

# NHD-5.0-800480TF-ATXI#

## 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                             |
| I-      | 6:00 viewing angle, Wide Temp   |
| #       | <b>RoHS Compliant</b>           |

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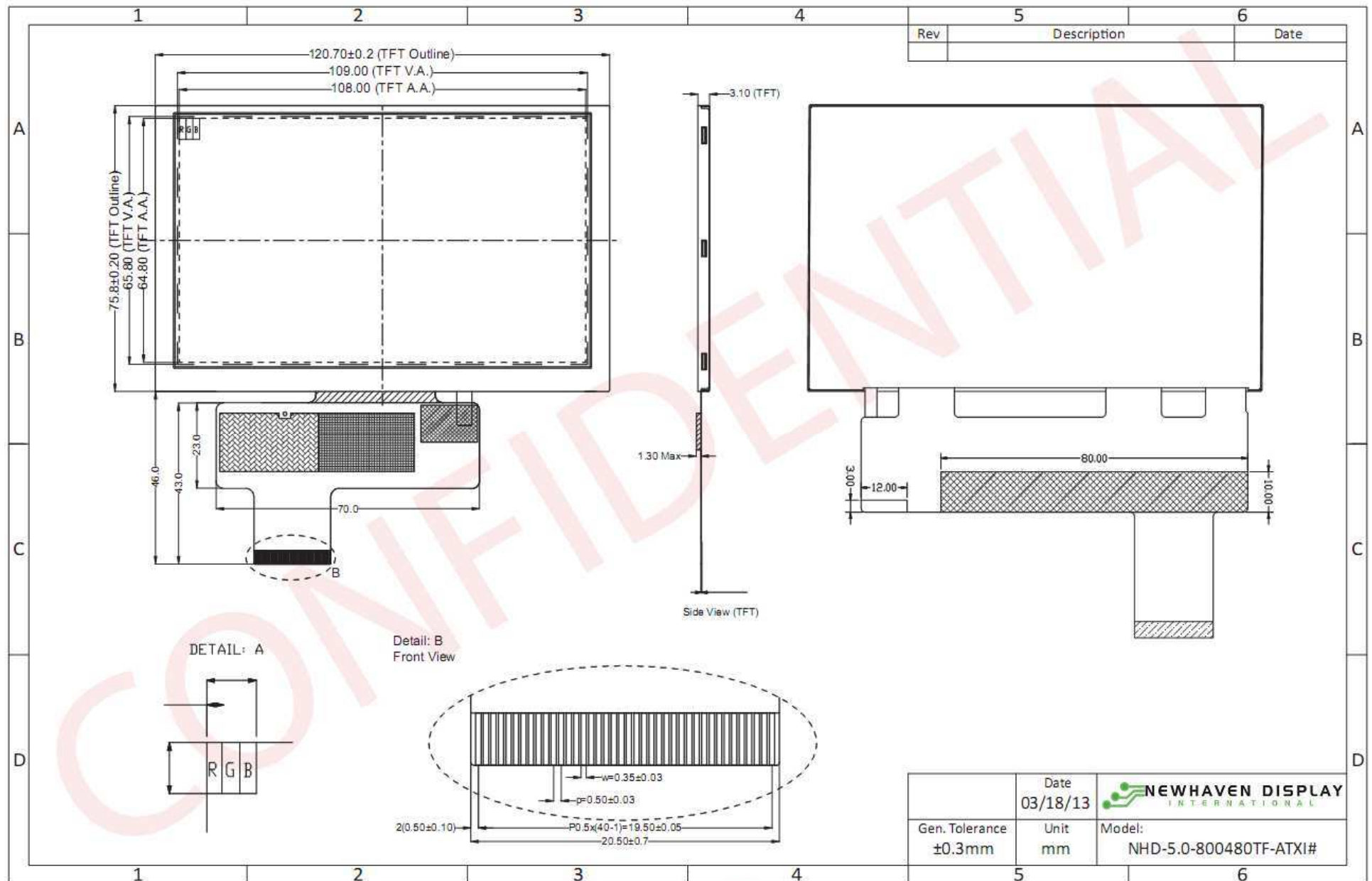
## Document Revision History

| Revision | Date      | Description                  | Changed by |
|----------|-----------|------------------------------|------------|
| 0        | 2/1/2012  | Initial Release              | SB         |
| 1        | 3/18/2013 | Timing Characteristics added | AK         |

## Functions and Features

- 800xRGBx480 resolution, up to 16.7M colors
- 14-LED backlight
- 24 bit RGB interface
- 4-wire resistive touch panel available
- Capacitive touch panel available

# Mechanical Drawing



The drawing contained herein is the exclusive property of Newhaven Display International, Inc. and shall not be copied, reproduced, and/or disclosed in any format without permission.

## Pin Description

| Pin No. | Symbol  | External Connection | Function Description                   |
|---------|---------|---------------------|----------------------------------------|
| 1       | LED-    | LED Power Supply    | Ground for Backlight                   |
| 2       | LED+    | LED Power Supply    | Backlight Power Supply (20mA @ ~23.1V) |
| 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      | HSYNC   | MPU                 | Line synchronization signal            |
| 33      | VSYNC   | MPU                 | Frame synchronization signal           |
| 34      | DE      | 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: 54132-4097

**Backlight connector:** on LCD connector **Mates with:** ---

## Electrical Characteristics

| 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      | -       | 132  | -       | mA   |
| "H" Level input             | Vih    |              | 0.7VDD  | -    | VDD     | V    |
| "L" Level input             | Vil    |              | 0       | -    | 0.3VDD  | V    |
| "H" Level output            | Voh    |              | VDD-0.4 | -    | -       | V    |
| "L" Level output            | Vol    |              | -       | -    | GND+0.4 | V    |
|                             |        |              |         |      |         |      |
| Backlight Supply Voltage    | VLED   |              | -       | 23.1 | -       | V    |
| Backlight Supply Current    | ILED   | VLED=23.1V   | -       | 20   | 25      | mA   |
| Backlight Power Consumption | PBL    |              | -       | 924  | -       | mW   |

## Optical Characteristics

| Item                  | Symbol | Condition | Min. | Typ. | Max. | Unit              |
|-----------------------|--------|-----------|------|------|------|-------------------|
| Viewing Angle –Top    |        | Cr ≥10    | -    | 50   | -    | °                 |
| Viewing Angle –Bottom |        | Cr ≥10    | -    | 70   | -    | °                 |
| Viewing Angle – Left  |        | Cr ≥ 10   | -    | 70   | -    | °                 |
| Viewing Angle – Right |        | Cr ≥ 10   | -    | 70   | -    | °                 |
| Contrast Ratio        | Cr     |           | 500  | 600  | -    |                   |
| Luminance             | YL     |           | -    | 250  | -    | cd/m <sup>2</sup> |
| Response Time (rise)  | Tr     | -         | -    | 5    | 15   | ms                |
| Response Time (fall)  | Tr     | -         | -    | 15   | 30   | ms                |

## Driver Information

Built-in HX8264-D02 Source Driver: [http://www.newhavendisplay.com/app\\_notes/HX8264-D02.pdf](http://www.newhavendisplay.com/app_notes/HX8264-D02.pdf)

Built in HX8664-B Gate Driver: [http://www.newhavendisplay.com/app\\_notes/HX8664-B.pdf](http://www.newhavendisplay.com/app_notes/HX8664-B.pdf)

## 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   |

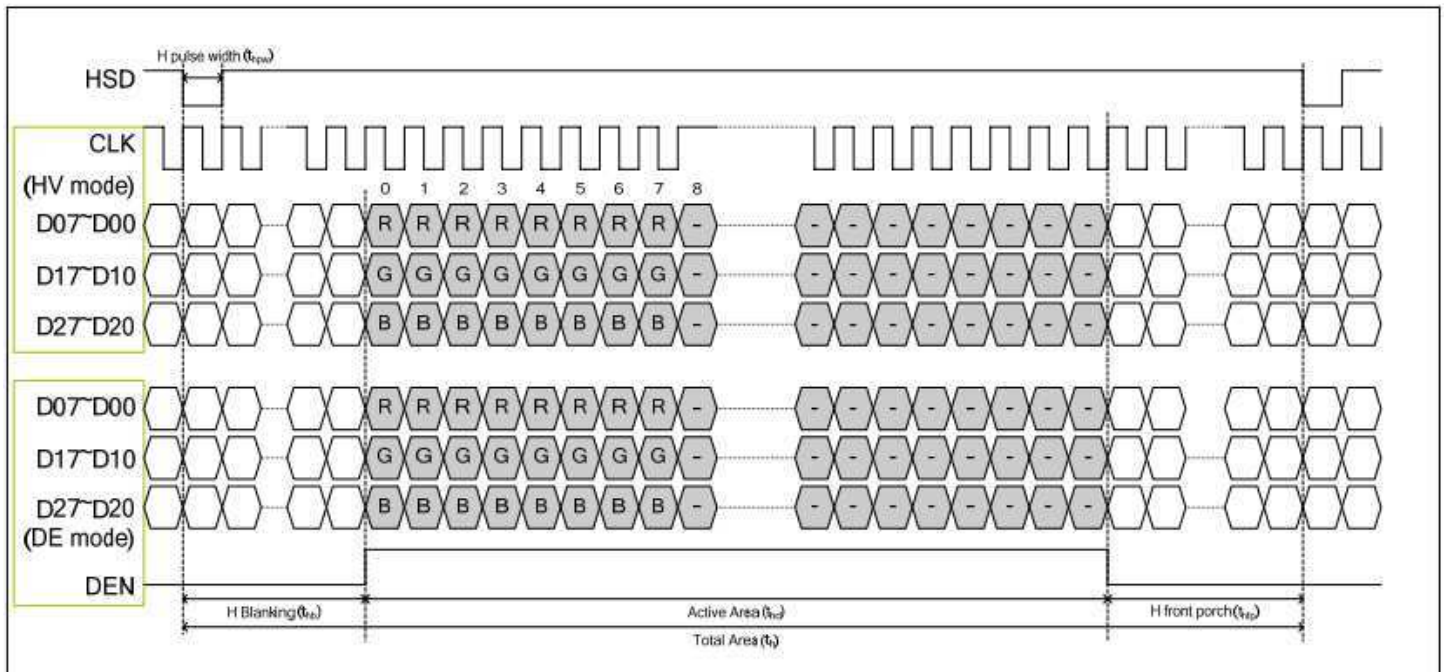
### Horizontal timing

| 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 |

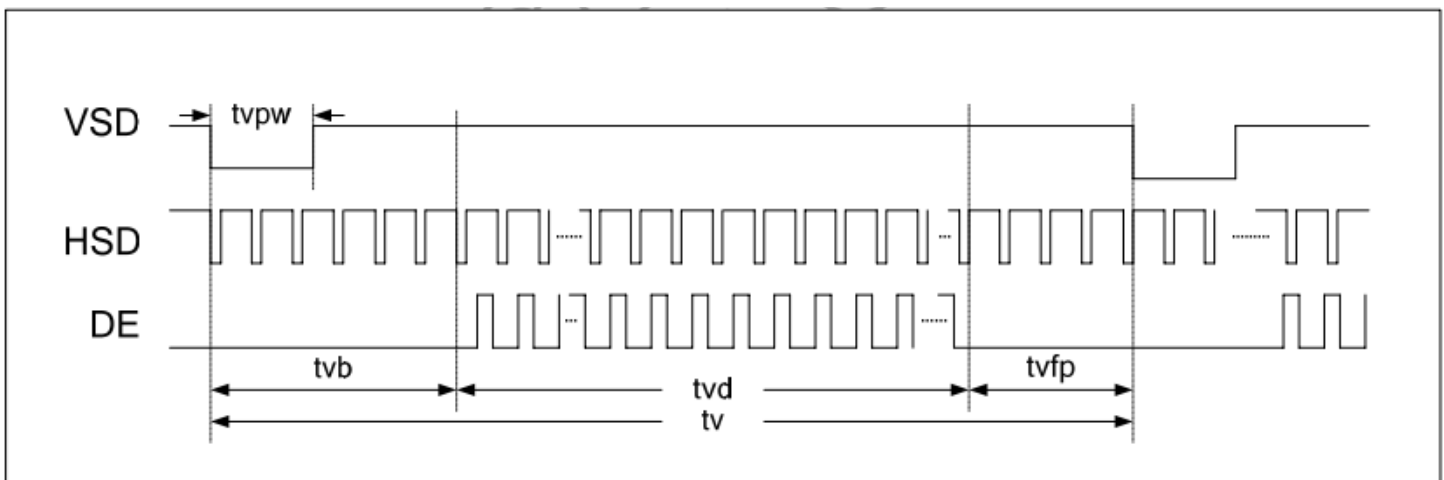
### Vertical timing

| 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



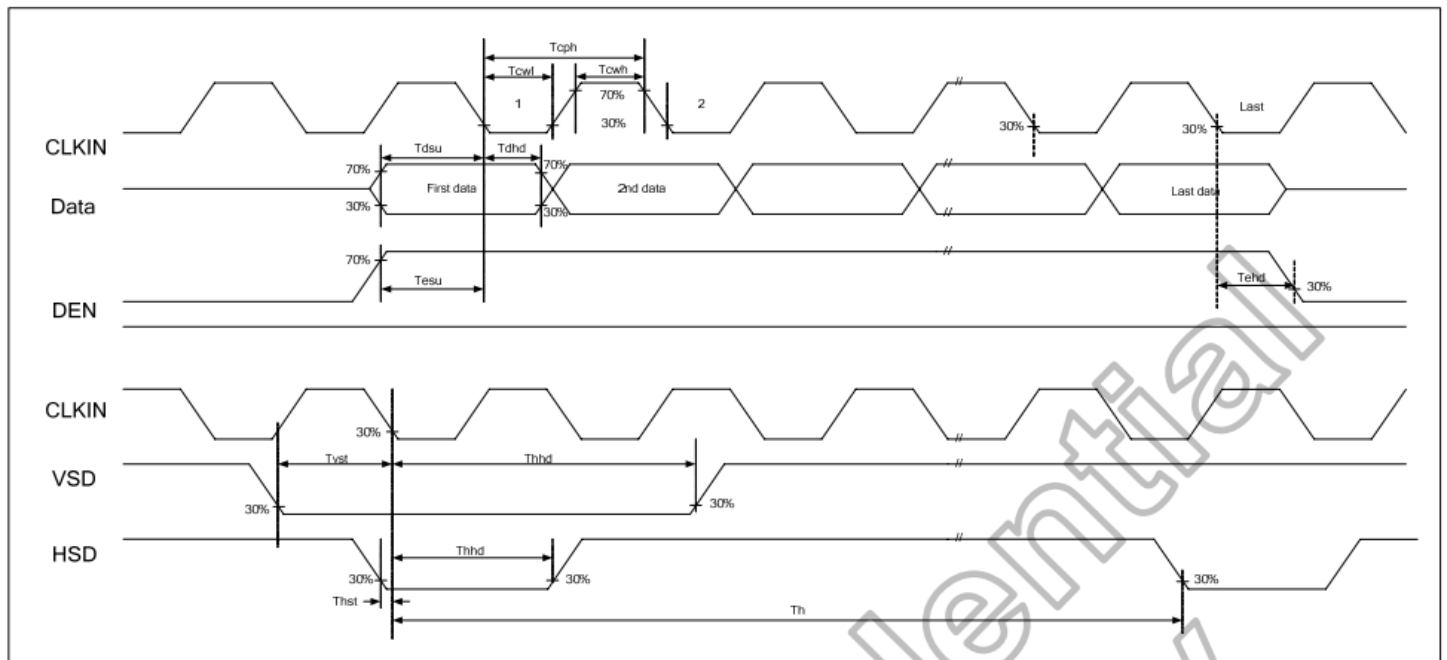
## Vertical Timing



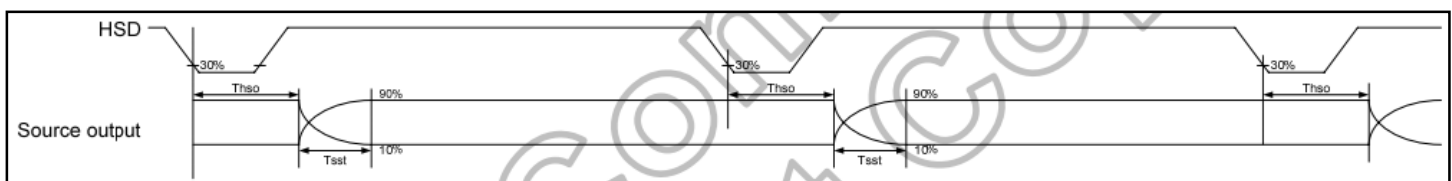
## Parallel 24-bit RGB mode

| 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 | -             |

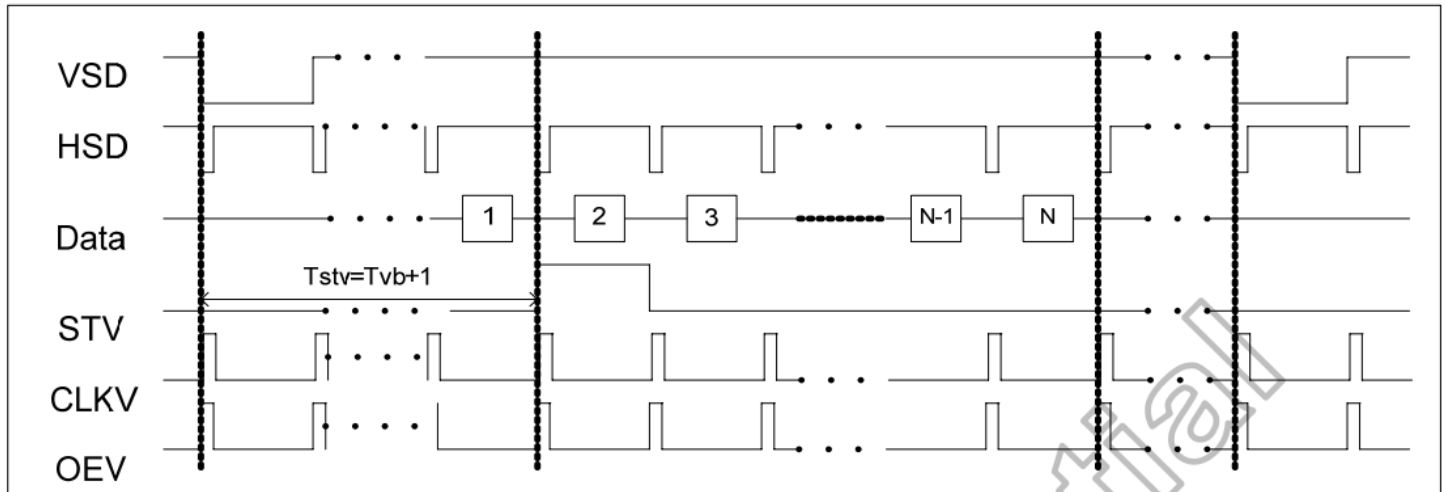
## Input Clock and Data Timing



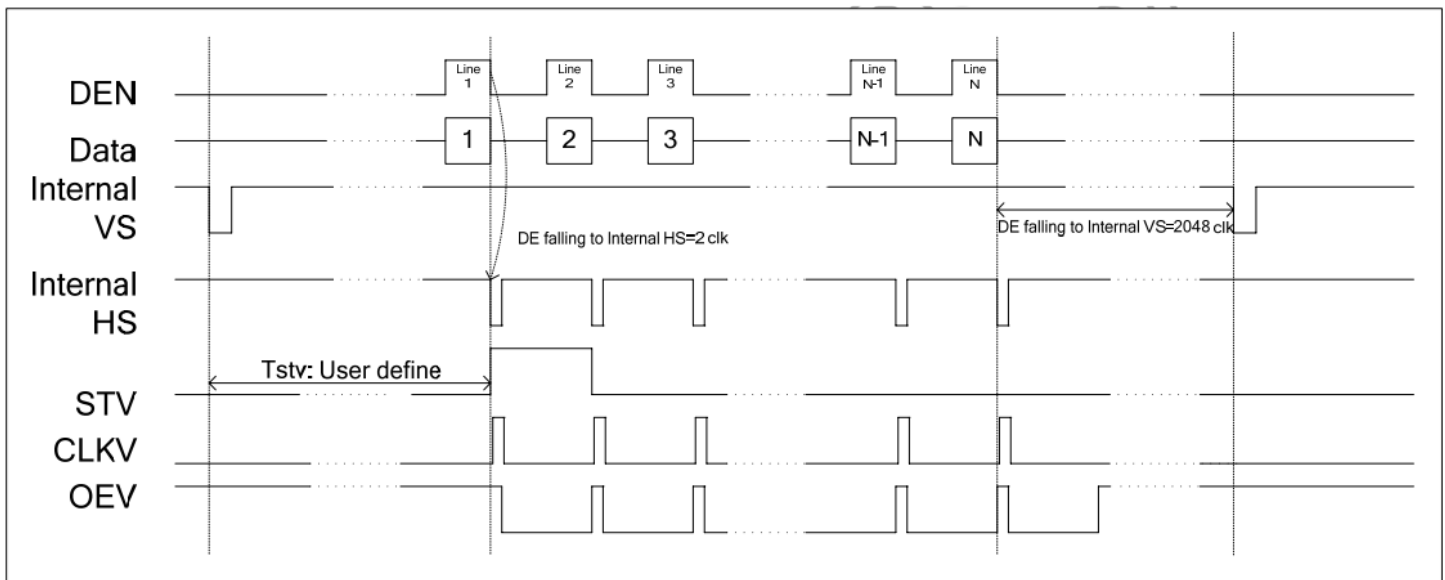
## Source Output Timing



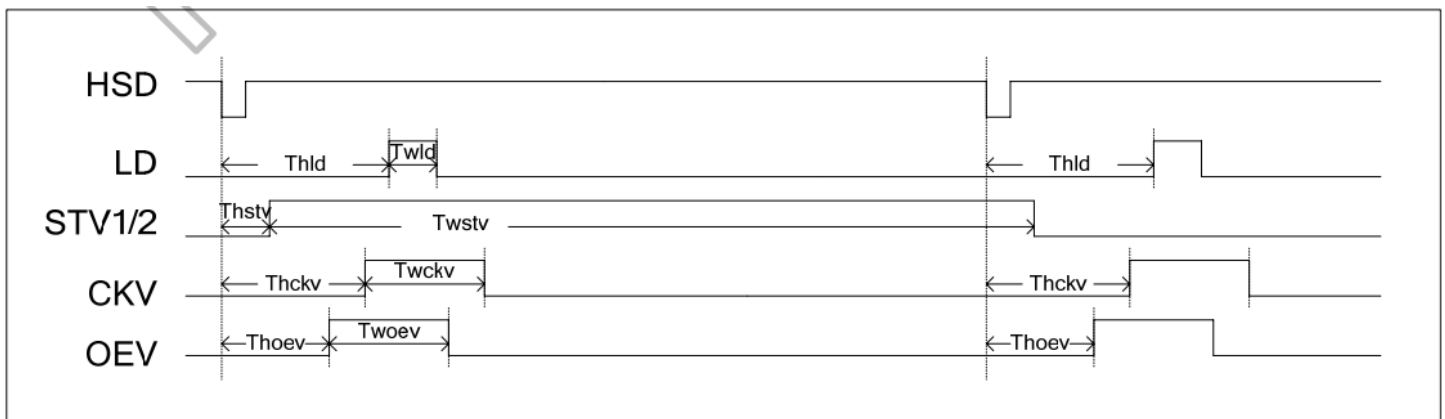
## Vertical Timing HV (Cascade)



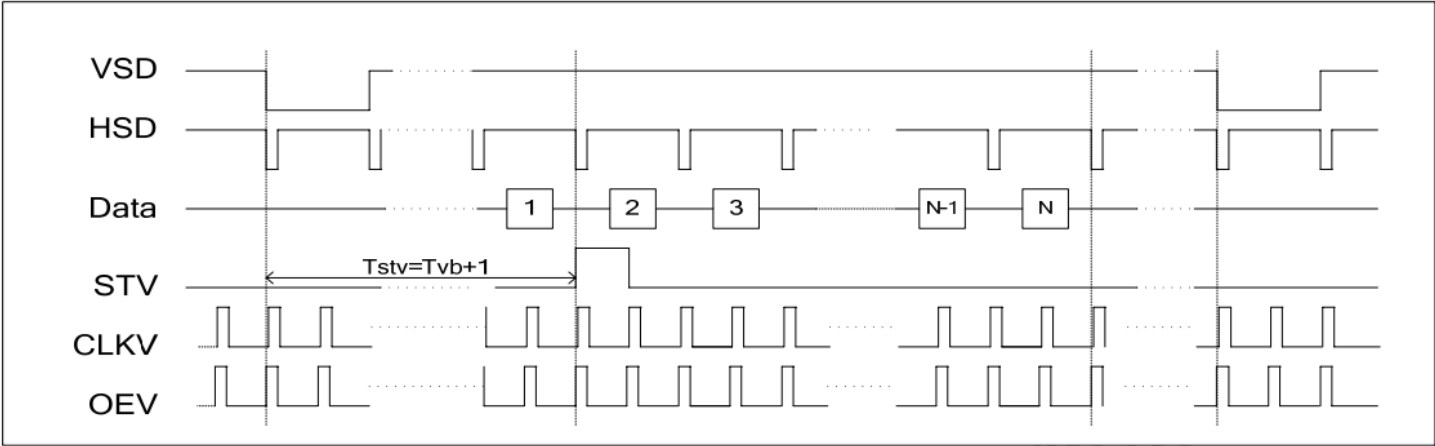
## Vertical Timing DE (Cascade)



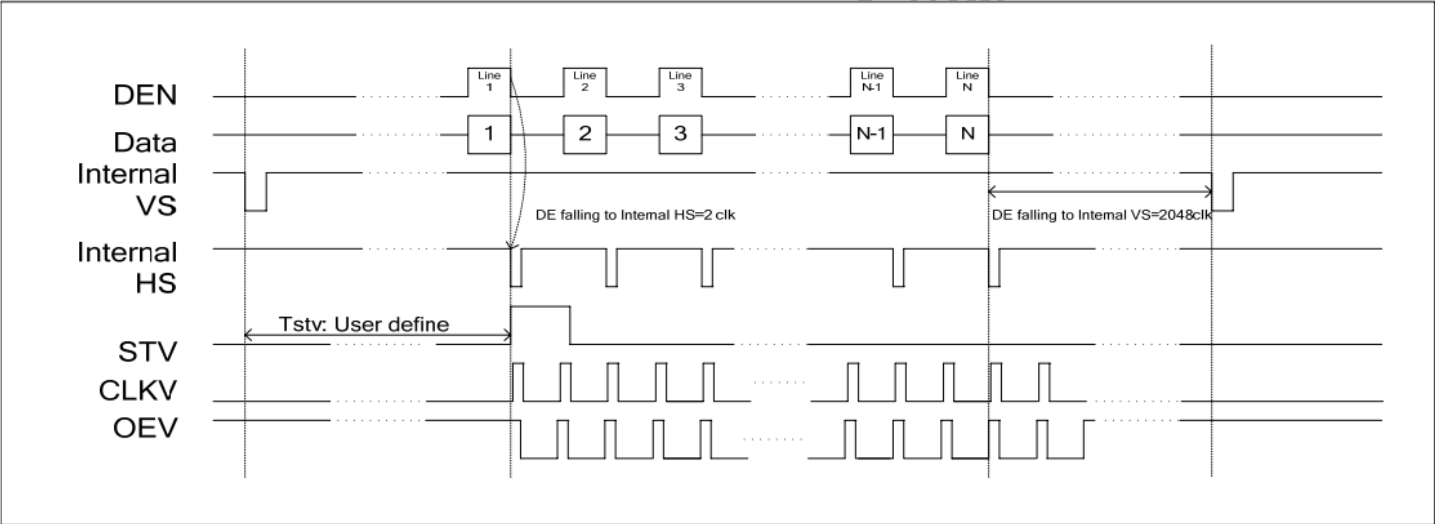
## Gate Output Timing



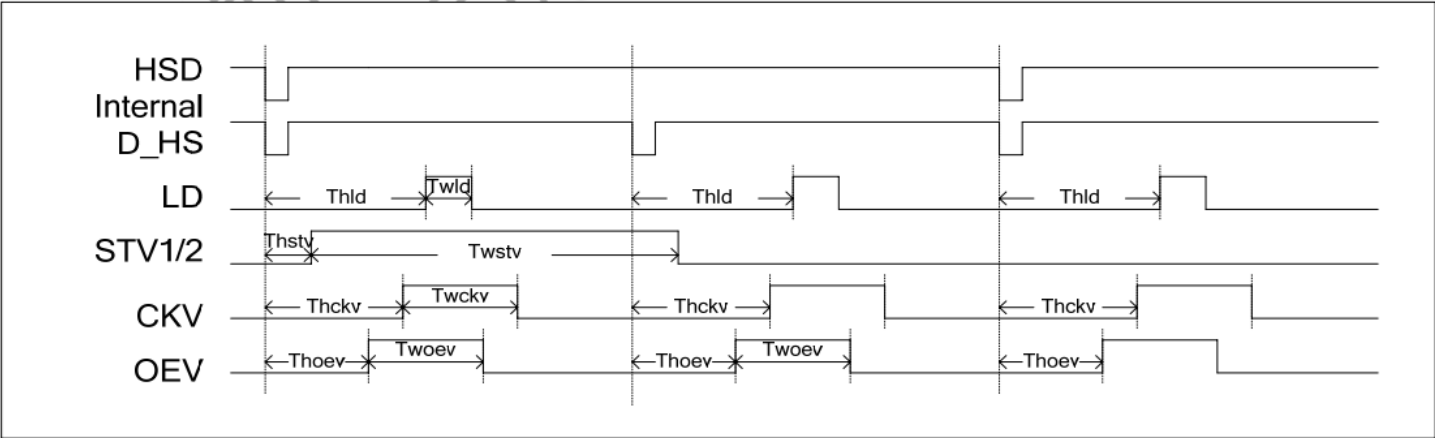
Vertical Timing HV (Dual Gate)



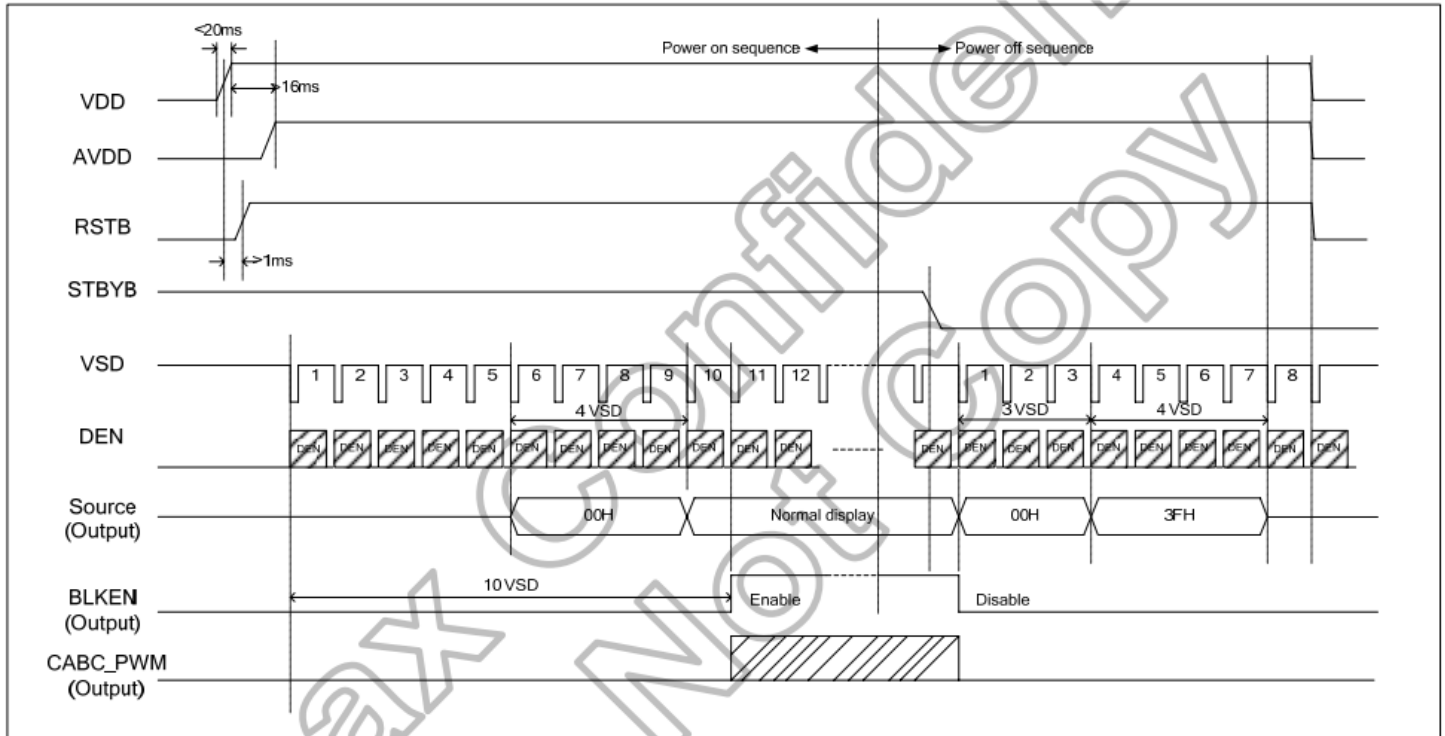
Vertical Timing DE (Dual Gate)



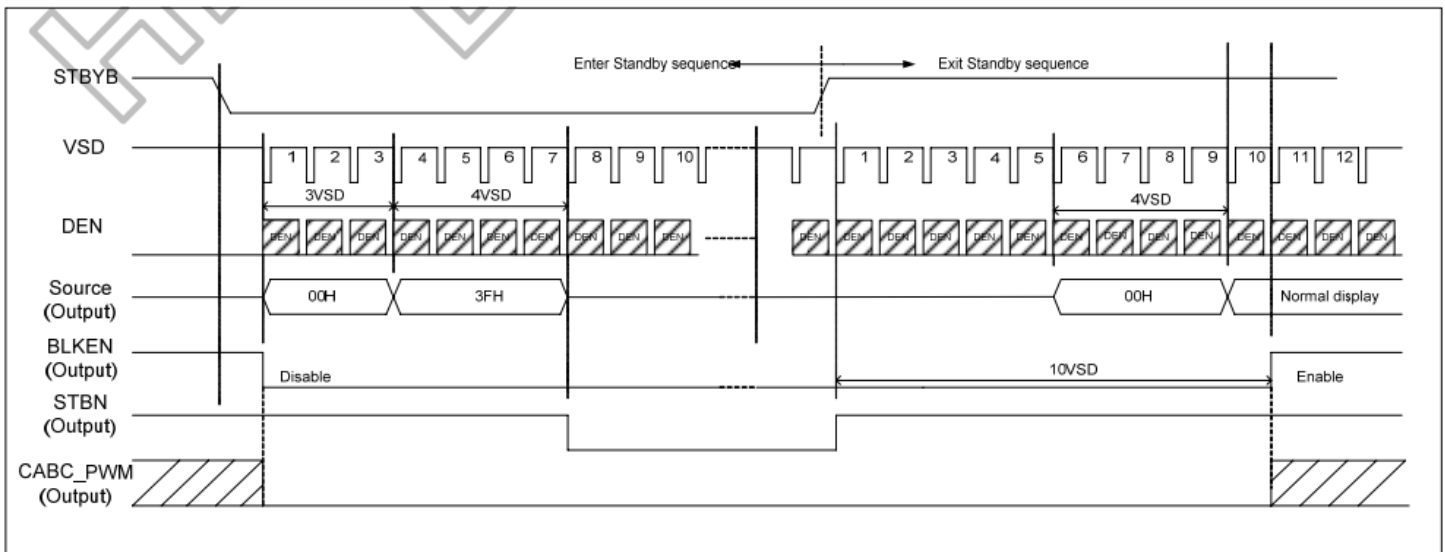
Gate Output Timing (Dual Gate)



## Power ON/OFF Sequence



## Enter/Exit Standby Mode Sequence



## 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<br>10 cycles                       |      |
| Vibration test                        | Endurance test applying vibration to simulate transportation and use.                                                           | 10-55Hz , 15mm amplitude.<br>60 sec in each of 3 directions X,Y,Z<br>For 15 minutes | 3    |
| Static electricity test               | Endurance test applying electric static discharge.                                                                              | VS=800V, RS=1.5kΩ, CS=100pF<br>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](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

[http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)