Product Specification

Part Name: TFT LCD Display Module
Customer Part ID:
Zhong JingYuan ID: ZJY320S0800TG02
Ver: A

Customer:
Approved by

From: Zhong JingYuan technology Co.,Ltd.
Approved by

Notes:

1. Please contact Zhong JingYuan technology Co.,Ltd. before assigning your product based on this module specification
2. The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by Zhong JingYuan technology Co.,Ltd. for any intellectual property claims or other problems that may result from application based on the module described herein.

Revised History

Part Number	Revision	Revision Content	Revised on
ZJY320S0800TG02	A	New	**2020-06-06**

TABLE OF Contents

1.General Description

ZJY320S0800TG02 is a 240RGB*320 dots matrix TFT LCD module. It has a TFT panel composed of 720sources and 320gates. The LCM can be easily accessed by micro-controller.

2. Features

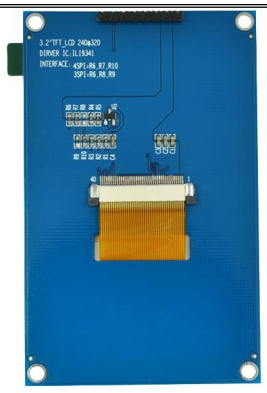
Display Mode	Transmissive
	a-TFT
Display Format	Graphic 240RGB*320 Dot-matrix
Input Data	SPI-4wire interface
Viewing Direction	12 o'clock
Drive	ILI9341

3. Mechanical Specification

Item	Specifications	Unit
Dimensional outline	56.00(W)*89.40(H)* 3.75MAX	mm
Resolution	240RGB*320	dots
LCD Active area	48.60(W)*64.80(H)	mm
Pixel size	0.2025(W)*0.2025(H)	mm

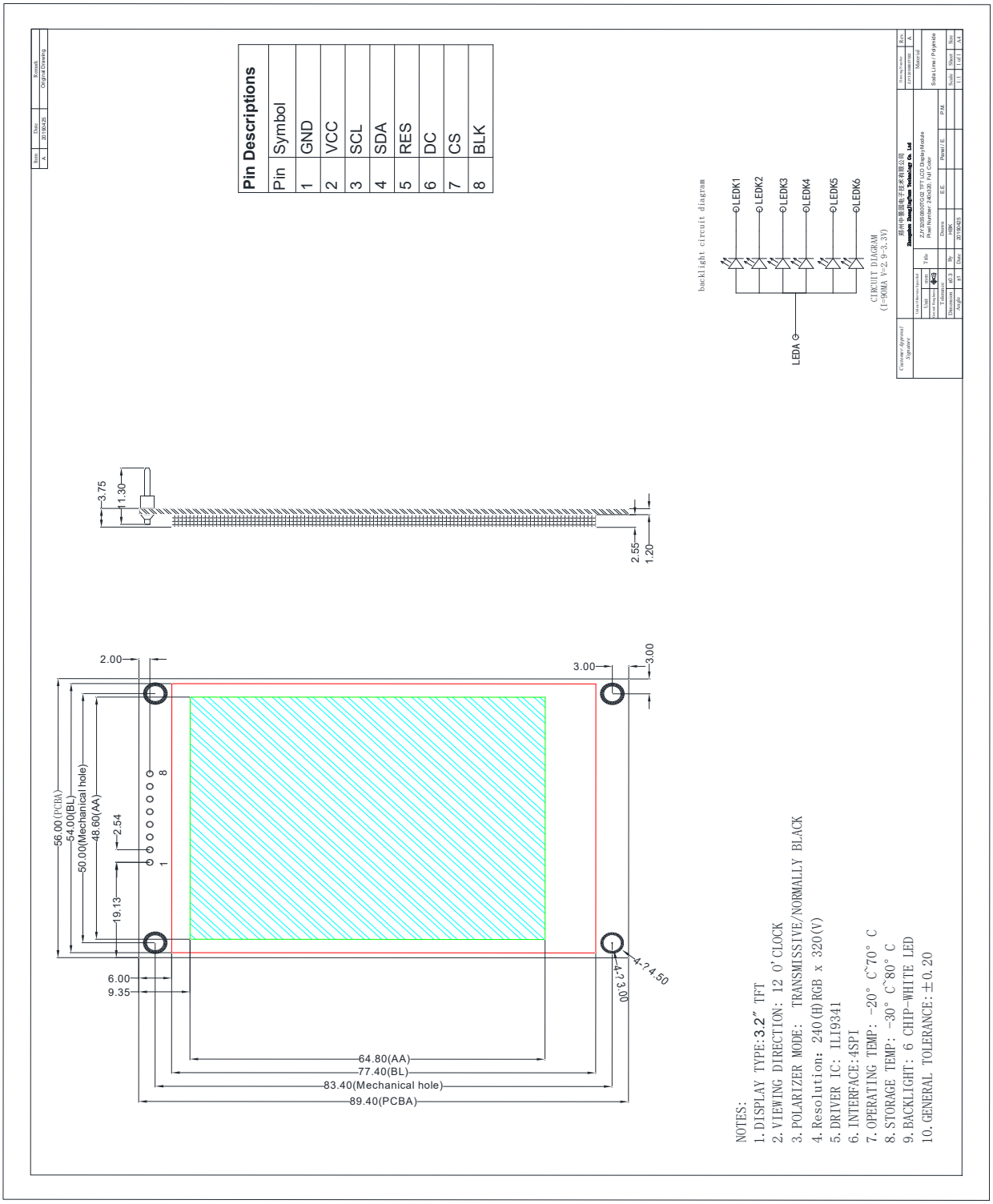
4. Product picture

Top view

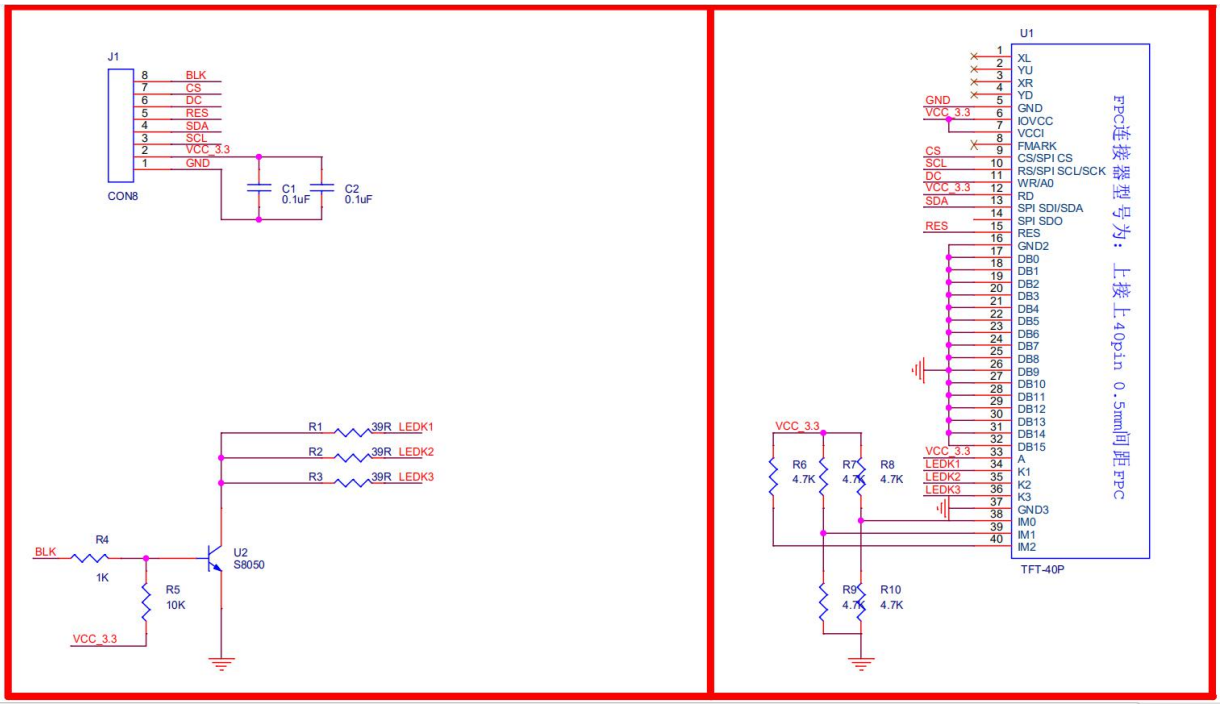


Bottom view

5.Mechanical Dimension



6. Schematic diagram



7. Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
Supply voltage	VCC	3.0	3.3	V	
Operating temperature	T_{OPR}	-20	70	℃	
Storage temperature	T_{STR}	-30	80	℃	

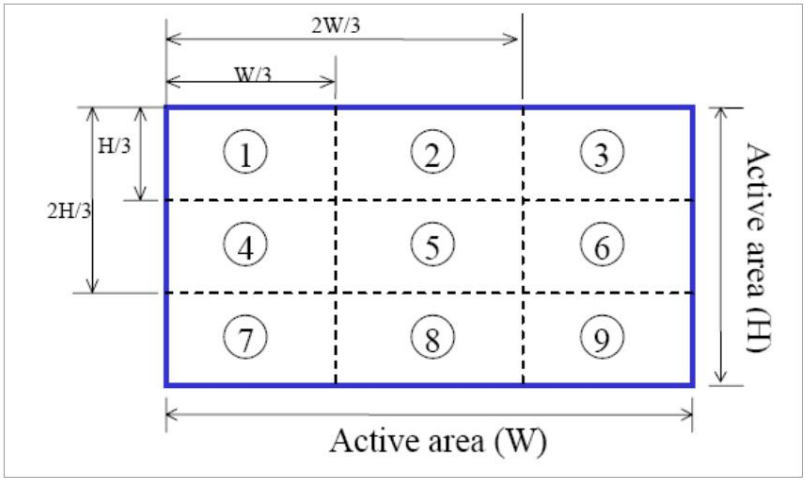
8. Electrical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Logic	V_{CC}		2.7	2.8	3.3	V
Input Voltage	H level	T_{IH}		0.8*IOVCC		IOVCC	V
	L level	T_{IL}		-0.3		0.2* IOVCC	
Storage temperature		I_{DD}	With internal voltage generation V_{CC}=2.8V; T_{emp}=25℃			TBD	mA

9. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit	Notes
LED module Forward voltage	V_{LED}	3.0	3.2	3.3	V	
LED module current	I_{LED}		90		mA	
L/G Surface Luminance ★1	L_s	3500			Cd/m^3	
LCM Surface brightness uniform ★2	L_D	80				%

★ 1Test condition is:
(a) Center point on active area.
(b)Best Contrast.
★2Uniform measure condition:
(1)Measure 9 point. Measure location show below;
(2)Uniform=(Min. brightness /Max. brightness)*100%
(3)Best Contrast.



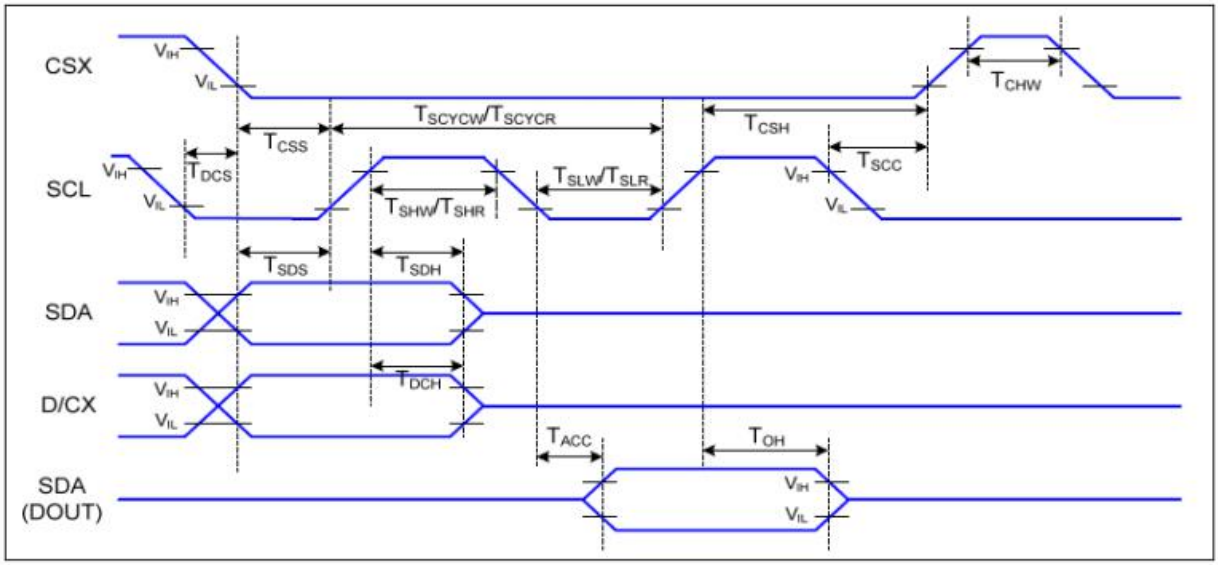
10. Module Function Description

10.1 Pin Descriptions

PIN No.	Symbol	Description
1	GND	Ground of Logic Circuit This is a ground pin. It acts as a reference for the logic pins. It must be connected to external ground
2	VCC	Power Supply for Logic This is a voltage supply pin. It must be connected to external source
3	CLK	The serial clock input
4	MOS	The serial data input
5	RES	Power Reset for Controller and Driver This pin is reset signal input. When the pin is low, initialization of the chip is executed. Keep this pin pull high during normal operation
6	DC	Data/Command Control This pin is Data/Command control pin. When the pin is pulled high, the input at SDA is treated as display data. When the pin is pulled low, the input at SDA will be transferred to the command register.
7	CS	Chip select pin (“Low” enable)
8	BLK	Backlight control pin When the pin is pulled high turn on backlight, When the pin is pulled low turn off backlight

10.2 Timing characteristics.

Serial Interface Characteristics (4-line Serial)



4-line Serial Interface Timing

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	TBD		ns	
	TCSH	Chip Select Hold Time (Write)	TBD		ns	
	TCSS	Chip Select Setup Time (Read)	TBD		ns	
	TSCC	Chip Select Hold Time (Read)	TBD		ns	
	TCHW	Chip Select "H" Pulse Width	TBD		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	TBD		ns	-Write Command & Data Ram
	TSHW	SCL "H" Pulse Width (Write)	TBD		ns	
	TSLW	SCL "L" Pulse Width (Write)	TBD		ns	
	TSCYCR	Serial Clock Cycle (Read)	TBD		ns	-Read Command & Data Ram
	TSHR	SCL "H" Pulse Width (Read)	TBD		ns	
	TSLR	SCL "L" Pulse Width (Read)	TBD		ns	
D/CX	TDCS	D/CX Setup Time	TBD		ns	
	TDCH	D/CX Hold Time	TBD		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	TBD		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	TBD		ns	
	TACC	Access Time	TBD	TBD	ns	
	TOH	Output Disable Time	TBD	TBD	ns	

4-line Serial Interface Characteristics

10.3 Commands

Refer to the Technical Manual for the ILI9341

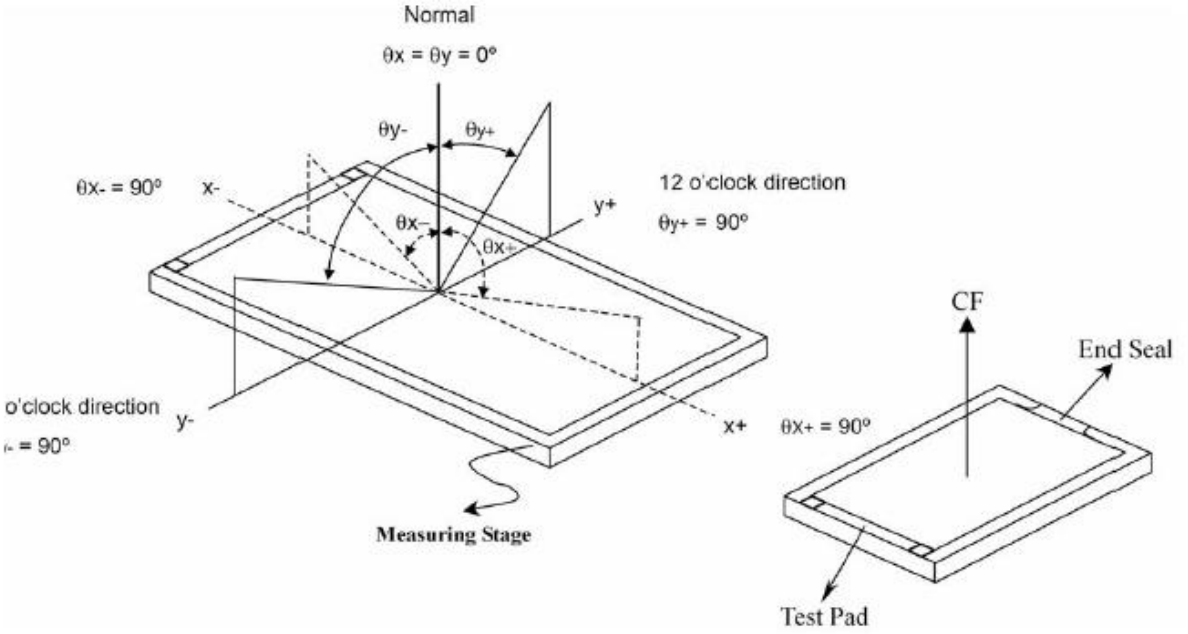
11.Electro-optical Characteristics

Item	Symbol	Conditions	Temp	Min.	Typ.	Max.	Unit	Note
Response Time	T_R	θ = ϕ =0	25℃		TBD	TBD	msec	NOTE2
	T_F				TBD	TBD		
Viewing Angle Range	ϕ =0^0(6”)	ϕ =90^0(3”)	ϕ =180^0(12”)			ϕ =270^0(9”)		NOTE3
θ（25℃） CR≥10	TBD	TBD	TBD			TBD		NOTE3

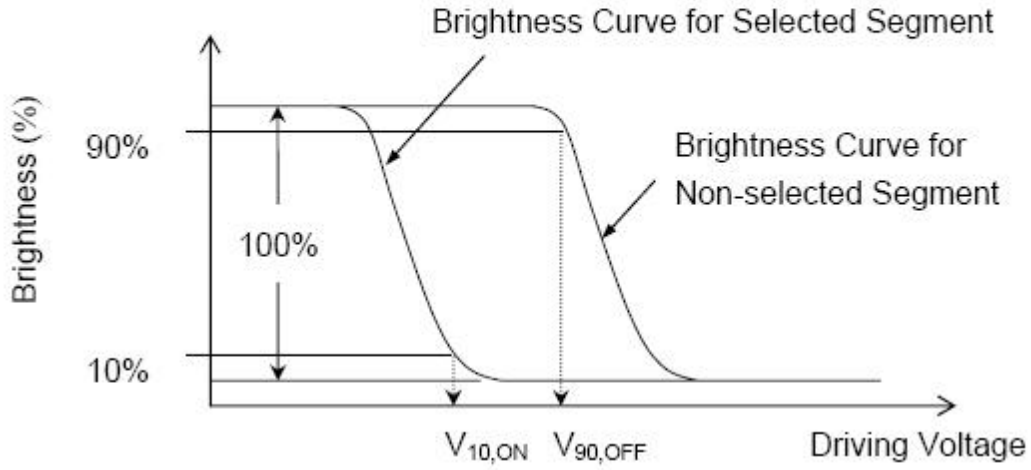
The above “viewing angle” is the measuring position with the largest contrast ratio. Not for good image quality. Viewing direction for good image quality is 12 O’clock.

●For panel only

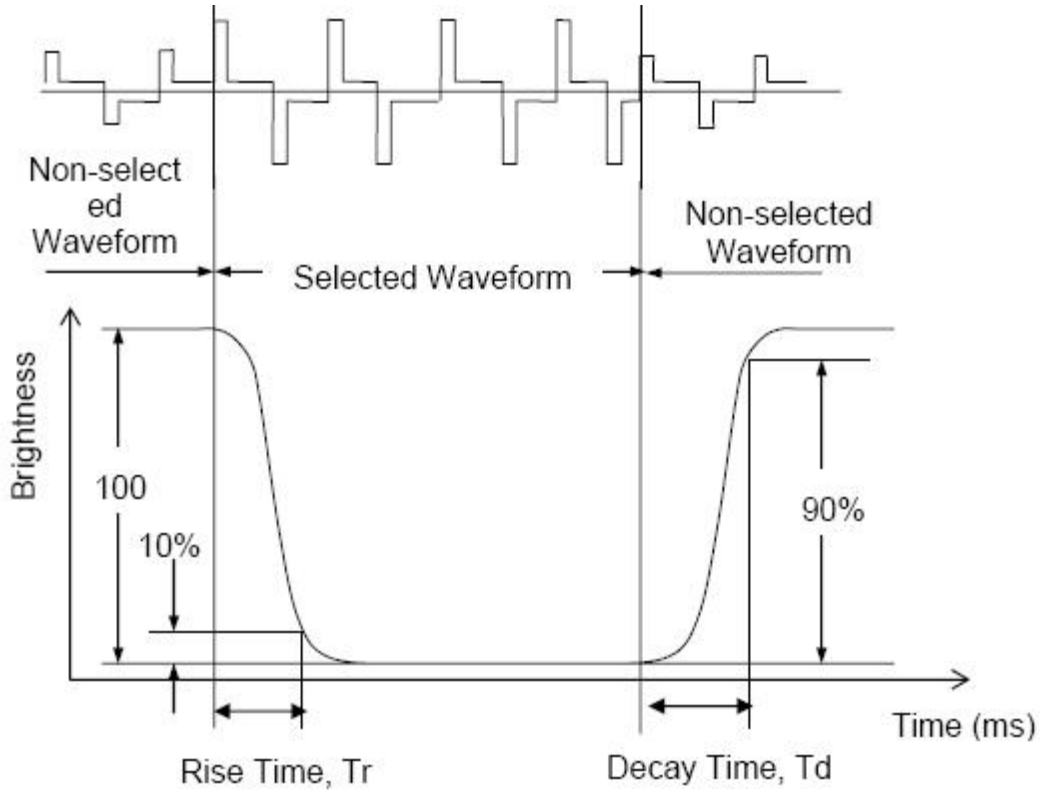
●Electro-Optical Characteristics Test Method



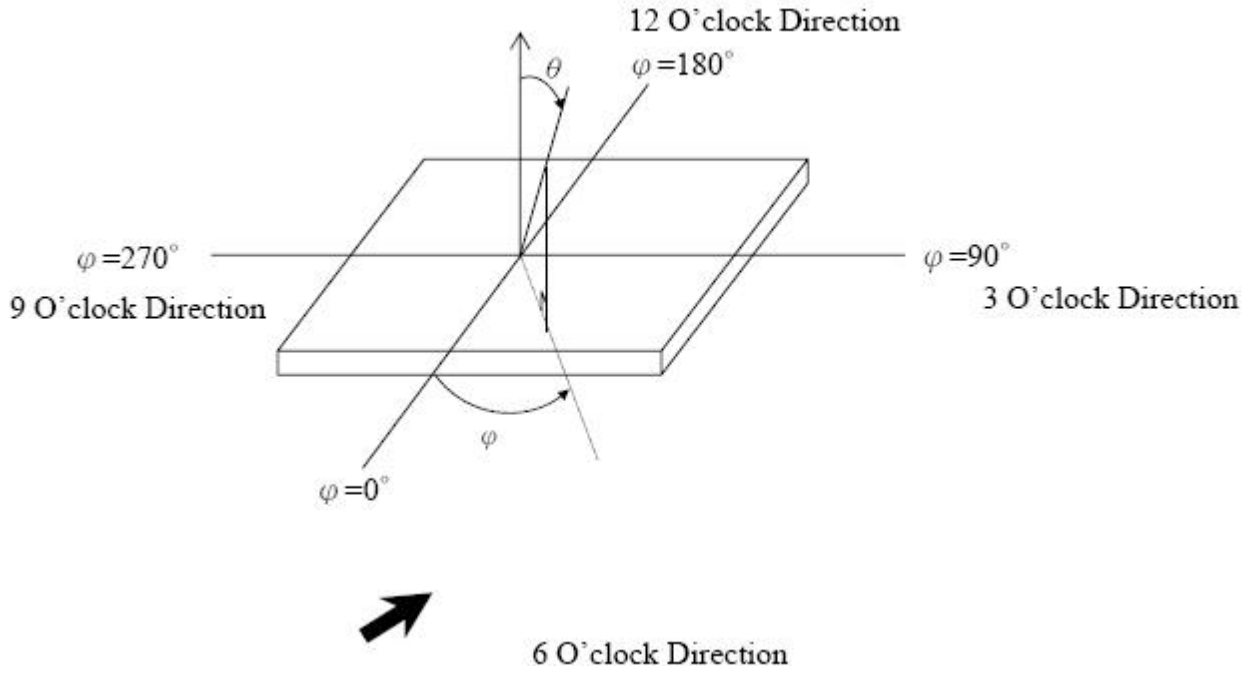
$$Vop = (V_{10,\,ON} + V_{90,\,OFF})/2$$



.Note2.Definition of Optical Response Time:

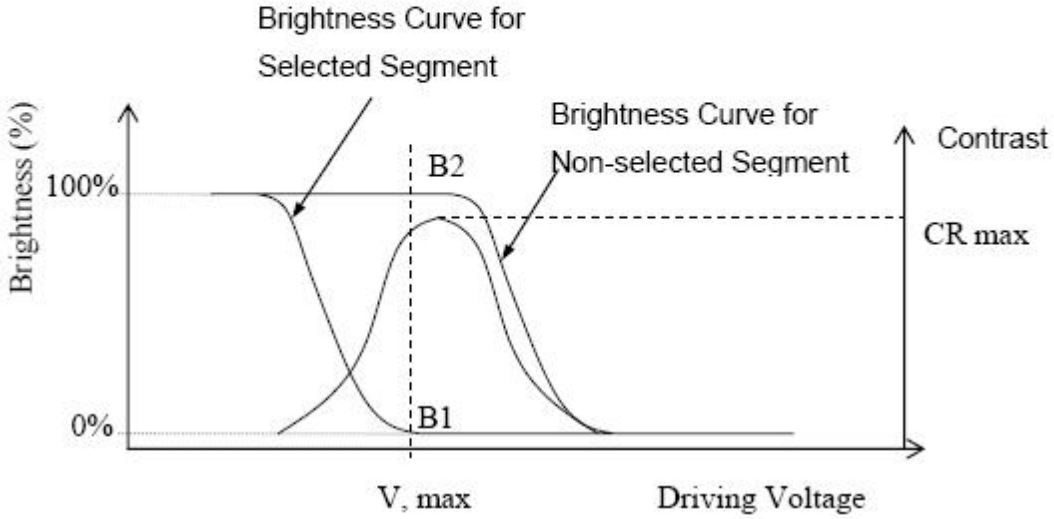


.Note3.Definition of Viewing Angle θ and Φ :



Note4.Definition of Contrast ratio (CR):

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



12. Reliability

12.1 Mtbf

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal

12.2 Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	80℃*240Hrs	。No Defect Of Operational Function In Room Temperature Are Allowable 。IDD of LCM in Pre-and Post-Test Should Follow Specification
2	Low Temperature Non-Operating Test	-30℃*240Hrs	
3	High Temperature/Humidity Non Operating Test	60℃*90%RH*240Hrs	
4	High Temperature Operating Test	70℃*240Hrs	
5	Low Temperature Operating Test	-20℃*240Hrs	
6	Thermal Shock Test	-20℃(30Min) ↔70℃(30Min) *10CYCLES	

Notes:
1. Judgments should be made after exposure in room temperature for two hours.
2. The distill water is used for the high temperature/humidity test.
3. The sample above is individually for every reliability tests condition.

13.Inspection standards

1.AQL(Acceptable Quality Level

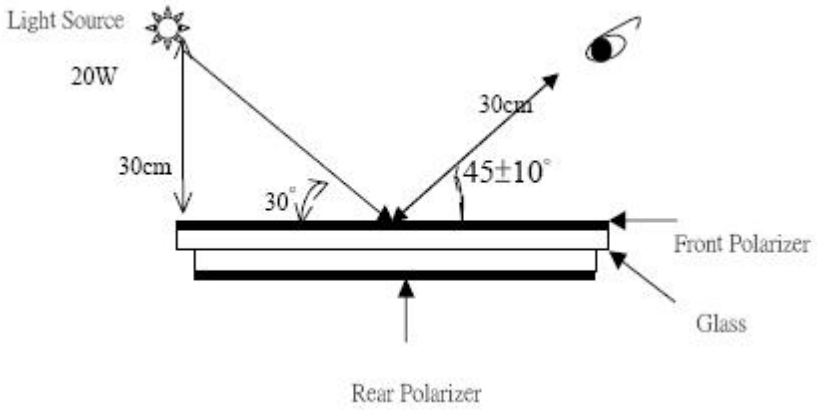
AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.5

2. Basic conditions for inspection

The LCM face to us, in normal environment, the lux is 1000±200.(Darkroom's lux: 100±50),About an angle of incidence 30,a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

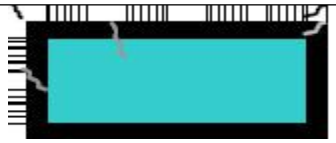
(As shown below)

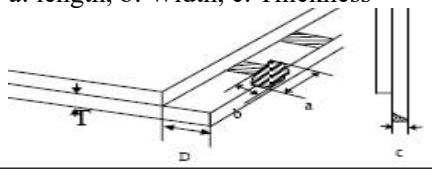
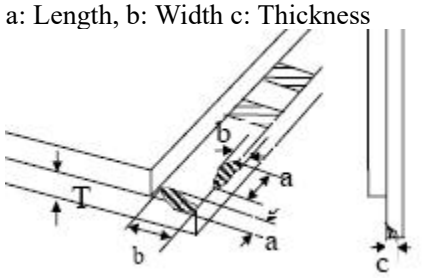
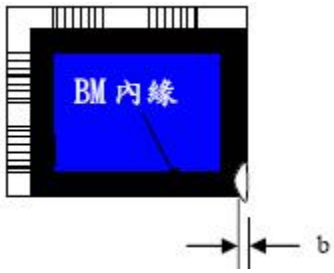


3.Inspection item and criteria

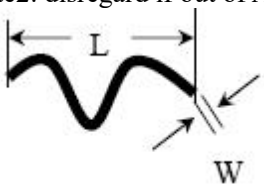
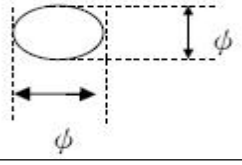
3.1 Visual inspection criterion in immobility

3.1.1Glass defect

NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) b≤1/3Pin width(non bonding area) 【Accept】 2)bonding area≤0.5mm	A: Length, b: Width

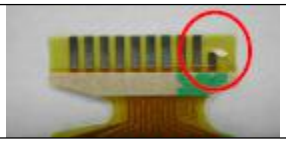
		【Accept】	
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) b≤1/3of effective length for bonding electrode 【Accept】	a: length, b: Width, c: Thickness 
5	Pin-side,non-conductive area damaged (minor defect)	1)Damage area don't touch the ITO (Inclueling contraposition mark, except scribing mark) 【Accept】 2)C<T b≦BM1/3of width 【Accept】 3)c=T b not touch the seal glue 【Accept】 4)a disregards	a: Length, b: Width c: Thickness 
6	Non-pin-side damage (minor defect)	c<T 1)b exceeds 1/3Bm 【Reject】 c=T b not touch the seal glue 【Reject】	c: Thickness b: width of  damage

3.1.2LCD appearance defect(View area)

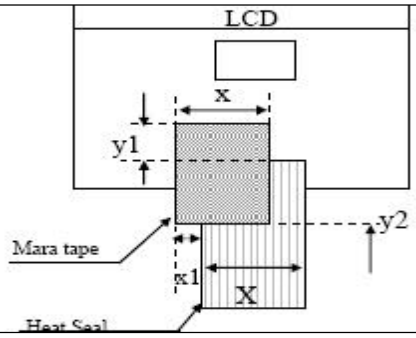
NO	Defect item	Criteria		Remark
1	Fiber、glass cratch、polarizer scratch/folded (minor defect)	Specification	Allowable	note1:L: Length, W: Width note2: disregard if out of AA 
		W≦0.03mm	disregard	
		0.03mm<W≦0.05mm; L≦3.0mm	2	
		0.05mm<W≦0.1mm; L≦3.0mm	1	
		W>0.1mm;L>3.0mm	0	
2	Polarizer bubble、concave and convex (minor defect)	φ≦0.2mm	disregard	note1: φ=(L+W)/2, L:Length, W :Width note2:disregard if out of AA
		0.2mm<φ≦0.3mm	2	
		0.3mm<φ≦0.5mm	1	
		0.5mm<φ	0	
3	Black dots、dirty dots、impurities、eye winker (minor defect)	φ≦0.15mm	disregard	note2:disregard if out of AA 
		0.15mm<φ≦0.25mm	2	
		0.25mm<φ≦0.3mm	1	
		0.3mm<φ	0	
4	Polarizer prick	φ≦0.1mm	disregard	note1: φ=(L+W)/2, L=Length,

	(minor defect)	0.1mm< ϕ ≦0. 25mm	3	W=Width note2:the distance between two dots>5mm
		ϕ >0. 25mm	0	

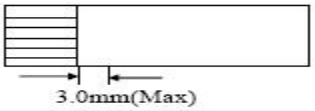
3.1.3FPC

NO	Defect item	Criteria		Remark
1	Copper screen peel (minor defect)	Copper screen peel 【Reject】		
2	No release tape or peel	No release tape or peel 【Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	Note1: Cannot have stride ITO impurities
		ϕ ≦0.25mm	2	
		ϕ >0. 25	0	

3.1.4Black tape &Mara tape

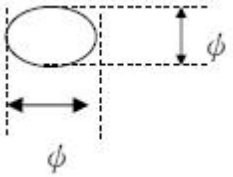
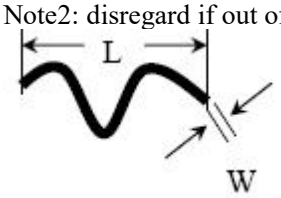
NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1)exceed of FPC edge or H-S edge【Reject】 2) IC bare 【Reject】	
2	No black tape (major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film 【Reject】	

3.1.5Silicon and Taffy glue

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect)	Uncover the ITO and circuit area 【Reject】	note: compared by engineering
2	Taffy glue (major defect)	1.Uncover the reveal copper area【Reject】 2.Cover layer 0.3mm(Min)~3.0mm(Max) 【Reject】	note: if customer has special requirement, refer to the technical document 
3	Depth of glue covering (major defect)	Depth of glue covering overtop front Polarizer 【Reject】	Except of the special requirement

3.2Electrical criteria

NO	Defect item	Criteria	Remark

1	No display (major defect)	No display 【Reject】		
2	Missing line (major defect)	Missing line 【Reject】		
3	Seg-com light and dark (major defect)	Seg-com light and dark 【Reject】	ND filter 2% test	
4	No display in immobility (major defect)	No display in immobility 【Reject】		
5	Flicker of Pattern (major defect)	Flicker of Pattern 【Reject】		
6	Mura (major defect)	ND filter 2%test		
7	Over current (major defect)	Over current 【Reject】		
8	Voltage out of specification (major defect)	Voltage out of specification 【Reject】		
9	Pattern blur, error code (major defect)	Pattern blur, error code 【Reject】		
10	Dark light, Flicker (major defect)	Dark light, Flicker 【Reject】		
11	Black/white dots、Dirty dots、eye winker (major defect)	Specification	Allowable	Note1:disregard if out of AA 
		Φ ≦0.15mm	disregard	
		0.15mm< Φ ≦0. 25mm	2	
		0.25mm< Φ ≦0. 3mm	1	
		0.3mm< Φ	0	
12	Fiber、glass crutch、Polarizer scratch/folded (major defect)	W≦0.03mm	disregard	Note1:L: Length, W: Width Note2: disregard if out of AA 
		0.03mm<W≦0. 0. 05mm L≦3. 0mm	2	
		0.05mm<W≦0. 1mm L≦3. 0mm	1	
		W>0.1mm;L>3.0mm	0	

14.Precautions for using LCD modules.

14.1 Safety

(1)Do mot swallow any liquid crystal ,even if there is no proof that liquid crystal is poisonous.
(2)If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3)If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

14.2 Srorang Conditions

(4)Store the panel or module in a dark place where the temperature is 23±5℃and the humidity is below 45±20%RH.
(5)Store in anti-static electricity container.
(6)Store in clean environment, free from dust, active gas, and solvent.
(7)Do not place the module near organics solvents or corrosive gases.
(8))Do not crush, shake, or jolt the module.

14.3 Handling Precautions

(9)Avoid static electricity, which can damage the CMOS LSI.
(10)The polarizing plate of the display is very fragile, please handle if very carefully.
(11)Do not give external shock.
(12)DO mot apply excessive force on the surface.
(13)Bo not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
(14)Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(15)Do not operate it above the absolute maximum rating.
(16)Do not remove the panel or frame from the module.

14.4Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.

15.Revision history

Version	Revise record	Date
v0.0	Original version	2020-06-06

16. The appendix

ILI9341_ initial

```
void LCD_Init(void)
{
    LCD_RES_Clr();//复位
    delay_ms(100);
    LCD_RES_Set();
    delay_ms(100);

    LCD_BLK_Set();//打开背光
    delay_ms(100);
    //************* Start Initial Sequence **********//
    LCD_WR_REG(0x11); //Sleep out
    delay_ms(120);              //Delay 120ms
    //************* Start Initial Sequence **********//
    LCD_WR_REG(0xCF);
    LCD_WR_DATA8(0x00);
    LCD_WR_DATA8(0xC1);
    LCD_WR_DATA8(0X30);
    LCD_WR_REG(0xED);
    LCD_WR_DATA8(0x64);
    LCD_WR_DATA8(0x03);
    LCD_WR_DATA8(0X12);
    LCD_WR_DATA8(0X81);
    LCD_WR_REG(0xE8);
    LCD_WR_DATA8(0x85);
    LCD_WR_DATA8(0x00);
    LCD_WR_DATA8(0x79);
    LCD_WR_REG(0xCB);
    LCD_WR_DATA8(0x39);
    LCD_WR_DATA8(0x2C);
    LCD_WR_DATA8(0x00);
    LCD_WR_DATA8(0x34);
    LCD_WR_DATA8(0x02);
    LCD_WR_REG(0xF7);
    LCD_WR_DATA8(0x20);
    LCD_WR_REG(0xEA);
    LCD_WR_DATA8(0x00);
    LCD_WR_DATA8(0x00);
    LCD_WR_REG(0xC0); //Power control
    LCD_WR_DATA8(0x1D); //VRH[5:0]
    LCD_WR_REG(0xC1); //Power control
    LCD_WR_DATA8(0x12); //SAP[2:0];BT[3:0]
```

```
LCD_WR_REG(0xC5); //VCM control
LCD_WR_DATA8(0x33);
LCD_WR_DATA8(0x3F);
LCD_WR_REG(0xC7); //VCM control
LCD_WR_DATA8(0x92);
LCD_WR_REG(0x3A); // Memory Access Control
LCD_WR_DATA8(0x55);
LCD_WR_REG(0x36); // Memory Access Control
LCD_WR_DATA8(0x08);
LCD_WR_REG(0xB1);
LCD_WR_DATA8(0x00);
LCD_WR_DATA8(0x12);
LCD_WR_REG(0xB6); // Display Function Control
LCD_WR_DATA8(0x0A);
LCD_WR_DATA8(0xA2);

LCD_WR_REG(0x44);
LCD_WR_DATA8(0x02);

LCD_WR_REG(0xF2); // 3Gamma Function Disable
LCD_WR_DATA8(0x00);
LCD_WR_REG(0x26); //Gamma curve selected
LCD_WR_DATA8(0x01);
LCD_WR_REG(0xE0); //Set Gamma
LCD_WR_DATA8(0x0F);
LCD_WR_DATA8(0x22);
LCD_WR_DATA8(0x1C);
LCD_WR_DATA8(0x1B);
LCD_WR_DATA8(0x08);
LCD_WR_DATA8(0x0F);
LCD_WR_DATA8(0x48);
LCD_WR_DATA8(0xB8);
LCD_WR_DATA8(0x34);
LCD_WR_DATA8(0x05);
LCD_WR_DATA8(0x0C);
LCD_WR_DATA8(0x09);
LCD_WR_DATA8(0x0F);
LCD_WR_DATA8(0x07);
LCD_WR_DATA8(0x00);
LCD_WR_REG(0XE1); //Set Gamma
LCD_WR_DATA8(0x00);
LCD_WR_DATA8(0x23);
LCD_WR_DATA8(0x24);
LCD_WR_DATA8(0x07);
LCD_WR_DATA8(0x10);
```

```
    LCD_WR_DATA8(0x07);
    LCD_WR_DATA8(0x38);
    LCD_WR_DATA8(0x47);
    LCD_WR_DATA8(0x4B);
    LCD_WR_DATA8(0x0A);
    LCD_WR_DATA8(0x13);
    LCD_WR_DATA8(0x06);
    LCD_WR_DATA8(0x30);
    LCD_WR_DATA8(0x38);
    LCD_WR_DATA8(0x0F);
    LCD_WR_REG(0x29); //Display on
}
```