LCD MODULE

SPECIFICATION

Model:	UE040HD-AB35-A050A
Version:	V1.0
Date:	20200722

☑ **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	2020.07.22	Preliminary release	

TABLE of CONTENTS

1. GENERAL INFORMATION

1.1 Features

1) Pixel Arrangement：RGB_Stripe
2) Interface Mode： MIPI
3) Driver IC: ST7703-G5-DP Touch IC：GT1151Q
4) Operation Temperature：-20~70℃
5) Storage Temperature：-30~80℃
6) Backlight Type：White LED
7) Display mode：Normally Black,
8) Pixel Density：357 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	IPS TFT	-	-
Screen Size	4	Inch	Diagonal
Resolution	640(W)*3(RGB)*1280(H)	Dots	
Interface	MIPI	-	4lane
Module Power Consumption	0.753	Watt	Typ.
Active Area	45.31(W)*90.88(H)	mm	-
Pixel pitch (W*H)	70.8(H)*71(V)	um	-
Module Size (W*H*D)	47.73(W)*97.55(H)*1.93(D)	mm	-
Luminance	530	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 supply1 voltage	IOVCC(1.8V)	-0.3	5.5	V	Note1
Power supply2 voltage	VCI(2.8V)	-0.3	6.6	V	Note1
Power supply4 voltage	VCC2.8	-0.3	3.6	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

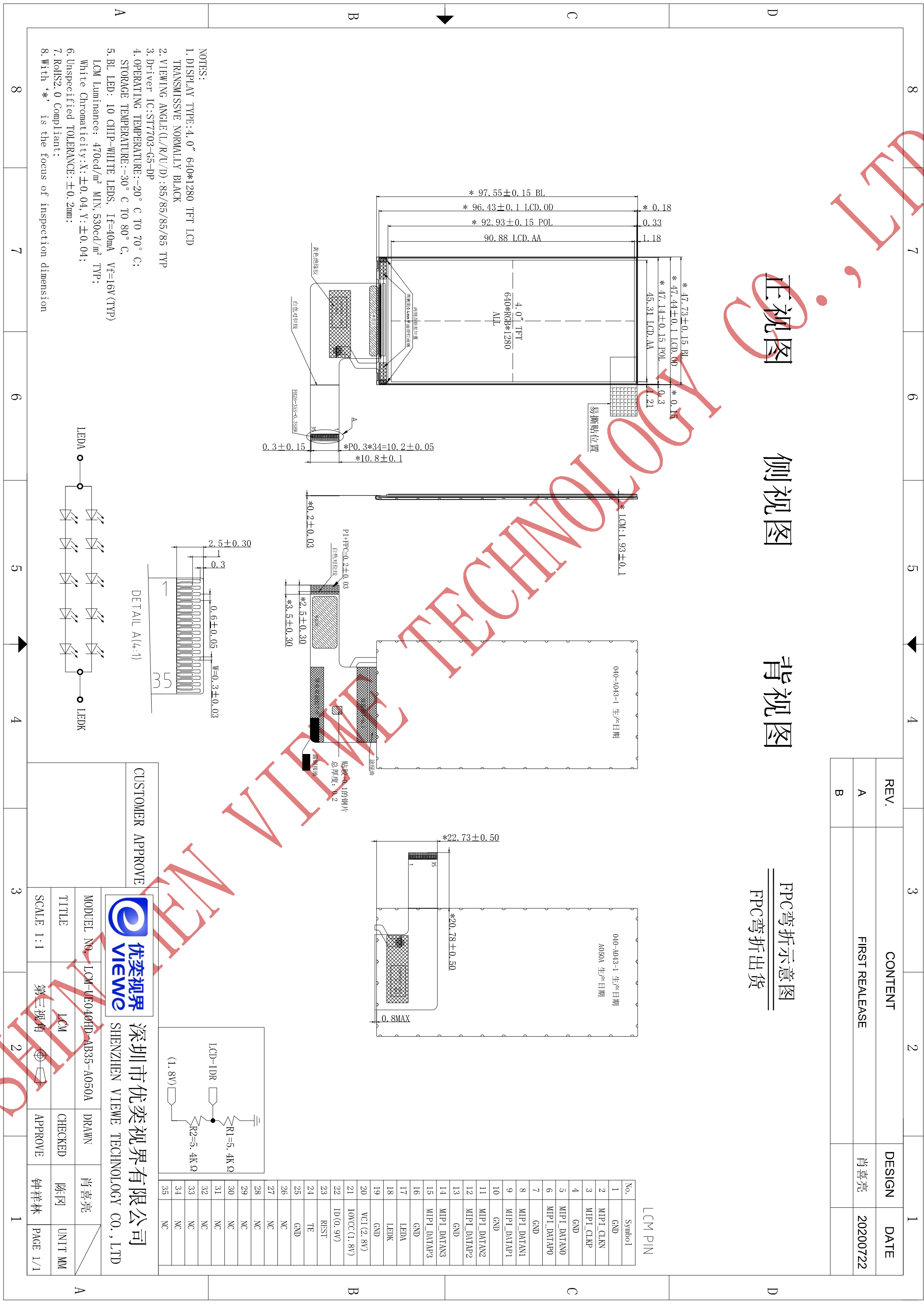
(Ta=+25°C,GND=0V)

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



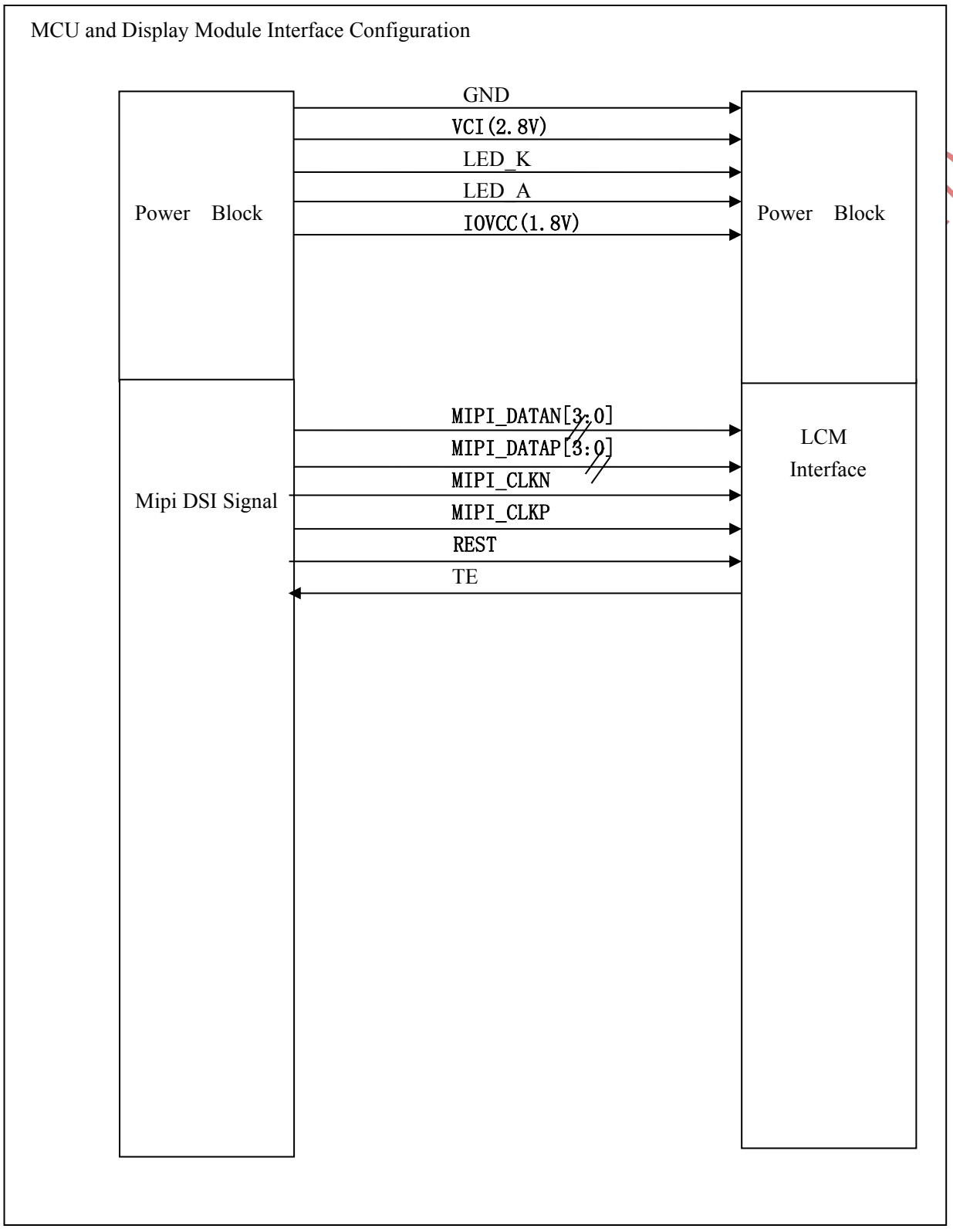
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin	Symbol	I/	Description
1	GND	P	Power Ground
2	MIPI_CLKN	I	MIPI-DSI clock lane negative-end input pin
3	MIPI_CLKP	I	MIPI-DSI clock lane positive-end input pin
4	GND	P	Power Ground
5	MIPI_DATAN0	I/O	MIPI-DSI data lane 0 negative-end input pin
6	MIPI_DATAP0	I/O	MIPI-DSI data lane 0 positive-end input pin
7	GND	P	Power Ground
8	MIPI_DATAN1	I	MIPI-DSI data lane 1 negative-end input pin
9	MIPI_DATAP1	I	MIPI-DSI data lane 1 positive-end input pin
10	GND	P	Power Ground
11	MIPI_DATAN2	I	MIPI-DSI data lane 2 negative-end input pin
12	MIPI_DATAP2	I	MIPI-DSI data lane 2 positive-end input pin
13	GND	P	Power Ground
14	MIPI_DATAN3	I	MIPI-DSI data lane 3 negative-end input pin
15	MIPI_DATAP3	I	MIPI-DSI data lane 3 positive-end input pin
16	GND	P	Power Ground
17	LEDA	P	Power supply for backlight anode
18	LEDK	P	Power supply for backlight cathode
19	GND	P	Power Ground
20	VCI(2.8V)	P	Power supply for analog circuits(2.8V)
21	IOVCC(1.8V)	P	Power supply for logic circuits and IO pads(1.8V)
22	ID(0.9V)	O	ID Select
23	REST	I	The signal will reset the LCM, Signal is active low.
24	TE	O	Tearing effect outputsignal. If not used, please let this pin open
25	GND	P	Power Ground
26-35	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	IOVCC(1.8V)	1.65	1.8	2.0	V	-
Power supply2 voltage	VCI(2.8V)	2.5	2.85	6.2	V	-
Power Supply1 Current	$I_{VCI(2.8V)}$	-	30	-	mA	Note1
Power Supply2 Current	$I_{IOVCC(1.8V)}$		10		V	
Logic Input High Voltage	V_{IH}	0.7*1V8	-	1V8	V	-
Logic Input Low Voltage	V_{IL}	0	-	0.3*1V8	V	-
Panel Power Consumption	P_{VDD}	-	0.103	-	Watt	Note1
Module Power Consumption	P_{LCM}	-	0.753	-	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.

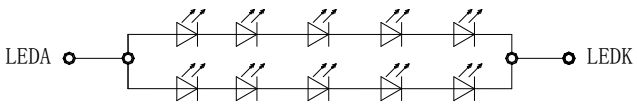
5.2 Back Light Driving Section

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	-	16	-	V	Note1
Forward Current	I_F	-	40	-	mA	Note1
Backlight Power consumption	P_{BL}	-	0.64	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity			10		PCS	

(Ta=+25℃,GND=0V)

Note1: The LED driving condition is defined for each LED module (5 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.



5.3 Power On/Off Sequence

5.3.1 Power On Sequence

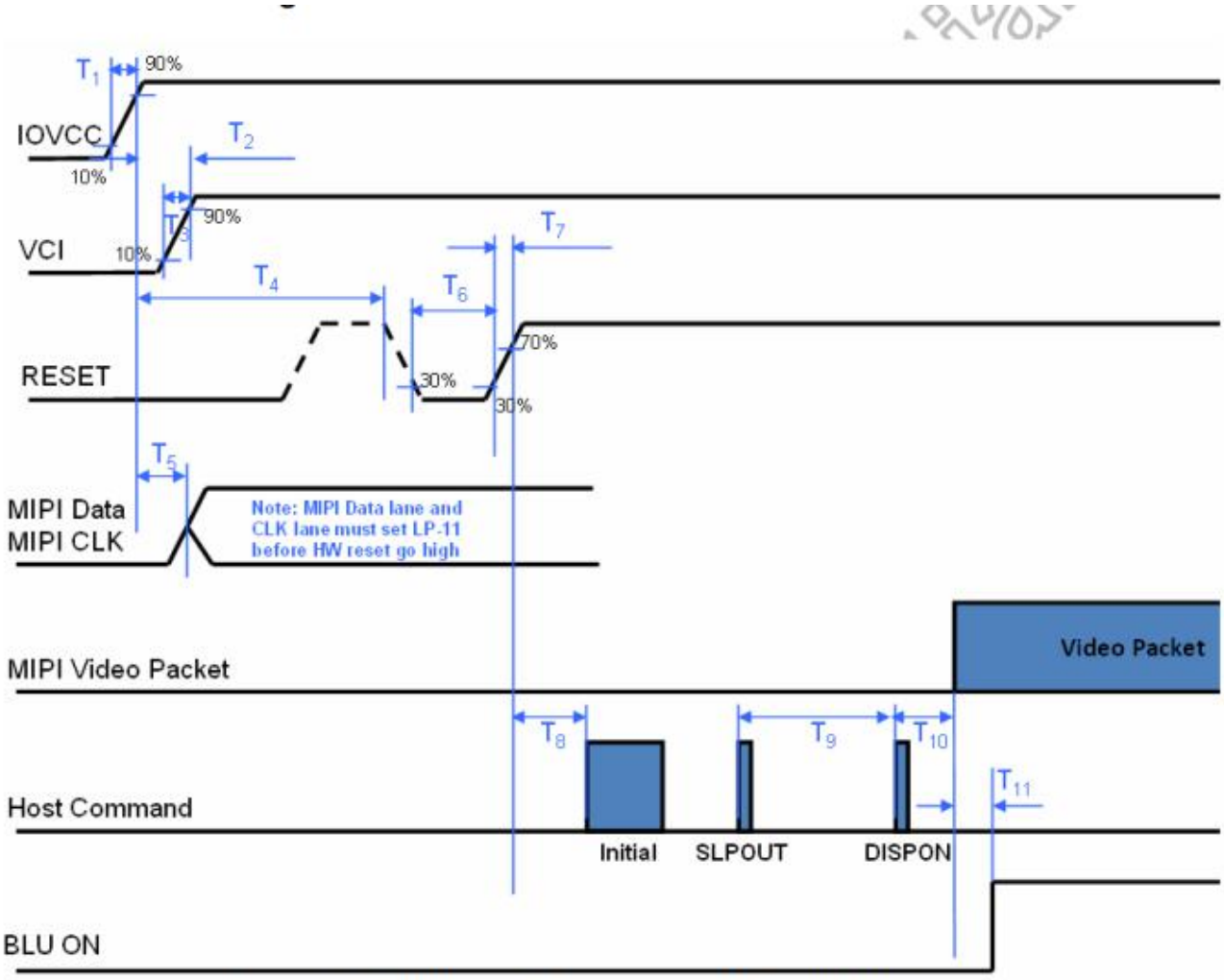


Figure 8-6: DSI Power On Sequence of Power IC Mode

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

5.3.2 Power Off Sequence

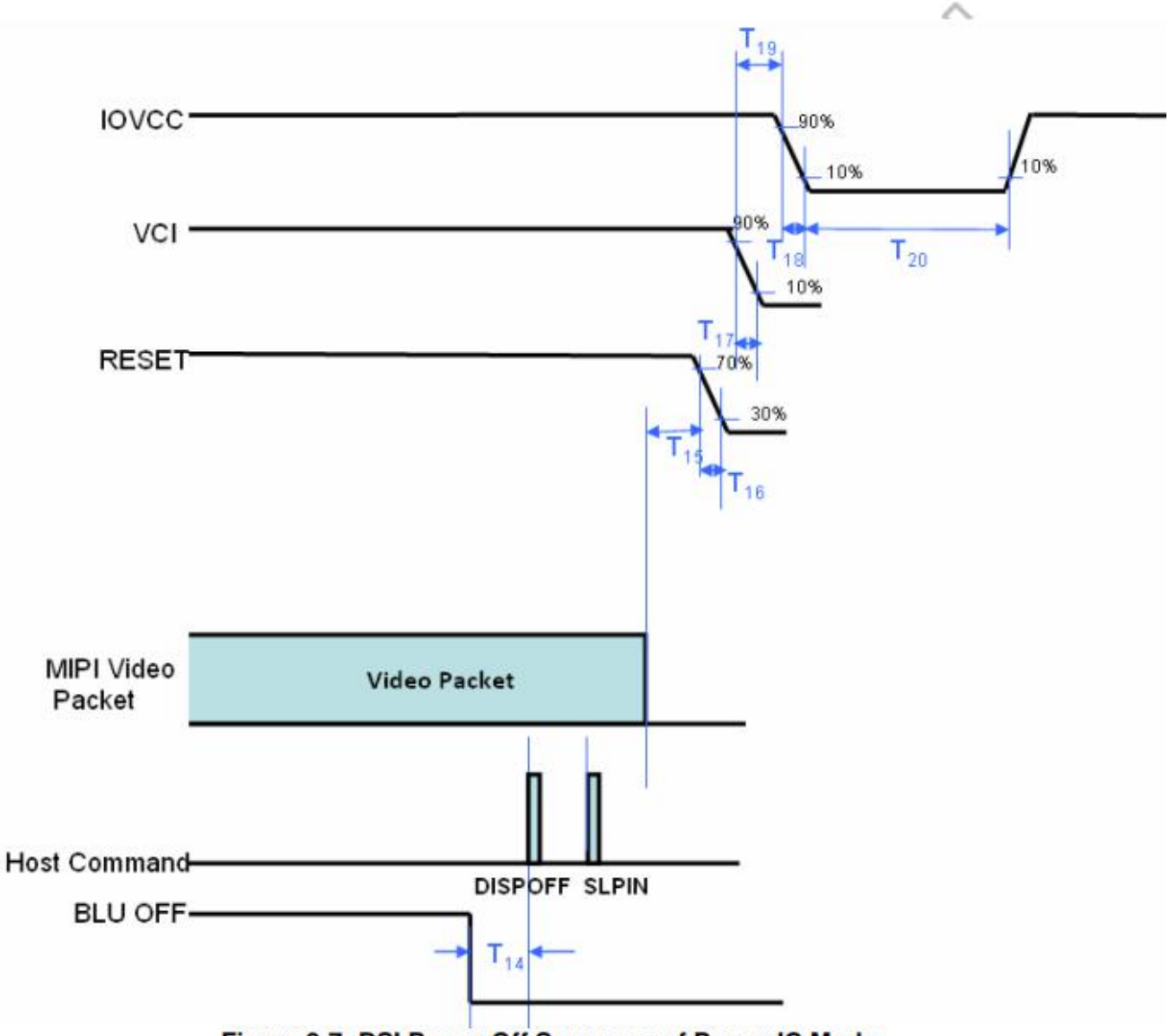


Figure 8-7: DSI Power Off Sequence of Power IC Mode

	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	500			ms

5.4 Timing Characteristics

5.4.1 AC Characteristics

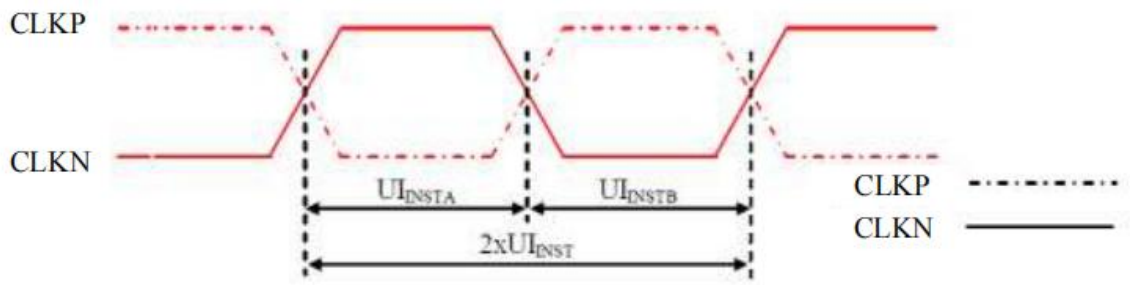


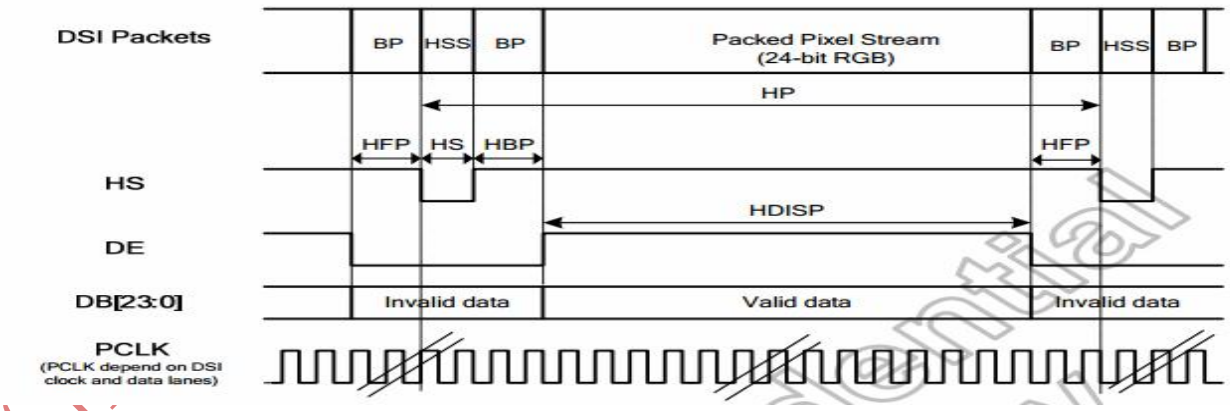
Figure 113: DSI Clock Channel Timing

Table 38: DSI Clock Channel Timing

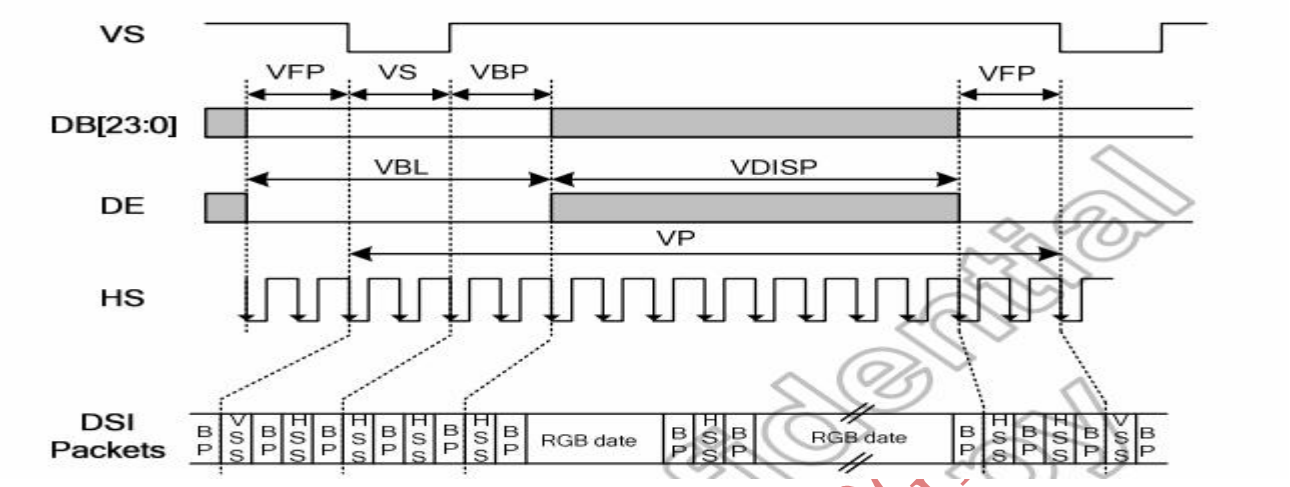
Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	$2xUI_{INST}$	Double UI instantaneous	*Note 2*	25	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	*Note 2*	12.5	ns

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	BR_{PHY}	80	-	1000	Mbps
Active pixel per line	HACT	-	640	-	Pixels
Horizontal back porch	t_{HBP}	-	26	-	DCLK
Horizontal sync active	t_{HSA}	-	2	-	DCLK
Horizontal front porch	t_{HFP}	-	130	-	DCLK
Active pixel per frame	VACT	-	1280	-	H
Vertical back porch	t_{VBP}	-	53	-	H
Vertical sync active	t_{VSA}	-	10	-	H
Vertical front porch	t_{VFP}	-	4	-	H

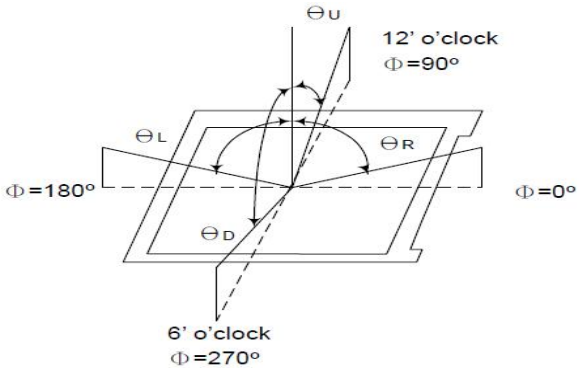
6. OPTICAL CHARACTERISTICS

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°	800	1000	-	-	Note(4)
NTSC Ratio	S	θ =0°	64	69	-	%	Note(7)
Luminance	L	θ =0°	-	530	-	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 = 0° (Center) Normal viewing angle B/L On	-0.03	0.300	+0.03	NTSC (x,y)	Note(6)
	W_Y			0.326			
	R_X			0.655			
	R_Y			0.327			
	G_X			0.284			
	G_y			0.594			
	B_X			0.138			
	B_Y			0.111			
Viewing Angle	Θ_1	C/R>10	-	85	-	Degree	Note(1)
	θ_R		-	85	-		
	θ_U		-	85	-		
	θ_D		-	85	-		

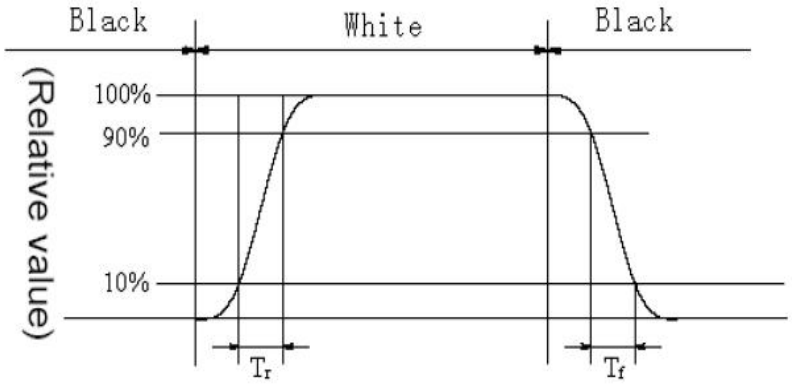
Test Conditions:

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

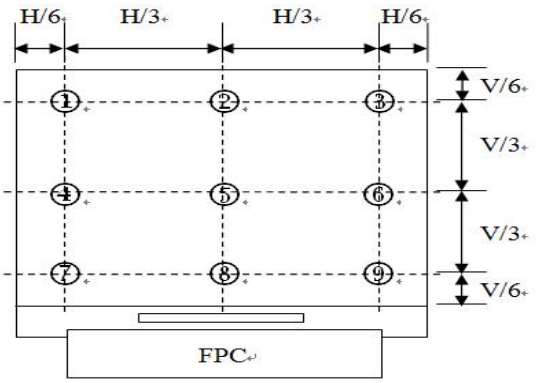


Note2: Definition of Response time: Sum of T_R and T_F



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.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \text{ x100\%}$$



Note4: Definition of Contrast Ratio (CR): measured at the center point of panel

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

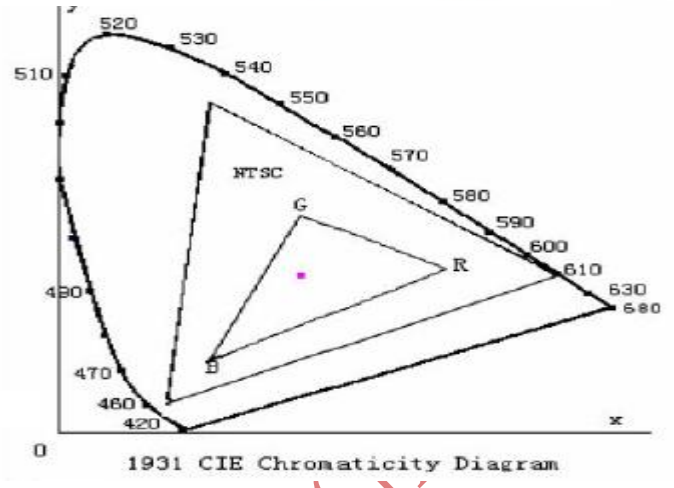
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

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

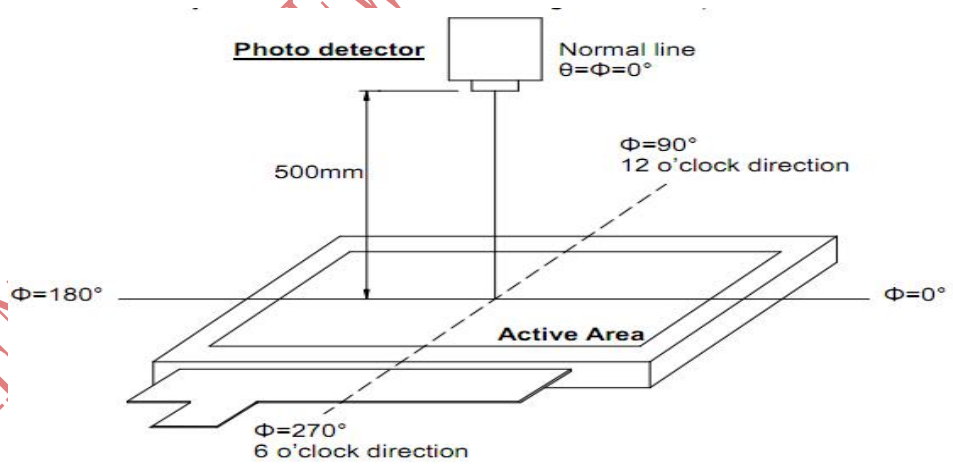
Note 7: Definition of NTSC ratio:

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



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	-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

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