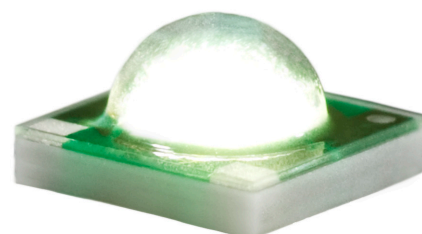


Cree® XLamp® XP-C LEDs

Data Sheet

The XLamp XP-C LED combines the proven lighting-class performance and reliability of the XLamp XR-E LED in a package with 80% smaller footprint. The XLamp XP-C LED continues Cree's history of innovation in LEDs for lighting applications with wide viewing angle, symmetrical package, unlimited floor life and electrically neutral thermal path.

Cree XLamp LEDs bring high performance and quality of light to a wide range of lighting applications, including color-changing lighting, portable and personal lighting, outdoor lighting, indoor directional lighting, commercial lighting and emergency-vehicle lighting.



FEATURES

- Available in white (2,600 K to 10,000 K CCT)
- Maximum drive current: up to 500 mA
- Low thermal resistance: 12 °C/W
- Wide viewing angle: 110°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- RoHS-compliant
- UL-recognized component (E326295)

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Flux Characteristics ($T_j = 25^{\circ}\text{C}$)

The following table provides several base order codes for XLamp XP-C LEDs. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family. For more order codes, as well as a complete description of the order-code nomenclature, please consult the XP-E & XP-C Binning and Labeling document.

Color	CCT Range		Base Order Codes Min Luminous Flux (lm)		Order Code
	Min.	Max.	Group	Flux (lm)	
Cool White	5,000 K	10,000 K	P4	80.6	XPCWHT-L1-0000-00901
			Q2	87.4	XPCWHT-L1-0000-00A01
			Q3	93.9	XPCWHT-L1-0000-00B01
			Q4	100	XPCWHT-L1-0000-00C01
Neutral White	3,700 K	5,000 K	P3	73.9	XPCWHT-L1-0000-008E4
			P4	80.6	XPCWHT-L1-0000-009E4
			Q2	87.4	XPCWHT-L1-0000-00AE4
Warm White	2,600 K	3,700 K	N4	62.0	XPCWHT-L1-0000-006E7
			P2	67.2	XPCWHT-L1-0000-007E7
			P3	73.9	XPCWHT-L1-0000-008E7

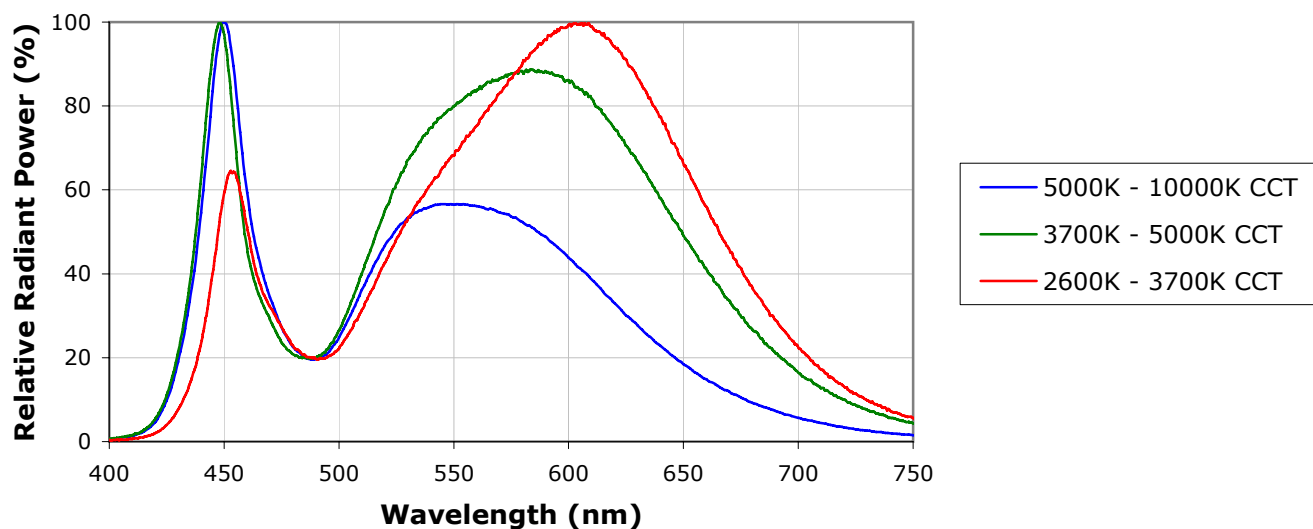
Notes:

- Cree maintains a tolerance of +/- 7% on flux and power measurements.
- Typical CRI for Cool White & Neutral White (3,700 K – 10,000 K CCT) is 75.
- Typical CRI for Warm White (2,600 K – 3,700 K CCT) is 80.

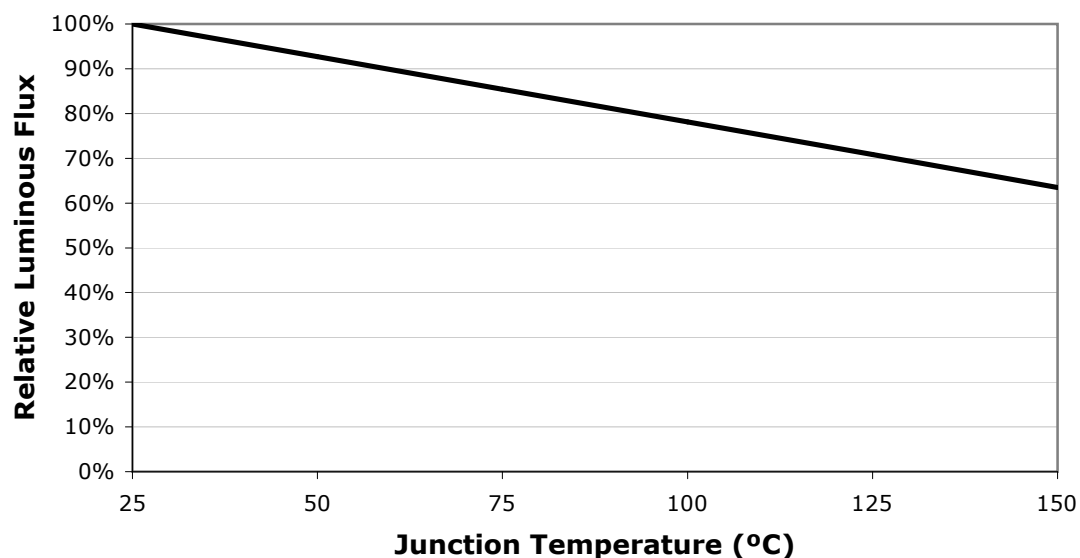
Characteristics

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	$^{\circ}\text{C}/\text{W}$		12	
Viewing angle (FWHM)	degrees		110	
Temperature coefficient of voltage	$\text{mV}/^{\circ}\text{C}$		-4.0	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current	mA			500
Reverse voltage	V			5
Forward voltage (@ 350 mA)	V		3.4	3.9
Forward voltage (@ 500 mA)	V		3.5	
LED junction temperature	$^{\circ}\text{C}$			150

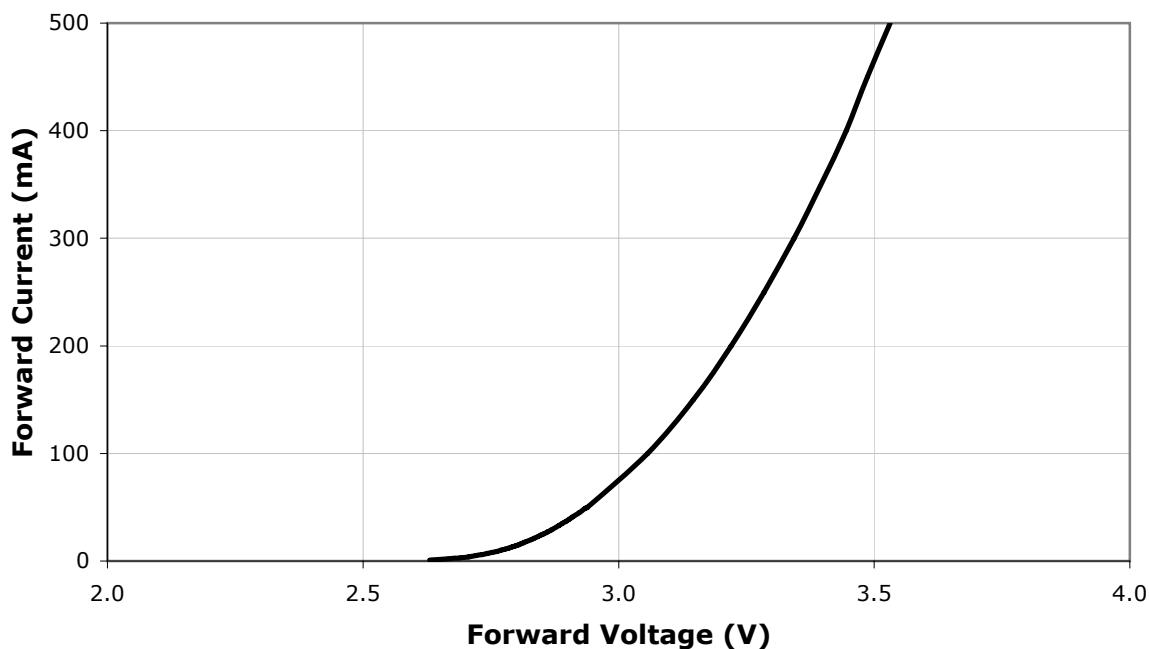
Relative Spectral Power Distribution



Relative Flux vs. Junction Temperature ($I_f = 350$ mA)

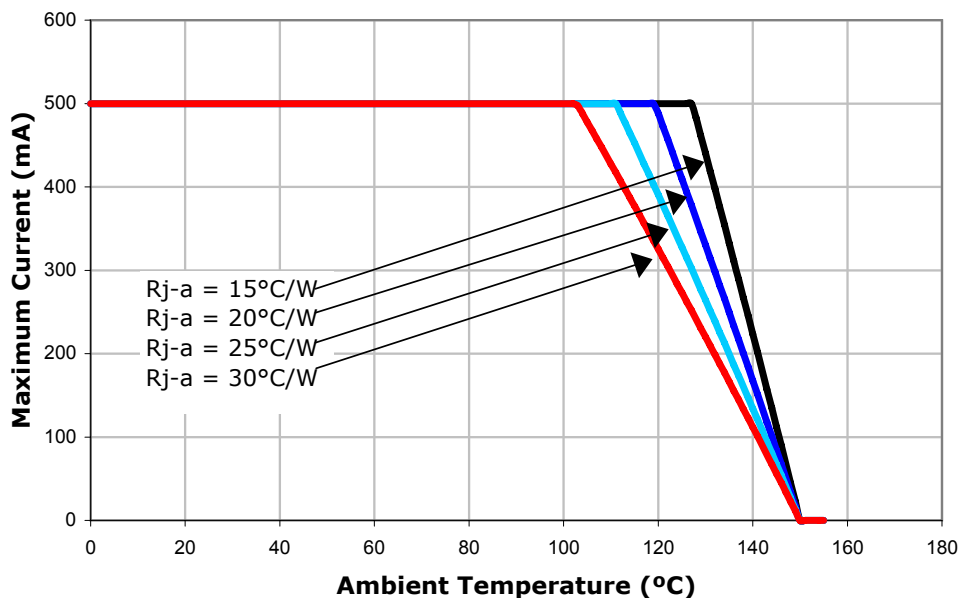


Electrical Characteristics ($T_j = 25^\circ\text{C}$)

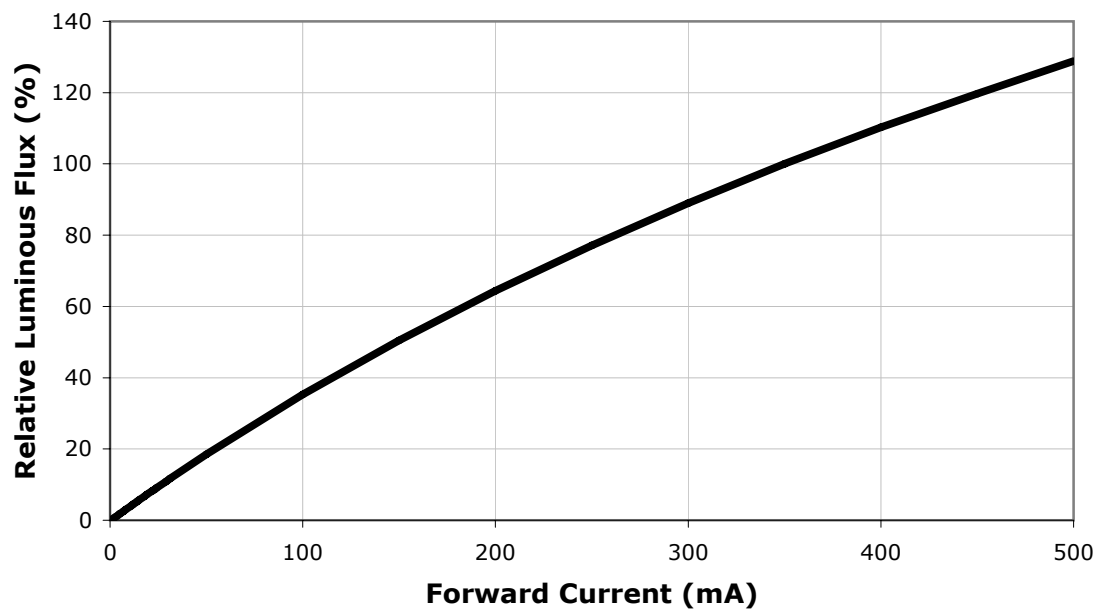


Thermal Design

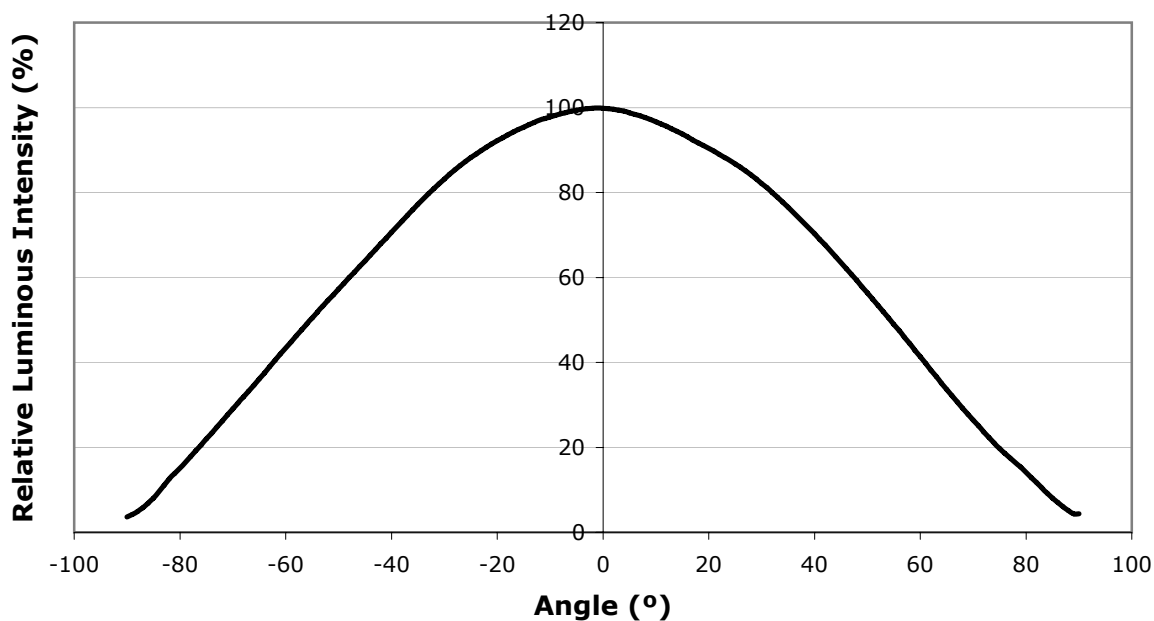
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. Given an existing thermal resistance of 12°C/W between the junction and the solder point, it is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



Relative Flux vs. Current ($T_j = 25^\circ\text{C}$)



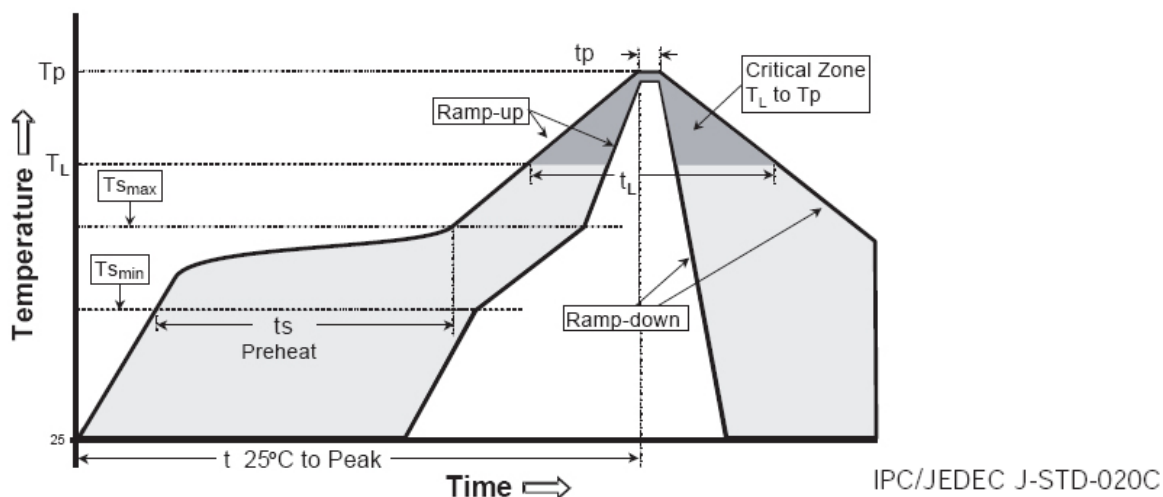
Typical Spatial Distribution



Reflow Soldering Characteristics

In testing, Cree has found XLamp XP-C LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree recommends that users follow the recommended soldering profile provided by the manufacturer of solder paste used.

Note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment.



Profile Feature	Lead-Based Solder	Lead-Free Solder
Average Ramp-Up Rate ($T_{s_{max}}$ to T_p)	3°C/second max.	3°C/second max.
Preheat: Temperature Min ($T_{s_{min}}$)	100°C	150°C
Preheat: Temperature Max ($T_{s_{max}}$)	150°C	200°C
Preheat: Time ($t_{s_{min}}$ to $t_{s_{max}}$)	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature (T_L)	183°C	217°C
Time Maintained Above: Time (t_L)	60-150 seconds	60-150 seconds
Peak/Classification Temperature (T_p)	215°C	260°C
Time Within 5°C of Actual Peak Temperature (t_p)	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.



Notes

Moisture Sensitivity

In testing, Cree has found XLamp XP-C & XP-E LEDs to have unlimited floor life in conditions $\leq 30^{\circ}\text{C}$ / 85% relative humidity (RH). Moisture testing included a 168 hour soak at 85°C / 85% RH followed by 3 reflow cycles, with visual and electrical inspections at each stage.

RoHS Compliance

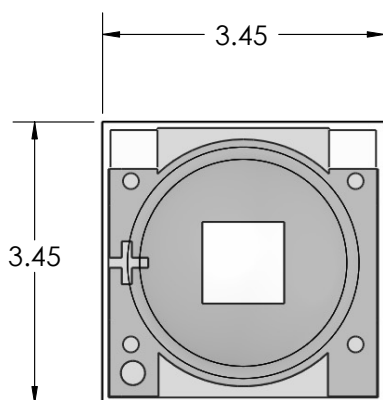
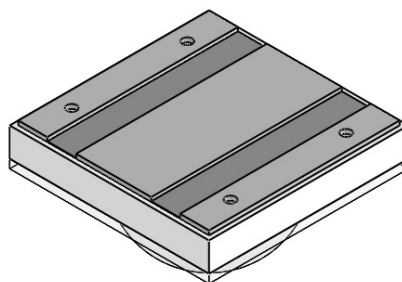
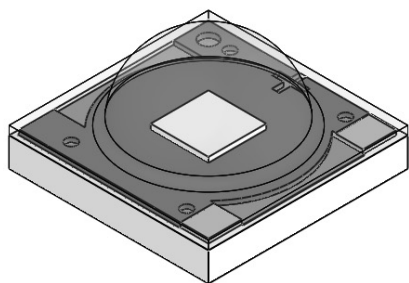
The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted 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

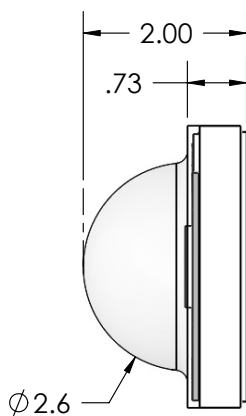
Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

Mechanical Dimensions (T_A = 25°C)

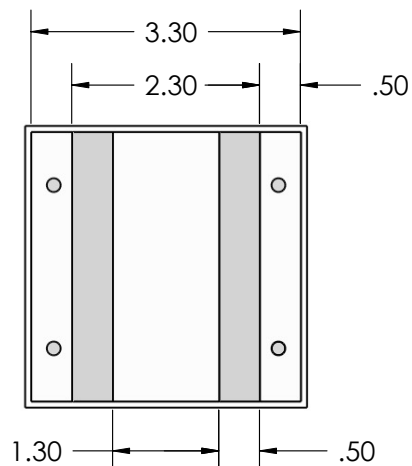
All measurements are ±.13 mm unless otherwise indicated.



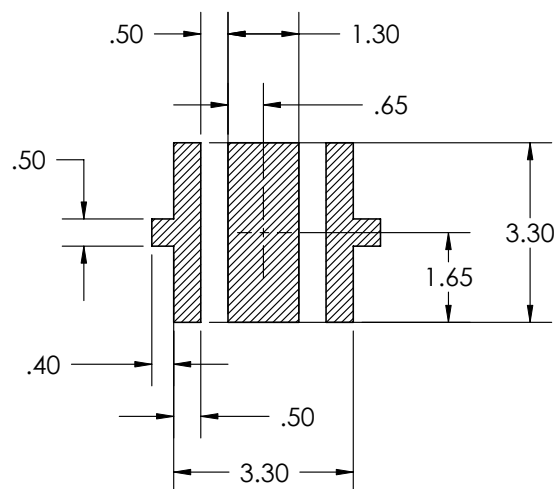
Top View



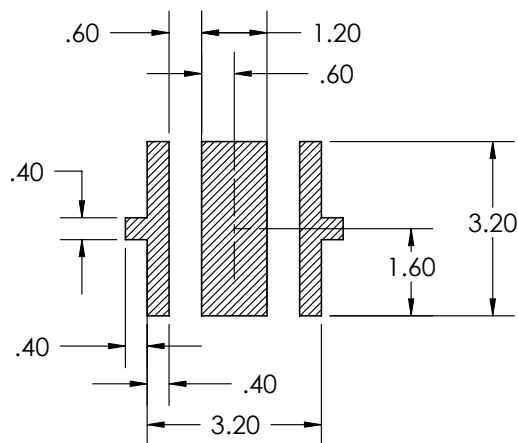
Side View



Bottom View



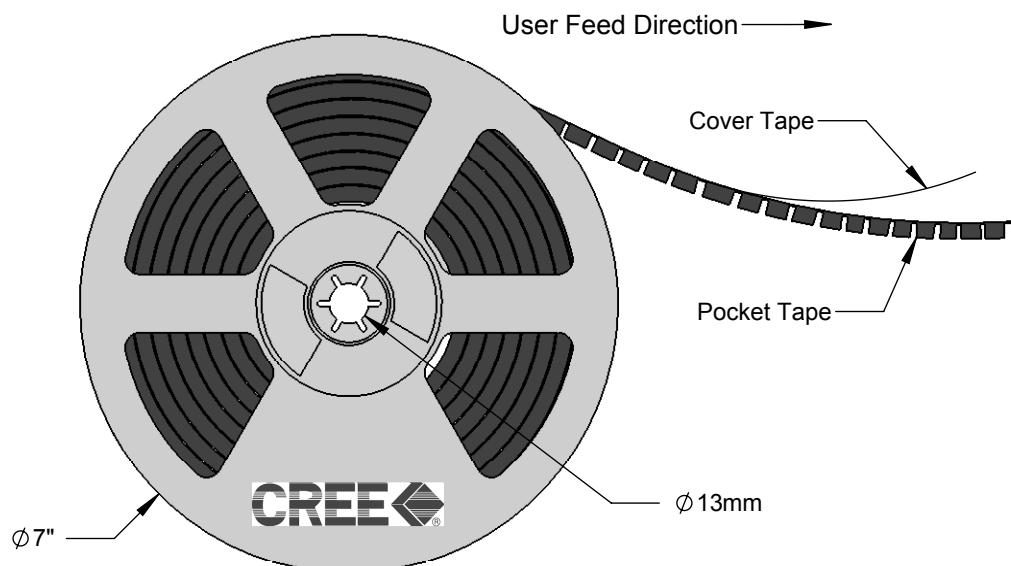
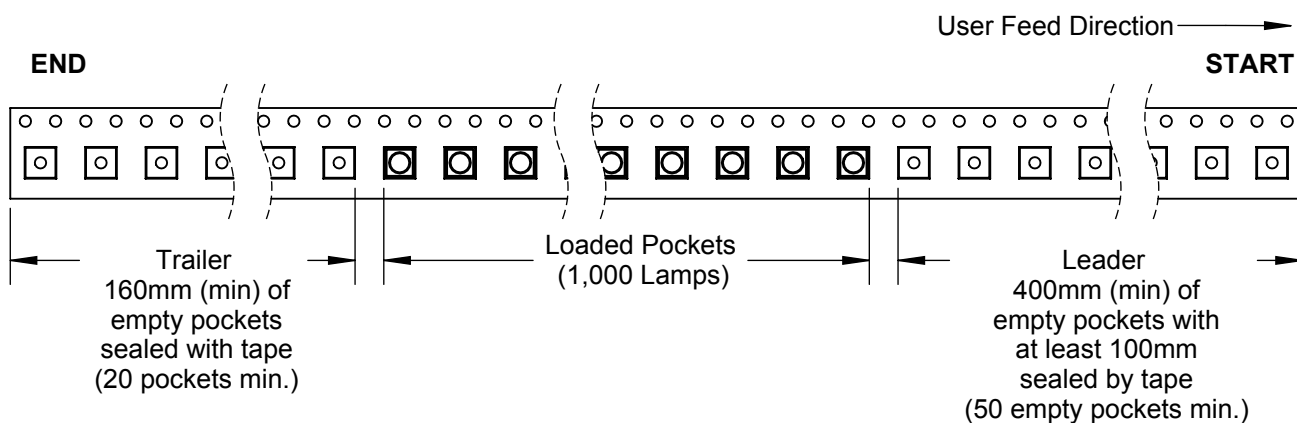
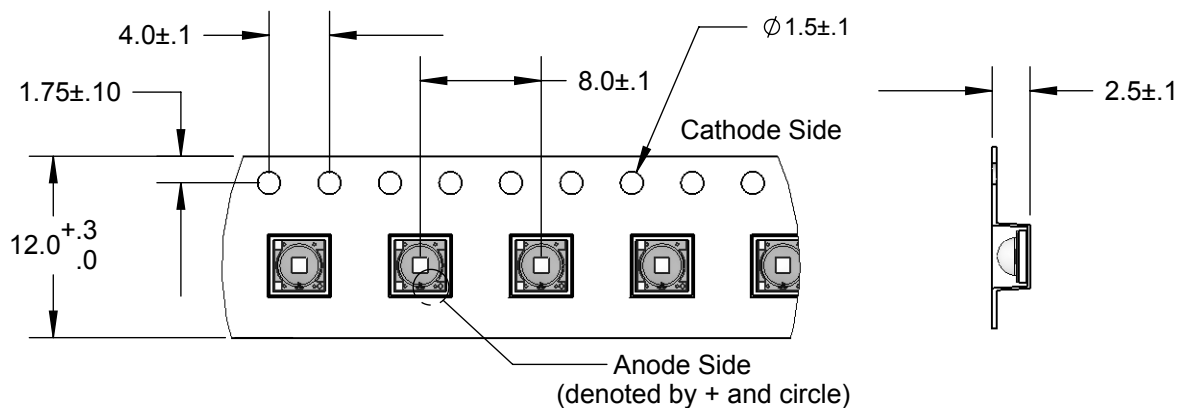
RECOMMENDED PCB SOLDER PAD



**RECOMMENDED STENCIL PATTERN
(HATCHED AREA IS OPENING)**

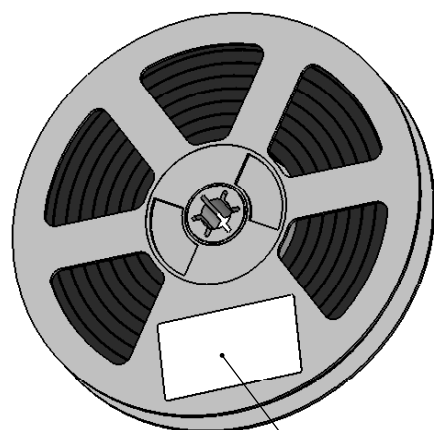
Tape and Reel

All dimensions in mm.

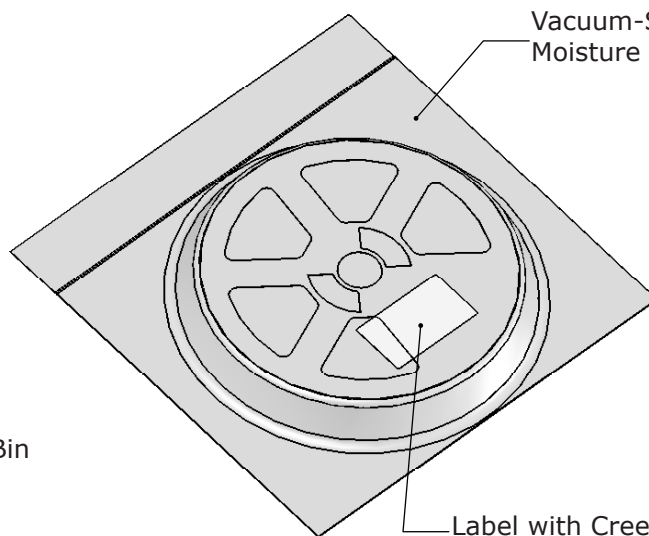


Packaging

All dimensions in mm.

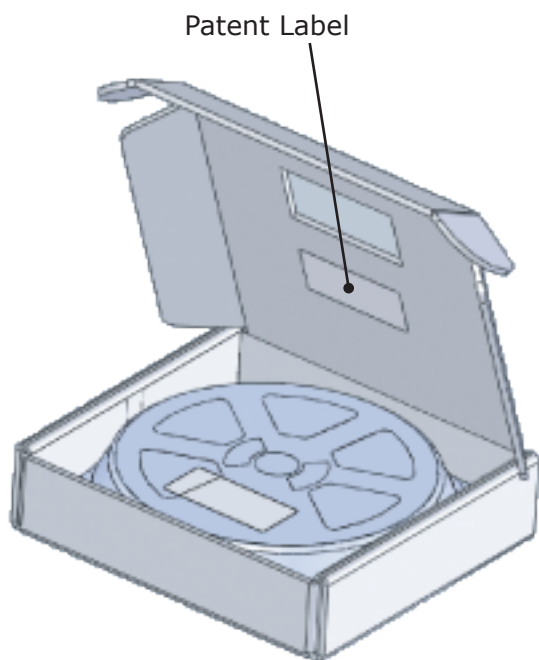


Label with Cree Bin Code, Qty, Lot #

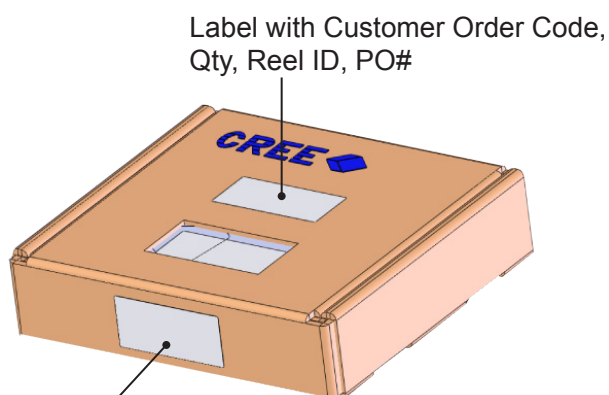


Vacuum-Sealed Moisture Barrier Bag

Label with Cree Bin Code, Qty, Lot #



Patent Label



Label with Customer Order Code, Qty, Reel ID, PO#

Label with Cree Bin Code, Qty, Lot #