

SPECIFICATIONS

| | | |
|------------------------|---|------------------------------|
| CUSTOMER | : | PTC |
| SAMPLE CODE | : | SH240320T062-LAA07 |
| MASS PRODUCTION CODE | : | PH240320T062-LAA07 |
| SAMPLE VERSION | : | 01 |
| SPECIFICATIONS EDITION | : | 002 |
| DRAWING NO. (Ver.) | : | JLMD- PH240320T062-LAA07_001 |
| PACKAGING NO. (Ver.) | : | JPKG- PH240320T062-LAA07_001 |

Customer Approved

Date:

| Approved | Checked | Designer |
|----------|---------|----------|
| 閔偉 | 劉進 | 張佑雨 |

- Preliminary specification for design input
- Specification for sample approval

POWERTIP TECH. CORP.

| | | |
|--|--|---|
| Headquarters: No.8, 6 th Road, Taichung Industrial Park, Taichung, Taiwan 台中市 407 工業區六路 8 號 | TEL: 886-4-2355-8168 FAX: 886-4-2355-8166 | E-mail: sales@powertip.com.tw Http://www.powertip.com.tw |
|--|--|---|

Contents

1. SPECIFICATIONS

- 1.1 Features
- 1.2 Mechanical Specifications
- 1.3 Absolute Maximum Ratings
- 1.4 DC Electrical Characteristics
- 1.5 Optical Characteristics
- 1.6 Backlight Characteristics

2. MODULE STRUCTURE

- 2.1 Counter Drawing
- 2.2 Interface Pin Description
- 2.3 Timing Characteristics

3. QUALITY ASSURANCE SYSTEM

- 3.1 Quality Assurance Flow Chart
- 3.2 Inspection Specification

4. RELIABILITY TEST

- 4.1 Reliability Test Condition

5. PRECAUTION RELATING PRODUCT HANDLING

- 5.1 Safety
- 5.2 Handling
- 5.3 Storage
- 5.4 Terms of Warranty

Appendix : LCM Drawing
LCM Packaging

1. SPECIFICATIONS

1.1 Features

Main LCD Panel

| Item | Standard Value |
|-------------------------------|--|
| Display Type | 240 * (R、G、B) * 320 Dots |
| LCD Type | a-Si TFT , Positive, Transmissive |
| Screen size(inch) | 2.4" (Diagonal) |
| Other(controller / driver IC) | ST7789VI |
| Viewing Direction | 12 O'clock |
| Color configuration | R.G.B. vertical stripe |
| Interface | 8080-8 &16 Bits data bus |
| ROHS | THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web site : http://www.powertip.com.tw/news.php?area_id_view=1085560481/ |

1.2 Mechanical Specifications

| Item | Standard Value | Unit |
|-------------------|-----------------------------------|------|
| Outline Dimension | 42.72 (W) * 61.46 (L) *2.55MAX(H) | mm |

LCD Panel & Touch Panel

| Item | Standard Value | Unit |
|-------------------|---------------------|------|
| Viewing Area(LCD) | 37.72(W) *49.96(L) | mm |
| Active Area(LCD) | 36.72(W) * 48.96(L) | mm |

Note : For detailed information please refer to LCM drawing.

1.3 Absolute Maximum Ratings

Module

| Item | Symbol | Condition | Min. | Max. | Unit |
|-----------------------------|--------|------------|------|------------|------|
| System Power Supply Voltage | VDD2 | - | -0.3 | +4.6 | V |
| | IOVDD | - | -0.3 | +4.6 | V |
| | VGH | - | +13 | +17 | V |
| | VGL | - | -12 | -7 | |
| Input Voltage | VIN | - | 0.5 | IOVDD +0.5 | V |
| Operating Temperature | TOP | - | -30 | +80 | °C |
| Storage Temperature | TST | - | -40 | +85 | °C |
| Storage Humidity | HD | Ta < 60 °C | - | 90 | %RH |

1.4 DC Electrical Characteristics

Module

GND = 0V, Ta = 25°C

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|--------|-----------------|------------|------|------------|------|
| System Voltage | VDD2 | - | 2.4 | 2.75 | 3.3 | V |
| Interface Operation Voltage | IOVDD | - | 1.65 | 1.8 | 3.3 | V |
| Input High Voltage | VIH | - | 0.8* IOVDD | - | IOVDD | V |
| Input Low Voltage | VIL | - | VSS | - | 0.2* IOVDD | V |
| Output High Voltage | VOH | IOH=-1.0mA | 0.8* IOVDD | - | IOVDD | V |
| Output Low Voltage | VOL | IOL=+1.0mA | VSS | - | 0.2* IOVDD | V |
| Supply Current | IDD*1 | VDD2=IOVDD=2.8V | - | 7 | 11 | mA |

Note1 : IDD contains the current of the VDD2 and IOVDD .

1.5 Optical Characteristics

TFT LCD Panel

VDD2= 2.8V, Ta=25°C

| Item | Symbol | Condition | Min. | Typ. | Max. | unit | | |
|---|------------|-------------|----------|------|------|-------------------|-------|-------|
| Response time | Tr + Tf | - | - | 27 | 41 | ms | Note2 | |
| Viewing angle | Rear | $\theta Y+$ | - | 60 | - | Deg. | Note4 | |
| | Front | $\theta Y-$ | - | 60 | - | | | |
| | Left | $\theta X-$ | - | 60 | - | | | |
| | Right | $\theta X+$ | - | 60 | - | | | |
| Contrast ratio | CR | - | 500 | 600 | - | - | Note3 | |
| Color of CIE Coordinate | White | X | IF=80 mA | 0.24 | 0.29 | 0.34 | - | Note1 |
| | | Y | | 0.26 | 0.31 | 0.36 | | |
| | Red | X | | 0.54 | 0.59 | 0.64 | | |
| | | Y | | 0.29 | 0.34 | 0.39 | | |
| | Green | X | | 0.29 | 0.34 | 0.39 | | |
| | | Y | | 0.55 | 0.60 | 0.65 | | |
| | Blue | X | | 0.10 | 0.15 | 0.20 | | |
| | | Y | | 0.01 | 0.06 | 0.11 | | |
| Average Brightness Pattern=white display | IV | IF=80 mA | 120 | 160 | - | cd/m ² | Note1 | |
| Uniformity | ΔB | IF= 80 mA | 80 | - | - | % | Note1 | |

Note1:

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

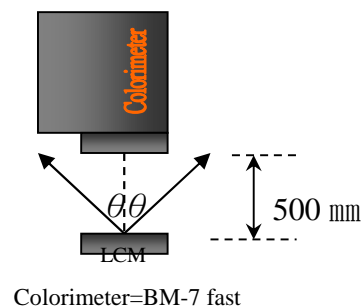
2 : Measurement Condition for Optical Characteristics:

a : Environment: 25°C±5°C / 60±20%R.H, no wind, dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance: 500 ± 50 mm, ($\theta = 0^\circ$).

c : Equipment: TOPCON BM-7 fast, (field 1°), after 10 minutes operation.

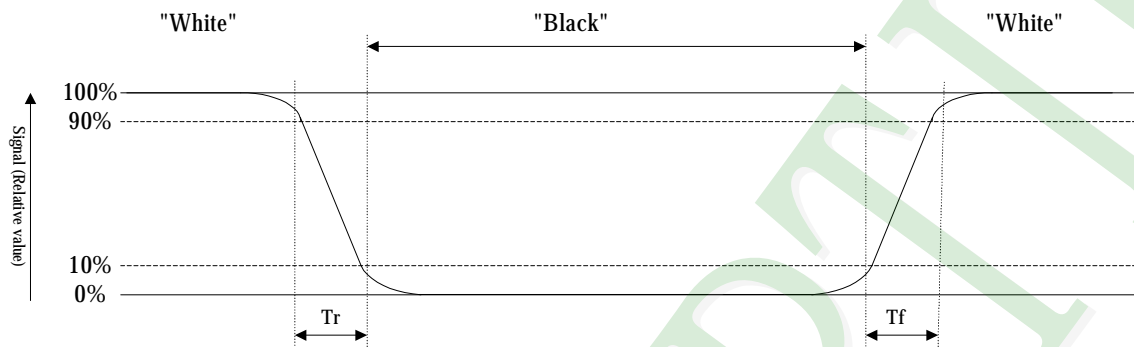
d : The uncertainty of the C.I.E coordinate measurement ±0.01, Average Brightness ± 4%.



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:



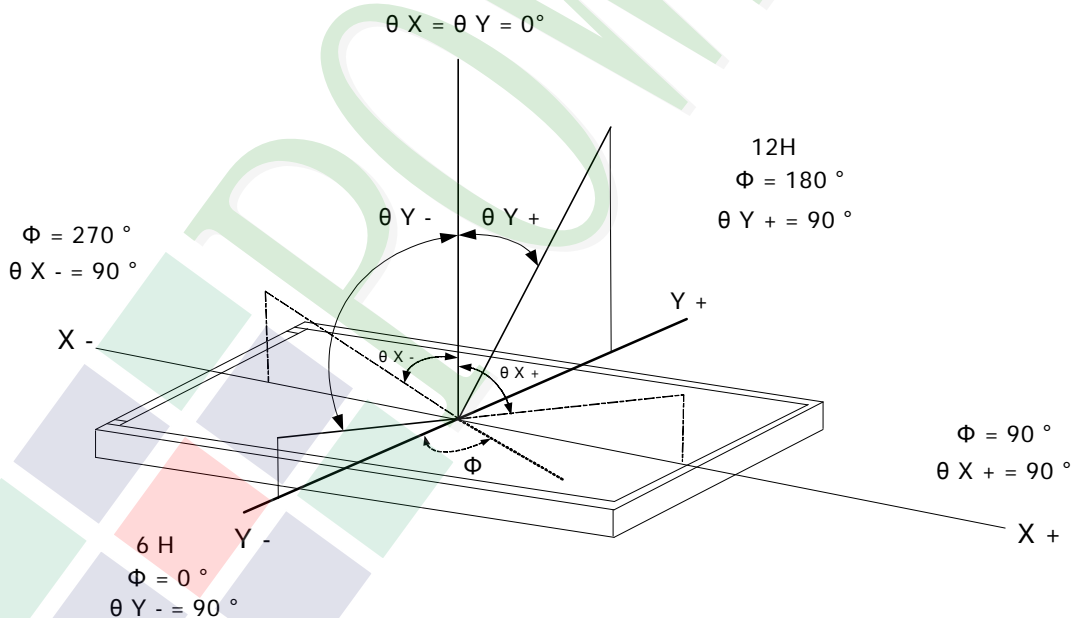
Note3: Definition of contrast ratio:

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

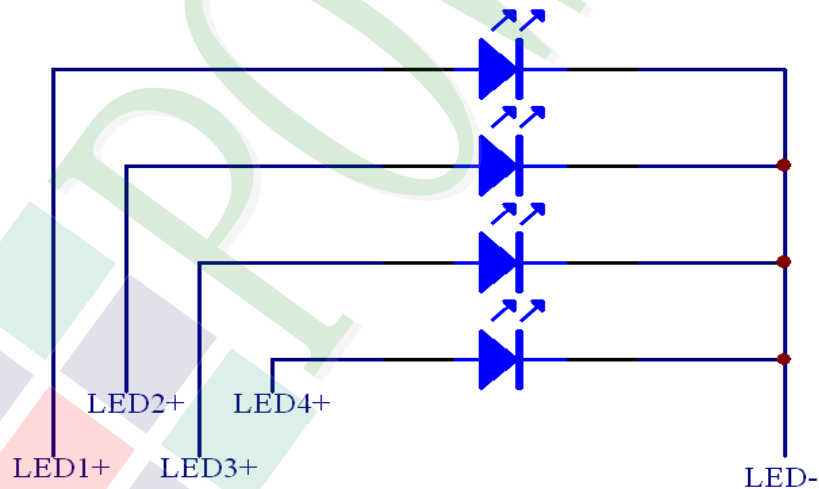
Maximum Ratings

| Item | Symbol | Conditions | Min. | Max. | Unit |
|-------------------|--------|------------|------|------|------|
| Forward Current | IF | Ta =25°C | - | 120 | mA |
| Forward Voltage | VF | Ta =25°C | - | 3.6 | V |
| Reverse Voltage | VR | Ta =25°C | - | 5.0 | V |
| Power Dissipation | PD | Ta =25°C | - | 360 | mW |

Electrical / Optical Characteristics

| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------|--------|------------|------|------|------|-------------------|
| Forward Voltage | VF | IF= 80mA | 2.8 | 3.2 | 3.6 | V |
| Average Brightness | IV | IF= 80mA | 3800 | 4200 | - | cd/m ² |
| Color of CIE Coordinate | X | IF= 80mA | 0.25 | 0.28 | 0.31 | - |
| | Y | | 0.25 | 0.28 | 0.31 | |
| Color | White | | | | | |

Internal Circuit Diagram :



Other Description

| Item | Conditions | Description |
|-----------|-----------------------|-------------|
| Life Time | Ta =25°C IF= 80 mA | 20000 hrs |

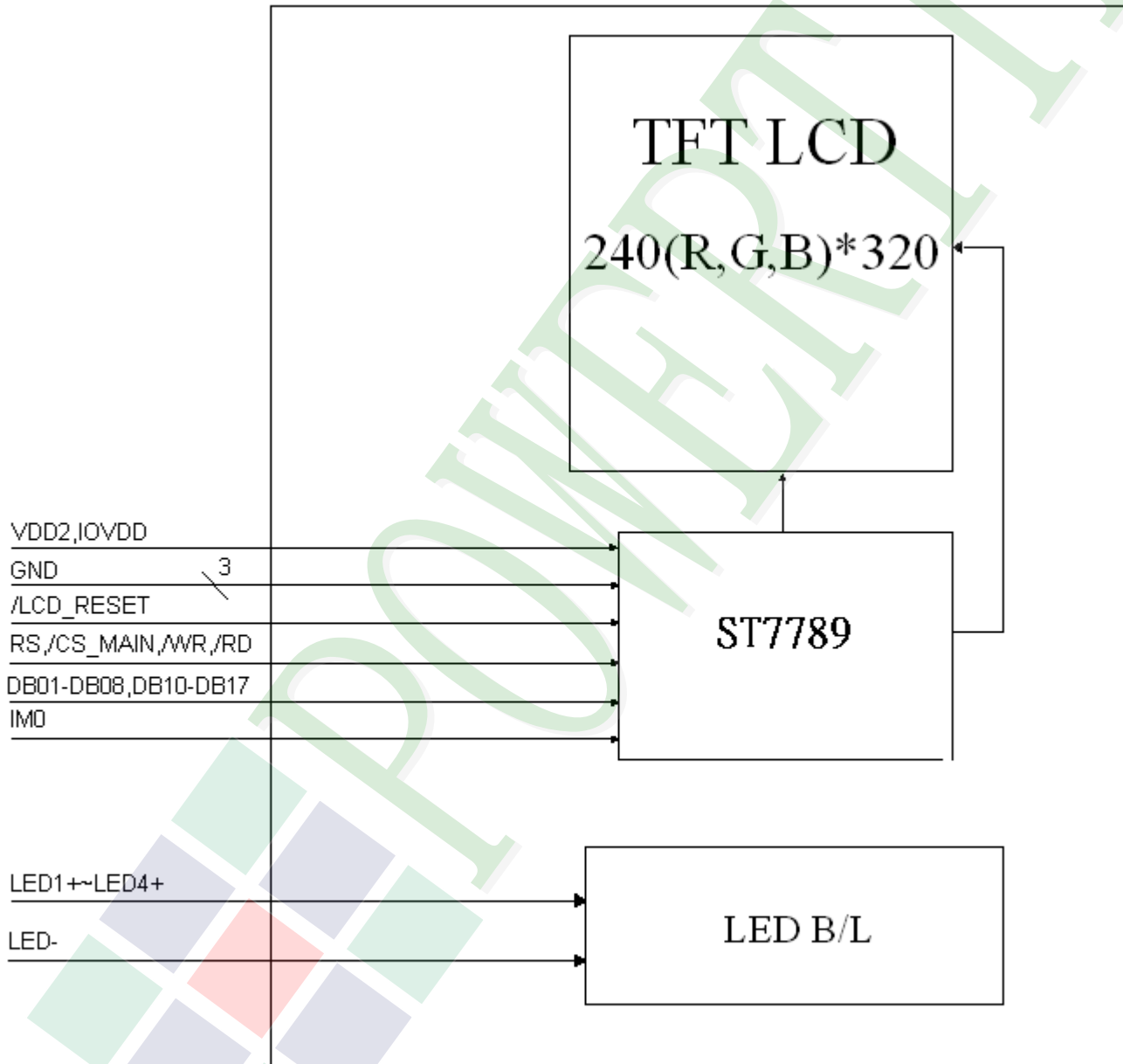
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

| Pin No | Symbol | Function |
|--------|------------|--|
| 1 | GND | System Ground. |
| 2 | /CS_MAIN | Chip select signal, Active "L" |
| 3 | RS | When RS = 0: Command. When RS = 1: Display data. |
| 4 | /WR | Write signal input , active at Low. |
| 5 | /RD | Read signal input , active at Low. |
| 6 | NC | Not connect |
| 7 | DB01 | Bi-directional data bus |
| 8 | DB02 | Bi-directional data bus |
| 9 | DB03 | Bi-directional data bus |
| 10 | DB04 | Bi-directional data bus |
| 11 | DB05 | Bi-directional data bus |
| 12 | DB06 | Bi-directional data bus |
| 13 | DB07 | Bi-directional data bus |
| 14 | DB08 | Bi-directional data bus |
| 15 | NC | Not connect |
| 16 | DB10 | Bi-directional data bus |
| 17 | DB11 | Bi-directional data bus |
| 18 | DB12 | Bi-directional data bus |
| 19 | DB13 | Bi-directional data bus |
| 20 | DB14 | Bi-directional data bus |
| 21 | DB15 | Bi-directional data bus |
| 22 | DB16 | Bi-directional data bus |
| 23 | DB17 | Bi-directional data bus |
| 24 | /LCD_RESET | Reset input pin for TFT LCD. When RESET is "L", initialization is executed. |
| 25 | NC | Not connect |

| Pin No | Symbol | Function |
|--------|--------|--|
| 26 | IM0 | IM0=0, 16 Bit, i80-system, DB pin assign DB17-DB10, DB8-DB1; IM0=1, 8 Bit, i80-system, DB pin assign DB17-DB10. |
| 27 | GND | System Ground. |
| 28 | X+ | NC |
| 29 | Y+ | NC |
| 30 | X- | NC |
| 31 | Y- | NC |
| 32 | GND | System Ground. |
| 33 | IOVDD | Power Supply for I/O System.(2.8V) |
| 34 | VDD2 | Power Supply for Analog, Digital System and Booster Circuit (2.8V) |
| 35 | LED1+ | Power supply for LED Backlight Anode input |
| 36 | LED2+ | Power supply for LED Backlight Anode input |
| 37 | LED3+ | Power supply for LED Backlight Anode input |
| 38 | LED4+ | Power supply for LED Backlight Anode input |
| 39 | LED- | Power supply for LED Backlight Cathode input |

2.2.1 Refer Initial Code

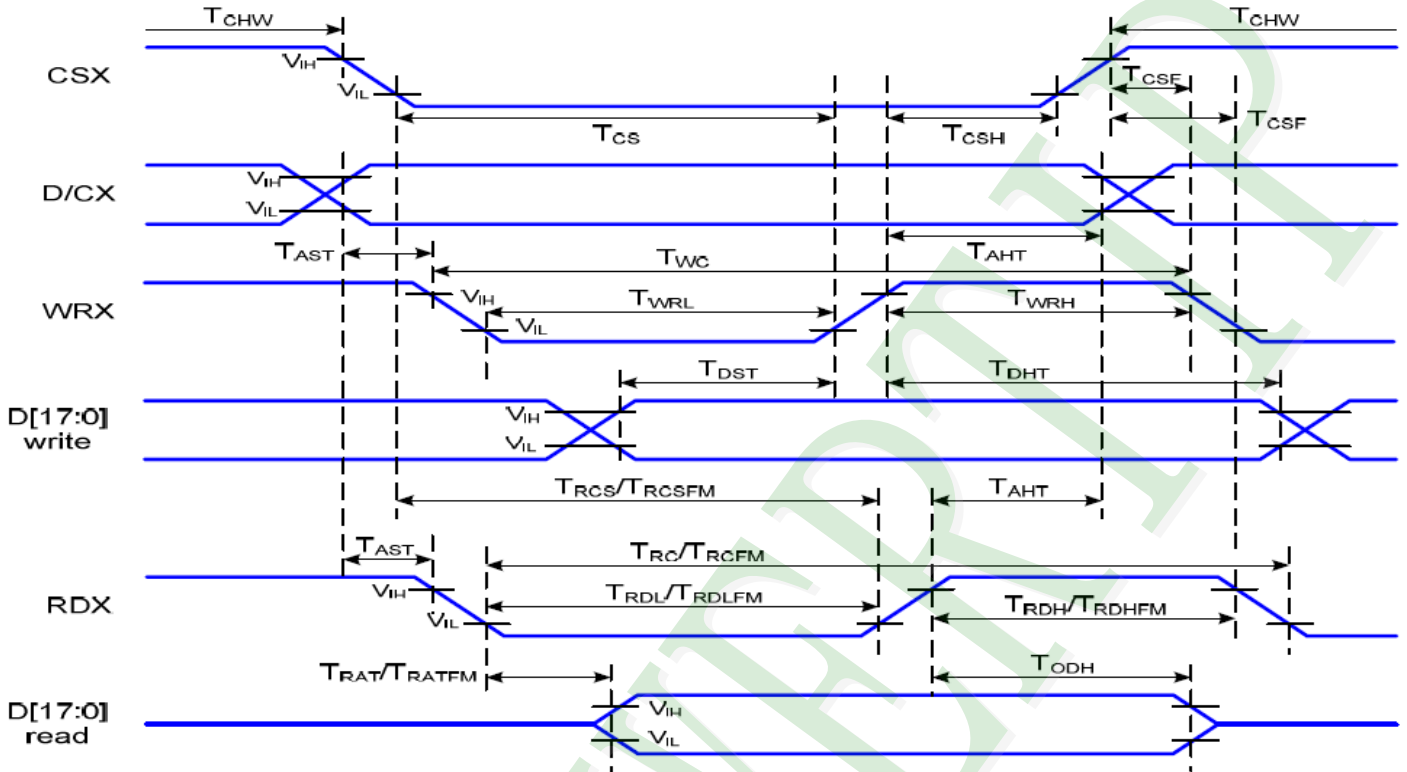
```
void int_lcd()
{
    write_com(0x00,0x01); //Software reset
    write_com(0x00,0x13); //normal display mode on
    write_com(0x00,0x20); //Display inversion off
    write_com(0x00,0x2a); //Column address set
    write_dat(0x00,0x00);
    write_dat(0x00,0x00);
    write_dat(0x00,0x00);
    write_dat(0x00,0xef);
    write_com(0x00,0x2b); //Row address set
    write_dat(0x00,0x00);
    write_dat(0x00,0x00);
    write_dat(0x00,0x01);
    write_dat(0x00,0x3f);
    write_com(0x00,0x2c); //Memory write
    write_com(0x00,0x36); //Memory data access control
    write_dat(0x00,0x00);
    write_com(0x00,0x3a); //Interface pixel format
    write_dat(0x00,0x55);
    write_com(0x00,0x55);
    write_dat(0x00,0x90);
    write_com(0x00,0xb2); //porch set
    write_dat(0x00,0x0C);
    write_dat(0x00,0x0C);
    write_dat(0x00,0x00);
    write_dat(0x00,0x33);
    write_dat(0x00,0x33);
    write_com(0x00,0xb7); //gate control
    write_dat(0x00,0x35);
    write_com(0x00,0xbb); //VCOM CONTROL
    write_dat(0x00,0x1F);
    write_com(0x00,0xc0); //Power control
    write_dat(0x00,0x2c);
    write_com(0x00,0xc2); //VDV and VRH command enable
    write_dat(0x00,0x01);
    write_com(0x00,0xc3); //vrh set
    write_dat(0x00,0x17);
}
```

```
write_com(0x00,0xc4); //vdv set
write_dat(0x00,0x20);
write_com(0x00,0xc6); //frame rate control in normal mode
write_dat(0x00,0x0f);
write_com(0x00,0xc8);
write_dat(0x00,0x08);
write_com(0x00,0xca);
write_dat(0x00,0x0f);
write_com(0x00,0xd0); //Power control
write_dat(0x00,0xa4);
write_dat(0x00,0xa1);
write_com(0x00,0xfc); //NVM SETTING
write_dat(0x00,0x00);
write_dat(0x00,0x00);
//gamma set-----
write_com(0x00,0xe0); //positive
write_dat(0x00,0xD0);
write_dat(0x00,0x00);
write_dat(0x00,0x14);
write_dat(0x00,0x15);
write_dat(0x00,0x13);
write_dat(0x00,0x2C);
write_dat(0x00,0x42);
write_dat(0x00,0x43);
write_dat(0x00,0x4E);
write_dat(0x00,0x09);
write_dat(0x00,0x16);
write_dat(0x00,0x14);
write_dat(0x00,0x18);
write_dat(0x00,0x21);
write_com(0x00,0xe1); //Negetive
write_dat(0x00,0xD0);
write_dat(0x00,0x00);
write_dat(0x00,0x14);
write_dat(0x00,0x15);
write_dat(0x00,0x13);
write_dat(0x00,0x0B);
write_dat(0x00,0x43);
```

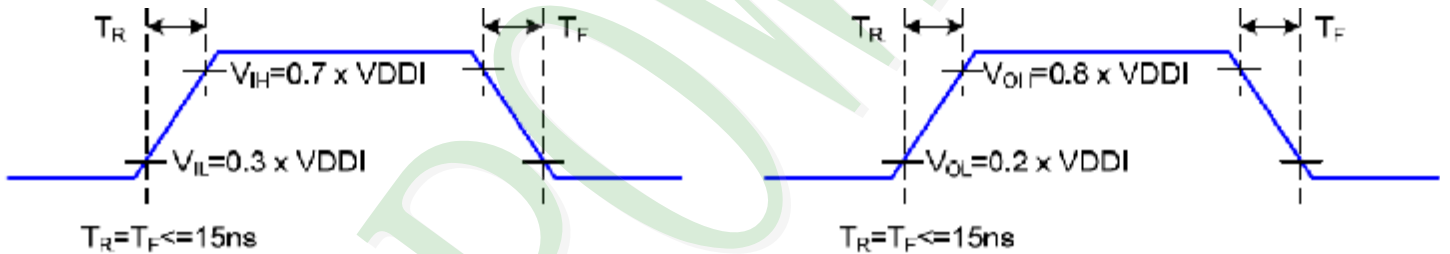
```
write_dat(0x00,0x55);
write_dat(0x00,0x53);
write_dat(0x00,0x0C);
write_dat(0x00,0x17);
write_dat(0x00,0x14);
write_dat(0x00,0x23);
write_dat(0x00,0x20);
write_com(0x00,0xe2);
write_com(0x00,0xe3);
//-----
write_com(0x00,0x11);    //Sleep out
delay(120);
write_com(0x00,0x29);    //Display on
}
void write_position(uint xs,uint xe,uint ys,uint ye)
{
write_com(0x00,0x2A);
write_dat(0x00,(xs/256));
write_dat(0x00,(xs%256));
write_dat(0x00,(xe/256));
write_dat(0x00,(xe%256));
write_com(0x00,0x2B);
write_dat(0x00,(ys/256));
write_dat(0x00,(ys%256));
write_dat(0x00,(ye/256));
write_dat(0x00,(ye%256));
write_com(0x00,0x2c);
}
```

2.3 Timing Characteristics

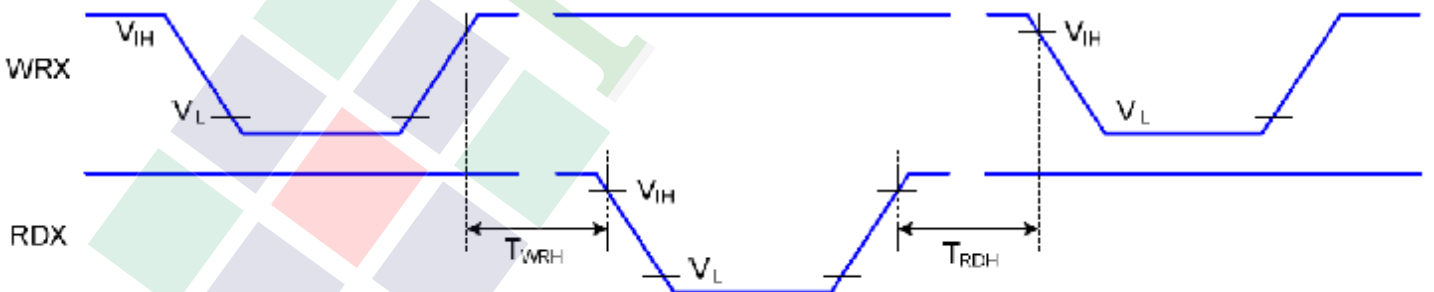
2.3.1 8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus.



Parallel Interface Timing Characteristics (8080-Series MCU Interface)



Rising and Falling Timing for I/O Signal



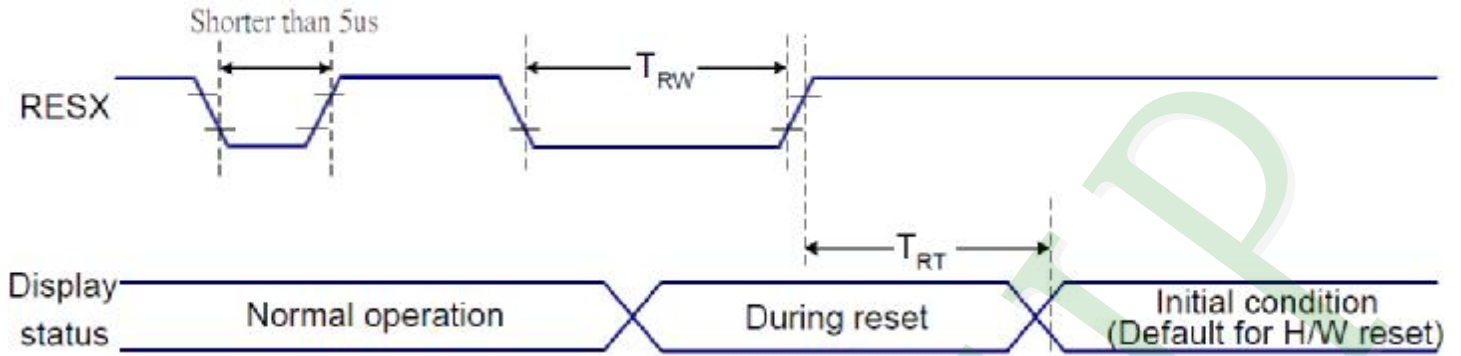
Write-to-Read and Read-to-Write Timing

Note: The rising time and falling time (T_r , T_f) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of IOVDD for Input signals.

| Signal | Symbol | Parameter | Min | Max | Unit | Description |
|----------|-------------|------------------------------------|-----|-----|------|-----------------------------|
| D/CX | T_{AST} | Address setup time | 0 | | ns | |
| | T_{AHT} | Address hold time (Write/Read) | 10 | | ns | |
| CSX | T_{CHW} | Chip select "H" pulse width | 0 | | ns | |
| | T_{CS} | Chip select setup time (Write) | 15 | | ns | |
| | T_{RCS} | Chip select setup time (Read ID) | 45 | | ns | |
| | T_{RCSFM} | Chip select setup time (Read FM) | 355 | | ns | |
| | T_{CSF} | Chip select wait time (Write/Read) | 10 | | ns | |
| | T_{CSH} | Chip select hold time | 10 | | ns | |
| WRX | T_{WC} | Write cycle | 66 | | ns | |
| | T_{WRH} | Control pulse "H" duration | 15 | | ns | |
| | T_{WRL} | Control pulse "L" duration | 15 | | ns | |
| RDX (ID) | T_{RC} | Read cycle (ID) | 160 | | ns | When read ID data |
| | T_{RDH} | Control pulse "H" duration (ID) | 90 | | ns | |
| | T_{RDL} | Control pulse "L" duration (ID) | 45 | | ns | |
| RDX (FM) | T_{RCFM} | Read cycle (FM) | 450 | | ns | When read from frame memory |
| | T_{RDHFM} | Control pulse "H" duration (FM) | 90 | | ns | |
| | T_{RDLFM} | Control pulse "L" duration (FM) | 355 | | ns | |
| D[17:0] | T_{DST} | Data setup time | 10 | | ns | For CL=30pF |
| | T_{DHT} | Data hold time | 10 | | ns | |
| | T_{RAT} | Read access time (ID) | | 40 | ns | |
| | T_{RATFM} | Read access time (FM) | | 340 | ns | |
| | T_{ODH} | Output disable time | 20 | 80 | ns | |

8080 Parallel Interface Characteristics

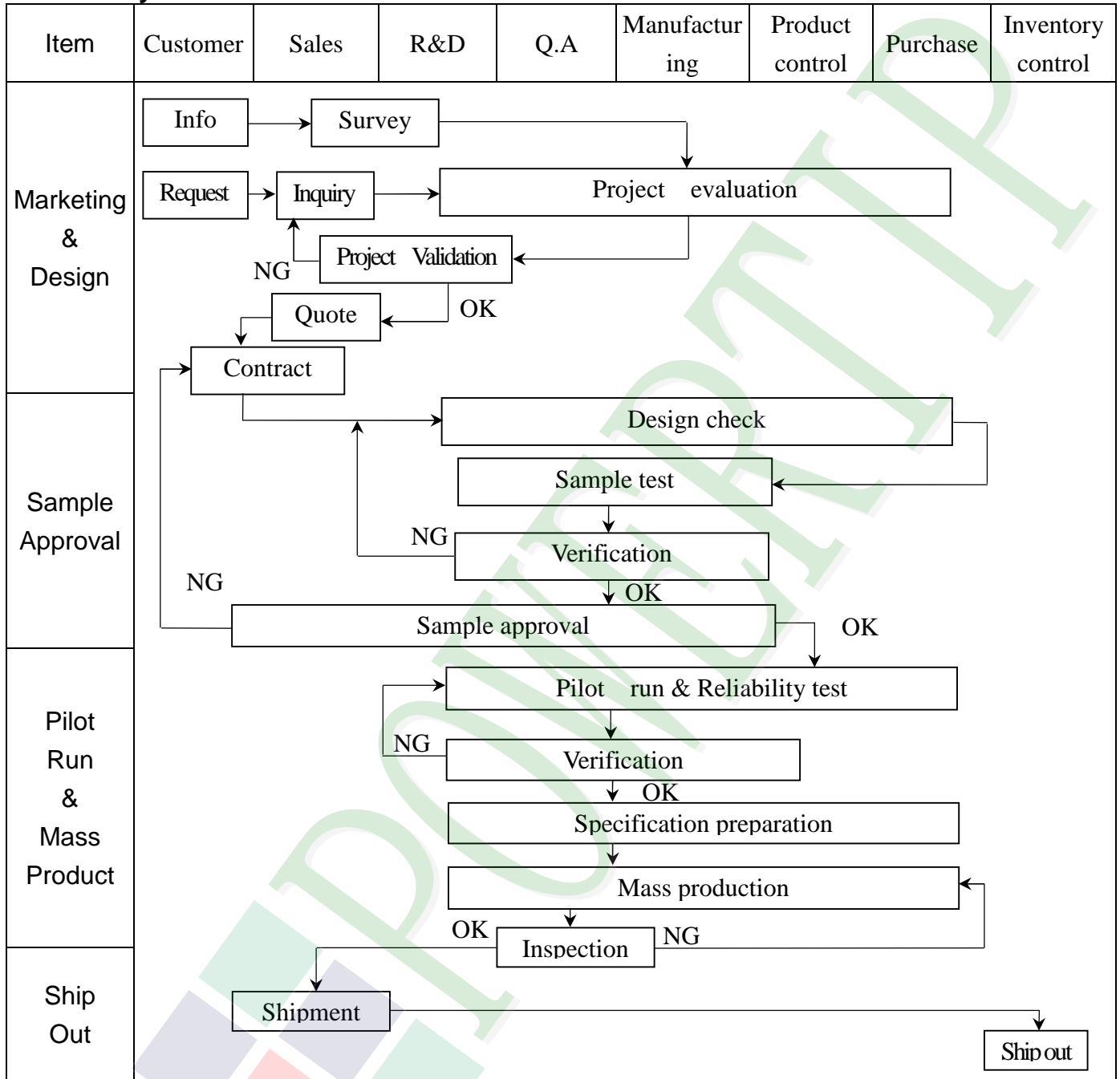
2.3.2 Reset Timing

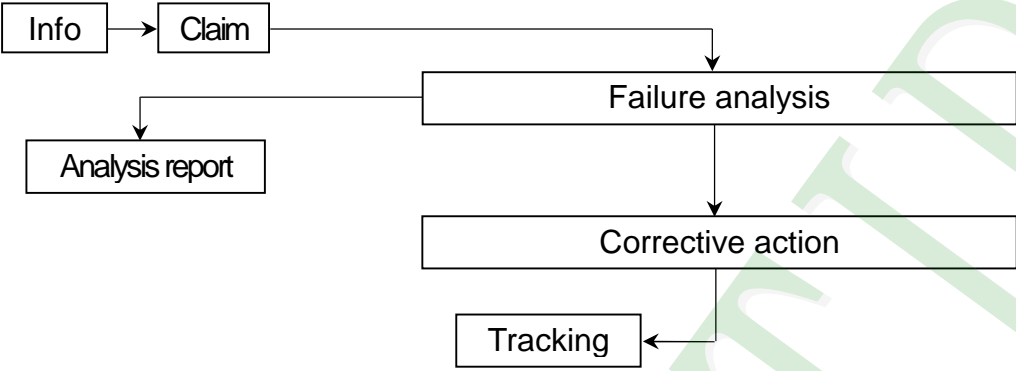


| Related Pins | Symbol | Parameter | MIN | MAX | Unit |
|--------------|--------|----------------------|-----|--------------------|------|
| RESX | TRW | Reset pulse duration | 10 | - | us |
| | TRT | Reset cancel | - | 5 (Note 1, 5) | ms |
| | | | | 120 (Note 1, 6, 7) | ms |

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



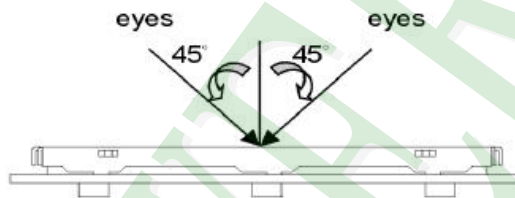
| Item | Customer | Sales | R&D | Q.A | Manufacturing | Product control | Purchase | Inventory control |
|---------------|---|-------|-----|-----|---|-----------------|----------|-------------------|
| Sales Service |  <pre> graph TD Info[Info] --> Claim[Claim] Claim --> FA[Failure analysis] Claim -->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

3.2. Inspection Specification

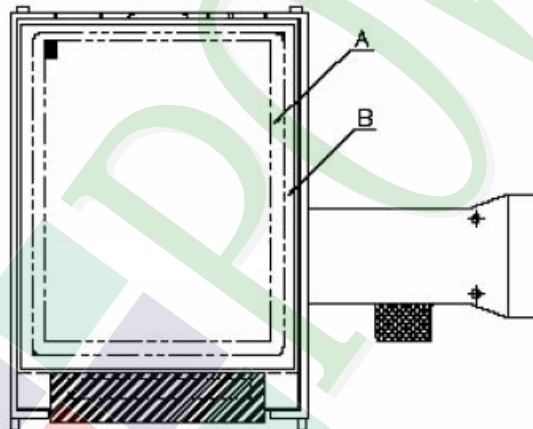
- ◆ Scope : The document shall be applied to TFT-LCD Module for less than 3.5" (Ver.B01).
- ◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II .
- ◆ Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample
- ◆ Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 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)

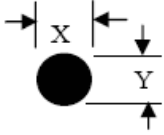
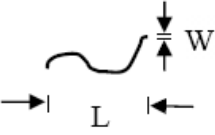
◆ Specification For TFT-LCD Module Less Than 3.5" :

(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 | | | | | | | | | | | | |
| 05 | Dot defect (Bright dot 、 Dark dot) On -display | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>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;">≤ 2</td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;">≤ 3</td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;">≤ 2</td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;">≤ 3</td> </tr> </tbody> </table> | | Item | Acceptance (Q'ty) | Dot Defect | Bright Dot | ≤ 2 | Dark Dot | ≤ 3 | Joint Dot | ≤ 2 | Total | ≤ 3 | Minor |
| | | | Item | Acceptance (Q'ty) | | | | | | | | | | | |
| Dot Defect | Bright Dot | ≤ 2 | | | | | | | | | | | | | |
| | Dark Dot | ≤ 3 | | | | | | | | | | | | | |
| | Joint Dot | ≤ 2 | | | | | | | | | | | | | |
| | Total | ≤ 3 | | | | | | | | | | | | | |
| 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 ≥ 5 mm. | | | | | | | | | | | | | | | |

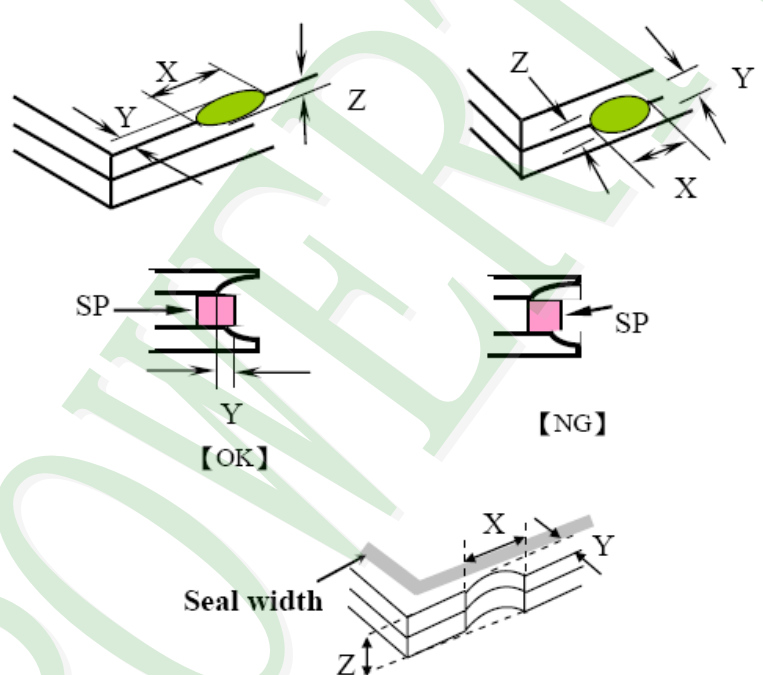
◆ Specification For TFT-LCD Module Less Than 3.5" :

(Ver.B01)

| NO | Item | Criterion | Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|---|--|-----------------------------------|-------------------|--|--------|--------|------------------|--------|--|-------------------------|---|--------|-------------------------|---|---------------|----------|--------------|----------|--|-----------|--|-------------------|--|------------|-----------|--------|--------|-----|---------------|--------|--------|--------------|----------------------|---|-----|------------|---------------|--------------|--|----------|--|-------|
| 06 | <p>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p>$\Phi = (x + y) / 2$</p> <p>Line type</p>  | <p>6.1 Round type (Non-display or display) :</p> <table border="1" data-bbox="552 439 1323 887"> <thead> <tr> <th rowspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.15$</td> <td colspan="2">Ignore</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.20$</td> <td>2</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> <td>2</td> </tr> <tr> <td>$\Phi > 0.30$</td> <td>0</td> </tr> <tr> <td>Total</td> <td colspan="2">3</td> </tr> </tbody> </table> <p>6.2 Line type(Non-display or display) :</p> <table border="1" data-bbox="533 1003 1342 1417"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>Length (L)</th> <th>Width (W)</th> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>3</td> </tr> <tr> <td>---</td> <td>$W > 0.05$</td> <td>As round type</td> </tr> <tr> <td colspan="2">Total</td> <td colspan="2">3</td> </tr> </tbody> </table> | Dimension (diameter : Φ) | Acceptance (Q'ty) | | A area | B area | $\Phi \leq 0.15$ | Ignore | | $0.15 < \Phi \leq 0.20$ | 2 | Ignore | $0.20 < \Phi \leq 0.30$ | 2 | $\Phi > 0.30$ | 0 | Total | 3 | | Dimension | | Acceptance (Q'ty) | | Length (L) | Width (W) | A area | B area | --- | $W \leq 0.03$ | Ignore | Ignore | $L \leq 5.0$ | $0.03 < W \leq 0.05$ | 3 | --- | $W > 0.05$ | As round type | Total | | 3 | | Minor |
| Dimension (diameter : Φ) | Acceptance (Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.15$ | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.15 < \Phi \leq 0.20$ | 2 | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.20 < \Phi \leq 0.30$ | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.30$ | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimension | | Acceptance (Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Length (L) | Width (W) | A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| --- | $W \leq 0.03$ | Ignore | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $L \leq 5.0$ | $0.03 < W \leq 0.05$ | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| --- | $W > 0.05$ | As round type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07 | Polarizer Bubble | <table border="1" data-bbox="542 1464 1334 1872"> <thead> <tr> <th rowspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td colspan="2">Ignore</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> <td rowspan="2">Ignore</td> </tr> <tr> <td>$\Phi > 0.50$</td> <td>0</td> </tr> <tr> <td>Total</td> <td colspan="2">3</td> </tr> </tbody> </table> | Dimension (diameter : Φ) | Acceptance (Q'ty) | | A area | B area | $\Phi \leq 0.20$ | Ignore | | $0.20 < \Phi \leq 0.50$ | 3 | Ignore | $\Phi > 0.50$ | 0 | Total | 3 | | Minor | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimension (diameter : Φ) | Acceptance (Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.20$ | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.20 < \Phi \leq 0.50$ | 3 | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.50$ | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

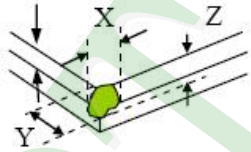
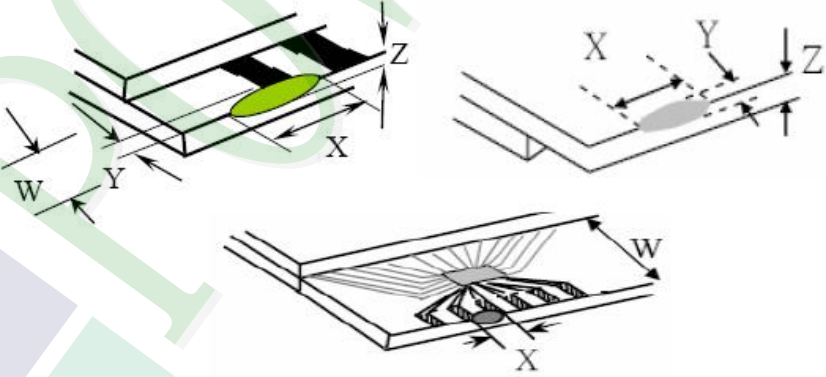
◆ Specification For TFT-LCD Module Less Than 3.5" :

(Ver.B01)

| NO | Item | Criterion | Level | | | | | | |
|----------|--|--|-------|---|---|---|----------|--------------------------------|--------------|
| 08 | The crack of glass | <p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p> | Minor | | | | | | |
| | | <p>8.1 General glass chip :</p> <p>8.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="542 1456 1340 1747"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq a$</td> <td>Crack can't enter viewing area</td> <td>$\leq 1/2 t$</td> </tr> <tr> <td>$\leq a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </tbody> </table> | | X | Y | Z | $\leq a$ | Crack can't enter viewing area | $\leq 1/2 t$ |
| 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. | $1/2 t < Z \leq 2 t$ | | | | | | | |

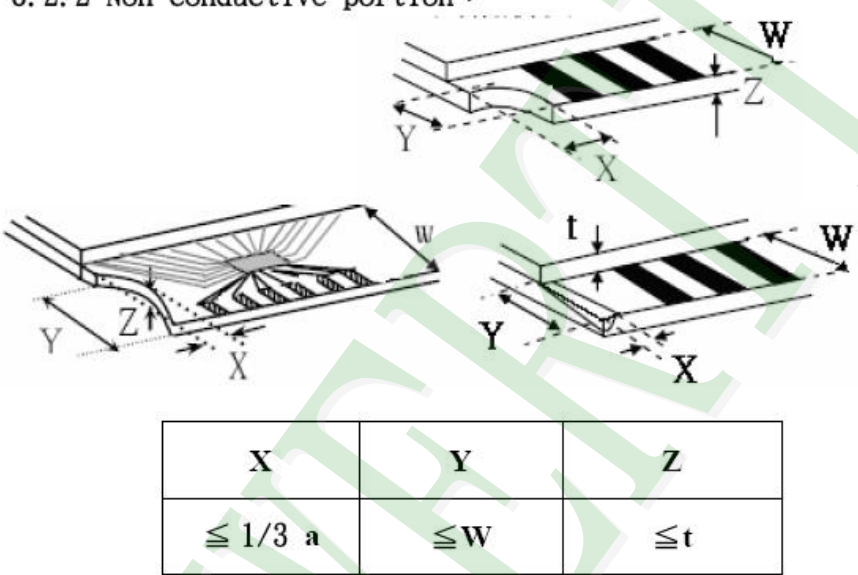
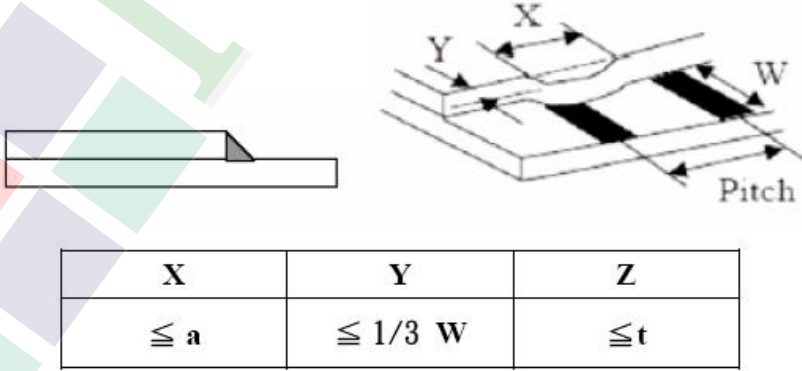
◆ Specification For TFT-LCD Module Less Than 3.5" :

(Ver.B01)

| NO | Item | Criterion | Level | | | | | | | | | | | | |
|--------------|--|---|--------------|---|---|---|--------------|--------------------------------|----------------|--------------|--|----------------------|----------|--------------|--|
| 08 | The crack of glass | <p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p> | Minor | | | | | | | | | | | | |
| | | <p>8.1.2 Corner crack :</p>  <table border="1" data-bbox="533 788 1337 1077"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't enter viewing area</td> <td>$Z \leq 1/2 t$</td> </tr> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</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>8.2 Protrusion over terminal :</p> <p>8.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="571 1675 1345 1845"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td>$\leq a$</td> <td>$\leq 1/2 W$</td> <td>$\leq t$</td> </tr> <tr> <td>Back</td> <td>$\leq a$</td> <td>$\leq W$</td> <td>$\leq 1/2 t$</td> </tr> </tbody> </table> | | X | Y | Z | Front | $\leq a$ | $\leq 1/2 W$ | $\leq t$ | Back | $\leq a$ | $\leq W$ | $\leq 1/2 t$ | |
| | X | Y | Z | | | | | | | | | | | | |
| Front | $\leq a$ | $\leq 1/2 W$ | $\leq t$ | | | | | | | | | | | | |
| Back | $\leq a$ | $\leq W$ | $\leq 1/2 t$ | | | | | | | | | | | | |

◆ Specification For TFT-LCD Module Less Than 3.5" :

(Ver.B01)

| NO | Item | Criterion | Level |
|----|--------------------|--|-------|
| 08 | The crack of glass | <p>Symbols :</p> <p>X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length</p> | Minor |
| | | <p>8.2.2 Non-conductive portion :</p>  <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>8.2.3 Glass remain :</p>  | |

◆ Specification For TFT-LCD Module Less Than 3.5" :

(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 ≤ 1.5 mm. | Minor |

4. RELIABILITY TEST

4.1 Reliability Test Condition

(Ver.B01)

| NO. | TEST ITEM | TEST CONDITION | | | | | | | | | | |
|--|---|--|--|--|----------|-----|-------------|----|------------|----|----------|----|
| 1 | High Temperature Storage Test | Keep in $+85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | |
| 2 | Low Temperature Storage Test | Keep in $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | |
| 3 | High Temperature / High Humidity Storage Test | Keep in $+60^{\circ}\text{C}$ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer) | | | | | | | | | | |
| 4 | Temperature Cycling Storage Test | <p style="text-align: center;"> $-40^{\circ}\text{C} \rightarrow +25^{\circ}\text{C} \rightarrow +85^{\circ}\text{C} \rightarrow +25^{\circ}\text{C}$ (30mins) (5mins) (30mins) (5mins) $\leftarrow \hspace{10em} \rightarrow$ 10 Cycle </p> <p>Surrounding temperature, then storage at normal condition 4hrs.</p> | | | | | | | | | | |
| 5 | ESD Test | <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"> Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/- </td> <td style="width: 50%;"> Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/- </td> </tr> </table> | Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/- | Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/- | | | | | | | | |
| | | Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/- | Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/- | | | | | | | | | |
| <ol style="list-style-type: none"> 1. Temperature ambience : $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$ 2. Humidity relative : 30% ~ 60% 3. Energy Storage Capacitance(Cs+Cd) : $150\text{pF} \pm 10\%$ 4. Discharge Resistance(Rd) : $330\Omega \pm 10\%$ 5. Discharge, mode of operation : <p>Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : $\pm 5\%$)</p> | | | | | | | | | | | | |
| 6 | Vibration Test (Packaged) | <ol style="list-style-type: none"> 1. Sine wave 10~55 Hz frequency (1 min/sweep) 2. The amplitude of vibration : 1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs | | | | | | | | | | |
| 7 | Drop Test (Packaged) | <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Packing Weight (Kg)</th> <th>Drop Height (cm)</th> </tr> </thead> <tbody> <tr> <td>0 ~ 45.4</td> <td>122</td> </tr> <tr> <td>45.4 ~ 90.8</td> <td>76</td> </tr> <tr> <td>90.8 ~ 454</td> <td>61</td> </tr> <tr> <td>Over 454</td> <td>46</td> </tr> </tbody> </table> | Packing Weight (Kg) | Drop Height (cm) | 0 ~ 45.4 | 122 | 45.4 ~ 90.8 | 76 | 90.8 ~ 454 | 61 | Over 454 | 46 |
| | | Packing Weight (Kg) | Drop Height (cm) | | | | | | | | | |
| 0 ~ 45.4 | 122 | | | | | | | | | | | |
| 45.4 ~ 90.8 | 76 | | | | | | | | | | | |
| 90.8 ~ 454 | 61 | | | | | | | | | | | |
| Over 454 | 46 | | | | | | | | | | | |
| | | Drop Direction : ※1 corner / 3 edges / 6 sides each 1time | | | | | | | | | | |

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.

Ver.001

Documents NO. JPKG-PH240320T062-LAA07

LCM包裝規格書

LCM Packaging Specifications

(For Tray)

| Approve | Check | Contact |
|---------|-------|---------|
| Ryan | Terry | Endless |

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

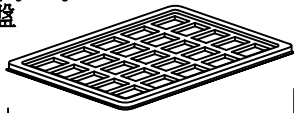
| No. | Item | Model | Dimensions (mm) | 1Pcs Weight | Quantity | Total Weight |
|-----|----------------------|--------------------|--------------------|-------------|----------|--------------|
| 1 | 成品 (LCM) | PH240320T062-LAA07 | 113.2 X 73.2 X 5.5 | 0.0222 | 576 | 12.7872 |
| 2 | 多層薄膜(1)POF | OTFILM0BA03ABA | 19"X350X0.015 | — | 6 | — |
| 3 | TRAY 盤 (2)Tray | TYSG000000077 | 352 X 260 X 12.8 | 0.1 | 54 | 5.4 |
| 4 | 內盒(3)Product Box | BX36627063ABBA | 393 X 274 X 68 | 0.2692 | 6 | 1.6152 |
| 5 | 保利龍板(4)Polylon board | OTPLB00PL08ABA | 550 X 393 X 20 | 0.0284 | 2 | 0.0568 |
| 6 | 外紙箱(5)Carton | BX57041027CCBA | 570 X 410 X 265 | 1.4208 | 1 | 1.4208 |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

2. 一整箱總重量 (Total LCD Weight in carton) : 21.28 Kg±10%

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

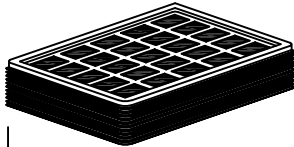
| | | | | | |
|---|----|---------------|---|---|-----|
| (1) LCM quantity per box : no per tray | 12 | x no of tray | 8 | = | 96 |
| (2) Total LCM quantity in carton : quantity per box | 96 | x no of boxes | 6 | = | 576 |

Use empty tray
空盤

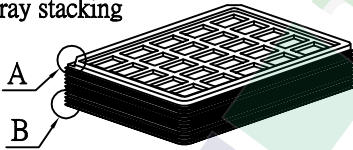


+

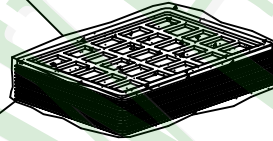
Put products into the tray



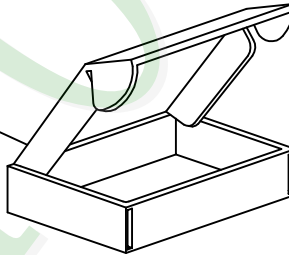
Tray stacking



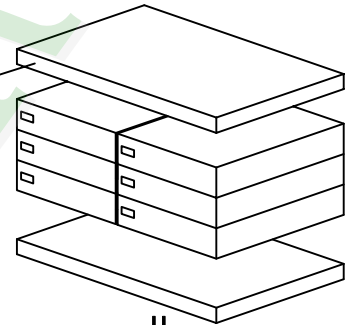
(1) 多層薄膜
POF



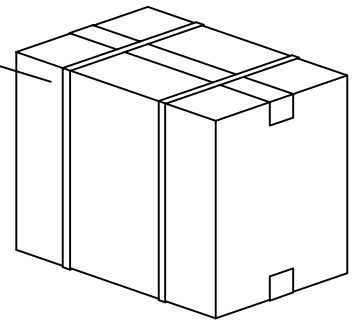
(3) 內盒
Product Box



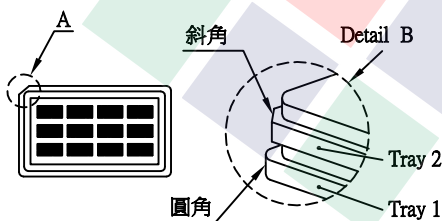
(4) 保利龍板
Polylon board



(5) 外紙箱
Carton



特 記 事 項 (REMARK)



4. TRAY 盤相疊時, 需旋轉180度, 請詳見B視圖
Rotate tray 180 degrees and place on top of stack.
Check the tray stack using Fig. B.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [TFT Displays & Accessories category](#):

Click to view products by [Powertip manufacturer](#):

Other Similar products are found below :

[OAI-80038AA-2013-A](#) [HDA430T-3G1H](#) [EA CARREDIPTFT02](#) [NL6448BC20-21D](#) [TM022HDHT11-00](#) [NB7W-KBA04](#) [NB-ATT01](#)
[NB5Q-ATT01](#) [NB5Q-KBA04](#) [NB-CN001](#) [NL12880BC20-05](#) [NL8060BC26-35C](#) [NL8060BC26-35F](#) [TCG104SVLQAPNN-AN20](#) [OAI-](#)
[80038AA-2008-A](#) [315-U004B15300](#) [UMSH-8596MD-34T \(REV D\)](#) [98-0003-3490-8](#) [1044278](#) [1029309](#) [1060549](#) [DE 127-TU-30/7,5](#) [DE](#)
[128-TU-20/7,5](#) [EP-LK007TFTPCAP](#) [FR7.0A00](#) [RC2002A-TIG-CSX](#) [NL6448BC2021C](#) [TX17D01VM2EAB](#) [TX14D23VM5BAA](#)
[TCG121WXLRXVNNANX35](#) [EIC-LCD-1080P](#) [T272480C07VR01](#) [1060632](#) [TCG070WVLPAANN-AN50](#) [TCG035QVLPDANN-GN50](#)
[1060630](#) [RFE430V-AIW-DNG](#) [T-55619GD065J-LW-ABN](#) [NHD-1.8-128160EF-SSXN-FT](#) [TCG104SVLPEANN-AN30](#) [NL6448BC33-70](#)
[NL192108BC18-06F](#) [NLB150XG02L-01](#) [NL6448BC20-30D](#) [NL10276BC16-06](#) [NL192108AC10-01D](#) [NL6448AC18-08F](#) [NL6448BC20-30F](#)
[NL12880BC20-05BD](#) [NL12880BC20-05D](#)