

# NHD-4.3-800480CF-ASXP

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

|         |                                      |
|---------|--------------------------------------|
| NHD-    | Newhaven Display                     |
| 4.3-    | 4.3" Diagonal                        |
| 800480- | 800xRGBx480 Pixels                   |
| CF-     | Model                                |
| A-      | Built-in Driver / No Controller      |
| S-      | High Brightness, White LED Backlight |
| X-      | TFT                                  |
| P-      | IPS, Wide Temperature                |

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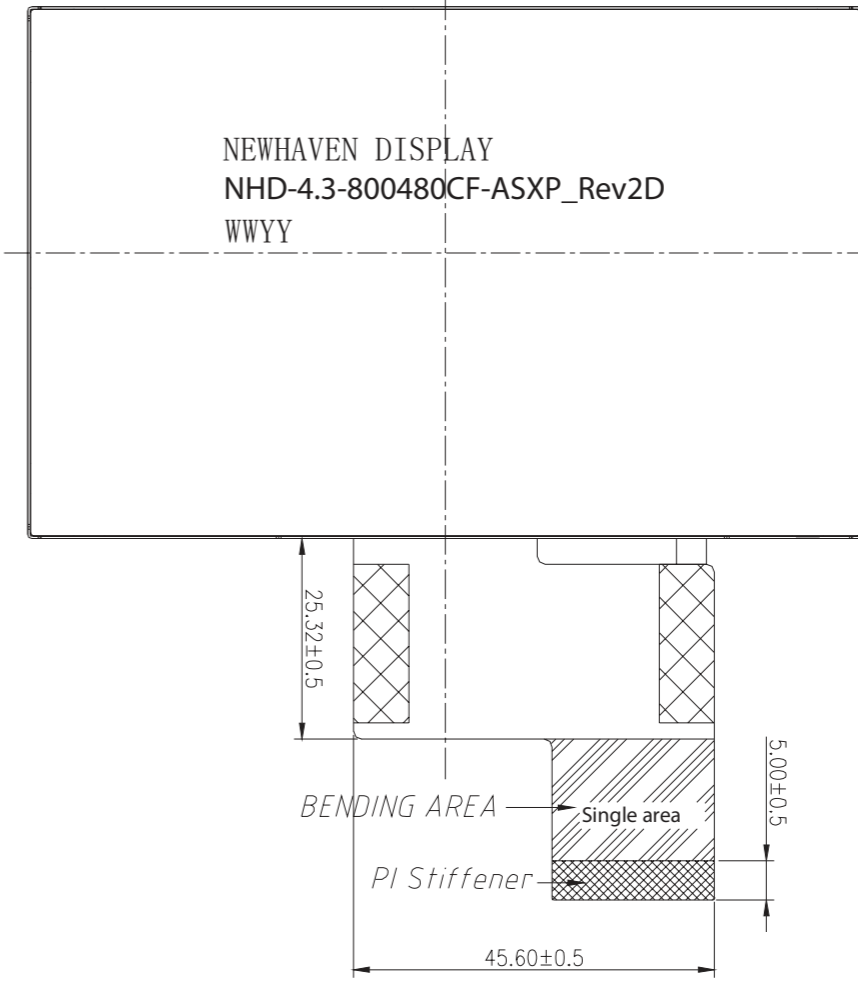
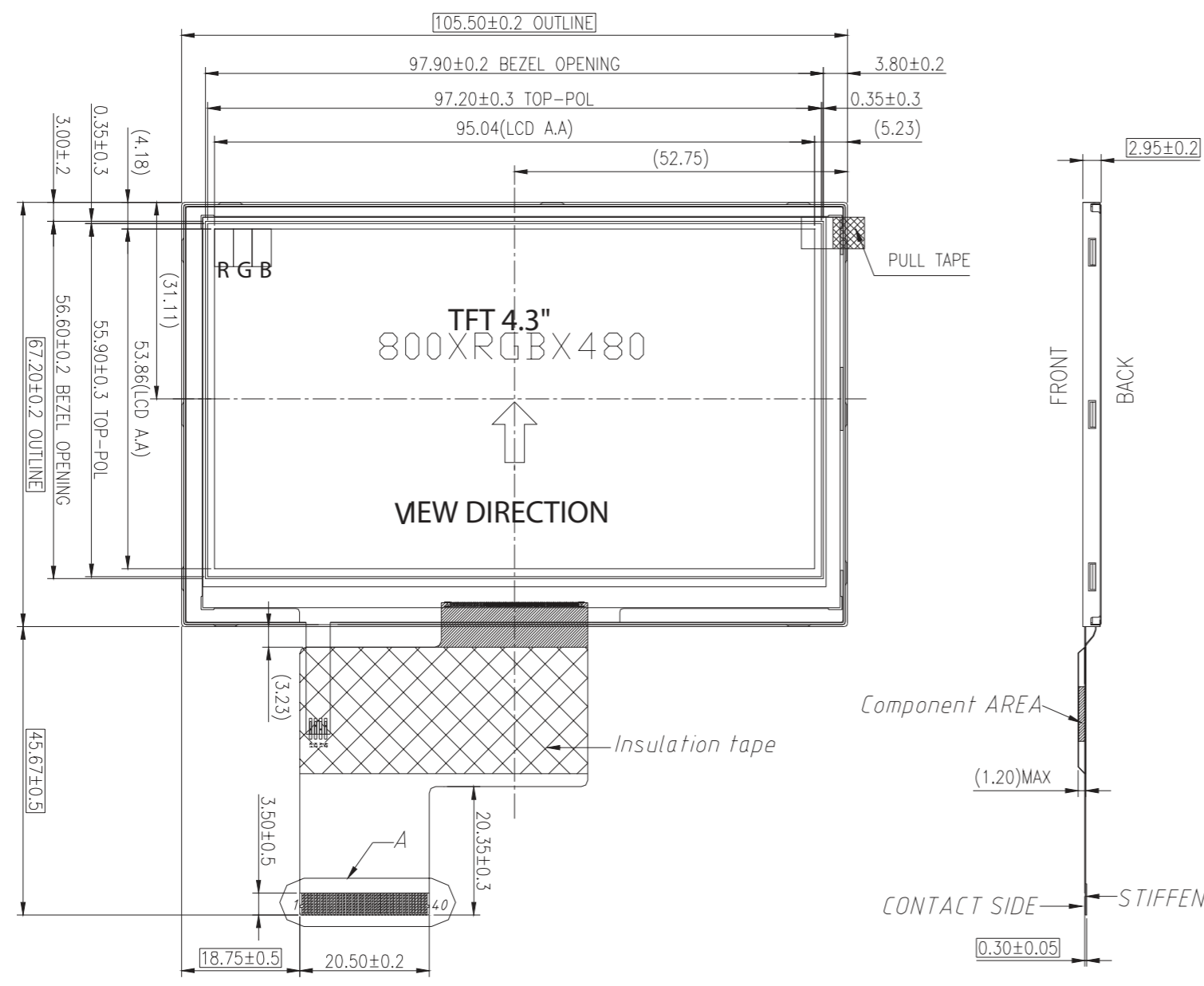
## Document Revision History

| Revision | Date     | Description   | Changed by |
|----------|----------|---|------------|
| -        | 10/20/19 | Initial Release   | PK         |
| 1        | 5/12/20  | Update to 2D Mechanical Drawing, Static Electricity Test Conditions | AS         |

## Functions and Features

- 800xRGBx480 resolution, up to 16.7M colors
- High-brightness LED backlight
- IPS Type, Full Viewing Angles
- 24-Bit RGB interface

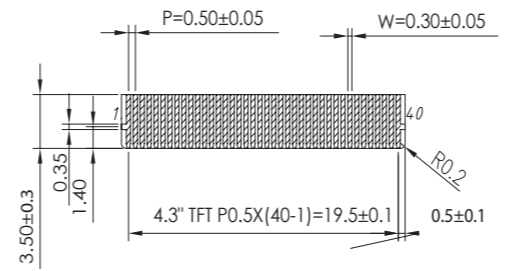
| SYMBOL | REVISION | DATE |
|--------|----------|------|
|        |          |      |
|        |          |      |



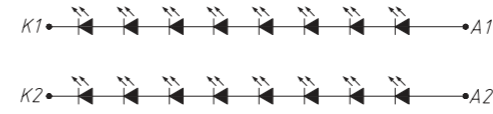
**Pin Assignment**

| Pin No. | Symbol          |
|---------|-----------------|
| 1       | LED-            |
| 2       | LED+            |
| 3       | GND             |
| 4       | V <sub>DD</sub> |
| 5-12    | [R0-R7]         |
| 13-20   | [G0-G7]         |
| 21-28   | [B0-B7]         |
| 29      | GND             |
| 30      | CLK             |
| 31      | DISP            |
| 32      | HSYNC           |
| 33      | VSYNC           |
| 34      | DEN             |
| 35      | BIST            |
| 36      | GND             |
| 37      | NC              |
| 38      | NC              |
| 39      | NC              |
| 40      | NC              |

- Notes:
1. Display Size: 4.3" TFT
  2. Optimal View: Full View IPS
  3. Display Mode: Transmissive / Normally Black / Anti-Glare
  4. Driver IC: EK9716BE3+EK73002AB2
  5. Supply Voltage: 3.3V
  6. Backlight: White LED / 25.6V / 40mA (Typ)
  7. Luminance: 850 cd/m<sup>2</sup> (Typ)
  8. 3M Brightness Enhancement Film



**Detail A**



White LED 40mA/25.6V(TYP)  
LED Circuit diagram

|   |  |  |                            |
|---|--|--|----------------------------|
| STANDARD TOLERANCE:<br>(UNLESS OTHERWISE SPECIFIED)   |  | <b>NEWHAVEN DISPLAY</b><br>INTERNATIONAL             |                            |
| LINEAR: ±0.3mm  |  | DRAWING/PART NUMBER:<br><b>NHD-4.3-800480CF-ASXP</b> | REVISION:<br>2D            |
| UNLESS OTHERWISE SPECIFIED:<br>- DIMENSIONS ARE IN MILLIMETERS<br>- THIRD ANGLE PROJECTION  |  | DRAWN BY:<br>A. Shah                                 | APPROVED BY:<br>A. Shah    |
|   |  | DRAWN DATE:<br>05/12/20                              | APPROVED DATE:<br>05/12/20 |
|   |  | DO NOT SCALE DRAWING                                 |                            |
|   |  | SHEET 1 OF 1   |                            |
| THIS DRAWING IS SOLELY THE PROPERTY OF NEWHAVEN DISPLAY INTERNATIONAL, INC. THE INFORMATION IT CONTAINS IS NOT TO BE DISCLOSED, REPRODUCED OR COPIED IN WHOLE OR PART WITHOUT WRITTEN APPROVAL FROM NEWHAVEN DISPLAY. |  |  |                            |

## Pin Description

| Pin No. | Symbol  | External Connection | Function Description  |
|---------|---------|---------------------|---|
| 1       | LED-    | Power Supply        | Backlight Cathode (Ground)  |
| 2       | LED+    | Power Supply        | Backlight Anode (25.6V @ 40 mA)   |
| 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                 | Pixel Clock signal  |
| 31      | DISP    | MPU                 | Display ON/OFF Signal   |
| 32      | HSYNC   | MPU                 | Line synchronization signal   |
| 33      | VSYNC   | MPU                 | Frame synchronization signal  |
| 34      | DEN     | MPU                 | Data Enable signal  |
| 35      | BIST    | MPU                 | Built in Self-Test. BIST = H: Self-Test Enabled. BIST = L: Normal Operation (Default) |
| 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:** 54104-4031 (top contact)

## 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>  | -   | 2.4                   | 3.3    | 3.5                   | V    |
| Supply Current              | I <sub>DD</sub>  | V <sub>DD</sub> = 3.3V                            | 80                    | 160    | 240                   | 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>  | -   | GND                   | -      | 0.3 * V <sub>DD</sub> | V    |
| Backlight Supply Current    | I <sub>LED</sub> | -   | 30                    | 40     | 50                    | mA   |
| Backlight Supply Voltage    | V <sub>LED</sub> | I <sub>LED</sub> = 40mA<br>T <sub>OP</sub> = 25°C | 22.4                  | 25.6   | 27.2                  | V    |
| Backlight Lifetime*         | -                |   | 30,000                | 50,000 | -                     | Hrs. |

\*Backlight is current driven; do not supply more than 50mA. 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                | -     | 80    | -                 | °  |    |
|                        | Bottom         | φY-                            |                        | -     | 80    | -                 | °  |    |
|                        | Left           | θX-                            |                        | -     | 80    | -                 | °  |    |
|                        | Right          | θX+                            |                        | -     | 80    | -                 | °  |    |
| Contrast Ratio         | CR             | -                              | 640                    | 800   | -     | -                 |    |    |
| Luminance              | L <sub>V</sub> | I <sub>LED</sub> = 40 mA       | 680                    | 850   | -     | cd/m <sup>2</sup> |    |    |
| Response Time          | Rise + Fall    | T <sub>R</sub> +T <sub>F</sub> | T <sub>OP</sub> = 25°C |       | -     | 30                | 40 | ms |
| Chromaticity           | Red            | X <sub>R</sub>                 | -                      | 0.558 | 0.598 | 0.638             | -  |    |
|                        |                | Y <sub>R</sub>                 | -                      | 0.305 | 0.345 | 0.385             | -  |    |
|                        | Green          | X <sub>G</sub>                 | -                      | 0.335 | 0.375 | 0.415             | -  |    |
|                        |                | Y <sub>G</sub>                 | -                      | 0.521 | 0.561 | 0.601             | -  |    |
|                        | Blue           | X <sub>B</sub>                 | -                      | 0.103 | 0.143 | 0.183             | -  |    |
|                        |                | Y <sub>B</sub>                 | -                      | 0.062 | 0.102 | 0.142             | -  |    |
| White                  | X <sub>W</sub> | -                              | 0.269                  | 0.309 | 0.349 | -                 |    |    |
|                        | Y <sub>W</sub> | -                              | 0.279                  | 0.319 | 0.355 | -                 |    |    |

\* Luminance is directly related to Backlight Supply Current.

## Driver Information

Built-in EK9716B Source Driver: [https://www.newhavendisplay.com/appnotes/datasheets/LCDs/EK9716B\\_v1-1.pdf](https://www.newhavendisplay.com/appnotes/datasheets/LCDs/EK9716B_v1-1.pdf)

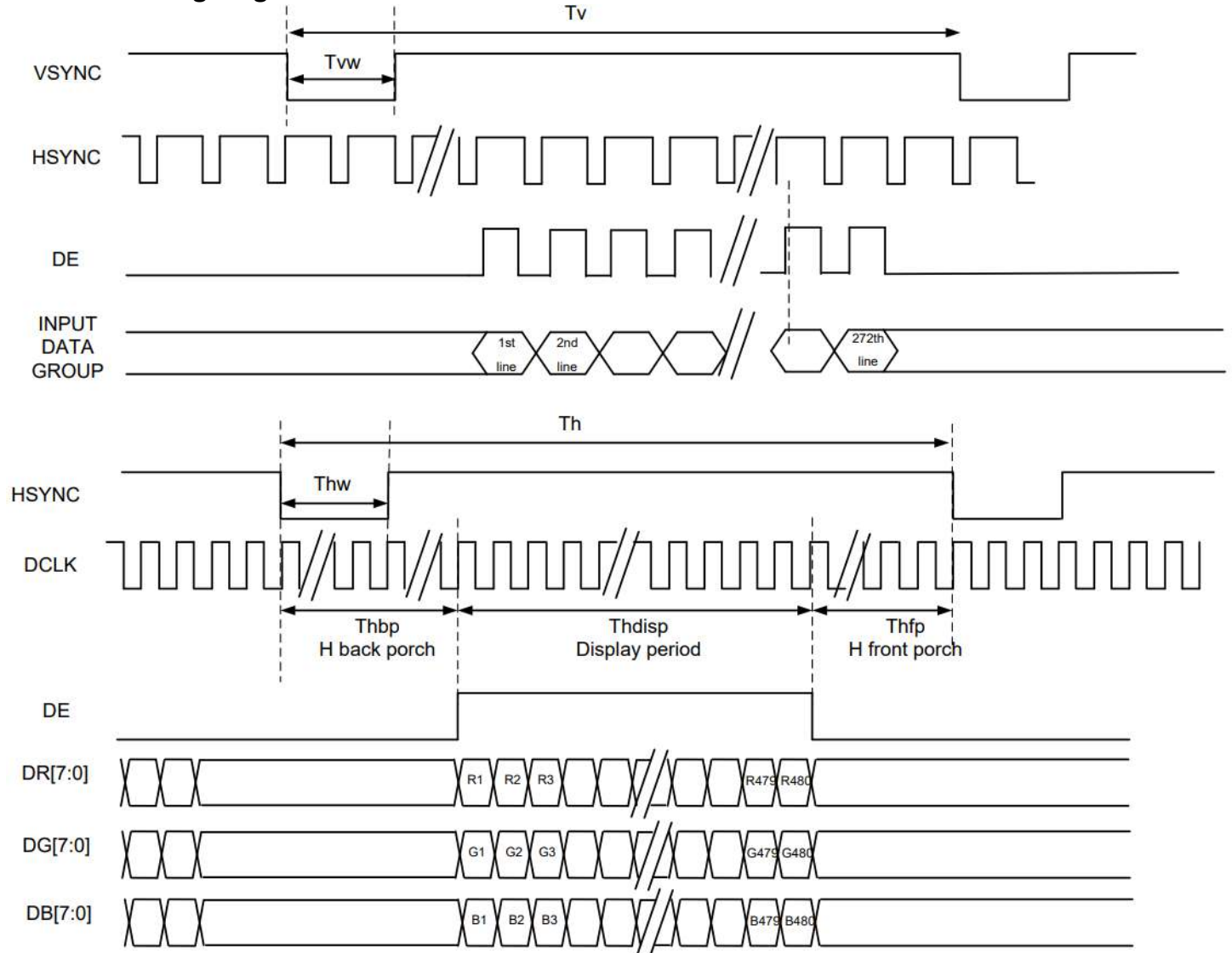
Built-in EK73002AB2 Gate Driver: <https://www.newhavendisplay.com/appnotes/datasheets/LCDs/EK73002AB2.pdf>

# Timing Characteristics

## Parallel RGB Input Timing Requirements

| Item           | Symbol         | Min.   | Typ. | Max. | Unit | Remark |                               |
|----------------|----------------|--------|------|------|------|--------|-------------------------------|
| DCLK Frequency | Fclk           | 28.2   | 29.2 | 40   | MHz  | -      |                               |
| DLCK Period    | Tclk           | 25     | 34   | -    | ns   | -      |                               |
| HSYNC          | Period Time    | Th     | 908  | 928  | 1088 | DCLK   | Thw + Thbp = 88 DLCK is fixed |
|                | Display Period | Thdisp | 800  |      |      | DCLK   |                               |
|                | Pulse Width    | Thw    | 1    | 48   | 87   | DCLK   |                               |
|                | Back Porch     | Thbp   | 87   | 40   | 1    | DCLK   |                               |
|                | Front Porch    | Thfp   | 20   | 40   | 200  | DCLK   | -                             |
| VSYNC          | Period Time    | Tv     | 517  | 525  | 613  | H      | Tvw + Tvbp = 32 H is fixed    |
|                | Display Period | Tvdisp | 480  |      |      | H      |                               |
|                | Pulse Width    | Tvw    | 1    | 1    | 3    | H      |                               |
|                | Back Porch     | Tvbp   | 31   | 31   | 29   | H      |                               |
|                | Front Porch    | Tvfp   | 5    | 13   | 101  | H      | -                             |

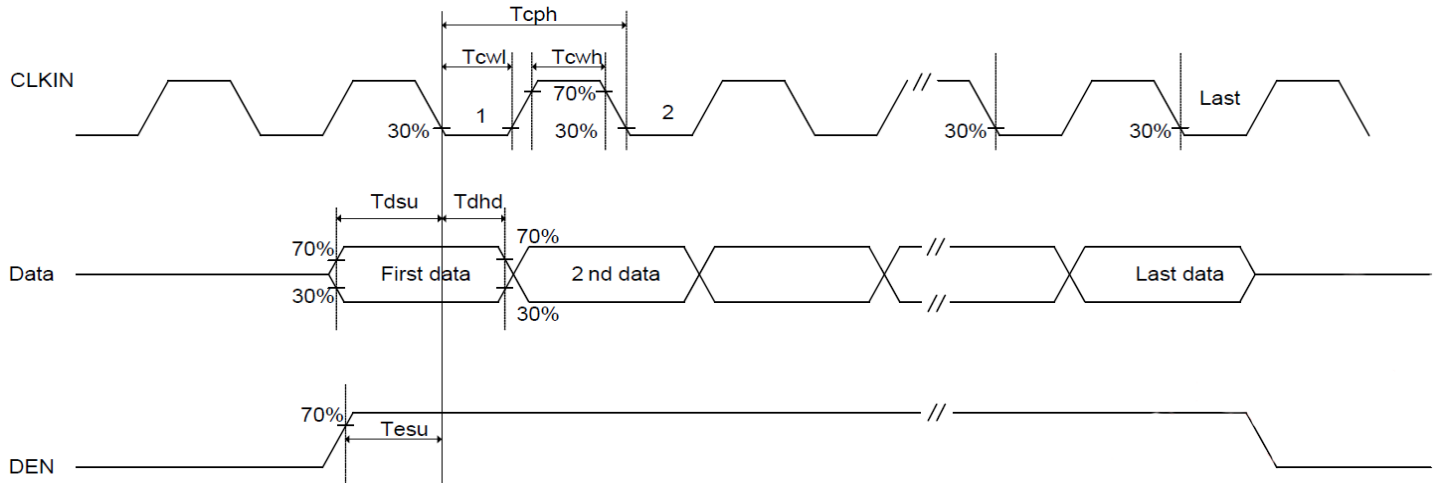
## DE Mode Timing Diagram



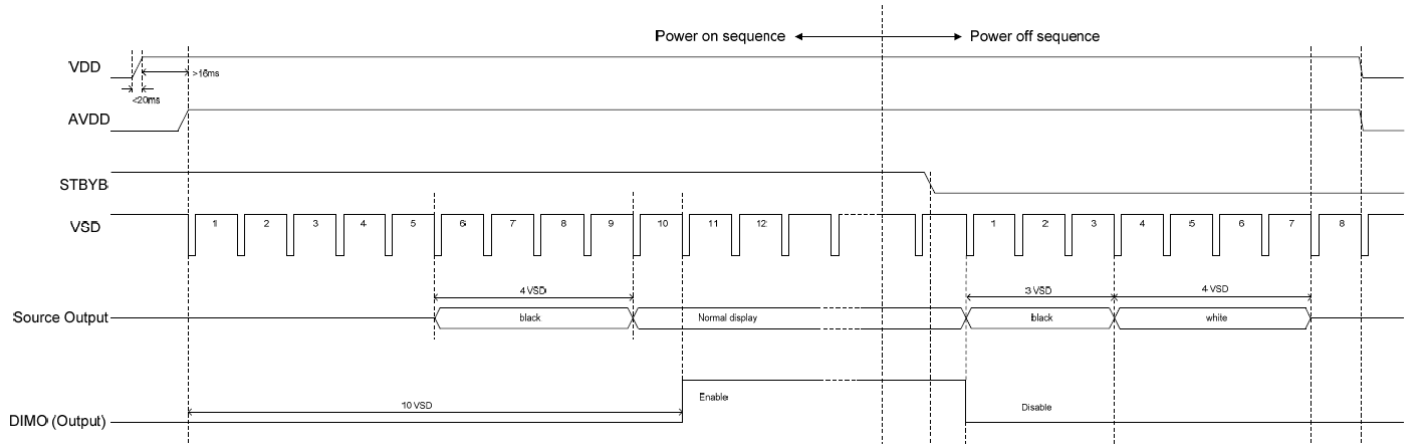
## Input Setup Timing Requirements

| Item                                   | Symbol           | Min. | Typ. | Max. | Unit | Conditions                     |
|--|------------------|------|------|------|------|--------------------------------|
| V <sub>DD</sub> Power Source Slew Time | T <sub>por</sub> | -    | -    | 20   | ms   | From 0V to 90% V <sub>DD</sub> |
| CLK cycle time                         | T <sub>cph</sub> | 25   | -    | -    | ns   | -                              |
| CLK pulse duty                         | T <sub>cwh</sub> | 40   | 50   | 60   | %    | -                              |
| Data setup time                        | T <sub>dsu</sub> | 8    | -    | -    | ns   | -                              |
| Data hold time                         | T <sub>dhd</sub> | 8    | -    | -    | ns   | -                              |
| DEN setup time                         | T <sub>esu</sub> | 8    | -    | -    | ns   | -                              |
| DEN hold time                          | T <sub>ehd</sub> | 8    | -    | -    | ns   | -                              |

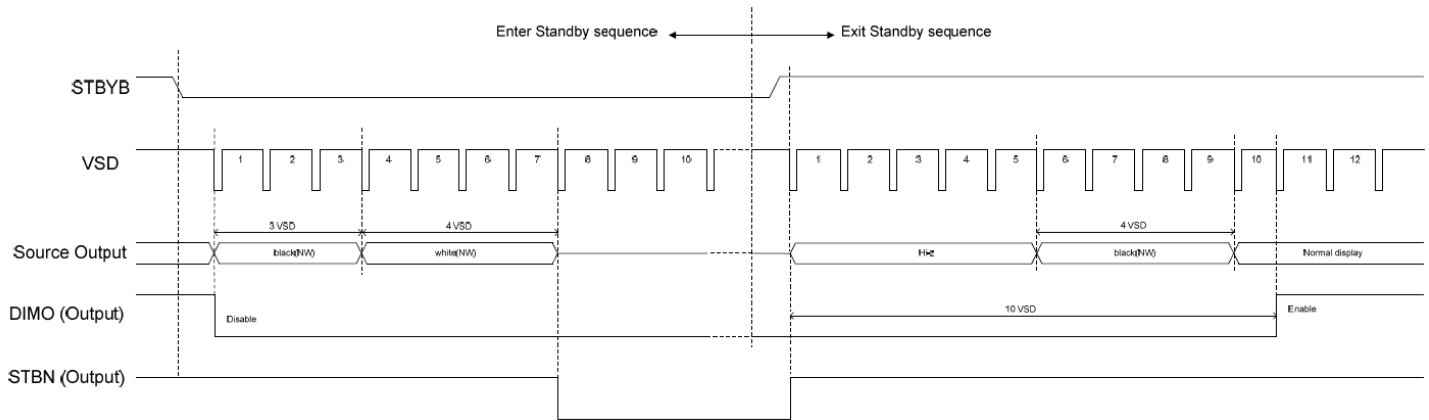
## Input Setup Timing Diagram



## 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, 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. | +60°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,30min -> 25°C,5min ->70°C,30min -> 25°C,5min<br>= 1 cycle, 10 cycles | -    |
| Vibration test                        | Endurance test applying vibration to simulate transportation and use.   | 10-55Hz, 1.5mm amplitude.<br>2 hours. Each Direction<br>X, Y, Z            | 3    |
| Static electricity test               | Endurance test applying electric static discharge.  | Air: $V_s = \pm 8KV$ , Contact: $V_s = \pm 4KV$<br>For 5 times each.       | -    |

**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)