

承認書

SPECIFICATION FOR APPROVAL

● 客戶名稱

● Customer

● 客戶品號

● Customer Part No.

● 產品品號

HC-S3528RGBDA-G3

● Brightek Part No.

● 產品規格描述

3528 幻彩 RGBDA

● Specification

● 製錶人

王清

● Prepared By

● 審核

李东平

● Checkedy

● 客戶回簽

● Customer

● 送樣日期:

● Deliver date:

說明: 一、謹致執事者: 茲提供敝公司產品之有關詳細規格及圖面資料, 敬請給予辦理測試認定手續。同時敬請 送返一份附有貴公司簽認之測試認定後之樣品認定書。

We are sending you our specification and drawings for your approval. Please return to us one copy "For Approval" with your approved signatures.

二、客戶意見欄 Customer's Proposal

☐ Approve 承認 (請於認可欄中簽名)

☐ Disagree 不同意

Reason 原因:

光宇集團

中高端光电元件定制企业, 20 多年封装经验, 品质稳定, 值得信赖, 体现光的价值。

光宇集团国际(香港)有限公司

GTU Group International (HK) Co., Limited

广东光宇半导体科技有限公司

工厂地址: 东莞市寮步镇松湖智谷 A2 栋 3 楼

东莞市弘呈光电有限公司

DongGuan Hong cheng Optoelectronics Co., Ltd.

工厂地址: 广东省东莞市樟木头镇莞樟路樟木头段 15 号 15 栋 2108 号

ADD: Room 2108, No.1 building, Wanhui Garden, East Guanzhang Road, Zhangmutou, Dongguan, Guangdong, China

TEL: 0769-87797616 87182291 Fax: 0769-82337396 www.hc-led168.com

业务联系人: 李顺阳 13925714318 (微信同号) 销售总监

企业邮箱: sales@led-hc.com



版本/版次	修改日期	修改内容

Customer Part No.:

Description (描述)

HC-S3528RGBDA-G3 是一个集控制电路与发光电路于一体的智能外控 LED 光源。其外型与一个 3528LED 灯珠相同，每个元件即为一个像素点。像素点内部包含了智能数字接口数据锁存信号整形放大驱动电路，电源稳压电路，内置恒流电路，高精度 RC 振荡器，输出驱动采用专利 PWM 技术，有效保证了像素点内光的颜色高一致性。LED 具有低电压驱动，环保节能，亮度高，散射角度大，一致性好，超低功率，超 长寿命等优点。将控制电路集成于 LED 上面，电路变得更加简单，体积小，安装更加 简便。

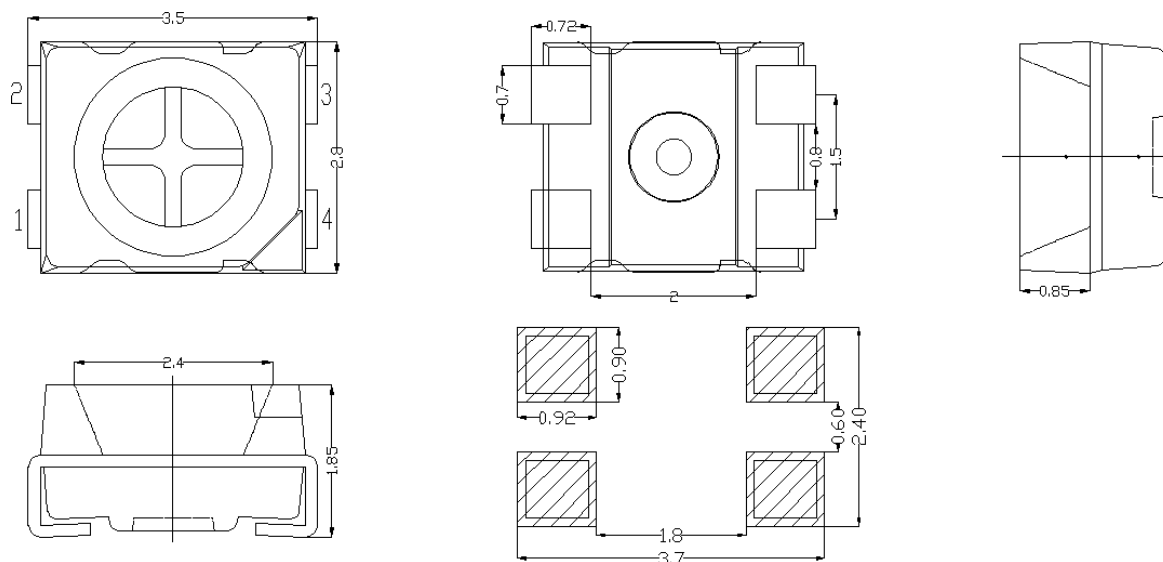
Applications (领域)

1. LED 幻彩软硬灯条，LED 全彩模块
LED Symphony soft and hard light bar, LED full color module.
2. LED 护栏管，LED 外观/情景照明
LED guardrail tube, LED appearance / scenario lighting.
3. LED 点光源，LED 像素屏 LED 异形
LED point light source, LED pixel screen LED shaped
4. 各种电子产品，电气设备跑马灯
Various electronic products, electrical equipment marquee.

Features (特征)

- 1.控制 IC 与 RGBLED 芯片集成 3528 封装。Control IC and RGBLED chip integrated 3535 package
- 2.OUT R/G/B 输出灰度等级：256 级。OUT R / G / B output gray level: 256 levels
- 3.内置高精度及高稳定振荡器。Built-in high precision and high stability oscillator
- 4.单线数据串联传输，可无限级连。Single-line data transmission in series, infinitely cascable
- 5.级联数据整形后输出，防止数据衰减。 Cascaded data output after shaping to prevent data attenuation
- 6.数据传输速率：800Kbps。 Data transmission rate: 800Kbps
- 7.每秒 30 帧时不低於 1024 级连。 No less than 1024 level connection at 30 frames per second
- 8.同一帧显示数据同步刷新。 Synchronous refresh of display data in the same frame

Package Dimensions (封装尺寸)



备注 NOTES:

1. All dimensions are in millimeters. 单位: 毫米
2. Tolerance is $\pm 0.10\text{mm}$ unless otherwise specified. 无明确标注下, 公差均为 $\pm 0.10\text{mm}$

Pin function (引脚功能)

序号 NO.	符号 symbol	管脚名 Pin name	功能描述 Functional description
1	DOUT	级联信号输出端 Cascade signal output terminal	控制数据信号输出 Control data signal output
2	VDD	电源端 The power supply side	供电管脚 Power supply pin
3	DIN	信号输入端 Signal input	控制数据信号输入 Control data signal input
4	GND	接地端 The grounding end	信号接地和电源接地 Signal grounding and power grounding

Electro-optical characteristics at Ta=25°C (光电特性)

颜 色 Color	波长(nm) Wavelength	光强(mcd) Brightness	光通量(lm) Luminous flux
红色(R)	620-630	250-450	0.6-1.5
绿色(G)	520-535	600-1300	2.0-4.0
蓝色(B)	460-475	200-300	0.4-1.0

最大绝对值（环境温度=25℃） Absolute Maximum Ratings (Ta=25℃)

参数 Parameter	符号 symbol	范围 Range	单位 unit
工作电压 Working voltage	VDD	-0.4~+5.5	V
逻辑输入电压 Logic input voltage	V _{I1}	-0.4~VDD+0.40	V
OUT R/G/B 端口耐压 OUT R/G/B Port voltage	BV _{out}	13	V
OUT R/G/B 端口输出电流 Port output current	I _{out}	12	mA
功耗 Power	P _o	0.5	W
工作温度 Working temperature	T _{opr}	-40~+85	℃
储存温度 Storage temperature	T _{stg}	-40~+100	℃
ESD 耐压 HBM	V _{esd}	2K	V

IC 电气参数 如无特殊说明：VDD=5V

参数 Parameter	符号 symbol	最小值 Min.	典型值 Stp.	最大值 Max.	单位 Unit
芯片工作电压 Chip operating voltage	VDD	3.5	-	5.5	V
高电平输入电压 High level input voltage	V _{IH}	0.65*V _{dd}	-	-	V
低电平输入电压 Low level input voltage	V _{IL}	-	-	0.3*V _{dd}	V
PWM 频率 The PWM frequency	FPWM	-	1.5	-	KHZ
静态功耗 Static power	I _{dd}	-	0.4	-	mA

开关特性（动态参数）

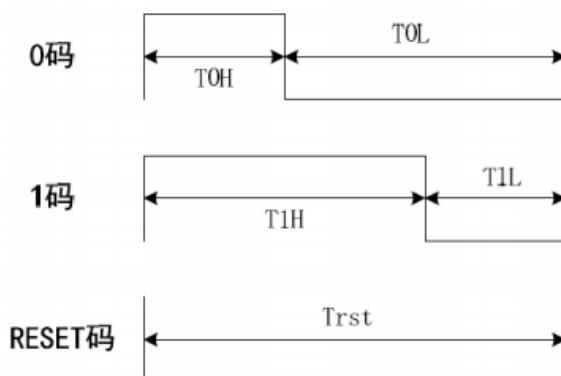
参数 Parameter	符号 symbol	最小值 Min.	典型值 Stp.	最大值 Max.	单位 Unit	备注 NOTE
数据传输速率 Data transfer rate	FDIN	—	800	—	KHZ	—
传输延迟时间 Transmission delay time	TPLH	—	0.21	—	us	DI-DO 信号延时 DO 端口对地负载电容 30pf
	TPHL	—	0.21	—	us	
DO 电平转换时间 DO level conversion time	TTLH	—	0.018	—	us	DO 端口对地负载电容 30pf
	TTHL	—	0.018	—	us	
RGB 端口电平转换 RGB port level conversion	T _r	—	0.15	—	us	I _{LED} =12mA, RGB 端口串接 200Ω 电阻至 VDD 对地负载电容 30pf
时间 Time	T _f	—	0.4	—	us	

时序特性 Timing Characteristics

输入码型：Input code type:

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。

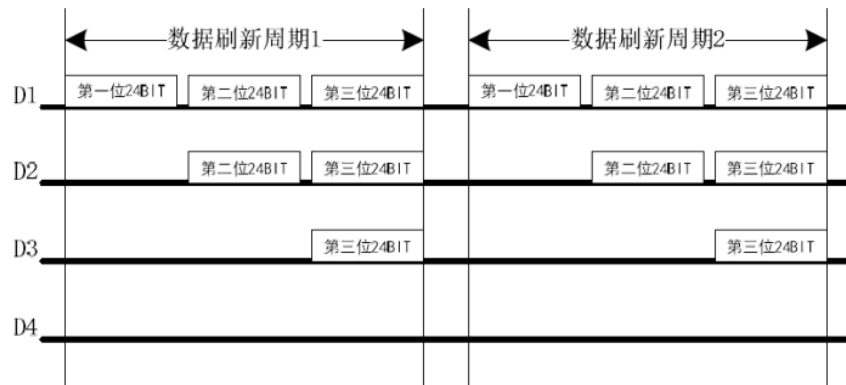
The protocol uses a unipolar return to zero code, and each code element must have a low level. Each symbol of this protocol starts at high level, and the high level time width is determined by "0" code or "1" code



码型时间：Type of time:

名称 Name	描述 describe	最小值 Min.	典型值 Stp.	最大值 Max.	单位 Unit
T0H	0 码, 高电平时间 0 code, high level time	—	330	—	ns
T1H	1 码, 高电平时间 1 code, high level time		660	—	ns
T0L	0 码, 低电平时间 0 code, low level time	—	920	—	ns
T1L	1 码, 低电平时间 1 code, low level time		590	—	ns
Trst	Reset 码, 低电平时间 Reset code, low level time	80	—	—	us

数据传输方式: Data transmission mode:



注: 其中 D1 为 MCU 端发送的数据, D2、D3、D4 为级联电路自动整形转发的数据。

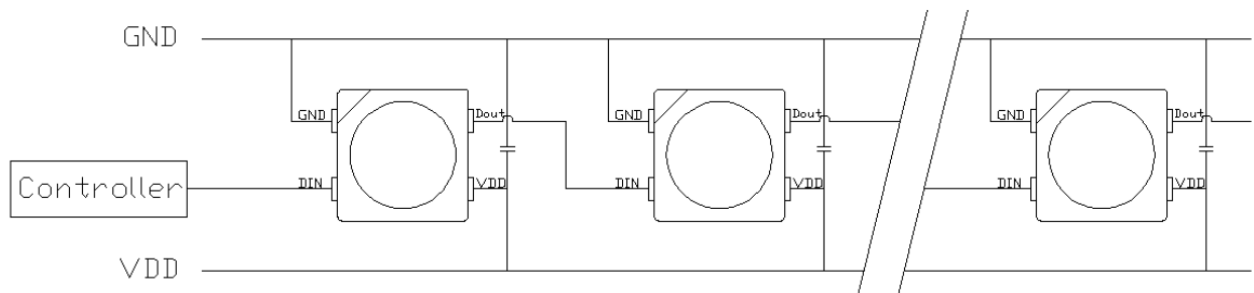
Note: D1 is the data sent by MCU end, D2, D3 and D4 are the data automatically reshaped and forwarded by the cascade circuit.

24bit 的数据结构: 24bit data structure:

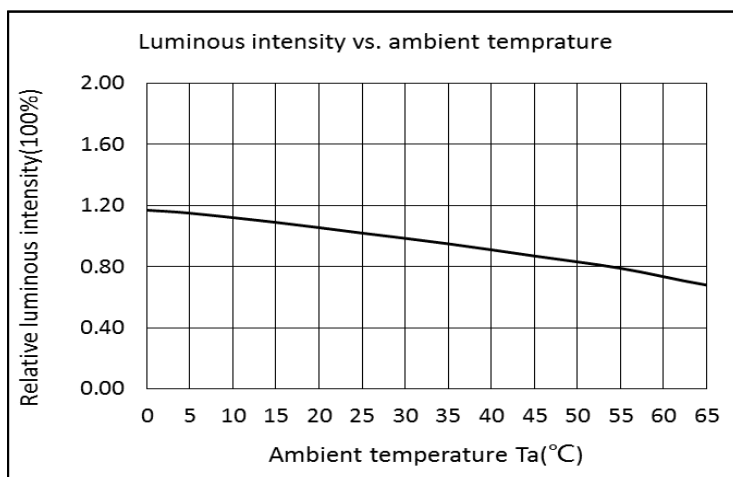
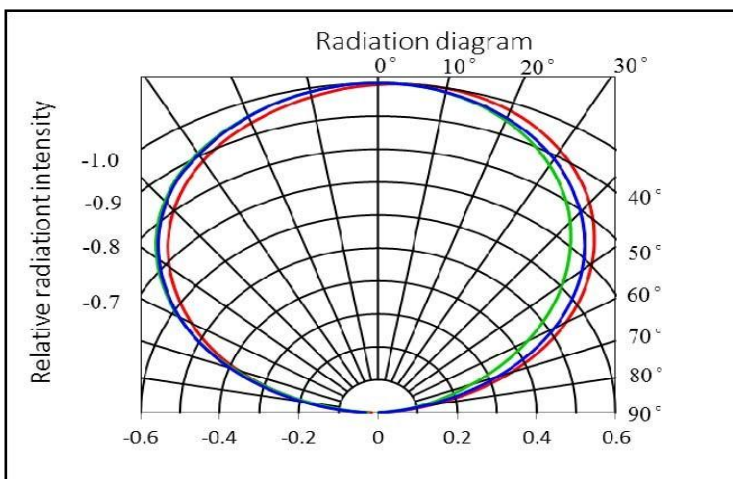
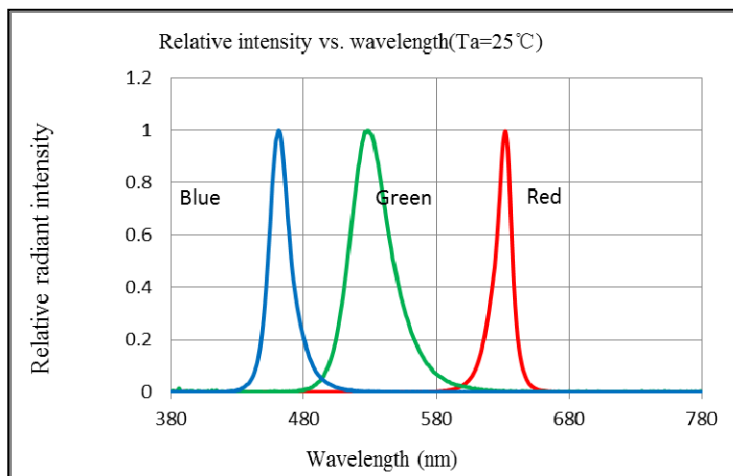
G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

注: 高位先发, 按照 GRB 的顺序发送数据 Note: high-order first, send data in RGB order

5V 应用电路 5V application circuit

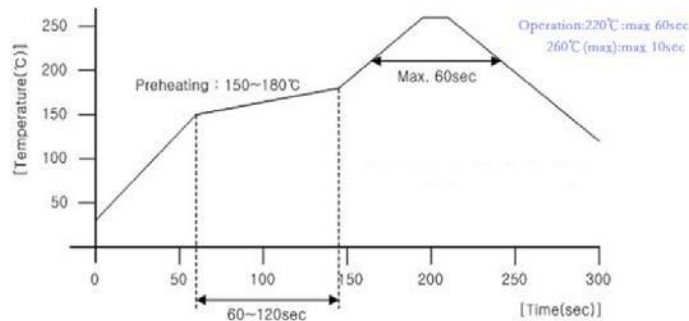


Typical optical characteristics curves (典型光学特性曲线)



Reflow profile (焊接说明)

■ SMD Reflow Soldering Instructions (回流焊简介)



.预热: 150°C~180°C ±5°C, 时间两分钟内。Preheating : 150°C~180°C ±5°C, within 2 minutes.

b.焊接条件 : 220°C 持续 60 秒 (max); 260°C (Max) 持续 10 秒 (Max); 逐渐冷却 (避免淬火)。

Operation heating : 220°C over time 60 sec max; 260°C (Max.) within 10 sec. (Max) Gradual Cooling

■ Soldering iron (烙铁)

1. When hand soldering, keep the temperature of the iron under 300°C, and at that temperature keep the time under 3 sec.

手工焊接时, 烙铁温度控制在 300°C 以下, 且时间不可超过 3 秒

2. The hand soldering should be done only a time

手工焊接只可焊接一次

CAUTIONS (注意事项)

The encapsulated material of the LEDs is silicone. Therefore the LEDs have a soft surface on the top of package. The pressure to the top surface will be influence to the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when using the picking up nozzle, the pressure on the silicone resin should be proper.

封装的 LED 为硅材料。该 LED 具有软表面的封装顶部。顶部表面的压力会影响 LED 的可靠性。应采取预防措施, 以避免有过大的压力作用于在封装件上。因此, 在选用吸嘴时, 应适用于有机硅树脂的压力。

■ Rework (返工)

a 打开包装前, LED 应储存在温度 30°C 或以下, 相对湿度在 60%RH 以下, 2 个月内使用。(注: 以标签日期为准, 且包装无漏气现象前提下使用; 针对不同防潮等级材料或包装保存的时间有一定的差异, 具体保存时间以产品规格书提示为准); 建议在未装配前不要随意打开防潮袋;

Before opening the package, the LED should be stored at a temperature of 30 ° C or below and a relative humidity below 60% RH, and used within 2 months. (Note: The date of the label shall and the package shall be used without air leakage; the storage time for different moisture- proof materials or packaging may be different, and the specific storage time shall be based on the product specification prompt); it is recommended that it is not assembled Do not open the moisture-proof bag at random before;

b.此款产品湿敏等级为 LEVEL5a，打开包装后，在温度 30℃或以下，相对湿度在 60%RH 或以下，使用时间为 24H；

The moisture sensitivity level of this product is LEVEL5a. After opening the package, the LED is at a temperature of 30° C or below, the relative humidity is at 60% RH or below, and the use time is 24H;

防潮等级 Moisture level	包装拆封后使用寿命 Service life after unpacking	
	时间 Time	条件 Conditions
LEVEL1	无限制 Unlimited	≦ 30℃/85 % RH
LEVEL2	1 年1year	≦ 30℃/60 % RH
LEVEL2a	4 周4weeks	≦ 30℃/60 % RH
LEVEL3	168H	≦ 30℃/60 % RH
LEVEL4	72H	≦ 30℃/60 % RH
LEVEL5	48H	≦ 30℃/60 % RH
LEVEL5a	24H	≦ 30℃/60 % RH
LEVEL6	取出即用 Take out and play	≦ 30℃/60 % RH

IPC/JEDEC J-STD-020 定的材料防潮等级（MSL） 定义 c.打开包装袋后，并贴在 PCB 板上的材料应在 0.5H 内完成焊接，不建议将材料贴在 PCB 板上，长时间放置在车间内不进行过炉焊接作业，以免材料吸收锡膏内水分造成不良隐患。

After opening the packaging bag, the material attached to the PCB board should be soldered within 0.5H. It is not recommended to stick the material on the PCB board. It should not be soldered in the workshop for a long time to avoid the material from absorbing the solder paste. Moisture causes bad hidden dangers.

d. 如果一卷材料未一次性用完，且车间温湿度在限定之条件（<30° C/60%RH）内，元件在空气中暴露时间未超出 2H,则余下材料应于干燥剂一起进行抽真空密封保存，否则，材料必须烘烤除湿；除湿后的材料重新包装可重新开始计算时间；对已完成装配的元件进行防潮控制。

If a roll of material is not used up at one time, and the temperature and humidity of the workshop are within the limited conditions (<30° C/60% RH), the exposure time of the components in the air does not exceed 2H, then the remaining materials should be pumped together with the desiccant Vacuum sealed and stored, otherwise, the material must be baked and dehumidified; the dehumidified material can be repackaged and the time can be restarted; moisture-proof control of the assembled components. d1.对已装配到 PCB 板后的元件不需再经过高温工序或回流焊工艺，则将不作特殊处理；

No special treatment is required for the components that have been assembled on the PCB board after going through the high-temperature process or the reflow soldering process; d2.对需要做灌胶、滴胶或包胶防护处理的产品，建议产品在做相应防护工艺前做好必要的除湿工作，在 60℃

±5℃的烤箱中烘烤不少于 12 小时，以剔除产品在检测、老化过程中暴露在空气中吸收的水分，以避免产品在防护处理后，包在材料表面的湿气会慢慢侵入产品，会造成产品失效；

For products that need to be filled, glued or covered, it is recommended that the product be dehumidified before the corresponding protection process is done. Bake it in an oven at 60 °C

± 5 °C for not less than 12 hours to eliminate The product is exposed to the moisture absorbed in the air during the testing and aging process, so as to prevent the moisture

wrapped on the surface of the material from invading the product slowly after the product is protected, which will cause the product to fail; d3.对需要进行二次 SMT

艺或高温的产品，在完成一次焊接后将会进行二次焊接前，亦应做好必要的防潮处理，暴露在（<30° C/60%RH）条件下，最长不可超过 2H,若二次高温工艺相隔时间较长，则一次焊接后的材料必需进行必要的除湿工作（在

60℃±5℃的烤箱中烘烤不少于 12 小时），然后抽真空密封保存；或者先将产品贮存在干燥箱内或带有干燥剂的容器内，二次高温工艺前，再做除湿工作（在 60℃±5℃的烤箱中烘烤不少于 12 小时），以确保产品在过高温工艺前不受潮；

For products that require secondary SMT process or high temperature, after the primary welding will be completed and the secondary welding will be performed, the necessary moisture-proof treatment should also be done. The length should not exceed 2H, and the second high-temperature process of Nuo is long, so the material after one welding must be dehumidified (bake it in an oven at 60 °C ± 5 °C for not less than 12 hours), and then vacuum seal Store; or store the product in a drying box or a container with a desiccant first, and then do the dehumidification work before the second high-temperature process (baking in an oven at 60 °C

± 5 °C for not less than 12 hours), Ensure that the product is not damp before the high temperature process; 低湿烘烤条件: 60° C±5° C 烘烤不小于 12 小时, 高温烘烤条件: 105° C±5° C 烘烤不小于 1 小时 Low humidity baking condition: 60° C ± 5° C baking not less than 12 hours, high temperature baking condition: 105° C ± 5° C baking not less than 1 hour

4.IC 器件的防静电及电涌防护

静电和电涌会伤害到 IC 器件的 LED 产品，因此，必须做好相应的防护措施；IC 器件的信号输入输出端口必须串接防护电阻以防电涌或静电冲击端口造成产品失效；为保护好 IC 器件的 LED 产品，无论什么时间与场合，只要接触到 LED 时，都要穿带防静电手带，防静电脚带及防静电手套，所有的装置和仪器设备均须接地。建议每一种产品在出货前检验时，都应有相关电性测试，以挑选出因静电而产生的不良品，在电路设计时，应考虑消除电涌对 LED 危害的可能性。

Static electricity and surges can damage LED products of IC devices. Therefore, corresponding protective measures must be taken; signal input and output ports of IC devices must be connected with protective resistors in series to prevent product failure caused by surges or electrostatic shock ports; for protection Good LED products of IC devices, no matter what time and occasion, as long as they touch the LED, they must wear anti-static hand straps, anti-static foot straps and anti-static gloves. All devices and instruments must be grounded. It is recommended that each product should have relevant electrical tests before shipment inspection to select out defective products due to static electricity. In the circuit design, consideration should be given to eliminating the possibility of surge damage to the LED.

5.特别说明 Special description a .亮度偏差允许 ± 10%

Iv : To l eranc e fo r eac h Bi n Cod e is ±10 % b .主波长偏差允许 ± 1nm

WLD: To l eran ce fo r e ach Bin Code i s ±1nm c.客户在使用过程中，为避免因批次不同，或客户的存货累计批次不同，而导致的颜色差异等情况，请留意标签上的 Part No、Lot No、BIN 的内容。

Customers in the use process, in order to avoid because of the different batches, or customer inventory accumulative batch is different, due to the color difference, etc., please pay attention to the Part No on the label, Lot No, the content of the BIN. d.在生产相同批次的订单时，尽量使用同波长等级、同亮度等级的灯珠。

When producing the same batch of orders, try to use lamp beads with the same wavelength level and the same brightness level

e.装配及使用过程中，禁止挤压到 LED 胶面。

It is forbidden to press into LED glue during assembly and use.

f. 对于 LED 产品散热的设计，设计时请考虑 LED 所产生的热量，PCB 板的热阻、LED 放置的密度和相关组成，以及输入的电功率都会使温度增加。为避免出现过多热量的产生，须保证 LED 运行时要在产品规格书中所要求的最大规格范围之内。在设定 LED 的驱动电流时，应考虑到最高的环境温度。产品引脚最高工作温度不超过 40° C。

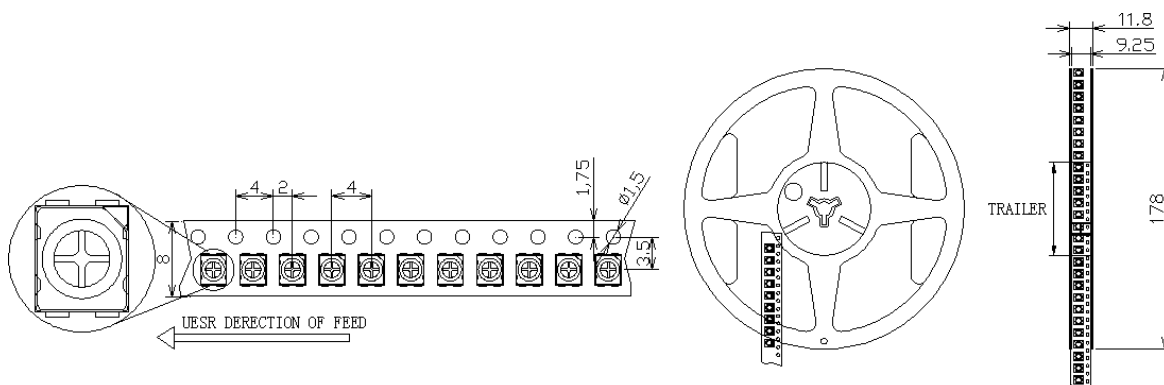
For the design of heat dissipation of LED products, please consider the heat generated by the LED, the

thermal resistance of the PCB, the density and phase of the LED placement The composition of the switch and the input electric power will increase the temperature. In order to avoid the generation of excessive heat, it must be ensured that the LED operation is within the maximum specification range required in the product specification. When setting the LED drive current, the highest ambient temperature should be considered. The maximum operating temperature of the product pins does not exceed 40° C.

TEST ITEMS AND RESULTS (测试项目和结果)

NO.	测试项目 Test Item	测试条件 Test Conditions	参考标准 Reference Standard	允许破坏数 Number of Damaged
1	寿命测试 Operation Life	测试电流: Typical current 温度: 25℃ 1000hrs	JESD22-A 108D	0/20
2	高温高湿储存 High Temperature High Humidity Storage	湿度: 85%RH 温度: 85℃ 1000hrs	JEITA ED-4701 100 103	0/20
3	高温储存 High Temperature Storage	高温温度: 100℃ 1000hrs	JEITA ED-4701 200 201	0/20
4	低温储存 Low Temperature Storage	低温温度: -40℃ 1000hrs	JEITA ED-4701 200 202	0/20
5	冷热冲击 Thermal Shock	-40℃~+100℃ 20min 10S 20min	MIL-STD-202G	0/20
6	回流焊 Reflow	预热温度: 150℃-180℃, 不到 2 分钟. 操作加热温度: 220℃ 不超过 60 秒, 260℃ (Max) 不超过 10 秒	JEITA ED-4701 300 301	0/20

Packaging Specifications (包装规格)



- 编带规格 (单位: mm) Tapping specifications (Units: mm)