

LCD MODULE
SPECIFICATION

Model:	UE050FH-RS39-L024-A
Version:	V1.0
Date:	20181016

☒ **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

REVISION HISTORY

Revision 版本号	Date 日期	Contents of Revision Change 修改内容	Remark 备注
V1.0	2018.10.16	Preliminary release	

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1. GENERAL INFORMATION

1.1 Features

- 1) Pixel Arrangement: RGB Vertical Stripe
- 2) Interface Mode: MIPI
- 3) Driver IC: HX8399C
- 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: 400 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	LTPS TFT	-	
Screen Size	5.5	Inch	Diagonal
Resolution	1080(W)*3(RGB)*1920(H)	Dots	
Interface	MIPI	-	4lane
Module Power Consumption	0.87	Watt	Typ.
Active Area	61.64(W)*109.58(H)	mm	
Pixel pitch (W*H)	0.01905(W)*0.05710(H)	mm	
Module Size (W*H*D)	64.30(W)*118.45(H)*1.56(D)	mm	Tolerance: ±0.1
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 supply2 voltage	IOVCC	-0.3	3.6	V	Note1
Power supply3 voltage	VCI	-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

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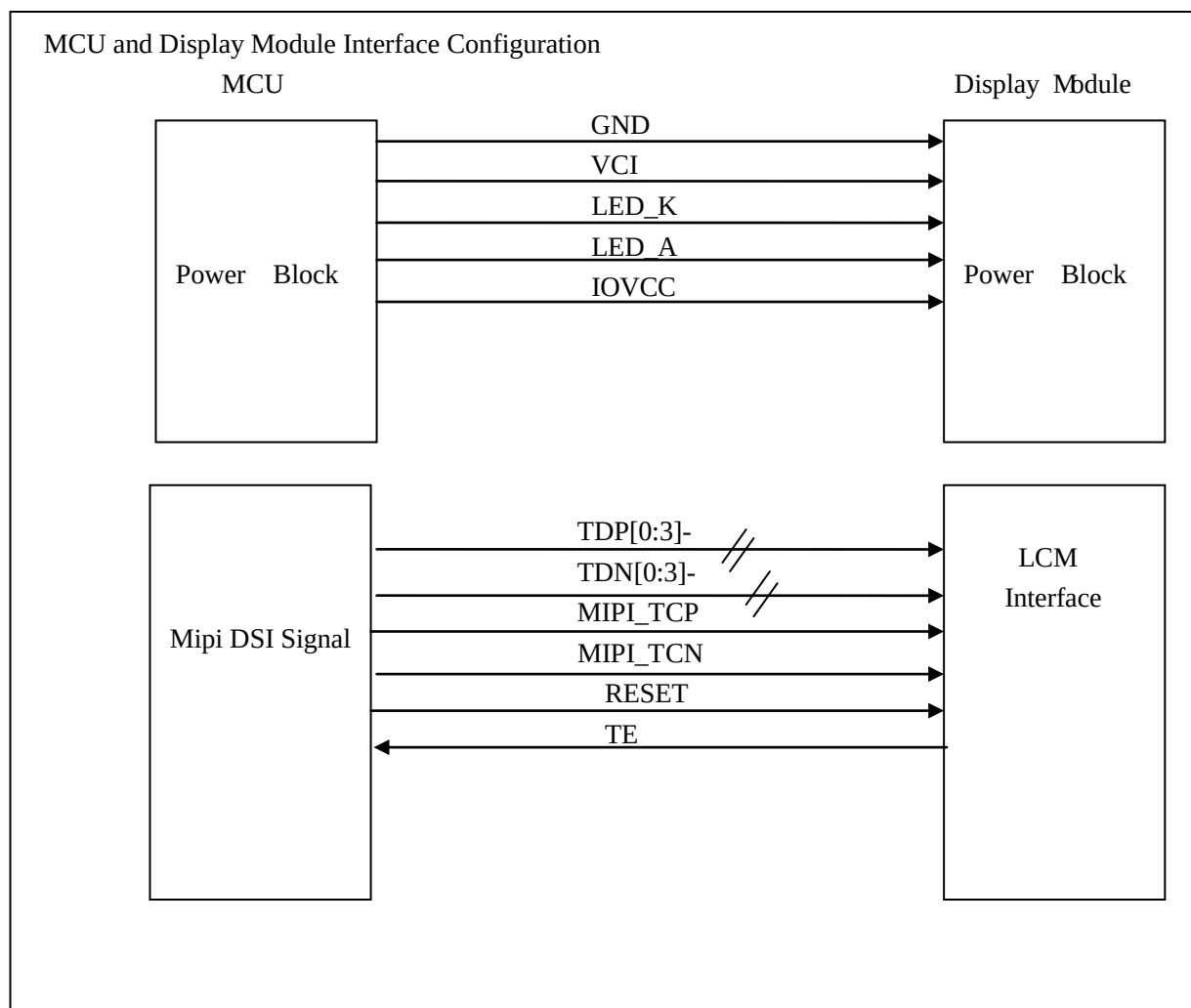
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin No. 序号	Symbol 符号	I/O	Description 描述
1-3	NC	-	Dummy
4	RST	I	Chip reset singal
5	GND	P	Power Ground
6	MIPI_TDP2	I	MIPI-DSI data lane 2 negative-end input pin
7	MIPI_TDN2	I	MIPI-DSI data lane 2 negative-end input pin
8	GND	P	Power Ground
9	MIPI_TDP1	I	MIPI-DSI data lane 1 negative-end input pin
10	MIPI_TDN1	I	MIPI-DSI data lane 1 negative-end input pin
11	GND	P	Power Ground
12	MIPI_TCP	I	MIPI-DSI data lane 3 positive-end input pin
13	MIPI_TCN	I	MIPI-DSI clock lane negative-end input pin
14	GND	P	Power Ground
15	MIPI_TDP0	I	MIPI-DSI data lane 0 negative-end input pin
16	MIPI_TDN0	I	MIPI-DSI data lane 0 negative-end input pin
17	GND	P	Power Ground
18	MIPI_TDP3	I	MIPI-DSI data lane 3 negative-end input pin
19	MIPI_TDN3	I	MIPI-DSI data lane 3 negative-end input pin
20	GND	P	Power Ground
21	TE	O	Tearing effect output pin to synchronize MCU to frame writing
22	VCI	I	Power supply for digital circuits (2.8V)
23	IOVCC	I	Power supply for digital circuits and IO pads(1.8V)
24-31	NC	-	Dummy
32-33	LED_A	P	Power supply for LED+
34-35	LED_K	P	Power supply for LED-
35-39	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 Supply2 Voltage	IOVCC	1.7	1.8	3.6	V	-
Power Supply3 Voltage	VCI	2.8	3.3	3.6	V	-
Power Supply Current	IVDD	-	30	-	mA	Note1
Logic Input High Voltage	V _{IH}	0.7VCI	-	VCI	V	-
Logic Input Low Voltage	V _{IL}	0	-	0.3VCI	V	-
Panel Power Consumption	P _{VCI}	-	0.099	-	Watt	Note1
Module Power Consumption	P _{LCM}	-	0.87	-	Watt	Note1,2

(Ta=+25°C,GND=0V)

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

Note2: P_{LCM}= P_{VDD}+ P_BL, About P_BL information, inference to 5.2 Back Light Driving Section.

5.2 Back Light Driving Section

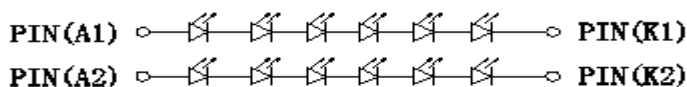
Item 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Forward Voltage	V _F	-	19.2	-	V	Note1
Forward Current	I _F	-	40	-	mA	Note1
Backlight Power consumption	P _B L	-	0.768	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity		12			PCS	

(Ta=+25°C,GND=0V)

Note1: The LED driving condition is defined for each LED module (6 LED Serial, 2 LED Parallel)。

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

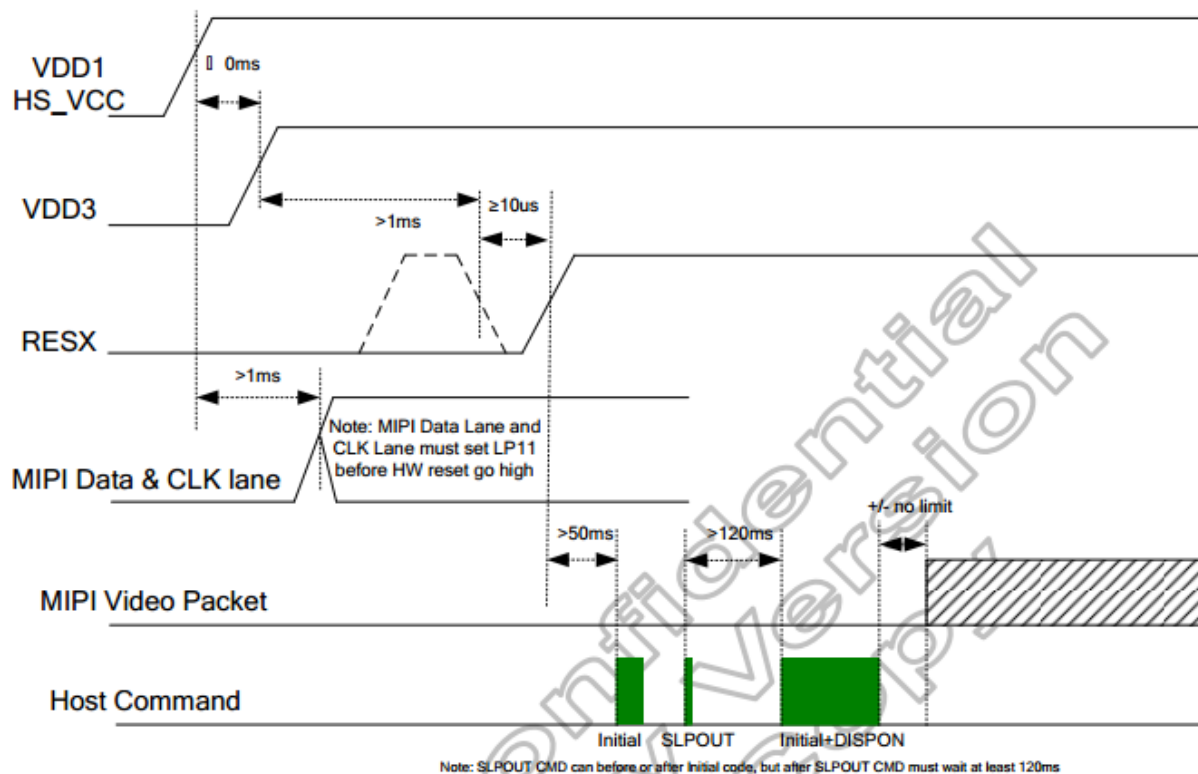
Note2:The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_{LED}=20mA(Per Led). The LED life time could be decreased if operating I_{LED} is larger than 20mA.



BACKLIGHT CIRCUIT DIAGRAM 20mA/LED (12LED)
LED Vf:19.2V(TYP)

5.3 Power On/Off Sequence

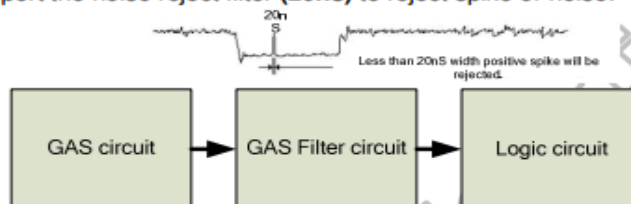
5.3.1 Power On Sequence



5.3.2 Power Off Sequence

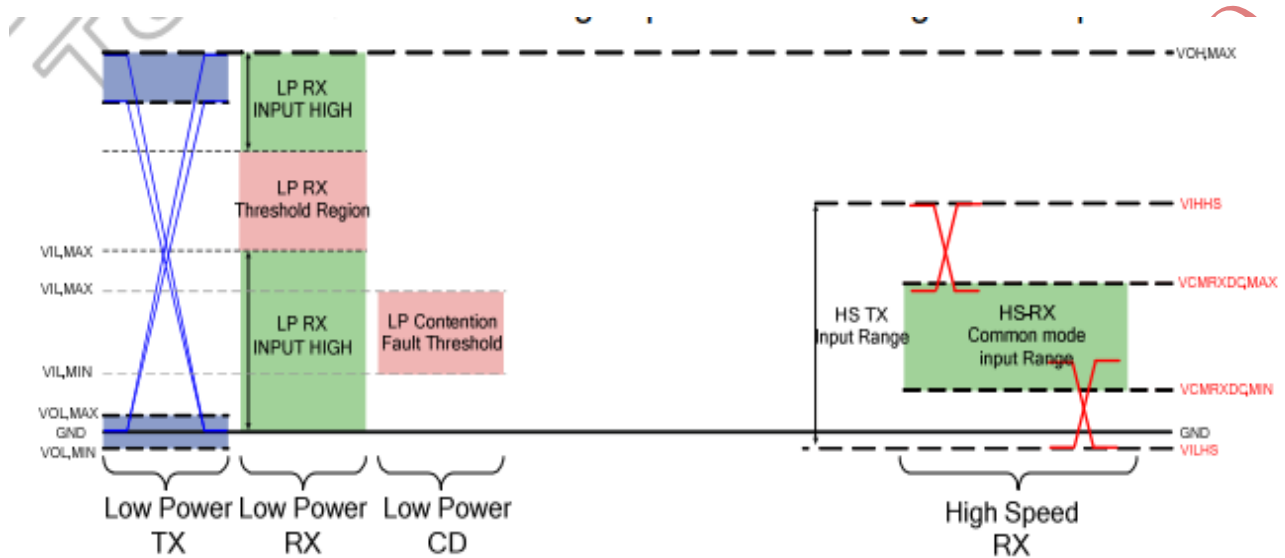
The uncontrolled power off means a situation when e.g. there is removed a battery without the controlled power off sequence. There will not be any damages for the display module or the display module will not cause any damages for the host or lines of the interface. At an uncontrolled power off the display will go blank and there will not be any visible effects within 1 second on the display (**blank display**) and remains blank until "Power on Sequence" powers it up.

Note: (1) HX8399-C is support the noise reject filter (**20ns**) to reject spike or noise.



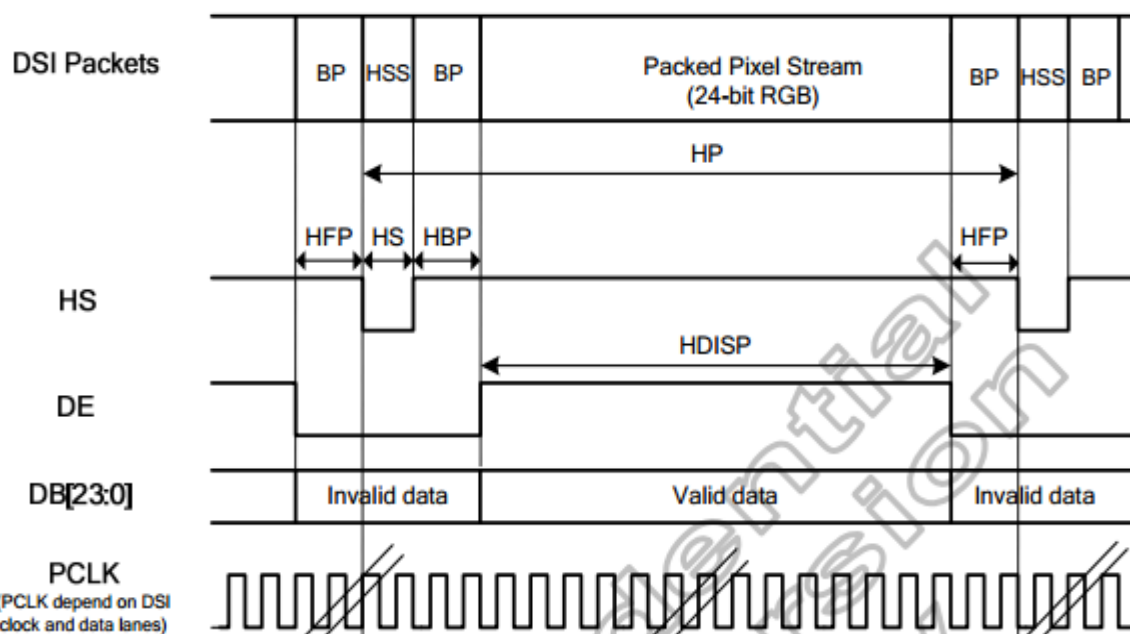
5.4 Timing Characteristics

5.4.1 AC Characteristics

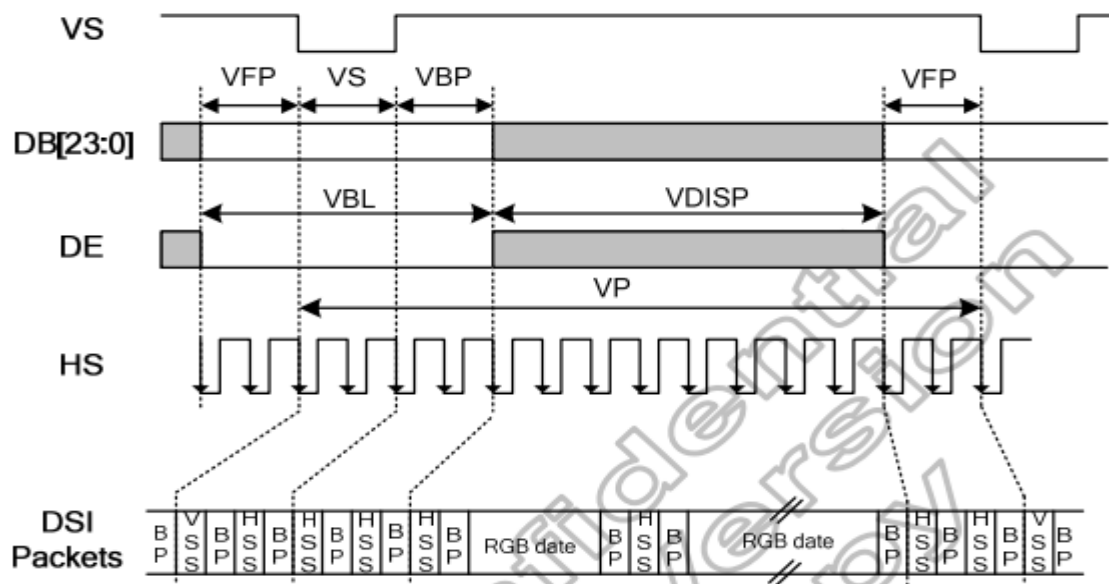


5.5 Timing Diagram

5.5.1 Horizontal Timings



5.5.2 Vertical Timings



5.5.3 Timing Parameters

Parameter	Symbol	Value			Unit
		Min.	Typ.	MAX.	
Bit rate per lane	BRPHY	80	-	1000	Mbps
Active pixel per line	HACT	-	1080	-	Pixels
Horizontal back porch	thBP	-	5	-	DCLK
Horizontal sync active	thSA	-	5	-	DCLK
Horizontal front porch	thFP	-	5	-	DCLK
Active pixel per frame	VACT	-	1920	-	H
Vertical back porch	tvBP	-	2	-	H
Vertical sync active	tvSA	-	2	-	H
Vertical front porch	tvFP	-	2	-	H

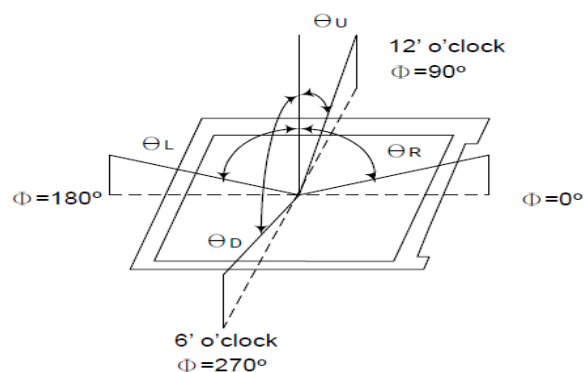
6. OPTICAL CHARACTERISTICS

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	$\theta = 0^\circ$	700	900	-	-	Note(4)
NTSC Ratio	S	$\theta = 0^\circ$	80	-	-	%	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	-	25	35	ms	Note(2)
Color Coordination	W _X	$\theta = 0^\circ$ (Center) Normal viewing angle B/L On	-0.03	0.299	+0.03	NTSC (x,y)	Note(6)
	W _Y			0.333			
	R _X			0.682			
	R _Y			0.312			
	G _X			0.265			
	G _Y			0.653			
	B _X			0.152			
	B _Y			0.039			
Viewing Angle	θ_L	C/R>10	-	80	-	Degree	Note(1)
	θ_R		-	80	-		
	θ_U		-	80	-		
	θ_D		-	80	-		

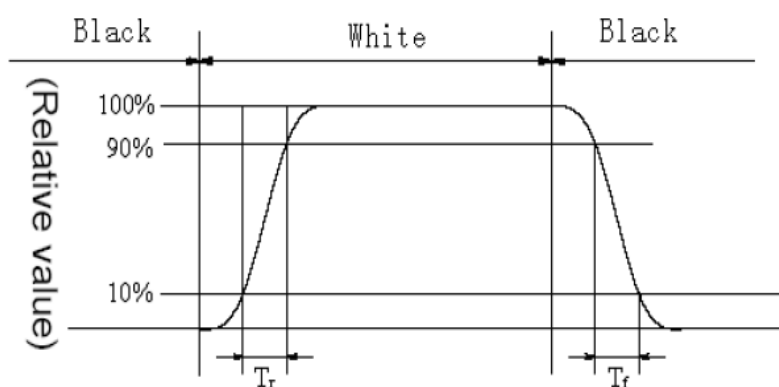
Test Conditions:

- VDD=2.8V, I_F=40mA (Backlight current), the ambient temperature is +25°C.
- The test systems refer to Note 8.

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

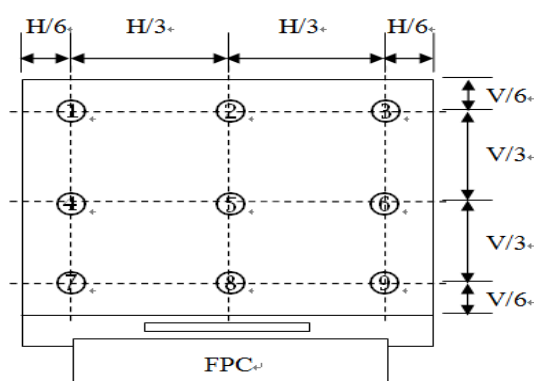


Note2: Definition of Response time: Sum of T_R and T_F



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

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

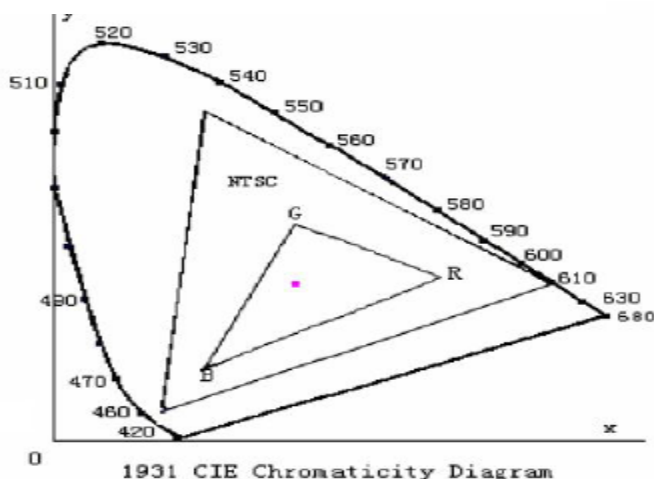
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

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

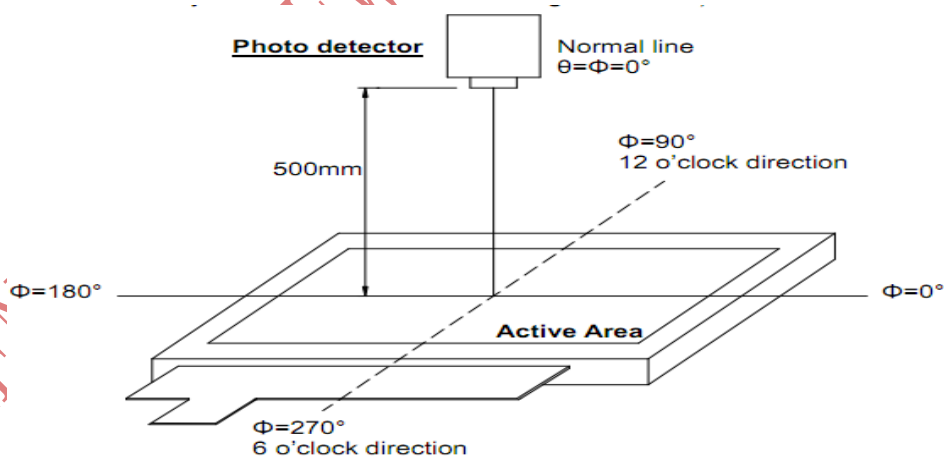
Note 7: Definition of NTSC ratio:

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



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

