



RVT70HSMNWC00

## IPS MIPI 7.0" LCD TFT DATASHEET

Rev.1.3  
2024-01-31

| ITEM                           | CONTENTS                              | UNIT              |
|--------------------------------|---------------------------------------|-------------------|
| LCD Type                       | TFT/Transmissive/Normally Black/IPS   | /                 |
| Size                           | 7.0                                   | Inch              |
| Viewing Direction              | Free                                  | /                 |
| Outside Dimensions (W x H x D) | 179.96 x 119.00 x 8.15                | mm                |
| Active Area (W x H)            | 154.21 x 85.92                        | mm                |
| Pixel Pitch (W x H)            | 0.1506 x 0.1432                       | mm                |
| Resolution                     | 1024 (RGB) x 600                      | /                 |
| Brightness                     | 800                                   | cd/m <sup>2</sup> |
| LCD Interface Type             | MIPI                                  | /                 |
| Color Depth                    | 16.7 M                                | /                 |
| Pixel Arrangement              | RGB Vertical Stripe                   | /                 |
| LCD Driver                     | EK79007AD3+EK73217BCGA                | /                 |
| With/Without Touch             | With Projected Capacitive Touch Panel | /                 |
| CTP Driver                     | ILI2132A                              | /                 |
| Touch Interface                | USB /I2C/Optional UART                | /                 |
| Weight                         | 222                                   | g                 |

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



## 1. REVISION RECORD

| REV NO. | REV DATE   | CONTENTS                                                                                                                                                        | REMARKS |
|---------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1.0     | 2021-05-28 | Initial Release                                                                                                                                                 |         |
| 1.1     | 2021-09-02 | Updating New Template                                                                                                                                           |         |
| 1.2     | 2023-02-23 | Update the chapter of Initialization code.<br>Delete <i>Generic_Short_Write_1P(0x87,0x5A);</i><br><br>Add timing characteristic table<br><br>Contrast rate: 800 |         |
| 1.3     | 2024-01-31 | Added chapter 11.3 MIPI-DSI timings.                                                                                                                            |         |



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3. MODULE CLASSIFICATION INFORMATION

|    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|-----|
| RV | T  | 70 | H  | S  | M  | N  | W  | C  | 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     | 70 – 7.0"                                |
| 4.  | MODEL SERIAL NO. | H – High Brightness, IPS                 |
| 5.  | RESOLUTION       | S – 1024 x 600 px                        |
| 6.  | INTERFACE        | M–MIPI                                   |
| 7.  | FRAME            | N – Without Mounting Metal Frame         |
| 8.  | BACKLIGHT TYPE   | W – LED White                            |
| 9.  | TOUCH PANEL      | C – With Capacitive Touch Panel, uxTouch |
| 10. | VERSION          | 00 – (00-99)                             |

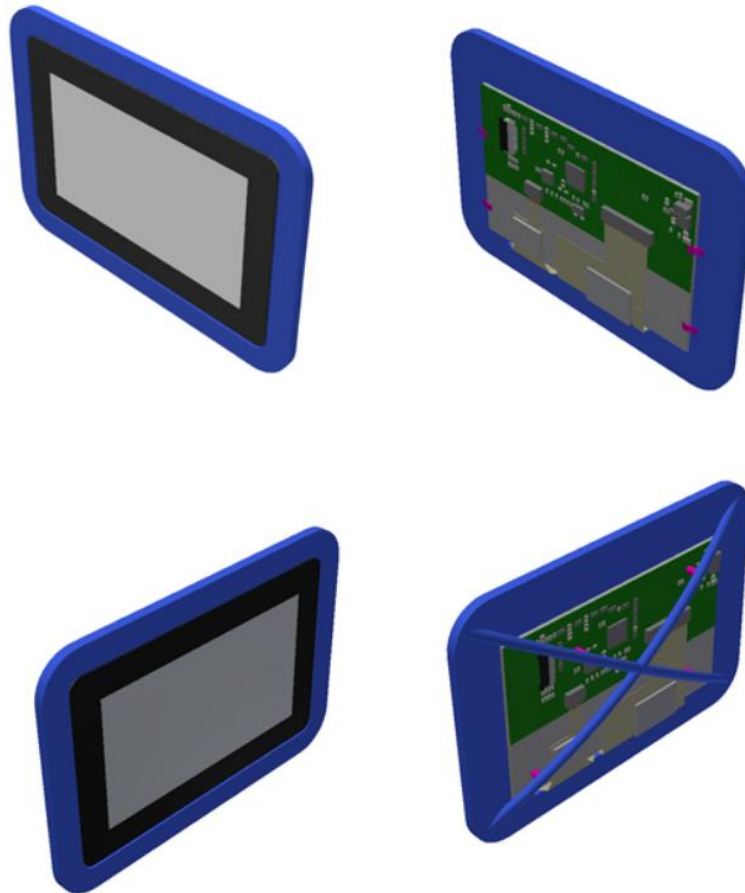
## 4. ASSEMBLY GUIDE

### 4.1 uxTouch assembly

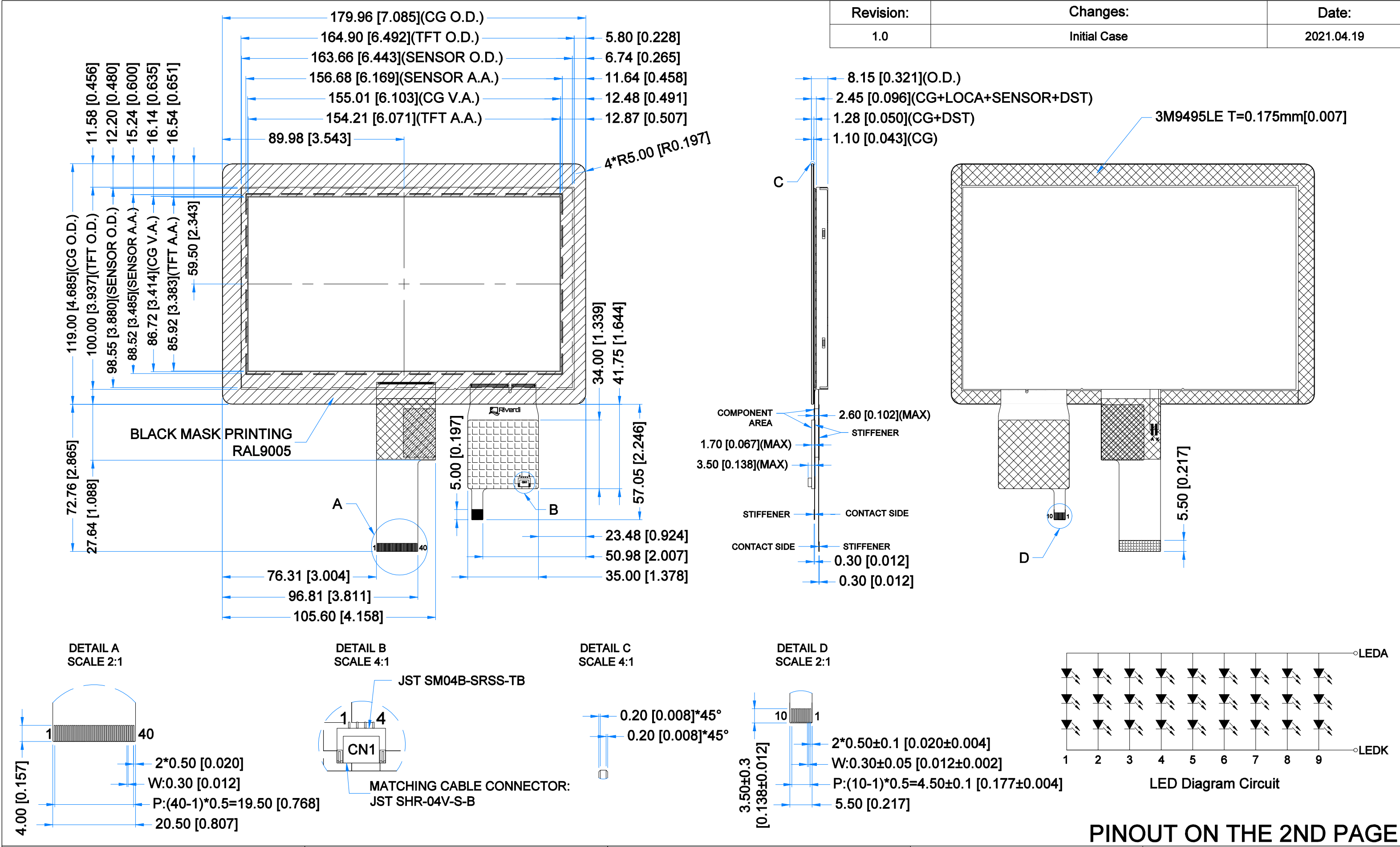
uxTouch are LCD TFT displays with specially designed projected capacitive touch panels. uxTouch display can be mounted without any hole in the housing. Our standard uxTouch displays include double-sided adhesive tape (DST) to stick TFT easily to the housing. Basic series include 4.3", 5.0", 7.0" and 10.1" display sizes.

uxTouch models with double-side adhesive tape can be mounted by connecting the glass to the housing. Riverdi recommends using support brackets assembled to display's back. An additional support will stiffen the whole structure and minimize the influence of external factors such as vibration. Figure 1 below shows examples of using support elements.

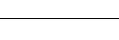
*Figure 1. Example of using support brackets*



| Revision: | Changes:     | Date:      |
|-----------|--------------|------------|
| 1.0       | Initial Case | 2021.04.19 |



PINOUT ON THE 2ND PAGE

|                                                                                                                                                                                                                                                                              |                                                                                                                                                                                              |                                                                                                                                                                                                                     |                   |           |                                                                                       |        |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------|---------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------|
| <b>TFT NOTES:</b><br>1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK,IPS<br>2. RESOLUTION: 1024x600<br>3. VIEWING ANGLE: FREE<br>4. IC CONTROLLER:EK79007AD3+EK73217BCGA<br>5. OPERATING VOLTAGE: 3.3V<br>6. INTERFACE: MIPI<br>7. BACKLIGHT: 27 LEDS WHITE, Vf = 9.6V, If = 270mA | <b>TP NOTES:</b><br>1. TP STRUCTURE: G+G<br>2. CG THICKNESS: 1.10 mm<br>3. DRIVER IC: ILI2132A<br>4. INTERFACE: USB /I2C/OPTIONAL UART<br>3. OPERATING VOLTAGE: 3.3V(CTP I2C); 5.0V(CTP USB) | <b>GENERAL NOTES:</b><br>1. MODULE SURFACE LUMINANCE: 800 cd/m^2<br>2. OPERATING TEMPERATURE: -20°C ~ 70°C<br>3. STORAGE TEMPERATURE: -30°C ~ 80°C<br>4. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm<br>5. RoHS3 COMPLIANT |                   |           |  |        |                                                                                       |
|                                                                                                                                                                                                                                                                              |                                                                                                                                                                                              |                                                                                                                                                                                                                     | PN: RVT70HSMNWC00 |           |                                                                                       |        |                                                                                       |
|                                                                                                                                                                                                                                                                              |                                                                                                                                                                                              |                                                                                                                                                                                                                     | SN:               |           |                                                                                       |        |                                                                                       |
|                                                                                                                                                                                                                                                                              |                                                                                                                                                                                              |                                                                                                                                                                                                                     | DRAWN: M.Natywa   |           | 2021.04.19                                                                            | 1:1.67 |  |
|                                                                                                                                                                                                                                                                              |                                                                                                                                                                                              |                                                                                                                                                                                                                     | CHECKED: Carol    |           | 2021.04.20                                                                            | [mm]   |                                                                                       |
| APPR:                                                                                                                                                                                                                                                                        |                                                                                                                                                                                              |                                                                                                                                                                                                                     | ISO A3            | P. 1 of 1 |                                                                                       |        |                                                                                       |



## 6. ABSOLUTE MAXIMUM RATINGS

| PARAMETER                               | SYMBOL          | MIN  | MAX  | UNIT |
|-----------------------------------------|-----------------|------|------|------|
| Power for Circuit Driving               | VDD             | -0.3 | +4.6 | V    |
| Operating Temperature                   | T <sub>OP</sub> | -20  | 70   | °C   |
| Storage Temperature                     | T <sub>ST</sub> | -30  | 80   | °C   |
| Storage Humidity (@ 25 ± 5°C)           | H <sub>ST</sub> | 10   | -    | % RH |
| Operating Ambient Humidity (@ 25 ± 5°C) | H <sub>OP</sub> | 10   | -    | % RH |

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

## 7. ELECTRICAL CHARACTERISTICS

| PARAMETER                  | SYMBOL | MIN    | TYP | MAX    | UNIT |
|----------------------------|--------|--------|-----|--------|------|
| Supply Voltage for Module  | VDD    | 2.6    | 3.3 | 3.6    | V    |
| Digital Power Current      | IDD    | -      | 168 | -      | mA   |
| Logic Input Signal Voltage | VIH    | 0.7VDD | -   | VDD    | V    |
|                            | VIL    | 0      | -   | 0.3VDD | V    |

## 8. BACKLIGHT ELECTRICAL CHARACTERISTICS

| PARAMETER                   | SYMBOL | MIN | TYP    | MAX  | UNIT |
|-----------------------------|--------|-----|--------|------|------|
| Backlight Driving Voltage   | VF     | 9.0 | 9.6    | 10.2 | V    |
| Backlight Driving Current   | IF     | -   | 270    | 315  | mA   |
| Backlight Power Consumption | WBL    | -   | 2592   | -    | mW   |
| Lifetime                    | -      | -   | 50,000 | -    |      |

**Note.** Operating life means the period in which the LED brightness goes down to 50% of the initial brightness. Typical operating lifetime is the estimated parameter.

## 9. ELECTRO-OPTICAL CHARACTERISTICS

Optical characteristics are determined after the unit has been ‘ON’ and stable for approximately 30 minutes in a dark environment at 25 °C. The values specified are at an approximate distance 500mm from the LCD surface at a viewing angle of  $\Phi$  and  $\theta$  equal to 0°.

| ITEM                    | SYMBOL         | CONDITION                                      | MIN   | TYP   | MAX   | UNIT  | RMK    | NOTE |
|-------------------------|----------------|------------------------------------------------|-------|-------|-------|-------|--------|------|
| Response Time           | Tr+Tf          | $\theta=0^\circ$<br>$\phi=0^\circ$<br>Ta=25 °C | -     | 35    | -     | ms    | FIG 2. | 4    |
| Contrast Ratio          | Cr             |                                                | -     | 800   | -     | ---   | FIG 3. | 1    |
| Luminance Uniformity    | $\delta$ WHITE |                                                | -     | 75    | -     | %     | FIG 3. | 3    |
| Surface Luminance       | Lv             |                                                | -     | 800   | -     | cd/m2 | FIG 3. | 2    |
| Viewing Angle Range     | $\theta$       | $\phi = 90^\circ$                              | -     | 85    | -     | deg   | FIG 4. | 6    |
|                         |                | $\phi = 270^\circ$                             | -     | 85    | -     | deg   | FIG 4. |      |
|                         |                | $\phi = 0^\circ$                               | -     | 85    | -     | deg   | FIG 4. |      |
|                         |                | $\phi = 180^\circ$                             | -     | 85    | -     | deg   | FIG 4. |      |
| CIE (x, y) Chromaticity | Rx             | $\theta=0^\circ$<br>$\phi=0^\circ$<br>Ta=25 °C | 0.578 | 0.618 | 0.658 | -     | FIG 3. | 5    |
|                         | Ry             |                                                | 0.489 | 0.329 | 0.369 | -     |        |      |
|                         | Gx             |                                                | 0.376 | 0.416 | 0.456 | -     |        |      |
|                         | Gy             |                                                | 0.493 | 0.533 | 0.573 | -     |        |      |
|                         | Bx             |                                                | 0.071 | 0.111 | 0.151 | -     |        |      |
|                         | By             |                                                | 0.108 | 0.148 | 0.188 | -     |        |      |
|                         | Wx             |                                                | 0.270 | 0.310 | 0.350 | -     |        |      |
|                         | Wy             |                                                | 0.290 | 0.330 | 0.370 | -     |        |      |

**Note 1.** Contrast Ratio (CR) is defined mathematically as below, for more information see Figure 3.

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

**Note 2.** Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see Figure 3.

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

**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 3.

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

**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 2. 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 4.

**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 2. The definition of response time

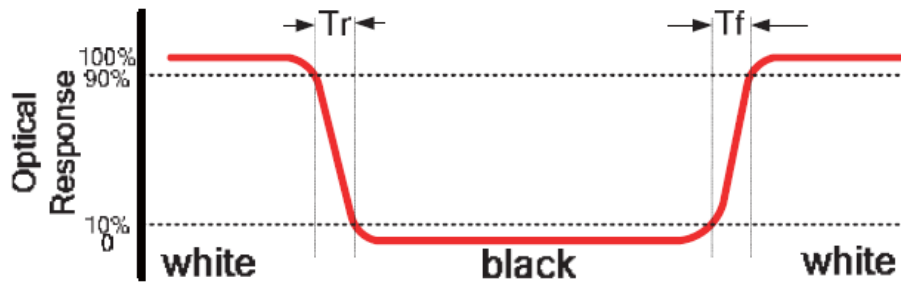
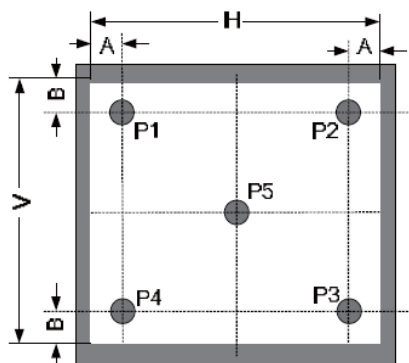


Figure 3. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity



A: 5mm

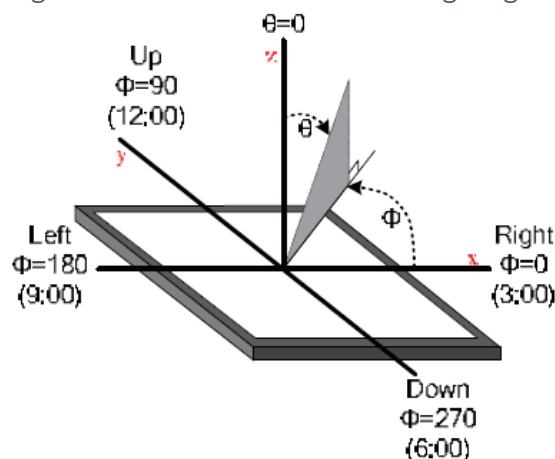
B: 5mm

H, V: Active Area

Light spot size  $\phi=5\text{mm}$ , 500mm distance from the LCD surface to detector lens.

Measurement instrument is TOPCON'S luminance meter BM-5

Figure 4. The definition of viewing angle





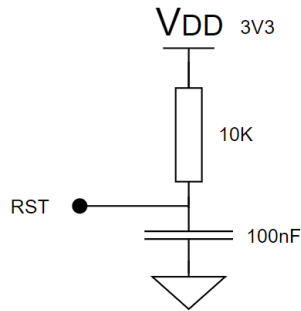
## 10. INTERFACE DESCRIPTION

### 10.1 TFT assignment

| PIN NO. | SYMBOL | I/O | DESCRIPTION                                                                                               | NOTE   |
|---------|--------|-----|-----------------------------------------------------------------------------------------------------------|--------|
| 1       | NC     | -   | No connection                                                                                             |        |
| 2       | VDD    | P   | Power supply 3.3V                                                                                         |        |
| 3       | VDD    | P   | Power supply 3.3V                                                                                         |        |
| 4       | NC     | -   | No connection                                                                                             |        |
| 5       | RESET  | I   | Global reset pin. Active low to enter reset state.                                                        | NOTE 1 |
| 6       | STBYB  | I   | Internally pull-up,<br>STBYB=1, normal operation.<br>STBYB=0, timing control, source driver will turn off |        |
| 7       | GND    | P   | Ground                                                                                                    |        |
| 8       | D0N    | I/O | Negative MIPI differential data input                                                                     |        |
| 9       | D0P    | I/O | Positive MIPI differential data input                                                                     |        |
| 10      | GND    | P   | Ground                                                                                                    |        |
| 11      | D1N    | I/O | Negative MIPI differential data input                                                                     |        |
| 12      | D1P    | I/O | Positive MIPI differential data input                                                                     |        |
| 13      | GND    | P   | Ground                                                                                                    |        |
| 14      | D2N    | I/O | Negative MIPI differential data input                                                                     |        |
| 15      | D2P    | I/O | Positive MIPI differential data input                                                                     |        |
| 16      | GND    | P   | Ground                                                                                                    |        |
| 17      | DCLKN  | I/O | Negative MIPI differential clock input                                                                    |        |
| 18      | DCLKP  | I/O | Positive MIPI differential clock input                                                                    |        |
| 19      | GND    | P   | Ground                                                                                                    |        |
| 20      | D3N    | I/O | Negative MIPI differential data input                                                                     |        |
| 21      | D3P    | I/O | Positive MIPI differential data input                                                                     |        |
| 22      | GND    | P   | Ground                                                                                                    |        |
| 23      | NC     | -   | No connection                                                                                             |        |
| 24      | NC     | -   | No connection                                                                                             |        |
| 25      | GND    | P   | Ground                                                                                                    |        |
| 26      | NC     | -   | No connection                                                                                             |        |
| 27      | NC     | -   | No connection                                                                                             |        |
| 28      | NC     | -   | No connection                                                                                             |        |
| 29      | NC     | -   | No connection                                                                                             |        |
| 30      | GND    | P   | Ground                                                                                                    |        |
| 31      | LED-   | P   | LED Cathode                                                                                               |        |
| 32      | LED-   | P   | LED Cathode                                                                                               |        |
| 33      | L/R    | I   | Left/Right display control, internally pull-up                                                            | Note 2 |
| 34      | U/D    | I   | Up/Down display control, internally pull down                                                             |        |
| 35      | NC     | -   | No connection                                                                                             |        |
| 36      | NC     | -   | No connection                                                                                             |        |
| 37      | NC     | -   | No connection                                                                                             |        |
| 38      | NC     | -   | No connection                                                                                             |        |
| 39      | LED+   | P   | LED Anode                                                                                                 |        |
| 40      | LED+   | P   | LED Anode                                                                                                 |        |

I: input, O: output, P: Power

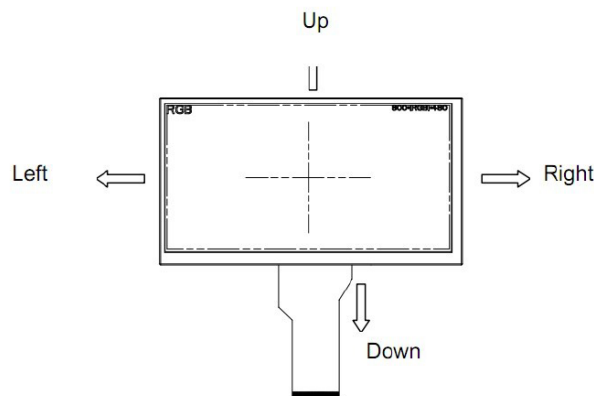
**Note 1:** Recommended Reset circuit:



**Note 2:** U/D (Pin 34) is internally pull-down, and R/L (Pin 33) is internally pull-up. The default scanning direction is up to down, left to right.

| SETTING OF SCAN CONTROL INPUT |     | SCANNING DIRECTION        |
|-------------------------------|-----|---------------------------|
| U/D                           | L/R |                           |
| GND                           | VDD | Up to down, left to right |
| VDD                           | GND | Down to up, right to left |
| GND                           | GND | Up to down, right to left |
| VDD                           | VDD | Down to up, left to right |

Definition of scanning direction, refer to the figure as below:



## 10.2 Touch panel assignment

| PIN NO. | SYMBOL  | DESCRIPTION                                | NOTE   |
|---------|---------|--------------------------------------------|--------|
| 1       | USB_GND | USB_ Ground                                |        |
| 2       | USB_VDD | USB Power for CTP, 5.0V                    |        |
| 3       | USB_D-  | USB _Data Signal -                         |        |
| 4       | USB_D+  | USB _Data Signal +                         |        |
| 5       | I2C_GND | I2C _ Ground                               |        |
| 6       | I2C_VDD | I2C _Power for CTP, 3.3 V                  |        |
| 7       | I2C_RST | I2C _Reset Pin, Active low                 | Note 1 |
| 8       | I2C_SCL | I2C _Clock Input                           |        |
| 9       | I2C_INT | I2C _Interrupt Signal from CTP, Active low |        |
| 10      | I2C_SDA | I2C _Data Signal                           |        |

**Note 1.** External pull-up resistors are required.



### 10.3 CON1 assignment

| PIN NO. | SYMBOL  | DESCRIPTION                |
|---------|---------|----------------------------|
| 1       | USB_VDD | USB_Power for CTP, DC 5.0V |
| 2       | USB_D-  | USB _Data Signal -         |
| 3       | USB_D+  | USB _Data Signal +         |
| 4       | USB_GND | USB_Ground                 |

## 11. TIMING CHARACTERISTICS

### 11.1 Input timing table

DE MODE

| PARAMETER                           | SYMBOL   | MIN  | TYP  | MAX  | UNIT |
|-------------------------------------|----------|------|------|------|------|
| DCLK frequency<br>(Frame rate 60Hz) | fclk     | 40.8 | 51.2 | 67.2 | MHz  |
| Horizontal display area             | thd      | 1024 |      |      | DCLK |
| HSYNC period time                   | th       | 1114 | 1344 | 1400 | DCLK |
| HSYNC blanking                      | thb+thfp | 90   | 320  | 376  | DCLK |
| Vertical display area               | tvd      | 600  |      |      | H    |
| VSYNC period time                   | tv       | 610  | 635  | 800  | H    |
| VSYNC blanking                      | tvb+tvfp | 10   | 85   | 200  | H    |

HV MODE- Horizontal input timing

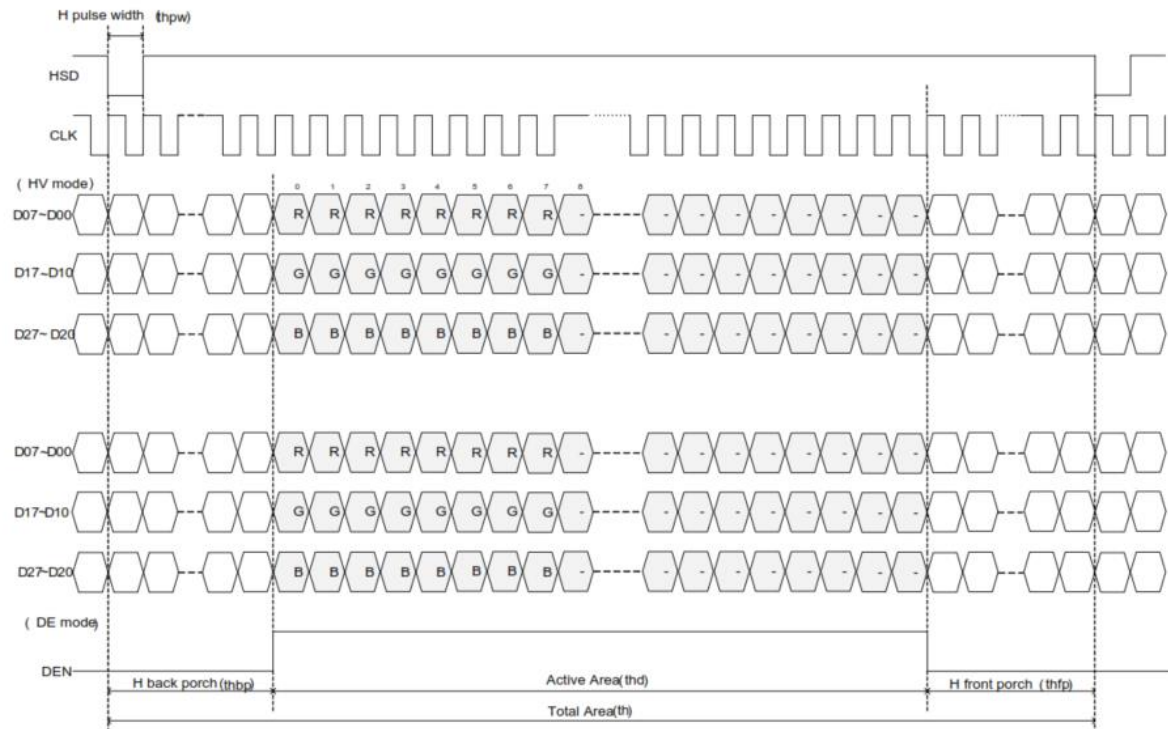
| PARAMETER                           | SYMBOL | MIN  | TYP  | MAX  | UNIT |
|-------------------------------------|--------|------|------|------|------|
| Horizontal display area             | thd    | 1024 |      |      | DCLK |
| DCLK frequency<br>(frame rate 60Hz) | fclk   | 44.9 | 51.2 | 63   | MHz  |
| 1 Horizontal Line                   | th     | 1200 | 1344 | 1400 | DCLK |
| HSYNC pulse width                   | thpw   | 1    | 70   | 140  | DCLK |
| HSYNC blanking                      | thb    | 160  | 160  | 160  | DCLK |
| HSYNC front porch                   | thfp   | 16   | 160  | 216  | DCLK |

HV MODE -Vertical input timing

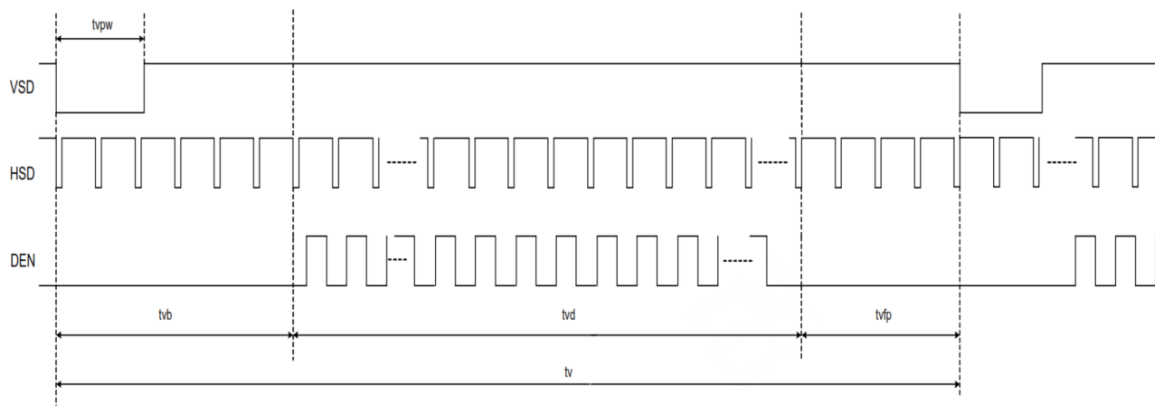
| PARAMETER             | SYMBOL | MIN | TYP | MAX | UNIT |
|-----------------------|--------|-----|-----|-----|------|
| Vertical display area | tvd    | 600 |     |     | H    |
| VSYNC period time     | tv     | 624 | 635 | 750 | H    |
| VSYNC pulse width     | tvpw   | 1   | 10  | 20  | H    |
| VSYNC back porch      | tvb    | 23  | 23  | 23  | H    |
| VSYNC front porch     | tvfp   | 1   | 12  | 127 | H    |

## 11.2 Input timing diagram

Horizontal input timing



Vertical input timing



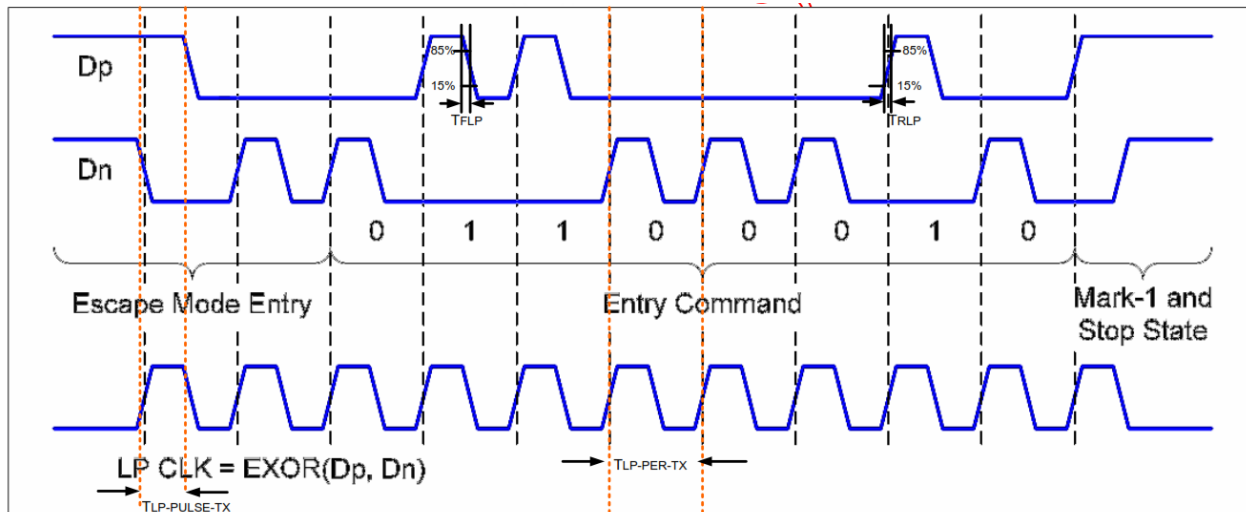
## 11.3 MIPI-DSI timings

The MIPI display we are using is together with THS\_ZERO time. Unfortunately, Driver MIPI does not meet the minimum value allowed by the MIPI standard. If the THS\_ZERO time is in the lower range, the Driver may not initialize correctly. This results in “jumping” of the image.

For correct operation of the display, it is necessary to modify the THS\_ZERO parameter in the DSI-PHY controller. The default value of THS\_ZERO should be changed to a value of about 213 ns.

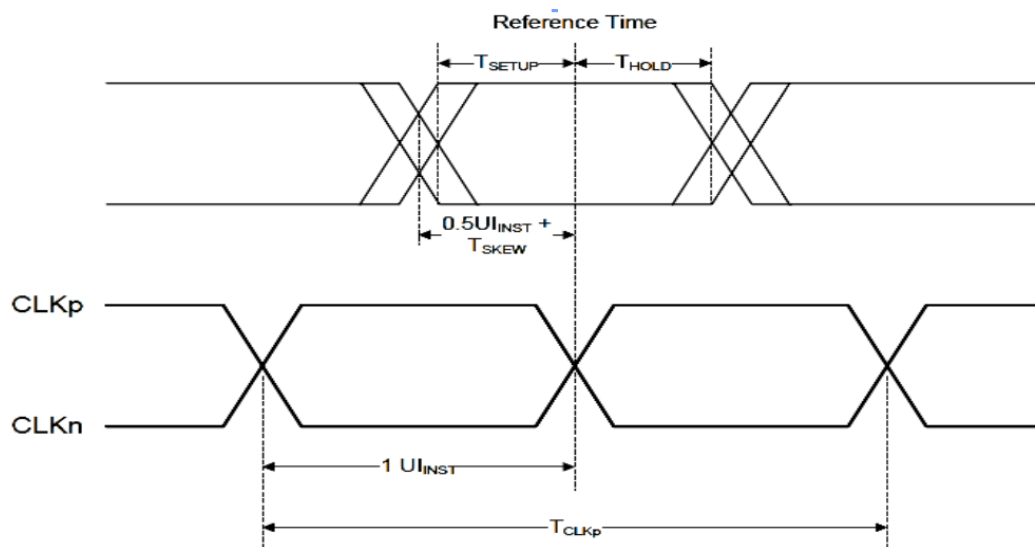
#### 11.4 Low power transmitter AC characteristic

| PARAMETER                             |                                                                            | SYMBOL                             | MIN | TYP | MAX | UNIT |
|---------------------------------------|----------------------------------------------------------------------------|------------------------------------|-----|-----|-----|------|
| 15%~85% rising time and falling time  |                                                                            | T <sub>RLP</sub> /T <sub>FLP</sub> | -   | -   | 25  | ns   |
| 30%~85% rising time and falling time  |                                                                            | T <sub>REOT</sub>                  | -   | -   | 35  |      |
| Pulse width of LP exclusive -OR clock | First LP EXOR clock pulse after STOP state or LAST pulse before stop state | T <sub>LP-PULSE-TX</sub>           | 40  | -   | -   |      |
|                                       | All other pulses                                                           |                                    | 20  | -   | -   |      |
| Period of the LP EXOR clock           |                                                                            | T <sub>LP-PER-TX</sub>             | 90  | -   | -   |      |
| Slew Rate @CLOAD =0pF                 |                                                                            | δV /δt <sub>SR</sub>               | 30  | -   | 500 |      |
| Slew Rate @CLOAD =5pF                 |                                                                            |                                    | 30  | -   | 200 |      |
| Slew Rate @CLOAD =20pF                |                                                                            |                                    | 30  | -   | 150 |      |
| Slew Rate @CLOAD =70pF                |                                                                            |                                    | 30  | -   | 100 |      |
| Load Capacitance                      |                                                                            | T <sub>RLP</sub>                   | -   | -   | 70  | pF   |



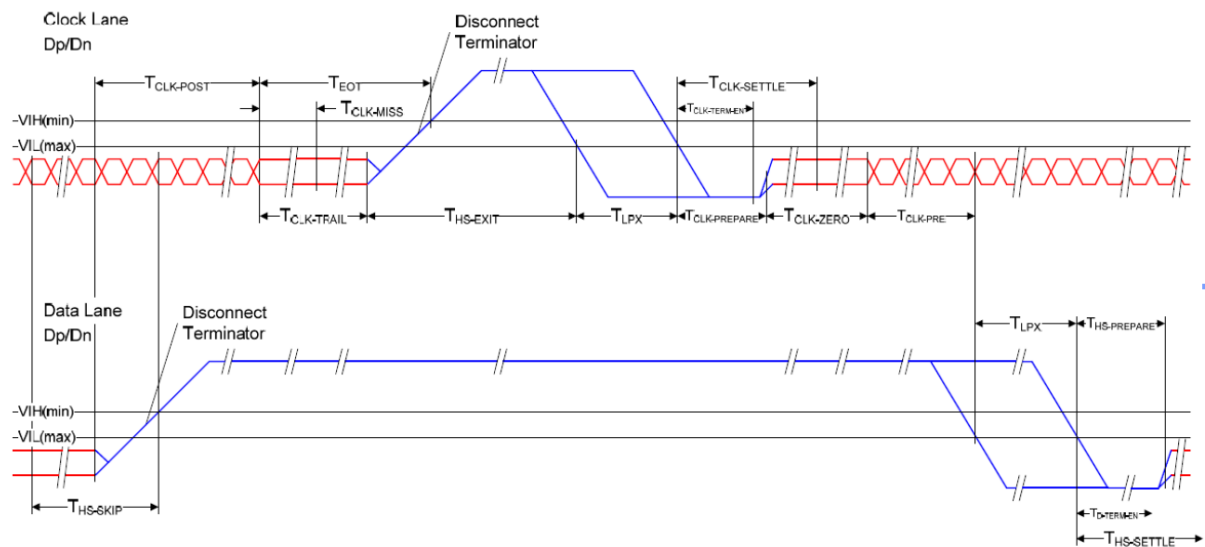
## 11.5 High speed transmission

| PARAMETER                                          | SYMBOL          | MIN   | TYP | MAX  | UNIT        |
|----------------------------------------------------|-----------------|-------|-----|------|-------------|
| UI instantaneous                                   | $UI_{INST}$     | 2     | -   | 12.5 | ns          |
| Data to Clock Skew (measured at transmitter)       | $T_{SKEW(TX)}$  | -0.15 | -   | 0.15 | $UI_{INST}$ |
| Data to Clock Setup time<br>(Measured at receiver) | $T_{SETUP(RX)}$ | 0.15  | -   | -    |             |
| Data to Clock Hold time<br>(Measured at receiver)  | $T_{HOLD(RX)}$  | 0.15  | -   | -    |             |
| 20%~80% rising time and falling time               | $T_R, T_F$      | 150   | -   | -    | ps          |
|                                                    |                 | -     | -   | 0.3  | $UI_{INST}$ |

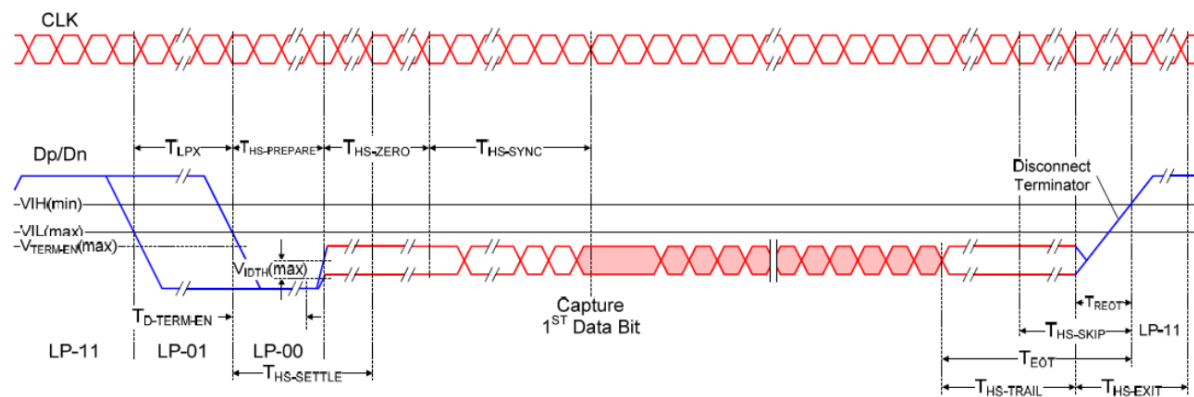


## 11.6 High speed clock transmission

| PARAMETER                                                                                                                 | SYMBOL                               | MIN       | TYP | MAX | UNIT |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------|-----|-----|------|
| Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode | $T_{CLK-POST}$                       | $60+52UI$ | -   | -   | ns   |
| Detection time that the clock has stopped toggling                                                                        | $T_{CLK-MISS}$                       | -         | -   | 60  |      |
| Time to drive LP-00 to prepare for HS clock transmission                                                                  | $T_{CLK-PREPARE}$                    | 38        | -   | 95  |      |
| Minimum lead HS-0 drive period before starting clock                                                                      | $T_{CLK-PREPARE+}$<br>$T_{CLK-ZERO}$ | 300       | -   | -   |      |
| Time to enable Clock Lane receiver line termination measured from when Dn cross $V_{IL,MAX}$                              | $T_{HS-TERM-EN}$                     | -         | -   | 38  |      |
| Minimum time that the HS clock must be prior to any associated data lane beginning the transmission from LP to HS mode    | $T_{CLK-PRE}$                        | 8         | -   | -   | UI   |
| Time to drive HS differential state after last payload clock bit of a HS transmission burst                               | $T_{CLK-TRAIL}$                      | 60        | -   | -   | ns   |



## 11.7 High speed data transmission in bursts



## 12. CAPACITIVE TOUCH SCREEN PANEL SPECIFICATIONS

### 12.1 Mechanical characteristics

| DESCRIPTION              | SPECIFICATION         | REMARK  |
|--------------------------|-----------------------|---------|
| Touch Panel Size         | 7.0 inch              | uxTouch |
| Outline Dimension of CTP | 179.96 mm x 119.00 mm |         |
| Product Thickness        | 2.45 mm               |         |
| Glass Thickness          | 1.1 mm                |         |
| CTP View Area            | 155.01 mm x 86.72 mm  |         |
| Sensor Active Area       | 156.68 mm x 88.52 mm  |         |
| Structure type           | Glass + Glass         |         |
| Surface Hardness         | 7H                    |         |

### 12.2 Electrical characteristics

| PARAMETER               | SPECIFICATION                    | REMARK  |
|-------------------------|----------------------------------|---------|
| Operating Voltage       | DC 5.0 V (USB)<br>DC 3.3 V (I2C) | uxTouch |
| Power Consumption (IDD) | Active Mode                      |         |
|                         | Sleep Mode                       |         |
| Interface               | USB / I2C / Optional UART        |         |
| Linearity               | +/-1.5mm                         |         |
| Controller              | ILI2132A                         |         |
| I2C address             | 0x82                             |         |
| Resolution              | 1024 x 600                       |         |



### 13. INITIALIZATION CODE

```
DCS_Short_Write_NP(0x01); //Software Reset  
Delay (120);  
Generic_Short_Write_1P(0xB2,0x70); //Set Channels 2LANE:0x50; 3LANE:0x60; 4LANE:0x70  
Generic_Short_Write_1P(0x80,0x4B); //Set Gamma voltage  
Generic_Short_Write_1P(0x81,0xFF); //Set Gamma voltage  
Generic_Short_Write_1P(0x82,0x1A); //Set Gamma voltage  
Generic_Short_Write_1P(0x83,0x88); //Set Gamma voltage  
Generic_Short_Write_1P(0x84,0x8F); //Set Gamma voltage  
Generic_Short_Write_1P(0x85,0x35); //Set Gamma voltage  
Generic_Short_Write_1P(0x86,0xB0); //Set Gamma voltage  
DCS_Short_Write_NP(0x11); //Exit Sleep Mode  
Delay (120);  
DCS_Short_Write_NP(0x29); //Display on; 0x28 is display off  
Delay (20);
```

## 14. INSPECTION

Standard acceptance/rejection criteria for TFT module

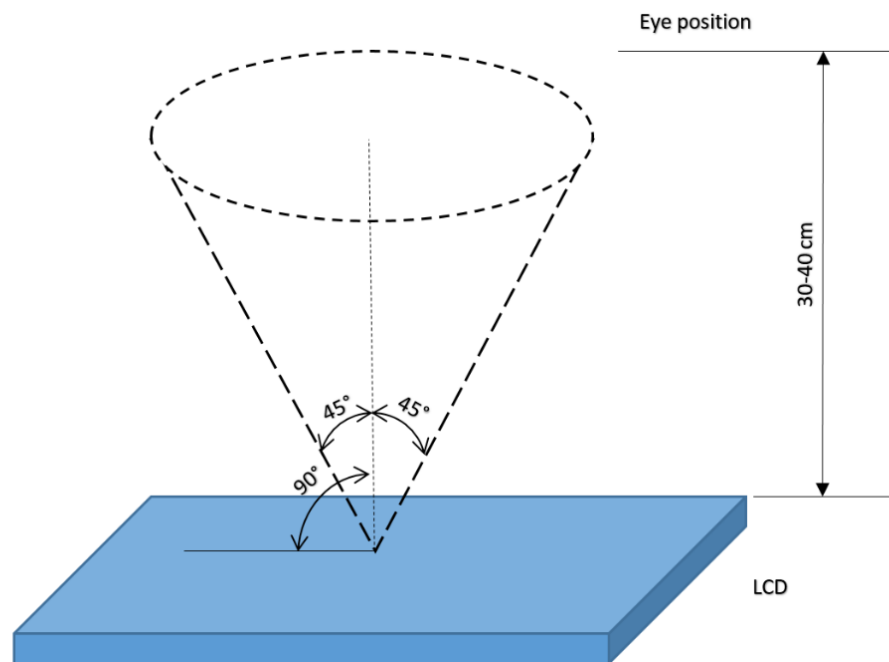
### 14.1 Inspection condition

Ambient conditions:

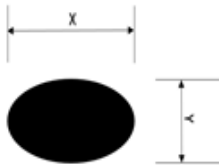
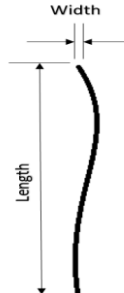
- Temperature:  $25 \pm 2^{\circ}\text{C}$
- Humidity:  $(60 \pm 10) \% \text{RH}$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

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

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



## 14.2 Inspection standard

| ITEM                                                                               |                                                                                                                           | CRITERION                                |                     |               |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------|---------------|
| Black spots,<br>white spots,<br>light leakage,<br>Foreign Particle<br>(round Type) | <br>$D=(x+y)/2$<br>Spot's density: 10 mm | Size = 7"                                |                     |               |
|                                                                                    |                                                                                                                           | Average Diameter                         |                     | Qualified Qty |
|                                                                                    |                                                                                                                           | $D \leq 0.2 \text{ mm}$                  |                     | Ignored       |
|                                                                                    |                                                                                                                           | $0.2 \text{ mm} < D \leq 0.3 \text{ mm}$ |                     | $N \leq 3$    |
|                                                                                    |                                                                                                                           | $0.5 \text{ mm} < D$                     |                     | Not allowed   |
|                                                                                    |                                                                                                                           | $0.5 \text{ mm} < D$                     |                     |               |
| LCD black spots,<br>white spots,<br>light leakage<br>(line Type)                   |                                          | Size = 7"                                |                     |               |
|                                                                                    |                                                                                                                           | Length                                   | Width               | Qualified Qty |
|                                                                                    |                                                                                                                           | -                                        | $W \leq 0.05$       | Ignored       |
|                                                                                    |                                                                                                                           | $L \leq 5.0$                             | $0.05 < W \leq 0.1$ | 3             |
|                                                                                    |                                                                                                                           | $5.0 < L$                                | $0.1 < W$           | Not allowed   |
| Bright/Dark<br>Dots                                                                | Size = 7"                                                                                                                 |                                          |                     |               |
|                                                                                    | Item                                                                                                                      |                                          | Qualified Qty       |               |
|                                                                                    | Bright dots                                                                                                               |                                          | $N \leq 2$          |               |
|                                                                                    | Dark dots                                                                                                                 |                                          | $N \leq 3$          |               |
|                                                                                    | Total bright and dark dots                                                                                                |                                          | $N \leq 4$          |               |
| Clear spots                                                                        | Size = 7"                                                                                                                 |                                          |                     |               |
|                                                                                    | Average Diameter                                                                                                          |                                          | Qualified Qty       |               |
|                                                                                    | $D < 0.2 \text{ mm}$                                                                                                      |                                          | Ignored             |               |
|                                                                                    | $0.2 \text{ mm} < D < 0.3 \text{ mm}$                                                                                     |                                          | 4                   |               |
|                                                                                    | $0.3 \text{ mm} < D < 0.5 \text{ mm}$                                                                                     |                                          | 2                   |               |
|                                                                                    | $0.5 \text{ mm} < D$                                                                                                      |                                          | 0                   |               |
| Polarizer<br>bubbles                                                               | Size = 7"                                                                                                                 |                                          |                     |               |
|                                                                                    | Average Diameter                                                                                                          |                                          | Qualified Qty       |               |
|                                                                                    | $D \leq 0.2 \text{ mm}$                                                                                                   |                                          | Ignored             |               |
|                                                                                    | $0.2 \text{ mm} < D \leq 0.5 \text{ mm}$                                                                                  |                                          | 4                   |               |
|                                                                                    | $0.5 \text{ mm} < D$                                                                                                      |                                          | 0                   |               |
| Touch panel<br>spot                                                                | Size $\geq 5"$                                                                                                            |                                          |                     |               |
|                                                                                    | Average Diameter                                                                                                          |                                          | Qualified Qty       |               |
|                                                                                    | $D < 0.25 \text{ mm}$                                                                                                     |                                          | Ignored             |               |
|                                                                                    | $0.25 \text{ mm} < D < 0.5 \text{ mm}$                                                                                    |                                          | 4                   |               |
|                                                                                    | $0.5 \text{ mm} < D$                                                                                                      |                                          | 0                   |               |
| Touch panel<br>White line<br>Scratch                                               | Size $\geq 5"$                                                                                                            |                                          |                     |               |
|                                                                                    | Length                                                                                                                    | Width                                    | Qualified Qty       |               |
|                                                                                    | -                                                                                                                         | $W < 0.03$                               | Ignored             |               |
|                                                                                    | $L < 5.0$                                                                                                                 | $0.03 < W < 0.05$                        | 2                   |               |
|                                                                                    | -                                                                                                                         | $0.05 < W$                               | 0                   |               |

## 15. RELIABILITY TEST

| NO. | TEST ITEM                           | TEST CONDITION                                                                                                                       |
|-----|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1   | High Temperature Storage            | 80°C/120 hours                                                                                                                       |
| 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                                          |
| 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                                                                                       |
| 9   | ESD Test                            | Air: ±2 kV,<br>Human Body Mode,<br>100 pF /1500 Ω                                                                                    |

**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.



## 16.LEGAL INFORMATION

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Therefore, Riverdi display modules are not CE marked.

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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