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MODEL NO : ET150WX01-R**MODEL VERSION: 01****SPEC VERSION : 1.0****ISSUED DATE: 2017-12-11**☒ **Preliminary Specification**☐ **Final Product Specification****Customer :** _____

Approved by	Notes

Table of Contents

Record of Revision.....	3
1 General Specifications	4
2 Input/Output Terminals	5
3 Absolute Maximum Ratings	6
4 Electrical Characteristics.....	7
5 Timing Chart.....	8
6 Optical Characteristics	11
7 Environmental / Reliability Test	14
9 Packing Drawing	17
10 Precautions for Use of LCD Modules	17

Record of Revision

[illegible]

1 General Specifications

Feature		Spec
Display Spec.	Size	15 inch
	Resolution	1024x768
	Technology Type	a-Si
	Pixel Configuration	RGB Vertical Stripe
	Pixel pitch(mm)	0.297 x 0.297
	Display Mode	TN, Normally White
	Viewing Direction	6 O'CLOCK
Mechanical Characteristics	LCM (W x H x D) (mm)	326.5(H)x 253.5(V) x 7.22(D)
	Active Area(mm)	304.128(H) x 228.096(V)
	With /Without TSP	Without TSP
	Surface Treatment	Haze 25% 3H
	Weight (g)	TBD
Electrical Characteristics	Interface	1 channel LVDS
	Color Depth	16.7M

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: Q/S0002

Note 3: LCM weight tolerance: $\pm 5\%$

2 Input/Output Terminals

The electronics interface connector is DF14H-20P-1.25H.

The LED connector is 3808K-F05N-03L

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	VDD	Power Supply,3.3V(typical)
2	VDD	Power Supply,3.3V(typical)
3	VSS	Ground
4	REV	Reverse Scan Control Low -> Normal mode High -> Reverse mode
5	RIN0-	-LVDS differential data input
6	RIN0+	+LVDS differential data input
7	VSS	Ground
8	RIN1-	-LVDS differential data input
9	RIN1+	+LVDS differential data input
10	VSS	Ground
11	RIN2-	-LVDS differential data input
12	RIN2+	+LVDS differential data input
13	VSS	Ground
14	CLKIN-	-LVDS differential clock input
15	CLKIN+	+LVDS differential clock input
16	VSS	Ground
17	RIN3-	-LVDS differential data input
18	RIN3+	+LVDS differential data input
19	VSS	Ground
20	SEL 6/8	LVDS 6/8 bit select function control High -> 6bit input mode Low -> 8bit input mode

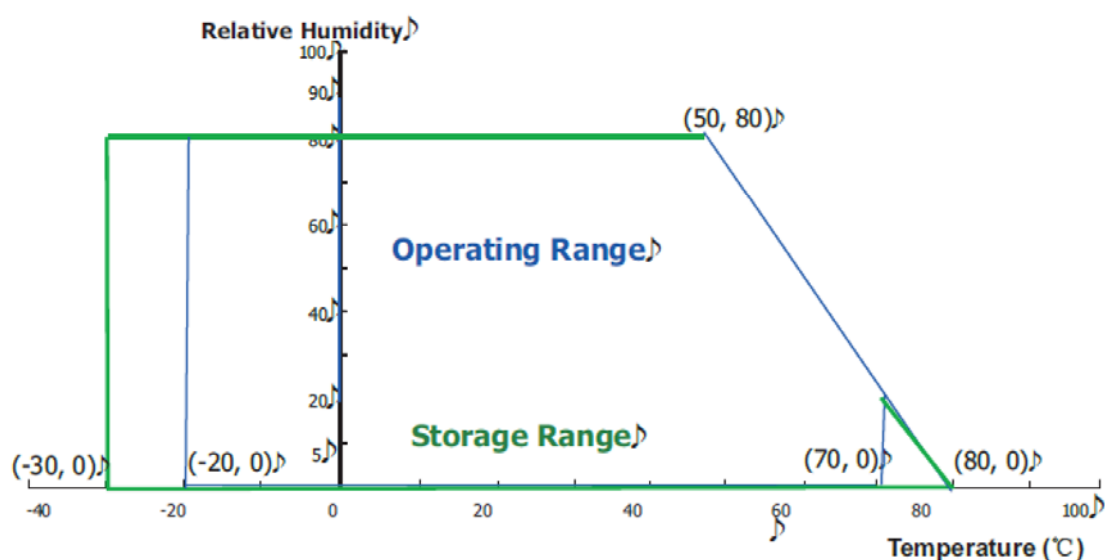
<Table 7. Pin Assignments for the LED Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	VCC	12V
2	GND	GND
3	Enable	5V-On / 0V-Off
4	Dimming	PWM Dimming
5	NC	No Connection

3 Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Remarks
Back-light Power Supply Voltage	HV_{DDOUT}	-0.3	24	V	
Back-light LED Current	I_{HVDD}	-	-	mA	
Back-light LED Reverse Voltage	V_R	-	40	V	
Operating Temperature	T_{OP}	-20	70	°C	Note.1
Storage Temperature	T_{ST}	-30	80	°C	

Note : 1) Temperature and relative humidity range are shown in the figure below.



4 Electrical Characteristics

4.1 Driving TFT LCD Panel

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Power Supply Input Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I_{DD}	-	520	700	mA	

4.2 Backlight Unit

Following characteristics are measured under stable condition using a LED driving board at 25℃ (Room Temperature).

Symbol	Parameter	Min	Typ	Max	Unit	Remark
V_{CC}	Input Voltage	10.8	12	12.6	Volt	
I_{VCC}	Input Current	-	0.61	-	A	100% Dimming
P_{LED}	Power Consumption	-	7.32	10	Watt	100% Dimming
$V_{LED\ on/off}$	On Control Voltage	3.0		5.5	Volt	
	Off Control Voltage	-	0	0.5	Volt	
F_{PWM}	PWM Dimming Frequency	200	-	20k	Hz	
	Swing Voltage	4.5	5	5.5		
	Dimming Duty Cycle	5	-	100	%	
V_{analog}	Analog Dimming Voltage	2.0	5	5.5		5V, 100% Brightness
I_F	LED Forward Current	-	80	84	mA	$T_a = 25^{\circ}C$
Operating Life		50000	-	-	Hrs	$T_a = 25^{\circ}C$

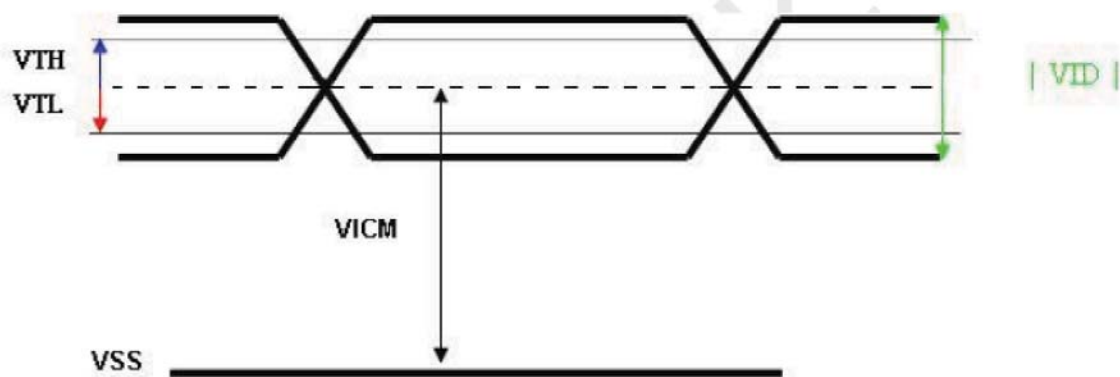
Note 1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm3^{\circ}C$, typical I_L value indicated in the above table and the $f_L=50k$ Hz until the brightness becomes less than 50%.

5 Timing Chart

5.1 Signal Electrical Characteristics

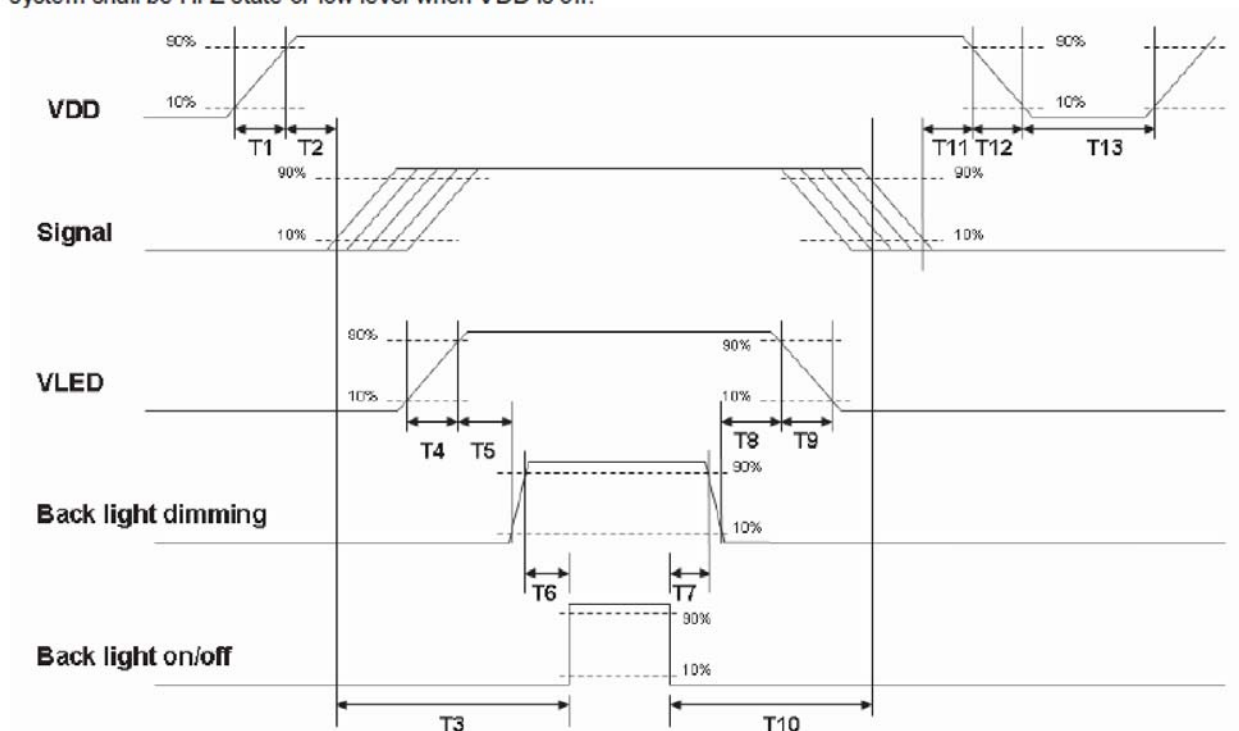
Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	100	-	-	[mV]	VCM=1.2V
VID	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.15	1.2	1.45	[V]	VTH/VTL=±100mV

Note: LVDS Signal Waveform.



5.2 Power ON/OFF Sequence

VDD power and LED on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

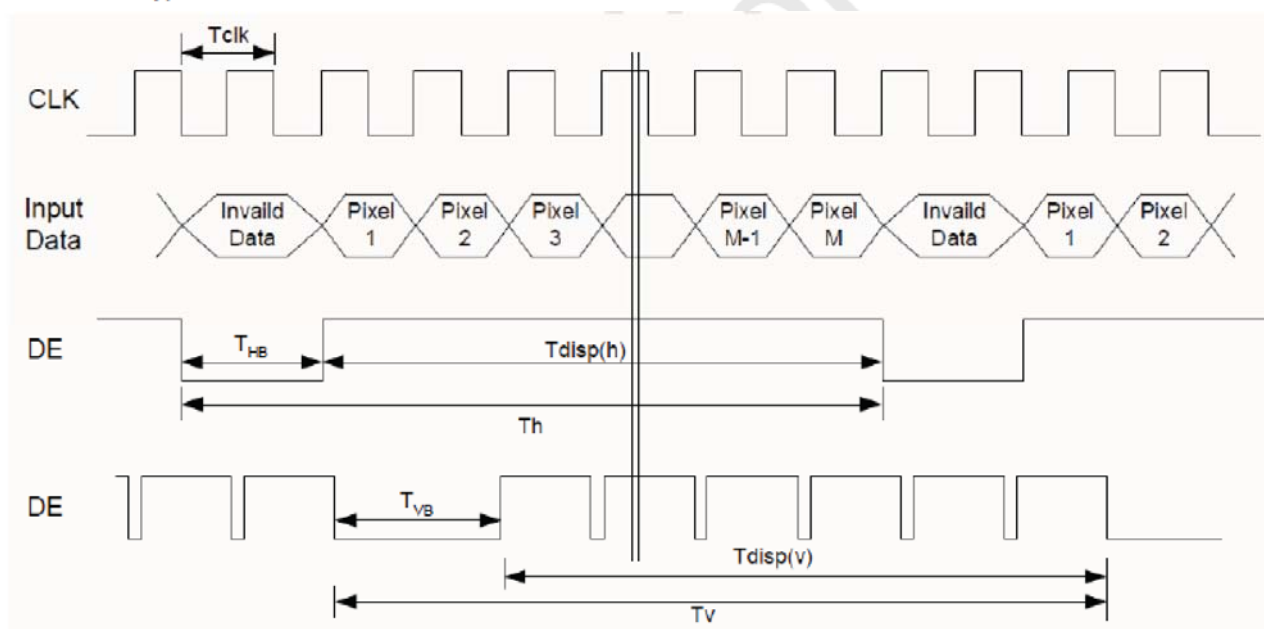
Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0	16	50	[ms]
T12	-	-	10	[ms]
T13	1000	-	-	[ms]

5.3 Timing Characteristics

Signal	Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock Timing	Clock frequency		1/ T _{Clock}	50	65	80	MHz
Vsync Timing	Vertical Section	Period	T _V	776	806	1023	T _{Line}
		Active	T _{VD}	-	768	-	
		Blanking	T _{VB}	8	38	255	
Hsync Timing	Horizontal Section	Period	T _H	1074	1344	2047	T _{Clock}
		Active	T _{HD}	-	1024	-	
		Blanking	T _{HB}	50	320	1023	
Frame Rate			F	50	60	75	Hz

Note: DE mode only.

Note : Typical value refer to VESA STANDARD



6 Optical Characteristics

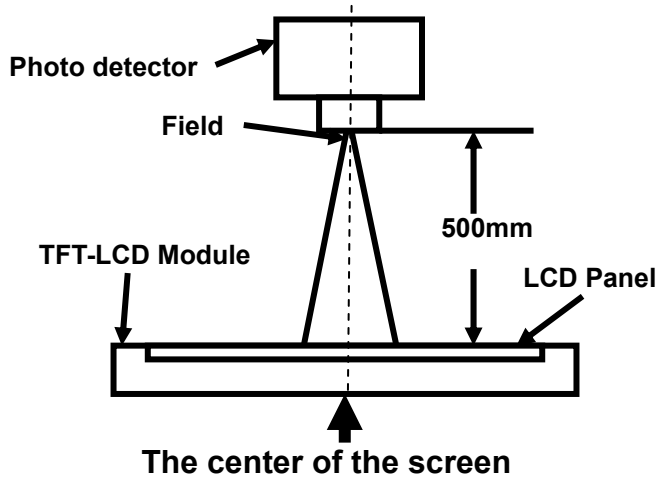
Item		Symbol	Condition	Mi	Typ	Max	Unit	Remark
View Angles		θT	CR≧10		80		Degree	Note2,3
		θB			80			
		θL			80			
		θR			80			
Contrast Ratio		CR	θ=0°	600	800	-		Note 3
Response Time		T _{ON}	25℃	-	25	30	ms	Note 4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.28	0.31	0.34		Note 1,5
		y		0.31	0.34	0.37		
	Red	x						Note 1,5
		y						
	Green	x						Note 1,5
		y						
	Blue	x						Note 1,5
		y						
Uniformity		U		75	80	--	%	Note 6
Luminance		L		700	800	-	cd/m ²	Note 7

Test Conditions:

1. $I_F = 20$ mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

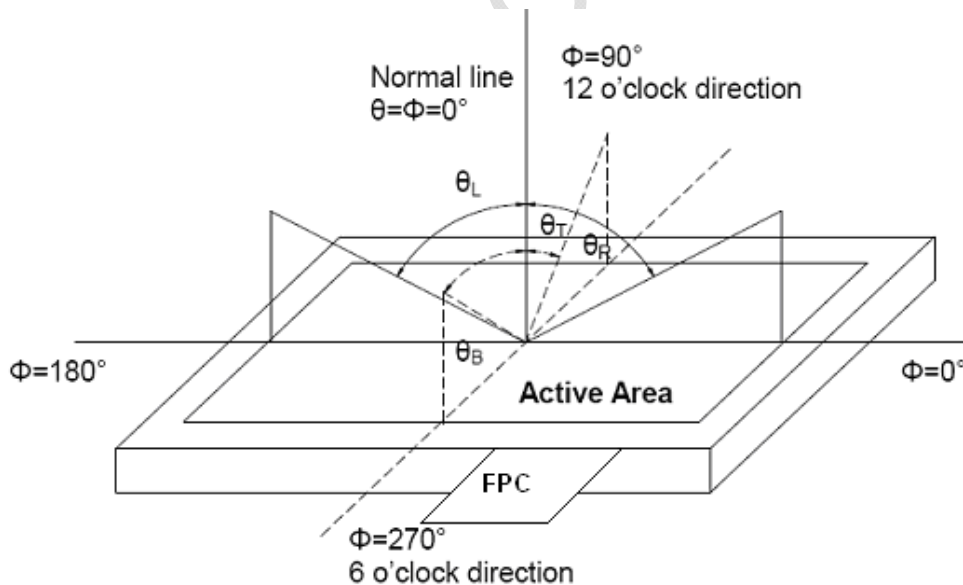
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD.



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

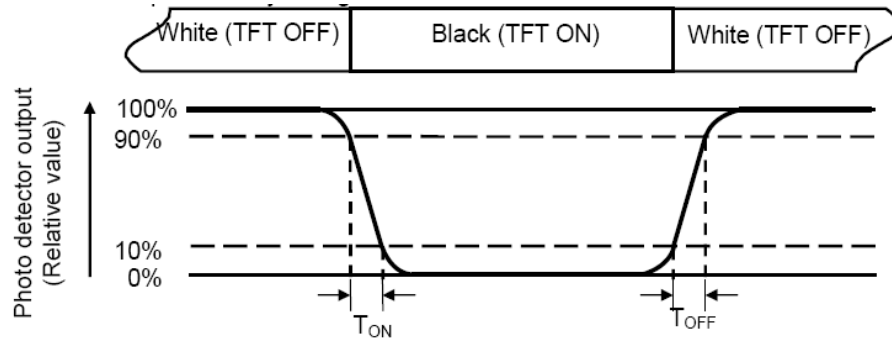
"White state ": The state is that the LCD should drive by V_{white} .

"Black state": The state is that the LCD should drive by V_{black} .

V_{white} : To be determined V_{black} : To be determined.

Note 4: 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_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

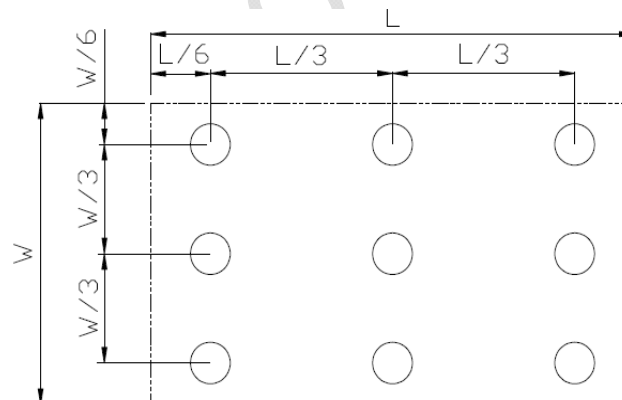
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width



$L_{\max}$: The measured Maximum luminance of all measurement position.

$L_{\min}$: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	70°C / 24Hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	-20°C / 24Hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	80°C / 24Hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-30°C / 24Hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	40°C x 90%RH / 24H	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	0°C $\leftrightarrow$ 50°C x 10cycles (30min) (5min) (30min)	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,G B2423.22-2002
7	ESD	Contact: $\pm$ 4KV Air: $\pm$ 8KV 150PF/330 Ω ,5Points/panel,5times	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	IEC60068-2-6:1982 GB/T2423.10—1995
10	Package Drop Test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	IEC60068-2-32:1990 GB/T2423.8—1995

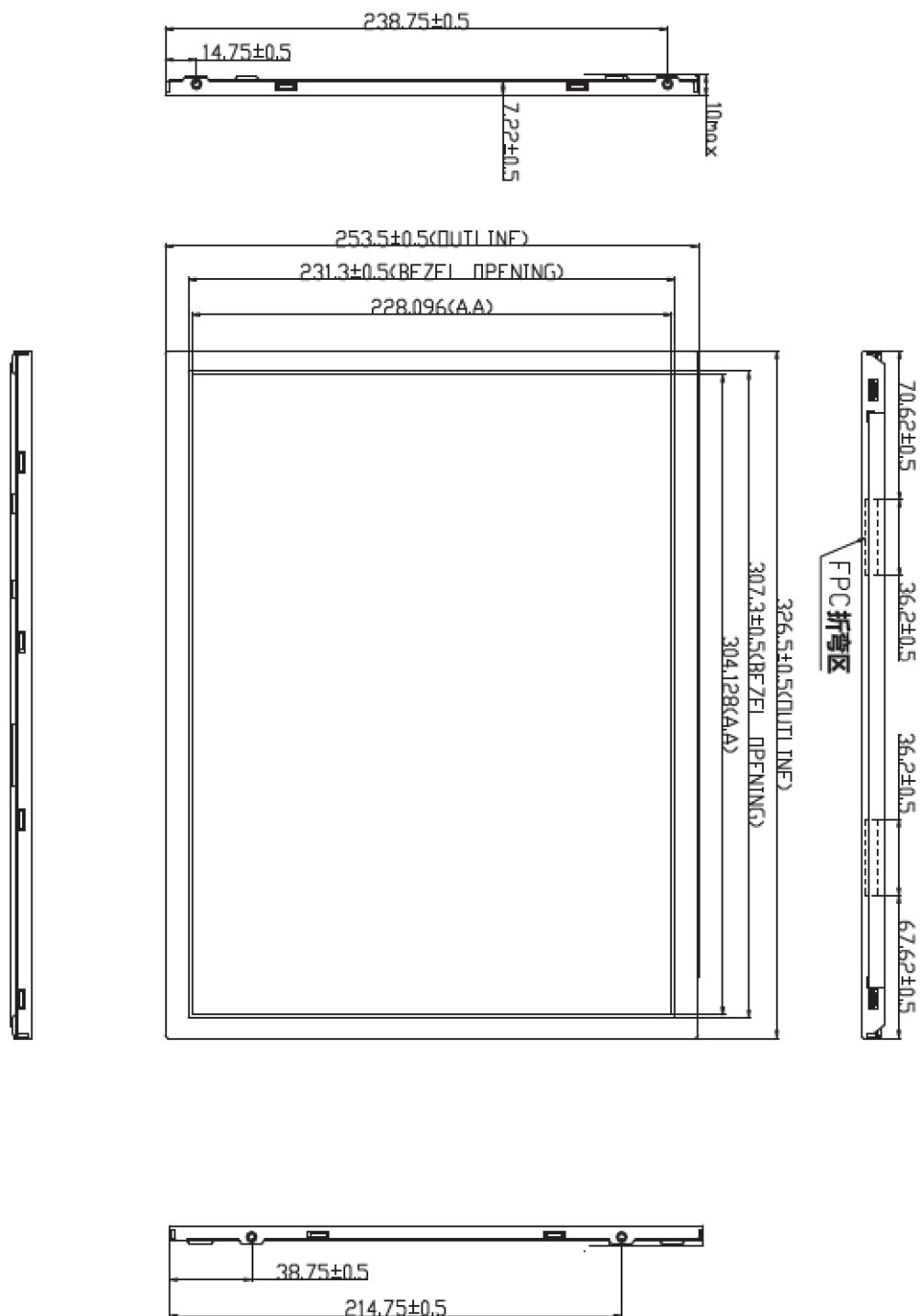
Note1: Ts is the temperature of panel's surface.

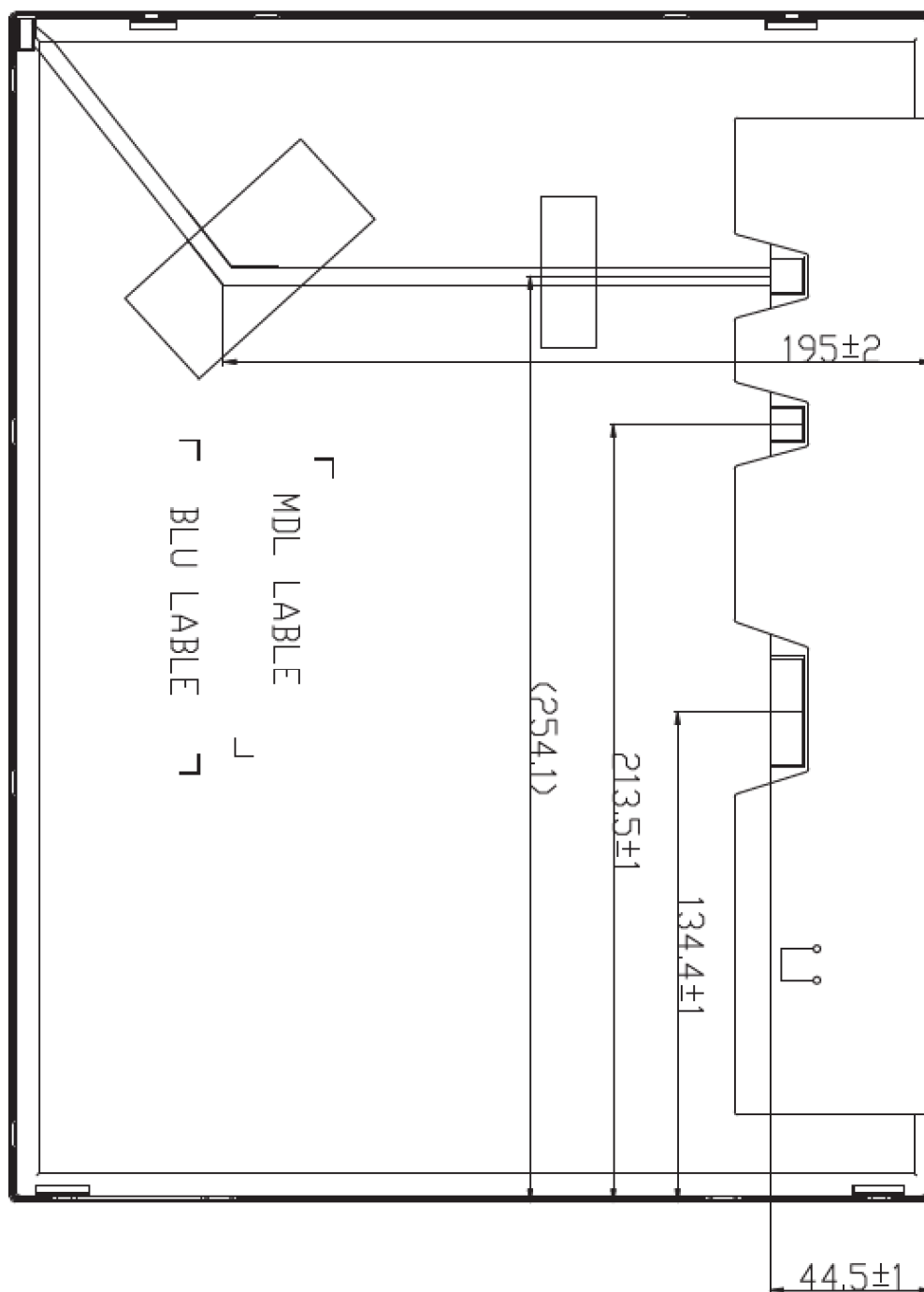
Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

8. Outline Dimension





9 Packing Drawing

TBD

10 Precautions for Use of LCD Modules

a) Handling Precautions

- i. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- ii. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- iii. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- iv. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- v. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
 - Ketone
 - Aromatic solvents
- vi. Do not attempt to disassemble the LCD Module.
 - vii. If the logic circuit power is off, do not apply the input signals.
 - viii. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

b) Storage precautions

- i. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

- ii. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%

- iii. The LCD modules should be stored in the room without acid, alkali and harmful gas.

c) Transportation Precautions

- i. The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.