

# Edixeon<sup>®</sup> KLC8 series



Edixeon<sup>®</sup> emitters are built with packages designed specifically for High Power LED. KLC8 series, the latest addition to Edixeon<sup>®</sup> family, utilize the advanced special manufacturing process by Edison Opto and the sophisticated EZ Bright 1000 chip from Cree Inc.

They can be driven at a current rating from 350mA to 1000mA (White) as you desire. With its versatility and exceptional luminous flux output, KLC8 Series is simply the ideal choice for your various illumination needs.

## Features

- More energy efficient than incandescent and most halogen lamps
- Low voltage operation
- Instant on
- Long life

## Typical Applications

- Reading lights
- Up-lights and Down-lights
- General lighting
- Ceiling lights
- Decoration lights
- Beacon lights
- Portable flashlight
- LCD Backlights
- Contour lights
- Garden lighting
- Architectural lighting

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## Edixeon® Coding Guideline

# E D E W – K L C 8 – B 3

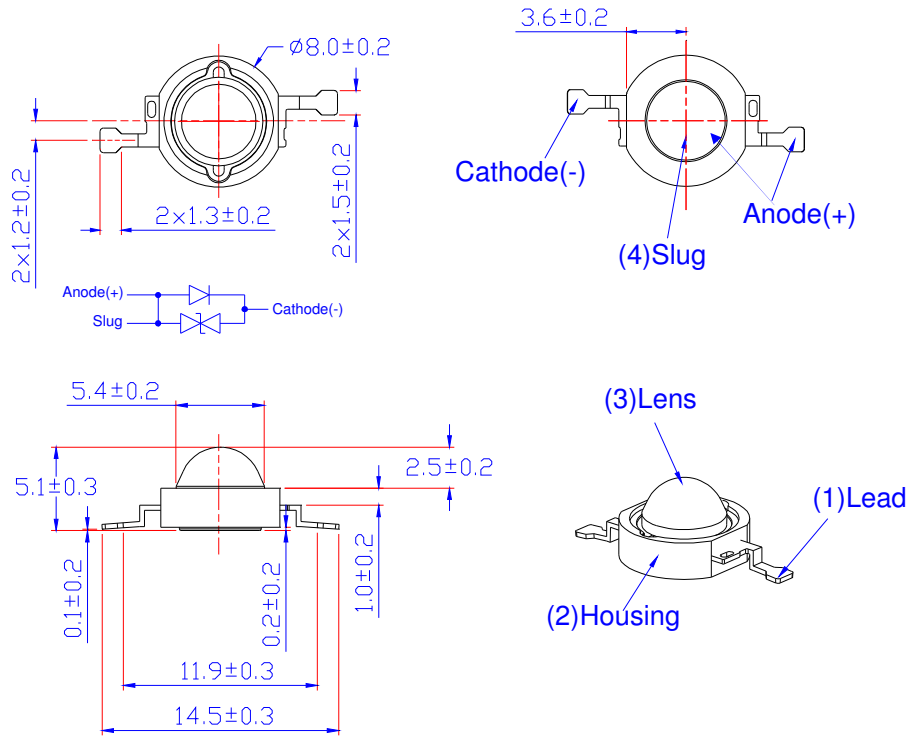
X1 X2 X3 X4 X5 X6 X7 X8 X9

X1 LED Item		X2 Module		X3 Emitting Color			X4 Power		X5 Lens Item		X6 Housing Item	
Code	Type	Code	Type	Code	Type		Code	Type	Code	Type	Code	Type
ED	Edixeon®	E	Emitter	W	White		K	Cree chip	L	Lambertian (140°)	A	White
		S	Star	X	Warm White		A	0.7W	B	Batwing (±40°)	B	Black-1
				R	Red		1	1W	S	Side Emitting (±80°)	C	Black-2
				O	Red Orange		3	3W	A	New Side Emitting (±80°)	D	Black-3
				A	Amber		5	5W	F	Focusing (80°)	E	Black-4
				T	True Green				G	Low Slug with Lambertian		
				B	Blue				E	Low Slug with Flat Lens		
				D	Dental Blue				H	High Dome Lambertian		
				C	Royal Blue							
				E	660nm							
				F	740nm							
				I	IR 850nm							
				N	IR 940nm							
				V	Ultraviolet							
				RTB	RGB 3 chips							
				RTA	RGA 3 chips							

X7 Material		X8 Phosphor Item		X9 Testing Current		X10 Shape Item		X11 Al PCB Color		X12 Thickness	
Code	Type	Code	Type	Code	Type	Code	Type	Code	Type	Code	Type
				1	350mA	A	Star	W	White	10	1.0mm
				3	700mA	B	Square(25*25mm)	G	Green	16	1.6mm
				5	1000mA	C	Square(35*35mm)	B	Black		

## Package Outlines

### Lambertian



### Notes:

1. All dimensions are measured in mm.
2. Drawings are not to scale.
3. It is strongly recommended that the temperature of lead dose not exceed  $55^{\circ}\text{C}$ .
4. The slug has polarity as anode.
5. It is strongly recommended to apply on electrically isolated heat conducting film between the slug and contact surfaces.

## Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
DC Forward Current	$I_F$	1000	mA
Peak pulse current;(tp ≤ 100μs, Duty cycle=0.25)	$I_{pulse}$	1500	mA
Reverse Voltage	$V_R$	5	V
Arc Voltage	$V_A$	8	V
LED junction Temperature	$T_J$	125	°C
Operating Temperature	$T_{opr}$	-30 ~ +110	°C
Storage Temperature	$T_{stg}$	-40 ~ +120	°C
ESD Sensitivity	$V_B$	4,000	V
Manual Soldering Time at 260°C (Max.)	$T_{sol}$	5	seconds

### Notes:

1. Proper current derating must be observed to maintain junction temperature below the maximum at all time.
2. LEDs are not designed to be driven in reverse bias.

## Luminous Flux Characteristics at $I_F=350mA$ and $T_J=25^\circ C$ :

Lens Item	Part Name	Color	Flux			Units
			Min.	Typ.	Max.	
Lambertian	EDEW-KLC8-B1	White	60.0	85.0	--	lm
	EDEH-KLC8-C1	Neutral White	30.3	45.0	--	lm
	EDEX-KLC8-C1	Warm White	30.3	45.0	--	lm
	EDEB-KLC8-01	Blue	13.8	20.0	--	lm

## Luminous Flux Characteristics at $I_F=700mA$ and $T_J=25^\circ C$ :

Lens Item	Part Name	Color	Flux			Units
			Min.	Typ.	Max.	
Lambertian	EDEW-KLC8-B3	White	110.0	140.0	--	lm
	EDEH-KLC8-C3	Neutral White	51.2	70.0	--	lm
	EDEX-KLC8-C3	Warm White	51.2	70.0	--	lm
	EDEB-KLC8-03	Blue	23.3	36.0	--	lm

### Luminous Flux Characteristics at $I_F=1000\text{mA}$ and $T_J=25^\circ\text{C}$ :

Lens Item	Part Name	Color	Flux			Units
			Min.	Typ.	Max.	
Lambertian	EDEW-KLC8-B5	White	<b>146.2</b>	<b>180.0</b>	--	lm
	EDEH-KLC8-C5	Neutral White	<b>66.5</b>	<b>90.0</b>	--	lm
	EDEX-KLC8-C5	Warm White	<b>66.5</b>	<b>90.0</b>	--	lm
	EDEB-KLC8-05	Blue	<b>30.3</b>	<b>45.0</b>	--	lm

### Color Temperature or Dominant Wavelength Characteristics $T_J=25^\circ\text{C}$

Lens Item	Part Name	Color	CCT/Wavelength			Units
			Min.	Typ.	Max.	
Lambertian	EDEW-KLC8-Bx	White	<b>5,000</b>	--	<b>10,000</b>	K
	EDEH-KLC8-Cx	Neutral White	<b>3,800</b>	--	<b>5,000</b>	K
	EDEX-KLC8-Cx	Warm White	<b>2,670</b>	--	<b>3,800</b>	K
	EDEB-KLC8-0x	Blue	<b>460</b>	--	<b>475</b>	nm

### Forward Voltage Characteristics at $T_J=25^\circ\text{C}$ :

Lens Item	Part Name	Forward Current (mA)	$V_F$			Units
			Min.	Typ.	Max.	
Lambertian	EDEx-KLC8-x1	350	<b>2.8</b>	--	<b>3.7</b>	V
	EDEx-KLC8-x3	700	<b>3.1</b>	--	<b>4.0</b>	
	EDEx-KLC8-x5	1000	<b>3.4</b>	--	<b>4.3</b>	

### Emission Angle Characteristics

Lens Item	Part Name	$2\theta_{1/2}$ (Typ.) Lambertian	Units
Lambertian	EDEx-KLC8-xx	<b>140</b>	Degrees

### Thermal Resistance Junction to Case Characteristics

Lens Item	Part Name	$R\theta_{J-B}$ Typ.	Units
Lambertian	EDEx-KLC8-xx	<b>10</b>	$^\circ\text{C/W}$

#### Notes:

1. Flux & power is measured with an accuracy of  $\pm 10\%$ .
2. CCT selection acc. to CCT groups and an accuracy of  $\pm 200\text{K}$
3. Forward Voltage is measured with an accuracy of  $\pm 0.1\text{V}$

### JEDEC Moisture Sensitivity:

Level	Floor Life		Soak Requirements			
	Time	Conditions	Standard		Accelerated Environment	
			Time (hours)	Conditions	Time (hours)	Conditions
2a	4 weeks	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	696 +5/-0	30°C / 60% RH	120 +1/-0	60°C / 60% RH

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Equivalent	
	Time	Condition	Time(hours)	Condition	Time(hours)	Condition
1	Unlimited	$\leq 30^{\circ}\text{C} / 85\% \text{RH}$	168 +5/-0	85 °C /85% RH		
2	1 year	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	168 +5/-0	85 °C /60% RH		
2a	4 weeks	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	696 <sup>1</sup> +5/-0	30 °C /60% RH	120 +1/-0	60 °C /60% RH
3	168 hours	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	192 <sup>1</sup> +5/-0	30 °C /60% RH	40 +5/-0	60 °C /60% RH
4	72 hours	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	96 <sup>1</sup> +5/-0	30 °C /60% RH	20 +5/-0	60 °C /60% RH
5	48 hours	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	72 <sup>1</sup> +5/-0	30 °C /60% RH	15 +5/-0	60 °C /60% RH
5a	24 hours	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	48 <sup>1</sup> +5/-0	30 °C /60% RH	10 +5/-0	60 °C /60% RH
6	Time on tabel (TOL)	$\leq 30^{\circ}\text{C} / 60\% \text{RH}$	TOL	30 °C /60% RH		

#### Notes:

1. The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag , and includes the maximum time allowed out of the bag at the distributor's facility.

**Operating life, mechanical, and environmental tests performed on Edixeon® package:**

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Room Temperature Operating Life	25°C, I <sub>F</sub> = max DC (Note 1)	1000 hours	Note 2
High Temperature High Humidity	85°C / 85%RH	1000 hours	Note 2
Temperature Cycle	-40°C/100°C ,30 min dwell / <5min transfer	200 cycles	Note 2
High Temperature Storage Life	110°C	1000 hours	Note 2
Low Temperature Storage Life	-55°C	1000 hours	Note 2
Thermal Shock	-40 / 120°C, 20 min dwell / <20 sec transfer	200 cycles	No catastrophics
Mechanical Shock	1500 G, 0.5 msec pulse, 5 shocks each 6 axis		No catastrophics
Solder Heat Resistance (SHR)	260°C ± 5°C, 10 sec		No catastrophics
Solderability	Steam age for 16 hr, then solder dip at 260°C for 5 sec		Solder coverage on lead

**Notes:**

1. Depending on the maximum derating curve.
2. Failure Criteria:
  - Electrical failures
    - V<sub>F</sub> shift >=10%
  - Light Output Degradation
    - % I<sub>v</sub> shift >= 30% @1,000hrs or 200cycle
  - Visual failures
    - Broken or damaged package or lead
    - Solderability < 95% wetting
    - Dimension out of tolerance

The MTBF of Edixeon® is based on the below formula.

$$\log(\text{Life}) = \frac{1,600}{T_J(^{\circ}\text{C}) + 273}$$

$T_J (^{\circ}\text{C})$	Life (hours)	$T_J (^{\circ}\text{C})$	Life (hours)
25	234,000	85	29,500
30	191,000	90	25,700
35	157,000	95	22,300
40	129,000	100	19,500
45	107,000	105	17,100
50	90,000	110	15,100
55	75,000	115	13,300
60	64,000	120	11,700
65	54,000	125	10,500
70	46,000	130	9,300
75	39,600	140	7,500
80	34,000	150	6,000

Life means the time when light output decay to 70%

The MTTF of Edixeon® is based on the following formula

MTTF is assumed to be 100,000,000

The failure rates at different hours and different systems(LED quantity) are as below:

if there is 1 failure of 1 emitter in a system

$T_J=75^{\circ}\text{C}$  is giving 0.01%(100ppm) at 10,000hrs

if there is 1 failure of 10 emitters in a system

$T_J=75^{\circ}\text{C}$  is giving 0.1%(1,000ppm) at 10,000hrs

if there is 1 failure of 1 emitter in a system

$T_J=75^{\circ}\text{C}$  is giving 0.05%(500ppm) at 50,000hrs

if there is 1 failure of 10 emitters in a system

$T_J=75^{\circ}\text{C}$  is giving 0.5%(5,000ppm) at 50,000hrs if there are 10 emitters

## How to Know T<sub>J</sub> in Your Application?

If it is white Edixeon<sup>®</sup>, Rth(junction to case)=10°C/W

The thermal grease is 200um.

Thermal conductivity of ALPCB=2.6 W/mk

$$\text{Then Rth(case to board)} = \frac{200}{2.6 \times (6.4/2)^2 \pi} = 2.4 \text{ } ^\circ\text{C/W}$$

The Rth between board and air is mainly dependent on the total surface area.

$$\text{Rth(board-air)} \doteq \frac{500}{\text{Area(cm}^2\text{)}}$$

If Area is 30cm<sup>2</sup> Rth=16.7 T(junction-air)=(10+2.4+16.7)x1=31.1 °C

If Area is 60cm<sup>2</sup> Rth=8.3 T(junction-air)=(10+2.4+8.3)x1=22.7 °C

If Area is 90cm<sup>2</sup> Rth=5.5 T(junction-air)=(10+2.4+5.5)x1=19.9 °C

## ASSIST FORM For High Power LED Reliability(Ex: Edixeon<sup>®</sup>@350mA)

	<u>Ts=45°C</u>	<u>Ts=65°C</u>	<u>Ts=85°C</u>
<b>Voltage</b>	3.3V	3.3V	3.3V
<b>Current</b>	350mA	350mA	350mA
<b>Wattage</b>	1.15W	1.15W	1.15W
<b>Heat</b>	0.92W	0.92W	0.92W
<b>Rth</b>	10 °C/W	10 °C/W	10 °C/W
<b>T<sub>J</sub></b>	54.2 °C	74.2 °C	94.2 °C
<b>L<sub>70%</sub></b>	64,000hrs	34,000hrs	19,500hrs

## Color Spectrum

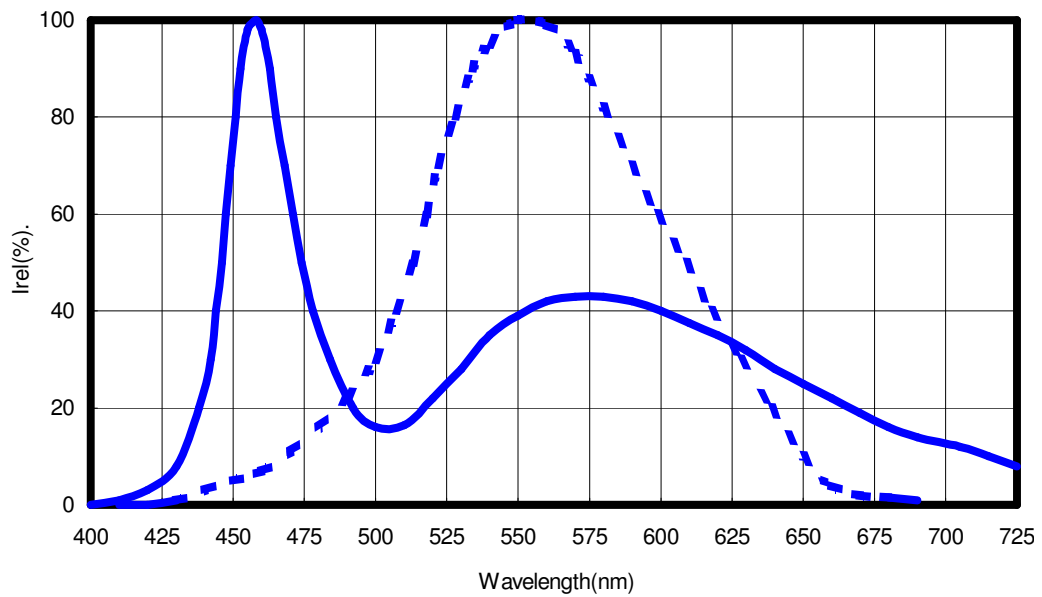


Figure 1. White color spectrum of typical CCT 、standard eyes response to dotted curve line at  $T_J=25^{\circ}\text{C}$  .

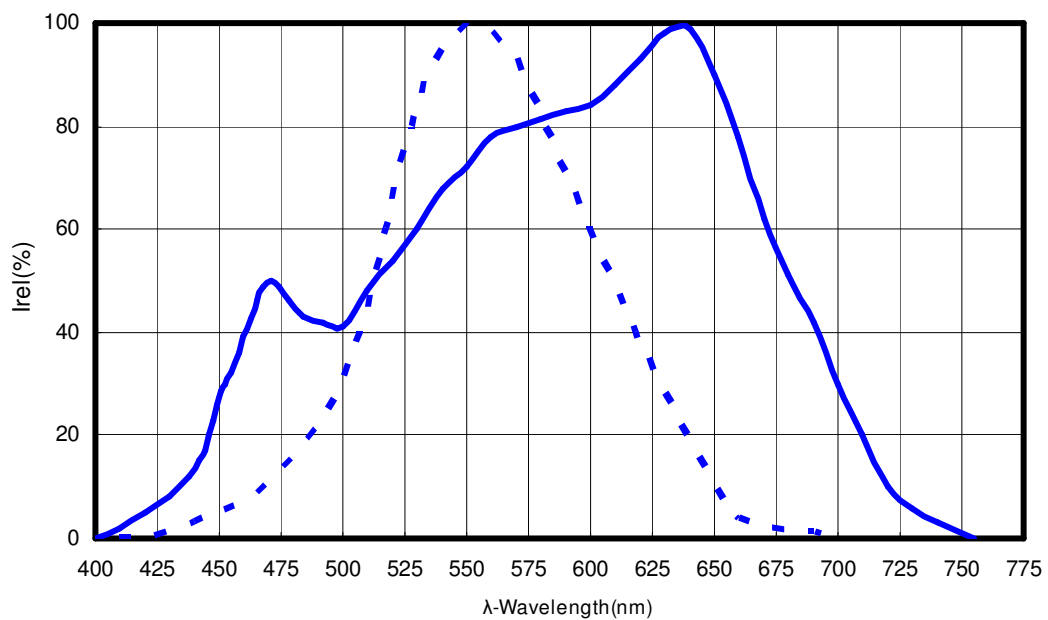


Figure 2. EDEX-KLC8-Cx 、EDEH-KLC8-Cx ,Neutral White & Warm white color spectrum of typical CCT 、standard eyes response to dotted curve line  $T_J=25^{\circ}\text{C}$  .

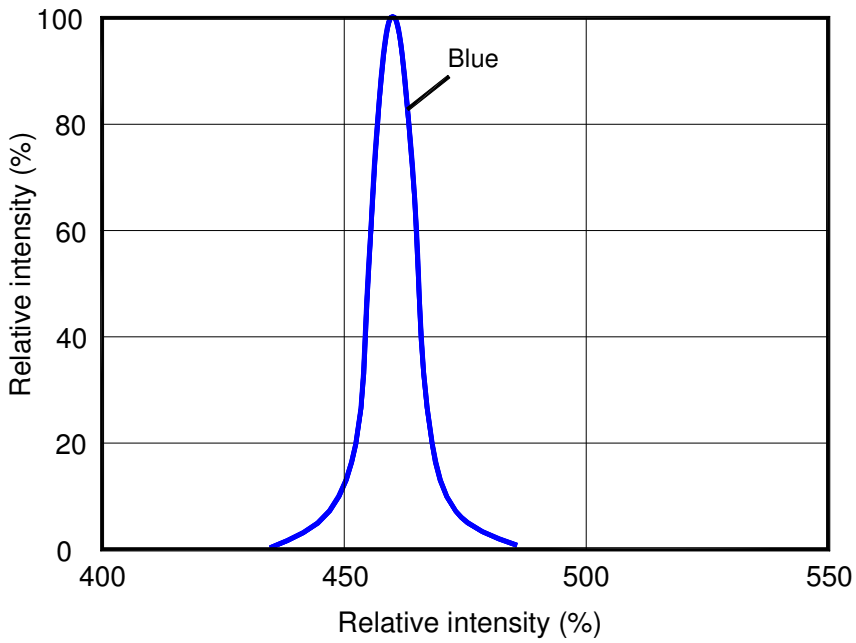


Figure 3. Blue typical wavelength at  $T_J=25^{\circ}\text{C}$ .

### Typical Radiation Patterns

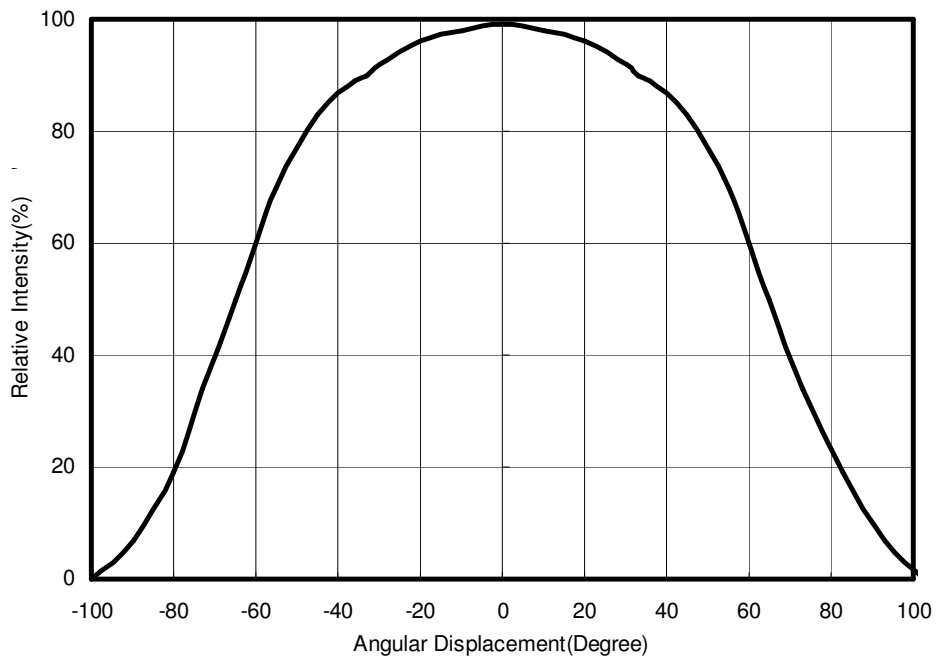


Figure 5.Lambertain for all colors at  $T_J=25^{\circ}\text{C}$ .

**Electric & Optical curves:**

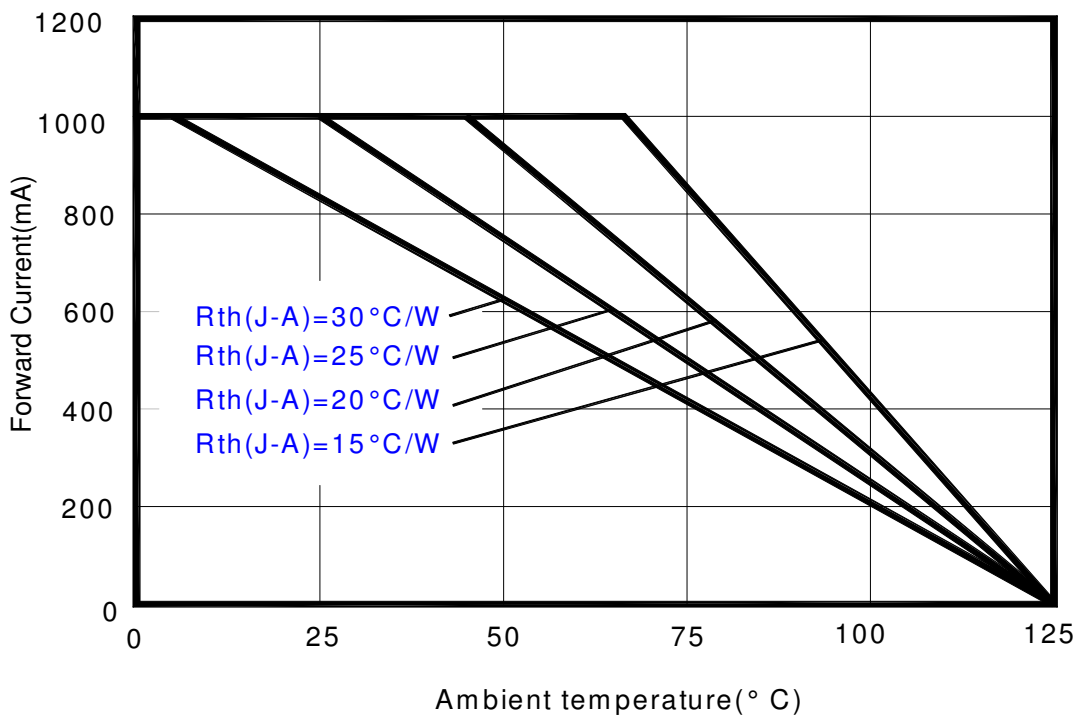


Figure 6. Forward Current & Ambient Temperature

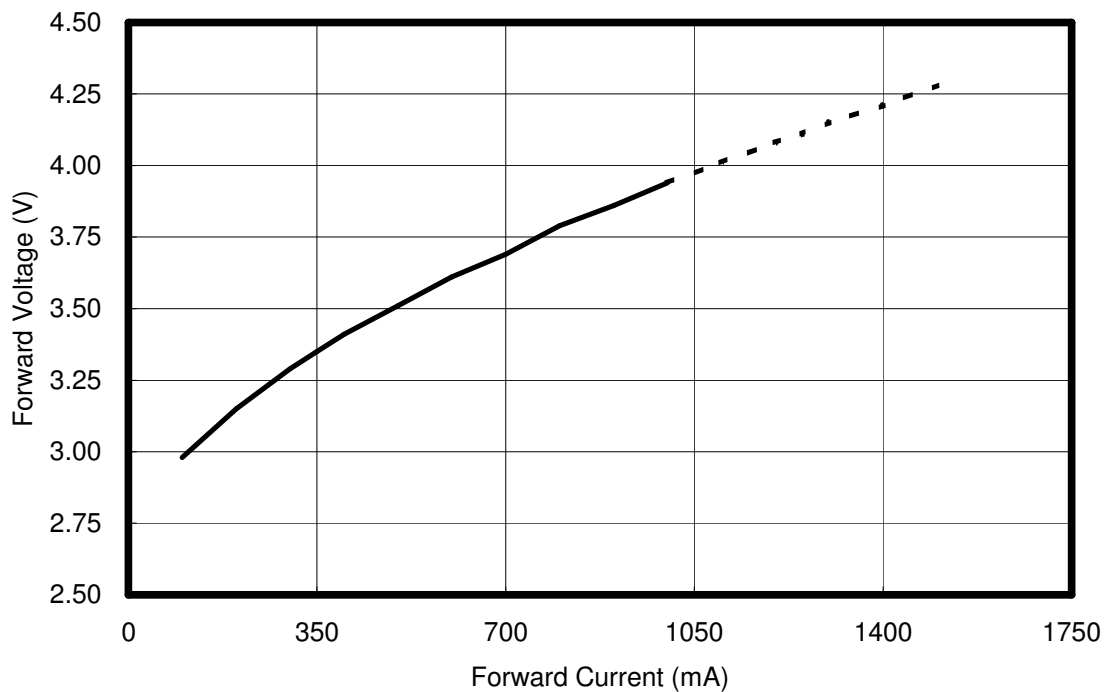


Figure 7. Forward Current & Forward Voltage for all colors at  $T_J = 25^\circ C$

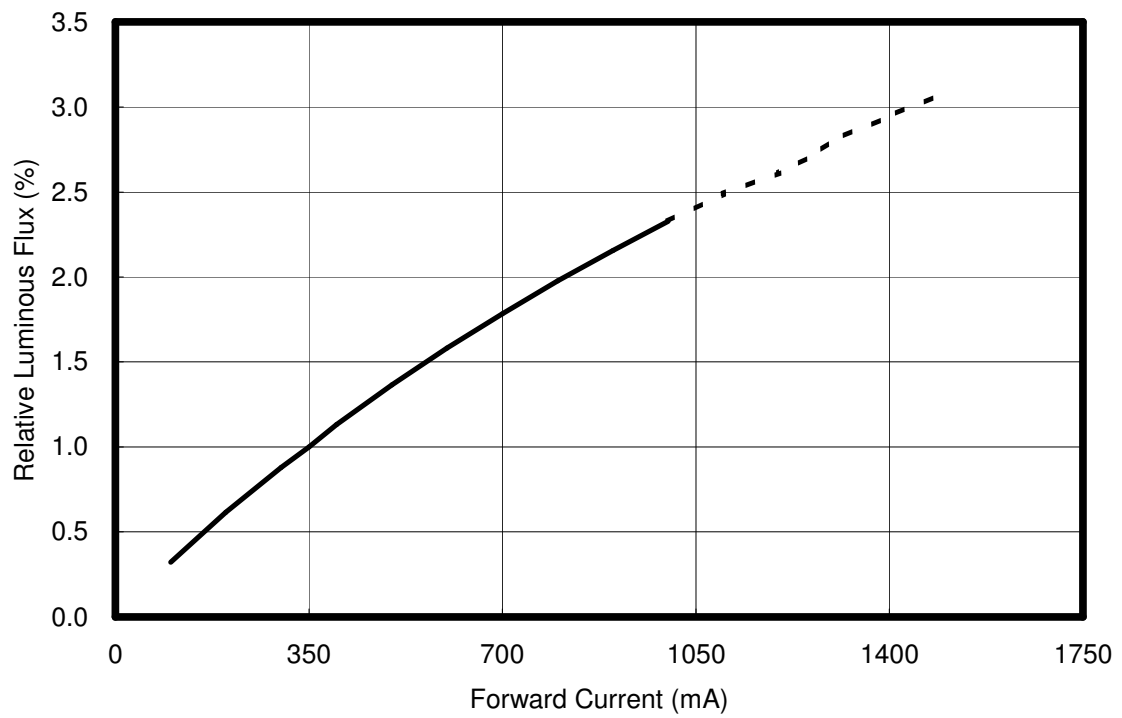


Figure 8. Forward Current & Relative Luminous for all colors at  $T_J=25^{\circ}\text{C}$

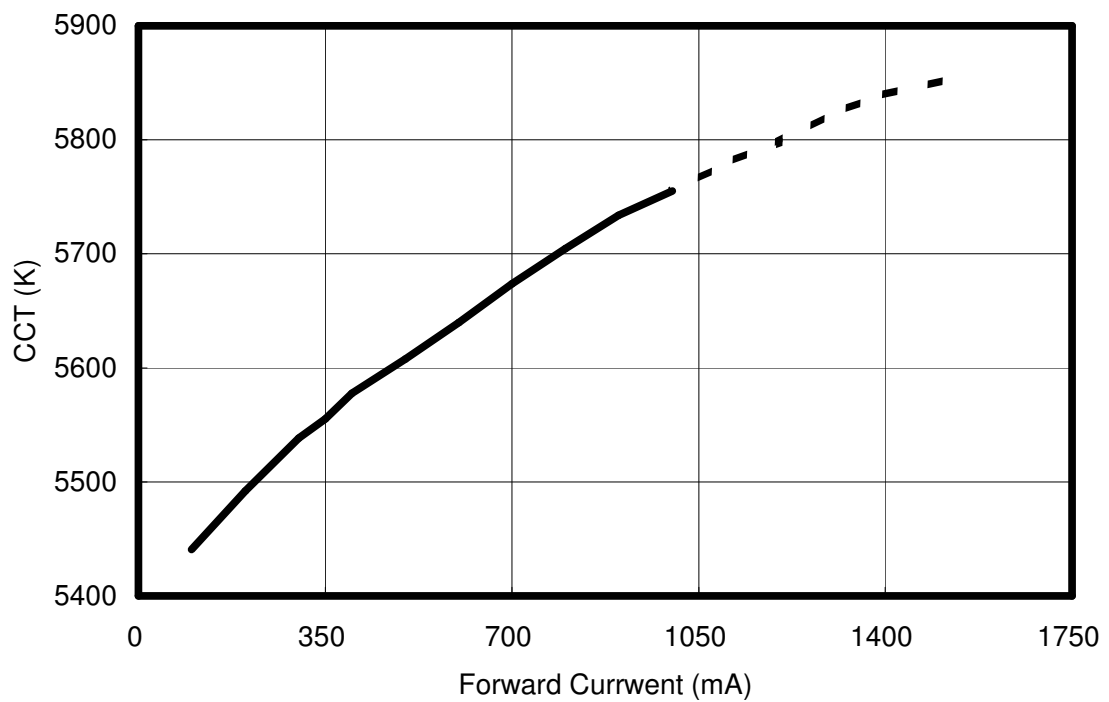


Figure 9. Forward Current & CCT for White at  $T_J=25^{\circ}\text{C}$

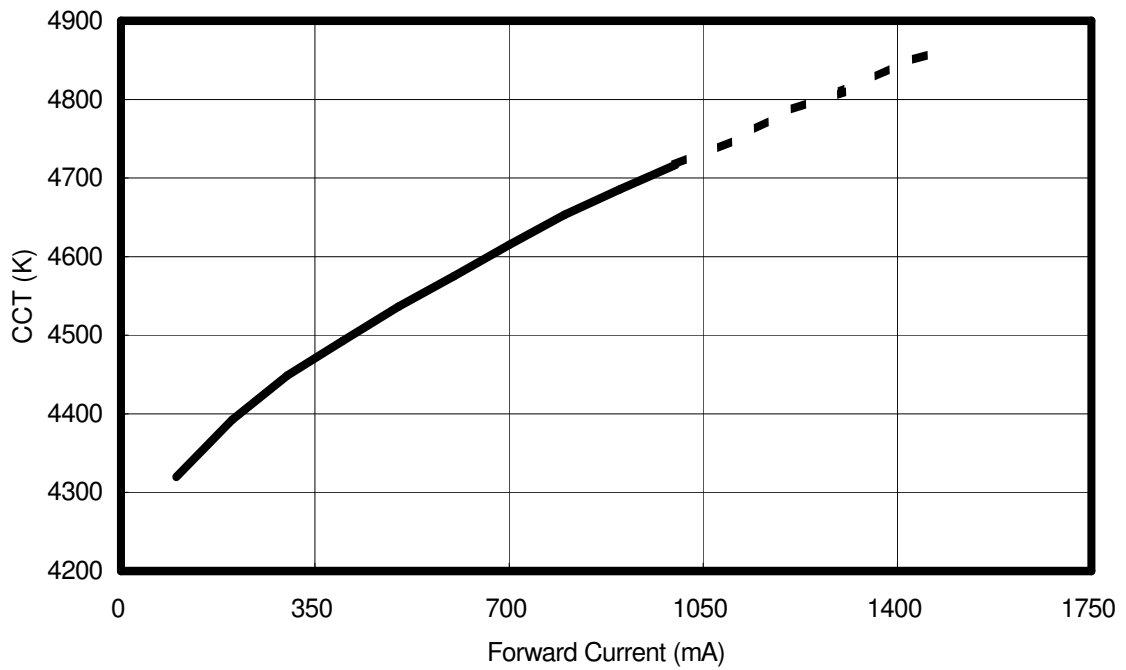


Figure 10. Forward Current & CCT for Neutral white at  $T_J=25^\circ\text{C}$

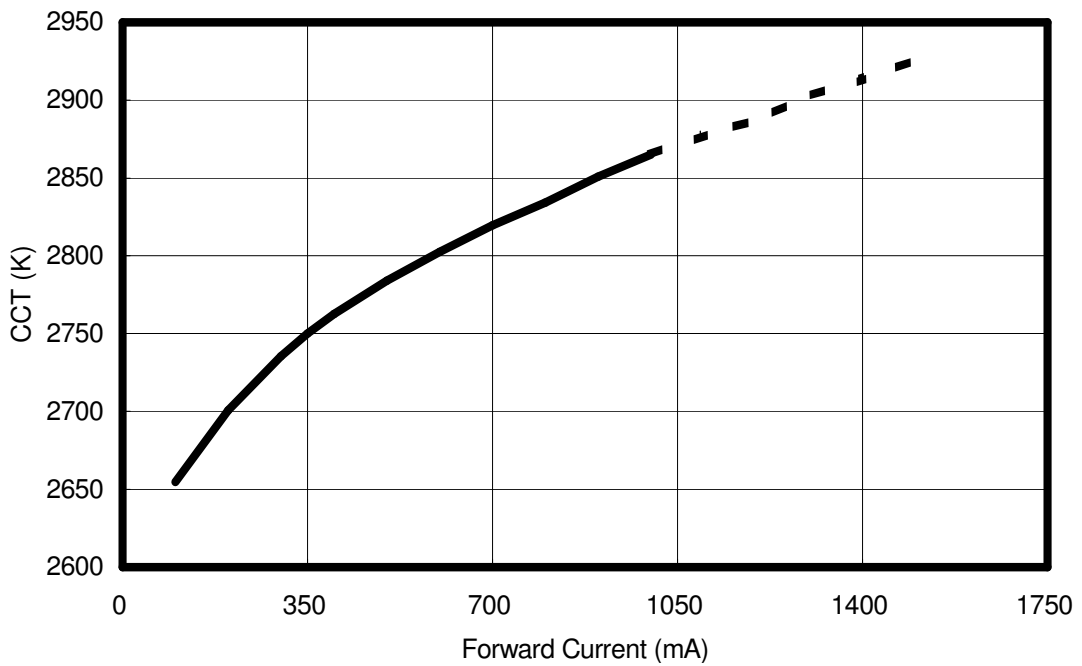


Figure 11. Forward Current & CCT for Warm white at  $T_J=25^\circ\text{C}$

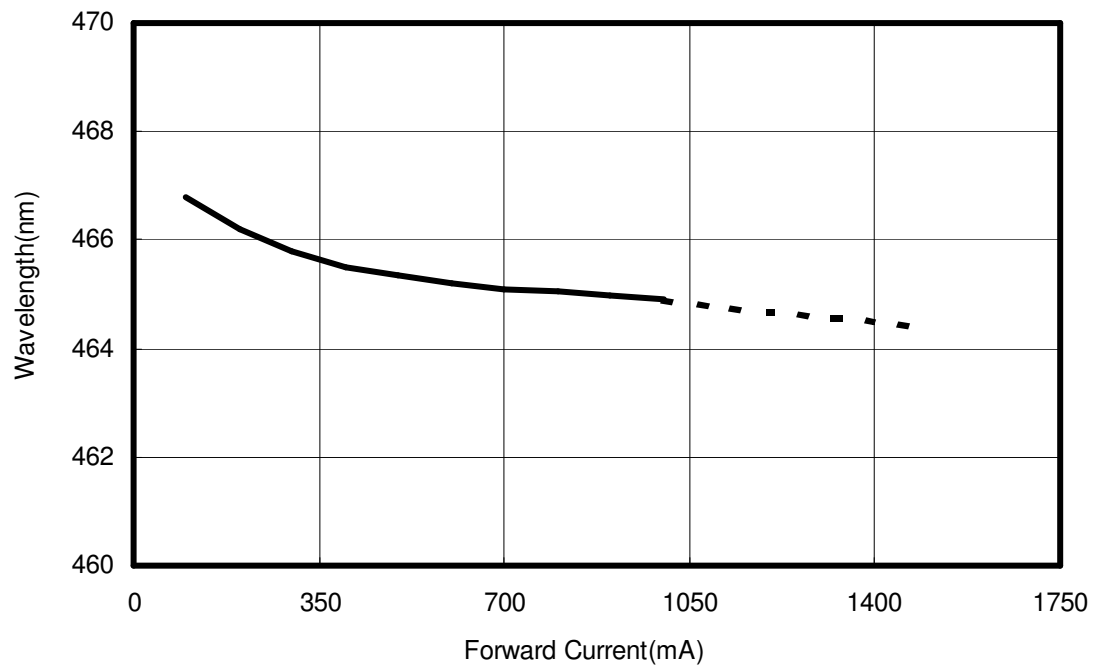
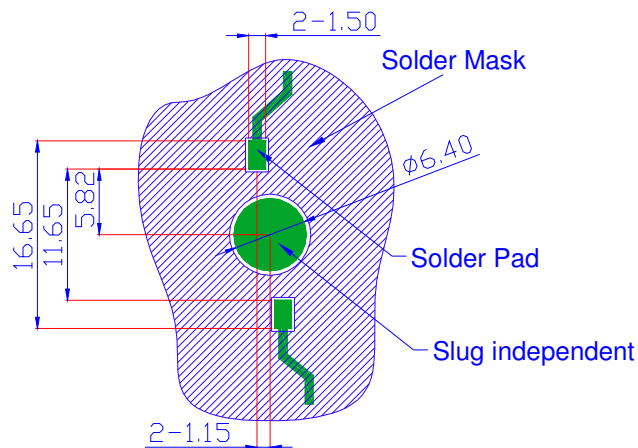


Figure 12. Forward Current & Wavelength for Blue at  $T_J=25^{\circ}\text{C}$

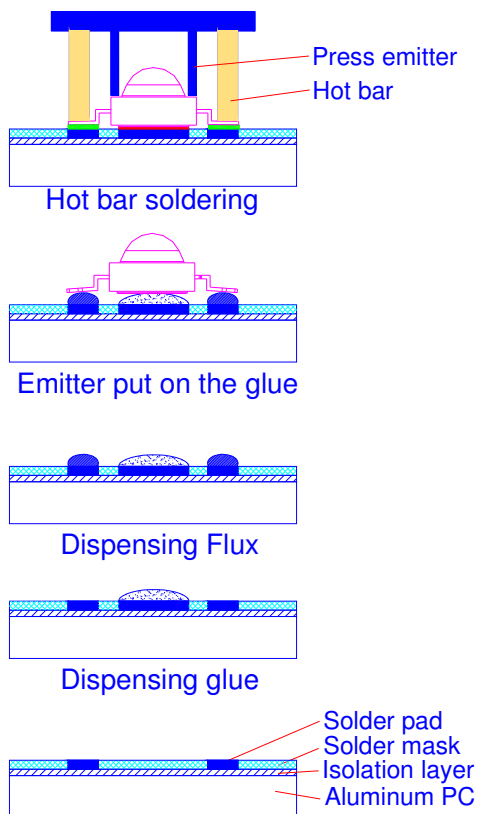
## Recommended Solder Pad Design



### Notes:

1. All dimensions are measured in mm.
2. The drawings are not to scale
3. Solder pad cannot be connected to slug.

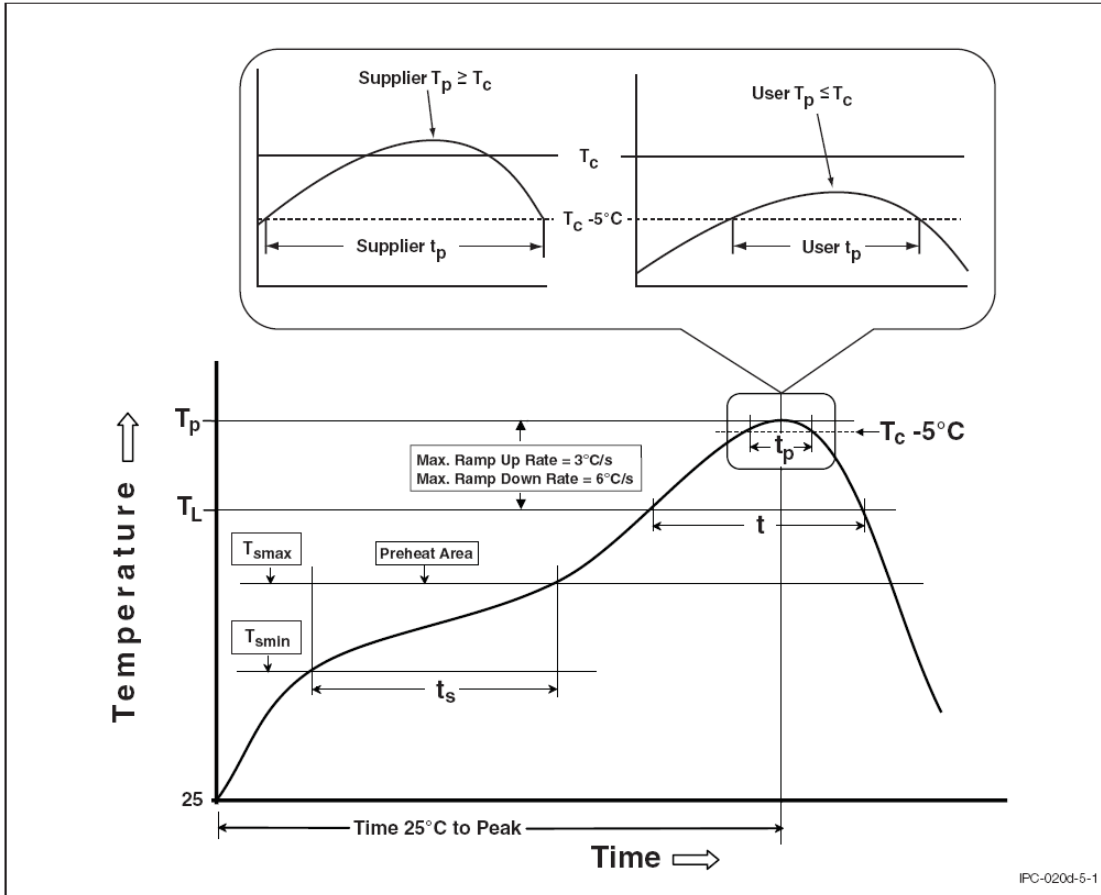
## Recommend Solder Steps



### Notes:

1. Aluminum PCB material with a thermal conductivity greater than 3.0 W/mK.
2. Solder pad cannot be connected to slug.
3. Please avoid touching the Edixeon<sup>®</sup> lens during assembly processes. This may cause pollution or scratch on the surface of lens.
4. Thermal glue with a thermal conductivity greater than 3.0 W/mK and the thickness must be less than 50 $\mu$ m.

## Recommended Profile for Reflow Soldering



### Table of Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
<b>Preheat &amp; Soak</b>		
Temperature min ( $T_{smin}$ )	100 °C	150 °C
Temperature max ( $T_{smax}$ )	150 °C	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max.	3 °C/second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time at liquidous ( $t_l$ )	60-150 seconds	60-150 seconds
Peak package body temperature ( $T_p$ )*	See classification temp in Table 4.1	See classification temp in Table 4.2
Time ( $t_p$ )** within 5 °C of the specified classification temperature ( $T_c$ )	20** seconds	30** seconds
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6 °C/second max.	6 °C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

\* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.  
 \*\* Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

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## Suggested Properties Adhesive Selection For

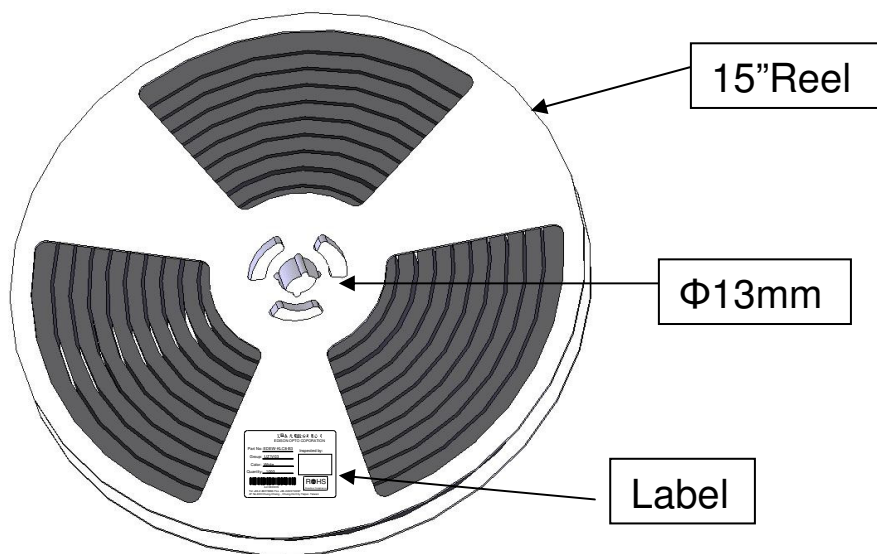
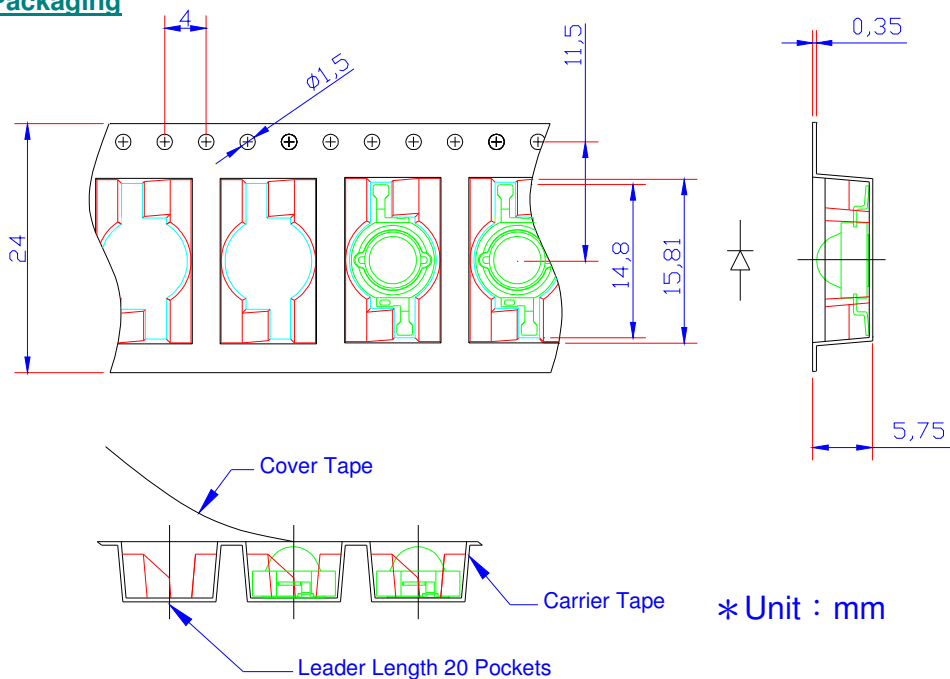
### Suggestion:

- **Ease of use**
  - Non-solvent, One-part
- **Fast tack free**
  - 3 minutes at 25°C
- **No corrosion**
  - Alcohol type of RTV
- **Low volatility**
  - Low weight loss of silicone volatiles
- **Adhesion**
  - Excellent adhesion to most materials without use of a primer
- **Dielectric properties**
  - Cured rubber exhibits good dielectric properties
- **Excellent thermal stability and cold resistance**
  - Cured rubber provides wide service temperature range

### Typical Properties

Specification	Suggested Properties
Take-free time	3~10 minutes
Specific gravity	< 3 g/cm <sup>2</sup>
Thermal conductivity	> 3 W/mK
Rth in using	< 1.8 °C/W
Volume resistance	> 1x10 <sup>14</sup>
Lap shear adhesion strength	> 200 N/ cm <sup>2</sup>
Tensile strength	> 4 Mpa

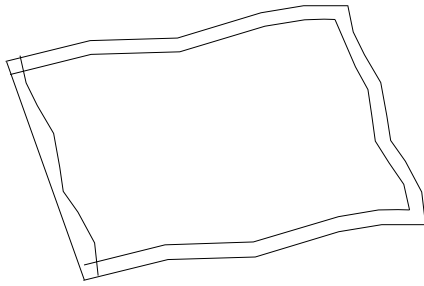
## Reel Packaging



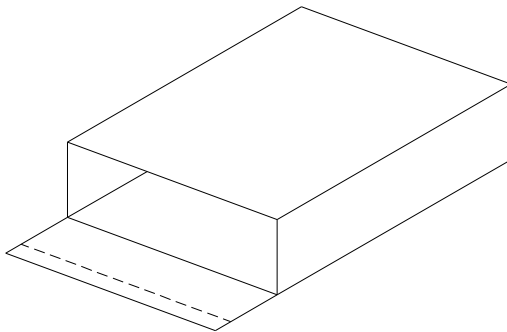
## The Label

	艾笛森光電股份有限公司 EDISON OPTO COPORATION
Part No: <u>EDEWKL C8-B3</u>	Inspected by:
Group: <u>UV1V08</u>	
Color: <u>White</u>	
Quantity: <u>1000</u>	
	
A410000005	Directive Compliance
Tel +86-2-82276996 Fax +86-2-8227-6997 4F No.800 Chung-Cheng ., Chung-Ho City Taipei. Taiwan	

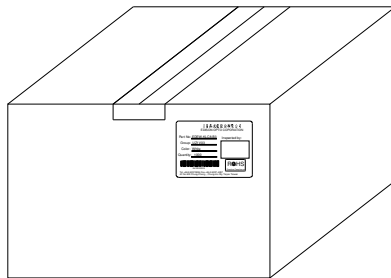
**Packaging Step:**



**1 reel in a bag.**



**2 bags in an inner box.**



**2 inner boxes in an outer box.**

**Notes:**

1. All dimensions are in mm.
2. There are 1000pcs emitters in a full reel
3. There is one reel in a bag
4. There are 2 bags in an inner box
5. There are 2 inner boxes in an outer box
6. A bag contains one humidity indicator card and drying agent

Packing Step	Type	Dimension(mm)	Emitter Q'ty(Max.)
1	Reel	$\Phi 380*30.0$	1,000
2-1	Bag	380*30.0	1,000
2-2	Inner Box	400*385*56	2,000
3	Outer Box	425*405*320	10,000