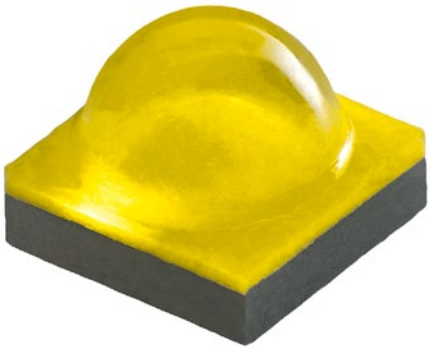
Cree® XLamp® XB-D White LEDs



PRODUCT DESCRIPTION

The XLamp XB-D is Cree's newest lighting class LED, bringing the next generation of performance and price to LED lighting applications. The XLamp XB-D delivers similar performance to the XP-G LED in a package that is 48% smaller than the XLamp XP footprint.

Using Cree's newest generation of silicon carbide-based LED chips, XB-D is optimized to dramatically lower system cost in any illumination application.

FEATURES

- Cree's smallest lighting class LED: 2.45 X 2.45 mm
- Up to 136 lm/W in cool white (@ 85 °C, 350 mA)
- Available in white, 80-min CRI white, and 70-min CRI cool white
- 1 A maximum drive current
- Low thermal resistance: 6.5 °C/W
- Wide viewing angle: 115°
- Reflow solderable - JEDEC J-STD-020C compatible
- Unlimited floor life at ≤ 30 °C/85% RH
- Electrically neutral thermal path
- RoHS- and REACH-compliant

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FLUX CHARACTERISTICS (T_J = 85 °C) - WHITE

The following table provides several base order codes for XLamp XB-D 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 XLamp XB-D Binning and Labeling document.

Color	CCT Range		Base Order Codes Min. Luminous Flux @ 350 mA (lm)		Calculated Minimum Luminous Flux (lm)*		Order Code
	Min.	Max.	Group	Flux (lm)	700 mA	1000 mA	
Cool White	5,000 K	8,300 K	R4	130	227	287	XBDAWT-00-0000-000000G51
			R3	122	213	270	XBDAWT-00-0000-000000F51
			R2	114	199	252	XBDAWT-00-0000-000000E51
Neutral White	3,700 K	5,000 K	R2	114	199	252	XBDAWT-00-0000-00000LEE4
			Q5	107	187	236	XBDAWT-00-0000-00000LDE4
			Q4	100	172	222	XBDAWT-00-0000-00000LCE4
80 CRI Minimum White	2,600 K	4,300 K	Q4	100	172	222	XBDAWT-00-0000-00000HCE7
			Q3	93.9	164	207	XBDAWT-00-0000-00000HBE7
			Q2	87.4	153	193	XBDAWT-00-0000-00000HAE7
Warm White	2,600 K	3,700 K	Q4	100	172	222	XBDAWT-00-0000-00000LCE7
			Q3	93.9	164	207	XBDAWT-00-0000-00000LBE7
			Q2	87.4	153	193	XBDAWT-00-0000-00000LAE7

Notes:

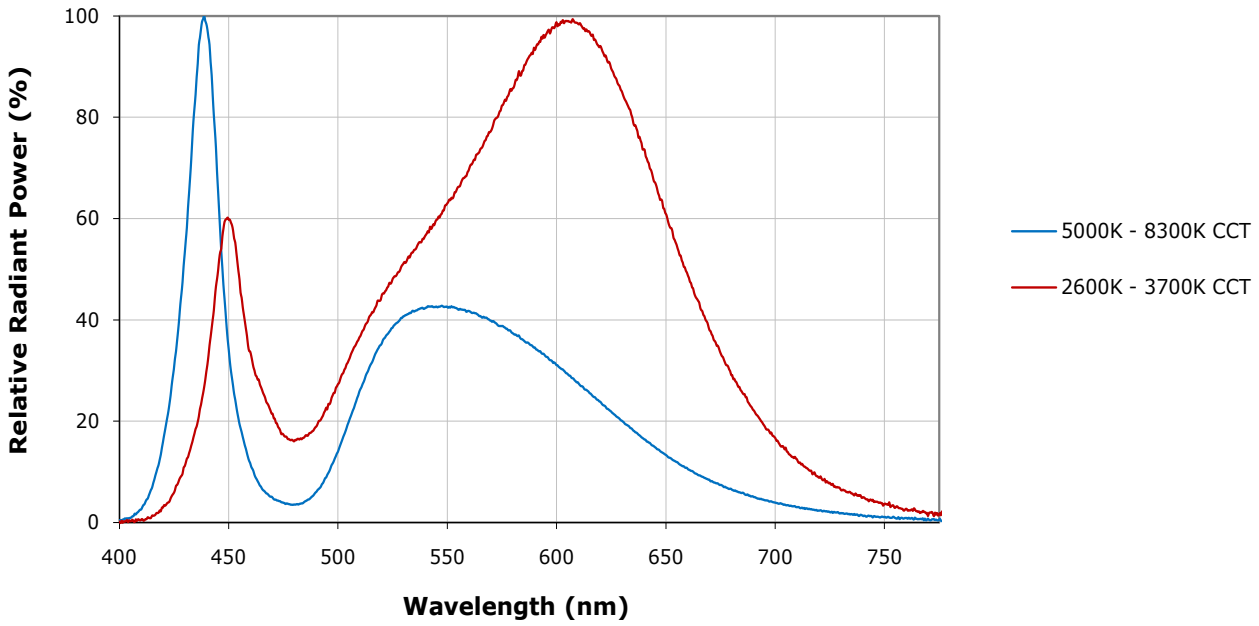
- Cree maintains a tolerance of ±7% on flux and power measurements and ±2 on CRI measurements.
- Typical CRI for Neutral White, 3700 K - 5000K CCT is 75.
- Typical CRI for Warm White, 2600 K - 3700 K CCT is 80.
- Minimum CRI for 80 CRI Minimum White is 80.

* Calculated flux values are for reference only

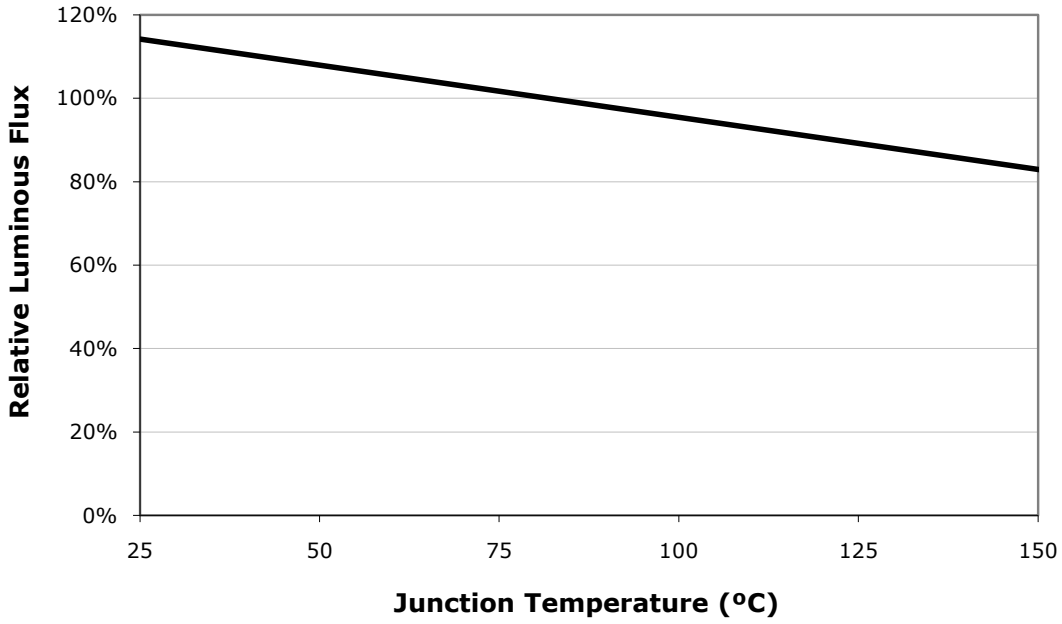
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point - white	°C/W		6.5	
Viewing angle (FWHM) - white	degrees		115	
Temperature coefficient of voltage - white	mV/°C		-2.5	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current - white	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 85 °C) - white	V		2.9	3.5
LED junction temperature	°C			150

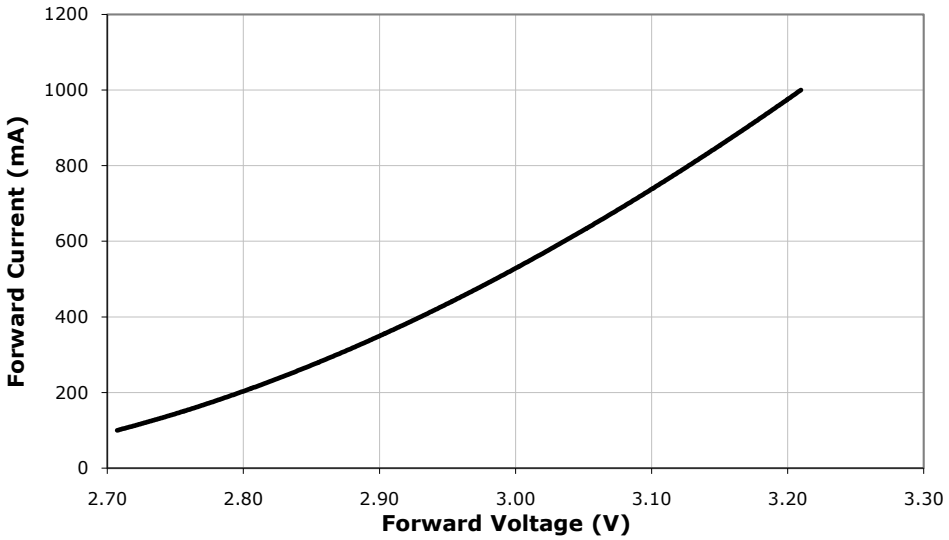
RELATIVE SPECTRAL POWER DISTRIBUTION



RELATIVE FLUX VS. JUNCTION TEMPERATURE (I_F = 350 mA)

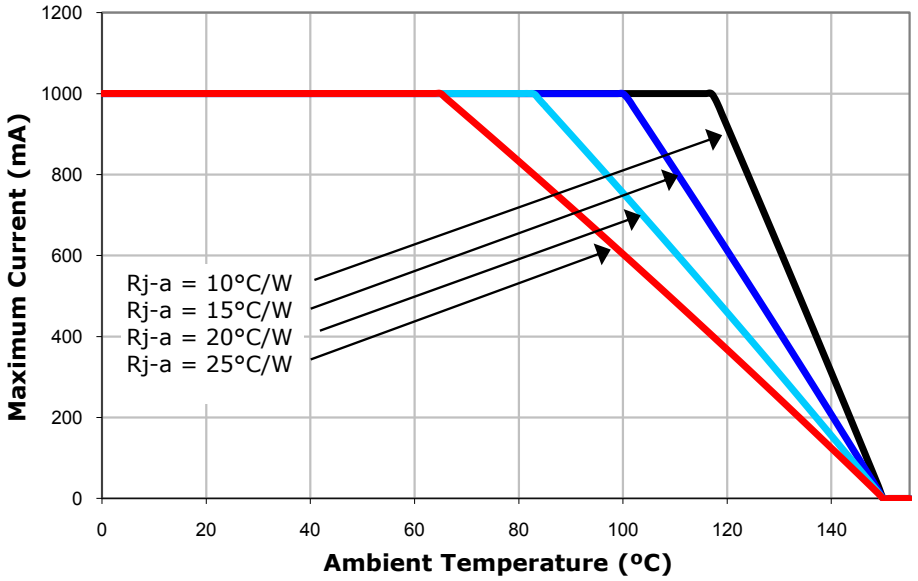


ELECTRICAL CHARACTERISTICS (T_J = 85 °C)

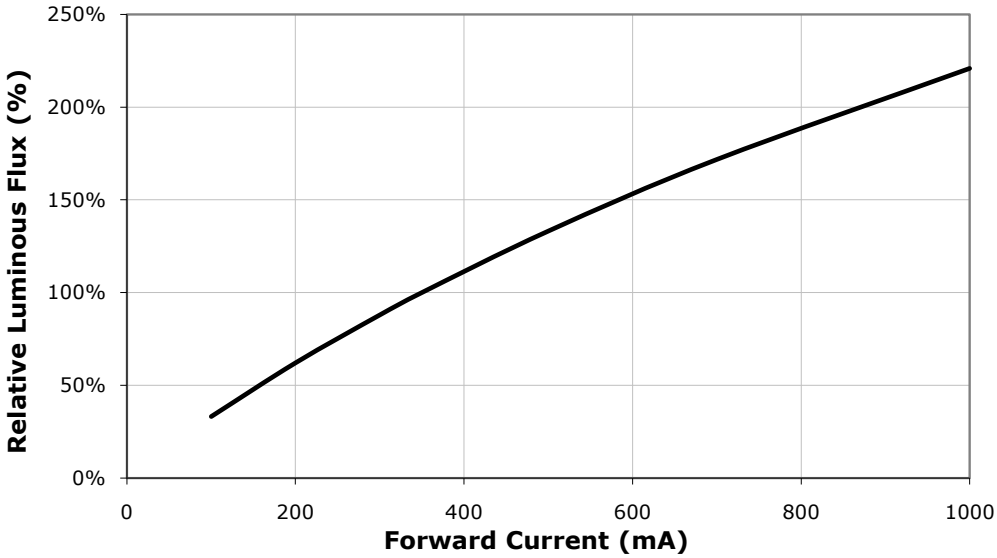


THERMAL DESIGN

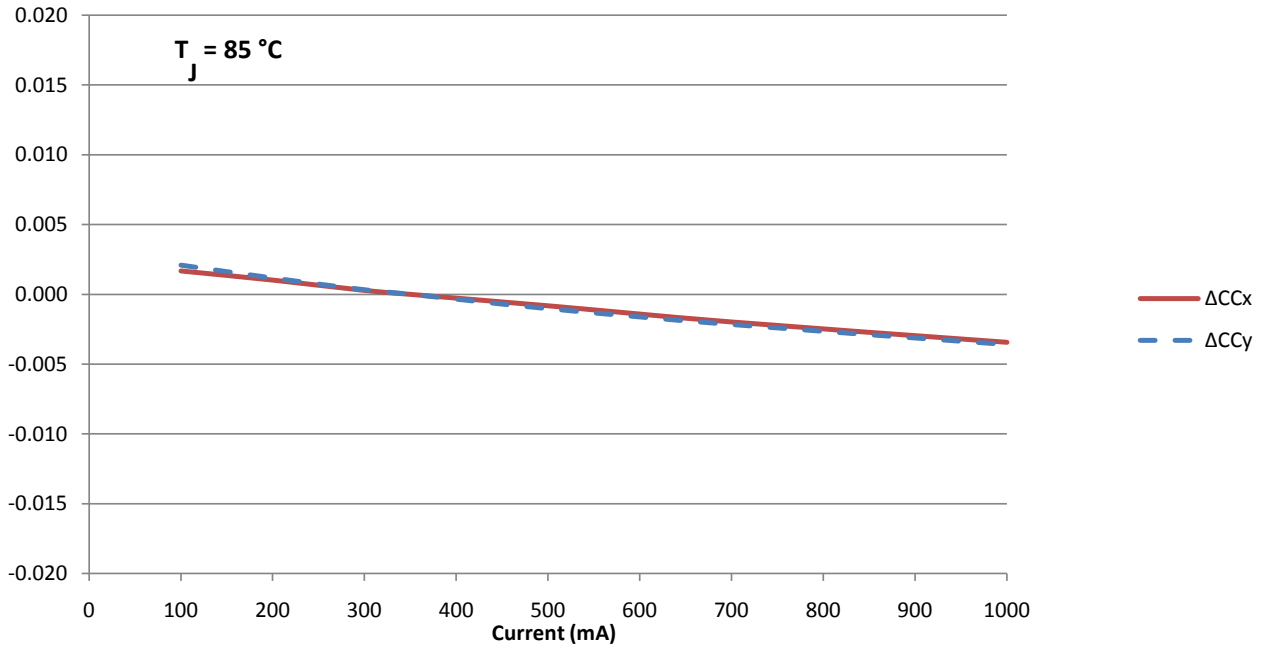
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optomize lamp life and optical characteristics.

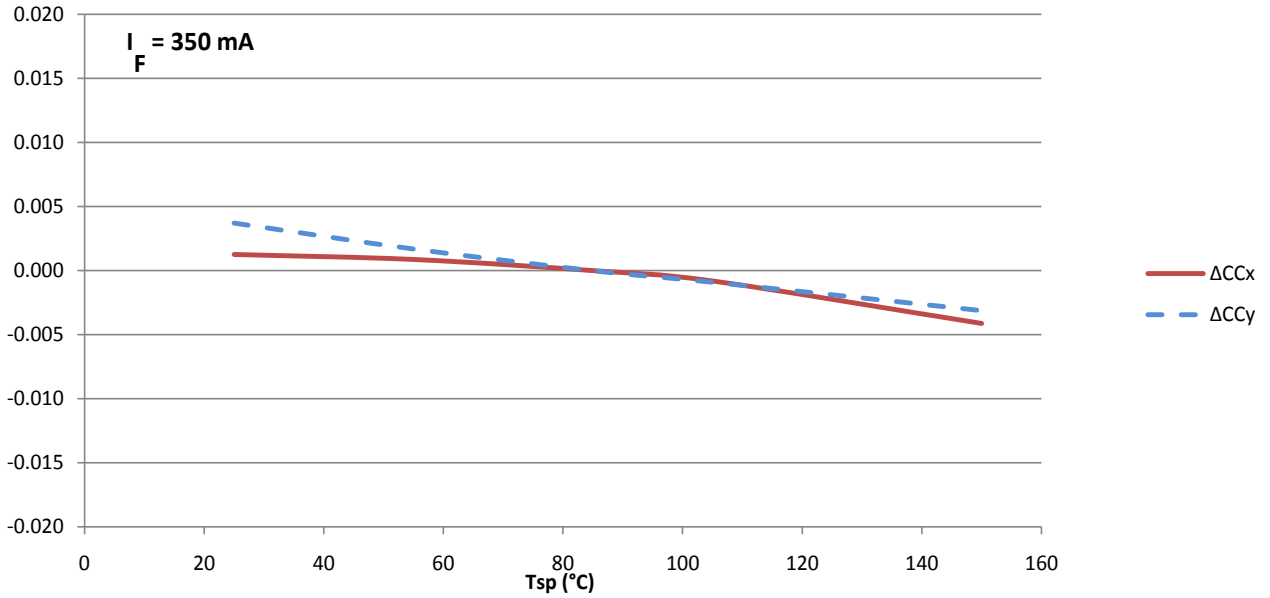


RELATIVE FLUX VS. CURRENT (T_J = 85 °C)

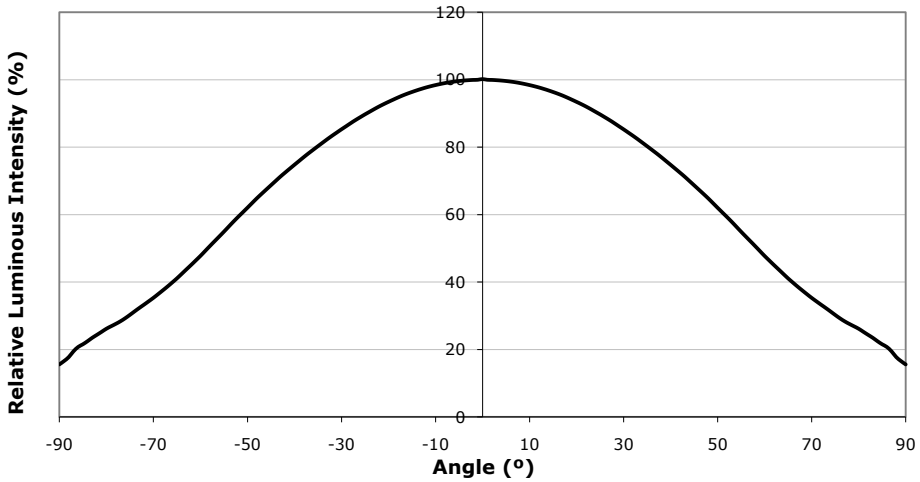


RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE (WARM WHITE)





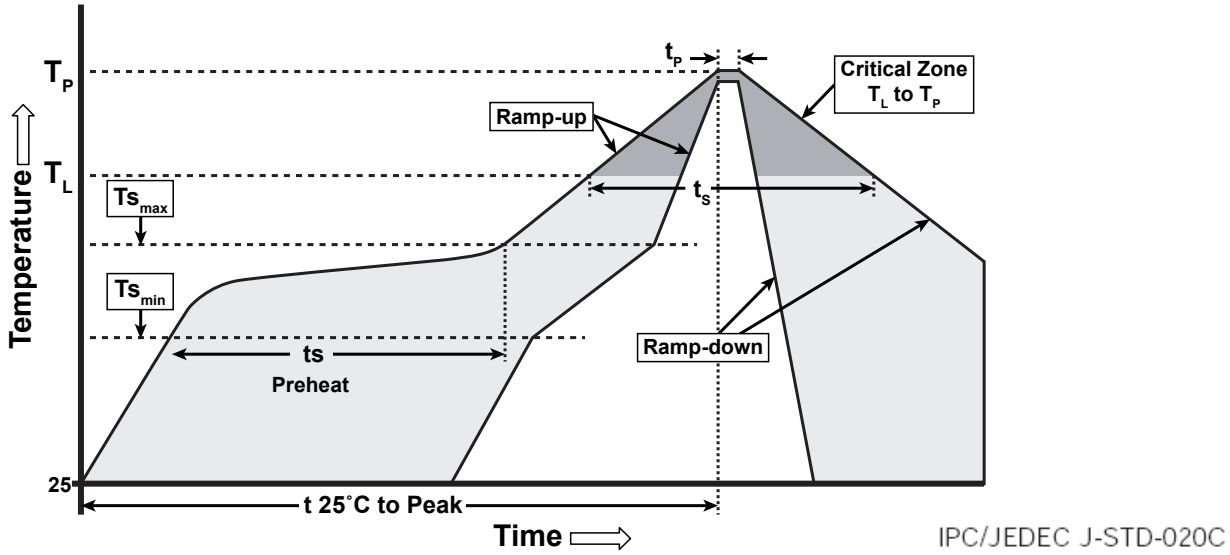
TYPICAL SPATIAL DISTRIBUTION



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XB-D 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.



IPC/JEDEC J-STD-020C

Profile Feature	Lead-Based Solder	Lead-Free Solder
Average Ramp-Up Rate (Ts_{max} to Tp)	3 °C/second max.	3 °C/second max.
Preheat: Temperature Min (Ts_{min})	100 °C	150 °C
Preheat: Temperature Max (Ts_{max})	150 °C	200 °C
Preheat: Time (ts_{min} to ts_{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 (Tp)	215 °C	260 °C
Time Within 5 °C of Actual Peak Temperature (tp)	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

Lumen Maintenance Projections

Please read the XLamp Long-Term Lumen Maintenance 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

In testing, Cree has found XLamp XB-D LEDs to have unlimited floor life in conditions ≤30 ºC/85% relative humidity (RH). Moisture testing included a 168-hour soak at 85 ºC/85% RH followed by 3 reflow cycles, with visual and electrical inspections at each stage.

Cree recommends keeping XLamp LEDs in their sealed moisture-barrier packaging until immediately prior to use. Cree also recommends returning any unused LEDs to the resealable moisture-barrier bag and closing the bag immediately after use.

RoHS Compliance

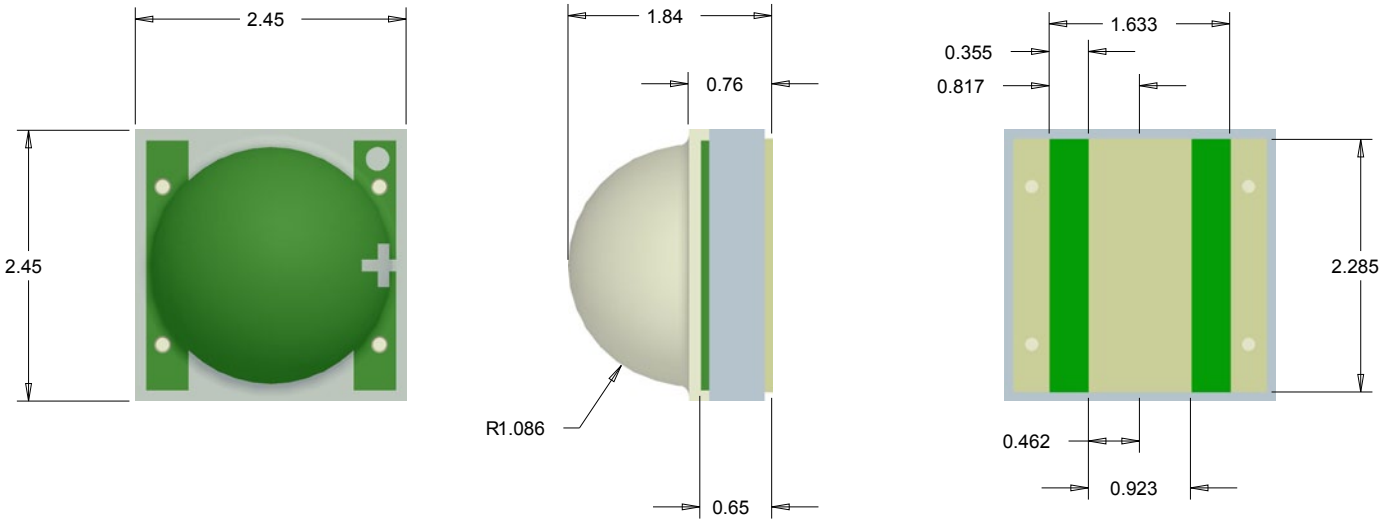
The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted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

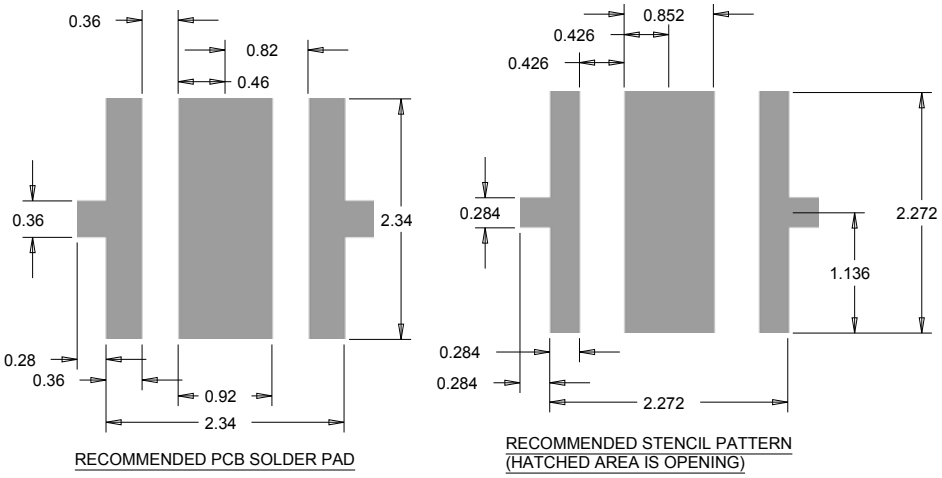
Vision Advisory Claim

WARNING: Do not look at exposed lamp in operation. Eye injury can result. See LED Eye Safety at www.cree.com/products/pdf/XLamp_EyeSafety.pdf.

MECHANICAL DIMENSIONS

All measurements are ±.13 mm unless otherwise indicated.

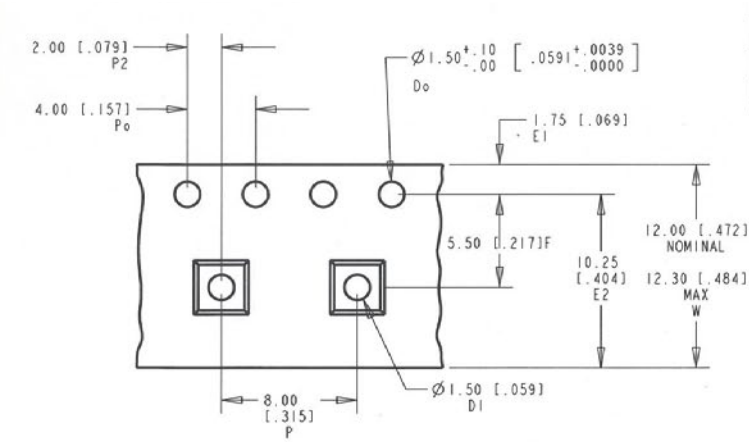


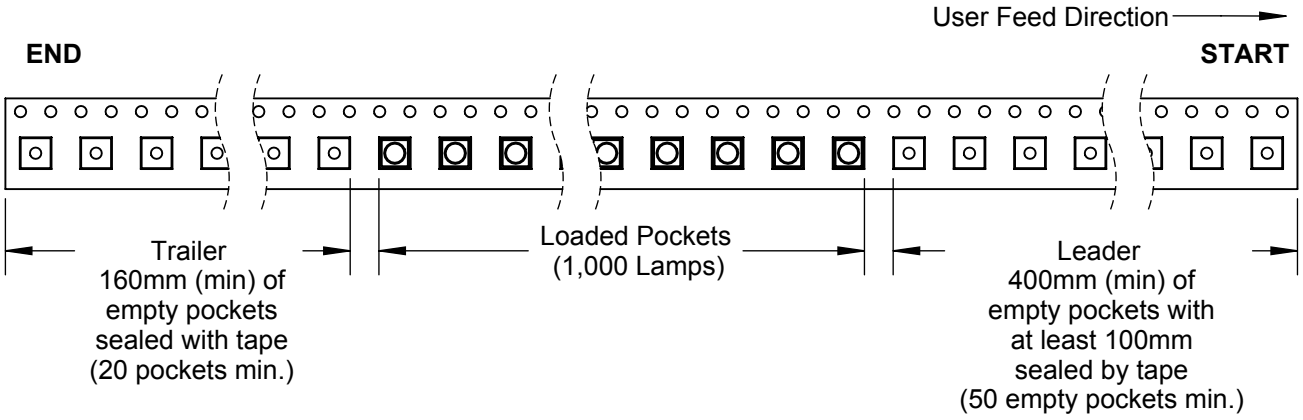


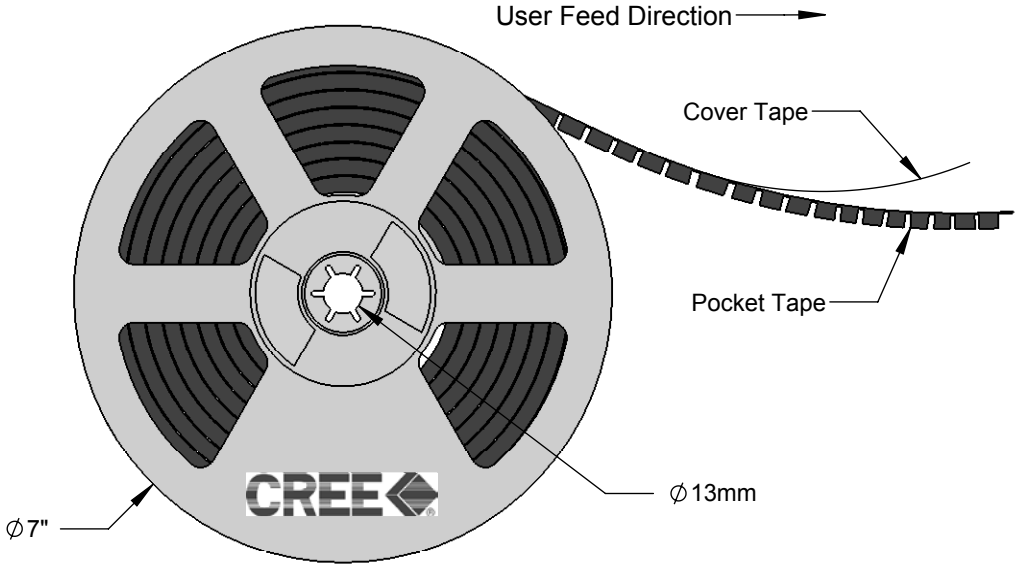
TAPE AND REEL

All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

All dimensions in mm.







PACKAGING

All dimensions in mm.