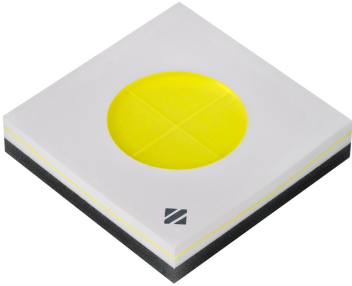


XLamp® XFLMNR White LEDs



PRODUCT DESCRIPTION

XLamp® XFLMNR LEDs are fully optimized for flashlights and other portable lighting applications in terms of light output, optical performance and value. The compact and proven 5.00 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 XFLMNR 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
- Binned at 25 °C
- 3 V/6 V is configurable by PCB layout
- Reflow solderable - JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- RoHS and REACH compliant
- UL® recognized component (E349212)



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XFLMNR White

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CHARACTERISTICS – WHITE

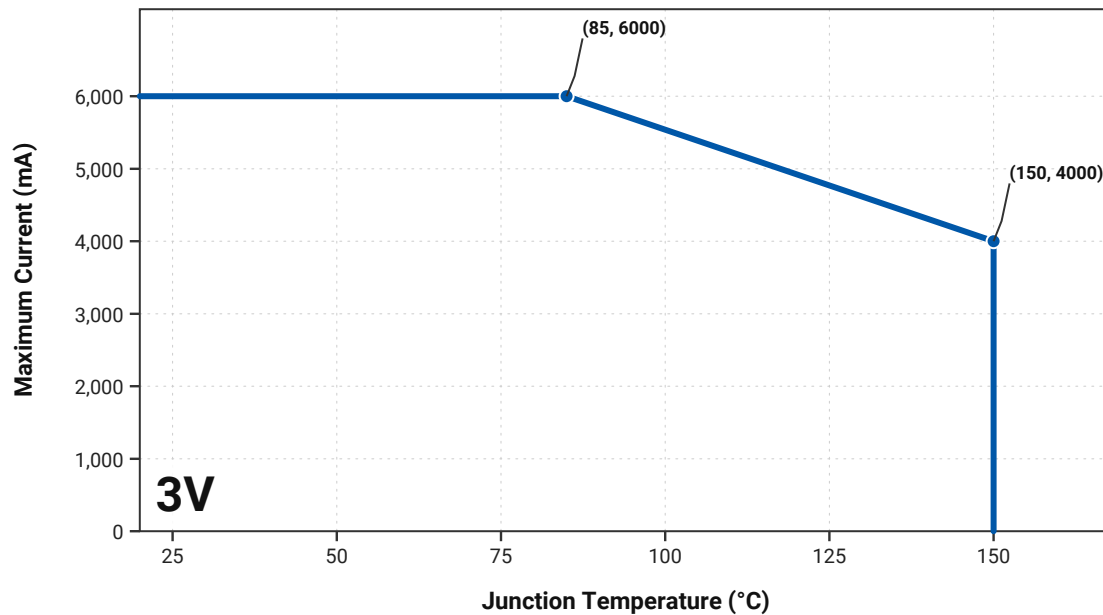
Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point $R_{\theta s}$ $\diamond$	$^{\circ}\text{C}/\text{W}$	-	1.8	-
Viewing angle (FWHM)	degrees	-	120	-
Temperature coefficient of voltage (@ 3 V)	$\text{mV}/^{\circ}\text{C}$	-	-1.4	-
Temperature coefficient of voltage (@ 6 V)*	$\text{mV}/^{\circ}\text{C}$	-	-2.8	-
DC forward current (@ 3 V)	mA	-	-	6000
DC forward current (@ 6 V)*	mA	-	-	3000
Reverse voltage	V	-	-	1
Forward voltage (@ 3 V, 2100 mA, 25 $^{\circ}\text{C}$)	V	-	2.8	3.2
Forward voltage (@ 6 V, 1050 mA, 25 $^{\circ}\text{C}$)*	V	-	5.6	6.4
LED junction temperature	$^{\circ}\text{C}$	-	-	150

$\diamond R_{\theta s}$ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the [Thermal Resistance Measurement](#) application note for more details.

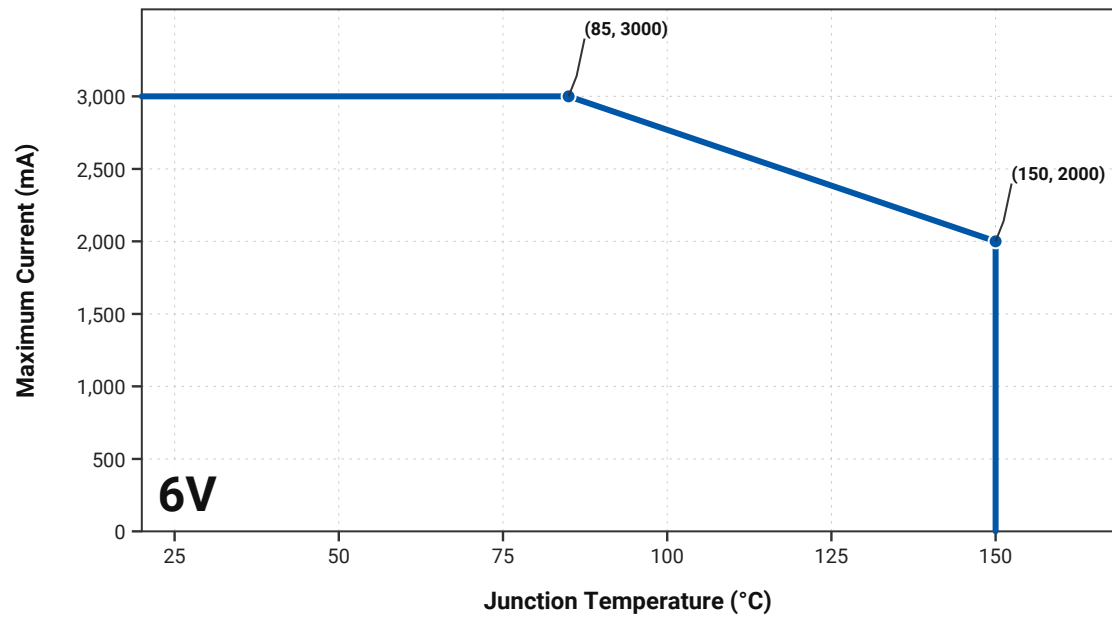
* Calculated for reference only.

MAXIMUM CURRENT VS. JUNCTION TEMPERATURE

XFL 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 XFL LEDs have been tested for hours of continuous operation.



MAXIMUM CURRENT VS. JUNCTION TEMPERATURE



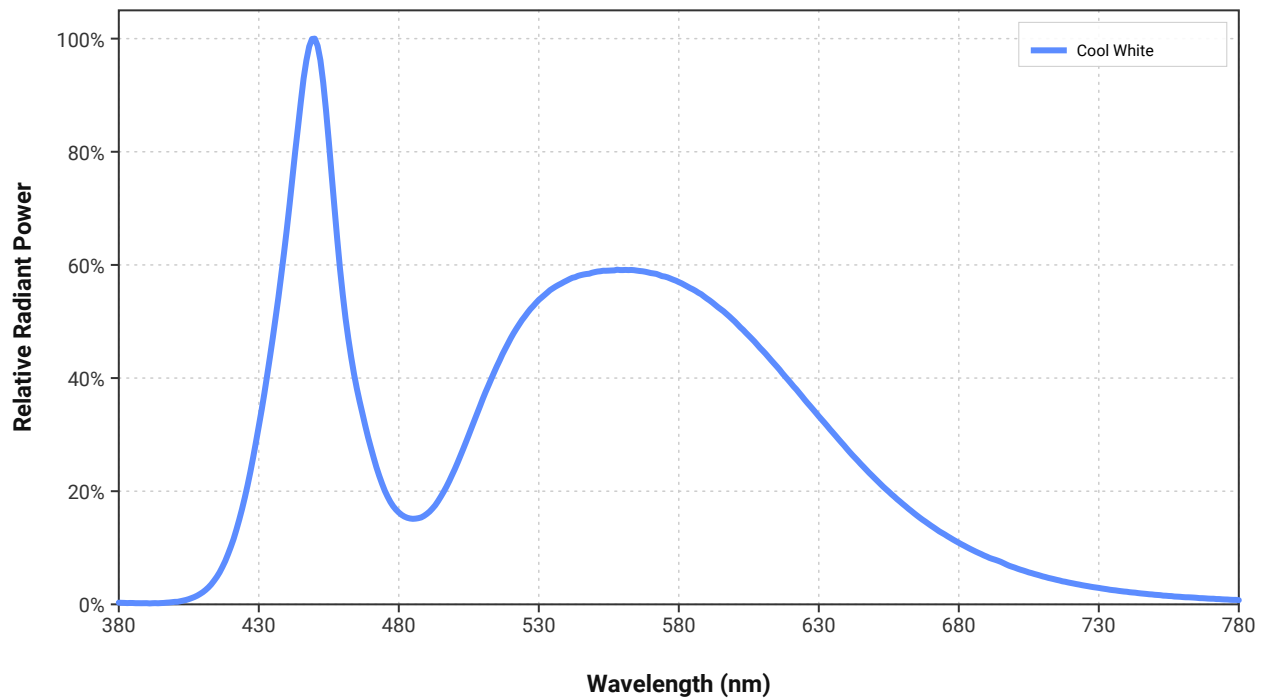
FLUX CHARACTERISTICS – ANSI CHROMATICITY KITS

Binning condition: $T_j = 25\text{ °C}$; 3 V , $I_F = 2100\text{ mA}$

Chromaticity		Flux Bin	Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	Order Codes
Kit	CCT				No Minimum CRI
E1	6500 K	0A	950	990	XFLMNR-H0-0000-0A000A0E1
E2	5700 K	0A	950	990	XFLMNR-H0-0000-0A000A0E2

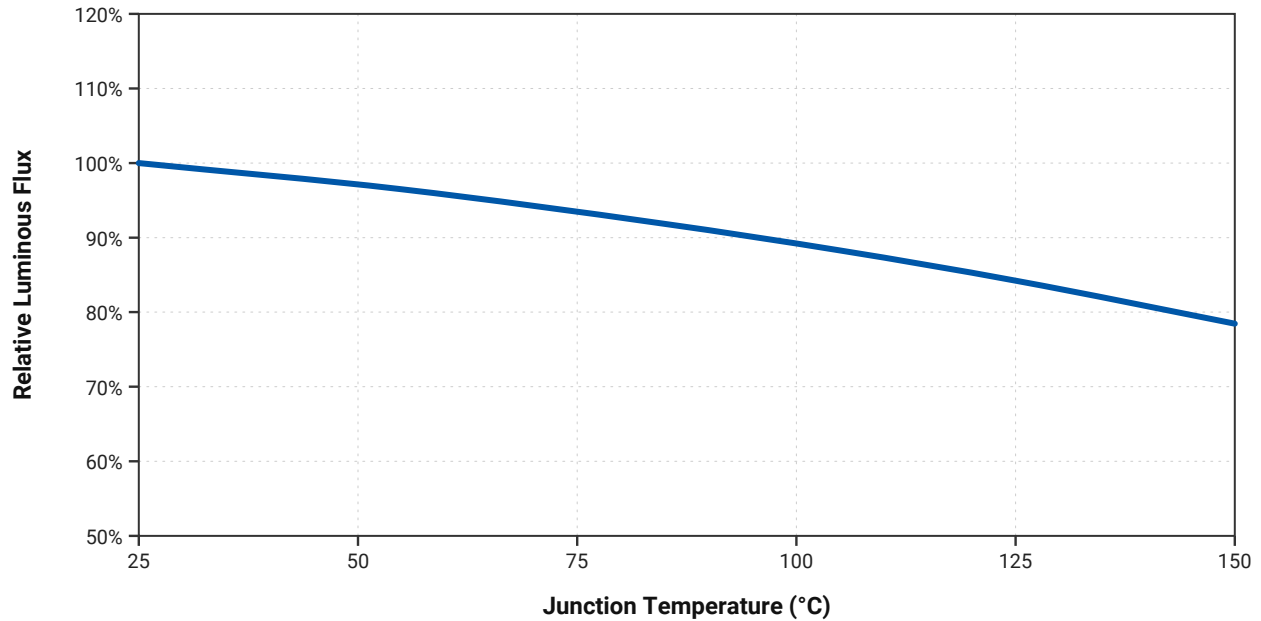
- Cree LED maintains a tolerance of $\pm 7\%$ on flux and power measurements, ± 0.005 on chromaticity measurements and ± 2 on CRI measurements.
- XLamp XFLMNR LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins higher than the minimum specified without advance notice.

RELATIVE SPECTRAL POWER DISTRIBUTION - WHITE

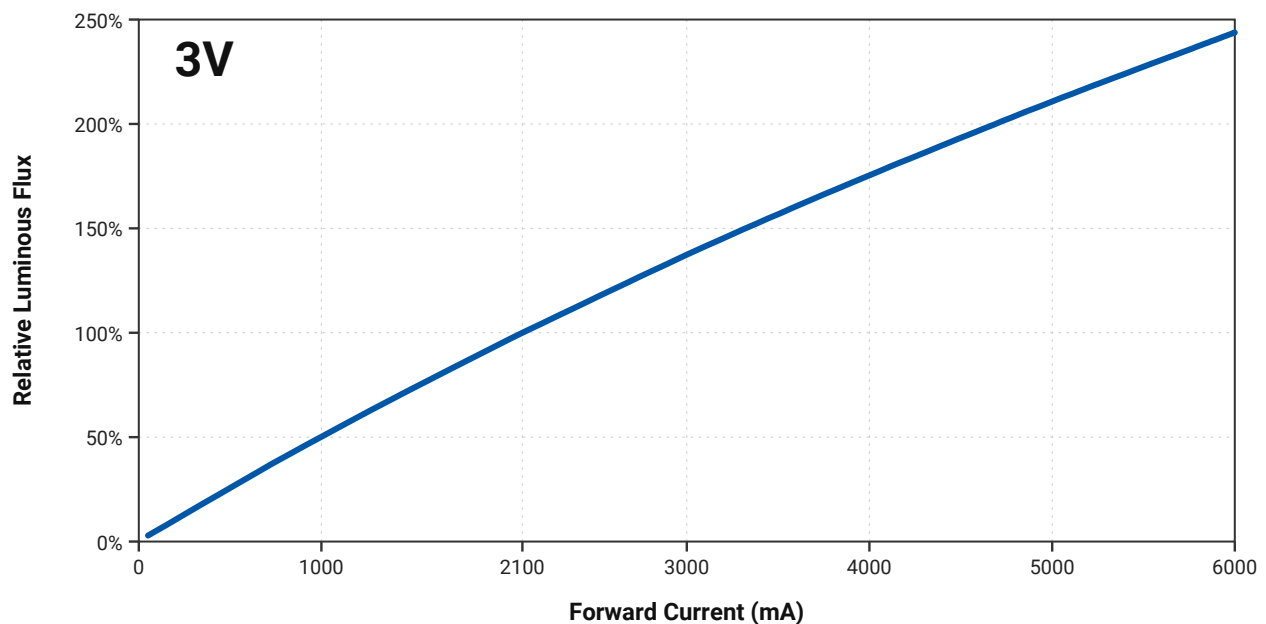


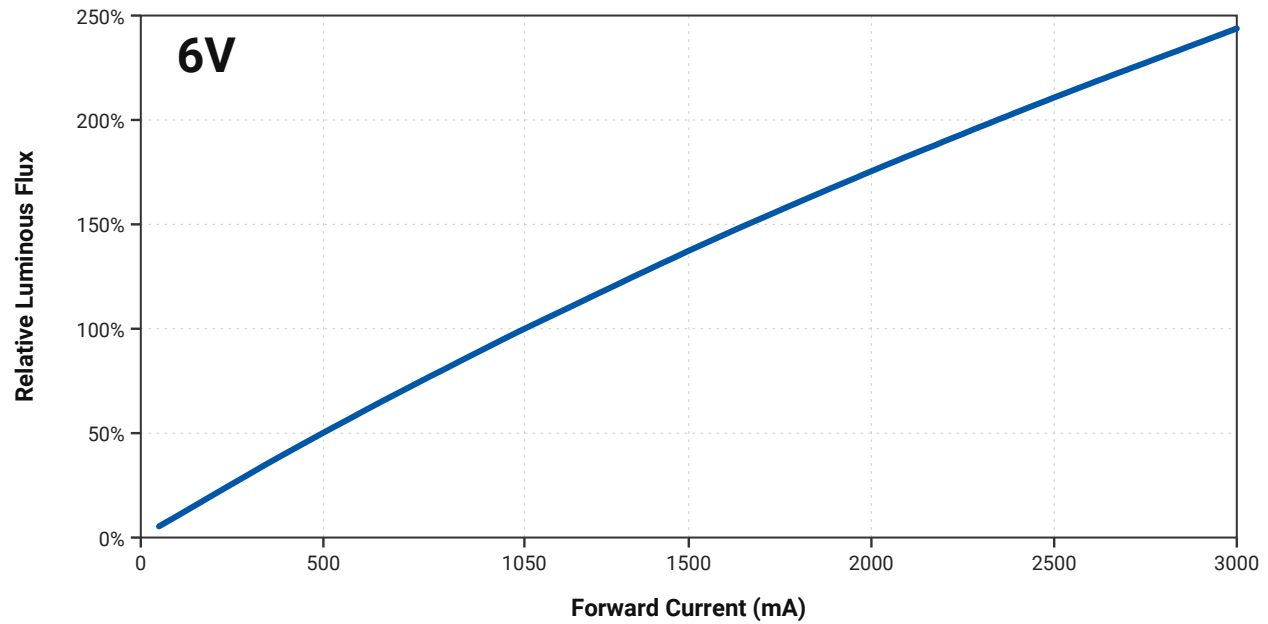
RELATIVE FLUX VS. JUNCTION TEMPERATURE – WHITE

Binning condition: $T_j = 25\text{ }^{\circ}\text{C}$; 3 V, $I_F = 2100\text{ mA}$; 6 V, $I_F = 1050\text{ mA}$

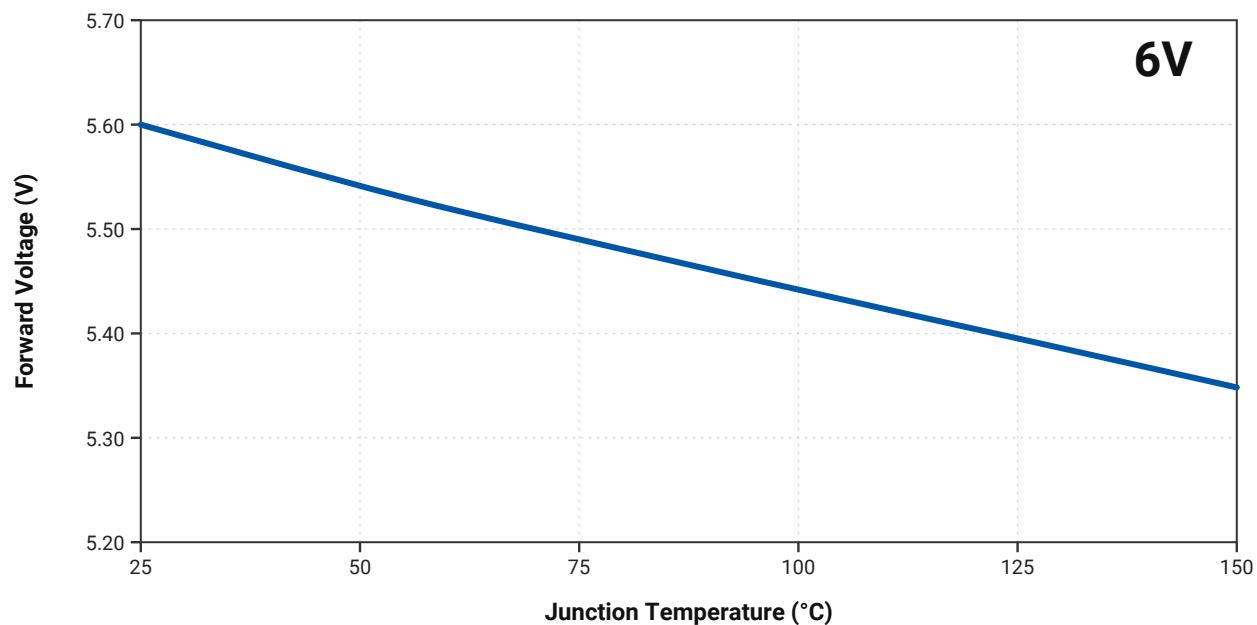
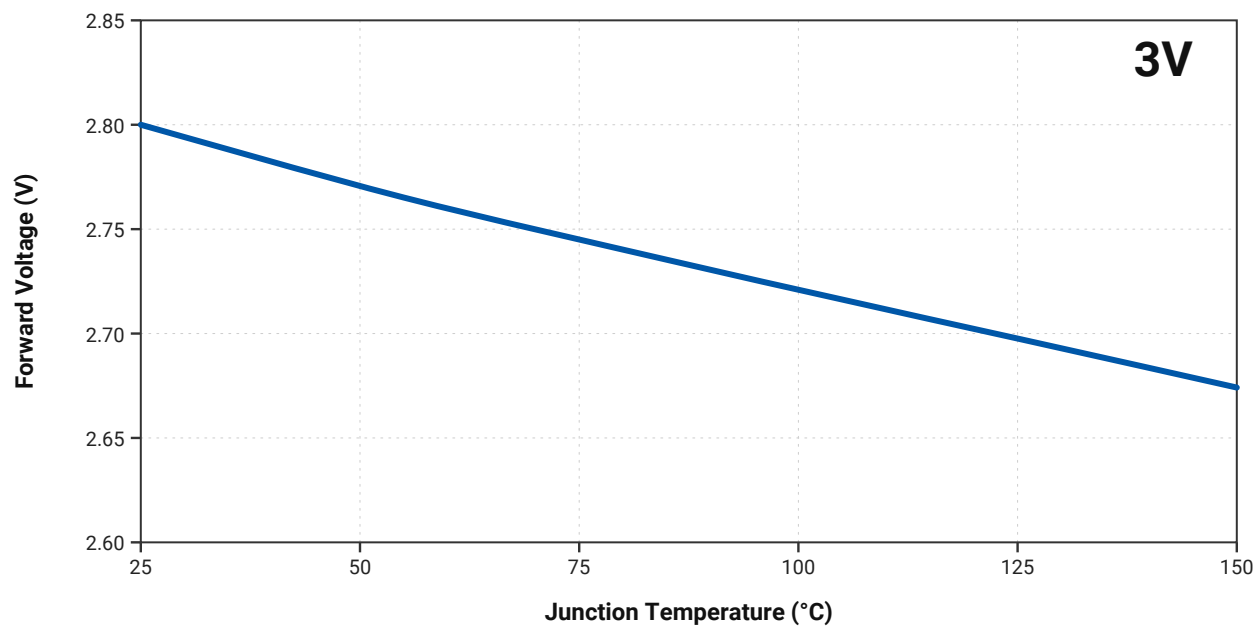


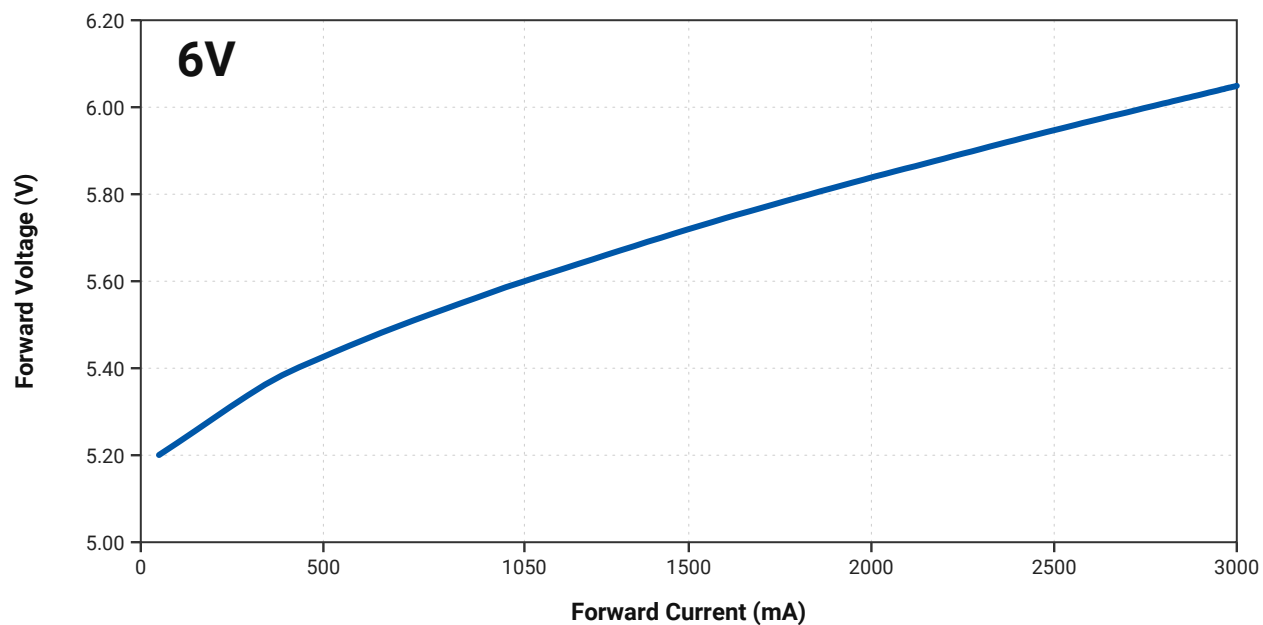
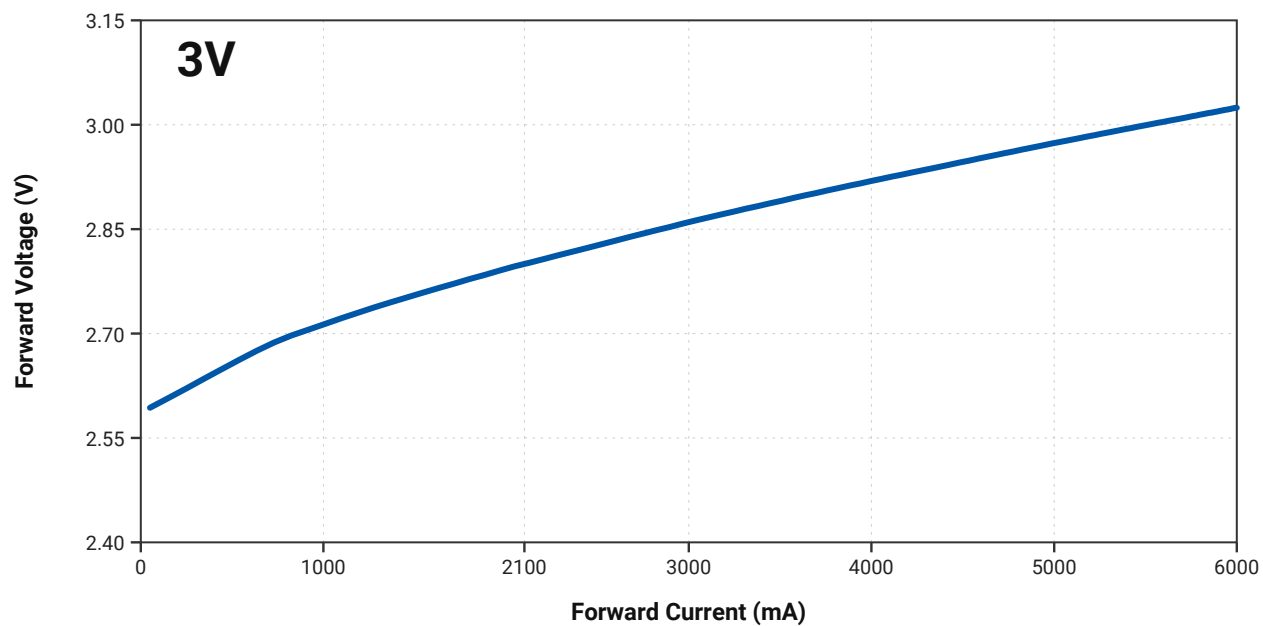
RELATIVE FLUX VS. FORWARD CURRENT – WHITE ($T_j = 25\text{ }^{\circ}\text{C}$)

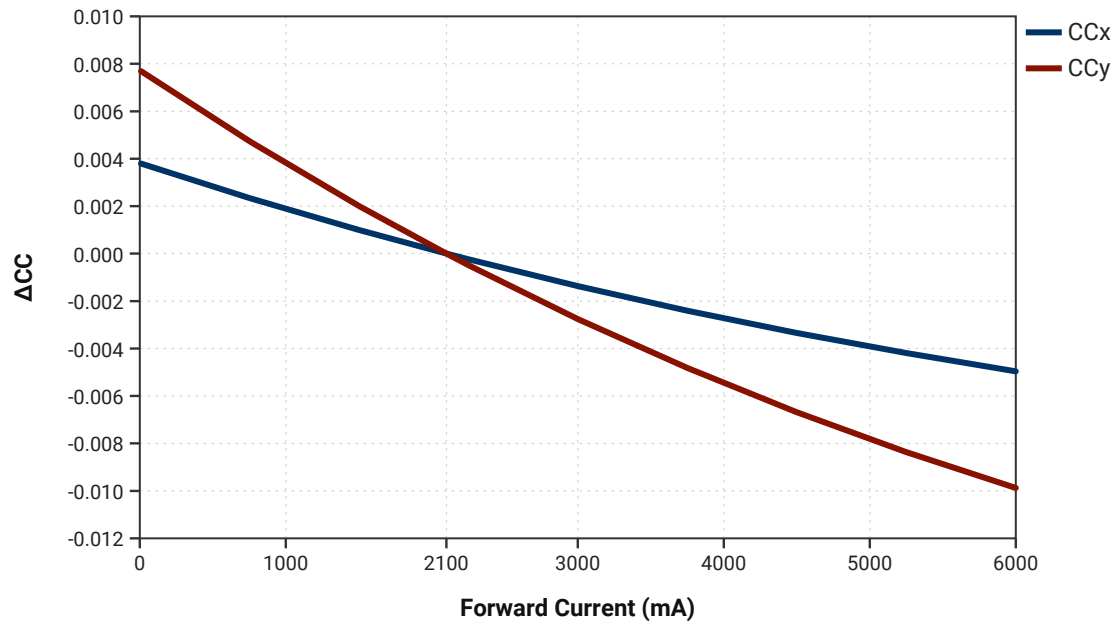
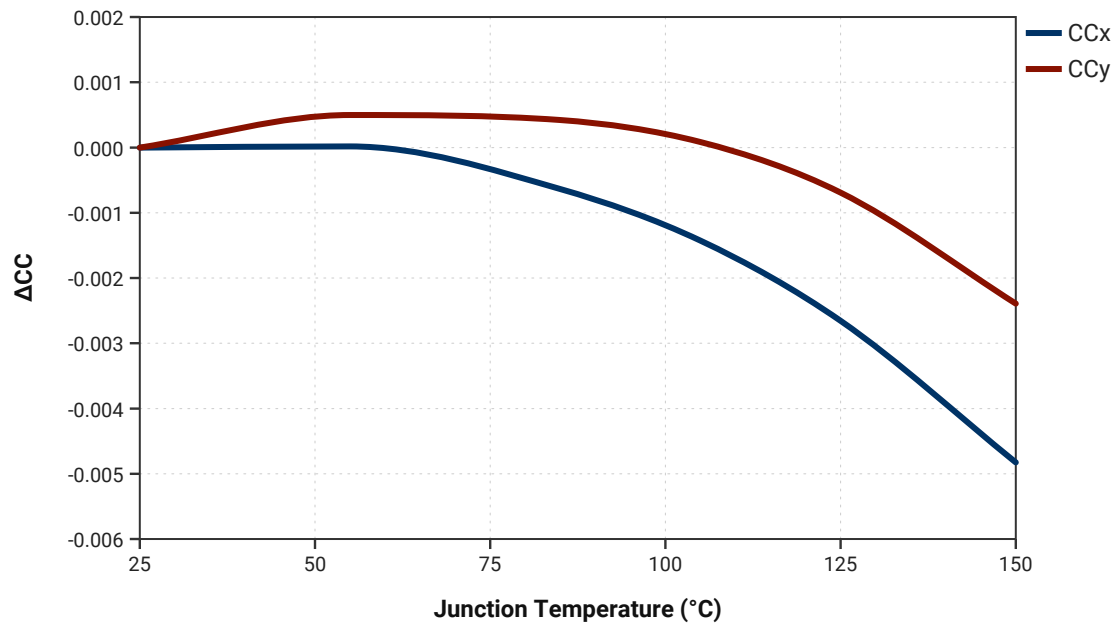




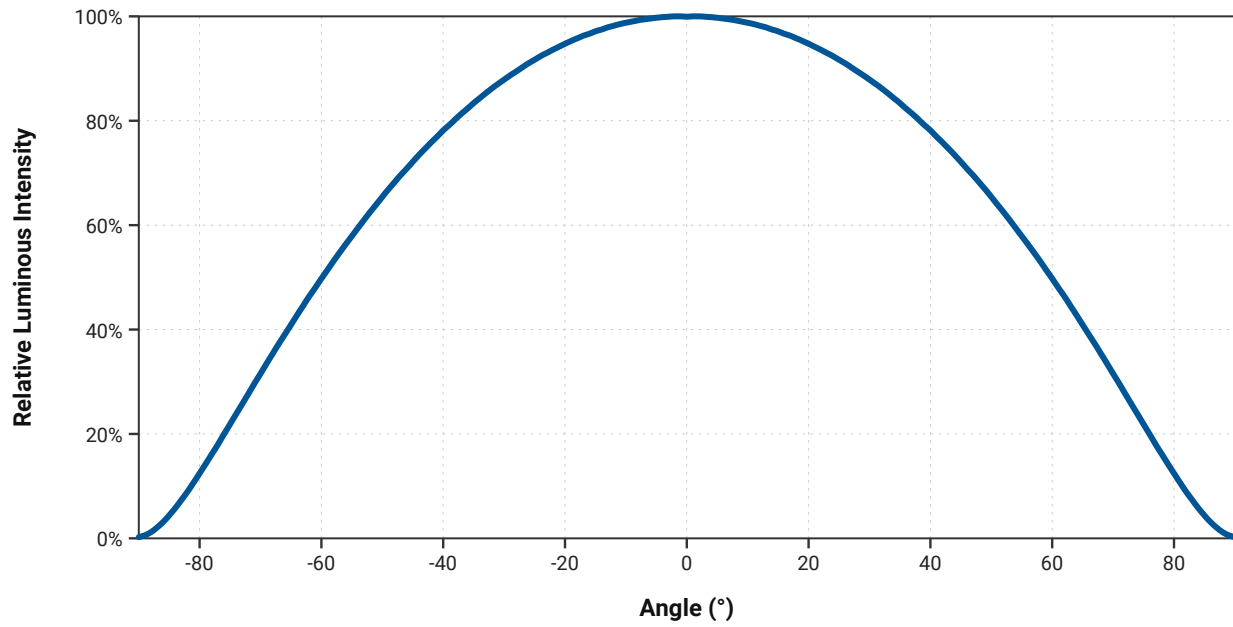
FORWARD VOLTAGE VS. JUNCTION TEMPERATURE – WHITE



FORWARD VOLTAGE VS. FORWARD CURRENT – WHITE ($T_J = 25\text{ }^{\circ}\text{C}$)

CCX / CCY VS. FORWARD CURRENT – WHITE ($T_J = 25\text{ }^{\circ}\text{C}$)CCX / CCY VS. JUNCTION TEMPERATURE – WHITE ($I_F = 2100\text{ MA}$)

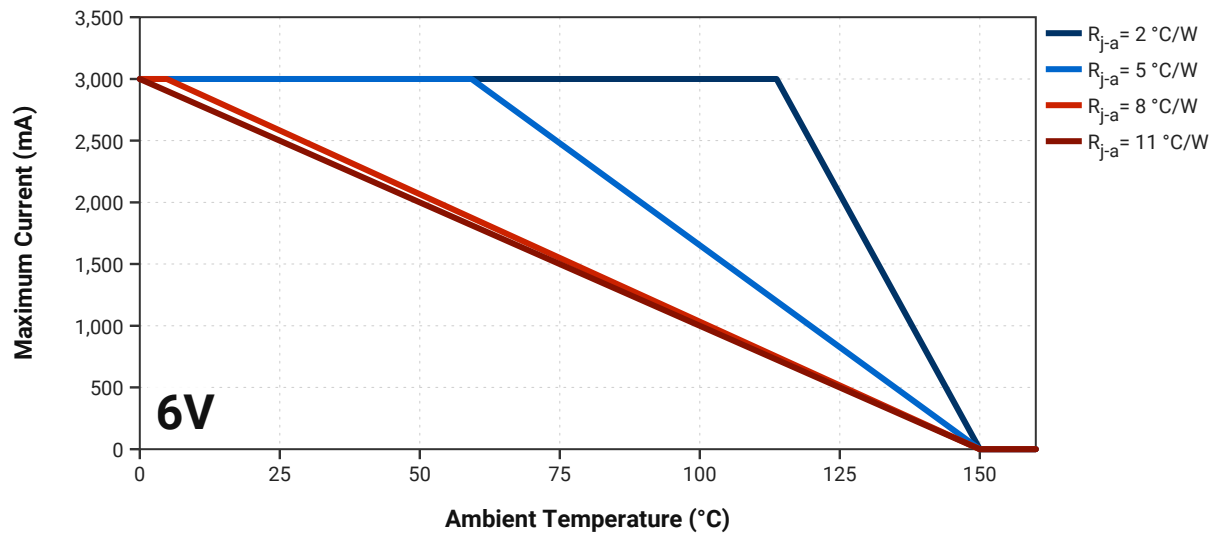
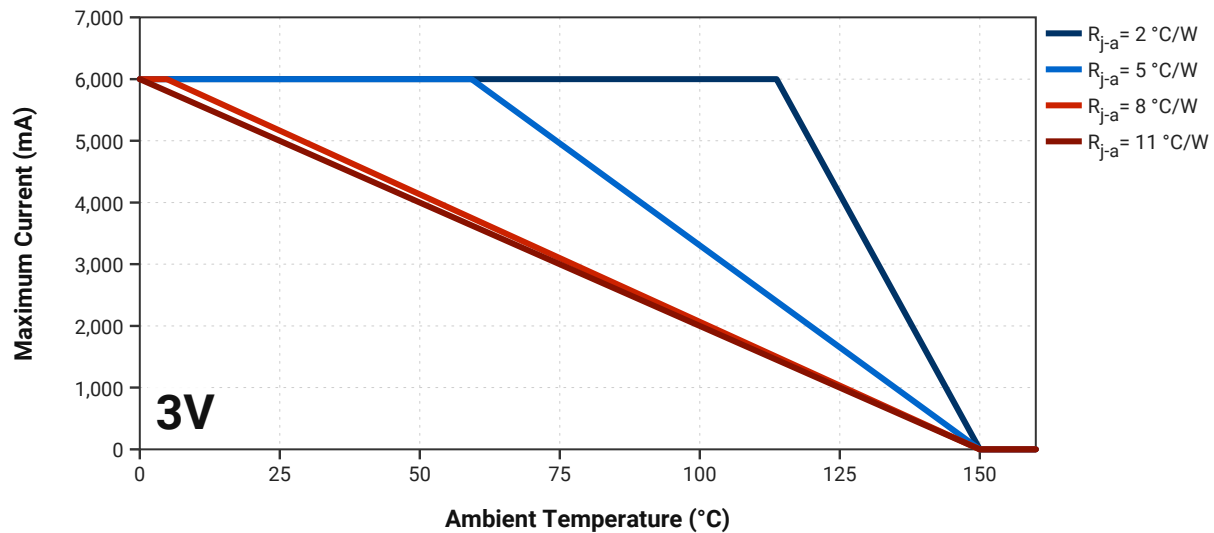
TYPICAL SPATIAL DISTRIBUTION



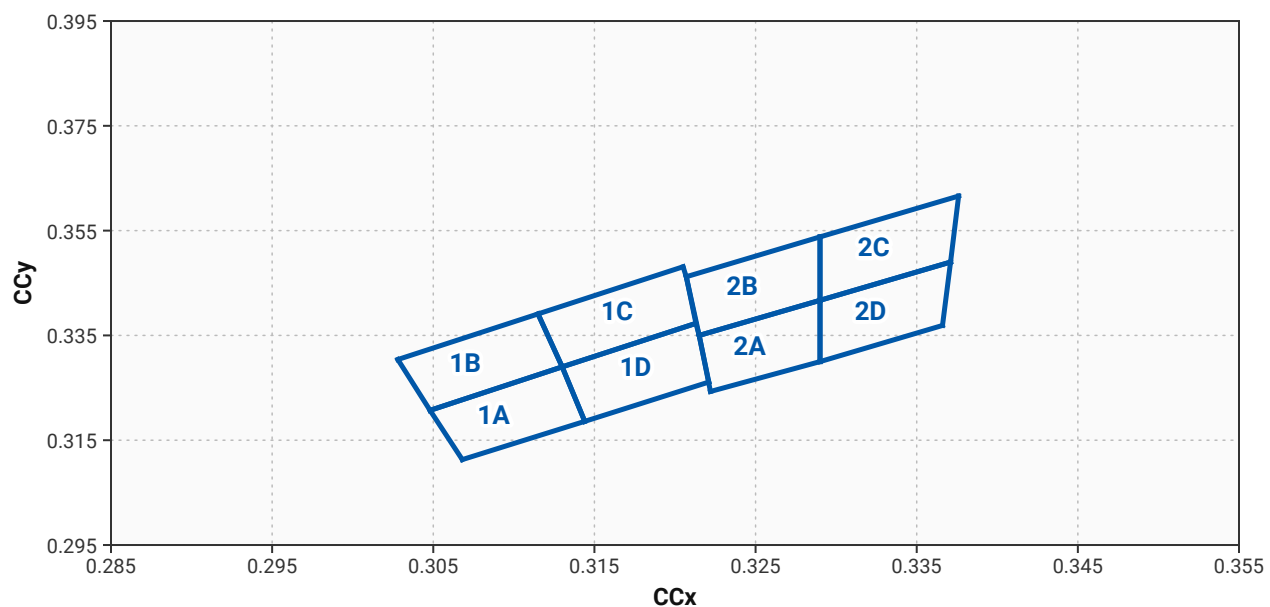
THERMAL DESIGN – WHITE

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.

Please refer to the Characteristics table on [page 3](#) for this product's thermal resistance and maximum junction temperature.



CHROMATICITY BINS – WHITE



PERFORMANCE GROUPS

XLamp XFLMNR LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

Color Bin											
Region	x	y	Region	x	y	Region	x	y	Region	x	y
1A	0.3048	0.3207	1B	0.3028	0.3304	1C	0.3115	0.3391	1D	0.3130	0.3290
	0.3130	0.3290		0.3115	0.3391		0.3205	0.3481		0.3213	0.3373
	0.3144	0.3186		0.3130	0.3290		0.3207	0.3462		0.3215	0.3350
	0.3068	0.3113		0.3048	0.3207		0.3213	0.3373		0.3221	0.3261
2A	0.3215	0.3350	2B	0.3207	0.3462	2C	0.3290	0.3538	2D	0.3290	0.3417
	0.3290	0.3417		0.3290	0.3538		0.3376	0.3616		0.3371	0.3490
	0.3290	0.3300		0.3290	0.3417		0.3371	0.3490		0.3366	0.3369
	0.3222	0.3243		0.3215	0.3350		0.3290	0.3417		0.3290	0.3300

Chromaticity Kits

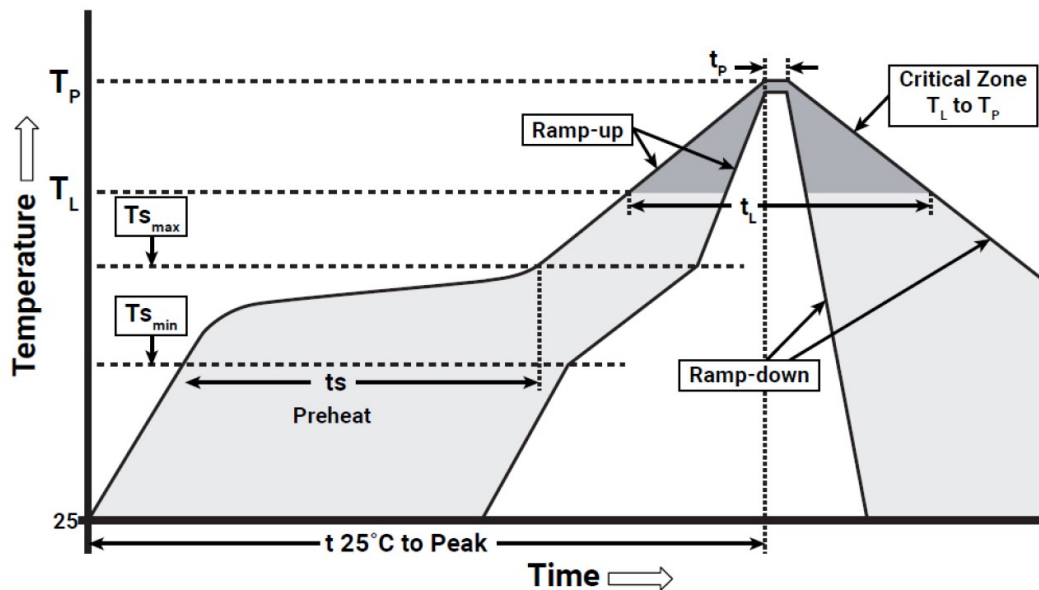
Kit	Color	CCT (K)	Chromaticity Bins
E1	Cool White	6500	1A, 1B, 1C, 1D
E2	Cool White	5700	2A, 2B, 2C, 2D

XLamp XFLMNR White LEDs are tested and placed into one of the following voltage bin groups.

Group Code	Minimum Vf (V)	Maximum Vf (V)
B1	5.50	5.80
B2	5.80	6.10
B3	6.10	6.40

REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XFLMNR 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.



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_L)	45 - 90 seconds
Peak/Classification Temperature (T_P)	235 - 245 °C
Time Within 5 °C of Actual Peak (t_p)	20 - 40 seconds
Ramp-Down Rate (max)	6 °C/second
JEDEC Compatible	Yes

ORDER CODE DESCRIPTION

SSS CCC - BD - GGGG - HJKLMMNNN

SSS - Series		CCC - Version		B - Type	
Series	XFL	Version	MNR	H	High intensity
D - Reel Size		GGGG - Internal code		H - Internal code	
Internal / product-defined		Internal / product-defined		Internal / product-defined	
J - Voltage Class		K - Internal code		L - CRI specification	
A	3V/6V	Internal / product-defined		0	CRI minimum
MM - Minimum luminous flux group		NNN - Chromaticity group			
See performance groups		See performance groups			

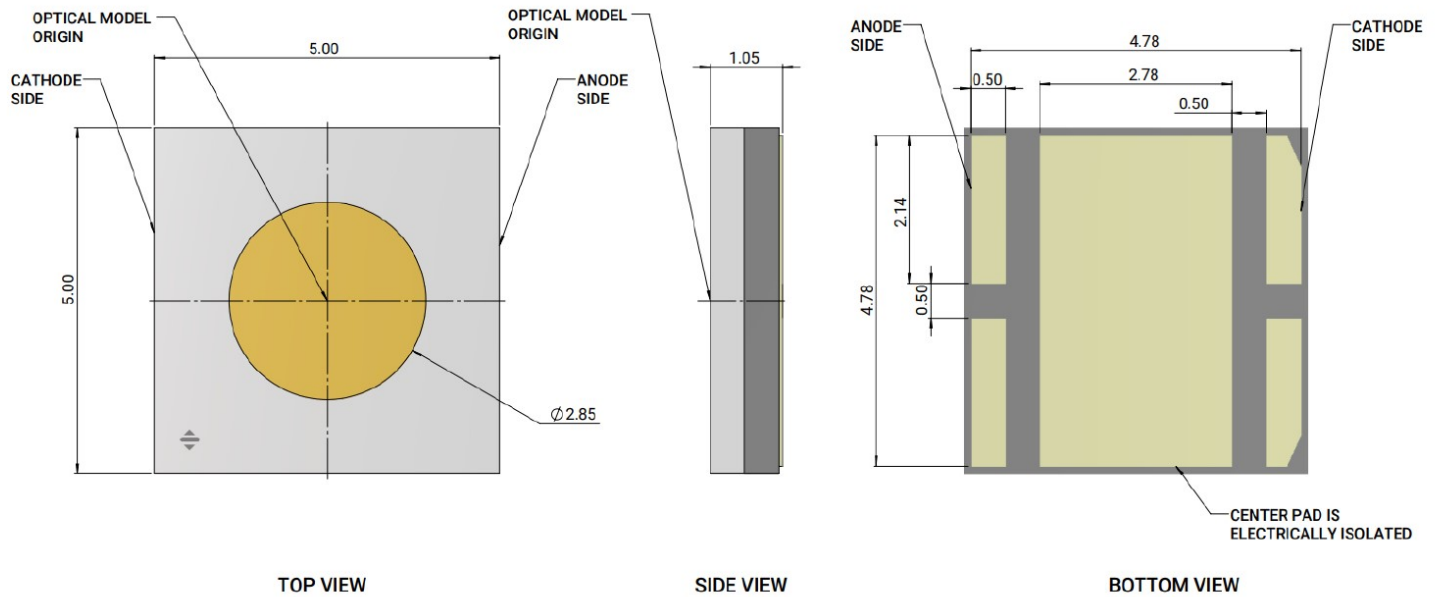
BIN CODE DESCRIPTION

SSS CCC - E - NNN - MMM - JK - L - PP

SSS - Series		CCC - Version		E - Type	
Series	XFL	Version	MNR	H	High intensity
NNN - Chromaticity group		MMM - Minimum luminous flux group		J - Voltage Class	
See performance groups		See performance groups		A	3V/6V
K - Voltage performance group		L - CRI specification		PP - Internal code	
Internal / product-defined		0	0 CRI minimum	Internal / product-defined	

MECHANICAL DIMENSIONS

XFLMNR has a backside thermal pad that is electrically isolated.

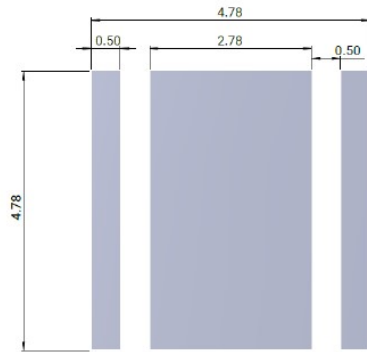
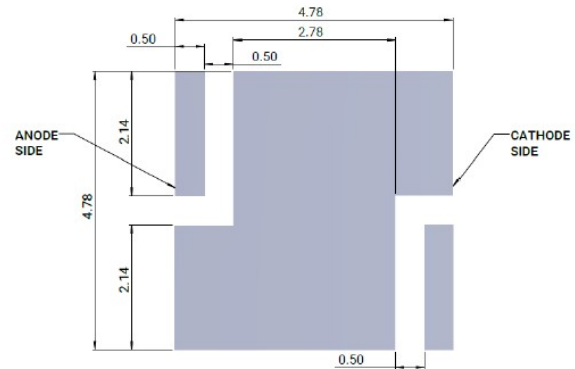
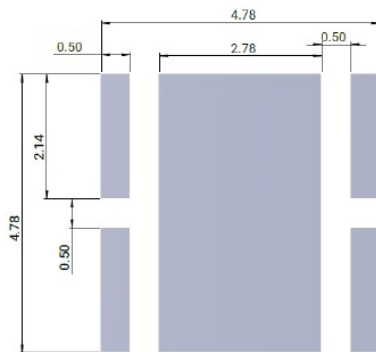
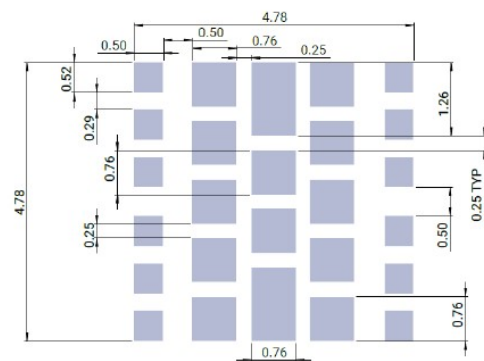


Color	Width / Length	Height	Substrate Thickness	Lens Radius / Lens Height
White	5.00	1.05	0.50	0.00

* Dimensions are +/- 0.13 unless otherwise noted.

MECHANICAL DIMENSIONS (CONTINUED)

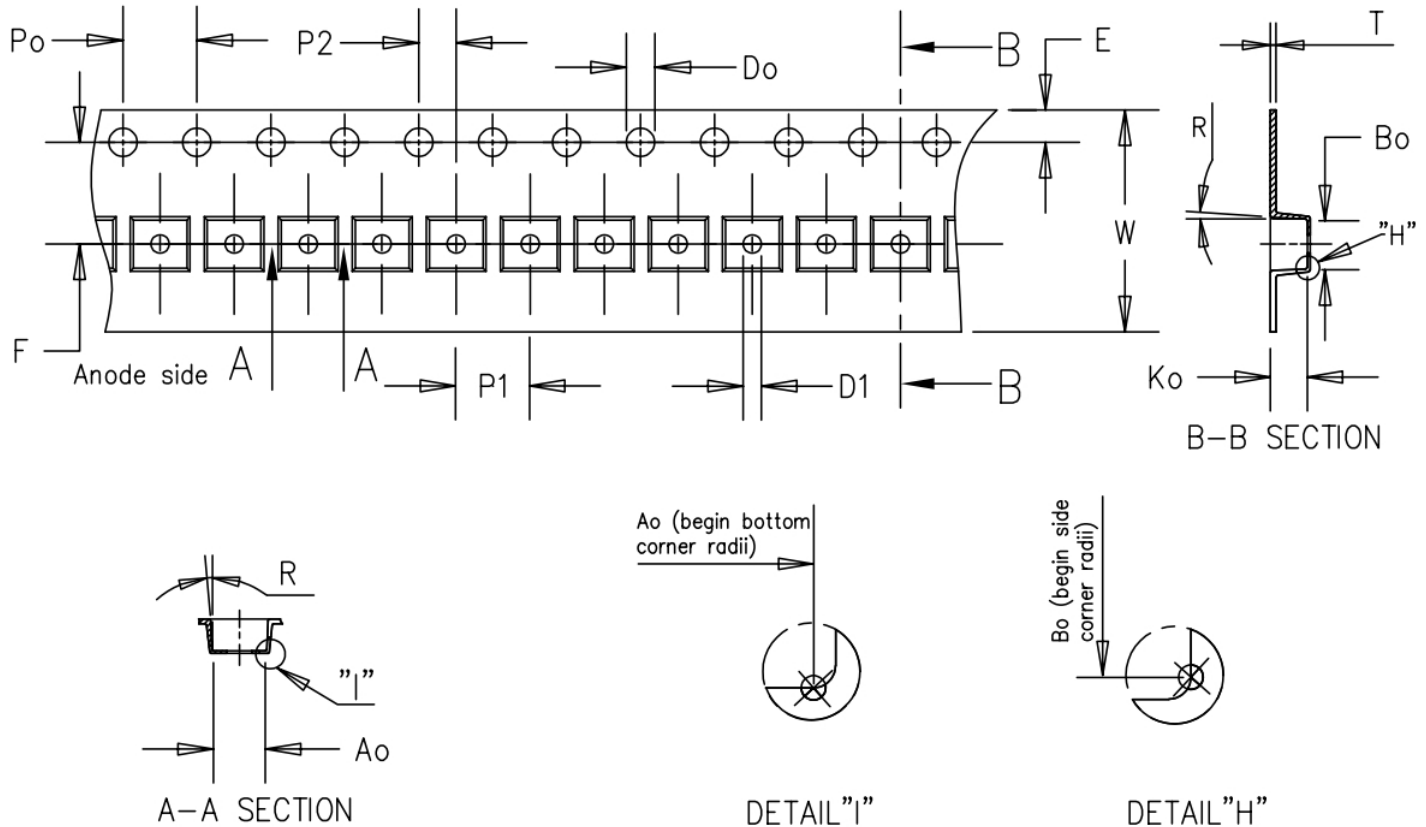
PCB / Stencil Drawing

3V RECOMMENDED PCB
FOOTPRINT6V RECOMMENDED PCB
FOOTPRINT3V AND 6V PCB
SOLDER MASK OPENING

RECOMMENDED STENCIL OPENING

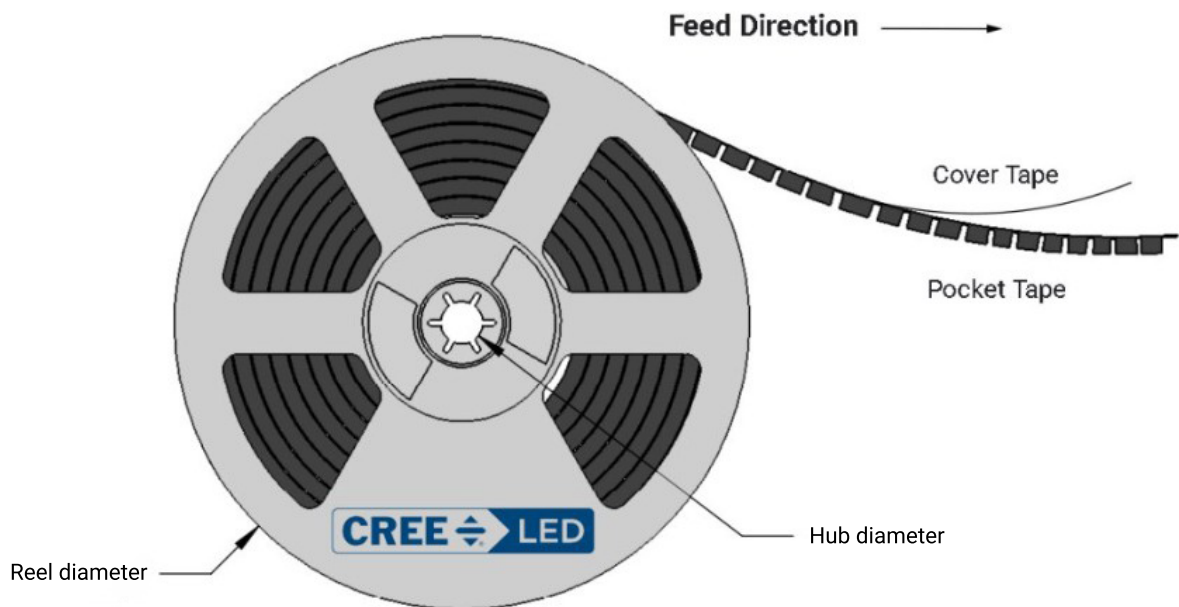
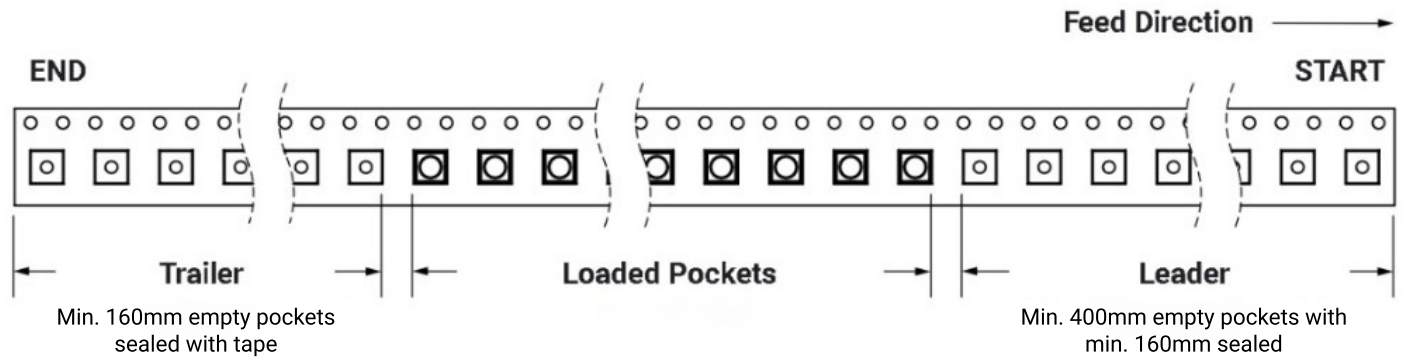
TAPE AND REEL

All Cree LED carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard. Except as noted, all dimensions are in mm, and measurement tolerances unless indicated otherwise: .xx = ± 0.15 mm.



White											
A_0	B_0	K_0	P_0	P_1	P_2	T	E	F	D_0	D_1	W
5.25	5.25	1.20	4.00	8.00	2.00	0.30	1.75	5.50	1.50	1.50	12.00

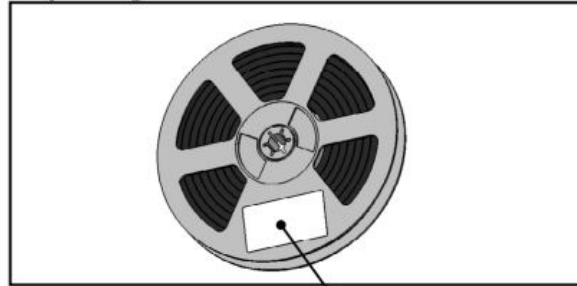
REEL SPECIFICATIONS



Parameter	Value
Hub Diameter	13 mm
Reel Diameter	7.5 inches
Pockets per Reel (Loaded)	1000
Leader (mm)	400
Trailer (mm)	160

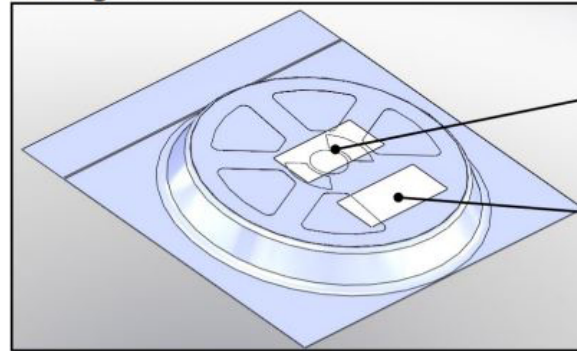
PACKAGING

Unpackaged Reel



Label with Cree LED Bin Code, Quantity, Reel ID

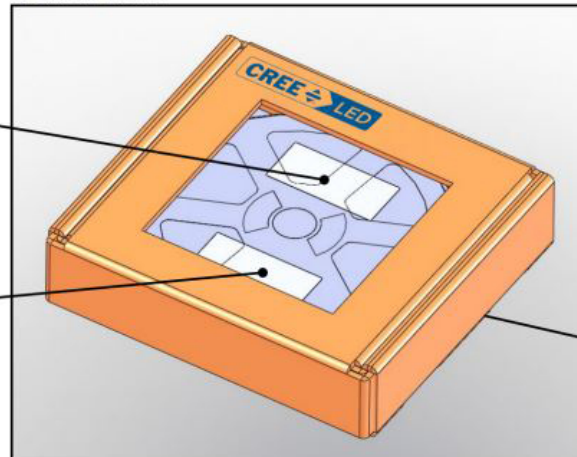
Packaged Reel



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)

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 of the qualification process Cree LED applies to ensure long-term reliability for XLamp LEDs and details of Cree LED's pre-release qualification testing for XLamp LEDs.

Lumen Maintenance

Cree LED 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 LED'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 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 XFLMNR 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 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 ensure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

NOTES (CONTINUED)

UL® Recognized Component

This product meets the requirements to be considered a UL Recognized Component with Level 1 enclosure consideration. The LED package or a portion thereof has not been investigated as a fire enclosure or 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.