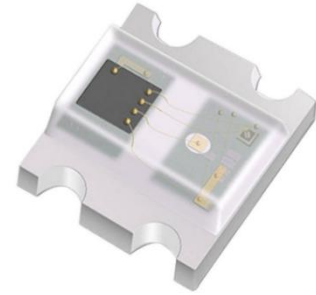


## 0807炫彩 贴片式发光二极管

### 特点 (characteristic) :

- \* 外观尺寸 (L/W/H) :2.0\*1.8\*0.8mm  
Appearance dimension (L / w / h): 2.0 x 1.8 x 0.8 mm
- \* 发光颜色及胶体: 炫彩RGB/透明胶体  
Luminous color and colloid: Colorful RGB/ transparent colloid
- \* 环保产品, 符合ROHS要求  
Environmental protection products meet ROHS requirements
- \* EIA规范标准包装  
EIA standard packaging
- \* 适用于自动贴片机  
Suitable for automatic mounter
- \* 适用于回流焊制程  
Suitable for reflow soldering process



### 应用领域 (product application) :

- \* LED全彩发光字灯串, LED全彩模组  
Led full-color luminous word lamp string, led full-color module
- \* LED幻彩软硬灯条, LED护栏管  
Led magic color soft and hard light strip, LED guardrail tube
- \* LED外观, 情景照明  
Led appearance, scene lighting
- \* LED异性屏  
Led heterosexual screen
- \* 各种电子产品, 电器设备跑马灯  
All kinds of electronic products, electrical equipment, runninglights



## 功能描述 (Function description) :

本产品是一款单线传输三通道 (RGB) 驱动控制电路与发光电路于一体的智能外控LED光源。产品内含有信号解码模块、数据缓存器、内置恒流电路及RC振荡器；内部集成电流增益控制模块，CMOS制程，低压、低耗电；三通道恒流驱动器默认输出19mA，采用单线输出方式，串接各晶片之输出动作同步；上电默认不亮灯。数据协议采用单极性归零码的通讯方式，单线传输LED驱动控制专用芯片，同时芯片内置的电流增益调节功能，可设置电流1.75mA~19mA，共16个电流增益等级；PWM信号刷新率高达4kHz，显示更趋细腻平滑，解决拍摄画面暗条纹问题。

This product is an intelligent external control LED light source integrating single line transmission three channel (RGB) drive control circuit and light-emitting circuit. RC signal decoding module, built-in buffer circuit and internal data storage module; Internal integrated current gain control module, CMOS process, low voltage and low power consumption; The default output of the three channel constant current driver is 19ma. The single line output mode is adopted, and the output action of each chip in series is synchronous; The light is not on by default when powered on. The data protocol adopts the communication mode of unipolar return to zero code, and the special chip for LED drive and control is transmitted in a single line. At the same time, the built-in current gain adjustment function of the chip can set the current of 1.75ma ~ 19ma, a total of 16 current gain levels; The refresh rate of PWM signal is up to 4kHz, the display is more delicate and smooth, and the problem of dark stripes in the shooting picture is solved.

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## 电性参数

## ◆Electrical Characteristics

极限参数（温度=25℃）：

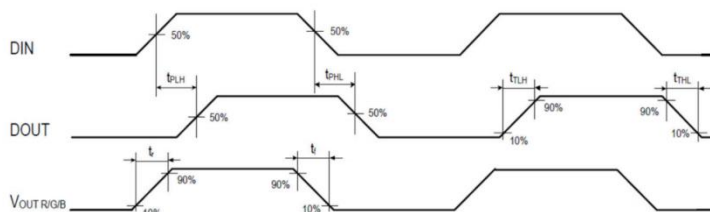
参数名称 Parameter	符号 Symbol	范围 Range	单位 Unit
电压Voltage	VDD	3.5~+5.5	V
逻辑输入电压 Logic input voltage	V <sub>IN</sub>	-0.4~VDD+0.4	V
工作温度 Working temperature	T <sub>opt</sub>	-40~+150	℃
储存温度 Storage temperature	T <sub>stg</sub>	-55~+150	℃
OUT R/G/B端口耐压 Out R / G / B port withstand voltage	BV <sub>out</sub>	16	V
ESD耐压ESD Withstand voltage	V <sub>ESD</sub>	>2K	V

开关特性 Switching characteristics（VCC=5V, Ta=25℃）：

符号 Symbol	参数 Parameter	测试条件 Test conditions	最小值 Min	规格值 Typ.	最大值 Max.	单位 Units
FPWM	OUT R/G/B输出 PWM频率 Out R / G / B output PWM frequency	IOUT=19mA, OUT端口 串联200Ω电阻至VDD IOUT=19mA, the out port is connected in series with 200 Ω resistance to VDD	-	4.0	-	KHz
TPLH	信号传输延时 Signal transmission delay	DOUT端口对地负载电容 30pF, DIN至DOUT的信号 传输延时	-	65	-	ns
TPHL		Dout port ground load capacitance 30pF, signal transmission delay from DIN to dout	-	55	-	ns
TTLH	DOUT转换时间 Dout conversion time	DOUT端口对地负载电容 30pF	-	3.0	-	ns
TTHL		Dout port ground load capacitance 30pF	-	3.0	-	ns
Tr	OUT R/G/B转换时间 Out R / G / B conversion time	IOUTR/B=19mA, OUTR/G /B端口串联200Ω至VDD, 对地负载电容15pF	-	55	-	ns
Tf		IOUTR/B=5mA, OUT R / G / B port 200 Ω in series to VDD, load capacitance to ground 15pF	-	60	-	ns

**电气特性** Electrical characteristics: (TA=-20~+70°C, VDD=5.0V, VSS=0V)

符号 Symbol	参数 Parameter	测试条件 Test conditions	最小值 Min	规格值 Typ.	最大值 Max.	单位 Units
VDD	芯片工作电压 Chip operating voltage	-	3.5	5.0	5.5	V
IDO	静态电流 Static power consumption	VDD=4.5V, IOUT “ OFF ”	-	2.5	-	mA
VIH	输入信号阈值电压 Input signal threshold voltage	VDD=5V, DIN或DOUT VDD = 5V, DIN or DOUT	0.7*VD D	-	-	V
VIL			-	-	0.3*VD D	V
IDOH	DOUT驱动能力 Dout drive capability	DOUT输出高, 串联2Ω 电阻至GND Dout output high, series 2 Ω resistor to GND	-	-46	-	mA
IDOL		DOUT输出低, VDD对 DOUT灌电流 Dout output is low, VDD perfusion current to dout	-	57	-	mA
IOUT	DOUT R/G/B/W端口驱动 电流 Dout R / G / B/W Port drive current	VDS=2V, 电流增益设置 0000~1111; VDS = 2V, current gain setting 0000 ~ 1111	1.75	-	19	mA
VDS_S	DOUT R/G/B恒流拐点电 压Dout R / G / b constant current inflection point voltage	IOUT=5mA	-	0.5	-	V
		IOUT=12mA	-	0.7	-	V
		IOUT=19mA	-	0.7	-	V
%VS.VDS	DOUT R/G/B输出电流变 化量Dout R / G / B output current variation	IOUT=19mA, VDS=1.0~ 3.0V	-	1.0	-	%
%VS.VD D		IOUT=19mA, VDD=4.0 ~5.2V	-	1.0	-	%
%VS.Ta		IOUT=19mA, TA=- 40~+85°C	-	-	6.0	%
Ileak	DOUT R/G/B端口漏电流 Dout R / G / B port leakage current	VDS=15V, IOUT “ OF F”	-	-	1	uA
FPWM	PWM频率 PWM frequency	-	-	4.0	-	KHZ



**光电参数（温度=25℃）：**

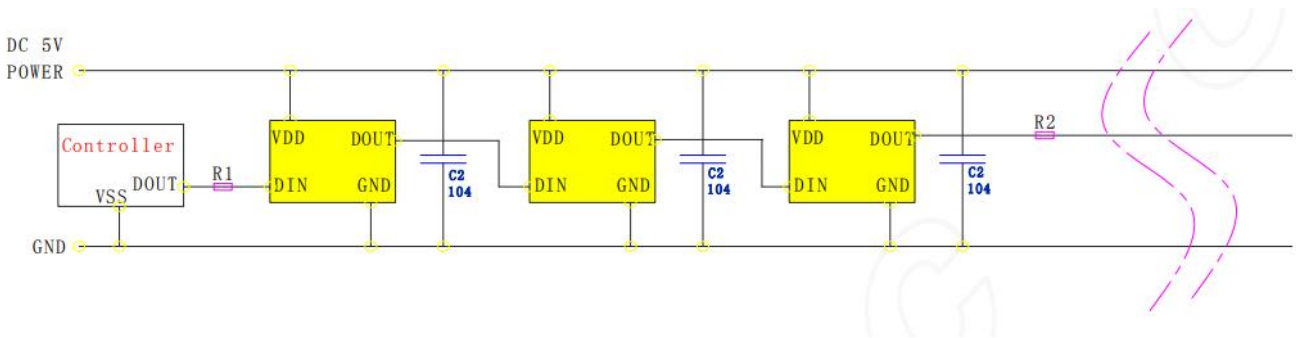
Electro-Optical Characteristics (Temperature=25℃):

符号 Symbol	参数 Parameter	颜色 Color	最小值 Min	规格值 Typ	最大值 Max	单位 Unit	测试条件 Test condition
IV	光强Light intensity	红Red	-	200	-	mcd	IF = 20mA
		绿Green	-	800	-		
		蓝Blue	-	300	-		
2θ1/2	半光强视角Half light angle	-	-	120	-	deg	IF = 20mA
λD	主波长Main wavelength	红Red	620	-	630	nm	IF = 20mA
		绿Green	520	-	530		
		蓝Blue	465	-	475		

## 典型应用电路

### Typical Application Circuit

典型应用电路一：Typical application circuit I

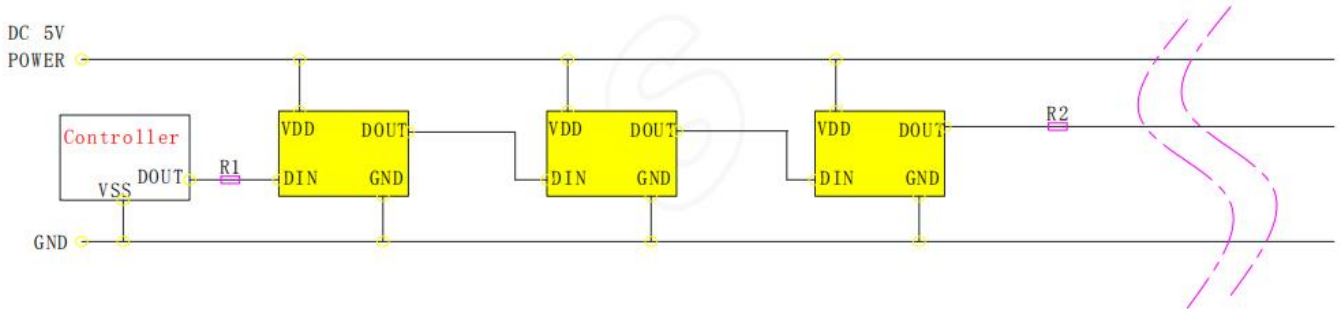


免电容版应用电路二：

必须确保产品所用电源没有杂波及尖峰对LED造成损坏；且最大级联LED个数 $\leq 30$ Pcs.

Application circuit II of capacitor free version:

It must be ensured that the power supply used by the product is free from impurities and spikes, causing damage to the LED; And the maximum number of cascaded LEDs  $\leq 30$ pcs



在实际应用电路中，为防止产品在测试时带电插拔产生的瞬间高压损伤IC内部电源及信号输入输出脚，应在信号输入及输出端串接保护电阻。此外，为了使各IC芯片间更稳定工作，各灯珠间的退偶电容则必不可少；

1. 产品两端所并的退偶电容一般不建议省略；必须要省略的话，须确保所用电源符合上述应用电路二所述的要求；
2. 产品的信号输入及输出端必需串接保护电阻R1/R2，因线材及传输距离不同，在信号线两端串接的保护电阻会略有不同；R1/R2的大小取决于级联灯珠的数量，级联数量越多，则R1/R2越小，灯珠间传输距离长，一般建议在20-2K $\Omega$ 之间取值，通常建议取值在500欧左右；以实际使用情况定。

In the practical application circuit, in order to prevent the instantaneous high voltage generated by the hot plug of the product during the test from damaging the internal power supply and signal input and output pins of the IC, the protection resistance should be connected in series at the signal input and output terminals. In addition, in order to make the IC chips work more stably, the decoupling capacitance between the lamp beads is essential;

1. The decoupling capacitance at both ends of the product is generally not recommended to be omitted; If it must be omitted, ensure that the power supply meets the requirements described in application circuit 2 above.
2. The signal input and output terminals of the product must be connected with protective resistors R1 / R2 in series. Due to different wire and transmission distance, the protective resistors connected in series at both ends of the signal line will be slightly different; The size of R1 / r2 depends on the number of cascaded lamp beads. The larger the number of cascades, the smaller R1 / R2 and the longer the transmission distance between lamp beads. It is generally recommended to take a value between 20-2k $\Omega$ , and it is generally recommended to take a value of about 500 $\Omega$ ; Subject to actual use.

## 可靠性试验

### Reliability Test Items And Conditions

测试项目 Test Parameter	参考标准 Reference Criterion	测试条件 Test Condition	测试次数 Number of tests	失效判定标准 Failure criteria	失效LED数量 Number of failed LEDs
防潮等级 Moisture proof grade	JEITA ED-4701 300 301	回流焊最高温=260℃, 10秒, 2次 回流焊Maximum reflow temperature = 260 °C, 10 seconds, twice reflow: 回流焊之前存储条件: 30℃, 相对湿度=70%, 168H; Storage conditions before reflow soldering: 30 °C, relative humidity = 70% ,168H	-	# 1	0/22
焊接信赖性 (无铅回流焊) Welding reliability (lead free reflow soldering)	JEITA ED-4701 303 303A	回流焊最高温度=245±5℃, 5秒 (无铅回流焊) Maximum reflow temperature = 245 ± 5 °C, 5 seconds (lead-free reflow)	-	# 2	0/22
冷热循环 Thermal cycling	JESD22-A104	-40℃ 30分钟~25℃ 5分钟~ 100℃ 30分钟~25℃ 5分钟	300 个 循环	# 1	0/22
冷热冲击 Thermal Shock	JESD22-A106	-35℃ 15分钟 转换时间3分钟 85℃ 15分钟	300 个 循环	# 1	0/22
高温存储 High temperature storage	JESD22-A103	Ta=100℃	1000 小时	# 1	0/22
低温存储 Low temperature storage	JESD22-A119	Ta=-40℃	1000 小时	# 1	0/22
常温老化Normal temperature aging	JESD22-A108	Ta=25℃ IF=20mA	1000小时	# 1	0/22

#### \*1 失效判断标准 Criteria For Judging Damage

标准Standard#	项目Parameter	测试条件Test Condition	失效标准Failure criteria
# 1	正向电压Forward Voltage	IF=20mA	>U.S.L*1.1
	光强Light intensity	IF=20mA	<L.S.L*0.7
	反向电流Reverse current	VR=5V	>U.S.L*2.0
# 2	焊接可靠Weldingreliability	/	锡膏覆盖焊盘比例小于95% The proportion of solder paste

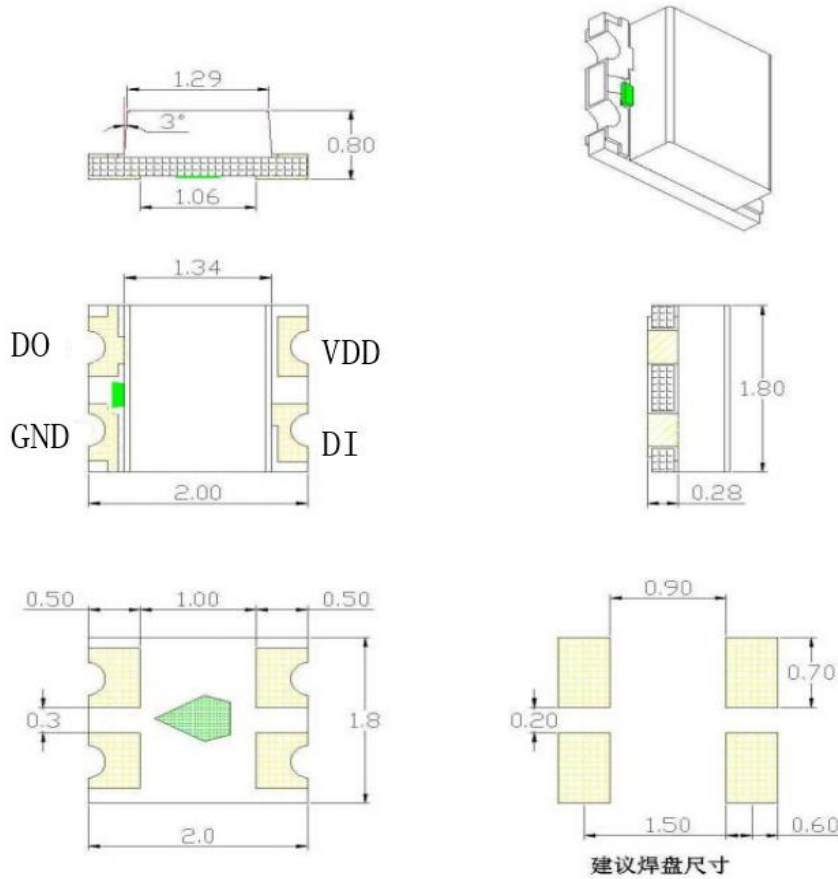
U. S. L : 规格上限; L. S. L : 规格下限

U.S.L: upper specification limit ; L.S.L: lower specification limit



## 外形尺寸

### Outline Dimension



备注: 1. 单位: 毫米 (mm)  
Remarks: 1 Unit: mm

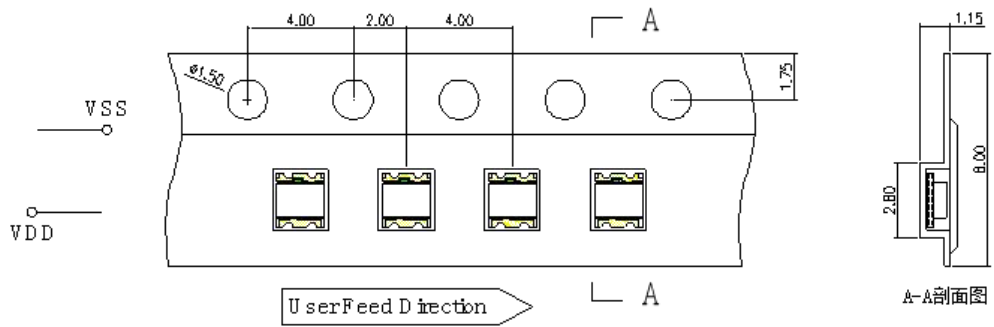
2. 公差: 如无特别标注则为±0.10mm  
2. Tolerance: ± 0.10mm unless otherwise specified

序号Number	符号Symbol	管脚名Pin name	功能描述Function description
1	VDD	电源Power Supply	供电管脚Power supply pin
2	DOUT	数据输出Data output	控制数据信号输出 Control data signal output
3	GND	地Land	信号接地和电源接地 Signal grounding and power grounding
4	DIN	数据输入Data input	控制数据信号输入Control data signal input

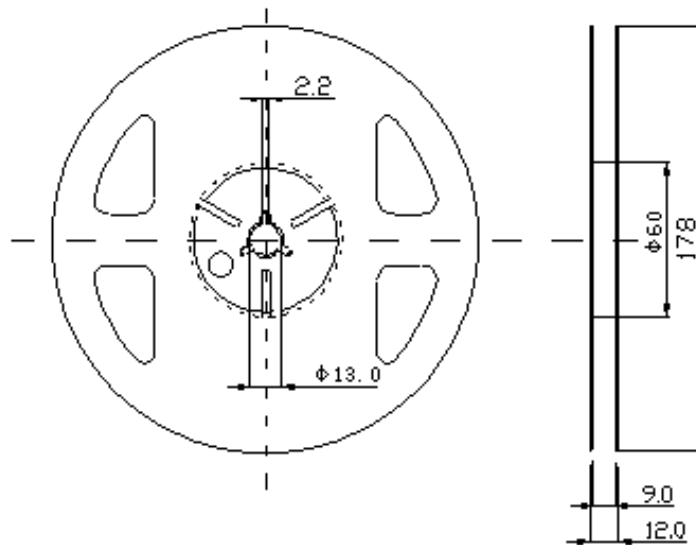
## 包装 (1)

### Packaging (1)

编带包装 Fabric with packaging



卷轴尺寸 Scroll size



## 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



Capacity 5 or 10 reels per box (内箱容量: 50或100卷)

#### ◇ 标签说明: Label Explanation

- LOT NO: 批次信息
- PART NO: 产品型号
- BIN CODE: 产品名称
- WL: 波长范围
- IV: 光强范围
- VF: 电压范围



## 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 300℃ 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。

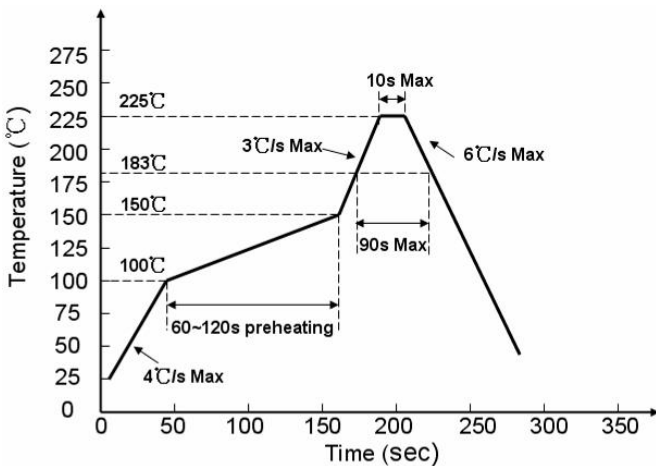
人手焊接过程中的不慎操作易引起 LED 产品的损坏，应当小心谨慎。

A soldering iron of less than 20W is recommended to be used in Hand Soldering. Please keep the temperature of the soldering iron under 300℃ while soldering. Each terminal of the LED is to go for less than 3 second and for one time only.

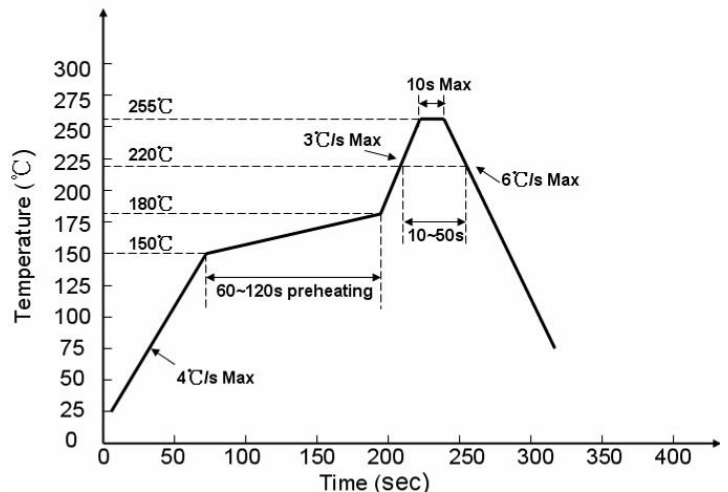
Be careful because the damage of the product is often started at the time of the hand soldering.

#### 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.



有铅回焊 (Lead Solder)



无铅回焊(Lead-Free Solder)

- 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。

Stress on the LEDs should be avoided during heating in soldering process.

- 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 drop 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进行清洗，在温度不高于 30°C 的条件下持续 3 分钟，不高于 50°C 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 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. But the influence of Ultrasonic cleaning on LED depends on factors such as ultrasonic power. Generally, the ultrasonic power should not be higher than 300W. Before cleaning, a pretest 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 technics in practise is influenced by many factors, it should be specialized base on the PCB designs and configurations of the soldering equipment..

## 使用注意事项（1）

### Precautions (1)

#### 1. 贮存：

##### Storage

- 本产品使用密封防潮抗静电袋包装，并附有干燥剂，未开封的产品有一年的保存时间。

Moisture proof and anti-electrostatic package with moisture absorbent material is used, to keep moisture to a minimum.

- 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 at 30℃ or less and humidity less than 60% RH, and be used within a year.

- 开封后，产品须存放在温度不高于 30℃，湿度不高于 10%RH 的环境中，且应该在 168 小时（7 天）内使用完。建议工作环境为温度不高于 30℃，湿度不高于 60%RH。

After opening the package, the product should be stored at 30℃ or less and humidity less than 10%RH, and be soldered within 168 hours (7 days). It is recommended that the product be operated at the workshop condition of 30℃ or less and humidity less than 60%RH.

- 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)℃，持续 24 小时。

If the moisture absorbent material has fade away or the LEDs have exceeded the storage time, baking treatment should be performed based on the following condition: (60±5)℃ for 24 hours.

#### 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 or surge voltage damages the LEDs. Damaged LEDs will show some unusual characteristic such as the forward voltage becomes lower, or the LEDs do not light at the low current. even not light.

All devices, equipment and machinery must be properly grounded. At the same time, it is recommended that wrist bands or anti-electrostatic gloves, anti-electrostatic containers be used 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, resistors for protection should be applied, otherwise slight voltage shift will cause big current change, burn out may happen.

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 encapsulant with bare hands will not only contaminate its surface, but also affect on its optical characteristics. Excessive force to the encapsulant 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 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 encapsulant is 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 direct to the light emitting center of the LEDs, especially those of great Luminous Intensity, will cause great hazard to human eyes. Please be careful.