

Cree® XLamp® CXA2520 LED



PRODUCT DESCRIPTION

The XLamp CXA2520 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 CXA2520’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 19-mm optical source, the CXA2520 brings new levels of flux and efficacy to this form factor.

FEATURES

- Available in ANSI white bins as well as 4-step and 2-step EasyWhite bins at 2700 K, 3000 K, 3500 K, 4000 K and 5000 K CCT
- Available in 70-, 80-, 90- and 93-minimum CRI options
- Forward voltage: 36 V
- 85 °C binning and characterization
- Maximum drive current: 1250 mA
- 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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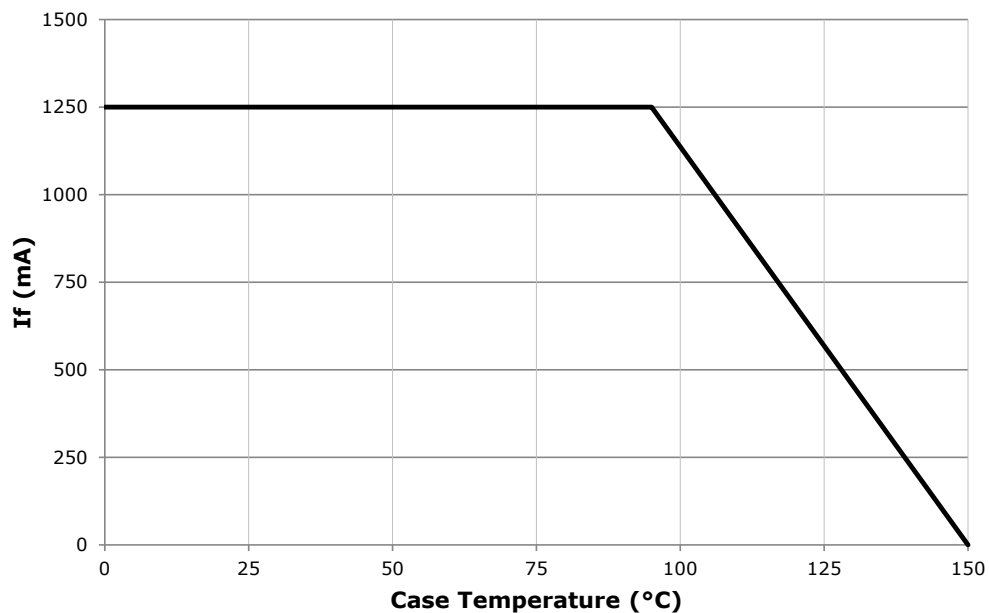
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD classification (HBM per Mil-Std-883D)			Class 2	
DC forward current	mA			1250*
Reverse current	mA			0.1
Forward voltage (@ 550 mA, 85 °C)	V		36	
Forward voltage (@ 550 mA, 25 °C)	V			42

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA2520 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 13 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 CXA2520 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 13).

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	CXA2520-0000-000N00Q450H	50F	CXA2520-0000-000N00Q450F	
			R2	2420	2741		CXA2520-0000-000N00R250H		CXA2520-0000-000N00R250F	
			R4	2600	2916		CXA2520-0000-000N00R450H		CXA2520-0000-000N00R450F	
	80	---	P4	1965	2226	50H	CXA2520-0000-000N0HP450H	50F	CXA2520-0000-000N0HP450F	
			Q2	2100	2379		CXA2520-0000-000N0HQ250H		CXA2520-0000-000N0HQ250F	
			Q4	2260	2560		CXA2520-0000-000N0HQ450H		CXA2520-0000-000N0HQ450F	
			R2	2420	2741		CXA2520-0000-000N0HR250H		CXA2520-0000-000N0HR250F	
	90	95	N4	1710	1937	50H	CXA2520-0000-000N0UN450H	50F	CXA2520-0000-000N0UN450F	
			P2	1830	2073		CXA2520-0000-000N0UP250H		CXA2520-0000-000N0UP250F	
			P4	1965	2226		CXA2520-0000-000N0UP450H		CXA2520-0000-000N0UP450F	
	4000 K	70	75	Q2	2100	2379	40H	CXA2520-0000-000N00Q240H	40F	CXA2520-0000-000N00Q240F
				Q4	2260	2560		CXA2520-0000-000N00Q440H		CXA2520-0000-000N00Q440F
R2				2420	2741	CXA2520-0000-000N00R240H		CXA2520-0000-000N00R240F		
80		---	P4	1965	2226	40H	CXA2520-0000-000N0HP440H	40F	CXA2520-0000-000N0HP440F	
			Q2	2100	2379		CXA2520-0000-000N0HQ240H		CXA2520-0000-000N0HQ240F	
			Q4	2260	2560		CXA2520-0000-000N0HQ440H		CXA2520-0000-000N0HQ440F	
			R2	2420	2741		CXA2520-0000-000N0HR240H		CXA2520-0000-000N0HR240F	
90		95	N2	1590	1801	40H	CXA2520-0000-000N0UN240H	40F	CXA2520-0000-000N0UN240F	
			N4	1710	1937		CXA2520-0000-000N0UN440H		CXA2520-0000-000N0UN440F	
			P2	1830	2073		CXA2520-0000-000N0UP240H		CXA2520-0000-000N0UP240F	
3500 K		80	---	P4	1965	2226	35H	CXA2520-0000-000N00P435H	35F	CXA2520-0000-000N00P435F
				Q2	2100	2379		CXA2520-0000-000N00Q235H		CXA2520-0000-000N00Q235F
	Q4			2260	2560	CXA2520-0000-000N00Q435H		CXA2520-0000-000N00Q435F		
	93	95	M4	1485	1685	35H	CXA2520-0000-000N0YM435h	35F	CXA2520-0000-000N0YM435F	
			N2	1590	1801		CXA2520-0000-000N0YN235H		CXA2520-0000-000N0YN235F	
			N4	1710	1937		CXA2520-0000-000N0YN435H		CXA2520-0000-000N0YN435F	

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	CXA2520-0000-000N00P430H	30F	CXA2520-0000-000N00P430F	
			Q2	2100	2379		CXA2520-0000-000N00Q230H		CXA2520-0000-000N00Q230F	
			Q4	2260	2535		CXA2520-0000-000N00Q430H		CXA2520-0000-000N00Q430F	
	90	---	M4	1485	1682	30H	CXA2520-0000-000N00M430H	30F	CXA2520-0000-000N00M430F	
			N2	1590	1801		CXA2520-0000-000N00N230H		CXA2520-0000-000N00N230F	
			N4	1710	1937		CXA2520-0000-000N00N430H		CXA2520-0000-000N00N430F	
			P2	1830	2073		CXA2520-0000-000N00P230H		CXA2520-0000-000N00P230F	
	93	95	M2	1380	1563	30H	CXA2520-0000-000N00M230H	30F	CXA2520-0000-000N00M230F	
			M4	1485	1682		CXA2520-0000-000N00M430H		CXA2520-0000-000N00M430F	
			N2	1590	1801		CXA2520-0000-000N00N230H		CXA2520-0000-000N00N230F	
	2700 K	80	---	P2	1830	2073	27H	CXA2520-0000-000N00P227H	27F	CXA2520-0000-000N00P227F
				P4	1965	2226		CXA2520-0000-000N00P427H		CXA2520-0000-000N00P427F
Q2				2100	2379	CXA2520-0000-000N00Q227H		CXA2520-0000-000N00Q227F		
90		---	M2	1380	1563	27H	CXA2520-0000-000N00M227H	27F	CXA2520-0000-000N00M227F	
			M4	1485	1682		CXA2520-0000-000N00M427H		CXA2520-0000-000N00M427F	
			N2	1590	1801		CXA2520-0000-000N00N227H		CXA2520-0000-000N00N227F	
			N4	1710	1937		CXA2520-0000-000N00N427H		CXA2520-0000-000N00N427F	
93		95	K4	1290	1436	27H	CXA2520-0000-000N00K427H	27F	CXA2520-0000-000N00K327F	
			M2	1380	1563		CXA2520-0000-000N00M227H		CXA2520-0000-000N00M227F	
			M4	1485	1682		CXA2520-0000-000N00M427H		CXA2520-0000-000N00M427F	

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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 CXA2520 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 13).

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	CXA2520-0000-000N00Q40E3	
			R2	2420	2741		CXA2520-0000-000N00R20E3	
			R4	2600	2916		CXA2520-0000-000N00R40E3	
	80	---	P4	1965	2226	3A0, 3B0, 3C0, 3D0	CXA2520-0000-000N0HP40E3	
			Q2	2100	2379		CXA2520-0000-000N0HQ20E3	
			Q4	2260	2560		CXA2520-0000-000N0HQ40E3	
			R2	2420	2741		CXA2520-0000-000N0HR20E3	
	90	95	N4	1710	1937	3A0, 3B0, 3C0, 3D0	CXA2520-0000-000N0UN40E3	
			P2	1830	2073		CXA2520-0000-000N0UP20E3	
			P4	1965	2226		CXA2520-0000-000N0UP40E3	
	4000 K	70	75	Q2	2100	2379	5A0, 5B0, 5C0, 5D0	CXA2520-0000-000N00Q20E5
				Q4	2260	2560		CXA2520-0000-000N00Q40E5
R2				2420	2741	CXA2520-0000-000N00R20E5		
80		---	P4	1965	2226	5A0, 5B0, 5C0, 5D0	CXA2520-0000-000N0HP40E5	
			Q2	2100	2379		CXA2520-0000-000N0HQ20E5	
			Q4	2260	2560		CXA2520-0000-000N0HQ40E5	
			R2	2420	2741		CXA2520-0000-000N0HR20E5	
90		95	N2	1590	1801	5A0, 5B0, 5C0, 5D0	CXA2520-0000-000N0UN20E5	
			N4	1710	1937		CXA2520-0000-000N0UN40E5	
			P2	1830	2073		CXA2520-0000-000N0UP20E5	
3500 K		80	---	P4	1965	2226	6A0, 6B0, 6C0, 6D0	CXA2520-0000-000N00P40E6
				Q2	2100	2379		CXA2520-0000-000N00Q20E6
	Q4			2260	2560	CXA2520-0000-000N00Q40E6		
	93	95	M4	1485	1685	6A0, 6B0, 6C0, 6D0	CXA2520-0000-000N0YM40E6	
			N2	1590	1801		CXA2520-0000-000N0YN20E6	
			N4	1710	1937		CXA2520-0000-000N0YN40E6	

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FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS ($I_F = 550 \text{ mA}$, $T_J = 85 \text{ }^\circ\text{C}$) - CONTINUED

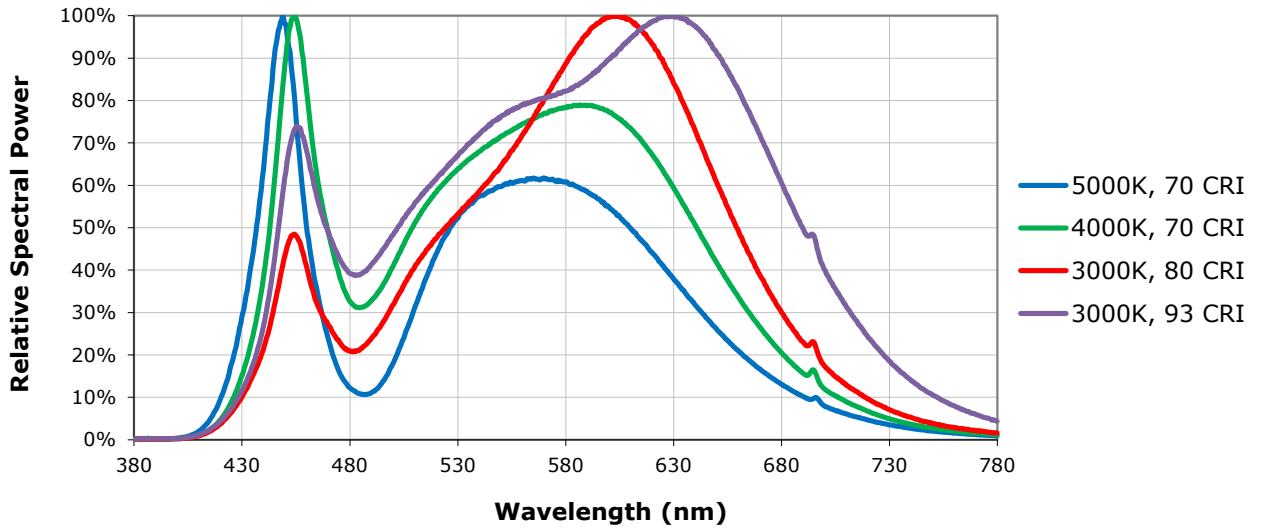
CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 550 mA			Chromaticity Regions	Order Code	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*			
3000 K	80	---	P4	1965	2226	7A0, 7B0, 7C0, 7D0	CXA2520-0000-000N00P40E7	
			Q2	2100	2379		CXA2520-0000-000N00Q20E7	
			Q4	2260	2535		CXA2520-0000-000N00Q40E7	
	90	---	M4	1485	1682	7A0, 7B0, 7C0, 7D0	CXA2520-0000-000N00M40E7	
			N2	1590	1801		CXA2520-0000-000N00N20E7	
			N4	1710	1937		CXA2520-0000-000N00N40E7	
			P2	1830	2073		CXA2520-0000-000N00P20E7	
	93	95	M2	1380	1563	7A0, 7B0, 7C0, 7D0	CXA2520-0000-000N00M20E7	
			M4	1485	1682		CXA2520-0000-000N00M40E7	
			N2	1590	1801		CXA2520-0000-000N00N20E7	
	2700 K	80	---	P2	1830	2073	8A0, 8B0, 8C0, 8D0	CXA2520-0000-000N00P20E8
				P4	1965	2226		CXA2520-0000-000N00P40E8
Q2				2100	2379	CXA2520-0000-000N00Q20E8		
90		---	M2	1380	1563	8A0, 8B0, 8C0, 8D0	CXA2520-0000-000N00M20E8	
			M4	1485	1682		CXA2520-0000-000N00M40E8	
			N2	1590	1801		CXA2520-0000-000N00N20E8	
			N4	1710	1937		CXA2520-0000-000N00N40E8	
93		95	K4	1290	1436	8A0, 8B0, 8C0, 8D0	CXA2520-0000-000N00K40E8	
			M2	1380	1563		CXA2520-0000-000N00M20E8	
			M4	1485	1682		CXA2520-0000-000N00M40E8	

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.

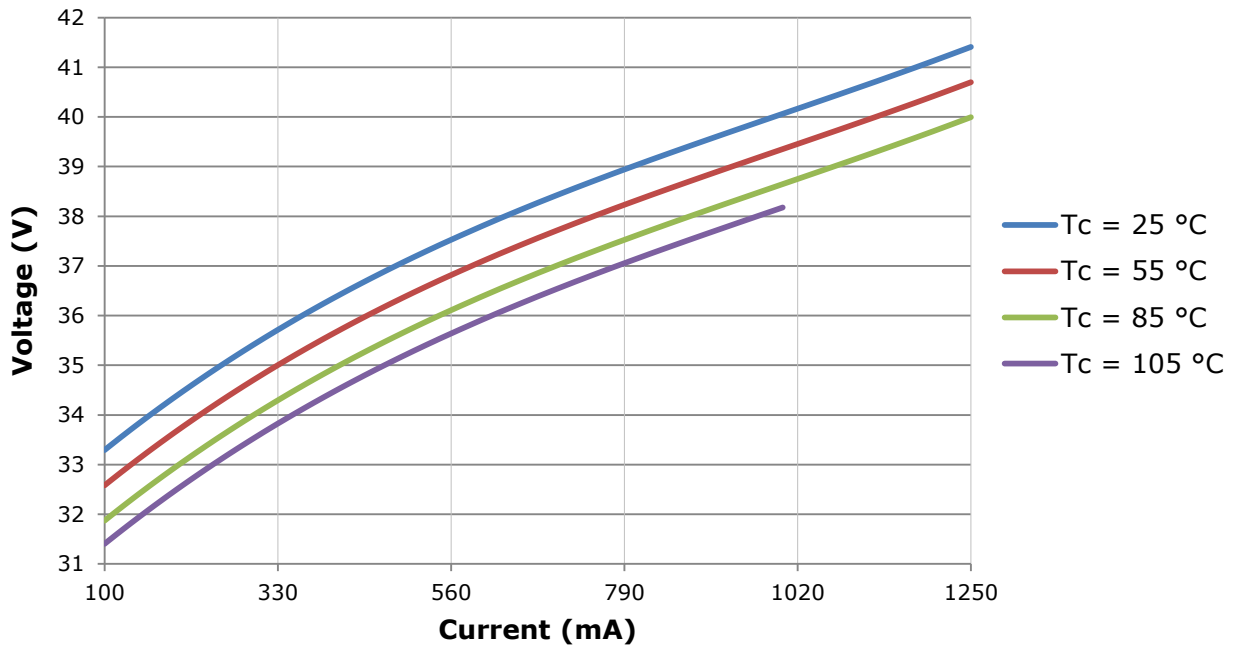
RELATIVE SPECTRAL POWER DISTRIBUTION ($I_f = 550 \text{ mA}$, $T_j = 85 \text{ }^\circ\text{C}$)

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



ELECTRICAL CHARACTERISTICS

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

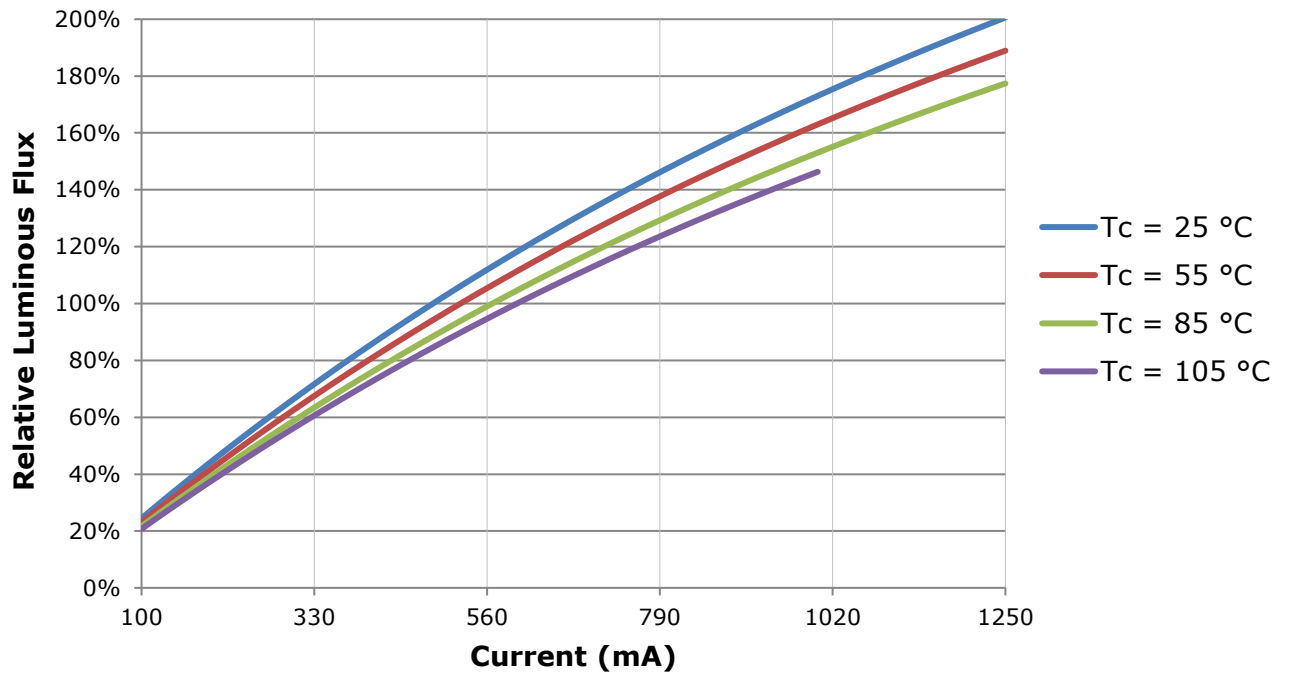


RELATIVE LUMINOUS FLUX

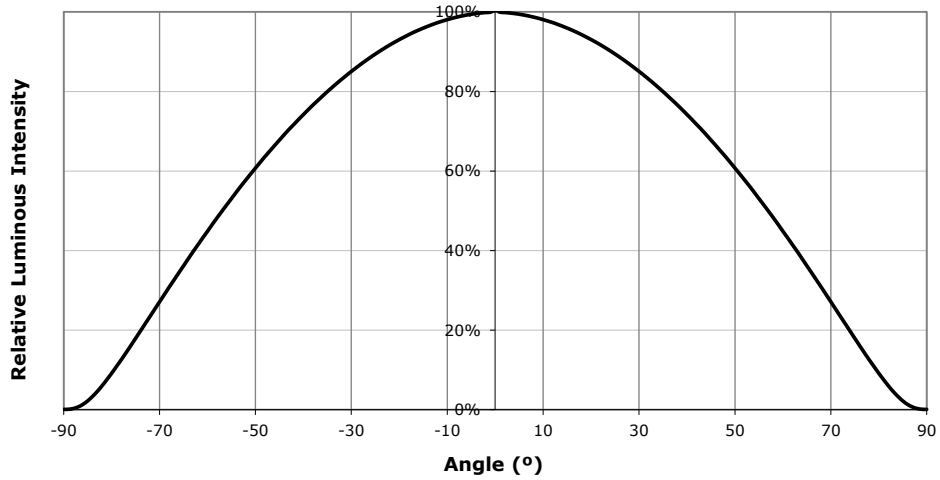
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA2520 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 550 mA at $T_j = 85\text{ }^\circ\text{C}$.

For example, at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 1020\text{ mA}$, the relative luminous flux ratio is 160% in the chart below. A CXA2520 LED that measures 2100 lm during binning will deliver 3300 lm (2100×1.6) at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 1020\text{ mA}$.



TYPICAL SPATIAL DISTRIBUTION



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

XLamp CXA2520 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 CXA2520 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

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E6	3500K	6A0	.3889	.3690
			.3941	.3848
			.4080	.3916
			.4017	.3751
		6B0	.3941	.3848
			.3996	.4015
			.4146	.4089
			.4080	.3916
		6C0	.4080	.3916
			.4146	.4089
			.4299	.4165
			.4221	.3984
		6D0	.4017	.3751
			.4080	.3916
			.4221	.3984
			.4147	.3814

ANSI White Bins					ANSI White Bins				
Code	CCT	Bin Code	x	y	Code	CCT	Bin Code	x	y
0E7	3000K	7A0	.4147	.3814	0E8	2700K	8A0	.4373	.3893
			.4221	.3984				.4465	.4071
			.4342	.4028				.4582	.4099
			.4259	.3853				.4483	.3919
		7B0	.4221	.3984			8B0	.4465	.4071
			.4299	.4165				.4562	.4260
			.4430	.4212				.4687	.4289
			.4342	.4028				.4582	.4099
		7C0	.4342	.4028			8C0	.4582	.4099
			.4430	.4212				.4687	.4289
			.4562	.4260				.4813	.4319
			.4465	.4071				.4700	.4126
		7D0	.4259	.3853			8D0	.4483	.3919
			.4342	.4028				.4582	.4099
			.4465	.4071				.4700	.4126
			.4373	.3893				.4593	.3944

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

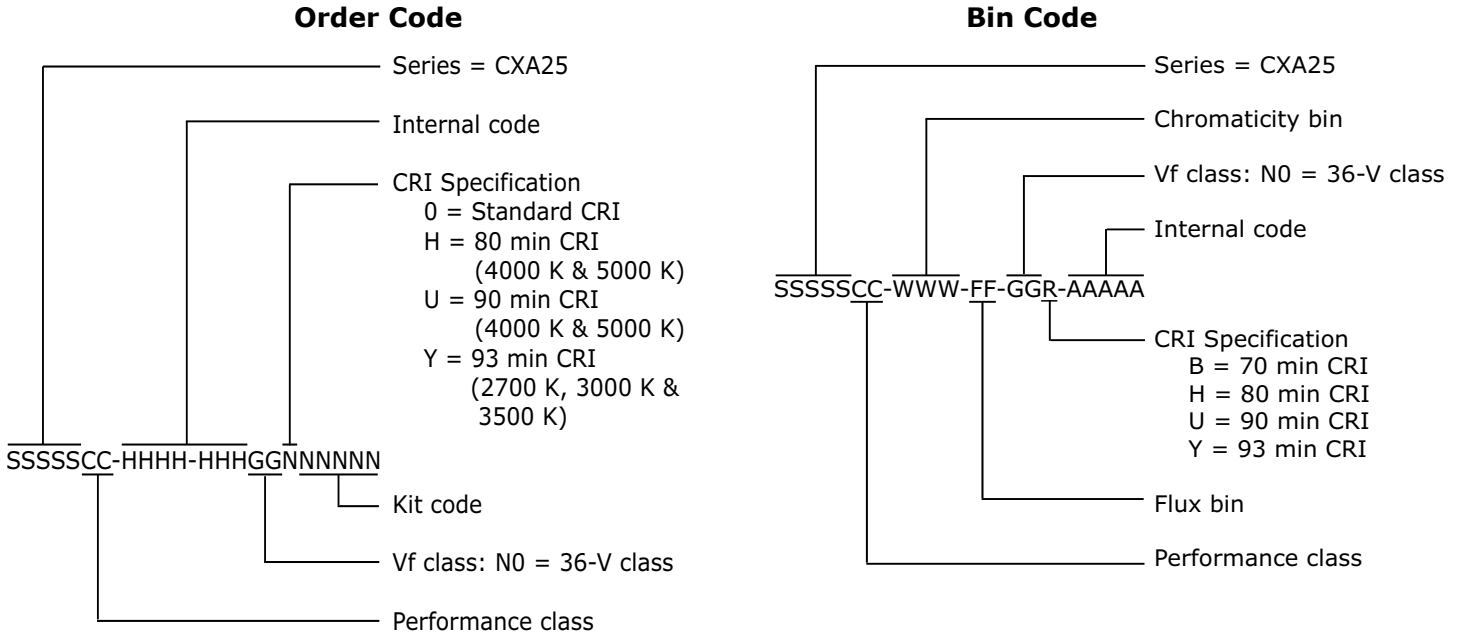


CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ($T_j = 85^\circ\text{C}$)



BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

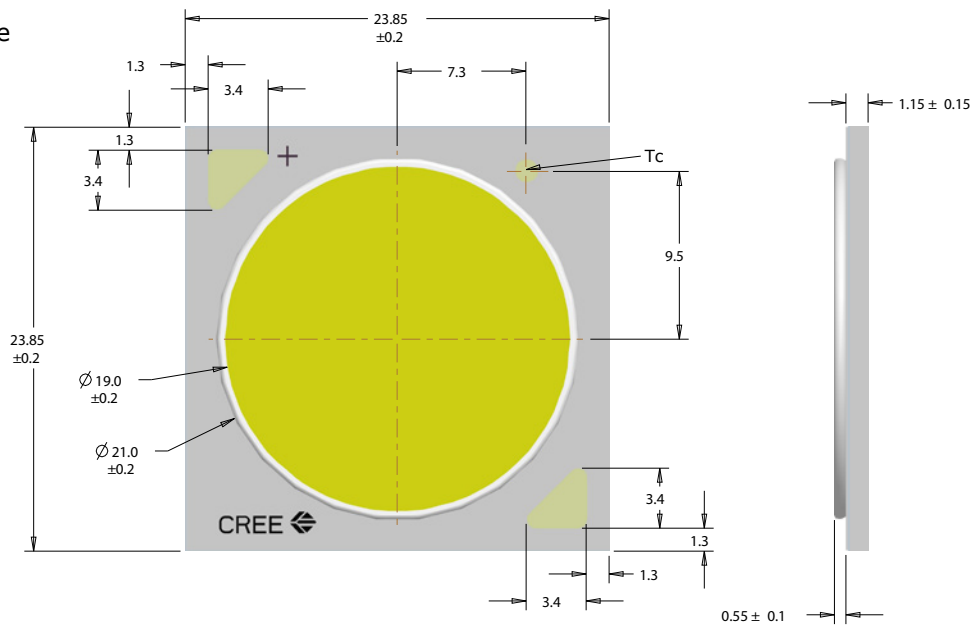


MECHANICAL DIMENSIONS

Dimensions are in mm.

Tolerances unless otherwise specified:

- .x ± .10
- .xx ± .03
- .xxx ± .010
- x° ± 1° x ± .10



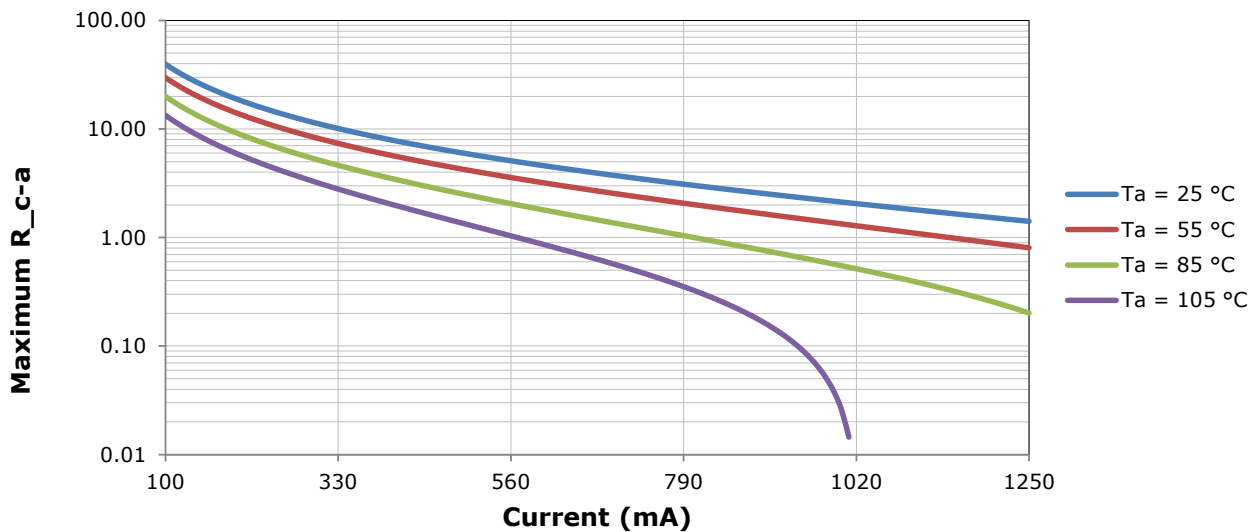
THERMAL DESIGN

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 CXA2520 LED at or below the maximum rated T_c , 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}).



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.

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 Claim

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

PACKAGING

Cree CXA2520 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 ± .1

.xx ± .05

.xxx ± .005

x° ± 1°

