



RVT70HSTNWC00

## IPS RGB 7.0" LCD TFT DATASHEET

Rev.1.2

2021-07-29

| 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             | RGB                                   | /                 |
| Color Depth                    | 16.7 M                                | /                 |
| Pixel Arrangement              | RGB Vertical Stripe                   | /                 |
| With/Without Touch             | With Projected Capacitive Touch Panel | /                 |
| CTP Driver                     | ILI2132A                              | /                 |
| Touch Interface Type           | USB /I2C/ Optional UART               | /                 |
| Weight                         | 220                                   | 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     | 2021-04-20 | Add" inch" unit on drawing |         |
| 1.2     | 2021-07-29 | Updating new template      |         |



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### 3. MODULE CLASSIFICATION INFORMATION

| RV | T  | 70 | H  | S  | T  | N  | W  | C  | 00  |
|----|----|----|----|----|----|----|----|----|-----|
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |

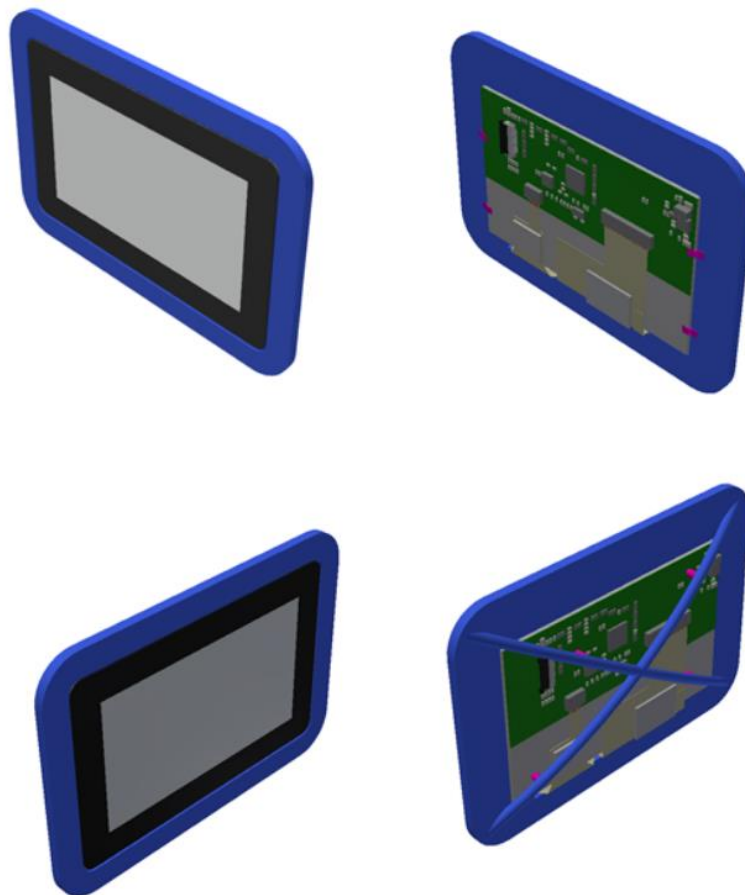
| NO. | PARAMETER        | SYMBOL                           |
|-----|------------------|----------------------------------|
| 1.  | BRAND            | RV – Riverdi                     |
| 2.  | PRODUCT TYPE     | T – TFT Standard                 |
| 3.  | DISPLAY SIZE     | 70 – 7.0”                        |
| 4.  | MODEL SERIAL NO. | H – High Brightness, IPS         |
| 5.  | RESOLUTION       | S – 1024 x 600 px                |
| 6.  | INTERFACE        | T – TFT LCD, RGB                 |
| 7.  | FRAME            | N – Without Mounting Metal Frame |
| 8.  | BACKLIGHT TYPE   | W – LED White                    |
| 9.  | TOUCH PANEL      | C – With Capacitive Touch Panel  |
| 10. | VERSION          | 00 – (00-99)                     |

#### 4. uxTouch ASSEMBLY

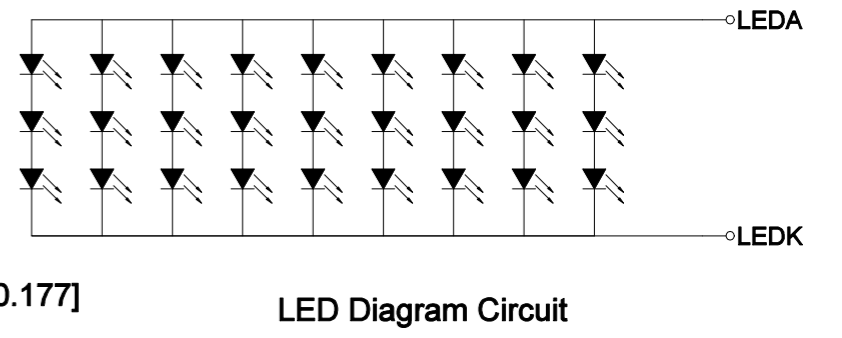
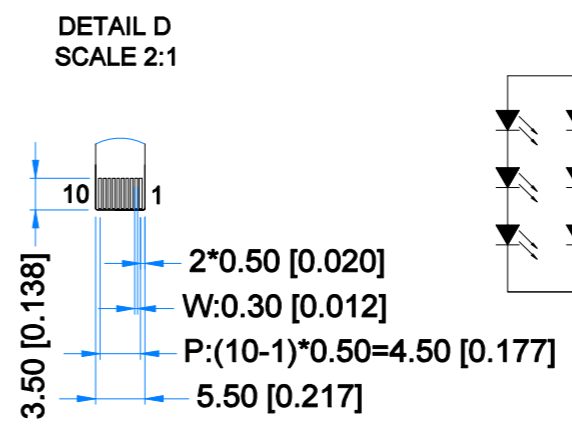
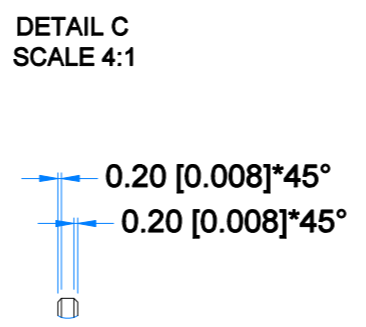
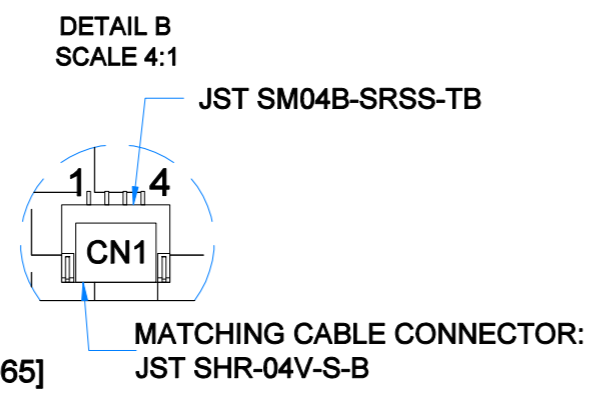
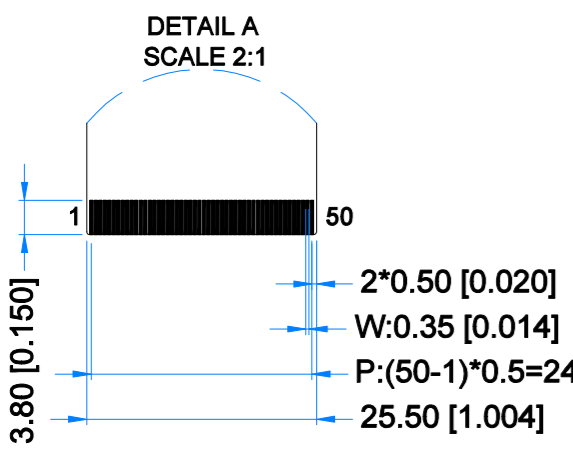
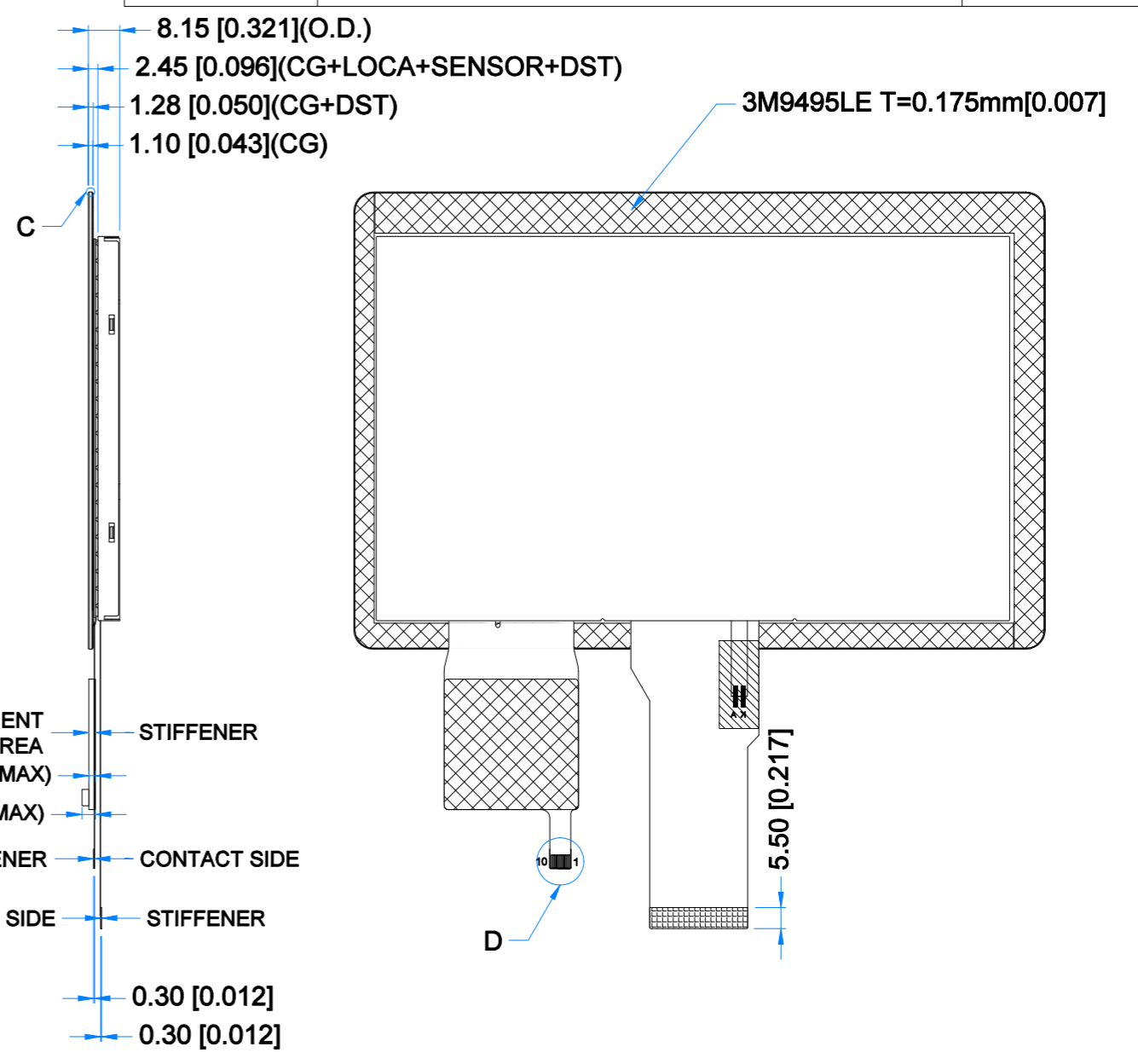
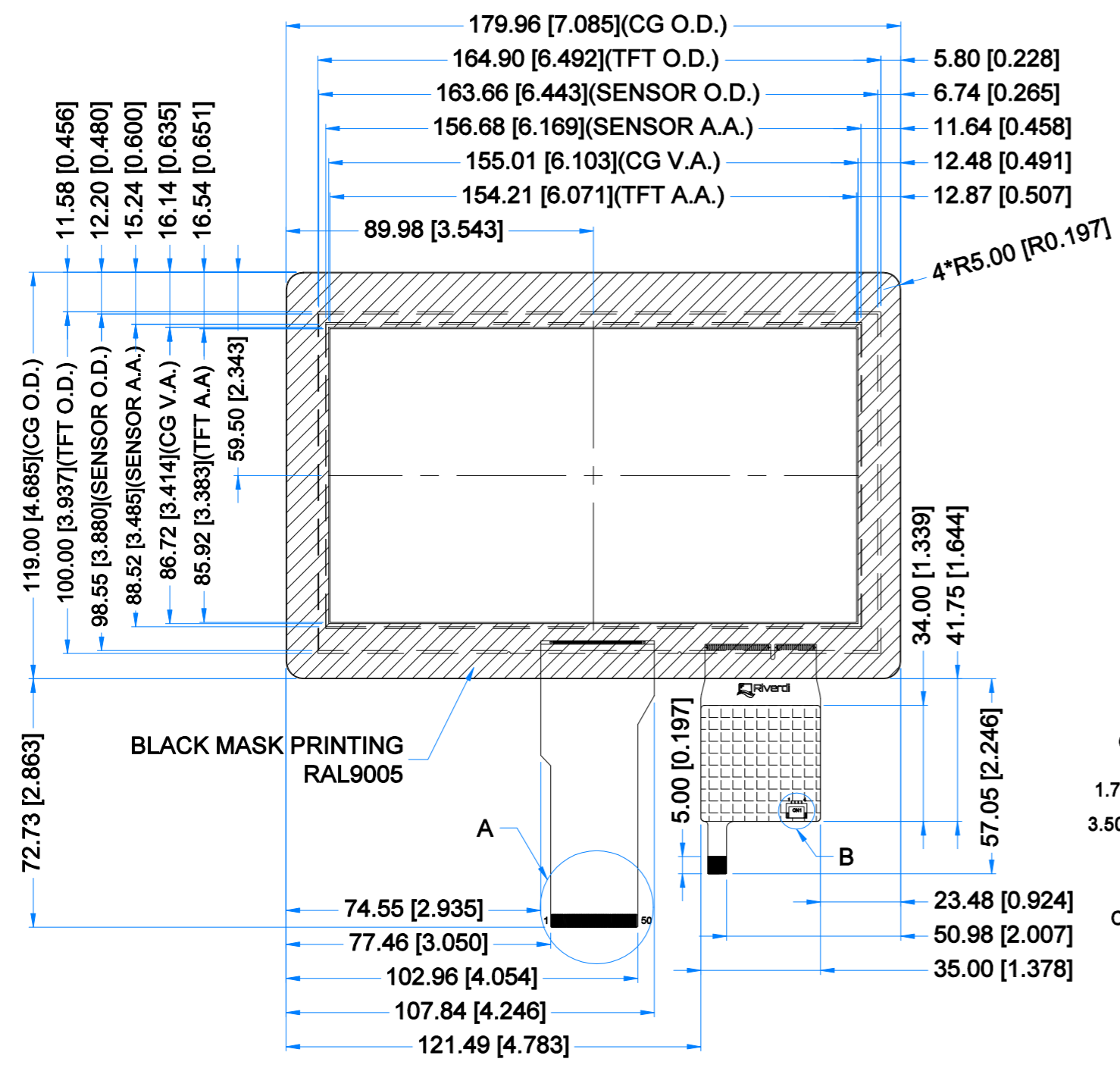
uxTouch are LCD TFT displays with specially designed projected capacitive touch panels. uxTouch display can be mounted without any holes in the housing. Our standard uxTouch displays include double-sided adhesive tape (DST) to stick TFT easily to the housing. Basic series include 4.3", 5.0", 7.0" and 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       | 2020.07.03 |
| 1.1       | Dimension Overhaul | 2021.04.19 |



**TFT NOTES:**  
1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS  
2. RESOLUTION: 1024x600  
3. VIEWING ANGLE: FREE  
4. INTERFACE: RGB  
5. LCD DRIVER: EK79001HK+EK73215BCGA  
6. LOGIC VOLTAGE: 3.3V  
7. BACKLIGHT: 27PCS LED, V<sub>f</sub>=9.6V, I<sub>f</sub>=270mA

**TP NOTES:**  
1. TP STRUCTURE: G+G  
2. CG THICKNESS: 1.10 mm  
3. DRIVER IC: ILI2132A  
4. INTERFACE: USB /I2C/OPTIONAL UART  
5. OPERATING VOLTAGE: 3.3V(CTP I2C); 5.0V(CTP USB)

**GENERAL NOTES:**  
1. MODULE SURFACE LUMINANCE: 800 cd/m<sup>2</sup>  
2. OPERATING TEMPERATURE: -20°C ~ 70°C  
3. STORAGE TEMPERATURE: -30°C ~ 80°C  
4. WITHOUT INDIVIDUAL TOLERANCE:  
DIM ACCORDING DIRECTLY TO TFT: ±0.2mm  
DIM ACCORDING DIRECTLY TO TP: ±0.3mm  
5. RoHS3 COMPLIANT

PN: RVT70HSTNWC00  
SN:  
DRAWN: M.Natywa  
CHECKED: Carol  
APPR:



|            |           |  |
|------------|-----------|--|
| 2021.04.19 | 1:1.68    |  |
| 2021.04.20 | [mm]      |  |
| ISO A3     | P. 1 of 1 |  |



## 6. ABSOLUTE MAXIMUM RATINGS

| PARAMETER                       | SYMBOL          | MIN   | MAX   | UNIT |
|---------------------------------|-----------------|-------|-------|------|
| Power for Circuit Driving       | VDD             | -0.3  | 3.96  | V    |
|                                 | AVDD            | -0.5  | 14.85 |      |
|                                 | VGH             | -0.3  | 40    |      |
|                                 | VGL             | -20.0 | 0.3   |      |
| Operating Temperature           | T <sub>OP</sub> | -20   | 70    | °C   |
| Storage Temperature             | T <sub>ST</sub> | -30   | 80    | °C   |
| Operating Humidity (@ 25 ± 5°C) | RH              | 10%   | -     | RH   |
| Storage Humidity (@ 25 ± 5°C)   | RH              | 10%   | -     | RH   |

**Note.** The following are maximum values. If exceeded, it may cause operation or damage to the unit.

## 7. ELECTRICAL CHARACTERISTICS

| PARAMETER                 | SYMBOL          | MIN     | TYP  | MAX    | UNIT | NOTE        |
|---------------------------|-----------------|---------|------|--------|------|-------------|
| Supply Voltage for Module | DVDD            | 3.0     | 3.3  | 3.6    | V    |             |
|                           | VGH             | 17      | 18   | 19     |      |             |
|                           | VGL             | -6.6    | -6.0 | -5.4   |      |             |
|                           | AVDD            | 9.4     | 9.6  | 9.8    |      |             |
|                           | VCOM            | 3.6     | 3.8  | 4.0    |      |             |
| Current of Power Supply   | IDD             | -       | 30   | 45     | mA   | DVDD = 3.3V |
|                           | IADD            | -       | 35   | 45     | mA   | AVDD = 9.6V |
|                           | IGH             | -       | 0.5  | 1      | uA   | VGH = 18V   |
|                           | IGL             | -       | 0.5  | 1      | mA   | VGL = -6V   |
| Input Voltage 'H' level   | V <sub>IH</sub> | 0.7DVDD | -    | DVDD   | V    | Note 1      |
| Input Voltage 'L' level   | V <sub>IL</sub> | 0       | -    | 0.3VDD | V    | Note 1      |

**Note 1.** STHL, STHR, OEH, L/R, CPH1÷CPH3, STVD, STVU, OEV, CKV, U/D.

## 8. BACKLIGHT ELECTRICAL CHARACTERISTICS

| PARAMETER                   | SYMBOL          | MIN | TYP    | MAX  | UNIT  | NOTE   |
|-----------------------------|-----------------|-----|--------|------|-------|--------|
| Backlight Driving Voltage   | V <sub>F</sub>  | 9.0 | 9.6    | 10.2 | V     |        |
| Backlight Driving Current   | I <sub>F</sub>  | -   | 270    | -    | mA    |        |
| Backlight Power Consumption | W <sub>BL</sub> | -   | 2592   | -    | mW    |        |
| LED Lifetime                | -               | -   | 50,000 | -    | hours | Note 1 |

**Note 1.** 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.

## 9. POWER CONSUMPTION

| PARAMETER               | SYMBOL | CONDITION  | MIN | TYP | MAX | UNIT | NOTE   |
|-------------------------|--------|------------|-----|-----|-----|------|--------|
| Gate on Power Current   | IVGH   | VGH=18V    | -   | 0.5 | 1   | mA   | Note 1 |
| Gate off Power Current  | IVGL   | VGL=6V     | -   | 0.5 | 1   |      |        |
| Digital Power Current   | IDVDD  | DVDD=3.3V  | -   | 30  | 45  |      |        |
| Analog Power Current    | IAVDD  | AVDD=9.6 V | -   | 35  | 45  |      |        |
| Total Power Consumption | PC     |            | -   | 447 | 604 | mW   |        |

**Note.** Typ. Specification: Gray-level test pattern; Max Specification: Black test pattern



256 gray patten



black pattern

## 10. ELECTRO-OPTICAL CHARACTERISTICS

| 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    | $\delta$<br>WHITE |  | -     | 75    | -     | %                 | FIG 3. | 3    |
| Surface Luminance       | Lv                |  | -     | 800   | -     | cd/m <sup>2</sup> | 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.



$L_v$  = 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,  $T_r$ ) and from black to white (Decay Time,  $T_f$ ). 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 calculating the 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

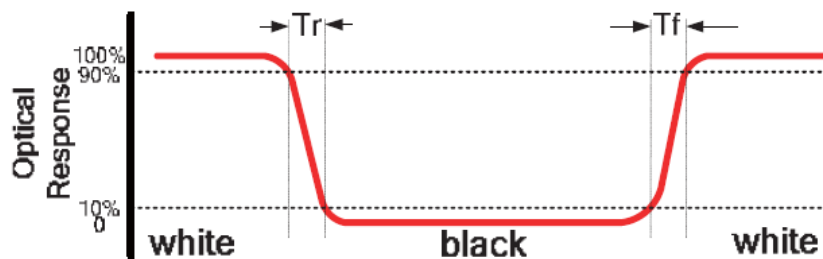
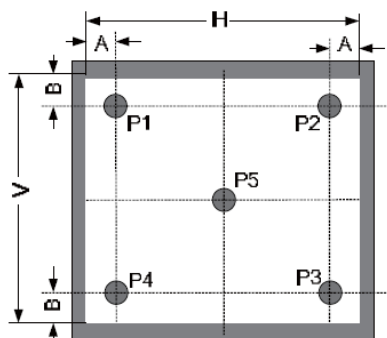


Figure 3. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity



A: 5mm

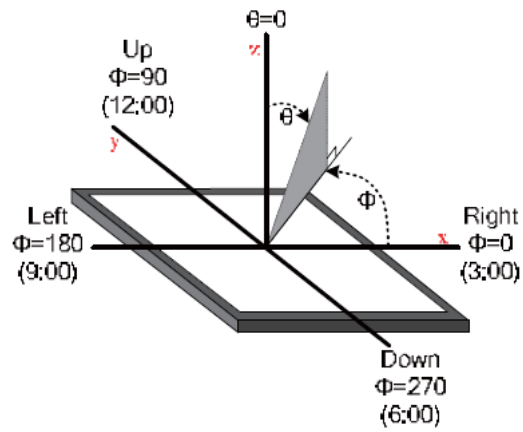
B: 5mm

H, V: Active Area

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

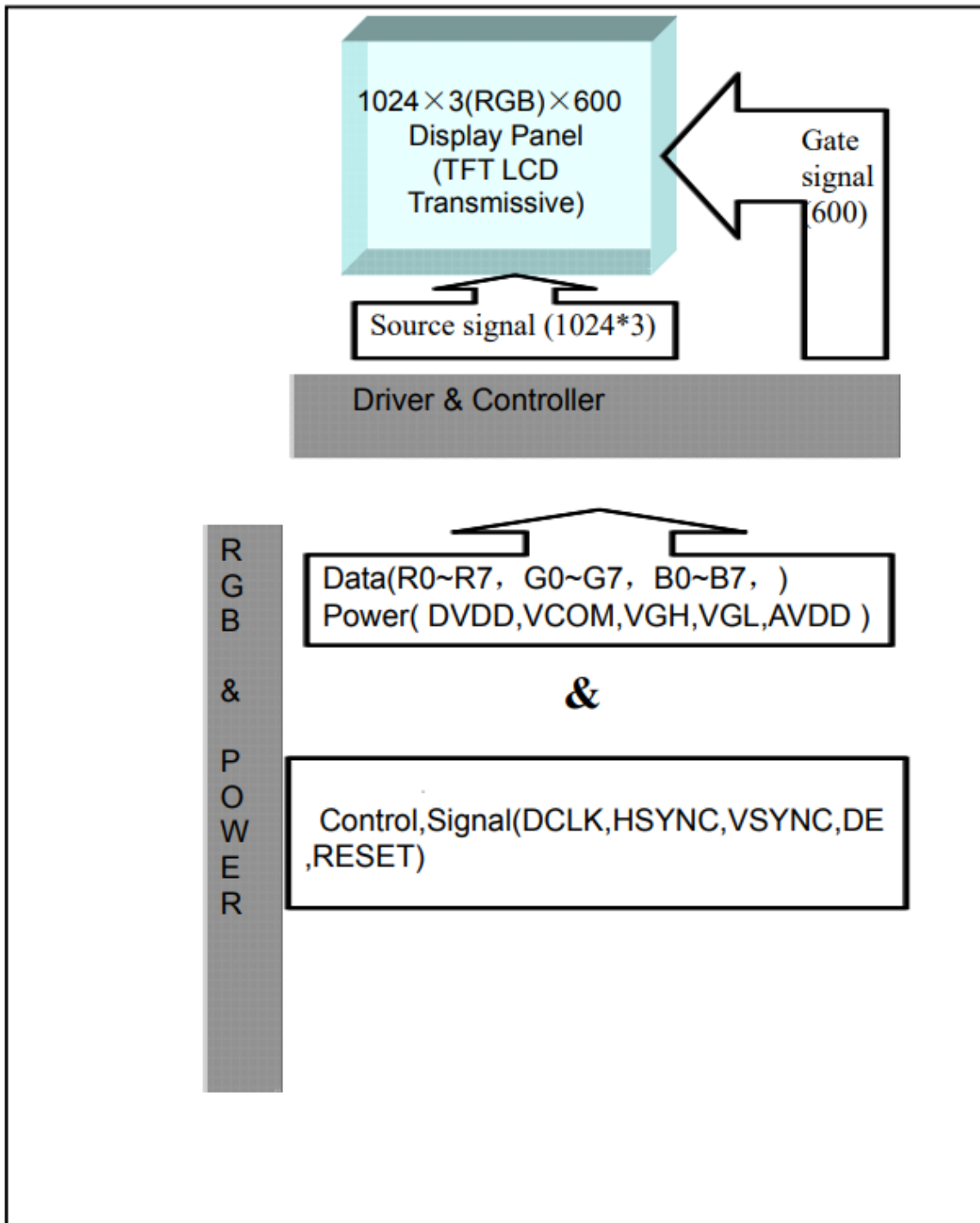
Measurement instrument is TOPCON'S luminance meter BM-5

Figure 4. The definition of viewing angle





11. BLOCK DIAGRAM





## 12. INTERFACES DESCRIPTION

### 12.1 TFT assignment

| PIN NO. | SYMBOL | I/O | DESCRIPTION                       | NOTES    |
|---------|--------|-----|-----------------------------------|----------|
| 1       | VLED+  | P   | Power for LED Backlight (Anode)   |          |
| 2       | VLED+  | P   | Power for LED Backlight (Anode)   |          |
| 3       | VLED-  | P   | Power for LED Backlight (Cathode) |          |
| 4       | VLED-  | P   | Power for LED Backlight (Cathode) |          |
| 5       | GND    | P   | Ground                            |          |
| 6       | VCOM   | I   | Common Voltage                    |          |
| 7       | DVDD   | P   | Power for Digital Circuit         |          |
| 8       | MODE   | I   | DE/SYNC mode select               | Note 1   |
| 9       | DE     | I   | Data Input Enable                 |          |
| 10      | VS     | I   | Vertical Sync Input               |          |
| 11      | HS     | I   | Horizontal Sync Input             |          |
| 12      | B7     | I   | Blue Data (MSB)                   |          |
| 13      | B6     | I   | Blue Data                         |          |
| 14      | B5     | I   | Blue Data                         |          |
| 15      | B4     | I   | Blue Data                         |          |
| 16      | B3     | I   | Blue Data                         |          |
| 17      | B2     | I   | Blue Data                         |          |
| 18      | B1     | I   | Blue Data                         | Note 2   |
| 19      | B0     | I   | Blue Data (LSB)                   | Note 2   |
| 20      | G7     | I   | Green Data (MSB)                  |          |
| 21      | G6     | I   | Green Data                        |          |
| 22      | G5     | I   | Green Data                        |          |
| 23      | G4     | I   | Green Data                        |          |
| 24      | G3     | I   | Green Data                        |          |
| 25      | G2     | I   | Green Data                        |          |
| 26      | G1     | I   | Green Data                        | Note 2   |
| 27      | G0     | I   | Green Data (LSB)                  | Note 2   |
| 28      | R7     | I   | Red Data (MSB)                    |          |
| 29      | R6     | I   | Red Data                          |          |
| 30      | R5     | I   | Red Data                          |          |
| 31      | R4     | I   | Red Data                          |          |
| 32      | R3     | I   | Red Data                          |          |
| 33      | R2     | I   | Red Data                          |          |
| 34      | R1     | I   | Red Data                          | Note 2   |
| 35      | R0     | I   | Red Data (LSB)                    | Note 2   |
| 36      | GND    | P   | Ground                            |          |
| 37      | DCLK   | P   | Sample Clock                      |          |
| 38      | GND    | P   | Ground                            |          |
| 39      | L/R    | I   | Left/Right Selection              | Note 4,5 |
| 40      | U/D    | I   | Up/Down Selection                 | Note 4,5 |
| 41      | VGH    | P   | Gate ON Voltage                   |          |
| 42      | VGL    | P   | Gate OFF Voltage                  |          |



|    |        |   |                          |        |
|----|--------|---|--------------------------|--------|
| 43 | AVDD   | P | Power for Analog Circuit |        |
| 44 | RESET  | I | Global Reset Pin         | Note 6 |
| 45 | NC     | - | No Connection            |        |
| 46 | VCOM   | I | Common Voltage           |        |
| 47 | DITHUB | I | Dithering Function       | Note 7 |
| 48 | GND    | I | Ground                   |        |
| 49 | NC     | - | No Connection            |        |
| 50 | NC     | - | No Connection            |        |

I: input, O: output, P: Power

**Note 1.** DE/SYNC mode select. Normally pull high.

H:DE Mode. L: HS/VS mode.

When select DE mode, MODE="1", VS and HS must pull high.

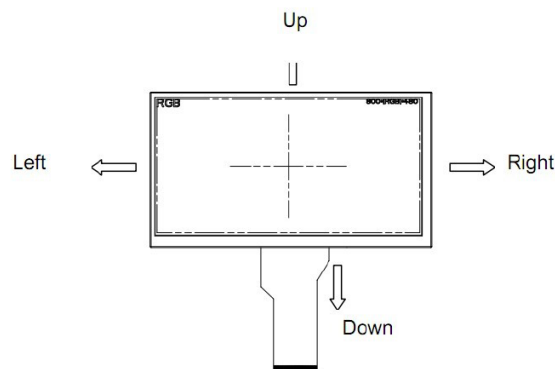
**Note 2.** When input 18 bits RGB data, the two low bits of R, G and B data must be grounded.

**Note 3.** Data shall be latched at the falling edge of DCLK.

**Note 4.** Selection of scanning mode:

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

**Note 5.** Definition of scanning direction, refer to the figure as below:



**Note 6.** Global reset pin. Active low to enter reset state, suggest connecting with an RC reset circuit for stability. Normally pull high.

**Note 7.** Dithering function enable control, normally pull high.

When DITHUB="1", Disable internal dithering function.

When DITHUB="0", Enable internal dithering function.

## 12.2 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.

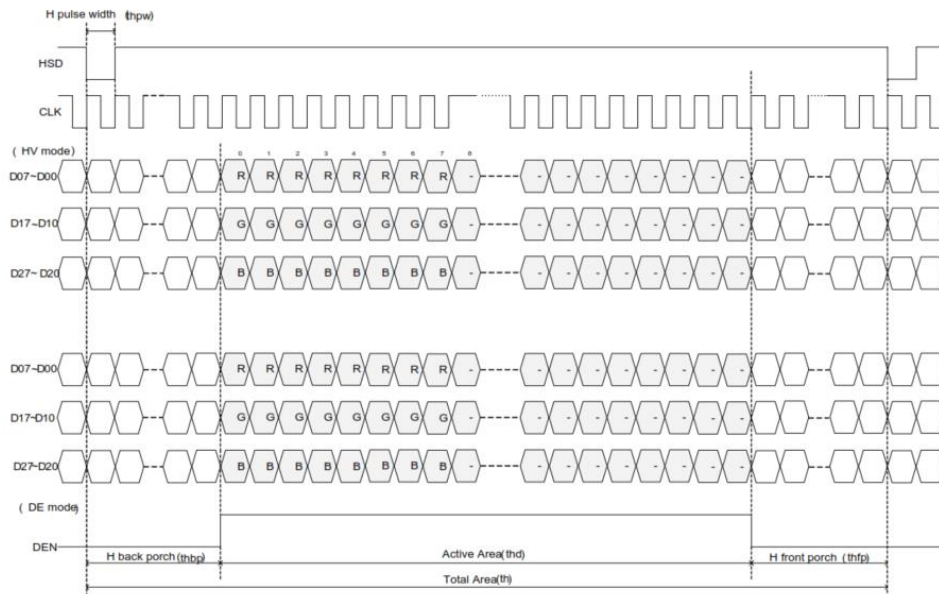
### 12.3 CON1 assignment

| 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                 |

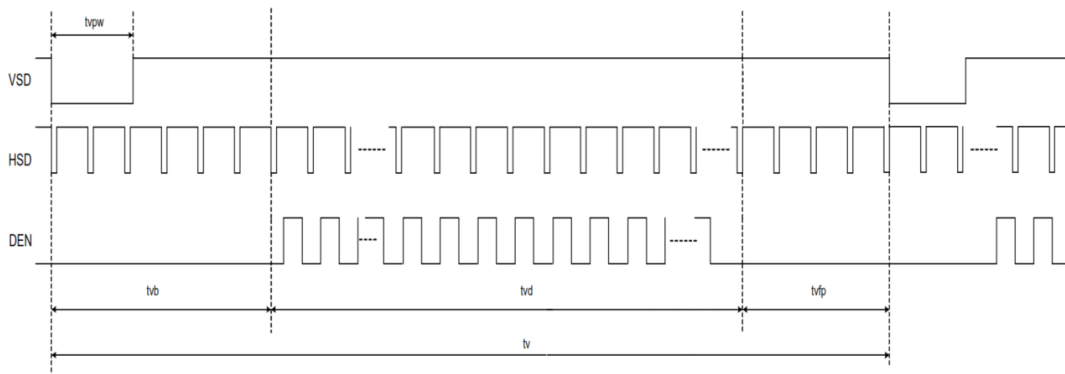


## 13. TIMING CHARACTERISTICS

### 13.1 Horizontal input timing



### 13.2 Vertical input timing





### 13.3 Parallel RGB timing characteristic

**Note:** DE/SYNC mode select. Normally pull high. H:DE Mode. L: HS/VS mode.  
When select DE mode, MODE="1", VS and HS must pull high.

#### 13.3.1 DE MODE

| PARAMETER                           | SYMBOL   | VALUE |      |      | UNIT |
|-------------------------------------|----------|-------|------|------|------|
|                                     |          | MIN.  | TYP. | MAX. |      |
| 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 |      |
| HSYNC blanking                      | thb+thfp | 90    | 320  | 376  |      |
| Vertical display area               | tvd      | 600   |      |      | H    |
| VSYNC period time                   | tv       | 610   | 635  | 800  |      |
| VSYNC blanking                      | tvb+tvfp | 10    | 85   | 200  |      |

#### 13.3.2 HV MODE – Horizontal input timing

| PARAMETER                           | SYMBOL | VALUE |      |      | UNIT |
|-------------------------------------|--------|-------|------|------|------|
|                                     |        | MIN.  | TYP. | MAX. |      |
| 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     | -    | 140  |      |
| HSYNC back porch                    | thbp   | 160   | 160  | 160  |      |
| HSYNC front porch                   | thfp   | 16    | 160  | 216  |      |

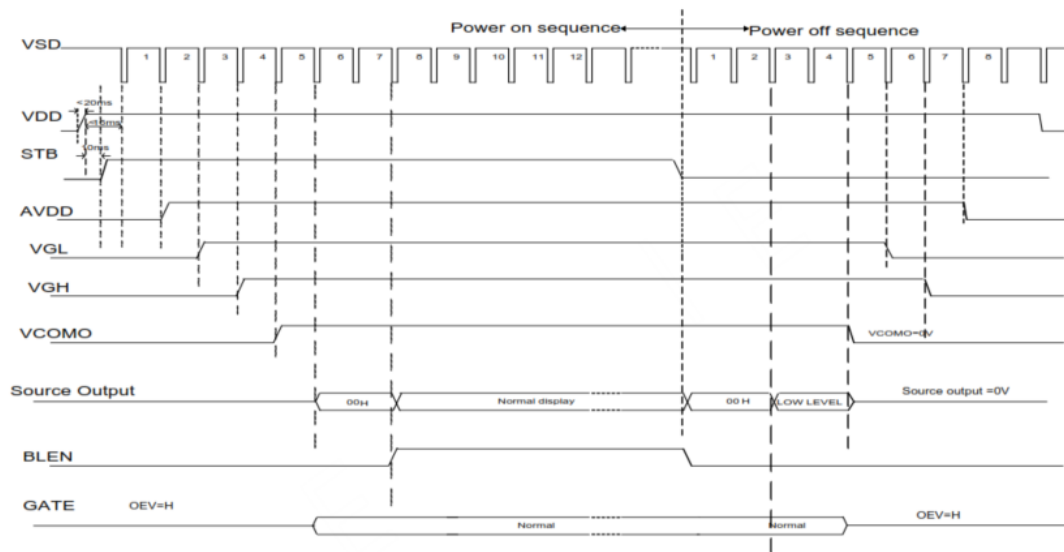
#### 13.3.3 HV MODE – Vertical input timing

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





### 13.3.4 Power On/Off sequence



## 14. CAPACITIVE TOUCH SCREEN PANEL SPECIFICATIONS

### 14.1 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                    |         |

### 14.2 Electrical characteristics

| DESCRIPTION             | SPECIFICATION |       |
|-------------------------|---------------|-------|
| Power Consumption (IDD) | Active Mode   | 90 mA |
|                         | Sleep Mode    | 10 mA |
| Linearity               | +/- 1.5mm     |       |
| Controller              | ILI2132A      |       |
| Resolution              | 1024 x 600    |       |

## 15. INSPECTION

Standard acceptance/rejection criteria for TFT module

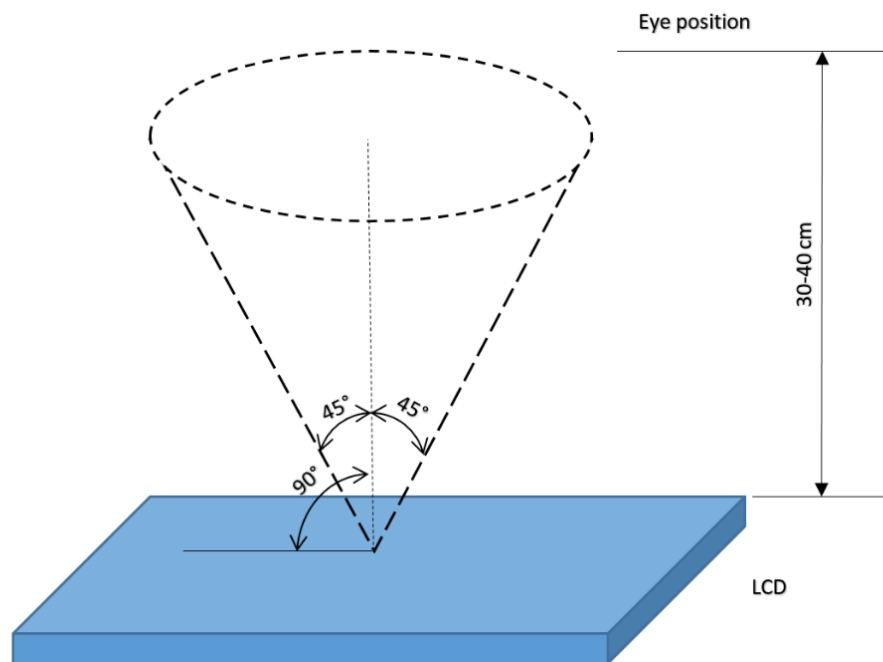
### 15.1 Inspection condition

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:  $45^{\circ}/45^{\circ}$



15.2 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> | Size =7"                                 |                     |               |
|  |  | Average Diameter                         | Qualified Qty       |               |
|  |  | $D \leq 0.2$ mm                          | Ignored             |               |
|  |  | $0.2 \text{ mm} < D \leq 0.3 \text{ mm}$ | N $\leq$ 3          |               |
|  |  | $0.5\text{mm} < D$                       | Not allowed         |               |
| LCD black spots, white spots, light leakage (line Type)                | <p>Spots density: 10 mm</p>                            | Size = 7"                                |                     |               |
|  |  | Length                                   | Width               | Qualified Qty |
|  |  | -  | $W \leq 0.05$       | Ignored       |
|  |  | $L \leq 5.0$                             | $0.05 < W \leq 0.1$ | N $\leq$ 3    |
|  |  | $5.0 < L$                                | $0.1 < W$           | Not allowed   |
| Bright/Dark 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 $\geq$ 5"   |  |                     |               |
|  | Average Diameter                                       | Qualified Qty                            |                     |               |
|  | $D < 0.2$ 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  |                     |               |
|  | Spots density: 10 mm                                   |  |                     |               |
| Polarizer bubbles  | Size $\geq$ 5"   |  |                     |               |
|  | Average Diameter                                       | Qualified Qty                            |                     |               |
|  | $D < 0.2$ mm   | Ignored                                  |                     |               |
|  | $0.2 \text{ mm} < D < 0.5 \text{ mm}$                  | 2  |                     |               |
|  | $0.5 \text{ mm} < D$                                   | 1  |                     |               |
| Touch panel spots  | Size $\geq$ 5"   |  |                     |               |
|  | Average Diameter                                       | Qualified Qty                            |                     |               |
|  | $D < 0.25$ mm  | Ignored                                  |                     |               |
|  | $0.25 \text{ mm} < D < 0.5 \text{ mm}$                 | 4  |                     |               |



|                                      | 0.5 mm < D |                 | 0             |
|--------------------------------------|------------|-----------------|---------------|
| Touch panel<br>white line<br>scratch | Size ≥ 5"  |                 |               |
|                                      | Length     | Width           | Qualified Qty |
|                                      | -          | W < 0.03        | Ignored       |
|                                      | L < 5.0    | 0.03 < W < 0.05 | 2             |
|                                      | -          | 0.05 < W        | 0             |

## 16.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.



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