LCD / LCM SPECIFICATION


WINSTAR Display Co.,Ltd.

華凌光電股份有限公司

**Winstar Display Co., LTD**
華凌光電股份有限公司
WEB: http://www.winstar.com.tw E-mail: sales@winstar.com.tw

# SPECIFICATION

**CUSTOMER :** _____

**MODULE NO.: WO24064D-TFH#**

| **APPROVED BY:** ( FOR CUSTOMER USE ONLY ) | PCB VERSION: DATA: |
|---|---|

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| | | | |

| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
|---|---|---|---|
| 0 | 2014/01/24 | | First issue |

**Winstar Display Co., LTD**
華凌光電股份有限公司

MODLE NO：

| RECORDS OF REVISION | | | DOC. FIRST ISSUE |
|---|---|---|---|
| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
| 0 | 2014/01/24 | | First issue |

# Contents

# 1.Module Classification Information

| W | O | 24064 | D | — | T | F | H | — | # |
|---|---|---|---|---|---|---|---|---|---|
| ① | ② | ③ | ④ | | ⑤ | ⑥ | ⑦ | | ⑧ |

① Brand：WINSTAR DISPLAY CORPORATION

② Display Type：H→Character Type, G→Graphic Type , X→TAB Type, O→COG Type

③ Display Font： 240 * 64 dot

④ Model serials no.

⑤ Backlight Type：

| | | |
|---|---|---|
| N→Without backlight | T→LED, White | S→LED, High light White |
| B→EL, Blue green | A→LED, Amber | L→LED, Full color |
| D→EL, Green | R→LED, Red | J→DIP LED,Blue |
| W→EL, White | O→LED, Orange | K→DIP LED,White |
| M→EL, Yellow Green | G→LED, Green | E→DIP LED, Yellow Green |
| F→CCFL, White | P→LED, Blue | H→DIP LED,Amber |
| Y→LED, Yellow Green | X→LED, Dual color | I→DIP LED, Red |
| G→LED, Green | C→LED, Full color | |

⑥ LCD Mode：

| | |
|---|---|
| B→TN Positive, Gray | V→FSTN Negative, Blue |
| N→TN Negative, | T→FSTN Negative, Black |
| L→VA Negative | D→FSTN Negative (Double film) |
| H→ HTN Positive, Gray | F→FSTN Positive |
| I→HTN Negative, Black | K→FSC Negative |
| U→HTN Negative, Blue | S→FSC Positive |
| M→STN Negative, Blue | E→ISTN Negative, Black |
| G→STN Positive, Gray | C→CSTN Negative, Black |
| Y→STN Positive, Yellow Green | A→ASTN Negative, Black |

⑦ LCD Polarize Type/ Temperature range/ View direction

| | |
|---|---|
| A→Reflective, N.T, 6:00 | H→Transflective, W.T,6:00 |
| D→Reflective, N.T, 12:00 | K→Transflective, W.T,12:00 |
| G→Reflective, W. T, 6:00 | C→Transmissive, N.T,6:00 |
| J→Reflective, W. T, 12:00 | F→Transmissive, N.T,12:00 |
| B→Transflective, N.T,6:00 | I→Transmissive, W. T, 6:00 |
| E→Transflective, N.T.12:00 | L→Transmissive, W.T,12:00 |

⑧ Special Code #：Fit in with the ROHS Directions and regulations

# 2.Precautions in use of LCD Modules

(1)Avoid applying excessive shocks to the module or making any alterations or modifications to it.

(2)Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.

(3)Don't disassemble the LCM.

(4)Don't operate it above the absolute maximum rating.

(5)Don't drop, bend or twist LCM.

(6)Soldering: only to the I/O terminals.

(7)Storage: please storage in anti-static electricity container and clean environment.

(8) Winstar have the right to change the passive components, including R3,R6 & backlight adjust resistors. (Resistors,capacitors and other passive components will have different appearance and color caused by the different supplier.)

(9)Winstar have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance...etc, under the premise of not affecting the electrical characteristics and external dimensions, Winstar have the right to modify the version.)

# 3.General Specification

| Item | Dimension | Unit |
|---|---|---|
| Number of dots | 240 x 64 | — |
| Module dimension | 86.2 x 39.3 x 5.10 | mm |
| View area | 80.8 x 24.8 | mm |
| Active area | 76.78 x 20.46 | mm |
| Dot size | 0.30 x 0.30 | mm |
| Dot pitch | 0.32 x 0.32 | mm |
| LCD type | FSTN Transflective Positive<br>(In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.) | |
| Duty | 1/64 | |
| View direction | 6 o'clock | |
| Backlight Type | LED, White | |
| IC | ST7586S | |

# 4.Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | $T_{OP}$ | -20 | — | +70 | ℃ |
| Storage Temperature | $T_{ST}$ | -30 | — | +80 | ℃ |
| Digital Power Supply Voltage | VDDI | -0.3 | — | 3.6 | V |
| Analog Power supply voltage | VDDA | -0.3 | — | 3.6 | V |
| LCD Power supply voltage | V0-XV0 | -0.3 | — | 19 | V |
| LCD Power supply voltage | VG | -0.3 | — | 5.5 | V |

# 5.Electrical Characteristics

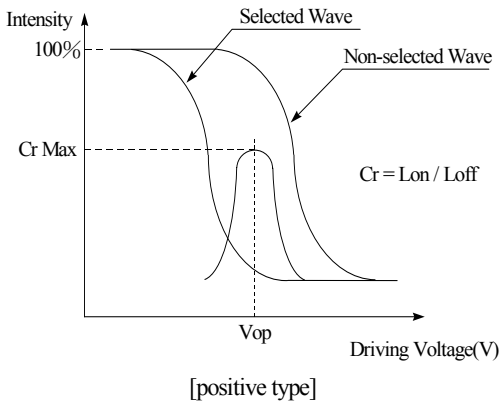
| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage For Logic | $V_{DD}$-$V_{SS}$ | — | 3.0 | 3.3 | 3.4 | V |
| Supply Voltage For LCM | V0-XV0 | Ta=-20℃<br>Ta=25℃<br>Ta=+70℃ | —<br>9.8<br>— | —<br>10.0<br>— | —<br>10.2<br>— | V<br>V<br>V |
| Input High Volt. | $V_{IH}$ | — | 0.7$V_{DD}$ | — | $V_{DD}$ | V |
| Input Low Volt. | $V_{IL}$ | — | Vss | — | 0.3 $V_{DD}$ | V |
| Output High Volt. | $V_{OH}$ | — | 0.8 $V_{DD}$ | — | $V_{DD}$ | V |
| Output Low Volt. | $V_{OL}$ | — | Vss | — | 0.2$V_{DD}$ | V |
| Supply Current(No include LED Backlight) | $I_{DD}$ | $V_{DD}$=3.3V | — | 1.5 | — | mA |

Please kindly consider to design the Vop to be adjustable while programing the software to match LCD contrast tolerance.

# 6.Optical Characteristics

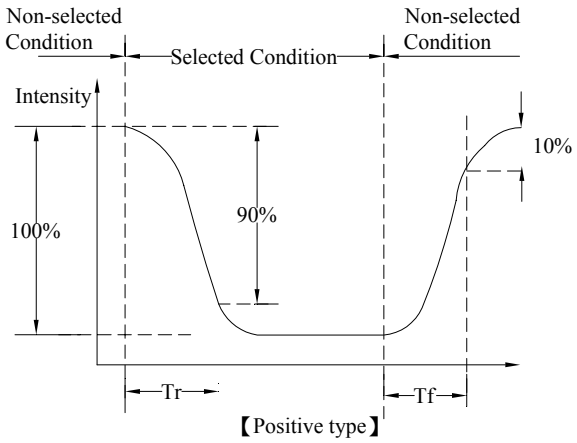
| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| View Angle | $\theta$ | CR≧2 | 0 | — | 30 | $\phi = 180^\circ$ |
| | $\theta$ | CR≧2 | 0 | — | 60 | $\phi = 0^\circ$ |
| | $\theta$ | CR≧2 | 0 | — | 45 | $\phi = 90^\circ$ |
| | $\theta$ | CR≧2 | 0 | — | 45 | $\phi = 270^\circ$ |
| Contrast Ratio | CR | — | — | 5 | — | — |
| Response Time | T rise | — | — | 150 | 200 | ms |
| | T fall | — | — | 150 | 200 | ms |

**Definition of Operation Voltage (Vop)**




[positive type]

**Definition of Response Time ( Tr , Tf )**



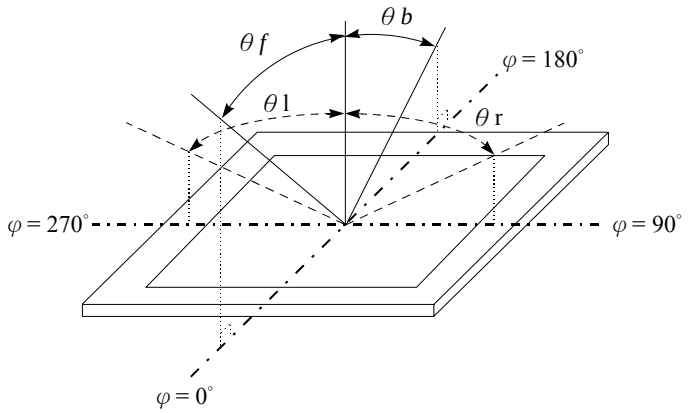

【Positive type】

**Conditions :**

Operating Voltage : Vop　　Viewing Angle( $\theta$ ， $\varphi$ ) : 0°， 0°

Frame Frequency : 64 HZ　　Driving Waveform : 1/N duty , 1/a bias

**Definition of viewing angle(CR≧2)**

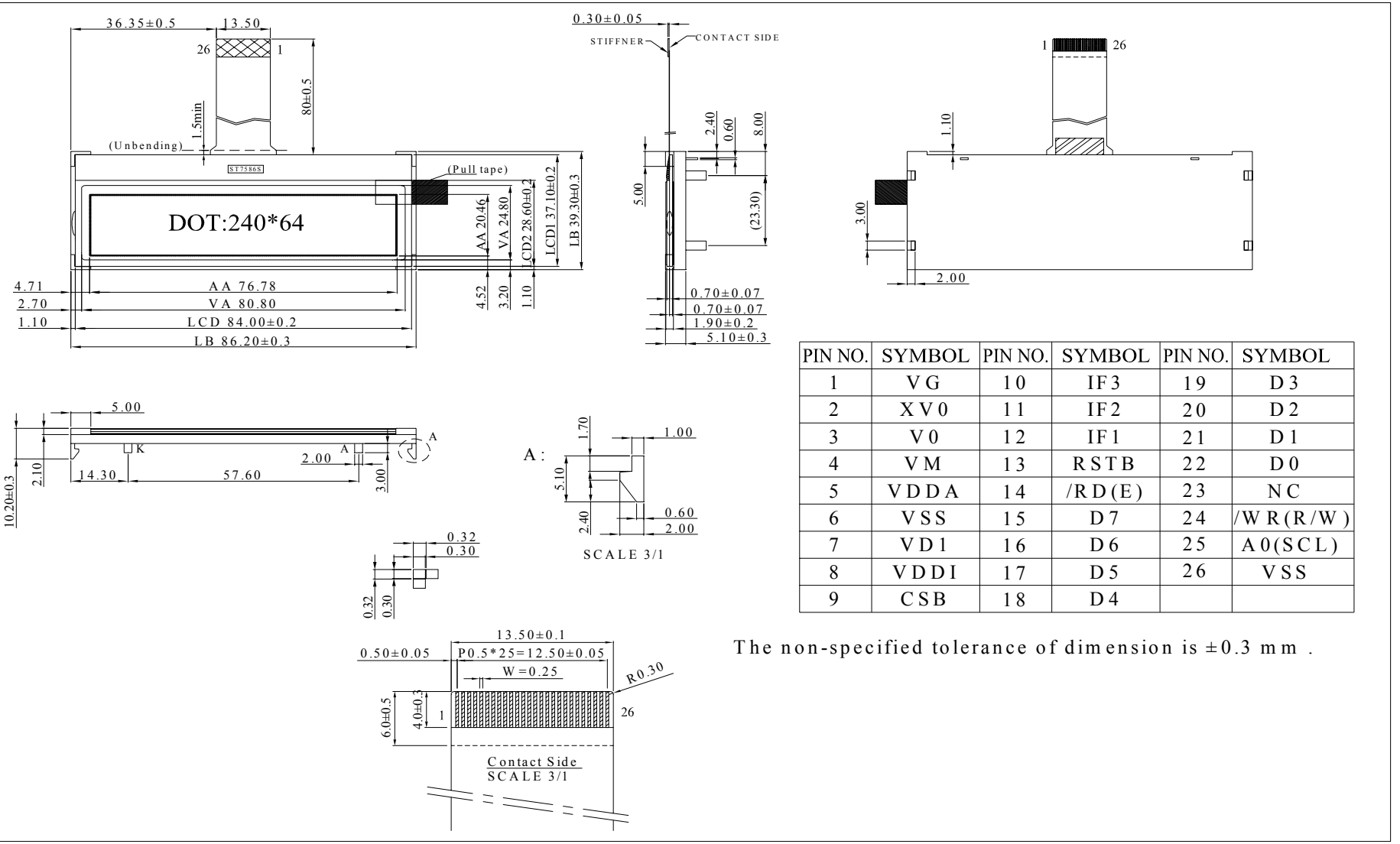


# 7.Interface Pin Function

<table>
<tr><th>Pin No.</th><th>Symbol</th><th>I/O</th><th>Description</th></tr>
<tr><td>1</td><td>VG</td><td>P</td><td>VG is the power of SEG-drivers.</td></tr>
<tr><td>2</td><td>XV0</td><td>P</td><td>Negative operating voltage of COM-drivers.</td></tr>
<tr><td>3</td><td>V0</td><td>P</td><td>Positive operating voltage of COM-drivers.<br>V0O is the output of the positive Vop generator.<br>V0I is the positive Vop supply of LCD drivers.<br>V0S is the sensor of the positive Vop generator.<br>V0O, V0I & V0S should be separated on ITO and be connected together by FPC.</td></tr>
<tr><td>4</td><td>VM</td><td>P</td><td>VM is the non-select voltage level of COM-drivers.</td></tr>
<tr><td>5</td><td>VDDA</td><td>P</td><td>Analog power for internal booster.</td></tr>
<tr><td>6</td><td>VSS</td><td>P</td><td>Ground</td></tr>
<tr><td>7</td><td>VD1</td><td>P</td><td>VD1I is the power source of digital circuits.</td></tr>
<tr><td>8</td><td>VDDI</td><td>P</td><td>Power of interface I/O circuit.</td></tr>
<tr><td>9</td><td>CSB</td><td>Input</td><td>Chip select input pin.<br>CSB=“L”: This chip is selected and the MPU interface is active.</td></tr>
<tr><td>10</td><td>IF3</td><td rowspan="3">Input</td><td rowspan="3">These pins select interface operation mode.
<table>
<tr><th>IF3</th><th>IF2</th><th>IF1</th><th>MPU interface type</th></tr>
<tr><td>H</td><td>H</td><td>L</td><td>80 series 8-bit parallel</td></tr>
<tr><td>H</td><td>L</td><td>L</td><td>68 series 8-bit parallel</td></tr>
<tr><td>L</td><td>H</td><td>H</td><td>8-bit serial (4-Line)</td></tr>
<tr><td>L</td><td>H</td><td>L</td><td>9-bit serial (3-Line)</td></tr>
</table>
Note: Refer to “Interface Selection” for detailed information.</td></tr>
<tr><td>11</td><td>IF2</td></tr>
<tr><td>12</td><td>IF1</td></tr>
<tr><td>13</td><td>RSTB</td><td>Input</td><td>Reset input pin. When RSTB is “L”, internal initialization procedure is executed.</td></tr>
<tr><td>14</td><td>/RD(E)</td><td>Input</td><td>Read / Write execution control pin. (This pin is only used in parallel interface)</td></tr>
<tr><td>15</td><td>D7</td><td>I/O</td><td>The bi-directional data bus of the MPU interface. When CSB is “H”, they are high impedance.</td></tr>
</table>

| | | | |
|---|---|---|---|
| 16 | D6 | | |
| 17 | D5 | | |
| 18 | D4 | | |
| 19 | D3 | | |
| 20 | D2 | | |
| 21 | D1 | | |
| 22 | D0 | | |
| 23 | NC | | No connection |
| 24 | /WR(R/W) | Input | Read / Write execution control pin. (This pin is only used in parallel interface) |
| 25 | A0(SCL) | Input | The function of this pin is different in parallel and serial interface.<br>In parallel interface: A0 is register selection input. |
| 26 | VSS | P | Ground |

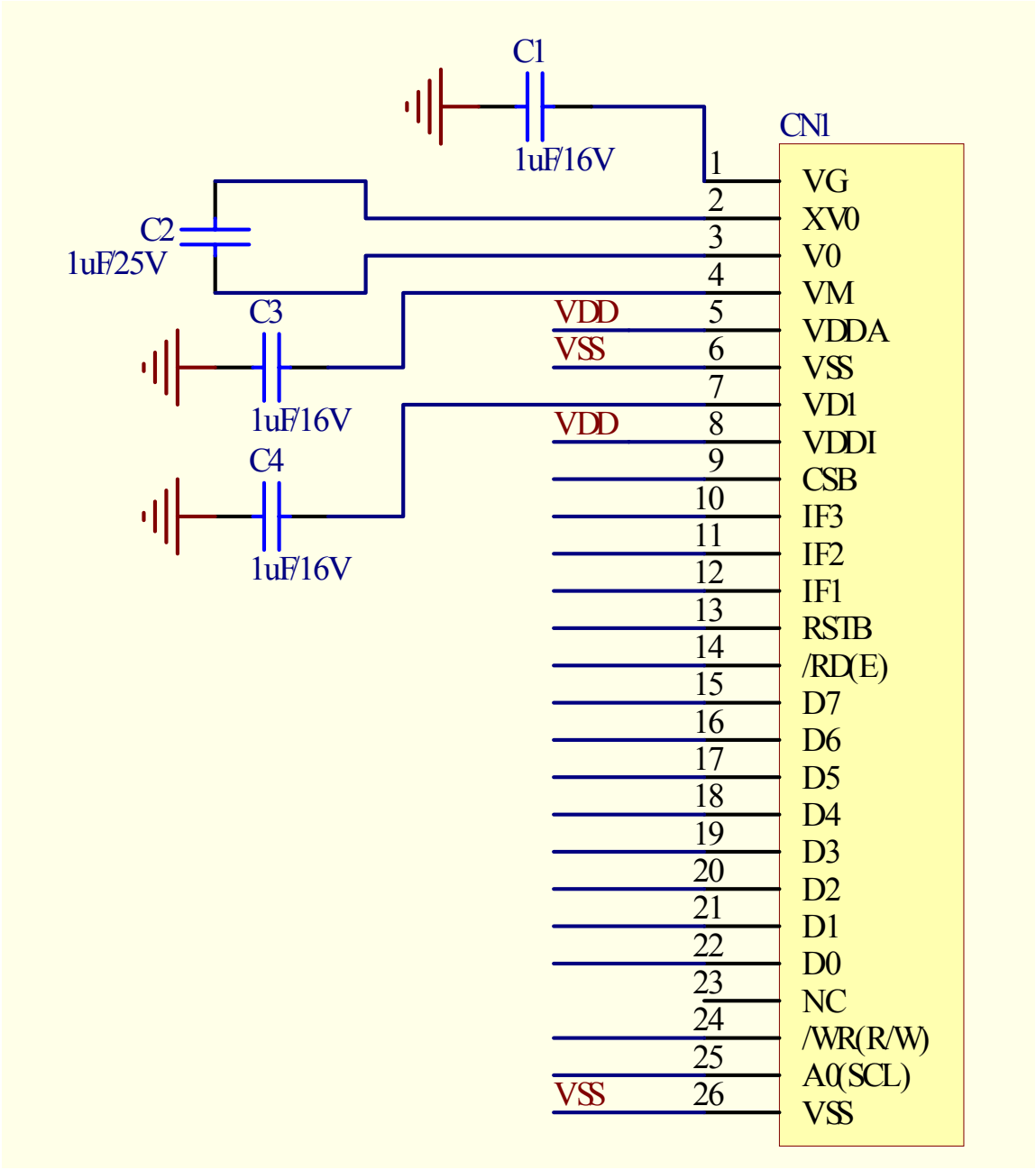
# 8.Contour Drawing




| PIN NO. | SYMBOL | PIN NO. | SYMBOL | PIN NO. | SYMBOL |
|---|---|---|---|---|---|
| 1 | VG | 10 | IF3 | 19 | D3 |
| 2 | XV0 | 11 | IF2 | 20 | D2 |
| 3 | V0 | 12 | IF1 | 21 | D1 |
| 4 | VM | 13 | RSTB | 22 | D0 |
| 5 | VDDA | 14 | /RD(E) | 23 | NC |
| 6 | VSS | 15 | D7 | 24 | /WR(R/W) |
| 7 | VD1 | 16 | D6 | 25 | A0(SCL) |
| 8 | VDDI | 17 | D5 | 26 | VSS |
| 9 | CSB | 18 | D4 | | |

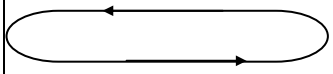
The non-specified tolerance of dimension is ±0.3 mm .

# Application schematic



# 9.Reliability

**Content of Reliability Test (Wide temperature, -20℃~70℃)**

| Environmental Test | | | |
|---|---|---|---|
| **Test Item** | **Content of Test** | **Test Condition** | **Note** |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80℃<br>200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30℃<br>200hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time. | 70℃<br>200hrs | —— |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20℃<br>200hrs | 1 |
| High Temperature/ Humidity storage | The module should be allowed to stand at 60℃,90%RH max<br>For 96hrs under no-load condition excluding the polarizer,<br>Then taking it out and drying it at normal temperature. | 60℃,90%RH<br>96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation<br>-20℃ 25℃ 70℃<br>  <br>30min 5min 30min<br>1 cycle | -20℃/70℃<br>10 cycles | —— |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 1.5mm<br>Vibration Frequency : 10~55Hz<br>One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes | 3 |
| Static electricity test | Endurance test applying the electric stress to the terminal. | VS=800V,RS=1.5kΩ<br>CS=100pF<br>1 time | —— |

**Note1: No dew condensation to be observed.**

**Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.**

**Note3: The packing have to including into the vibration testing.**

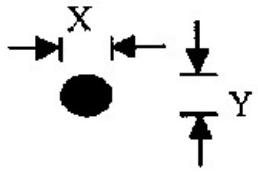
# 10.Backlight Information

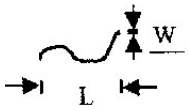
## Specification

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITION |
|---|---|---|---|---|---|---|
| Supply Current | ILED | — | 112 | 140 | mA | V= 3.5 V |
| Supply Voltage | V | 3.3 | 3.5 | 3.7 | V | — |
| Reverse Voltage | VR | — | — | 5 | V | — |
| Color coordinate | X | 0.26 | 0.29 | 0.32 | — | — |
| | Y | 0.27 | 0.30 | 0.33 | — | — |
| Luminance (Without LCD) | IV | 1440 | 1800 | — | $CD/M^2$ | ILED= 112 mA |
| LED Life Time (For Reference only) | — | — | 50K | — | Hr. | ILED= 112 mA 25℃,50-60%RH, (Note 1) |
| Color | White | | | | | |

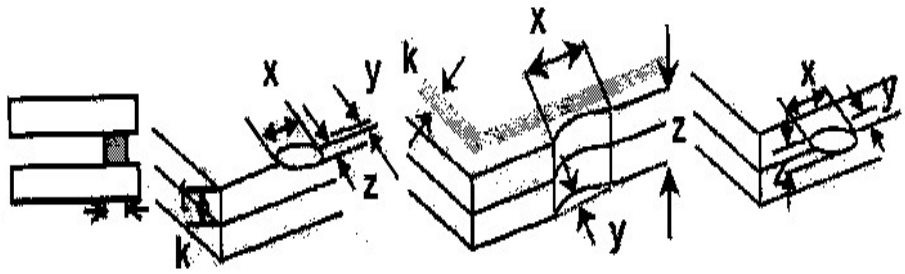
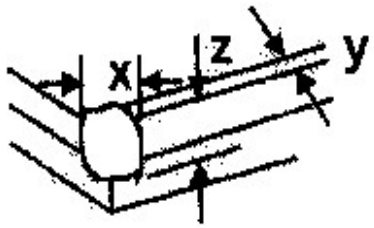
**Note: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage can make driving current under safety area (current between minimum and maximum).**

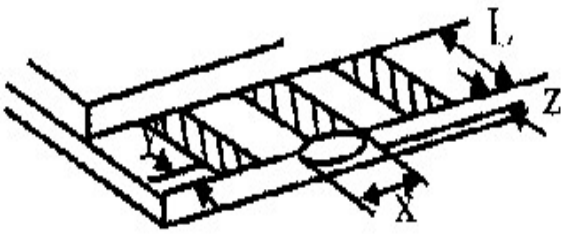
# 11.Inspection specification

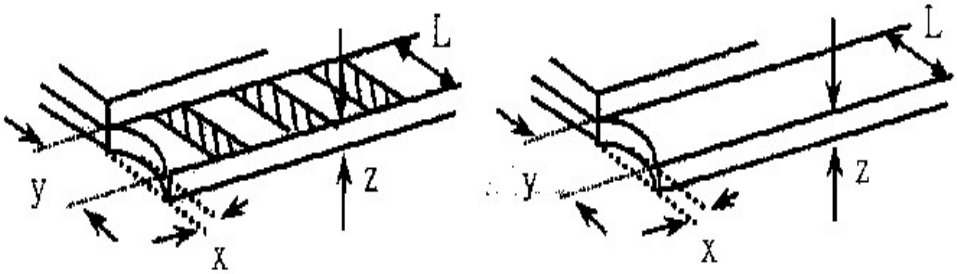
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>Missing vertical, horizontal segment, segment contrast defect.<br>Missing character , dot or icon.<br>Display malfunction.<br>No function or no display.<br>Current consumption exceeds product specifications.<br>LCD viewing angle defect.<br>Mixed product types.<br>Contrast defect.</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or white spots on LCD (display only)</td><td>2.1 White and black spots on display ≦0.25mm, no more than three white or black spots present.<br>2.2 Densely spaced: No more than two spots or lines within 3mm</td><td>2.5</td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD black spots, white spots, contamination (non-display)</td><td>3.1 Round type : As following drawing<br>Φ=( x + y ) / 2<br> 

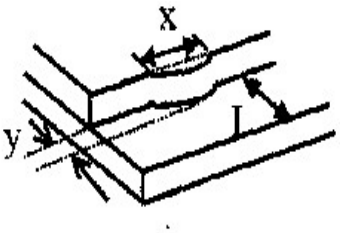
<table>
<tr><th>SIZE</th><th>Acceptable Q TY</th></tr>
<tr><td>Φ≦0.10</td><td>Accept no dense</td></tr>
<tr><td>0.10＜Φ≦0.20</td><td>2</td></tr>
<tr><td>0.20＜Φ≦0.25</td><td>1</td></tr>
<tr><td>0.25＜Φ</td><td>0</td></tr>
</table></td><td>2.5</td></tr>
<tr><td>3.2 Line type : (As following drawing)<br> 

<table>
<tr><th>Length</th><th>Width</th><th>Acceptable Q TY</th></tr>
<tr><td>---</td><td>W≦0.02</td><td>Accept no dense</td></tr>
<tr><td>L≦3.0</td><td>0.02＜W≦0.03</td><td rowspan="2">2</td></tr>
<tr><td>L≦2.5</td><td>0.03＜W≦0.05</td></tr>
<tr><td>---</td><td>0.05＜W</td><td>As round type</td></tr>
</table></td><td>2.5</td></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.
<table>
<tr><th>Size Φ</th><th>Acceptable Q TY</th></tr>
<tr><td>Φ≦0.20</td><td>Accept no dense</td></tr>
<tr><td>0.20＜Φ≦0.50</td><td>3</td></tr>
<tr><td>0.50＜Φ≦1.00</td><td>2</td></tr>
<tr><td>1.00＜Φ</td><td>0</td></tr>
<tr><td>Total Q TY</td><td>3</td></tr>
</table></td><td>2.5</td></tr>
</table>

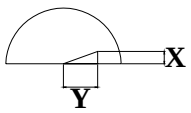
<table>
<tr><td>NO</td><td>Item</td><td>Criterion</td><td>AQL</td></tr>
<tr><td>05</td><td>Scratches</td><td>Follow NO.3 LCD black spots, white spots, contamination</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td>Symbols Define:<br>x: Chip length y: Chip width z: Chip thickness<br>k: Seal width t: Glass thickness a: LCD side length<br>L: Electrode pad length:<br><br>6.1 General glass chip :<br>6.1.1 Chip on panel surface and crack between panels:<br>  <br><br><table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr><tr><td>1/2t＜z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr></table>⊙If there are 2 or more chips, x is total length of each chip.<br><br>6.1.2 Corner crack:<br>  <br><br><table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr><tr><td>1/2t＜z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr></table>⊙If there are 2 or more chips, x is the total length of each chip.</td><td>2.5</td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>06</td><td>Glass crack</td><td>
Symbols :<br>
x: Chip length y: Chip width z: Chip thickness<br>
k: Seal width t: Glass thickness a: LCD side length<br>
L: Electrode pad length<br>
6.2 Protrusion over terminal :<br>
6.2.1 Chip on electrode pad :<br>


<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦0.5mm</td><td>x≦1/8a</td><td>0 ＜ z ≦ t</td></tr>
</table>
6.2.2 Non-conductive portion:<br>


<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦ L</td><td>x≦1/8a</td><td>0 ＜ z ≦ t</td></tr>
</table>
⊙If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.<br>
⊙If the product will be heat sealed by the customer, the alignment mark not be damaged.<br>
6.2.3 Substrate protuberance and internal crack.<br>


<table>
<tr><td>y: width</td><td>x: length</td></tr>
<tr><td>y≦1/3L</td><td>x ≦ a</td></tr>
</table>
</td><td>2.5</td></tr>
</table>

| NO | Item | Criterion | AQL |
|---|---|---|---|
| 07 | Cracked glass | The LCD with extensive crack is not acceptable. | 2.5 |
| 08 | Backlight elements | 8.1 Illumination source flickers when lit.<br>8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards.<br>8.3 Backlight doesn't light or color wrong. | 0.65<br>2.5<br>0.65 |
| 09 | Bezel | 9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination.<br>9.2 Bezel must comply with job specifications. | 2.5<br>0.65 |
| 10 | PCB、COB | 10.1 COB seal may not have pinholes larger than 0.2mm or contamination.<br>10.2 COB seal surface may not have pinholes through to the IC.<br>10.3 The height of the COB should not exceed the height indicated in the assembly diagram.<br>10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places.<br>10.5 No oxidation or contamination PCB terminals.<br>10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts.<br>10.7 The jumper on the PCB should conform to the product characteristic chart.<br>10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down.<br>10.9 The Scraping testing standard for Copper Coating of PCB<br>  <br><br>X * Y<=2mm2 | 2.5<br>2.5<br>0.65<br>2.5<br>2.5<br>0.65<br>0.65<br>2.5<br>2.5 |
| 11 | Soldering | 11.1 No un-melted solder paste may be present on the PCB.<br>11.2 No cold solder joints, missing solder connections, oxidation or icicle.<br>11.3 No residue or solder balls on PCB.<br>11.4 No short circuits in components on PCB. | 2.5<br>2.5<br>2.5<br>0.65 |

| NO | Item | Criterion | AQL |
|---|---|---|---|
| 12 | General appearance | 12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP. | 2.5 |
| | | 12.2 No cracks on interface pin (OLB) of TCP. | 0.65 |
| | | 12.3 No contamination, solder residue or solder balls on product. | 2.5 |
| | | 12.4 The IC on the TCP may not be damaged, circuits. | 2.5 |
| | | 12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever. | 2.5 |
| | | 12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. | 2.5 |
| | | 12.7 Sealant on top of the ITO circuit has not hardened. | 2.5 |
| | | 12.8 Pin type must match type in specification sheet. | 0.65 |
| | | 12.9 LCD pin loose or missing pins. | 0.65 |
| | | 12.10 Product packaging must the same as specified on packaging specification sheet. | 0.65 |
| | | 12.11 Product dimension and structure must conform to product specification sheet. | 0.65 |
| | | 12.12 Visual defect outside of VA is not considered to be rejection. | 0.65 |

# 12.Material List of Components for RoHs

1. WINSTAR Display Co., Ltd hereby declares that all of or part of products (with the mark "#"in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

   Exhibit A：The Harmful Material List

| Material | (Cd) | (Pb) | (Hg) | (Cr6+) | PBBs | PBDEs |
|---|---|---|---|---|---|---|
| Limited Value | 100 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm |
| Above limited value is set up according to RoHS. | | | | | | |

2.Process for RoHS requirement：

(1) Use the Sn/Ag/Cu soldering surface；the surface of Pb-free solder is rougher than we used before.

(2) Heat-resistance temp.：

Reflow：250℃,30 seconds Max.；

Connector soldering wave or hand soldering：320℃, 10 seconds max.

(3) Temp. curve of reflow, max. Temp.：235±5℃；

Recommended customer's soldering temp. of connector：280℃, 3 seconds.

# 13.Recommendable Storage

1. Place the panel or module in the temperature 25°C±5°C and the humidity below 65% RH
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module.

winstar **LCM Sample Estimate Feedback Sheet**

**Module Number：_____** **Page: 1**

**1、Panel Specification：**

1. Panel Type： ☐ Pass ☐ NG ,_____
2. View Direction： ☐ Pass ☐ NG ,_____
3. Numbers of Dots： ☐ Pass ☐ NG ,_____
4. View Area： ☐ Pass ☐ NG ,_____
5. Active Area： ☐ Pass ☐ NG ,_____
6. Operating Temperature： ☐ Pass ☐ NG ,_____
7. Storage Temperature： ☐ Pass ☐ NG ,_____
8. Others：_____

**2、Mechanical Specification：**

1. PCB Size： ☐ Pass ☐ NG ,_____
2. Frame Size： ☐ Pass ☐ NG ,_____
3. Materal of Frame： ☐ Pass ☐ NG ,_____
4. Connector Position： ☐ Pass ☐ NG ,_____
5. Fix Hole Position： ☐ Pass ☐ NG ,_____
6. Backlight Position： ☐ Pass ☐ NG ,_____
7. Thickness of PCB： ☐ Pass ☐ NG ,_____
8. Height of Frame to PCB： ☐ Pass ☐ NG ,_____
9. Height of Module： ☐ Pass ☐ NG ,_____
10. Others： ☐ Pass ☐ NG ,_____

**3、Relative Hole Size：**

1. Pitch of Connector： ☐ Pass ☐ NG ,_____
2. Hole size of Connector： ☐ Pass ☐ NG ,_____
3. Mounting Hole size： ☐ Pass ☐ NG ,_____
4. Mounting Hole Type： ☐ Pass ☐ NG ,_____
5. Others： ☐ Pass ☐ NG ,_____

**4、Backlight Specification：**

1. B/L Type： ☐ Pass ☐ NG ,_____
2. B/L Color： ☐ Pass ☐ NG ,_____
3. B/L Driving Voltage (Reference for LED Type)： ☐ Pass ☐ NG ,_____
4. B/L Driving Current： ☐ Pass ☐ NG ,_____
5. Brightness of B/L： ☐ Pass ☐ NG ,_____
6. B/L Solder Method： ☐ Pass ☐ NG ,_____
7. Others： ☐ Pass ☐ NG ,_____

>> **Go to page 2** <<

**5**、**Electronic Characteristics of Module**：

| | | | |
|---|---|---|---|
| 1. | Input Voltage： | ☐ Pass | ☐ NG ,_____ |
| 2. | Supply Current： | ☐ Pass | ☐ NG ,_____ |
| 3. | Driving Voltage for LCD： | ☐ Pass | ☐ NG ,_____ |
| 4. | Contrast for LCD： | ☐ Pass | ☐ NG ,_____ |
| 5. | B/L Driving Method： | ☐ Pass | ☐ NG ,_____ |
| 6. | Negative Voltage Output： | ☐ Pass | ☐ NG ,_____ |
| 7. | Interface Function： | ☐ Pass | ☐ NG ,_____ |
| 8. | LCD Uniformity： | ☐ Pass | ☐ NG ,_____ |
| 9. | ESD test： | ☐ Pass | ☐ NG ,_____ |
| 10. | Others： | ☐ Pass | ☐ NG ,_____ |

**6**、**Summary**：

**Sales signature**：_____

**Customer Signature**：_____ **Date**：  /  /

# 14.Initial code

```
void initial()
{

    RES=1;
    Delay_ms(120);
    RES=0;
    Delay_ms(10);
    RES=1;
    Delay_ms(120);

    write_com(0xD7);        // Disable Auto Read
    write_dat(0x9F);

    write_com(0xE0);        // Enable OTP Read
    write_dat(0x00);
    Delay_ms(10);

    write_com(0xE3);        // OTP Up-Load
    Delay_ms(20);

    write_com(0xE1);        // OTP Control Out

    write_com(0x11);        // Sleep Out

    write_com(0x28);        // Display OFF
    Delay_ms(50);

    write_com(0xC0);        // Set Vop
    write_dat(0xA0);        //
    write_dat(0x00);        //

    write_com(0xC3);        // BIAS System
    write_dat(0x05);        //

    write_com(0xC4);        // Booster Level
    write_dat(0x05);

    write_com(0xD0);        // Enable Analog Circuit
    write_dat(0x1D);



    write_com(0xB5);        // N-Line Inversion
    write_dat(0x00);        //


    write_com(0x39);        // Display Mode

    write_com(0xF1);        // Frame Rate (Monochrome Mode)
    write_dat(0x06);        //
    write_dat(0x0B);        //
    write_dat(0x0D);        //
```

```
    write_dat(0x10);          //


    write_com(0x3A);        // Enable DDRAM Interface
    write_dat(0x02);

        write_com(0x36);          // Display Control
    write_dat(0xC8);          //


    write_com(0xB0);        // Display Duty
    write_dat(0x3F);          //

    write_com(0x20);        // Inverse Display

    write_com(0x37);        // Start Line
    write_dat(0x00);          //

    write_com(0xB1);        // First Output COM
    write_dat(0x00);          //


    write_com(0xB3);        // FOSC Divider
    write_dat(0x00);


    write_com(0x2A);        // Set Column Address
    write_dat(0x00);          //
    write_dat(48);                  //
    write_dat(0x00);          //
    write_dat(127);                     //

    write_com(0x2B);        // Set Row Address
    write_dat(0x00);          //
    write_dat(96);                  //
    write_dat(0x00);          //
    write_dat(159);                     //


    write_com(0xC4);        // Booster Level
    write_dat(0x07);


    write_com(0x29);        // Display ON
}
```