Cree® XLamp® CXB3050 LED

PRODUCT DESCRIPTION

The XLamp® CXB3050 LED Array is a member of the second generation of the CXA family that delivers up to 30% higher efficacy and up to 20% higher lumens than the first generation in the same LES. The higher performance second generation CXA LED Arrays provide a drop-in performance upgrade to existing CXA LED designs to shorten product development time. In addition, the CXB LEDs also allow lighting manufacturers to achieve the same or better performance with a smaller LES, enabling a smaller, more impactful luminaire. Available in 2-step, 3-step and 5-step EasyWhite® bins, the CXB3050 LED delivers high lumen output 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 CXB3050 LED successfully in luminaire designs.

FEATURES

- 23-mm optical source
- Mechanical and optical design consistent with other CXA30 and CXB30 LEDs
- Available in 70-, 80- and 90-minimum CRI options
- Cree EasyWhite® 2-, 3- and 5-step binning
- Forward voltage option: 36-V class
- 85 °C binning and characterization
- Extremely uniform color over viewing angle
- 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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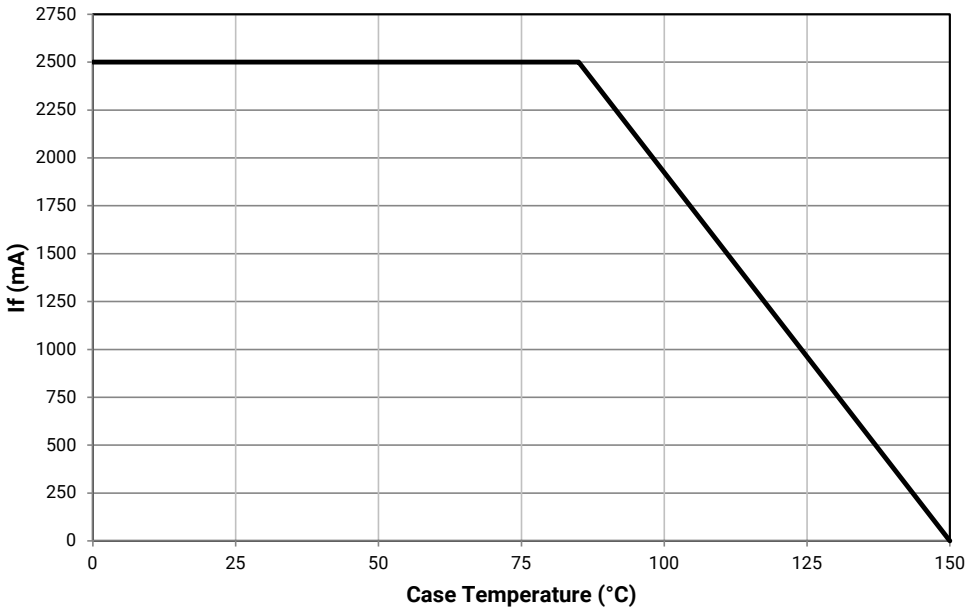
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			2500*
Reverse current	mA			0.1
Forward voltage (@ 1400 mA, T_j = 85 °C)	V		34.8	38

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXB3050 is dependent on the case temperature (Tc) when the LED has reached thermal equilibrium under steady-state operation. The graph shown below assumes 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 10 for the location of the Tc measurement point.



FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS (I_F = 1400 mA, T_J = 85 °C)

The following table provides order codes for XLamp CXB3050 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 10).

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
6500 K	70	---	Y4	6910	7648					65E	CXB3050-0000-000N0BY465E
			Z2	7390	8179						CXB3050-0000-000N0BZ265E
	80	---	Y2	6430	7116					65E	CXB3050-0000-000N0HY265E
			Y4	6910	7648						CXB3050-0000-000N0HY465E
5700 K	70	---	Y4	6910	7648					57E	CXB3050-0000-000N0BY457E
			Z2	7390	8179						CXB3050-0000-000N0BZ257E
	80	---	Y2	6430	7116					57E	CXB3050-0000-000N0HY257E
			Y4	6910	7648						CXB3050-0000-000N0HY457E
5000 K	70	---	Y4	6910	7648					50E	CXB3050-0000-000N0BY450E
			Z2	7390	8179						CXB3050-0000-000N0BZ250E
	80	---	Y2	6430	7116			50G	CXB3050-0000-000N0HY250G	50E	CXB3050-0000-000N0HY250E
			Y4	6910	7648				CXB3050-0000-000N0HY450G		CXB3050-0000-000N0HY450E
	90	92	X4	6010	6652			50G	CXB3050-0000-000N0UX450G		
			Y2	6430	7116				CXB3050-0000-000N0UY250G		
4000 K	70	---	Y4	6910	7648					40E	CXB3050-0000-000N0BY440E
			Z2	7390	8179						CXB3050-0000-000N0BZ240E
	80	---	Y2	6430	7116	40H	CXB3050-0000-000N0HY240H	40G	CXB3050-0000-000N0HY240G		
			Y4	6910	7648		CXB3050-0000-000N0HY440H		CXB3050-0000-000N0HY440G		
	90	92	X2	5590	6187	40H	CXB3050-0000-000N0UX240H	40G	CXB3050-0000-000N0UX240G		
			X4	6010	6652		CXB3050-0000-000N0UX440H		CXB3050-0000-000N0UX440G		

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 12).
- Cree XLamp CXB3050 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.

* For 80 CRI minimum LEDs, CRI R9 minimum is 0 with a ±2 tolerance. For 90 CRI minimum LEDs, CRI R9 typical is 60.

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

FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS (I_F = 1400 mA, T_J = 85 °C) - 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
3500 K	80	---	Y2	6430	7116	35H	CXB3050-0000-000N0HY235H	35G	CXB3050-0000-000N0HY235G		
			Y4	6910	7648		CXB3050-0000-000N0HY435H		CXB3050-0000-000N0HY435G		
	90	92	W4	5225	5783	35H	CXB3050-0000-000N0UW435H	35G	CXB3050-0000-000N0UW435G		
			X2	5590	6187		CXB3050-0000-000N0UX235H		CXB3050-0000-000N0UX235G		
3000 K	80	---	X4	6010	6652	30H	CXB3050-0000-000N0HX430H	30G	CXB3050-0000-000N0HX430G		
			Y2	6430	7116		CXB3050-0000-000N0HY230H		CXB3050-0000-000N0HY230G		
	90	92	W4	5225	5783	30H	CXB3050-0000-000N0UW430H	30G	CXB3050-0000-000N0UW430G		
			X2	5590	6187		CXB3050-0000-000N0UX230H		CXB3050-0000-000N0UX230G		
2700 K	80	---	X4	6010	6652	27H	CXB3050-0000-000N0HX427H	27G	CXB3050-0000-000N0HX427G		
			Y2	6430	7116		CXB3050-0000-000N0HY227H		CXB3050-0000-000N0HY227G		
	90	92	W2	4860	5379	27H	CXB3050-0000-000N0UW227H	27G	CXB3050-0000-000N0UW227G		
			W4	5225	5783		CXB3050-0000-000N0UW427H		CXB3050-0000-000N0UW427G		

Notes

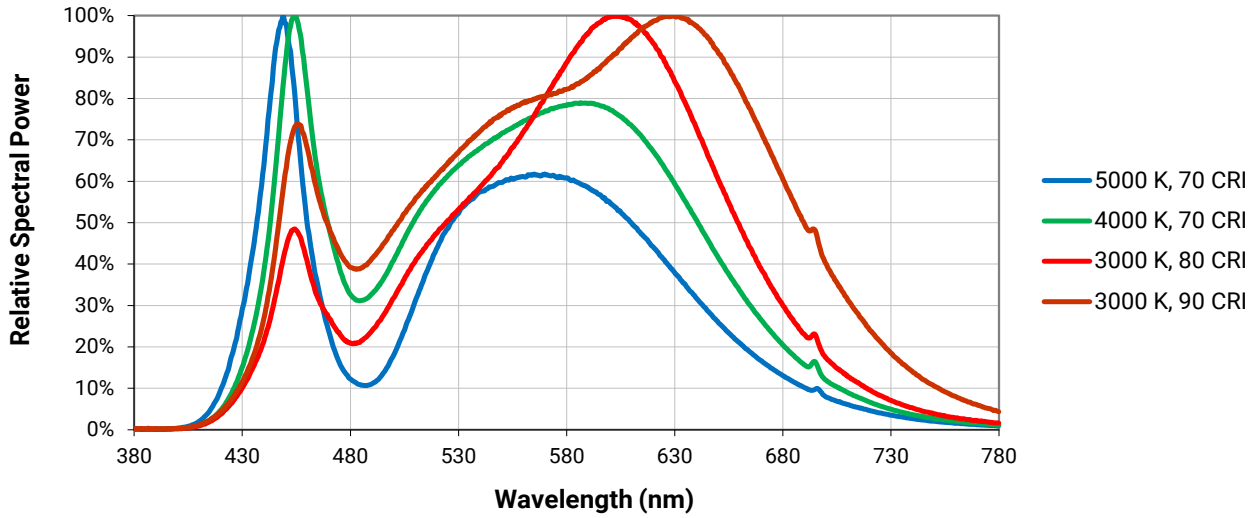
- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and a tolerance of ±2 on CRI measurements. See the Measurements section (page 12).
- Cree XLamp CXB3050 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels 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.

* For 80 CRI minimum LEDs, CRI R9 minimum is 0 with a ±2 tolerance. For 90 CRI minimum LEDs, CRI R9 typical is 60.

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

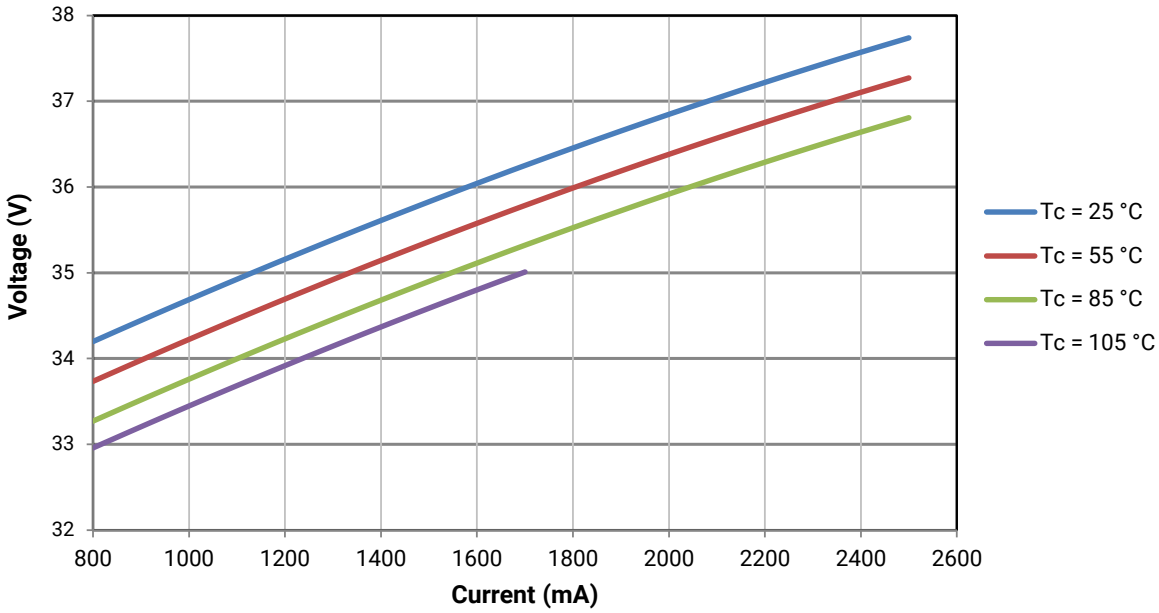
RELATIVE SPECTRAL POWER DISTRIBUTION

The following graph is the result of a series of pulsed measurements at 1400 mA and T_j = 85 °C.



ELECTRICAL CHARACTERISTICS

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

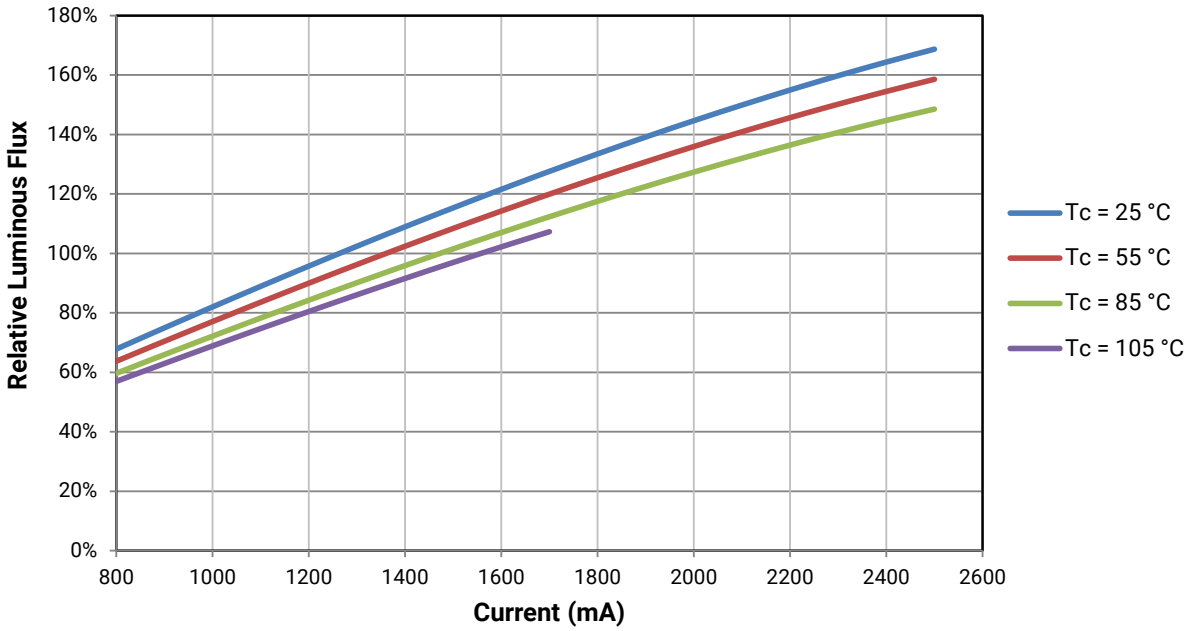


RELATIVE LUMINOUS FLUX

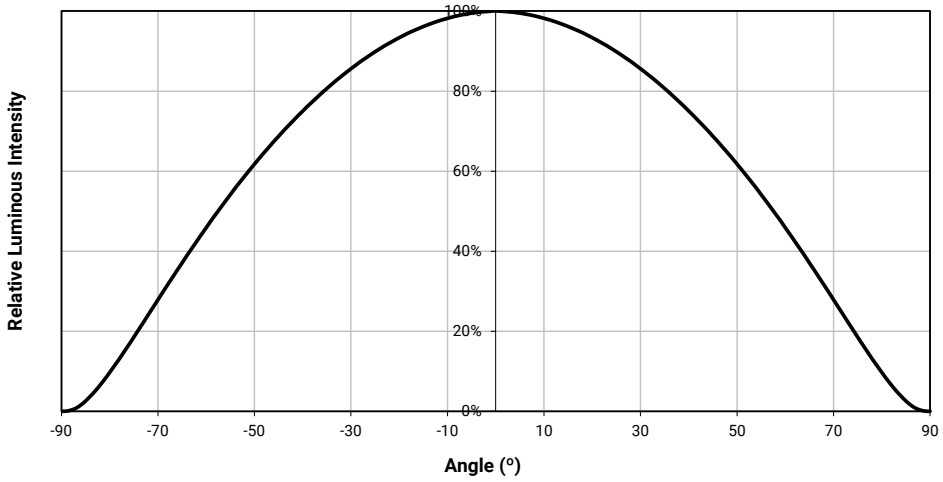
The relative luminous flux values provided below are the ratio of:

- Measurements of CXB3050 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 1400 mA at T_J = 85 °C.

For example, at steady-state operation of Tc = 25 °C, I_F = 1600 mA, the relative luminous flux ratio is 120% in the chart below. A CXB3050 LED that measures 6010 lm during binning will deliver 7212 lm (6010 * 1.2) at steady-state operation of Tc = 25 °C, I_F = 1600 mA.



TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - BRIGHTNESS (I_F = 1400 mA, T_J = 85 °C)

XLamp CXB3050 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Minimum Luminous Flux	Maximum Luminous Flux
W2	4860	5225
W4	5225	5590
X2	5590	6010
X4	6010	6430
Y2	6430	6910
Y4	6910	7390
Z2	7390	7945
Z4	7945	8500

PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C)

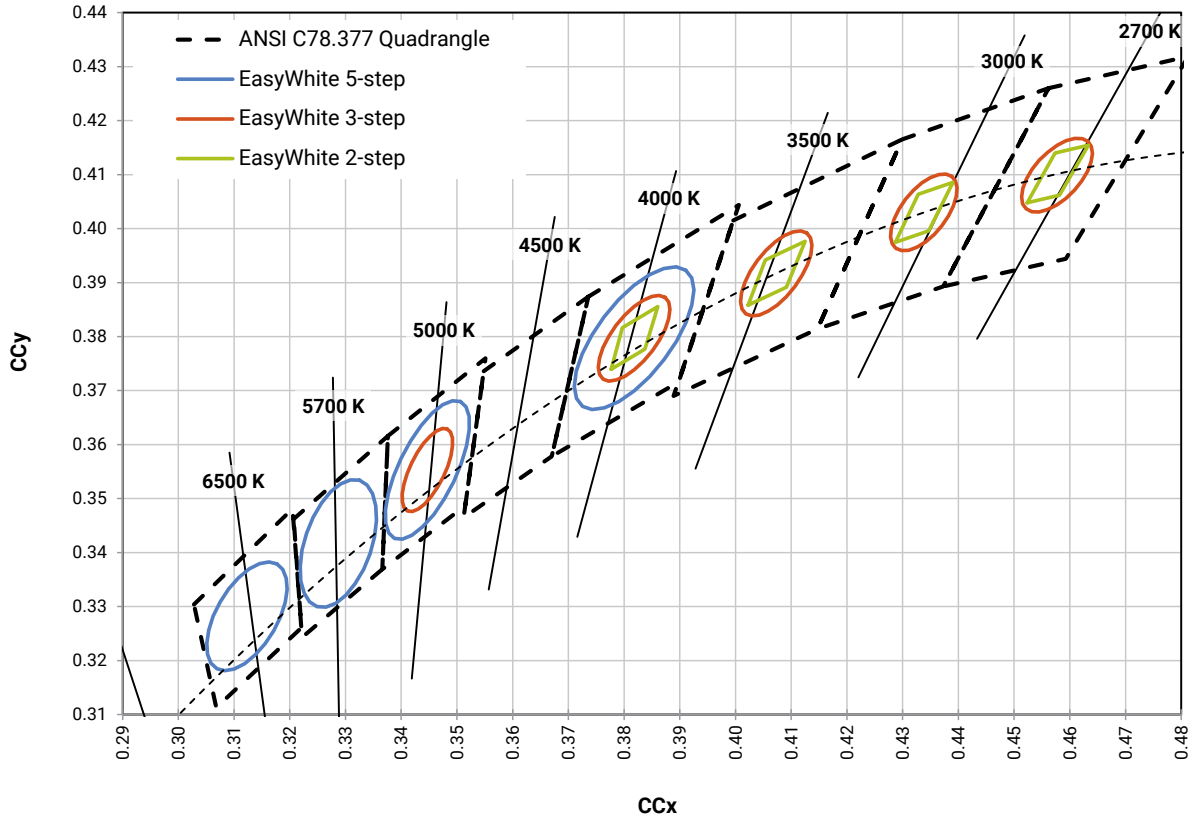
XLamp CXB3050 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

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

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

EasyWhite Color Temperatures – 5-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
65E	6500 K	0.3123	0.3282	0.01110	0.00550	61.0
57E	5700 K	0.3287	0.3417	0.01230	0.00600	72.0
50E	5000 K	0.3447	0.3553	0.01400	0.00520	65.0
40E	4000 K	0.3818	0.3797	0.01565	0.00670	53.7

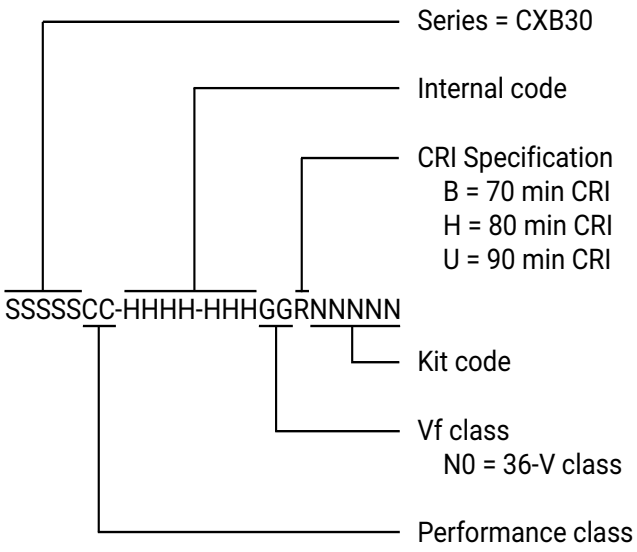
CREE EASYWHITE® BINS PLOTTED ON THE 1931 CIE COLOR SPACE



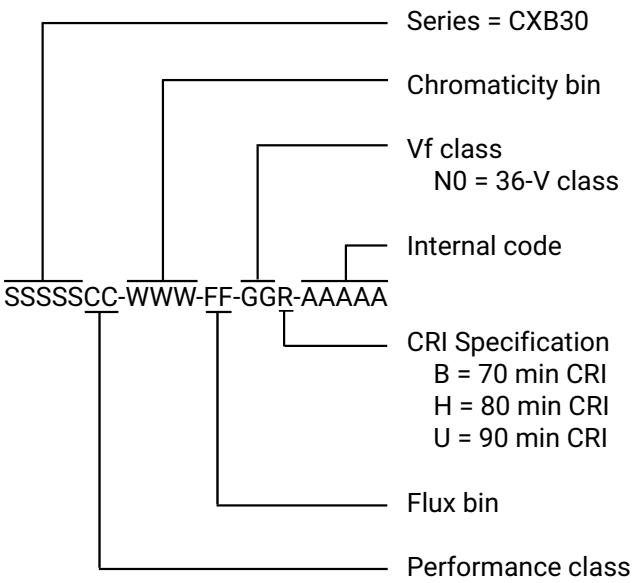
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code



Bin Code

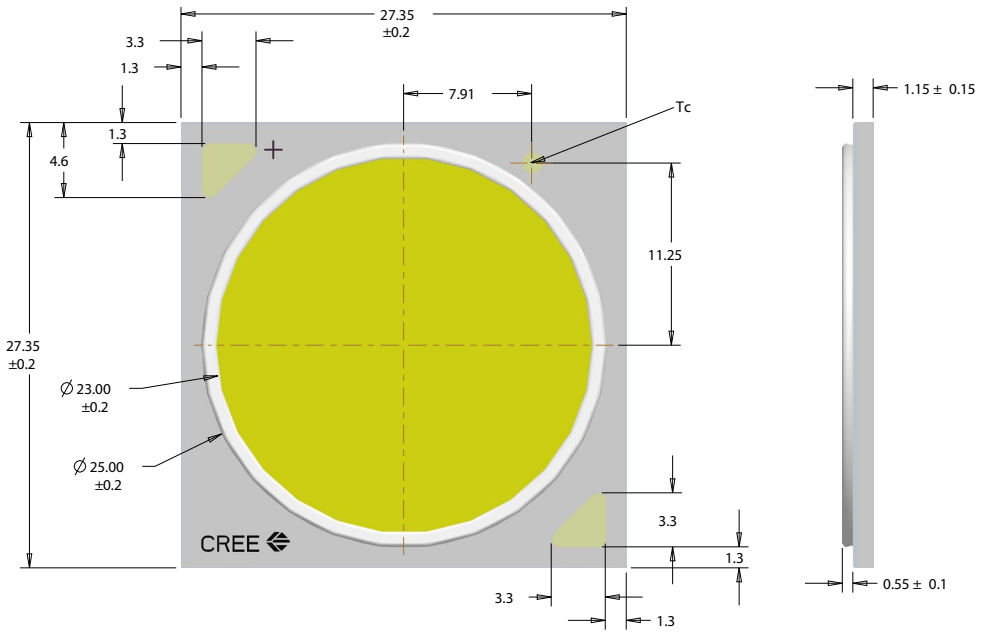


MECHANICAL DIMENSIONS

Dimensions are in mm.

Tolerances unless otherwise specified: ±.13

x° ±1°



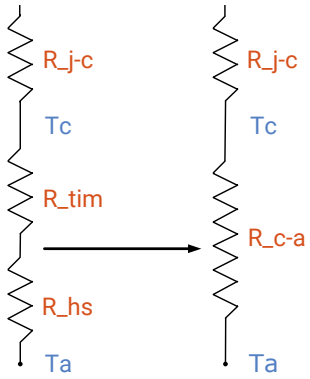
THERMAL DESIGN

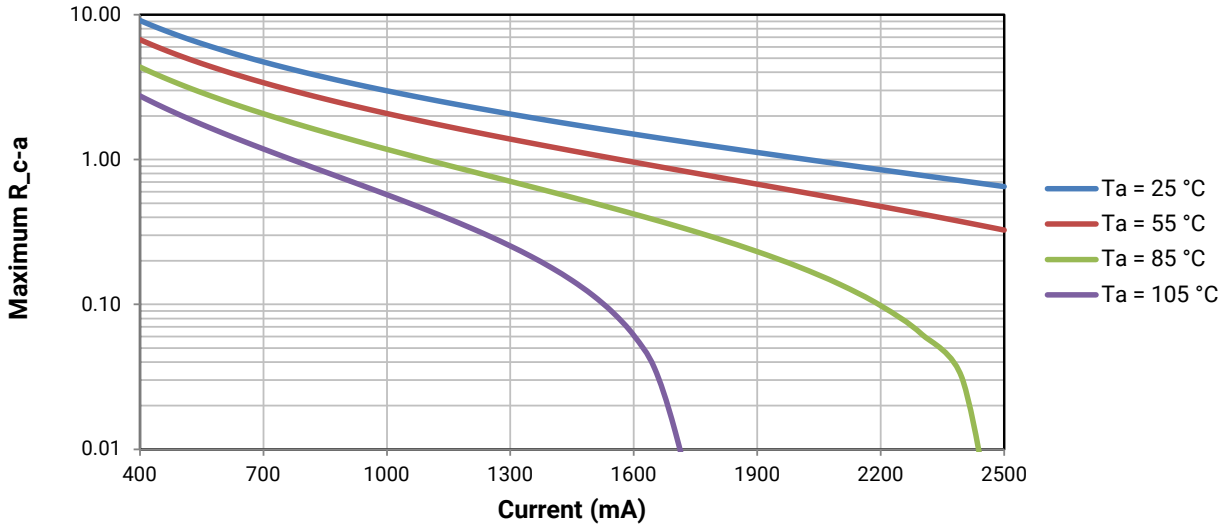
The CXB family of LED arrays can include over a hundred different LED die inside one package, and thus over a hundred different junction temperatures (T_J). Cree has intentionally removed junction-temperature-based operating limits and replaced the commonplace maximum T_J calculations with maximum ratings based on forward current (I_F) and case temperature (Tc). No additional calculations are required to ensure the CXB LED is being operated within its designed limits. Please refer to page 2 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 CXB 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 CXB LEDs successfully in luminaire designs.

To keep the CXB3050 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 graph, 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).





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 CXB3050 LEDs are packaged in trays of 20. Five trays are sealed in an anti-static bag and placed inside a carton, for a total of 100 LEDs per carton. Each carton contains 100 LEDs from the same performance bin.

Dimensions are in inches.
Tolerances: ±.13
x° ±1°