



Product Data Sheet

PN:1010RGB-WSIC



1010SMD LED-Full Color



ATTENTION

OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC DISCHARGE
SENSITIVE DEVICES

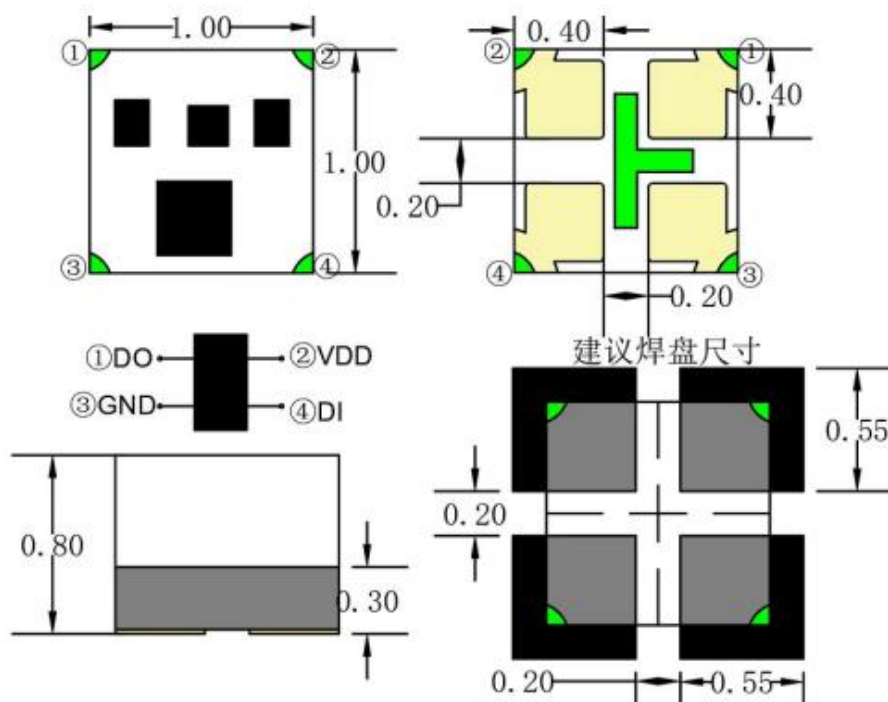
Features

- Dimensions:1.0mm×1.0mm×H0.8mm
- Color :RGB+IC LED
- Lens: White Diffused Epoxy
- Chip Material:InGaN、 InGaN、 AlGaAs
- Chip Dimension:305um、 305um、 305um
- Number of Chips:4pcs
- High reliability,High radiant intensity
- Low forward voltage
- Meet ROHS, Green Product

Applications

- Ideal for backlight
- Medical appliances
- Indicator Light

Package Dimensions



Notes:

- 1.All dimensions are in millimeters ;
- 2.Tolerance is ± 0.10 mm unless otherwise noted.

Absolute Maximum Ratings (Tc=25°C)

Parameter	Symbol	Rating	Unit
Logic supply voltage	VDD	+3.0~+7.5	V
Logic input voltage	VIN	-0.5~VDD~+5.5	V
RGB output port withstand voltage	VOUT	9	V
Operating temperature range	Topt	-30~+85	°C
Storage temperature range	Tstg	-40~+90	°C
Static power consumption	Idd		0.5
ESD withstand voltage	VESD	4000	V

Recommended working conditions (@Ta=25°C)

Parameter	Symbol	min	Typical	max	Company
supply voltage	VDD	4	5.0	5.5	V
High level input voltage	Vih	0.7VDD	---	VDD	V
Low level input voltage	Vil	0	---	0.3VDD	mA

Electrical Optical Characteristics(Tc=25°C)

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition	
Luminous Intensity	Red	IV	30		100	mcd	IF=20mA
	Green		100		300		
	Blue		30		100		
Peak Wavelength	Red	λP		633		nm	IF=20mA
	Green			525			
	Blue			460			
Dominant Wavelength	Red	λd	620	625	630	nm	IF=60mA
	Green		520	522	530		
	Blue		460	465	470		
Viewing Half Angle	2θ1/2		130		deg	IF=60mA	

*Luminous Intensity is measured by ZWL600.

*θ1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

Pin definition description

Pin number	Pin symbol	Pin name	Function description
①	DO	data output	Zero code data cascade output
②	VDD	Power supply (positive)	Positive pole of lamp bead power supply
③	GND	Ground (negative)	Negative pole of lamp bead
④	DI	data input	Zeroing code data input

Electrical parameters (@Ta=25°C)

Parameter	Symbol	min	typical	max	Company
Chip input voltage	VDD	-	5	7.5	V
R / g / B output port withstand voltage	Vds	-	-	9	V
R / g / B output drive current	IRGB	-	5	-	mA
High level input voltage	VIH	0.7 VDD	-		V
Low level input voltage	VIL	-	-	0.3 VDD	V
PWM frequency	fPWM		4		KHZ
consumption	Idd	-	0.5	-	mA

Switching characteristics (@Ta=25°C)

Parameter	Symbol	min	typical	max	Company	Test conditions
Data transmission rate	FDIN	-	800	1100	KHz	-
Transmission delay time	tPLZ	-	-	500	ns	

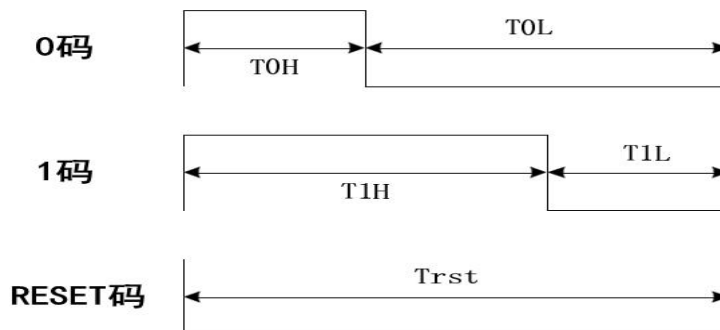
Characteristic

The chip adopts single line communication mode and sends signals by zeroing code. After the chip is powered on and reset, it receives the data from the din end. After receiving enough 24 bits, the dout port starts to forward the data to provide input data for the next chip. The dout port is always pulled down before forwarding. At this time, the chip will not receive new data. The three PWM output ports of the chip outr, outg and outb send corresponding signals with different duty cycles according to the received 24 bit data, and the signal frequency is 4 kHz. If the input signal of DIN terminal is reset signal, the chip will send the received data to the display, and the chip will receive new data again after the signal ends. After receiving the initial 24 bit data, the chip will forward the data through dout port. Before the chip receives the reset code, the original output of outr, outg and outb pins will remain unchanged. After receiving the low-level reset code above 80 μ s, The chip outputs the 24 bit PWM data pulse width just received to outr, outg and outb pins.

The chip adopts automatic shaping and forwarding technology, so that the number of cascades of the chip is not limited by signal transmission, but only limited by the requirements of screen brushing speed. For example, we design a 1024 cascade with a screen swiping time of $1024 \times 0.4 \times 2 = 0.8192$ MS (the data delay time of the chip is 0.4 μ s), without any flicker.

Timing waveform

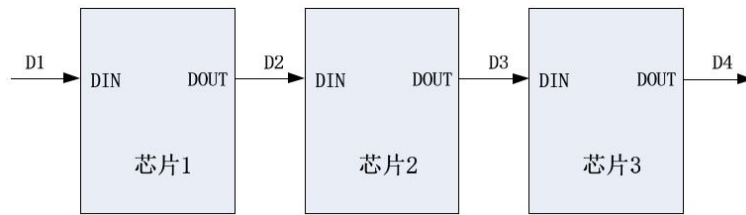
- Input code type



- Code type time

Name	Trace State	Typical value	Allowable error
T0H	0 code, high level time	0.3 μ s	$\pm 0.05\mu$ s
T1H	1 code, high level time	0.6 μ s	$\pm 0.05\mu$ s
T0L	0 code, low level time	0.6 μ s	$\pm 0.05\mu$ s
T1L	1 code, low level time	0.3 μ s	$\pm 0.05\mu$ s
Trst	Reset code, low level time	$\geq 80\mu$ s	

- Connection method



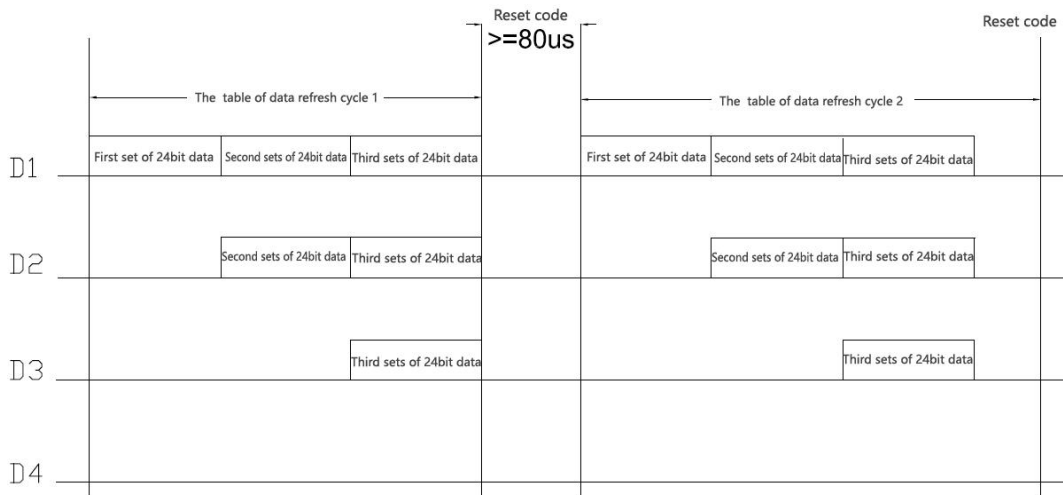
- 24bit data structure

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0
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Note: high order first mover sends data in RGB order

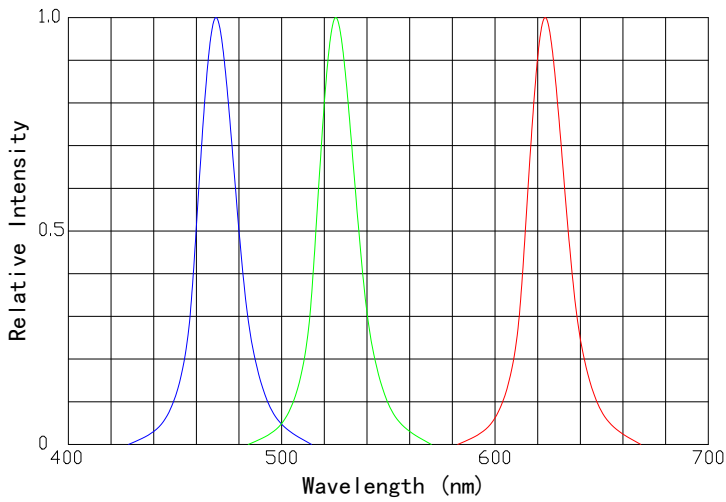
- Data transmission method

Note: D1 is the zeroing code data sent by the controller, and D2, D3 and D4 are the zeroing code data forwarded by the cascade chip.

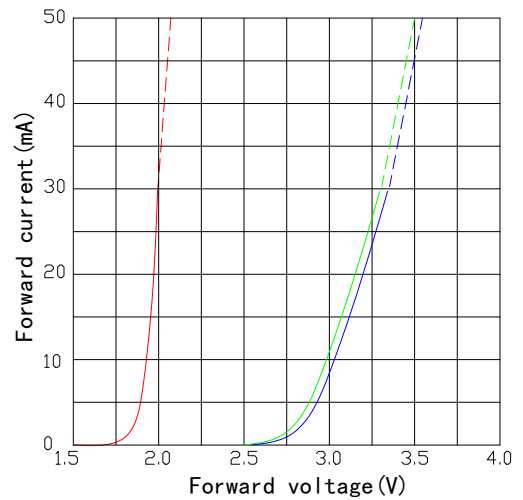


Typical Electrical-Optical Characteristics Curves

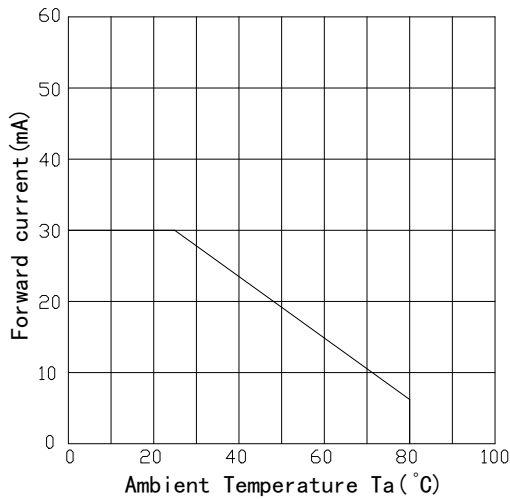
Relative Intensity vs. Wavelength



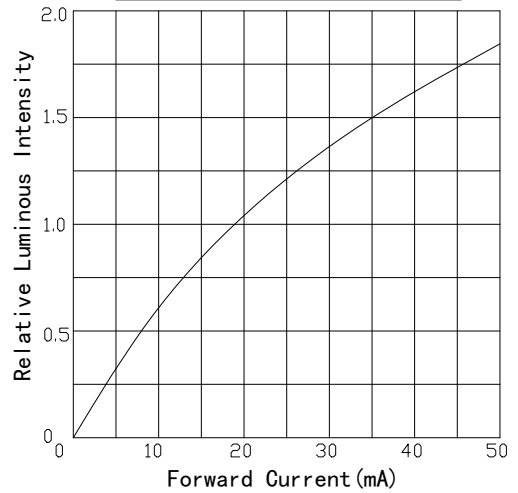
Forward current vs. Forward voltage



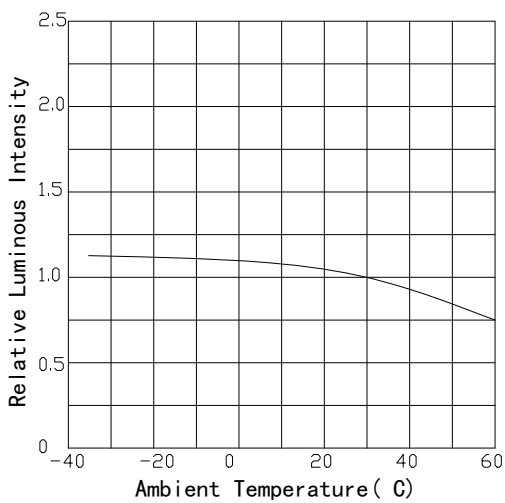
Forward current Derating Curve



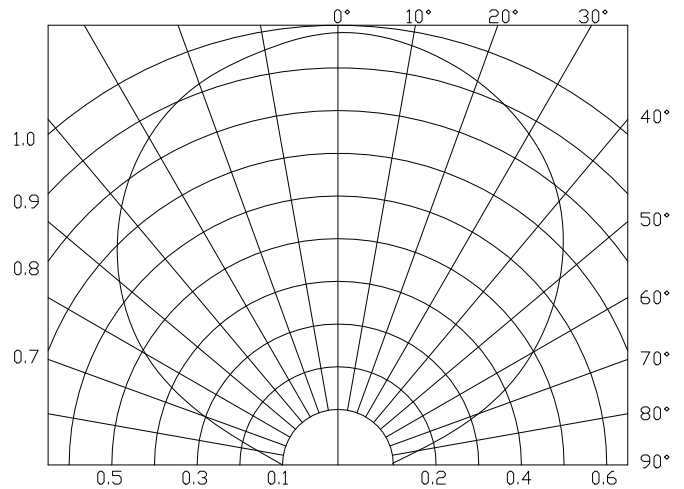
Relative Luminous Intensity vs. Forward Current



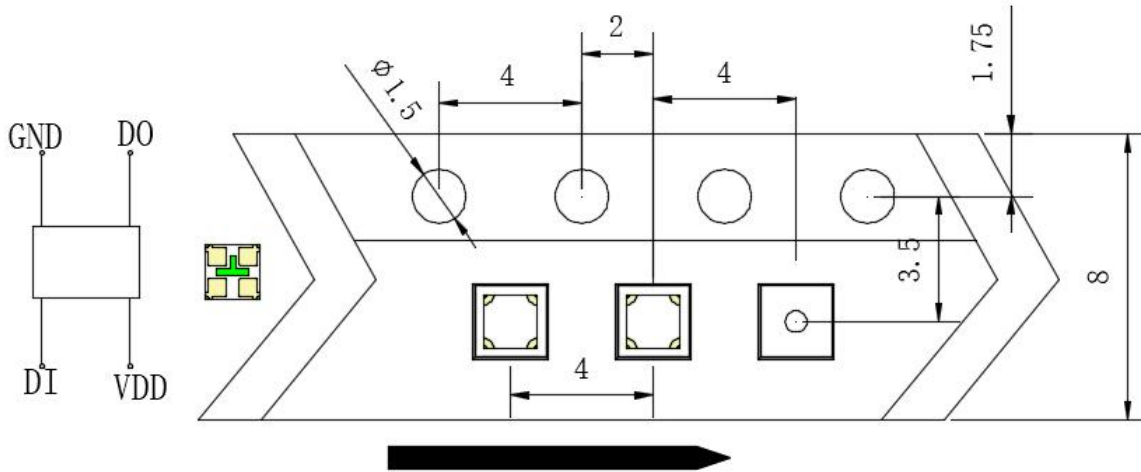
Luminous Intensity vs. Ambient Temperature



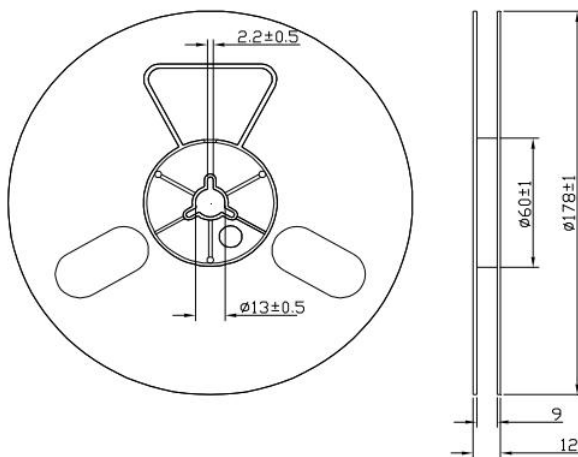
Radiation Diagram



Tape specifications (Units:mm)



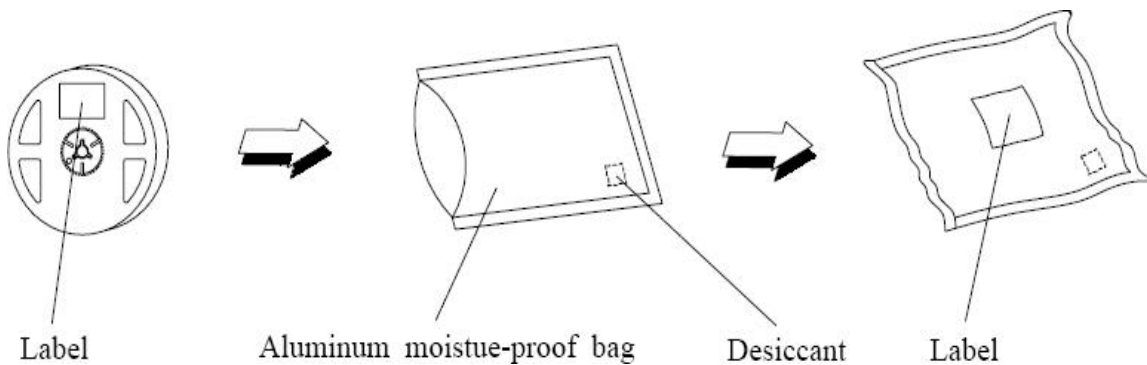
Reel Dimensions



Notes:

1. Empty component pockets sealed with top cover tape.
2. 6.6 inch reel-4000 pieces per reel.

Moisture Resistant Packaging



Reliability Test Items and Conditions

Test Item	Reference	Test Conditions	Time	Quantity	Criterion
Thermal Shock	JIS-C7021 A-4	100°C±5°C 15min ↓ ↑ -40°C±5°C 15min	200cycles	22	0/22
High Temperature Storage	JEITA ED- 4701 200 201	Ta=100°C	1000h	22	0/22
Low Temperature Storage	JEITA ED- 4701 200 202	Ta=-40°C	1000h	22	0/22
High Temperature High Humidity Storage	JIS-C7021 B-11	Ta=85°C, RH=85%	1000h	22	0/22
Resistance to Soldering Heat	GB/T 4937	Tsol*=(260±5)°C 10secs.	2times	22	0/22
Life Test	JESD22-A108	Ta=25°C±5°C IF=5mA	1000h	22	0/22
High Temperature Life Test	JESD22-A108	Ts=55°C±5°C	1000h	22	0/22

*Note:Tsol-Temperature of tin liquid

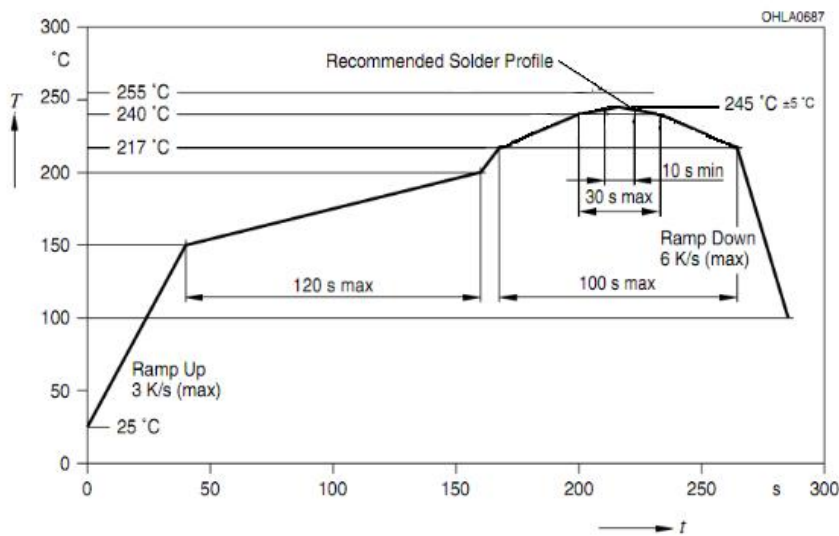
Criteria for Judging the Damage

Item	Symbol	Test Condition	Failure Criteria	
			MIN	MAX
Forward Voltage	VF (V)	IF=20mA	---	U.S.L*1.1
Reverse Current	IR (uA)	VR=5V	---	5uA
Luminous Intensity	IV (mcd)	IF=20mA	L.S.L*0.7	---

*Note:1.USL:Upper Specification Level

2.LSL:Lower Specification Level

Reflow soldering profile for LEAD-FREE SMD process



Notes:

1. Don't cause stress to the LEDs while it is exposed to high temperature.
2. The maximum number of reflow soldering passes is 2 times
3. Reflow soldering is recommended. Other soldering methods are not recommended as they might cause damage to the product

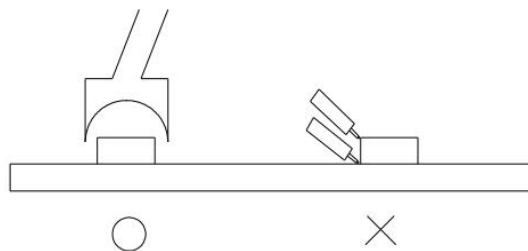
Soldering Iron

When hand soldering, keep the temperature of iron below less 300°C less than 3 seconds

The hand solder should be done only one times

Repairing

Repair should not be done after the LEDS have been soldered. When repairing is unavoidable, a double-head soldering iron should be used (as below figure). It should be confirmed in advance whether the characteristics of LEDS will or will not be damaged by repairing.



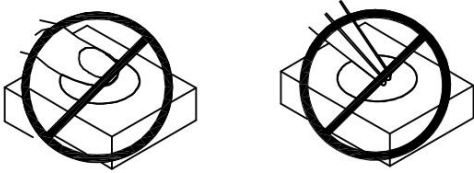
HANDLING PRECAUTIONS

Compare to epoxy encapsulant that is hard and brittle, silicone is softer and flexible. Although its characteristic significantly reduces thermal stress, it is more susceptible to damage by external mechanical force. As a result, special handling precautions need to be observed during assembly using silicone encapsulated LED products. Failure to comply might lead to damage and premature failure of the LED.

1. Handle the component along the side surfaces by using forceps or appropriate tools.



2. Do not directly touch or handle the silicone lens surface. It may damage the internal circuitry.



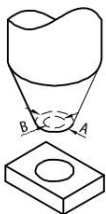
3. Do not stack together assembled PCBs containing exposed LEDs. Impact may scratch the silicone lens or damage the internal circuitry.



4. 4-A The inner diameter of the SMD pickup nozzle should not exceed the size of the LED to prevent air leaks
4-B A pliable material is suggested for the nozzle tip to avoid scratching or damaging the LED surface during pickup

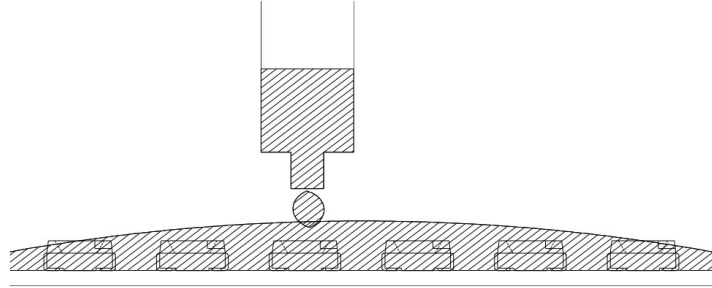
4-C The dimensions of the component must be accurately programmed in the pick-and-place machine to insure precise pickup and avoid damage during production

4-D As silicone encapsulation is permeable to gases, some corrosive substances such as H₂S might corrode silver plating of leadframe. Special care should be taken if an LED with Silicone encapsulation is to be used near such substances.



5. LED operating environment and sulfur element composition cannot be over 100PPM in the LED mating usage material.

6. When we need to use external glue for LED application products, please make sure that the external glue matches the LED packaging glue. Additionally, as most of LED packaging glue is silica gel, and it has strong Oxygen permeability as well as strong moisture permeability; in order to prevent external of Bromine element is required to be less than 900PPM, the single content of Chlorine element is required to be less than 900PPM, the total content of Bromine element and Chlorine element in the external glue of the application products is required to be less than 1500PPM



7. Avoid continued exposure to the condensing moisture environment and keep the product away from rapid transitions in ambient temperature.

Storage

1. Do not open moisture proof bag before the products are ready to use.
2. The storage conditions of sealed bags are: TA 5°C - 30°C, RH < 60%.
3. The storage time is calculated according to the date of the certificate on the packaging bag, and the effective time is 30 days. If the time is more than 30 days, it must be baked before use, and the baking condition is 65°C / 24h.
4. Before opening the package, please check the vacuum bag for find air leak in time. If so, please use it after baking.
5. After opening, please use the product under the following conditions: temperature < 30 °C / Rh < 60%. in addition, Please following baking treatment as below before use:
 - A: Baking condition: Place the product in an oven at 65 °C (± 5 °C) for 24 hours.
 - B: Take out the product from the packaging bag and bake it. Do not open the oven during baking.
6. In order to avoid the customer's loss in the production process that caused by moisture absorption of materials, please Strictly observe with the above requirements.