



# 规格书

## SPECIFICATION

产品名称 Description: 12V6脚5050(5.0\*5.4\*1.6)幻彩led

产品型号 Model : ZH5050H6-1809XD-A20

客户代码 Customer NO:

制作日期 Date: 2022, 04, 5

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核准 Approval	审核 Examine.	承认 Admit





## 主要特点

(Main features)

- IC 控制电路与 LED 点光源共用一个电源。  
The IC control circuit and the LED point light source share one power supply.
- 控制电路与 RGB 芯片集成在一个 5050 封装的元器件中，构成一个完整的外控像素点。  
The control circuit and the RGB chip are integrated in a 5050 packaged component, constituting a complete externally controlled 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. After any pixel point receives the signal, it is output after waveform shaping to ensure that the waveform distortion of the line will not accumulate.
- 内置上电复位和掉电复位电路。  
Built-in power-on reset and power-down 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。  
The three primary colors of each pixel point can achieve 256-level brightness display, and complete the true-color display of 16,777,216 kinds of colors.
- 端口扫描频率 2KHz。  
The port scanning frequency is 2 KHz
- 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, which can complete the reception and decoding of 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, there is no need to add any circuit.
- 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 cascade number is not less than 1024 points.
- 数据发送速度可达 800Kbps。  
The data transmission speed can reach up to 800 Kbps.
- 光的颜色高度一致，性价比高。  
The color of the light is highly consistent and has high cost performance

## 主要应用领域

(Main application fields)

- LED 全彩发光字灯串，LED 全彩软灯条硬灯条，LED 护栏管。  
LED full-color luminous word light string, LED full-color flexible light strip and hard light strip, LED guardrail tube.
- LED 点光源，LED 像素屏，LED 异形屏，各种电子产品，电器设备跑马灯。  
LED point light source, LED pixel screen, LED special-shaped screen, various electronic products, marquee lights of electrical equipment.



## 产品概述

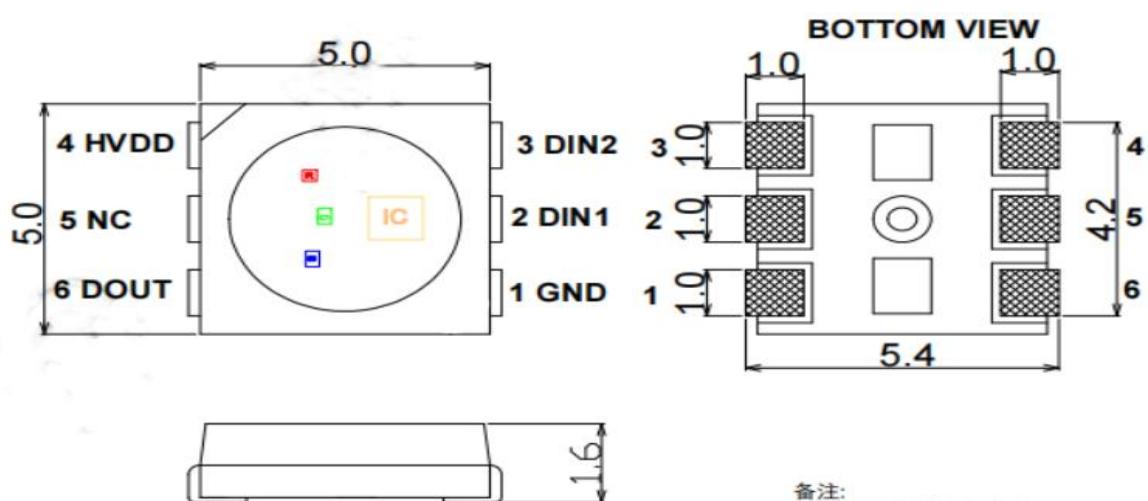
(Product overview.)

ZH5050H6-1809XD-A20是一个集控制电路与发光电路于一体的智能外控 LED 光源。具有较小体积，其外型尺寸与一个 5050LED 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，还包含有高精度的内部振荡器和可编程定电流控制部分，有效保证了像素点光的颜色高度一致。

ZH5050H6-1809XD-A20 is an intelligent external-controlled LED light source that integrates the control circuit and the light-emitting circuit. It has a relatively small volume, and its external dimension is the same as that of a 5050 LED lamp bead, and each element is a pixel point. The pixel point contains an intelligent digital interface data latch signal shaping amplification driving circuit, and also includes a high-precision internal oscillator and a programmable constant current control part, which effectively ensures a high degree of consistency in the color of the light of the pixel point.

## 机械尺寸 (单位mm)

(Mechanical dimension (unit: mm)).



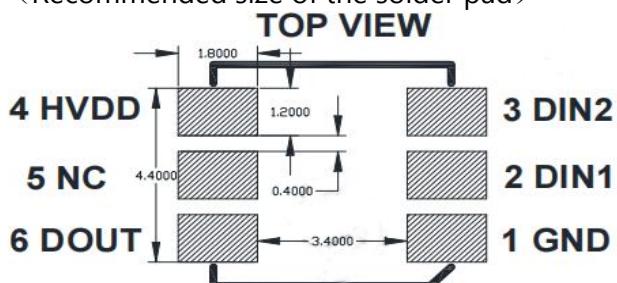
备注:

1. 以上标示单位为毫米.
2. 除非另外注明, 尺寸公差为 ±0.1 毫米.



焊盘建议图:

(Recommended size of the solder pad)



引脚功能 (Pin Function)

序号 Serial number	符号 sign	管脚名 Pin name	功 能 描 述 Function Description
1	GND	地	信号接地和电源接地 (Signal grounding and power supply grounding)
2	DIN1	数据输入1	控制数据信号输入1 (Control data signal1input)
3	DIN2	数据输入2	控制数据信号输入2 (Control data signal2input)
4	HVD D	电源	供电管脚 (Power supply)
5	NC	NC	空脚 (Suspended PIN)
6	DOU T	数据输出	控制数据信号输出 (Control data signal output)

最大额定值 (如无特殊说明,  $T_A=25^\circ C, V_{SS}=0V$ )

(Maximum Rated Value (Unless otherwise specified,  $TA = 25^\circ C, VSS = 0V$ )

参数argument	符号 sign	范围extent	单位 unit
电源电压Power supply voltage	$V_{DD}$	+9.5~+13.5	V
逻辑输入电压 Logic input voltage	$V_I$	-0.5~ $V_{DD}+0.5$	V
工作温度Working temperature	$T_{opt}$	-40~ +85	°C
储存温度Storage temperature	$T_{stg}$	-40~+105	°C
ESD耐压 (设备模式) ESD withstand voltage (device mode)	$V_{ESD}$	200	V
ESD耐压 (人体模式) ESD withstand voltage (human body mode)	$V_{ESD}$	2K	V



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电气参数 (如无特殊说明,  $T_A = -20 \sim +70^\circ C$ ,  $V_{DD} = 4.5 \sim 5.5V$ ,  $V_{SS} = 0V$ )

Electrical parameters (Unless otherwise specified,  $TA = -20$  to  $+70^\circ C$ ,  $VDD = 4.5$  to  $5.5V$ ,  $VSS = 0V$ )

参数 parameter	符号 sign	最小 min	典型 typical	最大 max	单位 unit	测试条件 Test conditions
芯片内部电源电压 Internal power supply voltage of the chip	VDD	---	12		V	---
R/G/B 端口耐压 Withstand voltage of R/G/B ports	VDS,MAX	---	---	26	V	---
DOUT 驱动能力 DOUT driving capability	IDOH	---	30	---	mA	DOUT 接地, 最大驱动 电流
	IDOL	---	30	---	mA	DOUT 接正, 最大灌电 流
信号输入翻转阀值 Signal input inversion threshold	VIH		3.4	---	V	VDD=5.0V
	VIL		---	1.6	V	
PWM 频率 PWM frequency	FPWM	---	8	---	kHz	---
静态功耗 Static power consumption	IDD	---	1.6	---	mA	---



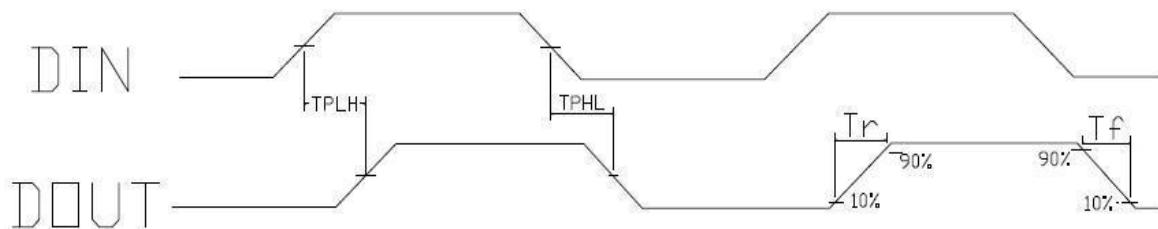
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开关特性 (如无特殊说明,  $T_A = -20 \sim +70^\circ\text{C}$ ,  $V_{DD} = 4.5 \sim 5.5\text{V}$ ,  $V_{SS} = 0\text{V}$ )

(Switching characteristics (Unless otherwise specified,  $TA = -20$  to  $+70^\circ\text{C}$ ,  $VDD = 4.5$  to  $5.5\text{V}$ ,  $VSS = 0\text{V}$ )

参数 parameter	符号 sign	最小 min	典型 typical	最大 max	单位 unit	测试条件 Test conditions
数据传输速度 Data transmission speed	fDI N	---	800	---	KHZ	占空比 67% (数据 1) Duty cycle 67% (Data 1)
DOUT 传输延迟 DOUT transmission delay	$T_{PLz}$	---	---	200	ns	$\text{DIN} \rightarrow \text{DOUT}$
$I_{out}$ 上升时间 $I_{out}$ rising time	$T_r$	---	---	200	ns	$V_{DS} = 1.5\text{V}$ $I_{OUT} = 9\text{mA}$
	$T_f$	---	---	200	ns	



### LED 特性参数 (Characteristic parameters of LED)

	参考值 Reference value
RGB 通道恒流 Constant current of RGB channels	9mA
红光亮度 Red light brightness	250-400mcd
绿光亮度 Green light brightness	600-1000mcd
蓝光亮度 Blue light brightness	200-350mcd
红光波长 Red light wavelength	620-630nm
绿光波长 Green light wavelength	515-530nm
蓝光波长 Blue light wavelength	460-475nm



数据传输时间 (Data transmission time)

T0H	0 码, 高电平时间 High-level time	0.3 $\mu$ s	$\pm 0.05\mu$ s
T1H	1 码, 高电平时间 High-level time	0.9 $\mu$ s	$\pm 0.05\mu$ s
T0L	0 码, 低电平时间 Low-level time	0.9 $\mu$ s	$\pm 0.05\mu$ s
T1L	1 码, 低电平时间 Low-level time	0.3 $\mu$ s	$\pm 0.05\mu$ s
RES	帧单位, 低电平时间 Frame unit, low-level time	80 $\mu$ s 以上	

1. 协议采用单极性归零码，每个码元必须有低电平，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“1”码。
2. 书写程序时，码元周期最低要求为 1.2 $\mu$ s。
3. “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 20 $\mu$ s

1. The protocol adopts unipolar return-to-zero code. Each symbol must have a low level. The start of each symbol of this protocol is a high level. The width of the high-level time determines the "0" code or the "1" code.
2. When writing the program, the minimum requirement for the symbol period is 1.2 $\mu$ s.
3. The high-level time of the "0" code and the "1" code needs to be within the specified range in the above table. The low-level time requirements of the "0" code and the "1" code are less than 20 $\mu$ s.



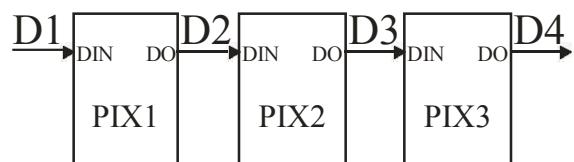
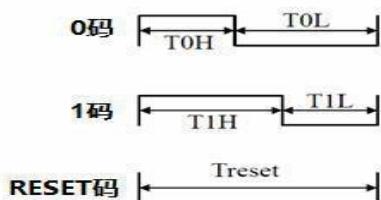
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时序波形图 (Timing waveform diagram)

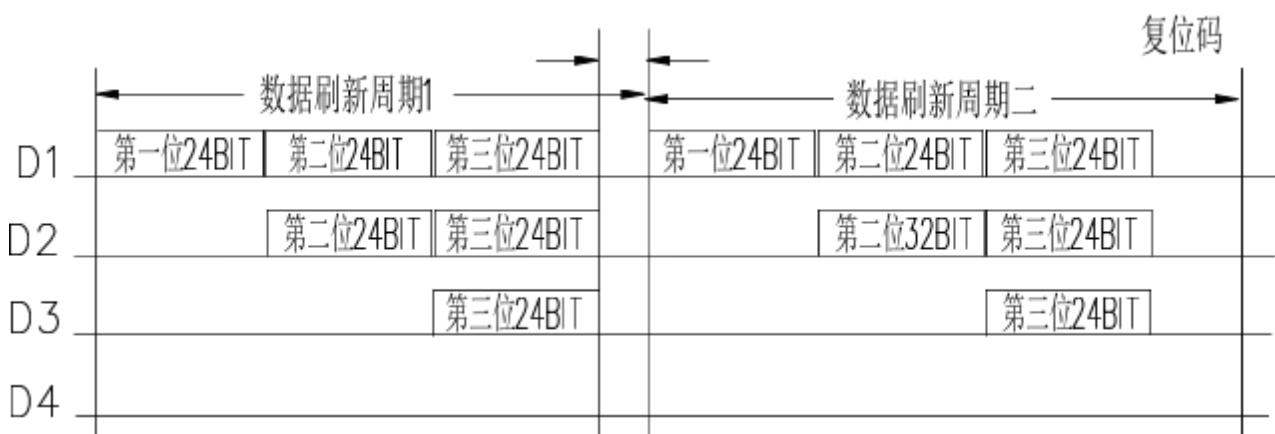
输入码型 (Input code pattern) :

连接方法 (Connection method) :



数据传输方法

(Data transmission method) :



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



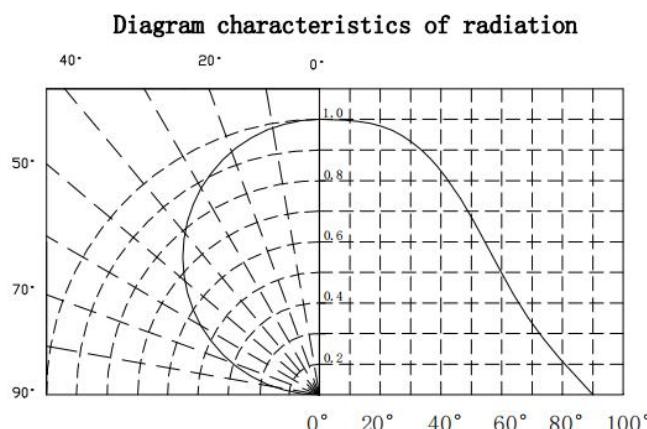
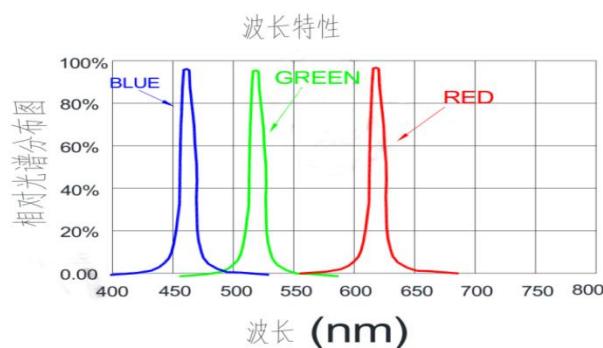
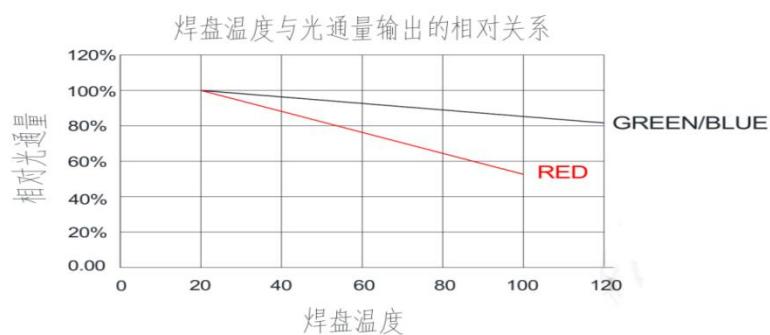
24bit 数据结构 (Data structure) :

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

注: 高位先发, 按照 RGB 的顺序发送数据 (R7 → R6 → B0)

Note: The high bits are sent first, and the data is sent in the order of GRB (R7 → R6 → B0)

## 光电特性 (photoelectric characteristics)





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### 测试项目及条件 (TEST ITEMS AND RESULTS)

试验项目 Test Items	实验条件 Test Conditions	试验数量 Quantity	判断标准 Judging Criteria
Solderability 可焊性试验	焊 接 温 度 ( Solder Temperature ) : 300°C 焊 接 时 间 ( Solder Duration ) : ( 3.5±0.5 ) sec.	22PCS	上锡面积在95%以上 Solderable Area Over 95%
Temperature Cycle 冷热冲击	-40°C 20min↑↓ 5 min 100°C 20min 100 cycles	22PCS	C=0 & I*
High Temperature Storage 高温储存	Ta=85°C 1000 hrs	22PCS	C=0 & I*
Life Test 寿命测试	Ta=25°C 1000 hrs@5v	22PCS	C=0 & I*
Low Temperature Storage 低温储存	Ta=-35°C 1000 hrs	22PCS	C=0 & I*

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

Items 测试项目	Symbol 符号	Test Conditions 测试条件	Criteria For Judging Damage I* 失效判断标准 I*	Criteria For Judging Damage I** 失效判断标准 I**
Forward Voltage 正向电压	V <sub>F</sub>	I <sub>F</sub> =12mA	≥USL×1.2	≥USL
Luminous Intensity 光强	I <sub>V</sub>	I <sub>F</sub> =12mA	≤LSL×0.5	≤LSL

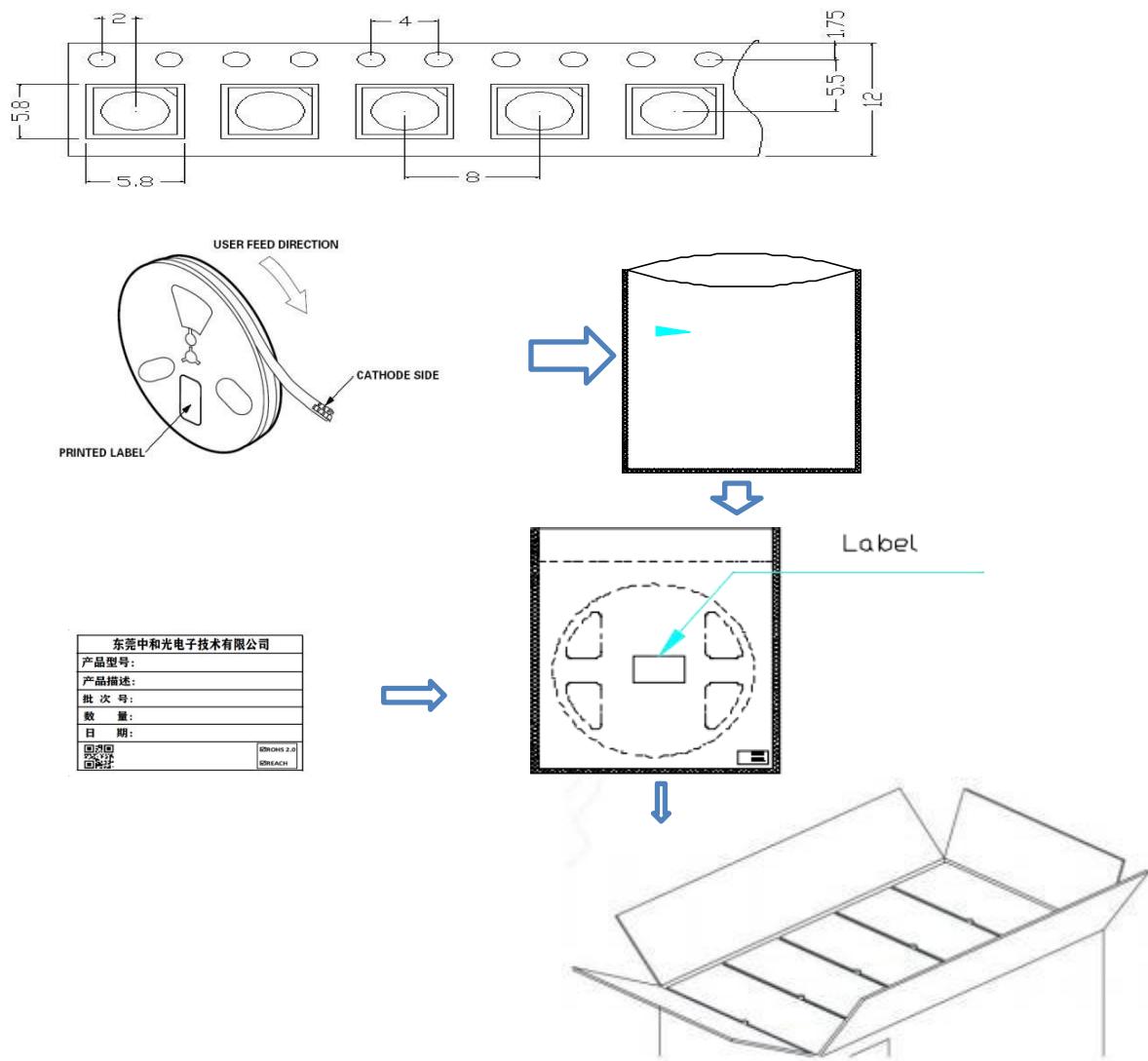
\* USL : 标准值上限值 , LSL : 标准值下限值 \* USL: Upper Standard Level, LSL: Lower Standard Level



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包装说明: (Packaging Instructions)



说明: 1: 表面贴装led采用卷盘包装, led在防静电包装袋包装后再装入纸箱中, 纸箱用于保护运输途中LED不受机械冲击, 纸箱不防水, 因此请注意防潮防水。

2: 卷盘两种包装数量, 小盘为1000pcs/盘, 大盘为5000pcs/盘。内附干燥剂, 湿度卡。

Instructions:

1: Surface mount LEDs are packaged in reels. LEDs are packaged in anti-static bags and then placed in cartons. Cartons are used to protect LEDs from mechanical shock during transportation. Cartons are not waterproof, so please pay attention to moisture-proof and waterproof.

2: There are two packaging quantities for reels. The small reel is 1000pcs/reel, and the large reel is 5000pcs/reel. Desiccant and humidity cards are included.



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### 使用注意事项

#### 1. 运输及适用范围

所有产品在运输过程中，需保持正面朝上，防潮防水，运输过程中避免挤压、碰撞和剧烈震动。

#### 1. Transportation and Scope of Application

During the transportation of all products, they need to be kept with the front side facing upwards, protected from moisture and water. Avoid extrusion, collision and severe vibration during transportation.

#### 2. 产品储存及期限

室温密封存储: 20°C~30°C, 40%~60%RH, 产品有效期为4周;

防潮密封存储: 20°C~30°C, 25%~60%RH, 产品有效期为 6周; 产品拆包开

封后, 建议 2 小时内使用完成, (环境条件温度<30°C, 湿度<60%)。

#### 2. Product Storage and Duration

Sealed storage at room temperature: 20°C - 30°C, 40% - 60% RH, the product is valid for 4 weeks;

Moisture-proof sealed storage: 20°C - 30°C, 25% - 60% RH, the product is valid for 6 weeks; After unpacking and unsealing the product, it is recommended to use it within 2 hours. (Environmental conditions: temperature < 30°C, humidity < 60%).

#### 3. 除湿处理

LED 产品超出以上规定期限, 或者由于其他原因受潮, 建议客户做除湿处理后再使用。

除湿方法: 低温除湿: 70°C-75°C/不少于12 小时。高温除湿: 125°C不少于6小时。

#### 3. Dehumidification Treatment

If the LED products exceed the above specified period or get damp for other reasons, it is recommended that customers perform dehumidification treatment before using them. Dehumidification methods: Low-temperature dehumidification: 70°C - 75°C for no less than 12 hours. High-temperature dehumidification: 125°C for no less than 6 hours.

#### 4. 湿度卡定义

拆开包装后TOP SMD LED 包装袋内湿度卡颜色指示处理方式如下:

- 如果湿度卡防潮珠 10%处变为粉红色, 其它档为蓝色, 此种情况, LED 可以直接使用;
- 如果湿度卡防潮珠 10%、20%处均变为粉红色, 其它档为蓝色, 此种情况, 需对元件进行低温烘烤除湿;



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- 如果湿度卡防潮珠 10%、20%、30%三处以上均变为粉红色，此种情况下，客户需将材料寄回我司进行高湿除湿，重新包装后方可使用；



#### 4. Definition of Humidity Card

The handling methods indicated by the color of the humidity card in the TOP SMD LED packaging bag after unpacking are as follows:

- If the moisture-proof beads at 10% of the humidity card turn pink and the other gears are blue, in this case, the LED can be used directly;
- If the moisture-proof beads at 10% and 20% of the humidity card both turn pink and the other gears are blue, in this case, the components need to be dehumidified by low-temperature baking;
- If the moisture-proof beads at 10%, 20%, and 30% of the humidity card all turn pink or more than three places turn pink, in this case, the customer needs to send the materials back to our company for high-humidity dehumidification and can be used after repackaging;

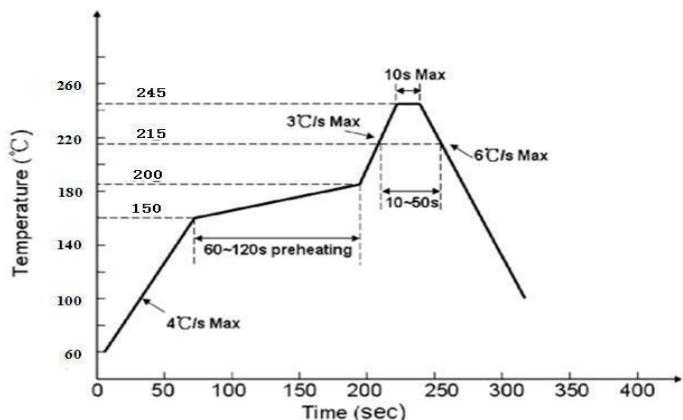
#### 5. 静电防护

LED 是静电敏感器件，虽然 LED 产品具有优异的抗静电能力，但每经历一次静电释放产生的冲击，都会对 LED 造成一定程度的损坏。因而在使用 LED 产品过程中需要做好静电防护措施，例如佩戴防静电手套及防静电手环等。

LED is an electrostatic sensitive device. Although LED products have excellent anti-static ability, each electrostatic discharge shock will cause a certain degree of damage to the LED. Therefore, electrostatic protection measures need to be taken during the use of LED products, such as wearing anti-static gloves and anti-static wrist straps.



### 无铅回流焊指引 (Lead-Free Reflow Soldering Guidelines)



曲线说明 Curve description	无铅回流焊 Lead-Free Reflow Soldering
最低预热温度(Tsmin) Minimum preheating temperature	150°C
最高预热温度(Tsmax) Maximum preheating temperature	200°C
预热区时间(Tsmin to Tsmax)(ts) Preheating zone time	60-180 S
平均升温速率(Tsmax to Tp) Average heating rate	<3°C/S
液相温度(TL) Liquid phase temperature	217°C
液相区保温时间(tL) Soaking time in the liquid phase zone	60-150 S
峰值温度(Tp) Peak temperature	245°C
高温区(峰值温度-5°C)停留时间(tp) Dwell time in the high-temperature zone (5°C below the peak temperature)	<10 S
降温速率 Cooling rate	<6°C/S
室温至峰值温度停留时间 Dwell time from room temperature to peak temperature	<6 min



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## 回流焊说明

- 1回流焊不可以做两次以上
- 2当回焊时，不要在材料受热时用力压胶体表

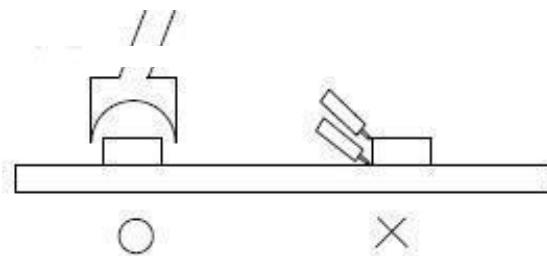
## 烙铁焊接说明

1. 当手工焊接时，烙铁的温度必须小于 300°C，时间不可超过 3 秒

手工焊接只可焊接一次

## 修补说明

LED 回流焊后不应该修补，当修复是不可避免时，必须使用双头烙铁（如下图），但必须事先确认此种方式会或不会损坏 LED 本身的特性。



### Reflow Soldering Instructions

1. Reflow soldering cannot be performed more than twice.
2. When reflow soldering, do not press the colloid surface with force when the material is heated.

### Soldering Iron Welding Instructions

1. When manual welding, the temperature of the soldering iron must be less than 300°C, and the time
2. should not exceed 3 seconds. Manual welding can only be performed once.

### Repair Instructions

LEDs should not be repaired after reflow soldering. When repair is inevitable, a double-ended soldering iron (as shown in the figure below) must be used, but this method must be confirmed in advance.