

SK6812D5

SPECIFICATION

INTEGRATED LIGHT SOURCE INTELLIGENT CONTROL OF LAMPS LED

Document No.: SPC/ SK6812D5

Model No.: SK6812D5

Description: 5mm Straw hat LED lamps with white clear lens
integrated light source Intelligent control LED

Rev. No.: 01

Date: 2015-08-15

Formal Specification



INTEGRATED LIGHT SOURCE INTELLIGENT CONTROL OF LAMPS LED

Model: SK6812D5

1. Product Overview :

SK6812D5 is a smart LED control circuit and light emitting circuit in one controlled LED source, which has the shape of a 5mm Straw hat LED lamps. Each lighting element is a pixel, and the intensities of the pixels are contained within the intelligent digital interface input. The output is driven by patented PWM technology, which effectively guarantees high consistency of the color of the pixels. The control circuit consists of a signal shaping amplification circuit, a built-in constant current circuit, and a high precision RC oscillator.

The data protocol being used is unipolar NRZ communication mode. The 24-bit data is transmitted from the controller to DIN of the first element, and if it is accepted it is extracted pixel to pixel. After an internal data latch, the remaining data is passed through the internal amplification circuit and sent out on the DO port to the remaining pixels. The pixel is reset after the end of DIN. Using automatic shaping forwarding technology makes the number of cascaded pixels without signal transmission only limited by signal transmission speed.

The LED has a low driving voltage (which allows for environmental protection and energy saving), high brightness, scattering angle, good consistency, low power, and long life. The control circuit is integrated in the LED above.

2. Main Application Field:

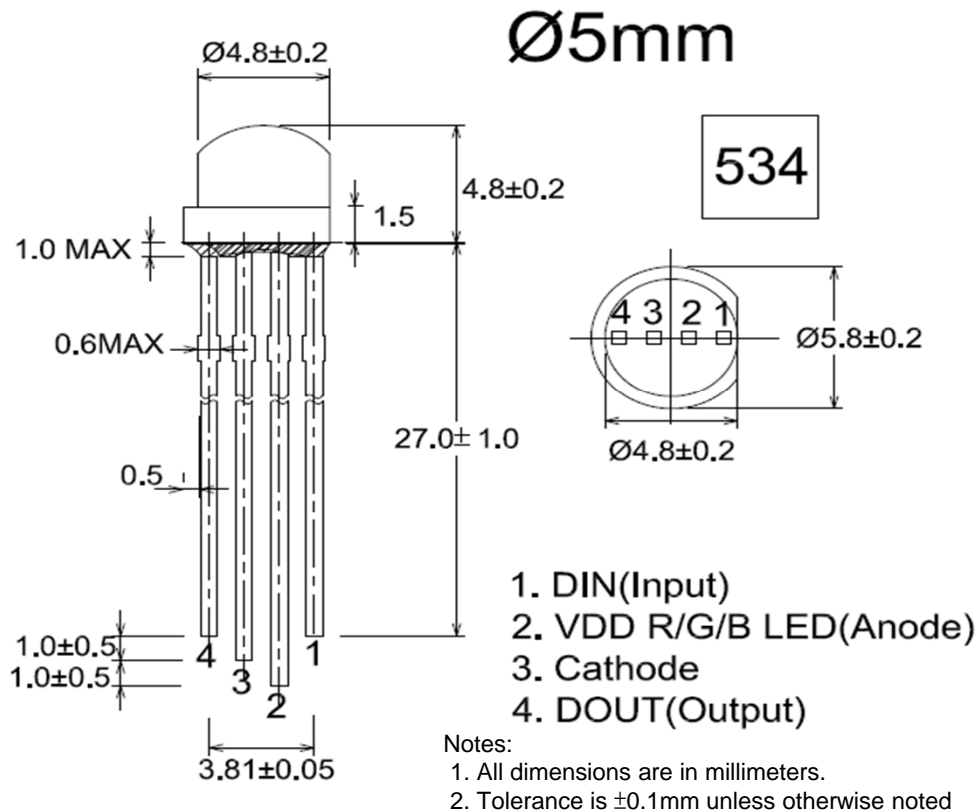
- Full color LED string light, LED full color module, LED guardrail tube, LED appearance / scene lighting, spot light for advertising
- LED point light, LED pixel screen, LED shaped screen, a variety of electronic products, electrical equipment etc..

3. Description:

- Lamps LED internal integrated high quality external control line serial cascade constant current IC;
- control circuit and the RGB chip in Lamps LED components, to form a complete control of pixel, color mixing uniformity and consistency;
- built-in data shaping circuit, a pixel signal is received after wave shaping and output waveform distortion will not guarantee a line;
- The built-in power on reset and reset circuit, the power does not work;
- gray level adjusting circuit (256 level gray scale adjustable);
- red drive special treatment, color balance;
- line data transmission;
- plastic forward strengthening technology, the transmission distance between two points over 10M;
- Using a typical data transmission frequency of 800 Kbps, when the refresh rate of 30 frames per sec

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4. Mechanical Dimensions:



NO.	Symbol	Function description
1	DIN	Control data signal input
2	VDD	Power supply LED
3	VSS	Ground
4	DOUT	Control data signal output

5. General Information

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SK6812: The default is RGB chips with IC integration
D5: 5mm Straw hat LED lamps

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6. Absolute Maximum Ratings (Ta=25°C, VSS=0V) :

Parameter	Symbol	Range	Unit
Power supply voltage	VDD	+3.5~+5.5	V
Logic input voltage	V _{IN}	-0.5~VDD+0.5	V
Working temperature	T _{opt}	-40~+85	°C
Storage temperature	T _{stg}	-50~+150	°C
ESD pressure	V _{ESD}	4K	V

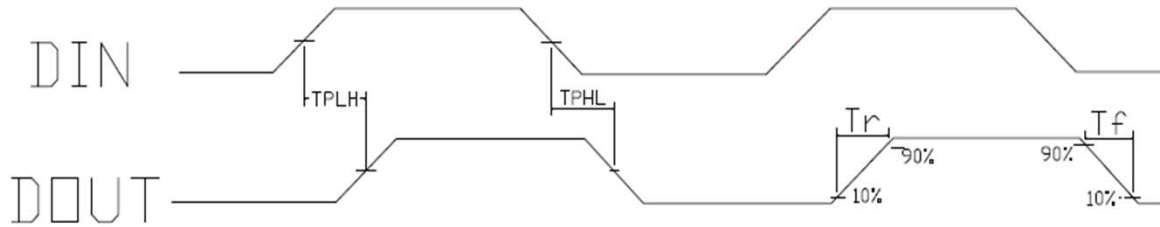
7. The electrical parameters (unless otherwise specified, TA=-20 ~ +70 °C, VDD=4.5 ~ 5.5V, VSS=0V):

Parameter	Symbol	Min	Typical	Max	Unit	Test conditions
The chip supply voltage	VDD	---	5.2	---	V	---
R/G/B port pressure	V _{DS,MAX}	---	---	26	V	---
DOUT drive capability	IDOH	---	49	---	mA	DOUT connect ground, the maximum drive current
	IDOL	---	-50	---	mA	DOUT connect +, the largest current
The signal input flip threshold	VIH	3.4	---	---	V	VDD=5.0V
	VIL	---	---	1.6	V	
The frequency of PWM	FPWM	---	1.2	---	KHZ	---
Static power consumption	IDD	---	1	---	mA	---

8. The dynamic parameters (Ta=25 °C):

Parameter	Symbol	Min	Typical	Max	Unit	Test conditions
The speed of data transmission	f _{DIN}	---	800	---	KHZ	The duty ratio of 67% (data 1)
DOUT transmission delay	T _{PLH}	---	---	500	ns	DIN→DOUT
	T _{PHL}	---	---	500	ns	
IOUT Rise/Drop Time	T _r	---	100	---	ns	V _{DS} =1.5 I _O UT=13mA
	T _f	---	100	---	ns	

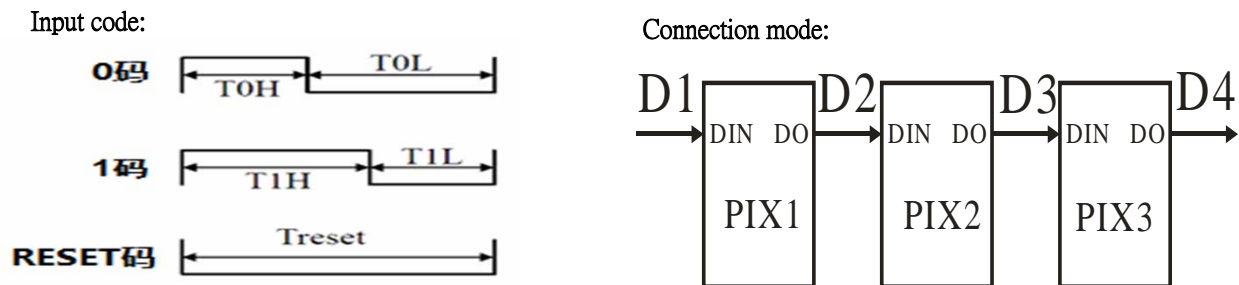
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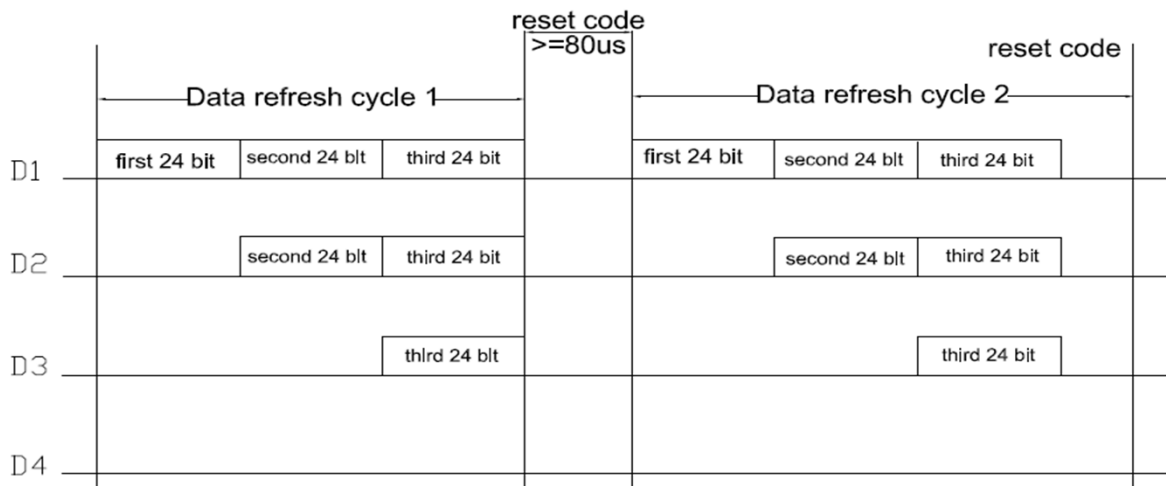
9. The data transmission time ($T_H+T_L=1.25\mu s\pm 600ns$):

T_{OH}	0 code, high level time	$0.3\mu s$	$\pm 0.15\mu s$
T_{OL}	0 code, low level time	$0.9\mu s$	$\pm 0.15\mu s$
T_{1H}	1 code, high level time	$0.6\mu s$	$\pm 0.15\mu s$
T_{1L}	1 code, low level time	$0.6\mu s$	$\pm 0.15\mu s$
T_{rst}	Reset code, low level time	$80\mu s$	

10. Timing waveform:



11. The method of data transmission:



Note: the D1 sends data for MCU, D2, D3, D4 for data forwarding automatic shaping cascade circuit.

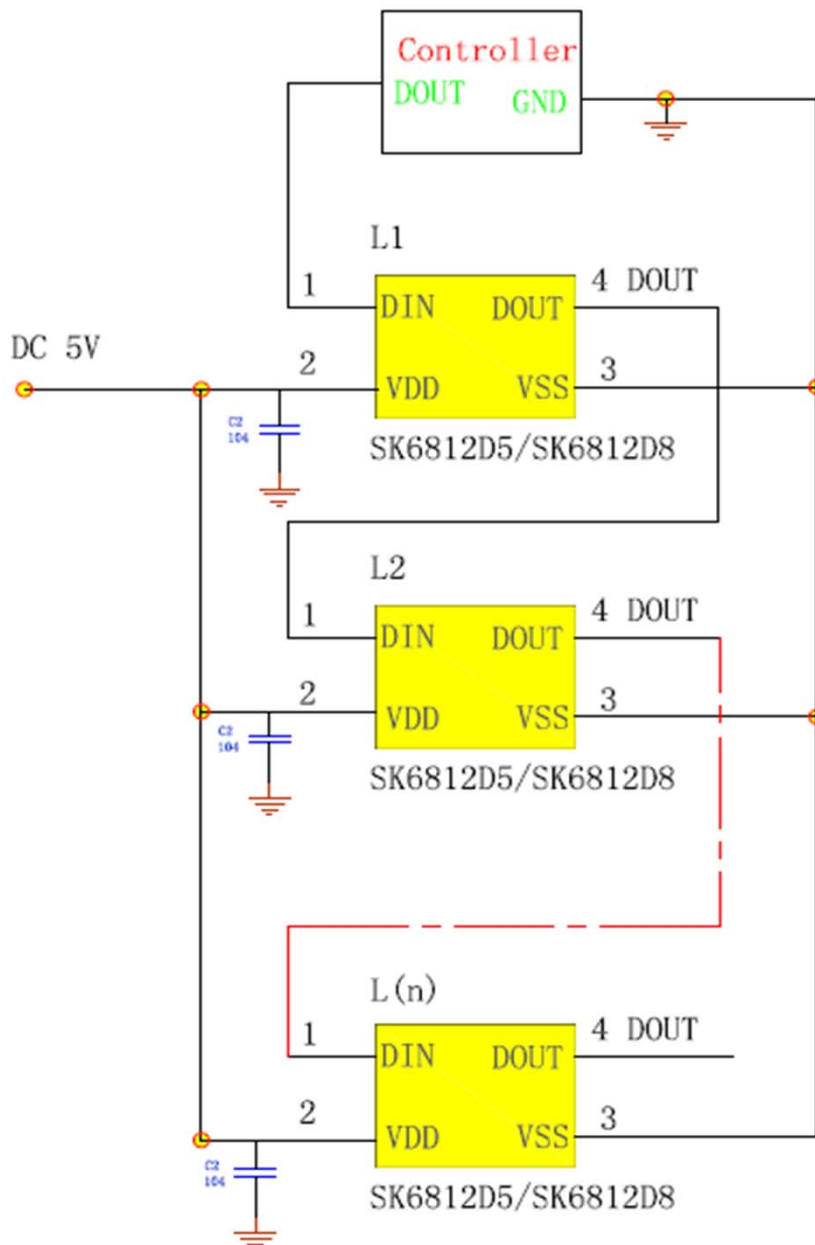
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12. The data structure of 24bit:

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4
R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

Note: high starting, in order to send data (G7 - G6 - B0)

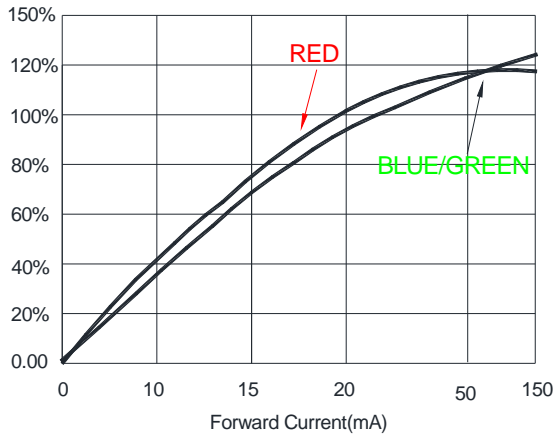
13. The typical application circuit:



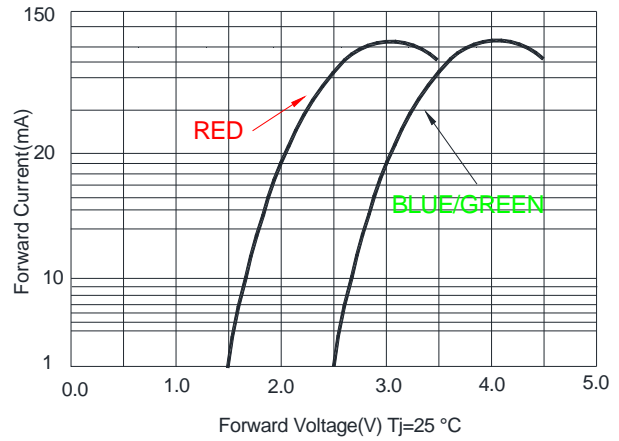
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15. Standard LED Performance Graph:

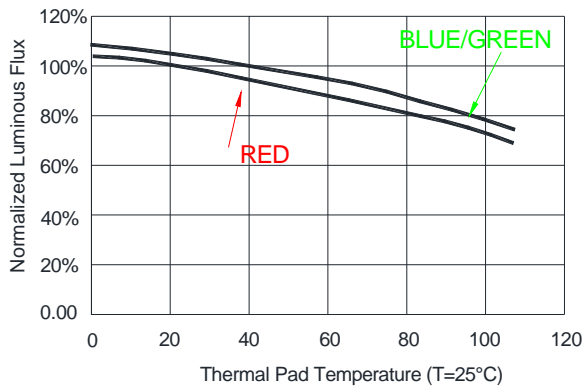
Typical Relative Luminous Flux vs. Forward Current



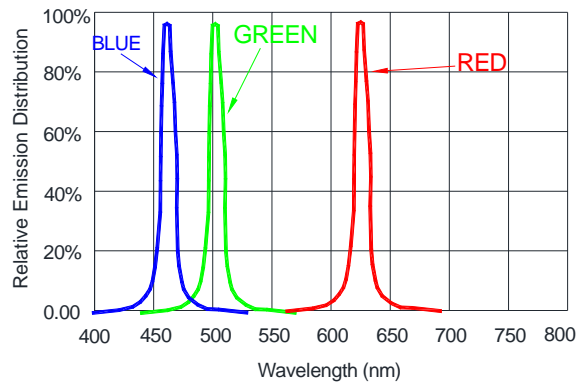
Forward Voltage vs. Forward Current



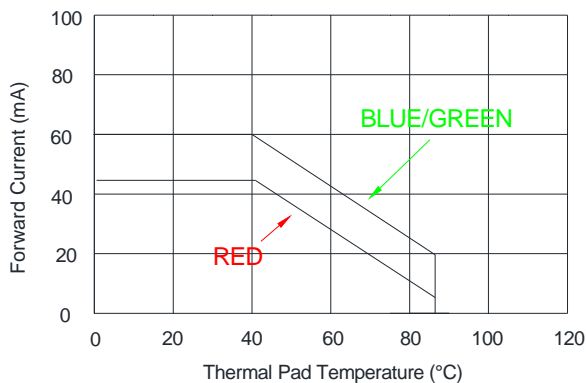
Thermal Pad Temperature vs. Relative Light Output



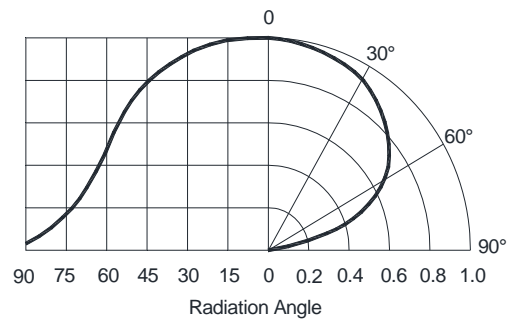
Wavelength Characteristics



Thermal Pad Temperature vs. Forward Current

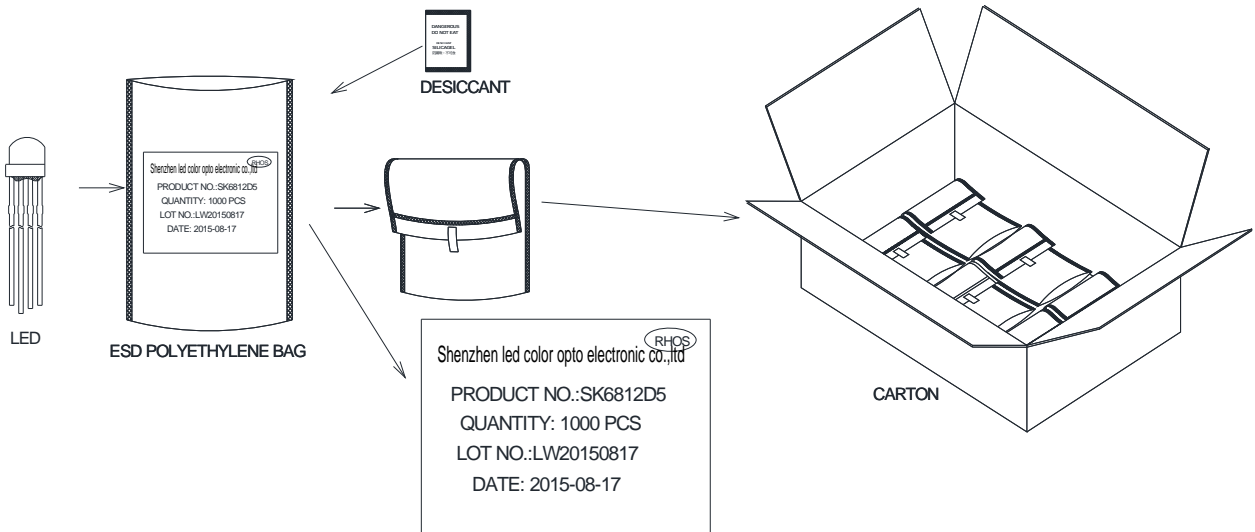


Typical Radiation Pattern 120°



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16. Packaging Standard:



The reel pack is applied in LAMPS 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.

Soldering & Handling

1. Features

The purpose of document is to provide customers and users with a clear understanding about the ways to use our LED lamps appropriately.

2. Description

Generally, The LEDs can be used the same way as other general-purpose semiconductors. When using LEDCOLOR's Lamps, the following precautions must be taken to protect the LED.

3. Cautions

3.1 Cleaning

- Don't use unspecified chemical liquids to clean the LED; the chemical could harm the LED. When washing is necessary, please wipe the LED with alcohol at normal room temperature and dry at normal room temperature for 15 minutes before use.
- The influence of ultrasonic on the LEDs depends on factors such as ultrasonic power and the way the LEDs are mounted. Ultrasonic cleaning should be pre-qualified to ensure this will not cause damage to the LEDs.

3.2. Forming

- During leads forming, the leads should be bent at a least 3 mm from the base of the package.
- Don't from the leads during or after soldering. If forming is required, this must be done before soldering.
- Avoid stressing the LED package during leads forming.
- When mounting the LEDs onto a PCB, the PCB holes must be aligned exactly with the lead position of the LEDs,

3.3. Storage

- 25°C and < 40%RH in proper package

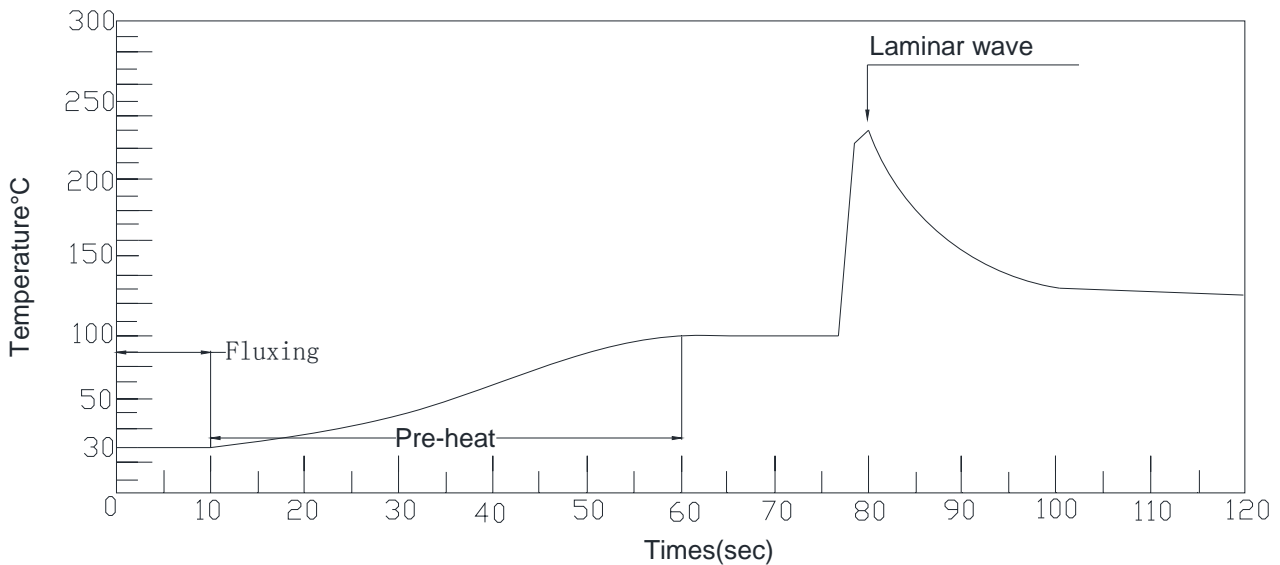
3.4. Soldering

- A minimal cathode pad area of 0.18 x 0.18 inches squared is recommended for Lamps LEDs .
- Soldering LEDs at not less than 3 mm from the base of the package and below the tie-bar is recommended.
- The LED soldering specification is shown below (suitable for both leaded & lead-free solder).

Manual Soldering		Solder Dipping	
Soldering iron	35 w max	Preheat	110°C max
Temperature	300°C max	Preheat Time	60 seconds max
		Solder-bath temperature	260°C max
Soldering time	3 seconds max	Dipping time	3seconds max
Position	Not less than 3 mm from the base of the package.	Position	Not less than 3 mm from the base of the package.

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- Manual soldering onto the PBC is not recommended because soldering time is uncontrollable.
- The recommended wave soldering is as below:



Solder	
Peak preheat temperature	100~110°C
Total preheat time	50~60 seconds
Peak profile temperature	260°C(MAX)
Dwell time above 200°C	Do not exceed 3 seconds
(For individual parts, refer to the product data sheet)	

*Different lead-free solder requires different solder conditions. Please contact us for details.

- Do not apply any stress to the LED package , particularly when heated.
- The LEDs must not be re-used once they have been extracted from PCB.
- After LED soldering, the package should be protected against mechanical shock or vibration until the LEDs have reached 40°C or below.
- Precautions must be taken as mechanical stress on the LEDs may be caused by PCB warpage or from the clinching and cutting of the led leads.
- When clamping of LEDs during soldering is required, it is important to ensure no mechanical stress is exerted on the LEDs.
- Lead cutting must be performed at normal room temperature. Lead cutting at an elevated temperature may lead to LED failures.

3.5 Electrostatic Discharge and Electrical Overstress:

- **Electrostatic discharge (ESD) electrical overstress (EOS) may damage LEDs.**
- **Precautions such as ESD wrist straps, ESD shoe straps or antistatic gloves must be worn whenever handling the LEDs.**
- **All devices, equipment and machinery must be properly grounded.**
- **It is recommended to perform electrical tests to screen out ESD failures at final inspection.**
- **It is important to eliminate the possibility of electrical overstress during circuitry design.**

3.6 Heat Management:

- **Heat management of LEDs must be taken into consideration during the design stage of an LED application. The current should be de-rated appropriately by referring to the de-rating curve included in each product specification.**
- **The temperature surrounding the LED shouldn't be so high that it will make the LED fail when used in an application, and the temperature surrounding the LED in the application should conform to the de-rating curve in our LED specification documents.**

3.7 Other Notes

- **Care must be taken so that reverse voltage will not exceed the absolute maximum rating.**
- **The leads are plated with solder. Leads will become tarnished if in contact hydrogen sulfide and other gaseous chemicals. Precautions must be taken to maintain a clean storage atmosphere.**
- **The power of high-brightness LEDs is very strong and may injure human eyes. Precautions must be taken such as avoiding looking directly into lit LEDs.**
- **3-mm conventional LEDs are not auto-insertable.**

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Change History

FCN No.	Date	Rev. No.	Changes/Reason of changes
	2015-08-18	01	Initial Document

Items	Signatures	Date	Note
Prepared by	Alice Zhu	2015-08-18	
Checked by			
Approved by			
FCN#			