TFT DISPLAY SPECIFICATION



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: http://www.winstar.com.tw E-mail: sales@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF101FSAFPLHTX#

APPROVED BY: **(FOR CUSTOMER USE ONLY)**	**PCB VERSION:** **DATA:**

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2017/04/26			

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TFT Display Inspection Specification: http://www.winstar.com.tw/technology/download.html

Winstar Display Co., LTD 華凌光電股份有限公司	MODLE NO：
RECORDS OF REVISION	**DOC. FIRST ISSUE**

VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2017/03/31		First issue
A	2017/04/26		Modify Interface.

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11.Contour Drawing

12.Other

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1.Module Classification Information

W	F	101	F	S	A	F	P	L	H	T	X	#
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬

<table>
<tr><td>①</td><td colspan="3">Brand：WINSTAR DISPLAY CORPORATION</td></tr>
<tr><td>②</td><td colspan="3">Display Type：F→TFT Type, J→Custom TFT</td></tr>
<tr><td>③</td><td colspan="3">Display Size：10.1” TFT</td></tr>
<tr><td>④</td><td colspan="3">Model serials no.</td></tr>
<tr><td>⑤</td><td>Backlight Type：</td><td>F→CCFL, White
S→LED, High Light White</td><td>T→LED, White
Z→Nichia LED, White</td></tr>
<tr><td>⑥</td><td>LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction</td><td>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</td><td>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</td></tr>
<tr><td>⑦</td><td colspan="2">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</td><td>F：TFT+CONTROL BOARD
G：TFT+FR
H：TFT+D/V BOARD
I：TFT+FR+D/V BOARD
J：TFT+POWER BD</td></tr>
<tr><td>⑧</td><td colspan="3">Resolution:
<table>
<tr><td>A</td><td>128160</td><td>B</td><td>320234</td><td>C</td><td>320240</td><td>D</td><td>480234</td><td>E</td><td>480272</td><td>F</td><td>640480</td></tr>
<tr><td>G</td><td>800480</td><td>H</td><td>1024600</td><td>I</td><td>320480</td><td>J</td><td>240320</td><td>K</td><td>800600</td><td>L</td><td>240400</td></tr>
<tr><td>M</td><td>1024768</td><td>N</td><td>128128</td><td>P</td><td>1280800</td><td>Q</td><td>480800</td><td>R</td><td>640320</td><td>S</td><td>480128</td></tr>
<tr><td>T</td><td>800320</td><td>U</td><td>8001280</td><td>V</td><td>176220</td><td>W</td><td>1280398</td><td>X</td><td>1024250</td><td>Y</td><td>1920720</td></tr>
<tr><td>Z</td><td>800200</td><td>2</td><td>1024324</td><td>3</td><td>7201280</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>⑨</td><td colspan="3">D: Digital L：LVDS M:MIPI</td></tr>
<tr><td>⑩</td><td colspan="3">Interface ： N:without control board A:8Bit B:16Bit H: HDMI I:I2C Interface
R:RS232 S:SPI Interface U:USB</td></tr>
<tr><td>⑪</td><td colspan="3">TS： N：Without TS T：resistive touch panel C：capacitive touch panel (G-F-F)
G：capacitive touch panel(G-G)</td></tr>
<tr><td>⑫</td><td colspan="3">Version</td></tr>
<tr><td>⑬</td><td>Special Code</td><td colspan="2">#:Fit in with ROHS directive regulations</td></tr>
</table>

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2.Summary

TFT 10.1” is a IPS transmissive type color active matrix TFT liquid crystal display . In-Plane Switching (IPS) was one of the first refinements to produce significant gains in the light-transmissive characteristics of TFT panels. It is a technology that addresses the two main issues of a standard twisted nematic (TN) TFT display: colour and viewing angle.

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3.General Specifications

Item	Dimension	Unit
Screen Diagonal	10.1	inch
Number of Pixels	1280 x 3(RGB) x 800	dots
Module dimension	230.56 x 155.01 x 27.7	mm
Active area	216.96 (H) x 135.6(V)	mm
Pixel pitch	0.1695 × 0.1695	mm
Display Mode	Normally Black	
Pixel Arrangement	R.G.B. Vertical Stripe	
Backlight Type	LED,Normally White	
Aspect Ratio	16:9	
Electrical Interface (Logic)	HDMI	
With /Without TP	With RTP	
Surface	Anti-Glare	

*Color tone slight changed by temperature and driving voltage.

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4.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	0	—	+50	℃
Storage Temperature	TST	-20	—	+60	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

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5.Electrical Characteristics

5.1. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	MAX.		
Power voltage	VDD	4.5	5.0	5.5	V	Note 2

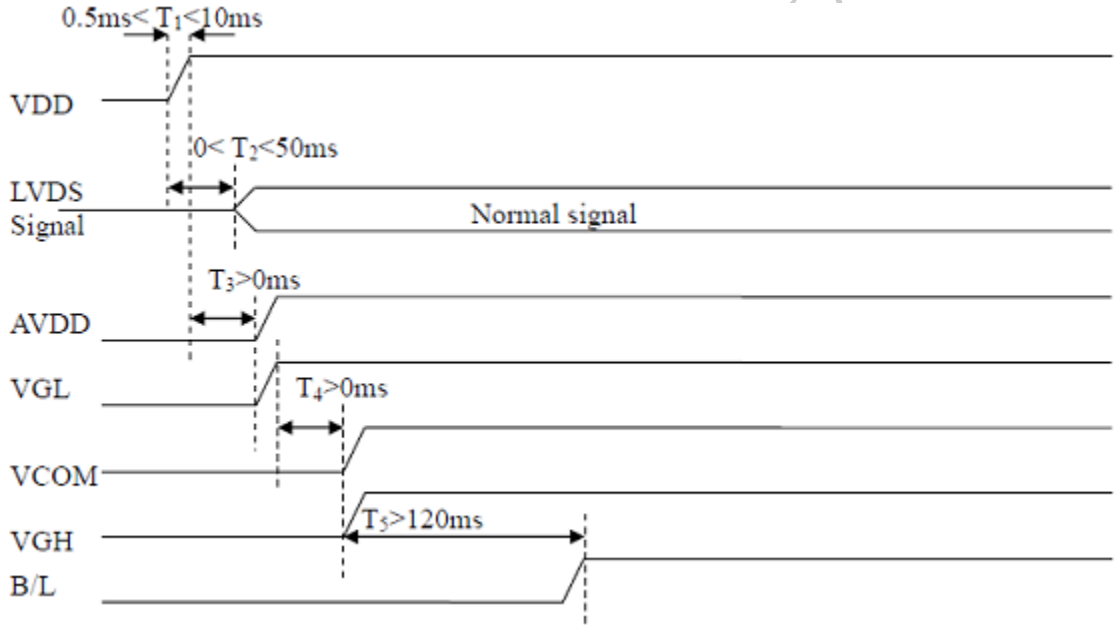
Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.
Note 2: VDD setting should match the signals output voltage

5.2. Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	MAX.		
	IVDD	-	2153	-	mA	VDD =2.5V
	IVLED(5V)		3		A	VLED=5V

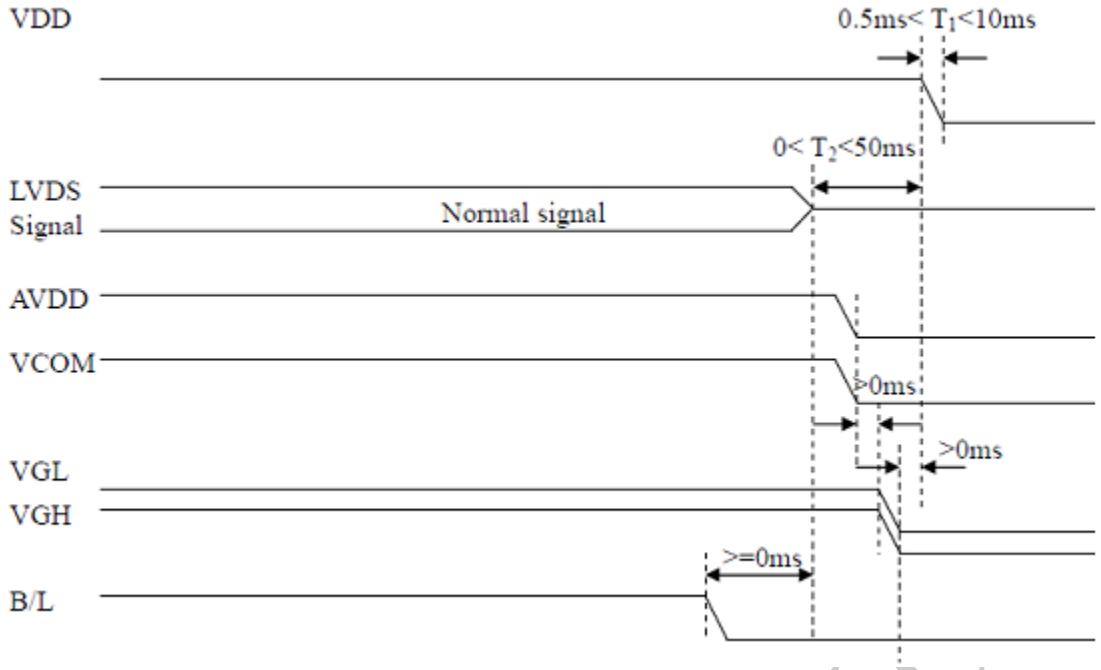
5.3. Power Sequence

a. Power on:



b. Power off:

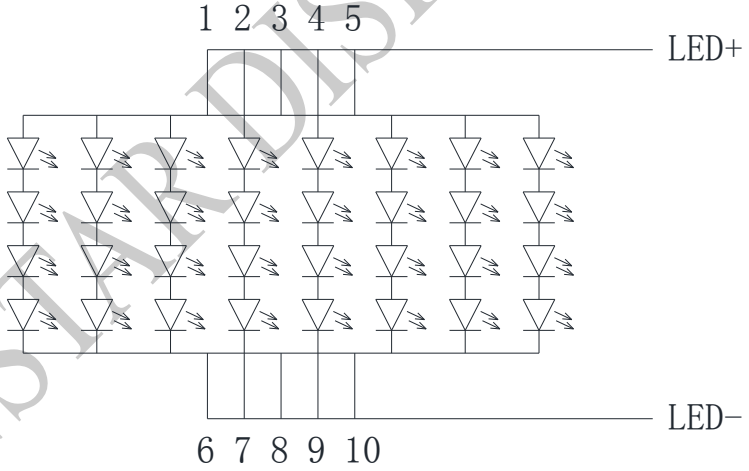
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5.4. Backlight Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage of white LED backlight	VL	—	12.8	13.6	V	Note 1
Current for LED backlight	IL	—	480	—	mA	
LED life time	-	50000	-	-	Hr	Note 1

Note 1 : There are 1 Groups LED



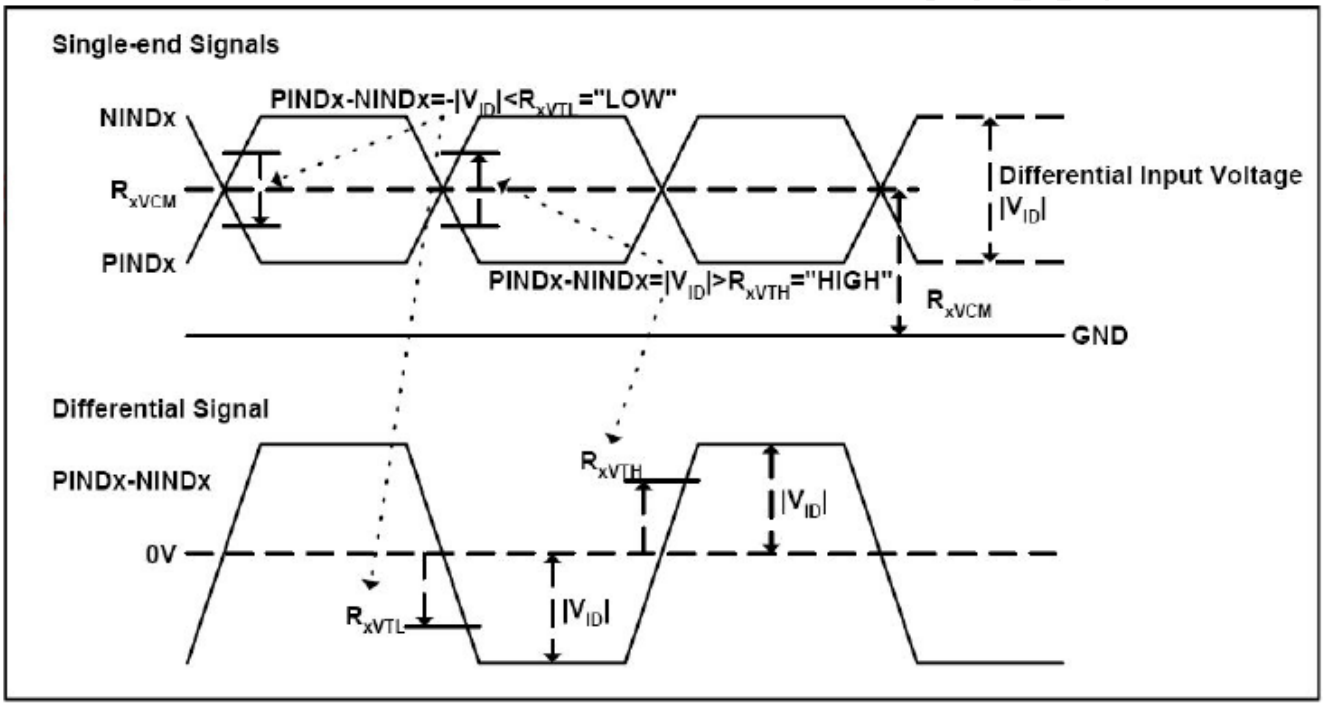
Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

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6.LVDS Signal Timing Characteristics

6.1. AC Electrical Characteristics

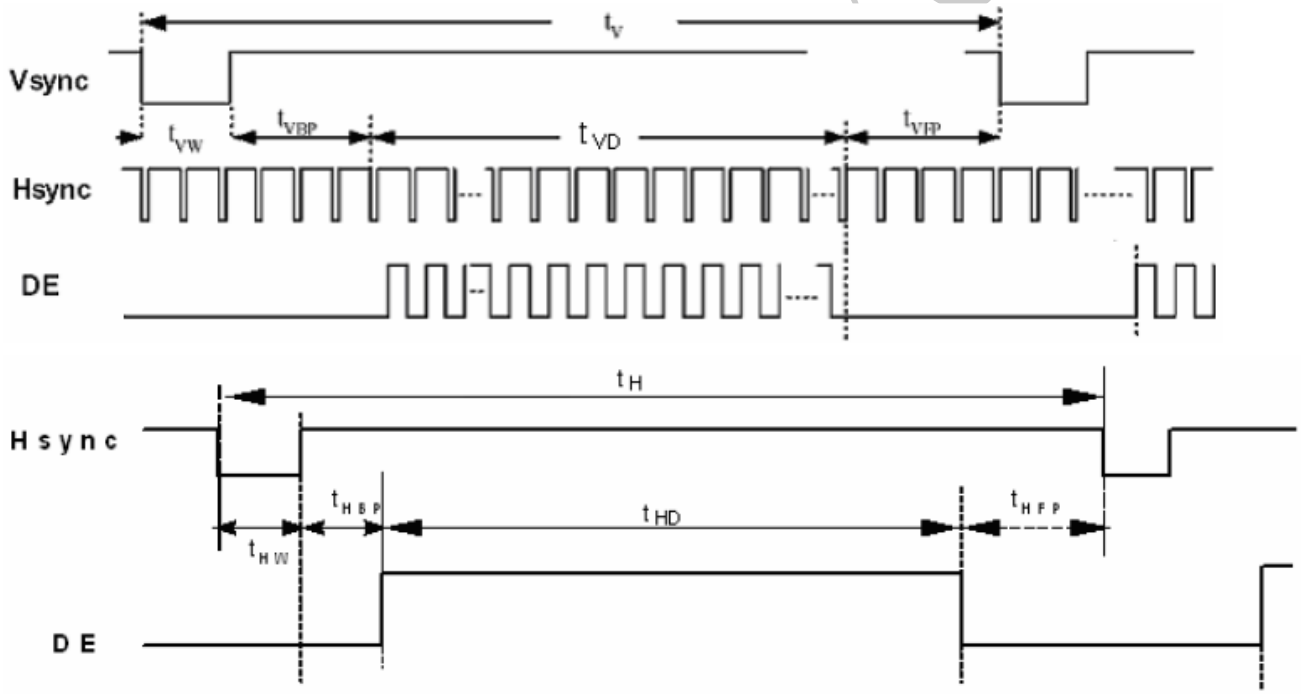
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	MAX.		
LVDS Differential input high Threshold voltage	RxVTH	-	-	+100	mV	RXVCM=1.2 V
LVDS Differential input low Threshold voltage	RxVTL	-100	-	-	mV	
LVDS Differential input common mode voltage	RxVCM	0.7	-	1.6	V	
LVDS Differential voltage	|VID|	200	-	600	mV	



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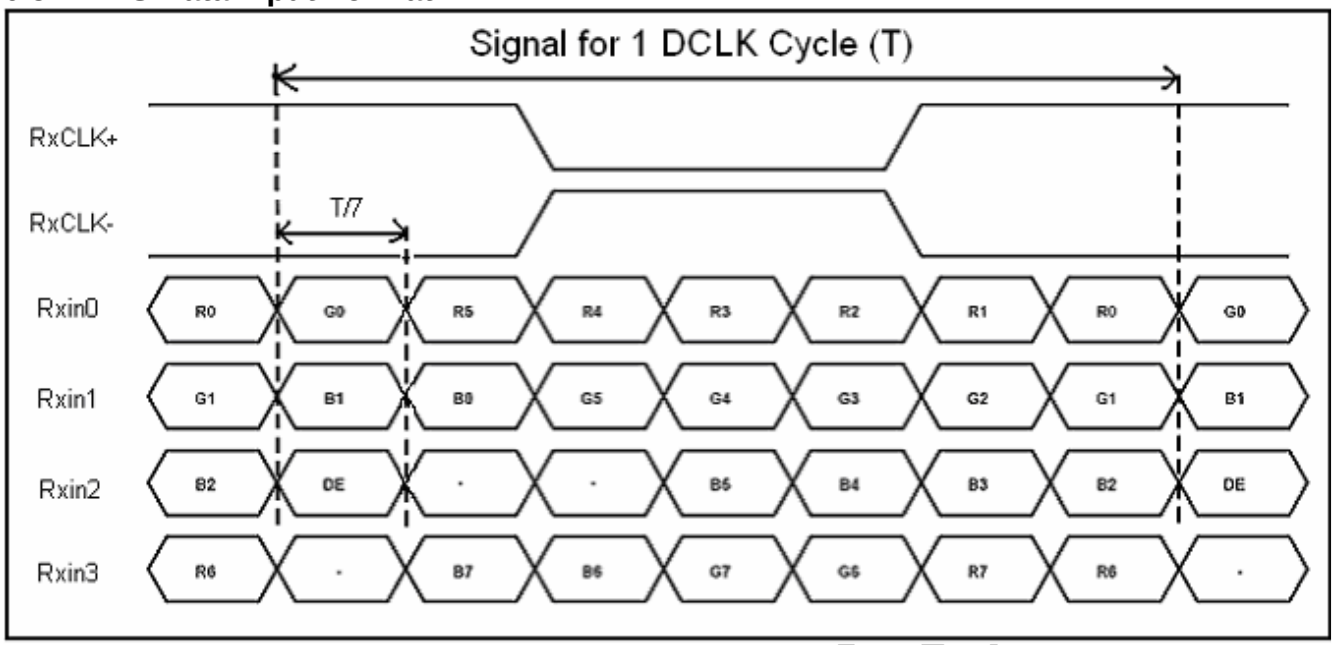
6.2. **Timing Table**

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	68.9	71.1	73.4	Mhz	Frame rate =60Hz
Horizontal display area	thd		1280		Tc	
HS period time	th	1410	1440	1470	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	60	160	190	Tc	
Vertical display area	tvd		800		tH	
VS period time	tv	815	823	833	tH	
VS Width +Back Porch +Front Porch	tvW+ tvBP +tvFP	15	23	33	tH	



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6.3. **LVDS Data Input Format**



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7.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	θ =0° 、Φ=0°	-	10	20	.ms	Note 3
		Tf		-	15	30		
Contrast ratio		CR	At optimized viewing angle	600	800	-	-	Note 4
Color Chromaticity	White	Wx	θ =0° 、Φ=0	0.26	0.31	0.36	-	Note 2,5
		Wy		0.28	0.33	0.38	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR≧10	75	85	-	Deg.	Note 1
		ΘL		75	85	-		
	Ver.	ΦT		75	85	-		
		ΦB		75	85	-		
Brightness		-	-	700	750	-	cd/m^2	Center of display

Ta=25±2℃

Note 1: Definition of viewing angle range

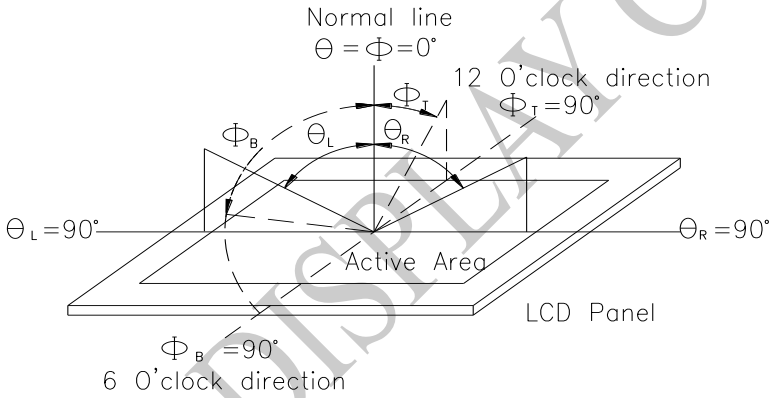


Fig. 7.1. Definition of viewing angle

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.

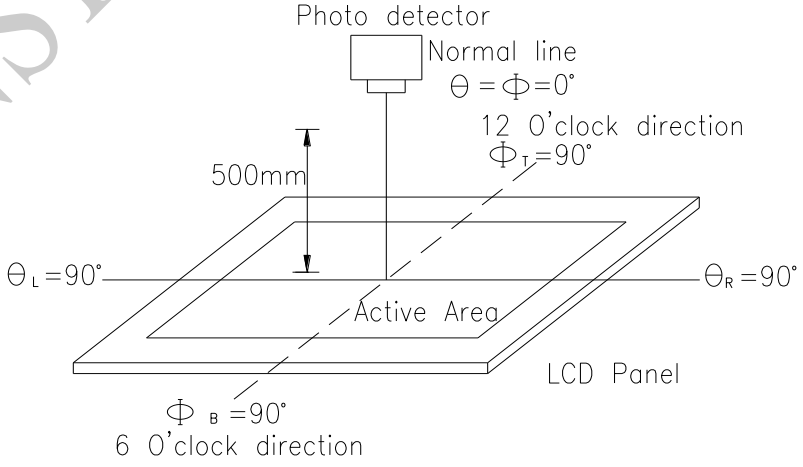
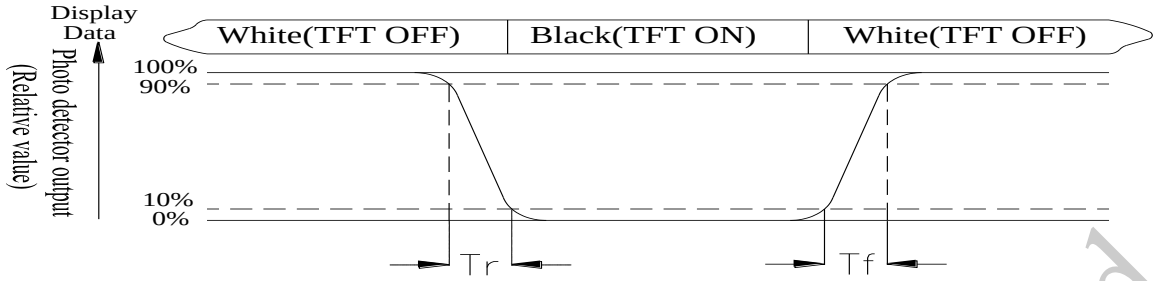


Fig. 7.2. Optical measurement system setup

Note 3: Definition of Response time:

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The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, 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 Vi = V_{i50} ± 1.5V
Black Vi = V_{i50} ± 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.

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8.Interface

8.1. CON4/CON5

Pin No.	Symbol	Function	Remark
1	3.3V	Raspberry Pi:Power 3.3V	
2	5V	Raspberry Pi:Power 5V	
3	SDA	CTP_SDA (For CTP type Reserved)	
4	5V	Raspberry Pi:Power 5V	
5	SCL	CTP_SCL (For CTP type Reserved)	
6	GND	Raspberry Pi:GND	
7	GPIO04	Raspberry Pi:GPIO04	
8	GPIO14	Raspberry Pi:GPIO14	
9	GND	Raspberry Pi:GND	
10	GPIO15	Raspberry Pi:GPIO15	
11	RST	CTP_RST (For CTP type Reserved)	
12	ACTIVE	GPIO	
13	WAKE	CTP_WAKE (For CTP type Reserved)	
14	GND	Raspberry Pi:GND	
15	INT	CTP_INT (For CTP type Reserved)	
16	GPIO23	Raspberry Pi:GPIO23	
17	3.3V	Power Supply	
18	GPIO24	Raspberry Pi:GPIO24	
19	GPIO10	Raspberry Pi:GPIO10	
20	GND	Raspberry Pi:GND	
21	GPIO09	Raspberry Pi:GPIO09	
22	GPIO25	Raspberry Pi:GPIO25	
23	GPIO11	Raspberry Pi:GPIO11	
24	GPIO08	Raspberry Pi:GPIO08	
25	GND	Raspberry Pi:GND	
26	GPIO07	Raspberry Pi:GPIO07	
27	ID_SD	Raspberry Pi:ID_SD	
28	ID_SC	Raspberry Pi:ID_SC	
29	GPIO05	Raspberry Pi:GPIO05	

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30	GND	Raspberry Pi:GND	
31	GPIO06	Raspberry Pi:GPIO06	
32	GPIO12	Raspberry Pi:GPIO12	
33	GPIO13	Raspberry Pi:GPIO13	
34	GND	Raspberry Pi:GND	
35	GPIO19	Raspberry Pi:GPIO19	
36	GPIO16	Raspberry Pi:GPIO16	
37	GPIO26	Raspberry Pi:GPIO26	
38	GPIO20	Raspberry Pi:GPIO20	
39	GND	Raspberry Pi:GND	
40	GPIO21	Raspberry Pi:GPIO21	

8.2. HDMI

Pin No.	Symbol	I/O	Function	Remark
1	Rx2+	I	+LVDS Differential Data Input	
2	GND	P	Ground	
3	Rx2-	I	-LVDS Differential Data Input	
4	Rx1+	I	+LVDS Differential Data Input	
5	GND	P	Ground	
6	Rx1-	I	-LVDS Differential Data Input	
7	Rx0+	I	+LVDS Differential Data Input	
8	GND	P	Ground	
9	Rx0-	I	-LVDS Differential Data Input	
10	RxC+	I	+LVDS Differential Clock Input	
11	GND	P	Ground	
12	RxC-	I	-LVDS Differential Clock Input	
13-14	NC	-	No connection	
15	SCL	I/O	DDC(Data Display Channel) Clock	
16	SDA	I/O	DDC(Data Display Channel) Data	
17	GND	P	Ground	
18	5V	P	Power Supply	
19	Detect	I/O	Hot plug detect	

I: input, O: output, P: Power

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8.3. USB

Pin No.	Symbol	I/O	Function	Remark
1	5V	P	Power Supply	
2	D-	I/O	USB Data -	
3	D+	I/O	USB Data +	
4	NC	-	No connection	
5	GND	P	Ground	

8.4. J2

Pin No.	Symbol	I/O	Function	Remark
1	VLED+	P	Power Supply	
2	VLED-	P	Ground	
3	NC		No connection	

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9.Reliability

Content of Reliability Test (Wide temperature, 0℃~50℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	60℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-20℃ 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.	50℃ 200hrs	——
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60 ℃,90%RH max	60℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 0℃ 25℃ 50℃ 30min 5min 30min 1 cycle	0℃/50℃ 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	——

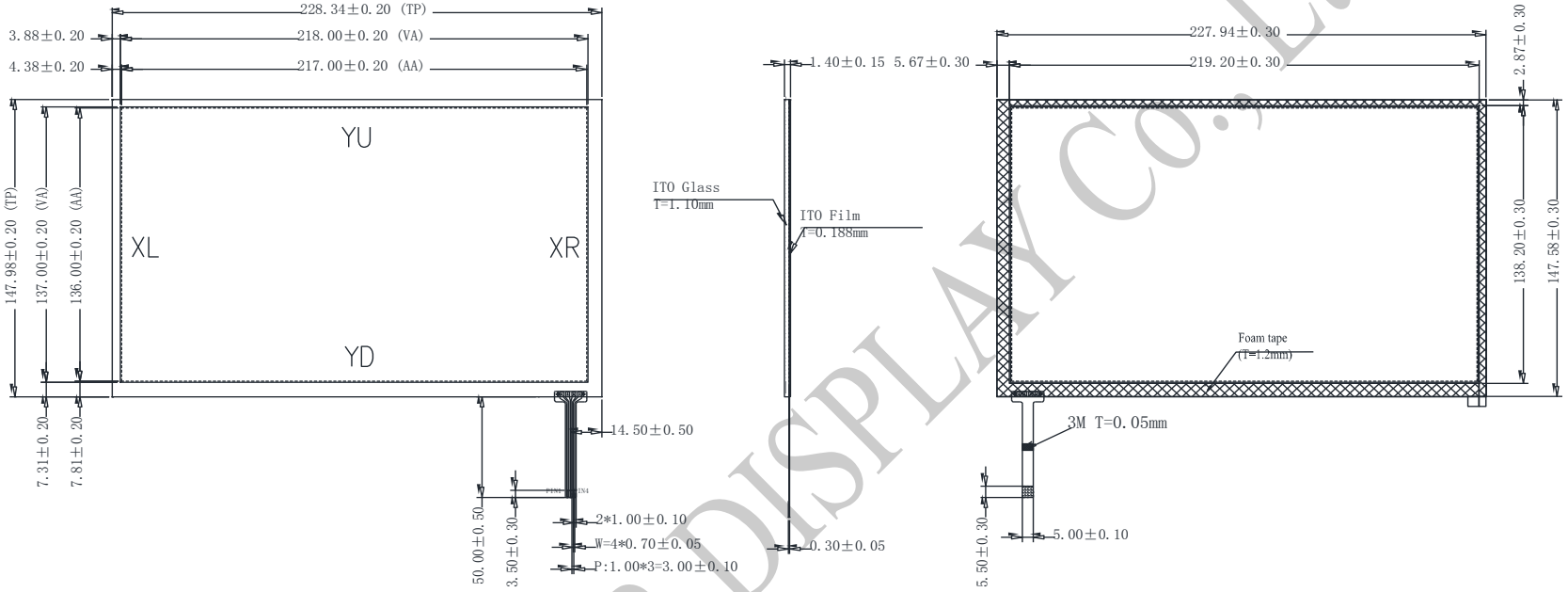
Note1: No dew condensation to be observed.

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

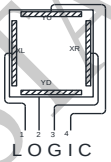
Note3: The packing have to including into the vibration testing.

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10.Touch Panel Information



Pin No.	SYMBOL
1	XL
2	YD
3	XR
4	YU



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

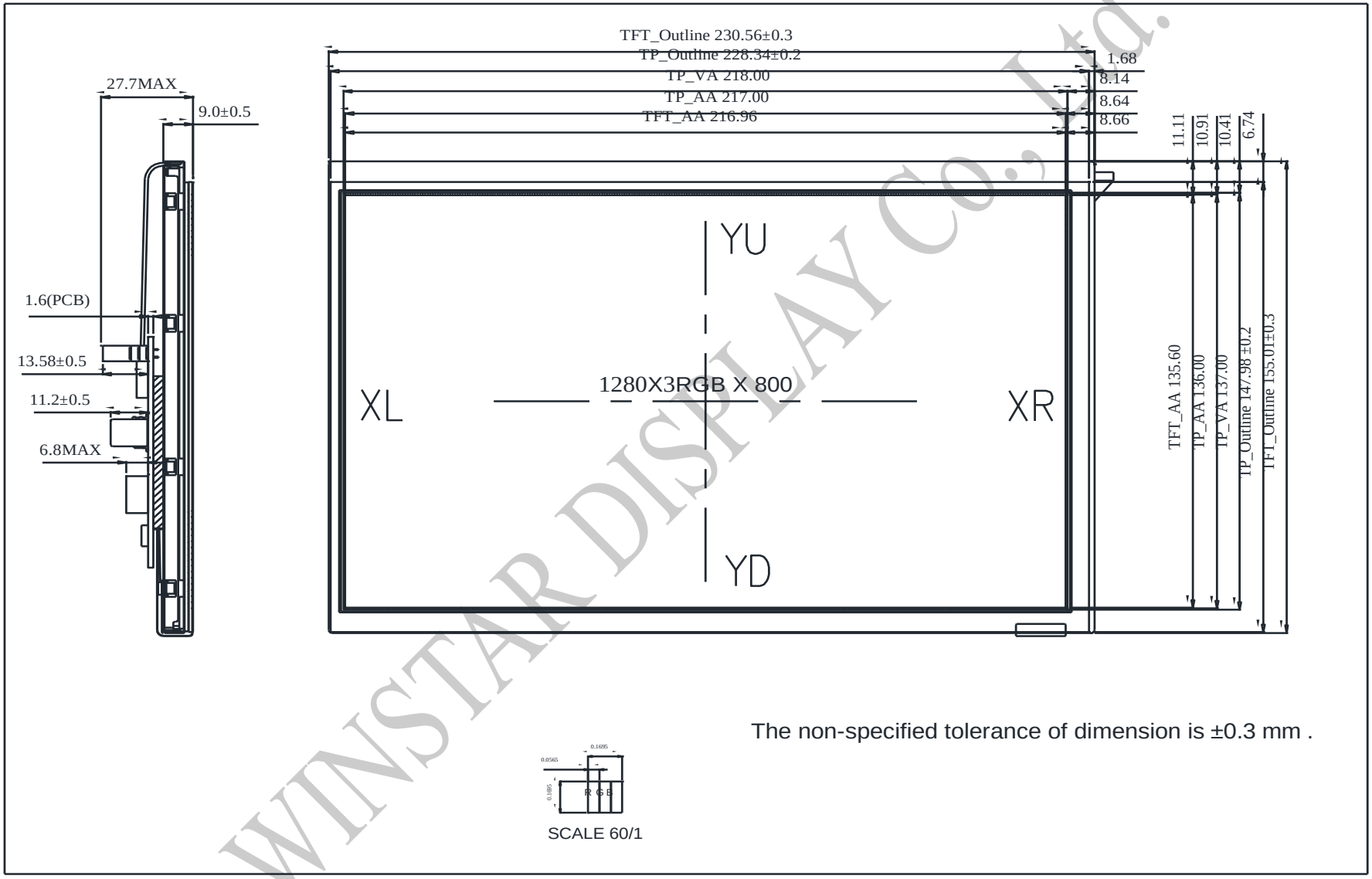
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10.1. Resistance Touch Panel General Specifications

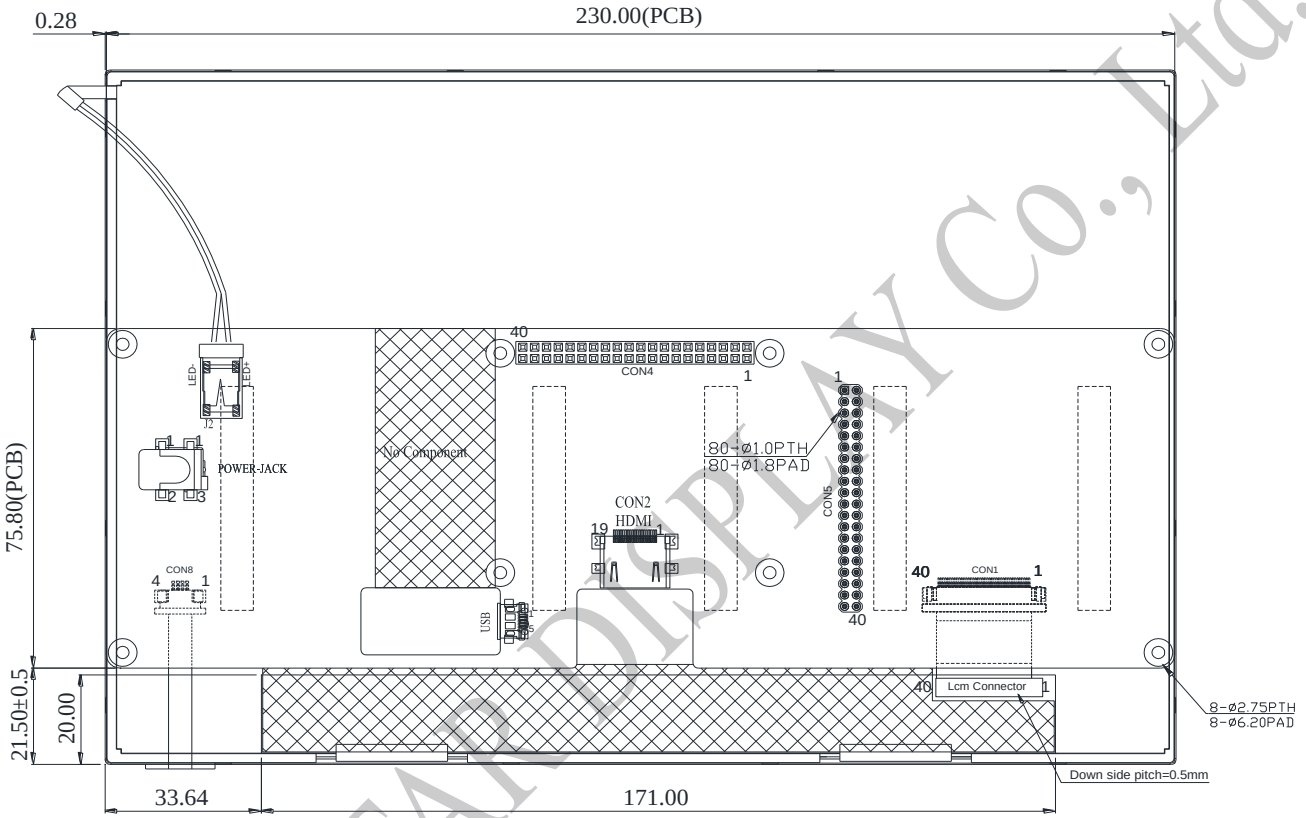
Item	Description
Driving condition	DC5V
Operating force	20~100g
Linearity max	≤±1.5%
Insulating resistance	＞20MΩ，25V(DC)
Light transparence	70%
Structure type	ITO Film/ITO Glass(F/G)
Surface Hardness	3H typ
Pen Hitting Durability (with the silicon rubber)	＞1000,000 times
X resistance	450~1100Ω
Y resistance	200~600Ω

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11.Contour Drawing



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

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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 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 ,_____

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>> 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：** / /

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