

NHD-5.0-800480TF-ATXL#-CTP

TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

| | |
|---------|---|
| NHD- | Newhaven Display |
| 5.0- | 5.0" Diagonal |
| 800480- | 800xRGBx480 Pixels |
| TF- | Model |
| A- | Built-in Driver / No Controller |
| T- | White LED Backlight |
| X- | TFT |
| L- | MVA, Enhanced Optical Characteristics, Wide Temperature |
| # | RoHS Compliant |
| CTP | Capacitive Touch Panel with Controller |

Newhaven Display International, Inc.

2661 Galvin Ct.

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

www.newhavendisplay.com

nhtech@newhavendisplay.com

nhsales@newhavendisplay.com

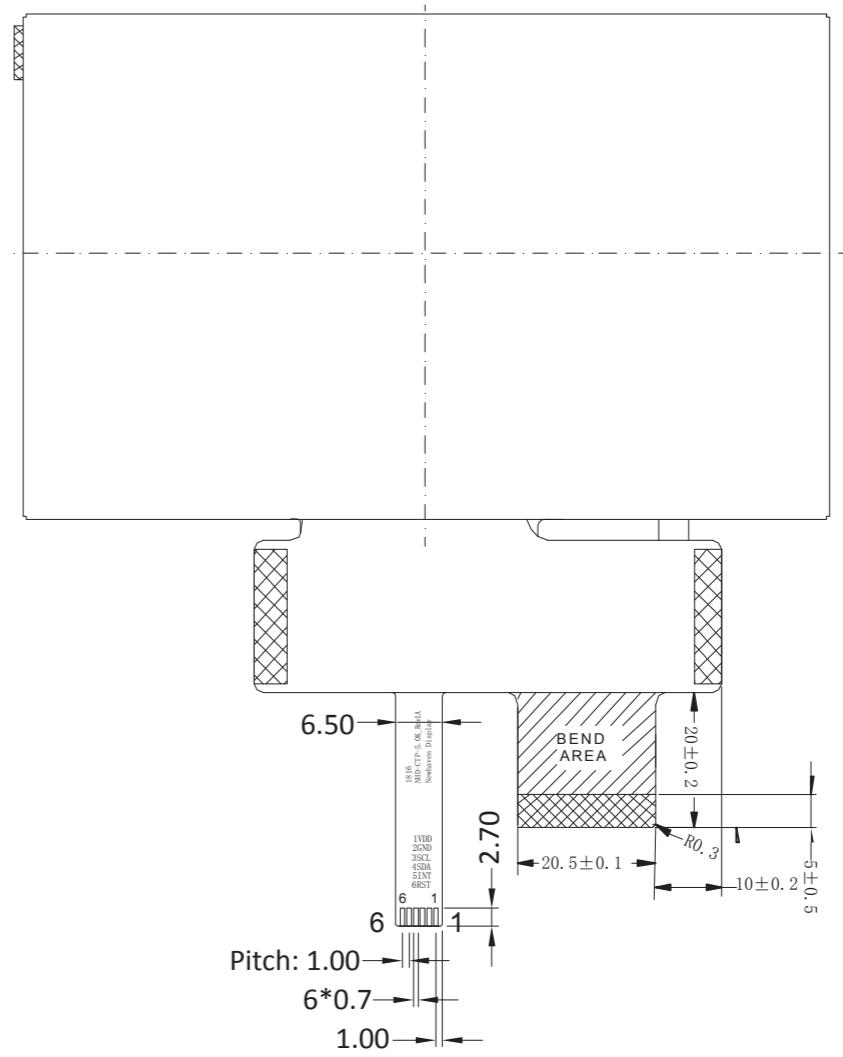
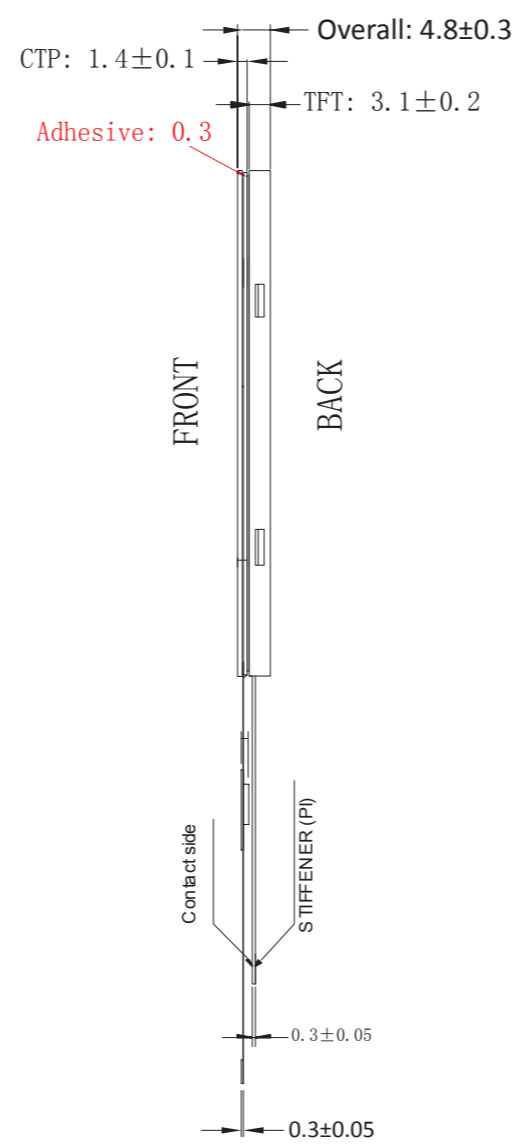
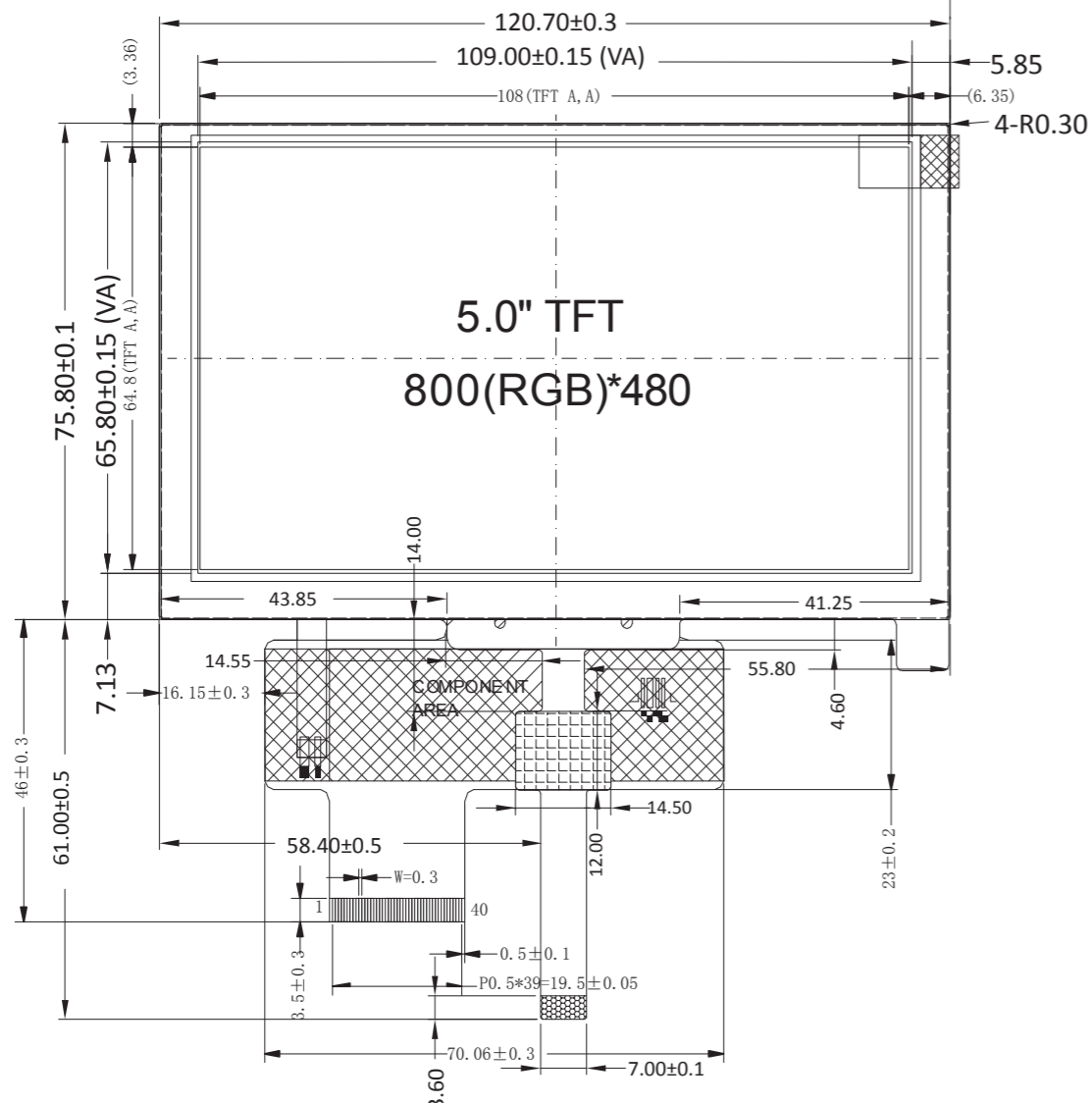
Document Revision History

| Revision | Date | Description | Changed by |
|----------|----------|--|------------|
| 0 | 3/20/13 | Initial Release | AK |
| 1 | 8/28/13 | Electrical Characteristics updated | AK |
| 2 | 9/16/14 | Electrical Characteristics updated | ML |
| 3 | 4/1/15 | CTP mechanical dimensions updated | AK |
| 4 | 9/2/15 | Driver, Electrical, Optical characteristics updated | AK |
| 5 | 10/27/15 | Backlight lifetime rating added | AK |
| 6 | 10/30/15 | Datasheet Reformat | SB |
| 7 | 1/18/16 | CTP Controller Updated, Updated Brightness Rating | SB |
| 6 | 2/23/16 | Corrected Notes on Drawing, Updated CTP Supply Voltage | SB |
| 7 | 4/5/16 | Updated Brightness Rating | SB |
| 8 | 7/7/16 | Mechanical Drawing Updated | SB |
| 9 | 7/22/16 | Electrical Characteristics | TM |
| 10 | 4/14/17 | Supply Current Updated | SB |
| 11 | 7/27/17 | CTP Registers updated | SB |
| 12 | 7/13/18 | Drawing Updated to Show Accurate Thickness | SB |
| 13 | 8/14/18 | CTP Bonding Tape Thickness Increased to 0.3mm | SB |
| 14 | 9/21/18 | Updated CTP Driver & Panel | SB |
| 15 | 10/10/18 | TFT Driver IC Updated | SB |

Functions and Features

- 800xRGBx480 resolution, up to 16.7M colors
- 18-LED backlight
- 24 bit RGB interface
- Enhanced Optical Characteristics
- Wide Viewing Angles
- Capacitive touch panel with controller
 - 10 point multi-touch input
 - Gesture input
 - Zoom In/Out
 - Swipe Up/Down/Left/Right

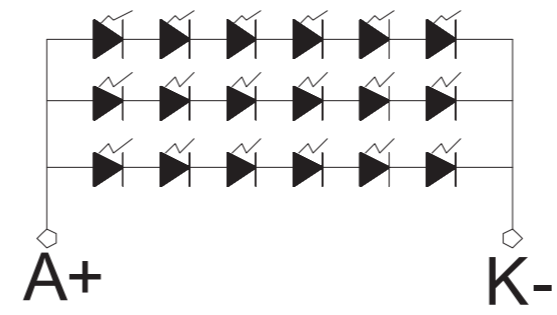
| SYMBOL | REVISION | DATE |
|--------|----------|------|
| | | |
| | | |



| PIN | Symbol |
|-----|--------|
| 1 | VLED- |
| 2 | VLED+ |
| 3 | GND |
| 4 | VDD |
| 5 | R0 |
| 6 | R1 |
| 7 | R2 |
| 8 | R3 |
| 9 | R4 |
| 10 | R5 |
| 11 | R6 |
| 12 | R7 |
| 13 | G0 |
| 14 | G1 |
| 15 | G2 |
| 16 | G3 |
| 17 | G4 |
| 18 | G5 |
| 19 | G6 |
| 20 | G7 |
| 21 | B0 |
| 22 | B1 |
| 23 | B2 |
| 24 | B3 |
| 25 | B4 |
| 26 | B5 |
| 27 | B6 |
| 28 | B7 |
| 29 | GND |
| 30 | CLKIN |
| 31 | STBYB |
| 32 | HSD |
| 33 | VSD |
| 34 | DEN |
| 35 | NC |
| 36 | GND |
| 37 | NC(XR) |
| 38 | NC(YD) |
| 39 | NC(XL) |
| 40 | NC(YU) |

| PIN | Symbol |
|-----|--------|
| 1 | VDD |
| 2 | GND |
| 3 | SCI |
| 4 | SDA |
| 5 | INT |
| 6 | RESET |

- Notes:
- | | |
|--------------------------|--|
| 1. Display Size: | 5.0" TFT |
| 2. Display Mode: | MVA / Transmissive / Normally Black / Anti-Glare |
| 3. Power Supply Voltage: | 3.3V |
| 4. Driver IC: | ILI6126C |
| 5. Backlight: | White LED / 19.2 V / 60 mA (Typ) |
| 6. Brightness: | 400 cd/m ² (Typ) |
| 7. Touch Panel: | PCAP |



| | | | |
|---|-------------------------|---------------------------|----------------------------|
| STANDARD TOLERANCES (UNLESS OTHERWISE SPECIFIED) LINEAR: XX. ±0.3 mm XX.X ±0.3 mm XX.XX ±0.3 mm | | | REVISION: 1B |
| | | | SIZE: A3 |
| UNLESS OTHERWISE SPECIFIED - DIMENSIONS ARE IN MILLIMETERS - THIRD ANGLE PROJECTION | DRAWN BY: S. Baxi | CHECKED BY: A. Khan | APPROVED BY: A. Khan |
| | DRAWN DATE: 10/10/18 | CHECKED DATE: 10/15/18 | APPROVED DATE: 10/15/18 |
| DO NOT SCALE DRAWING | | | SHEET 1 OF 1 |
| THIS DRAWING IS SOLELY THE PROPERTY OF NEWHAVEN DISPLAY INTERNATIONAL, INC. THE INFORMATION IT CONTAINS IS NOT TO BE DISCLOSED, REPRODUCED OR COPIED IN WHOLE OR PART WITHOUT WRITTEN APPROVAL FROM NEWHAVEN DISPLAY. | | | |

Pin Description

TFT:

| Pin No. | Symbol | External Connection | Function Description |
|---------|-----------------|---------------------|--|
| 1 | LED- | LED Power Supply | Ground for Backlight |
| 2 | LED+ | LED Power Supply | Backlight Power Supply (60mA @ ~19.2V) |
| 3 | GND | Power Supply | Ground |
| 4 | V _{DD} | Power Supply | Power supply for LCD and logic (3.3V) |
| 5-12 | [R0-R7] | MPU | Red Data Signals |
| 13-20 | [G0-G7] | MPU | Green Data Signals |
| 21-28 | [B0-B7] | MPU | Blue Data Signals |
| 29 | GND | Power Supply | Ground |
| 30 | CLKIN | MPU | Clock for input data (Rising Edge) |
| 31 | STBYB | MPU | 1: Normal Operation;0: Standby Mode |
| 32 | HSD | MPU | Line synchronization signal |
| 33 | VSD | MPU | Frame synchronization signal |
| 34 | DEN | MPU | Data Enable signal |
| 35 | NC | - | No Connect |
| 36 | GND | Power Supply | Ground |
| 37 | XR | - | No Connect |
| 38 | YD | - | No Connect |
| 39 | XL | - | No Connect |
| 40 | YU | - | No Connect |

Recommended LCD connector: 0.5mm pitch 40-Conductor FFC. Molex p/n: 54104-4031 (top contact)

Backlight connector: on LCD connector

Mates with: ---

Capacitive Touch Panel:

| Pin No. | Symbol | External Connection | Function Description |
|---------|-----------------|---------------------|--|
| 1 | V _{cc} | Power Supply | Power supply for logic (3.3V) |
| 2 | GND | Power Supply | Ground |
| 3 | SCL | MPU | Serial I2C Clock (Requires pull-up resistor) |
| 4 | SDA | MPU | Serial I2C Data (Requires pull-up resistor) |
| 5 | /INT | MPU | Interrupt signal from touch panel module to host |
| 6 | /RESET | MPU | Active LOW Reset signal |

Recommended connector: 1.0mm pitch 6-Conductor FFC. Molex p/n: 52271-0679

Driver/Controller Information

TFT:

Built-in ILI6126C Source Driver: <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/ILI6126C.pdf>

Built-in ILI5960D Gate Driver: <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/ILI5960D.pdf>

Capacitive Touch Panel:

Built-in FocalTech FT5426 controller.

Please download specification at <http://www.newhavendisplay.com/appnotes/datasheets/touchpanel/FT5x26.pdf>

Electrical Characteristics

TFT:

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------|-------------------------|-----------------------|--------|-----------------------|------|
| Operating Temperature Range | T _{OP} | Absolute Max | -20 | - | +70 | °C |
| Storage Temperature Range | T _{ST} | Absolute Max | -30 | - | +80 | °C |
| Supply Voltage | V _{DD} | - | 3.0 | 3.3 | 3.6 | V |
| Supply Current | I _{DD} | V _{DD} = 3.3V | 50 | 100 | 170 | mA |
| "H" Level input | V _{IH} | - | 0.7 * V _{DD} | - | V _{DD} | V |
| "L" Level input | V _{IL} | - | GND | - | 0.3 * V _{DD} | V |
| "H" Level output | V _{OH} | - | V _{DD} - 0.4 | - | V _{DD} | V |
| "L" Level output | V _{OL} | - | - | - | GND + 0.4 | V |
| Backlight Supply Current | I _{LED} | - | - | 60 | 75 | mA |
| Backlight Supply Voltage | V _{LED} | I _{LED} = 60mA | 17.4 | 19.2 | 19.8 | V |
| Backlight Lifetime* | - | T _{OP} = 25°C | 20,000 | 50,000 | - | Hrs. |

*Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions. The LED of the backlight is driven by current drain; drive voltage is for reference only. Drive voltage must be selected to ensure backlight current drain is below MAX level stated.

Capacitive Touch Panel:

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|-----------------|------------------------|-----------------------|------|-----------------------|------|
| Operating Temperature Range | T _{OP} | Absolute Max | -20 | - | +70 | °C |
| Storage Temperature Range | T _{ST} | Absolute Max | -30 | - | +80 | °C |
| Supply Voltage | V _{DD} | - | 2.8 | 3.3 | 3.6 | V |
| Supply Current – Operating | I _{DD} | V _{DD} = 3.3V | - | 12 | 20 | mA |
| Supply Current – Hibernate | I _{DD} | T _{OP} = 25°C | - | 1.0 | - | uA |
| "H" Level Input | V _{IH} | - | 0.7 * V _{DD} | - | V _{DD} | V |
| "L" Level Input | V _{IL} | - | V _{SS} | - | 0.3 * V _{DD} | V |
| "H" Level Output | V _{OH} | - | 0.7 * V _{DD} | - | V _{DD} | V |
| "L" Level Output | V _{OL} | - | V _{SS} | - | 0.3 * V _{DD} | V |

Optical Characteristics:

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|---------------------------------|--------------------------|------|------|------|-------------------|
| Optimal Viewing Angles | Top | CR ≥ 10 | - | 75 | - | ° |
| | Bottom | | - | 75 | - | ° |
| | Left | | - | 75 | - | ° |
| | Right | | - | 75 | - | ° |
| Contrast Ratio | CR | - | 350 | - | - | |
| Luminance | L _V | I _{LED} = 60 mA | 315 | 400 | - | cd/m ² |
| Response Time | T _R + T _F | T _{OP} = 25°C | - | 20 | 30 | ms |

Capacitive Touch Panel Material Characteristics:

| Property | Requirement | Unit |
|---------------------|-------------|------|
| IC | FT5426 | - |
| ITO Glass thickness | 0.55 | mm |
| Surface Hardness | ≥6 | H |
| Light transmission | 82% | - |
| Operating Humidity | 20~90 | RH |
| Storage Humidity | 20~90 | RH |

Capacitive Touch Panel Registers

| Register No. | Access | Register Name | Bits | Value | Description |
|--------------|--------|-------------------|-------|----------|---|
| 01h | RO | Gesture ID | [7:0] | 10 | Swipe Up |
| | | | | 18h | Swipe Down |
| | | | | 1Ch | Swipe Left |
| | | | | 14h | Swipe Right |
| | | | | 48h | Zoom Out |
| | | | | 49h | Zoom In |
| | | | | 00 | No gesture |
| 02h | RO | Touch Points | [7:0] | 0-Ah | 0: No touch detected A: 10 touch points detected |
| 03h | RO | TOUCH1_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 03h | RO | TOUCH1_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 04h | RO | TOUCH1_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 05h | RO | TOUCH1_YH | [3:0] | 0 -1 | Upper 4 bits of Y touch coordinate |
| 06h | RO | TOUCH1_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 07h | RO | TOUCH1_Weight | [7:0] | | Touch Weight |
| 08h | RO | TOUCH1_Misc | [3:0] | 00-0Fh | Touch Area |
| 09h | RO | TOUCH2_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 09h | RO | TOUCH1_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 0Ah | RO | TOUCH2_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 0Bh | RO | TOUCH2_YH | [3:0] | 0 -1 | Upper 4 bits of Y touch coordinate |
| 0Ch | RO | TOUCH2_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 0Dh | RO | TOUCH2_Weight | [7:0] | | Touch Weight |
| 0Eh | RO | TOUCH2_Misc | [3:0] | 00-0Fh | Touch Area |
| 0Fh | RO | TOUCH3_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 0Fh | RO | TOUCH3_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 10 | RO | TOUCH3_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 11h | RO | TOUCH3_YH | [3:0] | 0 -1 | Upper 4 bits of Y touch coordinate |
| 12h | RO | TOUCH3_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 13h | RO | TOUCH3_Weight | [7:0] | | Touch Weight |
| 14h | RO | TOUCH3_Misc | [3:0] | 00-0Fh | Touch Area |
| 15h | RO | TOUCH4_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 15h | RO | TOUCH4_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 16h | RO | TOUCH4_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 17h | RO | TOUCH4_YH | [3:0] | 0 -1 | Upper 4 bits of Y touch coordinate |
| 18h | RO | TOUCH4_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 1Ah | RO | TOUCH4_Misc | [3:0] | 00-0Fh | Touch Area |
| 1Bh | RO | TOUCH5_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |

| Register No. | Access | Register Name | Bits | Value | Description |
|--------------|--------|--------------------|-------|----------|------------------------------------|
| 1Bh | RO | TOUCH5_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 1Ch | RO | TOUCH5_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 1Dh | RO | TOUCH5_YH | [3:0] | 0 -1 | Upper 4 bits of Y touch coordinate |
| 1Eh | RO | TOUCH5_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 1Fh | RO | TOUCH5_Weight | [7:0] | | Touch Weight |
| 20 | RO | TOUCH5_Misc | [3:0] | 00-0Fh | Touch Area |
| 21h | RO | TOUCH6_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 21h | RO | TOUCH6_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 22h | RO | TOUCH6_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 23h | RO | TOUCH6_YH | [3:0] | 0 -1 | Upper 4 bits of Y touch coordinate |
| 24h | RO | TOUCH6_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 25h | RO | TOUCH6_Weight | [7:0] | | Touch Weight |
| 26h | RO | TOUCH6_Misc | [3:0] | 00-0Fh | Touch Area |
| 27h | RO | TOUCH7_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 27h | RO | TOUCH7_XH | [3:0] | 0 -1 | Upper 4 bits of X touch coordinate |
| 28h | RO | TOUCH7_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 29h | RO | TOUCH7_YH | [3:0] | 0 - 1 | Upper 4 bits of Y touch coordinate |
| 2Ah | RO | TOUCH7_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 2Bh | RO | TOUCH7_Weight | [7:0] | | Touch Weight |
| 2Ch | RO | TOUCH7_Misc | [3:0] | 00-0Fh | Touch Area |
| 2Dh | RO | TOUCH8_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 2Dh | RO | TOUCH8_XH | [3:0] | 0 - 1 | Upper 4 bits of X touch coordinate |
| 2Eh | RO | TOUCH8_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 2Fh | RO | TOUCH8_YH | [3:0] | 0 - 1 | Upper 4 bits of Y touch coordinate |
| 30 | RO | TOUCH8_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 31h | RO | TOUCH8_Weight | [7:0] | | Touch Weight |
| 32h | RO | TOUCH8_Misc | [3:0] | 00-0Fh | Touch Area |
| 33h | RO | TOUCH9_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 33h | RO | TOUCH9_XH | [3:0] | 0 - 1 | Upper 4 bits of X touch coordinate |
| 34h | RO | TOUCH9_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 35h | RO | TOUCH9_YH | [3:0] | 0 - 1 | Upper 4 bits of Y touch coordinate |
| 36h | RO | TOUCH9_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |
| 37h | RO | TOUCH9_Weight | [7:0] | | Touch Weight |
| 38h | RO | TOUCH9_Misc | [3:0] | 00 - 0Fh | Touch Area |
| 39h | RO | TOUCH10_Event_Flag | [7:6] | 0 | Put Down |
| | | | | 1 | Put Up |
| | | | | 2 | Contact |
| | | | | 3 | Reserved |
| 39h | RO | TOUCH10_XH | [3:0] | 0 - 1 | Upper 4 bits of X touch coordinate |
| 3Ah | RO | TOUCH10_XL | [7:0] | 00 - FFh | Lower 8 bits of X touch coordinate |
| 3Bh | RO | TOUCH10_YH | [3:0] | 0 - 1 | Upper 4 bits of Y touch coordinate |
| 3Ch | RO | TOUCH10_YL | [7:0] | 00 - FFh | Lower 8 bits of Y touch coordinate |

| Register No. | Access | Register Name | Bits | Value | Description |
|--------------|--------|--------------------|-------|-------------|--|
| 3Dh | RO | TOUCH10_Weight | [7:0] | 00-FFh | Touch Weight |
| 3Eh | RO | TOUCH10_Misc | [3:0] | 00-0Fh | Touch Area |
| 80 | RW | ID_G_MC_THGROUP | [7:0] | 00-FFh | Mutual-Capacitive touch Threshold / 4 Default: 4Bh |
| 81h | RW | ID_G_MC_THPEAK | [7:0] | 00-FFh | Mutual-Capacitive Peak Threshold / 4 Default: 46h |
| 85h | RW | ID_G_THDIFF | [7:0] | 00-FFh | Points Filtering Range Threshold / 16 Default: A0 |
| 86h | RW | ID_G_CTRL | [1:0] | 0-1 | Allowed to switch to monitor mode or not (1: Allowed, 0: Not Allowed) |
| 88h | RW | ID_G_PERIODACTIVE | [3:0] | 3h-Eh | Period of Active Status |
| 89h | RW | ID_G_PERIODMONITOR | [7:0] | 1Eh-FFh | Timer to enter "idle" while in Monitor (ms) |
| A1h | RO | ID_G_LIB_VERSION_H | [7:0] | 00-FFh | App library version high-byte Default: 0 |
| A2h | RO | ID_G_LIB_VERSION_L | [7:0] | 00-FFh | App library version low-byte Default: 2h |
| A3h | RO | ID_G_CHIPER_HIGH | [7:0] | 00-FFh | Chip Vendor ID Default: 0x54 |
| A4h | RW | ID_G_MODE | [0] | 0 1 | INT Trigger Mode INT Polling Mode |
| A5h | RW | ID_G_PMODE | [1:0] | 0 1 3 | Active Monitor Sleep |
| A6h | RO | ID_G_FIRMID | [7:0] | 00-FFh | Firmware ID Number Default: 1 |
| A8h | RO | ID_G_VENODRID | [7:0] | 00-FFh | CTPM Vendor's Chip ID Default: 79h |
| C0h | RW | ID_G_GLOVE_MODE_EN | [0] | 0 1 | Glove Mode Switch Disable Glove Mode Switch Enable |
| C1h | RW | ID_G_COVER_MODE_EN | [0] | 0 1 | Cover Mode Switch Disable Cover Mode Switch Enable |

Timing Characteristics – TFT display

Horizontal Input Timing

| Parameter | Symbol | Value | | | Unit | Note |
|---------------------------|--------|-------|------|------|------|-----------------------------|
| Horizontal Display Area | thd | 800 | | | MHz | |
| DCLK Frequency | fclk | Min | Typ | Max | MHz | |
| | | - | 33.3 | 50 | | |
| 1 Horizontal Line | th | 908 | 928 | 1010 | DCLK | thb = thpw=88 DCLK is fixed |
| HSD Pulse Width | thpw | 4 | 48 | 64 | | |
| HSD Back Porch (Blanking) | thb | 20 | 40 | 84 | | |
| HSD Front Porch | thfp | 20 | 40 | 122 | | |

Horizontal Input Timing

| Parameter | Symbol | Min | Typ | Max | Unit | Note |
|---------------------------|--------|-----|-----|-----|------|---------------------------|
| Vertical Display Area | tvd | 480 | | | H | tvpw + tvb = 32H is fixed |
| VSD Period Tim | tv | 515 | 525 | - | | |
| VSD Pulse Width | tvpw | 1 | 3 | 31 | | |
| VSD Back Porch (Blanking) | tvb | 1 | 29 | 31 | | |
| VSD Front Porch | tvfp | 3 | 13 | - | | |

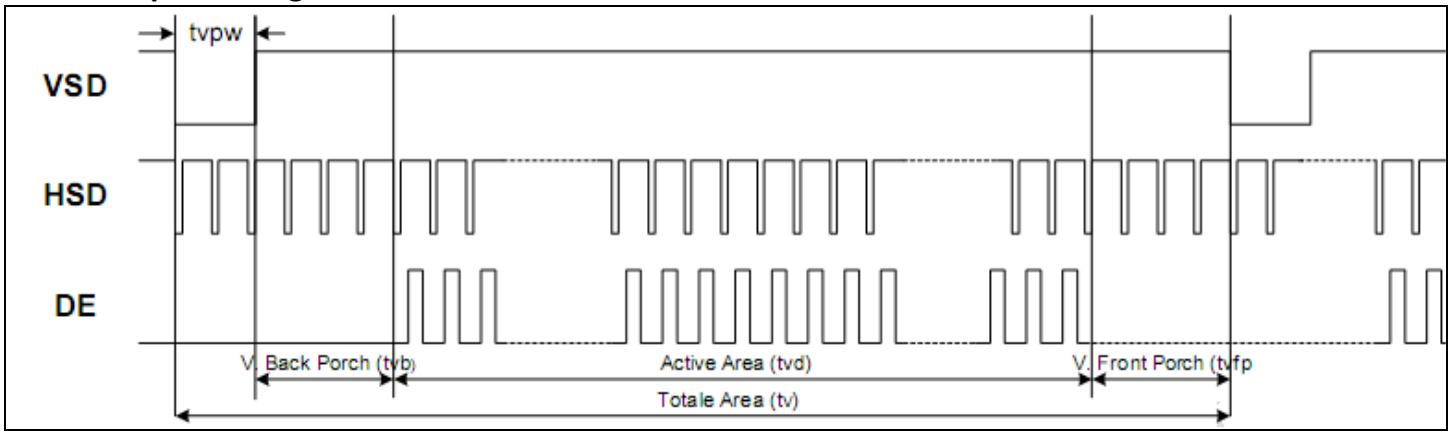
AC Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|------------------------------------|------------------|-----|-----|-----|------|--|
| V _{DD} Power ON Slew Rate | T _{POR} | - | - | 20 | ms | From 0V to 90% V _{DD} |
| RSTB Pulse Width | T _{RST} | 10 | - | - | μs | CLKIN = 45MHz |
| CLKIN cycle time | T _{cph} | 20 | - | - | ns | |
| CLKIN pulse duty | T _{cwh} | 40 | 50 | 60 | % | |
| VSD setup time | T _{vst} | 8 | - | - | ns | |
| VSD hold time | T _{vhd} | 8 | - | - | ns | |
| HSD setup time | T _{hst} | 8 | - | - | ns | |
| HSD hold time | T _{hhd} | 8 | - | - | ns | |
| Data set-up time | T _{dsu} | 8 | - | - | ns | DOR[7:0], D1G[7:0], D2B[7:0] to CLKIN |
| Data hold time | T _{dhd} | 8 | - | - | ns | DOR[7:0], D1G[7:0], D2B[7:0] to CLKIN |
| DE setup time | T _{esu} | 8 | - | - | ns | |
| DE hold time | T _{ehd} | 8 | - | - | ns | |
| Output stable time | T _{sst} | - | - | 6 | μs | 10%-90% target voltage C _L = 120pf, R= 10kΩ |

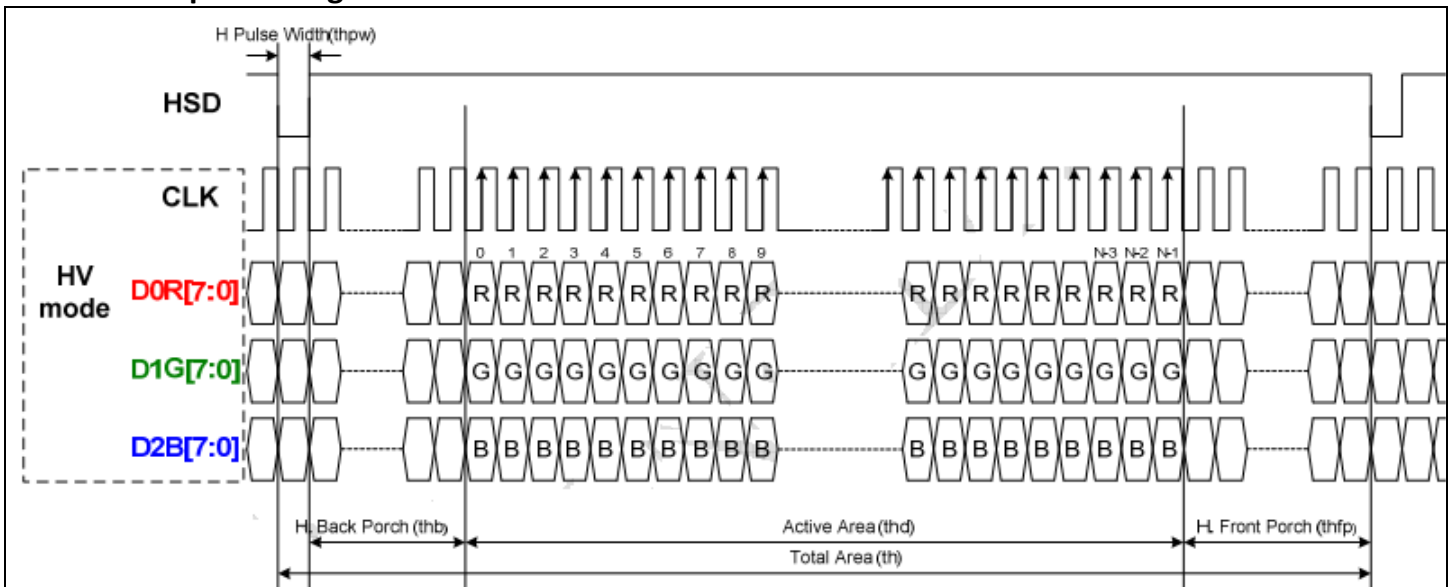
Parallel 24-Bit RGB Mode Timing

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|--------------------------------|-------------------|-----|-----|-----|-------|-------------------------------|
| CLKIN Frequency | F _{clk} | - | 33 | 50 | MHz | V _{DD} = 2.7V ~ 3.6V |
| CLKIN time | T _{clk} | 20 | 30 | - | Ns | |
| CLKIN Pulse Duty | T _{cwh} | 40 | 50 | 60 | % | T _{clk} |
| Time from HSD to Source Output | T _{hso} | - | 64 | - | CLKIN | |
| Time from HSD to LD | T _{hld} | - | 64 | - | CLKIN | |
| Time from HSD to STV | T _{hstv} | - | 2 | - | CLKIN | |
| Time from HSD to CKV | T _{hckv} | - | 20 | - | CLKIN | |
| Time from HSD to OEV | T _{hoev} | - | 4 | - | CLKIN | |
| LD Pulse Width | T _{wld} | - | 10 | - | CLKIN | |
| CKV Pulse Width | T _{wckv} | - | 66 | - | CLKIN | |
| OEV Puse Width | T _{woev} | - | 92 | - | CLKIN | |

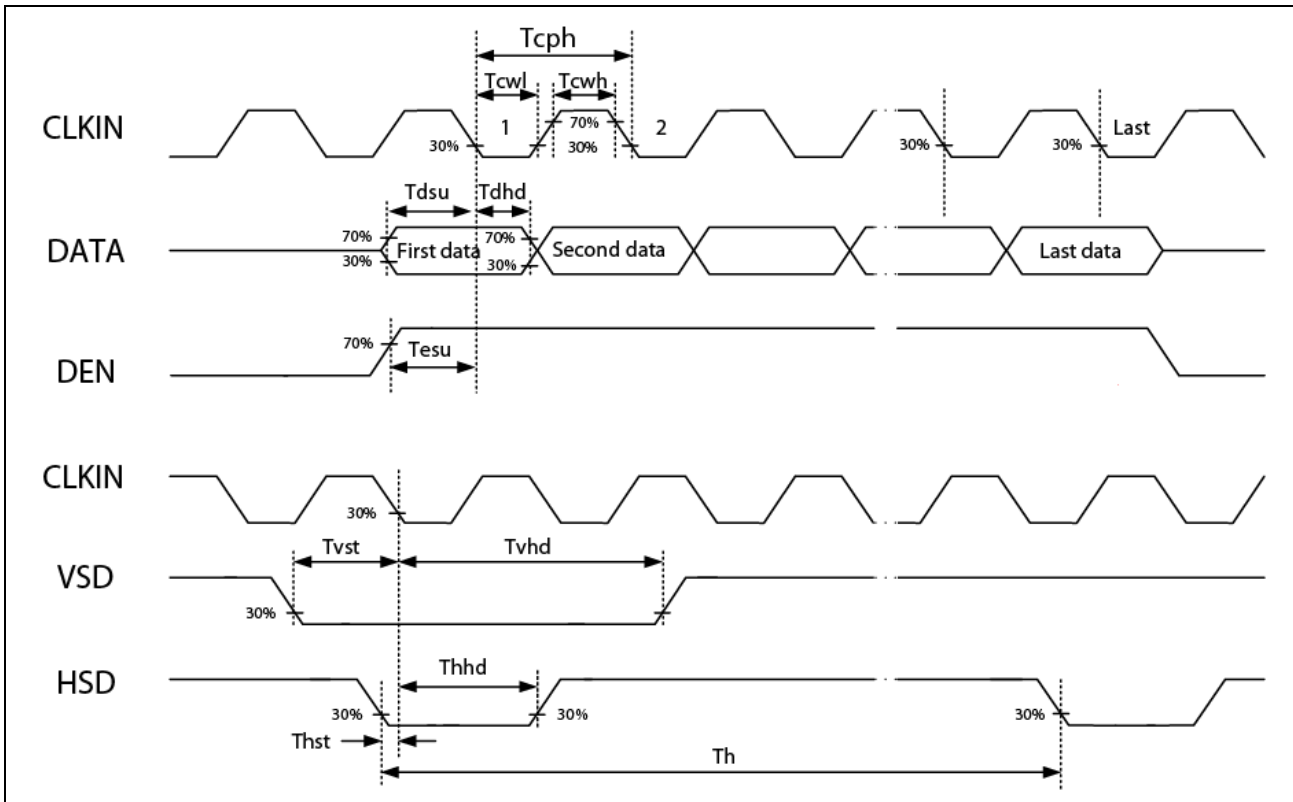
Vertical Input Timing



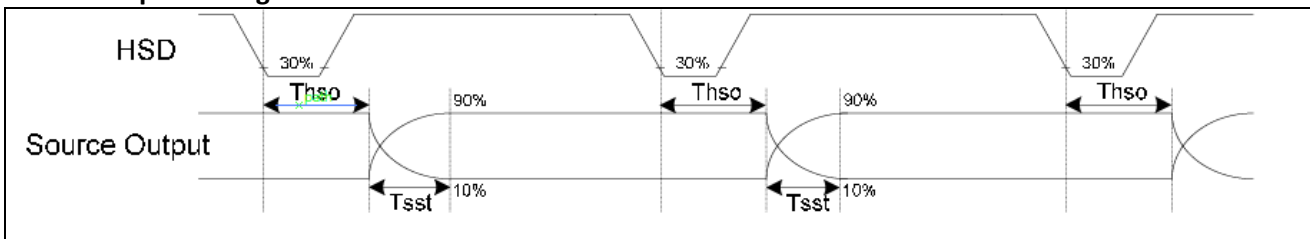
Horizontal Input Timing



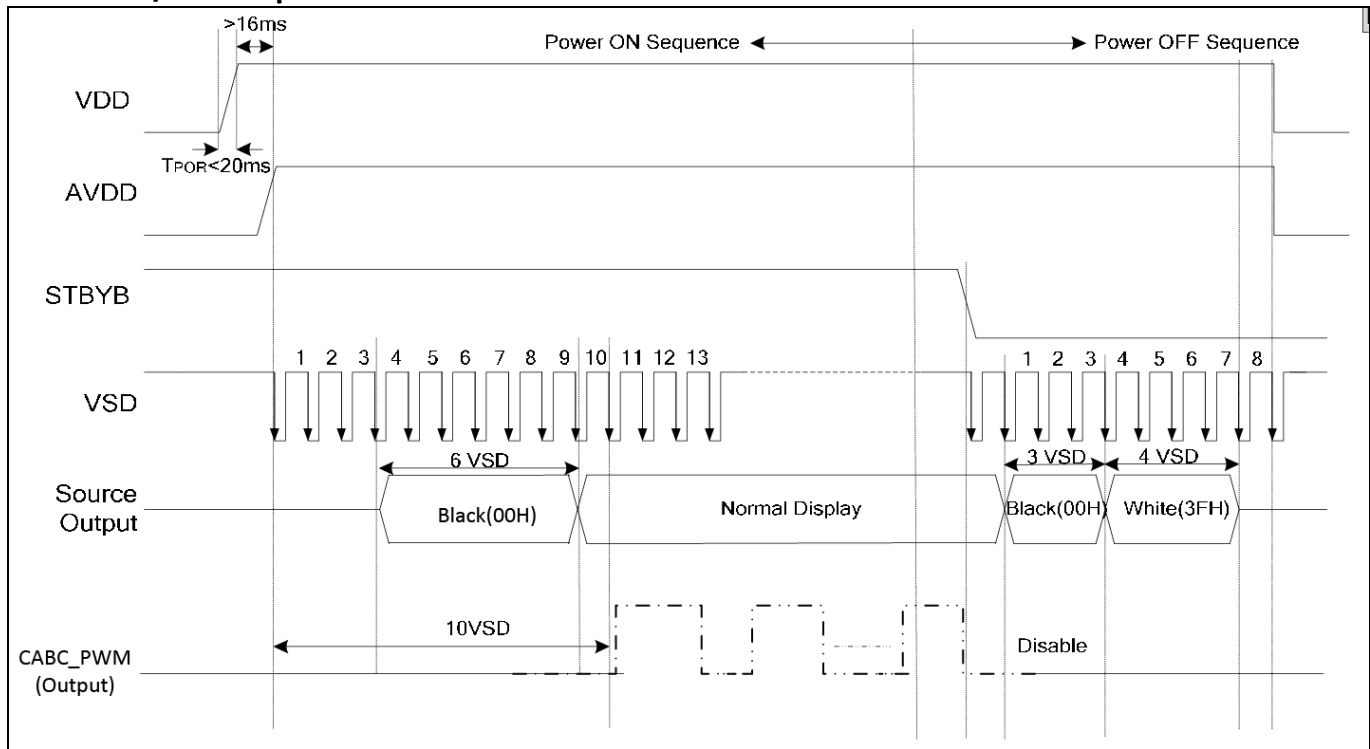
Input Clock and Data Timing



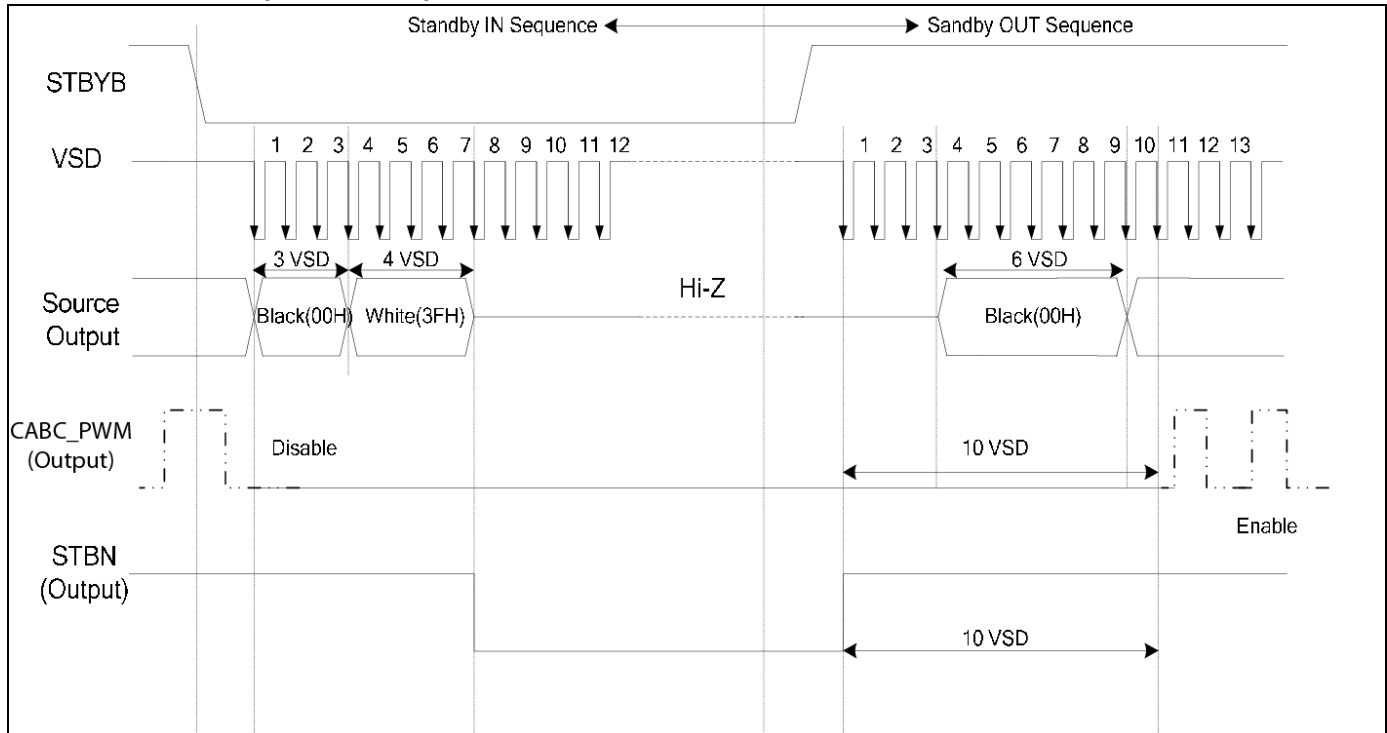
Source Output Timing



Power ON/OFF Sequence

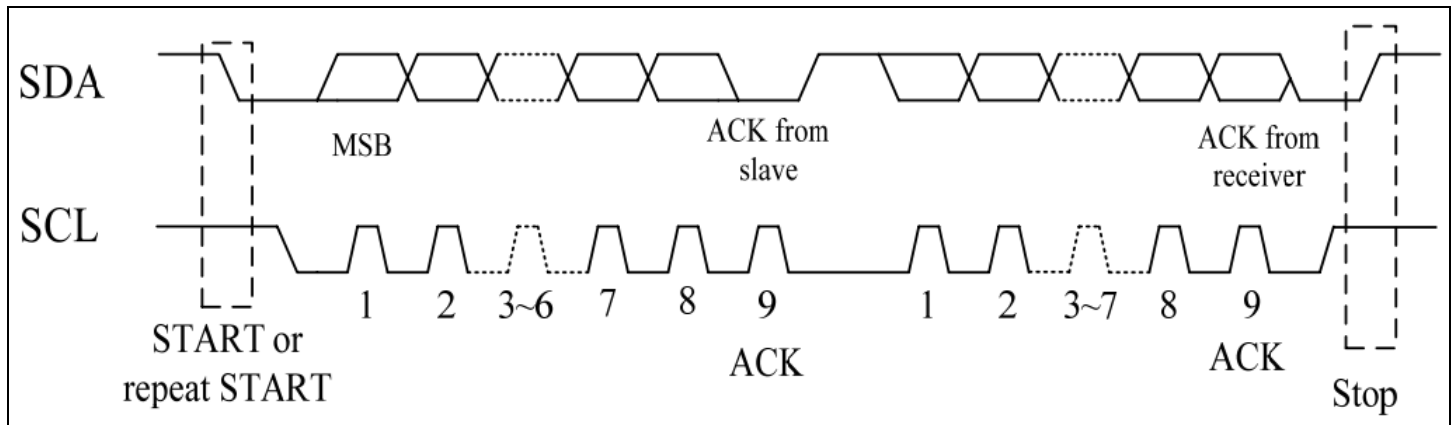


Enter/Exit Standby Mode Sequence

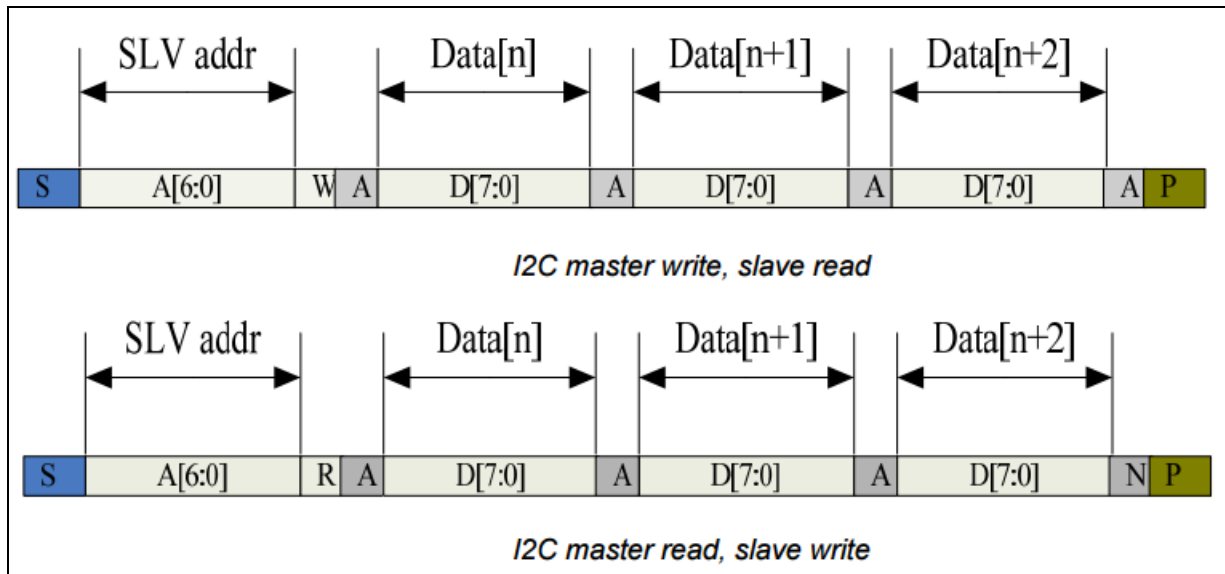


Timing Characteristics – Capacitive Touch Panel

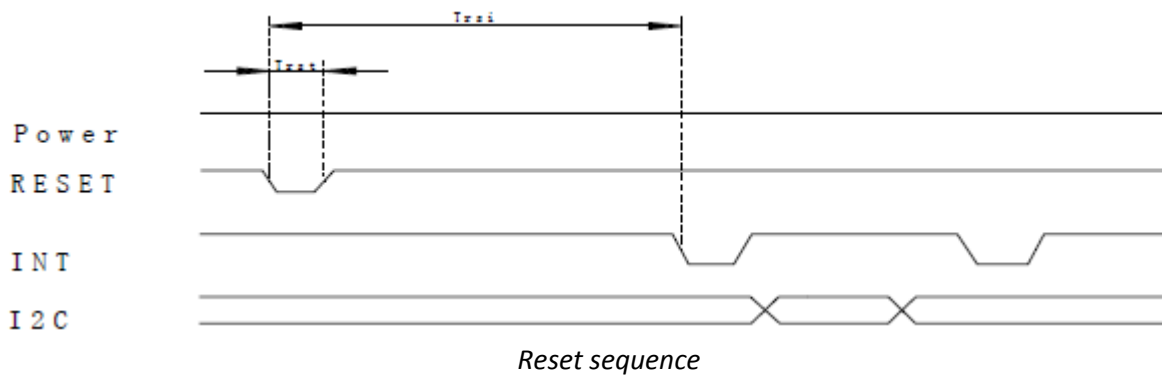
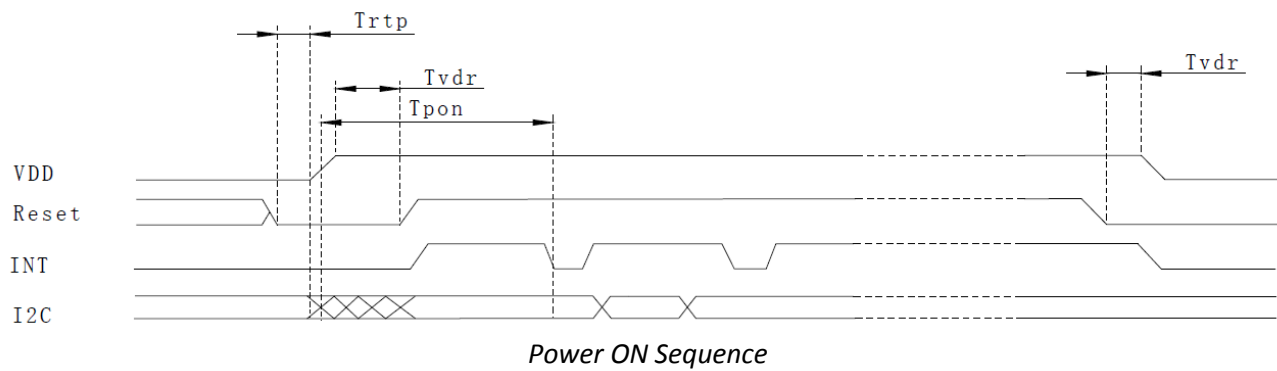
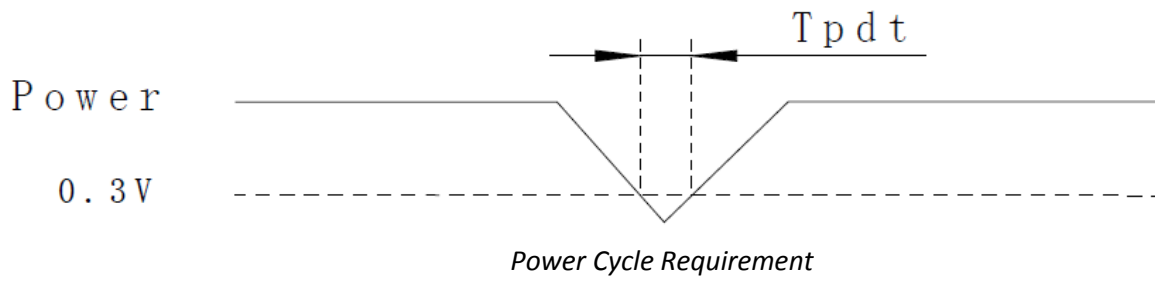
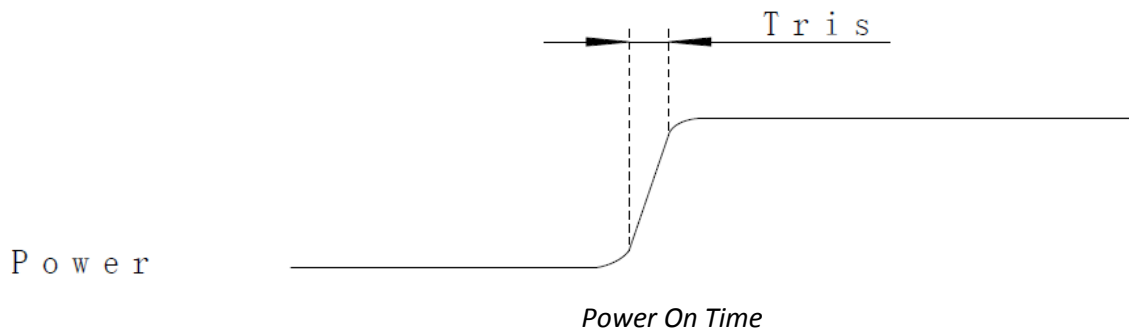
Data Transfer Format



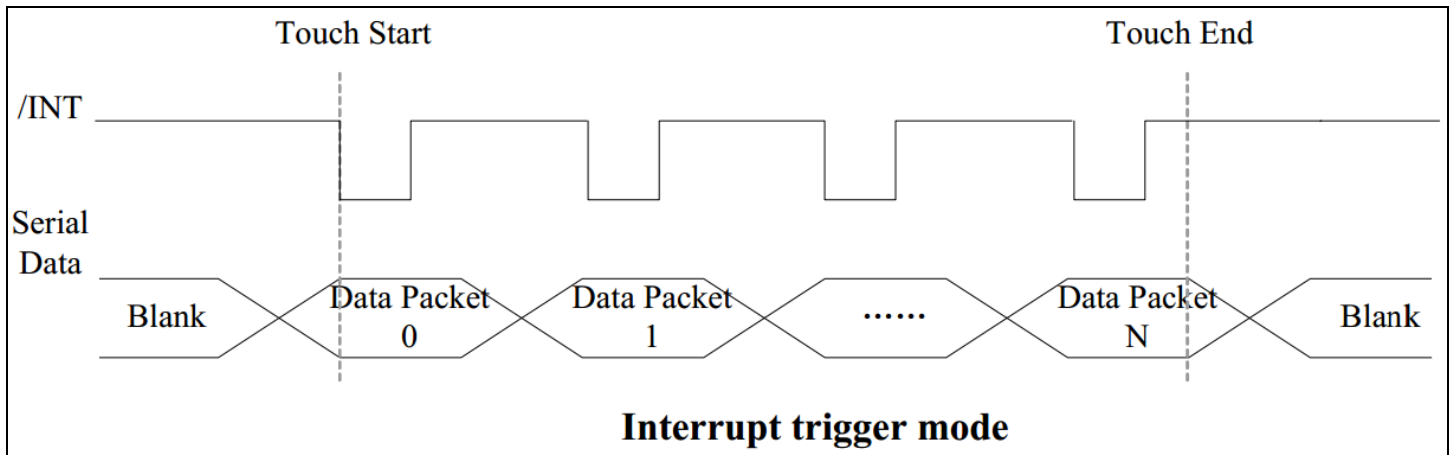
| Parameter | Min | Max | Unit |
|--|-----|-----|---------|
| SCL Frequency | 0 | 400 | KHz |
| Bus free time between a STOP & START condition | 1.3 | - | μ s |
| Hold time Repeated START condition | 0.6 | - | μ s |
| Data Setup Time | 100 | - | ns |
| Setup time for a repeated START condition | 0.6 | - | μ s |
| Setup time for a STOP condition | 0.6 | - | μ s |



Power ON/Reset Sequence



| Parameter | Description | Min | Max | Unit |
|-----------|---|-----|-----|------|
| T_{ris} | Rise time from 0.1V _{DD} to 0.9V _{DD} | - | 5 | ms |
| T_{pdt} | Time of the voltage of supply being below 0.3V | 5 | - | ms |
| T_{rtp} | Time of resetting to be low before powering on | 100 | - | μs |
| T_{pon} | Time to start reporting after power on | - | 200 | ms |
| T_{vdr} | Reset time after applying V _{DD} | 1 | - | ms |
| T_{rsi} | Time to start reporting after reset | - | 200 | ms |
| T_{rst} | Reset Time | 1 | - | ms |



Sample code to read touch data:

```

i2c_start();
i2c_tx(0x70);           //Slave Address (Write)
i2c_tx(0x00);           //Start reading address
i2c_stop();

i2c_start();
i2c_tx(0x71);           //Slave Address (Read)
for(i=0x00;i<0x1F;i++)
{touchdata_buffer[i] = i2c_rx(1);}
i2c_stop();

```

Sample code to overwrite default register values:

```

i2c_start();
i2c_tx(0x70);           //Slave Address (Write)
i2c_tx(0xA4);           //ID_G_Mode
i2c_tx(0x01);           //Disable interrupt status to host
i2c_stop();

```

Quality Information

| Test Item | Content of Test | Test Condition | Note |
|---------------------------------------|---|--|------|
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | +80°C , 96hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30°C , 96hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time. | +70°C 96hrs | 2 |
| Low Temperature Operation | Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time. | -20°C , 96hrs | 1,2 |
| High Temperature / Humidity Operation | Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time. | +50°C , 90% RH , 96hrs | 1,2 |
| Thermal Shock resistance | Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress. | -20°C,60min -> 70°C,60min = 1 cycle For 20 cycles | |
| Vibration test | Endurance test applying vibration to simulate transportation and use. | 10-50Hz, 5G in each of 3 directions X,Y,Z For 30 minutes each direction | 3 |
| Static electricity test | Endurance test applying electric static discharge. | Air: 8kV, 150pF, 330Ω, 5 times Contact: 4kV, 150pF, 330Ω, 5 times | |

Note 1: No condensation to be observed.

Note 2: Conducted after 4 hours of storage at 25°C, 0%RH.

Note 3: Test performed on product itself, not inside a container.

Precautions for using LCDs/LCMs

See Precautions at www.newhavendisplay.com/specs/precautions.pdf

Warranty Information and Terms & Conditions

http://www.newhavendisplay.com/index.php?main_page=terms