



## SPECIFICATIONS

|                        |   |                             |
|------------------------|---|-----------------------------|
| CUSTOMER               | : | PTC                         |
| SAMPLE CODE            | : | SH128800T004-ZZC06          |
| MASS PRODUCTION CODE   | : | PH128800T004-ZZC06          |
| SAMPLE VERSION         | : | 01                          |
| SPECIFICATIONS EDITION | : | 002                         |
| DRAWING NO. (Ver.)     | : | JLMD-PH128800T004-ZZC06_001 |
| PACKAGING NO. (Ver.)   | : | -                           |

**Customer Approved**

**Date:**



| Approved | Checked | Designer |
|----------|---------|----------|
| 閔偉       | 劉進      | 陳璐       |

- Preliminary specification for design input
- Specification for sample approval

### POWERTIP TECH. CORP.

|   |  |  |
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|---|--|--|



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## 1. SPECIFICATIONS

### 1.1 Features

| Item              | Standard Value   |
|-------------------|--|
| Screen size(Inch) | 10.1(Diagonal)   |
| Driver element    | Normally Black   |
| Resolution        | 1280* (R、G、B) * 800 Dots   |
| Display mode      | Transmissive, ANTI-GLARE   |
| Color             | 16.7M  |
| Weight            | - g  |
| Interface         | LVDS   |
| ROHS              | THIS PRODUCT CONFORMS THE ROHS OF PTC<br>Detail information please refer web site :<br><a href="http://www.powertip.com.tw/news.php?area_id_view=1085560481/">http://www.powertip.com.tw/news.php?area_id_view=1085560481/</a> |

### 1.2 Mechanical Specifications

| Item              | Standard Value                      | Unit |
|-------------------|-------------------------------------|------|
| Outline Dimension | 254.96(W) * 173.6 (L) * 10.0 (H)Max | mm   |

#### LCD panel

| Item        | Standard Value          | Unit |
|-------------|-------------------------|------|
| Active Area | 216.96 (W) * 135.60 (L) | mm   |

Note : For detailed information please refer to LCM drawing.

### 1.3 Absolute Maximum Ratings

| Item                                   | Symbol          | Condition              | Min. | Max. | Unit |
|--|-----------------|------------------------|------|------|------|
| Power Supply Voltage                   | VDD             | -                      | -0.3 | +4.0 | V    |
| Power Supply Voltage for LED Backlight | VLED            | -                      | -0.3 | +50  | V    |
| Operating Temperature                  | T <sub>OP</sub> | -                      | -30  | +80  | °C   |
| Storage Temperature                    | T <sub>ST</sub> | -                      | -30  | +80  | °C   |
| Storage Humidity                       | H <sub>D</sub>  | T <sub>a</sub> < 60 °C | -    | 90   | %RH  |

### 1.4 DC Electrical Characteristics

| Item                                   | Symbol           | Condition | Min.               | Typ.  | Max.               | Unit     |
|--|------------------|-----------|--------------------|-------|--------------------|----------|
| Power Supply Voltage for LCD           | VDD              | -         | 3.0                | 3.3   | 3.6                | V        |
| Power Supply Voltage for LED Backlight | VLED             | -         | 8.0                | 12.0  | 15.0               | V        |
| Power Supply Current for LCD           | IDD*1            | -         | (230)              | (280) | mA                 | VDD=3.3V |
| Power Supply Current for LED Backlight | IVLED            | -         | (1.2)              | (1.3) | A                  | VLED=8V  |
| EN Signal Voltage                      | V <sub>IH</sub>  | LED_EN    | 1.65               | -     | 5.25               | V        |
|  | V <sub>IL</sub>  |           | GND                | -     | 0.4                | V        |
| PWM Signal Voltage                     | V <sub>IH</sub>  | LED_PWM   | 0.8V <sub>EN</sub> | -     | 5.25               | V        |
|  | V <sub>IL</sub>  |           | GND                | -     | 0.2V <sub>EN</sub> | V        |
| PWM Frequency                          | F <sub>PWM</sub> | -         | 100                | -     | 20000              | Hz       |

Note1: Maximum current display.

## 1.5 Optical Characteristics

### TFT LCD Panel

Ta=25°C

| Item   | Symbol  | Condition | Min.   | Typ.   | Max.   | Unit              | -     |
|--|---------|-----------|--------|--------|--------|-------------------|-------|
| Response time  | Tr + Tf | -         | -      | 25     | 50     | ms                | Note2 |
| Viewing angle  | Top     | ΘY+       | -      | 85     | -      | Deg.              | Note4 |
|  | Bottom  | ΘY-       | -      | 85     | -      |                   |       |
|  | Left    | ΘX-       | -      | 85     | -      |                   |       |
|  | Right   | ΘX+       | -      | 85     | -      |                   |       |
| Contrast ratio   | CR      |           | 600    | 800    | -      | -                 | Note3 |
| Color of CIE Coordinate<br>(With B/L and TP)                     | White   | X         | (0.28) | (0.33) | (0.38) | -                 | Note1 |
|  |         | Y         | (0.31) | (0.36) | (0.41) |                   |       |
|  | Red     | X         | (0.55) | (0.60) | (0.65) |                   |       |
|  |         | Y         | (0.29) | (0.34) | (0.39) |                   |       |
|  | Green   | X         | (0.28) | (0.33) | (0.38) |                   |       |
|  |         | Y         | (0.53) | (0.58) | (0.63) |                   |       |
|  | Blue    | X         | (0.10) | (0.15) | (0.20) |                   |       |
|  |         | Y         | (0.13) | (0.18) | (0.23) |                   |       |
| Average Brightness<br>Pattern=white display<br>(With B/L and TP) | IV      | IF= 200mA | (700)  | (800)  | -      | cd/m <sup>2</sup> | Note1 |
| Luminance uniformity   | YU      | -         | 70     | -      | -      | %                 | Note1 |

Note1:

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

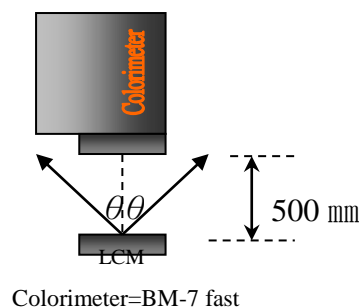
2 : Measurement Condition for Optical Characteristics:

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 , (θ = 0°)

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%

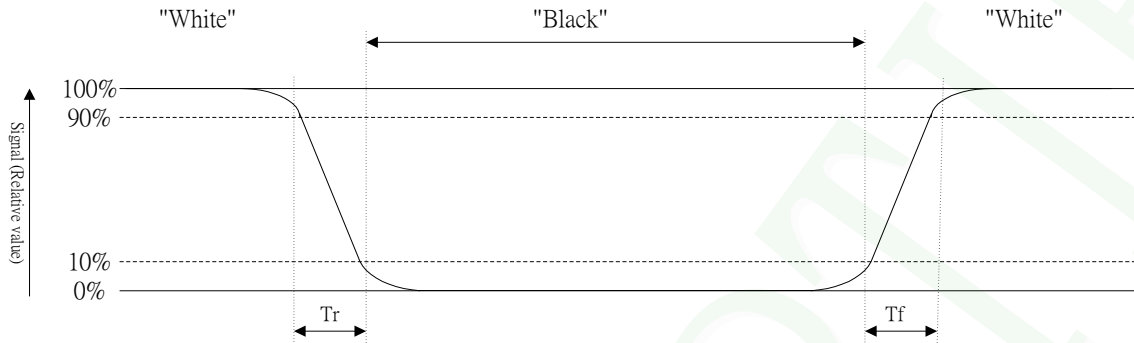


Colorimeter=BM-7 fast

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:



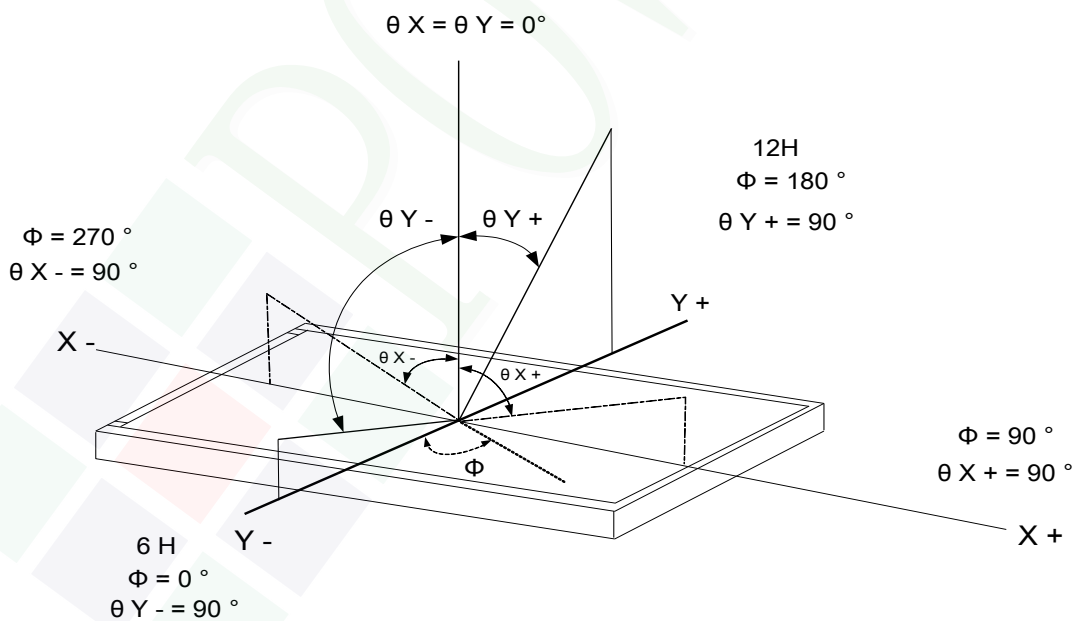
Note3: Definition of contrast ratio:

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

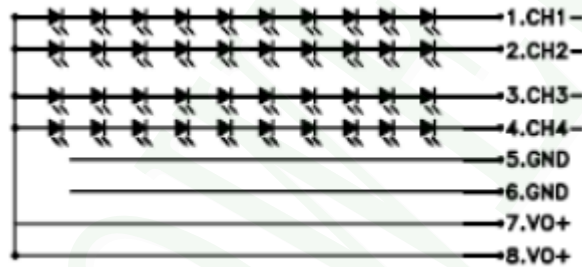
### Maximum Ratings

| Item              | Symbol | Conditions | Min. | Max.  | Unit |
|-------------------|--------|------------|------|-------|------|
| Forward Current   | IF     | Ta =25°C   | -    | 360   | mA   |
| Reverse Voltage   | VR     | Ta =25°C   | -    | 5.0   | V    |
| Power Dissipation | PD     | Ta =25°C   | -    | 12240 | mW   |

### Electrical / Optical Characteristics

| Item            | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--------|------------|------|------|------|------|
| Forward Voltage | VF     | IF=200mA   | 26   | 28   | 30   | V    |
| Color           | White  |            |      |      |      |      |

### Internal Circuit Diagram



### Other Description

| Item      | Conditions            | Description |
|-----------|-----------------------|-------------|
| Life Time | Ta =25°C<br>IF= 200mA | 70000 hrs   |



## 1.7 Touch Panel Characteristics

### Features

| Item             | Standard Value                    |
|------------------|-----------------------------------|
| Touch Panel Size | 10.1"                             |
| Touch type       | Projective capacitive touch panel |
| Input Method     | Finger / 5 Points touch           |
| Output Interface | USB                               |
| IC               | mxT1066T                          |

### Mechanical Specifications

| Item              | Standard Value          | Unit |
|-------------------|-------------------------|------|
| Outline Dimension | 254.96(W) * 173.6(L)    | mm   |
| Viewing Area      | 217.96 (W) * 136.60 (L) | mm   |

### Absolute Maximum Ratings

| Item                  | Symbol          | Condition | Min. | Max. | Unit |
|-----------------------|-----------------|-----------|------|------|------|
| Supply voltage        | VDD_5.0         | -         | -0.3 | +6.0 | V    |
| Operating Temperature | T <sub>OP</sub> | -         | -30  | +80  | °C   |
| Storage Temperature   | T <sub>ST</sub> | -         | -30  | +80  | °C   |

### DC Electrical Characteristics

| Item                         | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------------|--------|-----------|------|------|------|------|
| Power Supply Voltage for USB | VBUS   | -         | -    | 5.0  | -    | V    |

### Optical Characteristics

| Item                      | Standard Value | Unit |
|---------------------------|----------------|------|
| Total light transmittance | 85% or more    | -    |
| Hardness                  | ≥7H            |      |

### Touch Panel IC Read/Write description & Register Mapping

Reference :Atmel Touch Driver Porting Reference Guide.

## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

## 2.2 Interface Pin Description

| Pin No. | Symbol  | Description                                   |
|---------|---------|---|
| 1       | NC      | No Connection.                                |
| 2       | VDD     | Power Supply.                                 |
| 3       | VDD     | Power Supply.                                 |
| 4       | NC      | No Connection.                                |
| 5       | NC      | No Connection.                                |
| 6       | NC      | No Connection.                                |
| 7       | NC      | No Connection.                                |
| 8       | RXIN0-  | -LVDS Differential Data Input.                |
| 9       | RXIN0+  | +LVDS Differential Data Input.                |
| 10      | GND     | Ground.                                       |
| 11      | RXIN1-  | -LVDS Differential Data Input.                |
| 12      | RXIN1+  | +LVDS Differential Data Input.                |
| 13      | GND     | Ground.                                       |
| 14      | RXIN2-  | -LVDS Differential Data Input.                |
| 15      | RXIN2+  | +LVDS Differential Data Input.                |
| 16      | GND     | Ground.                                       |
| 17      | RXCLK-  | -LVDS Differential Clock Input.               |
| 18      | RXCLK+  | +LVDS Differential Clock Input.               |
| 19      | GND     | Ground.                                       |
| 20      | RXIN3-  | -LVDS Differential Data Input.                |
| 21      | RXIN3+  | +LVDS Differential Data Input.                |
| 22      | GND     | Ground.                                       |
| 23      | LED_GND | Ground for LED Driving                        |
| 24      | LED_GND | Ground for LED Driving                        |
| 25      | LED_GND | Ground for LED Driving                        |
| 26      | NC      | No Connection.                                |
| 27      | LED_PWM | LED Backlight PWM control signal for dimming. |

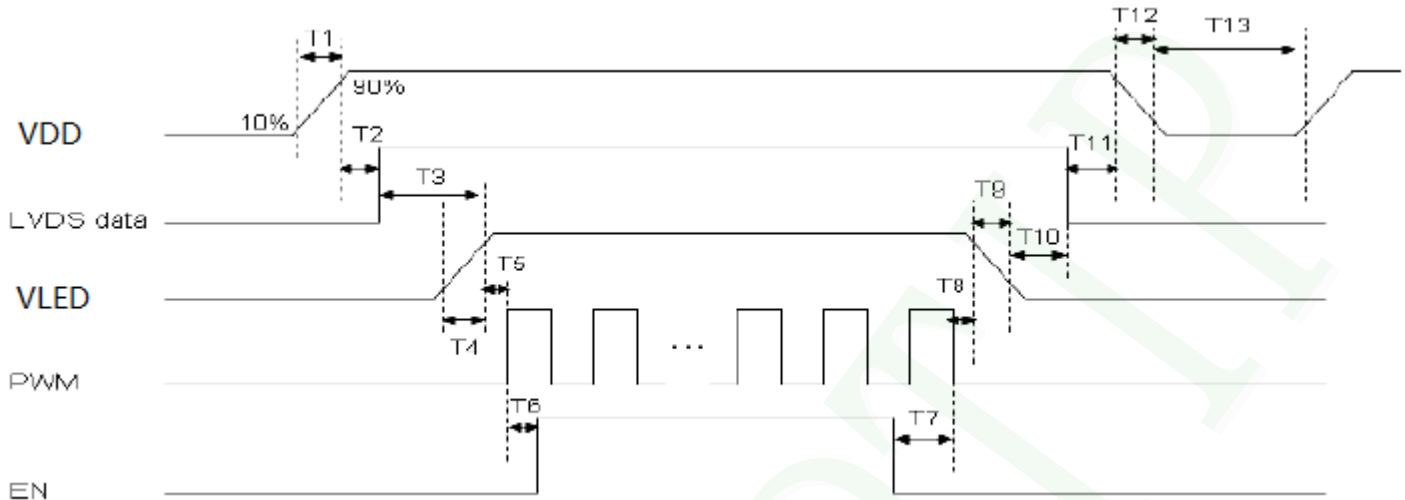
| Pin No. | Symbol | Description                             |
|---------|--------|---|
| 28      | LED_EN | LED Backlight Enable Input.             |
| 29      | NC     | No Connection.                          |
| 30      | NC     | No Connection.                          |
| 31      | VLED   | Power Supply for LED Backlight driving. |
| 32      | VLED   | Power Supply for LED Backlight driving. |
| 33      | VLED   | Power Supply for LED Backlight driving. |
| 34      | NC     | No Connection.                          |
| 35      | BIST   | No Connection.                          |
| 36      | NC     | No Connection.                          |
| 37      | NC     | No Connection.                          |
| 38      | NC     | No Connection.                          |
| 39      | NC     | No Connection.                          |
| 40      | NC     | No Connection.                          |

### CN1(CTP USB Interface):

| Pin No. | Symbol | Description                 |
|---------|--------|-----------------------------|
| 1       | VDD    | Power Supply.(+5.0V)        |
| 2       | D-     | D- Differential Data Input. |
| 3       | D+     | D+ Differential Data Input. |
| 4       | NC     | No Connection.              |
| 5       | GND    | Ground.                     |
| 6       | NC     | No Connection.              |

## 2.3 Timing Characteristics

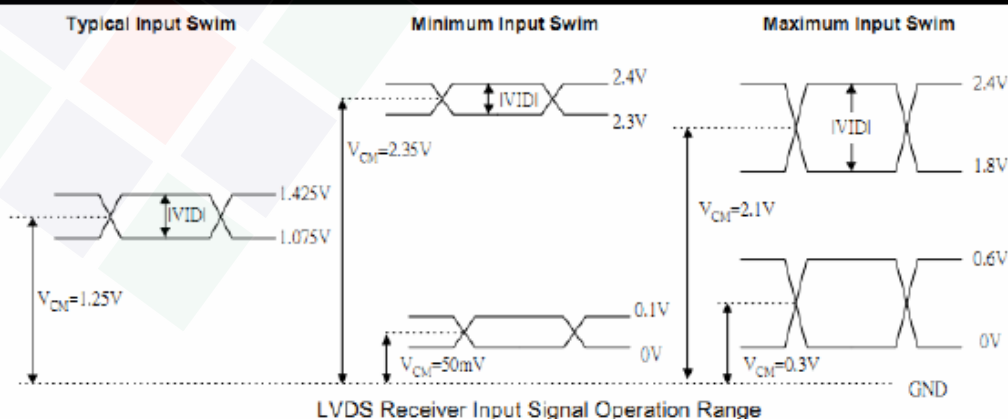
### 2.3.1 Power On and Reset Timing



| Parameter                              | Symbol | Unit | Min | Typ. | Max |
|--|--------|------|-----|------|-----|
| VDD Rise Time                          | T1     | ms   | 0.5 | --   | 10  |
| VDD Good to Signal Valid               | T2     | ms   | 30  | --   | 90  |
| Signal Valid to Backlight On           | T3     | ms   | 200 | --   | --  |
| Backlight Power On Time                | T4     | ms   | 0.5 | --   | --  |
| Backlight VDD Good to System PWM On    | T5     | ms   | 10  | --   | --  |
| System PWM ON to Backlight Enable ON   | T6     | ms   | 10  | --   | --  |
| Backlight Enable Off to System PWM Off | T7     | ms   | 0   | --   | --  |
| System PWM Off to B/L Power Disable    | T8     | ms   | 10  | --   | --  |
| Backlight Power Off Time               | T9     | ms   | 0.5 | 10   | 30  |
| Backlight Off to Signal Disable        | T10    | ms   | 200 | --   | --  |
| Signal Disable to Power Down           | T11    | ms   | 0   | --   | 50  |
| VDD Fall Time                          | T12    | ms   | 0.5 | 10   | 30  |
| Power Off                              | T13    | ms   | 500 | --   | --  |

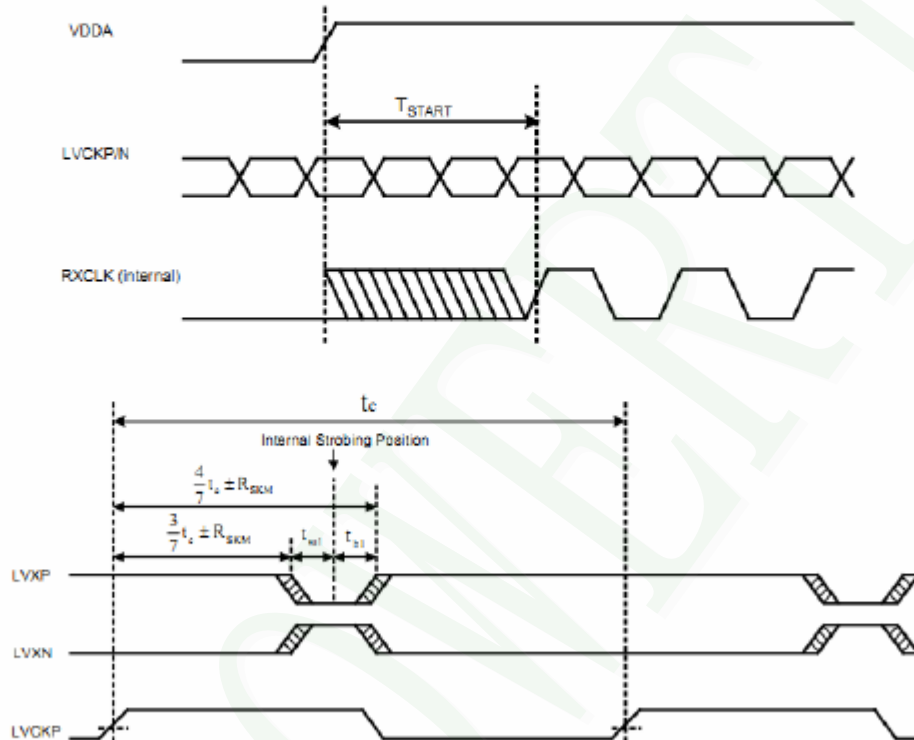
### 2.3.2 LVDS Signal Timing Characteristics DC Characteristics

| Symbol   | Parameter                         | Conditions       | Min. | Typ. | Max | Unit |
|----------|-----------------------------------|------------------|------|------|-----|------|
| $V_{TH}$ | Differential Input High Threshold | $V_{CM} = +1.2V$ | -    | -    | 100 | mV   |
| $V_{TL}$ | Differential Input Low Threshold  |                  | -100 | -    | -   | mV   |
| $I_{CC}$ | Average Supply Current            |                  | -    | TBD  | -   | mA   |



## AC Characteristics

| Symbol             | Parameter   | Conditions                                 | Min. | Typ. | Max | Unit |
|--------------------|---|--|------|------|-----|------|
| F <sub>OP</sub>    | Input Operating Frequency range                             | RX_HF=0                                    | 25   | -    | 100 | MHz  |
|                    |   | RX_HF=1                                    | 100  | -    | 170 | MHz  |
| R <sub>SKM</sub>   | Receiver Skew Margin  | 85MHz,  VID =400mV, V <sub>CM</sub> =1.2V  | 450  | -    | -   | pS   |
|                    |   | 150MHz,  VID =400mV, V <sub>CM</sub> =1.2V | 267  | -    | -   | pS   |
| T <sub>STRAT</sub> | Receiver startup time (after a valid LVDS clock is applied) |  | -    | -    | 10  | mS   |



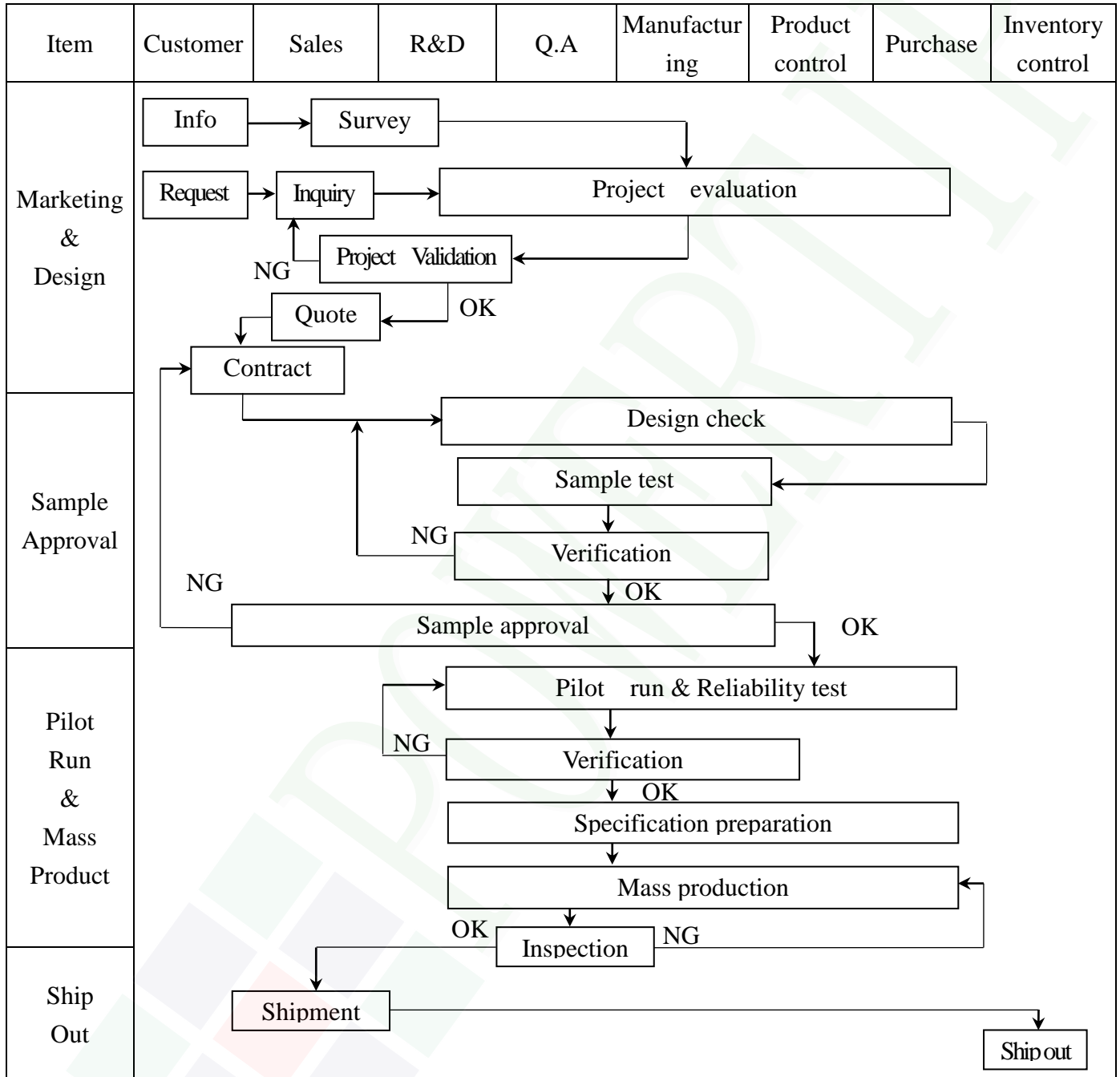
NOTE: LVCK is advanced or delayed with respect to data until errors are observed at the receiver outputs. The advance or delay is then reduced until there are no data errors observed. The magnitude of the advance or delay is RSKM.

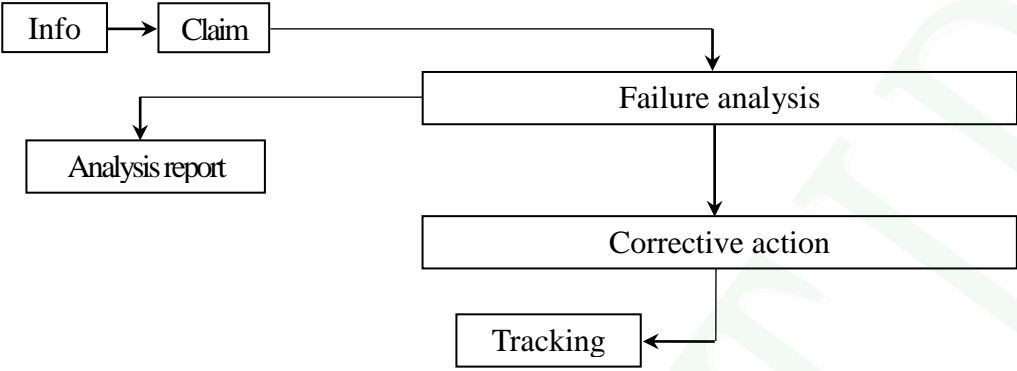
### 2.3.3 Interface Timings

| Parameter                | Symbol  | Unit  | Min.   | Typ.   | Max.   |
|--------------------------|---|-------|--------|--------|--------|
| Frame Rate               | --  | Hz    | -      | 60     | -      |
| Frame Period             | t <sub>V</sub>                                      | line  | (815)  | (823)  | (1023) |
| Vertical Display Time    | t <sub>VD</sub>                                     | line  | 800    |        |        |
| Vertical Blanking Time   | t <sub>VW</sub> +t <sub>VBP</sub> +t <sub>VF</sub>  | line  | (15)   | (23)   | (33)   |
| 1 Line Scanning Time     | t <sub>H</sub>                                      | clock | (1410) | (1440) | (1470) |
| Horizontal Display Time  | t <sub>HD</sub>                                     | clock | 1280   |        |        |
| Horizontal Blanking Time | t <sub>HW</sub> +t <sub>HBP</sub> +t <sub>HFP</sub> | clock | (60)   | (160)  | (190)  |
| Clock Rate               | 1/T <sub>C</sub>                                    | MHz   | (68.9) | (71.1) | (73.4) |

### 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; Failure[Failure analysis]     Failure --&gt; Report[Analysis report]     Failure --&gt; Action[Corrective action]     Action --&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

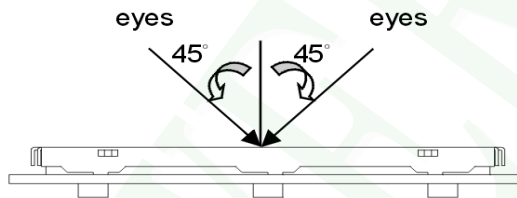
◆OUT Going Defect Level : Sampling.

◆Standard of the product appearance test :

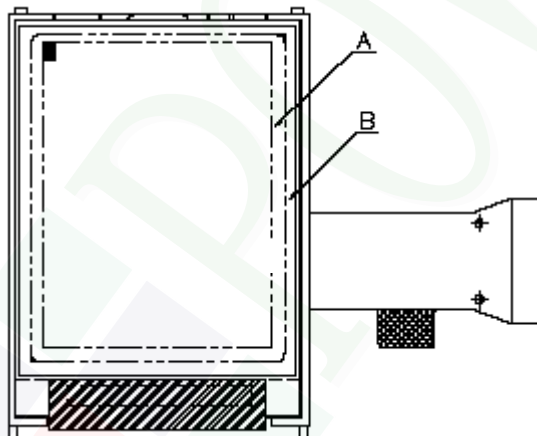
a. Manner of appearance test :

(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

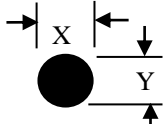
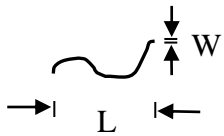
**B** area : Outside of viewing area

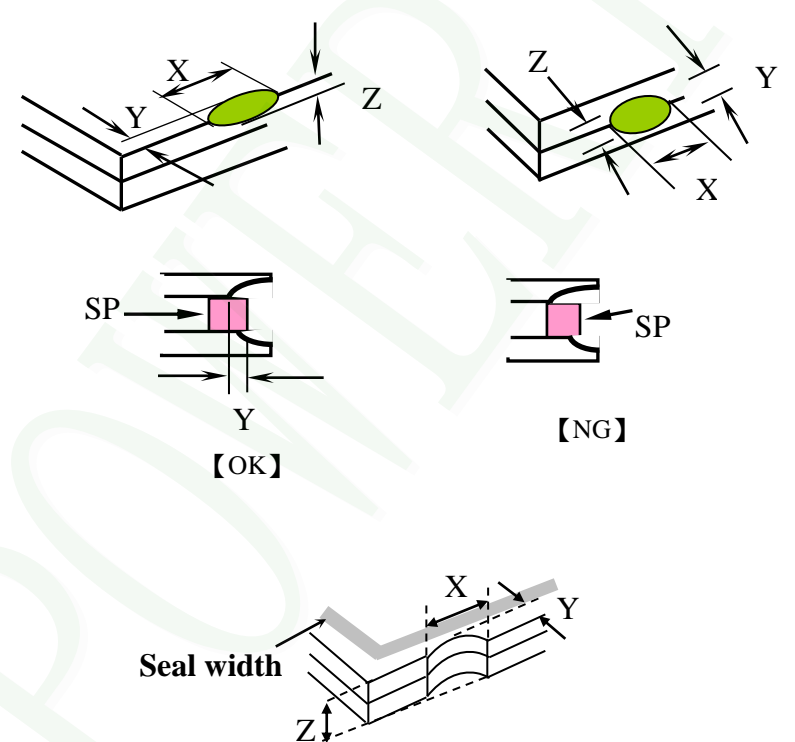
(4). Standard of inspection : (Unit : mm)

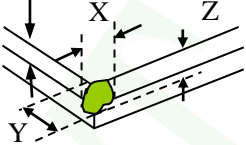
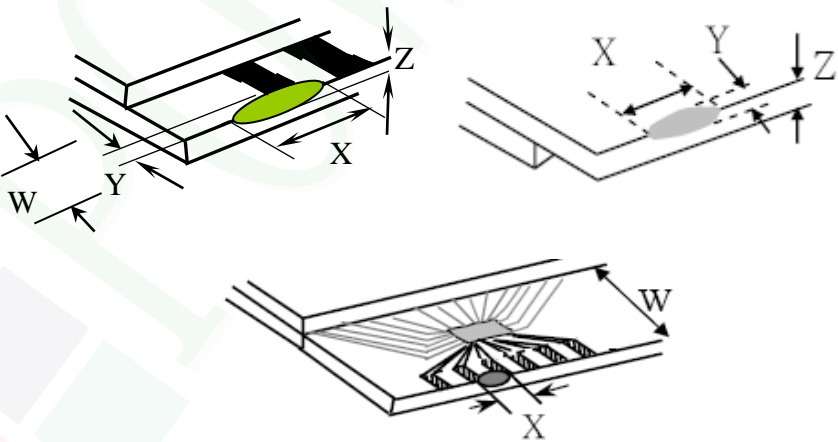
◆Specification For TFT-LCD Module 3.5" ~15" :

(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.<br>5. 2 It is defined as dot defect if defect area $> 1/2$ dot.<br>5. 3 The distance between two dot defect $\geq 5$ mm.<br>5. 4 Bright dot that can not be seen through 5% ND filter. |   |  |       |                   |                   |            |            |          |          |          |           |          |       |          |       |

| NO                             | Item  | Criterion   | Level                          |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|--------------------------------|---|---|--------------------------------|-------------------|---|--------|--------|------------------|--------|--|-------------------------|---|--------|-------------------------|---|---------------|---|--------------|------------|-----------|-------------------|--|--------|--------|-----------------|-----|---------------|--------|--|---------------|----------------------|---|--------|--------------|----------------------|---|-----|------------|---------------|--|--------------|--|--|---|--|-----------|-----|---------------|--------|--|---------------|----------------------|---|--------|-----|------------|---------------|--|--------------|--|--|---|--|-------|
| 06                             | <p>Black or white dot、scratch、contamination</p> <p>Round type</p>  <p><math>\Phi = (x + y) / 2</math></p> <p>Line type</p>  | <p>6.1 Round type ( Non-display or display ) :</p> <table border="1" data-bbox="512 436 1289 712"> <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> <p>6.2 Line type( Non-display or display ) :</p> <table border="1" data-bbox="434 831 1366 1368"> <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="4">3.5" to less 9"</td> <td>---</td> <td><math>W \leq 0.03</math></td> <td colspan="2">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> <td rowspan="3">Ignore</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 colspan="2">As round type</td> </tr> <tr> <td colspan="3"><b>Total</b></td> <td colspan="2">5</td> </tr> <tr> <td rowspan="4">9" to 15"</td> <td>---</td> <td><math>W \leq 0.05</math></td> <td colspan="2">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> <td rowspan="3">Ignore</td> </tr> <tr> <td>---</td> <td><math>W &gt; 0.10</math></td> <td colspan="2">As round type</td> </tr> <tr> <td colspan="3"><b>Total</b></td> <td colspan="2">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 | module size  | Length (L) | Width (W) | Acceptance (Q'ty) |  | A area | B area | 3.5" to less 9" | --- | $W \leq 0.03$ | Ignore |  | $L \leq 10.0$ | $0.03 < W \leq 0.05$ | 4 | Ignore | $L \leq 5.0$ | $0.05 < W \leq 0.10$ | 2 | --- | $W > 0.10$ | As round type |  | <b>Total</b> |  |  | 5 |  | 9" to 15" | --- | $W \leq 0.05$ | Ignore |  | $L \leq 10.0$ | $0.05 < W \leq 0.10$ | 5 | Ignore | --- | $W > 0.10$ | As round type |  | <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   |   |                                |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
| module size                    | Length (L)  | Width (W)   | Acceptance (Q'ty)              |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                |   |   | A area                         | B area            |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
| 3.5" to less 9"                | ---   | $W \leq 0.03$   | Ignore                         |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                | $L \leq 10.0$   | $0.03 < W \leq 0.05$  | 4                              | Ignore            |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                | $L \leq 5.0$  | $0.05 < W \leq 0.10$  | 2                              |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                | ---   | $W > 0.10$  | As round type                  |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
| <b>Total</b>                   |   |   | 5                              |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
| 9" to 15"                      | ---   | $W \leq 0.05$   | Ignore                         |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                | $L \leq 10.0$   | $0.05 < W \leq 0.10$  | 5                              | Ignore            |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                | ---   | $W > 0.10$  | As round type                  |                   |   |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
|                                | <b>Total</b>  |   |                                |                   | 5 |        |        |                  |        |  |                         |   |        |                         |   |               |   |              |            |           |                   |  |        |        |                 |     |               |        |  |               |                      |   |        |              |                      |   |     |            |               |  |              |  |  |   |  |           |     |               |        |  |               |                      |   |        |     |            |               |  |              |  |  |   |  |       |
| 07                             | Polarizer Bubble  | <table border="1" data-bbox="478 1512 1323 1933"> <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="3">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 colspan="2">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>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 1585 1353 1883"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td>Crack can't enter viewing area</td> <td><math>\leq 1/2 t</math></td> </tr> <tr> <td><math>\leq 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 | $\leq a$ | 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><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> <hr/> <p>8.1.2 Corner crack :</p>  <table border="1" data-bbox="520 779 1337 1070"> <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. | $1/2 t < Z \leq 2 t$ | Minor        |  |
|   |  | 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 1711 1347 1883"> <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         | $\leq a$                                 | $\leq W$             | $\leq 1/2 t$ |  |
|   | 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 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 |

## 4. RELIABILITY TEST

### 4.1 Reliability Test Condition

(Ver.A01)

| NO. | TEST ITEM                                       | TEST CONDITION  |  |
|-----|---|---|--|
| 1   | High Temperature Storage Test                   | Keep in $80^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.   |  |
| 2   | High Temperature Operating Test                 | Keep in $80^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.   |  |
| 3   | Low Temperature Storage Test                    | Keep in $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.  |  |
| 4   | Low Temperature Operating Test                  | Keep in $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 240 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.  |  |
| 5   | High Temperature / High Humidity Storage Test   | Keep in $+60^{\circ}\text{C}$ / 90% R.H duration for 240 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.<br>(Excluding the polarizer)  |  |
| 6   | High Temperature / High Humidity Operating Test | Keep in $+60^{\circ}\text{C}$ / 90% R.H duration for 240 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.<br>(Excluding the polarizer)  |  |
| 7   | Temperature Cycling Storage Test                | $  \begin{array}{ccccccc}  & -30^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +80^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\  & (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\  & \longleftarrow & & \longleftarrow & & \longleftarrow & & \longleftarrow \\  & & & & & & & 25 \text{ Cycle}  \end{array}  $ Surrounding temperature, then storage at normal condition 4hrs. |  |
| 8   | Temperature Cycling Operating Test              | $  \begin{array}{ccccccc}  & -30^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +80^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\  & (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\  & \longleftarrow & & \longleftarrow & & \longleftarrow & & \longleftarrow \\  & & & & & & & 25 \text{ Cycle}  \end{array}  $ Surrounding temperature, then storage at normal condition 4hrs. |  |
| 9   | ESD Test  | <b>Air Discharge:</b><br>Apply 2 KV with 5 times<br>Discharge for each polarity +/-   | <b>Contact Discharge:</b><br>Apply 250 V with 5 times<br>discharge for each polarity +/- |
|     |   | 1. Temperature ambience : $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$<br>2. Humidity relative : 30% ~ 60%<br>3. Energy Storage Capacitance( $C_s+C_d$ ) : $150\text{pF} \pm 10\%$<br>4. Discharge Resistance( $R_d$ ) : $330\Omega \pm 10\%$<br>5. Discharge, mode of operation :<br>Single Discharge (time between successive discharges at least 1 sec)<br>(Tolerance if the output voltage indication : $\pm 5\%$ )                       |  |
| 10  | Vibration Test (Packaged)                       | 1. Sine wave 10 ~ 55 Hz frequency (1 min/sweep)<br>2. The amplitude of vibration : 1.5 mm<br>3. Each direction (X、Y、Z) duration for 2 Hrs   |  |



|  |                                 |                            |  |                         |  |
|--|---------------------------------|----------------------------|--|-------------------------|--|
| 11   | <b>Drop Test<br/>(Packaged)</b> | <b>Packing Weight (Kg)</b> |  | <b>Drop Height (cm)</b> |  |
|  |                                 | 0 ~ 45.4                   |  | 122                     |  |
|  |                                 | 45.4 ~ 90.8                |  | 76                      |  |
|  |                                 | 90.8 ~ 454                 |  | 61                      |  |
|  |                                 | Over 454                   |  | 46                      |  |
| <b>Drop Direction : ※1 corner / 3 edges / 6 sides each 1time</b> |                                 |                            |  |                         |  |

## 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.

