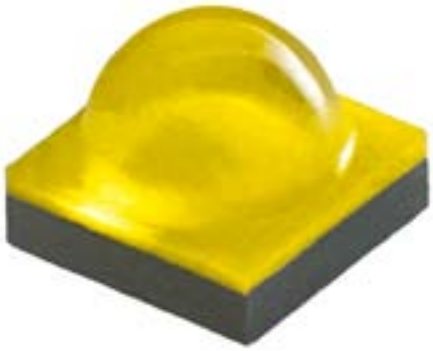
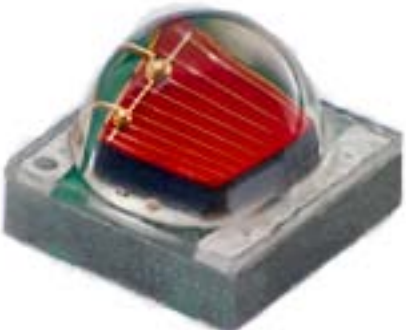
Cree® XLamp® XB-D LEDs





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-minimum CRI white, and 70-minimum CRI cool white, royal blue, blue, green, amber, red-orange & red
- 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
- UL-recognized component (E349212)

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Cree, Inc.
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Durham, NC 27703
USA Tel: +1.919.313.5300

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			Calculated Minimum Luminous Flux (lm)*		Order Code
	Min.	Max.	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1000 mA	
Cool White	5000 K	8300 K	R2	114	130	199	252	XBDAWT-00-0000-000000E51
			R3	122	139	213	270	XBDAWT-00-0000-000000F51
			R4	130	148	227	287	XBDAWT-00-0000-000000G51
70 CRI Minimum Cool White	5000 K	8300 K	R2	114	130	199	252	XBDAWT-00-0000-00000BE51
			R3	122	139	213	270	XBDAWT-00-0000-00000BF51
			R4	130	148	227	287	XBDAWT-00-0000-00000BG51
Neutral White	3700 K	5000 K	Q4	100	114	172	222	XBDAWT-00-0000-00000LCE4
			Q5	107	122	187	236	XBDAWT-00-0000-00000LDE4
			R2	114	130	199	252	XBDAWT-00-0000-00000LEE4
80 CRI Minimum White	2600 K	4300 K	Q2	87.4	100	153	193	XBDAWT-00-0000-00000HAE7
			Q3	93.9	107	164	207	XBDAWT-00-0000-00000HBE7
			Q4	100	114	172	222	XBDAWT-00-0000-00000HCE7
Warm White	2600 K	3700 K	Q2	87.4	100	153	193	XBDAWT-00-0000-00000LAE7
			Q3	93.9	107	164	207	XBDAWT-00-0000-00000LBE7
			Q4	100	114	172	222	XBDAWT-00-0000-00000LCE7

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) 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 70 CRI Minimum Cool White is 70.
- Minimum CRI for 80 CRI Minimum White is 80.

* Flux values @ 25 °C are calculated and are for reference only.

* Calculated flux values are for reference only.

FLUX CHARACTERISTICS (T_J = 25 °C) - COLOR

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	Dominant Wavelength Range				Base Order Codes Min. Radiant Flux (mW) @ 350 mA		Order Code
	Min.		Max.				
	Group	DWL (nm)	Group	DWL (nm)	Group	Flux (mW)	
Royal Blue	D36	450	D57	465	30 (J)	450	XBDROY-00-0000-000000K01
					31 (K)	475	XBDROY-00-0000-000000P01
					32 (L)	500	XBDROY-00-0000-000000Q01

Color	Dominant Wavelength Range				Base Order Codes Min. Luminous Flux (lm) @ 350 mA		Order Code
	Min.		Max.				
	Group	DWL (nm)	Group	DWL (nm)	Group	Flux (lm)	
Blue	B3	465	B6	485	J0	23.5	XBDBLU-00-0000-000000X01
					K2	30.6	XBDBLU-00-0000-000000Y01
					K3	35.2	XBDBLU-00-0000-000000Z01
					M2	39.8	XBDBLU-00-0000-000000201

Color	Dominant Wavelength Range				Base Order Codes Min. Luminous Flux (lm) @ 350 mA		Order Code
	Min.		Max.				
	Group	DWL (nm)	Group	DWL (nm)	Group	Flux (lm)	
Green	G2	520	G4	535	P4	80.6	XBDGRN-00-0000-000000901
					Q2	87.4	XBDGRN-00-0000-000000A01
					Q3	93.9	XBDGRN-00-0000-000000B01
					Q4	100	XBDGRN-00-0000-000000C01

Color	Dominant Wavelength Range				Base Order Codes Min. Luminous Flux (lm) @ 350 mA		Order Code
	Min.		Max.				
	Group	DWL (nm)	Group	DWL (nm)	Group	Flux (lm)	
Amber	A2	585	A3	595	M3	45.7	XBDAMB-00-0000-000000301
					N2	51.7	XBDAMB-00-0000-000000401
					N3	56.8	XBDAMB-00-0000-000000501
					N4	62.0	XBDAMB-00-0000-000000601

Color	Dominant Wavelength Range				Base Order Codes Min. Luminous Flux (lm) @ 350 mA		Order Code
	Min.		Max.				
	Group	DWL (nm)	Group	DWL (nm)	Group	Flux (lm)	
Red-Orange	O3	610	O4	620	P2	67.2	XBDRDO-00-0000-000000701
					P3	73.9	XBDRDO-00-0000-000000801
					P4	80.6	XBDRDO-00-0000-000000901
					Q2	87.4	XBDRDO-00-0000-000000A01

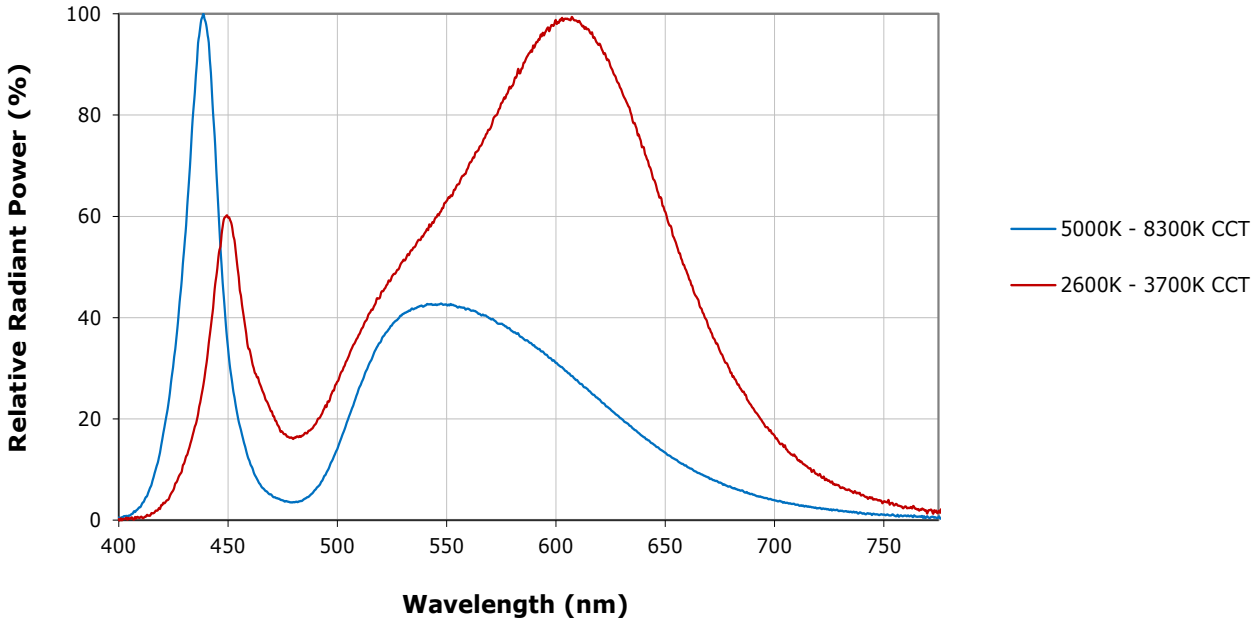
Color	Dominant Wavelength Range				Base Order Codes Min. Luminous Flux (lm) @ 350 mA		Order Code
	Min.		Max.				
	Group	DWL (nm)	Group	DWL (nm)	Group	Flux (lm)	
Red	R2	620	R3	630	N3	56.8	XBDRED-00-0000-000000501
					N4	62.0	XBDRED-00-0000-000000601
					P2	67.2	XBDRED-00-0000-000000701
					P3	73.9	XBDRED-00-0000-000000801

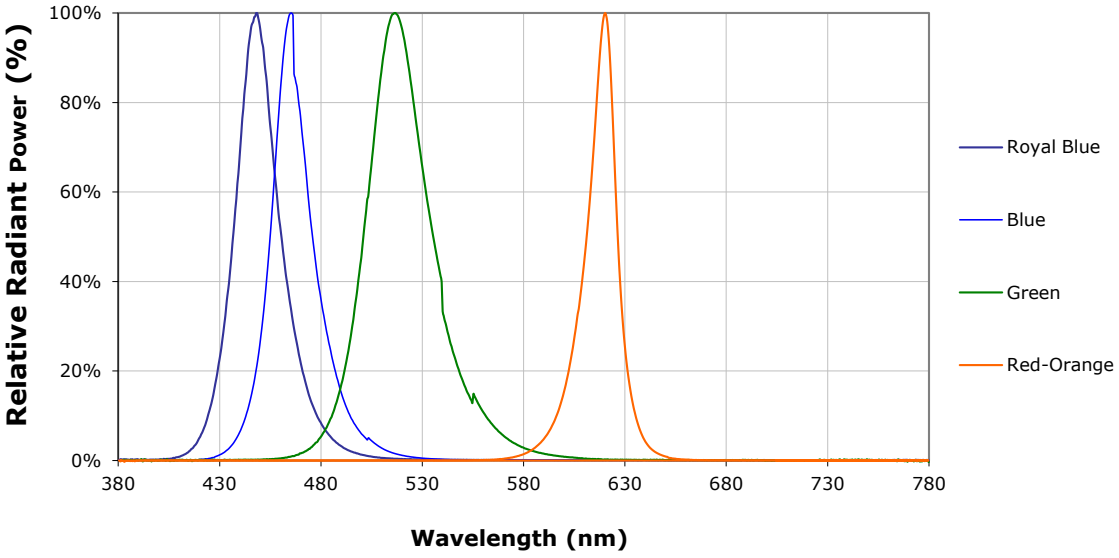
Note: Cree maintains a tolerance of +/- 7% on flux and power measurements.

CHARACTERISTICS

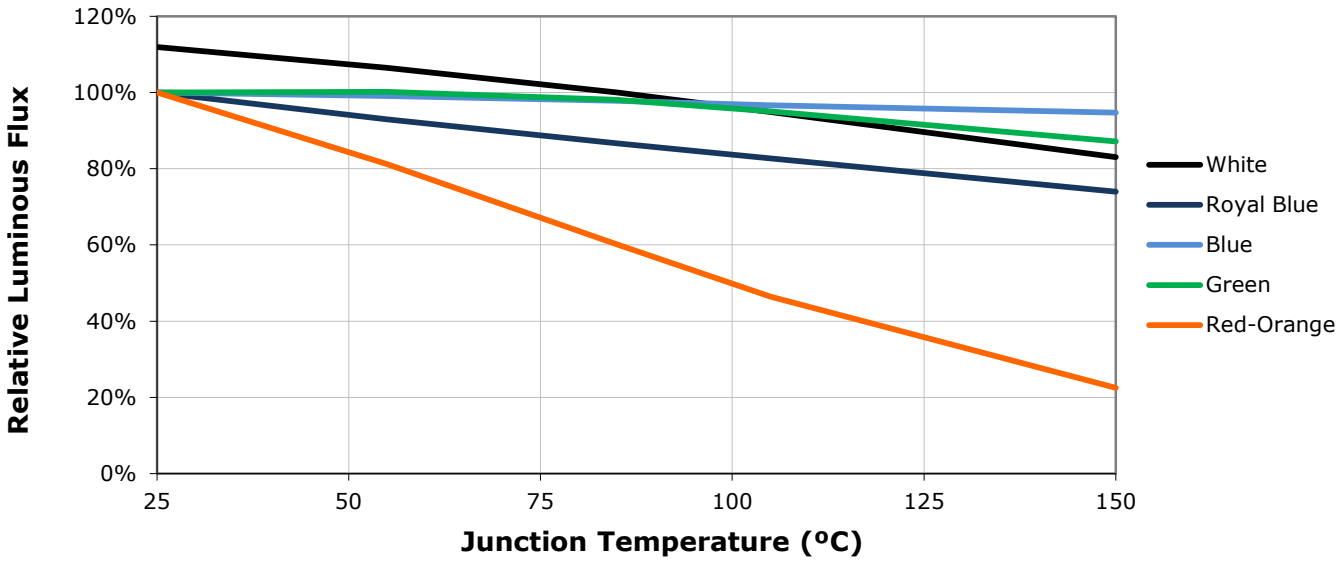
Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point - white	°C/W		6.5	
Thermal resistance, junction to solder point - royal blue, blue, red-orange	°C/W		6.5	
Thermal resistance, junction to solder point - green	°C/W		11	
Viewing angle (FWHM) - white	degrees		115	
Viewing angle (FWHM) - royal blue, blue, green	degrees		135	
Viewing angle (FWHM) - red-orange, red	degrees		145	
Temperature coefficient of voltage - white	mV/°C		-2.5	
Temperature coefficient of voltage - blue, green	mV/°C		-3.5	
Temperature coefficient of voltage - red-orange	mV/°C		-1.8	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current	mA			1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 85 °C) - white	V		2.9	3.5
Forward voltage (@ 350 mA, 25 °C) - royal blue, blue	V		3.1	3.7
Forward voltage (@ 350 mA, 25 °C) - green	V		3.2	3.8
Forward voltage (@ 350 mA, 25 °C) - red-orange, red	V		2.1	2.6
LED junction temperature	°C			150

RELATIVE SPECTRAL POWER DISTRIBUTION

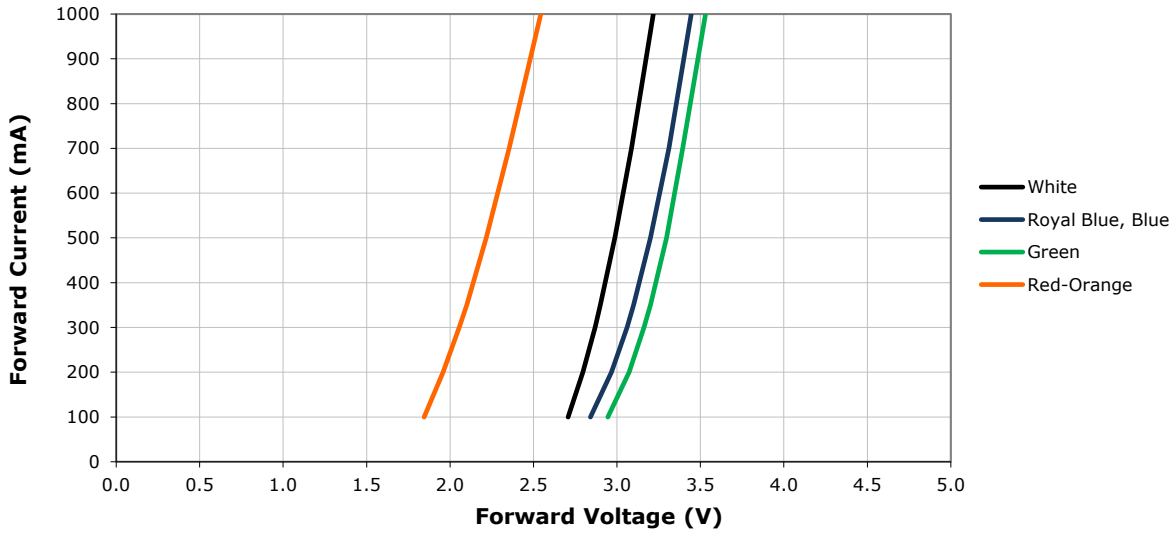




RELATIVE FLUX VS. JUNCTION TEMPERATURE (I_F = 350 mA)

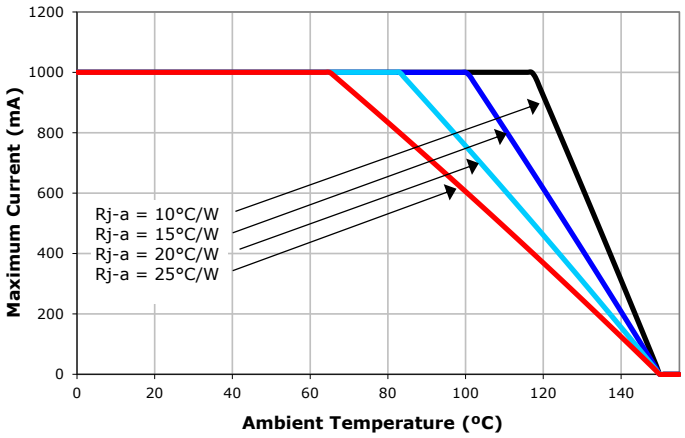


ELECTRICAL CHARACTERISTICS (T_J = 85 °C)

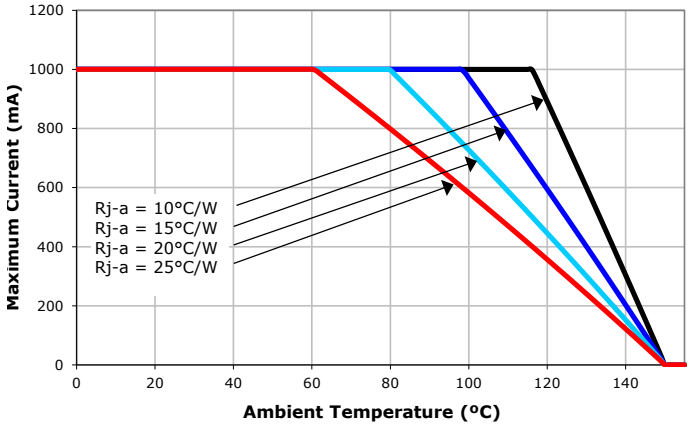


THERMAL DESIGN

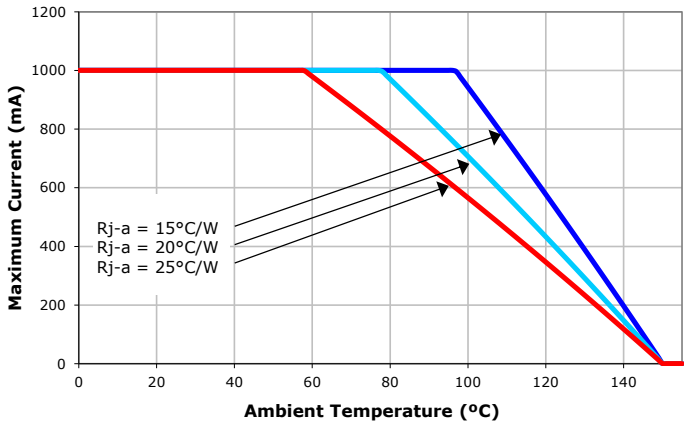
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optomize lamp life and optical characteristics.



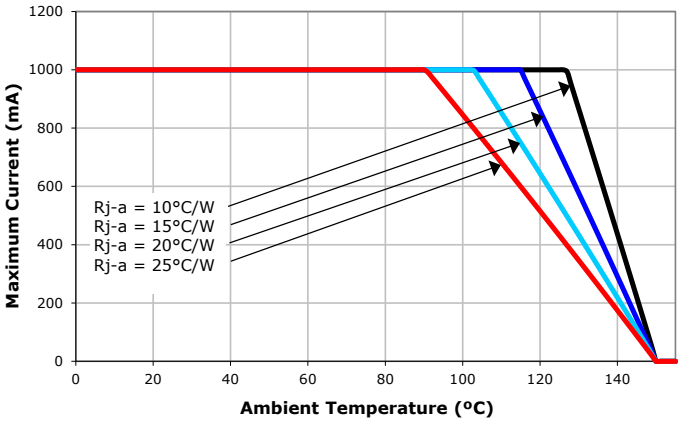
White



Blue

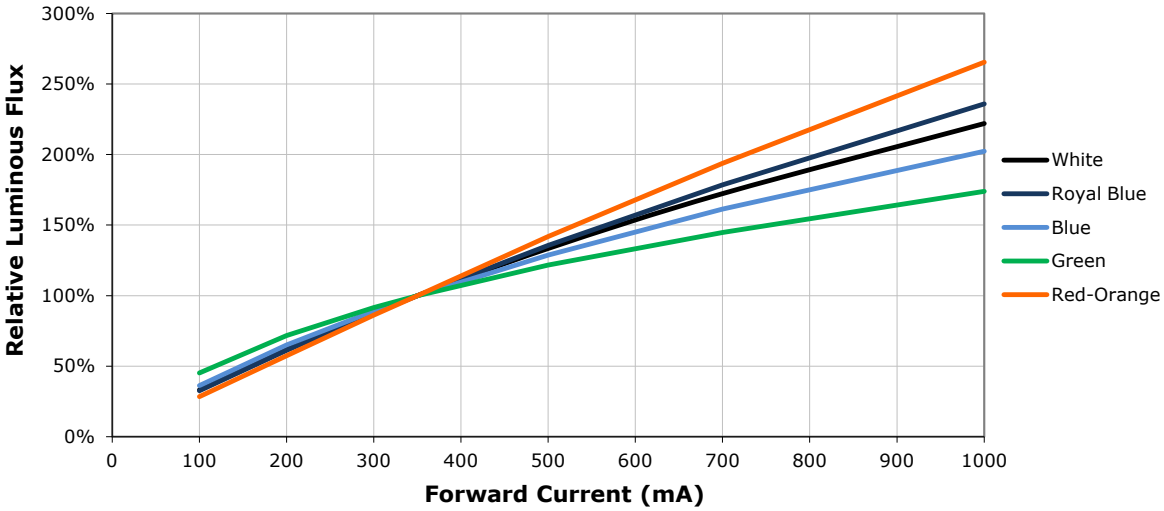


Green

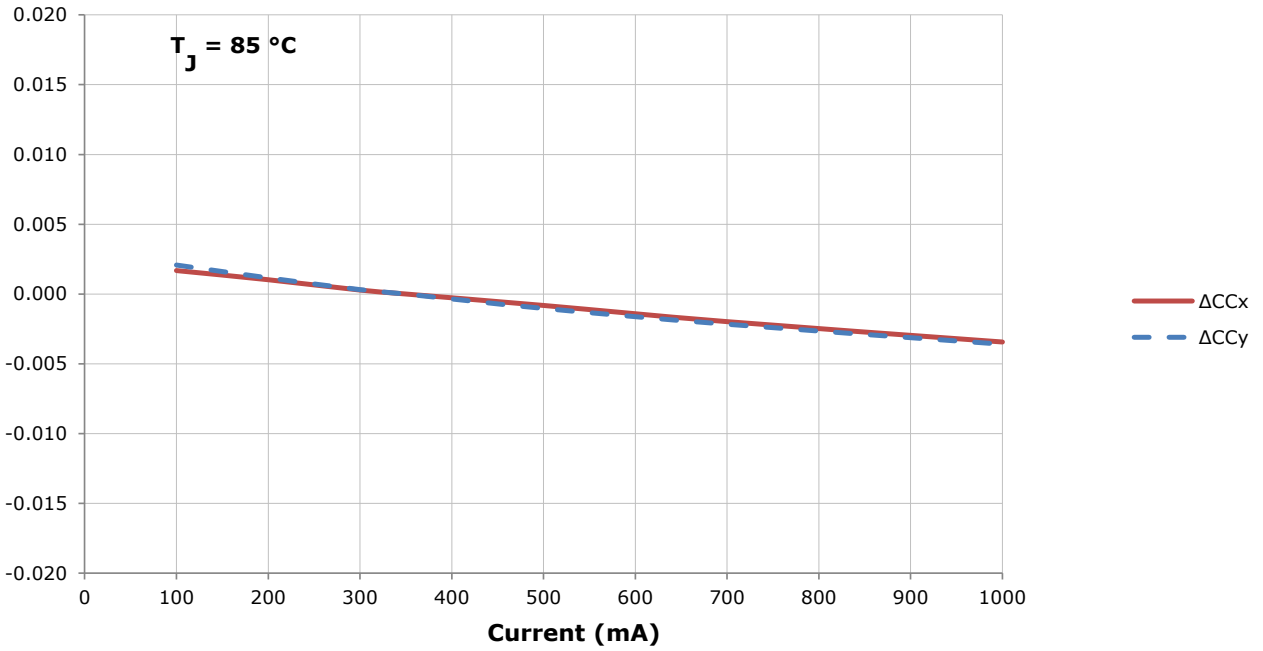


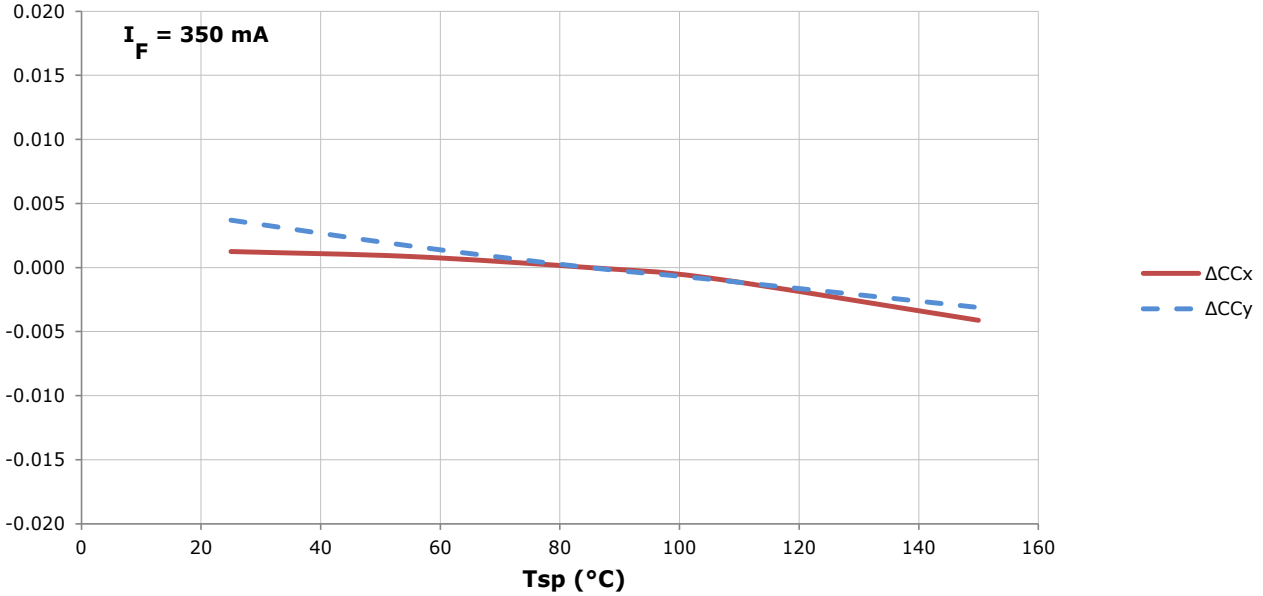
Red-orange

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

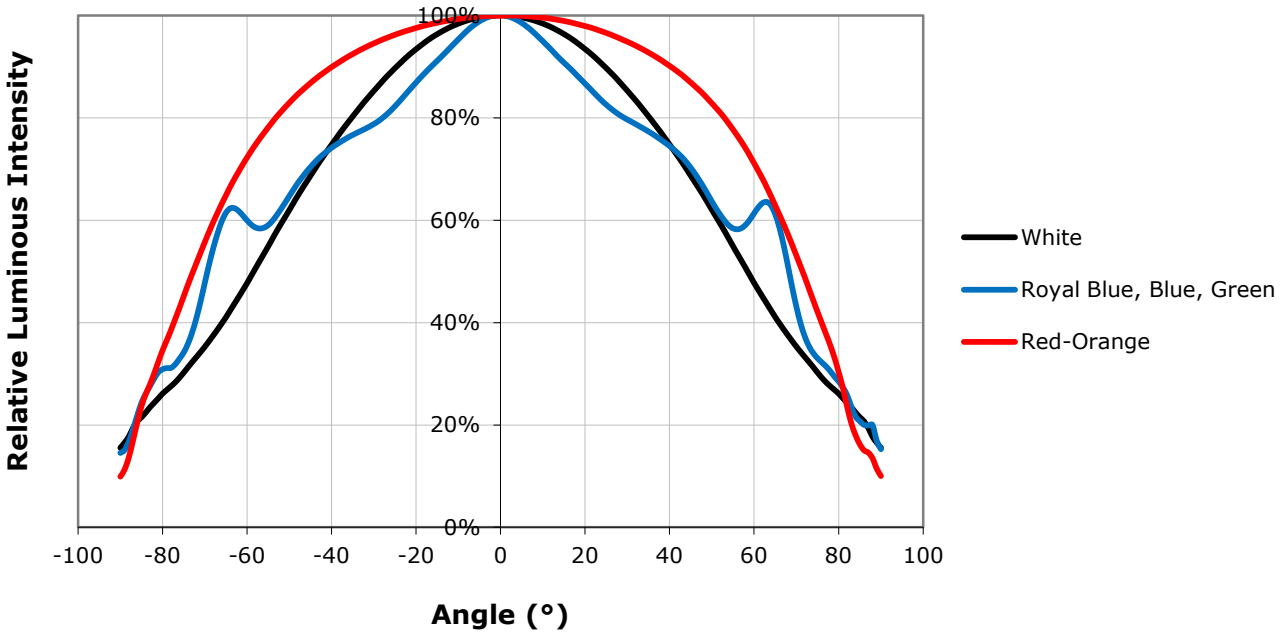


RELATIVE CHROMATICITY VS. CURRENT AND TEMPEATURE (WARM WHITE)





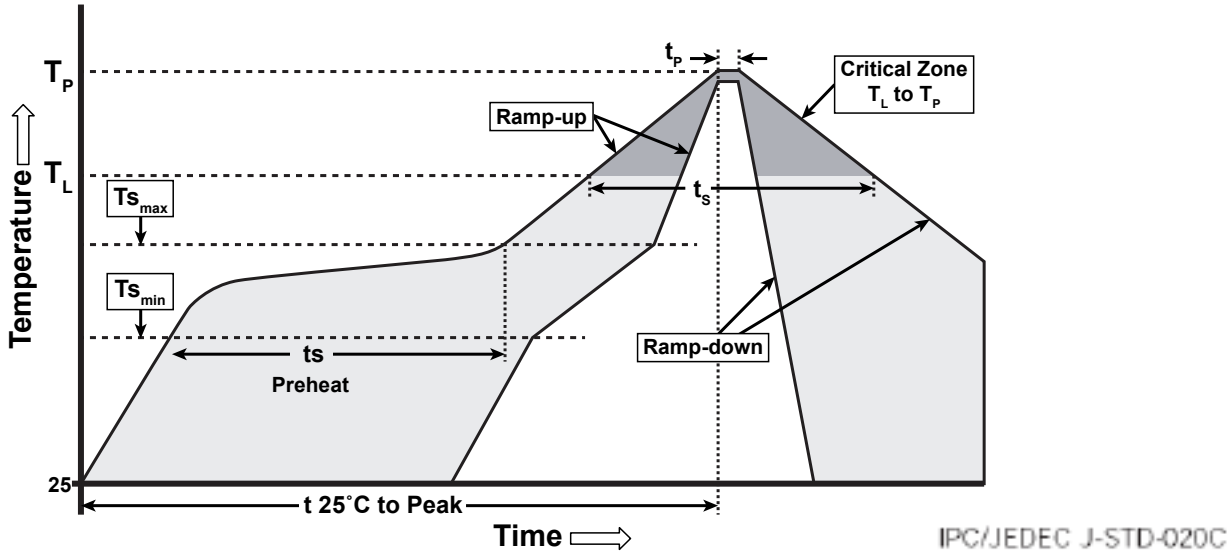
TYPICAL SPATIAL DISTRIBUTION



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.



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

Cree now uses standardized IES LM-80-08 and TM-21-11 methods for collecting long-term data and extrapolating LED lumen maintenance. For information on the specific LM-80 data sets available for this LED, refer to the public LM-80 results document at www.cree.com/xlamp_app_notes/LM80_results.

Please read the XLamp Long-Term Lumen Maintenance application note at www.cree.com/xlamp_app_notes/XRE_lumen_maintenance for more details on Cree's lumen maintenance testing and forecasting. Please read the XLamp Thermal Management application note at www.cree.com/xlamp_app_notes/thermal_management 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.

UL Recognized Component

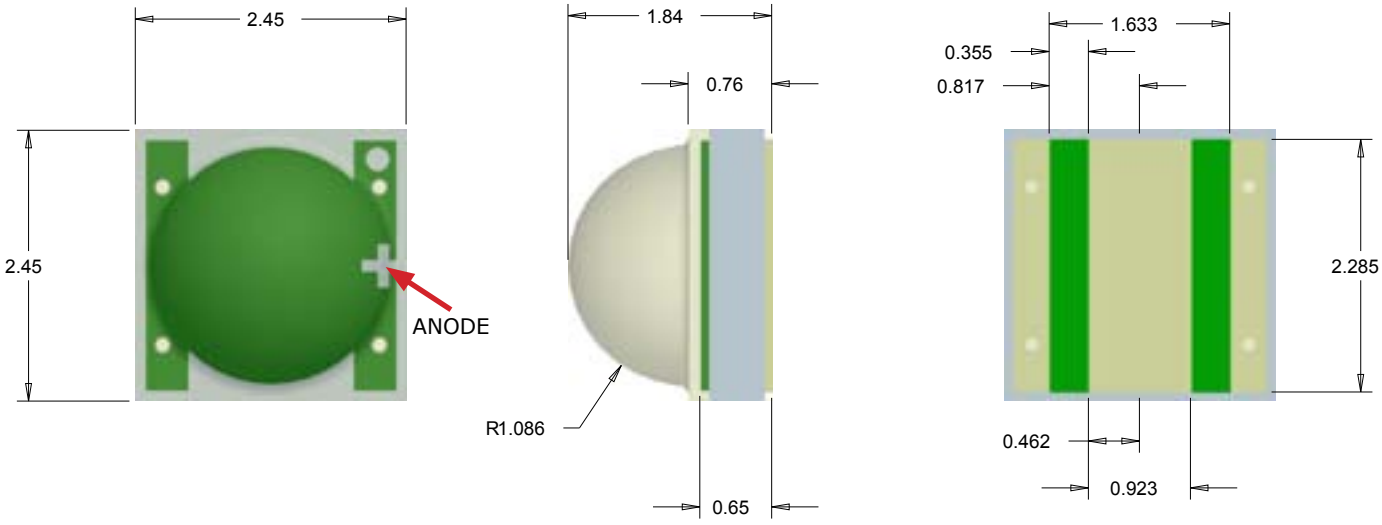
Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

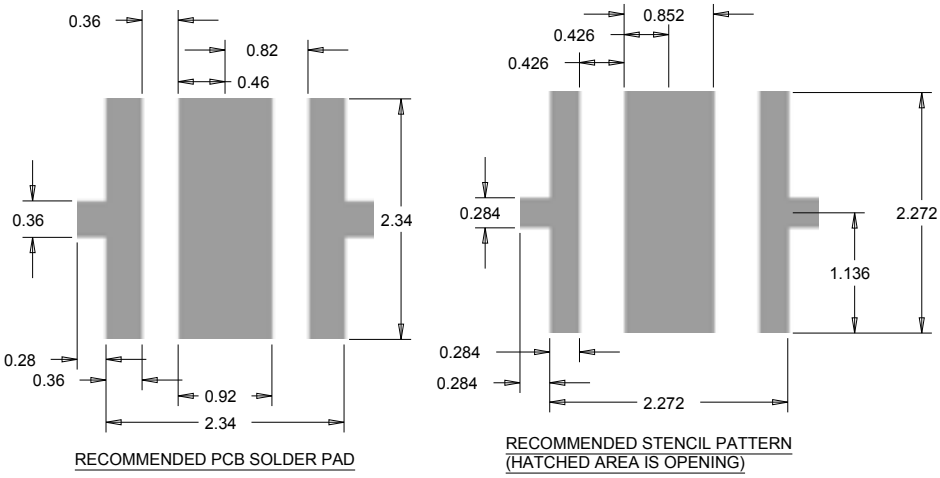
Vision Advisory Claim

WARNING: Do not look at exposed lamp in operation. Eye injury can result. See the LED Eye Safety application note at www.cree.com/xlamp_app_notes/led_eye_safety.

MECHANICAL DIMENSIONS

All measurements are ±.13 mm unless otherwise indicated.

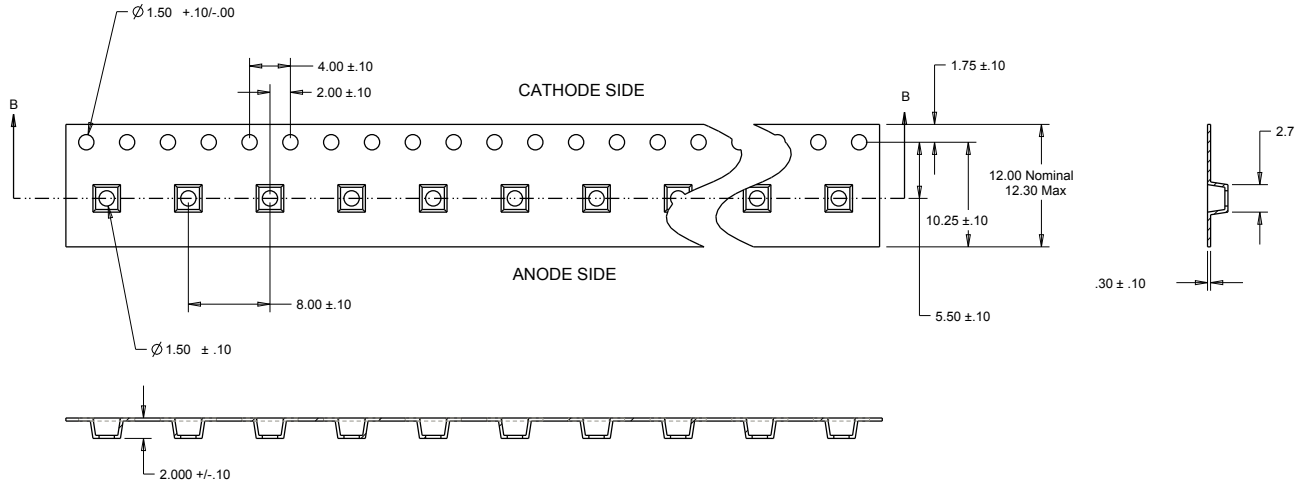


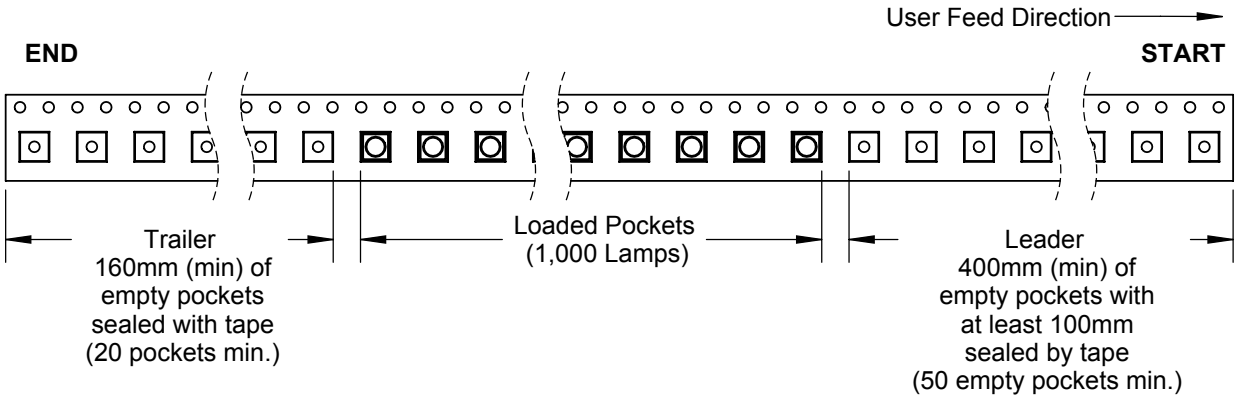


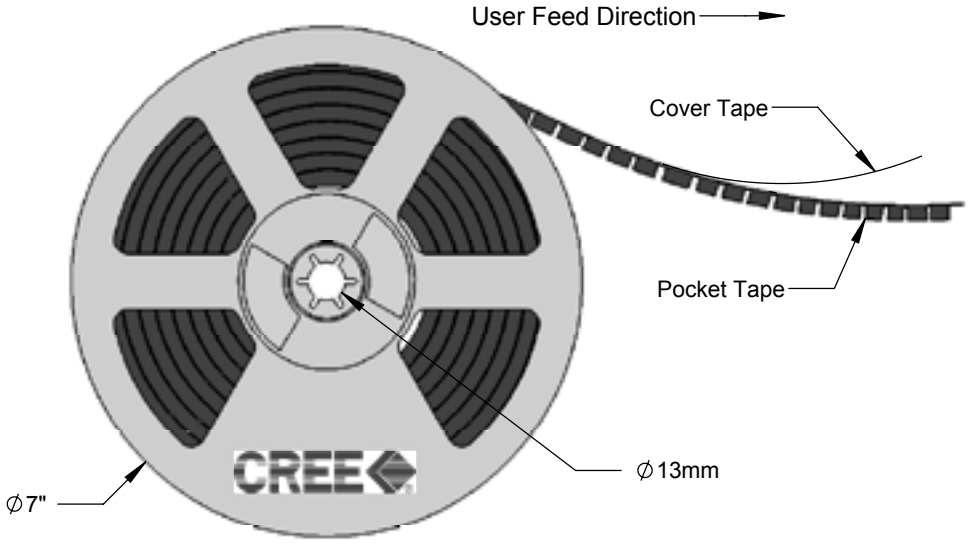
TAPE AND REEL - XB-D LEDS

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

All dimensions in mm

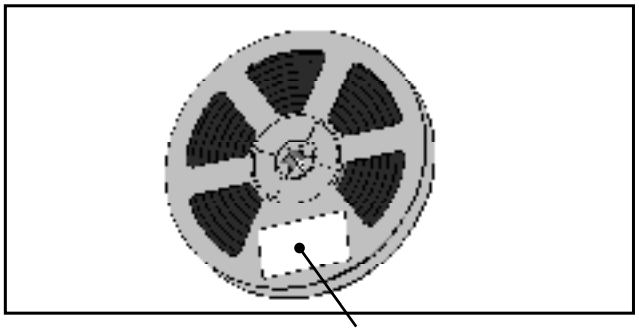




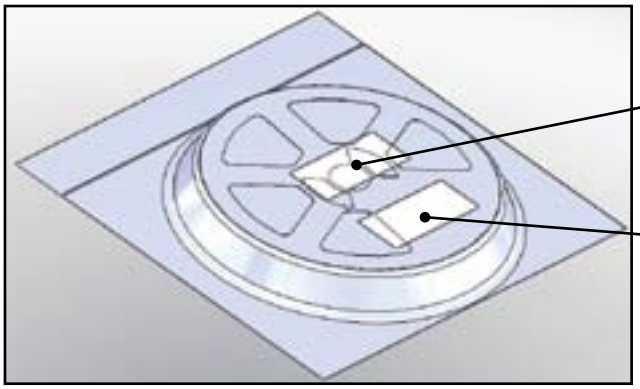


PACKAGING

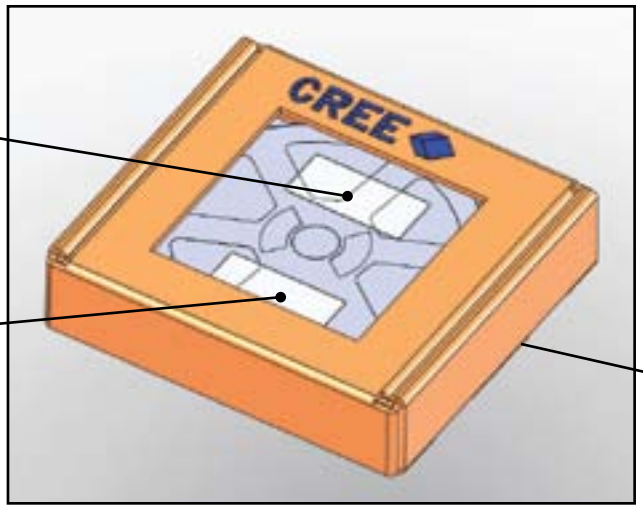
Unpackaged Reel



Packaged Reel



Boxed Reel



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Cree, Inc.:

XBDBLU-00-0000-000000Z01 XBDGRN-00-0000-000000B01 XBDRDO-00-0000-000000901 XBDRED-00-0000-000000701 XBDROY-00-0000-000000L01