





SPECIFICATIONS

CUSTOMER . _____
SAMPLE CODE (Ver.) . _____
MASS PRODUCTION CODE (Ver.) . PC1602LRS-FWA-B-Q (Rev.0)
DRAWING NO. (Ver.) . PC-95003

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 | Rev. | Description | Note | Page |
|------------|------|--|------|------|
| 2005/10/28 | 0 | PC1602LRS-FWA-B-Q is the ROHS compliant part number based on Powertip's standard PC1602LRS-FWA-B | | |
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Note : For detailed information please refer to IC data sheet : [ST7066U,KS0065B](#)

1. SPECIFICATIONS

1.1 Features

| Item | Standard Value |
|-------------------|--|
| Display Type | 16*2 Characters |
| LCD Type | STN Gray Positive Transflective Normal Temp. |
| Driver Condition | LCD Module : 1/16 Duty , 1/5 Bias |
| Viewing Direction | 6 O'clock |
| Backlight | YG LED B/L |
| Weight | 36 g |
| Interface | — |
| 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 | 84.0(L) * 44.0(w) * 13.7(H)(Max) | mm |
| Viewing Area | 61.0(L) * 15.8(w) | mm |
| Active Area | 56.21(L) * 11.5(w) | mm |
| Dot Size | 0.56(L) * 0.66(w) | mm |
| Dot Pitch | 0.60 (L) * 0.70(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 _{LCD} | — | V _{DD} -10.0 | V _{DD} +0.3 | V |
| Input Voltage | V _{IN} | — | -0.3 | V _{DD} +0.3 | V |
| Operating Temperature | T _{OP} | Excluded B/L | 0 | 50 | °C |
| Storage Temperature | T _{ST} | Excluded B/L | -20 | 70 | °C |
| Storage Humidity | H _D | T _a < 40 °C | - | 90 | %RH |

1.4 DC Electrical Characteristics

$V_{DD} = 5.0 \text{ V} \pm 0.5\text{V}$, $V_{SS} = 0\text{V}$, $T_a = 25^\circ\text{C}$

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------|----------|--------------------------|--------------|------|----------|------|
| Logic Supply Voltage | V_{DD} | — | 4.5 | 5.0 | 5.5 | V |
| “H” Input Voltage | V_{IH} | — | $0.7 V_{DD}$ | - | V_{DD} | V |
| “L” Input Voltage | V_{IL} | — | -0.3 | - | 0.6 | V |
| “H” Output Voltage | V_{OH} | $I_{OH} = -0.1\text{mA}$ | 3.9 | - | V_{DD} | V |
| “L” Output Voltage | V_{OL} | $I_{OL} = 0.1\text{mA}$ | - | - | 0.4 | V |
| Supply Current | I_{DD} | $V_{DD} = 5.0 \text{ V}$ | - | 1.5 | 3.0 | mA |
| LCM Driver Voltage | V_{OP} | 0°C | - | - | - | V |
| | | $25^\circ\text{C} *1$ | 4.3 | 4.5 | 4.7 | |
| | | 50°C | - | - | - | |

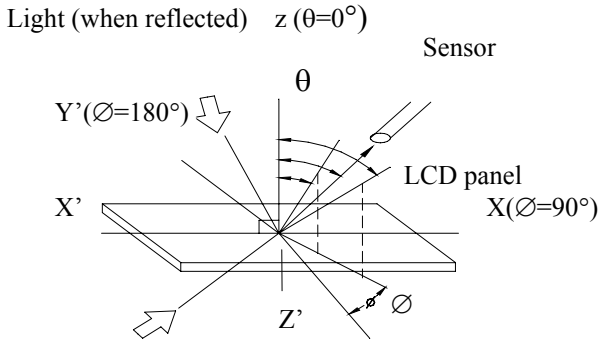
Note: *1. THE V_{OP} TEST POINT IS $V_{DD} - V_O$.

1.5 Optical Characteristics

LCD Panel : 1/16 Duty , 1/4 Bias , $V_{LCD} = 4.2 \text{ V}$, $T_a = 25^\circ\text{C}$

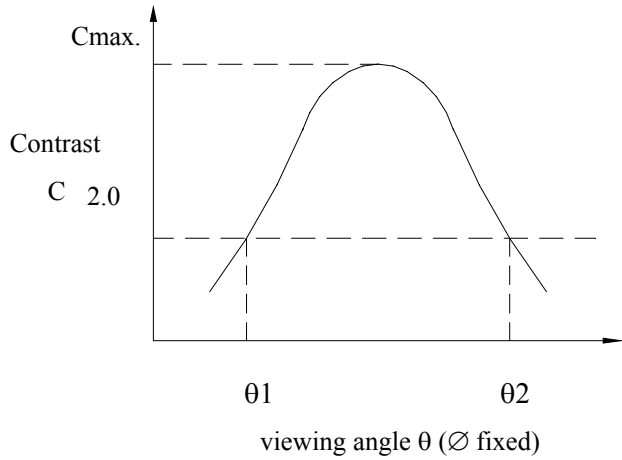
| Item | Symbol | Conditions | Min. | Typ. | Max. | Reference |
|---------------------|----------|--|------------|--------|------|-------------|
| View Angle | θ | $C \geq 2.0$, $\varnothing = 0^\circ$ | 40° | - | - | Notes 1 & 2 |
| Contrast Ratio | C | $\theta = 5^\circ$, $\varnothing = 0^\circ$ | 5 | 7 | - | Note 3 |
| Response Time(rise) | t_r | $\theta = 5^\circ$, $\varnothing = 0^\circ$ | - | 150 ms | - | Note 4 |
| Response Time(fall) | t_f | $\theta = 5^\circ$, $\varnothing = 0^\circ$ | - | 300 ms | - | Note 4 |

Note 1: Definition of angles θ and \varnothing



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

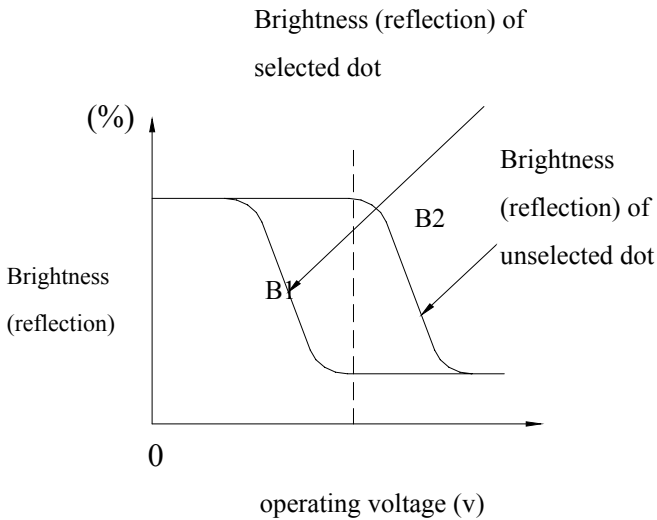
Note 2: Definition of viewing angles θ_1 and θ_2



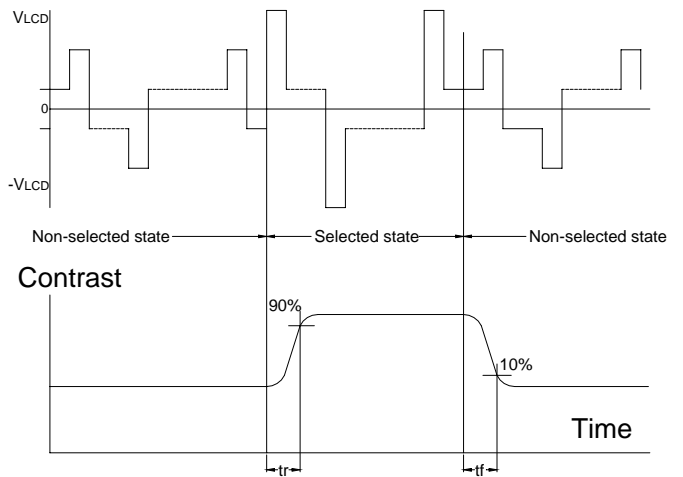
Note : Optimum viewing angle with the naked eye and viewing angle θ at C_{max} . Above are not always the same

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 cm^2

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

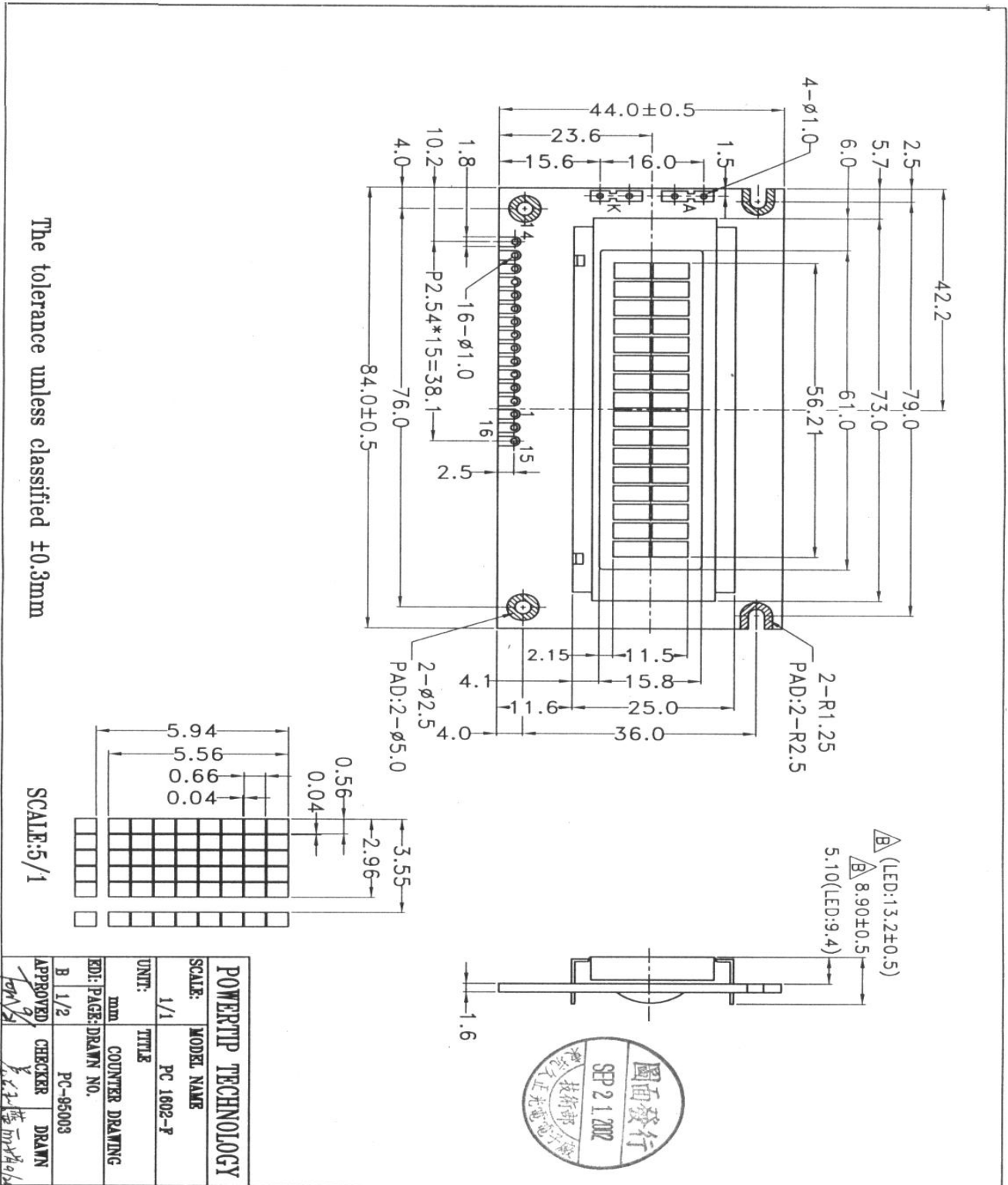
| Item | Symbol | Conditions | Min. | Max. | Unit |
|-------------------|--------|------------|------|------|------|
| Forward Current | IF | Ta =25°C | - | 300 | mA |
| Reverse Voltage | VR | Ta =25°C | - | 8 | V |
| Power Dissipation | PO | Ta =25°C | - | 1.38 | W |

Electrical / Optical Characteristics

| Ta =25°C | | | | | | |
|-------------------------------------|--------------|------------|------|------|------|-------------------|
| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
| Forward Voltage | VF | IF= 120 mA | - | 4.2 | 4.6 | V |
| Reverse Current | IR | VR= 8 V | - | - | 0.2 | mA |
| Wavelength | λp | IF= 120 mA | 571 | - | 576 | nm |
| Luminous Intensity (without LCD) | IV | IF=120 mA | 160 | 210 | 250 | cd/m ² |
| Color | Yellow-green | | | | | |

2. MODULE STRUCTURE

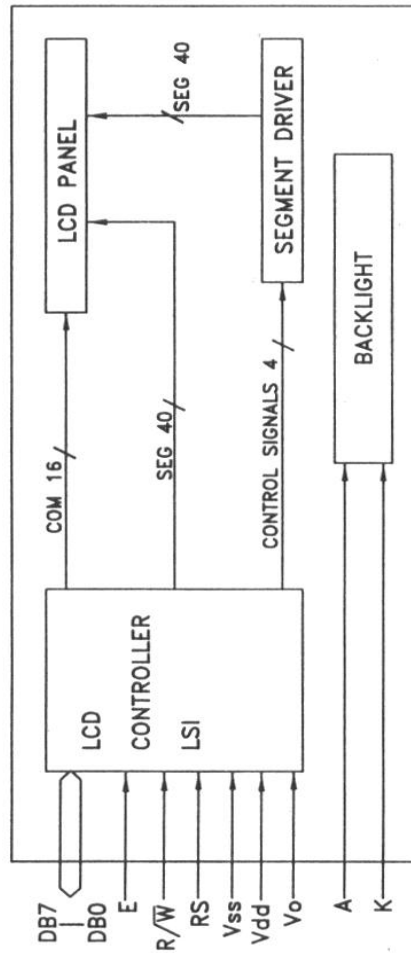
2.1 Counter Drawing





POWERTIP

| PIN NO. | SIGNAL |
|---------|--------|
| 1 | Vss |
| 2 | Vdd |
| 3 | Vo |
| 4 | RS |
| 5 | R/W |
| 6 | E |
| 7 | DB0 |
| 8 | DB1 |
| 9 | DB2 |
| 10 | DB3 |
| 11 | DB4 |
| 12 | DB5 |
| 13 | DB6 |
| 14 | DB7 |
| 15 | A |
| 16 | K |



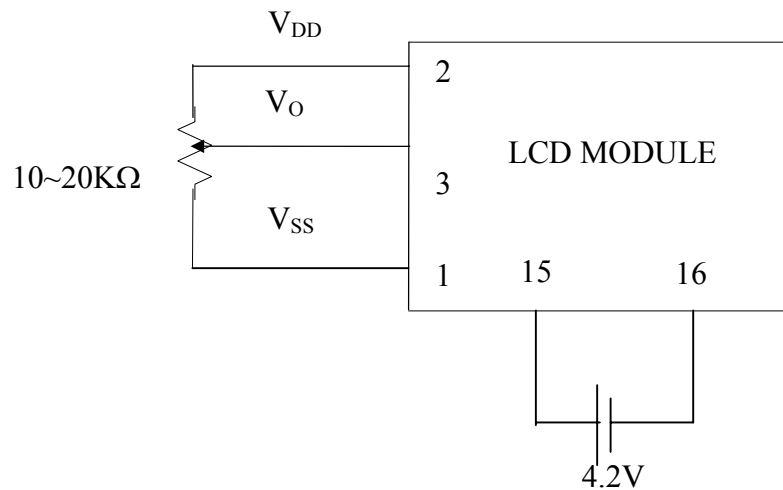
| POWERTIP TECHNOLOGY | |
|---------------------|-----------------|
| SCALE: | MODEL NAME |
| NO SCALE | PC 1602-F |
| UNIT: | TITLE |
| NO UNIT | COUNTER DRAWING |
| EDI: PAGE: | DRAWN NO. |
| B 2/2 | PC-95003 |
| APPROVED | CHECKER |
| 9/2002 | DRAWN |

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2.2 Interface Pin Description

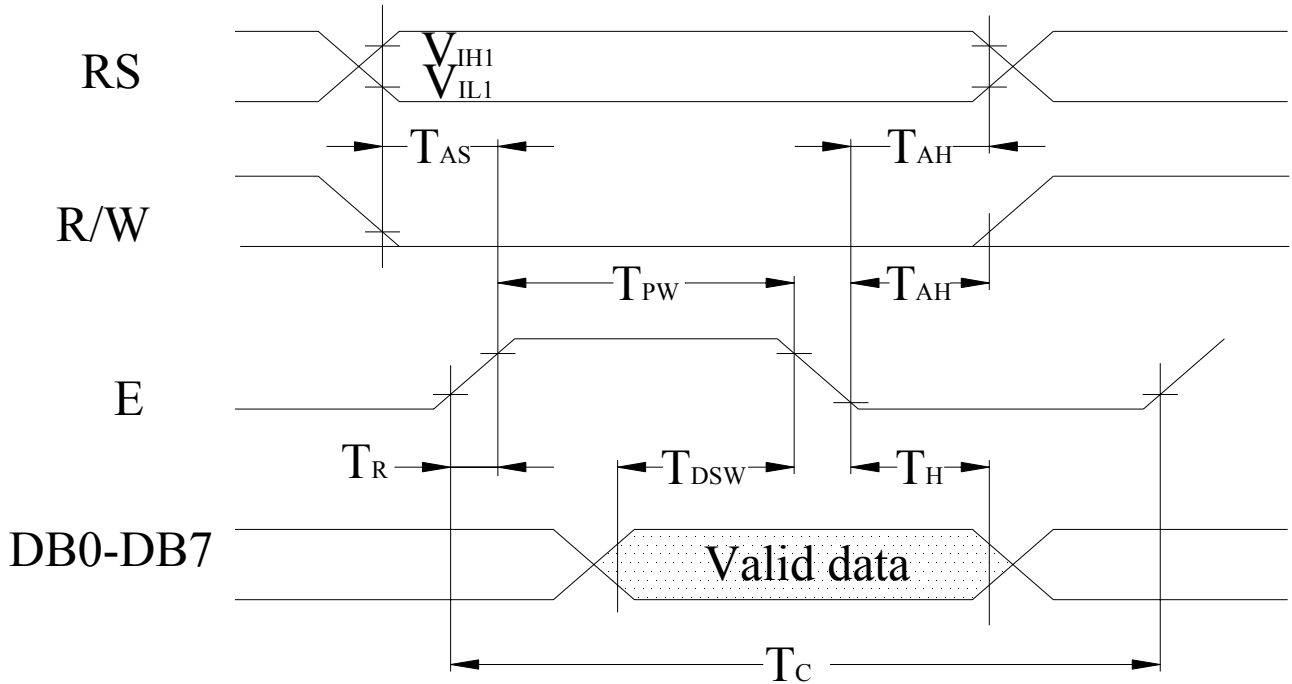
| Pin No. | Symbol | Signal Description |
|---------|-------------------------|---|
| 1 | V _{SS} | Power Supply (V _{SS} =0) |
| 2 | V _{DD} | Power Supply (V _{DD} >V _{SS}) |
| 3 | V _O | Operating voltage for LCD |
| 4 | RS | Register Selection input High = Data register Low = Instruction register (for write) Busy flag address counter (for read) |
| 5 | $\overline{\text{R/W}}$ | Read/Write signal input is used to select the read/write mode High = Read mode, Low = Write mode |
| 6 | E | Start enable signal to read or write the data |
| 7~10 | DB0 ~ DB3 | Four low order bi-directional three-state data bus lines. Use for data transfer between the MPU and the LCD module. These four are not used during 4-bit operation. |
| 11~14 | DB4~DB7 | Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCD module. DB7 can be used as a busy flag. |
| 15 | A | Power supply for LED B/L (+) |
| 16 | K | Power supply for LED B/L (-) |

Contrast Adjust

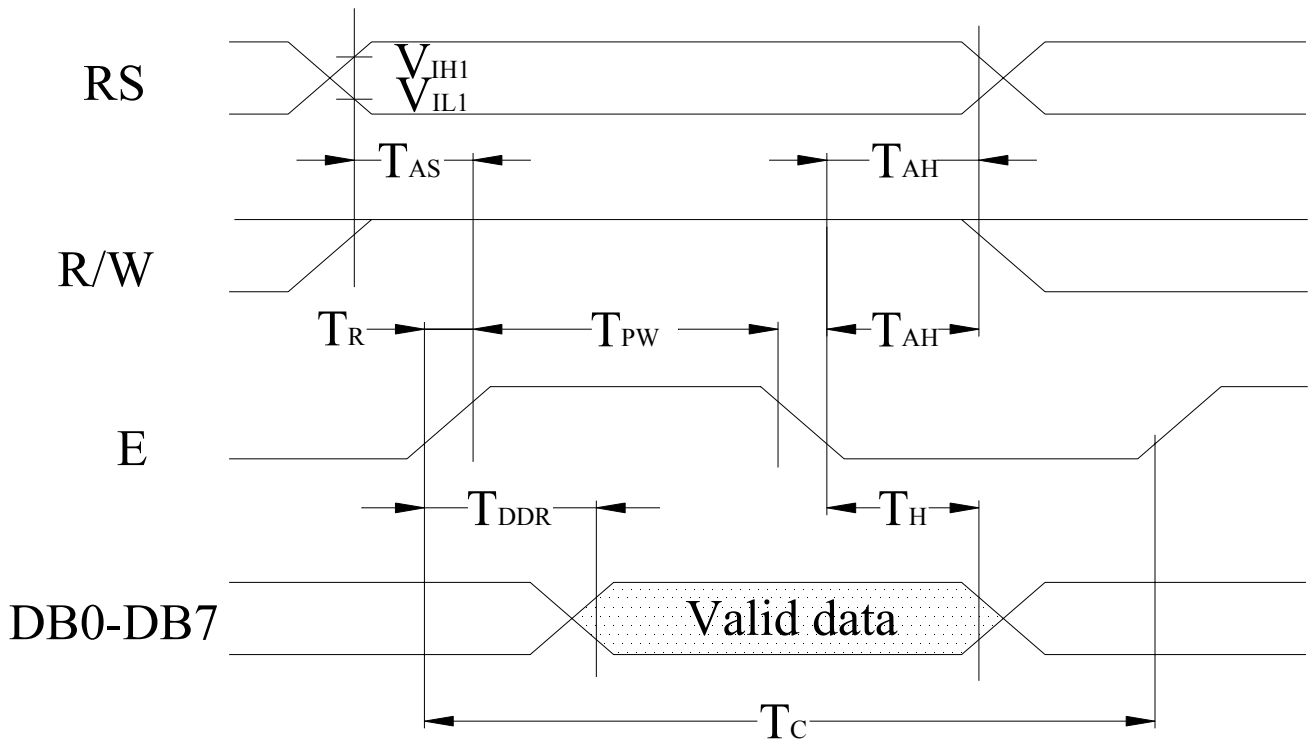


2.3 Timing Characteristics

- Writing data from MPU to ST7066U



- Reading data from ST7066U to MPU



- Write Mode (Writing data from MPU to ST7066U)

(V_{cc} = +5V, Ta=25°C)

| Symbol | Characteristics | Test Condition | Min. | Typ. | Max. | Unit |
|---------------------------------|-------------------------|-----------------|------|------|------|------|
| T _C | Enable Cycle Time | Pin E | 1200 | - | - | ns |
| T _{PW} | Enable Pulse Width | Pin E | 140 | - | - | ns |
| T _R , T _F | Enable Rise / Fall Time | Pin E | - | - | 25 | ns |
| T _{AS} | Address Setup Time | Pins: RS , RW,E | 0 | - | - | ns |
| T _{AH} | Address Hold Time | Pins :RS,RW,E | 10 | - | - | ns |
| T _{DSW} | Data Setup Time | Pins:DB0~DB7 | 40 | - | - | ns |
| T _H | Data Hold Time | Pins:DB0~DB7 | 10 | - | - | ns |

- Read Mode (Reading data from ST7066U to MPU)

(V_{cc} = +5V, Ta=25°C)

| Symbol | Characteristics | Test Condition | Min. | Typ. | Max. | Unit |
|---------------------------------|-------------------------|-----------------|------|------|------|------|
| T _C | Enable Cycle Time | Pin E | 1200 | - | - | ns |
| T _{PW} | Enable Pulse Width | Pin E | 140 | - | - | ns |
| T _R , T _F | Enable Rise / Fall Time | Pin E | - | - | 25 | ns |
| T _{AS} | Address Setup Time | Pins: RS , RW,E | 0 | - | - | ns |
| T _{AH} | Address Hold Time | Pins :RS,RW,E | 10 | - | - | ns |
| T _{DDR} | Data Setup Time | Pins:DB0~DB7 | - | - | 100 | ns |
| T _H | Data Hold Time | Pins:DB0~DB7 | 10 | - | - | ns |

2.4 Display Command

| Instructions | Instruction Code | | | | | | | | | | Description | Description Time (270KHz) | |
|-------------------------|------------------|-----|---------|---------|---------|---------|---------|---------|---------|---------|-------------|---|--------|
| | RS | R/W | DB 7 | DB 6 | DB 5 | DB 4 | DB 3 | DB 2 | DB 1 | DB 0 | | | |
| Clear Display | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Write "20H" to DDRAM. and set DDRAM address to "00H" from AC. | 1.52ms |
| Return Home | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | × | Set DDRAM address to "00H" from AC and return cursor to it's original position if shifted. The contents of DDRAM are not changed. | 1.52ms |
| Entry Mode Set | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | I/D | S | Sets cursor move direction and specifies display shift. These operations are performed during data write and read . | 37μs |
| Display ON/OFF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | D | C | B | D=1 : entire display on C=1 : cursor on B=1 : cursor position on | 37μs |
| Cursor or Display Shift | 0 | 0 | 0 | 0 | 0 | 0 | 1 | S/C | R/L | × | × | Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data. | 37μs |
| Function Set | 0 | 0 | 0 | 0 | 0 | 1 | DL | N | F | × | × | DL: interface data is 8/4 bits NL: number of line is 2/1 F: font size is 5×11/5×8 | 37μs |
| Set CGRAM Address | 0 | 0 | 0 | 1 | AC 5 | AC 4 | AC 3 | AC 2 | AC 1 | AC 0 | | Set CGRAM address in address counter. | 37μs |
| Set DDRAM Address | 0 | 0 | 1 | AC 6 | AC 5 | AC 4 | AC 3 | AC 2 | AC 1 | AC 0 | | Set DDRAM address in address counter. | 37μs |

| | | | | | | | | | | | | |
|----------------------------|---|---|----|------|------|------|------|------|------|------|--|------------|
| Read Busy Flag and Address | 0 | 1 | BF | AC 6 | AC 5 | AC 4 | AC 3 | AC 2 | AC 1 | AC 0 | Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read. | 0 μ s |
| Write Data to RAM | 1 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Write data into internal RAM (DDRAM/CGRAM). | 37 μ s |
| Read Data from RAM | 1 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Read data from internal RAM (DDRAM/CGRAM). | 37 μ s |

Note:

Be sure the ST7066U is not in the busy state (BF=0) before sending an instruction from the MPU to the ST7066.

If an instruction is sent without checking the busy flag , the time between the first instruction and next instruction will take much longer than the instruction time itself.

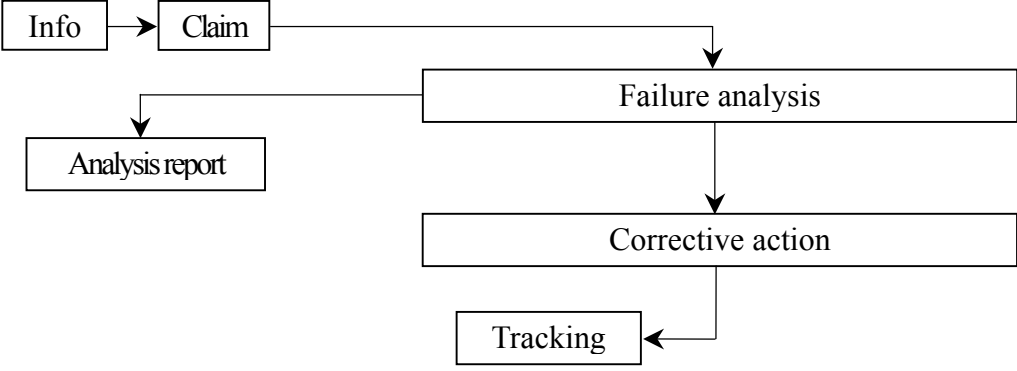
Refer to Instruction Table for the list of each instruction execution time .



2.5 Character Pattern

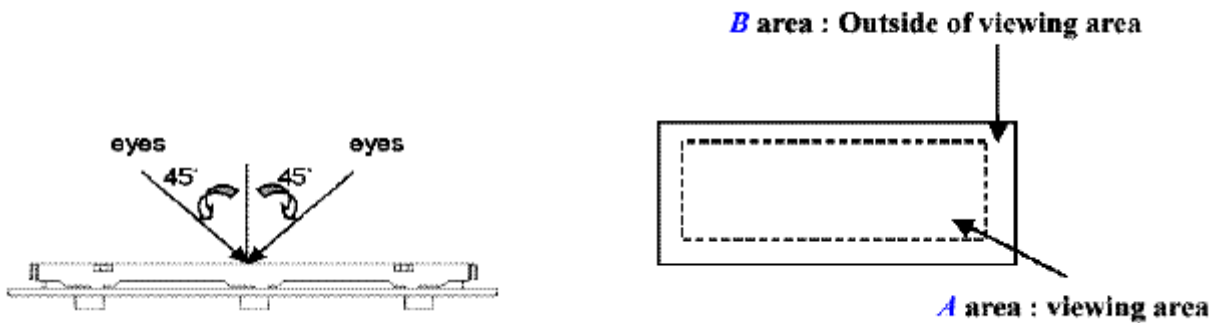
CHARACTER PATTERN(SO/HO/EA,WA)

| Lower 4 Bits | Upper 4 Bits | 0000 | 0001 | 0010 | 0011 | 0100 | 0101 | 0110 | 0111 | 1000 | 1001 | 1010 | 1011 | 1100 | 1101 | 1110 | 1111 |
|--------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| xxxx0000 | CG RAM (1) | | | 0 | 1 | 2 | 3 | 4 | 5 | | | 6 | 7 | 8 | 9 | A | B |
| xxxx0001 | (2) | | ! | 1 | 2 | 3 | 4 | 5 | 6 | | | 7 | 8 | 9 | A | B | C |
| xxxx0010 | (3) | | " | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | A | B | C | D |
| xxxx0011 | (4) | | # | 3 | 4 | 5 | 6 | 7 | 8 | | | 9 | A | B | C | D | E |
| xxxx0100 | (5) | | \$ | 4 | 5 | 6 | 7 | 8 | 9 | | | A | B | C | D | E | F |
| xxxx0101 | (6) | | % | 5 | 6 | 7 | 8 | 9 | A | | | B | C | D | E | F | G |
| xxxx0110 | (7) | | & | 6 | 7 | 8 | 9 | A | B | | | C | D | E | F | G | H |
| xxxx0111 | (8) | | ' | 7 | 8 | 9 | A | B | C | | | D | E | F | G | H | I |
| xxxx1000 | (1) | | (| 8 | 9 | A | B | C | D | | | E | F | G | H | I | J |
| xxxx1001 | (2) | |) | 9 | A | B | C | D | E | | | F | G | H | I | J | K |
| xxxx1010 | (3) | | * | A | B | C | D | E | F | | | G | H | I | J | K | L |
| xxxx1011 | (4) | | + | B | C | D | E | F | G | | | H | I | J | K | L | M |
| xxxx1100 | (5) | | , | C | D | E | F | G | H | | | I | J | K | L | M | N |
| xxxx1101 | (6) | | - | D | E | F | G | H | I | | | J | K | L | M | N | O |
| xxxx1110 | (7) | | . | E | F | G | H | I | J | | | K | L | M | N | O | P |
| xxxx1111 | (8) | | / | F | G | H | I | J | K | | | L | M | N | O | P | Q |

| 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

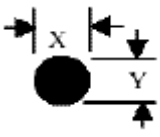
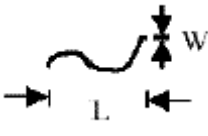

- ◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II .
- ◆ Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample
- ◆ Defect Level : Major Defect AQL 0.4; Minor Defect AQL 1.5 .
- ◆ OUT Going Defect Level : Sampling .
- ◆ Manner of appearance test :
 - (1). The test be under 40W×2 fluorescent light ' and distance of view must be at 30 cm.
 - (2). The test direction is base on about around 45° of vertical line. (Fig. 1)
 - (3). Definition of area . (Fig. 2)



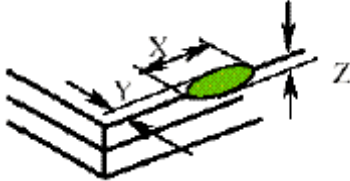
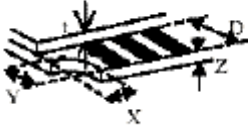
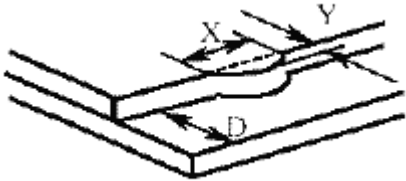
◆ Specification:

| 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 、 dot 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 |
| 05 | Black or white dot 、 scratch 、 contamination Round type | 5.1 Round type: 5.1.1 display only : <ul style="list-style-type: none"> • White and black spots on display $\leq 0.25\text{mm}$, no more than Four white or black spots present. • Densely spaced : NO more than two spots or lines within 3mm | Minor |

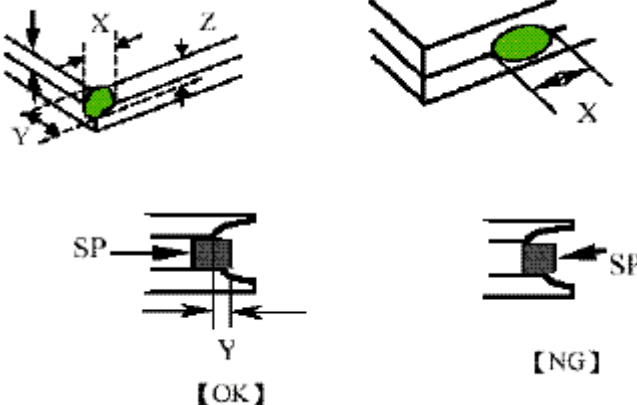
◆ Specification :

| NO | Item | Criterion | level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--------------------------------|------------------|---------------------------|-----------------|---|---------------------------|---|-------------|---|---------|--------------------------------|---|-------------------|-------------|------------------------|-------|-------------|----------------|-----|------------------------|-----------------|-------------|-----------------------|---|---|-------------|-----------------------|--|-------------|-----|----------------------|---------------|--|-------|
| 05 | Black or white dot、scratch、contamination Round type  $\Phi = (x+y)/2$  | 5.1.2 Nom-display : <table border="1" data-bbox="518 459 1340 683"> <thead> <tr> <th>Dimension (diameter : Φ)</th> <th>Acceptance(Q'ty)</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10\text{mm}$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10\text{mm} < \Phi \leq 0.20\text{mm}$</td> <td>3</td> </tr> <tr> <td>$0.20\text{mm} < \Phi \leq 0.25\text{mm}$</td> <td>2</td> </tr> <tr> <td>Total</td> <td>4</td> </tr> </tbody> </table> 5.1.3 Line type: <table border="1" data-bbox="422 750 1412 1008"> <thead> <tr> <th colspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>Length</th> <th>width</th> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$w \leq 0.03\text{mm}$</td> <td>Accept no dense</td> <td>Don't count</td> </tr> <tr> <td>$L \leq 3.0\text{mm}$</td> <td>$0.03\text{mm} < \Phi \leq 0.05\text{mm}$</td> <td rowspan="2">4</td> <td>Don't count</td> </tr> <tr> <td>$L \leq 2.5\text{mm}$</td> <td>$0.05\text{mm} < \Phi \leq 0.075\text{mm}$</td> <td>Don't count</td> </tr> <tr> <td>---</td> <td>$w > 0.075\text{mm}$</td> <td colspan="2">As round type</td> </tr> </tbody> </table> | Dimension (diameter : Φ) | Acceptance(Q'ty) | $\Phi \leq 0.10\text{mm}$ | Accept no dense | $0.10\text{mm} < \Phi \leq 0.20\text{mm}$ | 3 | $0.20\text{mm} < \Phi \leq 0.25\text{mm}$ | 2 | Total | 4 | Dimension (diameter : Φ) | | Acceptance (Q'ty) | | Length | width | A area | B area | --- | $w \leq 0.03\text{mm}$ | Accept no dense | Don't count | $L \leq 3.0\text{mm}$ | $0.03\text{mm} < \Phi \leq 0.05\text{mm}$ | 4 | Don't count | $L \leq 2.5\text{mm}$ | $0.05\text{mm} < \Phi \leq 0.075\text{mm}$ | Don't count | --- | $w > 0.075\text{mm}$ | As round type | | Minor |
| Dimension (diameter : Φ) | Acceptance(Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.10\text{mm}$ | Accept no dense | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.10\text{mm} < \Phi \leq 0.20\text{mm}$ | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.20\text{mm} < \Phi \leq 0.25\text{mm}$ | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimension (diameter : Φ) | | Acceptance (Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Length | width | A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| --- | $w \leq 0.03\text{mm}$ | Accept no dense | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $L \leq 3.0\text{mm}$ | $0.03\text{mm} < \Phi \leq 0.05\text{mm}$ | 4 | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $L \leq 2.5\text{mm}$ | $0.05\text{mm} < \Phi \leq 0.075\text{mm}$ | | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| --- | $w > 0.075\text{mm}$ | As round type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06 | Polarizer Bubble | <table border="1" data-bbox="422 1086 1396 1422"> <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>$\Phi \leq 0.20\text{mm}$</td> <td>Accept no dense</td> <td>Don't count</td> </tr> <tr> <td>$0.20\text{mm} < \Phi \leq 0.50\text{mm}$</td> <td>3</td> <td>Don't count</td> </tr> <tr> <td>$0.50\text{mm} < \Phi \leq 1.00\text{mm}$</td> <td>2</td> <td>Don't count</td> </tr> <tr> <td>$\Phi > 1.00\text{mm}$</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 | $\Phi \leq 0.20\text{mm}$ | Accept no dense | Don't count | $0.20\text{mm} < \Phi \leq 0.50\text{mm}$ | 3 | Don't count | $0.50\text{mm} < \Phi \leq 1.00\text{mm}$ | 2 | Don't count | $\Phi > 1.00\text{mm}$ | 0 | Don't count | Total quantity | 4 | Don't count | Minor | | | | | | | | | | | | | |
| Dimension (diameter : Φ) | Acceptance(Q'ty) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A area | B area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.20\text{mm}$ | Accept no dense | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.20\text{mm} < \Phi \leq 0.50\text{mm}$ | 3 | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $0.50\text{mm} < \Phi \leq 1.00\text{mm}$ | 2 | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\Phi > 1.00\text{mm}$ | 0 | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total quantity | 4 | Don't count | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07 | The crack of glass | <ul style="list-style-type: none"> ● Glass Crack: 7.1 Crack on the circuit of electrode terminal :  <table border="1" data-bbox="486 1792 1340 1948"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td>$X \leq 1/5 a$</td> <td>$Y \leq 1/2 D$</td> <td>$Z \leq t$</td> </tr> <tr> <td>Back</td> <td colspan="3">Neglect</td> </tr> </tbody> </table> | | X | Y | Z | Front | $X \leq 1/5 a$ | $Y \leq 1/2 D$ | $Z \leq t$ | Back | Neglect | | | Minor | | | | | | | | | | | | | | | | | | | | | |
| | X | Y | Z | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Front | $X \leq 1/5 a$ | $Y \leq 1/2 D$ | $Z \leq t$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Back | Neglect | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

◆ Specification :

| NO | Item | Criterion | Level | | | | | | | | | | | | |
|---------|---|---|-------|---|---------|--------------|------------|---------|---|---|---|---------|------------|---------|-------|
| 07 | <p>The crack of glass</p> <p>X: The length of Crack</p> <p>Y: The width of crack</p> <p>Z: The thickness of crack</p> <p>D: terminal length</p> <p>T: The thickness of glass</p> <p>A : The length of glass</p> | <p>● Glass Crack:</p> <p>7.2 General glass crack and corner edge:</p> <p>7.2.1</p>  <table border="1" data-bbox="552 824 1270 925"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>Neglect</td> <td>Out A area</td> <td>Neglect</td> </tr> </table> <p>7.2.2</p>  <table border="1" data-bbox="552 1200 1270 1301"> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>Neglect</td> <td>Out A area</td> <td>Neglect</td> </tr> </table> | X | Y | Z | Neglect | Out A area | Neglect | X | Y | Z | Neglect | Out A area | Neglect | Minor |
| X | Y | Z | | | | | | | | | | | | | |
| Neglect | Out A area | Neglect | | | | | | | | | | | | | |
| X | Y | Z | | | | | | | | | | | | | |
| Neglect | Out A area | Neglect | | | | | | | | | | | | | |
| | | <p>7.3 Glass remain:</p>  <table border="1" data-bbox="699 1776 1153 1877"> <tr> <td>X</td> <td>Y</td> </tr> <tr> <td>Neglect</td> <td>$\leq 1/3 d$</td> </tr> </table> | X | Y | Neglect | $\leq 1/3 d$ | Minor | | | | | | | | |
| X | Y | | | | | | | | | | | | | | |
| Neglect | $\leq 1/3 d$ | | | | | | | | | | | | | | |

◆ Specification :

| NO | Item | Criterion | Level | | | | | | | | | |
|-------------|---|---|-------|---|---|-------------|--------------------------------|-------------|-------------|--|--------------------|-------|
| 07 | <p>The crack of glass</p> <p>X: The length of Crack</p> <p>Y: The width of crack</p> <p>Z: The thickness of crack</p> <p>D: terminal length</p> <p>T: The thickness of glass</p> <p>A : The length of glass</p> | <p>7.4 Corner crack and medial crack:</p>  <table border="1" data-bbox="443 1025 1393 1220"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/5a$</td> <td>Crack can't enter viewing area</td> <td>$\leq 1/2t$</td> </tr> <tr> <td>$\leq 1/5a$</td> <td>Crack can't exceed the half of width of SP</td> <td>$1/2t < Z \leq 2t$</td> </tr> </tbody> </table> | X | Y | Z | $\leq 1/5a$ | Crack can't enter viewing area | $\leq 1/2t$ | $\leq 1/5a$ | Crack can't exceed the half of width of SP | $1/2t < Z \leq 2t$ | Minor |
| X | Y | Z | | | | | | | | | | |
| $\leq 1/5a$ | Crack can't enter viewing area | $\leq 1/2t$ | | | | | | | | | | |
| $\leq 1/5a$ | Crack can't exceed the half of width of SP | $1/2t < Z \leq 2t$ | | | | | | | | | | |
| 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 be the same as specified on packaging specification sheet. | Major | | | | | | | | | |
| | | 9.4 The folding and peeled off in polarizer are not acceptable | Major | | | | | | | | | |
| | | 9.5 The PCB or FPC between B/L assembled distance (PCB or FPC) is $\leq 1.5\text{mm}$ | Major | | | | | | | | | |

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

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

5.2 HANDLING

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

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.