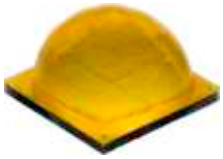
XLamp® XHP70.2 LEDs



PRODUCT DESCRIPTION

The XLamp XHP70.2 LED is the next generation of Extreme High Power LEDs that delivers the lowest system cost through the best lumen density, reliability and color consistency. Built on Cree LED's latest high-power LED technology, the XHP70.2 LED improves the lumen density, voltage characteristics, reliability and optical performance of the XHP70 LED in the same 7.0 mm x 7.0 mm footprint. The new XHP70.2 LED provides an easy drop-in upgrade to achieve higher system LPW for lighting manufacturers with existing XHP70 designs, eliminating redesign costs. Its unparalleled lumen density and longer lifetime at higher operating temperatures also enable new and innovative lighting designs at lower system costs.

FEATURES

- Available in white, and in 3-V version or 6-V & 12-V version (6-V/12-V is configurable by PCB layout)
- Available in 5-step EasyWhite® bins at 2200 K to 5000 K CCT, 3-step EasyWhite bins at 2700 K to 5000 K and 2-step EasyWhite bins at 2700 K to 4000 K CCT
- Available in ANSI white bins at 3000 K to 7000 K CCT
- Available in standard, 70-, 80-, and 90-minimum CRI options
- Binned at 85 °C
- Maximum drive current: 9600 mA (3 V), 4800 mA (6 V), 2400 mA (12 V)
- Low thermal resistance: 0.3 °C/W
- Wide viewing angle: 125°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C
- RoHS and REACH compliant
- UL® recognized component (E349212)

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CHARACTERISTICS

XHP70.2 LEDs are tested and binned in the 3-V and 12-V configurations. See the Mechanical Dimensions section on page 29 for pad layout options.

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point◊	°C/W		0.3	
Viewing angle (FWHM)	degrees		125	
Temperature coefficient of voltage (3 V)	mV/°C		-1.45	
Temperature coefficient of voltage (6 V)*	mV/°C		-2.9	
Temperature coefficient of voltage (12 V)	mV/°C		-5.8	
ESD withstand voltage (HBM per Mil-Std-883D)			Class 3B	
DC forward current (3 V)	mA			9600
DC forward current (6 V)*	mA			4800
DC forward current (12 V)	mA			2400
Reverse voltage	V			1
Forward voltage (3 V, @ 4200 mA, 85 °C)	V		2.8	3.1
Forward voltage (6 V, @ 2100 mA, 85 °C)*	V		5.6	6.2
Forward voltage (12 V, @ 1050 mA, 85 °C)	V		11.2	12.4
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.

* Data for the 6-V configuration are calculated and for reference only.

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EASYWHITE® ORDER CODES SUGGESTED FOR NEW DESIGNS (6-V/12-V)

The following table provides order codes for XLamp XHP70.2 LEDs. For a complete description of how the flux and chromaticity groups are reflected in the bin code and order code nomenclature, please see the Bin and Order Code Formats section (page 25).

Binning condition: T_J = 85 °C; 12 V, I_F = 1050 mA
Reference condition: T_J = 85 °C; 6 V, I_F = 2100 mA

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
5000 K	70		Q2	2100	2312					50E	XHP70B-00-0000-0D0BQ250E
			P4	1965	2164						XHP70B-00-0000-0D0BP450E
			P2	1830	2015						XHP70B-00-0000-0D0BP250E
	80		P2	1830	2015			50G	XHP70B-00-0000-0D0HP250G		
			N4	1710	1883				XHP70B-00-0000-0D0HN450G		
			N2	1590	1751				XHP70B-00-0000-0D0HN250G		
	90		N2	1590	1751			50G	XHP70B-00-0000-0D0UN250G		
			M4	1485	1635				XHP70B-00-0000-0D0UM450G		
			M2	1380	1520				XHP70B-00-0000-0D0UM250G		
4500 K	70		Q2	2100	2312					45E	XHP70B-00-0000-0D0BQ245E
			P4	1965	2164						XHP70B-00-0000-0D0BP445E
			P2	1830	2015						XHP70B-00-0000-0D0BP245E
	80		P2	1830	2015			45G	XHP70B-00-0000-0D0HP245G		
			N4	1710	1883				XHP70B-00-0000-0D0HN445G		
			N2	1590	1751				XHP70B-00-0000-0D0HN245G		
	90		N2	1590	1751			45G	XHP70B-00-0000-0D0UN245G		
			M4	1485	1635				XHP70B-00-0000-0D0UM445G		
			M2	1380	1520				XHP70B-00-0000-0D0UM245G		

Notes
- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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EASYWHITE® ORDER CODES SUGGESTED FOR NEW DESIGNS (6-V/12-V) - CONTINUED

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70		Q2	2100	2312					40E	XHP70B-00-0000-0D0BQ240E
			P4	1965	2164						XHP70B-00-0000-0D0BP440E
			P2	1830	2015						XHP70B-00-0000-0D0BP240E
	80		P2	1830	2015	40H	XHP70B-00-0000-0D0HP240H	40G	XHP70B-00-0000-0D0HP240G		
			N4	1710	1883		XHP70B-00-0000-0D0HN440H		XHP70B-00-0000-0D0HN440G		
			N2	1590	1751		XHP70B-00-0000-0D0HN240H		XHP70B-00-0000-0D0HN240G		
	90		N2	1590	1751	40H	XHP70B-00-0000-0D0UN240H	40G	XHP70B-00-0000-0D0UN240G		
			M4	1485	1635		XHP70B-00-0000-0D0UM440H		XHP70B-00-0000-0D0UM440G		
			M2	1380	1520		XHP70B-00-0000-0D0UM240H		XHP70B-00-0000-0D0UM240G		
3500 K	70		P4	1965	2164					35E	XHP70B-00-0000-0D0BP435E
			P2	1830	2015						XHP70B-00-0000-0D0BP235E
	80		P2	1830	2015	35H	XHP70B-00-0000-0D0HP235H	35G	XHP70B-00-0000-0D0HP235G		
			N4	1710	1883		XHP70B-00-0000-0D0HN435H		XHP70B-00-0000-0D0HN435G		
			N2	1590	1751		XHP70B-00-0000-0D0HN235H		XHP70B-00-0000-0D0HN235G		
	90		N2	1590	1751	35H	XHP70B-00-0000-0D0UN235H	35G	XHP70B-00-0000-0D0UN235G		
			M4	1485	1635		XHP70B-00-0000-0D0UM435H		XHP70B-00-0000-0D0UM435G		
			M2	1380	1520		XHP70B-00-0000-0D0UM235H		XHP70B-00-0000-0D0UM235G		

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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EASYWHITE® ORDER CODES SUGGESTED FOR NEW DESIGNS (6-V/12-V) - CONTINUED

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
3000 K	70		P4	1965	2164					30E	XHP70B-00-0000-0D0BP430E
			P2	1830	2015						XHP70B-00-0000-0D0BP230E
	80		N4	1710	1883	30H	XHP70B-00-0000-0D0HN430H	30G	XHP70B-00-0000-0D0HN430G		
			N2	1590	1751		XHP70B-00-0000-0D0HN230H		XHP70B-00-0000-0D0HN230G		
	90		M2	1380	1520	30H	XHP70B-00-0000-0D0UM230H	30G	XHP70B-00-0000-0D0UM230G		
			K4	1290	1420		XHP70B-00-0000-0D0UK430H		XHP70B-00-0000-0D0UK430G		
			K2	1200	1321		XHP70B-00-0000-0D0UK230H		XHP70B-00-0000-0D0UK230G		
2700 K	80		N2	1590	1751	27H	XHP70B-00-0000-0D0HN227H	27G	XHP70B-00-0000-0D0HN227G		
			M4	1485	1635		XHP70B-00-0000-0D0HM427H		XHP70B-00-0000-0D0HM427G		
	90		K4	1290	1420	27H	XHP70B-00-0000-0D0UK427H	27G	XHP70B-00-0000-0D0UK427G		
			K2	1200	1321		XHP70B-00-0000-0D0UK227H		XHP70B-00-0000-0D0UK227G		
			J4	1120	1233		XHP70B-00-0000-0D0UJ427H		XHP70B-00-0000-0D0UJ427G		
2200 K	70		N2	1590	1751					22E	XHP70B-00-0000-0D0BN222E
			M4	1485	1635						XHP70B-00-0000-0D0BM422E

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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ANSI WHITE ORDER CODES SUGGESTED FOR NEW DESIGNS (3-V)

The following table provides order codes for XLamp XHP70.2 LEDs. For a complete description of how the flux and chromaticity groups are reflected in the bin code and order code nomenclature, please see the Bin and Order Code Formats section (page 25).

Binning condition: T_J = 85 °C; 3 V, I_F = 4200 mA

3-V XHP70.2 LEDs

Nominal CCT	Chromaticity Regions	CRI		Minimum Luminous Flux			Order Code
		Min	Typ	Group	Flux l(m) @ 85 °C	Flux (lm) @ 25 °C*	
7000 K	0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U	0	68	P4	1965	2164	XHP70B-00-0000-0A00P40DT
				P2	1830	2015	XHP70B-00-0000-0A00P20DT
6500 K	1A, 1B, 1C, 1D	0	68	P4	1965	2164	XHP70B-00-0000-0A00P40E1
				P2	1830	2015	XHP70B-00-0000-0A00P20E1
6200 K	0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 2U, 3A, 3B, 3R, 3S	0	68	P4	1965	2164	XHP70B-00-0000-0A00P4051
				P2	1830	2015	XHP70B-00-0000-0A00P2051
5700 K	2A, 2B, 2C, 2D	0	68	P4	1965	2164	XHP70B-00-0000-0A00P40E2
				P2	1830	2015	XHP70B-00-0000-0A00P20E2
5000 K	3A, 3B, 3C, 3D	0	68	P4	1965	2164	XHP70B-00-0000-0A00P40E3
				P2	1830	2015	XHP70B-00-0000-0A00P20E3

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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ANSI WHITE ORDER CODES SUGGESTED FOR NEW DESIGNS (6-V/12-V)

Binning condition: T_J = 85 °C; 12 V, I_F = 1050 mA

Reference condition: T_J = 85 °C; 6 V, I_F = 2100 mA

6-V & 12-V XHP70.2 LEDs

Nominal CCT	Chromaticity Regions	CRI		Minimum Luminous Flux			Order Code
		Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	
7000 K	0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U	0	68	P4	1965	2164	XHP70B-00-0000-0D00P40DT
				P2	1830	2015	XHP70B-00-0000-0D00P20DT
				N4	1710	1883	XHP70B-00-0000-0D00N40DT
		70		P4	1965	2164	XHP70B-00-0000-0D0BP40DT
				P2	1830	2015	XHP70B-00-0000-0D0BP20DT
				N4	1710	1883	XHP70B-00-0000-0D0BN40DT
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20DT
				N4	1710	1883	XHP70B-00-0000-0D0HN40DT
				N2	1590	1751	XHP70B-00-0000-0D0HN20DT
6500 K	1A, 1B, 1C, 1D	0	68	P4	1965	2164	XHP70B-00-0000-0D00P40E1
				P2	1830	2015	XHP70B-00-0000-0D00P20E1
				N4	1710	1883	XHP70B-00-0000-0D00N40E1
		70		P4	1965	2164	XHP70B-00-0000-0D0BP40E1
				P2	1830	2015	XHP70B-00-0000-0D0BP20E1
				N4	1710	1883	XHP70B-00-0000-0D0BN40E1
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20E1
				N4	1710	1883	XHP70B-00-0000-0D0HN40E1
				N2	1590	1751	XHP70B-00-0000-0D0HN20E1
6000 K	1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 2U	0	68	P4	1965	2164	XHP70B-00-0000-0D00P40DV
				P2	1830	2015	XHP70B-00-0000-0D00P20DV
				N4	1710	1883	XHP70B-00-0000-0D00N40DV
		70		P4	1965	2164	XHP70B-00-0000-0D0BP40DV
				P2	1830	2015	XHP70B-00-0000-0D0BP20DV
				N4	1710	1883	XHP70B-00-0000-0D0BN40DV
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20DV
				N4	1710	1883	XHP70B-00-0000-0D0HN40DV
				N2	1590	1751	XHP70B-00-0000-0D0HN20DV
		90		M4	1485	1635	XHP70B-00-0000-0D0UM40DV
				M2	1380	1520	XHP70B-00-0000-0D0UM20DV

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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ANSI WHITE ORDER CODES SUGGESTED FOR NEW DESIGNS (6-V/12V) - CONTINUED

Nominal CCT	Chromaticity Regions	CRI		Minimum Luminous Flux			Order Code
		Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	
5700 K	2A, 2B, 2C, 2D	0	68	Q2	2100	2312	XHP70B-00-0000-0D00Q20E2
				P4	1965	2164	XHP70B-00-0000-0D00P40E2
				P2	1830	2015	XHP70B-00-0000-0D00P20E2
		70		Q2	2100	2312	XHP70B-00-0000-0D0BQ20E2
				P4	1965	2164	XHP70B-00-0000-0D0BP40E2
				P2	1830	2015	XHP70B-00-0000-0D0BP20E2
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20E2
				N4	1710	1883	XHP70B-00-0000-0D0HN40E2
				N2	1590	1751	XHP70B-00-0000-0D0HN20E2
		90		N2	1590	1751	XHP70B-00-0000-0D0UN20E2
				M4	1485	1635	XHP70B-00-0000-0D0UM40E2
				M2	1380	1520	XHP70B-00-0000-0D0UM20E2
5000 K	3A, 3B, 3C, 3D	0	68	Q2	2100	2312	XHP70B-00-0000-0D00Q20E3
				P4	1965	2164	XHP70B-00-0000-0D00P40E3
				P2	1830	2015	XHP70B-00-0000-0D00P20E3
		70		Q2	2100	2312	XHP70B-00-0000-0D0BQ20E3
				P4	1965	2164	XHP70B-00-0000-0D0BP40E3
				P2	1830	2015	XHP70B-00-0000-0D0BP20E3
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20E3
				N4	1710	1883	XHP70B-00-0000-0D0HN40E3
				N2	1590	1751	XHP70B-00-0000-0D0HN20E3
		90		N2	1590	1751	XHP70B-00-0000-0D0UN20E3
				M4	1485	1635	XHP70B-00-0000-0D0UM40E3
				M2	1380	1520	XHP70B-00-0000-0D0UM20E3
4500 K	4A, 4B, 4C, 4D	0	68	Q2	2100	2312	XHP70B-00-0000-0D00Q20E4
				P4	1965	2164	XHP70B-00-0000-0D00P40E4
				P2	1830	2015	XHP70B-00-0000-0D00P20E4
		70		Q2	2100	2312	XHP70B-00-0000-0D0BQ20E4
				P4	1965	2164	XHP70B-00-0000-0D0BP40E4
				P2	1830	2015	XHP70B-00-0000-0D0BP20E4
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20E4
				N4	1710	1883	XHP70B-00-0000-0D0HN40E4
				N2	1590	1751	XHP70B-00-0000-0D0HN20E4
		90		N2	1590	1751	XHP70B-00-0000-0D0UN20E4
				M4	1485	1635	XHP70B-00-0000-0D0UM40E4
				M2	1380	1520	XHP70B-00-0000-0D0UM20E4

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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ANSI WHITE ORDER CODES SUGGESTED FOR NEW DESIGNS (6-V/12V) - CONTINUED

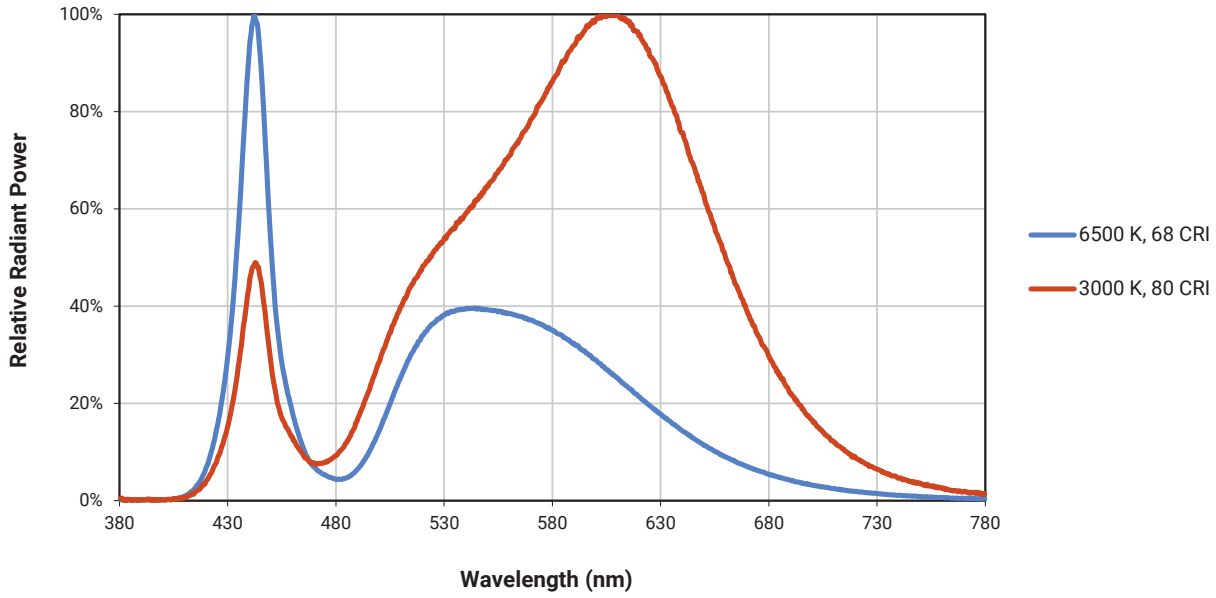
Nominal CCT	Chromaticity Regions	CRI		Minimum Luminous Flux			Order Code
		Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	
4000 K	5A, 5B, 5C, 5D	0	68	Q2	2100	2312	XHP70B-00-0000-0D00Q20E5
				P4	1965	2164	XHP70B-00-0000-0D00P40E5
				P2	1830	2015	XHP70B-00-0000-0D00P20E5
		70		Q2	2100	2312	XHP70B-00-0000-0D0BQ20E5
				P4	1965	2164	XHP70B-00-0000-0D0BP40E5
				P2	1830	2015	XHP70B-00-0000-0D0BP20E5
		80		P2	1830	2015	XHP70B-00-0000-0D0HP20E5
				N4	1710	1883	XHP70B-00-0000-0D0HN40E5
				N2	1590	1751	XHP70B-00-0000-0D0HN20E5
		90		N2	1590	1751	XHP70B-00-0000-0D0UN20E5
				M4	1485	1635	XHP70B-00-0000-0D0UM40E5
				M2	1380	1520	XHP70B-00-0000-0D0UM20E5
3500 K	6A, 6B, 6C, 6D	70		P4	1965	2164	XHP70B-00-0000-0D0BP40E6
				P2	1830	2015	XHP70B-00-0000-0D0BP20E6
3000 K	7A, 7B, 7C, 7D	70		P4	1965	2164	XHP70B-00-0000-0D0BP40E7
				P2	1830	2015	XHP70B-00-0000-0D0BP20E7

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

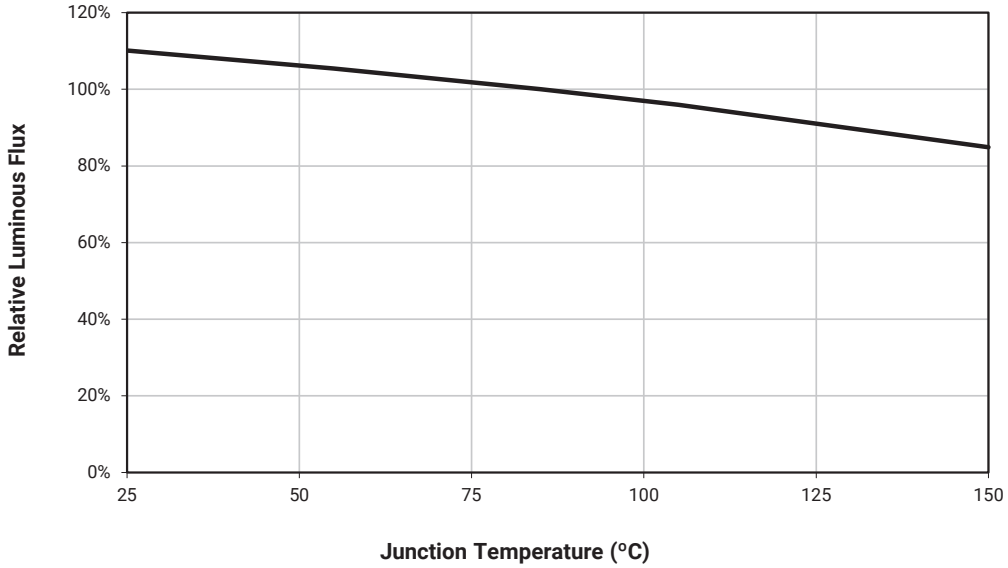
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RELATIVE SPECTRAL POWER DISTRIBUTION



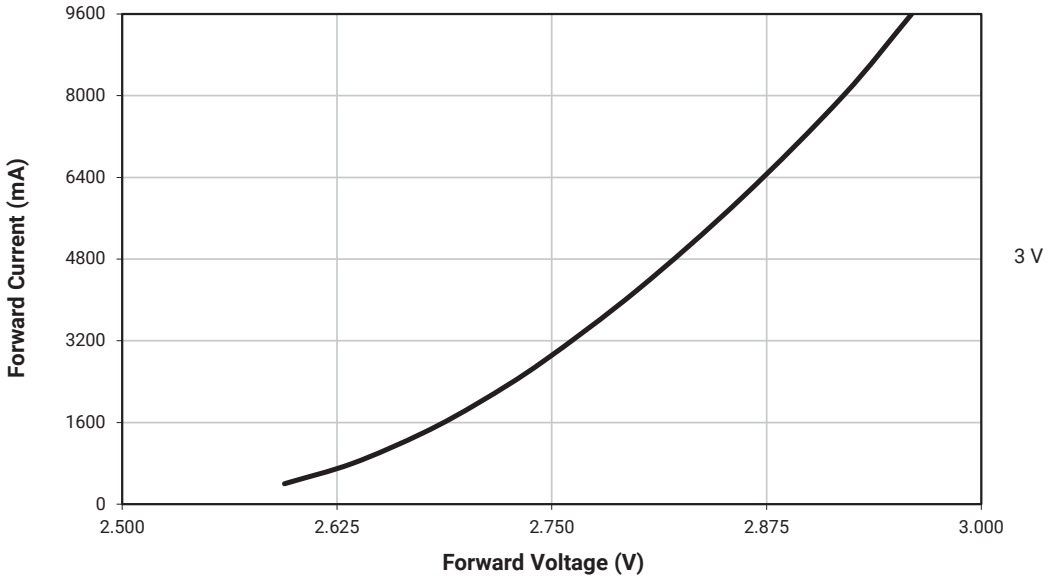
RELATIVE FLUX VS. JUNCTION TEMPERATURE

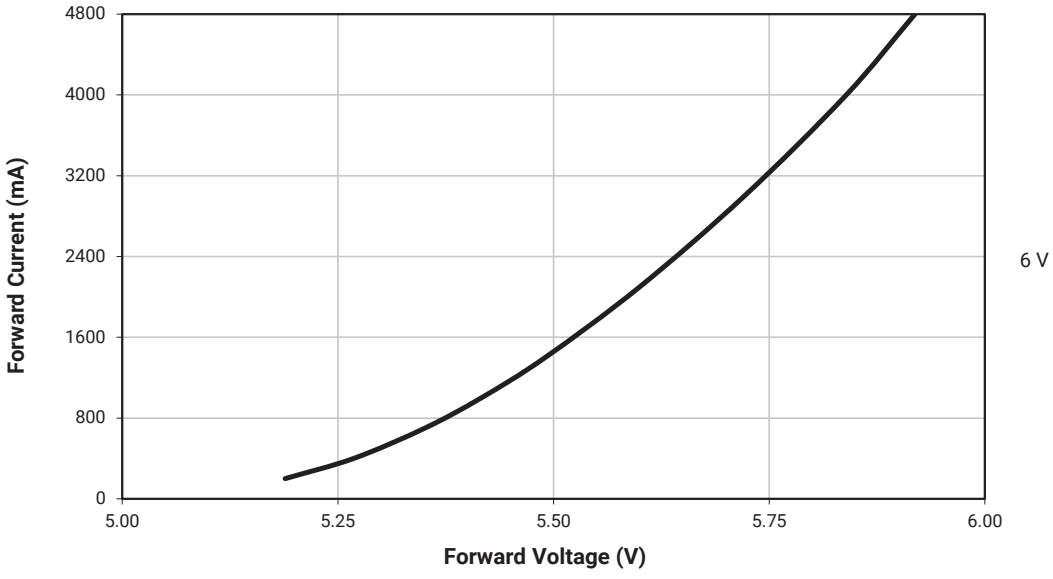
Reference condition: 3 V, I_F = 4200 mA; 6 V, I_F = 2100 mA; 12 V, I_F = 1050 mA



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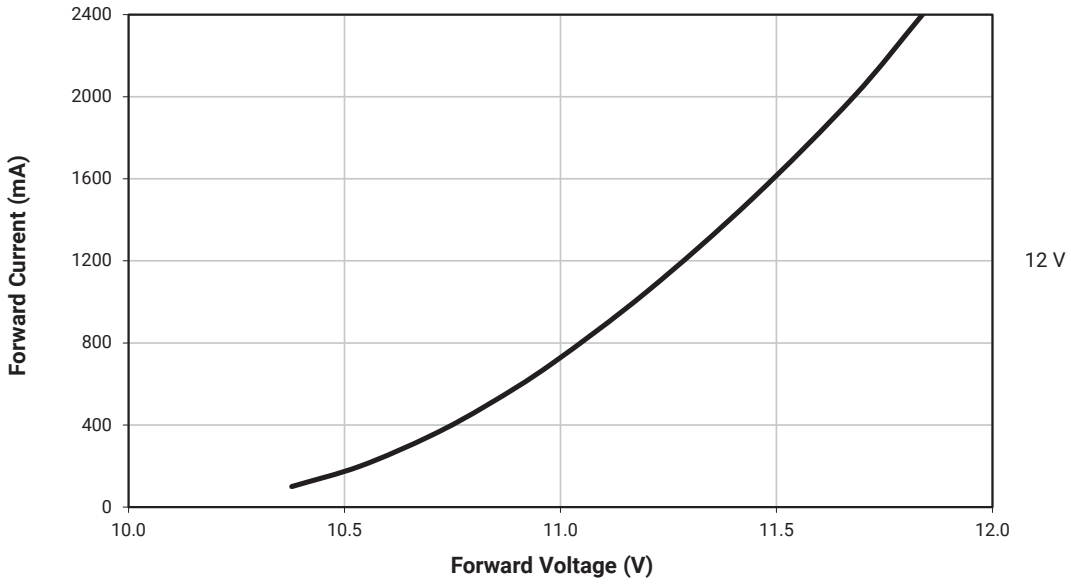
ELECTRICAL CHARACTERISTICS (T_J = 85 °C)



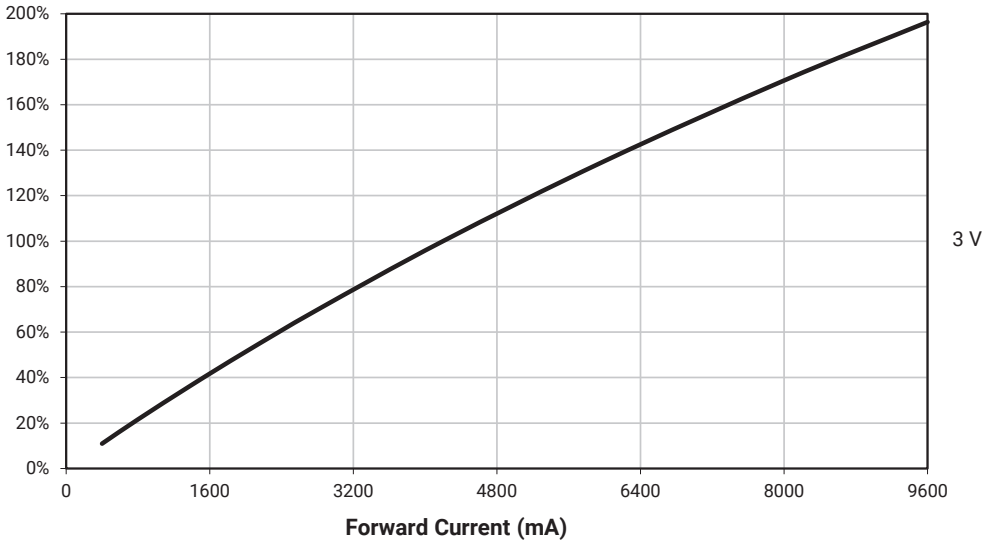


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ELECTRICAL CHARACTERISTICS (T_J = 85 °C) - CONTINUED

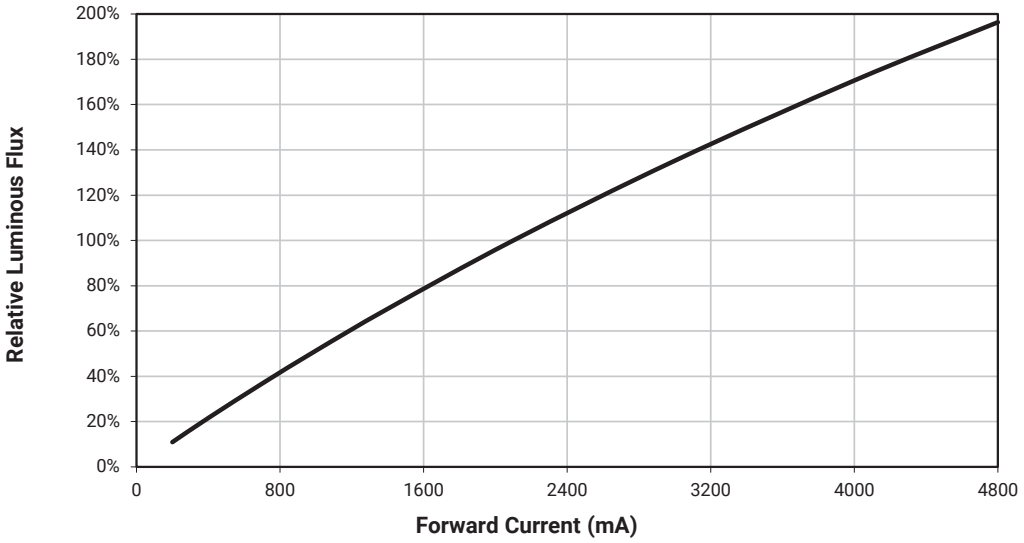


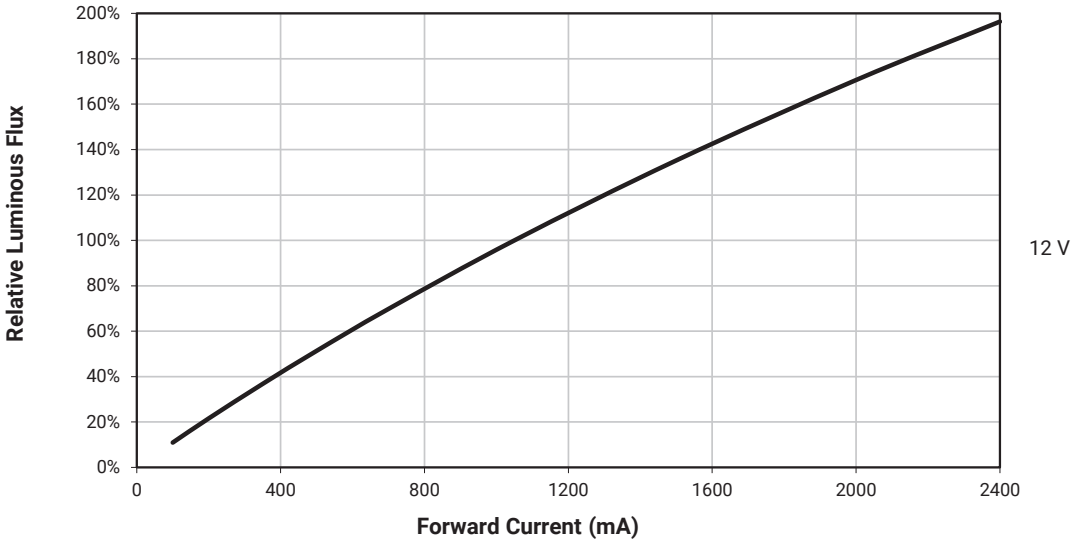
RELATIVE FLUX VS. CURRENT (T_J = 85 °C)



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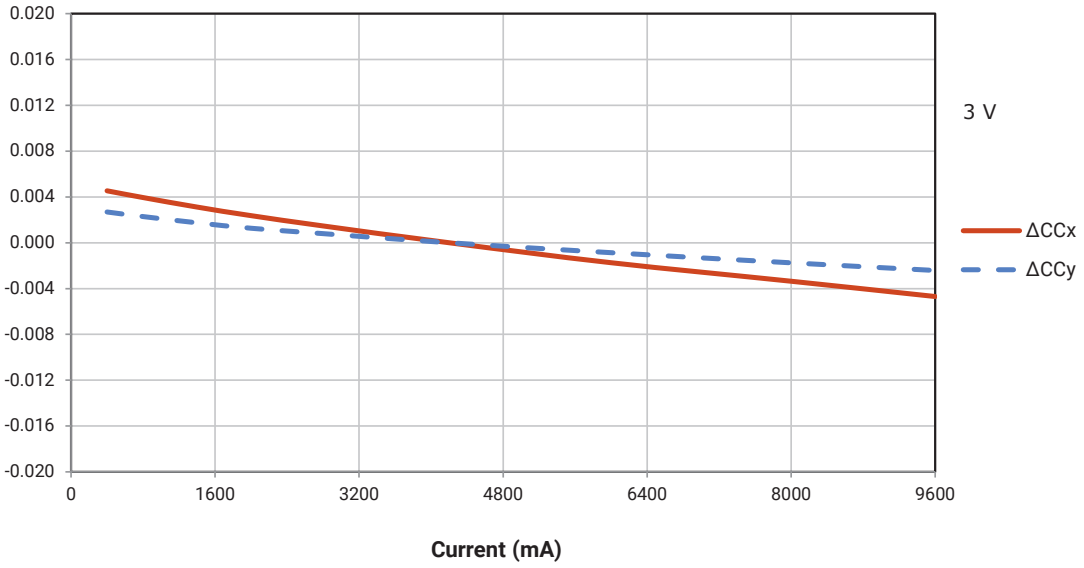
RELATIVE FLUX VS. CURRENT (T_J = 85 °C) - CONTINUED

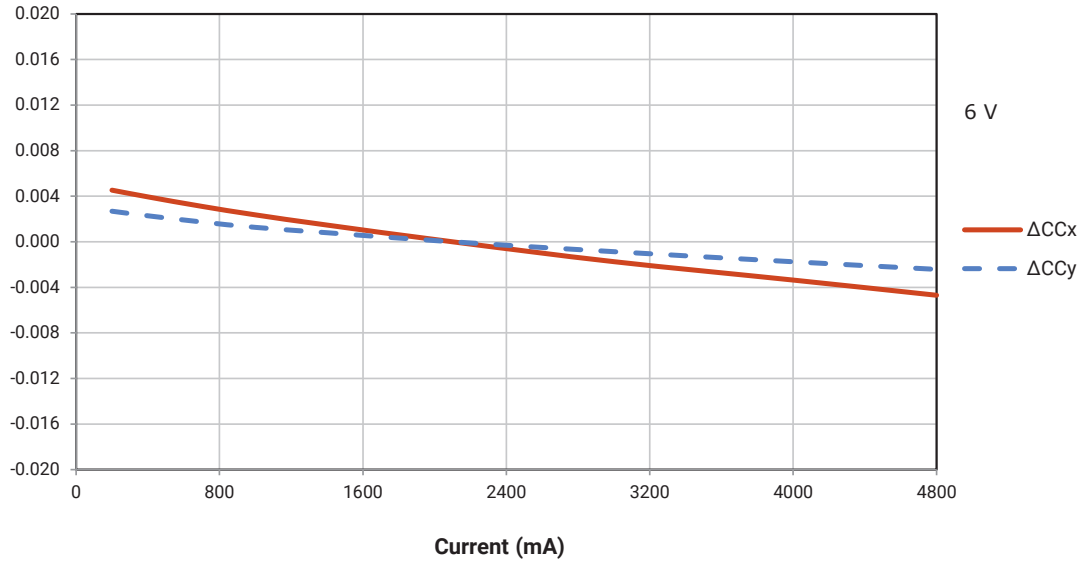




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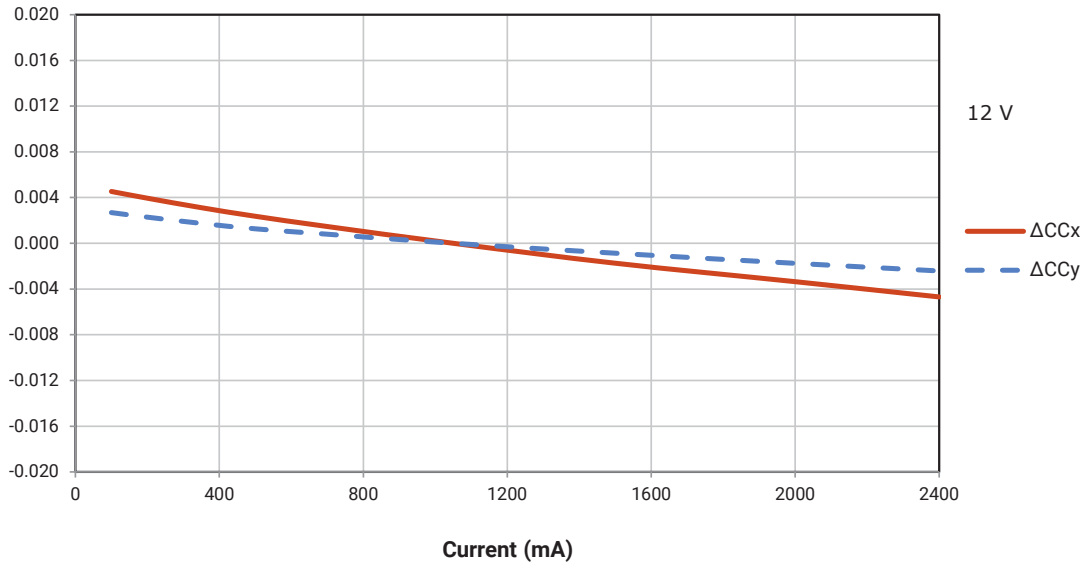
RELATIVE CHROMATICITY VS CURRENT (WARM WHITE)





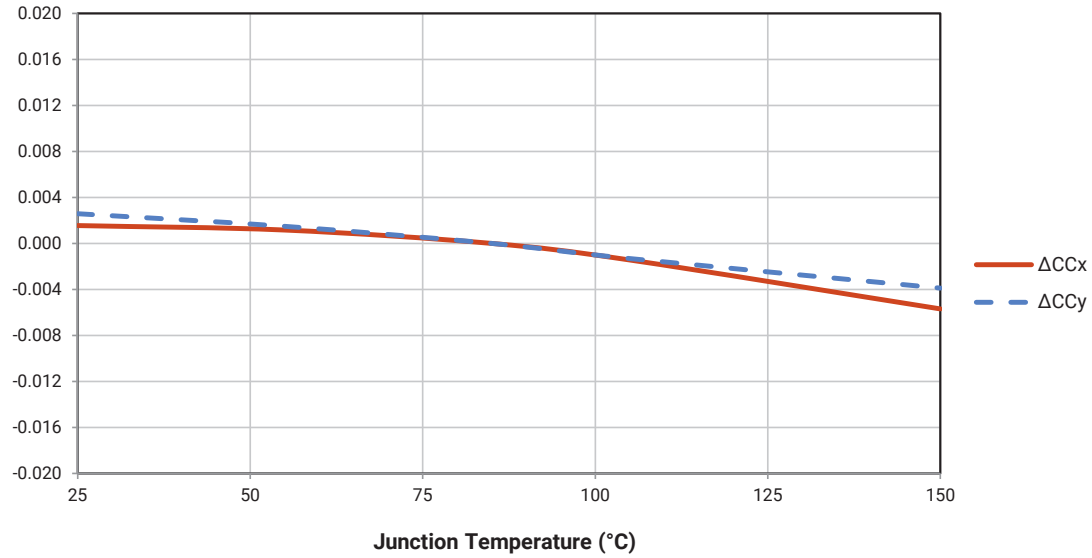
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RELATIVE CHROMATICITY VS CURRENT (WARM WHITE) - CONTINUED



RELATIVE CHROMATICITY VS TEMPERATURE (WARM WHITE)

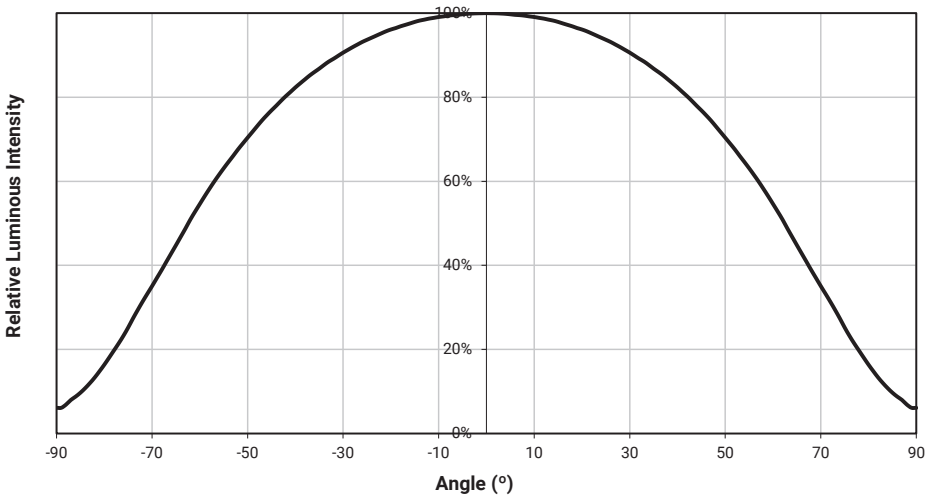
Reference condition: 3 V, I_F = 4200 mA; 6 V, I_F = 2100 mA; 12 V, I_F = 1050 mA



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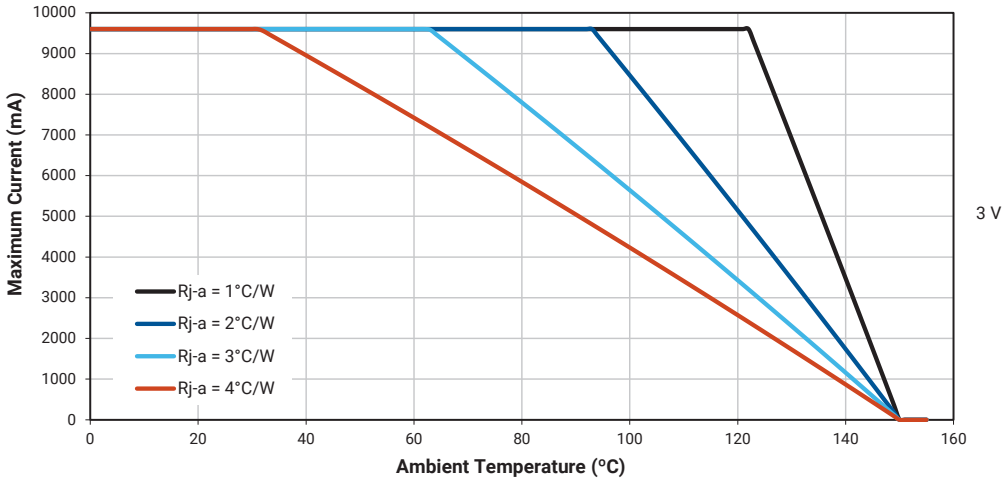
TYPICAL SPATIAL DISTRIBUTION

Reference condition: T_J = 85 °C; 3 V, I_F = 4200 mA; 6 V, I_F = 2100 mA; 12 V, I_F = 1050 mA



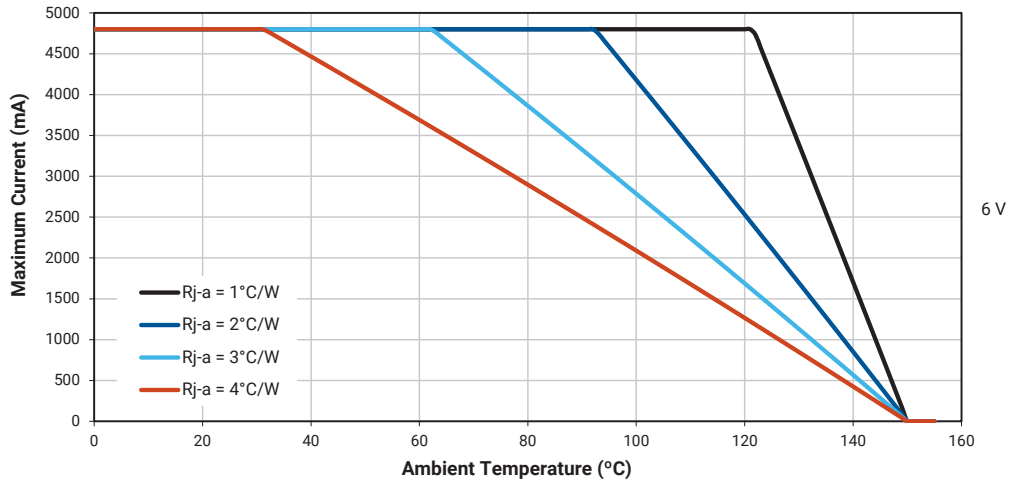
THERMAL DESIGN

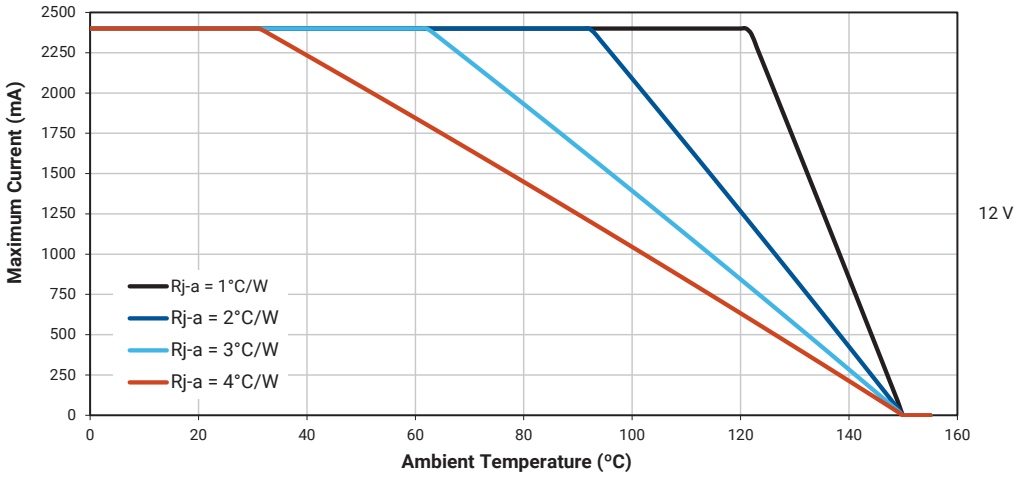
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



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THERMAL DESIGN - CONTINUED





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PERFORMANCE GROUPS - LUMINOUS FLUX (T_J = 85 °C)

XLamp XHP70.2 LEDs are tested for luminous flux and placed into one of the following luminous-flux groups.

Group Code	Minimum Luminous Flux	Maximum Luminous Flux
J4	1120	1200
K2	1200	1290
K4	1290	1380
M2	1380	1485
M4	1485	1590
N2	1590	1710
N4	1710	1830
P2	1830	1965
P4	1965	2100
Q2	2100	2260

PERFORMANCE GROUPS - CHROMATICITY

XLamp XHP70.2 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

EasyWhite Color Temperatures – 2-Step			
Code	CCT	x	y
40H	4000 K	0.3777	0.3739
		0.3797	0.3816
		0.3861	0.3855
		0.3838	0.3777
35H	3500 K	0.4022	0.3858
		0.4053	0.3942
		0.4125	0.3977
		0.4091	0.3891
30H	3000 K	0.4287	0.3975
		0.4328	0.4064
		0.4390	0.4086
		0.4347	0.3996
27H	2700 K	0.4524	0.4048
		0.4574	0.4140
		0.4633	0.4154
		0.4581	0.4062

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PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

EasyWhite Color Temperatures – 3-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
50G	5000 K	0.3447	0.3553	0.00840	0.00312	65.0
45G	4500 K	0.3611	0.3658	0.00852	0.00330	61.5
40G	4000 K	0.3818	0.3797	0.00939	0.00402	53.7
35G	3500 K	0.4073	0.3917	0.00927	0.00414	54.0
30G	3000 K	0.4338	0.4030	0.00834	0.00408	53.2
27G	2700 K	0.4577	0.4099	0.00834	0.00420	48.5

EasyWhite Color Temperatures – 5-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
50E	5000 K	0.3447	0.3553	0.01400	0.00520	65.0
45E	4500 K	0.3611	0.3658	0.01420	0.00550	61.5
40E	4000 K	0.3818	0.3797	0.01565	0.00670	53.7
35E	3500 K	0.4073	0.3917	0.01545	0.00690	54.0
30E	3000 K	0.4338	0.4030	0.01390	0.00680	53.2
22E	2200 K	0.5066	0.4158	0.01630	0.00800	45.5

ANSI White Bins			
CCT	Bin Code	x	y
7000 K	0A0	0.2950	0.2970
		0.2920	0.3060
		0.2984	0.3133
		0.3009	0.3042
	0B0	0.2920	0.3060
		0.2895	0.3135
		0.2962	0.3220
		0.2984	0.3133
	0C0	0.2984	0.3133
		0.2962	0.3220
		0.3028	0.3304
		0.3048	0.3207
	0D0	0.2984	0.3133
		0.3048	0.3207
		0.3068	0.3113
		0.3009	0.3042

ANSI White Bins			
CCT	Bin Code	x	y
7000 K	0R0	0.2980	0.2880
		0.2950	0.2970
		0.3009	0.3042
		0.3037	0.2937
	0S0	0.2895	0.3135
		0.2870	0.3210
		0.2937	0.3312
		0.2962	0.3220
	0T0	0.2962	0.3220
		0.2937	0.3312
		0.3005	0.3415
		0.3028	0.3304
	0U0	0.3037	0.2937
		0.3009	0.3042
		0.3068	0.3113
		0.3093	0.2993

ANSI White Bins			
CCT	Bin Code	x	y
7000 K	1A0	0.3048	0.3207
		0.3130	0.3290
		0.3144	0.3186
		0.3068	0.3113
	1B0	0.3028	0.3304
		0.3115	0.3391
		0.3130	0.3290
		0.3048	0.3207
	1C0	0.3115	0.3391
		0.3205	0.3481
		0.3213	0.3373
		0.3130	0.3290
	1D0	0.3130	0.3290
		0.3213	0.3373
		0.3221	0.3261
		0.3144	0.3186

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PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

ANSI White Bins			
CCT	Bin Code	x	y
7000 K	1R0	0.3068	0.3113
		0.3144	0.3186
		0.3161	0.3059
		0.3093	0.2993
	1S0	0.3005	0.3415
		0.3099	0.3509
		0.3115	0.3391
		0.3028	0.3304
	1T0	0.3099	0.3509
		0.3196	0.3602
		0.3205	0.3481
		0.3115	0.3391
	1U0	0.3144	0.3186
		0.3221	0.3261
		0.3231	0.3120
		0.3161	0.3059

ANSI White Bins			
CCT	Bin Code	x	y
6000 K	2A0	0.3215	0.3350
		0.3290	0.3417
		0.3290	0.3300
		0.3222	0.3243
	2B0	0.3207	0.3462
		0.3290	0.3538
		0.3290	0.3417
		0.3215	0.3350
	2C0	0.3290	0.3538
		0.3376	0.3616
		0.3371	0.3490
		0.3290	0.3417
	2D0	0.3290	0.3417
		0.3371	0.3490
		0.3366	0.3369
		0.3290	0.3300

ANSI White Bins			
CCT	Bin Code	x	y
6000 K	2R0	0.3222	0.3243
		0.3290	0.3300
		0.3290	0.3180
		0.3231	0.3120
	2S0	0.3196	0.3602
		0.3290	0.3690
		0.3290	0.3538
		0.3207	0.3462
	2T0	0.3290	0.3690
		0.3381	0.3762
		0.3376	0.3616
		0.3290	0.3538
	2U0	0.3290	0.3300
		0.3366	0.3369
		0.3361	0.3245
		0.3290	0.3180

ANSI White Bins			
CCT	Bin Code	x	y
5000 K	3A0	0.3371	0.3490
		0.3451	0.3554
		0.3440	0.3427
		0.3366	0.3369
	3B0	0.3376	0.3616
		0.3463	0.3687
		0.3451	0.3554
		0.3371	0.3490
	3C0	0.3463	0.3687
		0.3551	0.3760
		0.3533	0.3620
		0.3451	0.3554
	3D0	0.3451	0.3554
		0.3533	0.3620
		0.3515	0.3487
		0.3440	0.3427

ANSI White Bins			
CCT	Bin Code	x	y
4500 K	4A0	0.3530	0.3597
		0.3615	0.3659
		0.3512	0.3465
		0.3515	0.3487
	4B0	0.3548	0.3736
		0.3641	0.3804
		0.3530	0.3597
		0.3533	0.362
	4C0	0.3641	0.3804
		0.3736	0.3874
		0.3702	0.3722
		0.3615	0.3659
	4D0	0.3615	0.3659
		0.3702	0.3722
		0.3670	0.3578
		0.3590	0.3521

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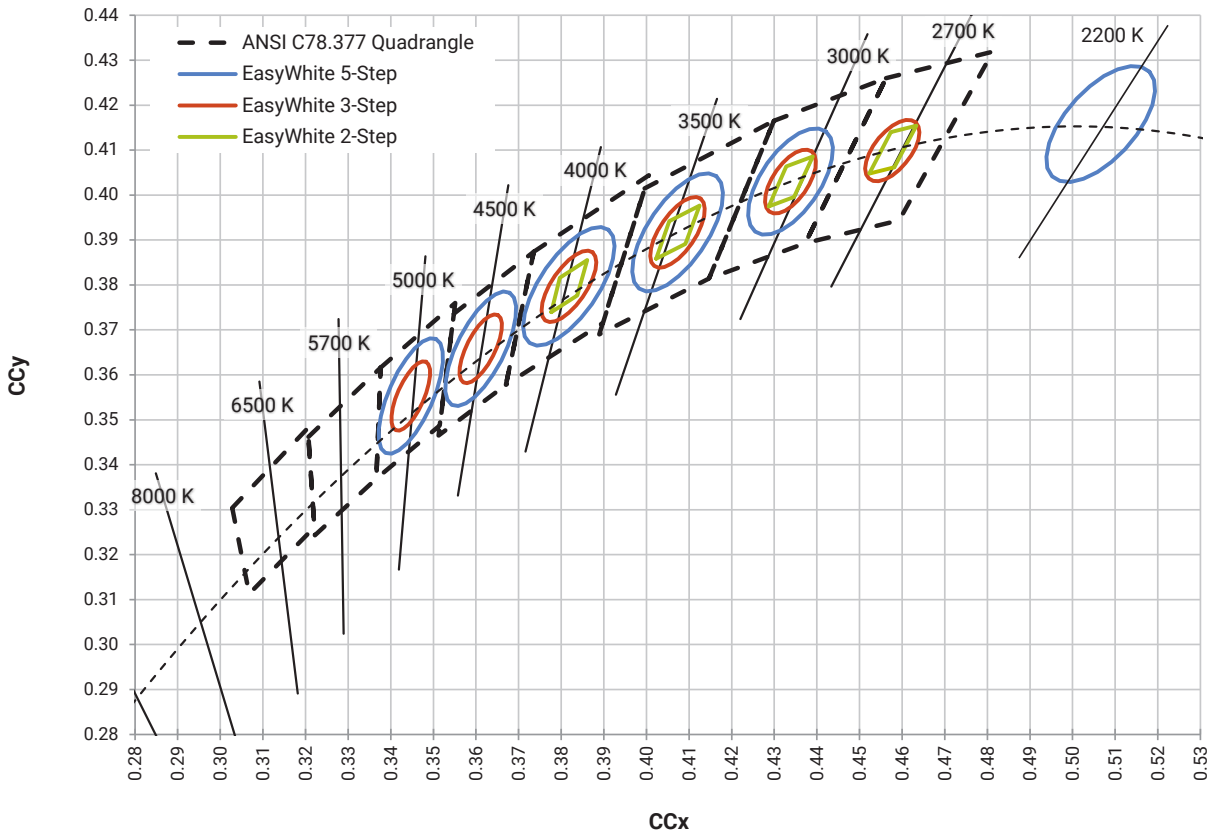
PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

ANSI White Bins			
CCT	Bin Code	x	y
4000 K	5A0	0.3670	0.3578
		0.3702	0.3722
		0.3825	0.3798
		0.3783	0.3646
	5B0	0.3702	0.3722
		0.3736	0.3874
		0.3869	0.3958
		0.3825	0.3798
	5C0	0.3825	0.3798
		0.3869	0.3958
		0.4006	0.4044
		0.3950	0.3875
	5D0	0.3783	0.3646
		0.3825	0.3798
		0.3950	0.3875
		0.3898	0.3716

ANSI White Bins			
CCT	Bin Code	x	y
3500 K	6A0	0.3889	0.3690
		0.3941	0.3848
		0.4080	0.3916
		0.4017	0.3751
	6B0	0.3]941	0.3848
		0.3996	0.4015
		0.4146	0.4089
		0.4080	0.3916
	6C0	0.4080	0.3916
		0.4146	0.4089
		0.4299	0.4165
		0.4221	0.3984
	6D0	0.4017	0.3751
		0.4080	0.3916
		0.4221	0.3984
		0.4147	0.3814

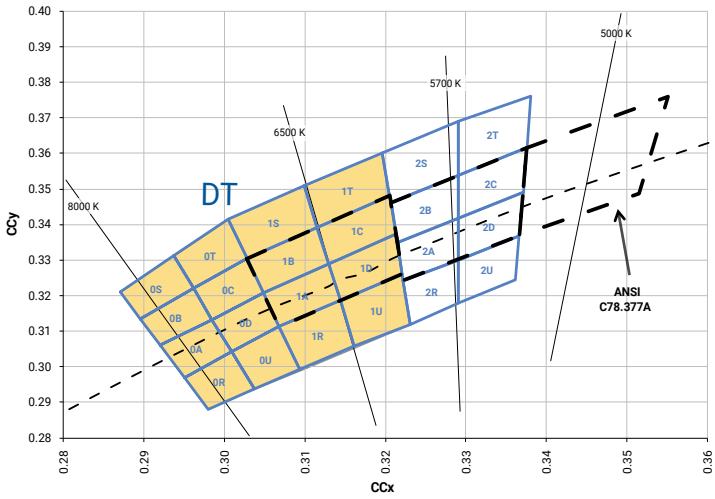
ANSI White Bins			
CCT	Bin Code	x	y
3000 K	7A0	0.4147	0.3814
		0.4221	0.3984
		0.4342	0.4028
		0.4259	0.3853
	7B0	0.4221	0.3984
		0.4299	0.4165
		0.4430	0.4212
		0.4342	0.4028
	7C0	0.4342	0.4028
		0.4430	0.4212
		0.4562	0.4260
		0.4465	0.4071
	7D0	0.4259	0.3853
		0.4342	0.4028
		0.4465	0.4071
		0.4373	0.3893

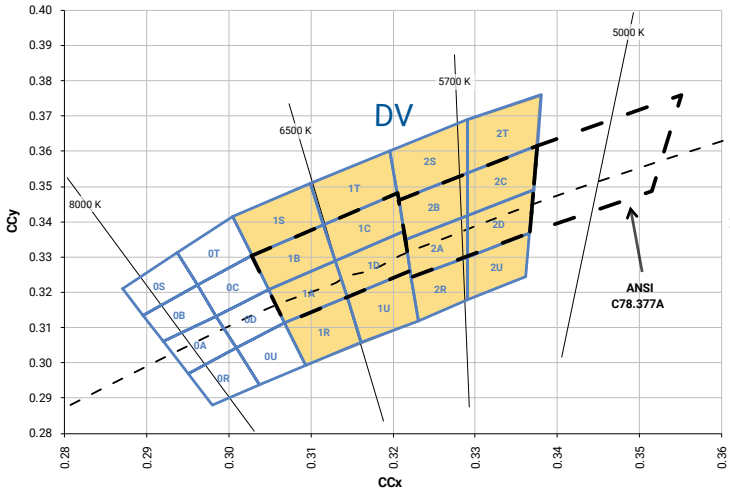
EASYWHITE® CHROMATICITY REGIONS PLOTTED ON THE CIE 1931 CURVE

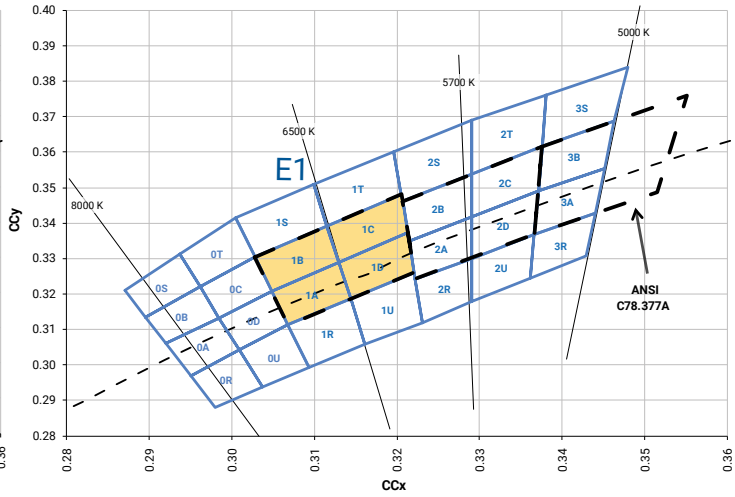


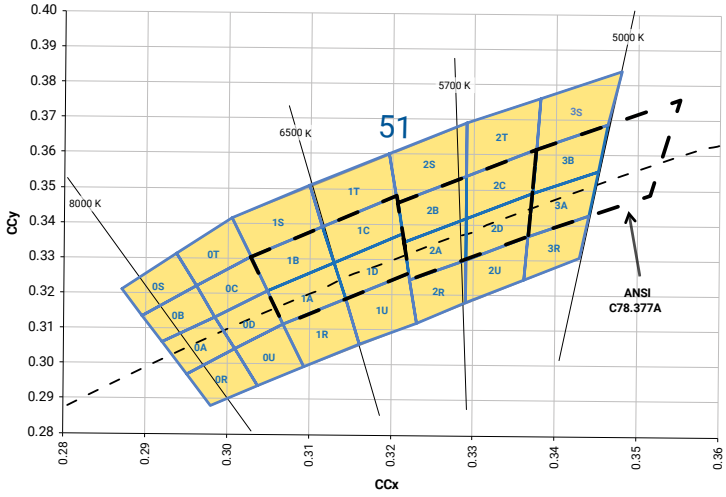
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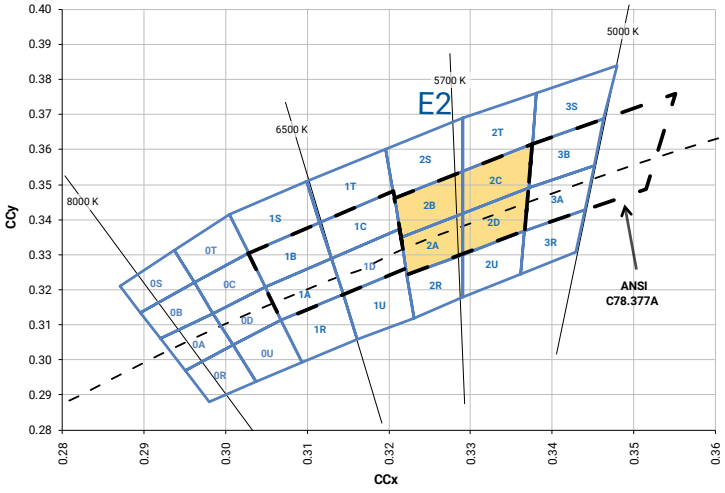
ANSI STANDARD COOL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS





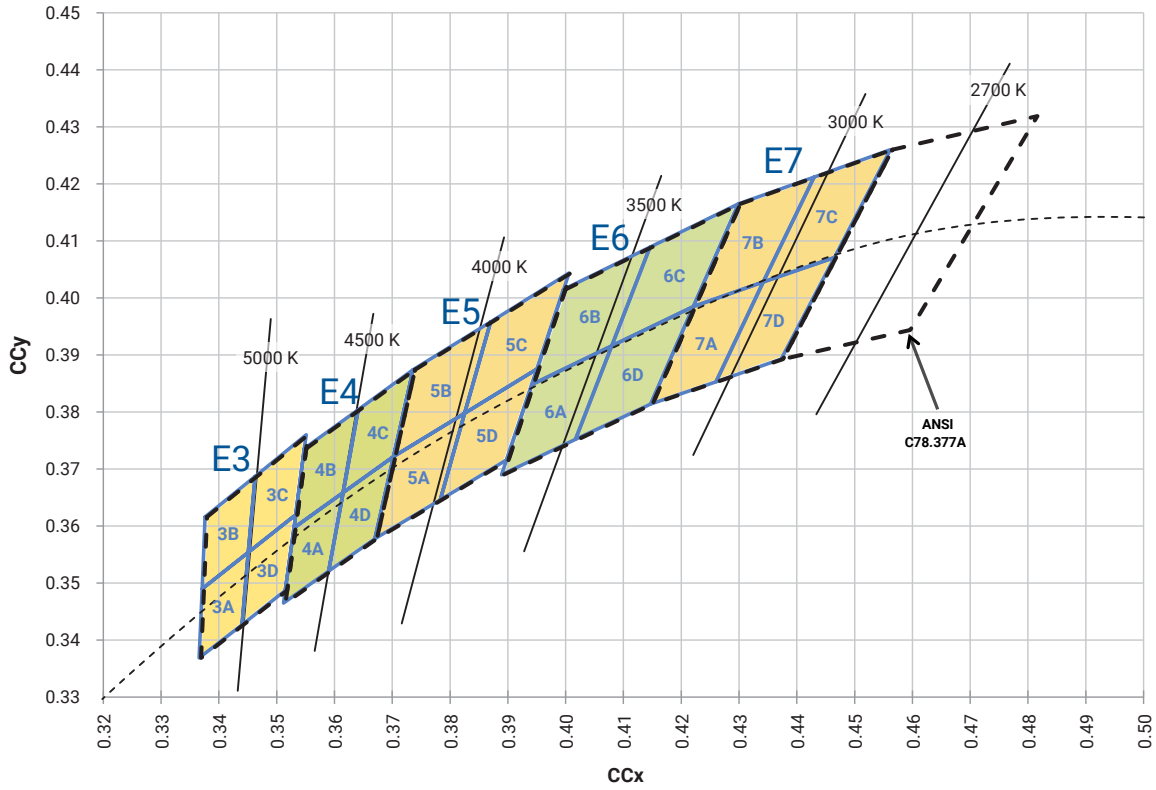






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STANDARD WARM AND NEUTRAL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS

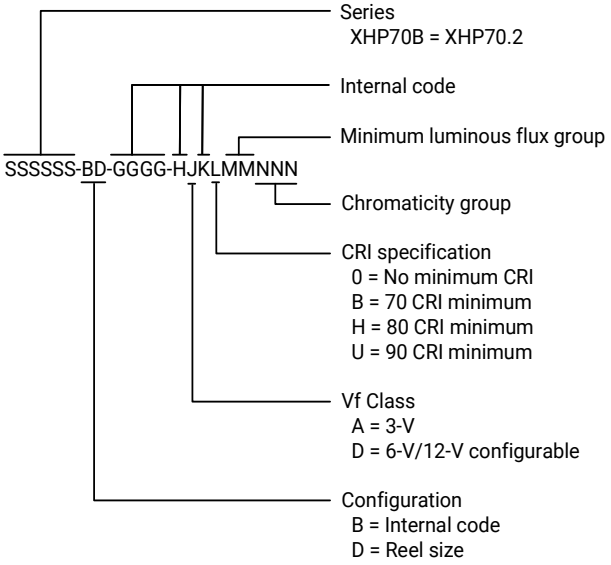


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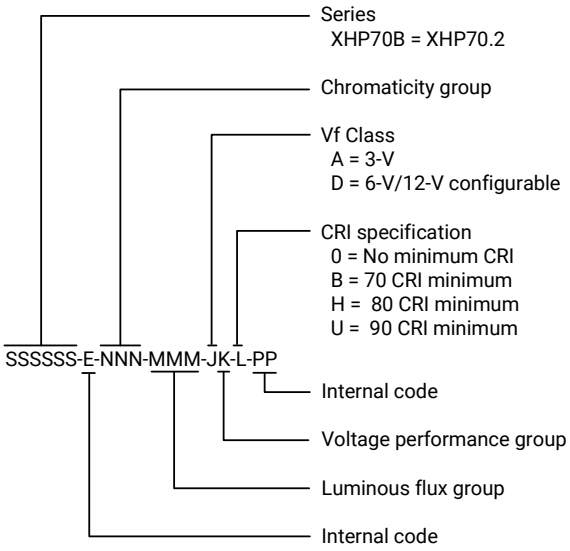
BIN AND ORDER-CODE FORMAT

Bin codes and order codes for XHP70.2 LEDs are configured in the following manner:

Order Code



Bin Code

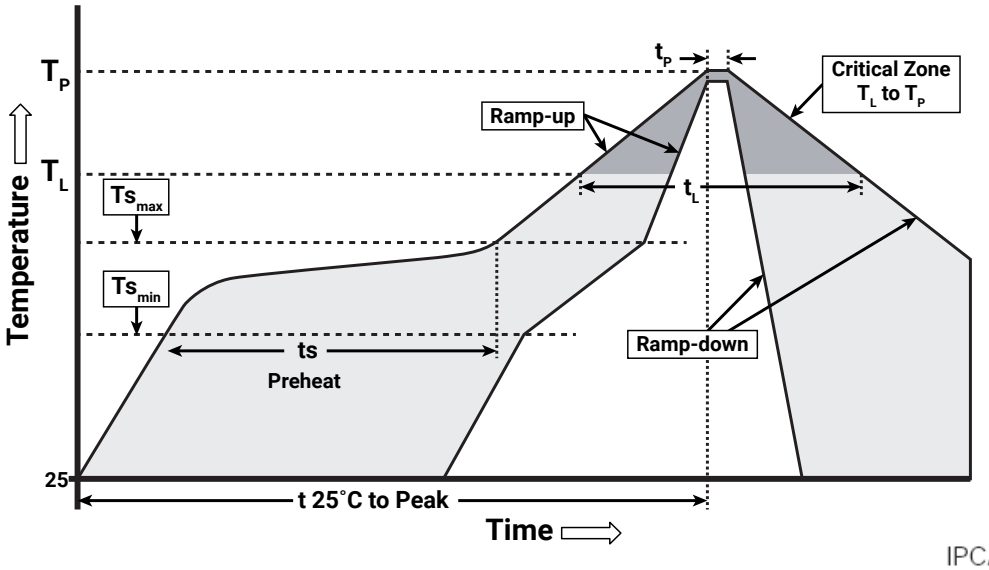


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REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XHP70.2 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.

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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. Cree LED did not perform Room Temperature Operating Life (RTOL) testing on the XHP70.2 LED.

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 XHP70.2 LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of ≤ 30 °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.

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NOTES - CONTINUED

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

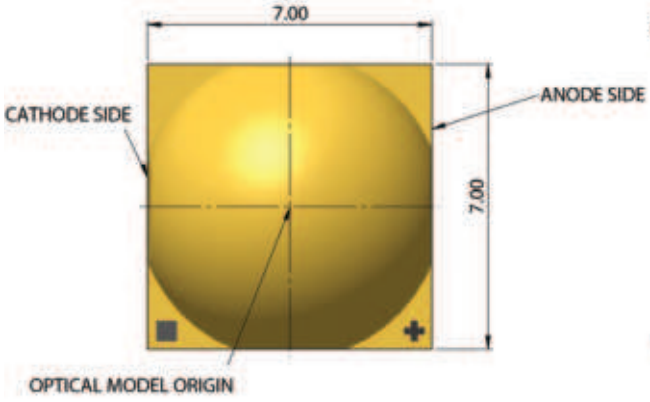
WARNING: Do not look at an exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

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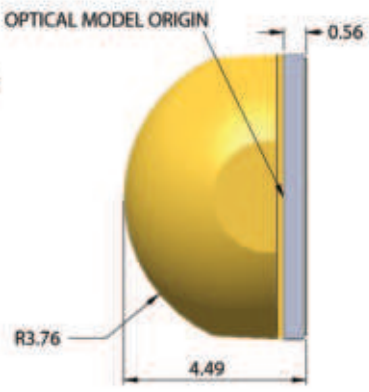
MECHANICAL DIMENSIONS

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

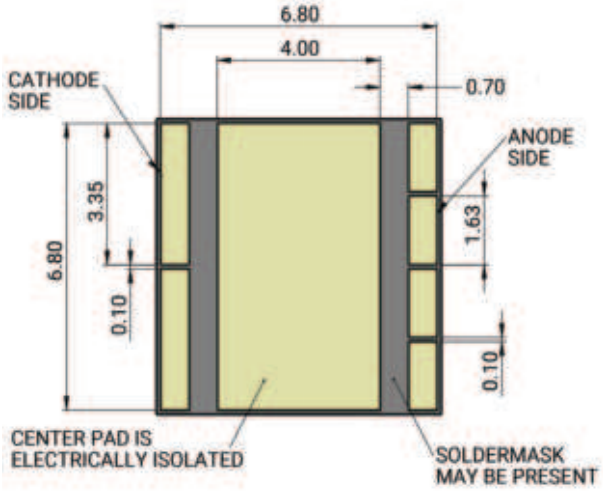
All dimensions are ±.13 mm unless otherwise indicated.



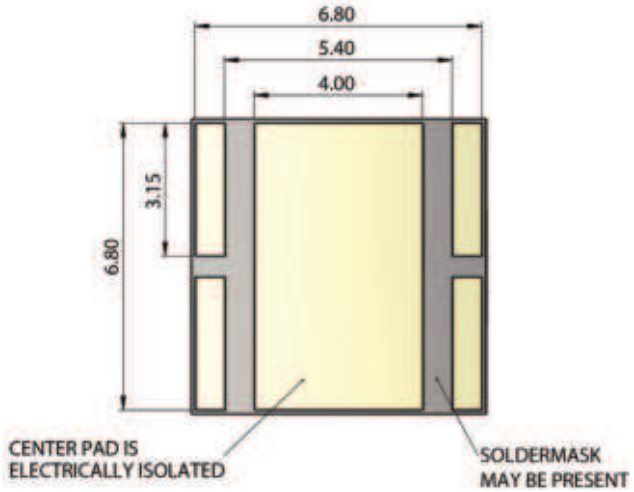
Top View



Side View



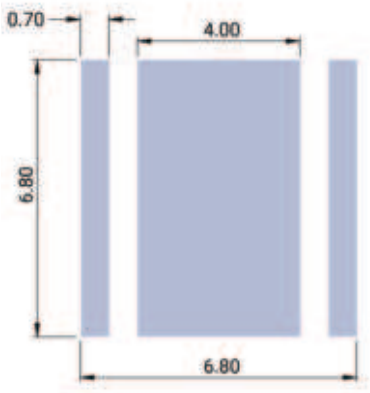
3-V Bottom View



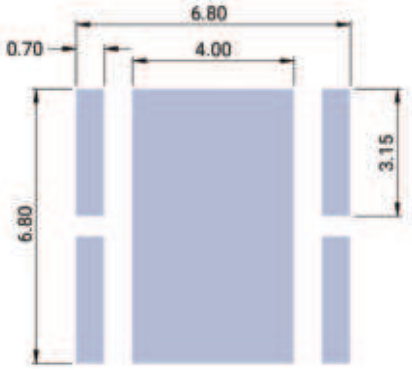
6-V & 12-V Bottom View

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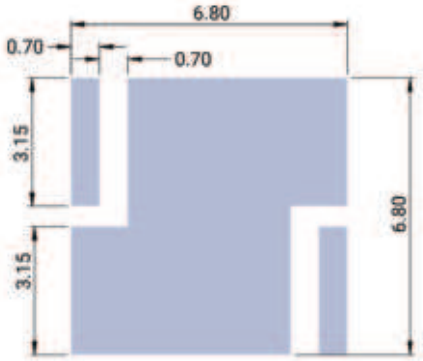
MECHANICAL DIMENSIONS - CONTINUED



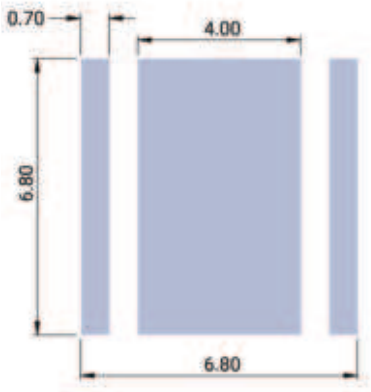
Recommended 3-V PCB Footprint



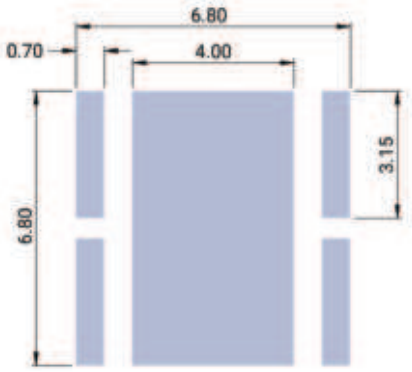
Recommended 6-V PCB Footprint Configuration Depending on Vf Class



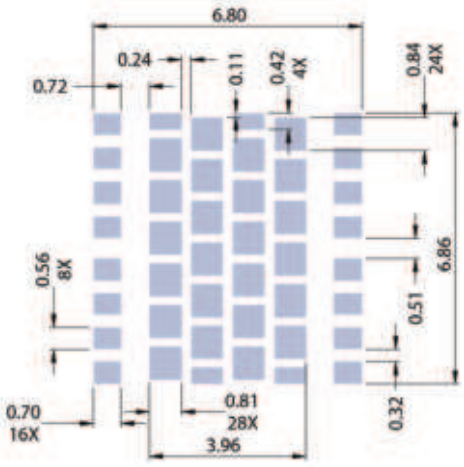
Recommended 12-V PCB Footprint (Thermal pad is connected to anode and cathode and is not electrically isolated)



Recommended 3-V PCB Solder Mask Opening



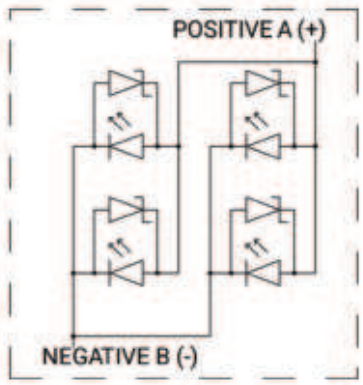
Recommended 6-V & 12-V PCB Solder Mask Opening



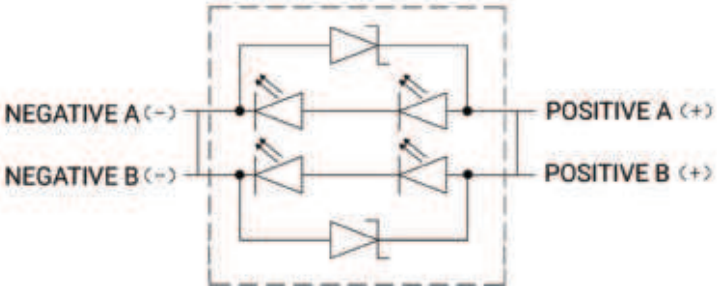
Recommended 3-V, 6-V & 12-V Stencil Openings

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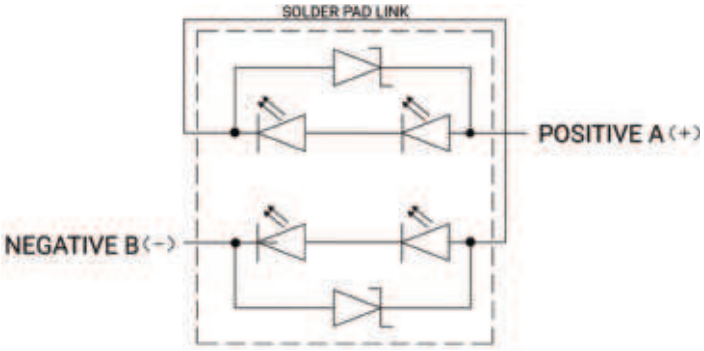
ELECTRICAL CONFIGURATION



3-V Configuration



6-V Configuration



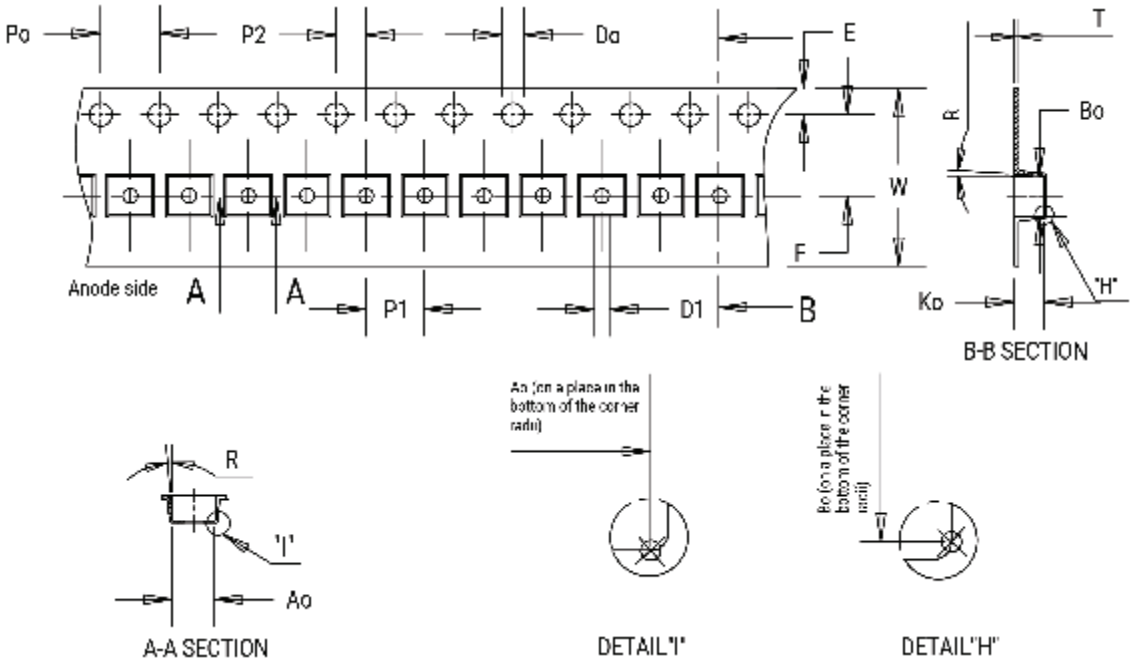
12-V Configuration

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TAPE AND REEL

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

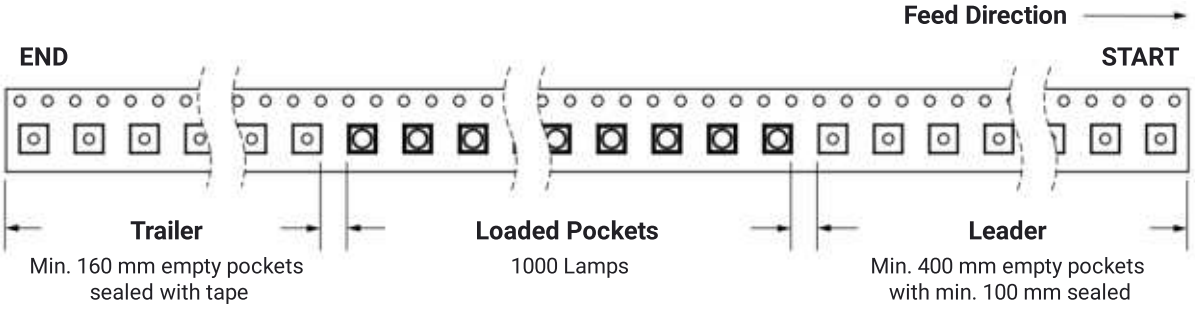
All dimensions are ±.13 mm unless otherwise indicated.

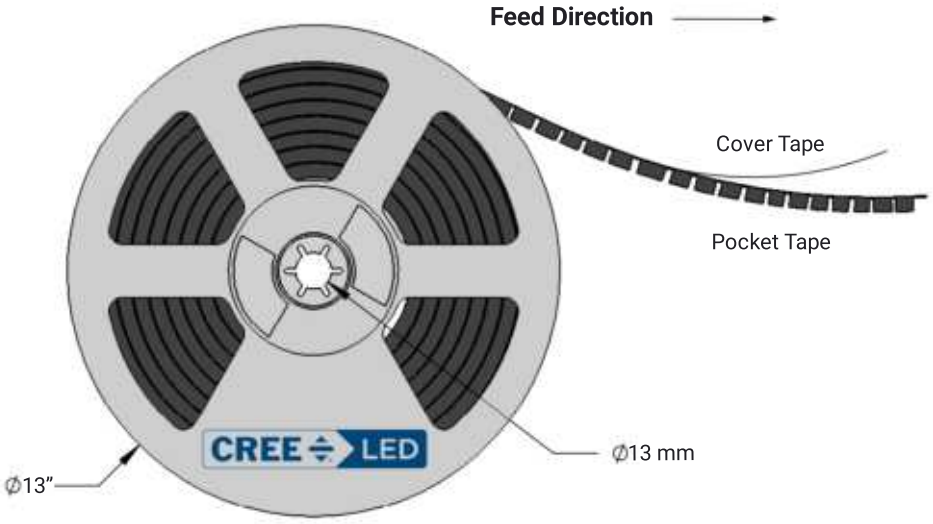


Item	Ao	Bo	Ko	Po	P1	P2	T	E	F	Do	D1	W	R
Dim.	7.40	7.40	4.60	4.00	12.00	2.00	0.36	1.75	7.50	1.50	1.50	16.00	5°

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TAPE AND REEL - CONTINUED

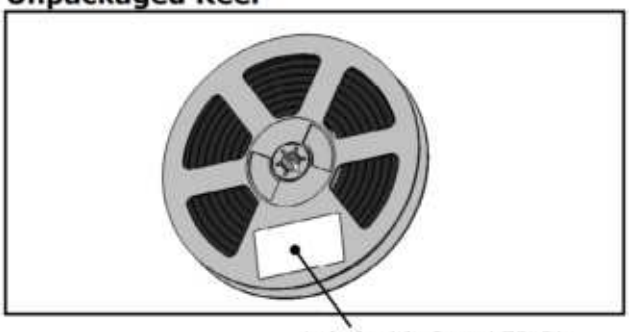




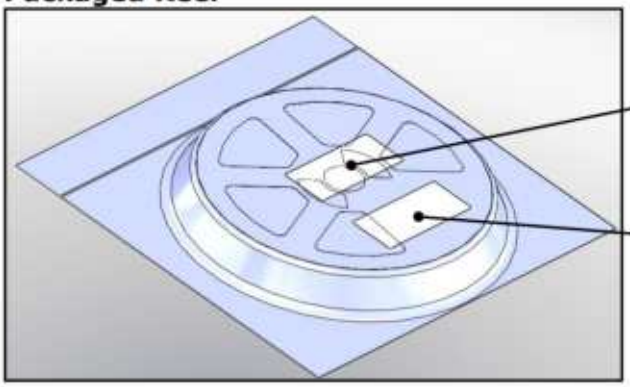
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PACKAGING

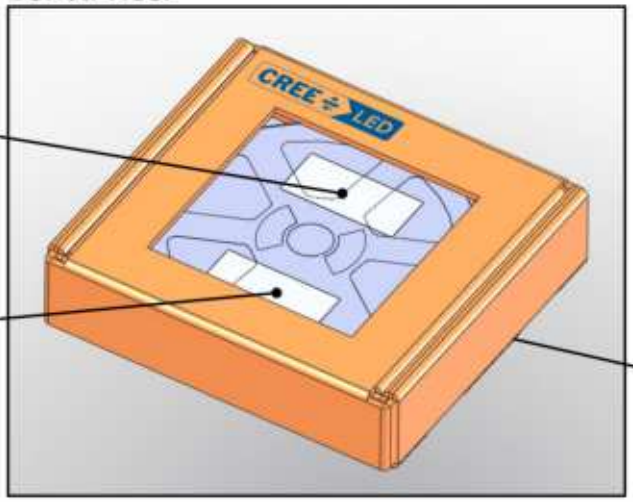
Unpackaged Reel



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 4 - page 6 for order codes of XLamp XHP70.2 Easywhite LEDs that could serve as alternatives for the order codes set forth below.

XHP70.2 Easywhite (T_J = 85 °C)

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
5000 K	70		N4	1710	1883					50E	XHP70B-00-0000-0D0BN450E
	80		M4	1485	1635			50G	XHP70B-00-0000-0D0HM450G		
4500 K	70		N4	1710	1883					45E	XHP70B-00-0000-0D0BN445E
	80		M4	1485	1635			45G	XHP70B-00-0000-0D0HM445G		
	90		K4	1290	1420			45G	XHP70B-00-0000-0D0UK445G		
4000 K	70		N4	1710	1883					40E	XHP70B-00-0000-0D0BN440E
	80		M4	1485	1635	40H	XHP70B-00-0000-0D0HM440H	40G	XHP70B-00-0000-0D0HM440G		
	90		K4	1290	1420	40H	XHP70B-00-0000-0D0UK440H	40G	XHP70B-00-0000-0D0UK440G		
3500 K	70		N4	1710	1883					35E	XHP70B-00-0000-0D0BN435E
			N2	1590	1751						XHP70B-00-0000-0D0BN235E
	80		M4	1485	1635	35H	XHP70B-00-0000-0D0HM435H	35G	XHP70B-00-0000-0D0HM435G		
	90		K4	1290	1420	35H	XHP70B-00-0000-0D0UK435H	35G	XHP70B-00-0000-0D0UK435G		
3000 K	70		N4	1710	1883					30E	XHP70B-00-0000-0D0BN430E
			N2	1590	1751						XHP70B-00-0000-0D0BN230E
	80		M4	1485	1635	30H	XHP70B-00-0000-0D0HM430H	30G	XHP70B-00-0000-0D0HM430G		
2700 K	80		M2	1380	1520	27H	XHP70B-00-0000-0D0HM227H	27G	XHP70B-00-0000-0D0HM227G		

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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APPENDIX - ORDER CODES NOT FOR NEW DESIGNS - CONTINUED

The following order codes are active and valid order codes, but higher performance options are also available. Please see page 7 - page 10 for order codes of XLamp XHP70.2 ANSI LEDs that could serve as alternatives for the order codes set forth below.

XHP70.2 ANSI (T_J = 85 °C)

Nominal CCT	Chromaticity Regions	CRI		Minimum Luminous Flux			Order Code
		Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	
7000 K	0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U	0	68	N2	1590	1751	XHP70B-00-0000-0D00N20DT
		70		N2	1590	1751	XHP70B-00-0000-0D0BN20DT
		80		M4	1485	1635	XHP70B-00-0000-0D0HM40DT
		90		K4	1290	1420	XHP70B-00-0000-0D0UK40DT
6500 K	1A, 1B, 1C, 1D	0	68	N2	1590	1751	XHP70B-00-0000-0D00N20E1
		70		N2	1590	1751	XHP70B-00-0000-0D0BN20E1
		80		M4	1485	1635	XHP70B-00-0000-0D0HM40E1
6000 K	1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 2U	80		M4	1485	1635	XHP70B-00-0000-0D0HM40DV
5700 K	2A, 2B, 2C, 2D	0	68	N4	1710	1883	XHP70B-00-0000-0D00N40E2
		70		N4	1710	1883	XHP70B-00-0000-0D0BN40E2
		80		M4	1485	1635	XHP70B-00-0000-0D0HM40E2
5000 K	3A, 3B, 3C, 3D	0	68	N4	1710	1883	XHP70B-00-0000-0D00N40E3
		70		N4	1710	1883	XHP70B-00-0000-0D0BN40E3
		80		M4	1485	1635	XHP70B-00-0000-0D0HM40E3
4500 K	4A, 4B, 4C, 4D	0	68	N4	1710	1883	XHP70B-00-0000-0D00N40E4
		70		N4	1710	1883	XHP70B-00-0000-0D0BN40E4
		80		M4	1485	1635	XHP70B-00-0000-0D0HM40E4
		90		K4	1290	1420	XHP70B-00-0000-0D0UK40E4
4000 K	5A, 5B, 5C, 5D	0	68	N4	1710	1883	XHP70B-00-0000-0D00N40E5
		70		N4	1710	1883	XHP70B-00-0000-0D0BN40E5
		80		M4	1485	1635	XHP70B-00-0000-0D0HM40E5
		90		K4	1290	1420	XHP70B-00-0000-0D0UK40E5
3500 K	6A, 6B, 6C, 6D	70		N4	1710	1883	XHP70B-00-0000-0D0BN40E6
				N2	1590	1751	XHP70B-00-0000-0D0BN20E6
3000 K	7A, 7B, 7C, 7D	70		N4	1710	1883	XHP70B-00-0000-0D0BN40E7
				N2	1590	1751	XHP70B-00-0000-0D0BN20E7

Notes

- 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).
- XLamp XHP70.2 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 bin restrictions specified by the order code.
- Flux values @ 25 °C are calculated and for reference only.

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