

POWERTIP TECH. CORP.

SPECIFICATIONS

CUSTOMER : CES008






SAMPLE CODE (Ver.) : PS320240WRM-002I01 (Ver.0)

MASS PRODUCTION CODE (Ver.) : PE320240WRM002IP1Q (Ver.0)

DRAWING NO. (Ver.) : PE-05011-005 (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 |
|------------|------|-----------------|------|-----------|
| 2006/09/15 | 0 | MASS PRODUCTION | - | Louis |
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Note : For detailed information please refer to IC data sheet : RAIO --- RA8835P3N

1. SPECIFICATIONS

1.1 Features

| Item | Standard Value |
|-------------------|--|
| Display Type | 320 * 240 Dots |
| LCD Type | STN, Negative, Transmissive |
| Driver Condition | LCD Module: 1/240 Duty, 1/15 Bias |
| Viewing Direction | 6 O'clock |
| Backlight | LED B/L |
| Weight | 250 g |
| Interface | Support 8080 MPU Parallel 8 Bits data bus |
| Controller IC | RAIO RA8835P3N |
| 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 | 153.54 (L) * 120.24 (w) * 18.9(H)(Max) | mm |
| Viewing Area | 120.14 (L) * 92.14 (w) | mm |
| Active Area | 115.18 (L) * 86.38 (w) | mm |
| Dot Size | 0.34 (L) * 0.34 (w) | mm |
| Dot Pitch | 0.36(L) * 0.36 (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 | $V_{DD}-V_{SS}$ | — | -0.3 | +7.0 | V |
| LCD Driver Supply Voltage | $V_0 -V_{SS}$ | — | -0.3 | +25.0 | V |
| Input Voltage | V_{IN} | — | -0.3 | $V_{DD}+0.3$ | V |
| Operating Temperature | T_{OP} | — | -20 | 70 | °C |
| Storage Temperature. | T_{ST} | — | -30 | 80 | °C |
| Storage Humidity | H_D | $T_a < 40\text{ }^\circ\text{C}$ | 20 | 90 | %RH |

1.4 DC Electrical Characteristics

$V_{DD} = 4.5V \sim 5.5V$, $V_{SS} = 0V$, $T_a = 25^\circ C$

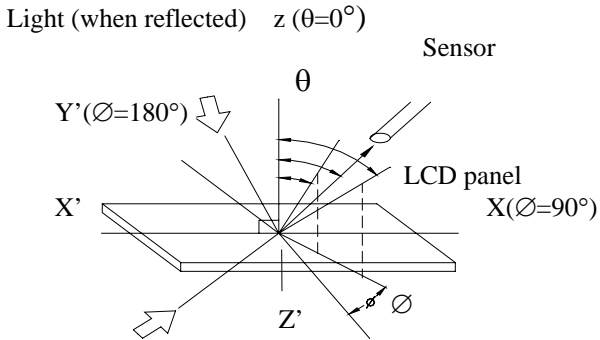
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------|--|-------------------|--------------|------|----------------|------|
| Logic Supply Voltage | V_{DD} | — | 4.5 | 5.0 | 5.5 | V |
| “H” Input Voltage | V_{IH} | — | $0.5 V_{DD}$ | — | V_{DD} | V |
| “L” Input Voltage | V_{IL} | — | V_{SS} | — | $0.2 V_{DD}$ | V |
| “H” Output Voltage | V_{OH} | $I_{OH} = -5.0mA$ | 2.4 | — | — | V |
| “L” Output Voltage | V_{OL} | $I_{OL} = +5.0mA$ | — | — | $V_{SS} + 0.4$ | V |
| Supply current | I_{DD} | $V_{DD} = 5.0V$ | - | 40 | 80 | mA |
| LCM driving voltage | V_{OP} ($V_{OP+} \sim V_{OP-}$) | -20°C | 21.7 | 21.9 | 22.1 | V |
| | | 25°C | 21.2 | 21.5 | 21.8 | |
| | | 70°C | 20.2 | 20.4 | 20.6 | |

1.5 Optical Characteristics

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

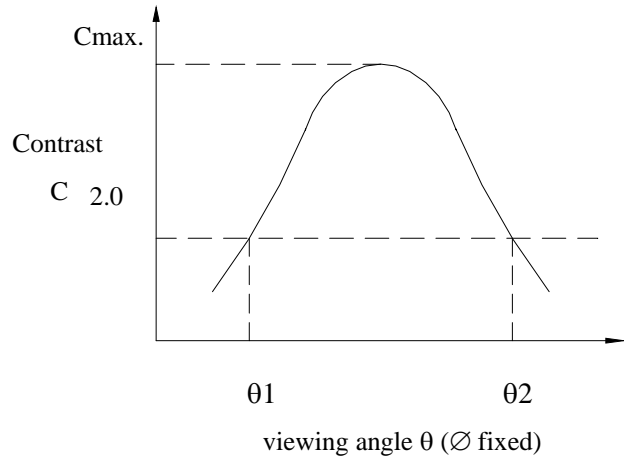
| Item | Symbol | Conditions | Min. | Typ. | Max. | Reference |
|---------------------|----------|---|------|--------|--------|-------------|
| View Angle | θ | $C \geq 2.0$, $\varnothing = 270^\circ$ | -40° | - | 40° | Notes 1 & 2 |
| Contrast Ratio | C | $\theta = -5^\circ$, $\varnothing = 270^\circ$ | 2 | 4 | - | Note 3 |
| Response Time(rise) | t_r | $\theta = -5^\circ$, $\varnothing = 270^\circ$ | - | 230 ms | 345 ms | Note 4 |
| Response Time(fall) | t_f | $\theta = -5^\circ$, $\varnothing = 270^\circ$ | - | 130 ms | 195 ms | |

Note 1: Definition of angles θ and ϕ



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

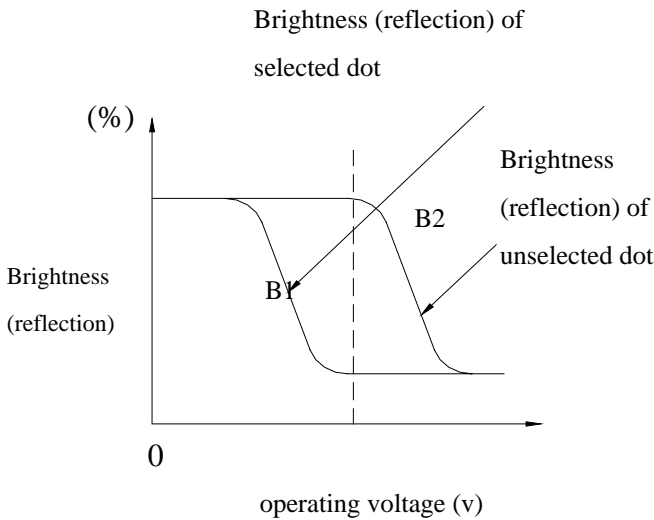
Note 2: Definition of viewing angles θ_1 and θ_2



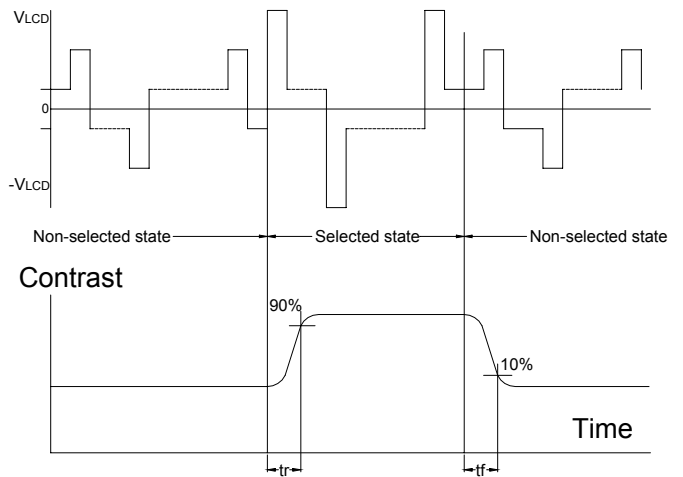
Note : Optimum viewing angle with the naked eye and viewing angle θ at Cmax. Above are not always the same

Note 3: Definition of contrast C

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



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

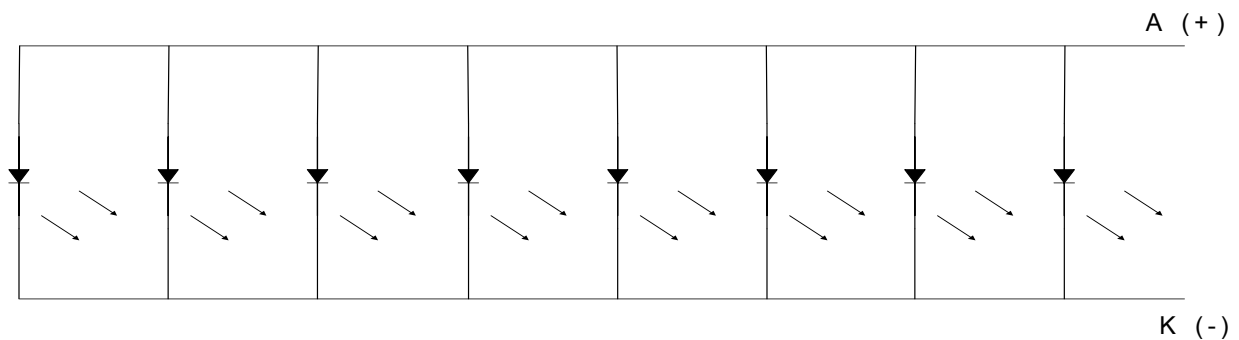
Maximum Ratings

| Item | Symbol | Conditions | Min. | Max. | Unit |
|-------------------|--------|------------|------|------|------|
| Forward Current | I_F | Ta =25°C | - | 160 | mA |
| Reverse Voltage | V_R | Ta =25°C | - | 5 | V |
| Power Dissipation | P_D | Ta =25°C | - | 0.67 | W |

Electrical / Optical Characteristics

| Ta =25°C | | | | | | |
|---------------------------------------|------------|-----------------------|------|------|------|-----------------|
| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
| Forward Voltage | V_F | $I_F= 160 \text{ mA}$ | - | 3.7 | 4.2 | V |
| Reverse Current | I_R | $V_R= 5 \text{ V}$ | - | - | 10 | μA |
| Average Brightness (with LCD) *1 | I_V | $I_F=160 \text{ mA}$ | 35 | 45 | - | cd/m^2 |
| CIE Color Coordinate (With LCD) *1 | x | $I_F= 160 \text{ mA}$ | 0.31 | 0.34 | 0.37 | - |
| | Y | | 0.32 | 0.35 | 0.38 | |
| Uniformity *2 | ΔB | $I_F= 160\text{mA}$ | 70 | - | - | % |
| Color | white | | | | | |

*1. $\Delta B=B(\text{min}) / B(\text{max}) *100\%$



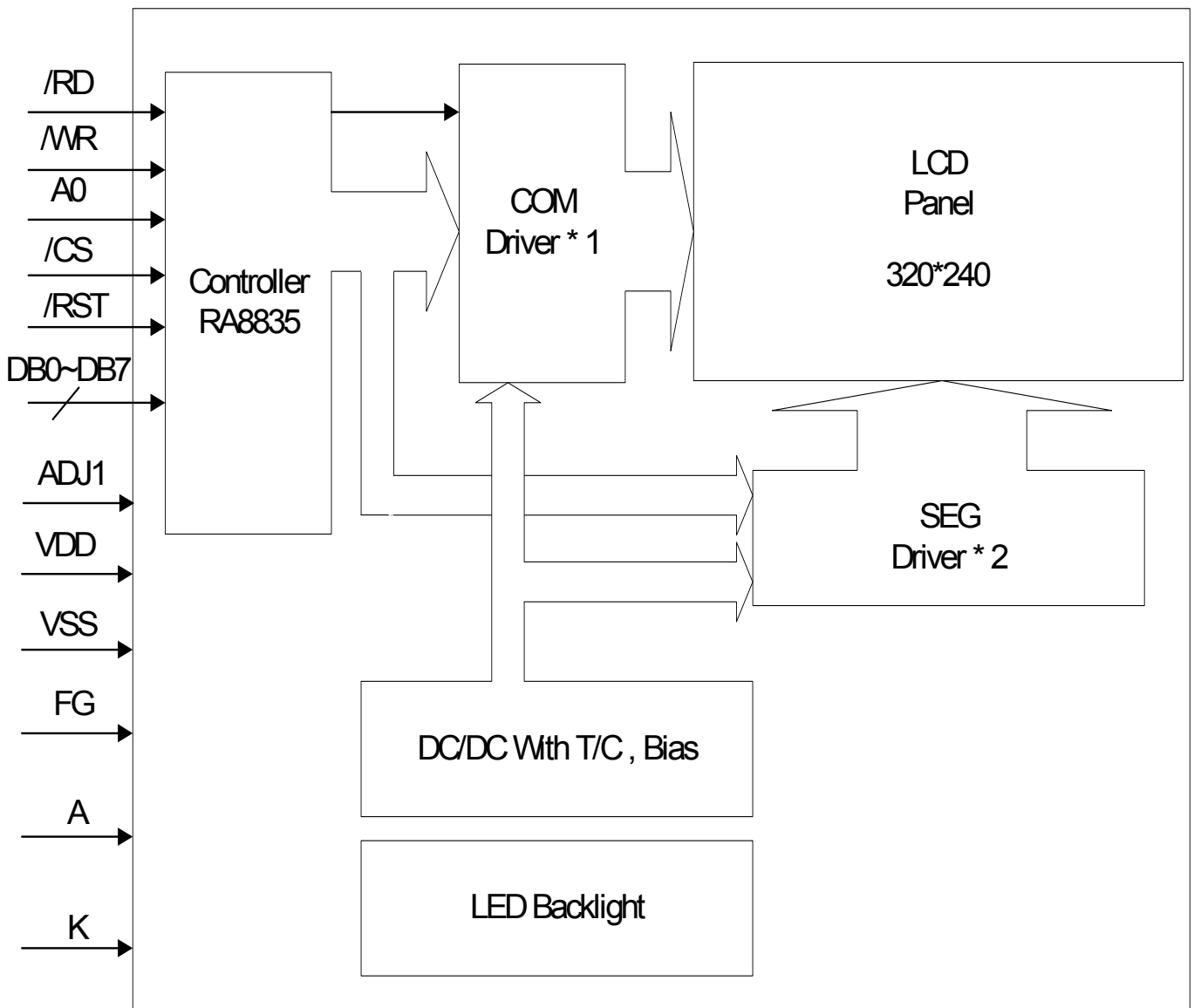
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

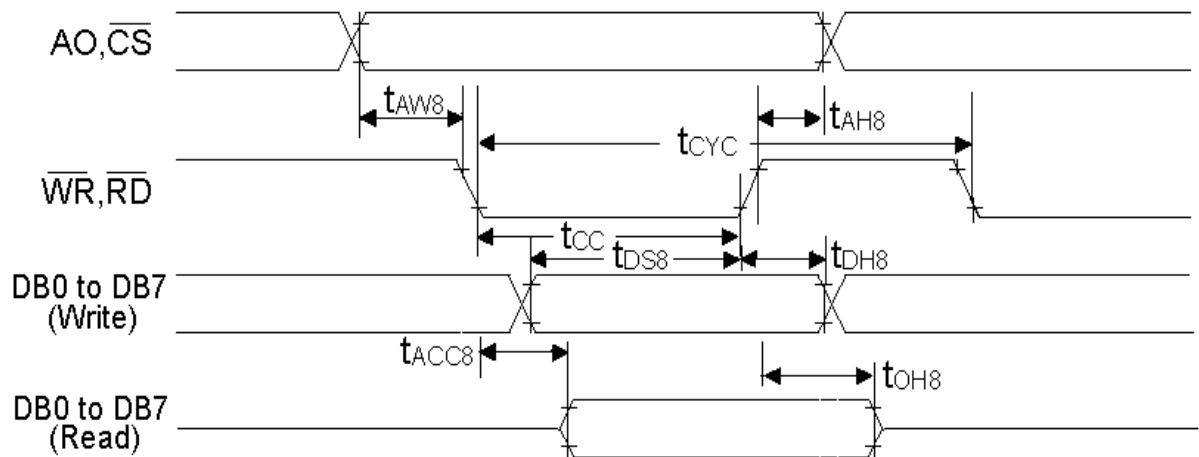
| Pin No. | Symbol | Function |
|---------|-----------------|--|
| 1 | V _{SS} | Ground (V _{SS} =0 V) |
| 2 | V _{DD} | Power Supply (V _{DD} = 5.0 V) |
| 3 | ADJ1 | Operating voltage for LCD . (Must be open) |
| 4 | /RD | Data read (read data from the module at "L") |
| 5 | /WR | Data write (write data to the module at "L") |
| 6 | A0 | Command / Data read or write select (H : command L : data) |
| 7 | DB0 | Data bus bit 0 |
| 8 | DB1 | Data bus bit 1 |
| 9 | DB2 | Data bus bit 2 |
| 10 | DB3 | Data bus bit 3 |
| 11 | DB4 | Data bus bit 4 |
| 12 | DB5 | Data bus bit 5 |
| 13 | DB6 | Data bus bit 6 |
| 14 | DB7 | Data bus bit 7 |
| 15 | /CS | Chip select , active "L" |
| 16 | /RST | Reset input , active "L" |
| 17 | ADJ1 | Operating voltage for LCD . (Must be open) |
| 18 | FG | Frame ground (connected to metal bezel) |
| 19 | NC | Not connection (Must be open) |
| 20 | NC | Not connection (Must be open) |
| | A | Power supply for LED backlight anode input. |
| | K | Power supply for LED backlight cathode input . |

Built in positive voltage generator circuit and temperature compensation circuit.

Built in Timing mode for 8080 family.

2.3 Timing Characteristics

8080 family interface timing



| Signal | Symbol | Parameter | Min | Max | Unit |
|------------|------------|---------------------|----------|-----|------|
| AO , /CS | t_{AH8} | Address hold time | 10 | - | ns |
| | t_{AW8} | Address setup time | 0 | - | ns |
| /WR , /RD | t_{CYC8} | System cycle time | See note | - | ns |
| | t_{CC} | Strobe pulse width | 120 | - | ns |
| DB0 to DB7 | t_{DS8} | Data setup time | 120 | - | ns |
| | t_{DH8} | Data hold time | 5 | - | ns |
| | t_{ACC8} | RD access time | - | 50 | ns |
| | t_{OH8} | Output disable time | 10 | 50 | ns |

Note : For memory control and system control command:

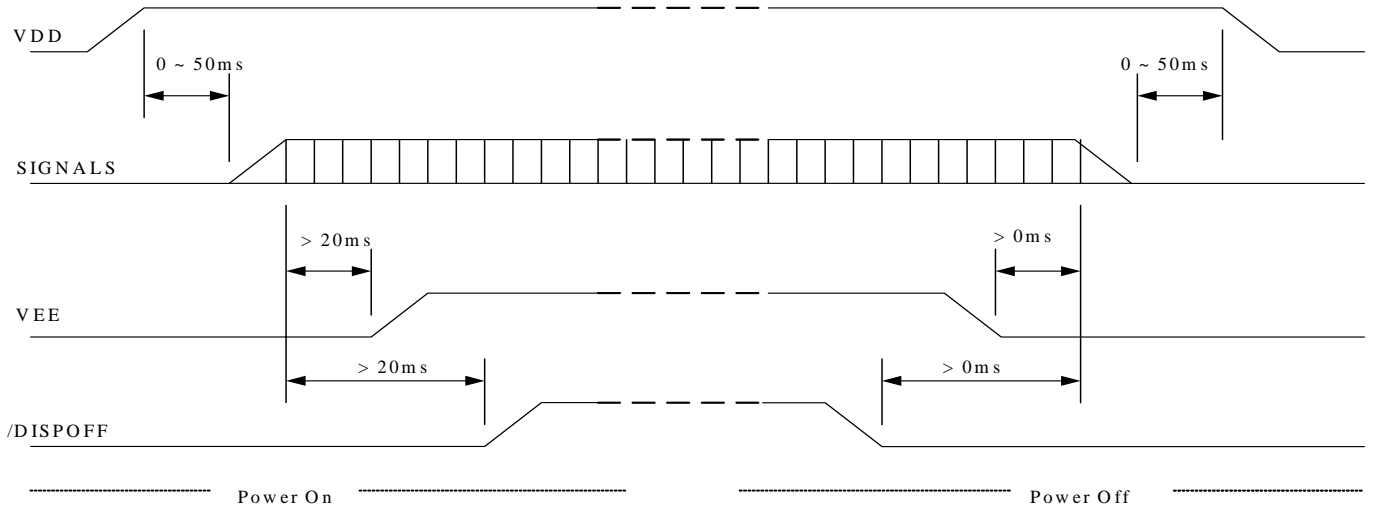
$$t_{CYC8} = 2t_c + t_{CC} + t_{CEA} + 75 > t_{ACV} + 245$$

For all other commands:

$$t_{CYC8} = 4t_c + t_{CC} + 30$$



Timing of power supply for graphic modules



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 | Section |
| System control | SYSTEM SET | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 40 | Initialize device and display | 8 | 9.2.1 |
| | SLEEP IN | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 53 | Enter standby mode | 0 | 9.2.2 |
| Display control | DISP ON/OFF | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 58.59 | Enable and disable display and display flashing | 1 | 9.3.1 | |
| | SCROLL | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 44 | Set display start address and display regions | 10 | 9.3.2 | |
| | CSRFORM | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 5D | Set cursor type | 2 | 9.3.3 | |
| | CGRAM ADR | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 5C | Set start address of character generator RAM | 2 | 9.3.6 | |
| | CSRDIR | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | CD 1 | CD 0 | 4C to 4F | Set direction of cursor movement | 0 | 9.3.4 |
| | HDOT SCR | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 5A | Set horizontal scroll position | 1 | 9.3.7 |
| | OVLAY | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 5B | Set display overlay format | 1 | 9.3.5 |
| Drawing control | CSRW | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 46 | Set cursor address | 2 | 9-r1 |
| | CSRR | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 47 | Read cursor address | 2 | 9.4.2 |
| Memory control | MWRITE | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 42 | Write to display memory | - | 9.5.1 |
| | MRAD | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 43 | Read from display memory | - | 9.5.2 |

Notes

- In general, the internal registers of the RA8835 series are modified as each command parameter is input. However, the microprocessor does not have to set all the parameters of a command and may send a new input will have been changed but the remaining parameter registers are unchanged.
 - 2-byte parameters (where two bytes are treated as 1 data item) are handled as follows:
 - CSRW, CSRR: Each byte is processed individually. The microprocessor may read or write just the low byte of the cursor address.
 - SYSTEM SET, SCROLL, CGRAM ADR: Both parameter bytes are processed together. If the command is changed after half of the parameter has been input, the single byte is ignored.
- APL and APH are 2-byte parameters, but are treated as two 1-byte parameters.

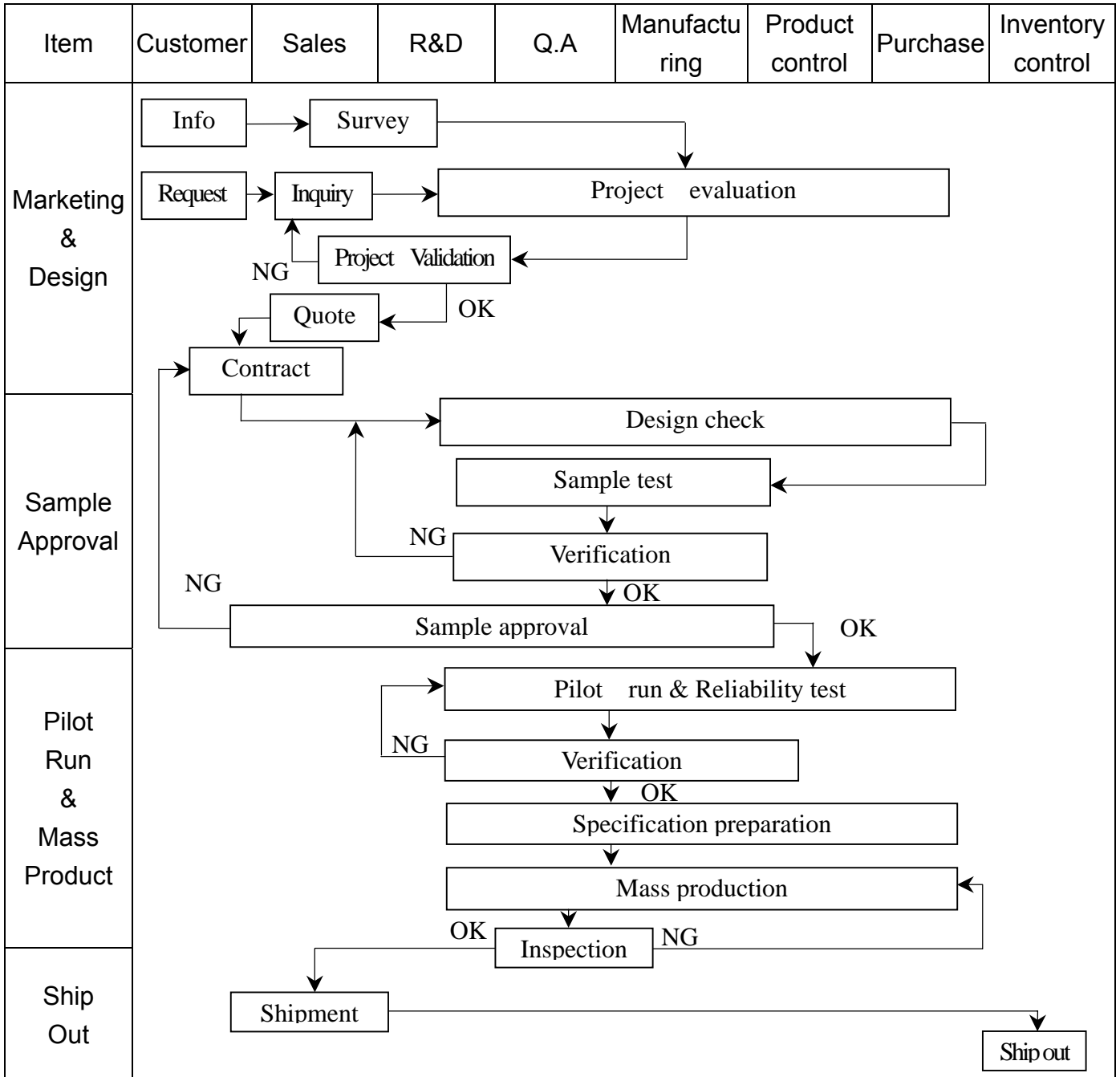


2.5 JUMPER(Setting different use)

JMS(1),JDS(1),JP70(2),JP71(1),JP72(1), JP73(1),JP74(2),JP75(1),JP76(2),JP77(2),JF Short

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart





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

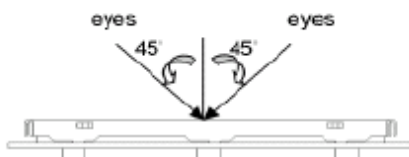


Fig.1

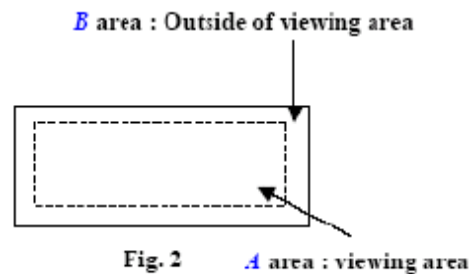


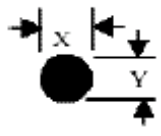
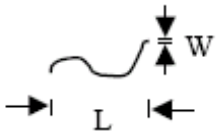
Fig. 2

◆ 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 :

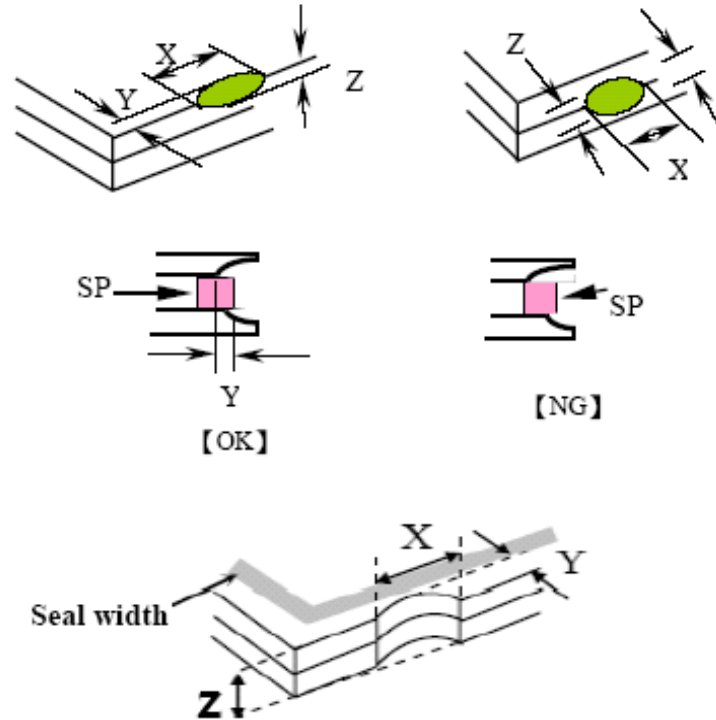
(Ver. 01)

| 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="507 694 1305 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="443 1108 1369 1451"> <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="443 1556 1369 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 :

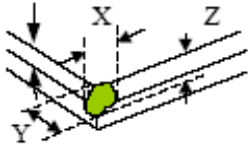
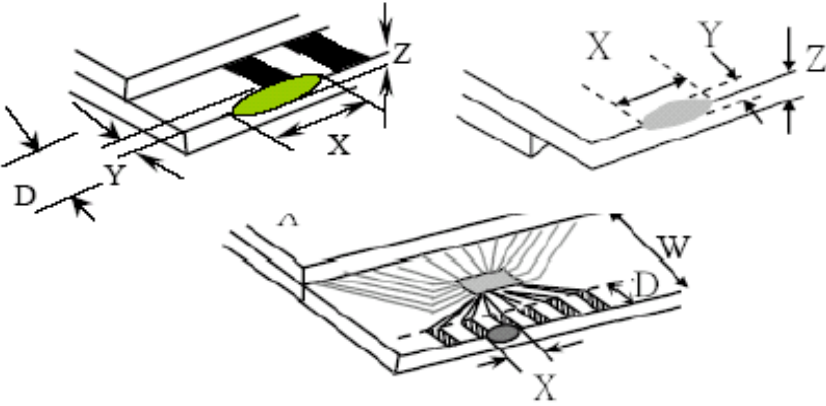
(Ver. 01)

| NO | Item | Criterion | Level | | | | | | | | | |
|----------|--|---|-------|---|---|----------|--------------------------------|--------------|----------|--|----------------------|-------|
| 07 | The crack of glass | <p>Symbols :</p> <p>X : The length of crack 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 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 :

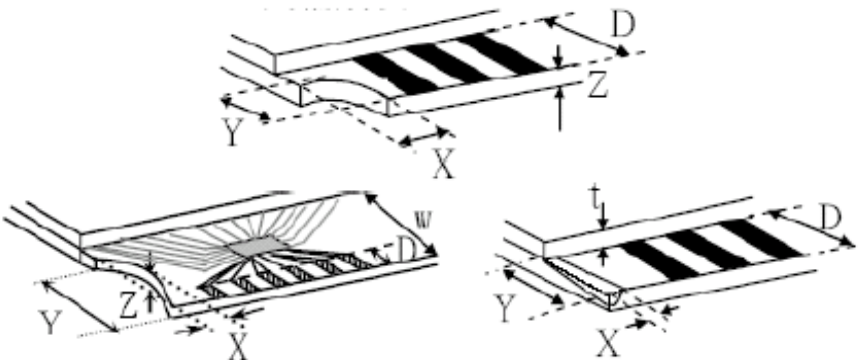
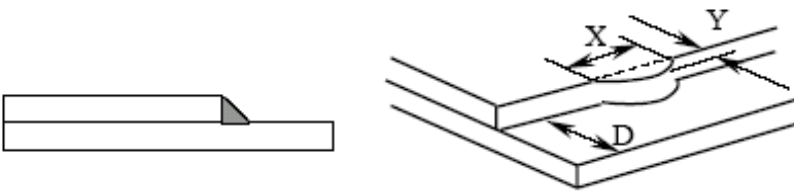
(Ver. 01)

| 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. Z : The thickness of crack D : terminal length 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

| NO | TEST ITEM | TEST CONDITION | | | | | | | | | | | |
|-------------|---|--|---|------------------|----------|-----|-------------|----|------------|----|----------|----|--|
| 1 | High Temperature Storage Test | Keep in $+80 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | | |
| 2 | Low Temperature Storage Test | Keep in $-30 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs. | | | | | | | | | | | |
| 3 | High Temperature / High Humidity Storage Test | Keep in $+60^{\circ}\text{C}$ / 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: $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$ 2. Humidity relative: $30\% \sim 60\%$ 3. Energy Storage Capacitance(Cs+Cd): $150\text{pF} \pm 10\%$ 4. Discharge Resistance(Rd): $330 \Omega \pm 10\%$ 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 s) (Tolerance if the output voltage indication: $\pm 5\%$) | | | | | | | | | | | |
| 5 | Temperature Cycling Storage Test | $ \begin{array}{ccccccc} -20^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +70^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\ (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\ \leftarrow & & & & & & \rightarrow \\ & & & & 10 \text{ Cycle} & & \end{array} $ 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"> <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 1 times | | | | | | | | | | | |

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.

| | |
|-----------|--------------------|
| LCM Model | PE320240WRM002IP1Q |
| 版次Ver.0 | |

LCM包裝規格書

LCM Packaging Specifications

| | | |
|--|--|--|
| Approve | Check | Contact |
|  |  |  |

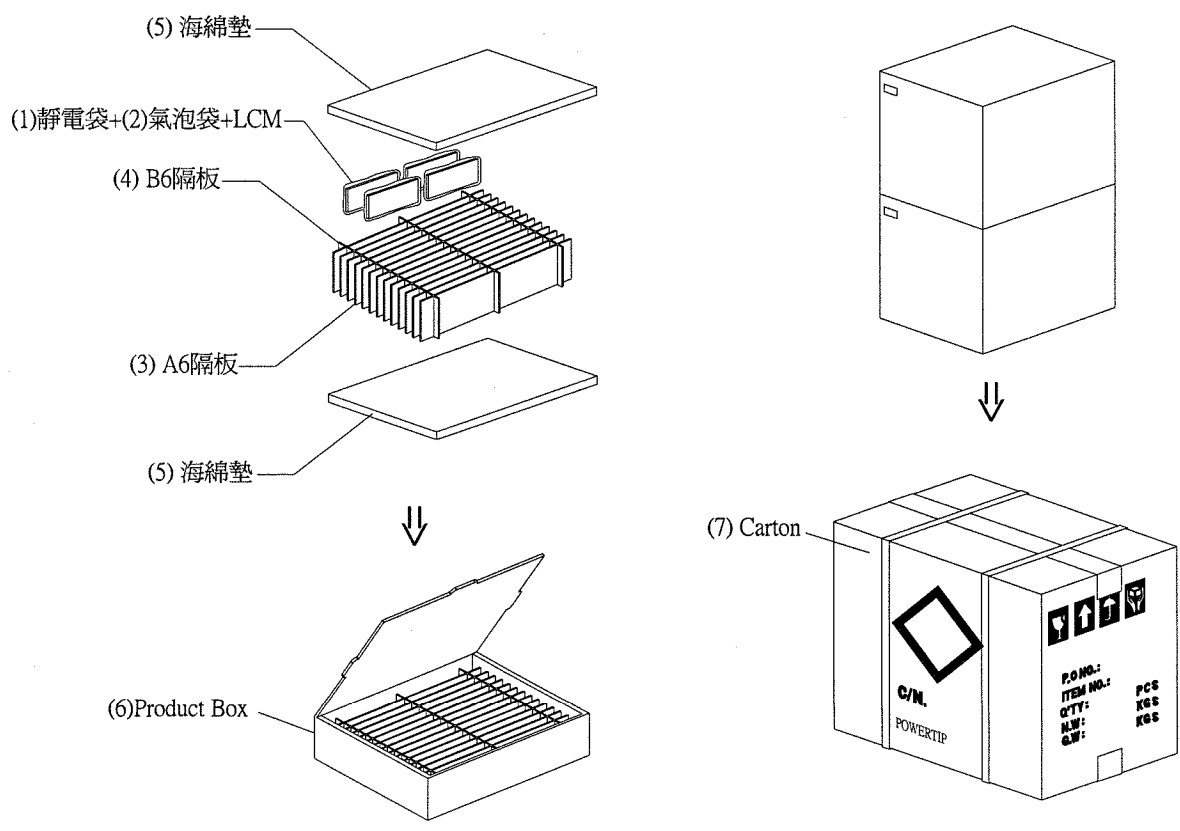
1. 包裝材料規格表 (Packaging Material) : (per carton)

| No. | Item | Model | Dimensions (mm) | Quantity |
|-----|--------------------|--------------------|-----------------|----------|
| 1 | 成品 (LCM) | PE320240WRM002IP1Q | 148.02 X 120.24 | 28 |
| 2 | 靜電袋(1) | BAG240170ARABA | 240 X 170 | 28 |
| 3 | 氣泡袋(2) | BAG170150AWBBA | 170 X 150 | 28 |
| 4 | A6隔板(3) | BX33800012BZBA | 338 X 125 X 3 | 16 |
| 5 | B6隔板(4) | BX29800012BZBA | 293 X 125 X 3 | 6 |
| 6 | 海綿墊(5) | OTFOAM00005ABA | 330 X 290 X 10 | 4 |
| 7 | C4內盒(6)Product Box | BX36031014AABA | 360 X 310 X 142 | 2 |
| 8 | 外紙箱(7)Carton | BX39432432CCBA | 394 X 324 X 321 | 1 |
| 9 | | | | |

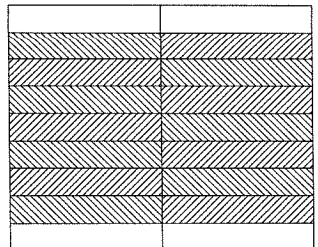
2. 單箱數量規格表 (Packaging Specifications and Quantity) :

(1)Quantity Of Spacer : A6隔板 X 8 , B6隔板 X 3

(2)Total LCM quantity in carton : quantity per box 14 x no of boxes 2 = 28



特 記 事 項 (REMARK)

| | | |
|---|---|--|
| <p>1. Label Specifications :</p> <div style="border: 1px solid black; padding: 5px;"> MODEL: LOT NO: QUANTITY: CHECK: </div> | <p>2. 每個間隔放1片模組，前後間隔不放置模組。(如放置格示意圖)</p> | <p>3. 放置格示意圖:</p> <div style="text-align: center;">  </div> <p>1. 模組 2. 空格</p> |
|---|---|--|