

深圳市畅世达科技有限公司

LCD MODULE SPECIFICATION

Customer: _____
Model Name: EE043NA-02A
Date: 2012/03/27
Version: 01

☐ Preliminary Specification
☒ Final Specification

Remark
4.3" FOG (FPC:48mm)

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by
Stanley CW Leung	Wenyi Wang	David Lee

电话：0755-27880400

传真：0755-29355600

地址：深圳市宝安区福永街道福海大道富桥第三工业区二期C1栋

网址：<http://www.csd-hc.com/>

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Version	Revise Date	Page	Content
Pre-spec .01	2010/11/23		Initial Release.
Final- Spec.01	2012/03/27	1	Add the weight in General specifications
		14	Add the weight in the packaging material table
		15	Add the packaging drawing

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2. Pin Assignment

2.1.TFT LCD Panel Driving Section

FPC Connector is used for the module electronics interface. The recommended model is “FH19SC-40S-0.5SH” manufactured by HIROSE.

Pin No.	Symbol	I/O	Function	Remark
1	LED-	P	Power for LED backlight cathode	
1	LED+	P	Power for LED backlight anode	
3	GND	P	Power ground	
4	V _{DD}	P	Power voltage	
5	R0	I	Red data (LSB)	
6	R1	I	Red data	
7	R2	I	Red data	
8	R3	I	Red data	
9	R4	I	Red data	
10	R5	I	Red data	
11	R6	I	Red data	
12	R7	I	Red data (MSB)	
13	G0	I	Green data (LSB)	
14	G1	I	Green data	
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data	
19	G6	I	Green data	
20	G7	I	Green data (MSB)	

21	B0	I	Blue data (LSB)	
22	B1	I	Blue data	
23	B2	I	Blue data	
24	B3	I	Blue data	
25	B4	I	Blue data	
26	B5	I	Blue data	
27	B6	I	Blue data	
28	B7	I	Blue data (MSB)	
29	GND	P	Power ground	
30	CLK	I	Pixel clock	
31	DISP	I	Display on/off	
32	NC	-	No connection	
33	NC	-	No connection	
34	DE	I	Data Enable	
35	NC	-	No connection	
36	GND	P	Power ground	
37	NC	-	No connection	
38	NC	-	No connection	
39	NC	-	No connection	
40	NC	-	No connection	

I: input, O: output, P: Power

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3. Operation Specifications

3.1. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{DD}	-0.5	5.0	V	
Input signal voltage	Logic input	-0.5	5.0	V	
Operation temperature	T_{OP}	-20	70	°C	
Storage temperature	T_{ST}	-30	80	°C	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

Note 2: In case of temperature below 0°C, the response time of liquid crystal (LC) becomes slower and the color of panel darker than normal one.

3.2. Typical operation conditions

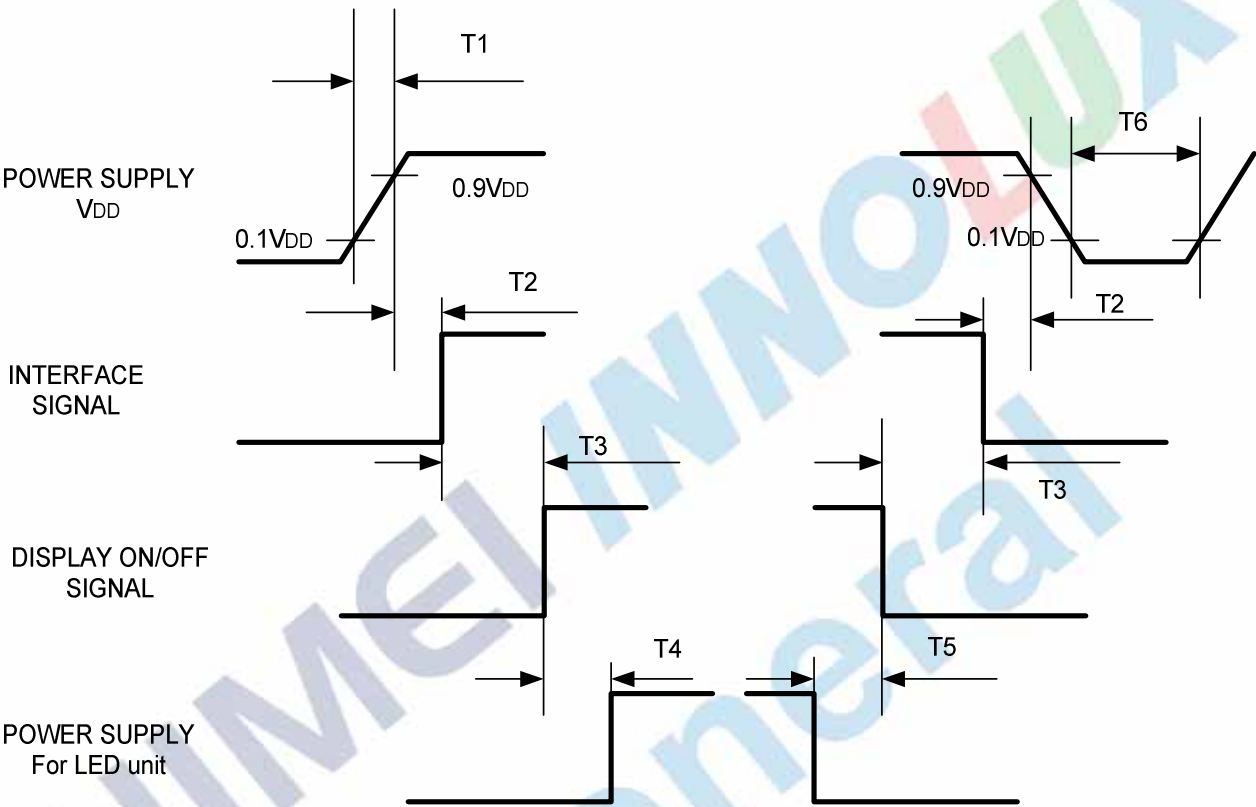
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	3.1	3.3	3.5	V	
Current for driver	I_{DD}	-	17	25	mA	$V_{DD} = 3.3V$
Input logic high voltage	V_{IH}	$0.8V_{DD}$	-	V_{DD}	V	Note 1
Input logic low voltage	V_{IL}	GND	-	$0.2V_{DD}$	V	

Note1: CLK, DE, R0~ R7, G0~ G7, B0~ B7.

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3.3.Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.



Symbol	Specification	Symbol	Specification
T1	$0 \leq T1 \leq 10 \text{ msec}$	T4	$160 \text{ msec} \leq T4$
T2	$0 \leq T2 \leq 100 \text{ msec}$	T5	$160 \text{ msec} \leq T5$
T3	$0 \leq T3 \leq 200 \text{ msec}$	T6	$1 \text{ msec} \leq T6$

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网址：<http://www.csd-hc.com/>

3.4. Timing Characteristics

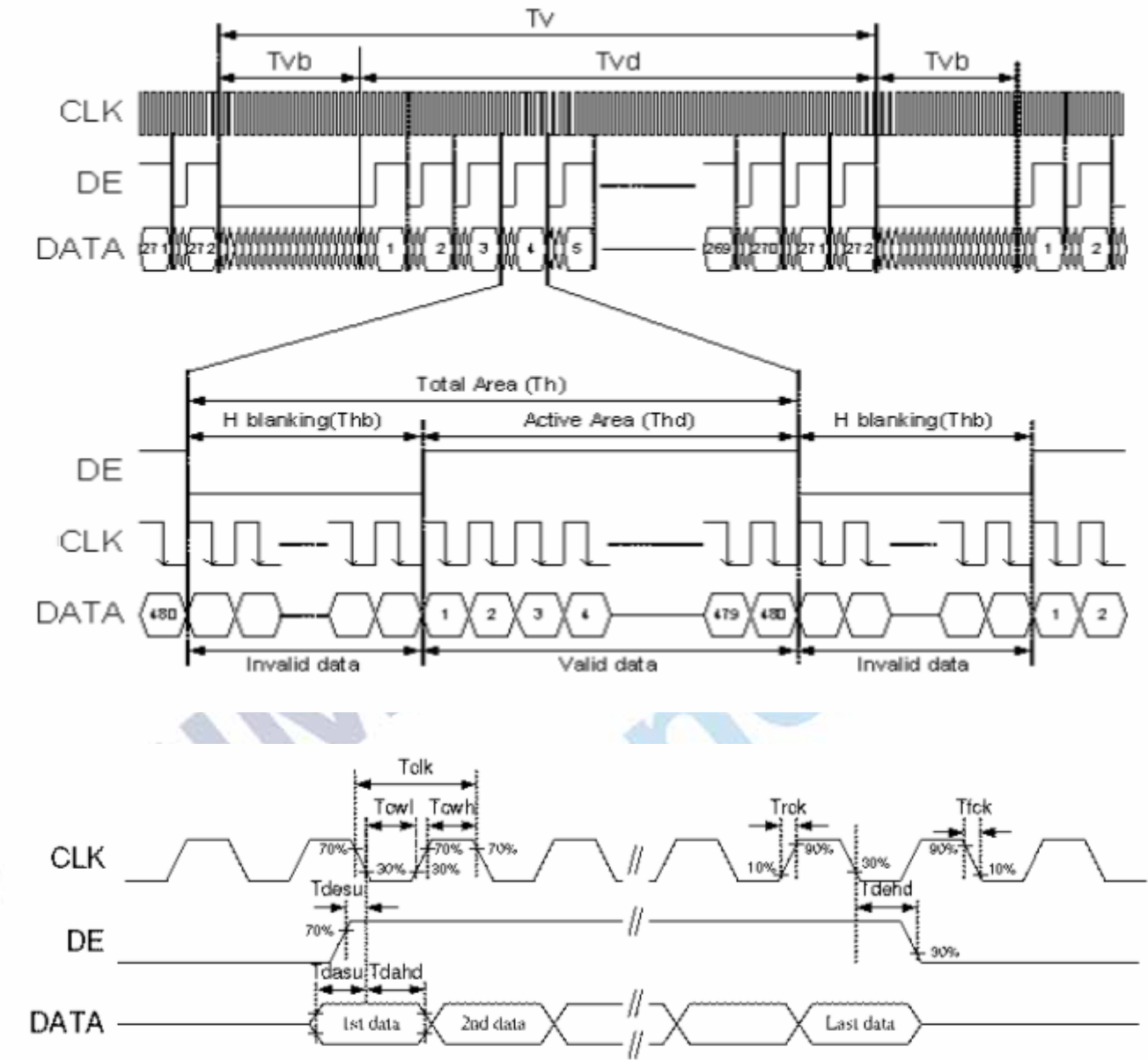
3.4.1. Timing Conditions

Parallel DE mode RGB input timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
CLK frequency	fclk	7	9	12	MHz
DEV period time	Tv	277	288	400	H
DEV display area	Tvd	272			H
DEV blanking	Tvb	5	16	128	H
DEH period time	Th	520	525	800	CLK
DEH display area	Thd	480			CLK
DEH blanking	Thb	40	45	320	CLK
CLK cycle time	Tclk	83	110	143	ns
Clock width of high level	Tcwh	40	50	60	%
Clock width of low level	Tcwl	40	50	60	%
Clock rising time	t _{rck}		-	9	ns
Clock falling time	t _{fck}		-	9	ns
Data Setup Time	t _{desu}	10	-	-	ns
Data Hold Time	t _{dahd}	10	-	-	ns
DE Setup Time	t _{desu}	10	-	-	ns
DE Hold Time	t _{dehd}	10	-	-	ns

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3.4.2. Timing Diagram



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地址：深圳市宝安区福永街道福海大道富桥第三工业区二期C1栋
网址：<http://www.csd-hc.com/>

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	60	70	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	60	70	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	40	50	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	60	70	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		400	500	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5
	W_Y		0.28	0.33	0.38	-	
Transmittance	Tr		5.4	6.23	-	%	

Test Conditions:

1. $V_{DD}=3.3V$, $I_L=20mA$ (Backlight current), the ambient temperature is $25^{\circ}C$.
2. The test systems refer to Note 2.

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Note 1: Definition of viewing angle range

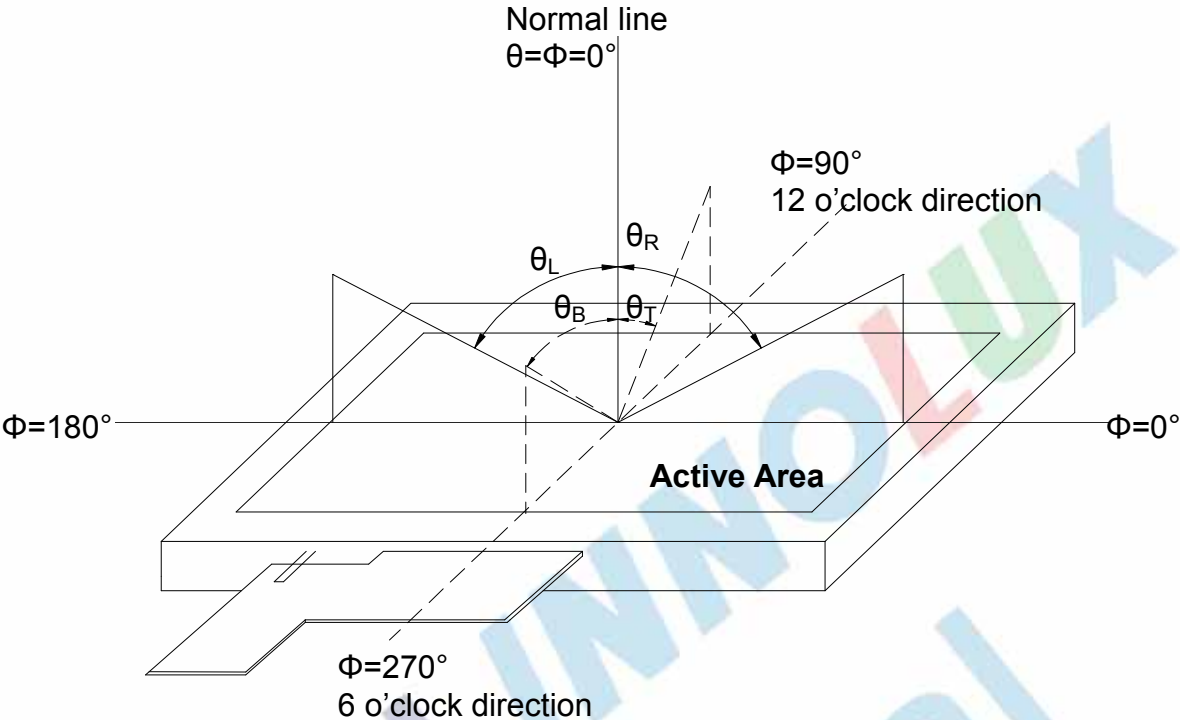


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

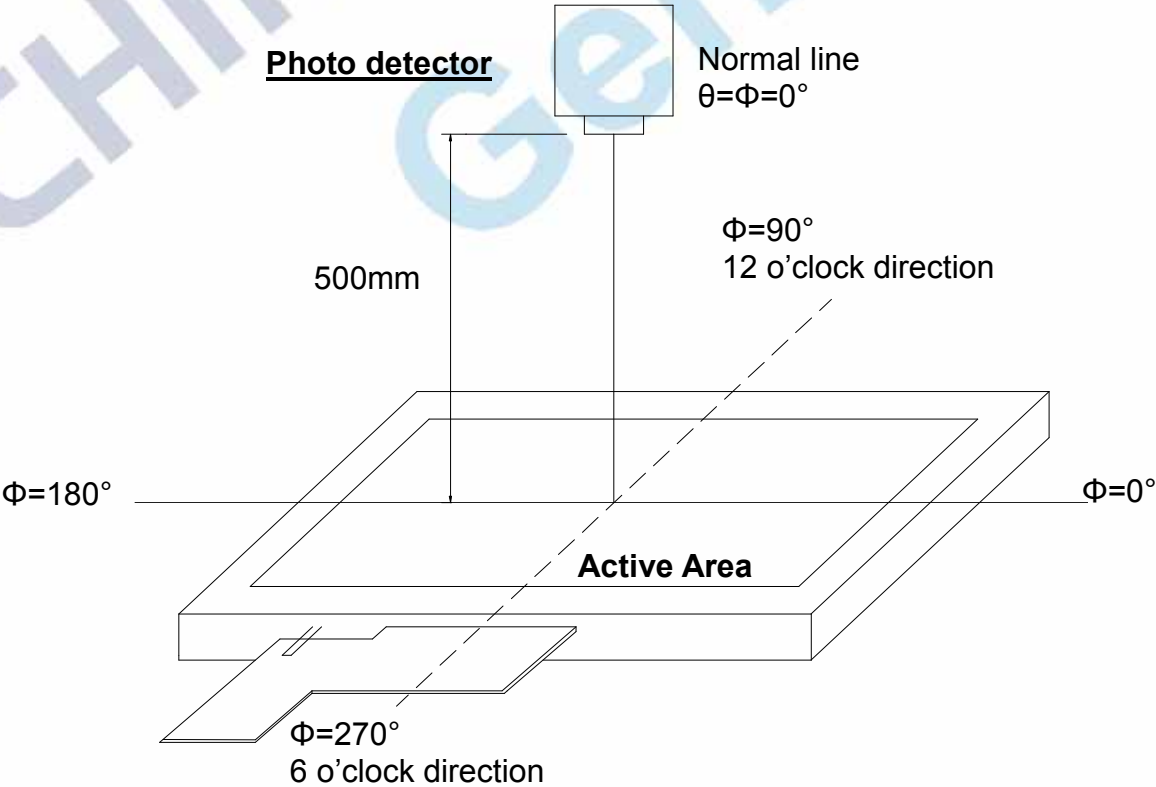


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

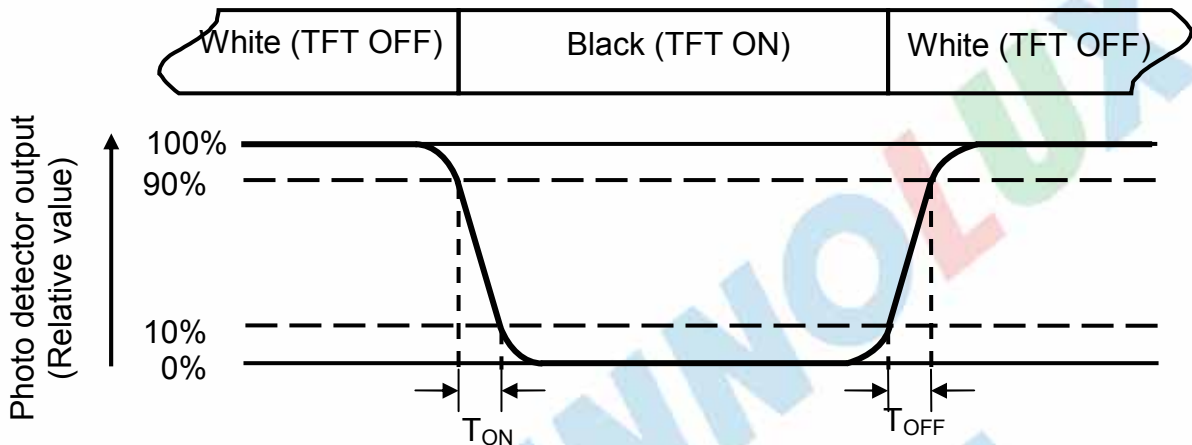


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

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5. Reliability Test Items

(Note3)

Item	Test Conditions	Remark
High Temperature Storage	Ta = 80℃ 240hrs	Note 1, Note 4
Low Temperature Storage	Ta = -30℃ 240hrs	Note 1, Note 4
High Temperature Operation	Ts = 70℃ 240hrs	Note 2, Note 4
Low Temperature Operation	Ta = -20℃ 240hrs	Note 1, Note 4
Operate at High Temperature and Humidity	+60℃, 90%RH 240hrs	Note 4
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

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6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

6.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

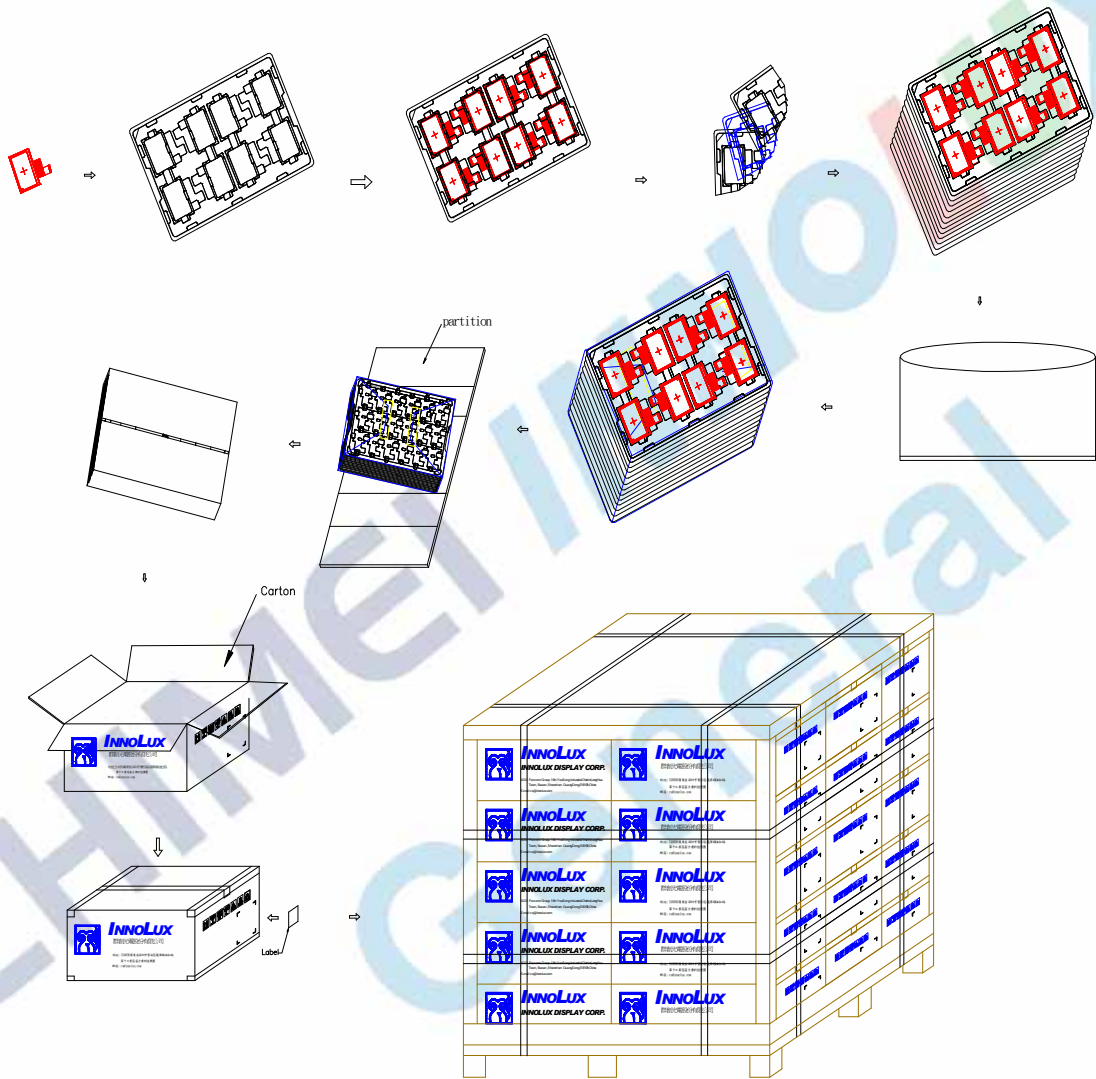
6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

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8.3. Packaging Drawing



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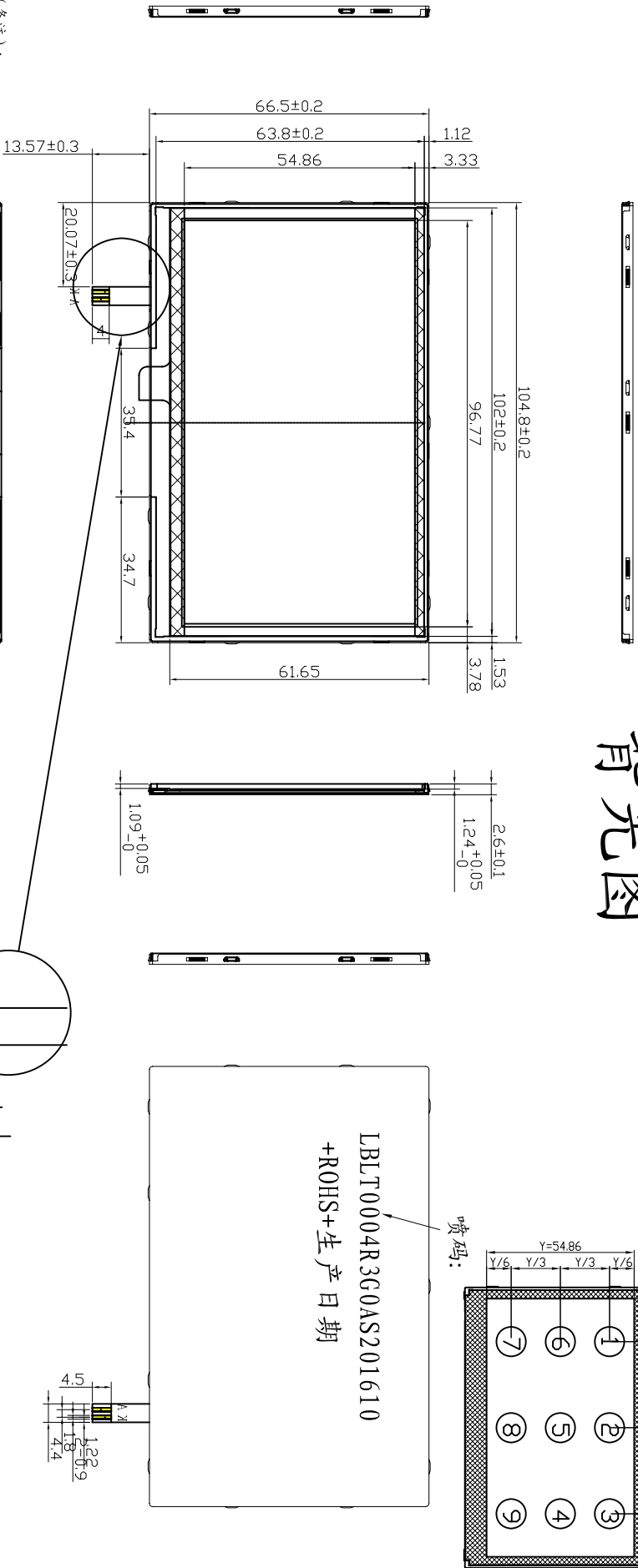
网址：<http://www.csd-hc.com/>

APP: (承认)	DATE
CHK: (核对)	DATE
DWN: (设计)	DATE

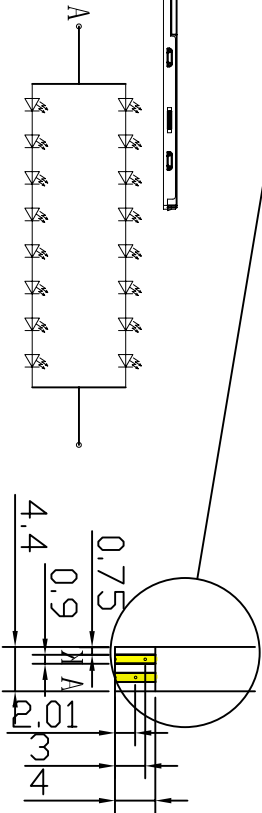
REV (标记)	DATE (日期)

DESCRIPTION (描述)

背光图



- NOTES (备注):
- Unit:mm, 单位:mm
 - Do not scale drawing, 未按比例出图
 - △ Modification rev. number, △为修改标记
 - Without tolerance is, 未注公差为±0.2
 - IMPORTANT DIMENSION MARK: (重点控制尺寸)*
 - 符合ROHS标准



CIRCUIT DIAGRAM (8串2并)

SPECIFICATION FOR BACKLIGHT (规格)

Page: (页数) 1/1

CUSTOMERS CODE: (客户料号)

EDITION: (版本号) 0

JT MODEL NO. (星百亿料号)

EDITION: (版本号) 0

SCALE: (比例) 1:1

UNIT: (单位) mm

Customer Name: 客户名称

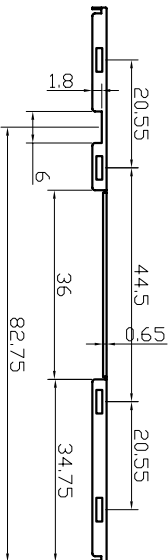
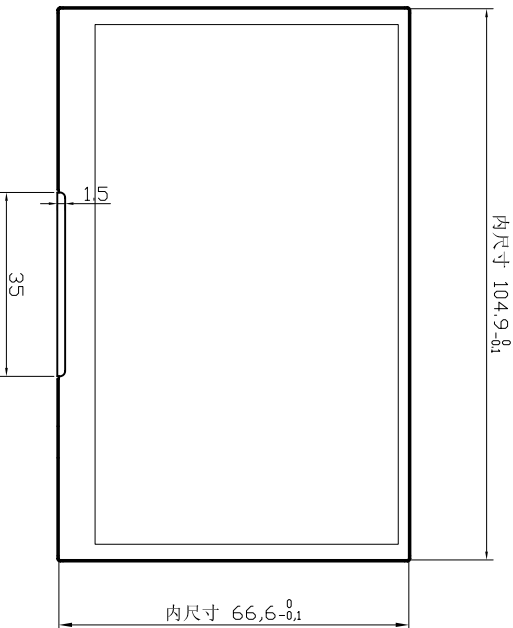
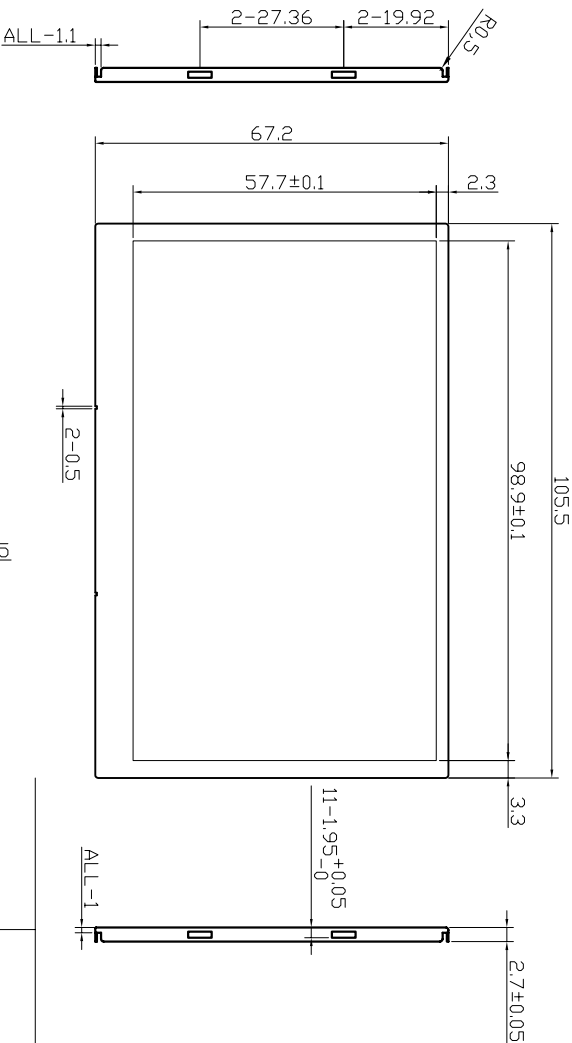
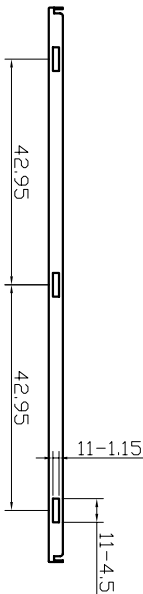
Approval Date: 承认日期

Approval Date: 承认日期

Approval Date: 承认日期

10	SHELL (铁框 SUS201)	1
9	LED (发光二极管)	16
8	FPC (软基板)	1
7	DOUBLE SIDE TAPE (FPC双面胶)	1
6	SHADING TAPE (遮光膜)	1
5	BEF (增光膜)	3
4	DIFUSER TAPE (扩散膜)	1
3	LIGHT GUIDE (导光板)	1
2	REFLECTOR SHEET (反射片)	1
1	HOUSING (胶框)	1

$T=0.3\pm0.02\text{mm}$ 镀铝锌板



备注:

1. 单位:mm
2. 未注R0.3
3. 修改标记
4. 材质:
5. 需要符合ROSH
6. 表面洁净, 需覆盖保护膜, 保证表面无刮伤、脏污、异物、压痕等
7. 无冲切毛刺, 不易刮伤其它物料
8. 未注尺寸结构要求按电子档实测为准

REV	DATE	DESCRIPTION	REVISER
修订	日期	修订内容	修订者

第三角法

零件图

TYPE	MODEL NO.
类型	模组号
上铁框	JTA-S337
PART NO.	EDITION
星百亿型号	版本
GJT337H-3	0

MATERIAL	DATE	PAGE
材料	日期	页次
SUS201	2011.11.18	1/1

APPROVED	CHECK	DESIGNED
承认	核对	设计

GENERAL TOLERANCES 公差表			
平面翘曲度公差表		线性尺寸公差表	
尺寸范围	公差	尺寸范围	公差
35>L	<0.1	10>L	±0.04
35<L<120	±0.3	10<L<70	±0.07
120<L	<0.4	70<L	±0.12
ANGLE ±0.5°			

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2.光电特性 ELECTRICAL/OPTICAL CHARACTERISTICS

项目 Item	符号 Symbol	最小值 min	典型值 typ	最大值 max	单位 Unit	测试条件 Condition
正向电压 Forward Voltage	VF	22.4	25.6	28	V	IF=40mA 加 DBEF
色坐标 Chromaticity Coordinates	X	0.260		0.320		
	Y	0.300		0.360		
亮度 CD/M2 Luminance	BLU	11000	11500			
均匀度 Uniformity	%	80				
反向电流 Reverse Current	Ir			50	μA	Vr=5V/SMD

单 LED 寿命极限 ≥ 50000 hrs 辉度减 50% ,此款 LED 灯用聚飞 020 LED 43 档 G2 色区

3. 极限参数 ABSOLUTE MAXIMUM RATINGS

(除非特别说明,环境温度 T=25℃. Unless specified,The Ambient temperature T=25℃)

项目 Item	符号 Symbol	条件 Condition	值 Rating	单位 Unit
反向电压 Reverse Voltage	VR		8*10	V
正向电流 Forward current	IFM		1*25	mA
正向脉冲电流 Peak forward current	IFP	Duty 1/10 pulse, width 0.1 ms 占空比 1/10, 脉 冲宽度 0.1ms	300	mA
极限功耗 Power description	Pd		25*3.4*16=1360	mW
工作温度 Operating temperature	Topr		-30℃~+70℃	℃
贮存温度 Storage temperature	Tstg		-40℃~+80℃	℃

* 当工作温度高于 25℃时,IF 必然降低; 电流降低率是 4*0.4mA/℃(直流驱动).

电话: 0755-27880400

传真: 0755-29355600

地址: 深圳市宝安区福永街道福海大道富桥第三工业区二期C1栋

网址: <http://www.csd-hc.com/>

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For operation above 25℃,The IF must be derated , the Current derating is $4*0.4\text{mA}/^{\circ}\text{C}$ for DC drive.

4.品质检验标准

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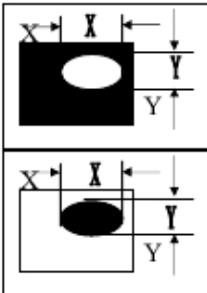
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不良项目	不良说明	判定												
1、缺亮	成品发光时未能有效将灯点亮	主缺												
2、亮度不均	发光区整体发光亮度有明显的差异,规格参照各机种 DS 规定或见限度样品	主缺												
3、颜色偏差	发光区整体发光颜色差异明显,规格参照各机种 DS 规定或见限度样品,同一批产品中有明显的颜色偏差	主缺												
4、划痕/线状不良	<table border="1"><thead><tr><th>长度 L(mm)</th><th>宽度 W(mm)</th><th>允许条数</th></tr></thead><tbody><tr><td>不计</td><td>$W \leq 0.02$</td><td>不计</td></tr><tr><td>$L \leq 1.0$</td><td>$W \leq 0.05$</td><td>间隔大于 10mm, ≤ 2 条</td></tr><tr><td>$L > 1.0$</td><td>$W > 0.05$</td><td>不可有</td></tr></tbody></table> 注: 1.L 表示线长, W 表示线宽 2.黑白线状缺陷整体允许数不超过 2 个 ; 3.对于线状缺陷很明显时,必要时参考签订的限度样品来控制。	长度 L(mm)	宽度 W(mm)	允许条数	不计	$W \leq 0.02$	不计	$L \leq 1.0$	$W \leq 0.05$	间隔大于 10mm, ≤ 2 条	$L > 1.0$	$W > 0.05$	不可有	次缺
长度 L(mm)	宽度 W(mm)	允许条数												
不计	$W \leq 0.02$	不计												
$L \leq 1.0$	$W \leq 0.05$	间隔大于 10mm, ≤ 2 条												
$L > 1.0$	$W > 0.05$	不可有												
5、点状不良 (黑白点)	 <table border="1"><thead><tr><th>Φ(mm)</th><th>允许个数</th></tr></thead><tbody><tr><td>$\Phi \leq 0.1$</td><td>不计</td></tr><tr><td>$0.1 < \Phi \leq 0.15$</td><td>间隔大于 10mm, ≤ 2</td></tr><tr><td>$0.15 < \Phi$</td><td>0</td></tr></tbody></table> 注: 1. $\Phi=(X+Y)/2$, X 为点缺陷的长, Y 为点缺陷的宽. 2. 一片背光不允许超过 2 个点状不良, 2 个点状不良的间距必须在 15mm 以上;	Φ (mm)	允许个数	$\Phi \leq 0.1$	不计	$0.1 < \Phi \leq 0.15$	间隔大于 10mm, ≤ 2	$0.15 < \Phi$	0	次缺				
Φ (mm)	允许个数													
$\Phi \leq 0.1$	不计													
$0.1 < \Phi \leq 0.15$	间隔大于 10mm, ≤ 2													
$0.15 < \Phi$	0													
6、暗影	发光区内任一处暗影以盖客户 LCD 玻璃 30cm 远目视仍可看见为 NG 或见限度样品	次缺												
7、亮线	发光区内任一处暗影以盖客户 LCD 玻璃 30cm 远目视仍可看见为 NG 或见限度样品	次缺												
8、点光源	不可有点光源或见限度样品	次缺												
9、短路	发光点被短接,造成缺亮现象	主缺												
10、亮度不符	亮度与规格不符	主缺												
11、色泽不符	色泽与规格不符(白光以 X/Y 值范围为准)	主缺												
12、白雾	不可有或见限度样品	次缺												

电话: 0755-27880400

传真: 0755-29355600

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网址: <http://www.csd-hc.com/>

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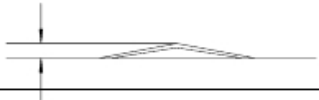
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13、漏光	不可有漏光或见限度样品	次缺
14、保护膜下表面 杂物	发光区内不允许有杂物(检验 标准同黑白点)	次缺
15、干涉纹	彩屏产品成发光盖玻璃不允许 有干涉纹现象	主缺

4.1 资料

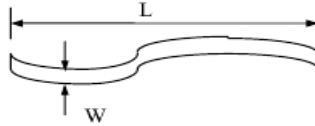
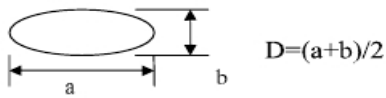
1、资料不符	机种数量、工单与流程单不符者	主缺
2、资料不明	1) 流程单记录(产品型号、单号、数量、作业者、QC 签章及其它应记录的内容)不全或错误 2) 装箱记录不全或错误	主缺
3、数量不符	产品数量与装箱记录不相符	主缺
4、资料不全	流程单与装箱记录不齐全	次缺
5、缺流程单	缺流程单	主缺
6、混产品	同一批材料中混有两种(含)以上之型号	主缺

4.2 外形

1	刮伤/折痕	外观	不允许或见限度样本
2	弯曲程度		长度<100mm, 弯曲<0.2mm; 长度>100mm, 弯曲<0.5mm
3	FPC 金手指折痕, 氧化, 脏污, 异物	外观	不允许
4	FPC 组装偏位	外观	偏位小于 0.2mm
5	喷码模糊、漏喷、喷错	外观	不允许
6	铁框变形, 松动, 未组装到位	外观	不允许
7	PCB 引脚/PIN 脚氧化, 脏污	外观	不允许
8	PCB 歪斜、松脱、脚短/长	外观	不允许
9	漏贴双面胶	外观	不允许
10	导光板未组到位	外观	不允许
11	发光面与 PET 间异物、毛屑	外观(发光区域内)	不允许

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上述线状与点状缺陷判定时, 使用 LCD 屏判定为辅
平均直径: D、宽: W、长: L 之定义如下图
L>2W 时, 视为线状缺陷



5. 保存和焊接条件 STORAGE & SOLDERING CONDITIONS:

y 注意: 保存条件不好时,会降低反光膜(扩散膜)与导光片(反射壳)的粘附附力. 推荐保存条件为: 温度:25±10℃ 湿度: 65%±20%RH)。Store with care: Storing the units in bad condition will cause the reflector sheet And decrease it's adhesive power. Storage the products under the condition for our recommendation is: temperature 25±10℃ and humidity 65%±20%RH ..

y 焊接温度 320℃±20℃,焊接时间小于 3 秒,烙铁功率小于 30W。The soldering temperature is 320℃±20℃ and Soldering time should be less than 3 sec, and soldering iron power should be less than 30W.

y 焊接点应离产品实体大于 1.6mm。。 The soldering point should be farther than 1.6mm from body.

6. 静电损伤与防护 (Static electricity damage)

静电与电冲击将损坏光产品, 在处理产品时推荐使用静电手环、手指套.(Static electricity and surge will damage the LEDs. It is recommended to use a wrist band or anti-electrostatic glove when handing the Leds)

所有设备仪器机器外壳必须牢靠地接地.(All devices , equipment and machinery must be properly grounded)

在检查背光源产品的 LED 是否被静电损坏时, 可在低电流下(一般推荐 1mA 以下)点亮 LED, 若发现不亮或亮度很低,

则说明 LED 很可能已被损坏. 被损坏的 LED 呈现的特性还有:反向漏电流增大、 正向电压偏低(When inspecting own

final products on which LEDs were mounted, it it recommended to check also whether the mounted LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by light emission test at lower current (below 1mA is recommended).Damaged LEDs will show some unusual characteristics such as leak current remarkably increases , starting forward voltage becomes lower)

7.信赖度试验(Reliability Test)

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传真: 0755-29355600

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Test Item	Reference Standard	Test Condition	Duration	Sample size	Defect	判定标准
Life Test		T=25℃ IF=29mA	20000hrs	10	0	无死灯 亮度衰减 ≤50%
Low Temperature Storage		T=-40℃	240hrs	22	0	无变形 /起翘/开 裂/死灯/ 开路等; 测试参数 附合图面 要求; 亮 度衰减≤ 30%
High Temperature Storage		T=80℃	240hrs	22	0	
High humidity and high temperature storage		T=60℃ RH=80%	240hrs	22	0	
High humidity and high temperature test		T=60℃ RH=80% IF=80mA	240hrs	10	0	

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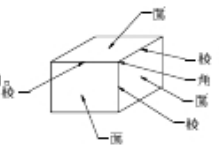
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技术参数名称	技术条件	技术规格	重要程度
包装特别要求		内包装要求防静电	一般
MTBF	IF=80mA	平均无故障时间大于 10000hrs	重要
寿命试验 (加速衰减)	T=25℃, 每个支路用 2*IF 的电流测试 48H	反向电流、正向电压、亮度、均匀度不能超过要求规格范围且变化不超过 20%, 不能有闪灯, 死灯, 显示不稳定现象;	重要
冷热冲击试验	-40℃ (20 分钟) ~25℃ (5 分钟) 80℃ (30 分钟) ~25℃ (5 分钟) 连续 10 个循环	反向电流、正向电压、亮度、均匀度不能超过要求规格范围且变化不超过 20%, 不能有闪灯, 死灯, 显示不稳定现象;	参考
ESD	COB LAMP型接触放电±2KV; SMD型接触放电±8KV; 正负极悬空	功能测试正常 [蓝色, 绿色, 白色抗静电参数: 接触放电 100-150V, 若有加反向二极管接触放电要大于 2000V; 黄绿色, 红色, 橙色, 抗静电参数: 接触放电 2000V 左右 (负极接 GND), 试验后功能测试正常。]	重要
反向电流	VR=5V/LED 或 VR=0.8V/LED	没有二极管时小于 25μA/支路 (5V/LED), 有反向二极管 20mA (典型值) /支路 (0.8V/LED)。	重要
振动试验	频率: 50 HZ 振幅: 1.5mm 时间: X, Y, Z 三个方向 30min	1、功能测试正常 2、不出现吸塑脱落等现象 3、无结构松动胶落	一般
跌落试验	在成品满包装的情况下, 自由落体, 外箱的一角三棱六面各一次 (距地面高度依总重量不同而异: 0~9kg:760mm; 9.1~22kg:610mm; 22.1~45.5kg:530mm; 	1、产品无变形、松脱、破裂、改变位置, 且功能正常。 2、包装材料无变形或严重变形。	一般

环保标准

本产品符合欧盟 RoHS 指令要求. This product accord with EU RoHS.

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