LCD MODULE

SPECIFICATION

Model:	UE013QV-AH12-L001D
Version:	V1.2
Date:	20210610

SHENZHEN VIEWE TECHNOLOGY CO., LTD

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	2020.07.28	Preliminary release	
V1.1	2021.06.06	Change FPC's size	
V1.2	2021.06.10	Change light	

SHENZHEN VIEWE TECHNOLOGY CO., LTD

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....7

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....9

5.4 Timing Characteristics....11

5.5 Timing Diagram....11-12

6. OPTICAL CHARACTERISTICS....13

7. RELIABILITY....16

8. PACKAGE DRAWING....17

SHENZHEN VIEWE TECHNOLOGY CO., LTD

1. GENERAL INFORMATION

1.1 Features

1) Pixel Arrangement：RGB_Stripe
2) Interface Mode： 12PIN 4 wire SPI 8bit
3) Driver IC：GC9307
4) Operation Temperature：-20~70℃
5) Storage Temperature：-30~80℃
6) Backlight Type：White LED
7) Display mode：Normally Black,
8) Pixel Density：261 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	TFT	-	
Screen Size	1.3	Inch	Diagonal
Resolution	240(W)*RGB*240(H)	Dots	-
Interface	SPI	-	4 wire
Module Power Consumption	0.1306	Watt	Typ.
Active Area	23.4(W)*23.4(H)	mm	-
Pixel pitch (W*H)	0.0975(W)*0.0975(H)	mm	-
Module Size (W*H*D)	25.8(W)*28.4(H)*1.86(D)	mm	-
Luminance	550	cd/m^2	Typ.
Viewing Direction	All	O'clock	-
Display Color	262K	Colors	18bits

SHENZHEN VIEWE TECHNOLOGY CO., LTD

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	4.6	V	Note1
LED forward current	I_F	-0.001	20	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)

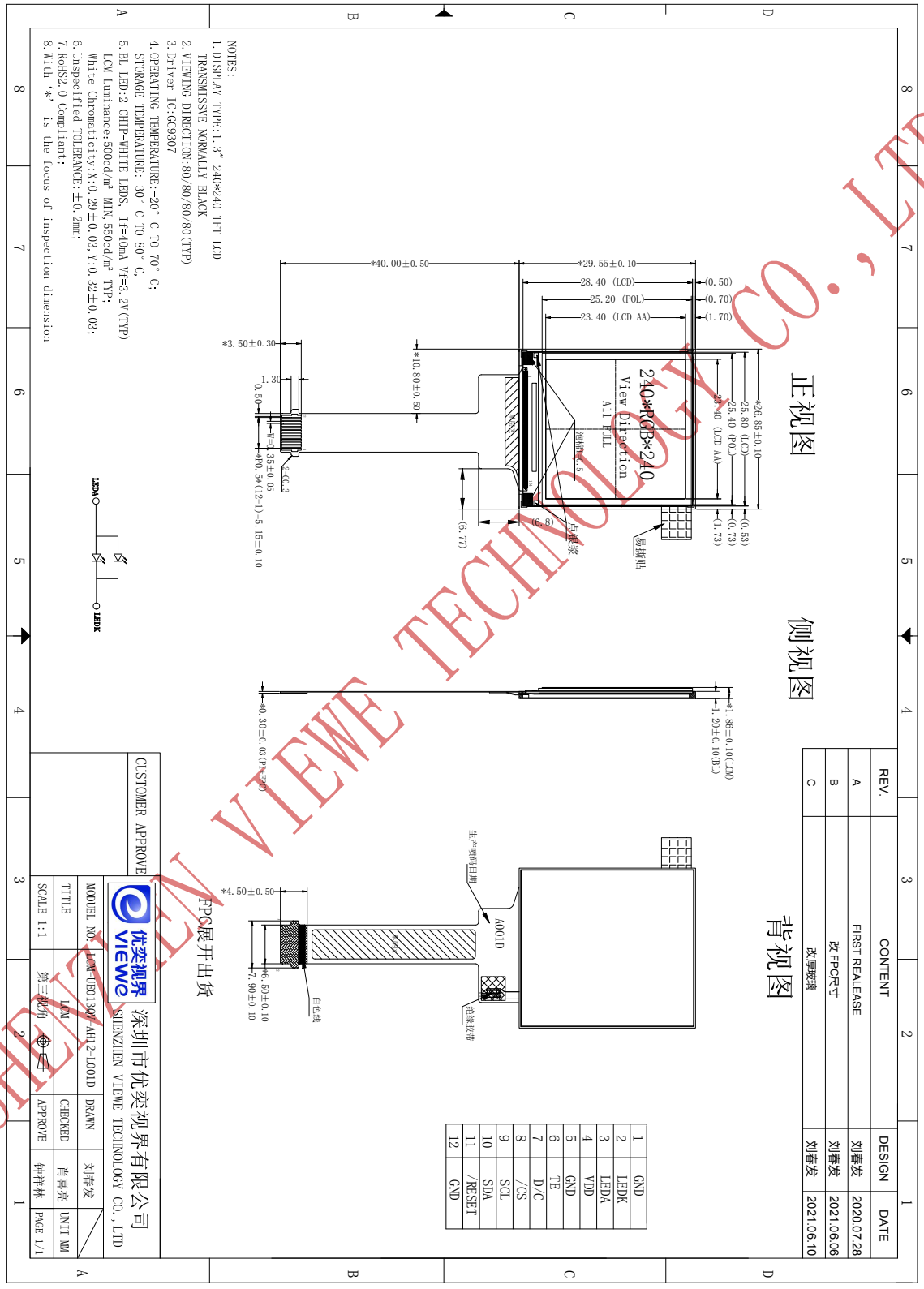
Note1:If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also if the module operates with the absolute maximum ratings for a long time, the reliability may drop.

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 .

SHENZHEN VIEWE TECHNOLOGY CO.,LTD

3. MECHANICAL DRAWING



SHENZHEN VIEWE TECHNOLOGY CO.,LTD

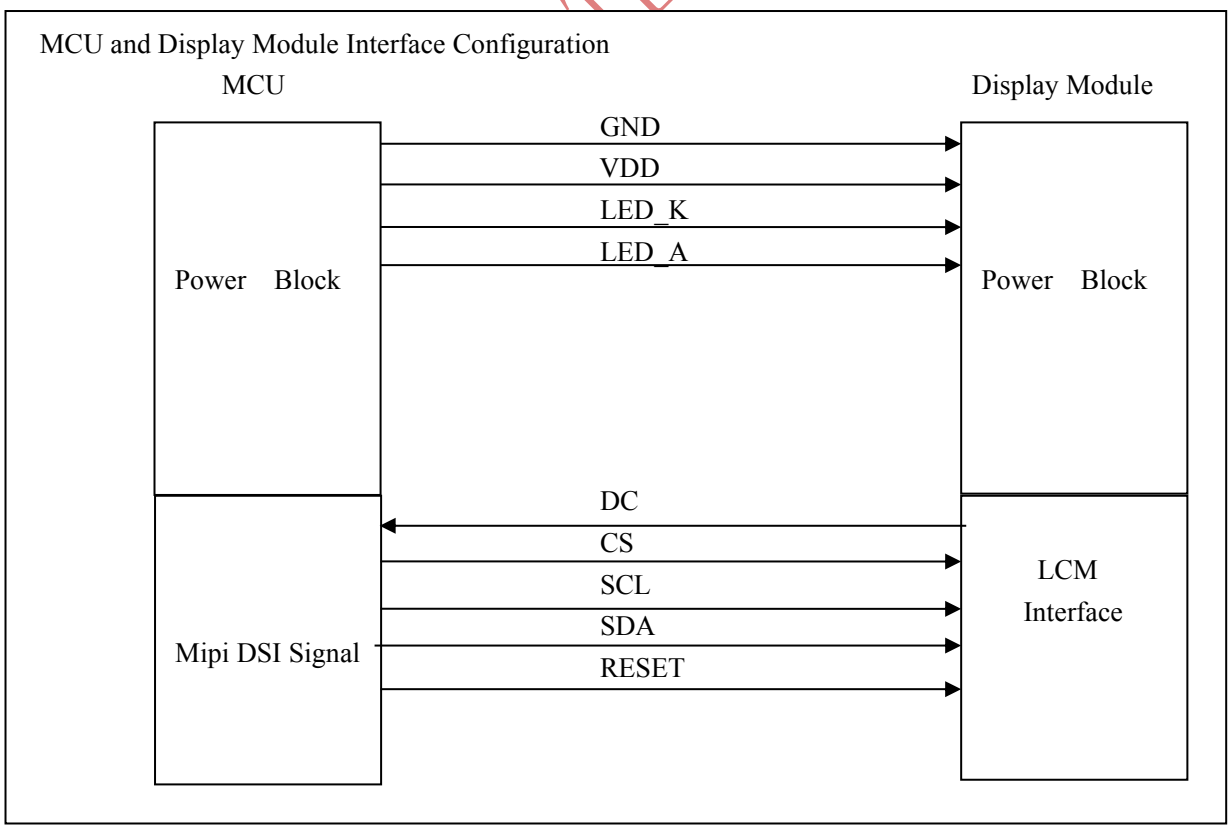
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin No. 序号	Symbol 符号	I/O	Description 描述
1	GND	P	Power Ground
2	LEDK	P	Power supply for backlight cathode
3	LEDA	P	Power supply for backlight anode
4	VDD	P	Power supply for LCM
5	GND	P	Power Ground
6	TE	O	Tearing effect outputsignal. If not used, please let this pin open
7	D/C	I	Data is regarded as a command when D/C is low Data is regarded as a parameter or data when D/C is high
8	/CS	I	Chip selection signal
9	SCL	I	Clock signal
10	SDA	I/O	Serial input/output data
11	/RESET	I	The signal will reset the LCM, Signal is active low.
12	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	VDD	2.5	2.8	3.3	V	-
Power Supply Current	I_{VDD}	-		8	mA	Note1
Logic Input High Voltage	V_{IH}	0.7*VDD	-	VDD	V	-
Logic Input Low Voltage	V_{IL}	0	-	0.3*VDD	V	-
Panel Power Consumption	P_{VCC}	-	0.096	-	Watt	Note1
Module Power Consumption	P_{LCM}	-	0.1306	-	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.

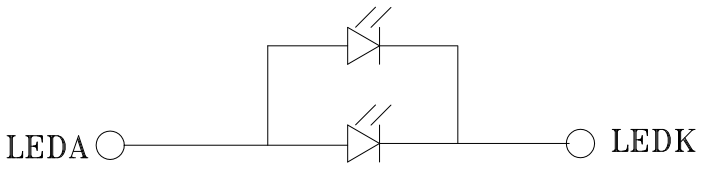
5.2 Back Light Driving Section

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	-	3.2	-	V	Note1
Forward Current	I_F	-	40	-	mA	Note1
Backlight Power consumption	P_{BL}	-	0.128	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity			2		PCS	

(Ta=+25°C,GND=0V)

Note1: The LED driving condition is defined for each LED module (1 LED Serial, 2 LED 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.

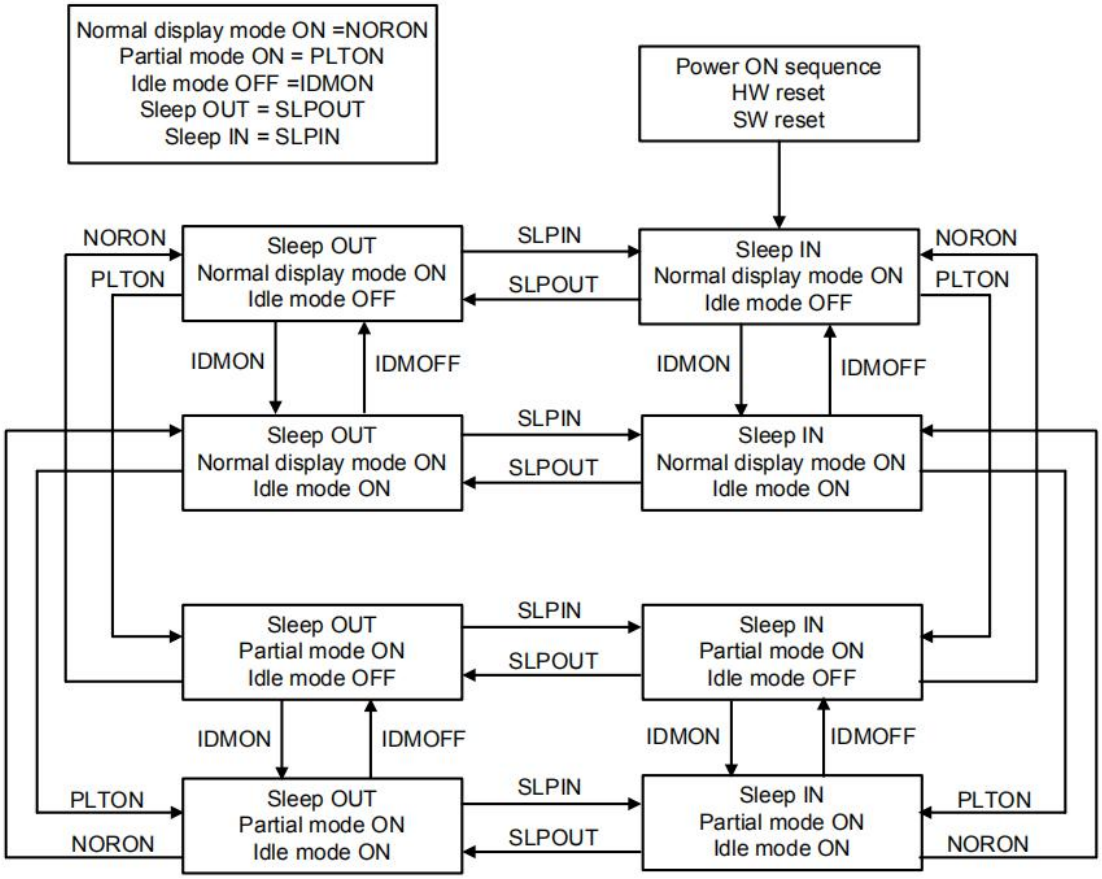


SHENZHEN VIEWE TECHNOLOGY CO., LTD

5.3 Power On/Off Sequence

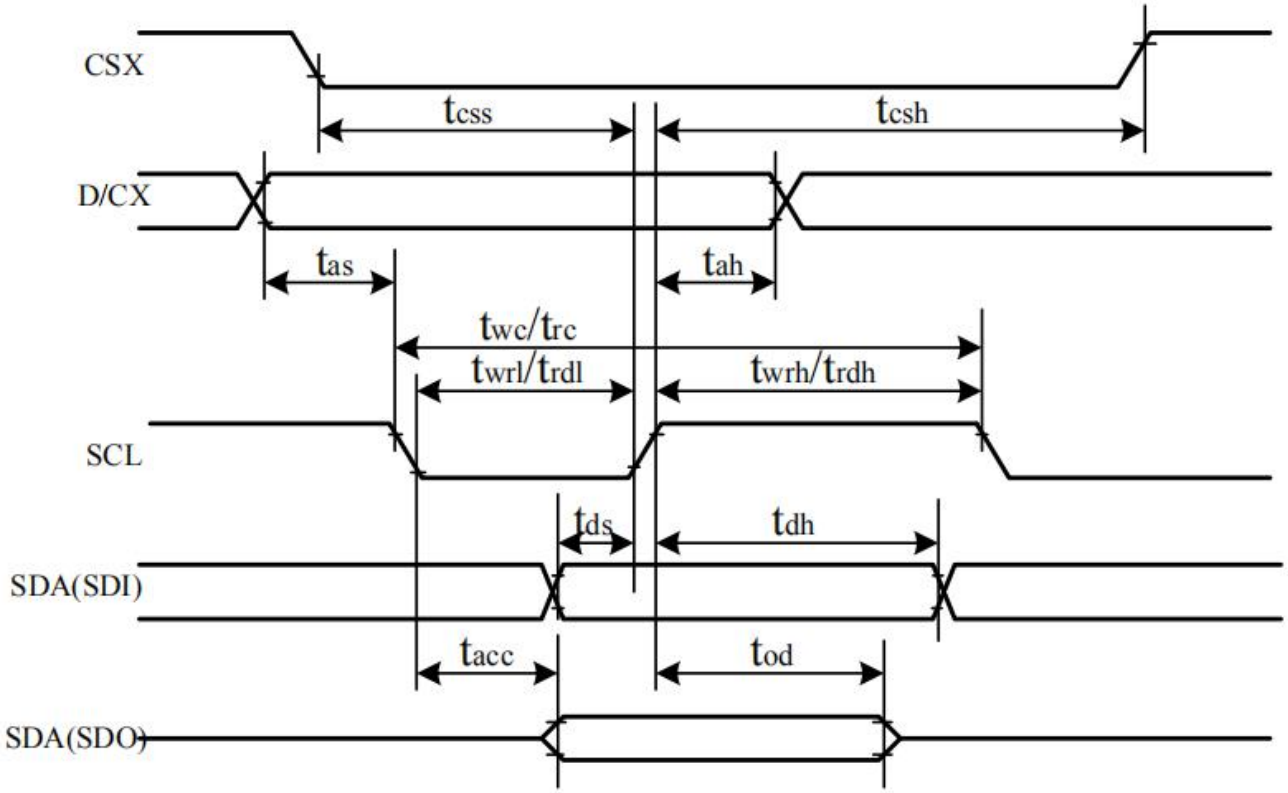
6 level modes are defined they are in order of Maximum Power consumption to Minimum Power Consumption:

1. Normal Mode On (full display), Idle Mode Off, Sleep Out.
   In this mode, the display is able to show maximum 262,144 colors.
2. Partial Mode On, Idle Mode Off, Sleep Out.
   In this mode part of the display is used with maximum 262,144 colors.
3. Normal Mode On (full display), Idle Mode On, Sleep Out.
   In this mode, the full display area is used but with 8 colors.
4. Partial Mode On, Idle Mode On, Sleep Out.
   In this mode, part of the display is used but with 8 colors.
5. Sleep In Mode.
   In this mode, the DC : DC converter, Internal oscillator and panel driver circuit are stopped. Only the MCU interface and memory works with IOVCC power supply. Contents of the memory are safe.
6. Power Off Mode.
   In this mode, both VCI and IOVCC are removed.



5.4 Timing Characteristics

5.4.1 AC Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
CSX	tcss	Chip select time (Write)	20	-	ns	
	tcsh	Chip select hold time (Read)	40	-	ns	
SCL	twc	Serial Clock Cycle (Write)	10	-	ns	
	twrh	SCL "H" Pulse Width (Write)	5	-	ns	
	twrl	SCL "L" Pulse Width (Write)	5	-	ns	
	trc	Serial Clock Cycle (Read)	150	-	ns	
	trdh	SCL "H" Pulse Width (Read)	60	-	ns	
	trdl	SCL "L" Pulse Width (Read)	60	-	ns	
D/CX	tas	D/CX setup time	10	-	ns	
	tah	D/CX hold time (Write/Read)	10	-	ns	
SDA/SDI (Input)	tds	Data setup time (Write)	5	-	ns	
	tdh	Data hold time (Write)	5	-	ns	
SDA/SD0 (Output)	tacc	Access time (Read)	10	-	ns	

5.5 Timing Diagram

The 4-line/8-bit serial bus interface of GC9307 can be used by setting external pin as IM [3:0] to "0110" for serial interface I or IM [3:0] to "1110" for serial interface II. The shown figure is the example of 4-line SPI interface.

Figure43.

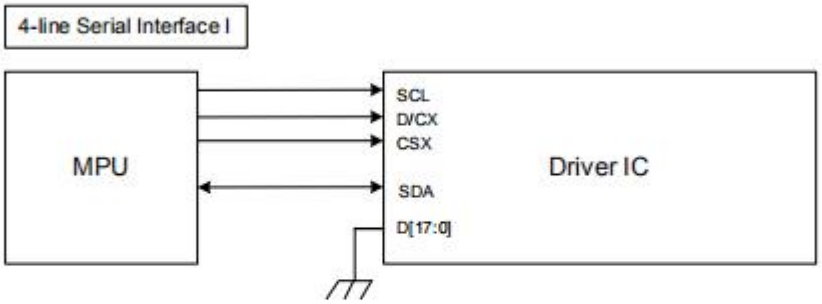
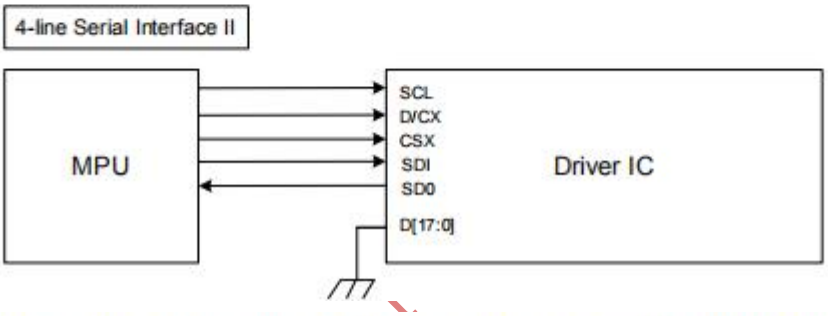


Figure44.

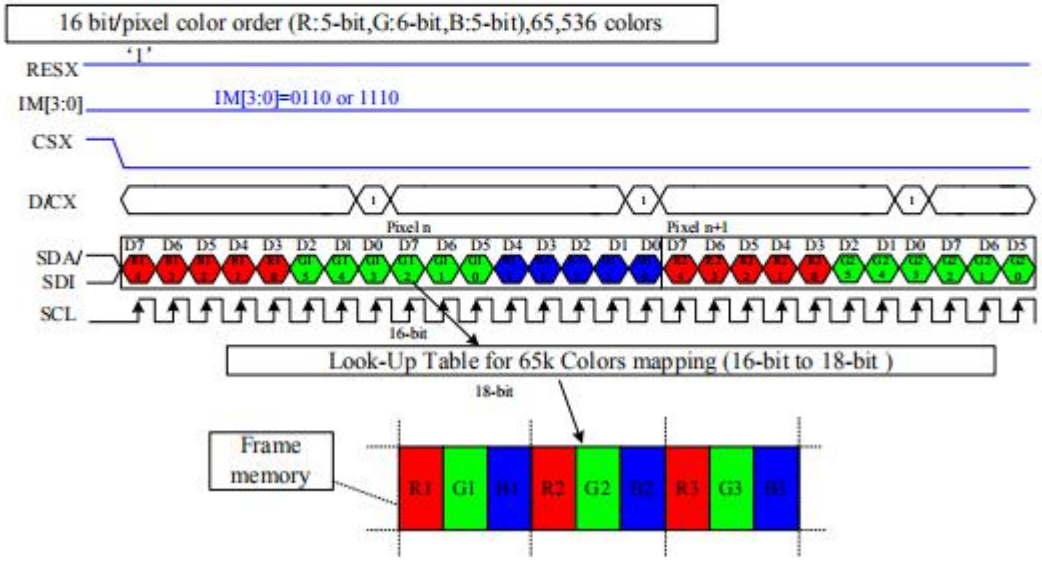


In 4-line serial interface, different display data format is available for two color depths supported by the LCM listed below.

-65k colors, RGB 5, 6, 5 -bits input.

-262k colors, RGB 6, 6, 6 -bits input.

Figure45.



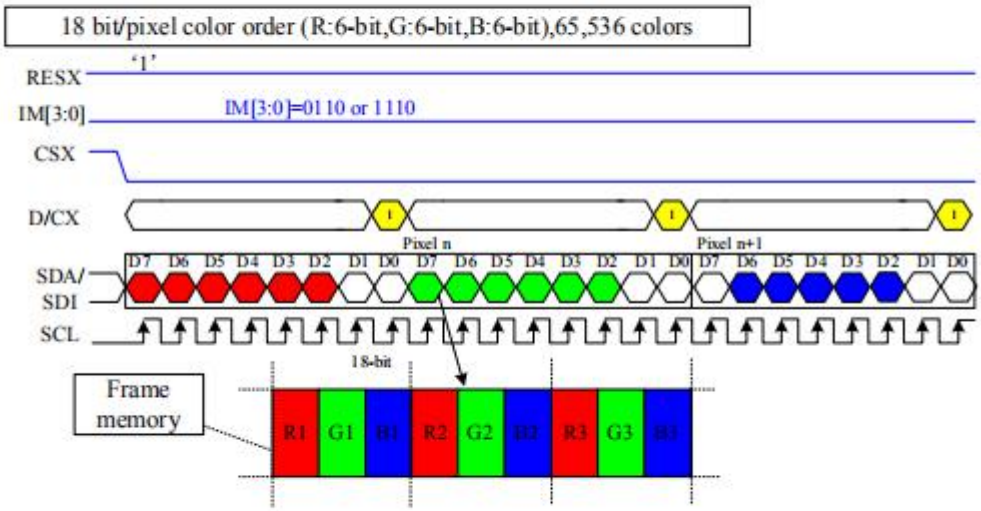
Note 1: The pixel data with 16-bit color depth information.

Note 2: The most significant bits are: Rx4, Gx5 and Bx4.

Note 3: The least significant bits are: Rx0, Gx0 and Bx0.

Note 4: '-'= Don't care –Can be set "0" or "1".

Figure46.



Note 1: The pixel data with 18-bit color depth information.

Note 2: The most significant bits are: Rx5, Gx5 and Bx5.

Note 3: The least significant bits are: Rx0, Gx0 and Bx0.

Note 4: '-'= Don't care –Can be set "0" or "1".

SHENZHEN VIEWE

6. OPTICAL CHARACTERISTICS

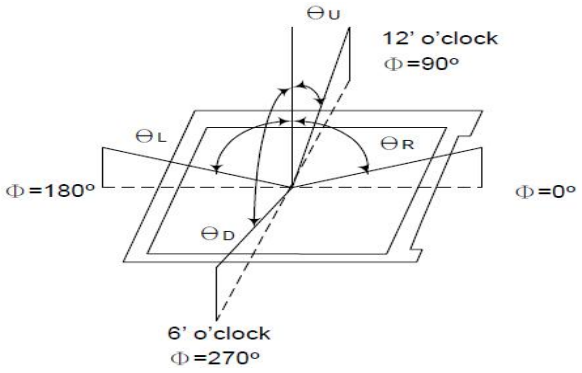
Parameter 参数	Symbol 符号	Condition 条件	Min. 最小值	Typ. 典型值	Max. 最大值	Unit 单位	Remark 备注
Contrast Ratio	C/R	θ = 0°	600	800	-	-	Note(4)
NTSC Ratio	S	θ =0°	-	50	-	%	Note(7)
Luminance	L	θ =0°	500	550	-	cd/m2	Note(5)
Luminance uniformity	U_W	θ =0°	70	80	-	%	Note(3)
Response Time	T_R+ T_F	25 °C	-	30	35	ms	Note(2)
Color Coordination	W_X	θ = 0° (Center) Normal viewing angle B/L On	-0.03	0.29	+0.03	NTSC (x,y)	Note(6)
	W_Y			0.32			
	R_X			0.624			
	R_Y			0.329			
	G_X			0.288			
	G_y			0.522			
	B_X			0.136			
	B_Y			0.137			
Viewing Angle	Θ_1	C/R>10	-	80	-	Degree	Note(1)
	θ_R		-	80	-		
	θ_U		-	80	-		
	θ_D		-	80	-		

Test Conditions:

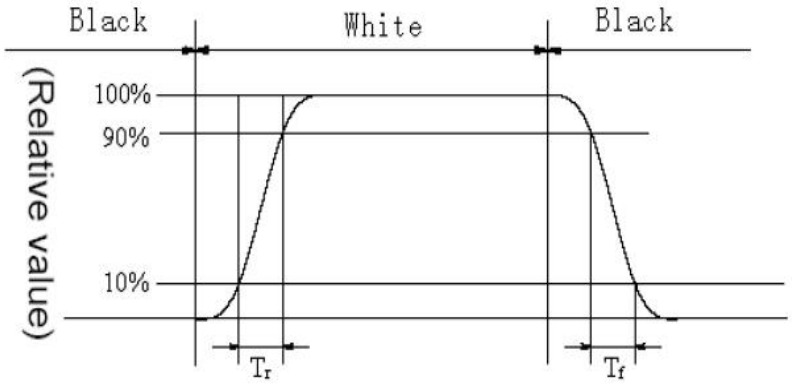
1. I_F=40mA (Backlight current), the ambient temperature is+25℃.
2. The test systems refer to Note 8.

SHENZHEN VIEWE TECHNOLOGY CO.,LTD

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

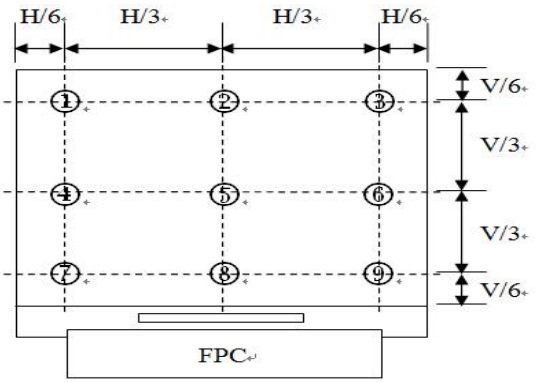


Note2: Definition of Response time: Sum of T_R and T_F



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

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

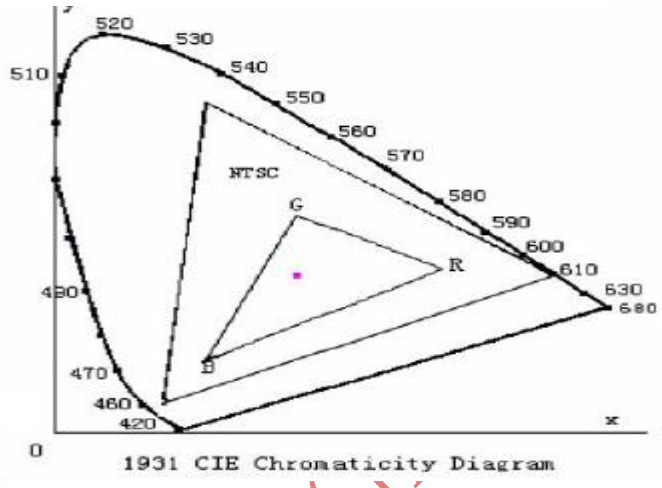
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

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

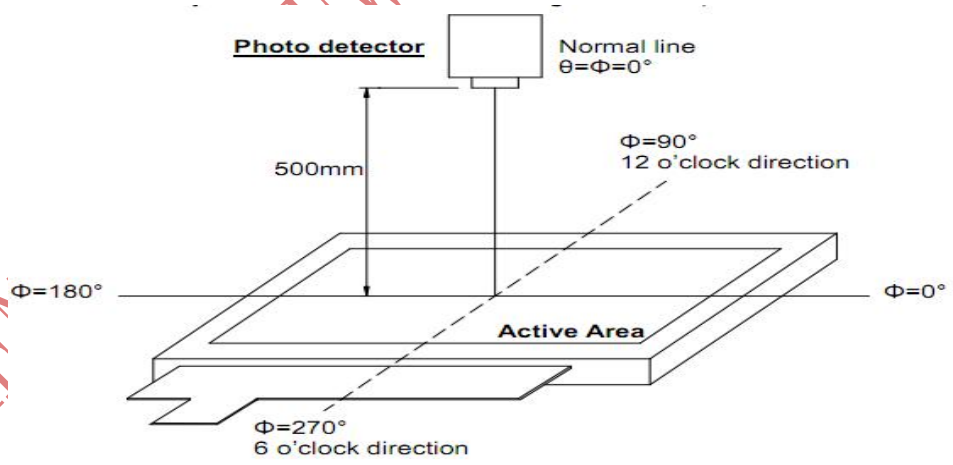
Note 7: Definition of NTSC ratio:

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



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

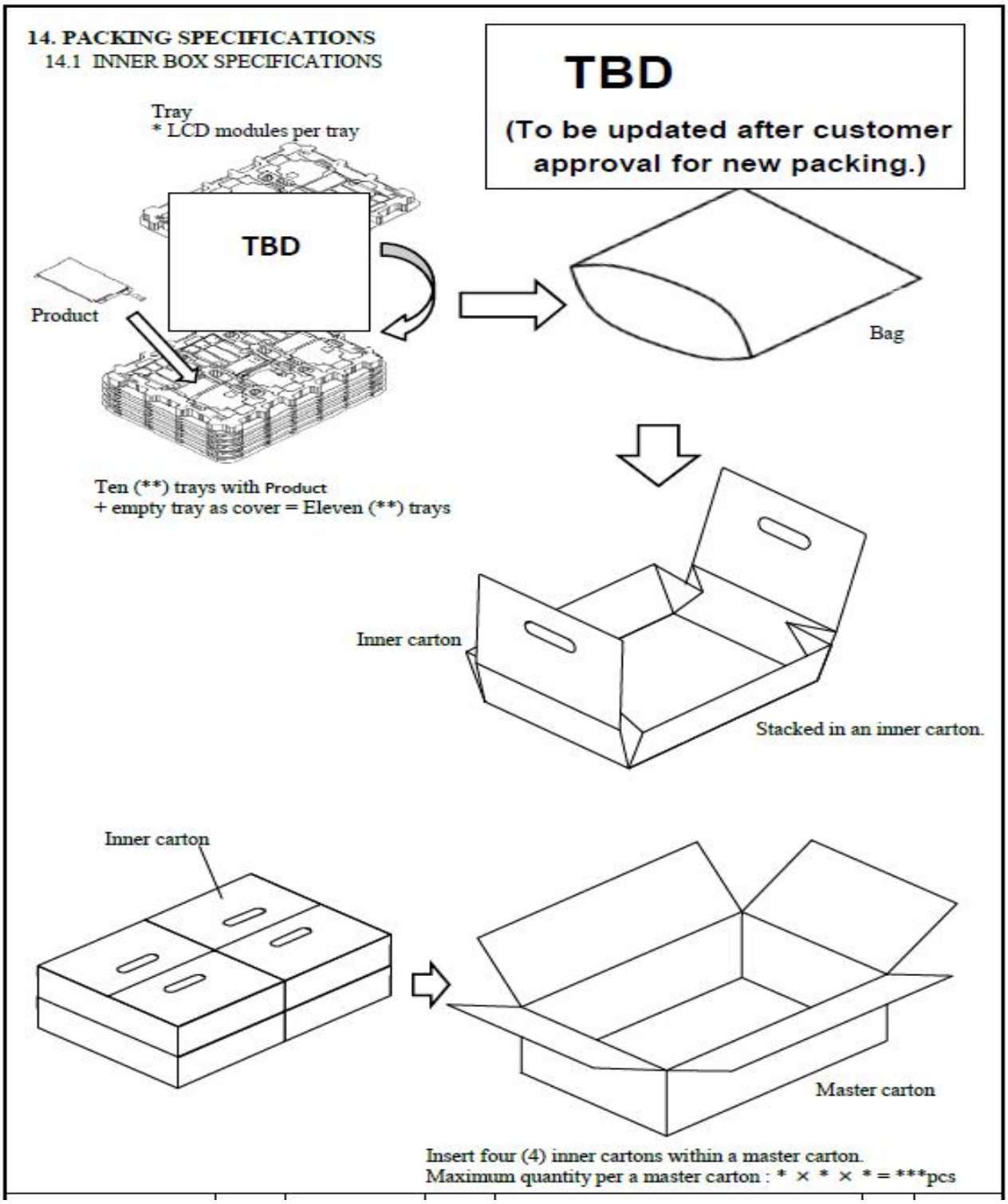
Item 项目	Test Condition 测试条件	Remark 备注
High Temperature Storage	Ta =+70°C / 96Hours	Note1,2,3
Low Temperature Storage	Ta =-20°C / 96Hours	Note1,2,3
High Temperature Operating	Ta =+80°C / 96Hours	Note1,2,3
Low Temperature Operating	Ta =-30°C / 96Hours	Note1,2,3
Temperature Cycle storage Test	-30°C/30min ⇆+80°C /30min for 30cycles,Transfer time less than 5min	Note2,3
Thermal humidity storage Test	70°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

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.

SHENZHEN VIEWE TECHNOLOGY CO., LTD

8. PACKAGE DRAWING