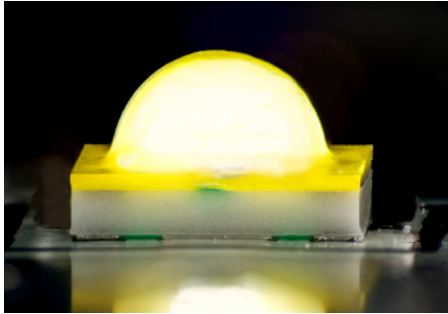


# Cree® XLamp® XP-E High-Efficiency White LEDs



## PRODUCT DESCRIPTION

XLamp XP-E High-Efficiency White LEDs upgrade the XLamp XP-E to leading performance levels for diffuse lighting applications. XP-E HEW is designed to enable faster adoption of LED light in cost-sensitive, consumer lighting products. Compared to the standard XLamp XP-E, XP-E HEW can reduce LED count by 50% and still deliver the same system performance.

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

## FEATURES

- Light output and efficacy similar to XLamp XP-G
- Maximum drive current: 1000 mA
- Low thermal resistance: 6 °C/W
- Maximum junction temperature: 150 °C
- Wide viewing angle: 120°
- Reflow solderable - JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- RoHS- and REACH-compliant
- UL-recognized component (E349212)



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**FLUX CHARACTERISTICS (T<sub>j</sub> = 25 °C) - WHITE**

The following table provides several base order codes for XLamp XP-E HEW 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.

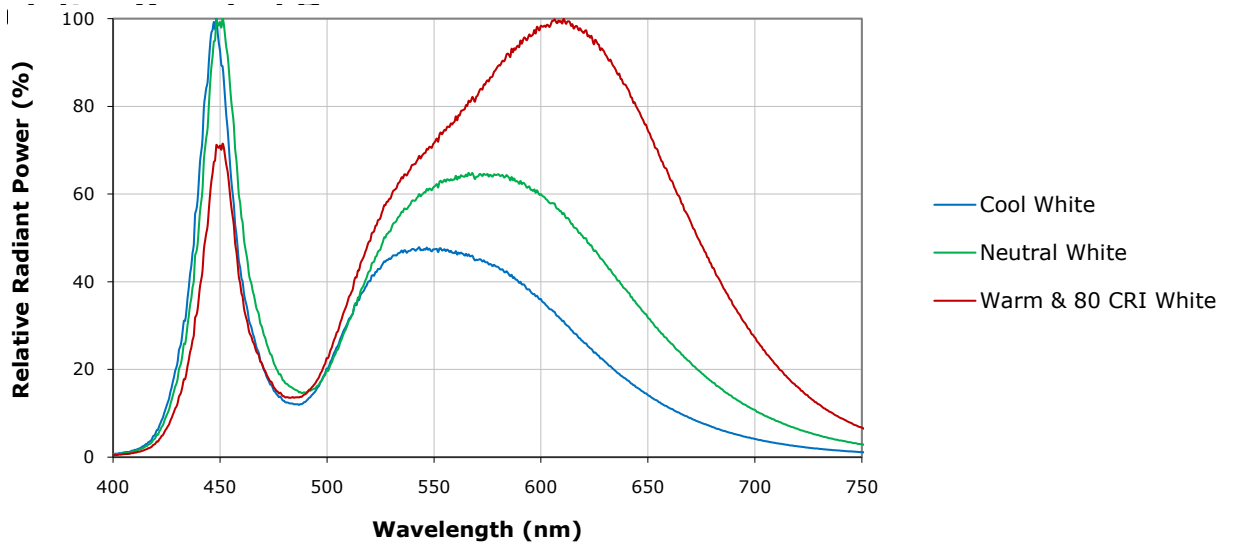
Color	CCT Range		Base Order Codes Min. Luminous Flux @ 350 mA		Order Code
	Min.	Max.	Group	Flux (lm)	
Cool White	5000 K	8300 K	R3	122	XPEHEW-L1-0000-00F51
			R4	130	XPEHEW-L1-0000-00G51
Outdoor White	2600 K	5300 K	R2	114	XPEHEW-01-0000-00EC2
			R3	122	XPEHEW-01-0000-00FC2
Neutral White	3700 K	5000 K	Q5	107	XPEHEW-L1-0000-00DE4
			R2	114	XPEHEW-L1-0000-00EE4
80-CRI White	2600 K	4300 K	Q3	93.9	XPEHEW-H1-0000-00BE7
			Q4	100	XPEHEW-H1-0000-00CE7
Warm White	2600 K	3700 K	Q3	93.9	XPEHEW-L1-0000-00BE7
			Q4	100	XPEHEW-L1-0000-00CE7
85-CRI White	2600 K	3200 K	P4	80.6	XPEHEW-P1-0000-009E7
			Q2	87.4	XPEHEW-P1-0000-00AE7
90-CRI White	2600 K	3200 K	P4	80.6	XPEHEW-U1-0000-009E7

**Notes:**

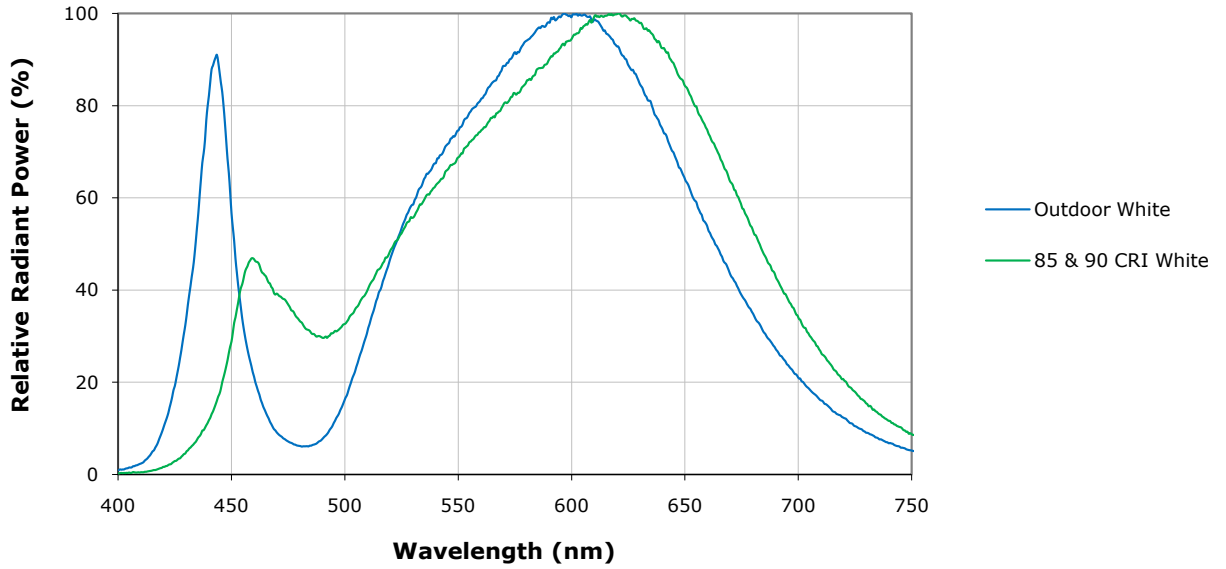
- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and  $\pm 2$  on CRI measurements.
- Typical CRI for Cool White (5000 K - 8300 K CCT) is 68.
- Typical CRI for Neutral White (3,700 K - 5000 K CCT) is 75.
- Typical CRI for Outdoor White (2600 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.

**CHARACTERISTICS**

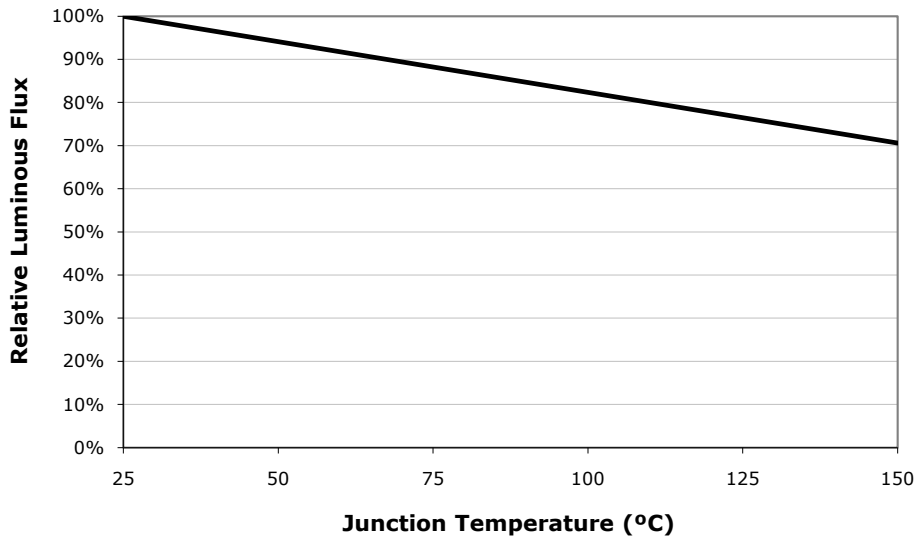
Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point - white	°C/W		6	
Viewing angle (FWHM) - white	degrees		120	
Temperature coefficient of voltage - white	mV/°C		-3	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current - white	mA			1000
Reverse voltage	V			5
Forward voltage (@ 350 mA) - white	V		3.0	3.5
Forward voltage (@ 700 mA) - white	V		3.15	
Forward voltage (@ 1000 mA) - white	V		3.25	
LED junction temperature	°C			150

**RELATIVE SPECTRAL POWER DISTRIBUTION**


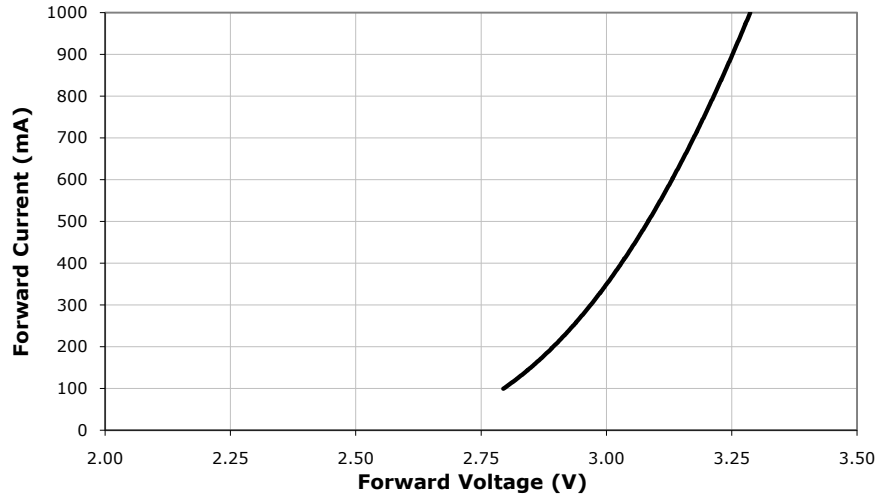
**RELATIVE SPECTRAL POWER DISTRIBUTION (CONTINUED)**



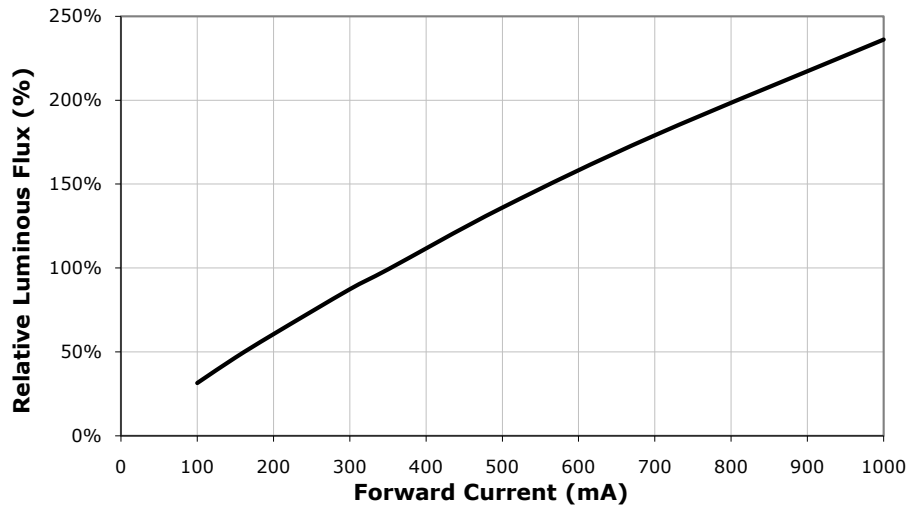
**RELATIVE FLUX VS. JUNCTION TEMPERATURE ( $I_F = 350$  mA)**



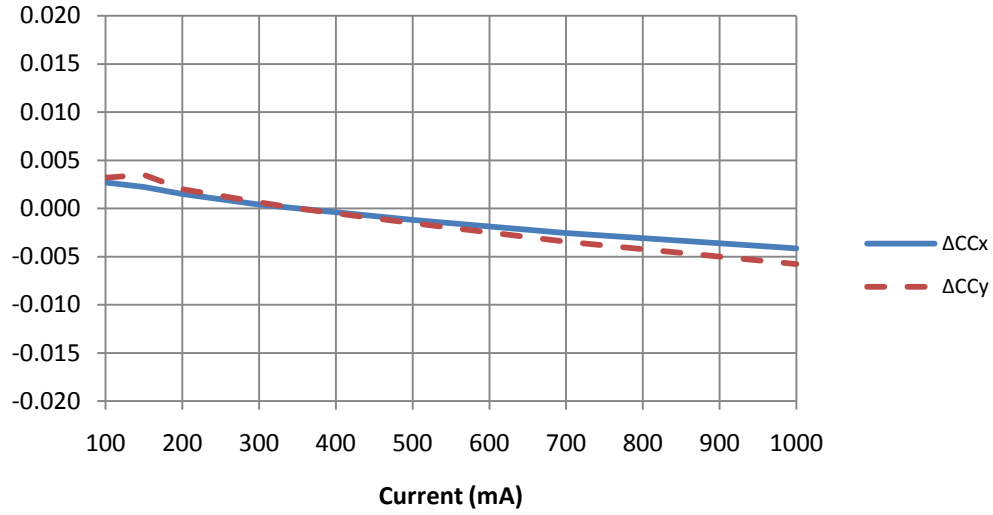
**ELECTRICAL CHARACTERISTICS ( $T_j = 25\text{ }^\circ\text{C}$ )**



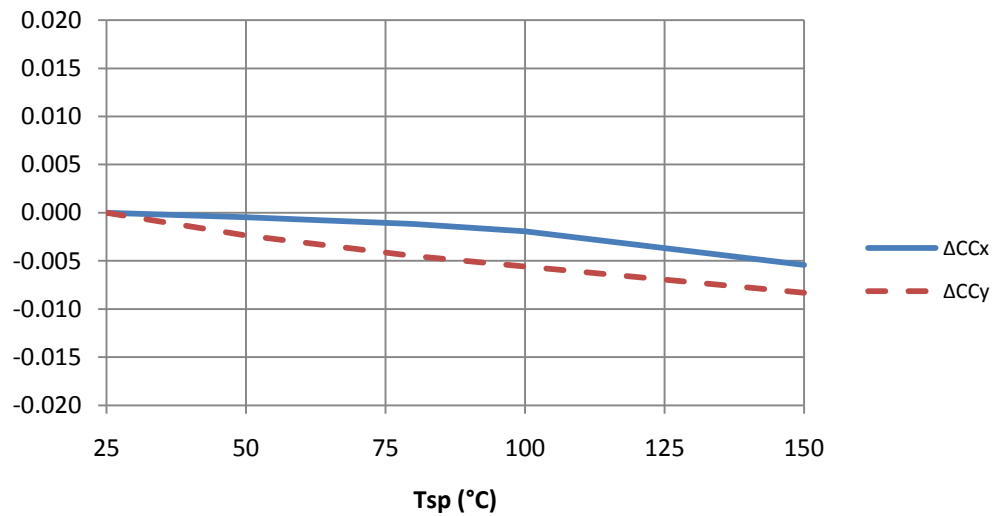
**RELATIVE FLUX VS. CURRENT ( $T_j = 25\text{ }^\circ\text{C}$ )**



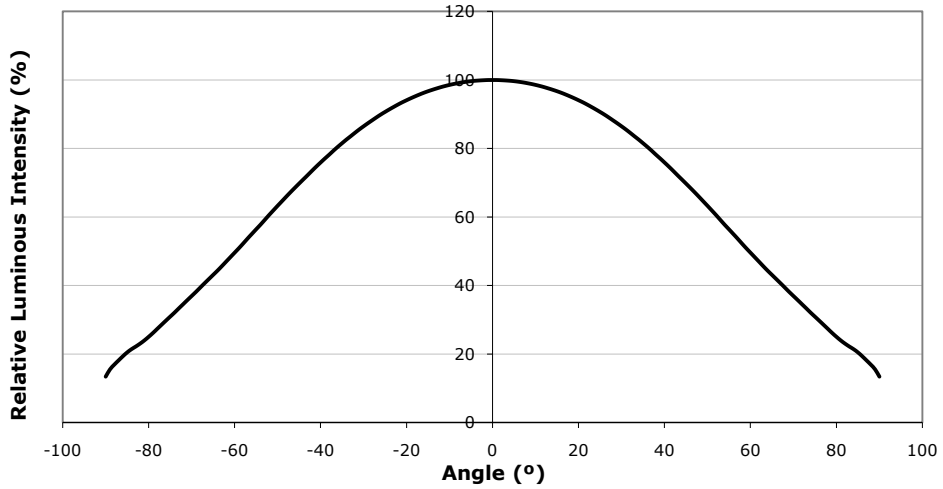
**RELATIVE CHROMATICITY VS. CURRENT (WARM WHITE)**



**RELATIVE CHROMATICITY VS. TEMPERATURE (WARM WHITE)**

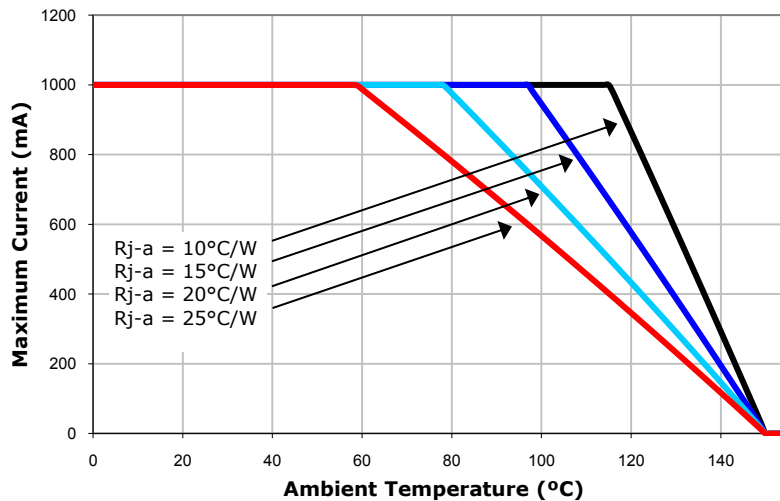


### TYPICAL SPATIAL DISTRIBUTION



### THERMAL DESIGN

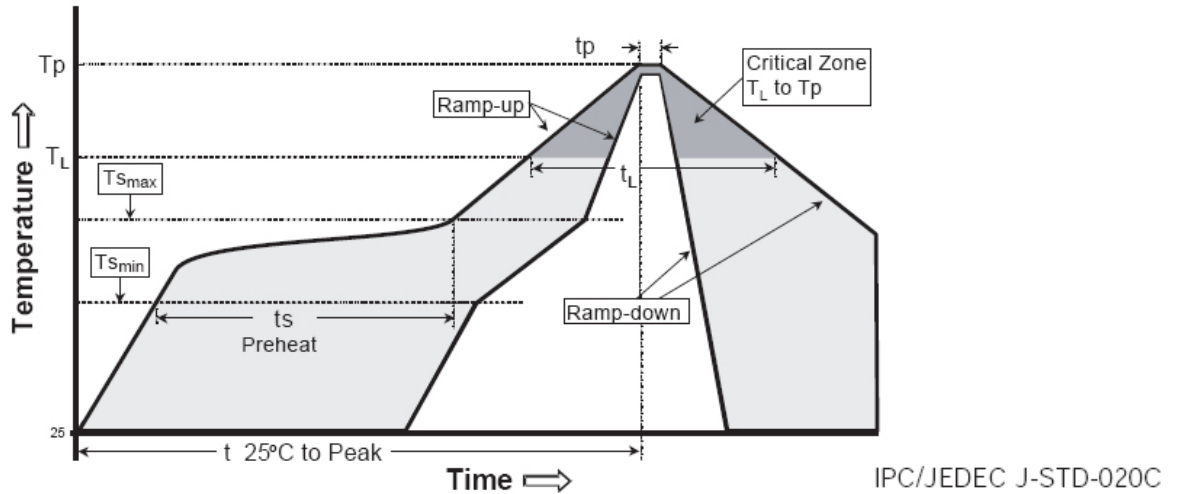
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



## REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XP-E 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

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### 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](http://www.cree.com/xlamp_app_notes/LM80_results).

Cree currently recommends a maximum drive current of 700 mA for XLamp XP-E High Efficiency White in designs seeking the ENERGY STAR\* 35,000-hour lifetime rating ( $\geq 94.1\%$  luminous flux @ 6000 hours) or 1000-mA driver current in designs seeking the ENERGY STAR\* 25,000-hour lifetime rating ( $\geq 91.8\%$  luminous flux @ 6000 hours).

Please read the XLamp Long-Term Lumen Maintenance application note at [www.cree.com/xlamp\\_app\\_notes/lumen\\_maintenance](http://www.cree.com/xlamp_app_notes/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](http://www.cree.com/xlamp_app_notes/thermal_management) for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

\* These lifetime ratings are based on the current ENERGY STAR Product Specification for Luminaires (Light Fixtures) V1.0 (February 16, 2011) and ENERGY STAR Program Requirements for Integral LED Lamps V1.4 (May 13, 2011) lumen maintenance criteria.

### Moisture Sensitivity

In testing, Cree has found XLamp XP-E LEDs to have unlimited floor life in conditions  $\leq 30\text{ }^{\circ}\text{C}/85\%$  relative humidity (RH). Moisture testing included a 168-hour soak at  $85\text{ }^{\circ}\text{C}/85\%$  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 RoHS 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 2011/65/EC (RoHS2), as amended through June 8, 2011. RoHS Declarations for this product can be obtained from your Cree representative or obtained from the Product Ecology section of [www.cree.com](http://www.cree.com).

### REACH Compliance

REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notices of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree representative to insure you get the most up-to-date REACH Declaration. Historical REACH banned substance information (substances restricted or banned in the EU prior to 2010) is also available upon request.

**UL Recognized Component**

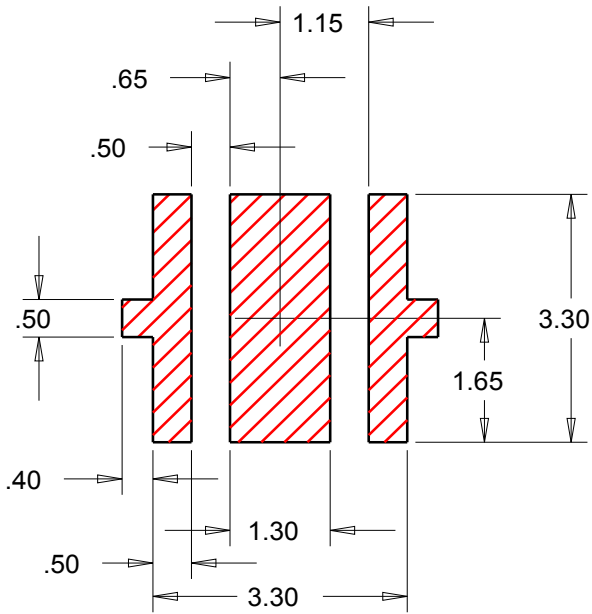
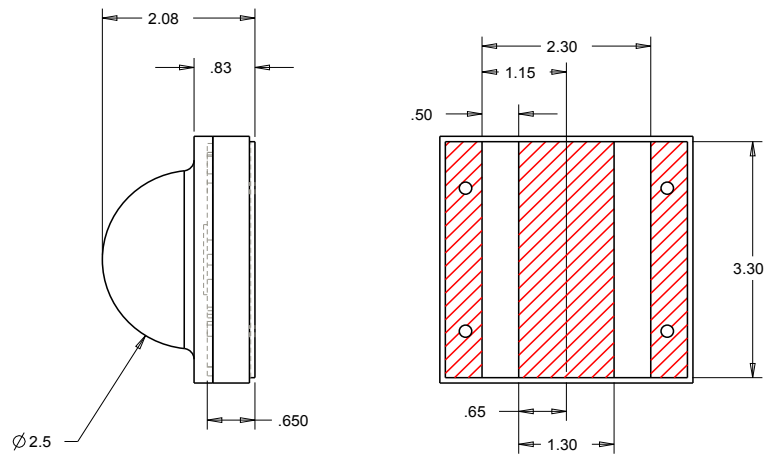
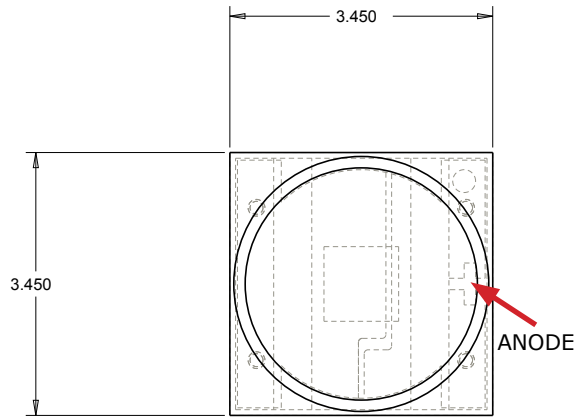
Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

**Vision Advisory Claim**

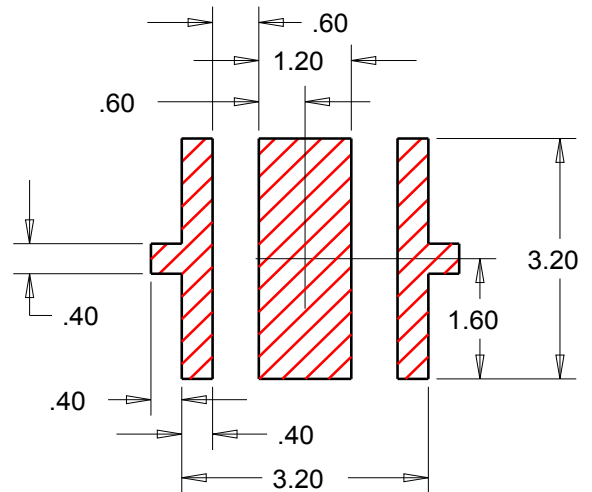
WARNING: Do not look at exposed lamp in operation. Eye injury can result. See LED Eye Safety at [www.cree.com/xlamp\\_app\\_notes/led\\_eye\\_safety](http://www.cree.com/xlamp_app_notes/led_eye_safety).

**MECHANICAL DIMENSIONS (T<sub>A</sub> = 25 °C)**

All measurements are ±.13 mm unless otherwise indicated.



RECOMMENDED PCB SOLDER PAD

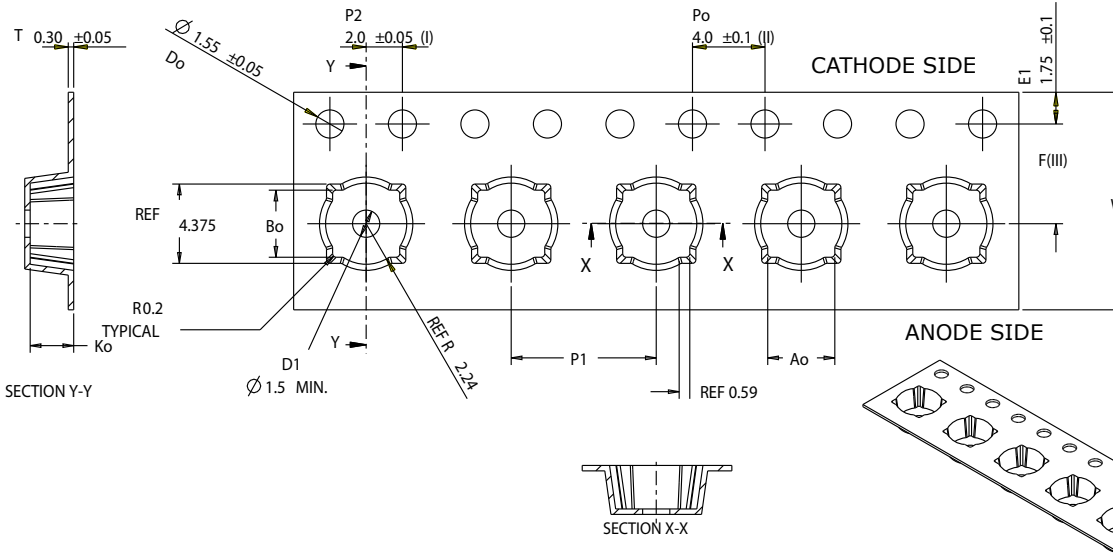


RECOMMENDED STENCIL PATTERN  
(HATCHED AREA IS OPENING)

**TAPE AND REEL**

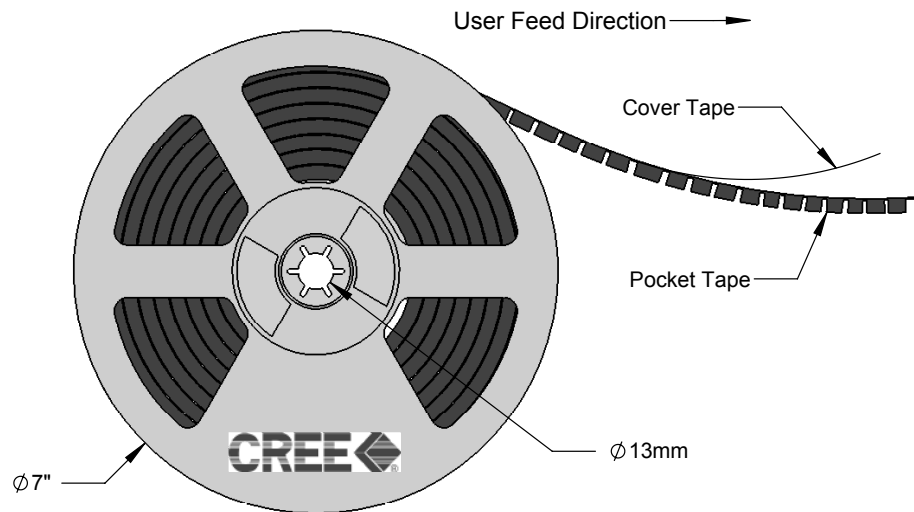
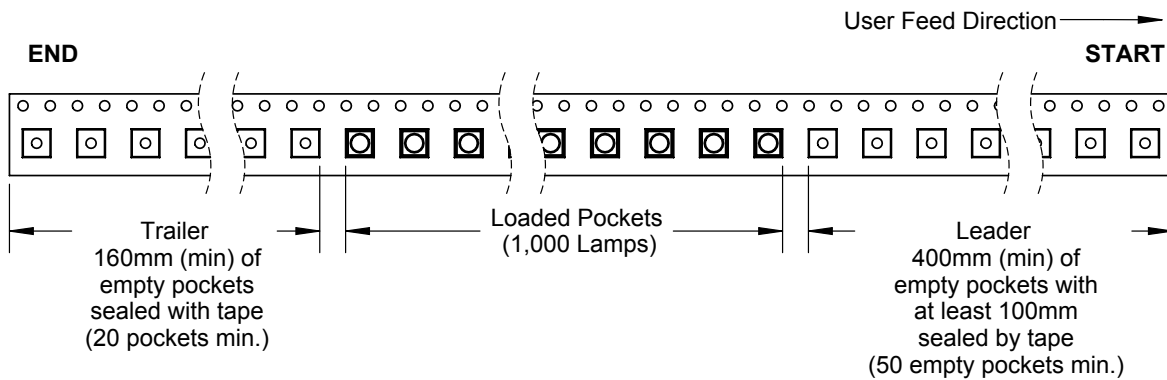
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

All dimensions in mm.



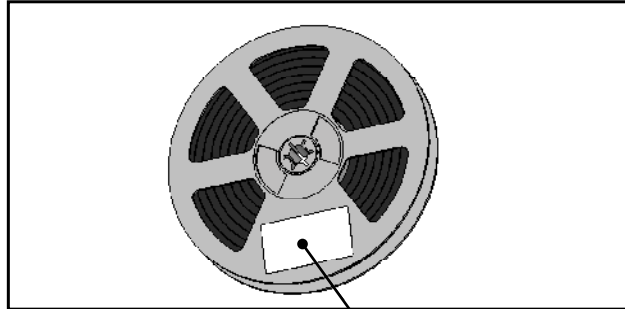
Ao	3.70	+/- 0.1
Bo	3.70	+/- 0.1
Ko	2.40	+0.0/-0.1
F	5.50	+/- 0.05
P 1	8.00	+/- 0.1
W	12.00	+0.3/-0.1

- (I) Measured from centerline of sprocket hole to centerline of pocket.
- (II) Cumulative tolerance of 10 sprocket holes is ± 0.20.
- (III) Measured from centerline of sprocket hole to centerline of pocket.
- (IV) Other material available.



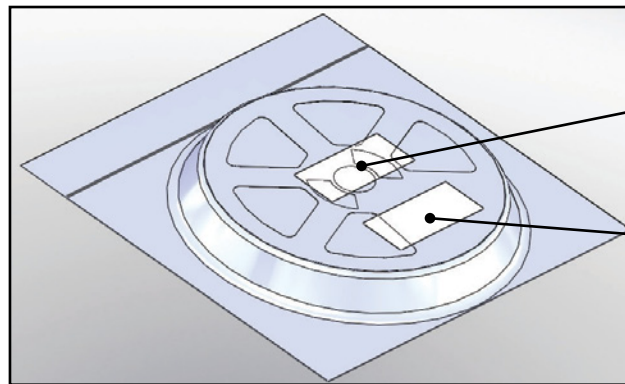
### PACKAGING

#### Unpackaged Reel



Label with Cree Bin Code, Qty, Reel ID

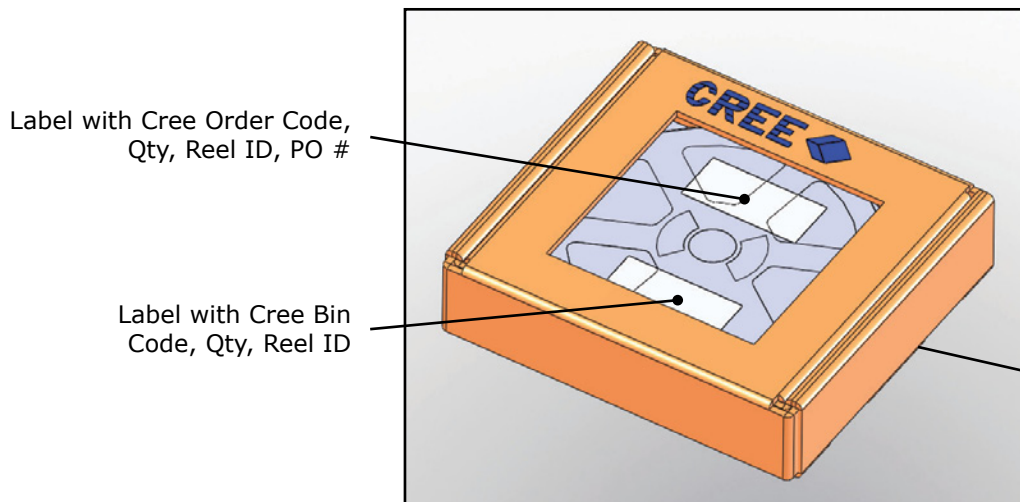
#### Packaged Reel



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 (on bottom of box)