

## NV3023A Datasheet

A-Si TFT LCD Single Chip Driver  
132RGBx162 Resolution and 262K color

Version 0.1  
Oct, 2019

|                                                                           |    |
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### **Introduction**

NV3023A is a 262,144-color one-chip SoC driver for a-TFT liquid crystal display with resolution of 132RGBx162 dots, comprising a 396-channel source driver, a 162-channel gate driver, 48,114 bytes GRAM for graphic data of 132RGBx162 dots, and power supply circuit.

The NV3023A supports 18-/16-/9-/8-bit data bus interface and serial peripheral interfaces (SPI). It also supplies 18-bit, 16-bit or 6-bit RGB interface for driving video signal directly from application controller. The moving picture area can be specified in internal GRAM by window address function. The specified window area can be updated selectively, so that moving picture can be displayed simultaneously independent of still picture area.

NV3023A can operate with 1.65V I/O interface voltage, and an incorporated voltage follower circuit to generate voltage levels for driving an LCD. The NV3023A also supports a function to display in 8 colors idle mode, allowing for precise power control by software. So these features make the NV3023A an ideal LCD driver for medium or small size portable products such as digital cellular phones, smart phone, MP3 and PMP, on which long battery life is a major concern.

### 1. Features

- ◆ Display resolution options
  - 120(RGB) (H) X 160 (V)
  - 128(RGB) (H) X 128 (V)
  - 128(RGB) (H) X 160 (V)
  - 130(RGB) (H) X 130 (V)
  - 132(RGB) (H) X 132(V)
  - 132(RGB) (H) X 162 (V)
- ◆ LCD Driver Output Circuits
  - 396 source outputs
  - 162 gate outputs
  - Common electrode output
- ◆ AM-LCD driver with on-chip full display RAM: 34,749 bytes
- ◆ System Interfaces
  - 8-bits, 9-bits, 16-bits, 18-bits interface with 8080-series MCU
  - 8-bits, 9-bits, 16-bits, 18-bits interface with 6800-series MCU
  - 6-bits, 16-bits, 18-bits RGB interface
  - 3-pin/4-pin serial interface
- ◆ Display color modes
  - Full color mode (idle mode off): 262K-colors
  - Reduced color modes (idle mode on): 8-colors
- ◆ On Chip Functions
  - VCOM generator and adjustment
  - Timing generator
  - Oscillator
  - DC/DC converter
  - Line/frame inversion
  - Factory default value (Maker ID, Version ID, Module ID, etc) are stored on the display module

- ◆ Low-Power Consumption
  - Low operating power supplies
    - IOVCC = 1.65V ~ 3.6 V (interface I/O)
    - VCI = 2.5V ~ 4.8 V (analog)
- ◆ LCD Voltage Drive
  - Source/VCOM power supply voltage
    - AVDD – VSS = 4.5V ~ 5.0V
    - VCL – VSS = -1.0V ~ -3.0V
    - VCI – VCL  $\leq$  5.0V
  - Gate driver output voltage
    - VGH – VSS = 10V ~ 16V
    - VGL – VSS = -6V ~ -12V
    - VGH – VGL  $\leq$  30V
  - VCOM driver output voltage
    - VCOMH = 3.1725V ~ 4.41V
    - VCOML = -0.36V ~ -1.8225V
- ◆ Operate Temperature Range: -30°C to 85°C

## 2. Pin Descriptions

| Pin Name            | I/O | Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
|---------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------|-----|-------|----------------|---|---|---|---|--------------------|---|---|---|---|---------------------|---|---|---|---|--------------------|---|---|---|---|---------------------|---|---|---|---|-------------------|---|---|---|---|------------------------------------------|
| Power Supply Pin    |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| IOVCC               | I   | Power supply for interface logic circuits (1.65 ~ 3.6V)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| VCI                 | I   | Power supply for analog circuit.<br>Could connect to external power supply (VCI=2.5~4.8V).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| VSSA                | I   | System Ground for Analog System and Booster Circuit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| VSS                 | I   | System Ground for I/O System and Digital System.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| Interface Logic Pin |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| P68                 | I   | 8080/6800 MCU Interface Mode Selection<br>P68 = ‘1’ : Select 6800-MCU parallel interface<br>P68 = ‘0’ : Select 8080-MCU parallel interface<br>Note: If not used, please fix this pin at VSS level.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| IM2<br>IM1<br>IM0   | I   | MCU Parallel interface bus and Serial interface select : <table><tr><th>IM2</th><th>IM1</th><th>IM0</th><th>SPI4W</th><th>Interface Type</th></tr><tr><td>1</td><td>0</td><td>0</td><td>X</td><td>MCU 8-bit Parallel</td></tr><tr><td>1</td><td>0</td><td>1</td><td>X</td><td>MCU 16-bit Parallel</td></tr><tr><td>1</td><td>1</td><td>0</td><td>X</td><td>MCU 9-bit Parallel</td></tr><tr><td>1</td><td>1</td><td>1</td><td>X</td><td>MCU 18-bit Parallel</td></tr><tr><td>0</td><td>X</td><td>X</td><td>1</td><td>SPI 4 Wire Serial</td></tr><tr><td>0</td><td>X</td><td>X</td><td>0</td><td>SPI 3 Wire Serial(or<br/>2 Data Line SPI)</td></tr></table> | IM2   | IM1                                      | IM0 | SPI4W | Interface Type | 1 | 0 | 0 | X | MCU 8-bit Parallel | 1 | 0 | 1 | X | MCU 16-bit Parallel | 1 | 1 | 0 | X | MCU 9-bit Parallel | 1 | 1 | 1 | X | MCU 18-bit Parallel | 0 | X | X | 1 | SPI 4 Wire Serial | 0 | X | X | 0 | SPI 3 Wire Serial(or<br>2 Data Line SPI) |
| IM2                 | IM1 | IM0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SPI4W | Interface Type                           |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| 1                   | 0   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X     | MCU 8-bit Parallel                       |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| 1                   | 0   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X     | MCU 16-bit Parallel                      |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| 1                   | 1   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X     | MCU 9-bit Parallel                       |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| 1                   | 1   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X     | MCU 18-bit Parallel                      |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| 0                   | X   | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1     | SPI 4 Wire Serial                        |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| 0                   | X   | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0     | SPI 3 Wire Serial(or<br>2 Data Line SPI) |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| SPI4W               |     | SPI4W=‘0’, 3-line SPI or 2 Data Line SPI Enable.<br>SPI4W=‘1’, 4-line SPI Enable.<br>If Not Used, Please fix this Pin at VSS Level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| RESX                | I   | Chip Reset Pin (“Low Active”)<br>Note: Keep this pin without glitch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| CSX                 | I   | Chip Select Pin (“Low Active”)<br>Pull down when chip accessible                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| DCX                 | I   | Reuse Pin according parallel and serial interface:<br>➤ MCU Interface: Distinguish Data (‘1’) or Command (‘0’).<br>➤ SPI Interface: Used as ‘SCL’ clock pin.<br>If not used, please connect this pin to VSS.                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| RDX                 | I   | ➤ 8080-parallel interface: used as ‘Read’ enable.<br>➤ 6800-parallel interface:<br>1. when WRX=‘0’ , RDX used as ‘write’ enable;<br>2. When WRX=‘1’ , RDX used as ‘Read’ enable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |
| WRX                 | I   | ➤ 8080-parallel interface, used as write enable.<br>➤ 6800-parallel interface, used to distinguish ‘write’ or ‘read’ operation.<br>➤ SPI 4-wire interface, used as D/CX.<br>➤ 2 Data Line SPI as RS;                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                          |     |       |                |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                    |   |   |   |   |                     |   |   |   |   |                   |   |   |   |   |                                          |

## NV3023A—132RGB x162 dot, 262k-color TFT LCD Single-Chip Driver

| Pin Name           | I/O | Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|--------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----|---------------------------------------|--------------|---|---|---|---------------------------------------|---|---|---|---------------------------------------|---|---|---|---------------------------------------|---|---|---|---------------------------------------|---|---|---|---------------------------------------|---|---|---|---------------------------------------|
| D[17:0]            | I/O | <div><div>➤ SPI without RGB interface : D[0] used as SDI/O, others don't care;</div><div>➤ SPI with RGB interface : D[17:0] used as data bus;</div><div>➤ MCU interface : D[17:0] used as data bus;</div></div> Note : When RGB interface enable , SPI should use 'SDA' pin as SDI/O                                                                                                                                                                                                                                                                                                                            |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TE                 | O   | Tearing effect output pin to synchronize MCU to frame writing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST12/SDA         | I/O | When RCM[1]='1',SDA is used for SPI write/read data line;<br>When RCM[0]='0',SDA is not used;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST1P             | I   | RCM[0], dont use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST2P             | I   | RCM[1], choose RGB interface, internal pull low.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST8/PCLK         | I   | RGB interface pixel clock signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST10/HS          | I   | RGB interface horizontal synchronization signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST11/VS          | I   | RGB interface vertical synchronization signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST9/DE           | I   | RGB interface data enable signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| OSC                | O   | OSC waveform output pin, for test purpose.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| Mode Selection Pin |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| GM2<br>GM1<br>GM0  | I   | Panel Resolution Selection Pins.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|                    |     | <table><tr><th>GM2</th><th>GM1</th><th>GM0</th><th>Descriptions</th></tr><tr><td>0</td><td>0</td><td>0</td><td>132RGBX162(S1~396 and G1~G162 output)</td></tr><tr><td>0</td><td>0</td><td>1</td><td>128RGBX128(S7~390 and G2~G129 output)</td></tr><tr><td>0</td><td>1</td><td>0</td><td>120RGBX160(S7~366 and G2~G161 output)</td></tr><tr><td>0</td><td>1</td><td>1</td><td>128RGBX160(S7~390 and G2~G161 output)</td></tr><tr><td>1</td><td>0</td><td>0</td><td>130RGBX130(S7~396 and G2~G131 output)</td></tr><tr><td>1</td><td>0</td><td>1</td><td>132RGBX132(S1~396 and G2~G133 output)</td></tr></table> | GM2                                   | GM1 | GM0                                   | Descriptions | 0 | 0 | 0 | 132RGBX162(S1~396 and G1~G162 output) | 0 | 0 | 1 | 128RGBX128(S7~390 and G2~G129 output) | 0 | 1 | 0 | 120RGBX160(S7~366 and G2~G161 output) | 0 | 1 | 1 | 128RGBX160(S7~390 and G2~G161 output) | 1 | 0 | 0 | 130RGBX130(S7~396 and G2~G131 output) | 1 | 0 | 1 | 132RGBX132(S1~396 and G2~G133 output) |
|                    |     | GM2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | GM1                                   | GM0 | Descriptions                          |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|                    |     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0                                     | 0   | 132RGBX162(S1~396 and G1~G162 output) |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|                    |     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0                                     | 1   | 128RGBX128(S7~390 and G2~G129 output) |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|                    |     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                                     | 0   | 120RGBX160(S7~366 and G2~G161 output) |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|                    |     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                                     | 1   | 128RGBX160(S7~390 and G2~G161 output) |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
|                    |     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0                                     | 0   | 130RGBX130(S7~396 and G2~G131 output) |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| 1                  | 0   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 132RGBX132(S1~396 and G2~G133 output) |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VPP                | I   | When writing NVM, it needs external power supply voltage (7.5V).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| Driver Output pins |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| S1~S396            | O   | Source driver output pins.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| G1~G162            | O   | Gate driver output pins.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VDD                | O   | Test pin for internal digital logic Power supply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| GVDD               | O   | A power supply for Grayscale Voltage Generator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| DDVDH              | O   | A power supply pin for source driver block that is generated from power block. Output of booster 1 circuit (output of 2-times output of VCI).                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VCL                | O   | A power supply pin for generating VCOML                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VGH                | O   | Power supply for Gate Driver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VGL                | O   | Negative power supply for Gate Driver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VCOMH              | O   | The high level of VCOM AC voltage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VCOML              | O   | The low level of VCOM AC voltage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| VCOM               | O   | TFT display common electrode power supply. Alternates between voltage levels between VCOMH-VCOML.<br>Registers set the alternating cycle for operating or halting VCOM.                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TEST_C<3:0>        | O   | Digital function test outputs, it is not accessible to user.must be open.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |
| TESTOP[8:1]        | O   | Analog function test outputs, it is not accessible to user.must be open.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                       |     |                                       |              |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |   |   |   |                                       |

### 3. Bump Arrangement and Coordination

#### 3.1. Bump Arrangement

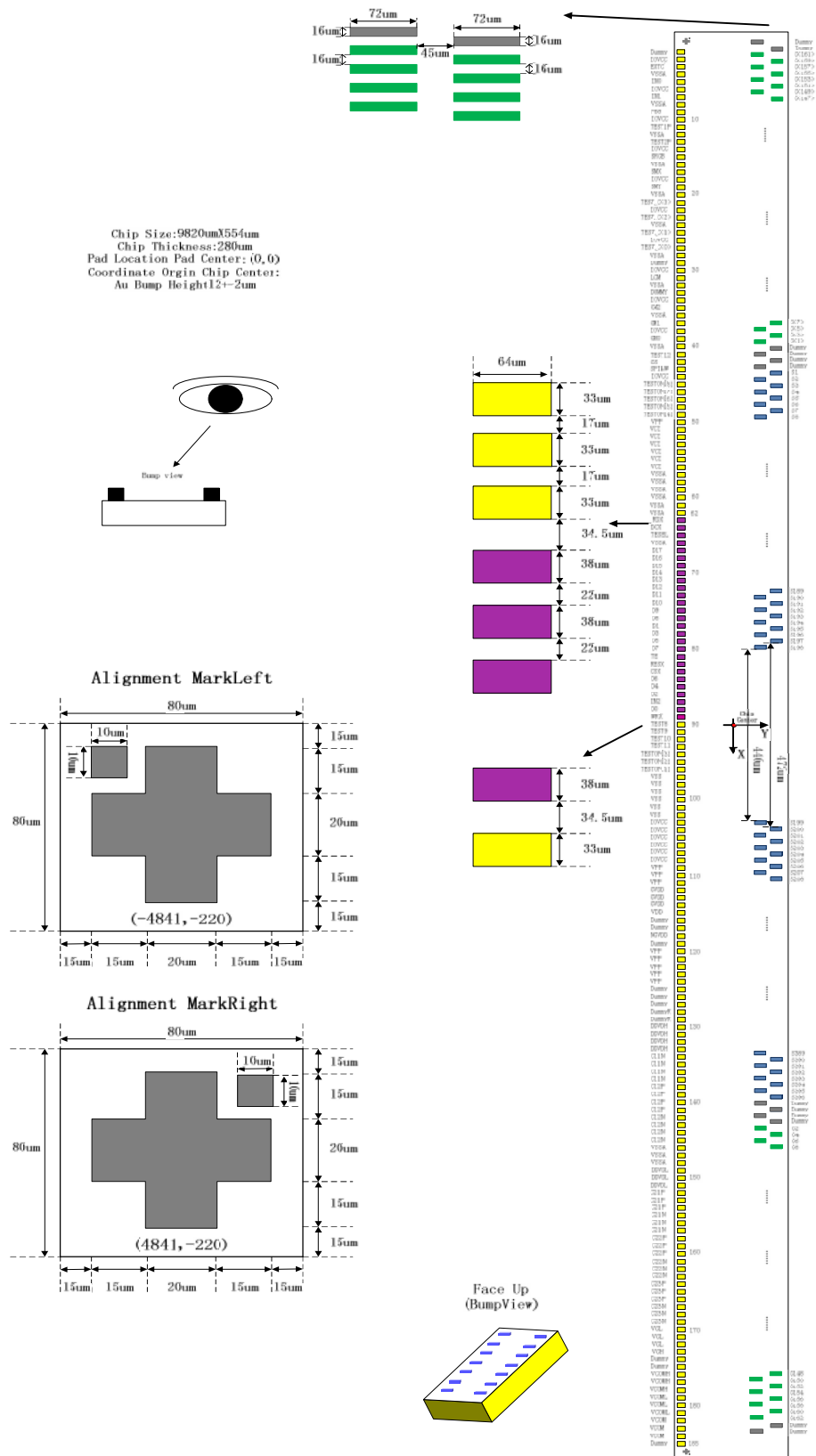


Figure 3-1 Pad Arrangement

### 3.2. Pin Connection

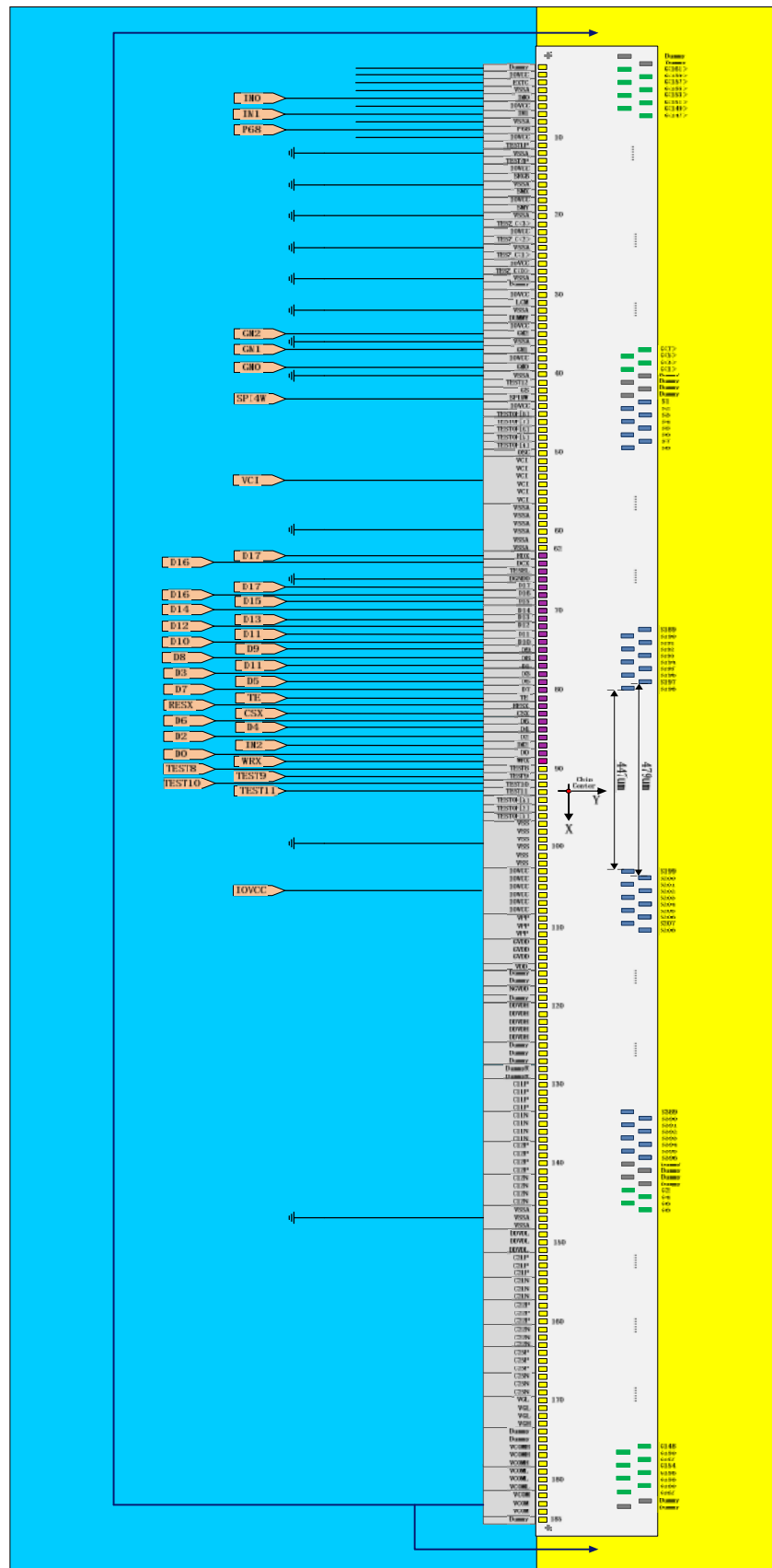


Figure 3-2 Pad Connection

| No. | PAD Name  | X     | Y    |
|-----|-----------|-------|------|
| 1   | DUMMY     | -4750 | -231 |
| 2   | IOVCC     | -4700 | -231 |
| 3   | EXTC      | -4650 | -231 |
| 4   | GND       | -4600 | -231 |
| 5   | IM0       | -4550 | -231 |
| 6   | IOVCC     | -4500 | -231 |
| 7   | IM1       | -4450 | -231 |
| 8   | GND       | -4400 | -231 |
| 9   | P68       | -4350 | -231 |
| 10  | IOVCC     | -4300 | -231 |
| 11  | RCM<0>    | -4250 | -231 |
| 12  | GND       | -4200 | -231 |
| 13  | RCM<1>    | -4150 | -231 |
| 14  | IOVCC     | -4100 | -231 |
| 15  | SRGB      | -4050 | -231 |
| 16  | GND       | -4000 | -231 |
| 17  | SMX       | -3950 | -231 |
| 18  | IOVCC     | -3900 | -231 |
| 19  | SMY       | -3850 | -231 |
| 20  | GND       | -3800 | -231 |
| 21  | TEST_C<3> | -3750 | -231 |
| 22  | IOVCC     | -3700 | -231 |
| 23  | TEST_C<2> | -3650 | -231 |
| 24  | GND       | -3600 | -231 |
| 25  | TEST_C<1> | -3550 | -231 |
| 26  | IOVCC     | -3500 | -231 |
| 27  | TEST_C<0> | -3450 | -231 |
| 28  | GND       | -3400 | -231 |
| 29  | DUMMY     | -3350 | -231 |
| 30  | IOVCC     | -3300 | -231 |
| 31  | LCM       | -3250 | -231 |
| 32  | GND       | -3200 | -231 |
| 33  | DUMMY     | -3150 | -231 |
| 34  | IOVCC     | -3100 | -231 |
| 35  | GM2       | -3050 | -231 |
| 36  | GND       | -3000 | -231 |
| 37  | GM1       | -2950 | -231 |
| 38  | IOVCC     | -2900 | -231 |
| 39  | GM0       | -2850 | -231 |
| 40  | GND       | -2800 | -231 |
| 41  | TEST12    | -2750 | -231 |
| 42  | GS        | -2700 | -231 |
| 43  | SPI4W     | -2650 | -231 |
| 44  | IOVCC     | -2600 | -231 |
| 45  | TESTOP[8] | -2550 | -231 |
| 46  | TESTOP[7] | -2500 | -231 |
| 47  | TESTOP[6] | -2450 | -231 |
| 48  | TESTOP[5] | -2400 | -231 |
| 49  | TESTOP[4] | -2350 | -231 |
| 50  | VPP       | -2300 | -231 |
| 51  | VCI       | -2250 | -231 |
| 52  | VCI       | -2200 | -231 |
| 53  | VCI       | -2150 | -231 |
| 54  | VCI       | -2100 | -231 |
| 55  | VCI       | -2050 | -231 |
| 56  | VCI       | -2000 | -231 |
| 57  | AGND      | -1950 | -231 |
| 58  | AGND      | -1900 | -231 |
| 59  | AGND      | -1850 | -231 |
| 60  | AGND      | -1800 | -231 |
| 61  | AGND      | -1750 | -231 |
| 62  | AGND      | -1700 | -231 |
| 63  | RDX       | -1630 | -231 |
| 64  | DCX       | -1570 | -231 |
| 65  | TESEL     | -1510 | -231 |
| 66  | GND       | -1450 | -231 |
| 67  | D17       | -1390 | -231 |
| 68  | D16       | -1330 | -231 |
| 69  | D15       | -1270 | -231 |
| 70  | D14       | -1210 | -231 |
| 71  | D13       | -1150 | -231 |

|     |           |       |      |
|-----|-----------|-------|------|
| 72  | D12       | -1090 | -231 |
| 73  | D11       | -1030 | -231 |
| 74  | D10       | -970  | -231 |
| 75  | D9        | -910  | -231 |
| 76  | D8        | -850  | -231 |
| 77  | D1        | -790  | -231 |
| 78  | D3        | -730  | -231 |
| 79  | D5        | -670  | -231 |
| 80  | D7        | -610  | -231 |
| 81  | TE        | -550  | -231 |
| 82  | RESX      | -490  | -231 |
| 83  | CSX       | -430  | -231 |
| 84  | D6        | -370  | -231 |
| 85  | D4        | -310  | -231 |
| 86  | D2        | -250  | -231 |
| 87  | IM2       | -190  | -231 |
| 88  | D0        | -130  | -231 |
| 89  | WRX       | -70   | -231 |
| 90  | TEST8     | 0     | -231 |
| 91  | TEST9     | 50    | -231 |
| 92  | TEST10    | 100   | -231 |
| 93  | TEST11    | 150   | -231 |
| 94  | TESTOP[3] | 200   | -231 |
| 95  | TESTOP[2] | 250   | -231 |
| 96  | TESTOP[1] | 300   | -231 |
| 97  | GND       | 350   | -231 |
| 98  | GND       | 400   | -231 |
| 99  | GND       | 450   | -231 |
| 100 | GND       | 500   | -231 |
| 101 | GND       | 550   | -231 |
| 102 | GND       | 600   | -231 |
| 103 | IOVCC     | 650   | -231 |
| 104 | IOVCC     | 700   | -231 |
| 105 | IOVCC     | 750   | -231 |
| 106 | IOVCC     | 800   | -231 |
| 107 | IOVCC     | 850   | -231 |
| 108 | IOVCC     | 900   | -231 |
| 109 | VPP       | 950   | -231 |
| 110 | VPP       | 1000  | -231 |
| 111 | VPP       | 1050  | -231 |
| 112 | DUMMY     | 1100  | -231 |
| 113 | DUMMY     | 1150  | -231 |
| 114 | DUMMY     | 1200  | -231 |
| 115 | VDD       | 1250  | -231 |
| 116 | DUMMY     | 1300  | -231 |
| 117 | DUMMY     | 1350  | -231 |
| 118 | DUMMY     | 1400  | -231 |
| 119 | DUMMY     | 1450  | -231 |
| 120 | VPP       | 1500  | -231 |
| 121 | VPP       | 1550  | -231 |
| 122 | VPP       | 1600  | -231 |
| 123 | VPP       | 1650  | -231 |
| 124 | VPP       | 1700  | -231 |
| 125 | DUMMY     | 1750  | -231 |
| 126 | DUMMY     | 1800  | -231 |
| 127 | DUMMY     | 1850  | -231 |
| 128 | DummyR    | 1900  | -231 |
| 129 | DummyR    | 1950  | -231 |
| 130 | C11P      | 2000  | -231 |
| 131 | C11P      | 2050  | -231 |
| 132 | C11P      | 2100  | -231 |
| 133 | C11P      | 2150  | -231 |
| 134 | C11N      | 2200  | -231 |
| 135 | C11N      | 2250  | -231 |
| 136 | C11N      | 2300  | -231 |
| 137 | C11N      | 2350  | -231 |
| 138 | C12P      | 2400  | -231 |
| 139 | C12P      | 2450  | -231 |
| 140 | C12P      | 2500  | -231 |
| 141 | C12P      | 2550  | -231 |
| 142 | DDVDHAC   | 2600  | -231 |
| 143 | DDVDHAC   | 2650  | -231 |

|     |         |      |       |
|-----|---------|------|-------|
| 144 | DDVDHAC | 2700 | -231  |
| 145 | DDVDHAC | 2750 | -231  |
| 146 | AGND    | 2800 | -231  |
| 147 | AGND    | 2850 | -231  |
| 148 | AGND    | 2900 | -231  |
| 149 | TVBG    | 2950 | -231  |
| 150 | TVBG    | 3000 | -231  |
| 151 | TVBG    | 3050 | -231  |
| 152 | T1UA    | 3100 | -231  |
| 153 | T1UA    | 3150 | -231  |
| 154 | T1UA    | 3200 | -231  |
| 155 | GVDD    | 3250 | -231  |
| 156 | GVDD    | 3300 | -231  |
| 157 | GVDD    | 3350 | -231  |
| 158 | C22P    | 3400 | -231  |
| 159 | C22P    | 3450 | -231  |
| 160 | C22P    | 3500 | -231  |
| 161 | C22N    | 3550 | -231  |
| 162 | C22N    | 3600 | -231  |
| 163 | C22N    | 3650 | -231  |
| 164 | DDVDL   | 3700 | -231  |
| 165 | DDVDL   | 3750 | -231  |
| 166 | DDVDL   | 3800 | -231  |
| 167 | VCL     | 3850 | -231  |
| 168 | VCL     | 3900 | -231  |
| 169 | VCL     | 3950 | -231  |
| 170 | VGL     | 4000 | -231  |
| 171 | VGL     | 4050 | -231  |
| 172 | VGL     | 4100 | -231  |
| 173 | VGH     | 4150 | -231  |
| 174 | DUMMY   | 4200 | -231  |
| 175 | DUMMY   | 4250 | -231  |
| 176 | VCOMH   | 4300 | -231  |
| 177 | VCOMH   | 4350 | -231  |
| 178 | VCOMH   | 4400 | -231  |
| 179 | VCOML   | 4450 | -231  |
| 180 | VCOML   | 4500 | -231  |
| 181 | VCOML   | 4550 | -231  |
| 182 | VCOM    | 4600 | -231  |
| 183 | VCOM    | 4650 | -231  |
| 184 | VCOM    | 4700 | -231  |
| 185 | DUMMY   | 4750 | -231  |
| 186 | DUMMY   | 4772 | 112.5 |
| 187 | DUMMY   | 4756 | 224.5 |
| 188 | G162    | 4740 | 112.5 |
| 189 | G160    | 4724 | 224.5 |
| 190 | G158    | 4708 | 112.5 |
| 191 | G156    | 4692 | 224.5 |
| 192 | G154    | 4676 | 112.5 |
| 193 | G152    | 4660 | 224.5 |
| 194 | G150    | 4644 | 112.5 |
| 195 | G148    | 4628 | 224.5 |
| 196 | G146    | 4612 | 112.5 |
| 197 | G144    | 4596 | 224.5 |
| 198 | G142    | 4580 | 112.5 |
| 199 | G140    | 4564 | 224.5 |
| 200 | G138    | 4548 | 112.5 |
| 201 | G136    | 4532 | 224.5 |
| 202 | G134    | 4516 | 112.5 |
| 203 | G132    | 4500 | 224.5 |
| 204 | G130    | 4484 | 112.5 |
| 205 | G128    | 4468 | 224.5 |
| 206 | G126    | 4452 | 112.5 |
| 207 | G124    | 4436 | 224.5 |
| 208 | G122    | 4420 | 112.5 |
| 209 | G120    | 4404 | 224.5 |
| 210 | G118    | 4388 | 112.5 |
| 211 | G116    | 4372 | 224.5 |
| 212 | G114    | 4356 | 112.5 |
| 213 | G112    | 4340 | 224.5 |
| 214 | G110    | 4324 | 112.5 |
| 215 | G108    | 4308 | 224.5 |

# NV3023A—132RGB x162 dot, 262k-color TFT LCD Single-Chip Driver

|     |       |      |       |
|-----|-------|------|-------|
| 216 | G106  | 4292 | 112.5 |
| 217 | G104  | 4276 | 224.5 |
| 218 | G102  | 4260 | 112.5 |
| 219 | G100  | 4244 | 224.5 |
| 220 | G98   | 4228 | 112.5 |
| 221 | G96   | 4212 | 224.5 |
| 222 | G94   | 4196 | 112.5 |
| 223 | G92   | 4180 | 224.5 |
| 224 | G90   | 4164 | 112.5 |
| 225 | G88   | 4148 | 224.5 |
| 226 | G86   | 4132 | 112.5 |
| 227 | G84   | 4116 | 224.5 |
| 228 | G82   | 4100 | 112.5 |
| 229 | G80   | 4084 | 224.5 |
| 230 | G78   | 4068 | 112.5 |
| 231 | G76   | 4052 | 224.5 |
| 232 | G74   | 4036 | 112.5 |
| 233 | G72   | 4020 | 224.5 |
| 234 | G70   | 4004 | 112.5 |
| 235 | G68   | 3988 | 224.5 |
| 236 | G66   | 3972 | 112.5 |
| 237 | G64   | 3956 | 224.5 |
| 238 | G62   | 3940 | 112.5 |
| 239 | G60   | 3924 | 224.5 |
| 240 | G58   | 3908 | 112.5 |
| 241 | G56   | 3892 | 224.5 |
| 242 | G54   | 3876 | 112.5 |
| 243 | G52   | 3860 | 224.5 |
| 244 | G50   | 3844 | 112.5 |
| 245 | G48   | 3828 | 224.5 |
| 246 | G46   | 3812 | 112.5 |
| 247 | G44   | 3796 | 224.5 |
| 248 | G42   | 3780 | 112.5 |
| 249 | G40   | 3764 | 224.5 |
| 250 | G38   | 3748 | 112.5 |
| 251 | G36   | 3732 | 224.5 |
| 252 | G34   | 3716 | 112.5 |
| 253 | G32   | 3700 | 224.5 |
| 254 | G30   | 3684 | 112.5 |
| 255 | G28   | 3668 | 224.5 |
| 256 | G26   | 3652 | 112.5 |
| 257 | G24   | 3636 | 224.5 |
| 258 | G22   | 3620 | 112.5 |
| 259 | G20   | 3604 | 224.5 |
| 260 | G18   | 3588 | 112.5 |
| 261 | G16   | 3572 | 224.5 |
| 262 | G14   | 3556 | 112.5 |
| 263 | G12   | 3540 | 224.5 |
| 264 | G10   | 3524 | 112.5 |
| 265 | G8    | 3508 | 224.5 |
| 266 | G6    | 3492 | 112.5 |
| 267 | G4    | 3476 | 224.5 |
| 268 | G2    | 3460 | 112.5 |
| 269 | DUMMY | 3444 | 224.5 |
| 270 | DUMMY | 3428 | 112.5 |
| 271 | DUMMY | 3412 | 224.5 |
| 272 | DUMMY | 3396 | 112.5 |
| 273 | S396  | 3380 | 224.5 |
| 274 | S395  | 3364 | 112.5 |
| 275 | S394  | 3348 | 224.5 |
| 276 | S393  | 3332 | 112.5 |
| 277 | S392  | 3316 | 224.5 |
| 278 | S391  | 3300 | 112.5 |
| 279 | S390  | 3284 | 224.5 |
| 280 | S389  | 3268 | 112.5 |
| 281 | S388  | 3252 | 224.5 |
| 282 | S387  | 3236 | 112.5 |
| 283 | S386  | 3220 | 224.5 |
| 284 | S385  | 3204 | 112.5 |
| 285 | S384  | 3188 | 224.5 |
| 286 | S383  | 3172 | 112.5 |
| 287 | S382  | 3156 | 224.5 |
| 288 | S381  | 3140 | 112.5 |
| 289 | S380  | 3124 | 224.5 |
| 290 | S379  | 3108 | 112.5 |
| 291 | S378  | 3092 | 224.5 |

|     |      |      |       |
|-----|------|------|-------|
| 292 | S377 | 3076 | 112.5 |
| 293 | S376 | 3060 | 224.5 |
| 294 | S375 | 3044 | 112.5 |
| 295 | S374 | 3028 | 224.5 |
| 296 | S373 | 3012 | 112.5 |
| 297 | S372 | 2996 | 224.5 |
| 298 | S371 | 2980 | 112.5 |
| 299 | S370 | 2964 | 224.5 |
| 300 | S369 | 2948 | 112.5 |
| 301 | S368 | 2932 | 224.5 |
| 302 | S367 | 2916 | 112.5 |
| 303 | S366 | 2900 | 224.5 |
| 304 | S365 | 2884 | 112.5 |
| 305 | S364 | 2868 | 224.5 |
| 306 | S363 | 2852 | 112.5 |
| 307 | S362 | 2836 | 224.5 |
| 308 | S361 | 2820 | 112.5 |
| 309 | S360 | 2804 | 224.5 |
| 310 | S359 | 2788 | 112.5 |
| 311 | S358 | 2772 | 224.5 |
| 312 | S357 | 2756 | 112.5 |
| 313 | S356 | 2740 | 224.5 |
| 314 | S355 | 2724 | 112.5 |
| 315 | S354 | 2708 | 224.5 |
| 316 | S353 | 2692 | 112.5 |
| 317 | S352 | 2676 | 224.5 |
| 318 | S351 | 2660 | 112.5 |
| 319 | S350 | 2644 | 224.5 |
| 320 | S349 | 2628 | 112.5 |
| 321 | S348 | 2612 | 224.5 |
| 322 | S347 | 2596 | 112.5 |
| 323 | S346 | 2580 | 224.5 |
| 324 | S345 | 2564 | 112.5 |
| 325 | S344 | 2548 | 224.5 |
| 326 | S343 | 2532 | 112.5 |
| 327 | S342 | 2516 | 224.5 |
| 328 | S341 | 2500 | 112.5 |
| 329 | S340 | 2484 | 224.5 |
| 330 | S339 | 2468 | 112.5 |
| 331 | S338 | 2452 | 224.5 |
| 332 | S337 | 2436 | 112.5 |
| 333 | S336 | 2420 | 224.5 |
| 334 | S335 | 2404 | 112.5 |
| 335 | S334 | 2388 | 224.5 |
| 336 | S333 | 2372 | 112.5 |
| 337 | S332 | 2356 | 224.5 |
| 338 | S331 | 2340 | 112.5 |
| 339 | S330 | 2324 | 224.5 |
| 340 | S329 | 2308 | 112.5 |
| 341 | S328 | 2292 | 224.5 |
| 342 | S327 | 2276 | 112.5 |
| 343 | S326 | 2260 | 224.5 |
| 344 | S325 | 2244 | 112.5 |
| 345 | S324 | 2228 | 224.5 |
| 346 | S323 | 2212 | 112.5 |
| 347 | S322 | 2196 | 224.5 |
| 348 | S321 | 2180 | 112.5 |
| 349 | S320 | 2164 | 224.5 |
| 350 | S319 | 2148 | 112.5 |
| 351 | S318 | 2132 | 224.5 |
| 352 | S317 | 2116 | 112.5 |
| 353 | S316 | 2100 | 224.5 |
| 354 | S315 | 2084 | 112.5 |
| 355 | S314 | 2068 | 224.5 |
| 356 | S313 | 2052 | 112.5 |
| 357 | S312 | 2036 | 224.5 |
| 358 | S311 | 2020 | 112.5 |
| 359 | S310 | 2004 | 224.5 |
| 360 | S309 | 1988 | 112.5 |
| 361 | S308 | 1972 | 224.5 |
| 362 | S307 | 1956 | 112.5 |
| 363 | S306 | 1940 | 224.5 |
| 364 | S305 | 1924 | 112.5 |
| 365 | S304 | 1908 | 224.5 |
| 366 | S303 | 1892 | 112.5 |
| 367 | S302 | 1876 | 224.5 |

|     |      |      |       |
|-----|------|------|-------|
| 368 | S301 | 1860 | 112.5 |
| 369 | S300 | 1844 | 224.5 |
| 370 | S299 | 1828 | 112.5 |
| 371 | S298 | 1812 | 224.5 |
| 372 | S297 | 1796 | 112.5 |
| 373 | S296 | 1780 | 224.5 |
| 374 | S295 | 1764 | 112.5 |
| 375 | S294 | 1748 | 224.5 |
| 376 | S293 | 1732 | 112.5 |
| 377 | S292 | 1716 | 224.5 |
| 378 | S291 | 1700 | 112.5 |
| 379 | S290 | 1684 | 224.5 |
| 380 | S289 | 1668 | 112.5 |
| 381 | S288 | 1652 | 224.5 |
| 382 | S287 | 1636 | 112.5 |
| 383 | S286 | 1620 | 224.5 |
| 384 | S285 | 1604 | 112.5 |
| 385 | S284 | 1588 | 224.5 |
| 386 | S283 | 1572 | 112.5 |
| 387 | S282 | 1556 | 224.5 |
| 388 | S281 | 1540 | 112.5 |
| 389 | S280 | 1524 | 224.5 |
| 390 | S279 | 1508 | 112.5 |
| 391 | S278 | 1492 | 224.5 |
| 392 | S277 | 1476 | 112.5 |
| 393 | S276 | 1460 | 224.5 |
| 394 | S275 | 1444 | 112.5 |
| 395 | S274 | 1428 | 224.5 |
| 396 | S273 | 1412 | 112.5 |
| 397 | S272 | 1396 | 224.5 |
| 398 | S271 | 1380 | 112.5 |
| 399 | S270 | 1364 | 224.5 |
| 400 | S269 | 1348 | 112.5 |
| 401 | S268 | 1332 | 224.5 |
| 402 | S267 | 1316 | 112.5 |
| 403 | S266 | 1300 | 224.5 |
| 404 | S265 | 1284 | 112.5 |
| 405 | S264 | 1268 | 224.5 |
| 406 | S263 | 1252 | 112.5 |
| 407 | S262 | 1236 | 224.5 |
| 408 | S261 | 1220 | 112.5 |
| 409 | S260 | 1204 | 224.5 |
| 410 | S259 | 1188 | 112.5 |
| 411 | S258 | 1172 | 224.5 |
| 412 | S257 | 1156 | 112.5 |
| 413 | S256 | 1140 | 224.5 |
| 414 | S255 | 1124 | 112.5 |
| 415 | S254 | 1108 | 224.5 |
| 416 | S253 | 1092 | 112.5 |
| 417 | S252 | 1076 | 224.5 |
| 418 | S251 | 1060 | 112.5 |
| 419 | S250 | 1044 | 224.5 |
| 420 | S249 | 1028 | 112.5 |
| 421 | S248 | 1012 | 224.5 |
| 422 | S247 | 996  | 112.5 |
| 423 | S246 | 980  | 224.5 |
| 424 | S245 | 964  | 112.5 |
| 425 | S244 | 948  | 224.5 |
| 426 | S243 | 932  | 112.5 |
| 427 | S242 | 916  | 224.5 |
| 428 | S241 | 900  | 112.5 |
| 429 | S240 | 884  | 224.5 |
| 430 | S239 | 868  | 112.5 |
| 431 | S238 | 852  | 224.5 |
| 432 | S237 | 836  | 112.5 |
| 433 | S236 | 820  | 224.5 |
| 434 | S235 | 804  | 112.5 |
| 435 | S234 | 788  | 224.5 |
| 436 | S233 | 772  | 112.5 |
| 437 | S232 | 756  | 224.5 |
| 438 | S231 | 740  | 112.5 |
| 439 | S230 | 724  | 224.5 |
| 440 | S229 | 708  | 112.5 |
| 441 | S228 | 692  | 224.5 |
| 442 | S227 | 676  | 112.5 |
| 443 | S226 | 660  | 224.5 |

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|     |      |      |       |
|-----|------|------|-------|
| 444 | S225 | 644  | 112.5 |
| 445 | S224 | 628  | 224.5 |
| 446 | S223 | 612  | 112.5 |
| 447 | S222 | 596  | 224.5 |
| 448 | S221 | 580  | 112.5 |
| 449 | S220 | 564  | 224.5 |
| 450 | S219 | 548  | 112.5 |
| 451 | S218 | 532  | 224.5 |
| 452 | S217 | 516  | 112.5 |
| 453 | S216 | 500  | 224.5 |
| 454 | S215 | 484  | 112.5 |
| 455 | S214 | 468  | 224.5 |
| 456 | S213 | 452  | 112.5 |
| 457 | S212 | 436  | 224.5 |
| 458 | S211 | 420  | 112.5 |
| 459 | S210 | 404  | 224.5 |
| 460 | S209 | 388  | 112.5 |
| 461 | S208 | 372  | 224.5 |
| 462 | S207 | 356  | 112.5 |
| 463 | S206 | 340  | 224.5 |
| 464 | S205 | 324  | 112.5 |
| 465 | S204 | 308  | 224.5 |
| 466 | S203 | 292  | 112.5 |
| 467 | S202 | 276  | 224.5 |
| 468 | S201 | 260  | 112.5 |
| 469 | S200 | 244  | 224.5 |
| 470 | S199 | 228  | 112.5 |
| 471 | S198 | -228 | 112.5 |
| 472 | S197 | -244 | 224.5 |
| 473 | S196 | -260 | 112.5 |
| 474 | S195 | -276 | 224.5 |
| 475 | S194 | -292 | 112.5 |
| 476 | S193 | -308 | 224.5 |
| 477 | S192 | -324 | 112.5 |
| 478 | S191 | -340 | 224.5 |
| 479 | S190 | -356 | 112.5 |
| 480 | S189 | -372 | 224.5 |
| 481 | S188 | -388 | 112.5 |
| 482 | S187 | -404 | 224.5 |
| 483 | S186 | -420 | 112.5 |
| 484 | S185 | -436 | 224.5 |
| 485 | S184 | -452 | 112.5 |
| 486 | S183 | -468 | 224.5 |
| 487 | S182 | -484 | 112.5 |
| 488 | S181 | -500 | 224.5 |
| 489 | S180 | -516 | 112.5 |
| 490 | S179 | -532 | 224.5 |
| 491 | S178 | -548 | 112.5 |
| 492 | S177 | -564 | 224.5 |
| 493 | S176 | -580 | 112.5 |
| 494 | S175 | -596 | 224.5 |
| 495 | S174 | -612 | 112.5 |
| 496 | S173 | -628 | 224.5 |
| 497 | S172 | -644 | 112.5 |
| 498 | S171 | -660 | 224.5 |
| 499 | S170 | -676 | 112.5 |
| 500 | S169 | -692 | 224.5 |
| 501 | S168 | -708 | 112.5 |
| 502 | S167 | -724 | 224.5 |
| 503 | S166 | -740 | 112.5 |
| 504 | S165 | -756 | 224.5 |
| 505 | S164 | -772 | 112.5 |
| 506 | S163 | -788 | 224.5 |
| 507 | S162 | -804 | 112.5 |
| 508 | S161 | -820 | 224.5 |
| 509 | S160 | -836 | 112.5 |
| 510 | S159 | -852 | 224.5 |
| 511 | S158 | -868 | 112.5 |
| 512 | S157 | -884 | 224.5 |
| 513 | S156 | -900 | 112.5 |
| 514 | S155 | -916 | 224.5 |
| 515 | S154 | -932 | 112.5 |
| 516 | S153 | -948 | 224.5 |
| 517 | S152 | -964 | 112.5 |
| 518 | S151 | -980 | 224.5 |
| 519 | S150 | -996 | 112.5 |

|     |      |       |       |
|-----|------|-------|-------|
| 520 | S149 | -1012 | 224.5 |
| 521 | S148 | -1028 | 112.5 |
| 522 | S147 | -1044 | 224.5 |
| 523 | S146 | -1060 | 112.5 |
| 524 | S145 | -1076 | 224.5 |
| 525 | S144 | -1092 | 112.5 |
| 526 | S143 | -1108 | 224.5 |
| 527 | S142 | -1124 | 112.5 |
| 528 | S141 | -1140 | 224.5 |
| 529 | S140 | -1156 | 112.5 |
| 530 | S139 | -1172 | 224.5 |
| 531 | S138 | -1188 | 112.5 |
| 532 | S137 | -1204 | 224.5 |
| 533 | S136 | -1220 | 112.5 |
| 534 | S135 | -1236 | 224.5 |
| 535 | S134 | -1252 | 112.5 |
| 536 | S133 | -1268 | 224.5 |
| 537 | S132 | -1284 | 112.5 |
| 538 | S131 | -1300 | 224.5 |
| 539 | S130 | -1316 | 112.5 |
| 540 | S129 | -1332 | 224.5 |
| 541 | S128 | -1348 | 112.5 |
| 542 | S127 | -1364 | 224.5 |
| 543 | S126 | -1380 | 112.5 |
| 544 | S125 | -1396 | 224.5 |
| 545 | S124 | -1412 | 112.5 |
| 546 | S123 | -1428 | 224.5 |
| 547 | S122 | -1444 | 112.5 |
| 548 | S121 | -1460 | 224.5 |
| 549 | S120 | -1476 | 112.5 |
| 550 | S119 | -1492 | 224.5 |
| 551 | S118 | -1508 | 112.5 |
| 552 | S117 | -1524 | 224.5 |
| 553 | S116 | -1540 | 112.5 |
| 554 | S115 | -1556 | 224.5 |
| 555 | S114 | -1572 | 112.5 |
| 556 | S113 | -1588 | 224.5 |
| 557 | S112 | -1604 | 112.5 |
| 558 | S111 | -1620 | 224.5 |
| 559 | S110 | -1636 | 112.5 |
| 560 | S109 | -1652 | 224.5 |
| 561 | S108 | -1668 | 112.5 |
| 562 | S107 | -1684 | 224.5 |
| 563 | S106 | -1700 | 112.5 |
| 564 | S105 | -1716 | 224.5 |
| 565 | S104 | -1732 | 112.5 |
| 566 | S103 | -1748 | 224.5 |
| 567 | S102 | -1764 | 112.5 |
| 568 | S101 | -1780 | 224.5 |
| 569 | S100 | -1796 | 112.5 |
| 570 | S99  | -1812 | 224.5 |
| 571 | S98  | -1828 | 112.5 |
| 572 | S97  | -1844 | 224.5 |
| 573 | S96  | -1860 | 112.5 |
| 574 | S95  | -1876 | 224.5 |
| 575 | S94  | -1892 | 112.5 |
| 576 | S93  | -1908 | 224.5 |
| 577 | S92  | -1924 | 112.5 |
| 578 | S91  | -1940 | 224.5 |
| 579 | S90  | -1956 | 112.5 |
| 580 | S89  | -1972 | 224.5 |
| 581 | S88  | -1988 | 112.5 |
| 582 | S87  | -2004 | 224.5 |
| 583 | S86  | -2020 | 112.5 |
| 584 | S85  | -2036 | 224.5 |
| 585 | S84  | -2052 | 112.5 |
| 586 | S83  | -2068 | 224.5 |
| 587 | S82  | -2084 | 112.5 |
| 588 | S81  | -2100 | 224.5 |
| 589 | S80  | -2116 | 112.5 |
| 590 | S79  | -2132 | 224.5 |
| 591 | S78  | -2148 | 112.5 |
| 592 | S77  | -2164 | 224.5 |
| 593 | S76  | -2180 | 112.5 |
| 594 | S75  | -2196 | 224.5 |
| 595 | S74  | -2212 | 112.5 |

|     |       |       |       |
|-----|-------|-------|-------|
| 596 | S73   | -2228 | 224.5 |
| 597 | S72   | -2244 | 112.5 |
| 598 | S71   | -2260 | 224.5 |
| 599 | S70   | -2276 | 112.5 |
| 600 | S69   | -2292 | 224.5 |
| 601 | S68   | -2308 | 112.5 |
| 602 | S67   | -2324 | 224.5 |
| 603 | S66   | -2340 | 112.5 |
| 604 | S65   | -2356 | 224.5 |
| 605 | S64   | -2372 | 112.5 |
| 606 | S63   | -2388 | 224.5 |
| 607 | S62   | -2404 | 112.5 |
| 608 | S61   | -2420 | 224.5 |
| 609 | S60   | -2436 | 112.5 |
| 610 | S59   | -2452 | 224.5 |
| 611 | S58   | -2468 | 112.5 |
| 612 | S57   | -2484 | 224.5 |
| 613 | S56   | -2500 | 112.5 |
| 614 | S55   | -2516 | 224.5 |
| 615 | S54   | -2532 | 112.5 |
| 616 | S53   | -2548 | 224.5 |
| 617 | S52   | -2564 | 112.5 |
| 618 | S51   | -2580 | 224.5 |
| 619 | S50   | -2596 | 112.5 |
| 620 | S49   | -2612 | 224.5 |
| 621 | S48   | -2628 | 112.5 |
| 622 | S47   | -2644 | 224.5 |
| 623 | S46   | -2660 | 112.5 |
| 624 | S45   | -2676 | 224.5 |
| 625 | S44   | -2692 | 112.5 |
| 626 | S43   | -2708 | 224.5 |
| 627 | S42   | -2724 | 112.5 |
| 628 | S41   | -2740 | 224.5 |
| 629 | S40   | -2756 | 112.5 |
| 630 | S39   | -2772 | 224.5 |
| 631 | S38   | -2788 | 112.5 |
| 632 | S37   | -2804 | 224.5 |
| 633 | S36   | -2820 | 112.5 |
| 634 | S35   | -2836 | 224.5 |
| 635 | S34   | -2852 | 112.5 |
| 636 | S33   | -2868 | 224.5 |
| 637 | S32   | -2884 | 112.5 |
| 638 | S31   | -2900 | 224.5 |
| 639 | S30   | -2916 | 112.5 |
| 640 | S29   | -2932 | 224.5 |
| 641 | S28   | -2948 | 112.5 |
| 642 | S27   | -2964 | 224.5 |
| 643 | S26   | -2980 | 112.5 |
| 644 | S25   | -2996 | 224.5 |
| 645 | S24   | -3012 | 112.5 |
| 646 | S23   | -3028 | 224.5 |
| 647 | S22   | -3044 | 112.5 |
| 648 | S21   | -3060 | 224.5 |
| 649 | S20   | -3076 | 112.5 |
| 650 | S19   | -3092 | 224.5 |
| 651 | S18   | -3108 | 112.5 |
| 652 | S17   | -3124 | 224.5 |
| 653 | S16   | -3140 | 112.5 |
| 654 | S15   | -3156 | 224.5 |
| 655 | S14   | -3172 | 112.5 |
| 656 | S13   | -3188 | 224.5 |
| 657 | S12   | -3204 | 112.5 |
| 658 | S11   | -3220 | 224.5 |
| 659 | S10   | -3236 | 112.5 |
| 660 | S9    | -3252 | 224.5 |
| 661 | S8    | -3268 | 112.5 |
| 662 | S7    | -3284 | 224.5 |
| 663 | S6    | -3300 | 112.5 |
| 664 | S5    | -3316 | 224.5 |
| 665 | S4    | -3332 | 112.5 |
| 666 | S3    | -3348 | 224.5 |
| 667 | S2    | -3364 | 112.5 |
| 668 | S1    | -3380 | 224.5 |
| 669 | DUMMY | -3396 | 112.5 |
| 670 | DUMMY | -3412 | 224.5 |
| 671 | DUMMY | -3428 | 112.5 |

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|     |       |       |       |
|-----|-------|-------|-------|
| 672 | DUMMY | -3444 | 224.5 |
| 673 | G1    | -3460 | 112.5 |
| 674 | G3    | -3476 | 224.5 |
| 675 | G5    | -3492 | 112.5 |
| 676 | G7    | -3508 | 224.5 |
| 677 | G9    | -3524 | 112.5 |
| 678 | G11   | -3540 | 224.5 |
| 679 | G13   | -3556 | 112.5 |
| 680 | G15   | -3572 | 224.5 |
| 681 | G17   | -3588 | 112.5 |
| 682 | G19   | -3604 | 224.5 |
| 683 | G21   | -3620 | 112.5 |
| 684 | G23   | -3636 | 224.5 |
| 685 | G25   | -3652 | 112.5 |
| 686 | G27   | -3668 | 224.5 |
| 687 | G29   | -3684 | 112.5 |
| 688 | G31   | -3700 | 224.5 |
| 689 | G33   | -3716 | 112.5 |
| 690 | G35   | -3732 | 224.5 |
| 691 | G37   | -3748 | 112.5 |
| 692 | G39   | -3764 | 224.5 |
| 693 | G41   | -3780 | 112.5 |
| 694 | G43   | -3796 | 224.5 |
| 695 | G45   | -3812 | 112.5 |
| 696 | G47   | -3828 | 224.5 |
| 697 | G49   | -3844 | 112.5 |
| 698 | G51   | -3860 | 224.5 |
| 699 | G53   | -3876 | 112.5 |
| 700 | G55   | -3892 | 224.5 |

|     |      |       |       |
|-----|------|-------|-------|
| 701 | G57  | -3908 | 112.5 |
| 702 | G59  | -3924 | 224.5 |
| 703 | G61  | -3940 | 112.5 |
| 704 | G63  | -3956 | 224.5 |
| 705 | G65  | -3972 | 112.5 |
| 706 | G67  | -3988 | 224.5 |
| 707 | G69  | -4004 | 112.5 |
| 708 | G71  | -4020 | 224.5 |
| 709 | G73  | -4036 | 112.5 |
| 710 | G75  | -4052 | 224.5 |
| 711 | G77  | -4068 | 112.5 |
| 712 | G79  | -4084 | 224.5 |
| 713 | G81  | -4100 | 112.5 |
| 714 | G83  | -4116 | 224.5 |
| 715 | G85  | -4132 | 112.5 |
| 716 | G87  | -4148 | 224.5 |
| 717 | G89  | -4164 | 112.5 |
| 718 | G91  | -4180 | 224.5 |
| 719 | G93  | -4196 | 112.5 |
| 720 | G95  | -4212 | 224.5 |
| 721 | G97  | -4228 | 112.5 |
| 722 | G99  | -4244 | 224.5 |
| 723 | G101 | -4260 | 112.5 |
| 724 | G103 | -4276 | 224.5 |
| 725 | G105 | -4292 | 112.5 |
| 726 | G107 | -4308 | 224.5 |
| 727 | G109 | -4324 | 112.5 |
| 728 | G111 | -4340 | 224.5 |
| 729 | G113 | -4356 | 112.5 |

|     |       |       |       |
|-----|-------|-------|-------|
| 730 | G115  | -4372 | 224.5 |
| 731 | G117  | -4388 | 112.5 |
| 732 | G119  | -4404 | 224.5 |
| 733 | G121  | -4420 | 112.5 |
| 734 | G123  | -4436 | 224.5 |
| 735 | G125  | -4452 | 112.5 |
| 736 | G127  | -4468 | 224.5 |
| 737 | G129  | -4484 | 112.5 |
| 738 | G131  | -4500 | 224.5 |
| 739 | G133  | -4516 | 112.5 |
| 740 | G135  | -4532 | 224.5 |
| 741 | G137  | -4548 | 112.5 |
| 742 | G139  | -4564 | 224.5 |
| 743 | G141  | -4580 | 112.5 |
| 744 | G143  | -4596 | 224.5 |
| 745 | G145  | -4612 | 112.5 |
| 746 | G147  | -4628 | 224.5 |
| 747 | G149  | -4644 | 112.5 |
| 748 | G151  | -4660 | 224.5 |
| 749 | G153  | -4676 | 112.5 |
| 750 | G155  | -4692 | 224.5 |
| 751 | G157  | -4708 | 112.5 |
| 752 | G159  | -4724 | 224.5 |
| 753 | G161  | -4740 | 112.5 |
| 754 | DUMMY | -4756 | 224.5 |
| 755 | DUMMY | -4772 | 112.5 |

## 4. Interface Description

### 4.1. Interface Type Selection

The selection of a given interfaces are done by setting P68, IM2, IM1, and IM0 pins as show in below tables.

Table 4-1 Interface Type Selection

| P68 | IM2 | IM1 | IM0 | Interface                | Read Back Selection                                                  |
|-----|-----|-----|-----|--------------------------|----------------------------------------------------------------------|
| X   | 0   | X   | X   | Serial interface         | Via the read instruction ( 8-bit , 24-bit and 32-bit read parameter) |
| 0   | 1   | 0   | 0   | 8080 MCU 8-bit Parallel  | RDX strobe ( 8-bit read data and 8-bit read parameter)               |
| 0   | 1   | 0   | 1   | 8080 MCU 16-bit Parallel | RDX strobe (16-bit read data and 8-bit read parameter)               |
| 0   | 1   | 1   | 0   | 8080 MCU 9-bit Parallel  | RDX strobe (9-bit read data and 8-bit read parameter)                |
| 0   | 1   | 1   | 1   | 8080 MCU 18-bit Parallel | RDX strobe (18-bit read data and 8-bit read parameter)               |
| 1   | 1   | 0   | 0   | 6800 MCU 8-bit Parallel  | RDX strobe (8-bit read data and 8-bit read parameter)                |
| 1   | 1   | 0   | 1   | 6800 MCU 16-bit Parallel | RDX strobe (9-bit read data and 8-bit read parameter)                |
| 1   | 1   | 1   | 0   | 6800 MCU 9-bit Parallel  | RDX strobe (16-bit read data and 8-bit read parameter)               |
| 1   | 1   | 1   | 1   | 6800 MCU 18-bit Parallel | RDX strobe (18-bit read data and 8-bit read parameter)               |

### 4.2. Serial Interface

The Module uses a 3-wire 9-bit serial interface or 4-pins/8-bit bi-directional interface for communication between the micro controller and the LCD driver chip. The 3-pins serial use: CSX (chip enable), SCL (serial clock) and SDA (serial data input/output) and the 4-pins serial use: CSX (chip enable), D/CX (data/ command select), SCL (serial clock), and SDA (serial data input/output).

Table 4-2 Serial Interface Type Selection

| IM2 | 4WSPI | Interface                                   | Read back selection                                                  |
|-----|-------|---------------------------------------------|----------------------------------------------------------------------|
| 0   | 0     | 3-Pins Serial Interface(or 2 Data Line SPI) | Via the read instruction ( 8-bit , 24-bit and 32-bit read parameter) |
| 0   | 1     | 4-Pins Serial Interface                     | Via the read instruction (8-bit , 24-bit and 32-bit read parameter)  |

### 4.2.1 Command/Data Write

The write mode of the interface means the micro controller writes commands and data to the LCD driver. 3-pins serial data packet contains a control bit D/CX and a transmission byte, but in 4-pins serial case, data packet contains just transmission byte and control bit D/CX is transferred by the D/CX pin. If D/CX is “low”, the transmission byte is interpreted as a command byte. If D/CX is “high”, the transmission byte is stored in the display data RAM (Memory write command), or command register as parameter.

Any instruction can be sent in any orders to the Driver. The MSB is transmitted first. The serial interface is initialized when CSX is high status. In this state, SCL clock pulse or SDA data have no effect. A falling edge on CSX enables the serial interface and indicated the start of data transmission.

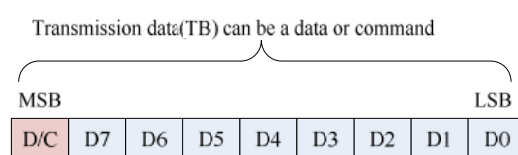


Figure 4-2-1-1 SPI 3-Wire Write Data Format

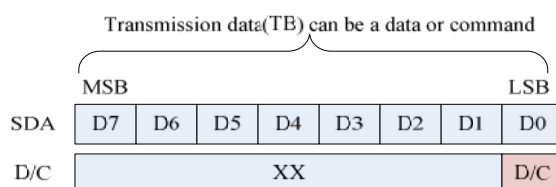


Figure 4-2-1-2 SPI 4-Wire Write Data Format

When CSX is “high”, SCL clock is ignored. At the falling edge of CSX, SCL can be high or low. SDA is sampled at the rising edge of SCL. D/CX indicates, whether the byte is command code (D/CX=’0’) or parameter/RAM data (D/CX=’1’). If CSX stays low after the last bit of command/data byte, the serial interface expects the D/CX bit (3-pin serial interface) or D7 (4-pins serial interface) of the next byte at the next rising edge of SCL.

## 4.2.2 Command/Data Read

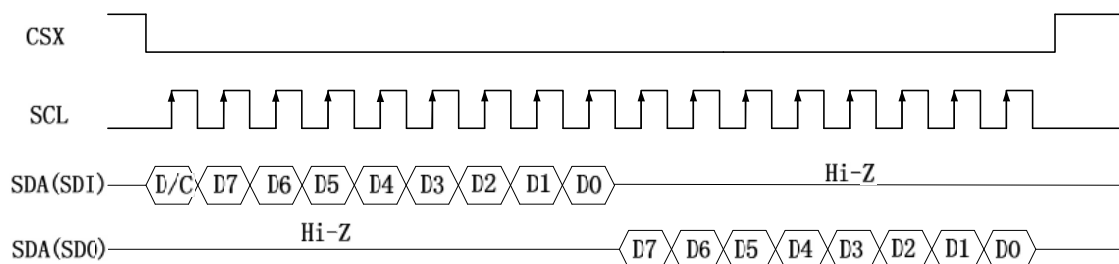


Figure 4-2-2-1 SPI 3-Wire 8-bit Read Operation  
(For 'DAH/DBH/DCH/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh' Command)

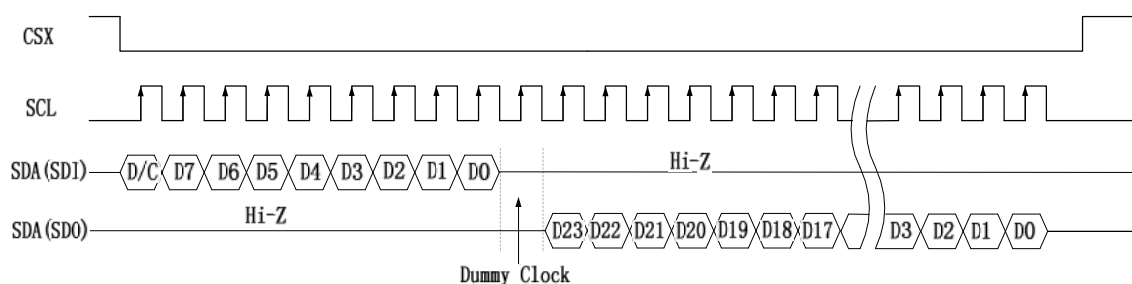


Figure 4-2-2-2 SPI 3-Wire 24-bit Read Operation  
(For '04H' Command with one dummy clock)

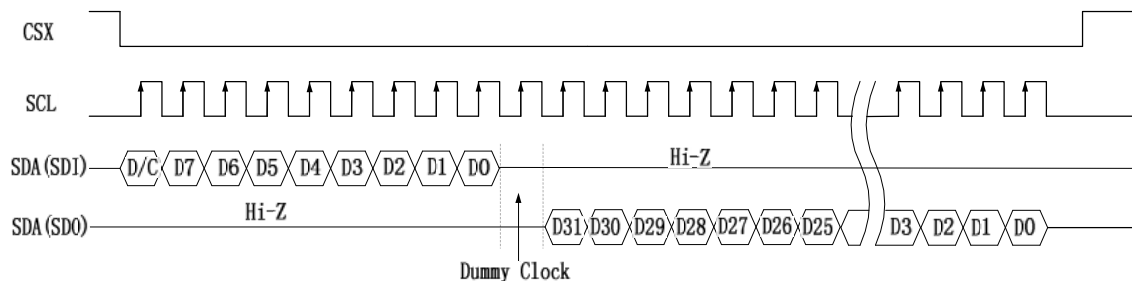


Figure 4-2-2-3 SPI 3-Wire 32-bit Read Operation  
(For '09H' Command with one dummy clock)

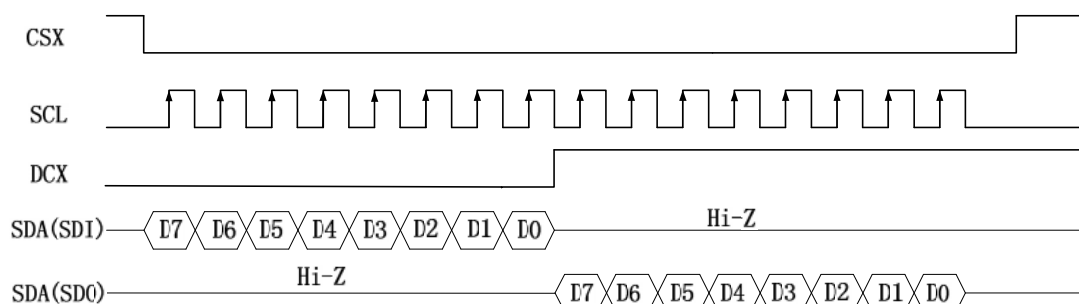


Figure 4-2-2-4 SPI 4-Wire 8-bit Read Operation  
(For 'DAH/DBH/DCH/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh' Command)

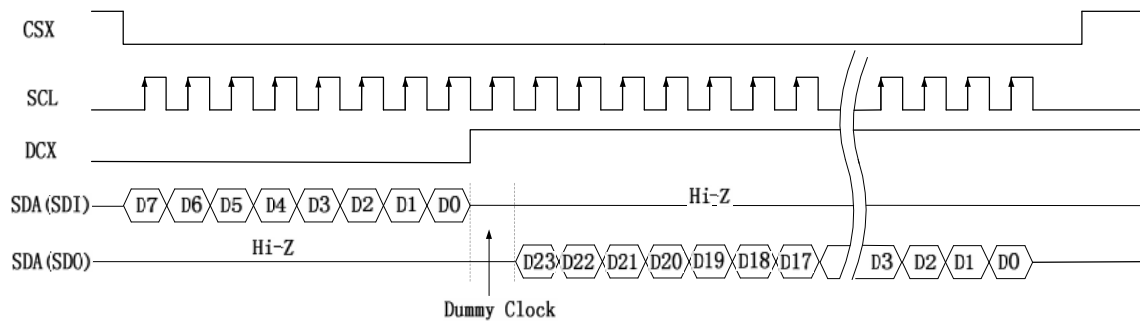


Figure 4-2-2-5 SPI 4-Wire 24-bit Read Operation  
(For '04H' Command with one dummy clock)

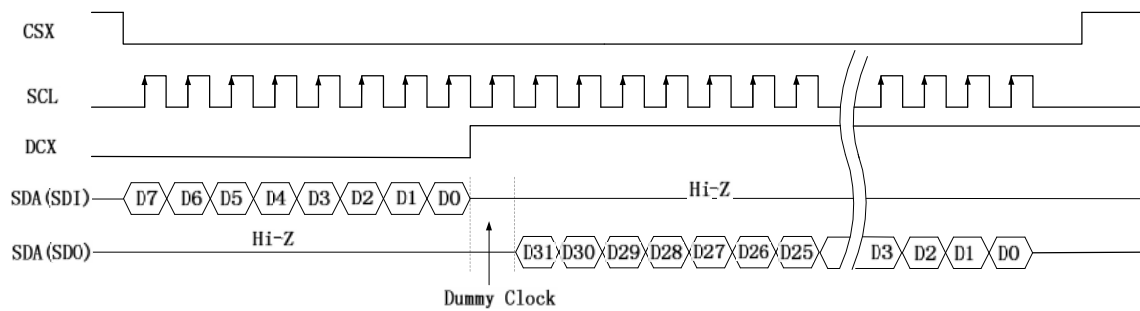


Figure 4-2-2-6 SPI 4-Wire 32-bit Read Operation  
(For '09H' Command with one dummy clock)

### 4.3. 8080-Series Parallel Interface (P68='0')

The MCU uses an 11-wires 8-data parallel interface or 12-wires 9-data parallel interface or 19-wires 16-data parallel interface or 21-wires 18-data parallel interface. The chip-select CSX (active low) enables and disables the parallel interface. RESX (active low) is an external reset signal. WRX is the parallel data write, RDX is the parallel data read and D[17:0] is parallel data.

The graphics controller chip reads the data at the rising edge of WRX signal. The D/CX is the data/command flag. When D/CX='1', D[17:0] bits are display RAM data or command parameters. When D/C='0', D[17:0] bits are commands.

The 8080-series bi-direction interface can be used for communication between the micro- controller and LCD driver chip. The selection of this interface is done when P68 pin is low state (VSS). Interface bus width can be selected with IM2, IM1 and IM0. The interface functions of 8080-series parallel interface are given in Table 4-3-1.

Table 4-3-1 8080 MCU Operation

| P68 | IM2 | IM1 | IM0 | Interface       | D/CX | RDX | WRX | Function                                     |
|-----|-----|-----|-----|-----------------|------|-----|-----|----------------------------------------------|
| 0   | 1   | 0   | 0   | 8-bit parallel  | L    | H   | R   | Write 8-bit command                          |
|     |     |     |     |                 | H    | H   | R   | Write 8-bit display data or 8-bit parameter  |
|     |     |     |     |                 | H    | R   | H   | Read 8-bit display data or 8-bit parameter   |
| 0   | 1   | 0   | 1   | 16-bit parallel | L    | H   | R   | Write 8-bit command                          |
|     |     |     |     |                 | H    | H   | R   | Write 16-bit display data or 8-bit parameter |
|     |     |     |     |                 | H    | R   | H   | Read 16-bit display data or 8-bit parameter  |
| 0   | 1   | 1   | 0   | 9-bit parallel  | L    | H   | R   | Write 8-bit command                          |
|     |     |     |     |                 | H    | H   | R   | Write 9-bit display data or 8-bit parameter  |
|     |     |     |     |                 | H    | R   | H   | Read 9-bit display data or 8-bit parameter   |
| 0   | 1   | 1   | 1   | 18-bit parallel | L    | H   | R   | Write 8-bit command                          |
|     |     |     |     |                 | H    | H   | R   | Write 18-bit display data or 8-bit parameter |
|     |     |     |     |                 | H    | R   | H   | Read 18-bit display data or 8-bit parameter  |

Note: Reading operation applied for command code: DAh, DBh, DCh, 04h, 09h, 0Ah, 0Bh, 0Ch, 0Dh, 0Eh, 0Fh

## 4.3.1. Write Cycle/Sequence

The write cycle means that the host writes information (command or/and data) to the display via the interface. Each write cycle (WRX high-low-high sequence) consists of 3 control (D/CX, RDX, WRX) and data signals (D[17...0]). D/CX bit is a control signal, which tells if the data is a command or a data. The data signals are a command if the control signal is low (= '0') and vice versa it is data (= '1'). The write cycle is described in the following figure.

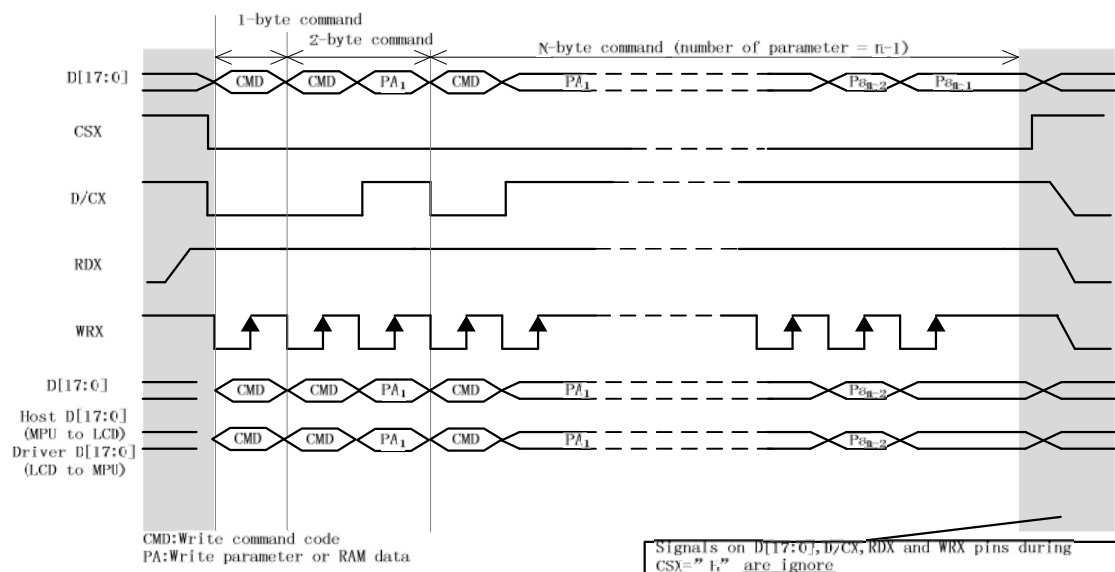


Figure 4-3-1 8080 MCU Write sequence

## 4.3.2. Read Cycle/Sequence

The read cycle (RDX high-low-high sequence) means that the host reads information from the display via interface. The display sends data (D[17:0]) to the host when there is a falling edge of RDX and the host reads data when there is a rising edge of RDX.

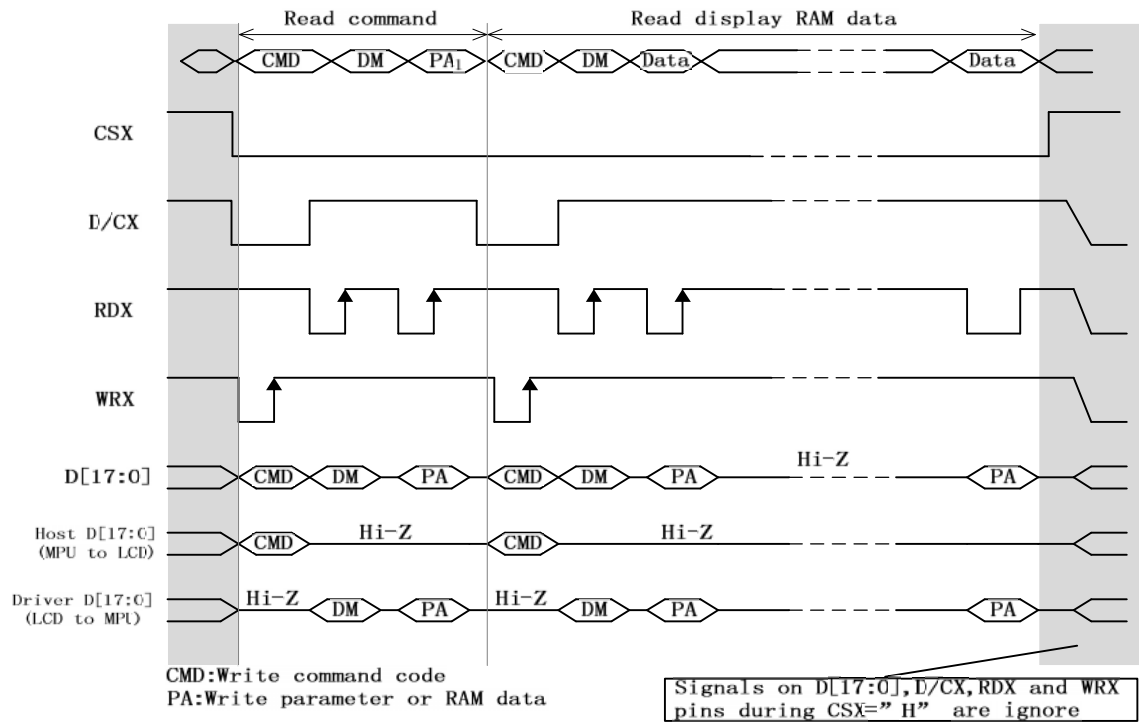


Figure 4-3-2 8080 Read sequence

#### 4.4. 6800-Series Parallel Interface (P68='1')

The MCU uses a 11-wires 8-data parallel interface or 12-wires 9-data parallel interface or 19-wires 16-data parallel interface or 21-wires 18-data parallel interface. The chip-select CSX (active low) enables and disables the parallel interface. RESX (active low) is an external reset signal. WRX is read/write flag, RDX is the parallel data read/write enable and D[17:0] is parallel data.

The Graphics Controller Chip reads the data at the falling edge of RDX signal when WRX = '1' and writes the data at the falling of the RDX signal when R/WX='0'. The D/CX is the data or command flag. When D/CX='1', D[17:0] bits are display RAM data or command parameters. When D/C='0', D[17:0] bits are commands.

The 6800-series bi-direction interface can be used for communication between the micro- controller and LCD driver chip. The selection of this interface is done when P68 pin is high state (IOVCC). Interface bus width can be selected with IM2, IM1 and IM0. The interface functions of 6800-series parallel interface are given in Table 4-4-1.

Table 4-4-1 6800 MCU Operation

| P68 | IM2 | IM1 | IM0 | Interface       | D/CX | WRX | RDX | Function                                     |
|-----|-----|-----|-----|-----------------|------|-----|-----|----------------------------------------------|
| 1   | 1   | 0   | 0   | 8-bit parallel  | L    | L   | F   | Write 8-bit command                          |
|     |     |     |     |                 | H    | L   | F   | Write 8-bit display data or 8-bit parameter  |
|     |     |     |     |                 | H    | H   | F   | Read 8-bit display data or 8-bit parameter   |
| 1   | 1   | 0   | 1   | 16-bit parallel | L    | L   | F   | Write 8-bit command                          |
|     |     |     |     |                 | H    | L   | F   | Write 16-bit display data or 8-bit parameter |
|     |     |     |     |                 | H    | H   | F   | Read 16-bit display data or 8-bit parameter  |
| 1   | 1   | 1   | 0   | 9-bit parallel  | L    | L   | F   | Write 8-bit command                          |
|     |     |     |     |                 | H    | L   | F   | Write 9-bit display data or 8-bit parameter  |
|     |     |     |     |                 | H    | H   | F   | Read 9-bit display data or 8-bit parameter   |
| 1   | 1   | 1   | 1   | 18-bit parallel | L    | L   | F   | Write 8-bit command                          |
|     |     |     |     |                 | H    | L   | F   | Write 18-bit display data or 8-bit parameter |
|     |     |     |     |                 | H    | H   | F   | Read 18-bit display data or 8-bit parameter  |

Note: Reading operation applied for command code: DAh, DBh, DCh, 04h, 09h, 0Ah, 0Bh, 0Ch, 0Dh, 0Eh, 0Fh

## 4.4.1. Write Cycle Sequence

The write cycle means that the host writes information (command or/and data) to the display via the interface. Each write cycle consists of 3 control (D/CX, RDX, WRX) and data signals (D[17:0]). D/CX bit is a control signal, which tells if the data is a command or a data. The data signals are a command if the control signal is low (D/CX= '0'), vice versa, it is data (D/CX= '1'). WRX work as write or read flag, WRX='0' stands for write operation, WRX='1' means read operation. The detail write cycle is described in the Figure 4-4-1.

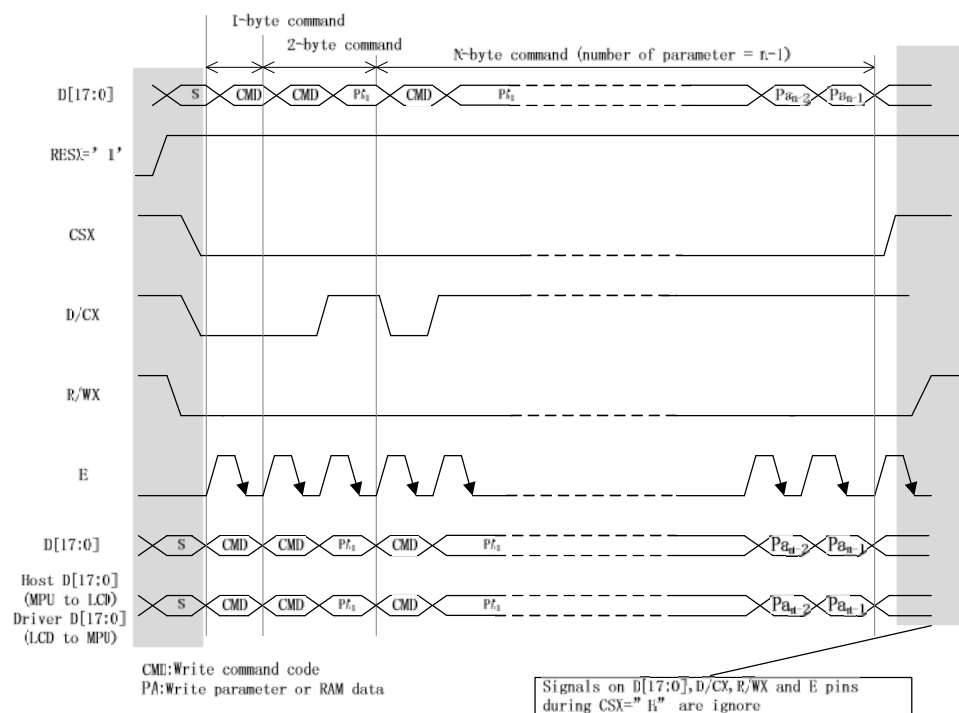


Figure 4-4-1 6800 Write Sequence

#### 4.4.2. Read Cycle Sequence

The read cycle means that the host reads information (command or/and data) to the display via the interface. Each read cycle consists of 3 control (D/CX, WRX, RDX) and data (D[17:0]). D/CX bit is control signal, which tells if the data is a command or a data. The data signals are the command if the control signal is low and vice versa it is data. WRX work as write or read flag, WRX='0' stands for write operation, WRX='1' means read operation. The detail read cycle is described in the figure Figure 4-4-2.

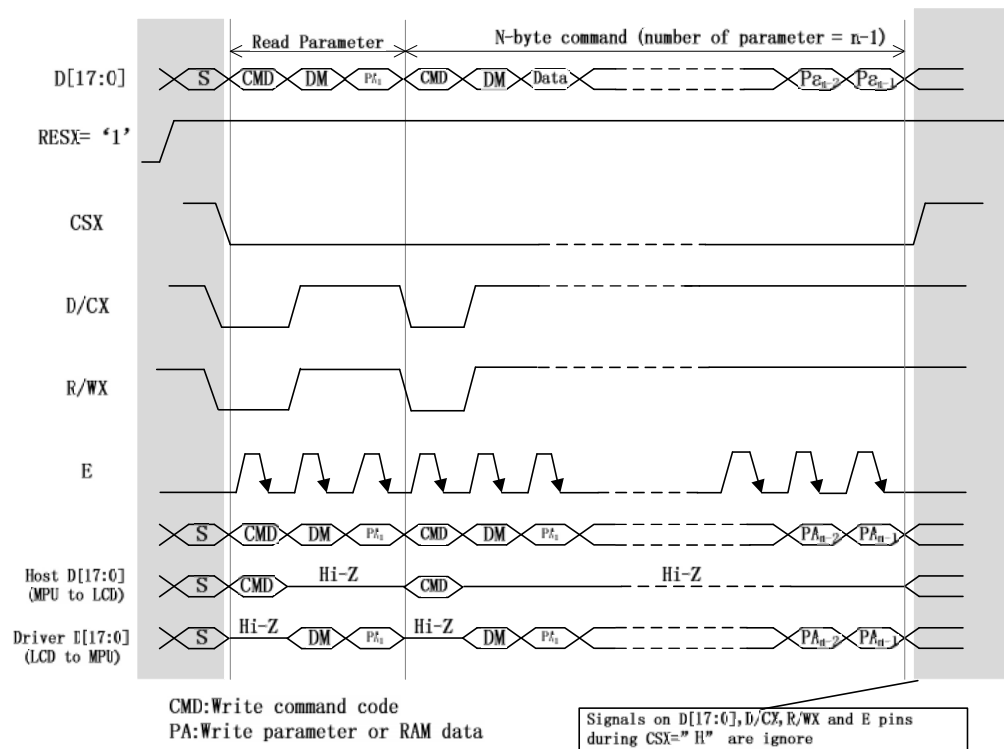


Figure 4-4-2 6800 Read Sequence

## 4.5. Serial Interface Recovery Function

If there is a break in data transmission by RESX pulse, while transferring a Command or Frame Memory Data or Multiple Parameter command Data, before Bit D0 of the byte has been completed, then Driver will reject the previous bits and should reset the interface that it will be ready to receive command data again when the chip select line (CSX) is next activated after RESX have been High state. See the following example.

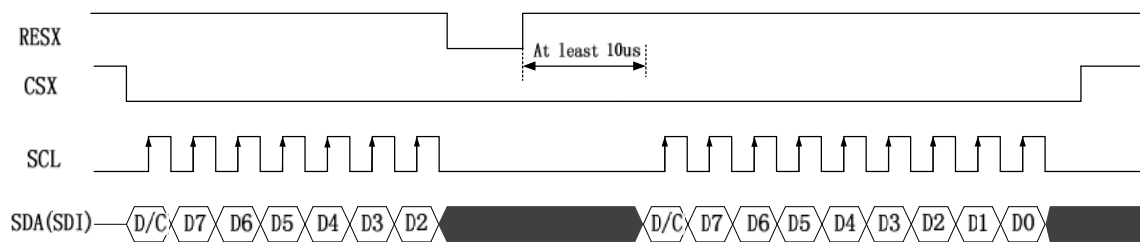


Figure 4-5-1 Serial interface recovery

If there is a break in data transmission by CSX pulse, while transferring a Command or Frame Memory Data or Multiple Parameter command Data, before Bit D0 of the byte has been completed, Then the Driver will reject the previous bits and should reset the interface such that it will be ready to receive the same byte re-transmitted when the chip select line (CSX) is next activated. See the following example.

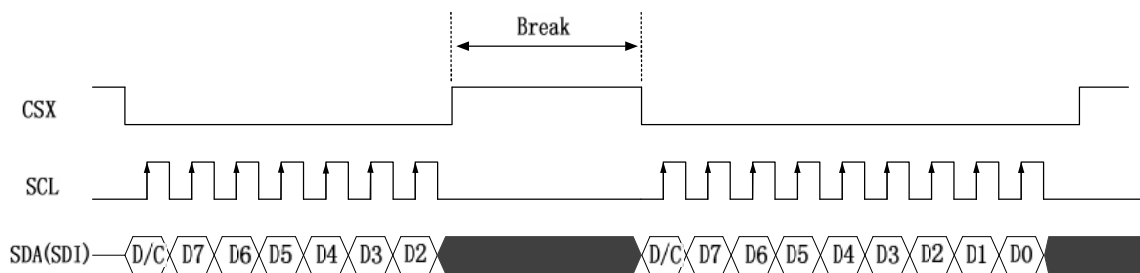


Figure 4-5-2 Serial interface recovery2

If 1, 2 or more parameter command is being sent and a break occurs while sending any parameter before the last one and if the host then sends a new command rather than re-transmitting the parameter that was interrupted, then the parameters that were successfully sent are stored and the parameter where the break occurred is rejected. The interface is ready to receive next byte as show below.

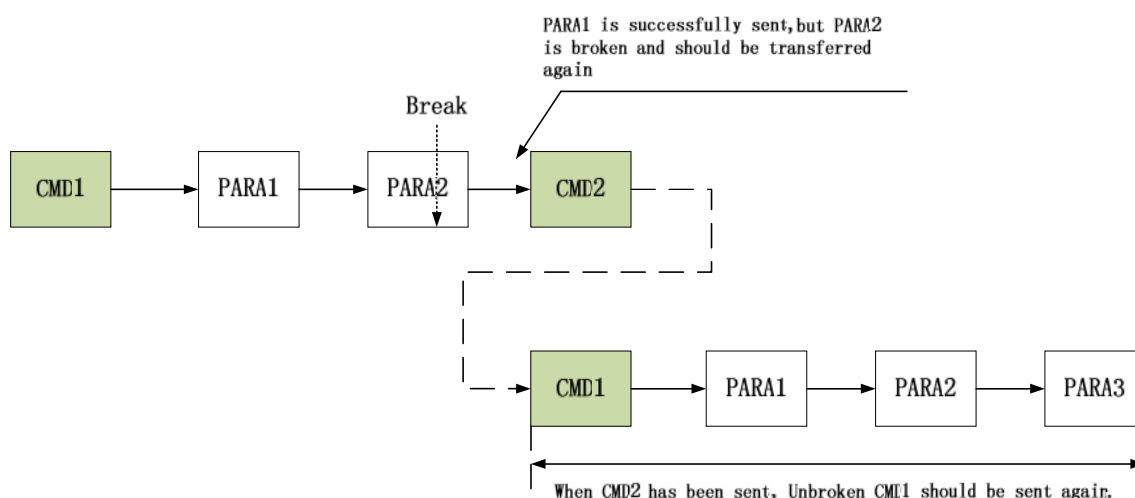


Figure 4-5-3 Serial interface recovery3

## 4.6. Display Data Transmission Pause

It will be possible when transferring a Command, Frame Memory Data or Multiple Parameter Data to invoke a pause in the data transmission. If the Chip Select Line is released after a whole byte of a Frame Memory Data or Multiple Parameter Data has been completed, then the Display Module will wait and continue the Frame Memory Data or Parameter Data Transmission from the point where it was paused. If the Chip Select Line is released after a whole byte of a command has been completed, then the Display Module will receive either the command's parameters (if appropriate) or a new command when the Chip Select Line is next enabled as shown below:

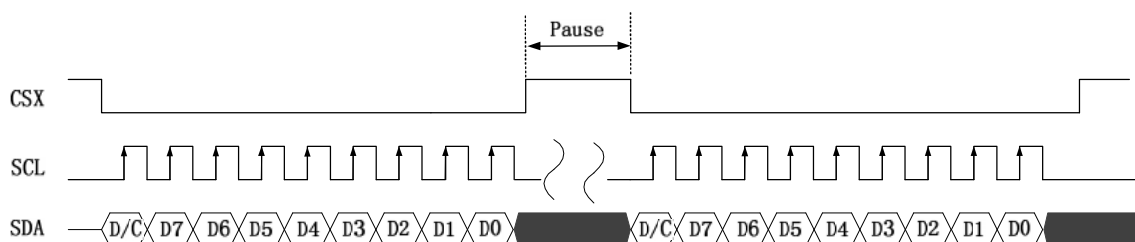


Figure 4-6 Serial interface recovery3

## 4.7. Display Data Transfer Mode

The data format is described for each interface. Data can be downloaded to the Frame Memory by 2 methods.

Method1:

The Image data is sent to the Frame Memory in successive Frame writes, each time the Frame Memory is filled, the Frame Memory pointer is reset to the start point and the next Frame is written.

|                      |                      |                      |                      |
|----------------------|----------------------|----------------------|----------------------|
| Start Frame<br>Write | Image Data<br>Frame1 | Image Data<br>Frame2 | Image Data<br>Frame3 |
|----------------------|----------------------|----------------------|----------------------|

Method2:

After image data is sent and at the end of each Frame Memory download, a command is sent to stop Frame Memory Write. Then Start Memory Write command is sent, and a new Frame is downloading.

|                      |                      |             |                      |                      |             |       |             |
|----------------------|----------------------|-------------|----------------------|----------------------|-------------|-------|-------------|
| Start Frame<br>Write | Image Data<br>Frame1 | Any Command | Start Frame<br>Write | Image Data<br>Frame2 | Any Command | · · · | Any Command |
|----------------------|----------------------|-------------|----------------------|----------------------|-------------|-------|-------------|

## 4.8. RGB Interface

### 4.8.1. RGB Interface Selection

The RGB interface mode is available for NV3023A and the interface is selected by setting the VIPF[3:0] bits as following table.

Table 4-8-1 RGB Interface Selection

| VIPF[3:0] |   |   |   | RGB Interface        | Data Bus         |
|-----------|---|---|---|----------------------|------------------|
| 0         | 1 | 1 | 0 | 18-bit RGB interface | D[17:0]          |
| 0         | 1 | 0 | 1 | 16-bit RGB interface | D[17:13],D[11:1] |
| 1         | 1 | 1 | 0 | 6-bit RGB interface  | D[7:2]           |
| Others    |   |   |   | Setting prohibited   |                  |

The display operation via RGB interface is synchronized with the VS, HS and PCLK signals. The RGB interface transfers the updated data to GRAM and the update area is defined by the window address function. The back porch and back porch are used to set the RGB interface timing.

- ◆ 18-bit data bus interface (D[17:0] is used) , VIPF[3:0] = 0110

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| D17  | D16  | D15  | D14  | D13  | D12  | D11  | D10  | D9   | D8   | D7   | D6   | D5   | D4   | D3   | D2   | D1   | D0   |
| R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |

- ◆ 16-bit data bus interface (D[17:13] and D[11:1] are used) , VIPF[3:0] = 0101

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| D17  | D16  | D15  | D14  | D13  | D11  | D10  | D9   | D8   | D7   | D6   | D5   | D4   | D3   | D2   | D1   |
| R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |

- ◆ 6-bit data bus interface (D[7:2] is used) , VIPF[3] = 1110

| First Transmission |      |      |      |      |      | Second Transmission |      |      |      |      |      | Third Transmission |      |      |      |      |      |
|--------------------|------|------|------|------|------|---------------------|------|------|------|------|------|--------------------|------|------|------|------|------|
| D7                 | D6   | D5   | D4   | D3   | D2   | D7                  | D6   | D5   | D4   | D3   | D2   | D7                 | D6   | D5   | D4   | D3   | D2   |
| R[5]               | R[4] | R[3] | R[2] | R[1] | R[0] | G[5]                | G[4] | G[3] | G[2] | G[1] | G[0] | B[5]               | B[4] | B[3] | B[2] | B[1] | B[0] |

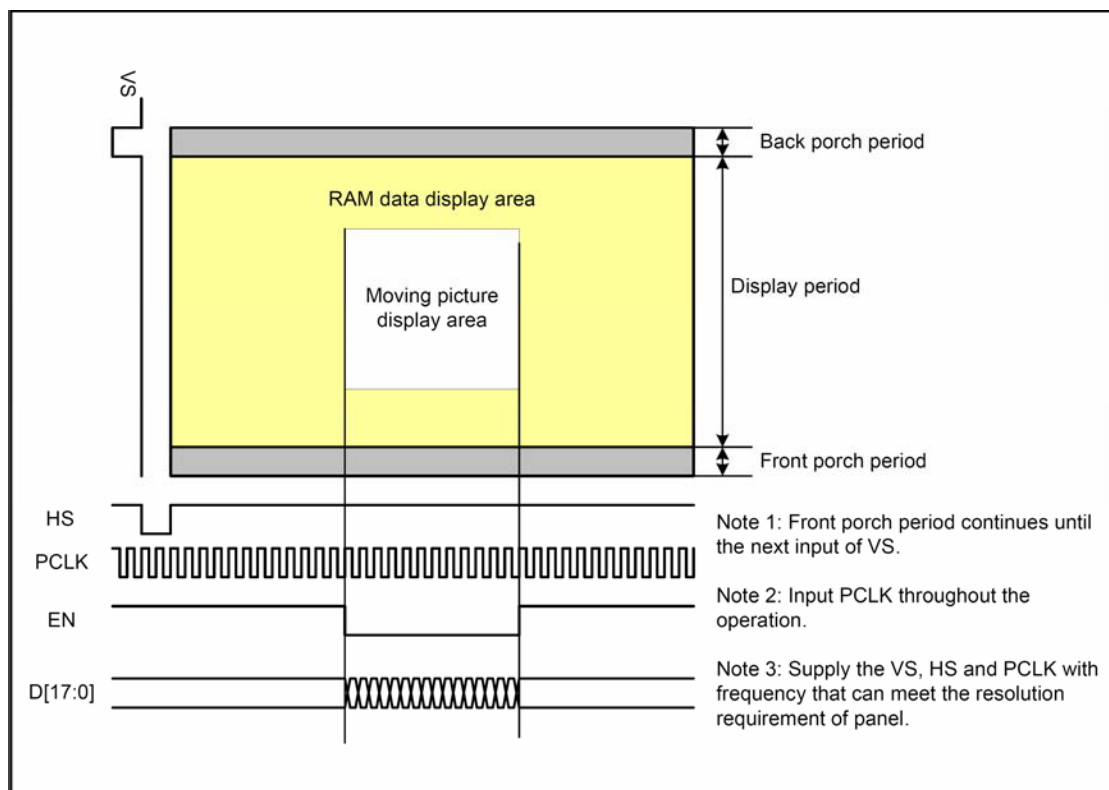
Pixel clock (PCLK) is running all the time without stopping and it is used to entering VS, HS, EN and D[17:0] states when there is a rising edge of the PCLK. The PCLK can not be used as continues internal clock for other functions of the display module.

Vertical synchronization (VS) is used to tell when there is received a new

frame of the display. This is high enable and its state is read to the display module by a rising edge of the PCLK signal.

Horizontal synchronization (HS) is used to tell when there is received a new line of the frame. This is low enable and its state is read to the display module by a rising edge of the PCLK signal.

Data Enable (DE) is used to tell when there is received RGB information that should be transferred on the display. This is a high enable and its state is read to the display module by a rising edge of the PCLK signal. D[17:0] are used to tell what is the information of the image that is transferred on the display (When EN= '1' and there is a rising edge of PCLK). D[17:0] can be '0' (low) or '1' (high). These lines are read by a rising edge of the PCLK signal.



#### 4.8.2. RGB Interface Timing

The timing chart of Signals in 18-/16-bit RGB interface mode is shown as below:

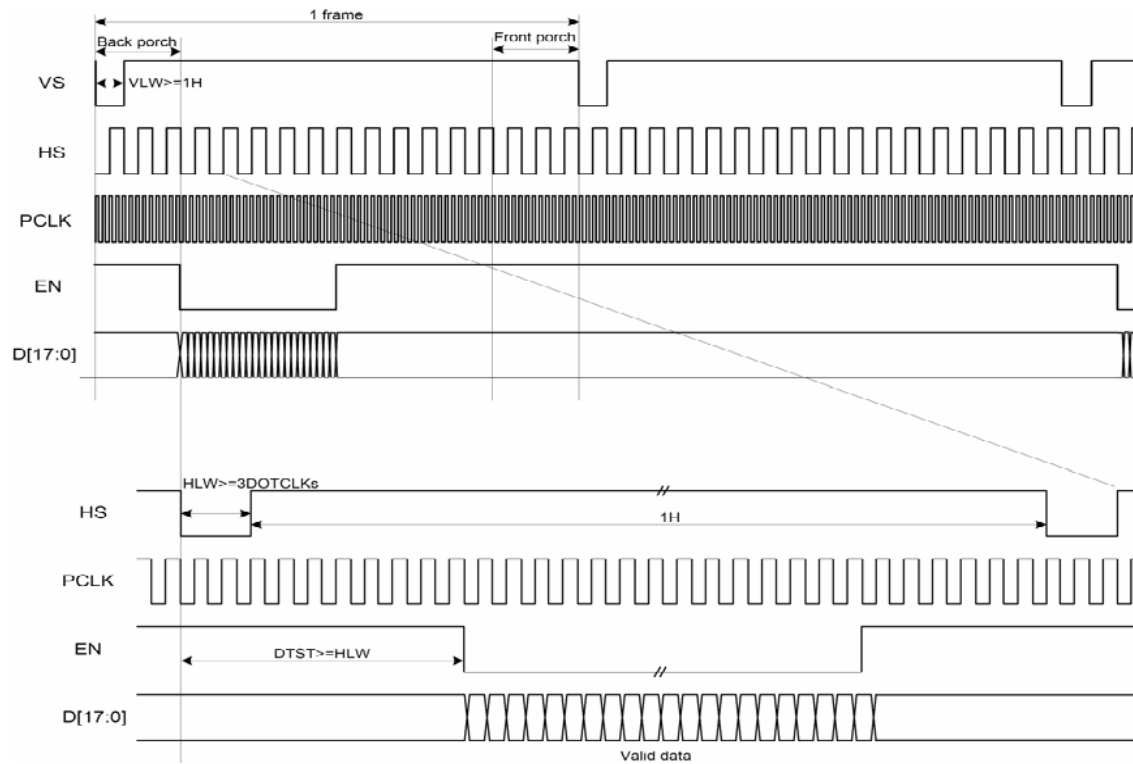


Figure 4-8-2-1 Timing Chart of Signals in 18-/16-bit RGB Interface Mode

The timing chart of 6-bit RGB interface mode is shown as below:

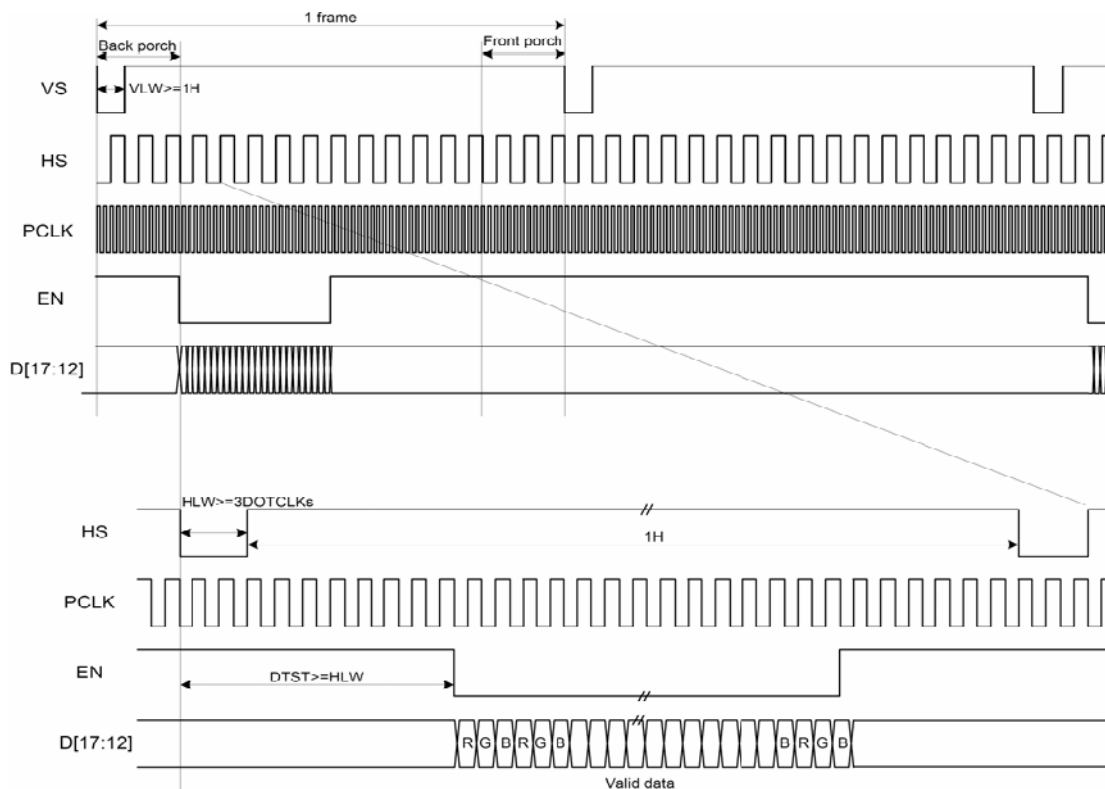


Figure 4-8-2-2 Timing Chart of Signals in 6-bit RGB Interface Mode

Note 1: In 6-bit RGB interface mode, each dot of one pixel (R, G and B) is transferred in synchronization with PCLK.

Note 2: In 6-bit RGB interface mode, set the cycles of VS, HS and EN to 3 multiples of PCLK.

### 4.8.3 RGB Interface Mode Selection

NV3023A supplies a RGB interface with DE mode and can be selected by pull high external “RCM” pad.

When use RGB interface, writing data to frame memory is done by “PCLK” and Video Data Bus. So, controller (host) needn’t always transfer PCLK, VS, HS and DE signals to driver.

## 4.9. Display Data Color Coding

### 4.9.1. Serial Interface

Different display data formats are available for three colors depth supported by the LCM listed below.

- ◆ 4k colors, RGB 4-4-4-bits input
- ◆ 65K colors, RGB 5-6-5-bits input
- ◆ 262K colors, RGB 6-6-6-bits input

Data format and Reconstruct ways are shown as follow figures:

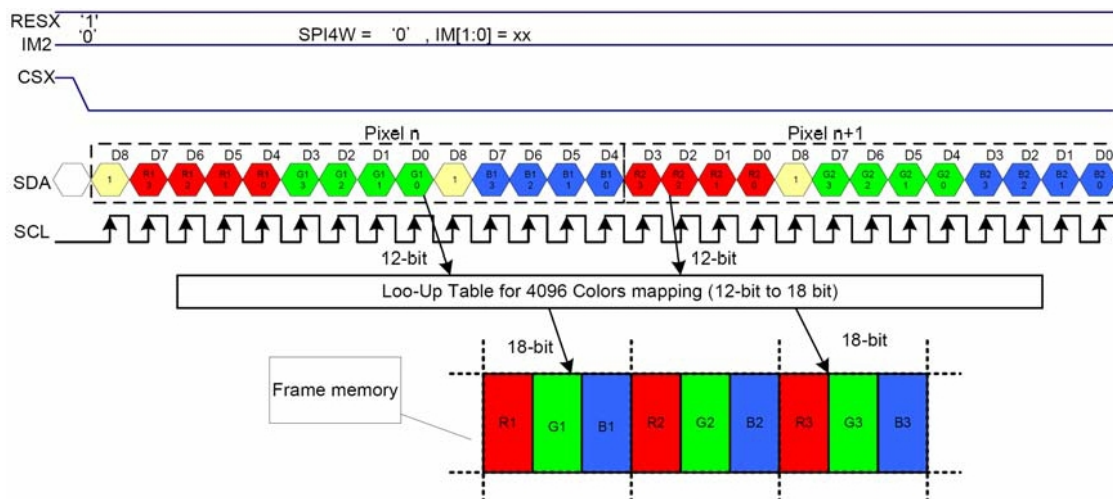


Figure 4-9-1-1 SPI 3-Wire 9-bit RGB4-4-4 Write Data Format

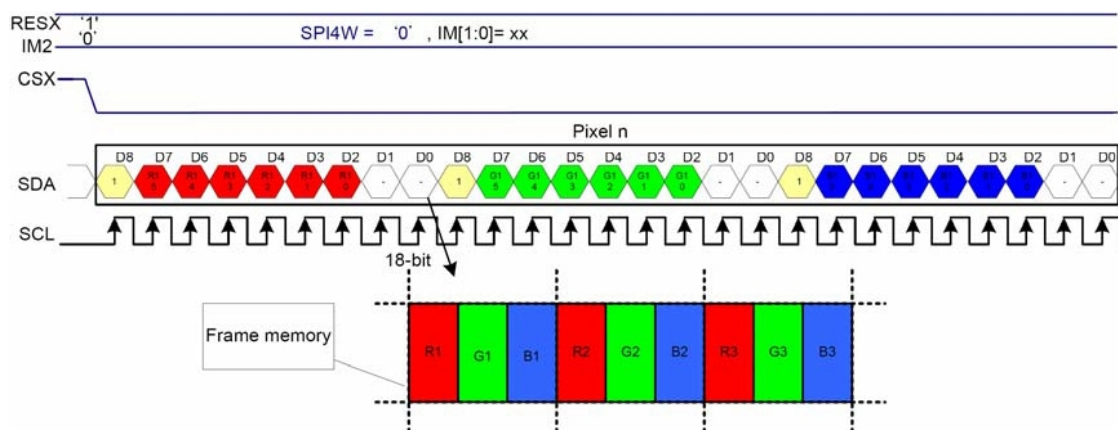


Figure 4-9-1-2 SPI 3-Wire 9-bit RGB6-6-6 Write Data Format

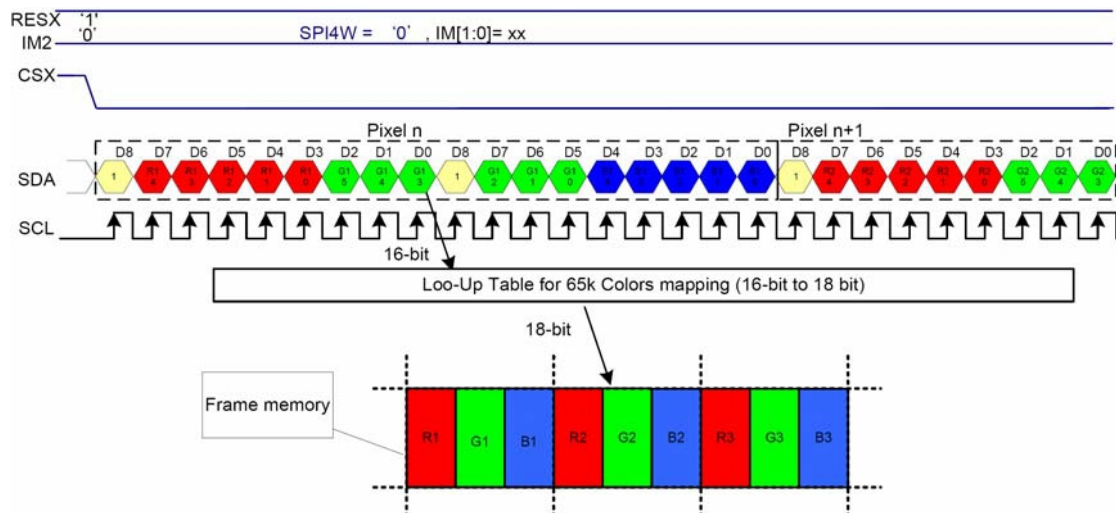


Figure 4-9-1-3 SPI 3-Wire 9-bit RGB5-6-5 Write Data Format

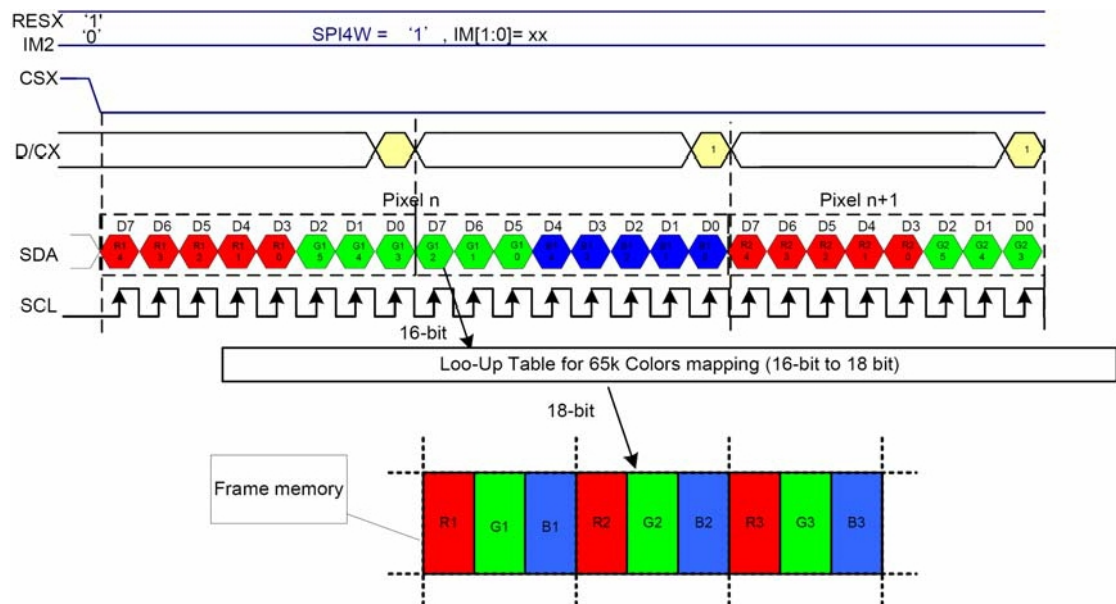


Figure 4-9-1-4 SPI 4-Wire 8-bit RGB5-6-5 Write Data Format

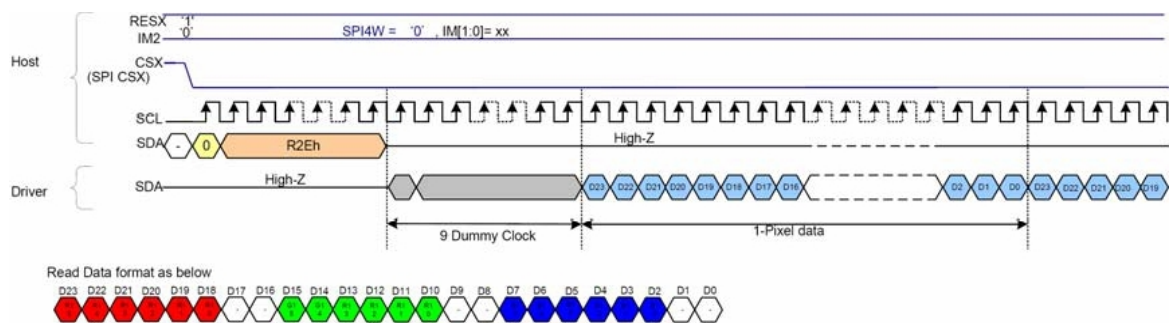


Figure 4-9-1-5 SPI 3-Wire Read Data Format

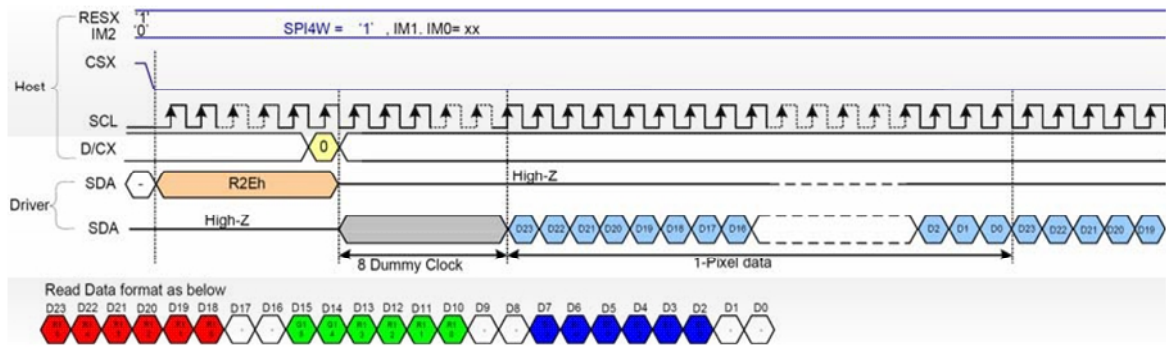


Figure 4-9-1-6 SPI 4-Wire Read Data Format

## 4.9.2. Parallel 8-bit Interface ( IM="100" )

Different display data formats are available for three colors depth supported by the LCM listed below.

- ◆ 4k colors, RGB 4-4-4-bits input
- ◆ 65K colors, RGB 5-6-5-bits input
- ◆ 262K colors, RGB 6-6-6-bits input

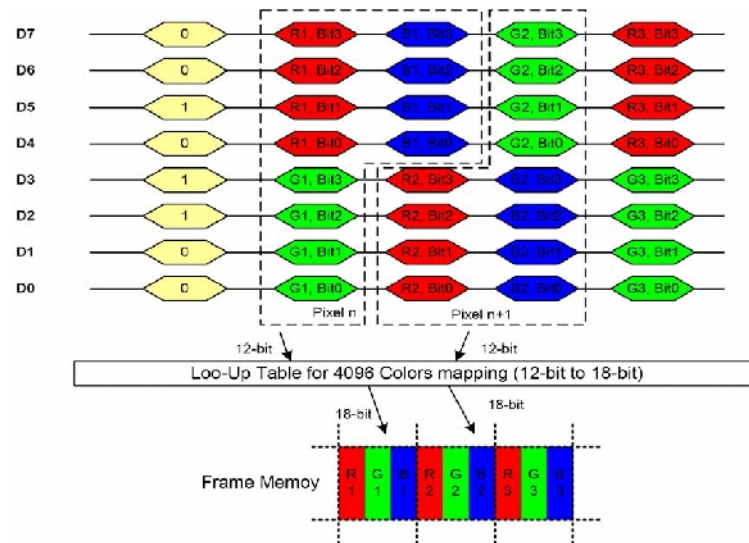


Figure 4-9-2-1 Two pixel (RGB4-4-4) in each three 8-bit write data packets

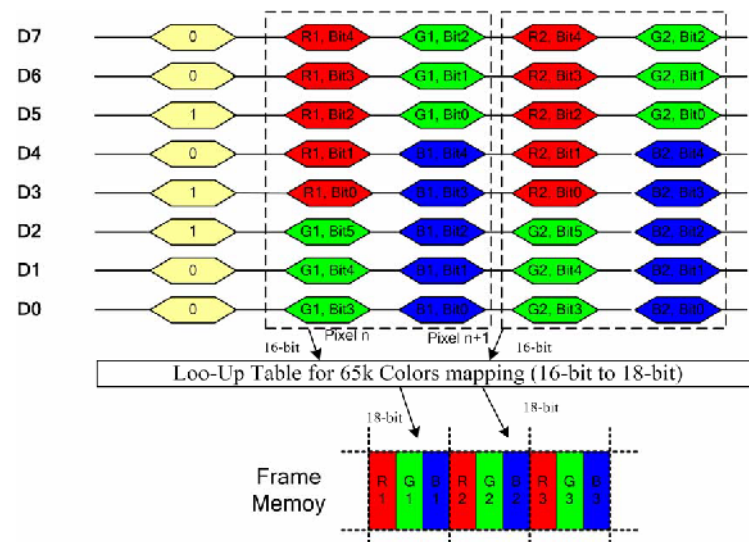


Figure 4-9-2-2 One pixel (RGB5-6-5) in each two 8-bit write data packets

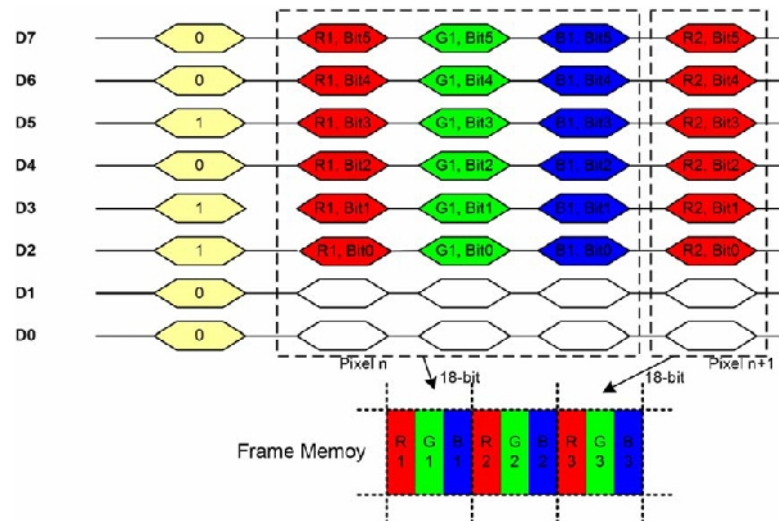


Figure 4-9-2-3 One pixel (RGB6-6-6) in each three 8-bit write data packets

#### 4.9.3. Parallel 9-bit Interface ( IM="110" )

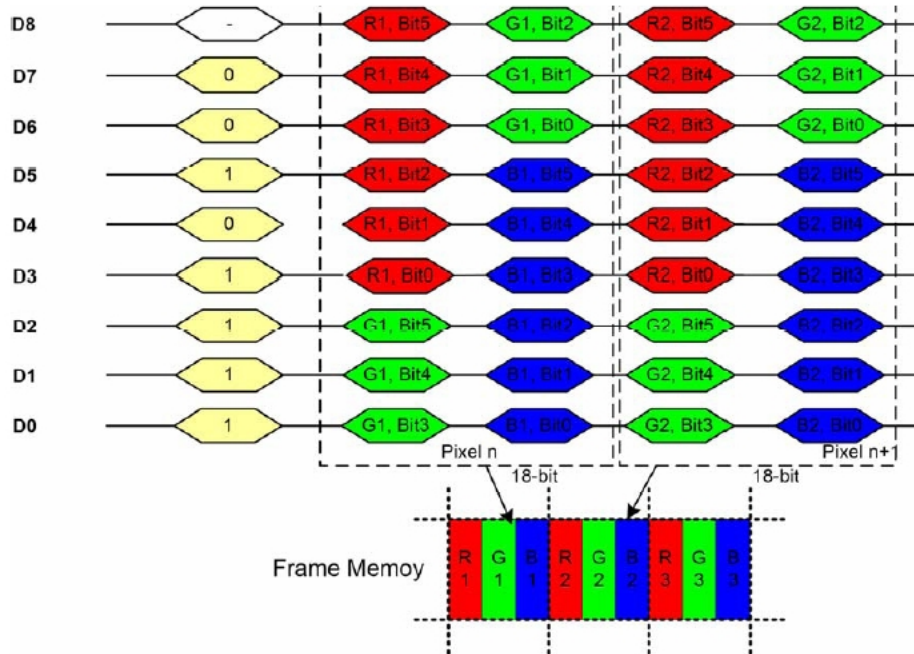


Figure 4-9-3 One pixel (RGB6-6-6) in each two 9-bit write data packets

#### 4.9.4. Parallel 16-bit Interface (IM="101")

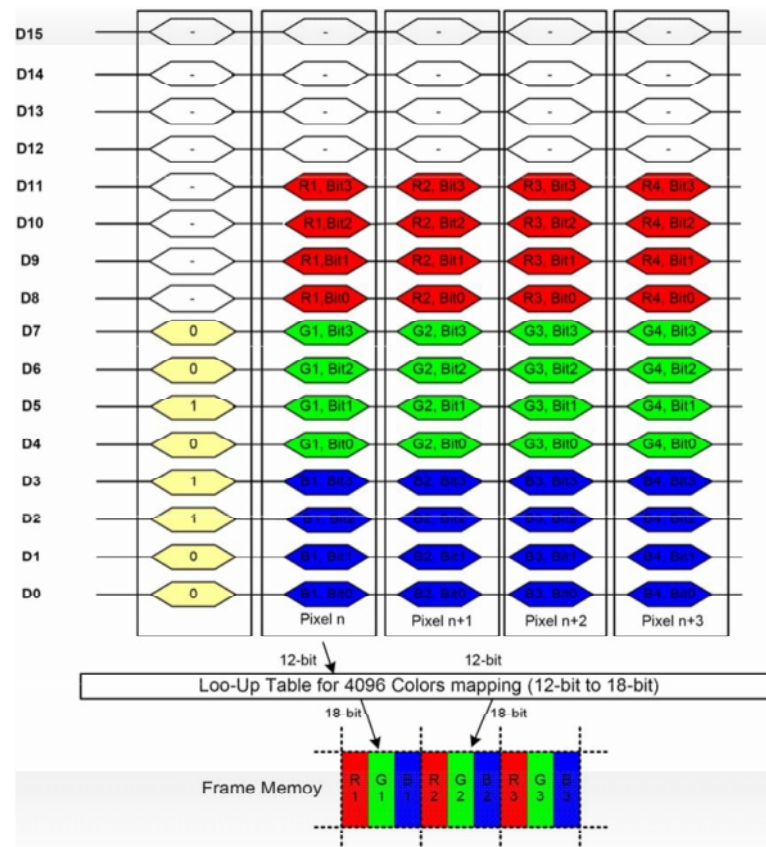


Figure 4-9-4-1 One pixel (RGB4-4-4) in each 16-bit write data packets

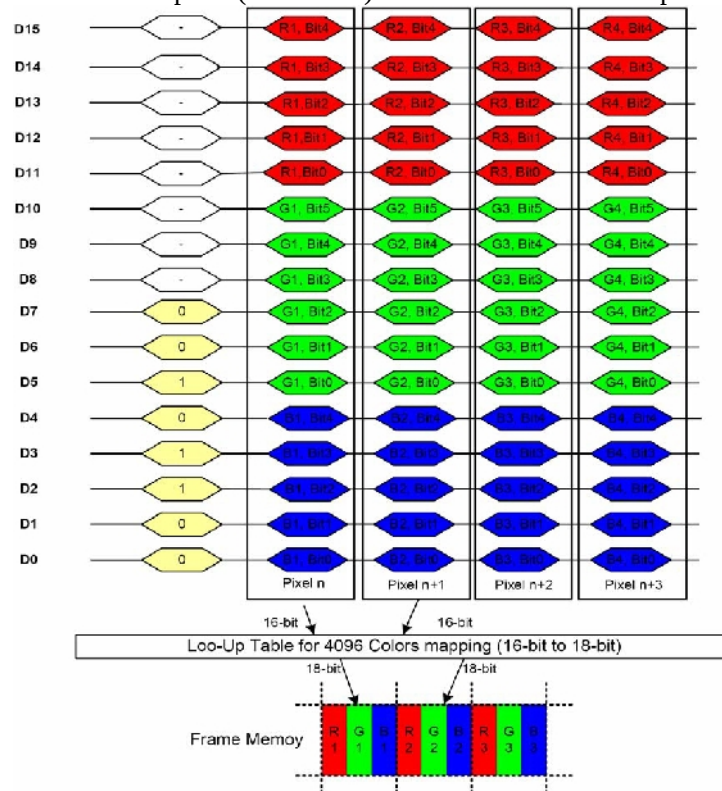


Figure 4-9-4-2 One pixel (RGB5-6-5) in each 16-bit write data packets

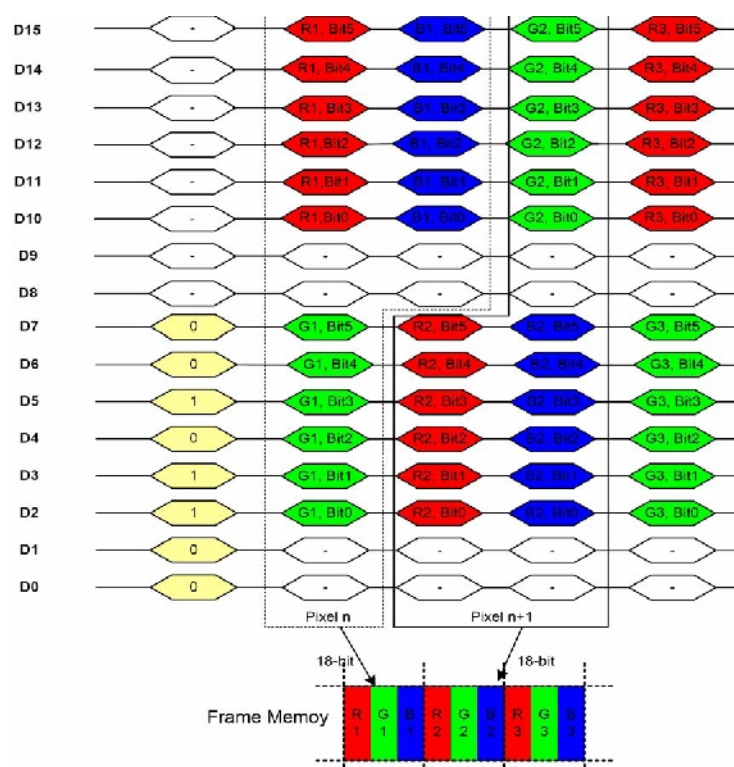


Figure 4-9-4-3 Two pixel (RGB6-6-6) in three 16-bit write data packets

#### 4.9.5. Parallel 18-bit Interface (IM="111")

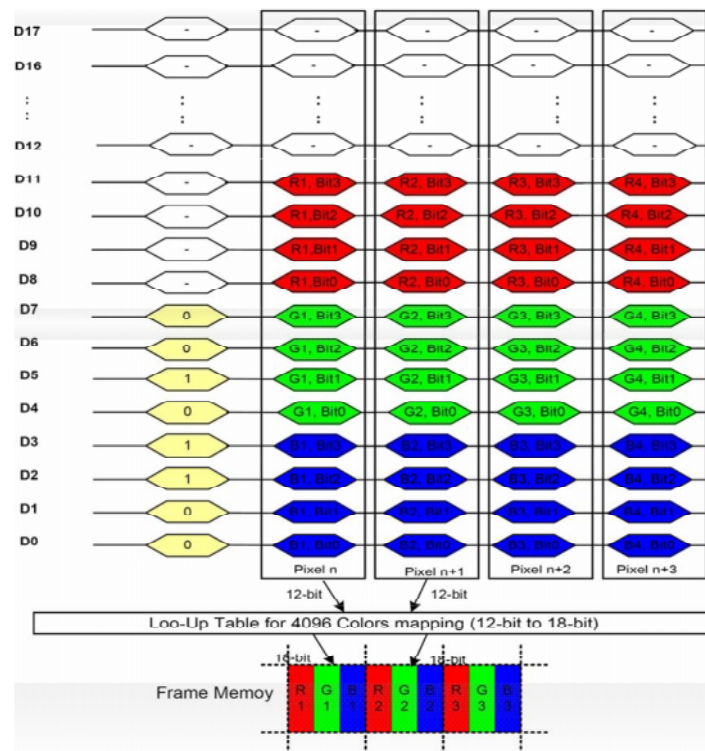


Figure 4-9-5-1 One pixel (RGB4-4-4) in one 18-bit write data packets

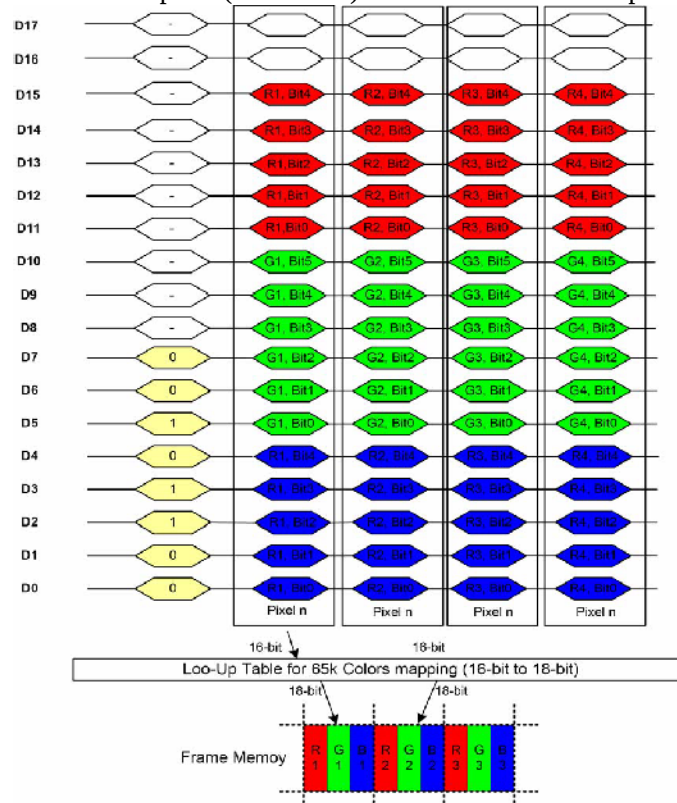


Figure 4-9-5-2 One pixel (RGB5-6-5) in one 18-bit write data packets

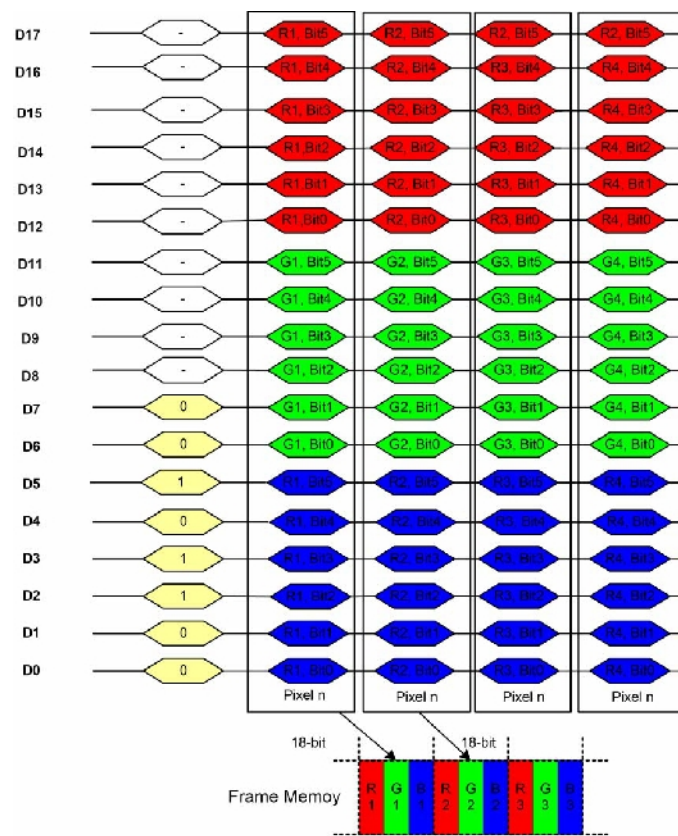
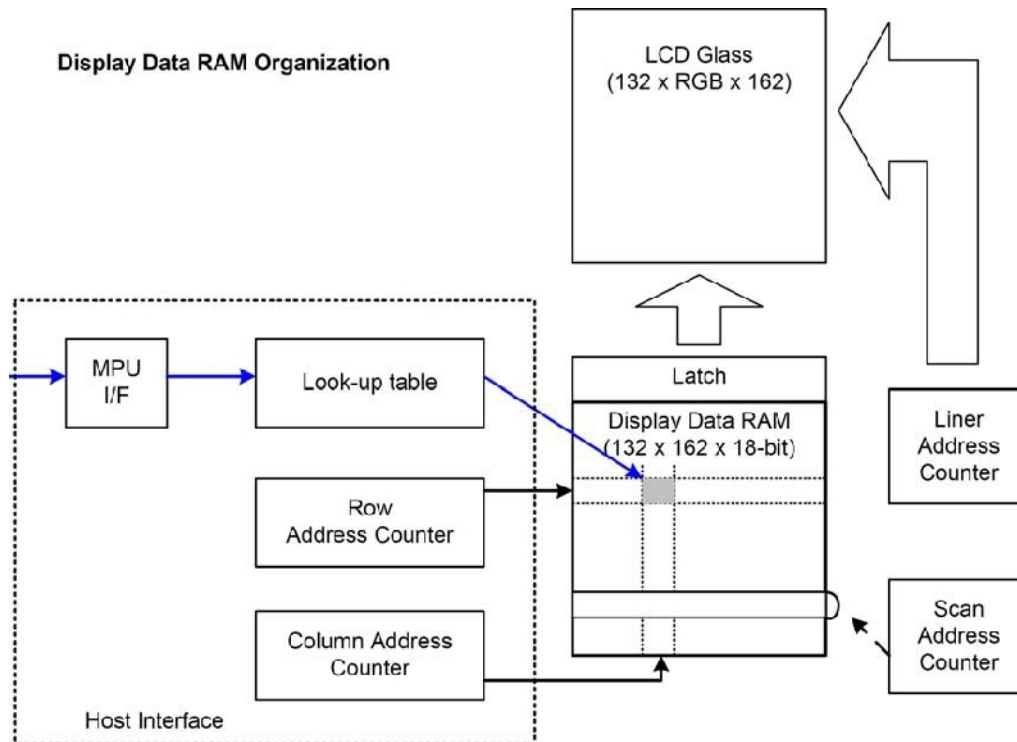


Figure 4-9-5-3 One pixel (RGB5-6-5) in one18-bit write data packets

## 5. Display Data with SRAM

### 5.1. SRAM Organization

The display data SRAM stores display dots and consists of 384,912 bits (132x18x162 bits). There is no restriction on access to the RAM even when the display data on the same address is loaded to “Source”. There will be no abnormal visible effect on the display when there is a simultaneous Panel Read and Interface Read or Write to the same location of the Frame Memory.



## 5.2. Memory To Display Mapping

Display data are written in different direction according to different MX/MY settings, and scan read from SRAM also controlled by ML configuration. The detail as below figure shows:

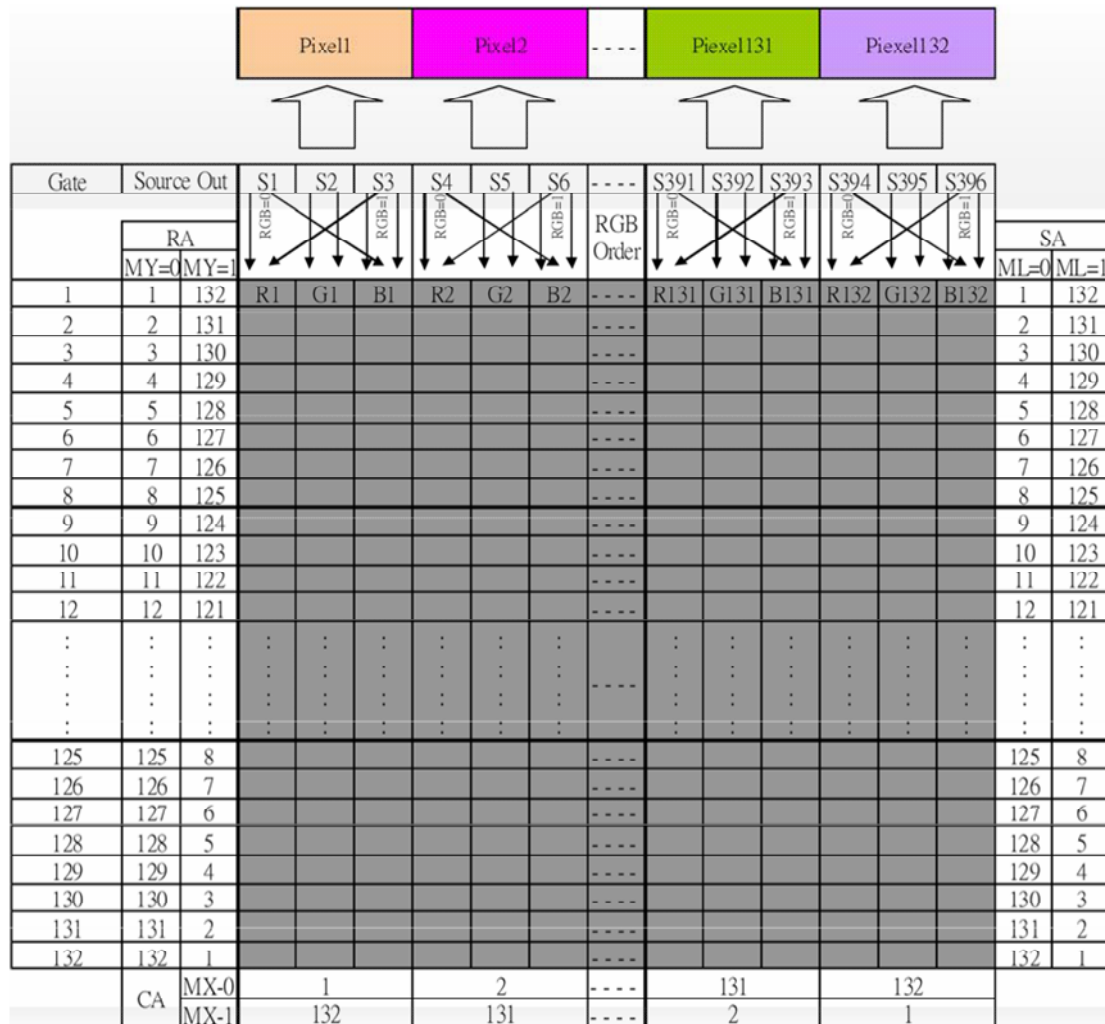


Figure 5-2 Display Data Mapping in SRAM

Note:

RA: Row Address

CA: Column Address

SA: Scan Address

MX: Mirror X-axis (Column address direction parameter), configured by MADCTL command

MY: Mirror Y-axis (Row address direction parameter), configured by MADCTL command

ML: Scan direction parameter, configured by MADCTL command

RGB: Red, Blue subpixel position change, configured by MADCTL command

### 5.3. MCU To SRAM Access Direction

The address counter set the addresses of the display data RAM for writing and reading. Data is written pixel-wise into the RAM matrix of DRIVER. The data for one pixel or two pixels is collected (RGB 6-6-6-bit), according to the data formats. As soon as this pixel-data information is complete the “Write access” is activated on the RAM. The locations of RAM are addressed by the address pointers. When GM=011, 132RGB x 162, the address ranges are X=0 to X=131 (83h) and Y=0 to Y=161 (A1h). Addresses outside these ranges are not allowed. Before writing to the RAM a window must be defined into which will be written. The window is programmable via the command register XS, YS designating the start address and XE, YE designating the end address.

For example, the whole display contents will be written, the window is defined by the following values: XS=0(0h) YS=0(0h) and XE=131(83h), YE=161(A1h) In vertical addressing mode (MV=1), the Y-address increments after each byte, after the last Y-address (Y=YE), Y wraps around to YS and X increments to address the next column. In horizontal addressing mode (V=0), the X-address increments after each byte, after the last X-address(X=XE), X wraps around to XS and Y increments to address the next row. After every last address (X=XE and Y=YE) the address pointers wrap around to address (X=XS and Y=YS).

For flexibility in handling a wide variety of display architectures, the commands “CASET, RASET” and “MADCTR”, define flags MX and MY, which allows mirroring of the X-address and Y-address. All combinations of flags are allowed. Below table shows the available combinations of writing to the display RAM. When MX, MY and MV will be changed the data must be rewritten to the display RAM. For each image orientation, the controls for the column and page counters apply as below:

| Condition                                                                                                         | Column Counter                | Row Counter                |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|
| When RAMWR/RAMRD command is accepted                                                                              | Return to “Start              | Return to “Start Row (YS)” |
|                                                                                                                   | Column (XS)”                  |                            |
| Complete Pixel Read/Write action                                                                                  | Increment by 1                | No change                  |
| The Column counter value is larger than “End Column (XE)”                                                         | Return to “Start Column (XS)” | Increment by 1             |
| The Column counter value is larger than “End Column (XE)” and the Row counter value is larger than “End Row (YE)” | Return to “Start Column (XS)” | Return to “Start Row (YS)” |

Table 5-3 Frame Data Write Direction According to the MADCTR parameters (MV, MX and MY)

| Display Data Direction | MADCTR Parameter |    |    | Image in the Memory (MPU) | Image in the Driver (DDRAM) |
|------------------------|------------------|----|----|---------------------------|-----------------------------|
|                        | MV               | MX | MY |                           |                             |
| Normal                 | 0                | 0  | 0  |                           |                             |
| Y-Mirror               | 0                | 0  | 1  |                           |                             |
| X-Mirror               | 0                | 1  | 0  |                           |                             |
| X-Mirror Y-Mirror      | 0                | 1  | 1  |                           |                             |
| X-Y Exchange           | 1                | 0  | 0  |                           |                             |
| X-Y Exchange Y-Mirror  | 1                | 0  | 1  |                           |                             |
| XY Exchange            | 1                | 1  | 0  |                           |                             |
| XY Exchange            | 1                | 1  | 1  |                           |                             |

## 6. Tearing Effect

The Tearing Effect output line supplies to the MCU a Panel synchronization signal. This signal can be enabled or disabled by the Tearing Effect Line Off & On commands. The mode of the Tearing Effect Signal is defined by the Parameter of the Tearing Effect Line On command. The signal can be used by the MCU to synchronize Frame Memory Writing when displaying video images.

### 6.1. Tearing Effect Line Modes

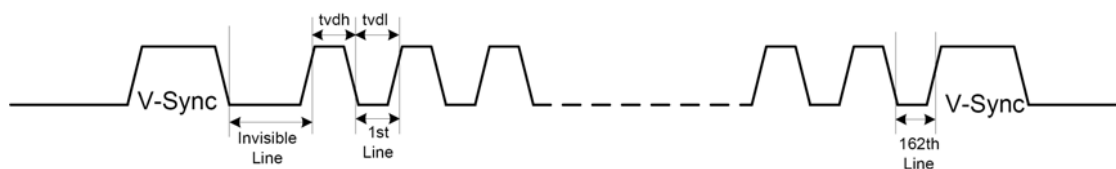
Mode 1, the Tearing Effect Output signal consists of V-Sync information only:



Tvdh = The LCD display is not updated from the Frame Memory.

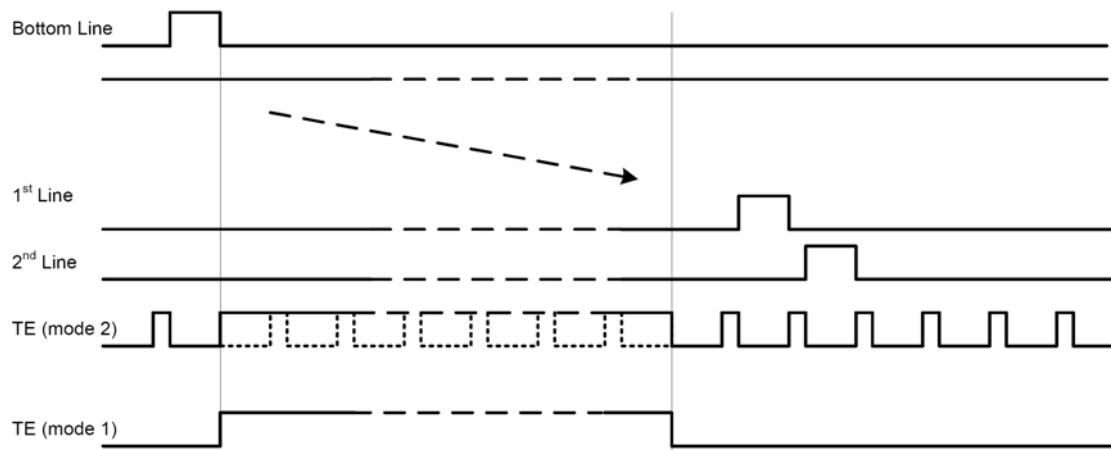
TvdI = The LCD display is updated from the Frame Memory (except Invisible Line – see below).

Mode 2, the Tearing Effect Output signal consists of V-Sync and H-Sync information, There are one V-sync and 162 H-sync pulses per field:



Thdh = The LCD display is not updated from the Frame Memory.

ThdI = The LCD display is updated from the Frame Memory (except Invisible Line – see above).



Note: During Sleep In Mode, the Tearing Effect Output Pin is active Low.

## 6.2. Tearing Effect Line Timing

The Tearing Effect signal is described below:

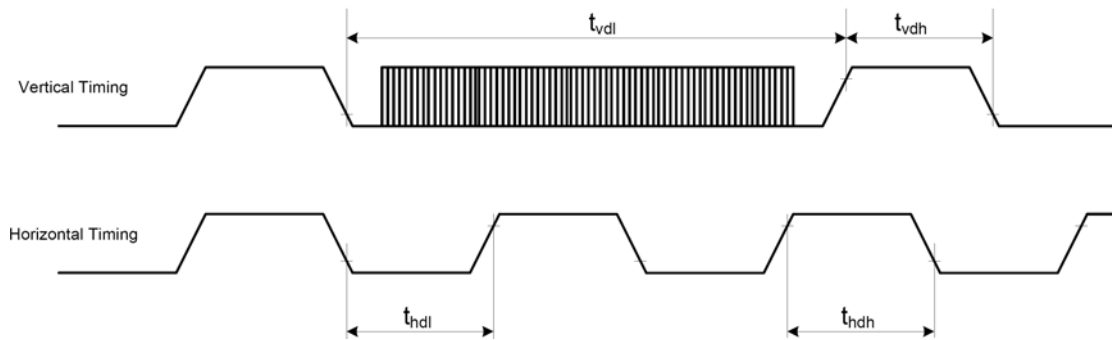


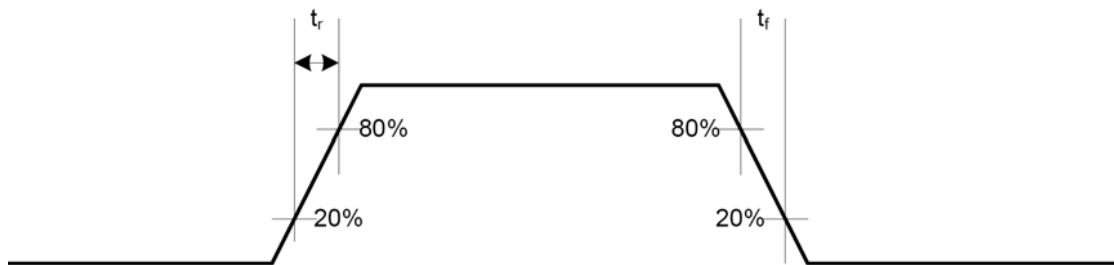
Table 6-2 AC characteristics of Tearing Effect Signal Idle Mode Off/On (Frame Rate = 58.9Hz)

| Symbol | Parameter                       | MIN  | MAX | Unit    | Description |
|--------|---------------------------------|------|-----|---------|-------------|
| tvdl   | Vertical Timing Low Duration    | 13   | -   | Ms      |             |
| tvdh   | Vertical Timing High Duration   | 1000 | -   | $\mu$ s |             |
| thdl   | Horizontal Timing Low Duration  | 33   | -   | $\mu$ s |             |
| thdh   | Horizontal Timing High Duration | 25   | 500 | $\mu$ s |             |

Notes:

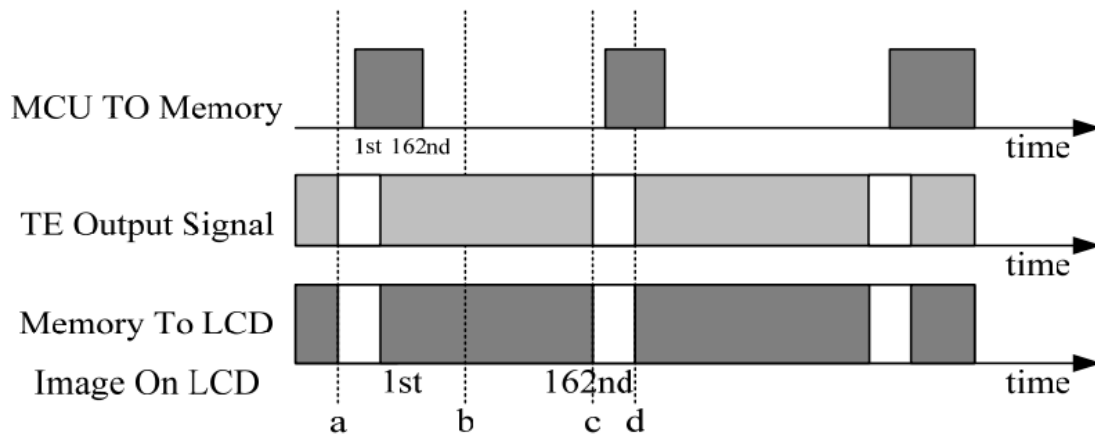
The timings in Table 7-2 apply when MADCTL B4=0

The signal's rise and fall times ( $t_f$ ,  $t_r$ ) are stipulated to be equal to or less than 15ns.



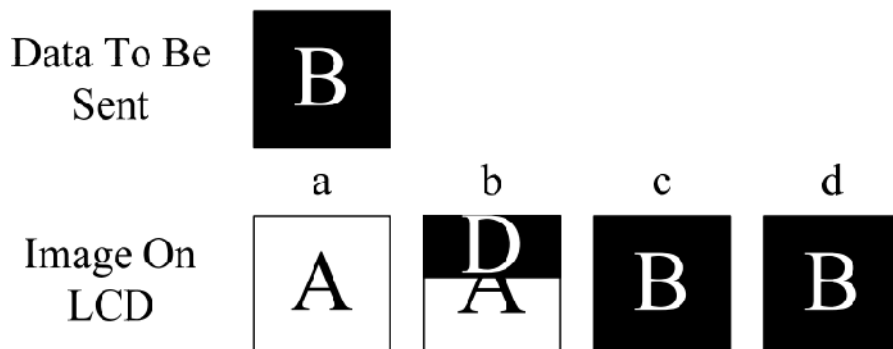
The Tearing Effect Output Line is fed back to the MCU and should be used as shown below to avoid Tearing Effect:

### 6.2.1. Example 1 MCU Write is Faster than Panel Read

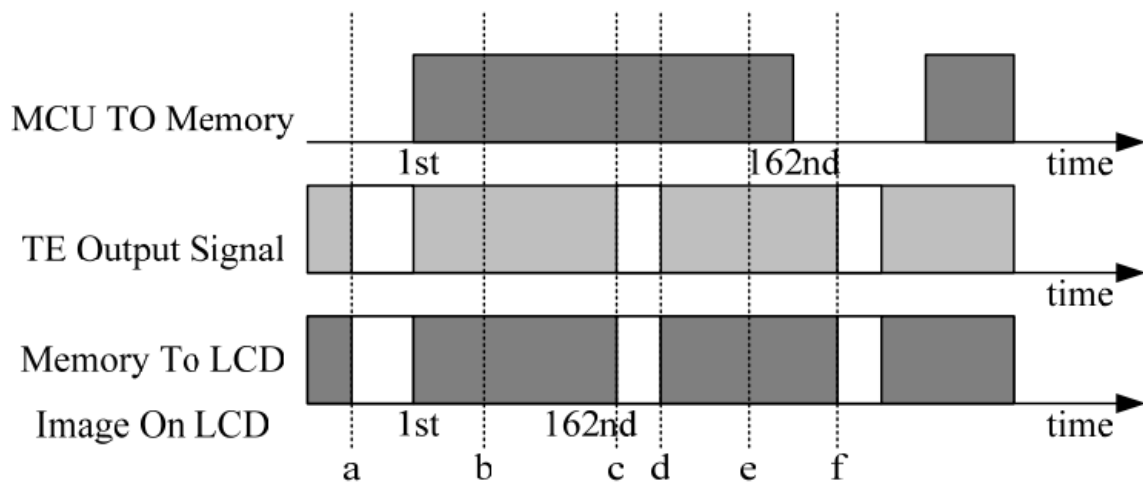


The MCU to Frame Memory write begins just after Panel Read has commenced i.e. after one horizontal sync pulse of the Tearing Effect Output Line. This allows time for the image to download behind the Panel Read pointer and finishing download during the subsequent Frame before the Read Pointer “catches” the MCU to Frame memory write position.

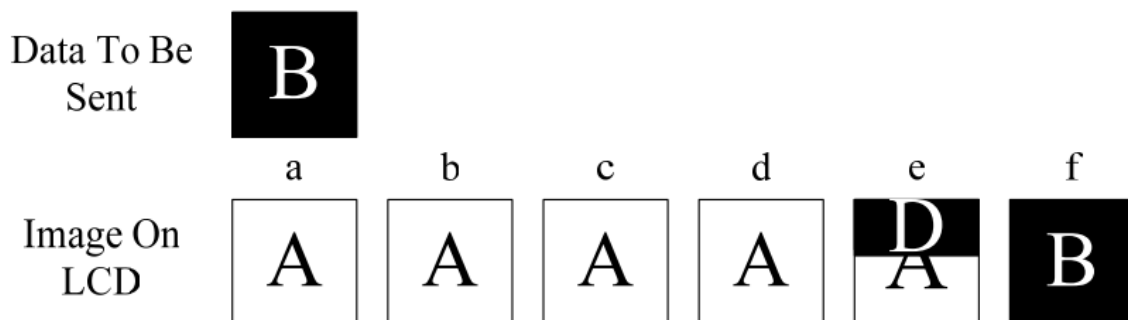
Frame refresh has a complete new image:



### 6.2.2. Example 2 MCU Write is slower than Panel Read



The MCU to Frame Memory write begins just after Panel Read has commenced i.e. after one horizontal sync pulse of the Tearing Effect Output Line. This allows time for the image to download behind the Panel Read pointer and finishing download during the subsequent Frame before the Read Pointer “catches” the MCU to Frame memory write position.



## 7. Power ON/OFF Sequence

IOVCC and VCI can be applied in any order.

VCI and IOVCC can be powered down in any order.

During power off, if LCD is in the Sleep Out mode, VCI and IOVCC must be powered down minimum 120 msec after RESX has been released.

During power off, if LCD is in the Sleep In Mode, IOVCC or VCI can be powered down minimum 0 msec after RESX has been released.

CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

### Notes:

There will be no damage to the display module if the power sequences are not met.

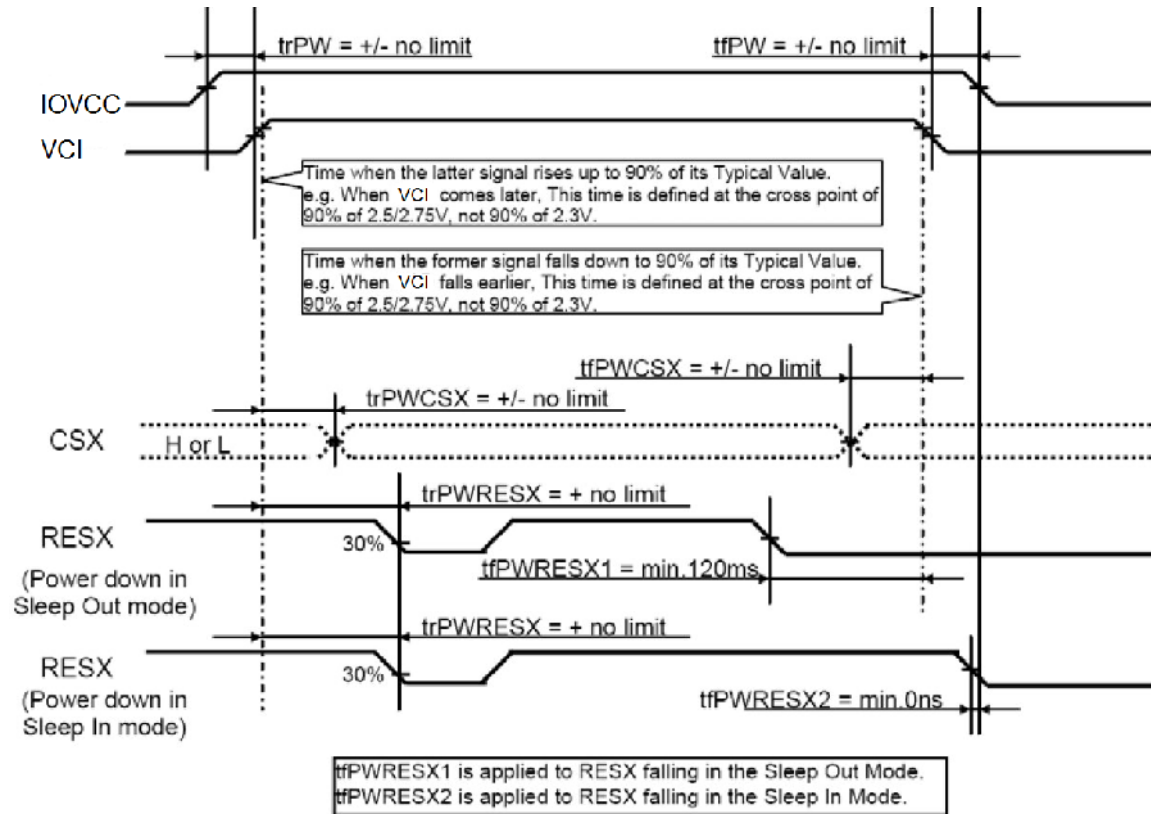
There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

If RESX line is not held stable by host during Power On Sequence as defined in Sections 8.1 and 8.2, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

## 7.1. Case 1 - RESX line is held high or Unstable by Host at Power On

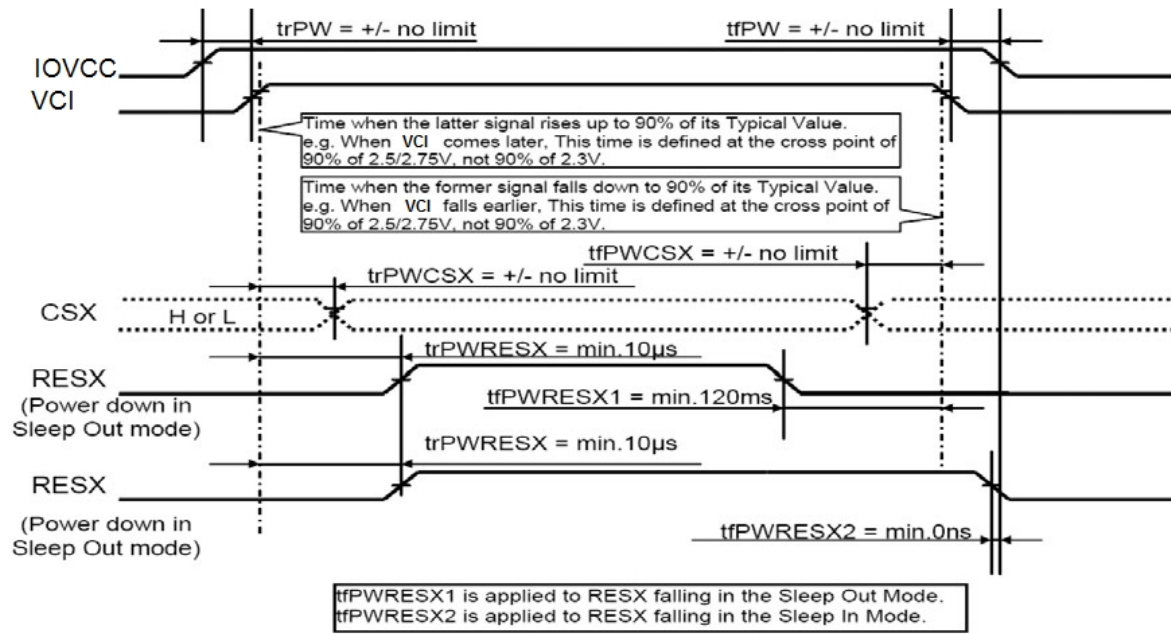
If RESX line is held high or unstable by the host during Power On, then a Hardware Reset must be applied after both VCI and IOVCC have been applied – otherwise correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.



Note: Unless otherwise specified, timings herein show cross point at 50% of signal/power level.

## 7.2. Case 2 - RESX line is held low by Host at Power On

If RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for minimum 10  $\mu$ sec after both VCI and IOVCC have been applied.



Note: Unless otherwise specified, timings herein show cross point at 50% of signal/power level.

## 7.3. Uncontrolled Power Off

The uncontrolled power off means a situation when e.g. there is removed a battery without the controlled power off sequence. The display module must meet following requirements:

There cannot be any damages for the display module or the display module cannot cause any damages for the host or lines of the interface.

There cannot be any abnormal visible effects (= Display must be blank) within 1 second on the display and remains blank until “Power On Sequence” powers it up.

## 8. Power Level Definition

### 8.1. Power Levels

6 level modes are defined they are in order of Maximum Power consumption to Minimum Power Consumption:

1. Normal Mode On (full display), Idle Mode Off, Sleep Out. In this mode, the display is able to show maximum 262,144 colors.

2. Partial Mode On, Idle Mode Off, Sleep Out. In this mode part of the display is used with maximum 262,144 colors.

3. Normal Mode On (full display), Idle Mode On, Sleep Out. In this mode, the full display area is used but with 8 colors.

4. Partial Mode On, Idle Mode On, Sleep Out. In this mode, part of the display is used but with 8 colors.

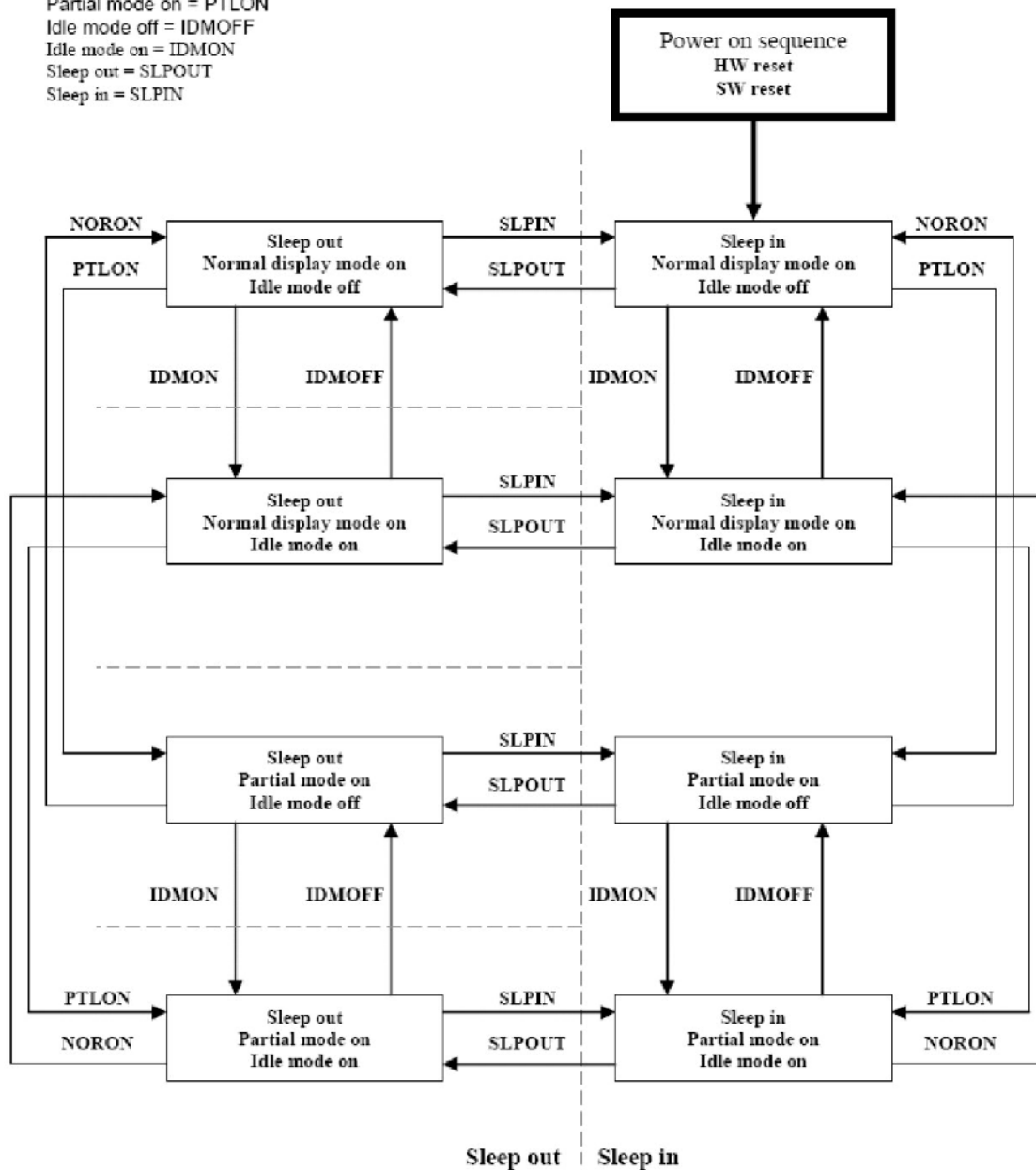
5. Sleep In Mode. In this mode, the DC/DC converter, internal oscillator and panel driver circuit are stopped. Only the MCU interface and memory works with IOVCC power supply. Contents of the memory are safe.

6. Power Off Mode. In this mode, both VCI and IOVCC are removed.

Note: Transition between modes 1-5 is controllable by MCU commands. Mode 6 is entered only when both Power supplies are removed. If RESX line is held high or unstable by the host during Power On, then a Hardware Reset must be applied after both VCI and IOVCC have been applied – otherwise correct functionality is not guaranteed. There is no timing restriction upon

## 8.2. Power Flow Chart

Normal display mode on = NORON  
 Partial mode on = PTLON  
 Idle mode off = IDMOFF  
 Idle mode on = IDMON  
 Sleep out = SLPOUT  
 Sleep in = SLPIN



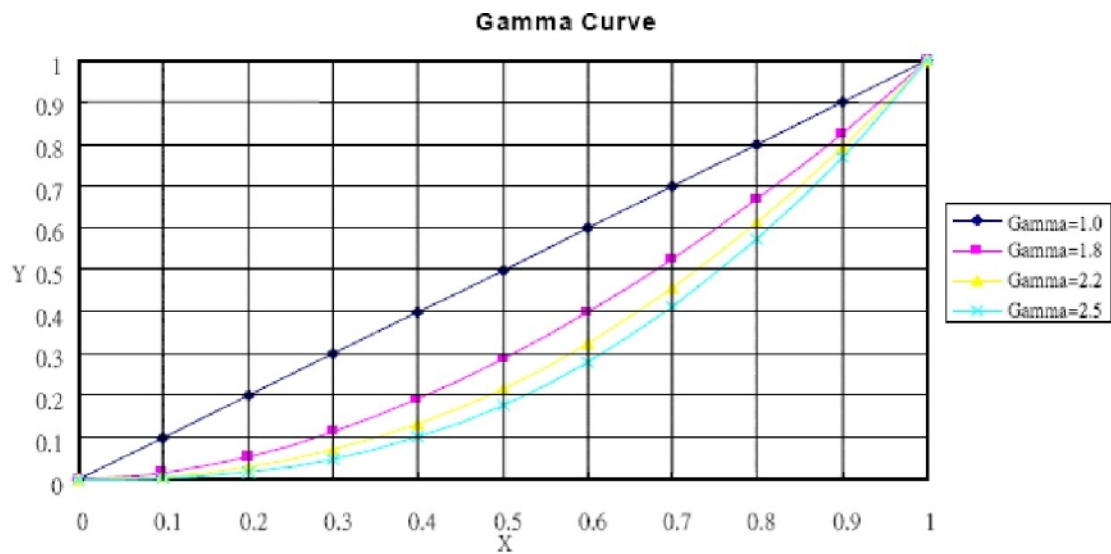
Note 1: There is not any abnormal visual effect when there is changing from one power mode to another power mode.

Note 2: There is not any limitation, which is not specified by Nokia, when there is changing from one power mode to another power mode.

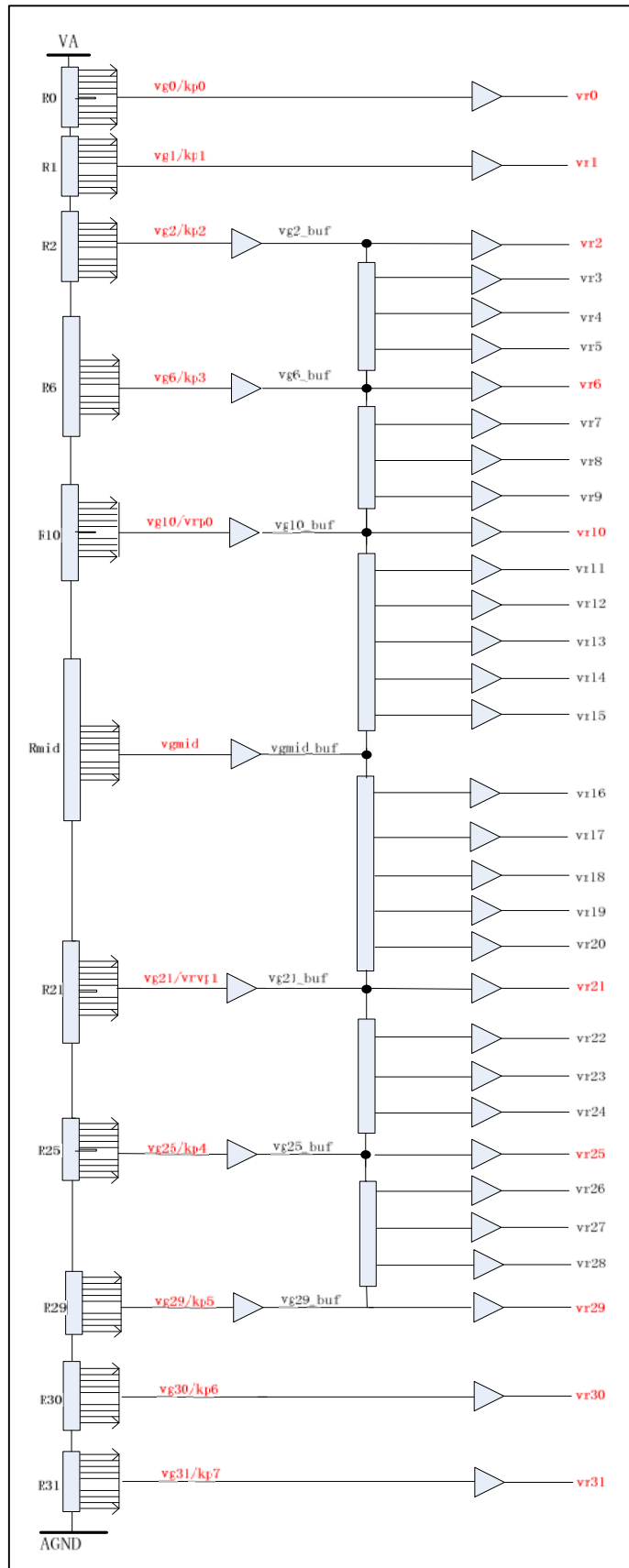
Note 3: It is recommended that it should be enter Sleep in before power off.

## 9. Gamma Curve

### 9.1. Gamma curve according to the Gamma 1.0/1.8/2.2/2.5



## 9.2. Gamma Structure



## 10. Reset Function

### 10.1. State of Register After Different Reset

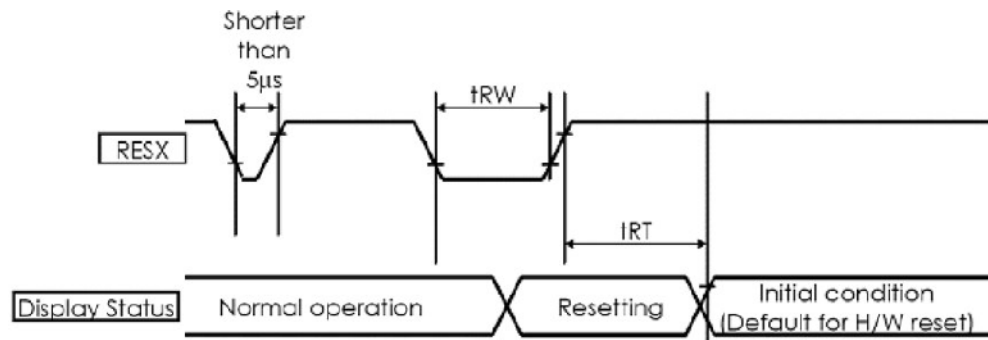
The registers for resolution 128(RGB) x160 are initialized are listed below:

| Item                                            | After Power On  | After Hardware Reset | After Software Reset |
|-------------------------------------------------|-----------------|----------------------|----------------------|
| Frame memory                                    | Random          | No Change            | No Change            |
| Sleep In/Out                                    | In              | In                   | In                   |
| Display On/Off                                  | Off             | Off                  | Off                  |
| Display mode(normal/partial)                    | Normal          | Normal               | Normal               |
| Display Inversion On/Off                        | Off             | Off                  | Off                  |
| Display Idle Mode On/Off                        | Off             | Off                  | Off                  |
| Column:Start Address(XS)                        | 0000h           | 0000h                | 0000h                |
| Column:End Address(XE)                          | 007Fh           | 007Fh                | 007Fh                |
| Row:Start Address(YS)                           | 0000h           | 0000h                | 0000h                |
| Row:End Address(YE)                             | 009Fh           | 009Fh                | 009Fh                |
| Gamma Setting                                   | GC0             | GC0                  | GC0                  |
| Color Set                                       | 262K            | 262K                 | 262K                 |
| Partial:Start Address(PSL)                      | 0000h           | 0000h                | 0000h                |
| Partial:End Address(PEL)                        | 009Fh           | 009Fh                | 009Fh                |
| Scroll:Vertical scrolling                       | Off             | Off                  | Off                  |
| Scroll:Top Fixed Area(TFA)                      | 0000h           | 0000h                | 0000h                |
| Scroll:Scroll Area(VSA)                         | 00A0h           | 00A0h                | 00A0h                |
| Scroll:Bottom Fixed Area(BFA)                   | 0000h           | 0000h                | 0000h                |
| Scroll Start Address (SSA)                      | 0000h           | 0000h                | 0000h                |
| Tearing:On/Off                                  | Off             | Off                  | Off                  |
| Tearing Effect Mode*3                           | 0(Mode1)        | 0(Mode1)             | 0(Mode1)             |
| Memory Data Access Control (MY/MX/MV/ML/MH/RGB) | 0/0/0/0/0/0     | 0/0/0/0/0/0          | No change            |
| Interface Pixel Color Format                    | 6(18-Bit/Pixel) | 6(18-Bit/Pixel)      | No change            |
| RDDPM                                           | 08h             | 08h                  | 08h                  |
| RDDMADCTR                                       | 0               | 0                    | No change            |
| RDDCOLMOD                                       | 6(18-Bit/Pixel) | 6(18-Bit/Pixel)      | No change            |
| RDDIM                                           | 00h             | 00h                  | No change            |
| RDDSM                                           | 00h             | 00h                  | 00h                  |
| RDDSER                                          | 00h             | 00h                  | 00h                  |
| ID1                                             | 33h             | 33h                  | 33h                  |
| ID2                                             | 30h             | 30h                  | 30h                  |
| ID3                                             | 25h             | 25h                  | 25h                  |

Notes:

1. There will be no abnormal visible effects on the display when S/W or H/W Reset are applied.
2. After Powered-On Reset finishes within 10 $\mu$ s after both VCI & IOVCC are applied.
3. Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only.

## 10.2. Reset Timing



(VSS=0V, IOVCC=1.65V to 3.6V, VCI=2.5V to 4.8V, Ta = -30 to 85°C)

| Symbol | Parameter                   | Related Pins | MIN | TYP | MAX | Note                                     | Unit |
|--------|-----------------------------|--------------|-----|-----|-----|------------------------------------------|------|
| tRW    | Valid Reset low pulse width | RESX         | 10  | -   | -   | -                                        | us   |
| tRT    | Valid Reset Complete width  | RESX         | -   | -   | 5   | When reset applied during Sleep in mode  | ms   |
|        |                             | RESX         | -   | -   | 120 | When reset applied during Sleep out mode | ms   |

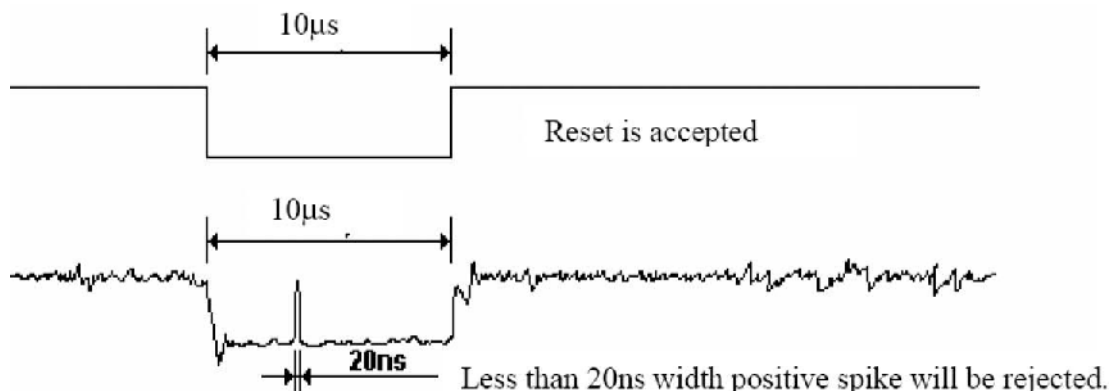
Note:

1> Spike due to an electrostatic discharge on RESX line does not cause system reset according to the table below.

| RESX Pulse           | Action                                                        |
|----------------------|---------------------------------------------------------------|
| Shorten than 5us     | Reset Rejected                                                |
| Longer than 10us     | Reset                                                         |
| Between 5us and 10us | Reset starts(It depends on voltage and temperature condition) |

2> During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In mode) and then return to Default condition for Hardware Reset.

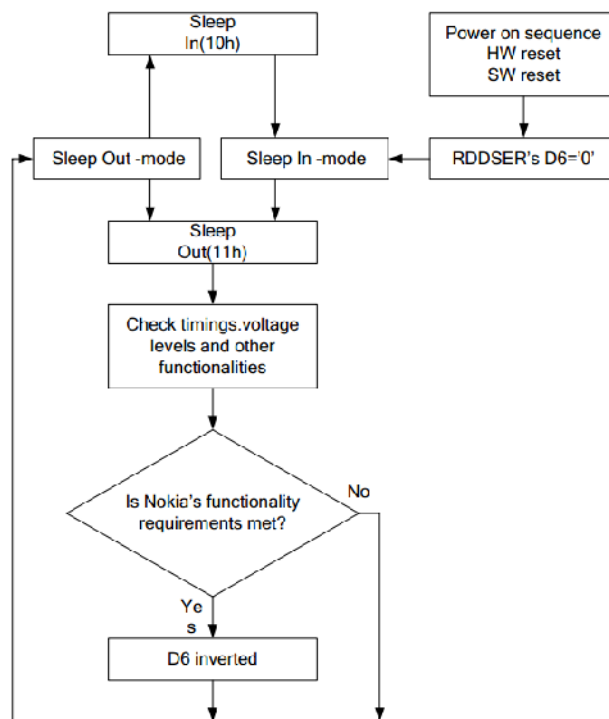
3> Spike Rejection also applies during a valid reset pulse as shown below:



4> It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

## 11. Sleep Out and Self-Diagnostic Functions of Display

Sleep Out-command (11h) is a trigger for an internal function of the display module, which indicates, if the display module is still running and meets functionality requirements. The internal function (= the display controller) is comparing, if the display module is still meeting functionality requirements (only Booster voltage level). If functionality requirement is met, there is inverted a bit, which defined in command (“0Fh”, The used bit of this command is D6). If functionality requirement is not same, this bit (D6) is not inverted. The flow chart for this internal function is following:



Note: There is needed 120msec after Sleep Out command, when there is changing from Sleep In mode to Sleep Out mode, before there is possible to check if Nokia's functionality requirements are met and a value of RDDSDR's D6 is valid. Otherwise, there is 5msec delay for D6's value, when Sleep Out command is sent in Sleep Out mode.

## 12. Command

### 12.1. System Function Command List and Description

| Addr | Name               | R/W | D7              | D6          | D5     | D4     | D3            | D2         | D1     | D0            |
|------|--------------------|-----|-----------------|-------------|--------|--------|---------------|------------|--------|---------------|
| 0x00 | NOP                | W   | 0               | 0           | 0      | 0      | 0             | 0          | 0      | 0             |
| 0x01 | SWR<br>ESET        | W   | 0               | 0           | 0      | 0      | 0             | 0          | 0      | 0             |
| 0x04 | RDDI<br>D          | R   | sys_id1[7:0]    |             |        |        |               |            |        |               |
|      |                    |     | sys_id2[7:0]    |             |        |        |               |            |        |               |
|      |                    |     | sys_id3[7:0]    |             |        |        |               |            |        |               |
| 0x09 | RDD<br>ST          | R   | boost<br>_on    | my          | mx     | mv     | ml            | rgb        |        |               |
|      |                    |     | pixel_fmt[3:0]  |             |        |        | idle_o<br>n   | ptl_on     | slpout | norma<br>l_on |
|      |                    |     | scroll<br>_on   | 1'b0        | invon  | 0      | 0             | dispo<br>n | te_on  | 0             |
|      |                    |     | 0               | 0           | telom  | rgb_on |               |            |        |               |
| 0x0A | RDD<br>PM          | R   | boost<br>_on    | idle_o<br>n | ptl_on | slpout | norma<br>l_on | dispo<br>n | 0      | 0             |
| 0x0B | RDD_<br>MAD<br>CTR | R   | my              | mx          | mv     | ml     | sbgr          | 0          | 0      | 0             |
| 0x0C | RDD_<br>COL<br>MOD | R   | vipf[3:0]       |             |        |        | 0             | ifpf[2:0]  |        |               |
| 0x0D | RDDI<br>M          | R   | scroll<br>_on   | 1'b0        | invon  | 0      | 0             | 0          | 0      | 0             |
| 0x0E | RDD<br>SM          | R   | te_on           | telom       | 0      | 0      | 0             | 0          | 0      | 0             |
| 0x0F | RDD<br>SDR         | R   | self_diag[4:0]  |             |        |        | 0             | 0          | 0      | 0             |
| 0x10 | SLPI<br>N          | W   |                 |             |        |        |               |            |        |               |
| 0x11 | SLPO<br>UT         | W   |                 |             |        |        |               |            |        |               |
| 0x12 | PTLO<br>N          | W   |                 |             |        |        |               |            |        |               |
| 0x13 | NOR<br>ON          | W   |                 |             |        |        |               |            |        |               |
| 0x20 | INVO<br>FF         | W   |                 |             |        |        |               |            |        |               |
| 0x21 | INVO<br>N          | W   |                 |             |        |        |               |            |        |               |
| 0x28 | DISP<br>OFF        | W   |                 |             |        |        |               |            |        |               |
| 0x29 | DISP<br>ON         | W   |                 |             |        |        |               |            |        |               |
| 0x2A | CASE<br>T          | W   | 0x00            |             |        |        |               |            |        |               |
|      |                    |     | col_st_set[7:0] |             |        |        |               |            |        |               |

## NV3023A—132RGB x162 dot, 262k-color TFT LCD Single-Chip Driver

| Addr | Name        | R/W | D7              | D6 | D5 | D4 | D3              | D2        | D1                     | D0        |
|------|-------------|-----|-----------------|----|----|----|-----------------|-----------|------------------------|-----------|
|      |             |     | 0x00            |    |    |    |                 |           |                        |           |
|      |             |     | col_ed_set[7:0] |    |    |    |                 |           |                        |           |
| 0x2B | RASE<br>T   | W   | 0x00            |    |    |    |                 |           |                        |           |
|      |             |     | row_st_set[7:0] |    |    |    |                 |           |                        |           |
|      |             |     | 0x00            |    |    |    |                 |           |                        |           |
|      |             |     | row_ed_set[7:0] |    |    |    |                 |           |                        |           |
| 0x2C | RAM<br>WR   | W   |                 |    |    |    |                 |           |                        |           |
| 0x2E | RAM<br>RD   | W   |                 |    |    |    |                 |           |                        |           |
| 0x30 | PTLA<br>R   | W   | ptl_st_set[7:0] |    |    |    |                 |           |                        |           |
|      |             |     | ptl_ed_set[7:0] |    |    |    |                 |           |                        |           |
| 0x33 | SCRL<br>AR  | W   | tfa[7:0]        |    |    |    |                 |           |                        |           |
|      |             |     | vsa[7:0]        |    |    |    |                 |           |                        |           |
| 0x34 | TEOF<br>F   | W   |                 |    |    |    |                 |           |                        |           |
| 0x35 | TEO<br>N    | W   |                 |    |    |    |                 |           |                        | TELO<br>M |
| 0x36 | MAD<br>CTR  | W   | my              | mx | mv | ml | rgb             |           |                        |           |
| 0x37 | VSCS<br>AD  | W   | ssa[7:0]        |    |    |    |                 |           |                        |           |
| 0x38 | IDM<br>OFF  | W   |                 |    |    |    |                 |           |                        |           |
| 0x39 | IDM<br>ON   | W   |                 |    |    |    |                 |           |                        |           |
| 0x3A | COL<br>MOD  | W   | vipf[3:0]       |    |    |    |                 | ifpf[2:0] |                        |           |
| 0x3D | SPI2S<br>ET | W   |                 |    |    |    | spi2li<br>ne_en |           | spi2line_mode<br>[1:0] |           |
| 0xDA | RDID<br>1   | R   | sys_id1[7:0]    |    |    |    |                 |           |                        |           |
| 0xDB | RDID<br>2   | R   | sys_id2[7:0]    |    |    |    |                 |           |                        |           |
| 0xDC | RDID<br>3   | R   | sys_id3[7:0]    |    |    |    |                 |           |                        |           |

## 12.1.1. NOP (00h)

| 00H                   | No Operation                                                                                                                                                                                                                                                                                                                                                                       |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|----|----|----|----|----|----|----|----|-----|--------|---------------|----------------------------------------|-----|---------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX           | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H             | R   | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 00H |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                       |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Description           | This command is an empty command. It does not have any effect on the display module. However it can be used to terminate Frame Memory White or Read as described in RAMWR (Memory White) and RAMRD (Memory Read) Commands.<br>X=Don't care.                                                                                                                                        |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Restriction           | None                                                                                                                                                                                                                                                                                                                                                                               |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |               |     |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode on,Idle Mode Off,Sleep Out | Yes | Normal Mode on,Idle Mode On,Sleep Out | Yes | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability  |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>N/A</td></tr><tr><td>SW Reset</td><td>N/A</td></tr><tr><td>HW Reset</td><td>N/A</td></tr></table>                                                                                                                                                                                           |               |     |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                      | N/A | SW Reset                              | N/A | HW Reset                                | N/A |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | N/A           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | N/A           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| HW Reset              | N/A                                                                                                                                                                                                                                                                                                                                                                                |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |

### 12.1.1.2. SWRESET (01h)

| 01H                   | Software Reset                                                                                                                                                                                                                                                                                                                                                                     |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|----|----|----|----|----|----|----|----|-----|--------|---------------|----------------------------------------|-----|---------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX           | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H             | R   | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 01H |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                       |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Description           | When the Software Reset command is written, it causes software reset. It resets the commands and parameters to their S/W Reset default values. (See default tables in each command description.)<br>Note: The Frame Memory contents are affected by this command.<br>X=Don't care                                                                                                  |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Restriction           | None                                                                                                                                                                                                                                                                                                                                                                               |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |               |     |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode on,Idle Mode Off,Sleep Out | Yes | Normal Mode on,Idle Mode On,Sleep Out | Yes | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability  |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>N/A</td></tr><tr><td>SW Reset</td><td>N/A</td></tr><tr><td>HW Reset</td><td>N/A</td></tr></table>                                                                                                                                                                                           |               |     |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                      | N/A | SW Reset                              | N/A | HW Reset                                | N/A |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | N/A           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | N/A           |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| HW Reset              | N/A                                                                                                                                                                                                                                                                                                                                                                                |               |     |    |    |    |    |    |    |    |    |     |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |

### 12.1.3. RDDID (04h)

| 04H                   | Read Display ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |     |              |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|--------------|----|----|----|-----|--------------|----|----|-----|--------|---------------|--|--|-----|-----|-----|-------------------|--------------|-----|-----|----------|----------------------------------------|-----|-----|----------|-----|-----|-----|--|-----|--|--|--|---------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|-----------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|----------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|----------|--|--|--|--|--|--|--|-----|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX           | WRX | D7           | D6 | D5 | D4 | D3  | D2           | D1 | D0 | HEX |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R             | H   | 0            | 0  | 0  | 0  | 0   | 1            | 0  | 0  | 04H |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R             | H   | X            | X  | X  | X  | X   | X            | X  | X  | X   |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R             | H   | SYS_ID1[7:0] |    |    |    |     |              |    |    | 33H |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter3            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R             | H   | SYS_ID2[7:0] |    |    |    |     |              |    |    | 30H |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter4            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R             | H   | SYS_ID3[7:0] |    |    |    |     |              |    |    | 25H |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Description           | This read byte returns 24-bit display identification.<br>The 1st Parameter is dummy read.<br>The 2st Parameter (SYS_ID1): LCD module’s manufacture ID.<br>The 3st Parameter (SYS_ID2): LCD module/driver version ID.<br>The 4st Parameter (SYS_ID3): LCD module/driver version ID.<br>Note: Commands RDDID1/2/3 (DAh, DBh, DCh) read data correspond to the parameters 1, 2, 3 of command 04h, respectively.                                                                                                                       |               |     |              |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Restriction           | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |     |              |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Register Availability | <table><tr><th colspan="8">Status</th><th colspan="4">Availability</th></tr><tr><td colspan="8">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Sleep In</td><td colspan="4">Yes</td></tr></table> |               |     |              |    |    |    |     |              |    |    |     | Status |               |  |  |     |     |     |                   | Availability |     |     |          | Normal Mode on,Idle Mode Off,Sleep Out |     |     |          |     |     |     |  | Yes |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Sleep In |  |  |  |  |  |  |  | Yes |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |     |              |    |    |    |     | Availability |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |     |              |    |    |    |     | Yes          |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |               |     |              |    |    |    |     | Yes          |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |     |              |    |    |    |     | Yes          |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |     |              |    |    |    |     | Yes          |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |     |              |    |    |    | Yes |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Default               | <table><tr><th rowspan="2">Status</th><th colspan="3">Default Value</th></tr><tr><th>ID1</th><th>ID2</th><th>ID3</th></tr><tr><td>Power On Sequence</td><td>33h</td><td>30h</td><td>25h</td></tr><tr><td>SW Reset</td><td>33h</td><td>30h</td><td>25h</td></tr><tr><td>HW Reset</td><td>33h</td><td>30h</td><td>25h</td></tr></table>                                                                                                                                                                                              |               |     |              |    |    |    |     |              |    |    |     | Status | Default Value |  |  | ID1 | ID2 | ID3 | Power On Sequence | 33h          | 30h | 25h | SW Reset | 33h                                    | 30h | 25h | HW Reset | 33h | 30h | 25h |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Default Value |     |              |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ID1           | ID2 | ID3          |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 33h           | 30h | 25h          |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 33h           | 30h | 25h          |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| HW Reset              | 33h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 30h           | 25h |              |    |    |    |     |              |    |    |     |        |               |  |  |     |     |     |                   |              |     |     |          |                                        |     |     |          |     |     |     |  |     |  |  |  |                                       |  |  |  |  |  |  |  |     |  |  |  |                                         |  |  |  |  |  |  |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |

## 12.1.4. RDDST (09h)

| 09H         | Read Display Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                           |                                                                    |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------|----------------|----|-----------|--------|-------------|------------|------------|---------------|-----|-----|-------------|-------|----------|------------------------|--------------------------------|----|-----------------------|----------------------------------------------------------|--------------------------------------------------------|----|-------------------------|------------------------------------------------------|------------------------------------------------------|----|-------------------------|---------------------------------------------------|-------------------------------------------|----|----------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|-----|--------------------|--------------------------------|--------------------------------|----------------|-----------------------------------------|---------------------|---------------------|---------------------|--|---------|------------------|----------------|--------|---------------------|----------------|--------|--------------|----------------|-----------|----------------------------|-------------------------------------------|-----------|---------------------------|------------------------------|-------|------------------|----------------|--------|----------------|----------------|
|             | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | RDX                                       | WRX                                                                | D7             | D6 | D5        | D4     | D3          | D2         | D1         | D0            | HEX |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Command     | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R                                         | H                                                                  | 0              | 0  | 0         | 0      | 1           | 0          | 0          | 1             | 09H |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Parameter1  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R                                         | H                                                                  | X              | X  | X         | X      | X           | X          | X          | X             | X   |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Parameter2  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R                                         | H                                                                  | BOOS<br>T_ON   | MY | MX        | MV     | ML          | RGB        | 0          | 0             | -   |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Parameter3  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R                                         | H                                                                  | PIXEL_FMT[3:0] |    |           |        | IDLE_<br>ON | PTL_O<br>N | SLPOU<br>T | NORMA<br>L_ON | -   |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Parameter4  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R                                         | H                                                                  | SCROL<br>L_ON  | 0  | INVON     | 0      | 0           | DISPO<br>N | TE_ON      | 0             | -   |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Parameter5  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | R                                         | H                                                                  | 0              | 0  | TELO<br>M | RGB_ON |             |            |            |               | -   |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| Description | <table><tr><th>Bit</th><th>Description</th><th>Value</th></tr><tr><td>BOOST_ON</td><td>Booster Voltage Status</td><td>“1”=Booster on,“0”=Booster off</td></tr><tr><td rowspan="2">MY</td><td rowspan="2">Row Address Order(MY)</td><td>“1”=Decrement. (Bottom to Top), when MADCTL (36h) D7=“1”</td></tr><tr><td>“0”=Increment.(Bottom to Top),when MADCTL (36h) D7=“0”</td></tr><tr><td rowspan="2">MX</td><td rowspan="2">Column Adress Order(MX)</td><td>“1”=Decrement.(Right to Left),when MADCTL(36h)D6=“1”</td></tr><tr><td>“0”=Increment.(Left to Right),when MADCTL(36h)D6=“0”</td></tr><tr><td rowspan="2">MV</td><td rowspan="2">Row/Column Exchange(MV)</td><td>“1”=Row/column exchange. when MADCTL (36h) D5=“1”</td></tr><tr><td>“0”=Normal(MV=0).when MADCTL (36h) D5=“0”</td></tr><tr><td rowspan="2">ML</td><td rowspan="2">Vertical refresh Order(ML)</td><td>“1”=Decrement.(LCD refresh Bottom to Top, when MADCTL (36h) D4=“1”</td></tr><tr><td>“0”=Increment.(LCD refresh Top to Bottom), when MADCTL(36h)D4=“0”</td></tr><tr><td rowspan="2">RGB</td><td rowspan="2">RGB/BGR Order(RGB)</td><td>“1”=BGR.when MADCTL(36h)D3=“1”</td></tr><tr><td>“0”=RGB.when MADCTL(36h)D3=“0”</td></tr><tr><td rowspan="4">PIXEL_FMT[3:0]</td><td rowspan="4">Interface Color Pixel Format Definition</td><td>“0011”=12-bit/pixel</td></tr><tr><td>“0101”=16-bit/pixel</td></tr><tr><td>“0110”=18-bit/pixel</td></tr><tr><td></td></tr><tr><td>IDLE_ON</td><td>Ldle Mode On/Off</td><td>“1”=On,“0”=Off</td></tr><tr><td>PTL_ON</td><td>Partial Mode On/Off</td><td>“1”=On,“0”=Off</td></tr><tr><td>SLPOUT</td><td>Sleep In/Out</td><td>“1”=On,“0”=Off</td></tr><tr><td>NORMAL_ON</td><td>Display Normal Mode On/Off</td><td>“1”=Normal Display,“0”=Normal Display Off</td></tr><tr><td>SCROLL_ON</td><td>Vertical Scrolling Status</td><td>“1”=Scroll On,“0”=Scroll Off</td></tr><tr><td>INVON</td><td>Inversion Status</td><td>“1”=On,“0”=Off</td></tr><tr><td>DISPON</td><td>Display On/Off</td><td>“1”=On,“0”=Off</td></tr></table> |                                           |                                                                    |                |    |           |        |             |            |            |               |     | Bit | Description | Value | BOOST_ON | Booster Voltage Status | “1”=Booster on,“0”=Booster off | MY | Row Address Order(MY) | “1”=Decrement. (Bottom to Top), when MADCTL (36h) D7=“1” | “0”=Increment.(Bottom to Top),when MADCTL (36h) D7=“0” | MX | Column Adress Order(MX) | “1”=Decrement.(Right to Left),when MADCTL(36h)D6=“1” | “0”=Increment.(Left to Right),when MADCTL(36h)D6=“0” | MV | Row/Column Exchange(MV) | “1”=Row/column exchange. when MADCTL (36h) D5=“1” | “0”=Normal(MV=0).when MADCTL (36h) D5=“0” | ML | Vertical refresh Order(ML) | “1”=Decrement.(LCD refresh Bottom to Top, when MADCTL (36h) D4=“1” | “0”=Increment.(LCD refresh Top to Bottom), when MADCTL(36h)D4=“0” | RGB | RGB/BGR Order(RGB) | “1”=BGR.when MADCTL(36h)D3=“1” | “0”=RGB.when MADCTL(36h)D3=“0” | PIXEL_FMT[3:0] | Interface Color Pixel Format Definition | “0011”=12-bit/pixel | “0101”=16-bit/pixel | “0110”=18-bit/pixel |  | IDLE_ON | Ldle Mode On/Off | “1”=On,“0”=Off | PTL_ON | Partial Mode On/Off | “1”=On,“0”=Off | SLPOUT | Sleep In/Out | “1”=On,“0”=Off | NORMAL_ON | Display Normal Mode On/Off | “1”=Normal Display,“0”=Normal Display Off | SCROLL_ON | Vertical Scrolling Status | “1”=Scroll On,“0”=Scroll Off | INVON | Inversion Status | “1”=On,“0”=Off | DISPON | Display On/Off | “1”=On,“0”=Off |
|             | Bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Description                               | Value                                                              |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | BOOST_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Booster Voltage Status                    | “1”=Booster on,“0”=Booster off                                     |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | MY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Row Address Order(MY)                     | “1”=Decrement. (Bottom to Top), when MADCTL (36h) D7=“1”           |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0”=Increment.(Bottom to Top),when MADCTL (36h) D7=“0”             |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | MX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Column Adress Order(MX)                   | “1”=Decrement.(Right to Left),when MADCTL(36h)D6=“1”               |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0”=Increment.(Left to Right),when MADCTL(36h)D6=“0”               |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | MV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Row/Column Exchange(MV)                   | “1”=Row/column exchange. when MADCTL (36h) D5=“1”                  |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0”=Normal(MV=0).when MADCTL (36h) D5=“0”                          |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | ML                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Vertical refresh Order(ML)                | “1”=Decrement.(LCD refresh Bottom to Top, when MADCTL (36h) D4=“1” |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0”=Increment.(LCD refresh Top to Bottom), when MADCTL(36h)D4=“0”  |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | RGB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RGB/BGR Order(RGB)                        | “1”=BGR.when MADCTL(36h)D3=“1”                                     |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0”=RGB.when MADCTL(36h)D3=“0”                                     |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | PIXEL_FMT[3:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Interface Color Pixel Format Definition   | “0011”=12-bit/pixel                                                |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0101”=16-bit/pixel                                                |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | “0110”=18-bit/pixel                                                |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           |                                                                    |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | IDLE_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Ldle Mode On/Off                          | “1”=On,“0”=Off                                                     |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | PTL_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Partial Mode On/Off                       | “1”=On,“0”=Off                                                     |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
|             | SLPOUT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sleep In/Out                              | “1”=On,“0”=Off                                                     |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| NORMAL_ON   | Display Normal Mode On/Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | “1”=Normal Display,“0”=Normal Display Off |                                                                    |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| SCROLL_ON   | Vertical Scrolling Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | “1”=Scroll On,“0”=Scroll Off              |                                                                    |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| INVON       | Inversion Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | “1”=On,“0”=Off                            |                                                                    |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |
| DISPON      | Display On/Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | “1”=On,“0”=Off                            |                                                                    |                |    |           |        |             |            |            |               |     |     |             |       |          |                        |                                |    |                       |                                                          |                                                        |    |                         |                                                      |                                                      |    |                         |                                                   |                                           |    |                            |                                                                    |                                                                   |     |                    |                                |                                |                |                                         |                     |                     |                     |  |         |                  |                |        |                     |                |        |              |                |           |                            |                                           |           |                           |                              |       |                  |                |        |                |                |

|                                         | <table><tr><td>TE_ON</td><td>Tearing effect line on/off</td><td>“1”=On,“0”=Off</td></tr><tr><td>TELOM</td><td>Tearing effect line mode</td><td>“0”=mode1,“1”=mode2,</td></tr><tr><td>RGB_ON</td><td>RGB interfacee flag</td><td>“0x1A”=RGB ON,”0x00”=RGB OFF</td></tr></table>                                                                                                                                                                                                                  | TE_ON                        | Tearing effect line on/off | “1”=On,“0”=Off                         | TELOM | Tearing effect line mode              | “0”=mode1,“1”=mode2, | RGB_ON                                  | RGB interfacee flag | “0x1A”=RGB ON,”0x00”=RGB OFF           |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------|----------------------------------------|-------|---------------------------------------|----------------------|-----------------------------------------|---------------------|----------------------------------------|-------------------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|
| TE_ON                                   | Tearing effect line on/off                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | “1”=On,“0”=Off               |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| TELOM                                   | Tearing effect line mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | “0”=mode1,“1”=mode2,         |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| RGB_ON                                  | RGB interfacee flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | “0x1A”=RGB ON,”0x00”=RGB OFF |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Restriction                             | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                              | Status                       | Availability               | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes                  | Partial Mode on,Idle Mode Off,Sleep Out | Yes                 | Partial Mode on,Idle Mode On,Sleep Out | Yes               | Sleep In  | Yes       |           |           |          |           |           |           |           |          |           |           |           |           |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Default                                 | <table><tr><th rowspan="2">Status</th><th colspan="4">Default Value(ST31 to ST0)</th></tr><tr><th>ST[31-24]</th><th>ST[23-16]</th><th>ST[15-8]</th><th>ST[7-0]</th></tr><tr><td>Power on Sequence</td><td>0000-0100</td><td>0110-0001</td><td>0000-0000</td><td>0000-0000</td></tr><tr><td>SW Reset</td><td>0xxx-xxx0</td><td>0xxx-0001</td><td>0000-0000</td><td>0000-0000</td></tr><tr><td>HW Reset</td><td>0000-0000</td><td>0110-0001</td><td>0000-0000</td><td>0000-0000</td></tr></table> | Status                       | Default Value(ST31 to ST0) |                                        |       |                                       | ST[31-24]            | ST[23-16]                               | ST[15-8]            | ST[7-0]                                | Power on Sequence | 0000-0100 | 0110-0001 | 0000-0000 | 0000-0000 | SW Reset | 0xxx-xxx0 | 0xxx-0001 | 0000-0000 | 0000-0000 | HW Reset | 0000-0000 | 0110-0001 | 0000-0000 | 0000-0000 |
| Status                                  | Default Value(ST31 to ST0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                              |                            |                                        |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
|                                         | ST[31-24]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ST[23-16]                    | ST[15-8]                   | ST[7-0]                                |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| Power on Sequence                       | 0000-0100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0110-0001                    | 0000-0000                  | 0000-0000                              |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| SW Reset                                | 0xxx-xxx0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0xxx-0001                    | 0000-0000                  | 0000-0000                              |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |
| HW Reset                                | 0000-0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0110-0001                    | 0000-0000                  | 0000-0000                              |       |                                       |                      |                                         |                     |                                        |                   |           |           |           |           |          |           |           |           |           |          |           |           |           |           |

### 12.1.5. RDDPM (0Ah)

| 0AH                   | Read Display Power Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------|--------------|-------------|------------|------------|-------------------|------------|----|----|-----|--------|-------------------------|----------------------------------------|----------------|---------------------------------------|----------------------------------|-----------------------------------------|------------------|----------------------------------------|--------|---------------------|---------------------------------------------|--------|--------------|-------------------------------|-----------|----------------------------|-------------------------------------------|--------|----------------|-----------------------------------|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX                               | WRX                                         | D7           | D6          | D5         | D4         | D3                | D2         | D1 | D0 | HEX |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R                                 | H                                           | 0            | 0           | 0          | 0          | 1                 | 0          | 1  | 0  | 0AH |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R                                 | H                                           | X            | X           | X          | X          | X                 | X          | X  | X  | X   |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | R                                 | H                                           | BOOS<br>T_ON | IDLE_<br>ON | PTL_O<br>N | SLPOU<br>T | NORM<br>AL_O<br>N | DISPO<br>N | 0  | 0  | -   |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Description           | <table><tr><th>Bit</th><th>Description</th><th>Value</th></tr><tr><td>BOOST_ON</td><td>Booster Voltage Status</td><td>“1”=Booster On<br/>“0”Booster Off</td></tr><tr><td>IDLE_ON</td><td>Idle mode On/Off</td><td>“1”=Idle mode On<br/>“0”=Idle mode Off</td></tr><tr><td>PTL_ON</td><td>Partial Mode On/Off</td><td>“1”=Partial Mode On<br/>“0”=Partial Mode Off</td></tr><tr><td>SLPOUT</td><td>Sleep In/Off</td><td>“1”=Sleep Out<br/>“0”=Sleep In</td></tr><tr><td>NORMAL_ON</td><td>Display Normal Mode On/Off</td><td>“1”=Normal Display<br/>“0”=Partial Display</td></tr><tr><td>DISPON</td><td>Display On/Off</td><td>“1”=Display On<br/>“0”=Display Off</td></tr></table> |                                   |                                             |              |             |            |            |                   |            |    |    |     | Bit    | Description             | Value                                  | BOOST_ON       | Booster Voltage Status                | “1”=Booster On<br>“0”Booster Off | IDLE_ON                                 | Idle mode On/Off | “1”=Idle mode On<br>“0”=Idle mode Off  | PTL_ON | Partial Mode On/Off | “1”=Partial Mode On<br>“0”=Partial Mode Off | SLPOUT | Sleep In/Off | “1”=Sleep Out<br>“0”=Sleep In | NORMAL_ON | Display Normal Mode On/Off | “1”=Normal Display<br>“0”=Partial Display | DISPON | Display On/Off | “1”=Display On<br>“0”=Display Off |
|                       | Bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Description                       | Value                                       |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | BOOST_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Booster Voltage Status            | “1”=Booster On<br>“0”Booster Off            |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | IDLE_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Idle mode On/Off                  | “1”=Idle mode On<br>“0”=Idle mode Off       |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | PTL_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Partial Mode On/Off               | “1”=Partial Mode On<br>“0”=Partial Mode Off |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | SLPOUT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sleep In/Off                      | “1”=Sleep Out<br>“0”=Sleep In               |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | NORMAL_ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display Normal Mode On/Off        | “1”=Normal Display<br>“0”=Partial Display   |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| DISPON                | Display On/Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | “1”=Display On<br>“0”=Display Off |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Restriction           | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                   |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                 |                                   |                                             |              |             |            |            |                   |            |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes            | Normal Mode on,Idle Mode On,Sleep Out | Yes                              | Partial Mode on,Idle Mode Off,Sleep Out | Yes              | Partial Mode on,Idle Mode On,Sleep Out | Yes    | Sleep In            | Yes                                         |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Availability                      |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes                               |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes                               |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes                               |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes                               |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>0000_1000(08h)</td></tr><tr><td>SW Reset</td><td>0000_1000(08h)</td></tr><tr><td>HW Reset</td><td>0000_1000(08h)</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |                                             |              |             |            |            |                   |            |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 0000_1000(08h) | SW Reset                              | 0000_1000(08h)                   | HW Reset                                | 0000_1000(08h)   |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0)           |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0000_1000(08h)                    |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0000_1000(08h)                    |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |
| HW Reset              | 0000_1000(08h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                             |              |             |            |            |                   |            |    |    |     |        |                         |                                        |                |                                       |                                  |                                         |                  |                                        |        |                     |                                             |        |              |                               |           |                            |                                           |        |                |                                   |

### 12.1.6. RDDMADCTL (0Bh)

| 0BH                   | Read Display MADCTL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------|----|----|----|----|------|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-----------------------------|-----------------------------------------|---------------------|----------------------------------------|-----|-------------------|----------------------------------------------------|----|--------------------|----------------------------------------------------------------|------|---------------|------------------|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX                     | WRX                                                            | D7 | D6 | D5 | D4 | D3   | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | R                       | H                                                              | 0  | 0  | 0  | 0  | 1    | 0  | 1  | 1  | 0BH |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | R                       | H                                                              | X  | X  | X  | X  | X    | X  | X  | X  | X   |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | R                       | H                                                              | MY | MX | MV | ML | SBGR | 0  | 0  | 0  | -   |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Description           | <table><tr><th>Bit</th><th>Description</th><th>Value</th></tr><tr><td>MY</td><td>Page Address Order</td><td>“1”=Decrement,“0”=Increment</td></tr><tr><td>MX</td><td>Column Adress Order</td><td>“1”=Decrement,“0”=Increment</td></tr><tr><td>MV</td><td>Page/Column Order</td><td>“1”=Row/column exchange (MV=1)<br/>“0”=Normal(MV=0)</td></tr><tr><td>ML</td><td>Line Address Order</td><td>“1”=LCD Refresh Botton to top<br/>“0”=LCD Refresh top to Botton</td></tr><tr><td>SBGR</td><td>RGB/BGR Order</td><td>“1”=BGR, “0”=RGB</td></tr></table> |                         |                                                                |    |    |    |    |      |    |    |    |     | Bit    | Description             | Value                                  | MY    | Page Address Order                    | “1”=Decrement,“0”=Increment | MX                                      | Column Adress Order | “1”=Decrement,“0”=Increment            | MV  | Page/Column Order | “1”=Row/column exchange (MV=1)<br>“0”=Normal(MV=0) | ML | Line Address Order | “1”=LCD Refresh Botton to top<br>“0”=LCD Refresh top to Botton | SBGR | RGB/BGR Order | “1”=BGR, “0”=RGB |
|                       | Bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Description             | Value                                                          |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | MY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Page Address Order      | “1”=Decrement,“0”=Increment                                    |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | MX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Column Adress Order     | “1”=Decrement,“0”=Increment                                    |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | MV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Page/Column Order       | “1”=Row/column exchange (MV=1)<br>“0”=Normal(MV=0)             |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | ML                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Line Address Order      | “1”=LCD Refresh Botton to top<br>“0”=LCD Refresh top to Botton |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| SBGR                  | RGB/BGR Order                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | “1”=BGR, “0”=RGB        |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Restriction           | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                         |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                  |                         |                                                                |    |    |    |    |      |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes                         | Partial Mode on,Idle Mode Off,Sleep Out | Yes                 | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In          | Yes                                                |    |                    |                                                                |      |               |                  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Availability            |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes                     |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes                     |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes                     |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes                     |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h08</td></tr><tr><td>SW Reset</td><td>8’h08</td></tr><tr><td>HW Reset</td><td>8’h08</td></tr></table>                                                                                                                                                                                                                                                                                                                                            |                         |                                                                |    |    |    |    |      |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h08 | SW Reset                              | 8’h08                       | HW Reset                                | 8’h08               |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Default Value(D7 to D0) |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 8’h08                   |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8’h08                   |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |
| HW Reset              | 8’h08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                                                                |    |    |    |    |      |    |    |    |     |        |                         |                                        |       |                                       |                             |                                         |                     |                                        |     |                   |                                                    |    |                    |                                                                |      |               |                  |

## 12.1.7. RDDCOLMOD (0Ch)

| 0CH                   | Read Display Pixel Format               |     |       |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|-----------------------|-----------------------------------------|-----|-------|-----------|----------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------|----|----|-----|
|                       | D/CX                                    | RDX | WRX   | D7        | D6                               | D5                     | D4                                                                                                                                                      | D3    | D2           | D1 | D0 | HEX |
| Command               | L                                       | R   | H     | 0         | 0                                | 0                      | 0                                                                                                                                                       | 1     | 1            | 0  | 0  | 0CH |
| Parameter1            | H                                       | R   | H     | X         | X                                | X                      | X                                                                                                                                                       | X     | X            | X  | X  | X   |
| Parameter2            | H                                       | R   | H     | VIPF[3:0] |                                  |                        |                                                                                                                                                         | 0     | IFPF[2:0]    |    |    | -   |
| Description           | The 1st Parameter is dummy read.        |     |       |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       |                                         |     |       | Bit       |                                  | Description            |                                                                                                                                                         | Value |              |    |    |     |
|                       | D7                                      |     | VIPF3 |           | RGB Interface<br>Color Fomat     |                        | 0101=16 bit/pixel(1 time data transfer)<br>0110=18 bit/pixel(1 time data transfer)<br>1110=18 bit/pixel(3 times data transfer)<br>The other=not defined |       |              |    |    |     |
|                       | D6                                      |     | VIPF2 |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       | D5                                      |     | VIPF1 |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       | D4                                      |     | VIPF0 |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       | D3                                      |     | D3    |           |                                  |                        | “0”∧Not Used)                                                                                                                                           |       |              |    |    |     |
|                       | D2                                      |     | IFPF2 |           | Control Interface<br>Color Fomat |                        | “011”=12 bit/pixel<br>“101”=16 bit/pixel<br>“110”=18 bit/pixel<br>The other=not defined                                                                 |       |              |    |    |     |
|                       | D1                                      |     | IFPF1 |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       | D0                                      |     | IFPF0 |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
| Restriction           | None                                    |     |       |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
| Register Availability |                                         |     |       |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       | Status                                  |     |       |           |                                  |                        |                                                                                                                                                         |       | Availability |    |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out  |     |       |           |                                  |                        |                                                                                                                                                         |       | Yes          |    |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out   |     |       |           |                                  |                        |                                                                                                                                                         |       | Yes          |    |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out |     |       |           |                                  |                        |                                                                                                                                                         |       | Yes          |    |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out  |     |       |           |                                  |                        |                                                                                                                                                         |       | Yes          |    |    |     |
| Sleep In              |                                         |     |       |           |                                  |                        |                                                                                                                                                         | Yes   |              |    |    |     |
| Default               |                                         |     |       |           |                                  |                        |                                                                                                                                                         |       |              |    |    |     |
|                       | Status                                  |     |       |           |                                  |                        | Default Value(D7 to D0)                                                                                                                                 |       |              |    |    |     |
|                       | Power On Sequence                       |     |       |           |                                  |                        | 0110_0110(18bit/pixel)                                                                                                                                  |       |              |    |    |     |
|                       | SW Reset                                |     |       |           |                                  |                        | No Change                                                                                                                                               |       |              |    |    |     |
| HW Reset              |                                         |     |       |           |                                  | 0110_0110(18bit/pixel) |                                                                                                                                                         |       |              |    |    |     |

### 12.1.8. RDDIM (0Dh)

| 0DH                   | Read Display Image Mode          |     |     |           |                                         |       |    |                                             |              |    |    |     |
|-----------------------|----------------------------------|-----|-----|-----------|-----------------------------------------|-------|----|---------------------------------------------|--------------|----|----|-----|
|                       | D/CX                             | RDX | WRX | D7        | D6                                      | D5    | D4 | D3                                          | D2           | D1 | D0 | HEX |
| Command               | L                                | R   | H   | 0         | 0                                       | 0     | 0  | 1                                           | 1            | 0  | 1  | 0DH |
| Parameter1            | H                                | R   | H   | X         | X                                       | X     | X  | X                                           | X            | X  | X  | X   |
| Parameter2            | H                                | R   | H   | SCROLL_ON | 0                                       | INVON | 0  | 0                                           | 0            | 0  | 0  | -   |
| Description           | The 1st Parameter is dummy read. |     |     |           |                                         |       |    |                                             |              |    |    |     |
|                       |                                  |     |     | Bit       | Description                             |       |    | Value                                       |              |    |    |     |
|                       |                                  |     |     | D7        | Scrolling On/Off                        |       |    | “1”=Scrolling is On<br>“0”=Scrolling is Off |              |    |    |     |
|                       |                                  |     |     | D5        | Inversion On/Off                        |       |    | “1”=Inversion is On<br>“0”=Inversion is Off |              |    |    |     |
| Restriction           | None                             |     |     |           |                                         |       |    |                                             |              |    |    |     |
| Register Availability |                                  |     |     |           |                                         |       |    |                                             |              |    |    |     |
|                       |                                  |     |     |           | Status                                  |       |    |                                             | Availability |    |    |     |
|                       |                                  |     |     |           | Normal Mode on,Idle Mode Off,Sleep Out  |       |    |                                             | Yes          |    |    |     |
|                       |                                  |     |     |           | Normal Mode on,Idle Mode On,Sleep Out   |       |    |                                             | Yes          |    |    |     |
|                       |                                  |     |     |           | Partial Mode on,Idle Mode Off,Sleep Out |       |    |                                             | Yes          |    |    |     |
|                       |                                  |     |     |           | Partial Mode on,Idle Mode On,Sleep Out  |       |    |                                             | Yes          |    |    |     |
|                       |                                  |     |     |           | Sleep In                                |       |    |                                             | Yes          |    |    |     |
| Default               |                                  |     |     |           |                                         |       |    |                                             |              |    |    |     |
|                       |                                  |     |     |           | Status                                  |       |    | Default Value(D7 to D0)                     |              |    |    |     |
|                       |                                  |     |     |           | Power On Sequence                       |       |    | 8’h00                                       |              |    |    |     |
|                       |                                  |     |     |           | SW Reset                                |       |    | 8’h00                                       |              |    |    |     |
|                       |                                  |     |     |           | HW Reset                                |       |    | 8’h00                                       |              |    |    |     |

### 12.1.9. RDDSM (0EH)

| 0EH                   | Read Display Signal Mode                |     |                            |       |       |                         |                       |              |    |    |    |     |
|-----------------------|-----------------------------------------|-----|----------------------------|-------|-------|-------------------------|-----------------------|--------------|----|----|----|-----|
|                       | D/CX                                    | RDX | WRX                        | D7    | D6    | D5                      | D4                    | D3           | D2 | D1 | D0 | HEX |
| Command               | L                                       | R   | H                          | 0     | 0     | 0                       | 0                     | 1            | 1  | 1  | 0  | 0EH |
| Parameter1            | H                                       | R   | H                          | X     | X     | X                       | X                     | X            | X  | X  | X  | X   |
| Parameter2            | H                                       | R   | H                          | TE_ON | TELOM | 0                       | 0                     | 0            | 0  | 0  | 0  | -   |
| Description           | The 1st Parameter is dummy read.        |     |                            |       |       |                         |                       |              |    |    |    |     |
|                       | Bit                                     |     | Description                |       |       |                         | Value                 |              |    |    |    |     |
|                       | D7                                      |     | Tearing Effect Line On/Off |       |       |                         | “0”=Off, “1”= On      |              |    |    |    |     |
|                       | D6                                      |     | Tearing Effect Line Mode   |       |       |                         | “0”=Mode1, “1”= Mode2 |              |    |    |    |     |
| Restriction           | None                                    |     |                            |       |       |                         |                       |              |    |    |    |     |
| Register Availability |                                         |     |                            |       |       |                         |                       |              |    |    |    |     |
|                       | Status                                  |     |                            |       |       |                         |                       | Availability |    |    |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out  |     |                            |       |       |                         |                       | Yes          |    |    |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out   |     |                            |       |       |                         |                       | Yes          |    |    |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out |     |                            |       |       |                         |                       | Yes          |    |    |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out  |     |                            |       |       |                         |                       | Yes          |    |    |    |     |
| Sleep In              |                                         |     |                            |       |       |                         | Yes                   |              |    |    |    |     |
| Default               |                                         |     |                            |       |       |                         |                       |              |    |    |    |     |
|                       | Status                                  |     |                            |       |       | Default Value(D7 to D0) |                       |              |    |    |    |     |
|                       | Power On Sequence                       |     |                            |       |       | 8’h00                   |                       |              |    |    |    |     |
|                       | SW Reset                                |     |                            |       |       | 8’h00                   |                       |              |    |    |    |     |
| HW Reset              |                                         |     |                            |       | 8’h00 |                         |                       |              |    |    |    |     |

### 12.1.10. RDDSDR (0Fh)

| 0FH                   | Read Display Self-Diagnostic Result                                                                                                                                                                                                                                                                                                                                                |                         |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----------------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7             | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | 0              | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 0FH |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | X              | X  | X  | X  | X  | X  | X  | X  | X   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | SELF_DIAG[3:0] |    |    |    | 0  | 0  | 0  | 0  | -   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | The 1st Parameter is dummy read.<br>If internal function work correctly, send this command will get an inverted result every time.                                                                                                                                                                                                                                                 |                         |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | None                                                                                                                                                                                                                                                                                                                                                                               |                         |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |                |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>SLPIN</td></tr><tr><td>SW Reset</td><td>8'h00</td></tr><tr><td>HW Reset</td><td>8'h00</td></tr></table>                                                                                                                                                                           |                         |     |                |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | SLPIN | SW Reset                              | 8'h00 | HW Reset                                | 8'h00 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | SLPIN                   |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8'h00                   |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8'h00                                                                                                                                                                                                                                                                                                                                                                              |                         |     |                |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

## 12.1.11. SLPIN (10h)

| 10H                                     | Sleep In                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                       | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                          | H   | R   | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 10H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description                             | This command causes the LCD module to enter the minimum power consumption mode. In this mode e.g. the DC/DC converter is stopped, Internal oscillator is stopped, and panel scanning is stopped.<br>MCU interface and memory are still working and the memory keeps it's contents.                                                                                                                                         |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction                             | This command has no effect when module is already in sleep in mode. Sleep In Mode can only be left by the Sleep Out Command (11h).<br>It will be necessary to wait 5msec before sending next command; this is to allow time for the supply voltages and clock circuits to stabilize.<br>It will be necessary to wait 120 msec after sending Sleep Out command (when in Sleep In Mode) before Sleep In command can be sent. |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                         |     |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>SLPIN</td></tr><tr><td>SW Reset</td><td>SLPIN</td></tr><tr><td>HW Reset</td><td>SLPIN</td></tr></table>                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | SLPIN | SW Reset                              | SLPIN | HW Reset                                | SLPIN |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Power On Sequence                       | SLPIN                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| SW Reset                                | SLPIN                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset                                | SLPIN                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.1.12. SLPOUT(11h)

| 11H                                     | Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|--------|---------------------------------------|--------|-----------------------------------------|--------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | H   | R   | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 11H |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Description                             | This command turns off sleep mode.<br>In this mode e.g. the DC/DC converter is enabled. Internal oscillator is started, and panel scanning is started.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Restriction                             | This command has no effect when module is already in sleep out mode. Sleep Out Mode can only be left by the Sleep in Command (10h).<br>It will be necessary to wait 5msec before sending next command; this is to allow time for the clock circuits to stabilize.<br>The display module loads all display supplier’s factory default values to the registers during this 120 msec and there cannot be any abnormal visual effect on the display image if faceory default and register values are same when this load is done and when the display module is already Sleep Out-mode.<br>The display module is doing self-diagnostic function during this 5msec. It will be necessary to wait 120msec after sending Sleep In command ( when in Sleep Out mode ) before Sleep Out command can be sent.<br>This command has no effect when module is already in sleep out mode.<br>Sleep Out Mode can only be left by HW Reset, Software Reset (01h), Sleep In (10h), or a NMI event trigger. |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes    | Normal Mode on,Idle Mode On,Sleep Out | Yes    | Partial Mode on,Idle Mode Off,Sleep Out | Yes    | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>SLPOUT</td></tr><tr><td>SW Reset</td><td>SLPOUT</td></tr><tr><td>HW Reset</td><td>SLPOUT</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | SLPOUT | SW Reset                              | SLPOUT | HW Reset                                | SLPOUT |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| Power On Sequence                       | SLPOUT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| SW Reset                                | SLPOUT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |
| HW Reset                                | SLPOUT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |        |                                       |        |                                         |        |                                        |     |          |     |

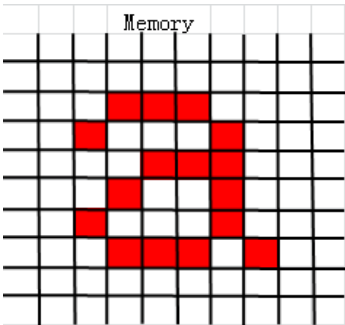
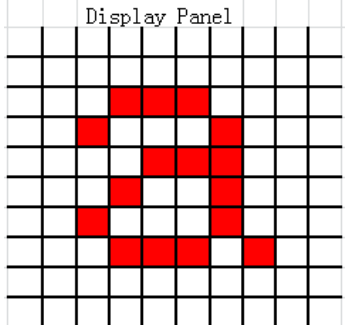
## 12.1.13. PTLON (12h)

| 12H                   | Partial Display Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |                   |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|-------------------|-------------------------|----|----|----|----|-----|--------|--|--|--|--|--|-------------------------|--|--|--|--|--|----------------------------------------|--|--|--|--|--|-------------------|--|--|--|--|--|---------------------------------------|--|--|--|--|--|-------------------|--|--|--|--|--|-----------------------------------------|--|--|--|--|--|-------------------|--|--|--|--|--|----------------------------------------|--|--|--|--|--|-----|--|--|--|--|--|----------|--|--|--|--|--|-----|--|--|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7 | D6 | D5                | D4                      | D3 | D2 | D1 | D0 | HEX |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 0  | 0  | 0                 | 1                       | 0  | 0  | 1  | 0  | 12H |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |                   |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Description           | This command turns on partial mode.The partial mode is described by the Partial Area command (30h).<br>To leave Partial mode, the Normal Display On command (13h) should be written.<br>X=Don't care<br>Note: If a command is written in a frame cycle, the command becomes effective from the next frame.                                                                                                                                                                                                                         |     |     |    |    |                   |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Restriction           | This command has no effect during Partial mode is active.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |    |    |                   |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Register Availability | <table><tr><th colspan="6">Status</th><th colspan="6">Availability</th></tr><tr><td colspan="6">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Sleep In</td><td colspan="6">Yes</td></tr></table> |     |     |    |    |                   |                         |    |    |    |    |     | Status |  |  |  |  |  | Availability            |  |  |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  | Yes               |  |  |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  | Yes               |  |  |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  | Yes               |  |  |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  | Yes |  |  |  |  |  | Sleep In |  |  |  |  |  | Yes |  |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |                   | Availability            |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |                   | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |                   | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |                   | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |                   | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    | Yes               |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">Normal Display On</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">Normal Display On</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">Normal Display On</td></tr></table>                                                                                                                                                                                       |     |     |    |    |                   |                         |    |    |    |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |  |  |  |  |  | Power On Sequence                      |  |  |  |  |  | Normal Display On |  |  |  |  |  | SW Reset                              |  |  |  |  |  | Normal Display On |  |  |  |  |  | HW Reset                                |  |  |  |  |  | Normal Display On |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |                   | Default Value(D7 to D0) |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |                   | Normal Display On       |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |    |    |                   | Normal Display On       |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    | Normal Display On |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |                   |  |  |  |  |  |                                       |  |  |  |  |  |                   |  |  |  |  |  |                                         |  |  |  |  |  |                   |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |

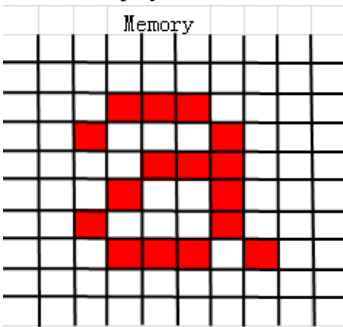
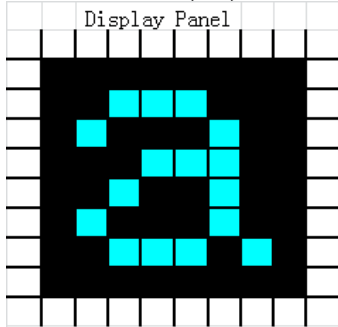
#### 12.1.14. NORON (13h)

| 13H                   | Normal Display Mode On                                                                                                                                                                                                                                                                                                                                                             |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------------------|---------------------------------------|-------------------|-----------------------------------------|-------------------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 13H |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                       |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Description           | This command returns the display to normal mode.<br>Normal display mode on means Partial mode off and Scroll mode off.<br>Exit from NORON by the Partial mode On command (12h)<br>X=Don't care<br>Note: If a command is written in a frame cycle, the command becomes effective from the next frame.                                                                               |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Restriction           | This command has no effect when Normal Display mode is active.                                                                                                                                                                                                                                                                                                                     |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes               | Normal Mode on,Idle Mode On,Sleep Out | Yes               | Partial Mode on,Idle Mode Off,Sleep Out | Yes               | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Normal Display On</td></tr><tr><td>SW Reset</td><td>Normal Display On</td></tr><tr><td>HW Reset</td><td>Normal Display On</td></tr></table>                                                                                                                                       |                         |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Normal Display On | SW Reset                              | Normal Display On | HW Reset                                | Normal Display On |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | Normal Display On       |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | Normal Display On       |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| HW Reset              | Normal Display On                                                                                                                                                                                                                                                                                                                                                                  |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |

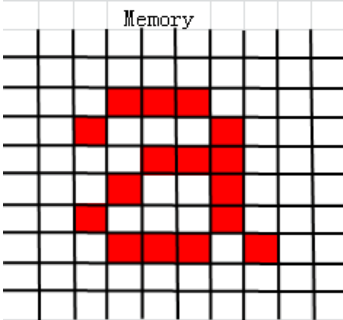
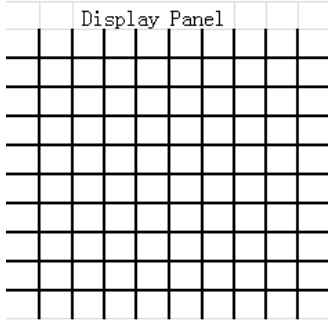
## 12.1.15. INVOFF (20h)

| 20H                                     | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------------------|---------------------------------------|-------------------|-----------------------------------------|-------------------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H   | R   | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 20H |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Description                             | <div><div><p>This command is used to recover from display inversion mode.<br/>This command makes no change of contents of frame memory.<br/>This command does not change any other status.</p><div><div><div>Memory</div></div><div>→</div><div><div>Display Panel</div></div></div></div></div> |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Restriction                             | This command has no effect when module is already in inversion off mode.                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                  |     |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes               | Normal Mode on,Idle Mode On,Sleep Out | Yes               | Partial Mode on,Idle Mode Off,Sleep Out | Yes               | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Normal Display On</td></tr><tr><td>SW Reset</td><td>Normal Display On</td></tr><tr><td>HW Reset</td><td>Normal Display On</td></tr></table>                                                                                                                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Normal Display On | SW Reset                              | Normal Display On | HW Reset                                | Normal Display On |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Power On Sequence                       | Normal Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| SW Reset                                | Normal Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| HW Reset                                | Normal Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |

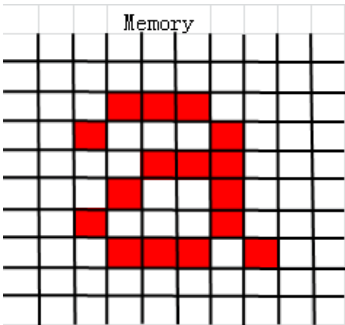
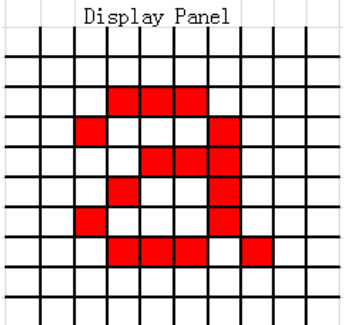
## 12.1.16. INVON (21h)

| 21H                                     | Display Inversion On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------------------|---------------------------------------|-------------------|-----------------------------------------|-------------------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 1  | 21H |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Description                             | <p>This command is used to enter into display inversion mode.<br/>This command makes no change of contents of frame memory. Every bit is inverted from the frame memory to the display.<br/>This command does not change any other status.<br/>To exit from Display Inversion On, the Display Inversion Off command (20h) should be written.</p> <div><div><p>Memory</p></div><div></div><div><p>Display Panel</p></div></div> |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Restriction                             | This command has no effect when module is already in inversion on mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                 |     |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes               | Normal Mode on,Idle Mode On,Sleep Out | Yes               | Partial Mode on,Idle Mode Off,Sleep Out | Yes               | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Normal Display On</td></tr><tr><td>SW Reset</td><td>Normal Display On</td></tr><tr><td>HW Reset</td><td>Normal Display On</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Normal Display On | SW Reset                              | Normal Display On | HW Reset                                | Normal Display On |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| Power On Sequence                       | Normal Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| SW Reset                                | Normal Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |
| HW Reset                                | Normal Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |                   |                                       |                   |                                         |                   |                                        |     |          |     |

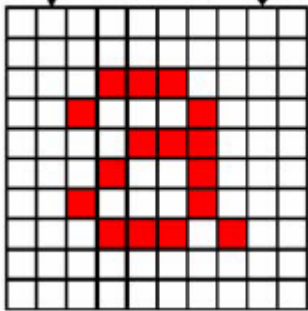
## 12.1.17. DISPOFF (28h)

| 28H                                     | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------------|---------------------------------------|-------------|-----------------------------------------|-------------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | H   | R   | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 0  | 28H |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Description                             | <div><div><p>This command is used to enter into DISPLAY OFF mode. In this mode, the output from Frame Memory is disabled and blank page inserted.</p><p>This command makes no change of contents of frame memory.</p><p>This command does not change any other status.</p><p>There will be no abnormal visible effect on the display.</p><p>Exit from this command by Display On (29h).</p></div><div><div><div>Memory</div></div><div><div>Display Panel</div></div></div></div> |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Restriction                             | This command has no effect when module is already in display off mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes         | Normal Mode on,Idle Mode On,Sleep Out | Yes         | Partial Mode on,Idle Mode Off,Sleep Out | Yes         | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Display Off</td></tr><tr><td>SW Reset</td><td>Display Off</td></tr><tr><td>HW Reset</td><td>Display Off</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Display Off | SW Reset                              | Display Off | HW Reset                                | Display Off |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| Power On Sequence                       | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| SW Reset                                | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |
| HW Reset                                | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |             |                                       |             |                                         |             |                                        |     |          |     |

### 12.1.18 DISPON (29h)

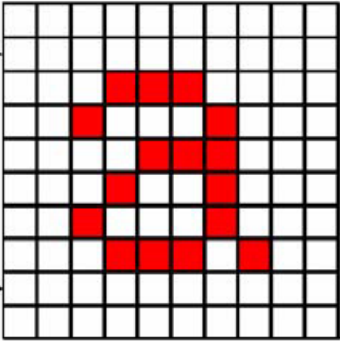
| 29H                                     | Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|------------|---------------------------------------|------------|-----------------------------------------|------------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | H   | R   | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 1  | 29H |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Description                             | <div><div><p>This command is used to recover from DISPLAY OFF mode. Output from the Frame Memory is enabled. This command makes no change of contents of frame memory. This command does not change any other status.</p></div><div><div><div><div>Memory</div></div><div>→</div><div><div>Display Panel</div></div></div></div></div> |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Restriction                             | This command has no effect when module is already in display on mode.                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                        |     |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes        | Normal Mode on,Idle Mode On,Sleep Out | Yes        | Partial Mode on,Idle Mode Off,Sleep Out | Yes        | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Display On</td></tr><tr><td>SW Reset</td><td>Display On</td></tr><tr><td>HW Reset</td><td>Display On</td></tr></table>                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Display On | SW Reset                              | Display On | HW Reset                                | Display On |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| Power On Sequence                       | Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| SW Reset                                | Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |
| HW Reset                                | Display On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |            |                                       |            |                                         |            |                                        |     |          |     |

## 12.1.19 CASET (2Ah)

| 2AH                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     | Column Address Set |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------------------|----|----|----|----|----|----|----|-----|--------|--------------|----------------------------------------|-----|---------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | RDX | WRX | D7                 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | H   | R   | 0                  | 0  | 1  | 0  | 1  | 0  | 1  | 0  | 2AH |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Parameter1                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | H   | R   | COL_ST_SET[15:8]   |    |    |    |    |    |    |    | 00H |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Parameter2                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | H   | R   | COL_ST_SET[7:0]    |    |    |    |    |    |    |    | 00H |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Parameter3                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | H   | R   | COL_ED_SET[15:8]   |    |    |    |    |    |    |    | 00H |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Parameter4                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | H   | R   | COL_ED_SET[7:0]    |    |    |    |    |    |    |    | 83H |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Description                             | <p>This command is used to define area of frame memory where MCU can access.<br/>This command makes no change on the other driver status.<br/>The value of COL_ST_SET[7:0] and COL_ED_SET[7:0] are referred when RAMWR command comes.<br/>Each value represents one column line in the Frame Memory.</p> <div><div>COL_ST_SET[7 : 0]</div><div>COL_ED_SET[7:0]</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Restriction                             | <p>XS[7:0] always must be equal to or less than XE[7:0].<br/>When XS[7:0] or XE[7:0] is greater than maximum row address like below, data of out of range will be ignored.</p> <p><b>1. 132x132 memory base(GM='101')</b><br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 131(0083H)):MV="0"<br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 131(0083H)):MV="1"</p> <p><b>2. 130x130 memory base(GM='100')</b><br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 129(0081H)):MV="0"<br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 129(0081H)):MV="1"</p> <p><b>3. 128x160 memory base(GM='011')</b><br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 127(007FH)):MV="0"<br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 159(009FH)):MV="1"</p> <p><b>4. 120x160 memory base(GM='010')</b><br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 119(0077H)):MV="0"<br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 159(009FH)):MV="1"</p> <p><b>5. 128x128 memory base(GM='001')</b><br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 127(007FH)):MV="0"<br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 127(007FH)):MV="1"</p> <p><b>6. 132x162 memory base(GM='000')</b><br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 131(0083H)):MV="0"<br/>(Parameter range:0 ≦ XS[7:0] ≦ XE[7:0] ≦ 127(00A1H)):MV="1"</p> |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |                    |    |    |    |    |    |    |    |     | Status | Availability | Normal Mode on,Idle Mode Off,Sleep Out | Yes | Normal Mode on,Idle Mode On,Sleep Out | Yes | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |                    |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |                                        |     |

|         | Sleep In                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               | Yes        |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|---------------|--------|---------------|--|--|--------------------|---------|---------|---------------|-------------------|-------|------------|--|-----------|-------|------------|------------|-----------|-------|------------|--|--------|---------------|--|--|--------------------|---------|---------|---------------|-------------------|-------|------------|--|-----------|-------|------------|------------|-----------|-------|------------|--|--------|---------------|--|--|--------------------|---------|---------|---------------|-------------------|-------|------------|--|-----------|-------|------------|------------|-----------|-------|------------|--|--------|---------------|--|--|--------------------|---------|---------|---------------|-------------------|-------|------------|--|-----------|-------|------------|------------|-----------|-------|------------|--|--------|---------------|--|--|--------------------|---------|---------|---------------|-------------------|-------|------------|--|-----------|-------|------------|------------|-----------|-------|------------|--|--------|---------------|--|--|--------------------|---------|---------|---------------|-------------------|-------|------------|--|-----------|-------|------------|------------|----------|-------|------------|--|
| Default | <table><tr><th>Status</th><th colspan="3">Default Value</th></tr><tr><td>(132x132 GM="101")</td><td>XS[7:0]</td><td>XE[7:0]</td><td>EX[7:0](MV=1)</td></tr><tr><td>Power On Sequence</td><td>0000h</td><td colspan="2">0083h(131)</td></tr><tr><td>S/W Reset</td><td>0000h</td><td>0083h(131)</td><td>0083h(131)</td></tr><tr><td>H/W Reset</td><td>0000h</td><td colspan="2">0083h(131)</td></tr><tr><th>Status</th><th colspan="3">Default Value</th></tr><tr><td>(130x130 GM="100")</td><td>XS[7:0]</td><td>XE[7:0]</td><td>EX[7:0](MV=1)</td></tr><tr><td>Power On Sequence</td><td>0000h</td><td colspan="2">0081h(129)</td></tr><tr><td>S/W Reset</td><td>0000h</td><td>0081h(129)</td><td>0081h(129)</td></tr><tr><td>H/W Reset</td><td>0000h</td><td colspan="2">0081h(129)</td></tr><tr><th>Status</th><th colspan="3">Default Value</th></tr><tr><td>(128x160 GM="011")</td><td>XS[7:0]</td><td>XE[7:0]</td><td>EX[7:0](MV=1)</td></tr><tr><td>Power On Sequence</td><td>0000h</td><td colspan="2">007Fh(127)</td></tr><tr><td>S/W Reset</td><td>0000h</td><td>007Fh(127)</td><td>009Fh(159)</td></tr><tr><td>H/W Reset</td><td>0000h</td><td colspan="2">007Fh(127)</td></tr><tr><th>Status</th><th colspan="3">Default Value</th></tr><tr><td>(120x160 GM="010")</td><td>XS[7:0]</td><td>XE[7:0]</td><td>EX[7:0](MV=1)</td></tr><tr><td>Power On Sequence</td><td>0000h</td><td colspan="2">0077h(119)</td></tr><tr><td>S/W Reset</td><td>0000h</td><td>007Fh(119)</td><td>009Fh(159)</td></tr><tr><td>H/W Reset</td><td>0000h</td><td colspan="2">0077h(119)</td></tr><tr><th>Status</th><th colspan="3">Default Value</th></tr><tr><td>(128x128 GM="001")</td><td>XS[7:0]</td><td>XE[7:0]</td><td>EX[7:0](MV=1)</td></tr><tr><td>Power On Sequence</td><td>0000h</td><td colspan="2">007Fh(127)</td></tr><tr><td>S/W Reset</td><td>0000h</td><td>007Fh(127)</td><td>009Fh(127)</td></tr><tr><td>H/W Reset</td><td>0000h</td><td colspan="2">0077h(119)</td></tr><tr><th>Status</th><th colspan="3">Default Value</th></tr><tr><td>(132x162 GM="000")</td><td>XS[7:0]</td><td>XE[7:0]</td><td>EX[7:0](MV=1)</td></tr><tr><td>Power On Sequence</td><td>0000h</td><td colspan="2">0083h(131)</td></tr><tr><td>S/W Reset</td><td>0000h</td><td>0083h(131)</td><td>00A1h(161)</td></tr><tr><td>HW Reset</td><td>0000h</td><td colspan="2">0083H(131)</td></tr></table> |               |            |               | Status | Default Value |  |  | (132x132 GM="101") | XS[7:0] | XE[7:0] | EX[7:0](MV=1) | Power On Sequence | 0000h | 0083h(131) |  | S/W Reset | 0000h | 0083h(131) | 0083h(131) | H/W Reset | 0000h | 0083h(131) |  | Status | Default Value |  |  | (130x130 GM="100") | XS[7:0] | XE[7:0] | EX[7:0](MV=1) | Power On Sequence | 0000h | 0081h(129) |  | S/W Reset | 0000h | 0081h(129) | 0081h(129) | H/W Reset | 0000h | 0081h(129) |  | Status | Default Value |  |  | (128x160 GM="011") | XS[7:0] | XE[7:0] | EX[7:0](MV=1) | Power On Sequence | 0000h | 007Fh(127) |  | S/W Reset | 0000h | 007Fh(127) | 009Fh(159) | H/W Reset | 0000h | 007Fh(127) |  | Status | Default Value |  |  | (120x160 GM="010") | XS[7:0] | XE[7:0] | EX[7:0](MV=1) | Power On Sequence | 0000h | 0077h(119) |  | S/W Reset | 0000h | 007Fh(119) | 009Fh(159) | H/W Reset | 0000h | 0077h(119) |  | Status | Default Value |  |  | (128x128 GM="001") | XS[7:0] | XE[7:0] | EX[7:0](MV=1) | Power On Sequence | 0000h | 007Fh(127) |  | S/W Reset | 0000h | 007Fh(127) | 009Fh(127) | H/W Reset | 0000h | 0077h(119) |  | Status | Default Value |  |  | (132x162 GM="000") | XS[7:0] | XE[7:0] | EX[7:0](MV=1) | Power On Sequence | 0000h | 0083h(131) |  | S/W Reset | 0000h | 0083h(131) | 00A1h(161) | HW Reset | 0000h | 0083H(131) |  |
|         | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |            |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | (132x132 GM="101")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS[7:0]       | XE[7:0]    | EX[7:0](MV=1) |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000h         | 0083h(131) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0083h(131) | 0083h(131)    |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0083h(131) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |            |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | (130x130 GM="100")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS[7:0]       | XE[7:0]    | EX[7:0](MV=1) |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000h         | 0081h(129) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0081h(129) | 0081h(129)    |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0081h(129) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |            |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | (128x160 GM="011")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS[7:0]       | XE[7:0]    | EX[7:0](MV=1) |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000h         | 007Fh(127) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 007Fh(127) | 009Fh(159)    |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 007Fh(127) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |            |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | (120x160 GM="010")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS[7:0]       | XE[7:0]    | EX[7:0](MV=1) |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000h         | 0077h(119) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 007Fh(119) | 009Fh(159)    |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0077h(119) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |            |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | (128x128 GM="001")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS[7:0]       | XE[7:0]    | EX[7:0](MV=1) |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000h         | 007Fh(127) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 007Fh(127) | 009Fh(127)    |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0077h(119) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |            |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | (132x162 GM="000")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | XS[7:0]       | XE[7:0]    | EX[7:0](MV=1) |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0000h         | 0083h(131) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0000h         | 0083h(131) | 00A1h(161)    |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |
|         | HW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0000h         | 0083H(131) |               |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |           |       |            |  |        |               |  |  |                    |         |         |               |                   |       |            |  |           |       |            |            |          |       |            |  |

## 12.1.20 RASET (2Bh)

| 2BH                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     | Row Address Set  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------------------|----|----|----|----|----|----|----|-----|--------|--------------|----------------------------------------|-----|---------------------------------------|-----|-----------------------------------------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | RDX | WRX | D7               | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |                                        |     |                                       |     |                                         |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | H   | R   | 0                | 0  | 1  | 0  | 1  | 0  | 1  | 1  | 2BH |        |              |                                        |     |                                       |     |                                         |     |
| Parameter1                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | H   | R   | ROW_ST_SET[15:8] |    |    |    |    |    |    |    | 00H |        |              |                                        |     |                                       |     |                                         |     |
| Parameter2                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | H   | R   | ROW_ST_SET[7:0]  |    |    |    |    |    |    |    | 00H |        |              |                                        |     |                                       |     |                                         |     |
| Parameter3                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | H   | R   | ROW_ED_SET[15:8] |    |    |    |    |    |    |    | 00H |        |              |                                        |     |                                       |     |                                         |     |
| Parameter4                              | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | H   | R   | ROW_ED_SET[7:0]  |    |    |    |    |    |    |    | A1H |        |              |                                        |     |                                       |     |                                         |     |
| Description                             | <p>This command is used to define area of frame memory where MCU can access.<br/>This command makes no change on the other driver status.<br/>The value of ROW_ST_SET[7:0] and ROW_ED_SET[7:0] are referred when RAMWR command comes.<br/>Each value represents one Page line in the Frame Memory.</p> <div><div>ROW_ST_SET[7:0] →</div><div>ROW_ED_SET[7:0] →</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |                  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |
| Restriction                             | <p>YS[7:0] always must be equal to or less than EP[7:0].<br/>When YS[7:0] or YE[7:0] is greater than maximum row address like below,data of out of range will be ignored.</p> <p><b>132x132 memory base(GM='101')</b><br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 131(0083H)):MV="0"<br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 131(0083H)):MV="1"</p> <p><b>130x130 memory base(GM='100')</b><br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 129(0081H)):MV="0"<br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 129(0081H)):MV="1"</p> <p><b>128x160 memory base(GM='011')</b><br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 159(009FH)):MV="0"<br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 127(009FH)):MV="1"</p> <p><b>120x160 memory base(GM='010')</b><br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 159(009FH)):MV="0"<br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 119(007FH)):MV="1"</p> <p><b>128x128 memory base(GM='001')</b><br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 127(007FH)):MV="0"<br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 127(007FH)):MV="1"</p> <p><b>132x162 memory base(GM='000')</b><br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 161(00A1H)):MV="0"<br/>(Parameter range:0 ≤ YS[7:0] ≤ YE[7:0] ≤ 131(0083H)):MV="1"</p> |     |     |                  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |                  |    |    |    |    |    |    |    |     | Status | Availability | Normal Mode on,Idle Mode Off,Sleep Out | Yes | Normal Mode on,Idle Mode On,Sleep Out | Yes | Partial Mode on,Idle Mode Off,Sleep Out | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |                  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |                  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |                  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |                  |    |    |    |    |    |    |    |     |        |              |                                        |     |                                       |     |                                         |     |

|         |  |                                          |         |                       |
|---------|--|------------------------------------------|---------|-----------------------|
|         |  | Partial Mode on, Idle Mode On, Sleep Out |         | Yes                   |
|         |  | Sleep In                                 |         | Yes                   |
| Default |  | <b>Status</b>                            |         | <b>Default Value</b>  |
|         |  | (132x132 GM="101")                       | YS[7:0] | YE[7:0] YX[7:0](MV=1) |
|         |  | Power On Sequence                        | 0000h   | 83h(131)              |
|         |  | S/W Reset                                | 0000h   | 83h(131) 83h(131)     |
|         |  | H/W Reset                                | 0000h   | 83h(131)              |
|         |  | <b>Status</b>                            |         | <b>Default Value</b>  |
|         |  | (130x130 GM="100")                       | YS[7:0] | YE[7:0] YX[7:0](MV=1) |
|         |  | Power On Sequence                        | 0000h   | 81h(129)              |
|         |  | S/W Reset                                | 0000h   | 81h(129) 81h(129)     |
|         |  | H/W Reset                                | 0000h   | 81h(129)              |
|         |  | <b>Status</b>                            |         | <b>Default Value</b>  |
|         |  | (128x160 GM="011")                       | YS[7:0] | YE[7:0] YX[7:0](MV=1) |
|         |  | Power On Sequence                        | 00h     | 9Fh(159)              |
|         |  | S/W Reset                                | 00h     | 9Fh(159) 7Fh(127)     |
|         |  | H/W Reset                                | 00h     | 9Fh(159)              |
|         |  | <b>Status</b>                            |         | <b>Default Value</b>  |
|         |  | (120x160 GM="010")                       | YS[7:0] | YE[7:0] YX[7:0](MV=1) |
|         |  | Power On Sequence                        | 00h     | 9Fh(159)              |
|         |  | S/W Reset                                | 00h     | 9Fh(159) 77h(119)     |
|         |  | H/W Reset                                | 00h     | 9Fh(159)              |
|         |  | <b>Status</b>                            |         | <b>Default Value</b>  |
|         |  | (128x128 GM="001")                       | YS[7:0] | YE[7:0] YX[7:0](MV=1) |
|         |  | Power On Sequence                        | 00h     | 7Fh(127)              |
|         |  | S/W Reset                                | 00h     | 7Fh(127) 7Fh(127)     |
|         |  | H/W Reset                                | 00h     | 7Fh(127)              |
|         |  | <b>Status</b>                            |         | <b>Default Value</b>  |
|         |  | (132x162 GM="000")                       | YS[7:0] | YE[7:0] YX[7:0](MV=1) |
|         |  | Power On Sequence                        | 00h     | A1h(161)              |
|         |  | S/W Reset                                | 00h     | A1h(161) 83h(131)     |
|         |  | HW Reset                                 | 00h     | A1h(161)              |

## 12.1.21 RAMWR (2Ch)

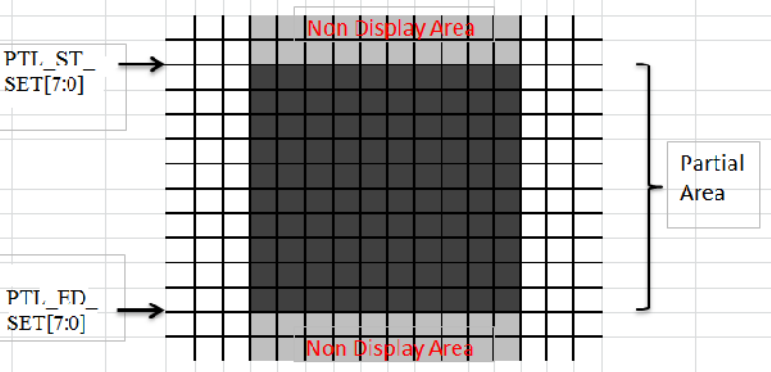
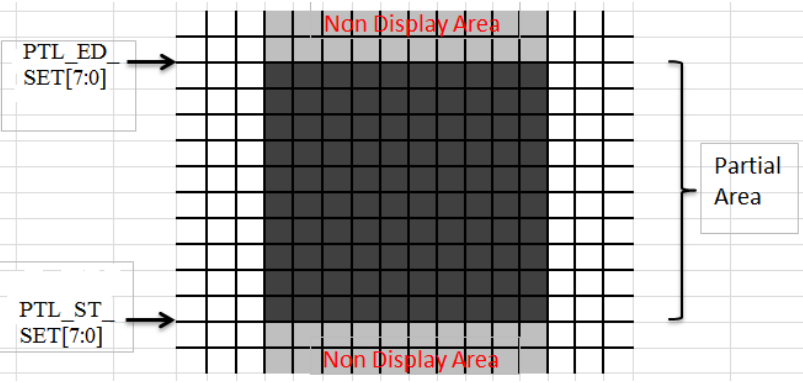
| 2CH                                     | Memory Write                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|------------------------------------|---------------------------------------|-----------------------------------|-----------------------------------------|-----------------------------------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | RDX | WRX | D7     | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | 0      | 0  | 1  | 0  | 1  | 1  | 0  | 0  | 2CH |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| 1st Parameter                           | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | D[7:0] |    |    |    |    |    |    |    | -   |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
|                                         | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | D[7:0] |    |    |    |    |    |    |    | -   |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Nth Parameter                           | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | D[7:0] |    |    |    |    |    |    |    | -   |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Description                             | This command is used to transfer data from MCU to frame memory.<br>This command makes no change to the other driver status.<br>When this command is accepted, the column register and the page register are reset to the Start Column/Start Page positions.<br>The Start Column /Start Page positions are different in accordance with MADCTL setting.<br>Then D[7:0] is stored in frame memory and the column refister and the row register incremented.<br>Sending any other command can stop frame Write.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Restriction                             | In all color modes, there is no restriction on length of parameters.<br><b>1. 132x132 memory base (GM="101")</b><br>132x132x18-bit memory can be written by this command.<br>Memory range(0000h,0000h)->(0083h,083h)<br><b>2. 130x130 memory base (GM="100")</b><br>130x130x18-bit memory can be written by this command.<br>Memory range(0000h,0000h)->(0081h,081h)<br><b>3. 128x160 memory base (GM="011")</b><br>128x160x18-bit memory can be written by this command.<br>Memory range(0000h,0000h)->(007Fh,09Fh)<br><b>4. 120x160 memory base (GM="010")</b><br>120x160x18-bit memory can be written by this command.<br>Memory range(0000h,0000h)->(0077h,09Fh)<br><b>5. 128x128 memory base (GM="001")</b><br>128x128x18-bit memory can be written by this command.<br>Memory range(0000h,0000h)->(007Fh,007Fh)<br><b>6. 132x162 memory base (GM="000")</b><br>132x162x18-bit memory can be written by this command.<br>Memory range(0000h,0000h)->(0083h,00A1h) |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |        |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes                                | Normal Mode on,Idle Mode On,Sleep Out | Yes                               | Partial Mode on,Idle Mode Off,Sleep Out | Yes                               | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Contents of memory is set randomly</td></tr><tr><td>SW Reset</td><td>Contents of memory is not cleared</td></tr><tr><td>HW Reset</td><td>Contents of memory is not cleared</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |        |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Contents of memory is set randomly | SW Reset                              | Contents of memory is not cleared | HW Reset                                | Contents of memory is not cleared |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Power On Sequence                       | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| SW Reset                                | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| HW Reset                                | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |

## 12.1.22 RAMRD (2EH)

| 2EH                                     | Memory Read                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|------------------------------------|---------------------------------------|-----------------------------------|-----------------------------------------|-----------------------------------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX | WRX | D7     | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | R   | H   | 0      | 0  | 1  | 0  | 1  | 1  | 1  | 0  | 2EH |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| 1st Parameter                           | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | R   | H   | D[7:0] |    |    |    |    |    |    |    | –   |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
|                                         | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H   | R   | D[7:0] |    |    |    |    |    |    |    | –   |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Nth Parameter                           | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H   | R   | D[7:0] |    |    |    |    |    |    |    | –   |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Description                             | <p>This command is used to transfer data from frame memory to MCU.</p> <p>This command makes no change to other driver status.</p> <p>When this command is accepted, the column register and then row register are reset to the Start Column/Start Row positions.</p> <p>The Start Column/Start Row positions are different in accordance with MADCTL setting.</p> <p>Then D[7:0] is read back from the frame memory and the column register and the register incremented.</p> <p>Frame Read can be stopped by sending any other command.</p> <p>Display Data Format for color coding (18 bit cases), when there is used 8,9,16 or 18 data line for image data.</p> |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Restriction                             | In all color modes, the Frame Read is always 24 bit so there is no restriction on length of parameters.<br>Note: Memory Read is only possible via the Parallel Interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                  |     |     |        |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes                                | Normal Mode on,Idle Mode On,Sleep Out | Yes                               | Partial Mode on,Idle Mode Off,Sleep Out | Yes                               | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Contents of memory is set randomly</td></tr><tr><td>SW Reset</td><td>Contents of memory is not cleared</td></tr><tr><td>HW Reset</td><td>Contents of memory is not cleared</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                       |     |     |        |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Contents of memory is set randomly | SW Reset                              | Contents of memory is not cleared | HW Reset                                | Contents of memory is not cleared |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| Power On Sequence                       | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| SW Reset                                | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |
| HW Reset                                | Contents of memory is not cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |        |    |    |    |    |    |    |    |     |        |                         |                                        |                                    |                                       |                                   |                                         |                                   |                                        |     |          |     |

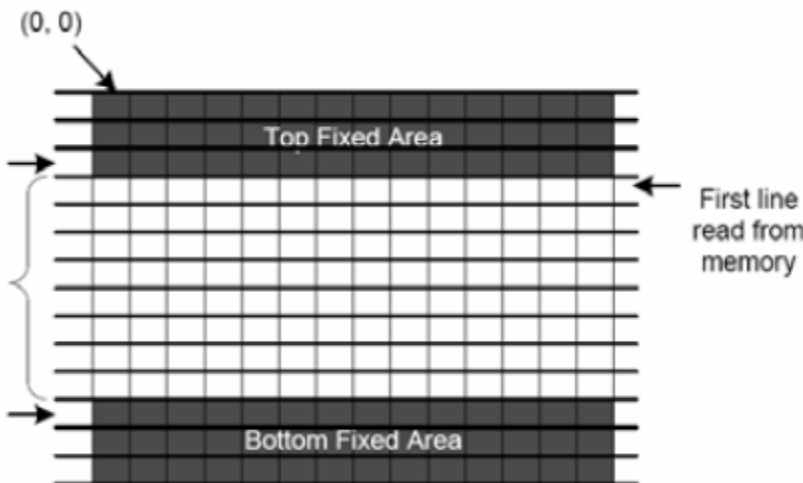
## 12.1.23 PTLAR(30h)

| 30H        | Partial Area |     |     |                  |    |    |    |    |    |    |    |     |
|------------|--------------|-----|-----|------------------|----|----|----|----|----|----|----|-----|
|            | D/CX         | RDX | WRX | D7               | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command    | L            | H   | R   | 0                | 0  | 1  | 1  | 0  | 0  | 0  | 0  | 30H |
| Parameter1 | H            | H   | R   | PTL_ST_SET[15:8] |    |    |    |    |    |    |    | 00H |
| Parameter2 | H            | H   | R   | PTL_ST_SET[7:0]  |    |    |    |    |    |    |    | 00H |
| Parameter3 | H            | H   | R   | PTL_ED_SET[15:8] |    |    |    |    |    |    |    | 00H |
| Parameter4 | H            | H   | R   | PTL_ED_SET[7:0]  |    |    |    |    |    |    |    | a1H |

|             |                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  |  |  |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Description | <p>This command defines the partial mode's display area. There are 4 parameters associated with this command, the first defines the Start Row(PSL) and the second the End Row(PEL), as illustrated in the figure below. PSL and PEL refer to the Frame Memory Line Pointer.</p> |  |  |  |  |  |  |  |  |  |  |  |
|             | <p>If End Row &gt; Start Row when MADCTL B4=0:</p>                                                                                                                                           |  |  |  |  |  |  |  |  |  |  |  |
|             | <p>If End Row &gt; Start Row when MADCTL ML=1:</p>  <p>If End Row &lt; Start Row when MADCTL ML=0:</p>                                                                                      |  |  |  |  |  |  |  |  |  |  |  |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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|  | <div><div><div><div>PTL_ED<br/>SET[7:0]</div><div>→</div></div><div><div>PTL_ST<br/>SET[7:0]</div><div>→</div></div></div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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### 12.1.24 SCRLAR (33h)

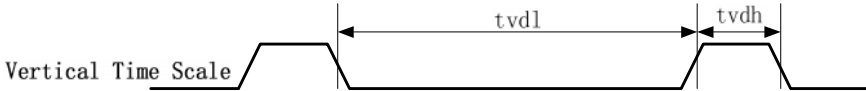
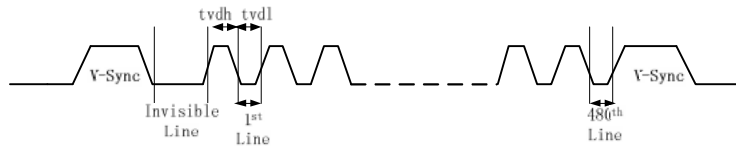
| 33H         | Scroll Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |     |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|-----|
|             | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | RDX | WRX | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command     | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | 0        | 0  | 1  | 1  | 0  | 0  | 1  | 1  | 33H |
| Parameter1  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | 00       |    |    |    |    |    |    |    | 00H |
| Parameter2  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | TFA[7:0] |    |    |    |    |    |    |    | 00H |
| Parameter3  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | 00       |    |    |    |    |    |    |    | 00H |
| Parameter4  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | H   | R   | VSA[7:0] |    |    |    |    |    |    |    | 00H |
| Description | <p>This command defines the Vertical Scrolling Area of the display.</p> <p>When MADCTL ML=0</p> <p>The 1st &amp;2nd parameter TFA[7:0]describes the Top Fixed Area (in No.of lines from TOP of the Frame Memory and Display).</p> <p>The 3rd &amp;4th parameter VSA[7:0]describes the height of the Vertical Scrolling Area(in No.of lines of the Frame Memory[ not the display] from the Vertical Scrolling Start Address). The first line read from Frame Memory appears immediately after the bottom most line of the Top Fixed Area.</p> <p>TFA, VSA refer to the Frame Memory Line Point.</p>  |     |     |          |    |    |    |    |    |    |    |     |
|             | <p>When MADCTL ML=1</p> <p>The 1st &amp;2nd parameter TFA[7:0] describes the Top Fixed Area (in No.of lines from Bottom of the Frame Memory and Display).</p> <p>The 3rd &amp;4th parameter VSA[7:0] describes the height of the Vertical Scrolling Area (in No.of lines of the Frame Memory [not the display] from the Vertical Scrolling Start Address). The first line read from Frame Memory appears immediately after the top most line of the Top Fixed Area.</p>                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |     |

|                                         | <div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-----|----------------------------------------|----------|----------|-----|--|--|--|----|------|-------|-------|-------|-------|-------|-------|-------------------|-----|-----|-----|-----|-----|-----|-----|----------|-----|-----|-----|-----|-----|-----|-----|----------|-----|-----|-----|-----|-----|-----|-----|
| Restriction                             | <p>The condition is (TFA+VSA+BFA)=128 in 128RGBx128(GM="001")</p> <p>The condition is (TFA+VSA+BFA)=130 in 130RGBx130(GM="100")</p> <p>The condition is (TFA+VSA+BFA)=132 in 132RGBx132(GM="101")</p> <p>The condition is (TFA+VSA+BFA)=160 in 128RGBx160(GM="011") or 120 RGB x 160 (GM="010")</p> <p>The condition is (TFA+VSA+BFA)=162 in 132RGBx162(GM="000")</p> <p>Otherwise Scrolling mode is undefined.</p> <p>In Vertical Scrol Mode,MADCTL parameter MV should be set to "0" this affects the Frame memory Write.</p>                                                                                      |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                   | Status   | Availability  | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes      | Sleep In | Yes |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Default                                 | <table><tr><th rowspan="2">Status</th><th colspan="7">Defalut Value</th></tr><tr><th>TFA[7:0]</th><th colspan="6">VSA[7:0]</th></tr><tr><td>GM</td><td>"xx"</td><td>"101"</td><td>"100"</td><td>"011"</td><td>"010"</td><td>"001"</td><td>"000"</td></tr><tr><td>Power On Sequence</td><td>00h</td><td>83h</td><td>81h</td><td>A0h</td><td>A0h</td><td>80h</td><td>A2h</td></tr><tr><td>SW Reset</td><td>00h</td><td>83h</td><td>81h</td><td>A0h</td><td>A0h</td><td>80h</td><td>A2h</td></tr><tr><td>HW Reset</td><td>00h</td><td>83h</td><td>81h</td><td>A0h</td><td>A0h</td><td>80h</td><td>A2h</td></tr></table> | Status   | Defalut Value |                                        |       |                                       |       |                                         |     | TFA[7:0]                               | VSA[7:0] |          |     |  |  |  | GM | "xx" | "101" | "100" | "011" | "010" | "001" | "000" | Power On Sequence | 00h | 83h | 81h | A0h | A0h | 80h | A2h | SW Reset | 00h | 83h | 81h | A0h | A0h | 80h | A2h | HW Reset | 00h | 83h | 81h | A0h | A0h | 80h | A2h |
| Status                                  | Defalut Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
|                                         | TFA[7:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | VSA[7:0] |               |                                        |       |                                       |       |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| GM                                      | "xx"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | "101"    | "100"         | "011"                                  | "010" | "001"                                 | "000" |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| Power On Sequence                       | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 83h      | 81h           | A0h                                    | A0h   | 80h                                   | A2h   |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| SW Reset                                | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 83h      | 81h           | A0h                                    | A0h   | 80h                                   | A2h   |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |
| HW Reset                                | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 83h      | 81h           | A0h                                    | A0h   | 80h                                   | A2h   |                                         |     |                                        |          |          |     |  |  |  |    |      |       |       |       |       |       |       |                   |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |          |     |     |     |     |     |     |     |

### 12.1.25 TEOFF (34h)

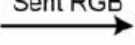
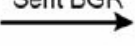
| 34H                   | Tearing Effect Line Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |     |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|-----|-------------------------|----|----|----|----|-----|--------|--|--|--|--|--|-------------------------|--|--|--|--|--|----------------------------------------|--|--|--|--|--|-----|--|--|--|--|--|---------------------------------------|--|--|--|--|--|-----|--|--|--|--|--|-----------------------------------------|--|--|--|--|--|-----|--|--|--|--|--|----------------------------------------|--|--|--|--|--|-----|--|--|--|--|--|----------|--|--|--|--|--|-----|--|--|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7 | D6 | D5  | D4                      | D3 | D2 | D1 | D0 | HEX |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 0  | 0  | 1   | 1                       | 0  | 1  | 0  | 0  | 34H |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |     |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Description           | This command is used to turn OFF (Active Low) the Tearing Effect output single from the TE signal line.                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |     |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Restriction           | This command has no effect when Tearing Effect output is already OFF.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |     |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Register Availability | <table><tr><th colspan="6">Status</th><th colspan="6">Availability</th></tr><tr><td colspan="6">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="6">Yes</td></tr><tr><td colspan="6">Sleep In</td><td colspan="6">Yes</td></tr></table> |     |     |    |    |     |                         |    |    |    |    |     | Status |  |  |  |  |  | Availability            |  |  |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  | Yes |  |  |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  | Yes |  |  |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  | Yes |  |  |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  | Yes |  |  |  |  |  | Sleep In |  |  |  |  |  | Yes |  |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |     | Availability            |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |     | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |     | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |     | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |     | Yes                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    | Yes |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">OFF</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">OFF</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">OFF</td></tr></table>                                                                                                                                                                                                                                 |     |     |    |    |     |                         |    |    |    |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |  |  |  |  |  | Power On Sequence                      |  |  |  |  |  | OFF |  |  |  |  |  | SW Reset                              |  |  |  |  |  | OFF |  |  |  |  |  | HW Reset                                |  |  |  |  |  | OFF |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |    |     | Default Value(D7 to D0) |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |     | OFF                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |    |    |     | OFF                     |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    | OFF |                         |    |    |    |    |     |        |  |  |  |  |  |                         |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |                                       |  |  |  |  |  |     |  |  |  |  |  |                                         |  |  |  |  |  |     |  |  |  |  |  |                                        |  |  |  |  |  |     |  |  |  |  |  |          |  |  |  |  |  |     |  |  |  |  |  |

## 12.1.26 TEON (35h)

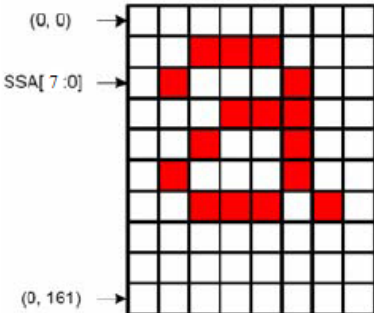
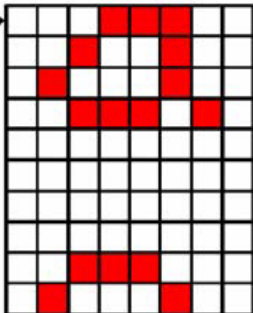
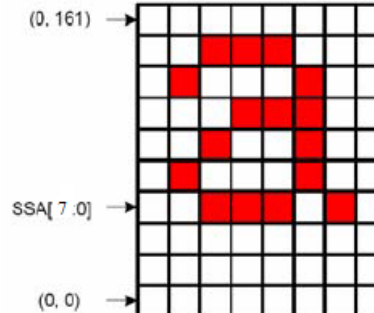
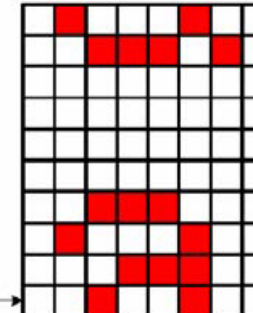
| 35H                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                  |     | Tearing Effect Line On |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------|----|----|----|----|----|----|-------|-----|--------|-------------------------|-------------------|----------------------------------------|----------|---------------------------------------|----------|-----------------------------------------|-----|----------------------------------------|-----|----------|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX                                                                                                                                                                                                                                                                                                                                                                                                              | WRX | D7                     | D6 | D5 | D4 | D3 | D2 | D1 | D0    | HEX |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H                                                                                                                                                                                                                                                                                                                                                                                                                | R   | 0                      | 0  | 1  | 1  | 0  | 1  | 0  | 1     | 35H |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Parameter                               | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H                                                                                                                                                                                                                                                                                                                                                                                                                | R   | 0                      | 0  | 0  | 0  | 0  | 0  | 0  | TELOM | 00H |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Description                             | <p>This command is used to turn ON the Tearing Effect output signal from the TE signal line. This output is not affected by charging MADCTL bit ML.</p> <p>The Tearing Effect Line On has one parameter which describes the mode of the Tearing Effect Output Line. (X=Don't Care).</p> <p>When TELOM=0:</p> <p>The Tearing Effect Output line consists of V-Blanking information only:</p> <div></div> <p>Vertical Time Scale</p> <p>When TELOM =1:</p> <p>The Tearing Effect Output line consists of both V-Blanking and H-Blanking information:</p> <div></div> <p>Note: During Sleep In Mode with Tearing Effect Line On, Tearing Effect Output pin will be active LOW. Display Data Format for color coding (18 bit cases), when there is used 8,9,16 or 18 data line for image data.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
|                                         | Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | This command has no effect when Tearing Effect output is already ON.                                                                                                                                                                                                                                                                                                                                             |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
|                                         | Register Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table> |     |                        |    |    |    |    |    |    |       |     |        | Status                  | Availability      | Normal Mode on,Idle Mode Off,Sleep Out | Yes      | Normal Mode on,Idle Mode On,Sleep Out | Yes      | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Default                                 | <table><thead><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>Tearing effect off &amp; M=0</td></tr><tr><td>SW Reset</td><td>Tearing effect off &amp; M=0</td></tr><tr><td>HW Reset</td><td>Tearing effect off &amp; M=0</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     | Status | Default Value(D7 to D0) | Power On Sequence | Tearing effect off & M=0               | SW Reset | Tearing effect off & M=0              | HW Reset | Tearing effect off & M=0                |     |                                        |     |          |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| Power On Sequence                       | Tearing effect off & M=0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| SW Reset                                | Tearing effect off & M=0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |
| HW Reset                                | Tearing effect off & M=0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                        |    |    |    |    |    |    |       |     |        |                         |                   |                                        |          |                                       |          |                                         |     |                                        |     |          |

## 12.1.27 MADCTR (36h)

| 36H         | Memory Data Access Control                                                                                                                        |     |     |     |                       |    |     |                                                                                       |    |                       |    |     |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----------------------|----|-----|---------------------------------------------------------------------------------------|----|-----------------------|----|-----|
|             | D/CX                                                                                                                                              | RDX | WRX | D7  | D6                    | D5 | D4  | D3                                                                                    | D2 | D1                    | D0 | HEX |
| Command     | L                                                                                                                                                 | H   | R   | 0   | 0                     | 1  | 1   | 0                                                                                     | 1  | 1                     | 0  | 36H |
| Parameter   | H                                                                                                                                                 | H   | R   | MY  | MX                    | MV | ML  | RGB                                                                                   | 0  | 0                     | 0  | 00H |
| Description | This command defines read/write scanning direction of frame memory.<br>This command makes no change on the other driver status.<br>Bit Assignment |     |     |     |                       |    |     |                                                                                       |    |                       |    |     |
|             |                                                                                                                                                   |     |     | Bit | Description           |    |     | Value                                                                                 |    |                       |    |     |
|             |                                                                                                                                                   |     |     | MY  | Row Address Order     |    |     | These 3 bits controls MPU to memory write/read direction.                             |    |                       |    |     |
|             |                                                                                                                                                   |     |     | MX  | Column Address Order  |    |     |                                                                                       |    |                       |    |     |
|             |                                                                                                                                                   |     |     | MV  | Page/Column Selection |    |     |                                                                                       |    |                       |    |     |
|             |                                                                                                                                                   |     |     | ML  | Vertical Order        |    |     | LCD Vertical refresh direction control                                                |    |                       |    |     |
|             |                                                                                                                                                   |     |     | RGB | RGB/BGR Order         |    |     | Color selector switch control<br>0=RGB color filter panel<br>1=BGR color filter panel |    |                       |    |     |
|             | B 5                                                                                                                                               |     |     | B 6 |                       |    | B 7 |                                                                                       |    | Image in Frame Memory |    |     |
|             | 0                                                                                                                                                 |     |     | 0   |                       |    | 0   |                                                                                       |    |                       |    |     |
|             | 0                                                                                                                                                 |     |     | 0   |                       |    | 1   |                                                                                       |    |                       |    |     |
|             | 0                                                                                                                                                 |     |     | 1   |                       |    | 0   |                                                                                       |    |                       |    |     |
|             | 0                                                                                                                                                 |     |     | 1   |                       |    | 1   |                                                                                       |    |                       |    |     |
|             | B 5                                                                                                                                               |     |     | B 6 |                       |    | B 7 |                                                                                       |    | Image in Frame Memory |    |     |
|             | 1                                                                                                                                                 |     |     | 0   |                       |    | 0   |                                                                                       |    |                       |    |     |
|             | 1                                                                                                                                                 |     |     | 0   |                       |    | 1   |                                                                                       |    |                       |    |     |
| 1           |                                                                                                                                                   |     | 1   |     |                       | 0  |     |                                                                                       |    |                       |    |     |
| 1           |                                                                                                                                                   |     | 1   |     |                       | 1  |     |                                                                                       |    |                       |    |     |

|                                         | <p style="text-align: center;">B3 = 0</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p>  </div> <div style="text-align: center;"> <p>Sent RGB</p>  </div> <div style="text-align: center;"> <p>Display Panel</p>  </div> </div> <p style="text-align: center;">B3 = 1</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Memory</p>  </div> <div style="text-align: center;"> <p>Sent BGR</p>  </div> <div style="text-align: center;"> <p>Display Panel</p>  </div> </div> |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|----------------------------------------|-----|---------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|----------|-----|
| Restriction                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Register Availability                   | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f4a460;"> <th style="text-align: center;">Status</th><th style="text-align: center;">Availability</th></tr> </thead> <tbody> <tr> <td>Normal Mode on,Idle Mode Off,Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr> <td>Normal Mode on,Idle Mode On,Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr> <td>Partial Mode on,Idle Mode Off,Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr> <td>Partial Mode on,Idle Mode On,Sleep Out</td><td style="text-align: center;">Yes</td></tr> <tr> <td style="text-align: center;">Sleep In</td><td style="text-align: center;">Yes</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                 | Status | Availability  | Normal Mode on,Idle Mode Off,Sleep Out | Yes | Normal Mode on,Idle Mode On,Sleep Out | Yes | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Default                                 | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f4a460;"> <th style="text-align: center;">Status</th><th style="text-align: center;">Default Value</th></tr> </thead> <tbody> <tr> <td>Power On Sequence</td><td style="text-align: center;">08H</td></tr> <tr> <td>SW Reset</td><td style="text-align: center;">08H</td></tr> <tr> <td>HW Reset</td><td style="text-align: center;">08H</td></tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Status | Default Value | Power On Sequence                      | 08H | SW Reset                              | 08H | HW Reset                                | 08H |                                        |     |          |     |
| Status                                  | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| Power On Sequence                       | 08H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| SW Reset                                | 08H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |
| HW Reset                                | 08H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |               |                                        |     |                                       |     |                                         |     |                                        |     |          |     |

## 12.1.28 VSCSAD (37h)

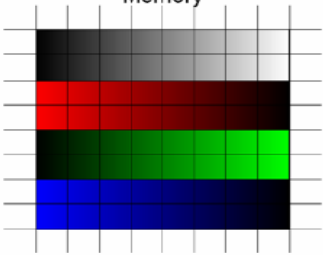
| 37H                   | Vertical Scroll Start Address of RAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|-----|--------|--------------|---|---|---|----|----|-----|-----|-----|-----|-----|-----|----|----|---|---|---|---|---|-------------|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX | WRX | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | H   | R   | 0        | 0  | 1  | 1  | 0  | 1  | 1  | 1  | 37H |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | H   | R   | 00       |    |    |    |    |    |    |    | 00H |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | H   | R   | SSA[7:0] |    |    |    |    |    |    |    | 00H |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| Description           | <p>This command is used together with Vertical Scrolling Definition(33h).These two command describe the scrolling area and scrolling mode.</p> <p>The Vertical Scrolling Start Address command has one parameter which describes the address of the line in the Frame Memory that will be written as the first line after the last lin of the Top Fixed Area on thd display as illustrated below.</p> <p>This command Start the scrolling.</p> <p>When MADCTL ML=0<br/>Exanple: GM=000,132RGBx162<br/>When Top Fixed Area=Bottom Fixed Area=00, Vertical Scrolling Area=162 and Vertical Scrolling Pointer SSA="3".</p> <div><div><p>Frame Memory</p></div><div><p>Pointer<br/>ML=0</p><table><tr><td>0</td></tr><tr><td>1</td></tr><tr><td>2</td></tr><tr><td>3</td></tr><tr><td>4</td></tr><tr><td>..</td></tr><tr><td>..</td></tr><tr><td>159</td></tr><tr><td>160</td></tr><tr><td>161</td></tr></table></div><div><p>Display</p></div></div> <p>When MADCTL ML=1<br/>Exanple:GM=000,132RGBx162<br/>When Top Fixed Area=Bottom Fixed Area=00, Vertical Scrolling Area=162 and SSA="3".</p> <div><div><p>Frame Memory</p></div><div><p>Pointer<br/>ML=1</p><table><tr><td>161</td></tr><tr><td>160</td></tr><tr><td>159</td></tr><tr><td>..</td></tr><tr><td>..</td></tr><tr><td>4</td></tr><tr><td>3</td></tr><tr><td>2</td></tr><tr><td>1</td></tr><tr><td>0</td></tr></table></div><div><p>Display</p></div></div> <p>Note:<br/>When new Pointer position and Picture Data are sent, the result on the display will happen at the next Panel Scan to avoid tearing effect. SSA refers to the Frame Memory scan address.<br/>When new Pointer position and Picture Data, internal system works as 128x128 and maximum scan address becomes 127 internal of 161.</p> |     |     |          |    |    |    |    |    |    |    |     | 0      | 1            | 2 | 3 | 4 | .. | .. | 159 | 160 | 161 | 161 | 160 | 159 | .. | .. | 4 | 3 | 2 | 1 | 0 | Restriction |  |
|                       | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
|                       | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
|                       | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
|                       | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 4                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| ..                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| ..                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 159                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 160                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 161                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 161                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 160                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 159                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| ..                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| ..                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 4                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 3                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 2                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 1                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| 0                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |     | Status | Availability |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |
| Status                | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |     |        |              |   |   |   |    |    |     |     |     |     |     |     |    |    |   |   |   |   |   |             |  |

|         |  |                                         |     |
|---------|--|-----------------------------------------|-----|
|         |  | Normal Mode on,Idle Mode Off,Sleep Out  | Yes |
|         |  | Normal Mode on,Idle Mode On,Sleep Out   | Yes |
|         |  | Partial Mode on,Idle Mode Off,Sleep Out | Yes |
|         |  | Partial Mode on,Idle Mode On,Sleep Out  | Yes |
|         |  | Sleep In                                | Yes |
| Default |  |                                         |     |
|         |  |                                         |     |
|         |  |                                         |     |
|         |  |                                         |     |
|         |  |                                         |     |

### 12.1.29 IDMOFF (38h)

| 38H                   | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                      |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|---------------|---------------------------------------|---------------|-----------------------------------------|---------------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 0  | 38H |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Parameter             | No Parameter                                                                                                                                                                                                                                                                                                                                                                       |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Description           | This commad is used to recover from Idle mode on.<br>There will be no abnormal visible effect on the display mode change transition.<br>In the Idle off mode<br>1, LCD can display maximum 4096, 65k, 262k colors.<br>2, Normal frame frequency is applied.                                                                                                                        |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Restriction           | This command has no effect when module is already in Idle off mode.                                                                                                                                                                                                                                                                                                                |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |    |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes           | Normal Mode on,Idle Mode On,Sleep Out | Yes           | Partial Mode on,Idle Mode Off,Sleep Out | Yes           | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>Idle Mode Off</td></tr><tr><td>SW Reset</td><td>Idle Mode Off</td></tr><tr><td>HW Reset</td><td>Idle Mode Off</td></tr></table>                                                                                                                                                   |                         |     |    |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | Idle Mode Off | SW Reset                              | Idle Mode Off | HW Reset                                | Idle Mode Off |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | Idle Mode Off           |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | Idle Mode Off           |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |
| HW Reset              | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                      |                         |     |    |    |    |    |    |    |    |    |     |        |                         |                                        |               |                                       |               |                                         |               |                                        |     |          |     |

## 12.1.30 IDMON (39h)

| 39H                                     | Idle Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|----|----|----|----|----|----|----|-----|---------------|-------------------------|----------------------------------------|--------------|---------------------------------------|--------------|-----------------------------------------|--------------|----------------------------------------|-------|----------|-------|-----|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | RDX    | WRX    | D7     | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | H      | R      | 0      | 0  | 1  | 1  | 1  | 0  | 0  | 1  | 39H |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Parameter                               | No Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Description                             | <p>This command is used to enter into Idle mode on.<br/>There will be no abnormal visible effect on the display mode change transition.<br/>In the Idle mode.<br/>Color expression is reduced. The primary and the secondary colors using MSB of each R,G and B in the Frame Memory, 8 color depth data is displayed.<br/>8-Color mode frame frequency is applied.<br/>Exit from IDMON by Idle Mode Off (38h) command.</p> <div><div><p>Memory</p></div><div><p>Panel Display</p></div></div> <table><thead><tr><th>Reduced Color</th><th>R[5:0]</th><th>G[5:0]</th><th>B[5:0]</th></tr></thead><tbody><tr><td>Black</td><td>0XXXX</td><td>0XXXX</td><td>0XXXX</td></tr><tr><td>Blue</td><td>0XXXX</td><td>0XXXX</td><td>1XXXX</td></tr><tr><td>Red</td><td>1XXXX</td><td>0XXXX</td><td>0XXXX</td></tr><tr><td>Magenta</td><td>1XXXX</td><td>0XXXX</td><td>1XXXX</td></tr><tr><td>Green</td><td>0XXXX</td><td>1XXXX</td><td>0XXXX</td></tr><tr><td>Cyan</td><td>0XXXX</td><td>1XXXX</td><td>1XXXX</td></tr><tr><td>Yellow</td><td>1XXXX</td><td>1XXXX</td><td>0XXXX</td></tr><tr><td>White</td><td>1XXXX</td><td>1XXXX</td><td>1XXXX</td></tr></tbody></table> |        |        |        |    |    |    |    |    |    |    |     | Reduced Color | R[5:0]                  | G[5:0]                                 | B[5:0]       | Black                                 | 0XXXX        | 0XXXX                                   | 0XXXX        | Blue                                   | 0XXXX | 0XXXX    | 1XXXX | Red | 1XXXX | 0XXXX | 0XXXX | Magenta | 1XXXX | 0XXXX | 1XXXX | Green | 0XXXX | 1XXXX | 0XXXX | Cyan | 0XXXX | 1XXXX | 1XXXX | Yellow | 1XXXX | 1XXXX | 0XXXX | White | 1XXXX | 1XXXX | 1XXXX |
|                                         | Reduced Color                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | R[5:0] | G[5:0] | B[5:0] |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
|                                         | Black                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0XXXX  | 0XXXX  | 0XXXX  |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
|                                         | Blue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0XXXX  | 0XXXX  | 1XXXX  |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Red                                     | 1XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0XXXX  | 0XXXX  |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Magenta                                 | 1XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0XXXX  | 1XXXX  |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Green                                   | 0XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1XXXX  | 0XXXX  |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Cyan                                    | 0XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1XXXX  | 1XXXX  |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Yellow                                  | 1XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1XXXX  | 0XXXX  |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| White                                   | 1XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1XXXX  | 1XXXX  |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Restriction                             | This command has no effect when module is already in idle on mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Register Availability                   | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |        |        |    |    |    |    |    |    |    |     | Status        | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes          | Normal Mode on,Idle Mode On,Sleep Out | Yes          | Partial Mode on,Idle Mode Off,Sleep Out | Yes          | Partial Mode on,Idle Mode On,Sleep Out | Yes   | Sleep In | Yes   |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
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| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| Power On Sequence                       | Idle Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| SW Reset                                | Idle Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |
| HW Reset                                | Idle Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |        |        |    |    |    |    |    |    |    |     |               |                         |                                        |              |                                       |              |                                         |              |                                        |       |          |       |     |       |       |       |         |       |       |       |       |       |       |       |      |       |       |       |        |       |       |       |       |       |       |       |

### 12.1.31 COLMOD (3Ah)

| 3AH                                                                                                                                      | Interface Color Mode Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----|----|----|----|-----------|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------|----------------------------------------|-----|----------|---------------|-------|--------------------------------|------------------------------------------------------------------------------------------|-------|-------|
|                                                                                                                                          | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | RDX                            | WRX                                                                                                                                                           | D7        | D6 | D5 | D4 | D3 | D2        | D1 | D0 | HEX |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Command                                                                                                                                  | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | H                              | R                                                                                                                                                             | 0         | 0  | 1  | 1  | 1  | 0         | 1  | 0  | 3AH |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Parameter                                                                                                                                | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | H                              | R                                                                                                                                                             | VIPF[3:0] |    |    |    | 0  | IFPF[2:0] |    |    | 66H |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Description                                                                                                                              | This command is used to define the format of RGB picture data,which is to be transferred via the MCU interface.The formats are shown in the table:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | <table><tr><th>Bit</th><th>Description</th><th>Value</th></tr><tr><td>VIPF3</td><td rowspan="4">RGB Interface Color Format</td><td rowspan="4">"0101"=16 bit/pixel(1 time data transfer)<br/>"0110"=18 bit/pixel(1 time data transfer)<br/>"1110"=18 bit/pixel(3 time data transfer)<br/>The others=not defined</td></tr><tr><td>VIPF2</td></tr><tr><td>VIPF1</td></tr><tr><td>VIPF0</td></tr><tr><td>D3</td><td></td><td>"0"(Not Used)</td></tr><tr><td>IFPF2</td><td rowspan="3">Control Interface Color Format</td><td rowspan="3">"011"=12 bit/pixel<br/>"101"=16 bit/pixel<br/>"110"=18 bit/pixel<br/>The others=not defined</td></tr><tr><td>IFPF1</td></tr><tr><td>IFPF0</td></tr></table> |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     | Bit    | Description             | Value                                  | VIPF3 | RGB Interface Color Format            | "0101"=16 bit/pixel(1 time data transfer)<br>"0110"=18 bit/pixel(1 time data transfer)<br>"1110"=18 bit/pixel(3 time data transfer)<br>The others=not defined | VIPF2                                   | VIPF1 | VIPF0                                  | D3  |          | "0"(Not Used) | IFPF2 | Control Interface Color Format | "011"=12 bit/pixel<br>"101"=16 bit/pixel<br>"110"=18 bit/pixel<br>The others=not defined | IFPF1 | IFPF0 |
|                                                                                                                                          | Bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Description                    | Value                                                                                                                                                         |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | VIPF3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RGB Interface Color Format     | "0101"=16 bit/pixel(1 time data transfer)<br>"0110"=18 bit/pixel(1 time data transfer)<br>"1110"=18 bit/pixel(3 time data transfer)<br>The others=not defined |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | VIPF2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | VIPF1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | VIPF0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | D3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                | "0"(Not Used)                                                                                                                                                 |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | IFPF2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Control Interface Color Format | "011"=12 bit/pixel<br>"101"=16 bit/pixel<br>"110"=18 bit/pixel<br>The others=not defined                                                                      |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
|                                                                                                                                          | IFPF1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| IFPF0                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Note:                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| 1. In 12-bits /Pixel, 16-bits/Pixel mode, the LUT is applied to transfer data into the Frame Memory.                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| 2. When VIPF[3:0]=1110, 6-bits data width of 3-times transfer is used to transmin 1 pixel data with the 18-bits color depth information. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Restriction                                                                                                                              | This command has no effect when module is already in Idle off mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Register Availability                                                                                                                    | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes                                                                                                                                                           | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes           |       |                                |                                                                                          |       |       |
| Status                                                                                                                                   | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Normal Mode on,Idle Mode Off,Sleep Out                                                                                                   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Normal Mode on,Idle Mode On,Sleep Out                                                                                                    | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Partial Mode on,Idle Mode Off,Sleep Out                                                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Partial Mode on,Idle Mode On,Sleep Out                                                                                                   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Sleep In                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Default                                                                                                                                  | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8'h66</td></tr><tr><td>SW Reset</td><td>8'h66</td></tr><tr><td>HW Reset</td><td>8'h66</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8'h66 | SW Reset                              | 8'h66                                                                                                                                                         | HW Reset                                | 8'h66 |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Status                                                                                                                                   | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| Power On Sequence                                                                                                                        | 8'h66                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| SW Reset                                                                                                                                 | 8'h66                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |
| HW Reset                                                                                                                                 | 8'h66                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                                                                                                                               |           |    |    |    |    |           |    |    |     |        |                         |                                        |       |                                       |                                                                                                                                                               |                                         |       |                                        |     |          |               |       |                                |                                                                                          |       |       |

### 12.1.32 RDID1 (DAh)

| DAH                   | Read ID1 Value                                                                                                                                                                                                                                                                                                                                                                     |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|--------------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7           | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 1            | 1  | 0  | 1  | 1  | 0  | 1  | 0  | DAH |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | X            | X  | X  | X  | X  | X  | X  | X  | X   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | SYS_ID1[7:0] |    |    |    |    |    |    |    | 33H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | The 1st Parameter is dummy read.<br>This read byte return 8-bit LCD module’s ID.<br>The parameter(SYS_ID7- SYS_ID0): LCD module manufacturer ID                                                                                                                                                                                                                                    |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |              |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h33</td></tr><tr><td>SW Reset</td><td>8’h33</td></tr><tr><td>HW Reset</td><td>8’h33</td></tr></table>                                                                                                                                                                           |                         |     |              |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h33 | SW Reset                              | 8’h33 | HW Reset                                | 8’h33 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h33                   |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h33                   |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h33                                                                                                                                                                                                                                                                                                                                                                              |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.1.33 RDID2 (DBh)

| DBH                   | Read ID2 Value                                                                                                                                                                                                                                                                                                                                                                     |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|--------------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7           | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 1            | 1  | 0  | 1  | 1  | 0  | 1  | 1  | DBH |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | X            | X  | X  | X  | X  | X  | X  | X  | X   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | SYS_ID2[7:0] |    |    |    |    |    |    |    | 30H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | The 1st Parameter is dummy read.<br>This read byte return 8-bit LCD module’s ID.                                                                                                                                                                                                                                                                                                   |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |              |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h30</td></tr><tr><td>SW Reset</td><td>8’h30</td></tr><tr><td>HW Reset</td><td>8’h30</td></tr></table>                                                                                                                                                                           |                         |     |              |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h30 | SW Reset                              | 8’h30 | HW Reset                                | 8’h30 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h30                   |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h30                   |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h30                                                                                                                                                                                                                                                                                                                                                                              |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.1.34 RDID3 (DCh)

| DCH                   | Read ID3 Value                                                                                                                                                                                                                                                                                                                                                                     |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|--------------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7           | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 1            | 1  | 0  | 1  | 1  | 1  | 0  | 0  | DCH |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | X            | X  | X  | X  | X  | X  | X  | X  | X   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | SYS_ID3[7:0] |    |    |    |    |    |    |    | 25H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | The 1st Parameter is dummy read.<br>This read byte return 8-bit LCD module's ID.                                                                                                                                                                                                                                                                                                   |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |              |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h23</td></tr><tr><td>SW Reset</td><td>8’h23</td></tr><tr><td>HW Reset</td><td>8’h23</td></tr></table>                                                                                                                                                                           |                         |     |              |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h23 | SW Reset                              | 8’h23 | HW Reset                                | 8’h23 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h23                   |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h23                   |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h23                                                                                                                                                                                                                                                                                                                                                                              |                         |     |              |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

## 12.2 Panel Function Command List and Description

| Addr | Name      | R/W | D7                 | D6       | D5               | D4           | D3               | D2               | D1                 | D0        |
|------|-----------|-----|--------------------|----------|------------------|--------------|------------------|------------------|--------------------|-----------|
| 0x3D | SPI2SET   | W   |                    |          |                  |              | spi2line_en      |                  | spi2line_mode[1:0] |           |
| 0x51 | PWC TR 1  | W   |                    |          |                  | ddvdh_clp_en |                  | ddvdh_clamp[2:0] |                    |           |
| 0x52 | PWC TR 2  | W   |                    |          |                  | vgh_clp_en   |                  |                  | vgh_clamp[1:0]     |           |
| 0x53 | PWC TR 3  | W   |                    |          |                  | vgl_clp_en   |                  |                  | vgl_clamp[1:0]     |           |
| 0x61 | FRM CTR 1 | W   | hbp[7:0]           |          |                  |              |                  |                  |                    |           |
| 0x62 | FRM CTR 2 | W   | hfp[7:0]           |          |                  |              |                  |                  |                    |           |
| 0x63 | FRM CTR 3 | W   |                    | vbp[6:0] |                  |              |                  |                  |                    |           |
| 0x64 | FRM CTR 4 | W   |                    | vfp[6:0] |                  |              |                  |                  |                    |           |
| 0x82 | RGB CTR   | W   |                    |          |                  |              | dpi_dp           | dpi_ep           | dpi_hsp            | dpi_vsp   |
| 0x84 | GATEST    | W   | gate_st[7:0]       |          |                  |              |                  |                  |                    |           |
| 0x85 | GATEED    | W   | gate_ed[7:0]       |          |                  |              |                  |                  |                    |           |
| 0x87 | PWC TR 4  | W   |                    |          |                  | vrh[4:0]     |                  |                  |                    |           |
| 0x88 | VMC TR 1  | W   |                    |          | vcm[5:0]         |              |                  |                  |                    |           |
| 0x89 | VMC TR 2  | W   |                    |          | vcom_vdv[5:0]    |              |                  |                  |                    |           |
| 0x93 | SRCS ET   | W   |                    |          |                  | ndl          |                  |                  | src_en_sel         | polar_sel |
| 0x94 | SRCS T    | W   | src_st[7:0]        |          |                  |              |                  |                  |                    |           |
| 0x95 | PCH GST   | W   | pchgst[7:0]        |          |                  |              |                  |                  |                    |           |
| 0xB1 | PWC TR 5  | W   |                    |          |                  |              | bth[1:0]         |                  | btl[1:0]           |           |
| 0xB2 | PWC TR 6  | W   | ddvdh_clk_sel[1:0] |          | vgh_clk_sel[1:0] |              | vgl_clk_sel[1:0] |                  | vcl_clk_sel[1:0]   |           |
| 0xB6 | VMBIAS    | W   |                    |          |                  |              |                  |                  | vcom_bias_fix[1:0] |           |
| 0xC3 | REV       | W   |                    |          |                  | src_ss       |                  |                  |                    | gate_gs   |
| 0xC4 | VDD18     | W   |                    |          |                  |              | regu_ad[2:0]     |                  |                    |           |
| 0xD1 | RDOTP 1   | R   | otp_rd_dat[7:0]    |          |                  |              |                  |                  |                    |           |
| 0xD2 | RDO       | R   | otp_rd_dat[15:8]   |          |                  |              |                  |                  |                    |           |

| Addr | Name         | R/W | D7                | D6            | D5           | D4 | D3              | D2           | D1             | D0                    |
|------|--------------|-----|-------------------|---------------|--------------|----|-----------------|--------------|----------------|-----------------------|
|      | TP 2         |     |                   |               |              |    |                 |              |                |                       |
| 0xD3 | RDO<br>TP 3  | R   | otp_rd_dat[23:16] |               |              |    |                 |              |                |                       |
| 0xD4 | RDO<br>TP 4  | R   | otp_rd_dat[31:24] |               |              |    |                 |              |                |                       |
| 0xE1 | OTPC<br>TR 1 | W   |                   |               | otp_ptm[1:0] |    | otp_v<br>pp_sel | otp_pr<br>og | otp_w<br>r_en  | otp_rd<br>_en         |
| 0xE2 | OTPC<br>TR 2 | W   |                   | otp_addr[6:0] |              |    |                 |              |                |                       |
| 0xE3 | OTPC<br>TR 3 | W   | otp_wr_dat[7:0]   |               |              |    |                 |              |                |                       |
| 0xE4 | OTPC<br>TR 4 | W   |                   |               |              |    |                 |              | otp_es<br>d_en | otp_sl<br>pout_<br>en |

## 12.2.1 SPI2SET (3Dh)

| 3DH                   | SPI 2 Line Set                                                                                                                                |     |     |           |    |              |                         |                                 |    |                    |    |     |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----------|----|--------------|-------------------------|---------------------------------|----|--------------------|----|-----|
|                       | D/CX                                                                                                                                          | RDX | WRX | D7        | D6 | D5           | D4                      | D3                              | D2 | D1                 | D0 | HEX |
| Command               | L                                                                                                                                             | H   | R   | 0         | 0  | 1            | 1                       | 1                               | 1  | 0                  | 1  | 3DH |
| Parameter             | H                                                                                                                                             | H   | R   | 0         | 0  | 0            | 0                       | SPI2LINE_EN                     | 0  | SPI2LINE_MODE[1:0] |    | 00H |
| Description           | SPI2LINE_EN: Enable SPI two data line function. “0” is ON,”1” is OFF;<br>SPI2LINE_MODE[1:0]: Select different data combination on data lines. |     |     |           |    |              |                         |                                 |    |                    |    |     |
|                       |                                                                                                                                               |     |     | MODE[1:0] |    | Pixel format |                         | Transmit method                 |    |                    |    |     |
|                       |                                                                                                                                               |     |     | 00        |    | 5-6-5        |                         | One transmit per pixel          |    |                    |    |     |
|                       |                                                                                                                                               |     |     | 11        |    |              |                         |                                 |    |                    |    |     |
|                       |                                                                                                                                               |     |     | 01        |    | 6-6-6        |                         | One transmit per pixel          |    |                    |    |     |
|                       |                                                                                                                                               |     |     | 10        |    | 6-6-6        |                         | Three transmits each two pixels |    |                    |    |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                            |     |     |           |    |              |                         |                                 |    |                    |    |     |
| Register Availability |                                                                                                                                               |     |     |           |    |              |                         |                                 |    |                    |    |     |
|                       | Status                                                                                                                                        |     |     |           |    |              |                         | Availability                    |    |                    |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                        |     |     |           |    |              |                         | Yes                             |    |                    |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                         |     |     |           |    |              |                         | Yes                             |    |                    |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                       |     |     |           |    |              |                         | Yes                             |    |                    |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                        |     |     |           |    |              |                         | Yes                             |    |                    |    |     |
| Sleep In              |                                                                                                                                               |     |     |           |    |              | Yes                     |                                 |    |                    |    |     |
| Default               |                                                                                                                                               |     |     |           |    |              |                         |                                 |    |                    |    |     |
|                       | Status                                                                                                                                        |     |     |           |    |              | Default Value(D7 to D0) |                                 |    |                    |    |     |
|                       | Power On Sequence                                                                                                                             |     |     |           |    |              | 8’h00                   |                                 |    |                    |    |     |
|                       | SW Reset                                                                                                                                      |     |     |           |    |              | 8’h00                   |                                 |    |                    |    |     |
| HW Reset              |                                                                                                                                               |     |     |           |    | 8’h00        |                         |                                 |    |                    |    |     |

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### 12.2.2 DDVDH\_CLAMP (51h)

| 51H                                     | Power Control 1                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|----|-----|-------------------|----|------------------|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7 | D6 | D5  | D4                | D3 | D2               | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 0  | 1  | 0   | 1                 | 0  | 0                | 0  | 1  | 51H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter                               | H                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 0  | 0  | 0   | DDVDH_CLP_EN      | 0  | DDVDH_CLAMP[2:0] |    |    | 14H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description                             | DDVDH_CLP_EN: This command is used to define DDVDH clamp enable.                                                                                                                                                                                                                                                                                                                   |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | DDVDH_CLP_EN                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |     | Description       |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 0                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |     | Disable the clamp |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 1                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |    |     | Enable the clamp  |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | DDVDH_CLAMP[2:0]: This command is used to define DDVDH clamp value                                                                                                                                                                                                                                                                                                                 |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | DDVDH_CLAMP[1:0]                                                                                                                                                                                                                                                                                                                                                                   |     |     |    |    |     | DDVDH (V)         |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 000                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 4.5               |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 001                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 4.6               |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 010                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 4.7               |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 011                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 4.8               |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 100                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 4.9               |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 101                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 5                 |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                                         | 110                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     | 5.1               |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| 111                                     |                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |    | 5.2 |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction                             | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |    |    |     |                   |    |                  |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                       |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h13</td></tr><tr><td>SW Reset</td><td>8’h13</td></tr><tr><td>HW Reset</td><td>8’h13</td></tr></table>                                                                                                                                                                           |     |     |    |    |     |                   |    |                  |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h13 | SW Reset                              | 8’h13 | HW Reset                                | 8’h13 |                                        |     |          |     |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                            |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Power On Sequence                       | 8’h13                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| SW Reset                                | 8’h13                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset                                | 8’h13                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |    |     |                   |    |                  |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

## 12.2.3 VGH\_CLAMP (52h)

| 52H                   | VGH_CLAMP                                                       |     |     |    |    |       |                         |     |              |                |    |     |
|-----------------------|-----------------------------------------------------------------|-----|-----|----|----|-------|-------------------------|-----|--------------|----------------|----|-----|
|                       | D/CX                                                            | RDX | WRX | D7 | D6 | D5    | D4                      | D3  | D2           | D1             | D0 | HEX |
| Command               | L                                                               | H   | R   | 0  | 1  | 0     | 1                       | 0   | 0            | 1              | 0  | 52H |
| Parameter             | H                                                               | H   | R   | 0  | 0  | 0     | VGH_CLP_EN              | 0   | 0            | VGH_CLAMP[1:0] |    | 13H |
| Description           | VGH_CLP_EN: This command is used to define VGH clamp enable.    |     |     |    |    |       |                         |     |              |                |    |     |
|                       | VGH_CLP_EN                                                      |     |     |    |    |       | Description             |     |              |                |    |     |
|                       | 0                                                               |     |     |    |    |       | Disable the clamp       |     |              |                |    |     |
|                       | 1                                                               |     |     |    |    |       | Enable the clamp        |     |              |                |    |     |
|                       | VGH_CLAMP[1:0]: This command is used to define VGH clamp value. |     |     |    |    |       |                         |     |              |                |    |     |
|                       | VGH_CLAMP[1:0]                                                  |     |     |    |    |       | VGH (unit:V)            |     |              |                |    |     |
|                       | 00                                                              |     |     |    |    |       | 10                      |     |              |                |    |     |
|                       | 01                                                              |     |     |    |    |       | 12                      |     |              |                |    |     |
|                       | 10                                                              |     |     |    |    |       | 13.5                    |     |              |                |    |     |
|                       | 11                                                              |     |     |    |    |       | 15                      |     |              |                |    |     |
| Restriction           | Should set “FF=A5” before configure this registers              |     |     |    |    |       |                         |     |              |                |    |     |
| Register Availability |                                                                 |     |     |    |    |       |                         |     |              |                |    |     |
|                       | Status                                                          |     |     |    |    |       |                         |     | Availability |                |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                          |     |     |    |    |       |                         |     | Yes          |                |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                           |     |     |    |    |       |                         |     | Yes          |                |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                         |     |     |    |    |       |                         |     | Yes          |                |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                          |     |     |    |    |       |                         |     | Yes          |                |    |     |
| Sleep In              |                                                                 |     |     |    |    |       |                         | Yes |              |                |    |     |
| Default               |                                                                 |     |     |    |    |       |                         |     |              |                |    |     |
|                       | Status                                                          |     |     |    |    |       | Default Value(D7 to D0) |     |              |                |    |     |
|                       | Power On Sequence                                               |     |     |    |    |       | 8’h13                   |     |              |                |    |     |
|                       | SW Reset                                                        |     |     |    |    |       | 8’h13                   |     |              |                |    |     |
| HW Reset              |                                                                 |     |     |    |    | 8’h13 |                         |     |              |                |    |     |

## 12.2.4 VGL\_CLAMP (53h)

| 53H                   | VGL_CLAMP                                          |     |     |    |    |       |                         |     |              |                |    |     |
|-----------------------|----------------------------------------------------|-----|-----|----|----|-------|-------------------------|-----|--------------|----------------|----|-----|
|                       | D/CX                                               | RDX | WRX | D7 | D6 | D5    | D4                      | D3  | D2           | D1             | D0 | HEX |
| Command               | L                                                  | H   | R   | 0  | 1  | 0     | 1                       | 0   | 0            | 1              | 1  | 53H |
| Parameter             | H                                                  | H   | R   | 0  | 0  | 0     | VGL_CLP_EN              | 0   | 0            | VGL_CLAMP[1:0] |    | 11H |
| Description           | This command is used to set the VGL clamp voltage. |     |     |    |    |       |                         |     |              |                |    |     |
|                       | VGL_CLAMP[1]                                       |     |     |    |    |       | VGL_CLAMP[0]            |     |              | VGL            |    |     |
|                       | 0                                                  |     |     |    |    |       | 0                       |     |              | -7.5           |    |     |
|                       | 0                                                  |     |     |    |    |       | 1                       |     |              | -10            |    |     |
|                       | 1                                                  |     |     |    |    |       | 0                       |     |              | -12.5          |    |     |
|                       | 1                                                  |     |     |    |    |       | 1                       |     |              | -13            |    |     |
| Restriction           | Should set “FF=A5” before configure this registers |     |     |    |    |       |                         |     |              |                |    |     |
| Register Availability |                                                    |     |     |    |    |       |                         |     |              |                |    |     |
|                       | Status                                             |     |     |    |    |       |                         |     | Availability |                |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out             |     |     |    |    |       |                         |     | Yes          |                |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out              |     |     |    |    |       |                         |     | Yes          |                |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out            |     |     |    |    |       |                         |     | Yes          |                |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out             |     |     |    |    |       |                         |     | Yes          |                |    |     |
| Sleep In              |                                                    |     |     |    |    |       |                         | Yes |              |                |    |     |
| Default               |                                                    |     |     |    |    |       |                         |     |              |                |    |     |
|                       | Status                                             |     |     |    |    |       | Default Value(D7 to D0) |     |              |                |    |     |
|                       | Power On Sequence                                  |     |     |    |    |       | 8’h10                   |     |              |                |    |     |
|                       | SW Reset                                           |     |     |    |    |       | 8’h10                   |     |              |                |    |     |
| HW Reset              |                                                    |     |     |    |    | 8’h10 |                         |     |              |                |    |     |

### 12.2.5 DISP\_HBP (61h)

| 61H                   | Frame Rate Control 1                                                                                                                                                                                                                                                                                                                                                               |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0        | 1  | 1  | 0  | 0  | 0  | 0  | 1  | 61H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | HBP[7:0] |    |    |    |    |    |    |    | 05H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | Internal frame rate control register, used to enlarge horizontal scan cycle.<br>Frame rate=fosc/2*(131+HBP+HFP)*(162+VBP+VFP)<br>Fosc=6MHz                                                                                                                                                                                                                                         |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |          |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h05</td></tr><tr><td>SW Reset</td><td>8’h05</td></tr><tr><td>HW Reset</td><td>8’h05</td></tr></table>                                                                                                                                                                           |                         |     |          |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h05 | SW Reset                              | 8’h05 | HW Reset                                | 8’h05 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h05                   |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h05                   |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h05                                                                                                                                                                                                                                                                                                                                                                              |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.2.6 DISP\_HFP (62h)

| 62H                   | Frame Rate Control 2                                                                                                                                                                                                                                                                                                                                                               |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0        | 1  | 1  | 0  | 0  | 0  | 1  | 0  | 62H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | HFP[7:0] |    |    |    |    |    |    |    | 05H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | Internal frame rate control register, used to enlarge horizontal scan cycle.<br>Frame rate=fosc/2*(131+HBP+HFP)*(162+VBP+VFP)<br>Fosc=6MHz                                                                                                                                                                                                                                         |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |          |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h05</td></tr><tr><td>SW Reset</td><td>8’h05</td></tr><tr><td>HW Reset</td><td>8’h05</td></tr></table>                                                                                                                                                                           |                         |     |          |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h05 | SW Reset                              | 8’h05 | HW Reset                                | 8’h05 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h05                   |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h05                   |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h05                                                                                                                                                                                                                                                                                                                                                                              |                         |     |          |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.2.7 DISP\_VBP (63h)

| 63H                   | Frame Rate Control 3                                                                                                                                                                                                                                                                                                                                                               |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----|----------|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7 | D6       | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | 1        | 1  | 0  | 0  | 0  | 1  | 1  | 63H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | VBP[6:0] |    |    |    |    |    |    | 02H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | Internal frame rate control register, used to enlarge vertical scan cycle.<br>Frame rate=fosc/2*(131+HBP+HFP)*(162+VBP+VFP)<br>Fosc=6MHz                                                                                                                                                                                                                                           |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |    |          |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8'h02</td></tr><tr><td>SW Reset</td><td>8'h02</td></tr><tr><td>HW Reset</td><td>8'h02</td></tr></table>                                                                                                                                                                           |                         |     |    |          |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8'h02 | SW Reset                              | 8'h02 | HW Reset                                | 8'h02 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8'h02                   |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8'h02                   |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8'h02                                                                                                                                                                                                                                                                                                                                                                              |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.2.8 DISP\_VFP (64h)

| 64H                   | Frame Rate Control 4                                                                                                                                                                                                                                                                                                                                                               |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----|----------|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7 | D6       | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | 1        | 1  | 0  | 0  | 1  | 0  | 0  | 64H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | VFP[6:0] |    |    |    |    |    |    | 02H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | Internal frame rate control register, used to enlarge vertical scan cycle.<br>Frame rate=fosc/2*(131+HBP+HFP)*(162+VBP+VFP)<br>Fosc=6MHz                                                                                                                                                                                                                                           |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |    |          |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h02</td></tr><tr><td>SW Reset</td><td>8’h02</td></tr><tr><td>HW Reset</td><td>8’h02</td></tr></table>                                                                                                                                                                           |                         |     |    |          |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h02 | SW Reset                              | 8’h02 | HW Reset                                | 8’h02 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h02                   |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h02                   |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h02                                                                                                                                                                                                                                                                                                                                                                              |                         |     |    |          |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

## 12.2.9. Positive Gamma Correction Setting (70h~7Fh)

| A1H~ABH               | GAMMA CORRECTION SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |                         |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|-------------------------|----------|-----------|--------------|----|----|----|------|--------|------|--|--|-------------------------|--|--|--------------|--|--|--|--|----------------------------------------|--|--|--|-------|--|--|-----|--|--|--|--|---------------------------------------|--|--|--|-------|--|--|-----|--|--|--|--|-----------------------------------------|--|--|--|-------|--|--|-----|--|--|--|--|----------------------------------------|--|--|--|--|--|--|-----|--|--|--|--|----------|--|--|--|--|--|--|-----|--|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7    | D6                      | D5       | D4        | D3           | D2 | D1 | D0 | HEX  |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 70H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp0     |    |    |    | 0x03 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 71H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         | gam_vrp2 |           |              |    |    |    | 0x32 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 72H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp4     |    |    |    | 0x0b |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 73H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp6     |    |    |    | 0x0c |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 74H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp12    |    |    |    | 0x07 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 75H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp16    |    |    |    | 0x0d |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 76H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       | gam_vrp20               |          |           |              |    |    |    |      | 0x34   |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 77H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp28    |    |    |    | 0x0a |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 78H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp34    |    |    |    | 0x08 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 79H                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       | gam_vrp42               |          |           |              |    |    |    |      | 0x32   |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 7AH                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp46    |    |    |    | 0x07 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 7BH                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp50    |    |    |    | 0x16 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 7CH                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp56    |    |    |    | 0x10 |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 7DH                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp58    |    |    |    | 0x0c |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 7EH                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          | gam_vrp60 |              |    |    |    |      | 0x31   |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| 7FH                   | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |          |           | gam_vrp62    |    |    |    |      |        | 0x08 |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Description           | This command is used to get different gamma curve.through changing this 16 key points’s voltage to get the ideal gamma curve.<br>Note: 19mV/step.                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       |                         |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |       |                         |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Register Availability | <table><tr><th colspan="7">Status</th><th colspan="5">Availability</th></tr><tr><td colspan="7">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Sleep In</td><td colspan="5">Yes</td></tr></table> |     |     |       |                         |          |           |              |    |    |    |      | Status |      |  |  |                         |  |  | Availability |  |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |       |  |  | Yes |  |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |       |  |  | Yes |  |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |       |  |  | Yes |  |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  | Yes |  |  |  |  | Sleep In |  |  |  |  |  |  | Yes |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |                         |          |           | Availability |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |                         |          |           | Yes          |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |                         |          |           | Yes          |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |                         |          |           | Yes          |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |                         |          |           | Yes          |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |                         |          | Yes       |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Default               | <table><tr><th colspan="4">Status</th><th colspan="8">Default Value(D7 to D0)</th></tr><tr><td colspan="4">Power On Sequence</td><td colspan="8">8’h02</td></tr><tr><td colspan="4">SW Reset</td><td colspan="8">8’h02</td></tr><tr><td colspan="4">HW Reset</td><td colspan="8">8’h02</td></tr></table>                                                                                                                                                                                                                           |     |     |       |                         |          |           |              |    |    |    |      | Status |      |  |  | Default Value(D7 to D0) |  |  |              |  |  |  |  | Power On Sequence                      |  |  |  | 8’h02 |  |  |     |  |  |  |  | SW Reset                              |  |  |  | 8’h02 |  |  |     |  |  |  |  | HW Reset                                |  |  |  | 8’h02 |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       | Default Value(D7 to D0) |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       | 8’h02                   |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       | 8’h02                   |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 8’h02 |                         |          |           |              |    |    |    |      |        |      |  |  |                         |  |  |              |  |  |  |  |                                        |  |  |  |       |  |  |     |  |  |  |  |                                       |  |  |  |       |  |  |     |  |  |  |  |                                         |  |  |  |       |  |  |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |

## 12.2.10. Negative Gamma Correction Setting (A0h~AFh)

| A1H~ABH               | GAMMA CORRECTION SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       |                         |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|-------------------------|-----------|--------------|-----------|----|----|----|------|--------|--|--|--|-------------------------|--|--------------|--|----------------------------------------|--|--|--|-------------------|--|-----|--|---------------------------------------|--|--|--|--|--|-----|--|-----------------------------------------|--|--|--|-------|--|-----|--|----------------------------------------|--|--|--|----------|--|-----|--|----------|--|--|--|--|--|-----|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7    | D6                      | D5        | D4           | D3        | D2 | D1 | D0 | HEX  |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA0                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn0  |    |    |    | 0x0b |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA1                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         | gam_vrn2  |              |           |    |    |    | 0x32 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA2                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn4  |    |    |    | 0x09 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA3                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn6  |    |    |    | 0x0c |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA4                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn12 |    |    |    | 0x07 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA5                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn16 |    |    |    | 0x03 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA6                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       | gam_vrn20               |           |              |           |    |    |    |      | 0x34   |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA7                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn28 |    |    |    | 0x05 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA8                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn34 |    |    |    | 0x07 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xA9                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       | gam_vrn42               |           |              |           |    |    |    |      | 0x32   |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xAA                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn46 |    |    |    | 0x0b |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xAB                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn50 |    |    |    | 0x16 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xAC                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn56 |    |    |    | 0x10 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xAD                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn58 |    |    |    | 0x0a |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xAE                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         | gam_vrn60 |              |           |    |    |    | 0x31 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| 0xAF                  | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   |       |                         |           |              | gam_vrn62 |    |    |    | 0x07 |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| Description           | This command is used to get different gamma curve.through changing this 16 key points’s voltage to get the ideal gamma curve.<br>Note: 19mV/step.                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       |                         |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |       |                         |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| Register Availability | <table><tr><th colspan="6">Status</th><th colspan="2">Availability</th></tr><tr><td colspan="6">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="2">Yes</td></tr><tr><td colspan="6">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="2">Yes</td></tr><tr><td colspan="6">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="2">Yes</td></tr><tr><td colspan="6">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="2">Yes</td></tr><tr><td colspan="6">Sleep In</td><td colspan="2">Yes</td></tr></table> |     |     |       |                         |           |              |           |    |    |    |      | Status |  |  |  |                         |  | Availability |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |                   |  | Yes |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  | Yes |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |       |  | Yes |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |          |  | Yes |  | Sleep In |  |  |  |  |  | Yes |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |                         |           | Availability |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |                         |           | Yes          |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |       |                         |           | Yes          |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |       |                         |           | Yes          |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       |                         |           | Yes          |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |       |                         | Yes       |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| Default               | <table><tr><th colspan="4">Status</th><th colspan="8">Default Value(D7 to D0)</th></tr><tr><td colspan="4">Power On Sequence</td><td colspan="8">8’h02</td></tr><tr><td colspan="4">SW Reset</td><td colspan="8">8’h02</td></tr><tr><td colspan="4">HW Reset</td><td colspan="8">8’h02</td></tr></table>                                                                                                                                                                                                                           |     |     |       |                         |           |              |           |    |    |    |      | Status |  |  |  | Default Value(D7 to D0) |  |              |  |                                        |  |  |  | Power On Sequence |  |     |  | 8’h02                                 |  |  |  |  |  |     |  | SW Reset                                |  |  |  | 8’h02 |  |     |  |                                        |  |  |  | HW Reset |  |     |  | 8’h02    |  |  |  |  |  |     |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |       | Default Value(D7 to D0) |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |       | 8’h02                   |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |       | 8’h02                   |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 8’h02 |                         |           |              |           |    |    |    |      |        |  |  |  |                         |  |              |  |                                        |  |  |  |                   |  |     |  |                                       |  |  |  |  |  |     |  |                                         |  |  |  |       |  |     |  |                                        |  |  |  |          |  |     |  |          |  |  |  |  |  |     |  |

### 12.2.9 RGBCTR (82h)

| 82H                   | RGB Interface Control                                                                                                                                                                                                                                                                                                                                                              |                         |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----|----|----|----|--------|--------|---------|---------|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7 | D6 | D5 | D4 | D3     | D2     | D1      | D0      | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 1  | 0  | 0  | 0  | 0      | 0      | 1       | 0       | 82H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | 0  | 0  | 0  | DPI_DP | DPI_EP | DPI_HSP | DPI_VSP | 00H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | DPI_DP : PCLK polarity ( “1”= data fetched at falling time, “0”= data fetched at rising time);<br>DPI_EP : DE polarity (“1”= Low enable, “0”=High enable)<br>DPI_HSP: HS polarity(“1”=Low level sync clock, “0”=High level sync clock)<br>DPI_VSP: VS polarity(“1”=Low level sync clock, “0”=High level sync clock)                                                                |                         |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |    |    |    |    |        |        |         |         |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Sleep In                                                                                                                                                                                                                                                                                                                                                                           | Yes                     |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h00</td></tr><tr><td>SW Reset</td><td>8’h00</td></tr><tr><td>HW Reset</td><td>8’h00</td></tr></table>                                                                                                                                                                           |                         |     |    |    |    |    |        |        |         |         |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h00 | SW Reset                              | 8’h00 | HW Reset                                | 8’h00 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h00                   |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h00                   |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | HW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h00                   |     |    |    |    |    |        |        |         |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 12.2.10 GATEST (84h)

| 84H                   | GATE START SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------------|----|-------|-------------------------|-----|--------------|----|----|-----|--------|--|--|--|--|--|-------------------------|--|--------------|--|--|--|----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|---------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|-----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|----------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|----------|--|--|--|--|--|--|--|-----|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7           | D6 | D5    | D4                      | D3  | D2           | D1 | D0 | HEX |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 1            | 0  | 0     | 0                       | 0   | 1            | 0  | 0  | 84H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | GATE_ST[7:0] |    |       |                         |     |              |    |    | 14H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Description           | Gate enables start position setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Register Availability | <table><tr><th colspan="8">Status</th><th colspan="4">Availability</th></tr><tr><td colspan="8">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Sleep In</td><td colspan="4">Yes</td></tr></table> |     |     |              |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  |                         |  | Availability |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Sleep In |  |  |  |  |  |  |  | Yes |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Availability |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |              |    |       |                         | Yes |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">8’h14</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">8’h14</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">8’h14</td></tr></table>                                                                                                                                                                                                                           |     |     |              |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |  |              |  |  |  | Power On Sequence                      |  |  |  |  |  | 8’h14 |  |     |  |  |  | SW Reset                              |  |  |  |  |  | 8’h14 |  |     |  |  |  | HW Reset                                |  |  |  |  |  | 8’h14 |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       | Default Value(D7 to D0) |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |              |    |       | 8’h14                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |              |    |       | 8’h14                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |              |    | 8’h14 |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |

### 12.2.11 GATE\_ED (85h)

| 85H                   | GATE END SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------------|----|-------|-------------------------|-----|--------------|----|----|-----|--------|--|--|--|--|--|-------------------------|--|--------------|--|--|--|----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|---------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|-----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|----------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|----------|--|--|--|--|--|--|--|-----|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7           | D6 | D5    | D4                      | D3  | D2           | D1 | D0 | HEX |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 1            | 0  | 0     | 0                       | 0   | 1            | 0  | 1  | 85H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | GATE_ED[7:0] |    |       |                         |     |              |    |    | 78H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Description           | Gate enables end position setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Register Availability | <table><tr><th colspan="8">Status</th><th colspan="4">Availability</th></tr><tr><td colspan="8">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Sleep In</td><td colspan="4">Yes</td></tr></table> |     |     |              |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  |                         |  | Availability |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Sleep In |  |  |  |  |  |  |  | Yes |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Availability |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |              |    |       |                         | Yes |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">8’h78</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">8’h78</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">8’h78</td></tr></table>                                                                                                                                                                                                                           |     |     |              |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |  |              |  |  |  | Power On Sequence                      |  |  |  |  |  | 8’h78 |  |     |  |  |  | SW Reset                              |  |  |  |  |  | 8’h78 |  |     |  |  |  | HW Reset                                |  |  |  |  |  | 8’h78 |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       | Default Value(D7 to D0) |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |              |    |       | 8’h78                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |              |    |       | 8’h78                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |              |    | 8’h78 |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |

## 12.2.12 VRH\_TEST (87h)

| 87H                   | Power Control 4                                               |     |     |          |    |       |                         |          |              |      |    |     |  |
|-----------------------|---------------------------------------------------------------|-----|-----|----------|----|-------|-------------------------|----------|--------------|------|----|-----|--|
|                       | D/CX                                                          | RDX | WRX | D7       | D6 | D5    | D4                      | D3       | D2           | D1   | D0 | HEX |  |
| Command               | L                                                             | H   | R   | 1        | 0  | 0     | 0                       | 0        | 1            | 1    | 1  | 87H |  |
| Parameter             | H                                                             | H   | R   | 0        | 0  | 0     | VRH[4:0]                |          |              |      |    | 16H |  |
| Description           | VRH[4:0]: This command is used to define GVDD trimming value. |     |     |          |    |       |                         |          |              |      |    |     |  |
|                       |                                                               |     |     | VRH[4:0] |    | GVDD  |                         | VRH[4:0] |              | GVDD |    |     |  |
|                       |                                                               |     |     | 00000    |    | 3.60  |                         | 10000    |              | 4.40 |    |     |  |
|                       |                                                               |     |     | 00001    |    | 3.65  |                         | 10001    |              | 4.45 |    |     |  |
|                       |                                                               |     |     | 00010    |    | 3.70  |                         | 10010    |              | 4.50 |    |     |  |
|                       |                                                               |     |     | 00011    |    | 3.75  |                         | 10011    |              | 4.55 |    |     |  |
|                       |                                                               |     |     | 00100    |    | 3.80  |                         | 10100    |              | 4.60 |    |     |  |
|                       |                                                               |     |     | 00101    |    | 3.85  |                         | 10101    |              | 4.65 |    |     |  |
|                       |                                                               |     |     | 00110    |    | 3.90  |                         | 10110    |              | 4.70 |    |     |  |
|                       |                                                               |     |     | 00111    |    | 3.95  |                         | 10111    |              | 4.75 |    |     |  |
|                       |                                                               |     |     | 01000    |    | 4.00  |                         | 11000    |              | 4.80 |    |     |  |
|                       |                                                               |     |     | 01001    |    | 4.05  |                         | 11001    |              | 4.85 |    |     |  |
|                       |                                                               |     |     | 01010    |    | 4.10  |                         | 11010    |              | 4.90 |    |     |  |
|                       |                                                               |     |     | 01011    |    | 4.15  |                         | 11011    |              | 4.95 |    |     |  |
|                       |                                                               |     |     | 01100    |    | 4.20  |                         | 11100    |              | 5.00 |    |     |  |
|                       |                                                               |     |     | 01101    |    | 4.25  |                         | 11101    |              | 5.05 |    |     |  |
|                       |                                                               |     |     | 01110    |    | 4.30  |                         | 11110    |              | 5.10 |    |     |  |
|                       |                                                               |     |     | 01111    |    | 4.35  |                         | 11111    |              | 5.15 |    |     |  |
| Restriction           | Should set “FF=A5” before configure this registers            |     |     |          |    |       |                         |          |              |      |    |     |  |
| Register Availability |                                                               |     |     |          |    |       |                         |          |              |      |    |     |  |
|                       | Status                                                        |     |     |          |    |       |                         |          | Availability |      |    |     |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                        |     |     |          |    |       |                         |          | Yes          |      |    |     |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                         |     |     |          |    |       |                         |          | Yes          |      |    |     |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                       |     |     |          |    |       |                         |          | Yes          |      |    |     |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                        |     |     |          |    |       |                         |          | Yes          |      |    |     |  |
| Sleep In              |                                                               |     |     |          |    |       |                         |          |              |      |    | Yes |  |
| Default               |                                                               |     |     |          |    |       |                         |          |              |      |    |     |  |
|                       | Status                                                        |     |     |          |    |       | Default Value(D7 to D0) |          |              |      |    |     |  |
|                       | Power On Sequence                                             |     |     |          |    |       | 8’h17                   |          |              |      |    |     |  |
|                       | SW Reset                                                      |     |     |          |    |       | 8’h17                   |          |              |      |    |     |  |
| HW Reset              |                                                               |     |     |          |    | 8’h17 |                         |          |              |      |    |     |  |

### 12.2.13 VCM\_TEST (88h)

| 88H         | VCOM Control 1                                                 |     |     |          |    |          |    |          |    |          |    |     |
|-------------|----------------------------------------------------------------|-----|-----|----------|----|----------|----|----------|----|----------|----|-----|
|             | D/CX                                                           | RDX | WRX | D7       | D6 | D5       | D4 | D3       | D2 | D1       | D0 | HEX |
| Command     | L                                                              | H   | R   | 1        | 0  | 0        | 0  | 1        | 0  | 0        | 0  | 88H |
| Parameter   | H                                                              | H   | R   | 0        | 0  | VCM[6:0] |    |          |    |          |    | 14H |
| Description | VCM[6:0]: This command is used to define VCOMH trimming value. |     |     |          |    |          |    |          |    |          |    |     |
|             |                                                                |     |     | VCM[6:0] |    | VCOMH    |    | VCM[6:0] |    | VCOMH    |    |     |
|             |                                                                |     |     | 0000000  |    | 3.198900 |    | 0101100  |    | 3.862800 |    |     |
|             |                                                                |     |     | 0000001  |    | 3.214000 |    | 0101101  |    | 3.877900 |    |     |
|             |                                                                |     |     | 0000010  |    | 3.229100 |    | 0101110  |    | 3.892900 |    |     |
|             |                                                                |     |     | 0000011  |    | 3.244100 |    | 0101111  |    | 3.908000 |    |     |
|             |                                                                |     |     | 0000100  |    | 3.259200 |    | 0110000  |    | 3.923100 |    |     |
|             |                                                                |     |     | 0000101  |    | 3.274300 |    | 0110001  |    | 3.938100 |    |     |
|             |                                                                |     |     | 0000110  |    | 3.289400 |    | 0110010  |    | 3.953300 |    |     |
|             |                                                                |     |     | 0000111  |    | 3.304500 |    | 0110011  |    | 3.968400 |    |     |
|             |                                                                |     |     | 0001000  |    | 3.319600 |    | 0110100  |    | 3.983400 |    |     |
|             |                                                                |     |     | 0001001  |    | 3.334700 |    | 0110101  |    | 3.998500 |    |     |
|             |                                                                |     |     | 0001010  |    | 3.349800 |    | 0110110  |    | 4.013600 |    |     |
|             |                                                                |     |     | 0001011  |    | 3.364800 |    | 0110111  |    | 4.028700 |    |     |
|             |                                                                |     |     | 0001100  |    | 3.379900 |    | 0111000  |    | 4.043800 |    |     |
|             |                                                                |     |     | 0001101  |    | 3.395000 |    | 0111001  |    | 4.058900 |    |     |
|             |                                                                |     |     | 0001110  |    | 3.410100 |    | 0111010  |    | 4.074000 |    |     |
|             |                                                                |     |     | 0001111  |    | 3.425200 |    | 0111011  |    | 4.089000 |    |     |
|             |                                                                |     |     | 0010000  |    | 3.440300 |    | 0111100  |    | 4.104100 |    |     |
|             |                                                                |     |     | 0010001  |    | 3.455400 |    | 0111101  |    | 4.119200 |    |     |
|             |                                                                |     |     | 0010010  |    | 3.470500 |    | 0111110  |    | 4.134400 |    |     |
|             |                                                                |     |     | 0010011  |    | 3.485600 |    | 0111111  |    | 4.149500 |    |     |
|             |                                                                |     |     | 0010100  |    | 3.500700 |    | 1000000  |    | 4.164600 |    |     |
|             |                                                                |     |     | 0010101  |    | 3.515800 |    | 1000001  |    | 4.179600 |    |     |
|             |                                                                |     |     | 0010110  |    | 3.530900 |    | 1000010  |    | 4.194700 |    |     |
|             |                                                                |     |     | 0010111  |    | 3.546000 |    | 1000011  |    | 4.209900 |    |     |
|             |                                                                |     |     | 0011000  |    | 3.561000 |    | 1000100  |    | 4.224900 |    |     |
|             |                                                                |     |     | 0011001  |    | 3.576100 |    | 1000101  |    | 4.239900 |    |     |
|             |                                                                |     |     | 0011010  |    | 3.591200 |    | 1000110  |    | 4.255000 |    |     |
|             |                                                                |     |     | 0011011  |    | 3.606300 |    | 1000111  |    | 4.270200 |    |     |
|             |                                                                |     |     | 0011100  |    | 3.621400 |    | 1001000  |    | 4.285200 |    |     |
|             |                                                                |     |     | 0011101  |    | 3.636500 |    | 1001001  |    | 4.300300 |    |     |
|             |                                                                |     |     | 0011110  |    | 3.651500 |    | 1001010  |    | 4.315400 |    |     |
|             |                                                                |     |     | 0011111  |    | 3.666700 |    | 1001011  |    | 4.330400 |    |     |
|             |                                                                |     |     | 0100000  |    | 3.681700 |    | 1001100  |    | 4.345600 |    |     |
|             |                                                                |     |     | 0100001  |    | 3.696900 |    | 1001101  |    | 4.360600 |    |     |
|             |                                                                |     |     | 0100010  |    | 3.711900 |    | 1001110  |    | 4.375700 |    |     |

|                                         | <table><tr><td>0100011</td><td>3.727000</td><td>1001111</td><td>4.390800</td></tr><tr><td>0100100</td><td>3.742100</td><td>1010000</td><td>4.405900</td></tr><tr><td>0100101</td><td>3.757100</td><td>1010001</td><td>4.420900</td></tr><tr><td>0100110</td><td>3.772200</td><td>1010010</td><td>4.436000</td></tr><tr><td>0100111</td><td>3.787300</td><td>1010011</td><td>4.451100</td></tr><tr><td>0101000</td><td>3.802400</td><td>1010100</td><td>4.466400</td></tr><tr><td>0101001</td><td>3.817500</td><td>1010101</td><td>4.481500</td></tr><tr><td>0101010</td><td>3.832600</td><td>1010110</td><td>4.496400</td></tr><tr><td>0101011</td><td>3.847600</td><td></td><td></td></tr></table> | 0100011 | 3.727000                | 1001111                                | 4.390800 | 0100100                               | 3.742100 | 1010000                                 | 4.405900 | 0100101                                | 3.757100 | 1010001  | 4.420900 | 0100110 | 3.772200 | 1010010 | 4.436000 | 0100111 | 3.787300 | 1010011 | 4.451100 | 0101000 | 3.802400 | 1010100 | 4.466400 | 0101001 | 3.817500 | 1010101 | 4.481500 | 0101010 | 3.832600 | 1010110 | 4.496400 | 0101011 | 3.847600 |  |  |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|----------------------------------------|----------|---------------------------------------|----------|-----------------------------------------|----------|----------------------------------------|----------|----------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|--|--|
| 0100011                                 | 3.727000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1001111 | 4.390800                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0100100                                 | 3.742100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010000 | 4.405900                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0100101                                 | 3.757100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010001 | 4.420900                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0100110                                 | 3.772200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010010 | 4.436000                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0100111                                 | 3.787300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010011 | 4.451100                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0101000                                 | 3.802400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010100 | 4.466400                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0101001                                 | 3.817500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010101 | 4.481500                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0101010                                 | 3.832600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1010110 | 4.496400                |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| 0101011                                 | 3.847600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Restriction                             | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                  | Status  | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes      | Normal Mode on,Idle Mode On,Sleep Out | Yes      | Partial Mode on,Idle Mode Off,Sleep Out | Yes      | Partial Mode on,Idle Mode On,Sleep Out | Yes      | Sleep In | Yes      |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h13</td></tr><tr><td>SW Reset</td><td>8’h13</td></tr><tr><td>HW Reset</td><td>8’h13</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Status  | Default Value(D7 to D0) | Power On Sequence                      | 8’h13    | SW Reset                              | 8’h13    | HW Reset                                | 8’h13    |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| Power On Sequence                       | 8’h13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| SW Reset                                | 8’h13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |
| HW Reset                                | 8’h13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                         |                                        |          |                                       |          |                                         |          |                                        |          |          |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         |          |  |  |

## 12.2.14 VDV\_TEST (89h)

| 89H         | VCOM Control 2                                                      |     |     |               |    |               |               |    |       |    |         |     |
|-------------|---------------------------------------------------------------------|-----|-----|---------------|----|---------------|---------------|----|-------|----|---------|-----|
|             | D/CX                                                                | RDX | WRX | D7            | D6 | D5            | D4            | D3 | D2    | D1 | D0      | HEX |
| Command     | L                                                                   | H   | R   | 1             | 0  | 0             | 0             | 1  | 0     | 0  | 1       | 89H |
| Parameter   | H                                                                   | H   | R   | 0             | 0  | VCOM_VDV[6:0] |               |    |       |    |         | 34H |
| Description | VCOM_VDV[6:0]: This command is used to define VCOML trimming value. |     |     |               |    |               |               |    |       |    |         |     |
|             |                                                                     |     |     | VCOM_VDV[6:0] |    | VCOML         | VCOM_VDV[6:0] |    | VCOML |    |         |     |
|             |                                                                     |     |     | 0000000       |    | -0.21116      | 0110110       |    |       |    | -1.0256 |     |
|             |                                                                     |     |     | 0000001       |    | -0.22624      | 0110111       |    |       |    | -1.0407 |     |
|             |                                                                     |     |     | 0000010       |    | -0.24132      | 0111000       |    |       |    | -1.0558 |     |
|             |                                                                     |     |     | 0000011       |    | -0.25641      | 0111001       |    |       |    | -1.0709 |     |
|             |                                                                     |     |     | 0000100       |    | -0.27149      | 0111010       |    |       |    | -1.086  |     |
|             |                                                                     |     |     | 0000101       |    | -0.28658      | 0111011       |    |       |    | -1.1011 |     |
|             |                                                                     |     |     | 0000110       |    | -0.30166      | 0111100       |    |       |    | -1.1162 |     |
|             |                                                                     |     |     | 0000111       |    | -0.31674      | 0111101       |    |       |    | -1.1312 |     |
|             |                                                                     |     |     | 0001000       |    | -0.33182      | 0111110       |    |       |    | -1.1463 |     |
|             |                                                                     |     |     | 0001001       |    | -0.3469       | 0111111       |    |       |    | -1.1614 |     |
|             |                                                                     |     |     | 0001010       |    | -0.36199      | 1000000       |    |       |    | -1.1765 |     |
|             |                                                                     |     |     | 0001011       |    | -0.37708      | 1000001       |    |       |    | -1.1916 |     |
|             |                                                                     |     |     | 0001100       |    | -0.39216      | 1000010       |    |       |    | -1.2067 |     |
|             |                                                                     |     |     | 0001101       |    | -0.40725      | 1000011       |    |       |    | -1.2217 |     |
|             |                                                                     |     |     | 0001110       |    | -0.42233      | 1000100       |    |       |    | -1.2368 |     |
|             |                                                                     |     |     | 0001111       |    | -0.43742      | 1000101       |    |       |    | -1.2519 |     |
|             |                                                                     |     |     | 0010000       |    | -0.45249      | 1000110       |    |       |    | -1.267  |     |
|             |                                                                     |     |     | 0010001       |    | -0.46758      | 1000111       |    |       |    | -1.2821 |     |
|             |                                                                     |     |     | 0010010       |    | -0.48266      | 1001000       |    |       |    | -1.2972 |     |
|             |                                                                     |     |     | 0010011       |    | -0.49775      | 1001001       |    |       |    | -1.3122 |     |
|             |                                                                     |     |     | 0010100       |    | -0.51283      | 1001010       |    |       |    | -1.3273 |     |
|             |                                                                     |     |     | 0010101       |    | -0.52791      | 1001011       |    |       |    | -1.3424 |     |
|             |                                                                     |     |     | 0010110       |    | -0.543        | 1001100       |    |       |    | -1.3575 |     |
|             |                                                                     |     |     | 0010111       |    | -0.55808      | 1001101       |    |       |    | -1.3726 |     |
|             |                                                                     |     |     | 0011000       |    | -0.57316      | 1001110       |    |       |    | -1.3877 |     |
|             |                                                                     |     |     | 0011001       |    | -0.58824      | 1001111       |    |       |    | -1.4028 |     |
|             |                                                                     |     |     | 0011010       |    | -0.60333      | 1010000       |    |       |    | -1.4178 |     |
|             |                                                                     |     |     | 0011011       |    | -0.61842      | 1010001       |    |       |    | -1.4329 |     |
|             |                                                                     |     |     | 0011100       |    | -0.6335       | 1010010       |    |       |    | -1.448  |     |
|             |                                                                     |     |     | 0011101       |    | -0.64859      | 1010011       |    |       |    | -1.4631 |     |
|             |                                                                     |     |     | 0011110       |    | -0.66367      | 1010100       |    |       |    | -1.4782 |     |
|             |                                                                     |     |     | 0011111       |    | -0.67876      | 1010101       |    |       |    | -1.4933 |     |
|             |                                                                     |     |     | 0100000       |    | -0.69383      | 1010110       |    |       |    | -1.5084 |     |
|             |                                                                     |     |     | 0100001       |    | -0.70892      | 1010111       |    |       |    | -1.5234 |     |
|             |                                                                     |     |     | 0100010       |    | -0.724        | 1011000       |    |       |    | -1.5385 |     |
|             |                                                                     |     |     | 0100011       |    | -0.73909      | 1011001       |    |       |    | -1.5536 |     |
|             |                                                                     |     |     | 0100100       |    | -0.75417      | 1011011       |    |       |    | -1.5687 |     |
|             |                                                                     |     |     | 0100101       |    | -0.76925      | 1011100       |    |       |    | -1.5838 |     |

|                                         | <table><tr><td>0100110</td><td>-0.78434</td><td>1011101</td><td>-1.5989</td></tr><tr><td>0100111</td><td>-0.79942</td><td>1011110</td><td>-1.6139</td></tr><tr><td>0101000</td><td>-0.81451</td><td>1011111</td><td>-1.629</td></tr><tr><td>0101001</td><td>-0.8296</td><td>1100000</td><td>-1.6441</td></tr><tr><td>0101010</td><td>-0.84467</td><td>1100001</td><td>-1.6592</td></tr><tr><td>0101011</td><td>-0.85977</td><td>1100010</td><td>-1.6743</td></tr><tr><td>0101100</td><td>-0.87485</td><td>1100011</td><td>-1.6894</td></tr><tr><td>0101101</td><td>-0.88994</td><td>1100100</td><td>-1.7045</td></tr><tr><td>0101110</td><td>-0.90502</td><td>1100101</td><td>-1.7195</td></tr><tr><td>0101111</td><td>-0.92011</td><td>1100110</td><td>-1.7346</td></tr><tr><td>0110000</td><td>-0.93518</td><td>1100111</td><td>-1.7497</td></tr><tr><td>0110001</td><td>-0.95027</td><td>1101000</td><td>-1.7648</td></tr><tr><td>0110010</td><td>-0.96535</td><td>1101001</td><td>-1.7799</td></tr><tr><td>0110011</td><td>-0.98045</td><td>1101010</td><td>-1.795</td></tr><tr><td><b>0110100</b></td><td><b>-0.99552</b></td><td>1101011</td><td>-1.8101</td></tr><tr><td>0110101</td><td>-1.0106</td><td></td><td></td></tr></table> <p>Note: This value need VCOMH set in 3.5V</p> | 0100110 | -0.78434                | 1011101                                | -1.5989 | 0100111                               | -0.79942 | 1011110                                 | -1.6139 | 0101000                                | -0.81451 | 1011111  | -1.629 | 0101001 | -0.8296 | 1100000 | -1.6441 | 0101010 | -0.84467 | 1100001 | -1.6592 | 0101011 | -0.85977 | 1100010 | -1.6743 | 0101100 | -0.87485 | 1100011 | -1.6894 | 0101101 | -0.88994 | 1100100 | -1.7045 | 0101110 | -0.90502 | 1100101 | -1.7195 | 0101111 | -0.92011 | 1100110 | -1.7346 | 0110000 | -0.93518 | 1100111 | -1.7497 | 0110001 | -0.95027 | 1101000 | -1.7648 | 0110010 | -0.96535 | 1101001 | -1.7799 | 0110011 | -0.98045 | 1101010 | -1.795 | <b>0110100</b> | <b>-0.99552</b> | 1101011 | -1.8101 | 0110101 | -1.0106 |  |  |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|----------------------------------------|---------|---------------------------------------|----------|-----------------------------------------|---------|----------------------------------------|----------|----------|--------|---------|---------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|---------|---------|----------|---------|--------|----------------|-----------------|---------|---------|---------|---------|--|--|
| 0100110                                 | -0.78434                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1011101 | -1.5989                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0100111                                 | -0.79942                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1011110 | -1.6139                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101000                                 | -0.81451                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1011111 | -1.629                  |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101001                                 | -0.8296                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1100000 | -1.6441                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101010                                 | -0.84467                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100001 | -1.6592                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101011                                 | -0.85977                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100010 | -1.6743                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101100                                 | -0.87485                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100011 | -1.6894                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101101                                 | -0.88994                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100100 | -1.7045                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101110                                 | -0.90502                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100101 | -1.7195                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0101111                                 | -0.92011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100110 | -1.7346                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0110000                                 | -0.93518                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1100111 | -1.7497                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0110001                                 | -0.95027                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1101000 | -1.7648                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0110010                                 | -0.96535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1101001 | -1.7799                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0110011                                 | -0.98045                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1101010 | -1.795                  |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| <b>0110100</b>                          | <b>-0.99552</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1101011 | -1.8101                 |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| 0110101                                 | -1.0106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Restriction                             | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Status  | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes     | Normal Mode on,Idle Mode On,Sleep Out | Yes      | Partial Mode on,Idle Mode Off,Sleep Out | Yes     | Partial Mode on,Idle Mode On,Sleep Out | Yes      | Sleep In | Yes    |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8'h0F</td></tr><tr><td>SW Reset</td><td>8'h0F</td></tr><tr><td>HW Reset</td><td>8'h0F</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Status  | Default Value(D7 to D0) | Power On Sequence                      | 8'h0F   | SW Reset                              | 8'h0F    | HW Reset                                | 8'h0F   |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| Power On Sequence                       | 8'h0F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| SW Reset                                | 8'h0F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |
| HW Reset                                | 8'h0F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                         |                                        |         |                                       |          |                                         |         |                                        |          |          |        |         |         |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |         |         |          |         |        |                |                 |         |         |         |         |  |  |

### 12.2.15 SRC\_POL (93h)

| 93H                   | SOURCE SET                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |    |     |        |                         |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|-----|--------|-------------------------|--------------|----|-----------|----|-----|--------|--|--|--|--|--|-------------------------|--------------|--|--|--|--|----------------------------------------|--|--|--|--|--|-------|-----|--|--|--|--|---------------------------------------|--|--|--|--|--|-------|-----|--|--|--|--|-----------------------------------------|--|--|--|--|--|-------|-----|--|--|--|--|----------------------------------------|--|--|--|--|--|--|-----|--|--|--|--|----------|--|--|--|--|--|--|-----|--|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7 | D6  | D5     | D4                      | D3           | D2 | D1        | D0 | HEX |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 1  | 0   | 0      | 1                       | 0            | 0  | 1         | 1  | 93H |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 0  | NDL | TE_SEL | SRC_EN_SEL              | 0            | 0  | POLAR_SEL |    | 60H |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Description           | NDL: Select max or min voltage to clear screen.<br>SRC_EN_SEL: Decide if the source enable is open during v-porch area. “1” is OPEN, “0” is CLOSE;<br>POLAR_SEL[1:0]:“00” is line inverse;<br>“01” is two lines inverse<br>“10” is four lines inverse<br>“11” is frame inverse                                                                                                                                                                                                                                                     |     |     |    |     |        |                         |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |    |     |        |                         |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Register Availability | <table><tr><th colspan="7">Status</th><th colspan="5">Availability</th></tr><tr><td colspan="7">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="5">Yes</td></tr><tr><td colspan="7">Sleep In</td><td colspan="5">Yes</td></tr></table> |     |     |    |     |        |                         |              |    |           |    |     | Status |  |  |  |  |  |                         | Availability |  |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       | Yes |  |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |       | Yes |  |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       | Yes |  |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  | Yes |  |  |  |  | Sleep In |  |  |  |  |  |  | Yes |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |     |        |                         | Availability |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |     |        |                         | Yes          |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |    |     |        |                         | Yes          |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |    |     |        |                         | Yes          |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |     |        |                         | Yes          |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |     |        | Yes                     |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">8’h10</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">8’h10</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">8’h10</td></tr></table>                                                                                                                                                                                                                           |     |     |    |     |        |                         |              |    |           |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |              |  |  |  |  | Power On Sequence                      |  |  |  |  |  | 8’h10 |     |  |  |  |  | SW Reset                              |  |  |  |  |  | 8’h10 |     |  |  |  |  | HW Reset                                |  |  |  |  |  | 8’h10 |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |    |     |        | Default Value(D7 to D0) |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |    |     |        | 8’h10                   |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |    |     |        | 8’h10                   |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |    |     | 8’h10  |                         |              |    |           |    |     |        |  |  |  |  |  |                         |              |  |  |  |  |                                        |  |  |  |  |  |       |     |  |  |  |  |                                       |  |  |  |  |  |       |     |  |  |  |  |                                         |  |  |  |  |  |       |     |  |  |  |  |                                        |  |  |  |  |  |  |     |  |  |  |  |          |  |  |  |  |  |  |     |  |  |  |  |

### 12.2.16 SRC\_ST (94h)

| 94H                   | SOURCE START SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |             |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------------|----|-------|-------------------------|-----|--------------|----|----|-----|--------|--|--|--|--|--|-------------------------|--|--------------|--|--|--|----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|---------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|-----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|----------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|----------|--|--|--|--|--|--|--|-----|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7          | D6 | D5    | D4                      | D3  | D2           | D1 | D0 | HEX |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 1           | 0  | 0     | 1                       | 0   | 1            | 0  | 0  | 94H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | SRC_ST[7:0] |    |       |                         |     |              |    |    | 0aH |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Description           | src_out_ctrl start position setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |             |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |             |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Register Availability | <table><tr><th colspan="8">Status</th><th colspan="4">Availability</th></tr><tr><td colspan="8">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Sleep In</td><td colspan="4">Yes</td></tr></table> |     |     |             |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  |                         |  | Availability |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Sleep In |  |  |  |  |  |  |  | Yes |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |             |    |       |                         |     | Availability |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |             |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |             |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |             |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |             |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |             |    |       |                         | Yes |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">8’h0A</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">8’h0A</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">8’h0A</td></tr></table>                                                                                                                                                                                                                           |     |     |             |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |  |              |  |  |  | Power On Sequence                      |  |  |  |  |  | 8’h0A |  |     |  |  |  | SW Reset                              |  |  |  |  |  | 8’h0A |  |     |  |  |  | HW Reset                                |  |  |  |  |  | 8’h0A |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |             |    |       | Default Value(D7 to D0) |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |             |    |       | 8’h0A                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |             |    |       | 8’h0A                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |             |    | 8’h0A |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |

### 12.2.17 PCHGST (95h)

| 95H                   | SOURCE PRECHARGE START SETTING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------------|----|-------|-------------------------|-----|--------------|----|----|-----|--------|--|--|--|--|--|-------------------------|--|--------------|--|--|--|----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|---------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|-----------------------------------------|--|--|--|--|--|-------|--|-----|--|--|--|----------------------------------------|--|--|--|--|--|--|--|-----|--|--|--|----------|--|--|--|--|--|--|--|-----|--|--|--|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7           | D6 | D5    | D4                      | D3  | D2           | D1 | D0 | HEX |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 1            | 0  | 0     | 1                       | 0   | 1            | 0  | 1  | 95H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | PCHG_ST[7:0] |    |       |                         |     |              |    |    | 03H |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Description           | Source pre-charge start position setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |              |    |       |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Register Availability | <table><tr><th colspan="8">Status</th><th colspan="4">Availability</th></tr><tr><td colspan="8">Normal Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Normal Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode Off,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Partial Mode on,Idle Mode On,Sleep Out</td><td colspan="4">Yes</td></tr><tr><td colspan="8">Sleep In</td><td colspan="4">Yes</td></tr></table> |     |     |              |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  |                         |  | Availability |  |  |  | Normal Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Normal Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode Off,Sleep Out |  |  |  |  |  |       |  | Yes |  |  |  | Partial Mode on,Idle Mode On,Sleep Out |  |  |  |  |  |  |  | Yes |  |  |  | Sleep In |  |  |  |  |  |  |  | Yes |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Availability |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       |                         |     | Yes          |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Sleep In              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |              |    |       |                         | Yes |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| Default               | <table><tr><th colspan="6">Status</th><th colspan="6">Default Value(D7 to D0)</th></tr><tr><td colspan="6">Power On Sequence</td><td colspan="6">8’h03</td></tr><tr><td colspan="6">SW Reset</td><td colspan="6">8’h03</td></tr><tr><td colspan="6">HW Reset</td><td colspan="6">8’h03</td></tr></table>                                                                                                                                                                                                                           |     |     |              |    |       |                         |     |              |    |    |     | Status |  |  |  |  |  | Default Value(D7 to D0) |  |              |  |  |  | Power On Sequence                      |  |  |  |  |  | 8’h03 |  |     |  |  |  | SW Reset                              |  |  |  |  |  | 8’h03 |  |     |  |  |  | HW Reset                                |  |  |  |  |  | 8’h03 |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |              |    |       | Default Value(D7 to D0) |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |              |    |       | 8’h03                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |              |    |       | 8’h03                   |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |
| HW Reset              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |              |    | 8’h03 |                         |     |              |    |    |     |        |  |  |  |  |  |                         |  |              |  |  |  |                                        |  |  |  |  |  |       |  |     |  |  |  |                                       |  |  |  |  |  |       |  |     |  |  |  |                                         |  |  |  |  |  |       |  |     |  |  |  |                                        |  |  |  |  |  |  |  |     |  |  |  |          |  |  |  |  |  |  |  |     |  |  |  |

### 12.2.18 PWCTR 5 (B1h)

| B1H         | Power Control 5                                    |                                                    |                                         |                   |        |    |          |                         |    |          |     |     |              |
|-------------|----------------------------------------------------|----------------------------------------------------|-----------------------------------------|-------------------|--------|----|----------|-------------------------|----|----------|-----|-----|--------------|
|             | D/CX                                               | RDX                                                | WRX                                     | D7                | D6     | D5 | D4       | D3                      | D2 | D1       | D0  | HEX |              |
| Command     | L                                                  | H                                                  | R                                       | 1                 | 0      | 1  | 1        | 0                       | 0  | 0        | 1   | B1H |              |
| Parameter   | H                                                  | H                                                  | R                                       | 0                 | 0      | 0  | 0        | BTH[1:0]                |    | BTL[1:0] |     | 0FH |              |
| Description | BTH[1:0]: is used to define the ratio in VGH pump. |                                                    |                                         |                   |        |    |          |                         |    |          |     |     |              |
|             |                                                    |                                                    |                                         | BTH[1:0]          |        |    | BTH[1:0] |                         |    | VGH      |     |     |              |
|             |                                                    |                                                    |                                         | 0                 |        |    | 0        |                         |    | 4*VCI    |     |     |              |
|             |                                                    |                                                    |                                         | 0                 |        |    | 1        |                         |    | 5*VCI    |     |     |              |
|             |                                                    |                                                    |                                         | 1                 |        |    | 0        |                         |    | 6*VCI    |     |     |              |
|             |                                                    |                                                    |                                         | 1                 |        |    | 1        |                         |    | 6*VCI    |     |     |              |
|             | BTL[1:0]: is used to define the ratio in VGL pump. |                                                    |                                         |                   |        |    |          |                         |    |          |     |     |              |
|             |                                                    |                                                    |                                         | BTL[1:0]          |        |    | BTL[1:0] |                         |    | VGL      |     |     |              |
|             |                                                    |                                                    |                                         | 0                 |        |    | 0        |                         |    | -3*VCI   |     |     |              |
|             |                                                    |                                                    |                                         | 0                 |        |    | 1        |                         |    | -4*VCI   |     |     |              |
|             |                                                    |                                                    |                                         | 1                 |        |    | 0        |                         |    | -5*VCI   |     |     |              |
|             |                                                    |                                                    |                                         | 1                 |        |    | 1        |                         |    | -5*VCI   |     |     |              |
|             | Restriction                                        | Should set “FF=A5” before configure this registers |                                         |                   |        |    |          |                         |    |          |     |     |              |
|             | Register Availability                              |                                                    |                                         |                   | Status |    |          |                         |    |          |     |     | Availability |
|             |                                                    |                                                    | Normal Mode on,Idle Mode Off,Sleep Out  |                   |        |    |          |                         |    |          | Yes |     |              |
|             |                                                    |                                                    | Normal Mode on,Idle Mode On,Sleep Out   |                   |        |    |          |                         |    |          | Yes |     |              |
|             |                                                    |                                                    | Partial Mode on,Idle Mode Off,Sleep Out |                   |        |    |          |                         |    |          | Yes |     |              |
|             |                                                    |                                                    | Partial Mode on,Idle Mode On,Sleep Out  |                   |        |    |          |                         |    |          | Yes |     |              |
|             |                                                    |                                                    | Sleep In                                |                   |        |    |          |                         |    |          | Yes |     |              |
| Default     |                                                    |                                                    |                                         | Status            |        |    |          | Default Value(D7 to D0) |    |          |     |     |              |
|             |                                                    |                                                    |                                         | Power On Sequence |        |    |          | 8’h0F                   |    |          |     |     |              |
|             |                                                    |                                                    |                                         | SW Reset          |        |    |          | 8’h0F                   |    |          |     |     |              |
|             |                                                    |                                                    |                                         | HW Reset          |        |    |          | 8’h0F                   |    |          |     |     |              |
|             |                                                    |                                                    |                                         |                   |        |    |          |                         |    |          |     |     |              |

## 12.2.19 PWCTR 6 (B2h)

| B2H                                     | Power Control 6                                                                                                                                                                                                                                                                                                                                                                    |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------------------|----|-------------------|----|------------------|----|------------------|----|-----|--------|-------------------------|----------------------------------------|-----|---------------------------------------|-----|-----------------------------------------|-----|----------------------------------------|-----|----------|-----|--|--|
|                                         | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D7                 | D6 | D5                | D4 | D3               | D2 | D1               | D0 | HEX |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Command                                 | L                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | 1                  | 0  | 1                 | 1  | 0                | 0  | 1                | 0  | B2H |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Parameter                               | H                                                                                                                                                                                                                                                                                                                                                                                  | H   | R   | ddvdh_clk_sel[1:0] |    | vgh_clk_sel[1:0]  |    | vgl_clk_sel[1:0] |    | vcl_clk_sel[1:0] |    | 96H |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Description                             | ddvdh_clk_sel[1:0] is used to set the operation frequency of DDVDH pump.                                                                                                                                                                                                                                                                                                           |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | ddvdh_clk_sel [1]  |    | ddvdh_clk_sel [0] |    | Frequency        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 0                 |    | 1 * OSC          |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 1                 |    | 1/2 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 0                 |    | 1/4 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 1                 |    | 1/8 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         | vgh_clk_sel [1:0] is used to set the operation frequency of VGH pump.                                                                                                                                                                                                                                                                                                              |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | vgh_clk_sel [1]    |    | vgh_clk_sel [0]   |    | Frequency        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 0                 |    | 1 * OSC          |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 1                 |    | 1/2 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 0                 |    | 1/4 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 1                 |    | 1/8 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         | vgl_clk_sel [1:0] is used to set the operation frequency of VGL pump.                                                                                                                                                                                                                                                                                                              |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | vgl_clk_sel [1]    |    | vgl_clk_sel [0]   |    | Frequency        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 0                 |    | 1 * OSC          |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 1                 |    | 1/2 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 0                 |    | 1/4 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 1                 |    | 1/8 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         | vcl_clk_sel[1:0] is used to set the operation frequency of VCL pump.                                                                                                                                                                                                                                                                                                               |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | vcl_clk_sel [1]    |    | vcl_clk_sel [0]   |    | Frequency        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 0                 |    | 1 * OSC          |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 0                  |    | 1                 |    | 1/2 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 0                 |    | 1/4 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     | 1                  |    | 1                 |    | 1/8 * OSC        |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Restriction                             | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Register Availability                   | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |                    |    |                   |    |                  |    |                  |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes | Normal Mode on,Idle Mode On,Sleep Out | Yes | Partial Mode on,Idle Mode Off,Sleep Out | Yes | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |  |  |
| Status                                  | Availability                                                                                                                                                                                                                                                                                                                                                                       |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Normal Mode on,Idle Mode Off,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Normal Mode on,Idle Mode On,Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Partial Mode on,Idle Mode Off,Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Partial Mode on,Idle Mode On,Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Sleep In                                | Yes                                                                                                                                                                                                                                                                                                                                                                                |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Default                                 | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td colspan="12"></td></tr></table>                                                                                                                                                                                                                                                                             |     |     |                    |    |                   |    |                  |    |                  |    |     | Status | Default Value(D7 to D0) |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
| Status                                  | Default Value(D7 to D0)                                                                                                                                                                                                                                                                                                                                                            |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                    |     |     |                    |    |                   |    |                  |    |                  |    |     |        |                         |                                        |     |                                       |     |                                         |     |                                        |     |          |     |  |  |

|  |  |                   |       |
|--|--|-------------------|-------|
|  |  | Power On Sequence | 8'h00 |
|  |  | SW Reset          | 8'h00 |
|  |  | HW Reset          | 8'h00 |

## 12.2.20 CHOP (B5h)

| B5H                   | CHOP SET                                                                                                                                           |     |     |    |                                                  |               |    |             |                         |                   |    |     |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----|--------------------------------------------------|---------------|----|-------------|-------------------------|-------------------|----|-----|
|                       | D/CX                                                                                                                                               | RDX | WRX | D7 | D6                                               | D5            | D4 | D3          | D2                      | D1                | D0 | HEX |
| Command               | L                                                                                                                                                  | H   | R   | 1  | 0                                                | 1             | 1  | 0           | 1                       | 0                 | 1  | B5H |
| Parameter             | H                                                                                                                                                  | H   | R   | 0  | 0                                                | CHOP_SEL[1:0] |    | GAM_FLW_FIX | 0                       | GAM_BIAS_FIX[1:0] |    | 30H |
| Description           | CHOPPER_SEL: Gamma chopper function option.                                                                                                        |     |     |    |                                                  |               |    |             |                         |                   |    |     |
|                       | CHOP_SEL[1:0]                                                                                                                                      |     |     |    | Description                                      |               |    |             |                         |                   |    |     |
|                       | 00                                                                                                                                                 |     |     |    | 2 frame chopper                                  |               |    |             |                         |                   |    |     |
|                       | 01                                                                                                                                                 |     |     |    | 1 line chopper (1 frame chopper polarity change) |               |    |             |                         |                   |    |     |
|                       | 10                                                                                                                                                 |     |     |    | 1 line chopper (2 frame chopper polarity change) |               |    |             |                         |                   |    |     |
|                       | 11                                                                                                                                                 |     |     |    | NONE                                             |               |    |             |                         |                   |    |     |
|                       | Gam_bias_fix[1:0] is used to adjust gamma op’s bias current, default =00.<br>Gam_flw_fix is used to change gamma op’s driver capacity, default =0. |     |     |    |                                                  |               |    |             |                         |                   |    |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                 |     |     |    |                                                  |               |    |             |                         |                   |    |     |
| Register Availability |                                                                                                                                                    |     |     |    |                                                  |               |    |             |                         |                   |    |     |
|                       | Status                                                                                                                                             |     |     |    |                                                  |               |    |             | Availability            |                   |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                             |     |     |    |                                                  |               |    |             | Yes                     |                   |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                              |     |     |    |                                                  |               |    |             | Yes                     |                   |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                            |     |     |    |                                                  |               |    |             | Yes                     |                   |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                             |     |     |    |                                                  |               |    |             | Yes                     |                   |    |     |
| Default               | Sleep In                                                                                                                                           |     |     |    |                                                  |               |    |             | Yes                     |                   |    |     |
|                       |                                                                                                                                                    |     |     |    |                                                  |               |    |             |                         |                   |    |     |
|                       | Status                                                                                                                                             |     |     |    |                                                  |               |    |             | Default Value(D7 to D0) |                   |    |     |
|                       | Power On Sequence                                                                                                                                  |     |     |    |                                                  |               |    |             | 8’h00                   |                   |    |     |
|                       | SW Reset                                                                                                                                           |     |     |    |                                                  |               |    |             | 8’h00                   |                   |    |     |
|                       | HW Reset                                                                                                                                           |     |     |    |                                                  |               |    |             | 8’h00                   |                   |    |     |

12.2.21 REV (C3h)

| C3H                   | REV                                                                                                                                                                                                                                                                                                                                                                                |                         |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----|----|----|--------|----|----|----|---------|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7 | D6 | D5 | D4     | D3 | D2 | D1 | D0      | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 1  | 1  | 0  | 0      | 0  | 0  | 1  | 1       | C3H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter             | H                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 0  | 0  | 0  | SRC_SS | 0  | 0  | 0  | GATE_GS | 10H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | SRC_SS: source reverse scan control. “1” is reverse, “0” is normal.<br>GATE_GS: gate reverse scan control. “1” is reverse, “0” is normal.                                                                                                                                                                                                                                          |                         |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                                                                 |                         |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |    |    |    |        |    |    |    |         |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h10</td></tr><tr><td>SW Reset</td><td>8’h10</td></tr><tr><td>HW Reset</td><td>8’h10</td></tr></table>                                                                                                                                                                           |                         |     |    |    |    |        |    |    |    |         |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h10 | SW Reset                              | 8’h10 | HW Reset                                | 8’h10 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h10                   |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h10                   |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h10                                                                                                                                                                                                                                                                                                                                                                              |                         |     |    |    |    |        |    |    |    |         |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

## 12.2.22 VDD18 (C4h)

| C4H                   | VDD18 Set                                          |     |     |    |       |                         |       |              |    |    |    |     |
|-----------------------|----------------------------------------------------|-----|-----|----|-------|-------------------------|-------|--------------|----|----|----|-----|
|                       | D/CX                                               | RDX | WRX | D7 | D6    | D5                      | D4    | D3           | D2 | D1 | D0 | HEX |
| Command               | L                                                  | H   | R   | 1  | 1     | 0                       | 0     | 0            | 1  | 0  | 0  | C4H |
| Parameter             | H                                                  | H   | R   | 0  | 0     | 0                       | 0     | REGU_AD[2:0] |    |    | 0  | 00H |
| Description           | REGU_AD[2:0]: vdd18 trimming signal.               |     |     |    |       |                         |       |              |    |    |    |     |
|                       | REGU_AD[2:0]                                       |     |     |    |       |                         | VDD18 |              |    |    |    |     |
|                       | 000                                                |     |     |    |       |                         | 1.853 |              |    |    |    |     |
|                       | 001                                                |     |     |    |       |                         | 1.904 |              |    |    |    |     |
|                       | 010                                                |     |     |    |       |                         | 1.958 |              |    |    |    |     |
|                       | 011                                                |     |     |    |       |                         | 2.106 |              |    |    |    |     |
|                       | 100                                                |     |     |    |       |                         | 1.597 |              |    |    |    |     |
|                       | 101                                                |     |     |    |       |                         | 1.654 |              |    |    |    |     |
|                       | 110                                                |     |     |    |       |                         | 1.737 |              |    |    |    |     |
|                       | 111                                                |     |     |    |       |                         | 1.805 |              |    |    |    |     |
| Restriction           | Should set “FF=A5” before configure this registers |     |     |    |       |                         |       |              |    |    |    |     |
| Register Availability |                                                    |     |     |    |       |                         |       |              |    |    |    |     |
|                       | Status                                             |     |     |    |       |                         |       | Availability |    |    |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out             |     |     |    |       |                         |       | Yes          |    |    |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out              |     |     |    |       |                         |       | Yes          |    |    |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out            |     |     |    |       |                         |       | Yes          |    |    |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out             |     |     |    |       |                         |       | Yes          |    |    |    |     |
| Sleep In              |                                                    |     |     |    |       |                         | Yes   |              |    |    |    |     |
| Default               |                                                    |     |     |    |       |                         |       |              |    |    |    |     |
|                       | Status                                             |     |     |    |       | Default Value(D7 to D0) |       |              |    |    |    |     |
|                       | Power On Sequence                                  |     |     |    |       | 8’h08                   |       |              |    |    |    |     |
|                       | SW Reset                                           |     |     |    |       | 8’h08                   |       |              |    |    |    |     |
| HW Reset              |                                                    |     |     |    | 8’h08 |                         |       |              |    |    |    |     |

### 12.2.23 VBG (C5h)

| C4H                   | VDD18 Set                                          |     |     |       |    |                         |             |             |              |       |    |     |
|-----------------------|----------------------------------------------------|-----|-----|-------|----|-------------------------|-------------|-------------|--------------|-------|----|-----|
|                       | D/CX                                               | RDX | WRX | D7    | D6 | D5                      | D4          | D3          | D2           | D1    | D0 | HEX |
| Command               | L                                                  | H   | R   | 1     | 1  | 0                       | 0           | 0           | 1            | 0     | 0  | C5H |
| Parameter             | H                                                  | H   | R   | 0     | 0  | 0                       | 0           | VBG_AD[3:0] |              |       | 0  | 00H |
| Description           | VBG_AD[3:0]: vdd18 trimming signal.                |     |     |       |    |                         |             |             |              |       |    |     |
|                       | VBG_AD[3:0]                                        |     |     | VBG   |    |                         | VBG_AD[3:0] |             |              | VBG   |    |     |
|                       | 0000                                               |     |     | 1.201 |    |                         | 1000        |             |              | 1.120 |    |     |
|                       | 0001                                               |     |     | 1.211 |    |                         | 1001        |             |              | 1.131 |    |     |
|                       | 0010                                               |     |     | 1.221 |    |                         | 1010        |             |              | 1.141 |    |     |
|                       | 0011                                               |     |     | 1.231 |    |                         | 1011        |             |              | 1.151 |    |     |
|                       | 0100                                               |     |     | 1.241 |    |                         | 1100        |             |              | 1.161 |    |     |
|                       | 0101                                               |     |     | 1.251 |    |                         | 1101        |             |              | 1.171 |    |     |
|                       | 0110                                               |     |     | 1.262 |    |                         | 1110        |             |              | 1.181 |    |     |
|                       | 0111                                               |     |     | 1.271 |    |                         | 1111        |             |              | 1.191 |    |     |
| Restriction           | Should set “FF=A5” before configure this registers |     |     |       |    |                         |             |             |              |       |    |     |
| Register Availability |                                                    |     |     |       |    |                         |             |             |              |       |    |     |
|                       | Status                                             |     |     |       |    |                         |             |             | Availability |       |    |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out             |     |     |       |    |                         |             |             | Yes          |       |    |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out              |     |     |       |    |                         |             |             | Yes          |       |    |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out            |     |     |       |    |                         |             |             | Yes          |       |    |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out             |     |     |       |    |                         |             |             | Yes          |       |    |     |
|                       | Sleep In                                           |     |     |       |    |                         |             |             | Yes          |       |    |     |
| Default               |                                                    |     |     |       |    |                         |             |             |              |       |    |     |
|                       | Status                                             |     |     |       |    | Default Value(D7 to D0) |             |             |              |       |    |     |
|                       | Power On Sequence                                  |     |     |       |    | 8’h08                   |             |             |              |       |    |     |
|                       | SW Reset                                           |     |     |       |    | 8’h08                   |             |             |              |       |    |     |
|                       | HW Reset                                           |     |     |       |    | 8’h08                   |             |             |              |       |    |     |

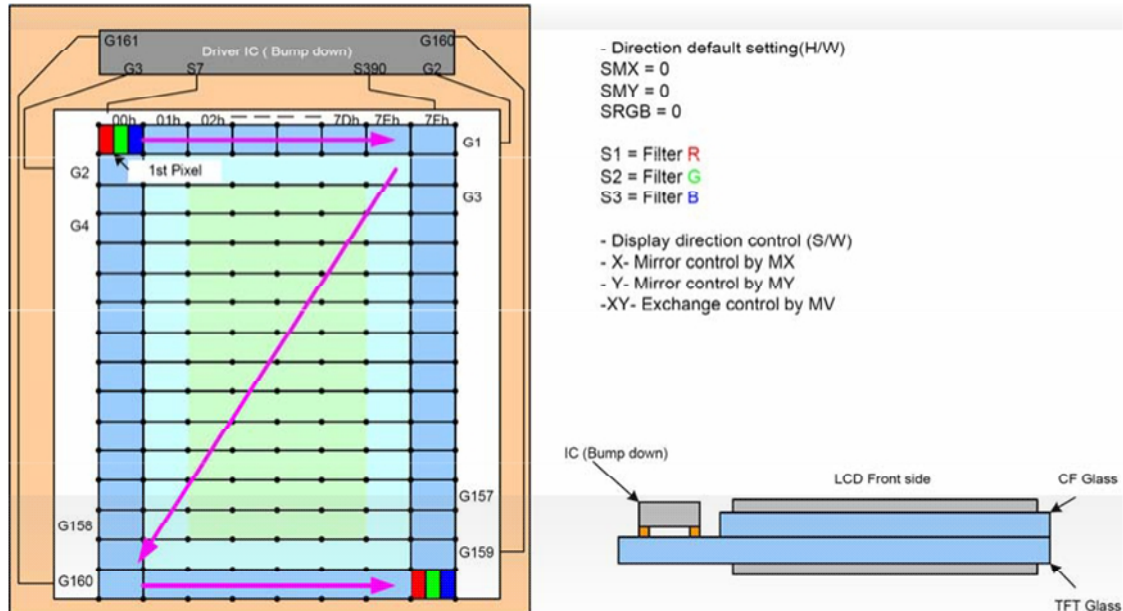
### 12.2.24 RDOTP 1 (D1h)

| D1H                   | Read OTP Data 1                                                                                                                                                                                                                                                                                                                                                                    |                         |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|-----------------|----|----|----|----|----|----|----|-----|--------|-------------------------|----------------------------------------|-------|---------------------------------------|-------|-----------------------------------------|-------|----------------------------------------|-----|----------|-----|
|                       | D/CX                                                                                                                                                                                                                                                                                                                                                                               | RDX                     | WRX | D7              | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Command               | L                                                                                                                                                                                                                                                                                                                                                                                  | H                       | R   | 1               | 1  | 0  | 1  | 0  | 0  | 0  | 1  | D1H |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter1            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | X               | X  | X  | X  | X  | X  | X  | X  | X   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Parameter2            | H                                                                                                                                                                                                                                                                                                                                                                                  | R                       | H   | OTP_RD_DAT[7:0] |    |    |    |    |    |    |    | -   |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Description           | OTP read data[7:0]                                                                                                                                                                                                                                                                                                                                                                 |                         |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Restriction           | The 1st Parameter is dummy read.<br>Should set “FF=A5” before configure this registers                                                                                                                                                                                                                                                                                             |                         |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Register Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode Off,Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode on,Idle Mode On,Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                         |     |                 |    |    |    |    |    |    |    |     | Status | Availability            | Normal Mode on,Idle Mode Off,Sleep Out | Yes   | Normal Mode on,Idle Mode On,Sleep Out | Yes   | Partial Mode on,Idle Mode Off,Sleep Out | Yes   | Partial Mode on,Idle Mode On,Sleep Out | Yes | Sleep In | Yes |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Availability            |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Normal Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                              | Yes                     |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode Off,Sleep Out                                                                                                                                                                                                                                                                                                                                            | Yes                     |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Partial Mode on,Idle Mode On,Sleep Out                                                                                                                                                                                                                                                                                                                                             | Yes                     |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Sleep In              | Yes                                                                                                                                                                                                                                                                                                                                                                                |                         |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| Default               | <table><tr><th>Status</th><th>Default Value(D7 to D0)</th></tr><tr><td>Power On Sequence</td><td>8’h00</td></tr><tr><td>SW Reset</td><td>8’h00</td></tr><tr><td>HW Reset</td><td>8’h00</td></tr></table>                                                                                                                                                                           |                         |     |                 |    |    |    |    |    |    |    |     | Status | Default Value(D7 to D0) | Power On Sequence                      | 8’h00 | SW Reset                              | 8’h00 | HW Reset                                | 8’h00 |                                        |     |          |     |
|                       | Status                                                                                                                                                                                                                                                                                                                                                                             | Default Value(D7 to D0) |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                  | 8’h00                   |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
|                       | SW Reset                                                                                                                                                                                                                                                                                                                                                                           | 8’h00                   |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |
| HW Reset              | 8’h00                                                                                                                                                                                                                                                                                                                                                                              |                         |     |                 |    |    |    |    |    |    |    |     |        |                         |                                        |       |                                       |       |                                         |       |                                        |     |          |     |

### 13. Example Panel Connection (GM="011")

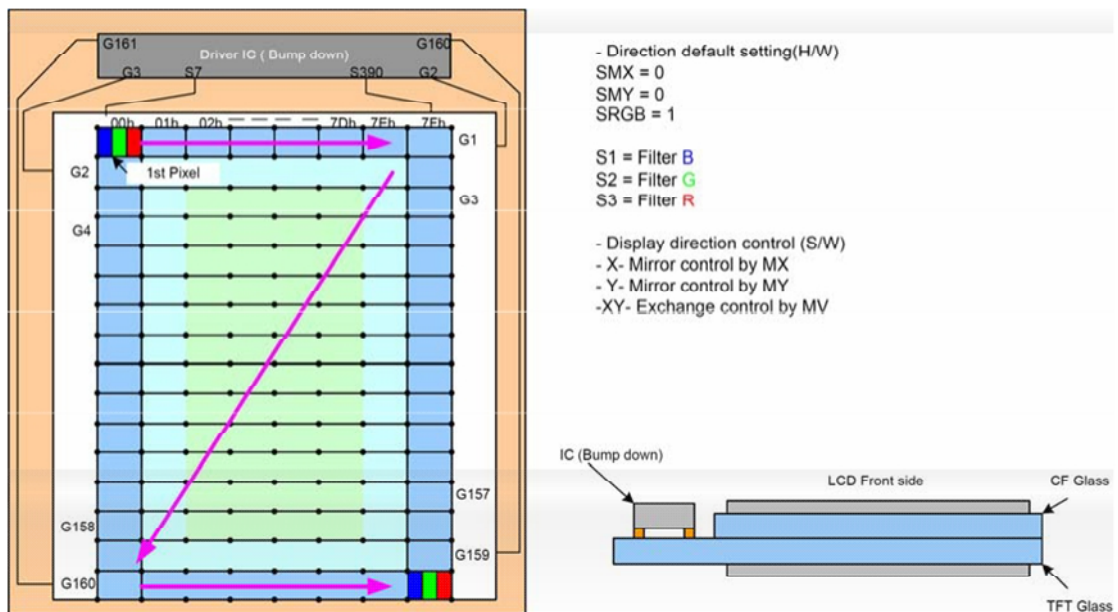
CASE 1: First pixel is at left\_top of the panel

RGB order is "R.G.B"



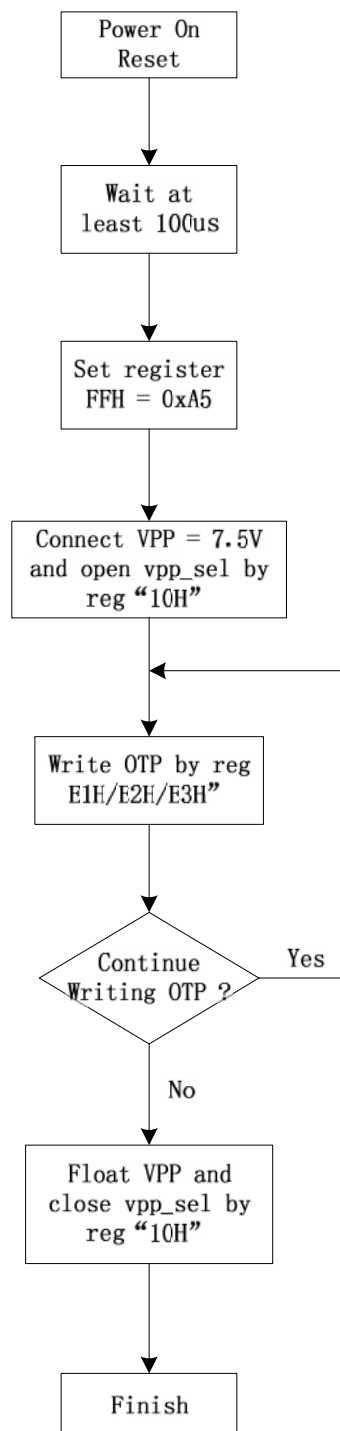
CASE 2: First pixel is at left\_top of the panel

RGB order is "B.G.R"





## 14. OTP Flow



## 15. Electrical Characteristics

### 15.1. Absolute Maximum Ratings

The absolute maximum rating is listed on following table. When NV3023A is used out of the absolute maximum ratings, the NV3023A may be permanently damaged. So working within the following electrical characteristics limit is strongly recommended during normal operation.

| Item                          | Symbol  | Unit | Value Note     |
|-------------------------------|---------|------|----------------|
| Supply voltage                | VCI     | V    | -0.3~+4.8      |
| Supply<br>voltage(Logic)      | IOVCC   | V    | -0.3~+3.6      |
| Supply<br>voltage(Digital)    |         |      |                |
| Driver supply voltage         | VCC     | V    | -0.3~+2.4      |
| Logic input voltage<br>range  | VGH-VGL | V    | -0.3~+30.0     |
| Logic output voltage<br>range | VIN     | V    | -0.3~IOVCC+0.3 |
| Operation<br>temperature      | VO      | V    | -0.3~IOVCC+0.3 |
| Storage temperature           | Topr    | ℃    | -35~+85        |
|                               | Tstg    | ℃    | -55~+110       |

## 15.2. DC Characteristics

| Item                                 | Symbol | Unit | Condition              | Min.     | Typ. | Max.     | Note       |
|--------------------------------------|--------|------|------------------------|----------|------|----------|------------|
| <b>Power &amp; Operation Voltage</b> |        |      |                        |          |      |          |            |
| Analog Operation Voltage             | VCI    | V    | Operation Voltage      | 2.5      | 2.75 | 4.8      | Note 2     |
| Logic Operation Voltage              | IOVCC  | V    | I/O Supply Voltage     | 1.65     | 1.8  | 3.6      | Note 2     |
| Digital Operation Voltage            | VCC    | V    | Digital Supply Voltage |          | 1.8  |          | Note 2     |
| Gate Driver High Voltage             | VGH    | V    |                        | 10       |      | 16       | Note 3     |
| Gate Driver Low Voltage              | VGL    | V    |                        | -16      |      | -7.5     | Note 3     |
| Driver Supply Voltage                |        | V    | VGH-VGL                | 19       |      | 32       | Note 3     |
| <b>Input/Output</b>                  |        |      |                        |          |      |          |            |
| Logic High Level Input Voltage       | VIH    | V    |                        | 0.7IOVCC |      | IOVCC    | Note 1,2,3 |
| Logic Low Level Input Voltage        | VIL    | V    |                        | VSS      |      | 0.3IOVCC | Note 1,2,3 |
| Logic High Level Output Voltage      | VOH    | V    | IOH=-1.0mA             | 0.8IOVCC |      | IOVCC    | Note 1,2,3 |
| Logic Low Level Output Voltage       | VOL    | V    | IOL=1.0mA              | VSS      |      | 0.2IOVCC | Note 1,2,3 |
| Logic Input Leakage Current          | IIL    | uA   | VIN=IOVCC or VSS       | -0.1     |      | 0.1      | Note 1,2,3 |
| <b>VCOM Operation</b>                |        |      |                        |          |      |          |            |
| VCOM High Voltage                    | VCOMH  | V    | Ccom=12nF              | 2.5      |      | 5        | Note 3     |
| VCOM Low Voltage                     | VCOML  | V    | Ccom=12nF              | -2.5     |      | 0        | Note 3     |
| VCOM Amplitude Voltage               | VOMA   | V    | VCOMH-VCOML            | 4        |      | 5.5      | Note 3     |
| <b>Source Driver</b>                 |        |      |                        |          |      |          |            |
| Source Output Range                  | Vsout  | V    |                        | 0.5      |      | AVDD-0.1 | Note 4     |
| Gama Reference Voltage               | GVDD   | V    |                        | 3        |      | 4.9      | Note 3     |

Note 1: IOVCC=1.65 to 3.3V, VCI=2.5 to 4.8V, VSSA=VSS=0V, Ta=-30 to 70 (to +85 °C no damage)

Note2: Please supply digital IOVCC voltage equal or less than analog VCI voltage. (IOVCC ≤ VCI)

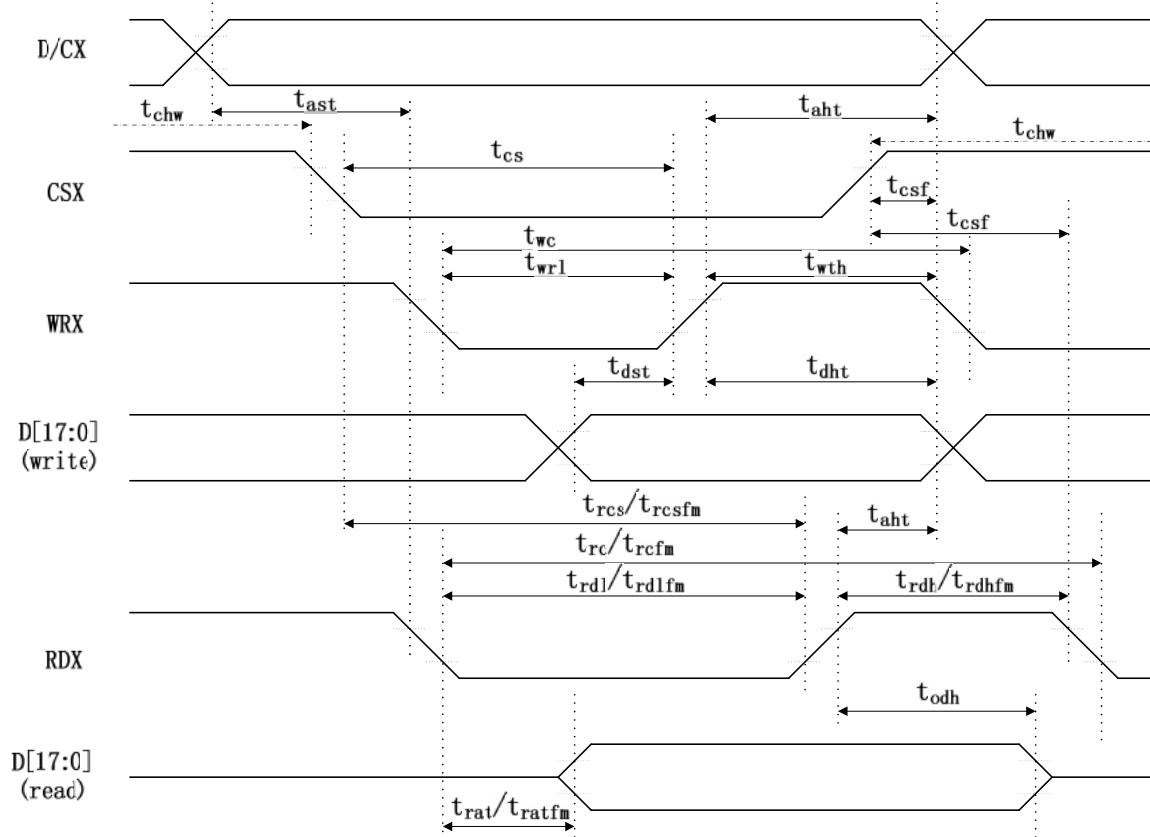
Note2, 3, 4: When the measurements are performed with LCD module. Measurement Points are like below.

Note3: CSX, RDX, WRX, D[23:0], D/CX, RESX, TE, PCLK, VS, HS, DE, SDA, SCL, GM2, GM1, GM0, RCM1, RCM0, P68, IM2, IM1, IM0, SRGB, REV, SMX, SMY, RL, TB, IDM, SHUT, PREG, GS and Test pins.

Note5: Source channel loading = 10pF/channel, Gate channel loading = 50pF/channel

## 15.3. AC Characteristics

### 15.3.1 Parallel MCU 18/16/9/8-bit BUS



Note: Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

Table 15.3.1 AC characteristics of parallel MCU I/F in asynchronous mode

| Signal | Symbol | Parameter                        | MIN | MAX | UNIT | Description  |
|--------|--------|----------------------------------|-----|-----|------|--------------|
| D/CX   | TAST   | Address Setup Time               | 0   |     | ns   |              |
|        | THAT   | Address Hold Time (W/R)          | 10  |     | ns   |              |
| CSX    | TCHW   | “S” “H” Pulse Width              | 0   |     | ns   |              |
|        | TCS    | Chip Select Setup Time(W)        | 10  |     | ns   |              |
|        | TRCS   | Chip Select Setup Time (Read ID) | 45  |     | ns   |              |
|        | TRCSFM | Chip Select Setup Time (Read FM) | 355 |     | ns   |              |
|        | TCSF   | Chip Select Wait Time (W/R)      | 10  |     | ns   |              |
| WRX    | TWC    | Write Cycle                      | 66  |     | ns   |              |
|        | TWRH   | Control Pulse H Duration         | 15  |     | ns   |              |
|        | TWRL   | Control Pulse L Duration         | 15  |     | ns   |              |
| RDX    | TRC    | Read Cycle(ID)                   | 160 |     | ns   | When Read ID |
|        | TRDH   | Control Pulse H Duration(ID)     | 90  |     | ns   |              |
|        | TRDL   | Control Pulse L                  | 45  |     | ns   |              |

|         |        | Duration(ID)                 |     |     |    |                             |
|---------|--------|------------------------------|-----|-----|----|-----------------------------|
| RDX     | TRCFM  | Read Cycle(FM)               | 450 |     | ns | When Read From Frame Memory |
|         | TRDHFM | Control Pulse H Duration(FM) | 90  |     | ns |                             |
|         | TRDLFM | Control Pulse L Duration(FM) | 355 |     | ns |                             |
| D[17:0] | TDST   | Data Setup Time              | 10  |     | ns | CLmax=30pF<br>Clmin=8pF     |
|         | TDHT   | Data Hold Time               | 10  |     | ns |                             |
|         | TRAT   | Read Access Time(ID)         |     | 40  | ns |                             |
|         | TRATFM | Read Access Time(FM)         |     | 340 | ns |                             |
|         | TODH   | Output Disable Time          | 20  | 80  | ns |                             |

Note 1: IOVCC 1.65 to 3.3V, VCI=2.6 to 3.3V, VSSA=VSS=0V, Ta=-30 to 70 °C (to +85°C no damage)

Note 2: This input signal rise time and fall time (tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of IOVCC for input signals

## 15.3.2 Display Serial Interface(SPI)

### 15.3.2.1 SPI 3-Wire Interface

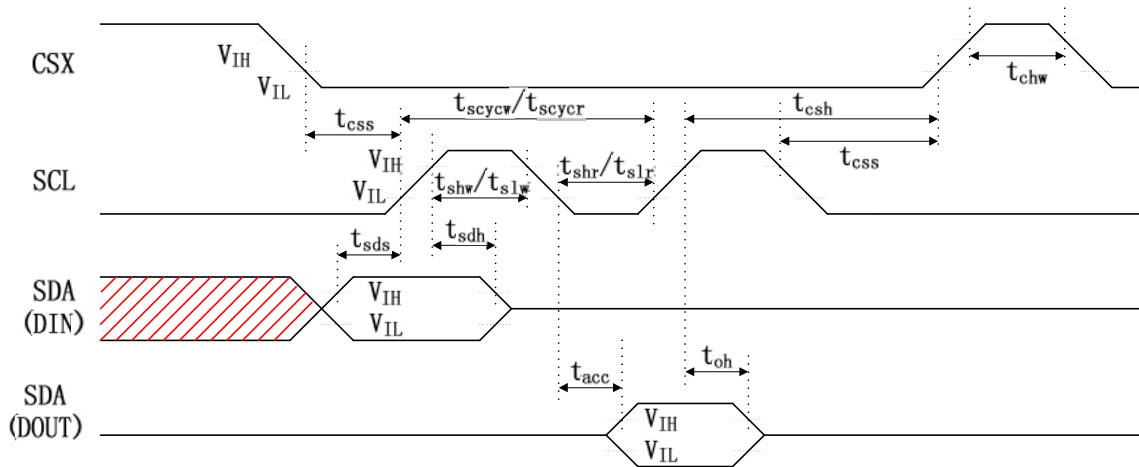


Table 15.3.2.1: 3-pin Serial Interface Characteristics

| Signal | Symbol | Parameter                   | MIN | MAX | UNIT | Description |
|--------|--------|-----------------------------|-----|-----|------|-------------|
| CSX    | TCSS   | Chip Select Setup Time      | 10  |     | ns   |             |
|        | TCSH   | Chip Select Hold Time       | 30  |     | ns   |             |
|        | TCHW   | Chip Select "H" Pulse Width | 30  |     | ns   |             |
| SCL    | TSCYCW | Serial Clock Cycle(Write)   | 66  |     | ns   |             |
|        | TSHW   | S"L""H" Pulse Width(Write)  | 15  |     | ns   |             |
|        | TSLW   | S"L""L" Pulse Width(Write)  | 15  |     | ns   |             |
|        | TSCYCR | Serial Clock                | 150 |     | ns   |             |

| Signal              | Symbol | Parameter                 | MIN | MAX | UNIT | Description             |
|---------------------|--------|---------------------------|-----|-----|------|-------------------------|
|                     |        | Cycle(Read)               |     |     |      |                         |
|                     | TSHR   | S”L””H” Pulse Width(Read) | 60  |     | ns   |                         |
|                     | TSLR   | S”L””L” Pulse Width(Read) | 60  |     | ns   |                         |
| SDA(DIN)<br>/(DOUT) | TSDS   | Data Setup Time           | 15  |     | ns   |                         |
|                     | TSDH   | Data Hold Time            | 5   |     | ns   |                         |
|                     | TACC   | Access Time               | 5   | 50  | ns   | CLmax=30pF<br>CLmin=8pF |
|                     | TOH    | Output Disable Time       | 10  |     | ns   |                         |

Note 1: IOVCC=1.65 to 3.3V, VCI=2.6 to 3.3V, VSSA=VSS=0V. Ta=-30 to 70℃ (to +85℃ no damage)

Note 2: The input signal rise time and fall time(tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 10% and 90% of IOVCC for Input signals.

## 15.3.2.2 SPI 4-Wire Interface

Table 15.3.2.2: 4 pin Serial Interface Characteristics

| Signal             | Symbol | Parameter                   | MIN | MAX | UNIT | Description             |
|--------------------|--------|-----------------------------|-----|-----|------|-------------------------|
| CSX                | TCSS   | Chip Select Setup Time      | 10  |     | ns   |                         |
|                    | TCSH   | Chip Select Hold Time       | 30  |     | ns   |                         |
|                    | TCHW   | Chip Select “H” Pulse Width | 30  |     | ns   |                         |
| SCL                | TSCYCW | Serial Clock Cycle(Write)   | 66  |     | ns   |                         |
|                    | TSHW   | S”L””H” Pulse Width(Write)  | 15  |     | ns   |                         |
|                    | TSLW   | S”L””L” Pulse Width(Write)  | 15  |     | ns   |                         |
|                    | TSCYCR | Serial Clock Cycle(Read)    | 150 |     | ns   |                         |
|                    | TSHR   | S”L””H” Pulse Width(Read)   | 60  |     | ns   |                         |
|                    | TSLR   | S”L””L” Pulse Width(Read)   | 60  |     | ns   |                         |
| D/CX               | TDCS   | D/CX Setup Time             | 5   |     | ns   |                         |
|                    | TDCH   | D/CX Hold Time              | 5   |     | ns   |                         |
| SDA(DIN)<br>(DOUT) | TSDS   | Data Setup Time             | 15  |     | ns   |                         |
|                    | TSDH   | Data Hold Time              | 5   |     | ns   |                         |
|                    | TACC   | Access Time                 | 5   | 50  | ns   | CLmax=30pF<br>CLmin=8pF |
|                    | TOH    | Output Disable Time         | 10  |     | ns   |                         |

Note 1: IOVCC=1.65 to 3.3V, VCI=2.6 to 3.3V, VSSA=VSS=0V. Ta=-30 to 70℃ (to +85℃ no damage)

Note 2: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 10% and 90% of IOVCC for Input signals.

### 15.3.3 Parallel RGB 18/16/6-bit BUS

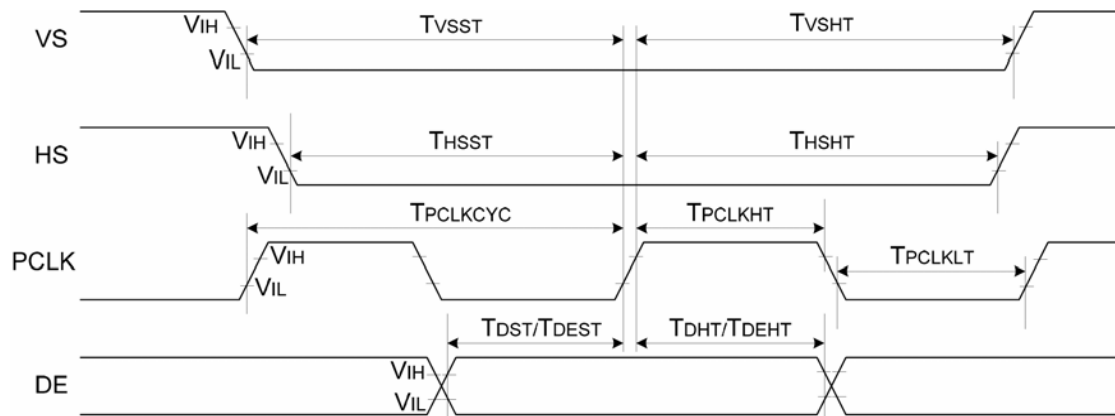


Table 15.3.3 RGB Interface Characteristics

| Signal  | Symbol   | Parameter                  | MIN | MAX | UNIT | Description |
|---------|----------|----------------------------|-----|-----|------|-------------|
| PCLK    | TPCLKCYC | TPCLK Cycle Time           | 66  |     | ns   |             |
|         | TPCLKLT  | Pixel Low Pulse Width      | 15  | -   | ns   |             |
|         | TPCLKHT  | Pixel High Pulse Width     | 15  | -   | ns   |             |
| VS      | TVSST    | Vertical Sync.setup time   | 15  | -   | ns   |             |
|         | TVSHT    | Vertical Sync.hold time    | 15  | -   | ns   |             |
| HS      | THSST    | Horizontal Sync.setup time | 15  | -   | ns   |             |
|         | THSHT    | Horizontal Sync.hold time  | 15  | -   | ns   |             |
| DE      | TDEST    | Data Enable Setup Time     | 15  | -   | ns   |             |
|         | TDEHT    | Data Enable Hold Time      | 15  | -   | ns   |             |
| D[17:0] | TDST     | Data Setup Time            | 15  | -   | ns   |             |
|         | TDHT     | Data Hold Time             | 15  | -   | ns   |             |

## 16. Revision History

| Date       | Revision | Page | Description           |
|------------|----------|------|-----------------------|
| 2019/10/12 | V1.0     | All  | First Release by lvjj |
|            |          |      |                       |
|            |          |      |                       |