SPECIFICATION FOR APPROVAL

DESCRIPTION: 4.39"AMOLED Module
CUSTOMER: BR439102-A1 V.1
Product No:
Released Date: 2024.08.05
Revision: v1

PLEASE RETURN TO US ONE COPY OF"SPECIFICATION FOR APPROVAL"WITH YOUR APPROVED SIGNATURES.

APPROVED SIGNATURES		

Table of Contents

Record of Revision

Rev	Issue Date	Description	Editor
A0	2024/07/19	Initial Released	Spark
A1	2024/08/05	1：Modify the AVVD voltage from 7V to 7.6V - Page 7 2：Modify reliability test conditions - Page 17	Spark

2 General Specifications

Feature		Spec	Remark
Display Spec	Screen Size (inch)	4.39	
	Display Mode	AMOLED	
	Resolution(dot)	568(W)×1210(H)	
	Active Area(mm)	47.3712(W)×100.914 (H)	
	Pixel Pitch (um)	83.4 (W)×83.4(H)	
	Technology Type	LTPS	
	Color Depth	16.7M	
	Interface	MIPI 2 LANE	
Mechanical Characteristics	Polarizer Surface Treatment	HC Coating	
	With TP/Without TP	With TP(on Cell)	
	Module Outline Dimension(W x H x D) (mm)	49.13(W)*103.55(H)*0.75(D)	
Electronic	Driver IC(Type)	SD5207	
	Touch IC(Type)	CST3530	
	Frame Rate	60HZ	

Note 1: Requirements on Environmental Protection: RoHS 2.0.

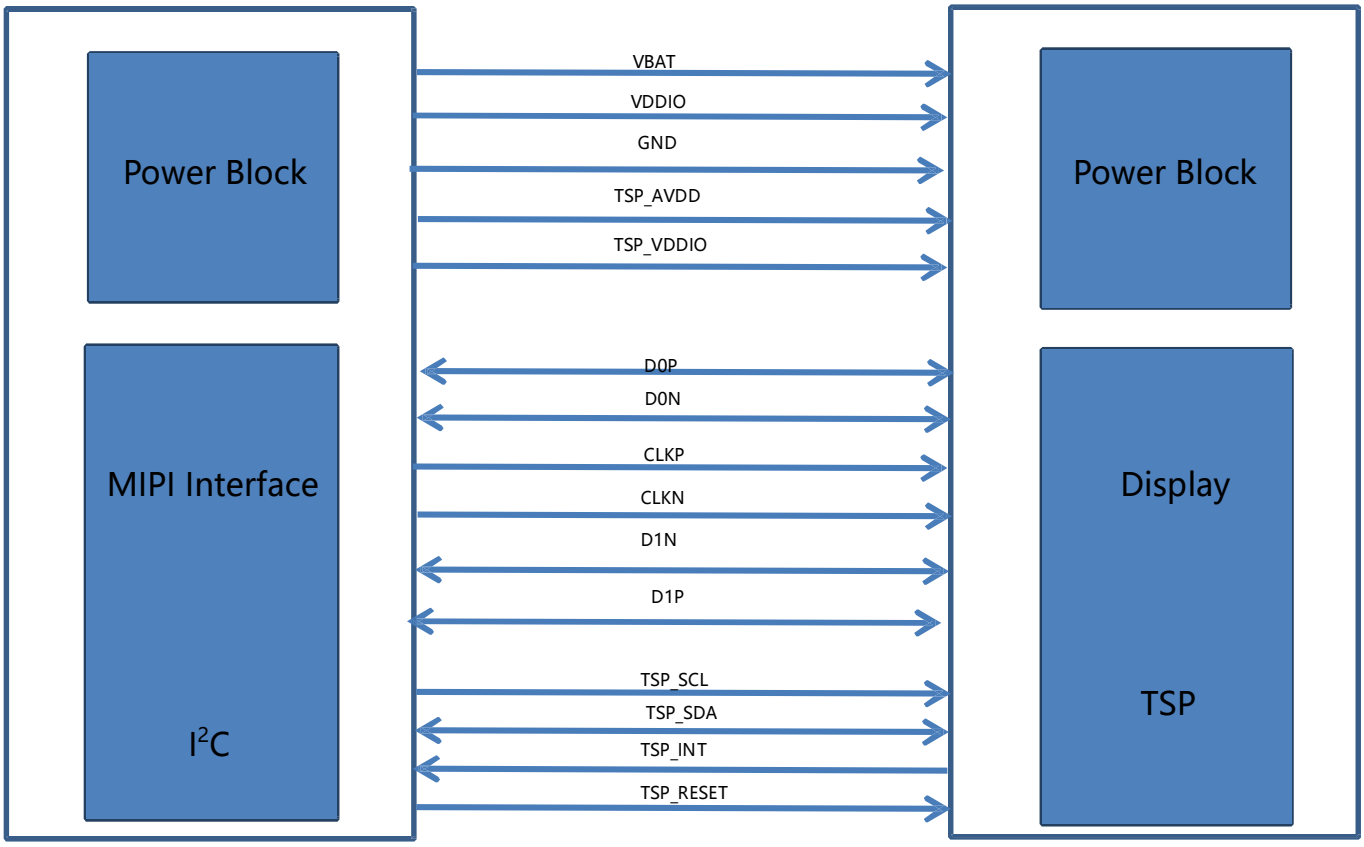
3 Input/output Terminals

3.1 Main TP-FPC Pin Assignment

Number	Signal	Description
1	ELVDD	AMOLED EL Positive 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 CLK Line
19	NC	No Connection
20	CLKN	MIPI CLK Line
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	Drive IC reset
31	VCI	AMOLED logic power for DDIC
32	AVDD_EN	AVDD enable
33	TP_VCI	Analog Power for Touch Panel
34	SWIRE	Control the PMIC
35	TP_RST	Reset Pin for Touch Panel
36	TE1	Tear Effect
37	TP_SCL	Serial Clock Signal for Touch Panel I2C I/F
38	TP_SDA	Serial Data Signal for Touch Panel I2C I/F

39	TSP_INT	Interrupt Signal for Touch Panel

3.2 MCU and Display Module Interface Conflagration



4 Absolute Maximum Ratings

4.1 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

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.

5 Electrical Characteristics

4.1 Driving AMOLED Panel

Ta=25℃

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

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

6 AC Characteristics

5.1 MIPI DC Characteristics

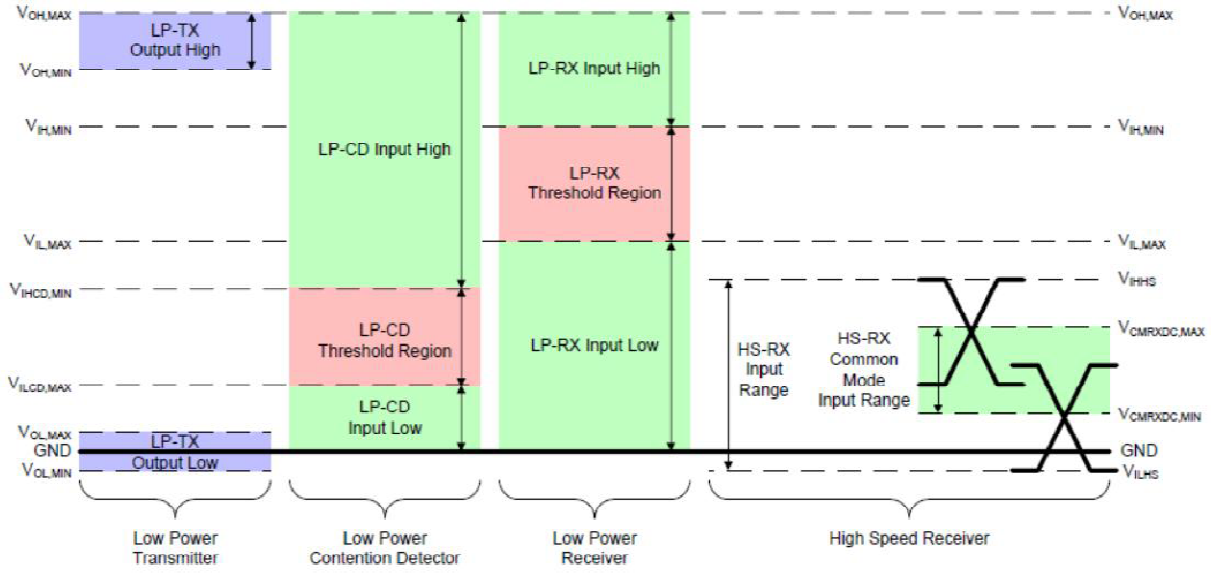


Figure 8-4-1-1 MIPI DC Characteristics

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
VIDTH	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

5.2 MIPI AC Characteristics

Characteristics[mipi_D-PHY_specification_2.1]

HS clock transmission

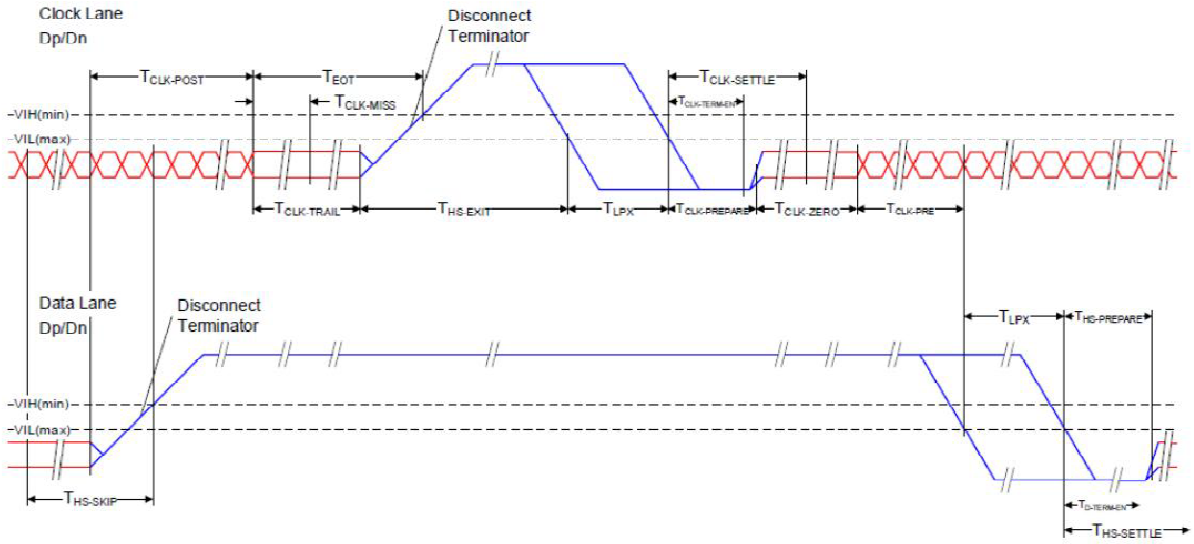


Figure 8-4-2-2 HS Clock Transmission

HS Data Transmission Burst

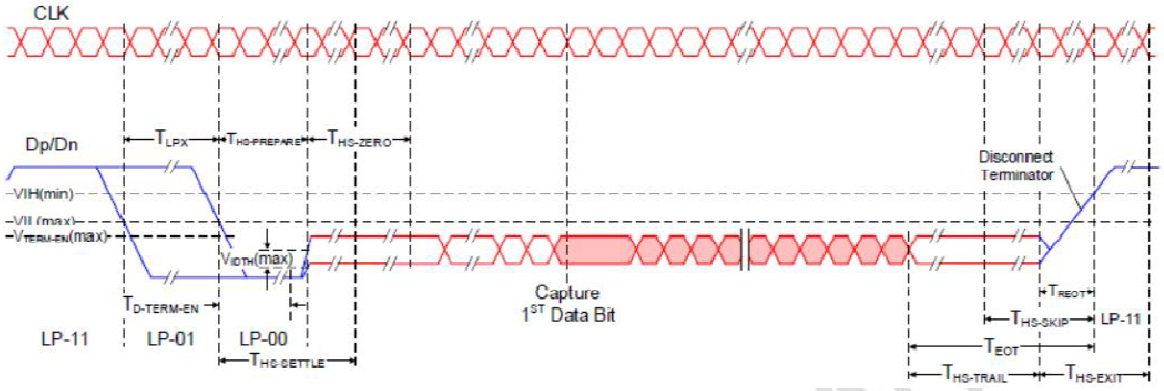


Figure 8-4-2-1 HS Data Transmission

Turnaround Procedure

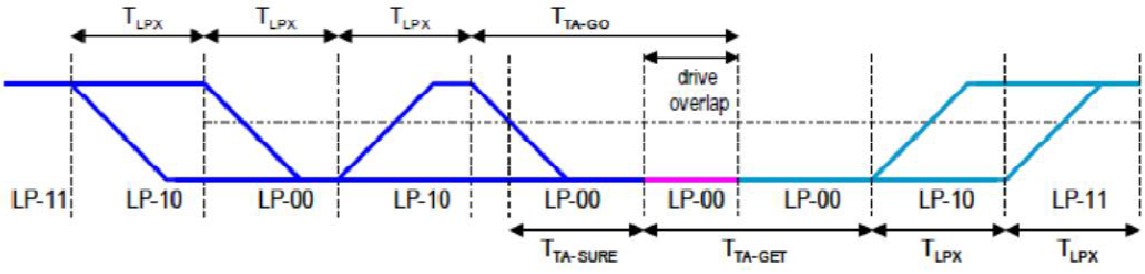


Figure 8-4-2-3 Turnaround Procedure

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 $V_{IL,MAX}$.	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 $V_{IL,MAX}$.	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_{LPX}	Transmitted length of any Low-Power state period	50			ns	4, 5
Ratio T_{LPX}	Ratio of $T_{LPX(MASTER)}/T_{LPX(SLAVE)}$ 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_{LPX}			ns	5
T_{TA-GO}	Time that the transmitter drives the Bridge state (LP-00) before releasing control during a Link Turnaround.	4*T_{LPX}			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_{LPX}		2*T_{LPX}	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

5.3 Display RESET Timing Characteristics

Reset input timing:

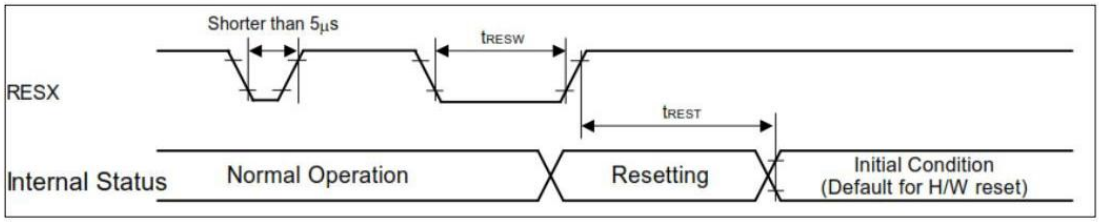


Figure 8-6-1 Reset Function

Symbol	Parameter	Related Pins	Min.	Typ.	Max.	Note	Unit
tRESW	*1) Reset low pulse width	RESX	10	-	-	-	us
tREST	*2) Reset complete time				5	When reset applied during sleep in mode	ms
					120	When reset applied during Sleep out mode	ms

7 Recommended Operating Sequence

7.1 Display Power on / off Sequence

7.1.1 Power On Sequence

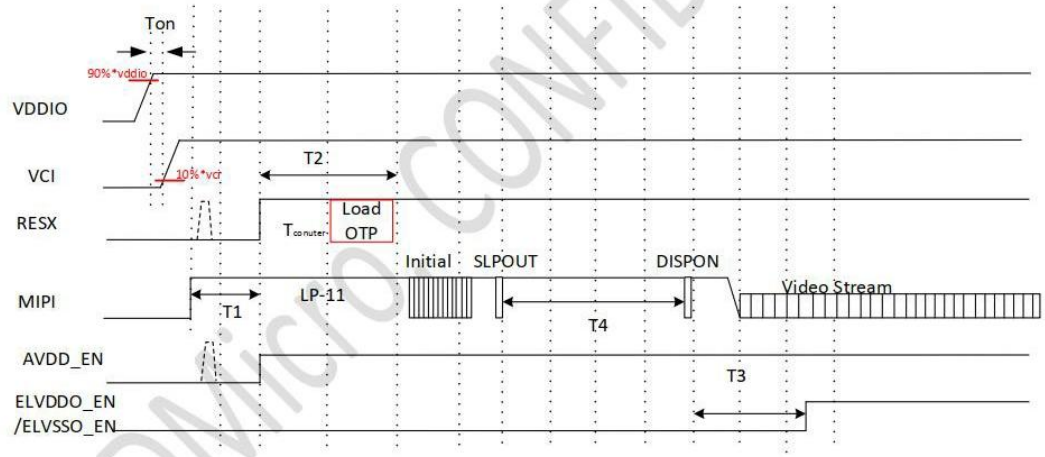


Figure 8-3-1-1 Power on sequence

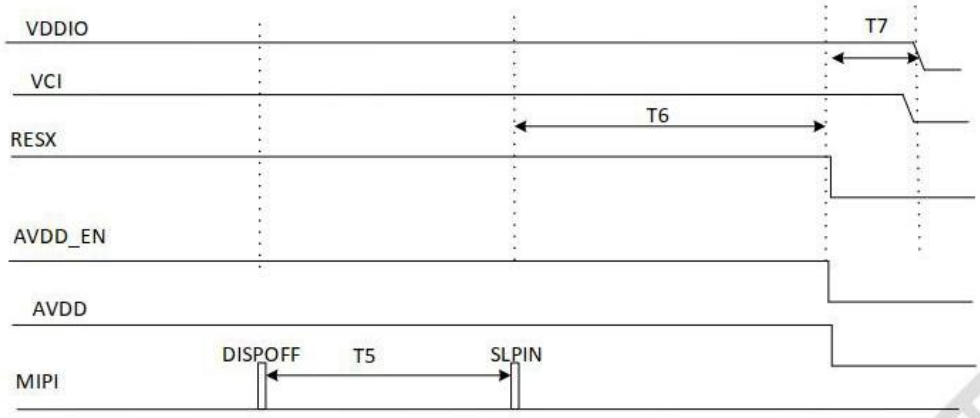
Note: 1.Ton: The time between the VDDIO and the VCI power on, Ton≥0 ms

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.

7.1.2 Power Off Sequence



7.2 Brightness control

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

8 Touch Specification

8.1 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	

8.2 Electrical Characteristics

8.2.1 Maximum Ratings

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

8.2.2 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

8.3 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

9 Optical Characteristics Optical Specification

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

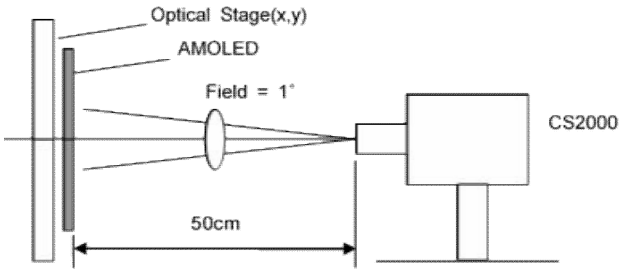
Test Conditions:

1. the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

Note 1: Definition of optical measurement system.

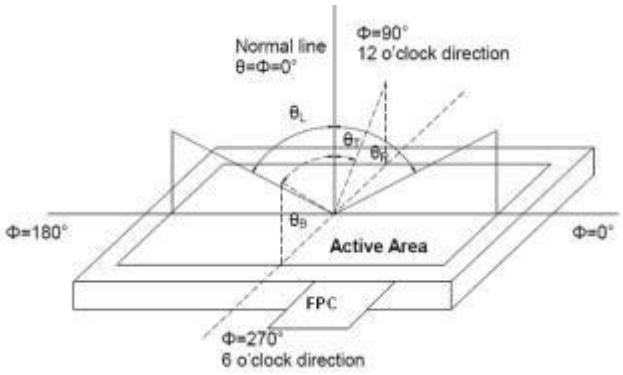
The optical characteristics should be measured in dark room. The optical properties are measured at the center point of the AMOLED screen. All input terminals AMOLED panel must be ground when

measuring the center area of the panel.



Optical Characteristic Measurement Equipment and Method

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



Note 3: Definition of contrast ratio

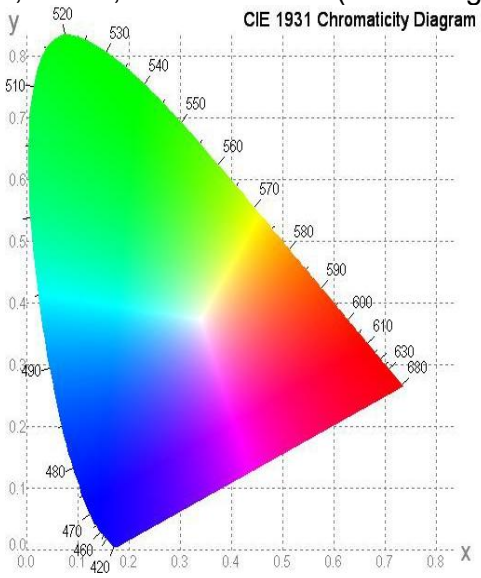
$$\text{Contrast ratio(CR)} = \frac{\text{Luminance measured when AMOLED is on the "white" state}}{\text{Luminance measured when AMOLED is on the "Black" state}}$$

"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.

Note 4: Definition of color chromaticity (CIE1931)

R,G,B and W are defined by (x, y) on the IE chromaticity diagram
NTSC=area of RGB triangle/area of NTSC triangleX100%
Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



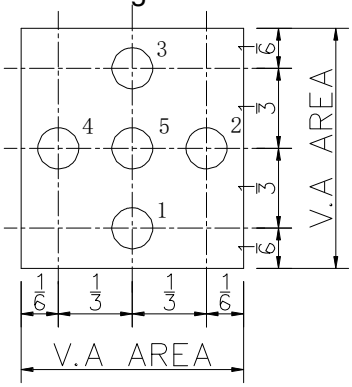
Note 5: Definition of luminance uniformity

Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

Surface Luminance: LV = average (LP1:LP5)

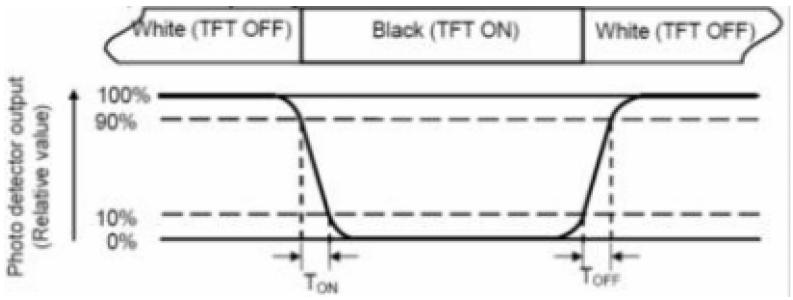
Uniformity = Minimal (LP1:LP5) / Maximal (LP1:LP5) * 100%

Note :Measuring machine:BM-7

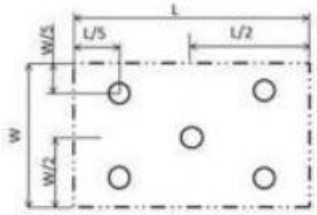


Note 9: Definition of response time

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 photodetector output intensity changing from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changing from 10% to 90%.



10 Environmental / Reliability Test

No	Test Item	Condition	Remark
1	High Temperature Operation	+70℃, 240hrs	IEC60068-2-2,GB2423.2
2	Low Temperature Operation	-30℃, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage	+80℃, 240hrs	IEC60068-2-2 GB2423.2
4	Low Temperature Storage	-40℃, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Operation	60℃, 90% RH,240hrs	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (Non-operation)	-40(℃)/30(min) ~+80 (℃)/30(min), Change time:10min, 30Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	ESD Test(end product)	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
8	Vibration Test (for packaging)	Frequency: 10Hz to 55Hz to 10Hz， Swing：1.5mm，time：X,Y,Z each 2H.	One inner carton

Note 1. For humidity test, DI water should be used.
Inspection Standard: Inspect after 1-2hrs storage at room temperature, the sample shall be free from the following defects:

- Non-display
- Missing Segment
- Glass Crack
- IDD is greater than twice initial value.
- One inner carton

Note 2. No defect is allowed after testing
The End Product ESD value is only indicative and depends on customer ESD protection design for the whole system.

Note 3. ESD should be applied to LCD glass panel, not other areas (such as on IC and so on)
IDD should be within twice initial value.
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.

Note 4. Only upon request.

11 Quality Level

11.1 AMOLED Module of Characteristic Inspection

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

10.1.1 Test conditions: OLED is not light, cold white fluorescent lamp, illumination 1000 ± 200lux; OLED lighting source shall not be higher than 200lux, with black background around.

10.1.2 Inspection distance: the standard observation distance of all surfaces of the tested object is 30cm ± 5cm.

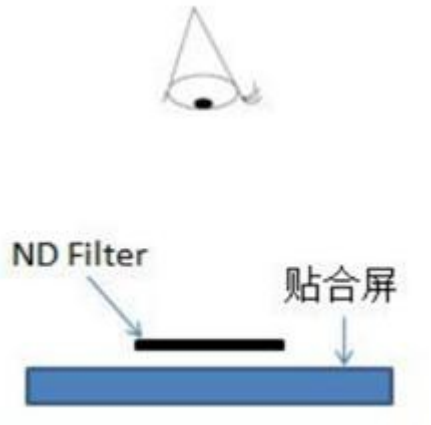
10.1.3 Inspection angle: the angle between the product and the horizontal plane is 45 °, and the eyes are perpendicular to the inspection plane. During inspection, the product needs to rotate 45 ° up, down, left and right. The observation line of sight needs to be within the half section of the cone. 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.

10.1.4 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.

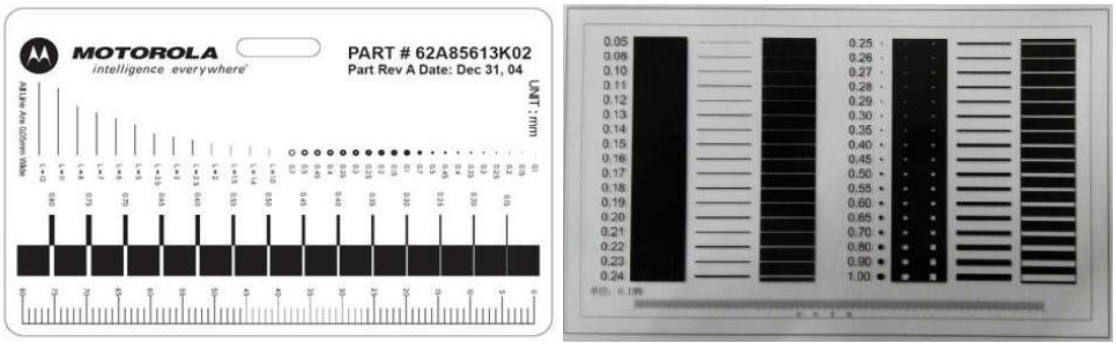
10.1.5 Test temperature: room temperature 15-35 ℃, ambient humidity: 20-75% RH.

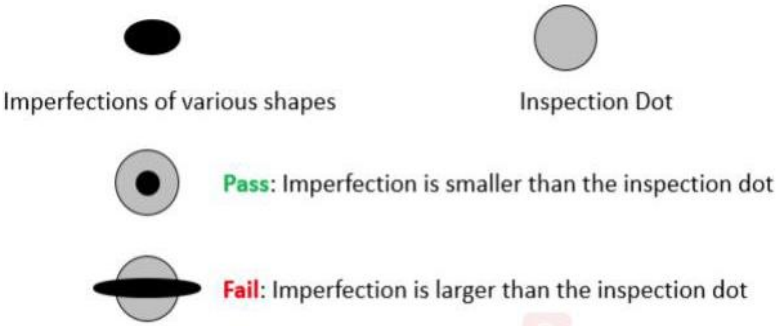
10.1.6 Inspection tools:

10.1.6.1 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)



10.1.6.2 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.





10.1.6.3 Microscopic examination: use 20-50 times adjustable microscope and 10-30 times test eyepiece.

10.1.6.4 Digital caliper: resolution 0.01mm.

10.1.6.5 Projector: anime microscope, 3D projector.

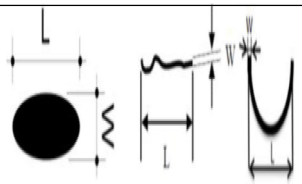
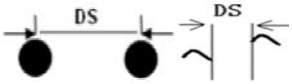
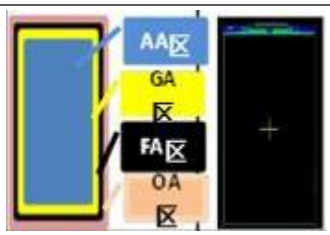
10.1.6.6 Judgment description

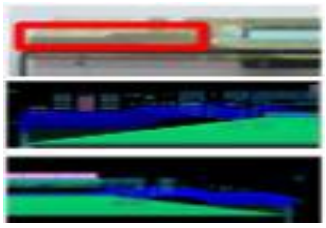
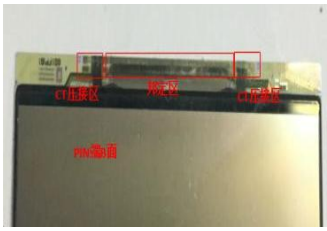
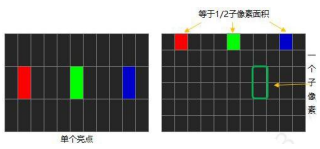
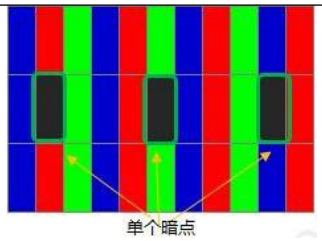
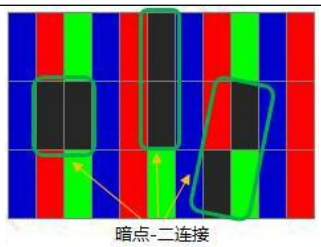
10.1.6.6.1 The measurement accuracy shall refer to the specification definition. When the measurement equipment accuracy is higher than the specification definition, the measured value needs to be rounded to the precision defined by the specificationthe. For example, the size of edge collapse is 0.20mm,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

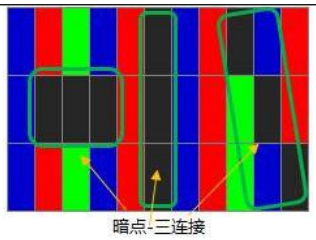
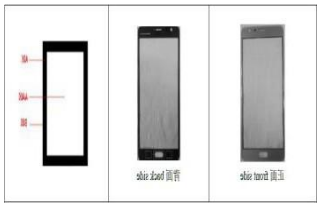
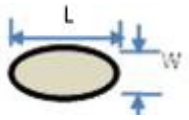
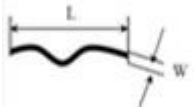
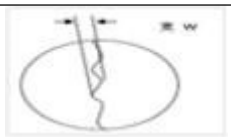
10.1.6.6.2 In addition to the tools used above, if additional inspection tools are needed to assist the judgment, they can only be carried out after the coordination of both parties.

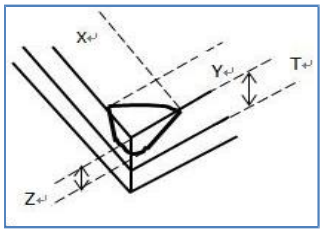
10.1.6.6.3 Bad code and definition

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		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 ≤ 0.1mm, DS ≥ 2mm, and the number N ≥ 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.

11.2 Sampling Procedures for Each Item Acceptance Table

Critical Defect (CR): any defect that directly or indirectly affects human health and safety, or the function of the product is lost.

Major Defect (MA): directly or indirectly affect the product function, or make part of the product function lost, and other customers do not acceptable defects.

Minor Defect (MI): appearance defect that does not affect product function and can be accepted by customers.

Defect Type	Sampling Procedures	AQL
Critical Defect (CR)	Take the normal inspection solution of the sampling plan of GB/T2828.1-2012 Inspection level Ⅱ	0.065

Major Defect (MA)	Take the normal inspection solution of the sampling plan of GB/T2828.1-2012 Inspection level Ⅱ	0.65
Minor Defect (MI)	Take the normal inspection solution of the sampling plan of GB/T2828.1-2012 Inspection level Ⅱ	1.0

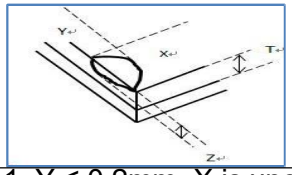
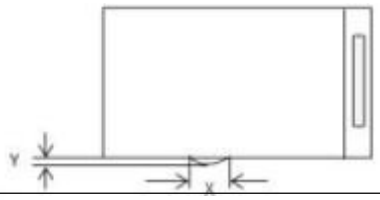
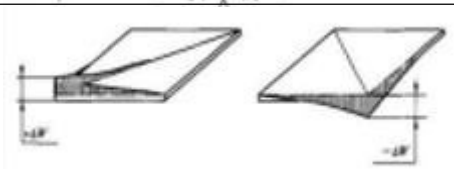
11.3 Telecommunications Inspection Item

category	NO.	Inspection items	Inspection specification	test mode	defect type
Poor function	1	Display exception	not allow	visual	CR
	2	No display	not allow	visual	CR
	3	The picture flickers	not allow	visual	MA
TP function	4	TP test NG	not allow	visual	MA
Dot	5	Bright dot	not allow	visual	MI
	6	Partial Bright dot	ND6% or reference limit sample	visual	MI
	7	Dark dot	1.D≤0.15mm, ignored; 2.0.15mm < D≤ 0.2mm, DS ≥ 10mm, N ≤ 4; 3.D > 0.2mm,not allowed;	Visual inspection, Flinka	MI
Line	8	Bright line	not allow	visual	MA
	9	Dark line	not allow	visual	MA
	10	Slightly bright line	not allow	visual	MA
Mura	11	horizontal mura	No control under W64/127 screen; The 5%ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI
	12	vertical mura	No control under W64/127 screen; The 5% ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI
	13	White spot	No control under W64/127 screen; The 5% ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI

	14	Black spot	No control under W64/127 screen; The 5% ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI
	15	Color mura	5% ND Filter in W64/255 screen determines that the invisible is OK and the visible is NG	Visual ND Filter/limit sample	MI
	16	snowflake	No control under W64/127 screen; The 5% ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI
	17	Twill mura	No control under W64/127 screen; The 5% ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI
	18	Newtonian ring	No control under W64/127 screen; The 5% ND Filter on the 255 screen determines that the invisible is OK and the visible is NG.	Visual ND Filter/limit sample	MI
	19	Uneven transition	Reference homogeneity standard to assist in judgment; The 5% ND Filter in the W64/255 screen determines that the invisible product is OK and the visible product is NG.	Visual ND Filter/limit sample	MI
	1、Mura all specify the screen judgment. For example, if the ELA mura judgment standard is 255, the ELA mura will only be judged on the W255 screen. 2、Other types of mura have a low adverse effect rate and low incidence. According to the 5% ND Filter in the W64/255 screen, the invisible products are OK and the visible ones are NG.				
Dot/line of foreign material	20	Dot/line defects (foreign material, black white dot, scratch, bubble, etc.)	Same point/line specifications	Visual inspection/Flinka	MI

11.4 Appearance Inspection Item

NO.	Inspection items	Surface Area	Inspection specification	test mode	defect type
1	Broken glass	AA/OA	not allow	visual	MA
2	crack	AA/OA	not allow	visual	MA

3	Edge collapse/corner	AA/OA	1. Y ≤ 0.15mm, X and N are ignored; 2. 0.15 < Y ≤ 0.4mm, X ≤ 2mm, N is ignored; 3. Y > 0.4mm, not allowed; 4. Z ≤ t, without damage to Frit body; 	Visual inspection, Flinka	MI
4	flange	AA/OA	1. Y ≤ 0.2mm, X is uncontrolled; 2. Y > 0.2mm, not allowed; 	Visual inspection, Flinka	MI
5	Glass warp	Whole area	 The product is placed horizontally on the front and back, and the lifting height at one end (plug gauge) ≤ 0.6mm	Visual inspection, Flinka	MI
6	Pin dirty	Bongding area	No control	visual	MI
7	Pin scratch	Bongding area	Scratches and whitening are found by visual inspection, and need to be rechecked with a microscope. The broken lead is not allowed, and the overlap is not allowed Note: CT pad area and pin non-bonding area are not controlled	visual	MI
8	PF film bump	LTPS	Touch is not allowed	visual	MI
9	PF film pinholes/pits	LTPS	No control	visual	MI
10	PF film scratch	LTPS	1. No scratch, no control; Scrape through, L<10mm; 2. The film shall be scraped through the exposed glass surface, referring to the lack of glue of PF film;	Visual inspection, Flinka	MI
11	PF film lacks glue	LTPS	50> 5mm, W>5mm not allowed	Visual inspection, Flinka	MI
12	PF membrane is dirty	LTPS	Wipable dirt needs to be wiped, and non-wipe dirt refers to the color difference of PF film;	visual	MI
13	PF film overflow	LTPS	1. Edge overflow W<0.2mm, acceptable; 2. W>0.2mm, not allowed;	Visual inspection, Flinka	MI

<table>
<tr><td>14</td><td>Color difference/stain (no convex touch)</td><td>LTPS</td><td colspan="4">No control</td><td>visual</td><td>MI</td></tr>
<tr><td>15</td><td>PF film gluing offset</td><td>LTPS</td><td colspan="4">1. Step area is not allowed;
2. Except for the step area, the rest shall be controlled by 0.5 ± 0.2mm;</td><td>Visual inspection, Flinka</td><td>MI</td></tr>
<tr><td>16</td><td>Screen body is dirty</td><td>LTPS</td><td colspan="4">1. The front can be wiped and the dirt can be wiped, and the polarizer of the dirt cover cannot be wiped;
2. The back is not controlled;</td><td>visual</td><td>MI</td></tr>
<tr><td rowspan="4">17</td><td rowspan="4">point defect</td><td rowspan="4">AA</td><td>D (mm)</td><td colspan="2">DS (mm)</td><td>Acceptable number</td><td rowspan="4">Visual inspection, Flinka</td><td rowspan="4">MI</td></tr>
<tr><td>D≤ 0.15mm</td><td colspan="2">/</td><td>Ignore</td></tr>
<tr><td>0.15mm＜ D≤0.2mm</td><td colspan="2">DS≥10</td><td>N≤10</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="6">18</td><td rowspan="6">Linear defect/foreign matter linear/non-inductive scratch</td><td rowspan="6">AA</td><td>W (mm)</td><td>L (mm)</td><td>DS (mm)</td><td>Acceptable number</td><td rowspan="6">Visual inspection, Flinka</td><td rowspan="6">MI</td></tr>
<tr><td>W≤ 0.03</td><td>L≤5</td><td>≥10</td><td>ignore</td></tr>
<tr><td>0.03< W≤ 0.05</td><td>L≤2</td><td>≥10</td><td>ignore</td></tr>
<tr><td>0.03< W≤ 0.05</td><td>2＜L≤5</td><td>≥10</td><td>N≤4</td></tr>
<tr><td>W>0.05</td><td>-</td><td>/</td><td>Not allowed</td></tr>
<tr><td>-</td><td>L>5</td><td>/</td><td>Not allowed</td></tr>
<tr><td rowspan="4">19</td><td rowspan="4">Point/Line defects</td><td rowspan="4">Camera hole area/Blind hole area</td><td colspan="2">D(mm)</td><td colspan="2">Acceptable number</td><td rowspan="4">Visual inspection, Flinka</td><td rowspan="4">MI</td></tr>
<tr><td colspan="2">D≤0.15</td><td colspan="2">ignore</td></tr>
<tr><td colspan="2">0.15＜D≤0.2</td><td colspan="2">ignore</td></tr>
<tr><td colspan="4">D>0.2</td></tr>
<tr><td>20</td><td>Newton rings（Blind hole area）</td><td>Camera hole area/Blind hole area</td><td colspan="4">Not control</td><td>Visual inspection</td><td>MI</td></tr>
<tr><td>21</td><td>offset</td><td>Camera hole area/Blind hole area</td><td colspan="4">The metal ring extends inward 0.1mm ,ingore</td><td>Visual inspection</td><td>MI</td></tr>
</table>

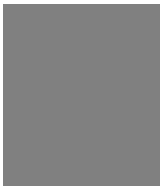
22	Blind hole color bias(same color)	Camera hole area/Blind hole area	Functional requirements such as transmittance and PV value are met,not control appearance	Visual inspection	MI
23	Protective film scratch	Whole area	No control under no hurt boby	Visual inspection	MI
24	Protective film starved/overflow glue/burr	Whole area	No control under no hurt boby	Visual inspection	MI
25	Dirt inside the protective film	Whole area	Not allowed	Visual inspection	MI
26	Easy to tear	Cover front	Function is invalid, damaged, leaked not allowed Wrinkles, bumps, dirt, punching bad, burr, overflow glue is not controlled	Visual inspection	MI
27	Polarizer edge overflow	AA	W≤0.35mm , Not control； W>0.35mm, Not allowed.	Visual inspection, Flinka	MI
28	Polarizer concave convex point	AA	convex point: D ≤ 0.2mm or refer to limit sample concave point: D≤3mm, DS≥10mm, N≤3or refer to limit sample	Visual inspection, Flinka	MI
29	Polarizer fold / indentation	AA	Does not affect the display as OK or refer to limit sample;	Visual inspection	MI
30	Polarizer chromatism	AA	No control	Visual inspection	MI
31	IC chip	IC	Not allowed	Visual inspection	MI
32	FPC body defect	FPC	1. The parts on the FPC must be consistent with the product BOM table, and there are incorrect, multiple, or missing parts, which are not allowed; Polarities such as capacitors and inductors should not be soldered backwards or crooked; 2. FPC scratches/scratches are based on the absence of exposed copper; 3. Creases/Indentations: Indentations in the circuit area should not cause the back of the covering film to turn white; Non line area indentation should not cause FPC damage 4. Except for the golden finger. FPC foreign object: a. Spot shape: D ≤ 0.5mm, N ≤ 3; b. Linear: length and width ≤ 0.3 * 5mm;	Visual inspection	MI

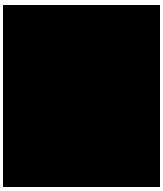
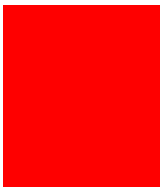
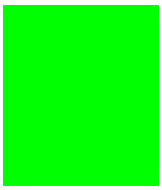
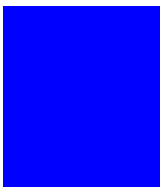
33	FPC gold finger defect	Golden Finger Region	1. Golden finger cracking: The length and width of the crack/damage at the top of the golden finger ⩽ the line width; 2. Gold finger copper leakage: W ⩽ 1/3 line width, L ⩽ line width, unlimited quantity 3. Gold finger gap W1 ⩽ 1/3 line width W, length L1 ⩽ 1/2 line width W, unlimited quantity, all of the above conditions are met and allowed; 4. Gold finger pressure/scratch should not expose copper, there should be no unevenness, and there should be no depth visible to the naked eye, which does not affect assembly and is acceptable; 5. Gold fingers should not have sharp creases or dead folds; 6. FPC gold fingers should not have oxidation, blackening, burns, or browning;	Visual inspection	MI
34	connector	connector	There should be no tin or residual solder beads on the connector, and there should be no tin connection on the connector pins; PIN deformation shall be controlled within 0.05mm; Does not affect the lighting function; Visual inspection of pin breakage, pin detachment, and deformation of the outer frame is not allowed;	Visual inspection	MI
35	Insulating tape	Bonding area	There must be no obvious wrinkles or bubbles	Visual inspection	MI
		Component area	1. Scratches and glue splashes are uncontrollable; 2. Do not wipe dirt or dirt; 3. The offset of the insulation tape should not exceed the edge of the product, and other requirements should be determined based on the drawing; 4. Burr edges, no control over glue overflow; 5. Damaged, incomplete, or missing labels are not allowed;		

36	Composite tape	All	1. It is not allowed for the composite tape to leak out of the edge of the screen body; 2. Folding of composite tape, light leakage during assembly, or affecting assembly and thickness are not allowed; 3. Damaged composite tape is not allowed; 4. The size of the composite tape cutting defect does not meet the requirements of the drawing and cannot be controlled; 5. Composite tape should not be wiped with dirt or foreign objects, and foreign objects should follow the dotted line standard; 6. The burrs of the composite tape should not exceed the edge of the screen body, regardless of control; 8. Composite adhesive tape with no control over glue splashes or overflow; 9. Composite tape bubbles: D ≤ 5mm, N not included; 10. Composite tape bumps: acute angle bumps D ≤ 0.3mm, N ≤ 3; Smooth concave convex points D ≤ 0.8mm, N ≤ 3; 11. Composite tape foreign object (foreign object between copper foil and blue film): D ≤ 0.3mm, N ≤ 3; 12. Edge sawtooth of composite tape: 0.5 * 3mm, N ≤ 3; 13. The color difference of the protective film in the composite tape is not controlled; 14. Copper foil indentation and dead bending in composite tape are not allowed, which does not affect assembly and thickness control; Or reference limit sample; 15. No control of foreign objects/dents in copper foil in composite tape;	Visual inspection	MI
37	OCA overflow	All	Not allowed within AA area; Externally visible: Control standard ≤ 0.15mm	Visual inspection	MI
38	Sealing glue	Pin	1. Broken adhesive is not allowed, and the circuit cannot be exposed. 2. The thickness of the colloid shall not be higher than the POL surface. 3. Bubble diameter<1mm. 4. Other: According to the drawings and work instructions.	Visual inspection	MI

39	Conductive cloth	All	1. Conductive cloth dirt: D ⩽ 5mm, N ⩽ 2; 2. Conductive cloth bubbles: D ⩽ 2mm, N ⩽ 2; 3. Conductive cloth foreign object: D ⩽ 1mm, N ⩽ 3; 4. Folding of conductive fabric: N ⩽ 2;	Visual inspection	MI
40	Copper foil	All	Copper foil sticking is not allowed to leak out of the edge of the screen body; Abnormal color of copper foil refers to standard samples/sealed samples, and damage is not allowed. Soft scratches on the surface are not controlled.	Visual inspection	MI
41	QR code	QR code	It is not allowed to be unable to scan or difficult to scan (recognition can only be achieved after three consecutive scans), with a clear appearance, no blurring, missing printing, and other defects	Visual inspection	MI
42	Package	Other	Products should put into the anti-static trays, with non-overlapping, and the trays should be staggered placed.	visual	-
			Different products cannot be mixed into the same inner package.		
			The package should not have obvious deformation or breakage .The printing labels type and quantity are correct.		
			The package should have QC signature. ROHS label is needed if the product is under ROHS control.		
43	Boundary dimension NG	Other	It is not allowed to exceed the dimensional tolerance required by the specifications and drawings	Calipers, measuring instruments	-

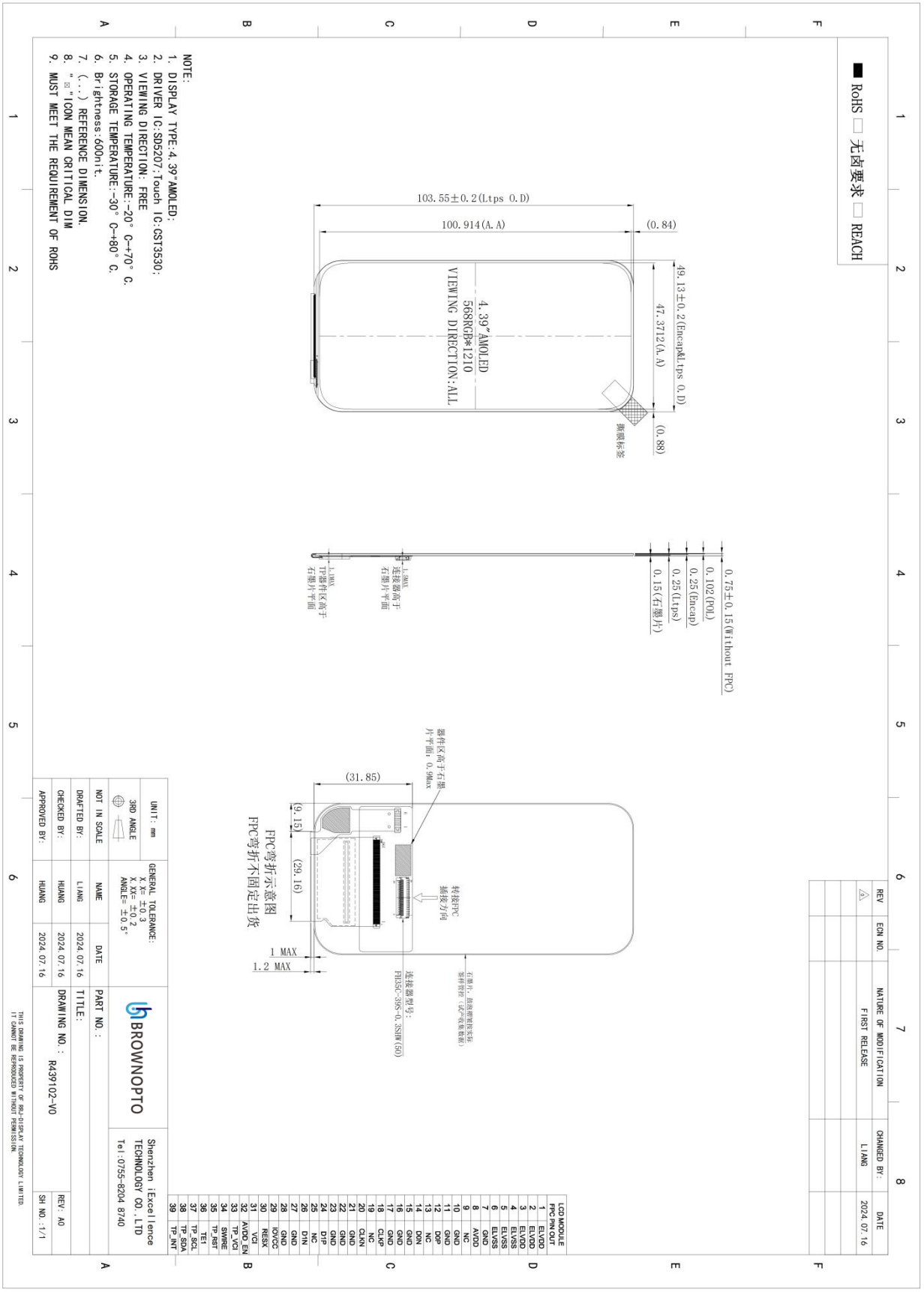
11.5 Inspection picture library

Serial number	picture	Picture name	Mainly judged as defective	remarks
1		W_ GRAD(64) 64 gray scale	Point/line type, foreign matter point/line, mura type	/
2		W_ GRAD(128) 128 gray scale	Point/line type, foreign matter point/line, mura type	/

3		WHITE white	Point/line type, foreign matter point/line, mura type	/
4		Black black	Bright spot, bright line, dark mura	/
5		RED red	Point type, line type, foreign matter point/line	/
6		GREEN green	Point type, line type, foreign matter point/line	/
7		BLUE blue	Point type, line type, foreign matter point/line	/

Note: The actual sequence and lock seconds of the screen can be adjusted according to the customer's requirements and the needs of the factory.

12 Mechanical Drawing



Packing Drawing

Packing Condition	Contents
Packing Type	TRAY + Carton packing type
TRAY material model	tray (10^5~$10^9\Omega$)
Tray packing type	TBD
Number of panels per tray	TBD
Number of Tray per carton	TBD
Number of panels per carton	TBD

13 Precautions for Use of AMOLED Modules

13.1 Handling Precautions:

13.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from height.

13.1.2 Do not press down the screen or the adjoining areas too hard because the color tone may be shifted.

13.1.3 The polarizer covering the display surface of the AMOLED module is soft and easily scratched. Handle this polarizer carefully.

13.1.4 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.

13.1.5 Solvents may damage the polarizer. Do not use water, ketone or aromatic solvents except ethyl alcohol.
Do not attempt to disassemble the AMOLED Module.

13.1.6 If the logic circuit power is off, do not apply the input signals.

13.1.7 To prevent destruction from static electricity, be careful to maintain an optimum working environment.

13.1.8 Be sure to make yourself in contact with the ground when handling with the AMOLED Modules.

13.1.9 Tools required for assembly, such as soldering irons, must be properly ground.

13.1.10 To reduce the generation of static electricity, do not conduct assembly or other work under dry conditions.

13.1.11 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.

13.2 Storage Precautions:

13.2.1 When storing the AMOLED modules, be sure that they are not directly exposed to the sunlight or the light of fluorescent lamps.

13.2.2 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%

13.2.3 The AMOLED modules should be stored in the room without acid, alkali or harmful gas.

13.3 Transportation Precautions:

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