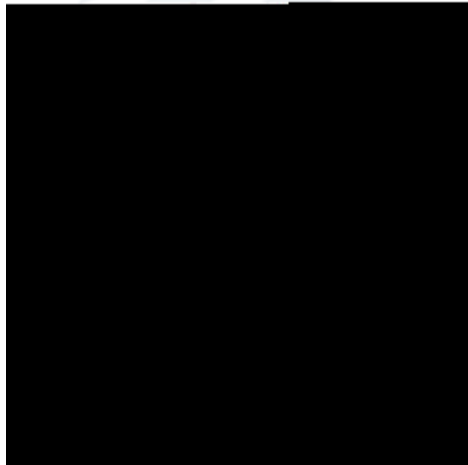


SPECIFICATION

产品规格书



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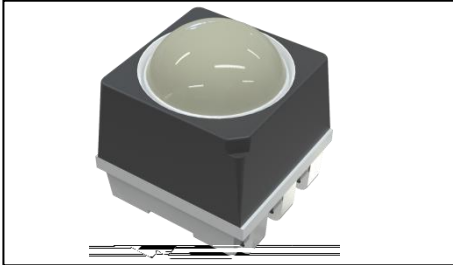
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1. Description 产品介绍

1.1 General Description 产品描述



Surface brush design

2.8mmx2.7mmx3.0mm

该产品为全彩 LED 器件，高对比度(五面刷墨设计)，产品尺寸: 2.8mmx2.7mmx3.0mm。

1.2 Features 产品特征

Surface not reflective. 表面不

High luminous Intensity, Low power consumption, High reliability and Long life.

光强高、功耗低、可靠性好、

Water-resistant(IPX6): 防水等

Moisture sensitivity level: 5a

RoHS compliant. 满足RoHS

Matte surface. 哑光表面

Pb-free reflow soldering application. 无铅回流焊

1.3 Application 产品应用

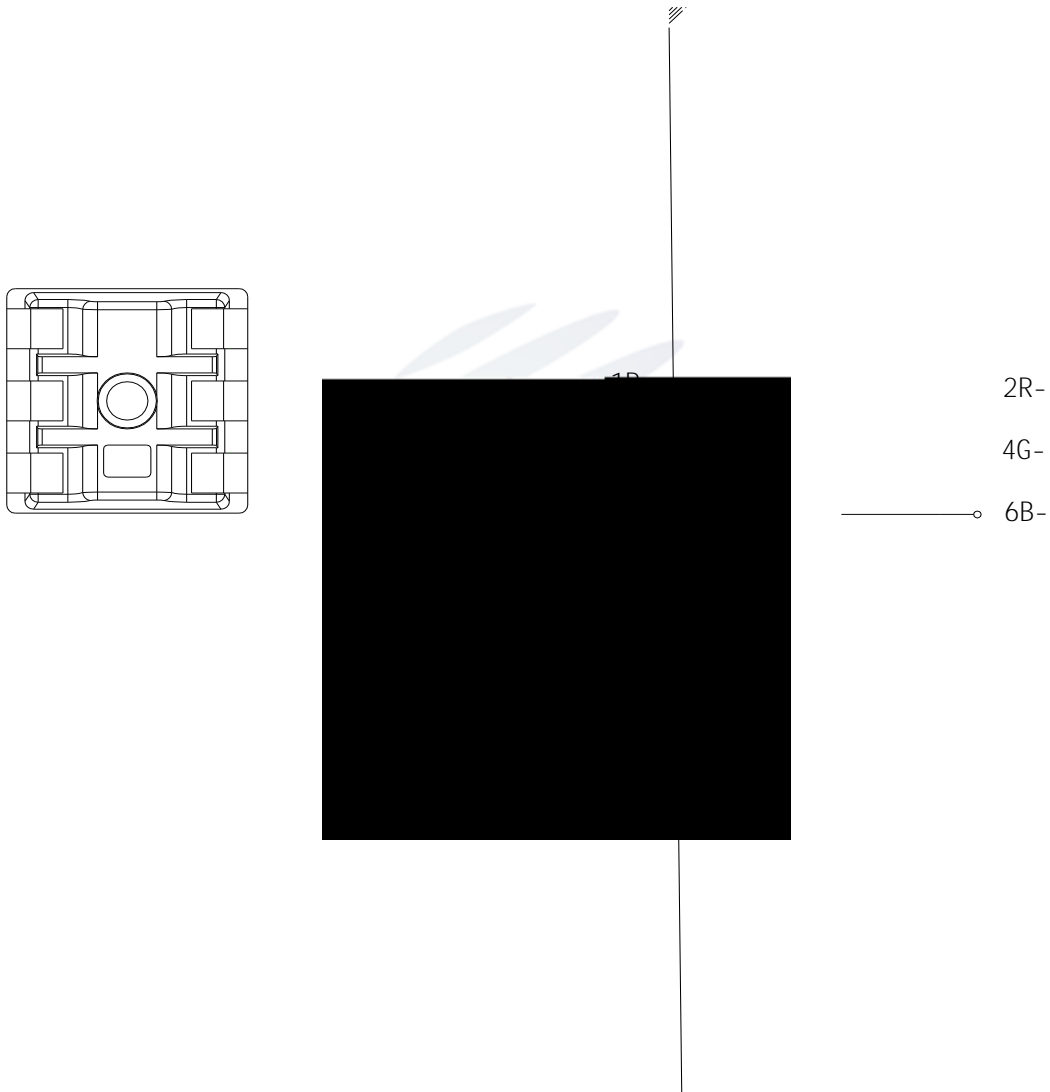
Outdoor full-color video screen. 户外全彩显示屏

Indoor and outdoor decorative lighting. 室内外装饰照明

Amusement. 娱乐产品

General use. 其他应用

1.4 Package Dimension 封装尺寸



Notes 备注:

1. All dimensions units are millimeters. 所有尺寸标注单位为毫米
2. All dimensions tolerances are $\pm 0.1\text{mm}$ unless otherwise noted.除特别标注外,所有尺寸公差为 ± 0.1 毫米

1.5 Product Parameters 产品参数

Table 1-1 Electrical / Optical Characteristics at Ts=25°C 电性与光学特性

| Item 项目 | Symbol 符号 | Test Condition 测试条件 | Value | | | Unit 单位 |
|--|--------------|---|----------|---------|---------|---------|
| | | | R | G | B | |
| Reverse Current (漏电流) | I_R | $V_R=5V$ | 6 | 6 | 6 | |
| Forward Voltage (正向电压) | V_F (min) | R $I_F = 20mA$ G $I_F = 20mA$ B $I_F = 20mA$ | 1.7 | 2.7 | 2.7 | V |
| | V_F (max) | | 2.4 | 3.4 | 3.4 | V |
| Dominant Wavelength 主波长 | λ_D | | 617~ 628 | 520~545 | 460~475 | nm |
| Spectrum Radiation Bandwidth 半波宽 | | | 24 | 38 | 30 | nm |
| Luminous Intensity 光强 | I_V (min) | | 1000 | 2300 | 350 | mcd |
| | I_V (avg) | | | 3500 | 520 | mcd |
| | I_V (max) | | | 5200 | 780 | mcd |
| Viewing Angle (发光角度) | | | 60-70 | 75-85 | deg | |

Table 1-2 Absolute Maximum Ratings

绝对最大值

| Parameter (参数) | Symbol (符号) | Rating (值) | | | Unit 单位 |
|---------------------------------------|-------------|------------|----|----|---------|
| | | R | G | B | |
| Forward Current (正向电流) | | 20 | 20 | 20 | mA |
| Peak Forward Current (峰值电流) | I_{FP} | 80 | 80 | 80 | mA |
| Reverse Voltage (反向电压) | V_R | 5 | 5 | 5 | V |
| Operating Temperature (操作温度) | T_{OPR} | -30 ~ +85 | | | |
| Storage Temperature (储存温度) | T_{STQ} | -40 ~ +100 | | | |
| Power Dissipation (功耗) | P_D | 60 | 68 | 68 | mW |
| Electrostatic Discharge (HBM) (静电) | E_{SD} | 1000V | | | |

Notes 备注:

1. 1/10 Duty cycle, 0.1ms pulse width. 脉宽0.1ms,占空比1/10.
2. The above forward voltage measurement allowance tolerance is $\pm 0.1V$. 以上所示电压测量误差 $\pm 0.1V$ 。
3. The above . 以上所示波长测量公差 $\pm 1nm$ 。
4. The above luminous intensity measurement allowance tolerance $\pm 10\%$. 上述发光强度的测试允许公差为 $\pm 10\%$
5. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product. 使用功率不能超过规定的最大值。
6. All measurements were made under the standardized environment of Refond. 标准测试平台。
7. All the datas are just for reference, 以上参数仅供参考,请以实物标签为准。

1.6 Typical optical character 伏安特性曲线

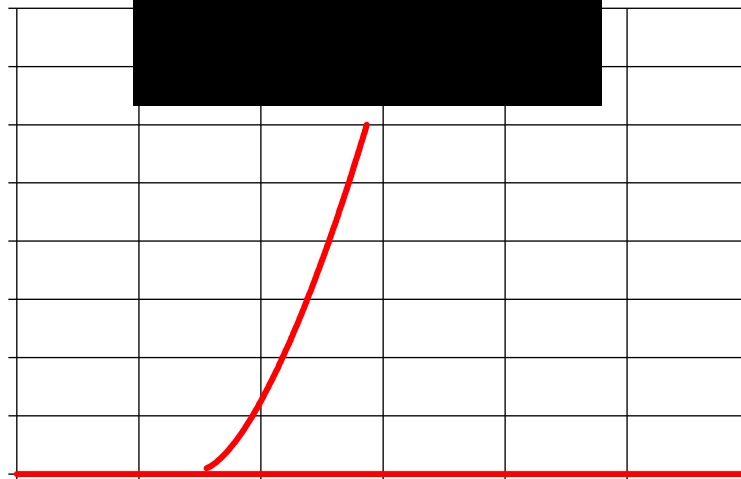
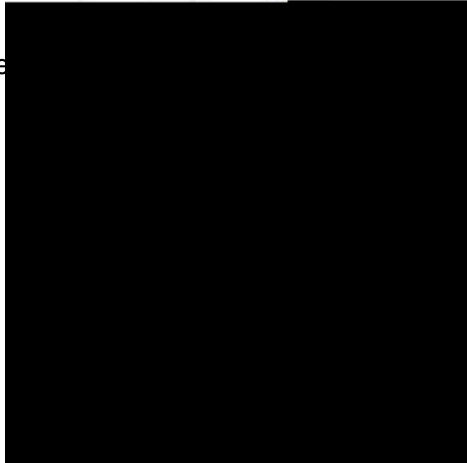


Fig 1-6 Forward Voltage Vs. Forward Current 伏安特性曲线



Fig 1-9 Solder Te



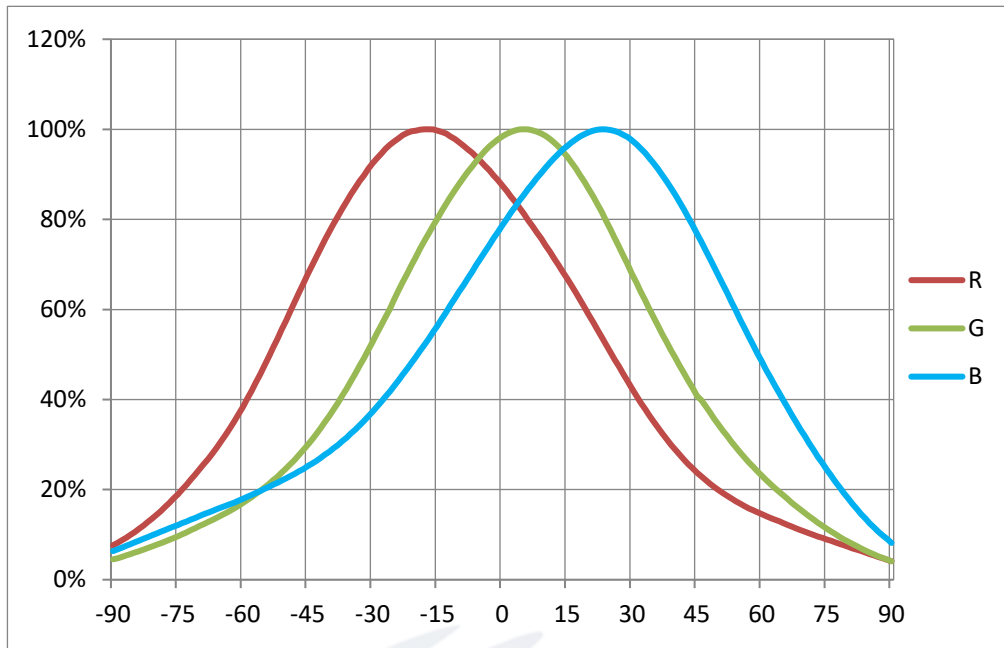


Fig 1-11 Directivity X-X radiation angle X轴方向辐射角度

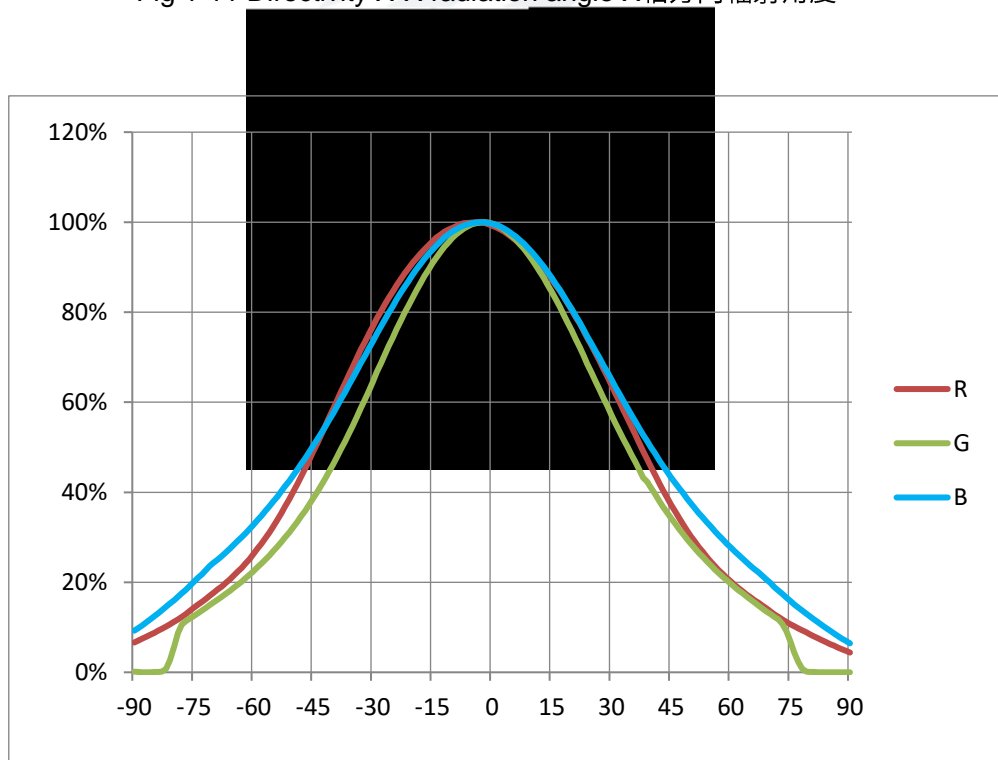
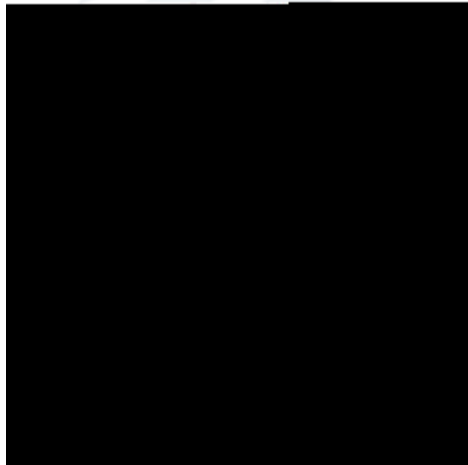


Fig 1-12 Directivity Y-Y radiation angle Y轴方向辐射角度





2.3 Cardboard Box 包装纸箱

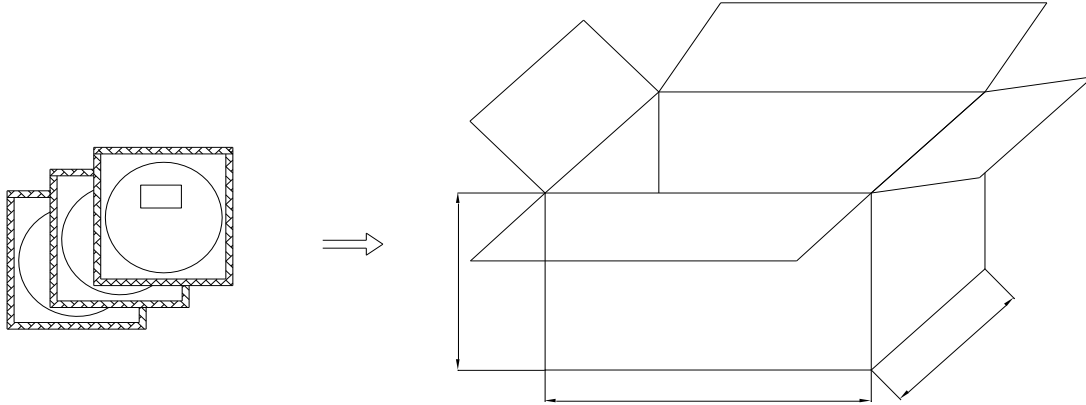


Fig.2-5 Cardboard 装箱

2.4 Reliability Test Items A 可靠性测试项目及条件

| Test Items 项目 | Ref.Standard 参考标准 | Test Condition 测试条件 | Time 时间 | Quantity 数量 | Ac/Re 接收/拒收 |
|---|--------------------------|--|------------|----------------|----------------|
| Resistance to Soldering Heat 耐焊接热 | JES | | times | 22pcs. | 0/1 |
| Thermal Shock 冷热冲击 | JEITA ED-701 300 307 | 10s 100°C 15min | 500cycle | 22pcs. | 0/1 |
| High Temperature Storage 高温保存 | JEITAED-4701 200 201 | Temp:100°C | 1000hrs. | 22pcs. | 0/1 |
| Low Temperature Storage 低温保存 | JEITA ED-4701 200 202 | Temp:-40°C | 1000hrs. | 22pcs. | 0/1 |
| Room Temperature Operating Life 常温寿命测试 | JESD22-A108 | T _A =25°C I _F =20mA | 1000hrs. | 22pcs. | 0/1 |

| | | | | | |
|--|--------------------------|------------------------|----------|--------|-----|
| High Temperature High Humidity Life Test 高温高湿寿命测试 | JESD22-A101 | 85°C/ 85%RH IF=10mA | 500hrs. | 22pcs. | 0/1 |
| Temperature Humidity Storage 高温高湿储存 | JEITA ED-4701 100 103 | TA=85°C RH=85% | 1000hrs. | 22pcs. | 0/1 |
| Low Temperature Life Test 低温寿命 | JESD22-A108D | TA=-40°C, IF=20mA | 1000hrs. | 22pcs. | 0/1 |

2.5 Criteria For Judging Damage 生效判定标准

| Test Items 项目 | Symbol 符号 | Test Condition 测试条件 | Criteria For Judgement 判定标准 |
|--------------------------------------|--------------|------------------------|---|
| Forward Voltage 正向电压 | | | Initial Data ±10% 初始值 ±10% |
| Reverse Current 反向电流 | | | IR |
| Luminous Intensity 光强 | Iv | IF=20mA | Average Iv degradation rate 平均 Iv 衰减 ≤30% |
| Resistance to Soldering Heat 耐焊接热 | / | / | No internal cracks, no material between stripped, no deaded light 材料无内部裂痕、剥离、无死灯 |

Notes 备注:

1. The Reliability tests are based on Refond existing test platform. 可靠性测试基于瑞丰现有的测试标准。
2. The above reliability tests is based on the verification of a single/strip LED of Refond's existing experimental platform, the reliability experiment was taken under good heat dissipation conditions. when customers applies the LED to the series and parallel circuit, should take consideration of all the factors such as the current, voltage distribution, heat dissipation and others. 以上可靠性测试是基于瑞丰现有实验平台单颗/条 LED 在良好散热条件验证下的结果。客户端将 LED 应用于串、并联线路时, 需自行评估电流、电压分配、散热等问题。
3. The technical information shown in the data sheets

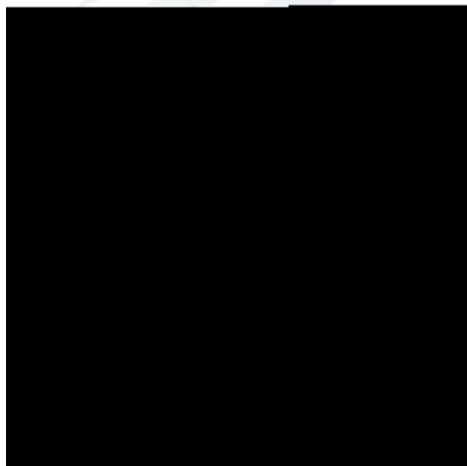


Table 3-1 Reflow Soldering Instructions

| | |
|--|----------------------|
| Average temperature rise speed平均升温速度 (T _{max} 至T _P) | Max 4 °C/ s 最高4 °C/秒 |
| Preheating: minimum temperature预热: 最低温度 (T _{min}) | 150 °C |
| Preheating: Max temperature预热: 最高温度 (T _{max}) | 200 °C |
| Preheating: Time预热: 时间 (T _{min} 至T _{max}) | 60s-120s 60 - 120秒 |
| Time limited to maintain high temperature: the temperature 限时维持高温: 温度 (T _L) | 217 °C |
| Time limited to maintain high temperature: The Time 限时维持高温: 时间 (t _L) | Max 60s 最多60秒 |
| Peak /Classification of temperature: 峰值 / 分类温度 (T _P) | 250 °C |
| Time limit classification of peak temperature 限时峰值分类温度: 时间 (t _P) | Max 10s 最多10秒 |
| Hold time within 5 °C with the temperature 与实际峰值温度 (T _P) 相差 5 °C 以内 保持时间 | Max 30s 最多30秒 |
| Cooling speed 降温速度 | Max 6 °C/ s 最高6 °C/秒 |
| Needed time from 25 °C to T _P 25 °C 升至峰值温度所需时间 | Max 8 minutes 最多8分钟 |

Notes 备注:

- 1.Reflow soldering should not be done more than one times.回流焊接最多只能进行一次.
- 2.It is recommended that use the middle temperature solder paste.推荐使用中温锡膏生产加工
- 3.Stress on the LEDES should be avoided during heating in soldering process.在回流焊接过程中,不要对 LED 施加任何压力.
- 4.After soldering ,do not deal with the product before its temperature drop down to room temperature.在焊接完成后,待产品温度下降到室温后,再进行其它处理.

3.1.1 Soldering Iron 烙铁焊接

(1) When hand soldering, keep the temperature of iron below less 300 less than 3 seconds
当手工焊接时, 烙铁的温度必须小于300°C, 时间不可超过3秒。

(2) The hand solder should be done only one time.手工焊接只可焊接一次。

3.1.2 Repairing 修补

Repair should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used (as below figure). It should be confirmed in advance whether the characteristics of LEDs will or will not be damaged by repairing.

LED回流焊后不应该修复, 当必须修复时, 必须使用双头烙铁, 而且事先应确认此种方式会不会损坏LED本身的特性。

3.1.3 Cleaning 清洗

Try to use "no clean solder paste" for cleaning. If you need to clean the PCB, after the completion of the soldering, the use of isopropyl alcohol (IPA) is recommended for cleaning. When using other solvents, please confirm beforehand the solvents do not damage the LED. Do not use ultrasonic cleaning.

尽量使用“免清洗型”焊锡膏, 这可以减少清洗步骤。如果需要清洁PCB, 焊接完成后推荐使用异丙醇(IPA)进行清洗。先确认使用的溶剂不会对LED造成损伤. 不推荐使用超声波清洗.

4.Handling Precautions 产品使用注意事项

4.1 Handling Precautions

4.1.1 Storage 贮存

(1) Moisture proof and anti-electrostatic package with moisture absorbent material is used, Packaged products have one year to save time.

本产使用密封防潮抗静电袋包装,并附有干燥剂,未开封的产品保存时间一年。

(2) Before opening the package, the product should be kept at 30°C or less and humidity less than 60%RH.

开封前,产品须存放在温度不高于30°C,湿度不高于60%RH的环境中。

(3) Seal anti-electrostatic bag humidity card should immediately check bag humidity indicator card in the open the bag after, Humidity is greater than or equal to 30%, Must be baked before use
 密封防静电袋内的湿度卡应在打开袋子后立即查看袋内的湿度指示卡来确定,湿度显示大于或等于30%时,使用前须进行烘烤。

(4) After opening the package, the product should be used within 24 hours. If not, please store at 30°C or less and humidity less than 60%RH, that the product be operated at the workshop condition of 30°C or less and humidity less than 60%RH.

开封后,产品必须24小时内使用完(温度不高于30°C,湿度不高于60%),如未使用完,余料须存放在温度不高于30°C,湿度不高于60%RH的环境中。

(5) If the moisture absorbent material have exceeded the storage time, baking treatment should be performed based on the following condition : 65±5°C for 24 hours.

对于尚未焊接的LED,如果吸湿剂或包装失效,或者产品没有符合以上有效存储条件,烘烤可以起到一定的性能恢复效果,烘烤条件:65±5°C,持续时间24H。

(6) Customer pre-treatment conditions before use: 客户使用前处理方式:

| Customer pre-treatment conditions before use 客户使用前处理方式 | | | |
|--|--|---|---|
| Condition before use 使用前情况: | undamped Production date: 2 months 未受潮,生产日期为 2个月内 | undamped Production date: 2-6 months 未受潮,生产日期为 2-6个月 | undamped Production date exceed 6 months 未受潮,生产日期为 6个月以上 |
| Pre-treatment | Baked 65°C±5°C/12H | Baked 65°C±5°C/24H | Baked 65°C±5°C/48H |

| | | | |
|-------|----------------|----------------|----------------|
| 处理方式: | 烘烤65°C±5°C/12H | 烘烤65°C±5°C/24H | 烘烤65°C±5°C/48H |
|-------|----------------|----------------|----------------|

4.1.2 Static Electricity 静电

(1) The following procedures may decrease the possibility of ESD damage.

以下操作可降低静电破坏的可能性

(2) Minimize friction between the product and surroundings to avoid static buildup.

将产品和外界之间的摩擦减到最低以避免静电产生。

(3) All production machinery and test instruments must be electrically grounded.

所有的产品设备和测试仪器必须接地。

(4) Operators must wear anti-static bracelets.

操作人员必须配戴静电环。

(5) Wear anti-static suit when entering work areas with conductive machinery.

进入带电设备工作区域时需穿防静电服。

(6) All workstations that handle IC must maintain an electrostatic potential of 150V or less.

所有操作 IC 和 ESD 敏感器件元件的工作站必须保持静电保护的静电保护。

4.1.3 Reverse voltage protection

array, we sug surface temperature should be lower than 55

temperature should be lower than 75 .

LED 在高温条件下,衰减会加速,本身应力也会增大,若长期处于高温环境下,极容易出现失效。对于高密度排列使用的情况,建议在使用过程中灯面温度不超过 55°C,灯脚温度不超过 75°C。

4.1.5 Others 其它事项

Do not directly touch or handle the epoxy surface. It may damage the internal circuitry.

Handle the component along the side surfaces by using forceps or appropriate tools.

请勿直接触摸或操作环氧树脂表面,这可能会损坏内部的电路,拿取时用镊子或合适的工具夹在元件的侧边

4.1.6 Declare 申明

(1) This specification is written by Refond. The latter is formal.

此规格书由瑞丰制定,规格书具有法律效力。

(2) Both the customers and Refond shall check the specifications of supplied products before

Refond

reserves the right to further modify the specifications of reference and sample without

noticing the customers.

在量产供货前,瑞丰需与客户签署规格书,规格书经双方确认后有效,对于

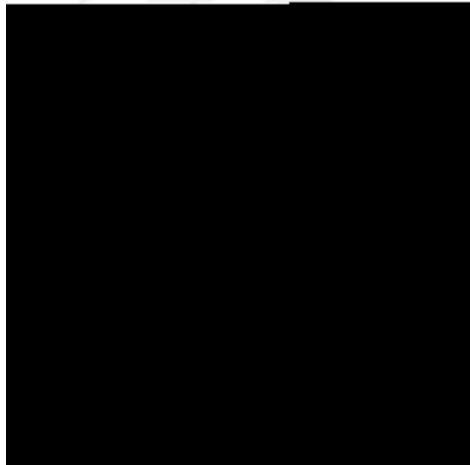
作为技术参考以及送样时提供的规格书,瑞丰需通知客户的权力。

Version History/修订历史

| Date日期 | Revisor修订者 | Version版本 | Verifier审核 | Remarks备注 |
|------------|------------|-----------|------------|-----------|
| 2023-07-01 | | E0 | | |
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www.refond.com



Declare 申明

This specification is written both in English and in Chinese and the latter is formal.

产品规格书以中英文方式书写，以中文为准。