

# Surennoo HDMI Display Module Series

Model No.: SHD070E-1024600 (IPS)

## USER MANUAL

MPN: SUR-MPI7002 (7 Inch HDMI Display-C)

Please click the following image to buy the sample



IPS Display, Not Support Aduio Output



Shenzhen Surenoo Technology Co.,Ltd.  
[www.surennoo.com](http://www.surennoo.com)

## Reference Links

[Surenoo HDMI Display Module Selection Guide](#)

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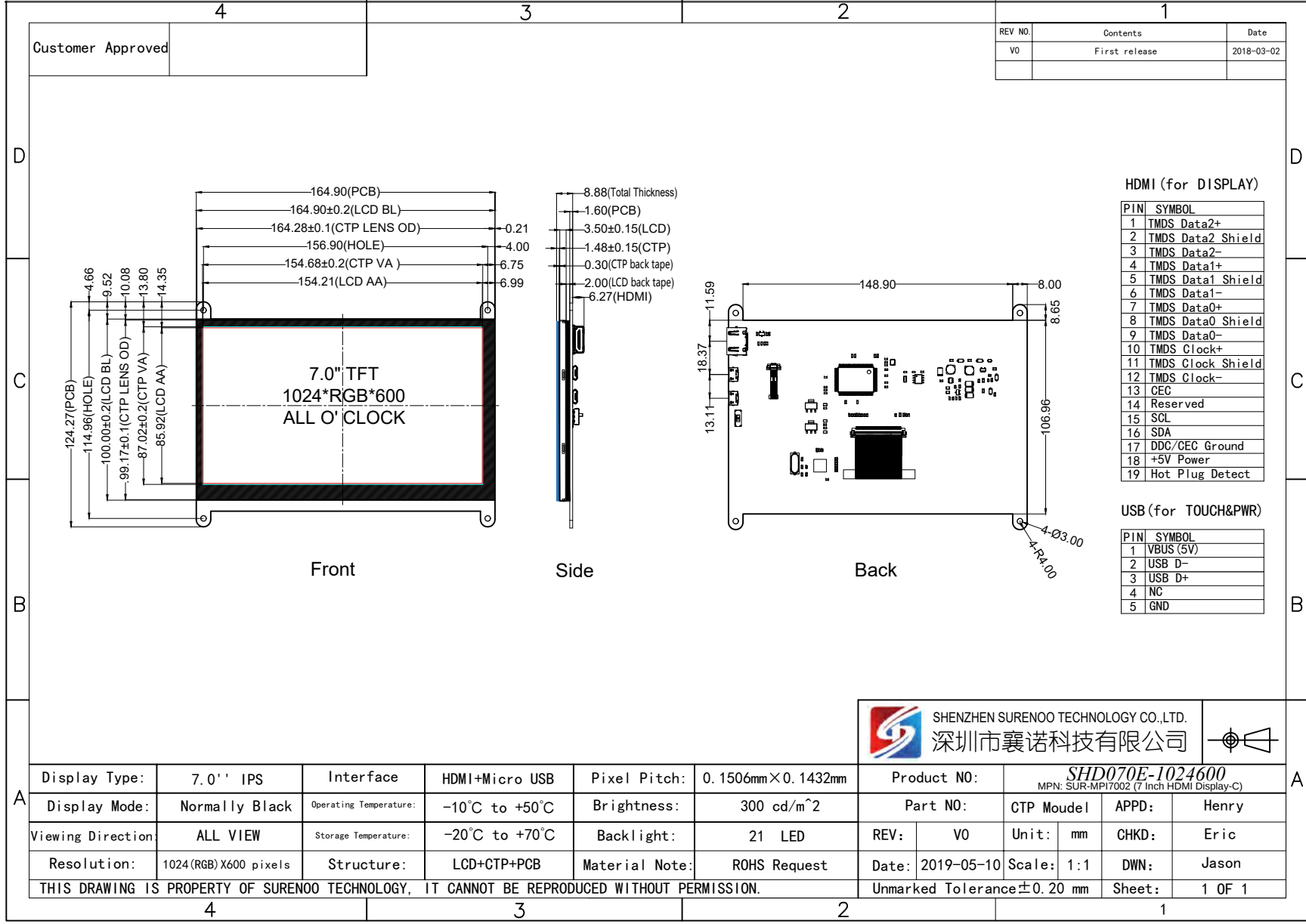
## 1、GENERAL INFORMATION

| <i>Item of general information</i>   | <i>Contents</i>                                    |                       | <i>Unit</i>  |
|--------------------------------------|----------------------------------------------------|-----------------------|--------------|
| <i>LCD Display Size (Diagonal)</i>   | 7.0                                                |                       | <i>inch</i>  |
| <i>Module Structure</i>              | <i>LCD Display + CTP Touch + PCB</i>               |                       | -            |
| <i>LCD Display Type</i>              | <i>TFT/TRANSMISSIVE</i>                            |                       | -            |
| <i>LCD Display Mode</i>              | <i>IPS</i>                                         |                       | -            |
| <i>Viewing Direction</i>             | <i>All VIEW</i>                                    |                       | -            |
| <i>Module size (W×H×T)</i>           | 164.90×124.27                                      |                       | <i>mm</i>    |
| <i>Active area (W×H)</i>             | 154.21×85.92                                       |                       | <i>mm</i>    |
| <i>Number of pixels (Resolution)</i> | 1024RGB×600                                        |                       | <i>pixel</i> |
| <i>Pixel pitch (W×H)</i>             | -                                                  |                       | <i>mm</i>    |
| <i>Color Pixel Arrangement</i>       | <i>RGB Stripe</i>                                  |                       | -            |
| <i>Module Interface Type</i>         | <i>LCD Display</i>                                 | <i>HDMI interface</i> | -            |
|                                      | <i>CTP Touch</i>                                   | <i>USB interface</i>  | -            |
| <i>System Support</i>                | <i>Win7/Win8/Win10(Plug and play)</i>              |                       | -            |
|                                      | <i>Android/Linux (need to be configured first)</i> |                       | -            |
| <i>Power Supply</i>                  | <i>USB (5.0V)</i>                                  |                       | -            |
| <i>Module Power consumption</i>      | 500(Max)                                           |                       | <i>mA</i>    |
| <i>Color Numbers</i>                 | 16.7M                                              |                       | -            |
| <i>Backlight Type</i>                | <i>White LED</i>                                   |                       | -            |

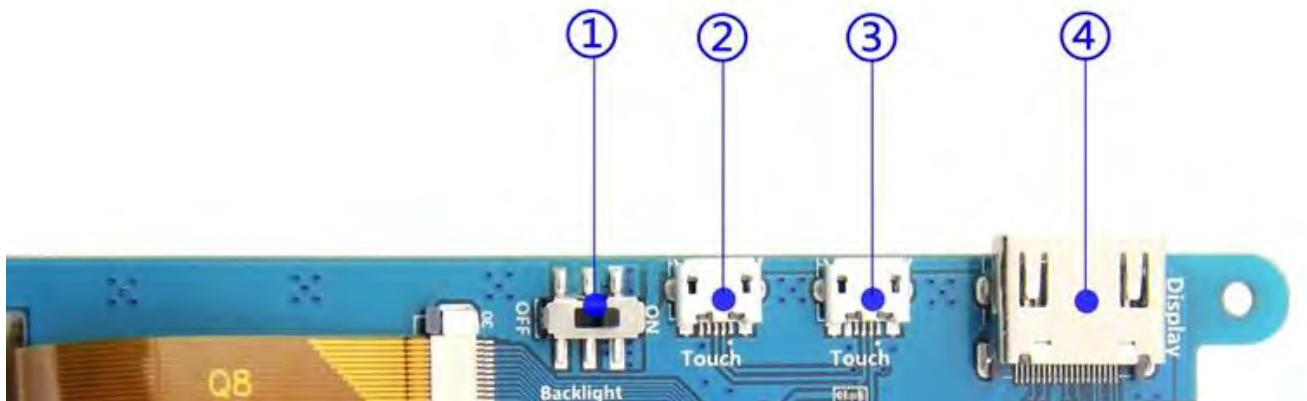


## 2、EXTERNAL DIMENSIONS

### 2.1 Outline Drawing



## 2.2 Hardware Description



- ① Backlight Power switch: Controls the backlight turned on and off to save power.
- ②③ USB Touch / power supply connector: For power supply and touch output, the functions of the both are the same, can just use one of them.
- ④ HDMI interface: For connecting motherboard and LCD monitor to HDMI transmission.



### 3、ABSOLUTE MAXIMUM RATINGS

| <i>Parameter of absolute maximum ratings</i> | <i>Symbol</i> | <i>Min</i> | <i>Max</i>    | <i>Unit</i> |
|----------------------------------------------|---------------|------------|---------------|-------------|
| <i>Operating temperature</i>                 | <i>Top</i>    | -20        | 70            | °C          |
| <i>Storage temperature</i>                   | <i>Tst</i>    | -30        | 80            | °C          |
| <i>Humidity</i>                              | <i>RH</i>     | -          | 90%(Max 60°C) | <i>RH</i>   |

*Note: Absolute maximum ratings means the product can withstand short-term, not more than 120 hours. If the product is a long time to withstand these conditions, the life time would be shorter.*

### 4、ELECTRICAL CHARACTERISTICS(DC CHARACTERISTICS)

| <i>Parameter of DC characteristics</i> | <i>Symbol</i> | <i>Min.</i>     | <i>Typ.</i> | <i>Max.</i>     | <i>Unit</i> |
|----------------------------------------|---------------|-----------------|-------------|-----------------|-------------|
| <i>PCB operating voltage</i>           | <i>VUSB</i>   | -               | 5.0         | -               | <i>V</i>    |
| <i>LCD I/O operating voltage</i>       | <i>VDD</i>    | 3.0             | 3.3         | 3.6             | <i>V</i>    |
| <i>Input voltage 'H' level</i>         | <i>VIH</i>    | 0.7* <i>VDD</i> | -           | <i>VDD</i>      | <i>V</i>    |
| <i>Input voltage 'L' level</i>         | <i>VIL</i>    | <i>VSS</i>      | -           | 0.3* <i>VDD</i> | <i>V</i>    |
| <i>Output voltage 'H' level</i>        | <i>VOH</i>    | <i>VDD</i> -0.4 | -           | <i>VDD</i>      | <i>V</i>    |
| <i>Output voltage 'L' level</i>        | <i>VOL</i>    | <i>VSS</i>      | -           | <i>VSS</i> +0.4 | <i>V</i>    |



## 5、CTP CHARACTERISTICS

| <i>Item of CTP characteristics</i> | <i>Specification</i>              | <i>Unit</i>  | <i>Remark</i> |
|------------------------------------|-----------------------------------|--------------|---------------|
| <i>Panel Type</i>                  | <i>Glass Cover + Glass Sensor</i> | -            | -             |
| <i>Resolution</i>                  | <i>1024 × 600</i>                 | <i>Pixel</i> | -             |
| <i>Surface Hardness</i>            | <i>≥6H</i>                        | -            | -             |
| <i>Transparency</i>                | <i>&gt;82%</i>                    | -            | -             |
| <i>Driver IC</i>                   | -                                 | -            | -             |
| <i>Interface Type</i>              | <i>USB</i>                        | -            | -             |
| <i>Support Points</i>              | <i>5</i>                          | -            | -             |
| <i>Sampling Rate</i>               | <i>20~100</i>                     | <i>Hz</i>    | -             |
| <i>Supply voltage</i>              | <i>3.3</i>                        | <i>V</i>     | -             |

## 6、ELECTRO-OPTICAL CHARACTERISTICS

| Item of<br>electro-optical<br>characteristics |                 | Symbol  | Condition                   | Min. | Typ.  | Max. | Unit  | Remark | Note |
|-----------------------------------------------|-----------------|---------|-----------------------------|------|-------|------|-------|--------|------|
| Response time                                 |                 | Tr+Tf   | $\theta=0$<br>=0<br>Ta=25°C | -    | 20    | -    | ms    | FIG 1. | 4    |
| Contrast Ratio                                |                 | CR      |                             | -    | 350   | -    | -     | FIG 2. | 1    |
| Luminance uniformity                          |                 | WHITE   |                             | -    | 80    | -    | %     | FIG 2. | 3    |
| Surface Luminance                             |                 | Lv      |                             | -    | 400   | -    | cd/m2 | FIG 2. | 2    |
| CIE (x, y)<br>chromaticity                    | White           | White x | $\theta=0$<br>=0<br>Ta=25°C | -    | 0.317 | -    | -     | FIG 2. | 5    |
|                                               |                 | White y |                             | -    | 0.324 | -    |       |        |      |
|                                               | Red             | Red x   |                             | -    | 0.633 | -    |       |        |      |
|                                               |                 | Red y   |                             | -    | 0.341 | -    |       |        |      |
|                                               | Green           | Green x |                             | -    | 0.324 | -    |       |        |      |
|                                               |                 | Green y |                             | -    | 0.551 | -    |       |        |      |
|                                               | Blue            | Blue x  |                             | -    | 0.153 | -    |       |        |      |
|                                               |                 | Blue y  |                             | -    | 0.143 | -    |       |        |      |
| Viewing<br>angle range                        | =90(12 o'clock) |         | CR 10                       | -    | 50    | -    | deg   | FIG 3. | 6    |
|                                               | =270(6 o'clock) |         |                             | -    | 60    | -    | deg   |        |      |
|                                               | =0(3 o'clock)   |         |                             | -    | 65    | -    | deg   |        |      |
|                                               | =180(9 o'clock) |         |                             | -    | 65    | -    | deg   |        |      |
| NTSC ratio                                    | -               |         | -                           | -    | 50    | -    | %     | -      | -    |

**Note 1.** Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.:

$$\text{Contrast Ratio(CR)} = \frac{\text{Average Surface Luminance with all white pixels(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}{\text{Average Surface Luminance with all black pixels(P1,P2,P3,P4,P5,P6,P7,P8,P9)}}$$

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

$$L_v = \text{Average Surface Luminance with all white pixels (P1,P2,P3,P4,P5,P6,P7,P8,P9)}$$

**Note 3.** The uniformity in surface luminance ( WHITE ) is determined by measuring

luminance at each test position 1 through 9, and then dividing the maximum luminance of 9 points luminance by minimum luminance of 9 points luminance. For more information see FIG 2.

$$\delta_{\text{WHITE}} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5, P6, P7, P8, P9)}}$$

**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 FIG 1.

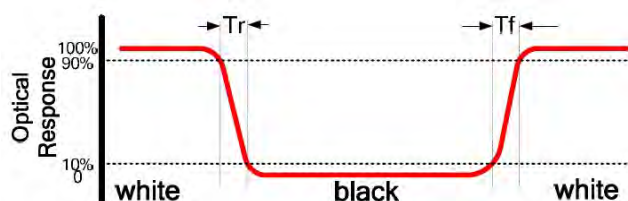
**Note 5.** CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 2.

**Note 6.** Viewing angle is the angle at which the contrast ratio is greater than a specific value. For TFT module, the specific value of contrast ratio is 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 the LCD surface. For more information see FIG 3.

**Note 7.** For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on BM-7 photo detector.

**Note 8.** For TN type TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle.

**FIG.1. The definition of Response Time**





**FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity,**

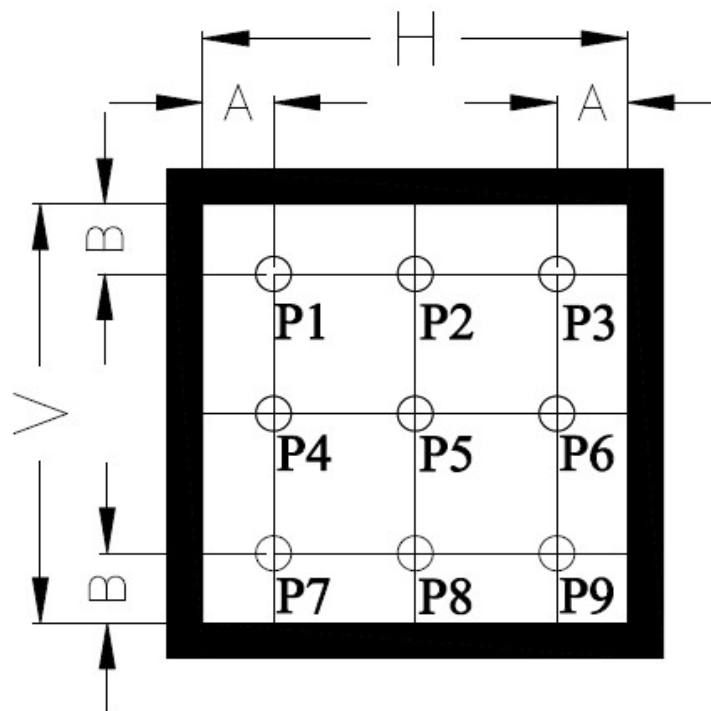
**CIE (x , y) chromaticity**

$A : H/6 ;$

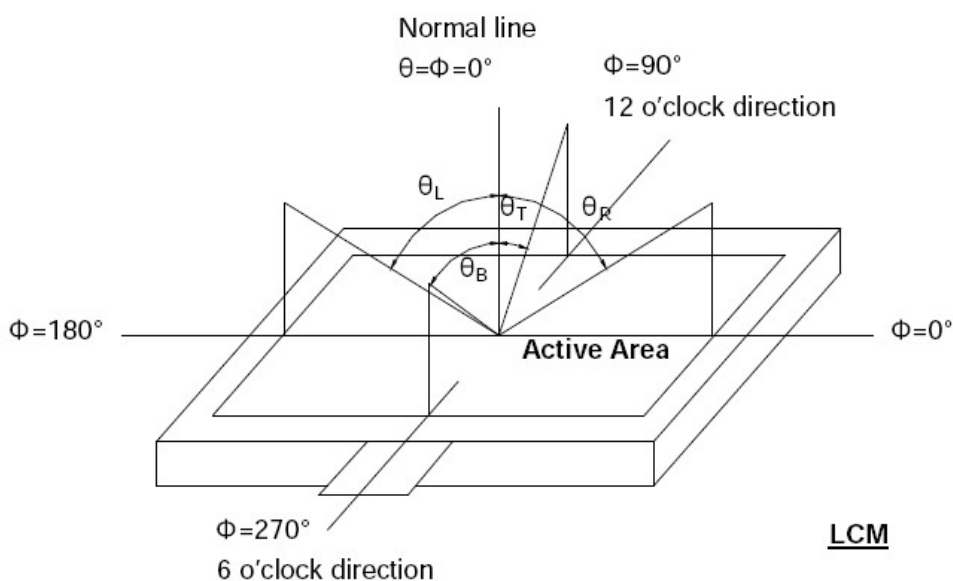
$B : V/6 ;$

$H, V : \text{Active Area(AA) size}$

Measurement instrument: BM-7; Light spot size=5mm, 350mm distance from the LCD surface to detector lens.



**FIG.3. The definition of viewing angle**





## 7、INTERFACE DESCRIPTION

### A、HDMI Interface Description

| NO. | Symbol            | DESCRIPTION                                                                       |
|-----|-------------------|-----------------------------------------------------------------------------------|
| 1   | TMDS Data2+       | Positive side of channel 2 TMDS low-voltage signal differential input pair        |
| 2   | TMDS Data2 Shield | Ground                                                                            |
| 3   | TMDS Data2-       | Negative side of channel 2 TMDS low-voltage signal differential input pair        |
| 4   | TMDS Data1+       | Positive side of channel 1 TMDS low-voltage signal differential input pair        |
| 5   | TMDS Data1 Shield | Ground                                                                            |
| 6   | TMDS Data1-       | Negative side of channel 1 TMDS low-voltage signal differential input pair        |
| 7   | TMDS Data0+       | Positive side of channel 0 TMDS low-voltage signal differential input pair        |
| 8   | TMDS Data0 Shield | Ground                                                                            |
| 9   | TMDS Data0-       | Negative side of channel 0 TMDS low-voltage signal differential input pair        |
| 10  | TMDS Clock+       | Positive side of reference clock. TMDS low-voltage signal differential input pair |
| 11  | TMDS Clock Shield | Ground                                                                            |
| 12  | TMDS Clock-       | Negative side of reference clock. TMDS low-voltage signal differential input pair |
| 13  | CEC               | No Connection                                                                     |
| 14  | Reserved(N.C.)    | No Connection                                                                     |
| 15  | SCL               | DDC SCL                                                                           |
| 16  | SDA               | DDC SDA                                                                           |
| 17  | DDC/CEC Ground    | Ground                                                                            |
| 18  | +5V Power         | +5V Power                                                                         |
| 19  | Hot Plug Detect   | Hot Plug Detect                                                                   |

### B、USB Touch Interface Description

| NO. | Symbol | DESCRIPTION   |
|-----|--------|---------------|
| 1   | VUSB   | USB Power     |
| 2   | D-     | USB Data-     |
| 3   | D+     | USB Data+     |
| 4   | NC     | No connection |
| 5   | GND    | Power Ground  |

**Application Note: Please connect the USB first, and then connect the HDMI interface.**



## 8、LCD TIMING

### Horizontal input Timing table

| Parameter                       | Symbol | Value |      |      | Unit |
|---------------------------------|--------|-------|------|------|------|
|                                 |        | Min.  | Typ. | Max. |      |
| DCLK frequency@ Frame rate=60Hz | DCLK   | 44.9  | 51.2 | 63   | MHz  |
| Horizontal display area         | thd    | 1024  |      |      | DCLK |
| 1 Horizontal Line               | th     | 1200  | 1344 | 1400 | DCLK |
| HSYNC pulse width               | thpw   | 1     | -    | 140  | DCLK |
| HSYNC Blanking                  | thb    | 160   | 160  | 160  | DCLK |
| HSYNC Front Porch               | thfp   | 16    | 160  | 216  | DCLK |
| Vertical display area           | tvd    | 600   |      |      | H    |
| VSYNC period time               | tv     | 624   | 635  | 750  | H    |
| VSYNC pulse width               | tvpw   | 1     | -    | 20   | H    |
| VSYNC Blanking                  | tvb    | 23    | 23   | 23   | H    |
| VSYNC Front Porch               | tvfp   | 1     | 12   | 127  | H    |

### Vertical input Timing table

| Parameter                       | Symbol     | Value |      |      | Unit |
|---------------------------------|------------|-------|------|------|------|
|                                 |            | Min.  | Typ. | Max. |      |
| DCLK frequency@ Frame rate=60Hz | DCLK       | 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    | 35   | 200  | H    |



## 9、RELIABILITY TEST CONDITIONS

| 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   | Temperature Cycle Storage  | -20°C(30min.)~25(5min.)~70°C(30min.)×10cycles |

### A、Inspection after test:

Inspection after 2~4 hours storage at room temperature, the sample shall be free from defects:

- Air bubble in the LCD;
- Sealleak;
- Non-display;
- Missing segments;
- Glass crack;
- Current is twice higher than initial value.

### B、Remark:

- The test samples should be applied to only one test item.
- Sample size for each test item is 5~10pcs.
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

## 10、INSPECTION CRITERION

*This specification is made to be used as the standard of acceptance/rejection criteria for TFT-LCD/IPS TFT-LCD module product, and this specification is applicable only in the case that the size of module equal to or exceed than 3.5 inch.*

### 10.1 Sample plan

*Sampling plan according to GB/T2828.1-2003/ISO 2859-1: 1999 and ANSI/ASQC*

*Z1.4-1993,normal level 2 and based on:*

*Major defect: AQL 0.65*

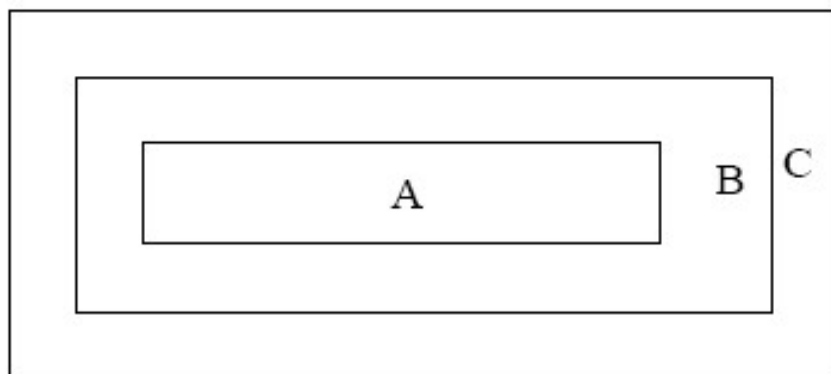
*Minor defect: AQL 1.5*

### 10.2 Inspection condition

*Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45 against perpendicular line. (Normal temperature 20~25 °C and normal humidity 60 15%RH )*

### 10.3 Definition of Inspection Item.

**A、Definition of inspection zone in LCD.**



*Zone A: character/Digit area*

*Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)*

*Zone C: Outside viewing area (invisible area after assembly in customer's product)*

*Fig.1 Inspection zones in an LCD*

*Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.*

### **B、 Definition of some visual defect**

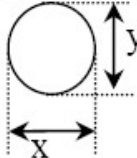
|                   |                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Bright dot</i> | <i>Because of losing all or part function, bad pixel dots appear bright and the size is more than 50% of one dot in which LCD panel is displaying under black pattern.</i> |
| <i>Dark dot</i>   | <i>Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture, or pure whiter picture.</i>                                |

### **10.4 Major Defect**

| <i>Item No.</i> | <i>Items to be inspected</i> | <i>Inspection standard</i>                                                                                                                                                                                                                   | <i>Classification of defects</i> |
|-----------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <i>1</i>        | <i>Functional defects</i>    | <i>1) No display</i><br><i>2) Display abnormally</i><br><i>3) Missing vertical, horizontal segment</i><br><i>4) Short circuit</i><br><i>5) Excess power consumption</i><br><i>6) Backlight no lighting, flickering and abnormal lighting</i> | <i>major</i>                     |
| <i>2</i>        | <i>Missing</i>               | <i>Missing component</i>                                                                                                                                                                                                                     |                                  |
| <i>3</i>        | <i>Outline dimension</i>     | <i>Overall outline dimension beyond the drawing is not allowed</i>                                                                                                                                                                           |                                  |



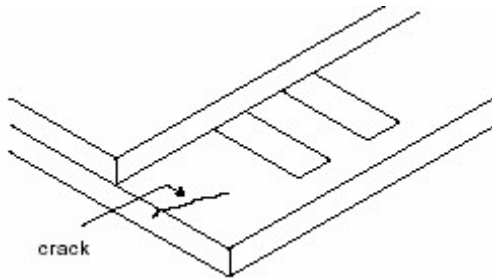
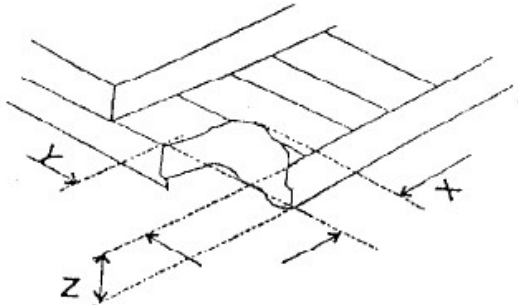
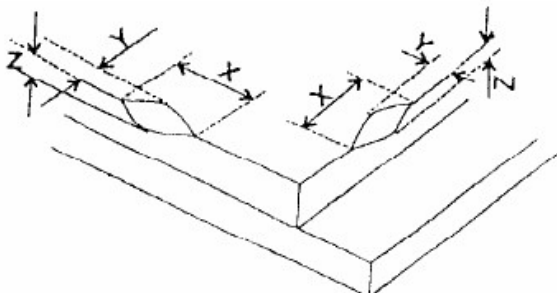
## 10.5 Minor Defect

| Item No.                                                                                                                                                                                             | Items to be inspected                                                                                                                                       | Inspection standard                                                                                                                 |                     |                |            |            | Classification of defects |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------|------------|------------|---------------------------|-------|
| 1                                                                                                                                                                                                    | Bright dot /dark dot defect                                                                                                                                 | <div>Zone</div>                                                                                                                     |                     | Acceptable Qty |            |            | C                         | Minor |
|                                                                                                                                                                                                      |                                                                                                                                                             |                                                                                                                                     |                     | A+B            |            |            |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             |                                                                                                                                     |                     | 3.5'' ~ 7''    | 7~10.1''   | >10.1''    |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | Bright pixel dot                                                                                                                    |                     | 1              | 2          | 3          | Acceptable                |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | Dark pixel dot                                                                                                                      |                     | 4              | 4          | 4          |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | 2bright dots adjacent                                                                                                               |                     | 0              | 0          | 0          |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | 2dark dots adjacent                                                                                                                 |                     | 0              | 0          | 0          |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | Total bright and dark dots                                                                                                          |                     | 5              | 6          | 7          |                           |       |
| Note: Minimum distance between defective dots is more than 5mm;<br>Pixel dots' function is normal, but bright dots caused by foreign material and other reasons are judged by the dot defect of 5.2. |                                                                                                                                                             |                                                                                                                                     |                     |                |            |            |                           |       |
| 2                                                                                                                                                                                                    | <div>Dot defect</div> <div></div> <div><math>\Phi=(x+y) / 2</math></div> | <div>Zone</div>                                                                                                                     |                     | Acceptable Qty |            |            | C                         | Minor |
|                                                                                                                                                                                                      |                                                                                                                                                             |                                                                                                                                     |                     | A+B            |            |            |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             |                                                                                                                                     |                     | 3.5''~7''      | 7~10.1''   | >10.1''    |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | $\Phi \leq 0.2$                                                                                                                     |                     | Acceptable     | Acceptable | Acceptable | Acceptable                |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | $0.2 < \Phi \leq 0.5$                                                                                                               |                     | 4              | 5          | 6          |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | $\Phi > 0.5$                                                                                                                        |                     | 0              | 0          | 0          |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | Note:<br>1. Minimum distance between defective dots is more than 5 mm;<br>2. The quantity of defect is zero in operating condition. |                     |                |            |            |                           |       |
| 3                                                                                                                                                                                                    | Linear defect                                                                                                                                               | <div>Zone</div>                                                                                                                     |                     | Acceptable Qty |            |            | C                         | Minor |
|                                                                                                                                                                                                      |                                                                                                                                                             |                                                                                                                                     |                     | A+B            |            |            |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             |                                                                                                                                     |                     | Size (mm)      | 3.5''~7''  | 7~10.1''   |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | Length                                                                                                                              | Width               | 3.5''~7''      | 7~10.1''   | >10.1''    | Acceptable                |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | Ignore                                                                                                                              | $W \leq 0.05$       | Acceptable     | Acceptable | Acceptable |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | $L \leq 5.0$                                                                                                                        | $0.05 < W \leq 0.1$ | 4              | 5          | 6          |                           |       |
|                                                                                                                                                                                                      |                                                                                                                                                             | $L > 5.0$                                                                                                                           | $W > 0.1$           | 0              | 0          | 0          |                           |       |

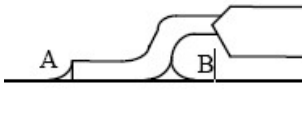
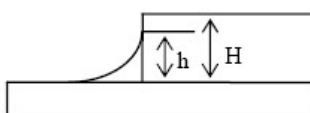


| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Polarizer defect       | 5.4.1 Polarizer Position<br>(i) Shifting in position should not exceed the glass outline dimension.<br>(ii) Incomplete covering of the viewing area due to shifting is not allowed.                                                                                                                                                                                                                                                                                                                                                                                                       | Minor          |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------|------------|----------------|------------|--|---|--------|-------|---------|---------|--------|------------|---------|---------------|------------|-----------------|------------|--------------------|----------------------|------------|-----------------------|---|-----------|-----------|---|--------------|---|---|---|---|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | 5.4.2 Dirt on polarizer<br>Dirt which can be wiped easily should be acceptable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | 5.4.3 Polarizer Dent & Air bubble                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | <table><tr><th colspan="2" rowspan="2">Zone<br/>Size(mm)</th><th colspan="3">Acceptable Qty</th><th rowspan="2">C</th></tr><tr><th colspan="3">A+B</th></tr><tr><th colspan="2"></th><th>3.5"~7"</th><th>7~10.1"</th><th>&gt;10.1"</th><th rowspan="4">Acceptable</th></tr><tr><td colspan="2"><math>\Phi \leq 0.2</math></td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td></tr><tr><td colspan="2"><math>0.2 &lt; \Phi \leq 0.5</math></td><td>4</td><td>5</td><td>6</td></tr><tr><td colspan="2"><math>\Phi &gt; 0.5</math></td><td>0</td><td>0</td><td>0</td></tr></table> |                | Zone<br>Size(mm) |            | Acceptable Qty |            |  | C | A+B    |       |         |         |        | 3.5"~7"    | 7~10.1" | >10.1"        | Acceptable | $\Phi \leq 0.2$ |            | Acceptable         | Acceptable           | Acceptable | $0.2 < \Phi \leq 0.5$ |   | 4         | 5         | 6 | $\Phi > 0.5$ |   | 0 | 0 | 0 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | Zone<br>Size(mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                  |            | Acceptable Qty |            |  |   | C      |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                | A+B              |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                | 3.5"~7"          | 7~10.1"    | >10.1"         | Acceptable |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | $\Phi \leq 0.2$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                | Acceptable       | Acceptable | Acceptable     |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | $0.2 < \Phi \leq 0.5$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                | 4                | 5          | 6              |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | $\Phi > 0.5$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                | 0                | 0          | 0              |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| 5.4.4 Polarizer scratch<br>(i) If the polarizer scratch can be seen after cover assembling or in the operating condition, judge by the linear defect of 5.3.<br>(ii) If the polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following:                                                                                                                                                                                                                                                                                                                                                         |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| <table><tr><th colspan="2" rowspan="2">Zone<br/>Size (mm)</th><th colspan="3">Acceptable Qty</th><th rowspan="2">C</th></tr><tr><th colspan="3">A+B</th></tr><tr><th>Length</th><th>Width</th><th>3.5"~7"</th><th>7~10.1"</th><th>&gt;10.1"</th><th rowspan="4">Acceptable</th></tr><tr><td>Ignore</td><td><math>W \leq 0.05</math></td><td>Acceptable</td><td>Acceptable</td><td>Acceptable</td></tr><tr><td><math>1.0 &lt; L \leq 5.0</math></td><td><math>0.05 &lt; W \leq 0.20</math></td><td>4</td><td>5</td><td>6</td></tr><tr><td><math>L &gt; 5.0</math></td><td><math>W &gt; 0.2</math></td><td>0</td><td>0</td><td>0</td></tr></table> | Zone<br>Size (mm)      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Acceptable Qty |                  |            | C              | A+B        |  |   | Length | Width | 3.5"~7" | 7~10.1" | >10.1" | Acceptable | Ignore  | $W \leq 0.05$ | Acceptable | Acceptable      | Acceptable | $1.0 < L \leq 5.0$ | $0.05 < W \leq 0.20$ | 4          | 5                     | 6 | $L > 5.0$ | $W > 0.2$ | 0 | 0            | 0 |   |   |   |
| Zone<br>Size (mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Acceptable Qty |                  |            |                | C          |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | A+B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| Length                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Width                  | 3.5"~7"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7~10.1"        | >10.1"           | Acceptable |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| Ignore                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $W \leq 0.05$          | Acceptable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Acceptable     | Acceptable       |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| $1.0 < L \leq 5.0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | $0.05 < W \leq 0.20$   | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5              | 6                |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| $L > 5.0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | $W > 0.2$              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0              | 0                |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MURA                   | Using 3% ND filter, it's NG if it can be seen in R,G,B picture.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Minor          |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | White/Black dot (MURA) | Visible under: ND3%; $D \leq 0.15mm$ , Acceptable;<br>$0.15mm < D \leq 0.5mm$ , $N \leq 4$ ; $D > 0.5mm$ , Not allowable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                  |            |                |            |  |   |        |       |         |         |        |            |         |               |            |                 |            |                    |                      |            |                       |   |           |           |   |              |   |   |   |   |



| 6                                                                                                                                                                                                                                                                                                                                                                                                       | Glass defect | <p>(i) Crack<br/>Cracks are not allowed.</p>                                                                                                                                                                                                                                                                                                                                | Minor      |            |            |            |                                      |            |                                      |            |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------------|--------------------------------------|------------|--------------------------------------|------------|-------|
|                                                                                                                                                                                                                                                                                                                                                                                                         |              | <p>(ii) TFT chips on corner</p>  <table><tr><th>X</th><th>Y</th><th>Z</th><th>Acceptable</th></tr><tr><td><math>\leq 3.0</math></td><td><math>\leq 3.0</math></td><td>Not more than the thickness of glass</td><td><math>N \leq 3</math></td></tr></table> <p>Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</p> | X          | Y          | Z          | Acceptable | $\leq 3.0$                           | $\leq 3.0$ | Not more than the thickness of glass | $N \leq 3$ | Minor |
|                                                                                                                                                                                                                                                                                                                                                                                                         |              | X                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Y          | Z          | Acceptable |            |                                      |            |                                      |            |       |
| $\leq 3.0$                                                                                                                                                                                                                                                                                                                                                                                              | $\leq 3.0$   | Not more than the thickness of glass                                                                                                                                                                                                                                                                                                                                                                                                                          | $N \leq 3$ |            |            |            |                                      |            |                                      |            |       |
| <p>(iii) Usual surface crack</p>  <table><tr><th>X</th><th>Y</th><th>Z</th><th>Acceptable</th></tr><tr><td><math>\leq 1.5</math></td><td><math>\leq 1.5</math></td><td>Not more than the thickness of glass</td><td><math>N \leq 4</math></td></tr></table> <p>It is only applicable to the upper glass of LCD.</p> | X            | Y                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Z          | Acceptable | $\leq 1.5$ | $\leq 1.5$ | Not more than the thickness of glass | $N \leq 4$ | Minor                                |            |       |
| X                                                                                                                                                                                                                                                                                                                                                                                                       | Y            | Z                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Acceptable |            |            |            |                                      |            |                                      |            |       |
| $\leq 1.5$                                                                                                                                                                                                                                                                                                                                                                                              | $\leq 1.5$   | Not more than the thickness of glass                                                                                                                                                                                                                                                                                                                                                                                                                          | $N \leq 4$ |            |            |            |                                      |            |                                      |            |       |

**10.6 Module Cosmetic Criteria**

| Item No. | Items to be inspected                | Inspection Standard                                                                                                                                                                            | Classification of defects |
|----------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1        | Difference in Spec.                  | Not allowable                                                                                                                                                                                  | Major                     |
| 2        | Pattern peeling                      | No substrate pattern peeling and floating                                                                                                                                                      | Major                     |
| 3        | Soldering defects                    | No soldering missing                                                                                                                                                                           | Major                     |
|          |                                      | No soldering bridge                                                                                                                                                                            | Major                     |
|          |                                      | No cold soldering                                                                                                                                                                              | Minor                     |
| 4        | Resist flaw on PCB                   | Visible copper foil ( $\Phi 0.5$ mm or more) on substrate pattern is not allowed                                                                                                               | Minor                     |
| 5        | FPC gold finger                      | No dirt, breaking, oxidation lead to black                                                                                                                                                     | Major                     |
| 6        | Backlight plastic frame              | No deformation, crack, breaking, backlight positioning column breaking, obvious nick.                                                                                                          | Minor                     |
| 7        | Marking printing effect              | No dark marking, incomplete, deformation lead to unable to judge                                                                                                                               | Minor                     |
| 8        | Accretion of metallic Foreign matter | No accretion of metallic foreign matter (Not exceed $\Phi 0.2$ mm)                                                                                                                             | Minor                     |
| 9        | Stain                                | No stain to spoil cosmetic badly                                                                                                                                                               | Minor                     |
| 10       | Plate discoloring                    | No plate fading, rusting and discoloring                                                                                                                                                       | Minor                     |
| 11       | 1. Lead parts                        | a. Soldering side of PCB Solder to form a 'Filet' all around the lead. Solder should not hide the lead form perfectly.                                                                         | Minor                     |
|          |                                      | b. Components side(In case of 'Through Hole PCB') Solder to reach the Components side of PCB.                                                                                                  | Minor                     |
|          | 2. Flat packages                     | Either 'Toe'(A) or 'Seal'(B) of the lead to be covered by "Filet". Lead form to be assume over Solder.<br> | Minor                     |
|          | 3. Chips                             | $(3/2) H \geq h \geq (1/2) H$<br>                                                                          | Minor                     |
|          | 4. Solder ball/Solder splash         | a. The spacing between solder ball and the conductor or solder pad $h \geq 0.13$ mm. The diameter of solder ball $d \leq 0.15$ mm.                                                             | Minor                     |
|          |                                      | b. The quantity of solder balls or solder splashes isn't beyond 5 in 600 mm <sup>2</sup> .                                                                                                     | Minor                     |
|          |                                      | c. Solder balls/Solder splashes do not violate minimum electrical clearance.                                                                                                                   | Major                     |

## 11、HOW TO USE IT

### 11.1 How to use with Raspbian/Ubuntu Mate/Win10 IoT Core System?

#### ◆ Step 1, Install Raspbian official image

- 1) Download the latest image from the official download.
- 2) Install the system according to the official tutorial steps.

#### ◆ Step 2, Modify the "config.txt"

After the programming of **Step 1** is completed, open the **config.txt** file of Micro SD Card root directory and add the following code at the end of the file, save and eject Micro SD Card safely:

```
max_usb_current=1
hdmi_force_hotplug=1
config_hdmi_boost=7
hdmi_group=2
hdmi_mode=1
hdmi_mode=87
hdmi_drive=1
display_rotate=0
hdmi_cvt 1024 600 60 6 0 0 0
```

- #### ◆ Step 3, Insert the Micro SD Card to **Raspberry Pi**, connect the **Raspberry Pi** and LCD by HDMI cable; connect USB cable to one of the four USB ports of **Raspberry Pi**, and connect the other end of the USB cable to the USB port of the LCD; then supply power to **Raspberry Pi**; after that if the display and touch both are OK, it means drive successfully (please use the full 2A for power supply).

#### ➤ How to rotate display direction:

1. Open the "**config.txt**" file (the "**config.txt**" file is located in /boot):

```
sudo nano /boot/config.txt
```

2. Add the statement in the "**config.txt**" file, press **Ctrl+X** to exit, press **Y** to save.

```
display_rotate=1          #0: 0; 1: 90; 2: 180; 3: 270
```

3. Restart the **Raspberry Pi** after saving.

```
sudo reboot
```

➤ **How to rotate Touch direction:**

After the display is rotated, the touch needs to be modified.

1. Install **libinput**

```
sudo apt-get install xserver-xorg-input-libinput
```

2. Create the **xorg.conf.d** directory in **/etc/x11 /** below (if the directory already exists, this will proceed directly to step 3)

```
sudo mkdir/etc/X11/xorg.conf.d
```

3. Copy the file "**40-libinput.conf**" to the directory you just created.

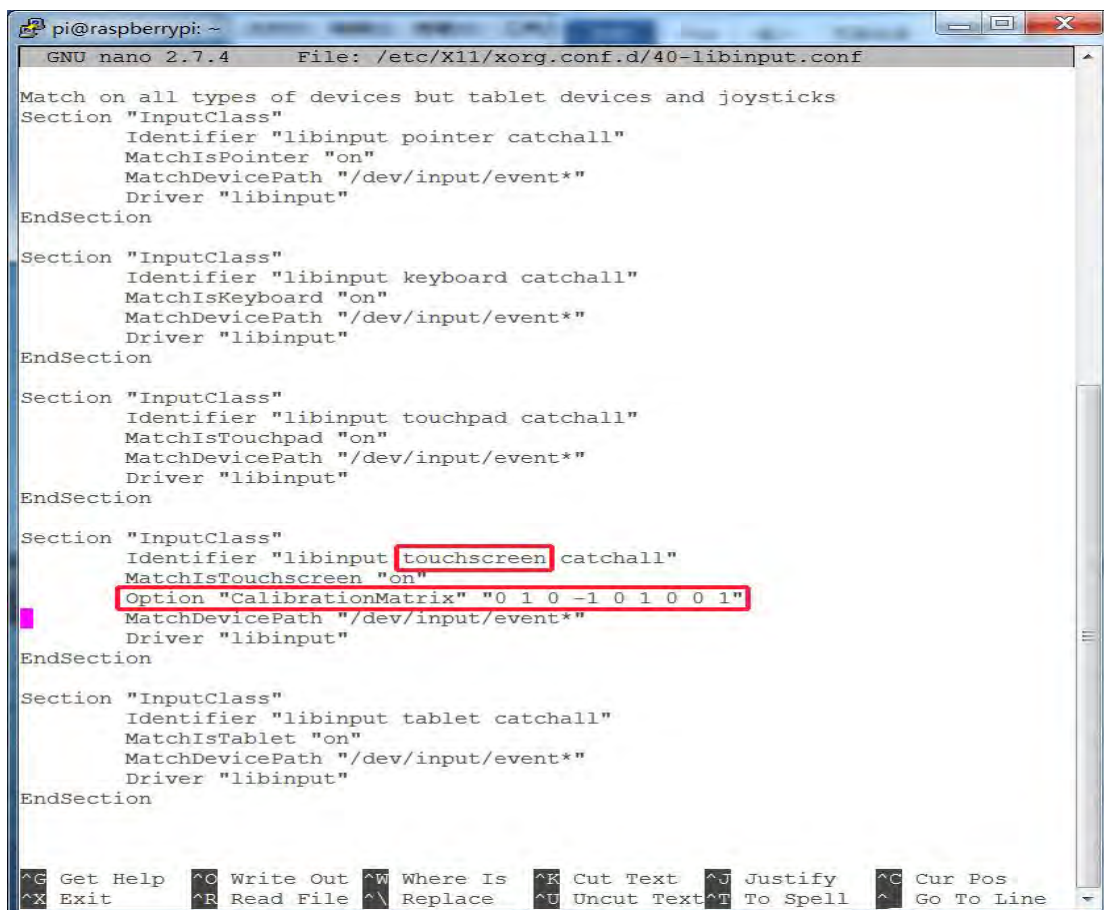
```
sudo cp /usr/share/X11/xorg.conf.d/40-libinput.conf /etc/X11/xorg.conf.d/
```

4. Edit "**/etc/X11/xorg.conf.d/40-libinput.conf**"

```
sudo nano /etc/X11/xorg.conf.d/40-libinput.conf
```

Find a part of the **touchscreen**, add the following statement inside, press **Ctrl+X** to exit, press **Y** to save.

Option "CalibrationMatrix" "0 1 0 -1 0 1 0 0 1"



## 5. Restar your **Raspberry Pi**

```
sudo reboot
```

Complete the above steps for a 90 degree rotation.

Note:

0 degrees of rotation parameters: Option "CalibrationMatrix" "1 0 0 0 1 0 0 0 1"

90 degrees of rotation parameters: Option "CalibrationMatrix" "0 1 0 0 -1 1 0 0 1"

180 degrees of rotation parameters: Option "CalibrationMatrix" "-1 0 1 0 -1 1 0 0 1"

270 degrees of rotation parameters: Option "CalibrationMatrix" "0 -1 1 1 0 0 0 0 1"

## 11.2 How to use as PC monitor?

- ◆ connect the computer HDMI output signal to the LCD HDMI interface by using the HDMI cable
- ◆ Connect the LCD's USB Touch interface (Either of the two MicroUSB) to the USB port of the device
- ◆ If there are several monitors, please unplug other monitor connectors first, and use LCD as the only monitor for testing.



## 12、PICTURE

