



Winstar Display Co., LTD

華凌光電股份有限公司



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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF50QTIFGDBN0#

| | |
|---|--|
| <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 |
| ISSUED DATE: 2016/10/04 | | | |



RECORDS OF REVISION

DOC. FIRST ISSUE

| VERSION | DATE | REVISED PAGE NO. | SUMMARY |
|---------|------------|------------------|-----------------|
| 0 | 2016/09/22 | | First issue |
| A | 2016/10/04 | | Modify Summary. |

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Contents

1.Module Classification Information

2.Summary

3.General Specification

4.Absolute Maximum Ratings

5.Electrical Characteristics

6.DC Characteristics

7.Interface Timing Characteristics

8.Optical Characteristics

9.Interface

10.Block Diagram

11.Reliability

12.Contour Drawing

13.Other

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1.Module Classification Information

W F 50 Q T I F G D B N 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 : 5.0" 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 | C→Transmissive, N. T, 6:00 ; I→Transmissive, W. T, 6:00 F→Transmissive, N.T,12:00 ; L→Transmissive, W.T,12:00 N→Transmissive, Super W.T, 6:00 Q→Transmissive, Super W.T, 12:00 X→Transmissive, W.T, VA TFT V→Transmissive, Super W.T, VA TFT R→Transmissive, Super W.T, O-TFT Z→Transmissive, W.T, O-TFT A→Transmissive, N.T, IPS TFT Y→Transmissive, W.T, IPS TFT | | | | | |
| 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 | Resolution: | | | | | | |
| | 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 |
| | S:480128 | T:800320 | | | | | |
| 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 (G-F-F) G : capacitive touch panel(G-G) | | | | | | |
| ⑫ | Version | | | | | | |
| ⑬ | Special Code | #:Fit in with ROHS directive regulations | | | | | |

2.Summary

TFT 5.0” is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for industrial application and this module follows RoHs.

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3. General Specifications

| Item | Dimension | Unit |
|--------------------------------|------------------------------------|------|
| Size | 5.0 | inch |
| Dot Matrix | 800 x 3(RGB) x 480 | dots |
| Module dimension | 120.7 x 75.8 x 8.0 (Max) | mm |
| Active area | 108.0 x 64.8 | mm |
| Dot pitch | 0.045 x 0.135 | mm |
| LCD type | TFT, Normally White, Transmissive | |
| View Direction | 12 o'clock | |
| Gray Scale Inversion Direction | 6 o'clock | |
| Aspect Ratio | 16:9 | |
| Backlight Type | LED, Normally White | |
| Controller IC | SSD1963 | |
| Interface | Digital 8080 family MPU 8bit/16bit | |
| With /Without TP | Without TP | |
| 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

1. 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

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5. Electrical Characteristics

5.1. Operating conditions: (CON3.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 | — | — | 150 | 230 | mA | Note1 |

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

5.2. Backlight driving conditions (CON3.Pin33,34=VLED-, Pin35,36=VLED+)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|----------------------------------|---------|------|--------|------|------|------------|
| Operation Current For LED Driver | VLED=5V | 200 | - | 300 | mA | 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=5.0V 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 | |

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7. Interface timing

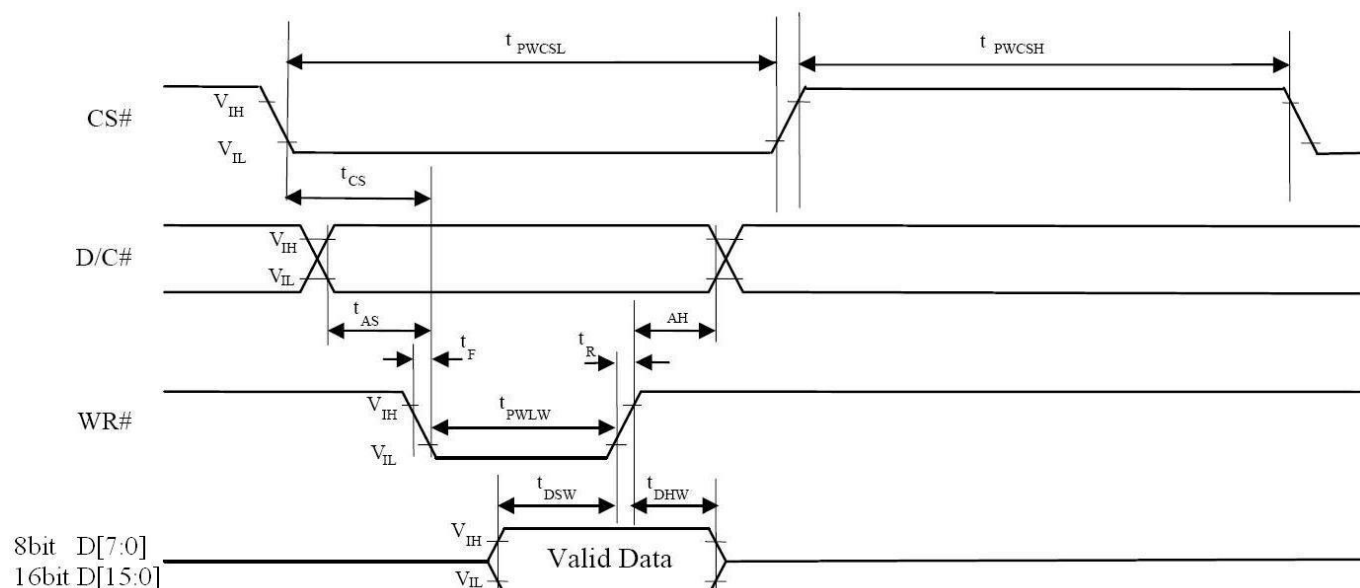
7.1. 8080 Mode 8bit/16bit

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data Bus signals. 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#.

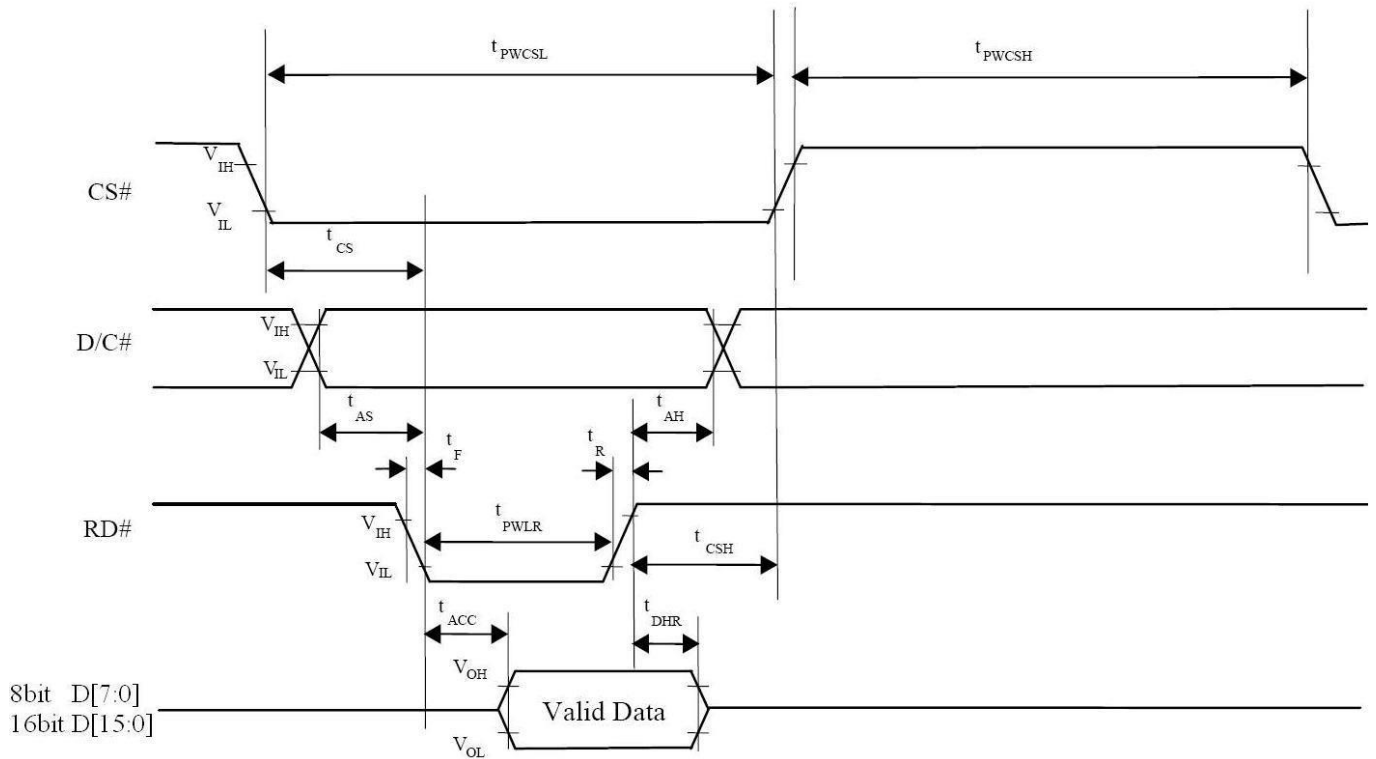
7.2. 8080 Mode Write Cycle

| 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 3,5 | |
| | Tf | | - | 15 | 30 | .ms | | |
| Contrast ratio | CR | At optimized viewing angle | 400 | 500 | - | - | Note 4,5 | |
| Color Chromaticity | White | Wx | $\theta = 0^\circ$ 、 $\Phi = 0$ | 0.26 | 0.31 | 0.36 | Note 2,6,7 | |
| | | Wy | | 0.28 | 0.33 | 0.38 | | |
| Viewing angle | Hor. | ΘR | $CR \geq 10$ | 60 | 70 | - | Deg. | Note 1 |
| | | ΘL | | 60 | 70 | - | | |
| | Ver. | ΦT | | 40 | 50 | - | | |
| | | ΦB | | 60 | 70 | - | | |
| Brightness | - | - | 400 | 500 | - | cd/ m ² | Center of display | |

Ta=25±2°C

Note 1: Definition of viewing angle range

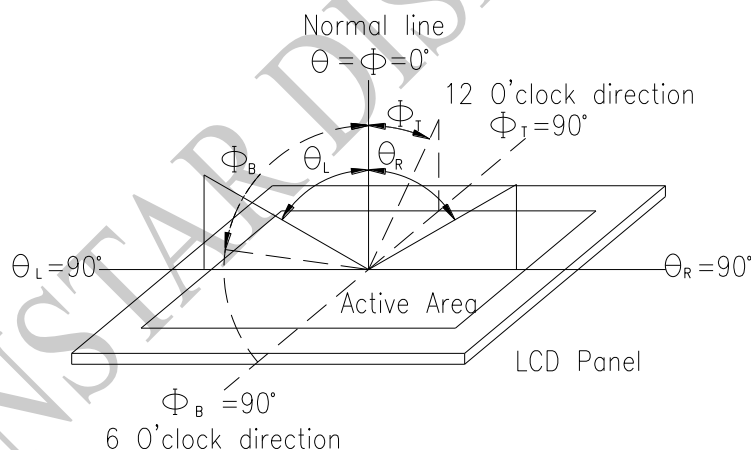


Fig. 8.1. Definition of viewing angle

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.

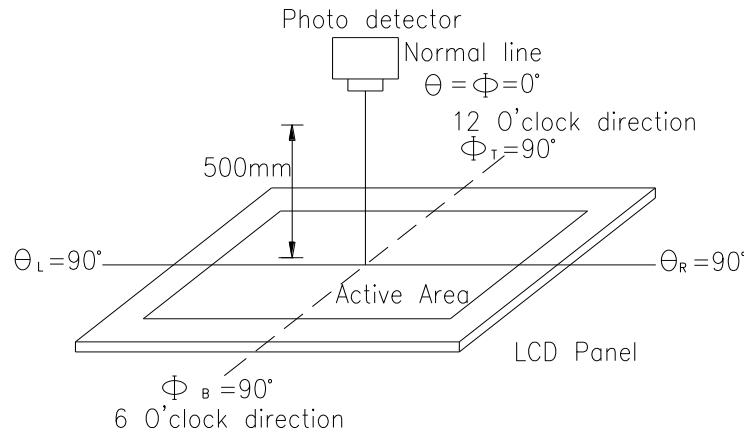
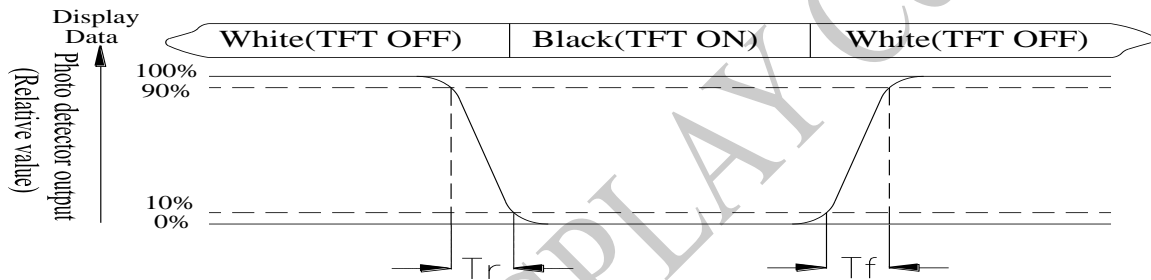


Fig. 8.2. Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%



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.

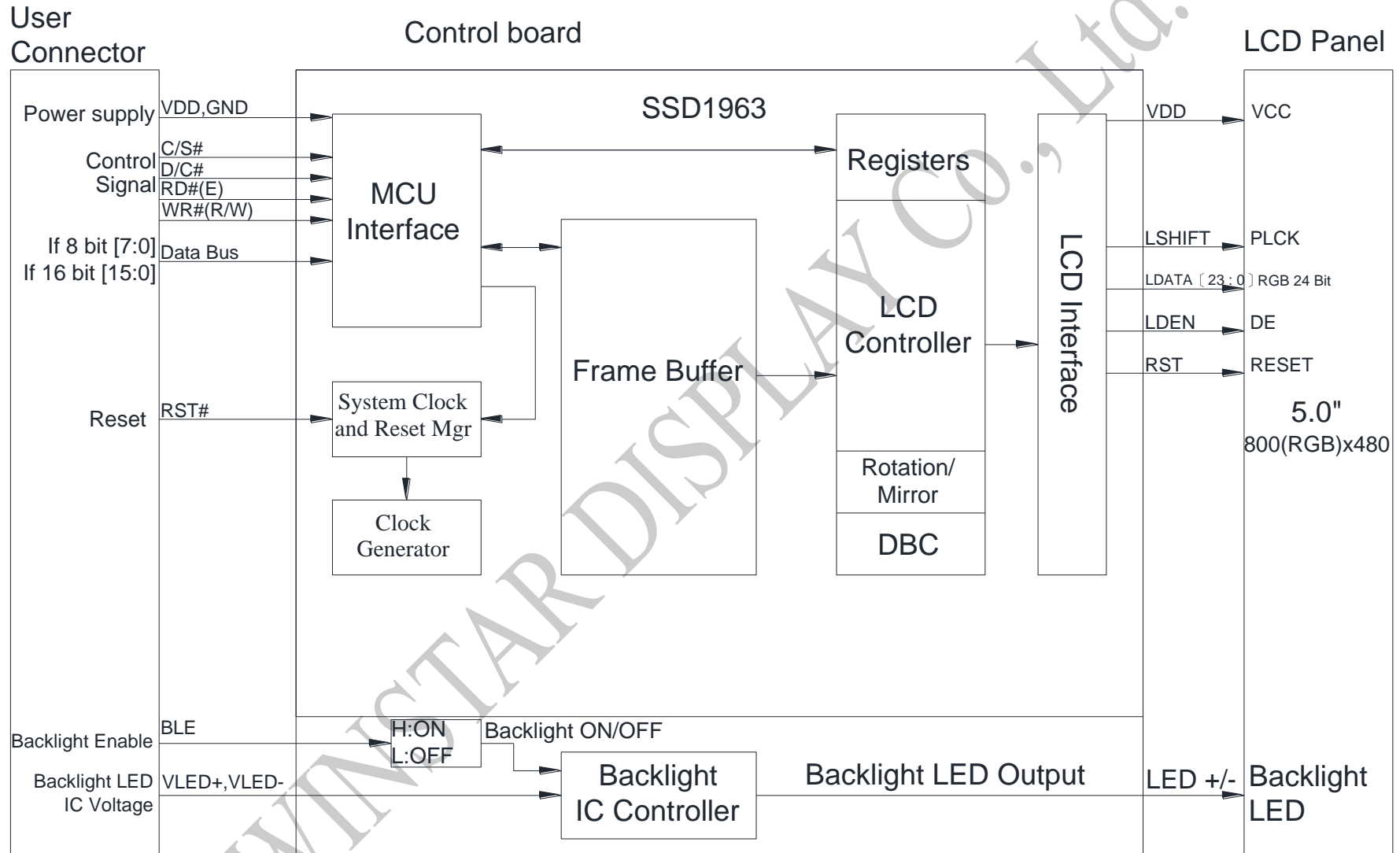
9.Interface

9.1. LCM PIN Definition (CON3)

| Pin | Symbol | Function | Remark |
|-----|--------|--|--------|
| 1 | GND | System round pin of the IC. Connect to system ground. | |
| 2 | VDD | Power Supply : +3.3V | |
| 3 | BL_E | 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 connection | |
| 24 | NC | No connection | |
| 25 | CS | Chip select | |
| 26 | RST | Hardware reset | |
| 27 | NC | No connection | |
| 28 | NC | No connection | |
| 29 | NC | No connection | |
| 30 | NC | No connection | |
| 31 | NC | No connection | |
| 32 | NC | No connection | |
| 33 | VLED- | VLED- for B/L LED inverter (GND) | |
| 34 | VLED- | VLED- for B/L LED inverter (GND) | |
| 35 | VLED+ | VLED+ for B/L LED inverter | |
| 36 | VLED+ | VLED+ for B/L LED inverter | |

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

10. Block Diagram



11. Reliability

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

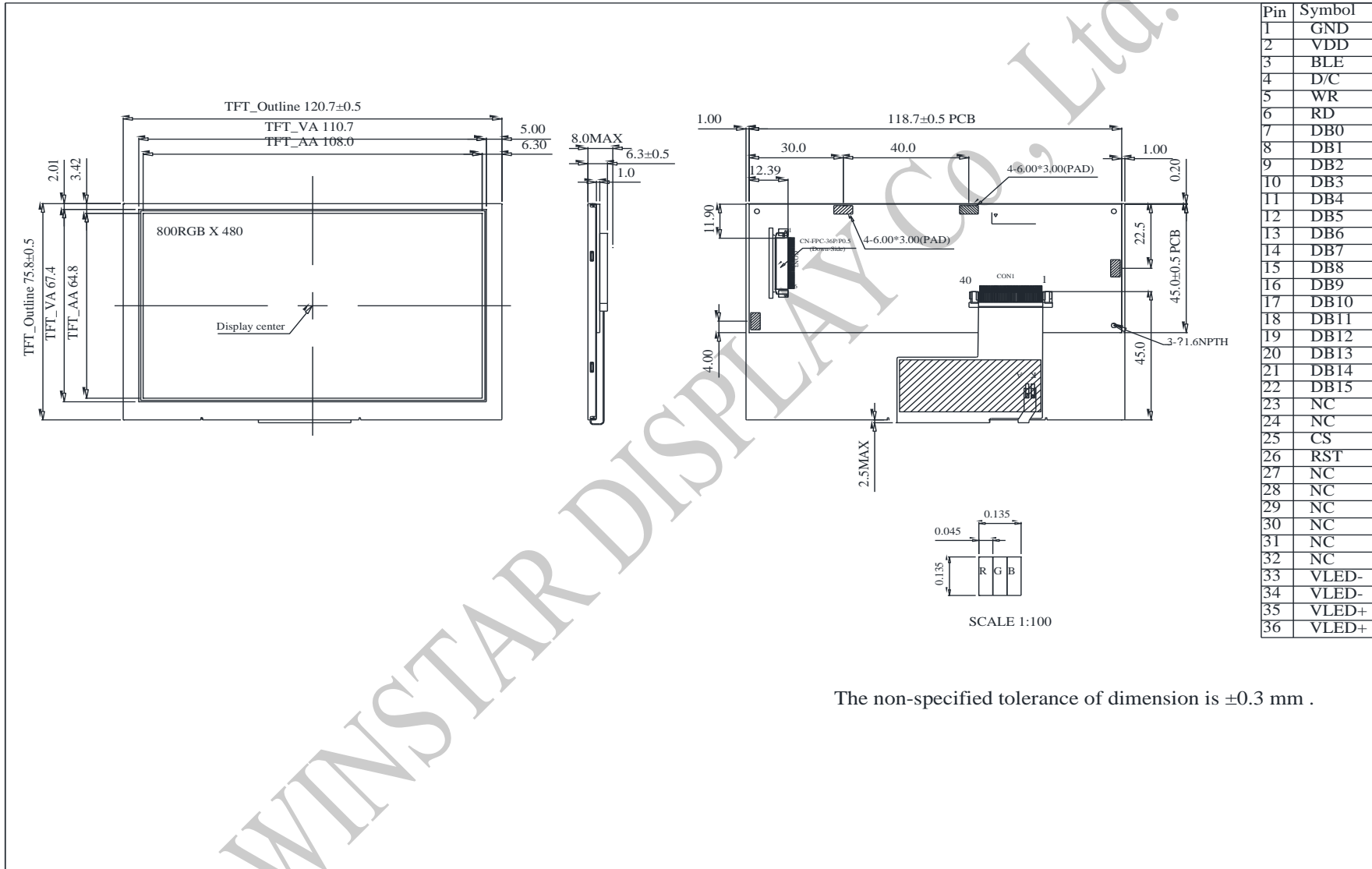
| Environmental Test | | | |
|---|---|---|------|
| Test Item | Content of Test | Test Condition | Note |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80°C 200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature 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 | 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="text-align: center;">-20°C 25°C 70°C</p> <p style="text-align: center;">30min 5min 30min</p> <p style="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 : 1.5mm 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=±600V(contact), ±800v(air), RS=330Ω CS=150pF 10 times | — |

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. Contour Drawing



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



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 : Pass NG , _____
- 7. Storage Temperature : Pass NG , _____
- 8. Others : _____

2、Mechanical

- 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) : 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 , _____



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 : / / _____

