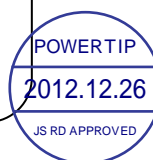


## SPECIFICATIONS

|                        |   |                                   |
|------------------------|---|-----------------------------------|
| CUSTOMER               | : | CTW1382                           |
| SAMPLE CODE            | : | SE9665WRF-002-I02Q                |
| MASS PRODUCTION CODE   | : | PE9665WRF-002-I02Q                |
| SAMPLE VERSION         | : | 02                                |
| SPECIFICATIONS EDITION | : | 005                               |
| DRAWING NO. (Ver.)     | : | LMD- PE9665WRF-002-I02Q (Ver:005) |
| PACKAGING NO. (Ver.)   | : | PKG- PE9665WRF-002-I02Q (Ver:003) |

**Customer Approved**

Date:



| Approved | Checked | Designer |
|----------|---------|----------|
| 閻偉       | 劉進      | 趙冬冬      |

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

## POWERTIP TECH. CORP.

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 Http://www.powertip.com.tw



## History of Version

[illegible]

Total : 26 Page

## Contents

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

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- 2.2 Interface Pin Description
- 2.3 Timing Characteristics

### 3. QUALITY ASSURANCE SYSTEM

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- 5.2 Handling
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#### Appendix :

- 1. LCM drawing
- 2. LCM Packaging Specifications

Note : For detailed information please refer to IC data sheet : SITRONIX –ST7579-G2

## 1. SPECIFICATIONS

### 1.1 Features

| Item              | Standard Value   |
|-------------------|--|
| Display Type      | 96 * 65 Dots   |
| LCD Type          | FSTN, Positive, Transflective  |
| Driver Condition  | LCD Module :1/68 Duty, 1/9 Bias  |
| Viewing Direction | 6 O'clock  |
| Backlight         | LED B/L  |
| Weight            | 5 g  |
| Interface         | 3-line SPI (serial peripheral interface)   |
| Driver IC         | SITRONIX – ST7579-G2   |
| ROHS              | THIS PRODUCT CONFORMS THE ROHS OF PTC<br>Detail information please refer web side :<br><a href="http://www.powertip.com.tw/news/LatestNews.asp">http://www.powertip.com.tw/news/LatestNews.asp</a> |

### 1.2 Mechanical Specifications

| Item              | Standard Value                | Unit |
|-------------------|-------------------------------|------|
| Outline Dimension | 34.0 (W) * 30.4 (L) * 3.1 (H) | mm   |
| Viewing Area      | 27.8 (W) * 18.9 (L)           | mm   |
| Active Area       | 25.42 (W) * 16.88 (L)         | mm   |
| Dot Size          | 0.245 (W) * 0.24 (H)          | mm   |
| Dot Pitch         | 0.265 (W) * 0.26 (H)          | mm   |

Note : For detailed information please refer to LCM drawing

### 1.3 Absolute Maximum Ratings

| Item                      | Symbol                          | Condition  | Min. | Max. | Unit |
|---------------------------|---------------------------------|------------|------|------|------|
| Power Supply Voltage      | V <sub>DD</sub>                 | —          | -0.3 | 3.6  | V    |
| LCD Driver Supply Voltage | V <sub>0</sub> –XV <sub>0</sub> | —          | -0.3 | 15   | V    |
| Operating Temperature     | T <sub>OP</sub>                 | —          | -20  | 70   | °C   |
| Storage Temperature.      | T <sub>ST</sub>                 | —          | -30  | 80   | °C   |
| Storage Humidity          | H <sub>D</sub>                  | Ta < 40 °C | 20   | 90   | %RH  |

## 1.4 DC Electrical Characteristics

Ta = 25°C

| Item                 | Symbol                | Condition   | Min.               | Typ. | Max.               | Unit |
|----------------------|-----------------------|---|--------------------|------|--------------------|------|
| Logic Supply Voltage | V <sub>dd</sub>       | —   | 2.6                | 2.8  | 3.0                | V    |
| “H” Input Voltage    | V <sub>IH</sub>       | —   | 0.7V <sub>DD</sub> | —    | V <sub>DD</sub>    | V    |
| “L” Input Voltage    | V <sub>IL</sub>       | —   | V <sub>SS</sub>    | —    | 0.3V <sub>DD</sub> | V    |
| “H” Output Voltage   | V <sub>OH</sub>       | I <sub>OUT</sub> =1mA, V <sub>DD</sub> =1.8V                                    | 0.8V <sub>DD</sub> | —    | V <sub>DD</sub>    | V    |
| “L” Output Voltage   | V <sub>OL</sub>       | I <sub>OUT</sub> =-1mA, V <sub>DD</sub> =1.8V                                   | V <sub>SS</sub>    | —    | 0.2V <sub>DD</sub> | V    |
| Supply Current       | I <sub>dd</sub>       | V <sub>DD</sub> = 2.8 V; V <sub>OP</sub> = 8.5 V;<br>Pattern= Full display      | —                  | 0.2  | —                  | mA   |
|                      |                       | V <sub>DD</sub> = 2.8 V; V <sub>OP</sub> = 8.5 V;<br>Pattern= Horizontal line*1 | —                  | 0.2  | 0.5                |      |
| LCM Driver Voltage   | V <sub>OP</sub><br>*2 | -20°C   | 8.7                | 8.8  | 8.9                | V    |
|                      |                       | 25°C  | 8.3                | 8.5  | 8.7                |      |
|                      |                       | 70°C  | 7.7                | 7.8  | 7.9                |      |

NOTE: \*1 The Maximum current display;

\*2 The VOP test point is V0~XV0.

## 1.5 Optical Characteristics

LCD Panel: 1/68 Duty, 1/9 Bias,  $V_{LCD} = 8.5\text{ V}$ ,  $T_a = 25^\circ\text{C}$

| Item                            |        | Symbol      | Conditions                                | Min. | Typ.   | Max.   | Unit              | Reference |
|---------------------------------|--------|-------------|---|------|--------|--------|-------------------|-----------|
| Response Time                   | Rise   | tr          | 25°C                                      | -    | 120 ms | 180 ms | -                 | Note2     |
|                                 | Fall   | tf          | 25°C                                      | -    | 200 ms | 300 ms |                   |           |
| Viewing angle range             | Top    | $\theta Y+$ | $C \geq 2.0$ ,<br>$\phi = 90^\circ$       | -    | 20     | -      | -                 | Note 1    |
|                                 | Bottom | $\theta Y-$ |   | -    | 30     | -      |                   |           |
|                                 | Left   | $\theta X-$ |   | -    | 20     | -      |                   |           |
|                                 | Right  | $\theta X+$ |   | -    | 25     | -      |                   |           |
| Contrast Ratio                  |        | C           | $\theta = 0^\circ$ ,<br>$\phi = 90^\circ$ | 2    | -      | -      | -                 | Note 3    |
| Average Brightness (with B/L)   |        | IV          | IF= 20 mA                                 | 110  | 165    | 220    | cd/m <sup>2</sup> | -         |
| CIE Color Coordinate (With B/L) |        | X           |   | 0.23 | 0.28   | 0.33   | -                 | Note 4    |
|                                 |        | Y           |   | 0.25 | 0.30   | 0.35   | -                 |           |
| Uniformity                      |        | $\Delta B$  |   | 70   | -      | -      | %                 |           |

Note 4:

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

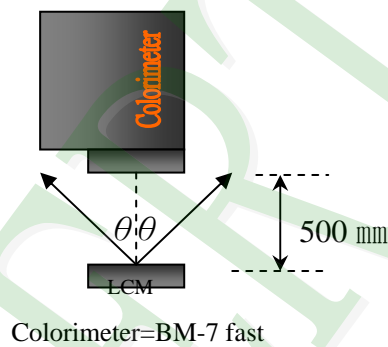
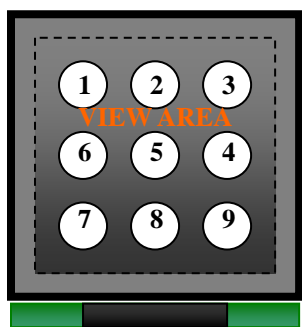
2 : Measurement Condition for Optical Characteristics:

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:  $500 \pm 50$  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  $\pm 0.01$  , Average Brightness  $\pm 4\%$

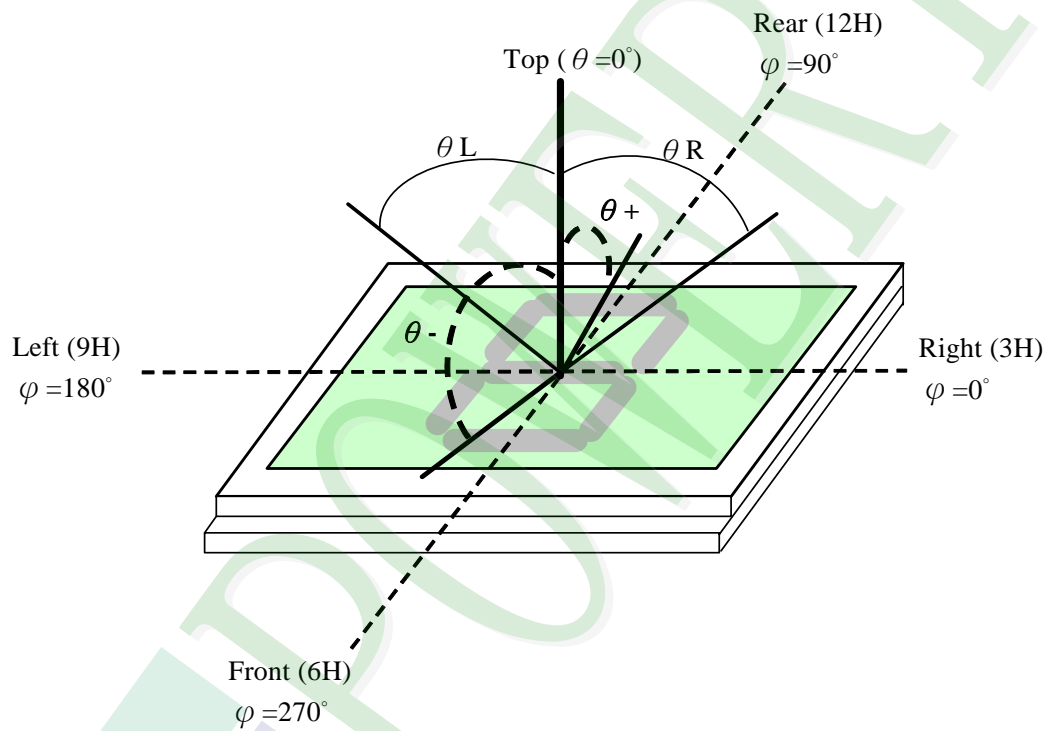




Note 1.

Optical characteristics-2

Viewing angle



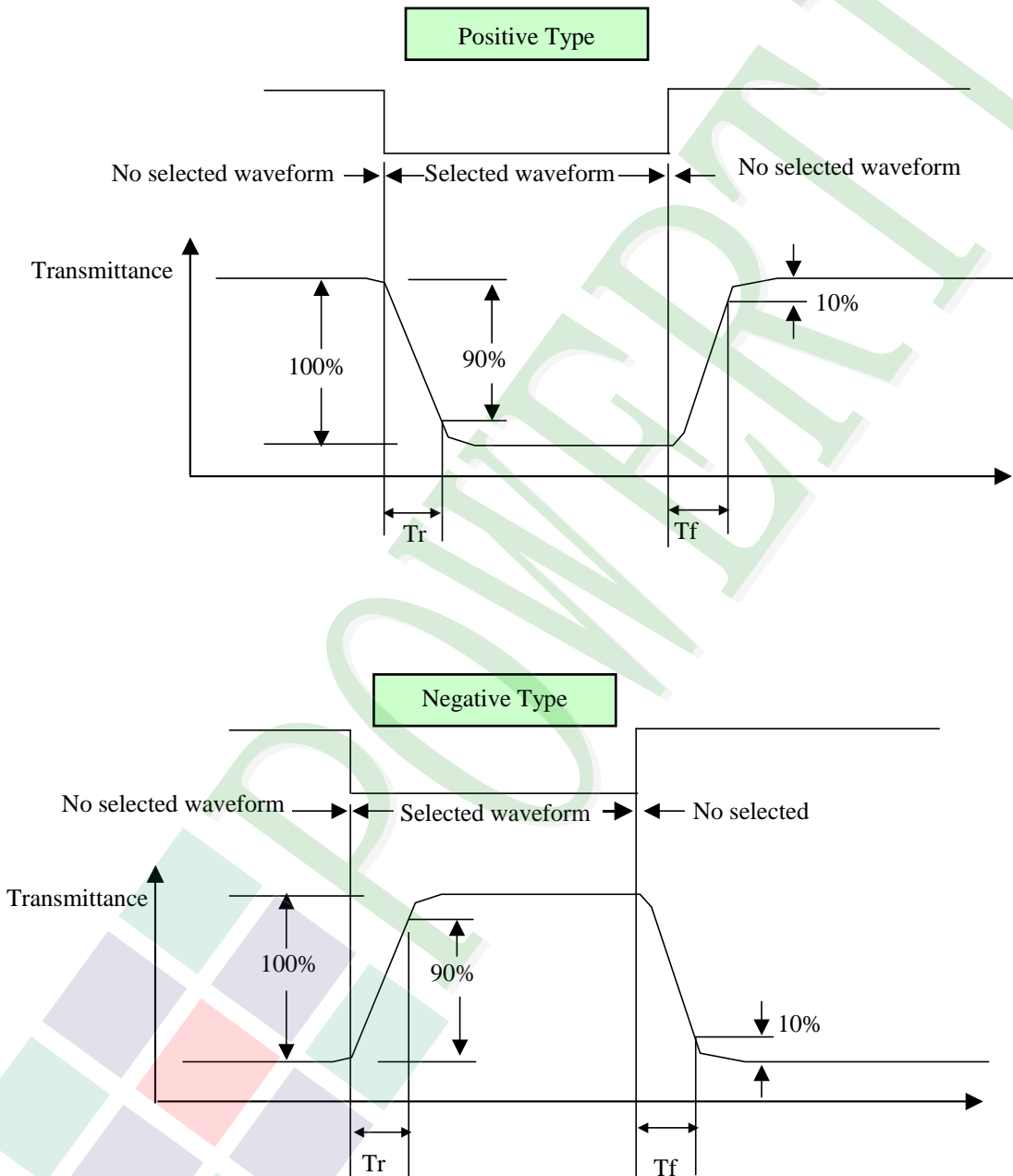




Note 2.

Optical characteristics-3

Fig.2 Definition of response time





## Electrical characteristics-2

※2 Drive waveform

$V_{op}$ : Drive voltage

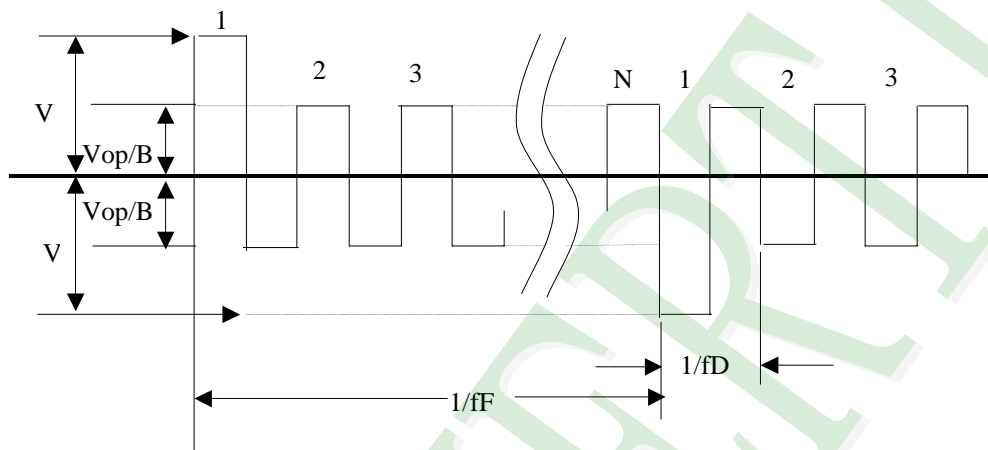
$f_F$ : Frame frequency

$1/B$ : Bias

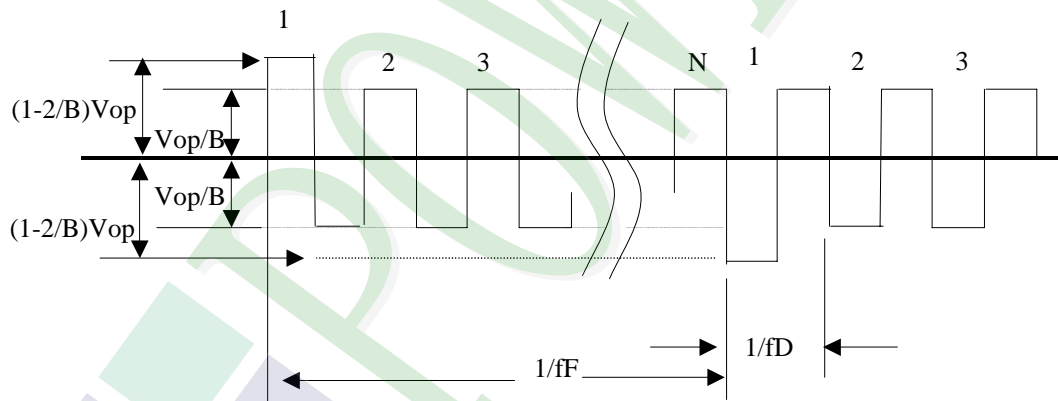
$f_D$ : Drive frequency

$N$ : Duty

### (1) Selected waveform



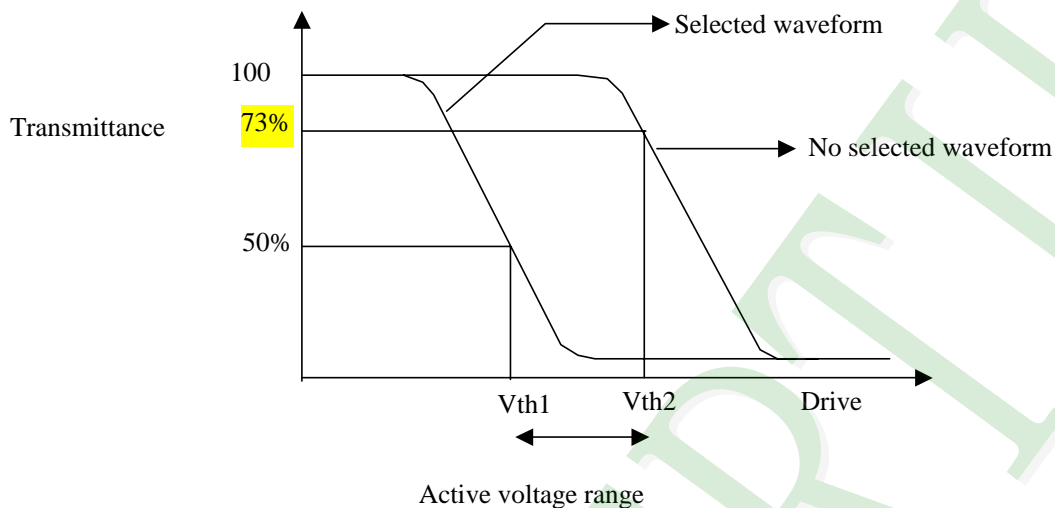
### (2) Non- Selected wave form



Note:

Frame frequency is defined as follows: Common side supply voltage peak - to - peak / 2 = 1 period

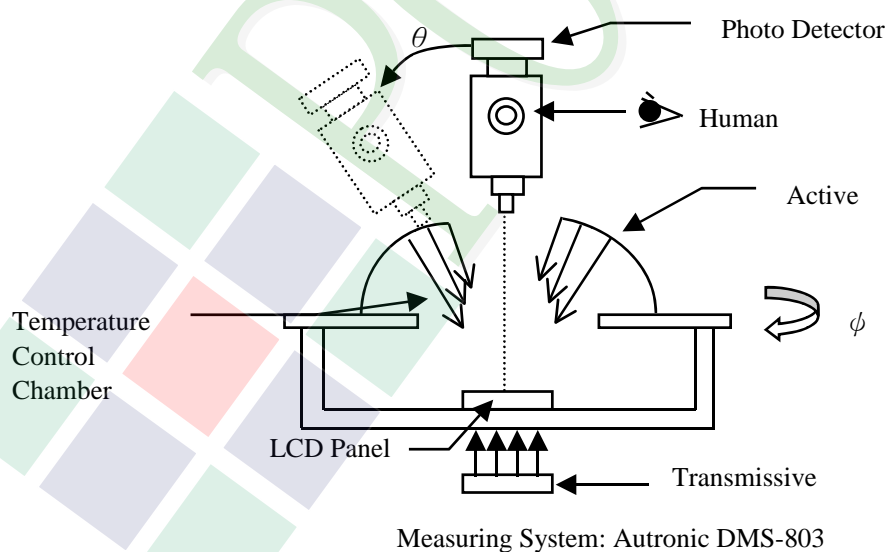
Note 3. : Definition of Vth



|                | Vth1                | Vth2                   |
|----------------|---------------------|------------------------|
| View direction | 10°                 | 40°                    |
| Drive waveform | (Selected waveform) | (No selected waveform) |
| Transmittance  | 50%                 | 73%                    |

※1 Contrast ratio  
= (Brightness in OFF state) / (Brightness in ON state)

Outline of Electro-Optical Characteristics Measuring System



## 1.6 Backlight Characteristics

LCD Module with LED Backlight

### Maximum Ratings

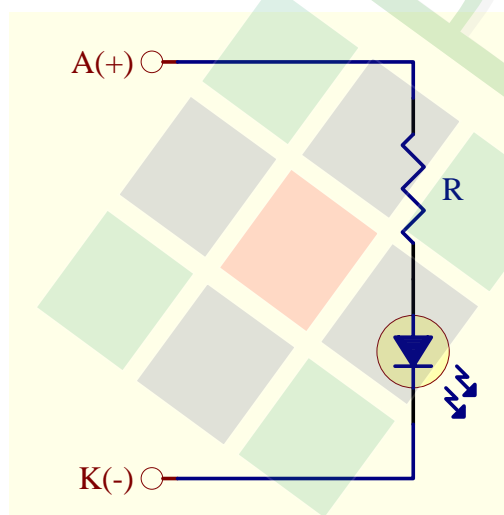
| Item            | Symbol | Conditions               | Min. | Max. | Unit |
|-----------------|--------|--------------------------|------|------|------|
| Forward Current | $I_F$  | $T_a = 25^\circ\text{C}$ | -    | 30   | mA   |
| Reverse Current | $I_R$  |                          | -    | 0.05 | mA   |
| Forward Voltage | $V_F$  |                          | -    | 4    | V    |
| Reverse Voltage | $V_R$  |                          | -    | 5    | V    |

### Electrical / Optical Characteristics

$T_a = 25^\circ\text{C}$

| Item                                  | Symbol | Conditions | Min. | Typ. | Max. | Unit              |
|---------------------------------------|--------|------------|------|------|------|-------------------|
| Forward Voltage                       | VF     | IF= 20mA   | 3.1  | 3.3  | 3.5  | V                 |
| Average Brightness<br>(without LCD)   | IV     |            | 400  | 500  | 600  | cd/m <sup>2</sup> |
| CIE Color Coordinate<br>(without LCD) | X      |            | 0.25 | 0.28 | 0.31 | -                 |
|                                       | Y      |            | 0.25 | 0.28 | 0.31 | -                 |
| Color                                 | White  |            |      |      |      |                   |

### Internal Circuit Diagram:



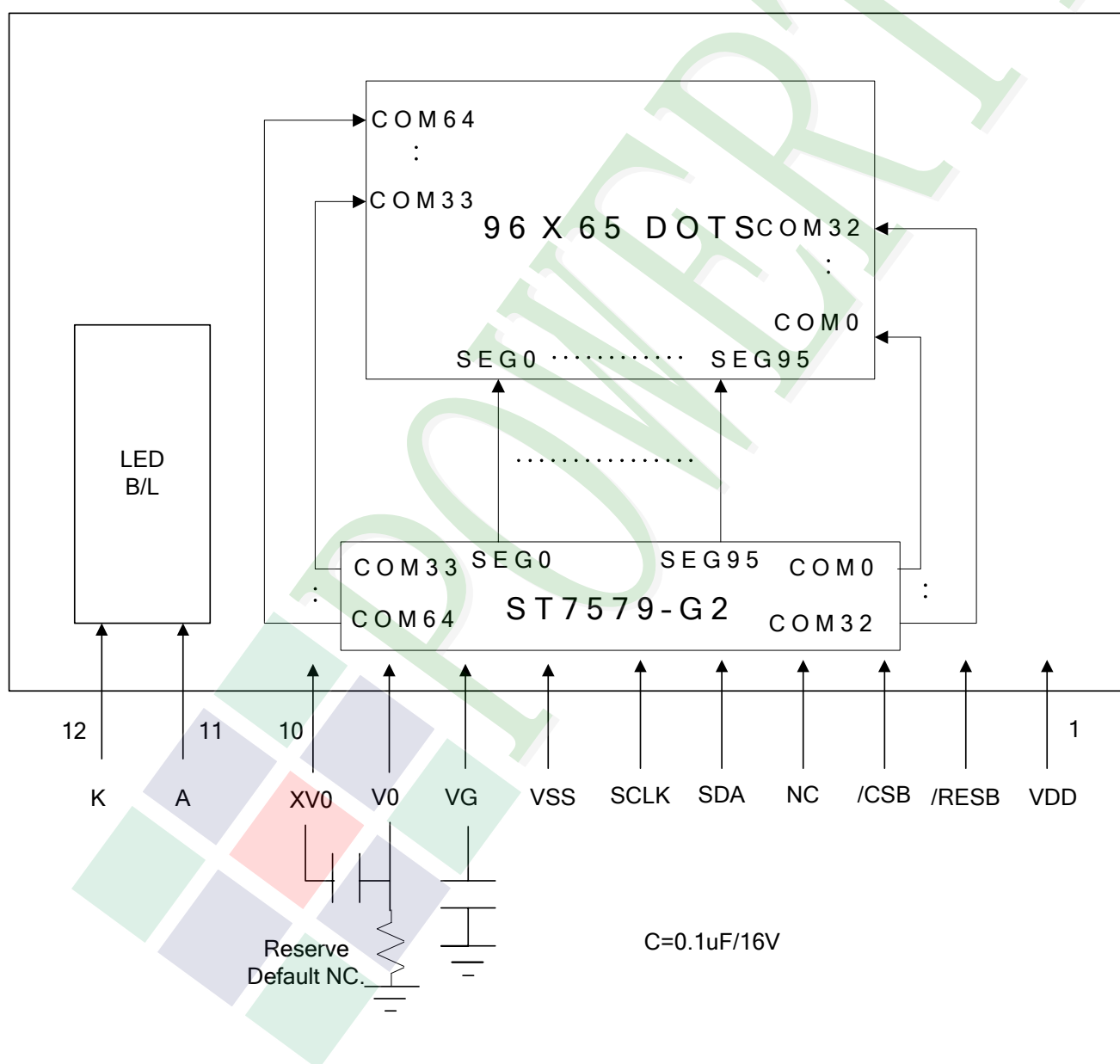
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\* See Appendix

#### 2.1.2 Block Diagram

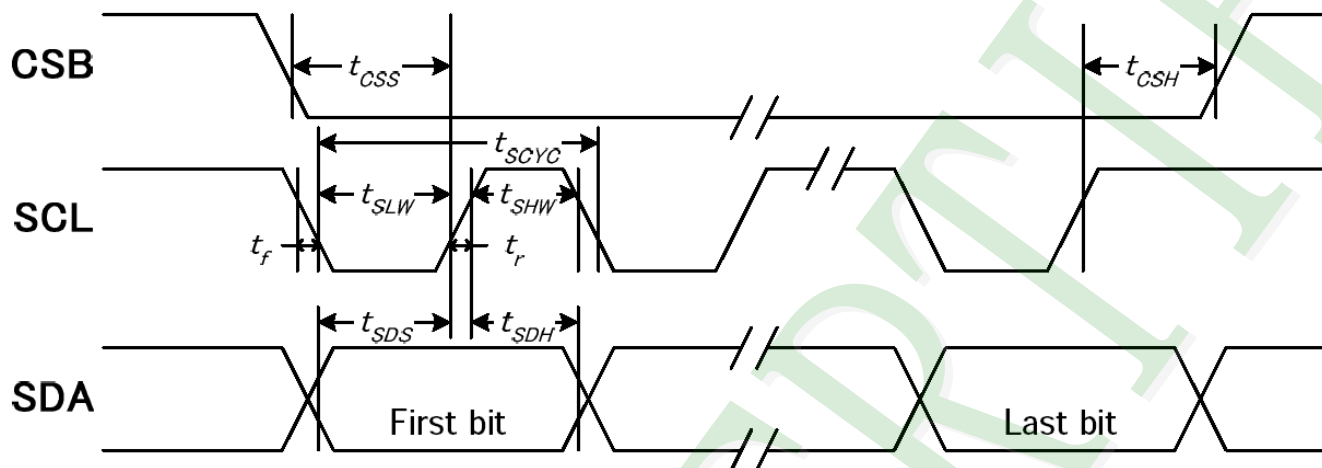


## 2.2 Interface Pin Description

| Pin No. | Symbol | Function  |
|---------|--------|---|
| 1       | VDD    | Power supply.   |
| 2       | /RESB  | Reset input pin.<br>When RESB is “L” , internal initialization is executed. |
| 3       | /CSB   | Chip select input pin.<br>Interface access is enabled when CSB is “L” .     |
| 4       | NC     | Not connection.   |
| 5       | SDA    | Serial data input,  |
| 6       | SCLK   | Serial clock input.   |
| 7       | VSS    | Ground.   |
| 8       | VG     | LCD driving voltage for segments.   |
| 9       | V0     | LCD driving voltage for commons at negative frame.                          |
| 10      | XV0    | LCD driving voltage for commons at positive frame.                          |
| 11      | A      | Backlight LED anode input pin.  |
| 12      | K      | Backlight LED cathode input pin.  |

## 2.3 Timing Characteristics

### SERIAL INTERFACE (3-Line Interface)

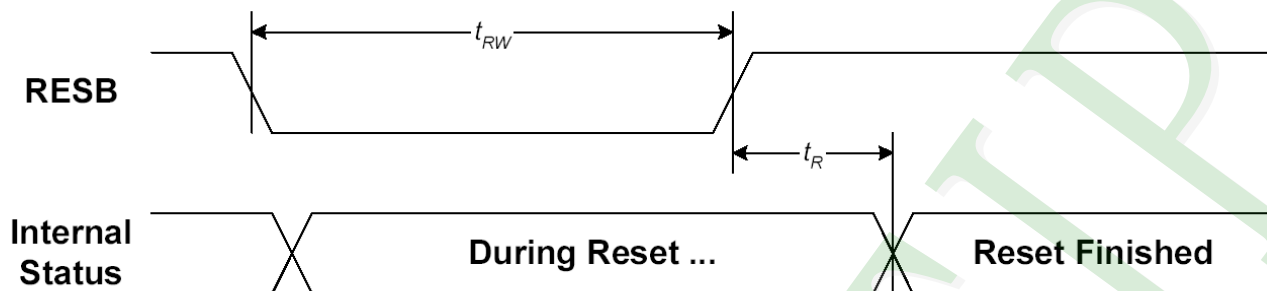


| Item                 | Signal | Symbol | Condition | Min. | Max. | Unit |
|----------------------|--------|--------|-----------|------|------|------|
| Serial clock period  | SCLK   | tSCYC  |           | 180  | —    | ns   |
| SCLK "H" pulse width |        | tSHW   |           | 90   | —    |      |
| SCLK "L" pulse width |        | tSLW   |           | 90   | —    |      |
| Data setup time      | SDA    | tSDS   |           | 30   | —    |      |
| Data hold time       |        | tSDH   |           | 20   | —    |      |
| CSB-SCLK time        | CSB    | tCSS   |           | 30   | —    |      |
| CSB-SCLK time        |        | tCSH   |           | 160  | —    |      |

\*1 The input signal rise and fall time ( $t_r$ ,  $t_f$ ) are specified at 15 ns or less.

\*2 All timing is specified using 20% and 80% of VDD1 as the standard.

## RESET TIMING

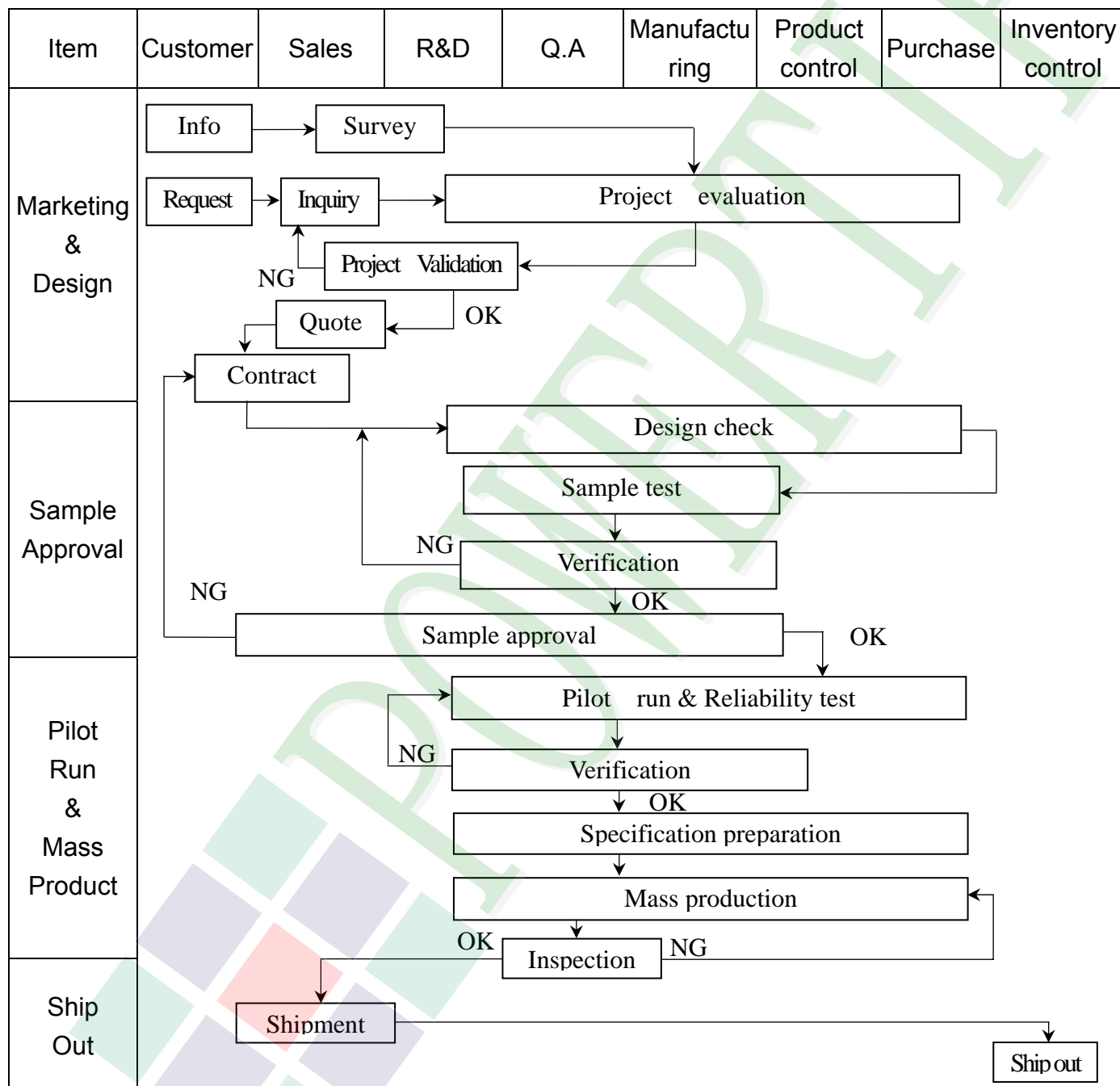


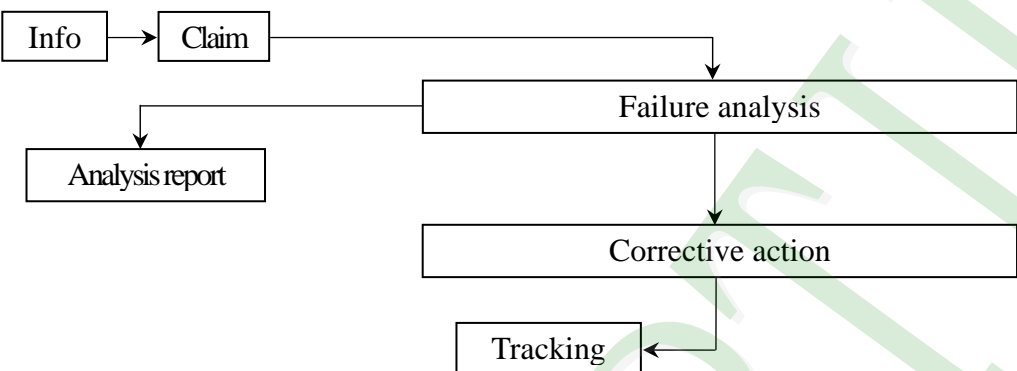
| Item                  | Symbol   | Condition | Min. | Max. | Unit |
|-----------------------|----------|-----------|------|------|------|
| Reset time            | $t_R$    |           | —    | 2.0  | us   |
| Reset "L" pulse width | $t_{RW}$ |           | 2.0  |      |      |



### 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]     Claim --&gt; Report[Analysis report]     Failure --&gt; Action[Corrective action]     Action --&gt; Tracking[Tracking]         </pre> |       |     |     |               |                 |          |                   |
| Q.A Activity  | <div> 1. ISO 9001 Maintenance Activities<br/> 3. Equipment calibration<br/> 5. Standardization Management </div> <div> 2. Process improvement proposal<br/> 4. Education And Training Activities </div>   |       |     |     |               |                 |          |                   |

## 3.2 Inspection Specification

- ◆ **Scope** : The document shall be applied to LCD Module for Monotype and Color STN(Ver. 02).
- ◆ **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 .
- ◆ **Manner of appearance test** :
  - (1). The test be under 20W×2 fluorescent light ' and distance of view must be at 30 cm.
  - (2). Standard of inspection : (Unit : mm)
  - (3). The test direction is base on about around 45° of vertical line. (Fig. 1)
  - (4). Definition of area . (Fig. 2)

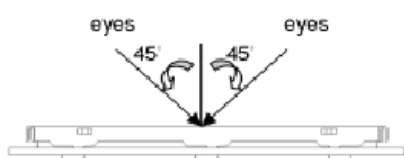


Fig.1

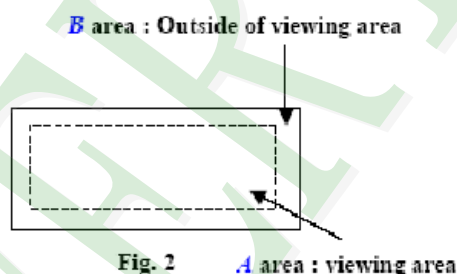


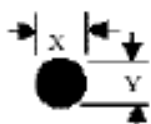

Fig. 2

### ◆ Specification:

| NO | Item               | Criterion   | level |
|----|--------------------|---|-------|
| 01 | Product condition  | 1. 1 The part number is inconsistent with work order of Production.     | Major |
|    |                    | 1. 2 Mixed production 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 Output data is error.  | Major |
|    |                    | 4. 4 LCD viewing angle defect.  | Major |
|    |                    | 4. 5 Current consumption exceeds product specifications.                | Major |

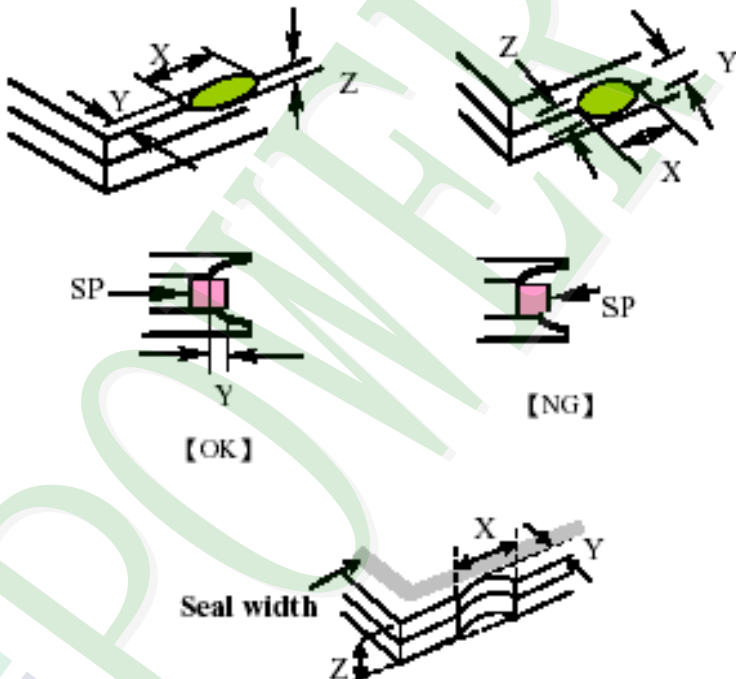
## ◆Specification For Monotype and Color STN :

(Ver. 02)

| NO                             | Item  | Criterion   | level                          |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
|--------------------------------|---|---|--------------------------------|-------------------|------------------|-----------------|-------------------------|------------------|-------------------------|-------------|-------------------------|---|-------------|-------------------------|-------------------|-------------|---------------|-----------|-------------|----------------|-----|---------------|-----------------|-------------|--------------|----------------------|---|-------------|--------------|-----------------------|-------------|-----|-------------|---------------|--|--|
| 05                             | Black or white dot 、 scratch 、 contamination  | 5. 1 Round type:<br>5. 1. 1 display only : <ul style="list-style-type: none"><li>• White and black spots on display <math>\leq 0.30</math> mm , no more than 4 white or black spots present.</li><li>• Densely spaced : NO more than two spots or lines within 3 mm.</li></ul> 5. 1. 2 Non-display :  | Minor                          |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
|                                | Round type<br><br>$\Phi = (x+y)/2$<br><br>Line type<br> |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
|                                |   | <table border="1"><thead><tr><th>Dimension (diameter : <math>\Phi</math>)</th><th>Acceptance (Q'ty)</th></tr></thead><tbody><tr><td><math>\Phi \leq 0.10</math></td><td>Accept no dense</td></tr><tr><td><math>0.10 &lt; \Phi \leq 0.20</math></td><td>3</td></tr><tr><td><math>0.20 &lt; \Phi \leq 0.30</math></td><td>2</td></tr><tr><td>Total quantity</td><td>4</td></tr></tbody></table><br>5. 1. 3 Line type: <table border="1"><thead><tr><th colspan="2">Dimension</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>Length (L)</th><th>Width (W)</th><th>A area</th><th>B area</th></tr></thead><tbody><tr><td>---</td><td><math>W \leq 0.03</math></td><td>Accept no dense</td><td>Don't count</td></tr><tr><td><math>L \leq 3.0</math></td><td><math>0.03 &lt; W \leq 0.05</math></td><td rowspan="2">4</td><td>Don't count</td></tr><tr><td><math>L \leq 2.5</math></td><td><math>0.05 &lt; W \leq 0.075</math></td><td>Don't count</td></tr><tr><td>---</td><td><math>W &gt; 0.075</math></td><td colspan="2">As round type</td></tr></tbody></table> | Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty) | $\Phi \leq 0.10$ | Accept no dense | $0.10 < \Phi \leq 0.20$ | 3                | $0.20 < \Phi \leq 0.30$ | 2           | Total quantity          | 4 | Dimension   |                         | Acceptance (Q'ty) |             | Length (L)    | Width (W) | A area      | B area         | --- | $W \leq 0.03$ | Accept no dense | Don't count | $L \leq 3.0$ | $0.03 < W \leq 0.05$ | 4 | Don't count | $L \leq 2.5$ | $0.05 < W \leq 0.075$ | Don't count | --- | $W > 0.075$ | As round type |  |  |
| Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty)   |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $\Phi \leq 0.10$               | Accept no dense   |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $0.10 < \Phi \leq 0.20$        | 3   |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $0.20 < \Phi \leq 0.30$        | 2   |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| Total quantity                 | 4   |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| Dimension                      |   | Acceptance (Q'ty)   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| Length (L)                     | Width (W)   | A area  | B area                         |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| ---                            | $W \leq 0.03$   | Accept no dense   | Don't count                    |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $L \leq 3.0$                   | $0.03 < W \leq 0.05$  | 4   | Don't count                    |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $L \leq 2.5$                   | $0.05 < W \leq 0.075$   |   | Don't count                    |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| ---                            | $W > 0.075$   | As round type   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| 06                             | Polarizer Bubble  | <table border="1"><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 0.20</math></td><td>Accept no dense</td><td>Don't count</td></tr><tr><td><math>0.20 &lt; \Phi \leq 0.50</math></td><td>3</td><td>Don't count</td></tr><tr><td><math>0.50 &lt; \Phi \leq 1.00</math></td><td>2</td><td>Don't count</td></tr><tr><td><math>\Phi &gt; 1.00</math></td><td>0</td><td>Don't count</td></tr><tr><td>Total quantity</td><td>4</td><td>Don't count</td></tr></tbody></table>   | Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty) |                  | A area          | B area                  | $\Phi \leq 0.20$ | Accept no dense         | Don't count | $0.20 < \Phi \leq 0.50$ | 3 | Don't count | $0.50 < \Phi \leq 1.00$ | 2                 | Don't count | $\Phi > 1.00$ | 0         | Don't count | Total quantity | 4   | Don't count   | Minor           |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| Dimension (diameter : $\Phi$ ) | Acceptance (Q'ty)   |   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
|                                | A area  | B area  |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $\Phi \leq 0.20$               | Accept no dense   | Don't count   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $0.20 < \Phi \leq 0.50$        | 3   | Don't count   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $0.50 < \Phi \leq 1.00$        | 2   | Don't count   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| $\Phi > 1.00$                  | 0   | Don't count   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |
| Total quantity                 | 4   | Don't count   |                                |                   |                  |                 |                         |                  |                         |             |                         |   |             |                         |                   |             |               |           |             |                |     |               |                 |             |              |                      |   |             |              |                       |             |     |             |               |  |  |

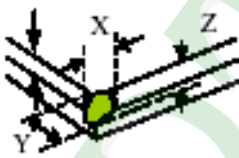
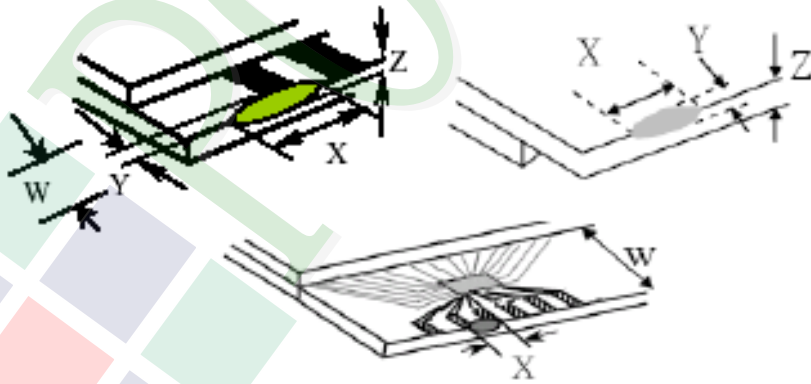
## ◆Specification For Monotype and Color STN :

(Ver. 02)

| NO       | Item                                     | Criterion  | Level |   |   |   |          |                                |              |
|----------|--|--|-------|---|---|---|----------|--------------------------------|--------------|
| 07       | 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>7.1 General glass chip :</p> <p>7.1.1 Chip on panel surface and crack between panels:</p>  <table><tr><th>X</th><th>Y</th><th>Z</th></tr><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></table> |       | X | Y | Z | $\leq a$ | Crack can't enter viewing area | $\leq 1/2 t$ |
| X        | Y  | Z  |       |   |   |   |          |                                |              |
| $\leq a$ | Crack can't enter viewing area           | $\leq 1/2 t$   |       |   |   |   |          |                                |              |
| $\leq a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$   |       |   |   |   |          |                                |              |

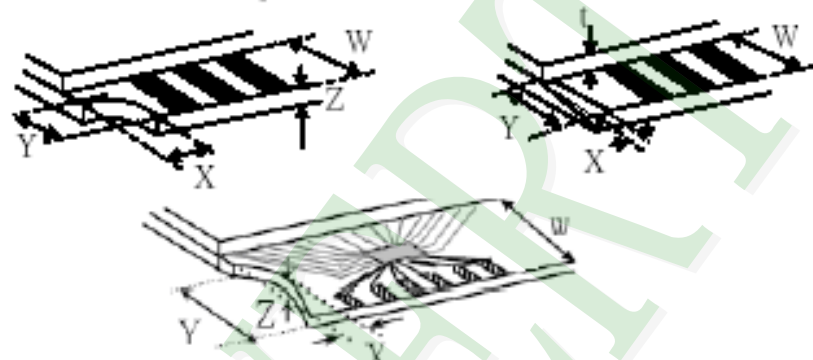
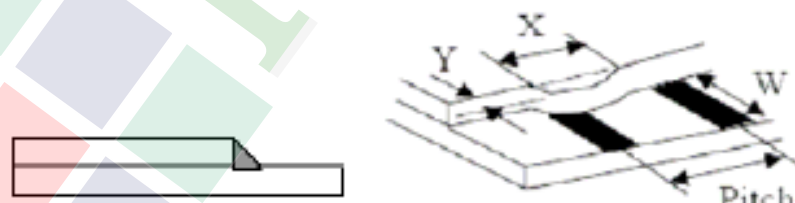
## ◆Specification For Monotype and Color STN :

(Ver. 02)

| NO   | Item                                     | Criterion  | Level    |   |       |              |                                |                |              |  |                      |       |
|--|--|--|----------|---|-------|--------------|--------------------------------|----------------|--------------|--|----------------------|-------|
| 07   | 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> <p>7.1.2 Corner crack :</p>  <table><tr><th>X</th><th>Y</th><th>Z</th></tr><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></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>7.2 Protrusion over terminal :</p> <p>7.2.1 Chip on electrode pad :</p>  <table><tr><th></th><th>X</th><th>Y</th><th>Z</th></tr><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 colspan="3">Neglect</td></tr></table> |  | X  | Y        | Z | Front | $\leq a$     | $\leq 1/2 W$                   | $\leq t$       | Back         | Neglect                                  |                      |       |
|  | X  | Y  | Z        |   |       |              |                                |                |              |  |                      |       |
| Front  | $\leq a$                                 | $\leq 1/2 W$   | $\leq t$ |   |       |              |                                |                |              |  |                      |       |
| Back   | Neglect                                  |  |          |   |       |              |                                |                |              |  |                      |       |

## ◆ Specification For Monotype and Color STN :

(Ver. 02)

| NO           | Item               | Criterion  | Level |   |   |   |              |          |          |   |   |   |
|--------------|--------------------|--|-------|---|---|---|--------------|----------|----------|---|---|---|
| 07           | The crack of glass | <p><b>Symbols :</b></p> <p><b>X :</b> The length of crack<br/><b>Z :</b> The thickness of crack<br/><b>t :</b> The thickness of glass</p> <p><b>Y :</b> The width of crack.<br/><b>W :</b> terminal length<br/><b>a :</b> LCD side length</p>  | Minor |   |   |   |              |          |          |   |   |   |
|              |                    | <p><b>7.2.2 Non-conductive portion :</b></p> <div></div> <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td><math>\leq 1/3 a</math></td><td><math>\leq W</math></td><td><math>\leq t</math></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><b>7.2.3 Glass remain :</b></p> <div></div> <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td><math>\leq a</math></td><td><math>\leq 1/3 W</math></td><td><math>\leq t</math></td></tr></table> |       | X | Y | Z | $\leq 1/3 a$ | $\leq W$ | $\leq t$ | X | Y | Z |
| X            | Y                  | Z  |       |   |   |   |              |          |          |   |   |   |
| $\leq 1/3 a$ | $\leq W$           | $\leq t$   |       |   |   |   |              |          |          |   |   |   |
| X            | Y                  | Z  |       |   |   |   |              |          |          |   |   |   |
| $\leq a$     | $\leq 1/3 W$       | $\leq t$   |       |   |   |   |              |          |          |   |   |   |

◆ Specification For Monotype and Color STN :

(Ver. 02)

| NO | Item               | Criterion   | Level |
|----|--------------------|---|-------|
| 08 | Backlight elements | 8. 1 Backlight can't work normally.   | Major |
|    |                    | 8. 2 Backlight doesn't light or color is wrong.                                     | Major |
|    |                    | 8. 3 Illumination source flickers when lit.   | Major |
| 09 | General appearance | 9. 1 Pin type must match type in specification sheet.                               | Major |
|    |                    | 9. 2 No short circuits in components on PCB or FPC.                                 | Major |
|    |                    | 9. 3 Product packaging must the same as specified on packaging specification sheet. | Minor |
|    |                    | 9. 4 The folding and peeled off in polarizer are not acceptable.                    | Minor |
|    |                    | 9. 5 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

| NO.                 | TEST ITEM                                     | TEST CONDITION   |   |                     |                  |          |     |             |    |            |    |          |    |
|---------------------|---|--|---|---------------------|------------------|----------|-----|-------------|----|------------|----|----------|----|
| 1                   | High Temperature Storage Test                 | Keep in +80 ±2℃ 96 hrs<br>Surrounding temperature, then storage at normal condition 4hrs.  |   |                     |                  |          |     |             |    |            |    |          |    |
| 2                   | Low Temperature Storage Test                  | Keep in -30 ±2℃ 96 hrs<br>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<br>Surrounding temperature, then storage at normal condition 4hrs.<br>(Excluding the polarizer)   |   |                     |                  |          |     |             |    |            |    |          |    |
| 4                   | ESD Test                                      | Air Discharge:<br>Apply 2 KV with 5 times<br>Discharge for each polarity +/-   | Contact Discharge:<br>Apply 250 V with 5 times<br>discharge for each polarity +/- |                     |                  |          |     |             |    |            |    |          |    |
|                     |   | 1. Temperature ambience : 15℃ ~35℃<br>2. Humidity relative : 30%~60%<br>3. Energy Storage Capacitance(Cs+Cd) : 150pF±10%<br>4. Discharge Resistance(Rd) : 330 Ω±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 : ±5%) |   |                     |                  |          |     |             |    |            |    |          |    |
| 5                   | Temperature Cycling Storage Test              | <div>-20℃ → +25℃ → +70℃ → +25℃<br/>(30mins) (5mins) (30mins) (5mins)<br/>← 10 Cycle →</div><br>Surrounding temperature, then storage at normal condition 4hrs.   |   |                     |                  |          |     |             |    |            |    |          |    |
| 6                   | Vibration Test (Packaged)                     | 1. Sine wave 10~55 Hz frequency (1 min)<br>2. The amplitude of vibration :1.5 mm<br>3. Each direction (X、Y、Z) duration for 2 Hrs   |   |                     |                  |          |     |             |    |            |    |          |    |
| 7                   | 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><br>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  |  |   |                     |                  |          |     |             |    |            |    |          |    |

## 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.

### 5.3 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.

**NOTES:**

- 1.LCD TYPE:FSTN
- 2.LCD DISPLAY:POSITIVE/TRANSMISSIVE
- 3.VIEW DIRECTION: 6 O'CLOCK
- 4.Top: -20~70°C Tst:-30~80°C
- 5.The tolerance unless classified  $\pm 0.3\text{mm}$
- 6.IC NO.:ST579-G2
- 7.b:P0.8X11=8.8 $\pm 0.1$
- 8.BACKLIGHT: WHITE, 1PCS LED DIES

**Dimensions and Features:**

- Overall width: 34.0
- Overall height: 31.8 $\pm 0.2$ (LCD)
- Viewing area: 27.8(V.A), 25.42(A.A)
- Dot pitch: 96X65 DOTS
- Viewing direction: Indicated by arrow
- Mounting holes: 2- $\phi 1.0$
- Conductor width: 0.15 $\pm 0.05$
- IC: ST579-G2
- Backlight: 1PCS LED DIES

**Section A-A:**

- Conductor: 0.15 $\pm 0.05$
- IC: ST579-G2
- Backlight: 1PCS LED DIES

**Detail a:**

- W: 0.4 $\pm 0.08$
- Scale: 3X

|     |                                   |         |            |                    |       |  |  |         |     |           |  |                 |  |  |  |
|-----|-----------------------------------|---------|------------|--------------------|-------|--|--|---------|-----|-----------|--|-----------------|--|--|--|
| 007 |                                   |         |            | PART NO.:          |       | 久正光電股份有限公司<br>POWER TIP TECHNOLOGY CORPORATION                     |  |         |     |           |  |                 |  |  |  |
| 006 |                                   |         |            | PE9665WRF-002-102Q |       | <div><div></div><div></div><div></div><div></div><div></div></div> |  |         |     |           |  |                 |  |  |  |
| 005 | MODIFY DIM                        | Stone   | 2010/07/12 | DRAWING NAME :     |       | <div><div></div><div></div><div></div><div></div><div></div></div> |  | Surface |     |           |  | Precision Level |  |  |  |
| 004 | MODIFY TOLERANCE                  | Miyake  | 2008/5/21  | Design             | Stone | <div><div></div><div></div><div></div><div></div><div></div></div> |  | Unit    | MM  | Material  |  | Tolerance (mm)  |  |  |  |
| 003 | Delete Color filter               | Miyake  | 2008/03/26 |                    |       | (3)  |  | Scale   | 2:1 | Thickness |  | 1 ~ 4           |  |  |  |
| 002 | Modify Controller IC to ST7579-G2 | Miyake  | 2008/02/01 | Check              | Mag   |  |  | Page    | 1/1 | Quantity  |  | 4 ~ 16          |  |  |  |
| 001 | NEW DRAWING                       | Miyake  | 2008/01/30 | Approve            | Linda |  |  |         |     |           |  | 16 ~ 63         |  |  |  |
| REV | REV BY                            | REVISER | DATE       | LCD Module Drawing |       |  |  |         |     |           |  | 63 ~ 250        |  |  |  |
|     |                                   |         |            |                    |       |  |  |         |     |           |  | 250 ~ 1000      |  |  |  |
|     |                                   |         |            |                    |       |  |  |         |     |           |  | -               |  |  |  |

|               |                        |  |         |       |         |
|---------------|------------------------|--|---------|-------|---------|
| Ver.003       |                        | LCM包裝規格書<br>LCM Packaging Specifications<br>(For Tray) | Approve | Check | Contact |
| Documents NO. | PKG-PE9665WRF-002-I02Q |  | Oliver  | Max   | Miyake  |

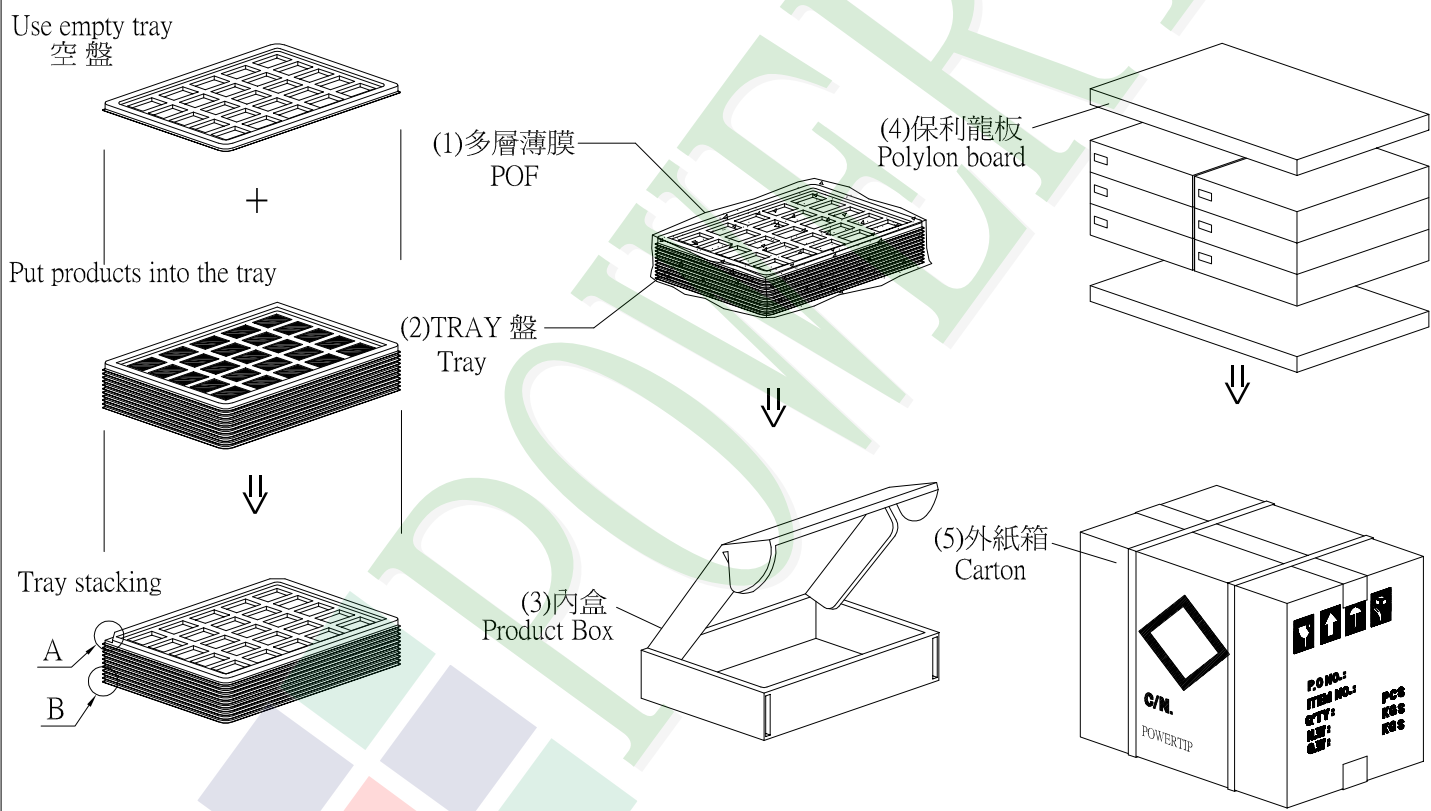
1.包裝材料規格表 (Packaging Material) : (per carton)

| No. | Item                 | Model              | Dimensions (mm)  | 1Pcs Weight | Quantity | Total Weight |
|-----|----------------------|--------------------|------------------|-------------|----------|--------------|
| 1   | 成品 (LCM)             | PE9665WRF-002-I02Q | 34.0 X 30.4      | 0.0048      | 1620     | 7.776        |
| 2   | 多層薄膜(1)POF           | OTFILM0BA03ABA     | 19"X350X0.015    | ——          | 6        | ——           |
| 3   | TRAY 盤 (2)Tray       | TY00000000015      | 352 X 260 X 10.8 | 0.1         | 60       | 6.0          |
| 4   | 內盒(3)Product Box     | BX36627063ABBA     | 393 X 274 X 68   | 0.2692      | 6        | 1.6152       |
| 5   | 保利龍板(4)Polylon board | OTPLB00PL08ABA     | 550 X 393 X 20   | 0.0284      | 2        | 0.0568       |
| 6   | 外紙箱(5)Carton         | BX57041027CCBA     | 570 X 410 X 265  | 1.4208      | 1        | 1.4208       |
| 7   |                      |                    |                  |             |          |              |
| 8   |                      |                    |                  |             |          |              |
| 9   |                      |                    |                  |             |          |              |

2.一整箱總重量 (Total LCD Weight in carton ) : 16.87 Kg±10%

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

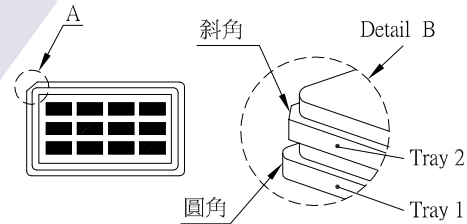
|  |     |               |   |   |      |
|--|-----|---------------|---|---|------|
| (1)LCM quantity per box : no per tray              | 30  | x no of tray  | 9 | = | 270  |
| (2)Total LCM quantity in carton : quantity per box | 270 | x no of boxes | 6 | = | 1620 |



特 記 事 項 (REMARK)

1. Label Specifications :

MODEL:  
LOT NO:  
QUANTITY:  
CHECK:



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

3.可適用於單品包裝  
 It's also suitable to Panel

4. Tray料號:  
 Tray Number:TY00000000015