Cree® XLamp® CXA2 Studio LED

PRODUCT DESCRIPTION

The XLamp® CXA2 Studio LED is optimized for motion picture, studio and photography applications, delivering high light quality that meets the film industry's color spectrum requirements combined with high lumen output and high optical control. Available in 3-step EasyWhite® bins, the CXA2 Studio LED delivers high lumen output, high light quality and high efficacy in a single, easy-to-use package that eliminates the need for reflow soldering.

The CX Family LED Design Guide provides basic information on the requirements to use the CXA2 Studio LED successfully in luminaire designs.

FEATURES

- CXA Gen 2 technology and platform
- Available in SU white bins at 5600 K and 3200 K CCT with 90 CRI
- Forward voltage options: 36 V & 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
- UL® recognized component (E349212)

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Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300

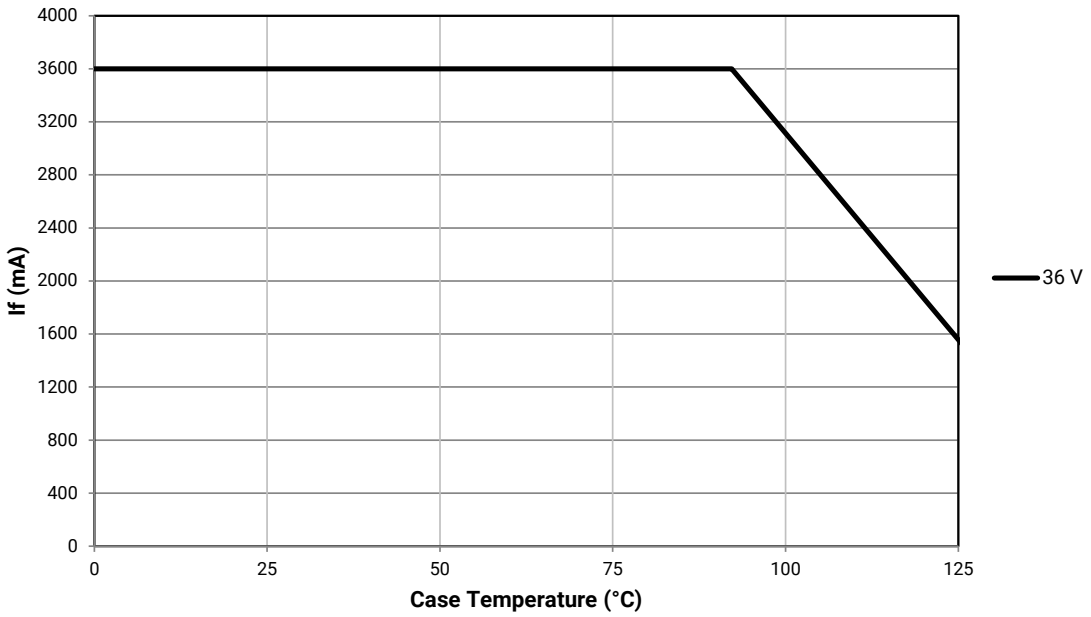
CHARACTERISTICS

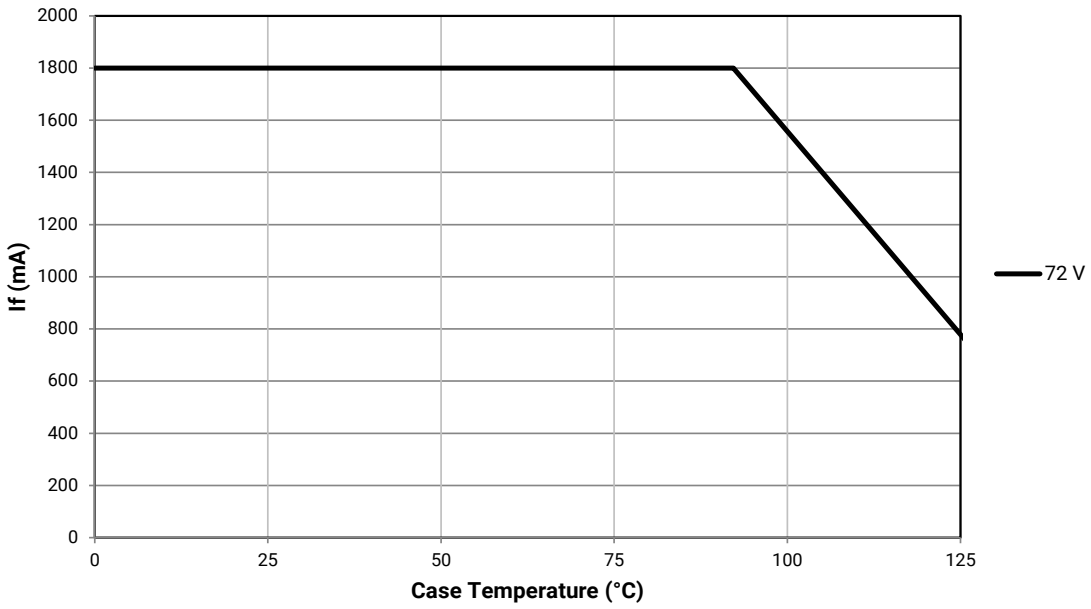
Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current (36 V)	mA			3600*
DC forward current (72 V)	mA			1800*
Reverse current (36 V, 72 V)	mA			0.1
Forward voltage (36 V, @ 2400 mA, T_j = 85 °C)	V		36	
Forward voltage (36 V, @ 2400 mA, T_j = 25 °C)	V			39
Forward voltage (72 V, @ 1200 mA, T_j = 85 °C)	V		72	
Forward voltage (72 V, @ 1200 mA, T_j = 25 °C)	V			78

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA2 Studio LED is dependent on the case temperature (Tc) 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 Drawings section on page 11 for the location of the Tc measurement point.





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

The following tables provide order codes for XLamp CXA2 Studio LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 11).

Nominal CCT	CRI		Minimum Luminous Flux			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
5600 K	93	95	BB	9,500	10,545	56Q	CXB3590-0000-000N0YBB56Q
			BD	10,000	11,100		CXB3590-0000-000N0YBD56Q
3200 K	93	95	AB	8,500	9,435	32Q	CXB3590-0000-000N0YAB32Q
			AD	9,000	9,990		CXB3590-0000-000N0YAD32Q

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

The following tables provide order codes for XLamp CXA2 Studio LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 11).

Nominal CCT	CRI		Minimum Luminous Flux			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
5600 K	93	95	BB	9,500	10,545	56Q	CXB3590-0000-000R0YBB56Q
			BD	10,000	11,100		CXB3590-0000-000R0YBD56Q
3200 K	93	95	AB	8,500	9,435	32Q	CXB3590-0000-000R0YAB32Q
			AD	9,000	9,990		CXB3590-0000-000R0YAD32Q

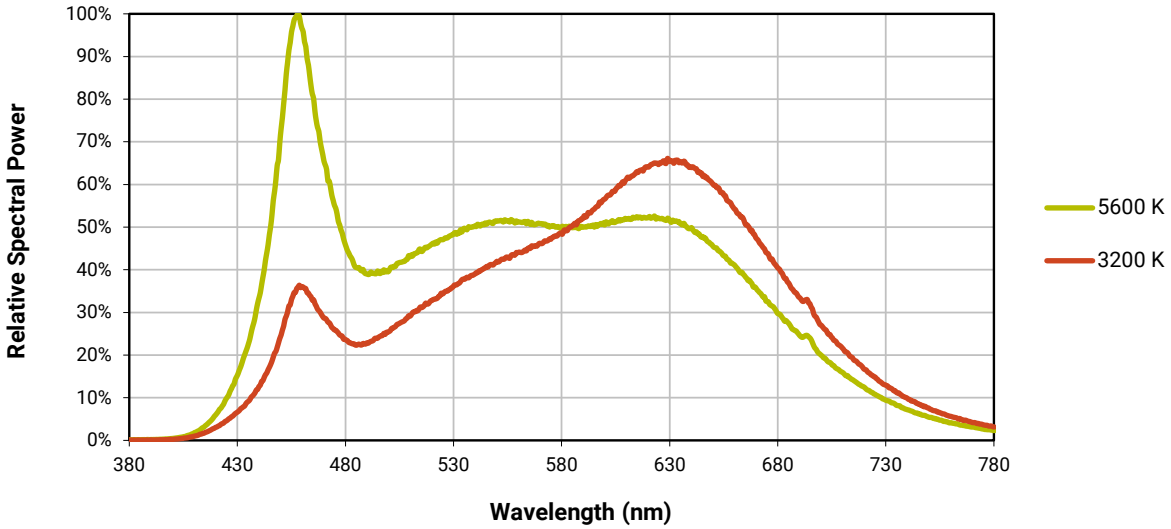
Notes

- 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 14).
- Cree XLamp CXA2 Studio 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.

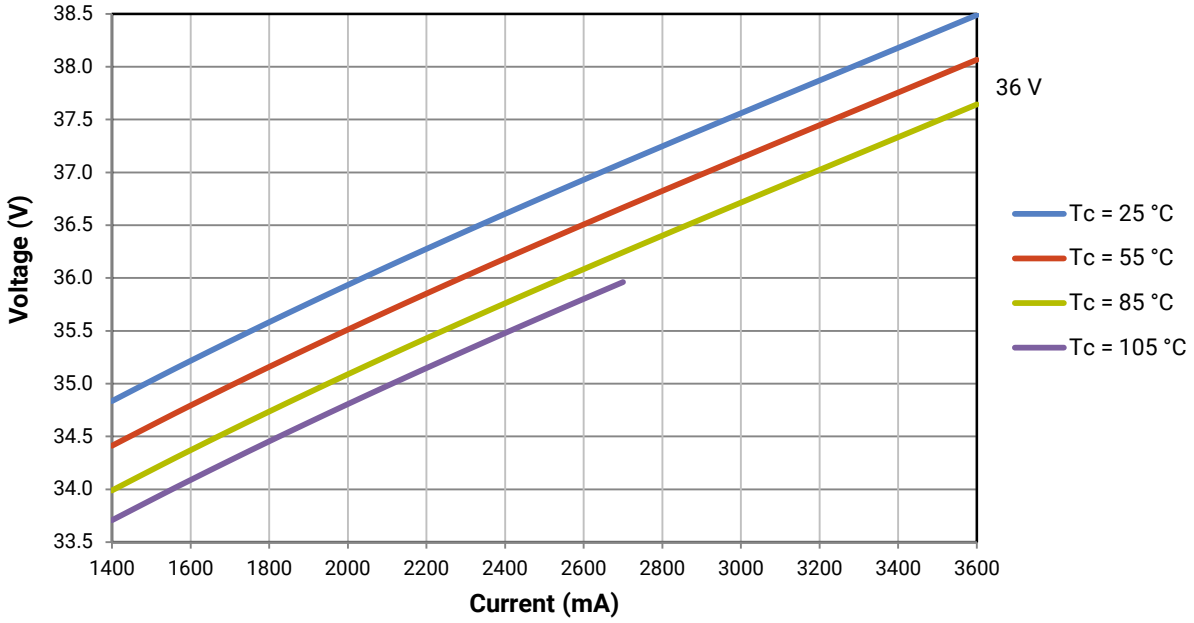
RELATIVE SPECTRAL POWER DISTRIBUTION (36 V, I_F = 2400 mA; 72 V, I_F = 1200 mA, T_J = 85 °C)

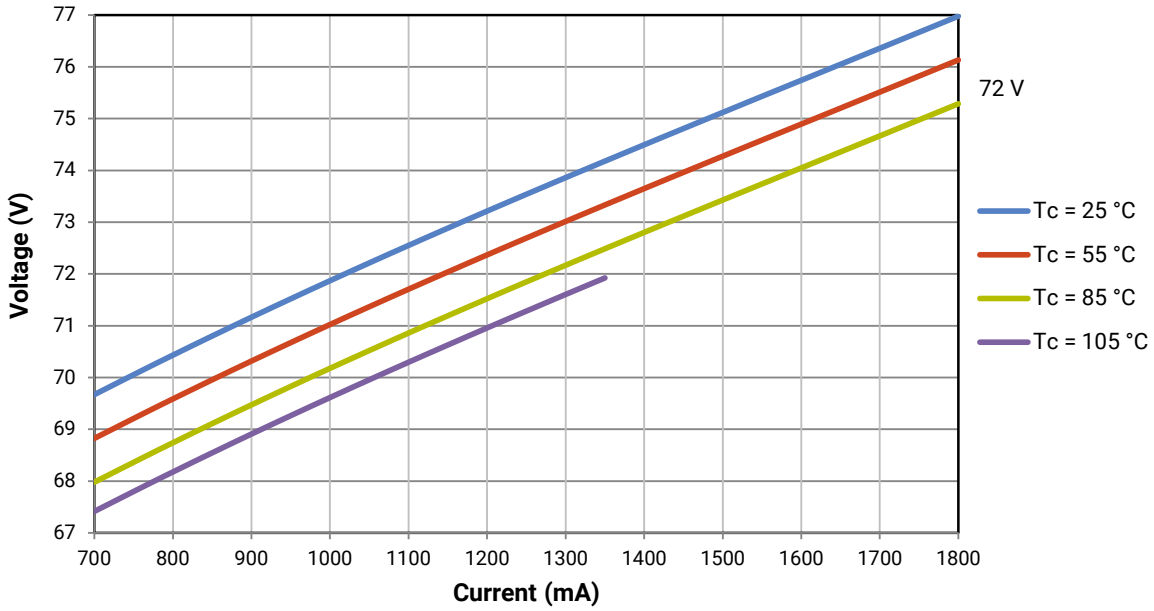
The following graph is the result of a series of pulsed measurements at 2400 mA for the 36-V CXA2 Studio LED and 1200 mA for the 72-V CXA2 Studio LED and T_J = 85 °C.



ELECTRICAL CHARACTERISTICS

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



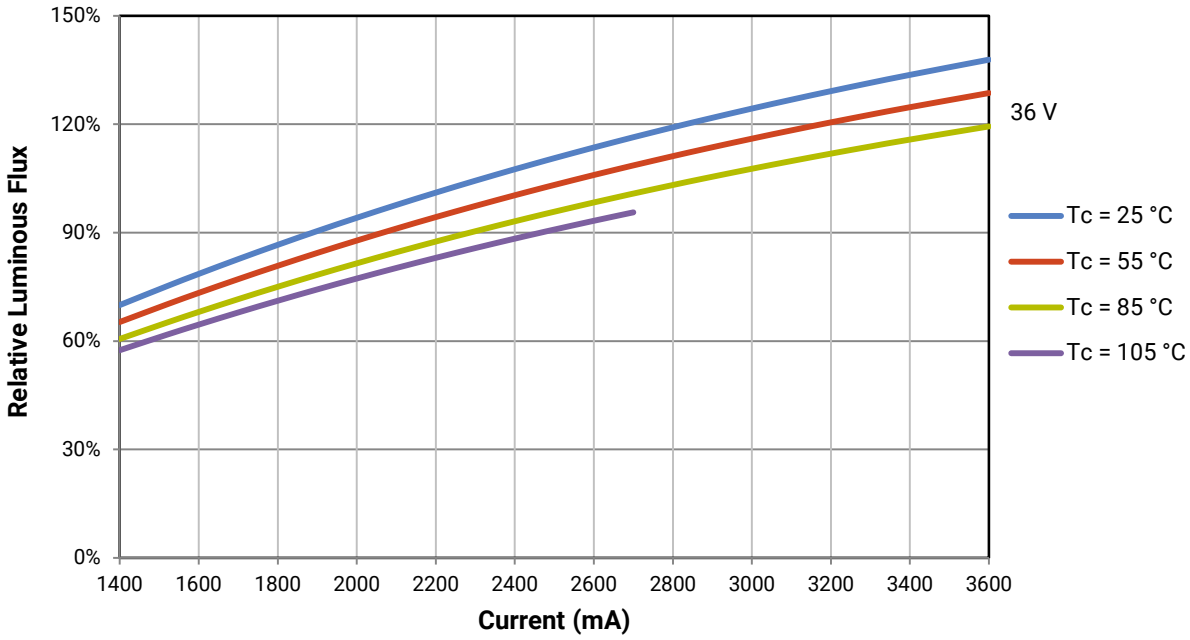


RELATIVE LUMINOUS FLUX

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

- Measurements of CXA2 Studio 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 °C for the 36-V CXA2 Studio LED.

Using the 36-V CXA2 Studio LED as an example, at steady-state operation of Tc = 55 °C, I_F = 3200 mA, the relative luminous flux ratio is 120% in the chart below. A CXA2 Studio LED that measures 10,000 lm during binning will deliver 12,000 lm (10,000 * 1.2) at steady-state operation of Tc = 25 °C, I_F = 3200 mA.

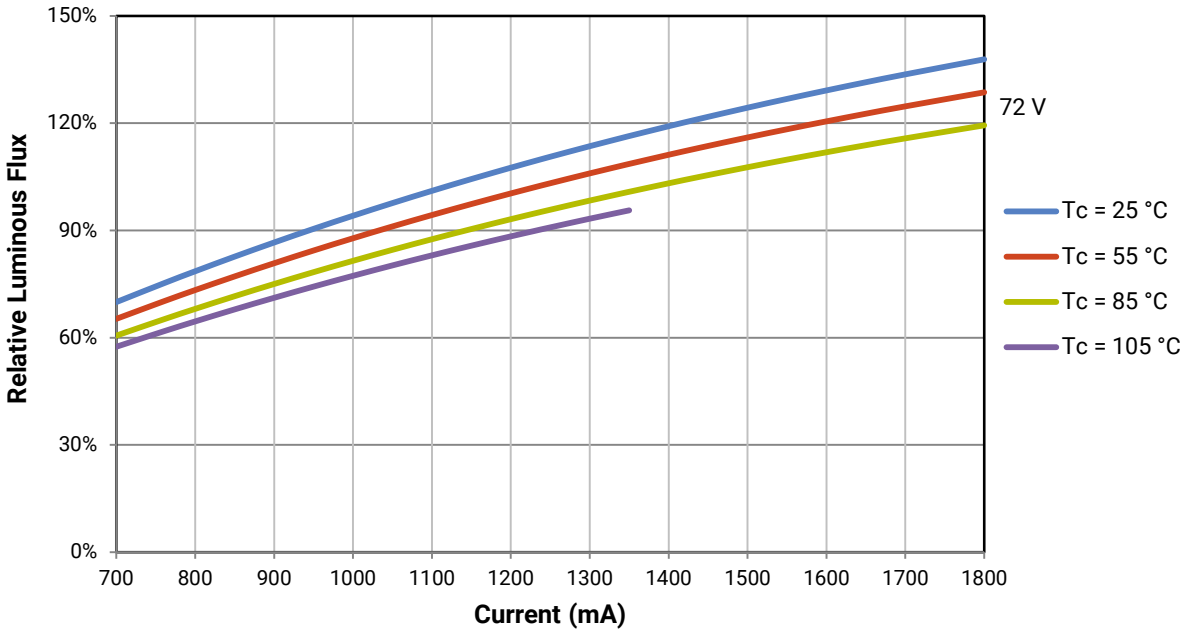


RELATIVE LUMINOUS FLUX - CONTINUED

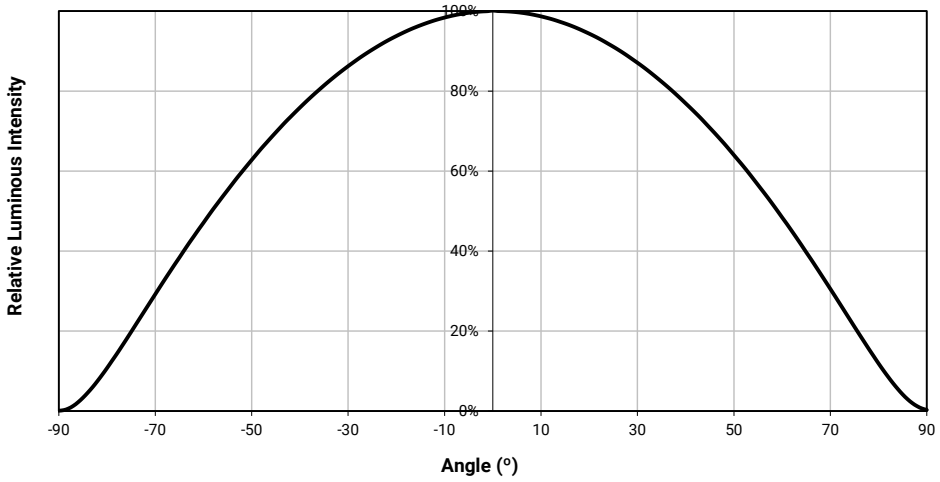
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA2 Studio 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 °C for the 72-V CXA2 Studio LED.

Using the 72-V CXA2 Studio LED as an example, at steady-state operation of Tc = 55 °C, I_F = 1600 mA, the relative luminous flux ratio is 120% in the chart below. A CXA2 Studio LED that measures 10,000 lm during binning will deliver 12,000 lm (10,000 * 1.2) at steady-state operation of Tc = 55 °C, I_F = 1600 mA.



TYPICAL SPATIAL DISTRIBUTION



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

XLamp CXA2 Studio LEDs are tested for luminous flux and placed into one of the following bins.

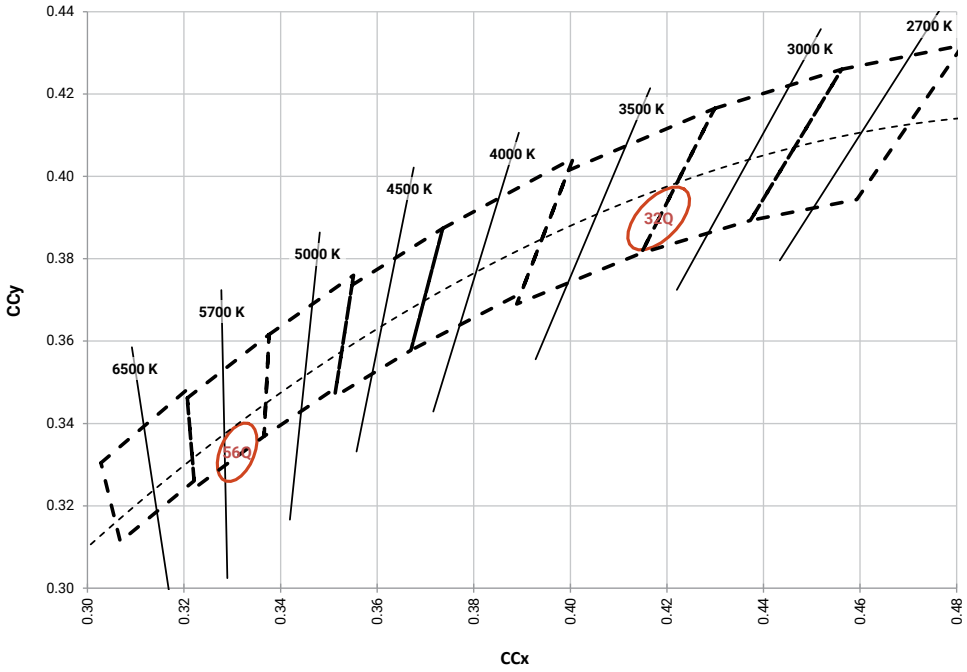
Group Code	Minimum Luminous Flux	Maximum Luminous Flux
AB	8,500	9,000
AD	9,000	9,500
BB	9,500	10,000
BD	10,000	11,000
CB	11,000	12,000

PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C)

XLamp CXA2 Studio LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

EasyWhite Color Temperatures – 3-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
56Q	5600 K	0.3310	0.3330	0.0084	0.00312	65
32Q	3200 K	0.4183	0.3898	0.0089	0.0045	53.6

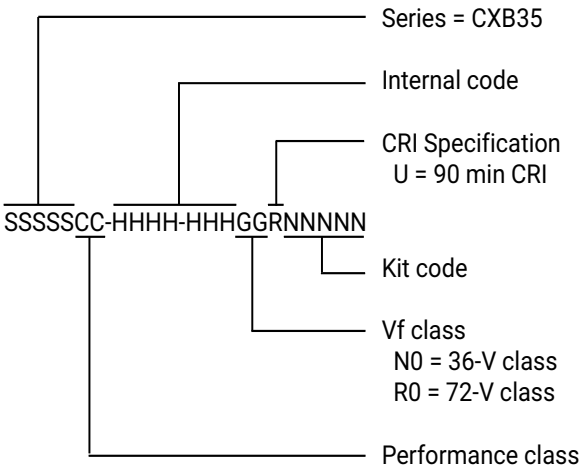
CREE EASYWHITE® BINS PLOTTED ON THE CIE 1931 COLOR SPACE (T_J = 85 °C)



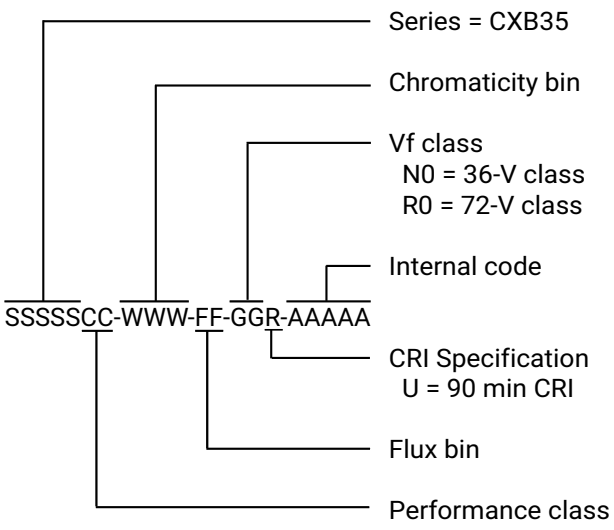
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code



Bin Code



MECHANICAL DIMENSIONS

Dimensions are in mm.

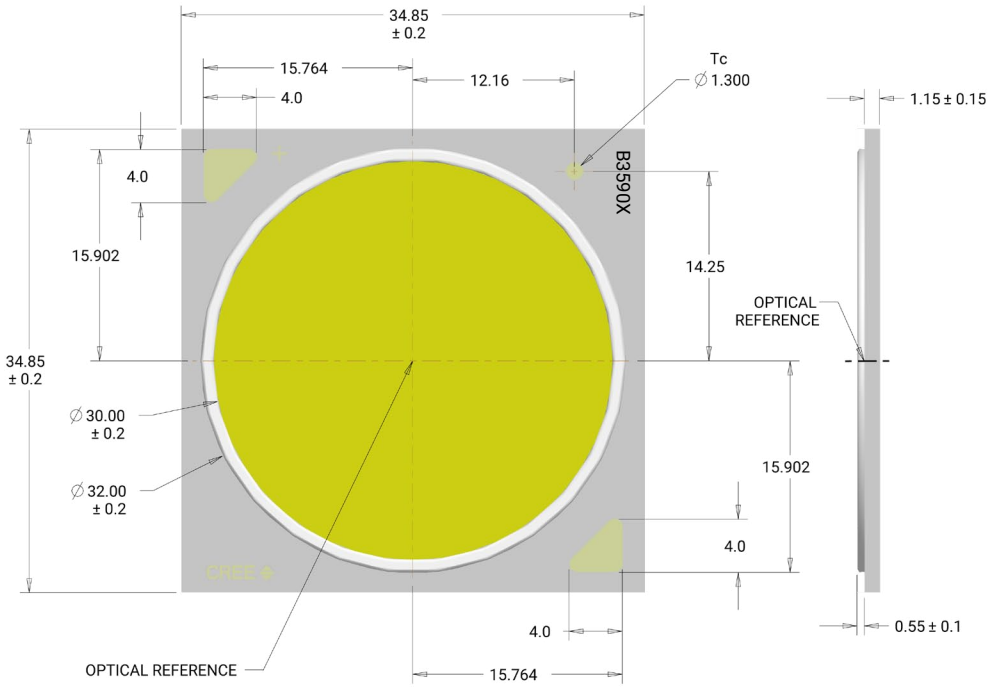
Tolerances unless otherwise specified: ±.13

x° ±1°

Meaning of B3590X

B3590N = 36-V CXA2 Studio

B3590R = 72-V CXA2 Studio



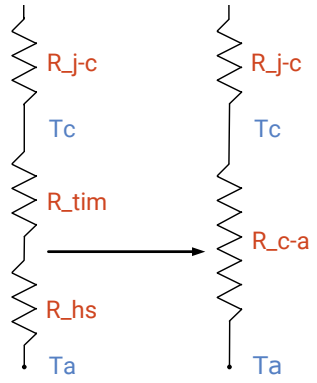
THERMAL DESIGN

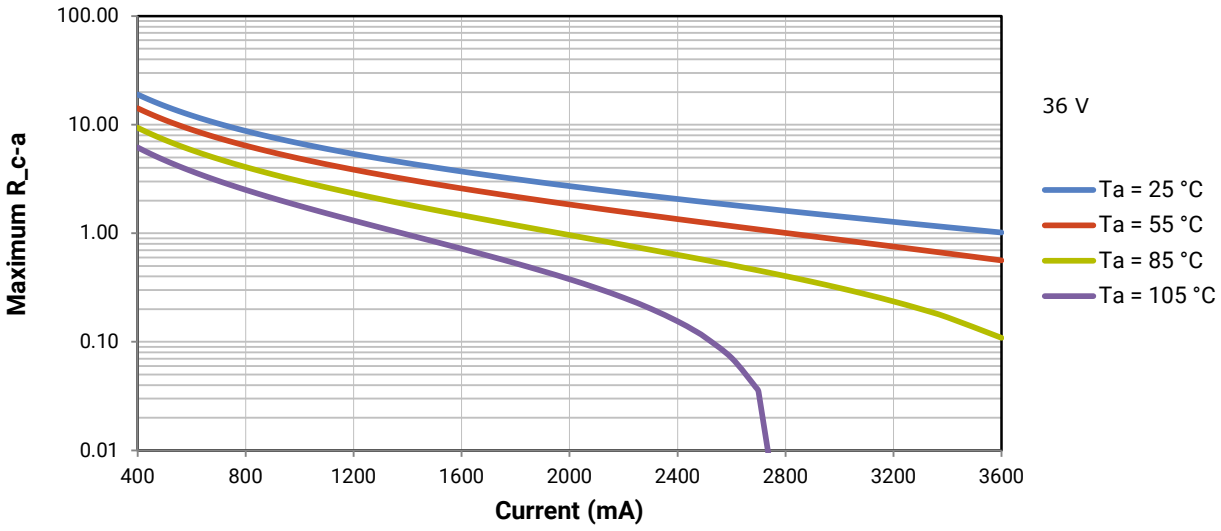
The CXA family of LED arrays can include over a hundred different LED die inside one package, and thus over a hundred different junction temperatures (T_J). Cree has intentionally removed junction-temperature-based operating limits and replaced the commonplace maximum T_J calculations with maximum ratings based on forward current (I_F) and case temperature (Tc). No additional calculations are required to ensure the CXA LED is being operated within its designed limits. Please refer to page 3 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 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.

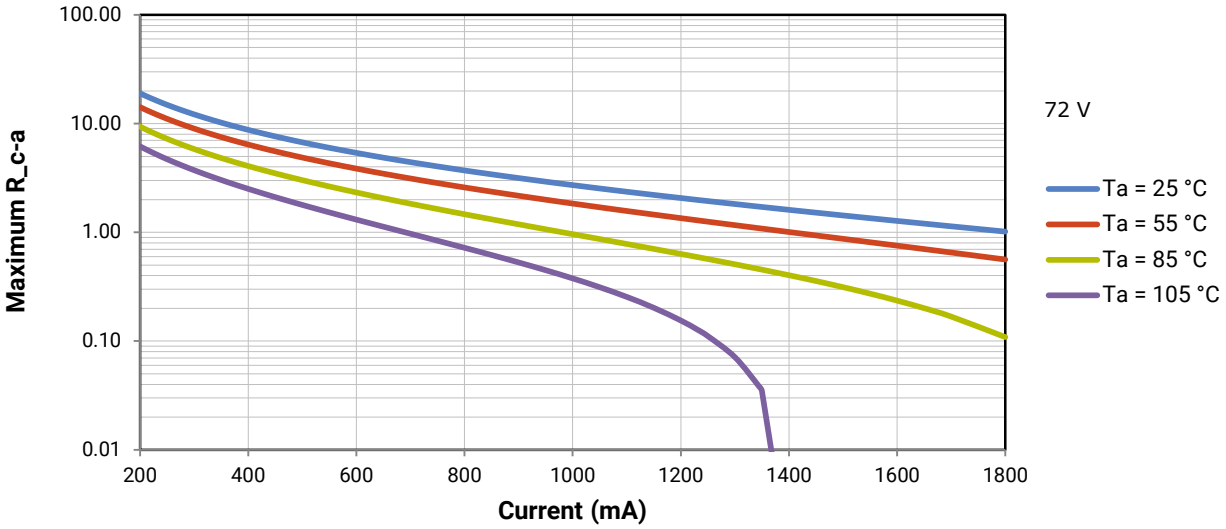
To keep the CXA2 Studio LED at or below the maximum rated Tc, the case to ambient temperature thermal resistance (R_c-a) must be at or below the maximum R_c-a value shown on the following graphs, depending on the operating environment. The y-axis in the graph is a base 10 logarithmic scale.

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.

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 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 CXA2 Studio 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: ±.13
x° ± 1°