

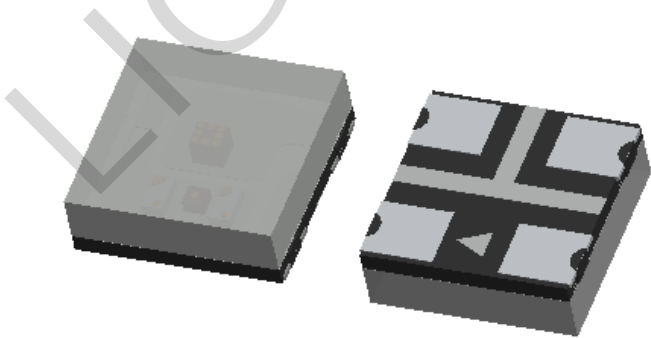


深圳市光贝电子有限公司

# 产 品 规 格 书

## Product Specification

文件编号 Document number	GB-WI-RD-932	版本版次 Version edition	A/0
产品名称 Product name	2020 幻彩内封 IC	产品规格 Product specification	GB-T2020RGB-HC/4P
文件编制 Documentation	马明海	批准发行 Approved issue	马小其
客户服务 Custormer Service		联系电话 Contact number	



深圳市光贝电子有限公司  
Shenzhen light bei electronic Co., LTD

电话（TEL）：0755-82563337  
传真（FAX）：0755-82788831  
官网（Web）：www.lightbei.cn



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## 1、产品概述/Product Overview:

2020 内封 IC 灯珠是一款集成高质量单线级联恒流驱动 IC 和高质量 RGB LED 芯片的外控恒流 2020 集成灯珠。其中内置控制 IC 是三通道低压 LED 灯串驱动芯片。芯片内部包含数据锁存电路、数据整形处理电路、数据转发电路、双振荡器、PWM 调制电路, 以及 R/G/B 三路 LED 驱动电路。采用单线归零码的通讯协议。芯片在上电复位后, DI 口接收从 MCU 传输过来的数据帧, 并通过数据锁存电路将数据帧里的头 24bit 数据锁存下来, 并送至 PWM 调制电路, 以控制 R/G/B LED 驱动电路的工作。数据帧的头 24bit 数据被锁存下来后, 剩余的数据经过内部数据整形处理电路进行整形后, 通过数据转发电路及 DO 口转发至下一颗级联的 IC 芯片。如此数据帧每经过一颗灯珠的传输, 数据便减少 24bit。

The 2020 IC is an integrated high-quality single-wire cascade constant-current driver IC and high-quality RGB LED chip external constant-current 2020 integrated lamp beads. ONE BUILT-IN CONTROL IC is a three-channel low-voltage LED lamp string driver chip. The chip contains a data latch circuit, a data shaping circuit, a data forwarding circuit, a dual oscillator, a PWM modulation circuit, and an R/g/b three-way LED driver circuit. Communication Protocol based on single-line zeroing. After the chip is reset, the DI interface receives the data frame from MCU, and the first 24bit data in the data frame is locked by the data latch circuit, and sent to the PWM modulation circuit to control the work of the R/G/B LED drive circuit. After the first 24 bit data of the data frame is locked down, the remaining data is processed by the internal data processing circuit, and then transmitted to the next cascaded IC chip through the data transmitting circuit and the DO port. Each time a data frame passes through a light bulb, the data is reduced by 24 bits.

## 2、功能特点/Functional characteristics:

- ◆ 内置上电复位和掉电复位电路  
Built-in power-on and power-off reset circuits
- ◆ R/G/B 端口耐压最高达 13V, 驱动电流 5mA  
R/G/B port withstand voltage up to 13V, Drive current 5 mA
- ◆ 内置数据整形电路, 保证数据经过多级级联不会产生波形畸变累加  
Built-in data shaping circuit to ensure that the data through the cascade will not generate wave distortion accumulation
- ◆ 256 级灰度可调  
256-level grayscale adjustable
- ◆ 数据传输频率可达 800Kbps  
Data transmission frequency can reach 800Kbps
- ◆ 当刷新速率为 30 帧/秒时, 芯片级联数可不小于 1024 点  
At a refresh rate of 30 FPS, the number of cascades can be no less than 1024

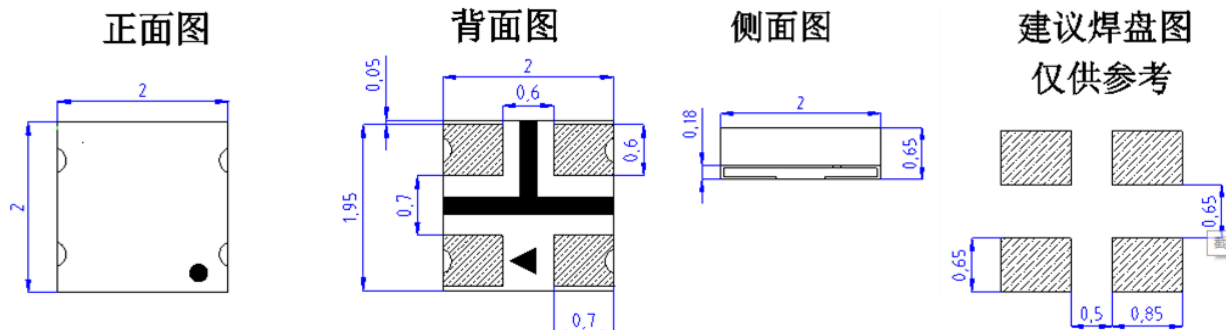
## 3、应用领域/Application area:

- ◆ 全彩发光字  
Full color luminous words
- ◆ 全彩模组  
Full color module
- ◆ 点光源  
Point light source
- ◆ 全彩灯条  
Full Light Bar
- ◆ 灯条屏  
Lamp screen
- ◆ 彩幕屏  
Color screen
- ◆ 圣诞装饰等多场景产品  
Christmas decorations and other multi-scene products

## 4、外观描述 /Appearance description:

型号 Type	发光颜色 Luminescent colors	表面胶体颜色 Surface colloid color
GB-T2020RGB-HC/4P	全彩 All color	半透明雾状胶体 Translucent aerosolized colloid

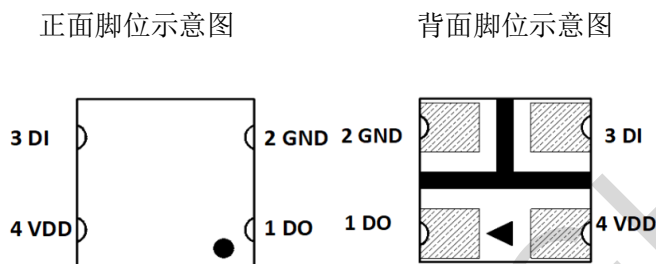
## 5、封装尺寸/Package Size:



### Notes

- 所有尺寸以毫米为单位  
All dimensions are in millimeters.
- 未标注公差为:  $X.X \pm 0.10\text{mm}$ ,  $X.XX \pm 0.05\text{mm}$   
Unmarked tolerances:  $X.X \pm 0.10\text{mm}$ ,  $X.XX \pm 0.05$

## 6、脚位图/Foot map:



序号 Serial number	符号 Symbol	功能描述 Functional description
1	DO	显示数据级联输出 (800K) Display data cascade output (800K)
2	GND	信号地及电源地 Signal ground and power supply ground
3	DI	显示数据输入 (800K) Display data input (800K)
4	VDD	内部 IC 电源正及 RGB 正极 INTERNAL IC power supply and RGB positive pole

## 7、最大额定值 (如无特殊说明, $T_A = 25^\circ\text{C}$ , $V_{DD} = 5\text{V}$ ) /Maximum Rating: ( $T_A = 25^\circ\text{C}$ , $V_{DD} = 5\text{V}$ , if not specified):

参数 Parameter	符号 Symbol	范围 Range	单位 Units
供电电压 Supply Voltage	Vdd	-0.5 ~ 5.5	V
R/G/B 输出端口耐压 R/g/b output port voltage withstand	Vout	13	V
逻辑输入电压 Logic input voltage	Vi	-0.5 ~ Vdd + 0.5	V
工作温度 Operating Temperature Range	Topt	-30 ~ +70	°C
储存温度 Operating Temperature Range	Tstg	-20 ~ +60	°C
湿气敏感等级 Moisture sensitive level	MSL	5a	-
ESD 耐压 (HBM) ESD WITHSTAND VOLTAGE (HBM)	VESD	>2	KV

8、推荐工作范围 (如无特殊说明,  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 5\text{V}$ ) / Recommended scope of work ( $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 5\text{V}$  without special description):

参数 Parameter	符号 Symbol	最小 Min.	典型 Typ.	最大 Max.	单位 Units
供电电压 Supply Voltage	$V_{DD}$	3.5	5.0	5.5	V
工作温度 Operating Temperature Range	$T_A$	-30	-	70	$^\circ\text{C}$

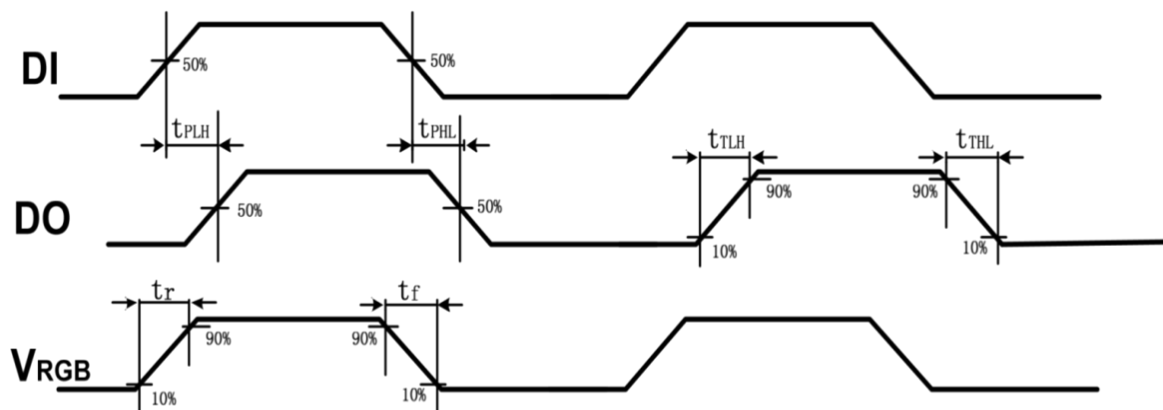
9、直流参数 (除非特别说明,  $V_{DD} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ ) / DC parameters (unless otherwise specified,  $V_{DD} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ )

参数 Parameter	符号 Symbol	最小 Min.	典型 Typ.	最大 Max.	单位 Units
工作电流 Operating Current	$I_{DD}$	-	0.5	-	mA
R/G/B 驱动电流 R/G/B drive current	$I_{LED01}$	-	5	-	mA
DI 高电平输入 Di High level input	$V_{IH}$	0.5VDD	-	-	V
DI 低电平输入 Di Low level input	$V_{IL}$	-	-	0.25VDD	V

10、交流参数 (除非特别说明,  $V_{DD} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ ) / AC parameters (unless otherwise specified,  $V_{DD} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ )

参数 Parameter	符号 Symbol	最小 Min.	典型 Typ.	最大 Max.	单位 Units	测试条件 Test Condition
数据传输速度 Data transfer speed	$f_{DATA}$	-	800	-	kHz	
R/G/B 口的 PWM 频率 PWM FREQUENCY OF R/G/B port	$f_{PWM}$	-	1.5	-	kHz	
数据转发传输延迟 Data forward transmission delay	$t_{PLH}$	-	0.21	-	us	DI $\rightarrow$ DO 信号延时, DO 端口对地负载电容 30pF
	$t_{PHL}$	-	0.21	-	us	
DO 电平转换时间 Do level transition time	$t_{TLH}$	-	0.018	-	us	DO 端口对地负载电容 30pF
	$t_{THL}$	-	0.018	-	us	
RGB 口电平转换时间(注 1) RGB Port Level Conversion Time (Note 1)	$t_r$	-	0.15	-	us	$I_{LED}=5\text{mA}$ , RGB 端口串接 200 $\Omega$ 电阻至 $V_{DD}$ , 对地负载电容 30pF
	$t_f$	-	0.40	-	us	

注 1/Note 1: 为了减少 RGB 端口的开关对电源电压的冲击,  $t_r/t_f$  比较缓慢, 不影响点亮 / To reduce the impact of RGB port switches on the supply voltage,  $t_r/t_f$  is slow and does not affect the lighting



注 2/Note 2: 交流参数示意图/Schematic Diagram of the AC parameters

## 11、内置 LED 参数/Built-in LED parameters:

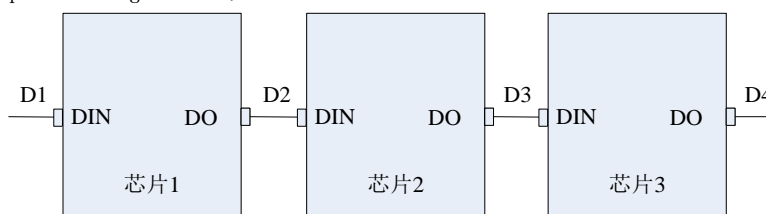
发光颜色 Luminous color	主波长 (nm) Main wavelength (nm)	发光强度 (mcd) Luminous Intensity (mcd)	工作电流 (mA) Operating Current (mA)	测试条件 Test Condition
R	620-625	50-150	5	DC5V
G	525-530	200-400	5	DC5V
B	470-475	50-150	5	DC5V

## 12、功能说明/Description of functions:

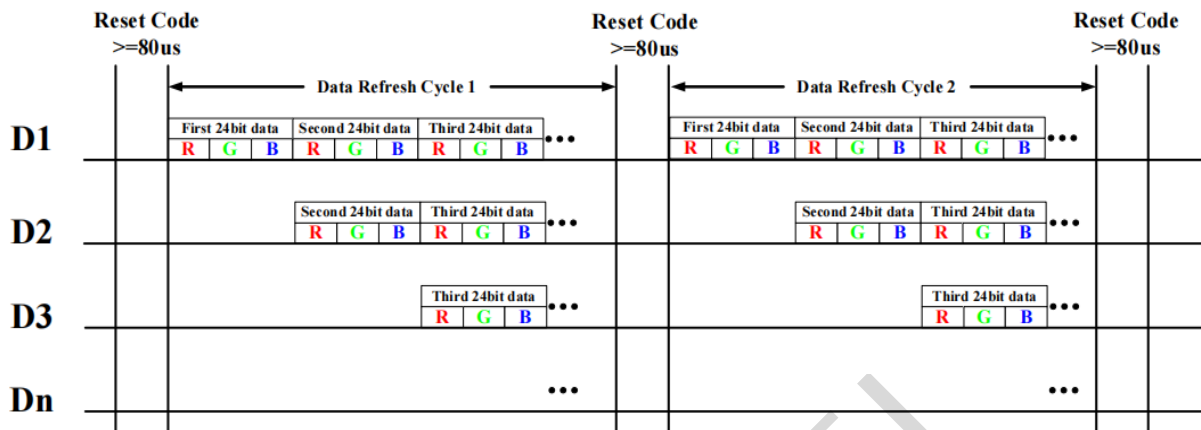
2020 内封 IC 灯珠采用单线通讯方式, 采用归零码的方式发送信号。芯片在上电复位以后, 接收 DIN 端打来的数据, 接收够 24bit 后, DO 端口开始转发数据, 供下一个芯片提供输入数据。在转发之前, DO 口一直拉低。此时灯珠将不接收新的数据, 内置 RGB 芯片根据接收到的 24bit 数据后产生的不同占空比信号, 展现不同亮度。如果 DIN 端输入信号为 RESET 信号, 芯片将接收到的数据送显示, 芯片将在该信号结束后重新接收新的数据, 在接收完开始的 24bit 数据后, 通过 DO 口转发数据, 灯珠在没有接收到 RESET 码前, RGB 亮度保持不变, 当接收到 80us 以上低电平 RESET 码后, 灯珠内部 RGB 芯片将根据刚才接收到的 24bit 数据后产生的不同占空比信号, 展现不同亮度。

2020 IC lamp beads sealed in a single line of communication, the use of zero-return code to send signals. After the reset, the chip receives the data from Din. After receiving 24 bits, the DO begins to transmit the data for the next chip to provide the input data. The DO was pulled down until it was retweeted. At this point will not receive new data, BUILT-IN RGB chip according to the received 24 bit data generated by the duty cycle signal, display different brightness. If the DIN input signal is a RESET signal, the chip will send the received data to display, the chip will re-receive the new data after the end of the signal, after receiving the initial 24 bit data, the data will be transmitted through the DO port, before receiving the Reset Code, the RGB brightness remains the same. After receiving the low level RESET code above 80us, the RGB chip inside the lamp will display different brightness according to the different duty cycle signal produced after receiving the 24bit data just now.

### 1) 芯片级联方法/Chip cascading method:



## 2) 数据传输/Data transmission:



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

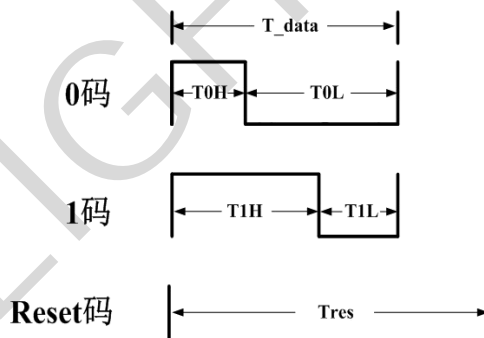
Note: Where D1 is the data sent by the MCU, D2, D3, and Dn are the data automatically transferred by the cascading circuit.

## 3) 24bit 数据结构/24 bit data structure:



注: 高位先发, 按照 GRB 的顺序发送数据/Note: Higher-level starts, sending data in GRB order.

## 4) 时序波形图/Sequential wave map:



## 5) 控制器发送码型要求(除非特别说明, VDD = 5 V, Ta = 25℃)/Controller Transmit Code type requirements (unless otherwise specified, VDD = 5V, TA = 25 ° C):

参数 Parameter	符号 Symbol	最小值 MIN.	典型值 Typ.	最大值 Max.	单位 Units
输入 0 码高电平时间 Enter a 0-yard high-level time	Tin0h	—	0.25	0.47	us
输入 1 码高电平时间 Enter 1 yard high level time	Tin1h	0.58	0.85	1	us
输入 0 码低电平时间 Enter the zero yard low level time	T0L	—	1	—	us
输入 1 码低电平时间 Enter 1 yard low level time	T1L	—	0.4	—	us
0 码/1 码周期 Zero-yard-per-yard period	T0/T1	1.2	1.25	—	us
RESET 码低电平时间 Reset Code Low level time	Treset	80	—	—	us

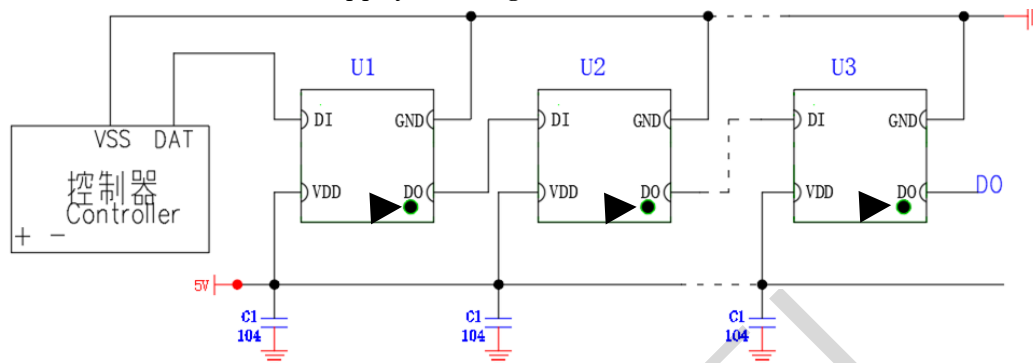
注: 控制器发送数据 “0” 码高电平时间必须小于 **0.47us**; 数据 “1” 码高电平时间必须大于 **0.58u**



Note: Controller must send data "0" Code High Level Time is less than 0.47 US; data "1" Code high level time is more than 0.58 us.

### 13、应用线路图/Application Route Diagram:

电源电压 5V (如下图示) /Power supply voltage 5V(as shown)



注/Note:

1. 在走线时, 应避免电源线、地线走线过细;

In the line, should avoid the power cord, the ground wire too fine.

2. 产品应用中驱控灯珠级联数量及控制器参数配置、驱动电源品质均有较大差异, 故请在批量使用产品前, 客户方务必自行验证产品兼容性, 我司不承诺满足客户所有应用需求.

In the application of the product, there are big differences in the number of the cascade of the driving lights, the configuration of the controller parameters and the quality of the driving power, we are not committed to meeting all the application requirements of our customers.

### 14、使用注意事项/Precautions:

通常 LED 也像其它的电子元件一样有着相同的使用方法, 为了让客户更好地使用威能照明的 LED 产品, 请参看以下 LED 保护预防措施.

In general, leds are used in the same way as other electronic component. To get customers to use WENNEN Lighting leds, see the following LED protection precautions.

#### (一)、关于产品/About the product

1、本 LED 器件的核心组件是 LED 芯片, 其主要材料为半导体化合物。故在 LED 器件使用时应特别注意: 正向工作电流 (IF)、正向工作电压 (VF)、允许功耗 (Pm)、工作环境 (°C/RH)、光色波长 (WL) 等光电性参数, 详情请参阅敝司提供的《产品规格书》所述相关技术性条款。

The core component of the LED device is LED chip, the main material of which is semiconductor compound. Therefore, special attention should be paid to such optical and electrical parameters as forward operating current (IF), forward operating voltage (VF), permissible power consumption (Pm), working environment (°C/RH), light color wavelength (WL), etc., for details, please refer to the relevant technical terms and conditions as stated in our product specification.

2、本 LED 器件采用之引线架由注塑工艺成型, 故塑件受外力即有可能发生形变导致拉裂内部邦线并导致开路缺色, 故在产品设计及生产制程中务必评估并避免因 PCB 基板形变造成 LED 灯珠受损, 否则建议更改灯珠方案。

The lead frame of the LED device is molded by injection molding process. Therefore, the plastic part may be deformed by external forces, which may cause the inner wire to be pulled apart and the open circuit to be short of color, therefore, in the product design and production process must be evaluated and avoid damage caused by PCB substrate deformation LED lights, otherwise, it is recommended to change the scheme of lights.

3、在高温条件下, 衰减会加速, 本身应力也会增大, 若长期处于高温环境下, 极容易出现失效, 对于高密度排列使用的情况, 建议在使用过程中灯面温度不超过 55°C, 灯脚温度不超过 75°C。

Under the high temperature condition, the attenuation will accelerate, and the stress will also increase. If the lamp is under the high temperature environment for a long time, it is very easy to fail. For the case of high density arrangement, it is suggested that the surface temperature of the lamp should not exceed 55 °C during the use, lamp Foot temperature not exceeding 75 °C.

#### (二)、关于湿敏性/On humidity sensitivity

本 LED 器件属湿敏性元器件, 空气中的湿气会通过扩散渗透到产品中, 当经过高温回流焊时, 在高温状态下, 渗入其中的湿气快速蒸发膨胀产生足够的蒸汽压力损伤或毁坏 LED 的光学系统, 从而出现 LED 元件内胶裂、分层或金线损伤等可靠性失效问题。此款产品防潮等级为:

LEVEL5a, 尽管产品在出厂前对吸湿和防潮进行了严格的除湿和防护措施, 但仍需在产品使用时特别注意:



The LED device is a humidity-sensitive device. Moisture in the air can permeate into the product through diffusion. When it is reflow soldered at high temperature, under the high temperature state, the moisture rapidly evaporates and expands, which results in enough steam pressure to damage or destroy the optical system of LED, which leads to the reliability failure of LED components, such as gluing, delamination or gold wire damage. This product moisture level is: Level 5A, although the product before leaving the factory to moisture absorption and moisture protection of the strict dehumidification and protection measures, but still need to be used in the product with special attention:

1、推荐储存环境: 温度:  $5^{\circ}\text{C} - 30^{\circ}\text{C}$  ; 湿度: 相对湿度 60% 以下;

Recommended Storage Environment: Temperature:  $5^{\circ}\text{C} - 30^{\circ}\text{C}$ ; Humidity: relative humidity below 60% ;

2、生产前确认产品真空包装完好且在封口日期起 15 天内,产品拆封后,LED 在温度 $<30^{\circ}\text{C}$ , 相对湿度 $<60\%\text{RH}$  的条件下, 并请贴片上机时边上料边开袋, 且确保开袋产品在 4 小时内完成贴片固焊作业! 若没有使用完的产品需以  $65 \pm 5^{\circ}\text{C}/24\text{H}$  除潮后密封, 建议放入干燥柜中存放;

Before production, make sure the vacuum packaging of the product is in good condition and within 15 days after the sealing date. After the product is unsealed, the LED should be opened at the condition of temperature  $\leq 30^{\circ}\text{C}$  and relative humidity  $\leq 60\%\text{rh}$ , and ensure that the open bag products in 4 hours to complete the patch bonding operation! If the unused product needs to be sealed after dehumidification at  $65 \pm 5^{\circ}\text{C}/24\text{H}$ , it is recommended to store in a drying cabinet;

3、生产前检查产品真空包装是否漏气, 如漏气请停用! 并标识区分后进行低温除湿(低温除湿条件: 即去除铝箔袋后将料盘放置在柜式干燥箱内进行温度  $65 \pm 5^{\circ}\text{C}$ 、相对湿度 $\leq 10\%\text{RH}$ 、烘烤时间 $\geq 24$  小时的除湿作业, 如属热风烤箱则建议除湿时关闭烤箱进风口开关, 关键确保箱内相对湿度 $\leq 10\%\text{RH}$ ; 且回温过程必须在干燥的环境下进行! 建议产品除湿后在 4 个小时内完成贴片固焊作业!) 或联系专属客服人员并返厂处理。 /

Before production check whether the product vacuum packaging leak, such as leak please stop using! Low temperature dehumidification (low temperature dehumidification condition: After removing the aluminum foil bags, put the tray in the cabinet drying box to do the dehumidification operation with the temperature  $65 \pm 5^{\circ}\text{C}$ , relative humidity  $\leq 10\%\text{rh}$ , and baking time  $\leq 24$  hours. If the oven is a hot air oven, it is suggested to turn off the oven air inlet switch when dehumidifying. The key is to ensure the relative humidity  $\leq 10\%\text{RH}$  in the oven! It is recommended that after dehumidifying the product, the bonding operation should be completed within 4 hours!) Or contact customer service personnel and return to factory for processing.

### (三)、关于贴片加工/About SMT

1、本 LED 器件容易受到机械外力的破坏, 在表面上施加压力将会影响发光二极管的可靠性。在这样的情况下, 装配使用产品时必须遵守相应的处理措施, 避免任何的压力施加给本 LED 器件的任何部分, 所以在使用时请采用气动吸嘴, 否则会导致发光二极管损坏和可靠性降低影响其寿命。并检查贴片机设备的吸嘴装置与产品匹配性, 以不伤及产品胶体为宜;

The LED device is vulnerable to mechanical forces, and applying pressure to the surface will affect the reliability of the light-emitting diode. In such cases, the assembly of the product must comply with the corresponding treatment measures to avoid any pressure applied to any part of this LED device, so in use, please use pneumatic nozzle, otherwise, it will lead to light-emitting diode damage and reduce the reliability of its life, and check the SMT equipment suction nozzle device and product compatibility, not to hurt the product Gel is appropriate.

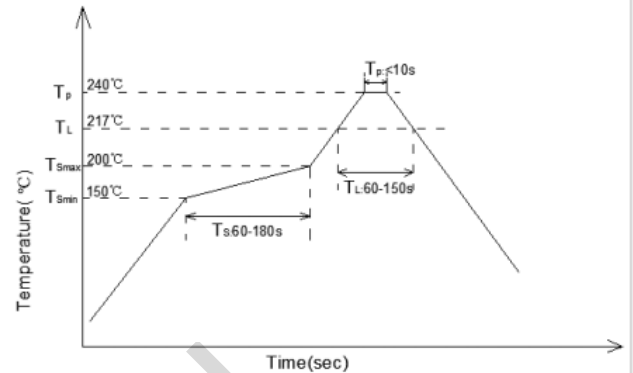
2、当手动焊接时, 建议采用 20W 的防静电烙铁, 焊头的温度必须控制在  $360^{\circ}\text{C}$  以下/3 秒, 焊接次数为 1 次。

When manual welding, it is recommended to use 20W antistatic soldering iron. The temperature of welding head should be controlled below  $360^{\circ}\text{C}/3$  seconds and the welding times should be 1.

3、本 LED 器件属于潮湿敏感性元件, 经过用下面所列参数检测证明, 表面贴装型 LED 符合 JEDEC J-STD-020C 标准。建议作业前检查回流焊设备的峰值温度/时间是否控制在  $240 \pm 0 \sim -5^{\circ}\text{C}/\leq 10$  秒, 无铅锡膏的温度曲线建议(作为一般指导原则, 建议遵循所用焊锡膏制造商推荐使用的焊接温度曲线。):

The LED device is a moisture-sensitive element. The surface-mount LED meets the JEDEC J-STD-020C standard by testing the following parameters. It is recommended to check if the peak temperature/time of reflow equipment is controlled at  $240 \pm 0 \sim -5^{\circ}\text{C}/\leq 10$  seconds before operation, temperature curve recommendations for lead-free solder paste (as a general guideline, it is recommended to follow the soldering temperature curve recommended by the manufacturer of the solder paste used):

温度曲线描述	无铅回流焊
最低预热温度(Tsmin)	150°C
最高预热温度(Tsmax)	200°C
预热区时间(Tsmin to Tsmax)(ts)	60-180 S
平均升温速率(Tsmax to Tp)	<3°C/S
液相温度(TL)	217°C
液相区保温时间(tL)	60-150 S
峰值温度(Tp)	240°C
高温区停留时间(tp)	<10 S
降温速率	<6°C/S
室温至峰值温度停留时间	<6 min



4、回流焊接次数不可超过 1 次，建议检查终端产品是否需要经历二次回流焊工艺，二次回流焊工艺具有一定品质风险性，如需请自行评估并尽量缩短二次回流焊间隔时间（建议不超过 4 小时）。

The number of reflow soldering shall not exceed 1 time. It is recommended to check whether the terminal products need to go through reflow soldering process, which has certain quality risk, if necessary, please self-assessment and minimize the reflow interval time (not more than 4 hours is recommended).

5、焊接期间，加热时不要在本 LED 器件上添加任何压力。

During welding, do not add any pressure to the LED when heating.

6、焊接后，正常回温至 40°C 以下后才可过电流。

After welding, the normal return temperature below 40 °C can be over-current.

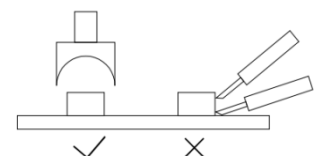
7、使用操作示意图：USE THE ACTION DIAGRAM:

使用镊子或合适的工具，沿侧表面夹取元件。 Using tweezers or a suitable tool, clamp the element along the side surface.	不可直接用手或尖锐金属压胶体表面，它可能会损坏内部电路。 Do not press colloidal surfaces directly by hand or sharp metal; it may damage internal circuits	不要将焊接好的发光二极管堆叠放置，会导致发光二极管划伤及胶体受损造成死灯。 Do not stack the welded light-emitting diode. This can cause light-emitting diode scratches, Gel damage and a dead light.

(四)、关于修复/About the restoration

当修复发光二极管时，应事先确认发光二极管是否会被破坏，修复过程中应避免接触胶体表面，双焊头烙铁应使用如下图的方式作业。

When repairing the light-emitting Diode, it should be confirmed in advance whether the light-emitting diode will be damaged or not. The repair process should avoid touching the COLLOID surface. The double welding head soldering iron should be used in the way shown below.



(五)、关于清洗/About cleaning

在焊接后推荐使用纯酒精清洗，清洗擦拭或浸渍不要超过 1 分钟。使用其它类似溶剂清洗前，请确保溶剂不会对本 LED 器件封装造成损伤。

Pure alcohol cleaning is recommended after welding. Cleaning, wiping or maceration should not exceed 1 minute. Before cleaning with other similar solvents, please ensure that the solvent will not cause damage to the LED packaging.

(六)、关于灌封/About potting

1、使用硅酮胶（玻璃胶）灌封时推荐采用中性、醇型类灌封胶。

It is recommended to use neutral and alcohol type filling sealant when silicone (glass sealant) is used.

2、灌封胶若使用脱肟型中性灌封胶，请确保灌封胶固化过程中的通风良好，在未固化过程中不可进行密封组装本 LED 器件，这样会造成镀银层氧化及发光颜色变淡。

If using deoxime neutral filling sealant, please ensure that the filling sealant curing process ventilation is good, in the unfinished curing process can not be sealed assembly of this LED device, which will cause silver coating oxidation and light color.

3、禁止使用醋酸型（酸性）硅酮胶进行灌封。

The use of acetic acid type (acidic) Silicone Gel is prohibited for potting.

4、使用正常灌封胶时建议进行少量灌封试验，常温点亮测试 168H 确认无异常后再批量作业。

It is recommended to do a small amount of pouring test when using normal pouring sealant and light up at room temperature for 168H before batch operation.

5、更改任何一种灌封材料时，请先作试样确认是否对我公司产品造成侵蚀反应。将灌封材料取 5-10g 和本 LED 器件 10-20pcs 于 100ml 的器皿内密封放置 168H 后确认产品是否有异常。

When changing any kind of filling material, please make sample first to confirm whether it will cause corrosion reaction to our products. 5-10g of the filling material and 10-20pcs of the LED device were sealed in 100ML containers for 168H to confirm whether the product was abnormal.

（七）、防护措施/Protective measures

1、LED 器件封装胶水采用的是硅树脂系原材，终端产品如需户外使用需对器件做二次防护措施并请特别注意；

Led packaging glue is silicone raw materials, terminal products such as outdoor use of the device to do secondary protection measures and please pay special attention;

2、建议检查各个工艺流程环节应规避产品与硫、卤、酸、醇、碱、酮类强氧化物、塑化剂等腐蚀性物质接触；

It is suggested that the contact between the products and corrosive substances such as sulfur, halogen, acid, alcohol, Alkali, ketone strong oxide and plasticizer should be avoided



3、建议检查终端产品是否需要封盖、灌胶、裸板高温挤出、超声等二次封装工艺，如需请评估可能伤及 LED 器件的风险；是否需要刷胶、涂油、抹漆等二次涂装工艺，如需请评估可能导致器件胶体表面凹凸、污垢等因素影响发光、导热的风险。

It is recommended to check whether the end product needs secondary packaging processes such as sealing, pouring, high temperature extrusion of bare board, ultrasonic and so on. If so, please assess the risk of possible damage to LED devices, if you need to assess the possible causes of device COLLOIDAL surface bump, dirt and other factors affecting the light, heat conduction risk.

（八）、驱动方式/Driving Mode

1、LED 产品为单向导通性，使用安装前请确认产品极性，若反向安装，不能正常点亮，且在施加电压时容易造成 LED 芯片损伤或失效；

Led products for one-way conduction, please confirm the product polarity before installation, if the reverse installation, can not normally light, and in the application of voltage LED chip damage or failure;

2、注意正确的电路设计，不当之设计与电流控制，易造成 LED 失效，如电流过大引起寿命问题甚至烧毁，电流过小引起亮度不足等；

Attention to the correct circuit design, improper design and current control, easy to cause LED failure, such as the current is too large to cause life problems or even burn out, the current is too small to cause insufficient brightness, etc.

3、不同 BIN 号之 LED 建议分开使用，若需安装在同一个组件时，请先确认是否可满足相关电气及光学特性要求，如电流是否均衡，光色、亮度的一致性。

It is recommended that leds of different BIN sizes should be used separately. If they are installed in the same module, please make sure that they can meet the requirements of electrical and optical characteristics, such as current balance, light color, brightness consistency, etc..

（九）、静电防护/Electrostatic protection

对于整个工序（生产、测试、包装等）所有与 LED 直接接触的员工都要做好防止和消除静电措施，主要有：

For the entire process (production, testing, packaging, etc.) all employees in direct contact with the LED to prevent and eliminate static measures, mainly:

1、车间铺设防静电地板并做好接地，工作台采用防静电工作台，带电产品接触低阻值的金属表面时，由于急放电引发产品故障的可能性是很高的，故要求工作台及与产品相接触之处使用表面电阻为  $10^6 - 10^9 \Omega$  的桌垫。

The workshop lays the anti-static floor and makes the ground well, the worktable uses the anti-static worktable, when the live product contacts the low resistance value metal surface, because the sudden discharge causes the product breakdown the possibility is very high, table Mats with a surface resistance of  $10^6 - 10^9 \Omega$  are required for the table and for contact with the product.

2、生产机台如：锡炉、回流焊、SMT 设备、电烙铁，以及检测设备均需接地良好，接地交流

阻抗小于  $1.0\Omega$ 。在容易产生静电的环境与设备上,还必须安装离子风扇、作业过程中,操作员穿防静电服、带防静电手环、手套等,取放时尽可能接触产品的绝缘部分。

Production equipment such as: Tin Furnace, reflow soldering, SMT equipment, electric soldering iron, and testing equipment should be well grounded, grounded AC impedance less than  $1.0\Omega$ . In the environment and equipment prone to static electricity, it is necessary to install an ion fan, during the operation, the operator wearing anti-static clothing, with anti-static bracelet, gloves, etc. .

3、盛装 LED 使用防静电元件盒,包装则采用防静电材料。

Filled with LED anti-static components box, the use of anti-static packaging materials.

4、请保持环境湿度在 60%RH 以下,以免空气过于干燥产生静电。

Please keep the humidity below 60% rh to prevent the air from being too dry to generate static electricity.

5、静电接地需与电源零线、防雷地线分开,接地措施应完全防止静电产生,必须用粗的铜线引入泥土内,在铜线末端系上大铁块,埋入地表 1 米以下,各接地线均需与主线连接在一起。

The static grounding should be separated from the power supply zero wire and the lightning protection ground wire. The grounding measure should prevent static electricity completely. The thick copper wire must be introduced into the soil, each grounding wire must be connected with the main wire

(十)、其他 / Others

1. 本规格所描述的 LED 定义应用在普通的电子设备范围(例如办公设备、通讯设备等等)。如果有更为严苛的信赖度要求,特别是当元件失效或故障时可能会直接危害到生命和健康时(如航天、运输、交通、医疗器械、安全保护等等),请事先知会敝司业务人员;

The LED definitions described in this specification apply to ordinary electronic devices (such as office equipment, communication equipment, etc.) . If there are more stringent reliability requirements, especially when component failure or failure may directly endanger life and health (such as aerospace, transportation, transportation, medical devices, safety protection, etc.) , please inform our sales staff in advance;

2. 高亮度 LED 产品点亮时可能会对人眼造成伤害,应避免从正上方直视;

High-brightness LED products lighting may cause harm to the human eye, should avoid looking directly from the top;

3. 出于持续改善的目的,产品外观和参数规格可能会在没有预先通知的情况下作改良性变化。

For the purpose of continuous improvement, the appearance and specifications of the product may be modified without prior notice.

(十一)、声明/ The statement

1. 为确保以上注意事项有效进行! 建议客户加强各工艺流程环节中的首检及周期性巡检! 以最大程度预防异常发生或减少因异常造成的损失!

In order to ensure the above matters needing attention to carry on effectively! We suggest customers to strengthen the process of the first inspection and periodic inspection! To maximize the prevention of abnormal occurrence or reduce the losses caused by abnormal!

2. 如需更加详细产品规格信息请联系销售代表,谢谢!

For more detailed product specifications, please contact the sales representative, thank you!

3. 选购威能照明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,威能照明有限公司保留最终决定处理方式的权力,相关质保服务仅限于威能照明产品本体,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。经威能照明技术人员分析结果,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。合作中唯本条款与其它合约协议不一致的均以此条款为准。

If you choose to buy the products produced by power lighting, you will enjoy the standard after-sale service within the shelf life. Please contact our sales staff for details. Power Lighting Co., Ltd. reserves the right to decide the final treatment method, the related quality service is limited to the power lighting product body, and is not responsible for the development of the client products/systems (including direct and indirect) . If the customer has not carried out the specification and functional verification of the product and requested the corresponding product, the product acknowledgement (specification) information is signed to confirm the direct order will be regarded as the default of this terms of service. Customer Incoming Quality Control (IQC) , Final Quality Control (FQC) , System Quality Control, SQC (System Quality Control) and other stages of the Quality of products found abnormal, please contact our sales, personnel. According to the analysis result of the lighting technician, if the fault can be attributed to our products, customers can negotiate with our sales, return/exchange/refund options. This clause shall prevail in all cases where it is inconsistent with other contractual agreements.