



产品规格书

产品名称：发光二极管贴片

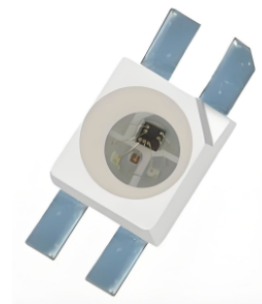
Product Name: Light emitting diode patch

产品型号：GL6028RGB01H-T 幻彩透明 铜支架

Product model: 6028 Colorful Transparent

发布日期：2023 年 5 月

Release date: May 2023



环保产品，符合 ROHS 要求

Environmental protection products meet ROHS requirements

湿气敏感性等级 (MSL) :4-5 级

Moisture sensitivity level (MSL) : 4-5 levels

EIA 规范标准包装

EIA standard packaging

使用寿命长

long service life

高能效、启动快

High energy efficiency, fast startup

低电压有流驱动

Low voltage current drives



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6028 幻彩灯珠主要特点

6028 Colorful LED Beads Main Features

- 智能反接保护，电源反接不会损坏 IC。

Intelligent reverse connection protection, power reverse connection will not damage the IC.

- IC 控制电路与 LED 点光源公用一个电源。

The IC control circuit shares a power supply with the LED point light source..

- 控制电路与 RGB 芯片集成在一个 6028 封装的元器件中，构成一个完整的外控像素点。

The control circuit and RGB chip are integrated into a 6028 packaged component, forming a complete external control pixel point.

- 内置信号整形电路，任何一个像素点收到信号后经过波形整形再输出，保证线路波形畸变不会累加。

Built in signal shaping circuit, any pixel receives a signal and undergoes waveform shaping before outputting, ensuring that the distortion of the line waveform does not accumulate.

- 内置上电复位和掉电复位电路。

Built in power on reset and power off reset circuits.

- 每个像素点的三基色颜色可实现 256 级亮度显示，完成 16777216 种颜色的全真色彩显示，扫描频率不低于 400Hz/s。

The three primary colors of each pixel can achieve 256 levels of brightness display, achieving full true color display of 16777216 colors with a scanning frequency of not less than 400Hz/s.

- 串行级联接口，能通过一根信号线完成数据的接收与解码。

Serial cascade interface, capable of receiving and decoding data through a single signal line.

- 任意两点传输距离在不超过 5 米时无需增加任何电路。

When the transmission distance between any two points does not exceed 5 meters, no additional circuits need to be added.

- 当刷新速率 30 帧/秒时，级联数不小于 1024 点

When the refresh rate is 30 frames per second, the number of cascading points should not be less than 1024

- 数据发送速度可达 800Kbps。

The data transmission speed can reach 800Kbps.

- 光的颜色高度一致，性价比高。

The color of light is highly consistent and cost-effective.

- 恒流值：11.5mA

Constant current value: 11.5mA



二、应用领域 Application area

* LED 全彩发光灯串

LED full-color luminous light string

* LED 全彩模组

LED full-color module

* LED 全彩软灯条硬灯条

LED full-color soft light strip hard light strip

* LED 护栏管

LED guardrail tube

* LED 点光源

LED point light source

* LED 像素屏

LED pixel screen

* LED 异性屏

LED opposite sex screen

* 电器设备跑马灯

Electrical equipment scrolling lights

* 城市亮化

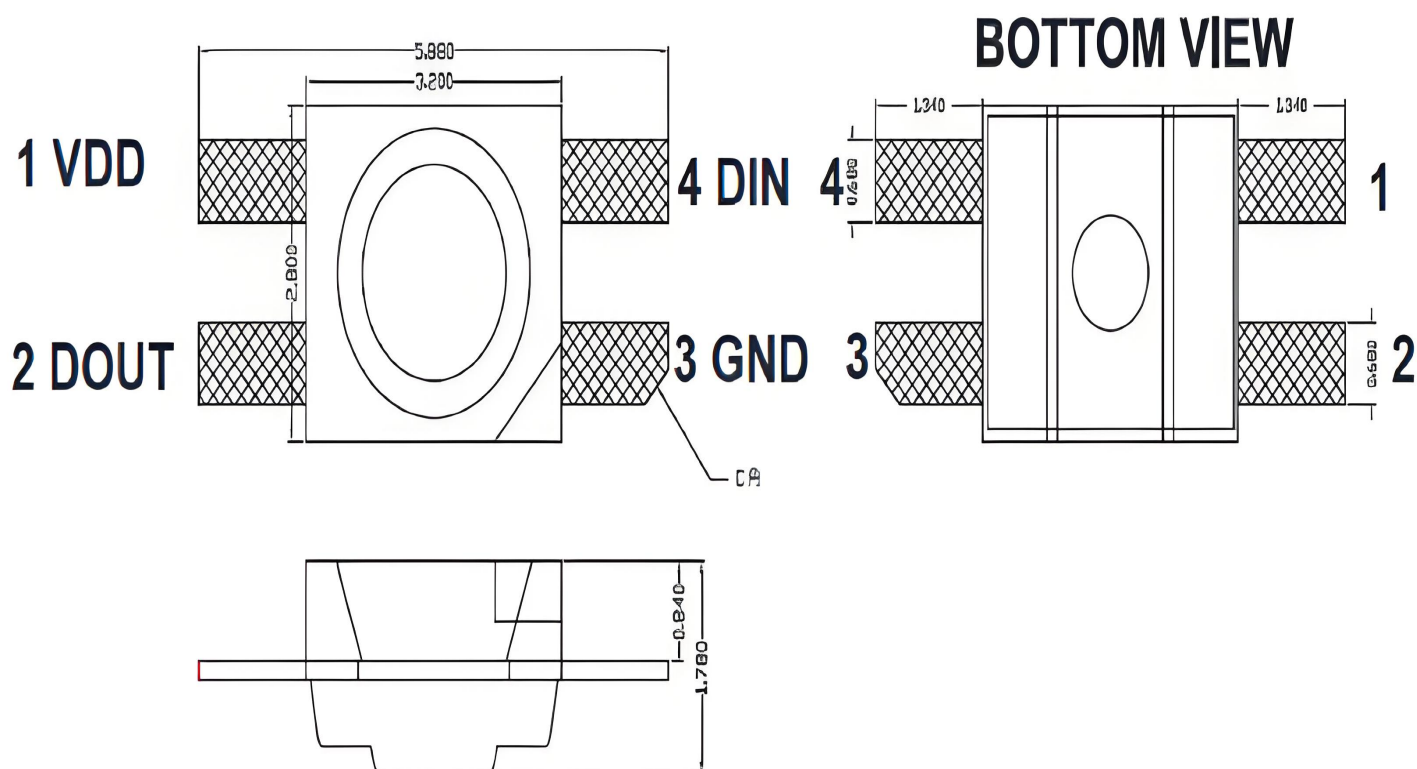
Urban lighting





三、外观与尺寸 Appearance and size

- 1、外观尺寸/ Package (L/W/H) : 6.0*2.8*1.8 mm
- 2、颜色/ Color: 超亮 RGB 全彩色/ Ultra Bright RGB full-color
- 3、胶体/ Lens: 清水平模/ Water Clear Flat Mold
- 4、用于自动贴片机/Compatible With SMT Automatic Equipment
- 5、适用于红外线回流焊制程/Compatible With Infrared Reflow Solder Process



备注 (Note):

1. 所有尺寸均以 mm 为单位;
All dimensions are in millimeters
2. 在没有明确标注的情况下, 公差均为 ± 0.1 mm.
In the absence of clear markings, the tolerance is ± 0.1 mm



四、电性参数 Electrical parameters

1、引脚功能 pin function

序号 NB	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 grounds	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

2、最大额定值（如无特殊说明，TA=25℃, VSS=0V）

Maximum rated value (unless otherwise specified, TA=25 °C), VSS=0V)

参数 parameter	符号 symbol	范围 range	单位 unit
电源电压 supply voltage	VDD	+3.5~+5.5	V
逻辑输入电压 Logic input voltage	VI	-0.5~VDD+0.5	V
工作温度 operation temperature	Topt	-40~+150	℃
储存温度 storage temperature	Tstg	-55~+150	℃

3、LED 特性参数 LED characteristic parameters

颜色 colour	型号 model	波长 wavelength		亮度 brightness		电压 voltage	
R	10R1MUX	620-630	Nm	300-500	Mcd	2.0-2.2	V
G	13CGAUP	515-530	Nm	700-1500	Mcd	3.0-3.4	V
B	13CBAUP	460-475	Nm	200-300	Mcd	3.0-3.4	V



4、电气参数（如无特殊说明, VDD=5V, TA=25℃）

Electrical parameters (VDD=5V, TA=25 °C unless otherwise specified)

参数 parameter	缩写 abbrevia tion	测试条件 Test conditions	最小值 Min	典型值 Typ	最大值 Max	单位 unit
芯片电源电压 Chip power supply voltage	VDD	—	3.5	—	5.5	V
静态电流 static current	IDD	VDD = 5V, IOU T ”OFF”	—	0.45	—	mA
输入信号阈值电压 Input signal threshold voltage	VIH	DIN 输入高电平 DIN input high level	3.1	—	—	V
	VIL	DIN 输入低电平 DIN input low level	—	—	1.5	
DOUT 输入电流 DOUT input current	IOH	DOUT 输出高, 串接 10Ω 电阻至 GND DOUT output high, connect a 10 Ω resistor in series to GND	—	-14	—	mA
DOUT 灌电流 DOUT current injection	IOL	DOUT 输出低, 电源对 DOUT 灌电流 DOUT output low, power supply injects current into DOUT	—	14	—	mA
OUT R/G/B 恒流拐点电压 OUT R/G/B constant current inflection point voltage	VDS_S	IOU T = 11.5mA	—	0.6	—	V
OUT R/G/B 输出电流变化量 OUT R/G/B output current variation	%VS.VDS	IOU T = 11.5mA, VDS = 1.0~3.0V	—	0.5	—	%
	%VS.VDD	IOU T = 11.5mA, VDD = 4.5~5.5V	—	0.5	—	
	%VS.TA	IOU T = 11.5mA, TA = -40~+85℃	—	5.0	—	
OUT R/G/B 端口漏电流 OUT R/G/B port leakage current	Ileak	VDS = 11V, IOU T ”OFF”	—	—	1	uA

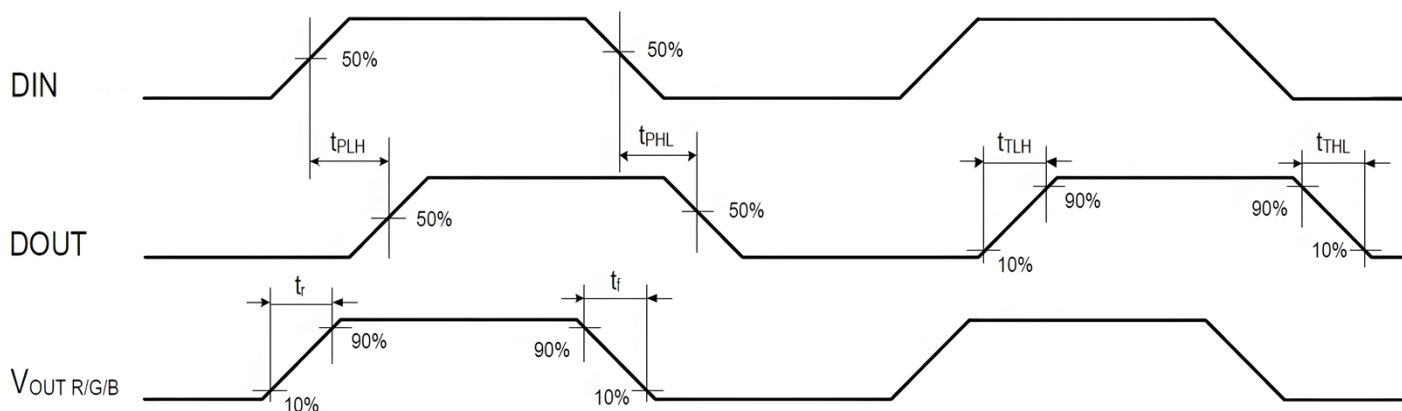


5、开关特性（如无特殊说明, VDD=5V, TA=25℃）

Switch characteristics (unless otherwise specified, VDD=5V, TA=25 °C)

参数 parameter	缩写 abbrevia tion	测试条件 Test conditions	最小值 Min	典型值 Typ	最大值 Max	单位 unit
OUT R/G/B 输出 PWM 频率 OUT R/G/B output PWM frequency	fPWM	IOUT=11.5mA, OUT 端口串接200Ω 电 至VDD IOUT=11.5mA, OUT port connected in series with 200 Ω power to VDD	—	4.5	—	KHz
信号传输延迟(注4) Signal transmission delay (Note 4)	tPLH	DOUT 端口对地负载电容 30pF, DIN 至 DOUT 的信号传输延时 The DOUT port has a ground load capacitance of 30pF, Signal transmission delay from DIN to DOUT	—	80	—	Ns
	tPLH		—	80	—	
DOUT 转换时间(注5) DOUT conversion time (Note 5)	tTLH	DOUT 端口对地负载电容 30pF DOUT port to ground load capacitor 30pF	—	12	—	Ns
	tTLH		—	10	—	
OUTR/G/B 转换时间 (注6) OUTR/G/B conversion time (Note 6)	tr	IOUT R/G/B =11.5mA, OUT R/G/B 端口串接 200 Ω 电阻至 VDD, 对地负 载电容 30pF IOUT R/G/B=11.5mA, OUT R/G/B ports connected in series 200 Ω resistor to VDD, 30pF to ground load capacitance	—	500	—	Ns
	tr		—	500	—	

注4、注5、注6 如图下所示: (Note 4, Note 5, Note 6: As shown in the figure below)





6、通信协议 communication protocol

a、编码描述 (Coded Description)

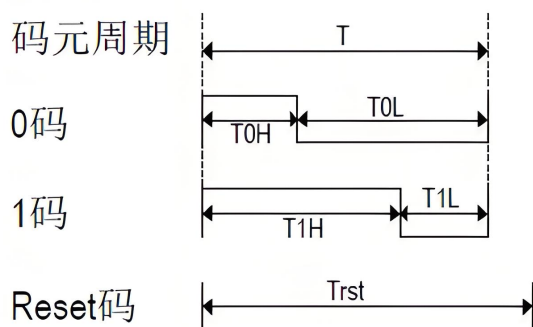
协议采用的是单极性归零码，每一个码元都必须有低电平。本协议的每个码元起始为高电平，高电平时间宽度决定“0”码或者“1”码。

The protocol uses unipolar zeroing code, and each symbol must have a low level. Each symbol in this protocol starts at a high level,

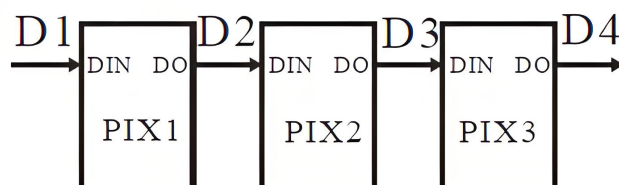
The high-level time width determines the "0" code or the "1" code.

时序波形图 (Time series waveform diagram)

输入码型:



连接方法:



数据传输时间 (Data transmission time)

参数 parameter	符号 symbol	最小值 Min	容差范围 Tolerance range	单位 Unit
码元周期 Symbol period	T	1.2	—	us
0 码, 高电平时间 0 code, high-level time	T0H	0.3	±0.05	us
0 码, 低电平时间 0 code, low level time	T0L	0.9	±0.05	us
1 码, 高电平时间 1 code, high-level time	T1H	0.9	±0.05	us
1 码, 低电平时间 1 code, low level time	T1L	0.3	±0.05	us
Reset 码, 低电平时间 Reset code, low level time	Trst	>200	—	us

注.: 写程序时, 码元周期最低要求为 1.2us

Note When writing programs, the minimum required symbol period is 1.2us

注: 0 码、1 码的高电平时间需按照上表的规定范围, 0 码、1 码的低电平时间要求小于 20us;

Note: The high-level time of codes 0 and 1 should be within the range specified in the table above, and the low-level time of codes 0 and 1 should be less than 20us



7、协议数据格式 Protocol Data Format

●Trst+第一颗芯片 24bits 数据+第二颗芯片 24bits 数据+.....+第 N 颗芯片 24bits 数据+Trst
Trst+24bit data from the first chip+24bit data from the second chip+...+24bit data from the Nth chip+Trst ● 24bit 灰度数据结构: 高位在前, 按照 RGB 的顺序发送

24 bit grayscale data structure: high-order, sent in RGB order

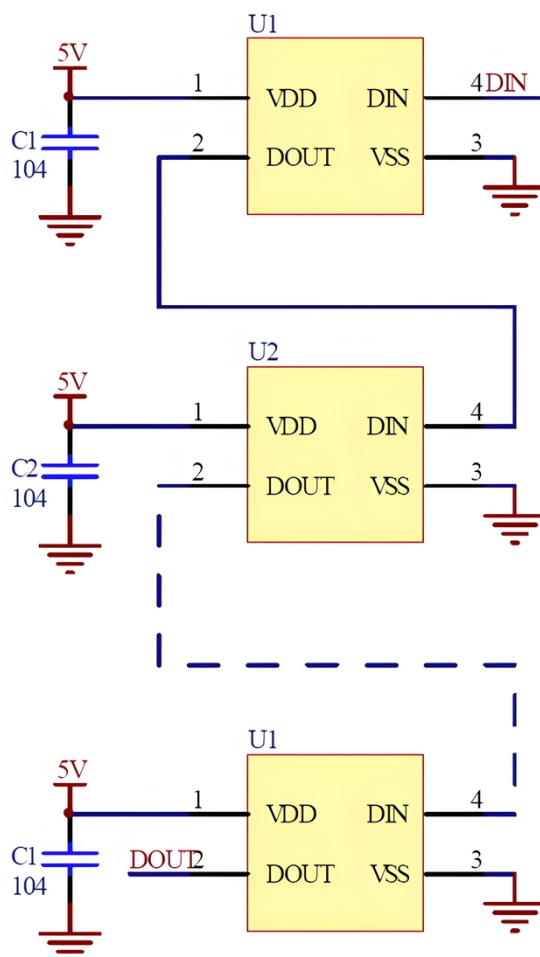
R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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bit23.....bit0

- 各芯片输入数据流 (以 3 颗芯片为例):



典型应用 (5V) Typical application (5V)





五、可靠性试验 Reliability Test

序号 Serial Number	测试项目 Test project	测试条件 Test conditions	样品数量 Number of samples	允收/拒收 Accept/Reject
1	寿命实验 Life test	测试电流: 20mA Test current: 20mA 温度: 25° C Temperature: 25° C 测试时间: 1000 小时 Testing time: 1000 hours	20	0/1
2	高温高湿 (静态实验) High temperature and humidity (Static experiment)	温度: 等于 65° C Temperature: equal to 65° C 湿度: RH90% Humidity: RH90% 测试时间: 240 小时 Testing time: 240 hours	20	0/1
3	冷热冲击 Thermal Shock	-40° C~+100° C 20min 10s 20min 测试时间: 100 个循环 Test time: 100 cycles	20	0/1
4	高温储存 high temperature storage	高温: +100° C High temperature: + 100° C 测试时间: 1000 小时 Testing time: 1000 hours	20	0/1
5	低温储存 low temperature storage	低温: -40° C Low temperature: - 40° C 测试时间: 1000 小时 Testing time: 1000 hours	20	0/1
6	温度循环 Temperature cycling	-40° C~+100° C 30min 5min 30min 测试时间: 20 个循环 Testing time: 20 cycles	20	0/1
7	回流焊 Reflow Soldering	260° C (Max.), 最大不超过 10 秒钟 260° C (Max.), maximum not exceeding 10 seconds	20	0/1

可靠度实验不合格判定标准/ Criteria for determining the failure of reliability experiments

IV: 衰减超过 50%

IV: Attenuation exceeding 50%

VF: 变化超过 20%

VF: Changes exceeding 20%

备注 (Notes):

1. 同一项实验结果的测试需要在 2 个小时之内完成;

The testing of the same experimental result needs to be completed within 2 hours

2. 测试必须在每项实验完成后, 材料恢复正常环境条件下才能进行。

The testing can only be carried out after each experiment is completed and the material is restored to normal environmental conditions



六、包装与标签说明 Packaging and labeling instructions

裁带与圆盘尺寸 Cutting tape and disc size

包装数量: 2000 pcs/卷 (Packaging quantity: 2000 pcs/roll)

注 (pour) :

1. 尺寸单位为毫米(mm)。

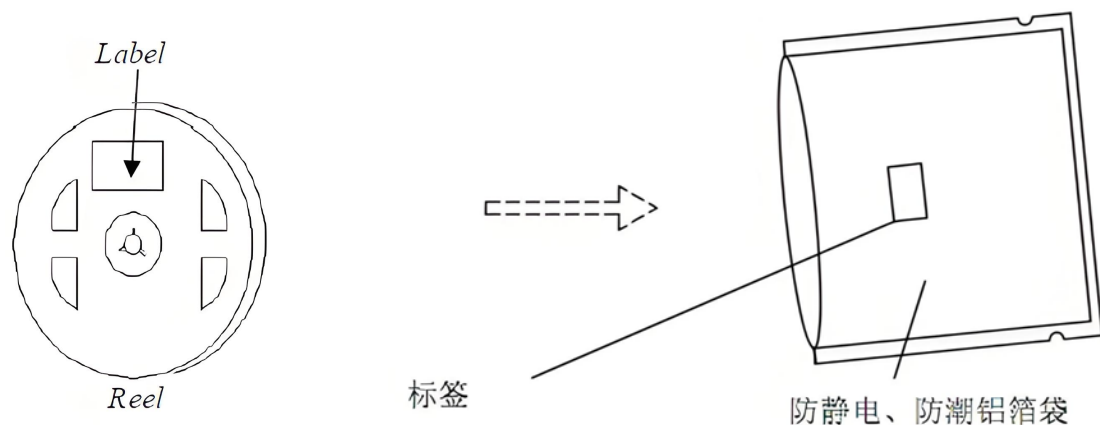
The unit of measurement is millimeters (mm)

2. 尺寸公差是 $\pm 0.1\text{mm}$ 。

The dimensional tolerance is $\pm 0.1\text{mm}$.

包装方式: (单位: mm)

Packaging method: (Unit: mm)



◆ 标签说明 (Label description)

LOT NO: 批次信息 (Batch Information)

PART NO: 产品型号 (PRODUCT MODEL)

BIN CODE: 产品名称 (product name)

WL: 波长范围 (wavelength range)

LV: 光强范围 (Light intensity range)

VF: 电压范围 (Voltage range)



七、焊接指导 Welding guidance

1、使用烙铁人手焊接

Hand soldering with a soldering iron

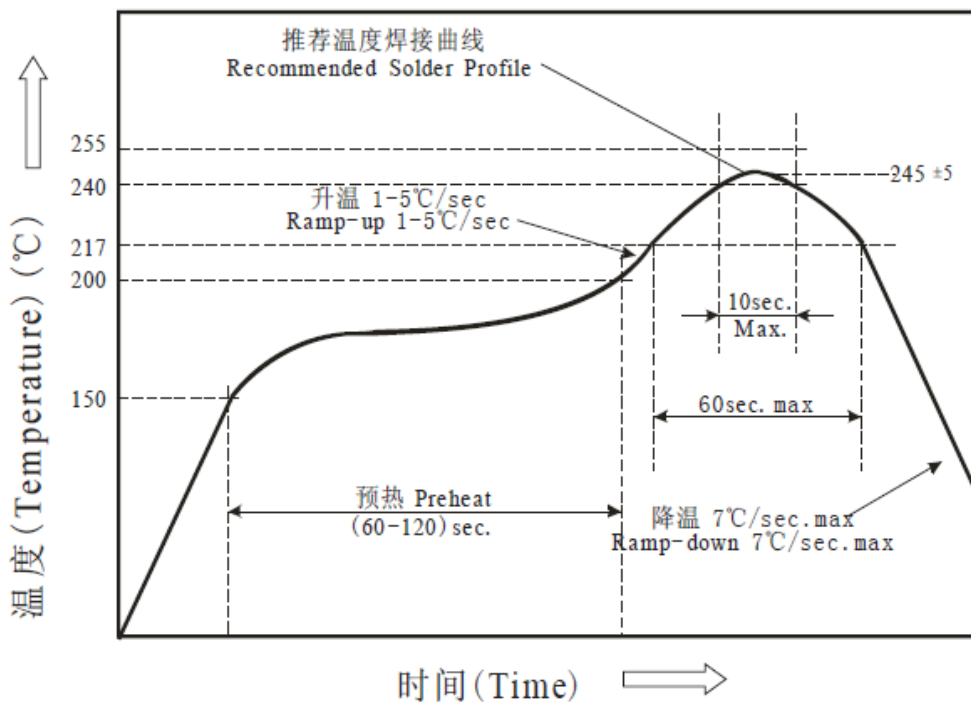
推荐使用功率低于 20W 的烙铁，焊接时烙铁的温度必须保持在 350℃ 以下，且每个电极只能进行一次焊接，每次焊接的持续时间不得超过 3 秒

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。

It is recommended to use a soldering iron with a power of less than 20W. During soldering, the temperature of the soldering iron must be kept below 350 °C, and each electrode can only enter Perform welding once, and the duration of each welding should not exceed 3 seconds
Careless operation during manual welding can easily cause damage to LED products, and caution should be taken.

2、回流焊接：推荐使用以下无铅回流焊接温度图进行。

Reflow soldering: It is recommended to use the following lead-free reflow soldering temperature chart



回流焊接最多只能进行两次。

Reflow soldering can only be performed twice at most.

在回流焊接升温过程中，请不要对 LED 施加任何压力。

Please do not apply any pressure to the LED during the reflow soldering heating 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 welding is completed, wait for the product temperature to drop to room temperature before proceeding with other treatments.



八、使用注意事项 Precautions for use

1、清洗 clean

a. 不能用超声波清洗。建议使用异丙醇 (isopropyl alcohol)、纯酒精擦拭或浸渍，不要超过 1 分钟，在室温下放置 15 分钟再使用。清洗后，确保 LED 发光面干净，异物会影响发光颜色。

Ultrasonic cleaning is not allowed. It is recommended to wipe or soak with isopropyl alcohol or pure alcohol for no more than 1 minute, and let it sit at room temperature for 15 minutes before use. After cleaning, ensure that the LED emitting surface is clean, as foreign objects can affect the color of the light

b. 应避免接触或污染天那水，三氯乙烯、丙酮、硫化物、氮化物、酸、碱、盐类，这些物质会损伤 LED.

Avoid contact with or contamination of Tian Na water, trichloroethylene, acetone, sulfides, nitrides, acids, bases, and salts, as these substances can damage LEDs

2、灌封 Potting

a. 纳离子、硫化物会使荧光颜色变淡（中毒），灌封时，避免使用含纳离子、硫化物的灌封胶。

Nano ions and sulfides can cause the fluorescent color of Lou to become lighter (toxic). When sealing, avoid using sealing adhesives containing nano ions and sulfides

b. 使用正常灌封胶时，建议先以少量试验，常温点亮 168 小时，确定没有问题再作业。

When using normal sealant, it is recommended to conduct a small test first, light it up at room temperature for 168 hours, and confirm that there are no problems before starting work

3、保存 save

a. 打开包装前，LED 应存储在温度 30℃或以下，相对湿度在 RH60%以下，一年内使用。

Before opening the packaging, the LED should be stored at a temperature of 30 °C or below and a relative humidity of RH60% or below, and used within one year

b. 打开包装后，LED 应在温度 30℃或以下、相对湿度在 RH30-35%或更低环境下，使用时间 7 天。LED 吸潮后，回流焊时可能裂胶，影响发光颜色。对于未使用的散件，请去潮处理（对于卷装品：烘烤 60℃±5℃，12 小时；对于散装品：烘烤 105℃±5℃，1 小时），然后再用铝箔袋密封后保存。

After opening the packaging, the LED should be used for 7 days in an environment with a temperature of 30°C or below and a relative humidity of RH30-35% or lower. After the LED absorbs moisture, it may crack during reflow soldering, affecting the color of the light emission. For unused loose parts, please remove moisture (for roll products: bake at 60°C±5°C for 12 hours; for bulk products: bake at 105°C±5°C for 1 hour), then seal with aluminum foil bag and store

c. 保存环境中避免有酸、碱以及腐蚀气体存在，同时避免强烈震动及强磁场作用。

Avoid the presence of acids, alkalis, and corrosive gases in the storage environment, while also avoiding strong vibrations and strong magnetic fields



4、静电 static electricity

a. 静电或峰值浪涌电压会损坏 LED, 避免在开灯、关灯时产生瞬时电压。

Static electricity or peak surge voltage can damage LEDs, avoiding the generation of instantaneous voltage when turning on or off lights

b. 建议使用 LED 时佩戴防静电手腕带、防静电手套, 穿防静电鞋, 使用的设备、仪器正确接地。LED 损坏后, 表现出漏电流明显增加, 低电流正向电压变低, 低电流点不亮等现象。

It is recommended to wear anti-static wrist straps, anti-static gloves, anti-static shoes when using LEDs, and ensure that the equipment and instruments used are properly grounded. After the LED is damaged, it shows a significant increase in leakage current, a decrease in forward voltage at low current, and the low current point does not light up

5、测试 test

a. LED 要在额定电流下驱动, 同时电路中需要加限流电阻保护, 否则, 轻微的电压变化就会引起较大的电流变化, 从而破坏 LED.

LEDs need to be driven at rated current, and current limiting resistors need to be added to the circuit for protection. Otherwise, slight voltage changes can cause significant current changes, which can damage the LED

b. 在电路导通或关闭情况下, 要避免瞬间浪涌电压的产生, 否则, LED 将被烧坏。

When the circuit is turned on or off, it is necessary to avoid the generation of transient surge voltage, otherwise the LED will be burned out.

c. 顺向电压 V_F 过高或反向电压 V_R 过高, 均会损坏 LED.

Excessive forward voltage V_F or excessive reverse voltage V_R can damage the LED

d. 点亮或测试 LED 时, 加在 LED 两端的反向电压不得高于 5V, 否则容易击伤 LED.

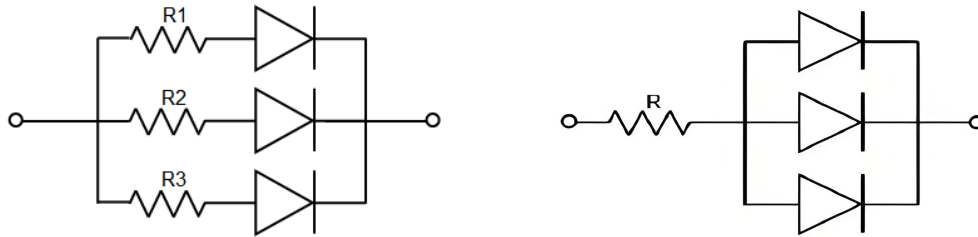
When lighting or testing the LED, the reverse voltage applied to both ends of the LED should not exceed 5V, otherwise it is easy to damage the LED



6、其他 other

LED 发光颜色会随着工作电流不同而有少许变化，建议设计时考虑电阻与 LED 串联使用。点亮时，注意不要直视 LED 发光面，LED 的光强度会灼伤眼睛。

The color of LED light may vary slightly with different operating currents. It is recommended to consider using resistors in series with the LED during design. When lighting up, be careful not to look directly at the LED emitting surface, as the light intensity of the LED can burn the eyes



7、声明 The statement

选购桂光光电生产之产品即享有保质期内标准售后服务，详情请洽询我司相关销售人员，桂光光电有限公司保留最终决定处理方式的权力，相关保质服务仅限于桂光光电产品本体，恕不对客户端产品/系统等负担衍展性的责任(含直接及间接)。客户如未对产品进行规格和功能性验证及索取对应产品承认书（规格书）资料进行签署确认直接下单则视为默认此服务条款。

客户进货检验 IQC(Incoming Quality Control)、最终检验 FQC(Final Quality Control)、系统质量检验 SQC(System Quality Control)等不同阶段如有发现产品品质异常，请尽速与我司相关销售人员联系。经桂光光电技术人员分析结果,如可确认归责为我司产品瑕疵的，客户可与我司相关销售人员协商退货/换货/退款方式择一处理。合作中惟本条款与其它合约协议不一致的均以此条款为准。

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Incoming Quality Control (IQC), Final Quality Control (FQC), System Quality Control (SQC) and other different stages of customer Incoming Quality Control (IQC), Incoming Quality Control (FQC), System Quality Control (SQC) Please contact our sales staff as soon as possible. According to the analysis result of Guiguang photoelectric technical personnel, if it can be confirmed that the fault is attributed to our company's product defects, the customer can negotiate with our company's relevant sales staff to choose a way to deal with the return/replacement/refund. In cooperation, this clause shall prevail if there is any inconsistency between this clause and other contractual agreements.

the luminous color. Heat dissipation should be fully considered in the design