# Cree® XLamp® MT-G2 EasyWhite® LEDs



### **PRODUCT DESCRIPTION**

The XLamp<sup>®</sup> MT-G2 EasyWhite<sup>®</sup> LED builds on the breakthrough performance of the original MT-G by increasing lumen output up to 25%, while providing a small, uniform, single point source for precise optical control. The MT-G2 shares the same mechanical footprint as the original MT-G, providing customers with a seamless upgrade path and shortening the LED luminaire and retrofit lamp design cycle.

MT-G2 LEDs are designed for highoutput, directional lighting applications and are the ideal replacement for lighting applications that currently use inefficient halogen lamps. MT-G2 LEDs are optimized for use in track, accent, lamp retrofit, downlighting and other applications where color quality, consistency and optical control are required.

### **FEATURES**

- Cree EasyWhite color temperatures from 2700 K to 5000 K CCT
- 85 °C binning and characterization
- Three voltage options: 6 V, 9 V, 36 V
- 80 and 90 minimum CRI options
- Low effective thermal resistance: 1.5 °C/W
- High lumen density
- Small, uniform emitting area for excellent optical control
- · Electrically neutral thermal path
- · RoHS and REACh compliant
- UL<sup>®</sup> recognized component (E349212)

### **APPLICATIONS**

- MR, PAR, BR, AR and other directional retrofit lamps
- Commercial/residential directional lighting
- General illumination

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### **CHARACTERISTICS**

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
Effective thermal resistance, junction to solder point	°C/W		1.5	
LED junction temperature	°C			150
DC forward current (6 V)	mA			3000
DC forward current (9 V)	mA			2000
DC forward current (36 V)	mA			500
Forward voltage (6 V, 1100 mA, 85 °C)	V		5.7	
Forward voltage (6 V, 1100 mA, 25 °C)	V			7
Forward voltage (9 V, 735 mA, 85 °C)	V		8.55	
Forward voltage (9 V, 735 mA, 25 °C)	V			10.5
Forward voltage (36 V, 185 mA, 85 °C)	V		34.2	
Forward voltage (36 V, 185 mA, 25 °C)	V			42
Temperature coefficient of voltage (6 V)	mV/°C		-4	
Temperature coefficient of voltage (9 V)	mV/°C		-6	
Temperature coefficient of voltage (36 V)	mV/°C		-26	
Reverse voltage (6 V)	V			-5
Reverse current (6 V, 9 V, 36 V)	А			0.1

## FLUX CHARACTERISTICS, STANDARD ORDER CODES, BINS, 6-VOLT MT-G2 (1100 mA, T = 85 °C)

The following table provides several base order codes for 6-volt XLamp MT-G2 EasyWhite LEDs. For a complete description of the ordercode nomenclature, please reference page 13 of this document.

	сст		Minimum Luminous Flux (lm) @ 1100 mA			2-Step		4-Step
Color	Range	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region	Order Code	Chromaticity Region	Order Code
	5000 K	N0	750	863	5011	MTGBEZ-00-0000-0B00N050H	505	MTGBEZ-00-0000-0B00N050F
	5000 K	P0	800	920	50H	MTGBEZ-00-0000-0B00P050H	50F	MTGBEZ-00-0000-0B00P050F
		K0	650	748		MTGBEZ-00-0000-0B00K040H		MTGBEZ-00-0000-0B00K040F
	4000 K	M0	700	805	40H	MTGBEZ-00-0000-0B00M040H	40f	MTGBEZ-00-0000-0B00M040F
		N0	750	863		MTGBEZ-00-0000-0B00N040H		MTGBEZ-00-0000-0B00N040F
		K0	650	748		MTGBEZ-00-0000-0B00K035H		MTGBEZ-00-0000-0B00K035F
Standard	l l l l l l l l l l l l l l l l l l l	M0	700	805	35H	MTGBEZ-00-0000-0B00M035H	35F	MTGBEZ-00-0000-0B00M035F
CRI EasyWhite		N0	750	863		MTGBEZ-00-0000-0B00N035H		MTGBEZ-00-0000-0B00N035F
		JO	600	690		MTGBEZ-00-0000-0B00J030H		MTGBEZ-00-0000-0B00J030F
	3000 K	K0	650	748	30H	MTGBEZ-00-0000-0B00K030H	30F	MTGBEZ-00-0000-0B00K030F
		M0	700	805		MTGBEZ-00-0000-0B00M030H		MTGBEZ-00-0000-0B00M030F
		H0	560	644		MTGBEZ-00-0000-0B00H027H		MTGBEZ-00-0000-0B00H027F
	2700 K	JO	600	690	27H	MTGBEZ-00-0000-0B00J027H	27F	MTGBEZ-00-0000-0B00J027F
		K0	650	748		MTGBEZ-00-0000-0B00K027H		MTGBEZ-00-0000-0B00K027F
		M0	700	805	5011	MTGBEZ-00-0000-0B0HM050H	FOF	MTGBEZ-00-0000-0B0HM050F
	5000 K	N0	750	863	50H	MTGBEZ-00-0000-0B0HN050H	50F	MTGBEZ-00-0000-0B0HN050F
80 CRI EasyWhite		JO	600	690		MTGBEZ-00-0000-0B0HJ040H		MTGBEZ-00-0000-0B0HJ040F
	4000 K	K0	650	748	40H	MTGBEZ-00-0000-0B0HK040H	40F	MTGBEZ-00-0000-0B0HK040F
		M0	700	805		MTGBEZ-00-0000-0B0HM040H		MTGBEZ-00-0000-0B0HM040F
	3000 K	F0	480	552	30H	MTGBEZ-00-0000-0B0UF030H	30F	MTGBEZ-00-0000-0B0UF030F
90 CRI	3000 K	G0	520	598	3011	MTGBEZ-00-0000-0B0UG030H	301	MTGBEZ-00-0000-0B0UG030F
EasyWhite	2700 K	E0	440	506	27H	MTGBEZ-00-0000-0B0UE027H	27F	MTGBEZ-00-0000-0B0UE027F
	2700 K	F0	480	552	2/11	MTGBEZ-00-0000-0B0UF027H	2/1	MTGBEZ-00-0000-0B0UF027F

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 15).
- Cree XLamp MT-G2 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.
- Minimum CRI for standard EasyWhite color temperatures 27F, 27H, 30F, 30H, 35F, 35H is 80.
- Minimum CRI for standard EasyWhite color temperatures, 40F, 40H, 50F, 50H is 70.
- Typical CRI for standard EasyWhite color temperatures 40F, 40H, 50F, 50H is 75.
- \* Flux values @ 25 °C are calculated and for reference only.

## FLUX CHARACTERISTICS, STANDARD ORDER CODES, BINS, 9-VOLT MT-G2 (735 mA, T = 85 °C)

The following table provides several base order codes for 9-volt XLamp MT-G2 EasyWhite LEDs. For a complete description of the ordercode nomenclature, please reference page 13 of this document.

	сст	Minimur	n Luminous @ 735 mA	Flux (lm)	2-Step		4-Step		
Color	Range	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region	Order Code	Chromaticity Region	Order Code	
	5000 K	N0	750	863	5011	MTGBEZ-00-0000-0C00N050H	505	MTGBEZ-00-0000-0C00N050F	
	5000 K	P0	800	920	50H	MTGBEZ-00-0000-0C00P050H	50F	MTGBEZ-00-0000-0C00P050F	
		K0	650	748		MTGBEZ-00-0000-0C00K040H		MTGBEZ-00-0000-0C00K040F	
	4000 K	M0	700	805	40H	MTGBEZ-00-0000-0C00M040H	40F	MTGBEZ-00-0000-0C00M040F	
		N0	750	863		MTGBEZ-00-0000-0C00N040H		MTGBEZ-00-0000-0C00N040F	
		K0	650	748		MTGBEZ-00-0000-0C00K035H		MTGBEZ-00-0000-0C00K035F	
Standard	d 3500 K	M0	700	805	35H	MTGBEZ-00-0000-0C00M035H	35F	MTGBEZ-00-0000-0C00M035F	
CRI EasyWhite		N0	750	863		MTGBEZ-00-0000-0C00N035H		MTGBEZ-00-0000-0C00N035F	
		JO	600	690		MTGBEZ-00-0000-0C00J030H		MTGBEZ-00-0000-0C00J030F	
	3000 K	K0	650	748	30H	MTGBEZ-00-0000-0C00K030H	30F	MTGBEZ-00-0000-0C00K030F	
		M0	700	805		MTGBEZ-00-0000-0C00M030H		MTGBEZ-00-0000-0C00M030F	
		H0	560	644		MTGBEZ-00-0000-0C00H027H		MTGBEZ-00-0000-0C00H027F	
	2700 K	JO	600	690	27H	MTGBEZ-00-0000-0C00J027H	27F	MTGBEZ-00-0000-0C00J027F	
		K0	650	748	MTGBEZ-00-0000-0C00K027H		MTGBEZ-00-0000-0C00K027F		
	E000 K	M0	700	805	50H	MTGBEZ-00-0000-0C0HM050H	50F	MTGBEZ-00-0000-0C0HM050F	
	5000 K	N0	750	863	JUH	MTGBEZ-00-0000-0C0HN050H	JUF	MTGBEZ-00-0000-0C0HN050F	
80 CRI EasyWhite		JO	600	690		MTGBEZ-00-0000-0C0HJ040H		MTGBEZ-00-0000-0C0HJ040F	
	4000 K	K0	650	748	40H	MTGBEZ-00-0000-0C0HK040H	40F	MTGBEZ-00-0000-0C0HK040F	
		M0	700	805		MTGBEZ-00-0000-0C0HM040H		MTGBEZ-00-0000-0C0HM040F	
	3000 K	F0	480	552	30H	MTGBEZ-00-0000-0C0UF030H	30F	MTGBEZ-00-0000-0C0UF030F	
90 CRI		GO	520	598	5011	MTGBEZ-00-0000-0C0UG030H		MTGBEZ-00-0000-0C0UG030F	
EasyWhite	2700 K	E0	440	506	27H	MTGBEZ-00-0000-0C0UE027H	27F	MTGBEZ-00-0000-0C0UE027F	
	2700 K	F0	480	552	2/11	MTGBEZ-00-0000-0C0UF027H	2/1	MTGBEZ-00-0000-0C0UF027F	

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 15).
- Cree XLamp MT-G2 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.
- Minimum CRI for standard EasyWhite color temperatures 27F, 27H, 30F, 30H, 35F, 35H is 80.
- Minimum CRI for standard EasyWhite color temperatures, 40F, 40H, 50F, 50H is 70.
- Typical CRI for standard EasyWhite color temperatures 40F, 40H, 50F, 50H is 75.
- \* Flux values @ 25 °C are calculated and for reference only.

## FLUX CHARACTERISTICS, STANDARD ORDER CODES, BINS, 36-VOLT MT-G2 (185 mA, T = 85 °C)

The following table provides several base order codes for 36-volt XLamp MT-G2 EasyWhite LEDs. For a complete description of the ordercode nomenclature, please reference page 13 of this document.

	ССТ	Minimum Luminous Flux (Im) @ 185 mA		2-Step			4-Step	
Color	Range	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region	Order Code	Chromaticity Region	Order Code
	5000 1/	N0	750	863	5011	MTGBEZ-00-0000-0N00N050H	505	MTGBEZ-00-0000-0N00N050F
	5000 K	P0	800	920	50H	MTGBEZ-00-0000-0N00P050H	50F	MTGBEZ-00-0000-0N00P050F
		K0	650	748		MTGBEZ-00-0000-0N00K040H		MTGBEZ-00-0000-0N00K040F
	4000 K	M0	700	805	40H	MTGBEZ-00-0000-0N00M040H	40F	MTGBEZ-00-0000-0N00M040F
		N0	750	863		MTGBEZ-00-0000-0N00N040H		MTGBEZ-00-0000-0N00N040F
		K0	650	748		MTGBEZ-00-0000-0N00K035H		MTGBEZ-00-0000-0N00K035F
Standard	RI	M0	700	805	35H	MTGBEZ-00-0000-0N00M035H	35F	MTGBEZ-00-0000-0N00M035F
CRI EasyWhite		N0	750	863		MTGBEZ-00-0000-0N00N035H		MTGBEZ-00-0000-0N00N035F
		JO	600	690		MTGBEZ-00-0000-0N00J030H		MTGBEZ-00-0000-0N00J030F
	3000 K	K0	650	748	30H	MTGBEZ-00-0000-0N00K030H	30F	MTGBEZ-00-0000-0N00K030F
		M0	700	805		MTGBEZ-00-0000-0N00M030H		MTGBEZ-00-0000-0N00M030F
		H0	560	644		MTGBEZ-00-0000-0N00H027H		MTGBEZ-00-0000-0N00H027F
	2700 K	JO	600	690	27H	MTGBEZ-00-0000-0N00J027H	27F	MTGBEZ-00-0000-0N00J027F
		K0	650	748		MTGBEZ-00-0000-0N00K027H		MTGBEZ-00-0000-0N00K027F
	5000 K	M0	700	805	50H	MTGBEZ-00-0000-0N0HM050H	50F	MTGBEZ-00-0000-0N0HM050F
		N0	750	863	DUH	MTGBEZ-00-0000-0N0HN050H	JUF	MTGBEZ-00-0000-0N0HN050F
80 CRI EasyWhite		JO	600	690		MTGBEZ-00-0000-0N0HJ040H		MTGBEZ-00-0000-0N0HJ040F
	4000 K	K0	650	748	40H	MTGBEZ-00-0000-0N0HK040H	40F	MTGBEZ-00-0000-0N0HK040F
		M0	700	805		MTGBEZ-00-0000-0N0HM040H		MTGBEZ-00-0000-0N0HM040F
	3000 K	F0	480	552	30H	MTGBEZ-00-0000-0N0UF030H	30F	MTGBEZ-00-0000-0N0UF030F
90 CRI		GO	520	598	5011	MTGBEZ-00-0000-0N0UG030H	501	MTGBEZ-00-0000-0N0UG030F
EasyWhite	2700 K	E0	440	506	27H	MTGBEZ-00-0000-0N0UE027H	27F	MTGBEZ-00-0000-0N0UE027F
	2700 K	F0	480	552	2/11	MTGBEZ-00-0000-0N0UF027H	2/1	MTGBEZ-00-0000-0N0UF027F

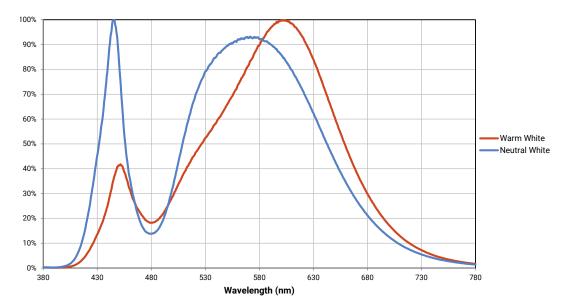
Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 15).
- Cree XLamp MT-G2 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.
- Minimum CRI for standard EasyWhite color temperatures 27F, 27H, 30F, 30H, 35F, 35H is 80.
- Minimum CRI for standard EasyWhite color temperatures, 40F, 40H, 50F, 50H is 70.
- Typical CRI for standard EasyWhite color temperatures 40F, 40H, 50F, 50H is 75.
- \* Flux values @ 25 °C are calculated and for reference only.



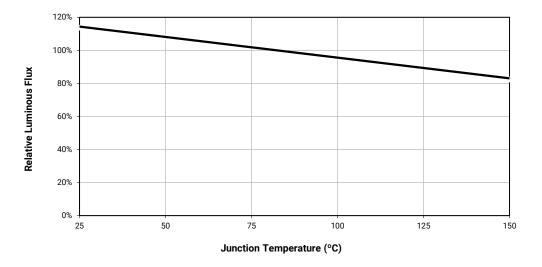
## RELATIVE SPECTRAL POWER DISTRIBUTION (6 V, 1100 mA; 9 V, 735 mA; 36 V, 185 mA; T<sub>J</sub> = 85 °C)

The following graph represents typical spectral output of the XLamp MT-G2 EasyWhite LED.



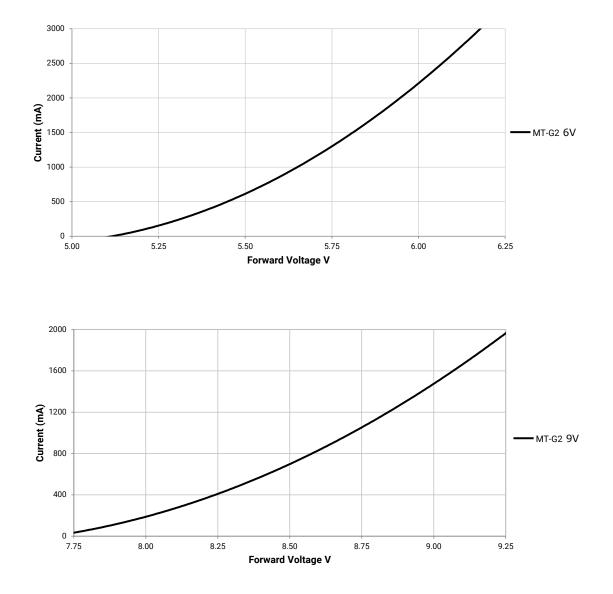
## RELATIVE LUMINOUS FLUX VS. JUNCTION TEMPERATURE (6 V, 1100 mA; 9 V, 735 mA; 36 V, 185 mA)

The following graph represents typical performance of the XLamp MT-G2 EasyWhite LED.



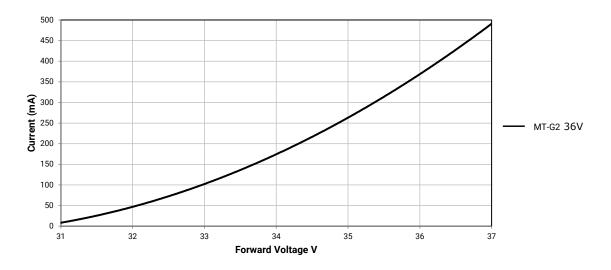
## **ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 85 °C)**

CREE 🔶

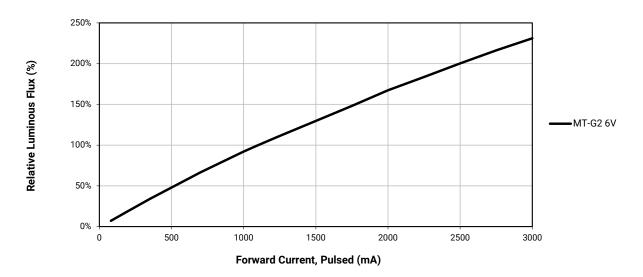


## **ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 85 °C) - CONTINUED**

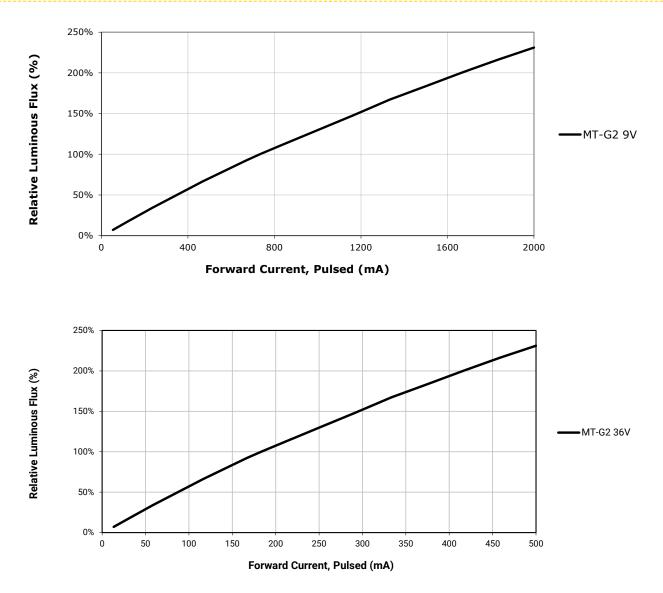
CREE 🔶



## **RELATIVE LUMINOUS FLUX VS. CURRENT (T<sub>J</sub> = 85 °C)**

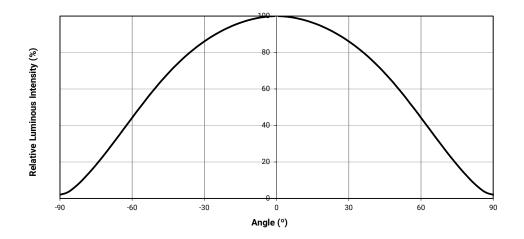






## **TYPICAL SPATIAL DISTRIBUTION**

The following graph represents typical performance of the XLamp MT-G2 EasyWhite LED.



## **PERFORMANCE GROUPS – BRIGHTNESS (T**<sub>J</sub> = 85 °C)

XLamp MT-G2 EasyWhite LEDs are tested for luminosity and placed into one of the following bins.

Group Code	Minimum Luminous Flux @ Nominal I <sub>F</sub>	Maximum Luminous Flux @ Nominal I <sub>F</sub>
D0	400	440
EO	440	480
F0	480	520
GO	520	560
H0	560	600
JO	600	650
KO	650	700
M0	700	750
NO	750	800
P0	800	860

## **PERFORMANCE GROUPS – CHROMATICITY (T<sub>J</sub> = 85 °C)**

XLamp MT-G2 EasyWhite LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

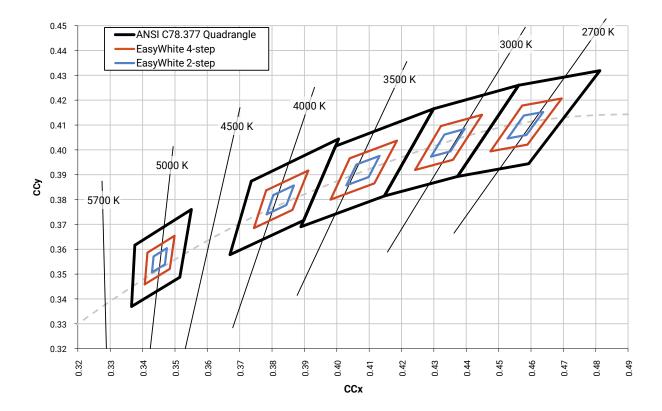
EasyWhite Color Temperatures - 4-Step				
Code	ССТ	х	у	
		0.3407	0.3459	
50F	5000 K	0.3415	0.3586	
JUF	5000 K	0.3499	0.3654	
		0.3484	0.3521	
		0.3744	0.3685	
40F	4000 K	0.3782	0.3837	
40F	4000 K	0.3912	0.3917	
		0.3863	0.3758	
		0.3981	0.3800	
35F	3500 K	0.4040	0.3966	
30F		0.4186	0.4037	
		0.4116	0.3865	
		0.4242	0.3919	
30F	3000 K	0.4322	0.4096	
30F	3000 K	0.4449	0.4141	
		0.4359	0.3960	
		0.4475	0.3994	
27F	2700 K	0.4573	0.4178	
2/F	7F 2700 K	0.4695	0.4207	
		0.4589	0.4021	

EasyWhite Color Temperatures – 2-Step					
Code	ССТ	х	у		
		0.3429	0.3507		
50H	5000 K	0.3434	0.3571		
JUH	2000 K	0.3475	0.3604		
		0.3469	0.3539		
		0.3784	0.3741		
40H	4000 K	0.3804	0.3818		
40日	4000 K	0.3867	0.3857		
		0.3844	0.3778		
	3500 K	0.4030	0.3857		
35H		0.4061	0.3941		
301		0.4132	0.3976		
		0.4099	0.3890		
		0.4291	0.3973		
30H	3000 K	0.4333	0.4062		
301	3000 K	0.4395	0.4084		
		0.4351	0.3994		
		0.4528	0.4046		
27H	2700 K	0.4578	0.4138		
2/П	2700 K	0.4638	0.4152		
		0.4586	0.4060		

XLAMP<sup>®</sup> MT-G2 EASYWHITE<sup>®</sup> LED

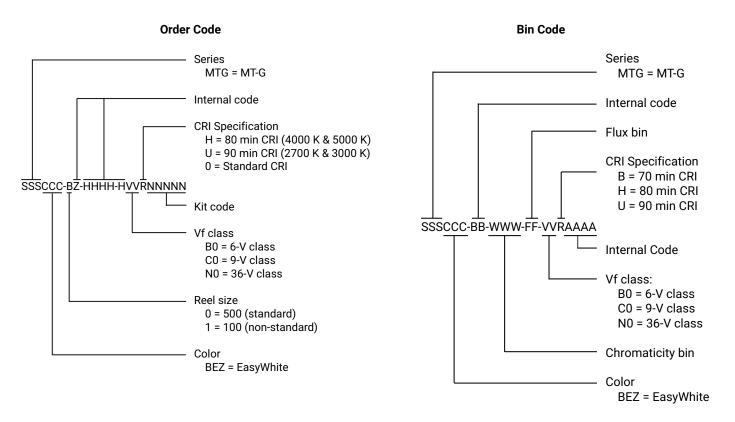


## CREE EASYWHITE® COLOR TEMPERATURES PLOTTED ON THE 1931 CIE CURVE (T<sub>1</sub> = 85 °C)



### **BIN AND ORDER CODE FORMATS**

Bin codes and order codes are configured as follows:

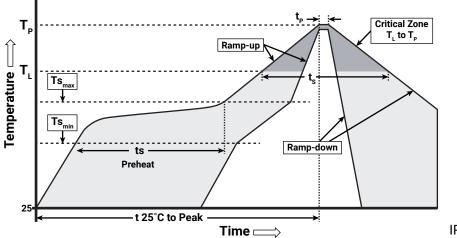


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## **REFLOW SOLDERING CHARACTERISTICS**

In testing, Cree has found XLamp MT-G2 EasyWhite 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 <sub>max</sub> to Tp)	1.2 °C/second
Preheat: Temperature Min (Ts <sub>min</sub> )	120 °C
Preheat: Temperature Max (Ts <sub>max</sub> )	170 °C
Preheat: Time (ts <sub>min</sub> to ts <sub>max</sub> )	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.

#### **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 MT-G2 EasyWhite LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of  $\leq$  30 °C/85% relative humidity (RH). Regardless of 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.

### **REACh Compliance**

REACh substances of 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 representative to insure you get the most up-to-date REACh 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.



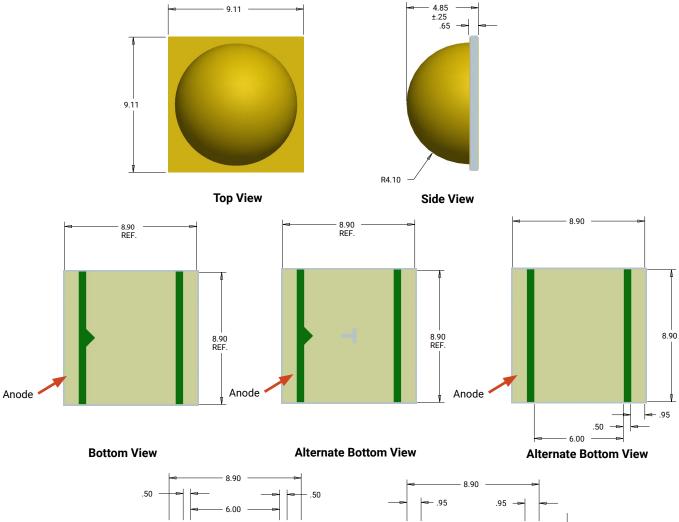
### **NOTES - CONTINUED**

### **Vision Advisory**

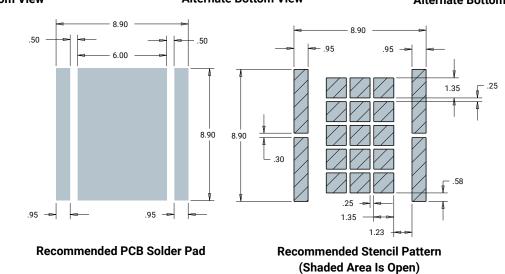
WARNING: Do not look at an exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

## **MECHANICAL DIMENSIONS**

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



All measurements are ±.13 mm unless otherwise indicated.

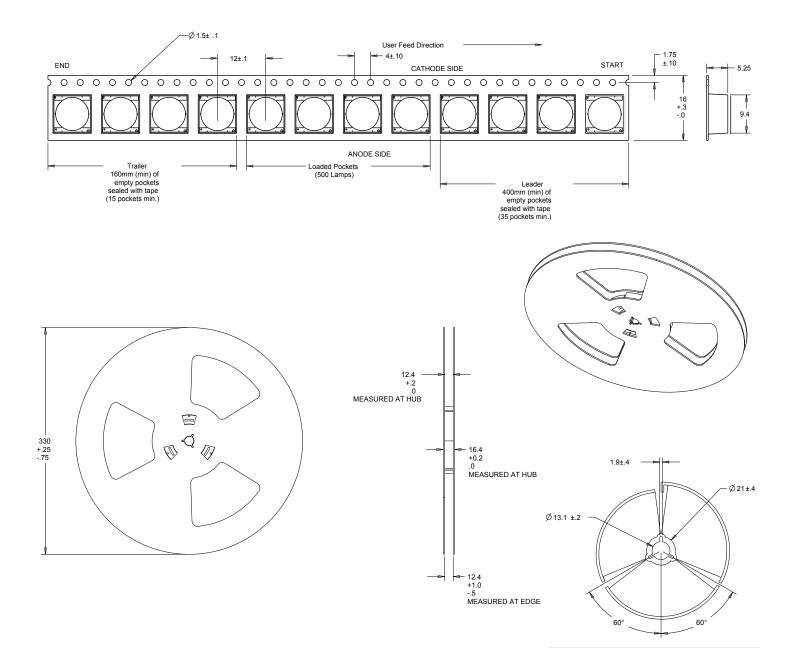






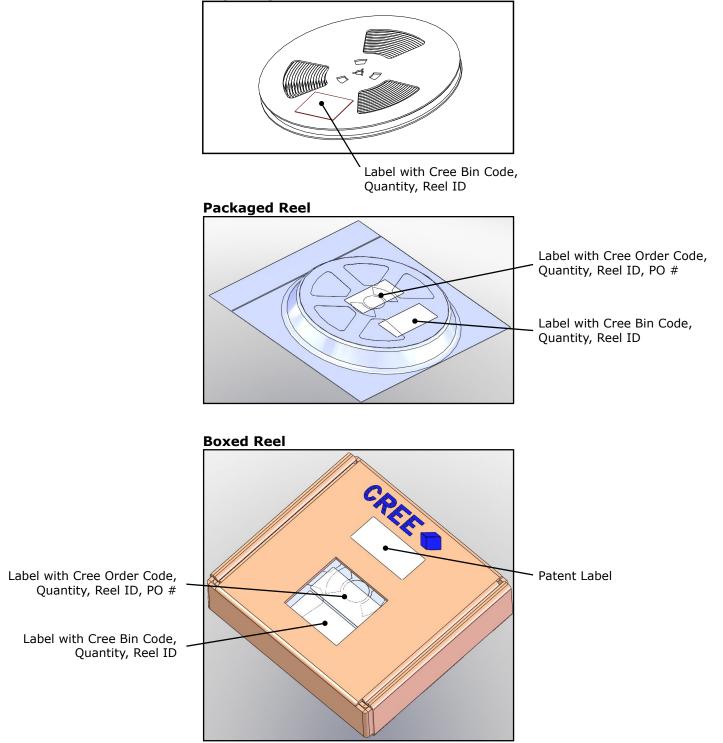
### **TAPE AND REEL**

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



## PACKAGING

### **Unpackaged Reel**



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