



# FORMIKE ELECTRONIC CO.,LTD

## PRODUCT SPECIFICATION

### TFT LCD MODULE

MODEL : KWH018TG02-F01 Ver 1.0

【 ◆ 】 Preliminary Specification

【     】 Finally Specification

|                     |          |
|---------------------|----------|
| CUSTOMER'S APPROVAL |          |
| SIGNATURE:          | DATE:    |
| <br><br>            | <br><br> |

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- This specification is subject to change without notice.Please contact FORMIKE or it's representative before designing your product based on this specification.



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## Record of Revision

| Rev | Issued Date | Description                       | Editor  |
|-----|-------------|-----------------------------------|---------|
| 1.0 | 2010-1-22   | Preliminary Specification Release | Stephen |
|     |             |                                   |         |
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|     |             |                                   |         |



## 1 General Specification

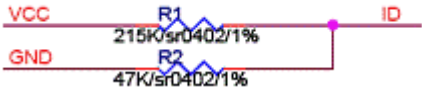
| Feature                        |           | Description                  |
|--------------------------------|-----------|------------------------------|
| Size                           |           | 1.77 inch                    |
| Display Mode                   |           | Normally White, Transmissive |
| Technology Type                |           | a-Si, Clear Type(3H)         |
| Resolution                     |           | 128(RGB) x 160               |
| Interface                      |           | CPU 8bits/SPI                |
| Color Depth                    |           | 65/262K                      |
| Pixel Pitch (mm)               |           | 0.219x0.219                  |
| Pixel Configuration            |           | R.G.B. Vertical Stripe       |
| Viewing Direction              |           | 6 o'clock                    |
| Gray Scale Inversion Direction |           | 12 o'clock                   |
| LCM (W x H x D) (mm)           |           | 34.0x47.0x2.4                |
| Active Area(mm)                |           | 28.032x35.04                 |
| With/Without TSP               |           | Without TSP                  |
| Weight (g)                     |           | TBD                          |
| LED Numbers                    |           | 1 LED                        |
| Driver IC                      |           | HX8353D                      |
| Temperature                    | Operation | -20~+70°C                    |
|                                | Storage   | -30~+80°C                    |

Note : Viewing direction for best image quality is different from TFT definition.  
There is a 180 degree shift.



## 2 Input/Output Terminals

### 2.1 TFT LCD Panel

| No | Symbol  | I/O | Description                                                                                                                                                                | Comment |
|----|---------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1  | LED1+   | P   | LED anode                                                                                                                                                                  |         |
| 2  | LED2+   | P   | NC                                                                                                                                                                         |         |
| 3  | LED-    | P   | LED cathode                                                                                                                                                                |         |
| 4  | IM2     | I   | MCU Parallel interface bus and Serial interface select<br>IM2='1', Parallel interface<br>IM2='0', Serial interface                                                         |         |
| 5  | NRES    | I   | Reset Pin                                                                                                                                                                  |         |
| 6  | DB7     | I   | Data input, In serial interface, they are not used and should be fixed at VCI or DGND level.                                                                               |         |
| 7  | DB6     | I   |                                                                                                                                                                            |         |
| 8  | DB5     | I   |                                                                                                                                                                            |         |
| 9  | DB4     | I   |                                                                                                                                                                            |         |
| 10 | DB3     | I   |                                                                                                                                                                            |         |
| 11 | DB2     | I   |                                                                                                                                                                            |         |
| 12 | DB1     | I   |                                                                                                                                                                            |         |
| 13 | DB0/SDI | I   | Data input, when SPI interface, as SDI                                                                                                                                     |         |
| 14 | NC      | -   | No connection                                                                                                                                                              |         |
| 15 | NC      | -   | No connection                                                                                                                                                              |         |
| 16 | NC      | -   | No connection                                                                                                                                                              |         |
| 17 | NC      | -   | No connection                                                                                                                                                              |         |
| 18 | NC      | -   | No connection                                                                                                                                                              |         |
| 19 | NC      | -   | No connection                                                                                                                                                              |         |
| 20 | NC      | -   | No connection                                                                                                                                                              |         |
| 21 | NC      | -   | No connection                                                                                                                                                              |         |
| 22 | NRD     | I   | Read strobe in 8080 MCU parallel interface.<br>-If not used, please fix this pin at VCI or DGND level.                                                                     |         |
| 23 | NWR     | I   | -Write enable in MCU parallel interface.<br>-In 4-line SPI, this pin is used as D/CX (data/ command selection).<br>-If not used, please fix this pin at VCI or DGND level. |         |
| 24 | RS      | I   | -Display data/command selection pin in MCU interface.<br>- RS ='1': display data or parameter.<br>- RS ='0': command data.<br>-In serial interface, this is used as SCL.   |         |
| 25 | NCS     | I   | Chip select                                                                                                                                                                |         |
| 26 | ID      | O   |  <p>ID Pin<br/>R1=215K,R2=47K,VID=0.502V(VCC=2.8V)</p>                                 |         |
| 27 | VCI     | P   | Power supply                                                                                                                                                               |         |



|    |       |     |                                                                                                                        |  |
|----|-------|-----|------------------------------------------------------------------------------------------------------------------------|--|
| 28 | SPI4W | I   | - SPI4W='0', 3-line SPI enable.<br>- SPI4W='1', 4-line SPI enable.<br>-If not used, please fix this pin at DGND level. |  |
| 29 | XR    | I/O | NC                                                                                                                     |  |
| 30 | YD    | I/O | NC                                                                                                                     |  |
| 31 | XL    | I/O | NC                                                                                                                     |  |
| 32 | YU    | I/O | NC                                                                                                                     |  |
| 33 | GND   | P   | GND                                                                                                                    |  |

Note1: I/O definition: I-----Input O---Output P----Power/Ground



### 3 Absolute Maximum Ratings

#### 3.1 Driving TFT LCD Panel

GND=0V, Ta = 25°C

| Item                       | Symbol                                   | MIN  | MAX     | Unit | Remark       |
|----------------------------|------------------------------------------|------|---------|------|--------------|
| Logic Supply Voltage       | VCI                                      | -0.3 | 3.6     | V    |              |
| Analog Supply Voltage      | VCI                                      | -0.3 | 3.6     | V    |              |
| Input voltage              | D8~D15,NCS,RS,NWR,NRD<br>NRES,IM2, SPI4W | -0.3 | VCI+0.3 | V    |              |
| Back Light Forward Current | I <sub>LED</sub>                         |      | 20      | mA   | For each LED |
| Operating Temperature      | T <sub>OPR</sub>                         | -20  | 70      | °C   |              |
| Storage Temperature        | T <sub>STG</sub>                         | -30  | 80      | °C   |              |



## 4 Electrical Characteristics

### 4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

| Item                              |            | Symbol            | MIN                 | TYP | MAX                 | Unit | Remark                                 |
|-----------------------------------|------------|-------------------|---------------------|-----|---------------------|------|----------------------------------------|
| Logic Supply Voltage              |            | V <sub>CI</sub>   | 2.3                 | 2.8 | 3.3                 | V    |                                        |
| Analog Supply Voltage             |            | V <sub>CI</sub>   | 2.3                 | 2.8 | 3.3                 | V    |                                        |
| Input Signal Voltage              | Low Level  | V <sub>IL</sub>   | -0.3                | --  | 0.2xV <sub>CI</sub> | V    | D8~D15,NCS,RS,NWR, NRD,NRES,IM2, SPI4W |
|                                   | High Level | V <sub>IH</sub>   | 0.8xV <sub>CI</sub> | --  | V <sub>CI</sub>     | V    |                                        |
| Output Signal Voltage             | Low Level  | V <sub>OL</sub>   | --                  | --  | 0.2xV <sub>CI</sub> | V    |                                        |
|                                   | High Level | V <sub>OH</sub>   | 0.8xV <sub>CI</sub> | --  | --                  | V    |                                        |
| (Panel+ LSI)<br>Power Consumption |            | Black Mode (60Hz) | --                  | TBD | --                  | -    |                                        |
|                                   |            | Standby Mode      | --                  | TBD | --                  | --   |                                        |
|                                   |            | Sleeping Mode     | --                  | TBD | --                  | --   |                                        |



## 4.2 Driving Backlight

Ta=25°C

| Item                        | Symbol   | Min   | Typ     | Max | Unit | Remark       |
|-----------------------------|----------|-------|---------|-----|------|--------------|
| Forward Current             | $I_F$    | --    | 20      | --  | mA   | 1 LEDs       |
| Forward Voltage             | $V_F$    | --    | 3.2     | --  | V    |              |
| Backlight Power Consumption | $W_{BL}$ | --    | 64      | --  | mW   |              |
| Operating Life Time         | -        | 10000 | (20000) | -   | Hrs  | For each LED |

Note 1: The figure below shows the connection of backlight LED.



Note 2: One LED :  $I_F = 20 \text{ mA}$ ,  $V_F = 3.2 \text{ V}$

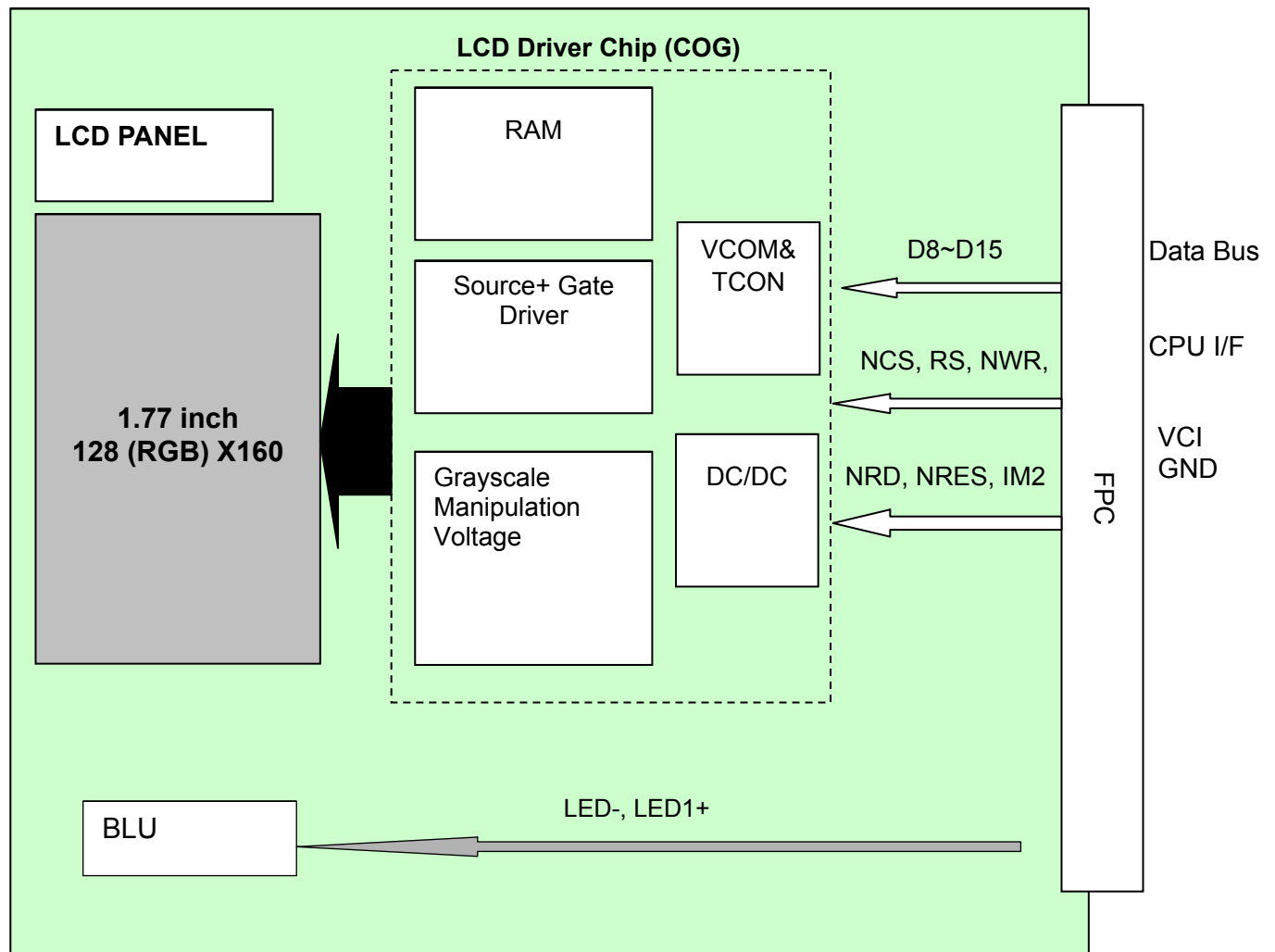
Note 3 :  $I_F$  is defined for one channel LED.

Optical performance should be evaluated at Ta=25°C only.

If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.



### 4.3 Block Diagram





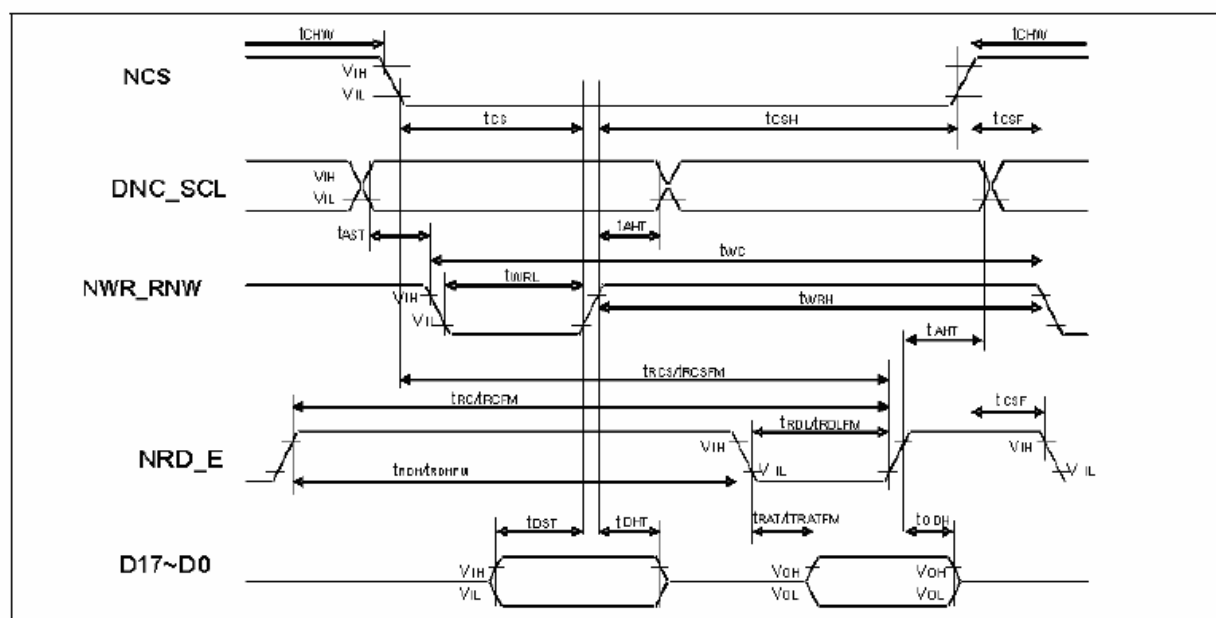
## 5.1 Timing Chart(Parallel interface)

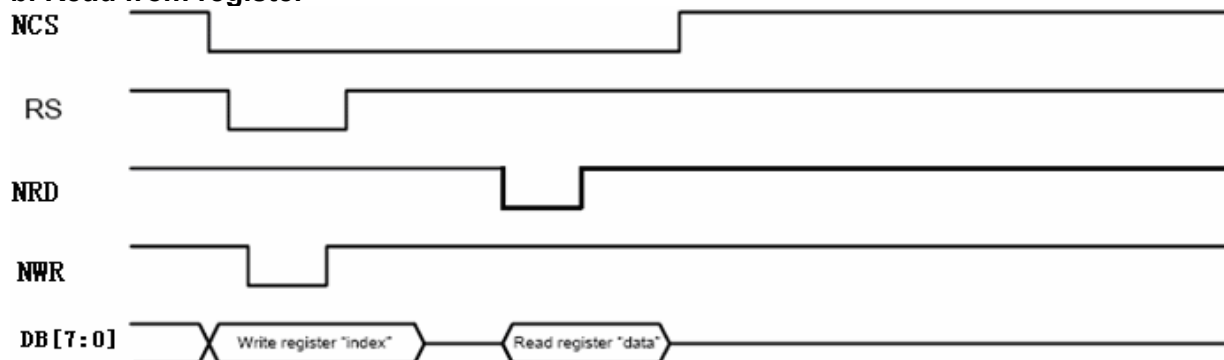
## 5 Timing Chart(Parallel interface)

## 5.1.1Timing Parameter

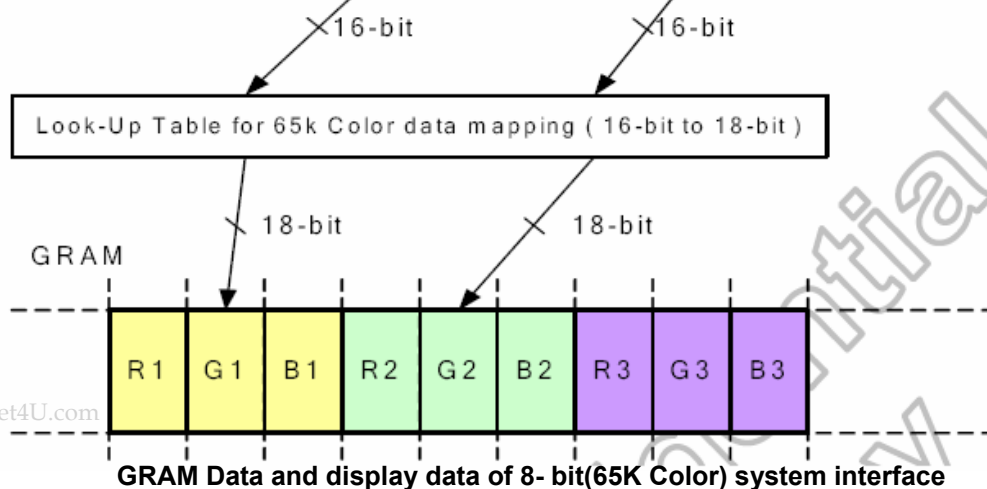
(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3 V, T<sub>A</sub> = -30 to 70℃)

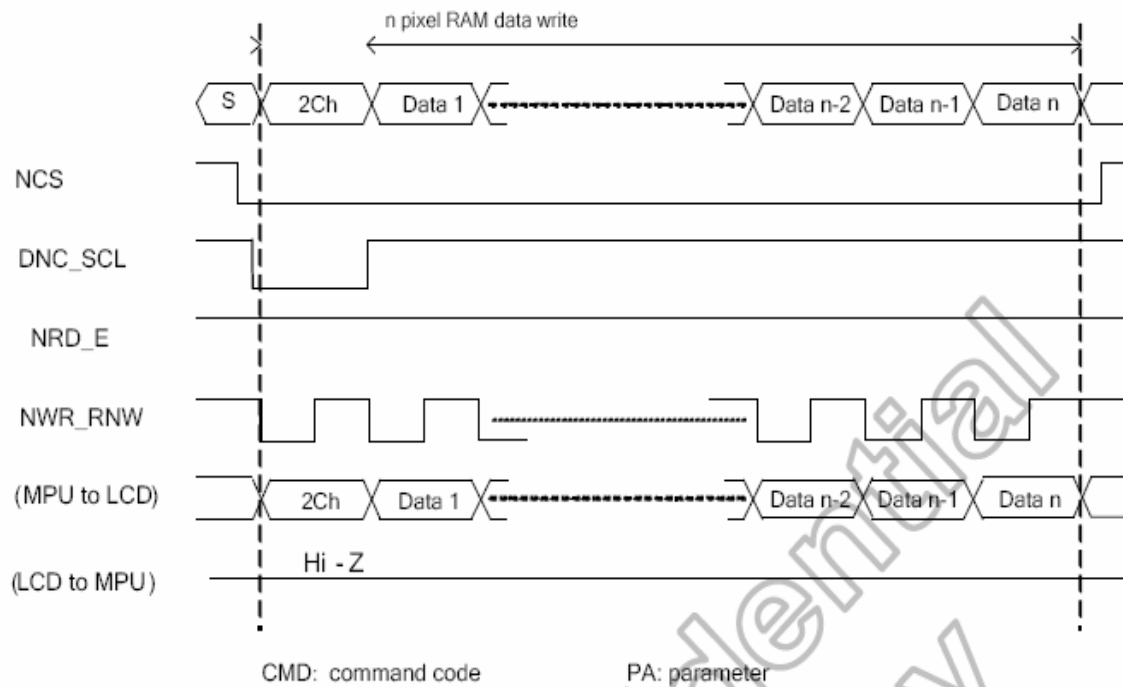
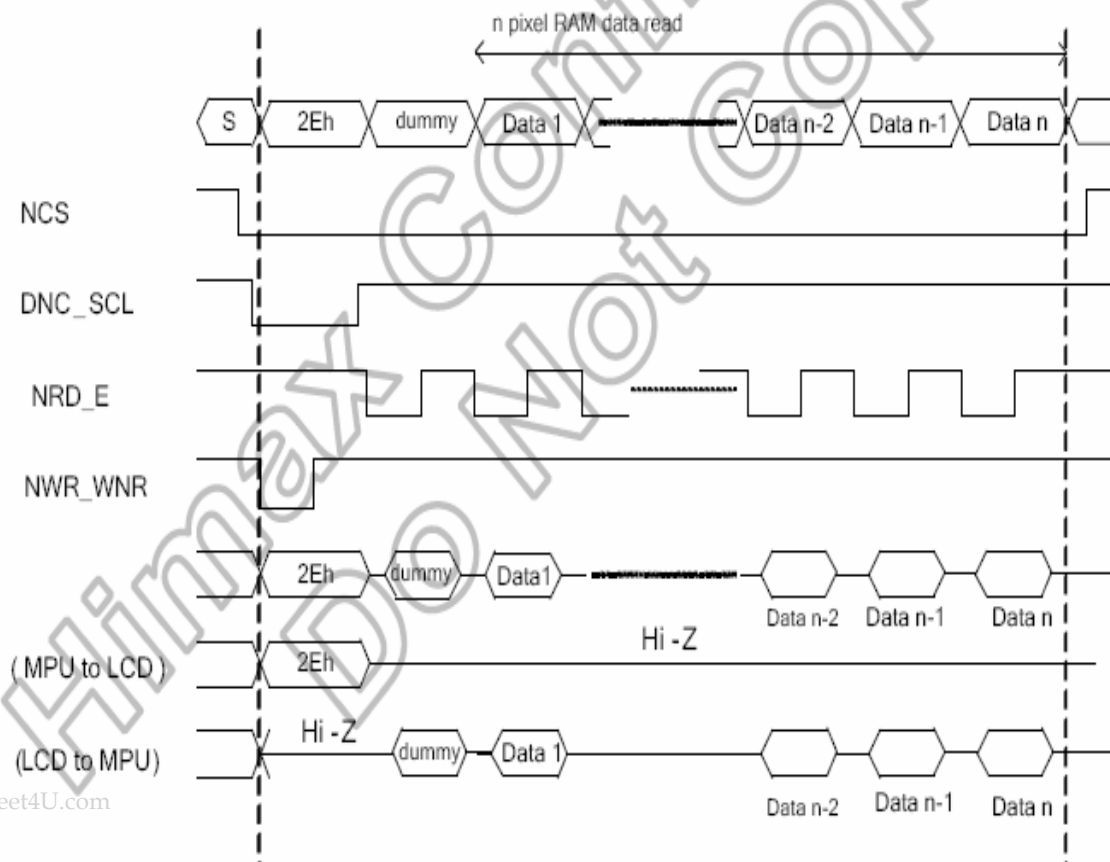
| Signal     | Symbol                                                                                                                | Parameter                                                                                                                                                                                            | Min.                             | Max.                       | Unit | Description                                                         |
|------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------|------|---------------------------------------------------------------------|
| DNC_SCL    | t <sub>AST</sub><br>t <sub>AHT</sub>                                                                                  | Address setup time<br>Address hold time (Write/Read)                                                                                                                                                 | 0<br>10                          | -<br>-                     | ns   | -                                                                   |
| NCS        | t <sub>CHW</sub><br>t <sub>CS</sub><br>t <sub>RCS</sub><br>t <sub>RCSFM</sub><br>t <sub>CSF</sub><br>t <sub>CSH</sub> | Chip select "H" pulse width<br>Chip select setup time (Write)<br>Chip select setup time (Read ID)<br>Chip select setup time (Read FM)<br>Chip select wait time (Write/Read)<br>Chip select hold time | 0<br>15<br>45<br>355<br>10<br>10 | -<br>-<br>-<br>-<br>-<br>- | ns   | -                                                                   |
| NWR_SCL    | t <sub>WC</sub><br>t <sub>WRH</sub><br>t <sub>WRL</sub>                                                               | Write cycle<br>Control pulse "H" duration<br>Control pulse "L" duration                                                                                                                              | 66<br>15<br>15                   | -<br>-<br>-                | ns   | -                                                                   |
| NRD_E (ID) | t <sub>RC</sub><br>t <sub>RDH</sub><br>t <sub>RDL</sub>                                                               | Read cycle (ID)<br>Control pulse "H" duration (ID)<br>Control pulse "L" duration (ID)                                                                                                                | 160<br>90<br>45                  | -<br>-<br>-                | ns   | When read ID data                                                   |
| NRD_E (FM) | t <sub>RCFM</sub><br>t <sub>RDHFM</sub><br>t <sub>RDLFM</sub>                                                         | Read cycle (FM)<br>Control pulse "H" duration (FM)<br>Control pulse "L" duration (FM)                                                                                                                | 450<br>90<br>355                 | -<br>-<br>-                | ns   | When read from frame memory                                         |
| D17 to D0  | t <sub>DST</sub><br>t <sub>DHT</sub><br>t <sub>TRAT</sub><br>t <sub>TRATFM</sub><br>t <sub>ODH</sub>                  | Data setup time<br>Data hold time<br>Read access time (ID)<br>Read access time (FM)<br>Output disable time                                                                                           | 10<br>10<br>-<br>-<br>20         | -<br>-<br>40<br>340<br>80  | ns   | For maximum C <sub>L</sub> =30pF<br>For minimum C <sub>L</sub> =8pF |

**Note:** 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 follows. **Table 5.1 timing parameter** Input signals.Figure 11.1 Parallel interface characteristics (8080-series MPU)  
i80 System Bus Timing

**5.1.2 Register write/read timing in I80 series system****Write to register****b. Read from register****5.1.3.GRAM write/read timing in i80 series system**

| 65k Color Data | DNC_SCL | DB7                     | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | GRAM Write           |
|----------------|---------|-------------------------|-----|-----|-----|-----|-----|-----|-----|----------------------|
| MEMWR          | 0       | GRAM Write command code |     |     |     |     |     |     |     | -                    |
| 1st write      | 1       | R14                     | R13 | R12 | R11 | R10 | G15 | G14 | G13 | -                    |
| 2nd write      | 1       | G12                     | G11 | G10 | B14 | B13 | B12 | B11 | B10 | 1st pixel (R1/G1/B1) |
| 3rd write      | 1       | R24                     | R23 | R22 | R21 | R20 | G25 | G24 | G23 | -                    |
| 4th write      | 1       | G22                     | G21 | G20 | B24 | B23 | B22 | B21 | B20 | 2nd pixel (R2/G2/B2) |



**Write to GRAM****Read from GRAM**

### 5.1.4 Reset Timing Characteristics

Ta=25°C

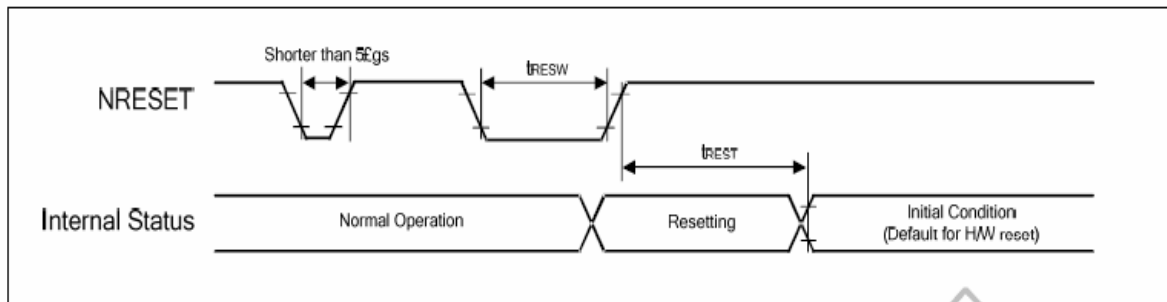


Figure 11.5 Reset input timing

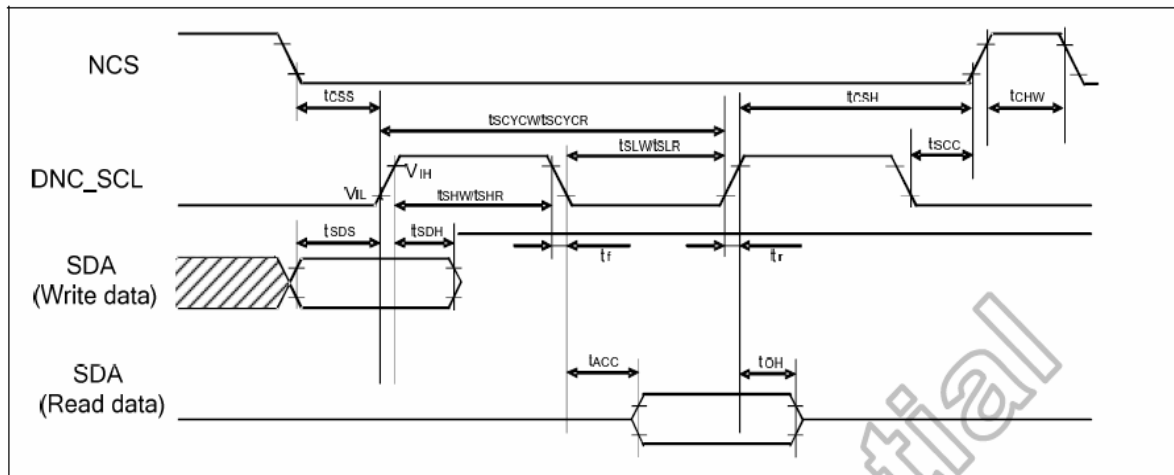
| Symbol | Parameter                            | Related Pins | Spec. |      |      | Note                                     | Unit |
|--------|--------------------------------------|--------------|-------|------|------|------------------------------------------|------|
|        |                                      |              | Min.  | Typ. | Max. |                                          |      |
| tRESW  | Reset low pulse width <sup>(1)</sup> | NRESET       | 10    | -    | -    | -                                        | µs   |
| tREST  | Reset complete time <sup>(2)</sup>   | -            | -     | -    | 5    | When reset applied during Sleep In mode  | ms   |
|        |                                      | -            | -     | -    | 120  | When reset applied during Sleep Out mode | ms   |

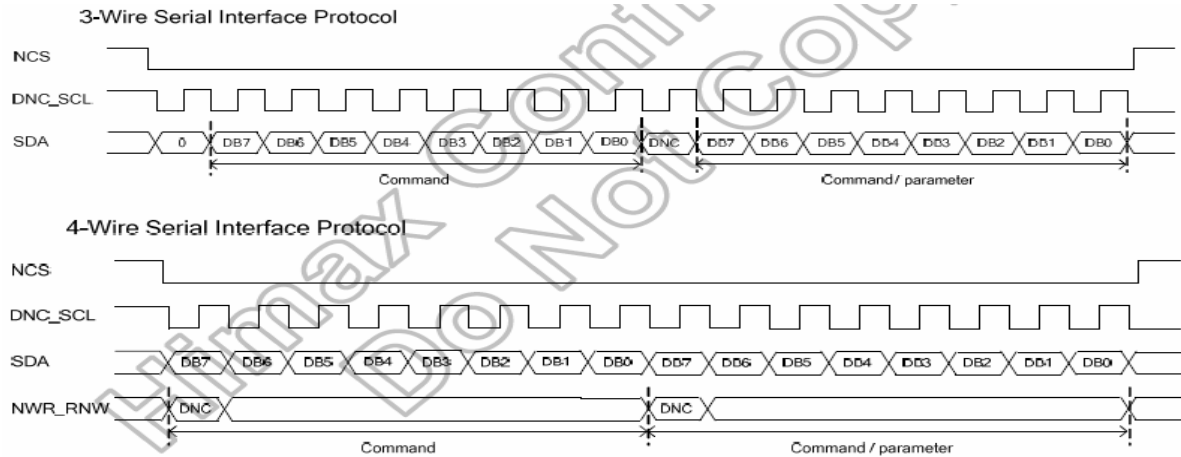
NRES Timing

**5.2 Timing Chart(4-wire SPI interface)****5.2.1 Timing Parameter**

| Parameter                       | Symbol | Conditions                                       | Min. | Typ. | Max. | Unit |
|---------------------------------|--------|--------------------------------------------------|------|------|------|------|
| Serial clock cycle (Write)      | tSCYCW | DNC_SCL                                          | 66   | -    | -    | ns   |
| DNC_SCL "H" pulse width (Write) | tSHW   |                                                  | 15   | -    | -    |      |
| DNC_SCL "L" pulse width (Write) | tSLW   |                                                  | 15   | -    | -    |      |
| Data setup time (Write)         | tSDS   | SDA                                              | 10   | -    | -    | ns   |
| Data hold time (Write)          | tSDH   |                                                  | 10   | -    | -    |      |
| Serial clock cycle (Read)       | tSCYCR | DNC_SCL                                          | 150  | -    | -    | ns   |
| DNC_SCL "H" pulse width (Read)  | tSHR   |                                                  | 60   | -    | -    |      |
| DNC_SCL "L" pulse width (Read)  | tSLR   |                                                  | 60   | -    | -    |      |
| Access Time                     | tACC   | SDI for maximum<br>CL=30pF<br>For minimum CL=8pF | 10   | -    | 50   | ns   |
| Output disable time             | tOH    | SDO For maximum<br>CL=30pF<br>For minimum CL=8pF | 15   | -    | 50   | ns   |
| DNC_SCL to Chip select          | tSCC   | DNC_SCL, NCS                                     | 15   | -    | -    | ns   |
| NCS "H" pulse width             | tCHW   | NCS                                              | 40   | -    | -    | ns   |
| Chip select setup time          | tCSS   | NCS                                              | 60   | -    | -    | ns   |
| Chip select hold time           | tCSH   |                                                  | 65   | -    | -    |      |

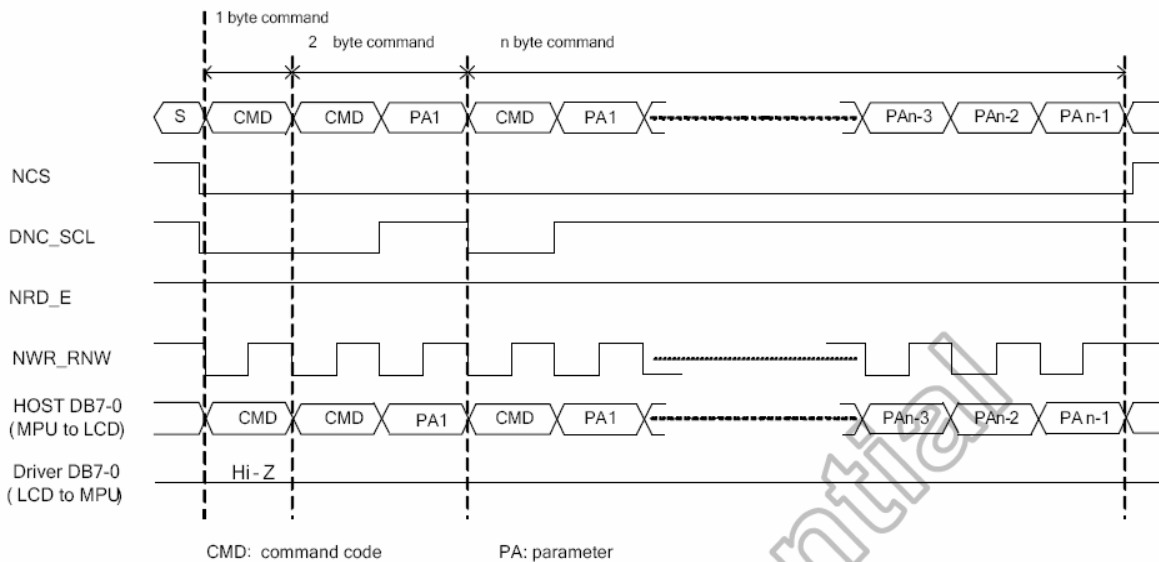
Note1 : NCS—CSX; RS—SCL; NWR—D/CX; DB0—SDA;





### 5.2.2 write command mode

#### Write to register

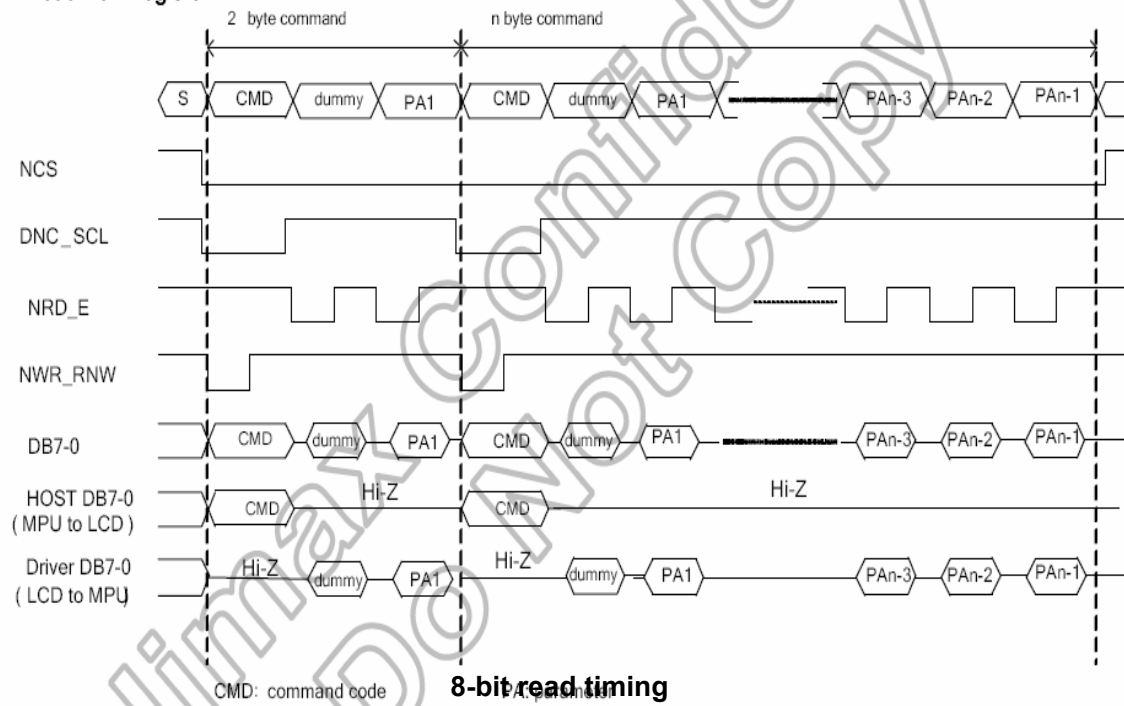


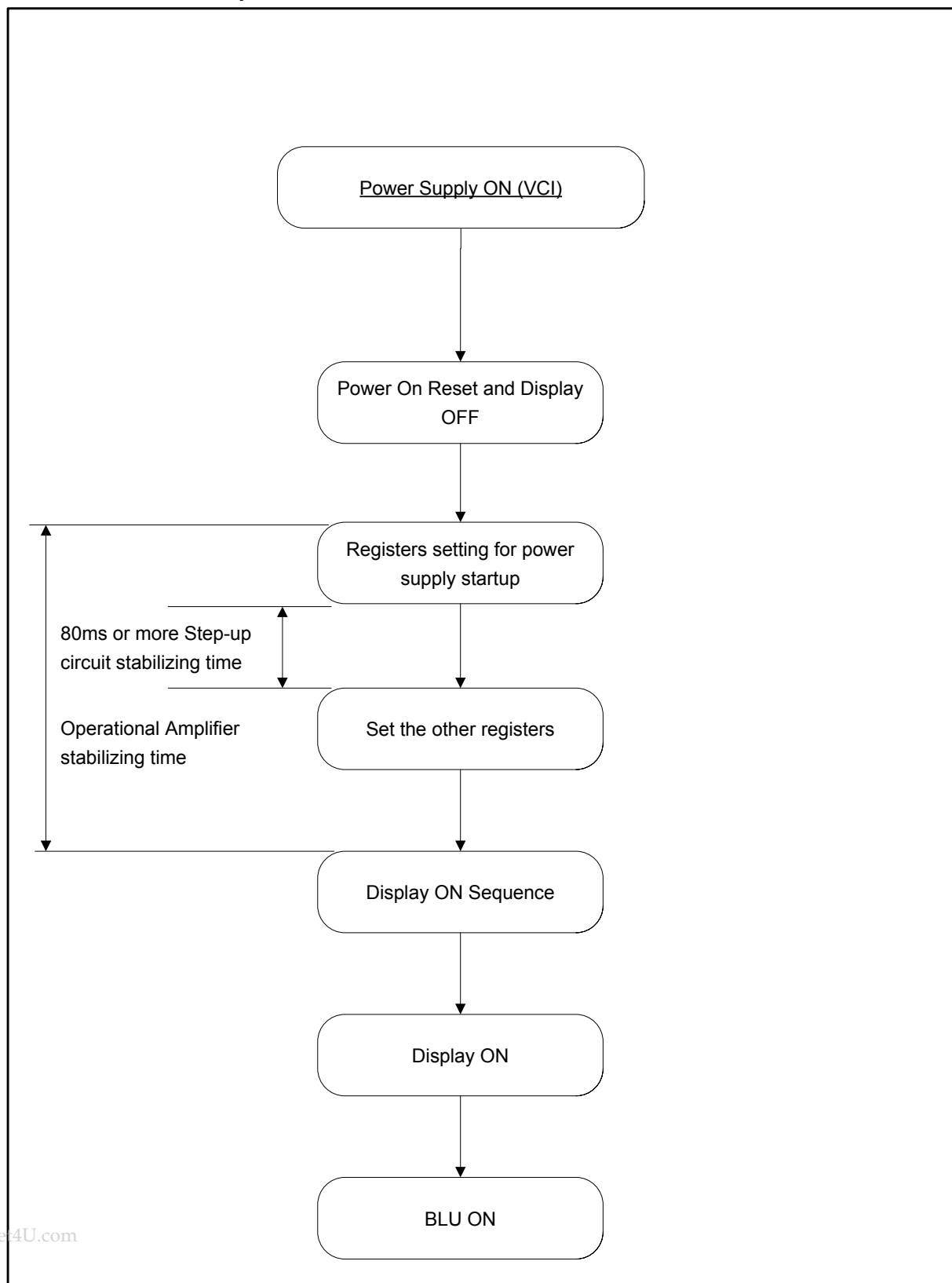
Note2 : D/CX is sampled when 8th rising edge of SCL. D/CX indicates whether the byte is command (D/CX=0) or parameter/RAM data (D/CX=1)



### 5.2.3 read function

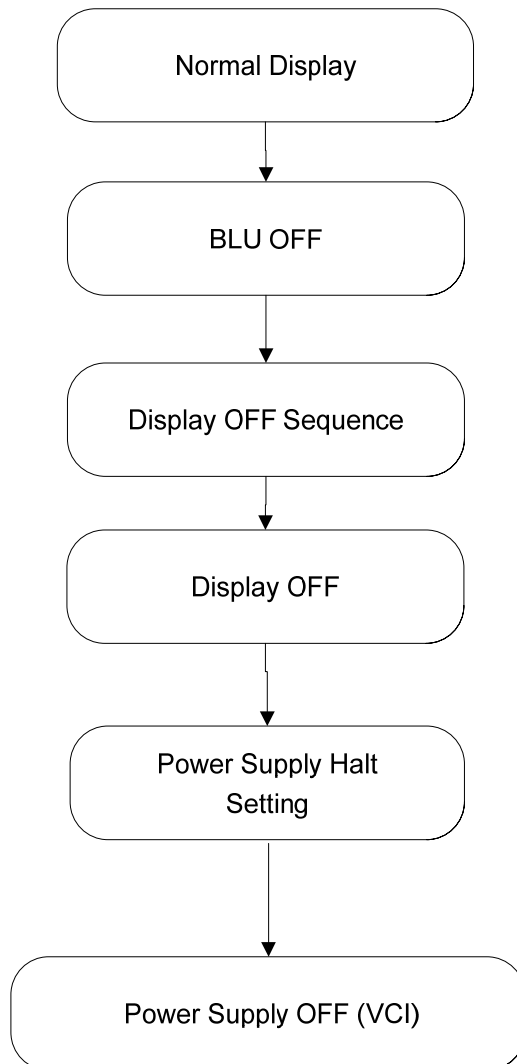
#### Read from register



**5.3****Power On/Off sequence****5.3.1 Power on Sequence**



### 5.3.2 Power off Sequence





## 6 Optical Characteristics

Ta=25℃

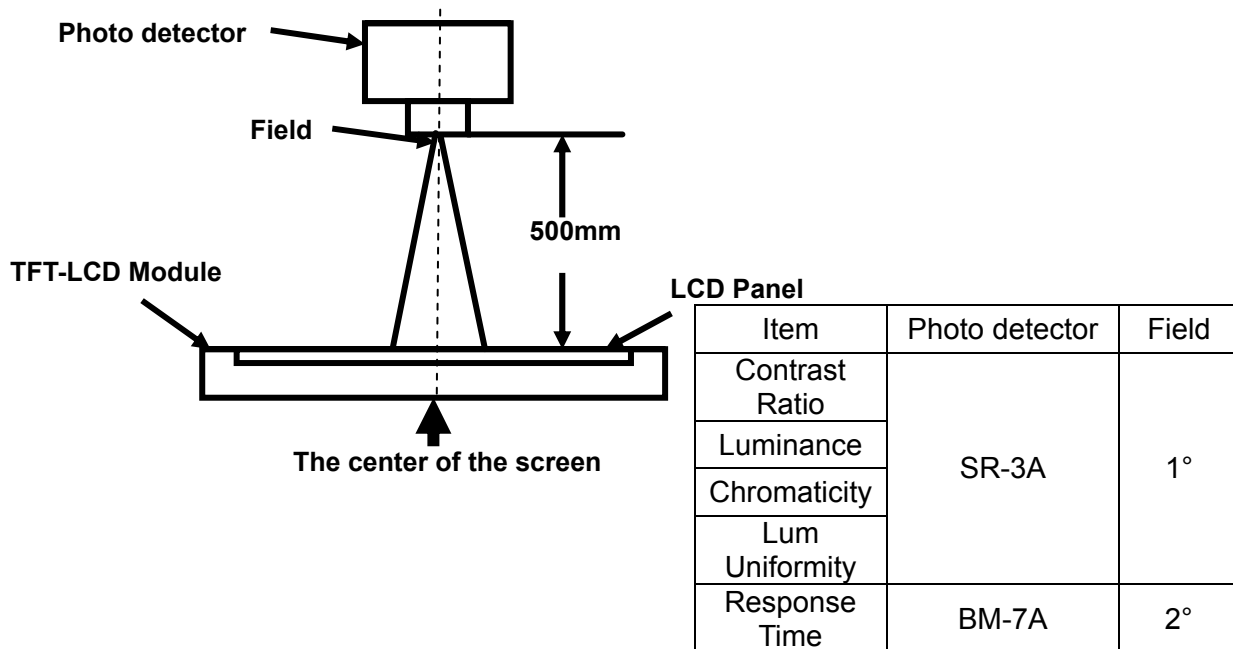
| Item           |       | Symbol           | Condition       | Min   | Typ   | Max   | Unit              | Remark         |
|----------------|-------|------------------|-----------------|-------|-------|-------|-------------------|----------------|
| View Angles    |       | θT               | CR≧10           | 45    | 50    | -     | Degree            | Note 2         |
|                |       | θB               |                 | 15    | 20    | -     |                   |                |
|                |       | θL               |                 | 40    | 45    | -     |                   |                |
|                |       | θR               |                 | 40    | 45    | -     |                   |                |
| Contrast Ratio |       | CR               | θ=0°            | 200   | 350   | -     | -                 | Note1<br>Note3 |
| Response Time  |       | T <sub>ON</sub>  | 25℃             | -     | 30    | 40    | ms                | Note1<br>Note4 |
|                |       | T <sub>OFF</sub> |                 |       |       |       |                   |                |
| Chromaticity   | White | x                | Backlight is on | 0.222 | 0.272 | 0.322 | -                 | Note5<br>Note1 |
|                |       | y                |                 | 0.255 | 0.305 | 0.355 |                   |                |
|                | Red   | x                |                 | 0.540 | 0.590 | 0.640 |                   |                |
|                |       | y                |                 | 0.290 | 0.340 | 0.390 |                   |                |
|                | Green | x                |                 | 0.271 | 0.321 | 0.371 |                   |                |
|                |       | y                |                 | 0.461 | 0.511 | 0.561 |                   |                |
|                | Blue  | x                |                 | 0.096 | 0.146 | 0.196 |                   |                |
|                |       | y                |                 | 0.062 | 0.112 | 0.162 |                   |                |
| Uniformity     |       | U                | -               | 70    | 80    | -     | %                 | Note1<br>Note6 |
| NTSC           |       | -                | -               | -     | 40    | -     | %                 | Note 5         |
| Luminance      |       | L                |                 | 140   | 170   | -     | cd/m <sup>2</sup> | Note1<br>Note7 |

Test Conditions:

1.  $V_F=3.2V$ ,  $I_F=15mA$ (One LED current), the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

### Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



### Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

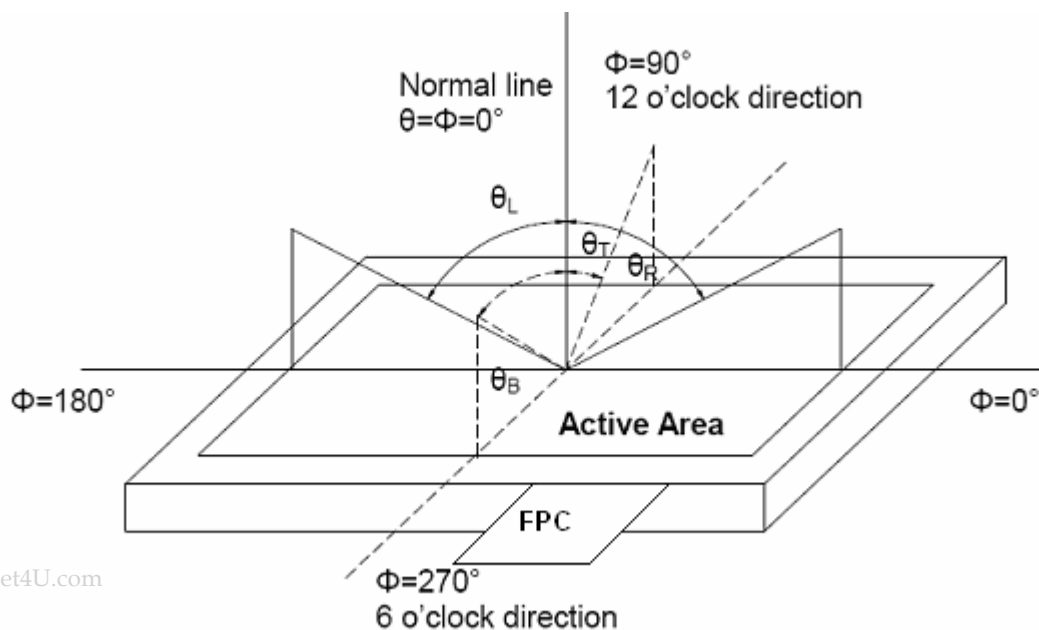


Fig. 1 Definition of viewing angle

### Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

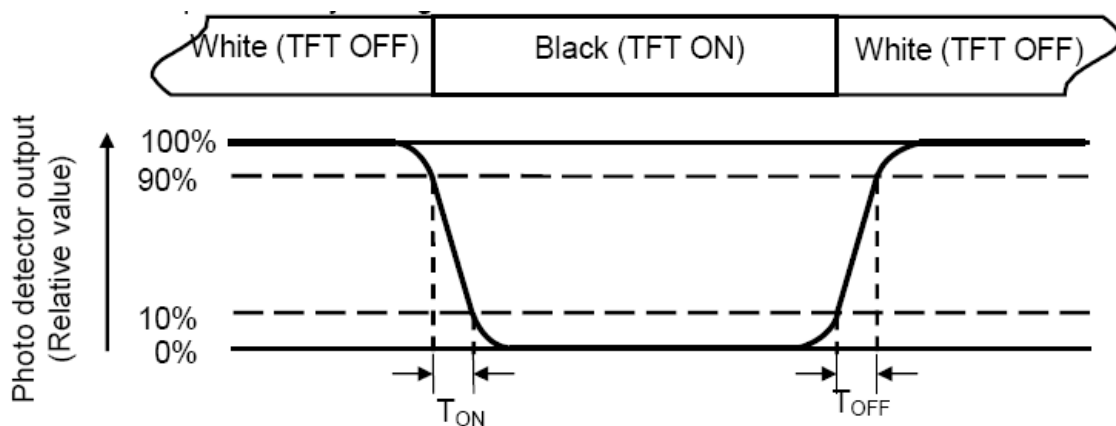
"White state ":The state is that the LCD should driven by Vwhite.

"Black state": The state is that the LCD should driven by Vblack.

Vwhite: To be determined    Vblack: To be determined.

### Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



### Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

### Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity}(U) = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width

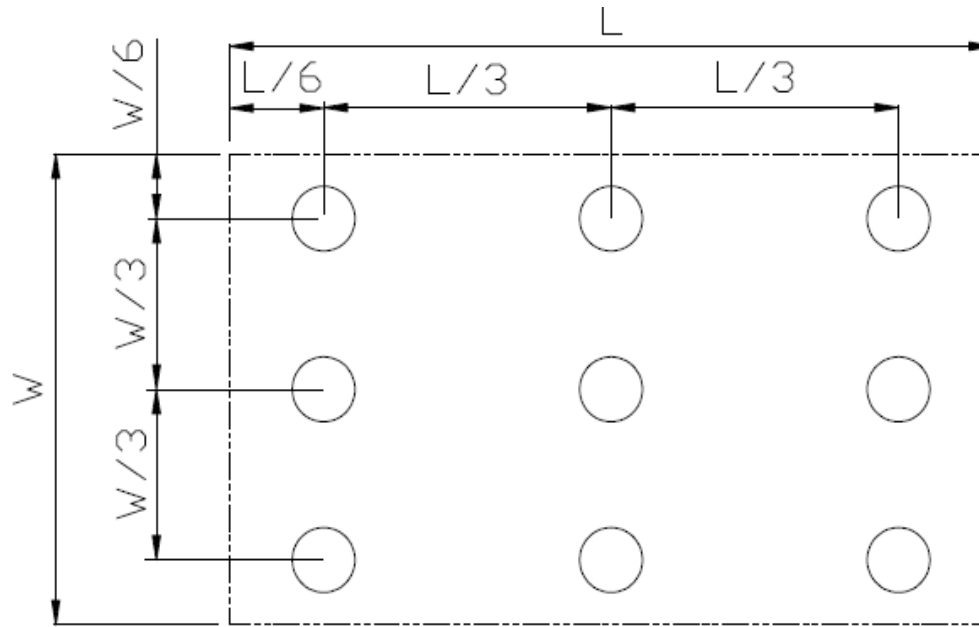


Fig. 2 Definition of uniformity

$L_{\max}$ : The measured maximum luminance of all measurement position.

$L_{\min}$ : The measured minimum luminance of all measurement position.

### Note 7: Definition of Luminance :

Measure the luminance of white state at center point.



## 7 Environmental / Reliability Test

| No | Test Item                                | Condition                                                                                                                                           | Remark                                                                                          |
|----|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1  | High Temperature Operation               | Ts=+70℃, 240hrs                                                                                                                                     | Note1<br>IEC60068-2-1:2007,GB2423.2-2008                                                        |
| 2  | Low Temperature Operation                | Ta=-20℃, 240hrs                                                                                                                                     | IEC60068-2-1:2007<br>GB2423.1-2008                                                              |
| 3  | High Temperature Storage                 | Ta=+80℃, 240hrs                                                                                                                                     | IEC60068-2-1:2007<br>GB2423.2-2008                                                              |
| 4  | Low Temperature Storage                  | Ta=-30℃, 240hrs                                                                                                                                     | IEC60068-2-1:2007<br>GB2423.1-2008                                                              |
| 5  | High Temperature & High Humidity Storage | Ta=+60℃, 90% RH 240 hours                                                                                                                           | Note2<br>IEC60068-2-78 :2001<br>GB/T2423.3—2006                                                 |
| 6  | Thermal Shock (Non-operation)            | -30℃ 30 min~+70℃ 30 min,<br>Change time:5min, 20 Cycles                                                                                             | Start with cold temperature,<br>End with high temperature,<br>IEC60068-2-14:1984,GB2423.22-2002 |
| 7  | Electro Static Discharge (Operation)     | C=150pF, R=330Ω,5points/panel<br>Air:± 8KV, 5times,<br>Contact:± 4KV, 5 times,<br>( Environment: 15℃ ~35℃,<br>30% ~60%, 86Kpa ~106Kpa )             | IEC61000-4-2:2001<br>GB/T17626.2-2006                                                           |
| 8  | Vibration (Non-operation)                | Frequency range:10~55Hz,<br>Stroke:1.5mm<br>Sweep:10Hz~55Hz~10Hz<br>hours<br>for each direction of X.Y.Z.<br>(6 hours for total)(Package condition) | 2<br>IEC60068-2-6:1982<br>GB/T2423.10—1995                                                      |
| 9  | Shock (Non-operation)                    | 60G 6ms, ± X,± Y,± Z 3times,<br>for each direction                                                                                                  | IEC60068-2-27:1987<br>GB/T2423.5—1995                                                           |
| 10 | Package Drop Test                        | Height:80 cm,<br>1 corner, 3 edges, 6 surfaces                                                                                                      | IEC60068-2-32:1990<br>GB/T2423.8—1995                                                           |

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

## 8 Mechanical Drawing

**Technical Drawing of LCD Module**

**Front View Dimensions:**

- Overall Width:  $47.00 \pm 0.20$  (LCM Outline)
- Overall Height:  $34.00 \pm 0.20$  (LCM Outline)
- Viewing Area:  $1.77"$  TFT
- Viewing Area:  $6.0"$  clock
- Pin 1 to Pin 16:  $2.00 \pm 0.10$
- Pin 17 to Pin 33:  $2.00 \pm 0.10$
- Pin 34 to Pin 33:  $2.00 \pm 0.10$
- Pin 33 to Pin 32:  $0.80$
- Pin 32 to Pin 31:  $0.80$
- Pin 31 to Pin 30:  $0.80$
- Pin 30 to Pin 29:  $0.80$
- Pin 29 to Pin 28:  $0.80$
- Pin 28 to Pin 27:  $0.80$
- Pin 27 to Pin 26:  $0.80$
- Pin 26 to Pin 25:  $0.80$
- Pin 25 to Pin 24:  $0.80$
- Pin 24 to Pin 23:  $0.80$
- Pin 23 to Pin 22:  $0.80$
- Pin 22 to Pin 21:  $0.80$
- Pin 21 to Pin 20:  $0.80$
- Pin 20 to Pin 19:  $0.80$
- Pin 19 to Pin 18:  $0.80$
- Pin 18 to Pin 17:  $0.80$
- Pin 17 to Pin 16:  $0.80$
- Pin 16 to Pin 15:  $0.80$
- Pin 15 to Pin 14:  $0.80$
- Pin 14 to Pin 13:  $0.80$
- Pin 13 to Pin 12:  $0.80$
- Pin 12 to Pin 11:  $0.80$
- Pin 11 to Pin 10:  $0.80$
- Pin 10 to Pin 9:  $0.80$
- Pin 9 to Pin 8:  $0.80$
- Pin 8 to Pin 7:  $0.80$
- Pin 7 to Pin 6:  $0.80$
- Pin 6 to Pin 5:  $0.80$
- Pin 5 to Pin 4:  $0.80$
- Pin 4 to Pin 3:  $0.80$
- Pin 3 to Pin 2:  $0.80$
- Pin 2 to Pin 1:  $0.80$

**Side View Dimensions:**

- Overall Width:  $43.20 \pm 0.50$
- Overall Height:  $20.00 \pm 0.50$
- Viewing Area:  $1.77"$  TFT
- Viewing Area:  $6.0"$  clock
- Pin 1 to Pin 16:  $2.00 \pm 0.10$
- Pin 17 to Pin 33:  $2.00 \pm 0.10$
- Pin 34 to Pin 33:  $2.00 \pm 0.10$
- Pin 33 to Pin 32:  $0.80$
- Pin 32 to Pin 31:  $0.80$
- Pin 31 to Pin 30:  $0.80$
- Pin 30 to Pin 29:  $0.80$
- Pin 29 to Pin 28:  $0.80$
- Pin 28 to Pin 27:  $0.80$
- Pin 27 to Pin 26:  $0.80$
- Pin 26 to Pin 25:  $0.80$
- Pin 25 to Pin 24:  $0.80$
- Pin 24 to Pin 23:  $0.80$
- Pin 23 to Pin 22:  $0.80$
- Pin 22 to Pin 21:  $0.80$
- Pin 21 to Pin 20:  $0.80$
- Pin 20 to Pin 19:  $0.80$
- Pin 19 to Pin 18:  $0.80$
- Pin 18 to Pin 17:  $0.80$
- Pin 17 to Pin 16:  $0.80$
- Pin 16 to Pin 15:  $0.80$
- Pin 15 to Pin 14:  $0.80$
- Pin 14 to Pin 13:  $0.80$
- Pin 13 to Pin 12:  $0.80$
- Pin 12 to Pin 11:  $0.80$
- Pin 11 to Pin 10:  $0.80$
- Pin 10 to Pin 9:  $0.80$
- Pin 9 to Pin 8:  $0.80$
- Pin 8 to Pin 7:  $0.80$
- Pin 7 to Pin 6:  $0.80$
- Pin 6 to Pin 5:  $0.80$
- Pin 5 to Pin 4:  $0.80$
- Pin 4 to Pin 3:  $0.80$
- Pin 3 to Pin 2:  $0.80$
- Pin 2 to Pin 1:  $0.80$

**Detail A: Pinout Diagram**

Pin 1: GND  
Pin 2: NC  
Pin 3: LED+  
Pin 4: LED-  
Pin 5: ME  
Pin 6: ME  
Pin 7: ME  
Pin 8: ME  
Pin 9: ME  
Pin 10: ME  
Pin 11: ME  
Pin 12: ME  
Pin 13: ME  
Pin 14: ME  
Pin 15: ME  
Pin 16: ME  
Pin 17: ME  
Pin 18: ME  
Pin 19: ME  
Pin 20: ME  
Pin 21: ME  
Pin 22: ME  
Pin 23: ME  
Pin 24: ME  
Pin 25: ME  
Pin 26: ME  
Pin 27: ME  
Pin 28: ME  
Pin 29: ME  
Pin 30: ME  
Pin 31: ME  
Pin 32: ME  
Pin 33: ME

**Notes:**

1. Display Type: TFT
2. Backlight: LED
3. Driver IC: HX8353D
4. Driver IC: HX8353D
5. General Tolerance:  $\pm 0.2$
6. Requirements on Environment Protection: Q/S0002
7. VA is suggest custom window opening



## 9 Packing Information

| No | Item             | Model (Material) | Dimensions(mm) | Unit Weight(Kg) | Quantity | Remark      |
|----|------------------|------------------|----------------|-----------------|----------|-------------|
| 1  | Module           | KWH018TG02-F01   | 34x47x2.4      | TBD             | 672      |             |
| 2  | Tray             | PET(Transmit)    | 315×247×10.3   | TBD             | 48       | Anti-static |
| 3  | EPE              | EPE              | 315×247×5      | 0.0035          | 12       |             |
| 4  | Anti-static bag  | PE               | 327×440        | 0.021           | 6        |             |
| 5  | BOX              | Corrugated Paper | 345×260×70     | TBD             | 6        |             |
| 6  | Desiccant        | Desiccant        | 45x50          | 0.0035          | 12       |             |
| 7  | Carton           | Corrugated Paper | 544×365×250    | 1.01            | 1        |             |
| 8  | Total weight(Kg) | TBD              |                |                 |          |             |

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## 10 Precautions For Use of LCD Modules

### 10.1 Handling Precautions

- 10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 10.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- 10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 10.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

- 10.1.6 Do not attempt to disassemble the LCD Module.
- 10.1.7 If the logic circuit power is off, do not apply the input signals.
- 10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
  - 10.1.8.1 Be sure to ground the body when handling the LCD Modules.
  - 10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.
  - 10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
  - 10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

### 10.2 Storage precautions

- 10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 10.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C      Relatively humidity: ≤80%

- 10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

### 10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

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