



RVT50HQTNWN00

IPS RGB 5.0" LCD TFT DATASHEET

Rev.1.1  
2021-07-28

| ITEM                           | CONTENTS                            | UNIT              |
|--------------------------------|-------------------------------------|-------------------|
| LCD Type                       | TFT/Transmissive/Normally black/IPS | /                 |
| Size                           | 5.0                                 | Inch              |
| Viewing Direction              | Free                                | /                 |
| Outside Dimensions (W x H x D) | 120.70 x 75.80 x 2.95               | mm                |
| Active Area (W x H)            | 108.00 x 64.80                      | mm                |
| Pixel Pitch (W x H)            | 0.135 x 0.135                       | mm                |
| Resolution                     | 800 x 480 (RGB)                     | /                 |
| Brightness                     | 1000                                | cd/m <sup>2</sup> |
| LCD Interface Type             | RGB                                 | /                 |
| Color Depth                    | 16.7 M                              | /                 |
| Pixel Arrangement              | RGB Vertical Stripe                 | /                 |
| LCD Driver                     | ST7262-G4                           | /                 |
| With/Without Touch             | Without Touch Panel                 | /                 |
| Surface Treatment              | Anti-Glare                          | /                 |
| LCD Input Voltage              | 3.3                                 | V                 |
| Weight                         | 51                                  | g                 |

**Note 1:** RoHS3 compliant**Note 2:** LCM weight tolerance:  $\pm 5\%$ .



## 1. REVISION RECORD

| REV NO. | REV DATE   | CONTENTS              | REMARKS |
|---------|------------|-----------------------|---------|
| 1.0     | 2020-08-05 | Initial Release       |         |
| 1.1     | 2021-07-28 | Updating new template |         |



## 2. CONTENTS

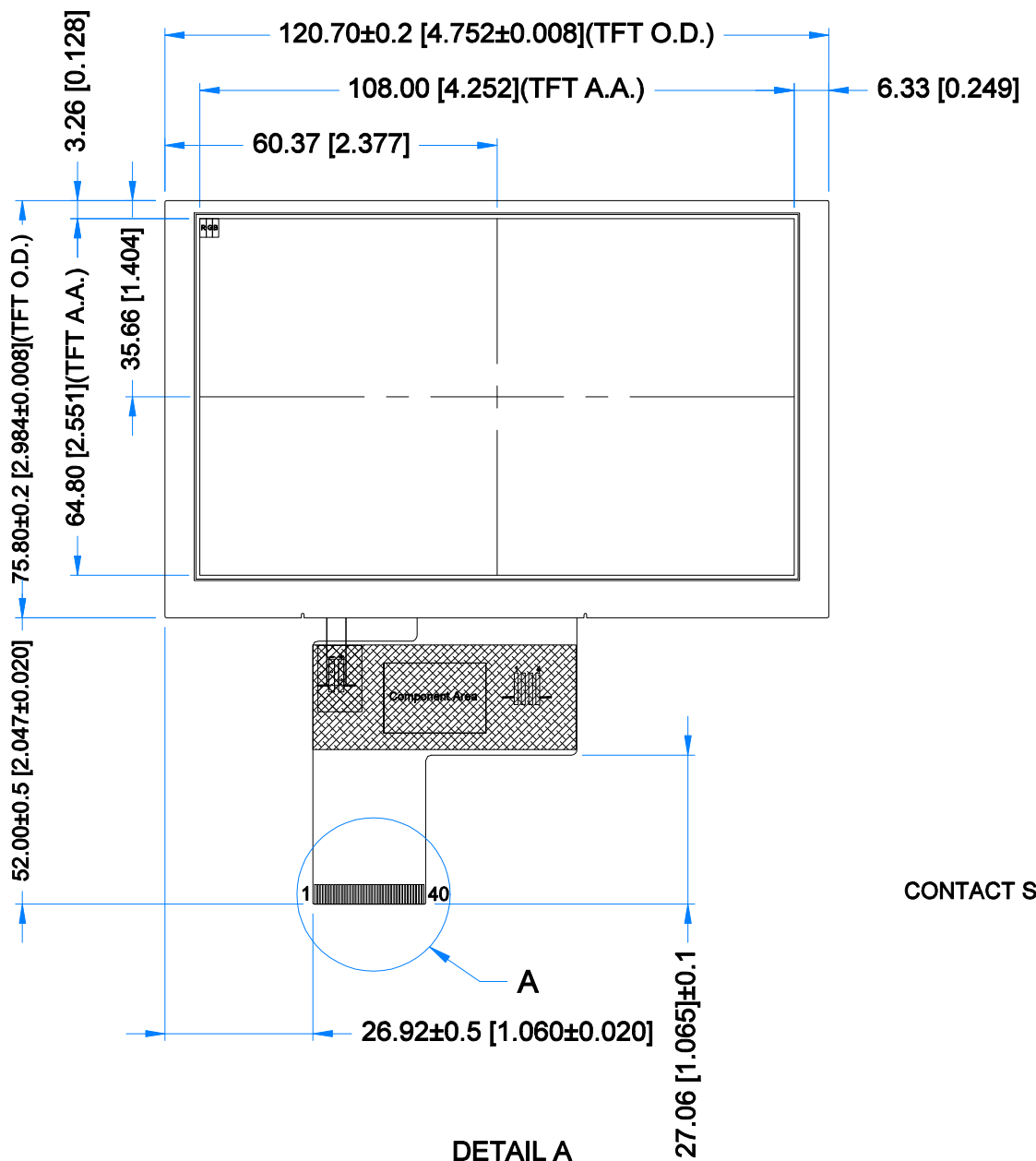
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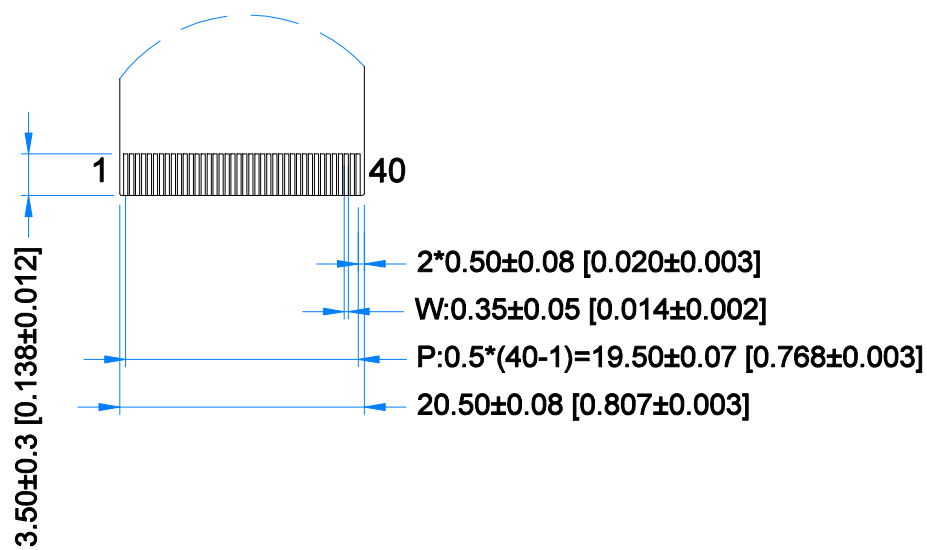
### 3. MODULE CLASSIFICATION INFORMATION

| RV | T  | 50 | H  | Q  | T  | N  | W  | N  | 00  |
|----|----|----|----|----|----|----|----|----|-----|
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |

| NO. | PARAMETER        | SYMBOL                           |
|-----|------------------|----------------------------------|
| 1.  | BRAND            | RV – Riverdi                     |
| 2.  | PRODUCT TYPE     | T – TFT Standard                 |
| 3.  | DISPLAY SIZE     | 50 – 5.0"                        |
| 4.  | MODEL SERIAL NO. | H – High Brightness, IPS         |
| 5.  | RESOLUTION       | Q – 800 x 480 px                 |
| 6.  | INTERFACE        | T – TFT LCD, RGB                 |
| 7.  | FRAME            | N – Without Mounting Metal Frame |
| 8.  | BACKLIGHT TYPE   | W – LED White                    |
| 9.  | TOUCH PANEL      | N – Without Touch Panel          |
| 10. | VERSION          | 00 – (00-99)                     |



DETAIL A  
SCALE 2:1



**TFT NOTES:**

1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS
2. RESOLUTION: 800x480
3. VIEWING ANGLE: FREE
4. IC CONTROLLER: ST7262-G4
5. OPERATING VOLTAGE: 3.3V
6. SURFACE LUMINANCE: 1000 cd/m<sup>2</sup>
7. BACKLIGHT: 14-LED WHITE, Vf =12.0 V, If =140 mA

**GENERAL NOTES:**

1. OPERATING TEMPERATURE: -20°C ~ 70°C
2. STORAGE TEMPERATURE: -30°C ~ 80°C
3. WITHOUT INDIVIDUAL TOLERANCE:  
 $\pm 0.2\text{mm}$ [0.008inch]
4. RoHS COMPLIANT



## 5. ABSOLUTE MAXIMUM RATINGS

| PARAMETER                     | SYMBOL    | MIN  | MAX | UNIT |
|-------------------------------|-----------|------|-----|------|
| Operating Ambient temperature | $T_{OP}$  | -20  | 70  | °C   |
| Storage Temperature           | $T_{ST}$  | -30  | 80  | °C   |
| Operating Ambient Humidity    | $H_{OP}$  | 10   | -   | % RH |
| Power for Circuit Driving     | $V_{DD}$  | -0.3 | 5   | V    |
| Backlight Forward Current     | $I_{LED}$ | -    | 25  | mA   |

**Note.** The above are maximum values. If exceeded, they may cause permanent damage to the unit.

## 6. ELECTRICAL CHARACTERISTICS

| PARAMETER                       | SYMBOL       | MIN      | TYP             | MAX | UNIT |             |
|---------------------------------|--------------|----------|-----------------|-----|------|-------------|
| Power Supply for analog circuit | $V_{DD}$     | 3.0      | 3.3             | 3.6 | V    |             |
| Logic Input Voltage             | Low Voltage  | $V_{IL}$ | 0               | -   |      | $0.3V_{DD}$ |
|                                 | High Voltage | $V_{IH}$ | $0.7V_{DD}$     | -   |      | $V_{DD}$    |
| Logic Output Voltage            | Low Voltage  | $V_{OL}$ | -               | -   |      | 0.4V        |
|                                 | High Voltage | $V_{OH}$ | $V_{DD} - 0.4V$ | -   | -    |             |
| Power Consumption               | Black Mode   | $P_b$    | -               | 80  | 85   | mA          |
|                                 | Standby Mode | $P_w$    | -               | 40  | 50   | µA          |

## 7. BACKLIGHT ELECTRICAL CHARACTERISTICS

| PARAMETER                   | SYMBOL   | MIN  | TYP    | MAX  | UNIT  | NOTE       |
|-----------------------------|----------|------|--------|------|-------|------------|
| Backlight Driving Voltage   | $V_F$    | 11.2 | 12.0   | 12.8 | V     | Notes 1, 2 |
| Backlight Driving Current   | $I_F$    | -    | 140    | -    | mA    |            |
| Backlight Power Consumption | $W_{BL}$ | -    | 1680   | -    | mW    |            |
| Backlight Lifetime          | -        | -    | 50,000 | -    | hours | Note 3     |

**Note 1.** Unless specified, the ambient temperature  $T_a = 25^\circ\text{C}$

**Note 2.** The recommended operating conditions refer to a range in which operation of this product is guaranteed. Should this range be exceeded, the operation cannot be guaranteed even if the values may be without the absolute maximum ratings.

**Note 3.** If LED is driven by high current, the lifetime of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating lifetime is estimated data.

## 8. ELECTRO-OPTICAL CHARACTERISTICS

| ITEM                       | SYMBOL            | CONDITION   | MIN   | TYP   | MAX   | UNIT              | RMK    | NOTE |
|----------------------------|-------------------|---|-------|-------|-------|-------------------|--------|------|
| Response Time              | Tr+Tf             | $\theta=0^\circ$<br>$\varnothing=0^\circ$<br>Ta=25 °C | -     | 30    | -     | ms                | FIG 1. | 4    |
| Contrast Ratio             | Cr                |   | -     | 1000  | -     | ---               | FIG 2. | 1    |
| Luminance Uniformity       | $\delta$<br>WHITE |   | -     | 75    | -     | %                 | FIG 2. | 3    |
| Surface Luminance          | Lv                |   | 900   | 1000  | -     | cd/m <sup>2</sup> | FIG 2. | 2    |
| Viewing Angle Range        | $\theta$          | $\varnothing = 90^\circ$                              | -     | 80    | -     | deg               | FIG 3. | 6    |
|                            |                   | $\varnothing = 270^\circ$                             | -     | 80    | -     | deg               | FIG 3. |      |
|                            |                   | $\varnothing = 0^\circ$                               | -     | 80    | -     | deg               | FIG 3. |      |
|                            |                   | $\varnothing = 180^\circ$                             | -     | 80    | -     | deg               | FIG 3. |      |
| CIE (x, y)<br>Chromaticity | Rx                | $\theta=0^\circ$<br>$\varnothing=0^\circ$<br>Ta=25 °C | 0.575 | 0.615 | 0.655 | -                 | FIG 2. | 5    |
|                            | Ry                |   | 0.296 | 0.336 | 0.376 | -                 |        |      |
|                            | Gx                |   | 0.352 | 0.392 | 0.432 | -                 |        |      |
|                            | Gy                |   | 0.512 | 0.552 | 0.592 | -                 |        |      |
|                            | Bx                |   | 0.100 | 0.140 | 0.180 | -                 |        |      |
|                            | By                |   | 0.085 | 0.125 | 0.165 | -                 |        |      |
|                            | Wx                |   | 0.274 | 0.316 | 0.358 | -                 |        |      |
|                            | Wy                |   | 0.295 | 0.336 | 0.378 | -                 |        |      |

**Note 1.** Contrast Ratio (CR) is defined mathematically as below, for more information see Figure 2.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

**Note 2.** Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see Figure 2.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

**Note 3.** The uniformity in surface luminance  $\delta$  WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the minimum luminance of 5 points luminance by maximum luminance of 5 points luminance. For more information see Figure 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

**Note 4.** Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see Figure 1. The test equipment is Autronic-Melchers's ConoScope series.

**Note 5.** CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then make average value.

**Note 6.** Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to LCD surface. For more information see Figure 3.

**Note 7.** For viewing angle and response time testing, the testing data is based on Autronic-Melchers's ConoScope series. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, CIE the test data is based on TOPCON's BM-5 photo detector.

Figure 1. The definition of response time

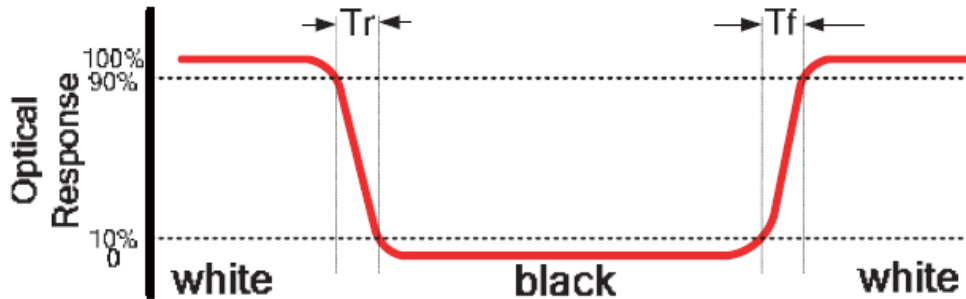


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

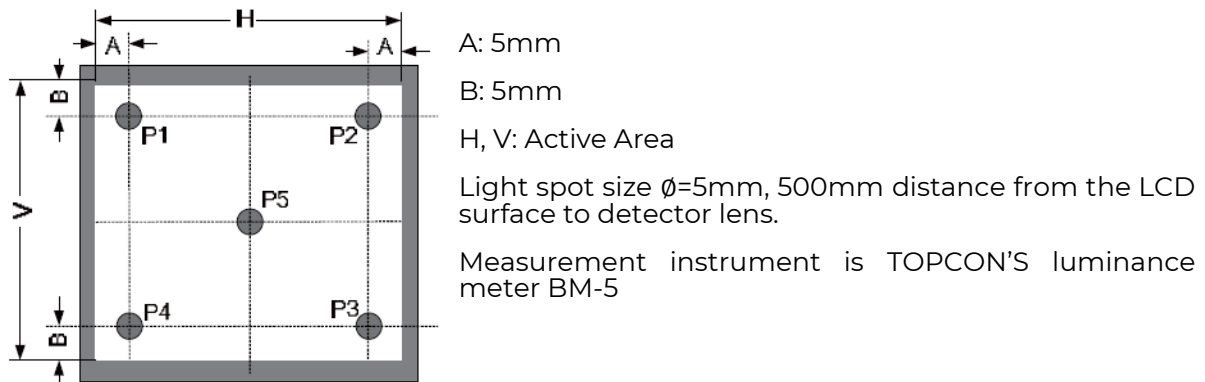
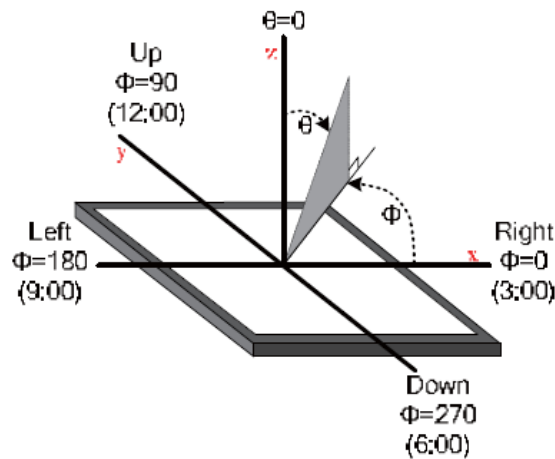


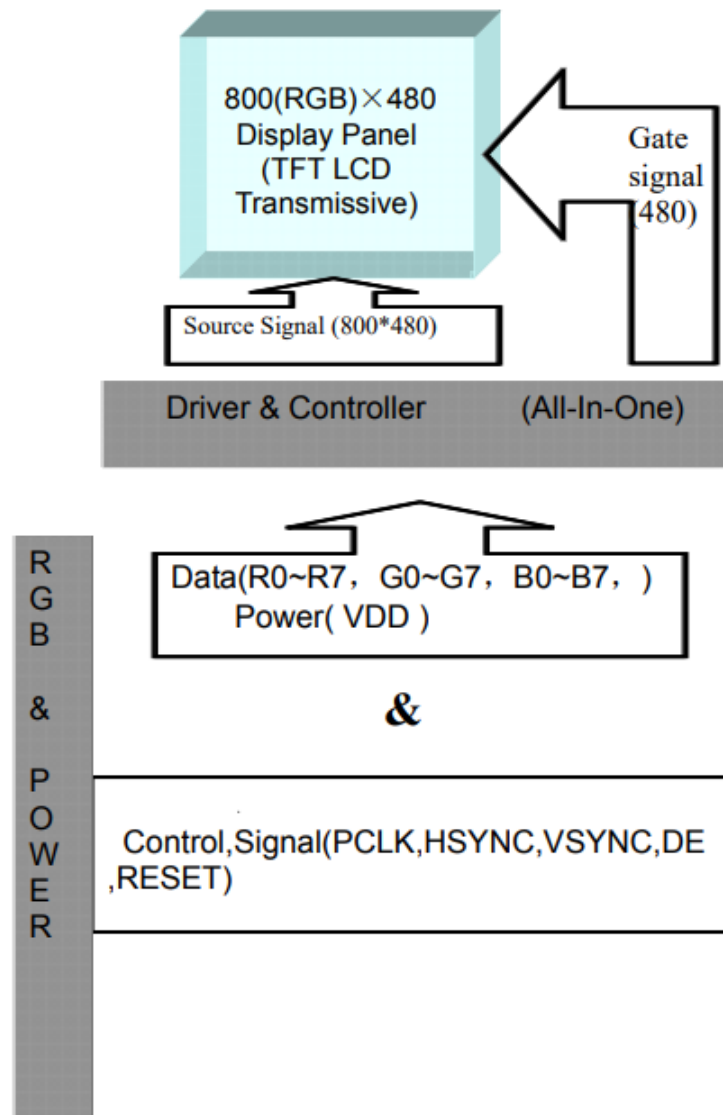
Figure 3. The definition of viewing angle







9. BLOCK DIAGRAM





## 10. INTERFACES DESCRIPTION

### 10.1 TFT assignment

| PIN NO. | SYMBOL | DESCRIPTION                       |
|---------|--------|-----------------------------------|
| 1       | VLED-  | Backlight Power Input PIN Cathode |
| 2       | VLED+  | Backlight Power Input PIN Anode   |
| 3       | GND    | Ground                            |
| 4       | VDD    | Power Supply Voltage              |
| 5-12    | R0-R7  | Red Data                          |
| 13-20   | G0-G7  | Green Data                        |
| 21-28   | B0-B7  | Blue Data                         |
| 29      | GND    | Ground                            |
| 30      | DCLK   | Clock for Input Data              |
| 31      | DISP   | Display on/off Control            |
| 32      | HSYNC  | Horizontal Synchronized Signal    |
| 33      | VSYNC  | Vertical Synchronized Signal      |
| 34      | DE     | Data Input Enable                 |
| 35      | NC     | Not Connect                       |
| 36      | GND    | Ground                            |
| 37      | NC     | No Connection                     |
| 38      | NC     | No Connection                     |
| 39      | NC     | No Connection                     |
| 40      | NC     | No Connection                     |



## 11. TIMING CHARACTERISTICS

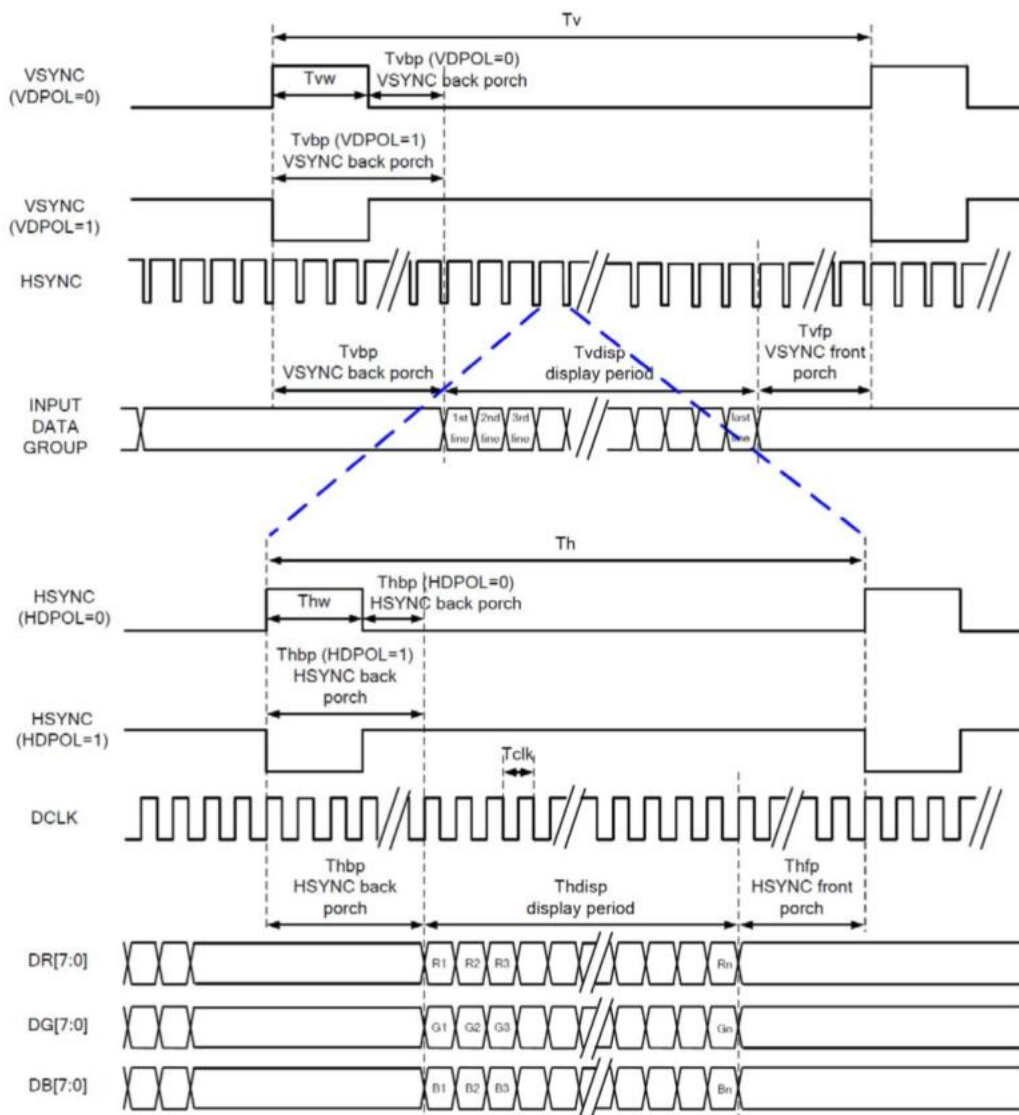
### 11.1 RGB mode selection

| RGB MODE SELECTION | DCLK  | HSYNC | VSYNC | DE    |
|--------------------|-------|-------|-------|-------|
| SYNC-DE Mode       | Input | Input | Input | Input |
| SYNC Mode          | Input | Input | Input | GND   |
| DE Mode            | Input | GND   | GND   | Input |

**Note.** RGB interface display signal: DCLK, VSYNC, HSYNC, DE, DR [7:0], DB [7:0]

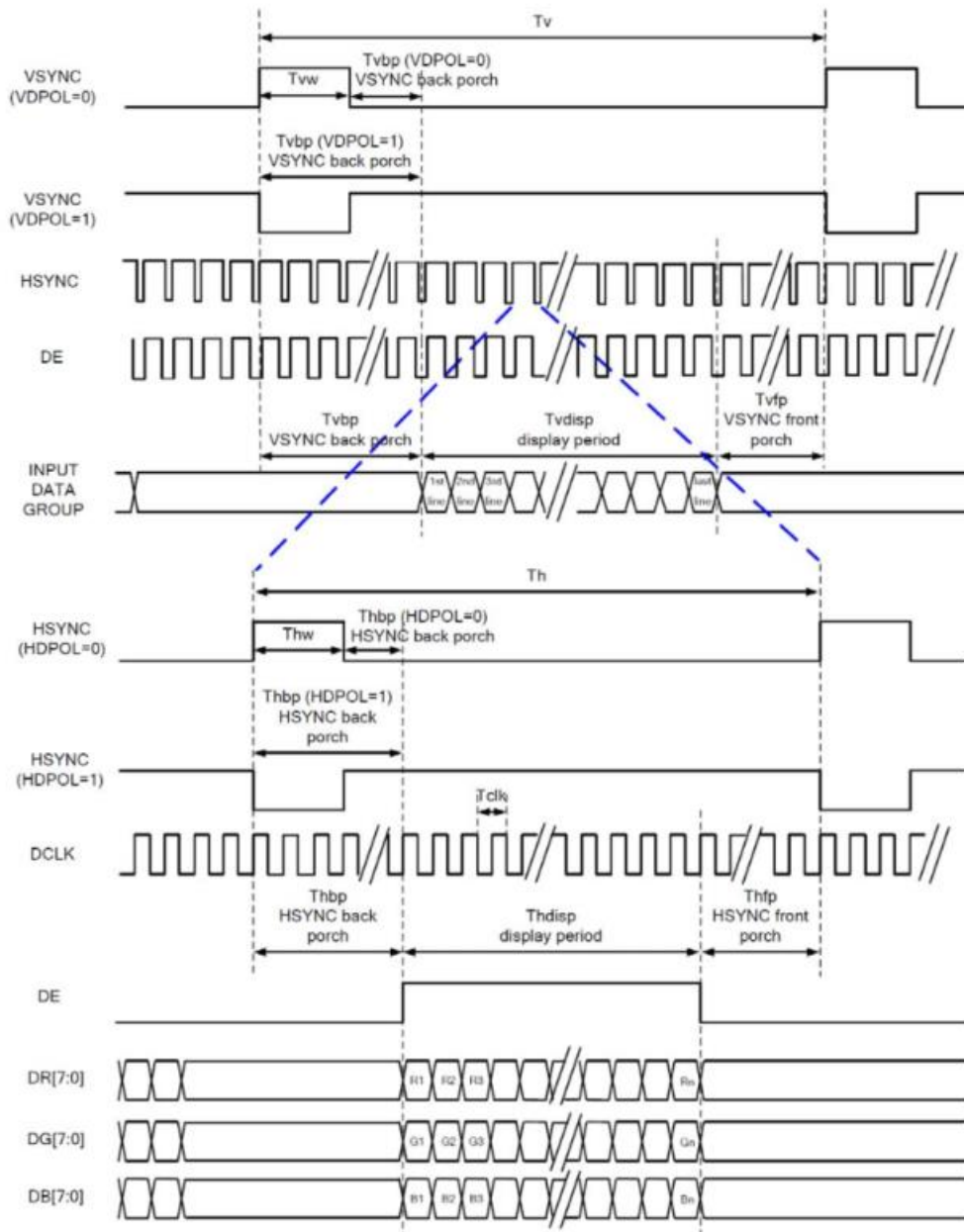
### 11.2 System bus timing for RGB interface

#### 11.2.1 SYNC Mode



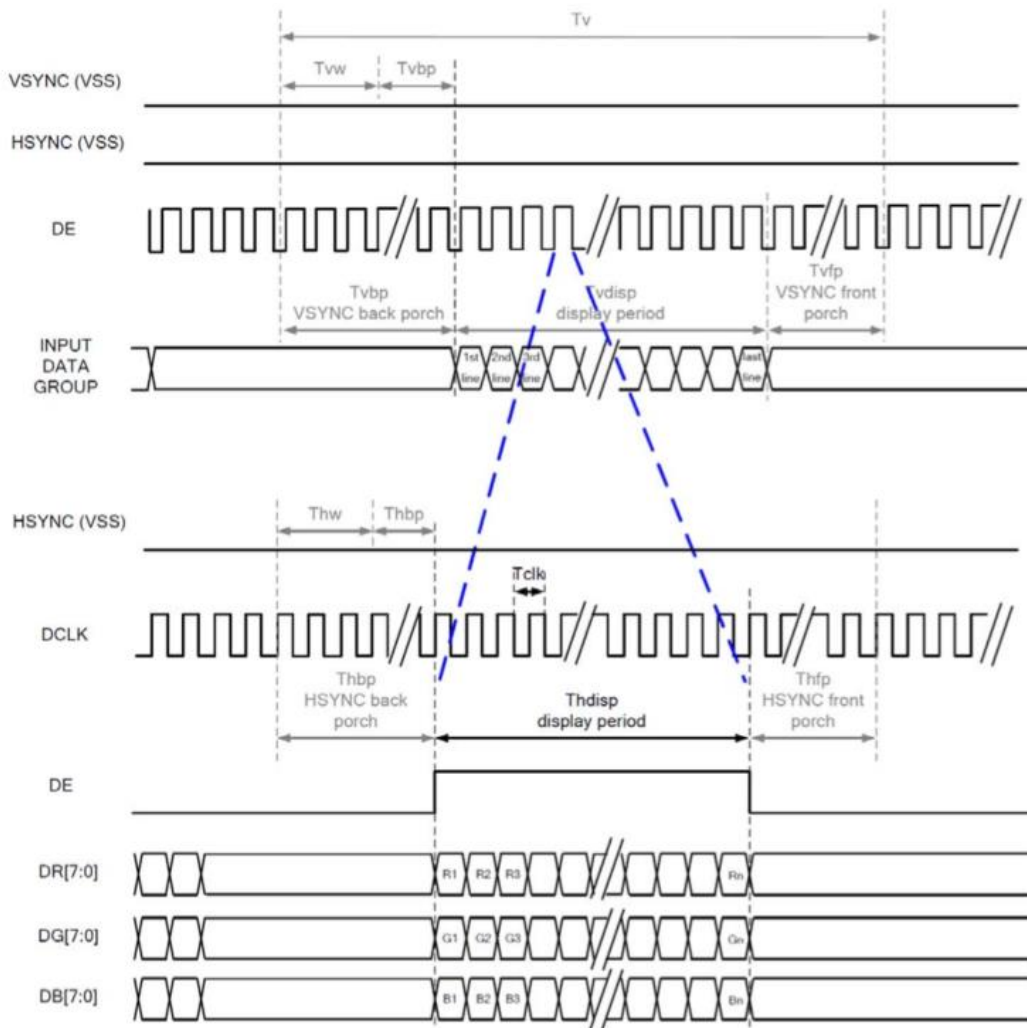


11.2.2 SYNC-DE Mode





### 11.2.3 DE Mode



### 11.3 Parallel 24-bit RGB input timing table

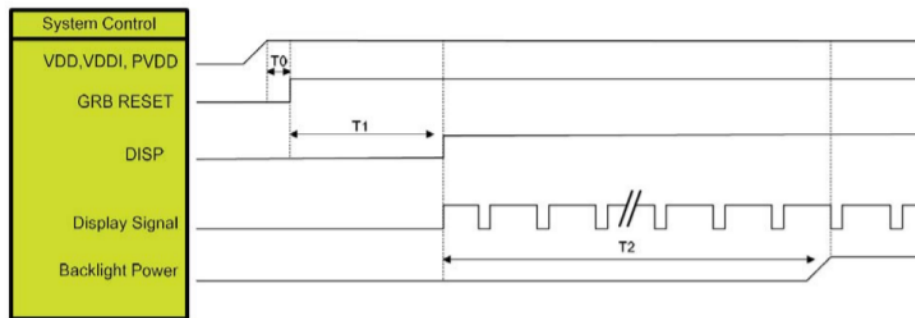
Parallel 24-bit RGB input Timing (PVDD=VDD=VDDI=3.3V,AGND=0V,Ta=25 °C)

| PARAMETER      | SYMBOL                        | MIN    | TYP | MAX | UNIT |       |
|----------------|-------------------------------|--------|-----|-----|------|-------|
| DCLK Frequency | Fclk                          | 23     | 25  | 27  | MHz  |       |
| HSYNC          | Period Time                   | Th     | 808 | 816 | 896  | DCLK  |
|                | Display Period                | Tdclk  | 800 |     |      |       |
|                | H <sub>sync</sub> Back Porch  | Thbp   | 4   | 8   | 48   |       |
|                | H <sub>sync</sub> Front Porch | Thfp   | 4   | 8   | 48   |       |
|                | H <sub>sync</sub> Pulse Width | Thw    | 2   | 4   | 8    |       |
| VSYNC          | Period Time                   | Tv     | 488 | 496 | 504  | HSYNC |
|                | Display Period                | Tvdisp | 480 |     |      |       |
|                | V <sub>sync</sub> Back Porch  | Tvbp   | 4   | 8   | 12   |       |
|                | V <sub>sync</sub> Front Porch | Tvfp   | 4   | 8   | 12   |       |
|                | V <sub>sync</sub> Pulse Width | Tvw    | 2   | 4   | 8    |       |



## 11.4 Power ON/OFF sequence

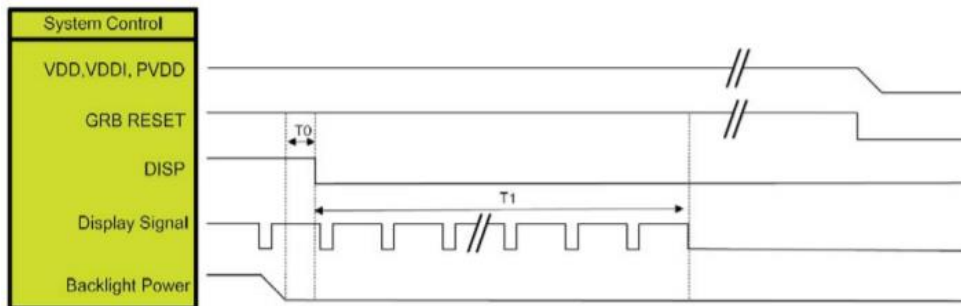
### 11.4.1 Power On sequence



| SYMBOL | DESCRIPTION                                 | MIN. TIME | UNIT |
|--------|---|-----------|------|
| T0     | System power stability to GRB RESET signal  | 0         | ms   |
| T1     | GRB RESET="High " to DISP="High "           | 10        |      |
| T2     | Display Signal output to Backlight Power on | 250       |      |

**Note.** RGB interface display signal: DCLK, VSYNC, HSYNC, DE, DR[7:0], DB[7:0].

### 11.4.2 Power Off sequence



## 12. INSPECTION

Standard acceptance/rejection criteria for TFT module

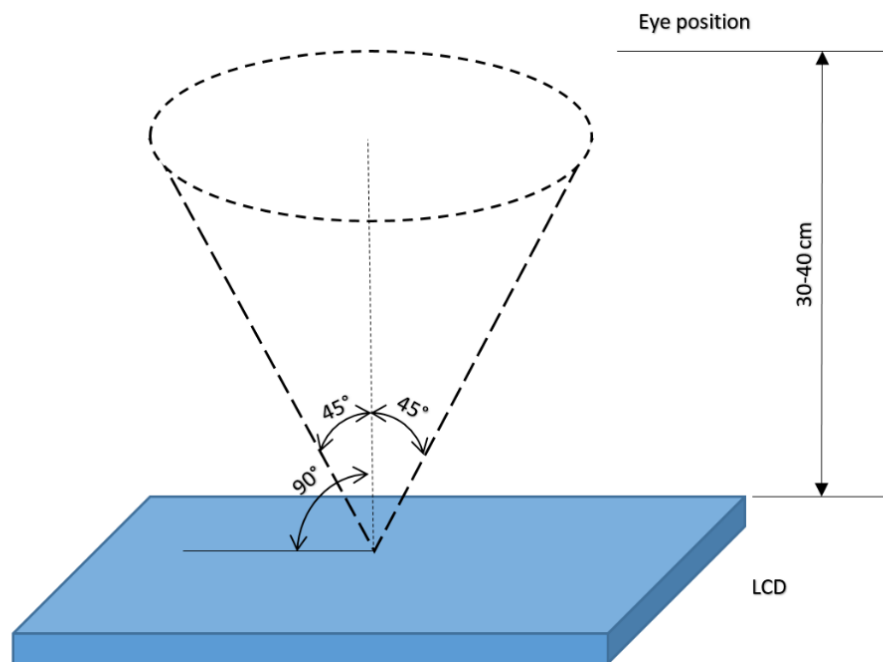
### 12.1 Inspection condition

Ambient conditions:

- Temperature:  $25 \pm 2^{\circ}\text{C}$
- Humidity:  $(60 \pm 10) \%RH$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance:  $35 \pm 5\text{cm}$  between inspector bare eye and LCD.

Viewing Angle: U/D:  $45^{\circ}/45^{\circ}$ , L/R:  $45^{\circ}/45^{\circ}$





12.2 Inspection standard

| ITEM   |  | CRITERION            |                 |               |
|--|--|----------------------|-----------------|---------------|
| Black spots, white spots, light leakage, Foreign Particle (round Type) | <p><math>D=(x+y)/2</math><br/>Spots density: 10 mm</p> | 3.5" ≤ Size ≤ 5"     |                 |               |
|  |  | Average Diameter     | Qualified Qty   |               |
|  |  | D ≤ 0.15 mm          | Ignored         |               |
|  |  | 0.15 mm < D ≤ 0.3 mm | N≤3             |               |
|  |  | 0.3 mm < D           | Not allowed     |               |
| LCD black spots, white spots, light leakage (line Type)                | <p>Spots density: 10 mm</p>                            | 3.5" ≤ Size ≤ 5"     |                 |               |
|  |  | Length               | Width           | Qualified Qty |
|  |  | -                    | W ≤ 0.03        | Ignored       |
|  |  | L ≤ 3.0              | 0.03 < W ≤ 0.05 | 2             |
|  |  | L ≤ 3.0              | 0.05 < W ≤ 0.1  | 1             |
|  |  | 3.0 < L              | 0.1 < W         | Not allowed   |
| Bright/Dark Dots   | 3.5" ≤ Size ≤ 5"                                       |                      |                 |               |
|  | Item   | Qualified Qty        |                 |               |
|  | Bright dots  | N ≤ 1                |                 |               |
|  | Dark dots  | N ≤ 2                |                 |               |
| Total Bright and Dark Dots   |  | N ≤ 3                |                 |               |
| Clear spots  | Size ≤ 5"  |                      |                 |               |
|  | Average Diameter                                       | Qualified Qty        |                 |               |
|  | D < 0.2 mm   | Ignored              |                 |               |
|  | 0.2 mm < D < 0.3 mm                                    | 3                    |                 |               |
|  | 0.3 mm < D < 0.5 mm                                    | 2                    |                 |               |
|  | 0.5 mm < D   | 0                    |                 |               |
| Spots density: 10 mm   |  |                      |                 |               |
| Polarizer bubbles  | 3.5" ≤ Size ≤ 5"                                       |                      |                 |               |
|  | Average Diameter                                       | Qualified Qty        |                 |               |
|  | D ≤ 0.2 mm   | Ignored              |                 |               |
|  | 0.2 mm < D ≤ 0.3 mm                                    | 2                    |                 |               |
|  | 0.2 mm < D ≤ 0.5 mm                                    | 1                    |                 |               |
|  | 0.5 mm < D   | 0                    |                 |               |
| Total Q'ty   |  | 3                    |                 |               |





### 13. RELIABILITY TEST

| NO. | TEST ITEM                           | TEST CONDITION   | NOTE   |
|-----|-------------------------------------|--|--------|
| 1   | High Temperature Storage            | 80°C/120 hours   | Note 1 |
| 2   | Low Temperature Storage             | -30°C/120 hours  |        |
| 3   | High Temperature Operating          | 70 °C /120 hours   |        |
| 4   | Low Temperature Operating           | -20°C/120 hours  |        |
| 5   | High Temperature and High Humidity  | Humidity 40°C, 90%RH, 120Hrs   |        |
| 6   | Thermal Cycling Test (No operation) | -20°C for 30min, 70°C for 30 min.<br>100 cycles. Then test at room temperature after 1 hour  | Note 2 |
| 7   | Vibration Test                      | Frequency: 10 ÷ 55 Hz.<br>Stroke: 1.5 mm.<br>Sweep: 10Hz ÷ 55Hz ÷ 10 Hz.<br>2 hours for each direction of X, Y, Z<br>(Total 6 hours) |        |
| 8   | Package Drop Test                   | Height: 60 cm<br>1 corner, 3 edges, 6 surfaces   |        |

**Note 1.** Sample quantity for each test item is 5 ÷ 10 pcs.

**Note 2.** Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.



## 14. LEGAL INFORMATION

Riverdi grants the guarantee for the proper operation of the goods for a period of 12 months from the date of possession of the goods. If in a consequence of this guaranteed execution the customer has received the defects-free item as replacement for the defective item, the effectiveness period of this guarantee shall start anew from the moment the customer receives the defects-free item.

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