



**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: <https://www.winstar.com.tw> E-mail: sales@winstar.com.tw

### SPECIFICATION

**CUSTOMER :** \_\_\_\_\_

**MODULE NO.:** WF43QTIBEDBTD#

<b>APPROVED BY:</b>  ( FOR CUSTOMER USE ONLY )	<b>PCB VERSION:</b>	<b>DATA:</b>

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
<b>ISSUED DATE: 2021/03/17</b>			

TFT Display Inspection Specification: <https://www.winstar.com.tw/technology/download.html>

Precaution in use of TFT module: <https://www.winstar.com.tw/technology/download/declaration.html>

MODLE NO :

<b>RECORDS OF REVISION</b>	<b>DOC. FIRST ISSUE</b>
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VERSION	DATE	REVISED PAGE NO.	<b>SUMMARY</b>
0	2019/02/26		First issue
A	2021/03/17		Modify Optical Characteristics

# 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.Touch Panel Information
- 13.Contour Drawing
- 14.Initial Code For Reference

# 1.Module Classification Information

W F 43 Q T I B E D B T D #  
 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 : 4.3” TFT											
④	Model serials no.											
⑤	Backlight Type :	F→CCFL, White S→LED, High Light White					T→LED, White Z→Nichia LED, White					
⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	A→Transmissive, N.T, IPS TFT C→Transmissive, N. T, 6:00 ; F→Transmissive, N.T,12:00 ; I→Transmissive, W. T, 6:00 K→Transflective, W.T,12:00 L→Transmissive, W.T,12:00 N→Transmissive, Super W.T, 6:00					Q→Transmissive, Super W.T, 12:00 R→Transmissive, Super W.T, O-TFT V→Transmissive, Super W.T, VA TFT W→Transmissive, Super W.T, IPS TFT X→Transmissive, W.T, VA TFT Y→Transmissive, W.T, IPS TFT Z→Transmissive, W.T, O-TFT					
⑦	A : TFT LCD B : TFT+SCREW HOLES+CONTROL BOARD C : TFT+ SCREW HOLES +A/D BOARD D : TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD E : TFT+ SCREW HOLES +POWER BOARD					F : TFT+CONTROL BOARD G : TFT+ SCREW HOLES H : TFT+D/V BOARD I : TFT+ SCREW HOLES +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	N	128128	P	1280800	Q	480800	R	640320	S	480128
	T	800320	U	8001280	V	176220	W	1280398	X	1024250	Y	1920720
	Z	800200	2	1024324	3	7201280	4	19201200	5	1366768	6	1280320
⑨	D: Digital L : LVDS M:MIPI											
⑩	Interface:											
	N	Without control board			A	8Bit		B	16Bit		H	HDMI
	I	I2C Interface			R	RS232		S	SPI Interface		U	USB
⑪	TS:											
	N	Without TS			T	Resistive touch panel			C	Capacitive touch panel (G-F-F)		
	G	Capacitive touch panel (G-G)					C1	Capacitive touch panel (G-F-F)+OCA				
	C2	Capacitive touch panel (G-F-F)+OCR					G1	Capacitive touch panel (G-G)+OCA				
	G2	Capacitive touch panel (G-G)+OCR					B	CTP+GG+USB				
⑫	Version: X:Raspberry pi											
⑬	Special Code	#:Fit in with ROHS directive regulations										

## **2.Summary**

TFT 4.3” 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.

### **3.General Specifications**

<b>Item</b>	<b>Dimension</b>	<b>Unit</b>
Size	4.3	inch
Dot Matrix	480 x RGBx272(TFT)	dots
Module dimension	106.7 x 83.98 x 8.05	mm
Active area	95.04 x 53.856	mm
Dot pitch	0.066 x 0.198	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	With RTP	
Surface	Anti-Glare	

\*Color tone slight changed by temperature and driving voltage.

## **4. Absolute Maximum Ratings**

<b>Item</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>
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.  $\square$  60°C, 90% RH MAX. Temp.  $>$  60°C, Absolute humidity shall be less than 90% RH at 60°C



# 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	—	—	200	300	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+=3.3V	270	-	405	mA	Note 1,2
Power Consumption	VLED+=3.3V	891	-	1337	mW	Note 1,2
Supply Voltage For LED Driver	VLED+	3.3	-	5	V	Note 1,2
LED Life Time		-	50,000	-	Hr	Note 2,3,4

Note 1 : Base on VLED= 3.3V 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

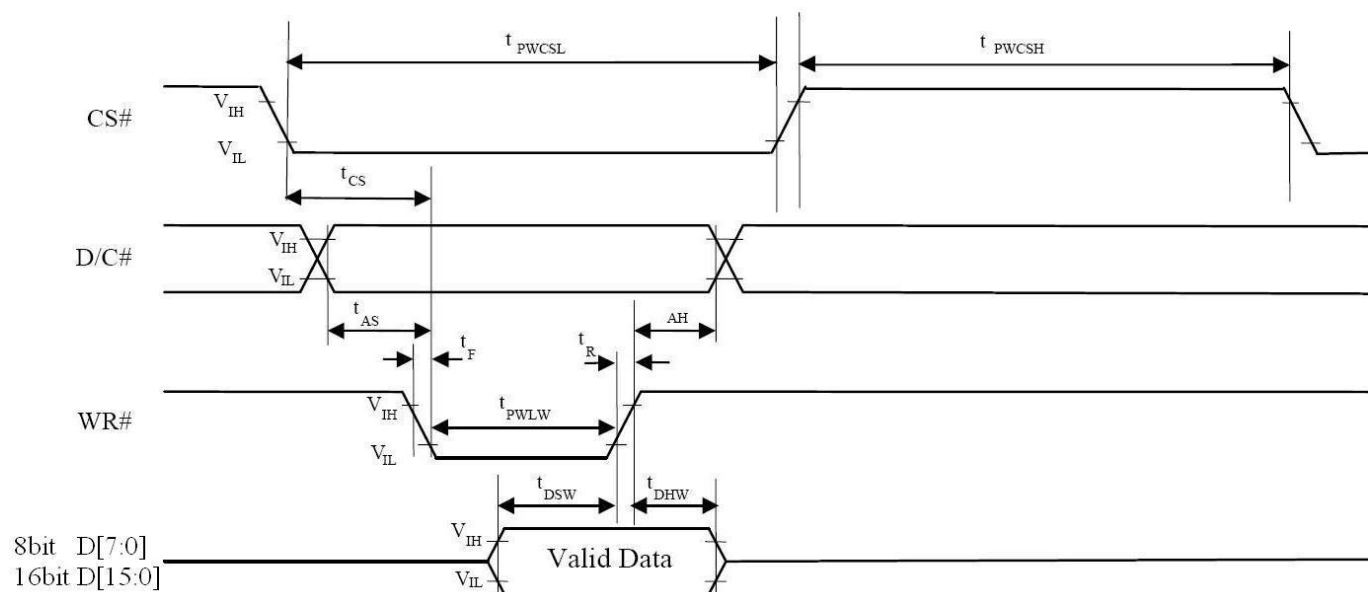
## 7.1. 8080 Mode 8bit/16bit

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#.

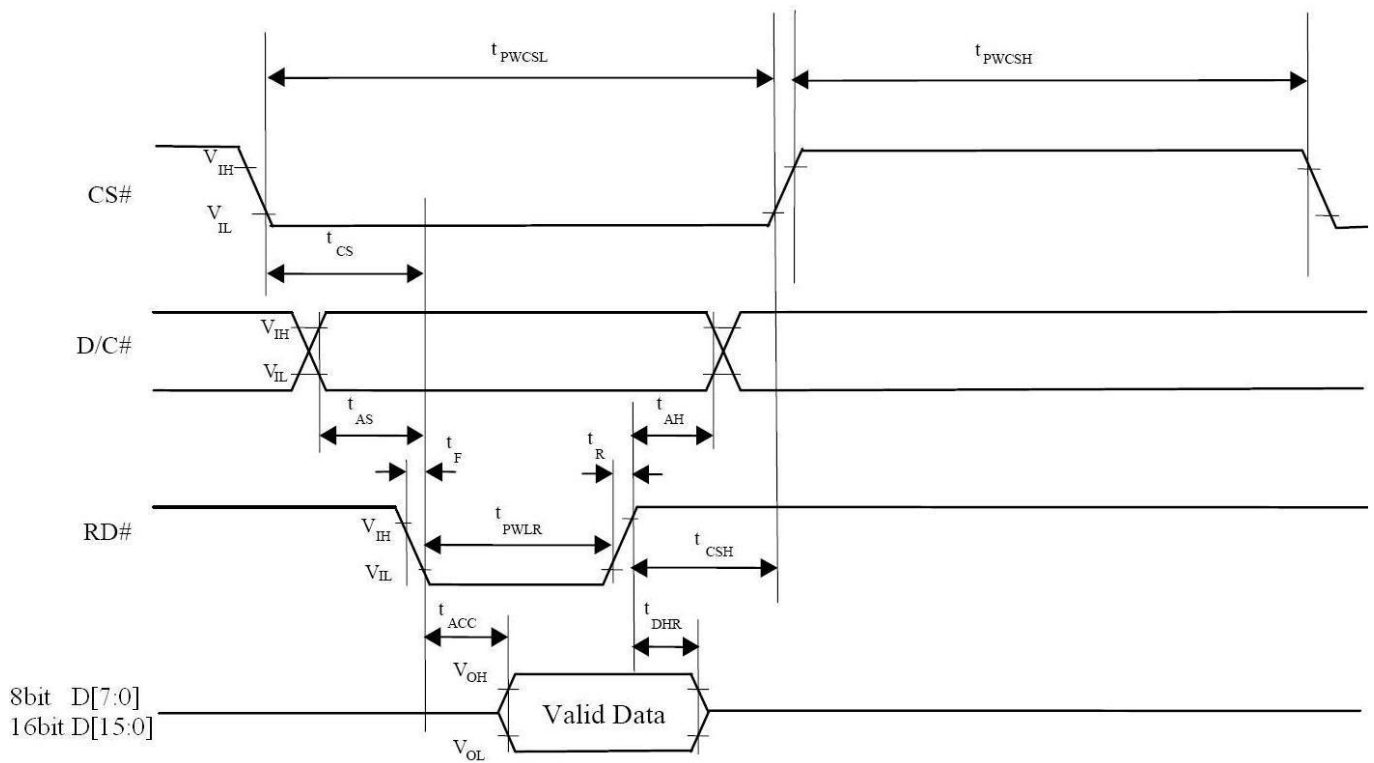
## 7.2. 8080 Mode Write Cycle

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
tPWLW	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 <sup>st</sup>	R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1 <sup>st</sup>	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2 <sup>nd</sup>	B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3 <sup>rd</sup>	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
8 bits	1 <sup>st</sup>									R7	R6	R5	R4	R3	R2	R1	R0
	2 <sup>nd</sup>									G7	G6	G5	G4	G3	G2	G1	G0
	3 <sup>rd</sup>									B7	B6	B5	B4	B3	B2	B1	B0

# 8. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr+ Tf	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	25	50	.ms	Note 3	
Contrast ratio	CR	At optimized viewing angle	-	500	-	-	Note 4	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0$	0.265	0.315	0.365		Note 2,6,7
		Wy		0.276	0.326	0.376		
Viewing angle (Gray Scale Inversion Direction)	Hor.	$\Theta_R$	CR $\geq 10$	-	70	-	Deg.	Note 1
		$\Theta_L$		-	70	-		
	Ver.	$\Phi_T$		-	50	-		
		$\Phi_B$		-	60	-		
Brightness	-	-	250	350	-	cd/m <sup>2</sup>	Center of display	
Uniformity	(U)	-	75	-	-	%	Note5	

Ta=25±2°C, VLED /ILED = 3.3V /270mA

Note 1: Definition of viewing angle range

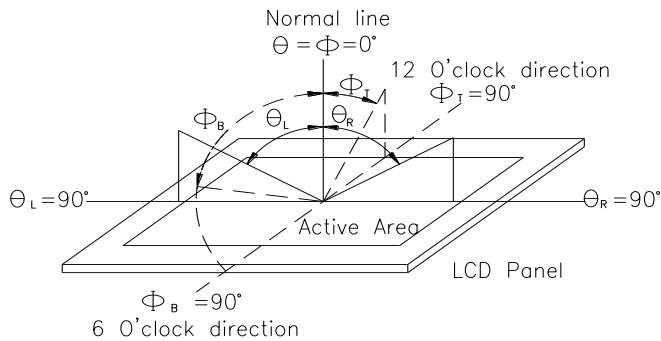


Fig. 8.1. Definition of viewing angle

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.

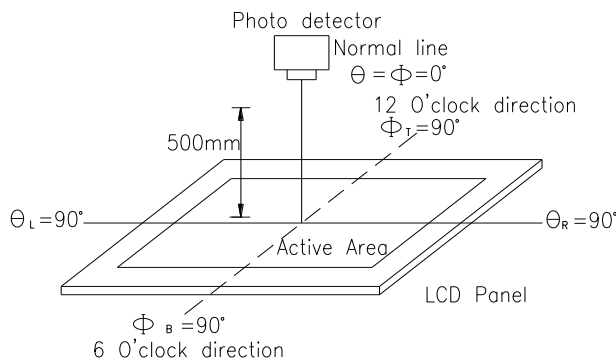
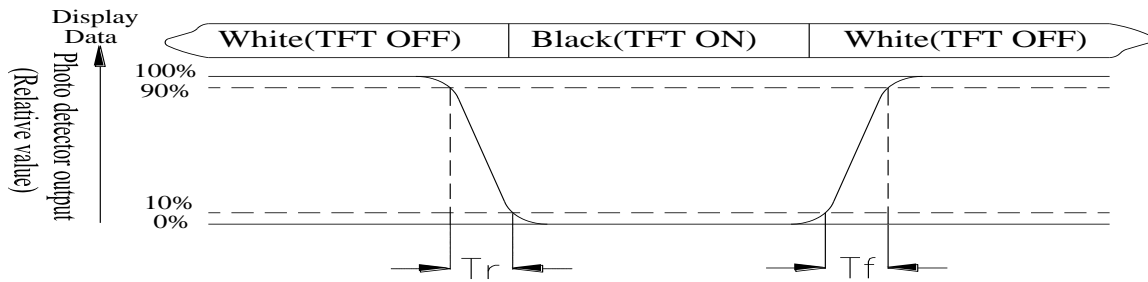


Fig. 8.2. Optical measurement system setup

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: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = \text{Lmin/Lmax} \times 100\%$$

L = Active area length

W = Active area width

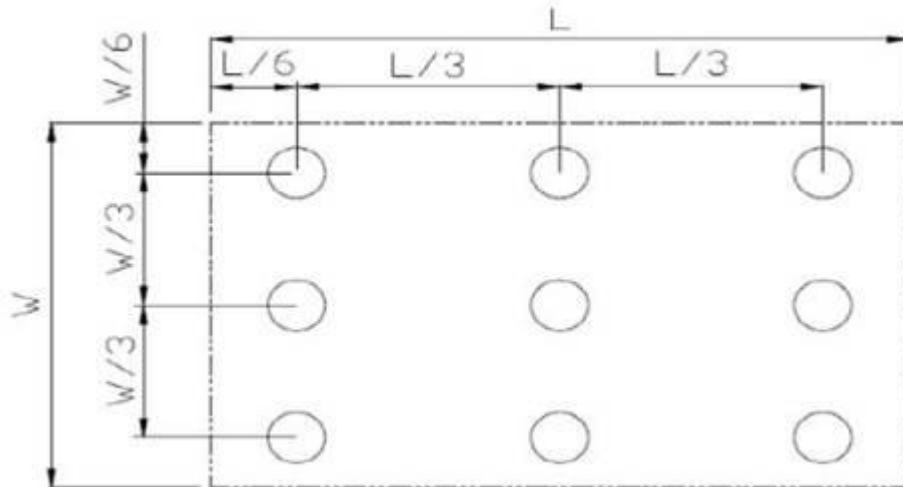


Fig8.3. Definition of uniformity

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)

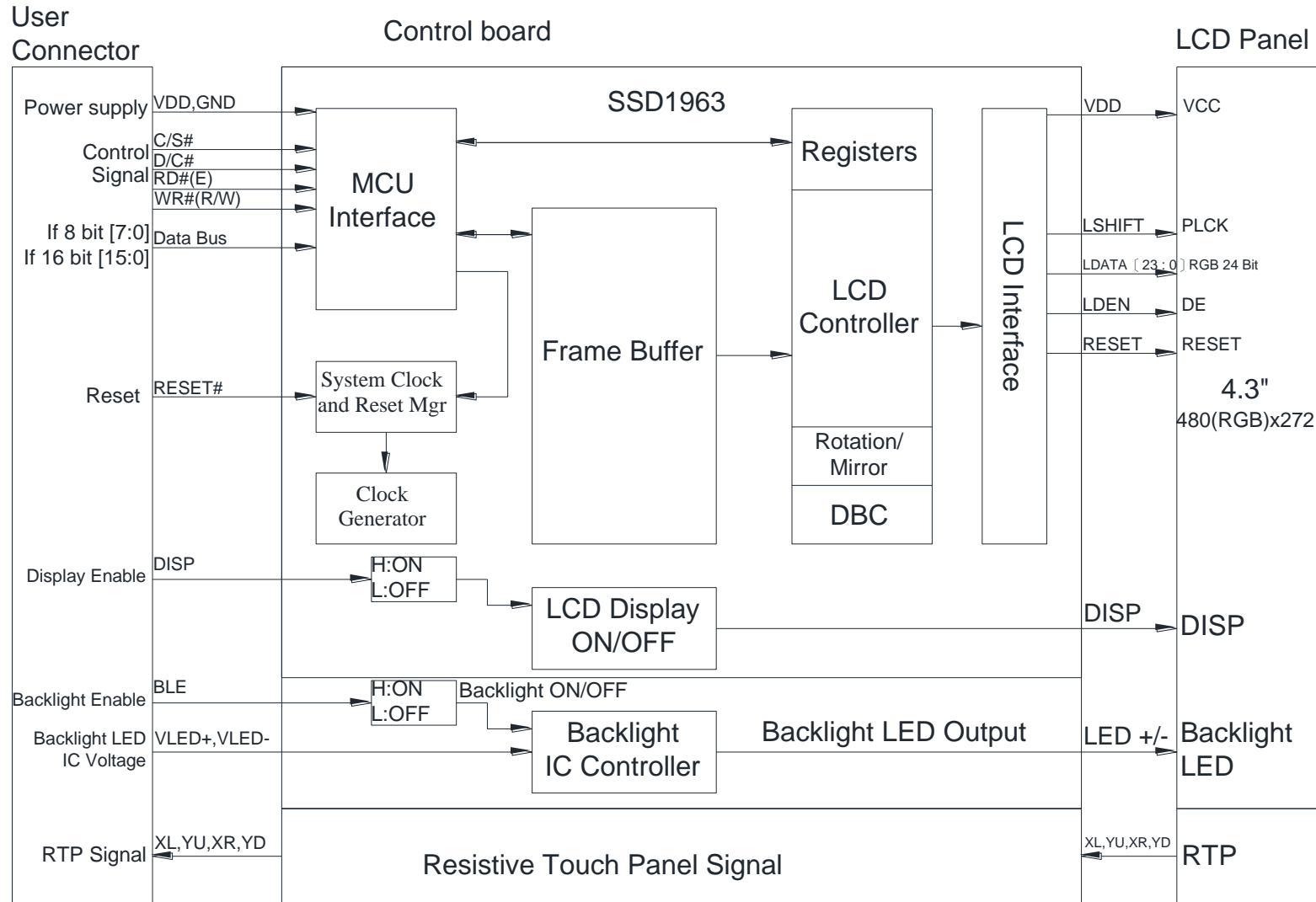
Pin	Symbol	Function	Remark
1	GND	System round pin of the IC. Connect to system ground.	
2	VDD	Power Supply : +3.3V	
3	BL_E	Backlight control signal , H: On \ L: Off	
4	D/C	Data/Command select	
5	WR	Write strobe signal	
6	RD	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data 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	RESET	Hardware reset	
27	DISP_ON	Display control H: On \ L:Off	
28	NC	No connection	
29	XL	Left electrode	
30	YU	Top electrode	

31	XR	Right electrode	
32	YD	Bottom electrode	
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 (+3.3V)	
36	VLED+	VLED+ for B/L LED inverter (+3.3V)	

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

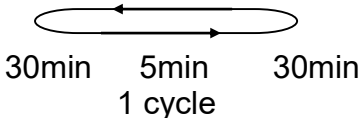


# 10. Block Diagram



# 11. Reliability

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

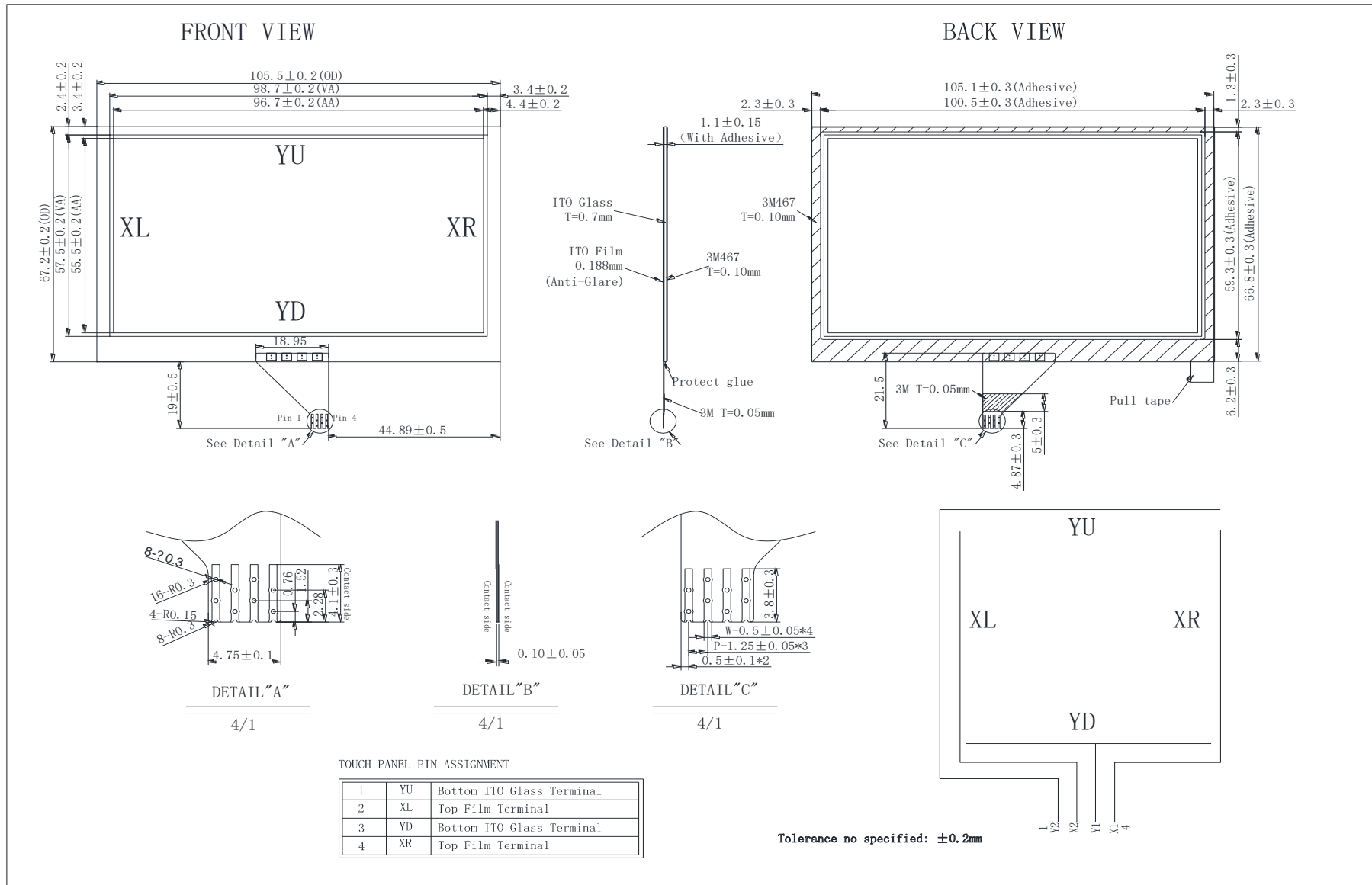
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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	<p>The sample should be allowed stand the following 10 cycles of operation</p> <p style="text-align: center;">-20°C    25°C    70°C</p>  <p style="text-align: center;">30min    5min    30min 1 cycle</p>	-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.

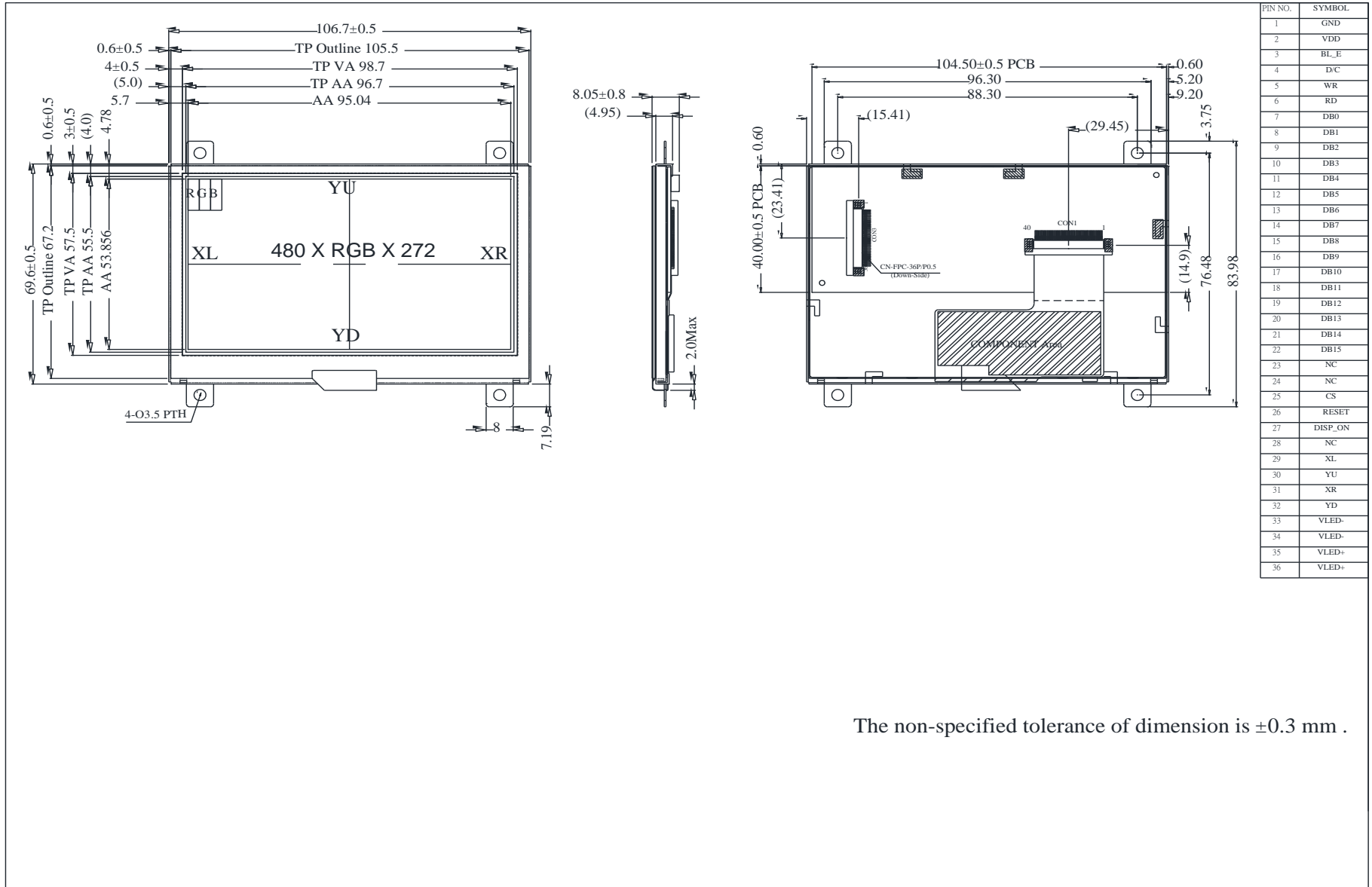
# 12.Touch Panel Information



### 12.1. Resistance Touch Panel General Specifications

Item	Description
Driving condition	DC 5V Max
Operating force	10~120g
Insulating resistance	> 20M $\Omega$ · 25V(DC)
Light transparence	70%
Structure type	ITO Film/ITO Glass(F/G)
Surface Hardness	3H typ
Pen Hitting Durability (with the silicon rubber)	> 1000,000 times
X resistance	200~1200 $\Omega$
Y resistance	200~900 $\Omega$

# 13. Contour Drawing



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

# 14.Initial Code For Reference

```
void Initial_code()
{
    Write_Command(0x01);
    Delay_ms(10);
    Write_Command(0xe0);
    Write_Parameter(0x01);
    Delay_ms(50);
    Write_Command(0xe0);
    Write_Parameter(0x03);
    Delay_ms(5);

    Write_Command(0xb0);
    Write_Parameter(0x20);
    Write_Parameter(0x00);
    Write_Parameter(0x01);
    Write_Parameter(0xdf);
    Write_Parameter(0x01);
    Write_Parameter(0x0f);
    Write_Parameter(0x00);

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

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

    Write_Command(0xe6);

//SET PCLK freq=9MHz; Vsync=60Hz
    Write_Parameter(0x01);
    Write_Parameter(0x99);
    Write_Parameter(0x9a);

    //Set front porch and back porch
    Write_Command(0xb4);
    Write_Parameter(0x02);
    Write_Parameter(0x0d);
    Write_Parameter(0x00);
    Write_Parameter(0x14);
    Write_Parameter(0x05);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
```

Write\_Parameter(0x00);

Write\_Command(0xb6);

Write\_Parameter(0x01);

Write\_Parameter(0x24);

Write\_Parameter(0x00);

Write\_Parameter(0x0a);

Write\_Parameter(0x05);

Write\_Parameter(0x00);

Write\_Parameter(0x00);

Write\_Command(0x2a);

Write\_Parameter(0x00);

Write\_Parameter(0x00);

Write\_Parameter(0x01);

Write\_Parameter(0xdf);

Write\_Command(0x2b);

Write\_Parameter(0x00);

Write\_Parameter(0x00);

Write\_Parameter(0x01);

Write\_Parameter(0x0f);

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  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 , \_\_\_\_\_

>> **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 :        /        / \_\_\_\_\_