

Cree® XLamp® XM-L2 LEDs



PRODUCT DESCRIPTION

The XLamp XM-L2 LED builds on the unprecedented performance of the original XM-L, increasing lumen output up to 20% while providing a single die LED point source for precise optical control. The XM-L2 LED shares the same mechanical and optical footprint as the original XM-L, providing a seamless upgrade path and shortened design cycle.

XLamp XM-L2 LEDs are the ideal choice for lighting applications where high light output and maximum efficacy are required, such as LED light bulbs, outdoor lighting, portable lighting, indoor lighting and solar-powered lighting.

FEATURES

- Available in white, 80-CRI white, 85-CRI white and 90-CRI white
- ANSI-compatible chromaticity bins
- Binned at 85 °C
- Maximum drive current: 3000 mA
- Low thermal resistance: 2.5 °C/W
- Wide viewing angle: 125°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C
- Electrically neutral thermal path

TABLE OF CONTENTS

Flux Characteristics.....	2
Characteristics	3
Relative Spectral Power Distribution.....	3
Relative Flux vs. Junction Temperature	4
Electrical Characteristics	4
Thermal Design	5
Relative Flux vs. Current	5
Relative Chromaticity vs. Current	6
Relative Chromaticity vs. Temperature	6
Typical Spatial Distribution.....	7
Reflow Soldering Characteristics ..	8
Notes.....	9
Mechanical Dimensions.....	10
Tape and Reel	11
Packaging.....	12

FLUX CHARACTERISTICS (T_j = 85 °C)

The following table provides several base order codes for XLamp XM-L2 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 XM-L Family Binning and Labeling document.

Color	CCT Range		Base Order Codes Min. Luminous Flux (lm) @ 700 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**			Order Code
	Min.	Max.	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	1000 mA	1500 mA	2000 mA	
Cool White	5000 K	8300 K	T5	260	296	357	502	631	XMLBWT-00-0000-0000T5051
			T6	280	318	385	541	679	XMLBWT-00-0000-0000T6051
			U2	300	341	412	580	728	XMLBWT-00-0000-0000U2051
Neutral White	3700 K	5000 K	T4	240	273	330	464	582	XMLBWT-00-0000-000LT40E4
			T5	260	296	357	502	631	XMLBWT-00-0000-000LT50E4
Warm White	2600 K	3700 K	T2	200	227	275	386	485	XMLBWT-00-0000-000LT20E7
			T3	220	250	302	425	534	XMLBWT-00-0000-000LT30E7
80-CRI White	2600 K	4300 K	T2	200	227	275	386	485	XMLBWT-00-0000-000HT20E7
			T3	220	250	302	425	534	XMLBWT-00-0000-000HT30E7
85-CRI White	2600 K	3200 K	S4	164	186	225	317	398	XMLBWT-00-0000-000PS40E7
			S5	172	196	236	332	417	XMLBWT-00-0000-000PS50E7
			S6	182	207	250	352	442	XMLBWT-00-0000-000PS60E7
90-CRI White	2600 K	3200 K	S4	164	186	225	317	398	XMLBWT-00-0000-000US40E7
			S5	172	196	236	332	417	XMLBWT-00-0000-000US50E7
			S6	182	207	250	352	442	XMLBWT-00-0000-000US60E7

Notes:

- Cree maintains a tolerance of $\pm 7\%$ on flux and power measurements, ± 0.005 on chromaticity (CCx, CCy) measurements and ± 2 on CRI measurements.
- Typical CRI for Cool White (5000 K – 8300 K CCT) is 65.
- 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.

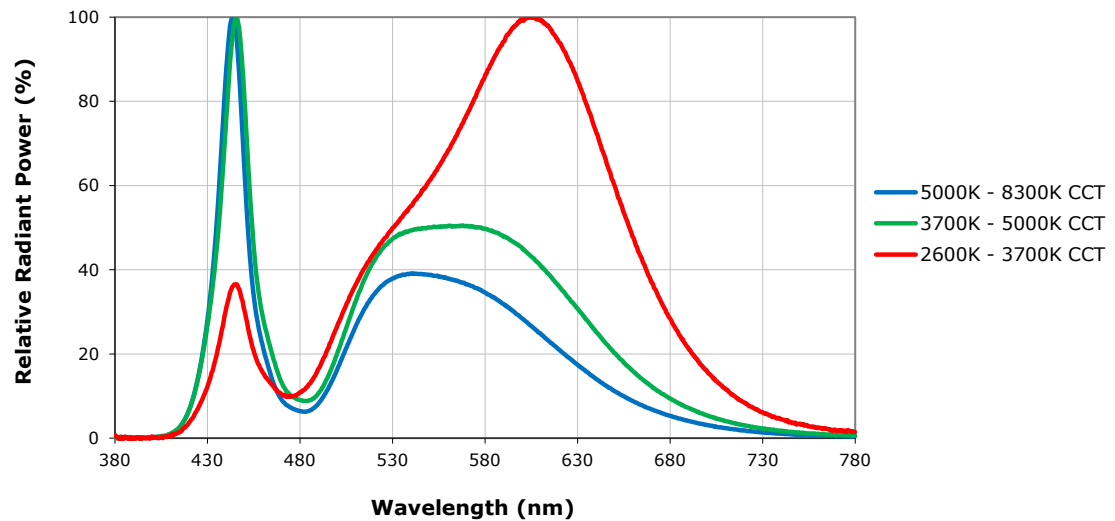
* Flux values @ 25 °C are calculated and are for reference only.

** Calculated flux values at 1000 mA, 1500 mA and 2000 mA are for reference only.

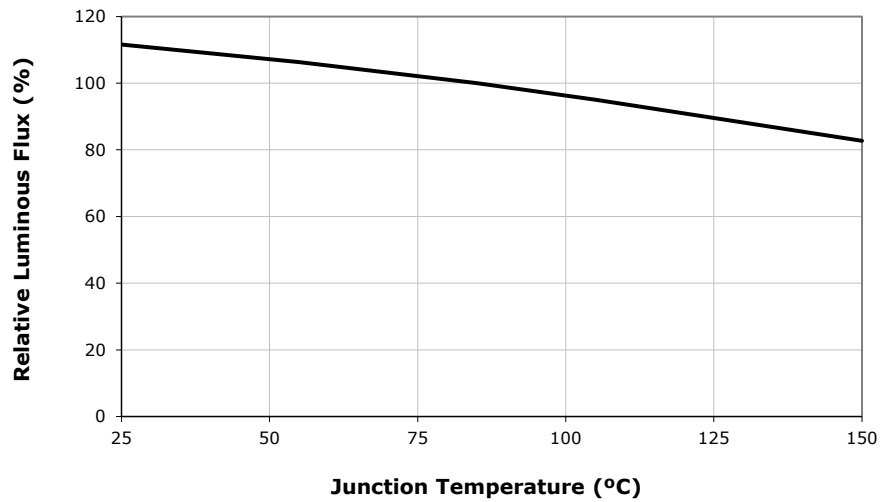
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		2.5	
Viewing angle (FWHM)	degrees		125	
Temperature coefficient of voltage	mV/°C		-1.6	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current	mA			3000
Reverse voltage	V			-5
Forward voltage (@ 700 mA, 85 °C)	V		2.85	3.5
Forward voltage (@ 1500 mA, 85 °C)	V		3.05	
Forward voltage (@ 3000 mA, 85 °C)	V		3.3	
LED junction temperature	°C			150

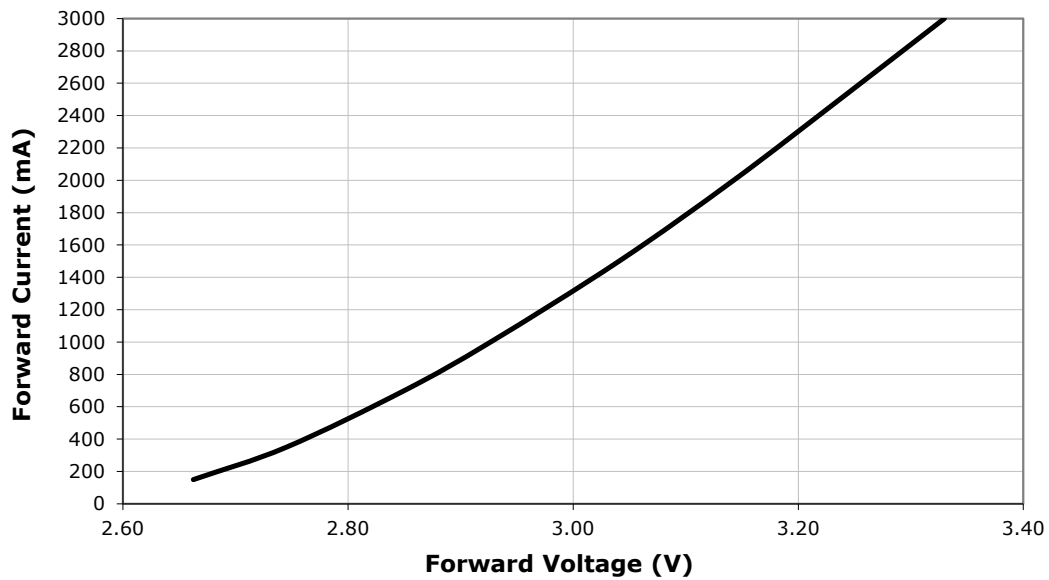
RELATIVE SPECTRAL POWER DISTRIBUTION



RELATIVE FLUX VS. JUNCTION TEMPERATURE ($I_f = 700 \text{ mA}$)

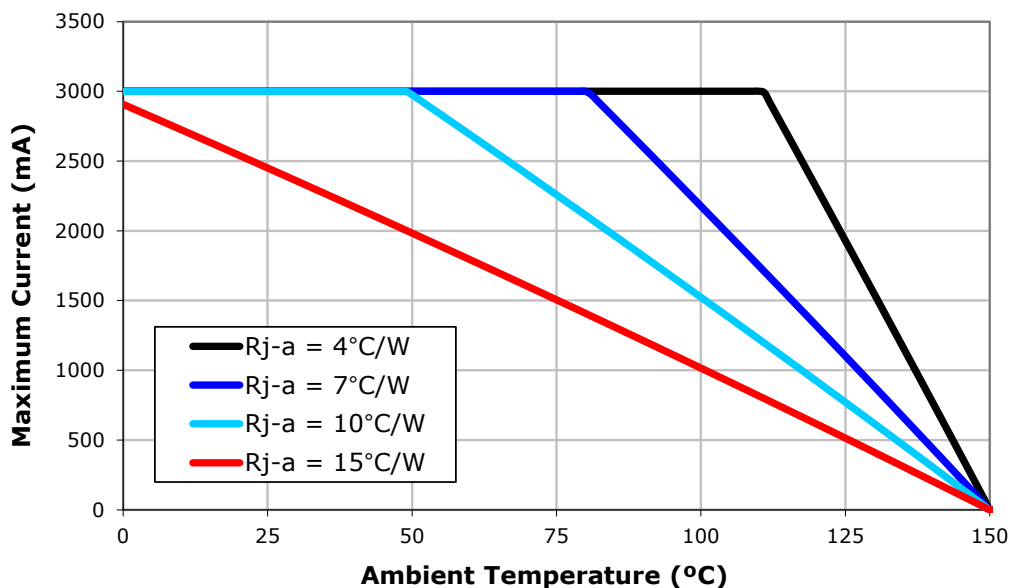


ELECTRICAL CHARACTERISTICS ($T_j = 85 \text{ °C}$)

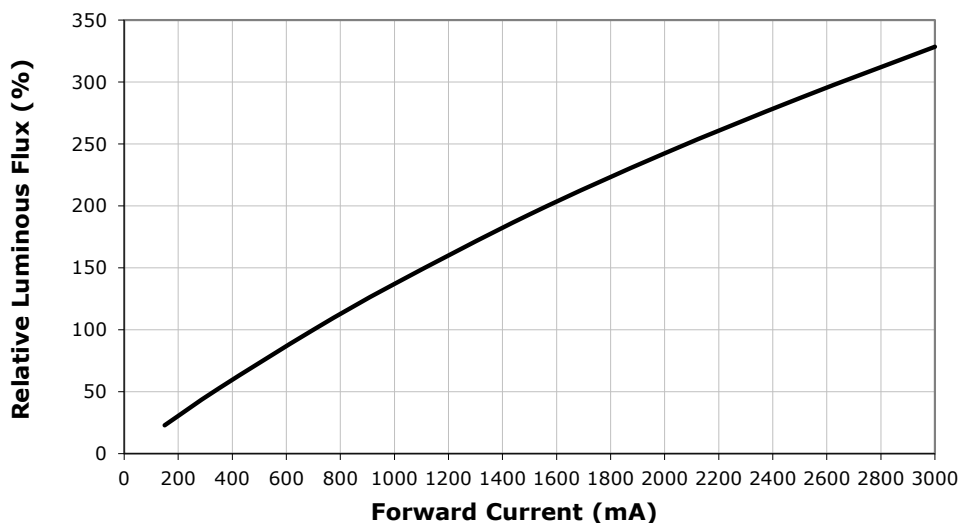


THERMAL DESIGN

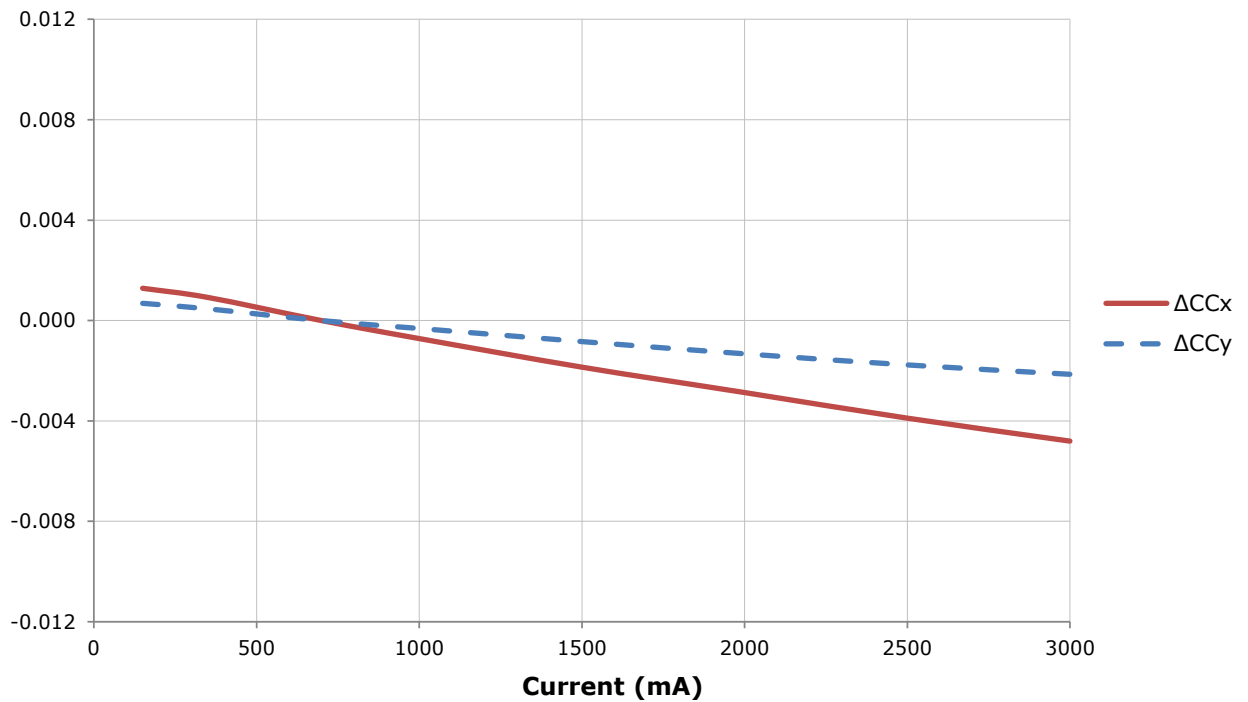
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



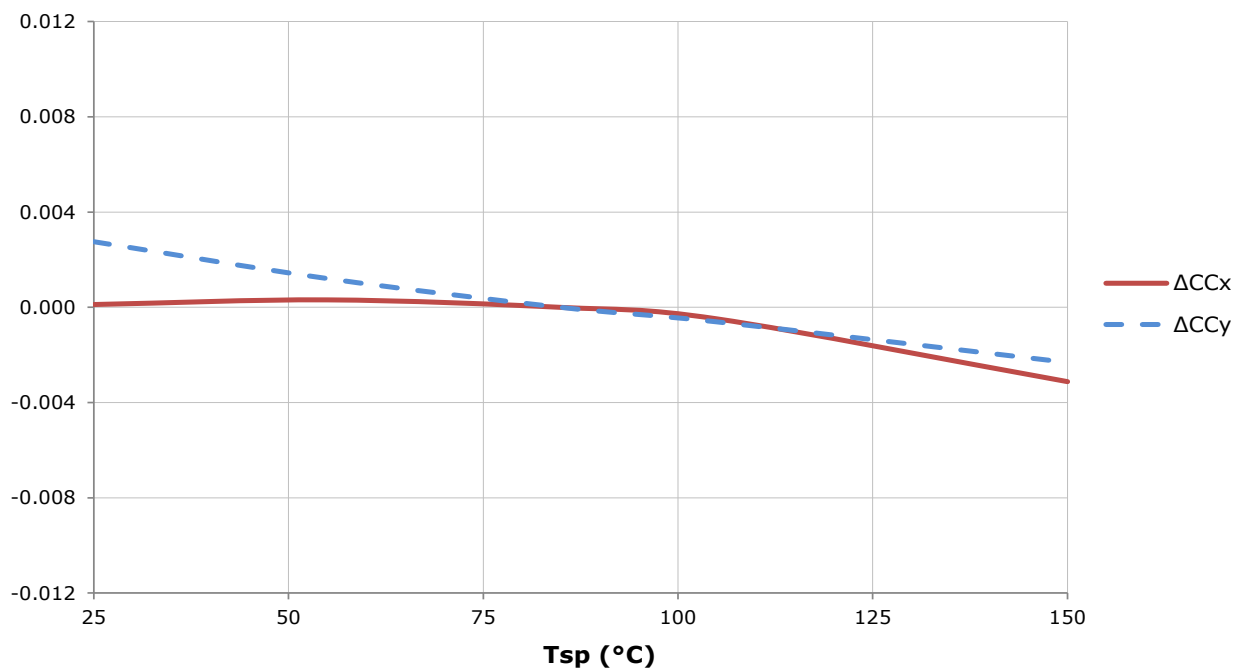
RELATIVE FLUX VS. CURRENT ($T_j = 85^\circ\text{C}$)



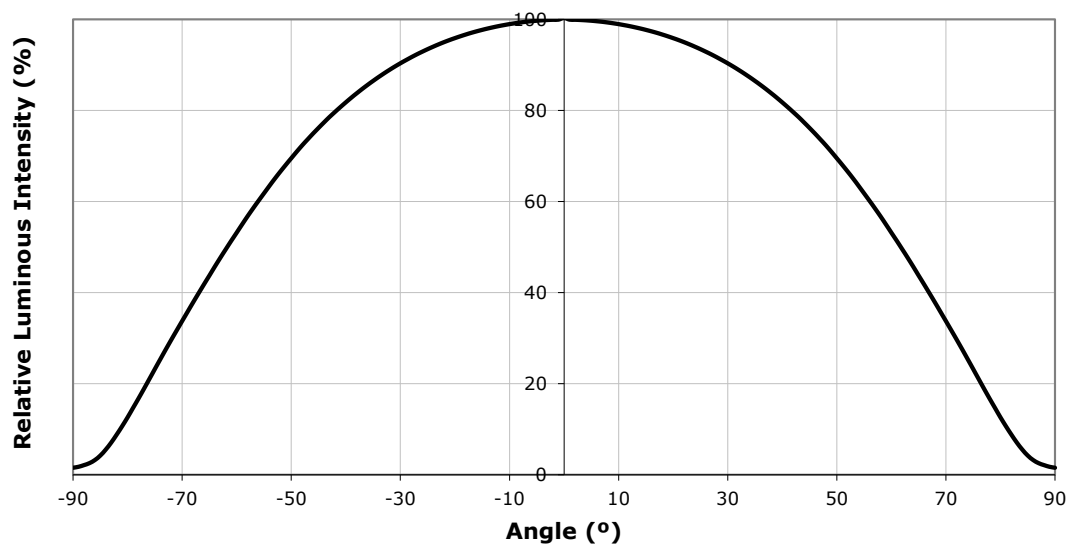
RELATIVE CHROMATICITY VS. CURRENT (WARM WHITE)



RELATIVE CHROMATICITY VS. TEMPERATURE (WARM WHITE)



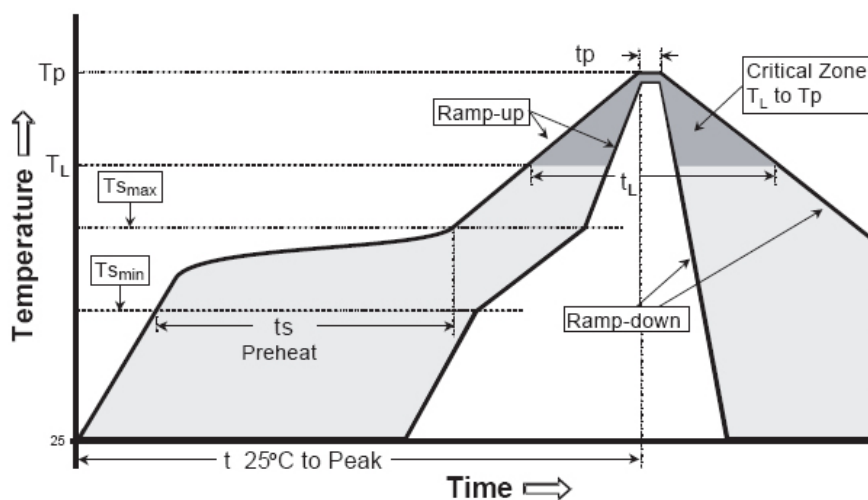
TYPICAL SPATIAL DISTRIBUTION



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XM-L2 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.



IPC/JEDEC J-STD-020C

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 the 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/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 XM-L2 LEDs to have unlimited floor life in conditions $\leq 30^{\circ}\text{C}/85\%$ relative humidity (RH). Moisture testing included a 168-hour soak at $85^{\circ}\text{C}/85\%$ RH followed by 3 reflow cycles, with visual and electrical inspections at each stage.

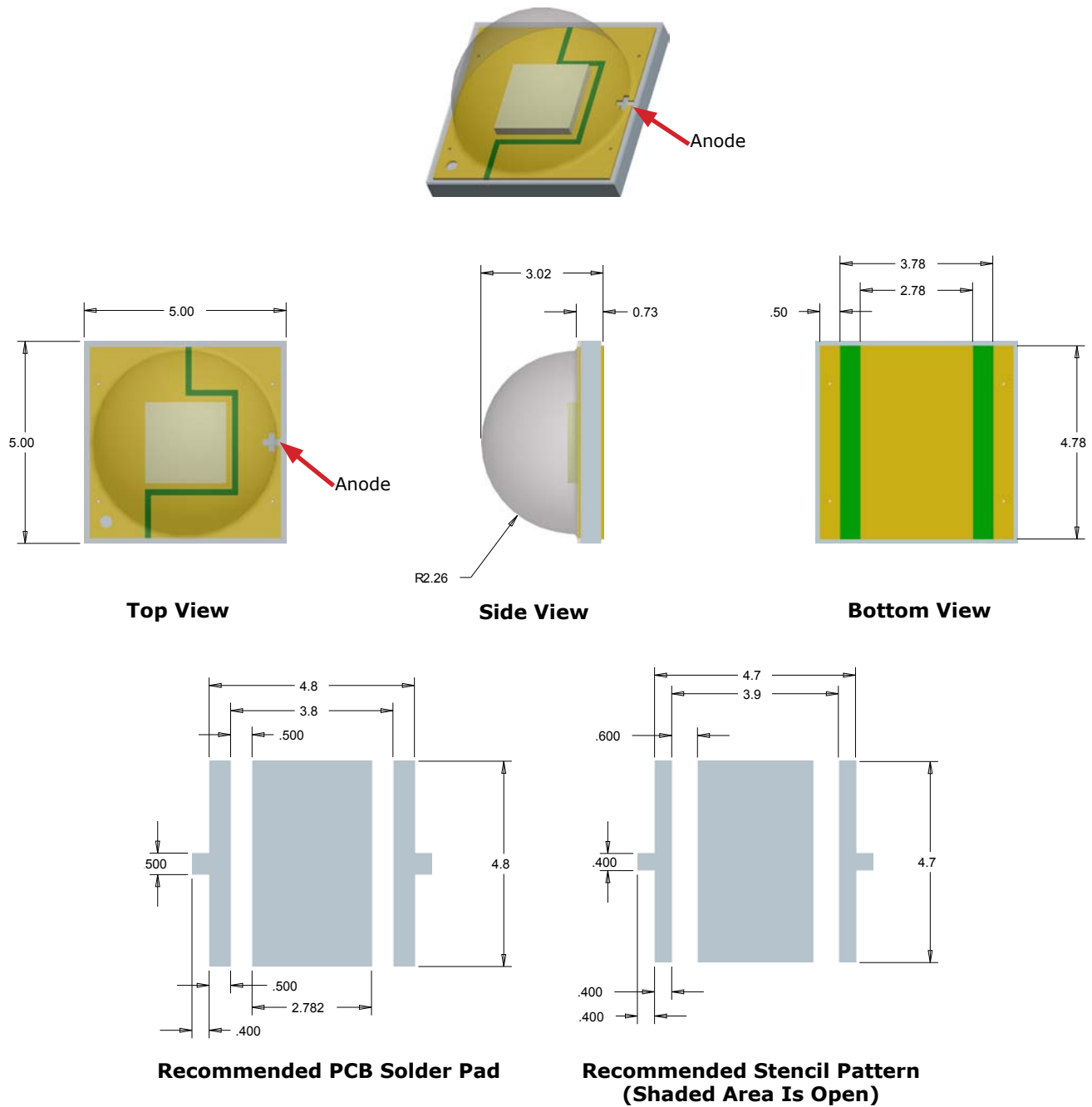
Cree recommends keeping XLamp LEDs in their sealed moisture-barrier packaging until immediately prior to use. Cree also recommends returning any unused LEDs to the resealable moisture-barrier bag and closing the bag immediately after use.

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

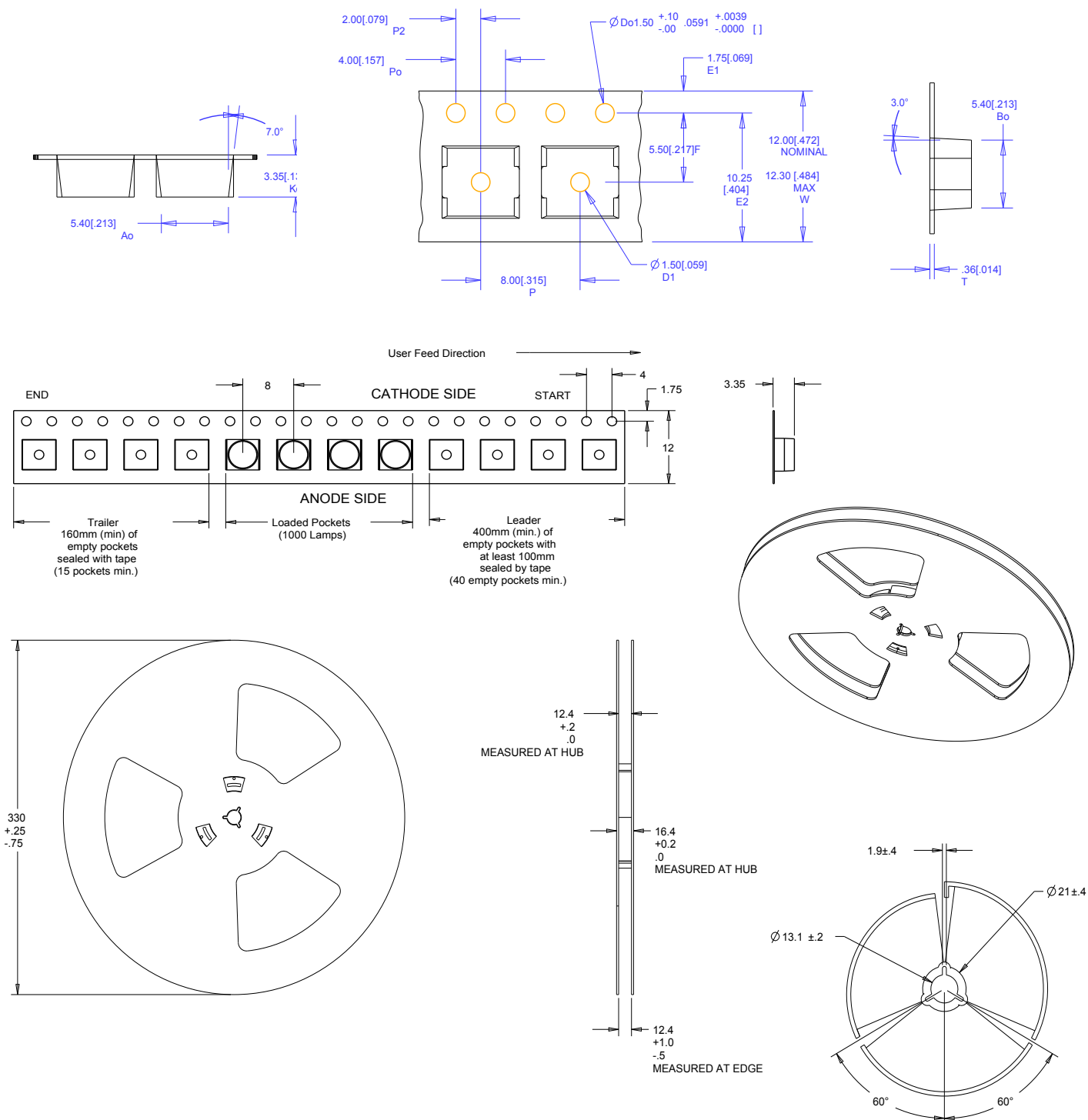
All measurements are $\pm .13$ mm unless otherwise indicated.



TAPE AND REEL

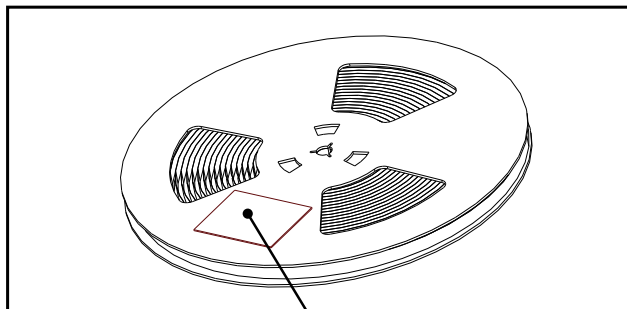
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

All dimensions in mm.



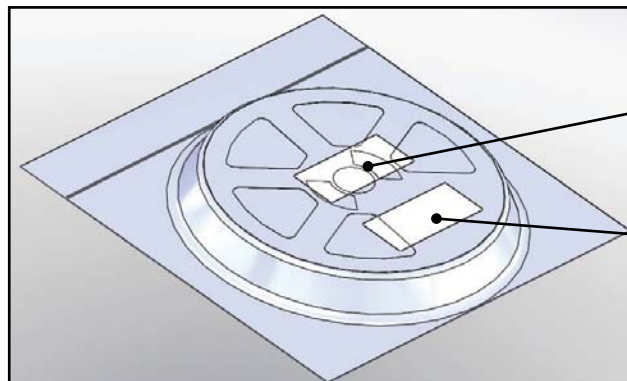
PACKAGING

Unpackaged Reel



Label with Cree Bin
Code, Qty, Reel ID

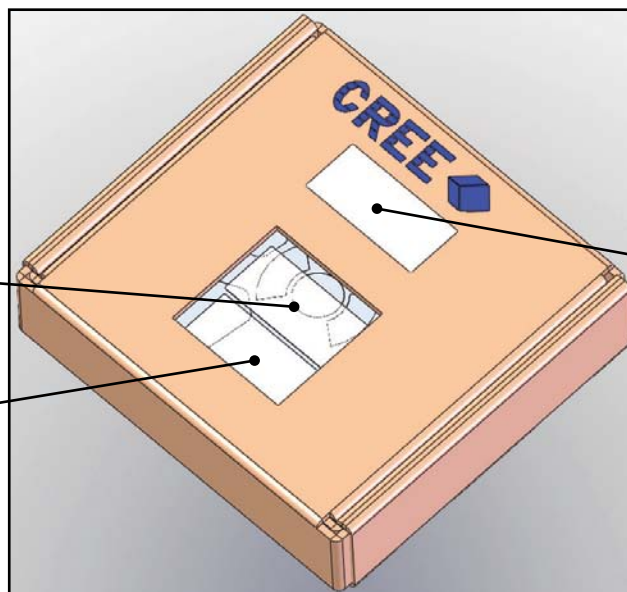
Packaged Reel



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