LCD MODULE

SPECIFICATION

Model:	UEW035VG-AF30-L024
Version:	V1.0
Date:	20190422

☐ **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	2019.04.22	Preliminary release	

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1. GENERAL INFORMATION

1.1 Features

1) Pixel Arrangement：RGB_Stripe
2) Interface Mode：MIPI
3) Driver IC：ST7703
4) Operation Temperature：-20~70℃
5) Storage Temperature：-30~80℃
6) Backlight Type：White LED
7) Display mode：Normally Black,
8) Pixel Density：228 PPI
9) LED life time：30,000 Hours

1.2 Mechanical Specification

No	Feature	Specification	unit
1	Size	3.5	Inch
2	Display Mode	Normal Black, IPS	-
3	Module outline dimension	76.30(L) x63.30(W)x2.97(H)	mm
4	Panel outline dimension	73.08 (H) X 59.56 (V) x 1.0 (D)	mm
5	Screen size (inch)	3.45" diagonal	inch
6	Active Area	70.08 (H) X 52.56 (V)	mm
7	Display Resolution (Pixel)	640 x RGB x 480	pixel
8	Pixel driving element	a-Si IPS	-
9	Pixel pitch (um)	109.5um X 109.5um	um
10	Pixel arrangement	RGB Stripe	-
11	Surface Treatment	HC	
12	View direction (Gray inversion)	85/85/85/85(TYP)	-
13	Luminance	700	cd/m^2
14	Interface	MIPI	
15	Driver IC	ST7703	-
16	Backlight LED Number	6 LEDS	
17	Weight	TBD	g

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	VDD	-0.3	5.5	V	Note1
Power supply2 voltage	VSP	-0.3	6.6	V	
Power supply3 voltage	VSN	-6.6	0.3	V	
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	℃	Note1,2
Storage temperature	T_{st}	-30	80	℃	Note1,2
Humidity	H_{st}	10	90	%RH	Note1,3

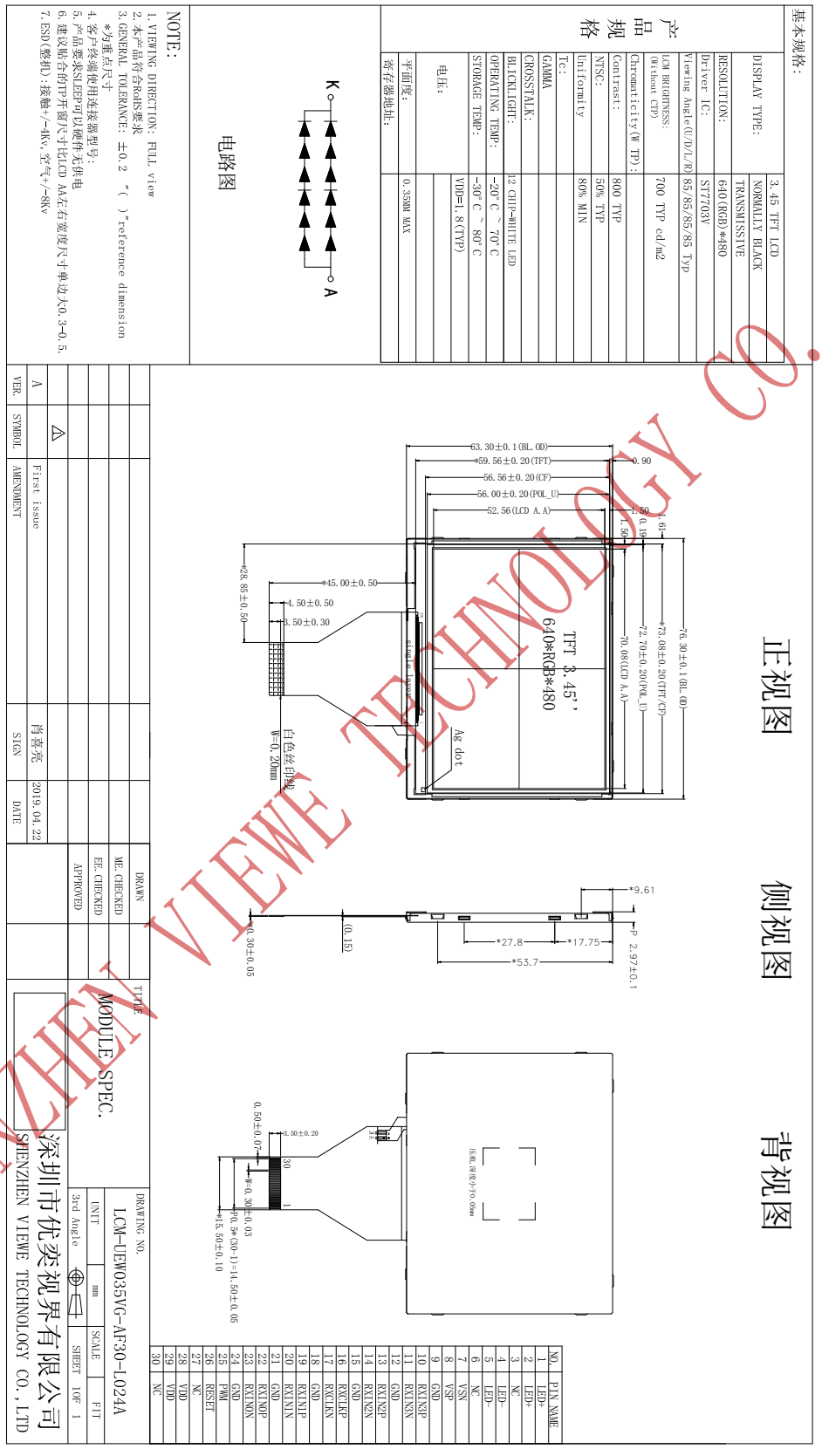
(Ta=+25°C,GND=0V)

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℃,the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

Note3: Temp. ≤ 60℃ , 90% RH MAX.
Temp. ＞60℃ , Absolute humidity shall be less than 90% RH .

3. MECHANICAL DRAWING



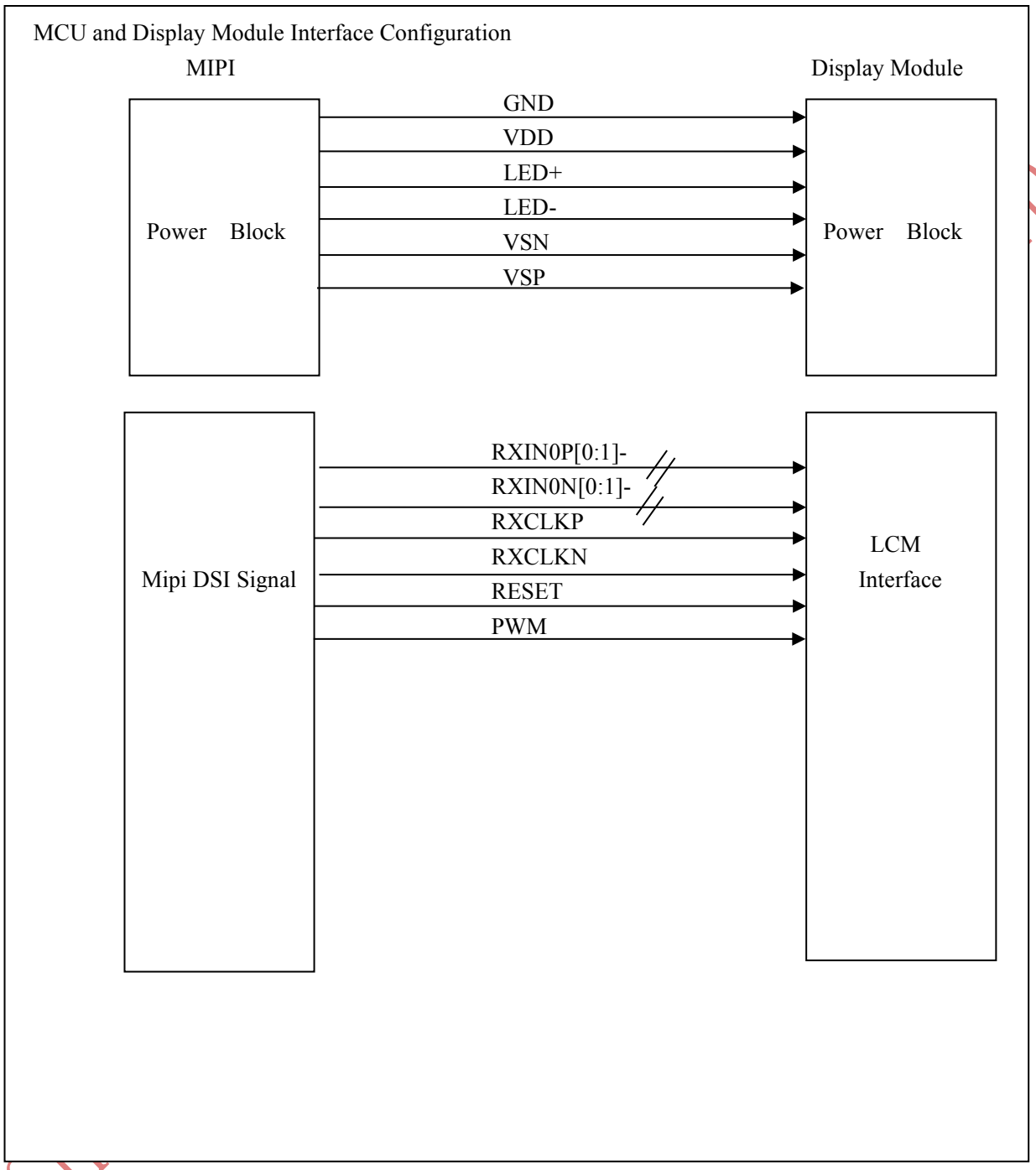
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin	Symbol	I/O	Description
1-2	LED+	P	Power supply for LED+
3	NC	-	NC
4-5	LED-	P	Power supply for LED-
6	NC	-	NC
7	VSN	P	Analog supply negative voltage - 5.5V
8	VSP	P	Analog supply positive voltage+5.5V
9	GND	P	Power Ground
10	RXIN3P	I	+MIPI differential data input
11	RXIN3N	I	-MIPI differential data input
12	GND	P	Power Ground
13	RXIN2P	I	+MIPI differential data input
14	RXIN2N	I	-MIPI differential data input
15	GND	P	Power Ground
16	RXCLKP	I	+MIPI differential clock input
17	RXCLKN	I	-MIPI differential clock input
18	GND	P	Power Ground
19	RXIN1P	I	+MIPI differential data input
20	RXIN1N	I	-MIPI differential data input
21	GND	P	Power Ground
22	RXIN0P	I	+MIPI differential data input
23	RXIN0N	I	-MIPI differential data input
24	GND	P	Power Ground
25	PWM	I	PWM control signal for LED driver
26	RESET	I	Global reset pin(1.8V)
27	NC	-	NC
28-29	VDD	P	Power Voltage for digital circuit(1.8V)
30	NC	-	NC

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	VDD	1.65	1.8	2.0	V	-
Power Supply2 Voltage	VSP	5.0	5.5	6.0	V	
Power Supply3 Voltage	VSN	-6.0	-5.5	-5.0	V	
Power Supply Current	I_{VDD}	-	28	-	mA	Note1
Logic Input High Voltage	V_{IH}	0.7IOVCC	-	IOVCC	V	-
Logic Input Low Voltage	V_{IL}	0	-	0.3IOVCC	V	-
Panel Power Consumption	P_{VDD}	-	0.05	-	Watt	Note1
Module Power Consumption	P_{LCM}	-	0.4	-	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_{BL}	-	0.764	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity			6		PCS	

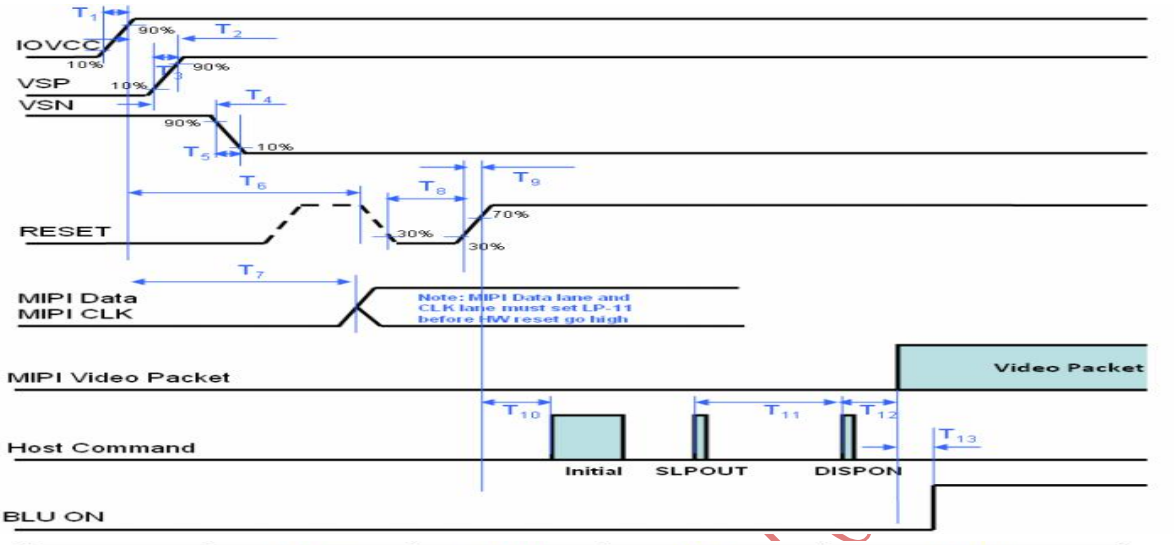
(Ta=+25°C,GND=0V)

Note1: The LED driving condition is defined for each LED module (12 LED Serial, 1LED Parallel)。
For each LED ： I_F=20mA,V_F=3.2V(Typ.),Ta=25℃。

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.

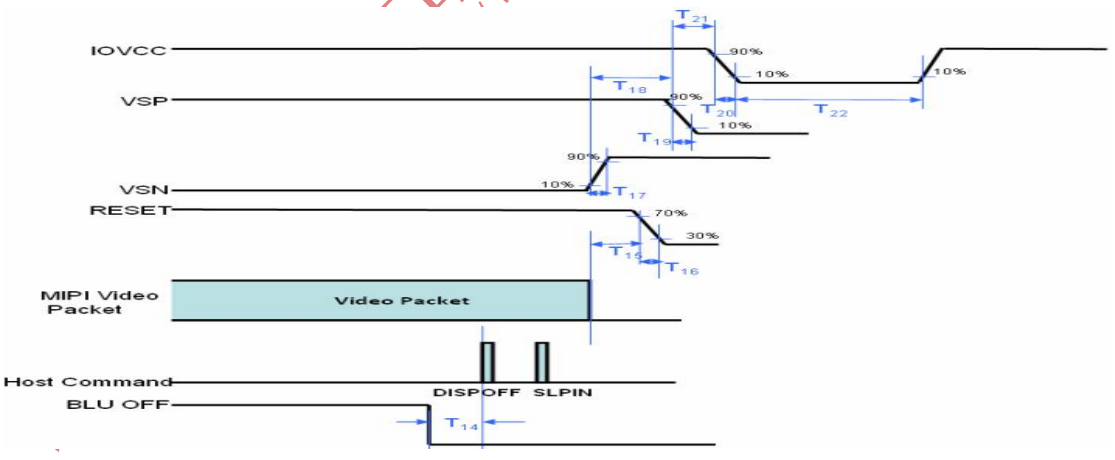
5.3 Power On/Off Sequence

5.3.1 Power On Sequence



	Min.	Typ.	Max.	Unit
T1	0.01	-	10	ms
T2		No Limit		ms
T3	0.01	-	10	ms
T4		No Limit		ms
T5	0.01	-	10	ms
T6	1	-	-	ms
T7	1	-	-	ms
T8	10	-	-	us
T9		No Limit		ns
T10	15	-	-	ms
T11	120	-	-	ms
T12		No Limit		ms
T13	100	150	-	ms

5.3.2 Power Off Sequence



	Min.	Typ.	Max.	Unit
T14	40	100	-	ms
T15	10	-	-	ms
T16		No Limit		ms
T17		No Limit		ms
T18		No Limit		ms
T19		No Limit		ms
T20		No Limit		ms
T21		No Limit		ms
T22	500	-	-	ms

5.4 Timing Characteristics

5.4.1 AC Characteristics

High Speed Mode

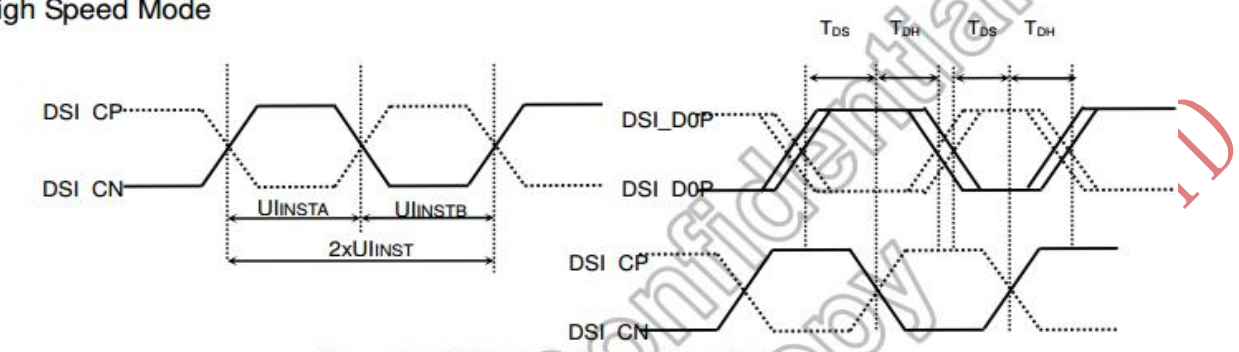
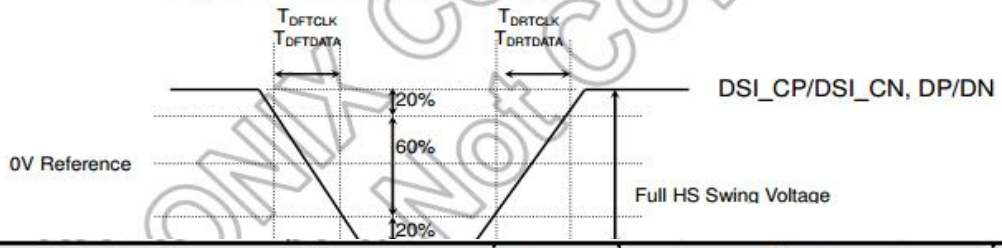


Figure 7.4: DSI clock timing Characteristics



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11 Host→ Display module	T_{LPXM}	50	-	-	ns
	Length of LP-00/LP01/LP10/LP11 Display module →Host	T_{LPXD}	50	-	-	ns
	Time-out before the MPU start driver	$T_{TA-SURE}$	T_{LPXD}	-	2xT_{LPXD}	ns
	Time to drive LP-00 by display module	T_{TA-GET}	5xT_{LPXD}	-	-	ns
	Time to drive LP-00 after turnaround request Host	T_{TAGO}	4xT_{LPXD}	-	-	ns

5.5 Timing Parameters

Parameter	Symbol	Value			Unit
		Min.	Typ.	MAX.	
Bit rate per lane	BR_{PHY}	200	-	500	Mbps
Active pixel per line	HACT	-	640	-	Pixels
Horizontal back porch	t_{HBP}	6	20	-	DCLK
Horizontal sync active	t_{HSA}	5	18	-	DCLK
Horizontal front porch	t_{HFP}	5	35	-	DCLK
Active pixel per frame	VACT	-	480	-	H
Vertical back porch	t_{VBP}	2	12	-	H
Vertical sync active	t_{VSA}	2	2	-	H
Vertical front porch	t_{VFP}	2	6	-	H

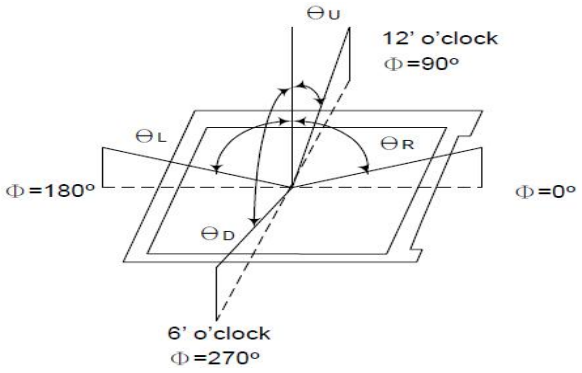
6. OPTICAL CHARACTERISTICS

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	θ = 0°	600	800	-	-	Note(4)
NTSC Ratio	S	θ =0°	45	50	-	%	Note(7)
Luminance	L	θ =0°	-	700	-	cd/m2	Note(5)
Luminance uniformity	U_W	θ =0°	70	80	-	%	Note(3)
Response Time	T_R+ T_F	25 °C	-	20	50	ms	Note(2)
Color Coordination	W_X	θ = 0° (Center) Normal viewing angle B/L On	-0.03	0.297	+0.03	NTSC (x,y)	Note(6)
	W_Y			0.318			
	R_X			TBD			
	R_Y			TBD			
	G_X			TBD			
	G_y			TBD			
	B_X			TBD			
	B_Y			TBD			
Viewing Angle	Θ_1	C/R>10	80	85	-	Degree	Note(1)
	θ_R		80	85	-		
	θ_U		80	85	-		
	θ_D		80	85	-		

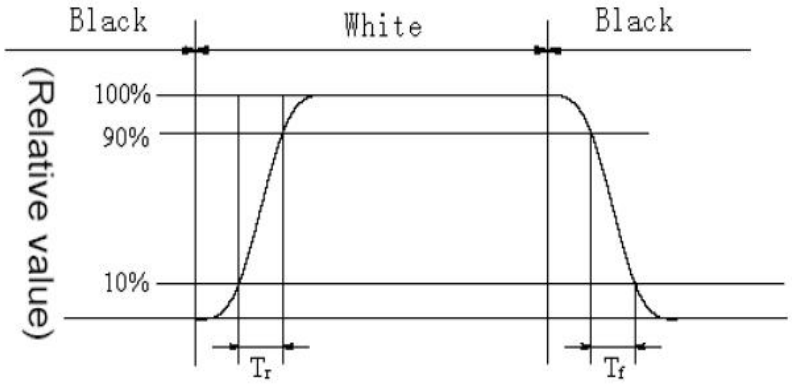
Test Conditions:

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

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

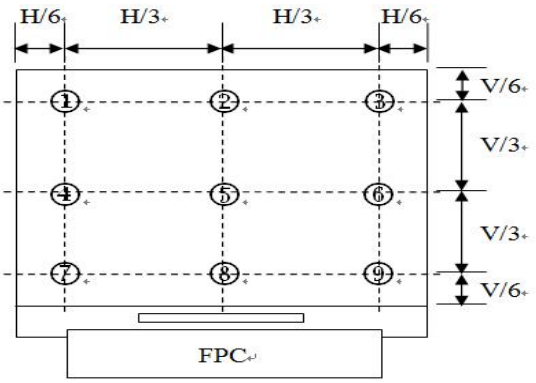


Note2: Definition of Response time: Sum of T_R and T_F



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

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

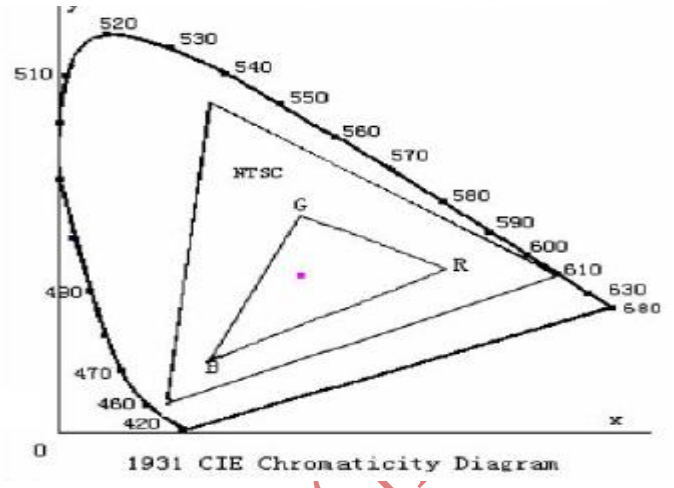
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

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

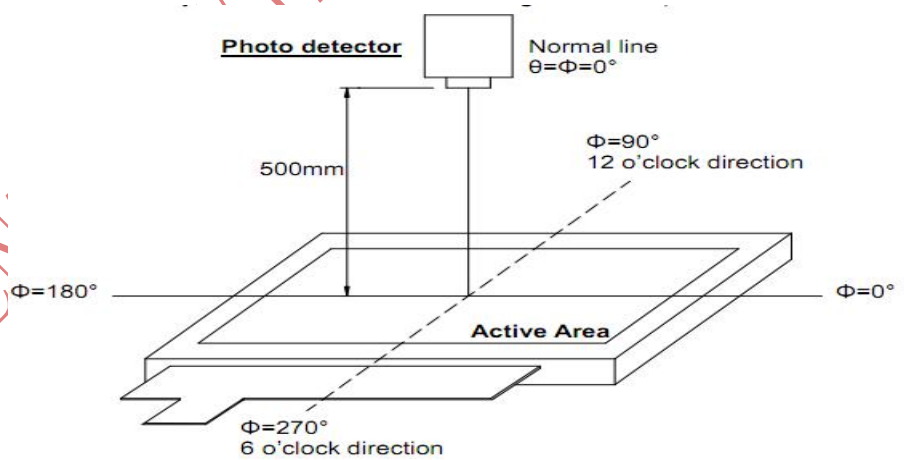
Note 7: Definition of NTSC ratio:

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



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 / 96Hours	Note1,2,3
Low Temperature Storage	Ta =-30°C / 96Hours	Note1,2,3
High Temperature Operating	Ta =+70°C / 96Hours	Note1,2,3
Low Temperature Operating	Ta =-20°C / 96Hours	Note1,2,3
Temperature Cycle storage Test	-30°C/30min ⇆+80°C /30min for 30cycles,Transfer time less than 5min	Note2,3
Thermal humidity storage Test	80°C x 90%RH / 96Hours	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
Electrical Static Discharge	Air:±4KV 150pF/330Ω 5 times	
	Contact:±2KV 150pF/330Ω 5 times	
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.		

8. PACKAGE DRAWING