

**DATA SHEET**

MODEL NAME	SMD LED
PART NUMBER	<b>A101EFCKBMP9</b>
PACKAGE	PLCC type
COLOR	High Color Gamut White

**Application**  
 Back light unit  
 General lighting

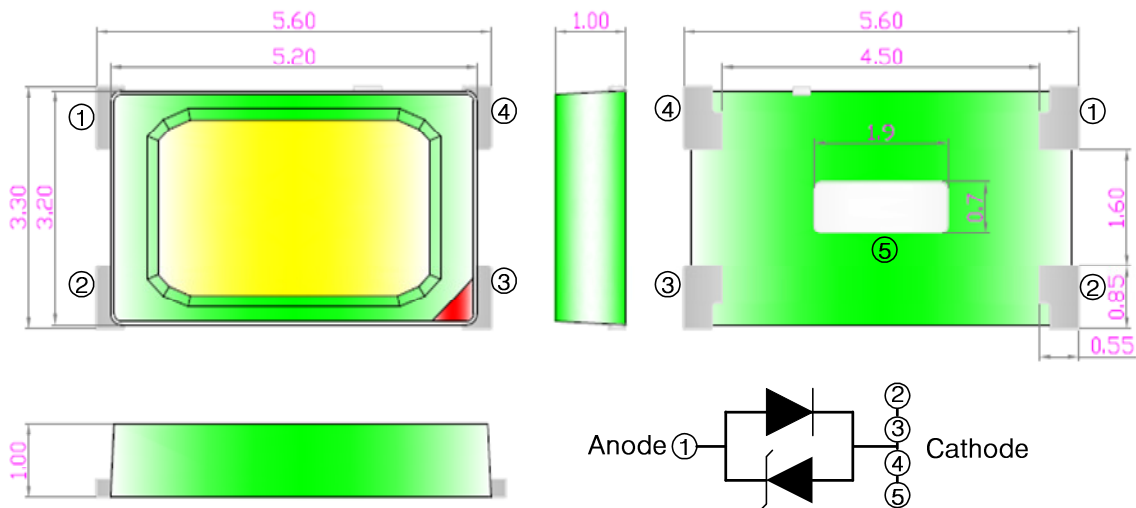
**1. Features**

- (1) Each Lead can be individually controlled  
 High power white color surface mount TOPLED
- (2) High flux output Flat type LED.
- (3) Compact package outline (LxW) of 5.6 x 3.2mm. Ultra low height profile – 1.0 mm.
- (4) Wide view angle : 120deg
- (5) Compatible to both IR reflow soldering and TTW soldering.
- (6) 1500unit / reel .taping
- (7) Applications : Back light unit, General light

**2. Dimension**

Unit : mm

General Tolerance : ±0.10



**(1) Material**

Item	Material
LED Chip	InGaN base
ESD Protector	Chip ESD screen(Min -2000V)
Wire	Au Gold wire.
Lead-frame.	Cu Alloy With Ag Plating.
Encapsulation	Silicone
Package Polymer	PPA

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### 3. SPECIFICATIONS

#### (1) Absolute Maximum Ratings.(Ta =25°C)

Parameters	Symbol	Maximum Value	Unit	Test condition
		White		
DC forward current	IF	175	mA	
Pulse current; (tp ≤ 10 ms, Duty cycle = 1/10)	IFP	300	mA	
Power dissipation ( at room temperature )	PDL	510	mW	
Reverse voltage.	VR	5	V	
	IR(MAX)	2	uA	
Operating temperature.	TOPR	-40 ~ +100	°C	
Storage temperature.	TSTG	-40 ~ +100	°C	
Soldering Temperature	TSOL	Reflow Soldering :260°C /10s Hand Soldering : 350°C /3s	°C	
Chip junction temperature.	Tj	125	°C	
Thermal Resistance	Rth	30±5	°C/W	
Peak Wavelength	Wp	448±3	nm	

\* Tj = 70 °C : 40,000hr Lifetime guarantee(@ If : 120mA)

\* IR Guarantee at Chip level

\* Wp(Peak Wavelength) at Module base(BLU)

#### (2) Optical Characteristics at Ta=25°C.

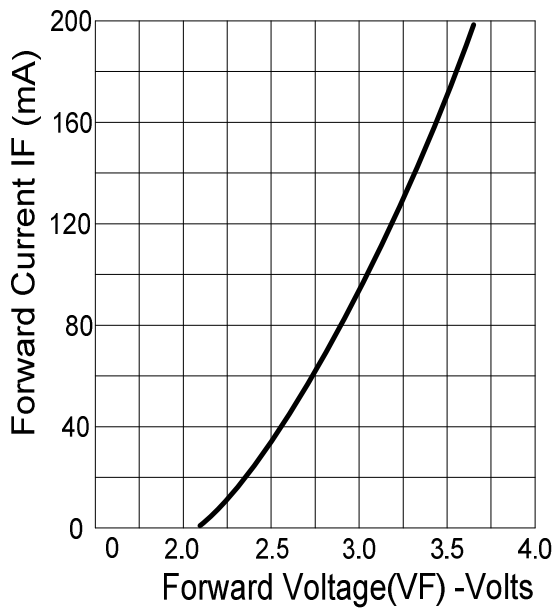
Item	Symbol	Rank	Min.	Typ.	Max.	Condition	Unit
Luminous Intensity	IV	A	8700		9100	IF=120 mA	mcd
		B	9100		9500	IF=120 mA	
		C	9500		9900	IF=120 mA	
		D	9900		10300	IF=120 mA	
		E	10300		10700	IF=120 mA	
		F	10700		11100	IF=120 mA	
Color Coordinate	CIE	ALL	Follow Detail rank			IF=120 mA	xy
Forward Voltage	VF	1	2.9		3.1	IF=120 mA	V
		2	3.1		3.3	IF=120 mA	
		3	3.3		3.5	IF=120 mA	
		4	3.5		3.7	IF=120 mA	

Luminous intensity is measured by **CAS-140** of Instrument System Co.

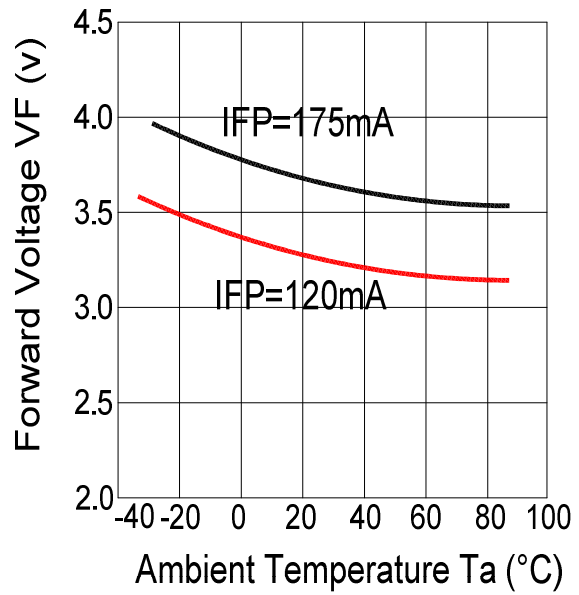
1. Luminous intensity is measured with an accuracy of +11%.
2. Forward voltage, Vf is measured with an accuracy of ± 0.05 V

**4. Optical and electrical characteristics @ 25°C**

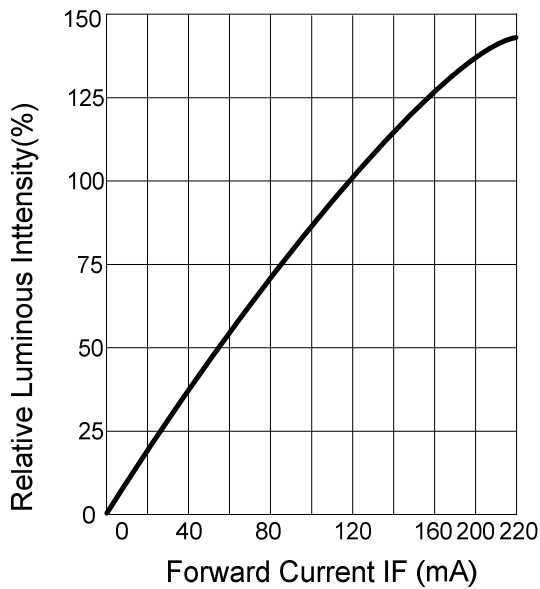
Forward current vs. forward voltage.



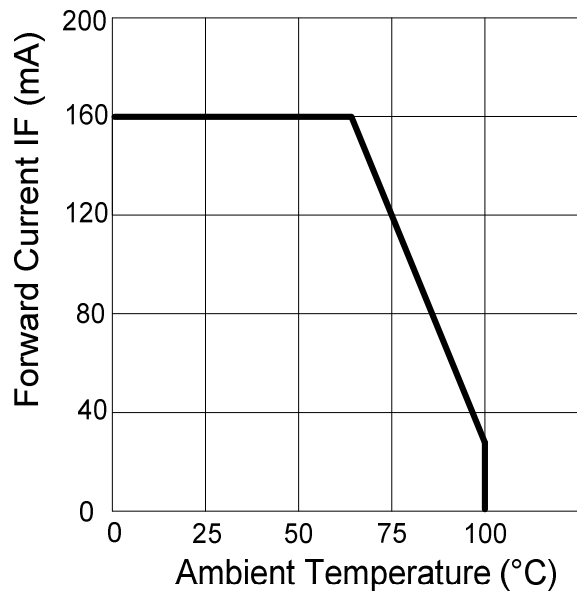
Ambient temperature vs. Forward Voltage



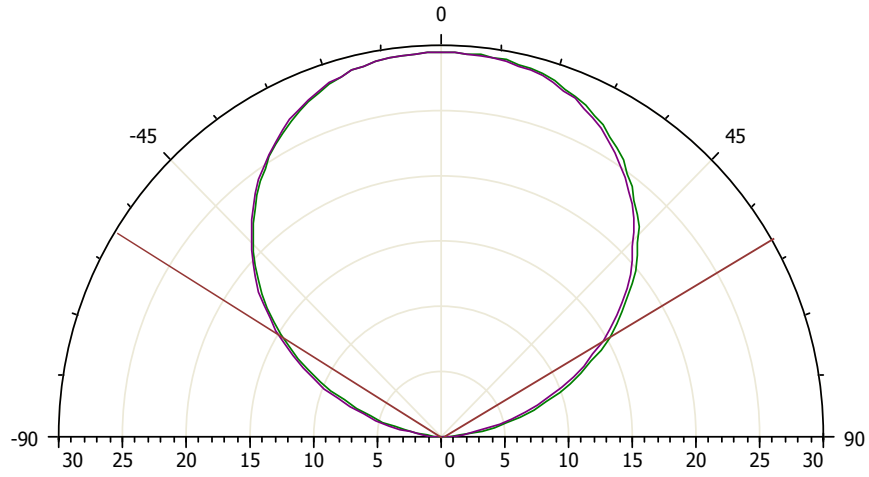
Relative luminous intensity vs. forward current.



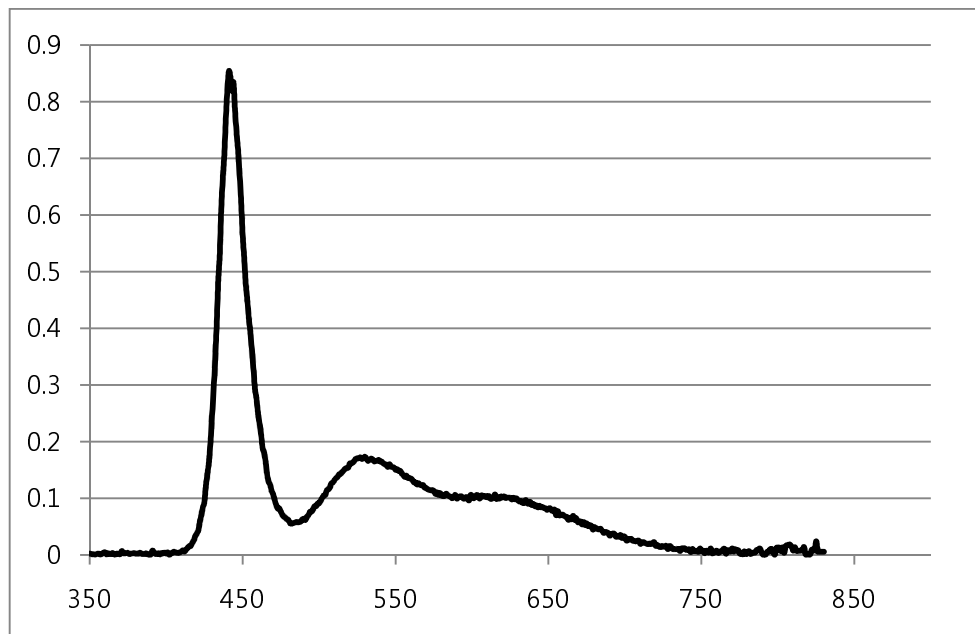
Relative Forward current vs Ambient temperature



**Radiation Characteristic**



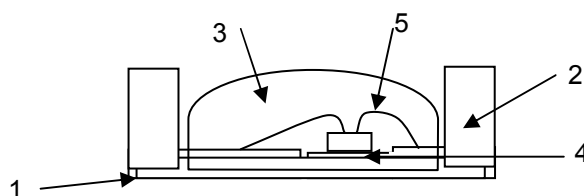
**Relative Spectrum Emission (  $T_a=25C^{\circ}C$ ,  $I_F=120mA$  )**



### 5.Material

Item	Material
1. Lead-frame. / Soldering Leads	Cu Alloy With Ni, Ag Plating.
2. Package.	High Temperature Resistant Plastic, PPA.
3. Encapsulation	Silicone Resin
4. Die	InGaN based
5. Bonding wire	Au Chip : Ball Bonding / Lead-frame Ball Bonding

Note: Product is lead-free ( Pb free).



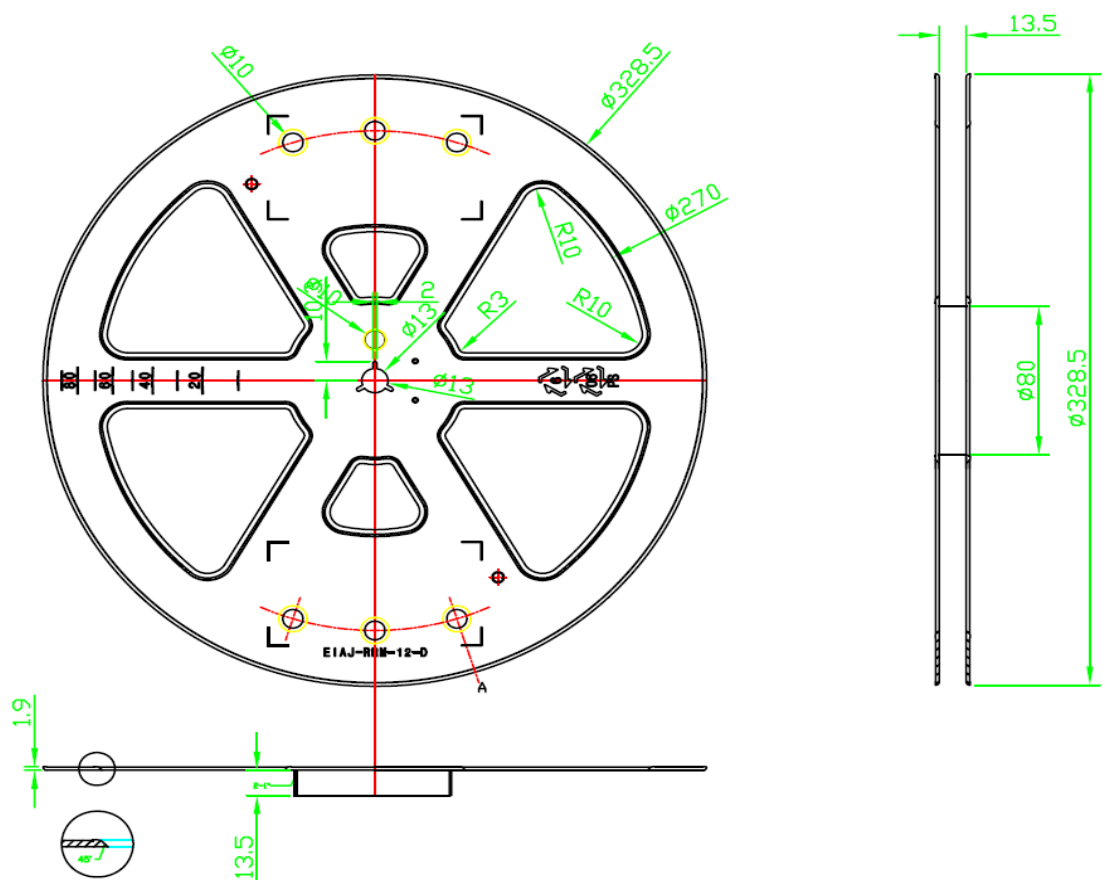
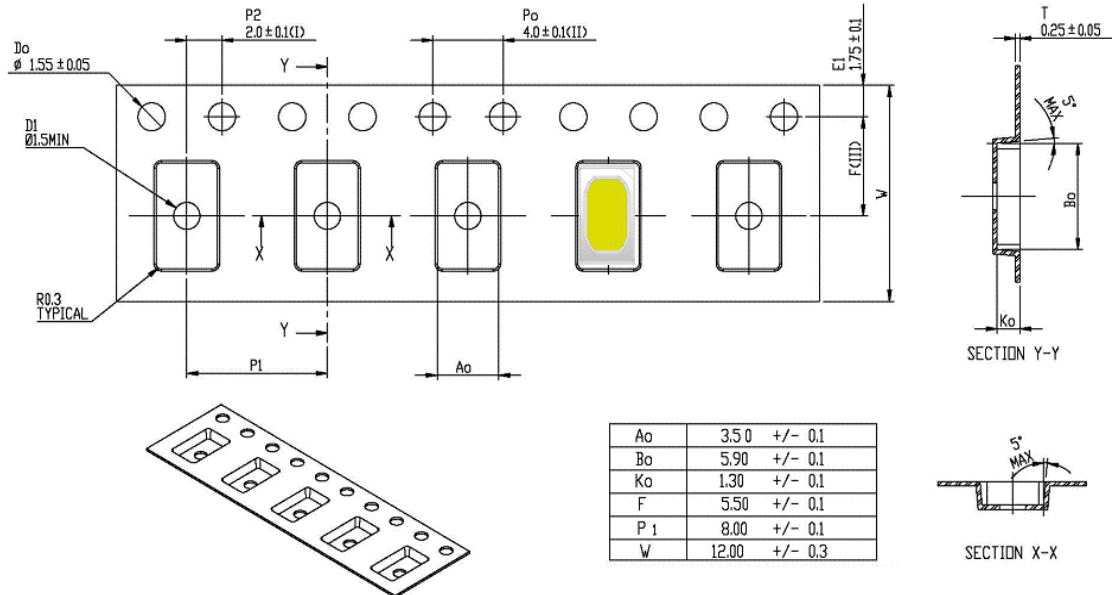
### Packing components

Criteria of Surface resistance :  $10^5 \sim 10^{11} \Omega$

Carrier Tape			Cover Tape		
Description	Typical Value	Unit	Description	Typical Value	Unit
Material	Polycarbonate		Thickness	0.061+-0.013	mm
Tensile Strength(yield)	63	Mpa	Tensile Strength (break)	70	Mpa
Impact strength (notched)	10.2	Kg-cm/cm	Elongation(length)	150	%
Elongation	105	%	Elongation(lateral)	145	%
Shrinkage	<1.0	%	Tear Strength(length)	0.20	N
Surface resistivity	10E4-10E6	Ohm/sq	Tear Strength(lateral)	0.19	N
Volume resistivity	<10E6	Ohm-cm	Surface resistivity (surface)	<2.0E+09	Ohm/sq
			Surface resistivity (sealing)	<2.0E+09	Ohm/sq

## 6. Taping And Orientation.

- Moisture proof bag.
- 1Reel/Bag
- Q'ty : 1500(Max)/Reel.



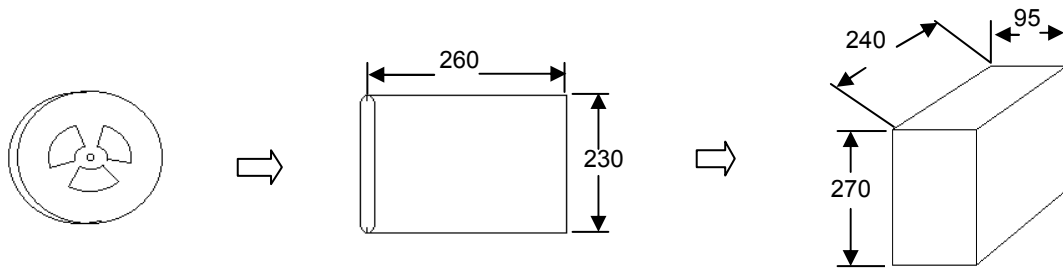
## Lumens Semiconductor Lighting

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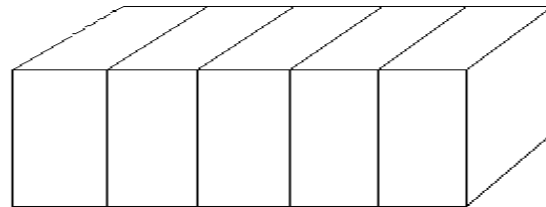
**7. Packing Formation**



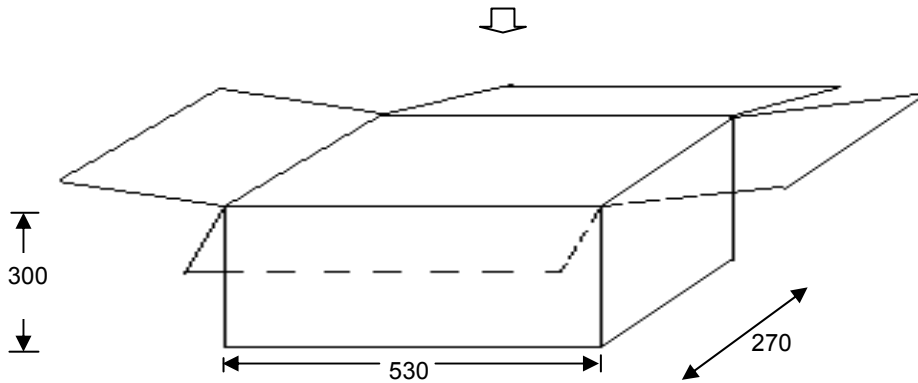
Diameter : 178 mm  
 Width : 17 mm  
 5630 ⇒ 1500 pcs/Reel  
 Anti-Static Shielding  
 Black Reel

Anti-Static Shielding  
 1 Reel / Bag ( T = 0.1 mm )




5 Bags / 1Inner Box  
 5630 ⇒ 7500 pcs/ 1 Inner Box



5 Inner Box/1 Carton  
 5630 ⇒ 25000 pcs/ 1Carton



**Label Format and Serial Number**

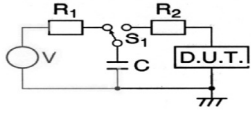
<b>Part Number : GGG</b>	- III	<b>LUMENS</b> solid state lighting
		
<b>Lot No. : AAA</b>		<b>MSL LEVEL 2a</b>
<b>VF : BBB</b>	<b>IV : CCC</b>	<b>LEAD-FREE</b>
<b>Quantity : EEE</b>	<b>EA</b>	<b>MSL LEVEL 2a</b>
<b>Serial No. : FFF</b>	<b>CIE : DDD</b>	<b>BIN : HHH</b>
		
XXXXXXXXXXXXXXXXXXXXXX		



## 8. Reliability Test

(1) The Reliability Criteria of SMD LED

### Reliability Test Matrix.

Test Item	Standard Test Method (option)	Test Conditions	Test time	Number of Damaged
Resistance to Soldering Heat (Reflow Soldering)	JEITA ED-4701 300 301	Tsld=260 °C, 10sec (Pre treatment 30 °C, 70%, 168hrs.)	2 times	0/50
Solderability(Reflow Soldering)	JEITA ED-4701 300 303	Tsld=215±5 °C, 3sec. (Lead Solder)	1 time over 95%	0/50
Temperature Cycle	JEITA ED-4701 100 105	(-) 40 °C~25 °C~100 °C~25 °C 30min. 5min. 30min. 5min.	100cycles	0/50
High Temperature Storage	JEITA ED-4701 200 201	Ta=100 °C	1000hrs.	0/50
Steady State Operating Life condition 1		Ta=25 °C, IF=120mA	1000hrs.	0/50
Steady State Operating Life of High Humidity Heat		60 °C, RH=90%, , IF=120mA	1000hrs	0/50
High Temperature Operating Life condition 1		85 °C, IF=120mA	1000hrs	0/50
High Temperature Operating Life condition 2		70 °C, IF=120mA	1000hrs	0/50
Vibration	JEITA ED-4701 400 403	100~2000~100Hz Sweep 4min. 200m/s 23direction, 4cycles	48min	0/50
ESD(HBM)		 <p>R<sub>1</sub>:10 MΩ, R<sub>2</sub>:1.5 kΩ, C:10 pF, ±5kV</p>	5 time	0/50
Pressure Cooker	JESD22-A102B	Ta=- 121 °C, RH = 100% Pressure = 2atm	1time , 4hrs	0/50

### Conclusions:

The reliability tests were designed to evaluate both package integrity as well as workability of product performance over time.

All samples have done well by completed test requirement and passed all the qualification criteria with zero failure. From design standpoint, the package is robust enough to meet its datasheet conditions.

Based on the good result shows on the above test, this product is qualified and released for market.

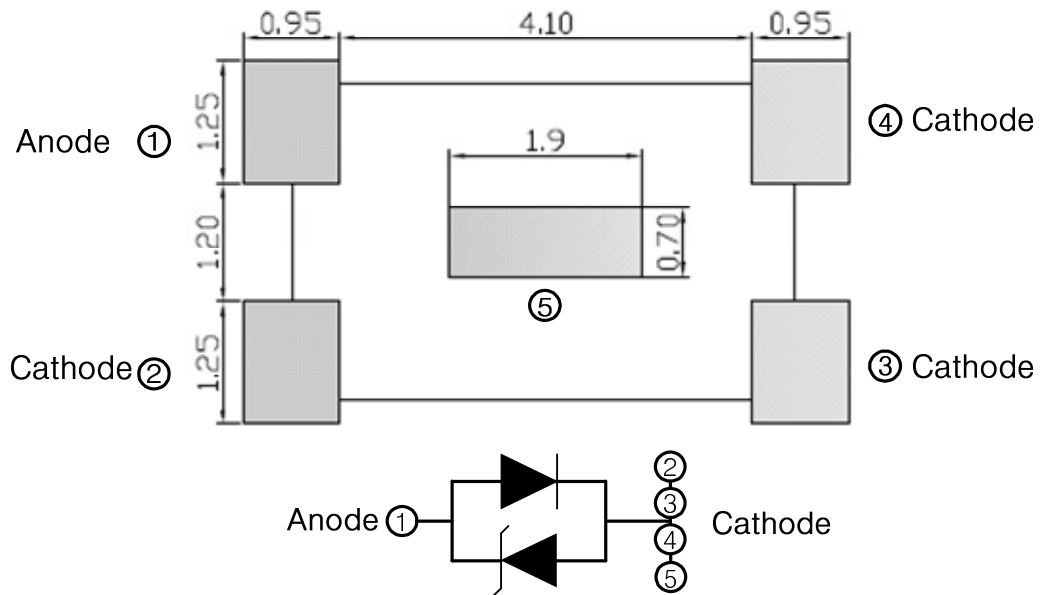
**All qualification samples passed.**

### 9. Standard Solder Pad

Note: Individual high power LED must not be turned on unless soldered on PCB in order to ensure proper heat dissipation.

Unit : mm

General Tolerance :  $\pm 0.1$



Shown is recommended pad geometry only. Customer pcb design shall include adequate thermal heat sink design & thermal analysis.

## 10. Recommended Soldering Temperature – Time Profile (Reflow Soldering)

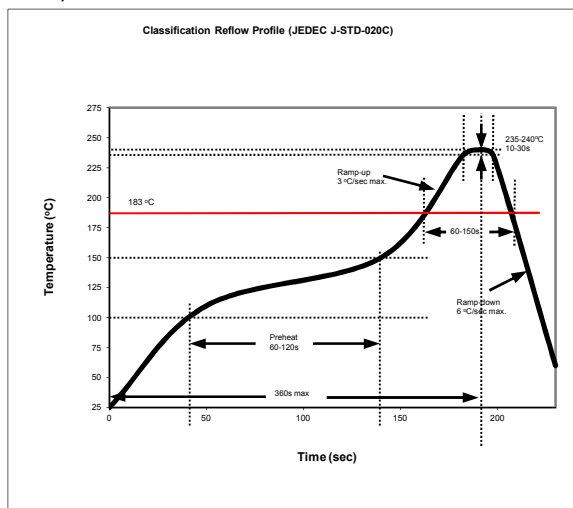
### Surface Mounting Condition

In automatic mounting of the SMD LEDs on printed circuit boards, any bending, expanding and pulling forces or shock against the SMD LEDs should be kept min. to prevent them from electrical failures and mechanical damages of the devices.

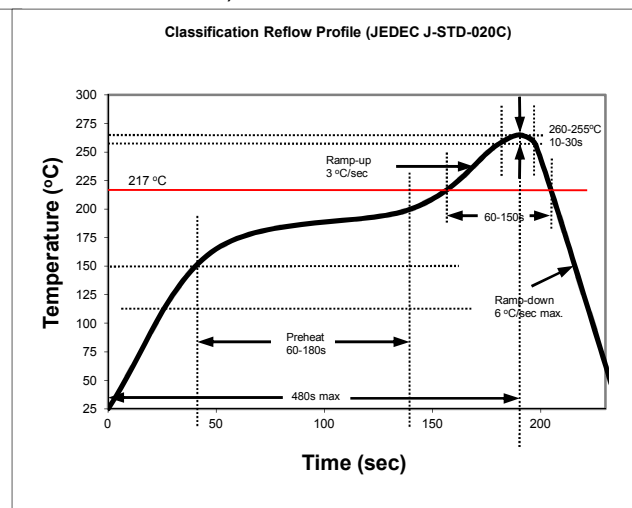
### Soldering Reflow

- Soldering of the SMD LEDs should conform to the soldering condition in the individual specifications.
- SMD LEDs are designed for Reflow Soldering.
- In the reflow soldering, too high temperature and too large temperature gradient such as rapid heating/cooling may cause electrical & optical failures and damages of the devices.
- Lumens cannot guarantee the LEDs after they have been assembled using the solder dipping method.

#### 1) Lead Solder



#### 2) Lead-Free Solder



#### 3) Manual Soldering conditions.

- Lead Solder
  - Max. 300 °C for Max. 3sec, and only one time.
- Lead-free Solder
  - Max. 350 °C for Max. 3sec, and only one time.
- There is possibility that the brightness of LEDs is decreased, which is influenced by heat or ambient atmosphere during reflow. It is recommended to use the nitrogen reflow method use the nitrogen reflow method.
- After LEDs have been soldered, repairs should not be done. As repairs is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will be damaged by repairing or not.
- Reflow soldering should not be done more than two times.

## **11. Precautions To Use**

### (1) Moisture Proof Package

The moisture proof package should be used to prevent moisture in the package as the moisture may cause damage to optical characteristics of the LEDs.

The aluminum bag with zipper is used for moisture proof package. And, the moisture absorbent material, Silica gel, is inserted into aluminum bag.

### (2) Storage:

Storage Conditions

Before opening the package:

The LEDs should be kept at 30°C or less than 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material is recommended.

After opening the package:

After open the package, the LED should be kept at 30°C, 60%RH or less. The LED should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, it should be stored in moisture proof condition.

### (3) Heat Generation

Thermal design of the end products is of paramount importance. The heat generation must be taken into design consideration when using the LED. The coefficient of the temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components.

### (4) Cleaning

Use isopropyl alcohol as a solvent for cleaning the LEDs. The other solvent may dissolve the LEDs package and the epoxy.

Ultrasonic cleaning should not be done.

### (5) Static Electricity

Static electricity or surge voltage damages the LEDs. All equipment and machinery must be properly grounded. It is recommended to use a wristband or anti-electrostatic glove when handling the LEDs. When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by a light-on test or a Vf test at a lower current. (below 1mA is recommended).

Criteria: Vf >2.0V at If=0.01 mA

### (6) Others

When using the LEDs, it must care that the reverse voltage will not exceed the absolute maximum rating. The LED light is enough to injure human eyes, so it should avoid looking at LED light directly.

## **12. Others**

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