Cree® XLamp® CXB1310 LED



PRODUCT DESCRIPTION

Cree CXB1310 High Density (HD) LED arrays are the next generation of high lumen density LED arrays. Incorporating elements of Cree's SC5 Technology™ Platform, the CXB1310 HD LED arrays deliver the most lumens in the industry for their light-emitting surface (LES) size, enabling radically new and differentiated LED lighting form factors for applications like tracks, lamps and downlights. The industry-leading performance of the CXB1310 HD LED arrays allows lighting manufacturers to develop compact, cutting edge products that deliver high performance and energy savings.

The CX Family LED Design Guide provides basic information on the requirements to use the CXB1310 HD LED array successfully in luminaire designs.

FEATURES

- Available in 5-step EasyWhite® bins at 4000 K, 5000 K, 5700 K & 6500 K, 3-step EasyWhite bins at 2700 K, 3000 K, 3500 K, 4000 K & 5000 K and 2-step EasyWhite bins at 2700 K, 3000 K, 3500 K, & 4000 K CCT
- Available in 70-, 80- and 90-minimum CRI options
- Forward voltage options: 18-V class & 36-V class
- 85 °C binning and characterization
- Maximum drive current: 1400 mA (18 V), 700mA (36 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

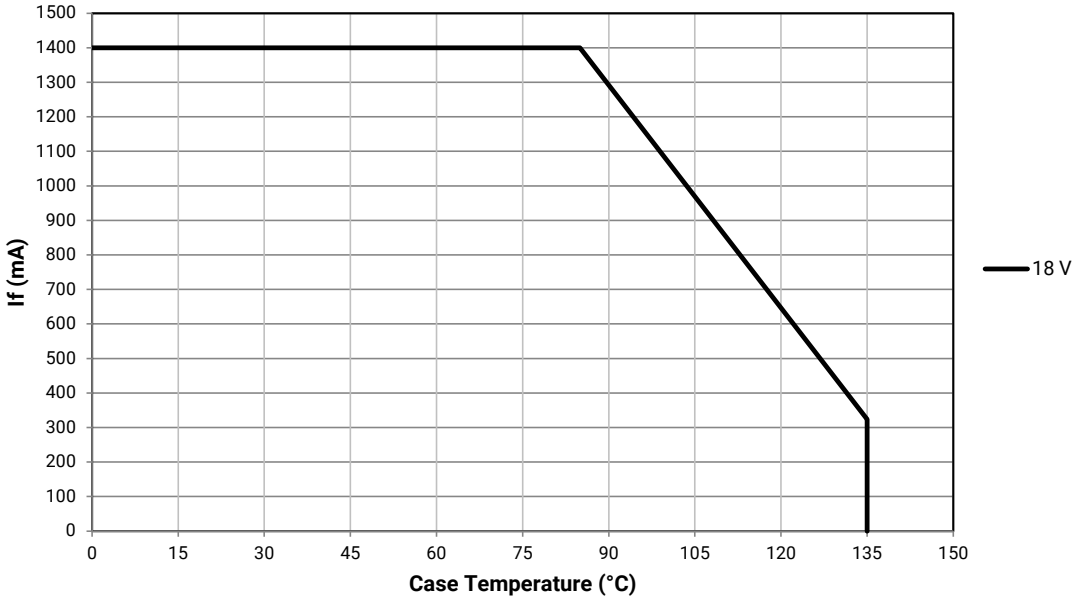
Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current (18 V)	mA			1400*
DC forward current (36 V)	mA			700*
Reverse current	mA			0.1
Forward voltage (18 V, @ 700 mA, 85 °C)	V		16.5	18.5
Forward voltage (36 V, @ 350 mA, 85 °C)	V		33.0	37.0

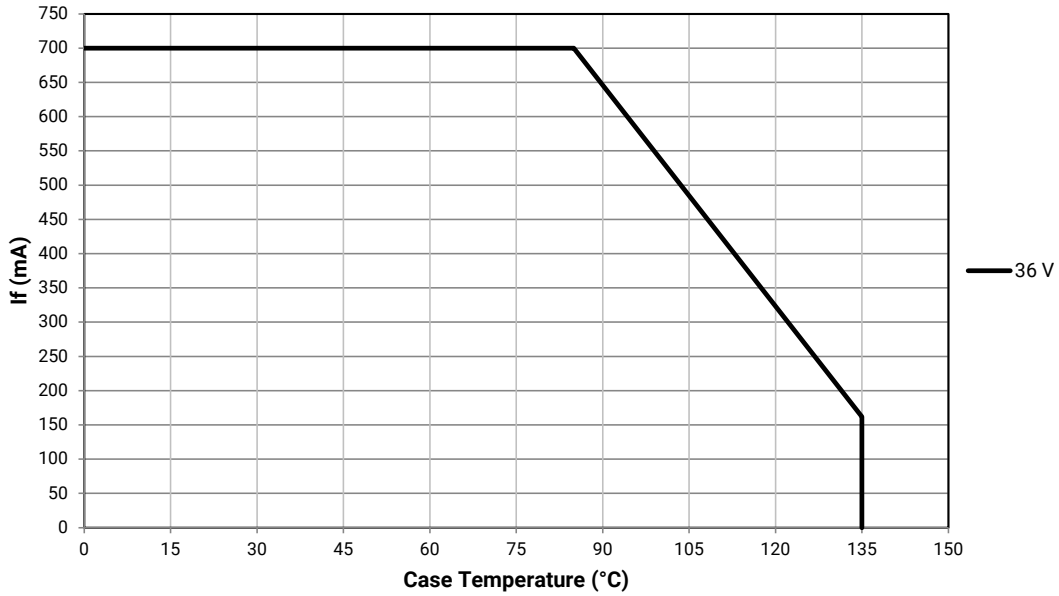
* Refer to the Operating Limits section.

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OPERATING LIMITS

The maximum current rating of the CXB1310 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 Dimensions section on page 16 for the location of the Tc measurement point.





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FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 18 V (I_F = 700 mA, T_J = 85 °C)

The following table provides order codes for XLamp CXB1310 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 16).

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	Group	Order Code
6500 K	70	---	N2	1590	1733							65E	CXB1310-0000-000F0BN265E
			N4	1710	1864								CXB1310-0000-000F0BN465E
	80	---	M4	1485	1618							65E	CXB1310-0000-000F0HM465E
			N2	1590	1733								CXB1310-0000-000F0HN265E
5700 K	70	---	N2	1590	1733							57E	CXB1310-0000-000F0BN257E
			N4	1710	1864								CXB1310-0000-000F0BN457E
	80	---	M4	1485	1618							57E	CXB1310-0000-000F0HM457E
			N2	1590	1733								CXB1310-0000-000F0HN257E
5000 K	70	---	N2	1590	1733							50E	CXB1310-0000-000F0BN250E
			N4	1710	1864								CXB1310-0000-000F0BN450E
	80	---	M4	1485	1618			50G	CXB1310-0000-000F0HM450G				
			N2	1590	1733				CXB1310-0000-000F0HN250G				
	90	92	K4	1290	1406			50G	CXB1310-0000-000F0UK450G				
			M2	1380	1504				CXB1310-0000-000F0UM250G				
4000 K	70	---	N2	1590	1733							40E	CXB1310-0000-000F0BN240E
			N4	1710	1864								CXB1310-0000-000F0BN440E
	80	---	M4	1485	1618	40H	CXB1310-0000-000F0HM440H	40G	CXB1310-0000-000F0HM440G				
			N2	1590	1733		CXB1310-0000-000F0HN240H		CXB1310-0000-000F0HN240G				
	90	92	K4	1290	1406	40H	CXB1310-0000-000F0UK440H	40G	CXB1310-0000-000F0UK440G				
			M2	1380	1504		CXB1310-0000-000F0UM240H		CXB1310-0000-000F0UM240G				

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 19).
- Cree XLamp CXB1310 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.

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FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 18 V (I_F = 700 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	Group	Order Code
3500 K	80	---	M2	1380	1504	35H	CXB1310-0000-000F0HM235H	35G	CXB1310-0000-000F0HM235G				
			M4	1485	1618		CXB1310-0000-000F0HM435H		CXB1310-0000-000F0HM435G				
	90	92	K2	1200	1308	35H	CXB1310-0000-000F0UK235H	35G	CXB1310-0000-000F0UK235G				
			K4	1290	1406		CXB1310-0000-000F0UK435H		CXB1310-0000-000F0UK435G				
3000 K	80	---	M2	1380	1504	30H	CXB1310-0000-000F0HM230H	30G	CXB1310-0000-000F0HM230G				
			M4	1485	1618		CXB1310-0000-000F0HM430H		CXB1310-0000-000F0HM430G				
	90	92	J4	1120	1221			30Q	CXB1310-0000-000F0UJ430Q	30U	CXB1310-0000-000F0UJ430U		
			K2	1200	1308				CXB1310-0000-000F0UK230Q		CXB1310-0000-000F0UK230U		
	90	92	J4	1120	1221	30H	CXB1310-0000-000F0UJ430H	30G	CXB1310-0000-000F0UJ430G				
			K2	1200	1308		CXB1310-0000-000F0UK230H		CXB1310-0000-000F0UK230G				
2700 K	80	---	K4	1290	1406	27H	CXB1310-0000-000F0HK427H	27G	CXB1310-0000-000F0HK427G				
			M2	1380	1504		CXB1310-0000-000F0HM227H		CXB1310-0000-000F0HM227G				
	90	92	J4	1120	1221	27H	CXB1310-0000-000F0UJ427H	27G	CXB1310-0000-000F0UJ427G				
			K2	1200	1308		CXB1310-0000-000F0UK227H		CXB1310-0000-000F0UK227G				

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 19).
- Cree XLamp CXB1310 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.

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

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FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 36 V (I_F = 350 mA, T_J = 85 °C)

The following table provides order codes for XLamp CXB1310 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 16).

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	Group	Order Code
6500 K	70	---	N2	1590	1733							65E	CXB1310-0000-000N0BN265E
			N4	1710	1864								CXB1310-0000-000N0BN465E
	80	---	M4	1485	1618							65E	CXB1310-0000-000N0HM465E
			N2	1590	1733								CXB1310-0000-000N0HN265E
5700 K	70	---	N2	1590	1733							57E	CXB1310-0000-000N0BN257E
			N4	1710	1864								CXB1310-0000-000N0BN457E
	80	---	M4	1485	1618							57E	CXB1310-0000-000N0HM457E
			N2	1590	1733								CXB1310-0000-000N0HN257E
5000 K	70	---	N2	1590	1733							50E	CXB1310-0000-000N0BN250E
			N4	1710	1864								CXB1310-0000-000N0BN450E
	80	---	M4	1485	1618			50G	CXB1310-0000-000N0HM450G				
			N2	1590	1733				CXB1310-0000-000N0HN250G				
	90	92	K4	1290	1406			50G	CXB1310-0000-000N0UK450G				
			M2	1380	1504				CXB1310-0000-000N0UM250G				
4000 K	70	---	N2	1590	1733							40E	CXB1310-0000-000N0BN240E
			N4	1710	1864								CXB1310-0000-000N0BN440E
	80	---	M4	1485	1618	40H	CXB1310-0000-000N0HM440H	40G	CXB1310-0000-000N0HM440G				
			N2	1590	1733		CXB1310-0000-000N0HN240H		CXB1310-0000-000N0HN240G				
	90	92	K4	1290	1406	40H	CXB1310-0000-000N0UK440H	40G	CXB1310-0000-000N0UK440G				
			M2	1380	1504		CXB1310-0000-000N0UM240H		CXB1310-0000-000N0UM240G				

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 19).
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FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 36 V (I_F = 350 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	Group	Order Code
3500 K	80	---	M2	1380	1504	35H	CXB1310-0000-000N0HM235H	35G	CXB1310-0000-000N0HM235G				
			M4	1485	1618		CXB1310-0000-000N0HM435H		CXB1310-0000-000N0HM435G				
	90	92	K2	1200	1308	35H	CXB1310-0000-000N0UK235H	35G	CXB1310-0000-000N0UK235G				
			K4	1290	1406		CXB1310-0000-000N0UK435H		CXB1310-0000-000N0UK435G				
3000 K	80	---	M2	1380	1504	30H	CXB1310-0000-000N0HM230H	30G	CXB1310-0000-000N0HM230G				
			M4	1485	1618		CXB1310-0000-000N0HM430H		CXB1310-0000-000N0HM430G				
	90	92	J4	1120	1221			30Q	CXB1310-0000-000N0UJ430Q	30U	CXB1310-0000-000N0UJ430U		
			K2	1200	1308				CXB1310-0000-000N0UK230Q		CXB1310-0000-000N0UK230U		
	90	92	J4	1120	1221	30H	CXB1310-0000-000N0UJ430H	30G	CXB1310-0000-000N0UJ430G				
			K2	1200	1308		CXB1310-0000-000N0UK230H		CXB1310-0000-000N0UK230G				
2700 K	80	---	K4	1290	1406	27H	CXB1310-0000-000N0HK427H	27G	CXB1310-0000-000N0HK427G				
			M2	1380	1504		CXB1310-0000-000N0HM227H		CXB1310-0000-000N0HM227G				
	90	92	J4	1120	1221	27H	CXB1310-0000-000N0UJ427H	27G	CXB1310-0000-000N0UJ427G				
			K2	1200	1308		CXB1310-0000-000N0UK227H		CXB1310-0000-000N0UK227G				

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 19).
- Cree XLamp CXB1310 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.

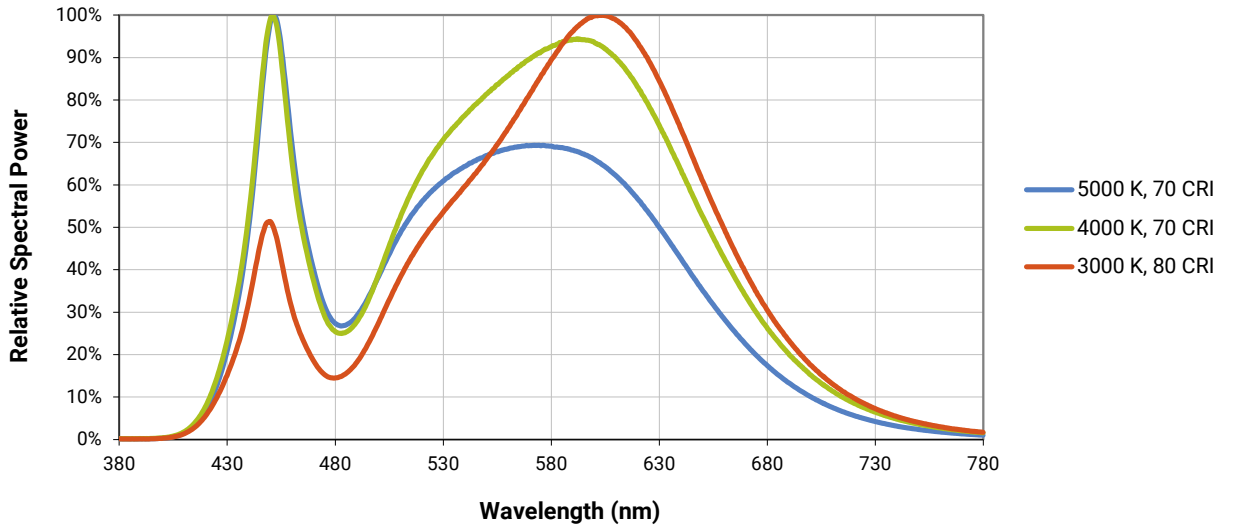
* For 80 CRI minimum LEDs, CRI R9 minimum is 0 with a ±2 tolerance. For 90 CRI minimum LEDs, CRI R9 typical is 60.

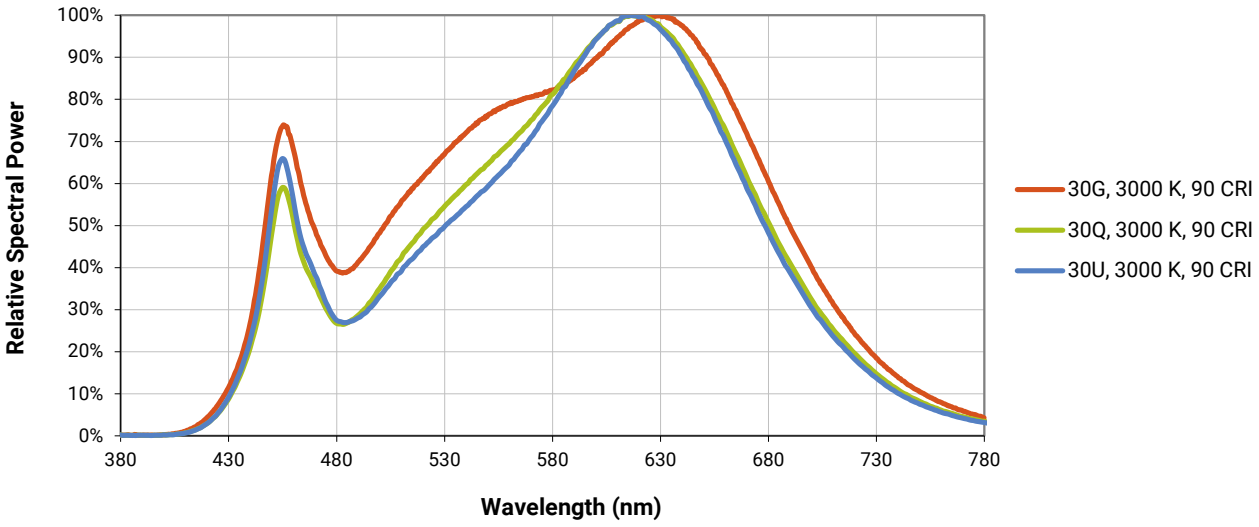
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RELATIVE SPECTRAL POWER DISTRIBUTION (18 V, I_F = 700 mA; 36 V, I_F = 350 mA, T_J = 85 °C)

The following graphs are the result of a series of pulsed measurements at 350 mA for the 18-V CXB1310 LED and 700 mA for the 36-V CXB1310 LED and T_J = 85 °C.

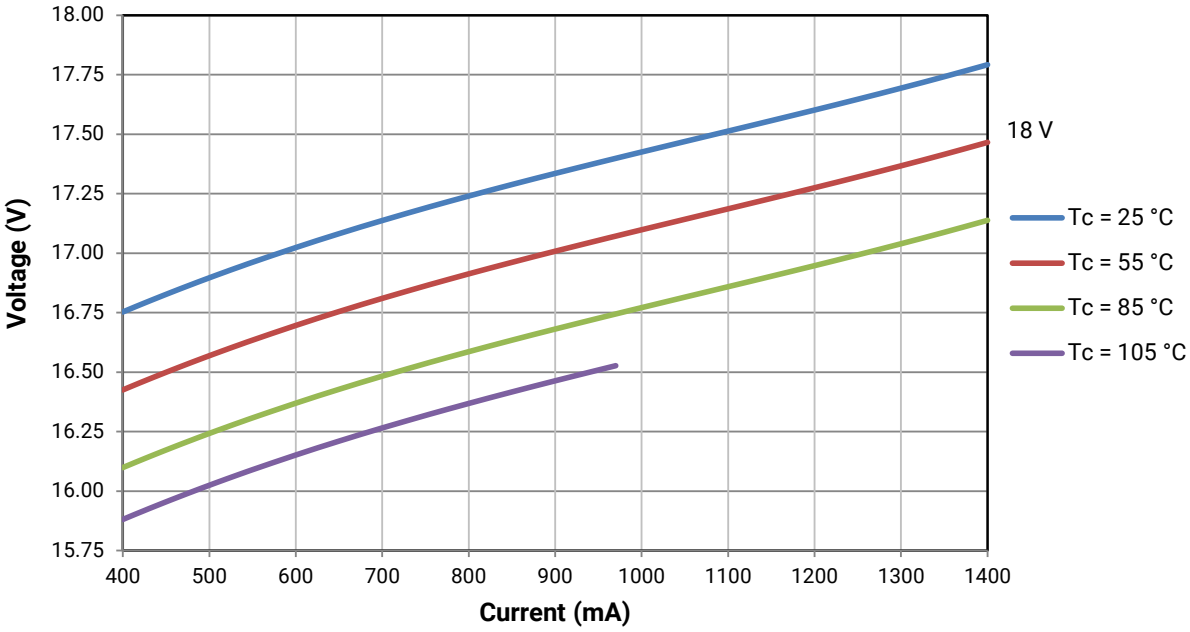


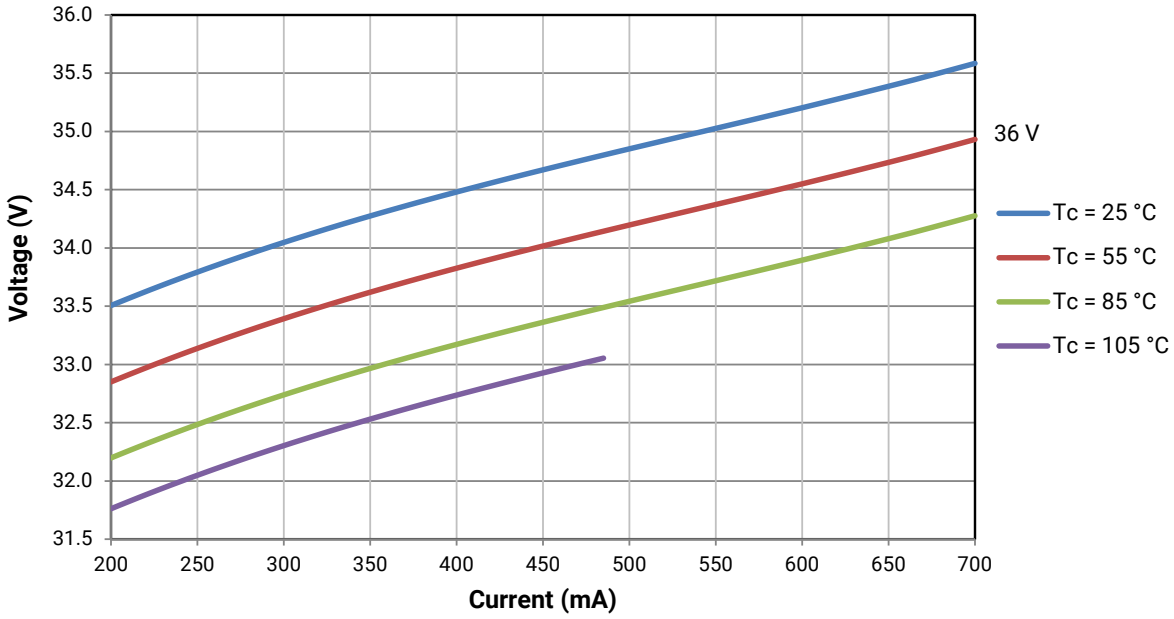


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ELECTRICAL CHARACTERISTICS

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





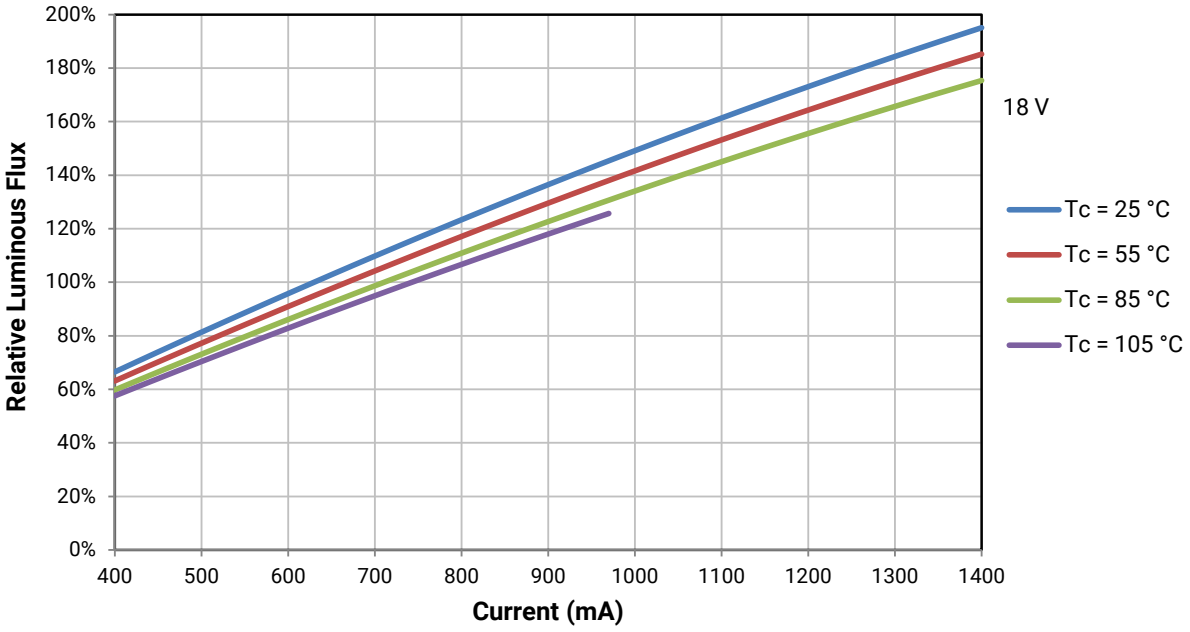
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RELATIVE LUMINOUS FLUX

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

- Measurements of CXB1310 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 700 mA at T_J = 85 °C for the 18-V CXB1310 LED.

For example, at steady-state operation of Tc = 55 °C, I_F = 1000 mA, the relative luminous flux ratio is 140% in the chart below. An 18-V CXB1310 LED that measures 1200 lm during binning will deliver 1680 lm (1200 * 1.4) at steady-state operation of Tc = 55 °C, I_F = 1000 mA.



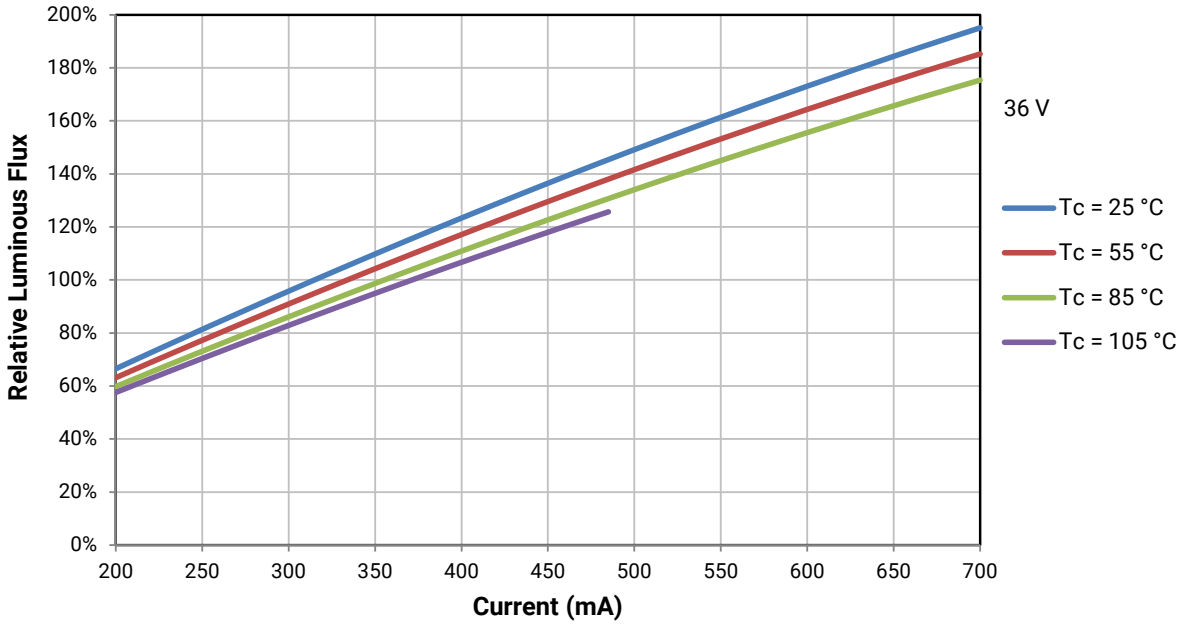
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RELATIVE LUMINOUS FLUX - CONTINUED

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

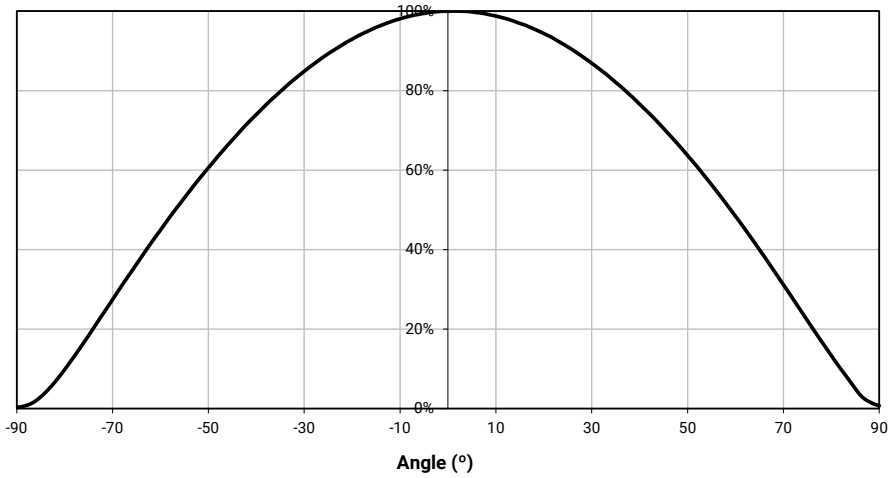
- Measurements of CXB1310 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 350 mA at T_J = 85 °C for the 36-V CXB1310 LED.

For example, at steady-state operation of Tc = 55 °C, I_F = 500 mA, the relative luminous flux ratio is 140% in the chart below. A 36-V CXB1310 LED that measures 1200 lm during binning will deliver 1680 lm (1200 * 1.4) at steady-state operation of Tc = 55 °C, I_F = 500 mA.



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TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - BRIGHTNESS (18 V, I_F = 700 mA; 36 V, I_F = 350 mA, T_J = 85 °C)

XLamp CXB1310 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Minimum Luminous Flux	Maximum Luminous Flux
J2	1040	1120
J4	1120	1200
K2	1200	1290
K4	1290	1380
M2	1380	1485
M4	1485	1590
N2	1590	1710
N4	1710	1830
P2	1830	1965

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PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C)

XLamp CXB1310 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

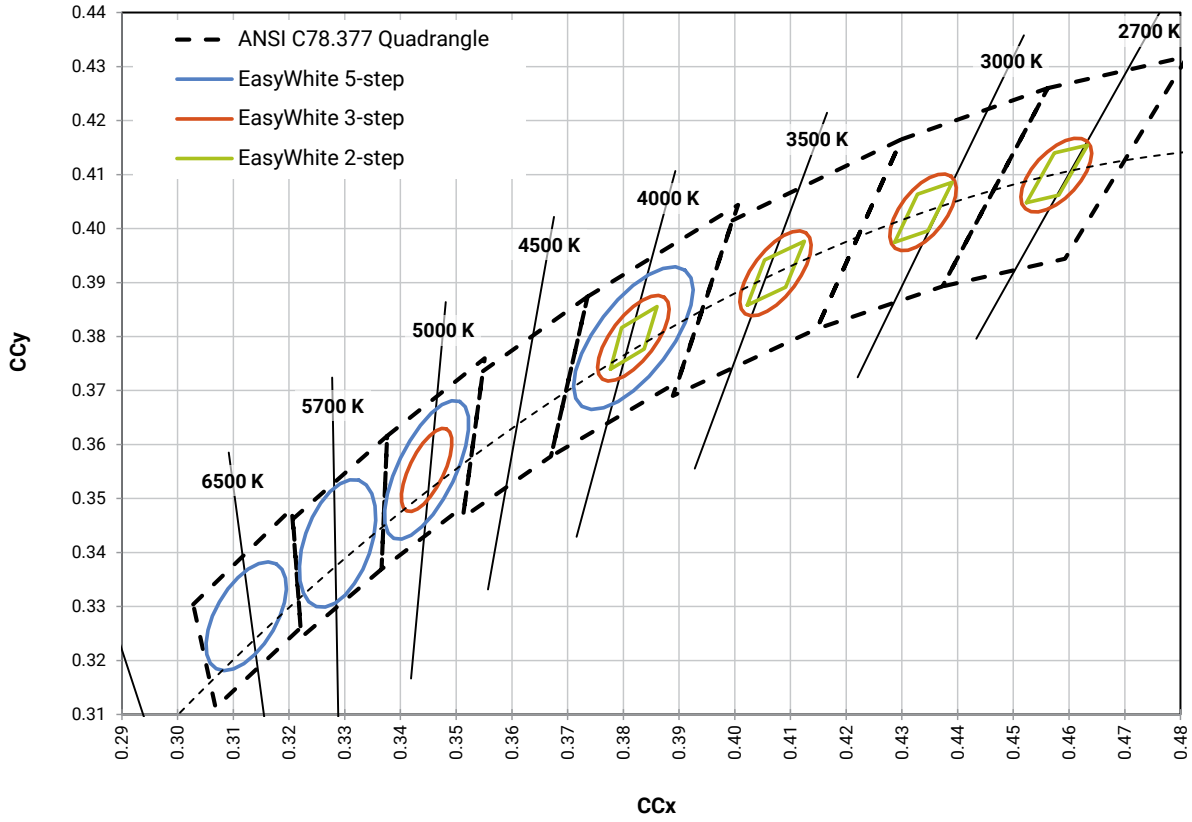
EasyWhite Color Temperatures – 2-Step			
Code	CCT	x	y
40H	4000 K	0.3777	0.3739
		0.3797	0.3816
		0.3861	0.3855
		0.3838	0.3777
35H	3500 K	0.4022	0.3858
		0.4053	0.3942
		0.4125	0.3977
		0.4091	0.3891
30H	3000 K	0.4287	0.3975
		0.4328	0.4064
		0.4390	0.4086
		0.4347	0.3996
27H	2700 K	0.4524	0.4048
		0.4574	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
30Q	3000 K	0.4305	0.3935	0.00834	0.00408	53.2
30U	3000 K	0.4274	0.3837	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

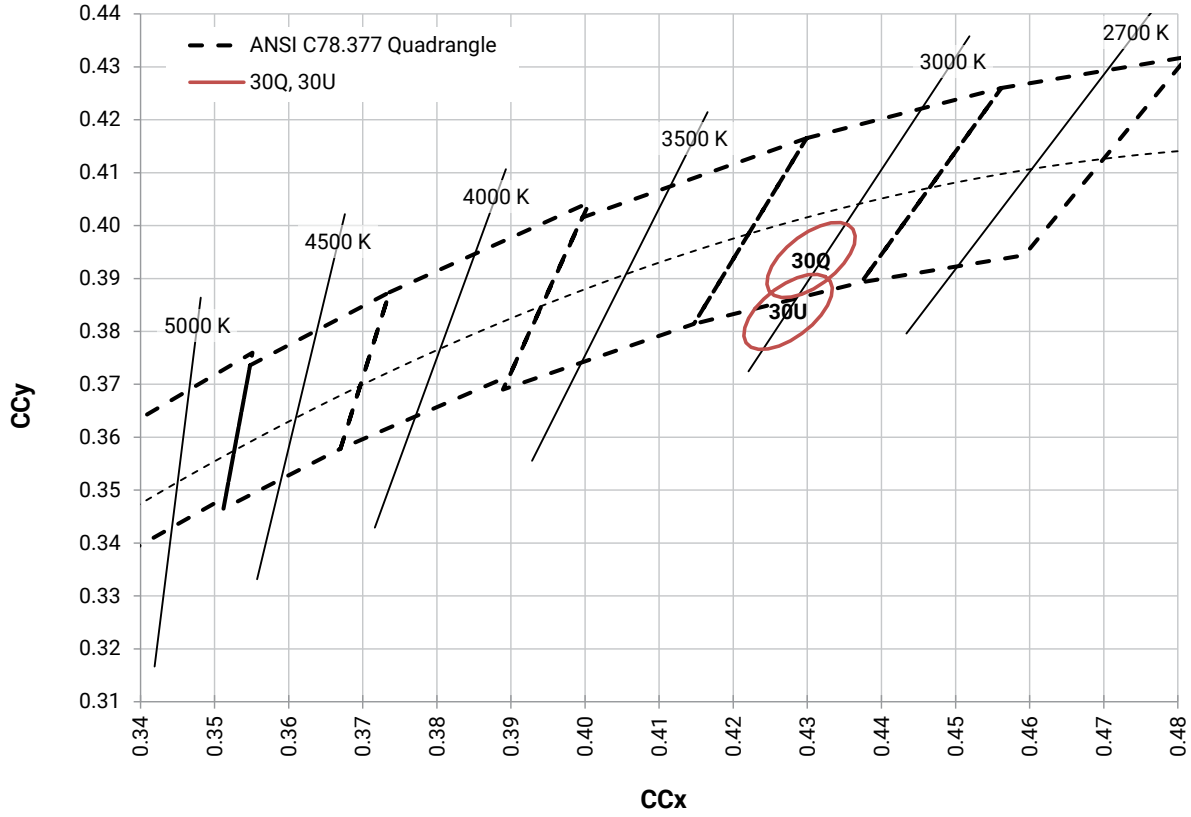
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CREE EASYWHITE® BINS PLOTTED ON THE 1931 CIE COLOR SPACE (T_J = 85 °C)



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

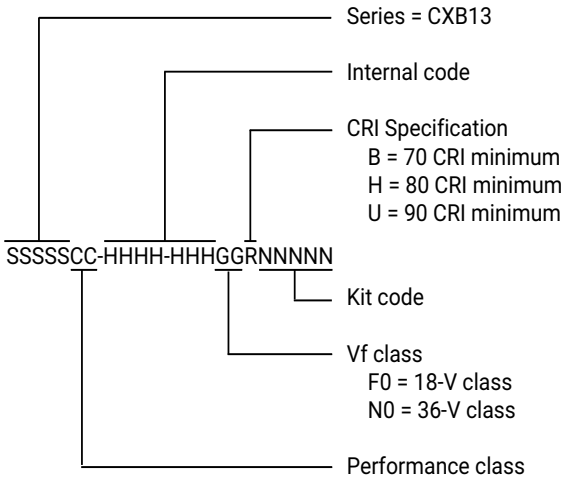


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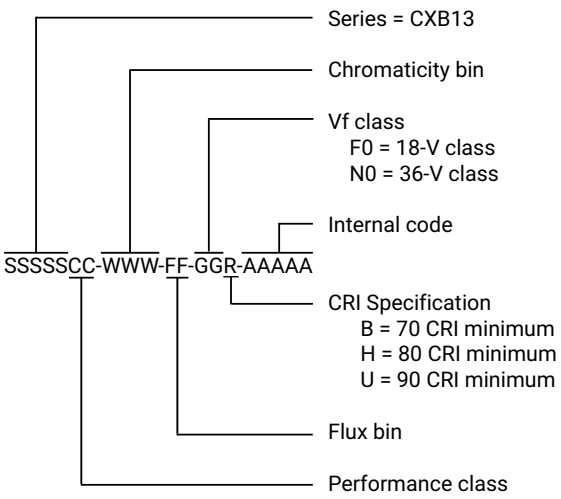
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code



Bin Code

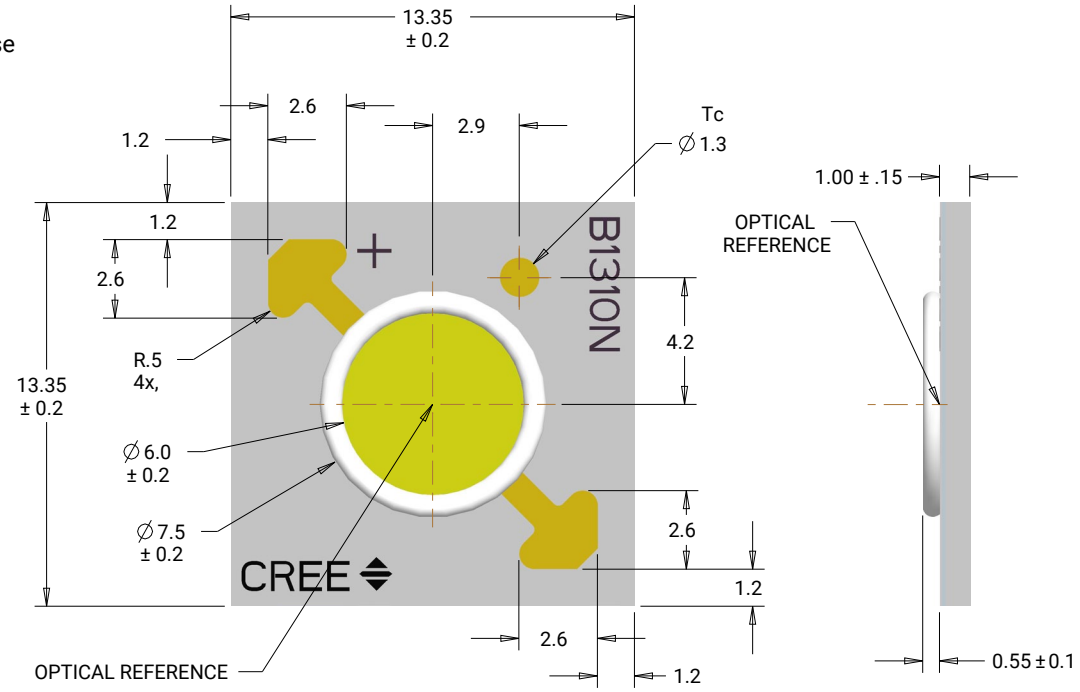


MECHANICAL DIMENSIONS

Dimensions are in mm.

Tolerances unless otherwise specified: ±.13

x° ±1°



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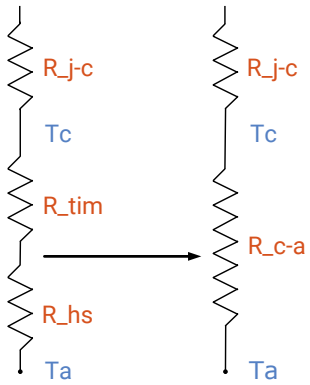
THERMAL DESIGN

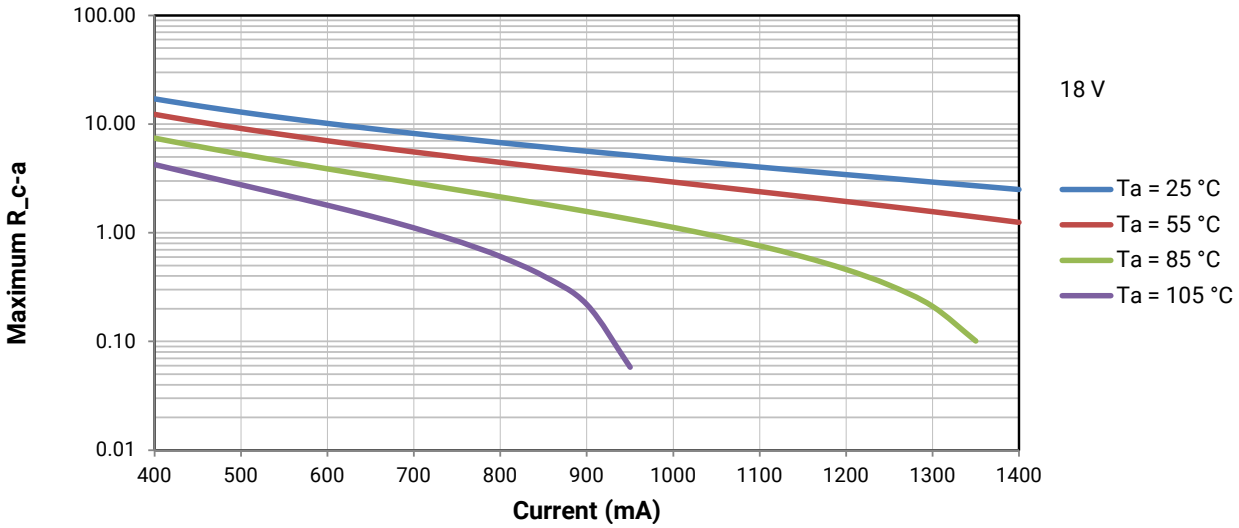
The CXB family of LED arrays can include over a hundred different LED die inside one package, and thus over a hundred different junction temperatures (T_J). Cree has intentionally removed junction-temperature-based operating limits and replaced the commonplace maximum T_J calculations with maximum ratings 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 15 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 CXB1310 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.

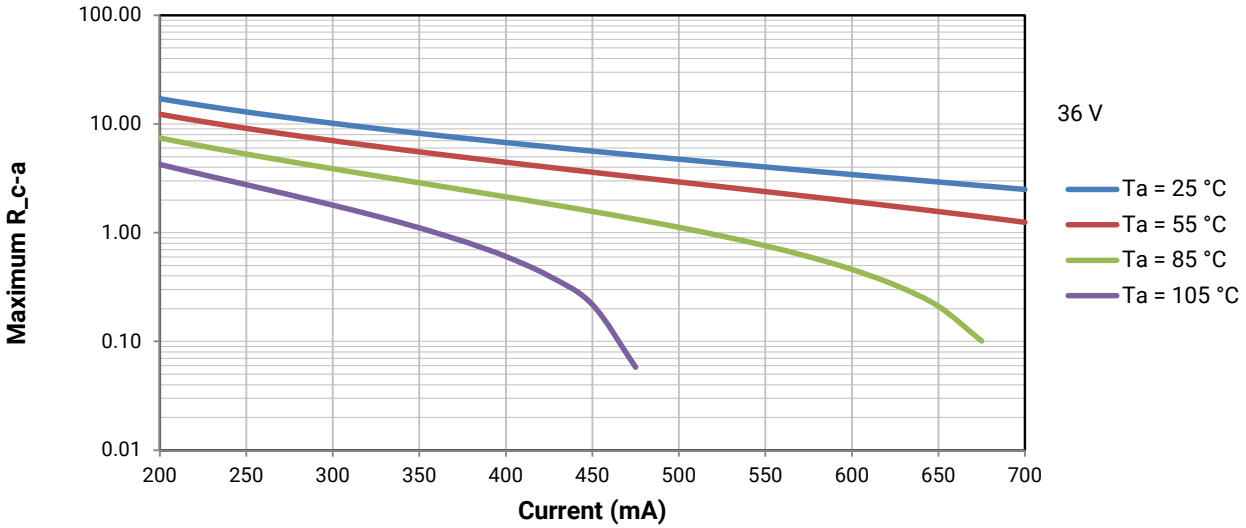
As the figure at right shows, the R_c-a value is the sum of the thermal resistance of the TIM (R_tim) plus the thermal resistance of the heat sink (R_hs).





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THERMAL DESIGN - CONTINUED



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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. Cree did not perform Room Temperature Operating Life (RTOL) testing on the CXB1310 LED.

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

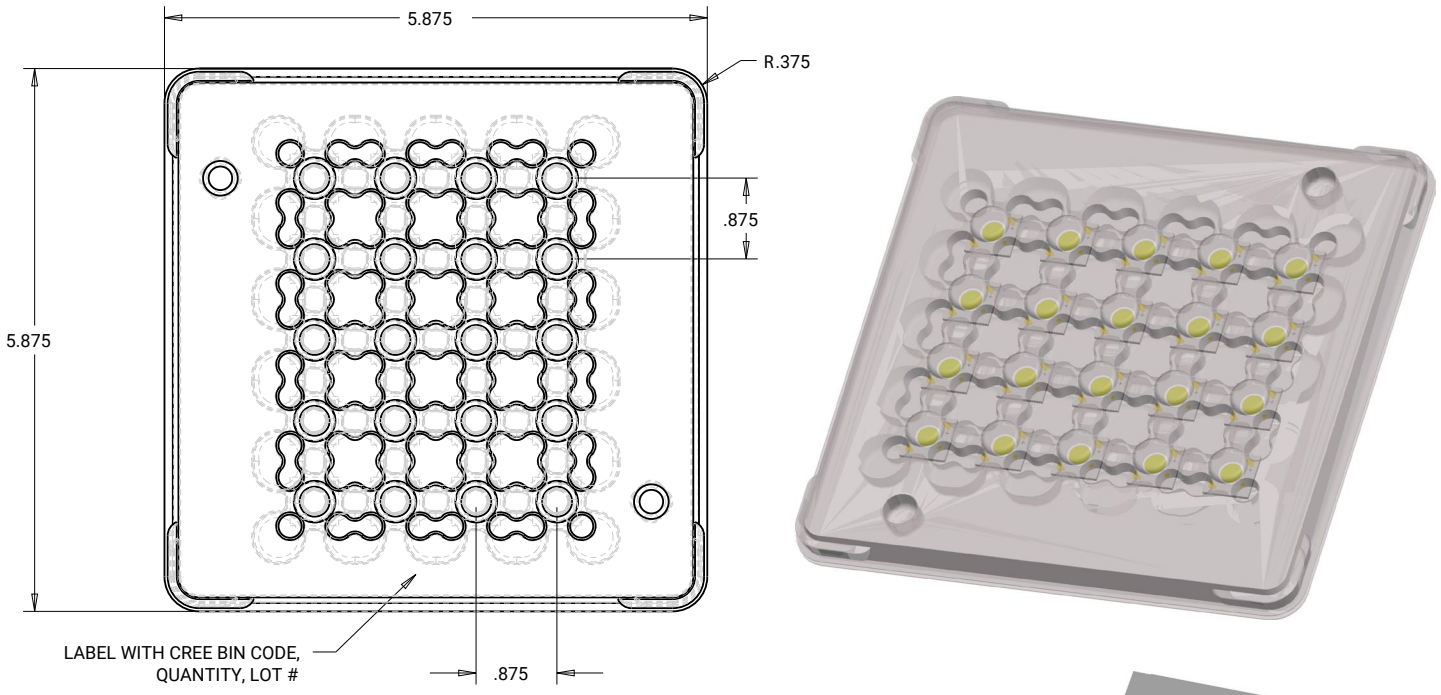
WARNING: Do not look at an exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

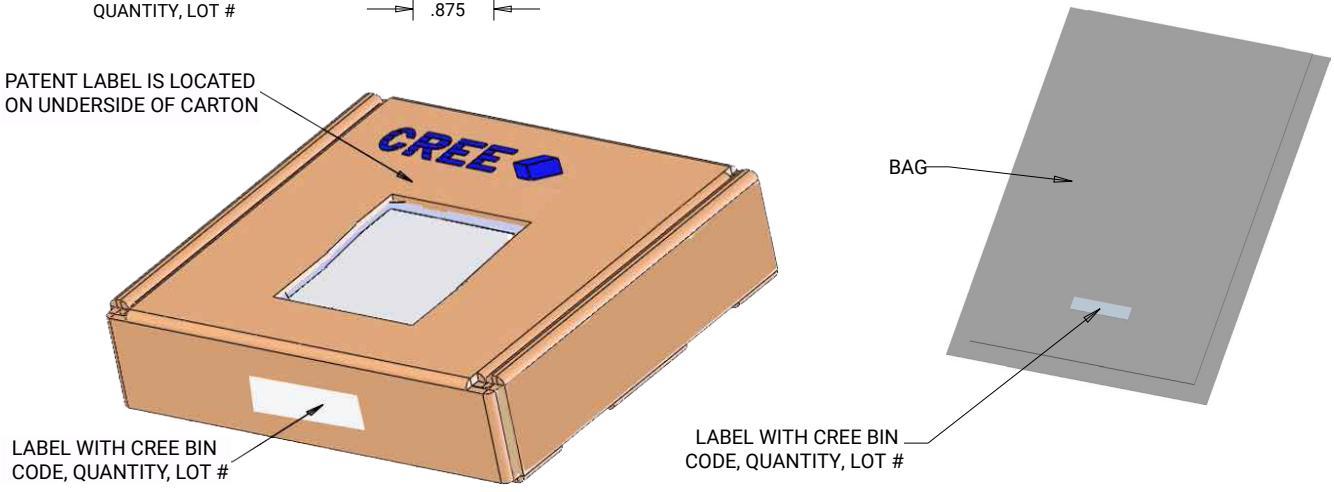
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PACKAGING

Cree CXB1310 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°





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