



# PF09N03

## Product Specification

## Approval Sheet

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Product Specification

RoHS

<b>Product</b>	2052 White LED
<b>Part Number</b>	PF09N03
<b>Issue Date</b>	2017/11/27



### ■ Feature

- ✓ White SMD LED (L x W x H) of 2.04 x 5.22 x 0.75 mm
- ✓ AEC-Q101 D and IEC 60810 qualification
- ✓ Dice Technology : InGaN
- ✓ Qualified according to JEDEC moisture sensitivity Level 1
- ✓ Environmental friendly ; RoHS compliance
- ✓ Packing : 1000/1500 pcs/reel

### ■ Applications

- ✓ Fog light
- ✓ Head lamp

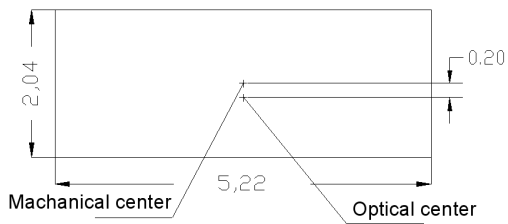
**Outline Dimension**

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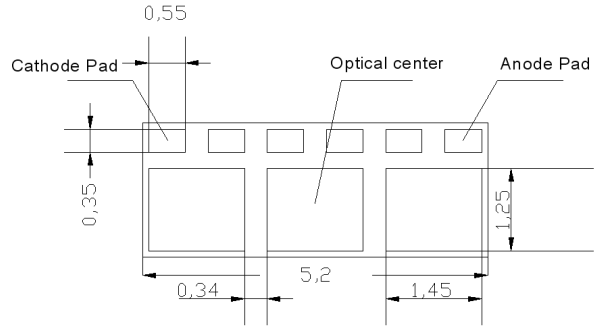
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**PKG Size:**

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

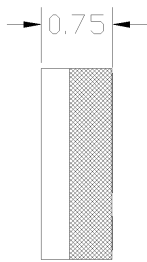


Top view



Other PADS are all neutral.

Bottom view

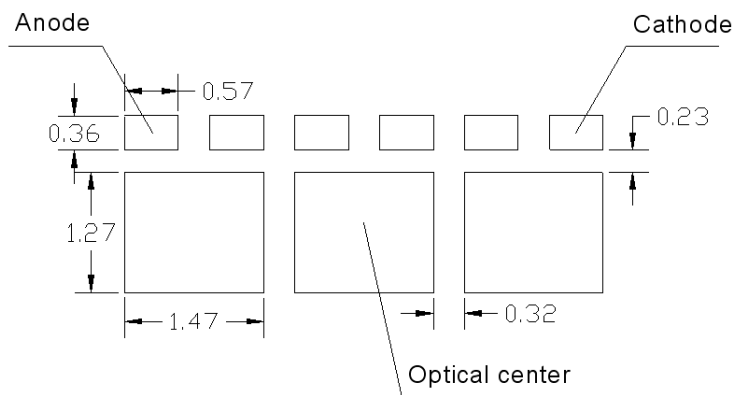


Side view



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>	$V_F$	$I_F = 1200 \text{ mA}$	9.1	9.5	9.9	V
Luminous Flux	$\Phi_V$		1000	1200	1600	Lm
View Angle	$\theta$		110	120	130	deg
Electrical Thermal Resistance	$R_{th,elec}$		--	1.4	--	°C/W

(1) The Forward Voltage tolerance is  $\pm 0.05V$

(2) The luminous flux tolerance is  $\pm 8\%$

(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  $\pm 0.005$

■ **Absolute Maximum Ratings**

Parameter	Symbol	value	Unit
DC Forward Current <sup>(1)</sup>	$I_F$	1500	mA
Power Dissipation	$P_D$	11.4	W
Pulse Forward Current <sup>(2)</sup>	$I_{FP}$	2000	mA
Storage Temperature	$T_{stg}$	-40 ~ +115	°C
Operating Temperature	$T_{opr}$	-40 ~ +115	°C
Junction Temperature	$T_J$	125	°C
Assembly Temperature	$T_{sld}$	260 (max. 30sec)	°C

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

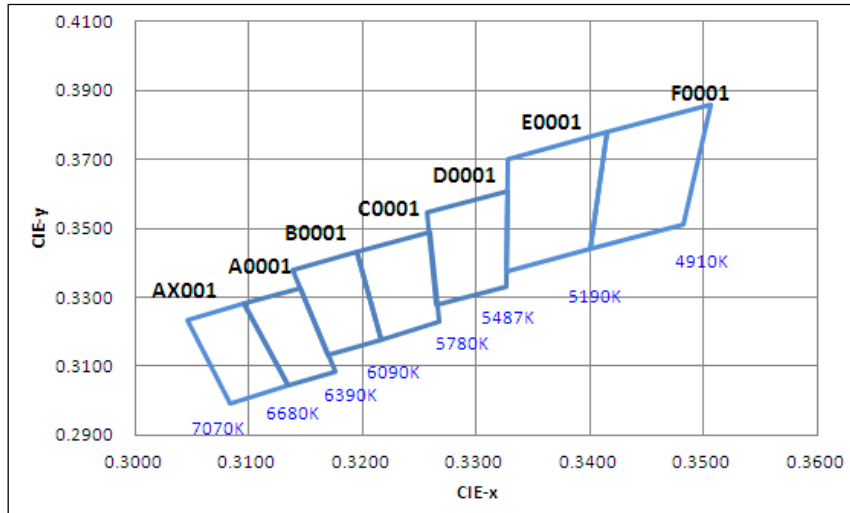
(2) IFP shall be applied under condition as max duration time 400ms and 1/10 duty cycle.

**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.
U1	I <sub>F</sub> = 1200mA T <sub>a</sub> = 25°C	1000	1100
U2		1100	1200
U3		1200	1300
U4		1300	1400

The luminous flux tolerance is ±8%

■ CIE Rank

CCT	CIE Rank	CIE X	CIE Y
6690~7070	AX001	0.3046	0.3235
		0.3096	0.3283
		0.3134	0.3043
		0.3083	0.2993
6390 ~ 6680	A0001	0.3096	0.3283
		0.3145	0.3328
		0.3176	0.3083
		0.3134	0.3043
6090 ~ 6390	B0001	0.3138	0.3381
		0.3195	0.3433
		0.3216	0.3178
		0.3169	0.3133
5780 ~ 6090	C0001	0.3195	0.3433
		0.3259	0.3491
		0.3267	0.3228
		0.3216	0.3178
5490 ~ 5780	D0001	0.3257	0.3546
		0.3328	0.3608
		0.3327	0.3331
		0.3265	0.3276
5190 ~ 5490	E0001	0.3328	0.3700
		0.3415	0.3779
		0.3400	0.3443
		0.3327	0.3375
4910 ~ 5190	F0001	0.3415	0.3779
		0.3506	0.3860
		0.3482	0.3510
		0.3400	0.3443

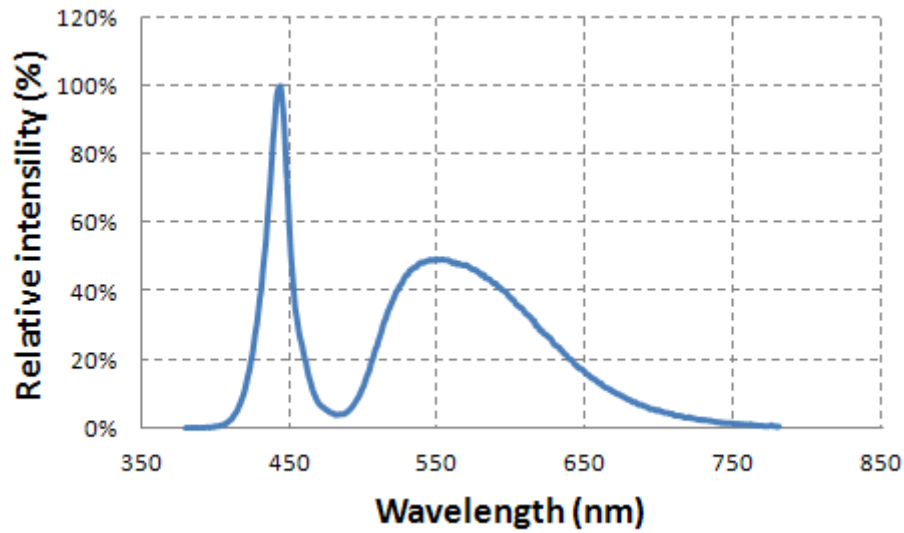
Color bins are tested at IF = 1200mA 50ms pulse operation condition

## Characteristics

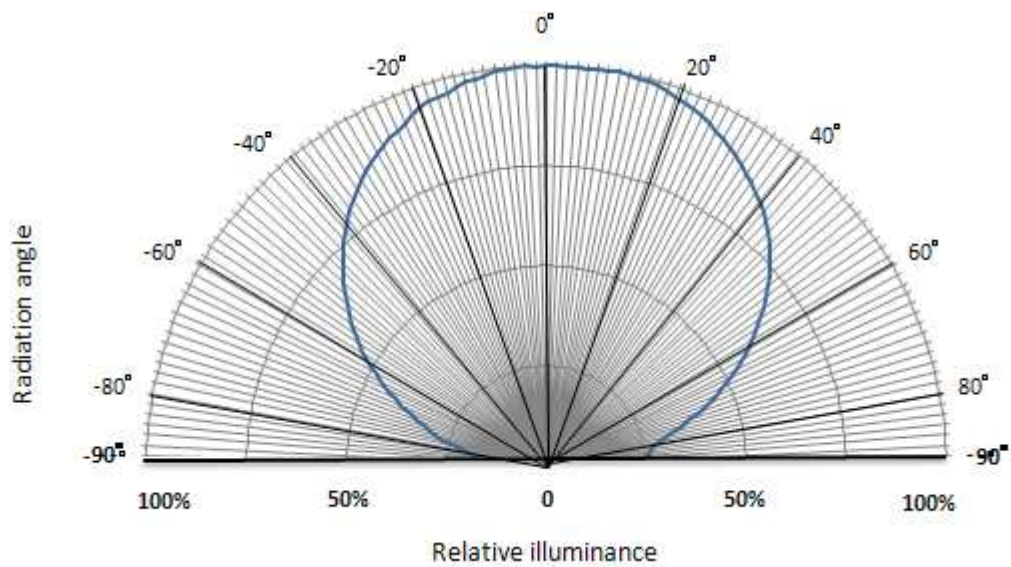
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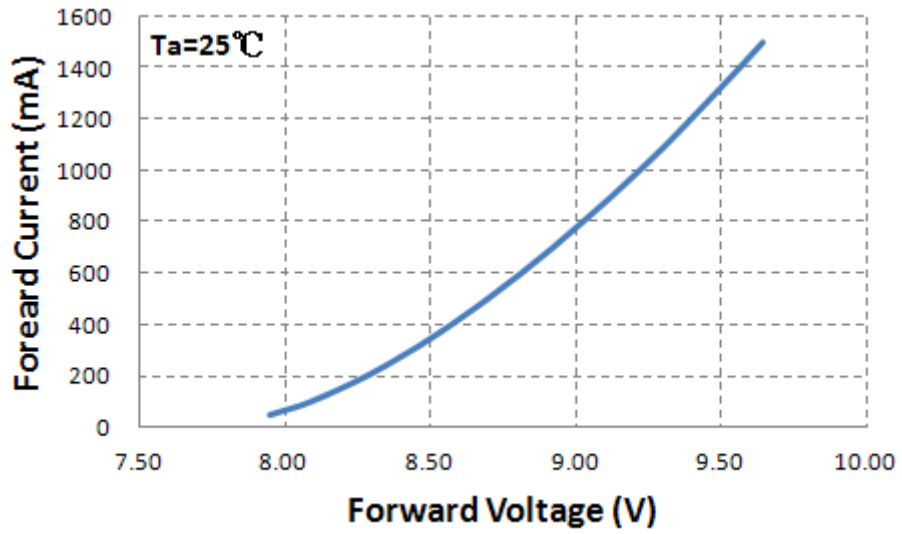
### Spectrum



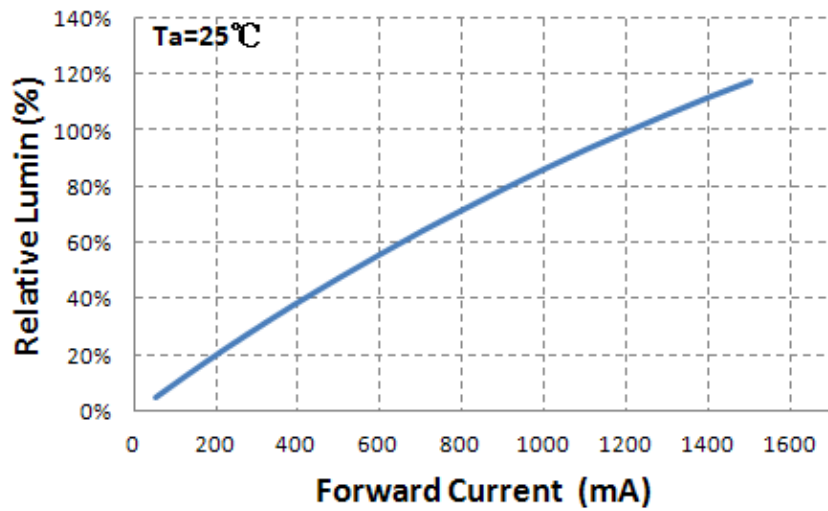
### Radiation Pattern



### Forward Voltage vs. Forward Current

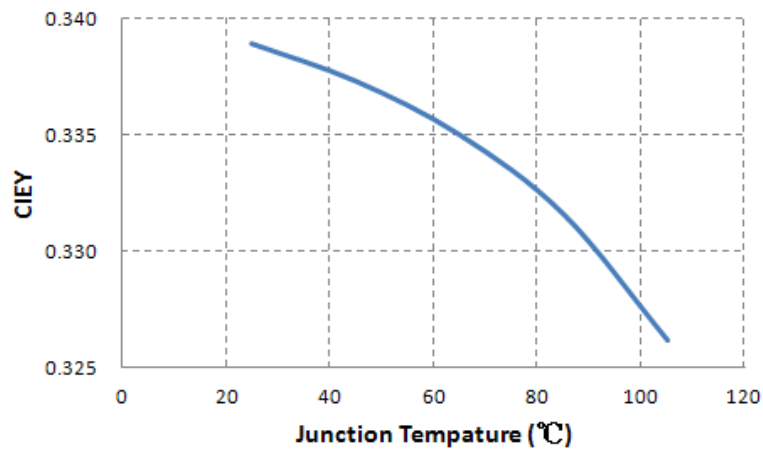
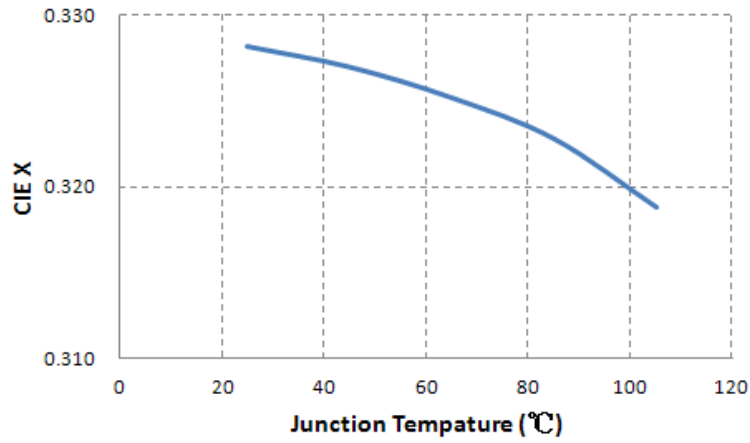


■ Forward Current vs. Relative Luminosity

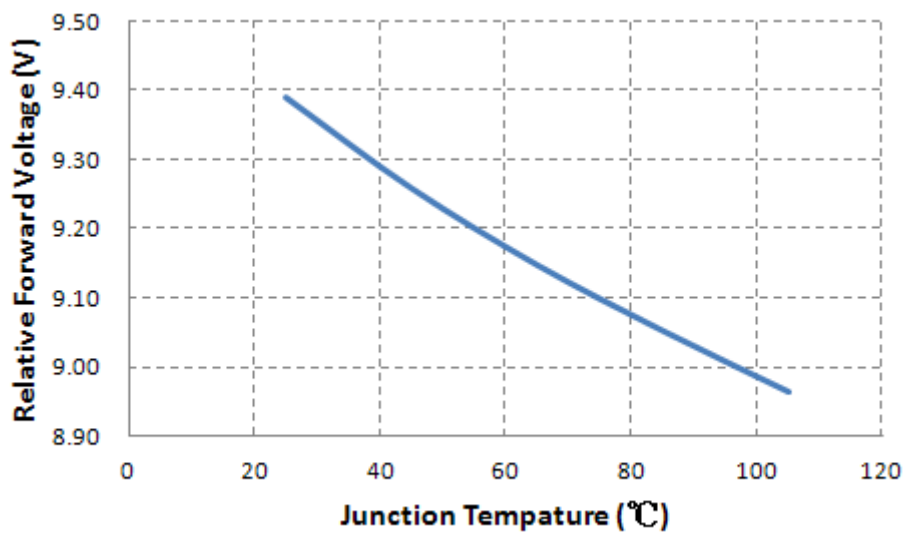




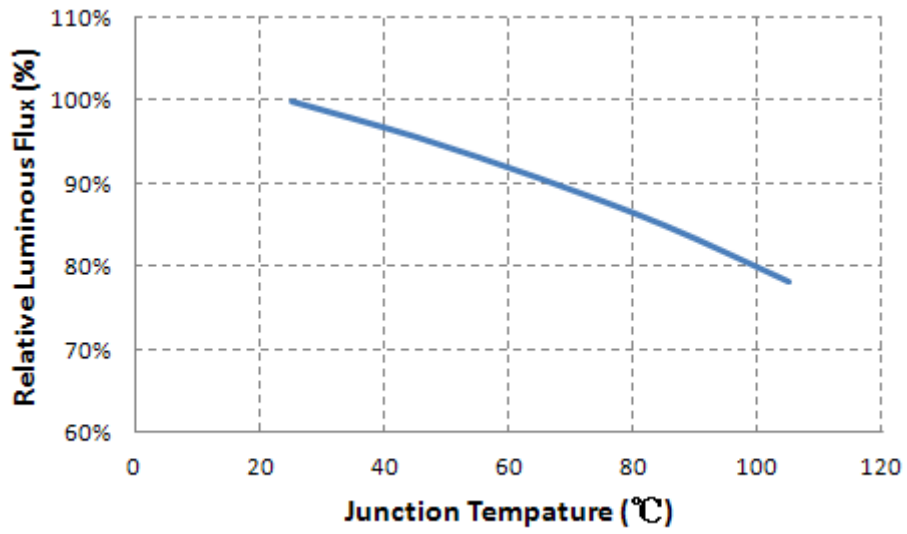
### ■ Chromaticity Coordinate vs. Junction Temperature



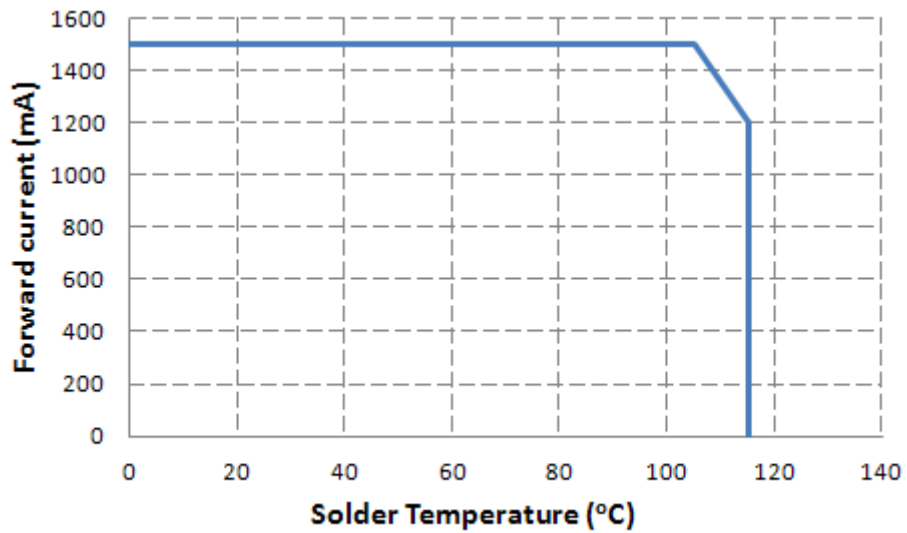
### ■ Relative Forward Voltage vs. Junction Temperature



### ■ 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
Power and Temperature Cycle	AEC-Q101 Rev. D	-40 °C~ 85 °C, IF=Max Current, Dwell/transfer time=10mins, 20 mins 1,000 cycles , on/off 15,000 cycles	15,000 cycles
MSL Level 1	J-STD-020	85°C/85% RH	168 hours
High Temperature Storage	JESD22-A103	TA=105°C, 1000h	1000hours
Low Temperature Storage	JESD22-A119	TA=-40°C, 1000h	1000hours
High Temperature Operating Life	AEC-Q101 Rev. D	TA=105°C, IF=Max Current	1000hours
Low Temperture Operating Life	JESD22-A108	TA= -40°C, IF=Max Current	1000hours
Temperature Humidity Operating Life	AEC-Q101 Rev. D	85°C, RH=85%, 1000h, IF=Max Current	1000hours
Electrostatic Discharges	AEC-Q101 Rev. D	HBM, X KV,1.5KΩ, 100pF, 3pulses, alternately positive or negative	NA

Item	Reference Standard	Condition	Time/Cycle
Corrosion robustness	IEC 60068-2-43	(H2S) [25°C / 75 % rh / 10 ppm H2S / 21 days]	336 hrs
	IEC 60068-2-60	[25 °C / 75 % rh / 200 ppb SO2, 200 ppb NO2,10 ppb Cl2 / 21 days]	504 hrs

■ **Judgment Criteria**

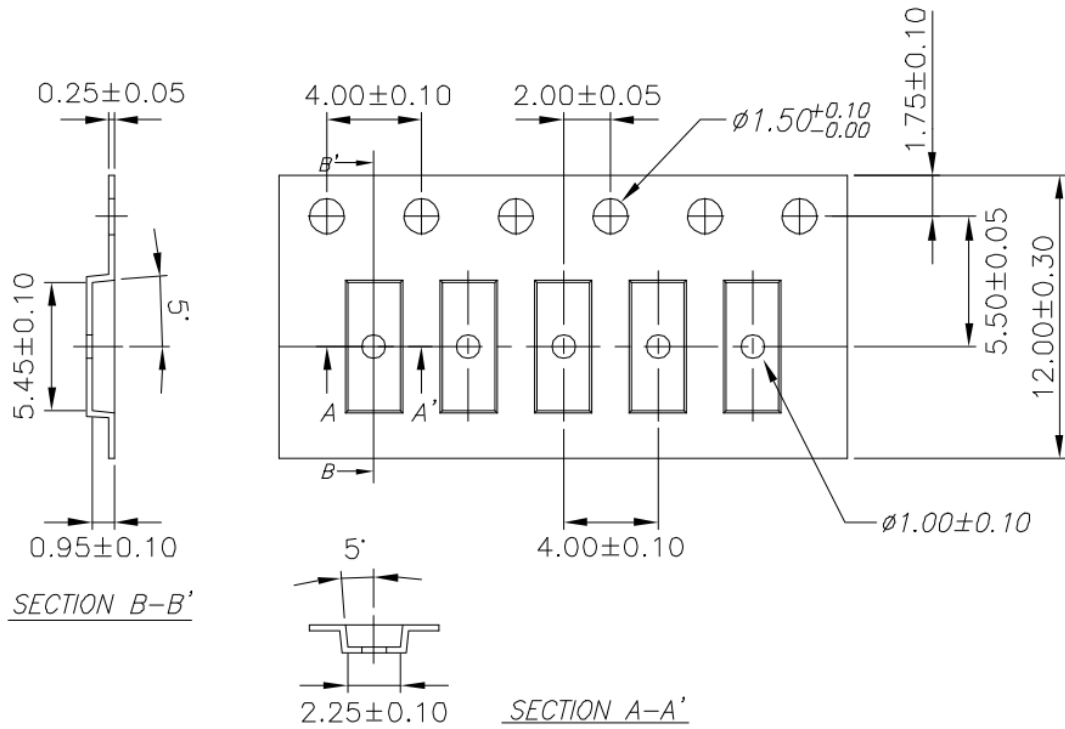
Item	Symbol	Test Condition	Judgment Criteria
Forward Voltage	Vf	1.2 A	$\Delta V_f < 10 \%$
Luminous Flux	Iv	1.2 A	$\Delta I_v < 20 \%$
Delta CIE	CIE-x ,CIE-y	1.2 A	$\Delta x,y < 0.01$

Packing

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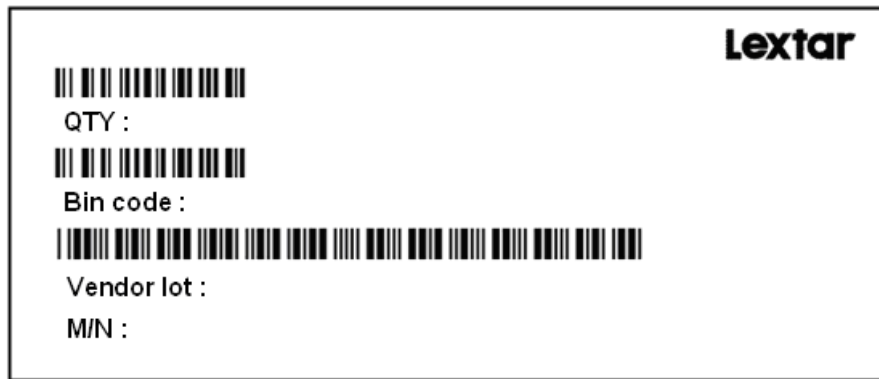
■ Emitter Pocket Tape Packing



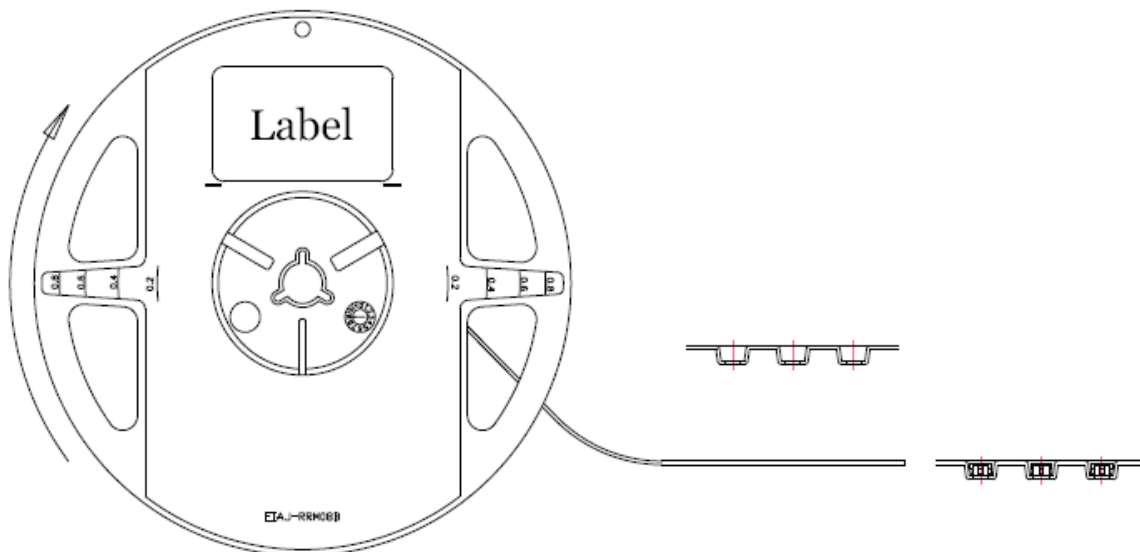
Unit : mm

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

■ **Label**



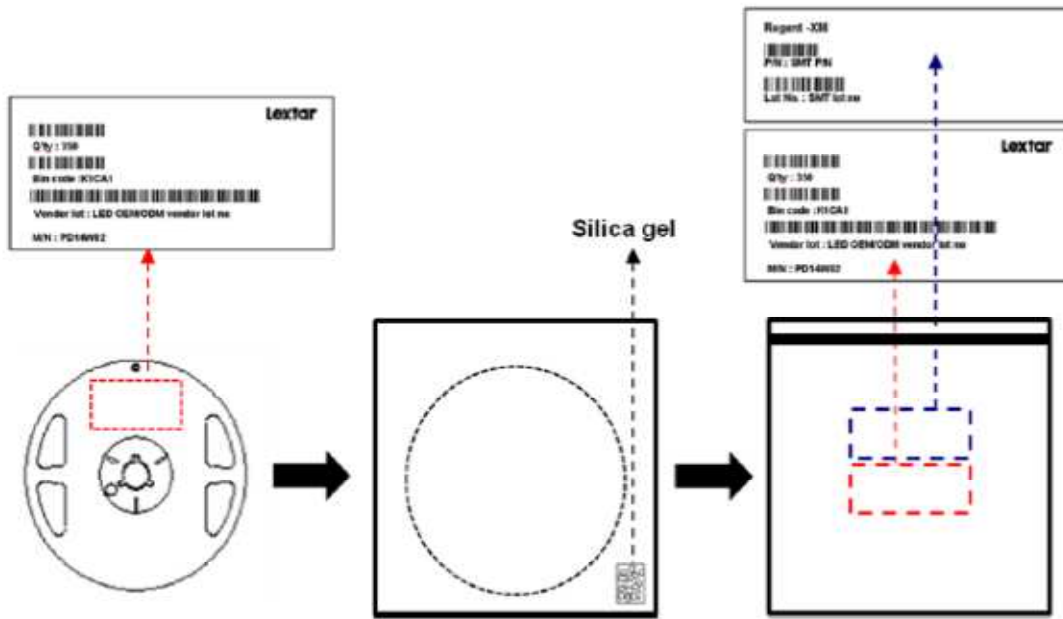
■ **Carrier Taping**



Notice:

1. 10 Sprocket hole pitch cumulative tolerance is  $\pm 0.20\text{mm}$ .
2. Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
3. Ao & Bo measured on a place in the middle of the corner radii.
4. Ko measured from a place on the inside bottom of the pocket to top surface of carrier.
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
6. Surface resistivity  $10^4 \sim 10^8$  ohm/sq.

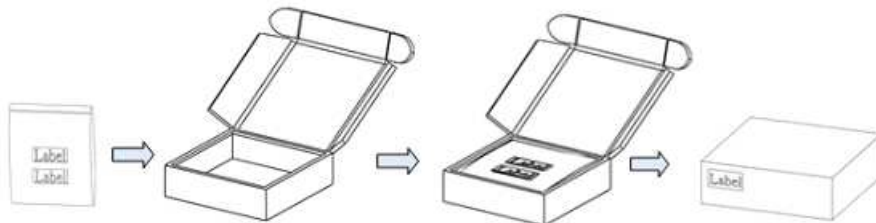
■ **Shield Bag Taping**



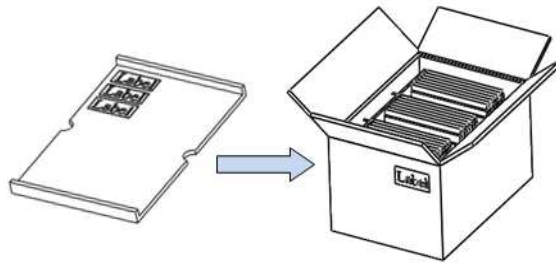
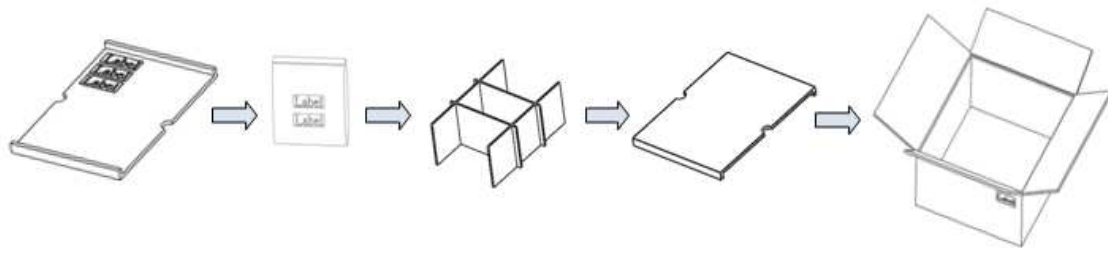
■ **Packing Box**

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

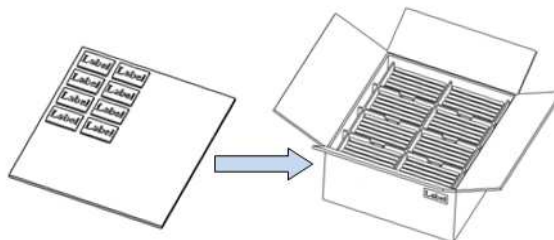
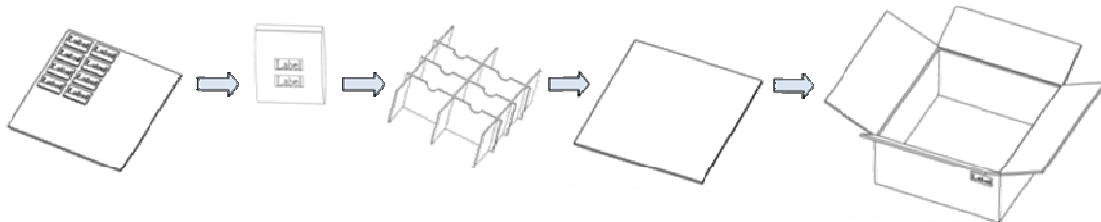
■ **Small Box**



■ **Medium Box**



■ **Large Box**





## Precautions

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### ■ 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

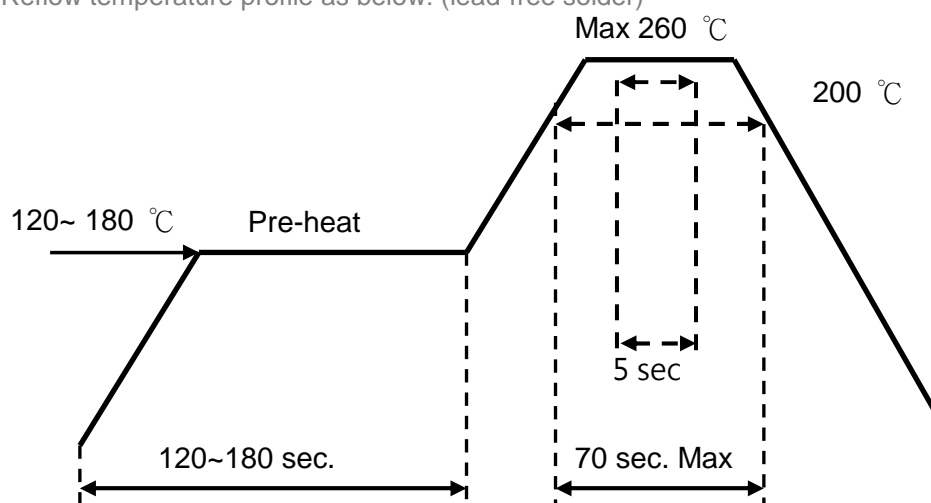
- When soldering LEDs, do not solder/reflow the same LED over two times.
- Recommend soldering conditions:

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
- After LEDs have been soldered, strongly recommend not to repair to keep the LEDs performance.

## Revision History

PF09Y02

Product Specification

Date	Contents	Writer	Approved
2017.10.31	1 <sup>st</sup> version	SK Chen	Sean Tsai

## *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. The company turnover in 2010 is 266 million USD.