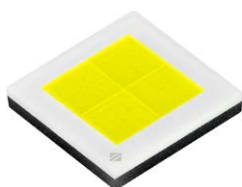


XLamp® XFLPNA LEDs



PRODUCT DESCRIPTION

XLamp® XFLPNA LEDs are fully optimized for flashlights and other portable lighting applications in terms of light output, optical performance and value. The compact and proven 3.45-mm platform has an excellent ecosystem of optics and system solutions available, enabling lighting manufacturers to simplify their design process and shorten time-to-market. The XFLPNA LED is offered as a high-intensity option to deliver maximum candela through secondary optics.

XLamp XFL LEDs are optimized for high-output flashlight and other portable lighting applications.

FEATURES

- Available in ANSI white bins at 6500 K & 5700 K CCT
- Binned at 25 °C
- Reflow solderable - JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- Unlimited floor life at ≤ 30 °C/85% RH
- RoHS and REACH compliant
- UL® recognized component (E349212)

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CHARACTERISTICS

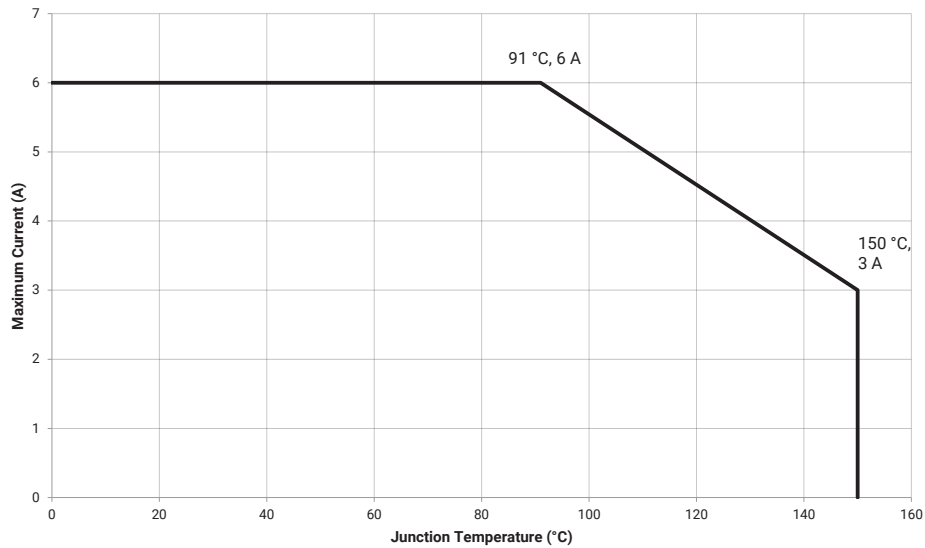
Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		0.7	
Viewing angle (FWHM)	degrees		120	
Temperature coefficient of voltage	mV/°C		-1.3	
DC forward current	A			6
Forward voltage (@ 1050 mA, 25 °C)	V		2.8	3.0
LED junction temperature	°C			150

Note

- Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the [Thermal Resistance Measurement application note](#) for more details.

MAXIMUM CURRENT VS. JUNCTION TEMPERATURE

XFLPNA LEDs should be driven at maximum current for only up to 60 seconds at a time with design measures taken to ensure the junction temperature (T_j) never exceeds the T_j value at the operating drive current as shown in the Maximum Current vs. Junction Temperature graphs below. For applications requiring longer operating lifetime, please refer to the [LED Reliability Overview document](#) for guidance on drive currents for which XFLPNA LEDs have been tested for hours of continuous operation.



FLUX CHARACTERISTICS

The following tables provide order codes for XLamp XFLPNA LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 10).

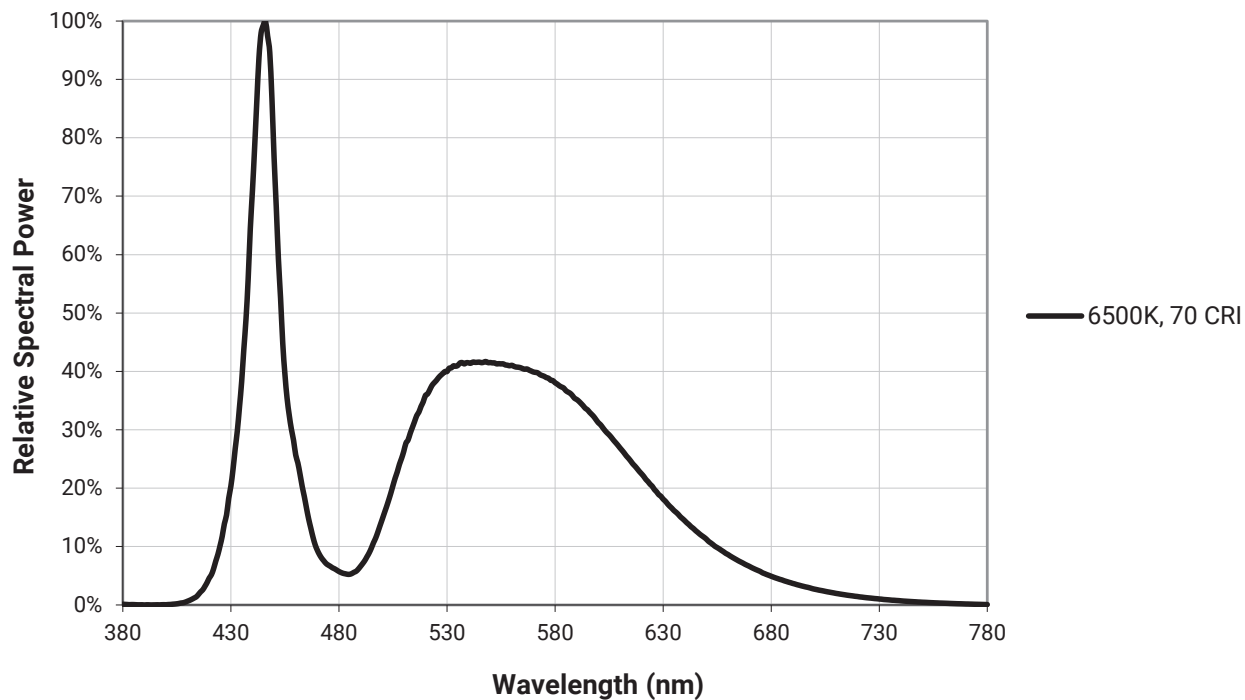
Binning condition: $T_J = 25\text{ }^{\circ}\text{C}$; 3 V, $I_F = 1050\text{ mA}$

Nominal CCT	Chromaticity Bins	CRI		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	Order Code
		Minimum	Typical			
6500 K	1A, 1B, 1C, 1D	0		510	535	XFLPNA-H0-0000-0A000A0E1
5700 K	2A, 2B, 2C, 2D	0		515	545	XFLPNA-H0-0000-0A000A0E2

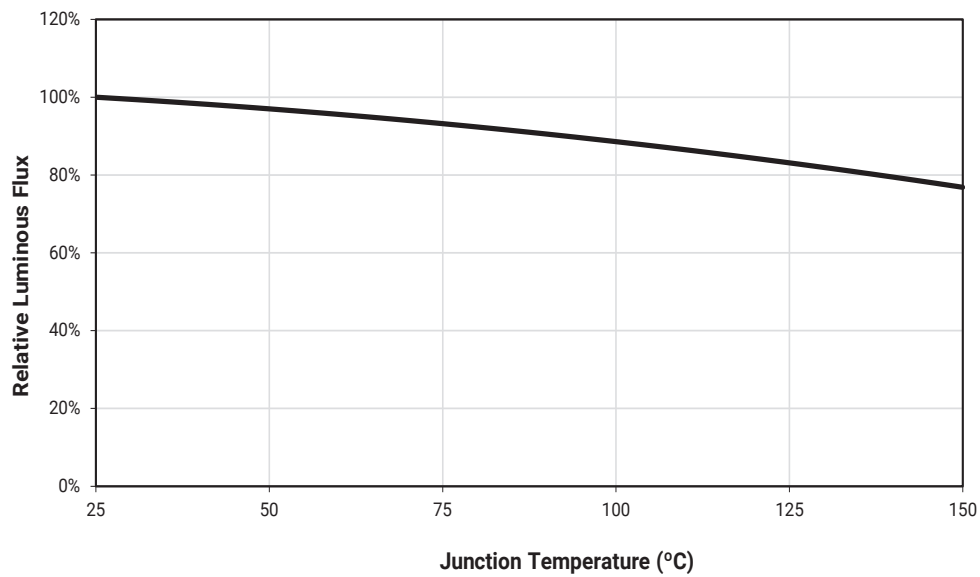
Note

- Cree LED maintains a tolerance of $\pm 7\%$ 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 12).

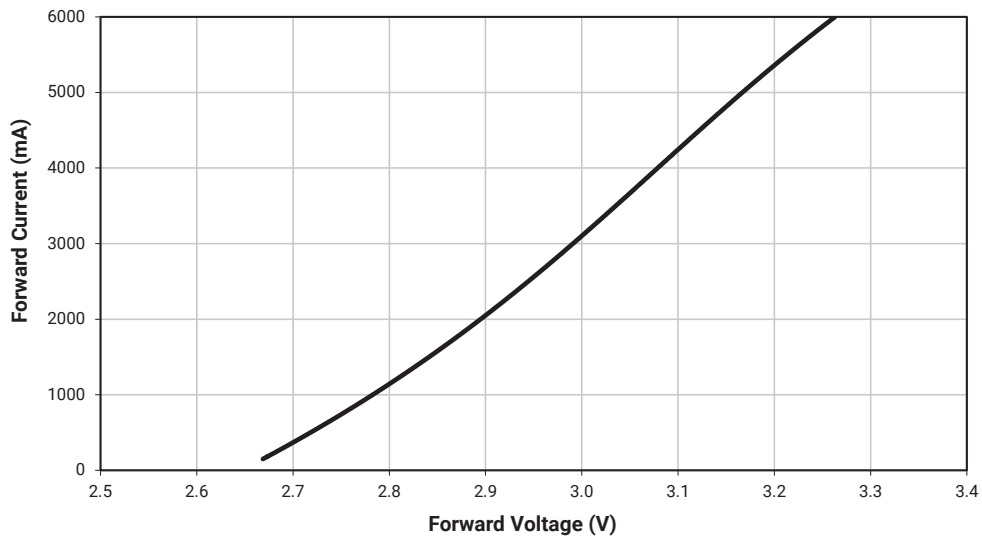
RELATIVE SPECTRAL POWER DISTRIBUTION



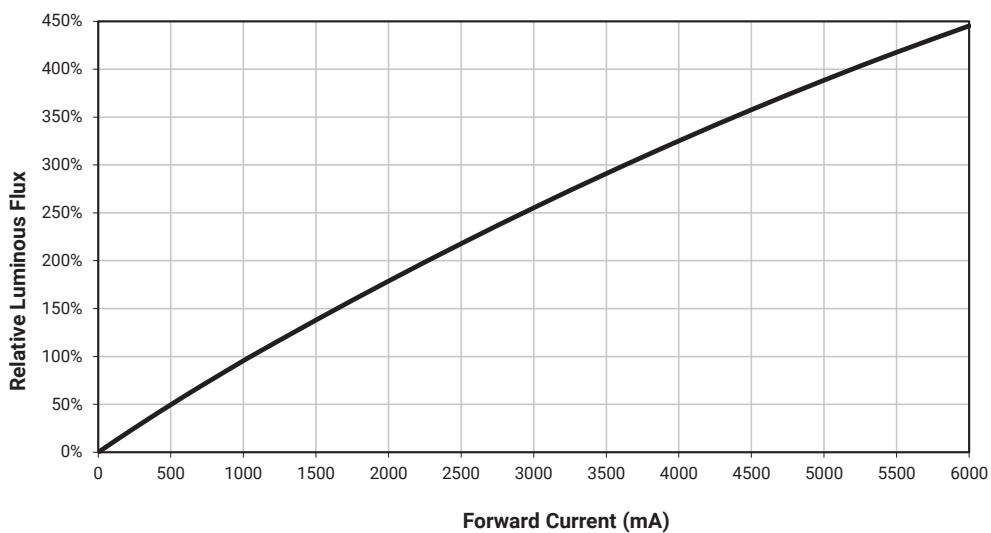
RELATIVE FLUX VS. JUNCTION TEMPERATURE



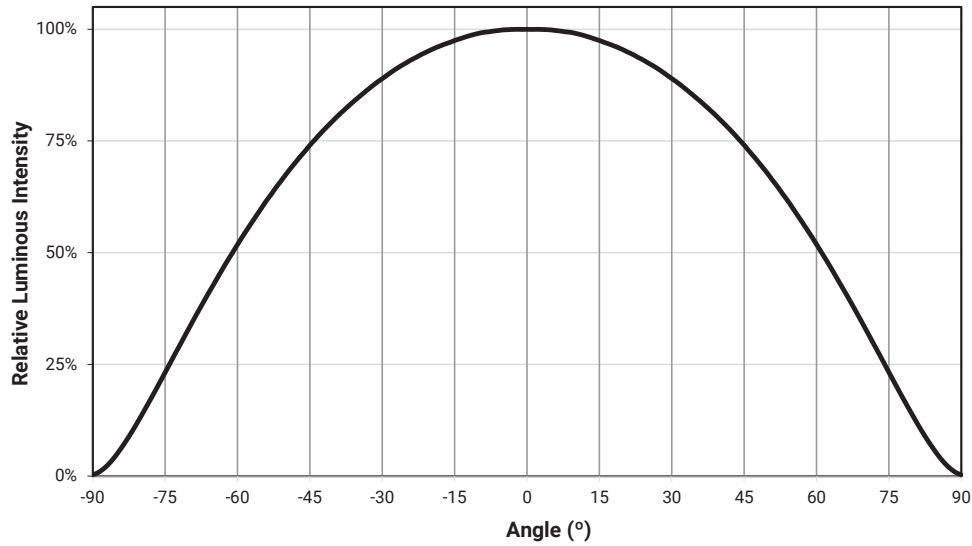
ELECTRICAL CHARACTERISTICS



RELATIVE FLUX VS. CURRENT

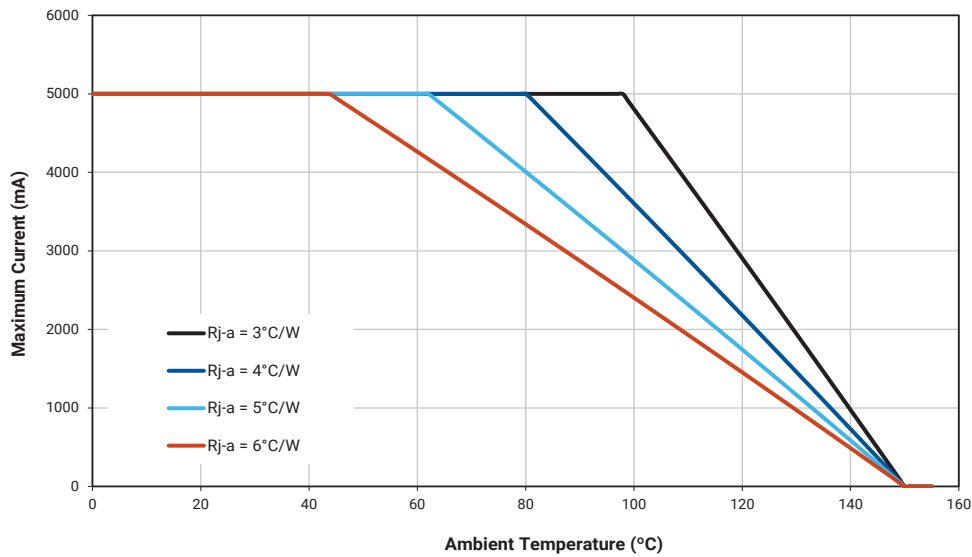


TYPICAL SPATIAL DISTRIBUTION



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.



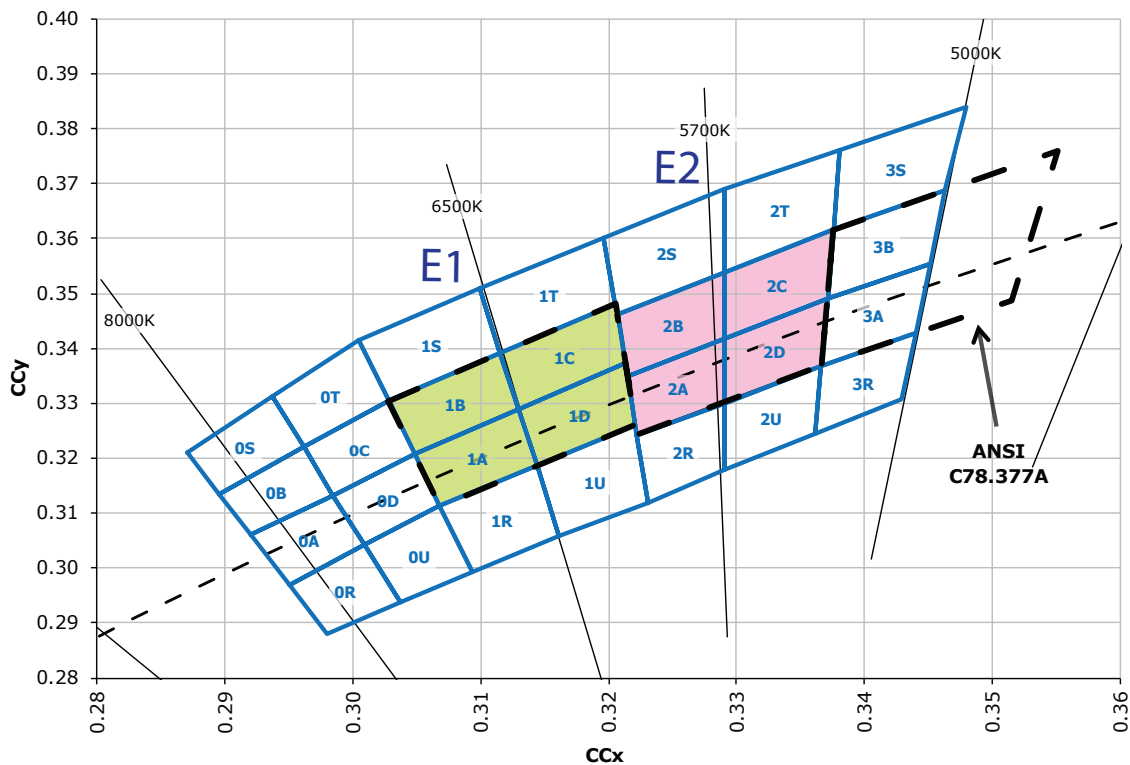
PERFORMANCE GROUPS - FORWARD VOLTAGE ($T_j = 25\text{ }^{\circ}\text{C}$)

XFLPNA LEDs are tested for forward voltage and placed into one of the following voltage bins.

Group Code	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
A1	2.6	2.8
A2	2.8	3.0

PERFORMANCE GROUPS - CHROMATICITY ($T_J = 25\text{ }^{\circ}\text{C}$)

Region	x	y	Region	x	y	Region	x	y	Region	x	y
1A	0.3144	0.3187	1B	0.3130	0.3290	1C	0.3213	0.3371	1D	0.3221	0.3261
	0.3130	0.3288		0.3117	0.3393		0.3205	0.3481		0.3213	0.3371
	0.3048	0.3209		0.3028	0.3304		0.3117	0.3393		0.3130	0.3290
	0.3068	0.3113		0.3048	0.3209		0.3130	0.3290		0.3144	0.3187
2A	0.3294	0.3306	2B	0.3293	0.3422	2C	0.3371	0.3493	2D	0.3366	0.3369
	0.3293	0.3422		0.3291	0.3539		0.3376	0.3616		0.3371	0.3493
	0.3214	0.3352		0.3206	0.3462		0.3291	0.3539		0.3293	0.3422
	0.3222	0.3243		0.3214	0.3352		0.3293	0.3422		0.3294	0.3306



ORDER CODE FORMAT

AAABBB-CD-GGGG-HJKLMMNNN

Characters	Description	Detail
AAA	Product Series	XFL
BBB	Product Version	PNA
C	Configuration	H = High Intensity
D	Reel Size	0 = 1000 pcs
GGGG	Internal Code	
H	Internal Code	
J	Voltage Class	A = 3V
K	Internal Code	
L	CRI Specification	0 = 0 CRI minimum
MM	Luminous Flux Group	0A = not binned in flux bins
NNN	Chromaticity Group	

BIN CODE FORMAT

AAABBB-C-PPP-QQQ-RR-L-SS

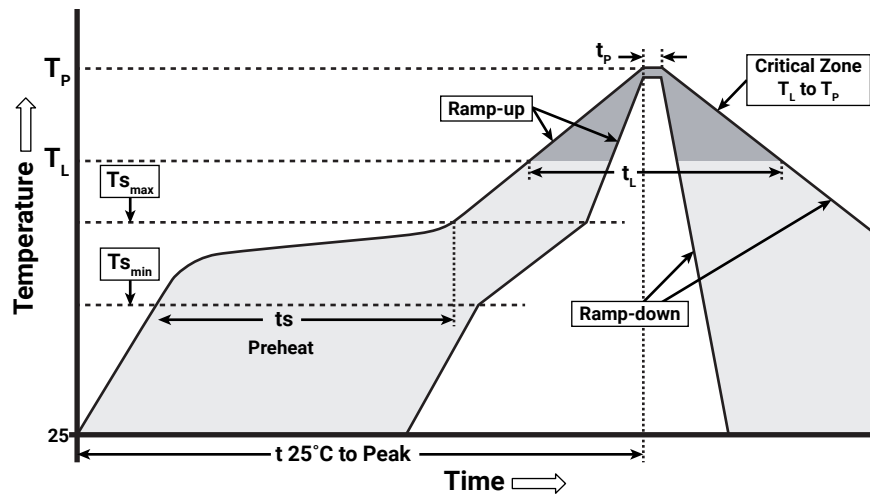
Characters A, B, C & L are identical to the definitions in the Order Code Format section.

Characters	Description	Detail
PPP	Chromaticity Bin	See details on page 9
QQQ	Flux Bin	0A0 = not binned in flux bins
RR	Voltage Bin	See details on page 8
SS	Internal Code	

REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XFLPNA LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree LED 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 ($T_{s_{min}}$ to T_P)	3 °C/second
Preheat: Temperature Min ($T_{s_{min}}$)	150 °C
Preheat: Temperature Max ($T_{s_{max}}$)	200 °C
Preheat: Time ($t_{s_{min}}$ to $t_{s_{max}}$)	60-180 seconds
Time Maintained Above: Temperature (T_L)	217 °C
Time Maintained Above: Time (t_L)	60-150 seconds
Peak/Classification Temperature (T_P)	260 °C
Time Within 5 °C of Actual Peak Temperature (t_p)	20-40 seconds
Ramp-Down Rate	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Note: All temperatures refer to 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 LED'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 on the qualification testing performed on XFLPNA LEDs.

Moisture Sensitivity

Cree LED 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 XFLPNA LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of $\leq 30^{\circ}\text{C}/85\%$ relative humidity (RH). Regardless of the storage condition, Cree LED 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 LED representative or from the [Product Ecology](#) section of the Cree LED website.

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 LED 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

This product meets the requirements to be considered a UL Recognized Component with Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

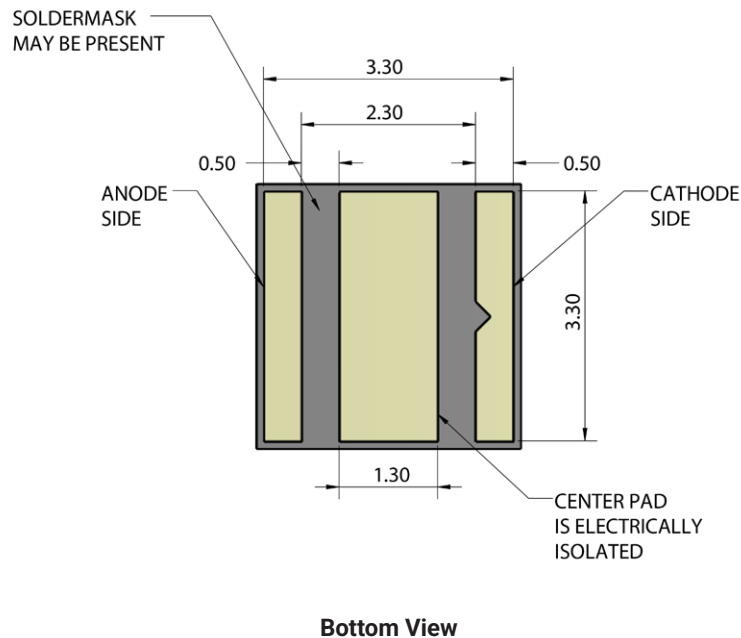
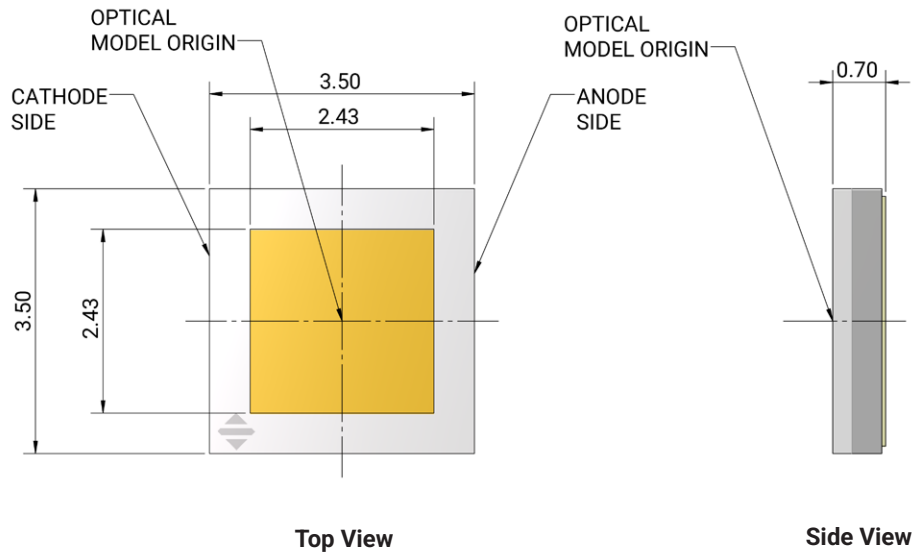
Vision Advisory

WARNING: Do not look at 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](#).

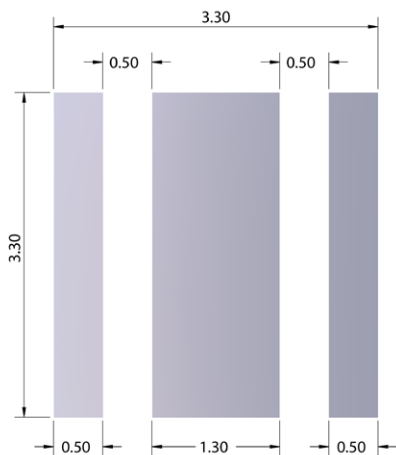
MECHANICAL DIMENSIONS

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

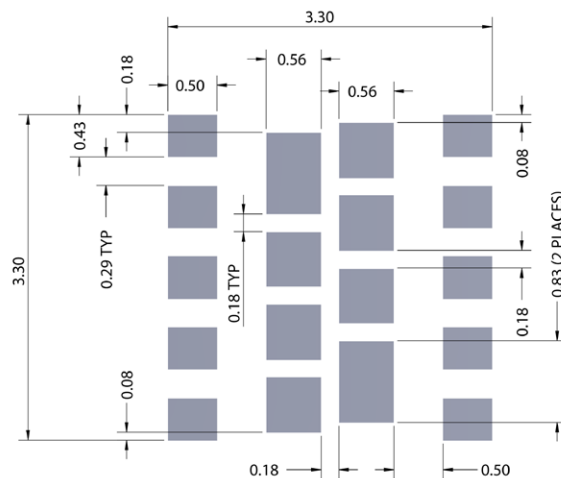
All measurements are ± 0.1 mm unless otherwise indicated.



MECHANICAL DIMENSIONS - CONTINUED



Recommended PCB Footprint



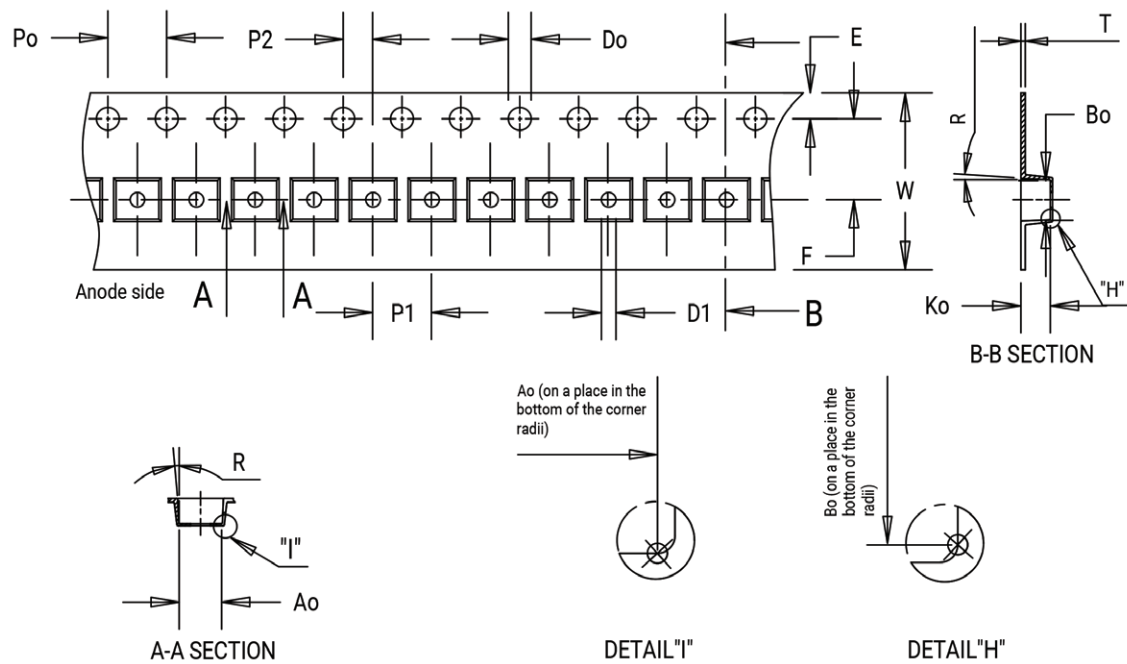
Recommended Stencil Opening

TAPE AND REEL

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

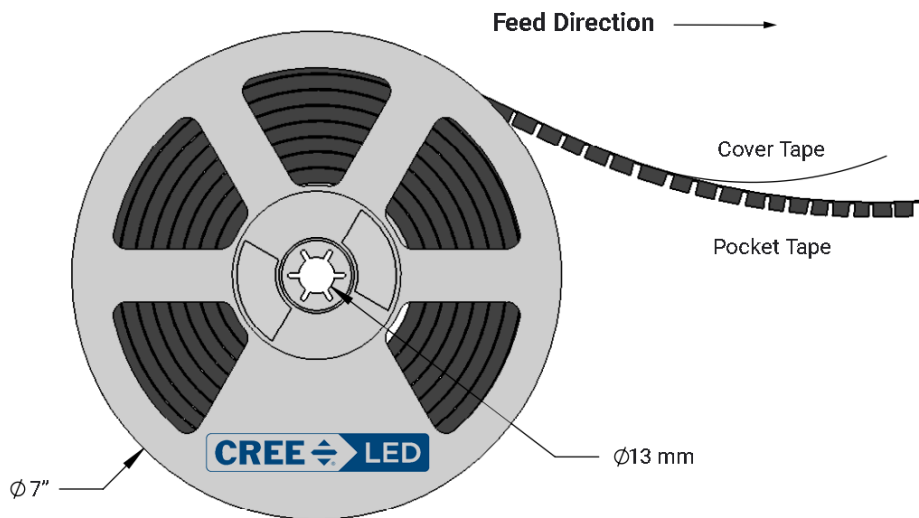
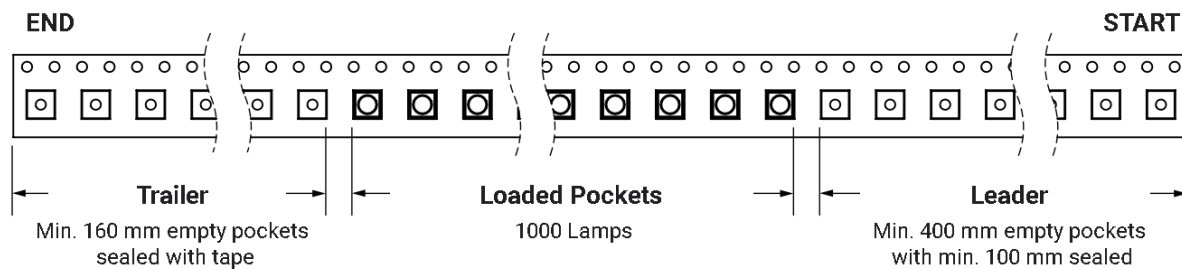
Except as noted, all dimensions in mm

All measurements are ± 0.13 mm unless otherwise indicated.



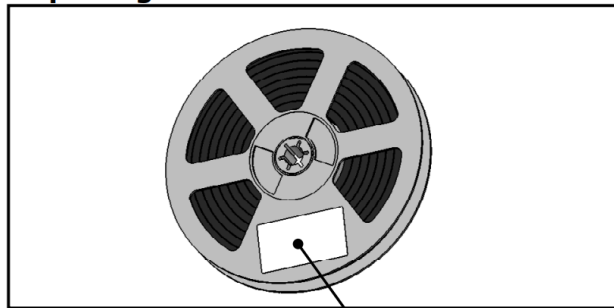
Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dimension	3.70	3.70	1.20	4.00	8.00	2.00	0.30	1.75	5.50	1.50	1.50	12.00	3°

TAPE AND REEL - CONTINUED



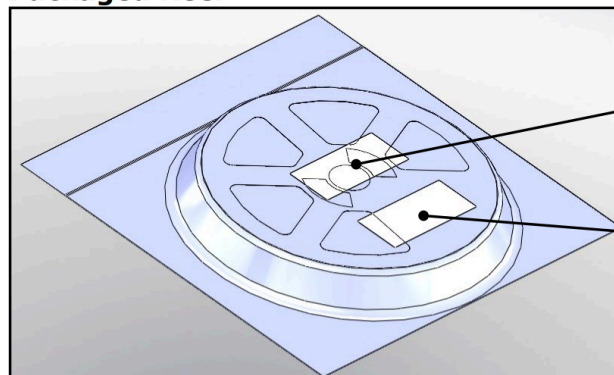
PACKAGING

Unpackaged Reel



Label with Cree LED Bin
Code, Quantity, Reel ID

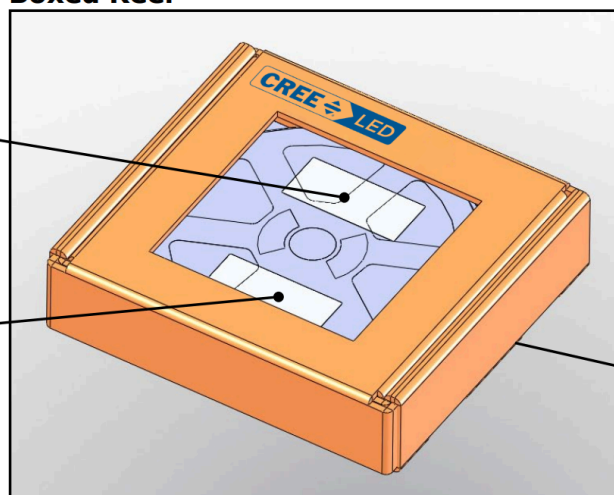
Packaged Reel



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

Label with Cree LED Bin
Code, Quantity, Reel ID

Boxed Reel



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

Label with Cree LED Bin Code,
Quantity, Reel ID

Patent Label
(on bottom of box)