

Catalogue

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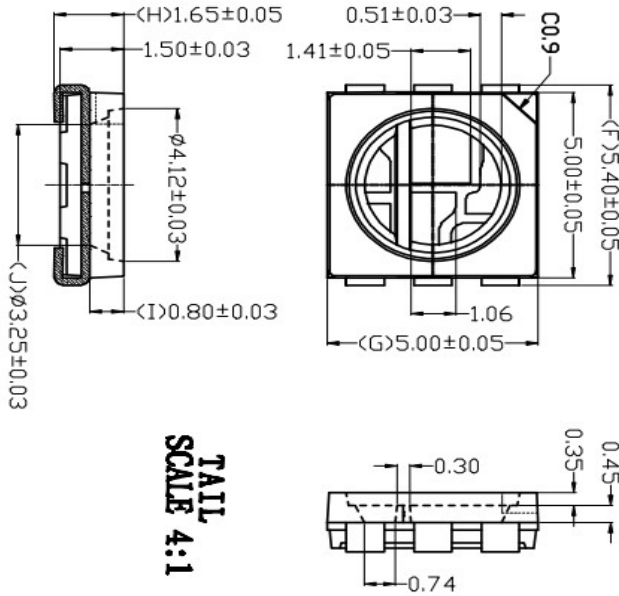
1. Characteristic Description:

- **Power input voltage: 9V-14V**
- **OUT R/G/B/W constant current value: 8mA**
- **OUT R/G/B/W Output gray scale: 256 levels**
- **OUT R/G/B/W Power on status: By default off**
- **OUT PWM frequency: 8KHz**
- **Data transmission rate: 800Kbps**
- **The display data of the same frame refreshes synchronously**
- **Built-in breakpoint resume function**

2. Product Applications

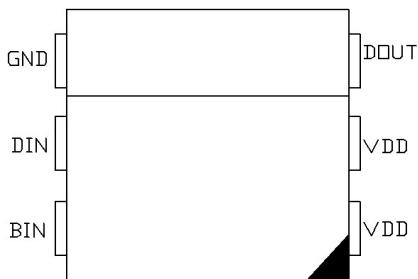
1	LED full-color LED light string, LED full-color LED modules
2	LED full color soft light bar hard light bar
3	Electrical equipment running light
4	Smart speaker. Fan
5	Display screen, pixel screen, point light source, LED irregular screen
6	Indoor LED decorative lighting, architectural LED exterior/scenario lighting

3. Structural Dimensions Diagram:



Note: All dimensions are in mm; if not otherwise indicated, the tolerance range is usually ± 0.2 mm.

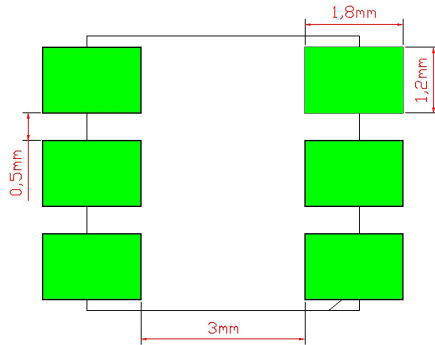
4. LED Pin Diagram



5. LED Pin Functions

Pin numbers	symbol	Name of the pipe	functional description
1	GND	the earth	landing
2	DIN	data-in	Signal data input
3	BIN	Assisted data entry	Assist signal data input
4	DOU	presentation of information	Signal data output
5	VDD	source	Chip power positive wire
6	VDD	source	Chip power positive wire

6. PCB Recommended Pad Size



7. Limits (TA=25°C unless otherwise specified)

symbol	Parameter	scope	unit
BVout	OUT R/G/B port withstand voltage	14	V
Tj	Working temperature range	-35~65	°C
Tstg	Storage temperature	-35~80	°C
Vesd	HBM Human discharge mode	2	KV

Note 1: If the maximum limit parameter is exceeded, the chip may be damaged. If the device works within the limit parameter range, the function is normal, but it is not completely guaranteed to meet individual performance indicators.

8. Electrical parameters (TA=25°C unless otherwise specified)

若无特殊说明, $V_{IN}=12V$ 、 $T_A=25^\circ C$ 。

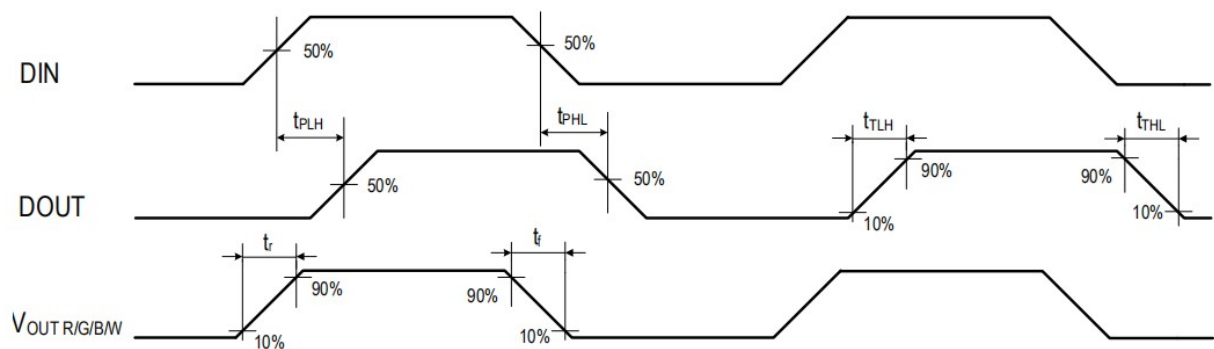
符号	参数	测试条件	最小值	典型值	最大值	单位
VIN	电源电压	-	9.0	12.0	14.0	V
IDD	静态电流	VIN=12V, IOUT"OFF"	-	0.26	-	mA
V _{IH}	输入信号阈值电压	DIN 输入高电平	2.7	-	-	V
V _{IL}		DIN 输入低电平	-	-	1.5	V
I _{OH}	DOUT 输出电流	DOUT 输出高, 串接 10Ω电阻至 GND	-	11.0	-	mA
I _{OL}	DOUT 灌电流	DOUT 输出低, 电源对 DOUT 灌电流	-	13.0	-	mA
I _{OUT_R/G/B}	OUT R/G/B/W 输出电流	VIN=12V, V _{DS} =1V	-	8.0	-	mA
V _{DS_S}	OUT 端口恒流拐点电压	I _{OUT_R/G/B/W} =8mA	-	0.5	-	V
%VS.VIN	OUT R/G/B/W 电流变化量	I _{OUT_R/G/B} =8mA, VIN= 10~14V	-	3.0	-	%
%VS.TA		I _{OUT_R/G/B} = 8mA, TA= -40~+85°C	-	5.0	-	%
R _{down_IN}	DIN 端口的下拉电阻	万用表测量 DIN 端口对 GND 阻值	-	51.0	-	KΩ

9. Switch Instructions (if No Special Instructions, TA=25°C)

若无特殊说明, $V_{IN}=12V$ 、 $T_A=25^\circ C$ 。

符号	参数	测试条件	最小值	典型值	最大值	单位
f_{PWM}	OUT R/G/B/W 输出 PWM 频率	$I_{OUT_R/G/B/W}=8mA$, $I_{OUT_R/G/B/W}$ 开启占空比 50%	-	8.0	-	KHz
t_{PLH}	信号传输延迟 (注 4)	DOUT 端口对地负载电容 30pF, DIN 至 DOUT 的信号传输延时	-	70	-	ns
t_{PHL}			-	80	-	ns
t_{TLH}	DOUT 转换时间 (注 5)	DOUT 端口对地负载电容 30pF	-	10	-	ns
t_{THL}			-	12	-	ns
t_r	OUT R/G/B/W 转换时间 (注 6)	$I_{OUT_R/G/B/W}=8mA$, 对地负载电容 30pF	-	125	-	ns
t_f			-	75	-	ns

10. Dynamic Parameters (Ta=25°C)



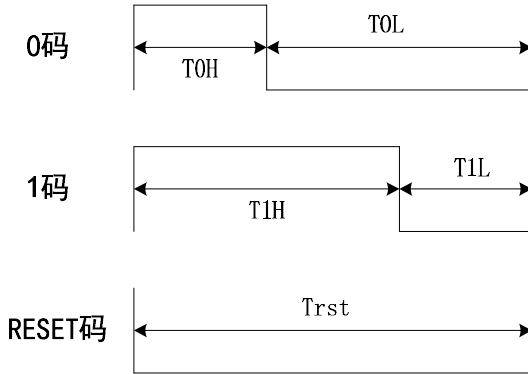
Schematic diagram of dynamic parameter test

11. Coding Description

The protocol of the IC uses a single-polarity return-to-zero code, where each code must have a low level. Each code in this protocol starts with a high level, and the duration of the high level determines whether it is a "0" or "1".

12. Time Series Waveform

1. Input code type

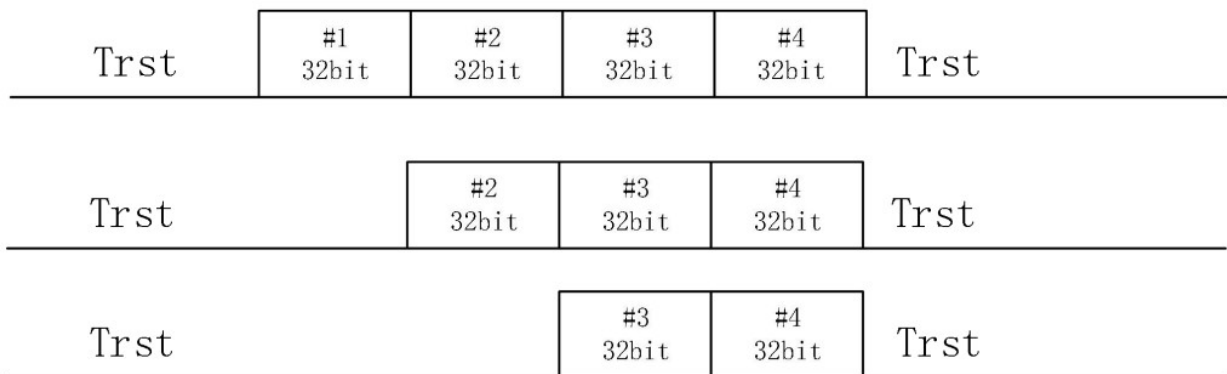


2. Code time

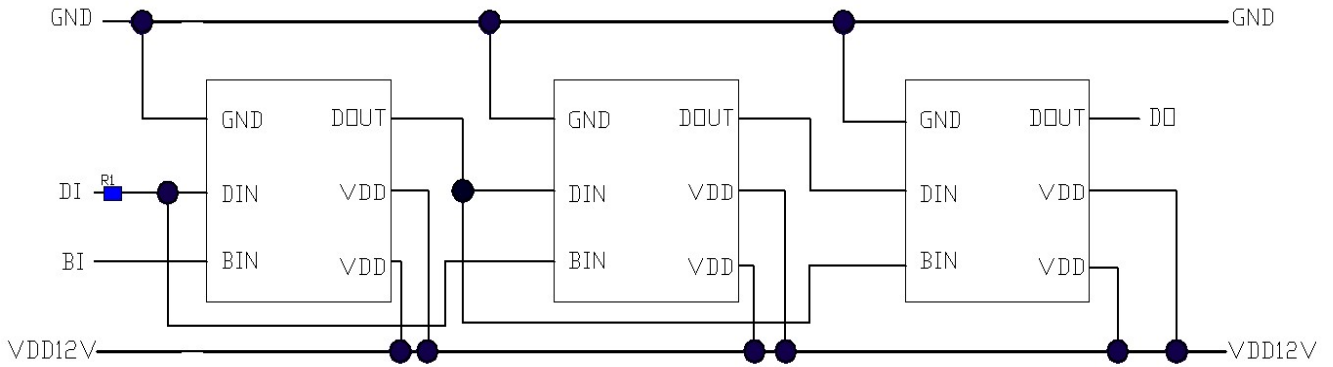
符号	参数	最小值	典型值	最大值	单位
T	码元周期	1000	1200	2000	ns
T0H	0 码, 高电平时间	200	300	400	ns
T0L	0 码, 低电平时间	600	900	-	ns
T1H	1 码, 高电平时间	600	900	-	ns
T1L	1 码, 低电平时间	200	300	-	ns
Trst	Reset 码, 低电平时间	200	-	-	us

注 7: 编写程序时, "0"码、"1"码的高电平时间需严格按照上表的规定范围编写, "0"码、"1"码的低电平时间小于 20us 即可。

13. Data Transfer Method



14. Typical Line Application Diagram



Note: In practical circuit applications, to prevent damage to the IC's internal signal input/output pins caused by instantaneous high voltage during live plug-and-unplug operations during testing, protective resistors should be connected in series at both signal input and output terminals. Additionally, decoupling capacitors between LED chips are essential to ensure stable operation among various IC chips.

Application 1: For soft or hard light strips, where the transmission distance between the lamp beads is short, it is recommended to connect a protection resistor in series at the input and output end of the signal clock line, that is, $R1=R0$ about 500 ohms;

Application 2: For modules or general irregular products, the transmission distance between lamp beads is long. Due to different wires and transmission distance, the protective resistors connected at both ends of the signal clock line will be slightly different; it depends on the actual use;

15. 32-bit LED data structure

Trst+第一颗芯片 32bits 数据+第二颗芯片 32bits 数据+.....+第 N 颗芯片 32bits 数据+Trst

● 32bit 灰度数据结构: 高位在前, 按照 RGBW 的顺序发送

R	R	R	R	R	R	R	R	G	G	G	G	G	G	G	B	B	B	B	B	B	B	W	W	W	W	W	W	W	W		
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

bit31.....bit0

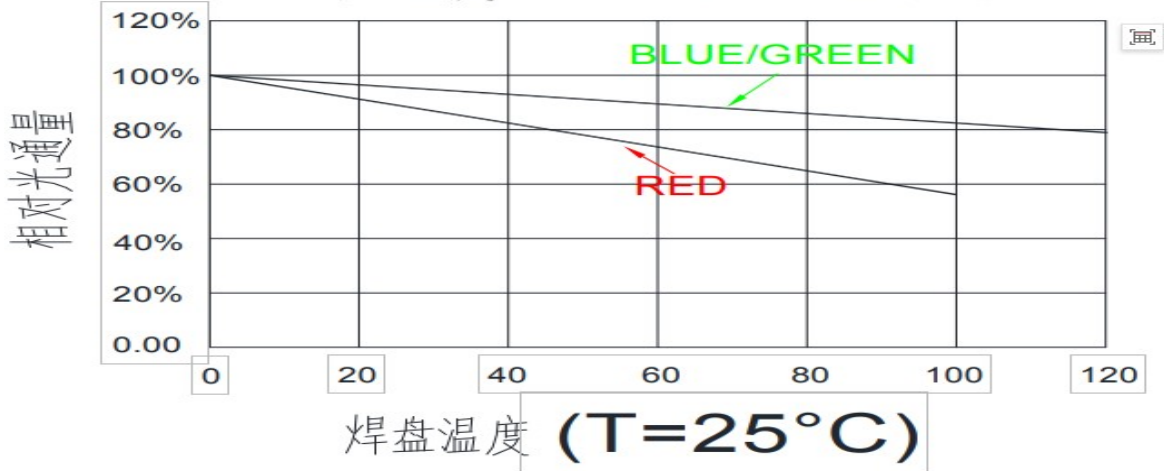
16. Optoelectronic Parameters

project	Symbols or codes	least value	representative value	crest value	unit	condition
White light color temperature (TC)	F3000	2800	3000	3200	K	8mA
	F3500	3200	3500	3800	K	8mA
	F4000	3800	4000	4200	K	8mA
	F5000	4700	5000	5300	K	8mA
	F6500	6000	6500	7000	K	8mA
Luminance (IV)	R	-	800	-	mcd	8mA
	G	-	1250	-	mcd	8mA
	B	-	300	-	mcd	8mA
	W	-	5	-	lm	8mA
RGB main wave (WD)	R	-	623	-	nm	8mA
	G	-	530	-	nm	8mA
	B	-	462	-	nm	8mA
White light color rendering index	Ra	80	-	85	/	8mA
Angle of white light emission	2 θ 1/2	-	120	-	Deg	8mA

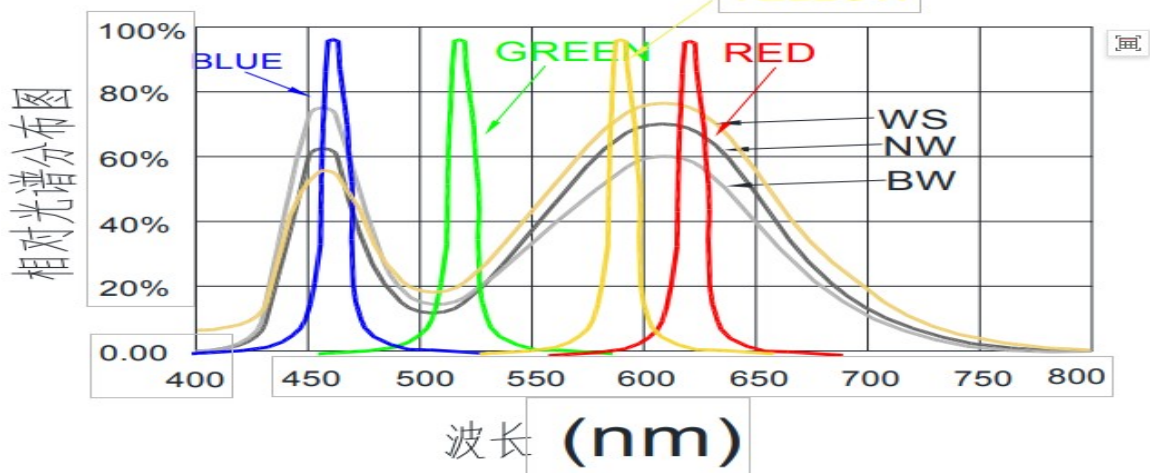
Note: The above data RGB test current is 8mA, white light test current is 8mA

17. Typical Optical Property Curve

焊盘温度与光通量输出的相对关系

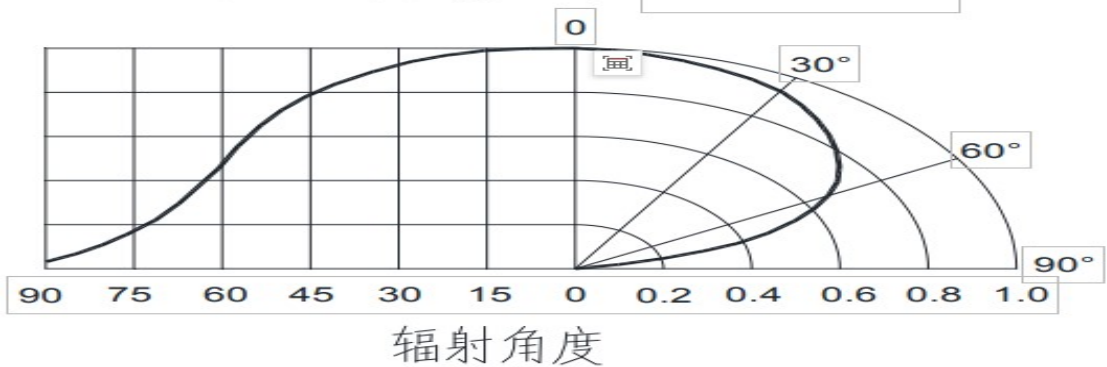


波长特性



典型的辐射方向图

120°



19. Reliability

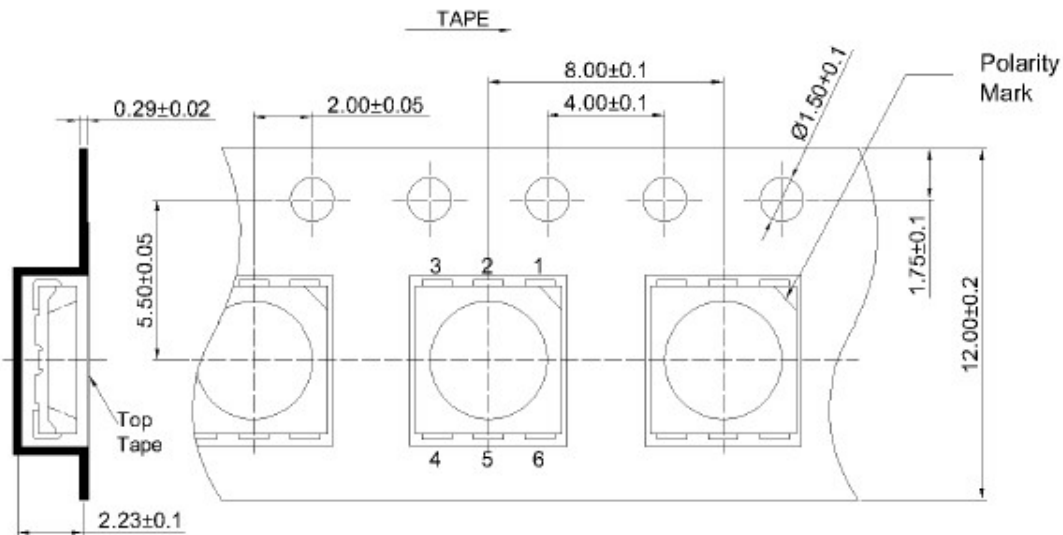
1) Test Items and Determination

order number	Experimental projects	experiment condition	reference standard	judge
1	Hot and cold shock	100±5℃/30min--35±5℃/30min, 100cycles	JESD22-A106	0/22
2	High temperature storage	Ta=100℃, 1000hrs	JESD22-A103	0/22
3	Low temperature storage	Ta=-35℃, 1000hrs	JESD22-A119	0/22
4	High temperature and humidity storage	Ta=60℃ RH=90%, 1000hrs	JEITA ED-4701 100103	0/22
5	temperature cycle	-35℃/30min-25℃/5min-100℃/30min-25℃ /5min, 100cycles	JESD22-A104	0/22
6	Reflow solder heat resistance	TSLD=260℃, 10sec. 2 times	JESD22-B106	0/22
7	Room temperature life test	25℃, IF:Typical curren. 1000hrs	JESD-A-108D	0/22

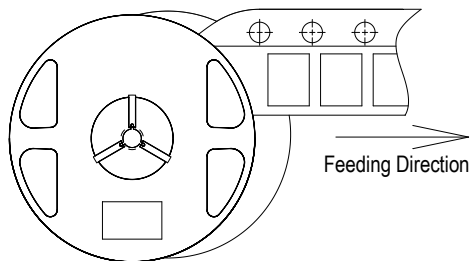
2) Criteria for Determining Invalidity

project	symbol	test condition	requirement	
			least value	crest value
luminous intensity	IV	DC=12V, typical circuit specifications	Initial data X0.7	-
Reflow solder heat resistance	----	DC=12V, typical circuit specifications	No dead light or obvious damage	

20. Packing Specifications :



•Conveyor direction



•Coil arrangement specifications



pour :

1 The material-free part is also sealed with a seal band

2 : The maximum difference of one volume of material is 2PCS

3: The direction of material gap is consistent with the direction of tooth hole on the roll

4:5000 pieces per roll.

* Usage Instructions:

1.lay in

- a. The package is sealed and stored at a temperature of $<30^{\circ}\text{C}$, humidity of $<60\%RH$, and the shelf life is 2 months. When the shelf life is exceeded, it needs to be baked again.
- b. Before opening the package, please check whether there is any air leakage in the package. If there is any air leakage, please re-bake and then use it.
- c. After 开封, please use under the following conditions: temperature $<30^{\circ}\text{C}$, humidity below $60\%RH$; if the use time exceeds 24 hours, it must be baked as follows before use.
- d. Baking conditions: product in oven temperature $65^{\circ}\text{C} \pm 3^{\circ}\text{C}$; time: 12 hours.
- e. Remove the product from the bag and bake it. Do not open the oven door during baking.

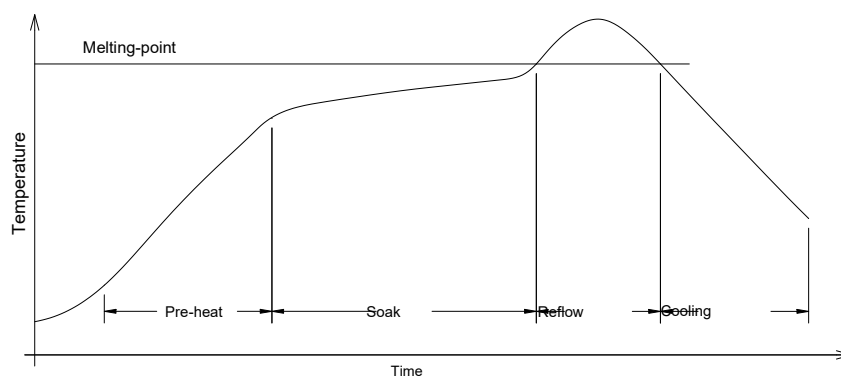
2.welding requirements

(1) . Hand Soldering Manual Soldering by Soldering Iron

- a. When welding by hand, keep the temperature of the soldering iron below 315 degrees Celsius and the welding time less than 3 seconds.
- b. Hand welding can only be done once.
- c. Do not touch the gel with an electric iron.
- d. Choose a double-ended soldering iron.

(2) 。 Reflow Soldering

a. Reflow Temperature Curve:



(The above picture is for reference only)

Welding agent: lead and tin	Welding agent: lead-free tin
Temperature rise slope = 4°C/s maximum	Temperature rise slope = 4°C/s maximum
Preheating temperature = 100°C ~150°C	Preheating temperature = 150°C ~200°C
Preheat time = 100s maximum	Preheat time = 100s maximum.
The slope of temperature decrease is 6°C/s at most	The slope of temperature decrease is 6°C/s at the maximum
Peak temperature = 230°C maximum	Peak temperature = 250°C maximum
The time at peak temperature $\pm 5^\circ\text{C}$ should not exceed 10s	The time at peak temperature $\pm 5^\circ\text{C}$ should not exceed 10s
The time exceeding 183°C temperature should not exceed 80s.	The time exceeding 217°C temperature should not exceed 80s.

b. Recommended pad heat dissipation design:

Refer to the pad design in the figure.

- c. Do not modify the welded surface after welding. If you want to modify, replace the removed LED with a good product of the same batch and grade.**
- d. Soldering should be done in one time, not in several times.**
- e. During the reflow process, the product should not be pressed.**
- f. The welded product must be cooled to room temperature before packaging.**

3. cleaning

a. Do not use unknown chemical liquids to clean SMD LEDs: Unknown chemical liquids may damage SMD LEDs. When cleaning is necessary, use a cotton swab dipped in alcohol to clean the SMD LED. Clean under normal room temperature for less than 1 minute and let it dry naturally for 15 minutes before use.

b. Do not use a soluble solution to clean the LED. An isopropyl solution may be used. Before using any cleaning solution, confirm that it is

No effect on LED dissolution.

C. Please do not use ultrasonic method to clean LED, if the product must use ultrasonic, then it is necessary to evaluate some parameters affecting the LED,

For example, the power of ultrasonic, baking time and assembly conditions must be tested before cleaning to confirm whether it will affect the LED.

4.static electricity

a. These products are electrostatic sensitive and must be handled carefully by the user. In particular, if current and voltage, or exceed absolute maximum ratings or may cause electrical damage, customers are required to take appropriate measures against static and surges when handling products by hand.

b. The product is properly grounded, using conductive pads, conductive work clothes and shoes, conductive capacitors to effectively prevent static and surge.

c. The product should be in contact with a place where the grounding resistance is low, such as a working platform on a metal surface, and should have a conductive pad (surface resistance $10^6 - 10^8$ ohms).

d. The use of soldering iron requires grounding. Ion fans should be installed in places with high static electricity.

e. Electrostatic discharge (ESD) or pulse current (EOS) can damage SMD LEDs.

f. You must wear a static wrist, shoes or gloves to carry out SMD LED production.

g. All machinery must be grounded.

5. Heat treatment

Heat treatment of SMD products should be carefully considered during SMD circuit design. The current should be appropriately reduced according to the current-temperature corresponding curve diagram of each product specification.

6. Selection of solder wire and solder paste

Do not use sulfur or bromide solder wire and solder paste, because sulfur or bromide will react with the silver layer on the surface of the bracket, resulting in blackening of the silver layer and greater attenuation of the LED bulb.

7. Material handling: use tweezers to pick up the material, do not press the colloid or prick the colloid with sharp objects, and do not stack the material;



When the product is in PCB wiring design, for flexible plates and plates below 0.5T, the direction of the pad should be perpendicular to the extension direction of the PCB, so as to reduce the stress caused by the bending of the PCB board on the LED pins, resulting in the failure risk of the LED products due to the tensile stress;

8: material moisture control

- a. **If a roll of material is not fully used in one batch and the workshop temperature/humidity remains within specified limits (<math> < 30^{\circ}\text{C}/60\% \text{ RH}</math>), and component exposure to air does not exceed 2 hours, the remaining material should be vacuum-sealed with desiccant. Otherwise, the material must undergo low-humidity baking for dehumidification. The dehumidified material can be repackaged and time recalculated. Moisture control measures should also be implemented for components that have completed assembly.**
- b. **Components assembled on the PCB board do not need to go through high temperature process or reflow soldering process, so they will not be specially treated;**
- c. **For products requiring encapsulation, dripping, or coating protection treatments, it is recommended to perform necessary dehumidification before applying protective processes. The products should be baked in an oven at $65^{\circ}\text{C}\pm 3^{\circ}\text{C}$ for no less than 12 hours to eliminate moisture absorbed from air exposure during testing and aging. This prevents the gradual infiltration of moisture from the coating surface into the product after treatment, which could lead to functional failure.**
- d. **If the product has not been used for two months, it needs to be dehumidified again. It should be baked in an oven of $130^{\circ}\text{C}\pm 5^{\circ}\text{C}$ for no less than 4 hours. If there is no dehumidification condition, you can return it to us for dehumidification.**

9. The workshop should ensure ventilation, especially for the workshop where reflow soldering is passed. Organic rubber related materials should not be piled up.

10. other

- a: **If the use exceeds the specification book, we will not be liable for any problem.**
- b: **Before extensive use. You should communicate with us to understand more detailed specifications.**
- c: **If there is any abnormality before use, communicate with us in time.**