

**Product Specification** 

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# NHD-4.3-480272EF-ASXP-T

## TFT Liquid Crystal Display

|                |                                      |
|----------------|--------------------------------------|
| <b>NHD-</b>    | Newhaven Display                     |
| <b>4.3-</b>    | 4.3" Diagonal                        |
| <b>320240-</b> | 480xRGBx272 Pixels                   |
| <b>EF-</b>     | Model                                |
| <b>A-</b>      | Built-In Driver / No Controller      |
| <b>S-</b>      | High Brightness, White LED Backlight |
| <b>X-</b>      | TFT                                  |
| <b>P-</b>      | IPS, Wide Temperature                |
| <b>T-</b>      | 4-Wire Resistive Touch Panel         |

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## Additional Resources

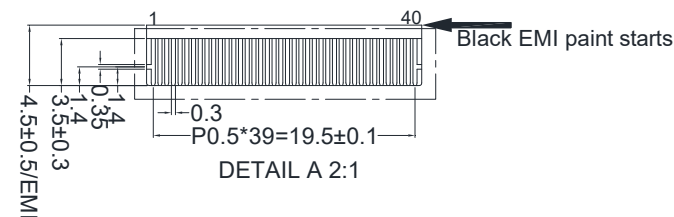
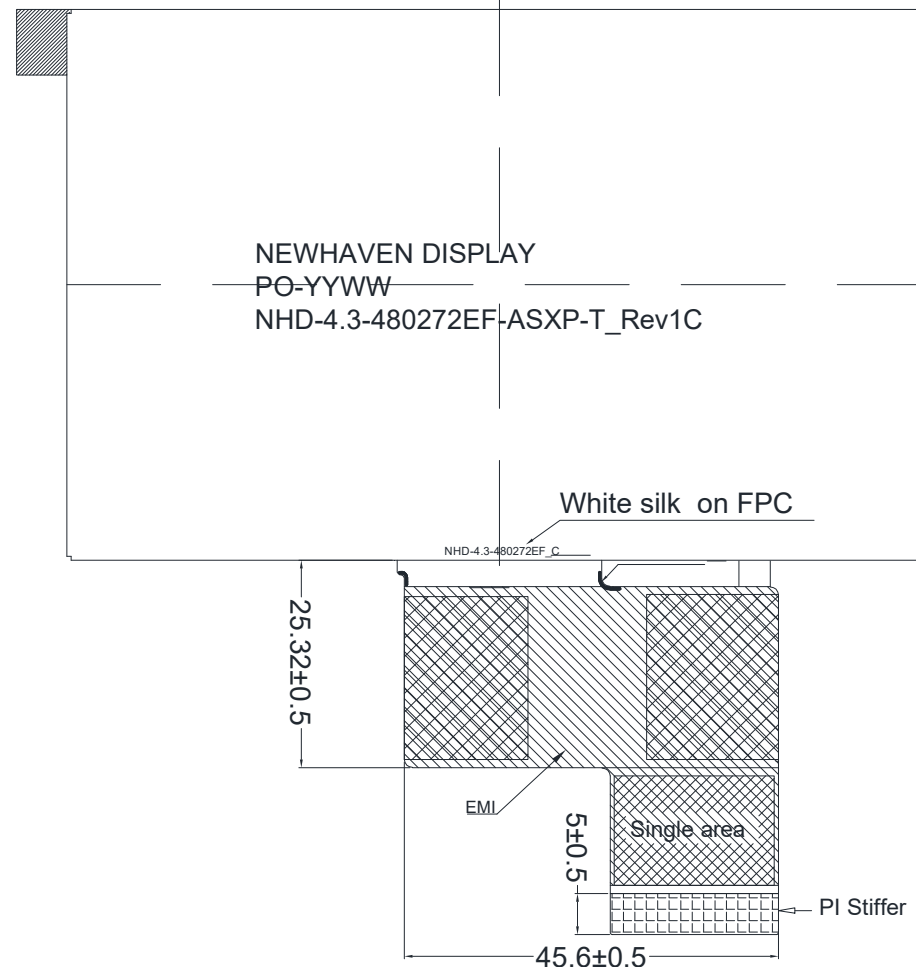
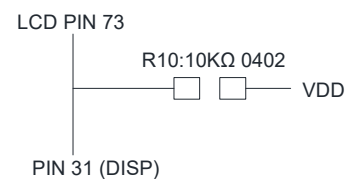
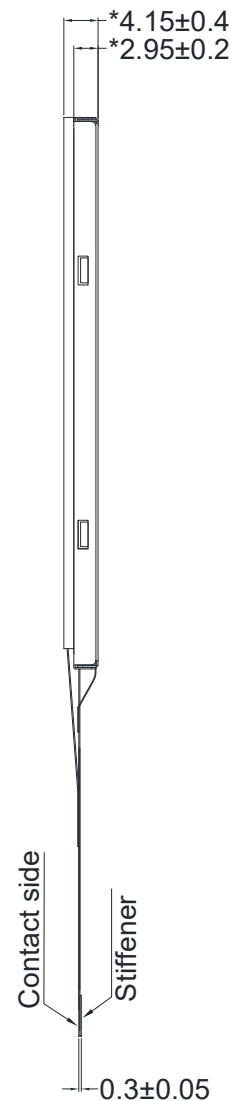
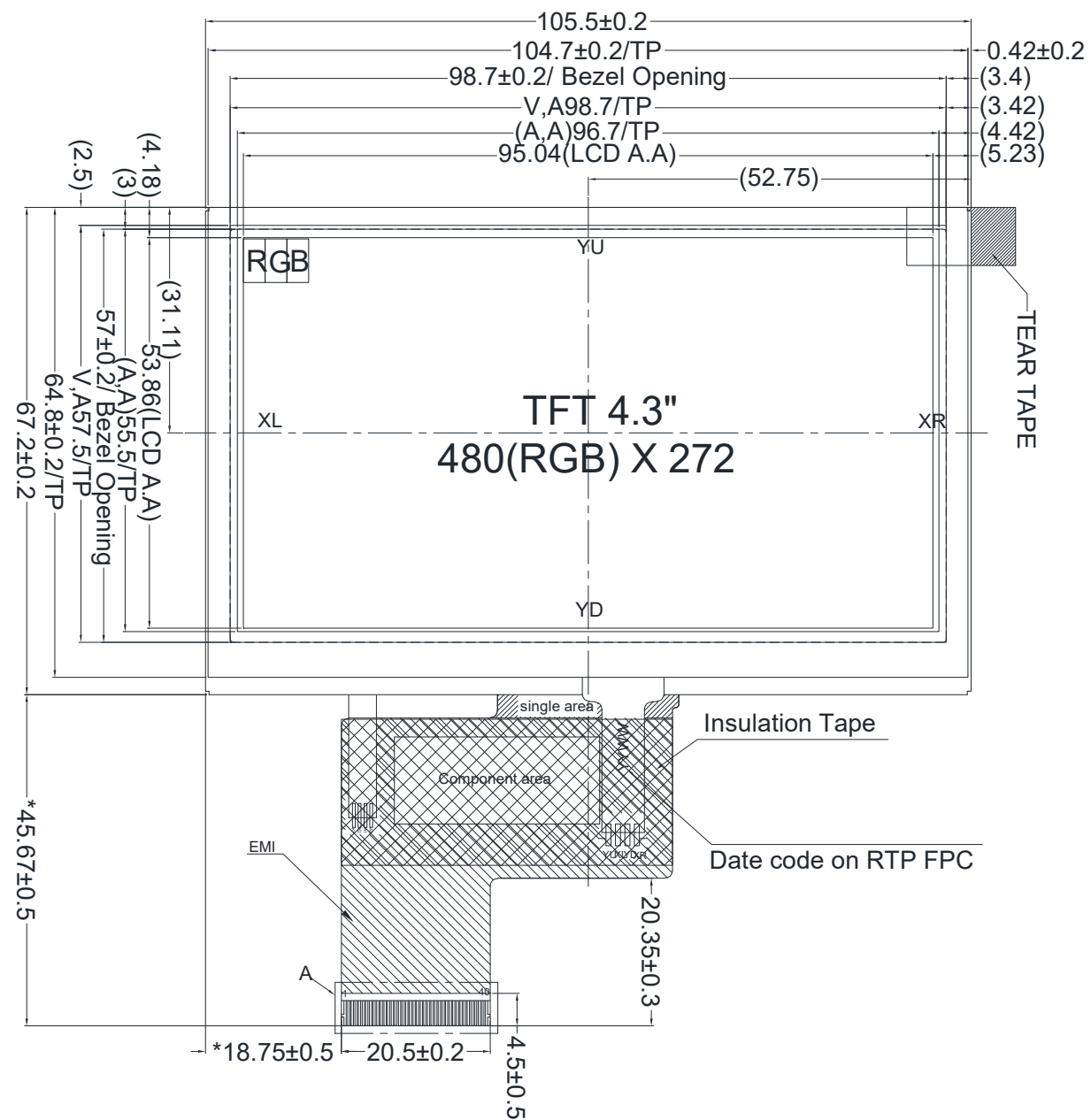
- Support Forum: <https://support.newhavendisplay.com/hc/en-us/community/topics>
- GitHub: <https://github.com/newhavendisplay>
- Example Code: <https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/>
- Knowledge Center: [https://www.newhavendisplay.com/knowledge\\_center.html](https://www.newhavendisplay.com/knowledge_center.html)
- Quality Center: [https://www.newhavendisplay.com/quality\\_center.html](https://www.newhavendisplay.com/quality_center.html)
- Precautions for using LCDs/LCMs: <https://www.newhavendisplay.com/specs/precautions.pdf>
- Warranty / Terms & Conditions: <https://www.newhavendisplay.com/terms.html>



## Document Revision History

| Revision | Date       | Description                                                           | Changed By |
|----------|------------|-----------------------------------------------------------------------|------------|
| 0        | 2/18/2022  | Initial Release                                                       | CJ         |
| 1        | 5/03/2022  | Updated Optical Characteristics                                       | CJ         |
| 2        | 6/01/2022  | Updated Typ. Backlight Lifetime                                       | ZP         |
| 3        | 6/08/2022  | RGB Interface Mode Selection Included. Backlight Typ. Rating Updated. | ZP         |
| 4        | 11/08/2022 | Mechanical Drawing Updated                                            | KL         |
| 5        | 10/17/2023 | Mechanical Drawing Updated, Part Upgraded to Rev1B                    | KL         |
| 6        | 12/13/2023 | Mechanical Drawing Updated, Part Revision Upgraded to Rev1C           | JT         |
| 7        | 01/16/2024 | Mechanical Drawing Updated                                            | KL         |

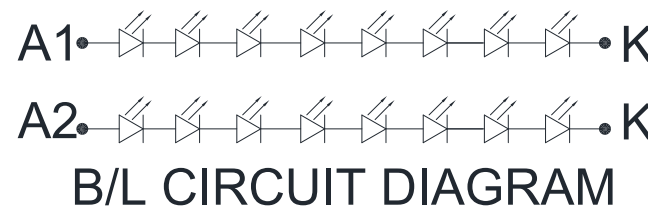
# Mechanical Drawing



| Pin assignment |        |
|----------------|--------|
| PIN            | SYMBOL |
| 1              | LEDK   |
| 2              | LEDA   |
| 3              | GND    |
| 4              | VCC    |
| 5              | R0     |
| 6              | R1     |
| 7              | R2     |
| 8              | R3     |
| 9              | R4     |
| 10             | R5     |
| 11             | R6     |
| 12             | R7     |
| 13             | G0     |
| 14             | G1     |
| 15             | G2     |
| 16             | G3     |
| 17             | G4     |
| 18             | G5     |
| 19             | G6     |
| 20             | G7     |
| 21             | B0     |
| 22             | B1     |
| 23             | B2     |
| 24             | B3     |
| 25             | B4     |
| 26             | B5     |
| 27             | B6     |
| 28             | B7     |
| 29             | GND    |
| 30             | CLK    |
| 31             | DISP   |
| 32             | Hsync  |
| 33             | Vsync  |
| 34             | DEN    |
| 35             | NC     |
| 36             | GND    |
| 37             | XR     |
| 38             | YD     |
| 39             | XL     |
| 40             | YU     |

Product Description: 4.3" 480x272 IPS TFT w/ Resistive Touch

1. Driver IC: SC7283
2. Interface: 24-bit RGB TFT, 4-wire RTP
3. Power Requirement: 3.3V TFT, 25.6V/40mA Backlight
4. Optical Features: Normally Black, Transmissive, Anti-Glare, 780cd/m<sup>2</sup>
5. Recommended FFC Connector: 40pin, 0.5mm pitch; Ex. Molex 54104-4031
6. EMI Shielded FPC



|                                                                                                                                                                                                                                           |                                                                                                                                |                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Standard Tolerance:</b><br>(Unless otherwise specified)<br><br>Linear: ±0.3mm                                                                                                                                                          |  <b>NEWHAVEN DISPLAY</b><br>INTERNATIONAL |                                  |
|                                                                                                                                                                                                                                           | Drawing/Part Number:<br><b>NHD-4.3-480272EF-ASXP-T</b>                                                                         | Revision:<br><b>1C</b>           |
| <b>Unless otherwise specified:</b> <ul style="list-style-type: none"><li>• Dimensions are in Millimeters</li><li>• Third Angle Projection </li></ul> | Drawn By: <b>K. Lewis</b>                                                                                                      | Approved By: <b>K. Lewis</b>     |
|                                                                                                                                                                                                                                           | Drawn Date: <b>01/16/2024</b>                                                                                                  | Approved Date: <b>01/16/2024</b> |
| 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

TFT:

| Pin No. | Symbol          | External Connection | Function Description                  |
|---------|-----------------|---------------------|---------------------------------------|
| 1       | LED-            | LED Power Supply    | Ground for Backlight                  |
| 2       | LED+            | LED Power Supply    | Backlight Power Supply (40mA @ 25.6V) |
| 3       | GND             | Power Supply        | Ground                                |
| 4       | V <sub>DD</sub> | 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              | Touch Controller    | Right                                 |
| 38      | YD              | Touch Controller    | Down                                  |
| 39      | XL              | Touch Controller    | Left                                  |
| 40      | YU              | Touch Controller    | Up                                    |

**Recommended LCD connector:** 0.5mm pitch 40-Conductor FFC. Molex p/n: 54104-4031 (top contact)

**Backlight connector:** on LCD connector

**Mates with:** ---

## RGB Interface Mode Selection

The Sitronix SC7283 driver IC is user configurable for DE Mode, SYNC mode, or SYNC-DE mode RGB interface.

**DE Mode** is enabled when HSYNC and VSYNC signals are set to logic-low state, and DE signal is toggled high for valid pixel data. Data is clocked in using DCLK signal. DE mode is recommended to enable the SC7283 driver IC to synchronize the display image on TFT panel without depending on specific horizontal and vertical sync timing from host controller.

**SYNC mode** is enabled when the DE signal is set to logic-low state, and HSYNC and VSYNC signals are used to explicitly define the horizontal and vertical sync timing to synchronize the display image on TFT panel. Data is clocked in using DCLK signal. Any change to the HSYNC or VSYNC values may prevent the image from correctly appearing on the display.

**SYNC-DE Mode** is enabled when HSYNC and VSYNC signals are used to explicitly define the horizontal and vertical sync timing to synchronize the display image on TFT panel. DE signal is used as an additional indicator for transmission of valid pixel data. Data is clocked in using DCLK signal. Any change to the HSYNC or VSYNC values may prevent the image from correctly appearing on the display.

| RGB Mode Selection Table | DCLK  | HSYNC | VSYNC | DE    |
|--------------------------|-------|-------|-------|-------|
| SYNC-DE Mode             | Input | Input | Input | Input |
| SYNC Mode                | Input | Input | Input | GND   |
| DE Mode                  | Input | GND   | GND   | Input |

## Electrical Characteristics

TFT:

| 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                            | 14                    | 28   | 56                    | 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    |
| "H" Level output            | V <sub>OH</sub>  | -                                                 | V <sub>DD</sub> - 0.4 | -    | V <sub>DD</sub>       | V    |
| "L" Level output            | V <sub>OL</sub>  | -                                                 | GND                   | -    | GND + 0.4             | 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*         | -                |                                                   | 20,000                | -    | -                     | Hrs. |

\*Backlight lifetime is rated as Hours until **half-brightness**, under normal operating conditions. The LED of the backlight is driven by current drain; drive voltage is for reference only. Drive voltage must be selected to ensure backlight current drain is below MAX level stated.

## 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 | 620   | 780   | 1200  | 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>                  | -                        | 0.540 | 0.590 | 0.640 | -                 |
|                             |        | Y <sub>R</sub>                  | -                        | 0.305 | 0.355 | 0.405 | -                 |
|                             | Green  | X <sub>G</sub>                  | -                        | 0.294 | 0.344 | 0.394 | -                 |
|                             |        | Y <sub>G</sub>                  | -                        | 0.542 | 0.592 | 0.642 | -                 |
|                             | Blue   | X <sub>B</sub>                  | -                        | 0.093 | 0.143 | 0.193 | -                 |
|                             |        | Y <sub>B</sub>                  | -                        | 0.044 | 0.094 | 0.144 | -                 |
|                             | White  | X <sub>W</sub>                  | -                        | 0.240 | 0.290 | 0.340 | -                 |
|                             |        | Y <sub>W</sub>                  | -                        | 0.275 | 0.325 | 0.375 | -                 |

## Driver/Controller Information

TFT:

Built-in SC7283 Driver: <https://support.newhavendisplay.com/hc/en-us/articles/4414845841687-SC7283>



## Touch Panel Characteristics

| Item                        | Min.      | Typ. | Max. | Unit       |
|-----------------------------|-----------|------|------|------------|
| Linearity                   | -1.5      | -    | 1.5  | %          |
| Circuit Resistance – X-Axis | 350       | -    | 1050 | $\Omega$   |
| Circuit Resistance – Y-Axis | 100       | -    | 450  | $\Omega$   |
| Insulation Resistance       | 20        | -    | -    | M $\Omega$ |
| Operating Voltage           | -         | -    | 10   | V          |
| Chattering                  | -         | -    | 10   | ms         |
| Transmittance               | 75        | -    | -    | %          |
| Activation Force            | 30        | -    | 120  | g          |
| Pen Writing Durability      | 20,000    | -    | -    | Characters |
| Pitting Durability          | 1,000,000 | -    | -    | Touches    |
| Surface Hardness            | 3         | -    | -    | H          |
| Haze                        | 2         | 4    | 6    | %          |

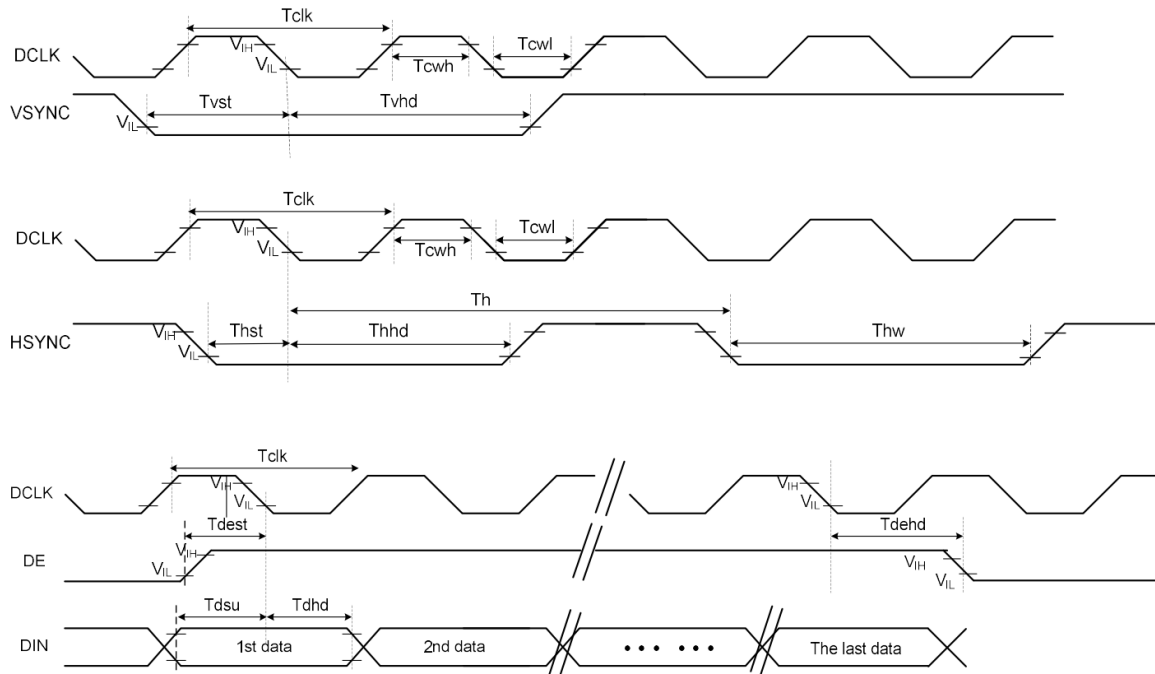
## Timing Characteristics – TFT Display

### Horizontal and Vertical Input Timing

| Item           |                | Symbol | Min. | Typ. | Max. | Unit |
|----------------|----------------|--------|------|------|------|------|
| DCLK Frequency |                | Fclk   | 8    | 9    | 12   | MHz  |
| DCLK Period    |                | Tclk   | 83   | 111  | 125  | ns   |
| HSYNC          | Period Time    | Th     | 485  | 531  | 598  | DCLK |
|                | Display Period | Thd    | 480  |      |      | DCLK |
|                | Back Porch     | Thb    | 3    | 43   | 43   | DCLK |
|                | Front Porch    | Thfp   | 2    | 8    | 75   | DCLK |
|                | Pulse Width    | Thpw   | 2    | 4    | 43   | DCLK |
| VSYNC          | Period Time    | Tv     | 276  | 292  | 321  | H    |
|                | Display Period | Tvd    | -    | 272  | -    | H    |
|                | Back Porch     | Tvbp   | 2    | 12   | 12   | H    |
|                | Front Porch    | Tvfp   | 2    | 8    | 37   | H    |
|                | Pulse Width    | Tvpw   | 2    | 4    | 12   | H    |

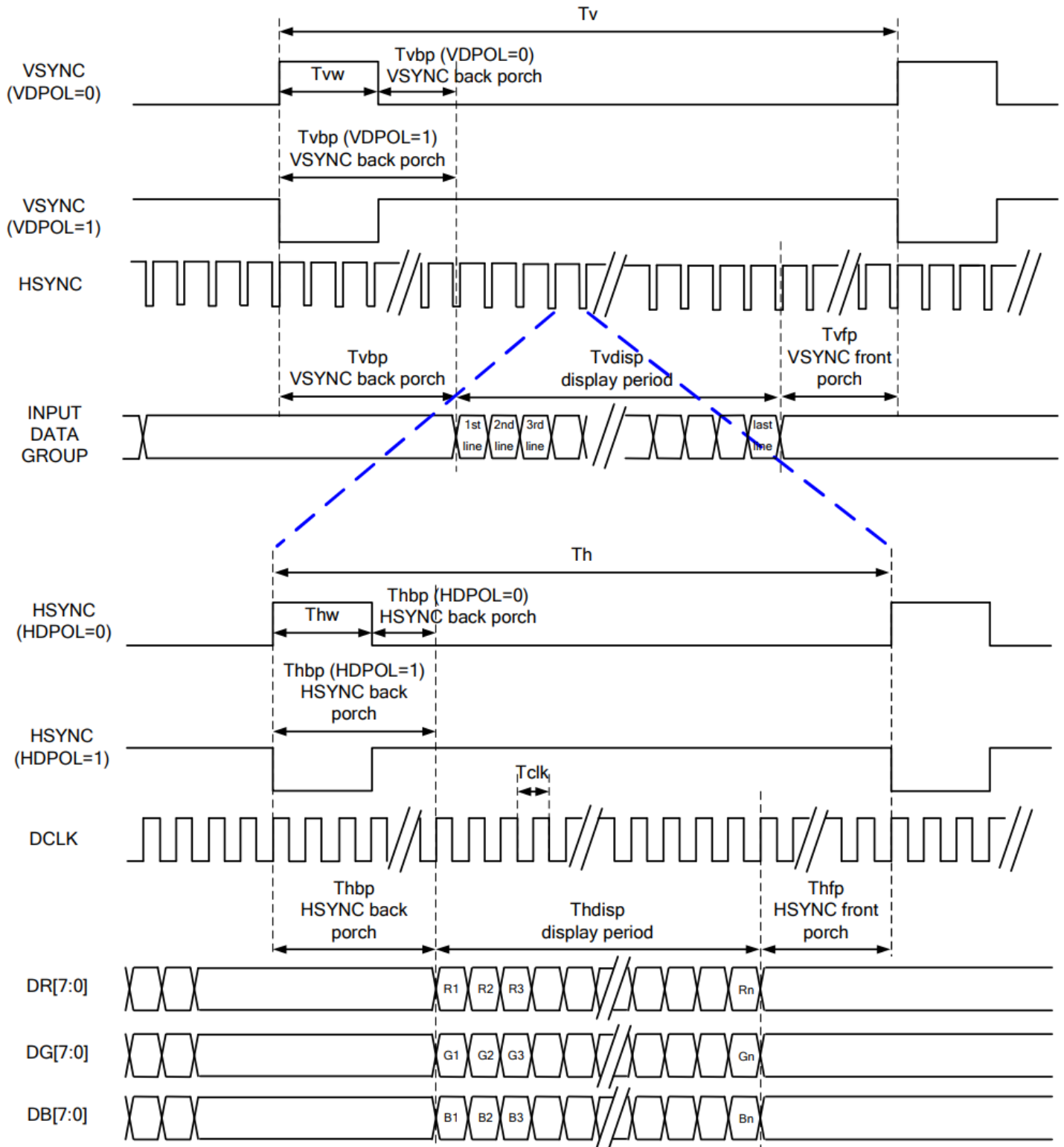
### AC Characteristics

#### System Bus Timing for RGB Interface

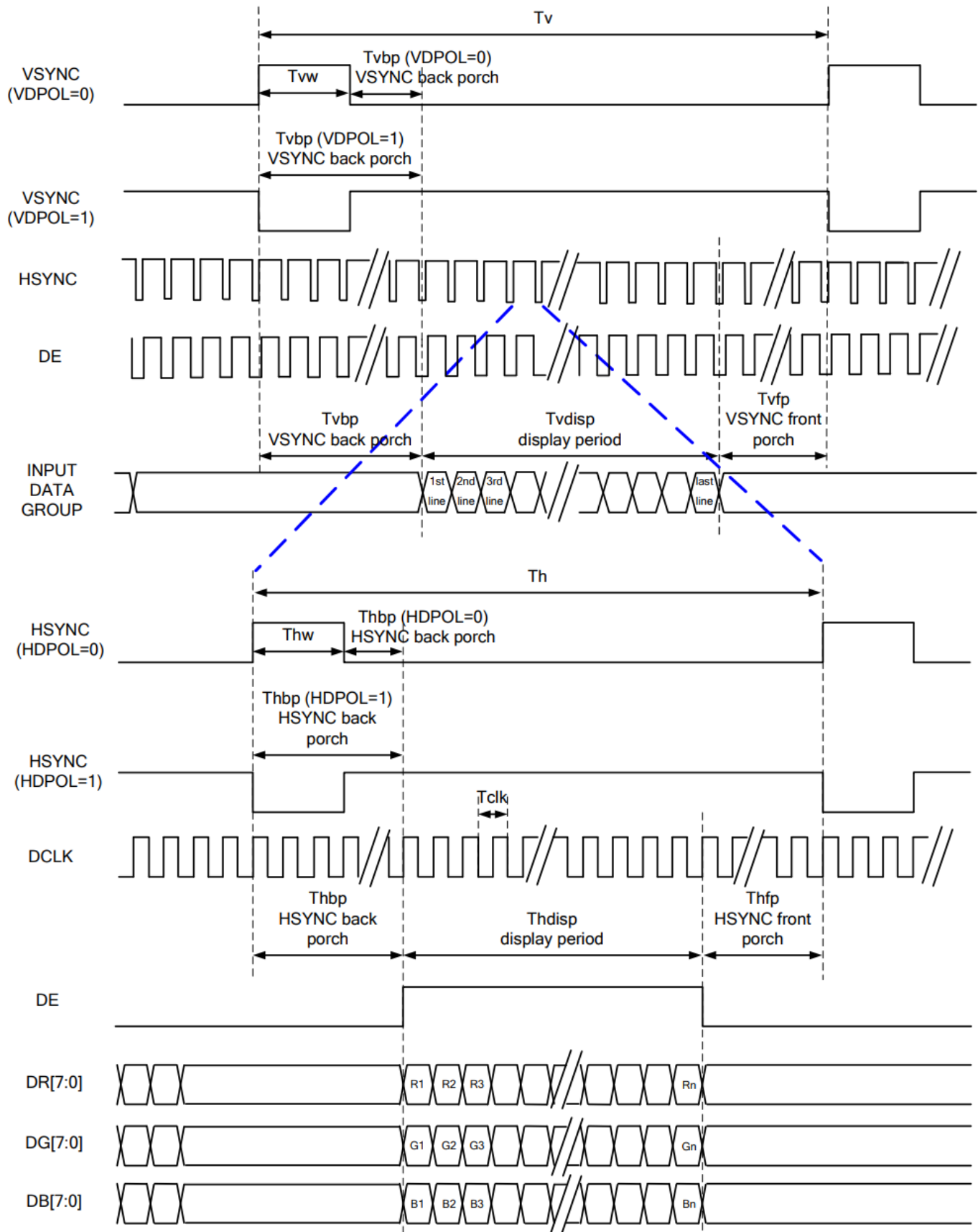


| Parameter        | Symbol            | Min | Typ | Max | Unit | Conditions |
|------------------|-------------------|-----|-----|-----|------|------------|
| CLKIN pulse duty | T <sub>cwh</sub>  | 40  | 50  | 60  | %    |            |
| HSYNC width      | T <sub>hw</sub>   | 2   | -   | -   | DCLK |            |
| HSYNC period     | T <sub>h</sub>    | 55  | 60  | 65  | us   |            |
| VSYNC setup time | T <sub>vst</sub>  | 12  | -   | -   | ns   |            |
| VSYNC hold time  | T <sub>vhd</sub>  | 12  | -   | -   | ns   |            |
| HSYNC setup time | T <sub>hst</sub>  | 12  | -   | -   | ns   |            |
| HSYNC hold time  | T <sub>hhd</sub>  | 12  | -   | -   | ns   |            |
| Data setup time  | T <sub>dsu</sub>  | 12  | -   | -   | ns   |            |
| Data hold time   | T <sub>dhd</sub>  | 12  | -   | -   | ns   |            |
| DE setup time    | T <sub>dest</sub> | 12  | -   | -   | ns   |            |
| DE hold time     | T <sub>dehd</sub> | 12  | -   | -   | ns   |            |

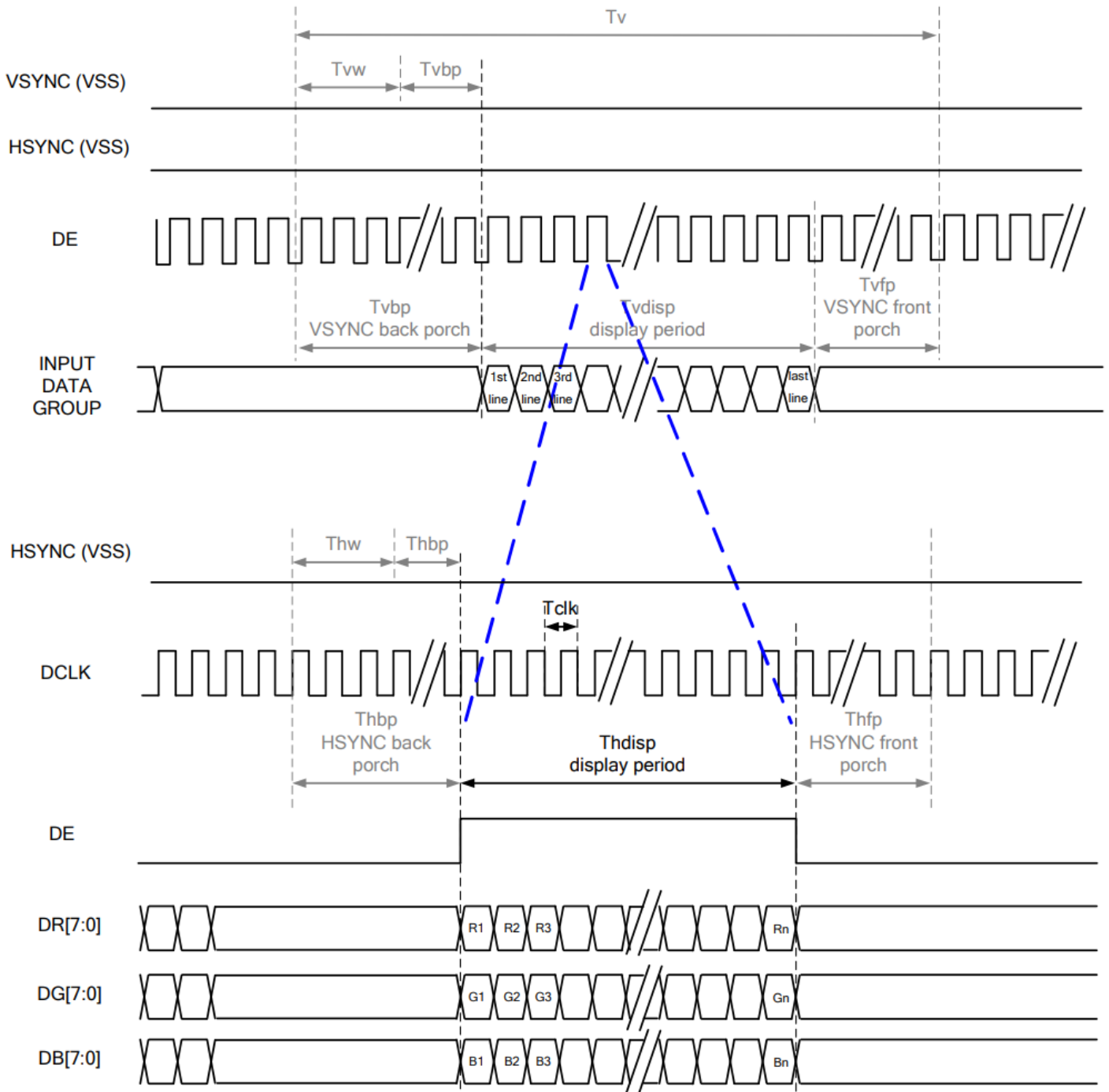
## SYNC Mode



## SYNC-DE Mode



## DE Mode

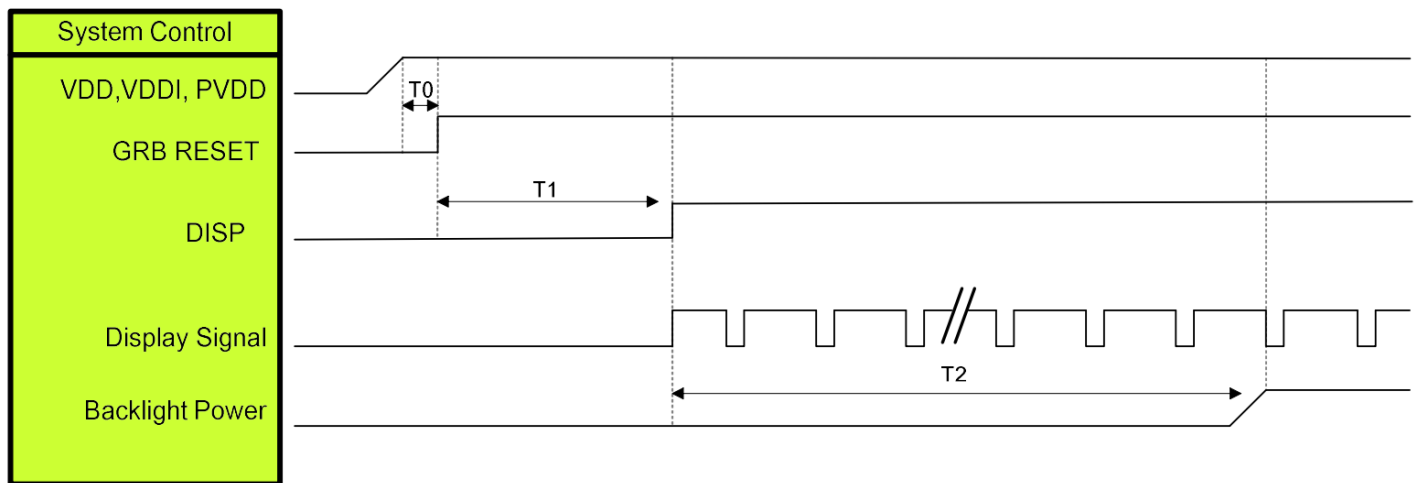


| RGB Mode Selection Table | DCLK  | HSYNC | VSYNC | DE    |
|--------------------------|-------|-------|-------|-------|
| SYNC - DE Mode           | Input | Input | Input | Input |
| SYNC Mode                | Input | Input | Input | GND   |
| DE Mode                  | Input | GND   | GND   | Input |

Note: "Input" means these signals are driven by host side.

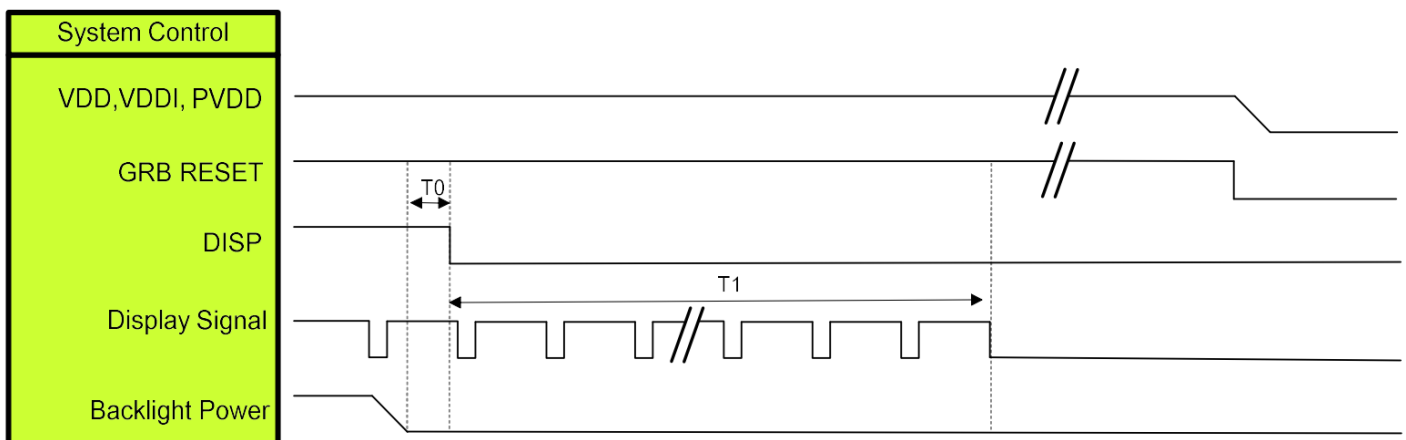
## Power ON/OFF Sequence

### 1. Power On Sequence



| Symbol | Description                                 | Min. Time | Unit |
|--------|---------------------------------------------|-----------|------|
| T0     | System power stability to GRB RESET signal  | 0         | ms   |
| T1     | GRB RESET= "High" to DISP="High"            | 10        | ms   |
| T2     | Display Signal output to Backlight Power on | 250       | ms   |

### 2. Power Off Sequence



| Symbol | Description                                          | Min. Time | Unit |
|--------|------------------------------------------------------|-----------|------|
| T0     | Backlight Power off to DISP="Low"                    | 5         | ms   |
| T1     | DISP="Low" to IC internal voltage discharge complete | 80        | ms   |

## 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 Storage | Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time. | +50°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,60min -> 70°C,60min<br>= 1 cycle<br>20 cycles                       |      |
| Vibration test                      | Endurance test applying vibration to simulate transportation and use.                                                           | 10-50Hz , 5G Acceleration<br>30 minutes in each of 3 directions (X, Y, Z) | 3    |
| Static electricity test             | Endurance test applying electric static discharge.                                                                              | Air: ±8kV 150pF/330Ω, 5 Times                                             |      |
|                                     |                                                                                                                                 | Contact: ±4kV 150pF/330Ω, 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.