

深圳市金逸晨电子有限公司

ShenZhen GoldenMorning Electronic Co.,Ltd

PRODUCT SPECIFICATION

Model No	T280C7-C12-26
Product Name	2.8 TFT LCD Module
Version	V1.0
Date	2025-07-23

- ☐ Preliminary Specification
- ☒ Final Specification

PREPARED BY	CHECKED BY	APPROVED BY

Revision History

Version	Date	Page	Revise record	Remarks
V1.0	2025.07.23	-	First issued	ZY

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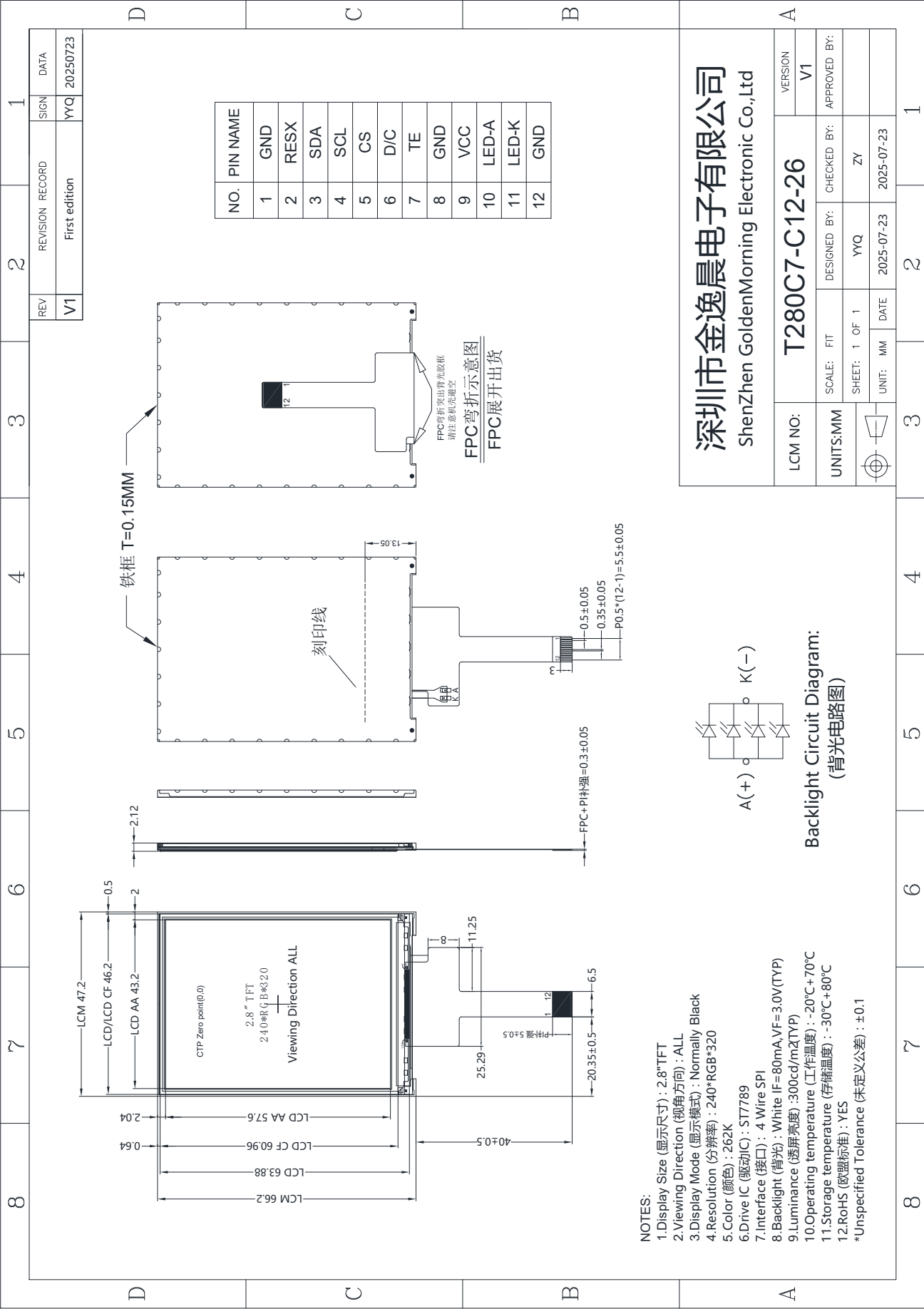
1. General Parameter

NO.	Features	Details	Unit
1	Display Size(Diagonal)	2.8"	Inch
2	LCD type	IPS TFT	-
3	Display Mode	Normally black	-
4	Resolution	240RGB x 320	Pixels
5	Viewing Direction	ALL	-
6	Module size	47.20(W) x 66.20(H) x 2.12(T)	mm
7	Active Area	43.2(W) x 57.6(H)	mm
8	Dot pitch	0.18 (H) x 0.18(V)	mm
9	Color arrangement	RGB Vertical stripe	-
10	Interface	4-wire SPI	-
11	Display Colors	262K	-
12	Driver IC	ST7789	-
13	With or Without Touch Panel	Without	-
14	Operating Temperature	-20℃~70℃	℃
15	Storage Temperature	-30℃~80℃	℃
16	Weight	-	g

Note 1: Please refer to the mechanical drawing.

2. Physical drawing

3. Mechanical Dimension



4. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Analog Supply Voltage	VCC	-0.3	4.6	V
Operating temperature	Top	-20	70	°C
Storage temperature	Tst	-30	80	°C

Note 1: If Ambient temperature below 50°C, the maximal humidity is 90%RH, if Ambient temperature over 50°C, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

Note 3: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

5. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Analog Supply Voltage	VCC	2.4	2.8	3.3	V
Input high voltage	V _{IN}	0.7*IOVCC	-	IOVCC	V
Input low voltage	V _{IL}	VSS	-	0.3*IOVCC	V
Output high voltage	V _{OH}	0.8*IOVCC	-	IOVCC	V
Output low voltage	V _{OL}	VSS	-	0.2*IOVCC	V
Input Current	I _{IN}	-	20	-	mA

6. Backlight Characteristic

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V _F	2.9	3.0	3.1	V	-
Forward Current	I _F	-	80	-	mA	-
Power dissipation	P _d	-	240	-	mW	-
LED Life Time(25 °C)	-	-	10000	-	Hrs	-

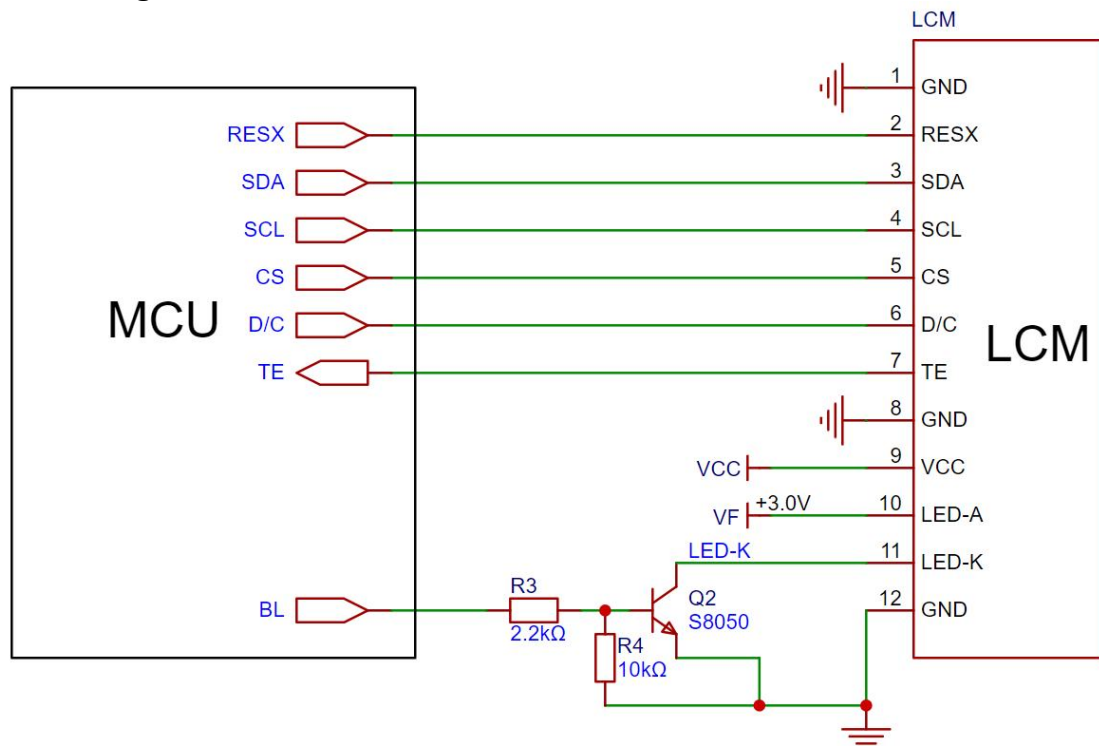
Note: LED life time defined as follows: The final brightness is at 50% of original brightness. Typical operating life time is estimated data.

7. Pins Definitions.

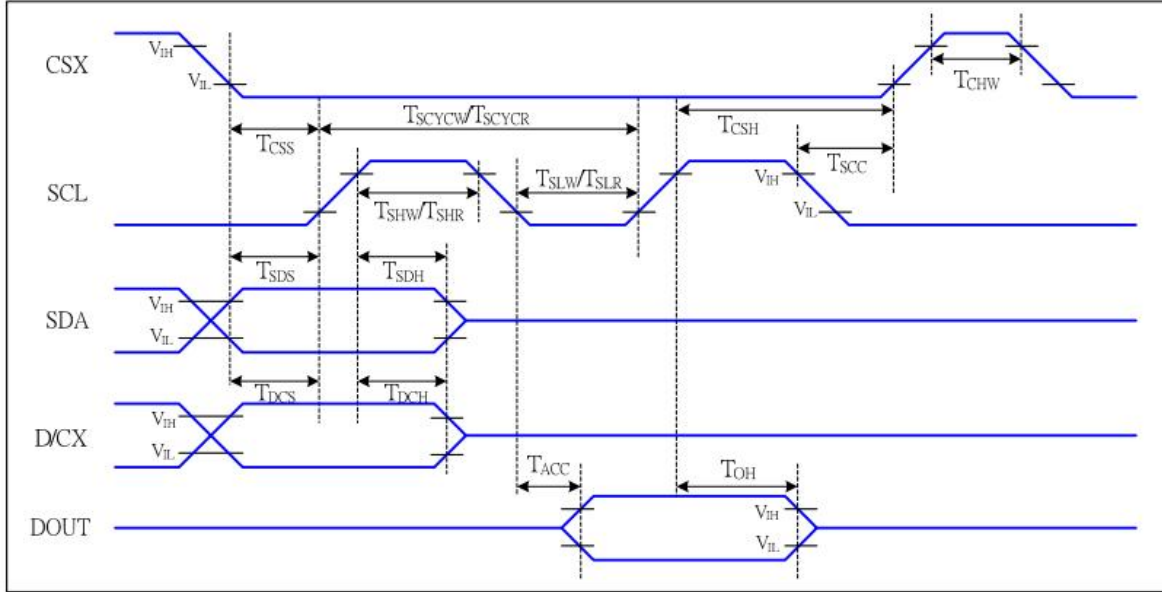
Pin.No	Symbol	Description
1	GND	Ground.
2	RESX	This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low
3	SDA	SPI interface input/output pin.
4	SCL	Serial interface clock.
5	CS	-Chip selection pin Low enable. High disable.
6	D/C	Display data/command selection pin
7	TE	Tearing effect signal is used to synchronize MCU to frame memory writing.
8	GND	Ground.
9	VCC	Power supply for Analog.
10	LED-A	Backlight anode
11	LED-K	Backlight cathode
12	GND	Ground.

Note: The backlight LED is recommended to be powered independently by constant current drive.

8. Schematic Diagram.



9. Timing Characteristics



4-line serial Interface Timing Characteristics

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25°C

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	16		ns	-write command & data ram
	T_{SHW}	SCL "H" pulse width (Write)	7		ns	
	T_{SLW}	SCL "L" pulse width (Write)	7		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	7		ns	
	T_{SDH}	Data hold time	7		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF For minimum CL=8pF
	T_{OH}	Output disable time	15	50	ns	

4-line serial Interface Characteristics

Note : The rising time and falling time (T_r , T_f) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

10. Optical Characteristics.

10.1 Optical Specifications

Item	Symbol	Condition	Specification			Unit	Remark
			Min.	Typ.	Max.		
Response Time	Tr+Tf	Ta=25℃ θ= 0°	-	-	35	ms	Note 1,2,3
Contrast Ratio	CR	θ= 0°	1000	1200	-		Note 1,2,4
Viewing Angle	Left (9 O'Clock)	CR≧ 10	80	85	-	deg.	Note 1,2,5,8 Normal Pol
	Right (3 O'Clock)		80	85	-		
	Top (12 O'Clock)		80	85	-		
	Bottom (6 O'Clock)		80	85	-		
Color Chromaticity (CF only with C light, CIE 1931)	Rx	θ= 0°	-0.015	0.643	+0.015		Note 1,6 CF Glass
	Ry			0.317			
	Gx			0.256			
	Gy			0.574			
	Bx			0.145			
	By			0.073			
	Wx		-0.010	0.301	+0.010		
	Wy			0.320			
Color Gamut (CF only with C light, CIE 1931)	NTSC	θ= 0° CIE1931	65	70	-	%	Note 1,6 CF Glass
Transmittance (Without APCF)	Tr	θ= 0°	(4.5)	(4.8)	-	%	Note 1,7,8 Normal Pol

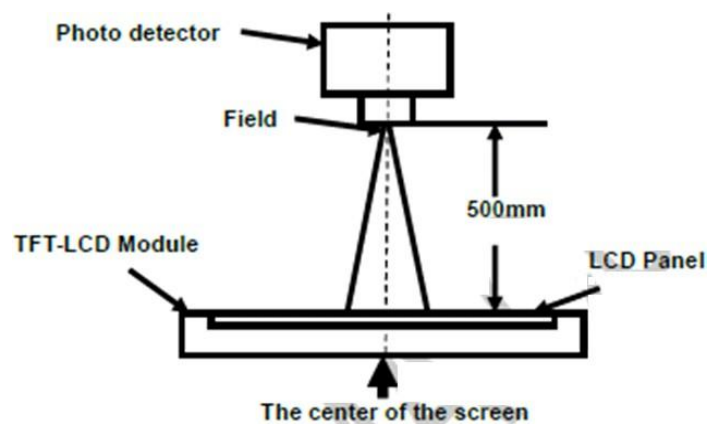
Note 1: Measuring Conditions:

The optical characteristics are determined after the unit has been 'ON' and stable at the maximum brightness, in a dark environment at an ambient temperature at 25℃ ± 2℃.

Note 2: Definition of optical measurement system.

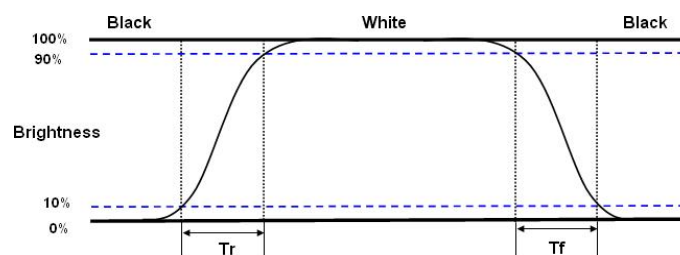
The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

Item	Photo detector	Field
Contrast Ratio	BM-5A	1°
Transmittance		
Chromaticity	LCF-2100M	1°
Response Time	TRD-100	2°



Note 3: Definition of response time:

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_r) is the time between photo detector output intensity changed from 10% to 90%. And fail time (T_f) is the time between photo detector out intensity changed from 90% to 10%.

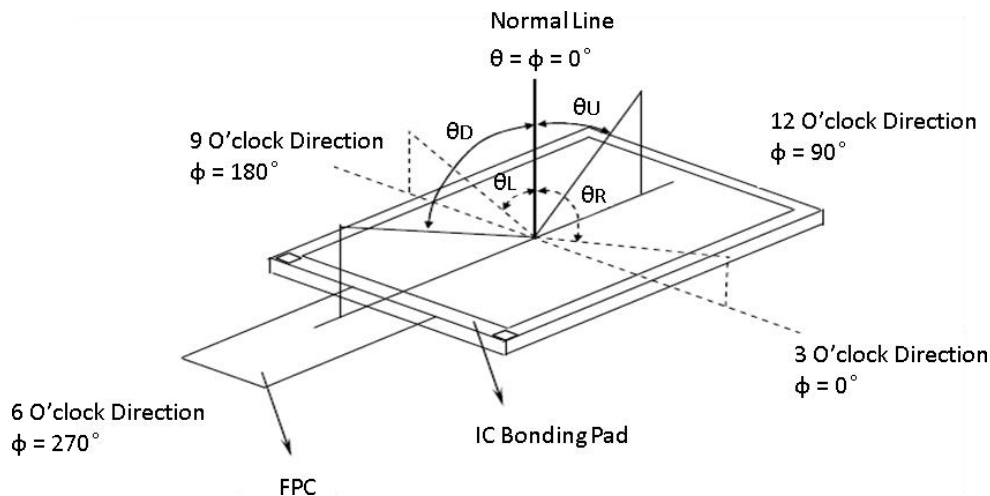


Note 4: Contrast ratio is calculated by the following formula:

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "white" state}}{\text{Brightness on the "black" state}}$$

Note 5: Definition of viewing angle range and measurement system:

Viewing angle is measured at the center point of the LCD (With Normal Polarizer) by BM-5A.



Note 6: Definition of color chromaticity (CIE1931):

Color coordinates measured at center point of CF Glass under the C light source.

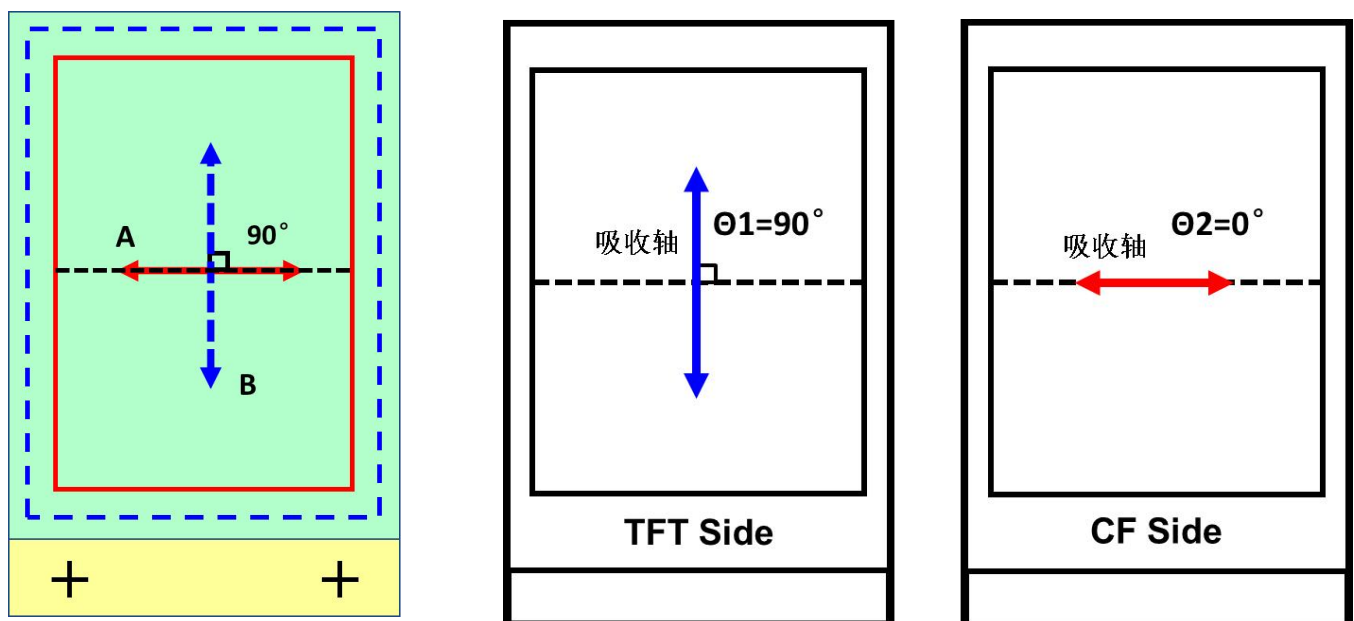
Note 7: Definition of transmittance:

Transmittance of specification is the value with normal polarizer and measured at the center point of LCD.

Note 8: Direction of Pol absorption axis: The red and blue arrow directions are meant to be absorption axis.

A \longleftrightarrow CF POL absorption axis

B \longleftrightarrow TFT POL absorption axis



TFT Side polarizing absorption angle $\theta_1 = 90^\circ$ (Protective film side up, glue layer face down)

CF Side polarizing absorption angle $\theta_2 = 0^\circ$ (Protective film side up, glue layer face down)

11. Reliability

11.1. MTBF

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

11.2. Test Condition

No	Item	Condition	Criteria
1	High Temperature Operating	70℃*24Hrs	1. No Defect Of Operational Function In Room Temperature Are Allowable. 2. IDD of LCM in Pre-and Post-Test Should Follow Specification.
2	Low Temperature Operating	-20℃*24Hrs	
3	High Humidity Storage	50℃*90%RH*24Hrs	
4	High Temperature Storage	80℃*24Hrs	
5	Low Temperature Storage	-30℃*24Hrs	
6	Thermal Cycling Test Storage	-	
7	Packing vibration	-	
8	Electrical Static Discharge	-	
		-	
9	Drop Test (Packaged)	-	

Note1. The test samples should be applied to only one test item.

Note2. Sample size for each test item is 2pcs.

Note3. No defection function allowable.

12. Precautions

12.1. Storage Conditions

- 12.1.1. Store the panel or module in a dark place where the temperature is $23\pm5^{\circ}\text{C}$ and the humidity is below $45\pm20\%\text{RH}$.
- 12.1.2. Store in anti-static electricity container.
- 12.1.3. Store in clean environment, free from dust, active gas, and solvent.
- 12.1.4. Do not place the module near organics solvents or corrosive gases.
- 12.1.5. Do not crush, shake, or jolt the module.
- 12.1.6. Strong light exposure causes degradation of polarizer and color filter.

12.2. Handling Precautions

- 12.2.1. Avoid static electricity, which can damage the CMOS LSI.
- 12.2.2. The polarizing plate of the display is very fragile, please handle it very carefully.
- 12.2.3. Do not give external shock.
- 12.2.4. Do not apply excessive force on the surface.
- 12.2.5. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.
- 12.2.6. Reverse and use within ratings in order to keep performance and prevent damage
- 12.2.7. Do not remove the panel or frame from the module.
- 12.2.8. Except for soldering the interface, do not make any alterations or modifications with a soldering iron; Ensure welding temperature at 320°C to 350°C , the welding time control within the 10 s, welding note don't stay too long in the same place to avoid scald FPC.

12.3. Limited Warranty

- 12.3.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss. (我们的保证责任仅限于修理和/或更换。我们将不负任何相应的损失。)
- 12.3.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used. (如果可能，我们建议客户在6个月内用完所有模块。如果模块存放时间超过12个月，我们建议在使用模块前重新检查。)
- 12.3.3. The warranty period is twelve months from the date of delivery. Buyer shall complete the assembly of all processes within twelve months of validity. During the warranty period, if the product quality problems, our company will be responsible for repair and replacement. All products must be stored and handled in accordance with regulations. Under warranty. When the goods do not comply with the above terms, we do not provide warranty services. (保修期为交货之日起十二个月。买方应在12个月内完成所有流程的组装。在保修期内，如果产品出现质量问题，我公司将负责维修和更换。所有产品必须按照规定储存和处理。在保修期内。当货物不符合上述条款时，我们不提供保修服务。)