

SPECIFICATIONS

| | | |
|------------------------------------|---|-----------------------------------|
| CUSTOMER | : | CDE021 |
| SAMPLE CODE (Ver.) | : | PS320240WRF-HE9H03 (Ver.0) |
| MASS PRODUCTION CODE (Ver.) | : | PG320240WRFHE9HYUQ (Ver.0) |
| DRAWING NO. (Ver.) | : | PG-03104-249 (Ver.0) |

Customer Approved

Date:

| Approved | QC Confirmed | Designer |
|----------|--------------|----------|
| | | |

- Approval For Specifications Only.
- * This specification is subject to change without notice.
Please contact Powertip or it's representative before designing your product based on this specification.
- Approval For Specifications and Sample.

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RECORDS OF REVISION

| Date | Ver. | Description | Page | Design by |
|------------|------|--|------|-----------|
| 2006/07/18 | 0 | Switch to ROHS compliance version | | Vodka |
| | | | | |
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Appendix A LCM Drawing

Appendix B LCM Package

Note For detailed information please refer to IC data sheet EPSON---S1D13700

1. SPECIFICATIONS

1.1 Features

| Item | Standard Value |
|-------------------|--|
| Display Type | 320 * 240 Dots |
| LCD Type | FSTN , Positive Transflective |
| Driver Condition | LCD Module: 1/240 Duty, 1/14 Bias |
| Viewing Direction | 6 O'clock |
| Backlight | White LED |
| Weight | 85 g |
| Interface | 8 bit parallel data input |
| Driver IC | Controller IC: S1D13700 |
| ROHS | THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web side : http://www.powertip.com.tw/news/LatestNews.asp |

1.2 Mechanical Specifications

| Item | Standard Value | Unit |
|-------------------|-------------------------------------|------|
| Outline Dimension | 92.0 (L) * 71.7 (w) * 10.5 (H)(Max) | mm |
| Viewing Area | 78.78 (L) * 59.58 (w) | mm |
| Active Area | 76.78 (L) * 57.58 (w) | mm |
| Dot Size | 0.22 (L) * 0.22 (w) | mm |
| Dot Pitch | 0.24 (L) * 0.24 (w) | 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_{DD} | | -0.3 | 7.0 | V |
| LCD Driver Supply Voltage | $V_{EE}-V_{SS}$ | | -0.3 | 25 | V |
| Input Voltage | V_{IN} | | -0.3 | $V_{DD}+0.5$ | V |
| Operating Temperature | T_{OP} | Excluded T/P | -20 | 70 | °C |
| Storage Temperature. | T_{ST} | Excluded T/P | -30 | 80 | °C |
| Storage Humidity | H_D | Ta 40 | 20 | 90 | %RH |

1.4 DC Electrical Characteristics

$V_{DD} = 5.0V \pm 10\%$ $V_{SS} = 0V$ $T_a = 25^\circ C$

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------|----------|------------------------------------|--------------|------|------|------|
| Logic Supply Voltage | V_{DD} | | 4.5 | 5.0 | 5.5 | V |
| “H” Input Voltage | V_{IH} | | 3.5 | | | V |
| “L” Input Voltage | V_{IL} | | | | 1.0 | V |
| “H” Output Voltage | V_{OH} | $I_{OH} = -8mA$ | $V_{DD}-0.4$ | | | V |
| “L” Output Voltage | V_{OL} | $I_{OL} = 8mA$ | | | 0.4 | V |
| Supply current | I_{DD} | $V_{DD} = 5.0V$, $V_{op} = 21.0V$ | | 17 | 56 | mA |
| LCM driving voltage | V_{OP} | V_{C9} ($T_a = -20^\circ C$) | 21.0 | 21.2 | 21.4 | V |
| | | V_{C9} ($T_a = 25^\circ C$) | 20.7 | 21.0 | 21.3 | |
| | | V_{C9} ($T_a = 70^\circ C$) | 19.4 | 19.6 | 19.8 | |

Test condition : M : 36Hz FLM : 72Hz

Note: Need to make sure that there is no flicker and ripper phenomenon when setting the frame frequency in your set .

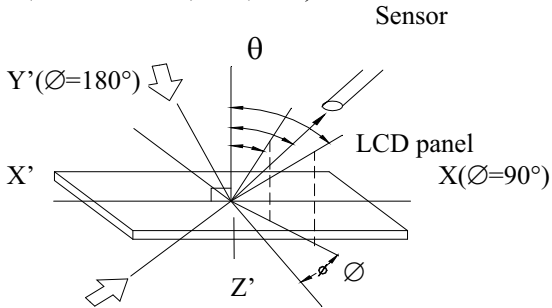
1.5 Optical Characteristics

LCD Panel: 1/240 Duty, 1/15 Bias, $V_{LCD} = 22.0 V$, $T_a = 25^\circ C$

| Item | Symbol | Conditions | Min. | Typ. | Max. | Reference |
|---------------------|----------|--|-------------|--------|-------------|-----------|
| View Angle | θ | $C \geq 2.0$, $\varnothing = 270^\circ$ | -40° | | $+40^\circ$ | Notes 1 |
| Contrast Ratio | C | $\theta = 5^\circ$, $\varnothing = 0^\circ$ | 1.5 | | | Note 3 |
| Response Time(rise) | tr | $\theta = 5^\circ$, $\varnothing = 0^\circ$ | | 110 ms | 165 ms | Note 2 |
| Response Time(fall) | tf | $\theta = 5^\circ$, $\varnothing = 0^\circ$ | | 260 ms | 390 ms | |

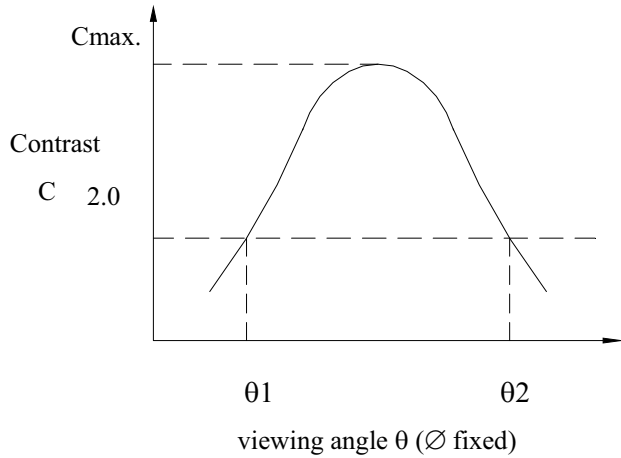
Note 1: Definition of angles θ and ϕ

Light (when reflected) $z (\theta=0^\circ)$



Light (when transmitted) $Y (\phi=0^\circ)$
 $(\theta=90^\circ)$

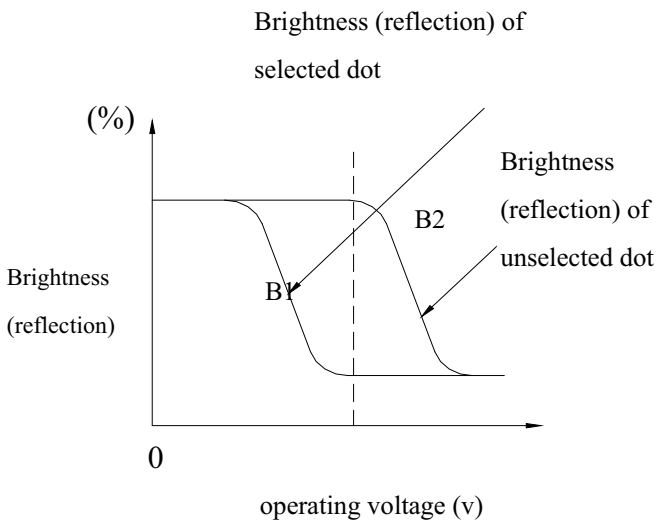
Note 2: Definition of viewing angles θ_1 and θ_2



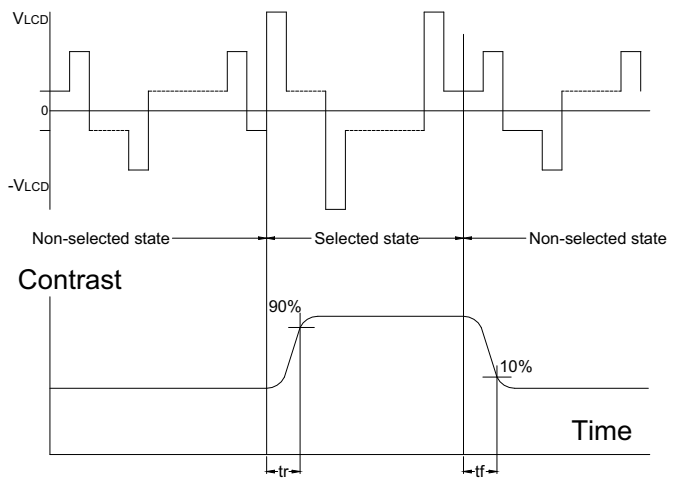
Note : Optimum viewing angle with the naked eye and viewing angle θ at C_{max} . Above are not always the same

Note 3: Definition of contrast C

$$C = \frac{\text{Brightness (reflection) of unselected dot (B2)}}{\text{Brightness (reflection) of selected dot (B1)}}$$



Note 4: Definition of response time



Note: Measured with a transmissive LCD panel which is displayed 1 cm²

V_{LCD} : Operating voltage f_{FRM} : Frame frequency
 t_r : Response time (rise) t_f : Response time (fall)

1.6 Backlight Characteristics

LCD Module with LED Backlight

Maximum Ratings

| Item | Symbol | Conditions | Min. | Max. | Unit |
|-------------------|--------|------------|------|------|------|
| Forward Current | IF | Ta =25°C | | 120 | mA |
| Reverse Voltage | VR | Ta =25°C | | 5 | V |
| Power Dissipation | PO | Ta =25°C | | 0.51 | W |

Electrical / Optical Characteristics

Ta =25°C

| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|--------|------------|------|------|------|-------------------|
| Reverse Current | IR | VR= 5 V | | | 10 | uA |
| Forward Voltage | VF | IF= 120 mA | | 3.7 | 4.2 | V |
| Average Brightness With LCD and Touch Panel | IV | | 10 | 25 | | cd/m ² |
| CIE Color Coordinate With LCD and Touch Panel | X | | 0.24 | 0.30 | 0.36 | - |
| | Y | | 0.25 | 0.31 | 0.37 | |
| Uniformity *1 | ΔB | | 70 | | | % |
| Color | White | | | | | |

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

1.7 Touch Screen Characteristic

1. Input Method and Activation Force

Stylus 10~70 grams and Finger 20~80 grams

2. Typical Optical Characteristics

Visible Light Transmission : >80%

Haze : 5%±2% through hard coated PET only

3. Electrical Specifications

1. Operating Voltage 5.5V or less

2. Contact current 20mA(maximum)

3. Circuit close resistance X : 400~1000Ω Y : 200~650Ω

4. Circuit open resistance > 20MΩ at 25V DC

5. Contact bounce < 15ms

6. Linear Test Specification : ± 1.5% (maximum)

4. Linearity Tolerance : ±1.5% (maximum)

5. Environment Specification

Operating Temperature -10°C ~ +60°C (Humidity less than 90% RH)

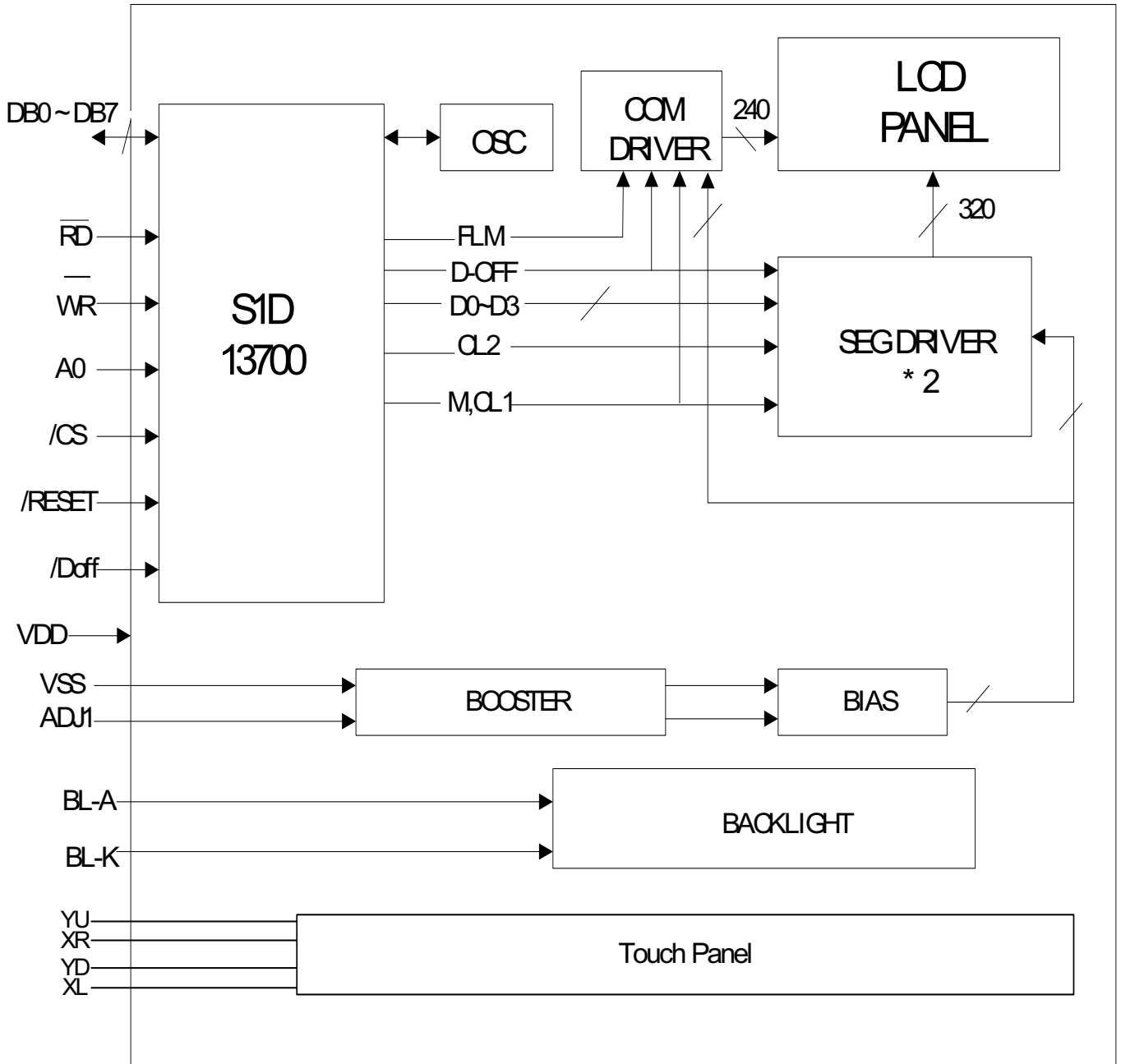
Storage Temperature -20°C ~ +80°C (at ambient Humidity)

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

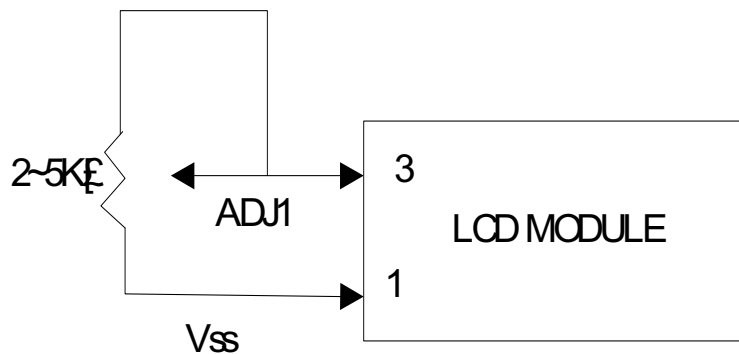
2.1.2 Block Diagram



2.2 Interface Pin Description

| Pin No. | Symbol | Function |
|---------|-----------------|--|
| 1 | V _{SS} | Ground (V _{SS} =0V) |
| 2 | V _{DD} | Power supply (V _{DD} =5.0V) |
| 3 | Adj1 | LCD Contrast Adjust |
| 4 | /RD | Data read (read data from the module at "L") |
| 5 | /WR | Data write (write data to the module at "L") |
| 6 | AO | S1D13700 command/data read or write select |
| 7 | DB0 | Display data input pin bit0 |
| 8 | DB1 | Display data input pin bit1 |
| 9 | DB2 | Display data input pin bit2 |
| 10 | DB3 | Display data input pin bit3 |
| 11 | DB4 | Display data input pin bit4 |
| 12 | DB5 | Display data input pin bit5 |
| 13 | DB6 | Display data input pin bit6 |
| 14 | DB7 | Display data input pin bit7 |
| 15 | /CS | S1D13700 chip select , active"L" |
| 16 | /RESET | S1D13700 reset input , active"L" |
| 17 | /Doff | Power Sleeping Control (Built in connect to S1D13700 YDIS) , active"L" |
| 18 | NC | Not connection,must be open |
| 19 | BL-A | Power supply for LED B/L. Anode |
| 20 | BL-K | Power supply for LED B/L. Cathode |

Contrast Adjust

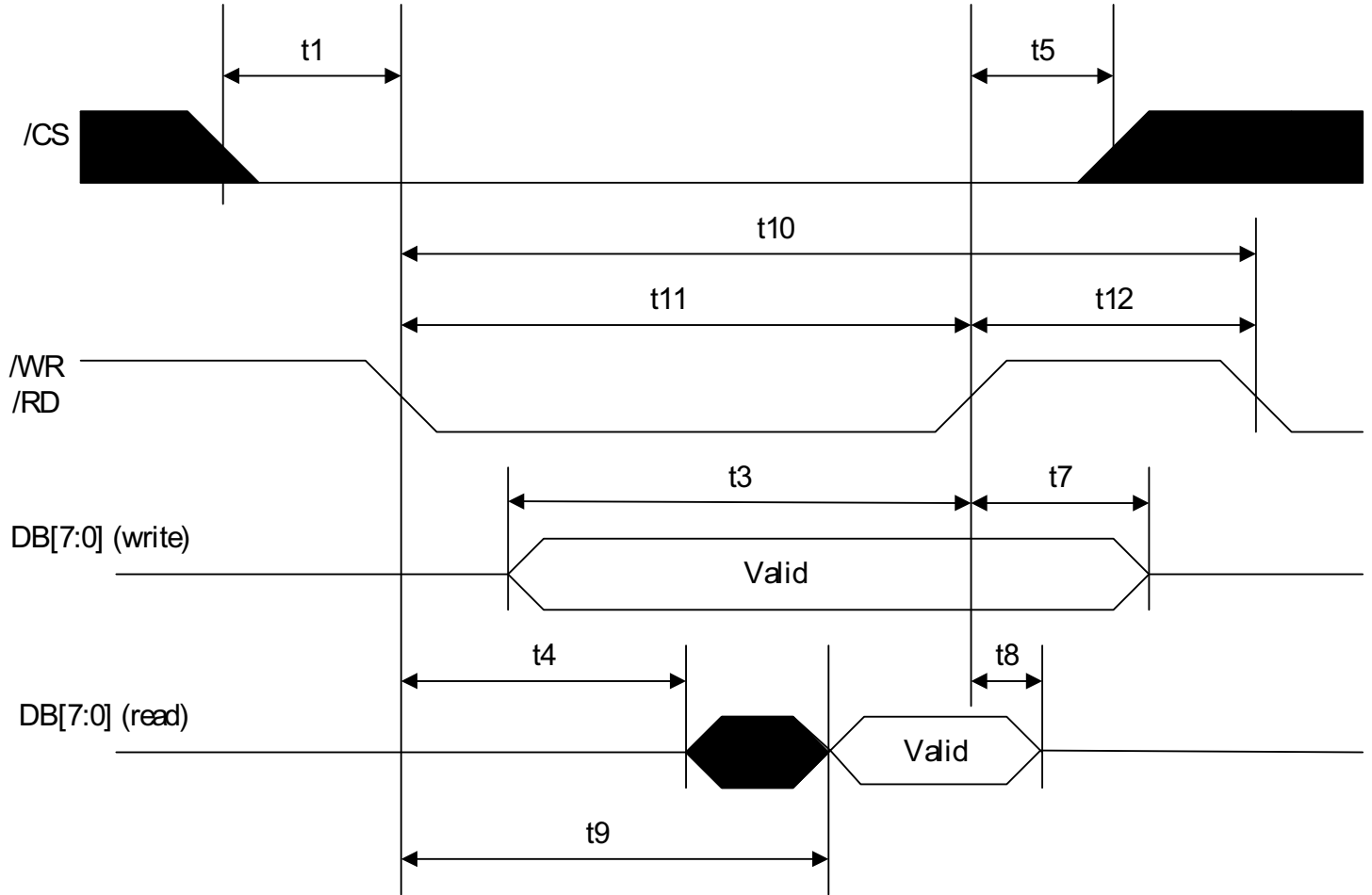




TOUCH PANEL

| Pin No. | Symbol | Function |
|---------|--------|--------------------------------|
| 1 | YU | Touch panel Y coordinate up |
| 2 | XR | Touch panel X coordinate right |
| 3 | YD | Touch panel Y coordinate down |
| 4 | XL | Touch panel X coordinate left |

2.3 Timing Characteristics For 8080 Interface



VDD= 4.5 ~ 5.5V , VSS= 0V , Ta=-20 ~ 70

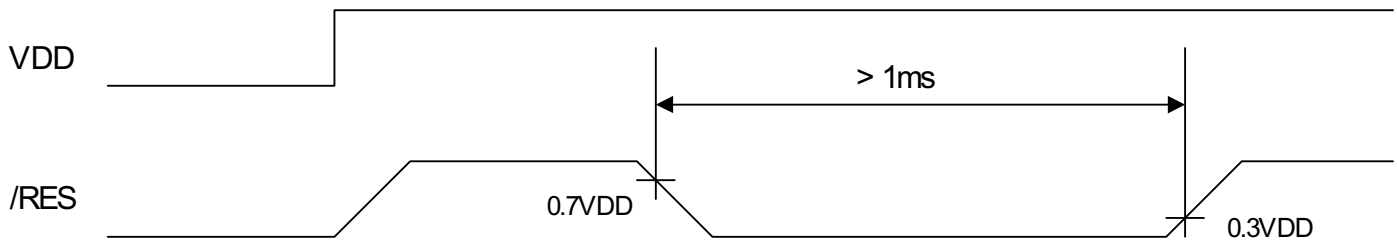
| Symbol | Parameter | Min | Max | Unit |
|--------|---|-------|-----|------|
| t1 | /CS setup time | 5 | | ns |
| t3 | DB[7:0] setup time to /WR rising edge (write cycle) | Note2 | | ns |
| t4 | /RD falling edge to DB[7:0] driven (read cycle) | 3 | | ns |
| t5 | /CS hold time | 7 | | ns |
| t7 | DB[7:0] hold time from /WR rising edge (write cycle) | 5 | | ns |
| t8 | DB[7:0] hold time from /RD rising edge (read cycle) | 3 | 14 | ns |

| Symbol | Parameter | Min | Max | Unit |
|--------|--|-------|-------|------|
| t9 | /RD falling edge to valid data (read cycle) | | Note3 | ns |
| t10 | /RD, /WR cycle time | Note4 | | ns |
| t11 | /RD, /WR pulse active time | 5 | | Ts |
| t12 | /RD, /WR pulse inactive time | Note5 | | ns |

Note:

1. Ts = System clock period
2. t3min = 2Ts + 5
3. t9max = 4Ts + 20
4. t10min = 6Ts (for a read cycle followed by a read or write cycle)
 = 7Ts + 2 (for a write cycle followed by a write cycle)
 = 10Ts + 2 (for a write cycle followed by a read cycle)
5. t12min = 1Ts (for a read cycle followed by a read or write cycle)
 = 2Ts + 2 (for a write cycle followed by a write cycle)
 = 5Ts + 2 (for a write cycle followed by a read cycle)

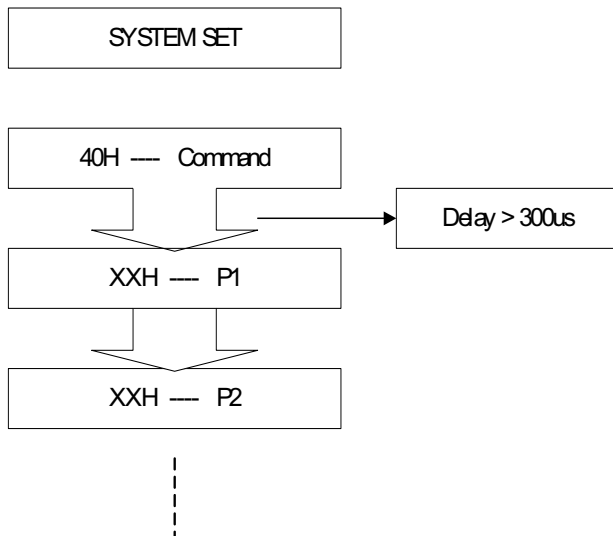
Reset Timing



2.4 Display Command

| Class | Command | Code | | | | | | | | | | | Hex | Command description | Command read Parameters |
|-----------------|-------------|------|-----|----|----|----|----|----|----|----|---------|---------|----------------|---|-------------------------|
| | | /RD | /WR | A0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | | | Number of bytes |
| System control | SYSTEM SET | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | Initialize device and display | 8 |
| | SLEEP IN | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 53 | Enter standby mode | 0 |
| Display control | DISP ON/OFF | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | D | 58 59 | Enable and disable display and display flashing | 1 |
| | SCROLL | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 44 | Set display start address and display regions | 10 |
| | CSRFORM | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 5D | Set cursor type | 2 |
| | CGRAM ADR | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 5C | Set start address of character generator RAM | 2 |
| | CSRDIR | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | CD 1 | CD 0 | 4C to 4F | Set direction of cursor movement | 0 |
| | HDOT SCR | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 5A | Set horizontal scroll position | 1 |
| | OVLAY | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 5B | Set display overlay format | 1 |
| Drawing control | CSRW | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 46 | Set cursor address | 2 |
| | CSRR | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 47 | Read cursor address | 2 |
| -- | Gray Scale | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 60 | Set Grayscale depth | 1 |
| Memory control | MWRITE | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 42 | Write to display memory | - |
| | MRAD | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 43 | Read from display memory | - |

Notes



2.5 Character Pattern

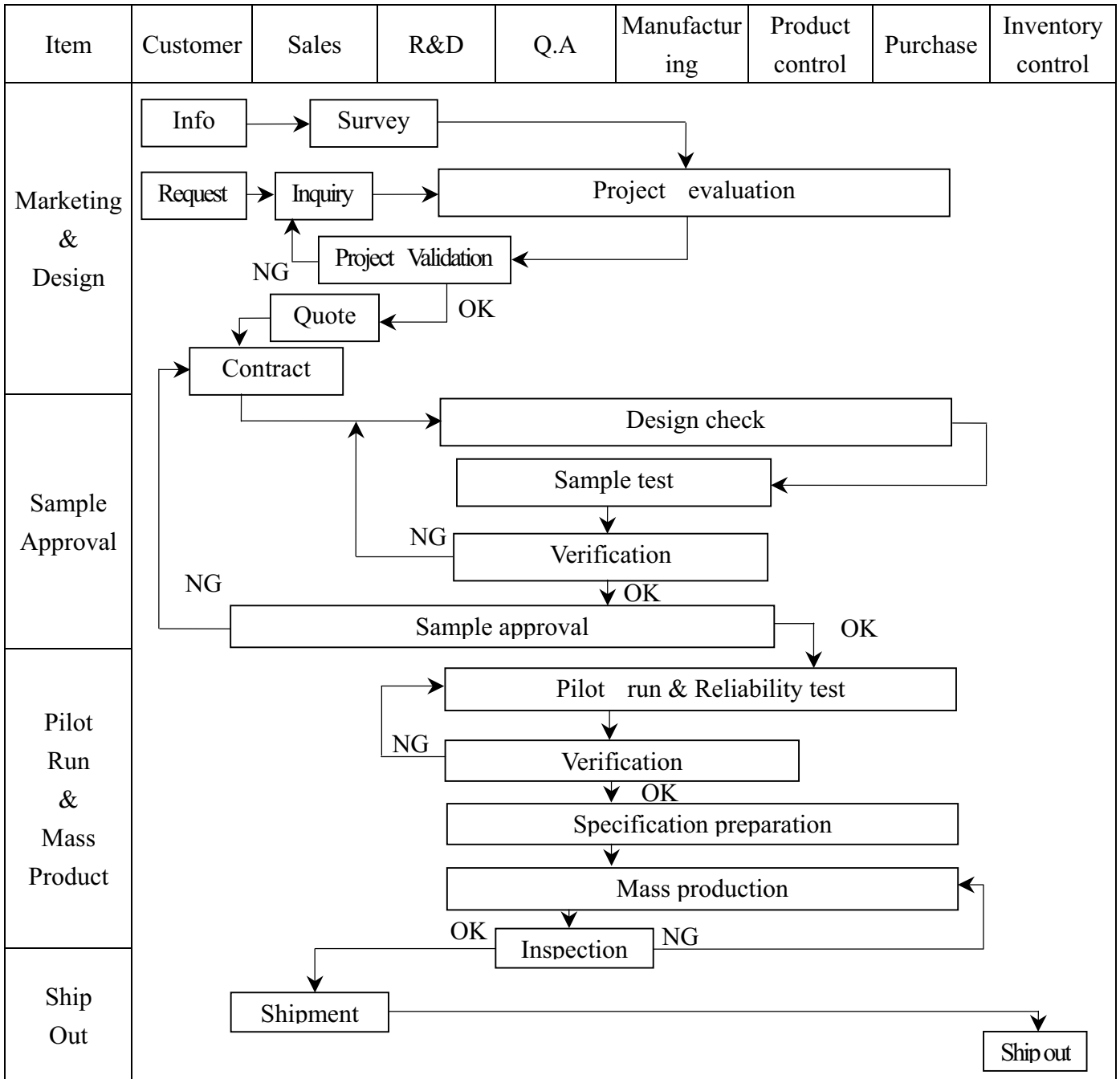
| | | Character code bits 0 to 3 | | | | | | | | | | | | | | | |
|----------------------------|---|----------------------------|---|---|---|----|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| Character code bits 4 to 7 | 2 | | ! | " | # | \$ | % | & | ' | (|) | * | + | , | - | . | / |
| | 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| | 4 | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | |
| | 5 | p | q | r | s | t | u | v | w | x | y | z | [| \ |] | ^ | _ |
| | 6 | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| | 7 | P | Q | R | S | T | U | V | W | X | Y | Z | [| \ |] | ^ | _ |
| | A | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > |
| | B | - | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > |
| | C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T |
| 1 | | | | | | | | | | | | | | | | | |

2.6 Jumper Setting

SHORT : JF,JDS-1,JMS-1,JCK-1

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart





POWER TIP

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

3.2 Inspection Specification

- ◆ **Scope** : The document shall be applied to LCD Module for Monotype and Color STN(Ver. 01).
- ◆ **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)

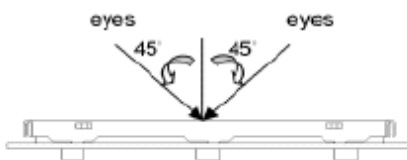


Fig.1

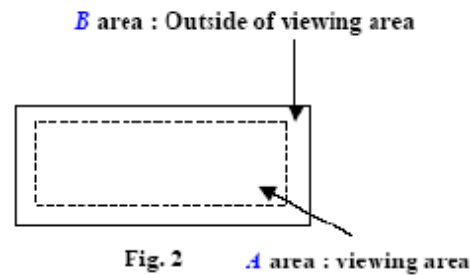


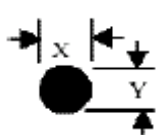
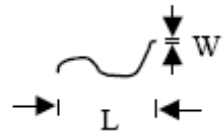
Fig. 2

◆ **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 :

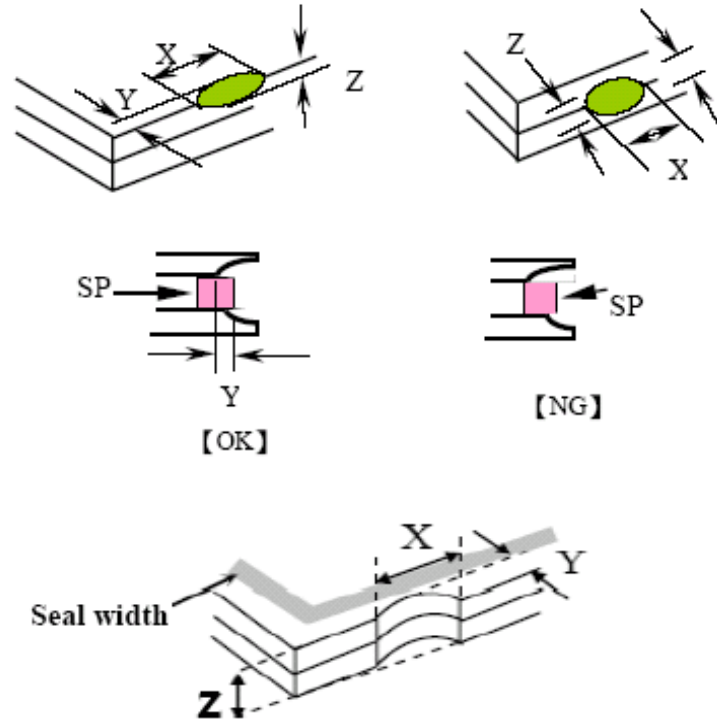
(Ver. 01)

| NO | Item | Criterion | level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|---|--|--------------------------------|-------------------|------------------|-----------------|-------------------------|------------------|-------------------------|-------------|-------------------------|----------|-------------|-------------------------|-------------------|-------------|---------------|-----------|-------------|-----------------------|----------|--------------------|-----------------|-------------|--------------|----------------------|---|-------------|--------------|-----------------------|-------------|-----|-------------|---------------|--|-------|
| 05 | Black or white dot、scratch、contamination Round type  $\Phi = (x+y)/2$ Line type  | 5. 1 Round type: 5. 1. 1 display only : <ul style="list-style-type: none"> • White and black spots on display ≤ 0.30 mm , no more than 4 white or black spots present. • Densely spaced : NO more than two spots or lines within 3 mm. 5. 1. 2 Non-display : <table border="1" data-bbox="502 694 1300 996"> <thead> <tr> <th>Dimension (diameter : Φ)</th> <th>Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>3</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> <td>2</td> </tr> <tr> <td>Total quantity</td> <td>4</td> </tr> </tbody> </table> 5. 1. 3 Line type: <table border="1" data-bbox="438 1108 1364 1444"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>Length (L)</th> <th>Width (W)</th> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Accept no dense</td> <td>Don't count</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.03 < W \leq 0.05$</td> <td rowspan="2">4</td> <td>Don't count</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.05 < W \leq 0.075$</td> <td>Don't count</td> </tr> <tr> <td>---</td> <td>$W > 0.075$</td> <td colspan="2">As round type</td> </tr> </tbody> </table> | Dimension (diameter : Φ) | 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 | | Minor |
| Dimension (diameter : Φ) | 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" data-bbox="438 1556 1364 1937"> <thead> <tr> <th rowspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.20$</td> <td>Accept no dense</td> <td>Don't count</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.50$</td> <td>3</td> <td>Don't count</td> </tr> <tr> <td>$0.50 < \Phi \leq 1.00$</td> <td>2</td> <td>Don't count</td> </tr> <tr> <td>$\Phi > 1.00$</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 : Φ) | 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 : Φ) | 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 :

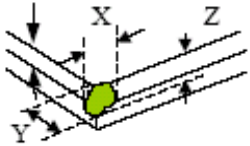
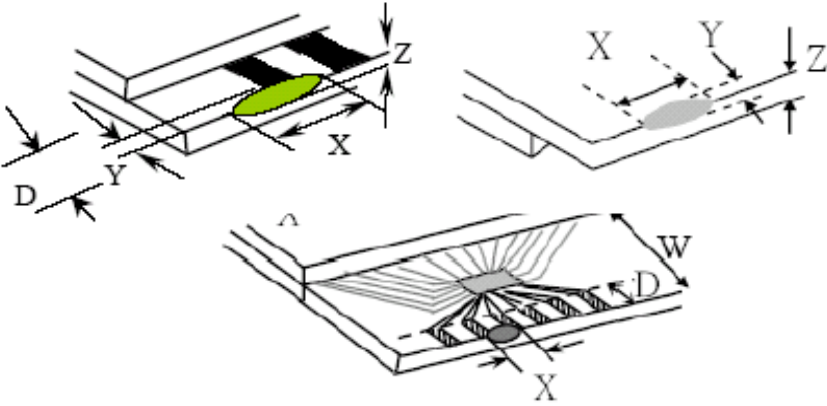
(Ver. 01)

| NO | Item | Criterion | Level | | | | | | | | | |
|----------|--|---|-------|---|---|----------|--------------------------------|--------------|----------|--|----------------------|-------|
| 07 | 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. D : terminal length a : LCD side length</p> <hr/> <p>7.1 General glass chip :</p> <p>7.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="454 1635 1244 1926"> <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. | $1/2 t < Z \leq 2 t$ | | | | | | | | | | |



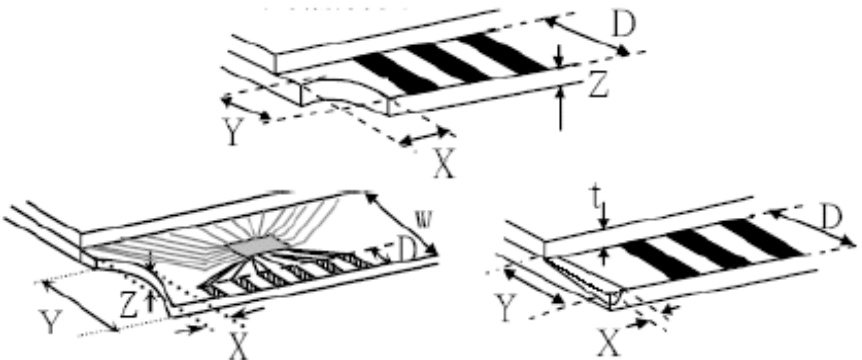
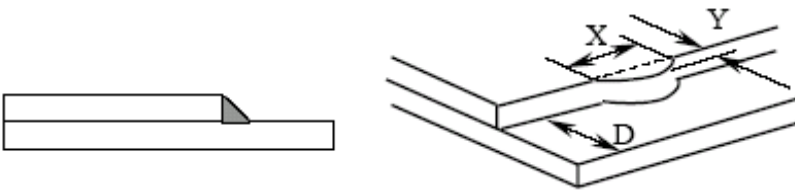
◆ Specification For Monotype and Color STN :

(Ver. 01)

| NO | Item | Criterion | Level | | | | | | | | | | |
|---|--|--|----------|---|-------|--------------|--------------------------------|----------------|--------------|--|----------------------|--|-------|
| 07 | The crack of glass | <p>Symbols :</p> <p>X : The length of crack Y : The width of crack. Z : The thickness of crack D : terminal length t : The thickness of glass a : LCD side length</p> <hr/> <p>7.1.2 Corner crack :</p>  <table border="1" data-bbox="502 869 1311 1153"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't enter viewing area</td> <td>$Z \leq 1/2 t$</td> </tr> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </tbody> </table> | X | Y | Z | $\leq 1/5 a$ | Crack can't enter viewing area | $Z \leq 1/2 t$ | $\leq 1/5 a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$ | | |
| | | X | Y | Z | | | | | | | | | |
| $\leq 1/5 a$ | Crack can't enter viewing area | $Z \leq 1/2 t$ | | | | | | | | | | | |
| $\leq 1/5 a$ | Crack can't exceed the half of SP width. | $1/2 t < Z \leq 2 t$ | | | | | | | | | | | |
| <p>7.2 Protrusion over terminal :</p> <p>7.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="470 1765 1252 1930"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td>$\leq a$</td> <td>$\leq 1/2 D$</td> <td>$\leq t$</td> </tr> <tr> <td>Back</td> <td colspan="3">Neglect</td> </tr> </tbody> </table> | | X | Y | Z | Front | $\leq a$ | $\leq 1/2 D$ | $\leq t$ | Back | Neglect | | | Minor |
| | X | Y | Z | | | | | | | | | | |
| Front | $\leq a$ | $\leq 1/2 D$ | $\leq t$ | | | | | | | | | | |
| Back | Neglect | | | | | | | | | | | | |

◆ Specification For Monotype and Color STN :

(Ver. 01)

| NO | Item | Criterion | Level | | | | | | | | | |
|--------------|--------------------|--|-------|---|---|---|--------------|----------|----------|---|---|---|
| 07 | The crack of glass | <p>Symbols :</p> <p>X : The length of crack Y : The width of crack.</p> <p>Z : The thickness of crack D : terminal length</p> <p>t : The thickness of glass a : LCD side length</p> | Minor | | | | | | | | | |
| | | <p>7.2.2 Non-conductive portion :</p>  <table border="1" data-bbox="571 1176 1193 1332"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/3 a$</td> <td>$\leq D$</td> <td>$\leq t$</td> </tr> </tbody> </table> <p>7.2.3 Glass remain :</p>  <table border="1" data-bbox="491 1780 1173 1915"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq a$</td> <td>$\leq 1/3 D$</td> <td>$\leq t$</td> </tr> </tbody> </table> | | X | Y | Z | $\leq 1/3 a$ | $\leq D$ | $\leq t$ | X | Y | Z |
| X | Y | Z | | | | | | | | | | |
| $\leq 1/3 a$ | $\leq D$ | $\leq t$ | | | | | | | | | | |
| X | Y | Z | | | | | | | | | | |
| $\leq a$ | $\leq 1/3 D$ | $\leq t$ | | | | | | | | | | |



◆ Specification For Monotype and Color STN :

(Ver. 01)

| 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 ≤ 1.5 mm. | Minor |

4. RELIABILITY TEST

4.1 Reliability Test Condition

(Ver. 01)

| 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 | ESD Test | Air Discharge: Apply 6 KV with 5 times Discharge for each polarity +/- | Contact Discharge: Apply 250V with 5 times discharge for each polarity +/- | | | | | | | | | | |
| | | 1. Temperature ambience: 15 35 2. Humidity relative: 30% 60% 3. Energy Storage Capacitance(Cs+Cd): 150pF±10% 4. Discharge Resistance(Rd): 330Ω±10% 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 s) (Tolerance if the output voltage indication: ±5%) | | | | | | | | | | | |
| 5 | Temperature Cycling Storage Test | <div style="text-align: center;"> $\begin{array}{ccccccc} -20 & \rightarrow & +25 & \rightarrow & +70 & \rightarrow & +25 \\ (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\ \leftarrow & & & & & & \rightarrow \\ & & & & & & 10 \text{ Cycle} \end{array}$ </div> Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | | |
| 6 | 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 | | | | | | | | | | | |
| 7 | Drop Test (Packaged) | <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Packing Weight (Kg)</th> <th>Drop Height (cm)</th> </tr> </thead> <tbody> <tr> <td>0 ~ 45.4</td> <td>122</td> </tr> <tr> <td>45.4 ~ 90.8</td> <td>76</td> </tr> <tr> <td>90.8 ~ 454</td> <td>61</td> </tr> <tr> <td>Over 454</td> <td>46</td> </tr> </tbody> </table> | | Packing Weight (Kg) | Drop Height (cm) | 0 ~ 45.4 | 122 | 45.4 ~ 90.8 | 76 | 90.8 ~ 454 | 61 | Over 454 | 46 |
| | | Packing Weight (Kg) | Drop Height (cm) | | | | | | | | | | |
| 0 ~ 45.4 | 122 | | | | | | | | | | | | |
| 45.4 ~ 90.8 | 76 | | | | | | | | | | | | |
| 90.8 ~ 454 | 61 | | | | | | | | | | | | |
| Over 454 | 46 | | | | | | | | | | | | |
| | | Drop direction : 1 corner / 3 edges / 6 sides etch 1times | | | | | | | | | | | |

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

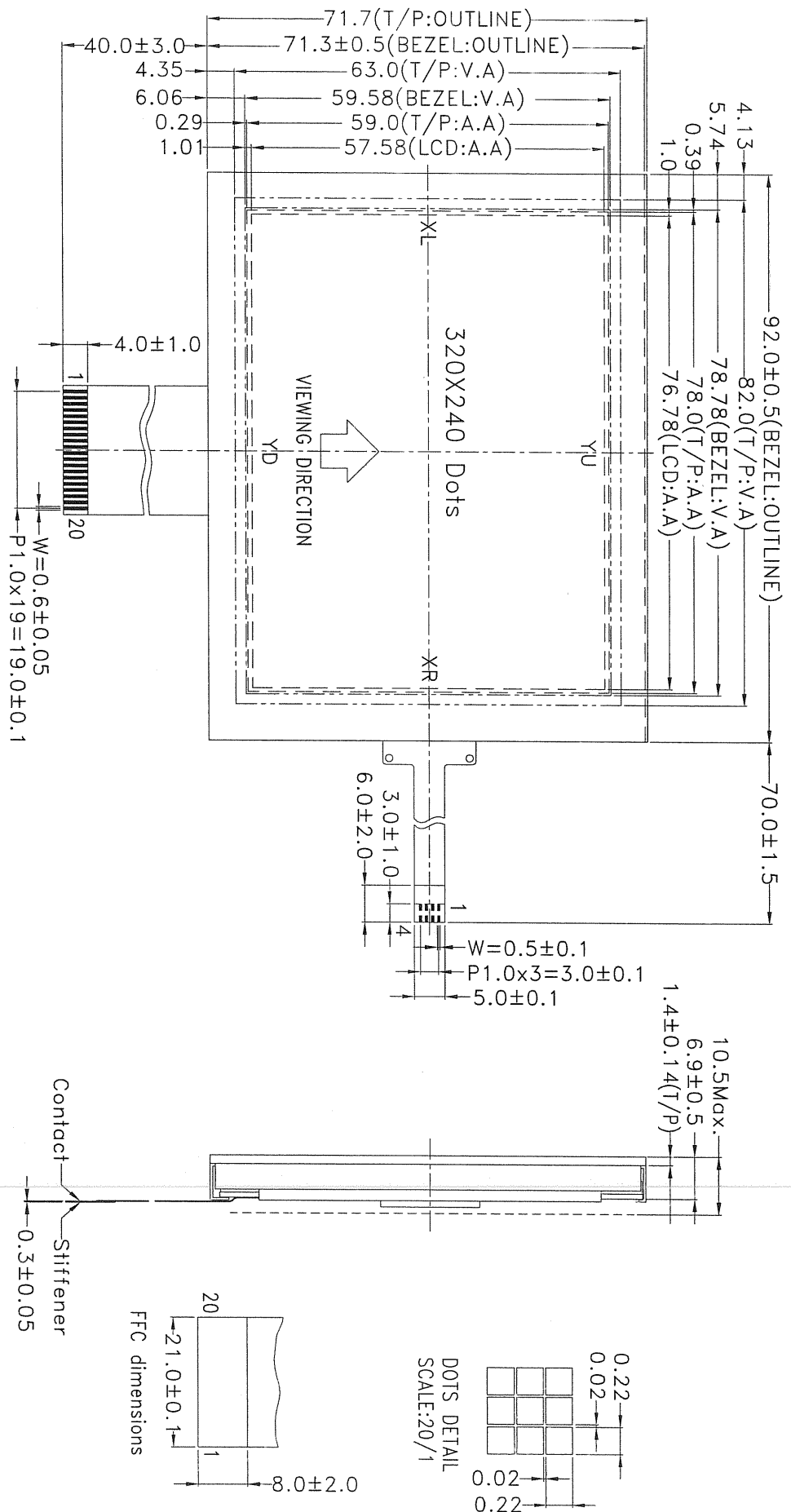
- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is 320 ± 10 and 3-5 sec. 5.2.9
To avoid liquid (include organic solvent) stained on LCM .

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is 25 ± 5 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.



- NOTE:
1. The tolerance unless classified $\pm 0.3\text{mm}$
 2. LCD type : FSTN
 3. LCD mode : Positive / Transflective
 4. T_{op} : $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$, T_{st} : $-30^{\circ}\text{C} \sim 80^{\circ}\text{C}$
 5. Viewing Direction : 6 O'clock.

| | | |
|-----|-------------|------|
| REV | DESCRIPTION | DATE |
| | | |
| | | |
| | | |

| | | | |
|--------------------|--------------------|--|---------|
| | | 久正光電股份有限公司 POWER TIP TECHNOLOGY CORPORATION | |
| 圖面名稱 | PG320240WRFHE9HYUQ | SCALE:1/1 | UNIT:mm |
| 圖面編號 | PG-03104-249 | PAGE:1/1 | ED I 0 |
| APPROVED | CHECKER | DRAWN | |
| 張慶源 95.7.21 | 李美倫 95.7.7. | 林忠聖 95.7.7. | |

LCM Model
版次 Ver.0

PG320240WRFHE9HYUQ

LCM包裝規格書

LCM Packaging Specifications



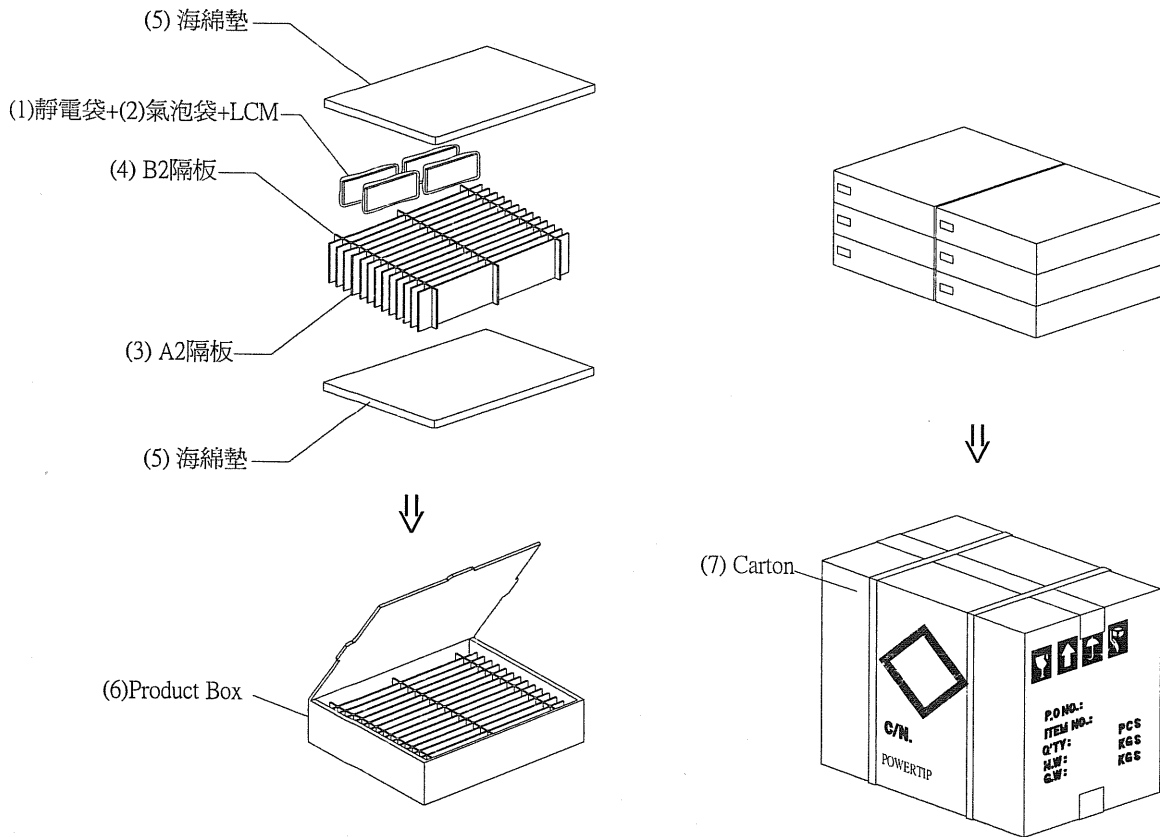
1. 包裝材料規格表 (Packaging Material) : (per carton)

| No. | Item | Model | Dimensions (mm) | Quantity |
|-----|--------------------|--------------------|-----------------|----------|
| 1 | 成品 (LCM) | PG320240WRFHE9HYUQ | 92.0 X 71.3 | 96 |
| 2 | 靜電袋(1) | BAG150120ARA0A | 150 X 120 | 96 |
| 3 | 氣泡袋(2) | BAG240100AWB0A | 240 X 100 | 96 |
| 4 | A2隔板(3) | BX29300070BM0A | 293 X 70 X 2.5 | 66 |
| 5 | B2隔板(4) | BX24500070BL0A | 245 X 70 X 2.5 | 18 |
| 6 | 海綿墊(5) | OTFOAM00006ABA | 290 X 240 X 10 | 12 |
| 7 | C3內盒(6)Product Box | BX31025510AABA | 310 X 255 X 100 | 6 |
| 8 | 外紙箱(7)Carton | BX52732536CCBA | 527 X 325 X 360 | 1 |
| 9 | | | | |

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

(1) Quantity Of Spacer : A2隔板 X 11 , B2隔板 X 3

(2) Total LCM quantity in carton : quantity per box 16 x no of boxes 6 = 96



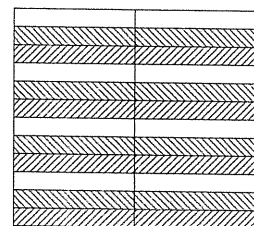
特 記 事 項 (REMARK)

1. Label Specifications :

MODEL:
LOT NO:
QUANTITY:
CHECK:

2. 每放兩片模組空一格放置格。(如放置格示意圖)

3. 放置格示意圖:



1. 模組 2. 空格