HD107S LED

SPECIFICIFATION

Description: 5.5x5.0x1.6mm Intelligent control SMD LED

1. General description

HD107S is a two-wire transmission channel three (RGB) driving intelligent control circuit and the light emitting circuit in one of the LED light source control. Products containing a signal decoding module, data buffer, a built-in constant current circuit and RC oscillator; CMOS, low voltage, low power consumption; 256 level grayscale PWM adjustment and 32 brightness adjustment; use the double output, Data and synchronization of the CLK signal, connected in series each wafer output action synchronization.

2. Main FeatuApplicationsreApplications

Full-color module, Flexible led Strip ,Rigid led strip

LED decorative lighting, LED Panel a variety of electronic products, electrical equipment

3. Main Feature

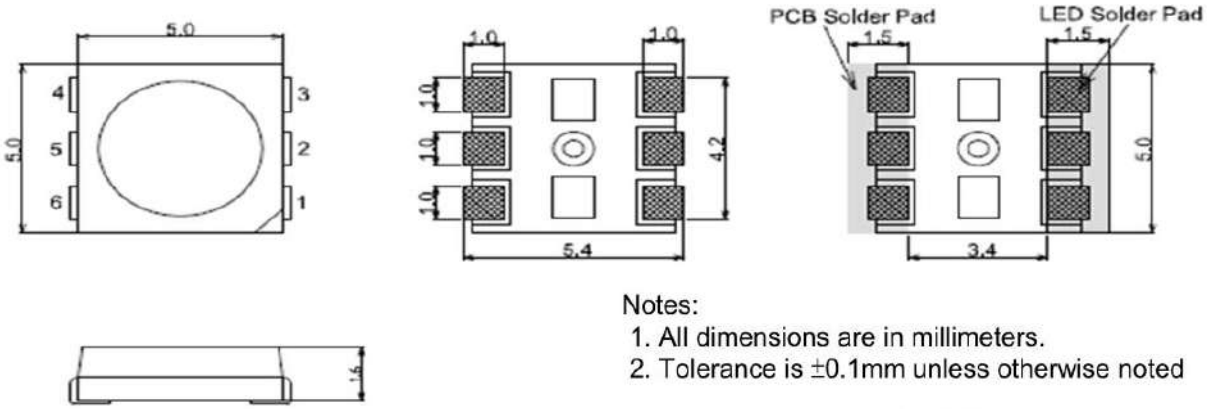
- Top SMD internal integrated high quality external control line serial cascade constant current IC，5V application;
- Control circuit and the RGB chip integrated in SMD 5050 components, to form a complete external control pixel, make the color mix uniformity and consistency;
- The two-wire synchronous control；
- The three RGB output control, 8Bit (256) color; 5Bit (32) to adjust the brightness;
- The three constant current drive, self detection function specific signal
- The maximum frequency of 30MHZ serial data input.PWM:27KHZ
- The double data transmission, built-in support uninterrupted oscillation PWM output, can maintain a static image.

4. Product Naming

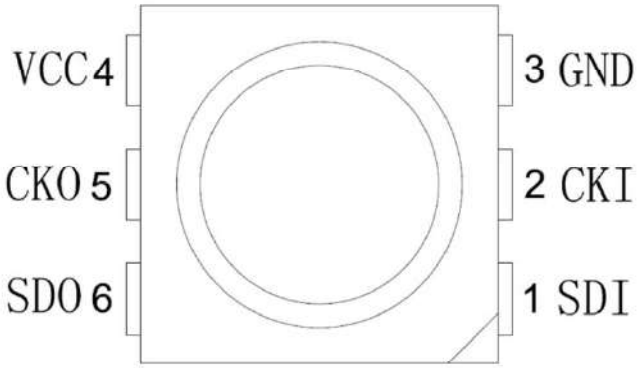
HD107S mean white surface ,12-14ma/channel ,without capacitor intergrated in 5050 (standard version)

HD107S-B mean black surface,12-14ma/channel, without capacitor intergrated in 5050

5. Mechanical Dimensions:



6. Pin Configuration:



Item	Symbol	Pin Name	Function description
1	SDI	Data Input	control signal Input data
2	CKI	CLK Input	control signal Input Clock data
3	GND	Ground	The signal and power supply and grounding
4	VCC	Power	power supply pin
5	CKO	CLK Output	control signal output Clock data
6	SDO	Data Input	control signal output data

7. RGB chip characteristic parameters

Color	Wavelength(nm)	Brightness(mcd)	Lumen(lm)
Red	620-630	400-700	1.0-2.0
Green	515-530	1000-1500	4.0-5.0
Blue	460-475	300-500	1.0-1.5

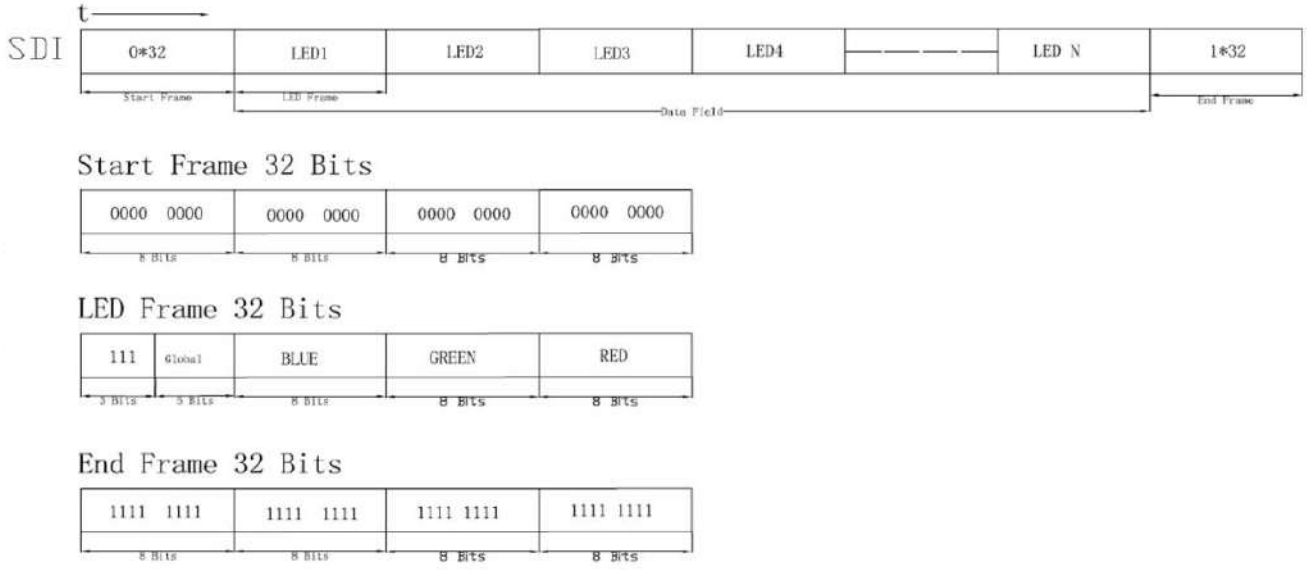
8. Absolute Maximum Ratings（Ta=25℃,VSS=0V） :

Parameter	Symbol	Range	Unit
Power supply voltage	VDD	-0.5～+5.5	V
Logic input voltage	V_{IN}	-0.3～VDD+0.3	V
Working temperature	Topt	-20~+80	℃
Storage temperature	Tstg	-50~+125	℃
ESD pressure	V_{ESD}	4K	V

9. The electrical parameters (unless otherwise specified, TA=-20 ~ +70 ℃, VDD=4.5 ~ 5.5V,VSS=0V):

Parameter	Symbol	Min	Typical	Max	Unit	Test conditions
The chip supply Voltage	VDD	---	5.0	5.3	V	---
The biggest LED output current	I omax	---	---	20	mA	---
The clock high level width	TCLKH	---	---	>30	ns	---
The clock low level width	TCLKL	---	---	>30	ns	---
Data set up time	TSETUP	---	---	>10	ns	---
The frequency of PWM	FPWM	---	26	---	KHZ	---
Static power consumption	IDD	---	1	---	mA	---

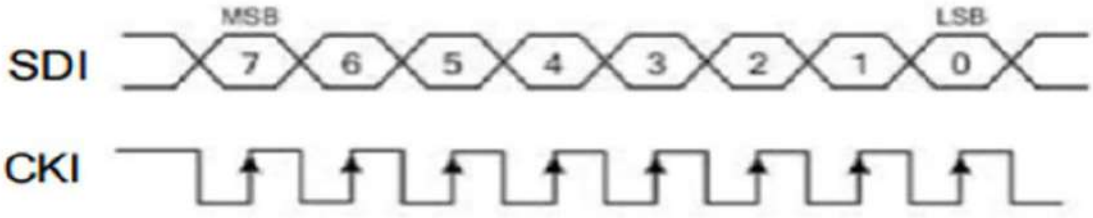
(1) Series data structure



(2) 256 level gray level:

Data	Duty Circle
MSB.....LSB	
0000 0000	**0/256**
0000 0001	**1/256**
0000 0010	**2/256**
-	-
-	-
-	-
-	-
1111 1101	**253/256**
1111 1110	**254/256**
1111 1111	**255/256**

(3) PWM input / output signal relationship:



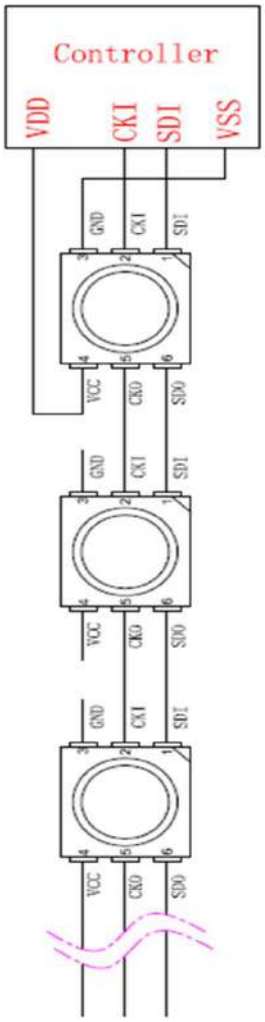
(4) 5-Bit (level 32) brightness adjustment (simultaneous control of OUTR\OUTG\OUTB three port current):

Data	Duty Circle
MSB.....LSB	
00000	0/31
00001	1/31
00010	2/31
- - - -	- - - -
11101	29/31
11110	30/31
11111	31/31

(5) Refresh Rate:

Frame rate (=1/ (64+ (32* points)) *CKI (cycle) unit: frames per second)
Such as: 1024 points, CKI frequency is 5MHZ, is =30 frames per second frame rate.

11. The typical application circuit:



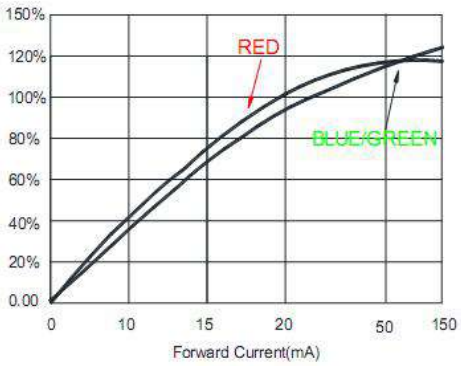
In the practical application circuit, the signal input and output pins of the IC signal input and output pins should be connected
to the signal input and output terminals. In addition, in order to make the IC chip is more stable, even the capacitance between
beads is essential back;

Application: used for soft lamp strip or hard light, lamp beads transmission distance is short, suggested in signal in time the
clock line input and output end of each connected in series protection resistors, R1=R0 of about 500 ohms.

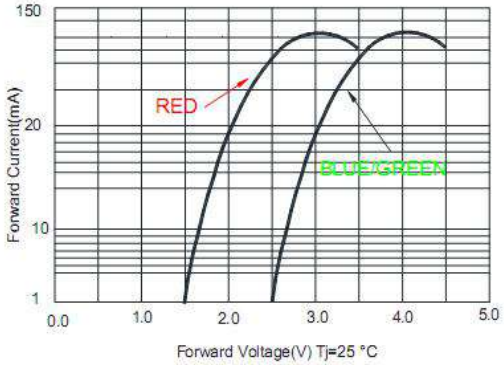
Application: for module or general special-shaped products, lamp beads transmission distance is long, because of different
wire and transmission distance, in the signal in time clock at both ends of the line on grounding protection resistance will be
slightly different; to the actual use of fixed;

12. Standard LED Performance Graph:

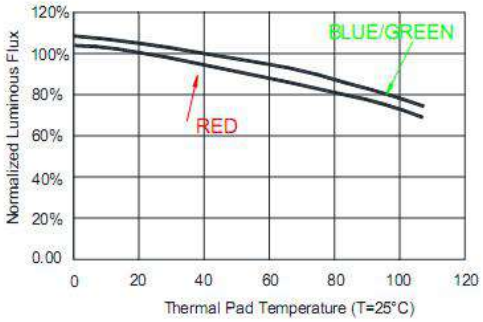
Typical Relative Luminous Flux vs. Forward Current



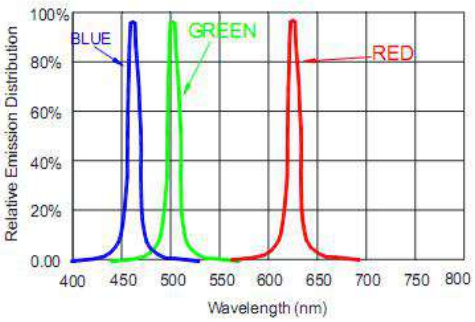
Forward Voltage vs. Forward Current



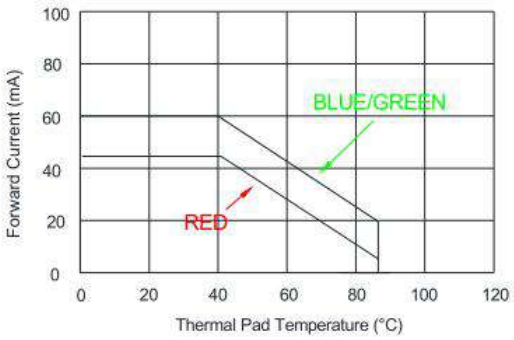
Thermal Pad Temperature vs. Relative Light Output



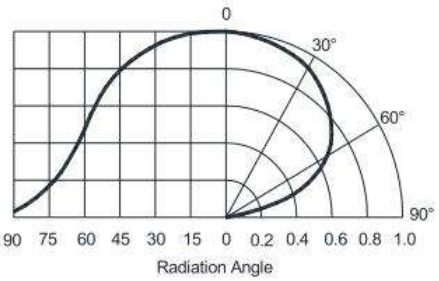
Wavelength Characteristics



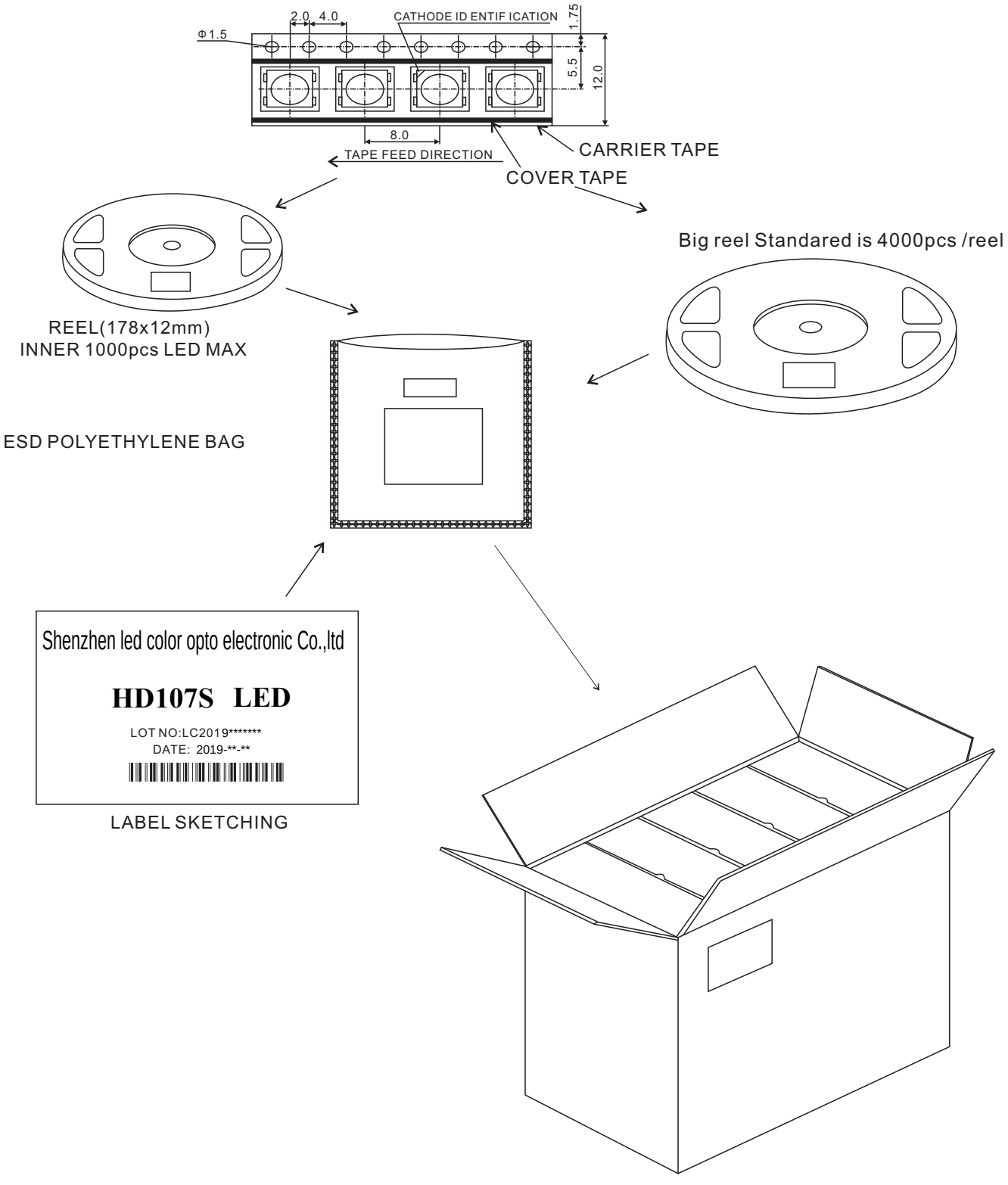
Thermal Pad Temperature vs. Forward Current



Typical Radiation Pattern 120°



13. Packaging Standard:



The reel pack is applied in SMD LED. The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags. cardboard boxes will be used to protect the LEDs from mechanical shocks during transportation. The boxes are not water resistant and therefore must be kept away from water and moisture.

14. Reliability test

No.	Test Project	Test Condition	Guideline	Judgment
1	Thermal shock	100±5° C ~ -40° C± 5° C 30min~30min 300cycles	MIL-STD-202G	0/22
2	High temperature storage	Ta= +100° C 1000hrs	JEITA ED-4701 200 201	0/22
3	Low temperature storage	Ta= -40° C 1000hrs	JEITA ED-4701 200 202	0/22
4	High temperature and humidity Storage	Ta=60° C RH=90% 1000hrs	JEITA ED-4701 100 103	0/22
5	Temperature cycle	-55° C~25° C~100° C~25° C 30min~5min~30min~5min 100 cycles	JEITA ED-4701 100 105	0/22
6	Resistance to soldering heat	Tsld = 260° C, 10sec. 3 times	JEITA ED-4701 300 301	0/22
7	Normal temperature lifespan test	25° C, IF: Typical current , 1000hrs	JESD22-A 108D	0/22

Failure criterion

Term	Symbol	Test Condition	Judgment Standard	
			Min	Max
light intensity	IV	DC=5V, typical current of specification	Initial data X0.7	---
Resistance to soldering heat	---	DC=5V, typical current of specification	No dead lights or obvious damage	

15.1 Dust & Cleaning

The LED use silicone glue to package the 5050 Surface, silicone surface can protect optical properties and improved anti-aging properties. However, silicone is a softer material and prone to attract dust. While a minimal amount of dust and debris on the LED will not cause significant reduction in illumination.We still need to avoid dust falling on the LED surface. After open the bags it must be used immediately.

When you use trichloroethylene or acetone to clean, sometimes the LED surface will dissolve.

Avoid using organic solvent, it is recommended that isopropyl be used as a solvent for cleaning the LEDs.When using other solvents, it should be confirmed beforehand whether the solvents will dissolve thepackage and the resin of not.

Do not clean the LEDs by the ultrasonic. When it is absolutely necessary, the influence as ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power. Baking time and assembled condition.

Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

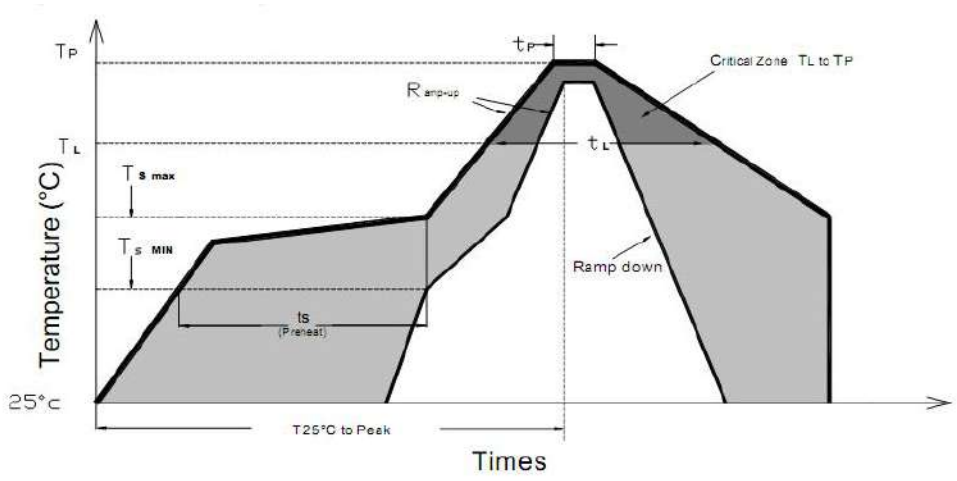
15.2 Dehumidification

LED COLOR smart led are moisture sensitive components, In IPC/JEDEC J-STD-020 MSL Level is 6. **No Matter the Package bag is open or not ,The LED must do dehumidification in the oven for 24 hours at 70 degree before use and used within 4 hours, otherwise it need to be dehumidified again**

15.3 Reflow Soldering Characteristics

In our Test, LED Color comfirm those smart led are compatible with JEDEC J-STD-020C,Customers are required to follow the soldering temperature profile recommended by the solder paste manufacturer used.

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



Profile Feature	Lead-Based Solder	Lead-Free Solder
Average Ramp-Up Rate (Ts max to Tp)	3 ℃/second max.	
Preheat: Temperature Min (Ts min)	100℃	150℃
Preheat: Temperature Min (Ts max)	150℃	200℃
Preheat: Time (ts min to ts max)	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature (T L)	183 ℃	217 ℃
Time Maintained Above: Time (t L)	60-150 seconds	60-150 seconds
Peak/Classification Temperature (T P)	215 ℃ ℃	238 ℃ ℃
Time Within 5℃ ℃ of Actual Peak Temperature (tp)	<10 seconds	<10 seconds
Ramp-Down Rate	6 ℃/second max	6 ℃/second max
Time 25 ℃ ℃ to Peak Temperature	<6 minutes max	<6 minutes max

Note: All temperatures refer to topside of the package, measured on the package body surface.

15.4 Anti-static and surge protection for IC devices

Static electricity and surges can damage the LED products of IC devices, so appropriate protective measures must be taken;

The signal input and output ports of IC devices must be connected in series with protective resistors to prevent product failure due to surge or electrostatic shock ports;

In order to protect the LED products of IC devices, whenever you encounter LEDs, wear anti-static straps, anti-static straps and anti-static gloves.

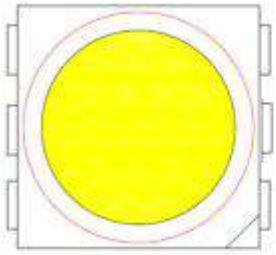
All devices and equipment must be grounded

It is recommended that each product be tested before shipment for relevant electrical tests to select defective products due to static electricity.

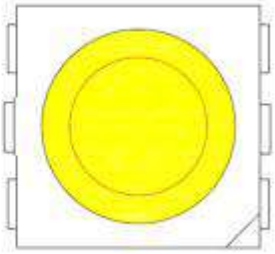
In the design of the circuit, consideration should be given to eliminating the surge to the LED

15.5 Other requirements

SMT nozzle requirements: (red circle refers to the inside diameter of the nozzle)



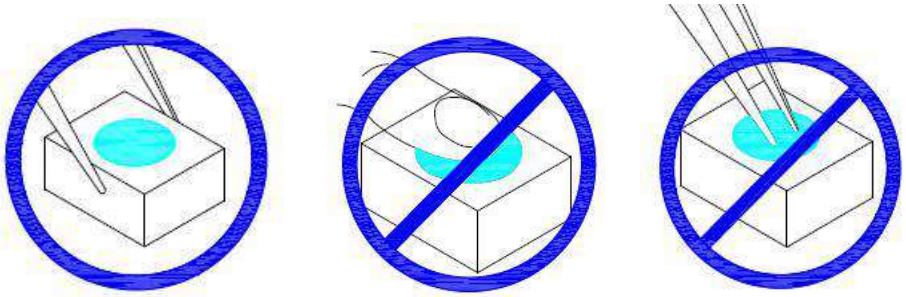
OK (the inside diameter of the nozzle is larger than the light-emitting area of the lamp)



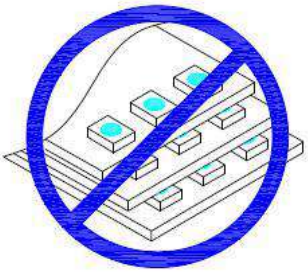
NG (the inside diameter of the nozzle is smaller than the lighting area of the lamp)

Pressing the colloid surface will affect the reliability of LED because the LED is advanced silicone-gel.And therefore precautions should be taken to avoid the strong pressure on the component. It's proper to make the LED be used in safe condition when using a suction nozzle. Silicon packing with soft and elastic, it greatly reduces thermal stresses and unable to bear external mechanical forces. Therefore, preventive measures should be taken in process of manually handling.

① Clip the LED from its side.Neither directly touch the gel surface with the hand or sharp instrument, it may damage its internal circuit.



② Not to be double stacked, it may damage its internal circuit.



③ Can not be stored in or applied in the acidic sites of PH<7.

Modify Records

Item NO.	Rev. No.	Modify Content Summary	Signature	Date
HD107S RGB	01	Initial Document	Andy Zhu	2019-07-10