Tailorpixels

A Professional Manufacturer of Display

Manufacturer Certificated

ISO 9001

CERT. No.: 282Q19070712006

ISO 14001

CERT. No.: 282E19070712007

Product Specification

Model: TOH392XVT-01C

3.92″ AMOLED Display Module (1080*1240）

This module uses RoHS material

Tailor Pixels Technology Co., Ltd.
www.tailorpixels.com
tailor@tailorpixels.com
Ph: 86-755-8821 2653

Table of Contents

Record of Revision

Rev	Issue Date	Description	Editor
A0	2024-04-19	Draft	Wang Chun

1 General Specifications

Feature		Spec	Remark
Display Spec	Screen Size (inch)	3.92	
	Display Mode	AMOLED	
	Display method	Active Matrix TFT	
	Resolution(dot)	1080(H) × 1240(V)	
	Active Area(mm)	65.448 (W) × 75.144 (H)	
	Pixel Pitch (um)	0.0606(H) × 0.0606(V)	
	Pixel Configuration	V-Style4	
	Technology Type	LTPS	
	Color Depth	16.7M	
	Interface	MIPI 4 LANE	
Mechanical Characteristics	Polarizer Surface Treatment	HC	2H
	With TP/Without TP	Without TP	
	Module Outline Dimension(W x H x D) (mm)	67.25mm*79.87mm*0.8mm	
Electronic	Driver IC(Type)	CH13726A	
	Touch IC(Type)	NC	
	Frame Rate	60HZ	

Note 1: Requirements on Environmental Protection: RoHS2.0.

2 Input/output Terminals

2.1 Main FPC Pin Assignment

	G2,G3,G6	GND	
19	TSP_SDA	20	VCI
18	TSP_SCL	21	TSP_AVDD
17	TSP_RESET	22	TSP_VDDIO
16	GND	23	TSP_INT
15	D3N	24	AVDD_EN
14	D3P	25	SWIRE
13	GND	26	TE
12	D2N	27	RSTB
11	D2P	28	VDDIO
10	GND	29	ELVSS
9	CLKN	30	ELVSS
8	CLKP	31	ELVSS
7	GND	32	ELVDD
6	D1N	33	ELVDD
5	D1P	34	ELVDD
4	GND	35	MTP_PWR(NC)
3	D0N	36	AVDD
2	D0P	37	ID(NC)
1	GND	38	ERR_FG
	G1,G4,G5	GND	

Note: I=Input; O=Output; P=Power; I/O=Input / Output

2.2 MCU and Display Module Interface Conflagration
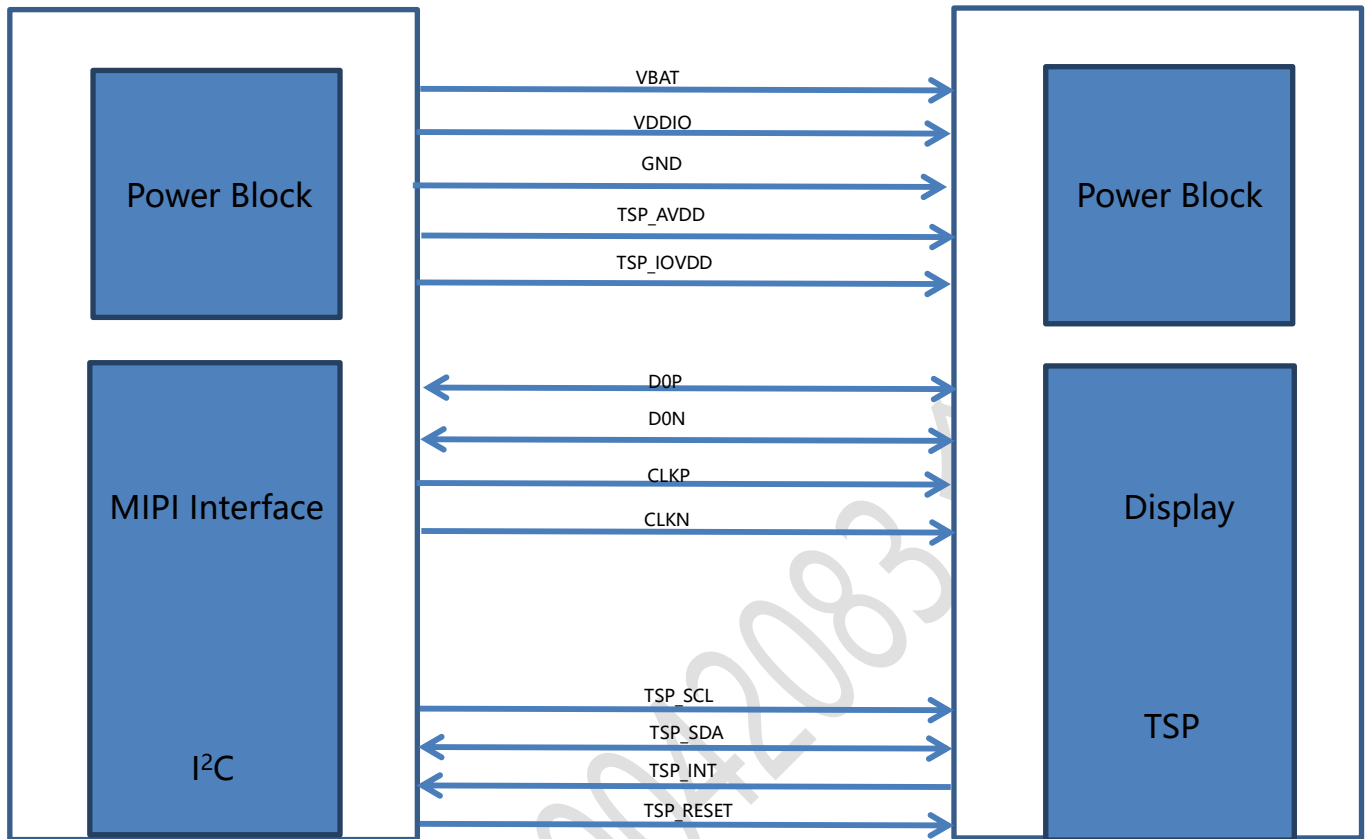
3 Absolute Maximum Ratings

3.1 Driving AMOLED Panel

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

Item	Symbol	MIN	MAX	Unit
Analog Power supply	VCI	-0.3	+5.5	V
Logic Power supply	VDDIO	-0.3	+5.5	V
Analog Power supply	AVDD	-0.3	8.8	V
Positive power for OLED	ELVDD	+4.0	+5.0	V
Negative power for OLED	ELVSS	-1.0	-5.0	V

Note: 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.

4 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	2.5	3.0	3.60	V
Analog Power supply		AVDD	4.5	6.5	6.5	V
Default Positive Output Voltage		ELVDD	4.55	4.60	4.65	V
Positive Output voltage total variation			-0.80	-	+0.80	%
Default Negative Output voltage		ELVSS	-1.00	-3.00	-4.00	V
Negative output voltage total variation			-1.00	-	+1.00	%
Input Signal Voltage	High Level	VIH	0.70*VDDIO	-	VDDIO	V
	Low Level	VIL	0.00	-	0.70*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℃

5 AC Characteristics

5.1 MIPI Interface Characteristics
HS Data Transmission Burst

Data lanes-Low Power Mode to/from High Speed Mode Timing

HS clock transmission

Clock lanes- High Speed Mode to/from Low Power Mode Timing

Timing Parameter:

Signal	Symbol	Parameter	Min.	Typ.	Max.	Unit	Description
Low Power Mode to High Speed Mode Timing							
DSI-Dn+/-	t_{LPX}	Length of any low power state period	50	-	-	ns	Input
DSI-Dn+/-	$t_{HS-PREPARE}$	Time to drive LP-00 to prepare for HS transmission	$40+4\times UI$	-	$85+6\times UI$	ns	Input
DSI-Dn+/-	$t_{HS-TERM-EN}$	Time to enable data receiver line termination measured from when Dn crosses V_{ILMAX}	-	-	$35+4\times UI$	ns	Input
High Speed Mode to Low Power Mode Timing							
DSI-Dn+/-	$t_{HS-SKIP}$	Time-out at display module to ignore transition period of EoT	40	-	$55+4\times UI$	ns	Input
DSI-Dn+/-	$t_{HS-EXIT}$	Time to drive LP-11 after HS burst	100	-	-	ns	Input
DSI-Dn+/-	$t_{HS-TRAIL}$	Time to drive flipped differential state after last payload data bit of a HS transmission burst	$60+4\times UI$	-	-	ns	Input
High Speed Mode to/from Low Power Mode timing							
DSI-CLK+/-	$t_{CLK-POS}$	Time that the MPU shall continue sending HS clock after the last associated data lane has transition to LP mode	$60+52\times UI$	-	-	ns	Input
DSI-CLK+/-	$t_{CLK-TRAIL}$	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	-	ns	Input
DSI-CLK+/-	$t_{HS-EXIT}$	Time to drive LP-11 after HS burst	100	-	-	ns	Input
DSI-CLK+/-	$t_{CLK-PREPARE}$	Time to drive LP-00 to prepare for HS transmission	38	-	95	ns	Input
DSI-CLK+/-	$t_{CLK-TERM-EN}$	Time-out at clock lane display module to enable HS transmission	-	-	38	ns	Input
DSI-CLK+/-	$t_{CLK-PREPARE}$ $+t_{CLK-ZERO}$	Minimum lead HS-0 drive period before starting clock	300	-	-	ns	Input
DSI-CLK+/-	$t_{CLK-PRE}$	Time that the HS clock shall be driven prior to any associated data lane beginning the transition from LP to HS mode	$8\times UI$	-	-	ns	Input

Note 1: VDDIO/VDDAM/VDDR =1.65~3.6V, VCI=2.5 to 3.6V, VSSIO=DVSS=VSSA=VSSAM=VSSR =VSSB=0V, Ta=-30 to +85 °C.
Note 2: Dn=D0, D1, D2 and D3.

High Speed Mode：

Signal	Symbol	Parameter	Min.	Typ.	Max.	Unit	Description
DSI-CLK+/-	$2\times UI_{INST}$	Double UI instantaneous	1.66	-	TBD	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halves ($UI = UI_{INSTA} = UI_{INSTB}$)	0.83	-	TBD	ns	
DSI-Dn+/-	t_{DS}	Data to clock setup time	$0.15\times UI$	-	-	ps	
DSI-Dn+/-	t_{DH}	Data to clock hold time	$0.15\times UI$	-	-	ps	
DSI-CLK+/-	t_{DRTCLK}	Differential rise time for clock	150	-	$0.3\times UI$	ps	
DSI-Dn+/-	$t_{DRTDATA}$	Differential rise time for data	150	-	$0.3\times UI$	ps	
DSI-CLK+/-	t_{DFTCLK}	Differential fall time for clock	150	-	$0.3\times UI$	ps	
DSI-Dn+/-	$t_{DFTDATA}$	Differential fall time for data	150	-	$0.3\times UI$	ps	

Note 1: VDDIO/VDDAM/VDDR =1.65~3.6V, VCI=2.5 to 3.6V, VSSIO=DVSS=VSSA=VSSAM=VSSR =VSSB=0V, Ta=-30 to +85 °C.
Note 2: Dn=D0, D1, D2 and D3.
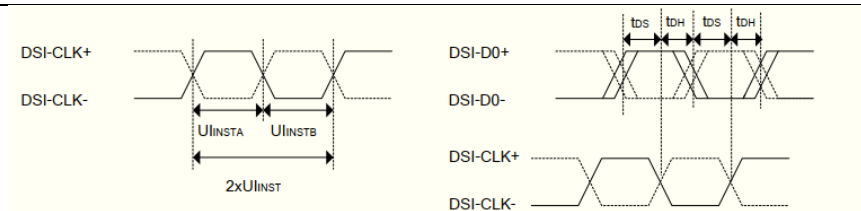
DSI clock channel timing
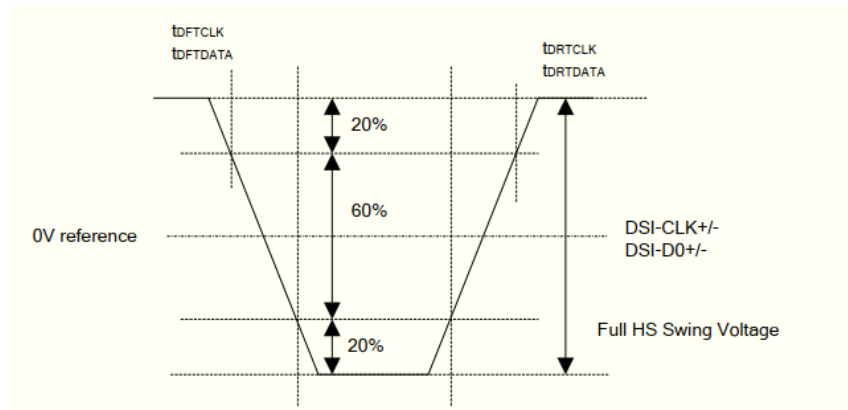

Rising and falling time on clock and data channel

Low Power Mode：

Signal	Symbol	Parameter	Min.	Typ.	Max.	Unit	Description
DSI-D0+/-	t_{LPXM}	Length of LP-00, LP-01, LP-10 or LP-11 periodsMPU → Display Module	50	-	75	ns	Input
DSI-D0+/-	t_{LPXD}	Length of LP-00, LP-01, LP-10 or LP-11periodsDisplay Module → MPU	50	-	75	ns	Output
DSI-D0+/-	$t_{TA-SURED}$	Time-out before the MPU start driving	t_{LPXD}	-	$2 \times t_{LPXD}$	ns	Output
DSI-D0+/-	$t_{TA-GETD}$	Time to drive LP-00 by display module	$5 \times t_{LPXD}$	-	-	ns	Input
DSI-D0+/-	t_{TA-GOD}	Time to drive LP-00 after turnaround request - MPU	$4 \times t_{LPXD}$	-	-	ns	Output

Note 1: VDDIO/VDDAM/VDDR =1.65~3.6V, VCI=2.5 to 3.6V, VSSIO=DVSS=VSSA=VSSAM=VSSR =VSSB=0V, Ta=-30 to +85 ⁰C.
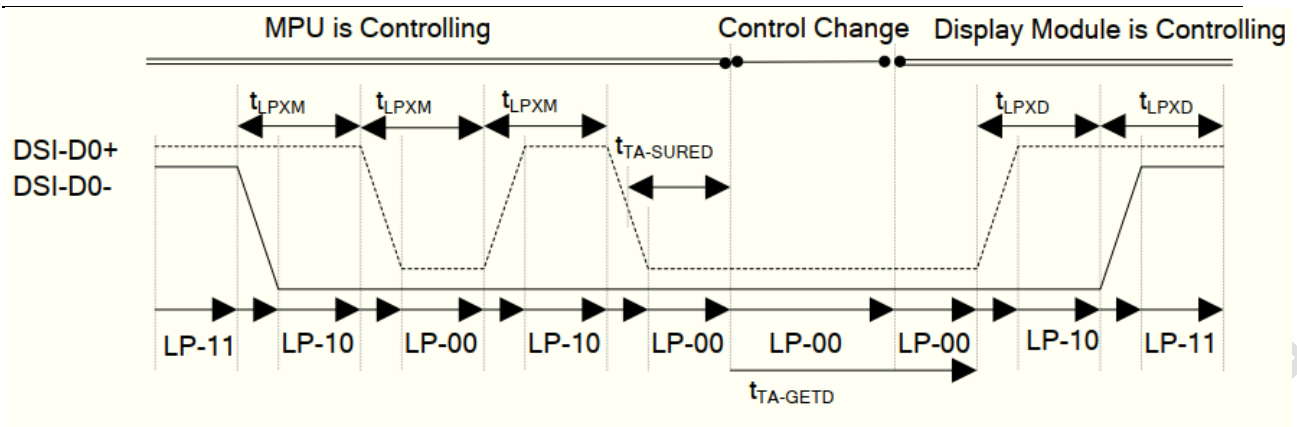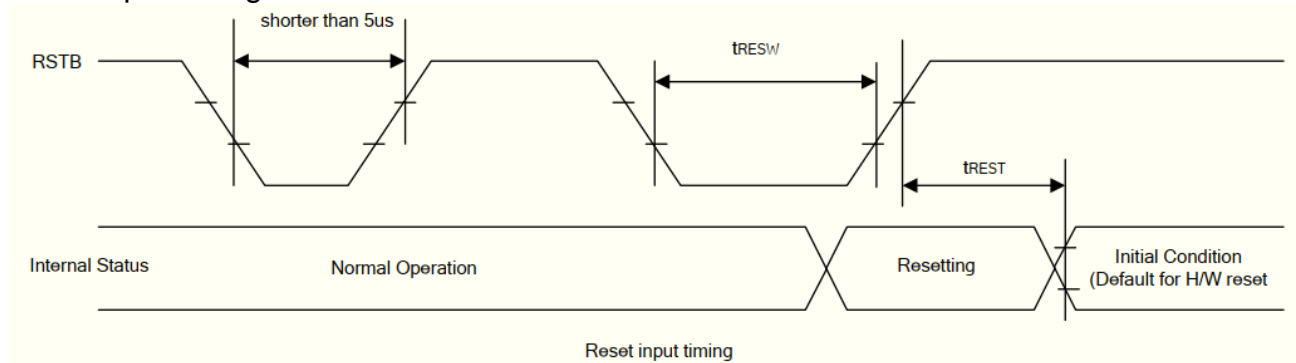
Bus Turnaround (BAT) from MPU to display module Timing
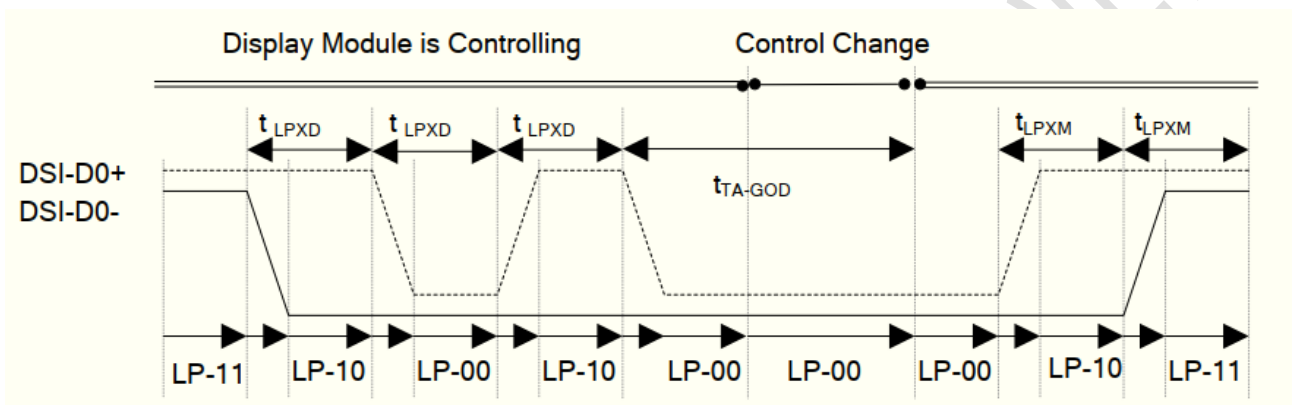
Bus Turnaround (BAT) from display module to MPU Timing

5.2 Display RESET Timing Characteristics
Reset input timing:

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

Note 1: Spike due to an electrostatic discharge on RSTB line does not cause irregular system Reset according to the table below

RSTB Pulse	Action
Shorter than 5µs	Reset Rejected
Longer than 10µs	Reset
Between 5µs and 10µs	Reset Start

Note 2: During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In– mode) and then return to Defaultcondition for H/W Reset.

Note 3: During Reset Complete Time, values in OTP memory will be latched to internal register during this period. This loading is doneevery time when there is H/W Reset complete time (tREST) within 5ms after a rising edge of RSTB.

Note 4: Spike Rejection also applies during a valid Reset pulse as shown below:
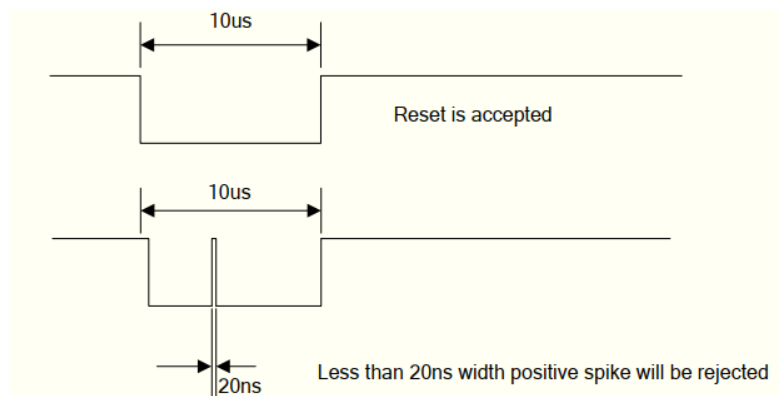
Note 5: It is necessary to wait 5msec after releasing RSTB before sending commands. Also Sleep Out command cannot be sent for 120msec

6 Recommended Operating Sequence

6.1 Display Power on / off Sequence

During power off, if AMOLED is in the Sleep Out mode, VCI / VDDIO (VDDR, VDDAM) must be powered down minimum 120msec after RSTB has been released. During power off, if AMOLED is in the Sleep In mode, VCI / VDDIO (VDDR, VDDAM) can be powered down minimum 0msec after RSTB has been released.

Notes:

1. There will be no damage to the display module if the power sequences are notmet.

2. There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

3. There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

4. If RSTB line is not held stable by host during Power On Sequence as defined in section "power Level Mode", then it will be necessary to apply a Hardware Reset (RSTB) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

5. There is not a limit for Rise/Fall time on VCI / VDDIO (VDDR, VDDAM).

6. The display module can also initialize and calibrate DSI-CLK+/- and DSI-D0+/- lanes within 10ms after LP-11 (Clock and Data Channels), VCI / VDDIO (VDDR, VDDAM) are applied and H/W Reset is not active (5ms is as same as the Reset Cancel Time).

6.1.1 Power On Sequence

7.1.1 Power on sequence

The Power on sequence has been appliedfollowing Fig1, otherwise correct functionality is not guaranteed.
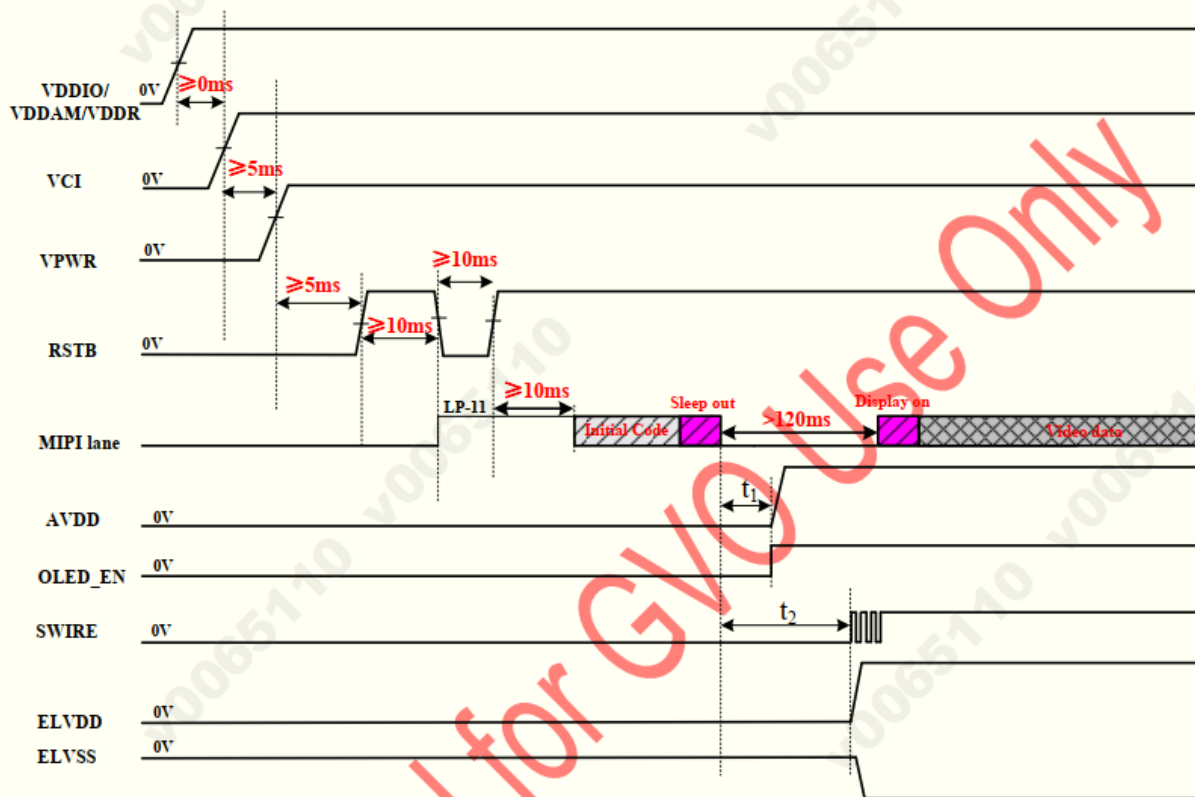
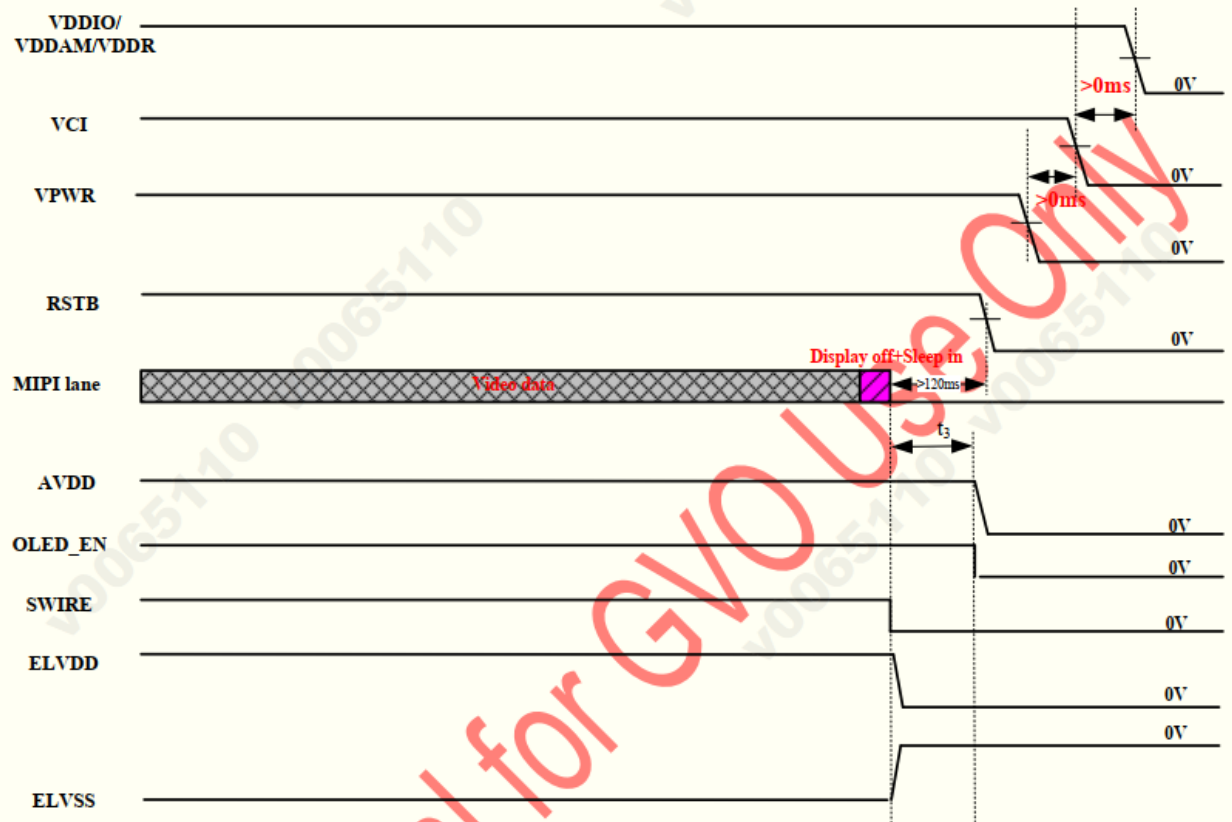Note1: t1 is AVDD set up time, is controlled by AVDD_ONT[7:0];
Note2: t2 is ELVDD/ELVSS set up time, is controlled by SWIRE_ONF[5:0];

Note3: VPWR is the power of Power IC for AVDD/ELVDD/ELVSS;

6.1.2 Power Off Sequence

7.1.2 Power off sequence

The Power off sequence have been appliedfollowing Fig2, otherwise correct functionality is not guaranteed.

Note1: t_3 is Power off Delay time, is controlled by AVDD_OFT[7:0];
Note2: VPWR is the power of Power IC for AVDD/ELVDD/ELVSS;

7 Touch Specification

7.1 General Specifications

NO	ITEM	SPEC	REMARK
1	Accuracy @D7mm Finger(mm)	center≤1.0mm border≤1.5mm	
2	Linearity @ D7mm Finger(mm)	center≤1.0mm border≤1.5mm	
3	Jitter @D7mm Finger(mm)	All≤1.0mm	
4	Sensitivity @D7mm Finger(mm)	w/o line broken	
5	Report rate	Typ：120Hz Max：240Hz	
6	Touch Point	Max 10 Fingers	

7.2 Electrical Characteristics

7.2.1 Maximum Ratings

Item	Symbol	MIN	MAX	Unit
TP power supply Input	TSP_AVDD	2.7	3.6	V
TP power supply for logic circuits	TSP_VDDIO	1.7	3.6	V

7.2.2 Power supply DC characteristics

Item	Symbol	MIN	TYP	MAX	Unit
TP power supply Input	TSP_AVDD	2.8	2.8/3.0/3.3	3.6	V
TP power supply for logic circuits	TSP_VDDIO	1.7	1.8/TSP_AVDD	3.6	V

7.3 TP FPC Pin Assignment

No	Symbol	I/O	Description
1	GND	GND	Ground
2	TSP_AVDD	Power	Analog Power for Touch Panel
3	TSP_IOVCC	Power	Digital Power for Touch Panel
4	TSP_INT	O	Interrupt signal for Touch Panel
5	TSP_SDA	I/O	SDA pin for Touch Panel
6	TSP_SCL	I	SCL pin for Touch Panel
7	TSP_RESET	I	Reset Pin for Touch Panel
8	GND	GND	Ground

7.4 Touch Design

Item		Description	Notes
Touch Design	Sensor structure	Oncell	
	Sensor pitch	Tx: 3.856mm，Rx:3.96mm	
	Sensor pattern	Diamond	
	CH Number	17(Tx) / 19(Rx)	
	Trace mode	1T1R	

7.5 TOUCH FPCB Schematic
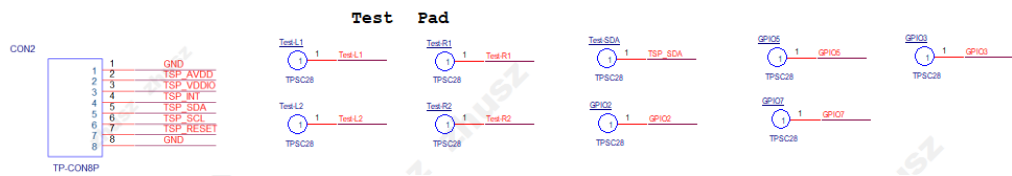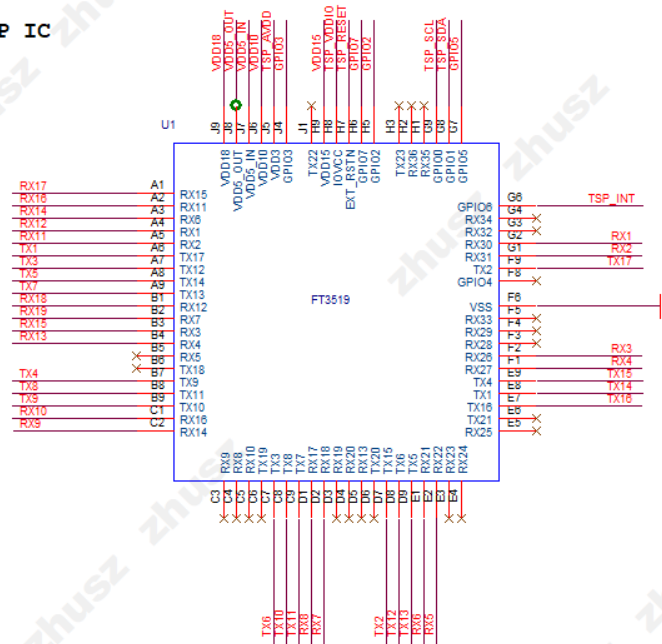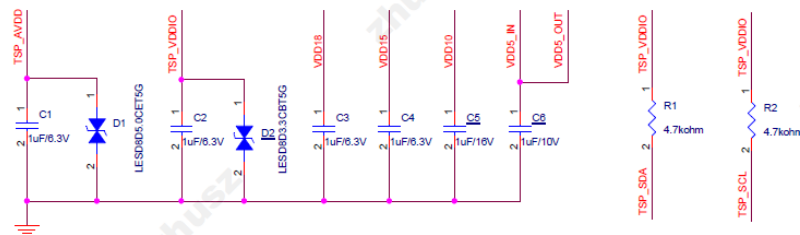
7.6 TSP FPC Electronic Part List

Item	Reference	Specification
1	C1 C2 C3 C4	1uF/6.3V/0402
2	C5	1uF/16V/0402
3	C6	1uF/10V/0402
4	D1	Bi-directional /5V/0402
5	D2	Bi-directional /3.3V/0402
6	R1 R2	4.7KΩ/0402
7	U1	Touch IC ,FT3519

8 Optical Characteristics Optical Specification

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
Luminance		L		450	500	550	Cd/m^2	
Chromaticity	white	x		(0.279)	(0.299)	(0.319)		
		y		(0.2952)	(0.3152)	(0.3352)		
	Red	x		(0.650)	(0.680)	(0.710)		
		y		(0.285)	(0.315)	(0.345)		
	Green	x		(0.200)	(0.240)	(0.280)		
		y		(0.670)	(0.710)	(0.750)		
	Blue	x		(0.1133)	(0.143)	(0.173)		
		y		(0.016)	(0.046)	(0.076)		

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.
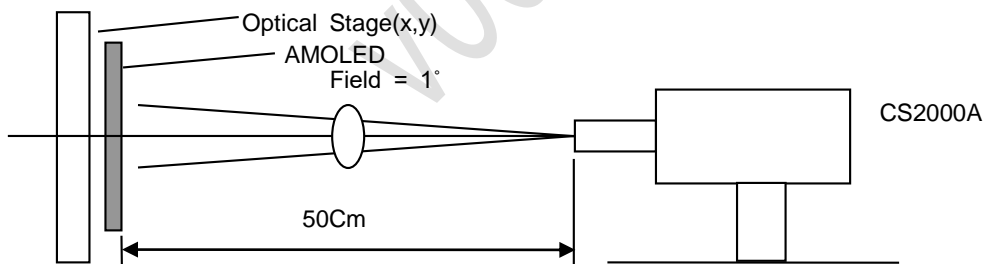
Note 2: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of AMOLED.
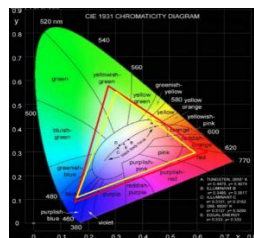
9 Environmental / Reliability Test

No	Test Item	Condition	Remark
1	High Temperature Operation	+70℃, 120hrs	IEC60068-2-2,GB2423.2
2	Low Temperature Operation	-20℃, 120hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage	+80℃, 120hrs	IEC60068-2-2 GB2423.2
4	Low Temperature Storage	-40℃, 120hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Operation	60℃, 90% RH,120hrs	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

Note：Product reliability items in the form of GK are used as reference items. The test results shall refer to the results of the reliability test of TPS standards.

10 Quality Level

10.1 AMOLED Module of Characteristic Inspection

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

11.1.1 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.

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

11.1.3 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.

11.1.4 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.

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

11.1.6 Inspection tools:

11.1.6.1 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)
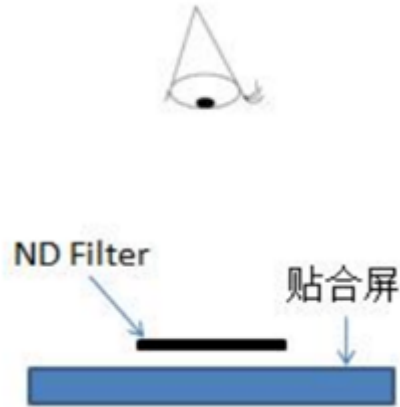
11.1.6.2 Point gauge (point gauge in the figure below is recommended), determination method: as shown in the figure, the point gauge film can cover is pass, and the point gauge film can not cover is Fail。 For example, a maximum of 0.2mm same-color spot defect is allowed on the Class A surface, and the pass that can be covered by 0.2mm on the film，The one that can be covered is Fail.

Imperfections of various shapes   Inspection Dot

Pass: Imperfection is smaller than the inspection dot

Fail: Imperfection is larger than the inspection dot

11.1.6.3 Microscopic examination: use 20-50 times adjustable microscope and 10-30 times test eyepiece.
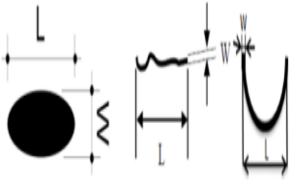
11.1.6.4 Digital caliper: resolution 0.01mm.
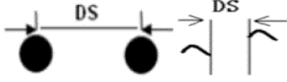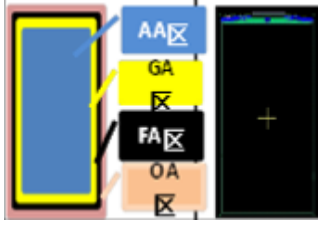
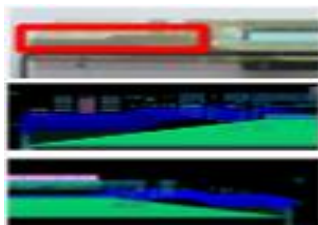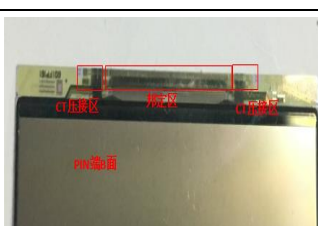**11.1.6.5** Projector: anime microscope, 3D projector.

11.1.6.6 Judgment description

11.1.6.6.1 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.

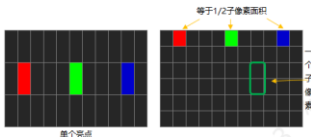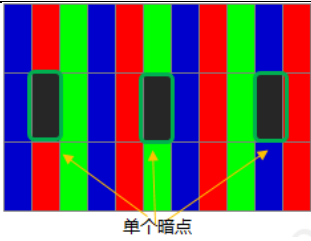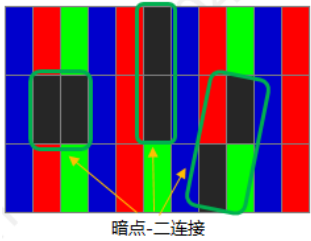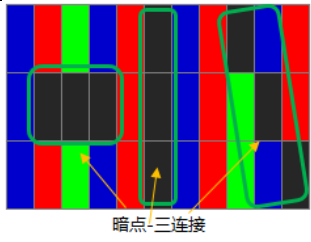11.1.6.6.2 In addition to the tools used above, if additional inspection tools are needed to assist the judgment, they can only be carried out after the coordination of both parties.
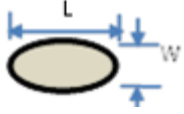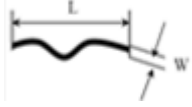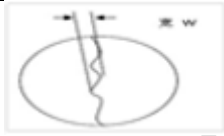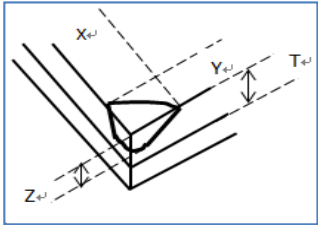
11.1.6.6.3 Bad code and definition

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;
W	Width (mm)		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.
S	Area (mm2)	-	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.

		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:
Dirty	-	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.

10.2 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.

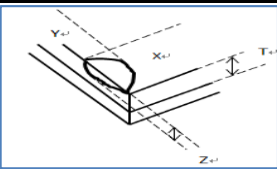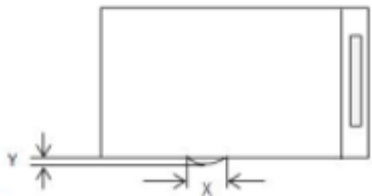| Defect Type	Sampling Procedures	AQL
Critical Defect (CR)	Take the normal inspection solution of the sampling plan of GB/T2828.1-2012 Inspection level Ⅱ	0.065
Major Defect (MA)	Take the normal inspection solution of the sampling plan of GB/T2828.1-2012 Inspection level Ⅱ	0.65
Minor Defect (MI)	Take the normal inspection solution of the sampling plan of GB/T2828.1-2012 Inspection level Ⅱ	1.0

10.3 Telecommunications Inspection Item

category	NO.	Inspection items	Inspection specification	test mode	defect type
	1	Display exception	not allow	visual	CR

Poor function	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 ≤ 10; 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 4%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 4% 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 4% 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 4% 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	4% 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 4% 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 4% 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 4% 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 4% 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 4% 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

10.4 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

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

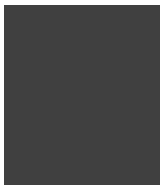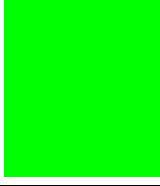|		area/Blind hole area			
22	Blind hole color bias(same color)	Camera hole area/Blind hole area	Functional requirements such as transmittance and PV value are met,not control appearance	Visual inspection	MI
23	Protective film scratch	Whole area	No control under no hurt boby	Visual inspection	MI
24	Protective 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≤3 or 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	Visual inspection	MI

			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; | | |
| 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. 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.	visual	-
43	Boundary dimension NG	Other	It is not allowed to exceed the dimensional tolerance required by the specifications and drawings	Calipers, measuring instruments	-

10.5 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.

Tailorpixels

11 Mechanical Drawing

12 Precautions for Use of AMOLED Modules

12.1 Handling Precautions:

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

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

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

12.1.4 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.

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

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

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

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

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

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

12.1.11 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.

12.2 Storage Precautions:

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

12.2.2 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%

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

12.3 Transportation Precautions:

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