# NHD-7.0-800480EF-ATXL#-CTP

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

| | |
|---|---|
| NHD- | Newhaven Display |
| 7.0- | 7.0” Diagonal |
| 800480- | 800xRGBx480 pixels |
| EF- | Model |
| A- | Built-in driver / No Controller |
| T- | White LED backlight |
| X- | TFT |
| L- | 12:00 Optimal View, Wide Temp |
| #- | **RoHS Compliant** |
| CTP- | Capacitive Touch Panel with built-in controller |


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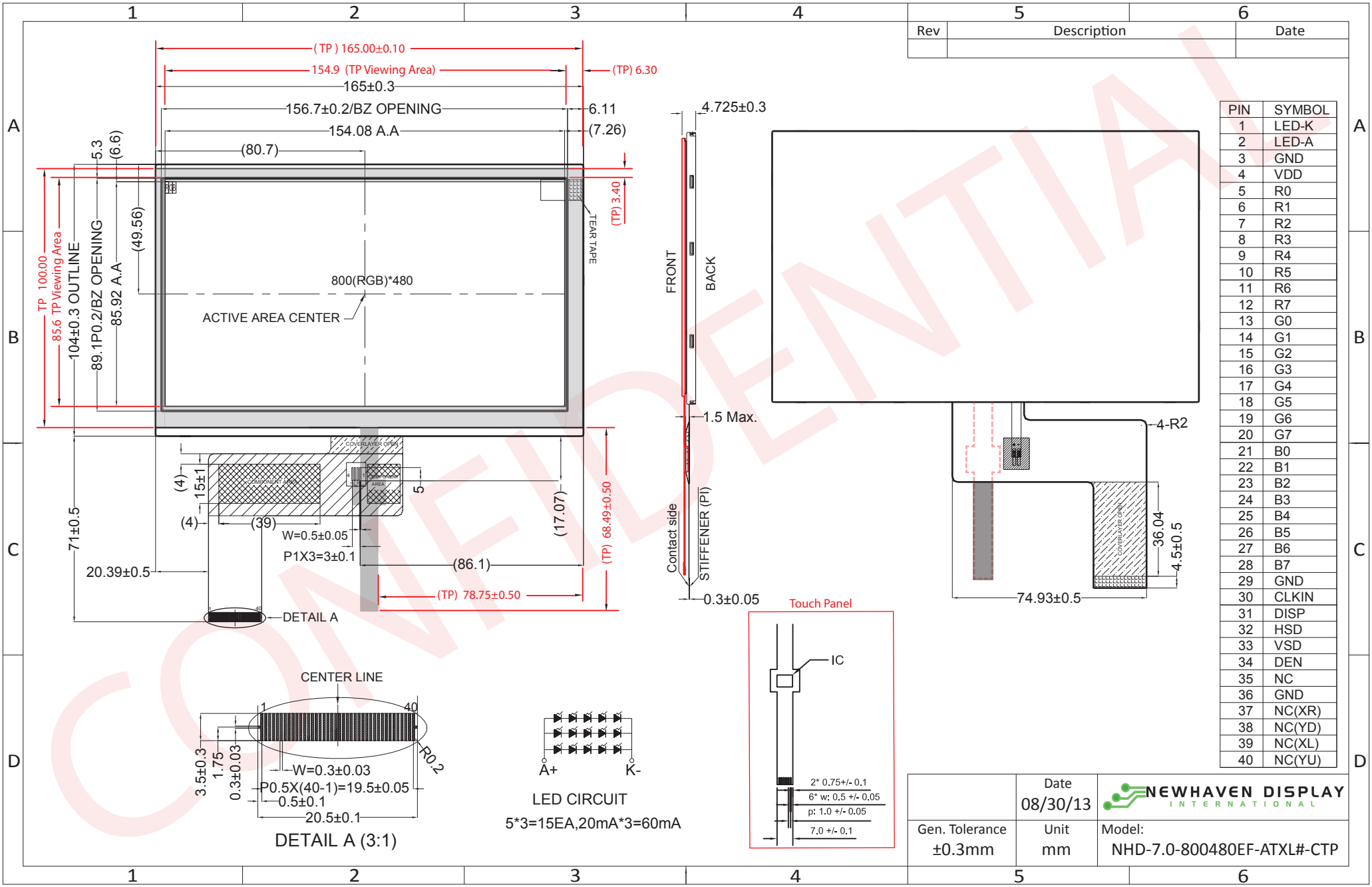
## Document Revision History

| Revision | Date | Description | Changed by |
|---|---|---|---|
| 0 | 8/30/2013 | Initial Release | ML |

## Functions and Features

- **800xRGBx480 resolution**
- **LED backlight**
- **24-bit digital RGB interface**
- **16.7M colors**
- **Capacitive Touch Panel with built-in controller**

# Mechanical Drawing




| Rev | Description | Date |
|---|---|---|
| | | |

| PIN | SYMBOL |
|---|---|
| 1 | LED-K |
| 2 | LED-A |
| 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 | DISP |
| 32 | HSD |
| 33 | VSD |
| 34 | DEN |
| 35 | NC |
| 36 | GND |
| 37 | NC(XR) |
| 38 | NC(YD) |
| 39 | NC(XL) |
| 40 | NC(YU) |

| | Date | NEWHAVEN DISPLAY INTERNATIONAL |
|---|---|---|
| | 08/30/13 | |
| Gen. Tolerance | Unit | Model: |
| ±0.3mm | mm | NHD-7.0-800480EF-ATXL#-CTP |

# Pin Description

### TFT:

| Pin No. | Symbol | Connection | Function Description |
|---|---|---|---|
| 1 | LED-K | Power Supply | Ground for Backlight |
| 2 | LED-A | Power Supply | Backlight Power Supply (60mA @ 16V) |
| 3 | GND | Power Supply | Ground |
| 4 | VDD | Power Supply | Power Supply (+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 |
| 31 | DISP | MPU | Display on/off DISP=1:Display on |
| 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 | NC(XR) | - | No Connect |
| 38 | NC(YD) | - | No Connect |
| 39 | NC(XL) | - | No Connect |
| 40 | NC(YU) | - | No Connect |

**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 | VDD | Power Supply | Power Supply (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 HX8264-D02 Source Driver: http://www.newhavendisplay.com/app_notes/HX8264-D02.pdf
Built-in HX8664-B Gate Driver: http://www.newhavendisplay.com/app_notes/HX8664-B.pdf

### Capacitive Touch Panel:

Built-in FocalTech FT5x06 controller.
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 | IDD | VDD=3.3V 25°C | 60 | 85 | 120 | mA |
| "H" Level Input | VIH | | 0.7*VDD | - | VDD | V |
| "L" Level Input | VIL | | GND | - | 0.3*VDD | V |
| "H" Level Output | VOH | | VDD-0.4 | - | - | V |
| "L" Level Output | VOL | | - | - | GND+0.4 | V |
| | | | | | | |
| Backlight Supply Voltage | VLED | | 15 | 16 | 17 | V |
| Backlight Supply Current | ILED | VLED=16V | 45 | 60 | 75 | mA |

### 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 | Ta=25°C, VDD=2.8V | - | 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 | - | 55 | - | o |
| Viewing Angle – Bottom | | | - | 65 | - | o |
| Viewing Angle – Left | | | - | 70 | - | o |
| Viewing Angle – Right | | | - | 70 | - | o |
| Contrast Ratio | Cr | - | - | 400 | - | |
| Luminance | L | - | 220 | 280 | - | $cd/m^2$ |
| Response Time | Tr+Tf | - | - | 25 | 35 | ms |

Viewing angles based on 6:00 gray scale inversion

# Capacitive Touch Panel Material Characteristics:

| Property | Requirement | Unit |
|---|---|---|
| IC | FT5406D09 | |
| 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

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| HS setup time | $T_{hst}$ | 8 | - | - | ns |
| HS hold time | $T_{hhd}$ | 8 | - | - | ns |
| VS setup time | $T_{vst}$ | 8 | - | - | ns |
| VS hold time | $T_{vhd}$ | 8 | - | - | ns |
| Data setup time | $T_{dsu}$ | 8 | - | - | ns |
| Data hold time | $T_{dhd}$ | 8 | - | - | ns |
| DE setup time | $T_{esu}$ | 8 | - | - | ns |
| DE hold time | $T_{ehd}$ | 8 | - | - | ns |
| VDD Power On Slew rate | $T_{POR}$ | - | - | 20 | ms |
| RSTB pulse width | $T_{Rst}$ | 10 | - | - | us |
| CLKIN cycle time | $T_{cph}$ | 20 | - | - | ns |
| CLKIN pulse duty | $T_{cwh}$ | 40 | 50 | 60 | % |
| Output stable time | $T_{sst}$ | - | - | 6 | us |

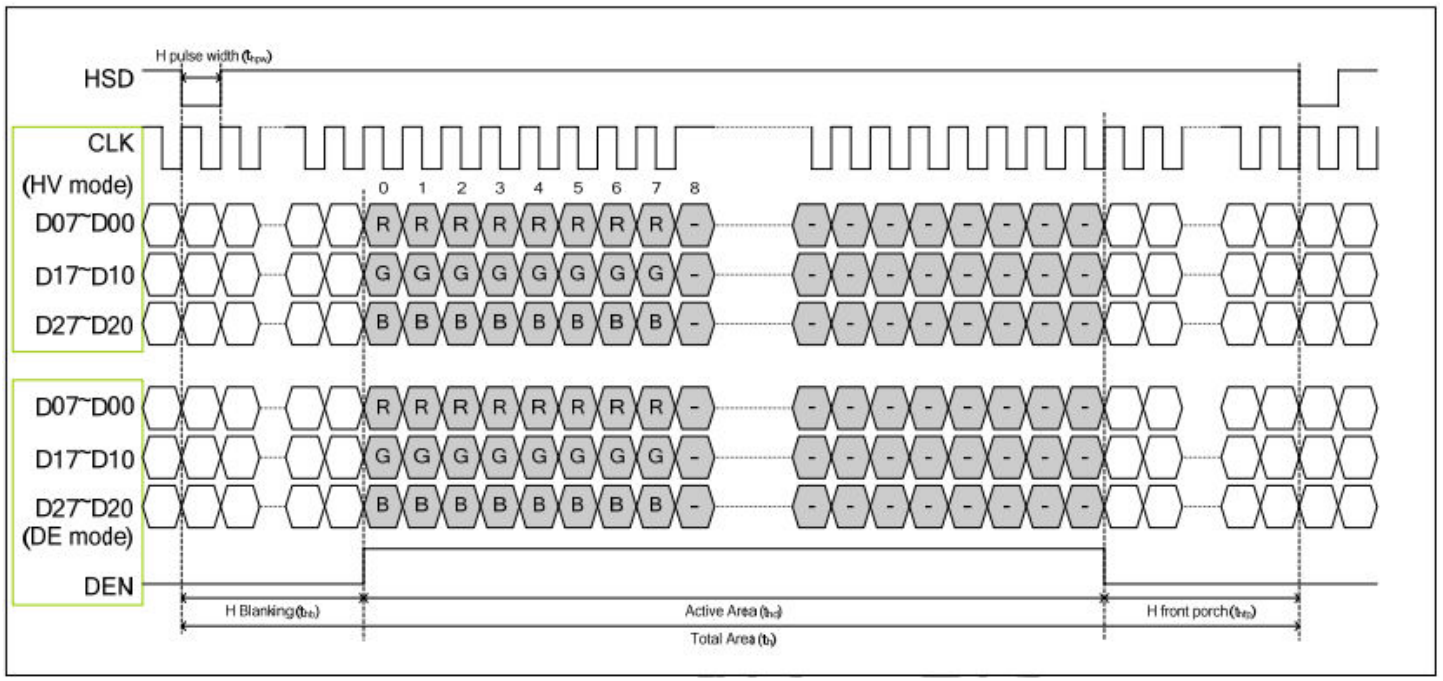
### Horizontal Timing

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Horizontal Display Area | thd | | 800 | | DCLK |
| DCLK frequency | fclk | - | 30 | 50 | MHz |
| One Horizontal Line | th | 889 | 928 | 1143 | DCLK |
| HS pulse width | thpw | 1 | 48 | 255 | DCLK |
| HS Back Porch (Blanking) | thb | | 88 | | DCLK |
| HS Front Porch | thfp | 1 | 40 | 255 | DCLK |
| DE mode Blanking | th-thd | 85 | 128 | 512 | DCLK |

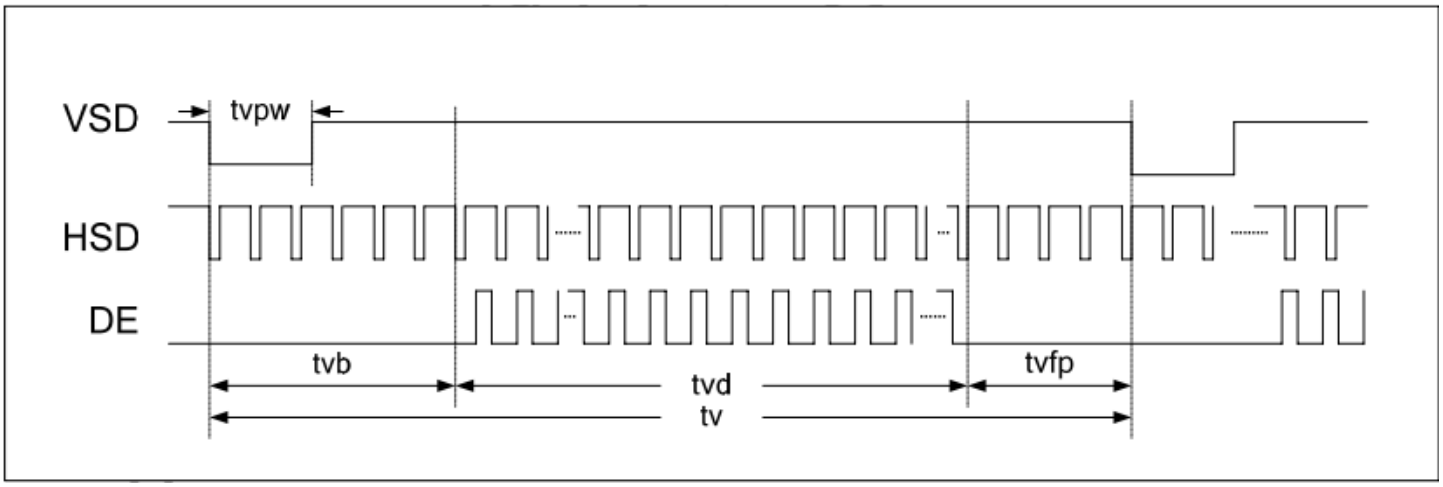
### Vertical Timing

| Parameter | Symbol | Spec. | | | Unit |
|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | |
| Vertical Display Area | tvd | | 480 | | $T_H$ |
| VS period time | tv | 513 | 525 | 767 | $T_H$ |
| VS pulse width | tvpw | 3 | 3 | 255 | $T_H$ |
| VS Back Porch (Blanking) | tvb | | 32 | | $T_H$ |
| VS Front Porch | tvfp | 1 | 13 | 255 | $T_H$ |
| DE mode Blanking | tv-tvd | 4 | 45 | 255 | $T_H$ |

## Horizontal Timing



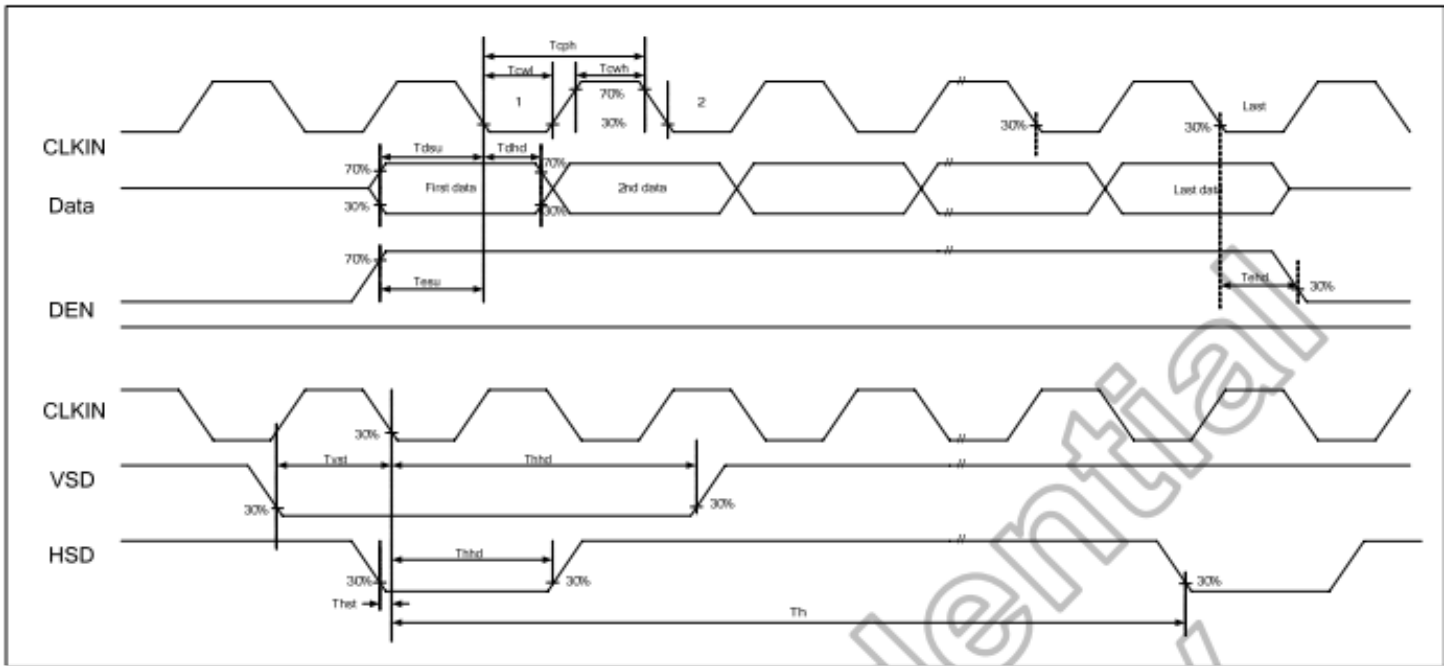

## Vertical Timing



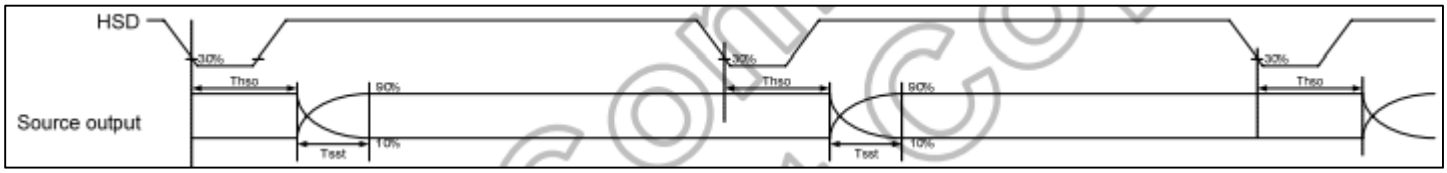
**Parallel 24-bit RGB mode**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| CLKIN Frequency | Fclk | - | 40 | 50 | MHz | VDD=3.0V~3.6V |
| CLKIN Cycle Time | Tclk | 20 | 25 | - | ns | - |
| CLKIN Pulse Duty | Tcwh | 40 | 50 | 60 | % | Tclk |
| Time from HSD to Source Output | Thso | | 64 | | CLKIN | - |
| Time from HSD to LD | Thld | | 64 | | CLKIN | - |
| Time from HSD to STV | Thstv | | 2 | | CLKIN | - |
| Time from HSD to CKV | Thckv | | 20 | | CLKIN | - |
| Time from HSD to OEV | Thoev | | 4 | | CLKIN | - |
| LD Pulse Width | Twld | | 10 | | CLKIN | - |
| CKV Pulse Width | Twckv | | 66 | | CLKIN | - |
| OEV Pulse Width | Twoev | | 74 | | CLKIN | - |

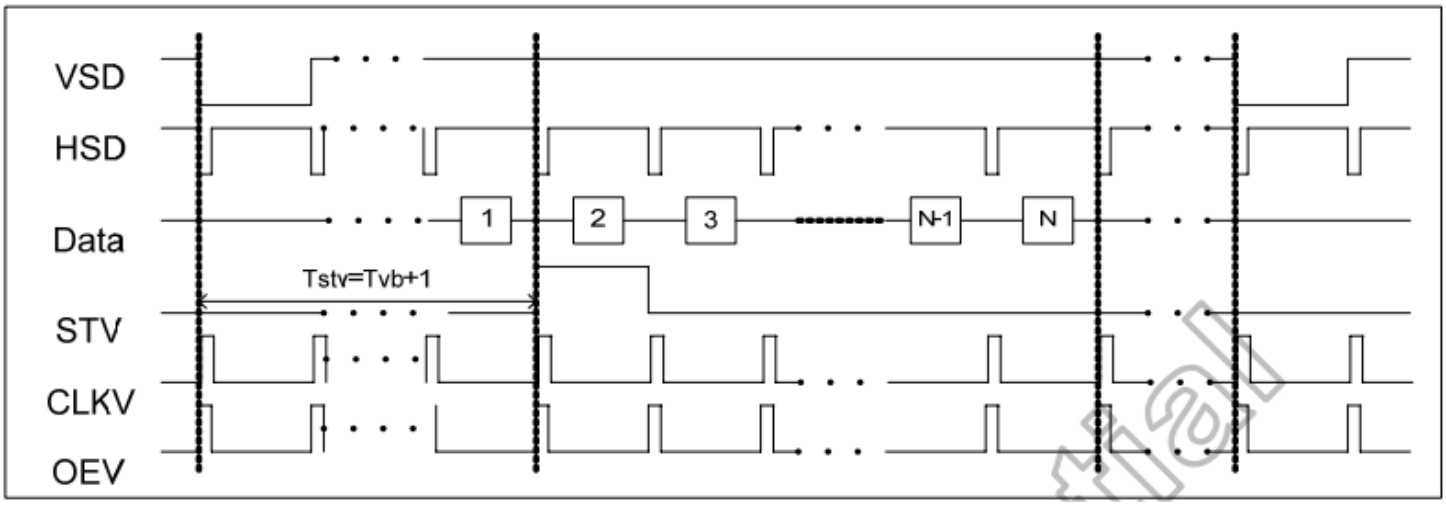
**Input Clock and Data Timing**



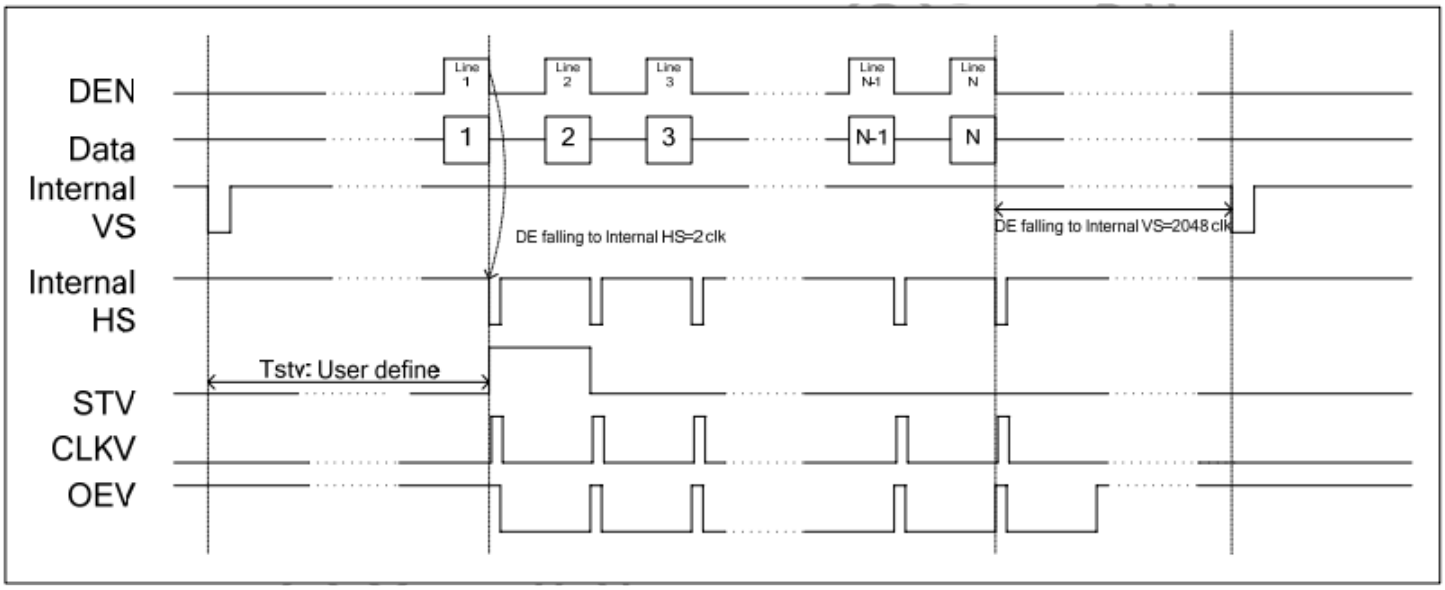

**Source Output Timing**



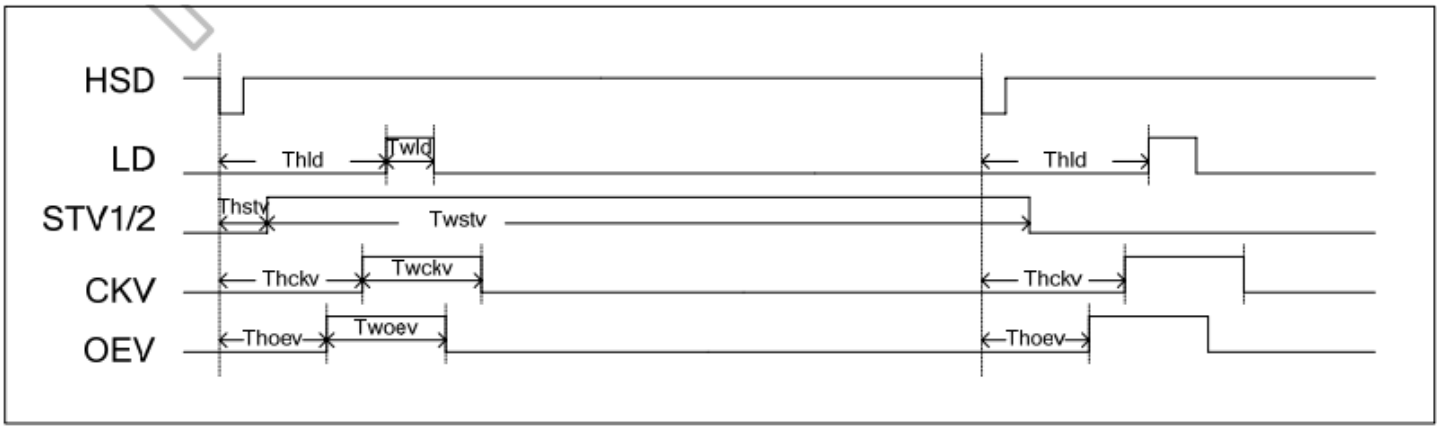
## Vertical Timing HV (Cascade)



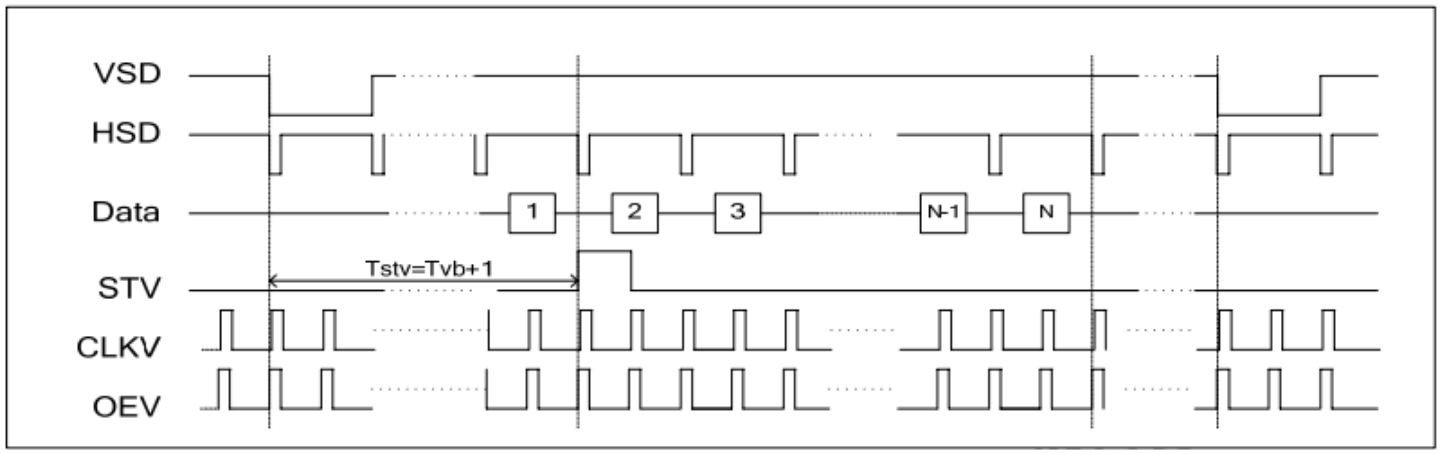

## Vertical Timing DE (Cascade)



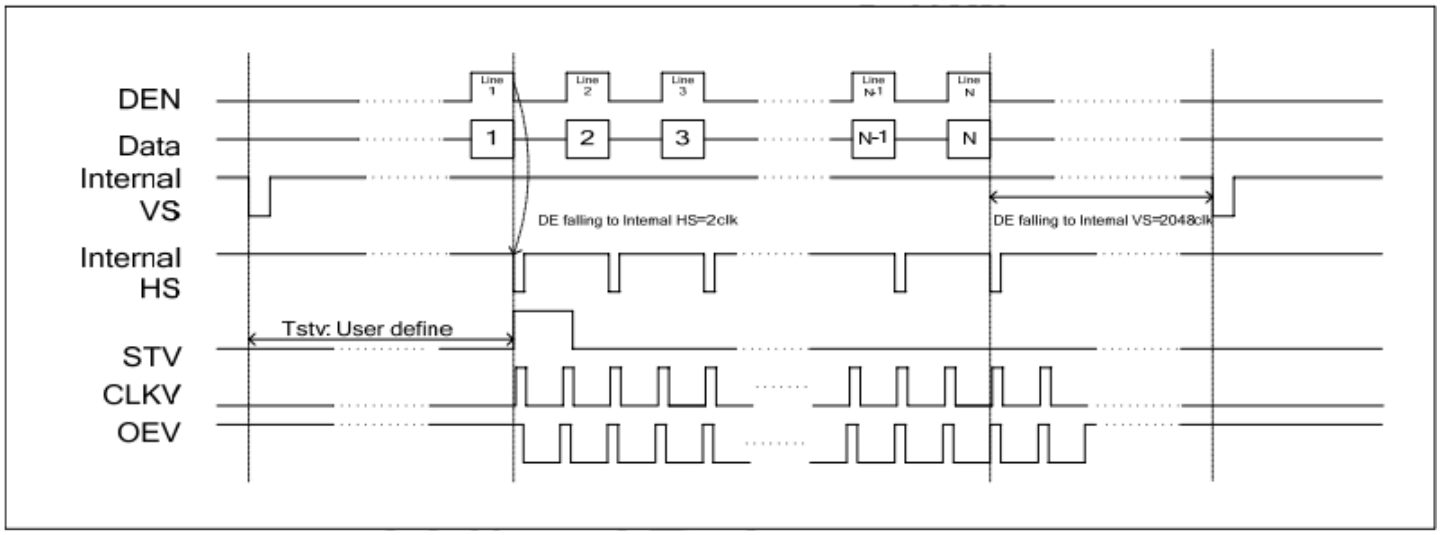

## Gate Output Timing (Cascade)



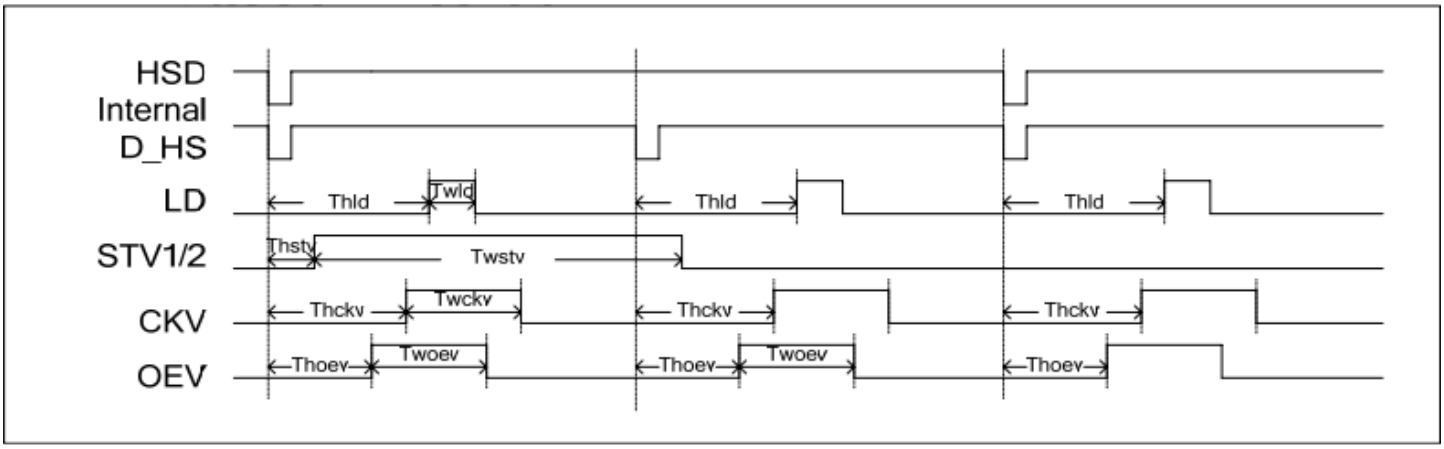
## Vertical Timing HV (Dual Gate)



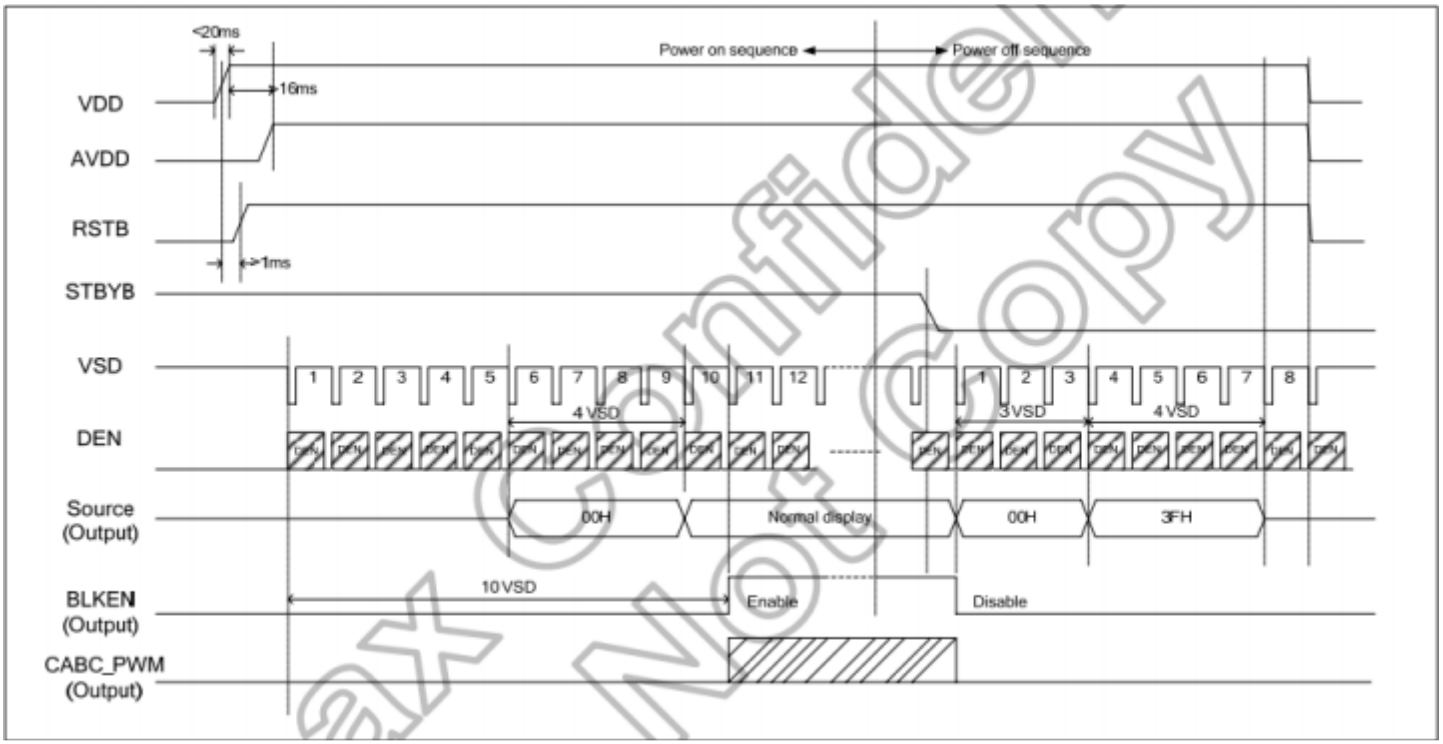

## Vertical Timing DE (Dual Gate)



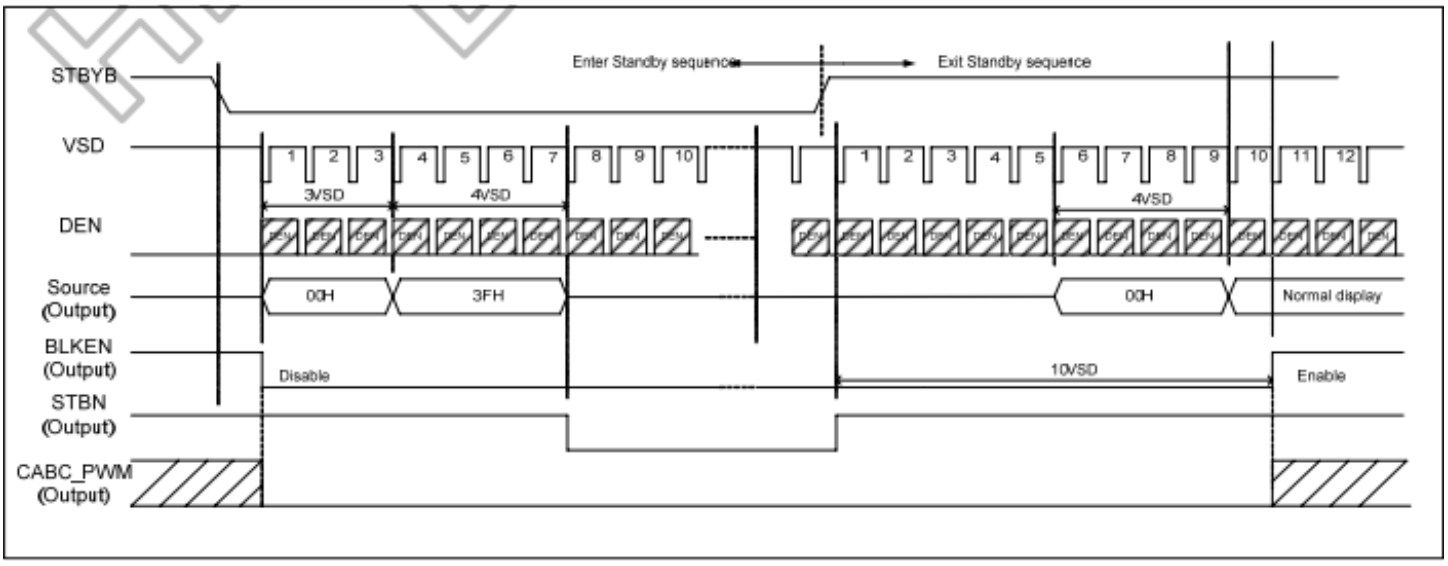

## Gate Output Timing (Dual Gate)



## Power ON/OFF Sequence




## Enter/Exit Standby Mode Sequence



# Capacitive Touch Panel Registers

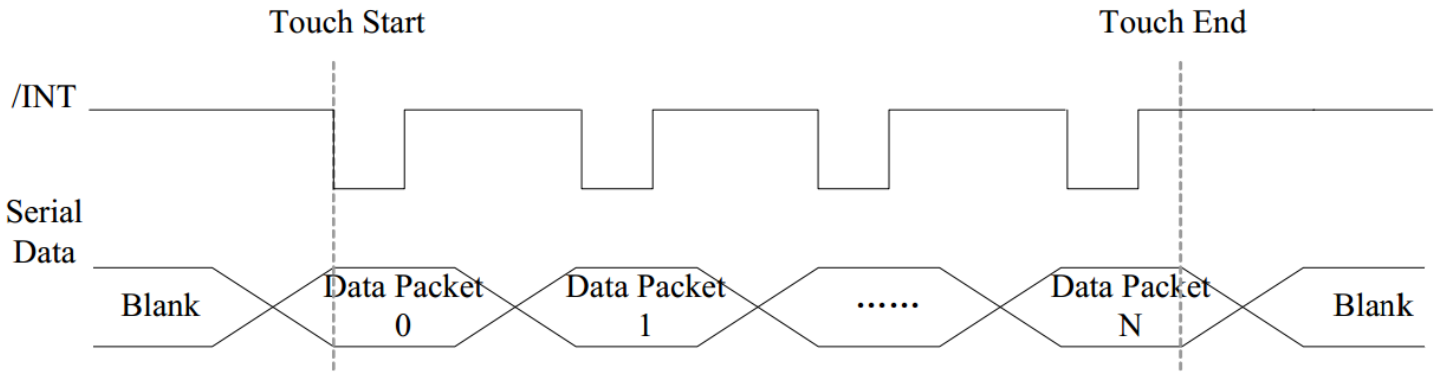
| Address | Name | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | Access |
|---|---|---|---|---|---|---|---|---|---|---|
| 00h | DEVICE_MODE | | Device Mode [2..0] | | | | | | | R/W |
| 01h | GEST_ID | Gesture ID [7..0] | | | | | | | | R |
| 02h | TD_STATUS | | | | | | Touch Points [3..0] | | | R |
| 03h | 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 | Put Down |
| | | | 01b | Put Up |
| | | | 10b | Contact |
| | | | 11b | 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 Recommended: 46h |
| | | | | Actual value will be 4 times register's value |
| 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 Recommended: A0h |
| | | | | Actual value is 32 times the register's value |
| 86h | ID_G_CTRL | [1:0] | 00h | Power Control Mode: Not Auto Jump |
| | | | 01h | 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 | Auto calibration mode: Enable auto calibration |
| | | | FFh | 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 | Interrupt status: Enable interrupt to host |
| | | | 01h | Interrupt status: Disable interrupt to host |
| A5h | ID_G_PMODE | [1:0] | 00h | 'Active' Mode |
| | | | 01h | 'Monitor' Mode |
| | | | 03h | 'Hibernate' Mode |
| A6h | ID_G_FIRMID | [7:0] | 05h | Firmware ID |
| A7h | ID_G_STATE | [7:0] | 00h | Running State: Configure |
| | | | 01h | Running State: Work |
| | | | 02h | Running State: Calibration |
| | | | 03h | Running State: Factory |
| | | | 04h | Running State: Auto-calibration |
| A8h | ID_G_FT5201ID | [7:0] | 79h | CTPM Vendor's Chip ID |
| A9h | ID_G_ERR | [7:0] | 00h | Error Code: OK |
| | | | 03h | Error Code: Chip register writing inconsistent with reading |
| | | | 05h | Error Code: Chip start fail |
| | | | 1Ah | Error Code: Calibration match fail |




**Interrupt trigger mode**

**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. | -30°C, 30min -> 80°C, 30min, Change time: 5min, 10 cycles | |
| Vibration test | Endurance test applying vibration to simulate transportation and use. | 10-55Hz , 1.5mm 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

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