

# Cree® XLamp® XH-G LED



## PRODUCT DESCRIPTION

Unlike common plastic packages, XLamp XH LEDs use a ceramic package to deliver the unique combination of high performance and reliability not available elsewhere in mid-power LEDs. The ceramic-based XH LEDs are designed to deliver the long L70 lifetimes of Cree’s other high-power LEDs, such as XP or XT LEDs, as well as industry-leading LED efficacy levels.

Optimized for fluorescent replacement lighting applications, such as troffers and panel lights, where high efficacy, long lifetime and smooth appearance are critical, the XH LEDs allow lighting manufacturers to offer products that meet the lifetime expectations of LED technology.

## FEATURES

- Package size: 3.0 X 3.0 mm
- Available in white, 70-minimum CRI cool white, 80-minimum CRI white and 85- and 90-minimum CRI warm white
- 350 mA maximum drive current
- Viewing angle: 130°
- Reflow solderable - JEDEC J-STD-020C compatible
- Unlimited floor life at  $\leq 30\text{ }^{\circ}\text{C}/85\%\text{ RH}$
- UL-recognized component (E349212)



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**CHARACTERISTICS**

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		20	
Viewing angle (FWHM)	degrees		130	
Temperature coefficient of voltage	mV/°C		-1.2	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			350
Reverse voltage	V			-5
Forward voltage (@ 65 mA, 25 °C)	V		2.9	3.4
LED junction temperature	°C			150

## FLUX CHARACTERISTICS (T<sub>j</sub> = 25 °C)

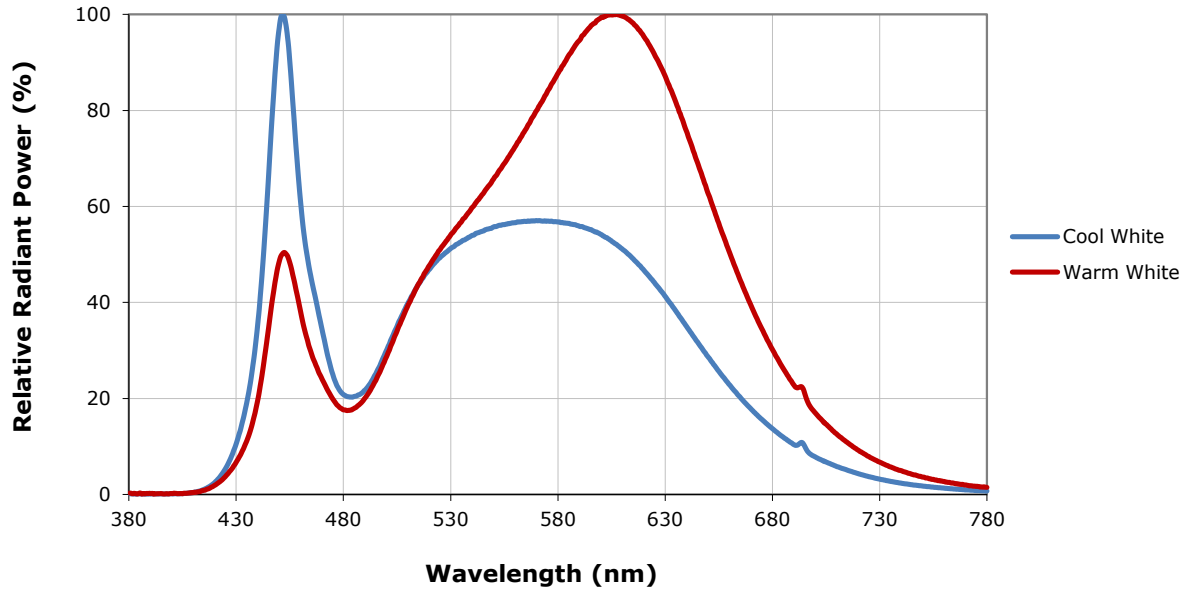
The following table provides several base order codes for XLamp XH-G LEDs. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family. For more order codes, as well as a complete description of the order-code nomenclature, please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

Color	CCT Range		Base Order Codes Minimum Luminous Flux @ 65 mA		Calculated Minimum Luminous Flux (lm)*	Order Code
	Min.	Max.	Group	Flux (lm)	300 mA	
Cool White	5000 K	8300 K	J3	26.8	113	XHGAWT-00-0000-00000LX51
Neutral White	3700 K	5000 K	J2	23.5	99	XHGAWT-00-0000-00000LWE5
Warm White	2600 K	3700 K	J2	23.5	99	XHGAWT-00-0000-00000LWE7
70-CRI White	5000 K	8300 K	J3	26.8	113	XHGAWT-00-0000-00000BX51
	3700 K	5000 K	J2	23.5	99	XHGAWT-00-0000-00000BWE5
	2600 K	3700 K	J2	23.5	99	XHGAWT-00-0000-00000BWE7
80-CRI White	5000 K	8300 K	J3	26.8	113	XHGAWT-00-0000-00000HX51
	3700 K	5000 K	J2	23.5	99	XHGAWT-00-0000-00000HWE5
	2600 K	3700 K	J2	23.5	99	XHGAWT-00-0000-00000HWE7
85-CRI White	2600 K	3200 K	H0	18.1	76	XHGAWT-00-0000-00000PVE7
90-CRI White	2600 K	3200 K	H0	18.1	76	XHGAWT-00-0000-00000UVE7

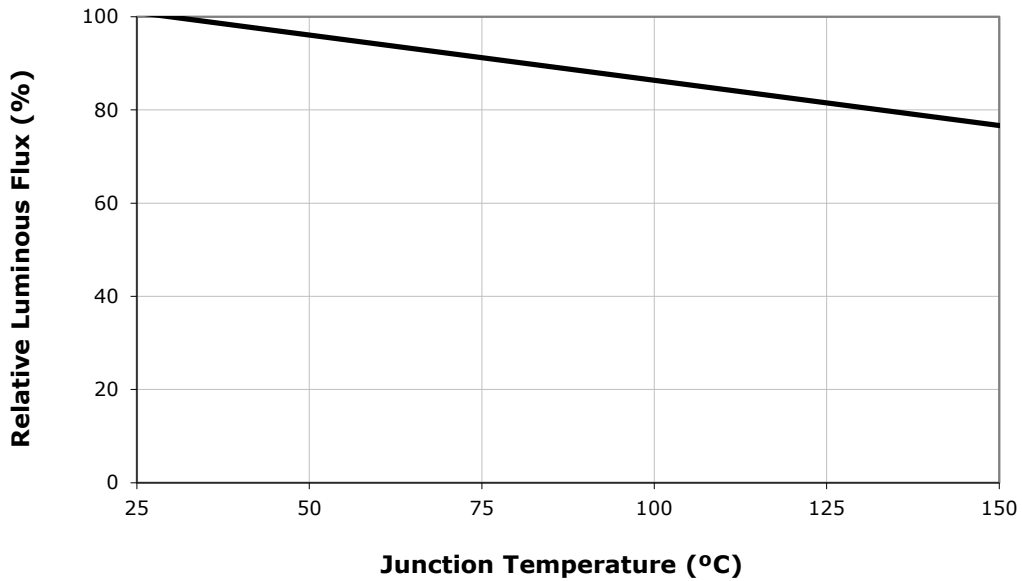
### Notes:

- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CC<sub>x</sub>, CC<sub>y</sub>) measurements and  $\pm 2$  on CRI measurements.
  - 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 70-CRI Minimum Cool White is 70.
  - Minimum CRI for 80-CRI Minimum White is 80.
  - Minimum CRI for 85-CRI Minimum White is 85.
  - Minimum CRI for 90-CRI Minimum White is 90.
- \* Calculated flux values at 300 mA are for reference only.

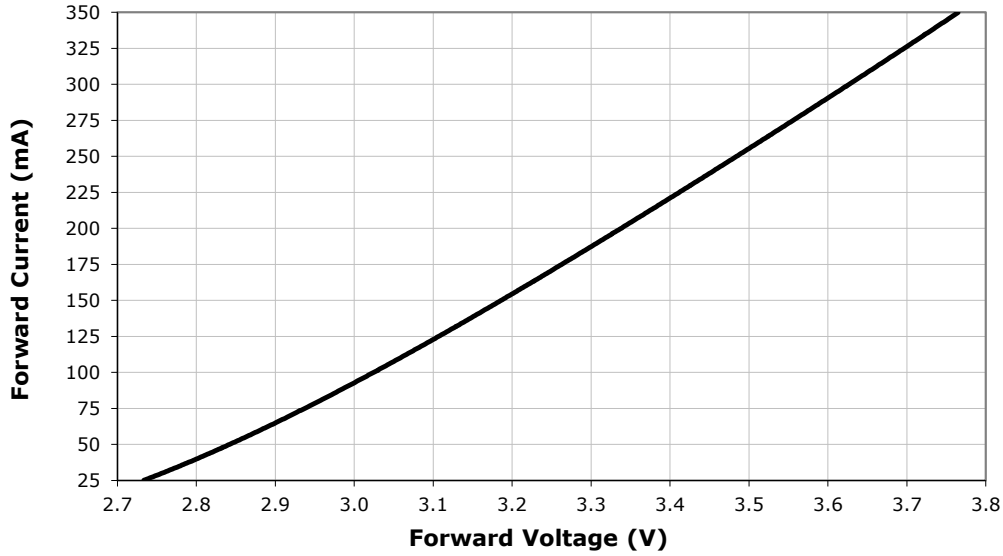
**RELATIVE SPECTRAL POWER DISTRIBUTION**



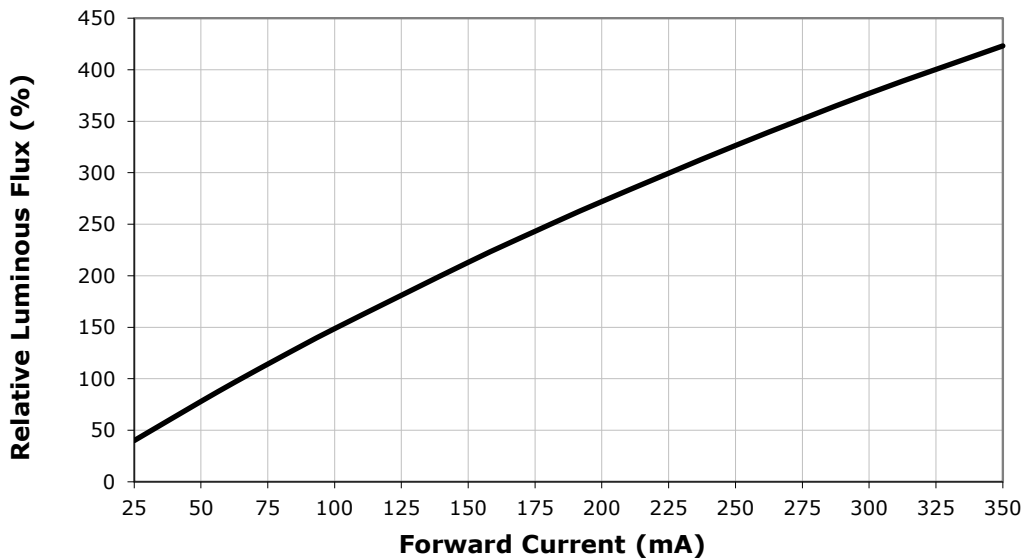
**RELATIVE FLUX VS. JUNCTION TEMPERATURE ( $I_f = 65 \text{ mA}$ )**



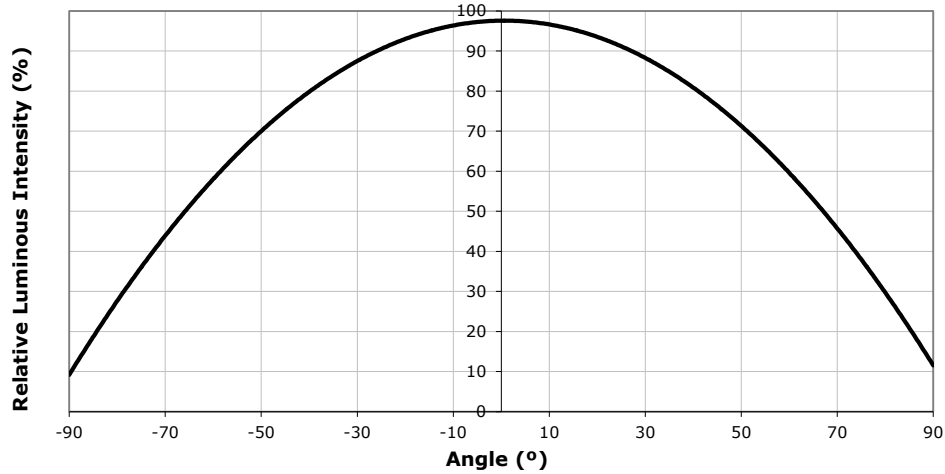
### ELECTRICAL CHARACTERISTICS ( $T_j = 25\text{ }^\circ\text{C}$ )



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

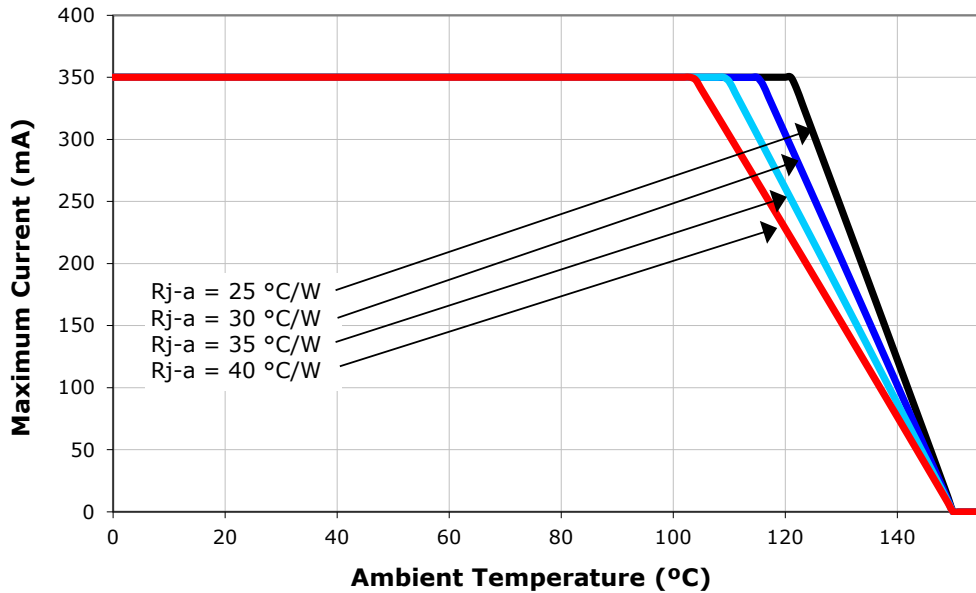


**TYPICAL SPATIAL DISTRIBUTION**



**THERMAL DESIGN**

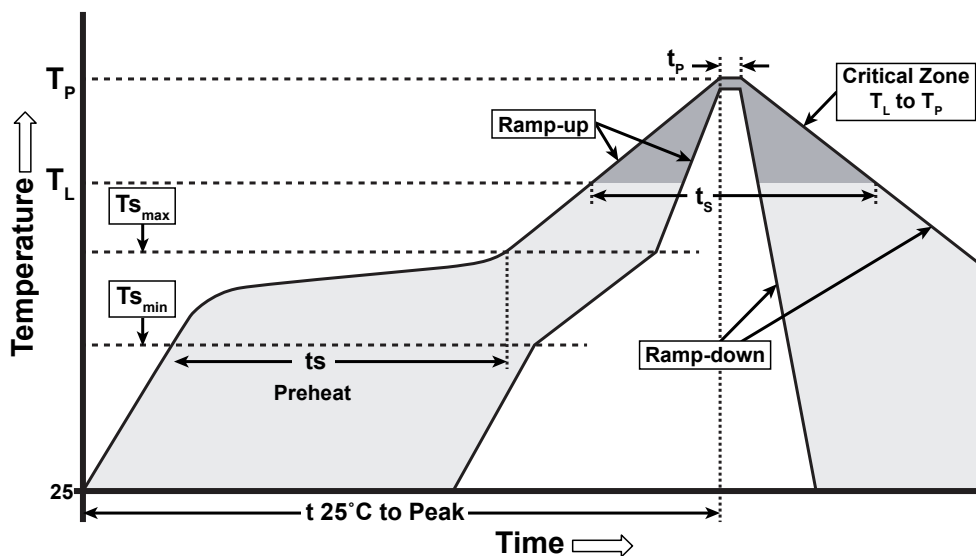
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



## REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XH-G 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).

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.

### **Moisture Sensitivity**

In testing, Cree has found XLamp XH-G LEDs to have unlimited floor life in conditions  $\leq 30$  °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.

### **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**

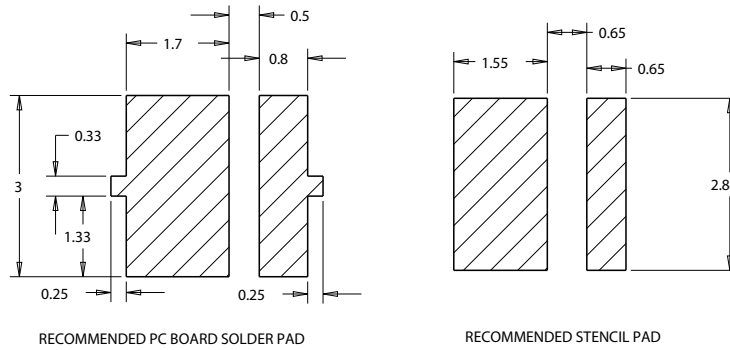
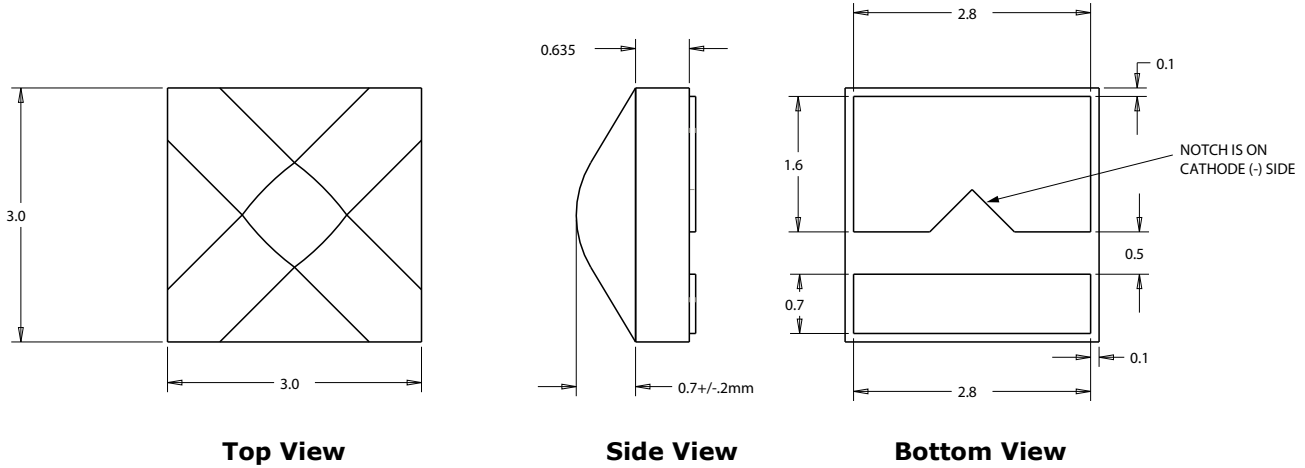
**WARNING:** Do not look at exposed lamp in operation. Eye injury can result. See the LED Eye Safety application note at [www.cree.com/xlamp\\_app\\_notes/led\\_eye\\_safety](http://www.cree.com/xlamp_app_notes/led_eye_safety).



### MECHANICAL DIMENSIONS

All dimensions in mm.

Measurement tolerances unless indicated otherwise: .xx = .25 mm, .xxx = .125 mm

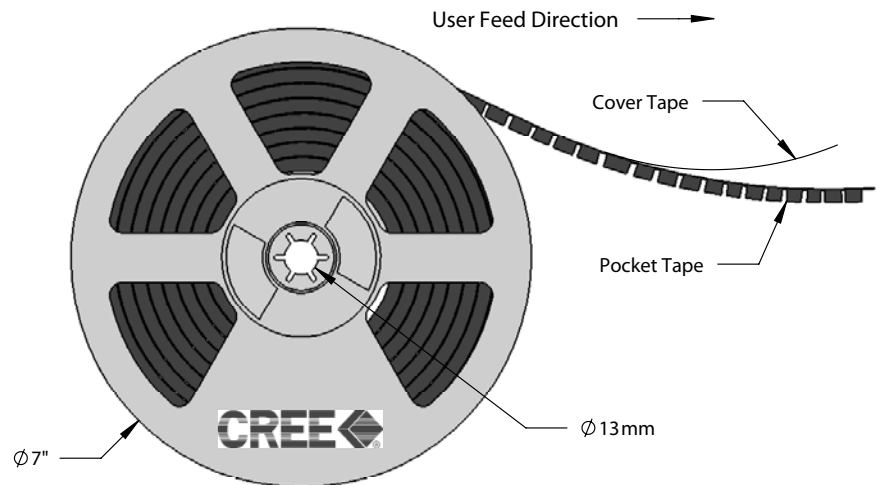
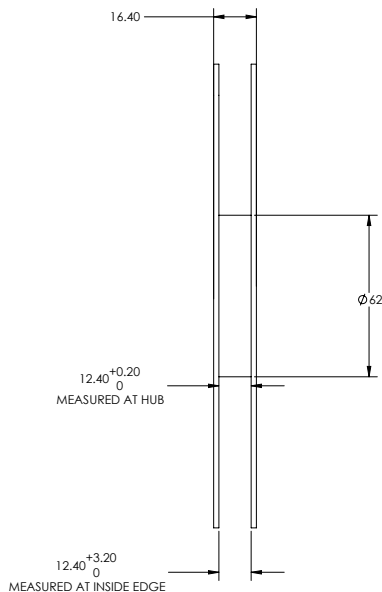
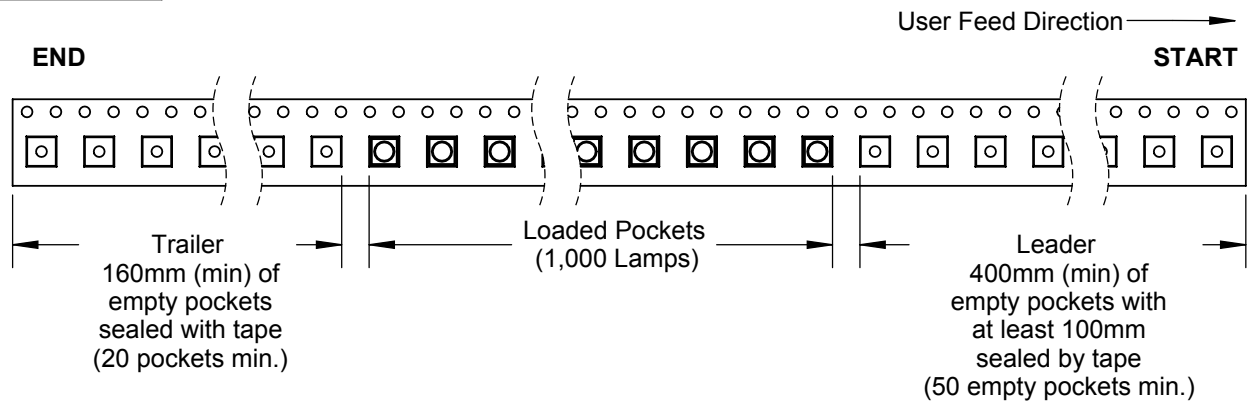
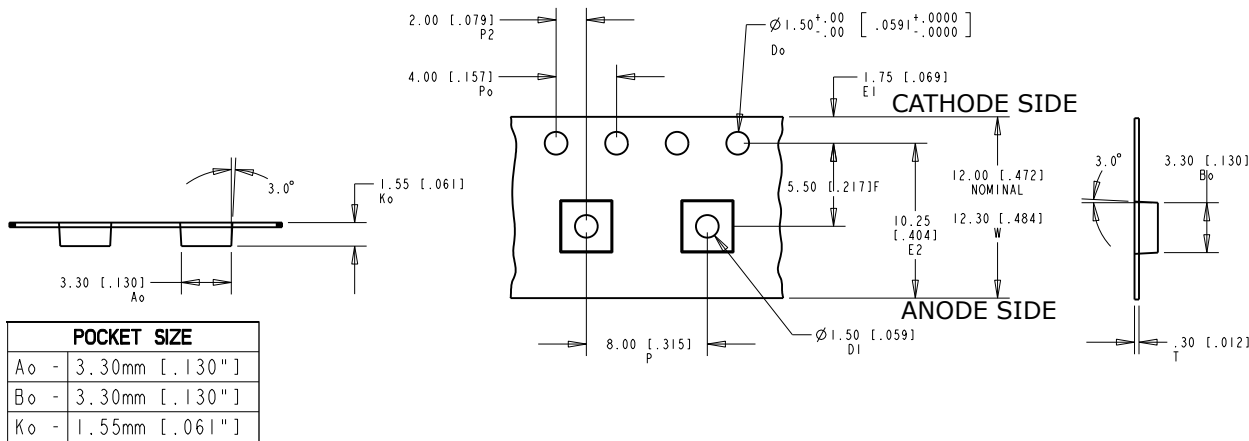


## TAPE AND REEL

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

All dimensions in mm.

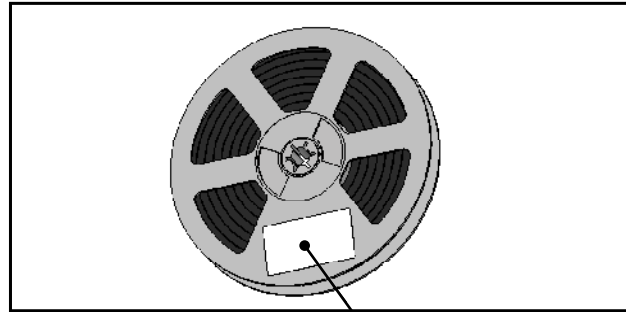
Measurement tolerances unless indicated otherwise: .xx = .25 mm, .xxx = .125 mm



## PACKAGING

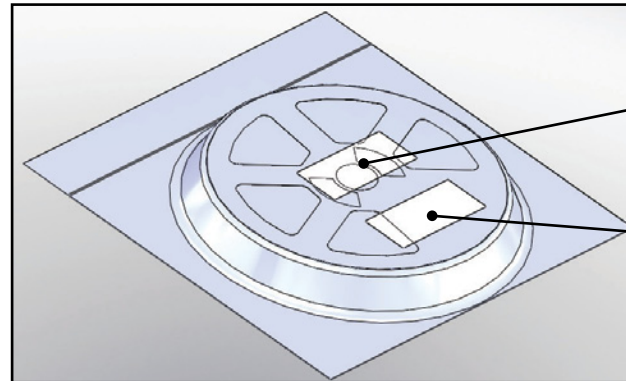
The diagrams below show the packaging and labels Cree uses to ship XLamp XH-G LEDs. XLamp XH-G LEDs are shipped in tape loaded on a reel. Each box contains only one reel in a moisture barrier bag.

### Unpackaged Reel



Label with Cree Bin Code, Qty, Reel ID

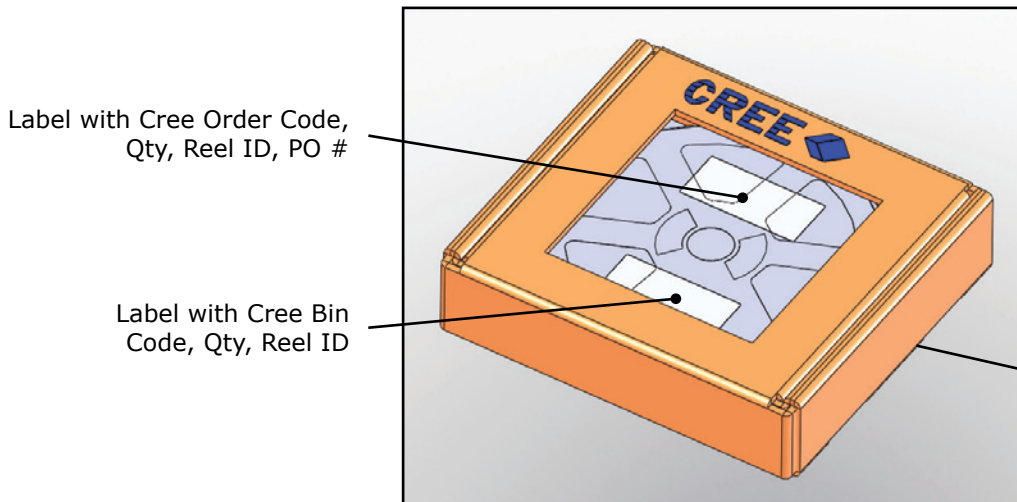
### Packaged Reel



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)