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Note: For detailed information please refer to IC data sheet: [ST7257](#)

1. SPECIFICATIONS

1.1 Features

| Item | Standard Value |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display Type | 480 * 3 (RGB) * 272 Dots |
| LCD Type | a-Si TFT, Positive/Normally white, Transmissive type |
| Screen size(inch) | 4.3 inch |
| Viewing Direction | 6 O'clock |
| Color configuration | RGB-Strip |
| Interface | Digital 24-bits RGB |
| Other(controller/driver IC) | ST7257 |
| ROHS | THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer website : http://www.powertip.com.tw/news.php?area_id_view=1085560481/ |

1.2 Mechanical Specifications

| Item | Standard Value | Unit |
|-------------------|------------------------------|------|
| Outline Dimension | 105.5(W) x 67.2 (L) x 2.6(H) | mm |

LCD panel

| Item | Standard Value | Unit |
|--------------|------------------------|------|
| Viewing Area | 96.04 (W) * 54.856 (L) | mm |
| Active Area | 95.04 (W) x 53.856 (L) | mm |
| Pixel Size | 0.198 (W) * 0.198 (H) | 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 | VDD | GND=0 | -0.3 | 4.6 | V |
| Operating Temperature | TOP | - | -20 | 70 | °C |
| Storage Temperature | TST | - | -30 | 80 | °C |
| Storage Humidity | HD | Ta < 60 °C | 10 | 90 | %RH |

1.4 DC Electrical Characteristics

Module

GND = 0V, Ta = 25°C

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------------|--------|-------------|---------|------|---------|------|
| Power Supply Voltage | VDD | - | 3.0 | 3.3 | 3.6 | V |
| | VGH | - | 12 | 15 | 16 | V |
| | VGL | - | -12 | -10 | -7 | V |
| Input H/L Level Voltage | VIH | - | 0.7VDD | - | VDD | V |
| | VIL | - | 0 | - | 0.3VDD | V |
| Output H/L Level Voltage | VOH | - | VDD-0.4 | - | VDD | V |
| | VOL | - | 0 | - | GND+0.4 | V |
| Supply Current | IDD | VDD = 3.3 V | - | 25 | 40 | mA |

1.5 Optical Characteristics

TFT LCD Module

VDD= 3.3 V, Ta=25°C

| Item | | Symbol | Condition | Min. | Typ. | Max. | unit | - |
|--------------------------------------------------------------|--------|-------------|--------------|------|------|------|-------|--------|
| Response time | Tr+Tf | 25°C | - | - | 26 | 39 | ms | - |
| Viewing angle | Top | $\theta Y+$ | CR \geq 10 | - | 60 | - | Deg. | Note 4 |
| | Bottom | $\theta Y-$ | | - | 60 | - | | |
| | Left | $\theta X-$ | | - | 60 | - | | |
| | Right | $\theta X+$ | | - | 60 | - | | |
| Contrast ratio | | CR | - | 500 | 600 | - | - | Note 3 |
| Color of CIE Coordinate (B/L + LCD) | White | X | IF= 20 mA | 0.24 | 0.29 | 0.34 | - | Note1 |
| | | Y | | 0.25 | 0.30 | 0.35 | | |
| | Red | X | | 0.55 | 0.60 | 0.65 | | |
| | | Y | | 0.31 | 0.36 | 0.41 | | |
| | Green | X | | 0.29 | 0.34 | 0.39 | | |
| | | Y | | 0.53 | 0.58 | 0.63 | | |
| | Blue | X | | 0.10 | 0.15 | 0.20 | | |
| | | Y | | 0.02 | 0.07 | 0.12 | | |
| Average Brightness Pattern=white display (B/L + LCD)*1 | | IV | IF= 20 mA | 350 | 450 | - | cd/m2 | Note1 |
| Uniformity (B/L + LCD)*2 | | ΔB | IF= 20 mA | 70 | - | - | % | Note1 |

Note 1:

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

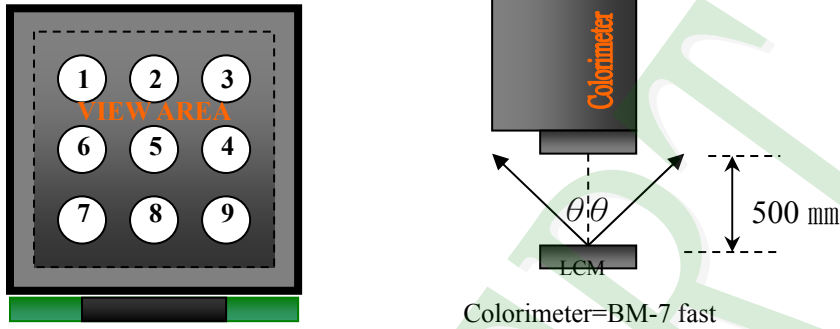
*2 : Measurement Condition for Optical Characteristics:

a : Environment: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ / $60 \pm 20\%$ 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 $\pm 4\%$



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

Note2: Definition of response time:

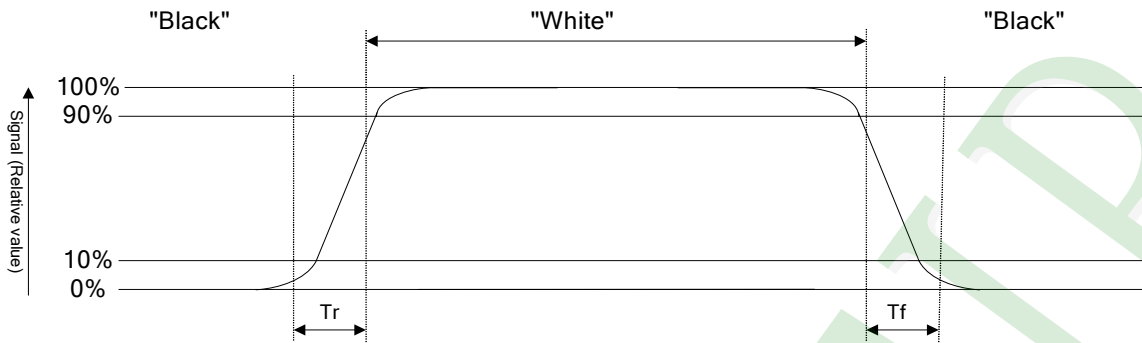
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



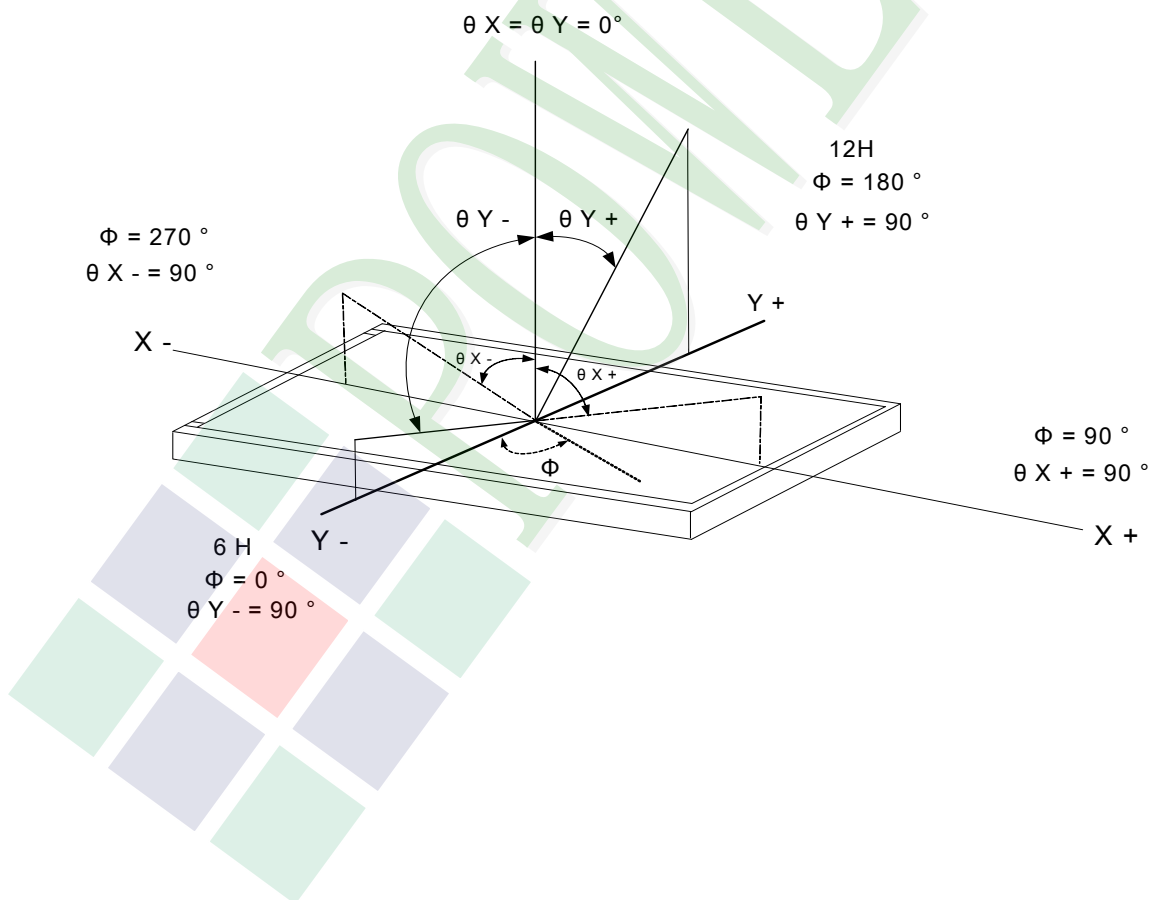
Note3: Definition of contrast ratio:

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

Maximum Ratings

| Item | Symbol | Conditions | Min. | Max. | Unit |
|-----------------------------------|--------|------------|------|------|------|
| LED Forward Current | IF | Ta =25°C | - | 30 | mA |
| LED Reverse Voltage (Each LED) | VR | Ta =25°C | - | 5.0 | V |
| Power Dissipation (Each LED) | PD | Ta =25°C | - | 816 | mW |

Electrical / Optical Characteristics

| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------------|--------|------------|------|------|------|-------------------|
| Forward Voltage | VF | IF=20mA | 23.2 | 25.6 | 27.2 | V |
| Average Brightness (Without LCD) | IV | | 6500 | 7800 | - | cd/m ² |
| CIE Color Coordinate (Without LCD) | X | | 0.26 | 0.28 | 0.31 | - |
| | Y | | 0.25 | 0.27 | 0.30 | |
| Color | White | | | | | |

Circuit diagram:



Other Description

| Item | Conditions | Description |
|-----------|-----------------------|-------------|
| Life Time | Ta =25°C IF= 20 mA | 50000 hrs |

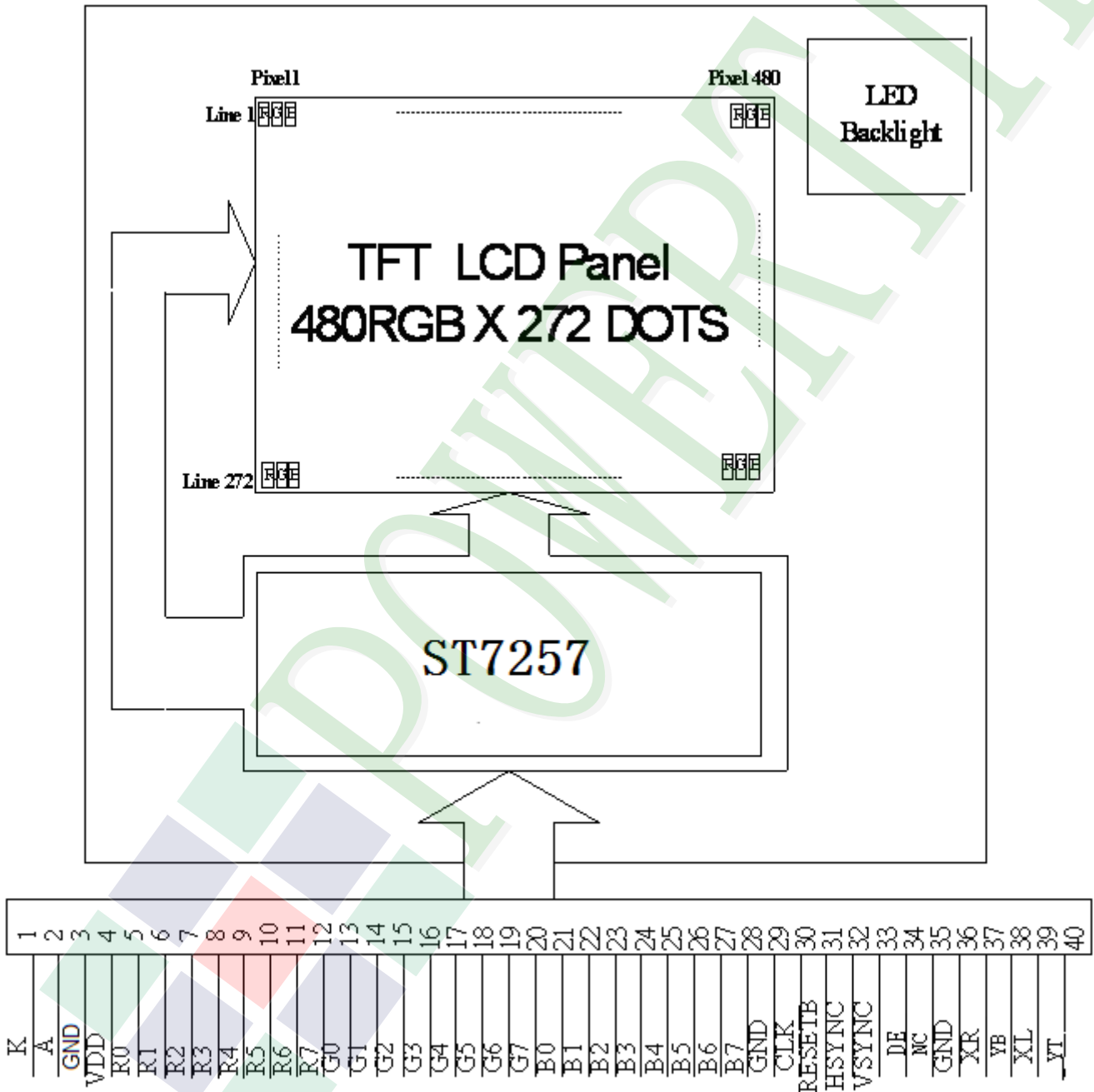
2. MODULE STRUCTURE

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 | K | Power supply for LED Backlight cathode input |
| 2 | A | Power supply for LED Backlight anode input |
| 3 | GND | Ground |
| 4 | VDD | Digital power |
| 5 | R0 | Red data bit 0 |
| 6 | R1 | Red data bit 1 |
| 7 | R2 | Red data bit 2 |
| 8 | R3 | Red data bit 3 |
| 9 | R4 | Red data bit 4 |
| 10 | R5 | Red data bit 5 |
| 11 | R6 | Red data bit 6 |
| 12 | R7 | Red data bit 7 |
| 13 | G0 | Green data bit 0 |
| 14 | G1 | Green data bit 1 |
| 15 | G2 | Green data bit 2 |
| 16 | G3 | Green data bit 3 |
| 17 | G4 | Green data bit 4 |
| 18 | G5 | Green data bit 5 |
| 19 | G6 | Green data bit 6 |
| 20 | G7 | Green data bit 7 |

| Pin No. | Symbol | Function |
|---------|--------|---------------------------------------------------------------------|
| 21 | B0 | Blue data bit 0 |
| 22 | B1 | Blue data bit 1 |
| 23 | B2 | Blue data bit 2 |
| 24 | B3 | Blue data bit 3 |
| 25 | B4 | Blue data bit 4 |
| 26 | B5 | Blue data bit 5 |
| 27 | B6 | Blue data bit 6 |
| 28 | B7 | Blue data bit 7 |
| 29 | GND | Ground |
| 30 | CLK | Dot data clock |
| 31 | DISP | Display control / standby mode selection "High" : Normal display |
| 32 | HSYNC | Horizontal sync input |
| 33 | VSYNC | Vertical sync input |
| 34 | DE | Data input enable. Active High to enable the data input |
| 35 | NC | Not Connect. |
| 36 | GND | Ground |
| 37 | XR | Not Connect. |
| 38 | YB | Not Connect. |
| 39 | XL | Not Connect. |
| 40 | YT | Not Connect. |

2.3 Timing Characteristics

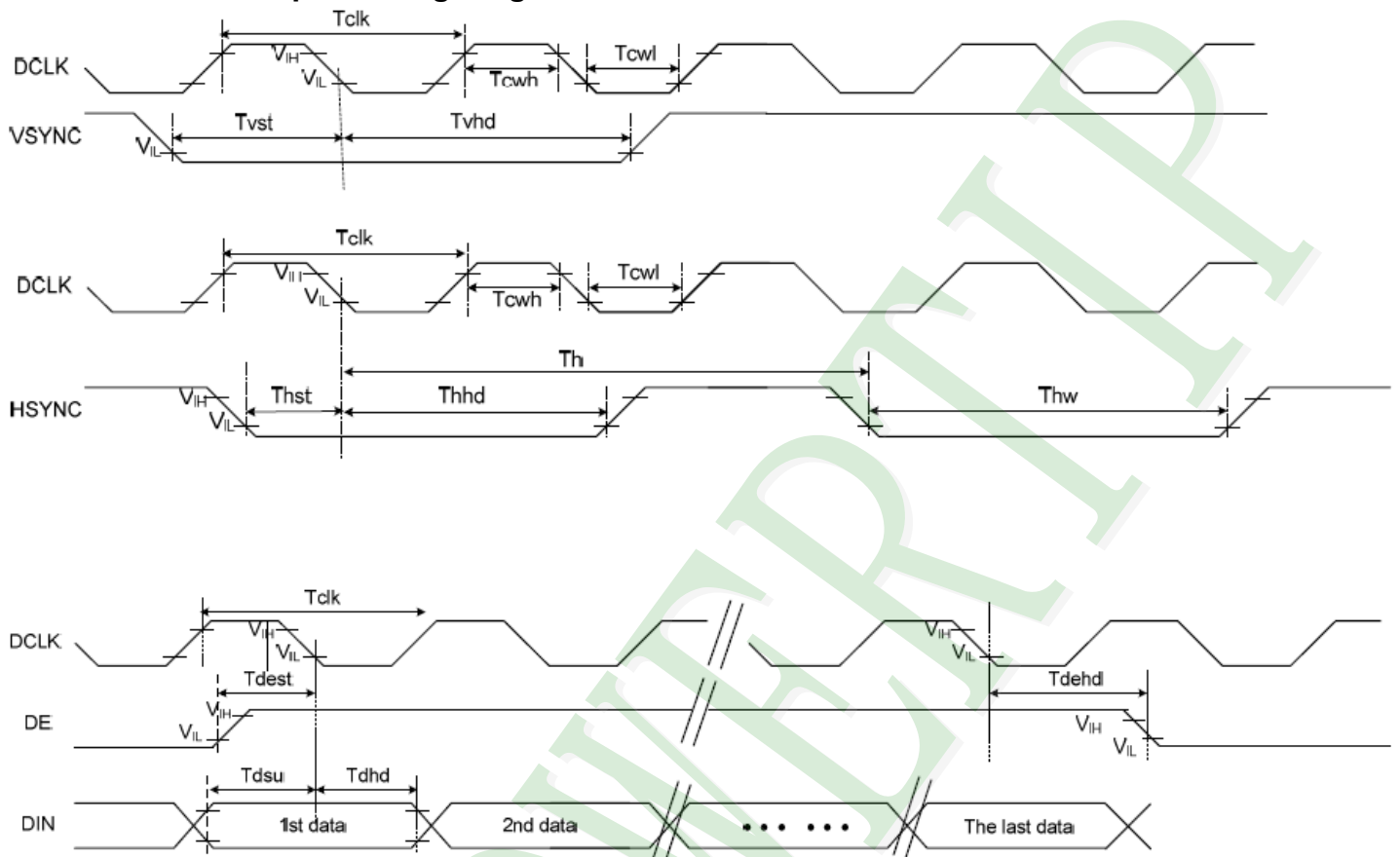
2.3.1 AC Characteristics

AC Electrical Characteristics (VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------------------------------|--------|------|------|------|------|-------------------------------------------------------|
| System operation timing | | | | | | |
| VDD power source slew time | TPOR | - | - | 20 | ms | From 0V to 99% VDD |
| GRB pulse width | tRSTW | 10 | 50 | - | us | R=10Kohm, C=1uF |
| Input/ Output timing | | | | | | |
| CLK pulse duty | Tcw | 40 | 50 | 60 | % | |
| HSYNC period | Th | 55 | 60 | 65 | us | |
| VSYNC setup time | Tvst | 12 | - | - | ns | |
| VSYNC hold time | Tvhd | 12 | - | - | ns | |
| HSYNC setup time | Thst | 12 | - | - | ns | |
| HSYNC hold time | Thhd | 12 | - | - | ns | |
| Data setup time | Tdsu | 12 | - | - | ns | |
| Data hold time | Tdhd | 12 | - | - | ns | |
| DE setup time | Tdest | 12 | - | - | ns | |
| DE hold time | Tdehd | 12 | - | - | ns | |
| SD output stable time | Tst | - | - | 12 | us | Output settled within +20mV Loading = 6.8k+28.2pF. |
| GD output rise and fall time | Tgst | - | - | 6 | us | Output settled (5%~95%), Loading = 4.7k+29.8pF |

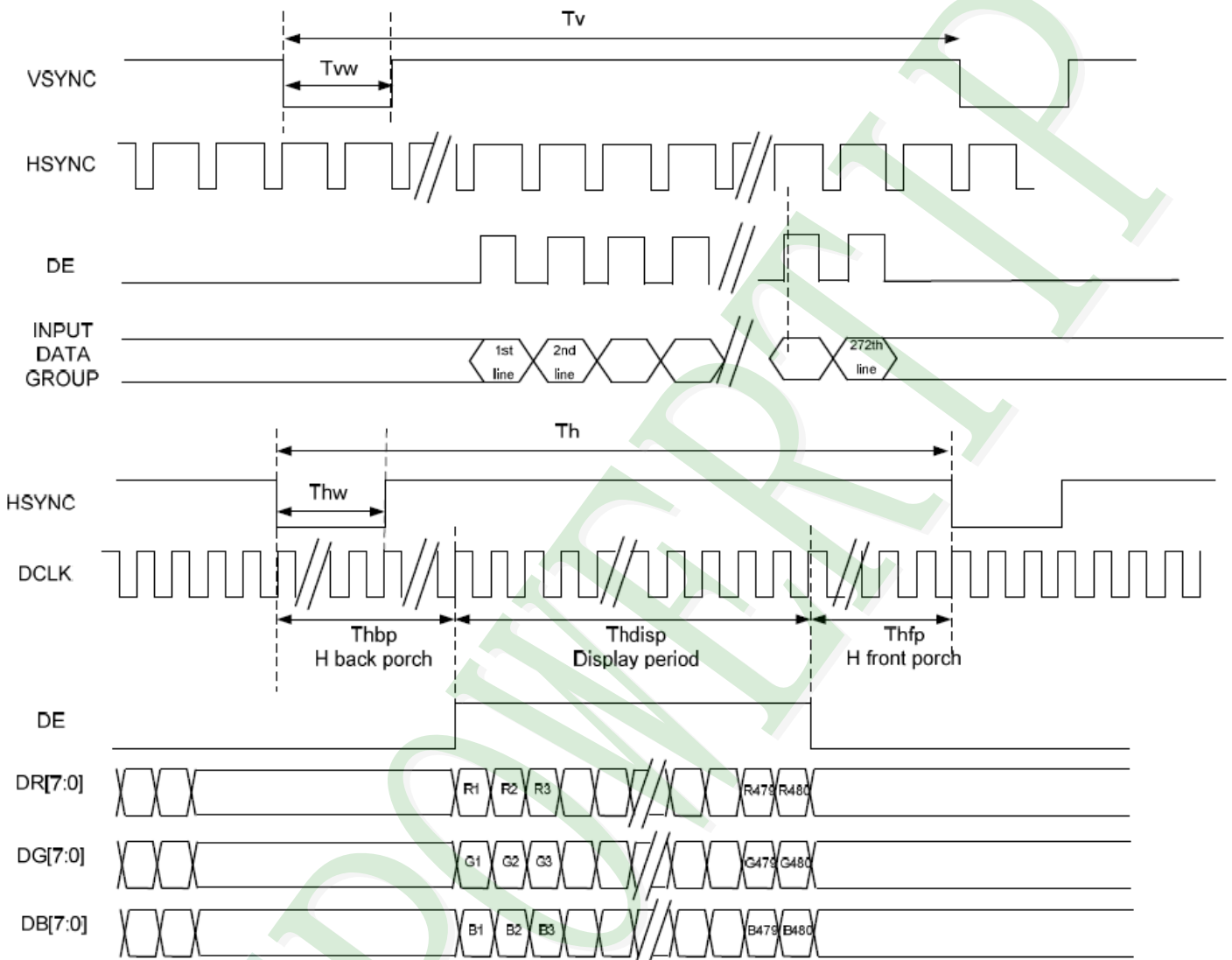
2.3.2 AC Timing Diagram

Clock and Data Input Timing Diagram



2.4 Data Format

2.4.1 SYNC-DE MODE



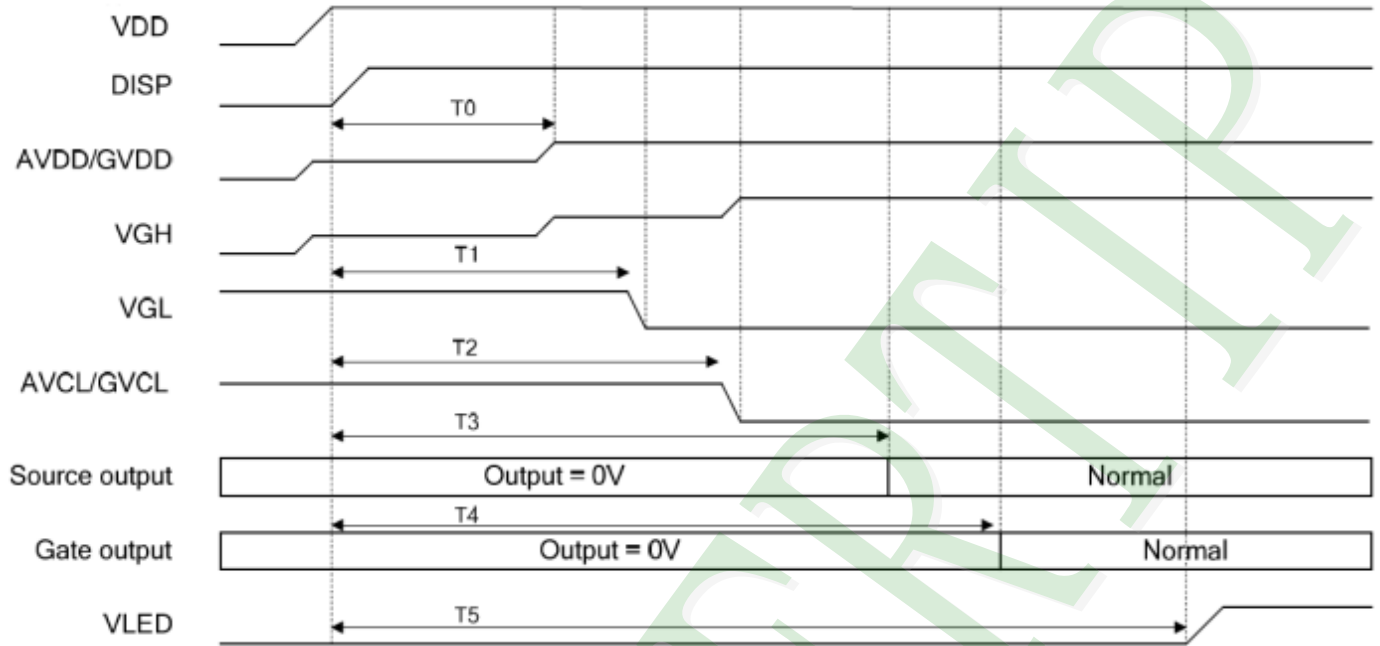
2.4.2 Parallel RGB Input Timing Table

| 480RGB X 272 Resolution Timing Table | | | | | | | |
|--------------------------------------|----------------|--------|------|------|------|--------|-----------------------|
| Item | Symbol | Min. | Typ. | Max. | Unit | Remark | |
| DCLK Frequency | Fclk | 8 | 9 | 12 | MHz | | |
| DCLK Period | Tclk | 83 | 111 | 125 | ns | | |
| HSYNC | Period Time | Th | 485 | 531 | 598 | DCLK | |
| | Display Period | Thdisp | | 480 | | DCLK | |
| | Back Porch | Thbp | 3 | 43 | 43 | DCLK | By H_Blanking setting |
| | Front Porch | Thfp | 2 | 8 | 75 | DCLK | |
| | Pulse Width | Thw | 2 | 4 | 75 | DCLK | |
| VSYNC | Period Time | Tv | 276 | 292 | 321 | H | |
| | Display Period | Tvdisp | | 272 | | H | |
| | Back Porch | Tvbp | 2 | 12 | 12 | H | By V_Blanking setting |
| | Front Porch | Tvfp | 2 | 8 | 37 | H | |
| | Pulse Width | Tvw | 2 | 4 | 37 | H | |

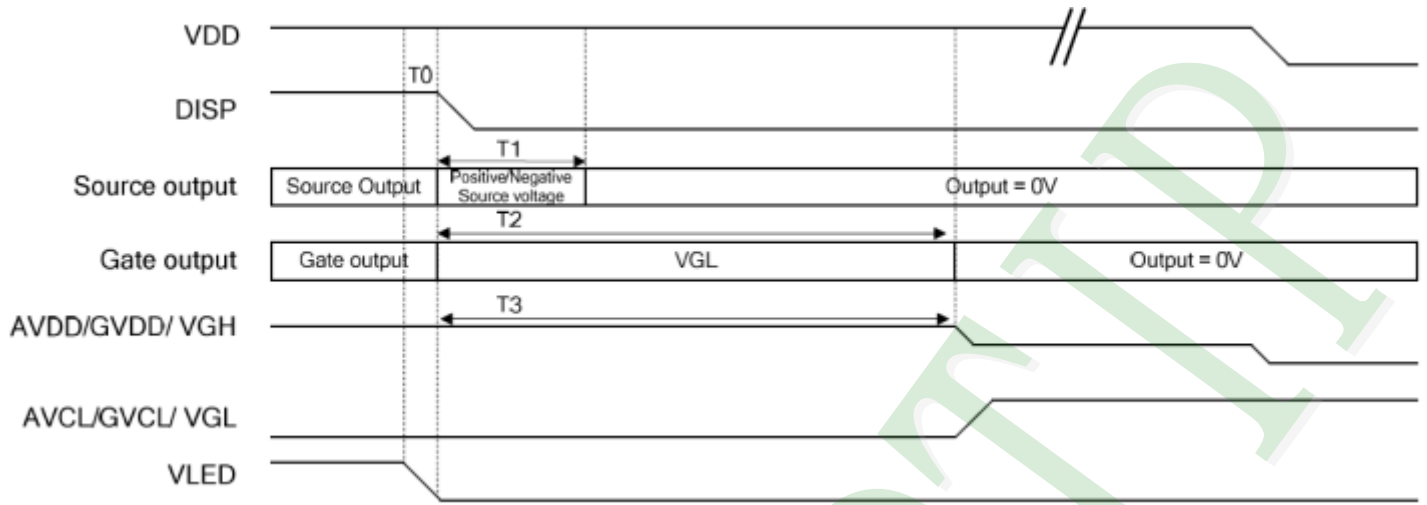
Note: It is necessary to keep $Tvbp = 12$ and $Thbp = 43$ in sync mode. DE mode is unnecessary to keep it.

2.4.3 Power Sequence

POWER ON



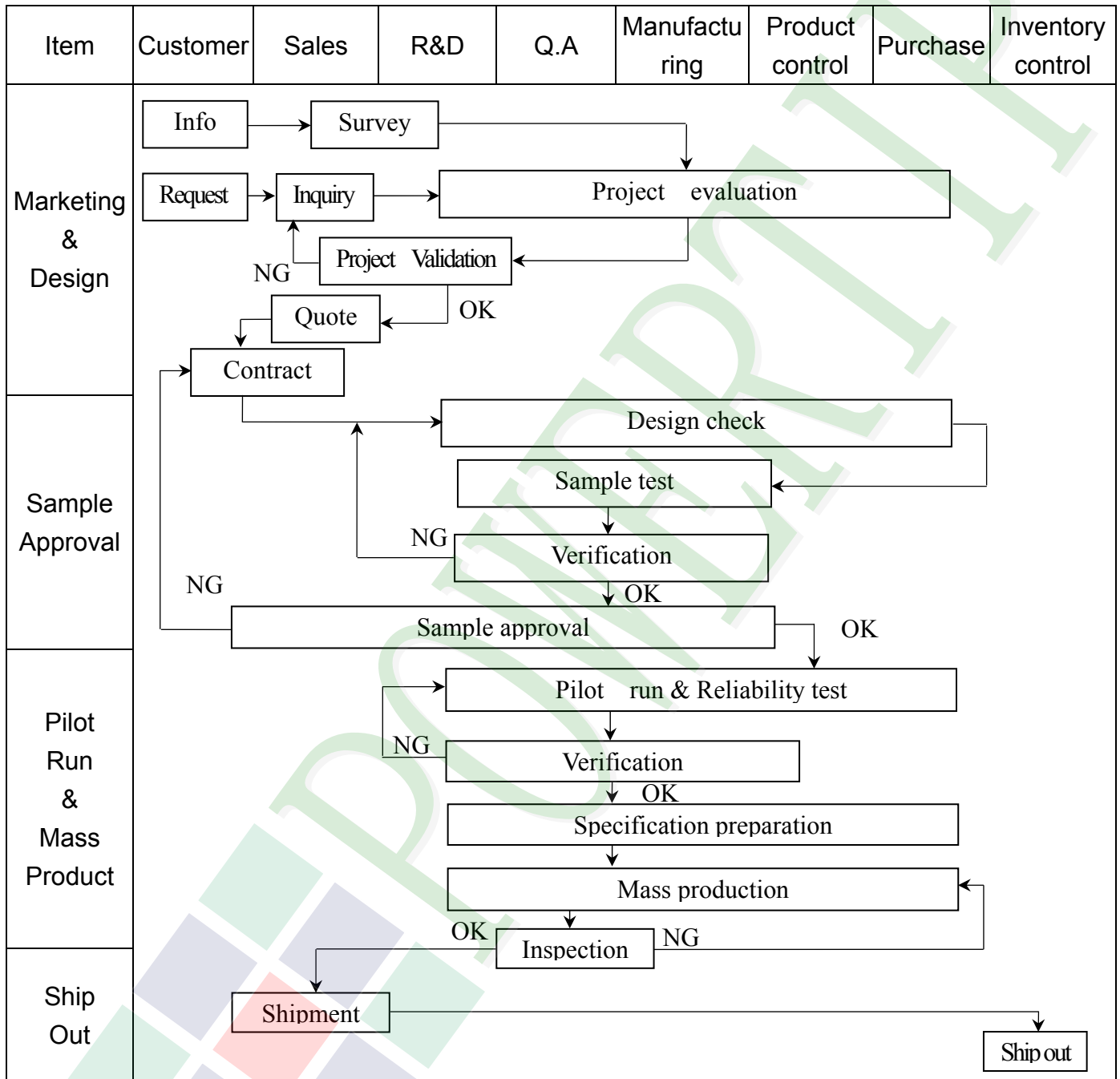
| Symbol | Description | Min. Time | Unit |
|--------|--------------------------------------------|-----------|------|
| T0 | DISP="High" to AVDD/GVDD voltage stability | 40 | ms |
| T1 | DISP="High" to VGL voltage stability | 50 | ms |
| T2 | DISP="High" to AVCL/GVCL stability | 70 | ms |
| T3 | DISP="High" to Source output | 100 | ms |
| T4 | DISP="High" to Gate output | 110 | ms |
| T5 | Black Turn on | 130 | ms |

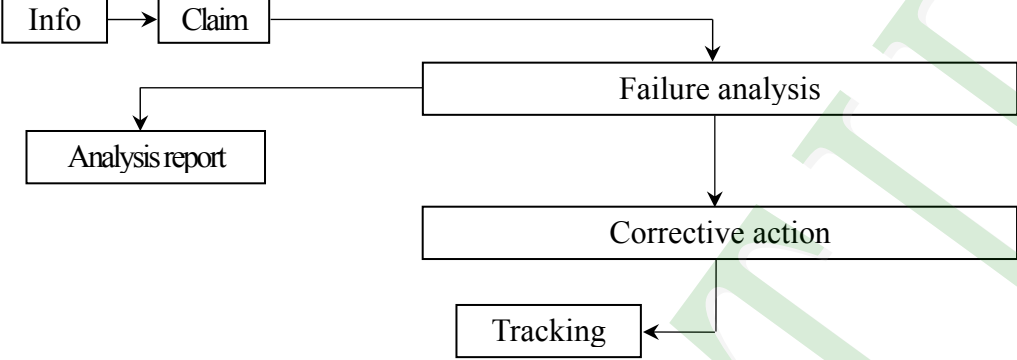
POWER OFF


| Symbol | Description | Min. Time | Unit |
|--------|-------------------------------------|-----------|------|
| T0 | Backlight turn off to DISP="Low" | 5 | ms |
| T1 | DISP="Low" to Source output disable | 20 | ms |
| T2 | DISP="Low" to Gate output disable | 50 | ms |
| T3 | DISP="Low" to Gate output disable | 50 | ms |

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



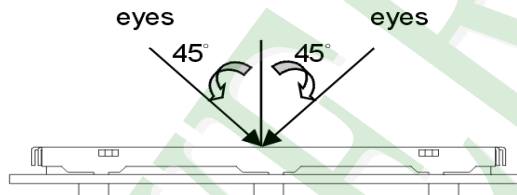
| Item | Customer | Sales | R&D | Q.A | Manufacturing | Product control | Purchase | Inventory control |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|-----|-------------------------------------------------------------------------|-----------------|----------|-------------------|
| Sales Service |  <pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis] Failure --> Report[Analysis report] Failure --> Action[Corrective action] Action --> 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

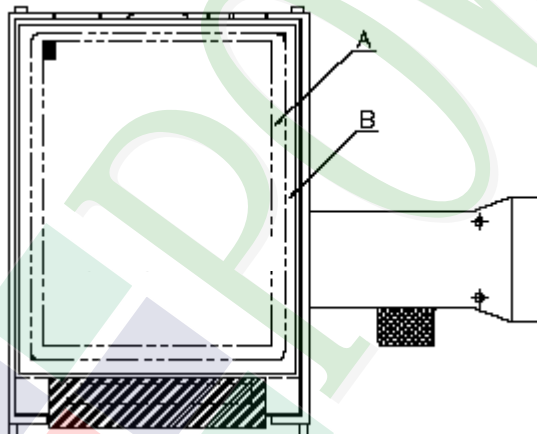
- ◆ Scope : The document shall be applied to TFT-LCD Module for 3.5" ~15" (Ver.B01).
- ◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆ Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample
- ◆ Defect Level : Major Defect AQL : 0.4 ; Minor Defect AQL : 1.5
-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

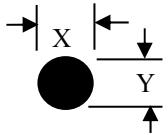
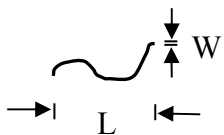
B area : Outside of viewing area

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

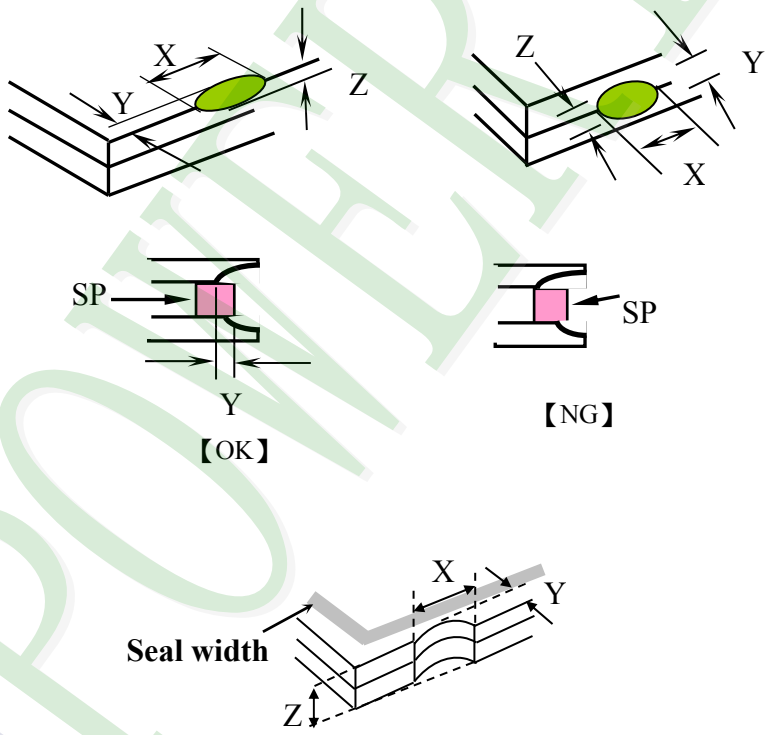
◆Specification For TFT-LCD Module 3.5" ~15" :
(Ver.B01)

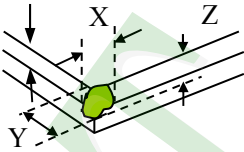
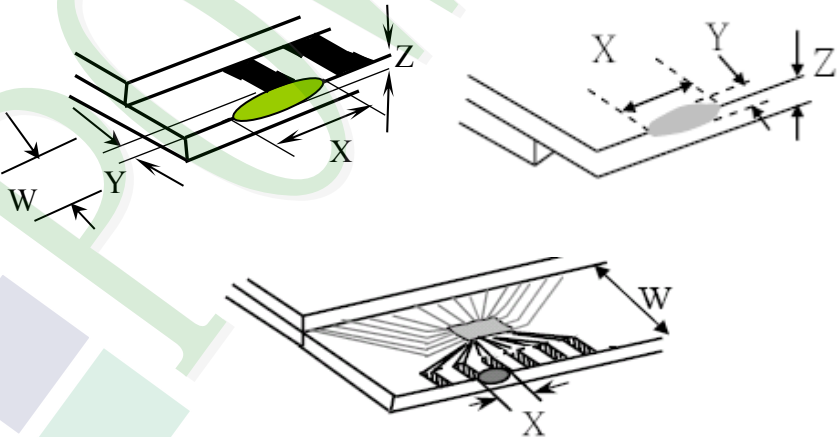
| NO | Item | Criterion | Level | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------|-------------------|-------------------|------------|----------|----------|----------|-----------|----------|-------|----------|-------|
| 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. (Mura : Under the normal examination angle of view, the picture has the non-uniform phenomenon.) | Minor | | | | | | | | | | | | |
| 05 | Dot defect (Bright dot 、 Dark dot) 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;">≤ 4</td> </tr> <tr> <td style="text-align: center;">Dark Dot</td> <td style="text-align: center;">≤ 5</td> </tr> <tr> <td style="text-align: center;">Joint Dot</td> <td style="text-align: center;">≤ 3</td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;">≤ 7</td> </tr> </tbody> </table> | Item | | Acceptance (Q'ty) | Dot Defect | Bright Dot | ≤ 4 | Dark Dot | ≤ 5 | Joint Dot | ≤ 3 | Total | ≤ 7 | Minor |
| | | Item | | Acceptance (Q'ty) | | | | | | | | | | | |
| | | Dot Defect | Bright Dot | ≤ 4 | | | | | | | | | | | |
| | | | Dark Dot | ≤ 5 | | | | | | | | | | | |
| | | | Joint Dot | ≤ 3 | | | | | | | | | | | |
| Total | ≤ 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 ≥ 5 mm. | | | | | | | | | | | | | | | |
| 5. 4 Bright dot that can not be seen through 5% ND filter. | | | | | | | | | | | | | | | |

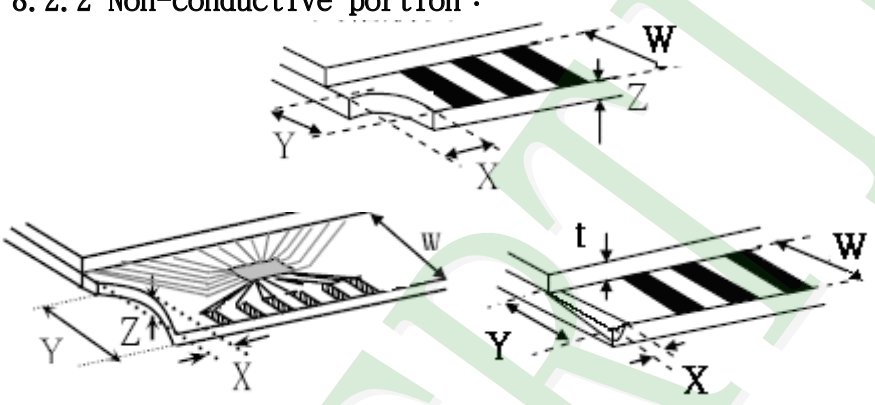
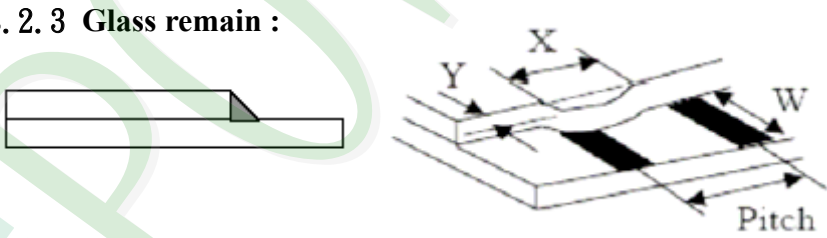
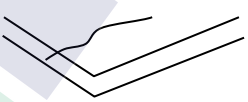
◆Specification For TFT-LCD Module 3.5" ~15" :
(Ver.B01)

| NO | Item | Criterion | Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|-------------------|--------|------------------|--------|------------------|-------------------------|---|-------------------------|---------------|--------|-------------------------|---|---------------|------------|--------------|-------------------|-------|--------|--------|-----------------|-----|---------------|--------|--------|---------------|----------------------|---|--------------|----------------------|---|-----|------------|---------------|--------------|--|---|-----------|-----|---------------|--------|--------|---------------|----------------------|---|-----|------------|---------------|--------------|--|---|-------|
| 06 | <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"> <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>$\Phi \leq 0.25$</td> <td colspan="2">Ignore</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.50$</td> <td>5</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$\Phi > 0.50$</td> <td>0</td> </tr> <tr> <td>Total</td> <td>5</td> </tr> </tbody> </table> <p>6.2 Line type(Non-display or display) :</p> <table border="1"> <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>$W \leq 0.03$</td> <td>Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td>$L \leq 10.0$</td> <td>$0.03 < W \leq 0.05$</td> <td>4</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.05 < W \leq 0.10$</td> <td>2</td> </tr> <tr> <td>---</td> <td>$W > 0.10$</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>$W \leq 0.05$</td> <td>Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td>$L \leq 10.0$</td> <td>$0.05 < W \leq 0.10$</td> <td>5</td> </tr> <tr> <td>---</td> <td>$W > 0.10$</td> <td>As round type</td> </tr> <tr> <td colspan="2">Total</td> <td>5</td> </tr> </tbody> </table> | Dimension (diameter : Φ) | Acceptance (Q'ty) | | A area | B area | $\Phi \leq 0.25$ | Ignore | | $0.25 < \Phi \leq 0.50$ | 5 | Ignore | $\Phi > 0.50$ | 0 | 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 | Minor |
| | | Dimension (diameter : Φ) | | Acceptance (Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.25$ | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.25 < \Phi \leq 0.50$ | 5 | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.50$ | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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"> <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>$\Phi \leq 0.25$</td> <td colspan="2">Ignore</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.50$</td> <td>4</td> <td rowspan="4">Ignore</td> </tr> <tr> <td>$0.50 < \Phi \leq 0.80$</td> <td>1</td> </tr> <tr> <td>$\Phi > 0.80$</td> <td>0</td> </tr> <tr> <td>Total</td> <td>5</td> </tr> </tbody> </table> | | Dimension (diameter : Φ) | 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 | Total | 5 | Minor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimension (diameter : Φ) | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

◆Specification For TFT-LCD Module 3.5" ~15" :
(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="539 1615 1353 1906"> <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. | $1/2 t < Z \leq 2 t$ | | | | | | | |

| 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> <hr/> <p>8.1.2 Corner crack :</p>  <table border="1" data-bbox="520 763 1337 1059"> <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="560 1697 1347 1872"> <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 | $\leq a$ | $\leq W$ | $\leq 1/2 t$ | 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>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> <hr/> <p>8.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="625 967 1257 1093"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/3 a$</td> <td>$\leq W$</td> <td>$\leq t$</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>8.2.3 Glass remain :</p>  <table border="1" data-bbox="545 1523 1241 1646"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq a$</td> <td>$\leq 1/3 W$</td> <td>$\leq t$</td> </tr> </tbody> </table> <p>8.2.4 Cracking</p>  <p style="text-align: center;">Not Allowed</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 ≤ 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 .
- 5.2.10 Caution!(LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SMPS) can lead to touch malfunction (e.g. ghost-touches).
Therefore, the touch needs to be thoroughly tested inside the target application.

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

LCM包裝規格書

Documents NO. JPKG-PH480272T005-IAA07

LCM Packaging Specifications
(For Tray)

| Approve | Check | Contact |
|---------|-------|---------|
| Ryan | Terry | Crystal |

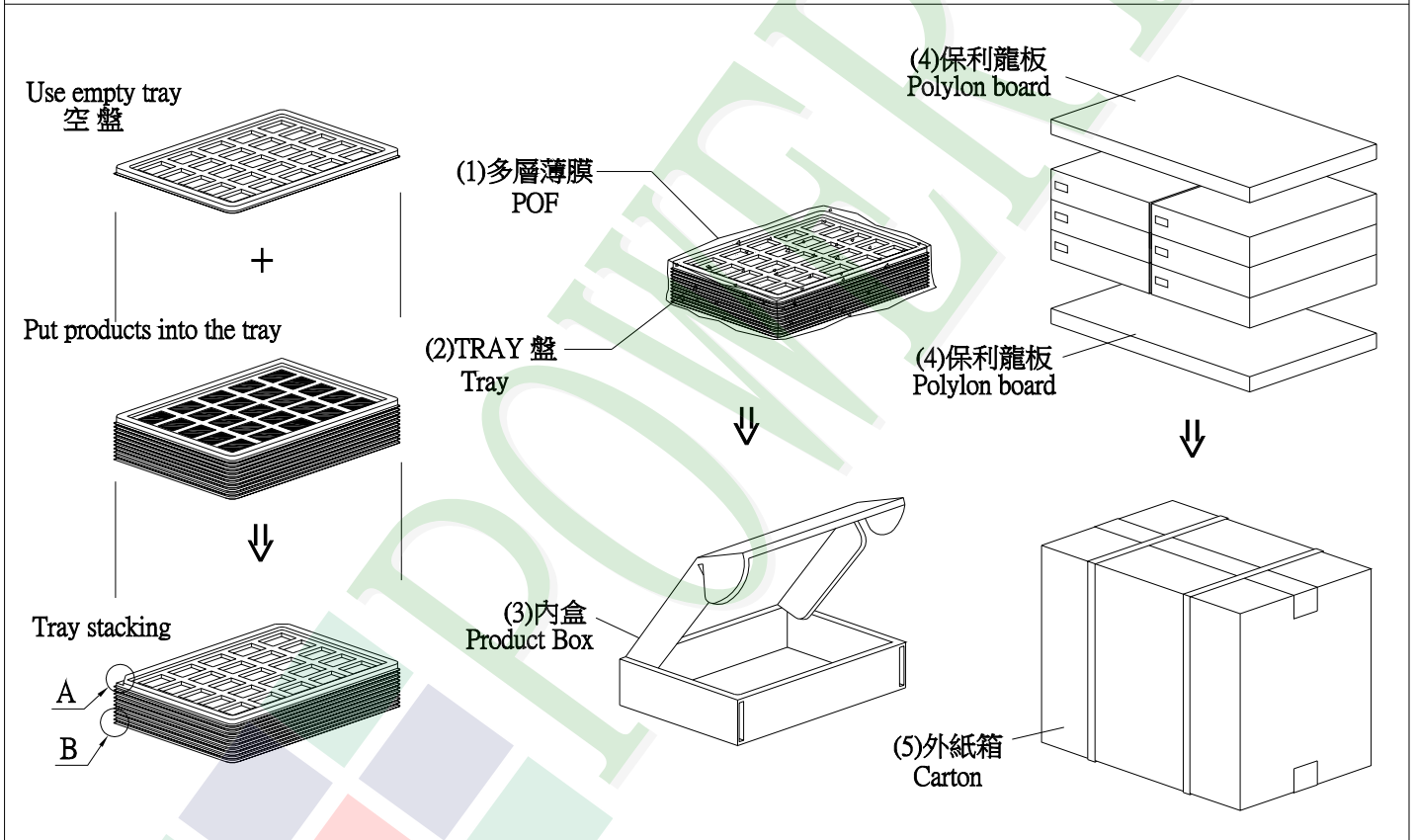
1. 包裝材料規格表 (Packaging Material) : (per carton)

| No. | Item | Model | Dimensions (mm) | 1Pcs Weight | Quantity | Total Weight |
|-----|---------------------|--------------------|--------------------|-------------|----------|--------------|
| 1 | 成品 (LCM) | PH480272T005-IAA07 | 105.5 X 67.2 X 2.6 | 0.0465 | 216 | 10.044 |
| 2 | 多層薄膜(1)POF | OTFILM0BA03ABA | 19"X350X0.015 | — | 6 | — |
| 3 | TRAY 盤 (2)Tray | TYSG000000227 | 352 X 260 X 2.6 | 0.1 | 60 | 6.0 |
| 4 | 內盒(3)Product Box | BX36627063ABBA | 383 X 270 X 66 | 0.182 | 6 | 1.092 |
| 5 | 保利龍板(4)Poylon board | OTPLB00PL08ABA | 550 X 393 X 20 | 0.0284 | 2 | 0.0568 |
| 6 | 外紙箱(5)Carton | BX57041027CCBA | 570 X 410 X 265 | 1.0 | 1 | 1.0 |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

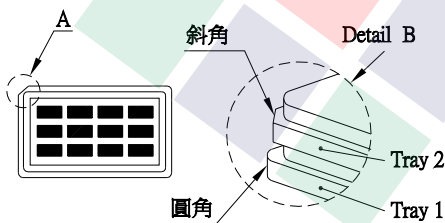
2. 一整箱總重量 (Total LCD Weight in carton) : 18.19 Kg±10%

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

| | | | | | |
|-----------------------------------------------------|----|---------------|---|---|-----|
| (1) LCM quantity per box : no per tray | 4 | x no of tray | 9 | = | 36 |
| (2) Total LCM quantity in carton : quantity per box | 36 | x no of boxes | 6 | = | 216 |



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.