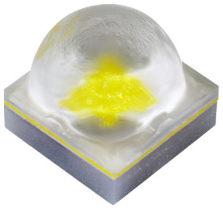
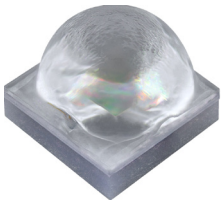
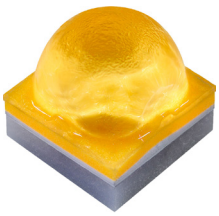
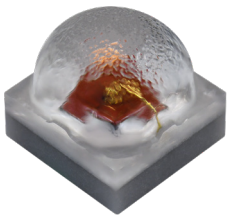
XLamp® XQ-A LEDs

PRODUCT DESCRIPTION

The XLamp® XQ-A LED brings a mid-power, cost-effective option to the proven, compact ceramic XQ package, enabling lighting manufacturers to quickly and easily expand their product portfolio by leveraging a common XQ design. Unlike plastic mid-power LEDs, the ceramic-based XQ-A LEDs are designed to deliver the long-term calculated lifetimes of Cree LED's other high-power LEDs. The XQ-A LED's combination of optical symmetry and consistency across all colors improves color mixing and simplifies the production process for lighting manufacturers. Available in both white and color configurations, the XQ-A LED family opens up new design possibilities for a wide spectrum of lighting applications, such as portable, directional and architectural lighting.

FEATURES

- Cree LED's smallest lighting class LED: 1.6 X 1.6 mm
- Available in 70-, 80- & 90-CRI white, and blue, PC blue, green, PC amber, red-orange & red
- Maximum drive current: 300 mA
- Wide viewing angle: 105° - 115°
- Reflow solderable - JEDEC J-STD-020C compatible
- Unlimited floor life at ≤ 30 °C/85% RH
- RoHS and REACH compliant
- UL® recognized component (E349212)

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

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CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊ - white	°C/W		12	
Thermal resistance, junction to ssolder point◊ - blue, PC blue	°C/W		9.5	
Thermal resistance, junction to solder point◊ - green	°C/W		17	
Thermal resistance, junction to solder point◊ - PC amber	°C/W		15	
Thermal resistance, junction to solder point◊ - red-orange, red	°C/W		13	
Viewing angle (FWHM) - white	degrees		105	
Viewing angle (FWHM) - blue, PC blue, green	degrees		115	
Viewing angle (FWHM) - PC amber	degrees		100	
Viewing angle (FWHM) - red-orange, red	degrees		110	
Temperature coefficient of voltage - white	mV/°C		-1.1	
Temperature coefficient of voltage - blue, PC blue	mV/°C		-1.1	
Temperature coefficient of voltage - green	mV/°C		-1.2	
Temperature coefficient of voltage - PC amber	mV/°C		-1.1	
Temperature coefficient of voltage - red-orange, red	mV/°C		-2.0	
ESD classification (HBM per Mil-Std-883D) - white, blue, PC blue, green, PC amber			Class 2	
ESD withstand voltage (HBM per Mil-Std-883D) - , red-orange, red			Class 3A	
DC forward current	mA			300
Reverse voltage	V			1
Forward voltage (@ 175 mA, 85 °C) - white	V		2.9	3.1
Forward voltage (@ 175 mA, 25 °C) - blue, PC blue	V		3.0	3.1
Forward voltage (@ 175 mA, 25 °C) - green	V		3.1	3.4
Forward voltage (@ 175 mA, 25 °C) - PC amber	V		3.1	3.4
Forward voltage (@ 175 mA, 25 °C) - red-orange, red	V		2.2	2.6
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.

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ORDER CODES SUGGESTED FOR NEW DESIGNS - WHITE (T_J = 85 °C)

The following tables provide order codes for XLamp XQ-A white LEDs. For a complete description of the order-code nomenclature, please consult the Bin and Order Code Formats section (page 25).

Chromaticity		Minimum Luminous Flux (lm) @ 175 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C*	Order Codes	
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	300 mA	No Minimum CRI	70 CRI Minimum
ANSI Cool White (5000 K – 8300 K)							
51	6200 K	N3	56.8	64.2	81.6	XQAAWT-00-0000-00000L551	XQAAWT-00-0000-00000B551
		N2	51.7	58.4	74.2	XQAAWT-00-0000-00000L451	XQAAWT-00-0000-00000B451
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L351	XQAAWT-00-0000-00000B351
53	6000 K	N3	56.8	64.2	81.6	XQAAWT-00-0000-00000L553	XQAAWT-00-0000-00000B553
		N2	51.7	58.4	74.2	XQAAWT-00-0000-00000L453	XQAAWT-00-0000-00000B453
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L353	XQAAWT-00-0000-00000B353
50	6200 K	N3	56.8	64.2	81.6	XQAAWT-00-0000-00000L550	XQAAWT-00-0000-00000B550
		N2	51.7	58.4	74.2	XQAAWT-00-0000-00000L450	XQAAWT-00-0000-00000B450
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L350	XQAAWT-00-0000-00000B350
E1	6500 K	N3	56.8	64.2	81.6	XQAAWT-00-0000-00000L5E1	XQAAWT-00-0000-00000B5E1
		N2	51.7	58.4	74.2	XQAAWT-00-0000-00000L4E1	XQAAWT-00-0000-00000B4E1
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L3E1	XQAAWT-00-0000-00000B3E1
E2	5700 K	N3	56.8	64.2	81.6	XQAAWT-00-0000-00000L5E2	XQAAWT-00-0000-00000B5E2
		N2	51.7	58.4	74.2	XQAAWT-00-0000-00000L4E2	XQAAWT-00-0000-00000B4E2
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L3E2	XQAAWT-00-0000-00000B3E2

Note:

- Cree LED 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 27).
- XQ-A 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.
- Typical CRI for Cool White (5000 K – 8300 K CCT) is 70.
- Typical CRI for Neutral White (3700 K – 5300 K CCT) is 75.
- Typical CRI for Warm White (2700 K – 3500 K CCT) is 80.
- Minimum CRI for 70-CRI White is 70.
- Minimum CRI for 80-CRI White is 80.
- Minimum CRI for 90-CRI White is 90.

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

** Calculated flux values at 300 mA are for reference only

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ORDER CODES SUGGESTED FOR NEW DESIGNS - WHITE (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 175 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C*	Order Codes		
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	300 mA	70 CRI Minimum	75 CRI Typical	80 CRI Minimum
ANSI Cool White (3700 K – 5000 K)								
E3	5000 K	N3	56.8	64.2	81.6	XQAAWT-00-0000-00000B5E3		
		N2	51.7	58.4	74.2	XQAAWT-00-0000-00000B4E3	XQAAWT-00-0000-00000L4E3	
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000B3E3	XQAAWT-00-0000-00000L3E3	
		M2	39.8	45.0	57.1		XQAAWT-00-0000-00000L2E3	
F4	4750 K	N2	51.7	58.4	74.2	XQAAWT-00-0000-00000B4F4	XQAAWT-00-0000-00000L4F4	
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000B3F4	XQAAWT-00-0000-00000L3F4	
		M2	39.8	45.0	57.1		XQAAWT-00-0000-00000L2F4	
E4	4500 K	N2	51.7	58.4	74.2	XQAAWT-00-0000-00000B4E4		
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000B3E4	XQAAWT-00-0000-00000L3E4	
		M2	39.8	45.0	57.1		XQAAWT-00-0000-00000L2E4	
F5	4250 K	N2	51.7	58.4	74.2	XQAAWT-00-0000-00000B4F5		
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000B3F5	XQAAWT-00-0000-00000L3F5	
		M2	39.8	45.0	57.1	XQAAWT-00-0000-00000B2F5	XQAAWT-00-0000-00000L2F5	
E5	4000 K	N2	51.7	58.4	74.2	XQAAWT-00-0000-00000B4E5		
		M3	45.7	51.6	65.6	XQAAWT-00-0000-00000B3E5	XQAAWT-00-0000-00000L3E5	XQAAWT-00-0000-00000H3E5
		M2	39.8	45.0	57.1	XQAAWT-00-0000-00000B2E5	XQAAWT-00-0000-00000L2E5	XQAAWT-00-0000-00000H2E5

Note:

- Cree LED 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 27).
- XQ-A 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.
- Typical CRI for Cool White (5000 K – 8300 K CCT) is 70.
- Typical CRI for Neutral White (3700 K – 5300 K CCT) is 75.
- Typical CRI for Warm White (2700 K – 3500 K CCT) is 80.
- Minimum CRI for 70-CRI White is 70.
- Minimum CRI for 80-CRI White is 80.
- Minimum CRI for 90-CRI White is 90.

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

** Calculated flux values at 300 mA are for reference only

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ORDER CODES SUGGESTED FOR NEW DESIGNS - WHITE (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 175 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C*	Order Codes		
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	300 mA	80 CRI Typical	80 CRI Minimum	90 CRI Minimum
ANSI Warm White (2700 K - 3750 K)								
F6	3750 K	M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L3F6	XQAAWT-00-0000-00000H3F6	
		M2	39.8	45.0	57.1	XQAAWT-00-0000-00000L2F6	XQAAWT-00-0000-00000H2F6	
E6	3500 K	M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L3E6	XQAAWT-00-0000-00000H3E6	
		M2	39.8	45.0	57.1	XQAAWT-00-0000-00000L2E6	XQAAWT-00-0000-00000H2E6	
F7	3250 K	M3	45.7	51.6	65.6	XQAAWT-00-0000-00000L3F7	XQAAWT-00-0000-00000H3F7	
		M2	39.8	45.0	57.1	XQAAWT-00-0000-00000L2F7	XQAAWT-00-0000-00000H2F7	
E7	3000 K	M2	39.8	45.0	57.1	XQAAWT-00-0000-00000L2E7	XQAAWT-00-0000-00000H2E7	
		K3	35.2	39.8	50.5	XQAAWT-00-0000-00000LZE7	XQAAWT-00-0000-00000HZE7	XQAAWT-00-0000-00000UZE7
		K2	30.6	34.6	43.9			XQAAWT-00-0000-00000UYE7
F8	2850 K	M2	39.8	45.0	57.1	XQAAWT-00-0000-00000L2F8	XQAAWT-00-0000-00000H2F8	
		K3	35.2	39.8	50.5	XQAAWT-00-0000-00000LZF8	XQAAWT-00-0000-00000HZF8	XQAAWT-00-0000-00000UZF8
		K2	30.6	34.6	43.9			XQAAWT-00-0000-00000UYF8
		J3	26.5	29.9	38.1			XQAAWT-00-0000-00000UXF8
E8	2700 K	M2	39.8	45.0	57.1	XQAAWT-00-0000-00000L2E8	XQAAWT-00-0000-00000H2E8	
		K3	35.2	39.8	50.5	XQAAWT-00-0000-00000LZE8	XQAAWT-00-0000-00000HZE8	XQAAWT-00-0000-00000UZE8
		K2	30.6	34.6	43.9			XQAAWT-00-0000-00000UYE8
		J3	26.5	29.9	38.1			XQAAWT-00-0000-00000UXE8

Note:

- Cree LED 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 27).
- XQ-A 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.
- Typical CRI for Cool White (5000 K – 8300 K CCT) is 70.
- Typical CRI for Neutral White (3700 K – 5300 K CCT) is 75.
- Typical CRI for Warm White (2700 K – 3500 K CCT) is 80.
- Minimum CRI for 70-CRI White is 70.
- Minimum CRI for 80-CRI White is 80.
- Minimum CRI for 90-CRI White is 90.

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

** Calculated flux values at 300 mA are for reference only

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ORDER CODES SUGGESTED FOR NEW DESIGNS - COLOR (T_J = 25 °C)

The following tables provide order codes for XLamp XQ-A color LEDs. For a complete description of the order-code nomenclature, please consult the Bin and Order Code Formats section (page 25).

Color	Minimum Luminous Flux (lm) @ 175 mA		Dominant Wavelength (nm)				Order Codes
			Minimum		Maximum		
	Group	Flux (lm)	Group	DWL (nm)	Group	DWL (nm)	
Blue	H2	18.1	B3	465	B6	485	XQABLU-00-0000-000000V01
			B3	465	B5	480	XQABLU-00-0000-000000V02
			B4	470	B5	480	XQABLU-00-0000-000000V05
	G2	13.9	B3	465	B6	485	XQABLU-00-0000-000000U01
			B3	465	B5	480	XQABLU-00-0000-000000U02
			B4	470	B5	480	XQABLU-00-0000-000000U05

Color	Color Bin	Minimum Luminous Flux (lm) @ 175 mA		Order Code
		Group	Flux (lm)	
PC Blue	N4B & N5B	H0	18.1	XQAAPB-00-0000-000000V01

Color	Minimum Luminous Flux (lm) @ 175 mA		Calculated Minimum PPF (µmol/s)*	Dominant Wavelength (nm)				Order Codes
				Minimum		Maximum		
	Group	Flux (lm)		Group	DWL (nm)	Group	DWL (nm)	
Green	N4	62.0	0.52	G2	520	G4	535	XQAGRN-00-0000-000000601
				G2	520	G3	530	XQAGRN-00-0000-000000602
				G3	525	G4	535	XQAGRN-00-0000-000000603
	N3	56.8	0.48	G2	520	G4	535	XQAGRN-00-0000-000000501
				G2	520	G3	530	XQAGRN-00-0000-000000502
				G3	525	G4	535	XQAGRN-00-0000-000000503
	N2	51.7	0.44	G2	520	G4	535	XQAGRN-00-0000-000000401
				G2	520	G3	530	XQAGRN-00-0000-000000402
				G3	525	G4	535	XQAGRN-00-0000-000000403

Note

- For additional order codes NOT recommended for new designs please see the Appendix section starting on page 33.
- Cree LED 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 27).
- XQ-A 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.

* Photosynthetic Photon Flux (PPF) values are calculated and for reference only.

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ORDER CODES SUGGESTED FOR NEW DESIGNS - COLOR (T_J = 25 °C) - CONTINUED

Color	Color Bin	Minimum Luminous Flux (lm) @ 175 mA		Order Codes
		Group	Flux (lm)	
PC Amber	Y2	K3	35.2	XQAAPA-00-0000-000000Z01
		K2	30.6	XQAAPA-00-0000-000000Y01
		J3	26.8	XQAAPA-00-0000-000000X01

Color	Minimum Luminous Flux (lm) @ 175 mA		Dominant Wavelength (nm)				Order Codes
			Minimum		Maximum		
	Group	Flux (lm)	Group	DWL (nm)	Group	DWL (nm)	
Red-Orange	M2	39.8	O3	610	O4	620	XQARDO-00-0000-000000201
			O3	610	O3	615	XQARDO-00-0000-000000202
	K3	35.2	O3	610	O4	620	XQARDO-00-0000-000000Z01
			O3	610	O3	615	XQARDO-00-0000-000000Z02
			O4	615	O4	620	XQARDO-00-0000-000000Z03
	K2	30.6	O3	610	O4	620	XQARDO-00-0000-000000Y01
			O3	610	O3	615	XQARDO-00-0000-000000Y02
			O4	615	O4	620	XQARDO-00-0000-000000Y03

Color	Minimum Luminous Flux (lm) @ 175 mA		Calculated Minimum PPF (µmol/s)*	Dominant Wavelength (nm)				Order Codes
				Minimum		Maximum		
	Group	Flux (lm)		Group	DWL (nm)	Group	DWL (nm)	
Red	K2	30.6	0.80	R2	620	R3	630	XQARED-00-0000-000000Y01
				R2	620	R2	625	XQARED-00-0000-000000Y02
	J3	26.8	0.70	R2	620	R3	630	XQARED-00-0000-000000X01
				R2	620	R2	625	XQARED-00-0000-000000X02
	J2	23.5	0.61	R2	620	R3	630	XQARED-00-0000-000000W01
				R2	620	R2	625	XQARED-00-0000-000000W02

Note

- Cree LED 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 27).
- XQ-A 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.

* Photosynthetic Photon Flux (PPF) values are calculated and for reference only.

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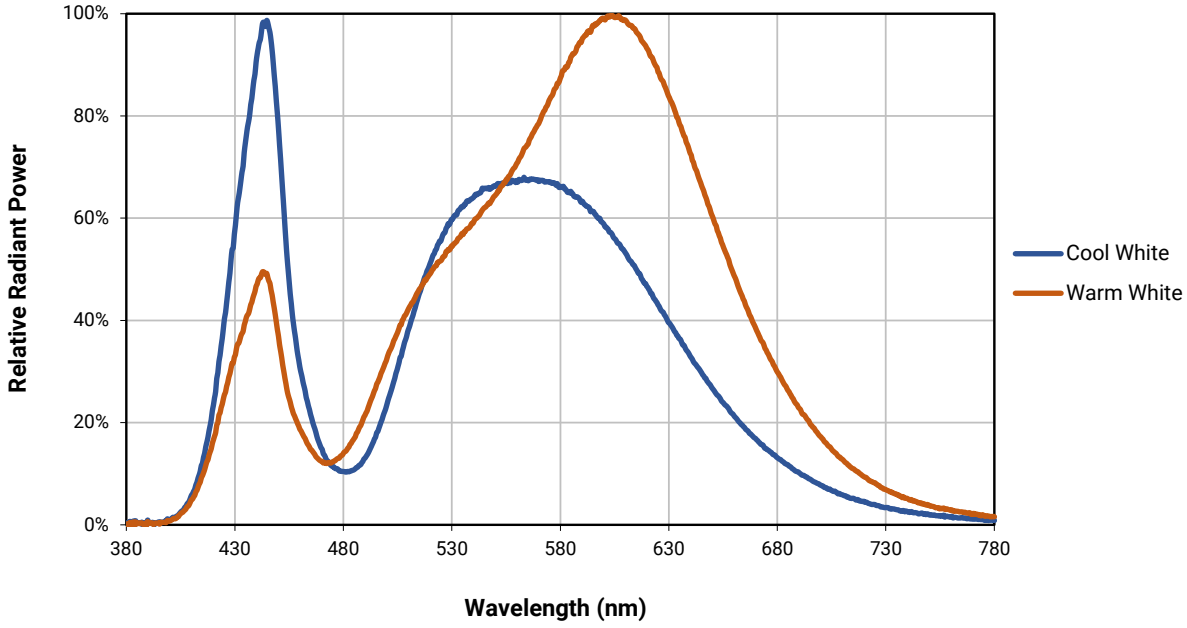
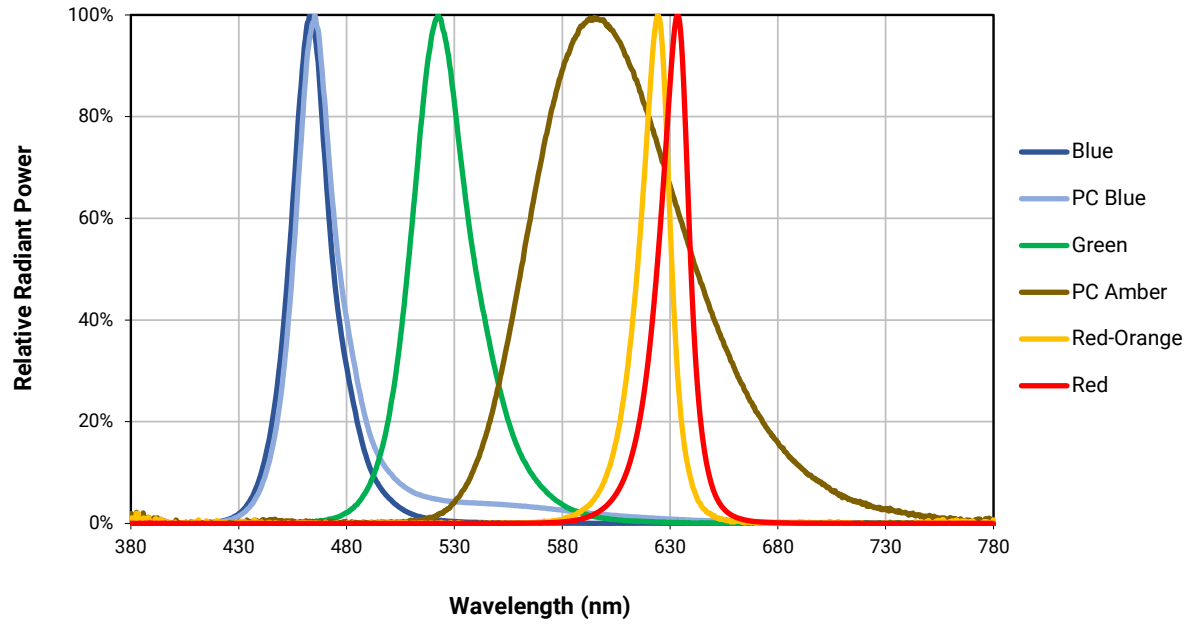
RELATIVE SPECTRAL POWER DISTRIBUTION





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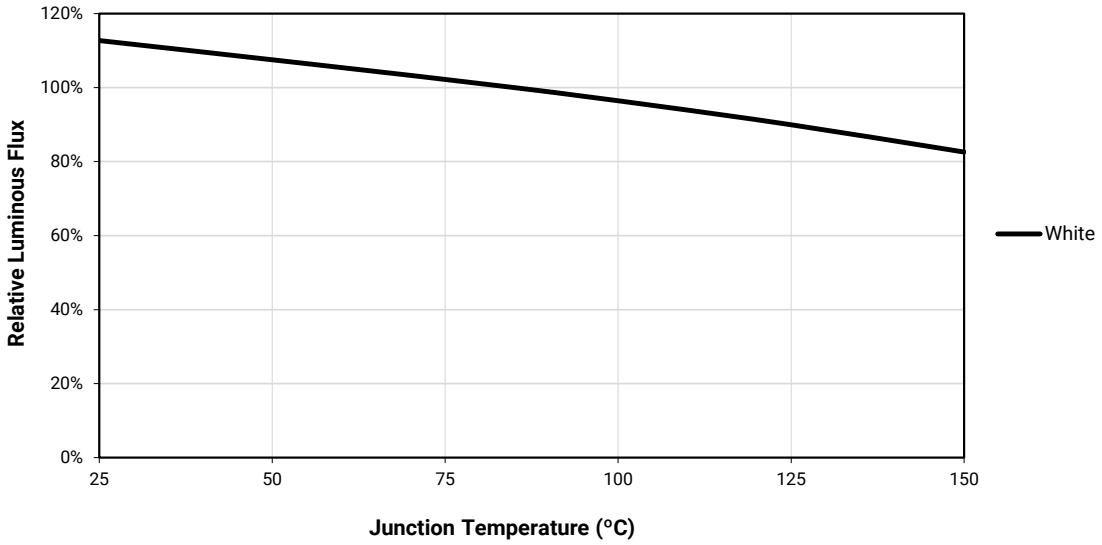
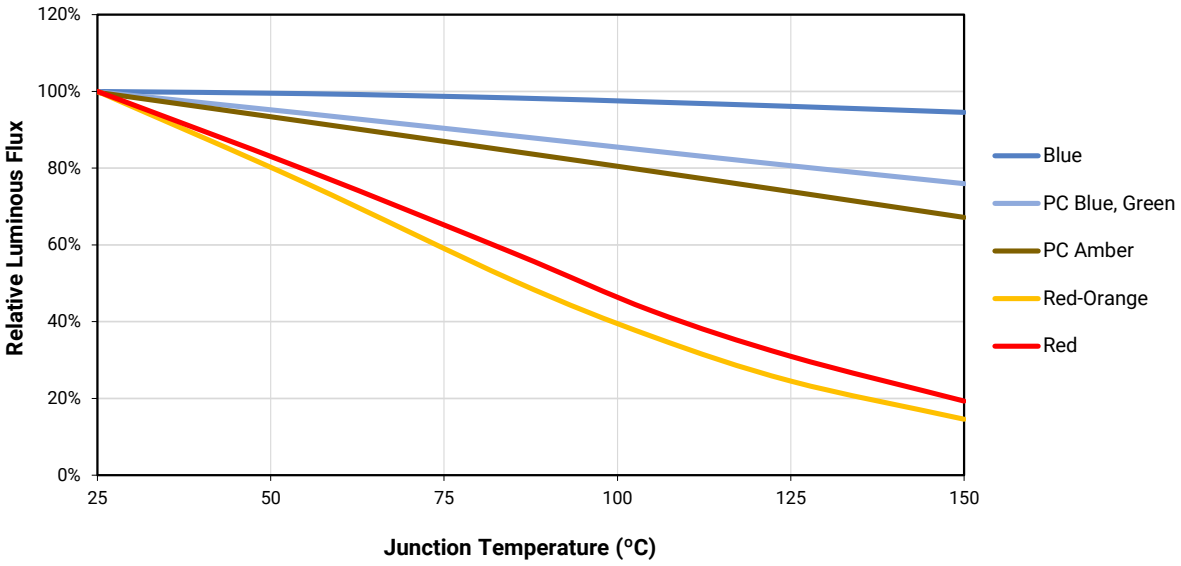
RELATIVE FLUX VS. JUNCTION TEMPERATURE (I_F = 175 mA)





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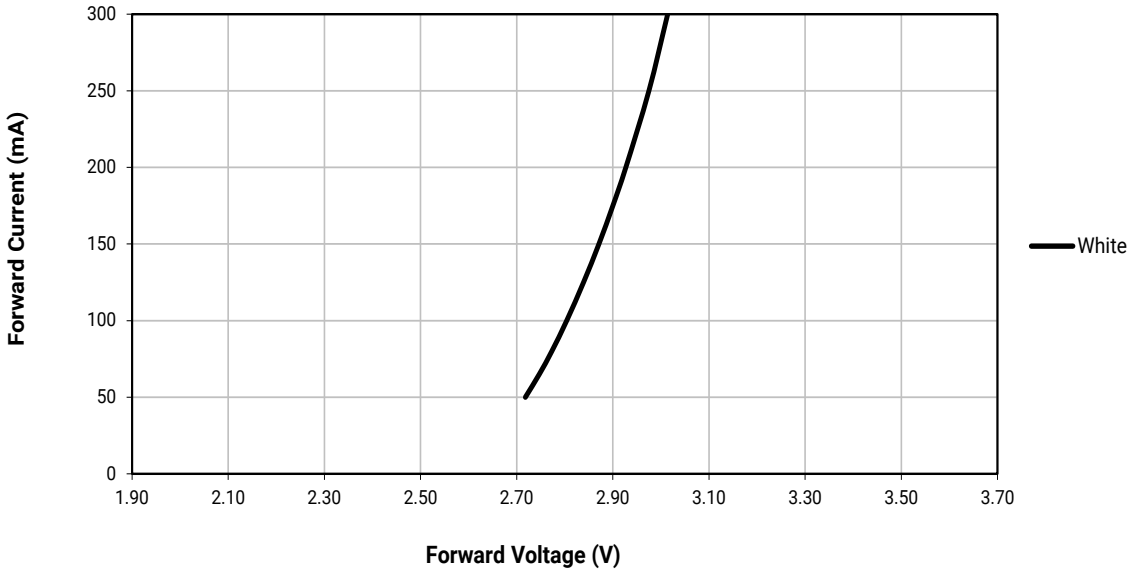
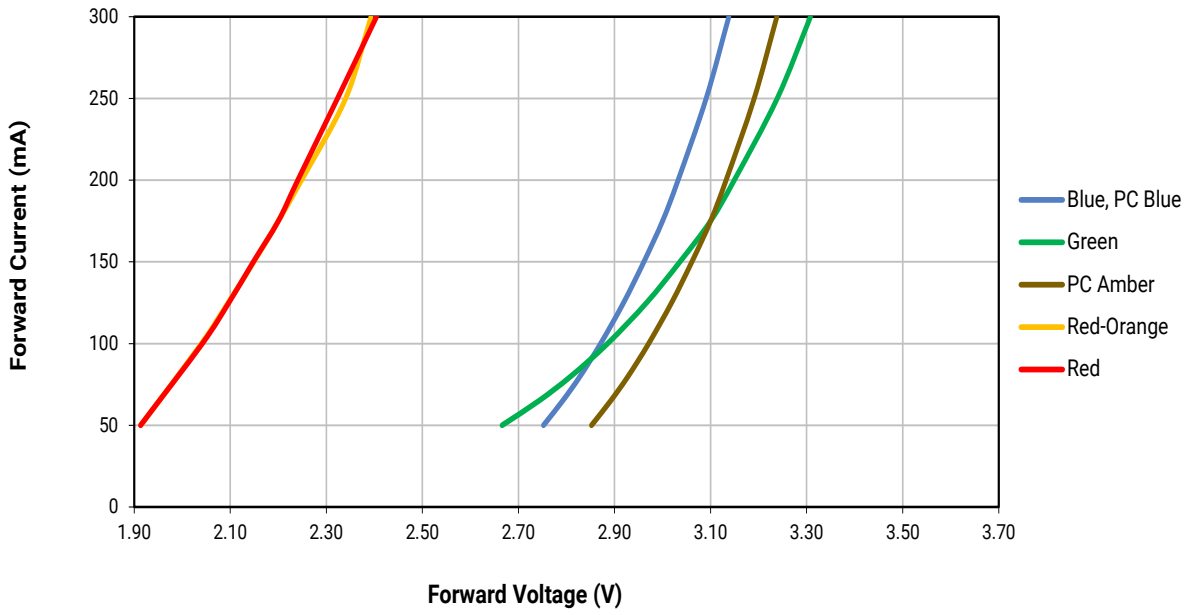
ELECTRICAL CHARACTERISTICS (T_J = 85 °C)



ELECTRICAL CHARACTERISTICS (T_J = 25 °C)



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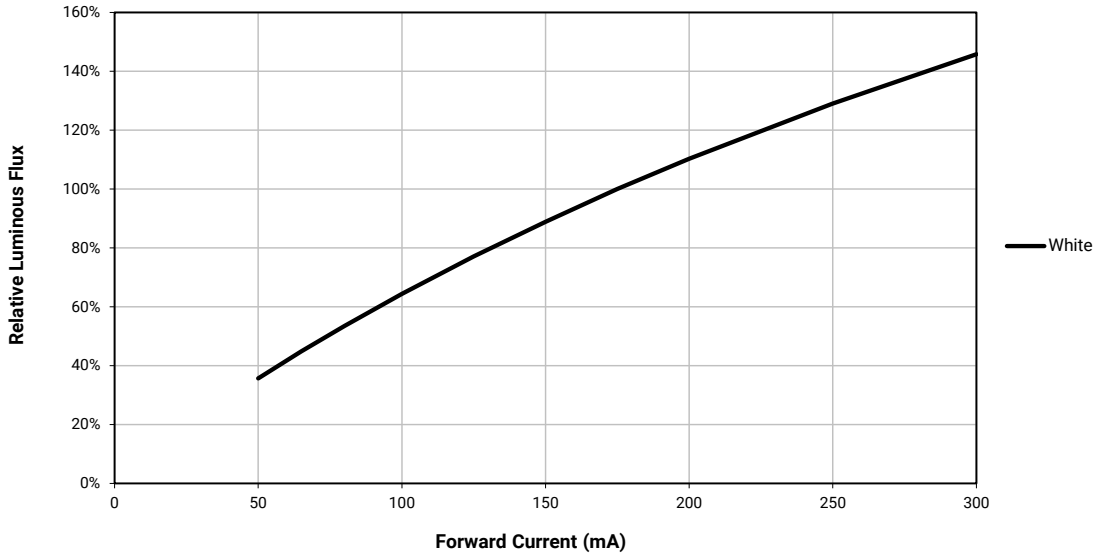
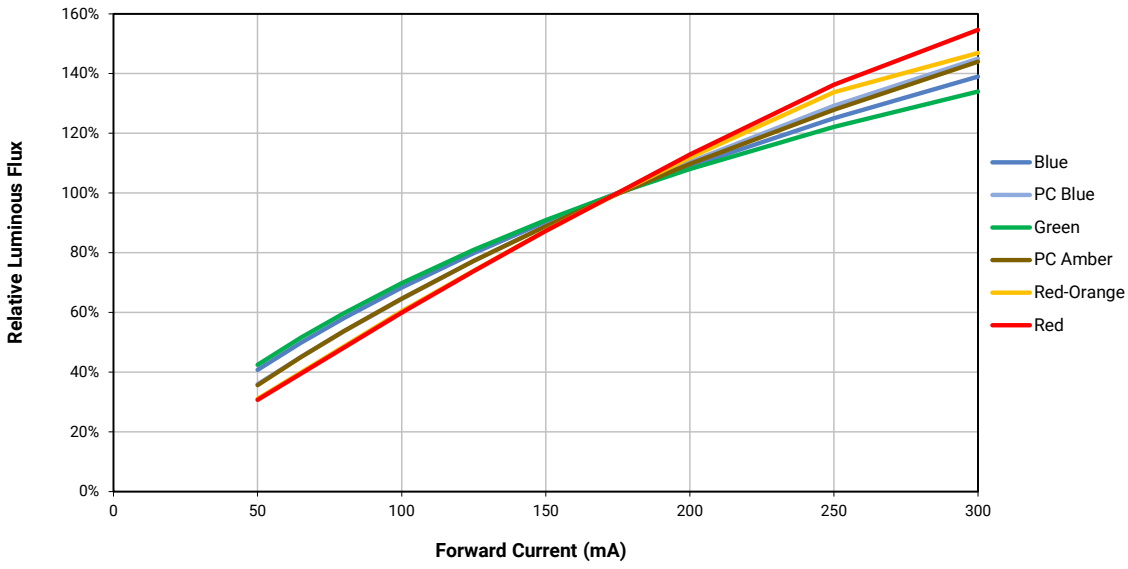
RELATIVE FLUX VS. CURRENT (T_J = 85 °C)



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



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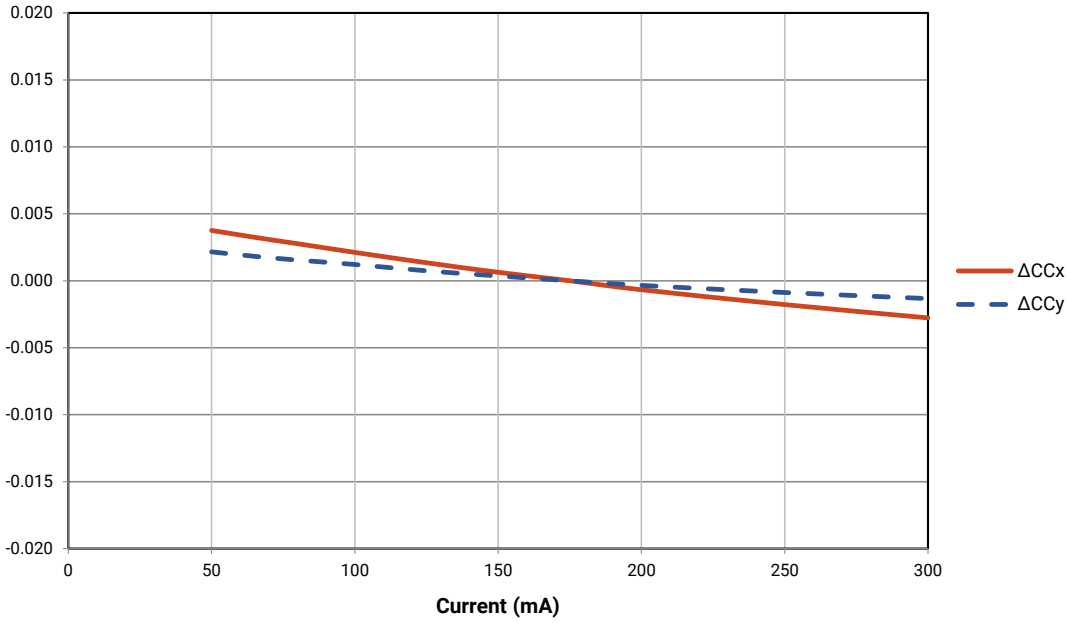
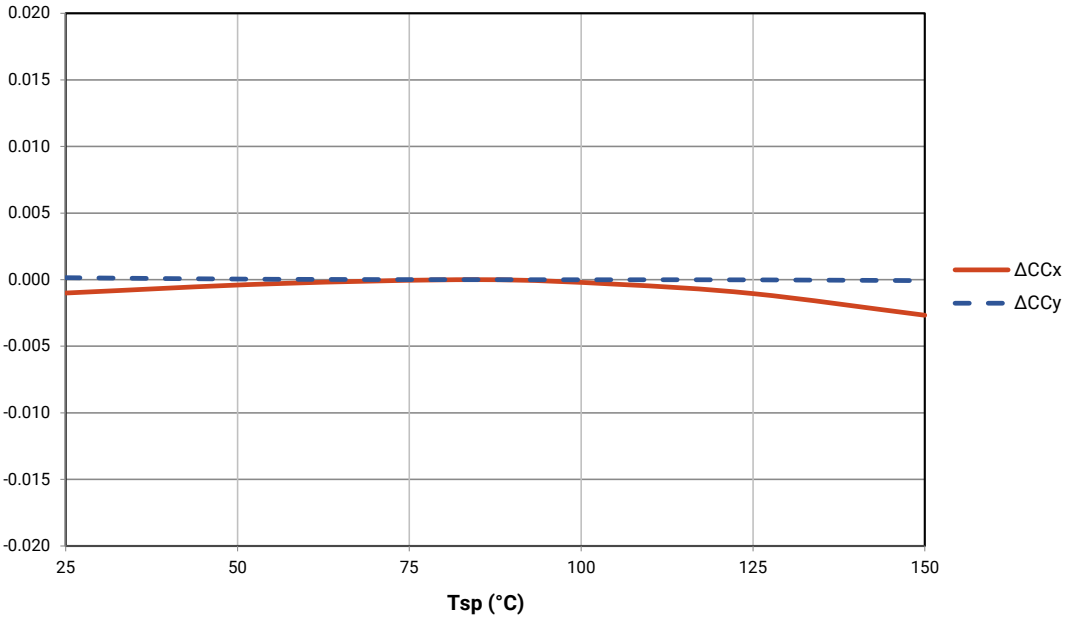
RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE





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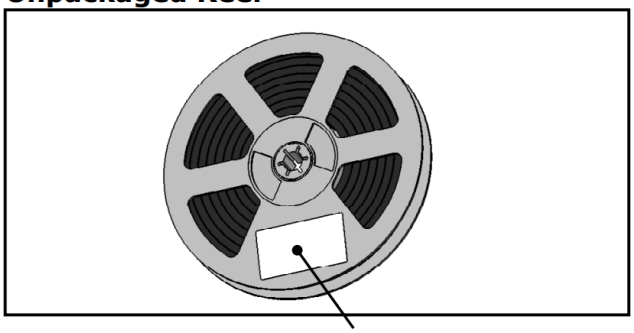
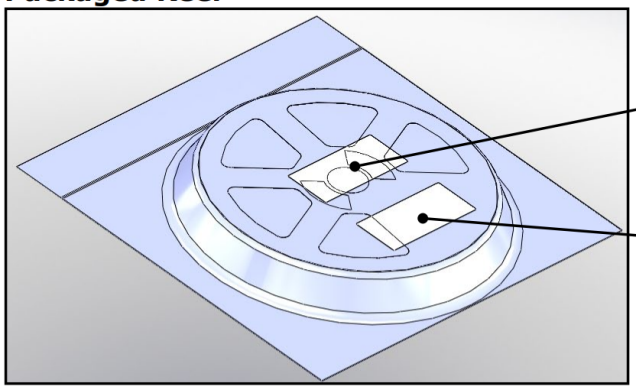
PACKAGING

The diagrams below show the packaging and labels Cree LED uses to ship XLamp XQ-A LEDs. XLamp XQ-A LEDs are shipped in tape loaded on a reel. Each box contains only one reel in a moisture barrier bag.

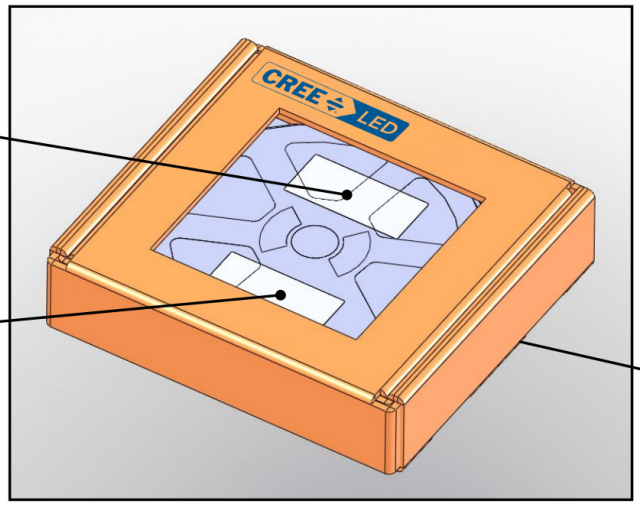
Unpackaged Reel



Packaged Reel



Boxed Reel



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APPENDIX - ORDER CODES NOT FOR NEW DESIGNS

The following order codes are active and valid order codes, but higher performance options are also available. Please see page 7 for order codes of XLamp XQ-A color LEDs that could serve as alternatives for the order codes set forth below.

XQ-A Blue, T_J = 25 °C

Color	Minimum Luminous Flux (lm) @ 175 mA		Dominant Wavelength (nm)				Order Codes
			Minimum		Maximum		
	Group	Flux (lm)	Group	DWL (nm)	Group	DWL (nm)	
Blue	F2	10.7	B3	465	B6	485	XQABLU-00-0000-000000T01
			B3	465	B5	480	XQABLU-00-0000-000000T02

XQ-A Green, T_J = 25 °C

Color	Minimum Luminous Flux (lm) @ 175 mA		Dominant Wavelength (nm)				Order Codes
			Minimum		Maximum		
	Group	Flux (lm)	Group	DWL (nm)	Group	DWL (nm)	
Green	M2	39.8	G2	520	G4	535	XQAGRN-00-0000-000000201
			G2	520	G3	530	XQAGRN-00-0000-000000202
			G3	525	G4	535	XQAGRN-00-0000-000000203
	K3	35.2	G2	520	G4	535	XQAGRN-00-0000-000000Z01
			G2	520	G3	530	XQAGRN-00-0000-000000Z02
			G3	525	G4	535	XQAGRN-00-0000-000000Z03
	K2	30.6	G2	520	G4	535	XQAGRN-00-0000-000000Y01
			G2	520	G3	530	XQAGRN-00-0000-000000Y02
			G3	525	G4	535	XQAGRN-00-0000-000000Y03

Note

- Cree LED 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 27).
- XQ-A 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.

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