

NHD-4.3-480272EF-ATXL#-CTP

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

| | |
|---------|--|
| NHD- | Newhaven Display |
| 4.3- | 4.3" Diagonal |
| 480272- | 480xRGBx272 pixels |
| EF- | Model |
| A- | Built-in driver / NO Controller |
| T- | White LED backlight |
| X- | TFT |
| L- | 6:00 optimum view, Wide Temp |
| #- | RoHS Compliant |
| CTP- | Capacitive touch panel with controller |

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Document Revision History

| Revision | Date | Description | Changed by |
|----------|-----------|-----------------|------------|
| 0 | 8/29/2012 | Initial Release | AK |

Functions and Features

- 480xRGBx272 resolution, up to 16.7M colors
- 12-LED backlight
- 24 bit RGB interface
- Capacitive touch panel with controller

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 (32mA @ 19.2V) |
| 3 | GND | Power Supply | Ground |
| 4 | VDD | 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 | PCLK | MPU | Data sample Clock signal |
| 31 | DISP | MPU | Display ON/OFF signal |
| 32 | HSYNC | MPU | Line synchronization signal |
| 33 | VSYNC | MPU | Frame synchronization signal |
| 34 | DE | MPU | Data Enable signal |
| 35 | AVDD | - | No Connect |
| 36 | GND | Power Supply | Ground |
| 37 | XR | Touch Panel MPU | Touch Panel RIGHT |
| 38 | YD | Touch Panel MPU | Touch Panel DOWN |
| 39 | XL | Touch Panel MPU | Touch Pane LEFT |
| 40 | YU | Touch Panel MPU | Touch Panel UP |

Recommended LCD connector: 0.5mm pitch 40-Conductor FFC. Molex p/n: 54132-4097

Backlight connector: on LCD connector

Mates with: ---

Capacitive Touch Panel:

| Pin No. | Symbol | External Connection | Function Description |
|---------|--------|---------------------|---|
| 1 | VDD | Power Supply | Power supply for logic (3.0V) |
| 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 | /WAKE | MPU | External interrupt signal from host (0: Disable /INT; 1: Enable /INT) |

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

Driver/Controller Information

TFT:

Built-in Himax HX8257-A

Please download specification at http://www.newhavendisplay.com/app_notes/HX8257.pdf

Capacitive Touch Panel:

Built-in FocalTech FT5x06

Please download specification at http://www.newhavendisplay.com/app_notes/FT5x06.pdf

Electrical Characteristics

TFT:

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-------------------------------|--------|--------------|---------|-------|---------|------|
| Operating Temperature Range | Top | Absolute Max | -20 | - | +70 | °C |
| Storage Temperature Range | Tst | Absolute Max | -30 | - | +80 | °C |
| Supply Voltage | VDD | | 3.0 | 3.3 | 3.6 | V |
| Supply Current (White screen) | IDD | | - | 24.24 | 28.78 | mA |
| Supply Current (Black screen) | IDD | | - | 25.76 | 30.30 | mA |
| "H" level input | Vih | | 0.8*VDD | - | VDD | V |
| "L" level input | Vil | | VSS | - | 0.2*VDD | V |
| | | | | | | |
| Backlight Supply Voltage | VLED | | - | 19.2 | 22 | V |
| Backlight Supply Current | ILED | | - | 32 | 40 | mA |
| Backlight Power Consumption | PBL | | - | 650 | - | mW |

Capacitive Touch Panel:

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|--------|----------------------|---------|------|---------|------|
| Operating Temperature Range | Top | Absolute Max | -20 | - | +70 | °C |
| Storage Temperature Range | Tst | Absolute Max | -30 | - | +80 | °C |
| Supply Voltage | VDD | | 2.8 | - | 3.3 | V |
| Supply Current (Operating) | IDD | Ta=25°C, VDD=2.8V | - | 6.0 | - | mA |
| Supply Current (Hibernate) | IDD | | - | 0.03 | - | mA |
| "H" level input | Vih | | 0.7*VDD | - | VDD | V |
| "L" level input | Vil | | VSS | - | 0.3*VDD | V |
| "H" level output | Voh | | 0.7*VDD | - | VDD | V |
| "L" level output | Vol | | VSS | - | 0.3*VDD | V |

Optical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|--------|-----------|------|------|------|-------------------|
| Viewing Angle – Top | | Cr ≥10 | - | 15 | - | ° |
| Viewing Angle – Bottom | | | - | 35 | - | ° |
| Viewing Angle – Left | | | - | 45 | - | ° |
| Viewing Angle – Right | | | - | 45 | - | ° |
| Contrast Ratio | Cr | | - | 400 | - | |
| Luminance | YL | | 340 | - | 480 | cd/m ² |
| Response Time | Tr+Tf | - | - | 20 | 45 | ms |

Capacitive Touch Panel Material Characteristics

| Property | Requirement | Unit |
|--------------------|-------------|------|
| IC | FT5306DE3 | - |
| Glass thickness | 0.7 | Mm |
| Top film thickness | 0.125 | Mm |
| Surface hardness | 6(750) | H(g) |
| Light transmission | 82% | - |
| Operating humidity | 45~85 | RH |
| Storage Humidity | 5~95 | RH |

Timing Characteristics

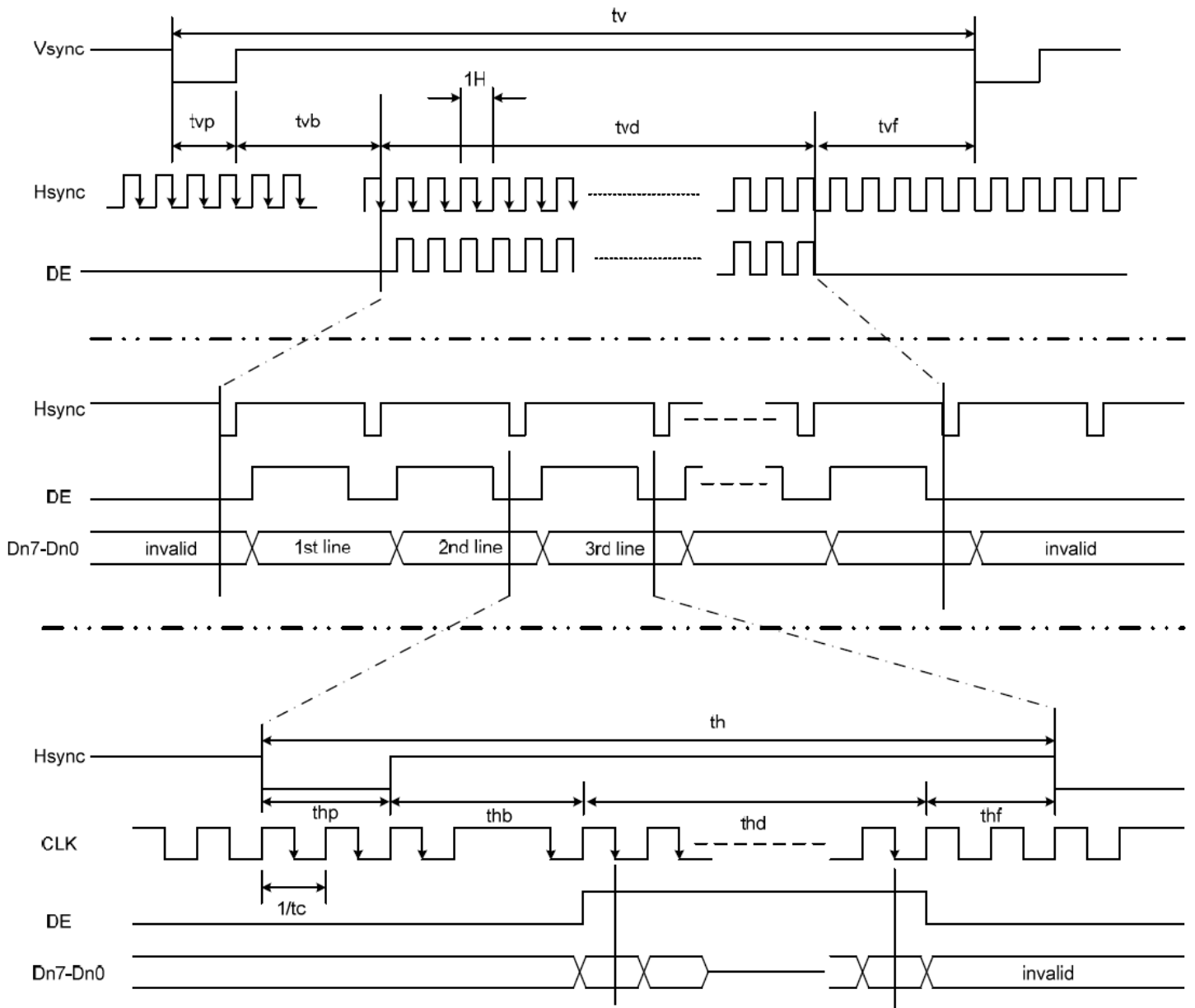
Parallel RGB input timing requirement

(480R GBx272, $T_A=25^\circ\text{C}$, $V_{DDIO}=1.8\text{V}$ to 3.6V , $DVSS=0\text{V}$)

| Parameter | Symbol | Spec. | | | Unit |
|---------------------------|------------------------|-------|-------|------|------------------|
| | | Min. | Typ. | Max. | |
| Clock cycle | $f_{\text{CLK}}^{(1)}$ | - | 9 | 15 | MHz |
| Hsync cycle | $1/\text{th}$ | - | 17.14 | - | KHz |
| Vsync cycle | $1/\text{tv}$ | - | 59.94 | - | Hz |
| Horizontal Signal | | | | | |
| Horizontal cycle | th | 525 | 525 | 605 | CLK |
| Horizontal display period | thd | 480 | 480 | 480 | CLK |
| Horizontal front porch | thf | 2 | 2 | 82 | CLK |
| Horizontal pulse width | $\text{thp}^{(2)}$ | 2 | 41 | 41 | CLK |
| Horizontal back porch | $\text{thb}^{(2)}$ | 2 | 2 | 41 | CLK |
| Vertical Signal | | | | | |
| Vertical cycle | tv | 285 | 286 | 511 | $\text{H}^{(1)}$ |
| Vertical display period | tvd | 272 | 272 | 272 | $\text{H}^{(1)}$ |
| Vertical front porch | tvf | 1 | 2 | 227 | $\text{H}^{(1)}$ |
| Vertical pulse width | $\text{tvp}^{(2)}$ | 1 | 10 | 11 | $\text{H}^{(1)}$ |
| Vertical back porch | $\text{tvb}^{(2)}$ | 1 | 2 | 11 | $\text{H}^{(1)}$ |

Note: (1) Unit: $\text{CLK}=1/f_{\text{CLK}}$, $\text{H}=\text{th}$,

(2) It is necessary to keep $\text{tvp}+\text{tvb}=12$ and $\text{thp}+\text{thb}=43$ in sync mode. DE mode is unnecessary to keep it.



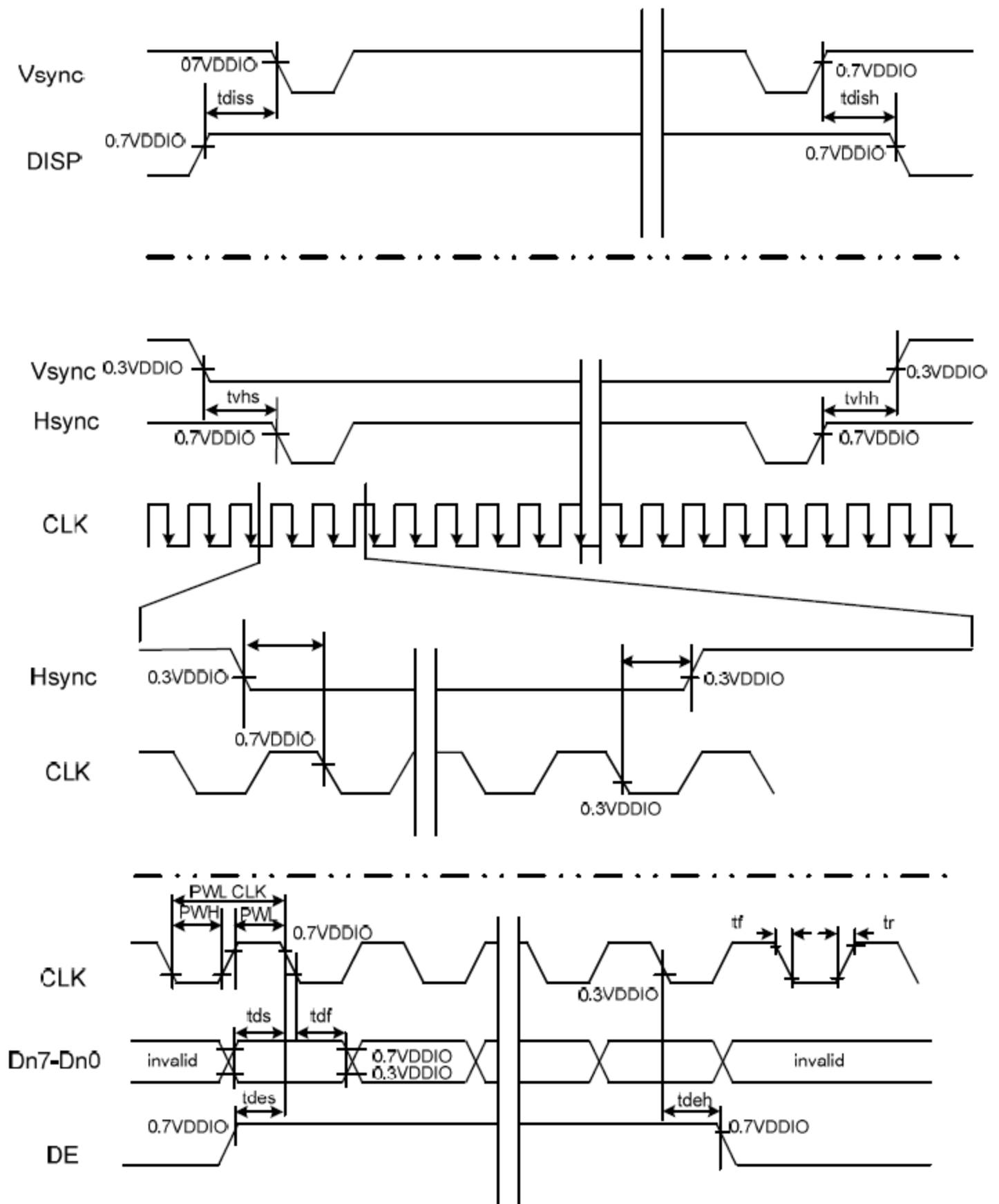
Input setup timing requirement

($T_A=25^\circ\text{C}$, $V_{DDIO}=1.8\text{V}$ to 3.6V , $DVSS = 0\text{V}$, $t_r^{(1)}=t_f^{(1)}=2\text{ns}$)

| Parameter | Symbol | Spec. | | | Unit |
|-------------------------|------------------|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| DIS P setup time | t_{dis} | 10 | - | - | ns |
| DIS P hold time | $t_{dis h}$ | 10 | - | - | ns |
| Clock period | $PW_{CLK}^{(2)}$ | 66.7 | - | - | ns |
| Clock pulse high period | $PWH^{(2)}$ | 26.7 | - | - | ns |
| Clock pulse low period | $PWL^{(2)}$ | 26.7 | - | - | ns |
| Hsync setup time | t_{hs} | 10 | - | - | ns |
| Hsync hold time | t_{hh} | 10 | - | - | ns |
| Data setup time | t_{ds} | 10 | - | - | ns |
| Data hold time | t_{dh} | 10 | - | - | ns |
| DE setup time | t_{des} | 10 | - | - | ns |
| DE hold time | t_{deh} | 10 | - | - | ns |
| Vsync setup time | t_{vhs} | 10 | - | - | ns |
| Vsync hold time | t_{vhh} | 10 | - | - | ns |

Note: (1) t_r , t_f is defined 10% to 90% of signal amplitude.

(2) For parallel interface, maximum clock frequency is 15MHz.



Capacitive Touch Panel Registers

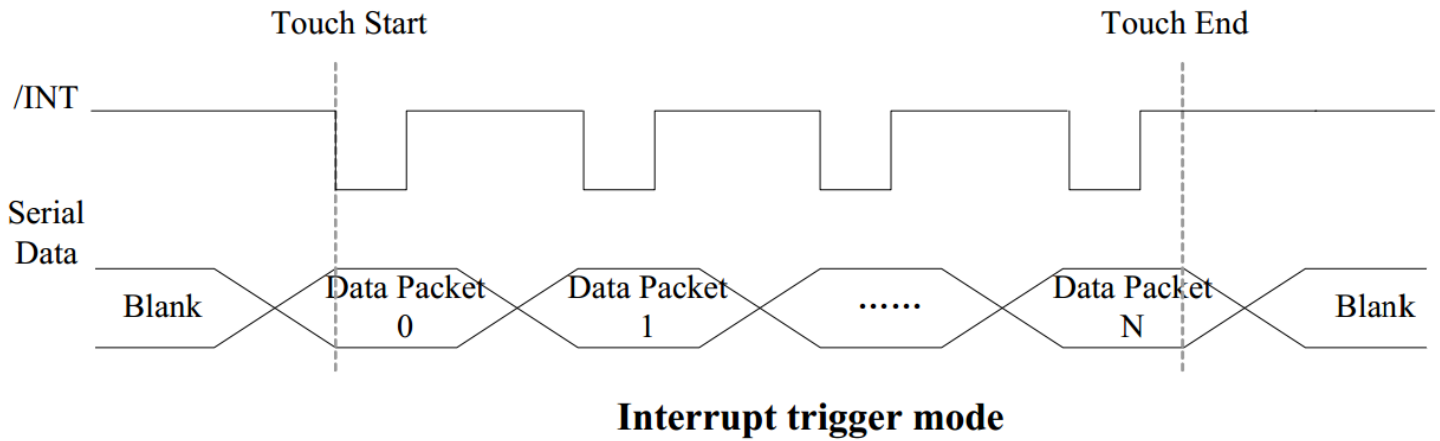
| Address | Name | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | Access | |
|---------|-------------|---------------------------------|----|----|----------------------------------|----|----|---------------------|----|--------|-----|
| 00h | DEVICE_MODE | Device Mode [2..0] | | | | | | | | | R/W |
| 01h | GEST_ID | Gesture ID [7..0] | | | | | | | | | R |
| 02h | TD_STATUS | | | | | | | Touch Points [3..0] | | | R |
| 03h | TOUCH1_XH | Event Flag | | | 1st Touch X Position MSB [11..8] | | | | | R | |
| 04h | TOUCH1_XL | 1st Touch X Position LSB [7..0] | | | | | | | | | R |
| 05h | TOUCH1_YH | Touch ID [3..0] | | | 1st Touch Y Position MSB [11..8] | | | | | R | |
| 06h | TOUCH1_YL | 1st Touch Y Position LSB [7..0] | | | | | | | | | R |
| 07h | | | | | | | | | | R | |
| 08h | | | | | | | | | | R | |
| 09h | TOUCH2_XH | Event Flag | | | 2nd Touch X Position MSB [11..8] | | | | | R | |
| 0Ah | TOUCH2_XL | 2nd Touch X Position LSB [7..0] | | | | | | | | | R |
| 0Bh | TOUCH2_YH | Touch ID [3..0] | | | 2nd Touch Y Position MSB [11..8] | | | | | R | |
| 0Ch | TOUCH2_YL | 2nd Touch Y Position LSB [7..0] | | | | | | | | | R |
| 0Dh | | | | | | | | | | R | |
| 0Eh | | | | | | | | | | R | |
| 0Fh | TOUCH3_XH | Event Flag | | | 3rd Touch X Position MSB [11..8] | | | | | R | |
| 10h | TOUCH3_XL | 3rd Touch X Position LSB [7..0] | | | | | | | | | R |
| 11h | TOUCH3_YH | Touch ID [3..0] | | | 3rd Touch Y Position MSB [11..8] | | | | | R | |
| 12h | TOUCH3_YL | 3rd Touch Y Position LSB [7..0] | | | | | | | | | R |
| 13h | | | | | | | | | | R | |
| 14h | | | | | | | | | | R | |
| 15h | TOUCH4_XH | Event Flag | | | 4th Touch X Position MSB [11..8] | | | | | R | |
| 16h | TOUCH4_XL | 4th Touch X Position LSB [7..0] | | | | | | | | | R |
| 17h | TOUCH4_YH | Touch ID [3..0] | | | 4th Touch Y Position MSB [11..8] | | | | | R | |
| 18h | TOUCH4_YL | 4th Touch Y Position LSB [7..0] | | | | | | | | | R |
| 19h | | | | | | | | | | R | |
| 1Ah | | | | | | | | | | R | |
| 1Bh | TOUCH5_XH | Event Flag | | | 5th Touch X Position MSB [11..8] | | | | | R | |
| 1Ch | TOUCH5_XL | 5th Touch X Position LSB [7..0] | | | | | | | | | R |
| 1Dh | TOUCH5_YH | Touch ID [3..0] | | | 5th Touch Y Position MSB [11..8] | | | | | R | |
| 1Eh | TOUCH5_YL | 5th Touch Y Position LSB [7..0] | | | | | | | | | R |
| 1Fh | | | | | | | | | | R | |

| Address | Name | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | Access | |
|---------|-------------------------|---|----|----|----|----|---------------------------|----|----|--------|-----|
| 80h | ID_G_THGROUP | valid touching detect threshold | | | | | | | | R/W | |
| 81h | ID_G_THPEAK | valid touching peak detect threshold | | | | | | | | R/W | |
| 82h | ID_G_THCAL | the threshold when calculating the focus of touching | | | | | | | | R/W | |
| 83h | ID_G_THWATER | the threshold when there is surface water | | | | | | | | R/W | |
| 84h | ID_G_TEMP | the threshold of temperature compensation | | | | | | | | R/W | |
| 85h | ID_G_THDIFF | the threshold whether the coordinate is different from original | | | | | | | | R/W | |
| 86h | ID_G_CTRL | | | | | | Power Control Mode [1..0] | | | | R/W |
| 87h | ID_G_TIME_ENTER_MONITOR | the timer for entering monitor status | | | | | | | | R/W | |
| 88h | ID_G_PERIODACTIVE | | | | | | Period Active [3..0] | | | | R/W |
| 89h | ID_G_PERIODMONITOR | the timer of entering idle when in monitor status | | | | | | | | R/W | |
| A0h | ID_G_AUTO_CLB_MODE | auto calibration mode | | | | | | | | R/W | |
| A1h | ID_G_LIB_VERSION_H | Firmware Library Version H byte | | | | | | | | R | |
| A2h | ID_G_LIB_VERSION_L | Firmware Library Version L byte | | | | | | | | R | |
| A3h | ID_G_CIPHER | Chip vendor ID | | | | | | | | R | |
| A4h | ID_G_MODE | the interrupt status to host | | | | | | | | R | |
| A5h | ID_G_PMODE | Power Consume Mode | | | | | | | | | |
| A6h | ID_G_FIRMID | Firmware ID | | | | | | | | R | |
| A7h | ID_G_STATE | Running State | | | | | | | | | |
| A8h | ID_G_FT5201ID | CTPM Vendor ID | | | | | | | | R | |
| A9h | ID_G_ERR | Error Code | | | | | | | | R | |
| AAh | ID_G_CLB | Configure TP module during calibration in Test Mode | | | | | | | | R/W | |
| FEh | LOG_MSG_CNT | The log MSG count | | | | | | | | R | |
| FFh | LOG_CUR_CHA | Current character of log message | | | | | | | | R | |

NOTE: Registers 80h – AFh have been configured for optimum settings and do not need to be modified.

| Register No | Register Name | Bits | Value | Description |
|-------------|--------------------|-------|-----------|--------------------------------------|
| 00h | Device Mode | [2:0] | 000b | Normal Operating Mode |
| | | | 100b | Test Mode - read raw data (reserved) |
| | | | 001b | System Information Mode (reserved) |
| 01h | Gesture ID | [7:0] | 48h | Zoom In |
| | | | 49h | Zoom Out |
| | | | 00h | No Gesture |
| 02h | Touch Points | [3:0] | 000b | 0 touch points detected |
| | | | 001b | 1 touch point detected |
| | | | 010b | 2 touch points detected |
| | | | 011b | 3 touch points detected |
| | | | 100b | 4 touch points detected |
| | | | 101b | 5 touch points detected |
| 03h | Touch 1 Event Flag | [7:6] | 00b | Put Down |
| | | | 01b | Put Up |
| | | | 10b | Contact |
| | | | 11b | Reserved |
| 03h | TOUCH1_XH | [3:0] | 0h - 1h | Upper 4 bits of X touch coordinate |
| 04h | TOUCH1_XL | [7:0] | 00h - FFh | Lower 8 bits of X touch coordinate |
| 05h | TOUCH1_YH | [3:0] | 0h - 1h | Upper 4 bits of Y touch coordinate |
| 06h | TOUCH1_YL | [7:0] | 00h - FFh | Lower 8 bits of Y touch coordinate |
| 09h | Touch 2 Event Flag | [7:6] | 00b | Put Down |
| | | | 01b | Put Up |
| | | | 10b | Contact |
| | | | 11b | Reserved |
| 09h | TOUCH2_XH | [3:0] | 0h - 1h | Upper 4 bits of X touch coordinate |
| 0Ah | TOUCH2_XL | [7:0] | 00h - FFh | Lower 8 bits of X touch coordinate |
| 0Bh | TOUCH2_YH | [3:0] | 0h - 1h | Upper 4 bits of Y touch coordinate |
| 0Ch | TOUCH2_YL | [7:0] | 00h - FFh | Lower 8 bits of Y touch coordinate |
| 0Fh | Touch 3 Event Flag | [7:6] | 00b | Put Down |
| | | | 01b | Put Up |
| | | | 10b | Contact |
| | | | 11b | Reserved |
| 0Fh | TOUCH3_XH | [3:0] | 0h - 1h | Upper 4 bits of X touch coordinate |
| 10h | TOUCH3_XL | [7:0] | 00h - FFh | Lower 8 bits of X touch coordinate |
| 11h | TOUCH3_YH | [3:0] | 0h - 1h | Upper 4 bits of Y touch coordinate |
| 12h | TOUCH3_YL | [7:0] | 00h - FFh | Lower 8 bits of Y touch coordinate |
| 15h | Touch 4 Event Flag | [7:6] | 00b | Put Down |
| | | | 01b | Put Up |
| | | | 10b | Contact |
| | | | 11b | Reserved |
| 15h | TOUCH4_XH | [3:0] | 0h - 1h | Upper 4 bits of X touch coordinate |
| 16h | TOUCH4_XL | [7:0] | 00h - FFh | Lower 8 bits of X touch coordinate |
| 17h | TOUCH4_YH | [3:0] | 0h - 1h | Upper 4 bits of Y touch coordinate |
| 18h | TOUCH4_YL | [7:0] | 00h - FFh | Lower 8 bits of Y touch coordinate |

| Register No | Register Name | Bits | Value | Description |
|-------------|-------------------------|-------|---------------------------------|--|
| 1Bh | Touch 5 Event Flag | [7:6] | 00b 01b 10b 11b | Put Down Put Up Contact Reserved |
| 1Bh | TOUCH5_XH | [3:0] | 0h - 1h | Upper 4 bits of X touch coordinate |
| 1Ch | TOUCH5_XL | [7:0] | 00h - FFh | Lower 8 bits of X touch coordinate |
| 1Dh | TOUCH5_YH | [3:0] | 0h - 1h | Upper 4 bits of Y touch coordinate |
| 1Eh | TOUCH5_YL | [7:0] | 00h - FFh | Lower 8 bits of Y touch coordinate |
| 80h | ID_G_THGROUP | [7:0] | 00h - FFh | Valid touching detect threshold Actual value will be 4 times register's value Recommended: 46h |
| 81h | ID_G_THPEAK | [7:0] | 00h - FFh | valid touching peak detect threshold Recommended: 3Ch |
| 82h | ID_G_THCAL | [7:0] | 00h - FFh | Touch focus threshold Recommended: 1Dh |
| 83h | ID_G_THWATER | [7:0] | 00h - FFh | threshold when there is surface water Recommended: D3h |
| 84h | ID_G_THTEMP | [7:0] | 00h - FFh | threshold of temperature compensation Recommended: EBh |
| 85h | ID_G_THDIFF | [7:0] | 00h - FFh | Touch difference threshold Actual value is 32 times the register's value Recommended: A0h |
| 86h | ID_G_CTRL | [1:0] | 00h 01h | Power Control Mode: Not Auto Jump Power Control Mode: Auto Jump |
| 87h | ID_G_TIME_ENTER_MONITOR | [7:0] | 00h-FFh | Delay to enter 'Monitor' status (s) Recommended: C8h |
| 88h | ID_G_PERIODACTIVE | [3:0] | 3h-Eh | Period of 'Active' status (ms) Recommended: 6h |
| 89h | ID_G_PERIODMONITOR | [7:0] | 1Eh-FFh | Timer to enter 'idle' when in 'Monitor' (ms) Recommended: 28h |
| A0h | ID_G_AUTO_CLB_MODE | [7:0] | 00h FFh | Auto calibration mode: Enable auto calibration Auto calibration mode: Disable auto calibration |
| A1h | ID_G_LIB_VERSION_H | [7:0] | 30h | Firmware Library Version H byte |
| A2h | ID_G_LIB_VERSION_L | [7:0] | 01h | Firmware Library Version L byte |
| A3h | ID_G_CIPHER | [7:0] | 55h | Chip vendor ID |
| A4h | ID_G_MODE | [0:0] | 00h 01h | Interrupt status: Enable interrupt to host Interrupt status: Disable interrupt to host |
| A5h | ID_G_PMODE | [1:0] | 00h 01h 03h | 'Active' Mode 'Monitor' Mode 'Hibernate' Mode |
| A6h | ID_G_FIRMID | [7:0] | 05h | Firmware ID |
| A7h | ID_G_STATE | [7:0] | 00h 01h 02h 03h 04h | Running State: Configure Running State: Work Running State: Calibration Running State: Factory Running State: Auto-calibration |
| A8h | ID_G_FT5201ID | [7:0] | 79h | CTPM Vendor's Chip ID |
| A9h | ID_G_ERR | [7:0] | 00h 03h 05h 1Ah | Error Code: OK Error Code: Chip register writing inconsistent with reading Error Code: Chip start fail Error Code: Calibration match fail |



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(0x70);           //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 , 200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30°C , 200hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time. | +70°C 200hrs | 2 |
| Low Temperature Operation | Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time. | -20°C , 200hrs | 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. | +60°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,30min -> 25°C,5min ->70°C,30min = 1 cycle 10 cycles | |
| Vibration test | Endurance test applying vibration to simulate transportation and use. | 10-55Hz , 15mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes | 3 |
| Static electricity test | Endurance test applying electric static discharge. | VS=800V, RS=1.5kΩ, CS=100pF One time | |

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