High Power LED

RC Edixeon® Emitter
KLC8 Series

Designer	Checker	Approval

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Version：1.0
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Edixeon® KLC8 series

Edixeon® emitters are one of the highest flux LEDs in the world by Edison Opto. Edixeon® emitters are designed to satisfy more and more Solid-State lighting High Power LED applications for brilliant world such as indoor and outdoor decoration light. Edixeon® emitters are designed by particular package for High Power LED. KLC8 series Edixeon® can be driven current from 350mA to 700mA in same package. Edixeon contains no mercury and has more energy efficient than other incandescent light source.

Features

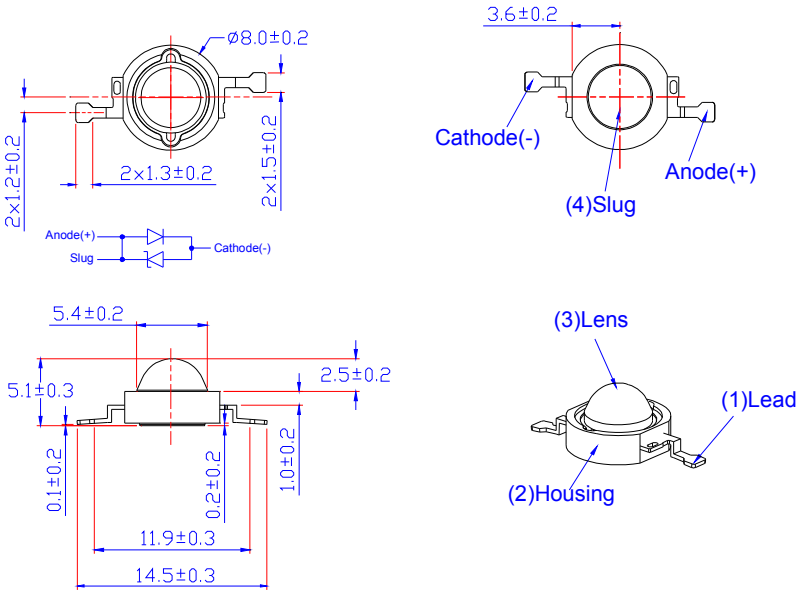
- More energy efficient than incandescent and most halogen lamps
- Low voltage operated
- Instant light
- Long operating life

Typical Applications

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

Package Outlines

Lambertian



Notes:

1. All dimensions are in mm.
2. Drawings are not to scale.
3. It is strongly recommended that the temperature of lead be not higher than 55℃.
4. The slug has polarity as anode.
5. It is important that the slug can't contact aluminum surface, It is strongly recommended that there should coat a uniform electrically isolated heat dissipation film on the aluminum surface.

Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
DC Forward Current	I_F	**700**	mA
Reverse Voltage	V_R	**5**	V
Arc Voltage	V_{FC}	**16**	V
LED junction Temperature	T_j	**150**	℃
Operating Temperature	T_{opr}	**-30 ~ +110**	℃
Storage Temperature	T_{stg}	**-40 ~ +120**	℃
ESD Sensitivity	V_B	**4,000**	V
Manual Soldering Time at 260℃(Max.)	T_{sol}	**5**	*seconds*

Notes:

1. **Proper current derating must be observed to maintain junction temperature below the maximum.**
2. **LEDs are not designed to be driven in reserve bias.**

Luminous Flux or Radiometric Power Characteristics at I_F=350mA and T_J=25℃:

Lens Item	Part Name	Color	Flux/Power			Units
			Min.	Typ.	Max.	
Lambertian	**EDEW-KLC8-B1**	White	***66.5***	***85.0***	**--**	*lm*
	EDEX-KLC8-A1	Warm White	***51.2***	***70.0***	**--**	*lm*
	EDEB-KLC8-01	Blue	***13.8***	***20.0***	**--**	*lm*
	EDED-KLC8-01	Dental Blue	***170.9***	***280.0***	**--**	*mW*
	EDEC-KLC8-01	Royal Blue	***170.9***	***280.0***	**--**	*mW*

Luminous Flux or Radiometric Power Characteristics at I_F=700mA and T_J=25℃:

Lens Item	Part Name	Color	Flux/Power			Units
			Min.	Typ.	Max.	
Lambertian	**EDEW-KLC8-B3**	White	***112.5***	***160.0***	**--**	*lm*
	EDEX-KLC8-A3	Warm White	***86.5***	***130.0***	**--**	*lm*
	EDEB-KLC8-03	Blue	***23.3***	***36.0***	**--**	*lm*
	EDED-KLC8-03	Dental Blue	***384.4***	***520.0***	**--**	*mW*
	EDEC-KLC8-03	Royal Blue	***384.4***	***520.0***	**--**	*mW*

Color Temperature or Dominant Wavelength[*1] or Peak Wavelength[*2] T_J=25℃ Characteristics

Lens Item	Part Name	Color	CCT			Units
			Min.	Typ.	Max.	
Lambertian	**EDEW-KLC8-Bx**	White	***4,500***	**--**	***10,000***	*K*
	EDEX-KLC8-Ax	Warm White	***2,800***	**--**	***3,800***	*K*
	EDEB-KLC8-0x	Blue[*1]	***460***	**--**	***475***	*nm*
	EDED-KLC8-0x	Dental Blue[*2]	***450***	**--**	***460***	*nm*
	EDEC-KLC8-0x	Royal Blue[*2]	***440***	**--**	***450***	*nm*

Forward Voltage Characteristics at T_J=25℃:

Lens Item	Part Name	Forward Current (mA)	V_F			Units
			Min.	Typ.	Max.	
Lambertian	**EDEx-KLC8-x1**	350	***2.8***	**--**	***3.7***	*V*
	EDEx-KLC8-x3	700	***3.1***	**--**	***4.0***	

Emission Angle Characteristics

Lens Item	Part Name	2Θ½(Typ.) Lambertian	Units
Lambertian	**EDEx-KLC8-xx**	***120***	Degrees

Thermal Resistance Junction to Case Characteristics

Lens Item	Part Name	$R\theta_{J-B}$ Typ.	Units
Lambertian	**EDEx-KLC8-xx**	***12***	℃/W

Luminous Flux or Radiometric Power[*1] Bin Group:

Part No.	Test Current(mA)	Group	Min.	Max.
EDEW-KLC8-B1	350	T	66.5	86.5
		U	86.5	112.5
EDEW-KLC8-B3	700	V	112.5	146.2
		W	146.2	190.0
EDEX-KLC8-A1	350	S	51.2	66.5
		T	66.5	86.5
EDEX-KLC8-A3	700	U	86.5	112.5
		V	112.5	146.2
EDEB-KLC8-01	350	M	13.8	17.9
		N	17.9	23.3
EDEB-KLC8-03	700	P	23.3	30.3
		Q	30.3	39.4
EDED-KLC8-01[*1]	350	H	170.9	256.3
		J	256.3	384.4
EDED-KLC8-03[*1]	700	K	384.4	576.7
		L	576.7	865.0
EDEC-KLC8-01[*1]	350	H	170.9	256.3
		J	256.3	384.4
EDEC-KLC8-03[*1]	700	K	384.4	576.7
		L	576.7	865.0

Note

1. Flux & power is measured with an accuracy of ± 10%.
2. CCT selection acc. to CCT groups and an accuracy of ± 200K
3. Forward Voltage is measured with an accuracy of ± 0.1V

JEDEC Moisture Sensitivity:

Level	Floor Life		Soak Requirements			
			Standard		Accelerated Environment	
	Time	Conditions	Time (hours)	Conditions	Time (hours)	Conditions
2a	**4 weeks**	**≦30℃ / 60% RH**	**696 +5/-0**	**30℃ / 60% RH**	**120 +1/-0**	**60℃ / 60% RH**

	FLOOR LIFE		SOAK REQUIREMENTS			
			STANDARD		ACCELERATED EQUIVALENT [1]	
LEVEL	TIME	CONDITIONS	TIME (hours)	CONDITIONS	TIME (hours)	CONDITIONS
1	Unlimited	≤30°C/85% RH	168 +5/-0	85°C/85% RH		
2	1 year	≤30°C/60% RH	168 +5/-0	85°C/60% RH		
2a	4 weeks	≤30°C/60% RH	696[2] +5/-0	30°C/60% RH	120 +1/-0	60°C/60% RH
3	168 hours	≤30°C/60% RH	192[2] +5/-0	30°C/60% RH	40 +1/-0	60°C/60% RH
4	72 hours	≤30°C/60% RH	96[2] +2/-0	30°C/60% RH	20 +0.5/-0	60°C/60% RH
5	48 hours	≤30°C/60% RH	72[2] +2/-0	30°C/60% RH	15 +0.5/-0	60°C/60% RH
5a	24 hours	≤30°C/60% RH	48[2] +2/-0	30°C/60% RH	10 +0.5/-0	60°C/60% RH
6	Time on Label (TOL)	≤30°C/60% RH	TOL	30°C/60% RH		

Note

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℃, I_F = max DC (Note 1)	1000 hours	Note 2
High Temperature High Humidity	85℃ / 85%RH	1000 hours	Note 2
Temperature Cycle	-40℃/100℃ ,30 min dwell /＜5min transfer	200 cycles	Note 2
High Temperature Storage Life	110℃	1000 hours	Note 2
Low Temperature Storage Life	-55℃	1000 hours	Note 2
Thermal Shock	-40 / 120℃, 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
Natural Drop	On concrete from 1.2 m, 3X		No catastrophics
Variable Vibration Frequency	10-2000-10 Hz, log or linear sweep rate, 20 G about 1 min, 1.5 mm, 3X/axis		No catastrophics
Solder Heat Resistance (SHR)	260℃ ± 5℃, 10 sec		No catastrophics
Solderability	Steam age for 16 hr, then solder dip at 260℃ for 5 sec		Solder coverage on lead

Note

1. **Depending on the maximum derating curve.**
2. **Failure Criteria:**

Electrical failures

V_F shift >=10%

I_R<50uA @Vr=5V

Light Output Degradation

% Iv shift >= 30% @1,000hrs or 200cycle

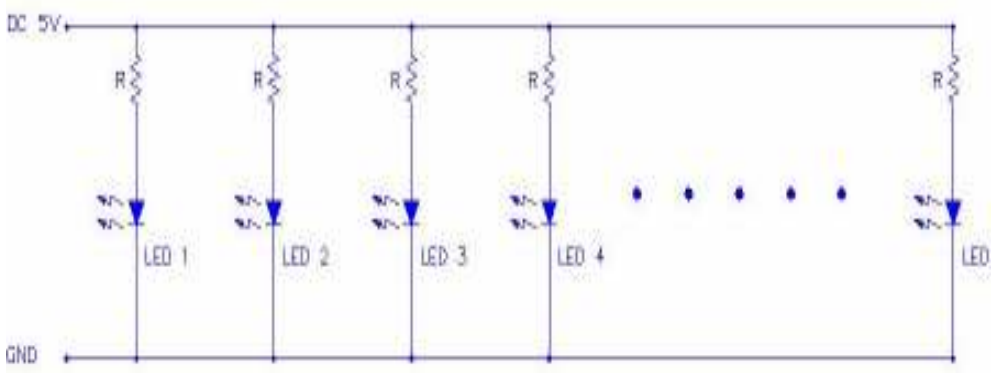
Visual failures

Broken or damaged package or lead

Solderability < 95% wetting

Dimension out of tolerance

Burn-in Condition Edixeon® Reliability



When we talk about MTBF of Edixeon®, we can provide a formula for customers.

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

Life means the time light output becomes 70%

Tj (°C)	Life (hours)	Tj (°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*

When we talk about MTTF of Edixeon®, we can provide a formula for customers_

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

Tj=75℃ is giving 0.01%(100ppm) at 10,000hrs

if there is 1 failure of 10 emitters in a system

Tj=75℃ is giving 0.1%(1,000ppm) at 10,000hrs

if there is 1 failure of 1 emitter in a system

Tj=75℃ is giving 0.05%(500ppm) at 50,000hrs

if there is 1 failure of 10 emitters in a system

Tj=75℃ is giving 0.5%(5,000ppm) at 50,000hrs if there are 10 emitters

How to Know Tj in Your Application?

If it is white Edixeon®, Rth(junction to case)=15°C/W

The thermal grease is 200um.

K(Aluminum PCB)=2.6 W/mk

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

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

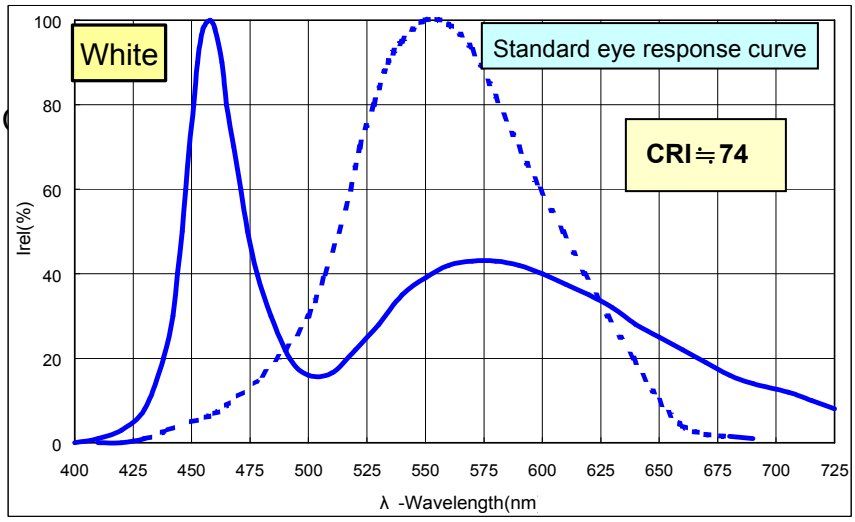
Rth(board-air) ≒ $\frac{500}{\text{Area}(\text{cm}^2)}$

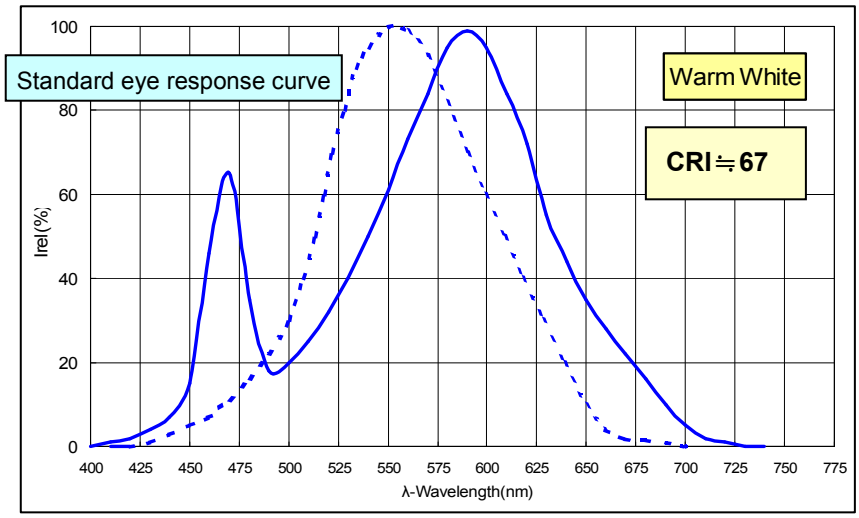
If Area is 30cm^2	Rth=16.7	T(junction-air)=(15+2.4+16.7)x1=34.1 °C
If Area is 60cm^2	Rth=8.3	T (junction-air)=(15+2.4+8.3)x1=25.7 °C
If Area is 90cm^2	Rth=5.5	T (junction-air)=(15+2.4+5.5)x1=22.9 °C

ASSIST FORM about High Power LED Reliability(Ex: Edixeon®@350mA)

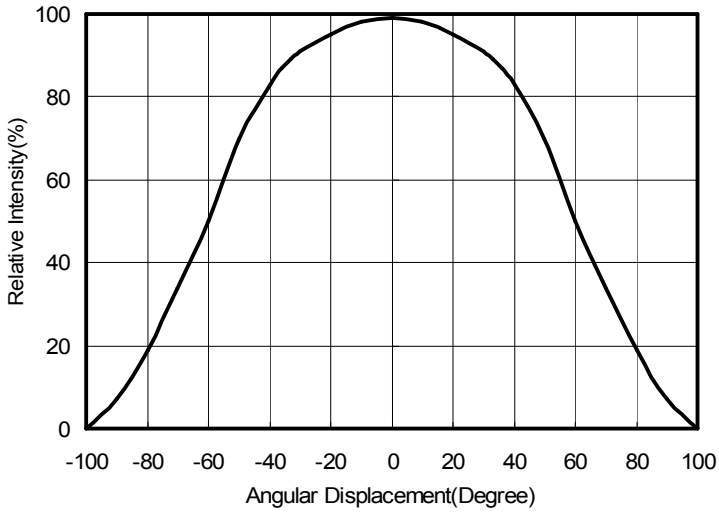
	Ts=45°C	Ts=65°C	Ts=85°C
Voltage	3.3V	3.3V	3.3V
Current	350mA	350mA	350mA
Wattage	1.15W	1.15W	1.15W
Heat	0.96W	0.96W	0.96W
Rth	15 °C/W	15 °C/W	15 °C/W
Tj	59 °C	80.6 °C	99.4 °C
$L_{70\%}$	64,000hrs	34,000hrs	19,500hrs

Electrical & Optical Curves-Spectrum





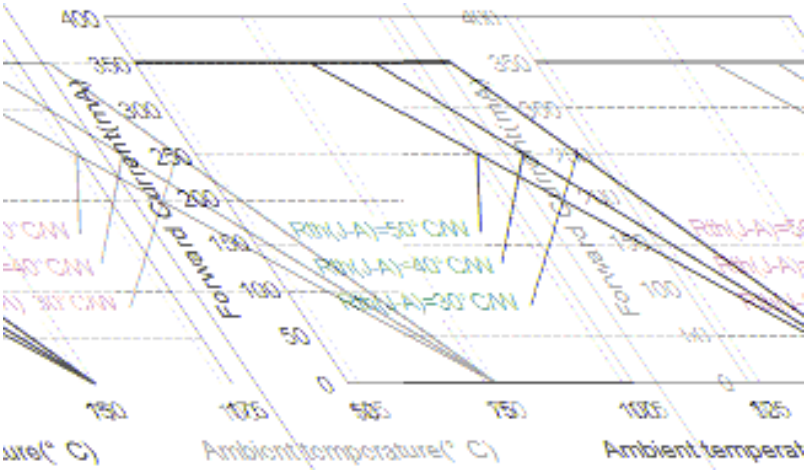
Typical Radiation Pattern



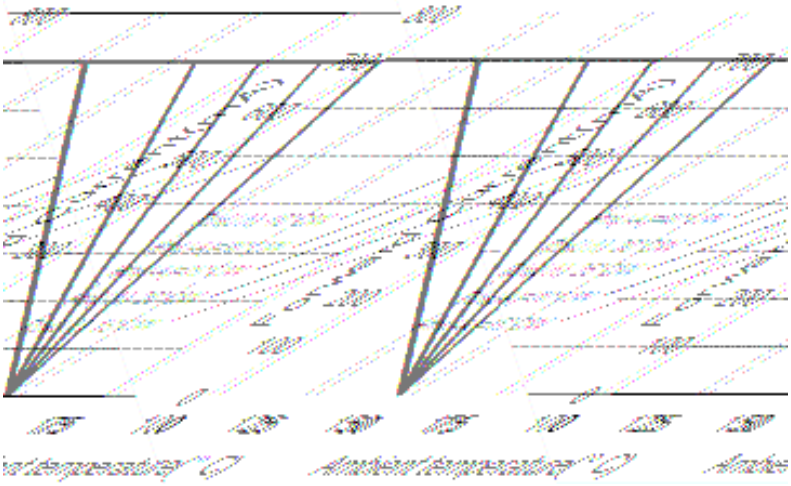
Typical Optical and Electrical Curves

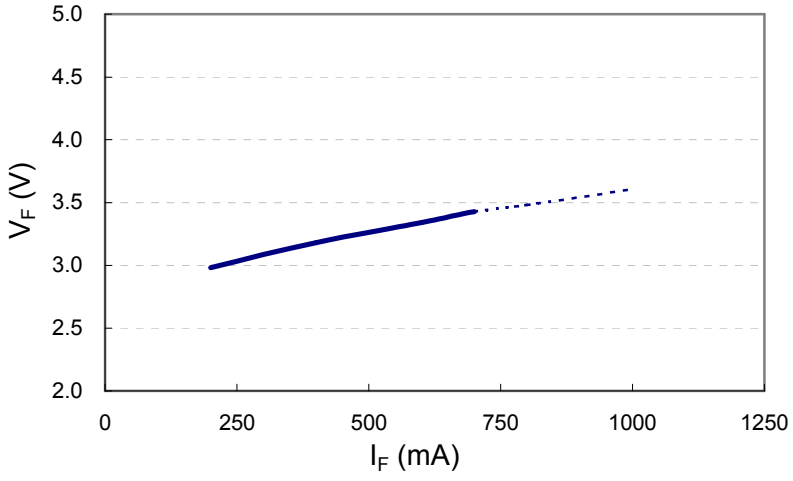
Operating Current & Ambient Temperature

Current derating curve for 350mA



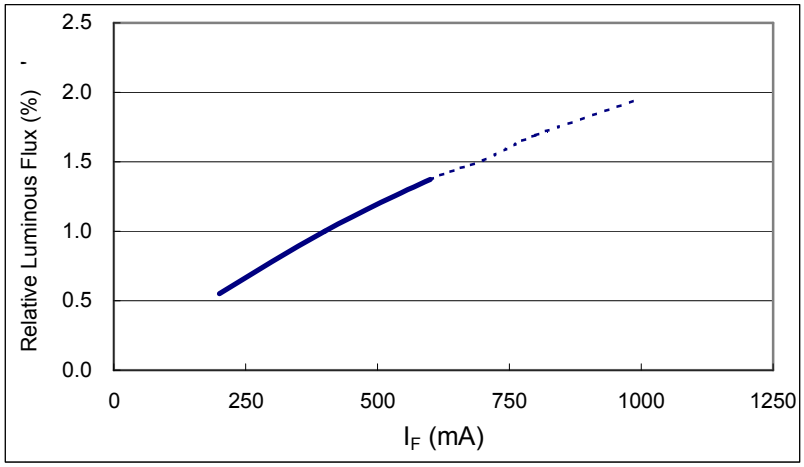
Current derating curve for 700mA



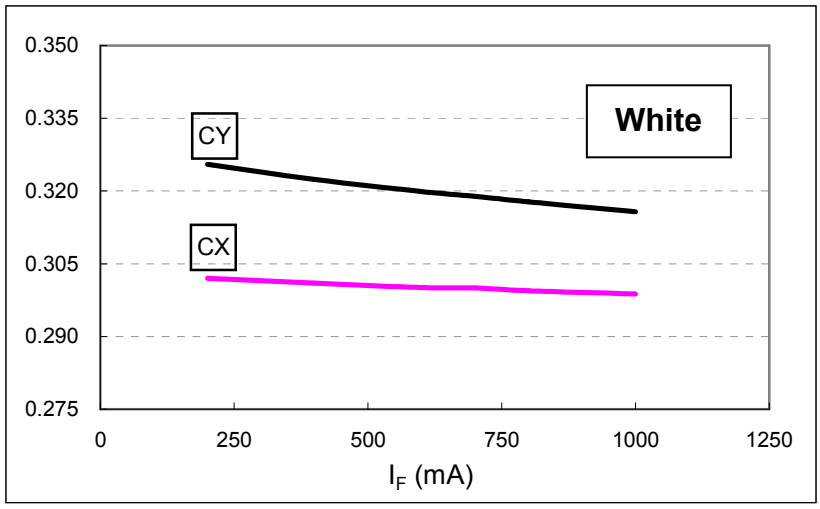


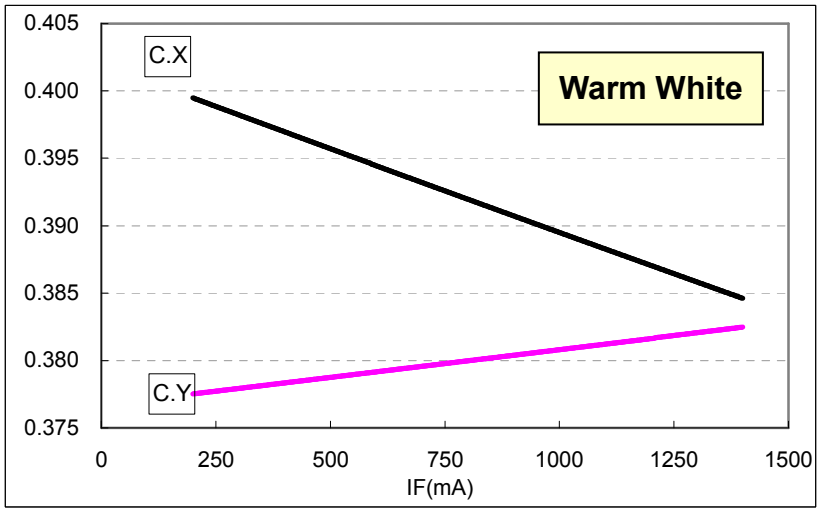
Operating Current & Forward Voltage

Typical Optical and Electrical Curves



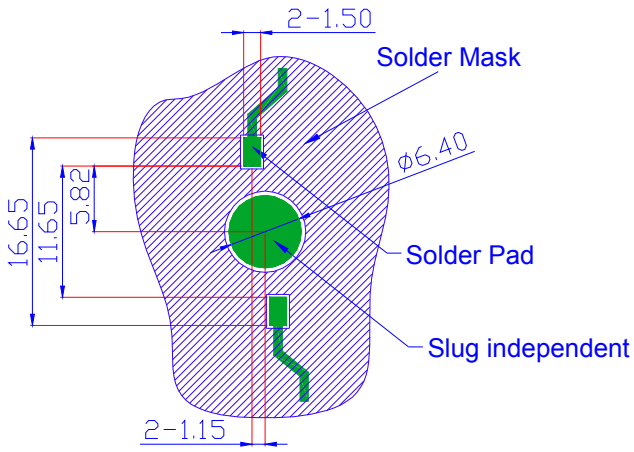
Forward Current & Luminous Flux





Forward Current & chromaticity coordinate

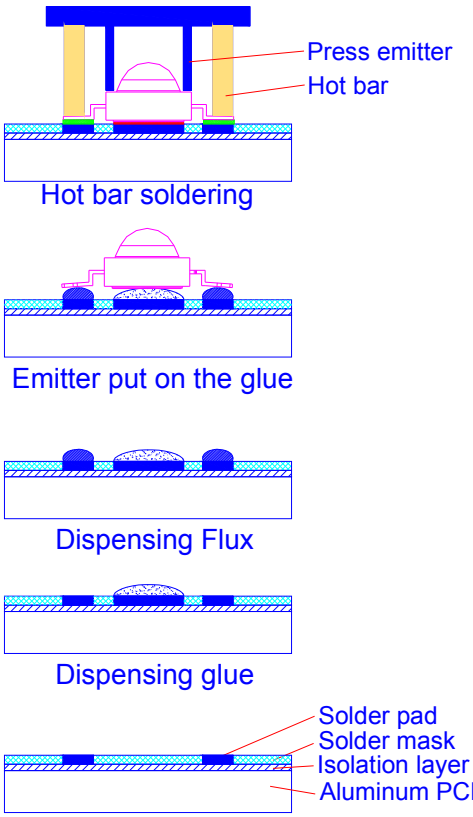
Recommended Solder Pad Design



Note:

1. All dimensions are in mm.
2. The drawings are not to scale
3. Solder pad can't be connected to slug.

Recommend Solder Steps



Notes:

1. Aluminum PCB material with a thermal conductivity greater than 2.0 W/mK.
2. Solder pad can't be connected to slug.
3. The Thermal glue should be as thin as possible for better heat conductivity.
4. During any assembly process touching lens is avoided. This will cause pollution or scratch on the surface of lens.
5. Thermal glue with a thermal conductivity greater than 1.0 W/mK and the thickness must be less than 100μm.

Recommended Profile for Reflow Soldering

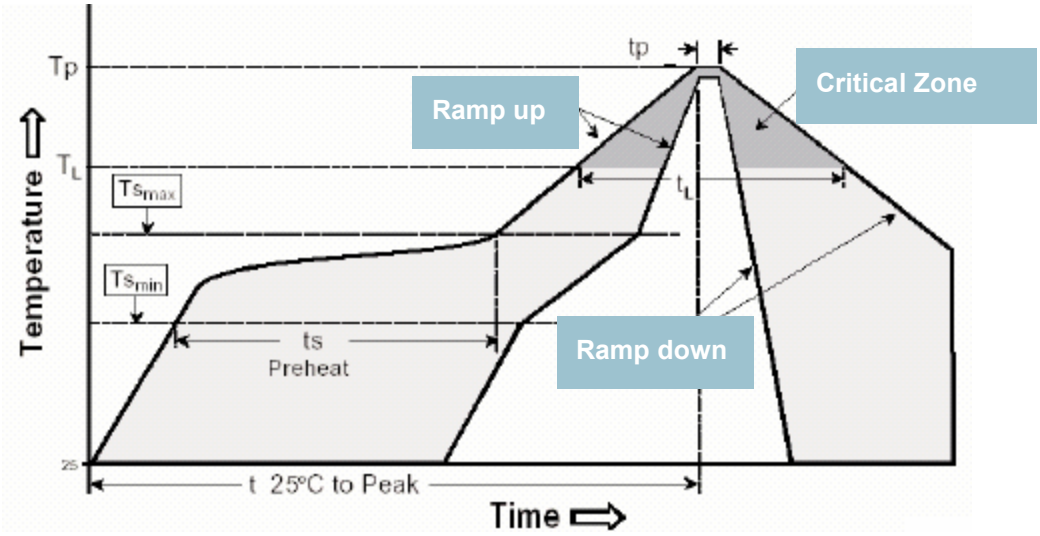


Table 5-2 Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (T_L to Tp)	3°C/second max.		3°C/second max.	
Preheat – Temperature Min (Ts_{min}) – Temperature Max (Ts_{max}) – Time (min to max) (ts)	100°C 150°C 60-120 seconds		150°C 200°C 60-180 seconds	
Tsmax to T_L – Ramp-up Rate			3°C/second max.	
Time maintained above: – Temperature (T_L) – Time (t_L)	183°C 60-150 seconds		217°C 60-150 seconds	
Peak Temperature (Tp)	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature (tp)	10-30 seconds	10-30 seconds	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.		6°C/second max.	
Time 25°C to Peak Temperature	6 minutes max.		8 minutes max.	

Note: All temperatures refer to topside of the package, measured on the package body surface.

Adhesive for Emitter to Aluminum PCB

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

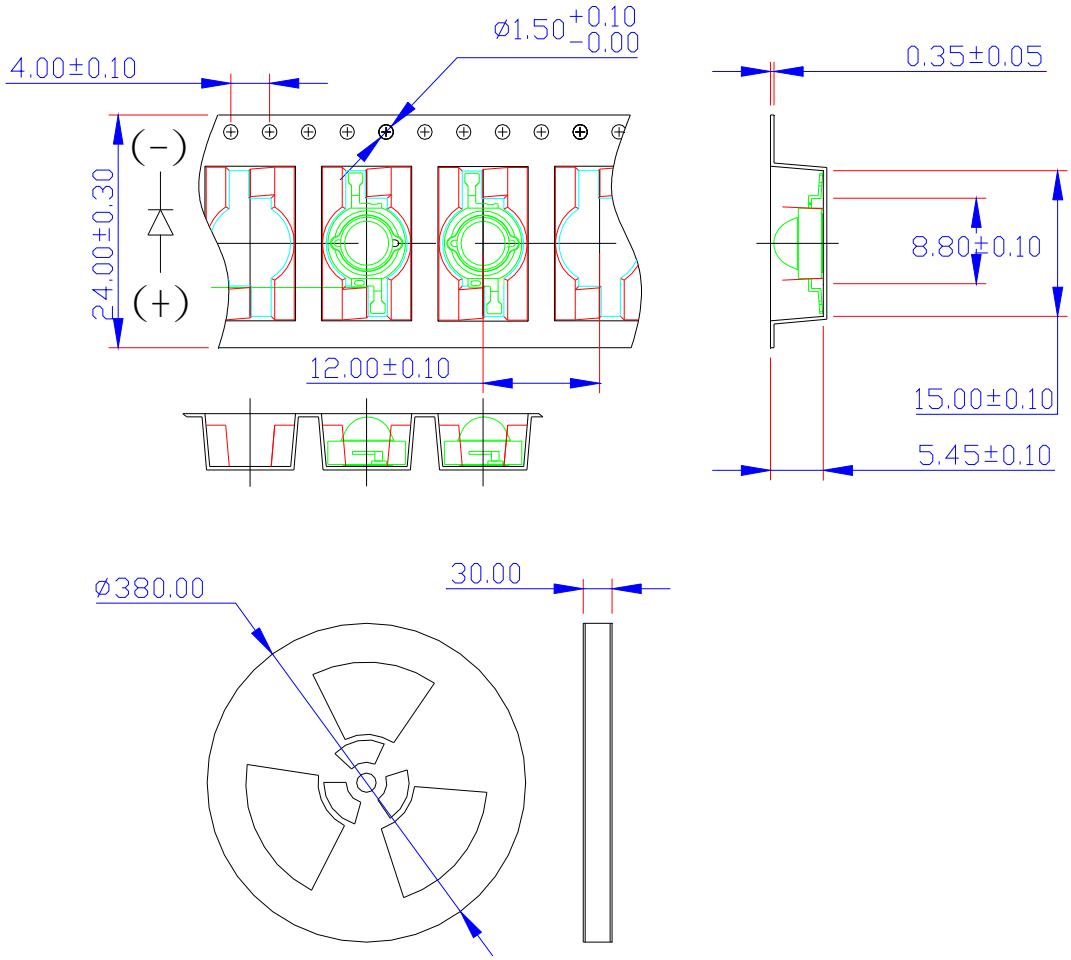
  Cured rubber exhibits good dielectric properties
- Excellent thermal stability and cold resistance

  Cured rubber provides wide service temperature range

Typical Properties

Specification	Suggested Properties
Take-free time	3~10 minutes
Specific gravity	< 3 g/cm^2
Thermal conductivity	> 2.5 W/mK
Rth in using	< 1.8 °C/W
Volume resistance	> 1x10^{14}
Lap shear adhesion strength	> 200 N/ cm^2
Tensile strength	> 4 Mpa

Package Specifications



Notes:

1. **All dimensions are in mm.**
2. **There are 1000pcs emitters in full reel**
3. **There is a reel in a bag**
4. **There are 2 bags in an inner box**
5. **There are 5 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	*Φ380*30.00*	*1,000*
2	Inner Box	*400*385*56*	*2,000*
3	Outer Box	*425*405*320*	*10,000*