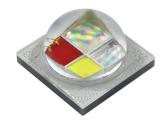
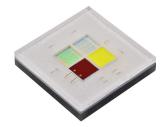


XLamp® XM-L® Color Gen 2 LEDs



XM-L Color Gen 2 High Density



XM-L Color Gen 2 High Intensity

PRODUCT DESCRIPTION

The XLamp® XM-L® Gen 2 LEDs are · Available in red, green, blue and white in multi-color RGBW LEDs that deliver the combination of high lumen output and · Maximum drive current per LED die: great color mixing in a small 5.0 x 5.0 mm package. The XLamp XM-L Color • Individually addressable LEDs Gen 2 LEDs feature the smallest possible • Reflow solderable – JEDEC J-STD-020 distance between LED die, creating a small • Electrically neutral thermal path optical source for excellent optical control · RoHS and REACH compliant and efficient color mixing. Compared to • UL® recognized component (E349212) the first generation LED, Gen 2 features a 75% higher maximum drive current and significant improvements in light output and efficacy, enabling almost double the maximum light output. Gen 2 also includes a new High Intensity version that further reduces the optical source size for even greater levels of optical control.

XLamp XM-L Color Gen 2 LEDs are for all high-performance RGBW lighting applications, including color-changing, stage, architectural and entertainment.

FEATURES

- a single 5 mm x 5 mm package
- 1.75 A

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Cree LED / 4001 E. Hwy. 54, Suite 2000 / Durham, NC 27709 USA / +1.919.313.5330 / www.cree-led.com



CHARACTERISTICS - COMPLETE PACKAGE

The following table lists the product characteristics for the XLamp XM-L Color Gen 2 LED package, measured with all LED dies on simultaneously and each LED die connected to independent drive circuits at 350 mA.

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		0.8	
Viewing angle - High Density (FWHM)	degrees (°)		120	
Viewing angle - High Intensity (FWHM)	degrees (°)		118	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
LED junction temperature	°C			150

CHARACTERISTICS - PER LED DIE

The following table lists the product characteristics for each LED die within the XLamp XM-L Color Gen 2 LED package.

Characteristics	Unit	Minimum	Typical	Maximum
Temperature coefficient of voltage - red	mV/°C		-1.7	
Temperature coefficient of voltage - green	mV/°C		-1	
Temperature coefficient of voltage - blue, white	mV/°C		-1.2	
DC forward current - red, green, blue, white	mA			1750
Forward voltage (@ 350 mA, 25 °C) - red	V		2.1	2.7
Forward voltage (@ 350 mA, 25 °C) - green	V		2.6	3.0
Forward voltage (@ 350 mA, 25 °C) - blue, white	V		2.9	3.2



FLUX CHARACTERISTICS - HIGH DENSITY (T $_{\! \scriptscriptstyle J}$ = 25 $^{\circ}\text{C})$

The following table provides order codes for XM-L Gen 2 High-Density Color LEDs. For a complete description of the order code nomenclature, please refer to the Order and Bin Code Formats section (page 11).

Colo	or		nt Wavelength nge		minous Flux 0 mA	Typical Luminous Flux @ 350 mA	Order Code		
		Minimum	Maximum	Group	Flux (lm)	Flux (lm)			
	Red	620 nm	630 nm		60	80			
	Green	520 nm	535 nm	05	140	155	VAI DOL 00 0000 0005 A A A 1		
	Blue	450 nm	465 nm	C5	18	23	XMLDCL-00-0000-00C5AAAA1		
	Cool White	5700 K	8000 K		140	155			
	Red	620 nm	630 nm		60	80			
	Green	520 nm	535 nm	C5	140	155	XMLDCL-00-0000-00C5AAA02		
	Blue	450 nm	465 nm	C5	18	23	XMLDCL-00-0000-00C5AAA02		
Color +	Cool White	5700 K	8000 K		140	155			
Cool White	Red	620 nm	630 nm		60	80			
	Green	520 nm	535 nm	C5	140	155	XMLDCL-00-0000-00C5AAAAA		
	Blue	450 nm	465 nm	CS	18	23	AMILDOL-00-0000-0005AAAAA		
	Cool White	5700 K	8000 K		140	155			
	Red	620 nm	630 nm		60	80			
	Green	520 nm	535 nm	C5	140	155	XMLDCL-00-0000-00C5AAAA2		
	Blue	450 nm	465 nm	03	18	23	NINLEDGE 00 0000 0003AAAA2		
	Cool White	5700 K	8000 K		140	155			
	Red	620 nm	630 nm		60	80			
	Green	520 nm	535 nm		140	155	VIII DOL 00 0000 000 II I I I		
	Blue	450 nm	465 nm	C4	18	23	XMLDCL-00-0000-00C4AAAE5		
Color +	Neutral White	3700 K	4300 K		120	145			
Neutral White	Red	620 nm	630 nm		60	80			
	Green	520 nm	535 nm	C4	140	155	VMI DCI 00 0000 0004AAAP1		
	Blue	450 nm	465 nm			23	XMLDCL-00-0000-00C4AAAB1		
	Neutral White	3700 K	4300 K		120	145			

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±1 nm on dominant wavelength measurements. See the Measurements section (page 18).
- Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350 mA. The flux and chromaticity of each LED die within the XLamp XM-L Color Gen 2 LED package are measured individually.



FLUX CHARACTERISTICS - HIGH DENSITY (T $_{\rm J}$ = 25 °C) - CONTINUED

Color			nt Wavelength nge		minous Flux 0 mA	Typical Luminous Flux @ 350 mA	Order Code	
		Minimum	Maximum	Group	Flux (lm)	Flux (lm)		
	Red	620 nm	630 nm		60	80		
	Green	520 nm	535 nm	C3	140	155	XMLDCL-00-0000-00C3AAAE7	
	Blue	450 nm	465 nm	U3	18	23	XMLDGL-00-0000-00G3AAAE7	
Color +	Warm White	2700 K	3200 K		100	130		
Warm White	Red	620 nm	630 nm		60	80		
	Green	520 nm	535 nm	C3	140	155	XMLDCL-00-0000-00C3AAAC1	
	Blue	450 nm	465 nm	03	18	23	AIVILDGL-00-0000-00C3AAAC1	
	Warm White	2700 K	3200 K		100	130		

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±1 nm on dominant wavelength measurements. See the Measurements section (page 18).
- Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350 mA. The flux and chromaticity of each LED die within the XLamp XM-L Color Gen 2 LED package are measured individually.



FLUX CHARACTERISTICS - HIGH INTENSITY (T $_{\! \scriptscriptstyle J}$ = 25 $^{\circ}\text{C})$

The following table provides order codes for XM-L Gen 2 High-Intensity Color LEDs. For a complete description of the order code nomenclature, please refer to the Order and Bin Code Formats section (page 11).

Colo	or	CCT / Dominant Wavelength Range			iminous Flux 0 mA	Typical Luminous Flux @ 350 mA	Order Code		
		Minimum	Maximum	Group	Flux (lm)	Flux (Im)			
	Red	620 nm	630 nm		50	65			
	Green	520 nm	535 nm	A4	120	140	XMLDCL-H0-0000-00A4AAAA1		
	Blue	450 nm	465 nm	A4	14	17	AMILDOL-HO-0000-00A4AAAA I		
	Cool White	5700 K	8000 K		120	140			
	Red	620 nm	630 nm		50	65			
	Green	520 nm	535 nm	A4	120	140	XMLDCL-H0-0000-00A4AAA02		
	Blue	450 nm	465 nm	A4	14	17	AMEDOL-110-0000-00A4AAA02		
Color +	Cool White	5700 K	8000 K		120	140			
Cool White	Red	620 nm	630 nm		50	65			
	Green	520 nm	535 nm	A4	120	140	XMLDCL-H0-0000-00A4AAAAA		
	Blue	450 nm	465 nm	A4	14	17	XIVIEDOL-110-00000-00A4AAAAA		
	Cool White	5700 K	8000 K		120	140			
	Red	620 nm	630 nm		50	65			
	Green	520 nm	535 nm	A4	120	140	XMLDCL-H0-0000-00A4AAAA2		
	Blue	450 nm	465 nm	Λ-τ	14	17	AMEDOL 110 0000 00A4AAAA2		
	Cool White	5700 K	8000 K		120	140			
	Red	620 nm	630 nm		50	65			
	Green	520 nm	535 nm		120	140	V4.41 D.01 110 0000 004 44 4 4 5		
	Blue	450 nm	465 nm	A4	14	17	XMLDCL-H0-0000-00A4AAAE5		
Color +	Neutral White	3700 K(4300 K		120	135			
Neutral White	Red	620 nm	630 nm		50	65			
	Green	520 nm	535 nm	A4	120	140	XMLDCL-H0-0000-00A4AAAB1		
	Blue	450 nm	465 nm	A4	14	17	AINILD GL-110-0000-00A4AAAD I		
	Neutral White	3700 K	4300 K		120	135			

- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±1 nm on dominant wavelength measurements. See the Measurements section (page 18).
- Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350 mA. The flux and chromaticity of each LED die within the XLamp XM-L Color Gen 2 LED package are measured individually.



FLUX CHARACTERISTICS - HIGH INTENSITY (T $_{_{\mathrm{J}}}$ = 25 °C) - CONTINUED

Color			nt Wavelength nge		minous Flux 0 mA	Typical Luminous Flux @ 350 mA	Order Code
		Minimum	Maximum	Group	Flux (lm)	Flux (lm)	
	Red	620 nm	630 nm		50	65	
	Green	520 nm	535 nm	4.0	120	140	XMLDCL-H0-0000-00A3AAAE7
	Blue	450 nm	465 nm	A3	14	17	AMILDGL-HU-UUUU-UUA3AAAE7
Color +	Warm White	2700 K	3200 K		100	120	
Warm White	Red	620 nm	630 nm		50	65	
	Green	520 nm	535 nm	۸۵	120	140	VMI DOL 110 0000 00 40 4 4 4 01
	Blue	450 nm	465 nm	A3	14	17	XMLDCL-H0-0000-00A3AAAC1
	Warm White	2700 K	3200 K		100	120	

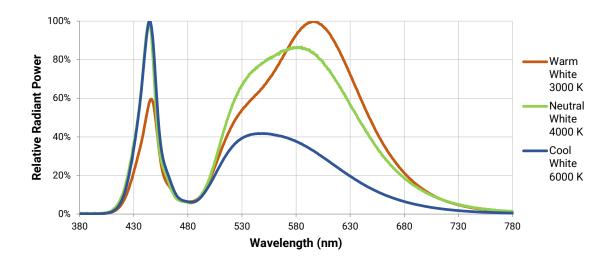
- Cree LED maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±1 nm on dominant wavelength measurements. See the Measurements section (page 18).
- Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350 mA. The flux and chromaticity of each LED die within the XLamp XM-L Color Gen 2 LED package are measured individually.

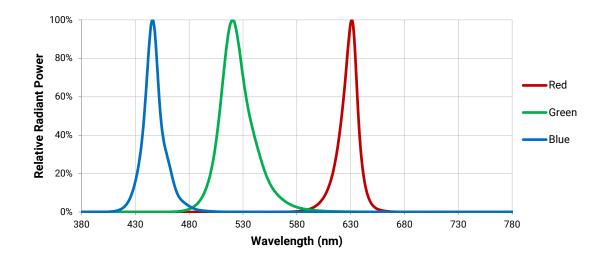


RELATIVE SPECTRAL POWER DISTRIBUTION (I_F = 350 mA PER LED DIE, 25 °C)

The following graph represents typical spectral output of the XLamp XM-L Color Gen 2 LED with each LED die on independently.

High Density



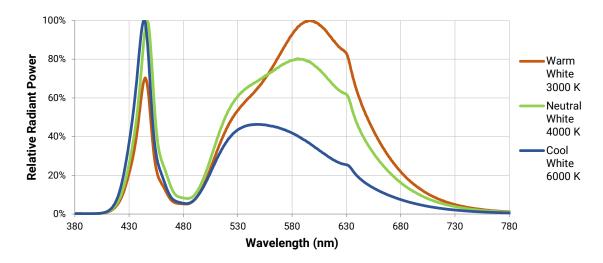


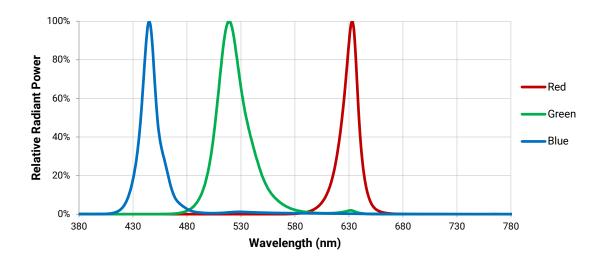


RELATIVE SPECTRAL POWER DISTRIBUTION (I $_{\rm F}$ = 350 mA PER LED DIE, 25 °C) - CONTINUED

The following graph represents typical spectral output of the XLamp XM-L Color Gen 2 LED with each LED die on independently.

High Intensity

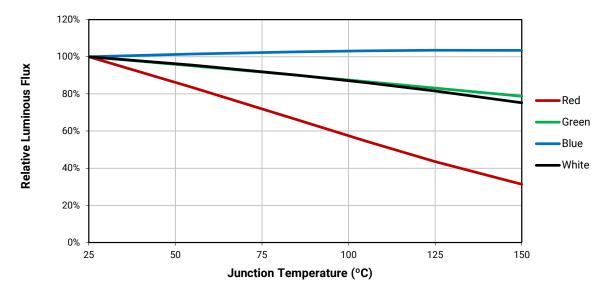






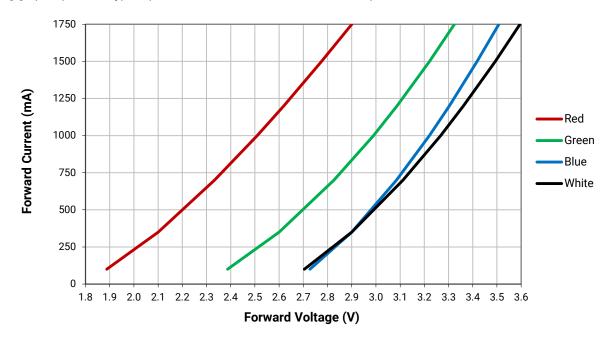
RELATIVE FLUX VS JUNCTION TEMPERATURE ($I_F = 350 \text{ mA}$)

The following graph represents typical performance of each LED die in the XLamp XM-L Color Gen 2 LED.



ELECTRICAL CHARACTERISTICS (T₁ = 25 °C)

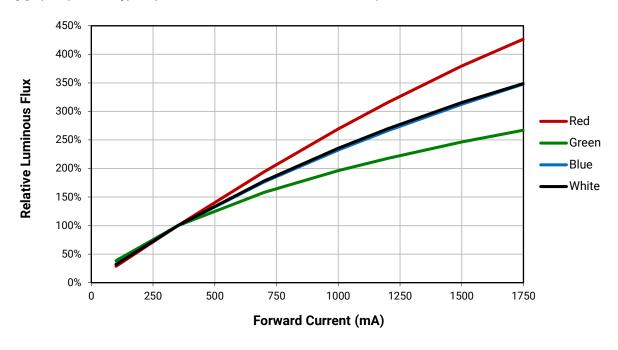
The following graph represents typical performance of each LED die in the XLamp XM-L Color Gen 2 LED.





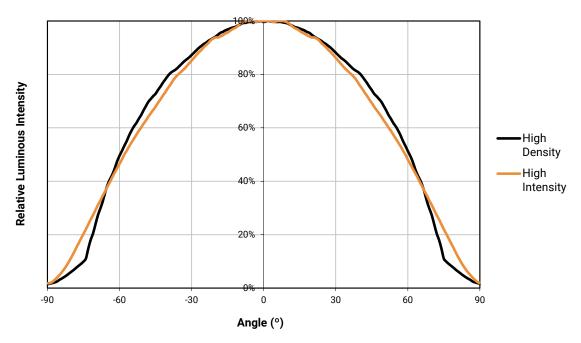
RELATIVE FLUX VS. CURRENT ($T_J = 25$ °C)

The following graph represents typical performance of each LED die in the XLamp XM-L Color Gen 2 LED.



TYPICAL SPATIAL DISTRIBUTION

The following graph represents typical output of the XLamp XM-L Color Gen 2 LED with all four LEDs on simultaneously.

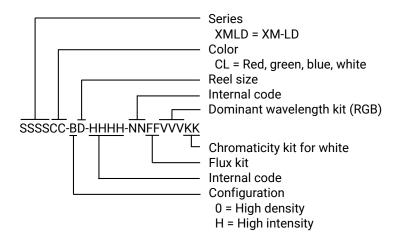




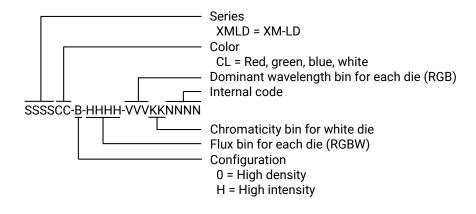
ORDER AND BIN CODE FORMATS

Order codes and bin codes are configured in the following manner:

Order Code



Bin Code





PERFORMANCE GROUPS - LUMINOUS FLUX

Each LED die in the XLamp XM-L Color Gen 2 LED is tested individually for luminous flux and placed into one of the following luminous flux groups.

High Density

Color	Flux Code	Minimum Luminous Flux (lm) @ 350 mA	Maximum Luminous Flux (lm) @ 350 mA)		
Red	G	60	100		
Reu	Н	100	140		
Green	N	140	180		
Green	Р	180	220		
Blue	В	18	45		
blue	С	45	70		
	3	100	120		
White	4	120	140		
willte	5	140	160		
	6	160	180		

High Intensity

Color	Flux Code	Minimum Luminous Flux (lm) @ 350 mA	Maximum Luminous Flux (Im) @ 350 mA)		
	F	50	100		
Red	G	60	100		
	Н	100	140		
	M	120	180		
Green	N	140	180		
	Р	180	220		
	А	14	45		
Blue	В	18	45		
	С	45	70		
	2	80	100		
White	3	100	120		
vvilite	4	120	140		
	5	140	160		

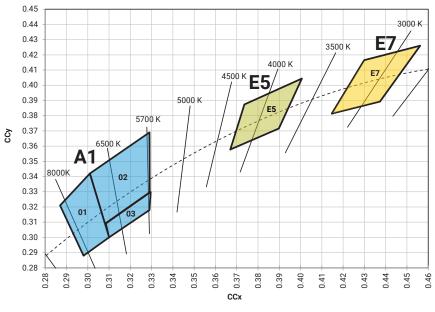
[·] Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350 mA.

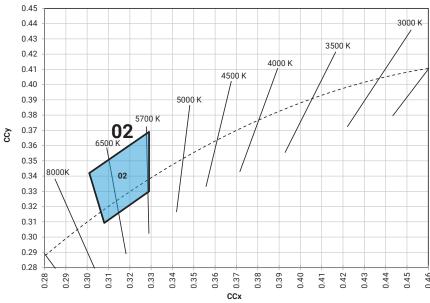


PERFORMANCE GROUPS - CHROMATICITY (I_F = 350 mA PER LED DIE)

The white LED die in the XLamp XM-L Color Gen 2 LED is individually tested for chromaticity at 350 mA and placed into one of the regions defined by the bounding coordinates shown below.

Region	х	у												
	0.2980	0.2880		0.3010	0.3420	93	0.3100	0.3000		0.3670	0.3578		0.4147	0.3814
01	0.2870	0.3210	00	0.3080	0.3093		0.3080	0.3093		0.3736	0.3874	F-7	0.4299	0.4165
01	0.3010	0.3420	02	0.3290	0.3300	03	0.3290	0.3300	E5	0.4006	0.4044	E7	0.4562	0.4260
	0.3100	0.3000		0.3290	0.3690		0.3290	0.3180		0.3898	0.3716		0.4373	0.3893







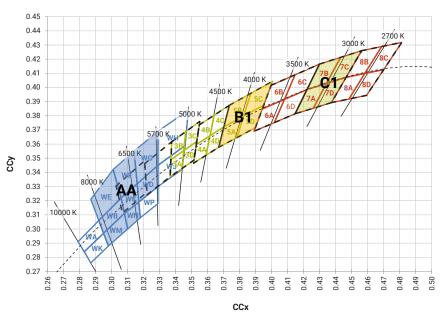
PERFORMANCE GROUPS – CHROMATICITY (I_F = 350 mA PER LED DIE) - CONTINUED

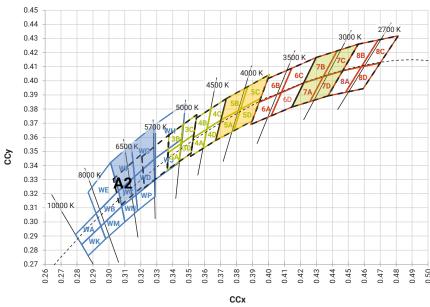
Region	x	у	Region	x	у
	0.295	0.297		0.316	0.332
WM	0.308	0.311	WC	0.317	0.319
VVIVI	0.310	0.300	VVC	0.308	0.311
	0.298	0.288		0.306	0.322
	0.306	0.322		0.314	0.355
WB	0.308	0.311	WF	0.316	0.332
MR	0.295	0.297	VVF	0.306	0.322
	0.292	0.306		0.301	0.342
	0.301	0.342		0.329	0.345
WE	0.306	0.322	WD	0.329	0.330
VVE	0.292	0.306	VVD	0.317	0.319
	0.287	0.321		0.316	0.332
	0.308	0.311		0.329	0.369
WN	0.317	0.319	WG	0.329	0.345
VVIV	0.318	0.308	WG	0.316	0.332
	0.310	0.300		0.314	0.355

Region	х	у	Region	х	у	Region	X	у	Region	х	у
	0.3670	0.3578		0.3702	0.3722		0.3825	0.3798		0.3783	0.3646
5A	0.3702	0.3722	5B	0.3736	0.3874	5C	0.3869	0.3958	5D	0.3825	0.3798
JA.	0.3825	0.3798		0.3869	0.3958	50	0.4006	0.4044		0.3950	0.3875
	0.3783	0.3646		0.3825	0.3798		0.3950	0.3875		0.3898	0.3716
	0.4147	0.3814		0.4221	0.3984		0.4342	0.4028	7D	0.4259	0.3853
7A	0.4221	0.3984	7B	0.4299	0.4165	7C	0.4430	0.4212		0.4342	0.4028
/A	0.4342	0.4028	76	0.4430	0.4212	70	0.4562	0.4260		0.4465	0.4071
	0.4259	0.3853		0.4342	0.4028		0.4465	0.4071		0.4373	0.3893



PERFORMANCE GROUPS – CHROMATICITY (I_F = 350 mA PER LED DIE) - CONTINUED







PERFORMANCE GROUPS - DOMINANT WAVELENGTH

The red, green and blue LED dies in the XLamp XM-L Color Gen 2 LED are tested individually for dominant wavelength (DWL) and sorted into one of the DWL bins defined below.

Color	DWL Group	Minimum DWL @ 350 mA	Maximum DWL @ 350 mA		
Red	А	620	630		
	2	520	525		
Green	3	525	530		
	4	530	535		
	K	450	455		
Blue	L	455	460		
	М	460	465		

PERFORMANCE GROUPS - CHROMATICITY BINS

The following table lists standard kit numbers and chromaticity bins. Kit numbers completely describe an order code's color or chromaticity bins and luminous flux range. For other flux and chromaticity combinations, contact Cree LED or an authorized distributor.

Color	Chromaticity Bins	Kit Code		
	01, 02, 03	AAAA1		
Cool White	02	AAA02		
	WC, WD, WF, WG, WB, WE, WM, WN	AAAA		
	WC, WD, WF, WG	AAAA2		
Neutral White	E5	AAAE5		
	5A, 5B, 5C, 5D	AAAB1		
Warm White	E7	AAAE7		
	7A, 7B, 7C, 7D	AAAC1		

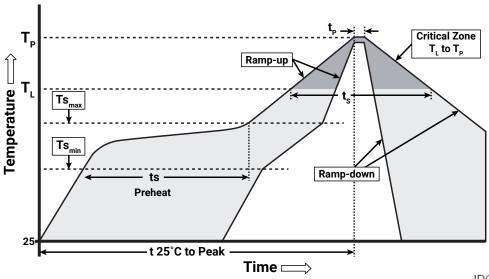
XLamp XM-L Color Gen 2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED may ship reels in flux bins
higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity or
DWL bin restrictions specified by the order code.



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XM-L Color Gen 2 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 (Ts _{max} to T _p)	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 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.

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.

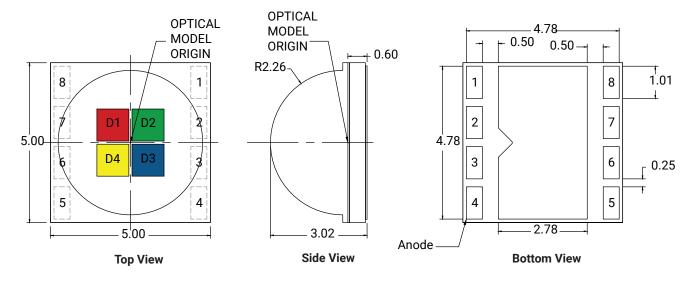


MECHANICAL DIMENSIONS

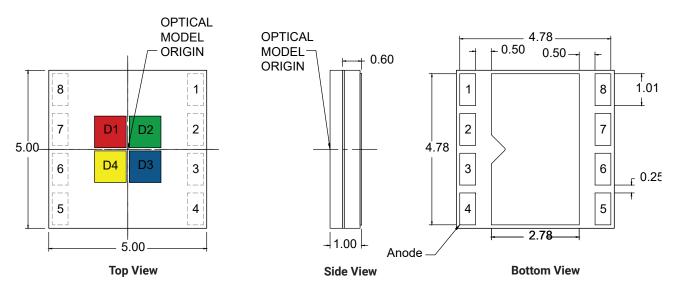
Thermal vias, if present, are not shown on these drawings.

All measurements are ±.13 mm unless otherwise indicated.

High Density



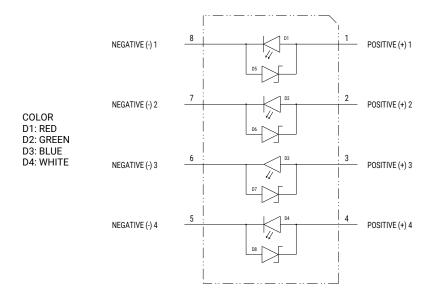
High Intensity

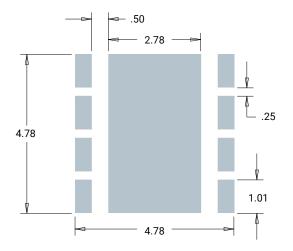




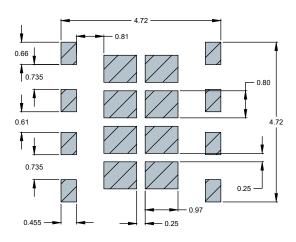
MECHANICAL DIMENSIONS - CONTINUED

High Density & High Intensity





Recommended PCB Footprint



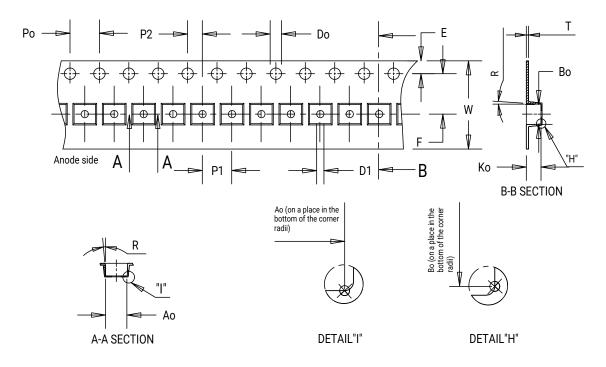
Recommended Solder Stencil



TAPE AND REEL

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

All dimensions in mm [in.].



High Density

Item	Ao	Во	Ko	Po	P1	P2	Т	Е	F	Do	D1	W	R
Dim.	5.40	5.40	3.35	4.00	8.00	2.00	0.36	1.75	5.50	1.50	1.50	12.00	3°

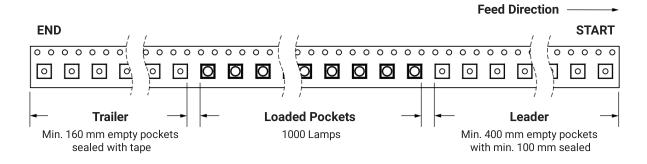
High Intensity

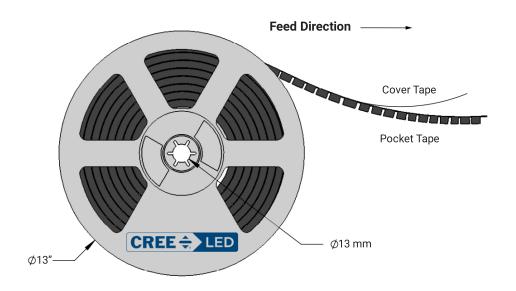
Item	Ao	Во	Ko	Po	P1	P2	Т	Е	F	Do	D1	W	R
Dim.	5.40	5.40	1.50	4.00	8.00	2.00	0.30	1.75	5.50	1.50	1.50	12.00	7°



TAPE AND REEL - CONTINUED

High Density & High Intensity



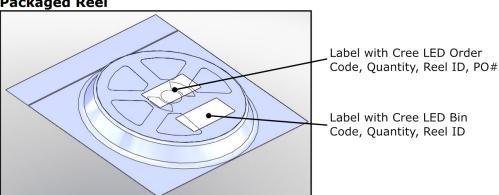


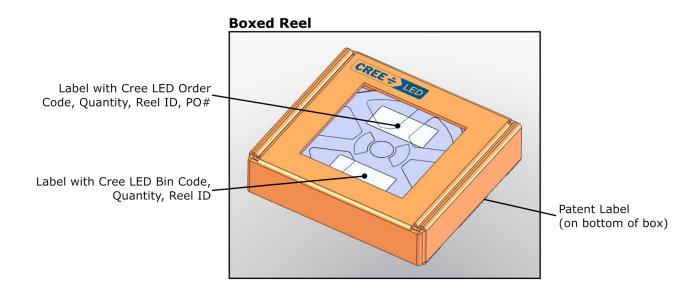


PACKAGING

Unpackaged Reel Label with Cree LED Bin Code, Quantity, Reel ID

Packaged Reel





X-ON Electronics

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Click to view similar products for High Power LEDs - Multi-Colour category:

Click to view products by Cree manufacturer:

Other Similar products are found below:

LZP-00MD00-0000 LZP-L0MD00-0000_G2 LL-HP60MV1L LL-HP60NUYC OSB4XME3E1E OSG5XDE5E1E OSR5XAE1E1E

OSR5XAE3E1E OSR5XME1E1E OSY5XAE1E1E OSY5XDE5E1E PK2N-3LGE-SD PK2N-3LRE-SD PQ2A-4FGE OSTCXBEAC1E

LZP-W0MD00-0000 PM2E-1LAS PM2E-1LGS PM2E-3LAE-SD PM2E-3LAS-SD PM2E-3LBS-SD PM2E-3LGS-SD PM2E-3LRE-SD

PM2E-3LRS-SD PP6N-TFFE-D60 PP6N-1LFE-P PK2N-3LLE-L OSG5XME1E1E OSR5XAT3C1E OSR5XME3E1E OSY5XME3E1E

PC8N-5L4E-C PK2N-3LBE-SD PM2B-1LPE-M PM2B-1LPS-M PQ2A-4FRE CLQ6B-TKW-S1L1R1H1TBB7935CC3 CLQ6B-TKW-S1L1R1H1TBB7935DD3 CLQ6B-TKW-S1L1R1H1TBB7935BB3 CLQ6B-TKW-S1L1R1H1TBB7935AA3 CLW6A-TKW-C90C070B0BB7C3CE73 CLW6A-TKW-C90C070B0BB7C3CE53 CLW6A-TKW-C90C070B0BB7C3CE53 CLW6A-TKW-C90C070B0BB7C3CE53 CLW6A-TKW-C90C070B0BB7C3CE83 XMLDCL-00-R250-00C5AAA02 XMLDCL-00-R250-00C4AAAE5 XMLDCL-00-R250-00C3AAA67 XMLDCL-00-0000-00C4AAAB1