

深圳市鸿展光电有限公司

SHENZHEN Great Prospect Optoelectronics CO., LTD

APPROVAL SHEET

承认书

客户名称 Customer	
产品型号 Part NO.	HY013001
产品内容 Product type	Mode: Transmissive type .Normally black. TFT LCD Module LCD Module: Graphic 240RGB*240Dot-matrix
备注栏 Remarks	<input type="checkbox"/> APPROVAL FOR SEPCIFICATIONS ONLY <input checked="" type="checkbox"/> APPROVAL FOR SEPCIFICATIONS AND SAMPLE
客户确认签章 Signature by Customer:	

PREPARED BY	CHECKED BY	APPROVED BY

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1. General Description 总则

HY013001 is a 240*240 dots matrix a-TFT LCD module. It has a TFT panel composed of 720 sources and 240 gates. The LCM can be easily accessed by micro-controller

HY013001 是一个 240*240 点矩阵 a-tft 液晶模块。它有一个由 720 个源和 240 个门组成的 TFT 面板。通过微控制器

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可以方便地访问 LCM

2. Features 产品特点

Display Mode 显示方式	Transmissive a-TFT
Display Format 显示格式	Graphic 240RGB*240 Dot-matrix
Input Data 输入数据通道	MCU 8bit
Viewing Direction 视角方向	ALL VIEW (IPS)
Drive IC 驱动 IC	GC9A01

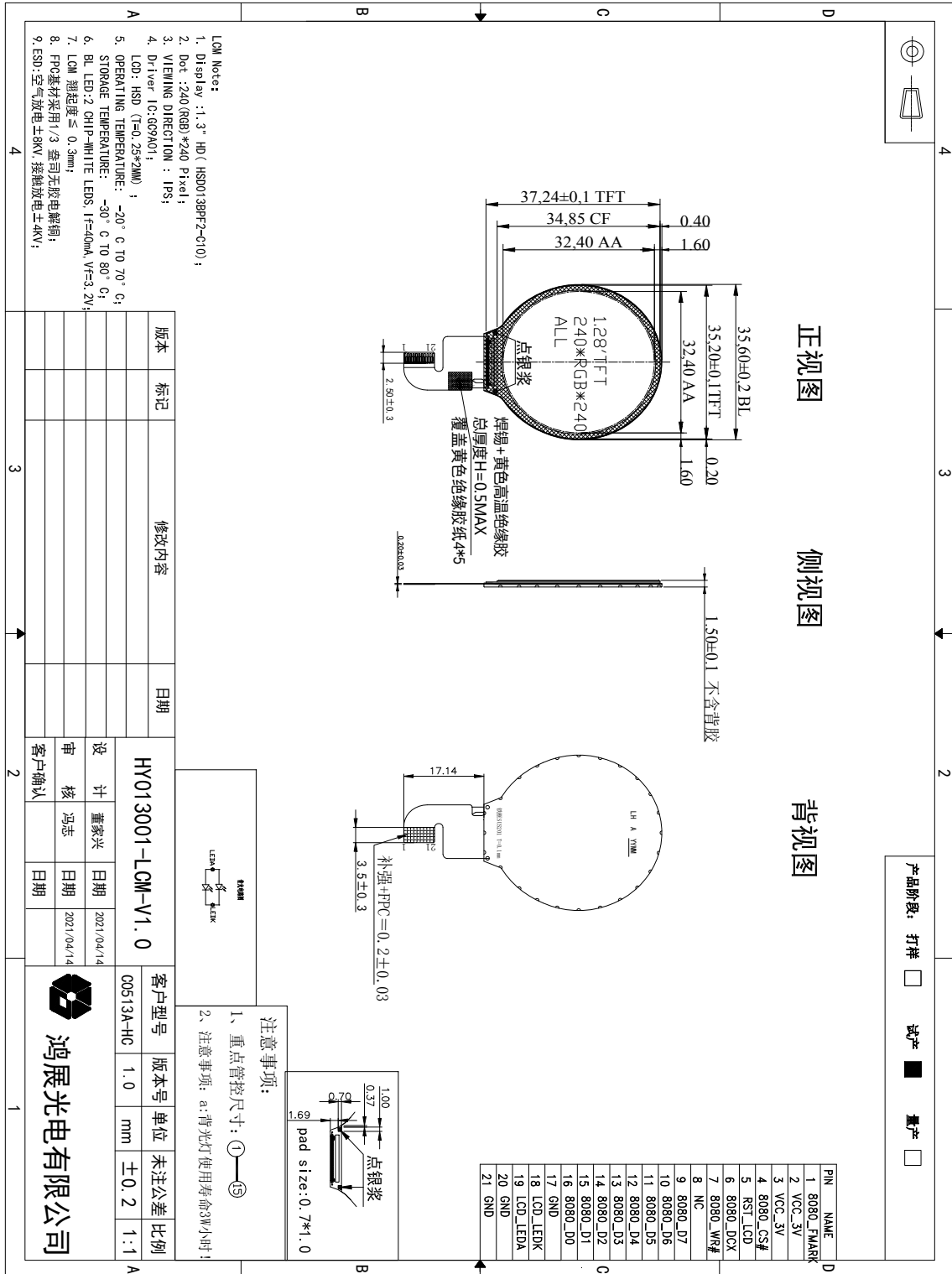
3. Mechanical Specification 产品规格

Item 项目	Specifications 规格	Unit 单位
Dimensional outline 外观尺寸	35.60(W)*37.74(H)*1.56(T) (FPC not include)	mm
Resolution 分辨率	240RGB*240	dots
LCD Active area 显示区域	Φ32.4	mm
Pixel size 像素	RGB Vertical Stripe	mm

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4.MechanicalDimens 外观尺寸工程图



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5. Maximum Ratings 最大额定值

Item 项目	Symbol 符号	Min 最小值	Max 最大值	Unit 单位	Note 注释
Supply voltage 供电电压	V	-	5.0	V	*1,*2
Operating temperature 工作温度	T _{op}	-20	70	°C	-
Storage temperature 储存温度	T _{STR}	-30	80	°C	-

6. Electrical Characteristics 电气参数

Item 项目	Symbol 符号	Condition 条件	Min. 最小值	Typ. 标准值	Max. 最大值	Unit 单位
Supply voltage 工作电压	Logic V _{CC}	-	1.65	1.8	3.3	V
Input Voltage 输入电压	H level T _{IH}	-	0.7*IOVCC	-	IOVCC	V
	L level T _{IL}		V _{SS}	-	0.2* IOVCC	

7. Backlight Characteristic 背光参数

Item 项目	Symbol 符号	Min 最小值	Typical 标准值	Max 最大值	Unit 单位
LED module Forward voltage 背光电压	V _{LED}	-	3.2	-	V
LED module current 背光电流	V _{LED}	-	20	-	mA
LCM Surface Luminance ★1 表面亮度	L _S	-	-	-	Cd/m ³
LCM Surface brightness uniform ★2 亮度均匀	L _D	-	-	-	%

★ 1 Test condition is 测试条件:

(a) Center point on active area 区域中心点.

(b) Best Contrast 对比测试.

★2 Uniform measure condition 统一的测量条件:

(1) Measure 9 point. Measure location show below 9点测量位置;

(2) Uniform=(Min. brightness /Max. brightness)*100% 均匀度

(3) Best Contrast.对比测试

8. Module Function Description 模块功能描述

8.1 Pin Descriptions MCU 8 位接口定义描述

1	TE	Tearing effect output pin	-
2	VCC	Interface power supply 3V	-
3	VCC	Interface power supply 3V	-
4	CS	Chip Select Pin CS	-
5	RESET	Reset Pin(For display driver)	-
6	DCX	Serves as command or parameter select	-
7	WRX	write signal and writes data at	-
8	NC	NC	-
9	D7	DB7	-
10	D6	DB6	-
11	D5	DB5	-
12	D4	DB4	-
13	D3	DB3	-
14	D2	DB2	-
15	D1	DB1	-
16	D0	DB0	-
17	GND	Power Ground	-
18	LEDK	Power supply for backlight cathode input terminal.	-
19	LEDA	Power supply for backlight anode input terminal.	-
20	GND	Power Ground	-
21	GND	Power Ground	-

8.2 Timing characteristics.

时间特征 Refer to IC datasheet 参考 IC 数据表

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9. Electro-optical Characteristics 光电参数

Item 项目	Symbol 符号		Conditions 条件	Temp 温度	Min. 最小值	Typ. 标准值	Max. 最大值	Unit 单位	Note 注释
Response Time 响应时间	T _R		θ = 0° φ = 0° If = 20mA /LED	25°C	-	10	15	msec	NOTE2
	T _F				-	20	25	-	
Contrast Ratio 对比度	CR				1000	1200	-	C-light t	NOTE1
LCMSurface Luminance LCM 亮度	LV				390	-	-		Cd/m ³
Viewing Angle Range 视角范围	Hor.	Θ21	CR > 10		-	85	-	degree	NOTE3
		Θ22			-	85	-		
	Ver	Θ11			-	85	-		
		Θ12			-	85	-		
Color Gamut 色饱和度	(%)				-	TBD	-	%	
Color Chromaticity (CIE1931) 色坐标	White	wx	θ = 0° φ = 0° Ta = 25°C		-	TBD	-	-	CF glass
		wy			-	TBD	-		
	Red	rx			-	TBD	-	-	
		ry			-	TBD	-		
	Green	gx			-	TBD	-	-	
		gy			-	TBD	-		
	Blue	bx			-	TBD	-	-	
		by			-	TBD	-		

The above "viewing angle" is the measuring position with the largest contrast ratio. Not for good image

以上所述视角为测量位置与最大的对比度

quality. Viewing direction for good image quality is 12 O'clock.

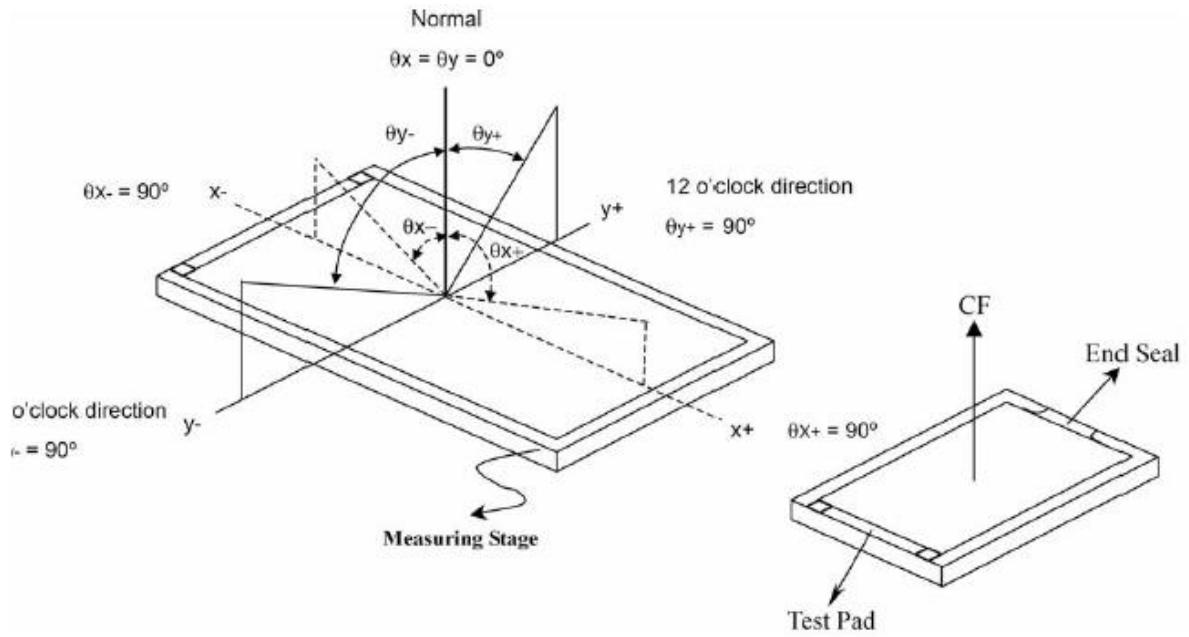
测量方向 12 点钟良好的图像质量

● For panel only 仅供面板

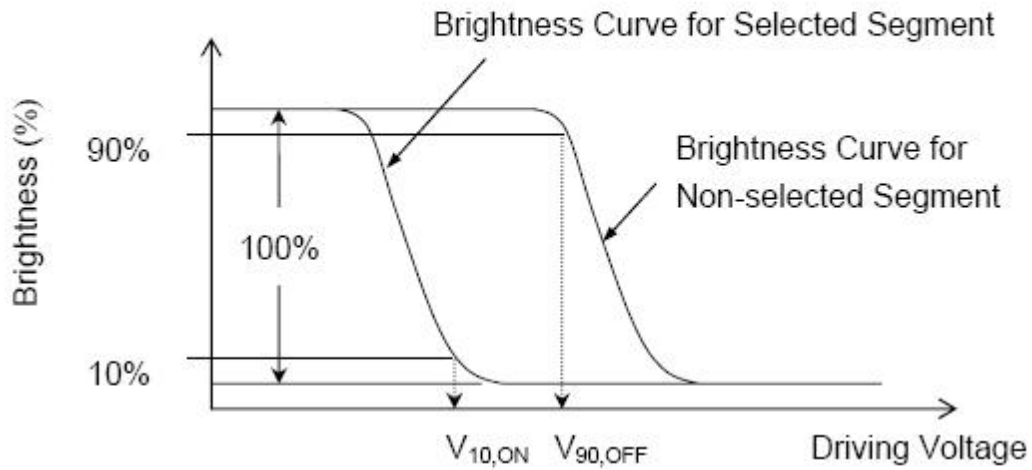
● Electro-Optical Characteristics Test Method 特性测试方法

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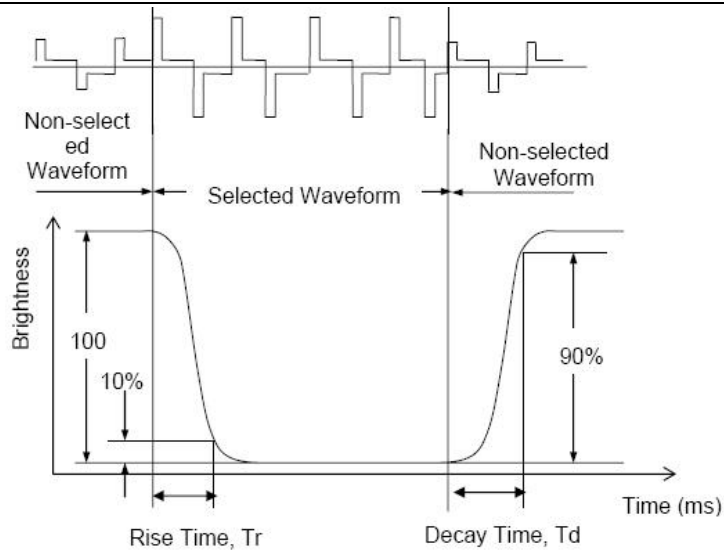
$$V_{op} = (V_{10,ON} + V_{90,OFF})/2$$



.Note2.Definition of Optical Response 光响应定义

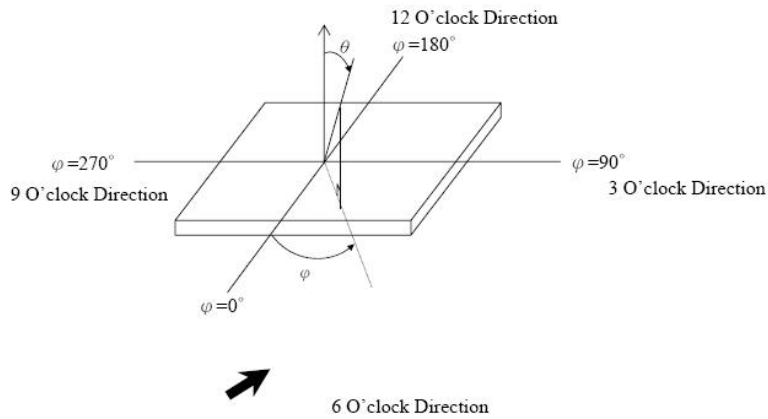
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Time:

.Note3. Definition of Viewing Angle θ and ϕ : 视场角 θ 和 ϕ 的定义:

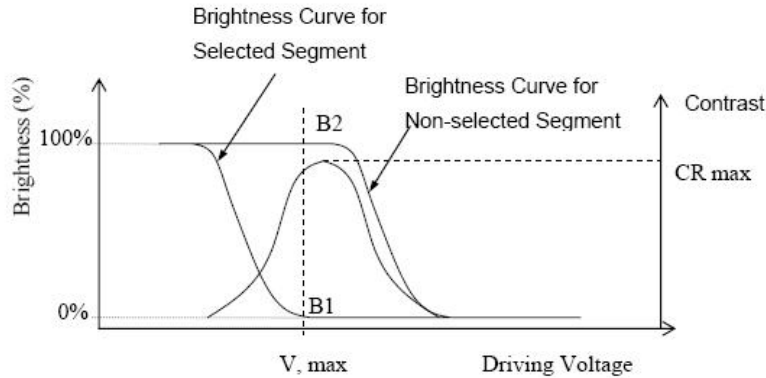


Note4. Definition of Contrast ratio (CR): 对比度 (CR) 的定义:

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$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



10. Reliability 可靠性试验

NO. 序号	Test Item 试验项目	Test Condition 试验条件	Inspection after test 试验标准
1	High Temperature Storage 高温存放	80 ± 2°C / 48 hours	Inspection after 2~4hours Storage at room temperature The sample shall be free From defects: 试验结束后, 已测试的 LCD 样品必需在室内正常环境下放置 2~4 小时以上才能进行功能与外观检查, 样品不允许有以下缺陷: 1. Air bubble in the LCD 模块中有气泡 2. Sealleak; 封口松脱 3. Non-display 不显示 4. Missing segments 漏笔 3. Glas crack 玻璃破碎 4. Cunent Idd is twice higher Than initial value. 电流 Idd 大于初时值的 2 倍
2	Low Temperature Storage 低温存放	-30 ± 2°C / 48 hours	
3	High Temperature Operating 高温操作	70 ± 2°C / 48 hours	
4	Low Temperature Operating 低温操作	-20 ± 2°C / 48 hours	
5	Temperature Cycle 冷热循环	-30 ± 2°C (30min) - 70 (30min) ± 2°C X48 Cycle	
6	High Temperature and High humidity 高温高湿	60°C ± 5°C × 90%RH / 48 hours	
7	Vibration Test 振荡测试	Frequency: 10Hz-55Hz-10Hz Amplitude 1.5mm, x,y,z direction for total 0.5 hours (Packing condition) 频率: 10Hz-55Hz-10Hz 幅值 1.5mm, x,y,z 方向共 0.5 小时 (包装情况)	

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8	Dropping Test 跌落测试	Drop to the ground from 0.8m height, one time,every side of carton . (Packing condition) 从 0.8 米的高度跌落到地面， 一次，纸箱的每一面。 (包装条件)	5.The surface shall be free from damage.表面无损伤 6.The electrical characteristics Requirements shall be satisfied 需要满足模块的电气性能
9	ESD Test 静电测试	R: 330Ω C: 150pF 10 time Air Discharge: ±8KV Contact Discharge: ±4KV R: 330 Ω C: 150pF 10 次 空气放电:±8 千伏 接触放电:±4 kv	

Remark 注意:

- 1.The test samples should be applied to only test item.每个测试模块只能用于其中一个测试项目。
- 2.Sample size for each test item is 5~10pcs.每个测试项目样品数量 5-10 片。
- 3.For Damp Proof Test,Pure water(Resistance>10MΩ) should be used.
对于防潮试验，试验箱用的水必须是电阻大于 10MΩ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

10.1Mtbf 无故障使用时间

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal
LCM 模块设计应满足最低使用时间 50000 小时

11.Inspection standards 检验标准

1.AQL(Acceptable Quality Level)质量合格标准 AQL

AQL of major and minor defect.

-	MAJOR DEFECT 主要缺陷	MINOR DEFECT 次要缺陷
AQL	0.65	1.5

2. Basic conditions for inspection 基本条件检查

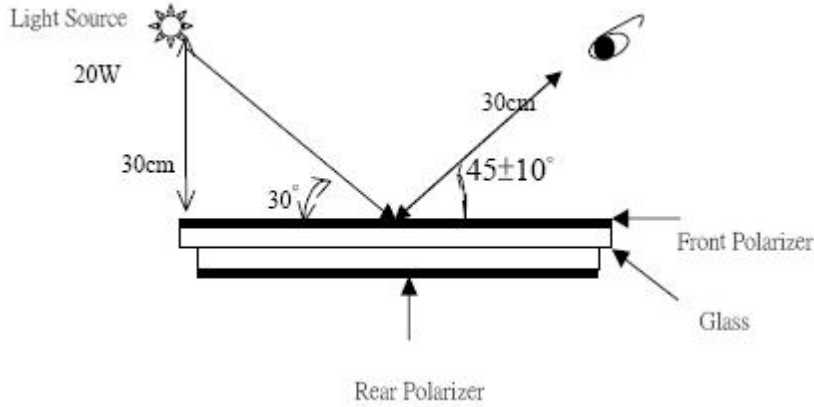
The LCM face to us, in normal environment, the lux is 1000±200.(Darkroom's lux: 100±50),About an angle of

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incidence 30,a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

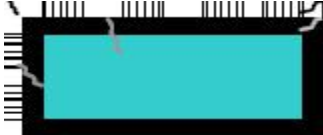
(As shown below) LCM 面对我们, 在正常环境下, lux 是 1000 ± 200 。(Darkroom 的 lux: 100 ± 50), 约入射角 30, 距离 30 厘米, 45 度角检查产品不露出胶卷! (如下所示)



3. Inspection item and criteria 检验项目和标准

3.1 Visual inspection criterion in immobility 目测外观检验标准

3.1.1 Glass defect 玻璃缺陷

NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect) 角度不整合 (主要缺陷)	By Engineering Drawing 通过工程图	
2	Cracks (Major defect) 裂缝 (主要缺陷)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample 线性裂纹板 【拒绝】 有限样本非线性裂纹对比	
3	Glass extrude the conductive area (minor defect) 玻璃挤压导电区域 (小瑕疵)	a: disregards and no influence assemblage. 1) $b \leq 1/3$ Pin width (non bonding area) 忽略且不影响集合。 $b \leq 1/3$ pin 宽度 (非粘接面积) 【Accept】 2) bonding area ≤ 0.5 mm 粘结面积 ≤ 0.5 毫米 【Accept】	A: Length, b: Width A: 长度, b: 宽度
4	Pin-side ,conductive area damaged (minor defect) 销侧, 导电区域损坏 (小瑕疵)	(a c: disregards) $b \leq 1/3$ of effective length for bonding electrode 【Accept】 $B \leq$ 键合电极有效长度的 $1/3$	a: length, b: Width, c: Thickness a: 长度, b: 宽度, c: 厚度

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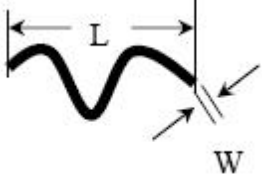
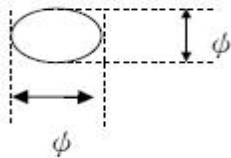
5	Pin-side, non-conductive area damaged (minor defect) Pin-side, 导电区域受损 (小瑕疵)	1) Damage area don't touch the ITO (Including contraposition mark, except scribing mark) 【Accept】 2) $C < T$ $b \leq BM1/3$ of width 【Accept】 3) $c = T$ b not touch the seal glue 【Accept】 4) a disregards 1) 损坏区域不要触摸 ITO(包括对位标记, 划痕除外) 【接受】 2) $C < T$ $b \leq BM1/3$ of 宽度 【接受】 3) $c = T$ B 不要碰密封胶 【接受】 4) 一个无视	a: Length, b: Width c: Thickness a: 长度, b: 宽度, c: 厚度
6	Non-pin-side damage (minor defect) Non-pin-side 损害 (小瑕疵)	$c < T$ 1) b exceeds $1/3Bm$ 【Reject】 $c = T$ b not touch the seal glue 【Reject】 1) b 超过 $1/3Bm$ 【拒绝】 $c = T$ B 不要碰密封胶 【拒绝】	c: Thickness b: width of damage c: 厚度 b: 损伤宽度

3.1.2 LCD appearance defect (View area) LCD 表面缺陷

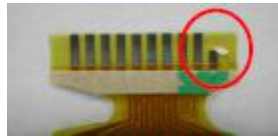
NO	Defect item 缺陷项目	Criteria 标准		Remark 备注
1	Fiber、glass cratch、polarizer scratch/folded (minor defect) 玻璃纤维,	Specification 规范	Allowable 允许	note 1: L: Length, W: Width note 2: disregard if out of AA 注 1: 长度, W: 宽度 注 2: 如果不是 AA, 请忽略
		$W \leq 0.03mm$	disregard	
		$0.03mm < W \leq 0.05mm$; $L \leq 3.0mm$	2	

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	饲料箱,偏振镜 刮伤/折叠 (小瑕疵)	$0.05\text{mm} < W \leq 0.1\text{mm};$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	
2	Polarizer bubble、 concave and convex (minor defect) 偏光泡, 凹凸 (小瑕疵)	$\phi \leq 0.2\text{mm}$	disregard	note1: $\phi = (L+W)/2$, L:Length, W :Width note2:disregard if out of AA 注一: $\phi = (L + W) / 2$, L:长度, W:宽度 注 2:如果不是 AA, 请忽略
		$0.2\text{mm} < \phi \leq 0.3\text{mm}$	2	
		$0.3\text{mm} < \phi \leq 0.5\text{mm}$	1	
		$0.5\text{mm} < \phi$	0	
3	Black dots、dirty dots、 impurities、eye winker (minor defect) 黑点, 脏点, 杂质, 眼珠 (小瑕疵)	$\phi \leq 0.15\text{mm}$	disregard	note2:disregard if out of AA 
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
		$0.3\text{mm} < \phi$	0	
4	Polarizer prick (minor defect) 偏振镜刺痛 (小瑕疵)	$\phi \leq 0.1\text{mm}$	disregard	note1: $\phi = (L+W)/2$, L=Length, W=Width note2:the distance between two dots>5mm 注一: $\phi = (L + W) / 2$, L =长度, W =宽度 注 2:两者之间的距离 点> 5 毫米
		$0.1\text{mm} < \phi \leq 0.25\text{mm}$	3	
		$\phi > 0.25\text{mm}$	0	

3.1.3FPC 表面缺陷

NO	Defect item	Criteria		Remark
1	Copper screen peel (minor defect) 铜屏幕皮 (小瑕疵)	Copper screen peel 【Reject】		
2	No release tape or peel 没有释放胶带或剥离	No release tape or peel 【Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect) 对客户使用的 FPC 无污点和 杂质 (轻微缺陷)e 胶带或剥离	Specification	Allowable	Note1: Cannot have stride ITO impurities 不能跨越 ITO 杂质
		$\phi \leq 0.25\text{mm}$	2	
		$\phi > 0.25$	0	

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3.1.4 Black tape & Mara tape 黑色胶带与异形胶纸

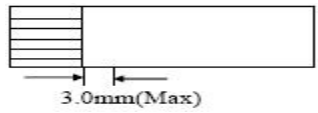
NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect) FPC 或 H/S 黑色胶带 (小瑕疵)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1) exceed of FPC edge or H-S edge 【Reject】 2) IC bare 【Reject】 1. 转变规范: 1) 胶水到极化 【拒绝】 2) IC 裸 【拒绝】 2. 左派和右派规范: 1) FPC 边缘或 H-S 边缘超过 2) IC 裸 【拒绝】	<p>The diagram shows a cross-section of an LCD assembly. A rectangular LCD panel is at the top. Below it, a Mara tape is applied, with a width dimension 'x' and a vertical offset 'y1'. A Heat Seal is applied below the Mara tape, with a width dimension 'x1' and a vertical offset 'y2' from the LCD panel's bottom edge.</p>
2	No black tape (major defect) 没有黑胶带 (主要缺陷)	No black tape 【Reject】	
3	Tape position mistake (minor defect) 胶带的位置错误 (小瑕疵)	Not by engineering drawing 不是通过工程制图	
4	Mara tape defect (minor defect) 玛拉胶带缺陷 (小瑕疵)	Peel before pulling the protecting film 【Reject】 在拔之前去皮保护膜 【拒绝】	

3.1.5 Silicon and Taffy glue 硅胶&胶水检查

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect) 量的硅 (主要缺陷)	Uncover the ITO and circuit area 【Reject】 揭开 ITO 和电路区域 【拒绝】	note: compared by engineering 注: 按工程比较

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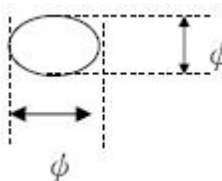
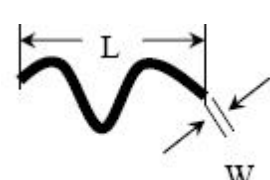
2	Taffy glue (major defect)	1.Uncover the reveal copper area 【Reject】 2.Cover layer 0.3mm(Min)~3.0mm(Max) 【Reject】 1. 揭开裸露的铜区域 1. 【拒绝】 2. 覆盖层 0.3 毫米 (Min) ~ 3.0 毫米 (Max) 【拒绝】	note: if customer has special requirement, refer to the technical document 注:如客户有特殊要求, 可参考技术文件 
3	Depth of glue covering (major defect) 涂胶深度 (主要缺陷)	Depth of glue covering ovetop front Polarizer 【Reject】 正面偏光片覆胶深度【拒绝】	Except of the special requirement 除特殊要求外

3.2Electrical criteria 电气标准

NO	Defect item	Criteria	Remark
1	No display 没有显示 (major defect)主要缺陷	No display 没有显示 【Reject】拒绝	
2	Missing line 丢失的线 (major defect)	Missing line 丢失的线 【Reject】	
3	Seg-com light and dark Seg-com 光明和黑暗 (major defect)	Seg-com light and dark Seg-com 光明和黑暗 【Reject】	ND filter 2% test
4	No display in immobility Seg-com 灯在静止和黑暗中不显示 (major defect)	No display in immobility Seg-com 灯在静止和黑暗中不显示 【Reject】	
5	Flicker of Pattern 闪变模式 (major defect)	Flicker of Pattern 闪变模式 【Reject】	
6	Mura 色差 (major defect)	ND filter 2%test ND 过滤 2%的测试	
7	Over current 过流测试 (major defect)	Over current 过流测试 【Reject】	
8	Voltage out of specification 电压超出规格 (major defect)	Voltage out of specification 电压超出规格 【Reject】	
9	Pattern blur, error code	Pattern blur, error code	

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	图案模糊, 错误代码 (major defect)	图案模糊, 错误代码 【Reject】		
10	Dark light, Flicker 暗黄的灯光, 闪烁 (major defect)	Dark light, Flicker 暗黄的灯光, 闪烁 【Reject】		
11	Black/white dots、 Dirty dots、 eye winker (major defect) 黑/白点, 脏点, 眨眼 (主要缺陷)	Specification	Allowable	Note1: disregard if out of AA 注 1: 如果是 AA, 请忽略 
		$\phi \leq 0.15\text{mm}$	disregard	
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
	$0.3\text{mm} < \phi$	0		
12	Fiber、glass crutch、Polarizer scratch/folded (major defect) 纤维, 玻璃拐杖, 偏光片划痕/折叠 (主要缺陷)	$W \leq 0.03\text{mm}$	disregard	Note1: L: Length, W: Width Note2: disregard if out of AA 注 1: L: 长度, W: 宽度 注 2: 如果是 AA, 请忽略 
		$0.03\text{mm} < W \leq 0.05\text{mm}$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm}$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	

12. Precautions for using LCD modules. 使用液晶模块预防措施

12.1 Safety 安全保障

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
不要吞食任何液晶, 即使没有证据表明液晶有毒
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
如果液晶面板破损, 注意不要让液晶接触到皮肤
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.
如果皮肤接触到液晶, 请用酒精或肥皂彻底清洗该区域

12.2 Storage Conditions 保存方法

- (4) Store the panel or module in a dark place where the temperature is $23 \pm 5^\circ\text{C}$ and the humidity is below $45 \pm 20\%RH$. 请将面板或模块放置在温度 $23 \pm 5^\circ\text{C}$ 、湿度 $45 \pm 20\%RH$ 以下的黑暗环境中。
- (5) Store in anti-static electricity container. 存放在防静电容器中
- (6) Store in clean environment, free from dust, active gas, and solvent.
储存在清洁的环境中, 不含灰尘、活性气体、溶剂等防静电容器
- (7) Do not place the module near organics solvents or corrosive gases.
请勿将模块放置在有机溶剂或腐蚀性气体附近
- (8) Do not crush, shake, or jolt the module. 请勿挤压、摇动或震动模块

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12.3 Handling Precautions 处理措施

(9) Avoid static electricity, which can damage the CMOS LSI.

避免静电损坏 CMOS LSI

(10) The polarizing plate of the display is very fragile, please handle it very carefully.

显示器的偏光板非常易碎，请小心搬运。

(11) Do not give external shock. 不要进行外部电击。

(12) Do not apply excessive force on the surface. 不要在表面施加过多的力。

(13) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate. 不要用干布擦拭偏光板，因为这样很容易划伤板的表面。

(14) Do not use ketone solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

不要使用酮类溶剂和芳香类溶剂，使用时应使用浸有清洁石脑油溶剂的软布。

(15) Do not operate it above the absolute maximum rating.

操作时不要超过绝对最大额定值。

(16) Do not remove the panel or frame from the module.

请勿将面板或框从模块上拆下。

12.4 Warranty 保质期

The period is within twelve months since the date of shipping out under normal using and storage conditions.

有效期为在正常使用和储存条件下，自发货之日起 12 个月内。

13. Factory 工厂模式

FACTORY NAME: 工厂名称:

FACTORY ADDRESS: 工厂地址:

FACTORY PHONE: 工厂的电话:

14. Revision history 修订记录

Version	Revise record	Date
V0.1	Original version	2021.05.15