



## SPECIFICATIONS

|                               |   |                                  |
|-------------------------------|---|----------------------------------|
| <b>CUSTOMER</b>               | : | _____                            |
| <b>SAMPLE CODE</b>            | : | SH720128T003-ZBC02               |
| <b>MASS PRODUCTION CODE</b>   | : | PH720128T003-ZBC02               |
| <b>SAMPLE VERSION</b>         | : | 01                               |
| <b>SPECIFICATIONS EDITION</b> | : | 004                              |
| <b>DRAWING NO. (Ver.)</b>     | : | LMD-PH720128T003-ZBC02 (Ver.002) |
| <b>PACKAGING NO. (Ver.)</b>   | : | PKG-PH720128T003-ZBC02(Ver.001)  |

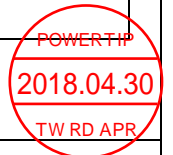
**Customer Approved**

**Date:** \_\_\_\_\_

| Approved            | Checked           | Designer         |
|---------------------|-------------------|------------------|
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- Preliminary specification for design input
- Specification for sample approval



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## History of Version

| Date<br>(mm / dd / yyyy) | Ver. | Edi. | Description   | Page  | Design by |
|--------------------------|------|------|---|-------|-----------|
| 06/08/2017               | 01   | 001  | New Drawing.  | -     | Terry     |
| 09/12/2017               | 01   | 002  | New Sample  | -     | Terry     |
| 01/16/2018               | 01   | 003  | Modify Sample Drawing                                 | -     | Terry     |
| 04/30/2018               | 01   | 004  | Add AC Electrical Characteristics&Modify Initial code | 14、15 | Terry     |
|                          |      |      |   |       |           |
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## 1. SPECIFICATIONS

### 1.1 Features

| Item              | Standard Value  |
|-------------------|---|
| Display Type      | 720 * (RGB) * 1280  |
| LCD Type          | IPS TFT , Normally Black , Transmissive type  |
| Touch panel       | True Multi-Touch Capacitive Touch Panel<br>True Multi-touch with up to 10 Points of Absolution  |
| Screen size(Inch) | 7.0 Inch  |
| Backlight Type    | LED B/L   |
| Weight            | 177.8 g   |
| Control IC        | ILI9881C (TFT Unit)   |
| Interface         | MIPI Interface (TFT Unit)   |
| ROHS              | THIS PRODUCT CONFORMS THE ROHS OF PTC<br>Detail information please refer website :<br><a href="http://www.powertip.com.tw/news_detail.php?Key=1&amp;cID=1">http://www.powertip.com.tw/news_detail.php?Key=1&amp;cID=1</a> |

### 1.2 Mechanical Specifications

| Item              | Standard Value                    | Unit |
|-------------------|-----------------------------------|------|
| Outline Dimension | 189.32 (W) * 120.24 (L) * 5.31(H) | mm   |
| Viewing Area      | 153.32 (W) * 90.21 (L)            | mm   |
| Active Area       | 152.32 (W) * 89.208 (L)           | mm   |

Note : For detailed information please refer to LCM drawing.

### 1.3 Absolute Maximum Ratings

| Item                  | Symbol          | Condition | Min. | Max. | Unit | Remark |
|-----------------------|-----------------|-----------|------|------|------|--------|
| Supply Voltage        | VDD             | GND=0     | -0.3 | +3.8 | V    | -      |
|                       | VCI             |           | -0.3 | +7.0 | V    |        |
| Operating Temperature | T <sub>OP</sub> | -         | -20  | +70  | °C   |        |
| Storage Temperature   | T <sub>ST</sub> | -         | -30  | +80  | °C   |        |

### 1.4 DC Electrical Characteristics

GND = 0V, Ta = 25 °C

| Item                 | Symbol           | Min.    | Typ. | Max.    | Unit | Remark |
|----------------------|------------------|---------|------|---------|------|--------|
| Supply Voltage       | VDD              | 3.0     | 3.3  | 3.6     | V    | Note2  |
|                      | VCI              | 3.0     | 3.3  | 3.6     |      |        |
| Input signal Voltage | V <sub>IH</sub>  | 0.7*VDD | -    | VDD     |      |        |
|                      | V <sub>IL</sub>  | -0.3    | -    | 0.3*VDD |      |        |
|                      | V <sub>OH</sub>  | 0.8*VDD | -    | VDD     |      |        |
|                      | V <sub>OL</sub>  | 0       | -    | 0.2*VDD |      |        |
| Supply Current       | I <sub>VDD</sub> | -       | 20mA | 35mA    |      | Note1  |
|                      | I <sub>VCI</sub> | -       | 25mA | 50mA    |      | Note1  |

Note1: Maximum current display.

Note2 :For DSI DC level please refer to driver IC ILI9881C Specifications

## 1.5 Optical Characteristics

VDD= 3.3 V, Ta=25°C

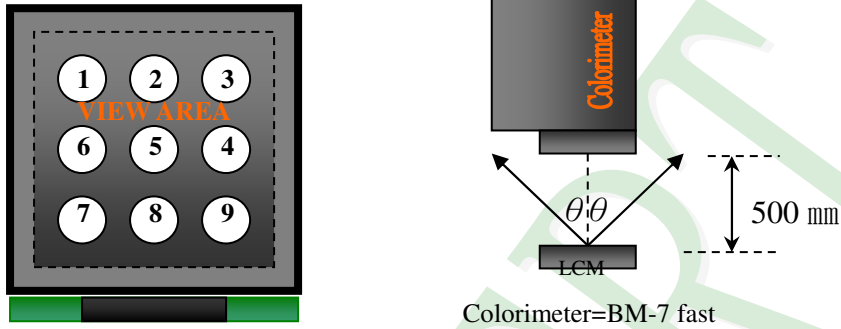
| Item   | Symbol | Condition                | Min.                      | Typ.  | Max.  | unit              |        |        |
|--|--------|--------------------------|---------------------------|-------|-------|-------------------|--------|--------|
| Response time  | Tr +Tf | Ta = 25°C<br>θX, θY = 0° | -                         | 35    | 40    | ms                | Note 2 |        |
| Viewing angle  | Top    | θY+                      | CR ≥ 10                   | 80    | 85    | -                 | Deg.   | Note 4 |
|  | Bottom | θY-                      |                           | 80    | 85    | -                 |        |        |
|  | Left   | θX-                      |                           | 80    | 85    | -                 |        |        |
|  | Right  | θX+                      |                           | 80    | 85    | -                 |        |        |
| Contrast ratio   | CR     |                          | 900                       | 1200  | -     |                   | Note 3 |        |
| Color of CIE<br>Coordinate<br>( With B/L & touch<br>panel )                  | White  | X                        | Ta = 25°C<br>θX , θY = 0° | 0.308 | 0.358 | 0.408             | -      | Note1  |
|  |        | Y                        |                           | 0.315 | 0.365 | 0.415             |        |        |
|  | Red    | X                        |                           | 0.584 | 0.634 | 0.684             |        |        |
|  |        | Y                        |                           | 0.273 | 0.323 | 0.373             |        |        |
|  | Green  | X                        |                           | 0.289 | 0.339 | 0.389             |        |        |
|  |        | Y                        |                           | 0.534 | 0.584 | 0.634             |        |        |
|  | Blue   | X                        |                           | 0.094 | 0.144 | 0.194             |        |        |
|  |        | Y                        |                           | 0.069 | 0.119 | 0.169             |        |        |
| Average Brightness<br>Pattern=white display<br>( With B/L & touch panel ) *2 | IV     | IF=90mA                  | 430                       | 500   | -     | cd/m <sup>2</sup> | Note1  |        |
| Uniformity<br>( With B/L & touch panel ) *1                                  | △B     |                          | 70                        | -     | -     | %                 | Note1  |        |

Note 1:

\*1 :  $\Delta B = B(\min) / B(\max) * 100\%$

\*2 : Measurement Condition for Optical Characteristics:

- a : Environment:  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  /  $60 \pm 20\% \text{R.H}$  , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.
- b : Measurement Distance:  $500 \pm 50 \text{ mm}$  , ( $\theta = 0^{\circ}$ )
- c : Equipment: TOPCON BM-7 fast , (field  $1^{\circ}$ ) , after 10 minutes operation.
- d : The uncertainty of the C.I.E coordinate measurement  $\pm 0.01$  , Average Brightness  $\pm 4\%$



To be measured at the center area of panel with a viewing cone of  $1^{\circ}$  by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:

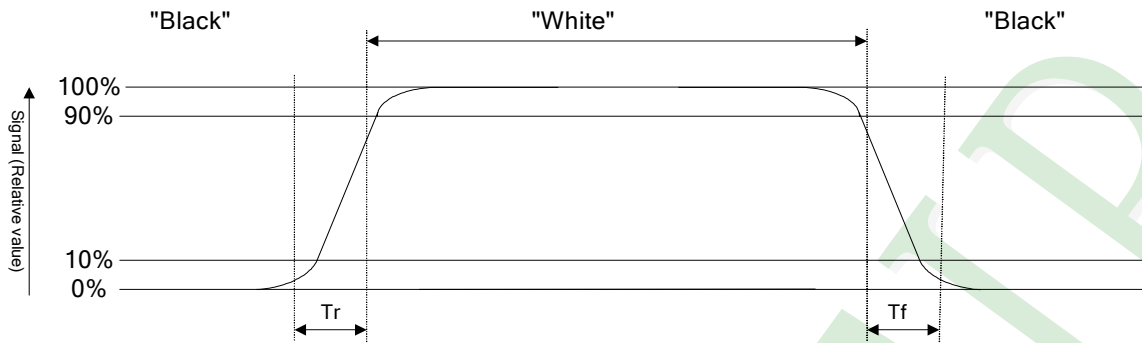
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



### Normally Black



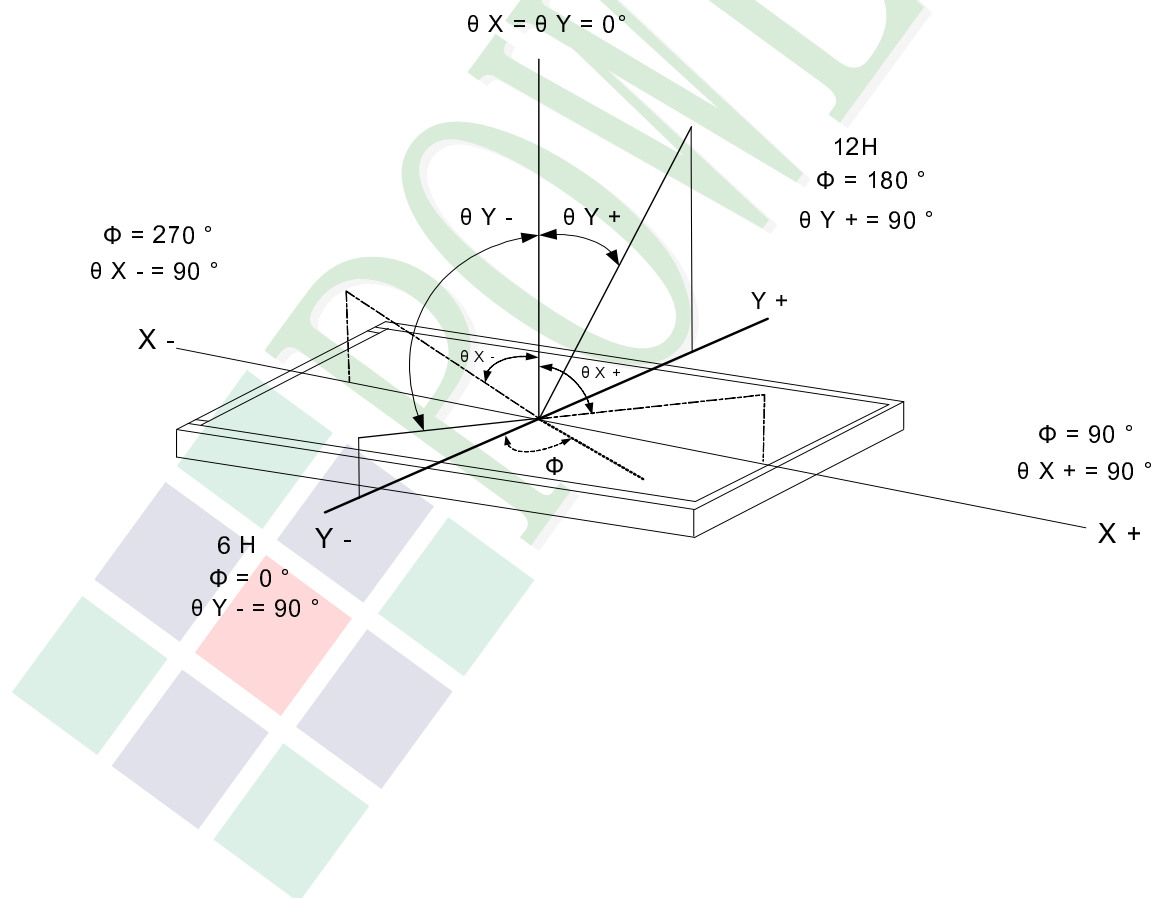
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note4: Definition of viewing angle:

Refer to figure as below:



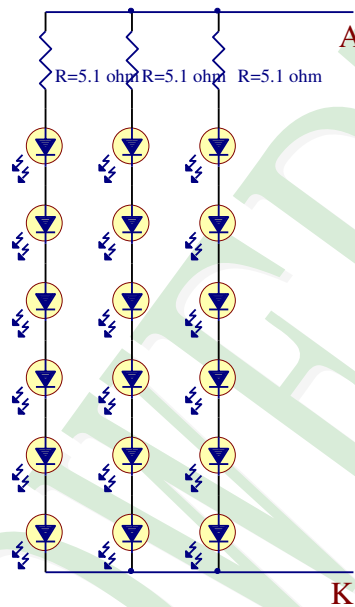


## 1.6 Backlight Characteristics

### Electrical / Optical Characteristics

| Item            | Symbol | Min.  | Typ. | Max. | Unit | Remark             |
|-----------------|--------|-------|------|------|------|--------------------|
| Forward Voltage | $V_f$  | 16.2  | 19.2 | 21.0 | V    | Ta=25°C<br>IF=90mA |
| Life time       | -      | 20000 | -    | -    | Hr   |                    |

LED Backlight Circuit:



## 1.7 Touch Panel Characteristics

| Item             | Standard Value   |
|------------------|--|
| Touch Panel Size | 7"   |
| Touch type       | Projective Capacitive Touch Panel  |
| Input Method     | True Multi-touch with up to 10 Points of Absolution<br>X and Y Coordinates |
| IC               | FT5426   |
| Output Interface | I2C  |
| I2C Address      | 0X70   |

### I<sup>2</sup>C Address

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0      |
|-------|-------|-------|-------|-------|-------|-------|------------|
| 1     | 1     | 1     | 0     | 0     | 0     | 0     | <b>R/W</b> |

Bit 0: 0 for Write / 1 for Read

## Mechanical Specifications

| Item                      | Standard Value         | Unit |
|---------------------------|------------------------|------|
| Viewing Area              | 153.32 (W) * 90.21 (L) | mm   |
| Number of sensing channel | 25(TX) * 15 (RX)       |      |

## Absolute Maximum Ratings

| Item                  | Symbol          | Condition | Min. | Max. | Unit |
|-----------------------|-----------------|-----------|------|------|------|
| Supply voltage        | TPVDD           | -         | 2.7  | +3.6 | V    |
| Operating Temperature | T <sub>OP</sub> | -         | -20  | +70  | °C   |
| Storage Temperature   | T <sub>ST</sub> | -         | -30  | +80  | °C   |

## DC Electrical Characteristics

| Item                 | Symbol | Condition | Min.           | Typ. | Max.          | Unit |
|----------------------|--------|-----------|----------------|------|---------------|------|
| Power Supply Voltage | TPVDD  | Ta=25°C   | 2.7            | 3.3  | 3.6           | V    |
| Input High Voltage   | VIH    |           | 0.7 *<br>TPVDD | -    | TPVDD         | V    |
| Input Low Voltage    | VIL    |           | -0.3           | -    | 0.3*<br>TPVDD | V    |

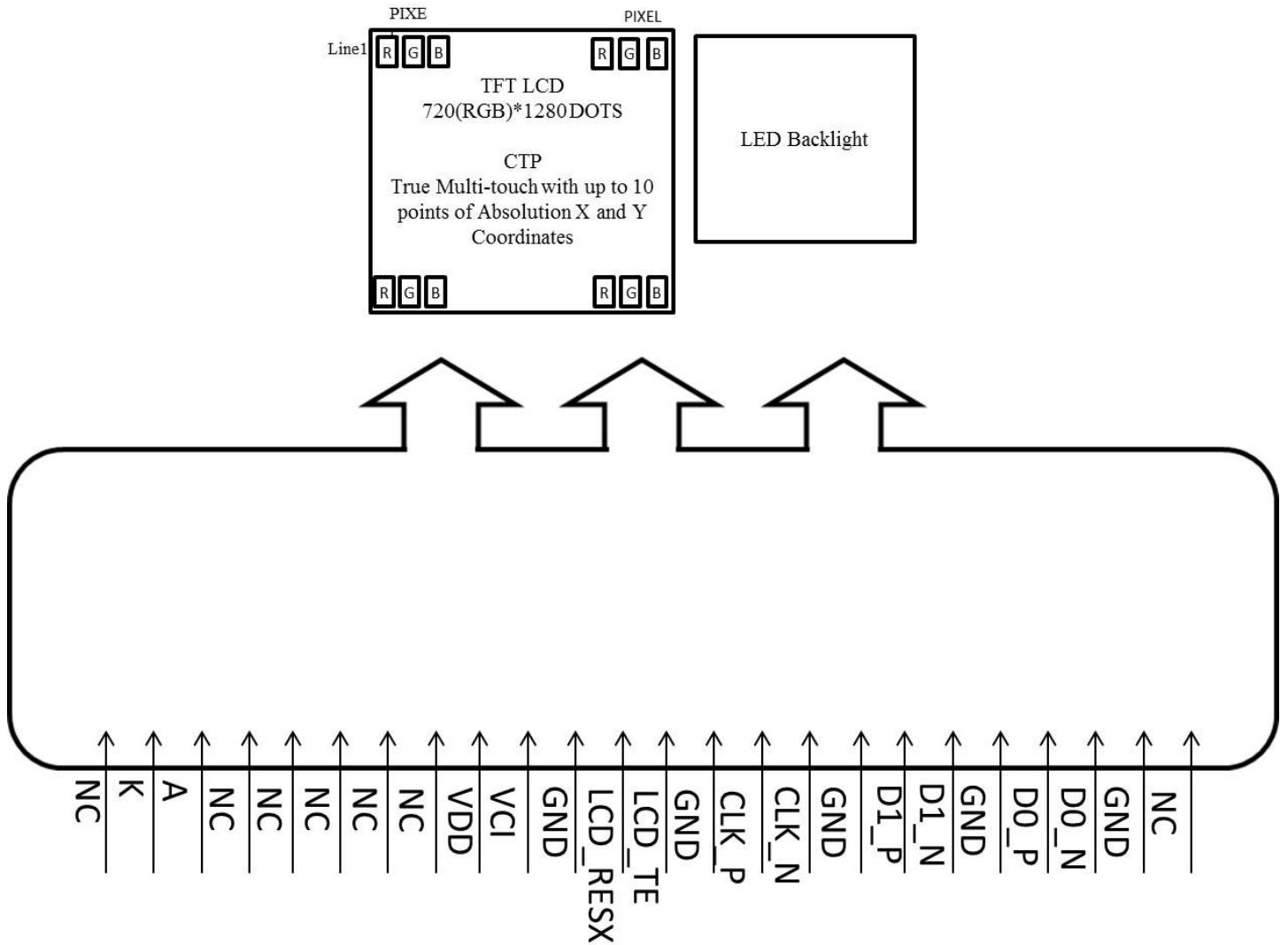
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

#### 2.1.2 Block Diagram



## 2.2 Interface Pin Description

### Interface for TFT display :

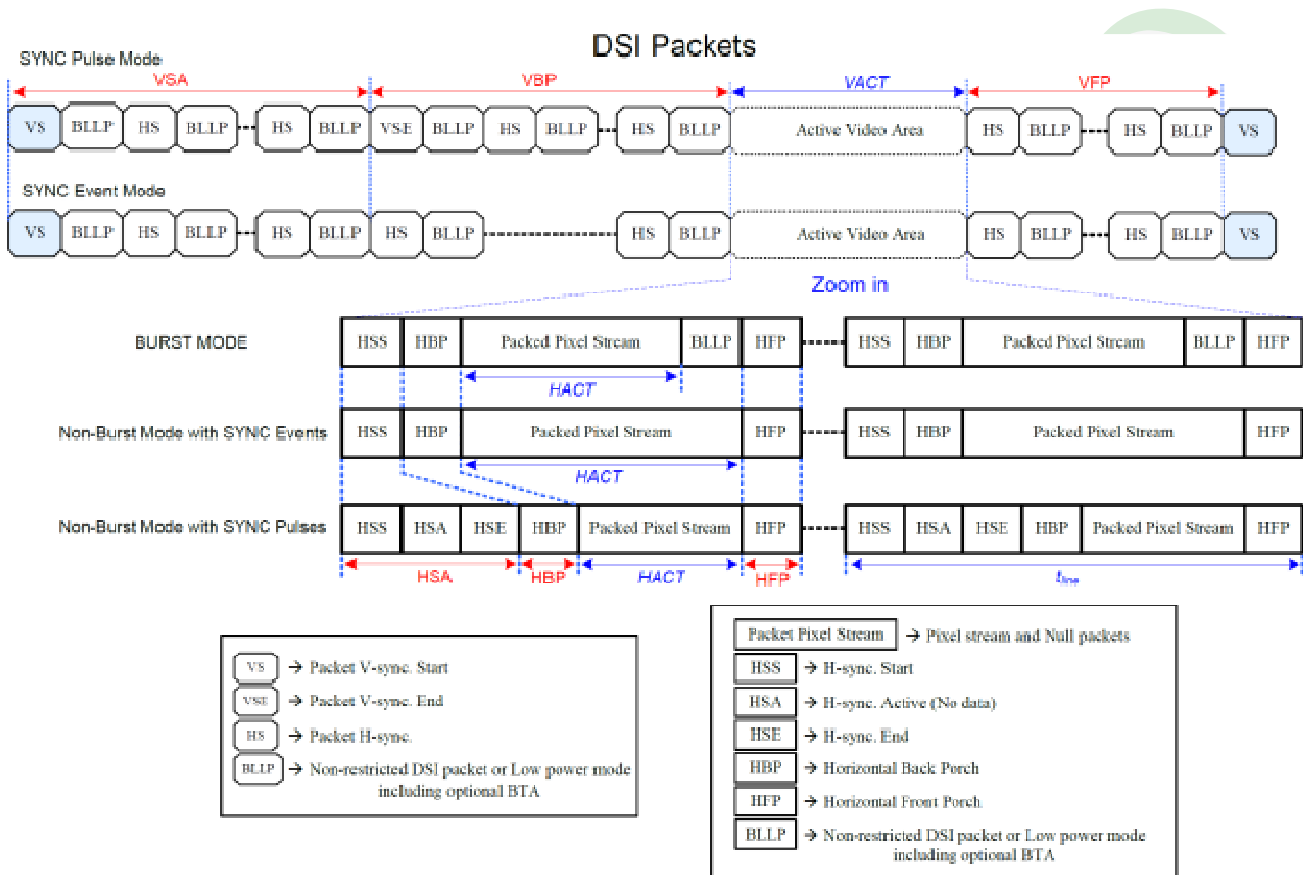
| Pin# | Name     | DESCRIPTION  |
|------|----------|--|
| 1    | NC       | No connection.   |
| 2    | K        | Power for LED backlight cathode input.   |
| 3    | A        | Power for LED backlight anode input.   |
| 4    | NC       | No connection.   |
| 5    | NC       | No connection.   |
| 6    | GND      | Ground   |
| 7    | NC       | No connection.   |
| 8    | NC       | No connection.   |
| 9    | VDD      | Power supply for internal logic regulator.   |
| 10   | VCI      | Power supply for analog circuit.   |
| 11   | GND      | Ground.  |
| 12   | LCD_RESX | The external reset input Initializes the chip with a low input. Be sure to execute a power-on reset after supplying power. |
| 13   | LCD_TE   | Tearing effect output pin.   |
| 14   | GND      | Ground.  |
| 15   | CLK_P    | MIPI DSI differential clock pair   |
| 16   | CLK_N    | MIPI DSI differential clock pair   |
| 17   | GND      | Ground.  |
| 18   | D1_P     | MIPI DSI differential data pair. (Data lane 1)   |
| 19   | D1_N     | MIPI DSI differential data pair. (Data lane 1)   |
| 20   | GND      | Ground.  |
| 21   | D0_P     | MIPI DSI differential data pair. (Data lane 0)   |
| 22   | D0_N     | MIPI DSI differential data pair. (Data lane 0)   |
| 23   | GND      | Ground.  |
| 24   | NC       | No connection.   |

**Interface for CTP:**

| Pin# | Name  | DESCRIPTION                             |
|------|-------|---|
| 1    | RST   | RESET.                                  |
| 2    | SCL   | I2C Data.                               |
| 3    | SDA   | I2C Data.                               |
| 4    | INT   | The interrupt from the CTP to the Host. |
| 5    | TPVDD | Power.                                  |
| 6    | GND   | Ground.                                 |

## 2.3 AC Electrical Characteristics

### Timing for DSI video mode



| Parameters              | Symbols           | Min.                       | Typ. | Max.   | Units     |
|-------------------------|-------------------|----------------------------|------|--------|-----------|
| Vertical sync. active   | VSA               | 2 <small>(Note 6)</small>  | -    | -      | Line      |
| Vertical Back Porch     | VBP               | 14 <small>(Note 6)</small> | -    | -      | Line      |
| Vertical Front Porch    | VFP               | 8 <small>(Note 6)</small>  | -    | -      | Line      |
| Active lines per frame  | VACT              | -                          | 1280 | -      | Line      |
| Horizontal sync. active | HSA               | 2                          | -    | -      | Pixel     |
| Horizontal Porch period | HSA + HBP + HFP   | 1.6                        | -    | -      | us        |
| Active pixels per line  | HACT              | -                          | 720  | -      | Pixel     |
| Bit rate                | BR <sub>bps</sub> | 385                        |      | Note 5 | Mbps/lane |

1 UI=1/Bit rate

$HSA(\text{pixel}) = (tHSA \times \text{lane number}) / (UI \times \text{pixel format})$

$HBP(\text{pixel}) = (tHBP \times \text{lane number}) / (UI \times \text{pixel format})$

$HFP(\text{pixel}) = (tHFP \times \text{lane number}) / (UI \times \text{pixel format})$

$$\text{Frame Rate} = \frac{BR_{bps} \times \text{Lane}_{num}}{(VACT+VSA+VBP+VFP) \times (HACT+HSA+HBP+HFP) \times \text{Pixel Format}}$$

Example : BR<sub>bps</sub> = 457Mbps/lane, 1UI=2.1883ns, Frame rate=60Hz, VACT=1280, VSA=2, VBP=30, VFP=20, HACT=720, HSA=33, HBP=100, HFP=100, Lane<sub>num</sub>=4(lane), Pixel Format=24(bit).

**Note:**

1. Lane<sub>num</sub>: Data lane of MIPI-DSI.
2. Pixel Format: Please reference to "4.1 DSI System Interface".
3. The formula exists slightly error because of the host-transmission way.
4. The best frame rate setting : 2 data lanes : 50~60 Hz / 3 data lanes : 50~70 Hz / 4 data lanes : 50~70 Hz.
5. Please reference to "Table 39: Limited Clock Channel Speed".
6. The minimum values of this table mean the limitation of IC without considering the panel GIP. The actual values of VSA, VBP and VFP will be changed by different panel GIP setting.

## 2.4 Refer Initial Code

```
Void ILI9881C_D-AM30841F-00_Initial Code(Void)
```

```
{  
  
LCD_nRESET = 1;  
  
Delaysms(1); // Delay 1ms  
  
LCD_nRESET = 0;  
  
Delaysms(1); // Delay 1ms // This Delay time is necessary  
  
LCD_nRESET = 1;  
  
Delaysms(10); // Delay 120 ms  
  
//***** Start Initial Sequence *****/  
  
LCD_ILI9881C_CMD(0xFF);  
  
LCD_ILI9881C_INDEX(0x98);  
  
LCD_ILI9881C_INDEX(0x81);  
  
LCD_ILI9881C_INDEX(0x03);  
  
LCD_ILI9881C_CMD(0x01);  
  
LCD_ILI9881C_INDEX(0x00);  
  
LCD_ILI9881C_CMD(0x02);
```

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x03);

LCD\_ILI9881C\_INDEX(0x55);

LCD\_ILI9881C\_CMD(0x04);

LCD\_ILI9881C\_INDEX(0x13);

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LCD\_ILI9881C\_CMD(0x09);

LCD\_ILI9881C\_INDEX(0x01);

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LCD\_ILI9881C\_INDEX(0x01);

LCD\_ILI9881C\_CMD(0x0B);

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LCD\_ILI9881C\_CMD(0x0C);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x0D);



LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x0E);

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LCD\_ILI9881C\_CMD(0x21);

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LCD\_ILI9881C\_CMD(0x26);

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LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x3B);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x3C);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x3D);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x3E);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x3F);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x40);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x41);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x42);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x43);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x44);

LCD\_ILI9881C\_INDEX(0x00);

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LCD\_ILI9881C\_INDEX(0x01);

LCD\_ILI9881C\_CMD(0x51);

LCD\_ILI9881C\_INDEX(0x23);

LCD\_ILI9881C\_CMD(0x52);

LCD\_ILI9881C\_INDEX(0x45);

LCD\_ILI9881C\_CMD(0x53);

LCD\_ILI9881C\_INDEX(0x67);

LCD\_ILI9881C\_CMD(0x54);

LCD\_ILI9881C\_INDEX(0x89);

LCD\_ILI9881C\_CMD(0x55);

LCD\_ILI9881C\_INDEX(0xAB);

LCD\_ILI9881C\_CMD(0x56);

LCD\_ILI9881C\_INDEX(0x01);

LCD\_ILI9881C\_CMD(0x57);

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LCD\_ILI9881C\_CMD(0x5B);

LCD\_ILI9881C\_INDEX(0xAB);

LCD\_ILI9881C\_CMD(0x5C);

LCD\_ILI9881C\_INDEX(0xCD);

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LCD\_ILI9881C\_INDEX(0xEF);

LCD\_ILI9881C\_CMD(0x5E);

LCD\_ILI9881C\_INDEX(0x11);

LCD\_ILI9881C\_CMD(0x5F);

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LCD\_ILI9881C\_INDEX(0x15);

LCD\_ILI9881C\_CMD(0x61);

LCD\_ILI9881C\_INDEX(0x0F);

LCD\_ILI9881C\_CMD(0x62);

LCD\_ILI9881C\_INDEX(0x0D);

LCD\_ILI9881C\_CMD(0x63);

LCD\_ILI9881C\_INDEX(0x0E);

LCD\_ILI9881C\_CMD(0x64);

LCD\_ILI9881C\_INDEX(0x0C);

LCD\_ILI9881C\_CMD(0x65);

LCD\_ILI9881C\_INDEX(0x06);

LCD\_ILI9881C\_CMD(0x66);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x67);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x68);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x69);

LCD\_ILI9881C\_INDEX(0x02);

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LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x6B);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x6C);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x6D);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x6E);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x6F);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x70);



LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x71);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x72);

LCD\_ILI9881C\_INDEX(0x01);

LCD\_ILI9881C\_CMD(0x73);

LCD\_ILI9881C\_INDEX(0x08);

LCD\_ILI9881C\_CMD(0x74);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x75);

LCD\_ILI9881C\_INDEX(0x14);

LCD\_ILI9881C\_CMD(0x76);

LCD\_ILI9881C\_INDEX(0x15);

LCD\_ILI9881C\_CMD(0x77);

LCD\_ILI9881C\_INDEX(0x0F);

LCD\_ILI9881C\_CMD(0x78);

LCD\_ILI9881C\_INDEX(0x0D);

LCD\_ILI9881C\_CMD(0x79);

LCD\_ILI9881C\_INDEX(0x0E);

LCD\_ILI9881C\_CMD(0x7A);

LCD\_ILI9881C\_INDEX(0x0C);

LCD\_ILI9881C\_CMD(0x7B);

LCD\_ILI9881C\_INDEX(0x08);

LCD\_ILI9881C\_CMD(0x7C);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x7D);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x7E);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x7F);

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LCD\_ILI9881C\_CMD(0x81);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x82);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x83);

LCD\_ILI9881C\_INDEX(0x02);

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LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x85);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x86);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0x87);

LCD\_ILI9881C\_INDEX(0x00);

LCD\_ILI9881C\_CMD(0x88)

LCD\_ILI9881C\_INDEX(0x01);

LCD\_ILI9881C\_CMD(0x89);

LCD\_ILI9881C\_INDEX(0x06);

LCD\_ILI9881C\_CMD(0x8A);

LCD\_ILI9881C\_INDEX(0x02);

LCD\_ILI9881C\_CMD(0xFF);

LCD\_ILI9881C\_INDEX(0x98);

LCD\_ILI9881C\_INDEX(0x81);

LCD\_ILI9881C\_INDEX(0x04);

LCD\_ILI9881C\_CMD(0x6C);

LCD\_ILI9881C\_INDEX(0x15);

LCD\_ILI9881C\_CMD(0x6E);

LCD\_ILI9881C\_INDEX(0x2A);

LCD\_ILI9881C\_CMD(0x6F);

LCD\_ILI9881C\_INDEX(0x33);

LCD\_ILI9881C\_CMD(0x3A);

LCD\_ILI9881C\_INDEX(0x24);

LCD\_ILI9881C\_CMD(0x8D);

LCD\_ILI9881C\_INDEX(0x14);

LCD\_ILI9881C\_CMD(0x87);

LCD\_ILI9881C\_INDEX(0xBA);

LCD\_ILI9881C\_CMD(0x26);

LCD\_ILI9881C\_INDEX(0x76);

LCD\_ILI9881C\_CMD(0xB2);

LCD\_ILI9881C\_INDEX(0xD1);

LCD\_ILI9881C\_CMD(0xB5);

LCD\_ILI9881C\_INDEX(0xD7);

LCD\_ILI9881C\_CMD(0x35);

LCD\_ILI9881C\_INDEX(0x1F);

LCD\_ILI9881C\_CMD(0xFF);

LCD\_ILI9881C\_INDEX(0x98);

LCD\_ILI9881C\_INDEX(0x81);

LCD\_ILI9881C\_INDEX(0x01);

LCD\_ILI9881C\_CMD(0x22);

LCD\_ILI9881C\_INDEX(0x0A);

LCD\_ILI9881C\_CMD(0x53);

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LCD\_ILI9881C\_CMD(0x50);

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LCD\_ILI9881C\_INDEX(0xA6);

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LCD\_ILI9881C\_CMD(0xA6);

LCD\_ILI9881C\_INDEX(0x1D);

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LCD\_ILI9881C\_CMD(0xAA);

LCD\_ILI9881C\_INDEX(0x29);

LCD\_ILI9881C\_CMD(0xAB);

LCD\_ILI9881C\_INDEX(0x8F);

LCD\_ILI9881C\_CMD(0xAC);

LCD\_ILI9881C\_INDEX(0x20);

LCD\_ILI9881C\_CMD(0xAD);

LCD\_ILI9881C\_INDEX(0x1F);

LCD\_ILI9881C\_CMD(0xAE);

LCD\_ILI9881C\_INDEX(0x4F);

LCD\_ILI9881C\_CMD(0xAF);

LCD\_ILI9881C\_INDEX(0x23);

LCD\_ILI9881C\_CMD(0xB0);

LCD\_ILI9881C\_INDEX(0x29);

LCD\_ILI9881C\_CMD(0xB1);

LCD\_ILI9881C\_INDEX(0x56);

LCD\_ILI9881C\_CMD(0xB2);

LCD\_ILI9881C\_INDEX(0x66);

LCD\_ILI9881C\_CMD(0xB3);

LCD\_ILI9881C\_INDEX(0x39);

LCD\_ILI9881C\_CMD(0xC0);

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LCD\_ILI9881C\_CMD(0xC1);

LCD\_ILI9881C\_INDEX(0x1A);

LCD\_ILI9881C\_CMD(0xC2);

LCD\_ILI9881C\_INDEX(0x2A);

LCD\_ILI9881C\_CMD(0xC3);

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LCD\_ILI9881C\_CMD(0xC4);

LCD\_ILI9881C\_INDEX(0x17);

LCD\_ILI9881C\_CMD(0xC5);

LCD\_ILI9881C\_INDEX(0x2B);

LCD\_ILI9881C\_CMD(0xC6);

LCD\_ILI9881C\_INDEX(0x1D);

LCD\_ILI9881C\_CMD(0xC7);

LCD\_ILI9881C\_INDEX(0x20);

LCD\_ILI9881C\_CMD(0xC8);

LCD\_ILI9881C\_INDEX(0x9D);

LCD\_ILI9881C\_CMD(0xC9);

LCD\_ILI9881C\_INDEX(0x1D);

LCD\_ILI9881C\_CMD(0xCA);

LCD\_ILI9881C\_INDEX(0x29);

LCD\_ILI9881C\_CMD(0xCB);

LCD\_ILI9881C\_INDEX(0x8F);

LCD\_ILI9881C\_CMD(0xCC);

LCD\_ILI9881C\_INDEX(0x20);

LCD\_ILI9881C\_CMD(0xCD);

LCD\_ILI9881C\_INDEX(0x1F);

LCD\_ILI9881C\_CMD(0xCE);

LCD\_ILI9881C\_INDEX(0x4F);

LCD\_ILI9881C\_CMD(0xCF);

LCD\_ILI9881C\_INDEX(0x24);

LCD\_ILI9881C\_CMD(0xD0);

LCD\_ILI9881C\_INDEX(0x29);

LCD\_ILI9881C\_CMD(0xD1);

LCD\_ILI9881C\_INDEX(0x56);

LCD\_ILI9881C\_CMD(0xD2);

LCD\_ILI9881C\_INDEX(0x66);

LCD\_ILI9881C\_CMD(0xD3);

LCD\_ILI9881C\_INDEX(0x39);

LCD\_ILI9881C\_CMD(0xFF);



```
LCD_ILI9881C_INDEX(0x98);
```

```
LCD_ILI9881C_INDEX(0x81);
```

```
LCD_ILI9881C_INDEX(0x00);
```

```
LCD_ILI9881C_CMD(0x11);
```

```
LCD_ILI9881C_INDEX(0x00);
```

```
Void ILI9881C_EnterSleep_Code(Void)
```

```
{
```

```
LCD_ILI9881C_CMD(0x28) //Display oFF
```

```
Delaysms(20);
```

```
LCD_ILI9881C_CMD(0x10); // Internal oscillator will be stopped
```

```
Delaysms(120);
```

```
}
```

```
Void ILI9881C_ExitSleep_Code(Void)
```

```
{
```

```
LCD_ILI9881C_CMD(0x11); // Sleep Out
```

```
Delaysms(120);
```

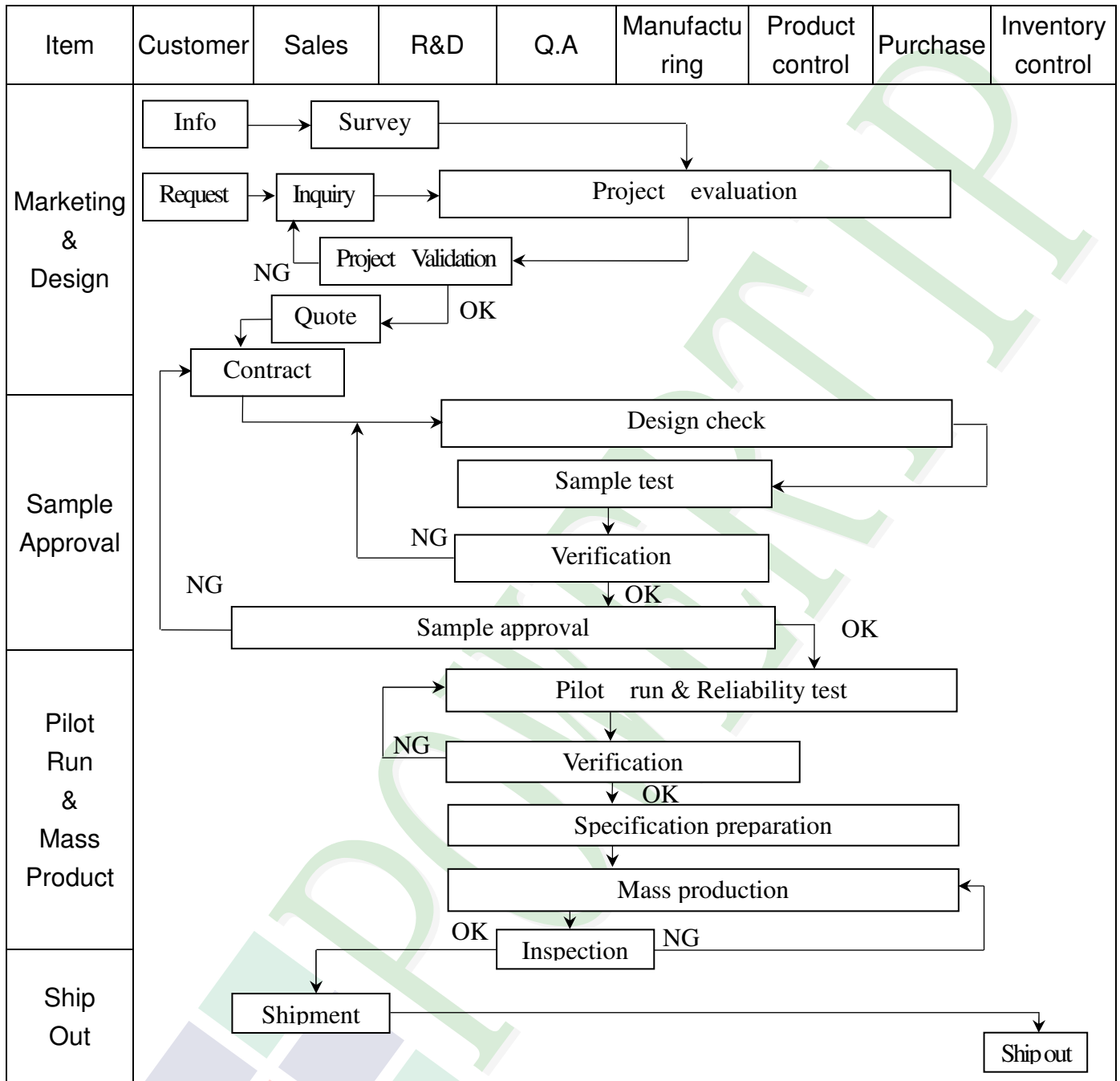
```
LCD_ILI9881C_CMD(0x29) //Display on
```

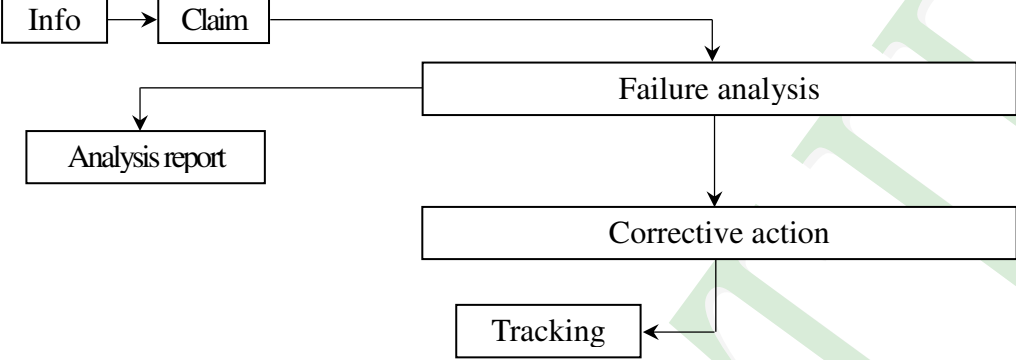
```
Delaysms(20);
```

```
}
```

### 3. QUALITY ASSURANCE SYSTEM

### 3.1 Quality Assurance Flow Chart



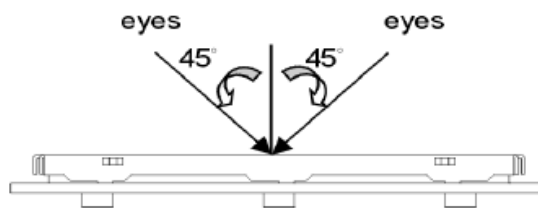
| Item          | Customer  | Sales | R&D | Q.A | Manufacturing   | Product control | Purchase | Inventory control |
|---------------|---|-------|-----|-----|---|-----------------|----------|-------------------|
| Sales Service |  <pre> graph TD     Info[Info] --&gt; Claim[Claim]     Claim --&gt; FA[Failure analysis]     Claim --&gt; AR[Analysis report]     FA --&gt; CA[Corrective action]     CA --&gt; Tracking[Tracking]           </pre> |       |     |     |   |                 |          |                   |
| Q.A Activity  | 1. ISO 9001 Maintenance Activities<br>3. Equipment calibration<br>5. Standardization Management   |       |     |     | 2. Process improvement proposal<br>4. Education And Training Activities |                 |          |                   |

### 3.2. Inspection Specification

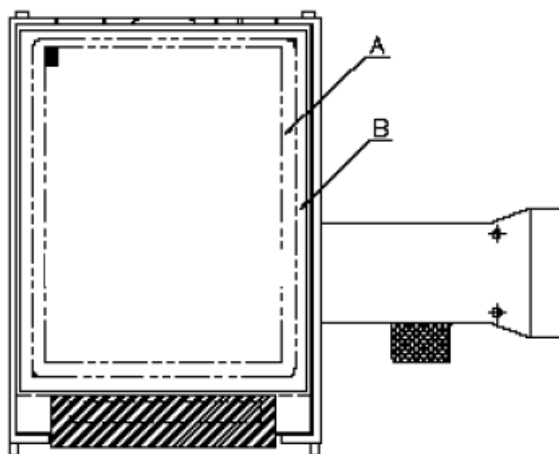
- ◆Scope : The document shall be applied to TFT-LCD Module for 3.5" ~15" (Ver.B01).
- ◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample
- ◆Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
- ◆OUT Going Defect Level : Sampling.
- ◆Standard of the product appearance test :

a. Manner of appearance test :

- (1). The test best be under 20W×2 fluorescent light , and distance of view must be at 30 cm.
- (2). The test direction is base on about around 45° of vertical line.



(3). Definition of area.



*A* area : viewing area

*B* area : Outside of viewing area

(4). Standard of inspection : (Unit : mm)

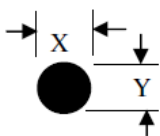
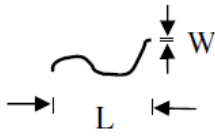
**◆Specification For TFT-LCD Module 3. 5" ~15" :**

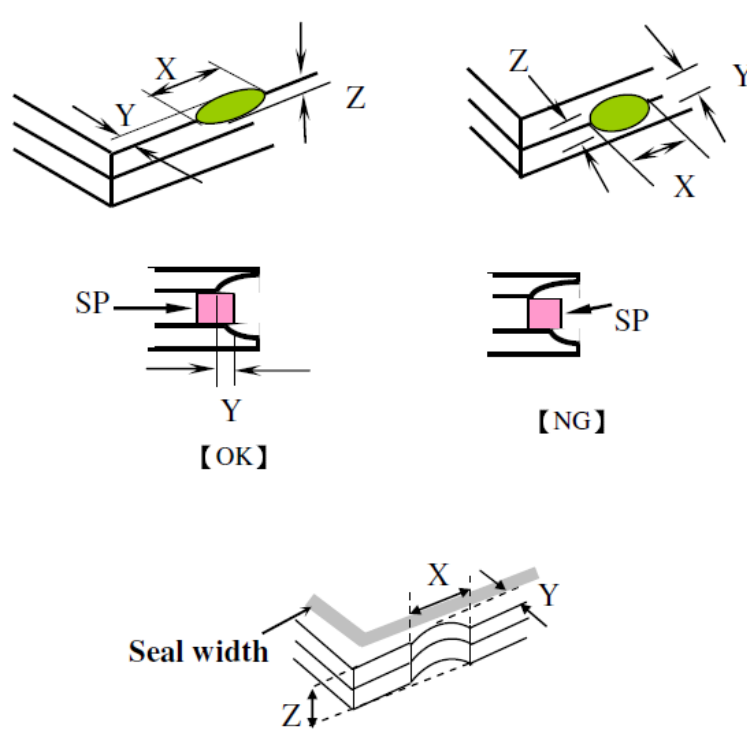
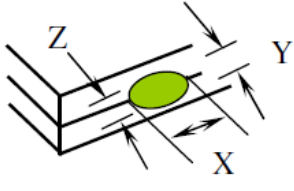
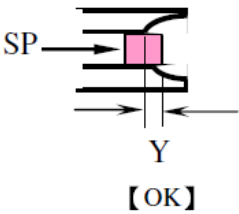
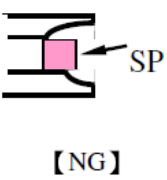
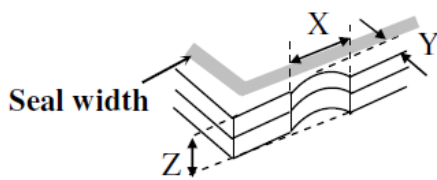
(Ver.B01)

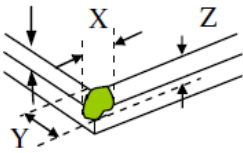
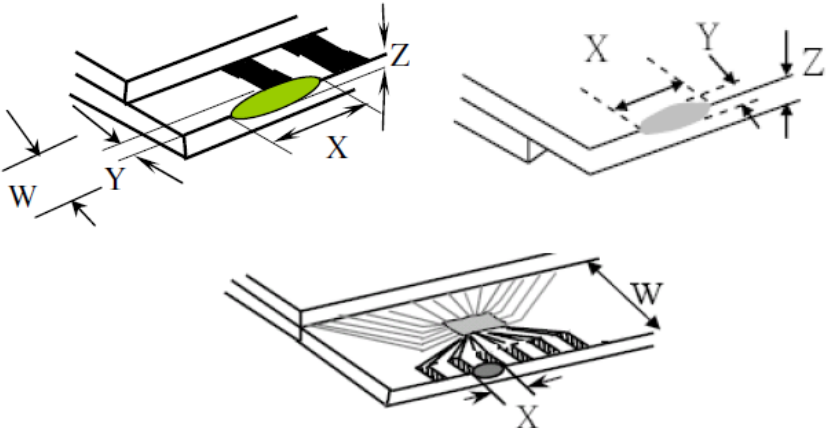
| NO  | Item  | Criterion  | Level      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|---|---|--|------------|-------------------|-------------------|------------|------------|----------|----------|----------|-----------|----------|-------|----------|-------|
| 01  | Product condition   | 1. 1 The part number is inconsistent with work order of production.  | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 1. 2 Mixed product types.  | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 1. 3 Assembled in inverse direction.   | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 02  | Quantity  | 2. 1 The quantity is inconsistent with work order of production.   | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 03  | Outline dimension   | 3. 1 Product dimension and structure must conform to structure diagram.  | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 04  | Electrical Testing  | 4. 1 Missing line character and icon.  | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 4. 2 No function or no display.  | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 4. 3 Display malfunction.  | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 4. 4 LCD viewing angle defect.   | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 4. 5 Current consumption exceeds product specifications.   | Major      |                   |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | 4. 6 Mura can not be seen through 5% ND filter.<br>(Mura : Under the normal examination angle of view, the picture has the non-uniform phenomenon.)  | Minor      |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 05  | Dot defect<br>(Bright dot 、<br>Dark dot)<br><br>On -display | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">Item</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="text-align: center; vertical-align: middle;">Dot Defect</td> <td style="text-align: center;">Bright Dot</td> <td style="text-align: center;"><math>\leq 4</math></td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;"><math>\leq 5</math></td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;"><math>\leq 3</math></td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;"><math>\leq 7</math></td> </tr> </tbody> </table> | Item       |                   | Acceptance (Q'ty) | Dot Defect | Bright Dot | $\leq 4$ | Dark Dot | $\leq 5$ | Joint Dot | $\leq 3$ | Total | $\leq 7$ | Minor |
|   |   | Item   |            | Acceptance (Q'ty) |                   |            |            |          |          |          |           |          |       |          |       |
|   |   | Dot Defect   | Bright Dot | $\leq 4$          |                   |            |            |          |          |          |           |          |       |          |       |
|   |   |  | Dark Dot   | $\leq 5$          |                   |            |            |          |          |          |           |          |       |          |       |
|   |   |  | Joint Dot  | $\leq 3$          |                   |            |            |          |          |          |           |          |       |          |       |
| Total   | $\leq 7$  |  |            |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 5. 1 Inspection pattern : full white , full black , Red , Green and blue screens. |   |  |            |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 5. 2 It is defined as dot defect if defect area $> 1/2$ dot.                      |   |  |            |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 5. 3 The distance between two dot defect $\geq 5$ mm.                             |   |  |            |                   |                   |            |            |          |          |          |           |          |       |          |       |
| 5. 4 Bright dot that can not be seen through 5% ND filter.                        |   |  |            |                   |                   |            |            |          |          |          |           |          |       |          |       |

**◆Specification For TFT-LCD Module 3.5" ~15" :**

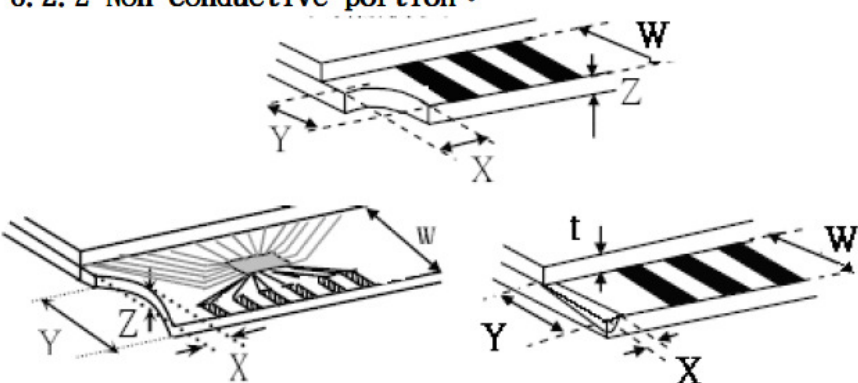
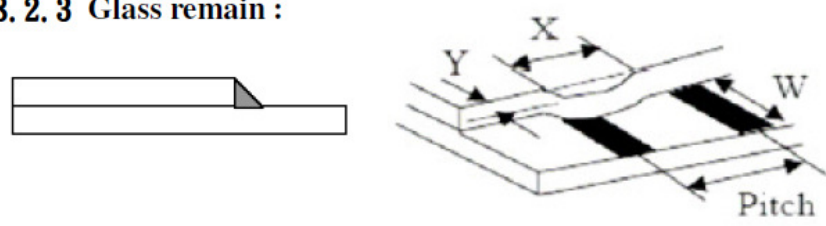

(Ver.B01)

| NO  | Item  | Criterion  | Level  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|---|---|--|--|-------------------|--------------------------------|-------------------|--------|------------------|--------|------------------|-------------------------|--------|-------------------------|----------------------|--------|-------------------------|----------------------|---------------|-----|--------------|---------------|-------|--|---|-----------|-----|---------------|--------|--------|---------------|----------------------|---|-----|------------|---------------|-------|--|---|
| 06  | Black or white dot、scratch、contamination<br><br>Round type<br><br>$\Phi = (x + y) / 2$<br><br>Line type<br> | <b>6.1 Round type ( Non-display or display ) :</b> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>5</td> <td rowspan="3">Ignore</td> </tr> <tr> <td><math>\Phi &gt; 0.50</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> </tr> </tbody> </table> | Dimension (diameter : $\Phi$ )   | Acceptance (Q'ty) |                                | A area            | B area | $\Phi \leq 0.25$ | Ignore |                  | $0.25 < \Phi \leq 0.50$ | 5      | Ignore                  | $\Phi > 0.50$        | 0      | <b>Total</b>            | 5                    | Minor         |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   |   | Dimension (diameter : $\Phi$ )   |  | Acceptance (Q'ty) |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| A area  | B area  |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $\Phi \leq 0.25$  | Ignore  |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $0.25 < \Phi \leq 0.50$   | 5   | Ignore   |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $\Phi > 0.50$   | 0   |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| <b>Total</b>  | 5   |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| <b>6.2 Line type( Non-display or display ) :</b> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th rowspan="2">module size</th> <th rowspan="2">Length (L)</th> <th rowspan="2">Width (W)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td rowspan="5">3.5" to less 9"</td> <td>---</td> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td>4</td> </tr> <tr> <td><math>L \leq 5.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>2</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td>As round type</td> </tr> <tr> <td colspan="2">Total</td> <td>5</td> </tr> <tr> <td rowspan="5">9" to 15"</td> <td>---</td> <td><math>W \leq 0.05</math></td> <td>Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.05 &lt; W \leq 0.10</math></td> <td>5</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td>As round type</td> </tr> <tr> <td colspan="2">Total</td> <td>5</td> </tr> </tbody> </table> | module size   | Length (L)   | Width (W)  | Acceptance (Q'ty) |                                | A area            | B area | 3.5" to less 9"  | ---    | $W \leq 0.03$    | Ignore                  | Ignore | $L \leq 10.0$           | $0.03 < W \leq 0.05$ | 4      | $L \leq 5.0$            | $0.05 < W \leq 0.10$ | 2             | --- | $W > 0.10$   | As round type | Total |  | 5 | 9" to 15" | --- | $W \leq 0.05$ | Ignore | Ignore | $L \leq 10.0$ | $0.05 < W \leq 0.10$ | 5 | --- | $W > 0.10$ | As round type | Total |  | 5 |
| module size   |   |  |  | Length (L)        | Width (W)                      | Acceptance (Q'ty) |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | A area  | B area   |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| 3.5" to less 9"   | ---   | $W \leq 0.03$  | Ignore   | Ignore            |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | $L \leq 10.0$   | $0.03 < W \leq 0.05$   | 4  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | $L \leq 5.0$  | $0.05 < W \leq 0.10$   | 2  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | ---   | $W > 0.10$   | As round type  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | Total   |  | 5  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| 9" to 15"   | ---   | $W \leq 0.05$  | Ignore   | Ignore            |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | $L \leq 10.0$   | $0.05 < W \leq 0.10$   | 5  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | ---   | $W > 0.10$   | As round type  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | Total   |  | 5  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | 07  | Polarizer Bubble   | <table border="1" style="margin-left: 40px;"> <thead> <tr> <th rowspan="2">Dimension (diameter : <math>\Phi</math>)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.25</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.50</math></td> <td>4</td> <td rowspan="4">Ignore</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 0.80</math></td> <td>1</td> </tr> <tr> <td><math>\Phi &gt; 0.80</math></td> <td>0</td> </tr> <tr> <td><b>Total</b></td> <td>5</td> </tr> </tbody> </table> |                   | Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty) |        | A area           | B area | $\Phi \leq 0.25$ | Ignore                  |        | $0.25 < \Phi \leq 0.50$ | 4                    | Ignore | $0.50 < \Phi \leq 0.80$ | 1                    | $\Phi > 0.80$ | 0   | <b>Total</b> | 5             | Minor |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| Dimension (diameter : $\Phi$ )  | Acceptance (Q'ty)   |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
|   | A area  | B area   |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $\Phi \leq 0.25$  | Ignore  |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $0.25 < \Phi \leq 0.50$   | 4   | Ignore   |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $0.50 < \Phi \leq 0.80$   | 1   |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| $\Phi > 0.80$   | 0   |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |
| <b>Total</b>  | 5   |  |  |                   |                                |                   |        |                  |        |                  |                         |        |                         |                      |        |                         |                      |               |     |              |               |       |  |   |           |     |               |        |        |               |                      |   |     |            |               |       |  |   |

| NO       | Item                                     | Criterion   | Level |   |   |   |          |                                |              |          |
|----------|--|---|-------|---|---|---|----------|--------------------------------|--------------|----------|
| 08       | The crack of glass                       | <p><b>Symbols :</b></p> <p><b>X :</b> The length of crack<br/> <b>Z :</b> The thickness of crack<br/> <b>t :</b> The thickness of glass</p> <p><b>Y :</b> The width of crack.<br/> <b>W :</b> terminal length<br/> <b>a :</b> LCD side length</p>   | Minor |   |   |   |          |                                |              |          |
|          |  | <p><b>8.1 General glass chip :</b></p> <p><b>8.1.1 Chip on panel surface and crack between panels:</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <p>【OK】</p> </div> <div style="text-align: center;">  <p>【NG】</p> </div> </div> <div style="text-align: center; margin-top: 20px;">  </div> <table border="1" style="margin-top: 20px; width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">X</th> <th style="width: 40%;">Y</th> <th style="width: 40%;">Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq a</math></td> <td style="text-align: center;">Crack can't enter viewing area</td> <td style="text-align: center;"><math>\leq 1/2 t</math></td> </tr> <tr> <td style="text-align: center;"><math>\leq a</math></td> <td style="text-align: center;">Crack can't exceed the half of SP width.</td> <td style="text-align: center;"><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table> |       | X | Y | Z | $\leq a$ | Crack can't enter viewing area | $\leq 1/2 t$ | $\leq a$ |
| X        | Y  | Z   |       |   |   |   |          |                                |              |          |
| $\leq a$ | Crack can't enter viewing area           | $\leq 1/2 t$  |       |   |   |   |          |                                |              |          |
| $\leq a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$  |       |   |   |   |          |                                |              |          |

| NO  | Item                                     | Criterion  | Level        |   |       |              |                                |                |              |  |                      |              |       |
|---|--|--|--------------|---|-------|--------------|--------------------------------|----------------|--------------|--|----------------------|--------------|-------|
| 08  | The crack of glass                       | <p><b>Symbols :</b></p> <p>X : The length of crack<br/>                     Y : The width of crack.<br/>                     Z : The thickness of crack<br/>                     W : terminal length<br/>                     t : The thickness of glass<br/>                     a : LCD side length</p> <hr/> <p><b>8.1.2 Corner crack :</b></p>  <table border="1" data-bbox="528 757 1331 1048"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't enter viewing area</td> <td><math>Z \leq 1/2 t</math></td> </tr> <tr> <td><math>\leq 1/5 a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2 t &lt; Z \leq 2 t</math></td> </tr> </tbody> </table> | X            | Y | Z     | $\leq 1/5 a$ | Crack can't enter viewing area | $Z \leq 1/2 t$ | $\leq 1/5 a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$ |              |       |
|   |  | X  | Y            | Z |       |              |                                |                |              |  |                      |              |       |
| $\leq 1/5 a$  | Crack can't enter viewing area           | $Z \leq 1/2 t$   |              |   |       |              |                                |                |              |  |                      |              |       |
| $\leq 1/5 a$  | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$   |              |   |       |              |                                |                |              |  |                      |              |       |
| <p><b>8.2 Protrusion over terminal :</b></p> <p><b>8.2.1 Chip on electrode pad :</b></p>  <table border="1" data-bbox="564 1675 1342 1854"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td><math>\leq a</math></td> <td><math>\leq 1/2 W</math></td> <td><math>\leq t</math></td> </tr> <tr> <td>Back</td> <td><math>\leq a</math></td> <td><math>\leq W</math></td> <td><math>\leq 1/2 t</math></td> </tr> </tbody> </table> |  | X  | Y            | Z | Front | $\leq a$     | $\leq 1/2 W$                   | $\leq t$       | Back         | $\leq a$                                 | $\leq W$             | $\leq 1/2 t$ | Minor |
|   | X  | Y  | Z            |   |       |              |                                |                |              |  |                      |              |       |
| Front   | $\leq a$                                 | $\leq 1/2 W$   | $\leq t$     |   |       |              |                                |                |              |  |                      |              |       |
| Back  | $\leq a$                                 | $\leq W$   | $\leq 1/2 t$ |   |       |              |                                |                |              |  |                      |              |       |



| NO           | Item               | Criterion  | Level |   |   |              |          |          |   |   |   |          |              |          |       |
|--------------|--------------------|--|-------|---|---|--------------|----------|----------|---|---|---|----------|--------------|----------|-------|
| 08           | The crack of glass | <p><b>Symbols :</b></p> <p><b>X :</b> The length of crack                      <b>Y :</b> The width of crack.<br/> <b>Z :</b> The thickness of crack                  <b>W :</b> terminal length<br/> <b>t :</b> The thickness of glass                   <b>a :</b> LCD side length</p> <hr/> <p><b>8.2.2 Non-conductive portion :</b></p>  <table border="1" data-bbox="638 952 1268 1086" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">X</th> <th style="text-align: center;">Y</th> <th style="text-align: center;">Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq 1/3 a</math></td> <td style="text-align: center;"><math>\leq W</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p><b>8.2.3 Glass remain :</b></p>  <table border="1" data-bbox="558 1512 1252 1624" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">X</th> <th style="text-align: center;">Y</th> <th style="text-align: center;">Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq a</math></td> <td style="text-align: center;"><math>\leq 1/3 W</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> </tbody> </table> <p><b>8.2.4 Cracking</b></p>  <p style="text-align: center;"><b>Not Allowed</b></p> | X     | Y | Z | $\leq 1/3 a$ | $\leq W$ | $\leq t$ | X | Y | Z | $\leq a$ | $\leq 1/3 W$ | $\leq t$ | Minor |
| X            | Y                  | Z  |       |   |   |              |          |          |   |   |   |          |              |          |       |
| $\leq 1/3 a$ | $\leq W$           | $\leq t$   |       |   |   |              |          |          |   |   |   |          |              |          |       |
| X            | Y                  | Z  |       |   |   |              |          |          |   |   |   |          |              |          |       |
| $\leq a$     | $\leq 1/3 W$       | $\leq t$   |       |   |   |              |          |          |   |   |   |          |              |          |       |

**◆Specification For TFT-LCD Module 3. 5" ~15" :**

(Ver.B01)

| NO | Item               | Criterion   | Level |
|----|--------------------|---|-------|
| 09 | Backlight elements | 9. 1 Backlight can't work normally.   | Major |
|    |                    | 9. 2 Backlight doesn't light or color is wrong.   | Major |
|    |                    | 9. 3 Illumination source flickers when lit.   | Major |
| 10 | General appearance | 10. 1 Pin type 、 quantity 、 dimension must match type in structure diagram.   | Major |
|    |                    | 10. 2 No short circuits in components on PCB or FPC .   | Major |
|    |                    | 10. 3 Parts on PCB or FPC must be the same as on the production characteristic chart .There should be no wrong parts , missing parts or excess parts. | Major |
|    |                    | 10. 4 Product packaging must the same as specified on packaging specification sheet.  | Minor |
|    |                    | 10. 5 The folding and peeled off in polarizer are not acceptable.   | Minor |
|    |                    | 10. 6 The PCB or FPC between B/L assembled distance(PCB or FPC ) is $\leq 1.5$ mm.  | Minor |



## 5. PRECAUTION RELATING PRODUCT HANDLING

### 5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

### 5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is  $320\pm 10^{\circ}\text{C}$  and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM .

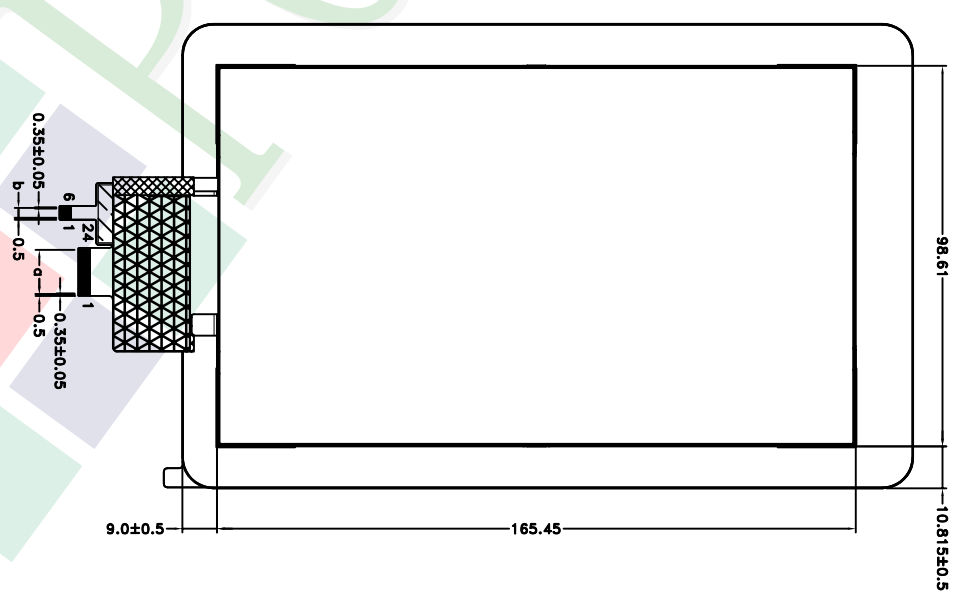
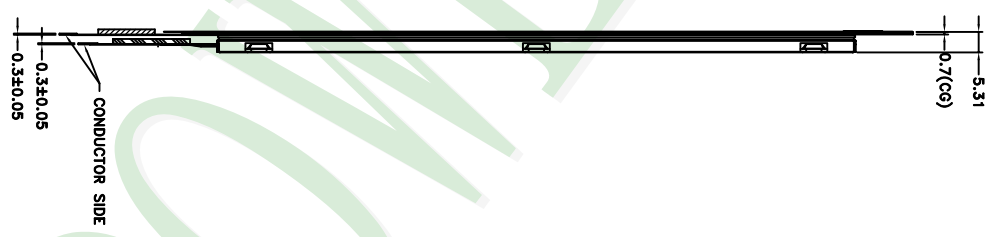
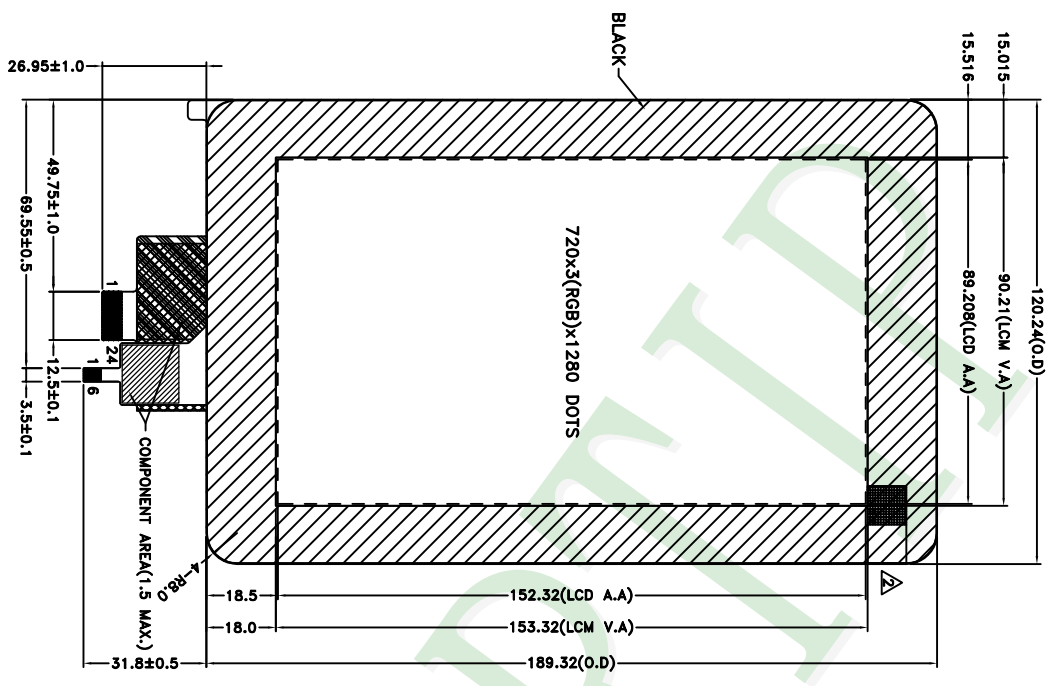
### 5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

### 5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period  
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility  
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.

A B C D E F G H



NOTES:  
 1.LCD TYPE: TFT LCD  
 2.LCD DISPLAY: Normally Black  
 3.The tolerance unless classified ±0.3mm  
 4.I/P suggested connector: "Cullux"  
 5.TFT suggested connector: "CHYAO SHUNN"  
 6.a:PO.5X23=11.5±0.05  
 7.b:PO.5X5=2.5±0.05

PART NO: PH720128T003-ZBC02  
 DRAWING NAME: LMD-PH720128T003-ZBC02  
 TITLE: LCD MODULE DRAWING

久正光電股份有限公司  
 POWER TIP TECHNOLOGY CORPORATION

| Design   | Check | Approve   |
|----------|-------|-----------|
| Stone    | Sam   | Oliver    |
| Unit     | MM    | Surface   |
| Scale    | 1:1   | Material  |
| Page     | 1/1   | Thickness |
| Quantity |       |           |

| REV | REV BY        | REVISER | DATE       |
|-----|---------------|---------|------------|
| 007 |               |         |            |
| 006 |               |         |            |
| 005 |               |         |            |
| 004 |               |         |            |
| 003 |               |         |            |
| 002 | ADD PULL TAPE | Stone   | 2018/01/12 |
| 001 | NEW DRAWING   | Stone   | 2017/06/08 |

| 7          | 8      | 9       | 10       |
|------------|--------|---------|----------|
| 1 ~ 4      | 4 ~ 16 | 16 ~ 63 | 63 ~ 250 |
| 250 ~ 1000 | -      | -       | -        |

# LCM包裝規格書

## LCM Packaging Specifications

|         |        |         |
|---------|--------|---------|
| Approve | Check  | Contact |
| Oliver  | Oliver | Stone   |

### 1. 包裝材料規格表 (Packaging Material) : (per carton)

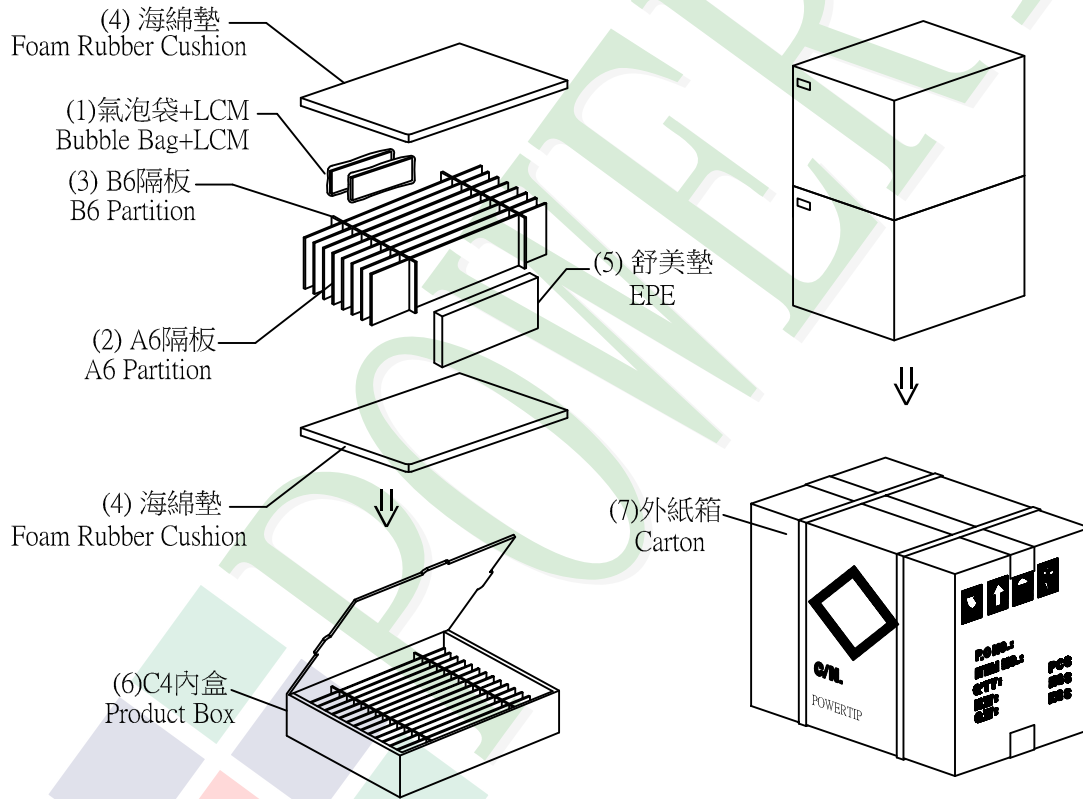
| No. | Item                      | Model              | Dimensions (mm) | 1Pcs Weight | Quantity | Total Weight |
|-----|---------------------------|--------------------|-----------------|-------------|----------|--------------|
| 1   | 成品 (LCM)                  | PH720128T003-ZBC02 | 120.24 X 189.32 | 0.178       | 28       | 4.984        |
| 2   | 氣泡袋(1)Bubble Bag          | BAG200160BRABA     | 200 X 160       | 0.0096      | 28       | 0.2688       |
| 3   | A6隔板(2)A6 Partition       | BX33800012BZBA     | 338 X 125 X 3   | 0.038       | 16       | 0.608        |
| 4   | B6隔板(3)B6 Partition       | BX29800012BZBA     | 298 X 125 X 3   | 0.023       | 4        | 0.092        |
| 5   | 海綿墊(4)Foam Rubber Cushion | OTFOAM00005ABA     | 330 X 290 X 10  | 0.025       | 4        | 0.1          |
| 6   | 舒美墊(5)EPE                 | OTFOAMT0006ABA     | 218 X 125 X 20  | 0.012       | 4        | 0.048        |
| 7   | C4內盒(6)Product Box        | BX36031014AABA     | 360 X 310 X 142 | 0.406       | 2        | 0.812        |
| 8   | 外紙箱(7)Carton              | BX39432432CCBA     | 394 X 324 X 321 | 0.884       | 1        | 0.884        |
| 9   |                           |                    |                 |             |          |              |

2. 一整箱總重量 (Total LCD Weight in carton) : 7.8 Kg±10%

3. 單箱數量規格表 (Packaging Specifications and Quantity) :

(1) Quantity Of Spacer : A6隔板 X 8 , B6隔板 X 2

(2) Total LCM quantity in carton : quantity per box 14 x no of boxes 2 = 28



### 特記事項 (REMARK)

4. 每個間隔放2片模組，前後間隔不放置模組。(如示意圖)

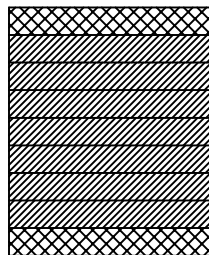
4. 2 LCM are placed on every other slot of the divider.

Note: First and last slot should be empty.

(See remarks 5 on packaging specifications)

5. 放置格示意圖:

5. Each divider is placed inside a product Box



▨ 模組(LCM) X 2pcs.

⊠ 舒美墊(EPE)