



**佛山市国星光电股份有限公司**  
FOSHAN NATIONSTAR OPTOELECTRONICS CO., LTD

# 产品规格书

## SPECIFICATION

顾客名称 Customer		产品名称 Product	Chip LED
顾客型号 Customer Type		产品型号 Type	FC-1608GEK-572E
顾客部品号 Customer No.		版本号 Version NO	A1 版



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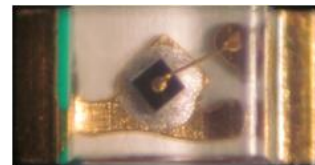
# FC-1608GEK-572E

# Chip Light Emitting Diode

## 技术数据表 Technical Data Sheet

本产品主要作为信号指示及照明的电子元件广泛应用于各类使用表面贴装结构的电子产品中, 如家用电器的开关指示灯、手机键盘灯、汽车仪表盘指示灯等。

This product is generally used as indicator and luminance for surface mounted electronic equipment, such as household appliance, communication equipment, and dashboard.



<b>特性:</b>	➢ 管芯材料: AlGaInP	发光颜色: 黄绿
	Material: AlGaInP	Emitting Color: Yellowish-Green
<b>Features:</b>	➢ 封装材料: 环氧树脂	
	Encapsulation: Epoxy Resin	
	➢ 焊接方法: 无铅回流焊	
	Soldering methods: Pb-Free reflow soldering	
	➢ 光强度高, 功耗低, 可靠性好, 寿命长	
	High Luminous Intensity ,Low Power Dissipation, Good Reliability and Long Lifespan	
	➢ 符合欧盟公布的 ROHS 指令要求	
	Complied With ROHS Directive	

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\* 产品规格如因工艺改进而有所改变, 恕不另行通知。

\* The specifications of the product may be modified for improvement without notice.

# 光电参数

## Electro-Optical Characteristics

极限参数 (温度=25℃)  
 Absolute Maximum Ratings (Temperature=25 °C)

参数名称 Parameter	符号 Symbol	数值 Rating	单位 Unit
正向电流 Forward Current	$I_F$	25	mA
正向脉冲电流* Pulse Forward Current*	$I_{FP}$	50	mA
反向电压 Reverse Voltage	$V_R$	5	V
工作温度 Operating Temperature	$T_{OPR}$	-30 ~ +85	°C
贮存温度 Storage Temperature	$T_{stg}$	-40 ~ +100	°C
功耗 Power Dissipation	$P_D$	65	mW

\* 注: 脉冲宽度 $\leq 0.1ms$ , 占空比 $\leq 1/10$  \* Note: Pulse Width $\leq 0.1ms$ , Duty $\leq 1/10$

光电参数 (温度=25℃)  
 Electro-Optical Characteristics (Temperature=25 °C)

参数名称 Parameter	符号 Symbol	条件 Condition	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
反向电流 Reverse Current	$I_R$	$V_R=5V$			10	$\mu A$
正向电压 Forward Voltage	$V_F$	$I_F=20mA$	1.6	2.0	2.6	V
峰值波长 Peak Wavelength	$\lambda_P$			575		nm
主波长 Dominant Wavelength	$\lambda_D$		565	572	578	nm
半波宽度 Spectrum Radiation Bandwidth	$\Delta\lambda$				24	nm
光强 Luminous Intensity	$I_V$		40	70		mcd
视角 View Angle	$2\theta_{1/2}$				130	deg.

\* 注 1: 光强偏差 $\pm 15\%$ ; 压降偏差 $\pm 0.1V$ ; (X,Y)坐标偏差 $\pm 0.01$ ; 单色光波长偏差 $\pm 1nm$ 。

\* Note1: Tolerance on each Luminous Intensity bin is  $\pm 15\%$ ; Tolerance on each Forward Voltage bin is  $\pm 0.1V$ ; Tolerance on each Hue(X,Y) bin is  $\pm 0.01$ ; Tolerance of Dominant Wavelength  $\pm 1nm$ .

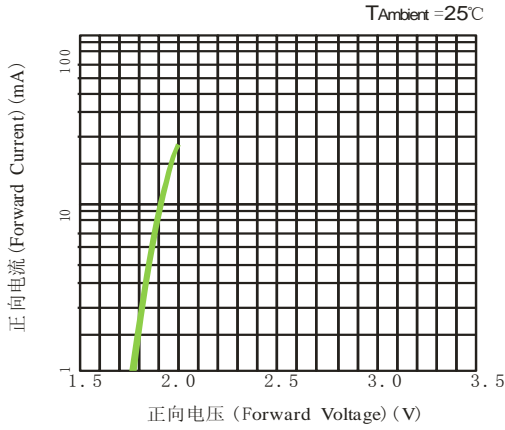
\* 注 2: 以上参数仅供参考, 请以实物标签为准。我司给出的参数均由国星测试系统测得。

\* Note2: The parameters above are only for your reference. In case of any discrepancy, please adhere to the label of our actual products. All parameters are tested by the standard testing system of NationStar.

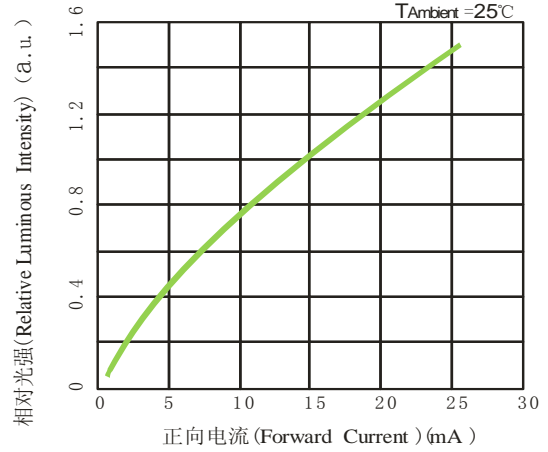
# 典型特性曲线

## Typical Characteristics Curves

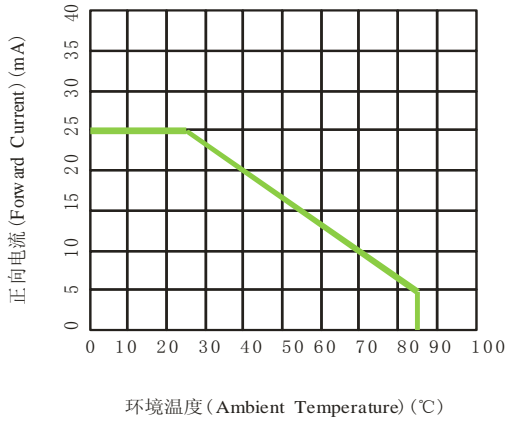
伏安特性  
Volt-Ampere Characteristics



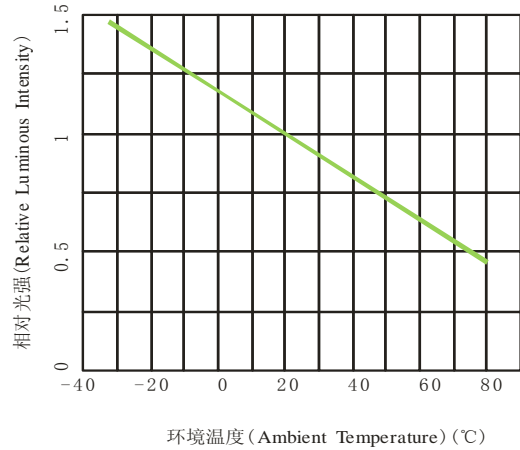
相对光强与正向电流特性  
Relative Luminous Intensity VS Forward Current



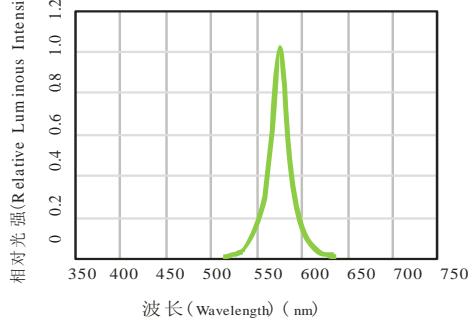
正向电流降额曲线  
Forward Current Derating Curve



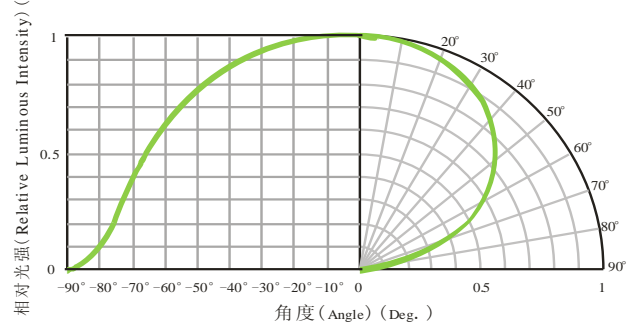
光强与环境温度曲线  
Luminous Intensity VS Ambient Temperature



光谱分布特性曲线  
Relative Spectral Distribution



光强分布特性曲线  
Typical Spatial Distribution



## 可靠性试验

### Reliability Test Items And Conditions

实验项目 Test Items	参考标准 Reference	实验条件 Test Conditions	时间 Time	样品数 Quantity	判据 Criterion
冷热冲击 Thermal Shock	MIL-STD-202G	-40°C(15min)←→100°C(15min)	循环 200 次 200 cycles	22	0/22
湿热循环 Temperature And Humidity Cyclic	JEITA ED-4701 200 203	(-10~65)°C , (0~90)%RH 24hrs./1cycle	循环 10 次 10 cycles	22	0/22
高温储存 High Temperature Storage	JEITA ED-4701 200 201	Ta=100°C	1000h	22	0/22
低温储存 Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40°C	1000h	22	0/22
常温寿命试验 Life Test	JESD22-A108D	Ta=25°C If =20mA	1000h	22	0/22
耐焊接热 Resistance to Soldering Heat	GB/T 4937, II ,2.2&2.3	Tsol*=(260±5)°C 10secs.	2 次 2 times	22	0/22

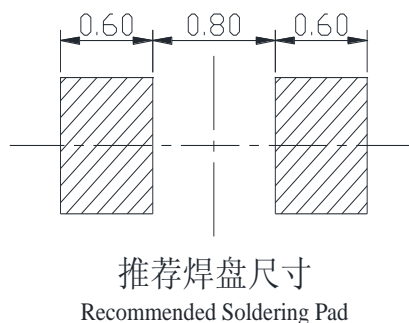
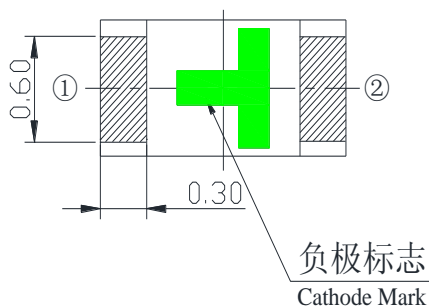
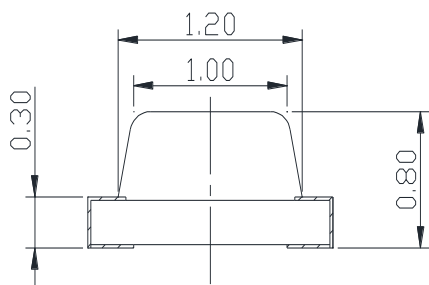
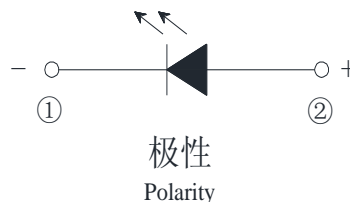
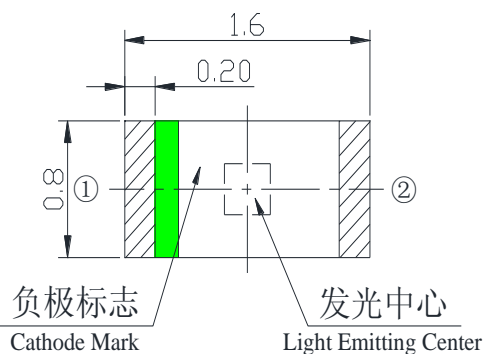
### 失效判断标准 Criteria For Judging Damage

测试项目 Test Items	符号 Symbol	测试条件 Test Conditions	判定标准 Criteria For Judging Damage
正向电压 Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = I <sub>FT</sub>	初始值±10% Initial Data±10%
反向电流 Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5V	I <sub>R</sub> ≤10μA
光强 Luminous Intensity	I <sub>V</sub>	I <sub>F</sub> = I <sub>FT</sub>	平均 I <sub>V</sub> 衰减≤30%, 单个 I <sub>V</sub> 衰减≤50% Average IV degradation≤30%; Single LED IV degradation≤50%
耐焊接热 Resistance to Soldering Heat			材料无内部裂痕、无材料间爆裂、剥离、无死灯。 Material without internal cracks, no material between stripped, no dead light .

\* 注: T<sub>sol</sub>-锡液温度; I<sub>FT</sub>: 典型电流 \* Note: T<sub>sol</sub>-Temperature of tin liquid; I<sub>FT</sub>: Typical current.

# 外形尺寸

## Outline Dimension



敷铜区域:

Cuprum Area:

阻焊丝印区域:

Solder Resist:

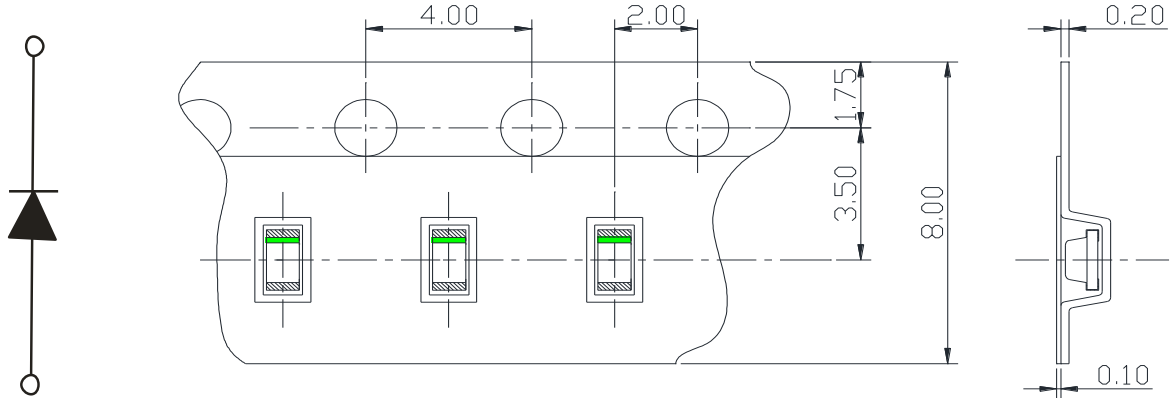
\*无特别规定时, 公差: X.X±0.1, X.XX±0.05, 单位为mm\*

\* The Tolerances Unless Mentioned is : X.X±0.1, X.XX±0.05, Unit= mm\*

# 包装 (1)

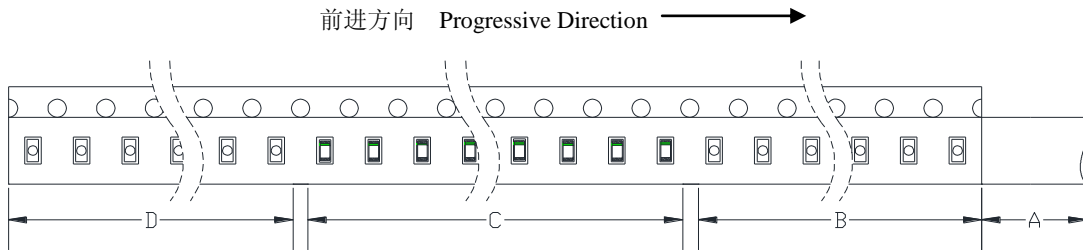
## Packaging (1)

### ◇ 载带 Carrier Tape



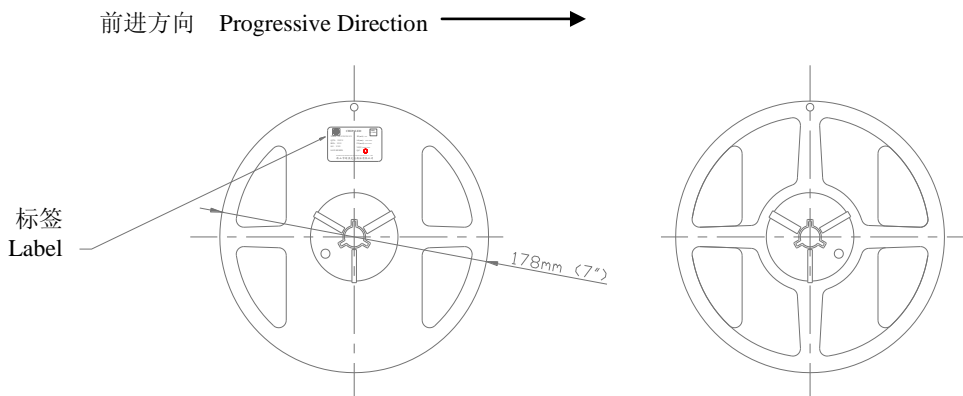
单位: mm, 未注公差:  $\pm 0.1$  mm  
 All dimensions in mm, tolerances unless mentioned is  $\pm 0.1$  mm.

### ◇ 编带细节 Details Of Carrier Tape



A: 盖带, 200 mm; B: 引导, 空带, 100mm; C: 编载产品 4000 只; D: 尾部, 空带, 100mm  
 A: Top Cover Tape, 200mm; B: Leader, Empty, 100mm; C: 4000 Lamps Loaded; D: Trailer, Empty, 100mm.

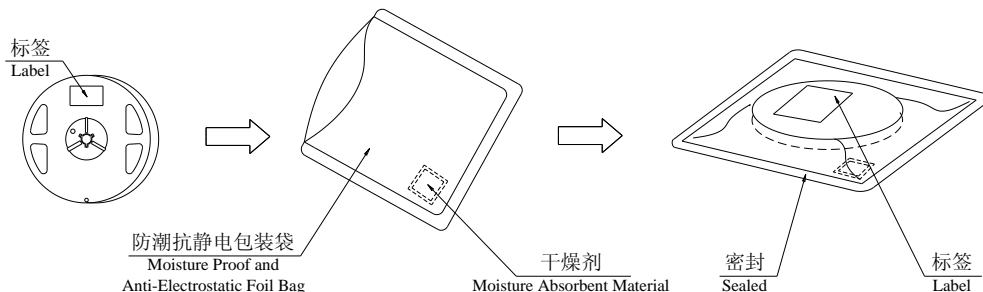
### ◇ 带盘 Reel Dimension



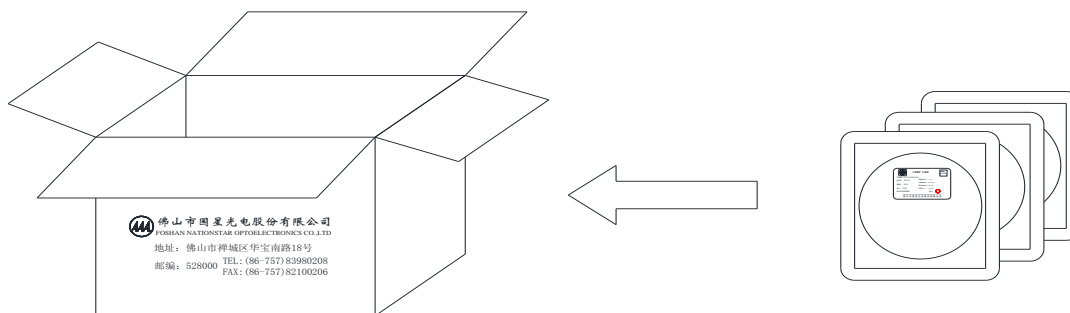
## 包装 (2)

### Packaging( 2)

#### 防潮防静电包装 Moisture Proof and Anti- Electrostatic Foil Bag



#### 外包装箱 Cardboard Box



#### 标签说明 Label Explanation

TYPE: 产品型号

QTY: 数量 Quantity

BIN: 分档 Rank

SC: 分档编号 Step Code

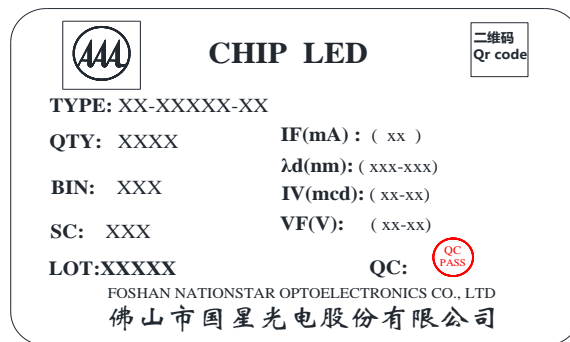
LOT: 批号 Lot Number

$\lambda d$ : 波长范围 Wavelength Range

IV: 光强范围 Luminous Intensity Range

VF: 正向电压范围 Forward Voltage Range

IF: 测试电流 Testing Current





# 焊接指导 (1)

## Guideline for Soldering (1)

### 1. 使用烙铁人手焊接

#### Hand Soldering

推荐使用功率低于 20W 的烙铁, 焊接时烙铁的温度必须保持在 360°C 以下, 且每个电极只能进行一次焊接, 每次焊接的持续时间不得超过 3 秒。

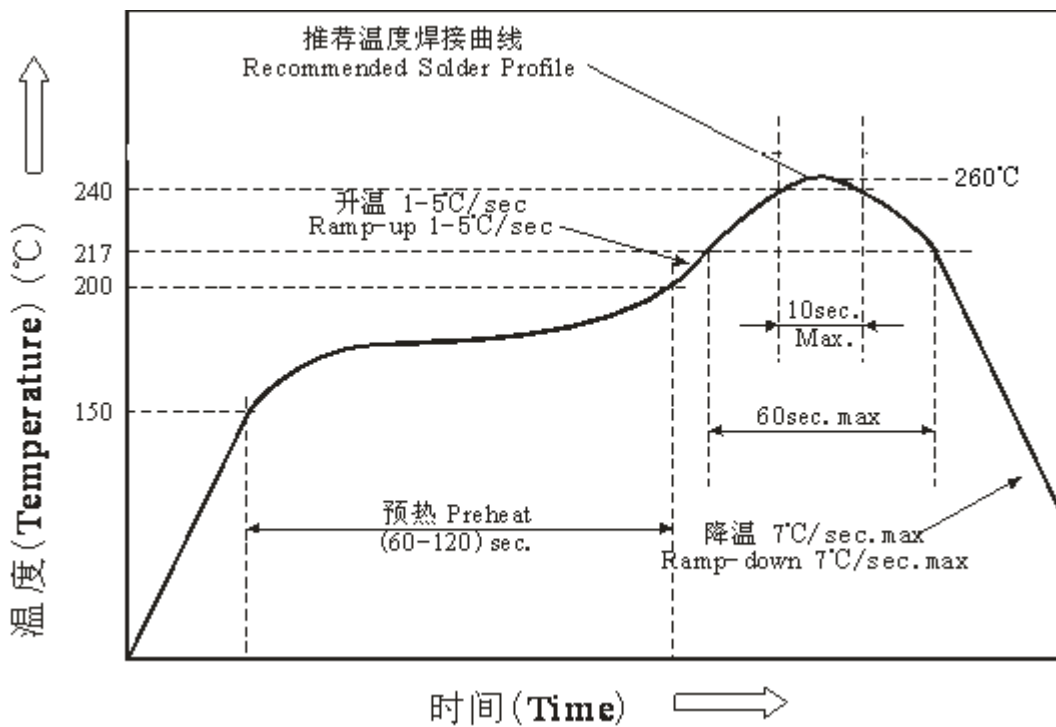
人手焊接过程中的不慎操作易引起 LED 产品的损坏, 应当小心谨慎。

If manual soldering is necessary used, the power of less than 20W is recommended. The temperature of the iron must be kept at below 360°C, with soldering time within 3 seconds and each electrode can be only soldered at one time.

It easily to damage the LED when doing manual soldering, please be careful during this process.

### 2. 回流焊接: 推荐使用以下无铅回流焊接温度图进行。

**Reflow Soldering:** Use the conditions shown in the under Figure of Pb-Free Reflow Soldering.



- 回流焊接最多只能进行两次。

Reflow soldering should not be done more than two times.

- 在回流焊接升温过程中, 请不要对 LED 施加任何压力。

No stress should be exerted on the package during the ramp-up progress of the soldering.

- 在焊接完成后, 待产品温度下降到室温之后, 再进行其他处理。

After soldering, do not deal with the product before its temperature cooling down to room temperature.

## 焊接指导 (2)

### Guideline for Soldering (2)

#### 3. 清洗:

##### Cleaning

在焊接后推荐使用酒精（无水乙醇）进行清洗，在温度不高于 30℃ 的条件下持续 3 分钟，不高于 50℃ 的条件下持续 30 秒。使用其他类似溶剂清洗前，请先确认使用的溶剂不会对 LED 的封装和环氧树脂部分造成损伤。

超声波清洗也是有效的方法，一般最大功率不应超过 300W，否则可能对 LED 造成损伤。请根据具体的情况预先测试清洗条件是否会对 LED 造成损伤。

It is recommended that alcohol (Anhydrous ethanol) should be used as a solvent for cleaning after soldering. Cleaning is to go under 30°C for 3 minutes or 50°C for 30 seconds. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not.

Ultrasonic cleaning is also an effective way for cleaning. The influence of Ultrasonic cleaning on LED depends on factors such as ultrasonic power. Generally, the ultrasonic power should not be higher than 300W, otherwise it will cause LED damage. Before cleaning, a pre-test should be done to confirm whether any damage to LEDs will occur.

- \* **注意:** 此一般指导原则并不适用于所有 PCB 设计和焊接设备的配置。具体工艺受到诸多因素的影响，请根据特定的 PCB 设计和焊接设备来确定焊接方案。
- \* **Note:** This general guideline may not apply to all PCB designs and configurations of all soldering equipment. The technique in practice is influenced by many factors. Thus, the soldering methods should be specific based on the PCB designs and configurations of the soldering equipment.

## 使用注意事项 (1)

### Precautions (1)

#### 1. 贮存:

##### Storage

- 产品在运输和储存中要注意防潮, 需使用密封防潮防静电袋包装, 并内附干燥剂。

In order to prevent moisture absorption into the SMD LEDs during the transportation and storage, the LEDs should be packed in the moisture proof and anti-electrostatic sealed foil bag and enclosed the desiccant.

- 开封前, 产品须存放在温度不高于 30℃, 湿度不高于 60%RH 的环境中。

Before opening the package, the product should be kept in under the circumstance that the temperature is below 30℃ and the humidity is below 60% RH.

- 开封后, 产品须存放在温度不高于 30℃, 湿度不高于 60%RH 的环境中, 最长存放时间 168 小时, 未用完的余料需重新存放在密封防潮防静电袋内。

The longest storage time can reach 168 hours if the product can be kept under the circumstance that the temperature is below 30℃ and the humidity is below 60% RH after opening the foil bag. Besides, the unspent LED should be restored into the moisture proof and anti-electrostatic sealed foil bag.

- 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, 烘焙可以起到一定的性能恢复效果。烘焙条件: (60±5) °C, 持续 24 小时。

To the not yet soldering LED, if the moisture absorbent material has fade away or the LEDs have exceeded the storage time, baking treatment can recover the performance of the LED and the baking condition is as follow: (60±5) °C for 24hours.

#### 2. 静电:

##### Static Electricity

静电和电涌会导致产品特性发生改变, 例如正向电压降低等, 如果情况严重甚至会损毁产品。所以在使用时必须采取有效的防静电措施。

所有相关的设备和机器都应该正确接地, 同时必须采取其他防止静电和电涌的措施。

使用防静电手环, 防静电垫子, 防静电工作服、工作鞋、手套, 防静电容器, 都是有效的防止静电和电涌的措施。

Static electricity and surge voltage damage the LEDs. Damaged LEDs will show some unusual characteristics such as the forward voltage becomes lower, or the LEDs don't light at the low current even no light.

All devices, equipment and machinery must be properly grounded. At the same time, it is recommended that anti-electrostatic wrist bands, pads, uniforms, gloves or containers can be used as effective measures when dealing with the LEDs.

## 使用注意事项 (2)

### Precautions (2)

#### 3. 设计建议:

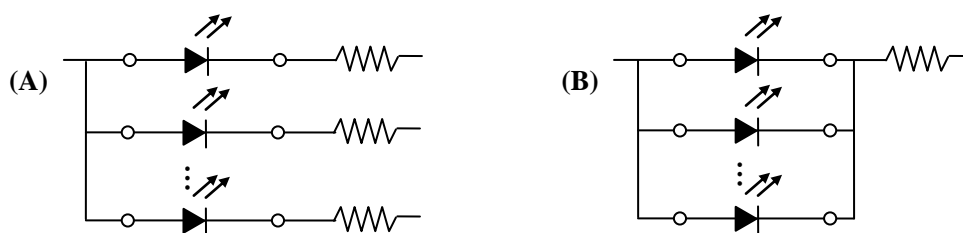
##### Design Consideration

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的电流变化, 可能导致产品损毁。

建议使用以下 (A) 电路, 该电路能够很好的调节通过每个 LED 的电流; 不推荐使用 (B) 电路, 该电路在持续的电压驱动下, LED 的正向电压 ( $V_F$ ) 发生变化, 电流会随之而发生变化, 可能使某些 LED 承受高于规定的电流值。

In designing a circuit, the current through each LED must not exceed the absolute maximum rating specified for each LED. In the meanwhile, Customer must apply protective resistors; otherwise slight voltage shift will cause comparatively large current change, or burnt out.

It is recommended to use Circuit A which regulates the current flowing through each LED rather than Circuit B. When driving LEDs with a constant voltage in Circuit B, the current through the LEDs may vary due to the variation in Forward Voltage ( $V_F$ ) of the LEDs. In the worst case, some LED may be subjected to stresses in excess of the Absolute Maximum Rating.



LED 的特性容易因为自身的发热和环境的温度的改变而发生改变。温度的升高会降低 LED 的发光效率、影响发光颜色等, 所以在设计时应充分考虑散热的问题。

Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color changed and so on. Please consider the heat generation of the LEDs when making the system design.

## 使用注意事项 (3)

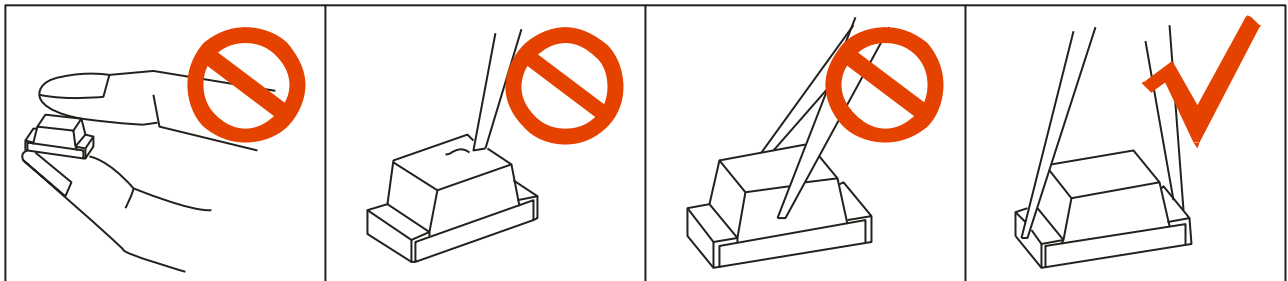
### Precautions (3)

#### 4. 其他事项:

##### Others

直接用手拿取产品不但会污染封装树脂表面,也可能由于静电等因素导致产品性能的改变。过度的压力也可能直接影响封装内部的管芯和金线,因此请勿对产品施加过度压力,特别当产品处于高温状态下,例如在回流焊接过程中。

When handling the product, touching the encapsulation with bare hands will not only contaminate its surface, but also affect on its optical characteristic. Excessive force to the encapsulation might result in catastrophic failure of the LEDs due to die breakage or wire deformation. For this reason, please do not put excessive stress on LEDs, especially when the LEDs are heated with high temperature such as during Reflow Soldering.



LED 的环氧树脂封装部分相当脆弱,请勿用坚硬、尖锐的物体刮、擦封装树脂部分。在用镊子夹取的时候也应当小心注意。

The epoxy resin of encapsulation of the LED is comparatively fragile, so please avoid scratch or friction over the epoxy resin surface. While handling the product with tweezers, do not hold by the epoxy resin, be careful.

#### 5. 眼睛保护忠告:

##### Safety Advice for Human Eyes

LED 发光时,请勿直视发光光源,特别是对于一些光强较高的 LED,强光可能伤害你的眼睛。

Viewing directly to the light emitting center of the LEDs when light emitting, especially those of comparatively high Luminous Intensity will cause great hazard to your eyes. Please be careful.