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## SPECIFICATION

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

**MODULE NO.:** WF70ATIFGDBT0#

<p><b>APPROVED BY:</b></p> <p>( FOR CUSTOMER USE ONLY )</p>	<p><b>PCB VERSION:</b> _____</p> <p><b>DATA:</b> _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
<b>ISSUED DATE: 2017/01/06</b>			

**RECORDS OF REVISION**

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	<b>SUMMARY</b>
0	2013/03/08		First issue
A	2017/01/06		Add size & Surface. Modify Pixel Data Format & Block Diagram & Static electricity test.

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- 11.Reliability
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# 1.Module Classification Information

W F 70 A 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	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 7.0”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.

### **3. General Specifications**

<b>Item</b>	<b>Dimension</b>	<b>Unit</b>
Size	7.0	inch
Dot Matrix	800 RGB x 480	dots
Module dimension	165(W) x 104.44(H) x 10.85 (D)	mm
Active area	152.4x91.44	mm
Dot pitch	63.5 x 190.5	um
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	
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

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

# 5. Electrical Characteristics

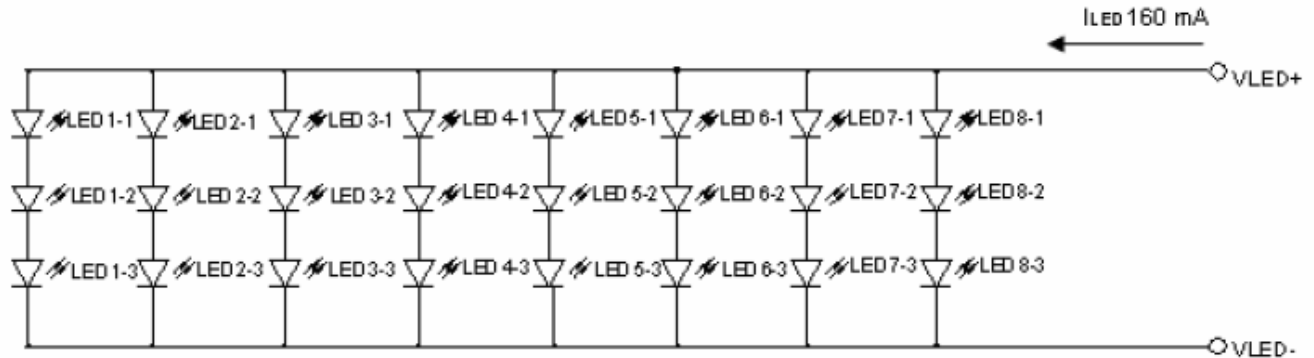
## 5.1. ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power supply for logic	VDD	VDD-DGND	3.0	3.3	3.6	V
Output voltage	VOH	Output high voltage	0.8VDD			
	VOL	Output low voltage			0.2VDD	
Input Voltage	VIH	Input high voltage	0.8VDD	—	VDD +0.5	V
	VIL	Input low voltage			0.2VDD	
Recommended TFT Driving Current for 25°C	IVDD	VDD=3.3V	—	200	260	mA

## 5.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I <sub>LED</sub>	-	160	-	mA	Note 1
LED voltage	V <sub>LED</sub>	-	9.9	-	V	
LED Life Time	-	10,000	20,000	-	Hr	Note 2

Note 1 : There are 8 Groups LED shown as below , V<sub>LED</sub>=9.9V , I<sub>LED</sub>=160mA.



Note 2 : Brightness to be decreased to 50% of the initial value.



## 6.DC CHARACTERISTICS

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

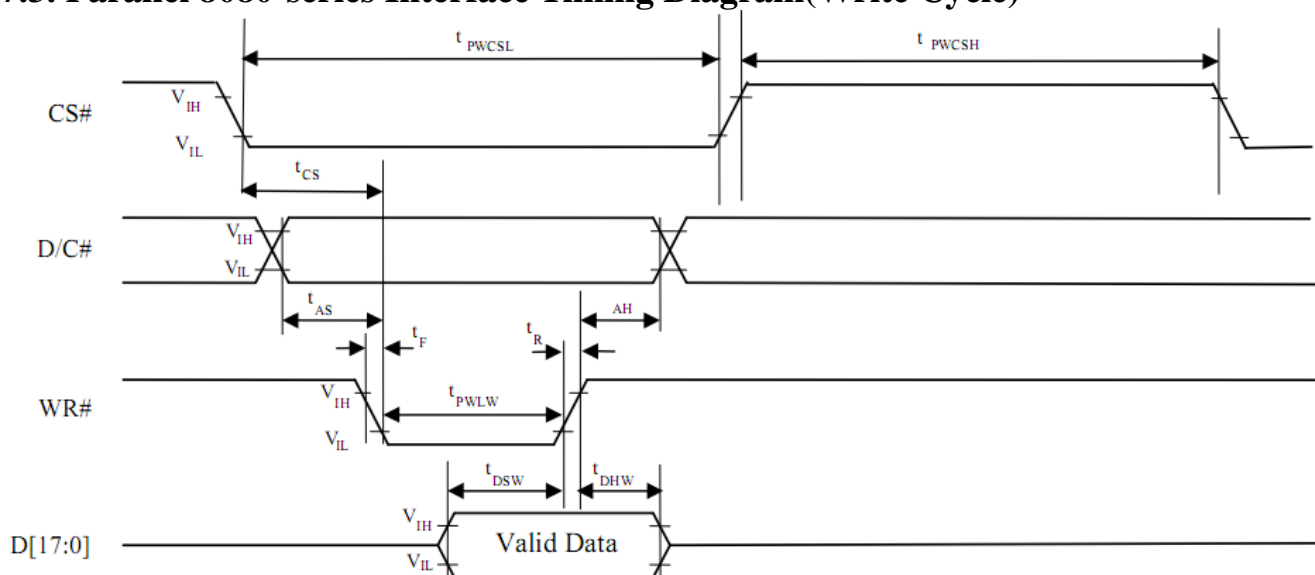
## 7.1. 8080 Mode

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

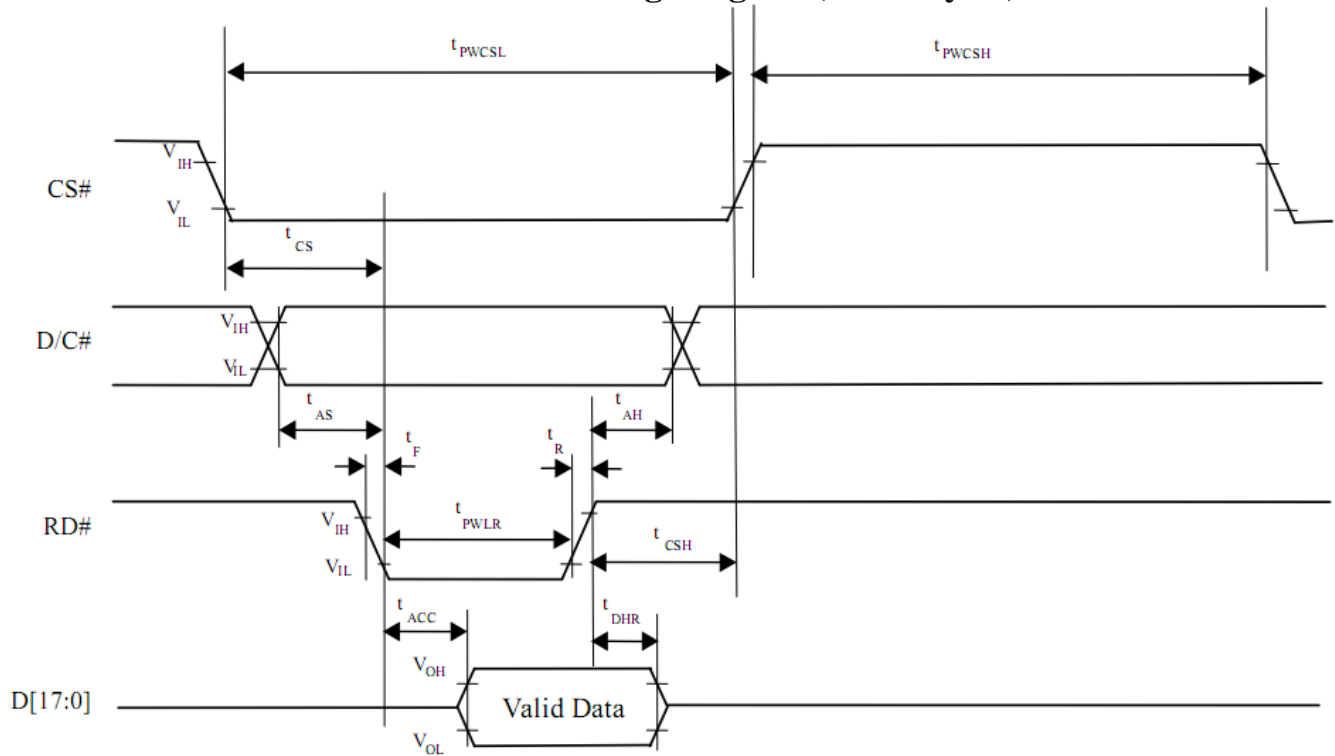
## 7.2. 8080 Mode Write Cycle

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

## TFT LCD characteristic (Without Touch Panel)

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr	$\theta = 0^\circ \cdot \Phi = 0^\circ$	-	5	10	.ms	Note 3,5	
	Tf		-	11	16	.ms		
Contrast ratio	CR	At optimized viewing angle	250	400	-	-	Note 4,5	
Color Chromaticity	White	Wx	$\theta = 0^\circ \cdot \Phi = 0^\circ$	0.249	0.299	0.349		Note 2,6,7
		Wy		0.278	0.328	0.378		
Viewing angle (Gray Scale Inversion Direction)	Hor.	$\Theta R$	$CR \geq 10$	60	70		Deg.	Note 1
		$\Theta L$		60	70			
	Ver.	$\Phi T$		50	60			
		$\Phi B$		60	70			
Brightness	-	-	210	250		cd/m <sup>2</sup>	Center of display	

Ta=25±2°C, IL=160mA

Note 1: Definition of viewing angle range

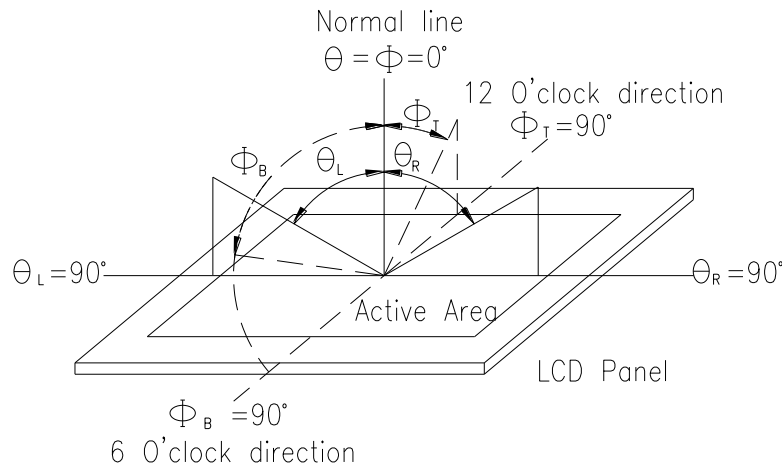


Fig.8.1. Definition of viewing angle

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.

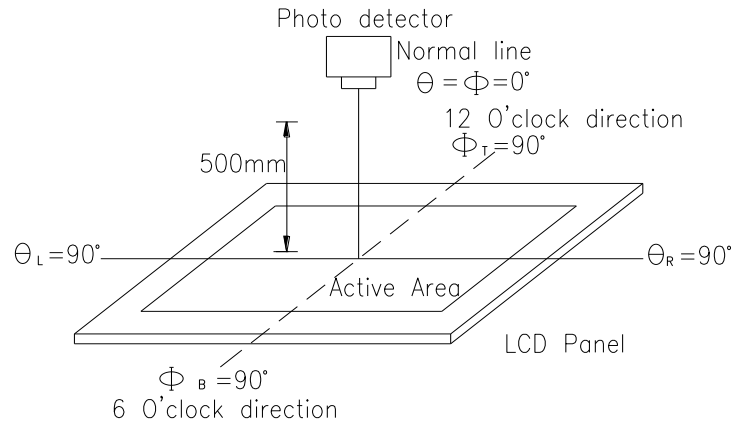
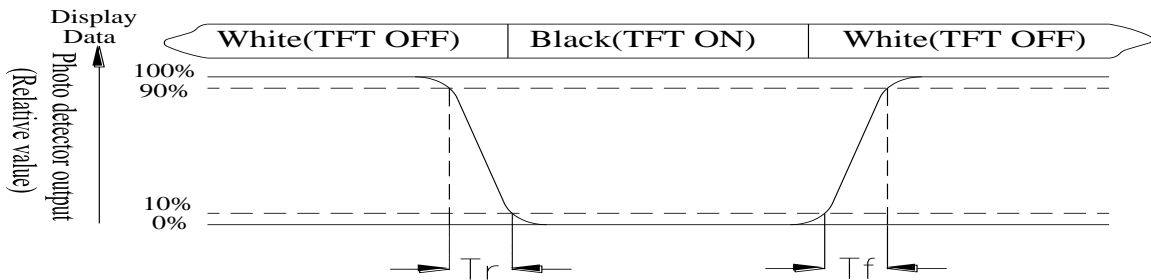


Fig. 8.2. Optical measurement system setup

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

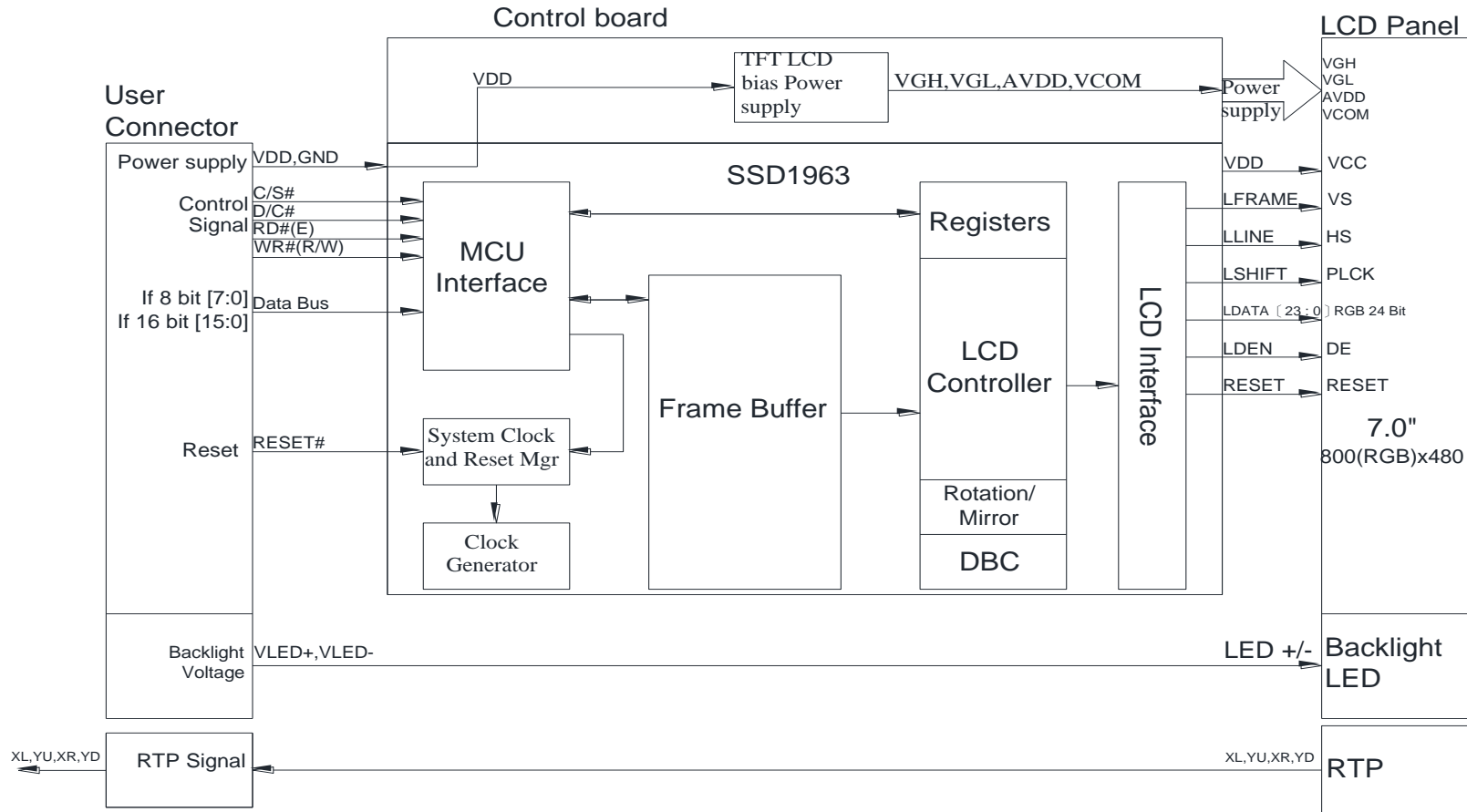
Pin	Symbol	Function	Remark
1	VDD	Power Supply : +3.3V	
2	VDD	Power Supply : +3.3V	
3	DB0	Data bus	
4	DB1	Data bus	
5	DB2	Data bus	
6	DB3	Data bus	
7	DB4	Data bus	
8	DB5	Data bus	
9	DB6	Data bus	
10	DB7	Data bus	
11	DB8	Data bus	
12	DB9	Data bus	
13	DB10	Data bus	
14	DB11	Data bus	
15	DB12	Data bus	
16	DB13	Data bus	
17	DB14	Data bus	
18	DB15	Data bus	
19	CS	Chip select	
20	D/C	Display/Command data	
21	RD	Read strobe signal	
22	WR	Write strobe signal	
23	NC	No connect	
24	RST	Hardware reset	
25	NC	No connect	
26	NC	No connect	
27	NC	No connect	
28	NC	No connect	
29	NC	No connect	
30	NC	No connect	
31	GND	System ground	
32	GND	System ground	

## 9.2. LED BACKLIGHT (CN2): JST BHSR-02VS-1

Pin No.	Symbol
1	A(Red)
2	K

CORRESPONDABLE BACKLIGHT CONNECTOR : SM 02B-BHSS-1

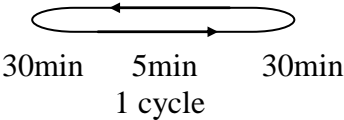
# 10. Block Diagram





# 11. Reliability

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

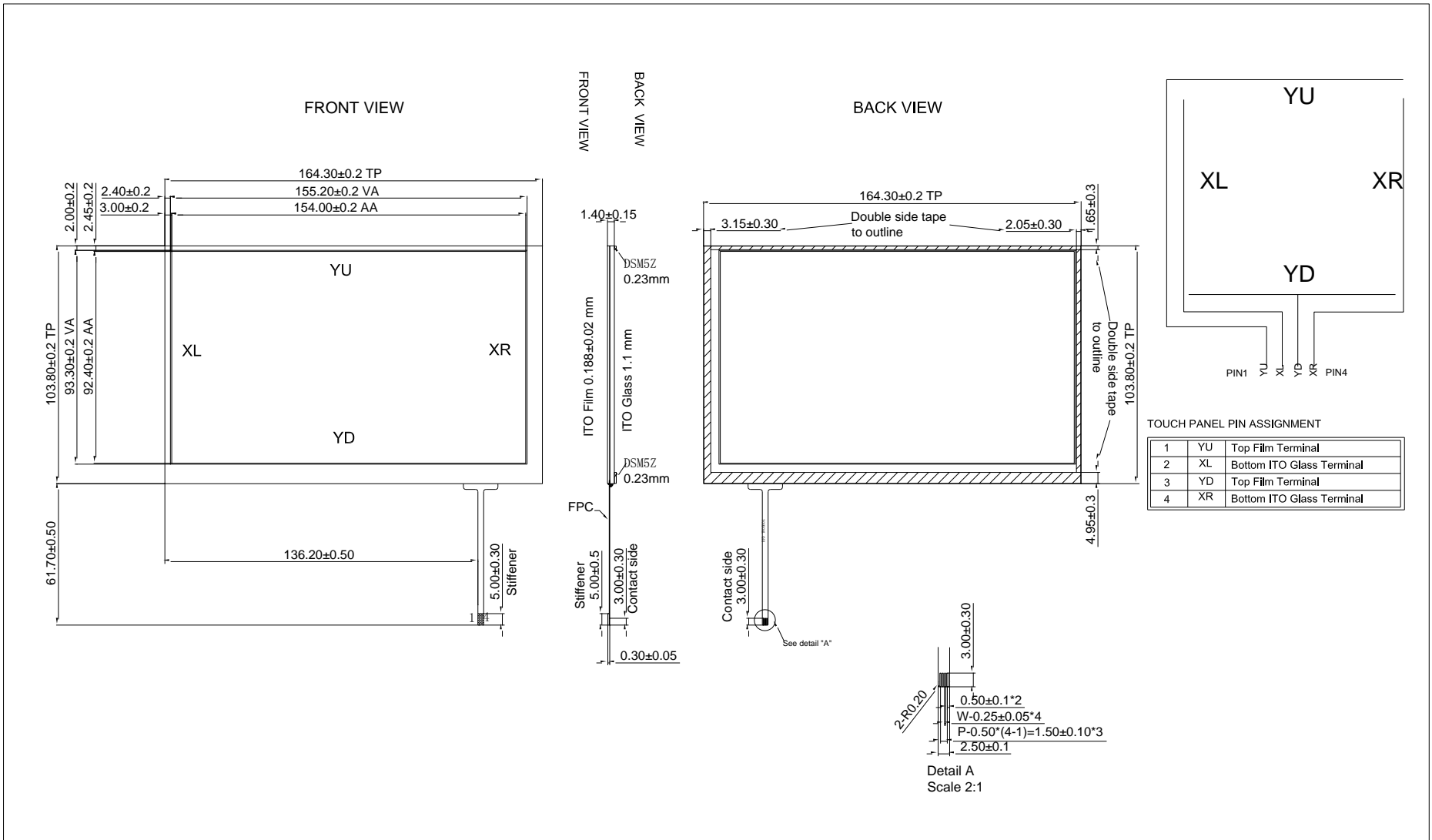
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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="margin: 0;">-20°C    25°C    70°C</p> <p style="margin: 0;">30min    5min    30min</p> <p style="margin: 0;">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.

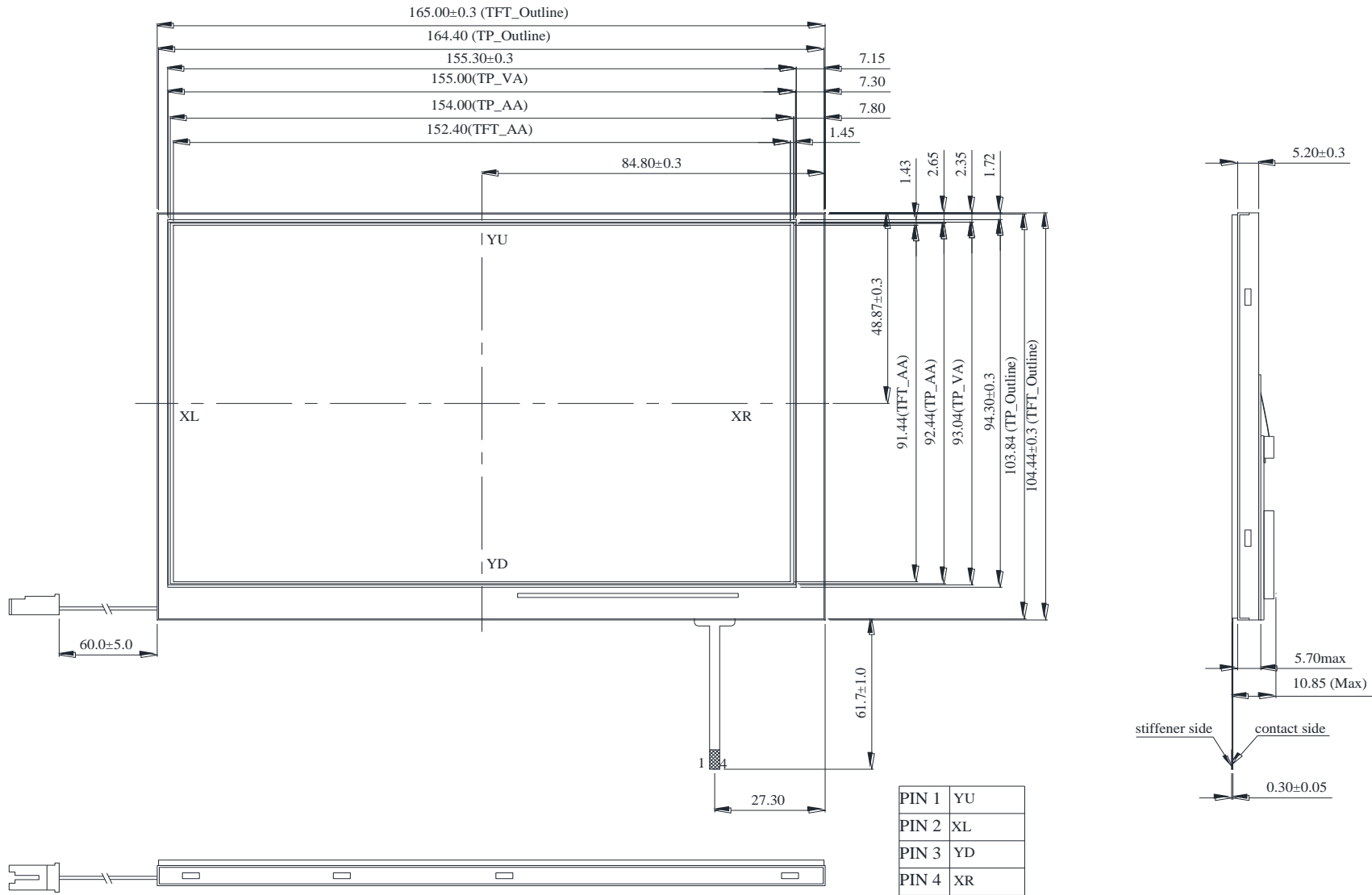
# 12.Touch Panel Information

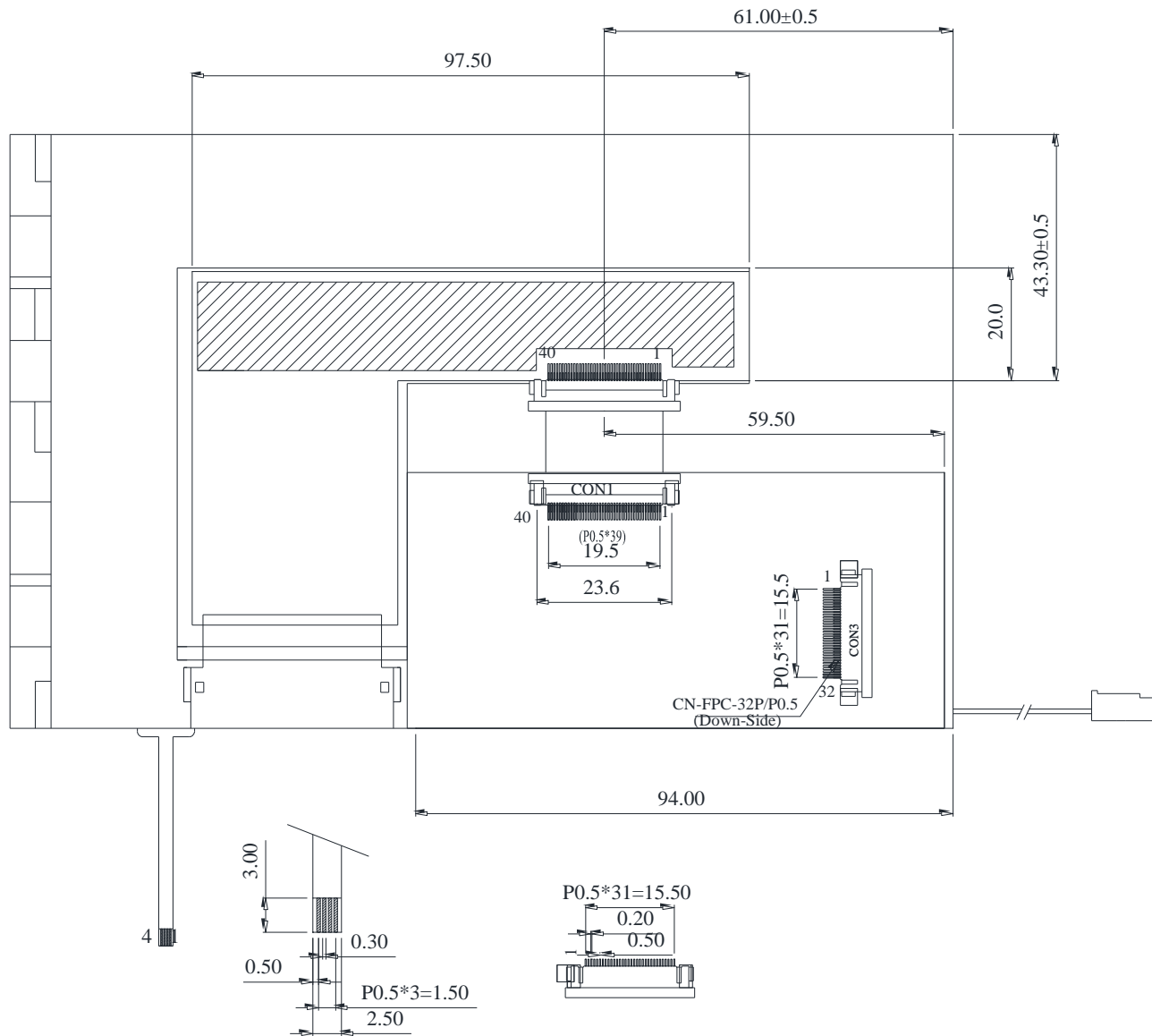


### 12.1. Resistance Touch Panel General Specifications

Item	Description
Driving condition	DC5V
Operating force	60~150g
Linearity max	$\leq \pm 1.5\%$
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	100~800 $\Omega$

# 13. Contour Drawing





PIN NO.	SYMBOL
1	VDD
2	VDD
3	DB0
4	DB1
5	DB2
6	DB3
7	DB4
8	DB5
9	DB6
10	DB7
11	DB8
12	DB9
13	DB10
14	DB11
15	DB12
16	DB13
17	DB14
18	DB15
19	CS
20	D/C
21	RD
22	WR
23	NC
24	RST
25	NC

PIN NO.	SYMBOL
26	NC
27	NC
28	NC
29	NC
30	NC
31	GND
32	GND

# 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** <<





**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 :        /        /        \_\_\_\_\_