

SPECIFICATIONS

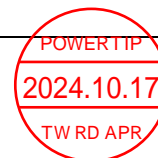
| | | |
|------------------------|---|-----------------------------------|
| CUSTOMER | : | - |
| SAMPLE CODE | : | SNA800480T013IHC09 |
| MASS PRODUCTION CODE | : | HNA800480T013IHC09 |
| SAMPLE VERSION | : | 01 |
| SPECIFICATIONS EDITION | : | 003 |
| DRAWING NO. (Ver.) | : | LMD- HNA800480T013IHC09 (Ver.003) |
| PACKAGING NO. (Ver.) | : | PKG- HNA800480T013IHC09 (Ver.001) |

Customer Approved

Date:

| Approved | Checked | Designer |
|-------------------|-----------------|------------------|
| 林裘中 Daniel Lin | 呂清溪 Marcs Lu | 陳漢霖 Hans Chen |

- ☐ Preliminary specification for design input
☒ Specification for sample approval



POWERTIP TECH. CORP.

Headquarters: No.8, 6th Road, Taichung Industrial Park,
Taichung, Taiwan
台中市 407 工業區六路 8 號

TEL: 886-4-2355-8168

FAX: 886-4-2355-8166

E-mail: sales@powertip.com.tw

[Http://www.powertip.com.tw](http://www.powertip.com.tw)

History of Version

| <u>Date</u> (mm / dd / yyyy) | <u>Ver.</u> | <u>Edi.</u> | <u>Description</u> | <u>Page</u> | <u>Design by</u> |
|---------------------------------|-------------|-------------|---|-------------------------|------------------|
| 11/25/2019 | 01 | 001 | New Drawing. | - | Rex |
| 02/03/2020 | 01 | 002 | New Sample. | - | Rex |
| 10/14/2024 | 01 | 003 | 1. Add J3 Connector 2. Add 3.2 Inspection Specification 3. Update Drawing | 10 15-21 Appendix | Hans |
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1. SPECIFICATIONS

1.1 Features

Hardware

| | | |
|---------------------------|------------------|--|
| <u>CPU</u> | RISC Processor | N32926 (ARM926EJ-S) 64MB DDR2 SDRAM |
| <u>Memory</u> | On Board Flash | 1Gb NAND Flash 4GB eMMC (Option) |
| | External Storage | 1x Micro SD (max. 32G) |
| <u>Display</u> | Resolution | 800 x 480 (16bits RGB) |
| | Touch Panel | Projected Capacitive Touch |
| | Interface | Parallel RGB 16 bits |
| <u>I/O</u> | USB | 1x USB2.0 Device |
| | Serial | 1 x UART |
| <u>Power Input</u> | DC | 5.0V |

Note1:

1. Memory type (Option) will be setting by customer's request.
2. Touch Panel Type will be setting by customer's request.
3. Support PWM Signal Output. (5kHz, Duty Cycle: 256 Step)
4. Support JPEG Codec.
5. Support H.264 & MJPEG Codec
6. Support Video Data Processor (VPE)
7. Support RTC

Note2:

This product built-in Powertip communication protocol system firmware. It manipulates the GUI contents that generated by Powertip Graphic Editor software. (Support maximum resolution up to 1024x600)

1.2 Mechanical Specifications

| <u>Item</u> | <u>Standard Value</u> | <u>Unit</u> |
|-------------------|--------------------------------------|-------------|
| Outline Dimension | 186.8(W) x 110.56(L) x 16.5 max. (H) | mm |
| Active Area | 154.08 (W) x 85.92(L) | mm |

1.3 Absolute Maximum Ratings

Ta = 25°C

| <u>Item</u> | <u>Symbol</u> | <u>Condition</u> | <u>Min.</u> | <u>Max.</u> | <u>Unit</u> |
|-----------------------|----------------------|------------------|-------------|-------------|-------------|
| Power Supply | VIN | GND=0 | -0.3 | 6.0 | V |
| Operating Temperature | T _{OP} (Ts) | Note 1 | -20 | 70 | °C |
| Storage Temperature | T _{ST} (Ta) | Note 2 | -30 | 80 | °C |
| Humidity | HD | Ta=60 °C | 10 | 90 | %RH |

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the product may be permanently destroyed.

Note 1 : Ts is the temperature of panel's surface.

Note 2 : Ta is the ambient temperature of samples.

1.4 DC Electrical Characteristics

Ta = 25°C

| <u>Item</u> | <u>Symbol</u> | <u>Condition</u> | <u>Min.</u> | <u>Typ.</u> | <u>Max.</u> | <u>Unit</u> |
|------------------------------|-----------------|------------------|-------------|-------------|-----------------------|-------------|
| Power Supply Voltage | VIN | - | 4.8 | 5.0 | 5.5 | V |
| Power Supply Voltage of RTC | VBAT | - | 2.0 | - | 3.6 | V |
| Power Supply Current *1 | IIN | VIN = 5.0V | - | 1.5 | - | A |
| Power Consumption of System | PIN | VIN = 5.0V | - | 7.5 | - | W |
| IO High-Level input voltage | V _{IH} | - | 2.0 | - | V _{3V3} +0.3 | V |
| IO Low-Level input voltage | V _{IL} | - | - | - | 0.8 | V |
| IO High-Level output voltage | V _{OH} | - | 2.4 | - | - | V |
| IO Low-Level output voltage | V _{OL} | - | - | - | 0.4 | V |

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℃ | - | - | 25 | 50 | ms | - |
| Viewing angle | Top | θY+ | CR ≥ 10 | | 60 | - | Deg. | Note 4 |
| | Bottom | θY- | | | 60 | - | | |
| | Left | θX- | | | 60 | - | | |
| | Right | θX+ | | | 60 | - | | |
| Contrast ratio | | CR | (Ta = 25℃ θX , θY = 0° | 500 | 600 | - | - | Note 3 |
| Color of CIE Coordinate (With B/L & T/P) | White | X | | 0.23 | 0.28 | 0.33 | - | Note1 |
| | | Y | | 0.27 | 0.32 | 0.37 | | |
| | Red | X | | 0.52 | 0.57 | 0.62 | | |
| | | Y | | 0.31 | 0.36 | 0.41 | | |
| | Green | X | | 0.29 | 0.34 | 0.39 | | |
| | | Y | | 0.55 | 0.60 | 0.65 | | |
| | Blue | X | | 0.09 | 0.14 | 0.19 | | |
| | | Y | | 0.02 | 0.07 | 0.12 | | |
| Average Brightness Pattern=white display (With T/P)*1 | | IV | | PWM="High" (Duty=100%) | 680 | 850 | - | cd/m2 |
| Uniformity (With T/P)*2 | | △ B | PWM="High" (Duty=100%) | 70 | - | - | % | Note1 |

Note 1:

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

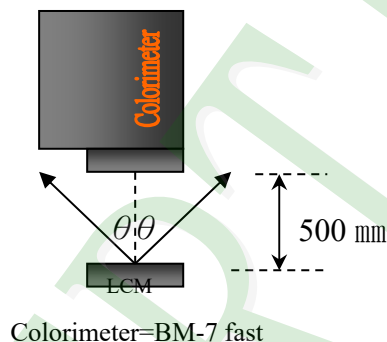
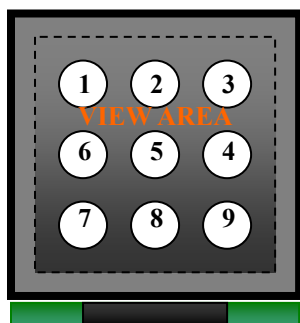
*2 : Measurement Condition for Optical Characteristics:

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:

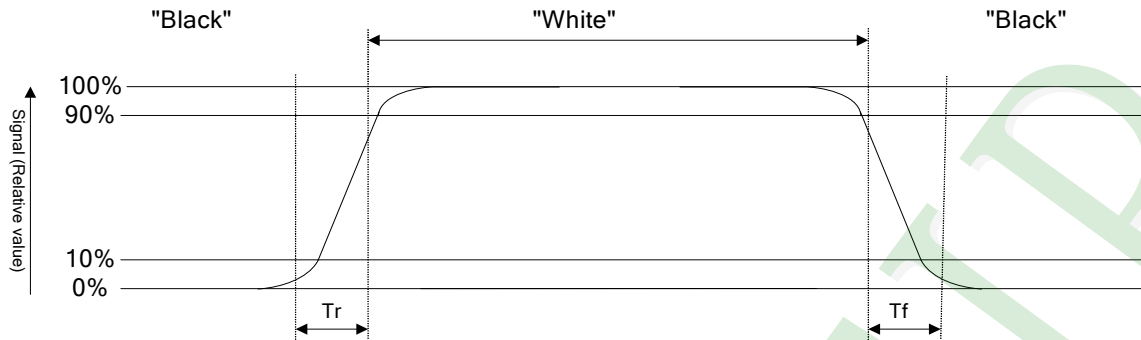
The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



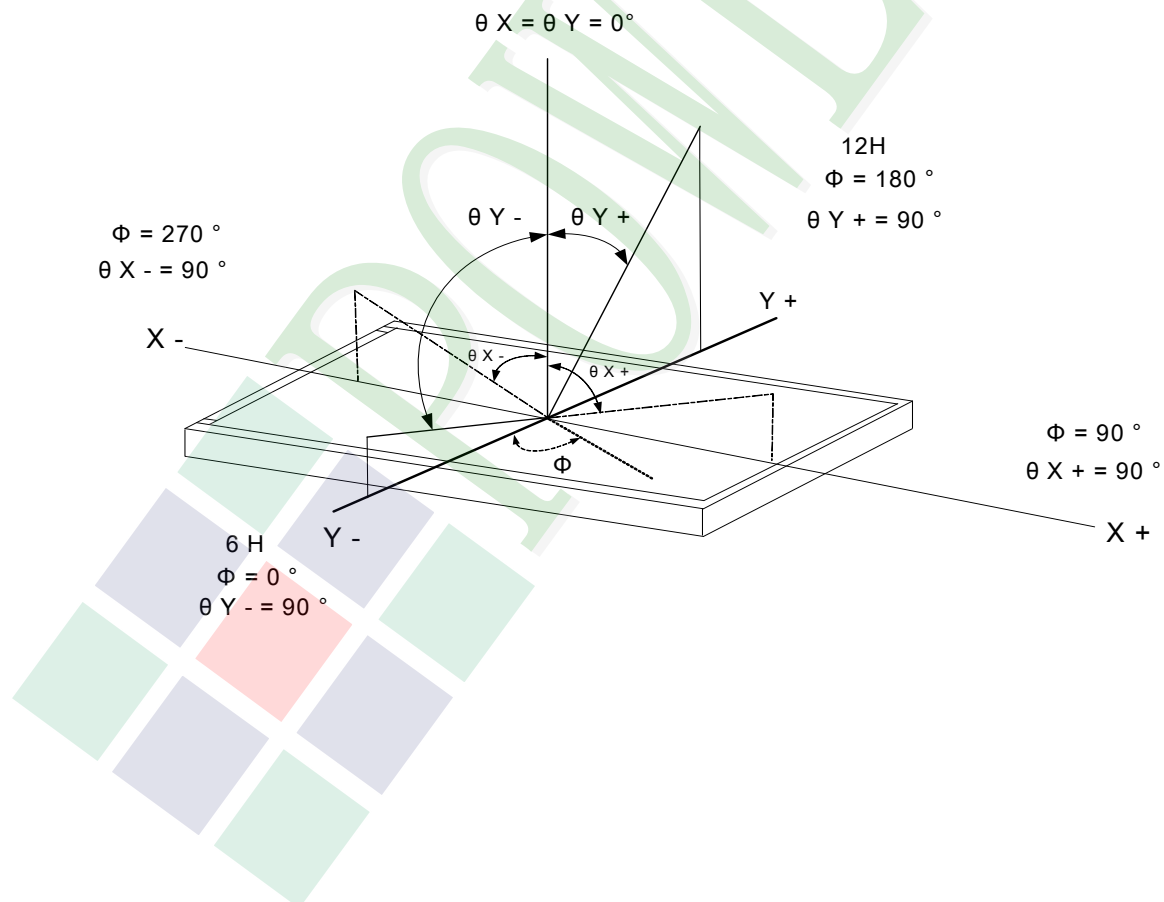
Note3: Definition of contrast ratio:

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:



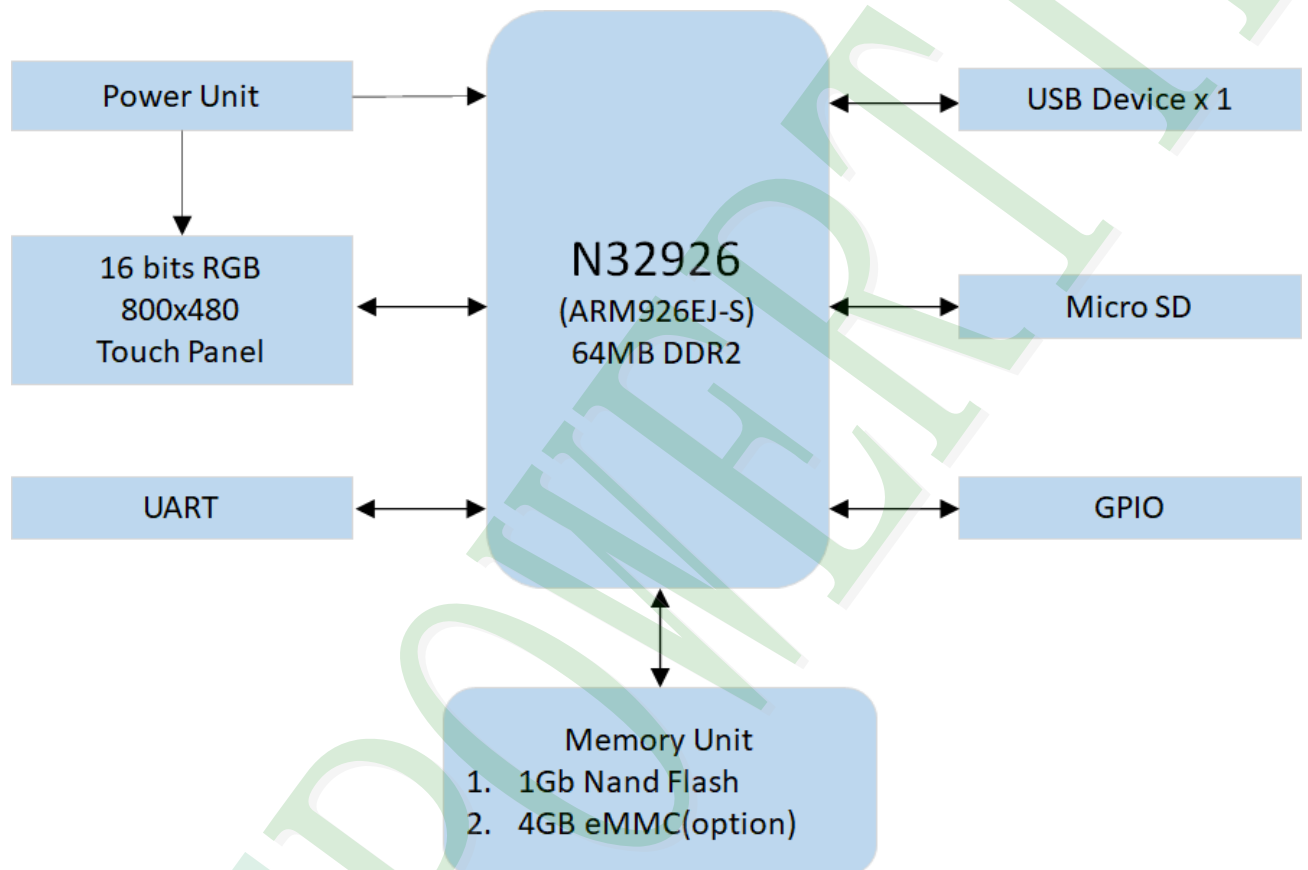
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

J3 --- UART

| Pin No. | Symbol | Type | DESCRIPTION |
|---------|----------|------|--------------------------------|
| 1 | VIN | P | DC 5.0V Power Supply. |
| 2 | UART_TXD | O | UART port, transmitter signal. |
| 3 | UART_RXD | I | UART port, receiver signal. |
| 4 | GND | P | Power ground. |

J8 --- I/O

| Pin No. | Symbol | Type | DESCRIPTION |
|---------|---------|------|---------------------------------|
| 1 | GND | P | Power ground. |
| 2 | GPG9 | IO | General Purpose I/O, Port G[9]. |
| 3 | GPG8 | IO | General Purpose I/O, Port G[8]. |
| 4 | NC | - | Not Used. |
| 5 | GND | P | Power ground. |
| 6 | NC | - | Not Used. |
| 7 | GND | P | Power ground. |
| 8 | NC | - | Not Used. |
| 9 | GND | P | Power ground. |
| 10 | GPG2 | IO | General Purpose I/O, Port G[2]. |
| 11 | GND | P | Power ground. |
| 12 | GPG4 | IO | General Purpose I/O, Port G[4]. |
| 13 | GPG5 | IO | General Purpose I/O, Port G[5]. |
| 14 | GND | P | Power ground. |
| 15 | GPG3 | IO | General Purpose I/O, Port G[3]. |
| 16 | GND | P | Power ground. |
| 17 | HPOUT_L | A | Connect to N32926 pin 102. |

| <u>Pin No.</u> | <u>Symbol</u> | <u>Type</u> | <u>Function</u> |
|----------------|---------------|-------------|--|
| 18 | HPOUT_R | A | Connect to N32926 pin 101. |
| 19 | GPG7 | IO | General Purpose I/O, Port G[7]. |
| 20 | GPA11 | IO | General Purpose I/O, Port A[11]. |
| 21 | GND | P | Power ground. |
| 22 | RESETn | I | System reset signal input, active low. |
| 23 | UART_RXD | I | UART port, receiver signal. |
| 24 | UART_TXD | O | UART port, transmitter signal. |
| 25 | GND | P | Power ground. |
| 26 | VDD5VIN | P | DC 5.0V Power Supply. |
| 27 | VDD5VIN | P | DC 5.0V Power Supply. |
| 28 | NC | - | Not Used. |
| 29 | NC | - | Not Used. |
| 30 | GND | P | Power ground. |

J9 --- USB 2.0 Device Micro USB type

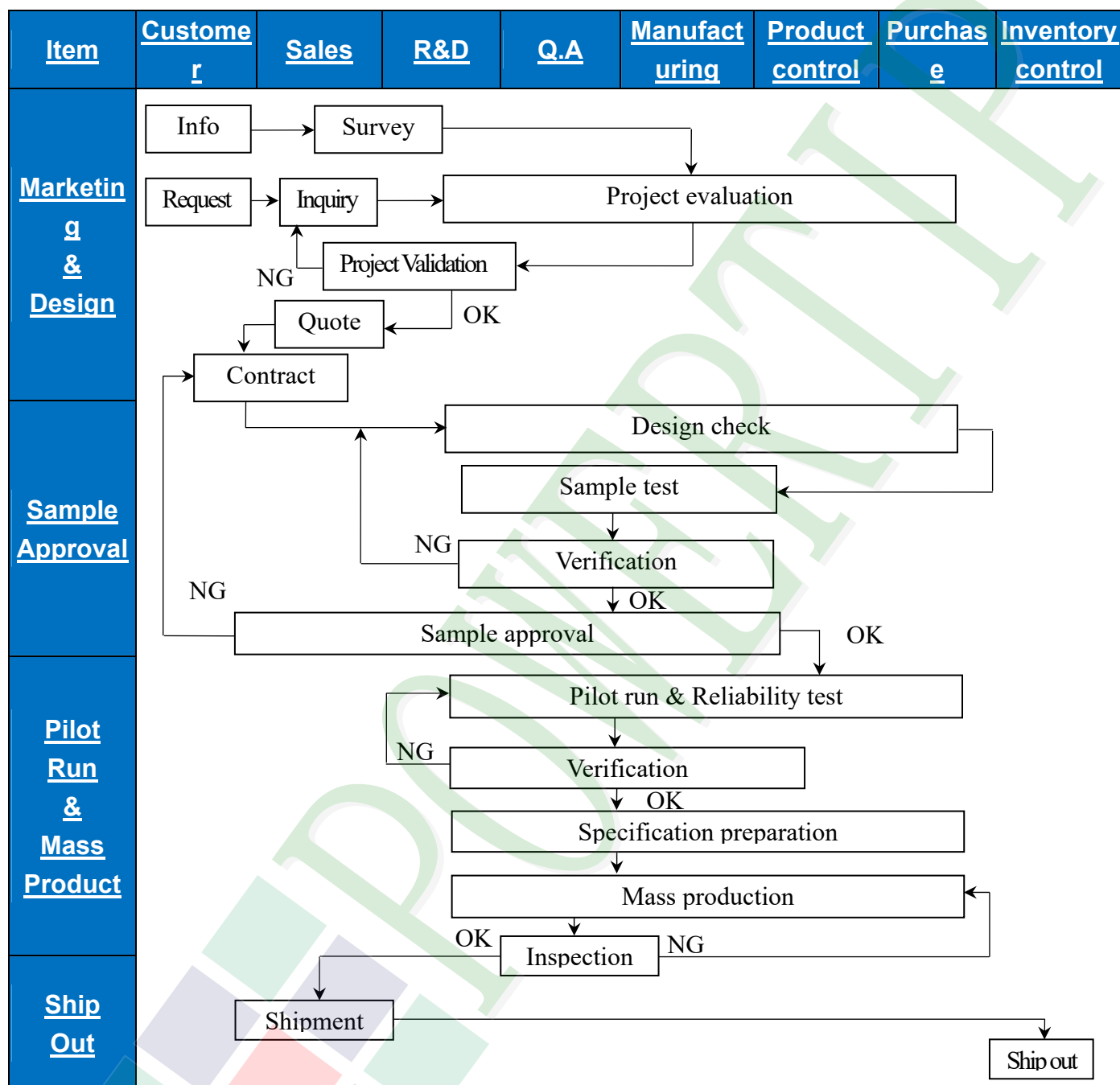
| <u>Pin No.</u> | <u>Symbol</u> | <u>Type</u> | <u>DESCRIPTION</u> |
|----------------|---------------|-------------|--------------------|
| 1 | VUSB5V | P | USB +5.0V. |
| 2 | D- | DS | Data – (Data M). |
| 3 | D+ | DS | Data + (Data P). |
| 4 | NC | - | Not Used. |
| 5 | GND | P | Ground. |

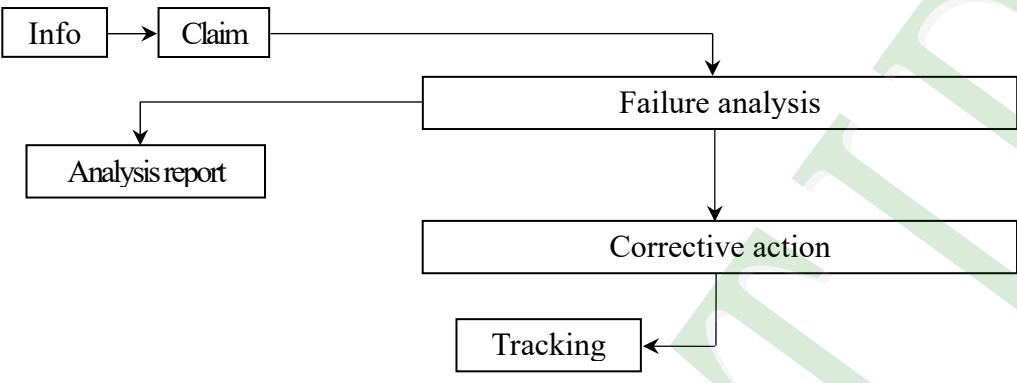
J11 --- RTC POWER

| <u>Pin No.</u> | <u>Symbol</u> | <u>Type</u> | <u>Function</u> |
|----------------|---------------|-------------|-----------------------|
| 1 | VBAT | P | Power Supply for RTC. |
| 2 | GND | P | Ground. |

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



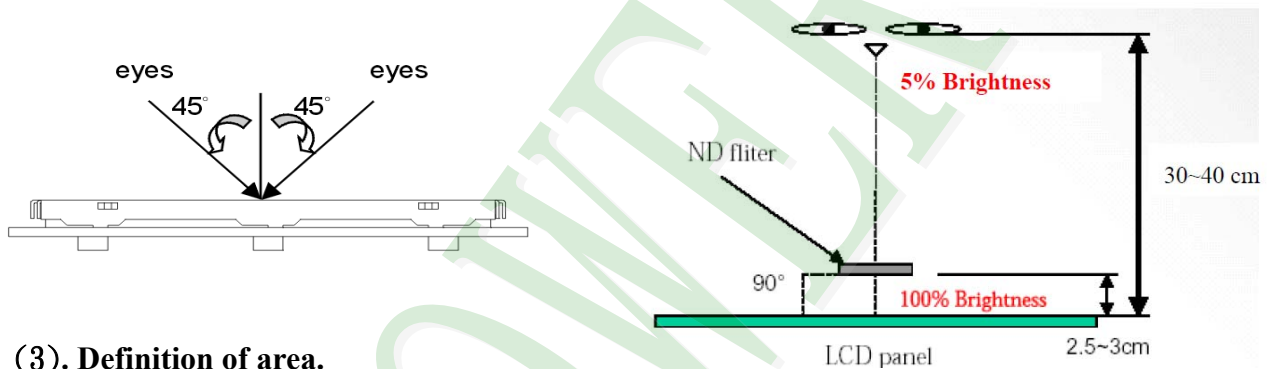
| Item | Customer | Sales | R&D | Q.A | Manufacturing | Product control | Purchase | Inventory control |
|----------------------|---|-------|-----|-----|---|-----------------|----------|-------------------|
| Sales Service |  <pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis]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

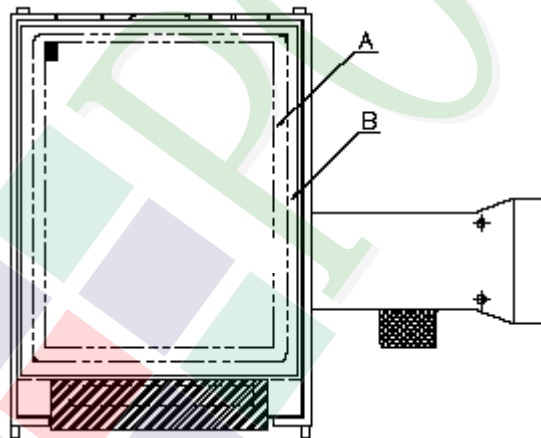
- ◆**Scope:** The document shall be applied to TFT-LCD Module for 3.5" ~15" (Ver.B01).
- ◆**Inspection Standard:** MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆**Equipment:** Gauge, MIL-STD, Powertip Tester, Sample
- ◆**Defect Level:** Major Defect AQL: 0.4; Minor Defect AQL: 1.5
- ◆**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(about 300lux ~500lux)
and distance of view must be at 30~40 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

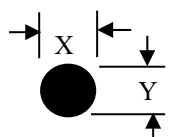
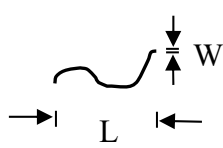
(4). Standard of inspection : (Unit : mm)

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

| <u>NO</u> | <u>Item</u> | <u>Criterion</u> | <u>Level</u> | | | | | | | | | | |
|---|---|---|--------------------------|--------------------------|------------|-----|----------|-----|-----------|-----|-------|-----|-------|
| 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 cannot be seen through 5% ND filter at 50% Gray, should be judged by the viewing angle of 90 degree. | Minor | | | | | | | | | | |
| 05 | Dot defect (Bright dot, Dark dot) On -display | <table><tr><th><u>Item</u></th><th><u>Acceptance (Q'ty)</u></th></tr><tr><td>Bright Dot</td><td>≤ 4</td></tr><tr><td>Dark Dot</td><td>≤ 5</td></tr><tr><td>Joint Dot</td><td>≤ 3</td></tr><tr><td>Total</td><td>≤ 7</td></tr></table> | <u>Item</u> | <u>Acceptance (Q'ty)</u> | Bright Dot | ≤ 4 | Dark Dot | ≤ 5 | Joint Dot | ≤ 3 | Total | ≤ 7 | Minor |
| | | <u>Item</u> | <u>Acceptance (Q'ty)</u> | | | | | | | | | | |
| 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. | | | | | | | | | | | | | |

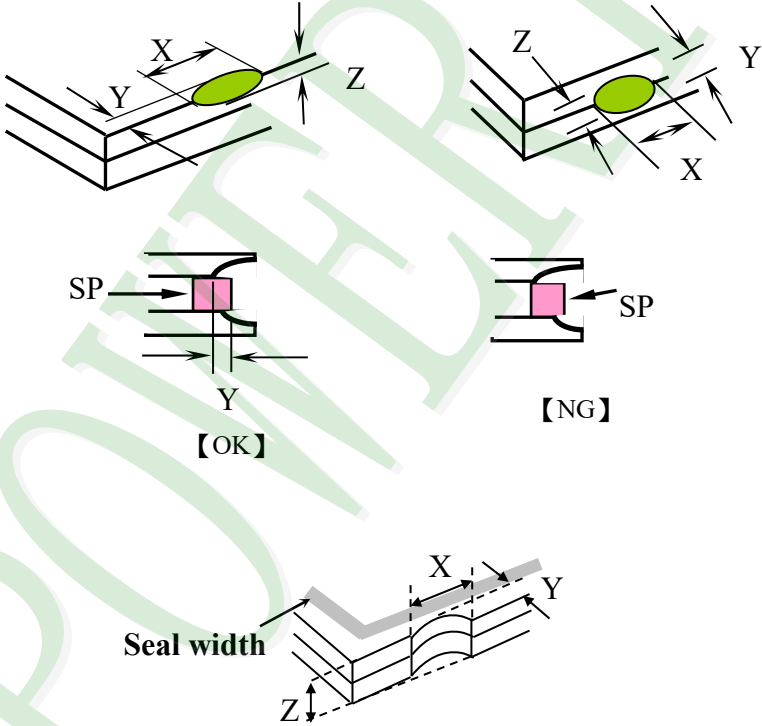
◆ Specification For TFT-LCD Module 3.5" ~15" :

(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><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>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.25 < \Phi \leq 0.50$</td><td>5</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><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="4">9" to 15"</td><td>---</td><td>$W \leq 0.05$</td><td>Ignore</td><td rowspan="4">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 | Ignore | $0.25 < \Phi \leq 0.50$ | 5 | $\Phi > 0.50$ | 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 | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.25 < \Phi \leq 0.50$ | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.50$ | 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 | <p>Polarizer Bubble</p> <table><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>Ignore</td><td rowspan="5">Ignore</td></tr><tr><td>$0.25 < \Phi \leq 0.50$</td><td>4</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 | Ignore | $0.25 < \Phi \leq 0.50$ | 4 | $0.50 < \Phi \leq 0.80$ | 1 | $\Phi > 0.80$ | 0 | Total | 5 | Minor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimension (diameter: Φ) | Acceptance (Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.25$ | Ignore | Ignore | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.25 < \Phi \leq 0.50$ | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.50 < \Phi \leq 0.80$ | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 0.80$ | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

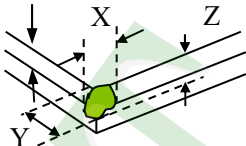
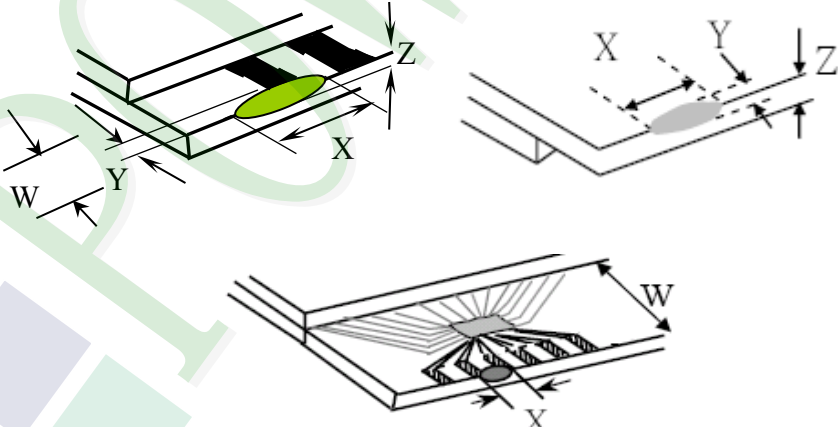
◆Specification For TFT-LCD Module 3.5" ~15" :

(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> <hr/> <p>8.1 General glass chip:</p> <p>8.1.1 Chip on panel surface and crack between panels:</p> <div></div> <table><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 | $\leq 1/2 t$ | $\leq a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$ | Minor |
| X | Y | Z | | | | | | | | | | |
| $\leq a$ | Crack can't enter viewing area | $\leq 1/2 t$ | | | | | | | | | | |
| $\leq a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$ | | | | | | | | | | |

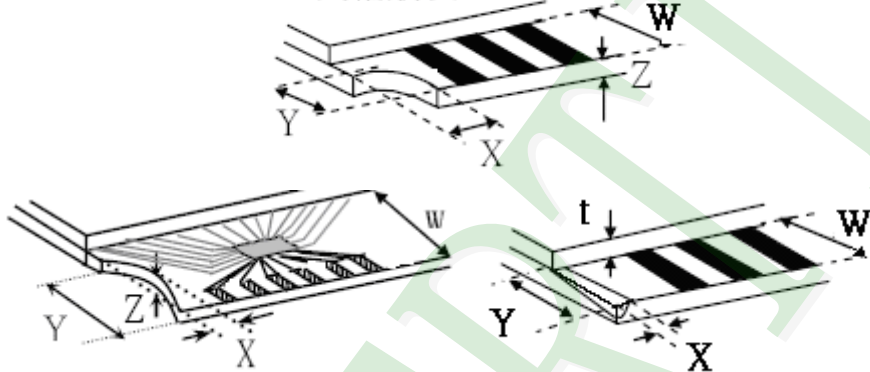
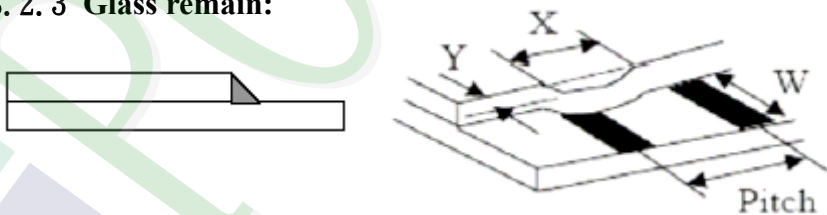

◆ Specification For TFT-LCD Module 3.5" ~15" :

(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> <p>8.1.2 Corner crack:</p>  <table><thead><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></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> | <u>X</u> | <u>Y</u> | <u>Z</u> | $\leq 1/5 a$ | 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 |
| | | <u>X</u> | <u>Y</u> | <u>Z</u> | | | | | | | | |
| $\leq 1/5 a$ | 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><thead><tr><th></th><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></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> | | <u>X</u> | <u>Y</u> | <u>Z</u> | Front | $\leq a$ | $\leq 1/2 W$ | $\leq t$ | Back | $\leq a$ | $\leq W$ | $\leq 1/2 t$ |
| | <u>X</u> | <u>Y</u> | <u>Z</u> | | | | | | | | | |
| 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 | | | | | | | | | | | | |
|--------------|--------------------|--|----------|----------|----------|--------------|----------|----------|----------|----------|----------|----------|--------------|----------|-------|
| 08 | The crack of glass | <p>Symbols:</p> <div> <div>X: The length of crack</div> <div>Y: The width of crack.</div> <div>Z: The thickness of crack</div> <div>W: terminal length</div> <div>t: The thickness of glass</div> <div>a: LCD side length</div> </div> <hr/> <p>8.2.2 Non-conductive portion:</p>  <table> <tr> <th><u>X</u></th> <th><u>Y</u></th> <th><u>Z</u></th> </tr> <tr> <td>$\leq 1/3 a$</td> <td>$\leq W$</td> <td>$\leq t$</td> </tr> </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> <tr> <th><u>X</u></th> <th><u>Y</u></th> <th><u>Z</u></th> </tr> <tr> <td>$\leq a$</td> <td>$\leq 1/3 W$</td> <td>$\leq t$</td> </tr> </table> <p>8.2.4 Cracking:</p>  <p>Not Allowed</p> | <u>X</u> | <u>Y</u> | <u>Z</u> | $\leq 1/3 a$ | $\leq W$ | $\leq t$ | <u>X</u> | <u>Y</u> | <u>Z</u> | $\leq a$ | $\leq 1/3 W$ | $\leq t$ | Minor |
| | | <u>X</u> | <u>Y</u> | <u>Z</u> | | | | | | | | | | | |
| $\leq 1/3 a$ | $\leq W$ | $\leq t$ | | | | | | | | | | | | | |
| <u>X</u> | <u>Y</u> | <u>Z</u> | | | | | | | | | | | | | |
| $\leq a$ | $\leq 1/3 W$ | $\leq t$ | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

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

| <u>NO</u> | <u>Item</u> | <u>Criterion</u> | <u>Level</u> |
|-----------|--------------------|--|--------------|
| 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: no wrong parts, missing parts or excess parts. | Major |
| | | 10. 4 Product packaging must the same as specified on packaging specification sheet. | Minor |
| | | 10. 5 The folding and peeled off in polarizer are not acceptable. | Minor |
| | | 10. 6 The PCB or FPC between B/L assembled distance(PCB or FPC) is ≤ 1.5 mm. | Minor |

4. RELIABILITY TEST

4.1 Reliability Test Condition

| NO. | TEST ITEM | TEST CONDITION | | | | | | | | | | |
|---------------------|---|--|---------------------|------------------|----------|-----|-------------|----|------------|----|----------|----|
| 1 | High Temperature Storage Test | Keep in +80 ±2℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | |
| 2 | Low Temperature Storage Test | Keep in -30 ±2℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | |
| 3 | High Temperature / High Humidity Storage Test | Keep in +60℃ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer) | | | | | | | | | | |
| 4 | Temperature Cycling Storage Test | <div>-30℃ → +25℃ → +80℃ → +25℃ (30mins) (5mins) (30mins) (5mins) ← 10 Cycle →</div> Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | |
| 5 | Vibration Test (Packaged) | 1. Sine wave 10~55 Hz frequency (1 min) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2 Hrs | | | | | | | | | | |
| 6 | Drop Test (Packaged) | <table><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr><tr><td>0 ~ 45.4</td><td>122</td></tr><tr><td>45.4 ~ 90.8</td><td>76</td></tr><tr><td>90.8 ~ 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table> Drop direction :※1 corner / 3 edges / 6 sides each 1times | Packing Weight (Kg) | Drop Height (cm) | 0 ~ 45.4 | 122 | 45.4 ~ 90.8 | 76 | 90.8 ~ 454 | 61 | Over 454 | 46 |
| Packing Weight (Kg) | Drop Height (cm) | | | | | | | | | | | |
| 0 ~ 45.4 | 122 | | | | | | | | | | | |
| 45.4 ~ 90.8 | 76 | | | | | | | | | | | |
| 90.8 ~ 454 | 61 | | | | | | | | | | | |
| Over 454 | 46 | | | | | | | | | | | |

Result Evaluation Criteria :

Under the display quality test conditions with normal operations with normal operation state.

Do not change these conditions as such changes may affect practical display function.

(Normal operation state)

Temperature : +20~30℃, Humidity : 50~70%, Atmospheric pressure : 86~106Kpa

NOTE:

In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

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 ketonic 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 (SPS) can lead to touch malfunction (e.g., ghost-touches). Therefore, the touch needs to be thoroughly tested inside the target application.
- 5.2.11 CAUTION: Continuously displaying same static image will result in high possibility of image sticking/image burn-in effect due to TFT panel characteristic.
- 5.2.12 Double-sided tape designed to be attached with the customer's mechanical device, please follow up the rules and regulations published by the original manufacturer of double-side tape for the attachment operation.

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.

[illegible]

| | | | | | |
|---------------|------------------------|--|---------|-------|---------|
| Ver.001 | | LCM包裝規格書 LCM Packaging Specifications | Approve | Check | Contact |
| Documents NO. | PKG-HNA800480T013IHC09 | | Marcus | Nini | Bright |

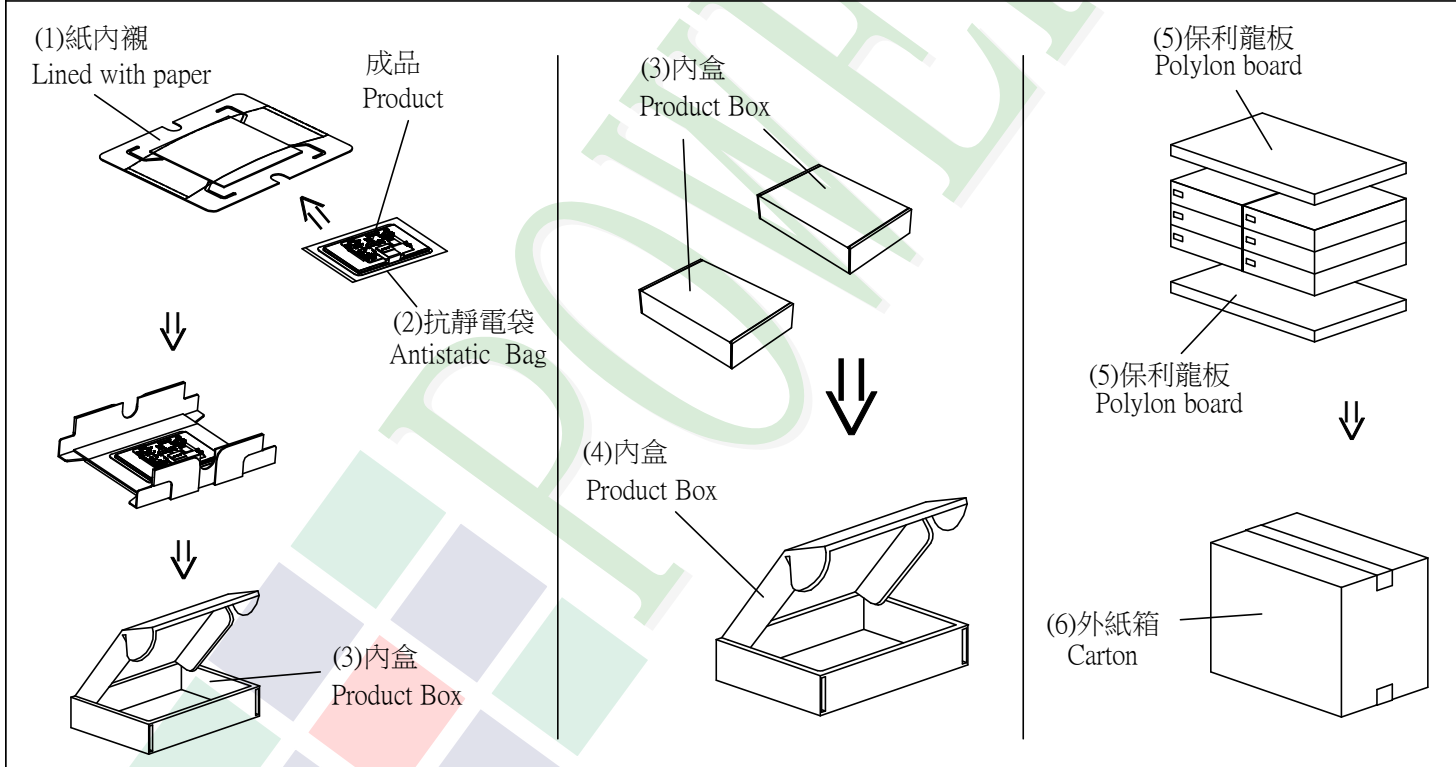
1.包裝材料規格表 (Packaging Material) : (per carton)

| No. | Item | Model | Dimensions (mm) | lPcs Weight | Quantity | Total Weight |
|-----|-------------------------|--------------------|-----------------|-------------|----------|--------------|
| 1 | 成品 (Product) | HNA800480T013IHC09 | 186.81 X 110.56 | 0.201 | 12 | 2.412 |
| 2 | 紙內襯 (1)Lined with paper | BX00000000132 | 347 X 262 | 0.07 | 12 | 0.84 |
| 3 | 抗靜電袋(2)Antistatic Bag | BAG240170ARABA | 170 X 240 | 0.005 | 12 | 0.06 |
| 4 | 內盒(3)Product Box | BX00000000131 | 258 X 175 X 58 | 0.11 | 12 | 1.32 |
| 5 | 內盒(4)Product Box | BX36627063ABBA | 383 X 270 X 66 | 0.2 | 6 | 1.2 |
| 6 | 保利龍板(5)Polylon board | OTPLB00PL08ABA | 550 X 393 X 20 | 0.0284 | 2 | 0.0568 |
| 7 | 外紙箱(6)Carton | BX57041027CCBA | 570 X 410 X 265 | 1.4208 | 1 | 1.4208 |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |

2.一整箱總重量 (Total LCD Weight in carton) : 7.31 Kg±10%

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

| | | | | | |
|---|---|-------------------|---|---|----|
| (1)LCM quantity per small box : no per lined with paper | 1 | x no of small box | 1 | = | 1 |
| (2)Total LCM quantity in big box : quantity per small box | 1 | x no of big boxes | 2 | = | 2 |
| (3)Total LCM quantity in carton : quantity per big box | 2 | x no of cartons | 6 | = | 12 |



特 記 事 項 (REMARK)

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