



SPECIFICATION

产品规格书

模组型号：FSD035B9072-A+CTP04

版 本：A0

客户 CUSTOMER:	
客户型号	
客户核准	

LEAGEND LCM R&D CENTER :

Technical Department: 研发部门	Quality Assurance Department 质量保证部门	Approved by:核准
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福建福盛达电子有限公司

Fujian Fushengda Electric Co., LTD

Table of Contents

1. GENERAL SPECIFICATION	
2. MAXIMUM ABSOLUTE LIMIT	
3. ELECTRICAL CHARACTERISTICS	
4. PIN DESCRIPTION	
5. MECHANICAL SPECIFICATION	
6. ELECTRO-OPTICAL CHARACTERISTICS	
7. RELIABILITY TEST CONDITIONS	
8. INSPECTION CRITERION	
9. Handling precaution for LCM	



1. GENERAL SPECIFICATION

- 1 Resolution 分辨率: 320xRGBx480
- 2 Module Size 模组尺寸: 54.66x82.94x3.71mm
- 3 Panel Active Area 可视区域: 48.96(H)x73.44(V)mm
- 4 Pixel Pitch 像素尺寸: 0.153(H)x0.153(V)mm
- 5 Pixel Arrangement 像素排列: RGB
- 6 Viewing Direction 视角: ALL
- 7 Driver IC 驱动芯片: ILI9488
- 8 Interface 接口方式: SPI 4
- 9 Light Source 背光源: 6 die White side LED parallel
- 10 NTSC 色彩饱和度: 70% (TYP)
- 11 Contrast Ratio 对比度: 400 (MIN)
- 12 Number of Colors 颜色数量: 16.7M
- 13 Display Mode 显示模式: Normally BLACK
- 14 Panel Type 面板类型: TFT

2. MAXIMUM ABSOLUTE LIMIT

■ ABSOLUTE MAXIMUM RATINGS

极限参数

Parameter of absolute maximum ratings 参数	Symbol 符号	Min 最小值	Max 最大值	Unit 单位
Supply voltage for logic 逻辑电压	VCC/VCI/IOVCC	-0.3	3.3	V
Input voltage 输入电压	VIN	1.8	3.2	V
Operating temperature 操作温度	Top	-20	70	℃
Storage temperature 储存温度	TST	-30	80	℃
Humidity 湿度	RH	-	90%(Max60 °C)	RH



■ ELECTRICAL CHARACTERISTICS

3. 模块电气特性

DC CHARACTERISTICS

直流特性

Parameter of DC	Symbol 符	Min 最小	Typ 典型	Max 最大	Unit 单
Analog Power Supply voltage	VCC/VCI	2.5	2.8	3.3	V
模拟电源电压	IOVCC	1.65	1.8	3.3	V
Input Current 输入电流	Idd	-	-	-	mA
Input voltage 'H' level 输入高电平	VIH	0.8VCC	-	VCC	V
Input voltage 'L' level 输入低电平	VIL	-0.3	-	0.2VCC	V
Output voltage 'H' level 输出高电平	VOH	0.8VCC	-	-	V
Output voltage 'L' level 输出低电平	VOL	-	-	0.2VCC	V

■ BACKLIGHT CHARACTERISTICS

背光电气特性

Item of backlight characteristics 项目	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage 正向电压	Vf	3.0	3.2	3.3	V	If=120mA Ta=25℃
LCM Luminance 亮度	Lv	350	400	/	cd/m ²	
Number of LED 灯数	-	-	6	-	Piece	-
Connection mode 连接类型	P&S	-	6 parallel	-	-	-

Using condition: constant current driving method If=120mA(+/-10%).

使用条件：恒流的驱动方式是If=120mA(+/-10%).



■ INTERFACE DESCRIPTION TIMING

4. DISPLAY PIN DESCRIPTION.

Pin no.	Symbol	Function
1	GND	Ground
2	SPI-MISO	Serial DATA output signal
3	TE	Tearing effect signal to frame memory writing
4	SPI-MOSI	Serial DATA input signal
5	SPI-DCX	Display data/command selection pin
6	SPI-CLK	Serial clock
7	SPI-SS	Chip select input pin
8	SPI-RST	Reset signal input terminal
9	VCC	Power supply
10	LEDA	Backlight Anode
11	LEDK	Backlight Cathode
12	GND	Ground

TOUCH PIN DESCRIPTION

Pin No.	Symbol	Function
1	RST	TOUCH RESET
2	INT	TOUCH INT
3	SDA	TOUCH SDA
4	SCL	TOUCH SCL
5	GND	Ground
6	VDD	Power supply

TIMING

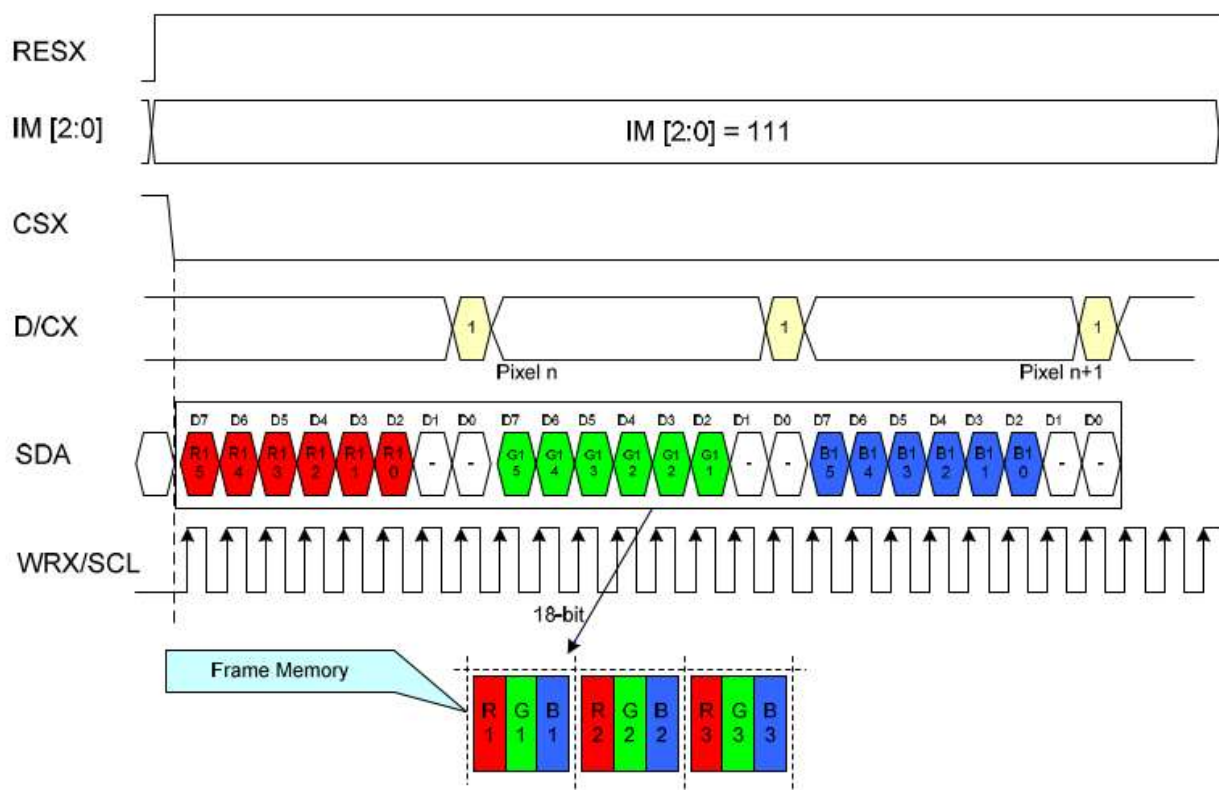
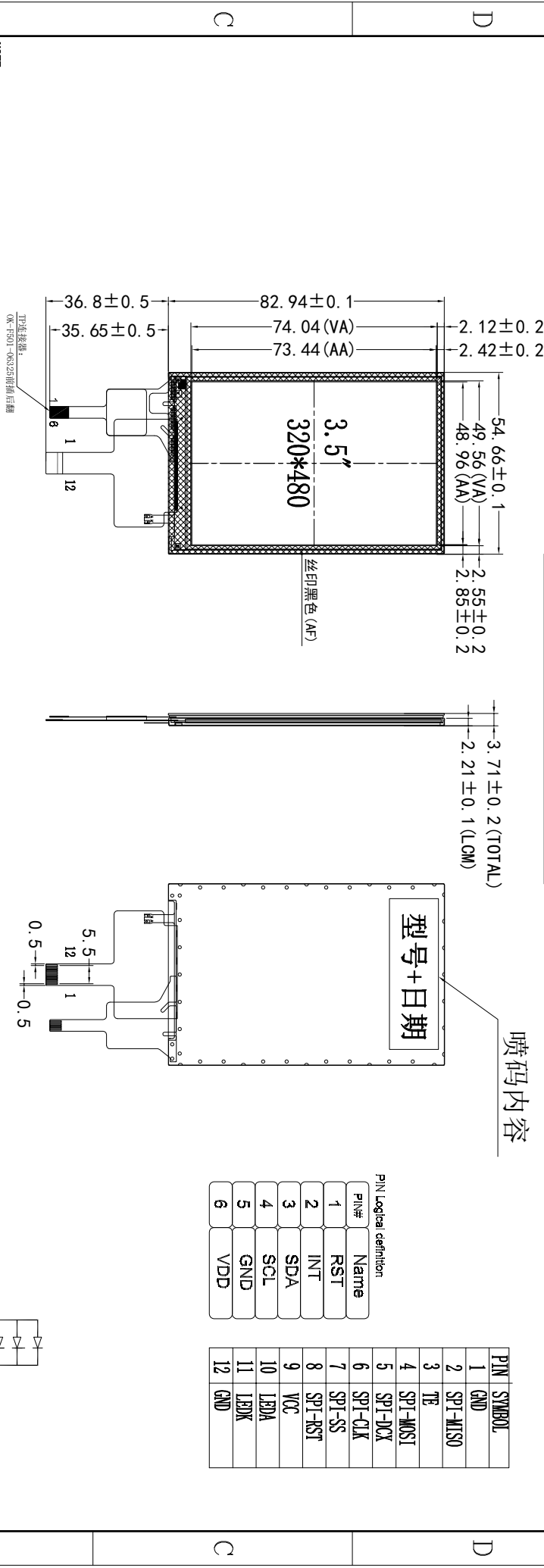


Figure 107: SPI Data for 18-bit/pixel (RGB 6-6-6 Bits Input), 262K-color

备注: **ILI9488**的**SPI**数据格式只支持**RGB666**, 不支持**RGB565**, 平台送图请注意

5.MECHANICALSPECIFICATION



NOTE:

1. 工作电压:DC2.8~3.3V;产品结构: 8+6

2. 盖板材质:0.55mm超薄子, 钢化玻璃, 表面硬度≥6H;

3. 碰撞测试: 64g钢球50mm, 中心点跌落3次, 不破碎;

4. 触摸芯片: 61911 (RX9*TX14) , 5点触摸;

5. 透 光 率 : ≥85%

6. 工作环境: 温度-20℃~70℃, 湿度20%~90%

7. 储存环境: 温度-30℃~80℃, 湿度20%~90%

8. 未注公差: ±0.2

电路图 (6并串)

电压:3.0V~3.3V

电流:120mA

A	Display Type	TFT	LCM Luminance		400cd/㎡	福建福盛达电子有限公司		
	Number of pixels	Normally BLACK	Backlight		White Color			
	Viewing Direction	320*RGB*480			IF: 120MA, VF: 3.3V			
	Drive IC	ALL" CLOCK	Operating temperature		-20℃~70℃			
A	POLARIZE TYPE	IL19488	Storage temperature		-30℃~80℃	FSD035B9072-A		
	Interface	CE-L 80° / TFT 光 0°	RoHS		YES			
		SPI	Unspecified Tolerance		±0.2			
8		7	6	5	4	3	2	1

UNITS: MM

SCALE: FT

DESIGNED BY:

CHECKED BY:

APPROVED BY:

SHEET: 1 OF 1

UNIT: MM

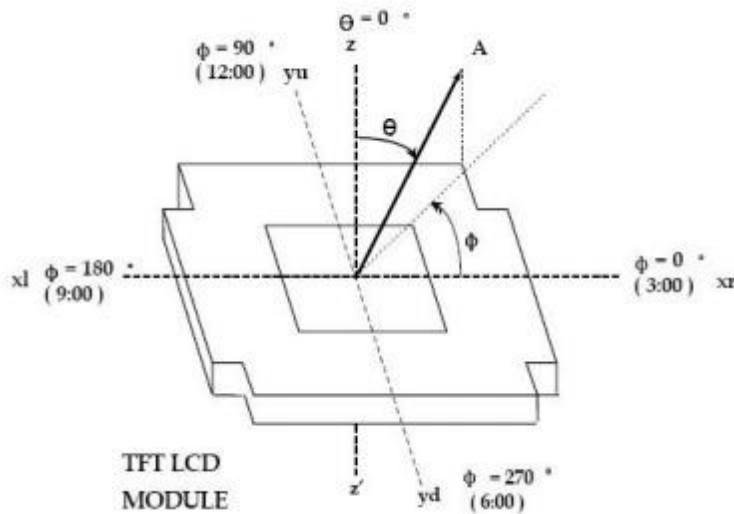
DATE



■ ELECTRO-OPTICAL CHARACTERISTICS

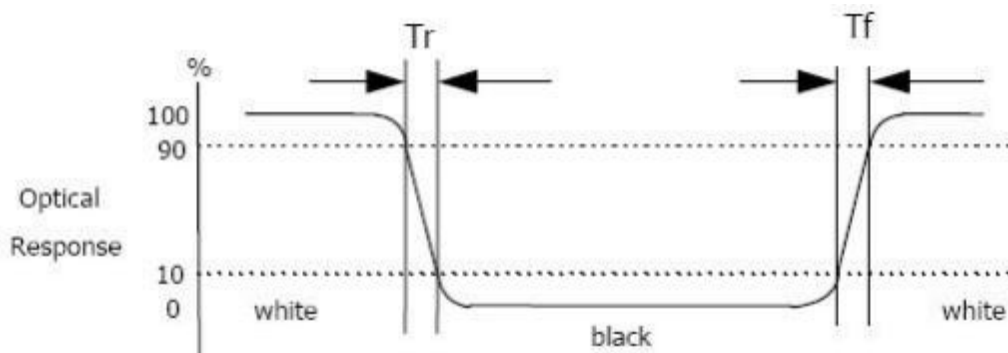
6. 光电参数

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle Range 视角	Left	θL	CR≥10	-	85	-	degree
	Right	θR		-	85	-	
	Top	θT		-	85	-	
	Bottom	θB		-	85	-	
Response Time		Ton+Toff	θ=Φ=0°	-	30	35	ms
Contrast Ratio 对比度		CR	θ=Φ=0°	800	1000-	-	-
Luminance 亮度		L	θ=Φ=0°	350	400	-	cd/m2
Color Chromaticity (CIE1931) 色坐标	White	Wx	Normal θ=Φ=0°	-0.03	0.299	+0.03	-
		Wy			0.322		
	Red	Rx			0.656		
		Ry			0.326		
	Green	Gx			0.260		
		Gy			0.579		
	Blue	Bx			0.140		
		By			0.079		
		Uniformity 均匀度			UL		
Cross Talk		Ct			2		%
Flicker 闪烁		dB	-			-25	-



viewing angle is the angle at which the contrast ratio is greater than 10. the angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the lcd surface.

(2) Response time



Response time is the time required for the display to transition from white to black (Rising time, T_r) and from black to white (Falling time, T_f). for additional information

(3) Contrast Ratio(CR)

Contrast Ratio(CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Surface luminance is the center point across the lcd surface 500mm from the surface with all pixels displaying white.



■ RELIABILITY TEST CONDITIONS

7. 可靠性试验条件

No. 序号	Test Item 试验 项目	Test Condition 试验 条件	test Inspection after 判断 标准
1	High Temperature Storage 高温存放	70±2℃/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 样品必须在室内正常温 湿度环境下放置2~4个 小时以上才能进行功能和 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 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 shall be free from damage. 表面无损 伤.
2	Low Temperature Storage 低温存放	-20±2℃/48 hours	
3	High Temperature Operating 高温操作	60±2℃/48 hours	
4	Low Temperature Operating 低温操作	-10±2℃/48 hours	
5	Temperature Cycle 冷热冲击	-10±2℃~25~60±2℃×2cycles (30min.) (5min.) (30min.)	
6	Dropping test 跌落试验	Drop to the ground from 0.5m height, one time, every side of carton. (Packing condition)	
7	High Temperature/Humidity Non-Operating Test 高温高湿测试	50℃*90%RH*48Hrs	
8	ESD test 静电试验	±4KV, Human Body Mode, 150pF/330Ω;10time ±6KV, Air Mode, 150pF/330Ω;10time	

Remark: 注意:

1.The test samples should be applied to only one test item.

每个被测试的模块只能用于其中的一个测试项目。

2.Sample size for each test item is 5~10pcs.

每个测试项目的样品数量为 5~10 片.

3.For Damp Proof Test, Pure water(Resistance>10MΩ) 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.EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.

带EL片的可靠性测试在高温高湿条件下,荧光粉会发生自然化学反应而产生黑点或瑕疵,因此不在高温高湿条件测试范围内。

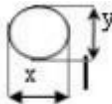
6.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

故障判断标准:基本规格,电气特性,机械特性,光电特性



■ INSPECTION CRITERION

8. 检查标准

Item No	Items to be inspected	Inspection Standard	Classification of defects																					
	All functional defects	1) No display 2) Display abnormally 3) Missing vertical , horizontal segment 4) Short circuit 5) Back-light no lighting, flickering and abnormal lighting.	Major																					
	Missing	Missing component																						
	Outline dimension	Overall outline dimension beyond the drawing is not allowed.																						
	linearity	No more than 1.5%																						
Item No	Items to be inspected	Inspection Standard	Classification of defects																					
	Clear Spots	For dark/white spot, sizeΦis defined	Minor																					
	Black and white Spot defect Pinhole, Foreign Particle, polarizer Dirt	as $\Phi = \frac{(x + y)}{2}$																						
		<table><tr><th rowspan="2">Zone Size(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.1$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.10 < \Phi \leq 0.2$</td><td colspan="2">2</td></tr><tr><td>$0.2 < \Phi \leq 0.25$</td><td colspan="2">1</td></tr><tr><td>$\Phi > 0.25$</td><td colspan="2">0</td></tr></table>		Zone Size(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.10 < \Phi \leq 0.2$	2		$0.2 < \Phi \leq 0.25$	1		$\Phi > 0.25$	0		
		Zone Size(mm)			Acceptable Qty																			
				A	B	C																		
		$\Phi \leq 0.1$		Ignore		Ignore																		
		$0.10 < \Phi \leq 0.2$		2																				
	$0.2 < \Phi \leq 0.25$	1																						
	$\Phi > 0.25$	0																						
	Clear Spots TP Dirt	<table><tr><th rowspan="2">Zone Size(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.1$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.10 < \Phi \leq 0.15$</td><td colspan="2">3</td></tr><tr><td>$0.15 < \Phi \leq 0.25$</td><td colspan="2">2</td></tr><tr><td>$0.25 < \Phi$</td><td colspan="2">0</td></tr></table>		Zone Size(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.10 < \Phi \leq 0.15$	3		$0.15 < \Phi \leq 0.25$	2		$0.25 < \Phi$	0		
Zone Size(mm)		Acceptable Qty																						
		A	B	C																				
$\Phi \leq 0.1$		Ignore		Ignore																				
$0.10 < \Phi \leq 0.15$	3																							
$0.15 < \Phi \leq 0.25$	2																							
$0.25 < \Phi$	0																							



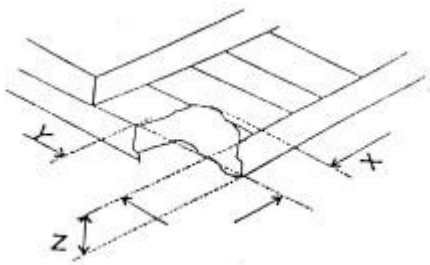
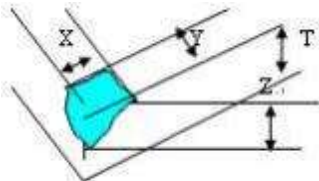
	Dim Spots Circle shaped and dim edged defects					
		2. Zone Size(mm)	Acceptable Qty			
			A	B	C	
		$\Phi \leq 0.2$	Ignore		Ignore	
		$0.20 < \Phi \leq 0.40$	2			
		$0.40 < \Phi \leq 0.60$	1			
		$0.60 < \Phi$	0			

Item No	Items to be inspected	Inspection Standard					Classification of defects	
	Line defect Black line, White line, Foreign material on polarizer	size(mm)		Acceptable Qty			Minor	
		L(Length)	W(Width)	zone				
				A	B	C		
		Ignore	$W \leq 0.02$	Ignore		Ignore		
		$L \leq 3.0$	$0.02 < W \leq 0.03$	2				
		$L \leq 2.0$	$0.03 < W \leq 0.05$	1				
			$0.05 < W$	Define as spot defect				
	Foreign material on TP film	The line can be seen after mobile phone in the operating condition:						Ignore
		size(mm)		Acceptable Qty				
		L(Length)	W(Width)	zone				
				A	B	C		
		Ignore	$W \leq 0.03$	Ignore		Ignore		
		$L \leq 5.0$	$0.03 < W \leq 0.05$	3				
			$0.05 < W$	Define as spot defect				

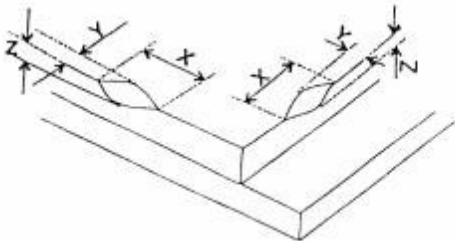
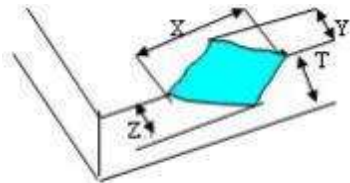
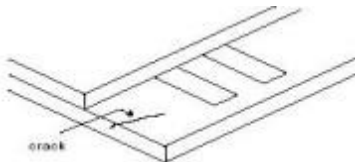


	Dim line defect Polarizer scratch TP film scratch	If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2.				
		If the scratch can be seen only in non-operating condition or some special angle, judge by the following.				
		Size(mm)		Acceptable Qty		
		L(Length)	W(Width)	Zone		
				A	B	C
		Ignore	$W \leq 0.03$	Ignore		Ignore
		$5.0 < L \leq 10.0$	$0.03 < W \leq 0.05$	2		
		$L \leq 5.0$	$0.05 < W \leq 0.08$	1		
	$0.08 < W$	0				

Item No	Items to be inspected	Inspection Standard	Classification of defects																				
	Polarize Air bubble	Air bubbles between glass & polarizer <table><tr><th rowspan="2">2. Zone Size(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.2$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.20 < \Phi \leq 0.30$</td><td colspan="2">2</td></tr><tr><td>$0.30 < \Phi \leq 0.50$</td><td colspan="2">1</td></tr><tr><td>$0.50 < \Phi$</td><td colspan="2">0</td></tr></table>	2. Zone Size(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore		Ignore	$0.20 < \Phi \leq 0.30$	2		$0.30 < \Phi \leq 0.50$	1		$0.50 < \Phi$	0		Minor
2. Zone Size(mm)	Acceptable Qty																						
	A	B	C																				
$\Phi \leq 0.2$	Ignore		Ignore																				
$0.20 < \Phi \leq 0.30$	2																						
$0.30 < \Phi \leq 0.50$	1																						
$0.50 < \Phi$	0																						

Glass defect	(i) Chips on corner A:LCD Glass defect  <table border="1" data-bbox="432 636 1066 730"> <tr> <th>X</th><th>Y</th><th>Z</th></tr> <tr> <td>≤ 2.0</td><td>$\leq S$</td><td>Disregard</td></tr> </table> Notes: S=contact pad length Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. B:TP Glass defect  <table border="1" data-bbox="432 1086 1066 1178"> <tr> <th>X(mm)</th><th>Y(mm)</th><th>Z(mm)</th></tr> <tr> <td>≤ 3.0</td><td>≤ 3.0</td><td>Disregard</td></tr> </table>	X	Y	Z	≤ 2.0	$\leq S$	Disregard	X(mm)	Y(mm)	Z(mm)	≤ 3.0	≤ 3.0	Disregard	Minor
X	Y	Z												
≤ 2.0	$\leq S$	Disregard												
X(mm)	Y(mm)	Z(mm)												
≤ 3.0	≤ 3.0	Disregard												



Item No	Items to be inspected	Inspection Standard	Classification of defects												
	Glass defect	(ii) Usual surface cracks A: LCD Glass defect  <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0</td><td><Inner border line of the seal</td><td>Disregard</td></tr></table> B: TP Glass defect  <table><tr><th>X(mm)</th><th>Y(mm)</th><th>Z(mm)</th></tr><tr><td>≤6.0</td><td><2.0</td><td>Disregard</td></tr></table>	X	Y	Z	≤3.0	<Inner border line of the seal	Disregard	X(mm)	Y(mm)	Z(mm)	≤6.0	<2.0	Disregard	Minor
X	Y	Z													
≤3.0	<Inner border line of the seal	Disregard													
X(mm)	Y(mm)	Z(mm)													
≤6.0	<2.0	Disregard													
		(iii) Crack Cracks tend to break are not allowed. 	Major												



9. Storage Precautions 储存注意事项

9.1 When storing the LCD modules, the following precaution are necessary.

液晶显示模块的存储依照以下几点：

9.2 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.

使用聚乙烯袋密封，如果密封得当，不需要干燥剂。

9.3 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荧光灯下，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。

9.4 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（建议在货运时存放防静电包装中）。

9.5 Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

液晶在低温会凝固（低于储存温度范围以下）会导致缺陷或产生气泡（黑或白）如果模块处于低温下，也会产生气泡。

9.6 If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

如果液晶显示模块长时间工作于同一个显示图案，换屏时会出现鬼影和轻微的对对比度不均。停止使用一段时间后可恢复到正常状态。此现象不会严重影响性能可靠性。

9.7 To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

为最小限度地降低由静电等对液晶显示模块性能的破坏，使用模块时避免接触下列区域：

9.7.1 - Exposed area of the printed circuit board.

— 印制电路板裸露区域。

9.7.2 - Terminal electrode sections.

— 印制电路板引出端子区域。