



# PF09N03

## Product Specification

## Approval Sheet

PF09N03

Product Specification

RoHS

Product	2052 White LED
Part Number	PF09N03
Issue Date	2018/5/28



### ■ Feature

- ✓ White SMD LED (L x W x H) of 2.04 x 5.22 x 0.75 mm
- ✓ Dice Technology : InGaN
- ✓ Environmental friendly ; RoHS compliance
- ✓ Packing : 1000/1500 pcs/reel

### ■ Applications

- ✓ Fog light
- ✓ Head lamp

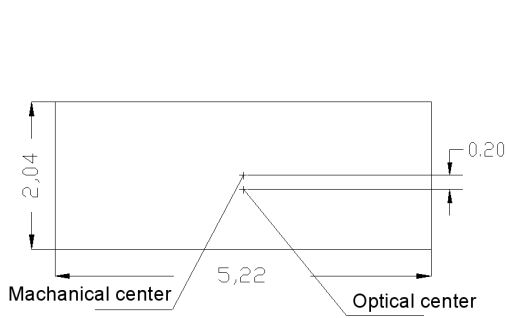
**Outline Dimension**

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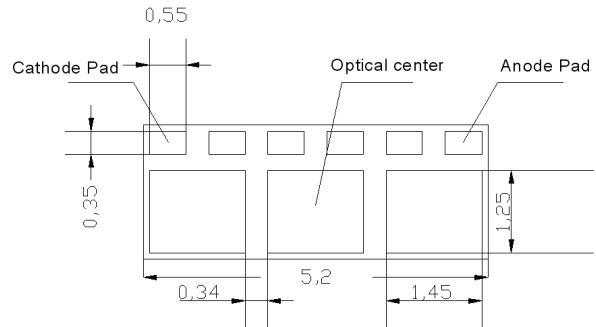
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**PKG Size:**

**2.04 mm \* 5.22 mm \* 0.75 mm (LXWXH)**

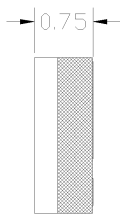


Top view

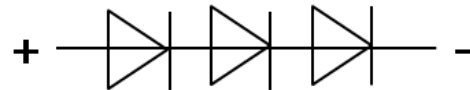


Other PADs are neutral

Bottom view

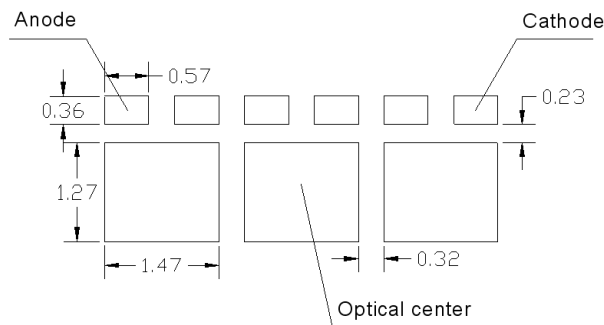


Side view



Equivalent Circuit

**Recommend Soldering Pad Layout**



Unit: mm, Tolerance:  $\pm 0.10$ mm

**Performance**

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**Electro-Optical Characteristics (Ta=25°C)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage <sup>(1)</sup>	V <sub>F</sub>	I <sub>F</sub> = 1200 mA	9.1	9.5	9.9	V
Luminous Flux	Φ <sub>V</sub>		1000	1200	1600	Lm
View Angle	θ		--	120	--	deg
Electrical Thermal Resistance	R <sub>th,elec</sub>		--	1.4	--	°C/W

(1) The Forward Voltage tolerance is ±0.05V

(2) The luminous flux tolerance is ±8%

(3) Thermal resistance is calculated from junction to solder

(4) Electric and optical data is tested at 50 ms pulse condition

(5) The color coordinates measurement tolerance is ±0.005

**Absolute Maximum Ratings**

Parameter	Symbol	value	Unit
DC Forward Current <sup>(1)</sup>	I <sub>F</sub>	1200	mA
Power Dissipation	P <sub>D</sub>	11.5	W
Pulse Forward Current <sup>(2)</sup>	I <sub>FP</sub>	2000	mA
Storage Temperature	T <sub>stg</sub>	-40 ~ +105	°C
Operating Temperature <sup>(3)</sup>	T <sub>opr</sub>	-40 ~ +105	°C
Junction Temperature	T <sub>J</sub>	125	°C
Assembly Temperature	T <sub>sld</sub>	260 (max. 10sec)	°C

(1) Proper current rating must be observed to maintain junction temperature below maximum at all time

(2) IFP shall be applied under condition as max duration time 400ms and 1/10 duty cycle.

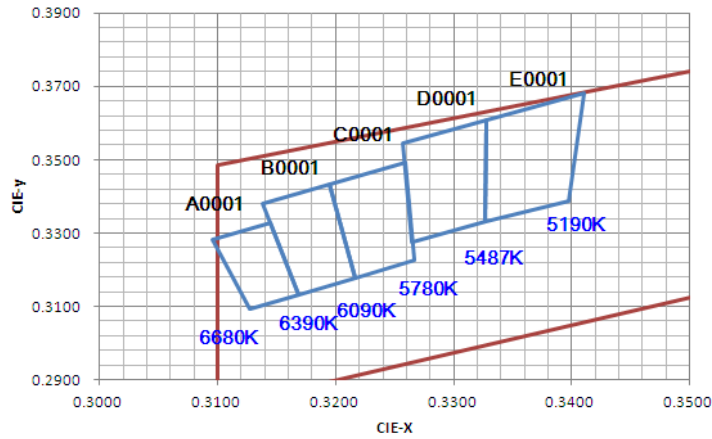
(3) This operation temperature is defined as soldering temperature.

**Binning**

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**Chromaticity Coordinates**



**Bin code definition**

V <sub>F</sub> Rank	Luminous Flux Rank	CIE Rank
A	U3	A0001

V <sub>F</sub> Rank	Condition	Voltage	
		Min.	Max.
A	I <sub>F</sub> = 1200 mA T <sub>a</sub> = 25°C	9.1	9.4
B		9.4	9.7
C		9.7	10.0

The Forward Voltage tolerance is ±0.05V

Luminous Flux Rank	Condition	Luminance Flux(Lm)	
		Min.	Max.
U2	I <sub>F</sub> = 1200mA T <sub>a</sub> = 25°C	1100	1200
U3		1200	1300
U4		1300	1400

The luminous flux tolerance is ±8%

■ **CIE Rank**

<b>CCT</b>	<b>CIE Rank</b>	<b>CIE X</b>	<b>CIE Y</b>
<b>6390 ~ 6680</b>	<b>A0001</b>	0.3096	0.3283
		0.3145	0.3328
		0.3176	0.3083
		0.3134	0.3043
<b>6090 ~ 6390</b>	<b>B0001</b>	0.3138	0.3381
		0.3195	0.3433
		0.3216	0.3178
		0.3169	0.3133
<b>5780 ~ 6090</b>	<b>C0001</b>	0.3195	0.3433
		0.3259	0.3491
		0.3267	0.3228
		0.3216	0.3178
<b>5490 ~ 5780</b>	<b>D0001</b>	0.3257	0.3546
		0.3328	0.3608
		0.3327	0.3331
		0.3265	0.3276
<b>5190 ~ 5490</b>	<b>E0001</b>	0.3328	0.3700
		0.3415	0.3779
		0.3400	0.3443
		0.3327	0.3375

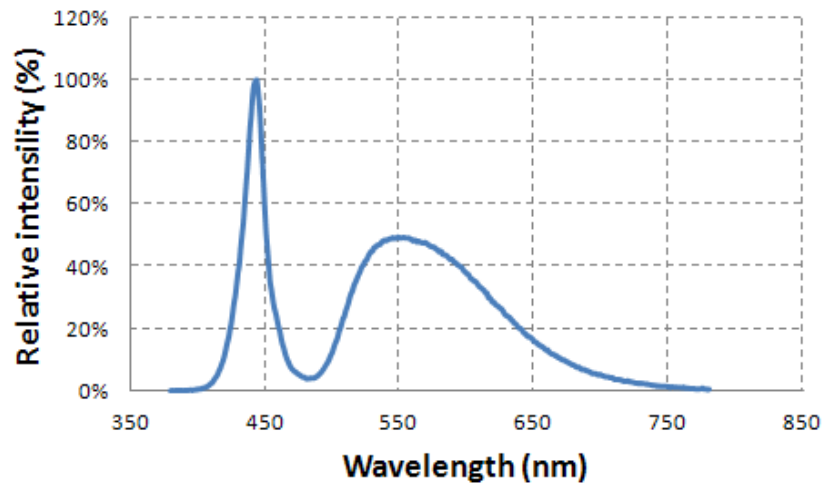
Color bins are tested at IF = 1200mA 50ms pulse operation condition

## Characteristics

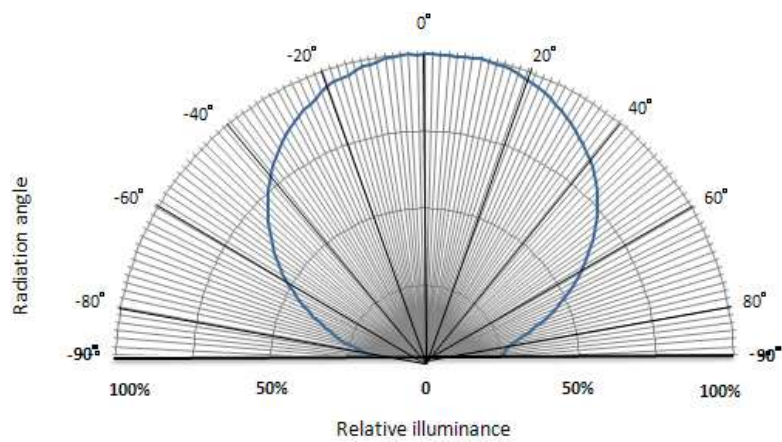
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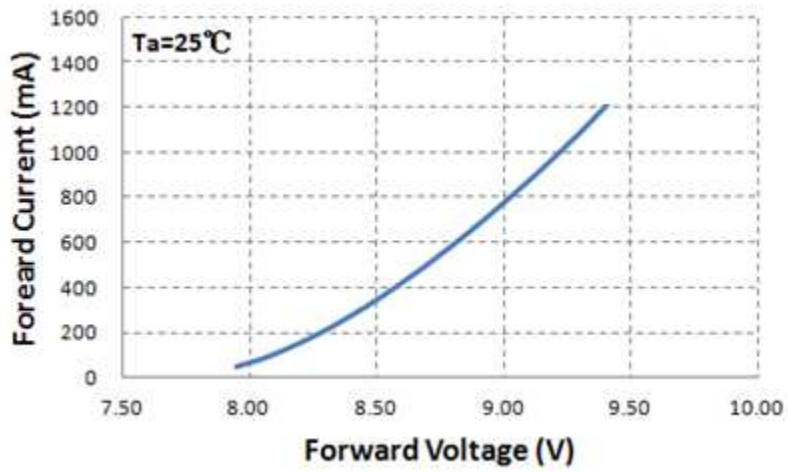
### ■ Spectrum



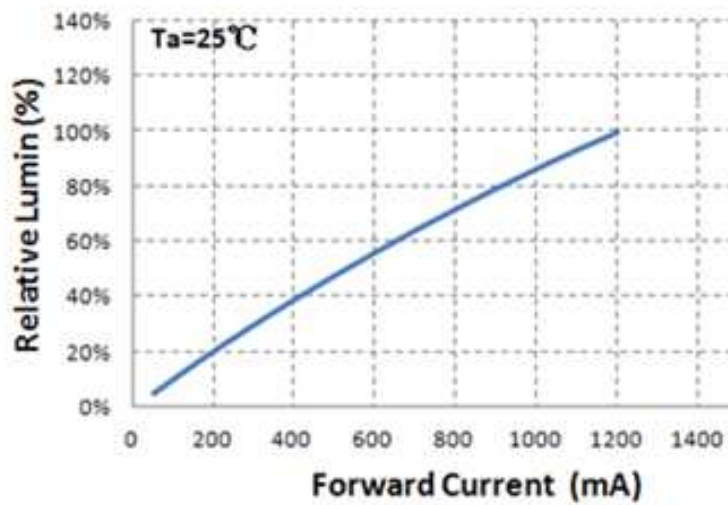
### ■ Radiation Pattern



### ■ Forward Voltage vs. Forward Current

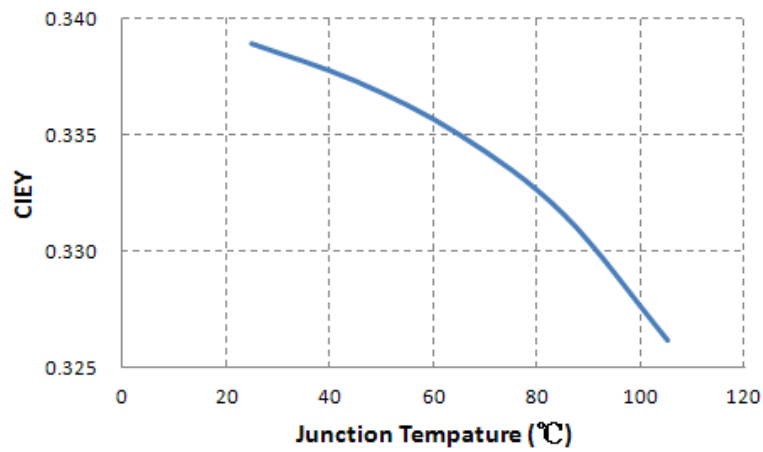
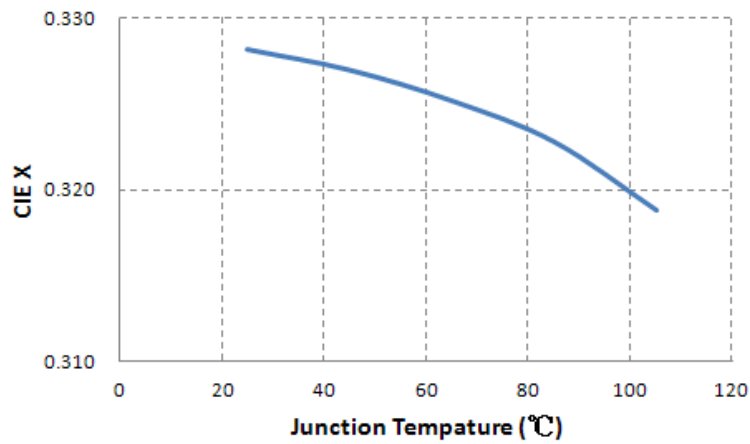


### ■ Forward Current vs. Relative Luminosity

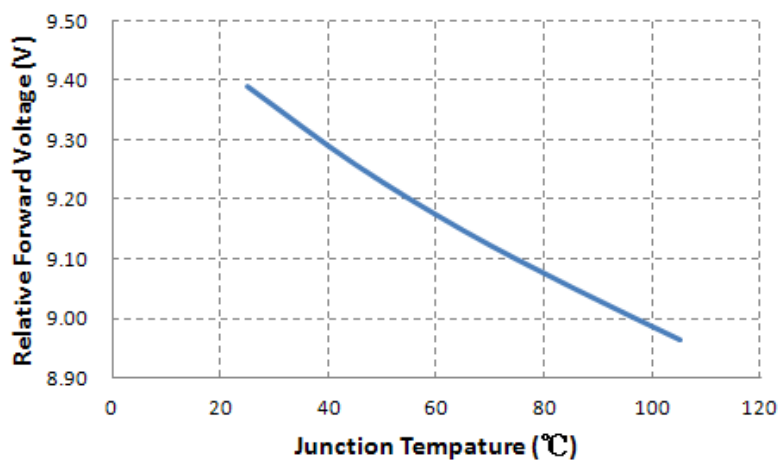




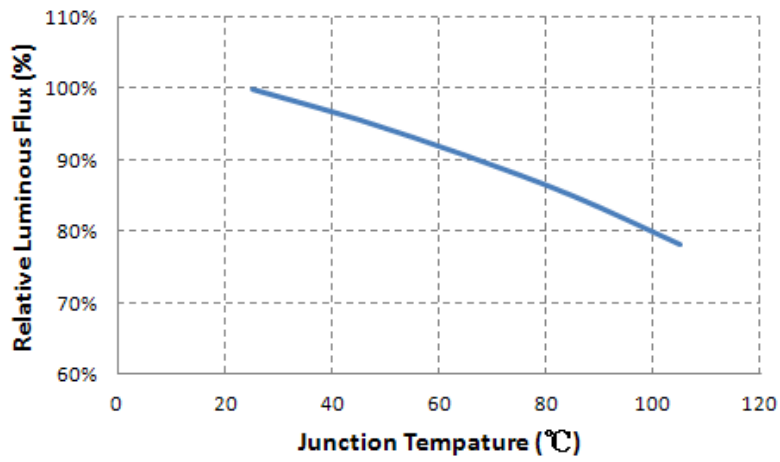
### ■ Chromaticity Coordinate vs. Junction Temperature



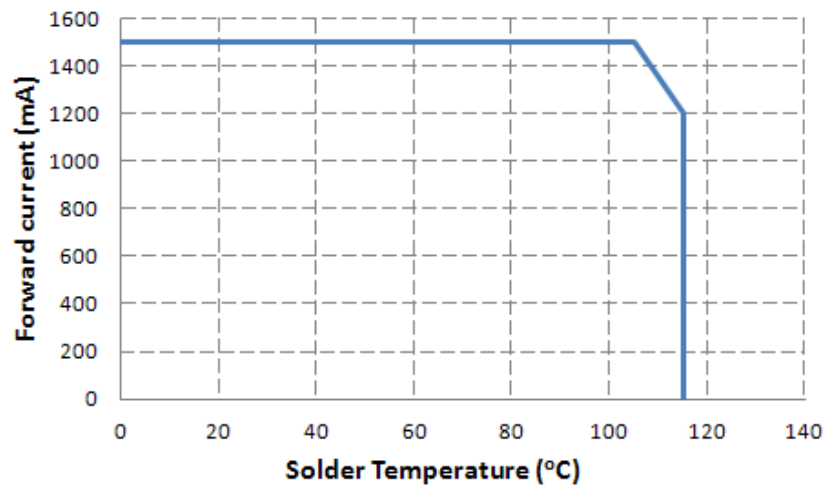
### ■ Relative Forward Voltage vs. Junction Temperature



### ■ Relative Luminous Intensity vs. Junction Temperature



### ■ Forward Current Derating Curve



Reliability

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**Reliability test**

Item	Reference Standard	Condition	Time/Cycle
Thermal shock	JESD22-A106	-40°C to 100 °C, 20min dwell, 5 min transfer time	1000Cycles
Temperature Cycle	AEC-Q101 Rev. D	-55°C to 125 °C 15 minutes dwell at each high and low temperature extreme	1000 cycles
High Temperature Storage	JESD22-A103	Ts=105°C, 1000h	1000hours
High Temperature Operating Life	AEC-Q101 Rev. D	Ts=85°C, IF=Max Current	1000hours
Temperature Humidity Operating Life	AEC-Q101 Rev. D	85°C, RH=85%, 1000h, IF=Max Current	1000hours

**Judgment Criteria**

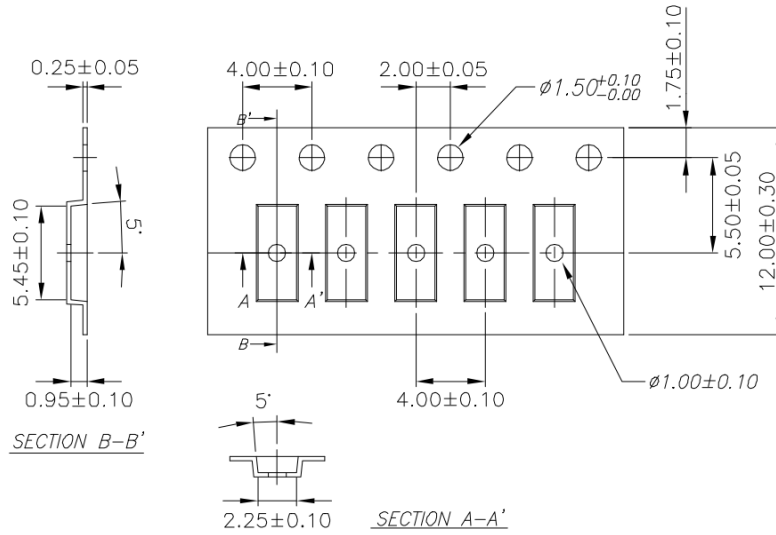
Item	Symbol	Test Condition	Judgment Criteria
Forward Voltage	Vf	1.2 A	$\Delta V_f < 10 \%$
Luminous Flux	Iv	1.2 A	$\Delta I_v < 20 \%$
Delta CIE	CIE-x ,CIE-y	1.2 A	$\Delta x,y < 0.01$

Packing

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■ Emitter Pocket Tape Packing

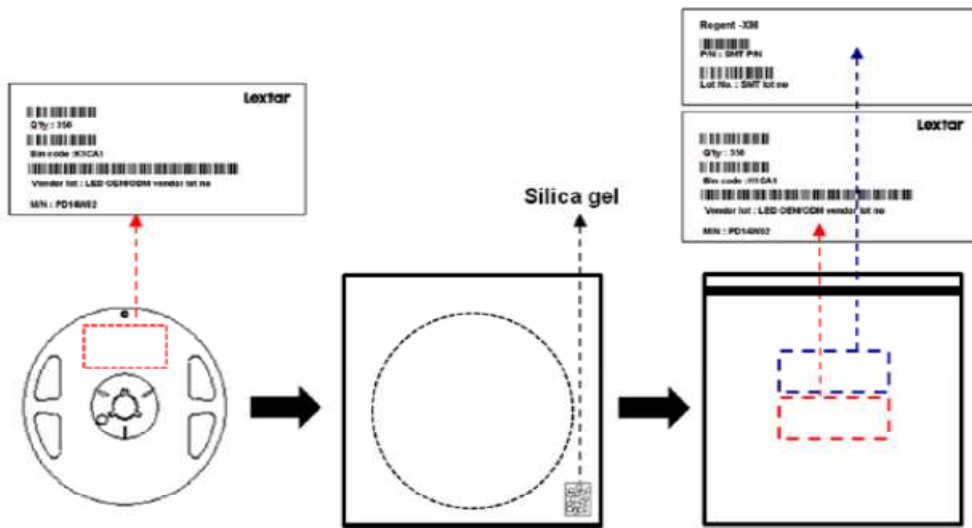


Unit : mm

Item	Spec	Tol(+/-)	Item	Spec	Tol(+/-)
W	12.00	±0.30	P2	2.00	±0.05
E	1.75	±0.10	P0 x 10	40.00	±0.10
F	5.50	±0.05	T	0.25	±0.05
D0	1.50	±0.1	A0	2.25	±0.10
D1	1.50	±0.25	B0	5.45	±0.10
P0 P1	4.00	±0.10	K0	0.95	±0.10



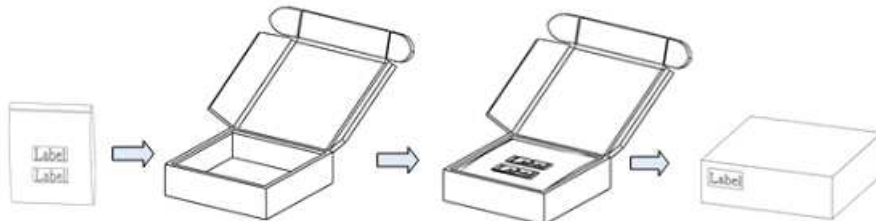
### Shield Bag Taping



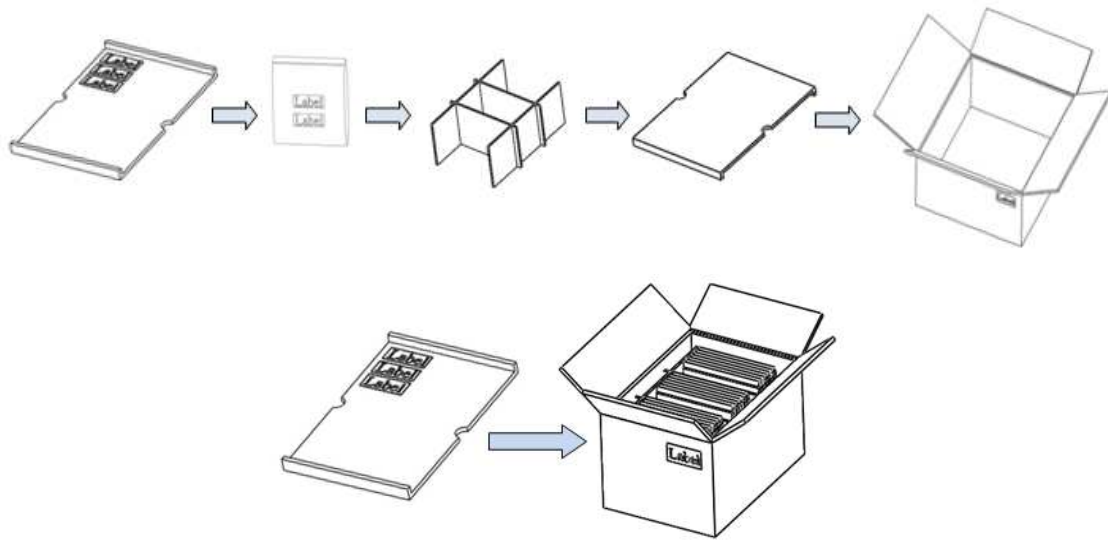
### Packing Box

Type	Large Box		Medium Box		Small Box	
Dimension	541X511X276mm		385X303X260mm		283X235x70mm	
Maximum Reels	7"X12mm Reel	64/R	7"X12mm Reel	21/R	7"X12mm Reel	4/R
Minimum Reels	7"X12mm Reel	32/R	7"X12mm Reel	9/R	7"X12mm Reel	1/R

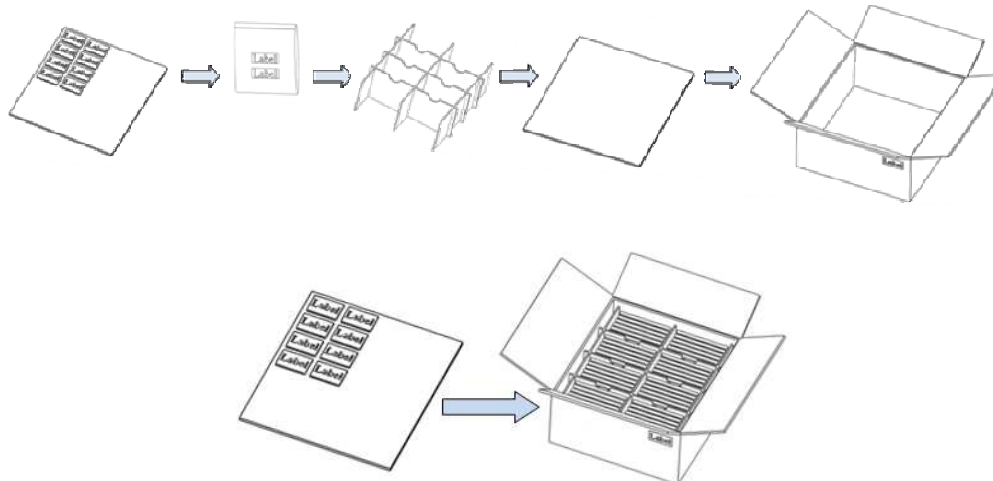
### Small Box



■ **Medium Box**



■ **Large Box**



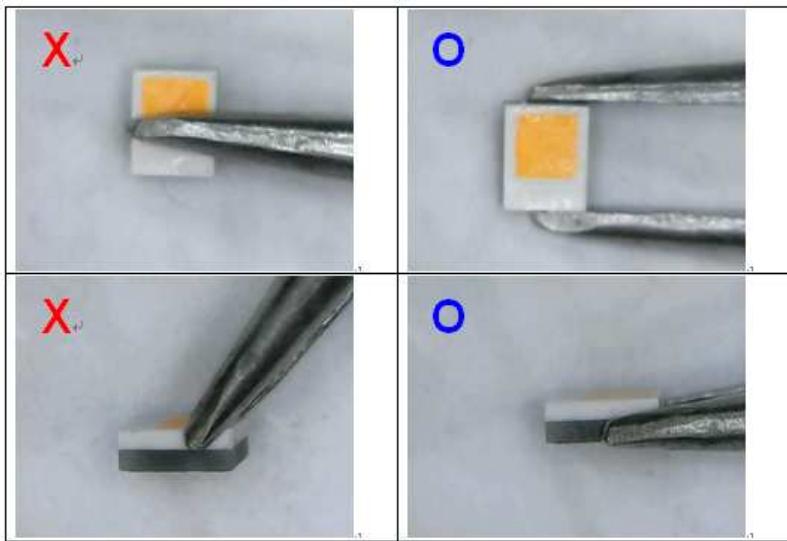
## Precautions

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### ■ Handling of LEDs

1. Under SMT process, mechanical stress on the LED surface should be avoided.
2. In general, LEDs should be handled from the side of the substrate, since the surface will be scratched or the white reflector will be peeled off.



3. There are no restrictions on the form of the pick and place nozzle, except that mechanical stress on the surface of LED must be prevented. Lextar recommend that the material of nozzle is the rubber or the silicone, which the property is soft to prevent break the LED.

### ■ Safety Precautions

- The LED light output is too strong for human eyes without shield. Prevent eye contact directly more than seconds.
- Ensure operating under maximum rating.

### ■ Storage

- Before opening the package, the LEDs should storage under 30°C, 60% RH.
- After opening the package bag, the LEDs should be keep under 30°C, 60% RH. Recommend to use within 168 hrs. If unused LEDs remain, suggest to store into moisture proof bag or original package bag with moisture absorbent material such as silica gel. Reseal well is necessary.
- If the product exceeded the storage period or the moisture absorbent material faded away, baking treatment should be done by following conditions.  
Bake condition: 60°C, 12hours (One time only).

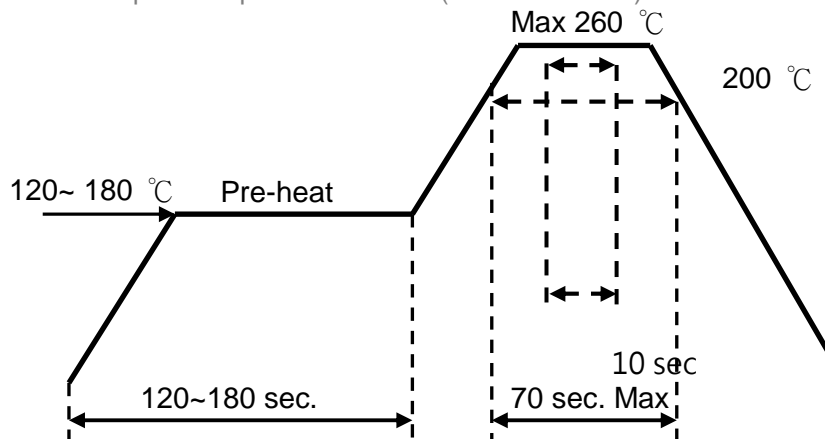
### ■ Soldering Notice and Conditions

- When soldering LEDs, do not solder/reflow the same LED over two times.



- Recommend soldering conditions:  
Hand soldering: 350 °C max , 3 sec. max.  
Reflow soldering: Pre-heat 150 °C max , 180 sec. max.  
Peak 260 °C max , 5 sec. max.

- Reflow temperature profile as below: (lead-free solder)



- When soldering, don't put stress on the LEDs
- The selection of nozzle for SMT:

If the nozzle is not suitable for the sample, it drops easily, when it is picked up. Recommended nozzle size is as the following list.

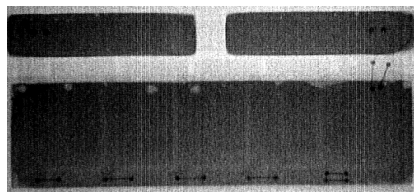
Precautions for SMT:

Under the SMT process, beware of the way of picking and pressing the sample, the appearance of sample is easily broken by the stress or the shear.

- After LEDs have been soldered, strongly recommend not to repair to keep the LEDs performance.
- Thicker solder will induce higher heat resistance. Thickness of solder is recommended to be thinner than 75um, at least 100um.



- The void rate of the solder on heat transparent lower than 10% is recommended.



Date	Contents	Writer	Approved
2017.10.31	1 <sup>st</sup> version	SK Chen	Sean Tsai
2018.5.3	1.revise the outlook 2.define the operation temperature as soldering temperature 3.revise reliability item list		
2018.5.28	1. Revise PKG outlook		

## *Smart Lighting* *Amazing Life*

Lextar Electronics Corp. is the leading LED (Light Emitting Diode) maker integrating upper stream epitaxial, middle stream chip, and downstream package, SMT and LED lighting applications. Founded in May, 2008, Lextar is a subsidiary of AU Optronics, the leading TFT-LCD and solar PV manufacturer. Lextar's product applications include lighting and LCD backlight.

Lextar's manufacturing sites include Hsinchu and Chunan in Taiwan, and Suzhou in China.  
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The company turnover in 2010 is 266 million USD.