

Cree® XLamp® CXA1830 LED



PRODUCT DESCRIPTION

The XLamp CXA1830 LED array expands Cree's family of high-flux, multi-die arrays in a smaller, easy-to-use platform. With XLamp lighting-class reliability, the CXA1830's small, uniform emitting surface enables both directional and non-directional lighting applications including lamp retrofit and luminaire designs. Available in 2-step and 4-step color consistency, and featuring a 14-mm optical source, the CXA1830 brings new levels of flux and efficacy to this form factor.

FEATURES

- Available in 4-step and 2-step EasyWhite® bins at 2700 K, 3000 K, 3500 K, 4000 K and 5000 K CCT
- Available in ANSI white bins at 4000 K and 5000 K CCT
- Available in 70-, 80- and 93-minimum CRI options
- Forward voltage: 37 V
- 85 °C binning and characterization
- Maximum drive current: 1400 mA
- 115° viewing angle, uniform chromaticity profile
- Top-side solder connections
- Thermocouple attach point
- NEMA SSL-3 2011 standard flux bins

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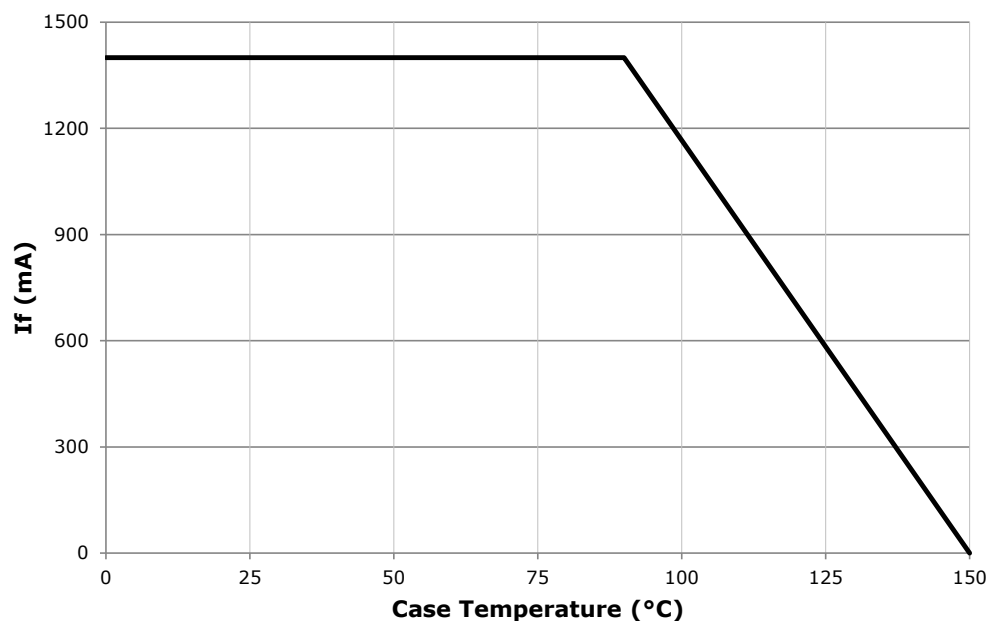
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			1400*
Reverse current	mA			0.1
Forward voltage (800 mA, 85 °C)	V		37	
Forward voltage (800 mA, 25 °C)	V			42

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA1830 is dependent on the case temperature (T_c) when the LED has reached thermal equilibrium under steady-state operation. Please refer to the Mechanical Dimensions section on page 11 for the location of the T_c measurement point.



FLUX CHARACTERISTICS, EASYWHITE ORDER CODES AND BINS ($I_f = 800 \text{ mA}$, $T_j = 85^\circ \text{C}$)

The following tables provide order codes for XLamp CXA1830 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 11).

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 800 mA			2-Step Order Code		4-Step Order Code	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region		Chromaticity Region	
5000 K	70	75	T4	3440	3887	50H	CXA1830-0000-000N00T450H	50F	CXA1830-0000-000N00T450F
			U2	3680	4158		CXA1830-0000-000N00U250H		CXA1830-0000-000N00U250F
	80	---	S4	2990	3379	50H	CXA1830-0000-000N0HS450H	50F	CXA1830-0000-000N0HS450F
			T2	3200	3616		CXA1830-0000-000N0HT250H		CXA1830-0000-000N0HT250F
			T4	3440	3887		CXA1830-0000-000N0HT450H		CXA1830-0000-000N0HT450F
	4000 K	70	75	T2	3200	3616	40H	CXA1830-0000-000N00T240H	40F
T4				3440	3887	CXA1830-0000-000N00T440H		CXA1830-0000-000N00T440F	
U2				3680	4158	CXA1830-0000-000N00U240H		CXA1830-0000-000N00U240F	
80		---	S4	2990	3379	40H	CXA1830-0000-000N0HS440H	40F	CXA1830-0000-000N0HS440F
			T2	3200	3616		CXA1830-0000-000N0HT240H		CXA1830-0000-000N0HT240F
			3500 K	80	---		S4		2990
T2	3200	3616				CXA1830-0000-000N00T235H	CXA1830-0000-000N00T235F		
T4	3440	3887				CXA1830-0000-000N00T435H	CXA1830-0000-000N00T435F		
93	95	Q4		2260	2554	35H	CXA1830-0000-000N0YQ435H	35F	CXA1830-0000-000N0YQ435F
		R2		2420	2735		CXA1830-0000-000N0YR235H		CXA1830-0000-000N0YR235F
		R4		2600	2938		CXA1830-0000-000N0YR435H		CXA1830-0000-000N0YR435F
3000 K	80	---	S4	2990	3379	30H	CXA1830-0000-000N00S430H	30F	CXA1830-0000-000N00S430F
			T2	3200	3616		CXA1830-0000-000N00T230H		CXA1830-0000-000N00T230F
	93	95	Q2	2100	2373	30H	CXA1830-0000-000N0YQ230H	30F	CXA1830-0000-000N0YQ230F
			Q4	2260	2554		CXA1830-0000-000N0YQ430H		CXA1830-0000-000N0YQ430F
			R2	2420	2735		CXA1830-0000-000N0YR230H		CXA1830-0000-000N0YR230F
	2700 K	80	---	S2	2780	3141	27H	CXA1830-0000-000N00S227H	27F
S4				2990	3379	CXA1830-0000-000N00S427H		CXA1830-0000-000N00S427F	
T2				3200	3616	CXA1830-0000-000N00T227H		CXA1830-0000-000N00T227F	
93		95	P4	1965	2221	27H	CXA1830-0000-000N0YP427H	27F	CXA1830-0000-000N0YP427F
			Q2	2100	2373		CXA1830-0000-000N0YQ227H		CXA1830-0000-000N0YQ227F
			Q4	2260	2554		CXA1830-0000-000N0YQ427H		CXA1830-0000-000N0YQ427F

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

FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS ($I_f = 800 \text{ mA}$, $T_j = 85 \text{ }^\circ\text{C}$)

The following tables provide order codes for XLamp CXA1830 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 11).

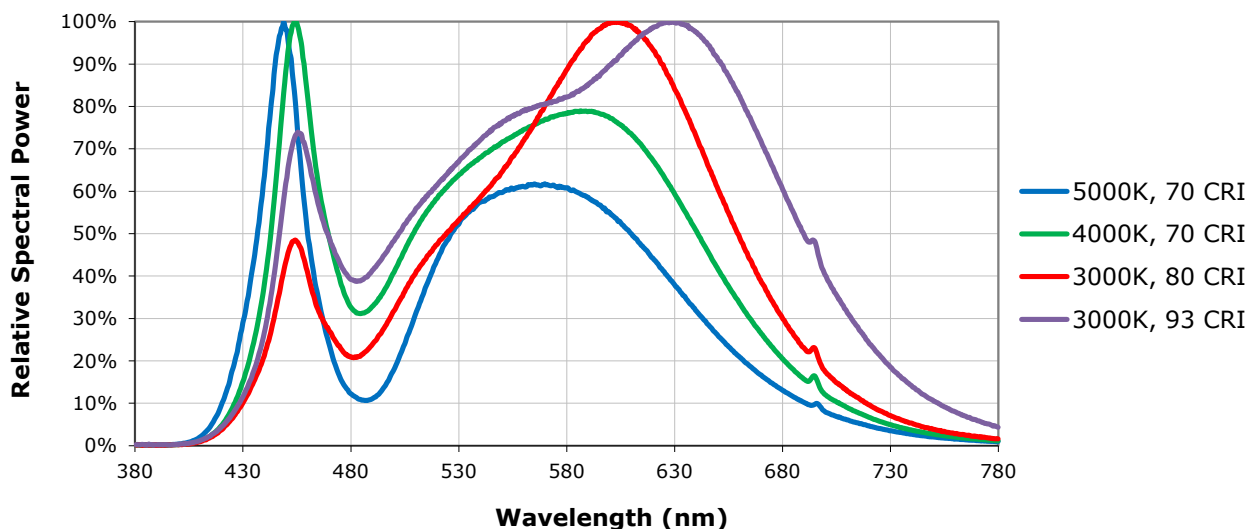
CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 800 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
5000 K	70	75	T4	3440	3887	3A0, 3B0, 3C0, 3D0	CXA1830-0000-000N00T40E3
			U2	3680	4158		CXA1830-0000-000N00U20E3
	80	---	S4	2990	3379	3A0, 3B0, 3C0, 3D0	CXA1830-0000-000N0HS40E3
			T2	3200	3616		CXA1830-0000-000N0HT20E3
			T4	3440	3887		CXA1830-0000-000N0HT40E3
4000 K	70	75	T2	3200	3616	5A0, 5B0, 5C0, 5D0	CXA1830-0000-000N00T20E5
			T4	3440	3887		CXA1830-0000-000N00T40E5
			U2	3680	4158		CXA1830-0000-000N00U20E5
	80	---	S4	2990	3379	5A0, 5B0, 5C0, 5D0	CXA1830-0000-000N0HS40E5
			T2	3200	3616		CXA1830-0000-000N0HT20E5

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

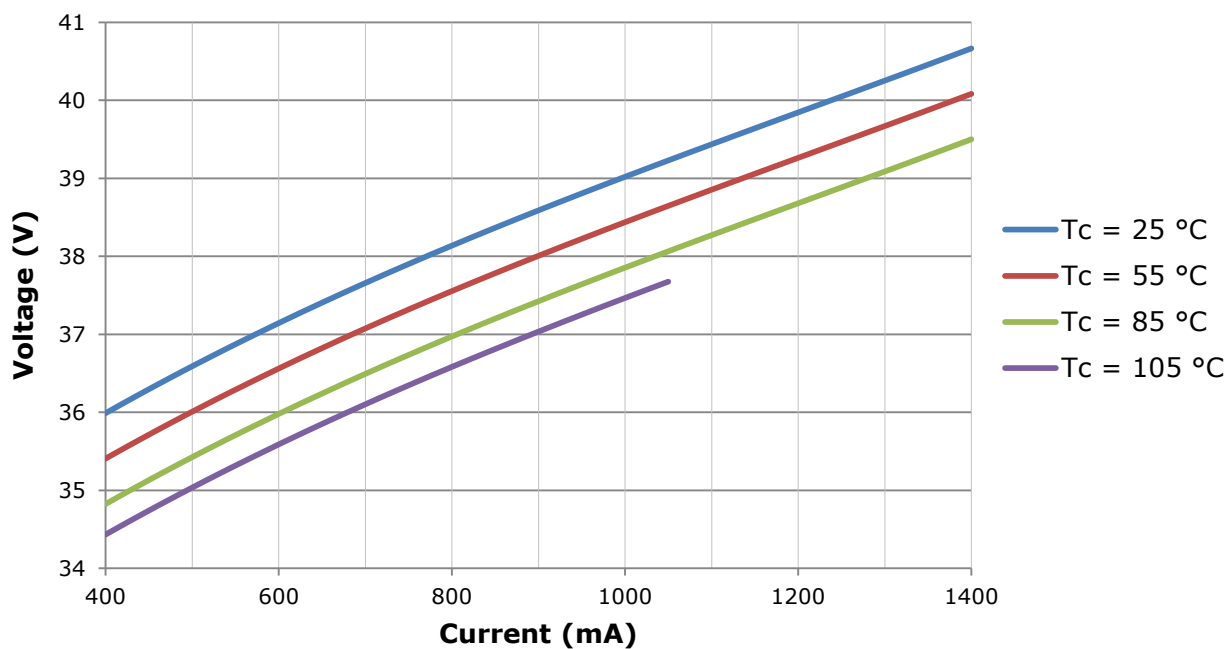
RELATIVE SPECTRAL POWER DISTRIBUTION ($I_F = 800 \text{ mA}$, $T_J = 85 \text{ }^\circ\text{C}$)

The following graph is the result of a series of pulsed measurements at 800 mA and $T_J = 85 \text{ }^\circ\text{C}$.



ELECTRICAL CHARACTERISTICS

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

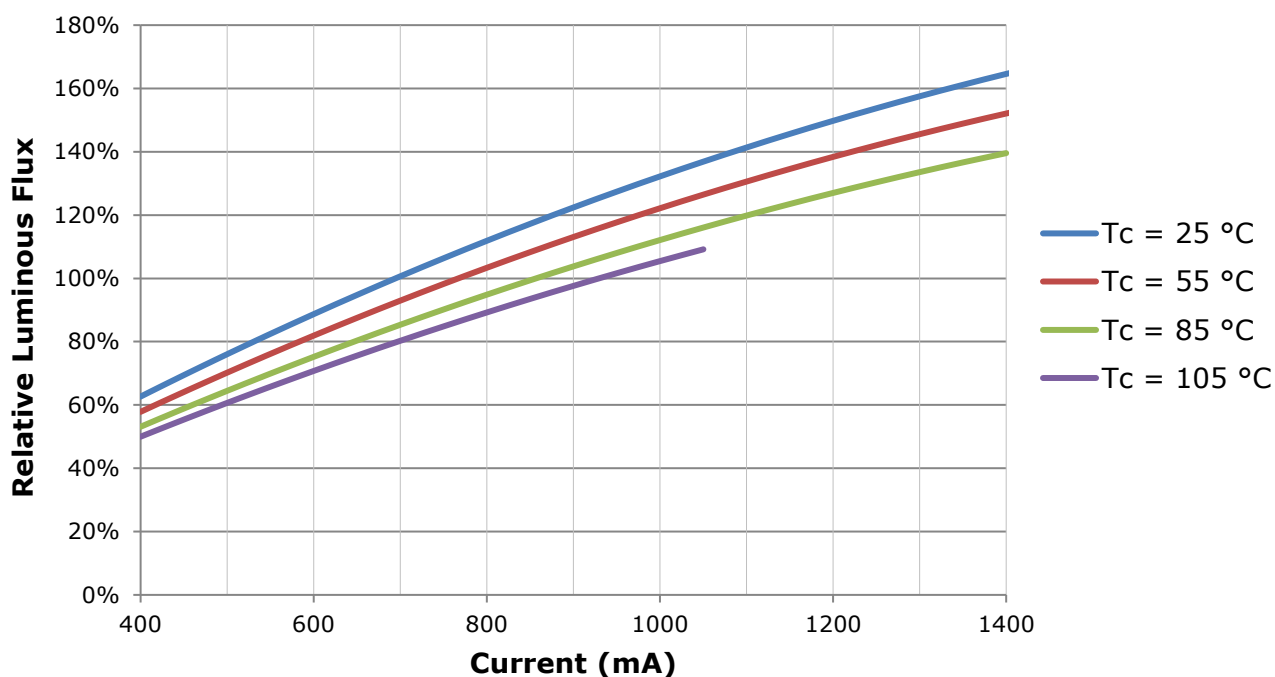


RELATIVE LUMINOUS FLUX

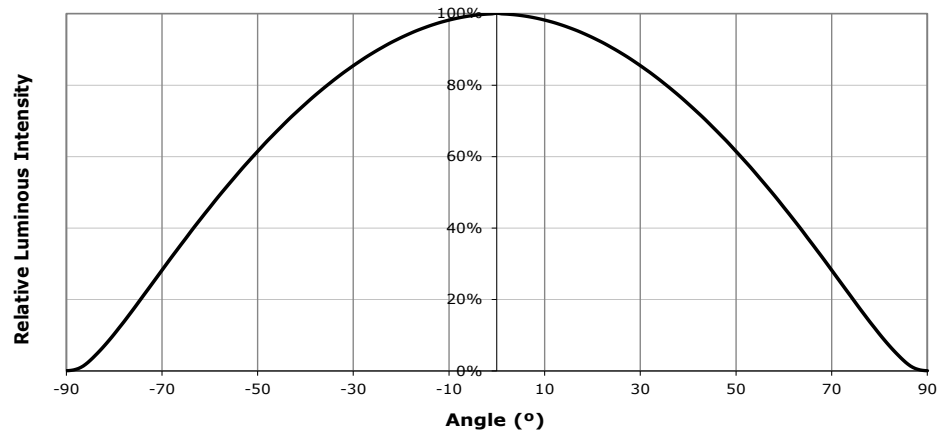
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA1830 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 800 mA at $T_j = 85^\circ\text{C}$.

For example, at steady-state operation of $T_c = 55^\circ\text{C}$, $I_f = 1000\text{ mA}$, the relative luminous flux ratio is 120% in the chart below. A CXA1830 LED that measures 2100 lm during binning will deliver 2340 lm (2100×1.2) at steady-state operation of $T_c = 55^\circ\text{C}$, $I_f = 1000\text{ mA}$.



TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - BRIGHTNESS ($I_F = 800\text{ mA}$, $T_J = 85\text{ °C}$)

XLamp CXA1830 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Min. Luminous Flux @ 800 mA	Max. Luminous Flux @ 800 mA
P4	1965	2100
Q2	2100	2260
Q4	2260	2420
R2	2420	2600
R4	2600	2780
S2	2780	2990
S4	2990	3200
T2	3200	3440
T4	3440	3680
U2	3680	3955

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

XLamp CXA1830 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

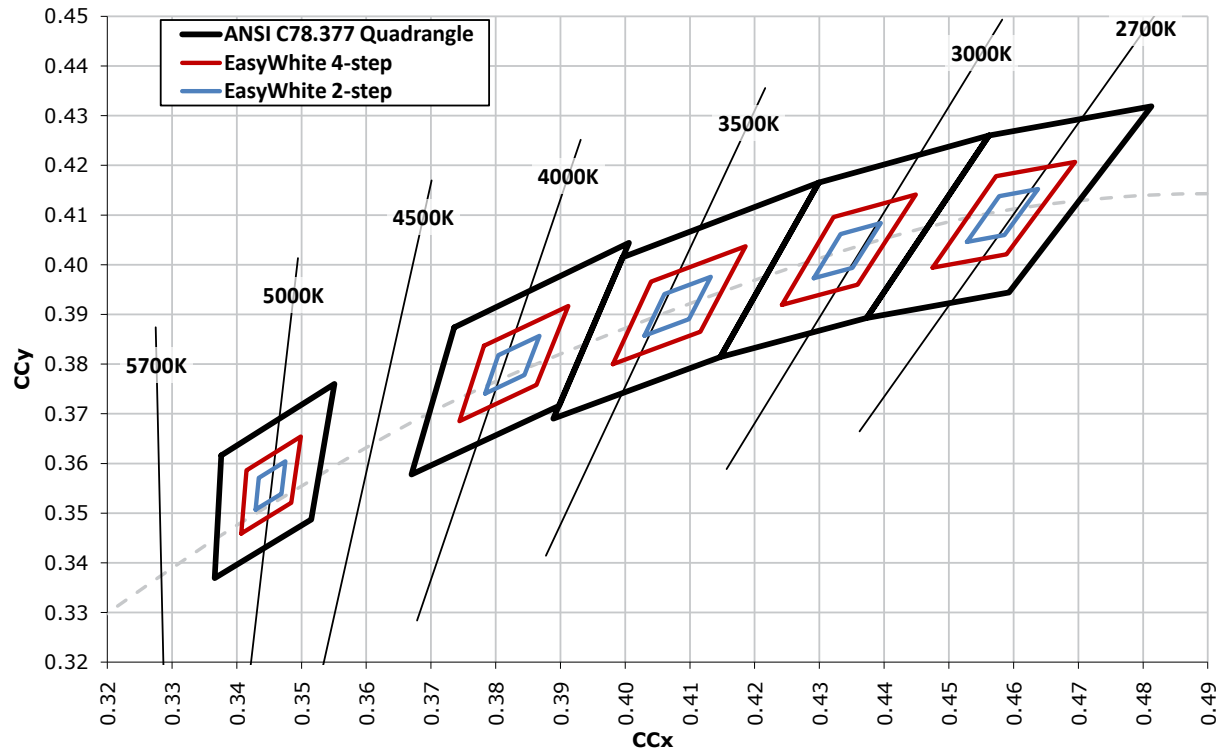
EasyWhite Color Temperatures – 4-Step			
Code	CCT	x	y
50F	5000K	0.3407	0.3459
		0.3415	0.3586
		0.3499	0.3654
		0.3484	0.3521
40F	4000K	0.3744	0.3685
		0.3782	0.3837
		0.3912	0.3917
		0.3863	0.3758
35F	3500K	0.3981	0.3800
		0.4040	0.3966
		0.4186	0.4037
		0.4116	0.3865
30F	3000K	0.4242	0.3919
		0.4322	0.4096
		0.4449	0.4141
		0.4359	0.3960
27F	2700K	0.4475	0.3994
		0.4573	0.4178
		0.4695	0.4207
		0.4589C	0.4021

EasyWhite Color Temperatures – 2-Step			
Code	CCT	x	y
50H	5000K	0.3429	0.3507
		0.3434	0.3571
		0.3475	0.3604
		0.3469	0.3539
40H	4000K	0.3784	0.3741
		0.3804	0.3818
		0.3867	0.3857
		0.3844	0.3778
35H	3500K	0.4030	0.3857
		0.4061	0.3941
		0.4132	0.3976
		0.4099	0.3890
30H	3000K	0.4291	0.3973
		0.4333	0.4062
		0.4395	0.4084
		0.4351	0.3994
27H	2700K	0.4528	0.4046
		0.4578	0.4138
		0.4638	0.4152
		0.4586	0.4060

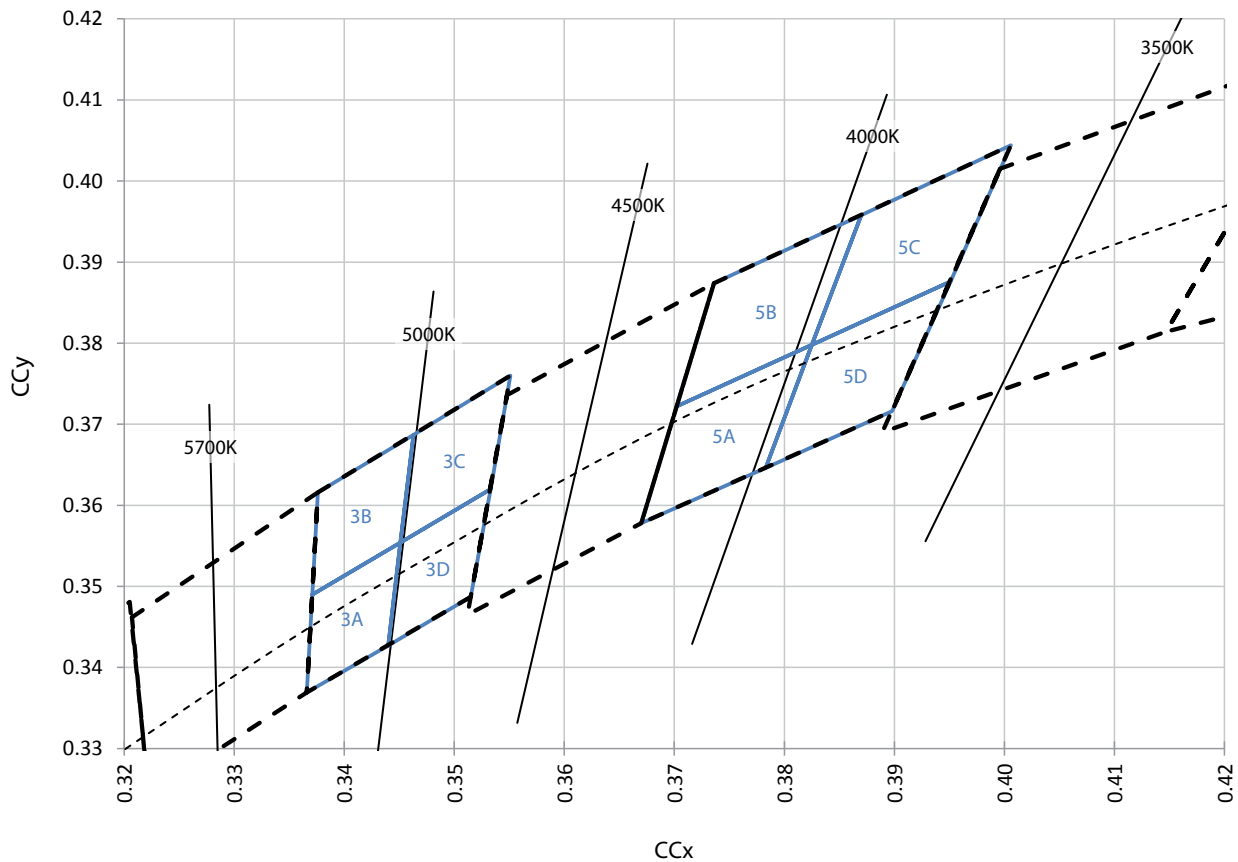
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E3	5000K	3A0	.3371	.3490
			.3451	.3554
			.3440	.3427
			.3366	.3369
		3B0	.3376	.3616
			.3463	.3687
			.3451	.3554
			.3371	.3490
		3C0	.3463	.3687
			.3551	.3760
			.3533	.3620
			.3451	.3554
		3D0	.3451	.3554
			.3533	.3620
			.3515	.3487
			.3440	.3427

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E5	4000K	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 ($T_j = 85^\circ\text{C}$)

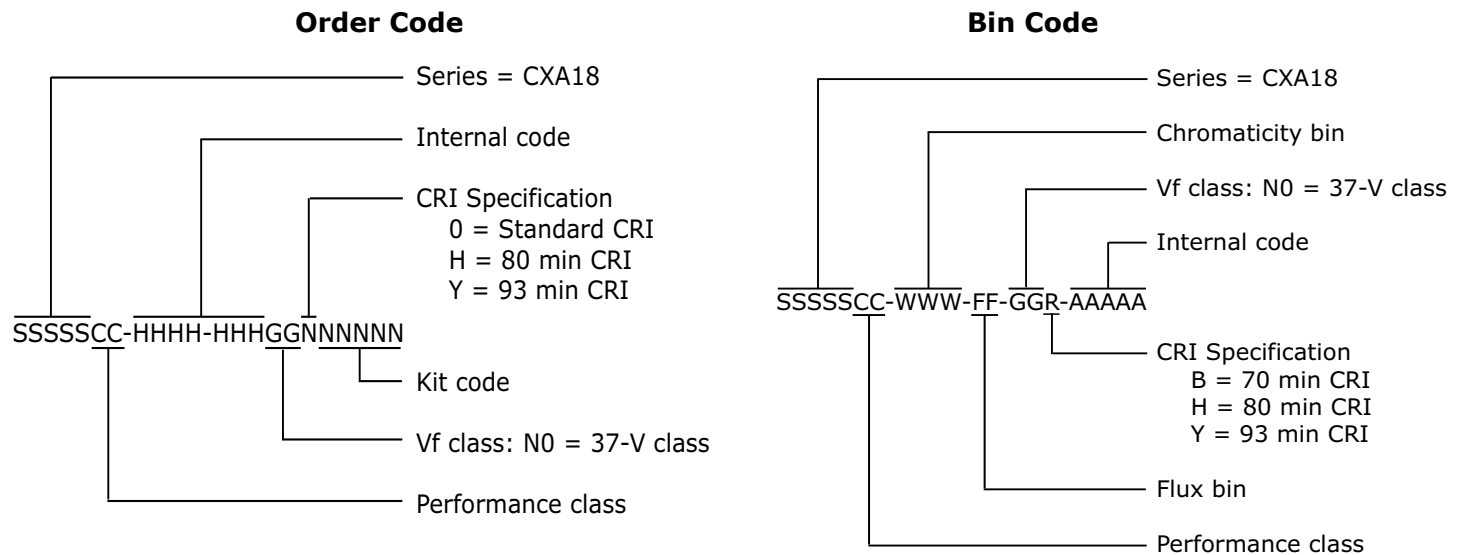


CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ($T_j = 85^\circ\text{C}$)



BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:



MECHANICAL DIMENSIONS

Dimensions are in mm.

Tolerances unless otherwise

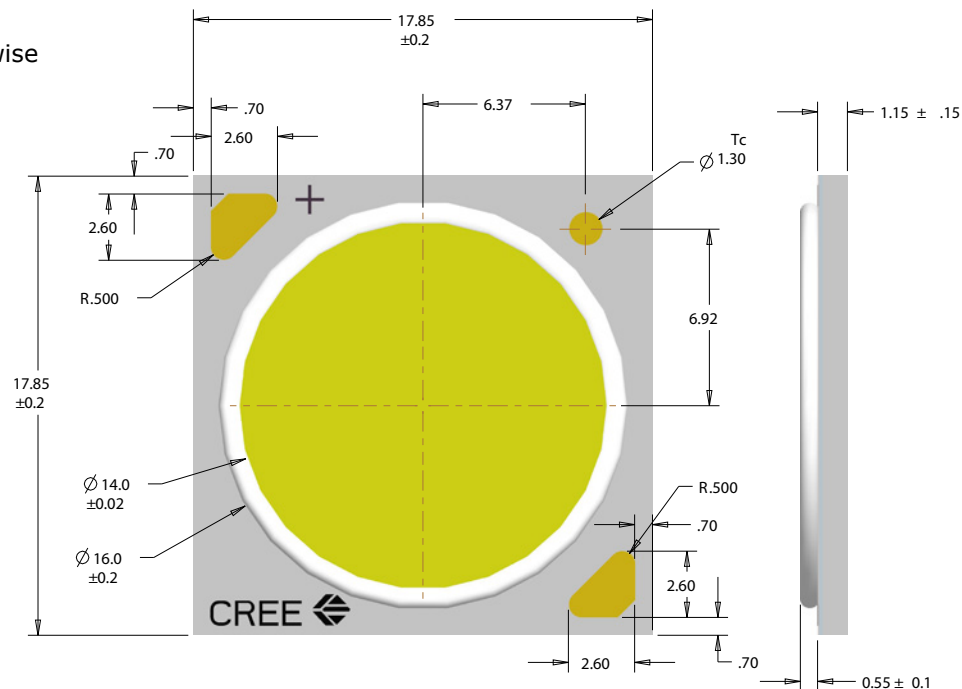
specified:

.x ± .10

.xx ± .03

.xxx ± .010

x° ± 1°



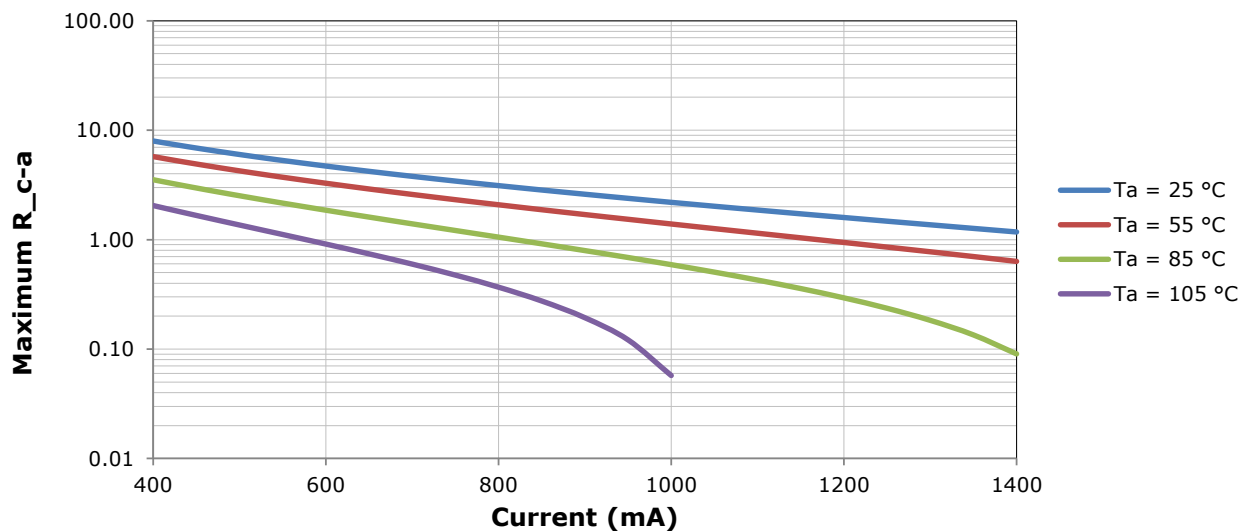
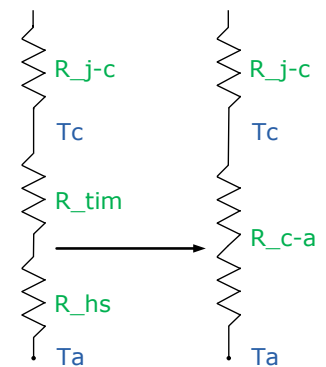
THERMAL DESIGN

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 2 for the Operating Limit specification.

Cree has measured the temperature at the bottom of the package, commonly referred to as the solder point (T_{sp}), and found this value to be equivalent to the temperature at the T_c location at the top of the package once the LED has reached thermal equilibrium. 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 XLamp Thermal Management application note at www.cree.com/xlamp_app_notes/thermal_management. For CXA soldering recommendations and more information on thermal interface materials (TIM) and connection methods, please refer to the Cree XLamp CXA Family LEDs soldering and handling document at www.cree.com/xlamp_app_notes/CXA_SH.

To keep the CXA1830 LED at or below the maximum rated T_c , the case to ambient 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

Lumen Maintenance Projections

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 at www.cree.com/xlamp_app_notes/LM80_results.

Please read the XLamp Long-Term Lumen Maintenance application note at www.cree.com/xlamp_app_notes/lumen_maintenance for more details on Cree's lumen maintenance testing and forecasting. Please read the XLamp Thermal Management application note at www.cree.com/xlamp_app_notes/thermal_management for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

Vision Advisory Claim

Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

PACKAGING

Cree CXA1830 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.

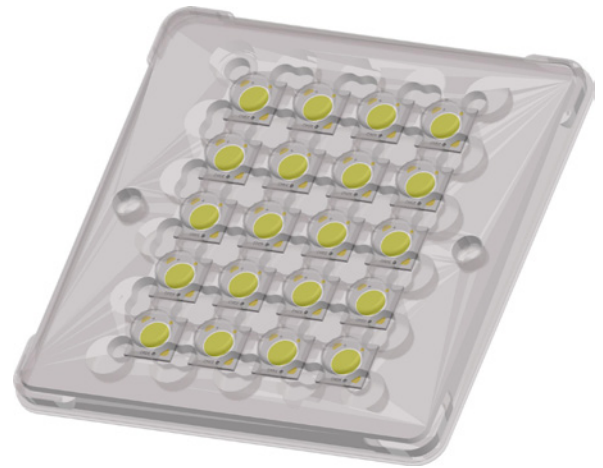
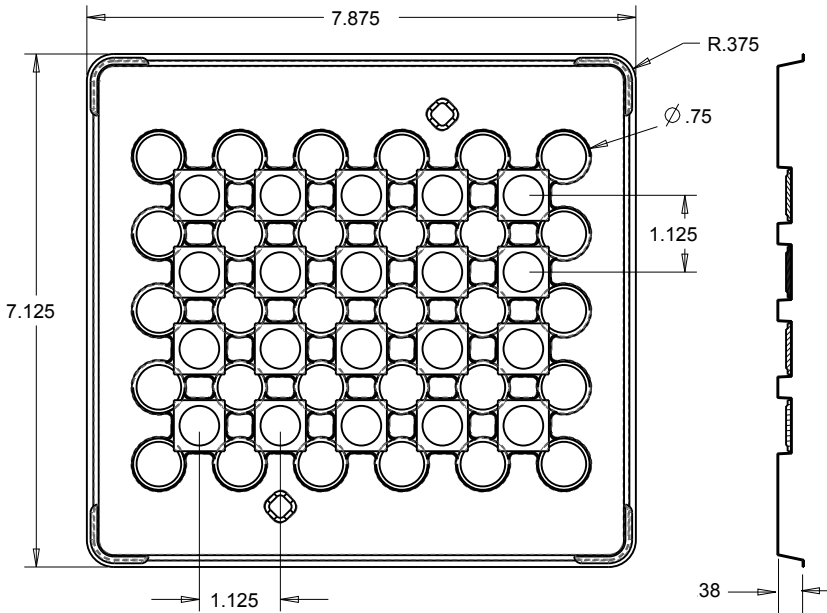
Tolerances:

.x $\pm$.1

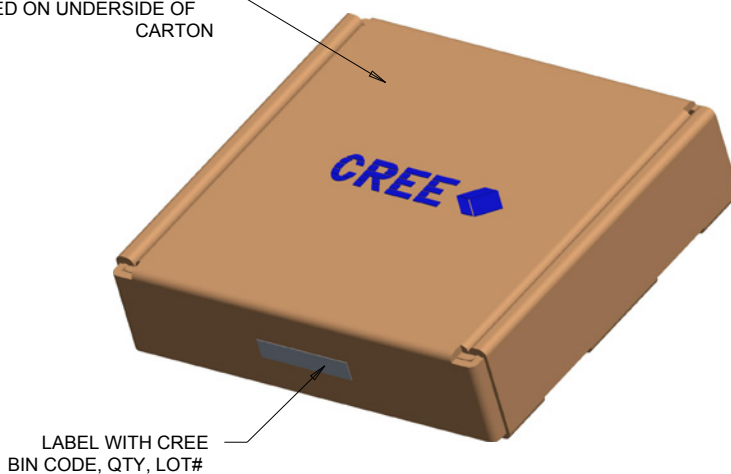
.xx $\pm$.05

.xxx $\pm$.005

x° $\pm$ 1°



PATENT LABEL
IS LOCATED ON UNDERSIDE OF
CARTON



BAG

LABEL WITH CREE
BIN CODE, QTY, LOT#

