

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- | 12:00 Optimum View, Enhanced Optical Characteristics, Wide Temperature |
| # | RoHS Compliant |
| CTP | Capacitive Touch Panel with Controller |

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Document Revision History

| Revision | Date | Description | Changed by |
|----------|-----------|------------------------------------|------------|
| 0 | 3/20/2013 | Initial Release | AK |
| 1 | 8/28/2013 | Electrical Characteristics updated | AK |
| 2 | 9/16/2014 | Electrical Characteristics updated | ML |
| 3 | 4/1/2015 | CTP mechanical dimensions updated | AK |

Functions and Features

- 800xRGBx480 resolution, up to 16.7M colors
- 18-LED backlight
- 24 bit RGB interface
- Enhanced Optical Characteristics
- 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 (60mA @ ~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 | 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 | VCC | 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 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=3.3 | - | 77 | - | mA |
| "H" Level input | Vih | | 0.7*VDD | - | VDD | V |
| "L" Level input | Vil | | 0 | - | 0.3*VDD | V |
| "H" Level output | Voh | | VDD-0.4 | - | - | V |
| "L" Level output | Vol | | - | - | GND+0.4 | V |
| | | | | | | |
| Backlight Supply Voltage | VLED | | 16.2 | 19.2 | 20.4 | V |
| Backlight Supply Current | ILED | | 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 | - | 1.0 | - | uA |
| "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 | 60 | 75 | - | ° |
| Viewing Angle – Bottom | | | 50 | 65 | - | ° |
| Viewing Angle – Left | | | 60 | 75 | - | ° |
| Viewing Angle – Right | | | 60 | 75 | - | ° |
| Contrast Ratio | Cr | | 500 | 600 | - | |
| Luminance | YL | | 400 | 450 | - | cd/m ² |
| Response Time | Tr+Tf | - | - | 20 | 30 | ms |

Capacitive Touch Panel Material Characteristics:

| Property | Requirement | Unit |
|---------------------|-------------|------|
| IC | FT5306DE4 | |
| ITO Glass thickness | 0.55 | mm |
| Surface Hardness | ≥6 | H |
| Light transmission | 83% ± 5% | - |
| Operating Humidity | 20~90 | RH |
| Storage Humidity | 20~90 | RH |

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] | 06h | 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] | 30h | 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] | 98h | 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 |

Timing Characteristics – TFT Display

| 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 |

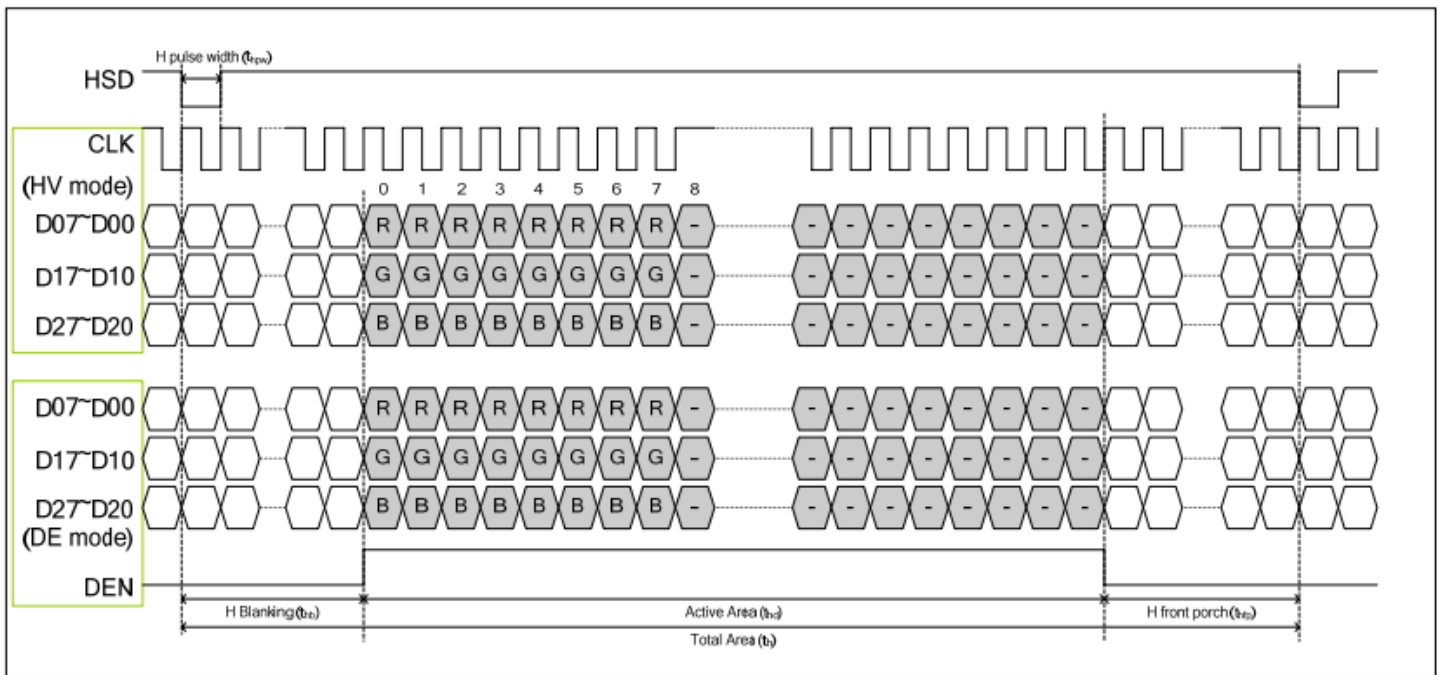
Horizontal Timing

| 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 |

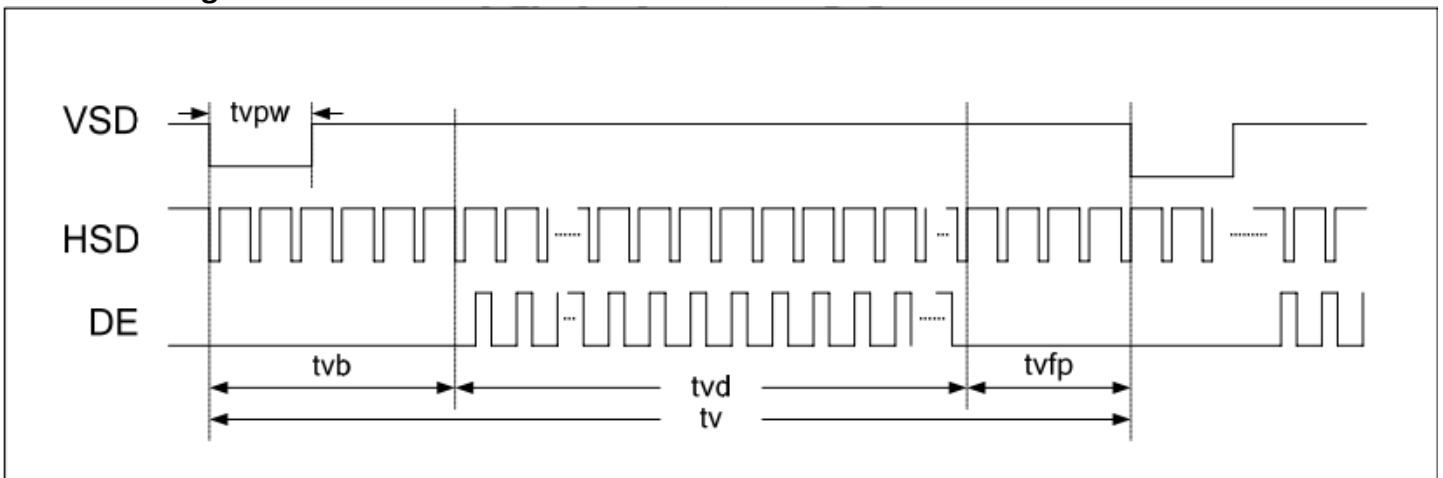
Vertical Timing

| 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 |

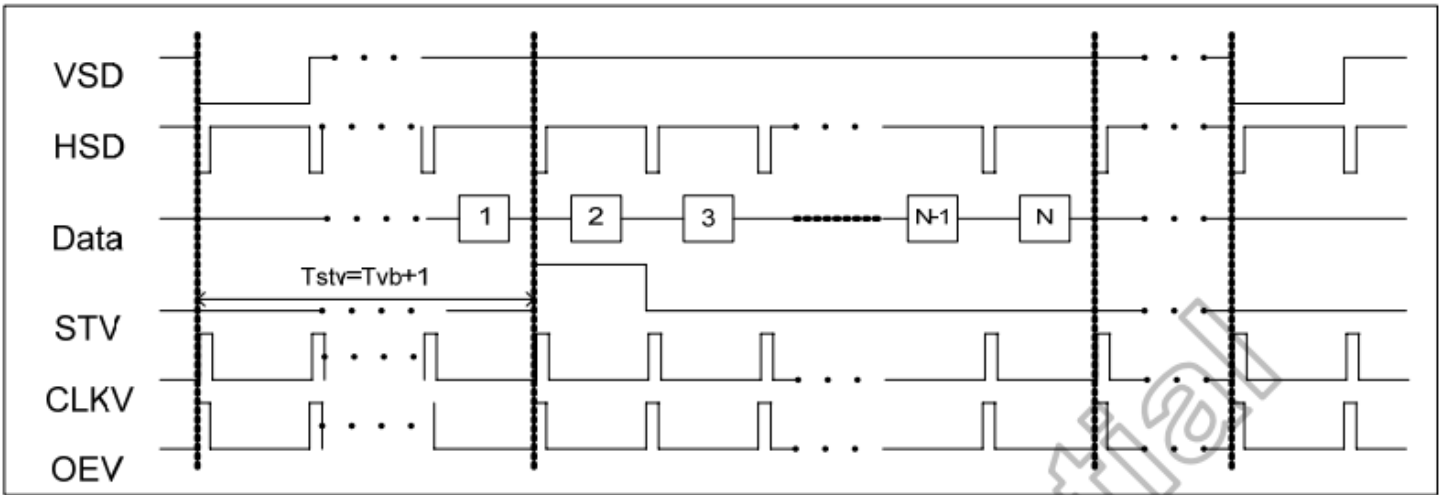
Horizontal Timing



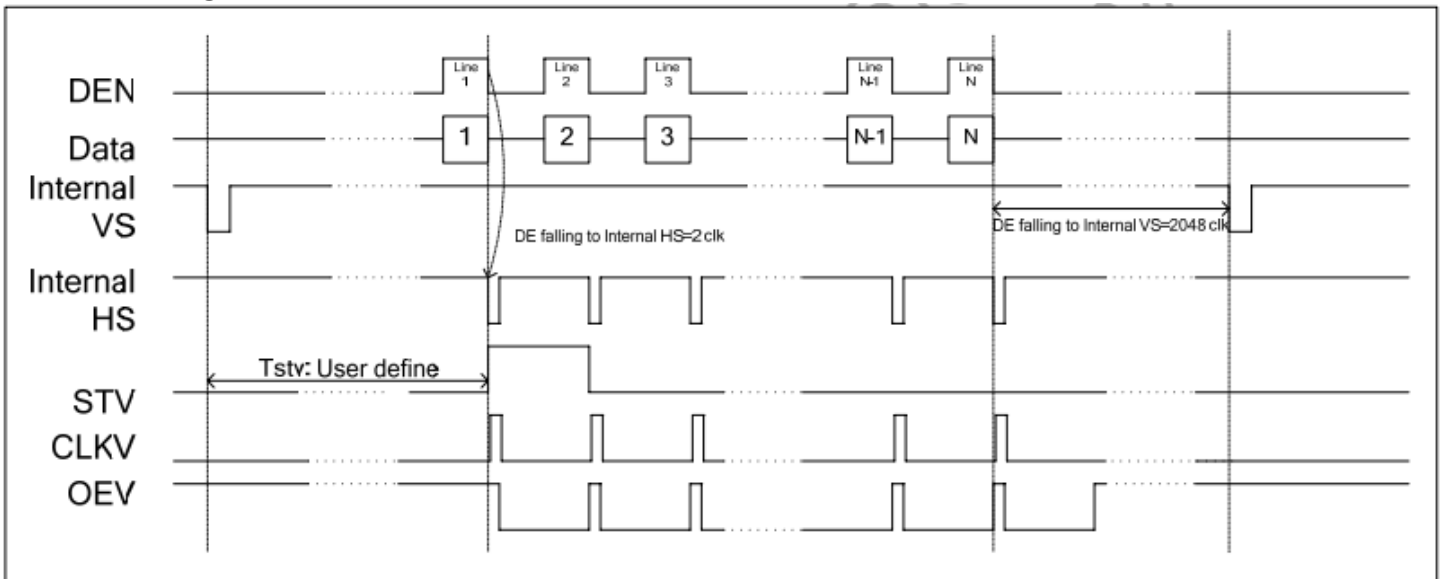
Vertical Timing



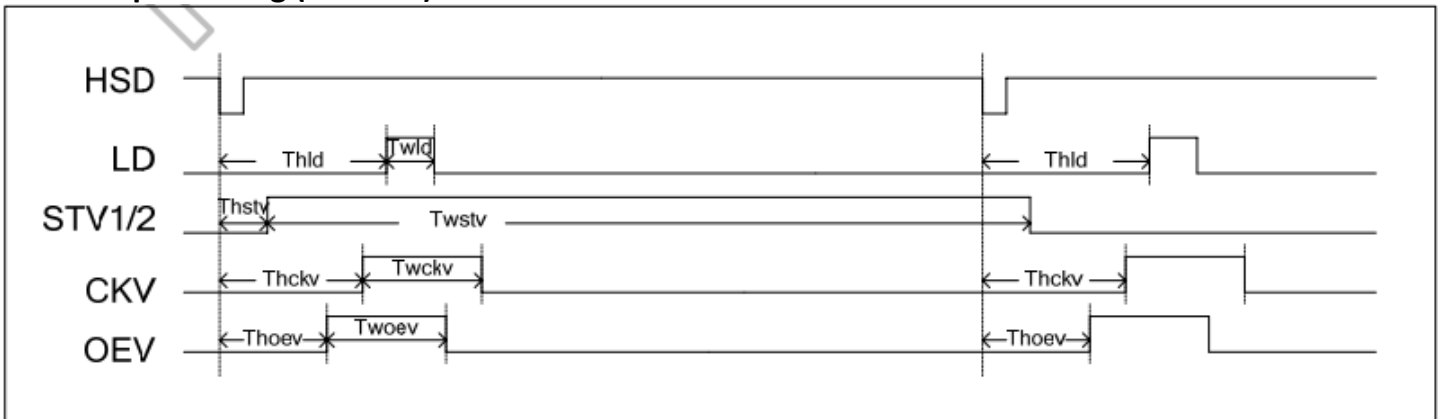
Vertical Timing HV (Cascade)



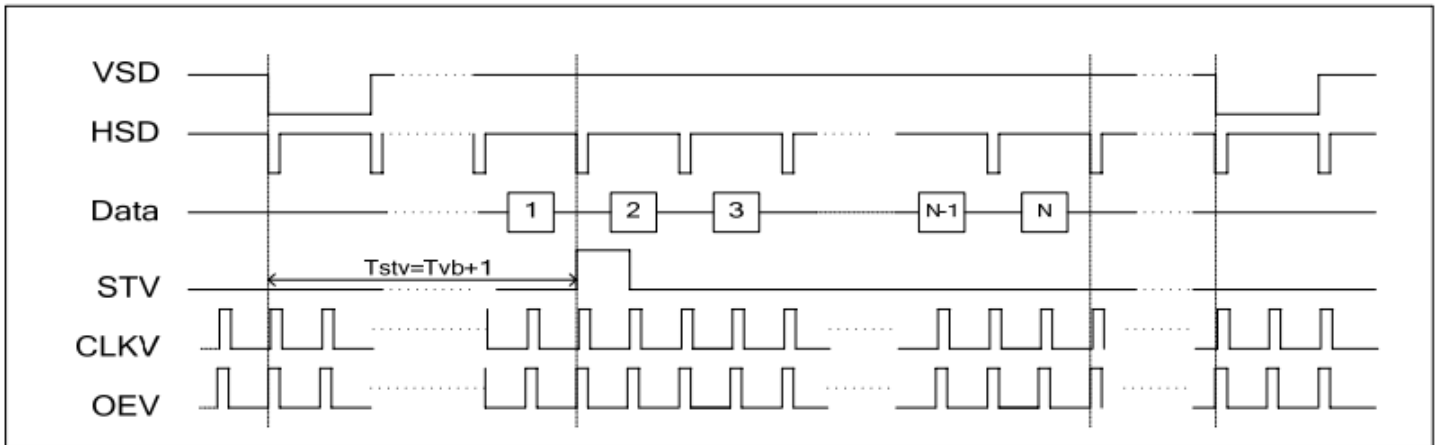
Vertical Timing DE (Cascade)



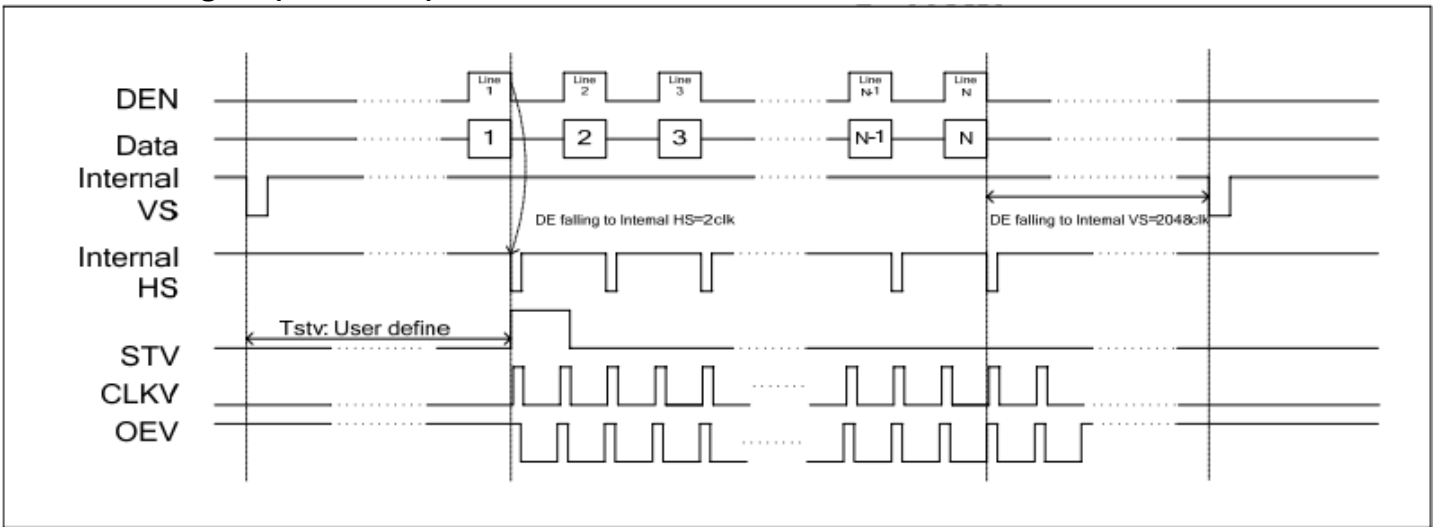
Gate Output Timing (Cascade)



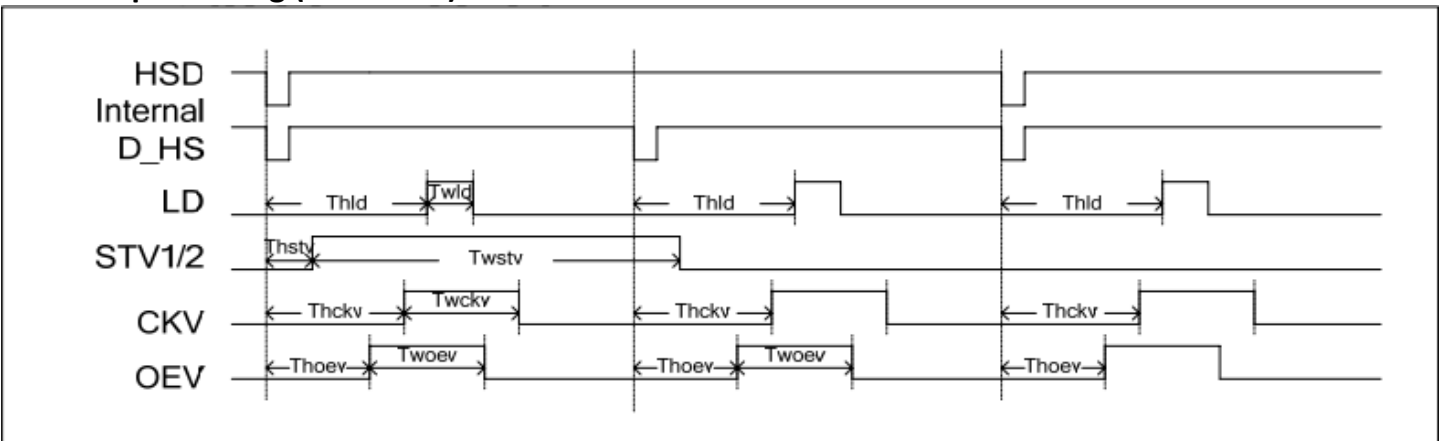
Vertical Timing HV (Dual Gate)



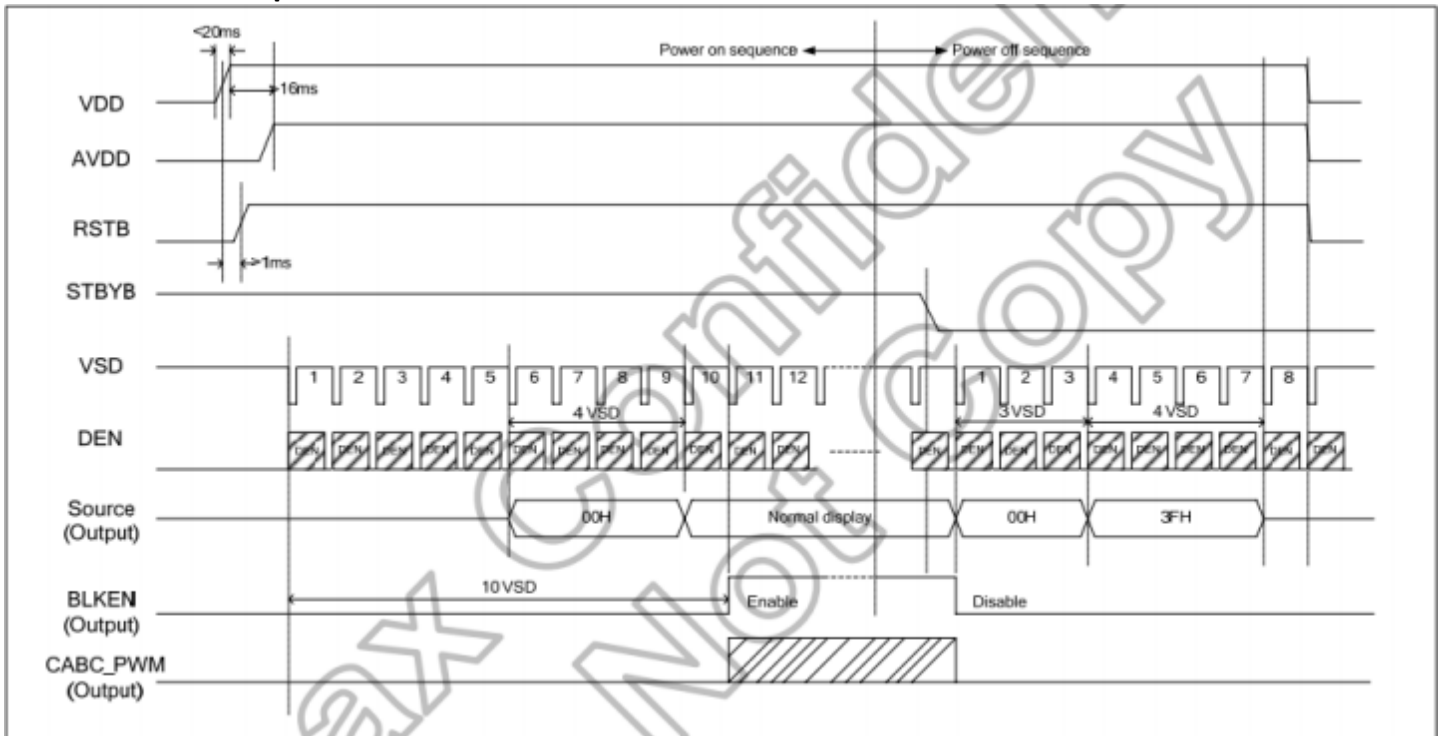
Vertical Timing DE (Dual Gate)



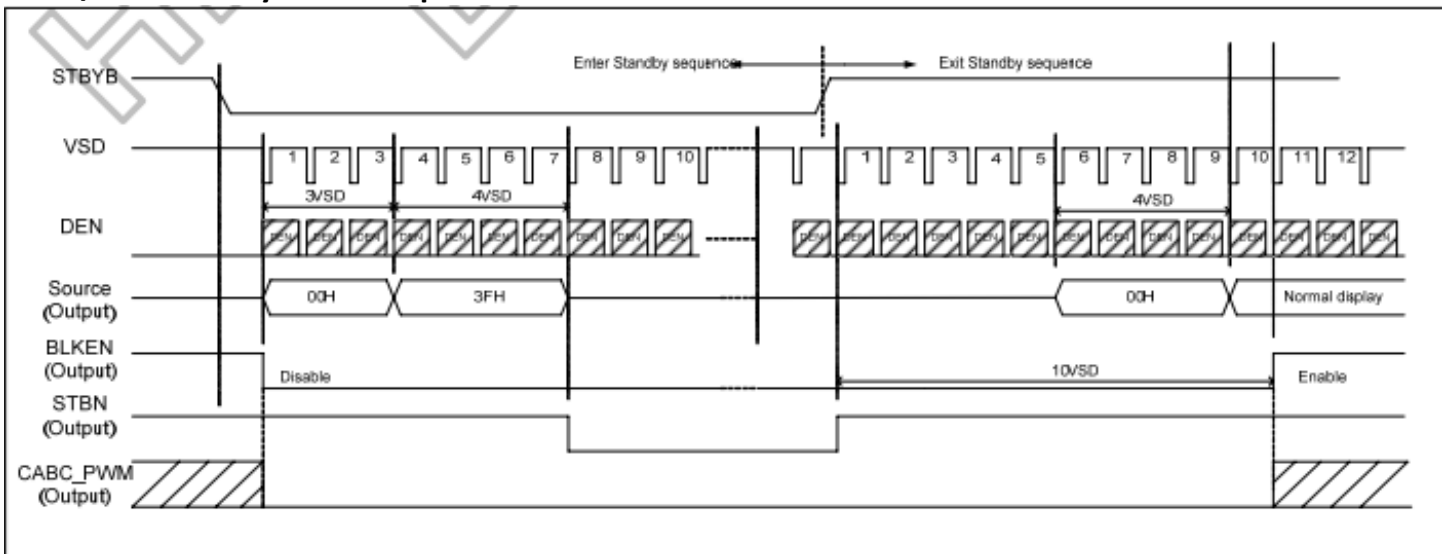
Gate Output Timing (Dual Gate)



Power ON/OFF Sequence

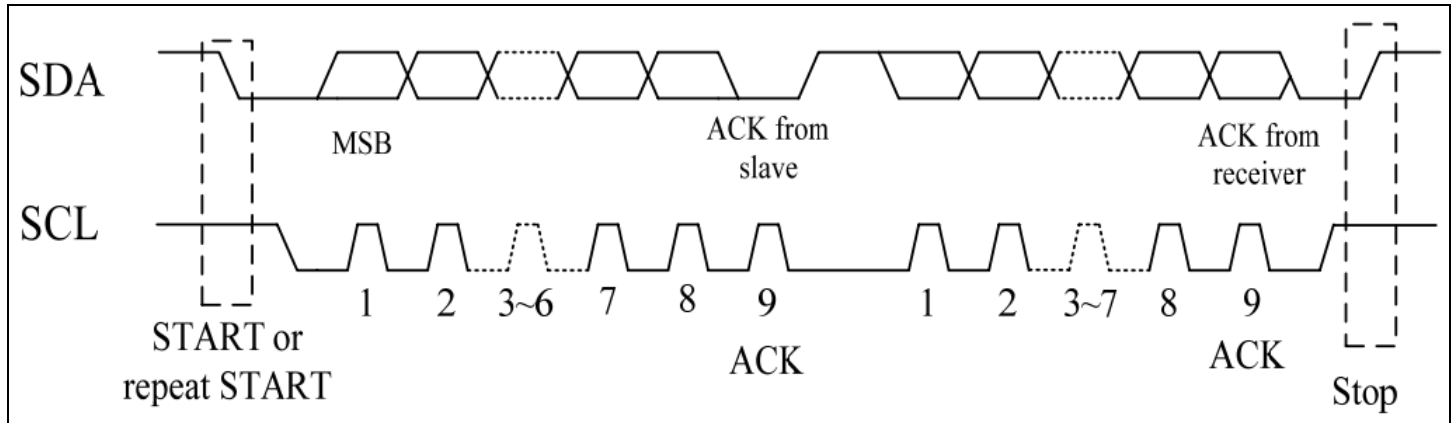


Enter/Exit Standby Mode Sequence

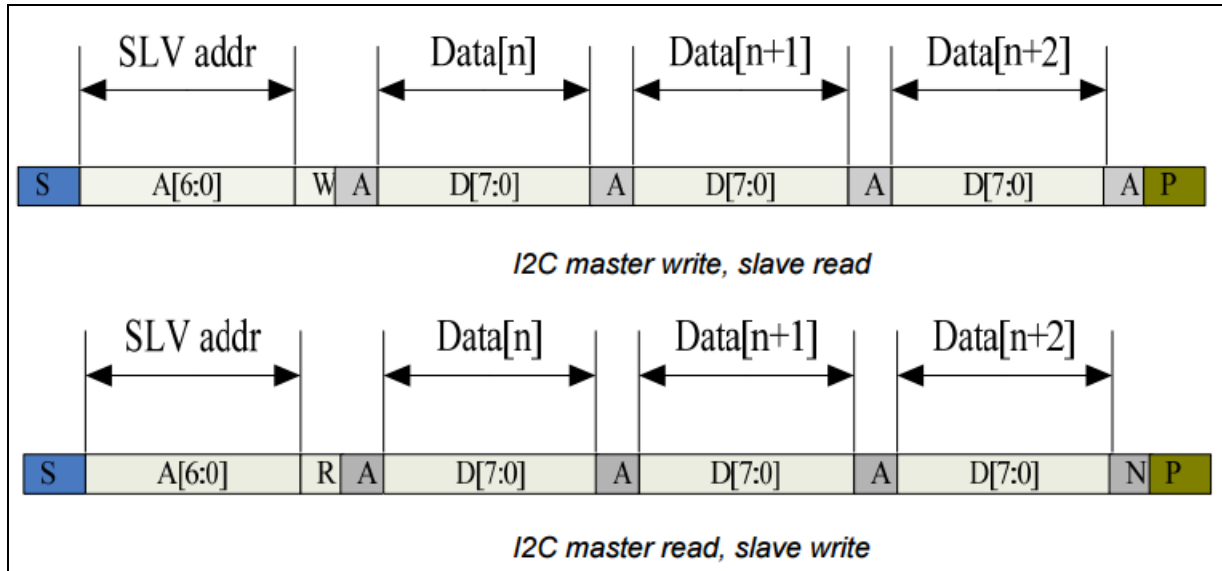


Timing Characteristics – Capacitive Touch Panel

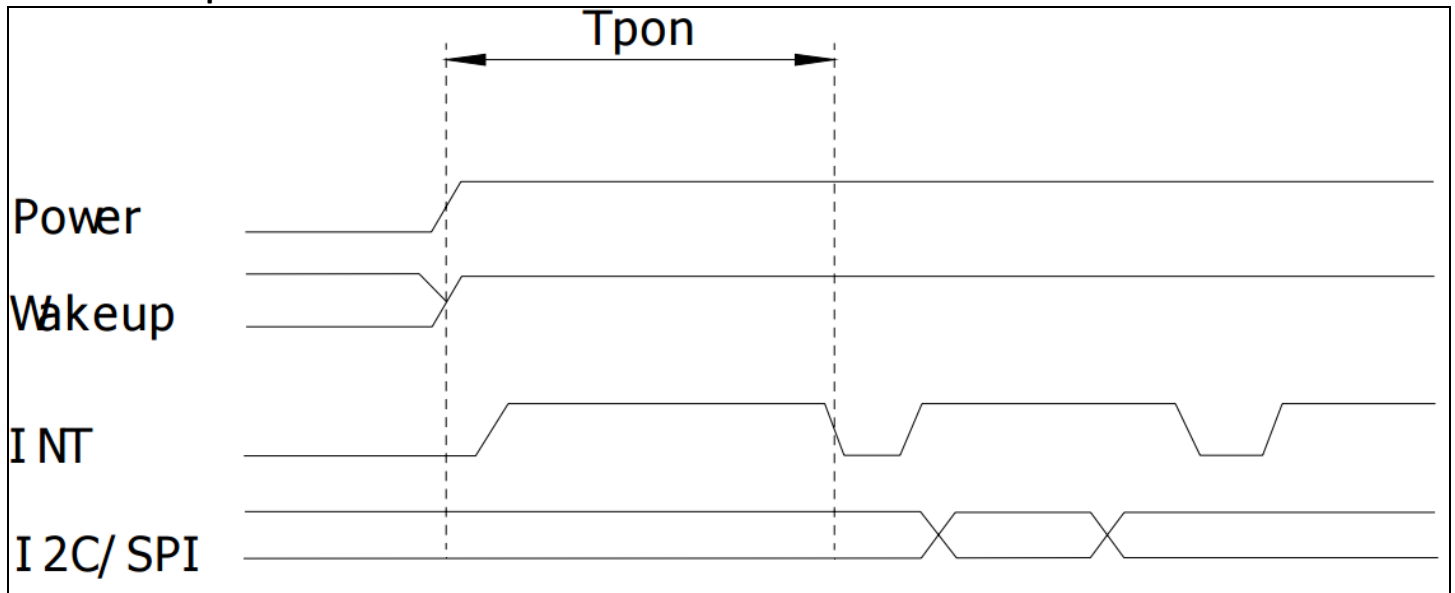
Data Transfer Format



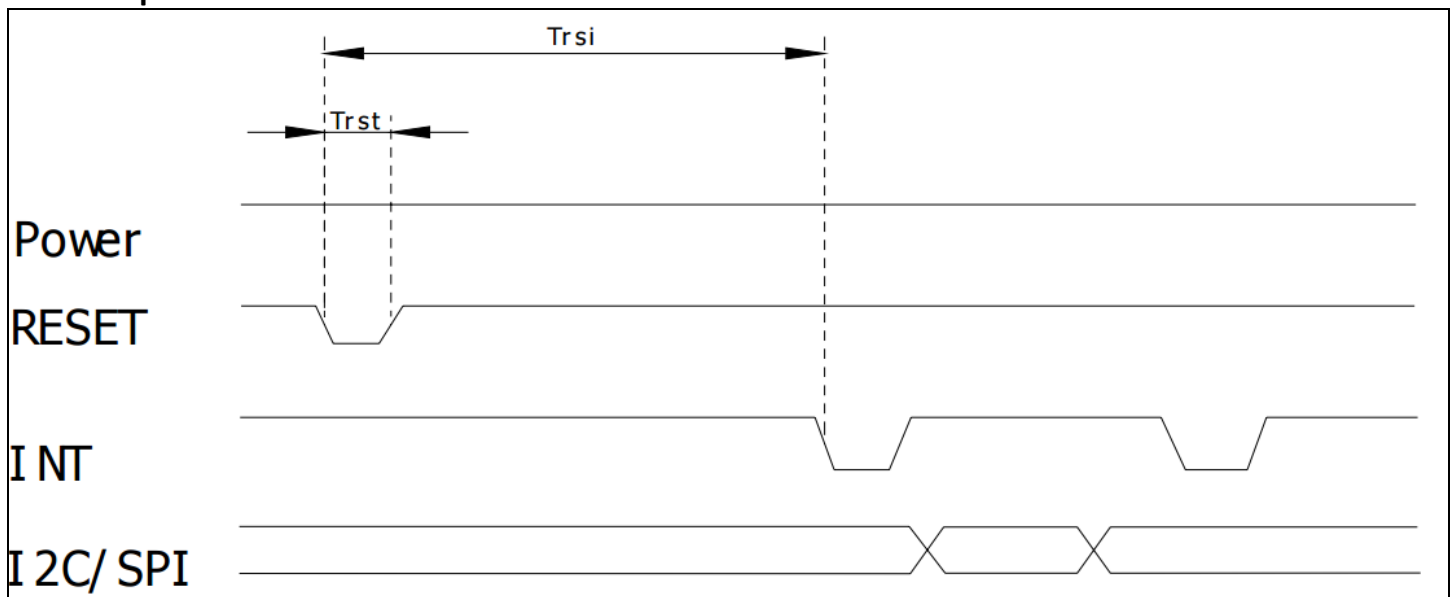
| Parameter | Unit | Min | Max |
|--|------|-----|-----|
| SCL frequency | KHz | 0 | 400 |
| Bus free time between a STOP and START condition | us | 4.7 | \ |
| Hold time (repeated) START condition | us | 4.0 | \ |
| Data setup time | ns | 250 | \ |
| Setup time for a repeated START condition | us | 4.7 | \ |
| Setup Time for STOP condition | us | 4.0 | \ |



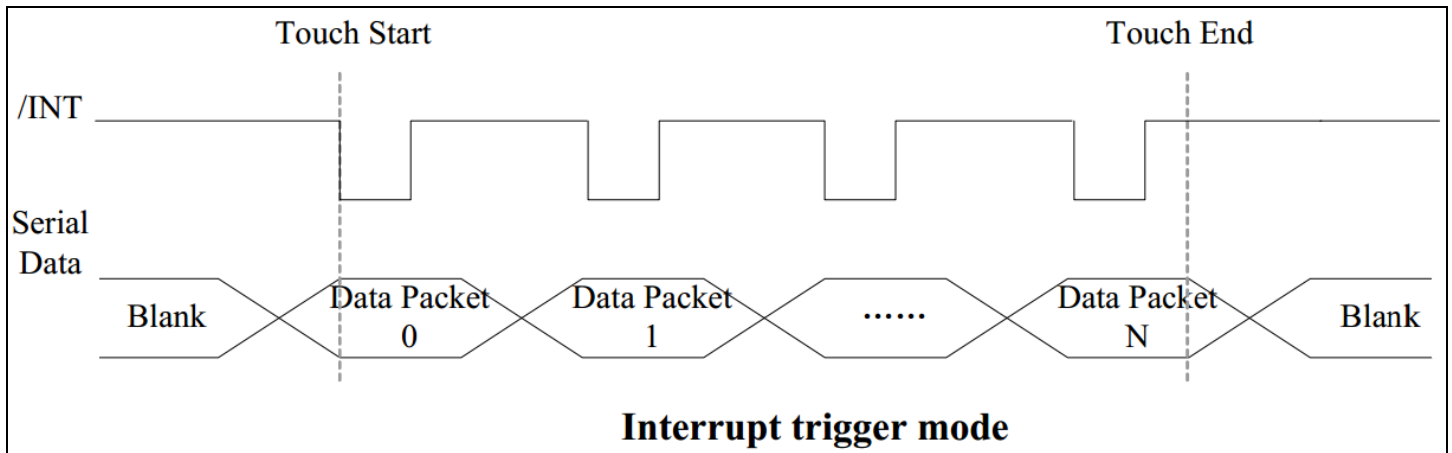
Power ON Sequence



Reset Sequence



| Parameter | Description | Min | Max | Units |
|-----------|--|-----|-----|-------|
| Tris | Rise time from 0.1VDD to 0.9VDD | -- | 10 | ms |
| Tpon | Time of starting to report point after powering on | 300 | -- | ms |
| Trsi | Time of starting to report point after resetting | 300 | -- | ms |
| Trst | Reset time | 5 | -- | ms |
| Twai | Time of starting to report point after waking | 300 | -- | ms |
| Twak | Wake up time | 5 | -- | 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 , 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

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
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- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
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- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
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