

Cree® XLamp® CXA1820 LED



PRODUCT DESCRIPTION

The XLamp CXA1820 LED array expands Cree's family of high-flux, multi-die arrays, offering high performance in an easy-to-use platform. With XLamp lighting-class reliability, the CXA1820's uniform emitting surface enables both directional and non-directional lighting applications and luminaire designs. Available in 2-step and 4-step color consistency, and featuring a 12-mm optical source, the CXA1820 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-, 90- and 93-minimum CRI options
- Forward voltage: 37 V
- 85 °C binning and characterization
- Maximum drive current: 1050 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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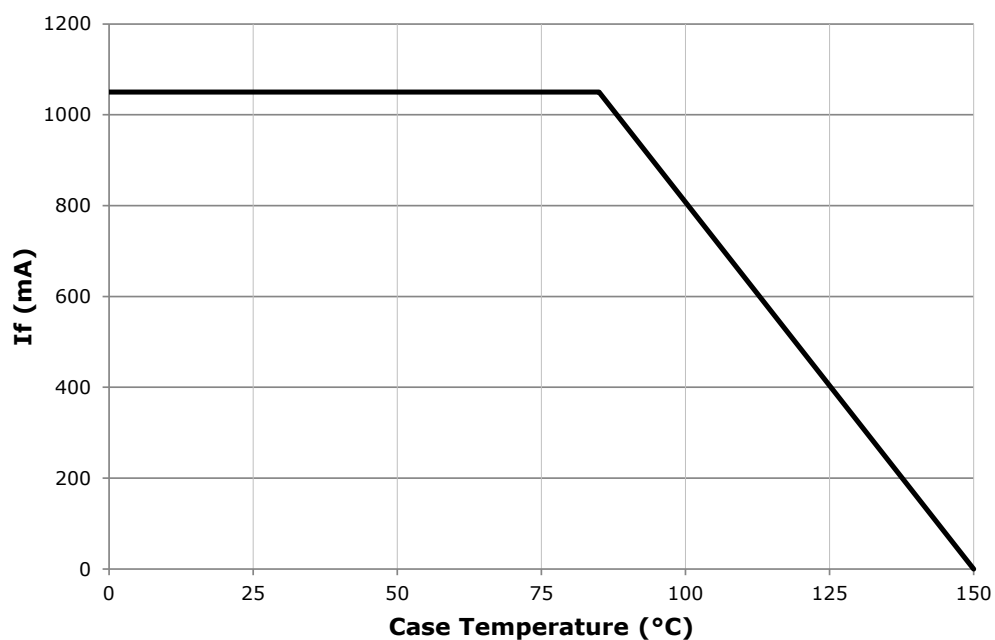
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			1050*
Reverse current	mA			0.1
Forward voltage (@ 550 mA, 85 °C)	V		37	
Forward voltage (@ 550 mA, 25 °C)	V			42

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA1820 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 12 for the location of the T_c measurement point.



FLUX CHARACTERISTICS, EASYWHITE ORDER CODES AND BINS ($I_f = 550 \text{ mA}$, $T_j = 85 \text{ }^\circ\text{C}$)

The following tables provide order codes for XLamp CXA1820 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 12).

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 550 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	Q4	2260	2560	50H	CXA1820-0000-000N00Q450H	50F	CXA1820-0000-000N00Q450F
			R2	2420	2741		CXA1820-0000-000N00R250H		CXA1820-0000-000N00R250F
			R4	2600	2916		CXA1820-0000-000N00R450H		CXA1820-0000-000N00R450F
	80	---	P4	1965	2226	50H	CXA1820-0000-000N0HP450H	50F	CXA1820-0000-000N0HP450F
			Q2	2100	2379		CXA1820-0000-000N0HQ250H		CXA1820-0000-000N0HQ250F
			Q4	2260	2560		CXA1820-0000-000N0HQ450H		CXA1820-0000-000N0HQ450F
			R2	2420	2741		CXA1820-0000-000N0HR250H		CXA1820-0000-000N0HR250F
	90	95	N4	1710	1937	50H	CXA1820-0000-000N0UN450H	50F	CXA1820-0000-000N0UN450F
			P2	1830	2073		CXA1820-0000-000N0UP250H		CXA1820-0000-000N0UP250F
			P4	1965	2226		CXA1820-0000-000N0UP450H		CXA1820-0000-000N0UP450F
4000 K	70	75	Q2	2100	2379	40H	CXA1820-0000-000N00Q240H	40F	CXA1820-0000-000N00Q240F
			Q4	2260	2560		CXA1820-0000-000N00Q440H		CXA1820-0000-000N00Q440F
			R2	2420	2741		CXA1820-0000-000N00R240H		CXA1820-0000-000N00R240F
	80	---	P4	1965	2226	40H	CXA1820-0000-000N0HP440H	40F	CXA1820-0000-000N0HP440F
			Q2	2100	2379		CXA1820-0000-000N0HQ240H		CXA1820-0000-000N0HQ240F
			Q4	2260	2560		CXA1820-0000-000N0HQ440H		CXA1820-0000-000N0HQ440F
	90	95	N2	1590	1801	40H	CXA1820-0000-000N0UN240H	40F	CXA1820-0000-000N0UN240F
			N4	1710	1937		CXA1820-0000-000N0UN440H		CXA1820-0000-000N0UN440F
			P2	1830	2073		CXA1820-0000-000N0UP240H		CXA1820-0000-000N0UP240F
3500 K	80	---	P4	1965	2226	35H	CXA1820-0000-000N00P435H	35F	CXA1820-0000-000N00P435F
			Q2	2100	2379		CXA1820-0000-000N00Q235H		CXA1820-0000-000N00Q235F
			Q4	2260	2560		CXA1820-0000-000N00Q435H		CXA1820-0000-000N00Q435F
	93	95	M4	1485	1685	35H	CXA1820-0000-000N0YM435h	35F	CXA1820-0000-000N0YM435F
			N2	1590	1801		CXA1820-0000-000N0YN235H		CXA1820-0000-000N0YN235F
			N4	1710	1937		CXA1820-0000-000N0YN435H		CXA1820-0000-000N0YN435F

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, EASYWHITE ORDER CODES AND BINS ($I_f = 550 \text{ mA}$, $T_j = 85 \text{ }^\circ\text{C}$) - CONTNUED

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 550 mA			2-Step Order Code		4-Step Order Code	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region		Chromaticity Region	
3000 K	80	---	P4	1965	2226	30H	CXA1820-0000-000N00P430H	30F	CXA1820-0000-000N00P430F
			Q2	2100	2379		CXA1820-0000-000N00Q230H		CXA1820-0000-000N00Q230F
			Q4	2260	2535		CXA1820-0000-000N00Q430H		CXA1820-0000-000N00Q430F
	90	---	M4	1485	1682	30H	CXA1820-0000-000N00M430H	30F	CXA1820-0000-000N00M430F
			N2	1590	1801		CXA1820-0000-000N00N230H		CXA1820-0000-000N00N230F
			N4	1710	1937		CXA1820-0000-000N00N430H		CXA1820-0000-000N00N430F
			P2	1830	2073		CXA1820-0000-000N00P230H		CXA1820-0000-000N00P230F
	93	95	M2	1380	1563	30H	CXA1820-0000-000N00M230H	30F	CXA1820-0000-000N00M230F
			M4	1485	1682		CXA1820-0000-000N00M430H		CXA1820-0000-000N00M430F
			N2	1590	1801		CXA1820-0000-000N00N230H		CXA1820-0000-000N00N230F
2700 K	80	---	P2	1830	2073	27H	CXA1820-0000-000N00P227H	27F	CXA1820-0000-000N00P227F
			P4	1965	2226		CXA1820-0000-000N00P427H		CXA1820-0000-000N00P427F
			Q2	2100	2379		CXA1820-0000-000N00Q227H		CXA1820-0000-000N00Q227F
	90	---	M2	1380	1563	27H	CXA1820-0000-000N00M227H	27F	CXA1820-0000-000N00M227F
			M4	1485	1682		CXA1820-0000-000N00M427H		CXA1820-0000-000N00M427F
			N2	1590	1801		CXA1820-0000-000N00N227H		CXA1820-0000-000N00N227F
			N4	1710	1937		CXA1820-0000-000N00N427H		CXA1820-0000-000N00N427F
	93	95	K4	1290	1436	27H	CXA1820-0000-000N00K427H	27F	CXA1820-0000-000N00K427F
			M2	1380	1563		CXA1820-0000-000N00M227H		CXA1820-0000-000N00M227F
			M4	1485	1682		CXA1820-0000-000N00M427H		CXA1820-0000-000N00M427F

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 ($I_F = 550 \text{ mA}$, $T_J = 85 \text{ }^\circ\text{C}$)

The following tables provide order codes for XLamp CXA1820 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 12).

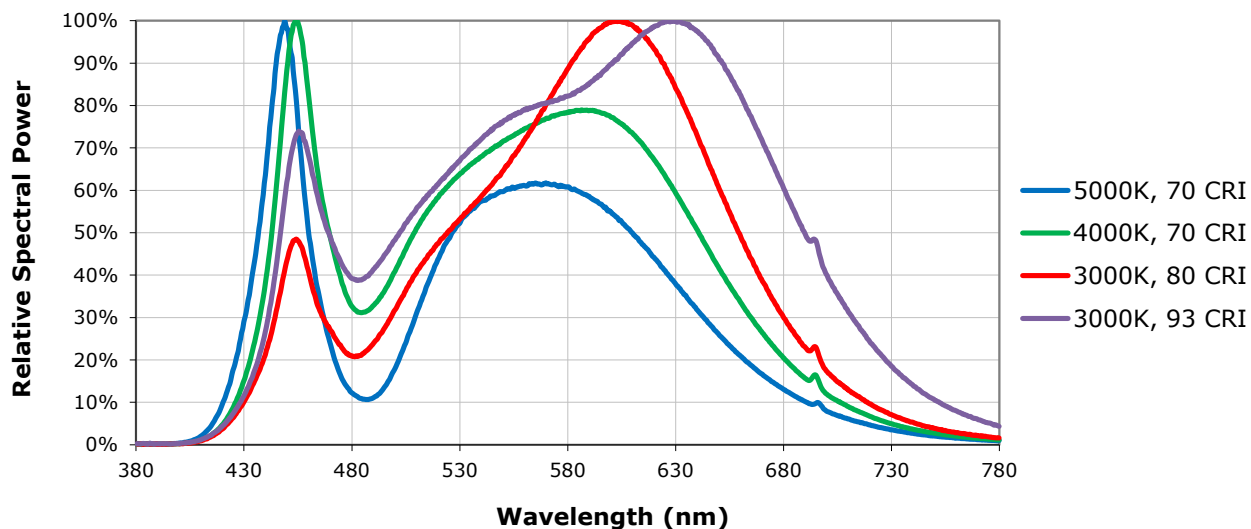
CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 550 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
5000 K	70	75	Q4	2260	2560	3A0, 3B0, 3C0, 3D0	CXA1820-0000-000N00Q40E3
			R2	2420	2741		CXA1820-0000-000N00R20E3
			R4	2600	2916		CXA1820-0000-000N00R40E3
	80	---	P4	1965	2226	3A0, 3B0, 3C0, 3D0	CXA1820-0000-000N0HP40E3
			Q2	2100	2379		CXA1820-0000-000N0HQ20E3
			Q4	2260	2560		CXA1820-0000-000N0HQ40E3
			R2	2420	2741		CXA1820-0000-000N0HR20E3
	90	95	N4	1710	1937	3A0, 3B0, 3C0, 3D0	CXA1820-0000-000N0UN40E3
			P2	1830	2073		CXA1820-0000-000N0UP20E3
			P4	1965	2226		CXA1820-0000-000N0UP40E3
4000 K	70	75	Q2	2100	2379	5A0, 5B0, 5C0, 5D0	CXA1820-0000-000N00Q20E5
			Q4	2260	2560		CXA1820-0000-000N00Q40E5
			R2	2420	2741		CXA1820-0000-000N00R20E5
	80	---	P4	1965	2226	5A0, 5B0, 5C0, 5D0	CXA1820-0000-000N0HP40E5
			Q2	2100	2379		CXA1820-0000-000N0HQ20E5
			Q4	2260	2560		CXA1820-0000-000N0HQ40E5
	90	95	N2	1590	1801	5A0, 5B0, 5C0, 5D0	CXA1820-0000-000N0UN20E5
			N4	1710	1937		CXA1820-0000-000N0UN40E5
			P2	1830	2073		CXA1820-0000-000N0UP20E5

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.

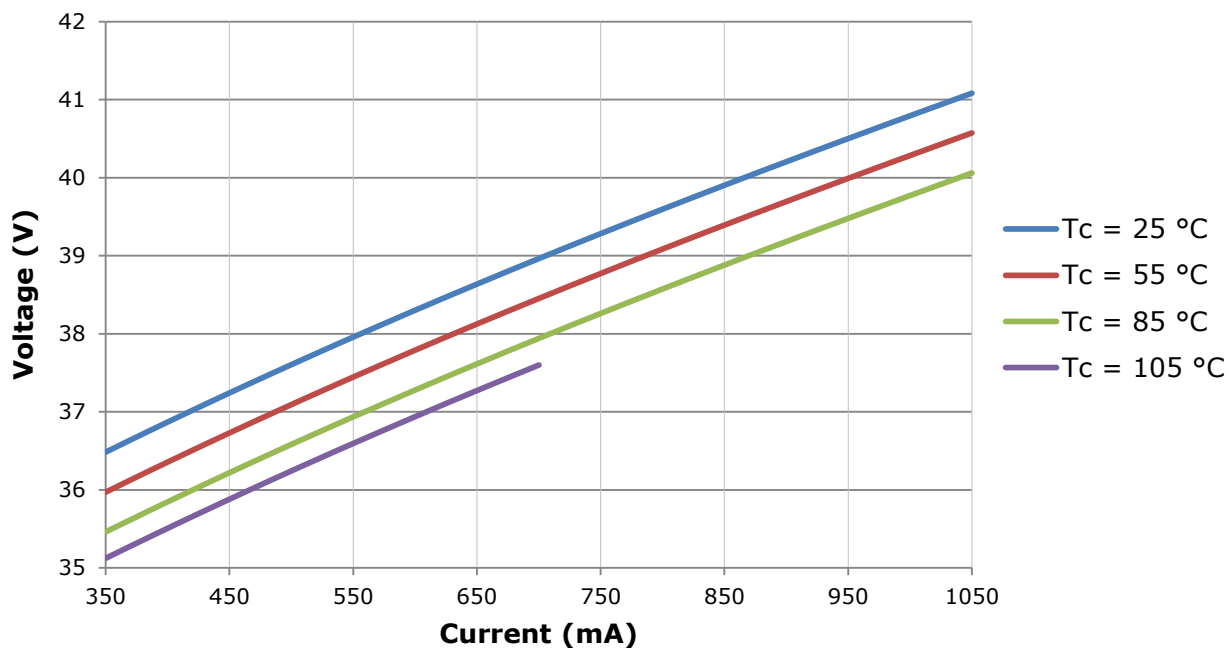
RELATIVE SPECTRAL POWER DISTRIBUTION ($I_F = 550 \text{ mA}$, $T_J = 85^\circ\text{C}$)

The following graph is the result of a series of pulsed measurements at 550 mA and $T_J = 85^\circ\text{C}$.



ELECTRICAL CHARACTERISTICS

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

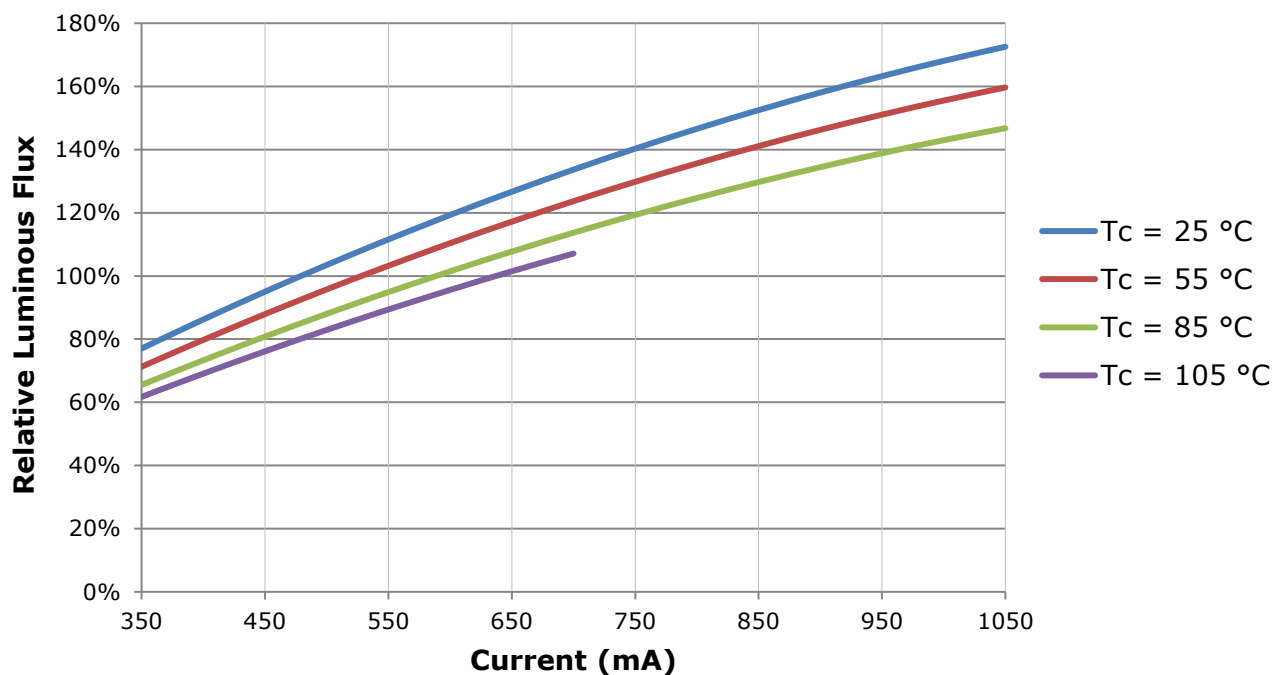


RELATIVE LUMINOUS FLUX

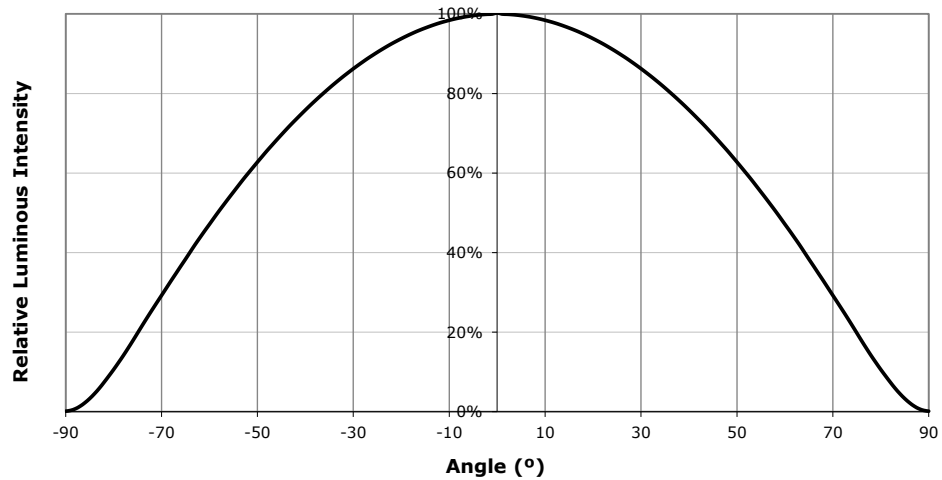
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA1820 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 550 mA at $T_j = 85^\circ\text{C}$.

For example, at steady-state operation of $T_c = 55^\circ\text{C}$, $I_f = 850\text{ mA}$, the relative luminous flux ratio is 140% in the chart below. A CXA1820 LED that measures 2100 lm during binning will deliver 2940 lm (2100×1.4) at steady-state operation of $T_c = 55^\circ\text{C}$, $I_f = 850\text{ mA}$.



TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - BRIGHTNESS ($I_f = 550 \text{ mA}$, $T_j = 85 \text{ °C}$)

XLamp CXA1820 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Min. Luminous Flux @ 550 mA	Max. Luminous Flux @ 550 mA
K4	1290	1380
M2	1380	1485
M4	1485	1590
N2	1590	1710
N4	1710	1830
P2	1830	1965
P4	1965	2100
Q2	2100	2260
Q4	2260	2420
R2	2420	2600
R4	2600	2780

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

XLamp CXA1820 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

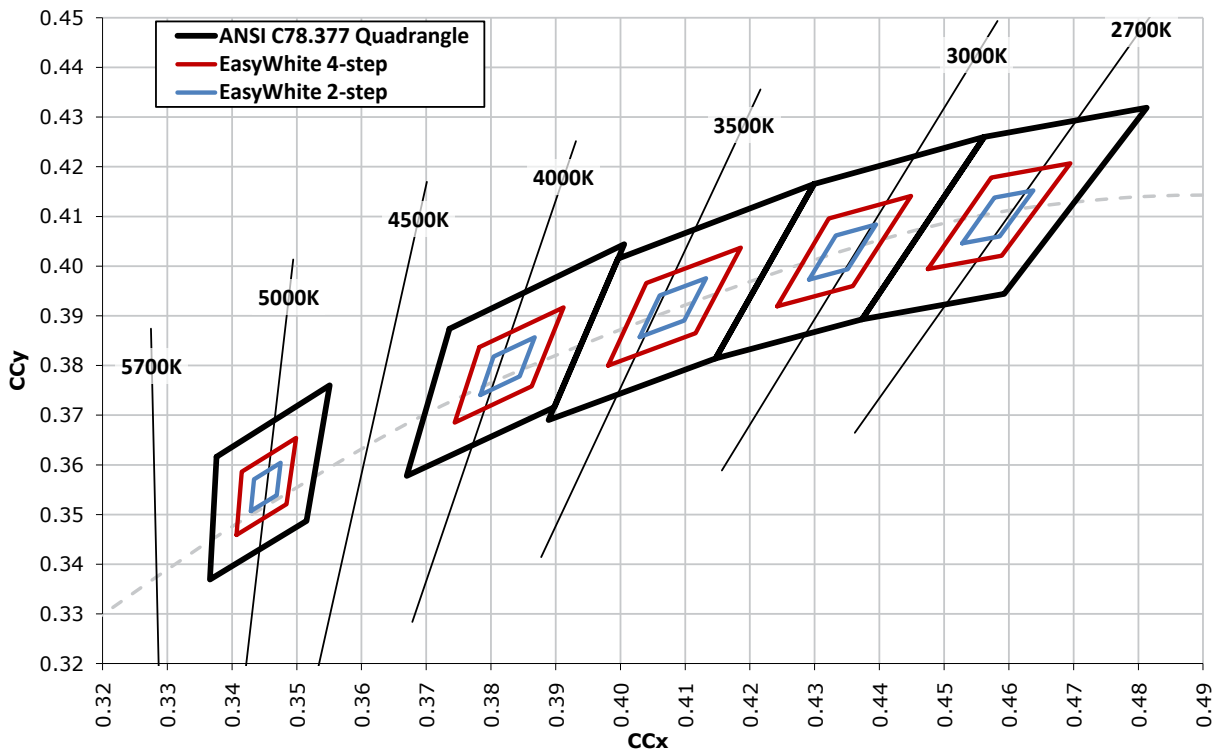
EasyWhite Color Temperatures – 4-Step			
Code	CCT	x	y
50F	5000K	0.3407	0.3459
		0.3415	0.3586
		0.3499	0.3654
		0.3484	0.3521
40F	4000K	0.3744	0.3685
		0.3782	0.3837
		0.3912	0.3917
		0.3863	0.3758
35F	3500K	0.3981	0.3800
		0.4040	0.3966
		0.4186	0.4037
		0.4116	0.3865
30F	3000K	0.4242	0.3919
		0.4322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

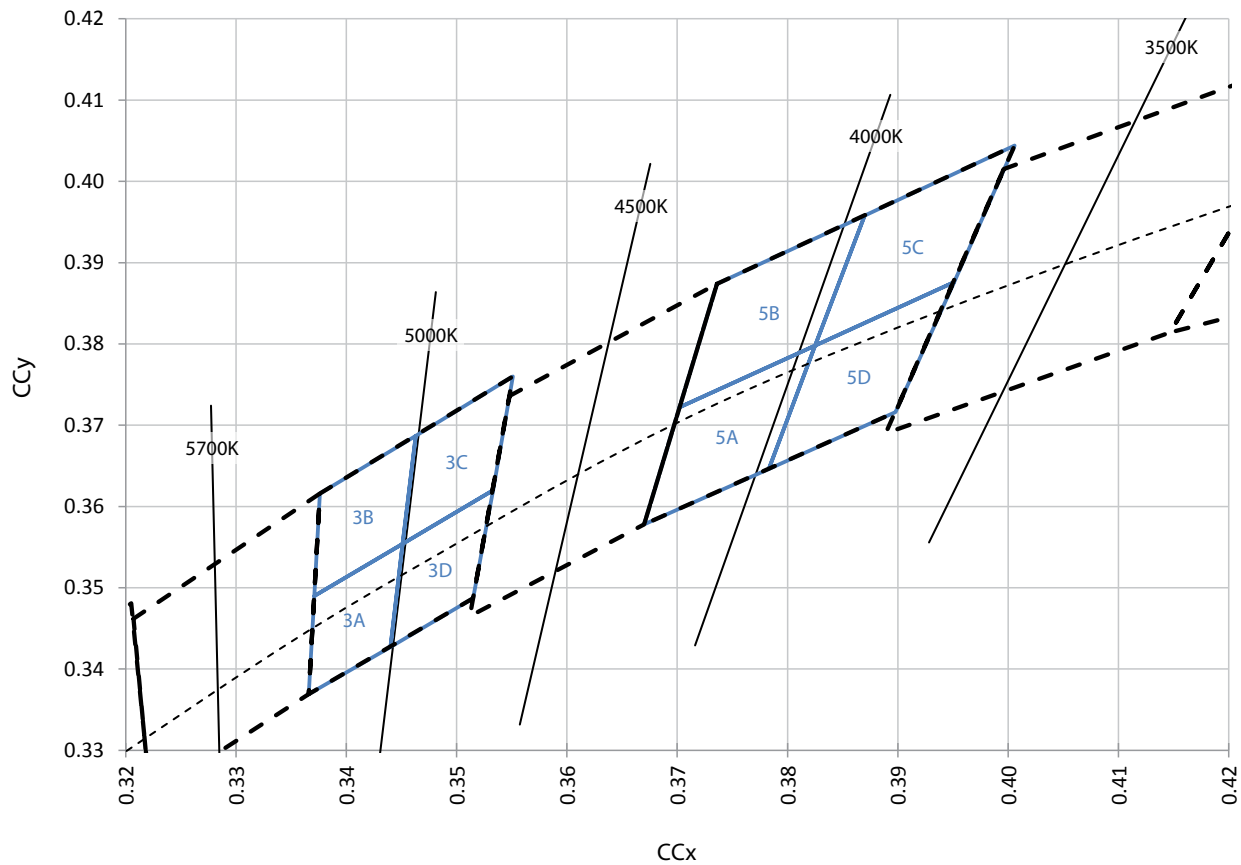
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E3	5000K	3A0	.3371	.3490
			.3451	.3554
			.3440	.3427
			.3366	.3369
		3B0	.3376	.3616
			.3463	.3687
			.3451	.3554
			.3371	.3490
		3C0	.3463	.3687
			.3551	.3760
			.3533	.3620
			.3451	.3554
		3D0	.3451	.3554
			.3533	.3620
			.3515	.3487
			.3440	.3427

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 ($T_j = 85^\circ\text{C}$)



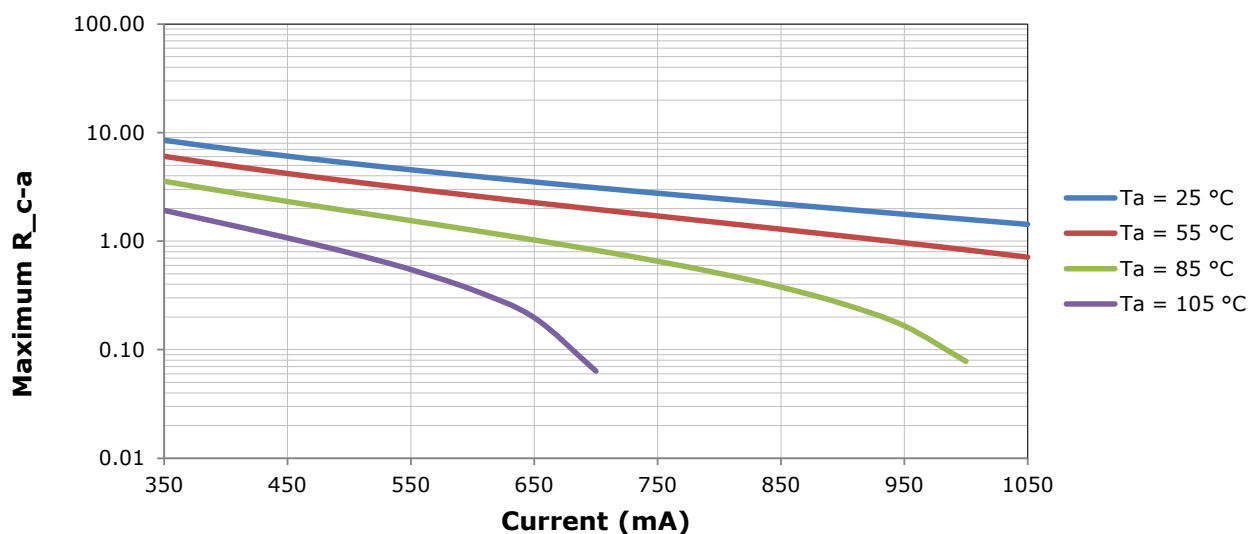
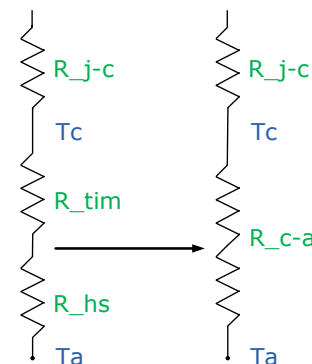
THERMAL DESIGN

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 CXA1820 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 CXA1820 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.

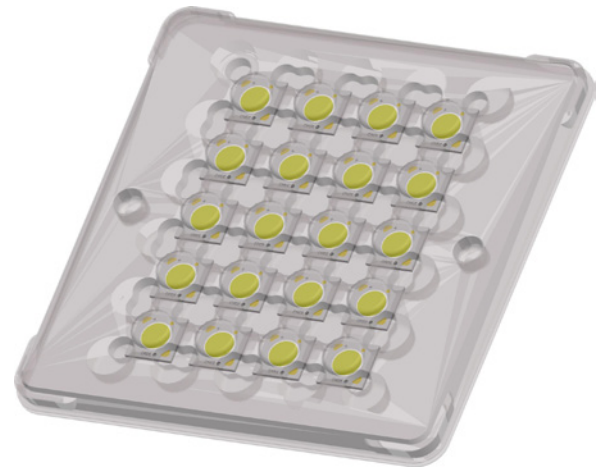
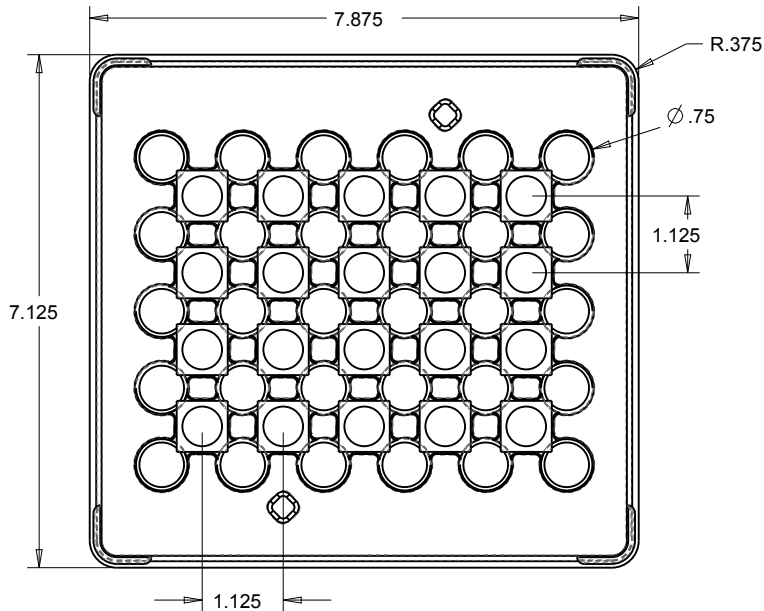
Tolerances:

.x $\pm$.1

.xx $\pm$.05

.xxx $\pm$.005

x° $\pm$ 1°

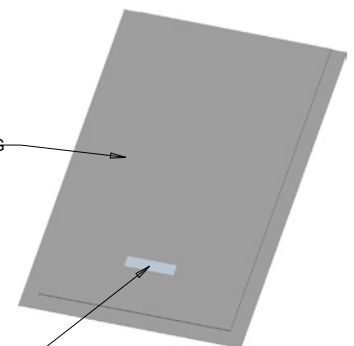


PATENT LABEL
IS LOCATED ON UNDERSIDE OF
CARTON



LABEL WITH CREE
BIN CODE, QTY, LOT#

BAG



LABEL WITH CREE
BIN CODE, QTY, LOT#