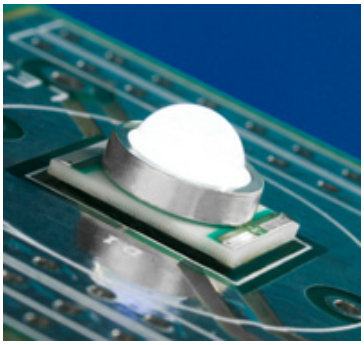
Cree® XLamp® XR-E LED
Data Sheet

Cree XLamp LEDs combine the brightness of power LED chips with a rugged package capable of operating up to four watts. Cree XLamp LEDs lead the solid-state lighting industry in brightness while providing a reflow-solderable design that is optimized for ease of use and thermal management. Lighting applications featuring XLamp LEDs maximize light output and increase design flexibility, while minimizing environmental impact.

Cree XLamp LEDs bring industry-leading brightness to a wide range of lighting and backlighting applications, including portable lighting and flashlights, outdoor and industrial, signaling, architectural, landscaping and entertainment/advertising installations.



FEATURES

- Full range of white: 2600 K to 10,000 K CCT
- Drive currents: 350 to 1000 mA
- Industry's lowest thermal resistance: 8°C/W
- Max junction temperature: 145°C
- Industry-leading JEDEC standard pre-qualification testing
- Reflow solderable – JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- RoHS-compliant
- Lumen maintenance of greater than 70% after 50,000 hours

Table of Contents

Flux Characteristics (T_j = 25°C)

Color	Correlated Color Temperature (CCT)		Typical Luminous Flux		
	Min.	Max.	@ 350 mA	@ 700 mA	@ 1000 mA
White	5000 K	10000 K	80 lm	136 lm	176 lm
	3700 K	5000 K	70 lm	120 lm	
	2600 K	3700 K	65 lm	110 lm	

Notes:
- Cree maintains a tolerance of +/- 7% on flux and power measurements.
- Typical CRI for white 3700 K – 10,000 K CCT is 75.
- Typical CRI for white 2600 K – 3700 K CCT is 80.

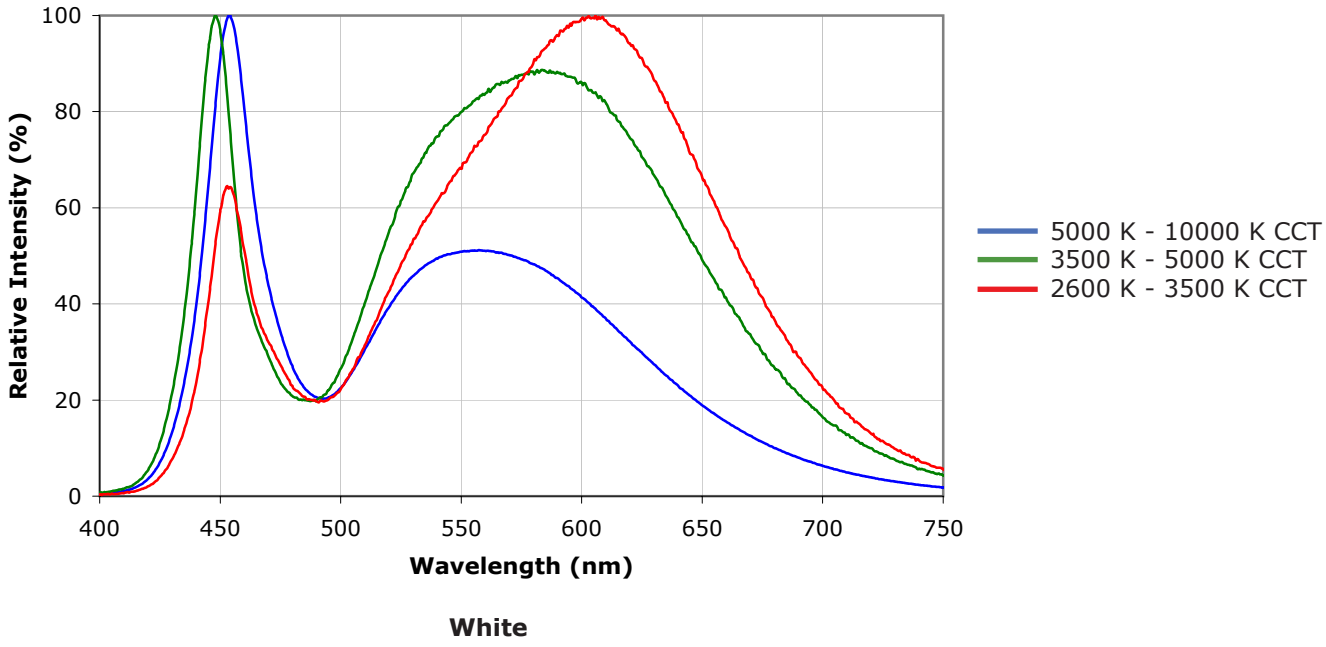
Characteristics

Characteristics	Unit	Minimum	Typical	Maximum
Thermal Resistance, junction to solder point	°C/W		8	
Viewing Angle (FWHM)	degrees		90	
Temperature coefficient of voltage	mV/°C		-4.0	
ESD Classification (HBM per Mil-Std-883D)			Class 2	
DC Forward Current (white ≥ 5000 K)	mA			1000
DC Forward Current (white < 5000 K)	mA			700
DC Pulse Current (@ 1 kHz, 10% duty cycle)	A			1.8
Reverse Voltage	V			5
Forward Voltage (@ 350 mA)	V		3.3	3.9
Forward Voltage (@ 700 mA)	V		3.5	
Forward Voltage (@ 1000 mA)	V		3.7	
LED Junction Temperature	°C			145
Operating Temperature	°C	-40		85

* These updates to the XLamp XR-E LED Characteristics are retroactive and apply to all XLamp XR-E LEDs produced by Cree. The updates are a result of more extensive qualification testing and a larger production data set for determining typical values.

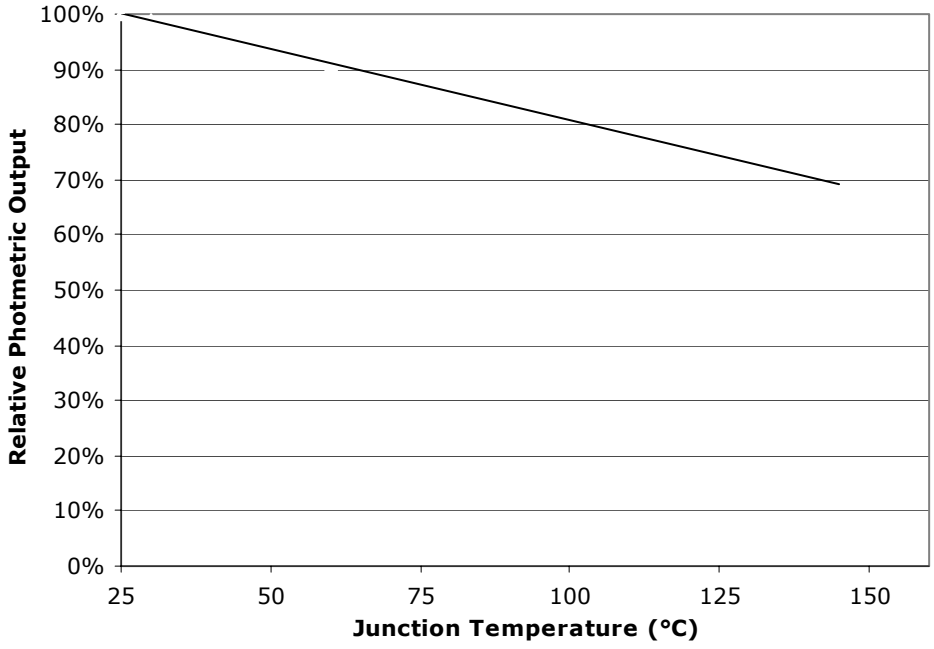
Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

Relative Spectral Power



White

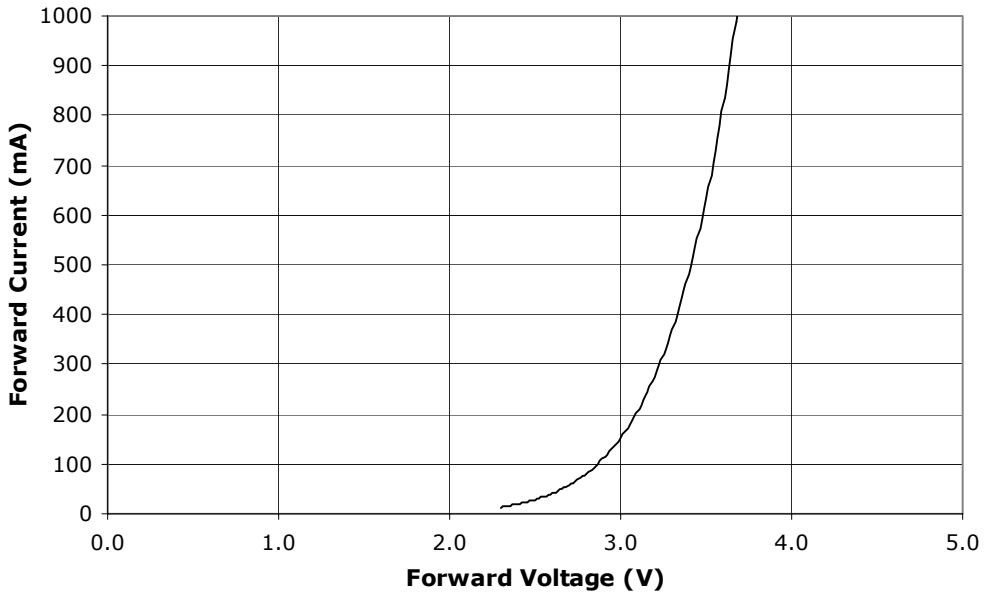
Photometric Output vs. Junction Temperature (I_F = 350 mA)



White

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

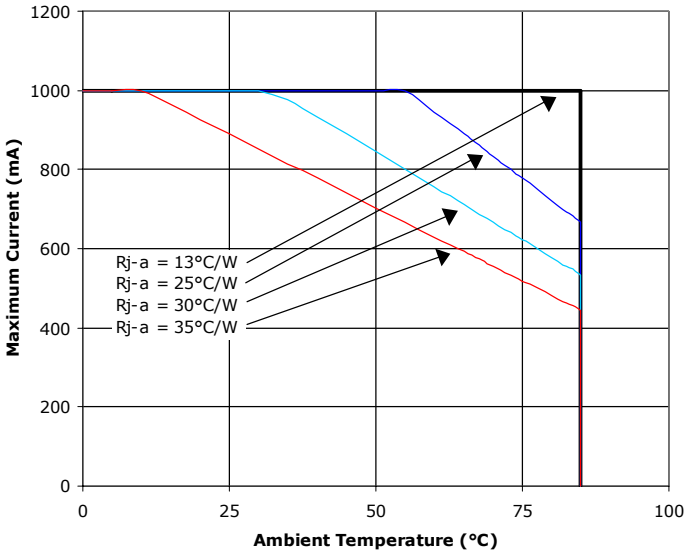
Electrical Characteristics (T_J = 25˚C)



White

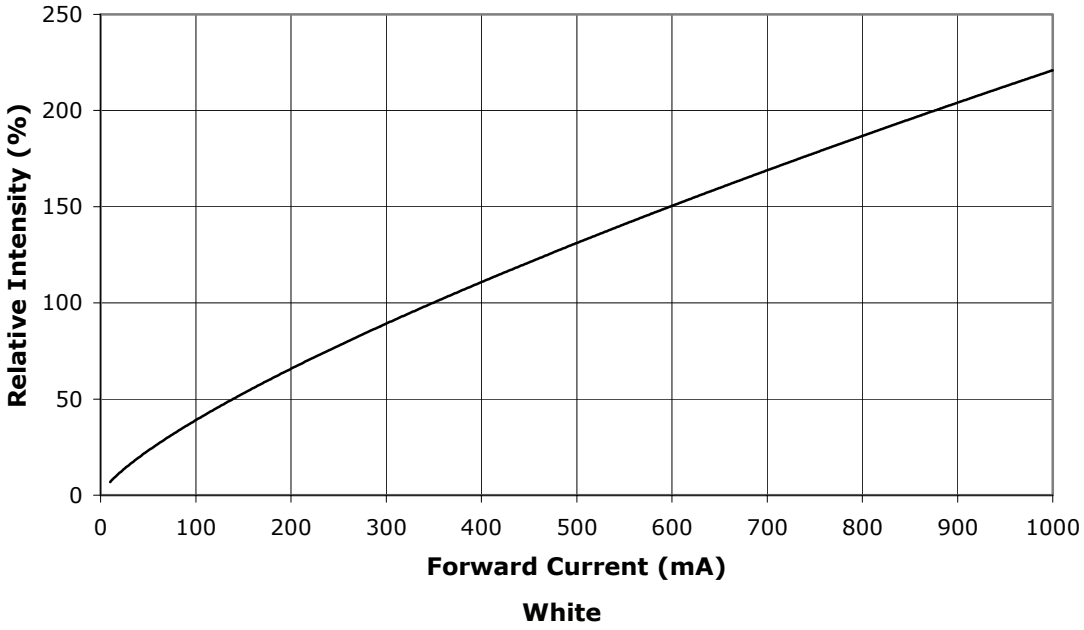
Thermal Design

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. Given an existing thermal resistance of 8°C/W between the junction and the solder point, it is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



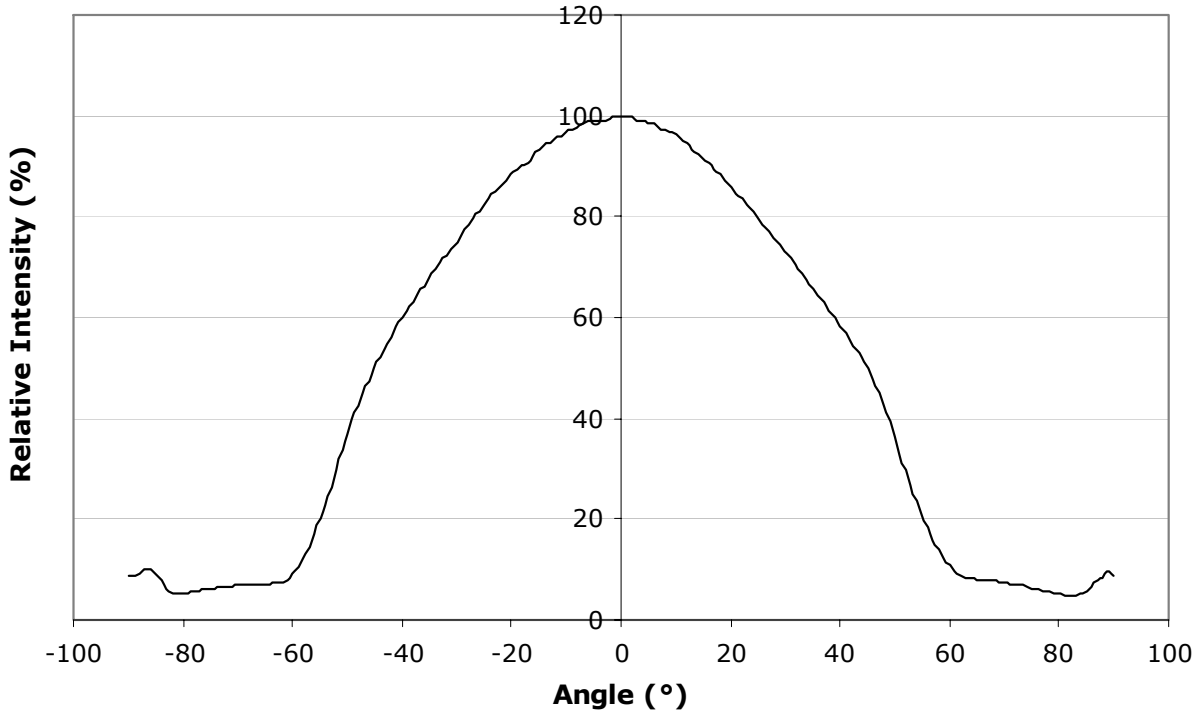
Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

Relative Intensity vs. Current (T_J = 25˚C)



White

Typical Spatial Radiation Pattern

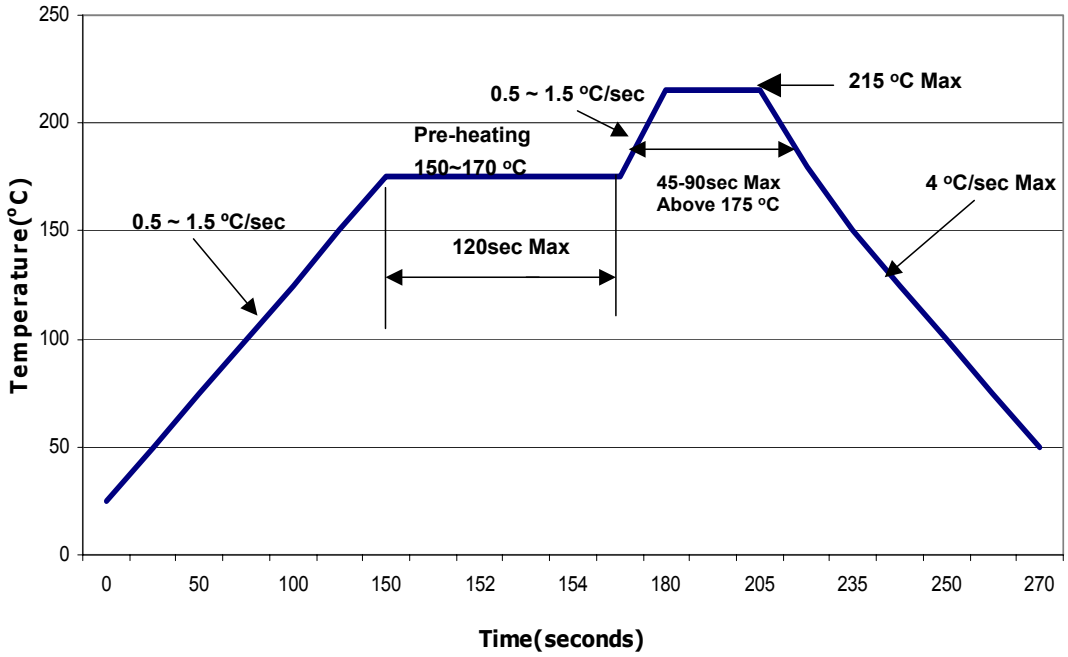


White

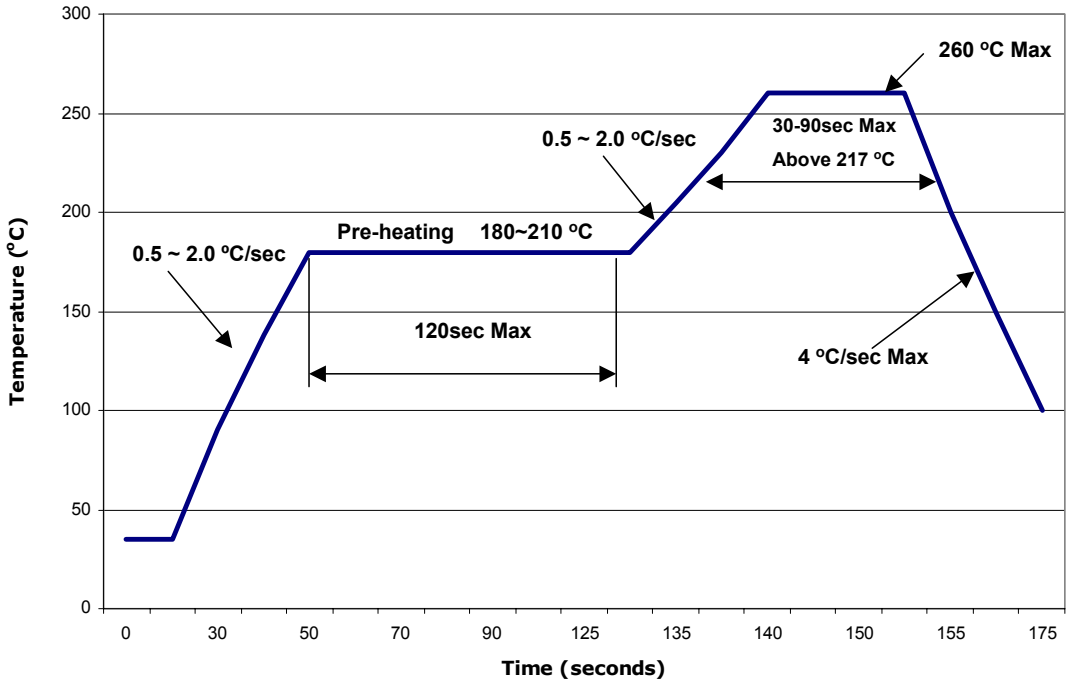
Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

Reflow Soldering Characteristics

The following reflow soldering profiles are provided for reference. Cree recommends that users follow the recommended solder paste profile provided by the manufacturer of the solder paste used. Cree XLamp LEDs are compatible with JEDEC J-STD-020C.



Lead-Based Solder Profile



Lead-Free Solder Profile

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

Notes

Lumen Maintenance Projections

Based on internal long-term reliability testing and standardized forecasting methods, Cree projects XLamp LEDs to maintain an average of 70% lumen maintenance after 50,000 hours, provided the LED junction temperature is maintained at or below 80°C.

Please read the XLamp Reliability application note for more details on Cree's lumen maintenance testing and forecasting. Please read the XLamp Thermal Management application note for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

Moisture Sensitivity

If XLamp LEDs are exposed to excessively moist environments before soldering, damage to the LED may occur during the soldering operation. To avoid this damage, exposed lamps must be baked at 80°C for 24 hours. The following derating table (excerpted from JEDEC J-STD-033 Table 7-1 - Recommended Equivalent Total Floor Life) defines the maximum time (in days) under various humidity and temperature conditions that a lamp may be exposed before requiring baking.

Temperature	Maximum Percent Relative Humidity						
	30%	40%	50%	60%	70%	80%	90%
30ºC	9	5	4	3	1	1	1
25ºC	12	7	5	4	2	1	1
20ºC	17	9	7	6	2	2	1

Within one hour of baking or one hour of opening the original packaging, XLamp LEDs must be stored according to Section 5.3 (Safe Storage) of JEDEC J-STD-033. Otherwise, these parts must be baked again at 80°C for 24 hours and resealed properly within one hour of baking. Do not bake parts at temperatures higher than 80°C, as damage to the reel will occur.

RoHS Compliance

The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.

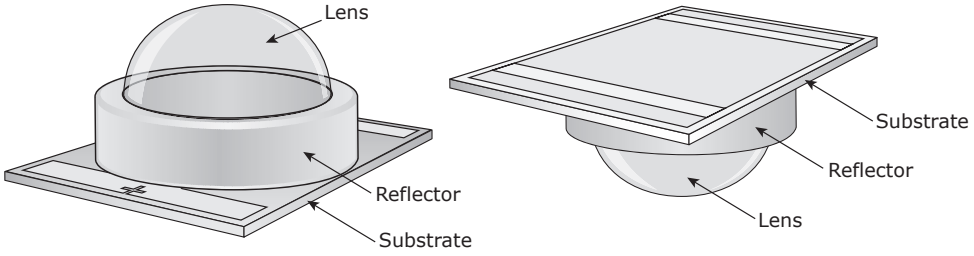
Vision Advisory Claim

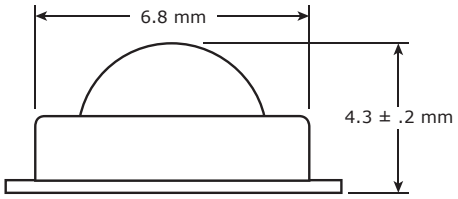
Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

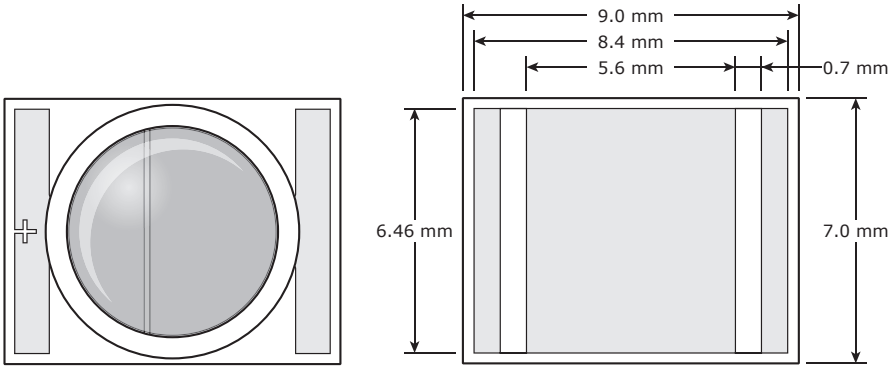
Mechanical Dimensions (T_A = 25°C)

All measurements are ±.1mm unless otherwise indicated.



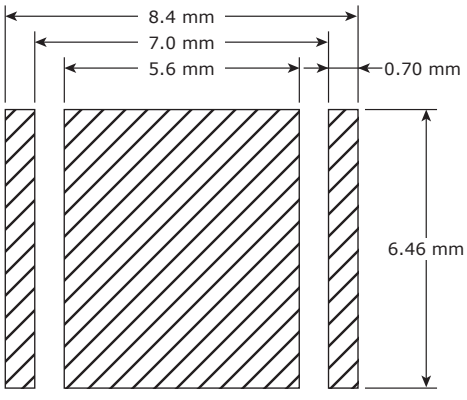


Side View



Top View

Bottom View

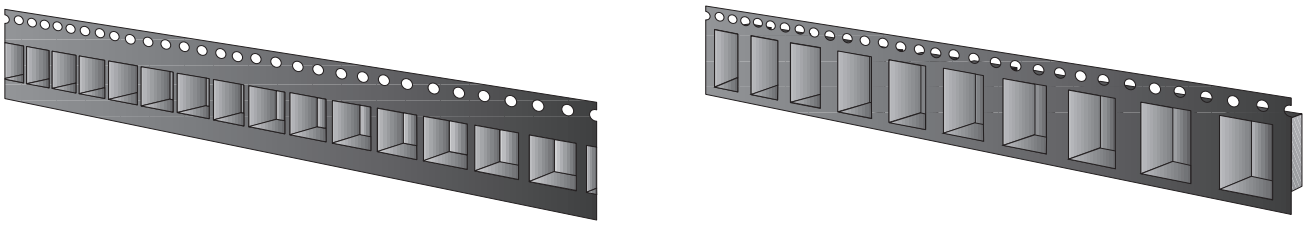


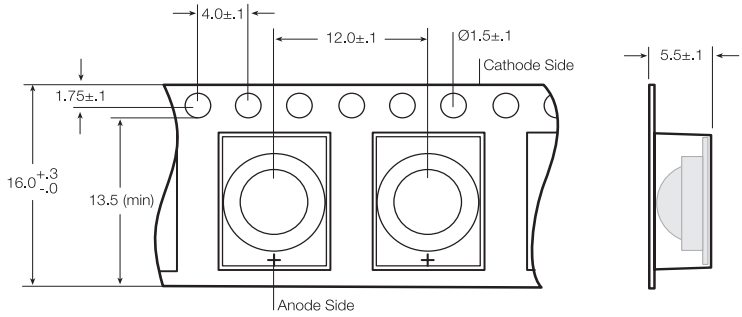
Recommended PC Board Solder Pad

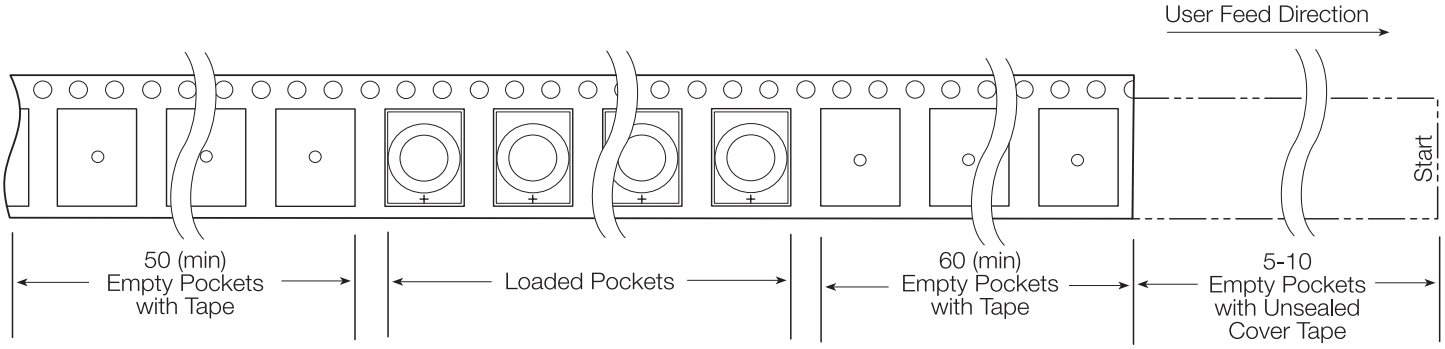
Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

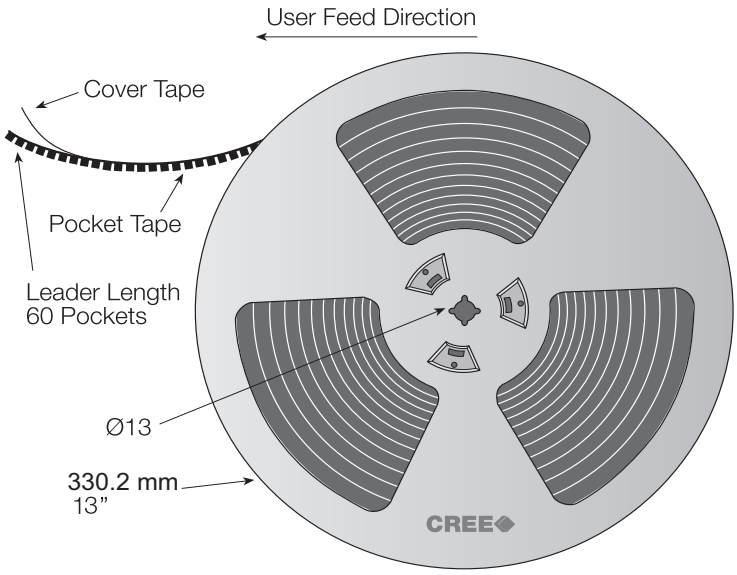
Tape and Reel

All dimensions in mm.



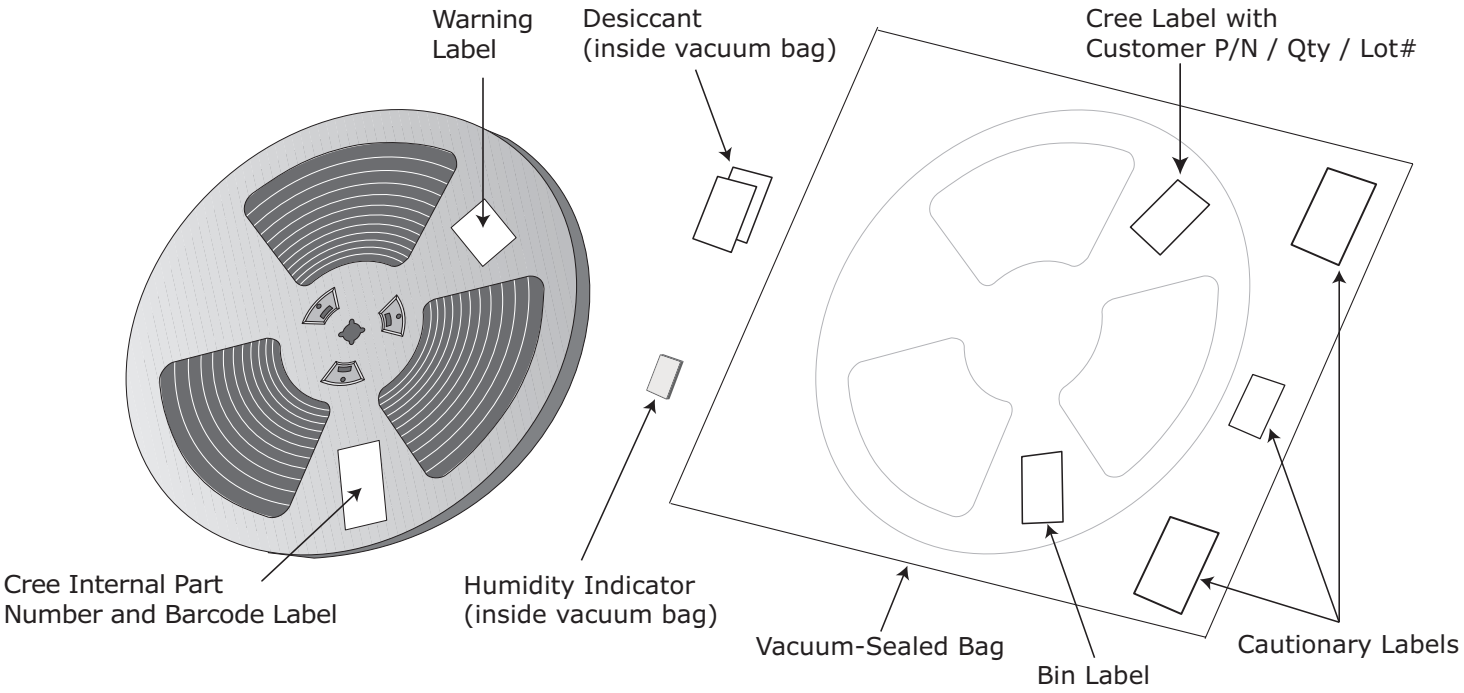


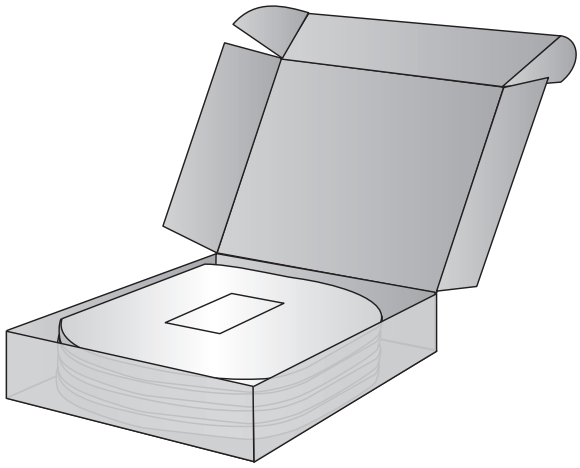


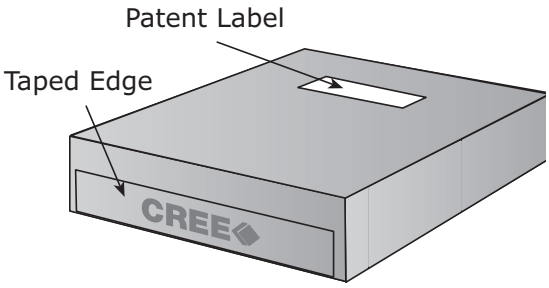


Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp

Dry Packaging and Packaging







Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5778
www.cree.com/xlamp