



Winstar Display Co., LTD

華凌光電股份有限公司

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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF70QTIFGDBT0#

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

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|--------------------------------|-------------|------------|-------------|
| | | | 葉虹蘭 |
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TFT Display Inspection Specification: <http://www.winstar.com.tw/service.php>

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| RECORDS OF REVISION | | | DOC. FIRST ISSUE |
|---------------------|------------|------------------|--|
| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
| 0 | 2013/11/11 | | First issue |
| A | 2014/09/18 | | Add size & Surface. Modify Pixel Data Format & Block Diagram & Static electricity test. |

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1.Module Classification Information

| | | | | | | | | | | | | |
|---|---|----|---|---|---|---|---|---|---|---|---|---|
| W | F | 70 | Q | T | I | F | G | D | B | T | 0 | # |
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | ⑫ | ⑬ |

| | | | | | | | | | | | | | |
|---|--|---|----------|----------|----------|------------|---|--------------|--|--|--|--|--|
| ① | Brand : WINSTAR DISPLAY CORPORATION | | | | | | | | | | | | |
| ② | Display Type : F→TFT Type, J→Custom TFT | | | | | | | | | | | | |
| ③ | Display Size : 7.0" TFT | | | | | | | | | | | | |
| ④ | Model serials no. | | | | | | | | | | | | |
| ⑤ | Backlight Type : | F→CCFL, White S→LED, High Light White | | | | | | T→LED, White | | | | | |
| ⑥ | LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction | I→Transmissive, W. T, 6:00 L→Transmissive, W.T,12:00 Z→Transmissive, W.T, Wide Viewing Angle for O-FILM Y→Transmissive, W.T, Wide View | | | | | | | | | | | |
| ⑦ | A : TFT LCD B : TFT+FR+CONTROL BOARD C : TFT+FR+A/D BOARD D : TFT+FR+A/D BOARD+CONTROL BOARD E : TFT+FR+POWER BOARD F : TFT+CONTROL BOARD | | | | | | G : TFT+FR H : TFT+D/V BOARD I : TFT+FR+D/V BOARD J : TFT+POWER BD | | | | | | |
| ⑧ | Solution: | | | | | | | | | | | | |
| | A: 128160 | B:320234 | C:320240 | D:480234 | E:480272 | F: 640480 | G: 800480 | | | | | | |
| | H:1024600 | I:320480 | J:240320 | K:800600 | L:240400 | M :1024768 | P :1280800 | | | | | | |
| ⑨ | D: Digital L : LVDS | | | | | | | | | | | | |
| ⑩ | Interface : N : without control board A : 8Bit B : 16Bit | | | | | | | | | | | | |
| ⑪ | TS : N : Without TS T : resistive touch panel C : capacitive touch panel | | | | | | | | | | | | |
| ⑫ | Version | | | | | | | | | | | | |
| ⑬ | Special Code | #:Fit in with ROHS directive regulations | | | | | | | | | | | |

2.Summary

This technical specification applies to 7.0' color TFT-LCD panel. The 7.0' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

3.General Specifications

| Item | Dimension | Unit |
|--------------------------------|------------------------------------|------|
| Size | 7.0 | inch |
| Dot Matrix | 800 x RGB x 480(TFT) | dots |
| Module dimension | 165.0(W) x 100.0(H) x 13.0(D) | mm |
| Active area | 154.08 x 85.92 | mm |
| Dot pitch | 0.0642 x 0.179 | mm |
| LCD type | TFT, Normally White, Transmissive | |
| View Direction | 12 o'clock | |
| Gray Scale Inversion Direction | 6 o'clock | |
| Backlight Type | LED,Normally White | |
| Controller IC | SSD1963 | |
| Interface | Digital 8080 family MPU 8bit/16bit | |
| With /Without TP | With RTP | |
| Surface | Anti-Glare | |

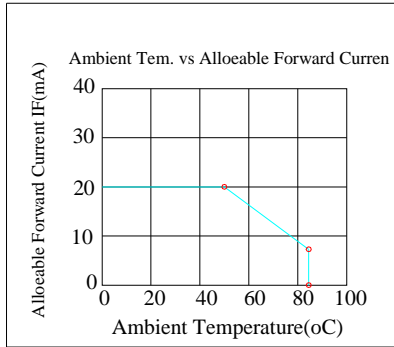
*Color tone slight changed by temperature and driving voltage.

4. Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|-----------------------|--------|-----|-----|-----|------|
| Operating Temperature | TOP | -20 | — | +70 | °C |
| Storage Temperature | TST | -30 | — | +80 | °C |

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

- Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C



5. Electrical Characteristics

5.1. Operating conditions: (CON2.Pin1=GND, Pin2=VDD)

| Item | Symbol | Condition | Min | Typ | Max | Unit | Remark |
|------------------------|--------|-----------|-----|-----|-----|------|--------|
| Supply Voltage For LCM | VDD | — | 3.0 | 3.1 | 3.3 | V | — |
| Supply Current For LCM | IDD | — | — | 300 | 450 | mA | Note1 |

Note 1 : This value is test for VDD=3.3V , Ta=25°C only

5.2. Backlight driving conditions (CON2.Pin33,34=VLED-, Pin35,36=VLED+)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|----------------------------------|---------|------|--------|------|------|------------|
| Operation Current For LED Driver | VLED=5V | 400 | — | 600 | mA | Note 1,2 |
| Power Consumption | VLED=5V | 2000 | — | 3000 | mW | Note 1,2 |
| Supply Voltage For LED Driver | VLED+ | — | 5 | — | V | — |
| LED Life Time | — | — | 50,000 | — | Hr | Note 2,3,4 |

Note 1 : Base on VLED= 5V for the back light driver IC specification

Note 2 : Ta = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

6.DC CHARATERISTICS

| Parameter | Symbol | Rating | | | Unit | Condition |
|--------------------------|----------|--------|-----|--------|------|-----------|
| | | Min | Typ | Max | | |
| Low level input voltage | V_{IL} | 0 | - | 0.3VDD | V | |
| High level input voltage | V_{IH} | 0.7VDD | - | VDD | V | |

7. Interface timing

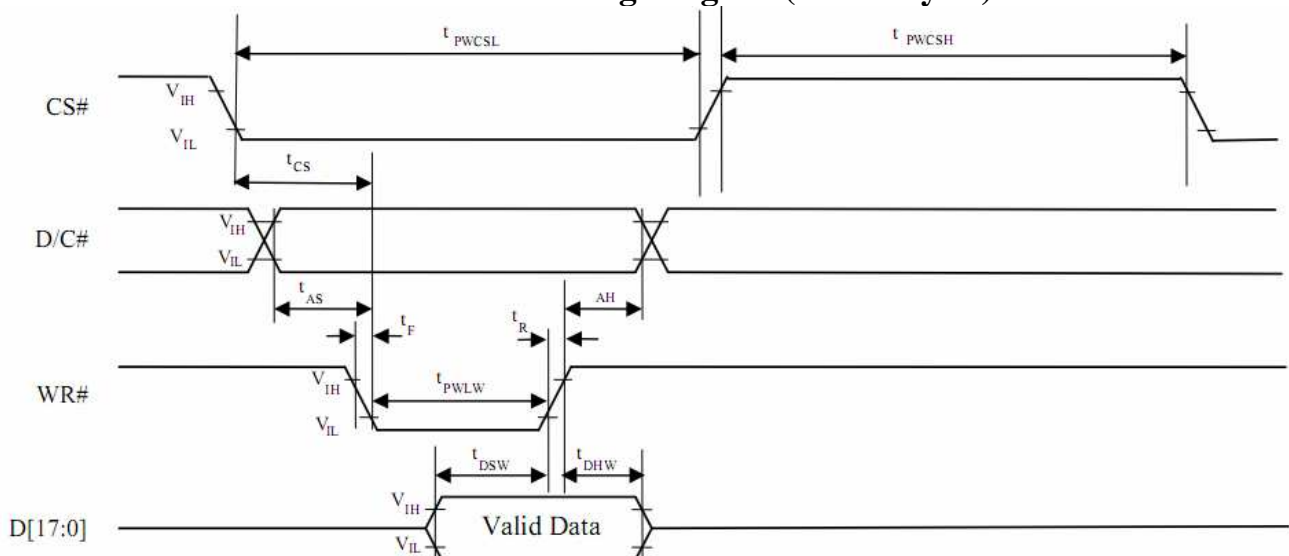
7.1. 8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data Bus and TE signals (Please refer to Table 6-1 for pin multiplexed with 6800 mode). This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

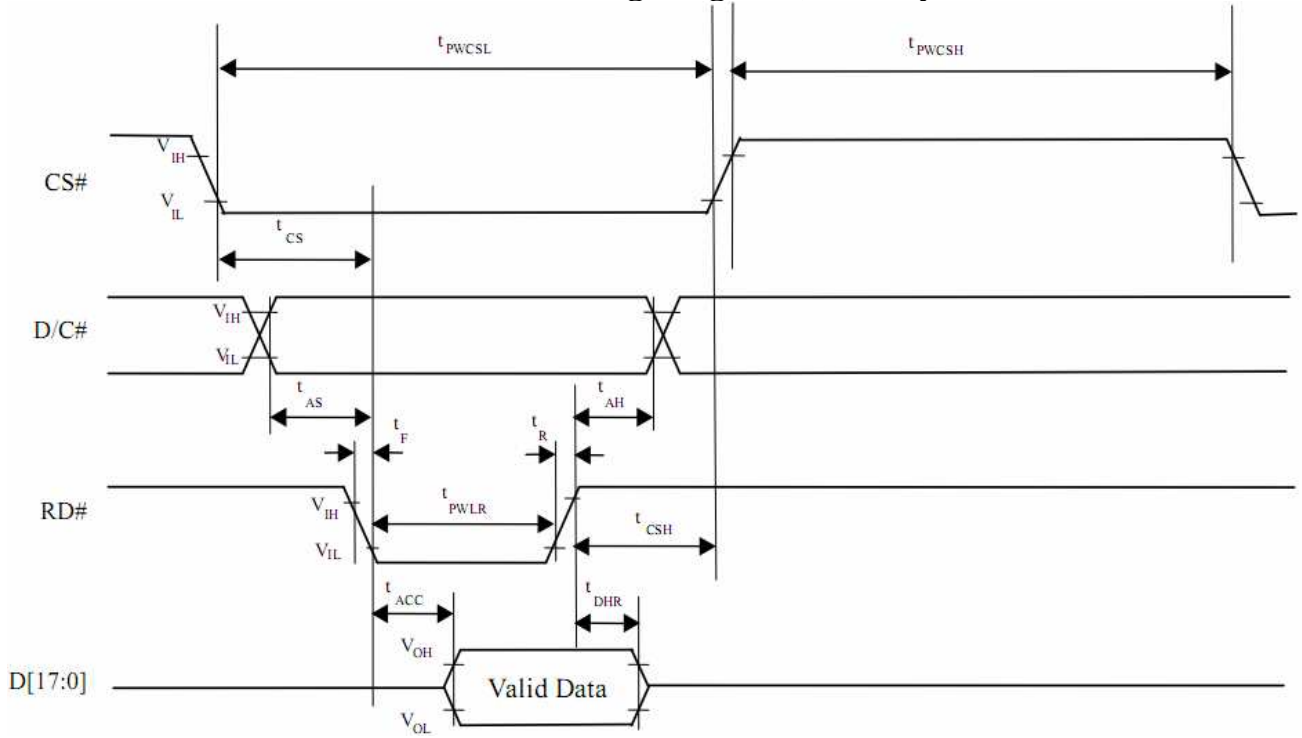
7.2. 8080 Mode Write Cycle

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------|---|----------------|------------------------------------|-----|------|
| fMCLK | System Clock Frequency | 1 | - | 110 | MHz |
| tMCLK | System Clock Period | 1/fMCLK | - | - | ns |
| tPWCSH | Control Pulse High Width Write Read | 13 30 | 1.5* tMCLK 3.5* tMCLK | - | ns |
| tPWCSL | Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read | 13 80 80 | 1.5* tMCLK 9* tMCLK 9* tMCLK | - | ns |
| tAS | Address Setup Time | 1 | - | - | ns |
| tAH | Address Hold Time | 2 | - | - | ns |
| tDSW | Write Data Setup Time | 4 | - | - | ns |
| tDHW | Write Data Hold Time | 1 | - | - | ns |
| tPWLW | Write Low Time | 12 | - | - | ns |
| tDHR | Read Data Hold Time | 1 | - | - | ns |
| tACC | Access Time | 32 | - | - | ns |
| tPWLR | Read Low Time | 36 | - | - | ns |
| tR | Rise Time | - | - | 0.5 | ns |
| tF | Fall Time | - | - | 0.5 | ns |
| tCS | Chip select setup time | 2 | - | - | ns |
| tCSH | Chip select hold time to read signal | 3 | - | - | ns |

7.3. Parallel 8080-series Interface Timing Diagram(Write Cycle)



7.4. Parallel 8080-series Interface Timing Diagram(Read Cycle)



7.5. Pixel Data Format

| Interface | Cycle | D[15] | D[14] | D[13] | D[12] | D[11] | D[10] | D[9] | D[8] | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
|----------------------|-----------------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|
| 16 bits (565 format) | 1 st | R5 | R4 | R3 | R2 | R1 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 |
| 16 bits | 1 st | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 |
| | 2 nd | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| | 3 rd | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| 8 bits | 1 st | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| | 2 nd | | | | | | | | | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 |
| | 3 rd | | | | | | | | | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |

8. Optical Characteristics

| Item | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark | |
|--|--------|---------------------------------------|------------|------|------|-------------------|-------------------|------------|
| Response time | Tr | $\theta = 0^\circ$ 、 $\Phi = 0^\circ$ | - | 10 | 20 | .ms | Note 3 | |
| | Tf | | - | 15 | 30 | .ms | | |
| Contrast ratio | CR | At optimized viewing angle | 400 | 500 | - | - | Note 4 | |
| Color Chromaticity | White | $\theta = 0^\circ$ 、 $\Phi = 0^\circ$ | Wx | 0.26 | 0.31 | 0.36 | | Note 2,5,6 |
| | | | Wy | 0.28 | 0.33 | 0.38 | | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | CR ≥ 10 | Θ_R | 60 | 70 | - | Deg. | Note 1 |
| | | | Θ_L | 60 | 70 | - | | |
| | Ver. | | Φ_T | 40 | 50 | - | | |
| | | | Φ_B | 60 | 70 | - | | |
| Brightness | - | - | 240 | 320 | - | cd/m ² | Center of display | |

Ta=25±2°C, VLED / ILED= 5V / 400mA

Note 1: Definition of viewing angle range

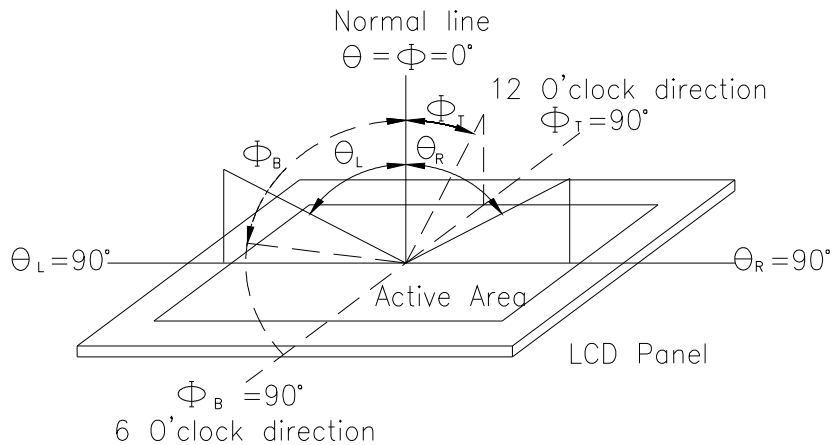


Fig. 8-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

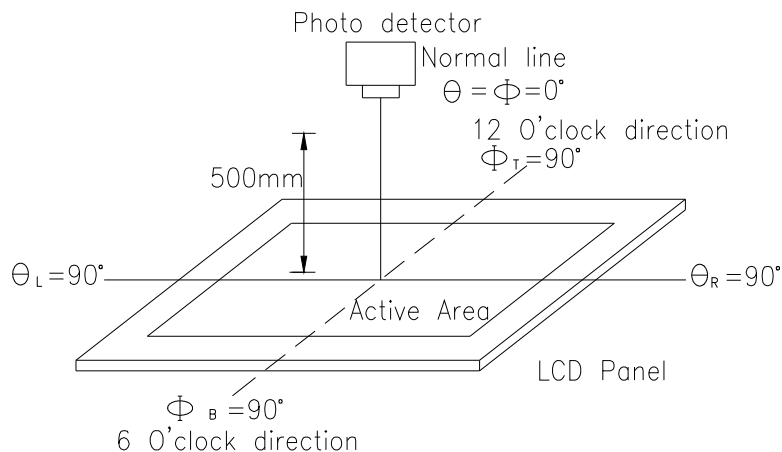
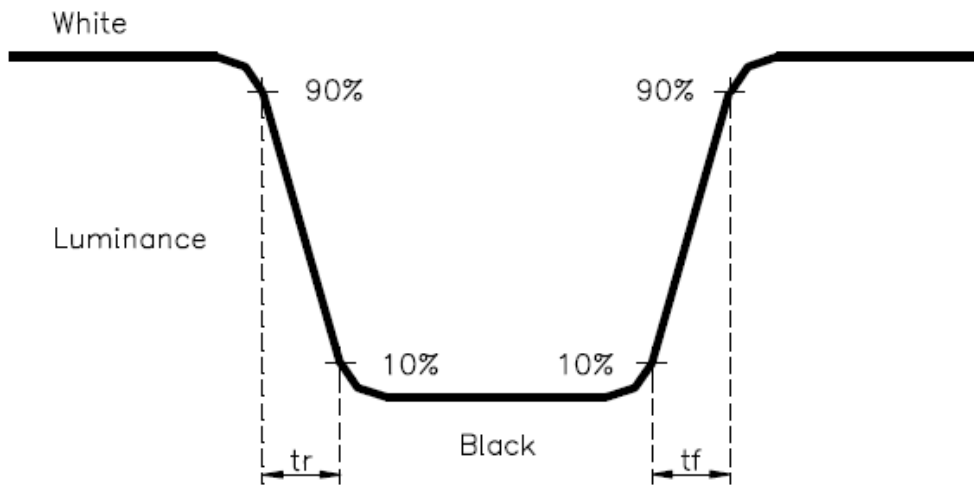


Fig. 8-2 Optical measurement system setup

Note 3: Definition of Response time:

Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

9.Interface

9.1. LCM PIN Definition (CON2)

| Pin | Symbol | Function | Remark |
|-----|--------|--|----------|
| 1 | GND | System ground pin of the IC . Connect to system ground. | |
| 2 | VDD | Power Supply : +3.3V | |
| 3 | BLE | Backlight control signal , H: On \ L: Off | |
| 4 | D/C | Data/Command select | |
| 5 | WR | Write strobe signal | |
| 6 | RD | Read strobe signal | |
| 7 | DB0 | Data bus | |
| 8 | DB1 | Data bus | |
| 9 | DB2 | Data bus | |
| 10 | DB3 | Data bus | |
| 11 | DB4 | Data bus | |
| 12 | DB5 | Data bus | |
| 13 | DB6 | Data bus | |
| 14 | DB7 | Data bus | |
| 15 | DB8 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 16 | DB9 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 17 | DB10 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 18 | DB11 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 19 | DB12 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 20 | DB13 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 21 | DB14 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 22 | DB15 | Data bus (When select 8bits Mode, this pin is NC) | Note1 |
| 23 | NC | No connect | |
| 24 | NC | No connect | |
| 25 | CS | Chip select | |
| 26 | RST | Hardware reset | |
| 27 | L/R | Left / right selection; Default L/R=H | Note 2,3 |
| 28 | U/D | Up/down selection; ; Default U/D=L | Note 2,3 |
| 29 | XL | Left electrode | |
| 30 | YU | Top electrode | |
| 31 | XR | Right electrode | |
| 32 | YD | Bottom electrode | |
| 33 | VLED- | Power for LED Driver IC(GND) | |
| 34 | VLED- | Power for LED Driver IC(GND) | |
| 35 | VLED+ | Power for LED Driver IC(+5V) | |
| 36 | VLED+ | Power for LED Driver IC(+5V) | |

Note1: When select 8bit mode, DB0~DB7 be used, DB8~DB15 no connect
When select 16bit mode, DB0~DB15 be used

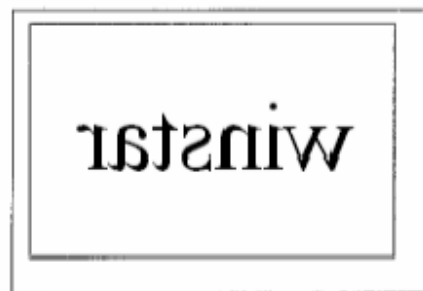
Note 2: Selection of scanning mode

| Setting of scan control input | | Scanning direction |
|-------------------------------|-----|---------------------------|
| U/D | L/R | |
| GND | VDD | Up to down, left to right |
| VDD | GND | Down to up, right to left |
| GND | GND | Up to down, right to left |
| VDD | VDD | Down to up, left to right |

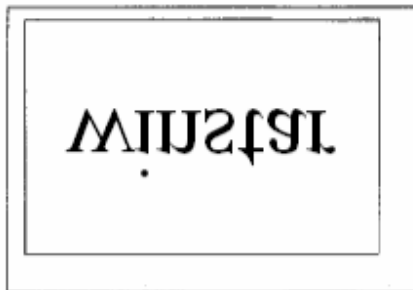
Note 3: Definition of scanning direction. Refer to the figure as below:



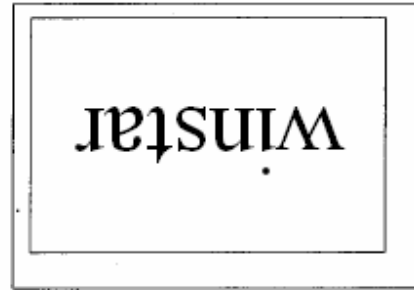
U/D=L, L/R=H



U/D=L, L/R=L

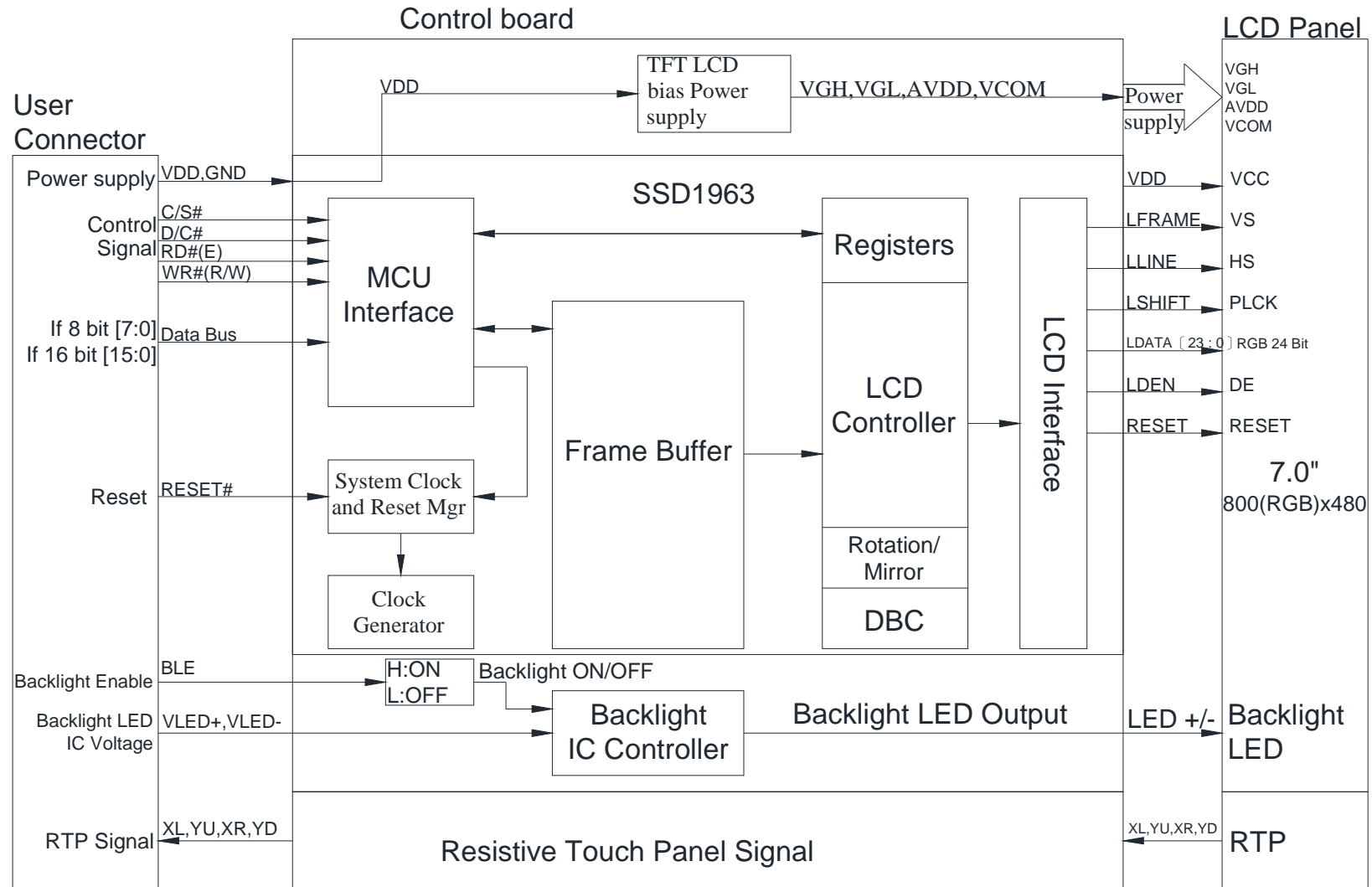


U/D=H, L/R=H



U/D=H, L/R=L

10. Block Diagram



11. Reliability

Content of Reliability Test (Wide temperature, -20°C~70°C)

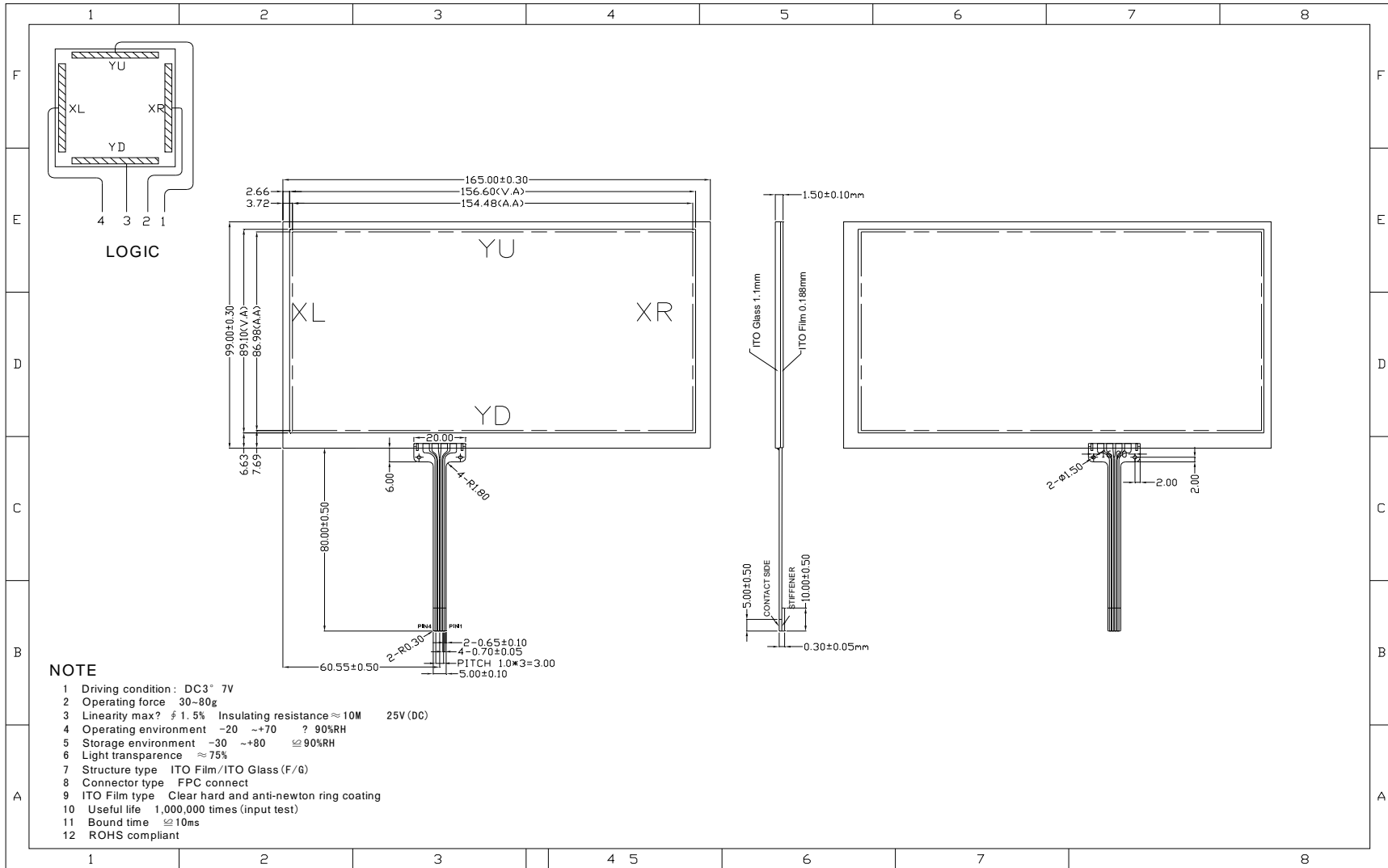
| Environmental Test | | | |
|---|--|--|------|
| Test Item | Content of Test | Test Condition | Note |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80°C 200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30°C 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°C 200hrs | — |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20°C 200hrs | 1 |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60 °C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature. | 60°C,90%RH 96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation <div style="text-align: center;"> <p style="margin: 0;">-20°C 25°C 70°C</p> <p style="margin: 0; text-align: center;"> </p> <p style="margin: 0; text-align: center;">30min 5min 30min</p> <p style="margin: 0; text-align: center;">1 cycle</p> </div> | -20°C/70°C 10 cycles | — |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 15mm Vibration Frequency : 10~55Hz 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 CS=100pF 1 time | — |

Note1: No dew condensation to be observed.

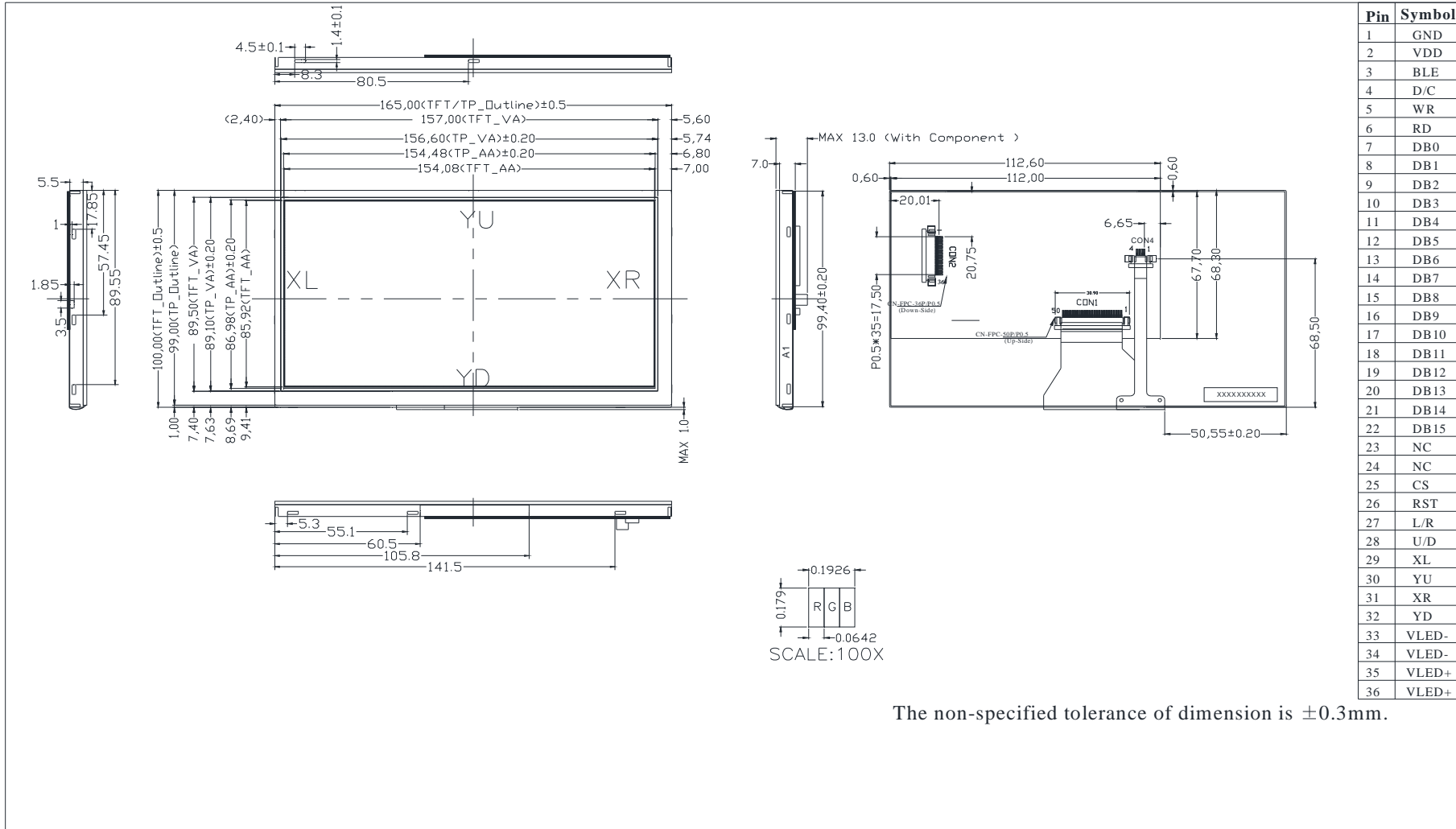
Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

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

12.Touch Panel Information



13. Contour Drawing



14.Initial Code For Reference

```
void Initial_SSD1963()
{
    Write_Command(0x01);
    Delay_ms(10);
    Write_Command(0xe0); //START PLL
    Write_Parameter(0x01);
    Delay_ms(50);
    Write_Command(0xe0); //START PLL
    Write_Parameter(0x03);
    Delay_ms(5);

    Write_Command(0xb0);
    Write_Parameter(0x20);
    Write_Parameter(0x80);
    Write_Parameter(0x03);
    Write_Parameter(0x1f);
    Write_Parameter(0x01);
    Write_Parameter(0xdf);
    Write_Parameter(0x00);

    Write_Command(0xf0);
    Write_Parameter(0x03); //pixel data format, 0x03 is 16bit(565 format);0x00 is for 8-bit

    //Set the MN of PLL
    Write_Command(0xe2);
    Write_Parameter(0x1d);
    Write_Parameter(0x02);
    Write_Parameter(0x54);

    Write_Command(0xe6);
    Write_Parameter(0x04);
    Write_Parameter(0x6f);
    Write_Parameter(0x47);

    //Set front porch and back porch
    Write_Command(0xb4);
    Write_Parameter(0x04);
    Write_Parameter(0x20);
    Write_Parameter(0x00);
    Write_Parameter(0x2e);
    Write_Parameter(0xd2);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);

    Write_Command(0xb6);
    Write_Parameter(0x02);
```

Write_Parameter(0x0d);
Write_Parameter(0x00);
Write_Parameter(0x17);
Write_Parameter(0x16);
Write_Parameter(0x00);
Write_Parameter(0x00);

Write_Command(0x2a);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x03);
Write_Parameter(0x1f);

Write_Command(0x2b);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x01);
Write_Parameter(0x1f);

Write_Command(0xb8);
Write_Parameter(0x0f);
Write_Parameter(0x01);
Write_Command(0xba);
Write_Parameter(0x01);

Write_Command(0x29);
Write_Command(0x2c);

}



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. Material 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** <<



Winstar Module Number : _____

Page: 2

5、Electronic Characteristics of Module :

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

6、Summary :

Sales signature : _____

Customer Signature : _____

Date : / / _____