

LCD MODULE

SPECIFICATION

Model:	UE040WV-RH25-L023
Version:	V1.0
Date:	20180321

- Preliminary Specification** 样品规格书
- Final Specification** 量产规格书

Customer Confirmation 客户确认

Approved by	Notes

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VIEWE Confirmation 优奕确认

Prepared by	Reviewed by	Approved by

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1. GENERAL INFORMATION

1.1 Features

- 1) Pixel Arrangement: RGB Vertical Stripe
- 2) Interface Mode: MIPI
- 3) Driver IC: JD9161BA
- 4) Operation Temperature: -20~70°C
- 5) Storage Temperature: -30~80°C
- 6) Backlight Type: White LED
- 7) Display mode: Normally Black, Transmissive
- 8) Pixel Density: 235 PPI
- 9) LED life time: 30,000 Hours

1.2 Mechanical Specification

Item 项目	Specification 规格	Unit 单位	Remark 备注
Pixel Driving element	a-Si TFT	-	
Screen Size	3.97	Inch	Diagonal
Resolution	480 RGB (W) x 800 (V)	Dots	
Interface	MIPI	-	2lane
Module Power Consumption	0.596	Watt	Typ.
Active Area	51.84(W)*86.4(H)	mm	
Pixel pitch (W*H)	0.108 (W) X 0.108 (H)	mm	
Module Size (W*H*D)	57.14(W)*96.85(H)*2.1(D)	mm	Tolerance: ± 0.15
Luminance	400	cd/m ²	Typ.
Viewing Direction	All	O'clock	-
Display Color	16.7M	Colors	24bits

2. ABSOLUTE MAXIMUM RATINGS

Item 项目	Symbol 符号	Min. 最小值	Max. 最大值	Unit 单位	Remark 备注
Power supply1 voltage	LCD_2V8	-0.3	6.6	V	Note1
Power supply2 voltage	TP_2V8	-0.3	3.6	V	Note1
LED forward current	I _F	-0.001	30	mA	For each led,Note1
LED Reverse Voltage	V _R	-	5	V	For each led,Note1
Operating temperature	T _{op}	-20	70	°C	Note1,2
Storage temperature	T _{st}	-30	80	°C	Note1,2
Humidity	H _{st}	10	90	%RH	Note1,3

(Ta=+25°C,GND=0V)

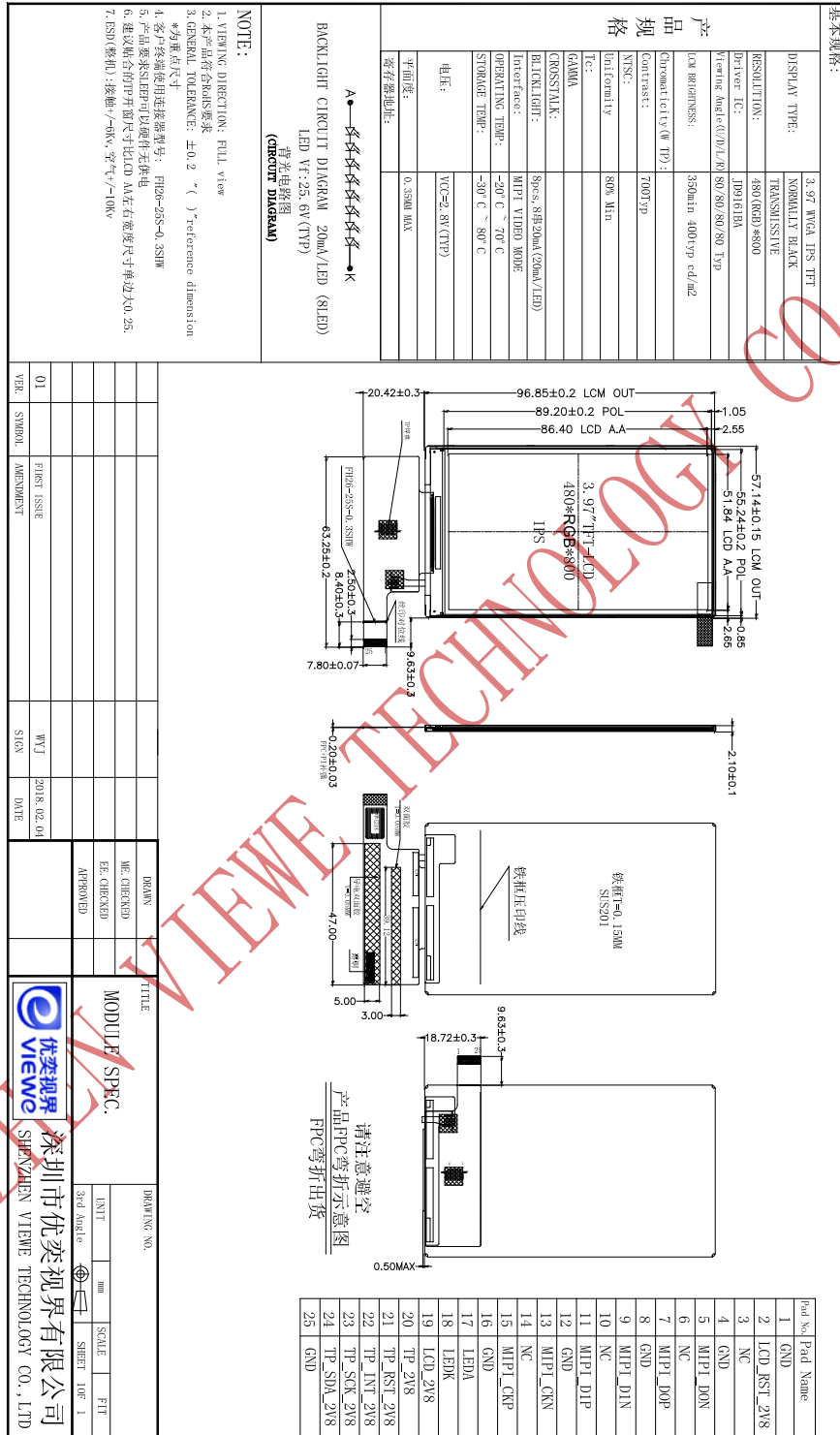
Note1:If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also if the module operates with the absolute maximum ratings for a long time, the reliability may drop.

Note2: In case of temperature below 0°C,the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

Note3: Temp. ≤ 60°C , 90% RH MAX.

Temp. >60°C , Absolute humidity shall be less than 90% RH .

3. MECHANICAL DRAWING



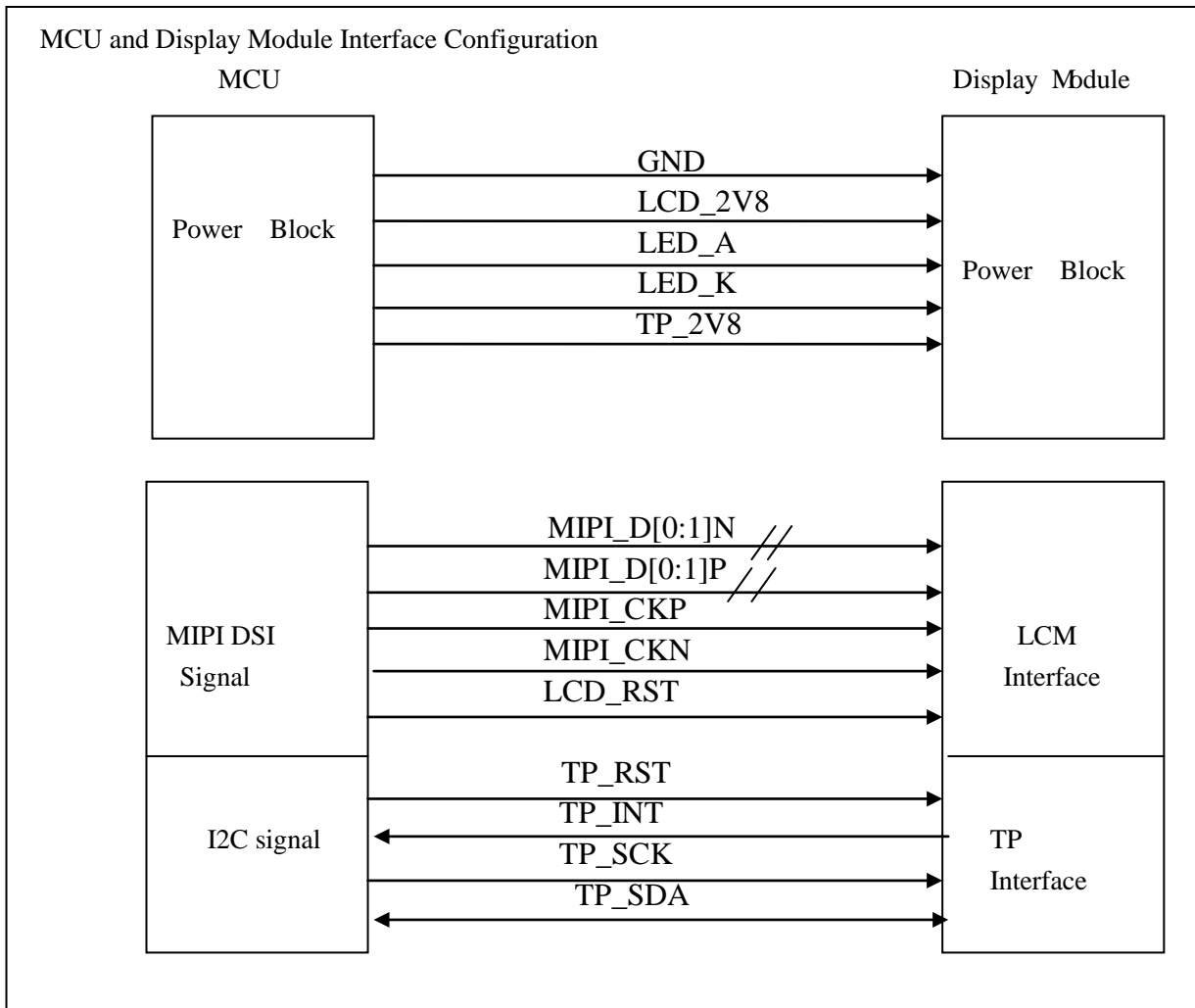
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin NO. 序号	Symbol 符合	I/O	Description 描述
1	GND	P	Power Ground
2	LCD_RST	I	Global reset for LCM, active is low
3	NC	-	
4	GND	P	Power supply for and IO pads(1.8V)
5	MIPI_D0N	I/O	DSI-D0- differential data signals for MIPI interface
6	NC	-	Dummy
7	MIPI_D0P	I/O	DSI-D0+ differential data signals for MIPI interface
8	GND	P	Power Ground
9	MIPI_D1N	I	DSI-D1- differential data signals for MIPI interface
10	NC	-	
11	MIPI_D1P	I	DSI-D1+ differential data signals for MIPI interface
12	GND	P	Power Ground
13	MIPI_CKN	I	DSI-CLK- differential clock signals for MIPI interface
14	NC	-	
15	MIPI_CKP	I	DSI-CLK+ differential clock signals for MIPI interface
16	GND	P	Power Ground
17	LEDA	P	Power for Backlight Anode
18	LEDK	P	Power for Backlight Cathode
19	LCD_2V8	P	LCM Power supply for analog & digital circuits
20	TP_2V8	P	Touch panel Power supply for analog & digital circuits
21	TP_RST	I	Global reset for Touch Panel, active is low
22	TP_INT	O	Interrupt signal for TP
23	TP_SCK	I	Serial Clock signal for TP
24	TP_SDA	I/O	Serial Data input&output signal for TP
25	GND	P	Power Ground

I : Input ; O : Output ; P : Power

4.2 Block Diagram



5. ELECTRICAL CHARACTERISTICS

5.1 TFT-LCD Panel Driving Section

Item 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Power Supply1 Voltage	LCD_2V8	2.7	2.8	3.6	V	-
Power Supply2 Voltage	TP_2V8	2.7	2.8	3.3	V	-
Power Supply Current	I _{VCC}	-	30	-	mA	Note1
Logic Input High Voltage	V _{IH}	0.8IOVCC	-	IOVCC	V	-
Logic Input Low Voltage	V _{IL}	-0.3	-	0.2IOVCC	V	-
Panel Power Consumption	P _{VCC}	-	0.084	-	Watt	Note1
Module Power Consumption	P _{LCM}	-	0.596	-	Watt	Note1,2

(Ta=+25°C,GND=0V)

Note1:Measurement Conditions (Video Mode): Full Screen Red Pattern,VCC=2.8V,60Hz Refresh.

Note2: P_{LCM}= P_{VCC}+ P_{B/L}, About P_{B/L} information, inference to 5.2 Back Light Driving Section.

5.2 Back Light Driving Section

Item 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Forward Voltage	V _F	-	25.6	-	V	Note1
Forward Current	I _F	-	20	-	mA	Note1
Backlight Power consumption	P _{B/L}	-	0.512	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity			8		PCS	

(Ta=+25°C,GND=0V)

Note1: The LED driving condition is defined for each LED module (8 LED Parallel).

For each LED : I_F=20mA,V_F=3.2V(Typ.),Ta=25°C。

Note2:The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_{LED}=20mA(Per Led). The LED life time could be decreased if operating I_{LED} is larger than 20mA.



BACKLIGHT CIRCUIT DIAGRAM 20mA/LED (8LED)

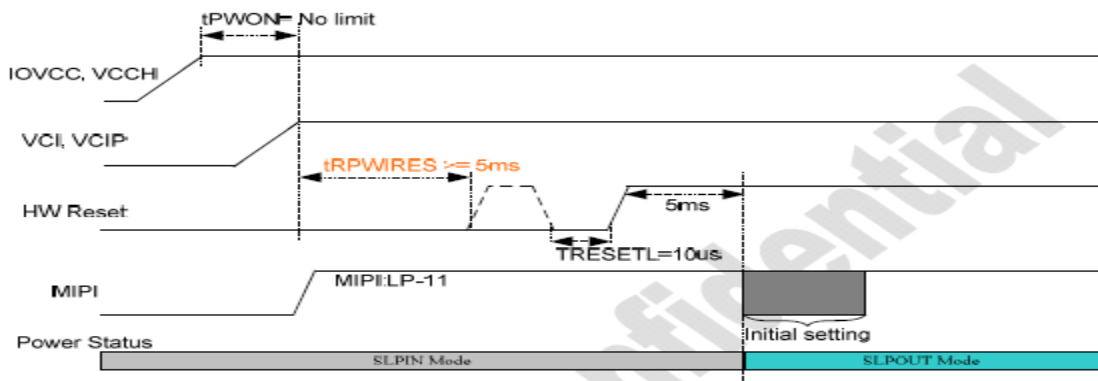
LED Vf:25.6V(TYP)

背光电路图
(CIRCUIT DIAGRAM)

5.3 Power On/Off Sequence

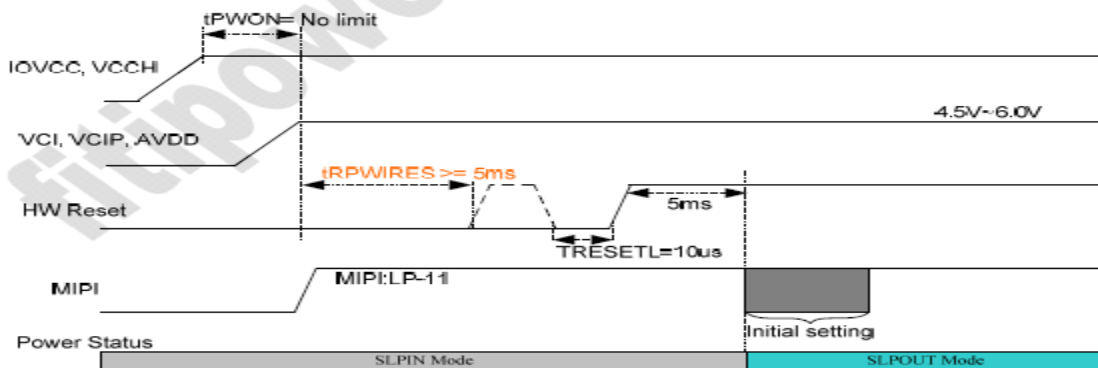
BOOSTM [1:0]=00 (Internal DC/DC power mode : PFM, Charge Pump, JD5001)

IOVCC=VCCH=1.65V ~ 3.6V, VCI=VCIP=2.5V ~ 4.8V.



BOOSTM [1:0]=01 (External AVDD power, Internal AVEE power)

IOVCC=VCCH=1.65V ~ 3.6V, AVDD=VCI=VCIP=4.5V ~ 6.0V



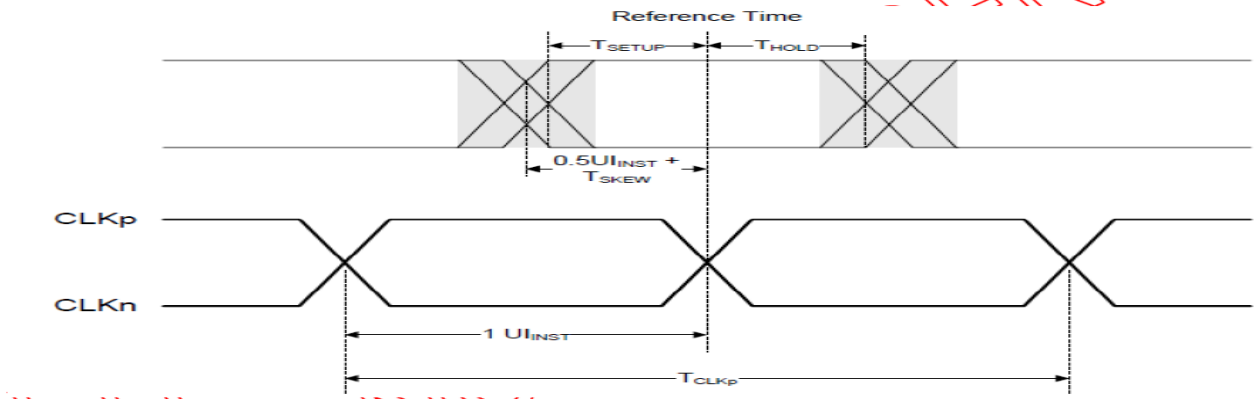


5.4 Timing Characteristics

5.4.1 AC Characteristics

Parameter	Symbol	Min	Typ	Max	Units
UI instantaneous	U_{INST}	2	-	12.5	ns
Data to Clock Skew(measured at transmitter)	$T_{SKEW(TX)}$	-0.15	-	0.15	U_{INST}
Data to Clock Setup time(measured at receiver)	$T_{SETUP(RX)}$	0.15	-	-	U_{INST}
Data to Clock Hold time(measured at receiver)	$T_{HOLD(RX)}$	0.15	-	-	U_{INST}
20%~80% rise time and fall time	T_R, T_F	150	-	-	ps
		-	-	0.3	U_{INST}

($T_a=+25^{\circ}C, GND=0V$)



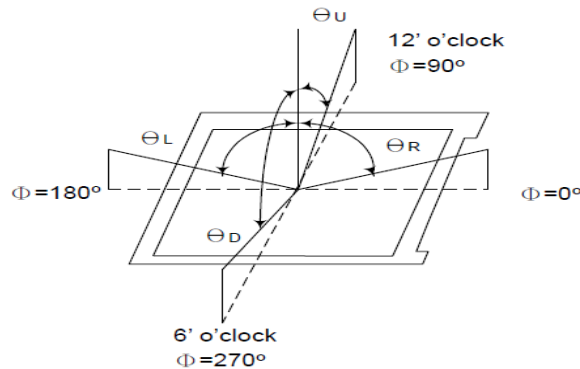
6. OPTICAL CHARACTERISTICS

Parameter 参数	Symbol 符号	Condition 条件	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Contrast Ratio	C/R	$\theta = 0^\circ$	720	900	-	-	Note(4)
NTSC Ratio	S	$\theta = 0^\circ$		70	-	%	Note(7)
Luminance	L	$\theta = 0^\circ$	-	400	-	cd/m ²	Note(5)
Luminance uniformity	U _w	$\theta = 0^\circ$	80	-	-	%	Note(3)
Response Time	T _{R+} T _F	25 °C	-	-	35	ms	Note(2)
Color Coordination	W _X	$\theta = 0^\circ$ (Center) Normal viewing angle B/L On	-0.03	0.310	+0.03	NTSC (x,y)	Note(6)
	W _Y			0.336			
	R _X			0.647			
	R _Y			0.317			
	G _X			0.275			
	G _Y			0.582			
	B _X			0.140			
	B _Y			0.088			
Viewing Angle	θ_L	C/R>10	-	80	-	Degree	Note(1)
	θ_R		-	80	-		
	θ_U		-	80	-		
	θ_D		-	80	-		

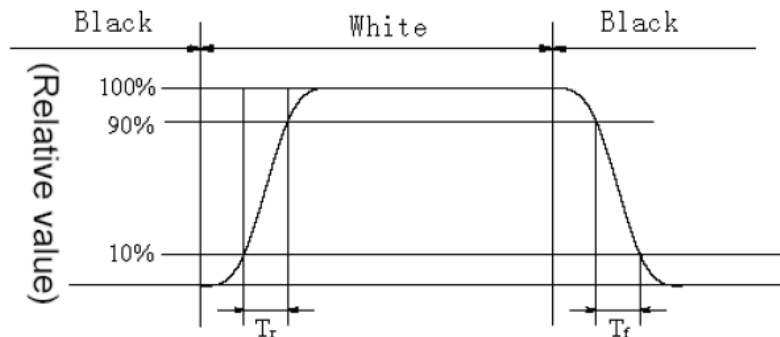
Test Conditions:

1. VCC=2.8V, I_F=20mA (Backlight current), the ambient temperature is +25°C.
2. The test systems refer to Note 8.

Note1: Definition of Viewing Angle: The viewing angle range that the CR>10

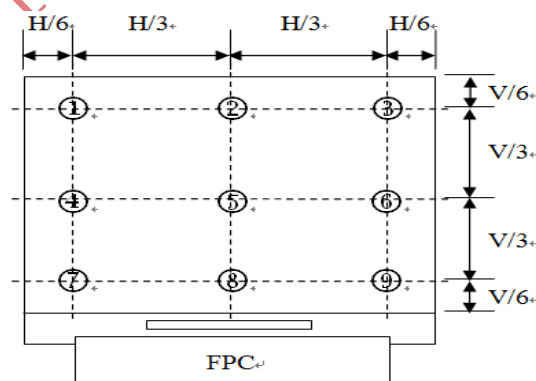


Note2: Definition of Response time: Sum of T_R and T_F



Note 3: Definition of Luminance Uniformity: Active area is divided into 9 measuring areas, every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \times 100\%$$



Note4: Definition of Contrast Ratio (CR): measured at the center point of panel

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

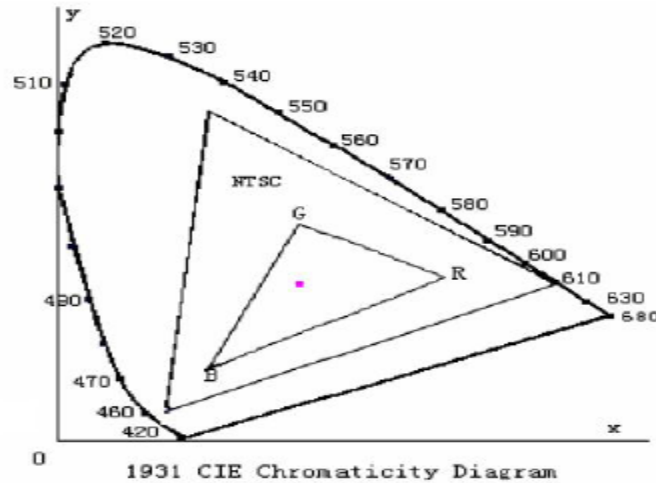
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

Color coordinates of white & red, green, blue measured at center point of LCD.

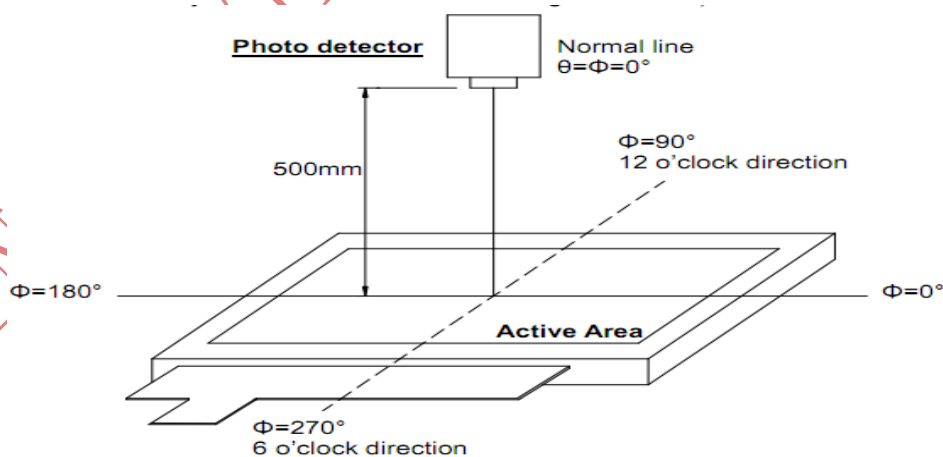
Note 7: Definition of NTSC ratio:

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$



Note 8: 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. (Response time is measured by Photo detector TOPCON BM-7, Field of view: 1°/Height: 500mm.)



7. RELIABILITY

Item 项目	Test Condition 测试条件	Remark 备注
High Temperature Storage	Ta =+80°C / 240Hours	Note1,2,3
Low Temperature Storage	Ta =-30°C / 240Hours	Note1,2,3
High Temperature Operating	Ta =+70°C / 240Hours	Note1,2,3
Low Temperature Operating	Ta =-20°C /240Hours	Note1,2,3
Temperature Cycle storage Test	-20°C/30min ↔+70°C /30min for 30cycles,Transfer time less than 5min	Note2,3
Thermal humidity storage Test	60°C x 90%RH / 240Hours	Note2,3
Package Vibration Test	Frequency: 10Hz~55Hz,Amplitude:1.5mm, 1 hrs for each direction of X, Y, Z	Note2
Packing shock test	Drop to the ground from 60cm height, 1 corner, 3 edges, 6 surfaces.	Note2
ESD(Whole Machine)	Contact: ±8KV,Air: ±12KV 150PF/330Ω,5Points/panel,5times	Note4

Inspection after Test:

Note1: Ta is the ambient temperature of samples.

Note 2: 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 doesn't guarantee all the cosmetic specification.

Note 3: Before cosmetic and function tests , the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Note5: The final interpretation of the above reliability test standard is owned by VIEWE.



8. PACKAGE DRAWING

