

LCD MODULE

SPECIFICATION

Model:	UE040WV-RB30-A032C
Version:	V1.0
Date:	20190809

☒ **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	2019.08.09	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.....	12
5.5 Timing Diagram.....	12
6. OPTICAL CHARACTERISTICS.....	13
7. RELIABILITY.....	16
8. PACKAGE DRAWING.....	17

1. GENERAL INFORMATION

1.1 Features

- 1) Pixel Arrangement: RGB Vertical Stripe
- 2) Interface Mode: MIPI 2lane
- 3) Driver IC: ST7701S
- 4) Operation Temperature: -20~70℃
- 5) Storage Temperature: -30~80℃
- 6) Backlight Type: White LED
- 7) Display mode: Normally Black
- 8) Pixel Density: 233 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	4.0	Inch	Diagonal
Resolution	480(W)*3(RGB)*800(H)	Dots	-
Interface	MIPI	-	2lane
Module Power Consumption	0.6	Watt	Typ.
Active Area	51.84(W)*86.30(H)	mm	-
Pixel pitch (W*H)	0.108(W)*0.108(H)	mm	-
CTP_Module Size (W*H*D)	63.10(W)*106.79(H)*3.79(D)	mm	Tolerance: ±0.2
Luminance	450	cd/m ²	Typ.
Viewing Direction	ALL	O'clock	Gray inversion
Display Color	16.7M	Colors	8bits

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	VCC	-0.5	3.9	V	Note1
Power supply2 voltage	IOVCC	-0.5	3.6	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	70	°C	Note1,2
Storage temperature	T _{st}	-30	80	°C	Note1,2
Humidity	H _{st}	10	90	%RH	Note1,3

(Ta=+25°C,GND=0V)

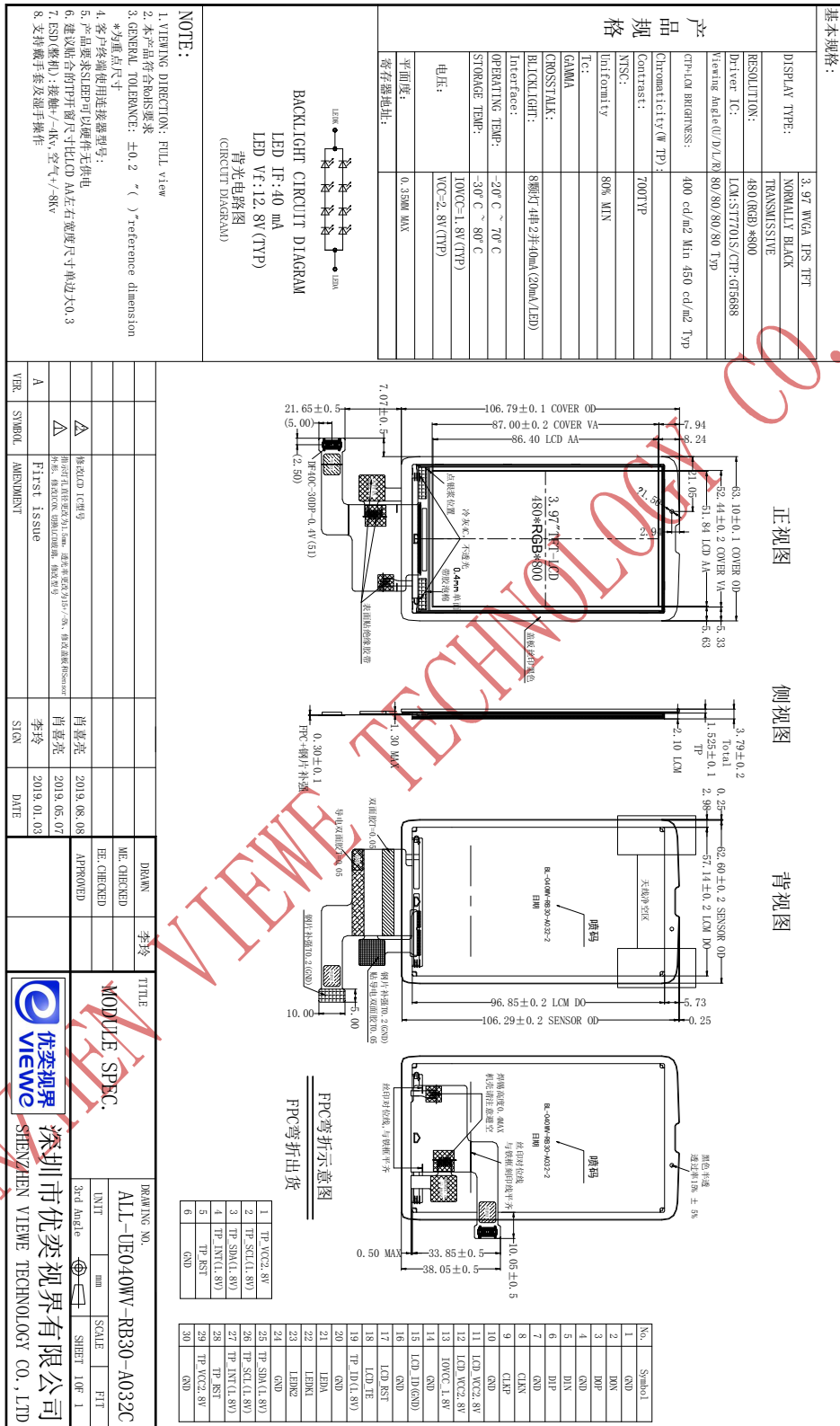
Note1:If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also if the module operates with the absolute maximum ratings for a long time, the reliability may drop.

Note2: In case of temperature below 0°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 at 60°C.

3. MECHANICAL DRAWING



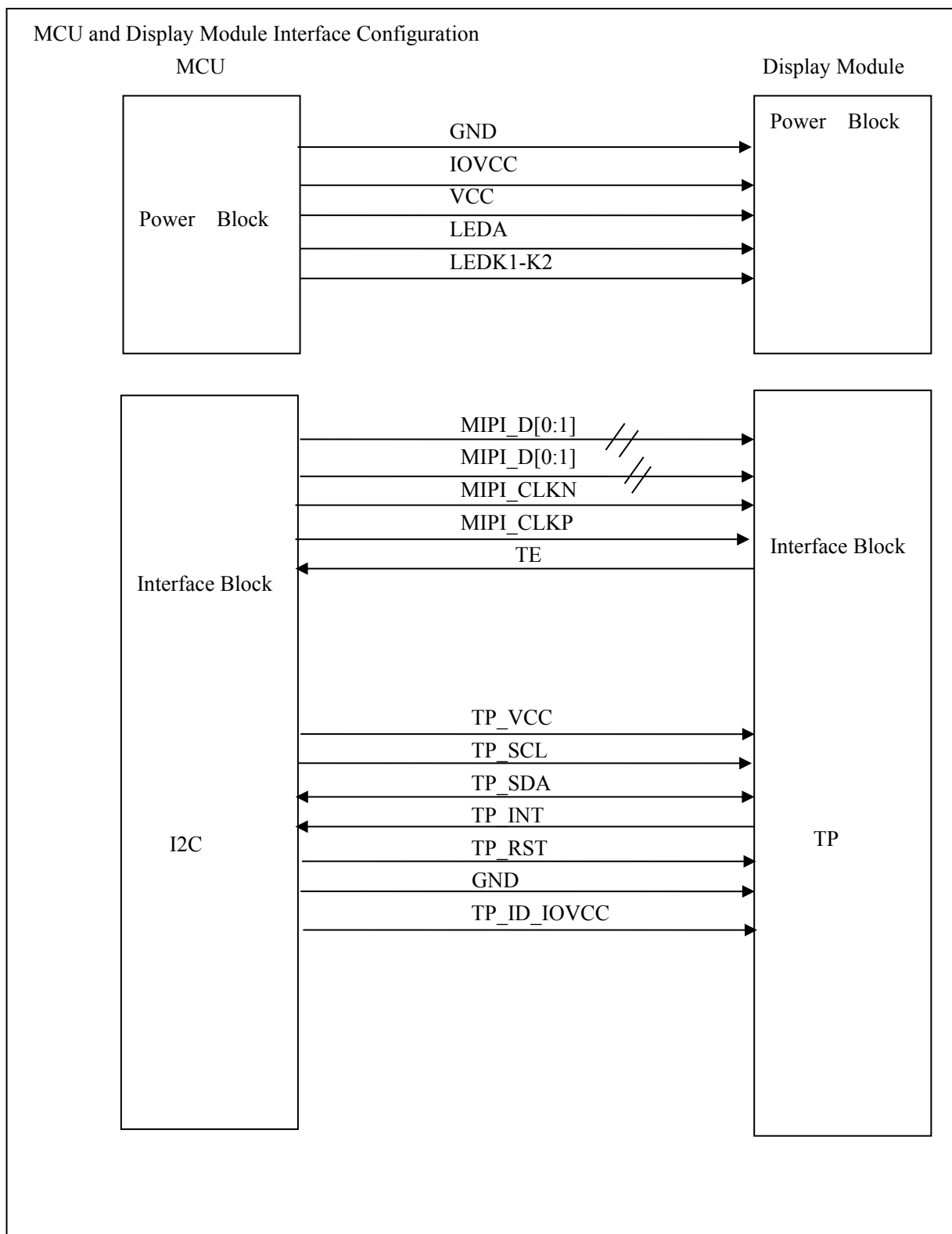
4. I/O CONNECTION & BLOCK DIAGRAM

4.1 I/O Connection

Pin No. 管脚号	Symbol 符号	I/O	Description 描述
1	GND	P	Power Ground
2	MIPI_D0N	I	MIPI differential data
3	MIPI_D0P	I	MIPI differential data
4	GND	P	Power Ground
5	MIPI_D1N	I	MIPI differential data
6	MIPI_D1P	I	MIPI differential data
7	GND	P	Power Ground
8	MIPI_CLKN	I	MIPI differential clock
9	MIPI_CLKP	I	MIPI differential clock
10	GND	P	Power Ground
11-12	VCC	P	A power supply for digital circuits and IO pads(3.3V)
13	IOVCC	P	Power supply for digital circuits (1.8V)
14	GND	P	Power Ground
15	LCD_ID(GND)		Power Ground
16	GND	P	Power Ground
17	RESET	I	Global reset pin
18	TE	O	Tearing effect output pin to synchronize MCU to frame
19	TP_ID_IOVCC	P	Power supply for digital circuits (1.8V)
20	GND	P	Power Ground
21	LEDA	P	Power supply for LED+
22	LEDK1	P	Power supply for LED-
23	LEDK2	P	Power supply for LED-
24	GND	P	Power Ground
25	TP_SDA	I/O	I2C data signals for TP
26	TP_SCL	I	I2C clock signals for TP
27	TP_INT	O	Interrupt signals for TP
28	TP_RST	I	The signal will reset the TP, Signal is active low
29	TP-VCC2.8V	P	TP_VDD(2.8V) Power Supply for TP
30	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	IOVCC	-	1.8	-	V	-
Power Supply2 Voltage	VCC	-	3.3	-	V	-
Power Supply Current	VCC	-	32	-	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}	-	0.611	-	Watt	Note1,2

(Ta=+25°C,GND=0V)

Note1:Measurement Conditions (Video Mode): Full Screen Red Pattern,VDD=1.8V,60Hz Refresh.

Note2: P_{LCM}= P_{VDD}+ P_{B/L}, About P_{B/L} information, inference to 5.2 Back Light Driving Section.

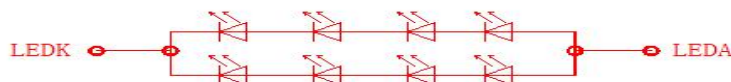
Note3: VCOM values reference only, must be adjusted to optimize display quality

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	-	12.8	-	V	Note1
Forward Current	I _F	-	40	-	mA	Note1
Backlight Power consumption	P _{B/L}	-	0.512	-	Watt	Note1
LED life time	-	30000	-	-	Hours	Note2
LED Quantity		8			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.



BACKLIGHT CIRCUIT DIAGRAM

LED I_F: 40 mA

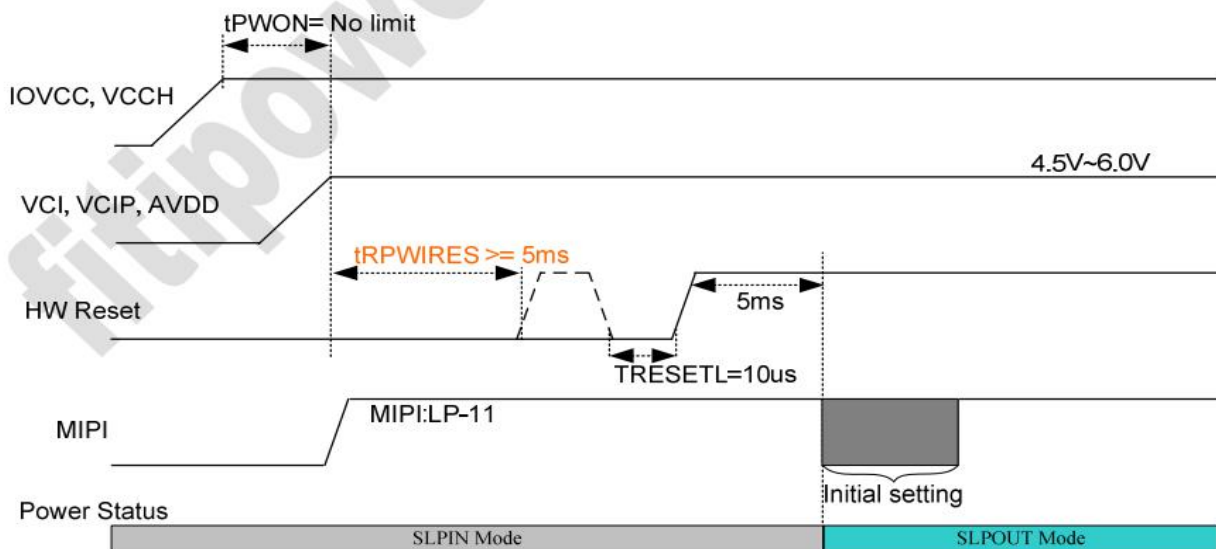
LED V_f: 12.8V (TYP)

背光电路图
(CIRCUIT DIAGRAM)

5.3 Power On/Off Sequence

BOOSTM [1:0]=01 (External AVDD power, Internal AVEE power)

IOVCC=VCCH=1.65V ~ 3.6V, AVDD=VCI=VCIP=4.5V ~ 6.0V

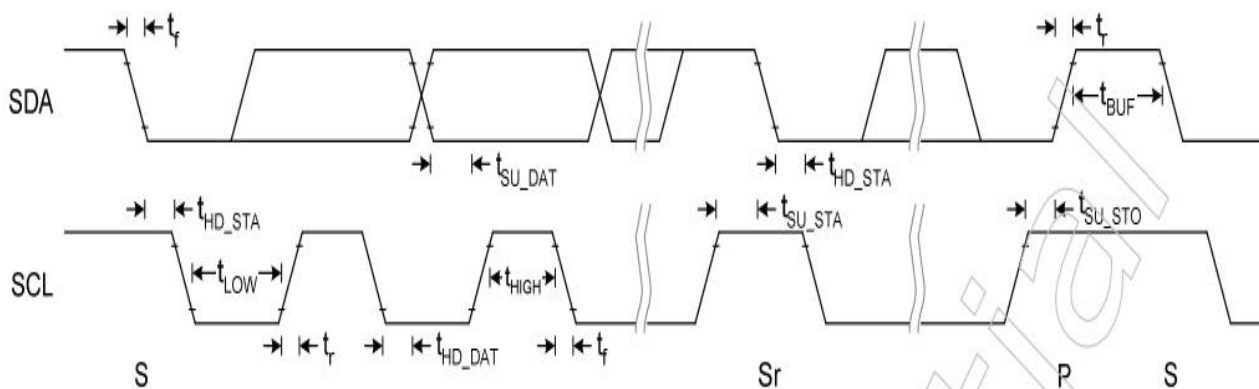


Uncontrolled power off

The uncontrolled power off means a situation when e.g. there is removed a battery without the controlled power off sequence. The display module must meet following requirements:

- There cannot be any damages for the display module or the display module cannot cause any damages for the host or lines of the interface.
- There cannot be any abnormal visible effects (= display must be blank) with in 1 second on the display and remains blank until "Power On Sequence" powers it up

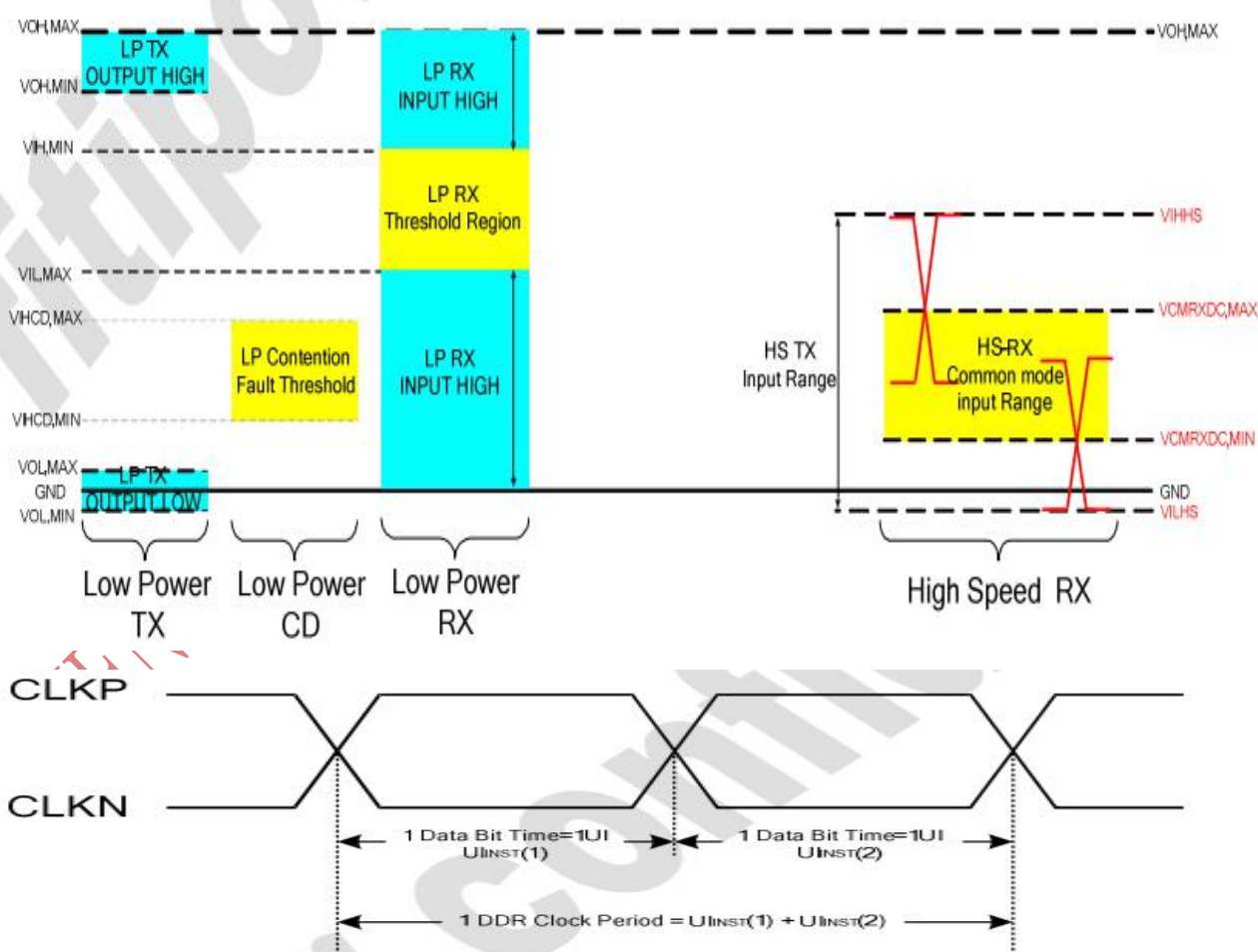
5.4.0 I2C interface timings



Parameter	Symbol	Min.	Max.	Unit
SCL low period	t_{lo}	1.3	-	us
SCL high period	t_{hi}	0.6	-	us
SCL setup time for START condition	t_{st1}	0.6	-	us
SCL setup time for STOP condition	t_{st3}	0.6	-	us
SCL hold time for START condition	t_{hd1}	0.6	-	us
SDA setup time	t_{st2}	0.1	-	us
SDA hold time	t_{hd2}	0	-	us

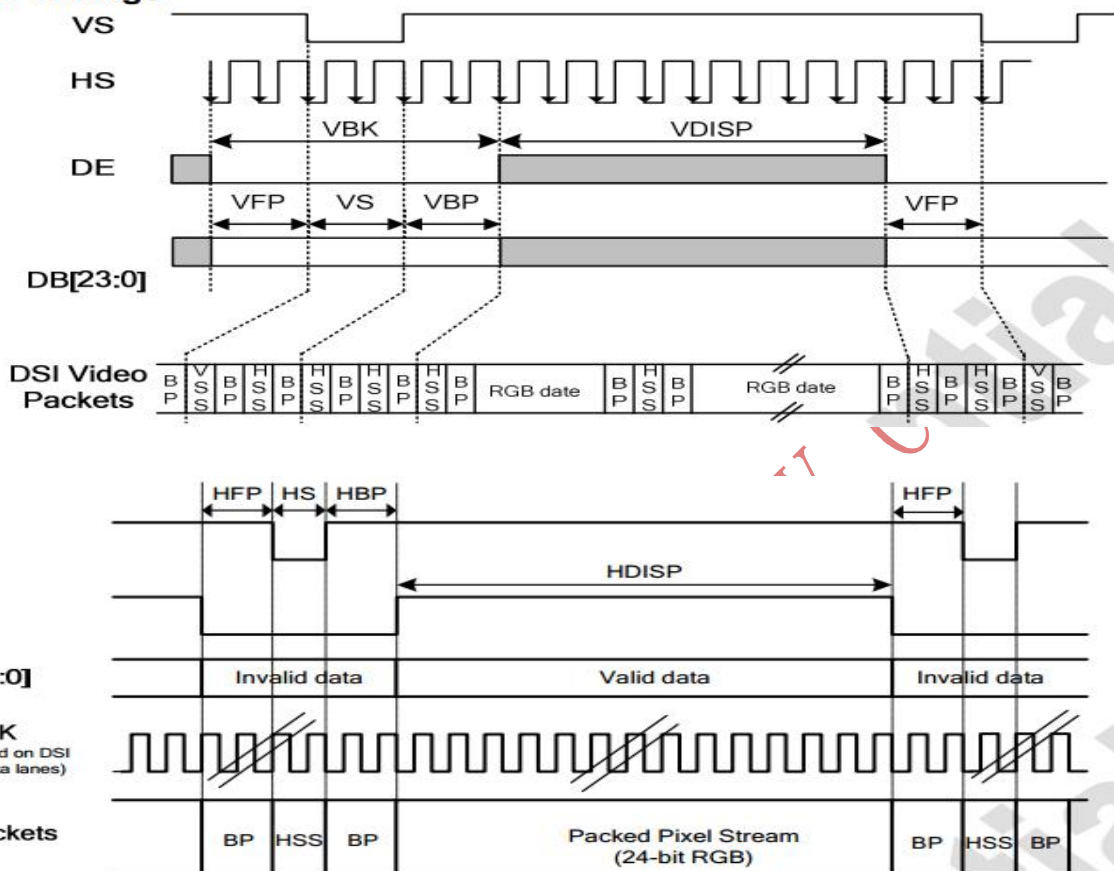
Note: 3.3V 通讯接口，400Kbps 通讯速度，上拉电阻 2K

5.4.1ACCharacteristics



5.5 Timing Diagram

Vertical Timings



5.5.1 Timing Parameters

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2	-	Note(1)	Line
Vertical front porch	VFP	-	2	-	-	Line
Vertical back porch	VBP	-	2	-	Note(1)	Line
Vertical blanking period	VBK	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	800	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Note: (1) The VS and VBP pulse width are related to GIP start pulse and GIP clock pulse timing. The GIP start pulse and GIP clock pulse must be set at corresponding position for LCD normal display.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	-	78	DCK
Horizontal back porch	HBP	-	5	-	78	DCK
Horizontal front porch	HFP	-	5	-	78	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	16	-	88	DCK
Horizontal active area	HDISP	-	-	480	-	DCK

Note: (1) HS+HBP>0.5uS.

(2) HFP>0.5uS.

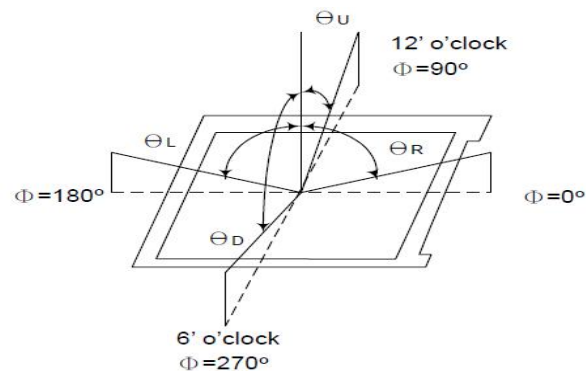
6. OPTICAL CHARACTERISTICS

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	$\theta = 0^\circ$	650	900	-	-	Note(4)
NTSC Ratio	S	$\theta = 0^\circ$	-	69.83		%	Note(7)
Luminance	L	$\theta = 0^\circ$	-	450	-	cd/m ²	Note(5)
Luminance uniformity	U _w	$\theta = 0^\circ$	75	80	-	%	Note(3)
Response Time	T _R + T _F	25 °C	-	35	-	ms	Note(2)
Color Coordination	W _X	$\theta = 0^\circ$ (Center) Normal viewing angle B/L On	-+0.03	0.288	+0.03	NTSC (x,y)	Note(6)
	W _Y			0.319			
	R _X			0.640			
	R _Y			0.335			
	G _X			0.325			
	G _Y			0.606			
	B _X			0.148			
	B _Y			0.045			
Viewing Angle	θ_L	C/R>10	-	80	-	Degree	Note(1)
	θ_R		-	80	-		
	θ_U		-	80	-		
	θ_D		-	80	-		

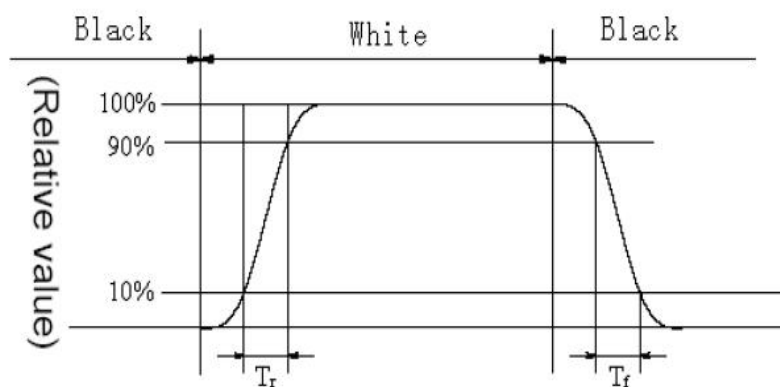
Test Conditions:

1. VDD=1.8V, I_F=40mA (Backlight current), the ambient temperature is +25°C.
2. The test systems refer to Note 8.

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

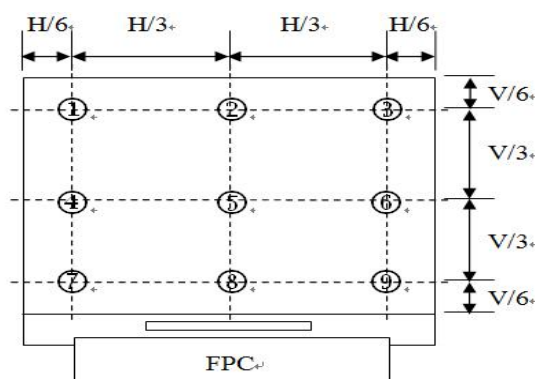


Note2: Definition of Response time: Sum of T_R and T_F



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

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

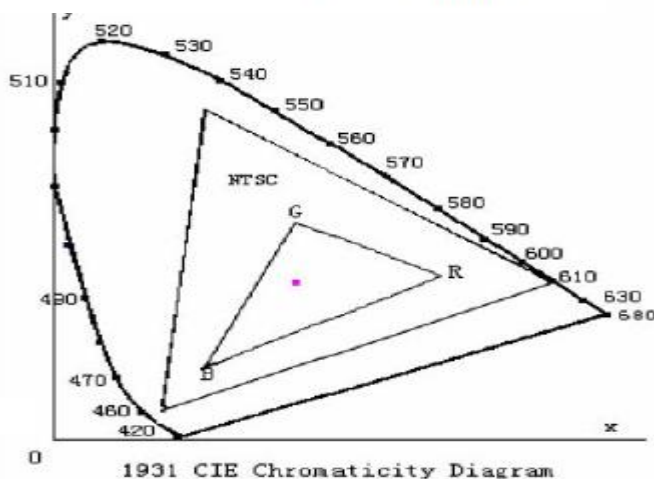
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1 point average across the LCD surface.

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:

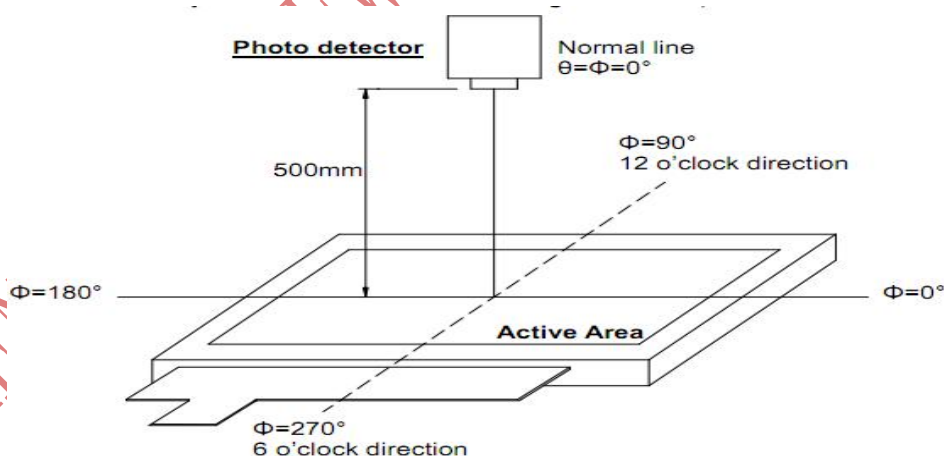
$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$



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 =+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 Δ+80°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 1m 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

