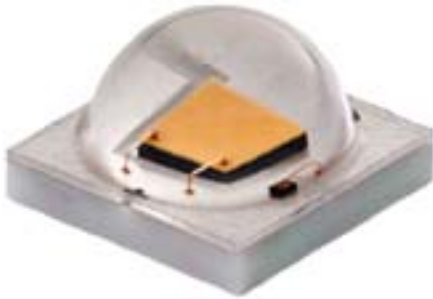


Cree® XLamp® XP-E2 LEDs



PRODUCT DESCRIPTION

The XLamp XP-E2 LED builds on the unprecedented performance of the original XP-E by increasing lumen output up to 20% while providing a single die LED point source for precise optical control. The XP-E2 LED shares the same footprint as the original XP-E, providing a seamless upgrade path to more lumens and/or greater efficiency while shortening the design cycle for existing XP customers.

XLamp XP-E2 LEDs are the ideal choice for lighting applications where high light output and maximum efficacy are required, such as LED retrofit lamps, outdoor lighting, portable lighting, or indoor directional lighting.

FEATURES

- Available in white, outdoor white, 80-CRI, 85-CRI and 90-CRI white
- ANSI-compatible chromaticity bins
- Binned @ 85 °C
- Maximum drive current: 1 A
- Low thermal resistance: 9 °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

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FLUX CHARACTERISTICS (T_j = 85 °C)

The following table provides several base order codes for XLamp XP-E2 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 XP Family Binning and Labeling document.

Color	CCT Range		Base Order Codes Min. Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm)** @ 85 °C		Order Code
	Min.	Max.	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	
Cool White	5000 K	10,000 K	Q4	100	116	171	218	XPEBWT-L1-0000-00C51
			Q5	107	124	183	233	XPEBWT-L1-0000-00D51
			R2	114	132	195	249	XPEBWT-L1-0000-00E51
			R3	122	142	209	266	XPEBWT-L1-0000-00F51
Outdoor White	4000 K	5300 K	Q4	100	116	171	218	XPEBWT-01-0000-00CC2
			Q5	107	124	183	233	XPEBWT-01-0000-00DC2
			R2	114	132	195	249	XPEBWT-01-0000-00EC2
			R3	122	142	209	266	XPEBWT-01-0000-00FC2
Neutral White	3700 K	5300 K	Q4	100	116	171	218	XPEBWT-L1-0000-00CE4
			Q5	107	124	183	233	XPEBWT-L1-0000-00DE4
			R2	114	132	195	249	XPEBWT-L1-0000-00EE4
80-CRI White	2600 K	4300 K	Q2	87.4	101	150	191	XPEBWT-H1-0000-00AE7
			Q3	93.9	109	161	205	XPEBWT-H1-0000-00BE7
Warm White	2600 K	3700 K	Q2	87.4	101	150	191	XPEBWT-L1-0000-00AE7
			Q3	93.9	109	161	205	XPEBWT-L1-0000-00BE7
			Q4	100	116	171	218	XPEBWT-L1-0000-00CE7
85-CRI White	2600 K	3200 K	P2	67.2	78.0	115	147	XPEBWT-P1-0000-007E7
			P3	73.9	85.7	127	161	XPEBWT-P1-0000-008E7
			P4	80.6	93.5	138	176	XPEBWT-P1-0000-009E7
			Q2	87.4	101	150	191	XPEBWT-P1-0000-00AE7
90-CRI White	2600 K	3200 K	P2	67.2	78.0	115	147	XPEBWT-U1-0000-007E7
			P3	73.9	85.7	127	161	XPEBWT-U1-0000-008E7
			P4	80.6	93.5	138	176	XPEBWT-U1-0000-009E7

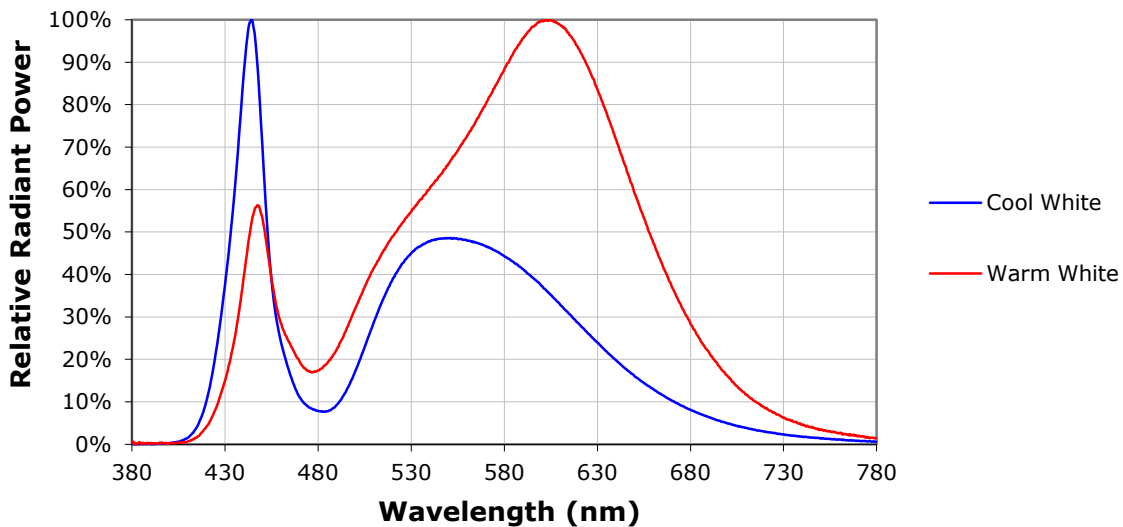
Notes:

- 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 Cool White (5000 K – 10,000 K CCT) is 70.
- Typical CRI for Neutral White (3700 K – 5300 K CCT) is 75.
- Typical CRI for Outdoor White (4000 K - 5300 K CCT) is 70.
- Typical CRI for Warm White (2600 K – 3700 K CCT) is 80.
- Minimum CRI for 80-CRI White is 80.
- Minimum CRI for 85-CRI White is 85.
- Minimum CRI for 90-CRI White is 90.
- * Flux values @ 25 °C are calculated and for reference only.
- ** Calculated flux values are for reference only.

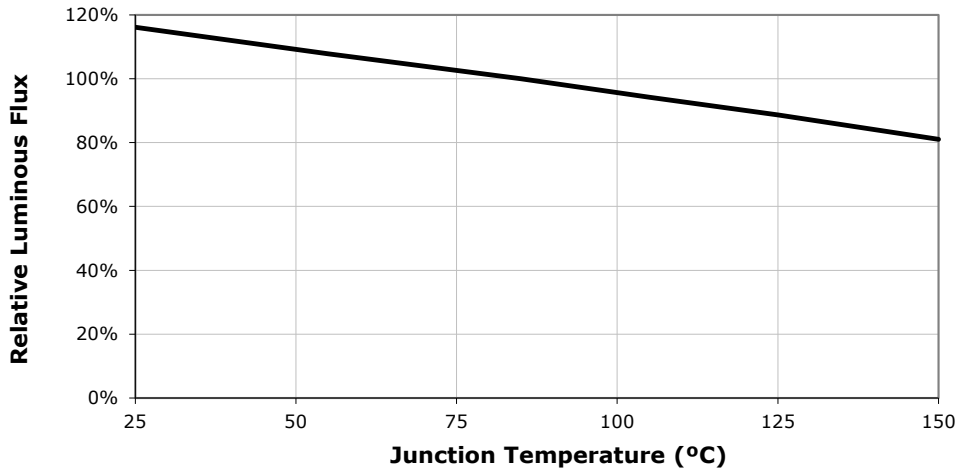
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		9	
Viewing angle (FWHM)	degrees		110	
Temperature coefficient of voltage	mV/°C		-2.3	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current	mA		350	1000
Reverse voltage	V			-5
Forward voltage (@ 350 mA, 85 °C)	V		2.9	3.75
Forward voltage (@ 700 mA, 85 °C)			3.05	
Forward voltage (@ 1000 mA, 85 °C)			3.15	
LED junction temperature	°C			150

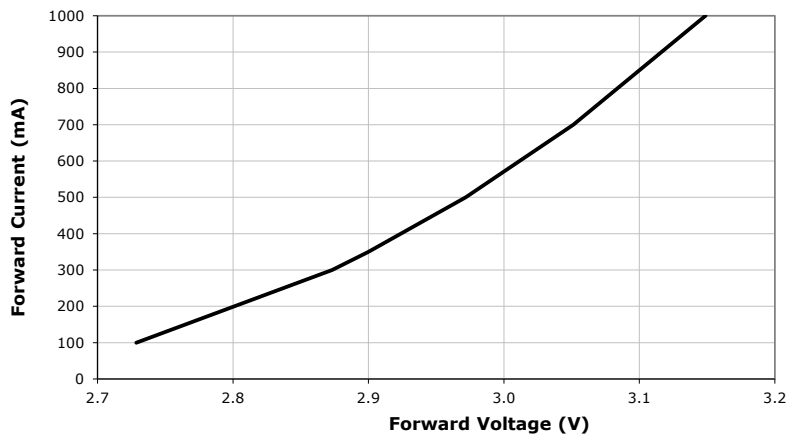
RELATIVE SPECTRAL POWER DISTRIBUTION



RELATIVE FLUX VS. JUNCTION TEMPERATURE ($I_F = 350 \text{ mA}$)

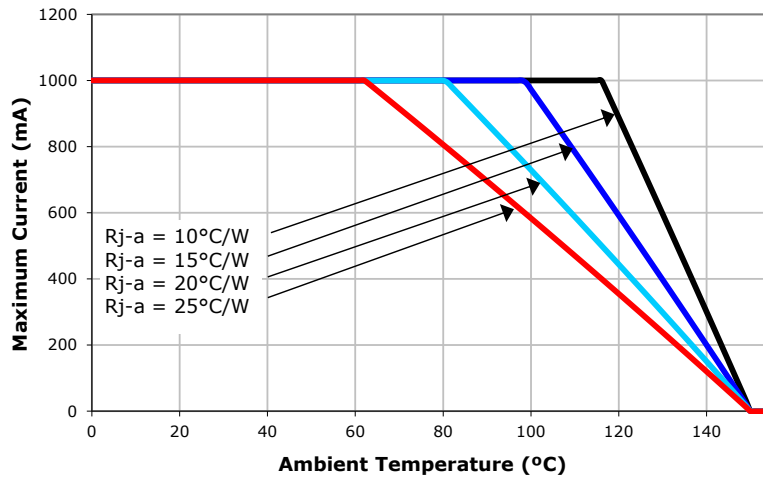


ELECTRICAL CHARACTERISTICS ($T_J = 85 \text{ °C}$)

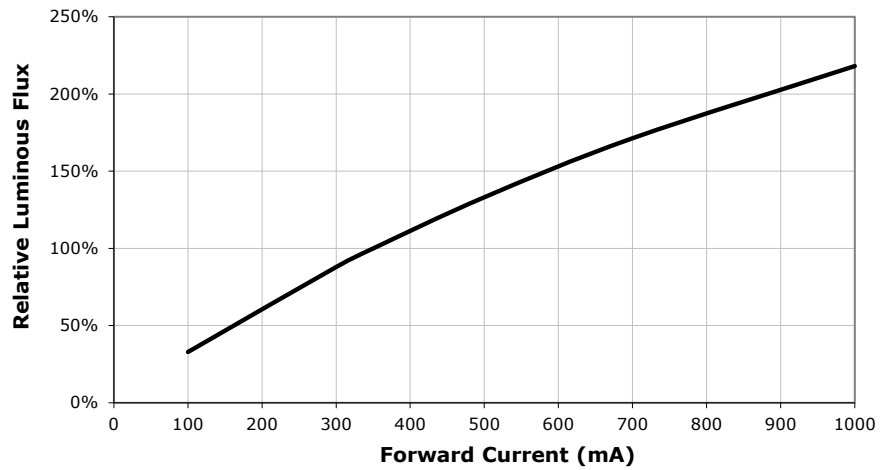


THERMAL DESIGN

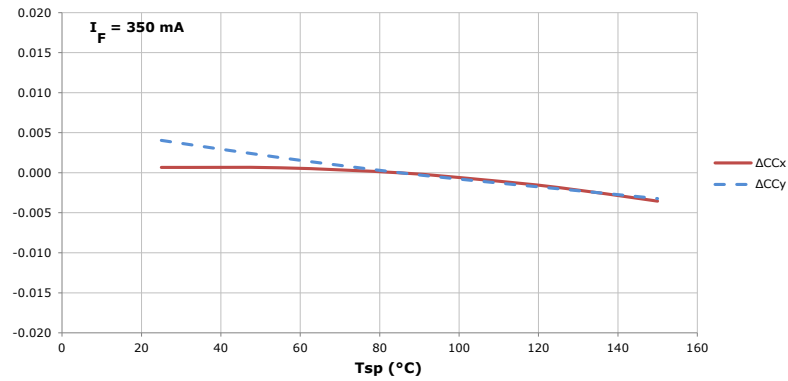
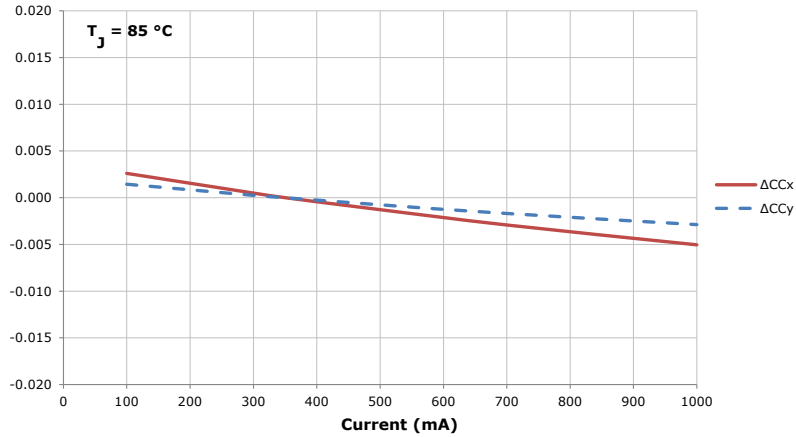
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



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

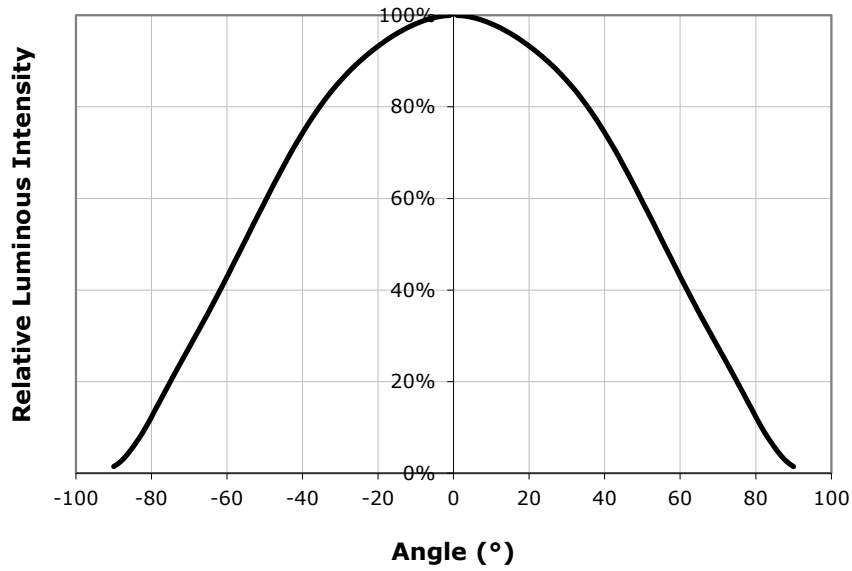


RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE - WARM WHITE*



* Warm White XLamp XP-E2 LEDs have a typical CRI of 80.

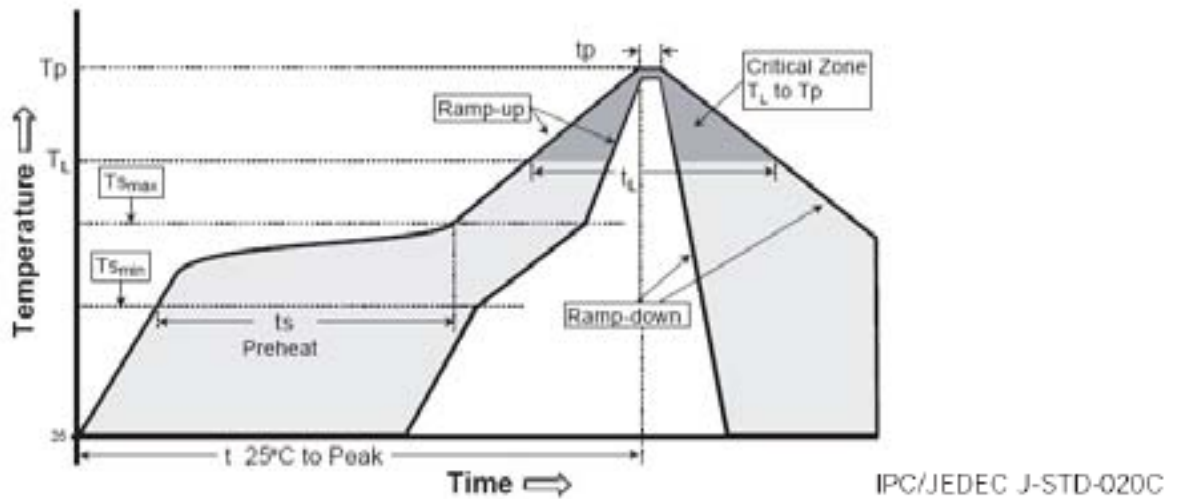
TYPICAL SPATIAL DISTRIBUTION



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XP-E2 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

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 XP-E2 LEDs to have unlimited floor life in conditions ≤ 30 °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.

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

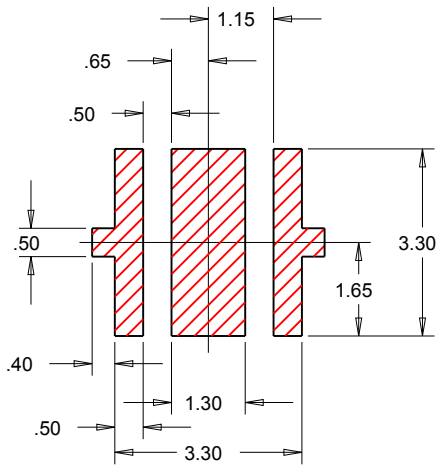
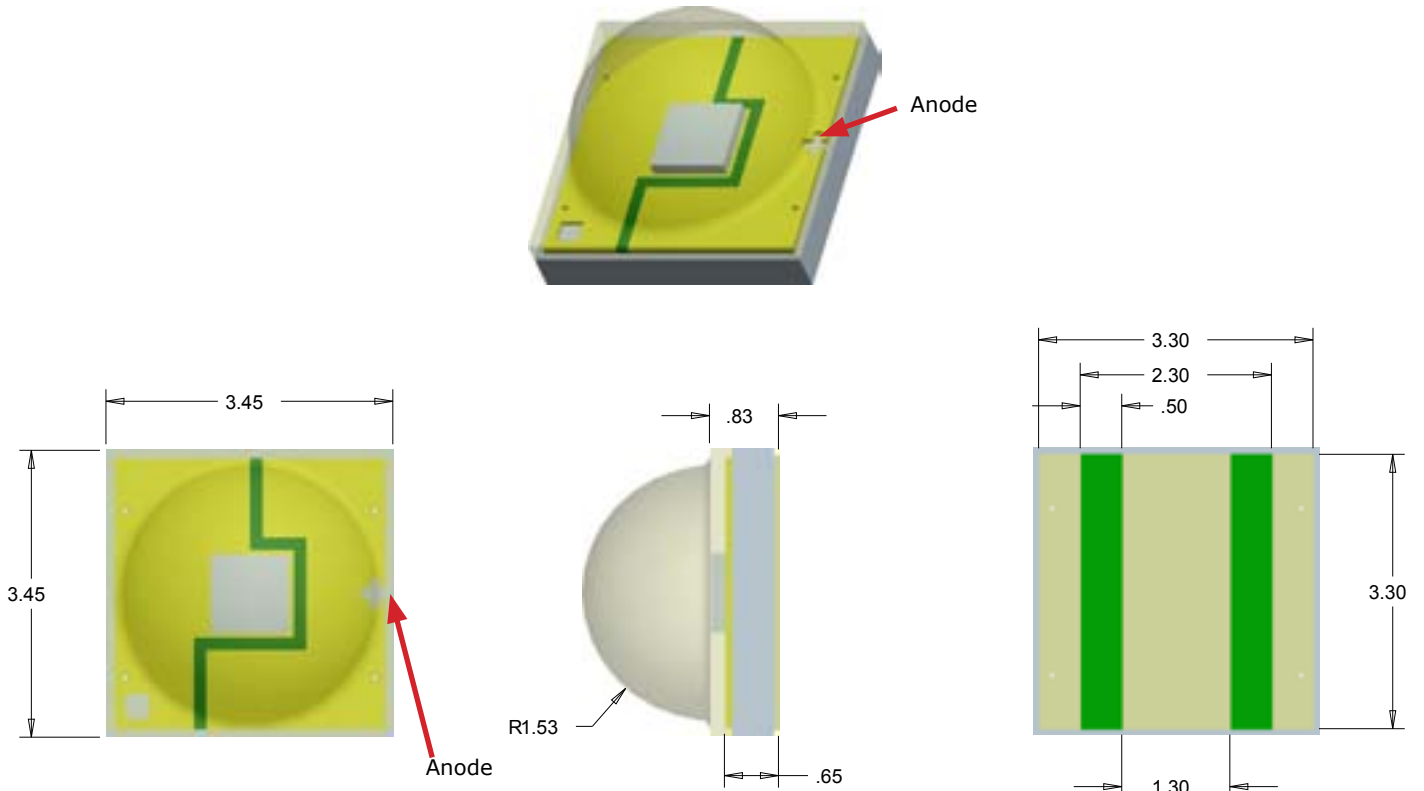
The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted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

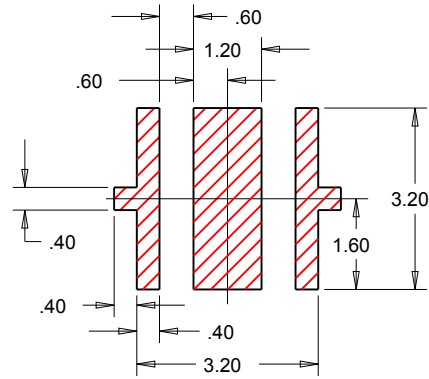
WARNING: Do not look at exposed lamp in operation. Eye injury can result. See LED Eye Safety at www.cree.com/xlamp_app_notes/led_eye_safety.

MECHANICAL DIMENSIONS

All measurements are $\pm .13$ mm unless otherwise indicated.



RECOMMENDED PCB SOLDER PAD

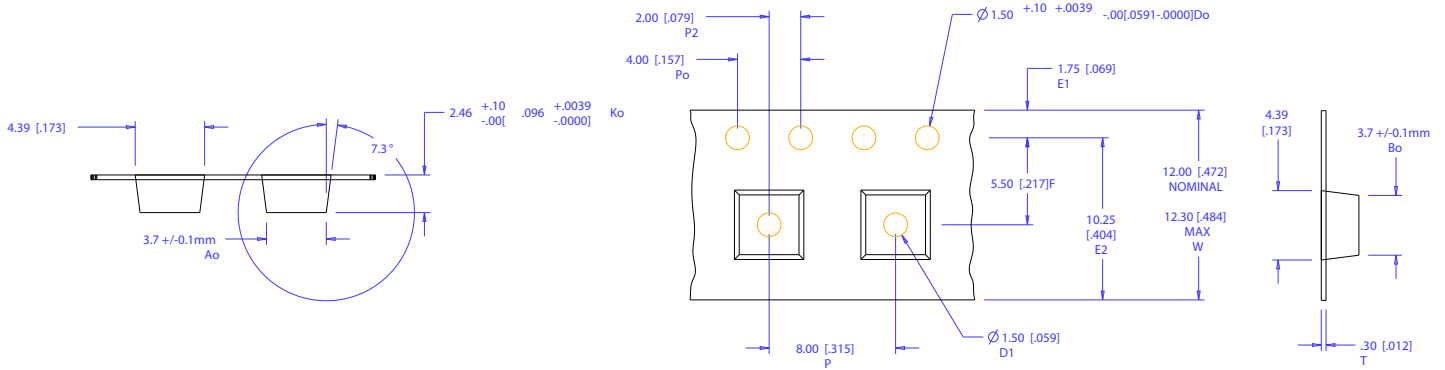


**RECOMMENDED STENCIL PATTERN
(HATCHED AREA IS OPENING)**

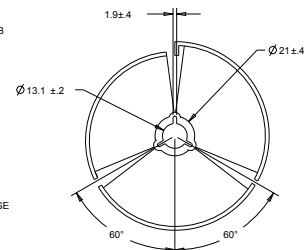
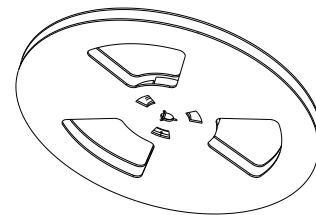
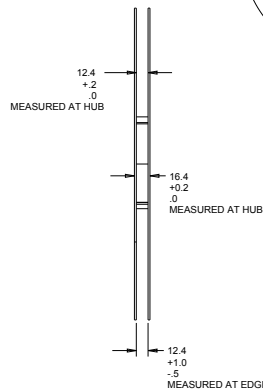
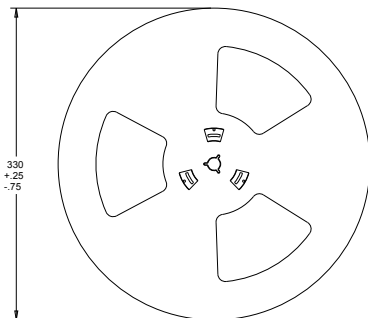
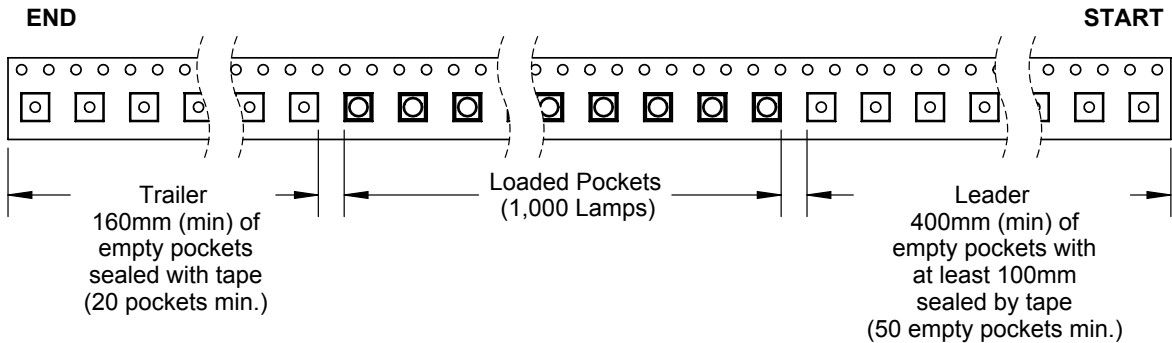
TAPE AND REEL

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

All dimensions in mm.

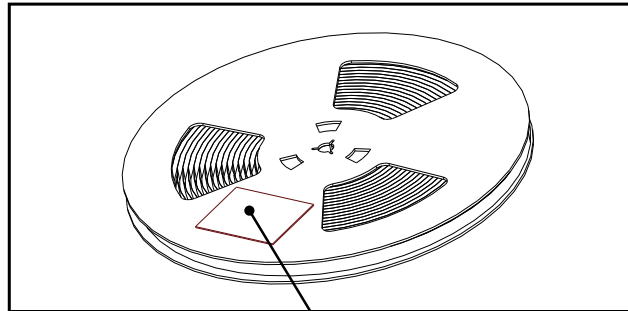


POCKET SIZE	
Ao -	3.7mm +/-0.1mm
Bo -	3.7mm +/-0.1mm
Ko -	2.46mm +0.1/-0mm



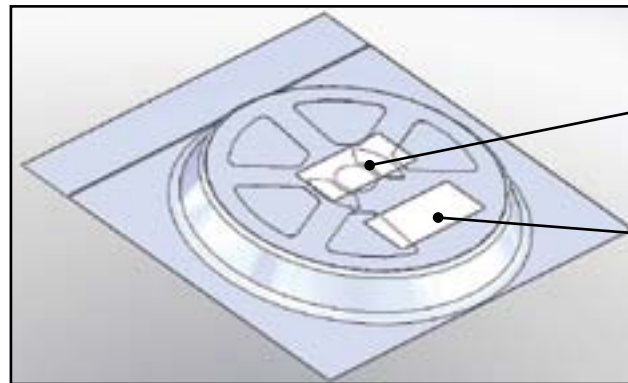
PACKAGING

Unpackaged Reel



Label with Cree Bin Code, Qty, Reel ID

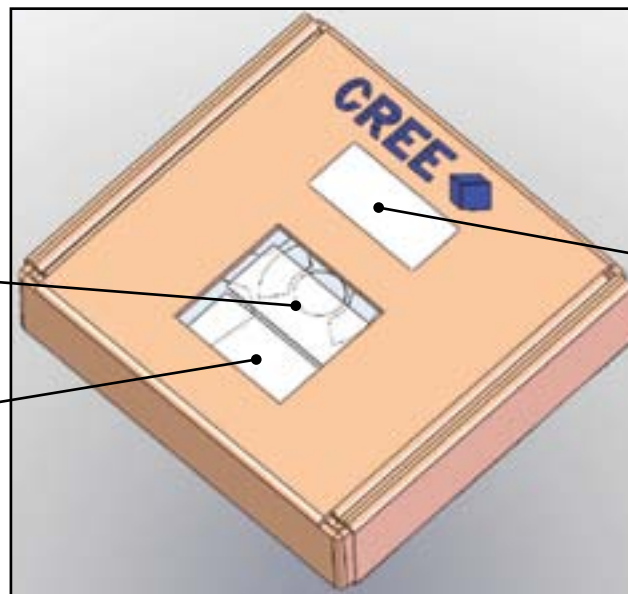
Packaged Reel



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

Label with Cree Bin Code, Qty, Reel ID

Boxed Reel



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

Label with Cree Bin Code, Qty, Reel ID

Patent Label