

深圳市色彩光电有限公司

Shenzhen LED Color Co.,LTD

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Product specification

Product No.: LC5050RGBW**90-H***W-00

Description: 5050SMD RGBW 4-in-1 LED

Date: 2020-9-1

Document No.: SPC-TOP-A/20701

Version No.: A/01



Customer review			LED Color		
Approved	Confirm	Make	Approved	Confirm	Make
			Mr Zhao	Mr Zhao	Mr Cheng
<input type="checkbox"/> Accept <input type="checkbox"/> Not accept			Date: 2020-9-1		

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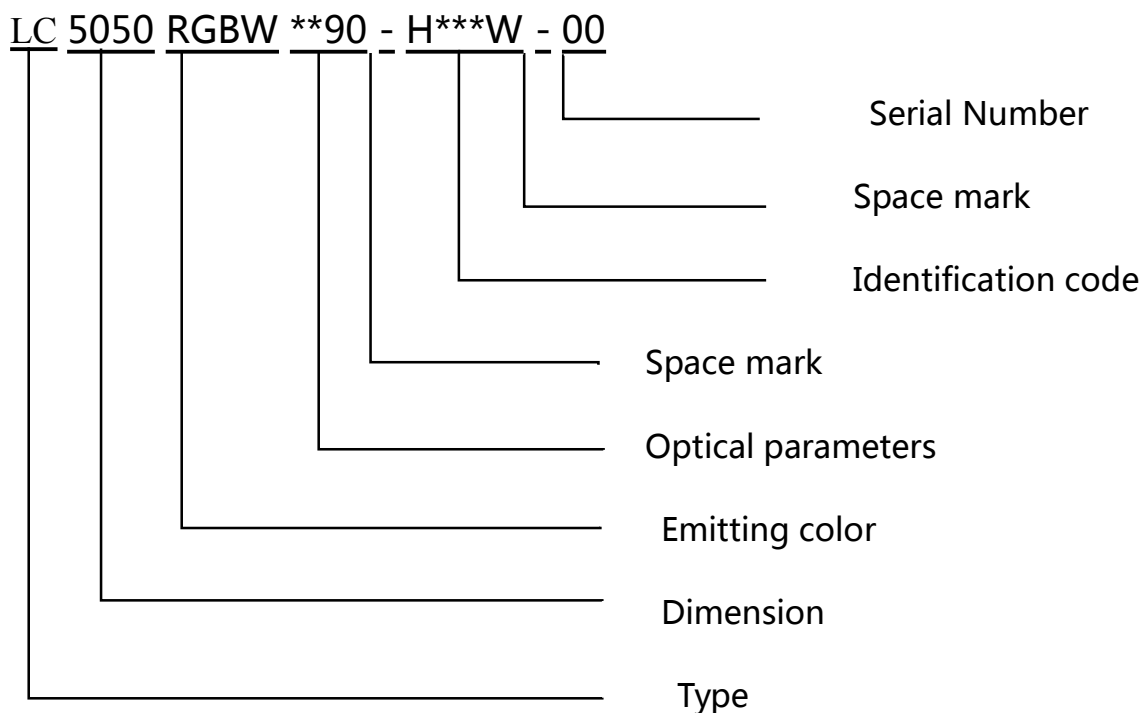
1.Product Feature:

- PLCC-2 Package
- Extremely wide viewing angle
- Suitable for all SMT assembly and solder process
- Available on tape and reel
- Package : 4000pcs/reel
- Positive polarity products , the gap is negative

2.Main application areas:

- LED Strip
- Indoor display

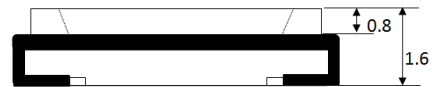
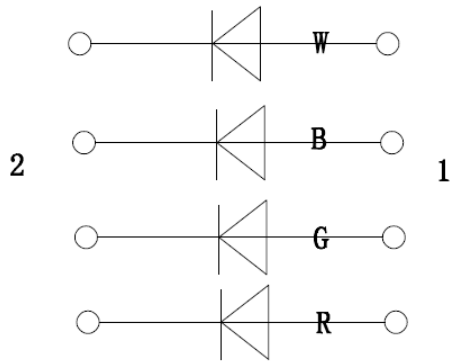
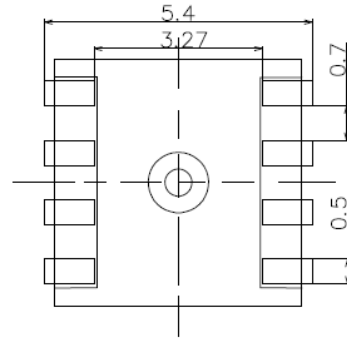
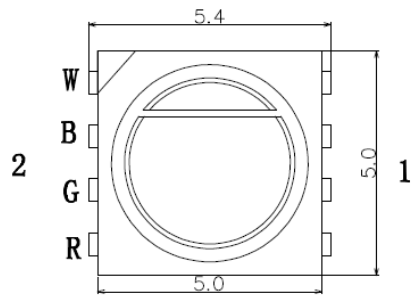
3.Product code explanation :



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4.Package size drawing:



NOTES:

1. All dimensions units are mm
2. All dimensions tolerances are ± 0.15 mm unless otherwise noted

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5.Limit parameters (temperature=25℃)

Item	Symbol	Absolute Maximum Rating		Unit
Forward Current	IF	20 (single chip)		mA
Reverse Voltage	VR	5		V
Power Dissipation	PD	R	46	mW
		G	64	
		B	64	
		W	64	
Operating Temperature	Topr	-40~85		℃
Storage Temperature	Tstg	-40~100		℃
Junction Temperature	Tj	110		℃
Pin Temperature	Tp	70		℃
Antistatic ability	ESD	HBM(Human Body Model) 2000V		
Soldering Temperature	Tsol	Reflow Soldering: 260℃/10 sec. Hand Soldering:350℃/3 sec.		

6.RGBW chip photoelectric characteristic parameters (temperature=25℃)

Color	Forward Voltage	Wavelength (nm)	Intensity (mcd)	Luminous (LM)
R	1.9-2.4	619-630	480-900	1.5-3.0
G	2.8-3.3	520-530	1400-2000	4.5-6.5
B	2.8-3.3	460-470	300-600	1.0-2.0
W	2.7-3.3	/	/	≥3

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Color Rendering Index	Ra	90	--	--		IF=20mA
Reverse Current	IR	--	--	1	uA	VR=5V
Viewing angle	2θ1/2	---	120	---	Deg	If=20mA

Note :

- 1.2θ1/2 is the angle from optical centrline where the luminous intensity is 1/2 the optical Centerline value
- 2.The above luminous flux measurement allowance tolerance is±8%
- 3.The above forward voltage measurement allowance tolerance is ±0.1V
- 4.The above dominant wavelength measurement allowance tolerance is ±1

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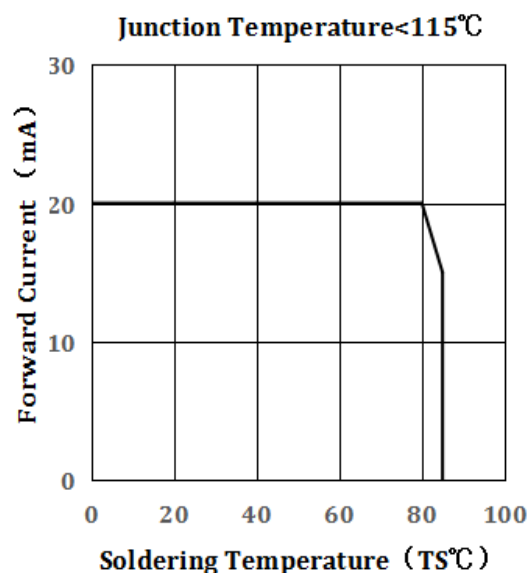
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7. Mass Production list (W color Parameter)

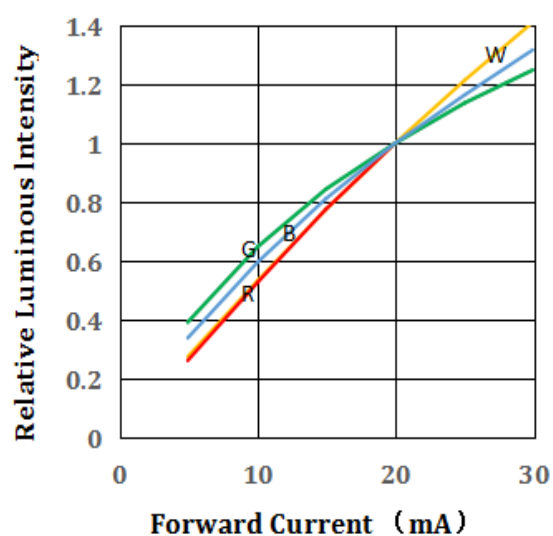
Part No.	CCT (K)	BIN	CCT (K)		Φ (lm)		Test Conditions
			Min	Max	Min	Max	
LC5050RGBW2790-H** *W-00	2700	V6	2600	2800	4.5	7.5	IF=20mA
LC5050RGBW2990-H** *W-00	2900	S6	2800	3200	5.5	8.5	
LC5050RGBW4090-H** *W-00	4000	L6	3800	4200	5.5	8.5	
LC5050RGBW6190-H** *W-00	6100	E6	5800	6500	6	9	

8. Typical optical characteristics curves

Soldering Temperature VS.Forward Current



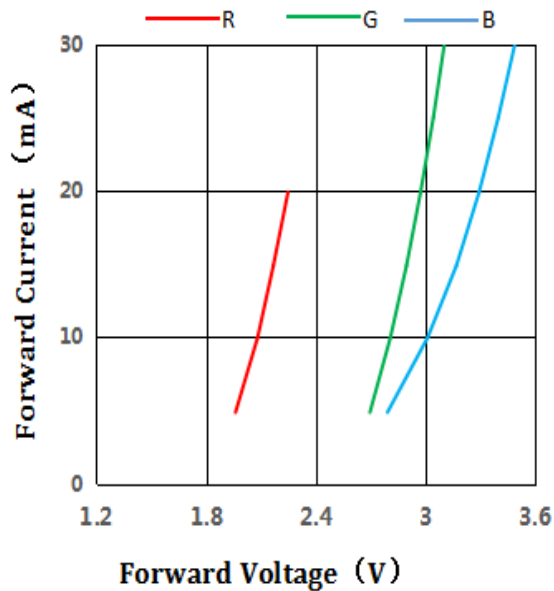
Forward Current VS.Relative Intensity



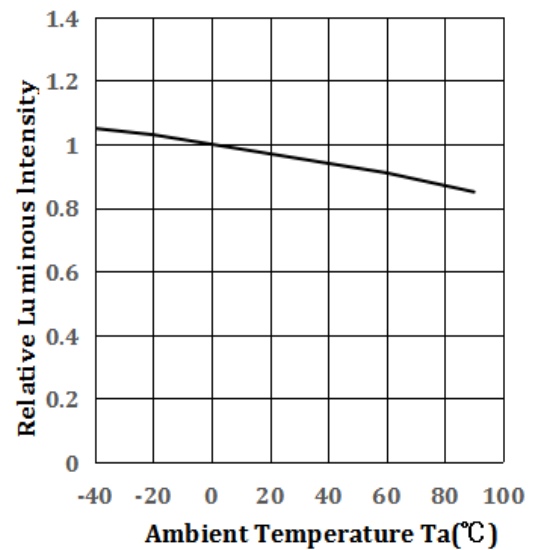
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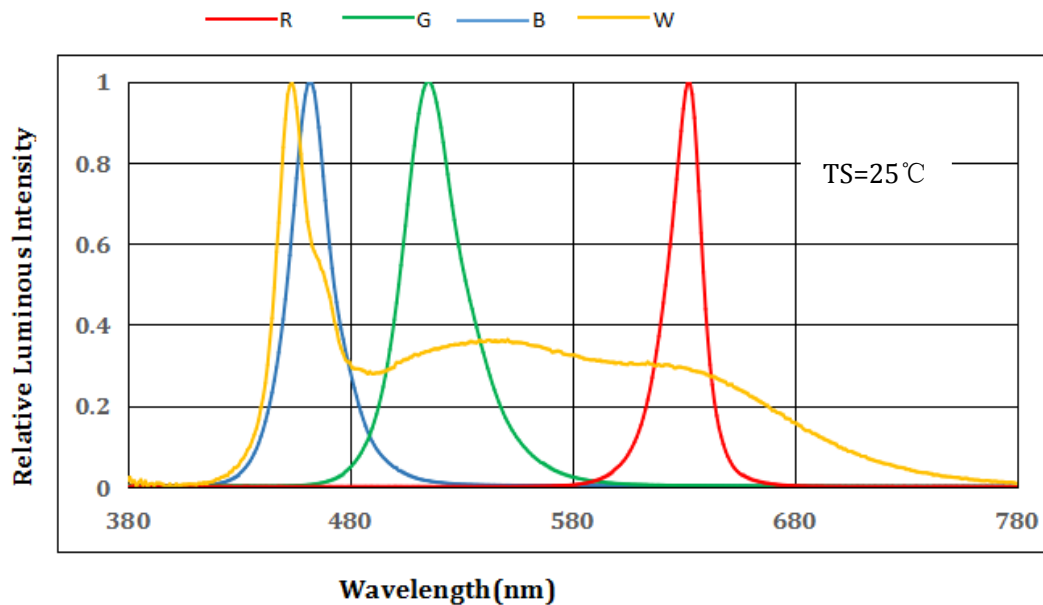
Forward Voltage VS. Forward Current



Ambient Temperature VS. Relative Intensity



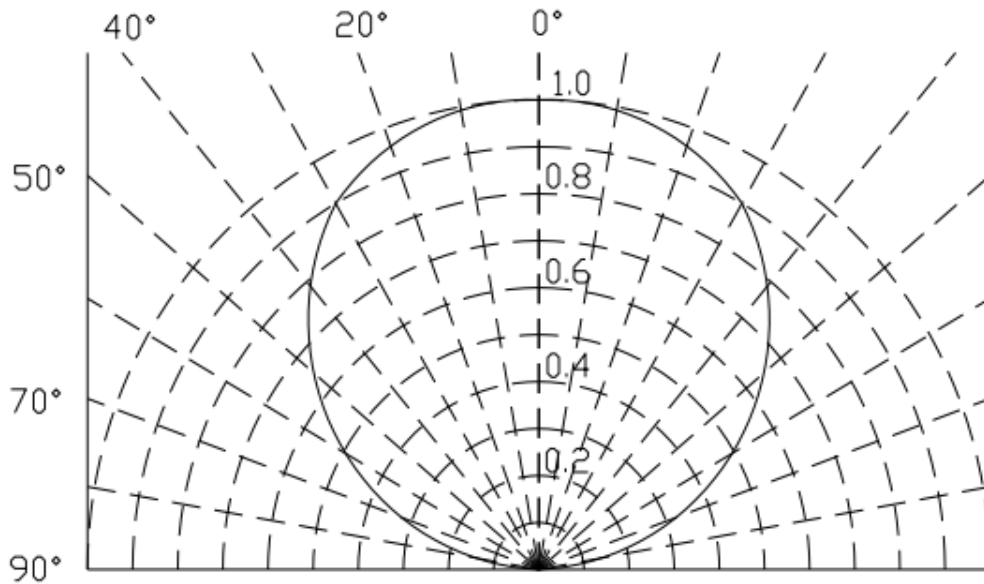
Relative spectral emission



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Radiation angle curve



9. Reliability Test Items and Conditions

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

LTPD : 10%

Test Item	Test Conditions	Duration/Cycle	Quantity	Accept/Reject
Thermal Shock	-40℃ 20min ↑↓ 5sec 100℃ 20min	300 times	22PCS	0/1
Low Temperature Storage	Ta=-40℃	1000 hours	22PCS	0/1
High Temperature Storage	Ta=100℃	1000 hours	22PCS	0/1
Room Temperature Test	IF=20mA, Ta=25℃	1000 hours	22PCS	0/1
High Temperature Test	IF=20mA, Ta=85℃	1000 hours	22PCS	0/10/1
Humidity Heat Test	Ta=85℃, RH=85% IF=20mA	500 hours	22PCS	0/1

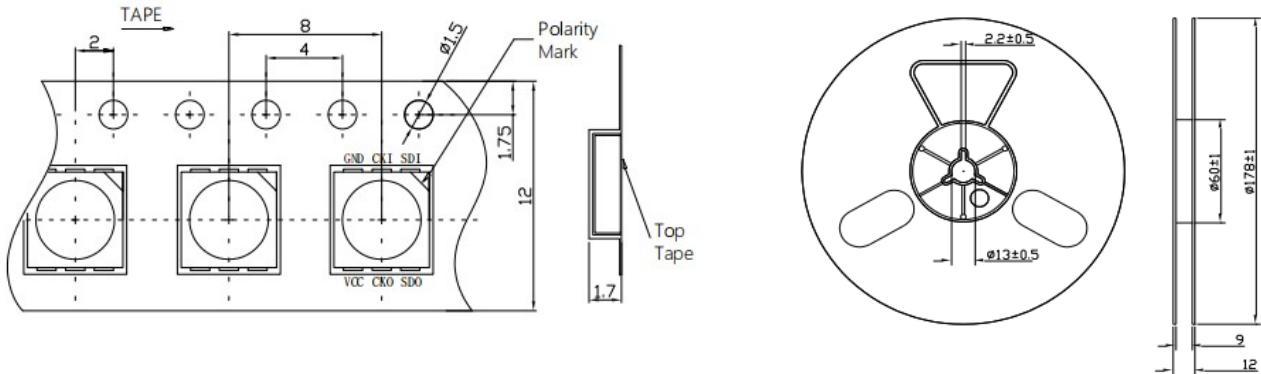
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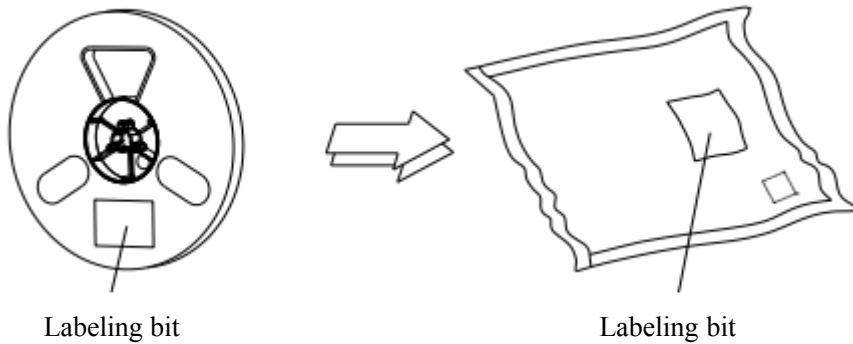
10.Packing specifications:

Carrier tape specifications (unit: mm)

Reel size:



Moisture-proof bag packaging:



Note: The marked tolerance is ± 0.1 mm, unit: mm

Label template :

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RoHS

Part NO :				
Chip	$\lambda d/TC(nm/K)$	VF(V)	IV(mcd/lm)	Date
R				
G				BIN
B				
W				Ra:
IF		Item No.		
LOT NO		QTY		

Note: Dehumidify the LED at 24H/70°C before use, the gap of the lamp bead bracket is (positive or negative)

Note: The SMD5050 series packing standard is 4000PCS/bag, except for special requirements.

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SMD LED Usage Notice

Thank you for using the LED chip of Shenzhen LED Color Co., LTD. In order to enhance your understanding of the characteristics of our products, and to facilitate you to quickly grasp the basic operations of the products, in order to minimize or avoid unnecessary products caused by human factors damaged, so that it can better serve your production, specially for some standard use in the process of use for corresponding instructions. At the same time even if the same specification LED, its reliability and design level in the actual application field, operation mode, use conditions They are all related. This instruction manual cannot cover all the problems that customers may encounter during use. We apologize for the inconvenience caused!

1. Generally, LEDs are used in the same way as other electronic components. In order to allow customers to better use our LED products, please refer to the following LED protection precautions.

2. Transportation and storage

Smart LED is packaged in a moisture-proof and anti-static aluminum foil bag. Avoid squeezing or piercing the packaging bag during transportation, and take necessary anti-static protection measures. Before the product is produced, if air leakage or damage is found, please stop using it directly and do the necessary use after high temperature dehumidification. In the process of product replacement, placement, finished product shipment, and installation, care should be taken to prevent external force from colliding and squeezing the LED, causing external force to damage the LED.

If the aluminum foil bag has been discovered before production, unsealed, damaged, or leaked, please return it to the original factory for dehumidification testing in time, and never use it online.

3. Packaging and storage

Smart LED is a humidity-sensitive element. Packaging the LED in an aluminum foil bag is to prevent the LED from absorbing moisture during transportation and storage. A desiccant is placed in the packaging bag to absorb moisture. If the LED absorbs moisture, the moisture will expand when the LED is reflowed, causing the gel to separate from the bracket, or damage the key alloy wire, causing the product to fail. For this reason, the vacuum moisture-proof packaging is to avoid moisture in the packaging bag. The moisture-proof grade of this product is LEVEL5.

Diagram 1: Definition of Material Moisture Resistance Level (MSL) specified by IPC/JEDEC J-STD-020

Moisture Resistance level	Workshop life after unpacking	
	Time	Condition
LEVEL1	Unlimited	$\leq 30^{\circ}\text{C}/85\% \text{ RH}$
LEVEL2	1year	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$
LEVEL2a	4weeks	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$
LEVEL3	168hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$
LEVEL4	72hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$
LEVEL5	48hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$
LEVEL5a	24hours	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$
LEVEL6	Take out and use	$\leq 30^{\circ}\text{C}/60\% \text{ RH}$

3.1 Storage in vacuum packaging: It is recommended that SMD series LEDs be stored in a drying cabinet with a built-in desiccant. The storage environment should be at a temperature of 20°C - 30°C , humidity: below 60%, and the storage time should not exceed three months.

3.2 Storage and use after unpacking:

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- a. Before unpacking, check the validity period of the package and ensure that there is no air leakage.
 - b. Workshop life of the exposed environment after the vacuum aluminum bag is unpacked: In the condition of $\leq 30^{\circ}\text{C}/60\%\text{RH}$, the online use time does not exceed 48 hours (Level 5), and the 5050 and shade series are recommended not to exceed 12 hours. If it does not meet the above environmental requirements, it is recommended that the unpacking operation time should not exceed 2 hours.
 - c. The remaining material after opening the package should be sealed within 12H in a workshop environment of $\leq 30^{\circ}\text{C}/60\%\text{RH}$ and stored in accordance with 3.1 conditions.
- 3.3 If the LED device is exposed to the air for 24 hours, and the environment meets the requirements of 3.1 and 3.2, the LED device can be used after low-temperature baking and dehumidification.
- 3.4 When the LED device is exposed to the air for more than 24 hours (or the environment does not meet the requirements of 3.1 and 3.2), the LED device needs to be baked at high temperature and dehumidified before use.
- 3.5 LED devices in the vacuum package are not opened, and the packaging is intact (no secondary sealing), and the LED devices within 90 days can be used directly, but the LED devices within 90-180 days need to be dehumidified at low temperature before use.
- 3.6 The LED device in the vacuum package has not been opened, and the package is intact (without secondary sealing), but the LED device must be dehumidified at high temperature for more than 180 days before use.
- 3.7 LED is a surface mount component. For example, after the LED is damp, under the high temperature condition of reflow soldering, the LED bracket and the packaging glue may peel off, and its luminous efficiency will be affected, resulting in a decrease in brightness or a variation in luminous color.
- 3.8 The LED electrode and bracket are made of silver-plated copper alloy, and the outer silver layer is easily affected by corrosive gas. Please avoid contact with corrosive environment to cause LED discoloration, so as to avoid poor solderability or influence of LED. Affect the photoelectric performance. Please avoid sudden changes in ambient temperature and humidity, especially in high humidity environments that are prone to condensation.

4. Product dehumidification:

4.1 Low temperature dehumidification method:

- 4.1.1 Unpack the vacuum package and take out the entire plate of LED devices from the vacuum package.
 - 4.1.2 Bake on the original reel, and flatten it to avoid deformation of the reel.
 - 4.1.3 Place the entire tray of LEDs in a 70°C oven and bake for 24 hours (note: the entire tray of LED devices cannot be baked at a temperature higher than 70°C , as the LED reel may be deformed if it is above 70°C).
 - 4.1.4 After the baking is completed, the LED devices can be used for normal operations.
 - 4.1.5 It is recommended that all low-temperature dehumidification of color light products are better in use.
- ##### 4.2 High dehumidification method: (recommend to return to our company for high temperature dehumidification)
- 4.2.1 After dividing according to the BIN level, unwrap the tape, and place the LED lamp beads in the stainless steel plate flat, and the flat thickness shall not be greater than 2CM.
 - 4.2.2 The high-temperature baking temperature is $80^{\circ}\text{C}/2\text{H}$ - $120^{\circ}\text{C}/2\text{H}$ - $150^{\circ}\text{C}/6\text{H}$, and then the temperature in the oven is naturally cooled for half an hour to start braiding. The braiding must be completed within 4H (the lamp beads should be placed in the drying cabinet during the waiting period. Inside, it is recommended to dry the cabinet humidity is controlled within 30%RH).

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4.2.3 Vacuum packaging after the tape is dehumidified at 70°C/6H.

4.3 Moisture-proof control of the assembled lamp bead components

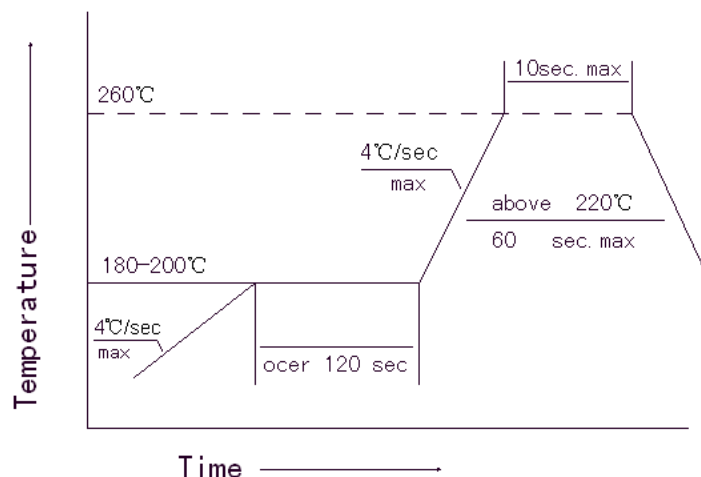
For products that require a secondary SMT process or high temperature, the necessary moisture-proof treatment should also be done before the secondary welding after the completion of the first welding. Exposure to the condition of ($\leq 30^{\circ}\text{C}/60\%\text{RH}$), the longest No more than 2H. If the time between the second high-temperature production is longer, the material after the first welding must be dehumidified (bake in an oven at $70^{\circ}\text{C}\pm 5^{\circ}\text{C}$ for no less than 12 hours), and then vacuum-sealed for storage , Or store the product in a constant temperature and humidity oven in a drying oven, and perform dehumidification (bake in an oven at $70^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for no less than 12 hours) before the second high temperature production to ensure that the product is over Before the high-temperature process, the low-humidity baking conditions: $70^{\circ}\text{C}\pm 5^{\circ}\text{C}$ baking not less than 12 hours, high-temperature baking conditions: $130^{\circ}\text{C}\pm 5^{\circ}\text{C}$ baking for 5 hours, the normal reflow soldering operation accumulatively does not exceed 3 times.

For products with extrusion process or high-temperature protection treatment, it is recommended that the products do the necessary dehumidification work before the protection process, and bake in an oven at $130^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 5 hours to eliminate the products in the process of testing, aging, and transportation. Exposure to the moisture absorbed in the air to prevent the moisture wrapped on the surface of the material from slowly entering the material after the product is protected, causing the product to fail.

5. Soldering

5.1 Reflow soldering: It is proved by Leitron Optoelectronics using the parameters listed below that the surface mount LED meets the JEDEC J-STD-020C standard. As a general guideline, Litron Optoelectronics recommends that customers follow the soldering temperature curve recommended by the manufacturer of the solder paste used.

Please note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment



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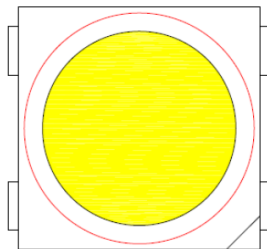
Profile Feature	Lead-Based Solder	Lead-Free Solder
Average Ramp-Up Rate (Ts max to Tp)	3 °C/second max	3 °C/second max
Preheat: Temperature Min (Ts min)	100°C	150°C
Preheat: Temperature Min (Ts max)	150°C	200°C
Preheat: Time (ts min to ts max)	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature (T L)	183 °C	217 °C
Time Maintained Above: Time (t L)	60-150 seconds	60-150 seconds
Peak/Classification Temperature (T P)	215 °C	240 °C
Time Within 5°C °C of Actual Peak Temperature (tp)	<10 seconds	<10 seconds
Ramp-Down Rate	6 °C/second max	6 °C/second max
Time 25 °C °C to Peak Temperature	<6 minutes max	<6 minutes max

5.2 Manual soldering:

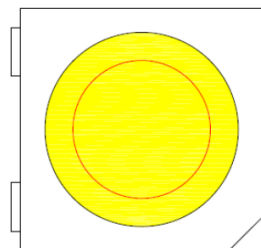
It is recommended to use an electric soldering iron with a power not exceeding 60W, and control the temperature of the soldering iron not to exceed 350°C. The electric soldering iron stays on the bracket pins for no more than 3 seconds during each soldering. If repeated soldering is required, the interval stay time is not Less than 3 seconds to avoid long-term high temperature damage to the LED. During the soldering process, do not touch or squeeze the surface of the LED lamp bead to avoid damage to the inside of the LED. At the same time, please pay attention to avoid the electric soldering iron on the LED surface colloid and PPA Burns and other injuries.

Note: All the Note: All the temperature refer to topside of the package, measured on the package body surface. When welding, do not forcefully press the surface of the colloid when the material is heated.

6.SMT nozzle requirements: (red circle refers to the inside diameter of the nozzle, see picture 1 and picture 2)



OK (the inside diameter of the nozzle is larger than the light-emitting area of the led)



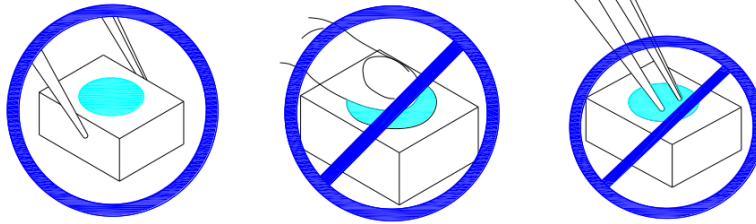
NG (the inside diameter of the nozzle is smaller than the lighting area of the led)

In order to prevent air pressure leakage, the outer diameter of the SMD nozzle should not exceed the size of the LED, and the inner diameter of the nozzle should be as large as possible. The tip of the nozzle should be made of soft material to prevent scratching or damaging the LED gel surface during suction. The size of the component must be Accurate in the pick and place machine.

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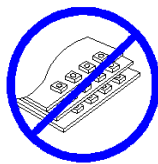
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7. Material picking method: use tweezers to pick up the material. Do not press the colloid or sharp objects to puncture the colloid. The materials cannot be stacked.

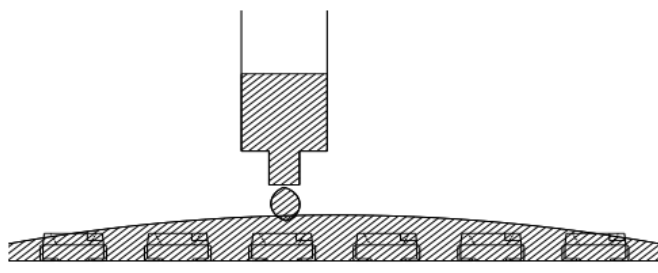


Do not stack products together, it may damage the internal circuit,

Cannot be used in acidic places with $\text{PH} < 7$



8. When we need to use the external sealant to coat the LED products, we should ensure that the external sealant matches the LED packaging glue, because most of the LED packaging glue is silica gel and epoxy glue, it has oriented oxidation and aligned moisture absorption. It is necessary to prevent the external sealing material from entering the LED to cause damage to the LED. The content of a single bromine element is required to be less than 900PPM, and the content of a single chlorine element is required to be less than 900PPM. When applying LED products, the total content of bromine and chlorine in the outer sealant must be less than 1500PPM.



9. Thermal design requirements

For LED products, the design of heat dissipation is very important. When designing the product, please consider the heat generated by the LED, the thermal resistance of the PCB board, the density of the LED arrangement, and the input electric power will all increase the temperature.

In order to avoid excessive heat generation, it is necessary to ensure that the LED runs within the maximum specification range required in the product specification. When setting the driving power of the LED, the highest ambient temperature should be considered.

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The maximum working temperature of the product cannot exceed 50°C (ie $\leq 50^{\circ}\text{C}$, which refers to the operating temperature at the GND of the LED pin).

10. Anti-static and surge protection for IC devices

Static electricity and surges can damage the LED products of IC devices. Therefore, corresponding protective measures must be taken. The signal input and output ports of the IC device are connected with protective resistors in series to prevent the product from failing due to surge or electrostatic shock.

In order to protect the LED products of IC devices, no matter what time or occasion, as long as you touch the LED, you need to wear an anti-static wristband and anti-static gloves. All equipment and instruments must be grounded.

It is recommended that each product is inspected before shipment, and there should be related electrical tests to select defective products caused by static electricity. When designing the circuit, consider eliminating the possibility of surges from harming LEDs.

11. Special statement

1. If it is used outside of the specification, our company will not be responsible for any problems.
2. The LED can emit a strong light that can damage the eyes. Take precautions and do not look directly at the LED light with the naked eye for too long.
3. Before mass use, you should communicate with relevant personnel of our company to understand more detailed specifications.
4. If the shape and specifications of LED products are changed, please forgive me for not being able to inform in time.