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WINSTAR

**WINSTAR Display Co.,Ltd.**
**華凌光電股份有限公司**

# SPECIFICATION

**CUSTOMER　　:** _____

**MODULE NO.:**　　　**WO12864H-TMI#**

| APPROVED BY:<br><br>( FOR CUSTOMER USE ONLY ) | PCB VERSION:　　　　　　DATA: |
|---|---|

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

| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
|---|---|---|---|
| O | 2025/05/09 |  | Modify description of C86 |

| | RECORDS OF REVISION | | DOC. FIRST ISSUE | |

| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
|---|---|---|---|
| 0 | 2012/01/31 | | First issue |
| A | 2013/05/27 | | Modify B/L information |
| B | 2013/10/31 | | Add Pull Tape |
| C | 2014/07/17 | | Modify pull tape. |
| D | 2016/01/27 | | Modify Precautions in use of LCD Modules & Static electricity test |
| E | 2016/04/21 | | Modify Response Time |
| F | 2016/05/18 | | Modify Contour Drawing. |
| G | 2016/11/21 | | Add FPC bending rule |
| H | 2019/08/27 | | Modify Material List of Components for RoHs |
| I | 2019/12/17 | | Modify Precautions in use of LCD Modules |
| J | 2020/12/23 | | Add Interface |
| K | 2022/07/29 | | Modify IC |
| L | 2022/10/18 | | Modify Contour Drawing |
| M | 2022/12/21 | | Modify B/L information |
| N | 2024/11/14 | | Modify the recommended soldering temperature |

| O | 2025/05/09 | Modify description of C86 |
|---|---|---|

# Contents

# 1.Module Classification Information

| <u>W</u> | <u>O</u> | <u>12864</u> | <u>H</u> | － | <u>T</u> | <u>M</u> | <u>I</u> | － | <u>#</u> |
|---|---|---|---|---|---|---|---|---|---|
| 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： 128 * 64 dot

④ Model serials no.

⑤ Backlight Type：

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

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# 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.)

(10) To ensure the stability of the display screen, please apply screen saver after showing 30 mins of fixed display content.

(11) The limitation of FPC bending
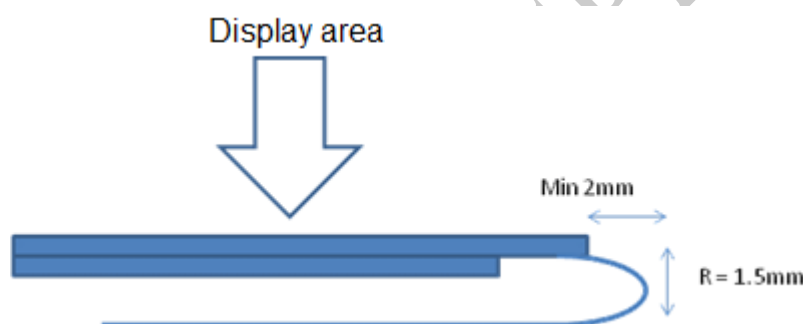


(12)Please heat up a little the tape sticking on the components when removing it; otherwise the components might be damaged.

# 3.General Specification

| Item | Dimension | Unit |
|---|---|---|
| Number of dots | 128 x 64 | ─ |
| Module dimension | 80.0 x 54.0 x 9.5 | mm |
| View area | 70.7 x 38.8 | mm |
| Active area | 66.52 x 33.24 | mm |
| Dot size | 0.48 x 0.48 | mm |
| Dot pitch | 0.52 x 0.52 | mm |
| LCD type | STN Negative, Blue    Transmissive<br>(In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.) | |
| Duty | 1/65 , 1/9 Bias | |
| View direction | 6 o'clock | |
| Backlight Type | LED, White | |
| IC | ST7567 | |
| Interface | 6800/8080/4-Line SPI | |

# 4.Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | $T_{OP}$ | -20 | — | +70 | ℃ |
| Storage Temperature | $T_{ST}$ | -30 | — | +80 | ℃ |
| Input Voltage | $V_I$ | -0.3 | — | $V_{DD}+0.3$ | V |
| Digital Power Supply Voltage | $V_{DD}$-Vss | -0.3 | — | 3.6 | V |
| LCD Power supply voltage | V0-XV0 | -0.3 | — | 16 | V |

# 5.Electrical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|------|--------|-----------|-----|-----|-----|------|
| Supply Voltage For Logic | $V_{DD}$-$V_{SS}$ | — | 3.0 | 3.3 | 3.6 | V |
| Supply Voltage For LCM | XV0-V0 | Ta=-20℃ | — | — | — | V |
| | | Ta=25℃ | — | 10.0 | — | V |
| | | Ta=70℃ | — | — | — | V |
| Input High Volt. | $V_{IH}$ | — | $0.7V_{DD}$ | — | $V_{DD}$ | V |
| Input Low Volt. | $V_{IL}$ | — | Vss | — | $0.3V_{DD}$ | V |
| Output High Volt. | $V_{OH}$ | — | $0.8 V_{DD}$ | — | $V_{DD}$ | V |
| Output Low Volt. | $V_{OL}$ | — | Vss | — | $0.2V_{DD}$ | V |
| Supply Current(No include LED Backlight) | $I_{DD}$ | $V_{DD}$=3.3V | — | 2.0 | — | 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 | — | 20 | $\phi = 180°$ |
| | $\theta$ | CR≧2 | 0 | — | 40 | $\phi = 0°$ |
| | $\theta$ | CR≧2 | 0 | — | 30 | $\phi = 90°$ |
| | $\theta$ | CR≧2 | 0 | — | 30 | $\phi = 270°$ |
| Contrast Ratio | CR | — | — | 3 | — | — |
| Response Time | T rise | — | — | 200 | 300 | ms |
| | T fall | — | — | 250 | 350 | ms |

**Definition of Operation Voltage (Vop)**
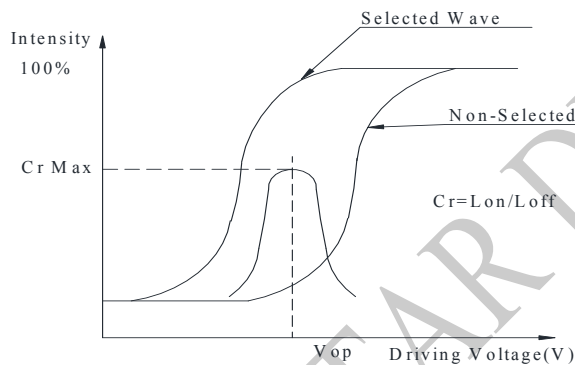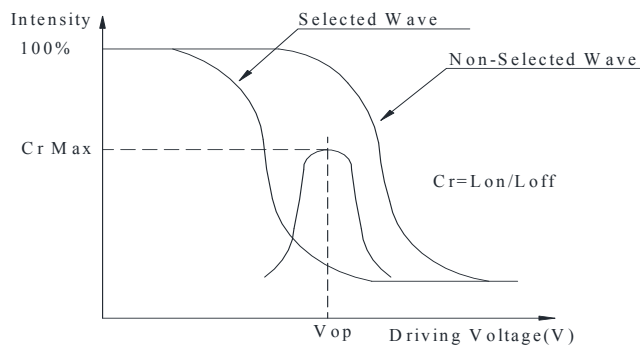


**Definition of Response Time ( Tr , Tf )**



【Positive type】

【Negative type】
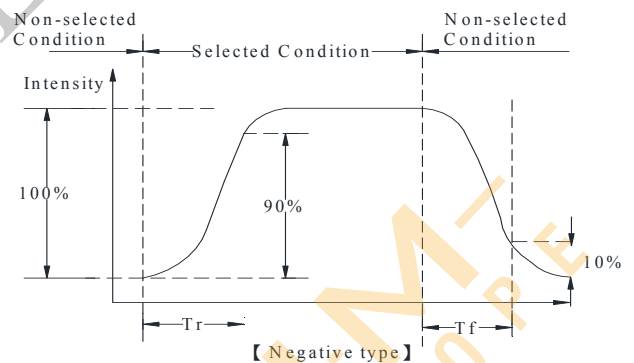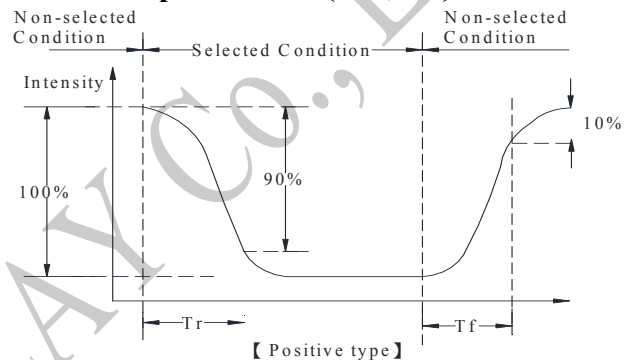
**Conditions :**

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)**
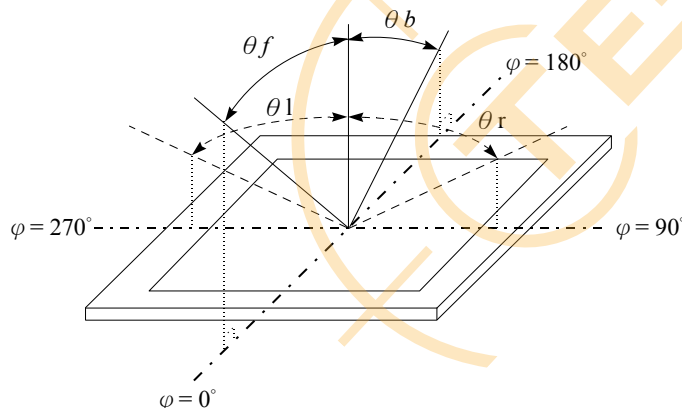
# 7.Interface Pin Function

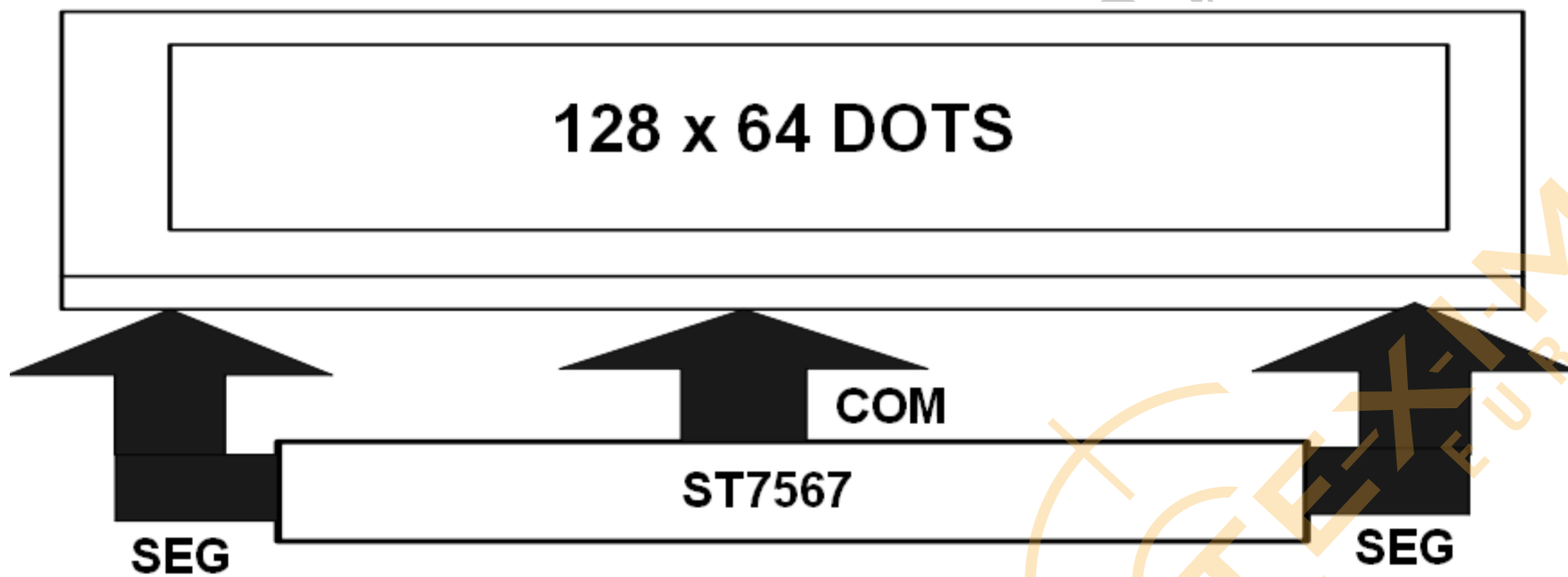| Pin No. | Symbol | Level | Description |
|---------|--------|-------|-------------|
| 1 | PSB | I | PSB selects the interface type: Serial or Parallel. |
| 2 | C86 | I | C86 selects the microprocessor type in parallel interface mode. <table><tr><th>PSB</th><th>C86</th><th>Selected Interface</th></tr><tr><td>"H"</td><td>"H"</td><td>Parallel 6800 Series MPU Interface</td></tr><tr><td>"H"</td><td>"L"</td><td>Parallel 8080 Series MPU Interface</td></tr><tr><td>"L"</td><td>"X"</td><td>Serial 4-Line SPI Interface</td></tr></table> |
| 3 | VG | Power | VG is the LCD driving voltage for segment circuits. |
| 4 | XV0 | Power | XV0 is the LCD driving voltage for common circuits at positive frame. |
| 5 | V0 | Power | V0 is the LCD driving voltage for common circuits at negative frame. |
| 6 | VSS | Power | This is a 0V terminal connected to the system GND. |
| 7 | VDD | Power | Shared with the MPU power supply terminal VDD. ( 3.3 V ) |
| 8-15 | D7-D0 | I/O | **When using 8-bit parallel interface: (6800 or 8080 mode)** 8-bit bi-directional data bus. Connect to the data bus of 8-bit microprocessor. When CSB is non-active (CSB="H"), D[7:0] pins are high impedance. |
|  |  | I | **When using serial interface: 4-LINE** D7=SDA : Serial data input. D6=SCL : Serial clock input. D[5:0] are not used and should connect to "H" by VDD1 or VDDH. When CSB is non-active (CSB="H"), D[7:0] pins are high impedance. |
| 16 | ERD | I | Read/Write execution control pin. When PSB is "H", <table><tr><th>C86</th><th>MPU Type</th><th>ERD</th><th>Description</th></tr><tr><td>H</td><td>6800 series</td><td>E</td><td>Read/Write control input pin. R/W="H": When E is "H", D[7:0] are in output mode. R/W="L": Signals on D[7:0] are latched at the falling edge of E signal.</td></tr><tr><td>L</td><td>8080 series</td><td>/RD</td><td>Read enable input pin. When /RD is "L", D[7:0] are in output mode.</td></tr></table> ERD is not used in serial interface and should fix to "H" by VDD1 or VDDH. |

| 17 | RWR | I | Read/Write execution control pin. When PSB is "H",

| C86 | MPU Type | RWR | Description |
|---|---|---|---|
| H | 6800 series | R/W | Read/Write control input pin. R/W="H": read. R/W="L": write. |
| L | 8080 series | /WR | Write enable input pin. Signals on D[7:0] will be latched at the rising edge of /WR signal. |

RWR is not used in serial interface and should fix to "H" by VDD1 or VDDH. |
|---|---|---|---|
| 18 | A0 | I | It determines whether the access is related to data or command. A0="H" : Indicates that signals on D[7:0] are display data. A0="L" : Indicates that signals on D[7:0] are command. |
| 19 | RSTB | I | Hardware reset input pin. When RSTB is "L", internal initialization is executed and the internal registers will be initialized. |
| 20 | CSB | I | Chip select input pin. Interface access is enabled when CSB is "L".When CSB is non-active (CSB="H"), D[7:0] pins are high impedance. |

C1=C2=1UF/0805

| PIN NO. | SIGNAL | |
|---|---|---|
| 1 | PSB | P3.6 |
| 2 | C86 | P3.6 |
| 3 | VG | |
| 4 | XV0 | |
| 5 | V0 | |
| 6 | VSS | VSS |
| 7 | VDD | VDD |
| 8 | D7 | P1.7 |
| 9 | D6 | P1.6 |
| 10 | D5 | P1.5 |
| 11 | D4 | P1.4 |
| 12 | D3 | P1.3 |
| 13 | D2 | P1.2 |
| 14 | D1 | P1.1 |
| 15 | D0 | P1.0 |
| 16 | ERD | P3.4 |
| 17 | RWR | P3.7 |
| 18 | A0 | P3.0 |
| 19 | RSTB | P3.2 |
| 20 | CSB | P3.3 |

C2 — C1

# 8.Contour Drawing &Block Diagram



| PIN NO. | SIGNAL |
|---|---|
| 1 | PSB |
| 2 | C86 |
| 3 | VG |
| 4 | XV0 |
| 5 | V0 |
| 6 | VSS |
| 7 | VDD |
| 8 | D7 |
| 9 | D6 |
| 10 | D5 |
| 11 | D4 |
| 12 | D3 |
| 13 | D2 |
| 14 | D1 |
| 15 | D0 |
| 16 | ERD |
| 17 | RWR |
| 18 | A0 |
| 19 | RSTB |
| 20 | CSB |

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

128x64 DOTS

DETAIL B
SCALE 2/1

Contact Side
SCALE 3/2

Contact side

Supporting tape

Pull tape

128 x 64 DOTS

COM

ST7567

SEG

SEG
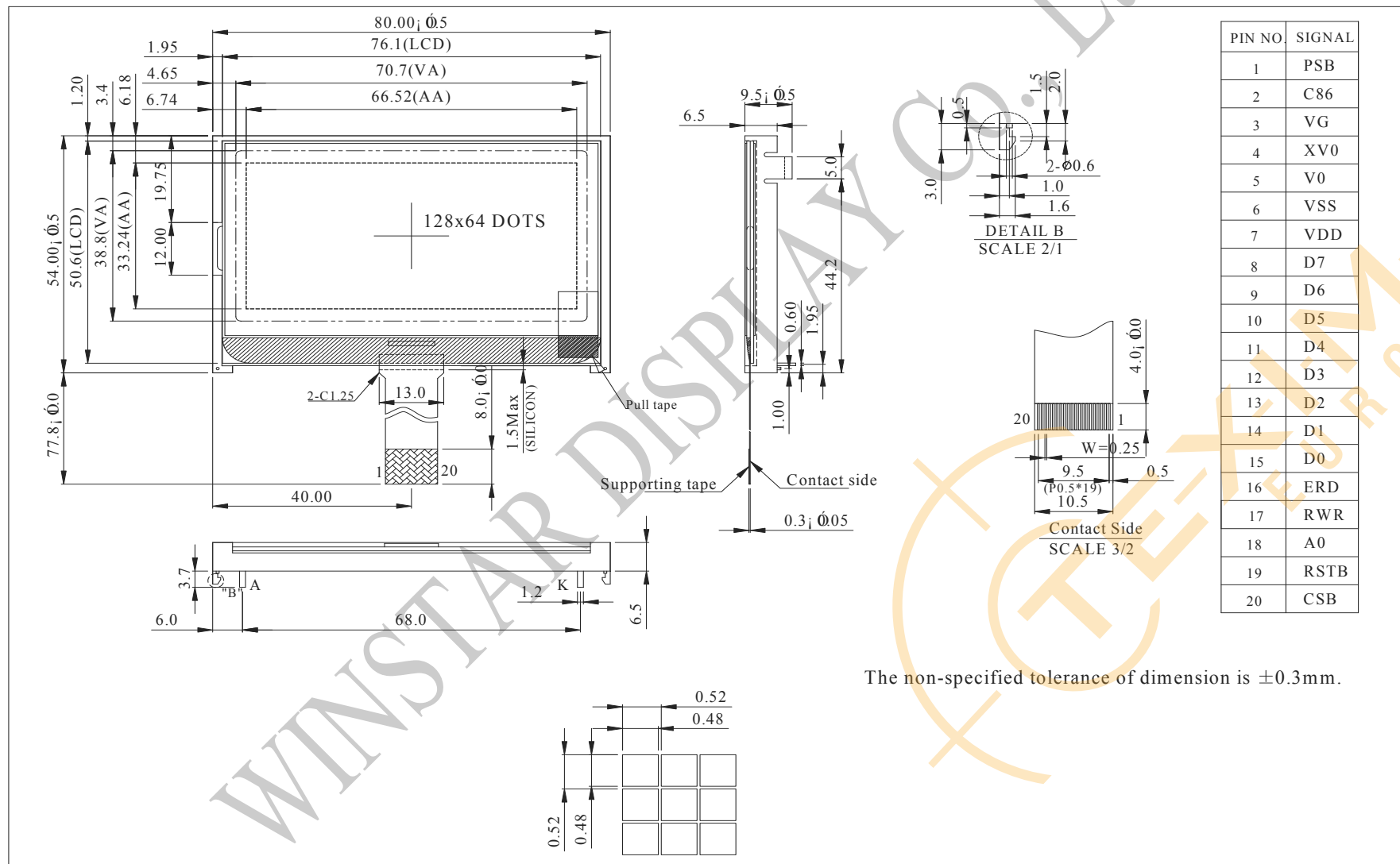
# 9.Reliability

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

<table>
<tr><th colspan="4">Environmental Test</th></tr>
<tr><th>Test Item</th><th>Content of Test</th><th>Test Condition</th><th>Note</th></tr>
<tr><td>High Temperature storage</td><td>Endurance test applying the high storage temperature for a long time.</td><td>80℃<br>200hrs</td><td>2</td></tr>
<tr><td>Low Temperature storage</td><td>Endurance test applying the low storage temperature for a long time.</td><td>-30℃<br>200hrs</td><td>1,2</td></tr>
<tr><td>High Temperature Operation</td><td>Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.</td><td>70℃<br>200hrs</td><td>—<br>—</td></tr>
<tr><td>Low Temperature Operation</td><td>Endurance test applying the electric stress under low temperature for a long time.</td><td>-20℃<br>200hrs</td><td>1</td></tr>
<tr><td>High Temperature/ Humidity storage</td><td>The module should be allowed to stand at 60℃,90%RH max<br>For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.</td><td>60℃,90%RH<br>96hrs</td><td>1,2</td></tr>
<tr><td>Thermal shock resistance</td><td>The sample should be allowed stand the following 10 cycles of operation<br>-20℃    25℃    70℃<br><br>30min   5min    30min<br>1 cycle</td><td>-20℃/70℃<br>10 cycles</td><td>—<br>—</td></tr>
<tr><td>Vibration test</td><td>Endurance test applying the vibration during transportation and using.</td><td>Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz<br>One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes</td><td>3</td></tr>
<tr><td>Static electricity test</td><td>Endurance test applying the electric stress to the terminal.</td><td>VS=±600V(contact), ±800v(air),<br>RS=330Ω<br>CS=150pF<br>10 times</td><td>—<br>—</td></tr>
</table>

**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.**
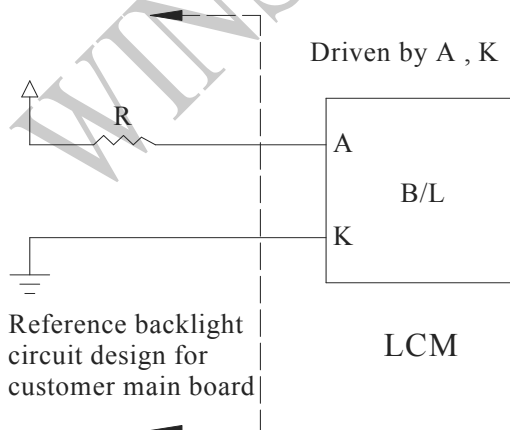
# 10.Backlight Information

## Specification

| Parameter | Symbol | Min | Typ | Max | Unit | Test    Condition |
|---|---|---|---|---|---|---|
| Supply Current | ILED | — | 96 | 120 | mA | V=3.5V |
| Supply Voltage | V | 3.3 | 3.5 | 3.7 | V | — |
| Reverse Voltage | VR | — | — | 5 | V | — |
| Colour coordinate | X | 0.24 | 0.27 | 0.30 | | V=3.5V |
| | Y | 0.24 | 0.27 | 0.30 | | |
| Luminance (Without LCD) | IV | 840 | 1050 | — | cd/m$^2$ | ILED=96mA |
| LED Life Time (For Reference only) | — | — | 50K | — | Hr. | ILED=96mA 25℃,50-60%RH, (Note 1) |
| Color | White | | | | | |
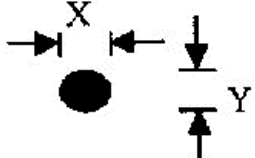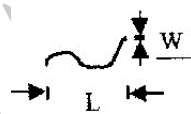
Note: A backlight driven by voltage will keep the drive current under the safe area (current between minimum and maximum).
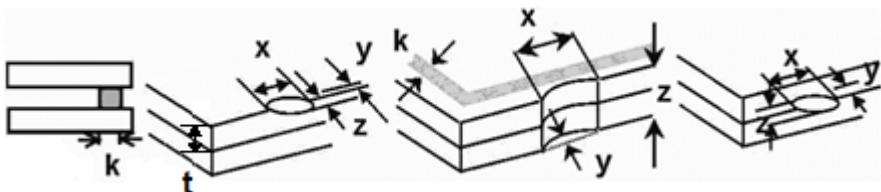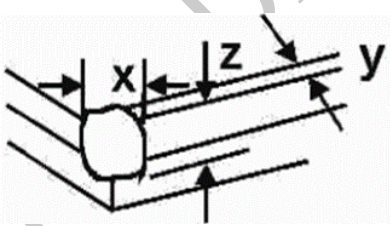
If the B/L LED is driven by current only, the drive voltage cannot be considered as a reference value.
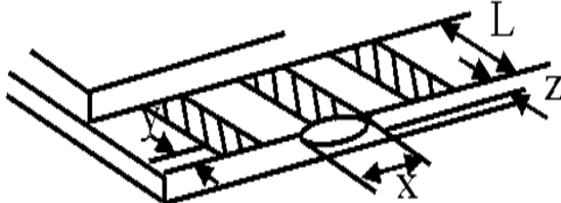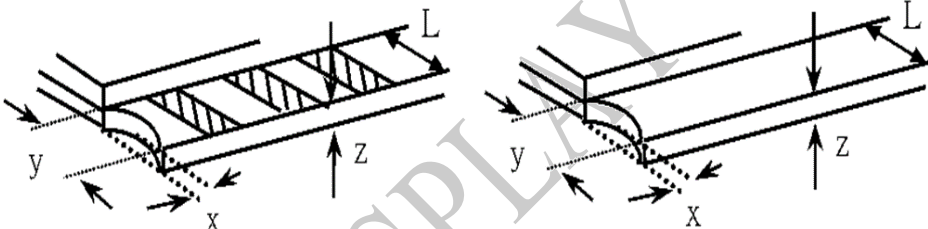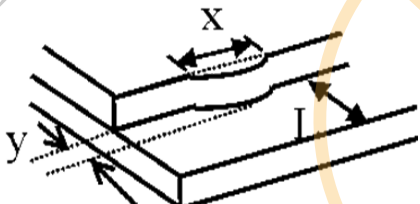
Note 1:50K hours is only an estimate for reference.

Driven by A , K

A

B/L

K

LCM

R

Reference backlight
circuit design for
customer main board
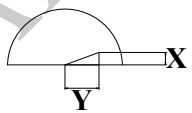
# 11.Inspection specification

| No | Item | Criterion | AQL |
|---|---|---|---|
| 01 | Electrical Testing | 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. | 0.65 |
| 02 | Black or white spots on LCD (display only) | 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 | 2.5 |

Item 03: LCD black spots, white spots, contamination (non-display)

3.1 Round type : As following drawing

$\Phi = ( x + y ) / 2$

| Size | Acceptable QTY |
|---|---|
| $\Phi \leqq 0.10$ | Accept no dense |
| $0.10 < \Phi \leqq 0.20$ | 2 |
| $0.20 < \Phi \leqq 0.25$ | 1 |
| $0.25 < \Phi$ | 0 |

AQL 2.5

3.2 Line type : (As following drawing)

| Length | Width | Acceptable Q TY |
|---|---|---|
| --- | $W \leqq 0.02$ | Accept no dense |
| $L \leqq 3.0$ | $0.02 < W \leqq 0.03$ | 2 |
| $L \leqq 2.5$ | $0.03 < W \leqq 0.05$ | 2 |
| --- | $0.05 < W$ | As round type |

AQL 2.5

| No | Item | Criterion | AQL |
|---|---|---|---|
| 04 | Polarizer bubbles | If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction. | 2.5 |

| Size Φ | Acceptable Q TY |
|---|---|
| $\Phi \leqq 0.20$ | Accept no dense |
| $0.20 < \Phi \leqq 0.50$ | 3 |
| $0.50 < \Phi \leqq 1.00$ | 2 |
| $1.00 < \Phi$ | 0 |
| Total Q TY | 3 |

| No | Item | Criterion | AQL |
|---|---|---|---|
| 05 | Scratches | Follow NO.3 LCD black spots, white spots, contamination | |
| 06 | Chipped glass | 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><br>⊙If there are 2 or more chips, x is total length of each chip.<br><br>6.1.2 Corner crack:<br><br><br><br>⊙If there are 2 or more chips, x is the total length of each chip. | 2.5 |

6.1.1 table:

| z: Chip thickness | y: Chip width | x: Chip length |
|---|---|---|
| Z≦1/2t | Not over viewing area | x≦1/8a |
| 1/2t＜z≦2t | Not exceed 1/3k | x≦1/8a |

6.1.2 table:

| z: Chip thickness | y: Chip width | x: Chip length |
|---|---|---|
| Z≦1/2t | Not over viewing area | x≦1/8a |
| 1/2t＜z≦2t | Not exceed 1/3k | x≦1/8a |

| No | Item | Criterion | AQL |
|----|------|-----------|-----|
| 06 | Glass crack | Symbols :<br><br>x: Chip length      y: Chip width      z: Chip thickness<br><br>k: Seal width      t: Glass thickness      a: LCD side length<br><br>L: Electrode pad length<br><br>6.2 Protrusion over terminal :<br><br>6.2.1 Chip on electrode pad :<br><br><br><br>(table below)<br><br>6.2.2 Non-conductive portion:<br><br><br><br>(table below)<br><br>⊙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><br>6.2.3 Substrate protuberance and internal crack.<br><br>(table below)<br><br> | 2.5 |

6.2.1 table:

| y: Chip width | x: Chip length | z: Chip thickness |
|---|---|---|
| $y \leqq 0.5mm$ | $x \leqq 1/8a$ | $0 < z \leqq t$ |

6.2.2 table:

| y: Chip width | x: Chip length | z: Chip thickness |
|---|---|---|
| $y \leqq L$ | $x \leqq 1/8a$ | $0 < z \leqq t$ |

6.2.3 table:

| y: width | x: length |
|---|---|
| $y \leqq 1/3L$ | $x \leqq a$ |

| 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. | 0.65 |
| | | 8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards. | 2.5 |
| | | 8.3 Backlight doesn't light or color wrong. | 0.65 |
| 09 | Bezel | 9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination. | 2.5 |
| | | 9.2 Bezel must comply with job specifications. | 0.65 |
| 10 | PCB、COB | 10.1 COB seal may not have pinholes larger than 0.2mm or contamination. | 2.5 |
| | | 10.2 COB seal surface may not have pinholes through to the IC. | 2.5 |
| | | 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. | 0.65 |
| | | 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. | 2.5 |
| | | 10.5 No oxidation or contamination PCB terminals. | |
| | | 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. | 2.5 / 0.65 |
| | | 10.7 The jumper on the PCB should conform to the product characteristic chart. | 0.65 |
| | | 10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down. | 2.5 |
| | | 10.9 The Scraping testing standard for Copper Coating of PCB <br> $X * Y <= 2mm^2$ | 2.5 |
| 11 | Soldering | 11.1 No un-melted solder paste may be present on the PCB. | 2.5 |
| | | 11.2 No cold solder joints, missing solder connections, oxidation or icicle. | 2.5 |
| | | 11.3 No residue or solder balls on PCB. | 2.5 |
| | | 11.4 No short circuits in components on PCB. | 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+ | PBB | PBDE | DEHP | BBP | DBP | DIBP |
|---|---|---|---|---|---|---|---|---|---|---|
| Limited Value | 100 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm | 1000 ppm |
| Above limited value is set up according to RoHS. | | | | | | | | | | |

2. For RoHS compliance, the recommended soldering temperatures for different components are as follows:

(1) FPC：300℃, 1-3 seconds

(2) Backlight AK and metal pin glass: 330℃, 1-5 seconds

Note: Customers should adjust the temperature and duration based on the actual materials used in their soldering process, including the soldering iron, solder paste, and any other components involved.

# 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.

**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**：___ / ___ / ___

**Disclaimer**

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All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.

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