LCD MODULE

SPECIFICATION

Model:	UE033HV-RB24-A003D
Version:	V1.4
Date:	20230525

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	20230525	Preliminary release	
V1.2	20230217	修改 LCD 排线及 TP	
V1.3	20230412	模组增加导电布+黑色麦拉包裹贴覆	
V1.4	20230814	保护膜改为双层，双膜一体结构， 修改液晶排线元件区	

TABLE of CONTENTS

1. GENERAL INFORMATION

1.1 Features

1) Pixel Arrangement：RGB Vertical Stripe
2) Interface Mode：MIPI 1lane
3) Driver IC：ST7797-G5
4) Operation Temperature：-10~60℃
5) Storage Temperature：-20~70℃
6) Backlight Type：White LED
7) Display mode：Normally Black
8) 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	IPS TFT	-	-
Screen Size	3.33	Inch	Diagonal
Resolution	320(W)*3(RGB)*480(H)	Dots	-
Interface	MIPI 1lane	-	-
Module Power Consumption	0.43	Watt	Typ.
Active Area	51.27*68.36	mm	Typ
Pixel pitch (W*H)	0.213*0.213	mm	Typ
Module Size (W*H*D)	60.8*85.8*4.04	mm	Typ
Luminance	230	cd/m^2	Typ.(ALL BLACK)
Viewing Direction	ALL	O'clock	
Display Color	16.7M	Colors	

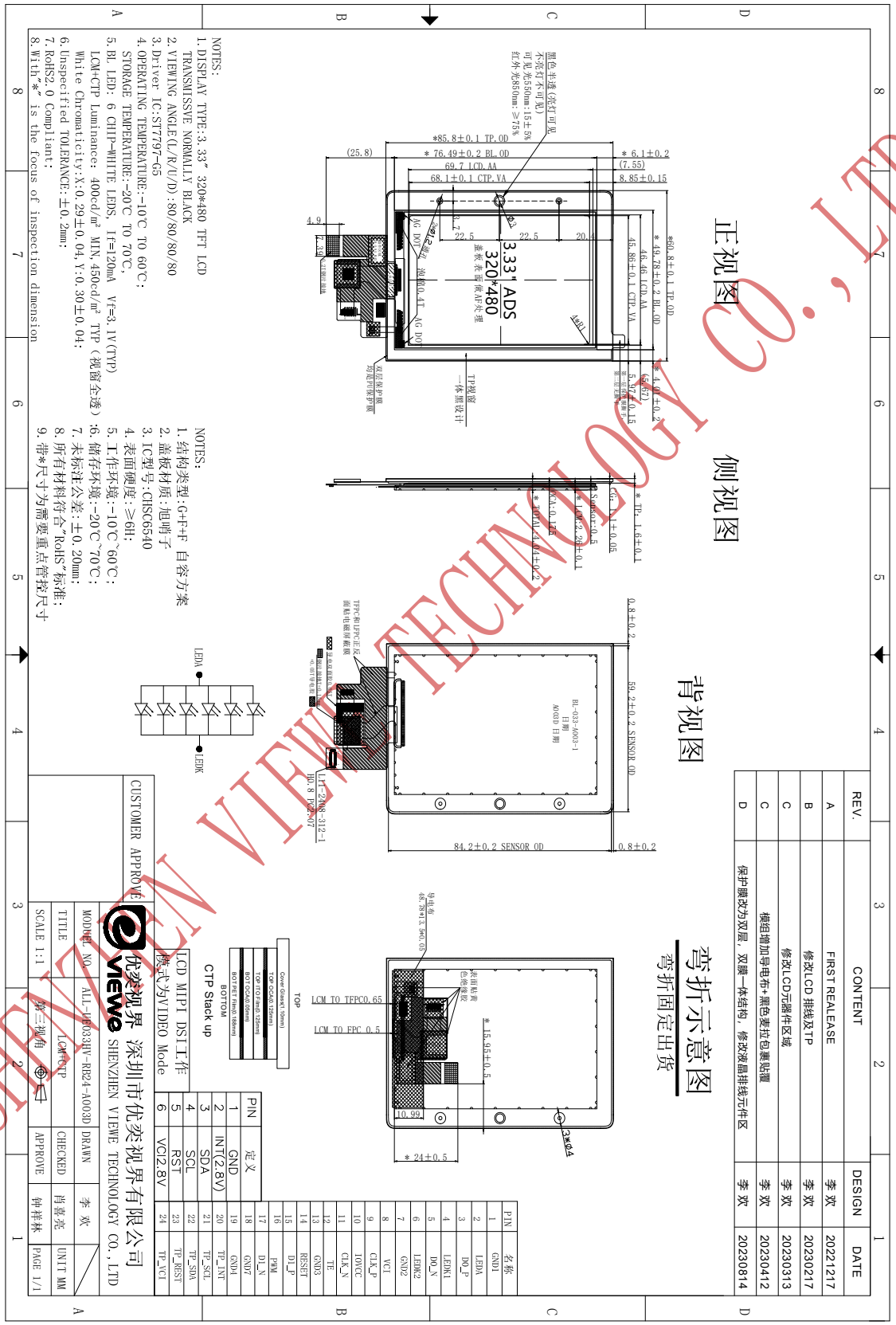
2. ABSOLUTE MAXIMUM RATINGS

Item 项目	Symbol 符号	Min. 最小值	Max. 最大值	Unit 单位	Remark 备注
Power supply1 voltage	IOVCC	-0.3	4.6	V	Note1
Power supply2 voltage	VCI	-0.3	4.6	V	Note1
LED Reverse Voltage	V_R	-	5	V	For each led,Note1

(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.

3. MECHANICAL DRAWING



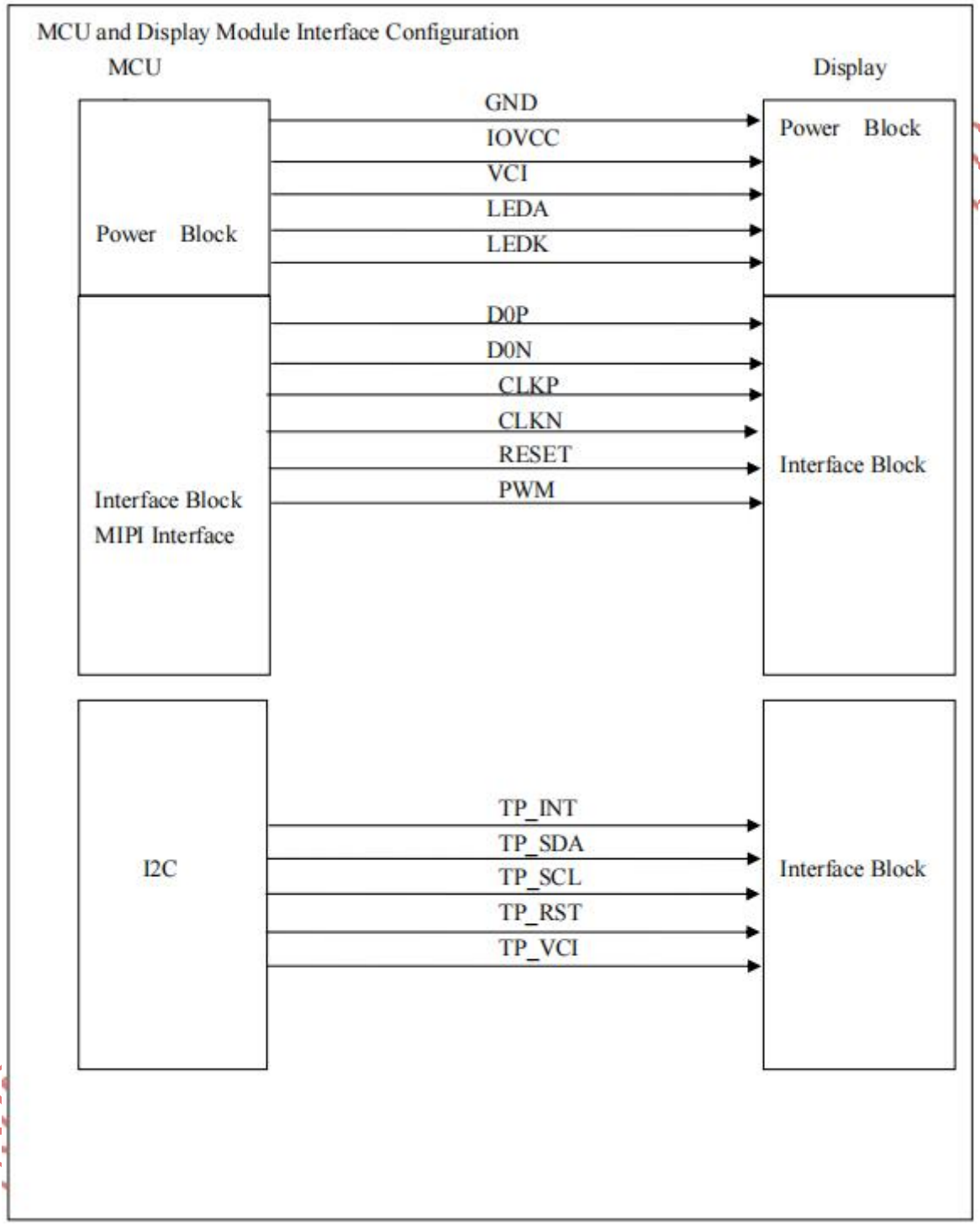
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin No. 序号	Symbol 符号	I/O	Description 描述
1	**GND**	P	Power Ground
2	**LEDA**	P	Power supply for backlight anode
3	**D0P**	I	MIPI-DSI data lane 0 positive-end input pin
4	**LEDK1**	P	Power supply for backlight cathode
5	**D0N**	I	MIPI-DSI data lane 0 negative-end input pin
6	**LEDK2**	P	Power supply for backlight cathode
7	**GND**	P	Power Ground
8	**VCI**	P	Power supply for analog circuits(3.3V)
9	**CLKP**	I	MIPI-DSI clock lane positive-end input pin
10	**IOVCC**	P	Power supply to interface pins(3.3V)
11	**CLKN**	I	MIPI-DSI clock lane negative-end input pin
12	**TE**	O	Tearing effect outputsignal. If not used, please let this pin open
13	**GND**	P	Power Ground
14	**RESET**	I	The signal will reset the LCM, Signal is active low.
15	**D1P**	-	NC
16	**PWM**	I	This pin is connecting with the external LED driver
17	**D1N**	-	NC
18-19	**GND**	P	Power Ground
20	**TP_INT**	O	Interrupt signals for CTP
21	**TP_SCL**	I	I2C clock signal for CTP
22	**TP_SDA**	I/O	I2C data signal for CTP
23	**TP_RESET**	I	The signal will reset the TP,Signal is active low
24	**TP_VCI**	P	Power supply for TP

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	IOVCC	1.65	1.8	3.3	V	-
Power Supply2 Voltage	VCI	2.5	2.8	3.3	V	-
Power Supply1 Current	I_{IOVCC}	-	-	-	mA	Note1
Power Supply2 Current	I_{VCI}	-	29	-	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_{VDD}	-	0.08	-	Watt	Note1
Module Power Consumption	P_{ALL}	-	0.45	-	Watt	Note1,2

(Ta=+25°C,GND=0V)

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

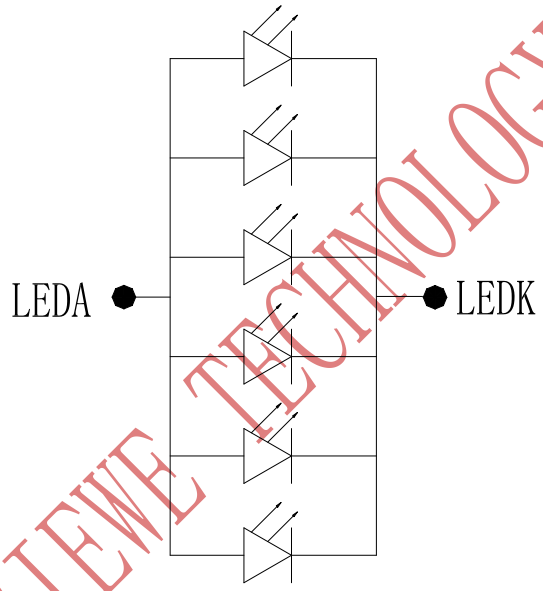
Note2: P_{ALL}= P_{VDD}+ P_{BL}， About P_{BL} information, inference to 5.2 Back Light Driving Section.

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	-	3.1	-	V	Note1
Forward Current	I_F	-	120	-	mA	Note1
Backlight Power consumption	P_{BL}	-	0.372	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity			6		PCS	

(Ta=+25°C,GND=0V)

Note1: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 LCM Power ON/OFF Sequence

VDDI and VCI can be applied in any order.

VCI and VDDI can be power down in any order.

During power off, if LCD is in the Sleep Out mode, VCI and VDDI must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDI or VCI can be powered down minimum 0msec after RESX has been released.

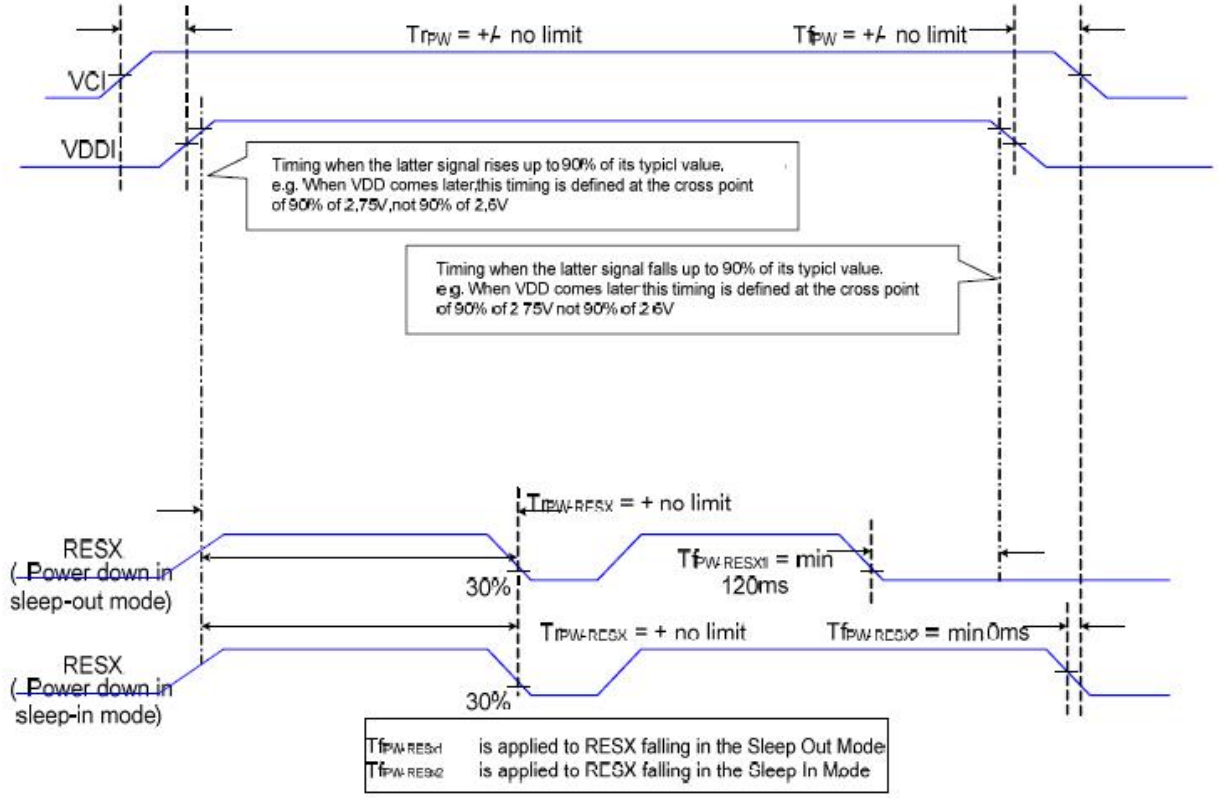
Note 1: There will be no damage to the display module if the power sequences are not met.

Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

Note 4: If RESX line is not held stable by host during Power On Sequence as defined in the sequence below, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

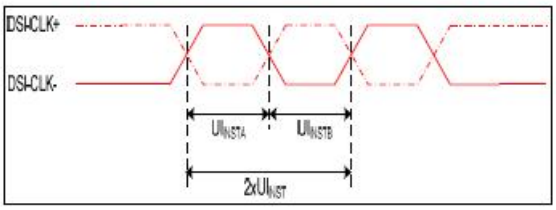
The power on/off sequence is illustrated below

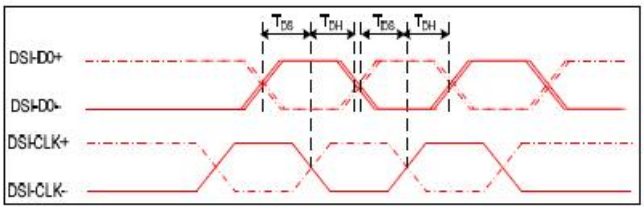


5.4 AC Characteristics

5.4.1 High speed mode:

- Clock Channel Timing





- Timing Characteristics

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xUI_{INSTA}$	Double UI instantaneous	4	25	ns	-
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halfs	2	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	tDS	Data to clock setup time	0.15	-	UI	-
DSI-Dn+/-	tDH	Data to clock hold time	0.15	-	UI	-

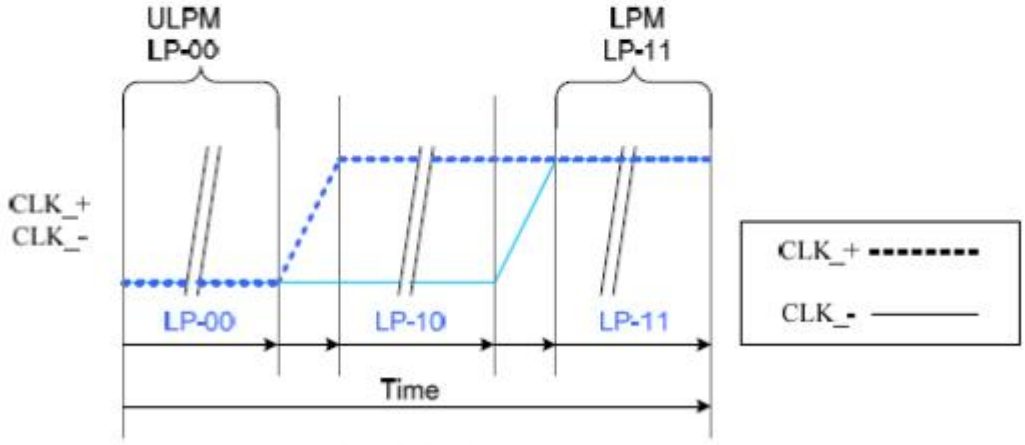
5.4.2 Low power mode:

DSI-CLK+/- lanes can be driven to the Low Power Mode(LMP),when DSI-CLK lanes are entering LP-11 State Code , in three different ways:

After SW Reset,HW Reset or Power On Sequence=>LP-11

After DSI-CLK+/- lanes are leaving Ultra Low Power Mode (ULPM,LP-00 State Code)=>LP10=>LP-11(LPM).

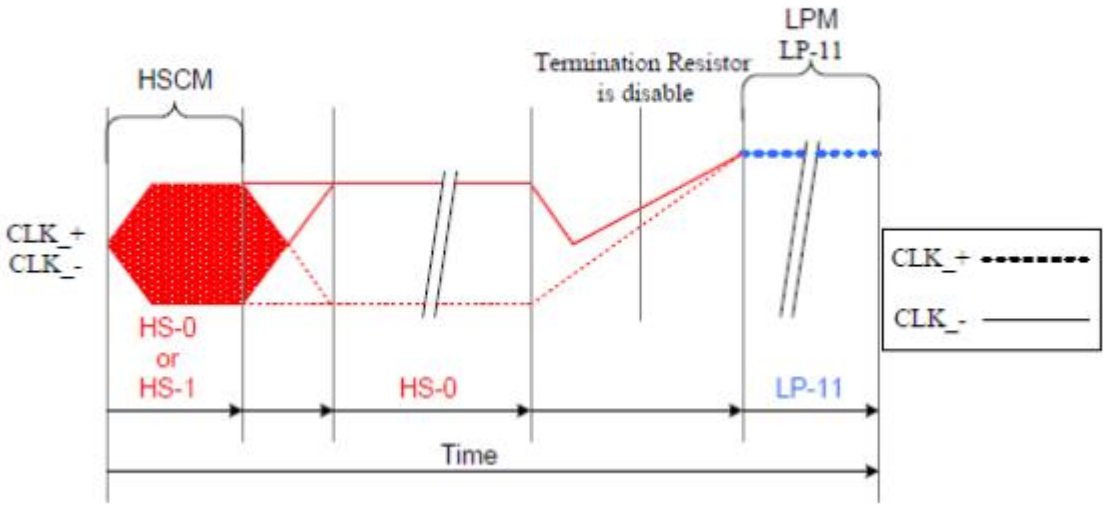
This sequence is illustrated below.



From ULPM to LPM

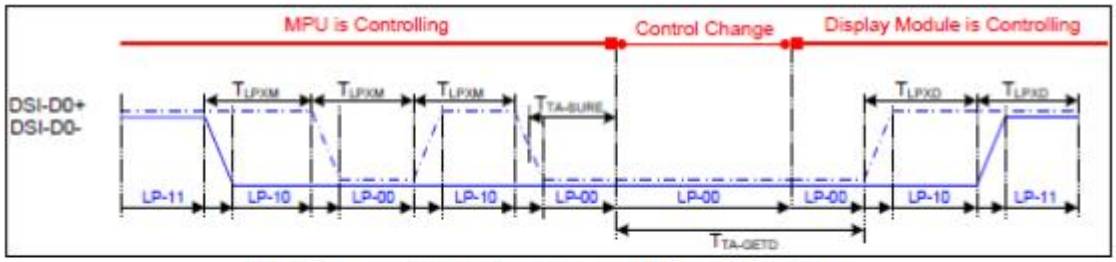
After DSI-CLK+/- lanes are leaving High Speed Clock Mode (HSCM, HS-0 or HS-1 State Code) =>HS-0 =>LP-11 (LPM).

This sequence is illustrated below.

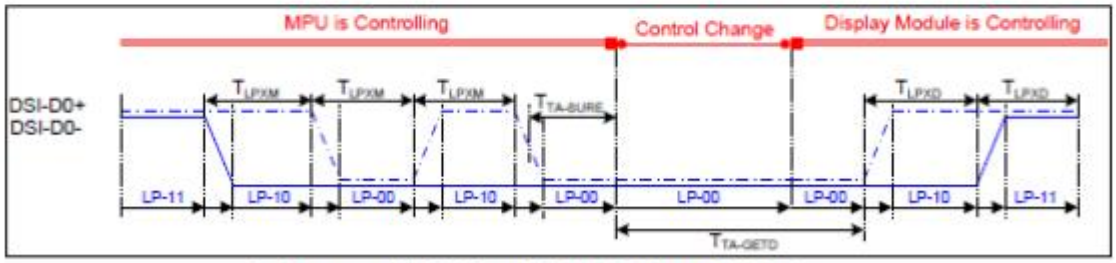


From HSCM to LPM

5.4.3 DSI Bursts mode:



Bus Turnaround (BTA) from display module to MPU Timing

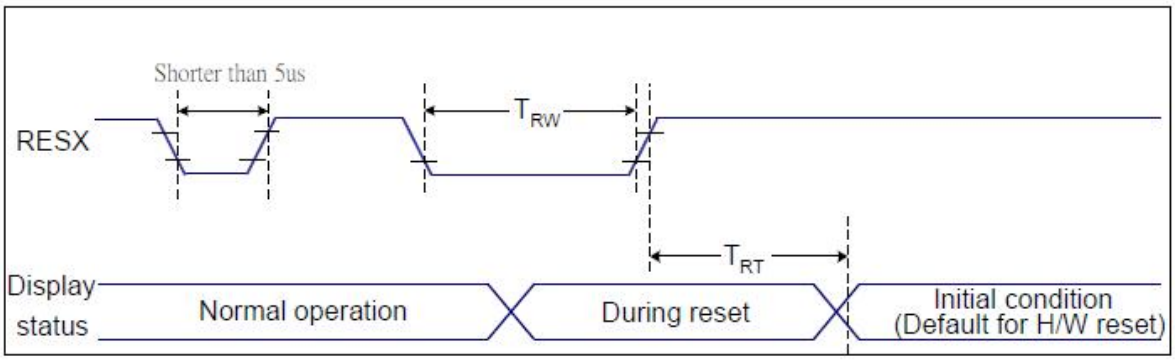


Bus Turnaround (BTA) from MPU to display module Timing

VDDI=1.8V,VCI=2.8V, AGND=DGND=AGNDR=0V, Ta=25℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-D0+/-	TLPXM	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Input
DSI-D0+/-	TLPXD	Length of LP-00,LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Output
DSI-D0+/-	TTA-SURED	Time-out before the MPU start driving	T_{LPXD}	$2xT_{LPXD}$	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	$5xT_{LPXD}$		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	$4xT_{LPXD}$		ns	Output

5.4.4 Reset Timing:



VDDI=1.8V,VCI=2.8V, AGND=DGND=AGNDR=0V, Ta=25℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
			-	120 (Note 1, 6, 7)	ms

Notes:

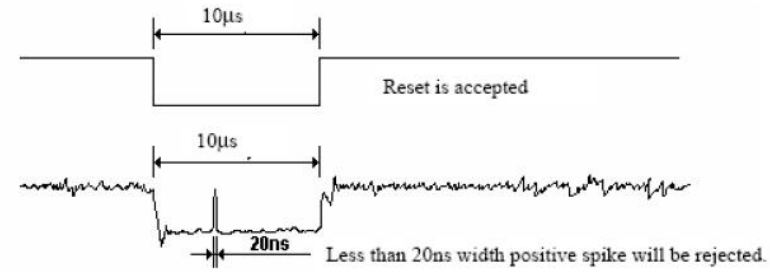
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:



5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

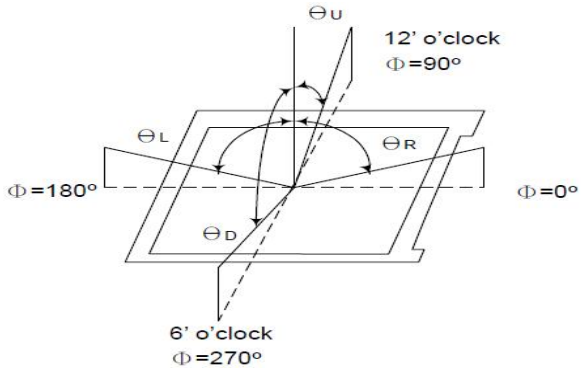
6. OPTICAL CHARACTERISTICS

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°	1000	1200	-	-	Note(4)
NTSC Ratio	S	θ =0°	55	60		%	Note(7)
Luminance	L	θ =0°	190	230	-	cd/m2	Note(5)
Luminance uniformity	U_W	θ =0°	80		-	%	Note(3)
Response Time	T_R+ T_F	25 °C	-	30	35	ms	Note(2)
Color Coordination	W_X	θ =s 0° (Center) Normal viewing angle B/L On	-0.04	0.32	+0.04	NTSC (x,y)	Note(6)
	W_Y			0.36			
Viewing Angle	θ_L	C/R>10	80	85	-	Degree	Note(1)
	θ_R		80	85	-		
	θ_U		80	85	-		
	θ_D		80	85	-		

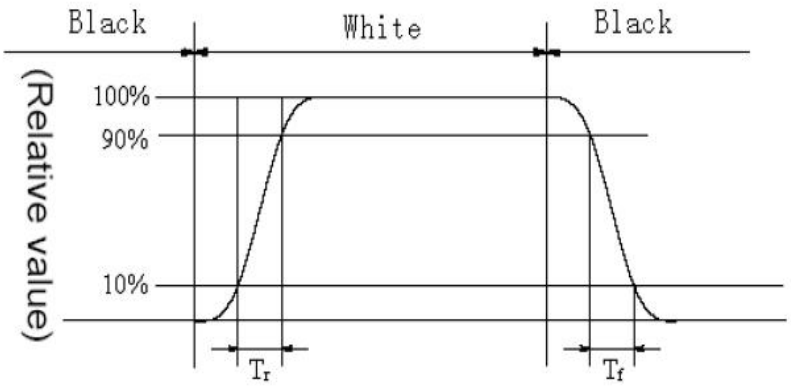
Test Conditions:

1. 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

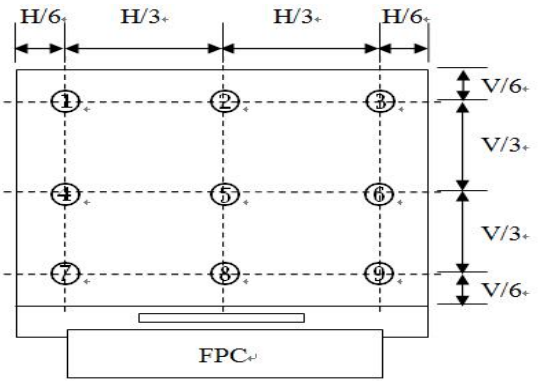


Note2: Definition of Response time: Sum of T_R and T_F



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

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

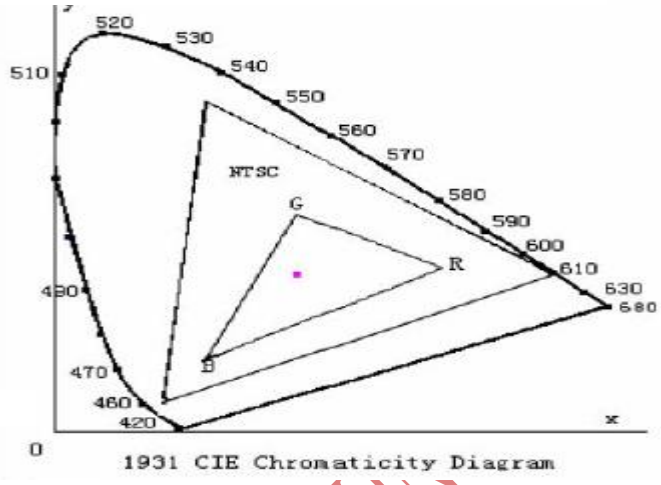
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

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

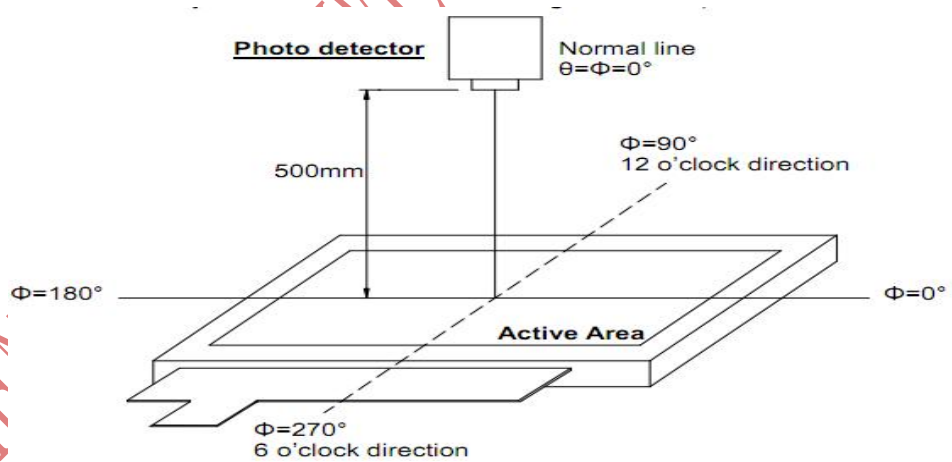
Note 7: Definition of NTSC ratio:

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



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 =+70°C / 96Hours	Note1,2,3
Low Temperature Storage	Ta =-20°C / 96Hours	Note1,2,3
High Temperature Operating	Ta =+60°C / 96Hours	Note1,2,3
Low Temperature Operating	Ta =-10°C / 96Hours	Note1,2,3
Temperature Cycle storage Test	-20°C/30min Δ+70°C /30min for 30cycles,Transfer time less than 5min	Note2,3
Thermal humidity storage Test	60°C x 90%RH / 96Hours	Note2,3
ESD	C=150PF,R=330 Ohm Air:±8kv,5times(Center) Contact: ±4kv,5times(Center)	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.

8. PACKAGE DRAWING