# SPECIFICATION
# 产品规格书

REFOND P/N [redacted]

RF-AL-C3535L2K1**-M4-H

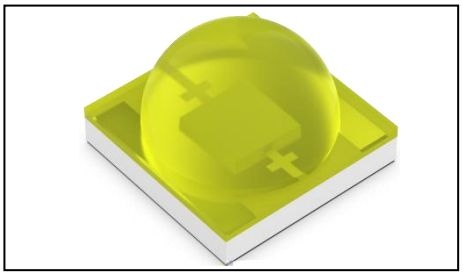
研发

Mass Product 量产供货

# Contents 目录

# 1. Description 产品介绍

## 1.1 p p 产品描述

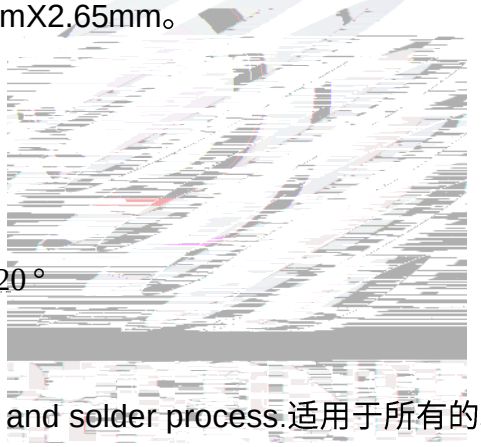


The White LED which was fabricated by using a blue chip and phosphors.

白光 LED，是由蓝光芯片激发荧光粉而形成

The LED package dimension: 3.45mmX3.45mmX2.65mm.

产品尺寸：3.45mmX3.45mmX2.65mm。



## 1.2Features 产品特征

► Ceramics Package.陶瓷封装

► viewing angle:120 °.发光角度120 °

►High reliability.高可靠性

►Suitable for all SMT assembly and solder process.适用于所有的SMT组装和焊接工艺

►Available on tape and reel.适用于载带及卷轴

►RoHS compliant.满足RoHS要求

## 1.3Application 产品应用

►Warning lights, Downlights, Wash wall lights, Spot lights, Street lights. 警报器、筒射灯、洗墙灯、天花灯、路灯

►Plant lighting, Landscape lighting 植物照明[redacted]观照明、舞台摄影

►Hotels, markets, offices, household and other indoor uses.酒店、商场、办公室、家用及其它室内用途

► 其他应用

## 1.4Package Dimension 封装尺寸

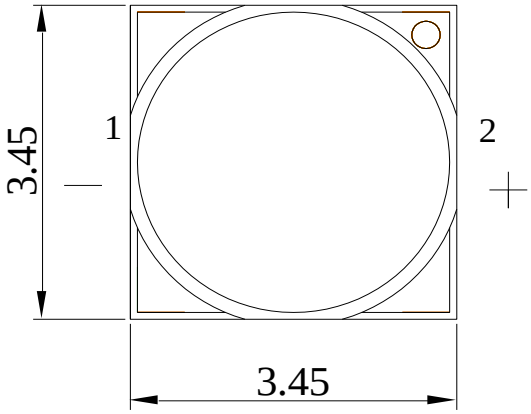



Fig.1-1 Top view 正面视图

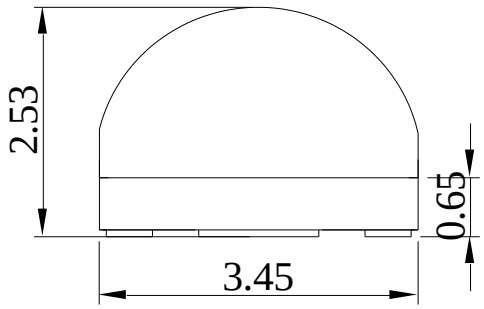



Fig.1-2 Side view 侧面视图

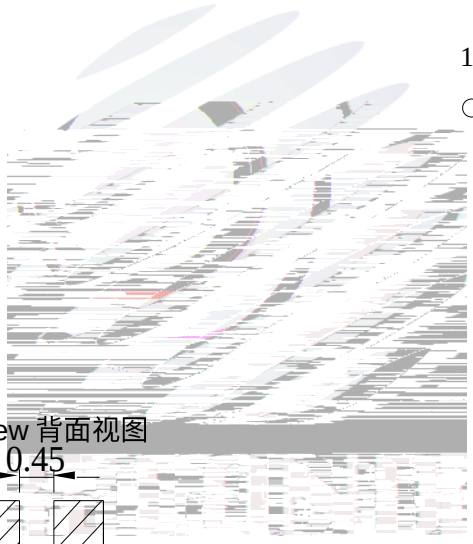


Fig.1-3 Bottom view 背面视图

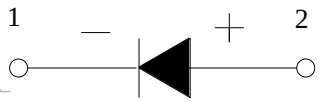



Fig.1-4 Polarity 极性

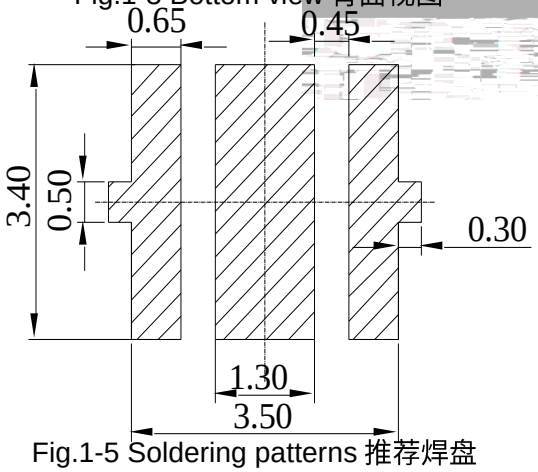



Fig.1-5 Soldering patterns 推荐焊盘

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 ±0.2mm unless otherwise noted.除特别标注外，所有尺寸公差为±0.2 毫米

## 1.5Product 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 |
|---|---|---|---|---|---|---|
| | | | Min. （最小值） | Typ （典型值） | Max. （最大值） | |
| Forward Voltage （正向电压） | $V_F$ | $I_F$=350mA | 2.6 | --- | 3.4 | V |
| RF-AL-C3535L2K127-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 160 | --- | 190 | lm |
| | | $I_F$=700mA | 300 | --- | 360 | lm |
| RF-AL-C3535L2K130-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 170 | --- | 200 | lm |
| | | $I_F$=700mA | 320 | --- | 380 | lm |
| RF-AL-C3535L2K135-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K140-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K145-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K150-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K157-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K160-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K165-M4-H Luminous Flux （光通量） | $I_V$ | $I_F$=350mA | 180 | --- | 210 | lm |
| | | $I_F$=700mA | 340 | --- | 400 | lm |
| RF-AL-C3535L2K127-M4-H Correlated Color Temperature 色温 | CCT | $I_F$=350mA | --- | 2700 | --- | K |
| RF-AL-C3535L2K130-M4-H Correlated Color Temperature 色温 | CCT | $I_F$=350mA | --- | 3000 | --- | K |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RF-AL-C3535L2K135-M4-H<br>Correlated Color Temperature<br>色温 | CCT | $I_F$=350mA | --- | 3500 | --- | K |

Table 1-2 Absolute Maximum Ratings at Ts=25°C 绝对最大值

| Parameter（参数） | Symbol（符号） | Rating（值） | Units（单位） |
|---|---|---|---|
| Power Dissipation<br>（功耗） | $P_D$ | 6800 | mW |
| Forward Current<br>（正向电流） | $I_F$ | 2000 | mA |
| Peak Forward Current<br>（峰值电流） | $I_{FP}$ | 3000 | mA |
| Reverse Voltage<br>（反向电压） | $V_R$ | 5 | V |
| Electrostatic Discharge<br>(HBM)（静电） | $E_{SD}$ | 2000 | V |
| Operating Temperature<br>（操作温度） | $T_{OPR}$ | -40 ~ +85 | |
| Storage Temperature<br>（储存温度） | $T_{OPR}$ | -40 ~ +85 | |
| Junction Temperature<br>（ | $T_J$ | 125 | |

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 ±0.1V. 以上所示电压测量误差 ±0.1V.

3. The above Dominant Wavelength measurement allowance tolerance is±1nm.以上所示波长测量误差±1nm.

4. The above luminous intensity measurement allowance tolerance ±10%. 上述发光强度的测试允许公差为±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. 所有测试都是基于瑞丰现有的标准测试平台。

7.When the LEDs are in operation the maximum current should be decided after measuring the package temperature，junction temperature should not exceed the maximum rate. LED 使用的最大电流需要根据散热条件确定，结温不能超过最大值。

## 1.5.1 Bin Range Of Forward Voltage and Luminous Intensity (IF=350mA)

## 光强分 BIN 范围(IF=350mA)

Table 1-3

| | | | | |
|---|---|---|---|---|
| $V_F$ V | F0 | G0 | H0 | I0 |
| | 2.6-2.8 | 2.8-3.0 | 3.0-3.2 | 3.2-3.4 |

Table 1-4 Chromaticity Region & Coordinates

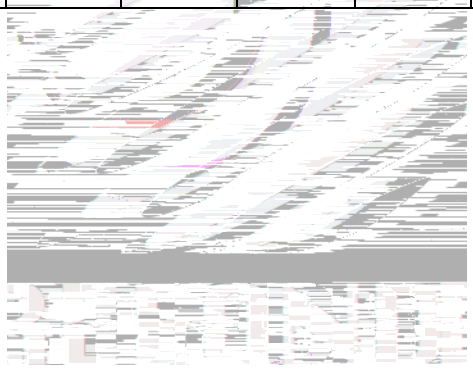
| | CIE-X | CIE-Y | Region | CIE-X | CIE-Y | Region | CIE-X | CIE-Y | Region | CIE-X | CIE-Y |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2700K | | | 3000K | | | 3500K | | | 4000K | | |
| 27A | 0.4373 | 0.3893 | 30A | 0.4147 | 0.3814 | 35A | 0.3889 | 0.3690 | 40A | 0.3670 | 0.3578 |
| | 0.4465 | 0.4071 | | 0.4221 | 0.3984 | | 0.3941 | 0.3848 | | 0.3702 | 0.3722 |
| | 0.4582 | 0.4099 | | 0.4342 | 0.4028 | | 0.4080 | 0.3916 | | 0.3825 | 0.3798 |
| | 0.4483 | 0.3919 | | 0.4259 | 0.3853 | | 0.4017 | 0.3751 | | 0.3783 | 0.3646 |
| 27B | 0.4465 | 0.4071 | 30B | 0.4221 | 0.3984 | 35B | 0.3941 | 0.3848 | 40B | 0.3702 | 0.3722 |
| | 0.4562 | 0.4260 | | 0.4299 | 0.4165 | | 0.3996 | 0.4015 | | 0.3736 | 0.3874 |
| | 0.4687 | 0.4289 | | 0.4430 | 0.4212 | | 0.4146 | 0.4089 | | 0.3869 | 0.3958 |
| | 0.4582 | 0.4099 | | 0.4342 | 0.4028 | | 0.4080 | 0.3916 | | 0.3825 | 0.3798 |
| 27C | 0.4582 | 0.4099 | 30C | 0.4342 | 0.4028 | 35C | 0.4080 | 0.3916 | 40C | 0.3825 | 0.3798 |
| | 0.4687 | 0.4289 | | 0.4430 | 0.4212 | | 0.4146 | 0.4089 | | 0.3869 | 0.3958 |
| | 0.4813 | 0.4319 | | 0.4562 | 0.4260 | | 0.4299 | 0.4165 | | 0.4006 | 0.4044 |
| | 0.4700 | 0.4126 | | 0.4465 | 0.4071 | | 0.4221 | 0.3984 | | 0.3950 | 0.3875 |
| 27D | 0.4483 | 0.3919 | 30D | 0.4259 | 0.3853 | 35D | 0.4017 | 0.3751 | 40D | 0.3783 | 0.3646 |
| | 0.4582 | 0.4099 | | 0.4342 | 0.4028 | | 0.4080 | 0.3916 | | 0.3825 | 0.3798 |
| | 0.4700 | 0.4126 | | 0.4465 | 0.4071 | | 0.4221 | 0.3984 | | 0.3950 | 0.3875 |
| | 0.4593 | 0.3944 | | 0.4373 | 0.3893 | | 0.4147 | 0.3814 | | 0.3898 | 0.3716 |
| Region | CIE-X | CIE-Y | Region | CIE-X | CIE-Y | Region | CIE-X | CIE-Y | Region | CIE-X | CIE-Y |
| 4500K | | | 5000K | | | 5700K | | | 6500K | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45A | 0.3530 | 0.3597 | 50A | 0.3371 | 0.3490 | 57A | 0.3215 | 0.3350 | 65A | 0.3048 | 0.3207 |
| | 0.3615 | 0.3659 | | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | 0.3130 | 0.3290 |
| | 0.3590 | 0.3521 | | 0.3440 | 0.3427 | | 0.3290 | 0.3300 | | 0.3144 | 0.3186 |
| | 0.3512 | 0.3465 | | 0.3366 | 0.3369 | | 0.3222 | 0.3243 | | 0.3068 | 0.3113 |
| 45B | 0.3548 | 0.3736 | 50B | 0.3376 | 0.3616 | 57B | 0.3207 | 0.3462 | 65B | 0.3028 | 0.3304 |
| | 0.3641 | 0.3804 | | 0.3463 | 0.3687 | | 0.3290 | 0.3538 | | 0.3115 | 0.3391 |
| | 0.3615 | 0.3659 | | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | 0.3130 | 0.3290 |
| | 0.3530 | 0.3597 | | 0.3371 | 0.3490 | | 0.3215 | 0.3350 | | 0.3048 | 0.3207 |
| 45C | 0.3641 | 0.3804 | 50C | 0.3463 | 0.3687 | 57C | 0.3290 | 0.3538 | 65C | 0.3115 | 0.3391 |
| | 0.3736 | 0.3874 | | 0.3551 | 0.3760 | | 0.3376 | 0.3616 | | 0.3205 | 0.3481 |
| | 0.3702 | 0.3722 | | 0.3533 | 0.3620 | | 0.3371 | 0.3490 | | 0.3213 | 0.3373 |
| | 0.3615 | 0.3659 | | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | 0.3130 | 0.3290 |
| | 0.3615 | 0.3659 | | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | | |
| 45D | | | 50D | | | 57D | | | 65D | | |



0.36590.3

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.3463 | 0.3687 | | 0.3290 | 0.3538 | | 0.3115 | 0.3391 |
| | | | | 0.3376 | 0.3616 | | 0.3207 | 0.3462 | | 0.3028 | 0.3304 |
| | | | | | | 57T | 0.3290 | 0.3690 | 65T | 0.3099 | 0.3509 |
| | | | | | | | 0.3381 | 0.3762 | | 0.3196 | 0.3602 |
| | | | | | | | 0.3376 | 0.3616 | | 0.3205 | 0.3481 |
| | | | | | | | 0.3290 | 0.3538 | | 0.3115 | 0.3391 |
| | | | | | | 57U | 0.3290 | 0.3300 | 65U | 0.3144 | 0.3186 |
| | | | | | | | 0.3366 | 0.3369 | | 0.3221 | 0.3261 |
| | | | | | | | 0.3361 | 0.3245 | | 0.3231 | 0.3120 |
| | | | | | | | 0.3290 | 0.3180 | | 0.3161 | 0.3059 |



## 1.6 Typical optical characteristics curves 典型光学特性曲线

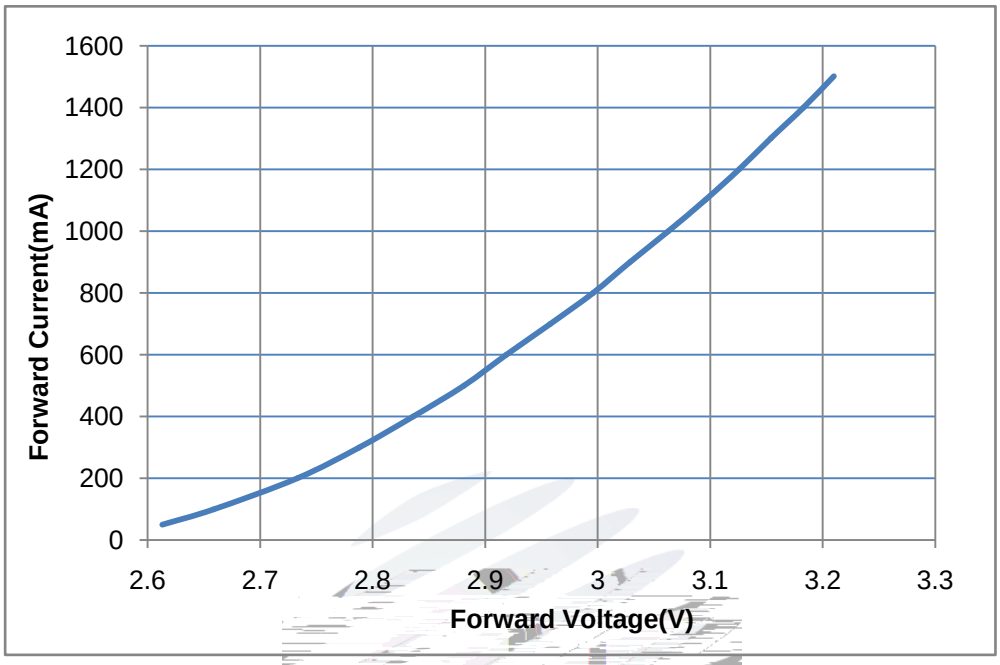



Fig 1-6 Forward Voltage Vs Forward Current伏安特性曲线

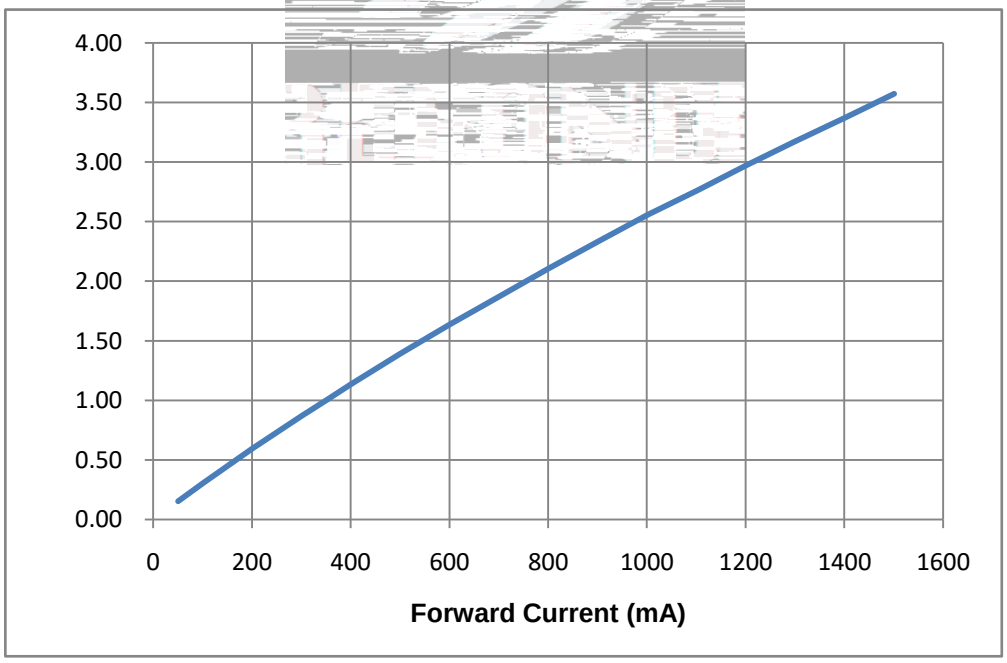



Fig.1-7 Forward Current Vs Relative Intensity

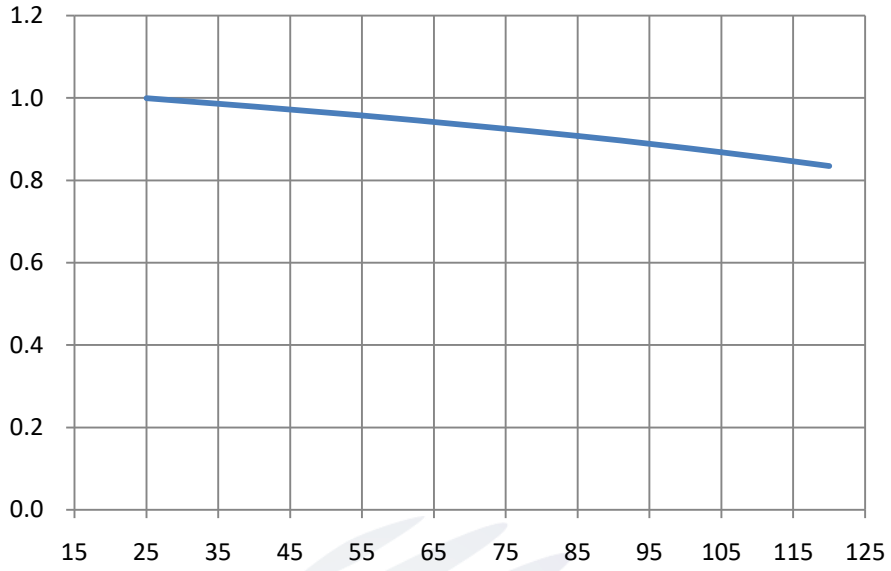



Fig.1-8 Temperature Vs Relative Intensity

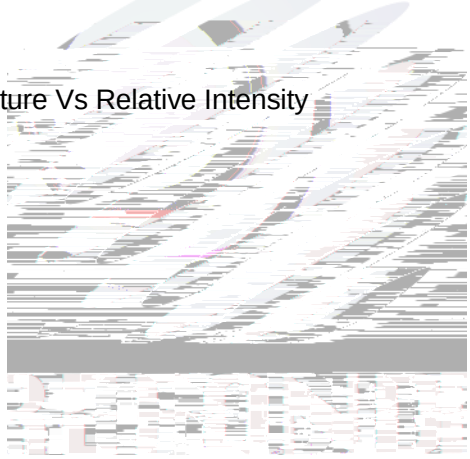


Fig 1-9 Ts Temperature Vs Forward Current 管脚温度与正向电流特性曲

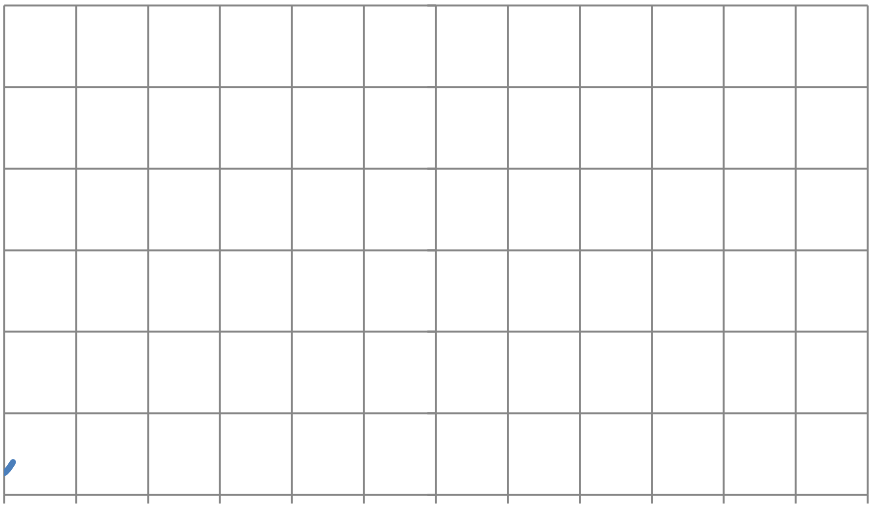


Fig 1-10 Radiation diagram 辐射特性曲线

Fig 1-11 Spectrum Distribution 光谱分布特性曲线

# 2. Packaging 产品包装

## 2.1 Packaging Specification 包装规格

Packagen-US n7 0 1 39.24 12.62 9 Tf662 9 Tp6/Lans/0.47W* n.1 60 680.98 Tm[P)-2(a)-3(7/MCID 5/L

### 2.1.3Label Form Specification 标签规格

Table 2-2 Label Parameter 标签参数

Fig 2-3 Label Form 标签模板

## 2.2Moisture Resistant Packing 防潮包装

Fig.2-4Packing specif04 BT5 T[TQq39.24 41.16 533.02 20.424 reW* n 1 36 496.15



2.2Moist[F2 12 Tf1 0 0 1 36 748.3 Tm0 g61&MCID 250O7 571(e)1T8 5.4799Tf/F1 1564 cm571(e)5.4T0395.4799Tf/F1 15647T5

## 2.4 Reliability Test Items And Conditions 信赖性测试项目及条件

Table 2-3 Test items and conditions 测试项目及条件

| TestItems<br>项目 | Ref.Standard<br>参考标准 | Test Condition<br>测试条件 | Time<br>时间 | Quantity<br>数量 | Ac/Re<br>接收/拒收 |
|---|---|---|---|---|---|
| Reflow<br>回流焊 | JESD22-B106 | $T_{emp}$:260℃max<br>T=10 sec | 2times. | 10pcs. | 0/1 |
| Thermal Shock<br>冷热冲击 | JEITAED-4701 300307 | -40℃ 15min<br>↑↓10s<br>100℃ 15min | 1000 cycle. | 10pcs. | 0/1 |
| High Temperature Storage<br>高温保存 | JEITAED-4701 200 201 | $T_{emp}$:100℃ | 1000hrs. | 10pcs. | 0/1 |
| Low Temperature Storage<br>低温保存 | JEITA ED-4701 200 202 | $T_{emp}$:-40℃ | 1000hrs. | 10pcs. | 0/1 |
| Life Test<br>常温通电 | JESD22-A108 | $T_A$=25℃<br>$I_F$=350mA | 1000hrs. | 10pcs. | 0/1 |
| High Temperature High Humidity Life Test<br>高温高湿通电 | JESD22-A101 | 60℃/ 90%$R_H$<br>$I_F$=350mA | 1000hrs. | 10pcs. | 0/1 |

标准

| | Applicable project<br>适用项目 |
|---|---|
| | Reflow<br>Thermal Shock |
| 0% | High and Low<br>Temperature Storage |

# 3. SMT Reflow Soldering Instructions SMT 回流焊说明

## 3.1SMT Reflow Soldering Instructions SMT 回流焊说明

Fig.3-1SMT Reflow Soldering Instructions SMT 回流焊说明

Table 3-1 SMT Reflow Soldering Parameter SMT 回流焊参数

| | |
|---|---|
| Average temperature rise speed平均升温速度（Tsmax 至$T_P$） | Max 3 °C/ s 最高3 °C/秒 |
| Preheating: minimum temperature预热：最低温度（Tsmin) | 150 °C |
| Preheating: Max temperature预热：最高温度（Tsmax) | 200 °C |
| Preheating: Time预热：时间（Tsmin 至Tsmax） | 60 - 120秒 60s-120s |
| 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（$T_P$) | 260 °C |
| Time limit classification of peak temperature time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 actual peak temperature (TP) 与实际峰值温度 ($T_P$) 相差 5 °C 以内的保持时间 | 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 Tp 25 °C 升至峰值温度所需时间 | Max 8 minutes 最多8分钟 |

Notes 备注:

31g

(3) Reflow soldering should not be done more than twice. If more than 24 hours between 26 319 0. 291 24114.oe solder

o

# 4. Handling Precautions 产品使用注意事项

## 4.1 Handling Precautions 产品使用注意事项

(1) LED operating environment and sulfur element composition cannot be over 100PPM in the LEDmating usage material. This is provided for informational purposes only and is not a warranty or endorsement.LED 工作环境及与 LED 适配的材料中硫元素及化合物成份不可超过 100PPM.这只是一个建议，不作任何品质担保。

(2) In order to prevent ex- ternal material from getting into the inside of LED, which may cause the malfunction of LED, the single content of Bromine element is required to be less than 900PPM,the single content of Chlorine elementis required to be less than 900PPM,the total content of Bromine element and Chlorine element in the external materials of the application products is required to be less than 1500PPM. This is provided for informational purposes only and is not a warranty or endorsement.为了防止外界物质进入 LED 内部以造成 LED 的损伤，所处环境及所用套件等等，单一的溴元素含量要求小于 900PPM，单一氯元素含量要求小于 900PPM，溴元素与氯元素总含量必须小于 1500PPM. 这只是一个建议，不作任何品质担保。

(3) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LEDs and discolor when exposed to heat and photonic energy. The result can be a significant loss of light output from the fixture. Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues. Refond advises against theuse of any chemicals or materials that have been found or are suspected to have an adverse affect on device performance or reliability. To verifycompatibility, Refond recommends that all chemicals and materials be tested in the specific application and environment for which they are intended tobe used. Attaching LEDs, do not use adhesives that outgas organic vapor. 应用套件中的挥发性物质会渗透到 LED 内部，在通电产生光子及热的条件下，会导致 LED 变色，进而造成严重光衰，提前了解套件材料能够避免产生这些问题。瑞丰反对使用任何对 LED 器件的性能或者可靠性有害的物质或材料，不管这些材料是已经证实了的还是仅仅怀疑有害。针对特定的用途和使用环境，瑞丰建议对所有的物质和材料进行相容性的测试。在贴装 LED 时候，不要使用能产生有机挥发性气体的粘结剂。

(4) Handle the component along the side surface by using forceps or appropriate tools; do not directlytouch or Handle the silicone lens surface, it may damage the internal circuitry.通过使用适当的工具沿侧表面处理元件；不要直接用手或尖锐金属压胶体表面，它可能会损坏内部电路。

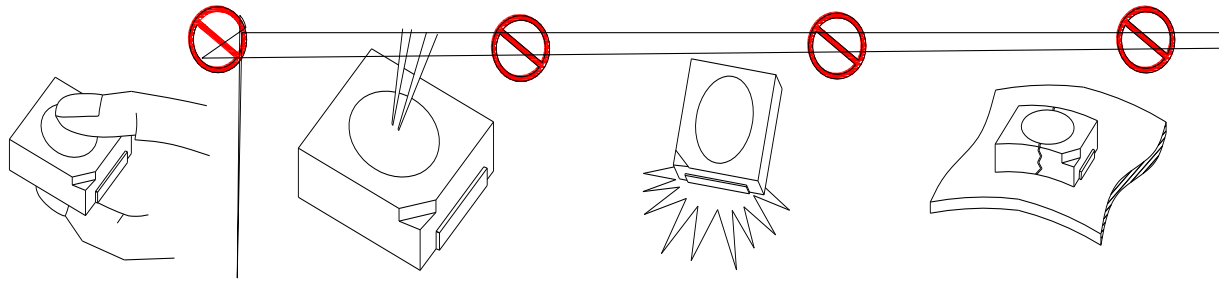


Fig 4-1Misoperation 错误操作

(5) In designing a circuit,the current through each LED must be exceed the absolute maximum rating specified for each LED.In the meanwhile,resistors for protection should be applied,otherwise slight voltage shift will cause big current change,burn out may happen. The driving circuit must be designed to allow forward voltage only when it is ON or OFF.If the reverse voltage is applied to LED, migration can be generated resulting in LED damage. 设计电路时，通过 LED 的电流不能超过规定的最大值。同时，还需使用保护电阻，否则，微小的电压变化将会引起较大电流变化，不要施加反压，否则会损坏 LED。

(6) Thermal Design is paramount importance because heat generation may result in the Characteristics decline,such as brightness decreased,Color change and so on.Please consider the heat generation of the LEDs when making the system design.LED 容易因为自身的发热和环境的温度改变而改变，温度升高会降低 LED 发光效率，影响发光颜色，所以在设计时应充分考虑散热问题。

(7) Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust，requiring special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components. Refond suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause

Version History/修订历史

| Date日期 | Revisor修订者 | Version版本 | Verifier审核 | Remarks备注 |
|---|---|---|---|---|
| 2022-05-13 | 刘明 | E0 | 姚胜坚 | |
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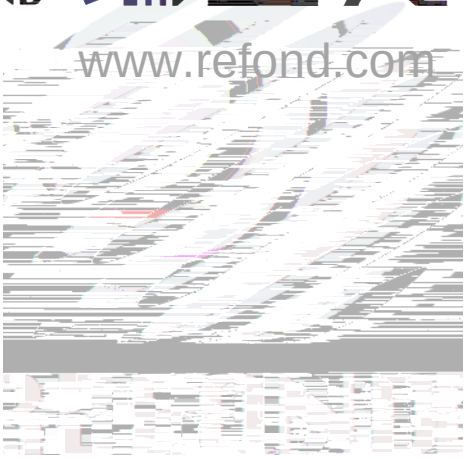

Declare 申明

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，若有冲突以中文版本为准。