



WINSTAR Display Co.,Ltd.
華凌光電股份有限公司



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華凌光電股份有限公司



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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF35PTIBCDBT0#

<p>APPROVED BY:</p> <p>(FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____</p> <p>DATA: _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2017/06/19			



RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2014/12/26		First issue
A	2015/04/02		Add Resistance Touch Panel General Specifications.
B	2015/04/27		Modify Reliability.
C	2016/01/21		Modify Static electricity test
D	2016/08/04		Modify pin3=NC.
E	2016/08/10		Modify Vibration test.
F	2016/10/05		Modify Summary Add Aspect Ratio
G	2017/05/11		Modify Contour Drawing.
H	2017/06/19		Modify FPC.

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2.Summary

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11.Reliability

12.Touch Panel Information

13.Contour Drawing

14.Initial Code For Reference

1.Module Classification Information

W F 35 P T I B C 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 : 3.5" 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 X→Transmissive, W.T, VA TFT Y→Transmissive, W.T, IPS TFT Z→Transmissive, W.T, O-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	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						
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)											
⑫	Version											
⑬	Special Code	#:Fit in with ROHS directive regulations										

2.Summary

TFT 3.5" is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is 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	3.5	inch
Dot Matrix	320 x RGB x 240	dots
Module dimension	93.5 x 66.44 x 9.8	mm
Active area	70.08 x 52.56	mm
Dot pitch	0.073 x 0.219	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	12 o'clock	
Gray Scale Inversion Direction	6 o'clock	
Aspect Ratio	4:3	
Backlight Type	LED ,Normally White	
Controller IC	RA8875	
Interface	Digital 8080 family MPU	
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°C

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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	3.3	3.6	V	-
Supply Current For LCM	IDD	-	-	50	75	mA	Note1
Power Consumption		-	-	165	270	mW	-

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

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Operation Current For LED Driver	IVLED	-	-	75	mA	Note 1
Power Consumption	-	-	-	375	mW	VLED=5V
Supply Voltage For LED Driver	VLED+	3.3	-	5	V	Note 1
LED Life Time	-	-	50,000	-	Hr	Note 2,3,4

Note 1 : Power supply the back light 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	VIL	GND	-	0.2 VDD	V	
High level input voltage	VIH	0.8 VDD	-	VDD	V	

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7.AC Characteristics

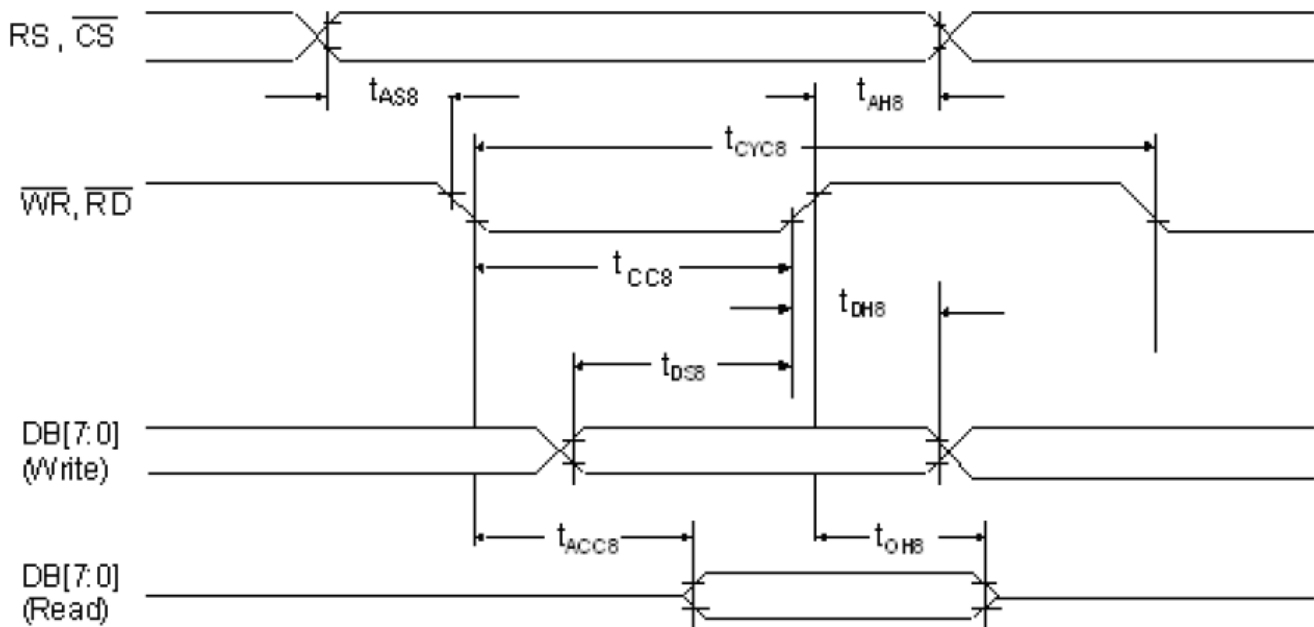
7.1. 8080 Mode

The following timing charts are used to describe the timing specification of the standard 8080 interfaces.

7.2. 8080 Mode Write Cycle

Symbol	Parameter	Rating		Unit	Symbol
		Min.	Max.		
tCYC8	Cycle time	50	-	ns	tc is one system clock period: tc = 1/SYS_CLK
tCC8	Strobe Pulse width	20	-	ns	
tAS8	Address setup time	0	-	ns	
tAH8	Address hold time	10	-	ns	
tDS8	Data setup time	20	-	ns	
tDH8	Data hold time	10	-	ns	
tACC8	Data output access time	0	20	ns	
tOH8	Data output hold time	0	20	ns	

8080 – 8/16-bit interface



The data bus width of RA8875 can be selected to 8-bit/16-bit by setting the Bit [1:0] of SYSR. When Bit [1:0] of SYSR is cleared to “00”, then the data bus is 8-bit. If Bit [1:0] of SYSR is set to “11”, then the data transition is set as 16-bit.

7.3. Pixel Data Format

16-bit mode color

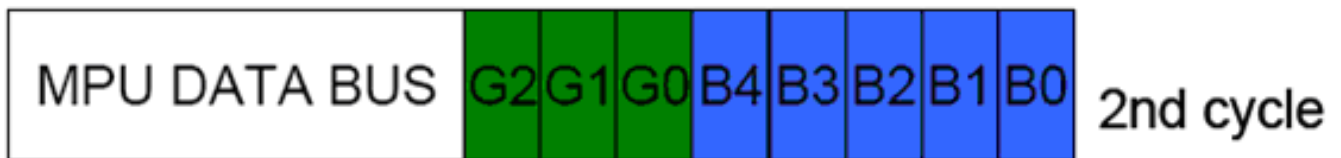


65K colors 16-bit



256 colors 16-bit

8-bit mode color



65K colors 8-bit



256 colors 8-bit

8. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr	$\theta = 0^\circ \cdot \Phi = 0^\circ$	-	10	-	ms	Note 3,5	
	Tf		-	15	-	ms		
Contrast ratio	CR	At optimized viewing angle	300	350	-	-	Note 4,5	
Color Chromaticity	White	$\theta = 0^\circ \cdot \Phi = 0$	Wx	0.26	0.31	0.36	-	Note 2,6,7
	Wy		0.28	0.33	0.38	-		
Viewing angle (Gray Scale Inversion Direction)	Hor.	$CR \geq 10$	ΘR	-	55	-	Deg.	Note 1
			ΘL	-	55	-		
	Ver.		ΦT	-	45	-		
			ΦB	-	50	-		
Brightness	-	-	250	300	-	cd/ m ²	Center of display	

Ta=25±2°C, VLED=3.3V

Note 1: Definition of viewing angle range

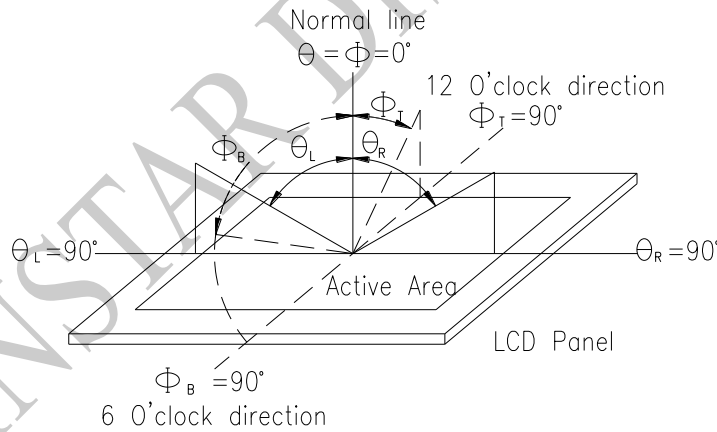


Fig. 8.1. Definition of viewing angle

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.

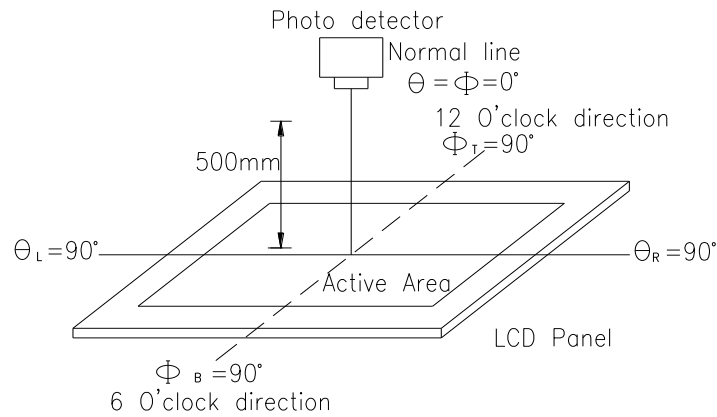
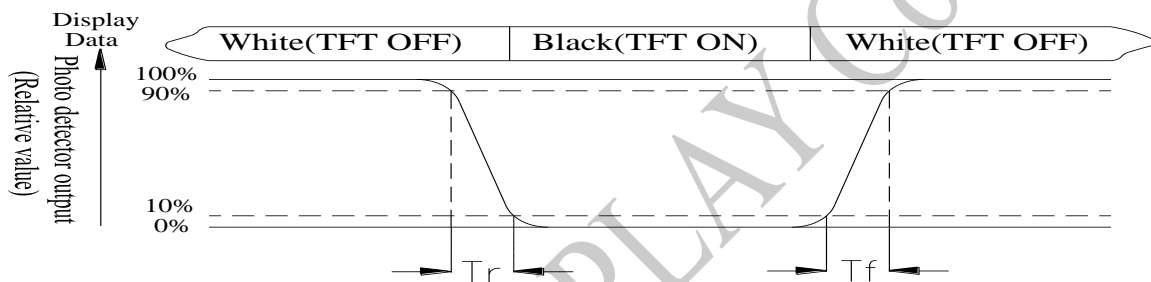


Fig. 8.2. Optical measurement system setup

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

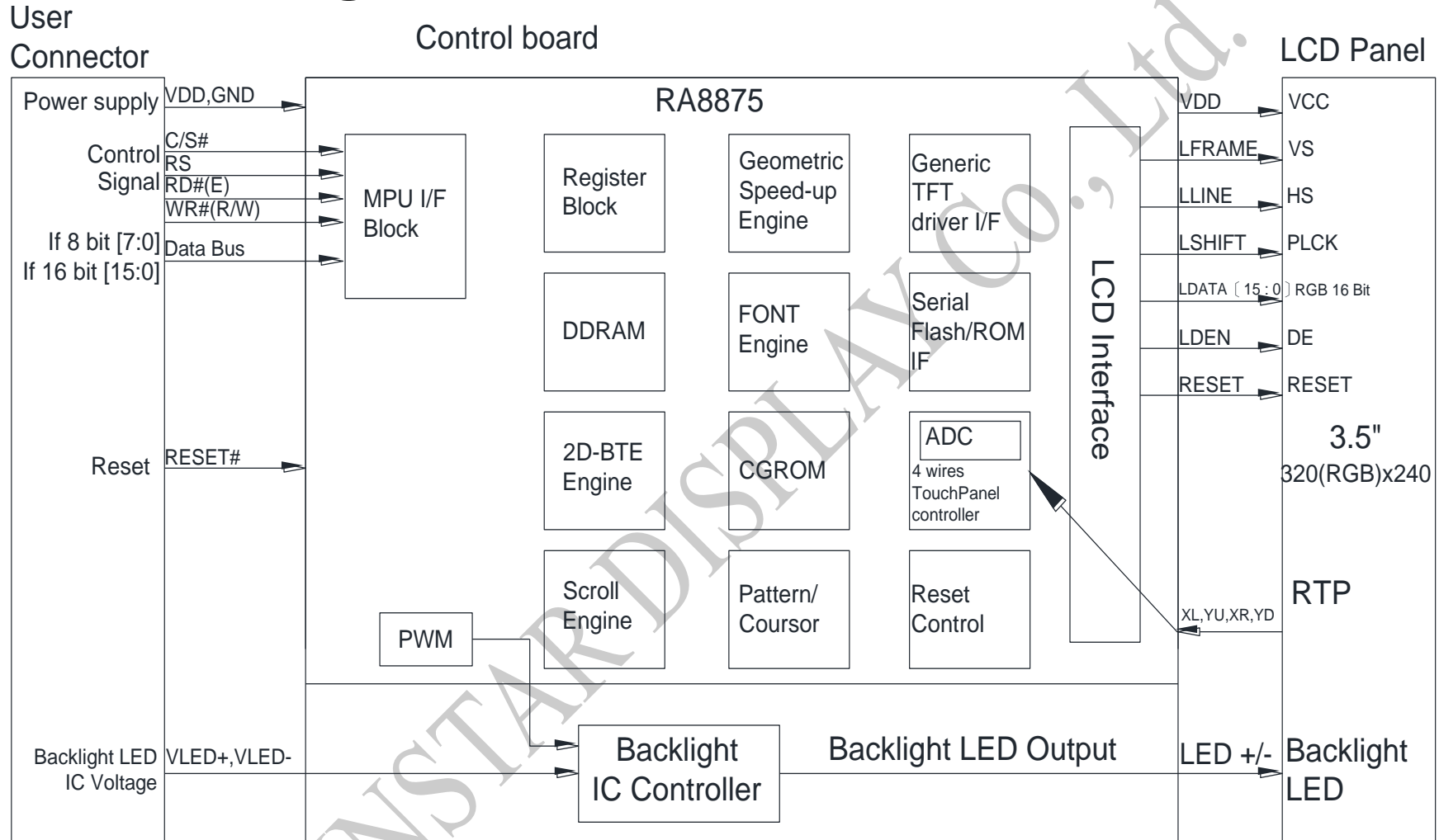
Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

9.Interface

9.1. LCM PIN Definition (CON2)

Pin	Symbol	Function	Remark
1	GND	System ground	
2	VDD	Power Supply : +3.3V	
3	NC	No connect	
4	RS	Data/Command select	
5	WR	Write strobe signal	
6	RD	Read strobe signal	
7~22	DB0~DB15	Data bus	
23	WAIT	Wait Signal Output(H:active)	
24	RTP_INT	RTP Interrupt	
25	CS	Chip select	
26	RST	Hardware reset	
27~32	NC	No connect	
33~34	VLED-	Power for LED backlight cathode	
35~36	VLED+	Power for LED backlight anode	

10. Block Diagram



11. Reliability

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

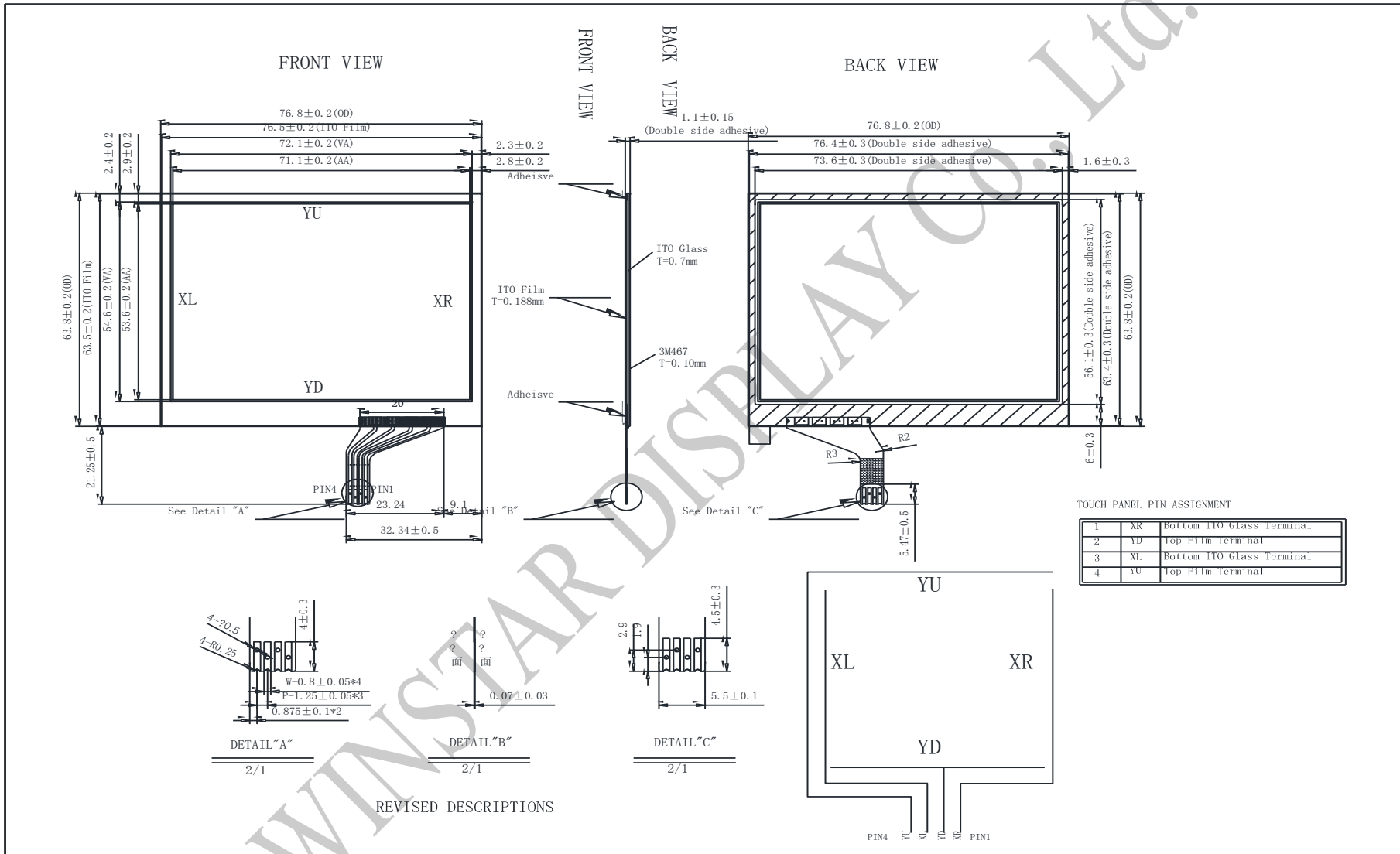
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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

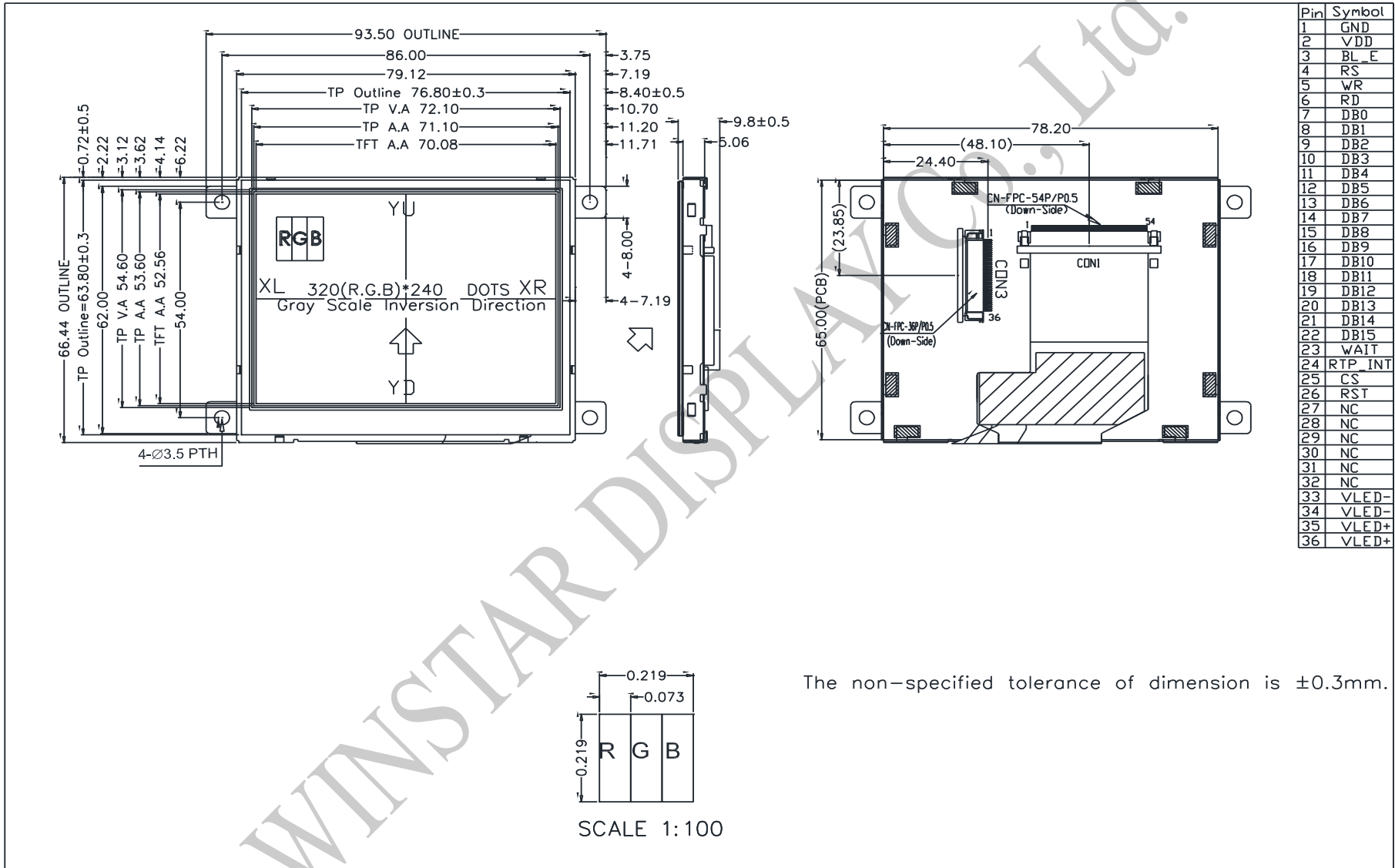


12.1. Resistance Touch Panel General Specifications

Item	Description
Driving condition	DC5V
Operating force	60~150g
Linearity max	$\leq \pm 1.5\%$
Insulating resistance	$> 20M\Omega$, 25V(DC)
Light transporence	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	200~1100 Ω
Y resistance	200~1100 Ω

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13. Contour Drawing



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

14.Initial Code For Reference

```
void Initial_RA8875()
{
    RES = 1;
    Delay1ms (10);
    RES = 0;
    Delay1ms (50);
    RES = 1;
    Delay1ms (100);

    LCD_CmdWrite(0x88);
    LCD_DataWrite(0x0a);
    Delay1ms(1);
    LCD_CmdWrite(0x89);
    LCD_DataWrite(0x02);
    Delay1ms(1);

    LCD_CmdWrite(0x10);
    LCD_DataWrite(0x0c);

    LCD_CmdWrite(0x04);
    LCD_DataWrite(0x03);
    Delay1ms(1);

    //Horizontal set
    LCD_CmdWrite(0x14);
    LCD_DataWrite(0x27);
    LCD_CmdWrite(0x15);
    LCD_DataWrite(0x80);
    LCD_CmdWrite(0x16);
    LCD_DataWrite(0x03);
    LCD_CmdWrite(0x17);
    LCD_DataWrite(0x02);
    LCD_CmdWrite(0x18);
    LCD_DataWrite(0x03);

    LCD_CmdWrite(0x19);
    LCD_DataWrite(0xef);
    LCD_CmdWrite(0x1A);
    LCD_DataWrite(0x00);
    LCD_CmdWrite(0x1B);
    LCD_DataWrite(0x0f);
    LCD_CmdWrite(0x1C);
    LCD_DataWrite(0x00);
    LCD_CmdWrite(0x1D);
    LCD_DataWrite(0x0e);
    LCD_CmdWrite(0x1E);
    LCD_DataWrite(0x06);
```

```
LCD_CmdWrite(0x1F);  
LCD_DataWrite(0x01);
```

```
LCD_CmdWrite(0x30);  
LCD_DataWrite(0x00);  
LCD_CmdWrite(0x31);  
LCD_DataWrite(0x00);  
LCD_CmdWrite(0x34);  
LCD_DataWrite(0x3F);  
LCD_CmdWrite(0x35);  
LCD_DataWrite(0x01);
```

```
LCD_CmdWrite(0x32);  
LCD_DataWrite(0x00);  
LCD_CmdWrite(0x33);  
LCD_DataWrite(0x00);  
LCD_CmdWrite(0x36);  
LCD_DataWrite(0xef);  
LCD_CmdWrite(0x37);  
LCD_DataWrite(0x00);
```

```
}
```

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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

- 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** <<



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 : / / _____

