

# NHD-4.3-480272EF-ASXN#-T

## 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 |
| S-      | Sunlight Readable               |
| X-      | TFT                             |
| N-      | TN, Wide Temperature            |
| #-      | <b>RoHS Compliant</b>           |
| T-      | 4-wire Resistive Touch Panel    |

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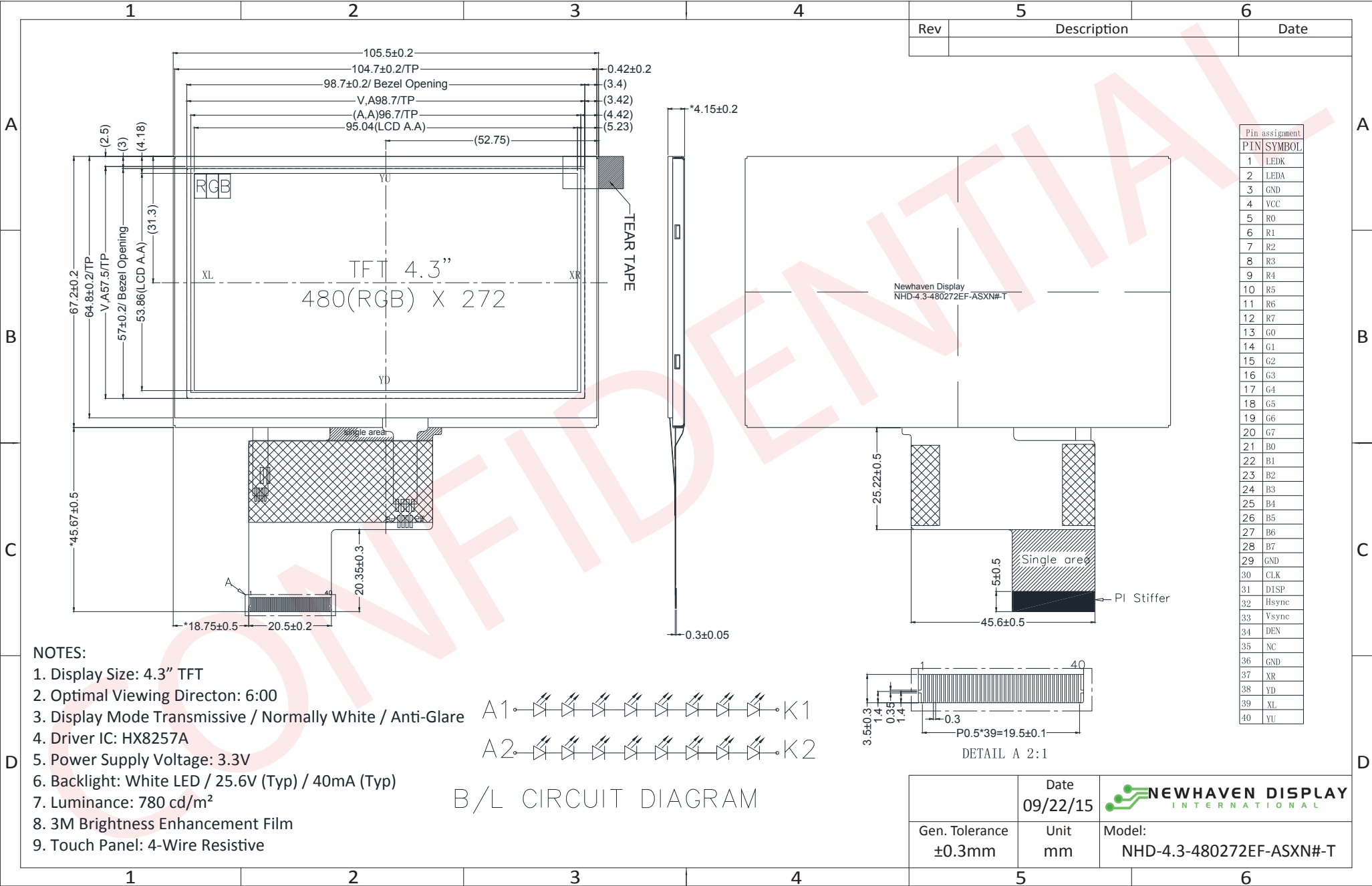
## Document Revision History

| Revision | Date    | Description     | Changed by |
|----------|---------|-----------------|------------|
| 0        | 9/22/15 | Initial Release | SB         |

## Functions and Features

- 480xRGBx272 resolution, up to 16.7M colors
- 16-LED backlight
- 24 bit RGB interface
- Sunlight readable
- 4-wire Resistive touch panel

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-    | Power Supply        | Backlight Cathode                       |
| 2       | LED+    | Power Supply        | Backlight Anode (40mA @ 25.6V)          |
| 3       | GND     | Power Supply        | Ground                                  |
| 4       | VDD     | 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                   |
| 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      | Touch Controller    | Touch Panel Right                       |
| 38      | YD      | Touch Controller    | Touch Panel Down                        |
| 39      | XL      | Touch Controller    | Touch Pane Left                         |
| 40      | YU      | Touch Controller    | Touch Panel Up                          |

**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    | -                         | -       | 28     | -       | mA   |
| "H" level input             | Vih    | -                         | 0.7*VDD | -      | VDD     | V    |
| "L" level input             | Vil    | -                         | 0       | -      | 0.3*VDD | V    |
|                             |        |                           |         |        |         |      |
| Backlight Supply Voltage    | VLED   | -                         | 23.2    | 25.6   | 26.4    | V    |
| Backlight Supply Current    | ILED   | -                         | -       | 40     | -       | mA   |
| Backlight Lifetime*         | -      | ILED = 40mA<br>Top = 25°C | 20,000  | 50,000 | -       | hrs  |

\*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    | Cr ≥ 10   | -    | 50   | -    | °                 |
|                        | Bottom |           | -    | 70   | -    | °                 |
|                        | Left   |           | -    | 70   | -    | °                 |
|                        | Right  |           | -    | 70   | -    | °                 |
| Contrast Ratio         | Cr     | -         | 400  | 500  | -    | -                 |
| Luminance              | Lv     | -         | 620  | 780  | -    | cd/m <sup>2</sup> |
| Response Time          | Rise   | Tr        | -    | 25   | 30   | ms                |
|                        | Fall   | Tf        | -    | 25   | 30   | ms                |

## Touch Panel Characteristics

| Item                        | Min.      | Typ. | Max. | Unit       |
|-----------------------------|-----------|------|------|------------|
| Linearity                   | -1.5      | -    | 1.5  | %          |
| Circuit Resistance – X-Axis | 350       | -    | 1050 | Ω          |
| Circuit Resistance – Y-Axis | 100       | -    | 450  | Ω          |
| Insulation Resistance       | 20        | -    | -    | MΩ         |
| Operating Voltage           | -         | -    | 10   | V          |
| Chattering                  | -         | -    | 10   | ms         |
| Transmittance               | 80        | -    | -    | %          |
| Activation Force            | 30        | -    | 120  | g          |
| Pen Writing Durability      | 20,000    | -    | -    | Characters |
| Pitting Durability          | 1,000,000 | -    | -    | Touches    |
| Surface Hardness            | 3         | -    | -    | H          |
| Haze                        | 4         | 7    | 10   | %          |

## Driver Information

Built-in Himax HX8257-A driver.

Please download specification at [http://www.newhavendisplay.com/app\\_notes/HX8257.pdf](http://www.newhavendisplay.com/app_notes/HX8257.pdf)

## Timing Characteristics

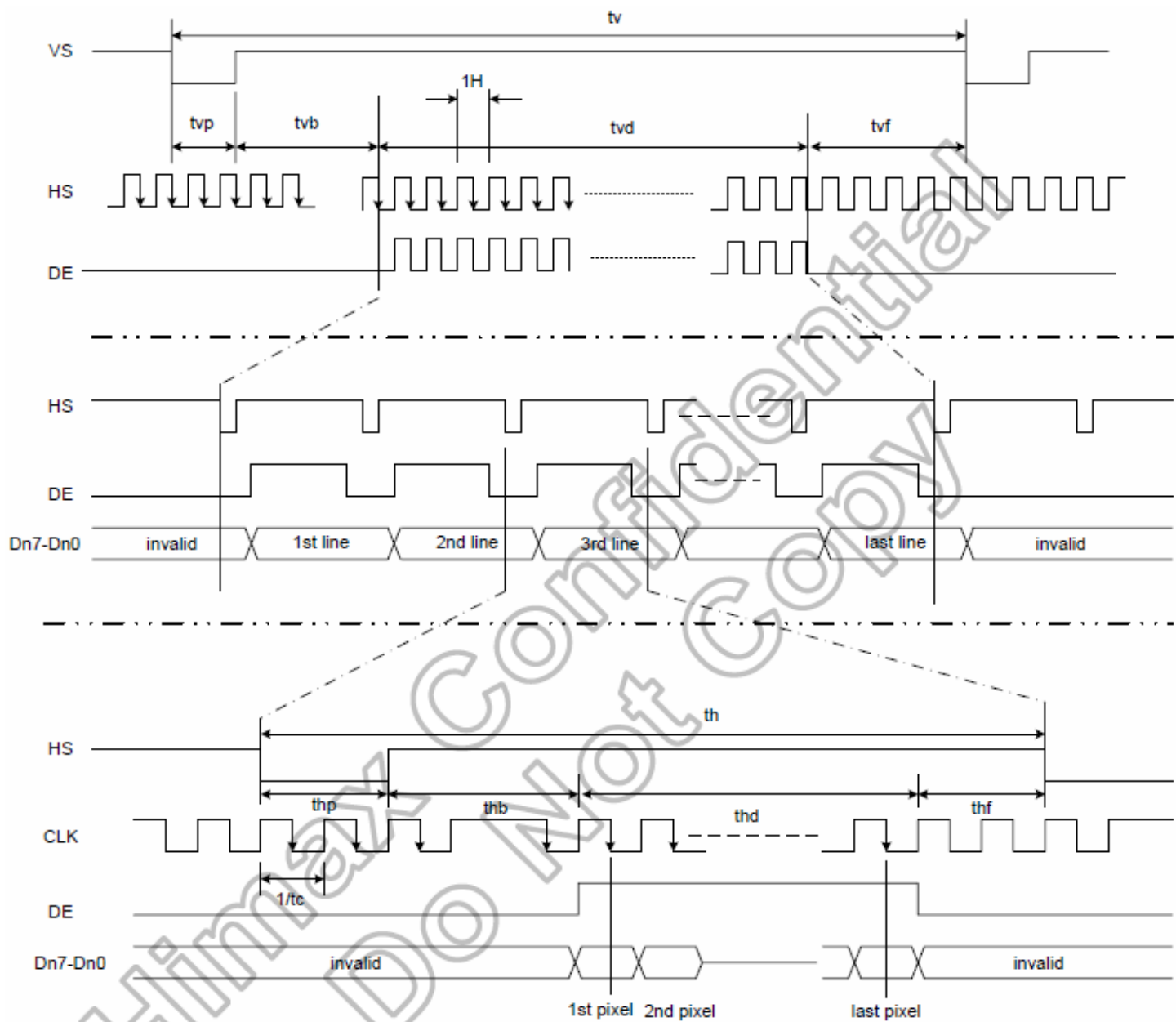
### Parallel RGB input timing requirement

(480RGBx272,  $T_A=25^{\circ}\text{C}$ ,  $V_{DDIO}=1.8\text{V}$  to  $3.6\text{V}$ ,  $DVSS=0\text{V}$ )

| 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   | 399  | $\text{H}^{(1)}$ |
| 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.



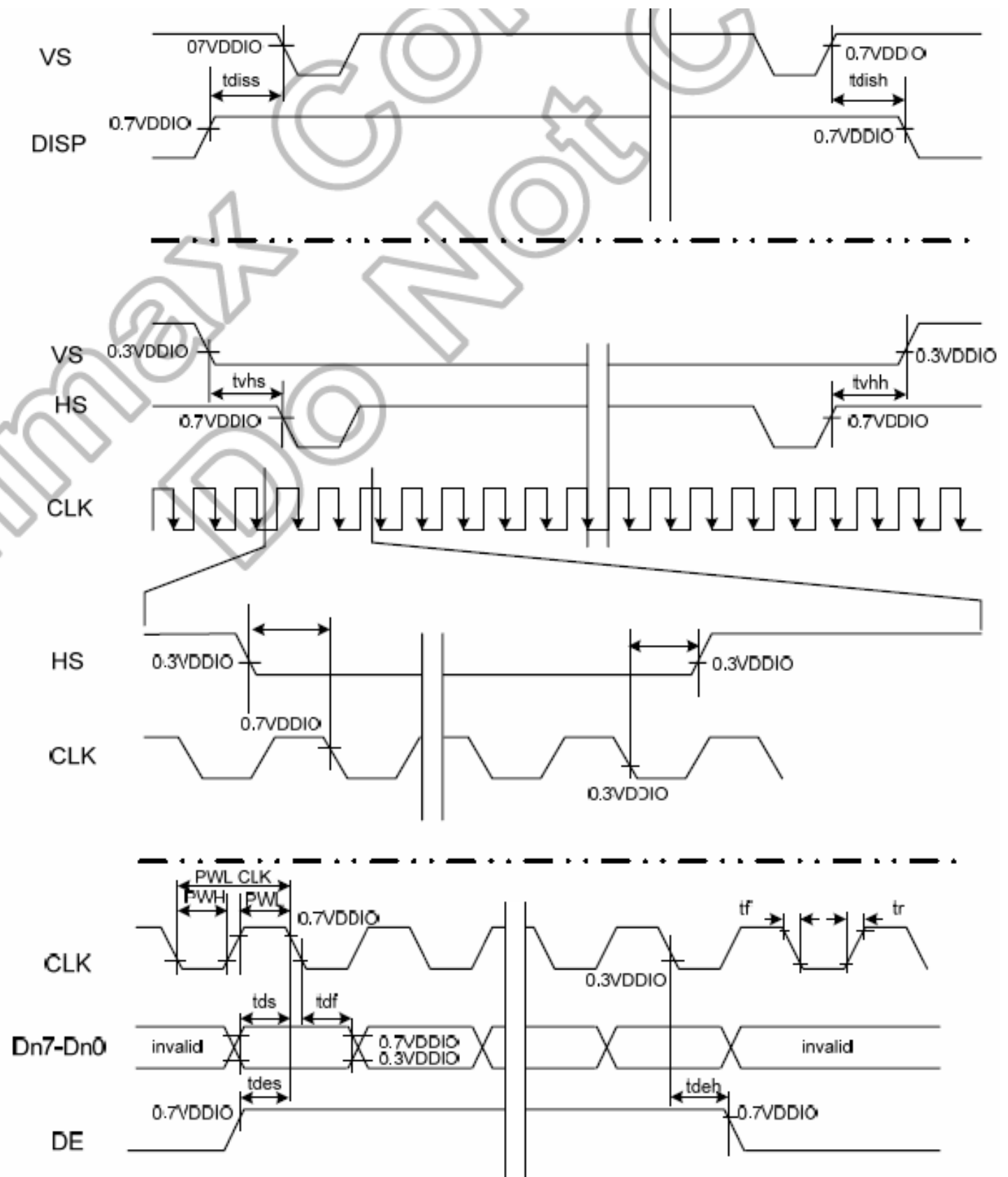
## Input setup timing requirement

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

| Parameter               | Symbol           | Spec. |      |      | Unit |
|-------------------------|------------------|-------|------|------|------|
|                         |                  | Min.  | Typ. | Max. |      |
| DISP setup time         | $t_{diss}$       | 10    | -    | -    | ns   |
| DISP hold time          | $t_{dish}$       | 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.



## 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. | +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

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