

# NHD-4.3-480272EF-ATXL#

## 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 Optimal View, Wide Temperature |
| #-      | <b>RoHS Compliant</b>               |

### Newhaven Display International, Inc.

2661 Galvin Ct.

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

[www.newhavendisplay.com](http://www.newhavendisplay.com)

[nhtech@newhavendisplay.com](mailto:nhtech@newhavendisplay.com)

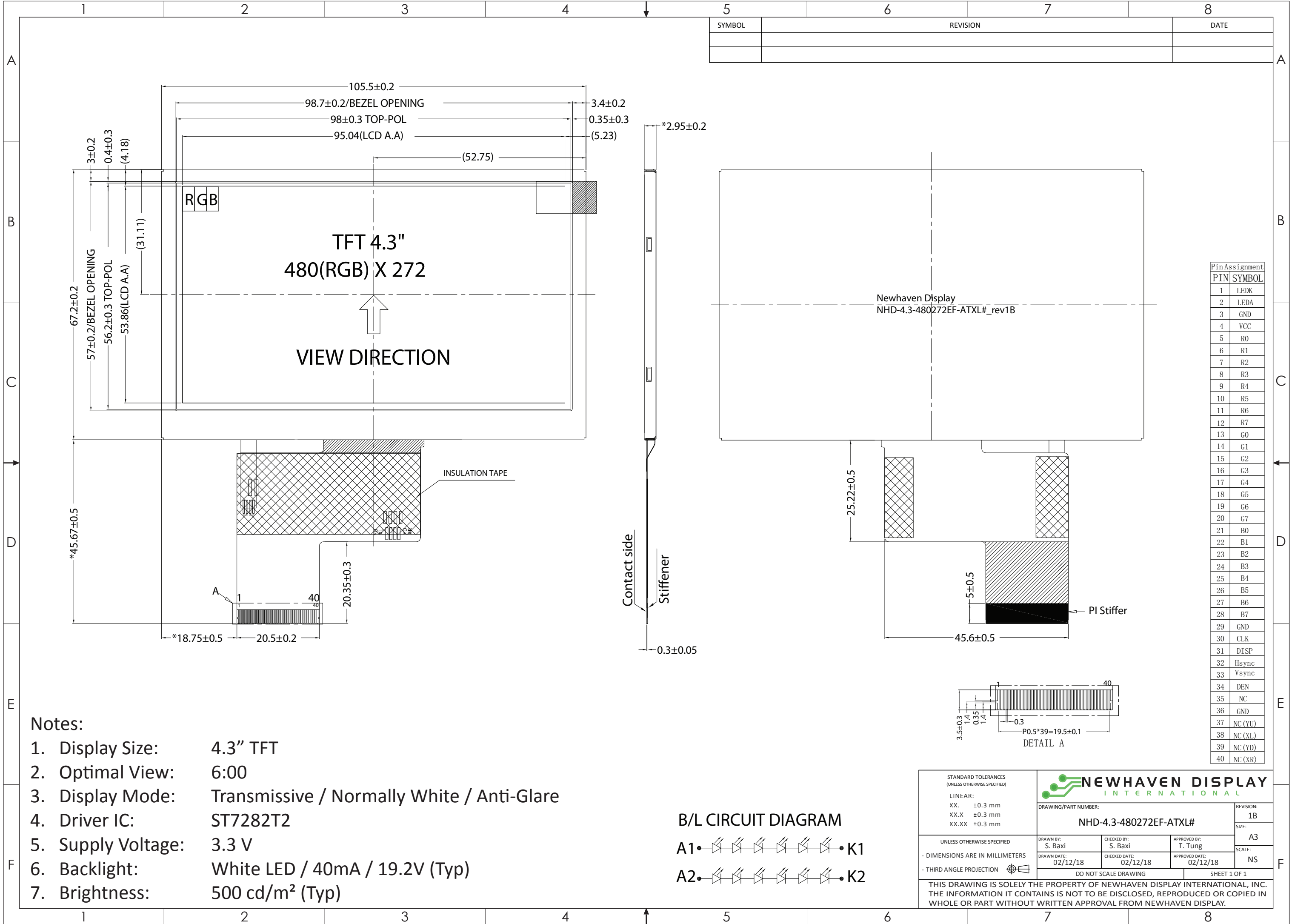
[nhsales@newhavendisplay.com](mailto:nhsales@newhavendisplay.com)

## Document Revision History

| Revision | Date     | Description                                             | Changed by |
|----------|----------|---------------------------------------------------------|------------|
| 0        | 8/29/12  | Initial Release                                         | AK         |
| 1        | 7/11/13  | Mechanical and Optical characteristic updated           | KA         |
| 2        | 2/14/14  | Mechanical drawing updated                              | KA         |
| 3        | 6/24/14  | Timing characteristics updated                          | ML         |
| 4        | 12/8/15  | Datasheet Reformat, Backlight lifetime added            | SB         |
| 5        | 11/10/16 | Mechanical Drawing & Electrical Characteristics Updated | SB         |
| 6        | 3/31/17  | Driver IC Updated                                       | SB         |
| 7        | 2/12/18  | Brightness and Mechanical Drawing Updated               | SB         |

## Functions and Features

- 480xRGBx272 resolution, up to 16.7M colors
- 12-LED backlight
- 24-Bit RGB interface
- Resistive and Capacitive touch panel available



## Pin Description

| Pin No. | Symbol          | External Connection | Function Description                                     |
|---------|-----------------|---------------------|----------------------------------------------------------|
| 1       | LED-            | Power Supply        | Backlight Cathode (Ground)                               |
| 2       | LED+            | Power Supply        | Backlight Anode (40mA @ 19.2V)                           |
| 3       | GND             | Power Supply        | Ground                                                   |
| 4       | V <sub>DD</sub> | Power Supply        | Supply Voltage 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      | CLK             | MPU                 | Data sample Clock signal                                 |
| 31      | DISP            | MPU                 | Display ON/OFF signal (High: ON (Default), Low: Standby) |
| 32      | HSYNC           | MPU                 | Line synchronization signal                              |
| 33      | VSYNC           | MPU                 | Frame synchronization signal                             |
| 34      | DEN             | MPU                 | Data Enable signal                                       |
| 35      | NC              | -                   | No Connect                                               |
| 36      | GND             | Power Supply        | Ground                                                   |
| 37      | NC              | -                   | No Connect                                               |
| 38      | NC              | -                   | No Connect                                               |
| 39      | NC              | -                   | No Connect                                               |
| 40      | NC              | -                   | No Connect                                               |

**Recommended LCD connector:** 0.5mm pitch 40-Conductor FFC. Molex p/n: 54132-4062

**Backlight connector:** on LCD connector

**Mates with:** ---

## Electrical Characteristics

| Item                        | Symbol           | Condition               | Min.                  | Typ.   | Max.                  | Unit |
|-----------------------------|------------------|-------------------------|-----------------------|--------|-----------------------|------|
| Operating Temperature Range | T <sub>OP</sub>  | Absolute Max            | -20                   | -      | +70                   | °C   |
| Storage Temperature Range   | T <sub>ST</sub>  | Absolute Max            | -30                   | -      | +80                   | °C   |
| Supply Voltage              | V <sub>DD</sub>  | -                       | 3.0                   | 3.3    | 3.6                   | V    |
| Supply Current              | I <sub>DD</sub>  | V <sub>DD</sub> = 3.3V  | 12                    | 25     | 50                    | mA   |
| "H" level input             | V <sub>IH</sub>  | -                       | 0.7 * V <sub>DD</sub> | -      | V <sub>DD</sub>       | V    |
| "L" level input             | V <sub>IL</sub>  | -                       | V <sub>SS</sub>       | -      | 0.3 * V <sub>DD</sub> | V    |
|                             |                  |                         |                       |        |                       |      |
| Backlight Supply Current    | I <sub>LED</sub> | -                       | -                     | 40     | 50                    | mA   |
| Backlight Supply Voltage    | I <sub>LED</sub> | I <sub>LED</sub> = 40mA | 16.8                  | 19.2   | 20.4                  | V    |
| Backlight Lifetime*         | -                | T <sub>OP</sub> = 25°C  | 20,000                | 50,000 | -                     | Hrs. |

\*Backlight is current driven; do not supply more than 50 mA. Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions.

## Optical Characteristics

| Item                   |             | Symbol                         | Condition                | Min.  | Typ.  | Max.  | Unit              |
|------------------------|-------------|--------------------------------|--------------------------|-------|-------|-------|-------------------|
| Optimal Viewing Angles | Top         | φY+                            | CR ≥ 10                  | -     | 50    | -     | °                 |
|                        | Bottom      | φY-                            |                          | -     | 70    | -     | °                 |
|                        | Left        | θX-                            |                          | -     | 70    | -     | °                 |
|                        | Right       | θX+                            |                          | -     | 70    | -     | °                 |
| Contrast Ratio         |             | CR                             | -                        | 400   | 500   | -     | -                 |
| Luminance              |             | L <sub>V</sub>                 | I <sub>LED</sub> = 40 mA | 400   | 500   | -     | cd/m <sup>2</sup> |
| Response Time          | Rise + Fall | T <sub>R</sub> +T <sub>F</sub> | T <sub>OP</sub> = 25°C   | -     | 25    | 30    | ms                |
| Chromaticity           | Red         | X <sub>R</sub>                 | -                        | 0.525 | 0.575 | 0.625 | -                 |
|                        |             | Y <sub>R</sub>                 | -                        | 0.292 | 0.342 | 0.392 | -                 |
|                        | Green       | X <sub>G</sub>                 | -                        | 0.261 | 0.311 | 0.361 | -                 |
|                        |             | Y <sub>G</sub>                 | -                        | 0.564 | 0.614 | 0.664 | -                 |
|                        | Blue        | X <sub>B</sub>                 | -                        | 0.093 | 0.143 | 0.193 | -                 |
|                        |             | Y <sub>B</sub>                 | -                        | 0.040 | 0.090 | 0.140 | -                 |
|                        | White       | X <sub>W</sub>                 | -                        | 0.221 | 0.271 | 0.321 | -                 |
|                        |             | Y <sub>W</sub>                 | -                        | 0.265 | 0.315 | 0.365 | -                 |

\* Luminance is directly related to Backlight Supply Current.

## Driver Information

Built-in Sitronix ST7282T2 Driver.

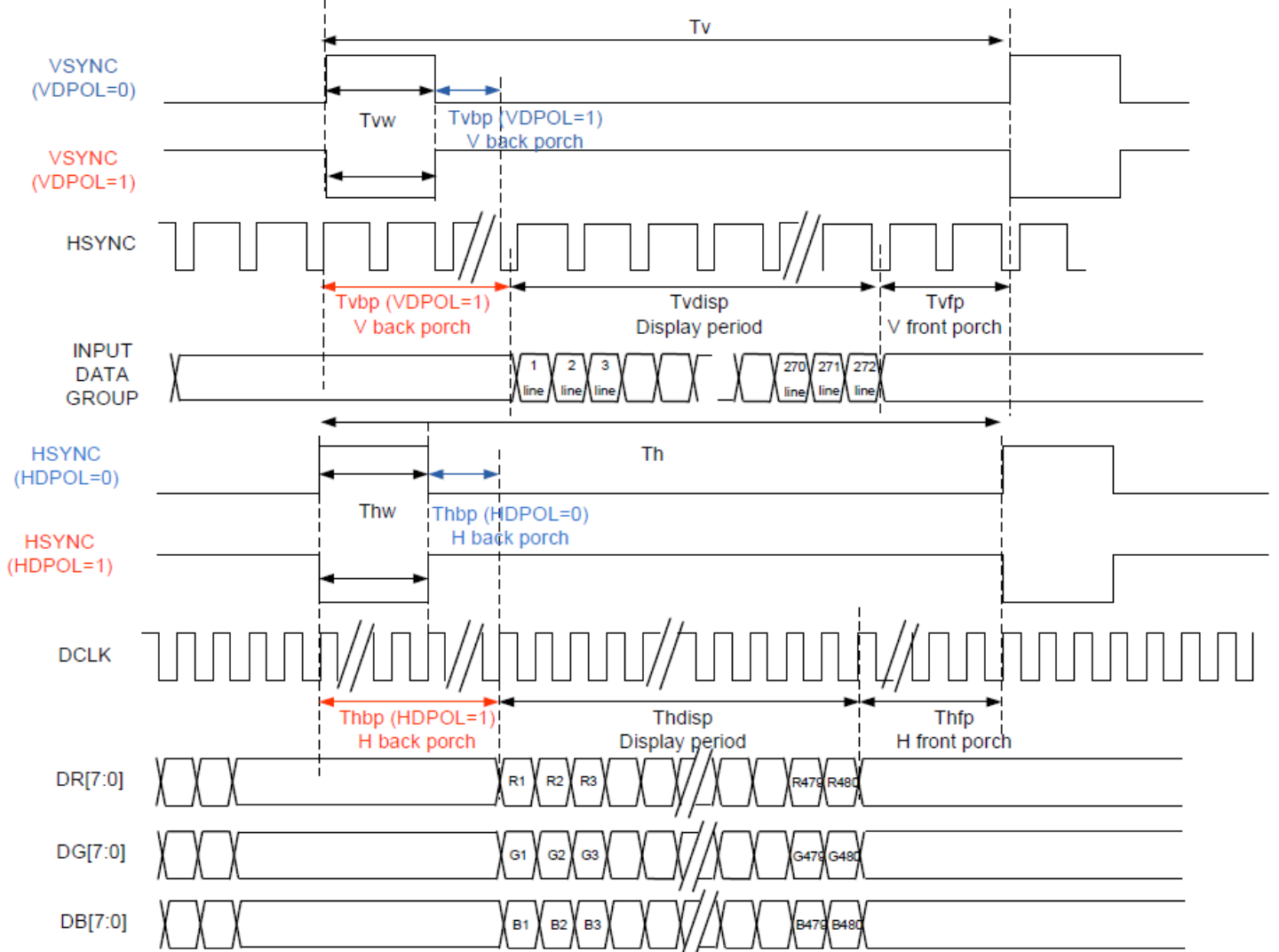
Please download specification at <http://www.newhavendisplay.com/appnotes/datasheets/LCDs/ST7282T2.pdf>

## Timing Characteristics

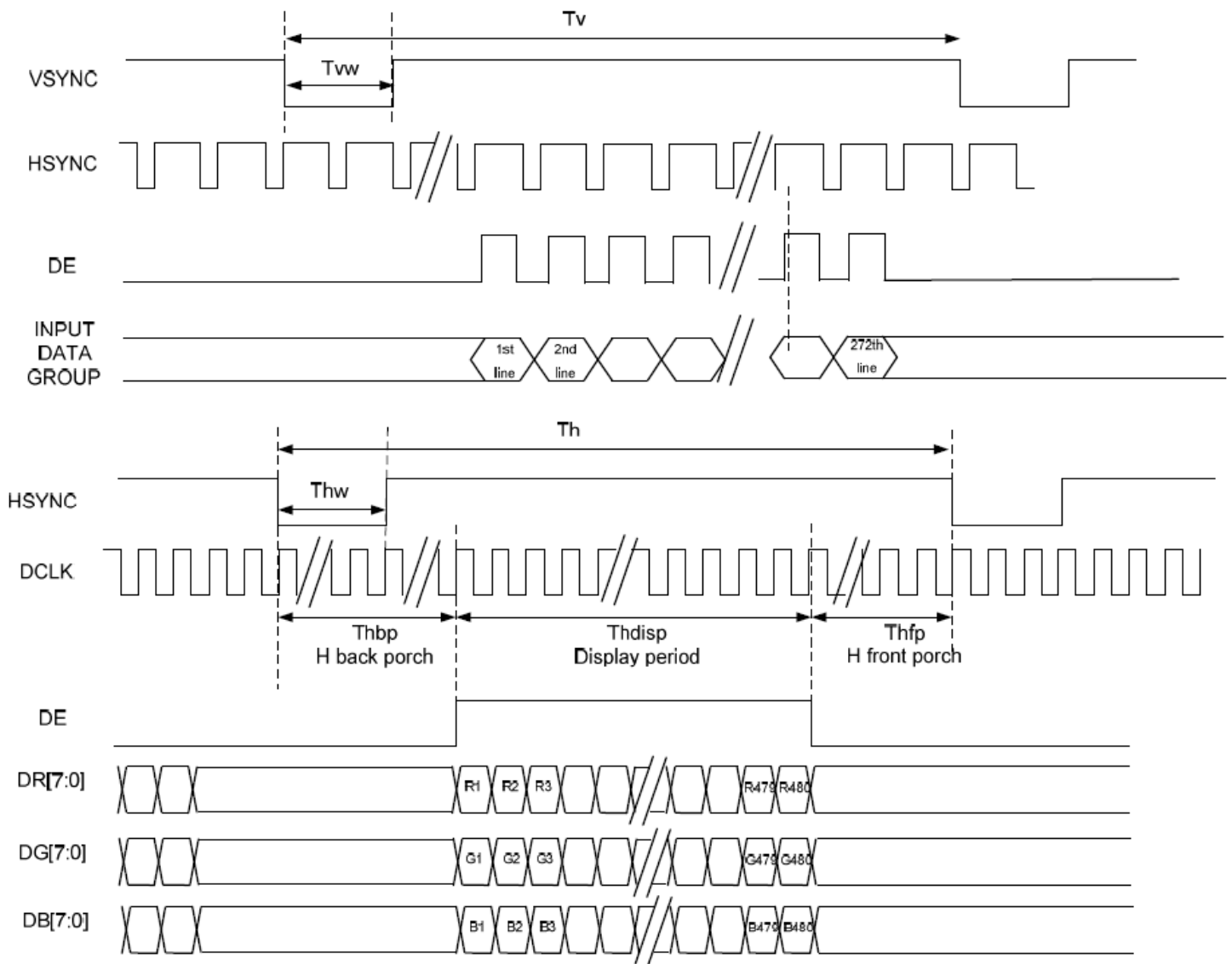
### Parallel RGB input timing requirement

| Item           |                | Symbol | Min. | Typ. | Max. | Unit | Remark                |
|----------------|----------------|--------|------|------|------|------|-----------------------|
| DCLK Frequency |                | FCLK   | 9    | 12   | 15   | MHz  |                       |
| DCLK Period    |                | TCLK   | 10   | 50   | -    | μS   | R=10KΩ, 1μF           |
| HSYNC          | Period Time    | Th     | 485  | 525  | 532  | DCLK |                       |
|                | Display Period | Thdisp | -    | 480  | -    | DCLK |                       |
|                | Back Porch     | Thbp   | 3    | 43   | 50   | DCLK | By H_Blanking Setting |
|                | Front Porch    | Thfp   | 2    | 2    | 2    | DCLK |                       |
|                | Pulse Width    | Thw    | 1    | 1    | 1    | DCLK |                       |
| VSYNC          | Period Time    | Tv     | 275  | 285  | 303  | H    |                       |
|                | Display Period | Tvdisp | -    | 272  | -    | H    |                       |
|                | Back Porch     | Tvbp   | 2    | 12   | 30   | H    | By V_Blanking Setting |
|                | Front Porch    | Tvfp   | 1    | 1    | 1    | H    |                       |
|                | Pulse Width    | Tvw    | 1    | 1    | 1    | H    |                       |

## - SYNC Mode Timing



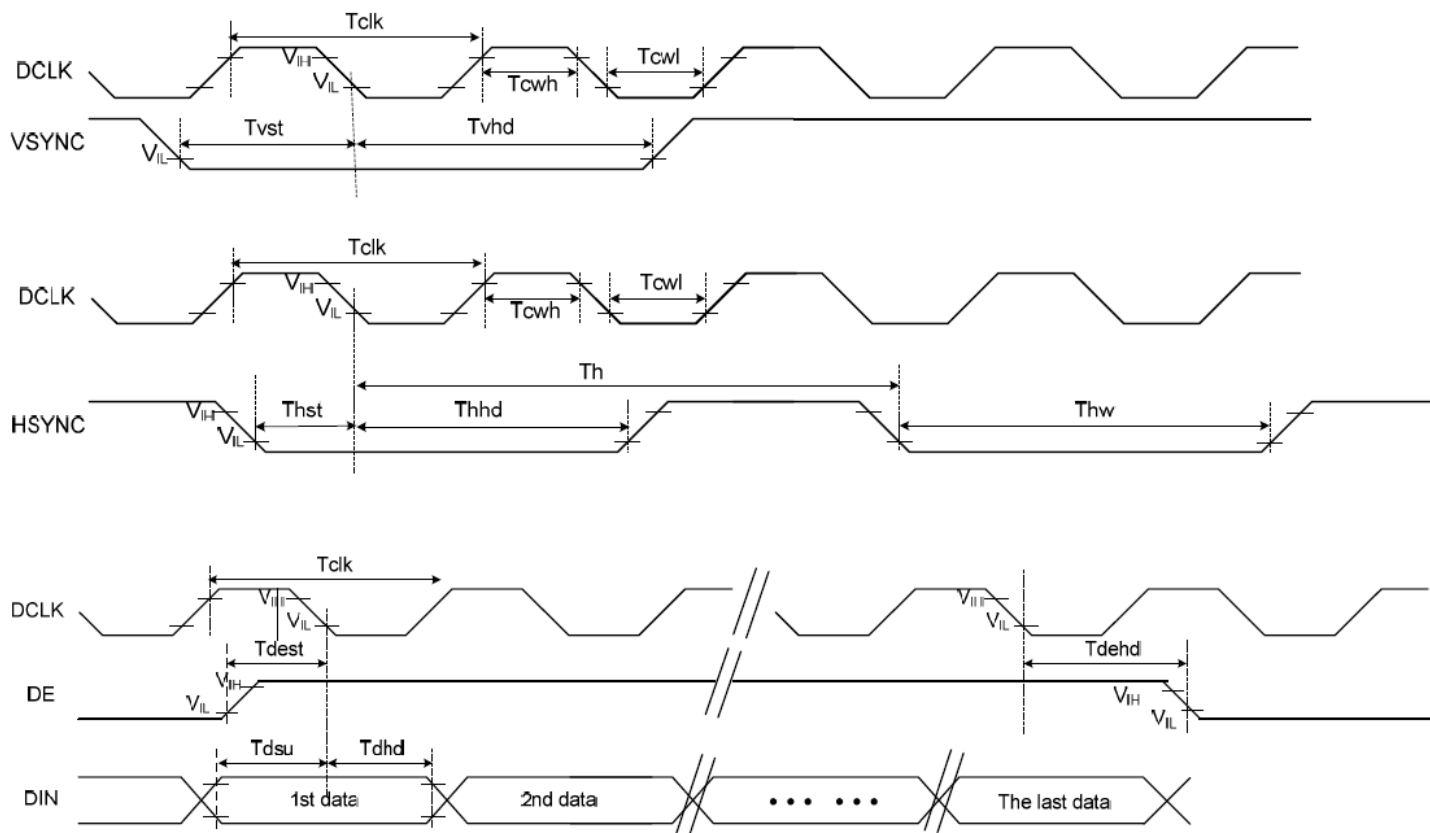
# - SYNC-DE Mode Timing



## Input setup timing requirement

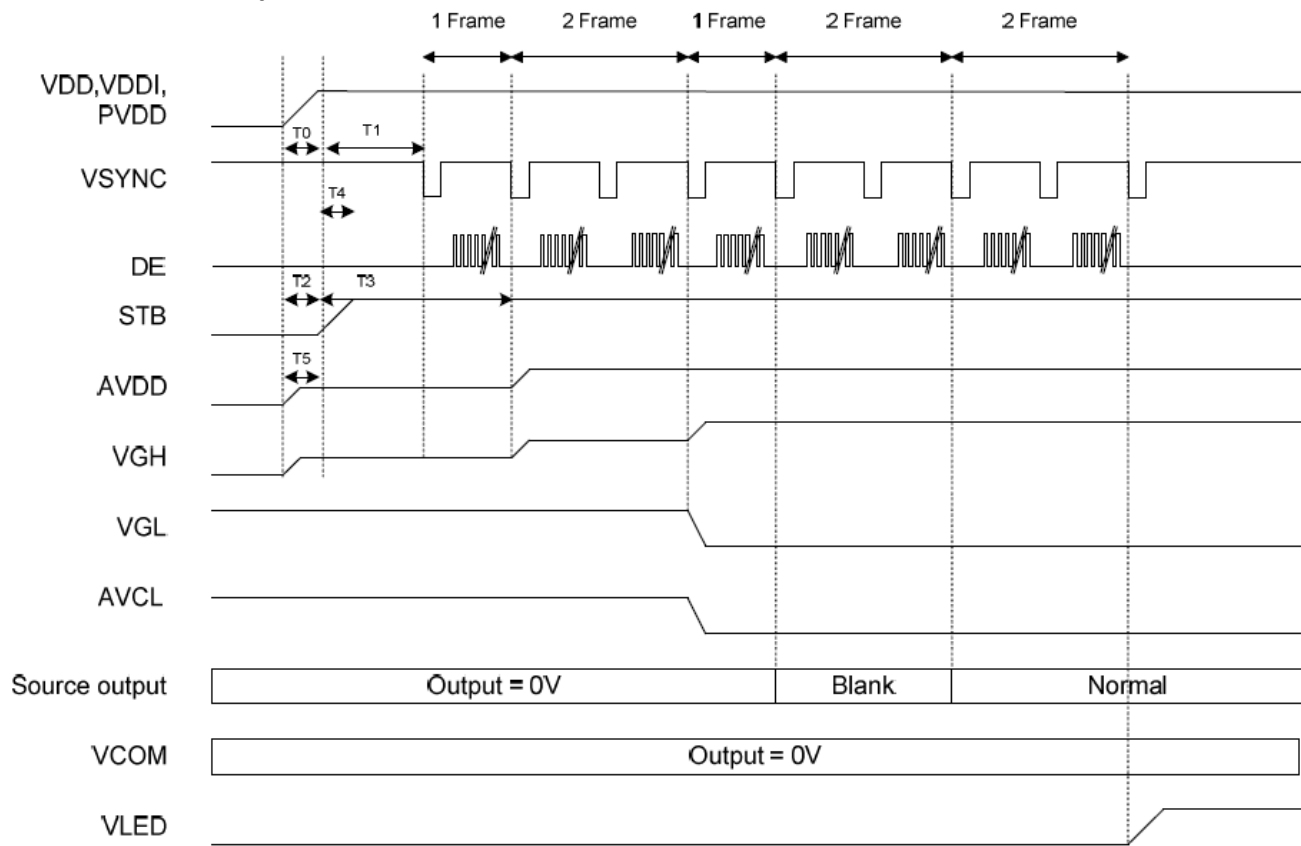
| Item                                   | Symbol | Min. | Typ. | Max. | Unit | Conditions                                           |
|----------------------------------------|--------|------|------|------|------|------------------------------------------------------|
| System Operation Timing                |        |      |      |      |      |                                                      |
| V <sub>DD</sub> Power Source Slew Time | TPOR   | -    | -    | 20   | ms   | From 0V to 99% V <sub>DD</sub>                       |
| GRB Pulse Width                        | tRSTW  | 10   | 50   | -    | μS   | R=10KΩ, 1μF                                          |
| Input / Output Timing                  |        |      |      |      |      |                                                      |
| CLK pulse Duty                         | TCW    | 40   | 50   | 60   | %    |                                                      |
| Hsync Width                            | Thw    | 1    | -    | -    | DCLK |                                                      |
| Hsync Period                           | Th     | 50   | 60   | 65   | μS   |                                                      |
| Vsync setup time                       | Tvst   | 12   | -    | -    | ns   |                                                      |
| Vsync hold time                        | Tvhd   | 12   | -    | -    | ns   |                                                      |
| Hsync setup time                       | Thst   | 12   | -    | -    | ns   |                                                      |
| Hsync hold time                        | Thhd   | 12   | -    | -    | ns   |                                                      |
| Data setup time                        | Tdsu   | 12   | -    | -    | ns   |                                                      |
| Data hold time                         | Tdhd   | 12   | -    | -    | ns   |                                                      |
| SD output stable time                  | Tst    | -    | -    | 12   | μS   | Output settled within +20mV<br>Loading = 6.8k+28.2pF |
| GD output rise and fall time           | Tgst   | -    | -    | 6    | μS   | Output settled (5%~95%)<br>Loading = 4.7k+29.8pF     |

### - Clock And Data Input Timing Diagram



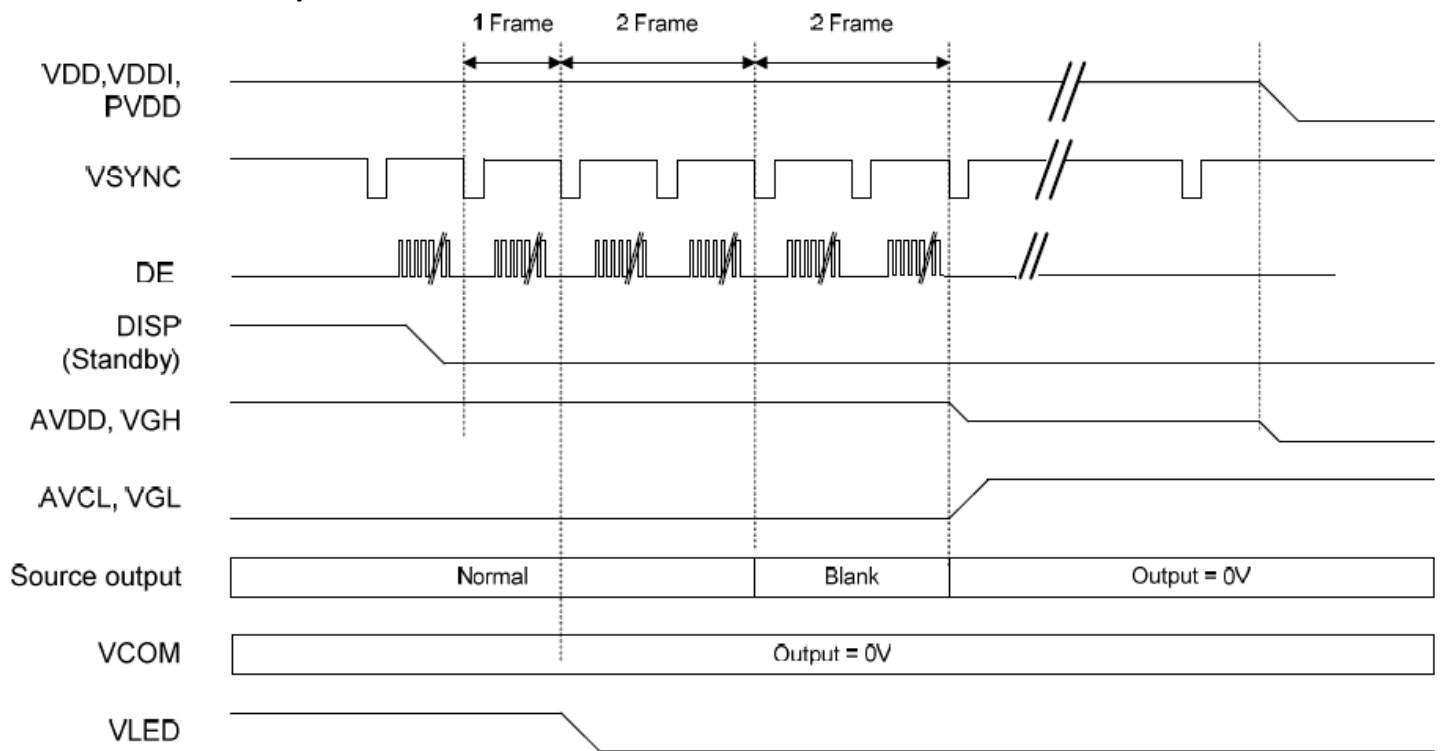
## Power On/Off Sequence

### - Power On Sequence



|    | Description                                                | Min. Time        |
|----|------------------------------------------------------------|------------------|
| T0 | Determined by the external power                           |                  |
| T1 | Time from stable VDD, VDDI, PVDD set-up to the first VSYNC | T1=0             |
| T2 | Time from AVDD=0V to AVDD=3.3V                             | T2=T0            |
| T3 | Time from AVDD=3.3V to AVDD=6.0V                           | T3=T1+ (1*Frame) |
| T4 | Time from stable VDD, VDDI, PVDD set-up to DISP asserted   | T4=0             |
| T5 | Time from VGH=0V to VGH=3.3V                               | T5=T0            |

## - Power Off 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 , 96 Hrs.                                                                                                   | 2    |
| Low Temperature storage               | Endurance test applying the low storage temperature for a long time.                                                            | -30°C , 96 Hrs.                                                                                                   | 1,2  |
| High Temperature Operation            | Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.                    | +70°C , 96 Hrs.                                                                                                   | 2    |
| Low Temperature Operation             | Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.                     | -20°C , 96 Hrs.                                                                                                   | 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 , 96 Hrs.                                                                                          | 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 -> 25°C,5min -> 70°C,60min = 1 cycle<br>20 cycles                                                     | -    |
| Vibration test                        | Endurance test applying vibration to simulate transportation and use.                                                           | 10-50Hz , 15mm amplitude.<br>30 Min. Each Direction<br>X,Y,Z                                                      | 3    |
| Static electricity test               | Endurance test applying electric static discharge.                                                                              | Air: V <sub>s</sub> =±8KV, Contact: V <sub>s</sub> =±4KV<br>R <sub>s</sub> =330Ω C <sub>s</sub> =150pF<br>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](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information

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