Osptek Display

AMOLED SPECIFICATION

Model No:

AM160Q480480LK

REVISION RECORD

REV NO. 版 本	CONTENTS 内 容	REVISION ITEM 修改项目	REV DATE 日 期
V1.0	First release	Preliminary	2024-10-12

CONTENTS

1. GENERAL SPECIFICATIONS(主要特征描述)

Item 项目	Contents 内容	Unit 单位
Display Type 显示类型	16.7M LTPS	AMOLED
Diagonal Length 尺寸	1.60	Inch
Recommended Viewing Direction 推荐使用方向	ALL	O’ Clock
Dot arrangement 点阵	480*3(R.G.B)*480	Dot
Assembly size (W*H*T) 总成尺寸（宽*高*厚）	43.15*43.45*2.65	mm^3
Module size (W*H*T) 模块外围尺寸（宽*高*厚）	41.52*41.54*0.800	mm^3
Viewing area (W*H) 可视区域（宽*高）	39.32*39.32	mm^2
Active area (W*H) 有效显示区域（宽*高）	39.12*39.12	mm^2
Pixel size (W*H) 像素大小（宽*高）	0.1335*0.1335	mm^2
Display Driver IC 显示驱动芯片	CH13613	
Power IC 电源芯片	BV6810AW	
Interface Type 接口类型	QSPI	

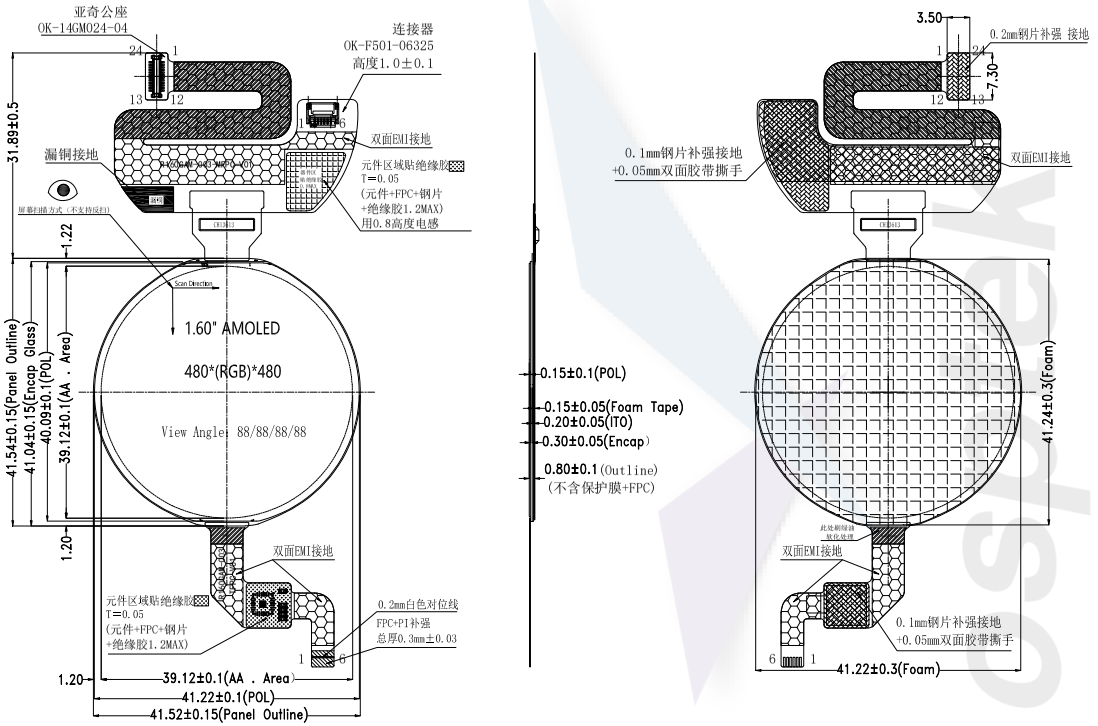
2. EXTERNAL DIMENSIONS(外形尺寸)

有害物质管理标准
■ 欧盟RoHS环保指令
□ 欧盟RoHS环保指令+无卤素要求
□ _____有害物质管理标准 第____版

REV	Date	Description
V01	20241012	NEW

注意屏幕的扫描方式

正视图 侧视图 背视图



Specification:
1). Display mode: 1.60" 480*480 16.7M Colors AMOLED;
2). Viewing angle: L88/R88/T88/B88 (Min);
3). Operating temp.: -20°C~+60°C;
Storage temp.: -30°C~+70°C;
4). IC: CH13613-11023(Display);CHSC6417(Touch);BV6810AW(Power);
5). Interface: QSPI; Brightness: 800CD/M^2(Type); Gamma 2.5&2.2(Options);
6). General Tolerance:±0.20.
7). Rohs Compliancy.
8). Recommended Case Open Area should be less than Module V.A;

共用物料

TP IO电压3.3V

TP定义

1	CTP_VDD
2	CTP_RST
3	CTP_SCL
4	CTP_SDA
5	CTP_INT
6	GND

QSPI

NO.	SYMBOL
1	CTP_VDD3.3V
2	CTP_INT
3	CTP_SDA
4	CTP_SCL
5	CTP_RST
6	GND
7	LCD_CS
8	QSPI_SIO0
9	QSPI_SIO3
10	GND
11	QSPI_CLK
12	GND
13	QSPI_SIO1
14	QSPI_SIO2
15	LCD_RST
16	LCD_TE
17	NC/MTP
18	GND
19	LCD_VDDIO3.3V
20	LCD_VDD_3.3V
21	NC
22	NC
23	VCI_EN
24	NC

QSPI

MATERIAL	FINISH	CRITICAL DIMENSION / SPEC DIMENSION	深圳市鱼鹰光电科技有限公司 Shenzhen Osprey Optoelectronics Technology Co., Ltd.				
APPROVED			TITLE: AMOLED	SIZE	UNIT	SHEET NUMBER	REVISION
CHECKED			PRO NO.: AM160Q480480LK	A4	mm	1 of 1	1
DESIGNED	WCP	20241012	DWG NO.:	3rd ANGLE		SCALE: 1:1	

ASSEMBLY SIZE(总成尺寸)

有害物质管理标准
■ 欧盟RoHS环保指令
□ 欧盟RoHS环保指令+无卤素要求
□ _____有害物质管理标准 第___版

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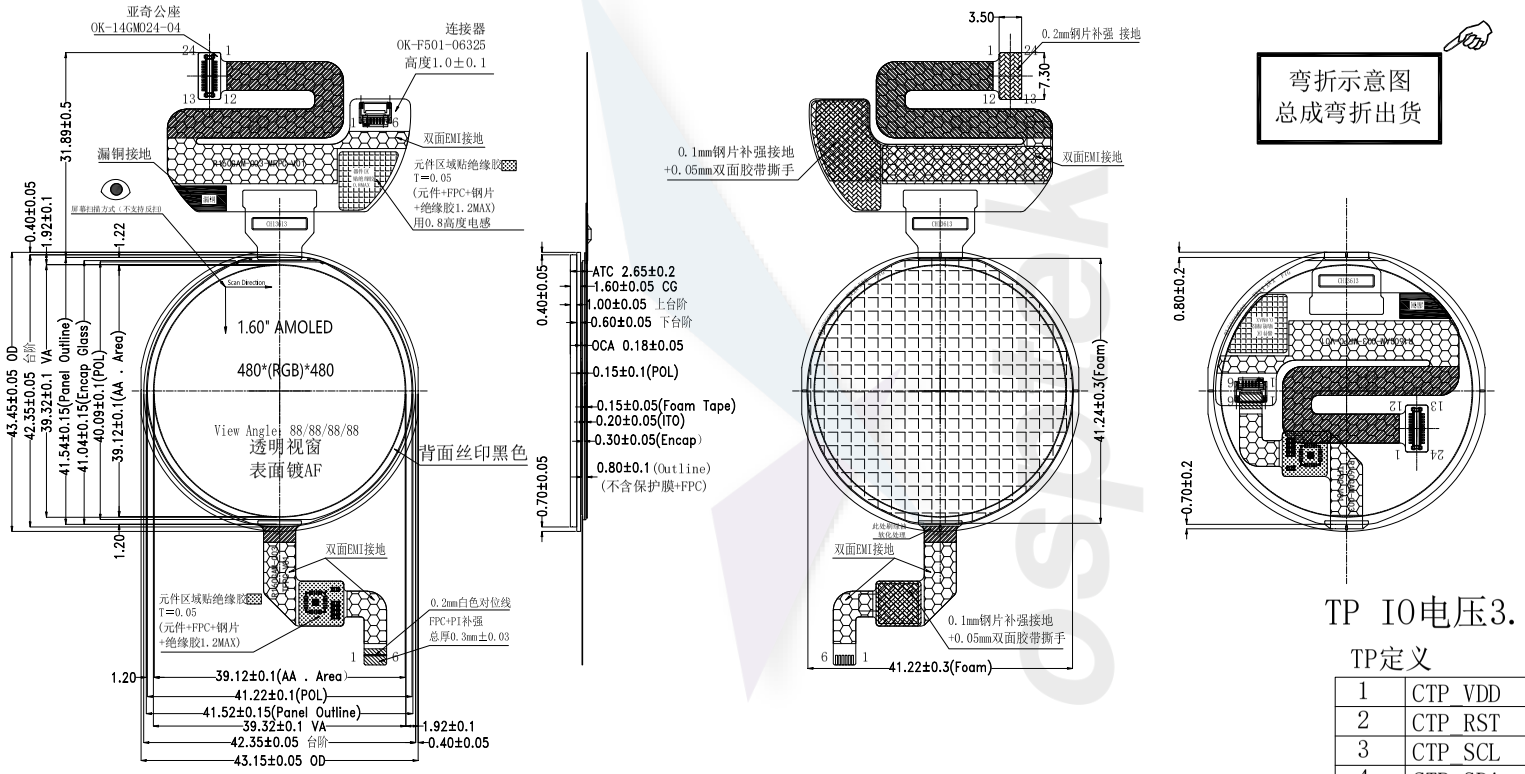
注意屏幕的扫描方式

正视图 侧视图 背视图



弯折示意图
总成弯折出货

TP IO电压3.3V

TP定义

1	CTP_VDD
2	CTP_RST
3	CTP_SCL
4	CTP_SDA
5	CTP_INT
6	GND

QSPI

NO.	SYMBOL
1	CTP_VDD3.3V
2	CTP_INT
3	CTP_SDA
4	CTP_SCL
5	CTP_RST
6	GND
7	LCD_CS
8	QSPI_SIO0
9	QSPI_SIO3
10	GND
11	QSPI_CLK
12	GND
13	QSPI_SIO1
14	QSPI_SIO2
15	LCD_RST
16	LCD_TE
17	NC/MTP
18	GND
19	LCD_VDDIO3.3V
20	LCD_VDD 3.3V
21	NC
22	NC
23	VCI_EN
24	NC

Specification:
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共用物料

MATERIAL	FINISH	CRITICAL DIMENSION / SPEC DIMENSION	QSPI					
APPROVED			TITLE:	AMOLED	SIZE	UNIT	SHEET NUMBER	REVISION
CHECKED			PRO NO.:		A4	mm	1 of 1	1
DESIGNED	WCP	20241012	DWG NO.:		3rd ANGLE		SCALE: 1:1	

3. ABSOLUTE MAXIMUM RATINGS(极限参数)

Parameter	Symbol	Spec			Unit	Note
		Min.	Typ.	Max.		
Analog/boost power voltage	VCI	-0.3	-	5.5	V	-
I/O voltage	VDDIO	-0.3	-	5.5	V	-
Operating temperature	Top	-20	-	70	℃	-
Storage temperature	Tstg	-40	-	80	℃	-

4. ELECTRICAL CHARACTERISTICS(模块电气特性)

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Power supply	VDDIO	1.7	1.8	1.95	V	Ref
Analog Power supply	VBAT	2.7	3.7	4.8	V	Ref

1) Normal Mode

Power Supply :BV6802, VBAT=3.7, VDDIO=1.8V, ELVDD=4.6V, ELVSS=-2.4V

Frame Frequency: 60Hz

Display Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
100% Pixel On 500nits	Normal mode		/		mW	Ref

2) Idle mode

Power Supply DDIC SH8501A VBAT=3.7, VDDIO=1.8V, ELVDD=4.6V, ELVSS=-2.4V

Frame Frequency: 15Hz

Display Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
10% Pixel On 50nits	Idle mode		/		mW	Ref

3) Deep Standby Mode

Display Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
All Pixel Off,0nits/ Vci off/Vddio on	Standby mode			200	μA	Ref

4) HBM

Power Supply : BV6802, VBAT=3.7, VDDIO=1.8V, ELVDD=4.6V, ELVSS=-3V

Frame Frequency:60Hz

Display Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
100% Pixel On 1000 nits	Power		/		mW	Ref

5.

4.1 Display Driver IC

CH13613-11023 (Refer to the IC datasheet).

6. BACKLIGHT SPECIFICATION(背光电气特性)…… NULL

7. ELECTRO-OPTICAL CHARACTERISTICS(光电参数)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Surface Luminance	Lv	θ=0° ∅=0° Ta=25℃		800		cd/m2	Note1
Luminance uniformity	δ WHITE		85	-	-	%	Note2
Contrast Ratio	Cr		-	100000:1	-	-	Note3
Viewing Angle	θ	Up/Down/ Right/Left Cr≥10	85	-	-	deg	Note4
Color Coordinate of CIE1931	Red x	θ=0° ∅=0° Ta=25℃.		TBD		-	Note 5
	Red y			TBD			
	Green x			TBD			
	Green y			TBD			
	Blue x			TBD			
	Blue y			TBD			
	White x		0.270	0.290	0.310		
	White y		0.290	0.310	0.330		
NTSC ratio	-	-	97	108	-	%	CIE1931
Life Time	T95	25℃	200	-	-	hours	-

8.INTERFACE DESCRIPTION(接口定义描述)

Pin No. Pin脚	Symbol 符 号	I/O 输入/出	Description 描 述	Memo 备注
1	CTP_VDD 3.3V	P	Power supply for CTP internal Analog	
2	CTP_INT	I	CTP Driver I2C interrupt output pin	
3	CTP_SDA	IO	CTP Driver I2C data pin	
4	CTP_SCL	I	CTP Driver I2C clock pin	
5	CTP_RST	I	CTP Driver hardware reset pin	
6	GND	P	Ground	
7	LCD_CS	I	Chip selection pin	
8	QSPI_SIO0	IO	QSPI data pin 初始化	
9	QSPI_SIO3	I	QSPI data pin	
10	GND	P	Ground	
11	QSPI_CLK	I	QSPI clock pin	
12	GND	P	Ground	
13	QSPI_SIO1	I	QSPI data pin	
14	QSPI_SIO2	I	QSPI data pin	
15	LCD_RST	I	AMOLED Reset signal pin	
16	LCD_TE	O	Tearing effect output pin ; Enable Cmd:0x35 data:0x00	
17	NC/MTP	/	NC	
18	GND	P	Ground	
19	LCD_VDDIO 3.3V	P	Power Supply for I/O System.	
20	LCD_VDD 3.3V	P	Power supply for LCM internal Analog	
21-22	NC	/	NC	
23	VCI_EN	P	VCI Enable Input Voltage 1.8V/3.3V (Power IC Enable pin)	
24	NC	/	NC	

9.TIMING CHARACTERIST（时序特征）

3.3.1 Power On/Off Sequence

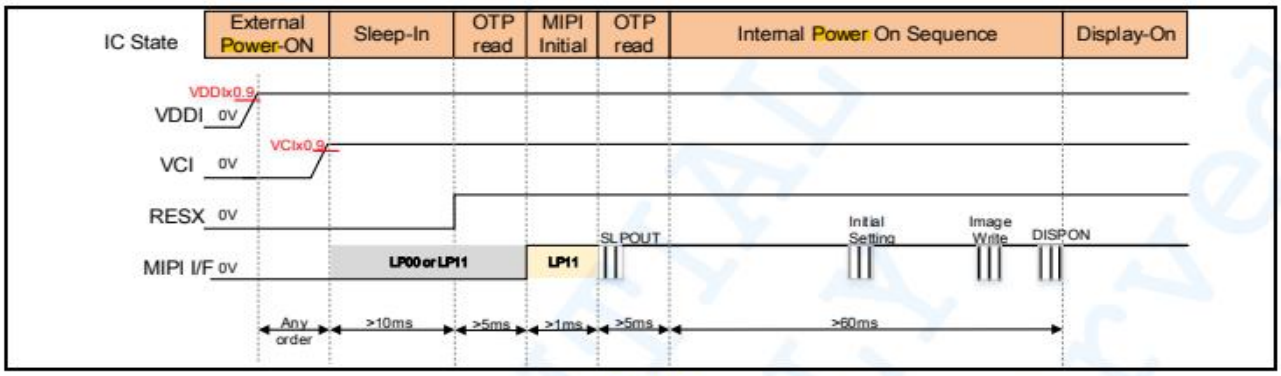
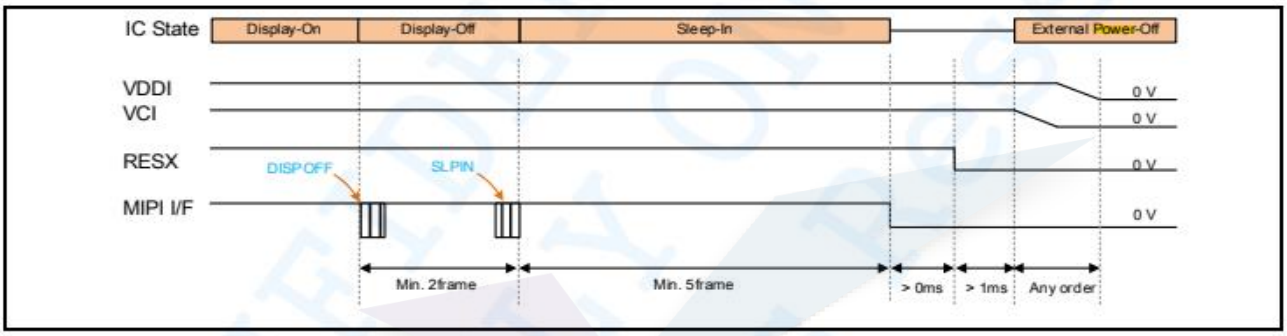
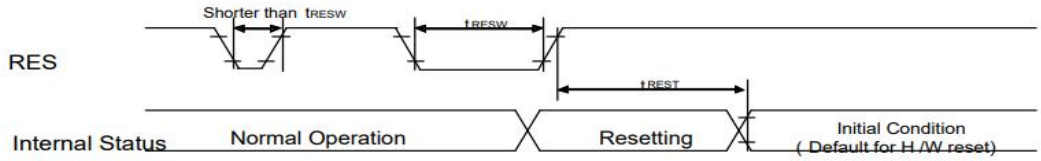


Figure 15 Power-On Sequence



Characteristic	Symbol		Specification		Unit
			Min.	Max.	
Chip select setup time	CSX	t_{cssq}	10	–	ns
Chip select hold time		t_{cshq}	10	–	ns
Chip select "High" pulse width		t_{chwq}	20	–	ns
Write cycle time	SCL (Write)	t_{wcq}	20	–	ns
SCL "High" period (Write)		t_{wrhq}	10	–	ns
SCL "Low" period (Write)		t_{wrlq}	10	–	ns
Read cycle time	SCL (Read)	t_{rcq}	100	–	ns
SCL "High" period (Read)		t_{rdhq}	50	–	ns
SCL "Low" period (Read)		t_{rdlq}	50	–	ns
Data setup time	SDI	t_{dsq}	10	–	ns
Data hold time		t_{dhq}	10	–	ns
Access time	SDO	t_{accq}	-	40	ns
Output disable time		t_{odq}	20	–	ns
Rise/Fall time	-	t_r/t_f	–	1	ns

10.Reset timing



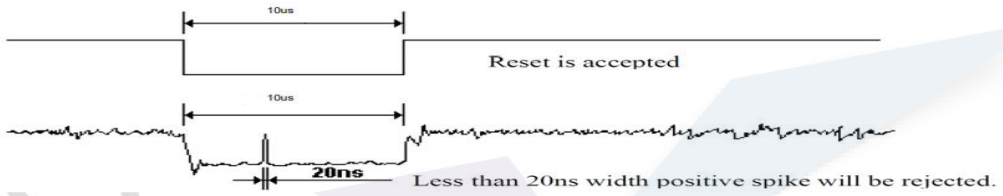
Reset input timing:
VDDI=1.65 to 1.95V, VDD=2.7 to 3.6V, AGND=DGND=0V, Ta=-40 to 85℃

Symbol	Parameter	Related Pins	MIN	TYP	MAX	Note	Unit
t_{RESW}	*1) Reset low pulse width	RESX	10	-	-	-	μs
t_{REST}	*2) Reset complete time	-	-	-	10	When reset applied during Sleep in mode	ms
		-		-	120	When reset applied during Sleep out mode	ms

Note 1) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5μs	Reset Rejected
Longer than 10μs	Reset
Between 5μs and 10μs	Reset starts (It depends on voltage and temperature condition.)

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 Default condition for H/W reset.
Note 3. During Reset Complete Time, data in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 10ms after a rising edge of RESX.
Note 4. Spike Rejection also applies during a valid reset pulse as shown below:



Note 5. It is necessary to wait 10msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

11.ELIABILITY TEST CONDITIONS(可靠性实验条件)

NO. 序号	**Test Item** 实验	Test Condition 实验条件	Inspection after test 判定标准
1	High Temperature Storage	80±2°C,240 hrs	Inspection after 2~4 hours storage at room temperature, the sample shall be free from defects. (试验结束后须正常室温存放2~4个小时之后才能测试判定，不允许有以下缺 陷) 1. Air bubble in the LCD（模块中有气泡）; 2. Seal leak（漏液）; 3. Non-display（不显示）; 4. Missing segments(漏笔); 5. Glass crack（玻璃破碎）; 6. Current IDD is twice higher than initial value（电流 Idd 大于初时值的 2倍）; 7. The surface damage（表面损伤） 8. Do not meet the electrical characteristics（不满足模块电气性能）
2	Low Temperature Storage 低温	-40±2°C,240 hrs	
3	High Temperature Operating 高温操作	70±2°C,240 hrs	
4	Low Temperature Operating 低温操作	-20±2°C,240 hrs	
5	Damp proof Test Storage 高温高湿	60±2°C,90%RH,240 hrs	
6	Temperature Cycle Storage 冷热循环	-40°C ∽ +80°C dwell time=0.5hrs 100 Cycles.	
7	Vibration Test 振荡试验	Frequency(频率):10HZ-55Hz ，Amplitude（振幅）:1.5mm ， x,y,z every direction for 1 hour (Packing condition) （包装状态，X,Y,Z 每个方向各 1 小时）	

8	Dropping Test 跌落 试验	Drop to the ground from 1M height, one time, every side of carton (Packing condition) (包装状态，一米高度,6面各一次)	
9	ESD Test 静电 测试	Voltage:8KV; Air discharge(空气放电),10 times Voltage:4KV; (C:150pf; R:330Ω;) Connet discharge(接触放电),10 times	

Remark（备注）:

1. The samples should be applied to only on test item(每个被测试样品只能用于其中的一个测试项目);
2. Sample size for each teat item is 5~10 pcs(每个测试项目的样品数量为 5~10 片);
3. For Damp Proof Test, Pure water(Resistance>10M Ω)should be used（对于防潮试验，试验箱的用水必须是电阻大于 10M 欧姆的纯水）;
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting ,it would be judged as a good part（如果由静电引起产品故障，当放置一段时间后能够恢复正常，则不视为产品缺陷）;
5. Failure Judgment Criterion: Basic Specification ,Electrical Characteristic, mechanical Characteristic, Optical Characteristic（故障判断标准：基本规格，电气特性，机械特性，光电特性）.

12.INSPECTION CRITERION(检查标准)(参考REX-BZ-001)

13.PRECAUTIONS FOR USING LCD MODULES(使用注意事项)

13.1.1 As glass is fragile, It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact. (由于玻璃是脆的，使用过程请特别注意边缘区，防止跌落或振动，不能机械碰撞)。

13.1.2 Do not apply excessive force to the display surface or the adjoining are since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals(some cosmetics are determined to the polarizer) (请勿施加过大的压力于显示屏或连接部位，否则会引起色调变化。不要裸手接触显示屏，这将弄脏显示区和降低端子之间的绝缘能力。一些外观问题是由偏光片决定的)。

13.1.3 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizes with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on it. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming in to contact with room temperature air.(覆盖液晶显示模块显示平面的偏光片是软性且易被擦伤，请小心轻拿。请勿用任何硬度大于 HB 铅笔芯的物品（玻璃，镊子等） 接触、撞压或摩擦裸露偏光片不要放置或粘附物体在显示区域上以免留下痕迹。冷凝在表面和端子将会损坏或弄脏偏光片。产品在 低温下测试之后，与室温空气接触之前必须在容器内升温)

13.1.4 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents: Isopropyl alcohol; Ethyl alcohol . Do not scrub hard to avoid damaging the display surface(如果显示平面受污，可对平面吹热气且轻轻地用软性干布擦除。如果受污严重，用含下列一种溶剂的湿布擦除:甘油, 酒精 。请勿用力擦拭以免损坏显示平面。)

13.1.5 Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following: Water, Ketone, Aromatic solvents. Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contact with oil and fats. (除以上提到的溶剂外，其他溶剂可能会损坏偏光片，特别要避免使用以下溶剂： 水, 丙酮，芳烃溶剂。立即擦掉唾液或水滴，长时间与水接触会引起变形或褪色。避免接触油和油脂)

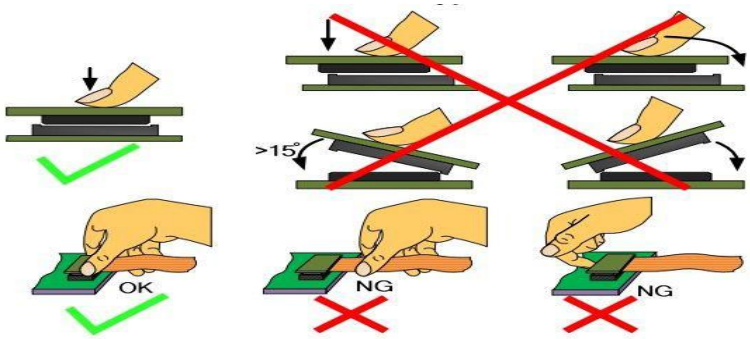
13.1.6 Do not attempt to disassemble or process the LCD module. （请勿拆卸液晶显示模块）

13.1.7 Electro-Static Discharge Control, Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.（由于液晶显示模块使用CMOS 集成电路，要特别注意静电放电问题。对CMOS器件，要特别注意静电。为防止静电损坏，注意保持合宜的工作环境）

13.1.8 Input logic voltage before apply analog high voltage such as LCD driving voltage when power on. Remove analog high voltage before logic voltage when power off the module. Input each signal after the positive/negative voltage becomes stable. （开机时，先让逻辑电压，再接通模拟高压， 如显示屏驱动电压。关机时，先断开模拟高压，再关逻辑电压。正负电源都稳定后再送控制信号。）

13.1.9 In the use of connector products, the operating process of attention to turn off the power before pull off and insert action. To avoid damage to the module (在使用连接器的产品时，插接过程注意先关闭电源再进行拔插动作，避免损坏模块)

13.1.10 Precaution for assemble the module with BTB connector:Please note the position of the male and female connector position, don't assemble or assemble like the method which the following picture shows
（用板对板连接器安装液晶显示模块注意事项：请注意连接器的公母及连接位置，请勿出现下图所示的错误连接方式）



13.2 Storage Modules 储存

13.2.1 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0° C and 35° C, and keep the relative humidity between 40%RH and 60%RH. （避光保存，避免直接暴露在太阳光或黄光灯下，保持温度在 0~35 摄氏度之间,保持相对湿度在 40%RH 和 60%RH 之间。）

13.2.2 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped). （偏光片表面避免接触其他物质，建议存放在货运防静电包装中）

13.3 Soldering

13.3.1 Iron head temperature（铬铁头实际温度）: 350±10℃, Soldering time（焊接时间）: <3-4S. Soldering don't repeat above 3 times（焊接次数勿超过 3 次）

13.3.2 If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation (This does not apply in the of a non-halogen type of flux). It is recommended that you protect the LCD surface case with a cover during soldering to prevent any damage due to flux spatters. （如果使用助焊剂，完成焊接后一定要清除剩余的助焊剂（除非卤化物助焊剂）。建议焊接时用盖子保护显示屏面以避免因焊剂油溅出造成的任何损坏。）

14. PRIOR CONSULT MATTER (提前商议事项)

14.1 For OSP electronics standard products, we keep the right to change material, process ... for improving the product property without prior notice to our customer.
（对于鱼鹰電子的标准模块产品，我们保留在不通知客户的情况下,为提高产品性能而改变原材料及加工方法等的权利。 ）

14.2 If you have special requirement about reliability condition, please let us know before you start the design on our samples.
（如对可靠性条件有特殊要求，请在模块设计开发前通知我们。）