

LCD MODULE SPECIFICATION

Model:	ALL-UEOL044WX-RB39-A001A
Version:	V1.0
Date:	2024.07.09

Customer Confirmation

Approved by	Notes

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VIEWE Confirmation

Prepared by	Reviewed by	Approved by

REVISION HISTORY 修改履历

Revision	Date	Contents of Revision Change	Remark
V1.0	2024.07.08	Preliminary release	

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1. GENERAL INFORMATION

Item 项目	Specification 规格	Unit 单位	Remark 备注
Display Type	AMOLED	-	-
Screen Size	4.39	Inch	Diagonal
Resolution	568(W)*3(RGB)*1210(H)	Dots	-
Active Area	47.3712(W)×100.914 (H)	mm	-
Module Size (W*H*D)	49.13(W)x103.55(H)x0.75(D)	mm	
Technology Type	LTPS	-	
Display Color	16.7M	Colors	24bits
Driver IC	SD5207	-	
TP IC	CST3530	-	
Interface Mode	39PIN MIPI 2 LANE	-	
Display mode	Normally Black	-	
Luminance	600	cd/m ²	Typ.
Viewing Direction	ALL	O'clock	-
Frame Rate	60HZ	-	
NTSC	100%	-	

2. ABSOLUTE MAXIMUM RATINGS

2.1 Driving AMOLED Panel

Maximum Ratings (Voltage Referenced to VSS) VSS=0V, Ta=25°C

Item	Symbol	MIN	MAX	Unit
Analog Power supply	VCI	0	+4	V
Logic Power supply	VDDIO	0	+4	V
Analog Power supply	AVDD	0	+10	V
Positive Power Input	ELVDD	-	+5.0	V
Negative Power Input	ELVSS	-5.0	-	V

(Ta=+25°C, GND=0V)

Not6.3e: Functional operation should satisfy the limits in the Electrical Characteristics tables or Pin Description section. If the module exceeds the absolute maximum ratings, permanent damage may occur. Besides, if the module is operated with the absolute maximum ratings for a long time, the reliability may also drop

REV.	REVISION RECORD	DESIGN	DATE
△	First Issue	卢浩贤	2024.07.09

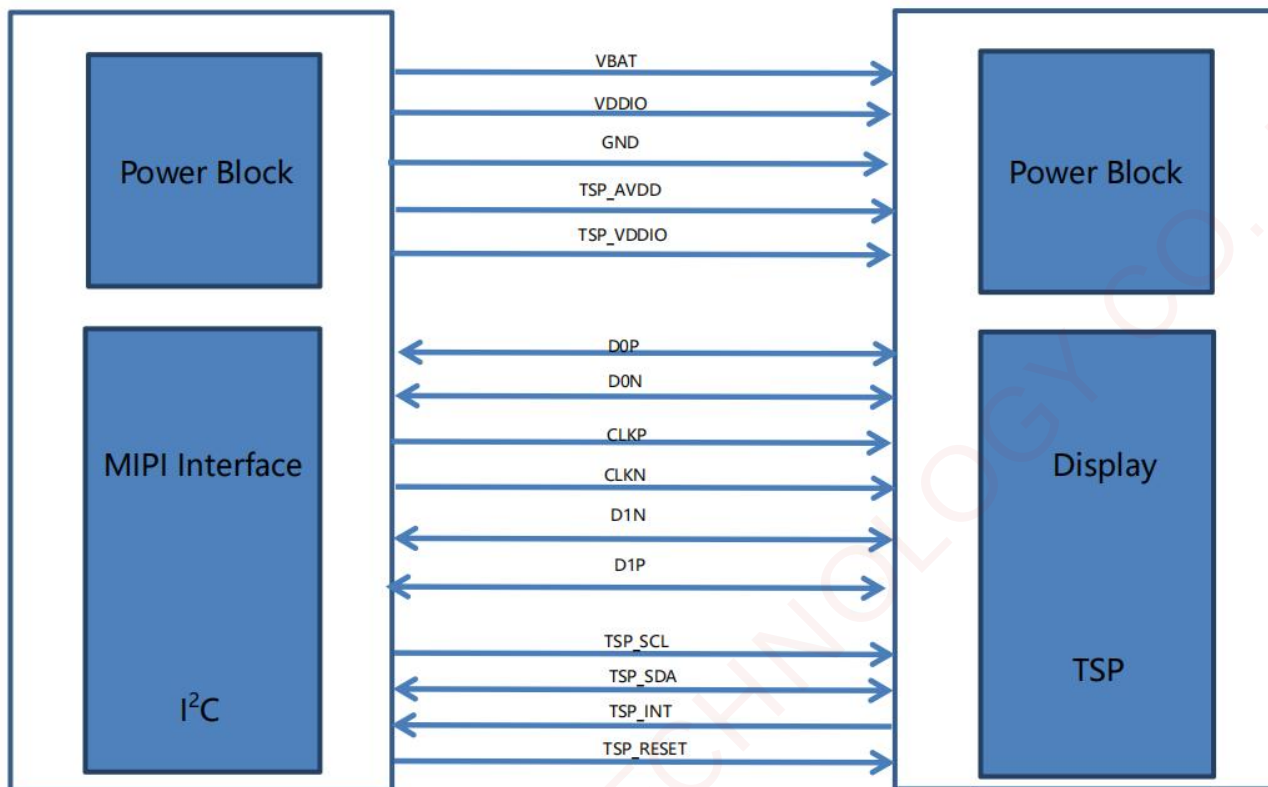
	LCD MODULE
	PFC pin OUT
1	ELVDD
2	ELVDD
3	ELVDD
4	ELVSS
5	ELVSS
6	ELVSS
7	GND
8	AVDD
9	NC
10	GND
11	GND
12	DOP
13	NC
14	DON
15	GND
16	GND
17	GND
18	CLKP
19	NC
20	CLKN
21	GND
22	GND
23	GND
24	D1P
25	NC
26	D1N
27	GND
28	GND
29	DOVC
30	RESX
31	VCI
32	AVDD.E
33	TP_VCI
34	SWIRE
35	TP_RST
36	TEI
37	TP_SCL
38	TP_SCL
39	TP_INT

4.I/O CONNECTION

4.1 Main TP-FPC Pin Assignment

Number	Signal	Description
1	ELVDD	AMOLED ELPositive power
2	ELVDD	
3	ELVDD	
4	ELVSS	AMOLED EL Negative power
5	ELVSS	
6	ELVSS	
7	GND	Ground
8	AVDD	AMOLED charge pumping power for DDIC
9	NC	No Connection
10	GND	Ground
11	GND	Ground
12	D0P	MIPI Data Line
13	NC	No Connection
14	D0N	MIPI Data Line
15	GND	Ground
16	GND	Ground
17	GND	Ground
18	CLKP	MIPI CLKLine
19	NC	No Connection
20	CLKN	MIPI CLKLine
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	D1P	MIPI Data Line
25	NC	No Connection
26	D1N	MIPI Data Line
27	GND	Ground
28	GND	Ground
29	IOVCC	AMOLED logic power for DDIC
30	RESX	DrivelC reset
31	Va	AMOLED logic power for DDIC
32	AVDD_EN	AVDD enable
33	TP_VCI	Analog Powerfor Touch Pane
34	SWIRE	Control the PMIC
35	TP_RST	Reset Pinfor TouchPane
36	TE1	Tear Effect
37	TP_SCL	Serial Clock Signal for Touch Panel I2CI/F
38	TP_SDA	Serial DataSignal forTouch PanelI2CI/F
39	TSP_INT	Interrupt Signal for Touch Panel

4.2 MCU and Display Module Interface Conflagration



5. ELECTRICAL CHARACTERISTICS

5.1 Driving AMOLED Panel

Item		Symbol	MIN	TYP	MAX	Unit
Logic Power Supply		VDDIO	1.65	1.80	1.98	V
Analog Power Supply		VCI	2.65	3.0	3.60	V
Analog Power Supply		AVDD	-	7.6	-	V
Default Positive Output Voltage		ELVDD		4.60		V
Positive Output Voltage Total Variation				-		%
Default Negative Output Voltage		ELVSS		-3.50		V
Negative Output Voltage Total Variation				-		%
Input Signal Voltage	High Level	VIH	0.70*VDDIO	-	VDDIO	V
	Low Level	VIL	0.00	-	0.30*VDDIO	V
Output Signal Voltage	High Level	VOH	0.80*VDDIO	-	VDDIO	V
	Low Level	VOL	0.00	-	0.20*VDDIO	V

(Ta=+25°C,GND=0V)

Note: The current and power consumption were tested under White pattern, 25°C

5.2 AC Characteristics

5.2.1 MIPI DC Characteristics

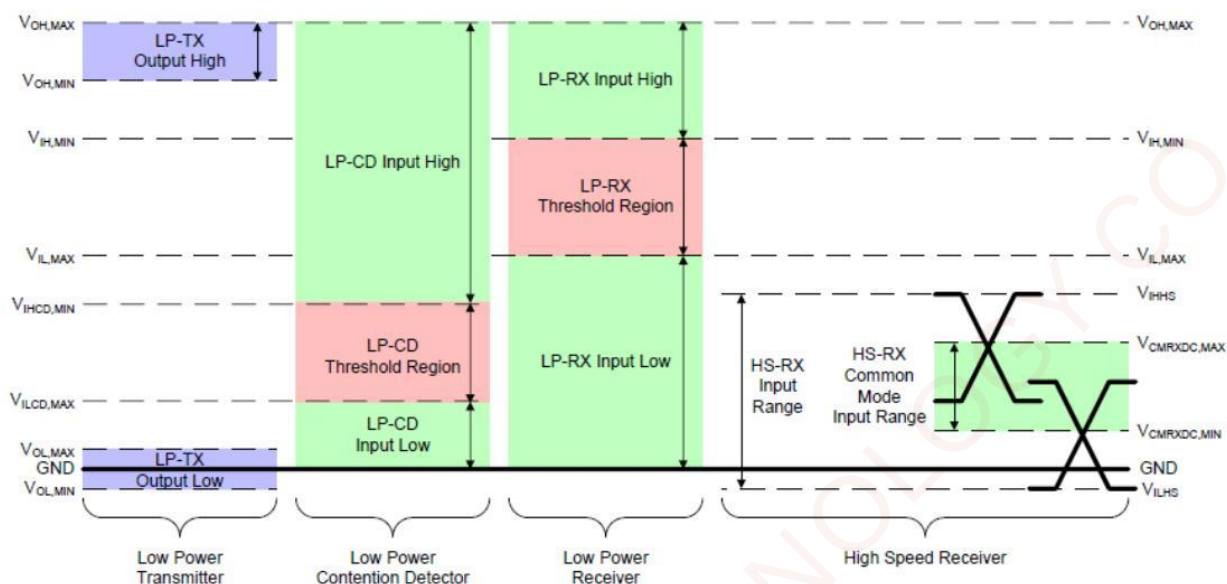


Figure 8-4-1-1 MIPI DC Characteristics

DC characteristics for MIPI LP mode:

Parameter	Description	Min	Nom	Max	Unit
VIH	Logic 1 input voltage	880			mV
VIL	Logic 0 input voltage			550	mV
VOH	Logic 1 output voltage	1	1.1	1.15	V
VOL	Logic 0 output voltage	-50	-	50	mV

DC characteristics for MIPI HS mode:

Parameter	Description	Min	Nom	Max	Unit
VCMRX(DC)	Common-mode voltage HS receive mode	70		330	mV
WIDTH	Differential input high threshold			70	mV
VIDTL	Differential input low threshold	-70			mV
VIHHS	Single-ended input high voltage			460	mV
VILHS	Single-ended input low voltage	-40			
ZID	Differential input impedance	80	100	120	Ω

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5.2.2 MIPI AC Characteristics

Characteristics[mipi_D-PHY_specification_2.1

HS clock transmission

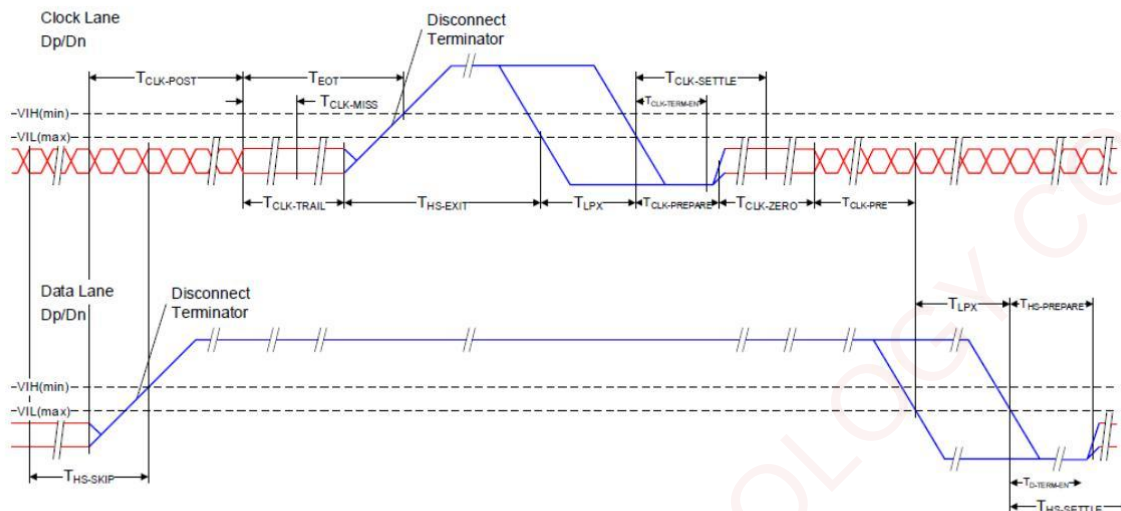


Figure 8-4-2-2 HS Clock Transmission

HS Data Transmission Burst

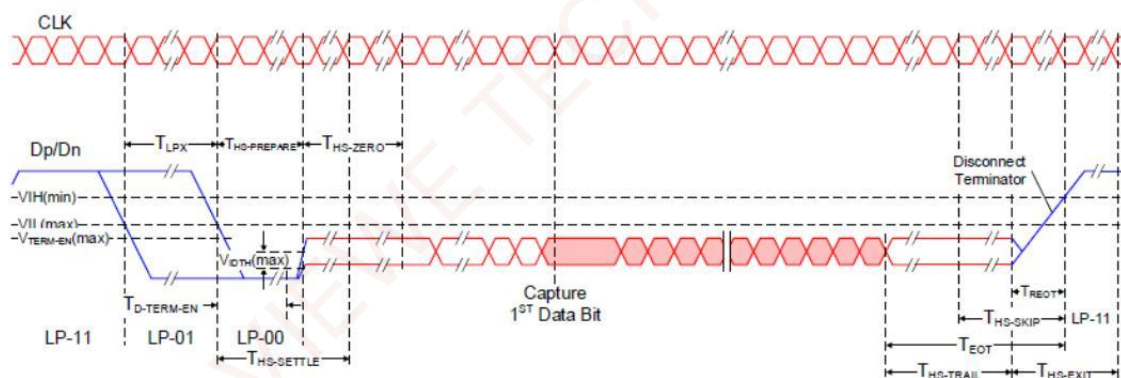


Figure 8-4-2-1 HS Data Transmission

Turnaround Procedure

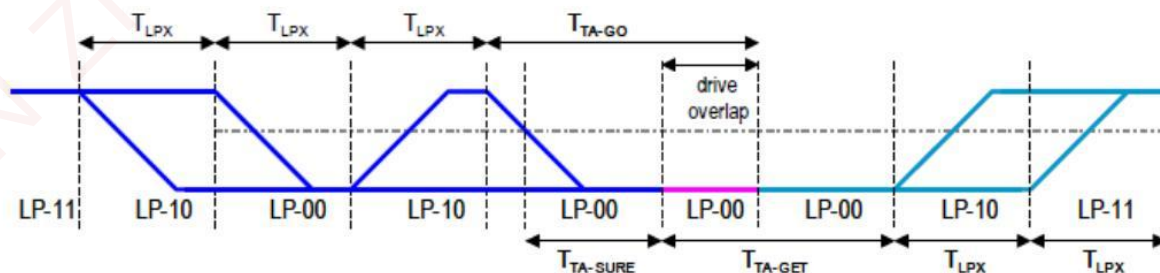


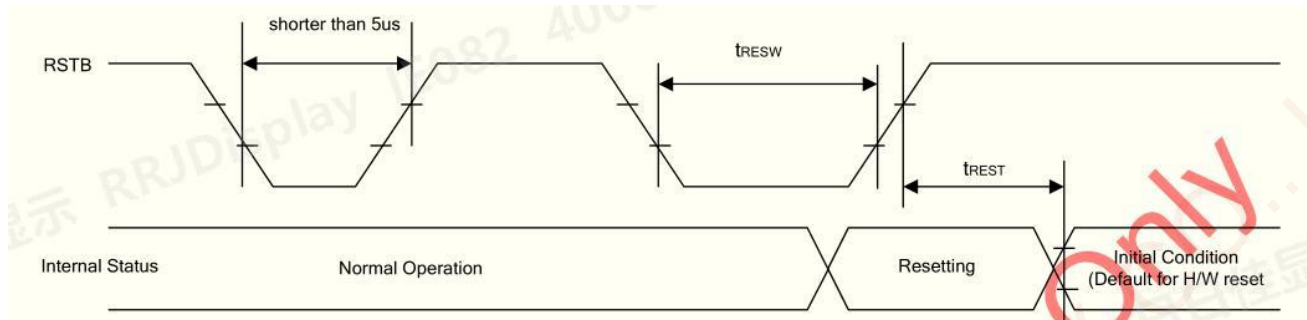
Figure 8-4-2-3 Turnaround Procedure

Parameter	Description	Min	Typ	Max	Unit	Notes
T _{CLK-MISS}	Timeout for receiver to detect absence of Clock transitions and disable the Clock Lane HS-RX.			60	ns	1, 6
T _{CLK-POST}	Time that the transmitter continues to send HS clock after the last associated Data Lane has transitioned to LP Mode. Interval is defined as the period from the end of T _{HS-TRAIL} to the beginning of T _{CLK-TRAIL} .	60 ns + 52*UI			ns	5
T _{CLK-PRE}	Time that the HS clock shall be driven by the transmitter prior to any associated Data Lane beginning the transition from LP to HS mode.	8			UI	5
T _{CLK-PREPARE}	Time that the transmitter drives the Clock Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission.	38		95	ns	5
T _{CLK-SETTLE}	Time interval during which the HS receiver should ignore any Clock Lane HS transitions, starting from the beginning of T _{CLK-PREPARE} .	95		300	ns	6, 7
T _{CLK-TERM-EN}	Time for the Clock Lane receiver to enable the HS line termination, starting from the time point when Dn crosses V _{ILMAX} .	Time for Dn to reach V _{TERM-EN}		38	ns	6
T _{CLK-TRAIL}	Time that the transmitter drives the HS-0 state after the last payload clock bit of a HS transmission burst.	60			ns	5
T _{CLK-PREPARE} + T _{CLK-ZERO}	T _{CLK-PREPARE} + time that the transmitter drives the HS-0 state prior to starting the Clock.	300			ns	5
T _{D-TERM-EN}	Time for the Data Lane receiver to enable the HS line termination, starting from the time point when Dn crosses V _{ILMAX} .	Time for Dn to reach V _{TERM-EN}		35 ns + 4*UI		6
T _{EOT}	Transmitted time interval from the start of T _{HS-TRAIL} or T _{CLK-TRAIL} , to the start of the LP-11 state following a HS burst.			105 ns + n*12*UI		3, 5
T _{HS-EXIT}	Time that the transmitter drives LP-11 following a HS burst.	100			ns	5

Parameter	Description	Min	Typ	Max	Unit	Notes
T _{HS-PREPARE}	Time that the transmitter drives the Data Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission.	40 ns + 4*UI		85 ns + 6*UI	ns	5
T _{HS-PREPARE} + T _{HS-ZERO}	T _{HS-PREPARE} + time that the transmitter drives the HS-0 state prior to transmitting the Sync sequence.	145 ns + 10*UI			ns	5
T _{HS-SETTLE}	Time interval during which the HS receiver shall ignore any Data Lane HS transitions, starting from the beginning of T _{HS-PREPARE} . The HS receiver shall ignore any Data Lane transitions before the minimum value, and the HS receiver shall respond to any Data Lane transitions after the maximum value.	85 ns + 6*UI		145 ns + 10*UI	ns	6
T _{HS-SKIP}	Time interval during which the HS-RX should ignore any transitions on the Data Lane, following a HS burst. The end point of the interval is defined as the beginning of the LP-11 state following the HS burst.	40		55 ns + 4*UI	ns	6
T _{HS-TRAIL}	Time that the transmitter drives the flipped differential state after last payload data bit of a HS transmission burst.	max(n*8*UI, 60 ns + n*4*UI)			ns	2, 3, 5
T _{INIT}	See Section 6.11.	100			μs	5
T _{LFX}	Transmitted length of any Low-Power state period	50			ns	4, 5
Ratio T _{LFX}	Ratio of T _{LFX(MASTER)} /T _{LFX(SLAVE)} between Master and Slave side	2/3		3/2		
T _{TA-GET}	Time that the new transmitter drives the Bridge state (LP-00) after accepting control during a Link Turnaround.	5*T _{LFX}			ns	5
T _{TA-GO}	Time that the transmitter drives the Bridge state (LP-00) before releasing control during a Link Turnaround.	4*T _{LFX}			ns	5
T _{TA-SURE}	Time that the new transmitter waits after the LP-10 state before transmitting the Bridge state (LP-00) during a Link Turnaround.	T _{LFX}		2*T _{LFX}	ns	5
T _{WAKEUP}	Time that a transmitter drives a Mark-1 state prior to a Stop state in order to initiate an exit from ULPS.	1			ms	5

5.2.3 Display RESET Timing Characteristics

VDDIO=1.65 to 3.3V, VDD=2.7 to 3.6V, AGND=DGND=0V, Ta=-40 to 85°C



Reset input timing

Signal	Symbol	Parameter	Min.	Typ.	Max.	Unit	Description
RSTB	tRESW	Reset "L" pulse width (Note 1)	10	-	-	μs	-
	tREST	Reset complete time (Note 2)	-	-	5	ms	When reset applied during Sleep In Mode
			-	-	120	ms	When reset applied during Sleep Out Mode

Timing Parameters

5.3 Recommended Operating Sequence 推荐操作时序

5.3.1 Display Power on / off Sequence

Power On Sequence

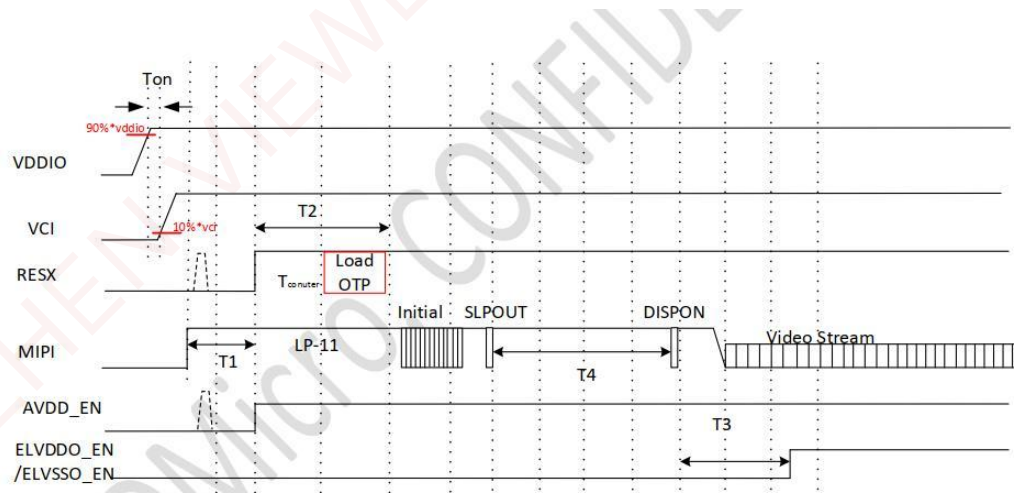
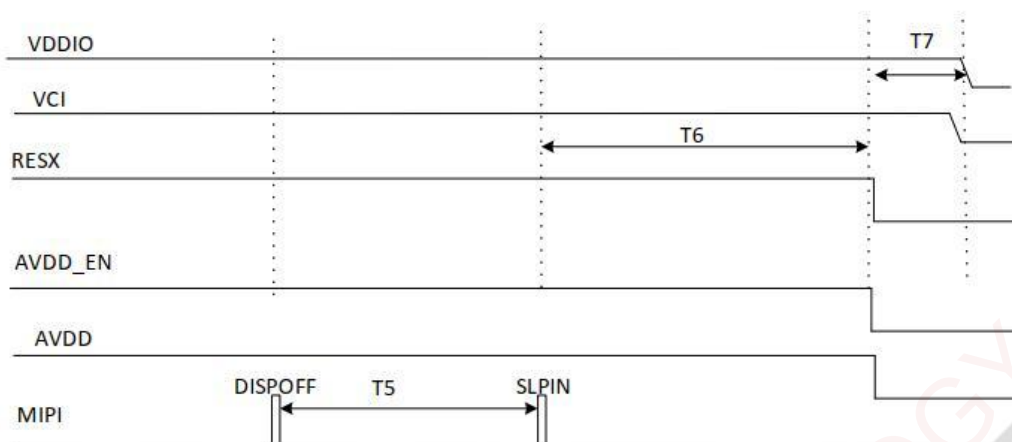


Figure 8-3-1-1 Power on sequence

- Note: 1.Ton: The time between the VDDIO and the VCI power on, Ton ≥ 0 ms
 2.Dotted line is optional.
 3. All the power supplies should be stable during display on status.
 4. Current of VDDIO, VCI, AVDD should be less than 150mA respectively.

Power Off Sequence



5.3.2 Brightness contro

Use “ command 5 1 0 0 h, data xxh ” to adjust the Manual Brightness value of the display:

In principle relation ship is that 0 0 h value means the lowest brightness and FFh value means the highest brightness.

Inst/Para	R/W	Address		Date Type	Description
		MIPI	Other		
BRTCTRL	W	51h	5100h	Hex	Value form 0~255(FF)

5.4 Touch Specification

5.4.1 Touch Design

Item		Description	Notes
Touch Design	Sensor structure	Oncell	
	Sensor pitch	Tx:4.742mm · Rx:5.048mm	
	Sensor pattern	Diamond	
	CH Number	10(Tx) / 20(Rx)	
	CTP IC	CST3530	

5.4.2 Electrical Characteristics

Maximum Ratings

Item	Symbol	MIN	MAX	Unit
TP power supply Input	TP_VCI	2.7	3.6	V

Power supply DC characteristics

Item	Symbol	MIN	TYP	MAX	Unit
TP power supply Input	TP_VCI	2.8	2.8/3.0/3.3	3.6	V

TP FPC Pin Assignment

No	Symbol	I/O	Description
1	GND	GND	Ground
2	TP_VCI	Power	Analog Power for Touch Panel
3	TP_RESET	I	Reset Pin for Touch Panel
4	TP_SDA	I/O	SDA pin for Touch Panel
5	TP_SCL	I	SCL pin for Touch Panel
6	TP_INT	O	Interrupt signal for Touch Panel

6. OPTICAL CHARACTERISTICS 光学特性

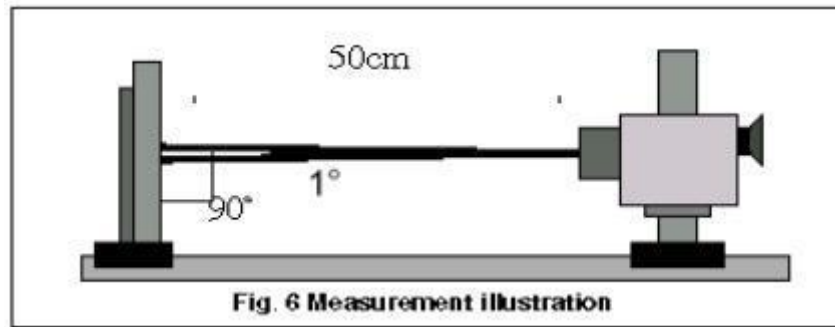
Item		Symbol	Condition	Value			Unit	Note
				Min	Typ	Max		
Luminance		Bp		550	600	-	nit	
Uniformity		△Bp	W255	85	-	-	%	Note 5
Viewing Angle	Left	θL	CR≥10	80	85	-	Degree	Note 2
	Right	θR		80	85	-		
	Top	ψT		80	85	-		
	Bottom	ψB		80	85	-		
Contrast Ratio		Cr	Θ=0°	-	100000:1	-	-	Note 3
Color Coordinate of CIE1931 (with lens)	Red	X		0.642	0.682	0.722	-	
		Y		0.275	0.315	0.355		
	Green	X		0.196	0.236	0.276		
		Y		0.682	0.722	0.762		
	Blue	X		0.098	0.138	0.178		
		Y		0.006	0.046	0.086		
	White	X		0.280	0.300	0.320		
		Y		0.290	0.310	0.330		
NTSC Ratio		NTSC		97	100	-	%	Note 4
Lifetime		LT95	At 25℃, with white color pattern	250	-	-	h	Normal mode
Response Time		Ton+Toff		-	-	2	ms	Note 9

Test Conditions:

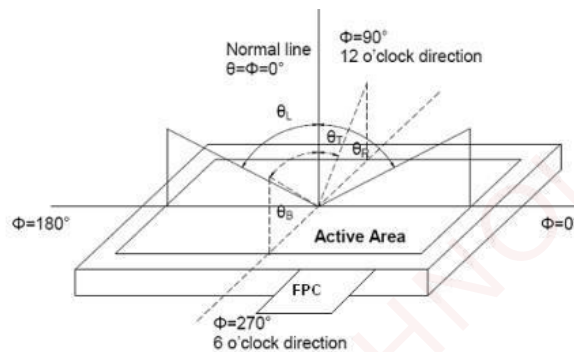
The ambient temperature is 25°C.

1. The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system. The optical characteristics should be measured in darkroom. The optical properties are measured at the center point of the AMOLED screen. All input terminals AMOLED panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.



Note 3: Definition of contrast ratio 对比度的定义

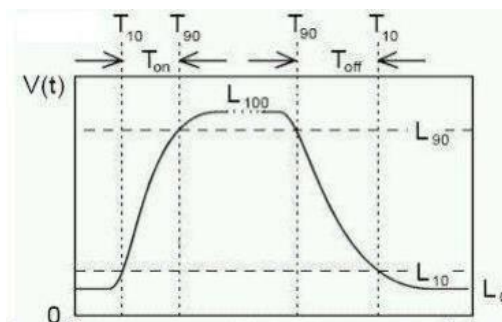
$$\text{Contrast ratio(CR)} = \frac{\text{Luminance measured when LCD is on the "white" stat}}{\text{Luminance measured when LCD is on the "Black" stat}}$$

“White state” : A state where the AMOLED should be driven by V_{white}.

“Black state” : A state where the AMOLED should be driven by V_{black}.

Note4: Definition of response time

The response time is defined as the AMOLED optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changing from 10% to 90%. And fall time (T_{OFF}) is the time between photo detector output intensity changing from 90% to 10%.



Note 5: Note 5: Definition of color chromaticity (CIE1931)

Color coordinates are measured at the center point of AMOLED.

Note 6: Definition of luminance uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2).

Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = L_{min} / L_{max}

L-----Active area length

W----- Active area width

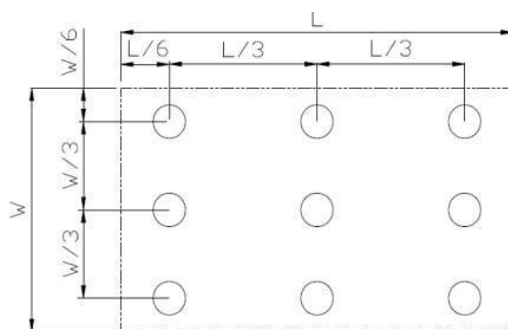


Fig. 2 Definition of uniformity

L_{max} : The measured maximum luminance of all measurement position.

L_{min} : The measured minimum luminance of all measurement position.

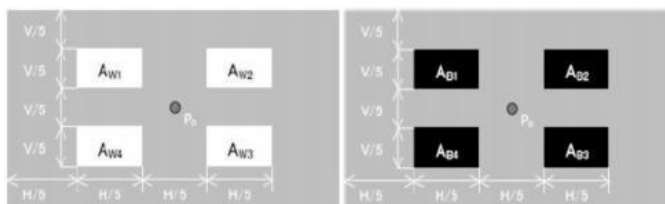
Note 7: Definition of luminance:

Measure the luminance of white state at the center point.

Note 8: Cross Talk

A. Measure luminance at the position, P0.

B. Calculate crosstalk as below equation.



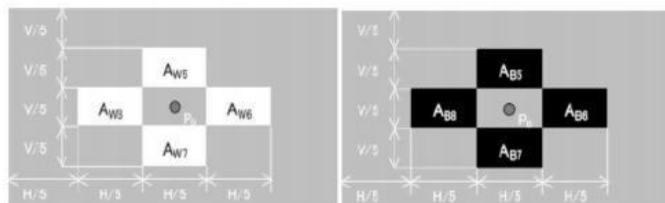
(a) L_{W_OFF} , L_{B_OFF} measuring pattern

$$L_{W_OFF} = \frac{L_{W1} + L_{W2} + L_{W3} + L_{W4}}{4}$$

$$L_{B_OFF} = \frac{L_{B1} + L_{B2} + L_{B3} + L_{B4}}{4}$$

$$\text{crosstalk} = \frac{|L_{W_ON} - L_{W_OFF}|}{L_{W_OFF}} \times 100\% \quad (i=5 \text{ to } 8)$$

$$\text{crosstalk} = \frac{|L_{B_ON} - L_{B_OFF}|}{L_{B_OFF}} \times 100\% \quad (i=5 \text{ to } 8)$$



(b) L_{W_ON} , L_{B_ON} measuring pattern

7. RELIABILITY

Item 项目	Test Condition 测试条件	Remark 备注
High Temperature Storage 高温存储	Ta =+80°C / 240Hours	Note1,2,3
Low Temperature Storage 低温存储	Ta =-40°C /240Hours	Note1,2,3
High Temperature Operating 高温工作	Ta =+70°C /240Hours	Note1,2,3
Low Temperature Operating 低温工作	Ta =-30°C / 240Hours	Note1,2,3
Temperature Cycle storage Test 冷热冲击	-40°C/30min Δ+80°C /30min for 30cycles,Transfer time less than 10min	Note2,3
Thermal humidity storage Test 高温高湿存储	60°C x 90%RH / 240Hours	Note2,3
Electro Static Discharge (Operation) 静电放电（工作）	C=150pF, R=330Ω , 5points/panel Air: ±8KV, 5times; Contact: ± 4 KV, 5 times; (Environment: 1 5 C~ 3 5 C, 3 0 % ~ 6 0 % , 8 6 Kpa~ 1 0 6 Kpa) .	IEC61000- 4-2 GB/T17626 .2
Package Vibration Test 包装震动	Frequency: 10Hz~55Hz,Amplitude:1.5mm, 1 hrs for each direction of X, Y, Z	Note2
Packing shock test 包装跌落	Drop to the ground from 60cm height, 1 corner, 3 edges, 6 surfaces.	Note2

Inspection after Test 试验后检查:

Note1:Ta is the ambient temperature of samples.

注1:Ta是样品的环境温度。

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.

注2: 在标准条件下, 不存在可能影响显示功能的实际问题。可靠性测试后, 产品仅保证运行工作, 但不保证产品的所有规格。

Note 3: Before cosmetic and function tests , the product must have enough recovery time, at least 2 hours at room temperature.

注3: 在进行外观和功能测试之前, 产品必须有足够的恢复时间, 在室温下至少2小时。

Note 4: In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

注4: 如果ESD损坏导致故障缺陷, 如果重置后恢复正常状态, 则判定为良好零件。

8. Specification of Quality Assurance :

8.1 AMOLED Module of Characteristic Inspection

The environmental condition and visual inspection shall be conducted as below:

8.1.1 Test conditions: OLED is not light, cold white fluorescent lamp, illumination $1000 \pm 200\text{lux}$; OLED lighting source shall not be higher than 200lux, with blackbackground around.

8.1.2 Inspection distance: the standard observation distance of all surfaces of the testedobject is $30\text{cm} \pm 5\text{cm}$.

8.1.3 Inspection angle: the angle between the product and the horizontal plane is 45° , and the eyes are perpendicular to the inspection plane. During inspection, the product needs to rotate 45° up, down, left and right. The observation line of sight needs to be within the half section of the cone. The observation angle is 45° with the vertical axis of the product apex. The central axis of the cone must be standard and perpendicular to the product surface and pass through the fluorescent lamp; For non-conventional display defects (including but not limited to local bright lines or local floodlights), the observation angle is 75 degrees from the normal of the product surface; Full visual angle of appearance.

8.1.4 Inspection time: the inspection time without lighting is at least 10-12 seconds; The time of OLED lighting inspection for each picture is 1~3 seconds. If the defect is still not visible within the specified time, the inspection piece is deemed to be qualified.

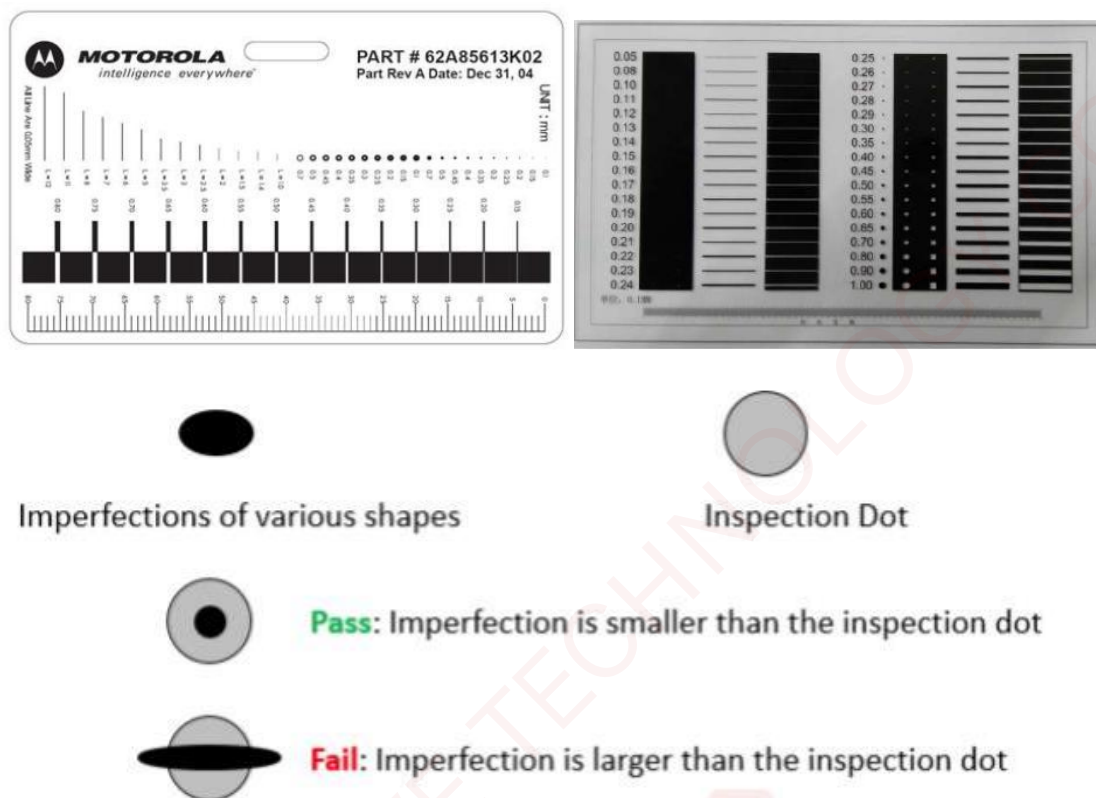
8.1.5 Test temperature: room temperature $15-35^\circ\text{C}$, ambient humidity: 20-75% RH.

8.1.6 Inspection tools:

8.1.6.1 ND Filter: The ND Filter is placed at a distance of 2-3 cm above the defect for 2-3s to judge whether the defect is visible. As Figure below: (ND Filter is used to test mura isochromatic and light unevenness)



8.1.6.2 Point gauge (point gauge in the figure below is recommended), determination method: as shown in the figure, the point gauge film can cover is pass, and the point gauge film can not cover is Fail. For example, a maximum of 0.2mm same-color spot defect is allowed on the Class A surface, and the pass that can be covered by 0.2mm on the film, The one that can be covered is Fail.



8.1.6.3 Microscopic examination: use 20-50 times adjustable microscope and 10-30 times test eyepiece. 10.1.6.4 Digital caliper: resolution 0.01mm.

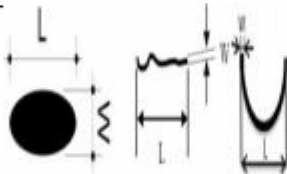
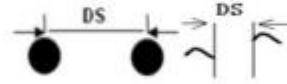
8.1.6.5 Projector: anime microscope, 3D projector.

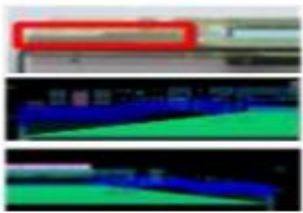
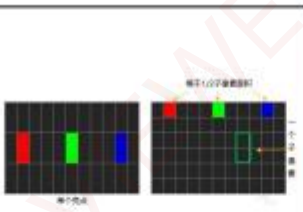
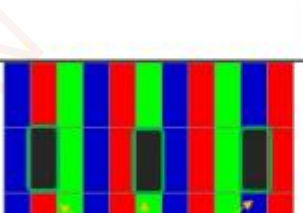
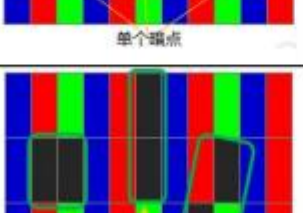
8.1.6.6 Judgment description

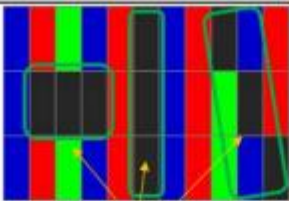
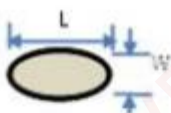
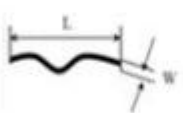
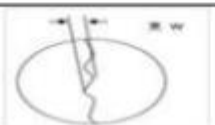
8.1.6.6.1 The measurement accuracy shall refer to the specification definition. When the measurement equipment accuracy is higher than the specification definition, the measured value needs to be rounded to the precision defined by the specification. For example, the size of edge collapse is 0.20mm, and the thousandth is the reference position, which is rounded to 0.200mm~0.204mm is OK, ≥ 0.205 mm, it is judged as NG.

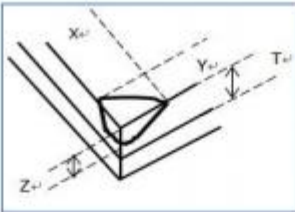
8.1.6.6.2 In addition to the tools used above, if additional inspection tools are needed to assist the judgment, they can only be carried out after the coordination of both parties.

8.1.6.6.3 Bad code and definition

Code and name		legend	explain
N	Number	-	Visually calculate the number; The statistics of the total number of defects does not include the completely "omitted" part. For the column defined as "omitted" and "omitted", it is not counted as the number of defects if it meets the requirements, otherwise it is calculated as an independent defect.
L	Length (mm)		Dot line distinguishing rule: L is the long side, W is the short side A. When $L > 3W$, handle as per line, otherwise handle as per point; B. When it is judged as line defect, S-shaped or C-shaped line appears, and the enclosed amount is less than 3/4 circle, it shall be treated as line defect; otherwise, it shall be treated as point defect, and the inner tangent circle shall simulate the size of point.
W	Width (mm)		
S	Area (mm ²)	-	Surface gauge
D	Diameter (mm) $D=(L+W)/2$	-	Point diameter calculation: calculated by half of the sum of the long side and the short side, that is, $D=(L+W)/2$, where D represents the diameter of the point, L is the long side, and W is the short side;
H	Depth (mm)	-	Digital micrometer
DS	Distance (mm)		Distance between two points or between two lines
Schematic diagram of screen area			AA area: display area; GA area: GIP circuit area; FA area: Frit area; OA area: outside FA area

Leader area		Screen GIP circuit area, screen data circuit area
PAD Bangding District		COG/FOG Bonding alignment mark and Bonding Pad on LTPS substrate
PAD Non-state area		Screen test pad, cutting area and lead-free area on LTPS substrate
CT crimping area		Pin end screen test pad
Highlights		A single sub-pixel (or red, or green, or blue) of one pixel is called a point; The definition of bright spot is that in the environment of 200 ± 50 Lux, the pixels or dots seen by employees with naked eyes are always bright, and the bright spot is checked under the black screen
Scotoma		A single sub-pixel (or red, or green, or blue) of one pixel is called a point; A dark point is defined as a point that is not bright in a single sub-pixel seen with naked eyes in a 100% white picture under the environment of 200 ± 50 Lux.
Dark spot - two connection		Two adjacent sub-pixels under the magnifying glass are not bright at the same time (horizontal, vertical and oblique)

Dark Spot - Three Links	 暗点-三连接	The adjacent R, G and B sub-pixels under the magnifying glass are not bright at the same time (horizontal, vertical and oblique)
CG monomer area division		AA: Front visible area, black ink internal area; A: Black ink area; B: Cover plate edge; The front defect that runs through the AA area and the A area shall be judged according to the specification of the strictest area, and the back defect shall be judged according to whether the AA area is visible.
Foreign matter highlights	-	Due to the foreign matter in the polarizer, the phenomenon that appears as a bright spot is called a foreign matter bright spot
point defect		There are bright spots and black spots in local positions, including but not limited to the internal dirt of the screen itself, pinholes, serrations, concave-convex spots, color spots, tiny bubbles, white spots, stains on the fitting of the polarizer, poor polarizer itself and other spot-like defects. Point defects are judged by diameter.
Linear defect		Linear impurities in the screen, including filaments, fibers, polarizer fitting impurities in the screen, and scratches on the surface of polarizer, etc. Linear defects are judged by length and width. Sensible scratch: also known as hard scratch, is a deep scratch on the surface, which is felt by hand. Senseless scratch: also known as fine scratch, no deep scratch on the surface, no feeling when touching.
Serrated defect		W: Distance from sawtooth crest to trough

Edge collapse/angle collapse		In the process of screen production, especially in the process of molding and cutting, the small glass missing at the glass edge is caused. X direction: parallel to FOG Pad or glass edge; Y direction: perpendicular to FOG Pad or glass edge; Z direction: screen thickness direction; T : The thickness of single-layer glass;
Pitting	-	In the unit area of 10mm * 10mm, the defect point with $D \leq 0.1\text{mm}$, $DS \geq 2\text{mm}$, and the number $N \geq 5$. If the customer has other requirements, follow the customer's requirements.
Dirty	-	Including handprints, oil stains, fingerprints, stains, white fog and other undesirable phenomena. It is divided into erasable dirt and non-erasable dirt. Use a dust-free cloth dipped in alcohol, which can not be erased as non-erasable dirt. Wipable dirt is determined as follows: A. Dry dust-free cloth can be directly erased; B. Wipe with clean cloth dipped with anhydrous alcohol Press the alcohol-stained dust-free cloth on the dry dust-free cloth twice to absorb excess alcohol; Wipe back and forth with a dust-free cloth twice, and the dirt can be removed.

9. Handling Precaution

9.1 Handling Precautions:

- 9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from height.
- 9.1.2 Do not press down the screen or the adjoining areas too hard because the color tone may be shifted.
- 9.1.3 The polarizer covering the display surface of the AMOLED module is soft and easily scratched. Handle this polarizer carefully.
- 9.1.4 If the display surface is contaminated, blow on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear, moisten the cloth with ethyl alcohol.
- 9.1.5 Solvents may damage the polarizer. Do not use water, ketone or aromatic solvents except ethyl alcohol. Do not attempt to disassemble the AMOLED Module.
- 9.1.6 If the logic circuit power is off, do not apply the input signals.
- 9.1.7 To prevent destruction from static electricity, be careful to maintain an optimum working environment.
- 9.1.8 Be sure to make yourself in contact with the ground when handling with the AMOLED Modules.
- 9.1.9 Tools required for assembly, such as soldering irons, must be properly ground.
- 9.1.10 To reduce the generation of static electricity, do not conduct assembly or other work under dry conditions.
- 9.1.11 To protect the display surface, the AMOLED Module is coated with a film. Be careful when peeling off this protective film, because static electricity may generate.

9.2 Storage Precautions:

- 9.2.1 When storing the AMOLED modules, be sure that they are not directly exposed to the sunlight or the light of fluorescent lamps.
- 9.2.2 The AMOLED modules should be stored under the storage temperature range. If the AMOLED modules will be stored for a long time, the recommended condition is: Temperature: 0℃~40℃ Relatively humidity: ≤80%
- 9.2.3 The AMOLED modules should be stored in the room without acid, alkali or harmful gas.

9.3 Transportation Precautions:

- 9.3.1 The AMOLED modules should not be suffered from falling and violent shocking during transportation. Besides, excessive press, water, damp and sunshine.

10. PACKAGE DRAWING

