

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



## PRODUCT DESCRIPTION

XLamp XP-E® High-Efficiency White (HEW) LEDs upgrade the XLamp XP-E LED to leading performance levels for diffuse lighting applications. The 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 LED, the 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 LED
- 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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**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

### FLUX CHARACTERISTICS ( $T_j = 25\text{ }^\circ\text{C}$ )

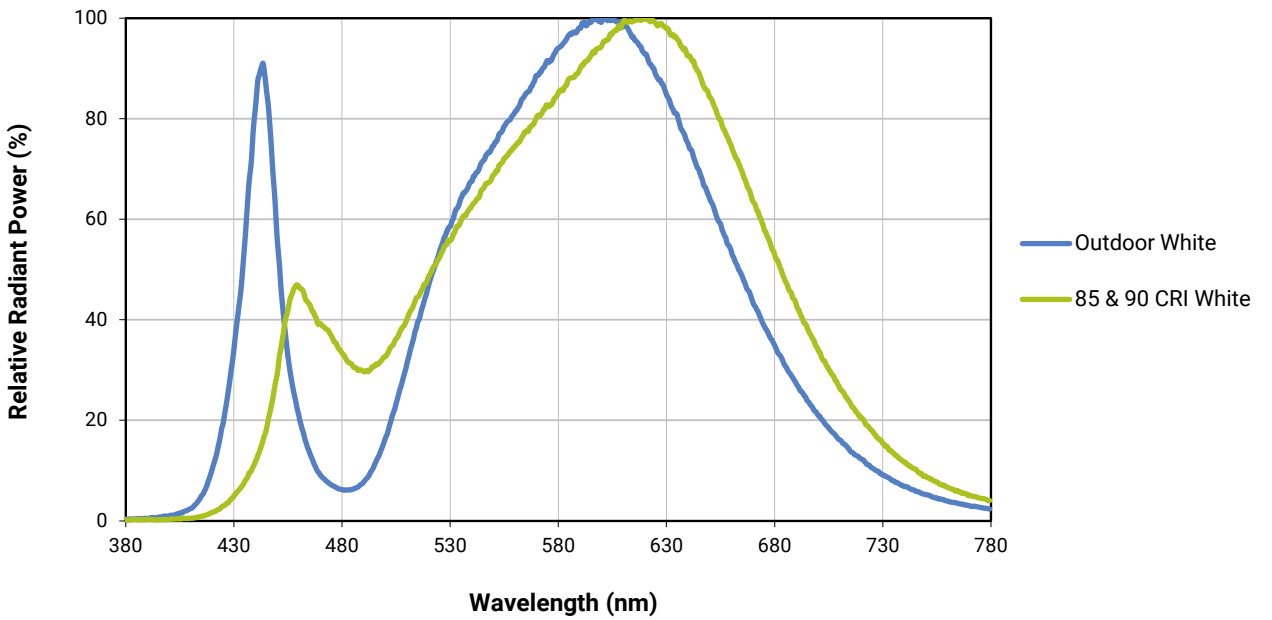
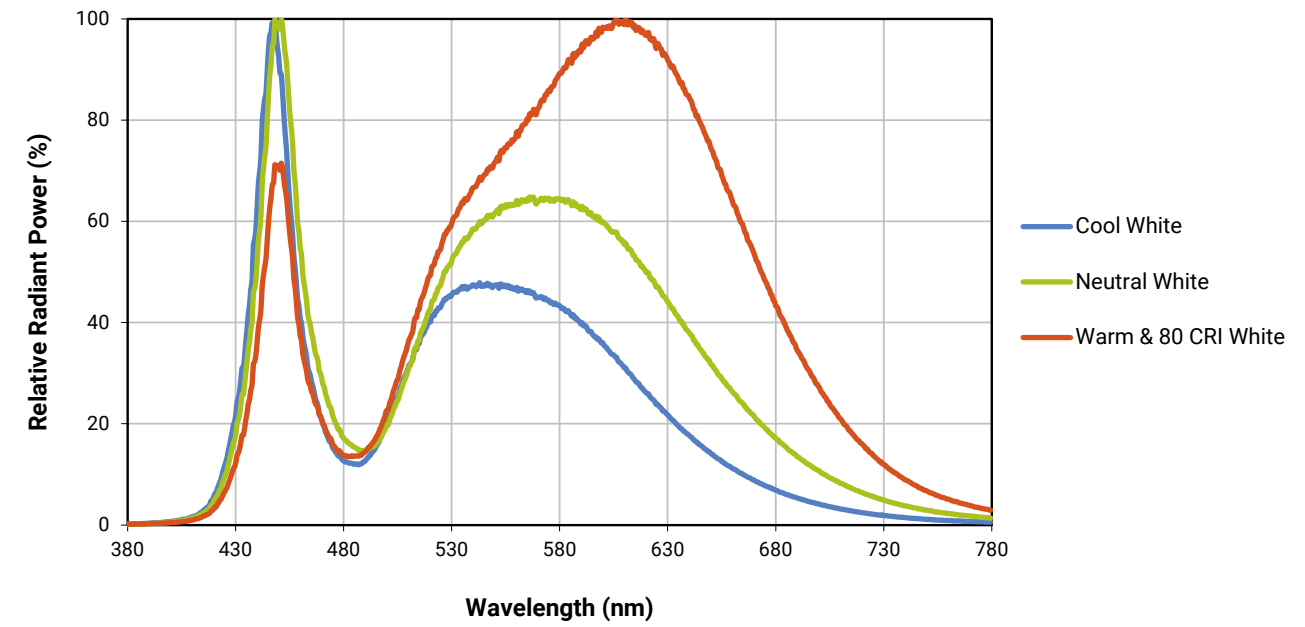
The following table provides several base order codes for XLamp XP-E HEW LEDs. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family. For more order codes, as well as a complete description of the order-code nomenclature,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

Color	CCT Range		Minimum 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
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

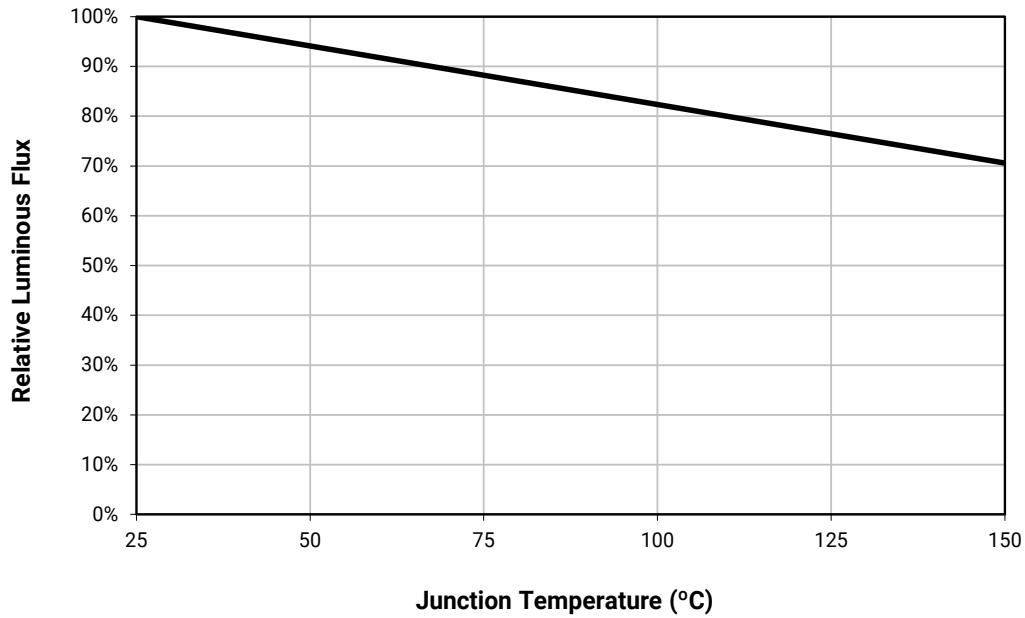
**Notes:**

- 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. See the Measurements section (page 10).
- Typical CRI for Cool White (5000 K - 8300 K CCT) is 68.
- Typical CRI for Neutral White (3700 K - 5000 K CCT) is 75.
- 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.

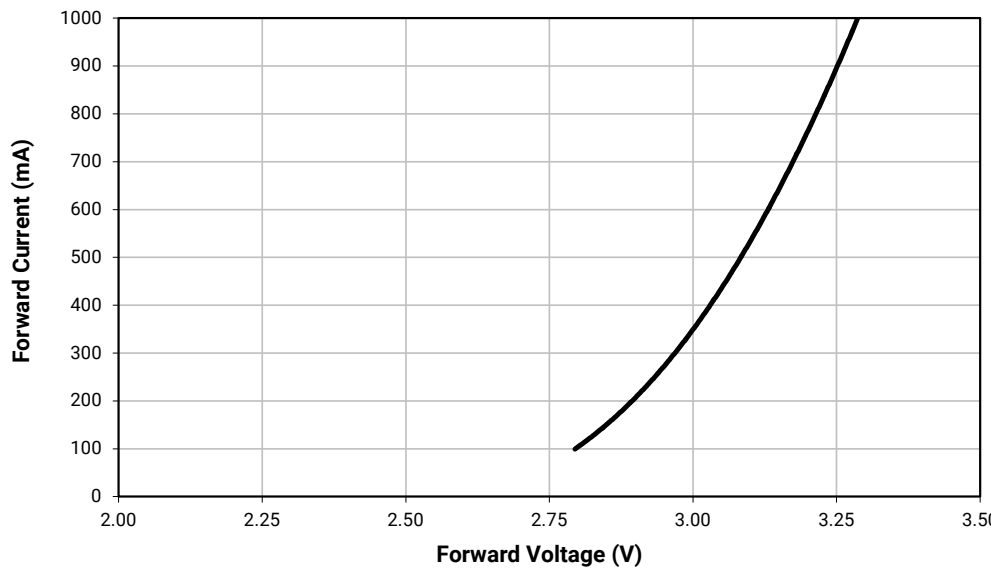
**RELATIVE SPECTRAL POWER DISTRIBUTION**



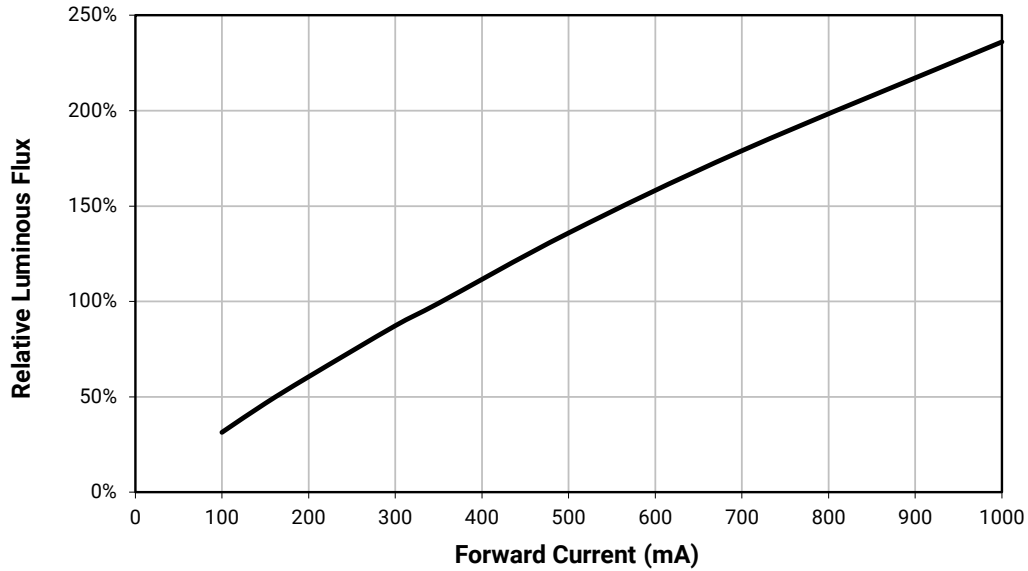
**RELATIVE FLUX VS. JUNCTION TEMPERATURE ( $I_F = 350 \text{ mA}$ )**



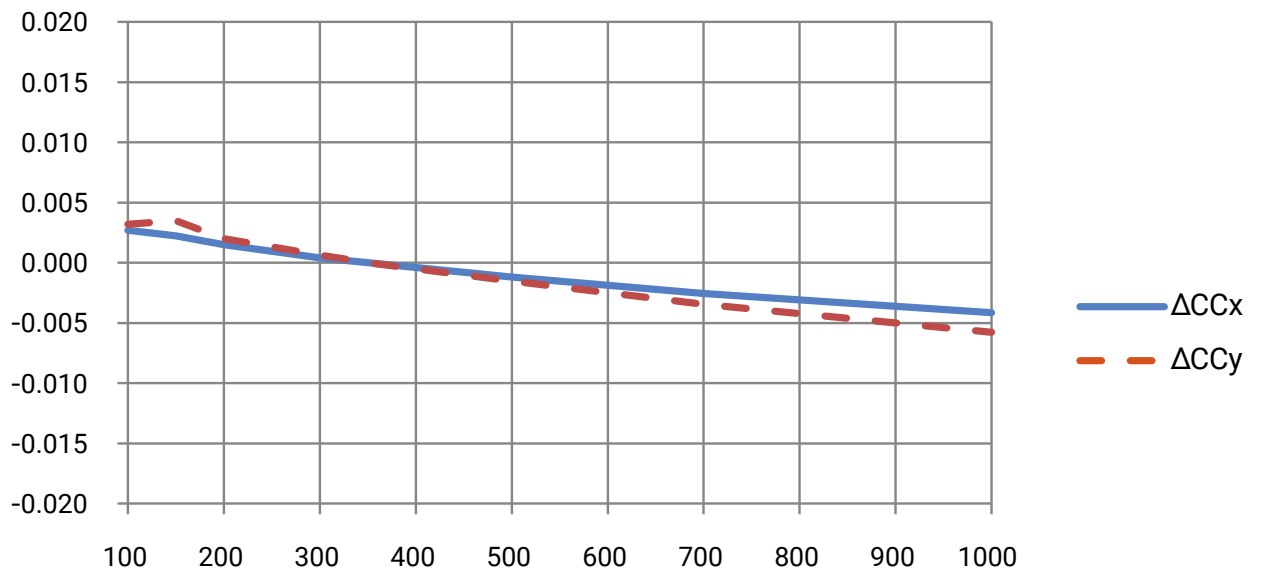
**ELECTRICAL CHARACTERISTICS ( $T_J = 25 \text{ °C}$ )**



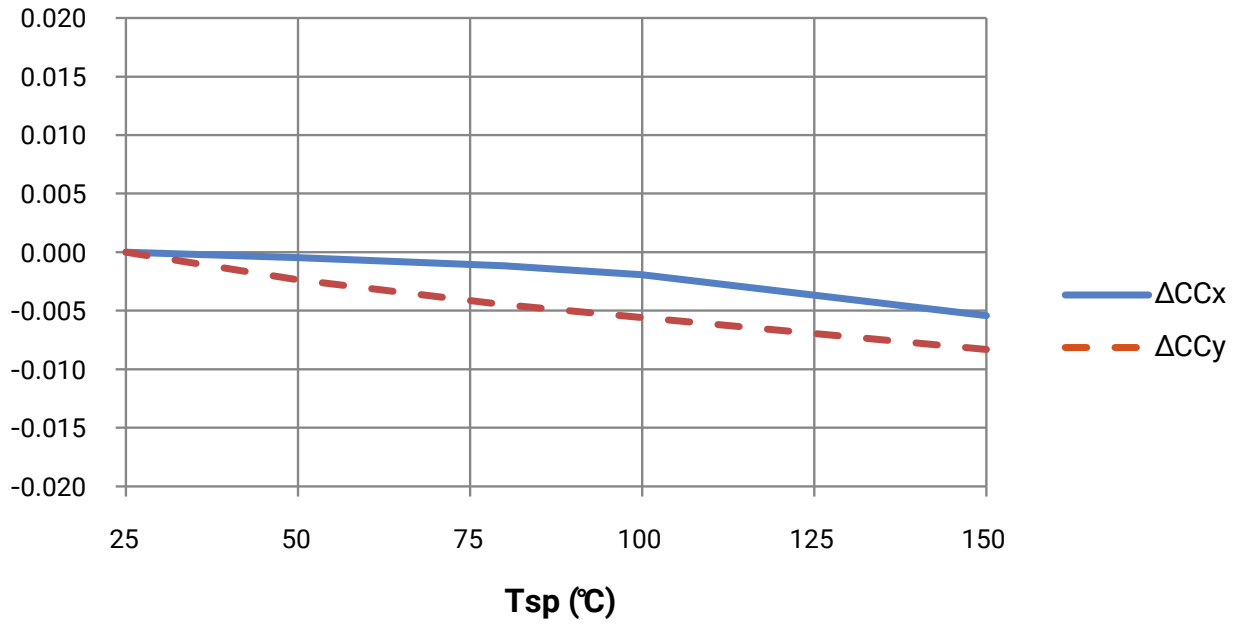
**RELATIVE FLUX VS. CURRENT ( $T_j = 25\text{ }^\circ\text{C}$ )**



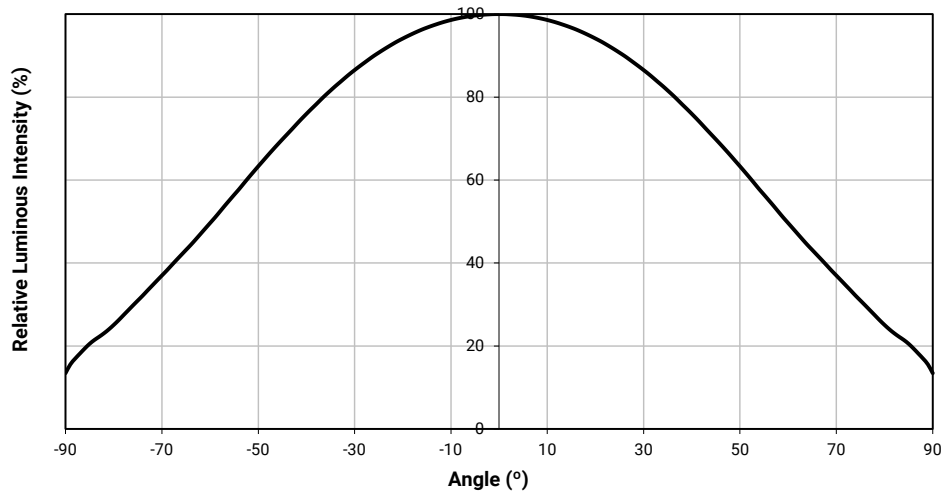
**RELATIVE CHROMATICITY VS. CURRENT (WARM WHITE)**



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

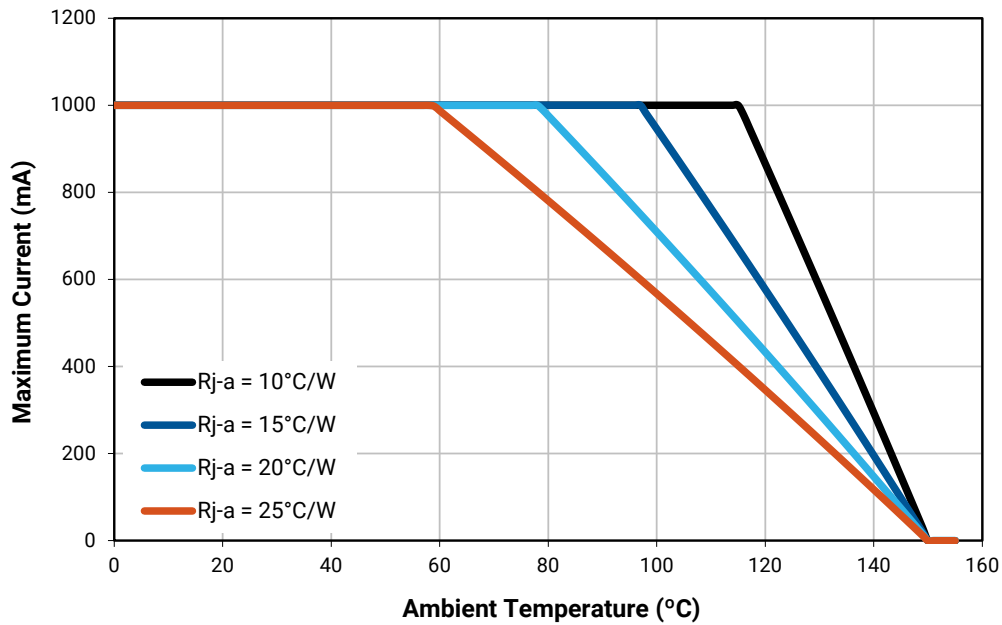


**TYPICAL SPATIAL DISTRIBUTION**



**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.

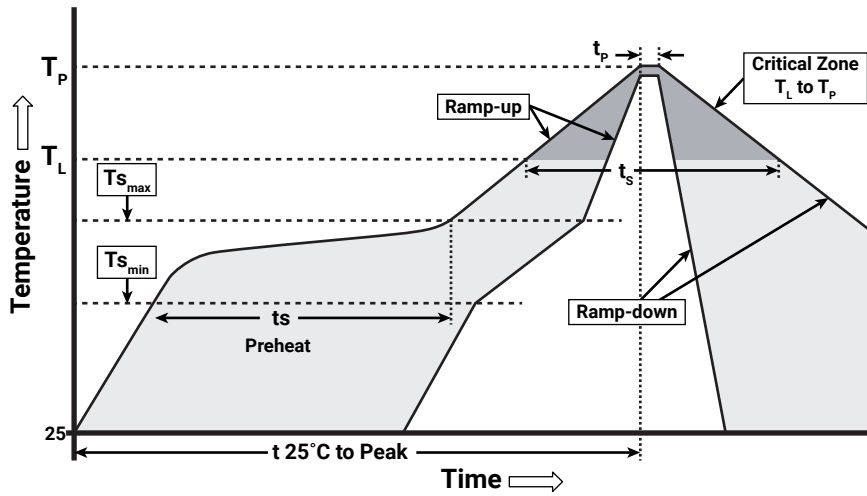




**REFLOW SOLDERING CHARACTERISTICS**

In testing, Cree has found XLamp XP-E HEW 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 the 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-Free Solder
Average Ramp-Up Rate ( $T_{S_{max}}$ to $T_P$ )	1.2 °C/second
Preheat: Temperature Min ( $T_{S_{min}}$ )	120 °C
Preheat: Temperature Max ( $T_{S_{max}}$ )	170 °C
Preheat: Time ( $t_{S_{min}}$ to $t_{S_{max}}$ )	65-150 seconds
Time Maintained Above: Temperature ( $T_L$ )	217 °C
Time Maintained Above: Time ( $t_t$ )	45-90 seconds
Peak/Classification Temperature ( $T_P$ )	235 - 245 °C
Time Within 5 °C of Actual Peak Temperature ( $t_p$ )	20-40 seconds
Ramp-Down Rate	1 - 6 °C/second
Time 25 °C to Peak Temperature	4 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

## NOTES

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### Measurements

The luminous flux, radiant power, chromaticity and CRI measurements in this document are binning specifications only and solely represent product measurements as of the date of shipment. These measurements will change over time based on a number of factors that are not within Cree's control and are not intended or provided as operational specifications for the products. Calculated values are provided for informational purposes only and are not intended as specifications.

### Pre-Release Qualification Testing

Please read the [LED Reliability Overview](#) for details of the qualification process Cree applies to ensure long-term reliability for XLamp LEDs and details of Cree's pre-release qualification testing for XLamp LEDs.

### Lumen Maintenance

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](#).

Cree currently recommends a maximum drive current of 700 mA for XLamp XP-E High Efficiency White LEDs 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 [Long-Term Lumen Maintenance application note](#) for more details on Cree's lumen maintenance testing and forecasting. Please read the [Thermal Management application note](#) 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

Cree recommends keeping XLamp LEDs in the provided, resealable moisture-barrier packaging (MBP) until immediately prior to soldering. Unopened MBPs that contain XLamp LEDs do not need special storage for moisture sensitivity.

Once the MBP is opened, XLamp XP-E HEW LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of  $\leq 30$  °C/85% relative humidity (RH). Regardless of the storage condition, Cree recommends sealing any unsoldered LEDs in the original MBP.

### 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 implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of [www.cree.com](http://www.cree.com).

**NOTES - CONTINUED**

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**REACH Compliance**

REACH substances of very high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice 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 SVHC Declaration. REACH banned substance information (REACH Article 67) 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.

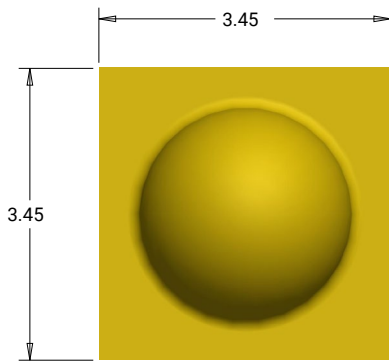
**Vision Advisory**

WARNING: Do not look at exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the [LED Eye Safety application note](#).

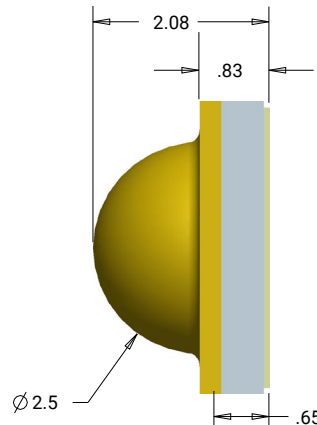
**MECHANICAL DIMENSIONS (T<sub>A</sub> = 25 °C)**

Thermal vias, if present, are not shown on these drawings.

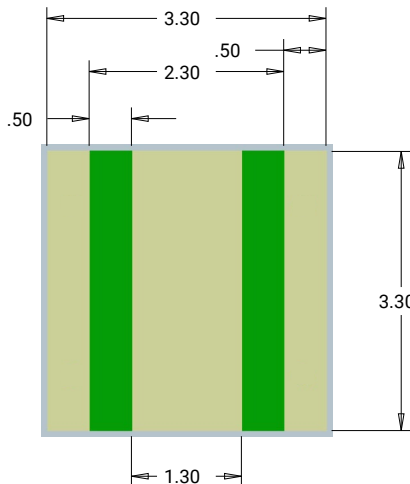
All measurements are ±.13 mm unless otherwise indicated.



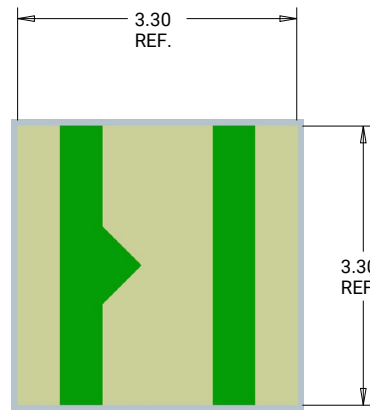
**Top View**



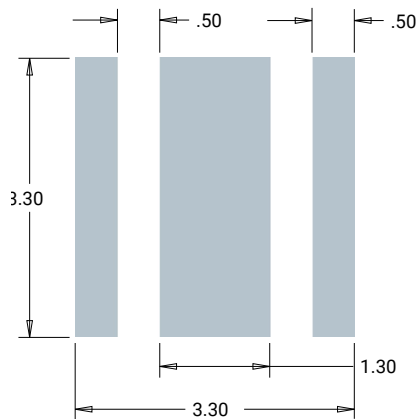
**Side View**



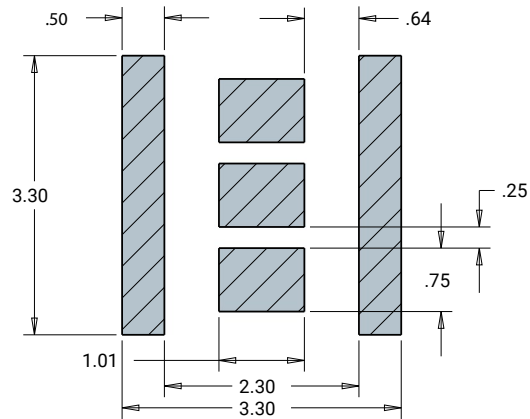
**Bottom View**



**Alternate Bottom View**



**Recommended PCB Solder Pad**

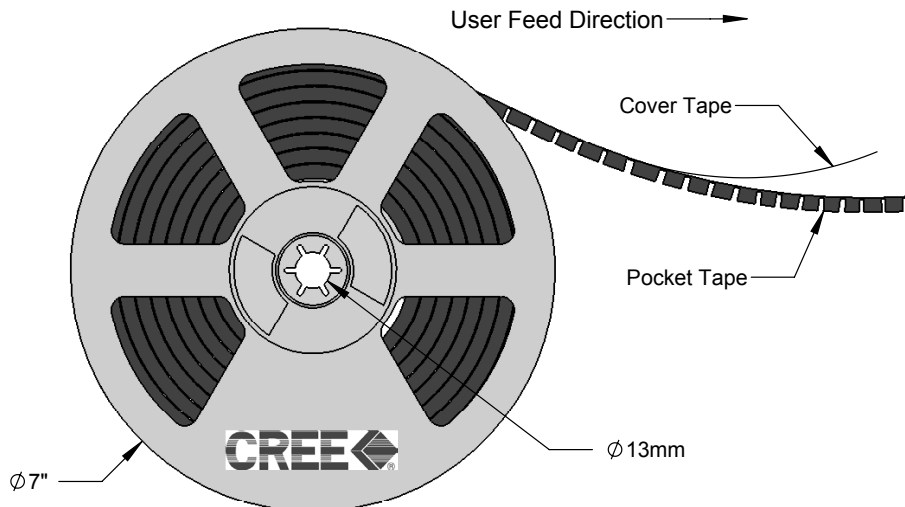
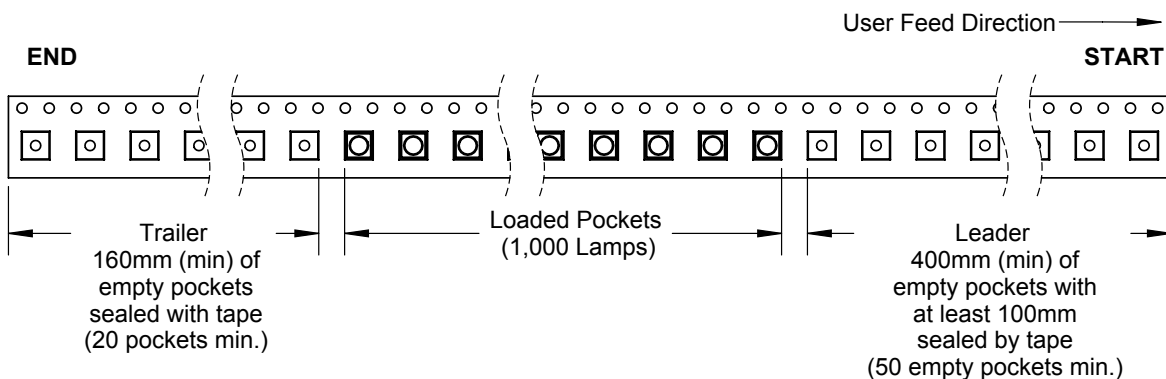
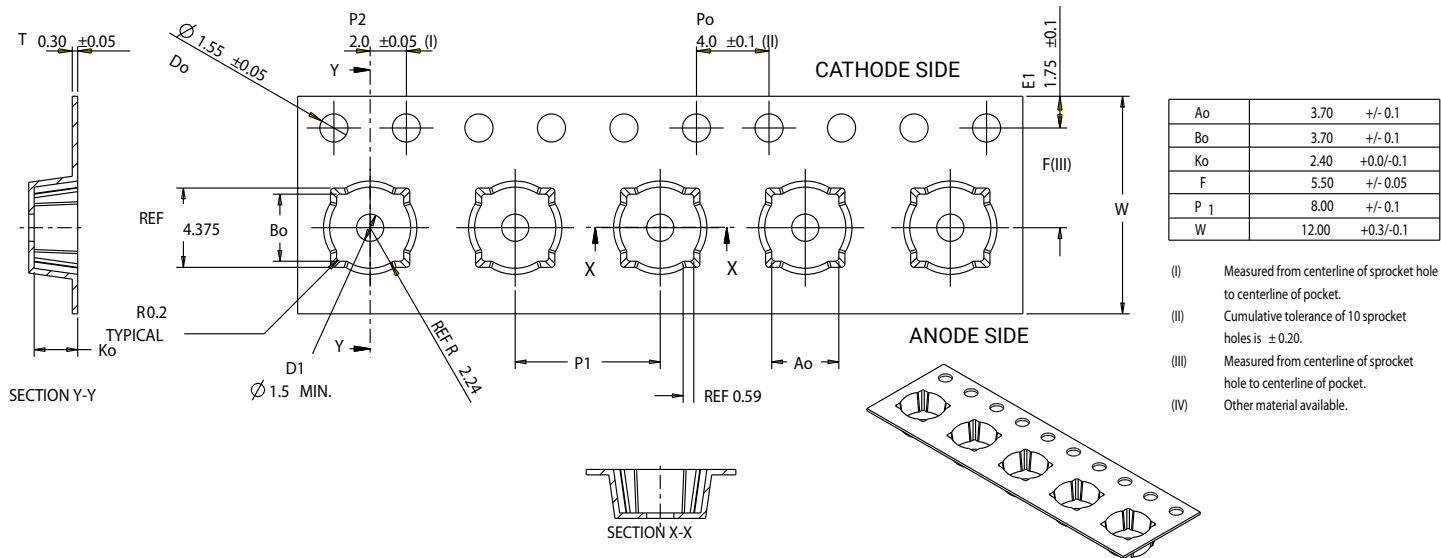


**Recommended Stencil Pattern  
(Hatched Area is Open)**

**TAPE AND REEL**

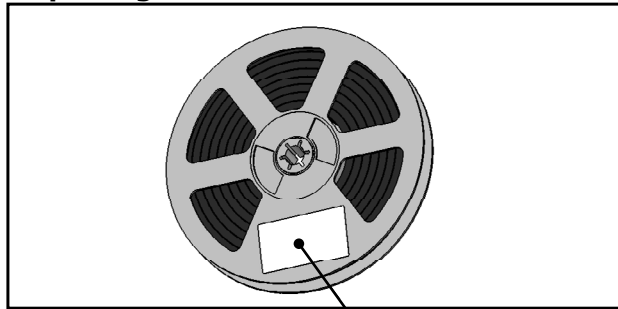
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

Except as noted, all dimensions in mm.



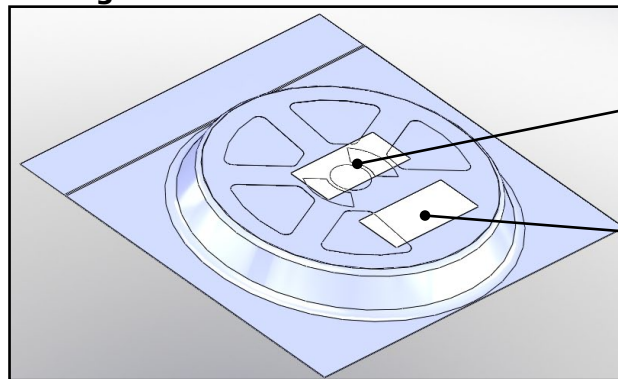
**PACKAGING**

**Unpackaged Reel**



Label with Cree Bin Code,  
Quantity, Reel ID

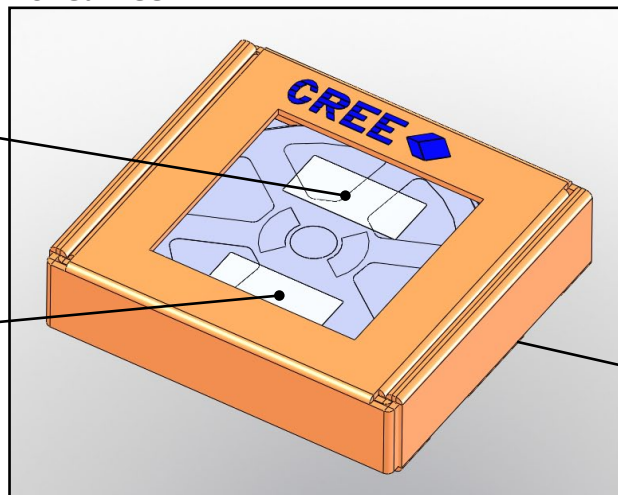
**Packaged Reel**



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

Label with Cree Bin Code,  
Quantity, Reel ID

**Boxed Reel**



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

Label with Cree Bin Code,  
Quantity, Reel ID

Patent Label  
(on bottom of box)