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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF70HTIFGDATA#

<p>APPROVED BY: (FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____ DATA: _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2014/07/22			

TFT Display Inspection Specification: <http://www.winstar.com.tw/service.php>

RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2013/02/21		First issue
A	2013/07/17		Modify LED driving conditions Modify Optical Characteristics Modify Contour Drawing Modify Package specification Modify Initial Code For Reference
B	2014/05/01		Modify Package Specification.
C	2014/07/22		Correct Block Diagram & PIN4=D/C.

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.Package Specification
- 15.Initial Code For Reference

1.Module Classification Information

W F 70 H T I F G D A 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
Dot Matrix	800 x RGB x 480(TFT)	dots
Module dimension	165.0(W) x 104.8(H) x 6.6(D)	mm
Active area	152.4 x 91.44	mm
Dot pitch	0.0635x0.1905	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	

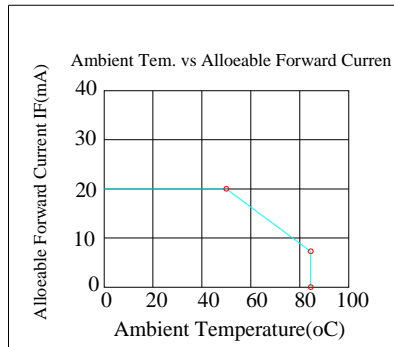
*Color tone slight changed by temperature and driving voltage.

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

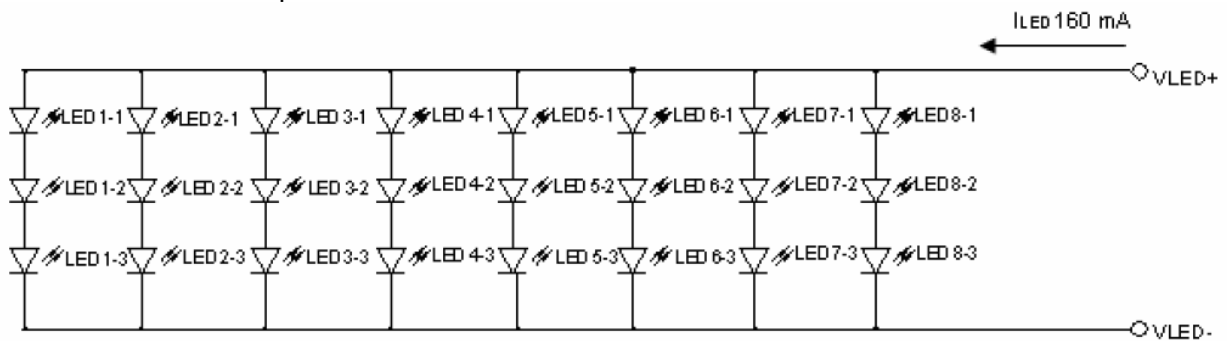
5.1. Operating conditions:

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	VDD	-	3.0	3.3	3.6	V

5.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	-	160	-	mA	
Power Consumption	-	-	1552	1760	mW	
LED voltage	VBL+	8.4	-	11	V	Note 1
LED Life Time	-	-	50,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Note 2 : $T_a = 25\text{ }^\circ\text{C}$

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	

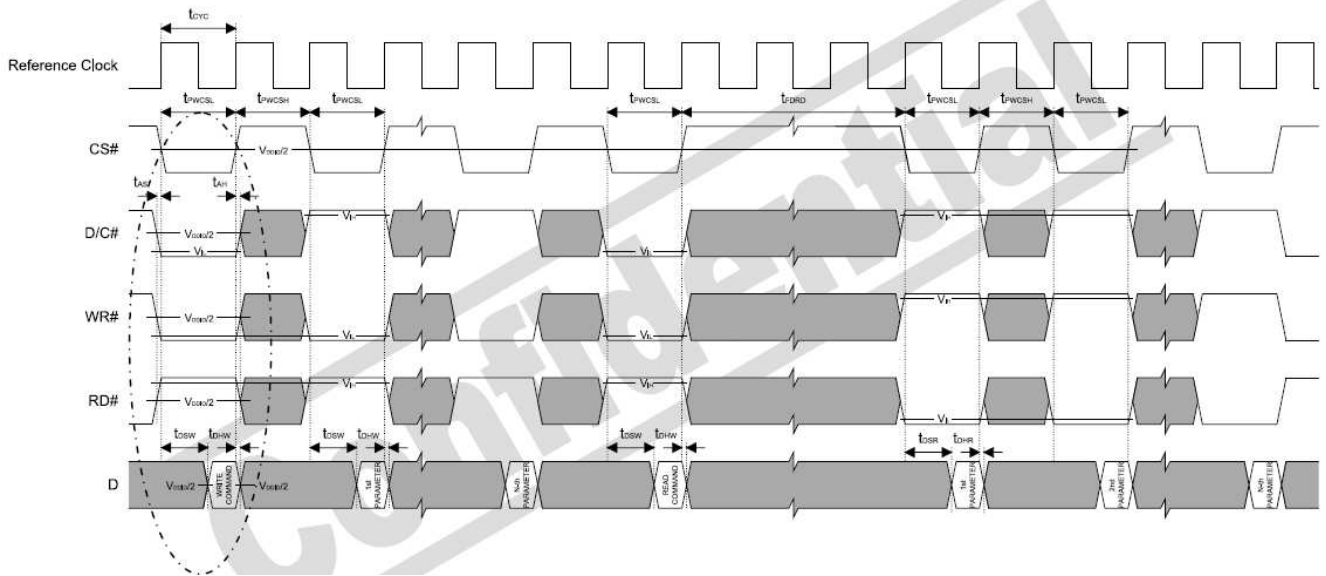
7. Interface timing

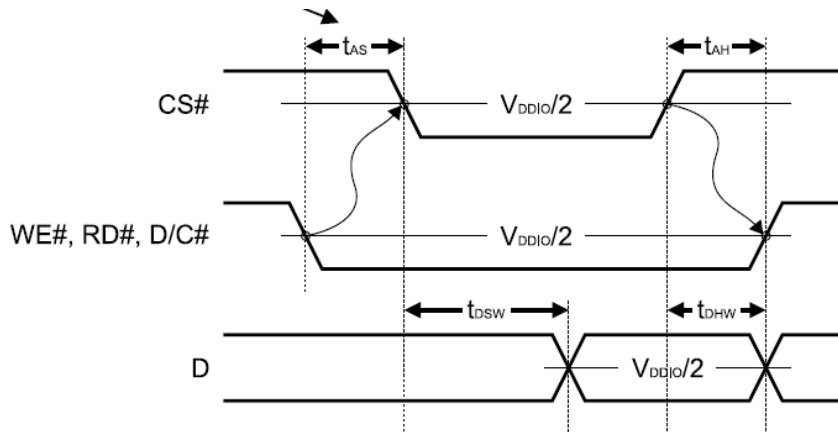
7.1. 8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, D[23:0] 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
t_{cyc}	Reference Clock Cycle Time	9	-	-	ns
t_{PWCSL}	Pulse width CS# low	1	-	-	t_{cyc}
t_{PWCSH}	Pulse width CS# high	1	-	-	t_{cyc}
t_{FDRD}	First Read Data Delay	5	-	-	t_{cyc}
t_{AS}	Address Setup Time	1	-	-	ns
t_{AH}	Address Hold Time	1	-	-	ns
t_{DSW}	Data Setup Time	4	-	-	ns
t_{DHW}	Data Hold Time	1	-	-	ns
t_{DSR}	Data Access Time	-	-	5	ns
t_{DHR}	Output Hold time	1	-	-	ns





7.3. Pixel Data Format

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	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]
24 bits	1 st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
18 bits	1 st							R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
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									R5	R4	R3	R2	R1	R0	X	X	G5	G4	G3	G2	G1	G0	X	X
	2 nd									B5	B4	B3	B2	B1	B0	X	X	R5	R4	R3	R2	R1	R0	X	X
	3 rd									G5	G4	G3	G2	G1	G0	X	X	B5	B4	B3	B2	B1	B0	X	X
9 bits	1 st																R5	R4	R3	R2	R1	R0	G5	G4	G3
	2 nd																G2	G1	G0	B5	B4	B3	B2	B1	B0
8 bits	1 st																	R5	R4	R3	R2	R1	R0	X	X
	2 nd																	G5	G4	G3	G2	G1	G0	X	X
	3 rd																	B5	B4	B3	B2	B1	B0	X	X

X: Don't Care

8. Optical Characteristics

TFT LCD characteristic (Without Capacitive Touch Panel)

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	T_r	$\theta = 0^\circ$ 、 $\Phi = 0^\circ$	-	5	10	.ms	Note 3,5	
	T_f		-	11	16	.ms		
Contrast ratio	CR	At optimized viewing angle	250	400	-	-	Note 4,5	
Color Chromaticity	White	$\theta = 0^\circ$ 、 $\Phi = 0^\circ$	W_x	0.26	0.31	0.36		Note 2,6,7
			W_y	0.28	0.33	0.38		
Viewing angle	Hor.	$CR \geq 10$	Θ_R	65	70	-	Deg.	Note 1
			Θ_L	65	70	-		
	Ver.		Φ_T	55	60	-		
			Φ_B	55	60	-		
Brightness	-	-	240	320	-	cd/m ²	Center of display	

Note 1: Definition of viewing angle range

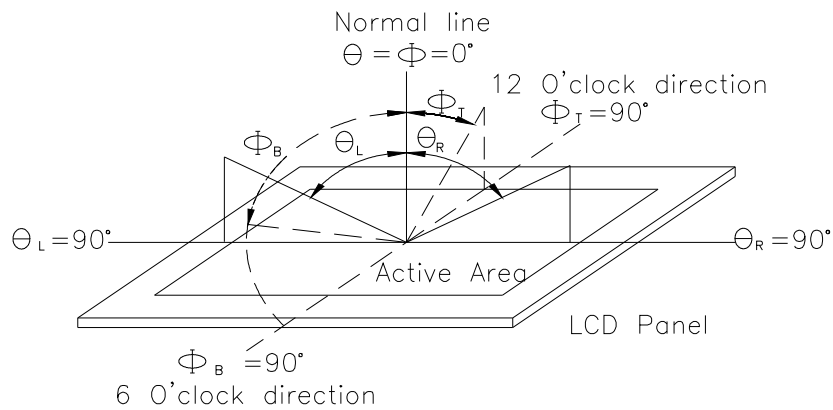


Fig.8.1. Definition of viewing angle

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-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

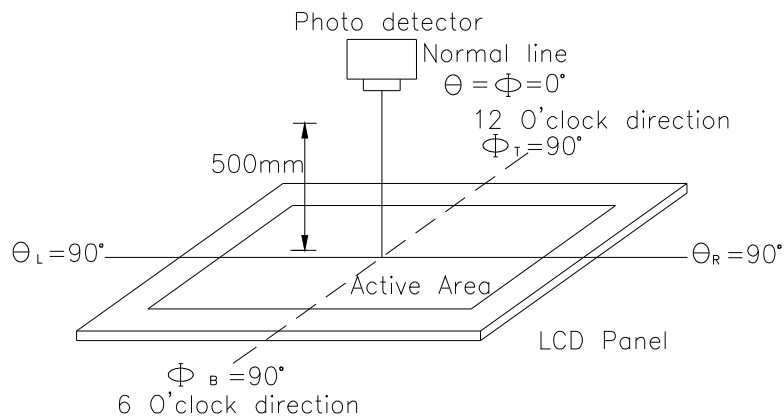
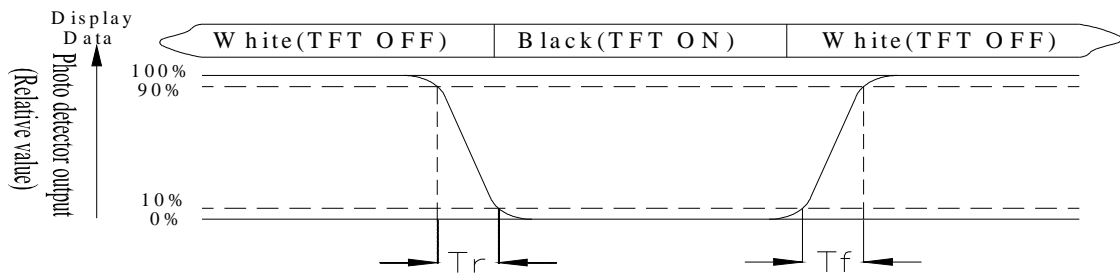


Fig. 8.2. Optical measurement system setup

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.

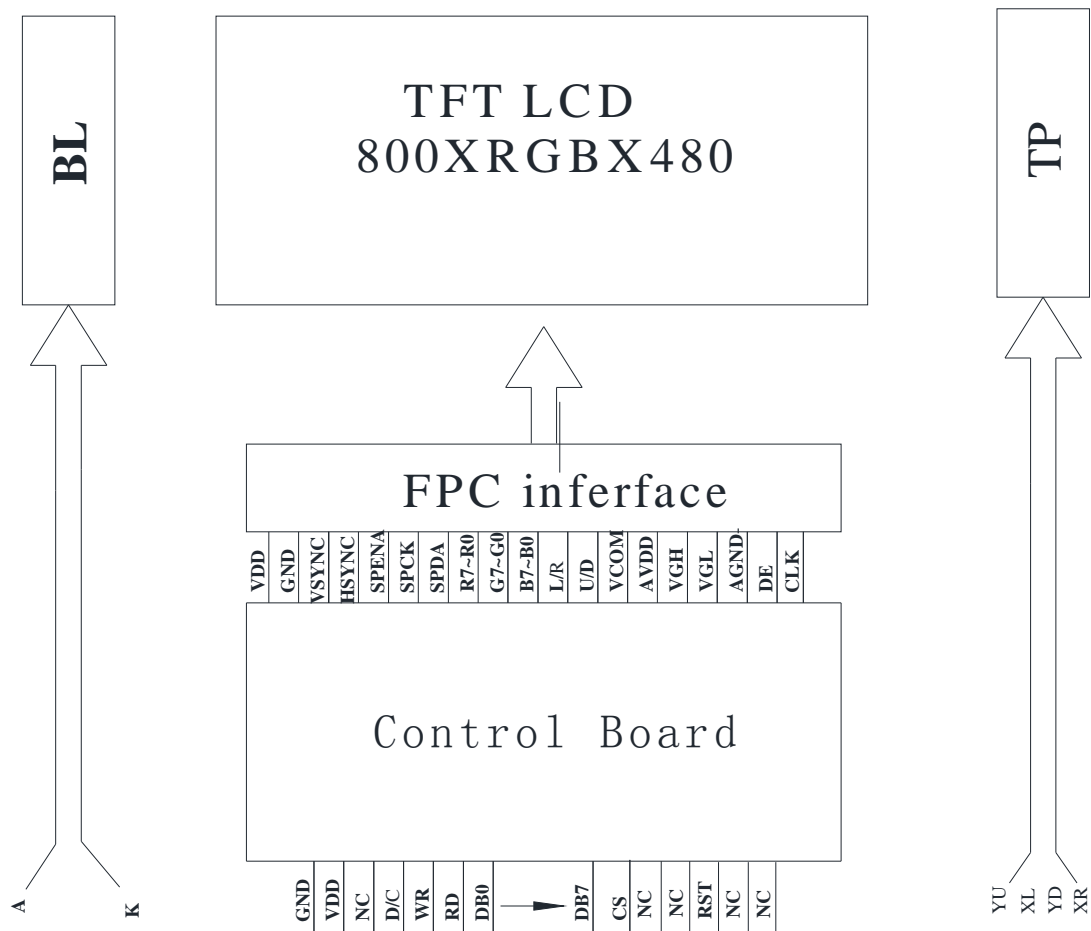
$$\text{Note 8: Uniformity (U)} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$

9.Interface

9.1. LCM PIN Definition

Pin	Symbol	I/O	Function
1	GND		Power Ground
2	VDD		Power Supply : +3.3V
3	NC		No connect
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	CS		Chip select
16	NC		No connect
17	NC		No connect
18	RST		Hardware reset
19	NC		No connect
20	NC		No connect

10. Block Diagram



11. Reliability

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

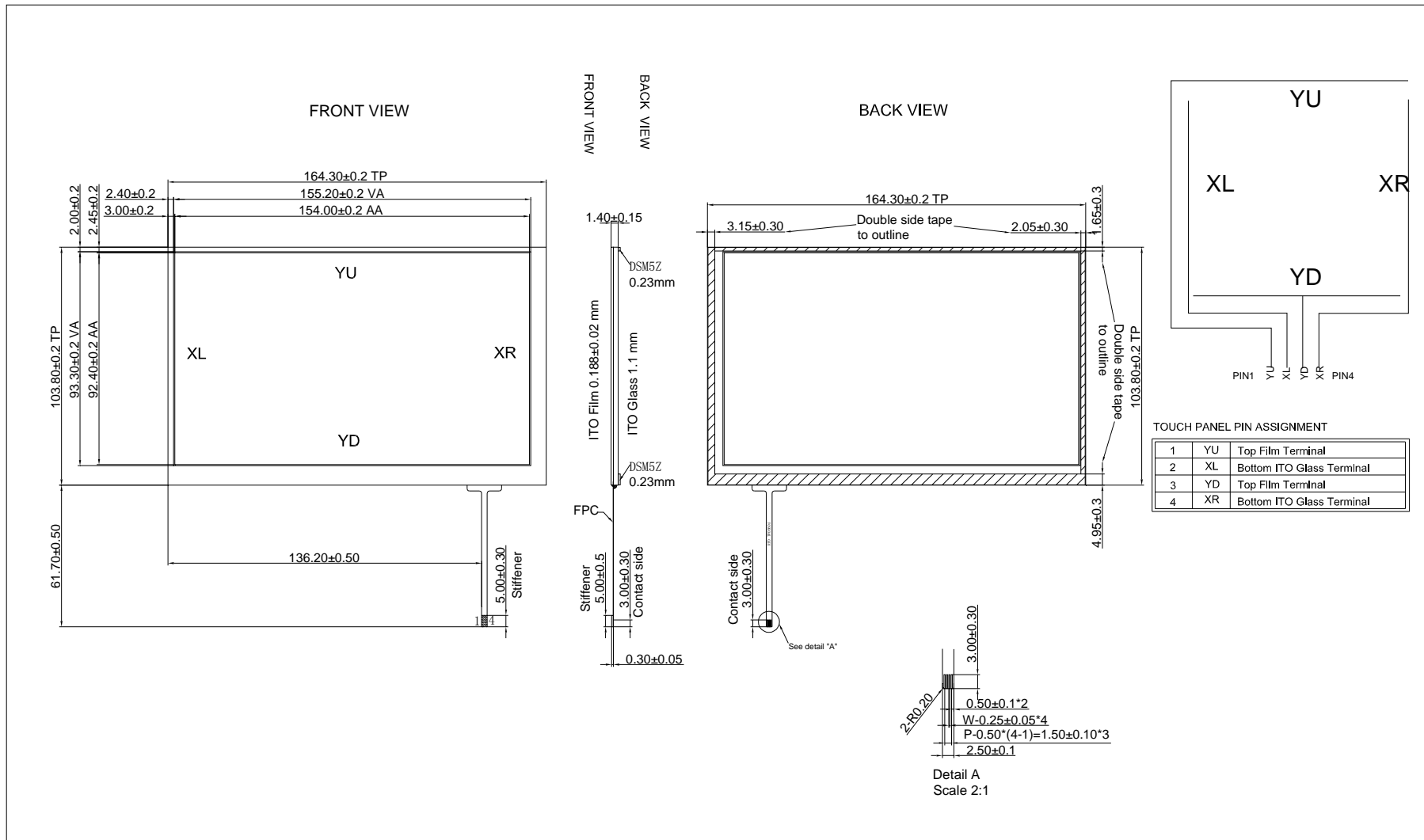
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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-left: 100px;">-20°C 25°C 70°C</p> <p style="margin-left: 100px;"> </p> <p style="margin-left: 100px;">30min 5min 30min</p> <p style="margin-left: 100px;">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.

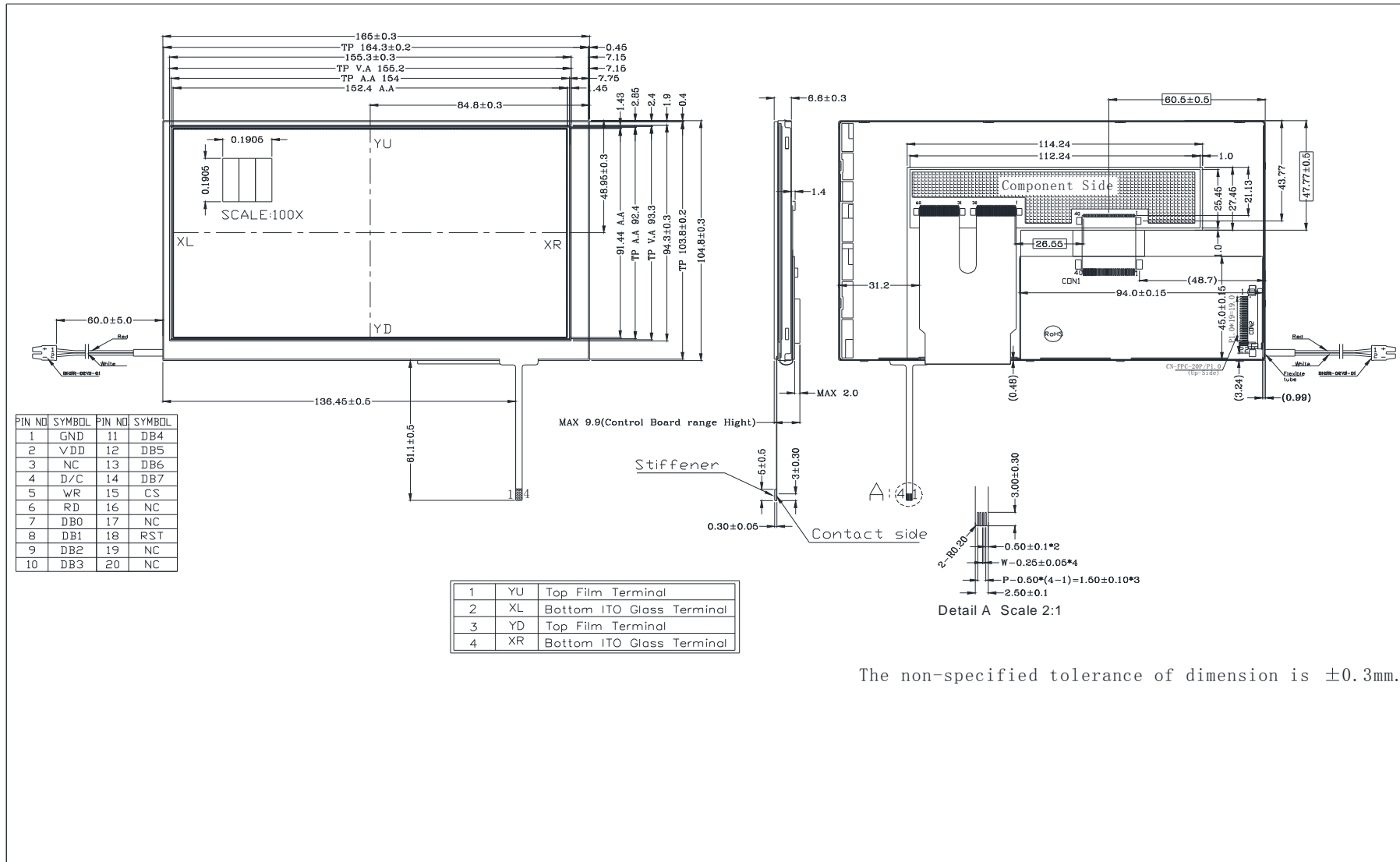
Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

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

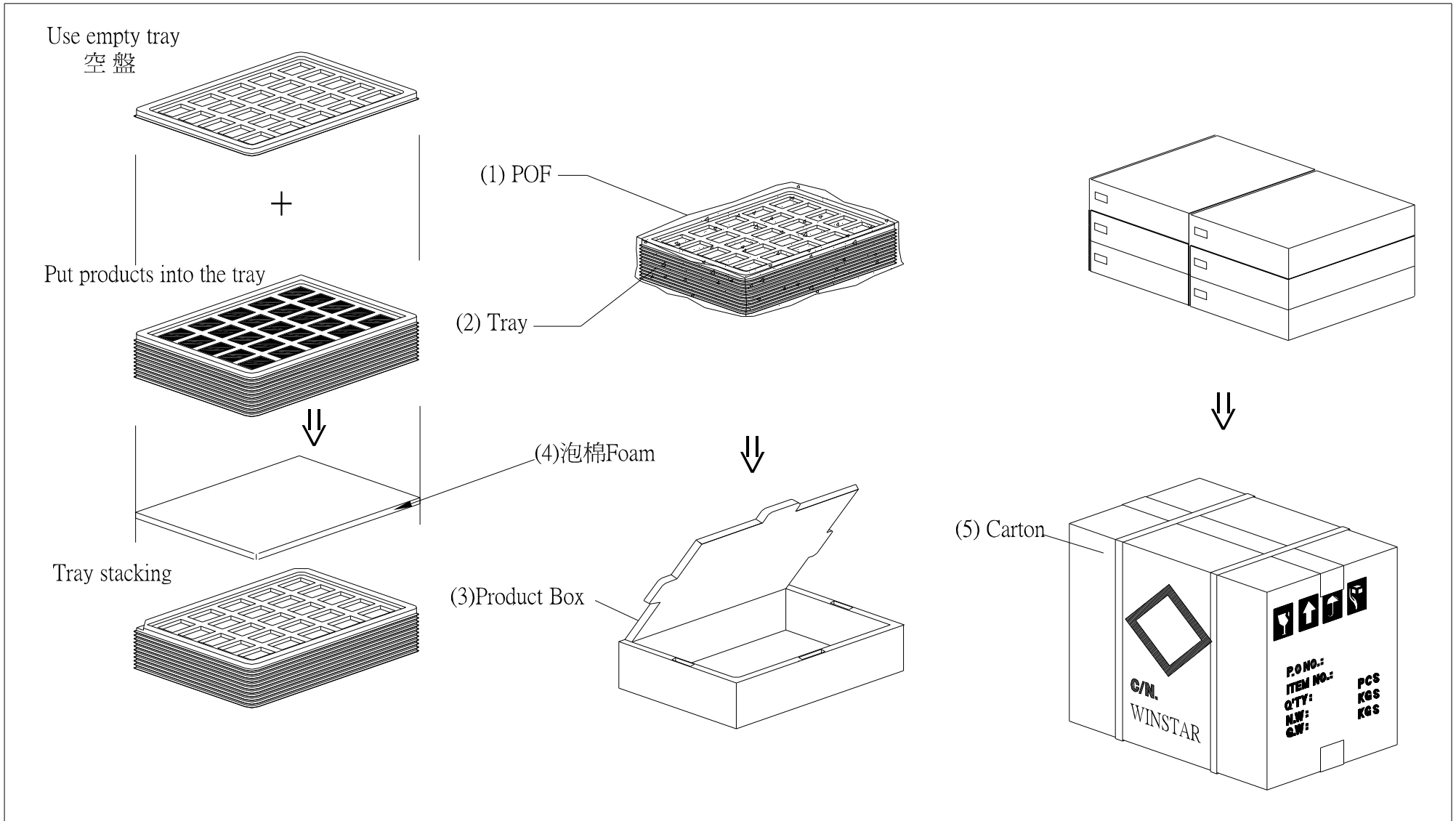
12.Touch Panel Information



13. Contour Drawing



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



15.Initial Code For Reference

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

    Write_Command(0xb0);
    Write_Parameter(0x08);
    Write_Parameter(0x80);
    Write_Parameter(0x03);
    Write_Parameter(0x1f);
    Write_Parameter(0x01);
    Write_Parameter(0xdf);
    Write_Parameter(0x00);

    Write_Command(0xf0);
    Write_Parameter(0x00);
    Write_Command(0x3a);
    Write_Parameter(0x60);

    Write_Command(0xe2);
    Write_Parameter(0x1d);
    Write_Parameter(0x02);
    Write_Parameter(0x54);

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

    Write_Command(0xb4);
    Write_Parameter(0x04);
    Write_Parameter(0x20);
    Write_Parameter(0x01);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);

    Write_Command(0xb6);
    Write_Parameter(0x02);
    Write_Parameter(0x0d);
```

```
Write_Parameter(0x00);  
Write_Parameter(0x2d);  
Write_Parameter(0x00);  
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(0xdf);
```

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

```
}
```



winstar LCM Sample Estimate Feedback Sheet

Module Number : _____

Page: 1

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 : / /