

Cree® XLamp® CXA3590 LED



PRODUCT DESCRIPTION

The XLamp® CXA3590 LED array expands Cree’s family of high-flux, multi-die integrated arrays, offering high performance in an easy-to-use platform. With XLamp LED lighting-class reliability, the CXA3590’s uniform emitting surface enables both directional and non-directional lighting applications and luminaire and lamp designs. Available in 2-step, 3-step and 4-step color consistency, and featuring a 30-mm optical source, the CXA3590 brings new levels of flux and efficacy to this form factor.

The [CX Family LED Design Guide](#) provides basic information on the requirements to use the CXA3590 LED successfully in luminaire designs.

FEATURES

- Available in 4-step, 3-step and 2-step EasyWhite® bins at 2700 K, 3000 K, 3500 K, 4000 K & 5000 K CCT and 4-step EasyWhite bins at 5700 K & 6500 K CCT
- Available in ANSI white bins at 4000 K, 5000 K, 5700 K & 6500 K CCT
- Available in 70-, 80-, 90- and 93-minimum CRI options
- Forward voltage options: 36-V class & 72-V class
- 85 °C binning and characterization
- Maximum drive current: 3600 mA (36 V), 1800 mA (72 V)
- 115° viewing angle, uniform chromaticity profile
- Top-side solder connections
- Thermocouple attach point
- NEMA SSL-3 2011 standard flux bins
- RoHS and REACH compliant
- UL® recognized component (E349212)

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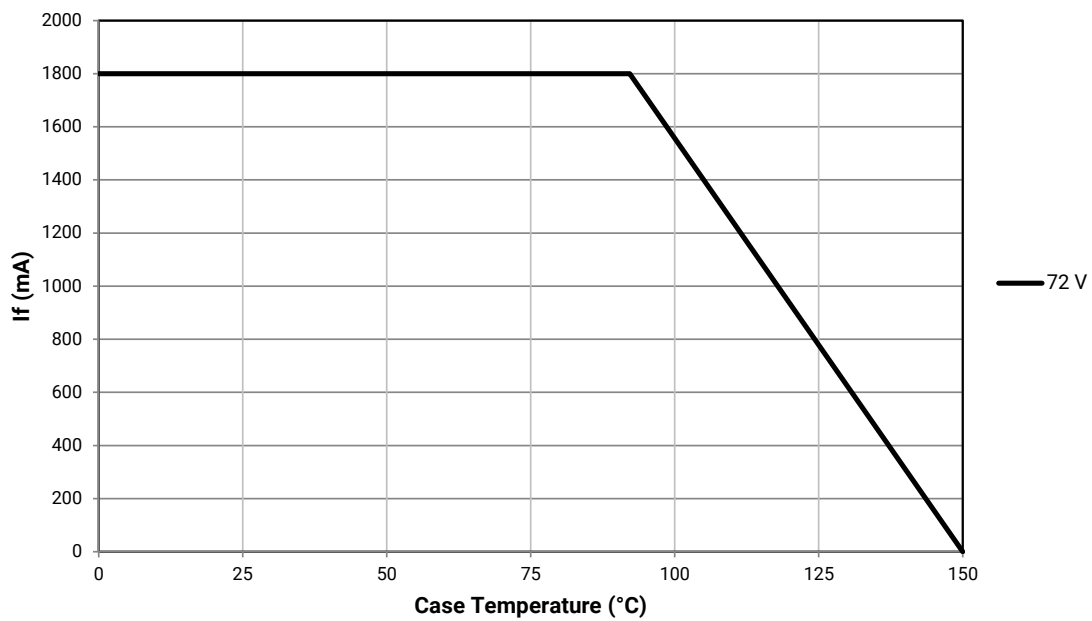
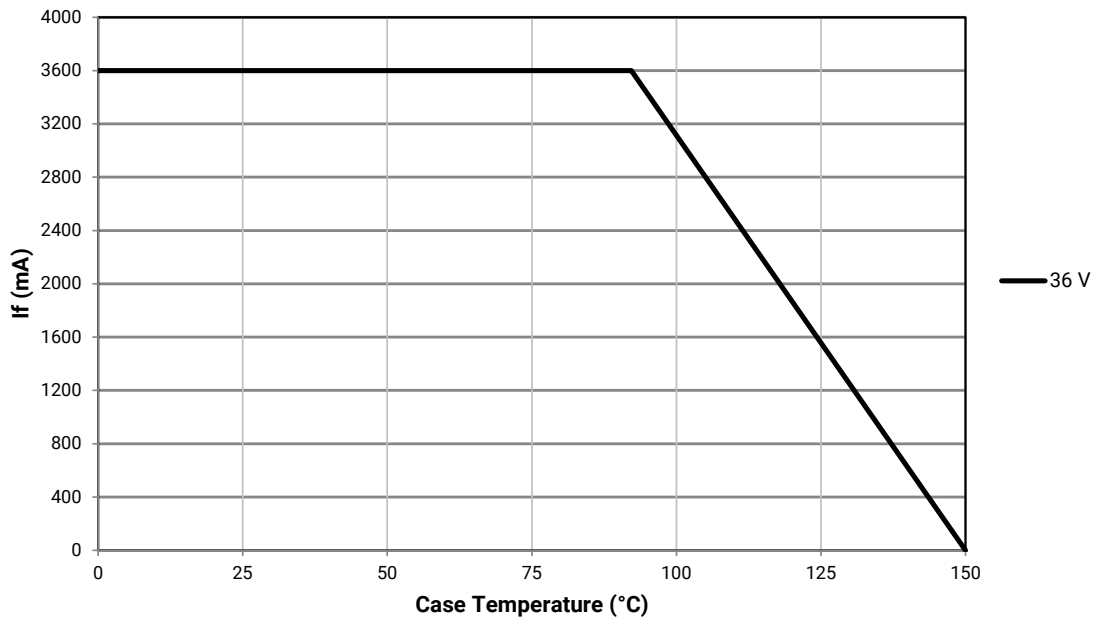
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current (36 V)	mA			3600*
DC forward current (72 V)	mA			1800*
Reverse current (36 V, 72 V)	mA			0.1
Forward voltage (36 V, @ 2400 mA, $T_j = 85\text{ }^\circ\text{C}$)	V		38.5	
Forward voltage (36 V, @ 2400 mA, $T_j = 25\text{ }^\circ\text{C}$)	V			42
Forward voltage (72 V, @ 1200 mA, $T_j = 85\text{ }^\circ\text{C}$)	V		77	
Forward voltage (72 V, @ 1200 mA, $T_j = 25\text{ }^\circ\text{C}$)	V			84

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA3590 is dependent on the case temperature (T_c) when the LED has reached thermal equilibrium under steady-state operation. The graphs shown below assume that the system design employs good thermal management (thermal interface material and heat sink) and may vary when poor thermal management is employed. Please refer to the Mechanical Dimensions section on page 19 for the location of the T_c measurement point.



FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 36 V ($I_F = 2400 \text{ mA}$, $T_J = 85 \text{ °C}$)

The following table provides order codes for XLamp CXA3590 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 19).

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		4-Step		
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code	
6500 K	70	75	BD	10,000	11,100					65F	CXA3590-0000-000N00BD65F	
			CB	11,000	12,210						CXA3590-0000-000N00CB65F	
			CD	12,000	13,320						CXA3590-0000-000N00CD65F	
	80	---	BB	9,500	10,545					65F	CXA3590-0000-000N0HBB65F	
			BD	10,000	11,100						CXA3590-0000-000N0HBD65F	
			CB	11,000	12,210						CXA3590-0000-000N0HCB65F	
5700 K	70	75	BD	10,000	11,100					57F	CXA3590-0000-000N00BD57F	
			CB	11,000	12,210						CXA3590-0000-000N00CB57F	
			CD	12,000	13,320						CXA3590-0000-000N00CD57F	
	80	---	BB	9,500	10,545					57F	CXA3590-0000-000N0HBB57F	
			BD	10,000	11,100						CXA3590-0000-000N0HBD57F	
			CB	11,000	12,210						CXA3590-0000-000N0HCB57F	
5000 K	70	75	BD	10,000	11,100	50H	CXA3590-0000-000N00BD50H			50F	CXA3590-0000-000N00BD50F	
			CB	11,000	12,210		CXA3590-0000-000N00CB50H					CXA3590-0000-000N00CB50F
			CD	12,000	13,320		CXA3590-0000-000N00CD50H					CXA3590-0000-000N00CD50F
	80	---	BB	9,500	10,545	50H	CXA3590-0000-000N0HBB50H	50G	CXA3590-0000-000N0HBB50G	50F	CXA3590-0000-000N0HBB50F	
			BD	10,000	11,100		CXA3590-0000-000N0HBD50H		CXA3590-0000-000N0HBD50G		CXA3590-0000-000N0HBD50F	
			CB	11,000	12,210		CXA3590-0000-000N0HCB50H		CXA3590-0000-000N0HCB50G		CXA3590-0000-000N0HCB50F	
	90	95	AB	8,500	9,435	50H	CXA3590-0000-000N0UAB50H	50G	CXA3590-0000-000N0UAB50G	50F	CXA3590-0000-000N0UAB50F	
			AD	9,000	9,990		CXA3590-0000-000N0UAD50H		CXA3590-0000-000N0UAD50G		CXA3590-0000-000N0UAD50F	

- Notes
- Cree maintains a tolerance of $\pm 7\%$ 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 22).
 - Cree XLamp CXA3590 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.
 - * Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 36 V (I_F = 2400 mA, T_J = 85 °C) - CONTINUED

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		4-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70	75	BB	9,500	10,545	40H	CXA3590-0000-000N00BB40H			40F	CXA3590-0000-000N00BB40F
			BD	10,000	11,100		CXA3590-0000-000N00BD40H				CXA3590-0000-000N00BD40F
			CB	11,000	12,210		CXA3590-0000-000N00CB40H				CXA3590-0000-000N00CB40F
	80	---	AD	9,000	9,435	40H	CXA3590-0000-000N0HAD40H	40G	CXA3590-0000-000N0HAD40G	40H	CXA3590-0000-000N0HAD40F
			BB	9,500	10,545		CXA3590-0000-000N0HBB40H		CXA3590-0000-000N0HBB40G		CXA3590-0000-000N0HBB40F
			BD	10,000	11,100		CXA3590-0000-000N0HBD40H		CXA3590-0000-000N0HBD40G		CXA3590-0000-000N0HBD40F
	90	95	Z4	7,945	8,819	40H	CXA3590-0000-000N0UZ440H	40G	CXA3590-0000-000N0UZ440G	40F	CXA3590-0000-000N0UZ440F
			AB	8,500	9,435		CXA3590-0000-000N0UAB40H		CXA3590-0000-000N0UAB40G		CXA3590-0000-000N0UAB40F
	3500 K	80	---	AD	9,000	9,990	35H	CXA3590-0000-000N00AD35H	35G	CXA3590-0000-000N00AD35G	35F
BB				9,500	10,545	CXA3590-0000-000N00BB35H		CXA3590-0000-000N00BB35G		CXA3590-0000-000N00BB35F	
BD				10,000	11,100	CXA3590-0000-000N00BD35H		CXA3590-0000-000N00BD35G		CXA3590-0000-000N00BD35F	
93		95	Z2	7,390	8,203	35H	CXA3590-0000-000N0YZ235H	35G	CXA3590-0000-000N0YZ235G	35F	CXA3590-0000-000N0YZ235F
			Z4	7,945	8,819		CXA3590-0000-000N0YZ435H		CXA3590-0000-000N0YZ435G		CXA3590-0000-000N0YZ435F
3000 K	80	---	AD	9,000	9,990	30H	CXA3590-0000-000N00AD30H	30G	CXA3590-0000-000N00AD30G	30F	CXA3590-0000-000N00AD30F
			BB	9,500	10,545		CXA3590-0000-000N00BB30H		CXA3590-0000-000N00BB30G		CXA3590-0000-000N00BB30F
			BD	10,000	11,100		CXA3590-0000-000N00BD30H		CXA3590-0000-000N00BD30G		CXA3590-0000-000N00BD30F
	93	95	Z2	7,390	8,203	30H	CXA3590-0000-000N0YZ230H	30G	CXA3590-0000-000N0YZ230G	30F	CXA3590-0000-000N0YZ230F
			Z4	7,945	8,819		CXA3590-0000-000N0YZ430H		CXA3590-0000-000N0YZ430G		CXA3590-0000-000N0YZ430F
2700 K	80	---	AB	8,500	9,435	27H	CXA3590-0000-000N00AB27H	27G	CXA3590-0000-000N00AB27G	27F	CXA3590-0000-000N00AB27F
			AD	9,000	9,990		CXA3590-0000-000N00AD27H		CXA3590-0000-000N00AD27G		CXA3590-0000-000N00AD27F
			BB	9,500	10,545		CXA3590-0000-000N00BB27H		CXA3590-0000-000N00BB27G		CXA3590-0000-000N00BB27F
	93	95	Y4	6,910	7,670	27H	CXA3590-0000-000N0YY427H	27G	CXA3590-0000-000N0YY427G	27F	CXA3590-0000-000N0YY427F
			Z2	7,390	8,203		CXA3590-0000-000N0YZ227H		CXA3590-0000-000N0YZ227G		CXA3590-0000-000N0YZ227F

- Notes
- Cree 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 22).
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 - * Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS - 36 V ($I_F = 2400 \text{ mA}$, $T_J = 85 \text{ °C}$)

The following table provides order codes for XLamp CXA3590 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 19).

CCT Range	CRI		Minimum Luminous Flux			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
6500 K	70	75	BD	10,000	11,100	1A0, 1B0, 1C0, 1D0, 65F	CXA3590-0000-000N00BD0E1
			CB	11,000	12,210		CXA3590-0000-000N00CB0E1
			CD	12,000	13,320		CXA3590-0000-000N00CD0E1
	80	---	BB	9,500	10,545	1A0, 1B0, 1C0, 1D0, 65F	CXA3590-0000-000N0HBB0E1
			BD	10,000	11,100		CXA3590-0000-000N0HBD0E1
			CB	11,000	12,210		CXA3590-0000-000N0HCB0E1
5700 K	70	75	BD	10,000	11,100	2A0, 2B0, 2C0, 2D0, 57F	CXA3590-0000-000N00BD0E2
			CB	11,000	12,210		CXA3590-0000-000N00CB0E2
			CD	12,000	13,320		CXA3590-0000-000N00CD0E2
	80	---	BB	9,500	10,545	2A0, 2B0, 2C0, 2D0, 57F	CXA3590-0000-000N0HBB0E2
			BD	10,000	11,100		CXA3590-0000-000N0HBD0E2
			CB	11,000	12,210		CXA3590-0000-000N0HCB0E2
5000 K	70	75	BD	10,000	11,100	3A0, 3B0, 3C0, 3D0, 50F	CXA3590-0000-000N00BD0E3
			CB	11,000	12,210		CXA3590-0000-000N00CB0E3
			CD	12,000	13,320		CXA3590-0000-000N00CD0E3
	80	---	BB	9,500	10,545	3A0, 3B0, 3C0, 3D0, 50F	CXA3590-0000-000N0HBB0E3
			BD	10,000	11,100		CXA3590-0000-000N0HBD0E3
			CB	11,000	12,210		CXA3590-0000-000N0HCB0E3
4000 K	70	75	BB	9,500	10,545	5A0, 5B0, 5C0, 5D0, 40F	CXA3590-0000-000N00BB0E5
			BD	10,000	11,100		CXA3590-0000-000N00BD0E5

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

FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 72 V ($I_F = 1200 \text{ mA}$, $T_J = 85 \text{ °C}$)

The following table provides order codes for XLamp CXA3590 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 19).

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		4-Step		
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code	
6500 K	70	75	BD	10,000	11,100					65F	CXA3590-0000-000R00BD65F	
			CB	11,000	12,210						CXA3590-0000-000R00CB65F	
			CD	12,000	13,320						CXA3590-0000-000R00CD65F	
	80	---	BB	9,500	10,545					65F	CXA3590-0000-000R0HBB65F	
			BD	10,000	11,100						CXA3590-0000-000R0HBD65F	
			CB	11,000	12,210						CXA3590-0000-000R0HCB65F	
5700 K	70	75	BD	10,000	11,100					57F	CXA3590-0000-000R00BD57F	
			CB	11,000	12,210						CXA3590-0000-000R00CB57F	
			CD	12,000	13,320						CXA3590-0000-000R00CD57F	
	80	---	BB	9,500	10,545					57F	CXA3590-0000-000R0HBB57F	
			BD	10,000	11,100						CXA3590-0000-000R0HBD57F	
			CB	11,000	12,210						CXA3590-0000-000R0HCB57F	
5000 K	70	75	BD	10,000	11,100	50H	CXA3590-0000-000R00BD50H			50F	CXA3590-0000-000R00BD50F	
			CB	11,000	12,210		CXA3590-0000-000R00CB50H					CXA3590-0000-000R00CB50F
			CD	12,000	13,320		CXA3590-0000-000R00CD50H					CXA3590-0000-000R00CD50F
	80	---	BB	9,500	10,545	50H	CXA3590-0000-000R0HBB50H	50G	CXA3590-0000-000R0HBB50G	50F	CXA3590-0000-000R0HBB50F	
			BD	10,000	11,100		CXA3590-0000-000R0HBD50H		CXA3590-0000-000R0HBD50G		CXA3590-0000-000R0HBD50F	
			CB	11,000	12,210		CXA3590-0000-000R0HCB50H		CXA3590-0000-000R0HCB50G		CXA3590-0000-000R0HCB50F	
	90	95	AB	8,500	9,435	50H	CXA3590-0000-000R0UAB50H	50G	CXA3590-0000-000R0UAB50G	50F	CXA3590-0000-000R0UAB50F	
			AD	9,000	9,990		CXA3590-0000-000R0UAD50H		CXA3590-0000-000R0UAD50G		CXA3590-0000-000R0UAD50F	

- Notes
- Cree maintains a tolerance of $\pm 7\%$ 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 22).
 - Cree XLamp CXA3590 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.
 - * Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 72 V (I_F = 1200 mA, T_J = 85 °C) - CONTINUED

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		4-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70	75	BB	9,500	10,545	40H	CXA3590-0000-000R00BB40H			40F	CXA3590-0000-000R00BB40F
			BD	10,000	11,100		CXA3590-0000-000R00BD40H				CXA3590-0000-000R00BD40F
			CB	11,000	12,210		CXA3590-0000-000R00CB40H				CXA3590-0000-000R00CB40F
	80	---	AD	9,000	9,435	40H	CXA3590-0000-000R0HAD40H	40G	CXA3590-0000-000R0HAD40G	40H	CXA3590-0000-000R0HAD40F
			BB	9,500	10,545		CXA3590-0000-000R0HBB40H		CXA3590-0000-000R0HBB40G		CXA3590-0000-000R0HBB40F
			BD	10,000	11,100		CXA3590-0000-000R0HBD40H		CXA3590-0000-000R0HBD40G		CXA3590-0000-000R0HBD40F
	90	95	Z4	7,945	8,819	40H	CXA3590-0000-000R0UZ440H	40G	CXA3590-0000-000R0UZ440G	40F	CXA3590-0000-000R0UZ440F
			AB	8,500	9,435		CXA3590-0000-000R0UAB40H		CXA3590-0000-000R0UAB40G		CXA3590-0000-000R0UAB40F
	3500 K	80	---	AD	9,000	9,990	35H	CXA3590-0000-000R00AD35H	35G	CXA3590-0000-000R00AD35G	35F
BB				9,500	10,545	CXA3590-0000-000R00BB35H		CXA3590-0000-000R00BB35G		CXA3590-0000-000R00BB35F	
BD				10,000	11,100	CXA3590-0000-000R00BD35H		CXA3590-0000-000R00BD35G		CXA3590-0000-000R00BD35F	
93		95	Z2	7,390	8,203	35H	CXA3590-0000-000R0YZ235H	35G	CXA3590-0000-000R0YZ235G	35F	CXA3590-0000-000R0YZ235F
			Z4	7,945	8,819		CXA3590-0000-000R0YZ435H		CXA3590-0000-000R0YZ435G		CXA3590-0000-000R0YZ435F
3000 K	80	---	AD	9,000	9,990	30H	CXA3590-0000-000R00AD30H	30G	CXA3590-0000-000R00AD30G	30F	CXA3590-0000-000R00AD30F
			BB	9,500	10,545		CXA3590-0000-000R00BB30H		CXA3590-0000-000R00BB30G		CXA3590-0000-000R00BB30F
			BD	10,000	11,100		CXA3590-0000-000R00BD30H		CXA3590-0000-000R00BD30G		CXA3590-0000-000R00BD30F
	93	95	Z2	7,390	8,203	30H	CXA3590-0000-000R0YZ230H	30G	CXA3590-0000-000R0YZ230G	30F	CXA3590-0000-000R0YZ230F
			Z4	7,945	8,819		CXA3590-0000-000R0YZ430H		CXA3590-0000-000R0YZ430G		CXA3590-0000-000R0YZ430F
2700 K	80	---	AB	8,500	9,435	27H	CXA3590-0000-000R00AB27H	27G	CXA3590-0000-000R00AB27G	27F	CXA3590-0000-000R00AB27F
			AD	9,000	9,990		CXA3590-0000-000R00AD27H		CXA3590-0000-000R00AD27G		CXA3590-0000-000R00AD27F
			BB	9,500	10,545		CXA3590-0000-000R00BB27H		CXA3590-0000-000R00BB27G		CXA3590-0000-000R00BB27F
	93	95	Y4	6,910	7,670	27H	CXA3590-0000-000R0YY427H	27G	CXA3590-0000-000R0YY427G	27F	CXA3590-0000-000R0YY427F
			Z2	7,390	8,203		CXA3590-0000-000R0YZ227H		CXA3590-0000-000R0YZ227G		CXA3590-0000-000R0YZ227F

- Notes**
- Cree 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 22).
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 - * Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS - 72 V ($I_F = 1200 \text{ mA}$, $T_J = 85 \text{ °C}$)

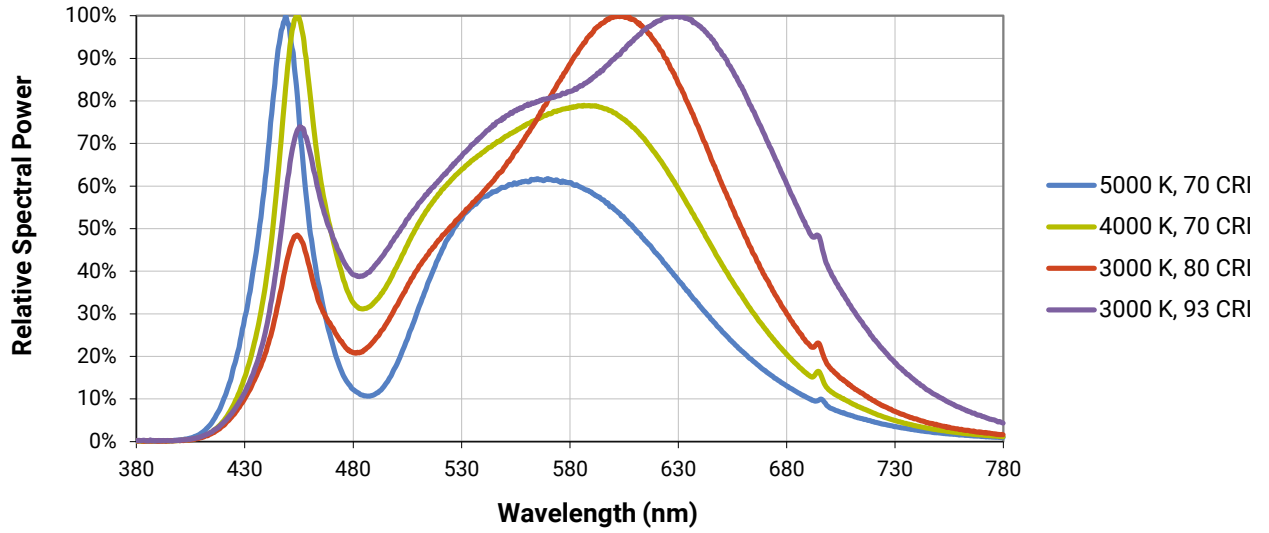
The following table provides order codes for XLamp CXA3590 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 19).

CCT Range	CRI		Minimum Luminous Flux			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
6500 K	70	75	BD	10,000	11,100	1A0, 1B0, 1C0, 1D0, 65F	CXA3590-0000-000R00BD0E1
			CB	11,000	12,210		CXA3590-0000-000R00CB0E1
			CD	12,000	13,320		CXA3590-0000-000R00CD0E1
	80	---	BB	9,500	10,545	1A0, 1B0, 1C0, 1D0, 65F	CXA3590-0000-000R0HBB0E1
			BD	10,000	11,100		CXA3590-0000-000R0HBD0E1
			CB	11,000	12,210		CXA3590-0000-000R0HCB0E1
5700 K	70	75	BD	10,000	11,100	2A0, 2B0, 2C0, 2D0, 57F	CXA3590-0000-000R00BD0E2
			CB	11,000	12,210		CXA3590-0000-000R00CB0E2
			CD	12,000	13,320		CXA3590-0000-000R00CD0E2
	80	---	BB	9,500	10,545	2A0, 2B0, 2C0, 2D0, 57F	CXA3590-0000-000R0HBB0E2
			BD	10,000	11,100		CXA3590-0000-000R0HBD0E2
			CB	11,000	12,210		CXA3590-0000-000R0HCB0E2
5000 K	70	75	BD	10,000	11,100	3A0, 3B0, 3C0, 3D0, 50F	CXA3590-0000-000R00BD0E3
			CB	11,000	12,210		CXA3590-0000-000R00CB0E3
			CD	12,000	13,320		CXA3590-0000-000R00CD0E3
	80	---	BB	9,500	10,545	3A0, 3B0, 3C0, 3D0, 50F	CXA3590-0000-000R0HBB0E3
			BD	10,000	11,100		CXA3590-0000-000R0HBD0E3
			CB	11,000	12,210		CXA3590-0000-000R0HCB0E3
4000 K	70	75	BB	9,500	10,545	5A0, 5B0, 5C0, 5D0, 40F	CXA3590-0000-000R00BB0E5
			BD	10,000	11,100		CXA3590-0000-000R00BD0E5

- Notes**
- Cree maintains a tolerance of $\pm 7\%$ 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 22).
 - Cree XLamp CXA3590 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.
 - * Flux values @ 25 °C are calculated and for reference only.

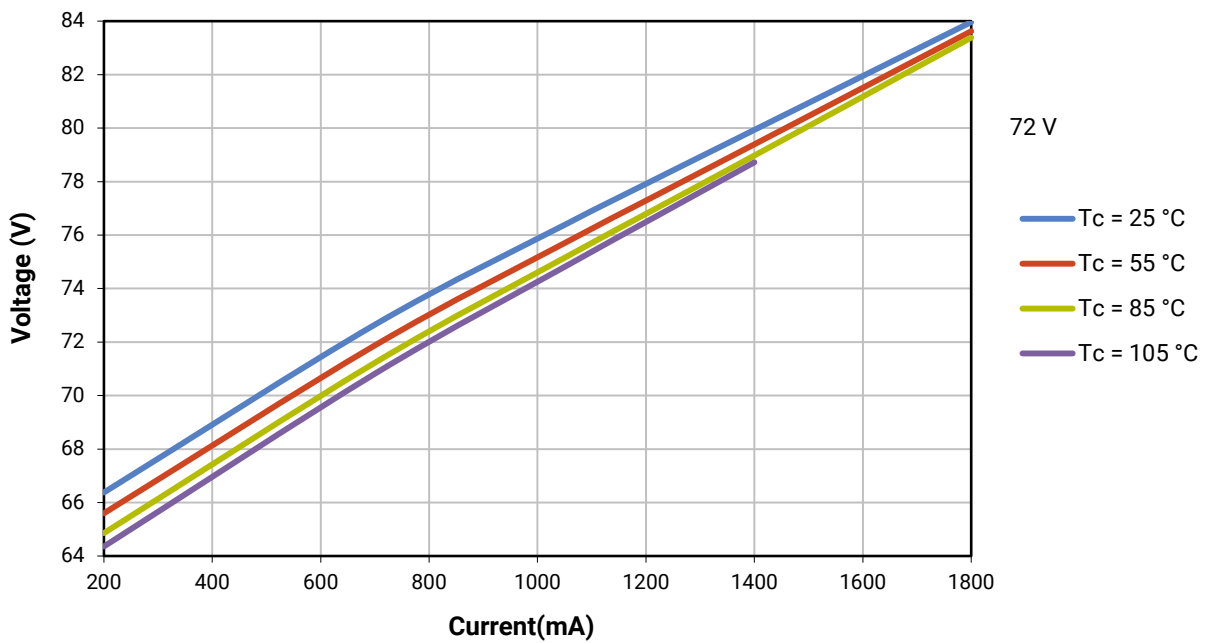
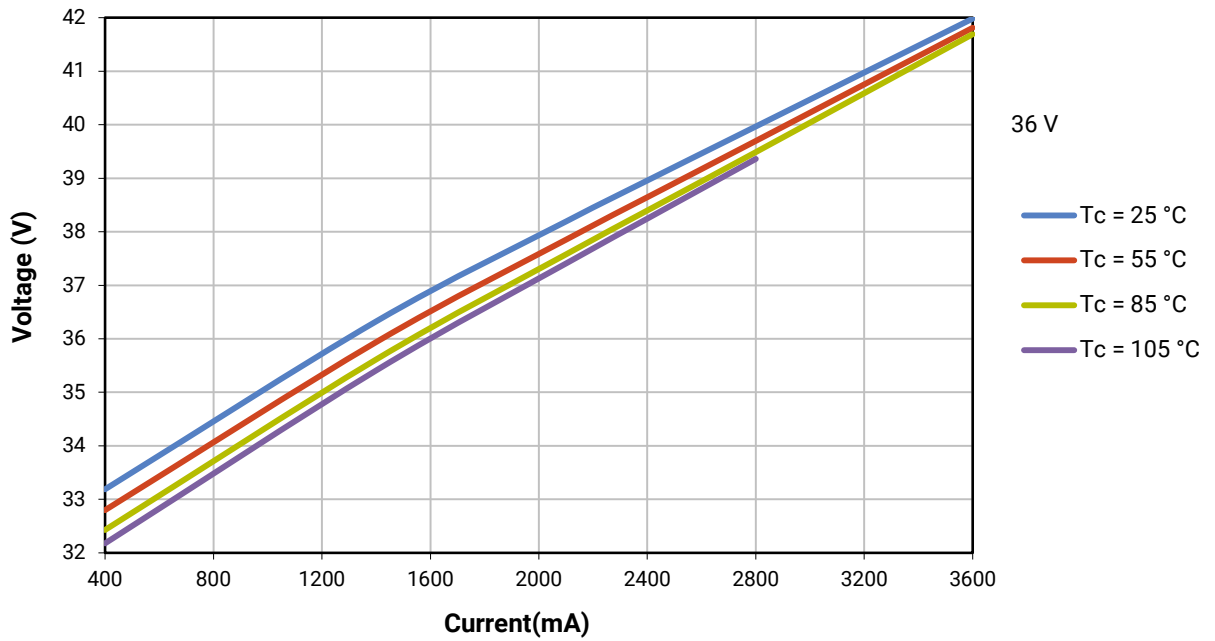
RELATIVE SPECTRAL POWER DISTRIBUTION

The following graph is the result of a series of pulsed measurements at 2400 mA for the 36-V CXA3590 and 1200 mA for the 72-V CXA3590 and $T_j = 85\text{ }^\circ\text{C}$.



ELECTRICAL CHARACTERISTICS

The following graph is the result of a series of steady-state measurements.

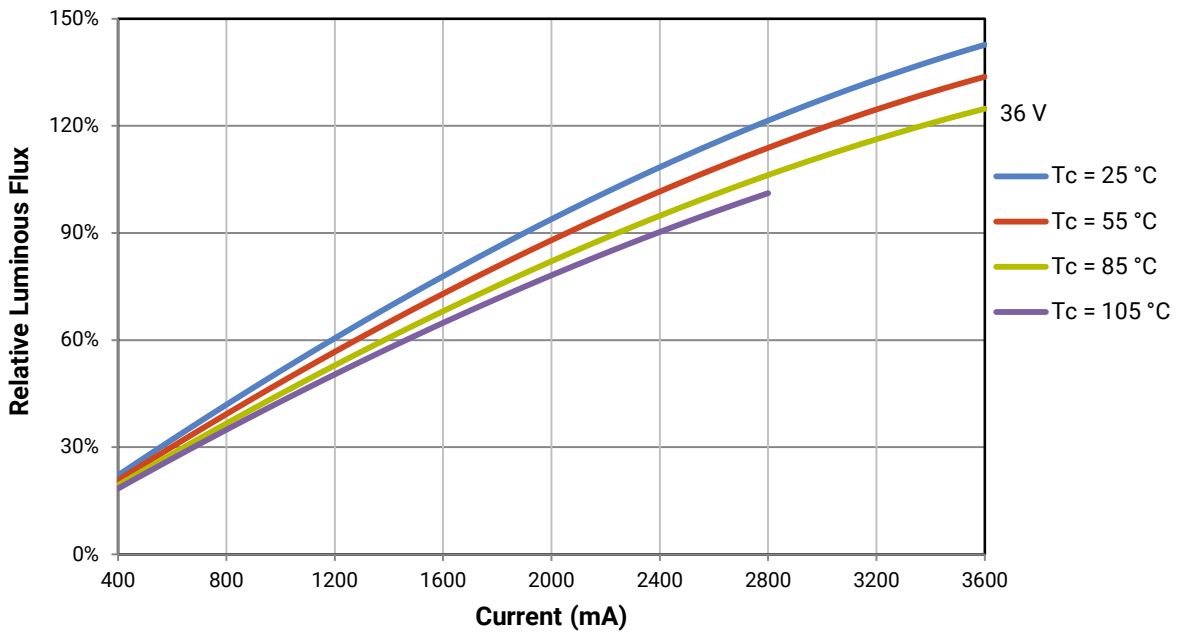


RELATIVE LUMINOUS FLUX

The relative luminous flux values provided below are the ratio of:

- Measurements of CXA3590 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 2400 mA at $T_j = 85\text{ °C}$ for the 36-V CXA3590.

Using the 36-V CXA3590 LED as an example, at steady-state operation of $T_c = 25\text{ °C}$, $I_f = 1200\text{ mA}$, the relative luminous flux ratio is 60% in the chart below. A CXA3590 LED that measures 11,000 lm during binning will deliver 6,600 lm ($11,000 \cdot 0.6$) at steady-state operation of $T_c = 25\text{ °C}$, $I_f = 1200\text{ mA}$.

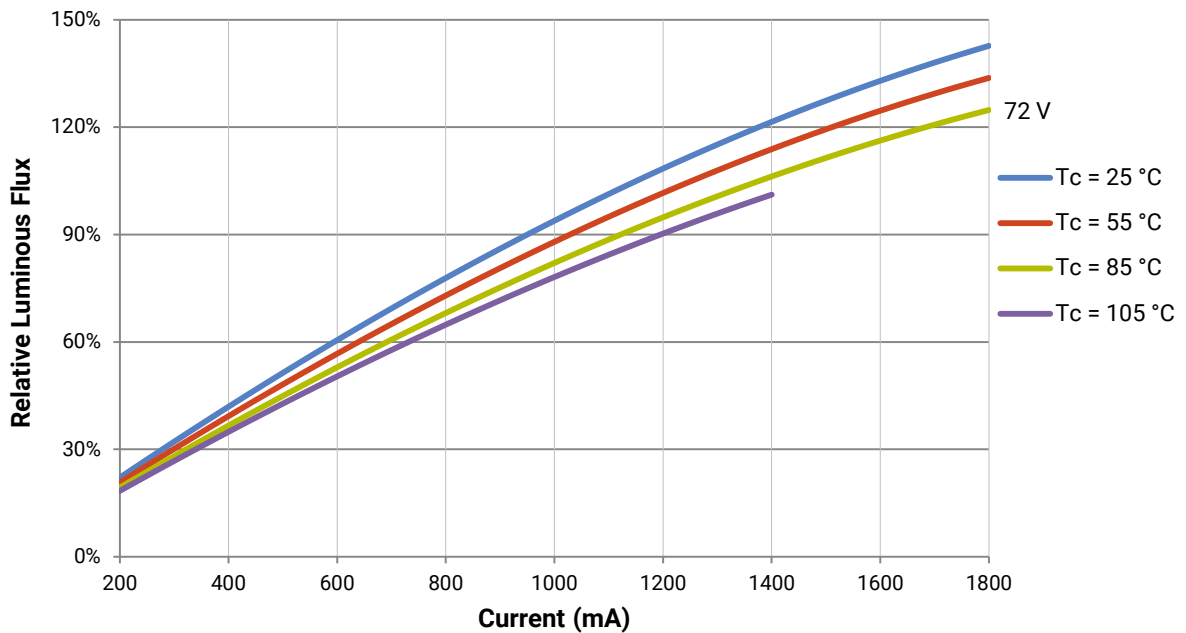


RELATIVE LUMINOUS FLUX - CONTINUED

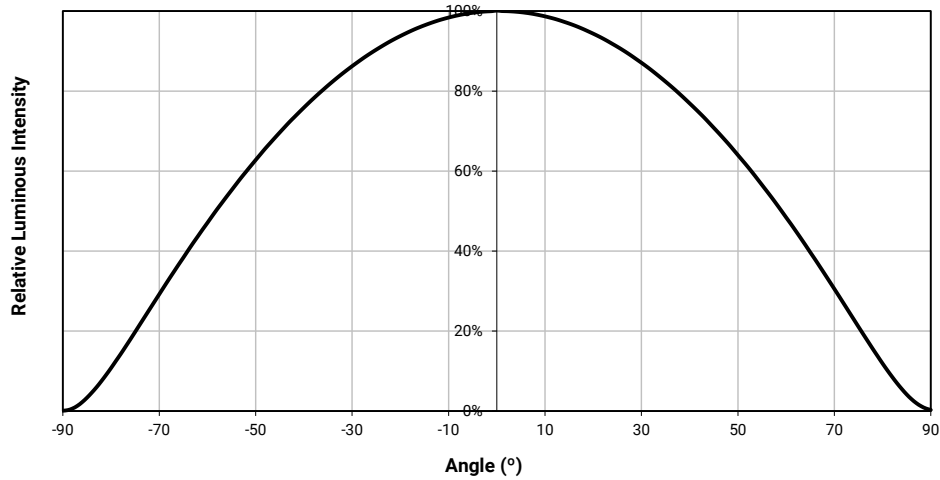
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA3590 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 1200 mA at $T_j = 85\text{ }^\circ\text{C}$ for the 72-V CXA3590.

Using the 72-V CXA3590 LED as an example, at steady-state operation of $T_c = 105\text{ }^\circ\text{C}$, $I_f = 1200\text{ mA}$, the relative luminous flux ratio is 90% in the chart below. A CXA3590 LED that measures 11,000 lm during binning will deliver 9,900 lm ($11,000 \times 0.9$) at steady-state operation of $T_c = 105\text{ }^\circ\text{C}$, $I_f = 1200\text{ mA}$.



TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - BRIGHTNESS (36 V, I_F = 2400 mA; 72 V I_F = 1200 mA, T_J = 85 °C)

XLamp CXA3590 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Minimum Luminous Flux	Maximum Luminous Flux
Y4	6,910	7,390
Z2	7,390	7,945
Z4	7,945	8,500
AB	8,500	9,000
AD	9,000	9,500
BB	9,500	10,000
BD	10,000	11,000
CB	11,000	12,000
CD	12,000	13,000
DB	13,000	14,000

PERFORMANCE GROUPS - CHROMATICITY ($T_j = 85\text{ °C}$)

XLamp CXA3590 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
50H	5000 K	0.3429	0.3507
		0.3434	0.3571
		0.3475	0.3604
		0.3469	0.3539
40H	4000 K	0.3784	0.3741
		0.3804	0.3818
		0.3867	0.3857
		0.3844	0.3778
35H	3500 K	0.4030	0.3857
		0.4061	0.3941
		0.4132	0.3976
		0.4099	0.3890
30H	3000 K	0.4291	0.3973
		0.4333	0.4062
		0.4395	0.4084
		0.4351	0.3994
27H	2700 K	0.4528	0.4046
		0.4578	0.4138
		0.4638	0.4152
		0.4586	0.4060

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
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

PERFORMANCE GROUPS - CHROMATICITY ($T_j = 85\text{ }^\circ\text{C}$) - CONTINUED

EasyWhite Color Temperatures – 4-Step			
Code	CCT	x	y
65F	6500 K	0.3097	0.3196
		0.3079	0.3297
		0.3164	0.3382
		0.3176	0.3275
57F	5700 K	0.3253	0.3325
		0.3249	0.3439
		0.3331	0.3514
		0.3330	0.3393
50F	5000 K	0.3407	0.3459
		0.3415	0.3586
		0.3499	0.3654
		0.3484	0.3521
40F	4000 K	0.3744	0.3685
		0.3782	0.3837
		0.3912	0.3917
		0.3863	0.3758
35F	3500 K	0.3981	0.3800
		0.4040	0.3966
		0.4186	0.4037
		0.4116	0.3865
30F	3000 K	0.4242	0.3919
		0.4322	0.4096
		0.4449	0.4141
		0.4359	0.3960
27F	2700 K	0.4475	0.3994
		0.4573	0.4178
		0.4695	0.4207
		0.4589	0.4021

PERFORMANCE GROUPS - CHROMATICITY ($T_j = 85^\circ\text{C}$) - CONTINUED

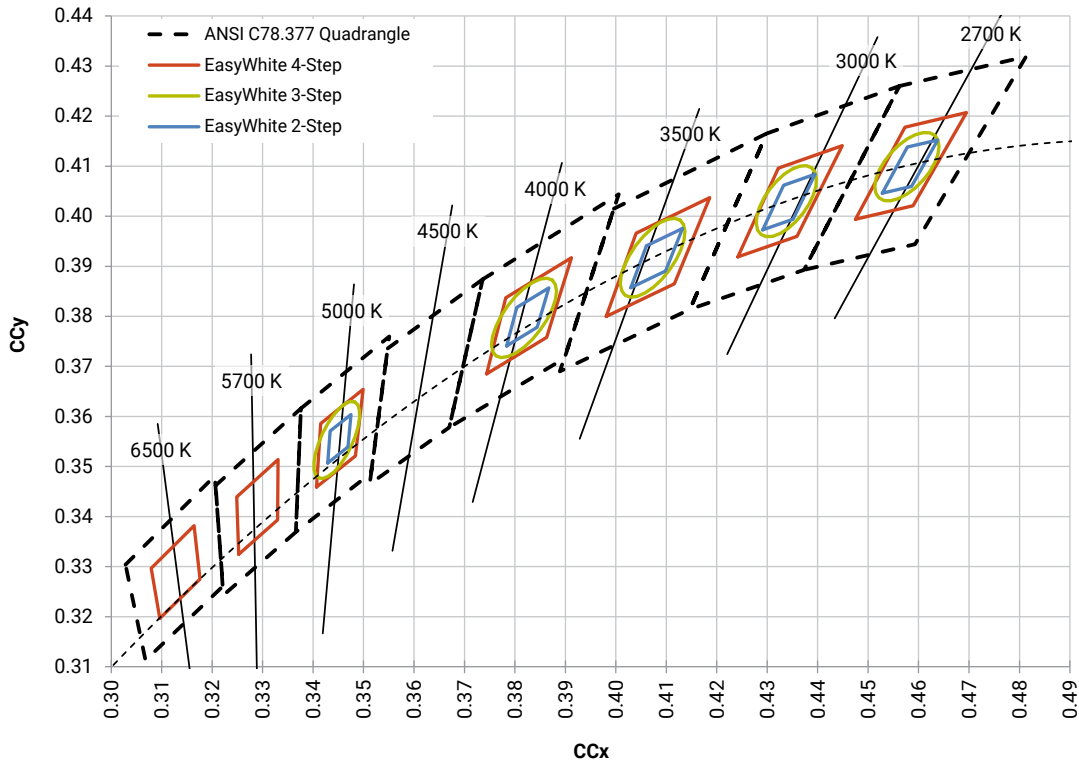
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E1	6500 K	1A0	0.3048	0.3207
			0.3130	0.3290
			0.3144	0.3186
			0.3068	0.3113
		1B0	0.3028	0.3304
			0.3115	0.3391
			0.3130	0.3290
			0.3048	0.3207
		1C0	0.3115	0.3391
			0.3205	0.3481
			0.3213	0.3373
			0.3130	0.3290
		1D0	0.3130	0.3290
			0.3213	0.3373
			0.3221	0.3261
			0.3144	0.3186

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E2	5700 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

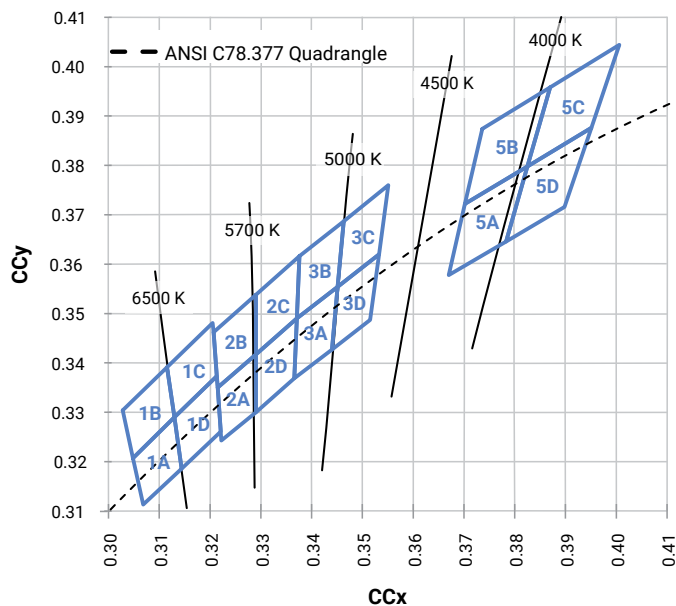
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E3	5000 K	3A0	.3371	.3490
			.3451	.3554
			.3440	.3427
			.3366	.3369
		3B0	.3376	.3616
			.3463	.3687
			.3451	.3554
			.3371	.3490
		3C0	.3463	.3687
			.3551	.3760
			.3533	.3620
			.3451	.3554
		3D0	.3451	.3554
			.3533	.3620
			.3515	.3487
			.3440	.3427

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E5	4000 K	5A0	.3670	.3578
			.3702	.3722
			.3825	.3798
			.3783	.3646
		5B0	.3702	.3722
			.3736	.3874
			.3869	.3958
			.3825	.3798
		5C0	.3825	.3798
			.3869	.3958
			.4006	.4044
			.3950	.3875
		5D0	.3783	.3646
			.3825	.3798
			.3950	.3875
			.3898	.3716

CREE EASYWHITE® BINS PLOTTED ON THE 1931 CIE COLOR SPACE ($T_j = 85^\circ\text{C}$)

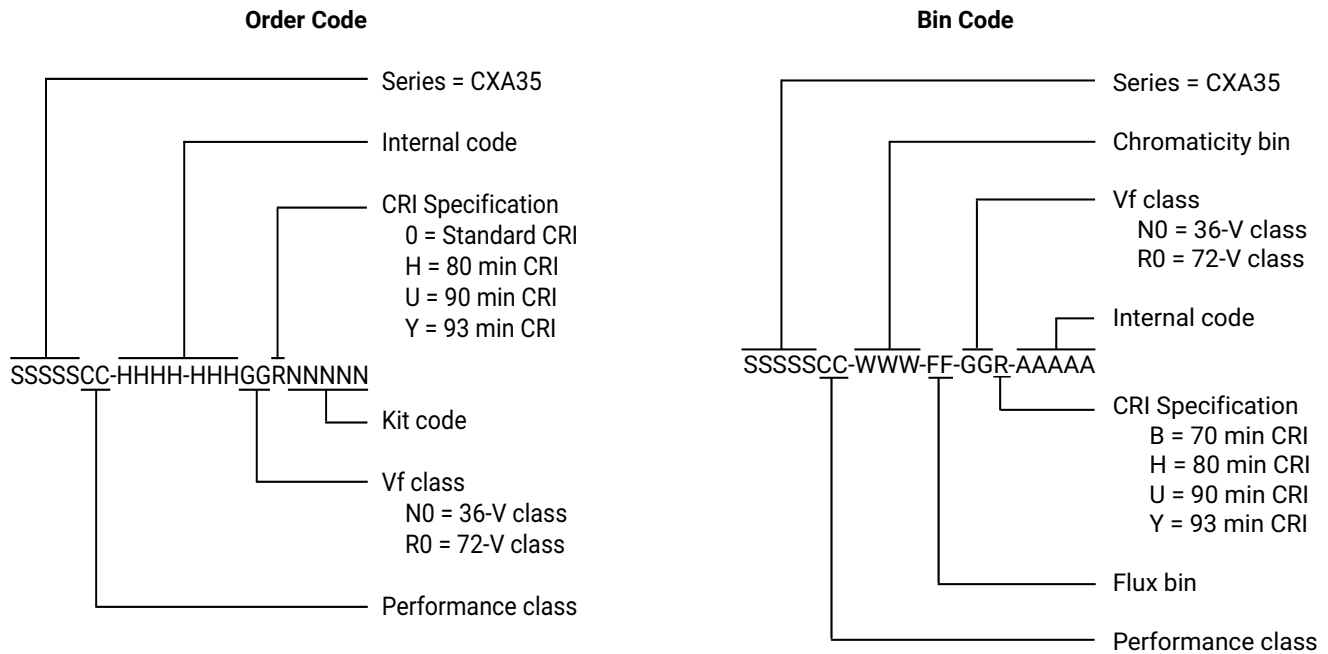


CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ($T_j = 85^\circ\text{C}$)



BIN AND ORDER CODE FORMATS

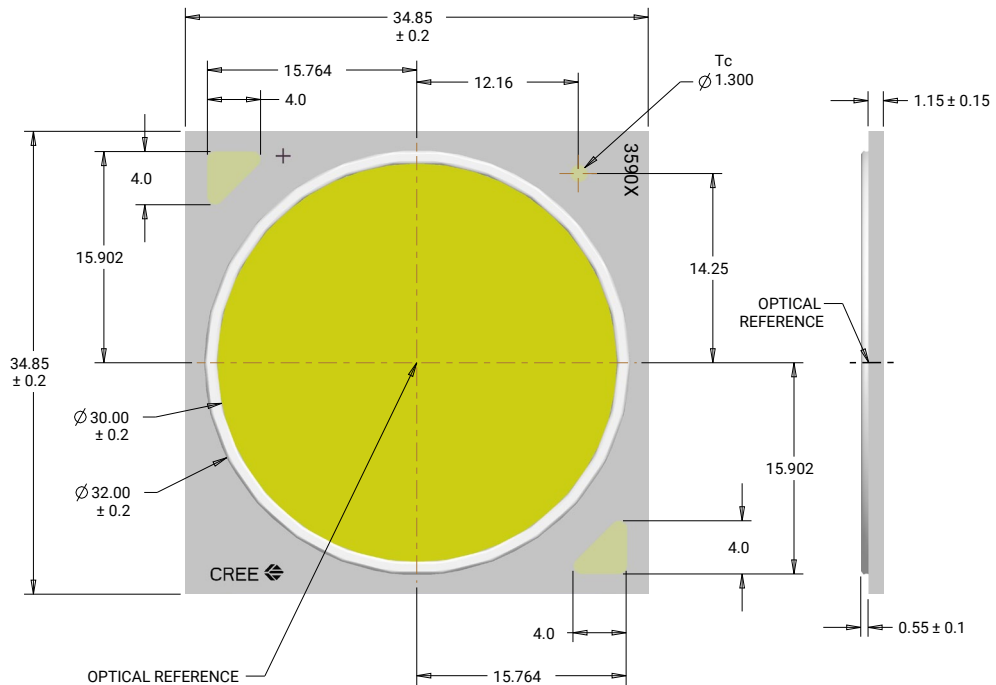
Bin codes and order codes are configured as follows:



MECHANICAL DIMENSIONS

Dimensions are in mm.
 Tolerances unless otherwise specified: ± 0.13
 $\alpha^\circ \pm 1^\circ$

Meaning of 3590X
 3590N = 36-V CXA3590
 3590R = 72-V CXA3590



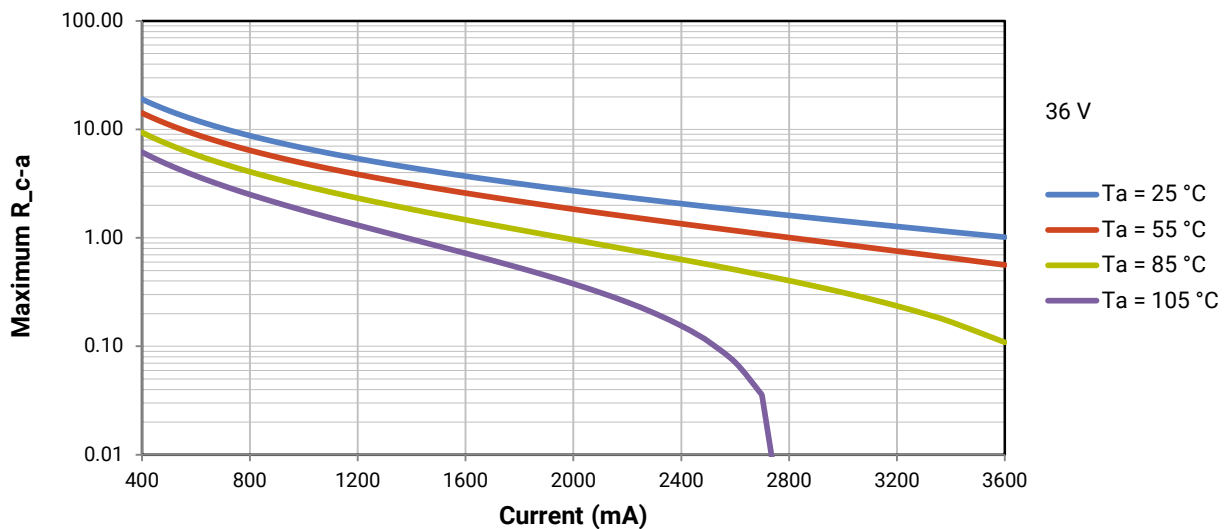
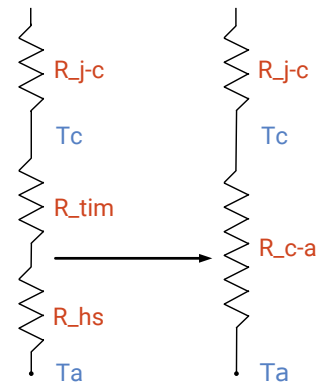
THERMAL DESIGN

The CXA family of LED arrays can include over a hundred different LED die inside one package, and thus over a hundred different junction temperatures (T_j). Cree has intentionally removed junction-temperature-based operating limits and replaced the commonplace maximum T_j calculations with maximum ratings based on forward current (I_f) and case temperature (T_c). No additional calculations are required to ensure the CXA LED is being operated within its designed limits. Please refer to page 22 for the Operating Limit specification.

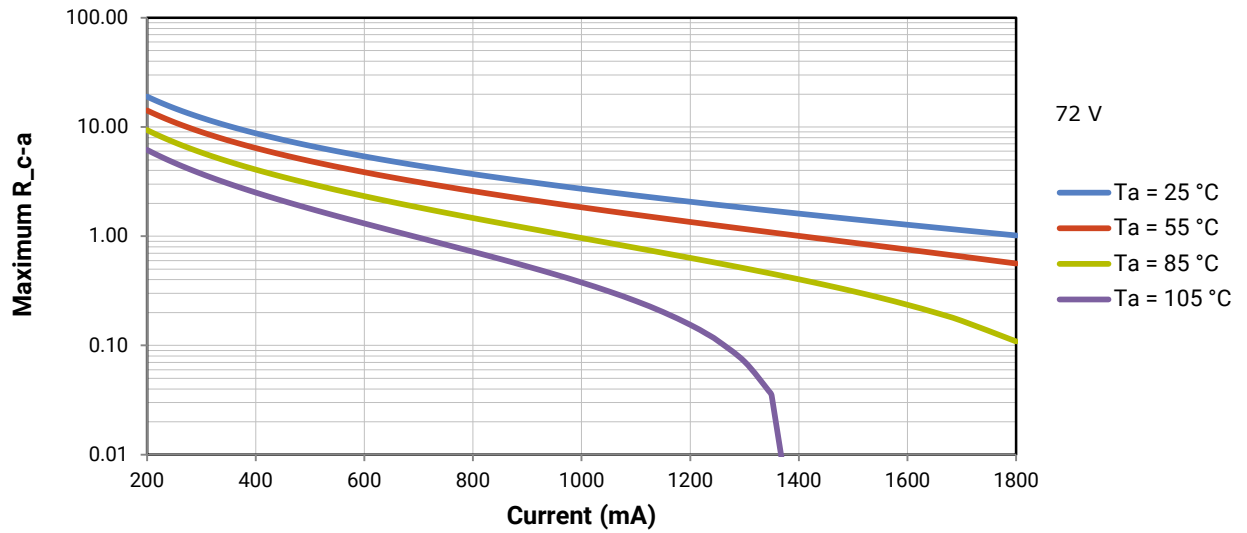
There is no need to calculate for T_j inside the package, as the thermal management design process, specifically from solder point (T_{sp}) to ambient (T_a), remains identical to any other LED component. For more information on thermal management of Cree XLamp LEDs, please refer to the [Thermal Management application note](#). For CXA soldering recommendations and more information on thermal interface materials (TIM) and connection methods, please refer to the [Cree XLamp CX Family LEDs soldering and handling document](#). The [CX Family LED Design Guide](#) provides basic information on the requirements to use Cree XLamp CXA LEDs successfully in luminaire designs.

To keep the CXA3590 LED at or below the maximum rated T_c , the case to ambient temperature thermal resistance (R_{c-a}) must be at or below the maximum R_{c-a} value shown on the following graph, depending on the operating environment. The y-axis in each graph is a base 10 logarithmic scale.

As the figure at right shows, the R_{c-a} value is the sum of the thermal resistance of the TIM (R_{tim}) plus the thermal resistance of the heat sink (R_{hs}).



THERMAL DESIGN - CONTINUED



NOTES

Measurements

The luminous flux, radiant power, chromaticity and CRI measurements in this document are binning specifications only and solely represent product measurements as of the date of shipment. These measurements will change over time based on a number of factors that are not within Cree's control and are not intended or provided as operational specifications for the products. Calculated values are provided for informational purposes only and are not intended as specifications.

Pre-Release Qualification Testing

Please read the [LED Reliability Overview](#) for details of the qualification process Cree applies to ensure long-term reliability for XLamp LEDs and details of Cree's pre-release qualification testing for XLamp LEDs.

Lumen Maintenance

Cree now uses standardized IES LM-80-08 and TM-21-11 methods for collecting long-term data and extrapolating LED lumen maintenance. For information on the specific LM-80 data sets available for this LED, refer to the public [LM-80 results document](#).

Please read the [Long-Term Lumen Maintenance application note](#) for more details on Cree'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.

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of www.cree.com.

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 representative to insure you get the most up-to-date REACH Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

UL® Recognized Component

Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

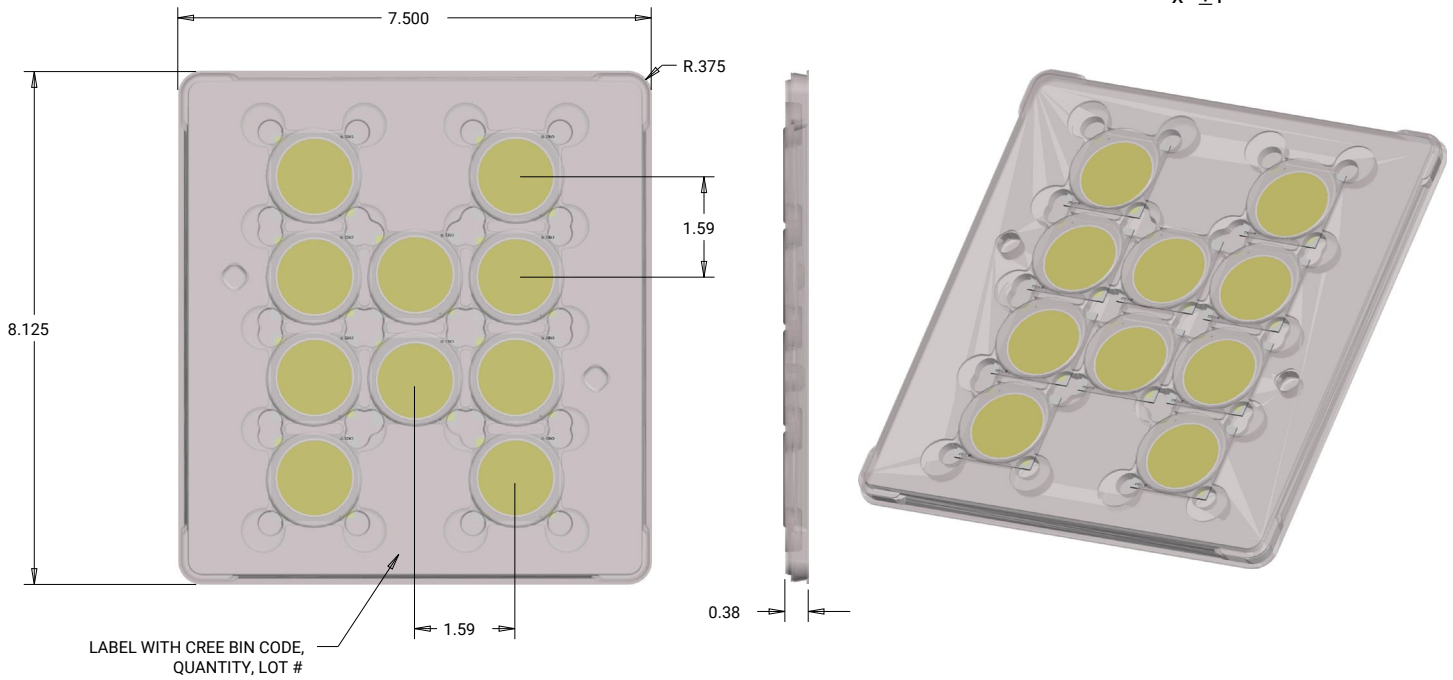
Vision Advisory

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](#).

PACKAGING

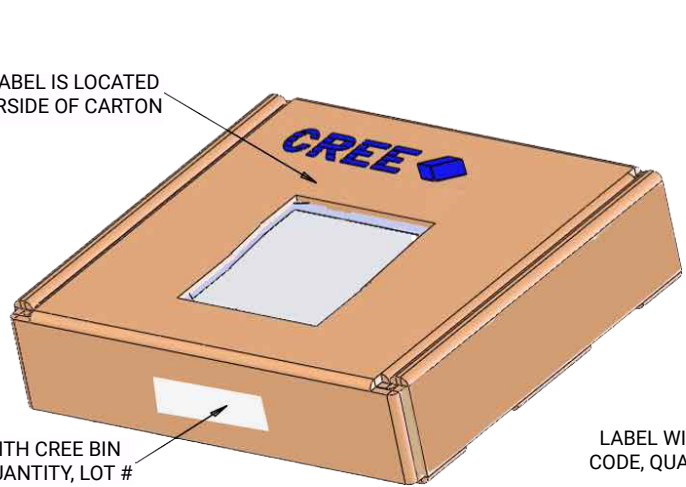
Cree CXA3590 LEDs are packaged in trays of 10. Five trays are sealed in an anti-static bag and placed inside a carton, for a total of 50 LEDs per carton. Each carton contains 50 LEDs from the same performance bin.

Dimensions are in inches.
Tolerances: $\pm .13$
 $x^\circ \pm 1^\circ$



PATENT LABEL IS LOCATED ON UNDERSIDE OF CARTON

LABEL WITH CREE BIN CODE, QUANTITY, LOT #



BAG

LABEL WITH CREE BIN CODE, QUANTITY, LOT #

