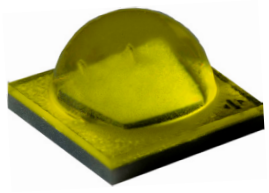
Cree® XLamp® XM-L3 LEDs



PRODUCT DESCRIPTION

The XLamp® XM-L3 LED delivers a massive 55% upgrade in maximum light output over the XM L2 LED, providing a single-die LED point source for precise optical control. The XM-L3 LED shares the same mechanical and optical footprint as the original XM-L® and XM-L2 LEDs, providing a seamless upgrade path and shortened design cycle.

XLamp XM-L3 LEDs are the ideal choice for lighting applications requiring maximum light output from an easily controlled source, including torch, aftermarket automotive and outdoor spotlight.

FEATURES

- ANSI-compatible chromaticity bins
- Binned at 85 °C
- Maximum drive current: 5000 mA
- Low thermal resistance: 2.2 °C/W
- Wide viewing angle: 125°
- Unlimited floor life at ≤ 30 ºC/85% RH
- Reflow solderable - JEDEC J-STD-020C
- Electrically neutral thermal path
- RoHS compliant

TABLE OF CONTENTS

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300

CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		2.2	
Viewing angle (FWHM)	degrees		125	
Temperature coefficient of voltage	mV/°C		-1.4	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			5000
Reverse voltage	V			-5
Forward voltage (@ 700 mA, 85 °C)	V		2.75	2.9
Forward voltage (@ 1500 mA, 85 °C)	V		2.9	
Forward voltage (@ 3000 mA, 85 °C)	V		3.14	
Forward voltage (@ 5000 mA, 85 °C)	V		3.42	
LED junction temperature	°C			150

FLUX CHARACTERISTICS (T_J = 85 °C)

The following table provides order codes for XLamp XM-L3 LEDs. For a complete description of the order-code nomenclature, please consult the XLamp XM LED Family Binning and Labeling document.

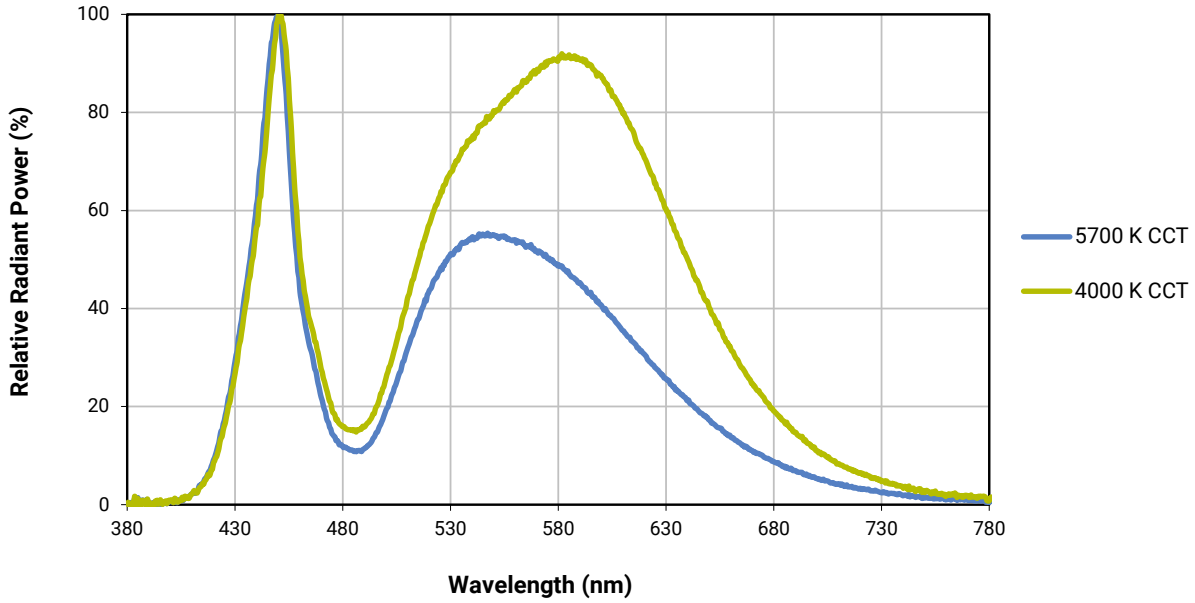
Chromaticity		Minimum Luminous Flux (lm) @ 700 mA			Order Codes
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @25 °C*	
E1	6500 K	U4	340	369	XMLDWT-00-0000-0000U40E1
		U3	320	347	XMLDWT-00-0000-0000U30E1
51	6200 K	U4	340	369	XMLDWT-00-0000-0000U4051
		U3	320	347	XMLDWT-00-0000-0000U3051
50	6200 K	U4	340	369	XMLDWT-00-0000-0000U4050
		U3	320	347	XMLDWT-00-0000-0000U3050
E2	5700 K	U4	340	369	XMLDWT-00-0000-0000U40E2
		U3	320	347	XMLDWT-00-0000-0000U30E2
E3	5000 K	U4	340	369	XMLDWT-00-0000-0000U40E3
		U3	320	347	XMLDWT-00-0000-0000U30E3

Notes

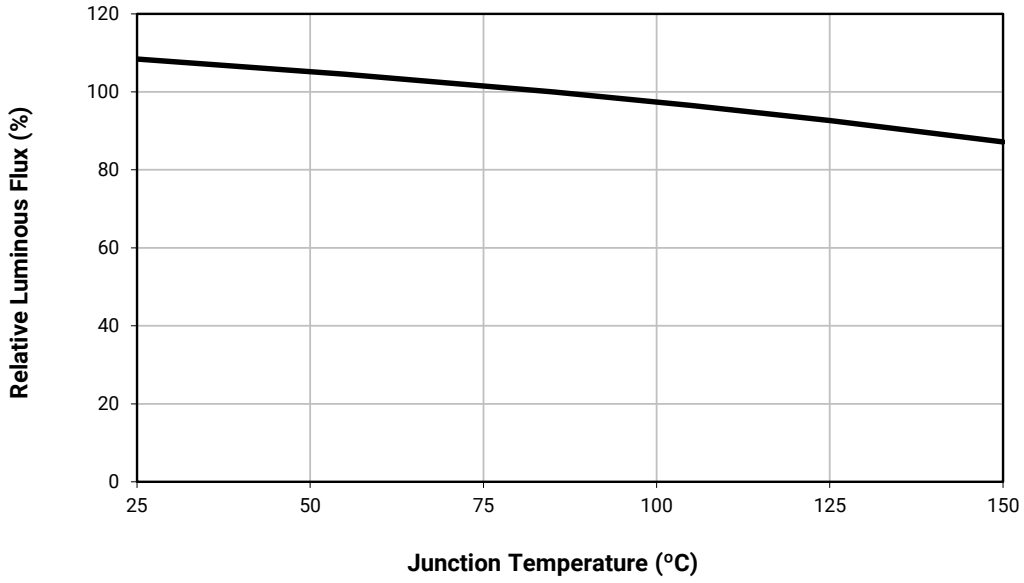
- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements. See the Measurements section (page 8).
- Cree XLamp XM-L3 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.

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

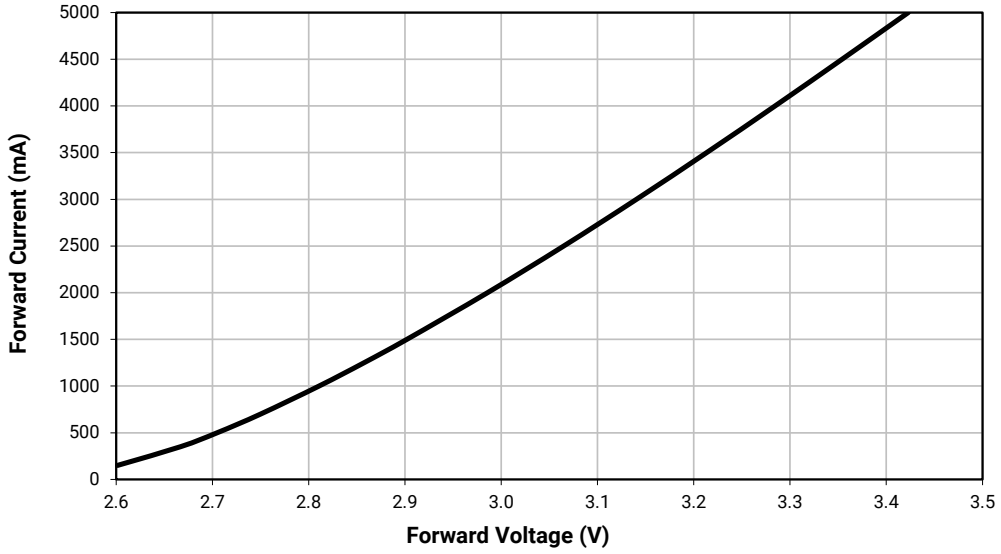
RELATIVE SPECTRAL POWER DISTRIBUTION



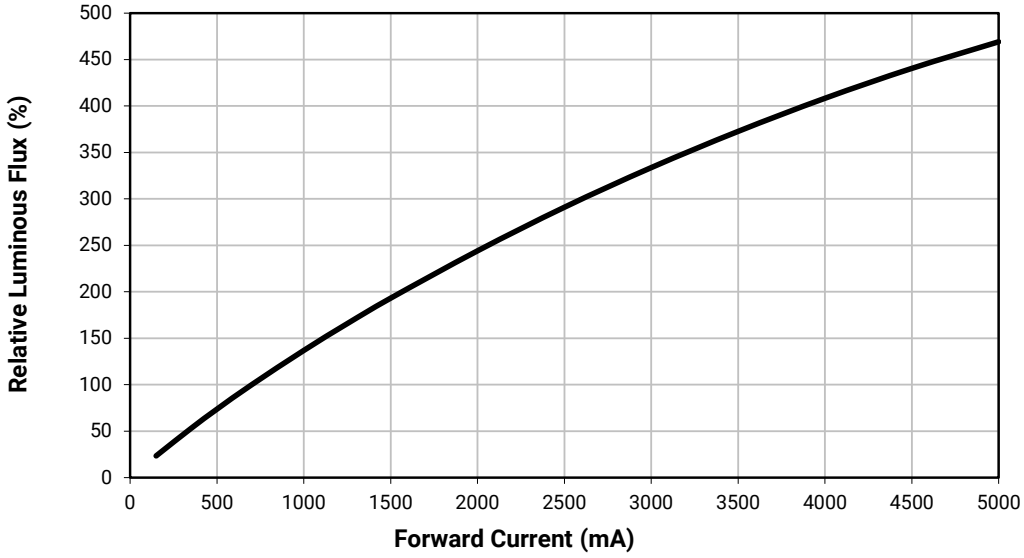
RELATIVE FLUX VS. JUNCTION TEMPERATURE (I_F = 700 mA)



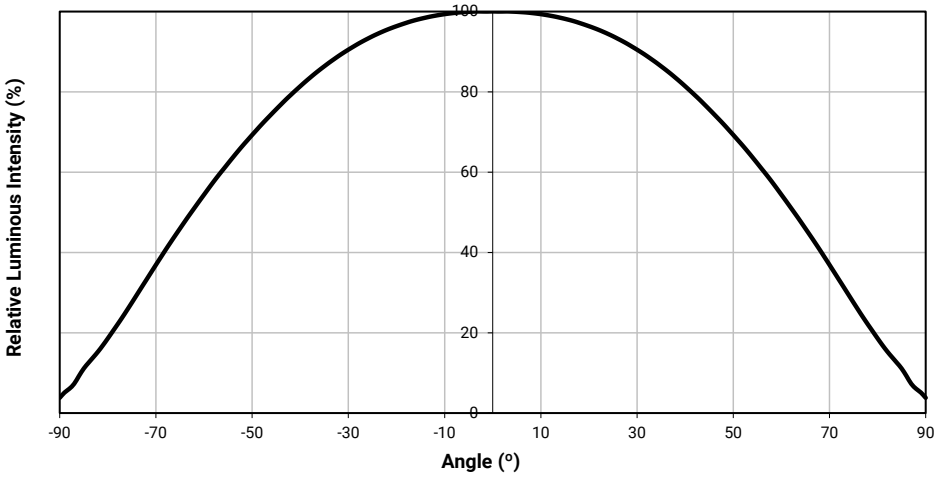
ELECTRICAL CHARACTERISTICS (T_J = 85 °C)



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

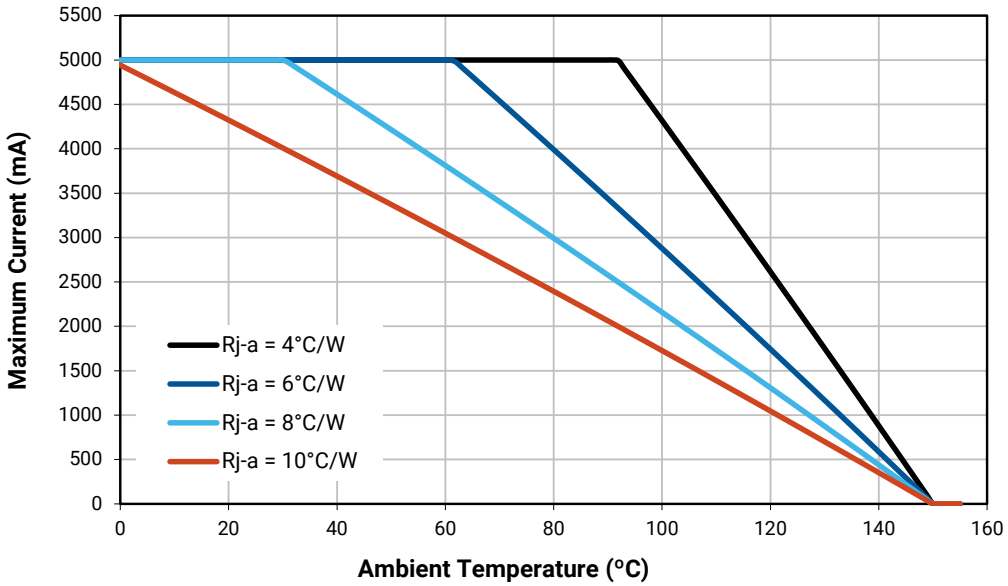


TYPICAL SPATIAL DISTRIBUTION



THERMAL DESIGN

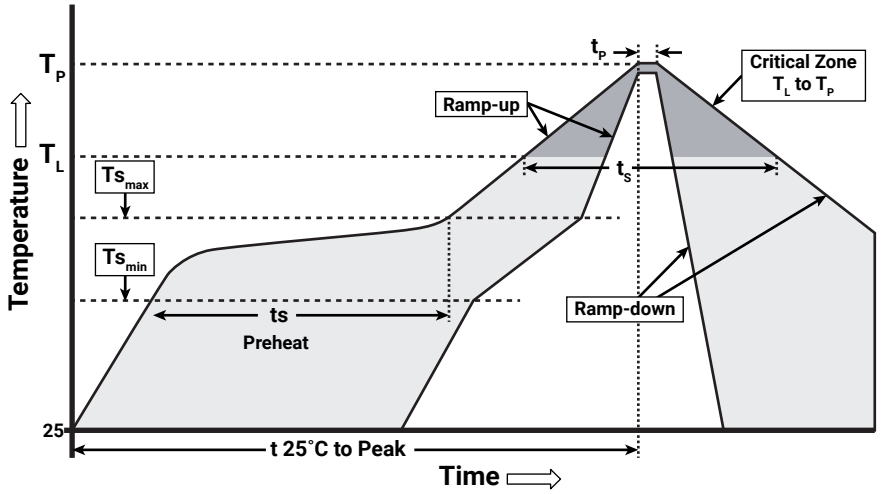
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XM-L3 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, and therefore it is the lamp or luminaire manufacturer's responsibility to determine applicable soldering requirements.

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 (Ts_{max} to Tp)	1.2 °C/second
Preheat: Temperature Min (Ts_{min})	120 °C
Preheat: Temperature Max (Ts_{max})	170 °C
Preheat: Time (ts_{min} to ts_{max})	65-150 seconds
Time Maintained Above: Temperature (T_L)	217 °C
Time Maintained Above: Time (t_L)	45-90 seconds
Peak/Classification Temperature (Tp)	235 - 245 °C
Time Within 5 °C of Actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	1 - 6 °C/second
Time 25 °C to Peak Temperature	4 minutes max.

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

NOTES

Measurements

The luminous flux, radiant power, chromaticity, forward voltage 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 or provided 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.

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.

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 XM-L3 LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of ≤ 30 ºC/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 Ecology section of the Cree website.

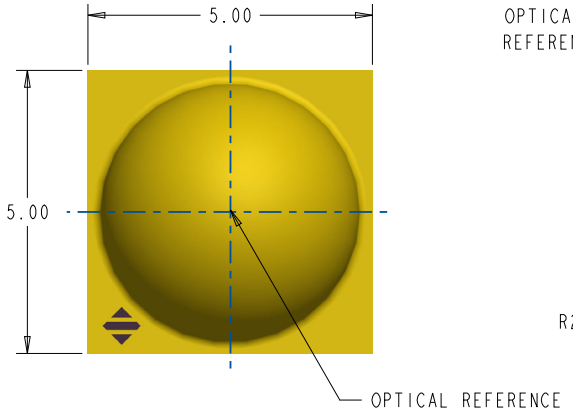
Vision Advisory

WARNING: Do not look at an 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.

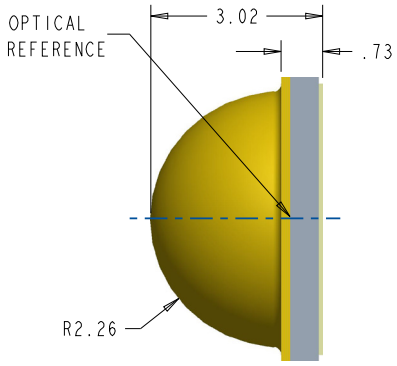
MECHANICAL DIMENSIONS

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

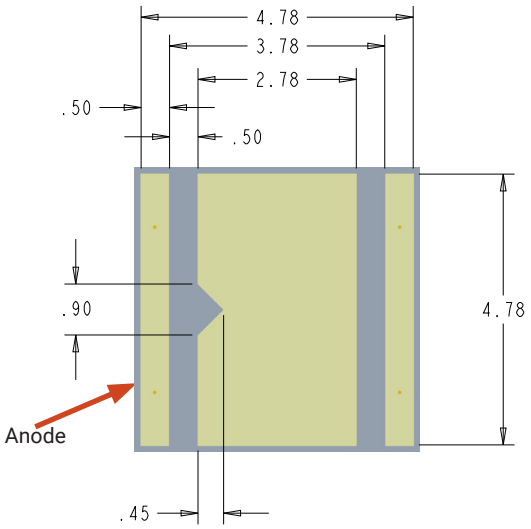
All measurements are ±.13 mm unless otherwise indicated.



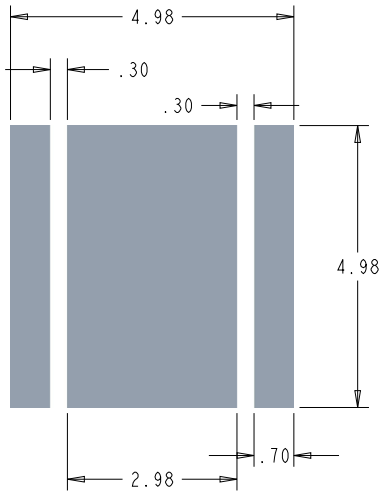
Top View



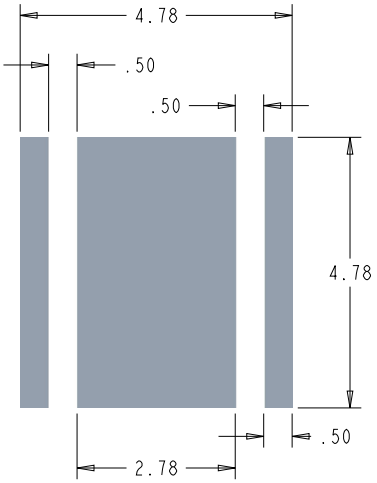
Side View



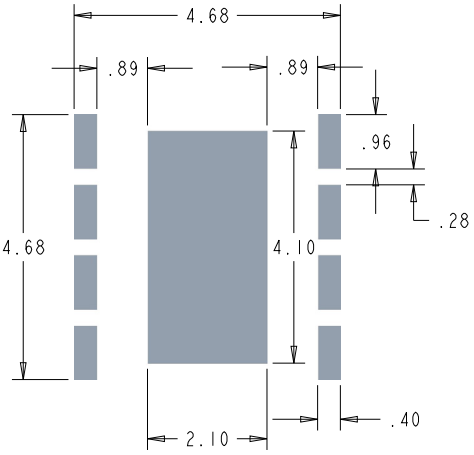
Bottom View



Recommended Copper Layout



Recommended Solder Pad (Solder Mask Pattern)



Recommended Stencil Openings*

Notes:

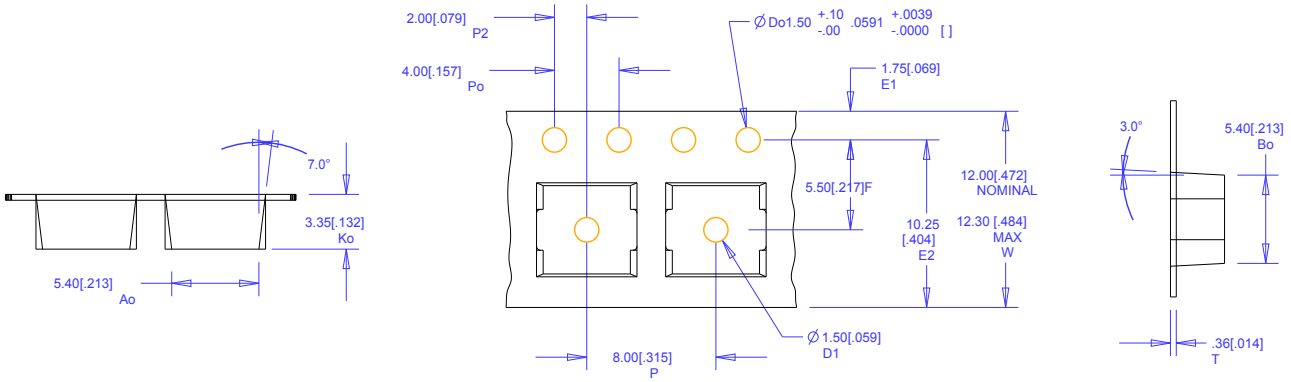
- Cree recommends using thermal pad kickouts to maximize component thermal performance.
- Cree recommends using white solder mask material to minimize system optical loss.

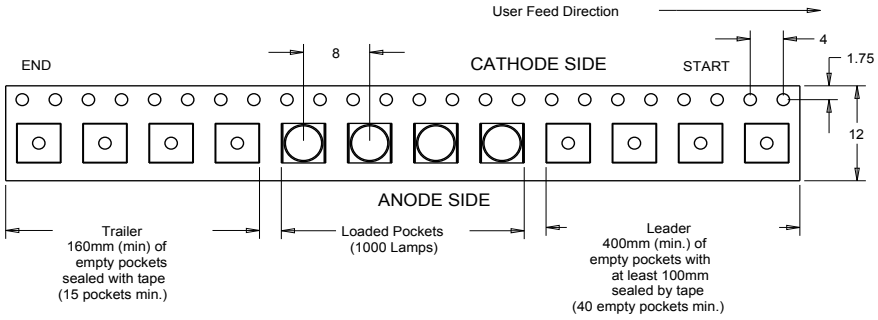
* This stencil has been tested and optimized for the avoidance of voiding when using ALPHA® LUMET® P30 Maxrel solder paste. For other solder pastes, a “window pane” design for the thermal pad stencil may result in a lower voiding percentage. Contact your local Cree Field Applications Engineer for consultation regarding your specific application.

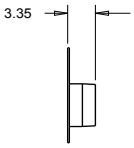
TAPE AND REEL

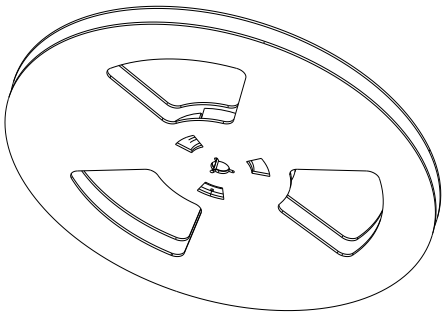
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

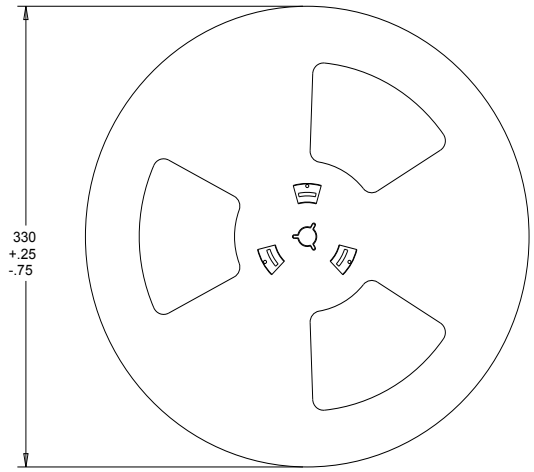
Except as noted, all dimensions in mm.

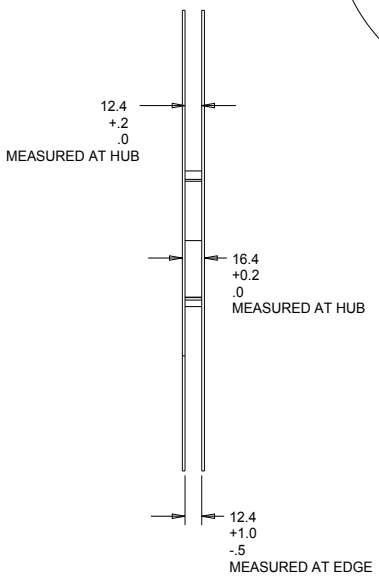


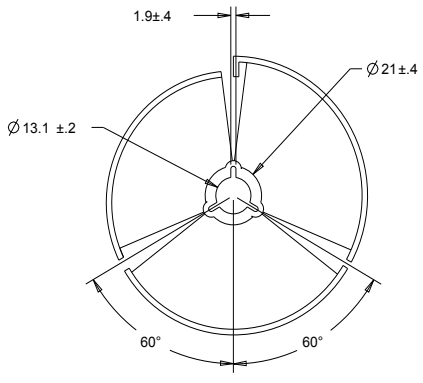






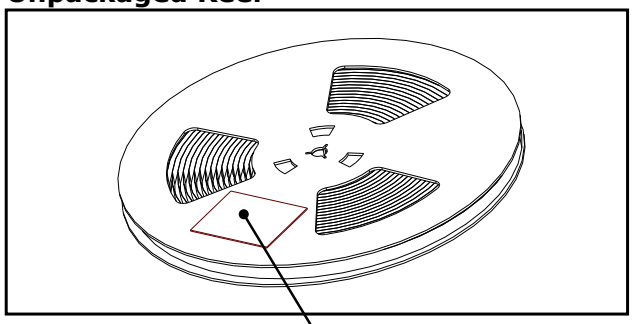




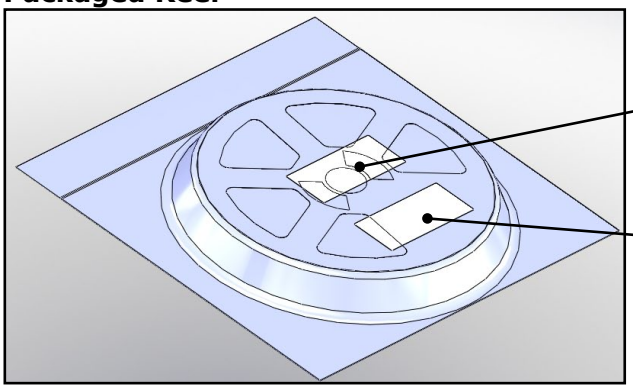


PACKAGING

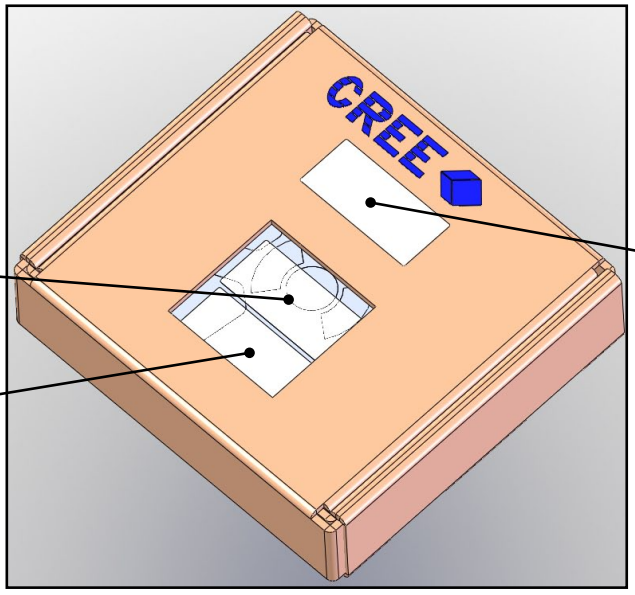
Unpackaged Reel



Packaged Reel



Boxed Reel



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Cree, Inc.:

XMLDWT-00-0000-0000U20E5 XMLDWT-00-0000-0000U3050 XMLDWT-00-0000-0000U3051 XMLDWT-00-0000-0000U30E1 XMLDWT-00-0000-0000U30E2 XMLDWT-00-0000-0000U40E2 XMLDWT-00-0000-0000U40E3 XMLDWT-00-0000-0000U40E4 XMLDWT-00-0000-0000U30E3 XMLDWT-00-0000-0000U30E4 XMLDWT-00-0000-0000U30E5 XMLDWT-00-0000-0000U4050 XMLDWT-00-0000-0000U4051 XMLDWT-00-0000-0000U40E1