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MODEL NO : ET070WU07-OMODEL VERSION: 01SPEC VERSION : 1.0ISSUED DATE: 2020-12-02

- ☒ Preliminary Specification
☐ Final Product Specification

Customer : _____

Approved by	Notes

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Record of Revision

[illegible]

1 General Specifications

Feature		Spec
Display Spec.	Size	7.02 inch incell
	Resolution	1200(RGB) X 1920
	Technology Type	LTPS TFT active matrix
	Pixel Configuration	RGB Vertical Stripe
	Pixel pitch(mm)	0.07875(W) × 0.07875(H)
	Display Mode	Normally Black
	Surface treatment	Hard coating
	Viewing Direction	ALL
Mechanical Characteristics	LCM (W x H x D) (mm)	160.80 (L)* 98.70(W)* 1.97 (H)
	Active Area(mm)	94.5(W) × 151.2(H)
	With /Without TSP	Without TSP
	Weight (g)	TBD
Electrical Characteristics	Interface	MIPI 4 lane
	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: ± 5%

2 Input/Output Terminals

A 40pin connector is used for the module electronics interface.

NO.	Symbol	Pin Description	NO.	Symbol	Pin Description
1	NC	No connection(BOE Internal use for OTP)	21	MIPI_3P	MIPI Positive data signal (+)
2	VDDI	Digital supply voltage,VDDI 1.8V	22	GND	Ground
3	VDDI		23	TP_SCL	TP I2C clock signal 1.8V
4	GND	Ground	24	TP_SDA	TP I2C data signal 1.8V
5	LCD_RST	LCD reset signal	25	GND	Ground
6	NC	No connection	26	TE	Tearing effect output signal
7	GND	Ground	27	PWMO	PWM control signal for LED driver
8	MIPI_0N	MIPI Negative data signal (-)	28	TP_INT	TP interruption signal 1.8V
9	MIPI_0P	MIPI Positive data signal (+)	29	TP_RST	TP reset signal 1.8V
10	GND	Ground	30	GND	Ground
11	MIPI_1N	MIPI Negative data signal (-)	31	LED-	LED cathode connect to pad
12	MIPI_1P	MIPI Positive data signal (+)	32	LED-	
13	GND	Ground	33	NC	No connection
14	MIPI_CKN	MIPI Negative clock signal (-)	34	VSN	Analog supply negative voltage,VSN=-6V
15	MIPI_CKP	MIPI Positive clock signal (+)	35	VSN	
16	GND	Ground	36	NC	No connection
17	MIPI_2N	MIPI Negative data signal (-)	37	VSP	Analog supply positive voltage,VSP=6V
18	MIPI_2P	MIPI Positive data signal (+)	38	VSP	
19	GND	Ground	39	LED+	LED A connect to pad
20	MIPI_3N	MIPI Negative data signal (-)	40	LED+	

3 Absolute Maximum Ratings

(GND=AV_{SS}=0V, Note 1)

Item 项目	Symbol 符号	Values 值		Unit 单位	Remark 备注
		Min.最小值	Max.最大值		
Power voltage 电源电压	IOVCC	0	4.6	V	
	VSP	0	6.5	V	
	VSN	-6.5	0	V	
Operation temperature 操作温度	T _{OP}	-10	60	°C	
Storage temperature 保存温度	T _{ST}	-30	70	°C	
Humidity 湿度	RH	-	90%(Max 60°C)	RH	

Note: The absolute maximum ratings are the values that must not be exceeded at any time for this product. It is not allowed for any of these ratings to be exceeded. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed. Therefore, when designing a system incorporating this module, make sure that adequate attentions be paid to the variations in the supply voltages, the characteristics of parts that are connected, surges in the input and output lines, and the ambient temperatures.

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

Parameter	Symbol	Specification			Unit	Note
		Min	Typ	Max		
Analog Operating voltage	AVDD	4.5	5.5	6.5	V	
Analog Operating voltage	AVEE	-6.5	-5.5	-4.5	V	
Digital Operating voltage	VDDI	1.65	1.8	3.6	V	

Parameter	Symbol	Typ	Max	Unit	Remark
Normal mode	I _{VDDI}	40	50	mA	Note
Normal mode	I _{AVEE}	60	75	mA	
Normal mode	I _{AVDD}	60	75	mA	
Sleep mode	I _{VDDI}	1.1	1.4	mA	
Sleep mode	I _{AVEE}	0.04	0.05	mA	
Sleep mode	I _{AVDD}	0.22	0.28	mA	

Note: Frame rate=60HZ, Color bar pattern, 25°C.

Note: The recommended operating conditions refers to a range in which operation of this product is guaranteed. Should this range is exceeded, the operation cannot be guaranteed even if the values may be within the absolute maximum ratings. Accordingly, please make sure that the module is used within this range.

4.2 Backlight Unit

The backlight system is an edge-lighting type with 16 LED. The characteristics of the LED are shown in the following tables.

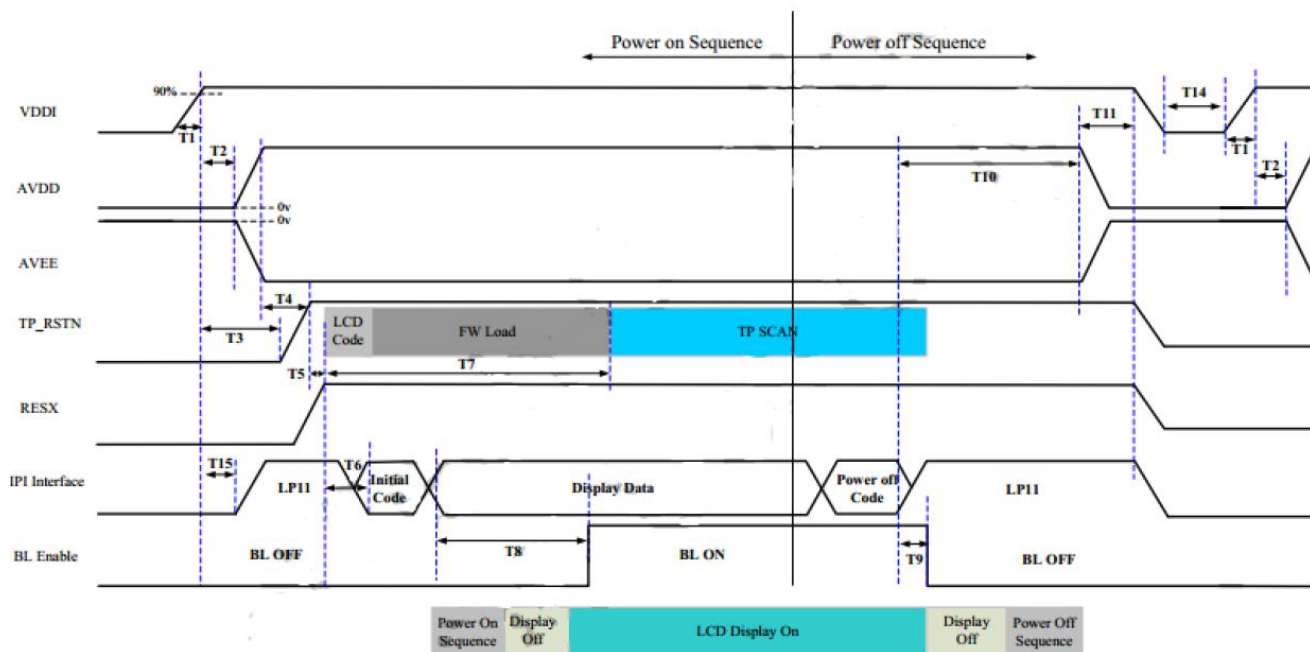
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Backlight forward voltage	V_F	9	-	11	V	45 LEDs
Backlight forward current	I_F	560			mA	
LED life time	--	20000	--	--	Hrs	

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

5 Timing Chart

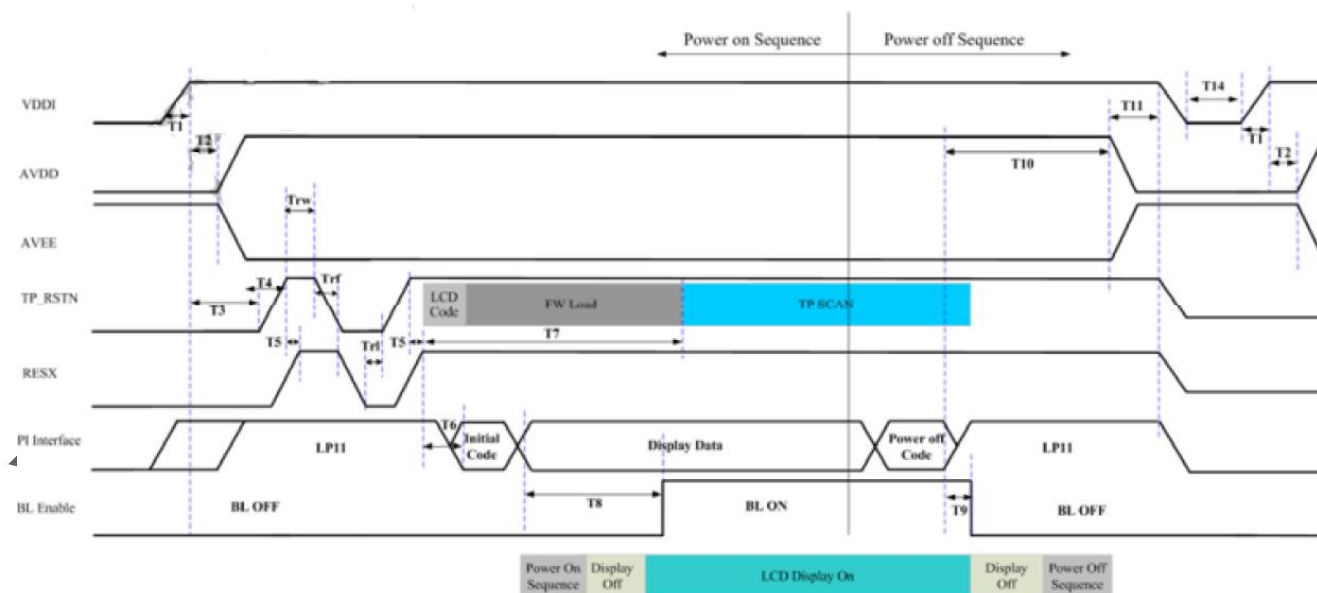
5.1 Power sequence

Power On/Off Sequence

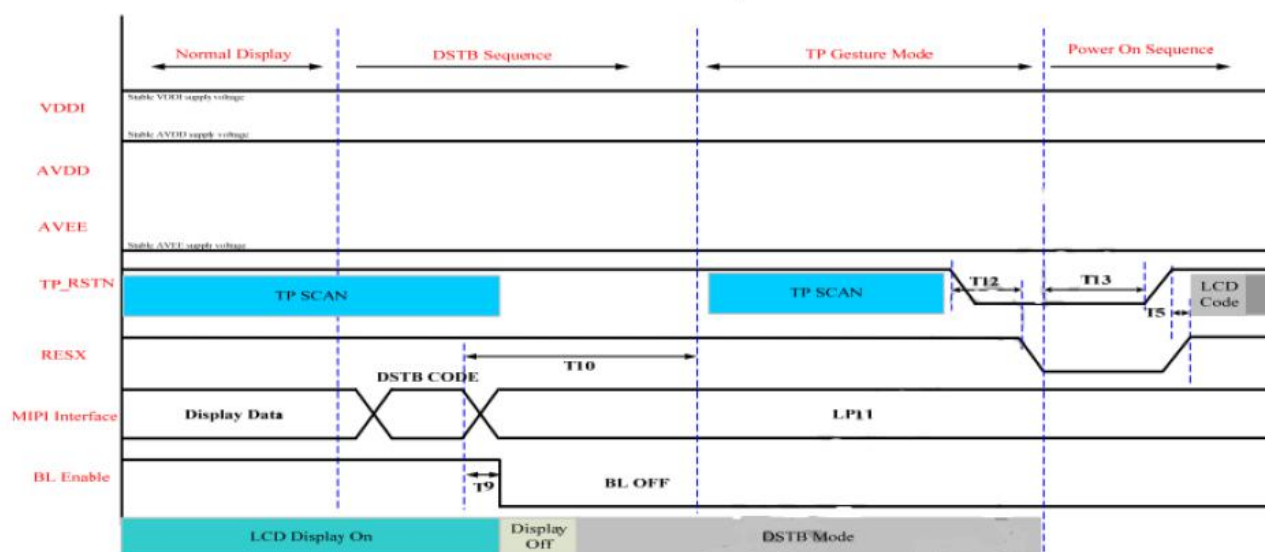


If system cannot ensure the MIPI interface power up after VDDI, 2nd reset is suggested to used as below diagram.

Power On/Off Sequence with 2nd Reset



TP Gesture Mode Exit Sequence



Power On/Off Sequence Timing

Parameter	Description	Min.	Max.	Unit
T1	Rise time from 0.1VDDI to 0.9VDDI	0	5	mS
T2	AVDD/AVEE rise after VDDI power on	1		mS
T3	TP reset time after VDDI power on	5		mS
T4	TP reset release time after AVDD power on	100		uS
T5	TP reset release to LCD Reset release	0		mS
T6	FLASH download LCD code after LCD Reset	120		mS
T7	LCD Reset release to TP SCAN Start	150		mS
T8	LED On after Initial Code	150		mS
T9	LED OFF after power off Code	50		mS
T10	AVDD/AVEE power down after power off code	150		mS
T11	VDDI power down after AVDD/AVEE power down	5		mS
T12	TP reset time before LCD reset	5		mS
T13	RESX reset falling to TP reset release	5	120	mS
T14	VDDI rise again after previous VDDI powered down	50		mS
T15	MIPI signals start(Hi-Z/GND to LP11)after VDDI power on	3		mS

5.2 MIPI interface timing

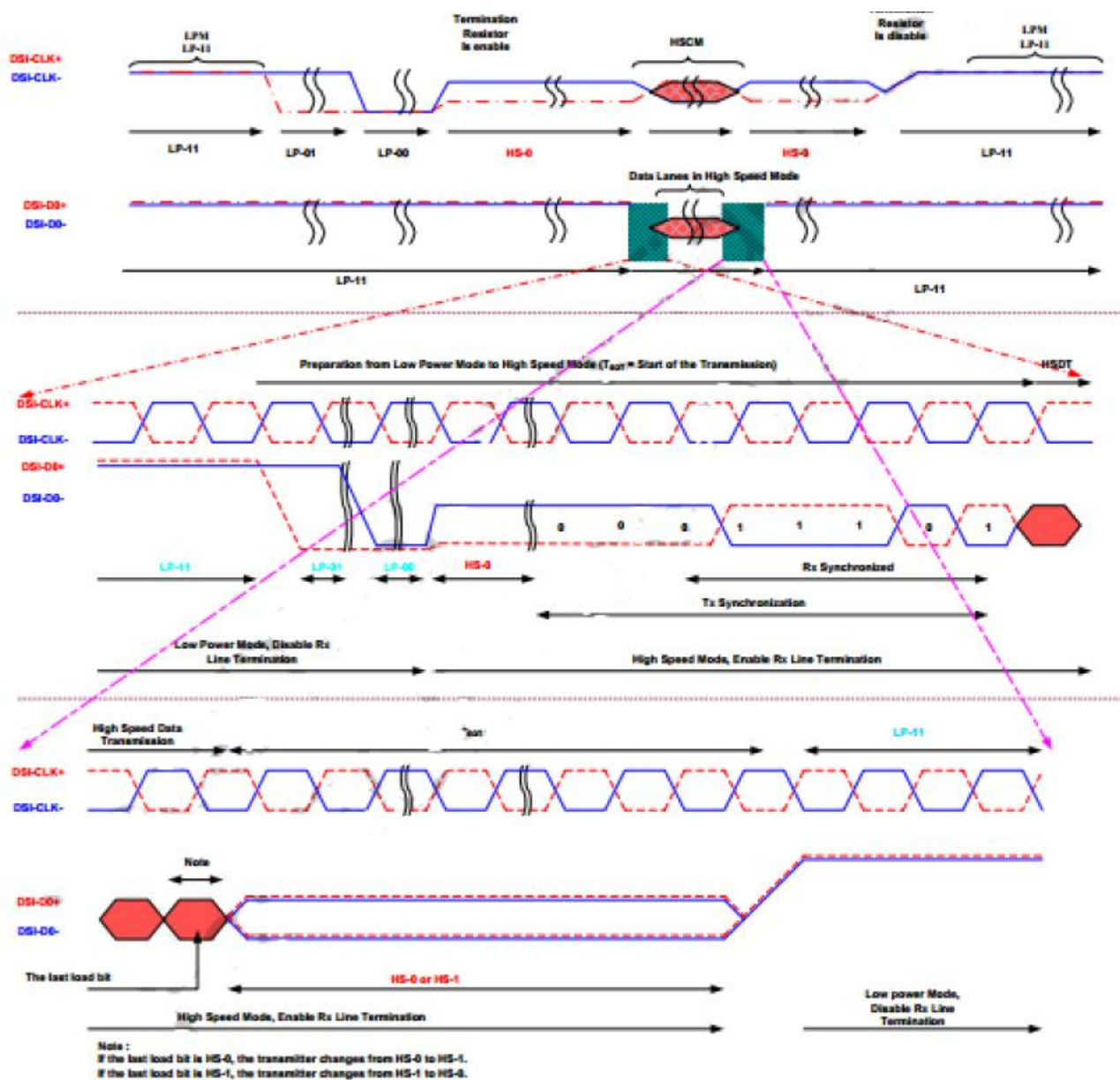
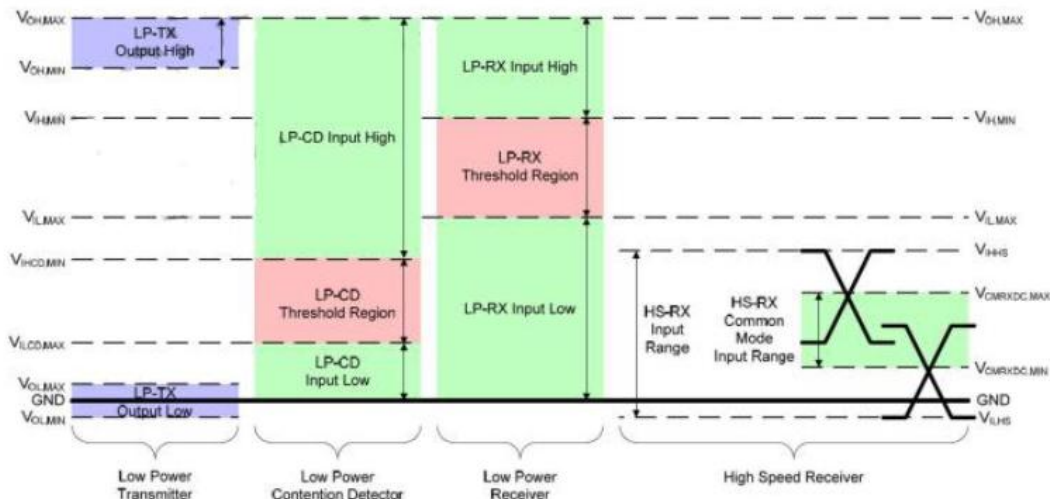


Figure: High speed clock burst

5.3 MIPI interface DC characteristics

Parameter	Symbol	Condition	Specification			Unit
			MIN	TYP	MAX	
Power supply voltage for MIPI interface						
Power supply voltage for MIPI interface	VDDAM	-	1.65	1.8	3.6	V
	LVDSVDD	-	1.125	1.3	1.5	V
LPDT Input Characteristics						
Pad signal voltage range	VI	-	-50	-	1350	mV
Ground Shift	VGND _{SH}	-	-50	-	50	mV
Logic 0 input threshold	VIL	-	0	-	550	mV
Logic 1 input threshold	VIH	-	880	-	LVDSVDD	mV
Input hysteresis	VHYST	-	25	-	-	mV
LPDT Output Characteristics						
Out low level	VOL	-	-50	-	50	mV
Out high level	VOH	-	1.1	1.2	1.3	V
Logic 1 contention threshold	VIH _{CD} ,MIN	-	450	-	LVDSVDD	mV
Logic 0 contention threshold	VIH _{CD} ,MAX	-	0	-	200	mV
Output impedance of LPDT	ZOLP	-	80	100	125	ohm
Hi-speed Input/Output Characteristics						
Single-end input low voltage	VIL _{HS}	-	-40	-	-	mV
Single-end input high voltage	VIH _{HS}	-	-	-	460	mV
Single-end threshold for HS termination enable	VTERM-EN	-	-	-	450	mV
Differential input low threshold	VID _{TL}	-	-70	-	-	mV
Differential input high threshold	VID _{TH}	-	-	-	70	mV
Common mode voltage	VCM _{RXDC}	-	70	-	330	mV
Differential input impedance	ZID	-	80	100	125	ohm



6 Optical Characteristics

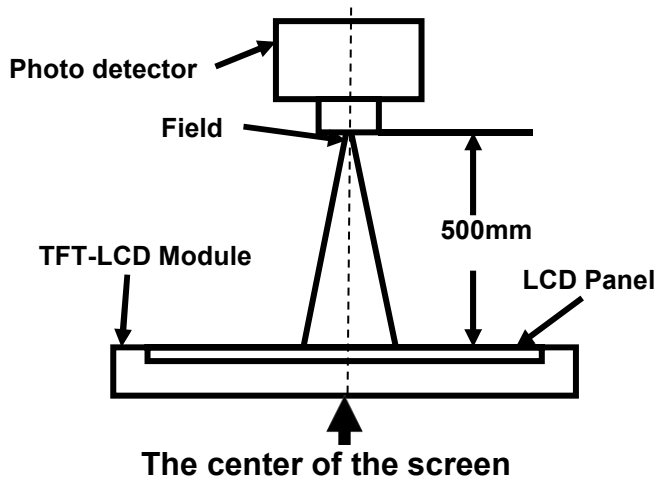
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	-	80	-	Degree	Note2,3
		θB		-	80	-		
		θL		-	80	-		
		θR		-	80	-		
Contrast Ratio		CR	θ=0°	-	1200	-		Note 3
Response Time		T _{ON}	25℃	-	30	-	ms	Note 4
		T _{OFF}						
Chromaticity	White	x	Backlight is on					Note 1,5
		y						
	Red	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 _A		1200	1500	-	cd/m ²	Note 7

Test Conditions:

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

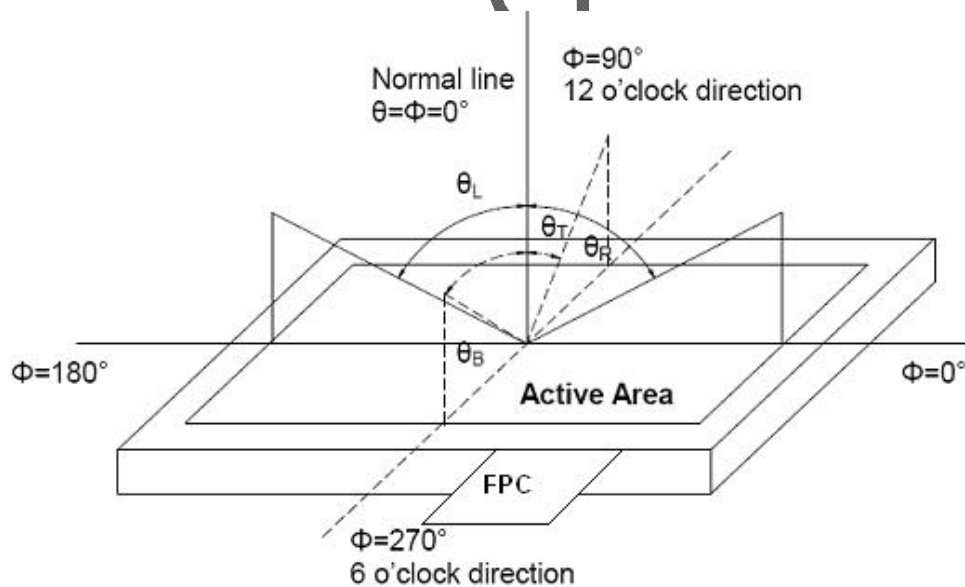
Note 1: Definition of optical measurement system.

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

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

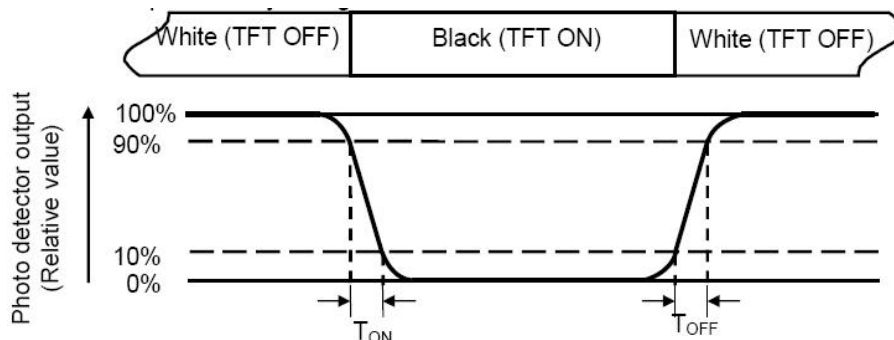
"White state ": The state is that the LCD should drive by V_{white} .

"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)

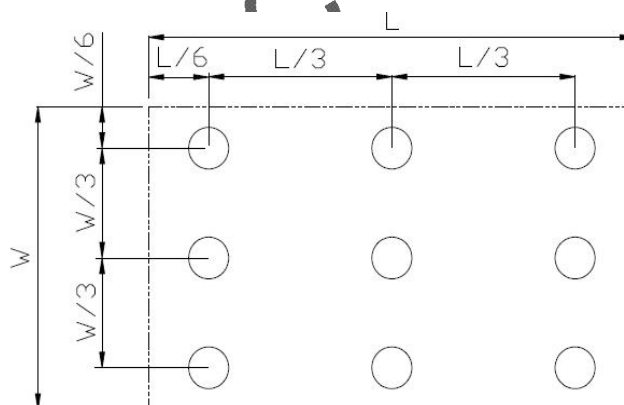
Color coordinates measured at center point of LCD.

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℃, 96Hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	-20℃, 96 Hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	80℃, 96Hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-30℃, 96 Hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	50℃, 90%RH, 96 Hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-20℃(30min)→+70℃(30min), 100 cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,G B2423.22-2002
7	ESD	Contact: ±4KV Air: ±8KV 150PF/330Ω, 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

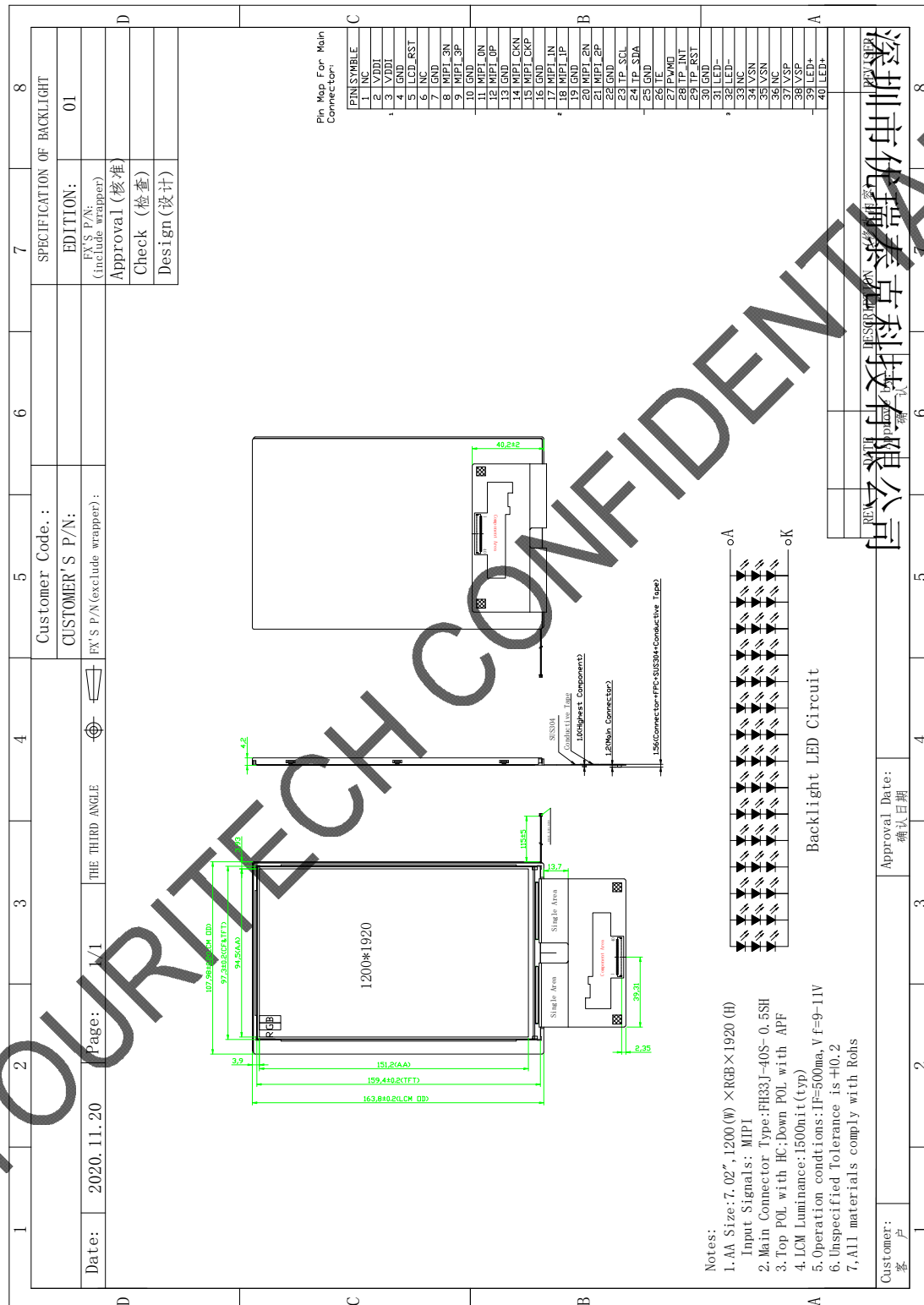
Note1: Ts is the temperature of panel's surface.

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.