

LCD MODULE
SPECIFICATION

Model:	UE050WQ-RN40-L021A
Version:	V1.0
Date:	20181018

☐ Preliminary Specification 样品规格书☒ Final Specification 量产规格书

Customer Confirmation 客户确认

Approved by	Notes

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

请贵司在收到规格书的两周内, 将签好字的规格书原件或者复印件寄回. 如果没有返回, 我司将会认为贵司已经默认接受产品规格书中的全部资料和规范.

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	2018.10.18	Preliminary release	

TABLE of CONTENTS

1. GENERAL INFORMATION.....	4
1.1 Features.....	4
1.2 Mechanical Specification.....	4
2. ABSOLUTE MAXIMUM RATINGS.....	5
3. MECHANICAL DRAWING.....	6
4. I/O CONNECTION & BLOCK DIAGRAM.....	7
4.1 I/O Connection.....	7
4.2 Block Diagram.....	8
5. ELECTRICAL CHARACTERISTICS.....	9
5.1 TFT-LCD Panel Driving Section.....	9
5.2 Back Light Driving Section.....	9
5.3 Power On/Off Sequence.....	10
5.4 Timing Characteristics.....	11
5.5 Timing Diagram.....	11
6. OPTICAL CHARACTERISTICS.....	12
7. RELIABILITY.....	15
8. PACKAGE DRAWING.....	16

1. GENERAL INFORMATION

1.1 Features

- 1) Pixel Arrangement: RGB Vertical Stripe
- 2) Interface Mode: 40PIN RGB 24bits
- 3) Driver IC: ILI6482C
- 4) Operation Temperature: -20~60℃
- 5) Storage Temperature: -30~70℃
- 6) Backlight Type: White LED
- 7) Display mode: Normally White.
- 8) Pixel Density: 128 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	5.0	Inch	Diagonal
Resolution	480(W)*3(RGB)*272(H)	Dots	-
Interface	RGB 24bits	-	40PIN
Module Power Consumption	0.87	Watt	Typ.
Active Area	110.88(W)*62.83(H)	mm	-
Pixel pitch (W*H)	0.231(W)*0.231(H)	mm	-
Module Size (W*H*D)	120.7(W)*75.8(H)*2.8(D)	mm	Tolerance: ±0.2
Luminance	500	cd/m ²	Typ.
Viewing Direction	6	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 supply voltage	VDD	-0.5	3.96	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	60	°C	Note1,2
Storage temperature	T _{st}	-30	70	°C	Note1,2
Humidity	H _{st}	10	90	%RH	Note1,3

(T_a=+25°C, GND=0V)

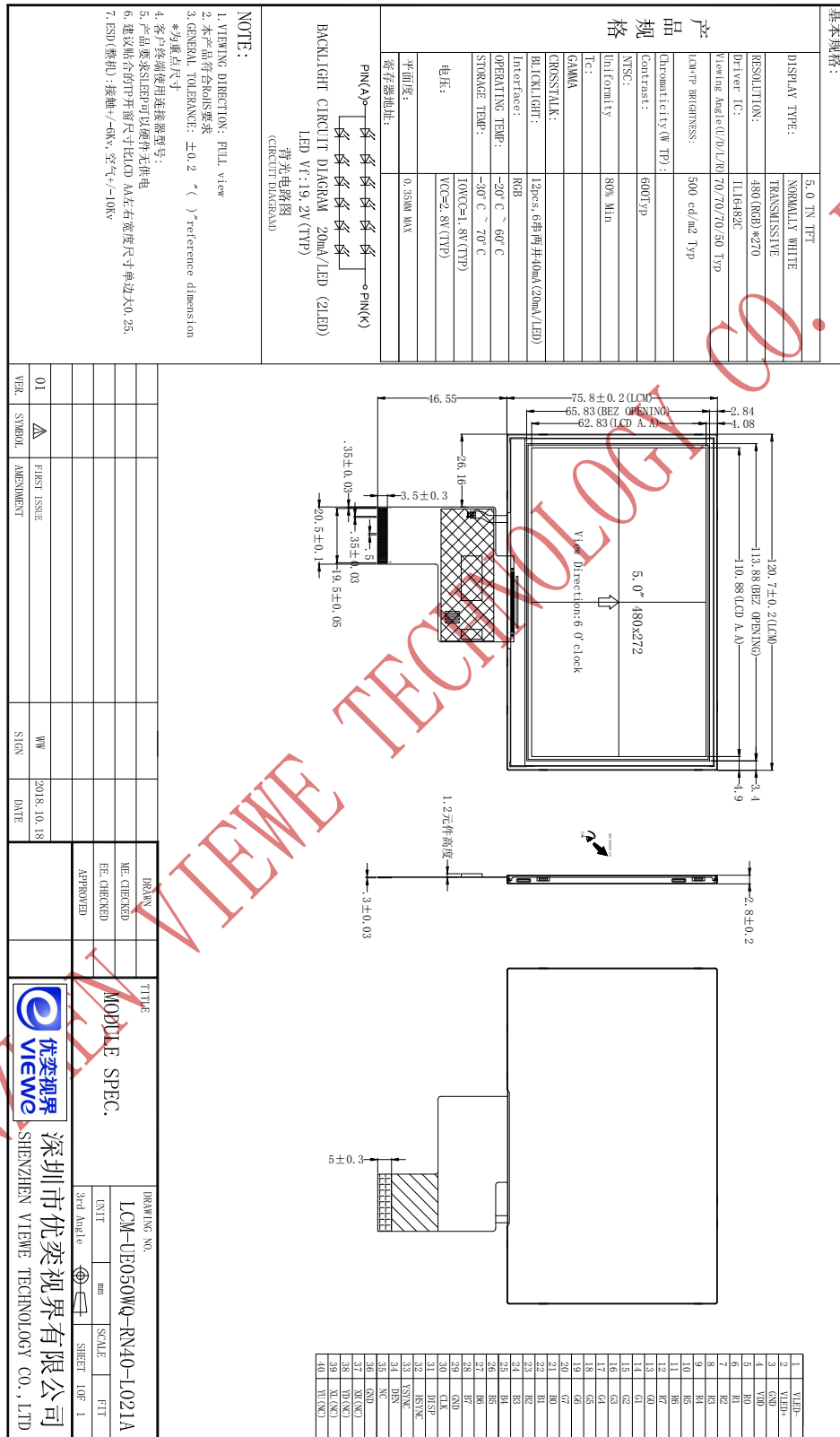
Note1: If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also if the module operates with the absolute maximum ratings for a long time, the reliability may drop.

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



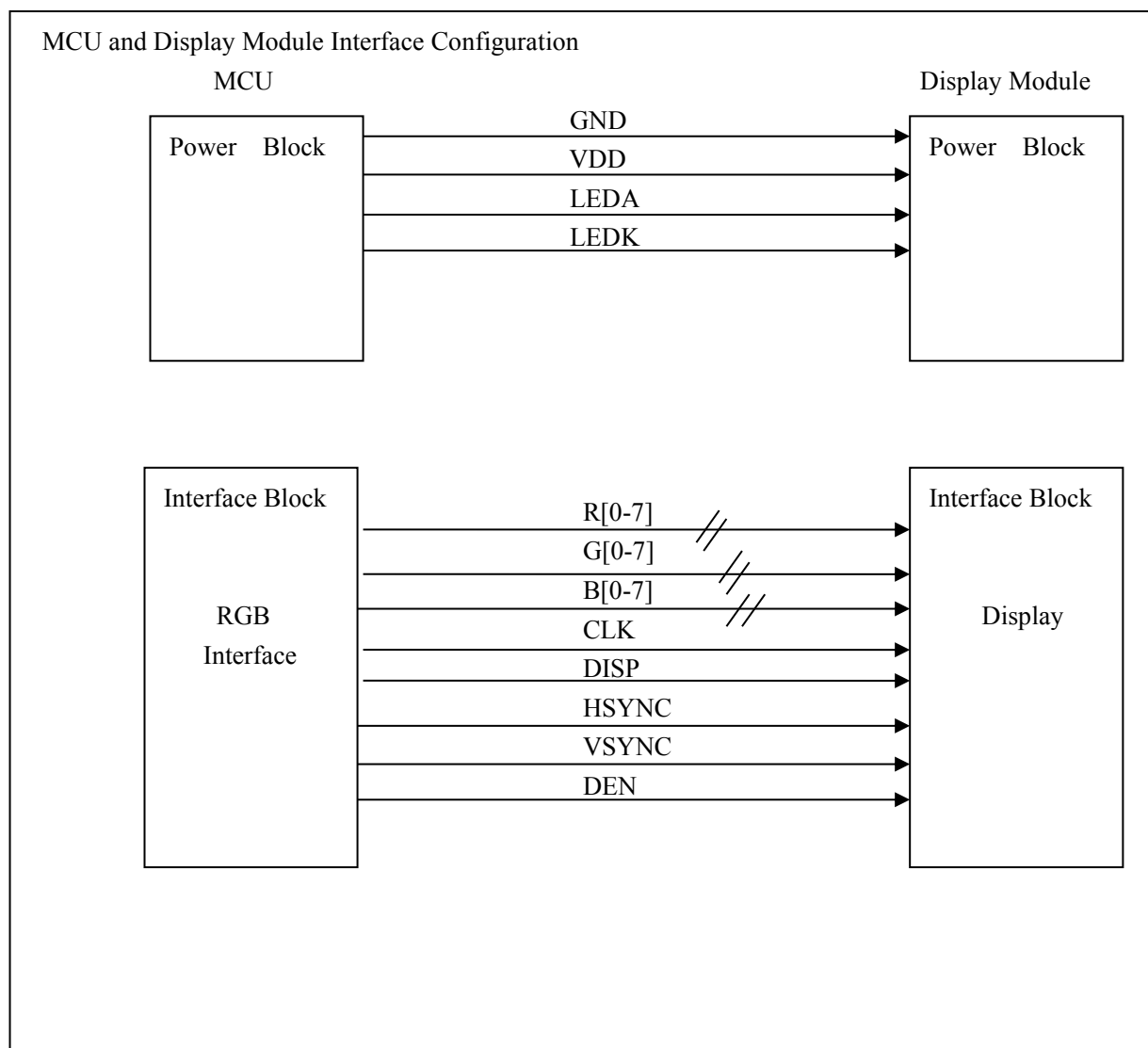
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin No. 序号	Symbol 符号	I/O	Description 描述
1	LEDK	P	Power supply for backlight cathode
2	LEDA	P	Power supply for backlight anode
3	GND	P	Power Ground
4	VDD	P	Power supply to the internal logic power regulator(3.3V)
5-12	R0-R7	I	Red data input.
13-20	G0-G7	I	Green data input.
21-28	B0-B7	I	Blue data input.
29	GND	P	Power Ground
30	CLK	I	Pixel clock input pin, Negative polarity
31	DISP	I	Standby mode. Normally pulled high.
32	HSYNC	I	Horizontal sync signal, Negative polarity
33	VSYNC	I	Vertical sync signal, Negative polarity
34	DEN	I	Data input enable. Display access is enabled when DE is “H”
35	NC	I	Dummy
36	GND	P	Power Ground
37	XR	-	Dummy
38	YD	-	Dummy
39	XL	-	Dummy
40	YU	-	Dummy

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 Supply Voltage	VDD	3.0	3.3	3.6	V	-
Power Supply Current	I _{VDD}	-	30	-	mA	Note1
Logic Input High Voltage	V _{IH}	0.7VDD	-	VDD	V	-
Logic Input Low Voltage	V _{IL}	0	-	0.3VDD	V	-
Panel Power Consumption	P _{VDD}	-	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=3.3V, 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

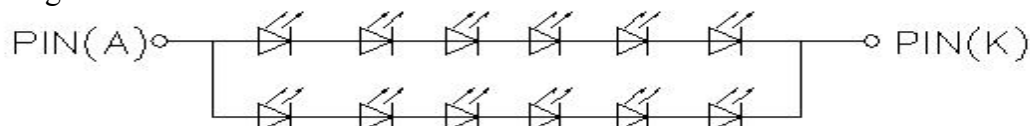
Item 项目	Symbol 符号	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Forward Voltage	V _F	-	19.2	17	V	Note1
Forward Current	I _F	-	40	-	mA	Note1
Backlight Power consumption	P _{BL}	-	0.768	-	Watt	Note1
LED life time	-	30000	-	-	Hrs	Note2
LED Quantity		12			PCS	

(Ta=+25°C,GND=0V)

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

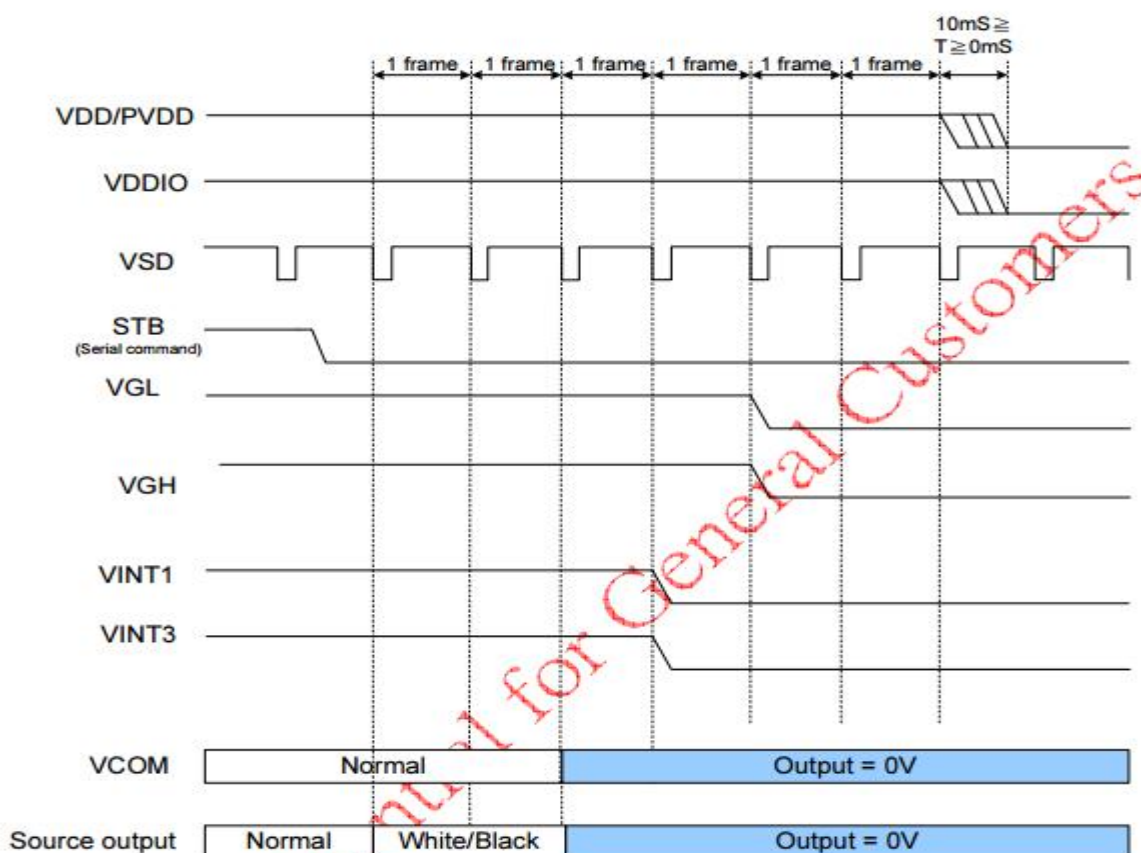
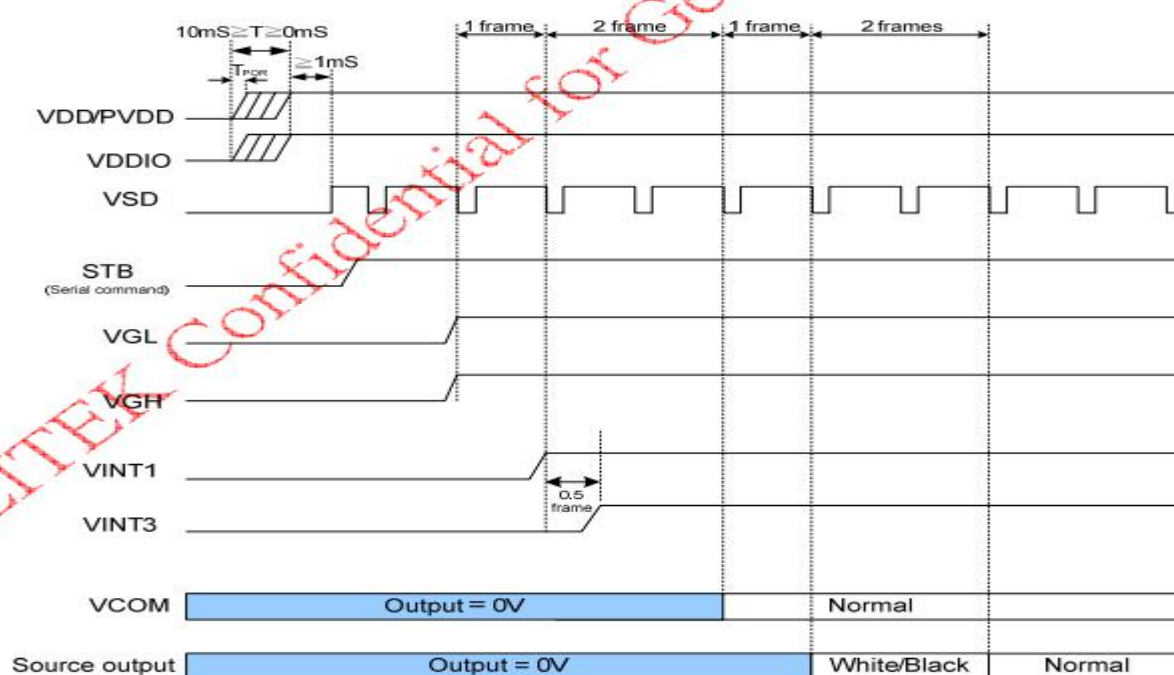
For each LED : I_F=20mA, V_F=3.2V(Typ.)/3.4V(Max.), Ta=25°C。

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 (2LED)
LED Vf: 19.2V(TYP)

5.3 Power On/Off Sequence



5.4 Timing Characteristics

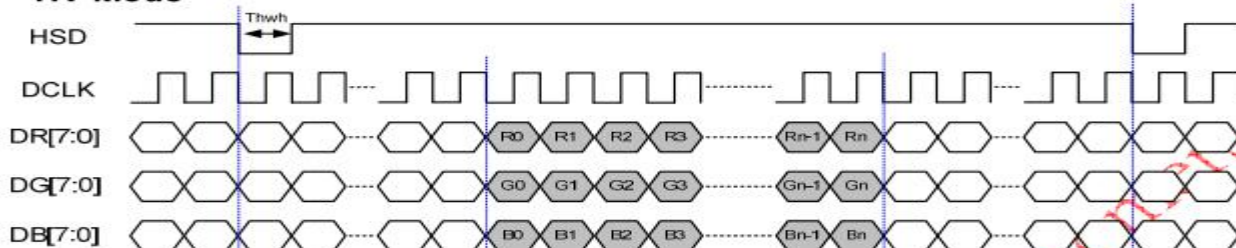
(Ta=+25°C,GND=0V)

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	279	288	400	H
VSD display area	Tvd	272			H
VSD back porch	Tvb	5	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	521	525	800	DCLK
HSD display area	Thd	480			DCLK
HSD back porch	Thbp	37	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

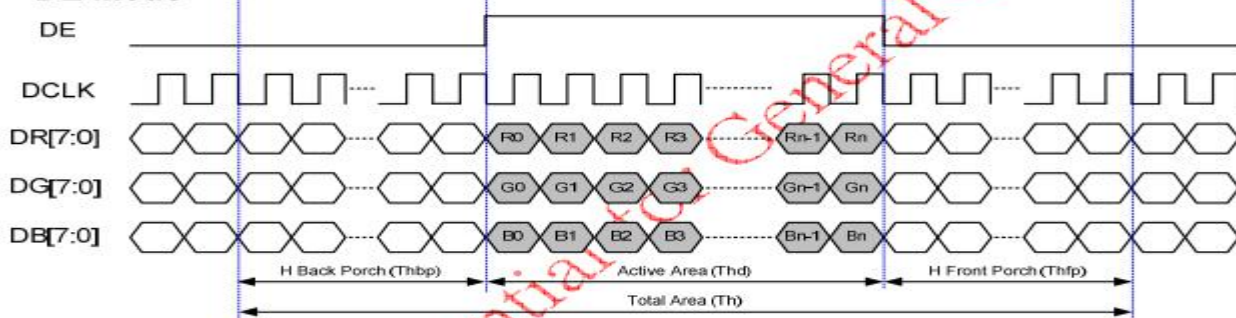
Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
DCLK frequency	Fclk	24	27	30	MHz	
DCLK cycle time	Tclk	42	37	33	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
Time from HSD to source output	Thso	-	13	-	DCLK	
Time from HSD to gate output	Thgo	-	27	-	DCLK	
Time from HSD to gate output off	Thgz	-	3	-	DCLK	
Time from HSD to VCOM	Thvc	-	12	-	DCLK	

5.5 Timing Diagram

HV Mode



DE Mode



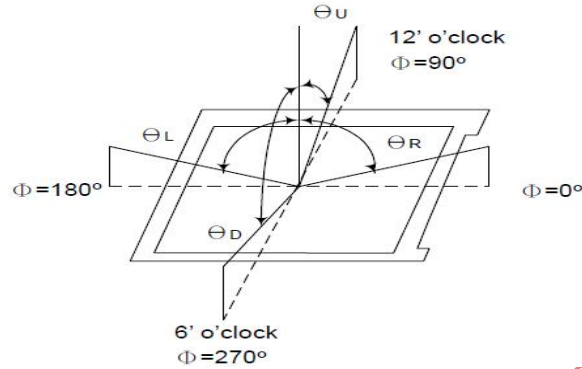
6. OPTICAL CHARACTERISTICS

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	$\theta = 0^\circ$	350	500	-	-	Note(4)
NTSC Ratio	S	$\theta = 0^\circ$	-	53	-	%	Note(7)
Luminance	L	$\theta = 0^\circ$	-	500	-	cd/m ²	Note(5)
Luminance uniformity	U _W	$\theta = 0^\circ$	75	80	-	%	Note(3)
Response Time	T _R + T _F	25 °C	-	30	-	ms	Note(2)
Color Coordination	W _X	$\theta = 0^\circ$ (Center) Normal viewing angle B/L On	-0.03	0.305	+0.03	NTSC (x,y)	Note(6)
	W _Y			0.334			
	R _X			0.608			
	R _Y			0.316			
	G _X			0.305			
	G _Y			0.556			
	B _X			0.135			
	B _Y			0.137			
Viewing Angle	θ_L	C/R>10	-	65	-	Degree	Note(1)
	θ_R		-	65	-		
	θ_U		-	55	-		
	θ_D		-	55	-		

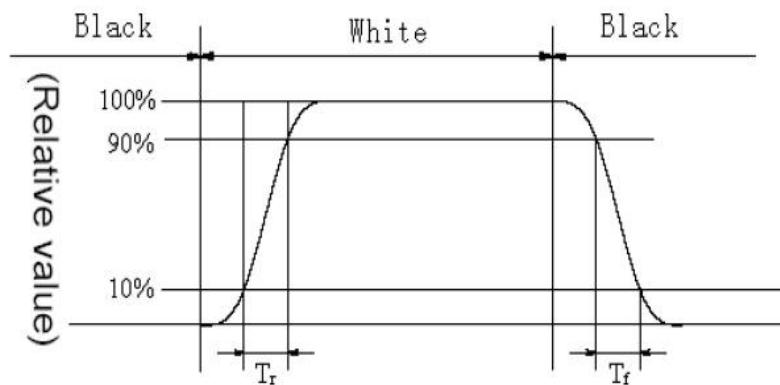
Test Conditions:

1. VDD=3.3V, 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

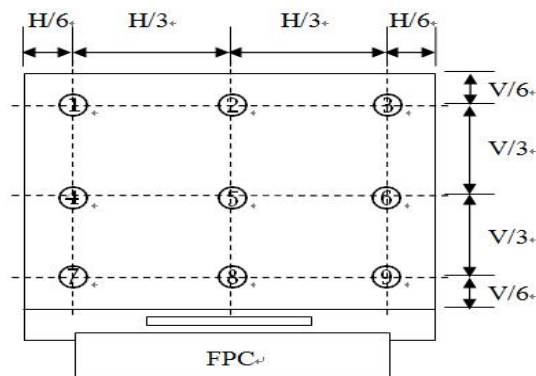


Note2: Definition of Response time: Sum of T_R and T_F



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

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

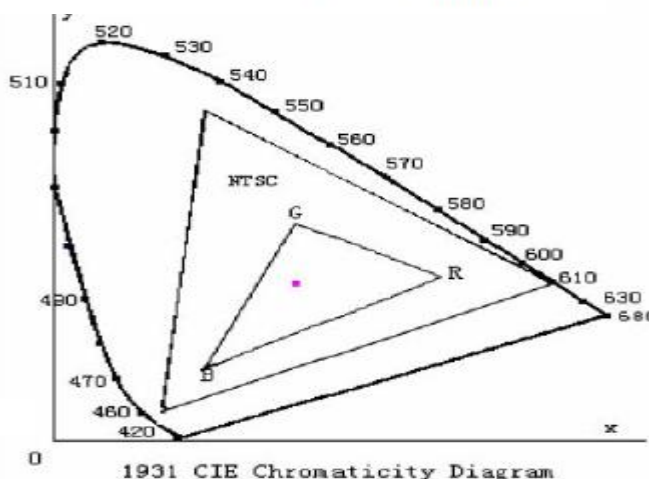
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

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:

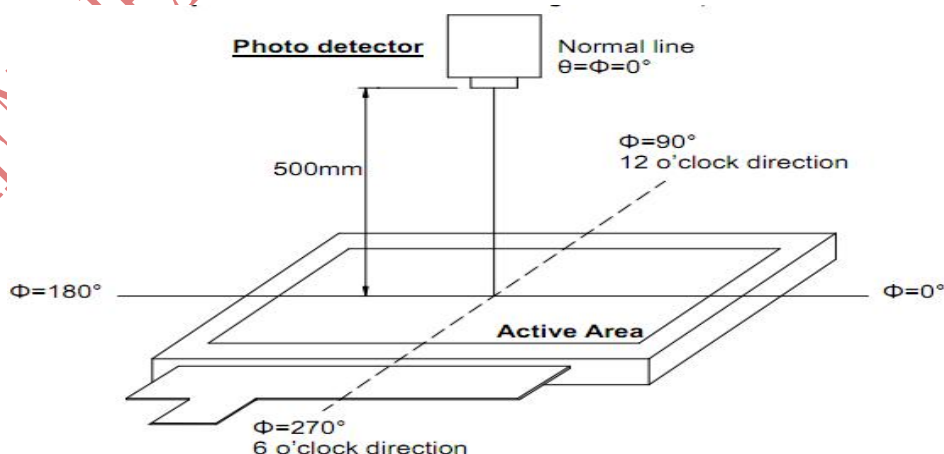
$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$



Note 8: Definition of measurement system.

optical

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 =+70°C / 96Hours	Note1,2,3
Low Temperature Storage	Ta =-30°C / 96Hours	Note1,2,3
High Temperature Operating	Ta =+60°C / 96Hours	Note1,2,3
Low Temperature Operating	Ta =-20°C / 96Hours	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 / 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
ESD test	Contact: ±6KV Air: ±10KV 150PF/330Ω, 5Points/panel, 5times	ESD

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.

8. PACKAGE DRAWING

