Cree® XLamp® CXA1850 LED

PRODUCT DESCRIPTION

The XLamp CXA1850 expands Cree's family of High Density (HD) LED arrays, featuring a 12-mm optical source and enabling lighting manufacturers to create a new generation of products that delivers the same intensity and light quality as 70-W ceramic metal halide (CMH) at up to 50 percent lower power. The new HD class of CXA arrays provide unrivaled lumen density that can reduce system cost for the next generation of LED spotlights.

The CXA LED Design Guide provides basic information on the requirements to use the CXA1850 LED successfully in luminaire designs.[1]

FEATURES

- Available in 4-step and 2-step EasyWhite® bins at 2700 K, 3000 K, 3500 K, 4000 K and 5000 K, 5700 K and 6500 K CCT
- Available in ANSI white bins at 4000 K, 5000 K, 5700 K and 6500 K CCT
- Available in 70-, 80- and 93-minimum CRI options
- Forward voltage: 35 V
- 85 °C binning and characterization
- Maximum drive current: 2100 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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1 Cree XLamp CXA LED Design Guide, Design Guide DG02, www.cree.com/xlamp_app_notes/cxa_design_guide

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.407.5300

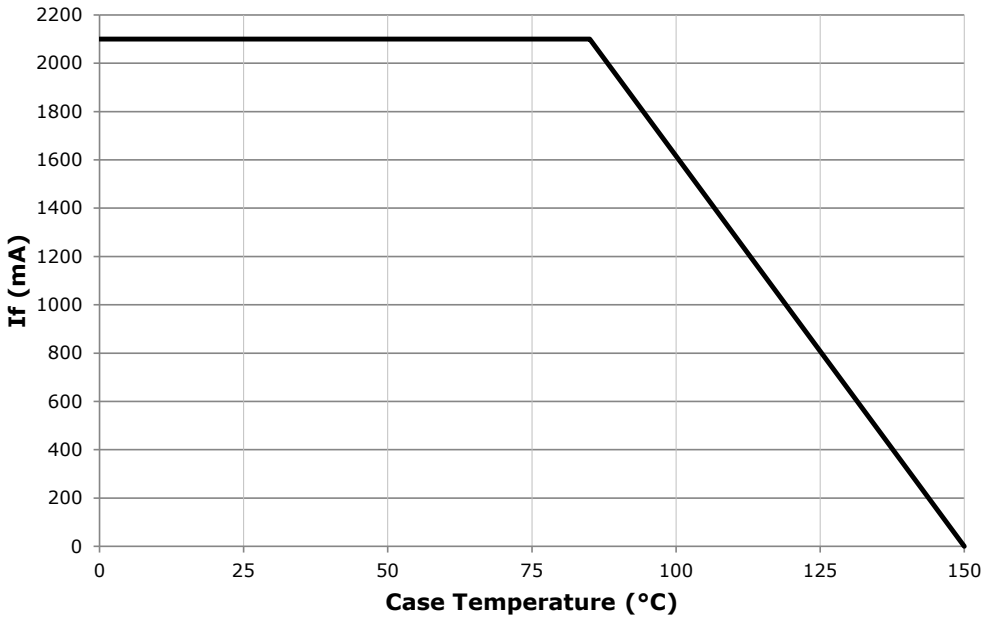
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			2100*
Reverse current	mA			0.1
Forward voltage (@ 1400 mA, T_j = 85 °C)	V		35	
Forward voltage (@ 1400 mA, T_j = 25 °C)	V			42

* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA1850 is dependent on the case temperature (Tc) 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 Tc measurement point.



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

The following tables provide order codes for XLamp CXA1850 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 @ 1400 mA			2-Step Order Code		4-Step Order Code	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region		Chromaticity Region	
6500 K	70	75	W4	5225	6014			65F	CXA1850-0000-000N00W465F
			X2	5590	6434				CXA1850-0000-000N00X265F
	80	---	W2	4860	5593			65F	CXA1850-0000-000N0HW265F
			W4	5225	6014				CXA1850-0000-000N0HW465F
5700 K	70	75	W4	5225	6014			57F	CXA1850-0000-000N00W457F
			X2	5590	6434				CXA1850-0000-000N00X257F
	80	---	W2	4860	5593			57F	CXA1850-0000-000N0HW257F
			W4	5225	6014				CXA1850-0000-000N0HW457F
5000 K	70	75	W4	5225	6014	50H	CXA1850-0000-000N00W450H	50F	CXA1850-0000-000N00W450F
			X2	5590	6434		CXA1850-0000-000N00X250H		CXA1850-0000-000N00X250F
	80	---	W2	4860	5593	50H	CXA1850-0000-000N0HW250H	50F	CXA1850-0000-000N0HW250F
			W4	5225	6014		CXA1850-0000-000N0HW450H		CXA1850-0000-000N0HW450F
4000 K	70	75	W4	5225	6014	40H	CXA1850-0000-000N00W440H	40F	CXA1850-0000-000N00W440F
			X2	5590	6434		CXA1850-0000-000N00X240H		CXA1850-0000-000N00X240F
	80	---	W2	4860	5593	40H	CXA1850-0000-000N0HW240H	40F	CXA1850-0000-000N0HW240F
			W4	5225	6014		CXA1850-0000-000N0HW440H		CXA1850-0000-000N0HW440F
3500 K	80	---	V4	4545	5231	35H	CXA1850-0000-000N00V435H	35F	CXA1850-0000-000N00V435F
			W2	4860	5593		CXA1850-0000-000N00W235H		CXA1850-0000-000N00W235F
			W4	5225	6014		CXA1850-0000-000N00W435H		CXA1850-0000-000N00W435F
	93	95	U2	3680	4235	35H	CXA1850-0000-000N0YU235H	35F	CXA1850-0000-000N0YU235F
			U4	3955	4552		CXA1850-0000-000N0YU435H		CXA1850-0000-000N0YU435F
3000 K	80	---	V4	4545	5231	30H	CXA1850-0000-000N00V430H	30F	CXA1850-0000-000N00V430F
			W2	4860	5593		CXA1850-0000-000N00W230H		CXA1850-0000-000N00W230F
	93	95	T4	3440	3959	30H	CXA1850-0000-000N0YT430H	30F	CXA1850-0000-000N0YT430F
			U2	3680	4235		CXA1850-0000-000N0YU230H		CXA1850-0000-000N0YU230F

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.

* 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

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 1400 mA			2-Step Order Code		4-Step Order Code	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Chromaticity Region		Chromaticity Region	
2700 K	80	---	V2	4230	4868	27H	CXA1850-0000-000N00V227H	27F	CXA1850-0000-000N00V227F
			V4	4545	5231		CXA1850-0000-000N00V427H		CXA1850-0000-000N00V427F
			W2	4860	5593		CXA1850-0000-000N00W227H		CXA1850-0000-000N00W227F
	93	95	T2	3200	3683	27H	CXA1850-0000-000N0YT227H	27F	CXA1850-0000-000N0YT227F
			T4	3440	3959		CXA1850-0000-000N0YT427H		CXA1850-0000-000N0YT427F

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.

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

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

The following tables provide order codes for XLamp CXA1850 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 @ 1400 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
6500 K	70	75	W4	5225	6014	1A0, 1B0, 1C0, 1D0	CXA1850-0000-000N00W40E1
			X2	5590	6434		CXA1850-0000-000N00X20E1
	80	---	W2	4860	5593	1A0, 1B0, 1C0, 1D0	CXA1850-0000-000N0HW20E1
			W4	5225	6014		CXA1850-0000-000N0HW40E1
5700 K	70	75	W4	5225	6014	2A0, 2B0, 2C0, 2D0	CXA1850-0000-000N00W40E2
			X2	5590	6434		CXA1850-0000-000N00X20E2
	80	---	W2	4860	5593	2A0, 2B0, 2C0, 2D0	CXA1850-0000-000N0HW20E2
			W4	5225	6014		CXA1850-0000-000N0HW40E2
5000 K	70	75	W4	5225	6014	3A0, 3B0, 3C0, 3D0	CXA1850-0000-000N00W40E3
			X2	5590	6434		CXA1850-0000-000N00X20E3
	80	---	W2	4860	5593	3A0, 3B0, 3C0, 3D0	CXA1850-0000-000N0HW20E3
			W4	5225	6014		CXA1850-0000-000N0HW40E3
4000 K	70	75	W4	5225	6014	5A0, 5B0, 5C0, 5D0	CXA1850-0000-000N00W40E5
			X2	5590	6434		CXA1850-0000-000N00X20E5
	80	---	W2	4860	5593	5A0, 5B0, 5C0, 5D0	CXA1850-0000-000N0HW20E5
			W4	5225	6014		CXA1850-0000-000N0HW40E5

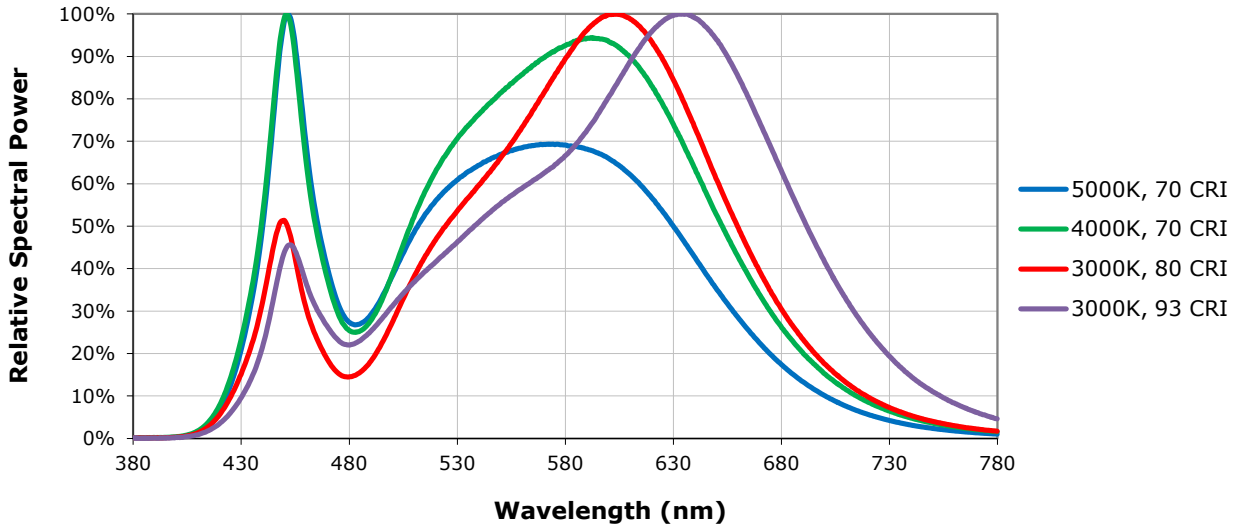
Notes

- 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.

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

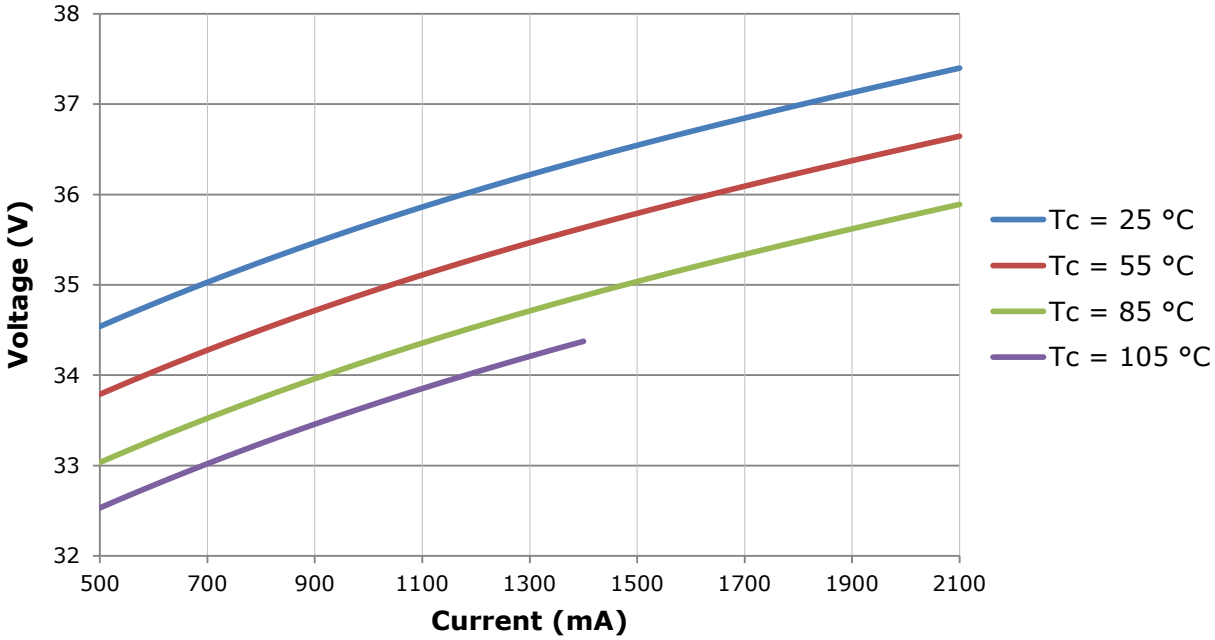
RELATIVE SPECTRAL POWER DISTRIBUTION (I_F = 1400 mA, T_J = 85 °C)

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.

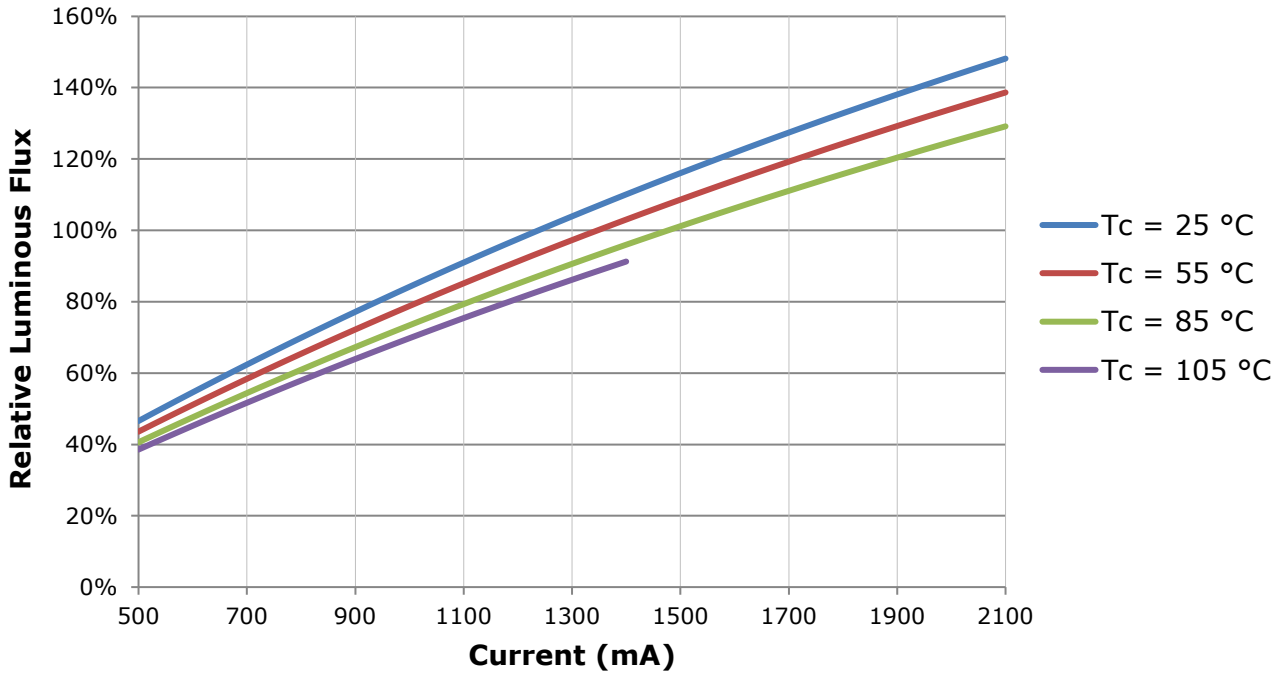


RELATIVE LUMINOUS FLUX

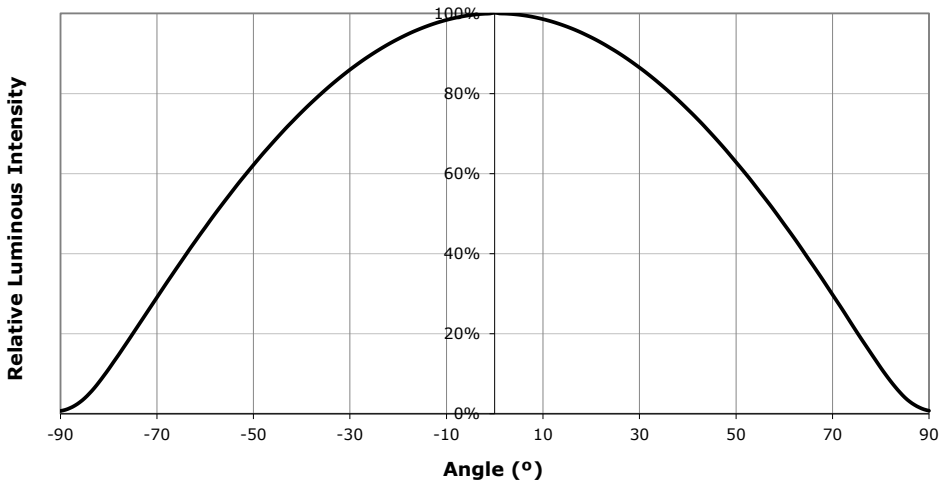
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA1850 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 = 55 °C, I_F = 1700 mA, the relative luminous flux ratio is 120% in the chart below. A CXA1850 LED that measures 5595 lm during binning will deliver 6714 lm (5595 * 1.2) at steady-state operation of Tc = 55 °C, I_F = 1700 mA.



TYPICAL SPATIAL DISTRIBUTION



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

XLamp CXA1850 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Min. Luminous Flux @ 1400 mA	Max. Luminous Flux @ 1400 mA
T2	3200	3440
T4	3440	3680
U2	3680	3955
U4	3955	4230
V2	4230	4545
V4	4545	4860
W2	4860	5225
W4	5225	5590
X2	5590	6010
X4	6010	6430

PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C)

XLamp CXA1850 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**
65F	6500 K	0.3253	0.3325
		0.3249	0.3439
		0.3331	0.3514
		0.3330	0.3393
57F	5700 K	0.3097	0.3196
		0.3079	0.3297
		0.3164	0.3382
		0.3176	0.3275
50F	5000 K	0.3407	0.3459
		0.3415	0.3586
		0.3499	0.3654
		0.3484	0.3521
40F	4000 K	0.3744	0.3685
		0.3782	0.3837
		0.3912	0.3917
		0.3863	0.3758
35F	3500 K	0.3981	0.3800
		0.4040	0.3966
		0.4186	0.4037
		0.4116	0.3865
30F	3000 K	0.4242	0.3919
		0.4322	0.4096
		0.4449	0.4141
		0.4359	0.3960
27F	2700 K	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	5000 K	0.3429	0.3507
		0.3434	0.3571
		0.3475	0.3604
		0.3469	0.3539
40H	4000 K	0.3784	0.3741
		0.3804	0.3818
		0.3867	0.3857
		0.3844	0.3778
35H	3500 K	0.4030	0.3857
		0.4061	0.3941
		0.4132	0.3976
		0.4099	0.3890
30H	3000 K	0.4291	0.3973
		0.4333	0.4062
		0.4395	0.4084
		0.4351	0.3994
27H	2700 K	0.4528	0.4046
		0.4578	0.4138
		0.4638	0.4152
		0.4586	0.4060

PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C) - CONTINUED

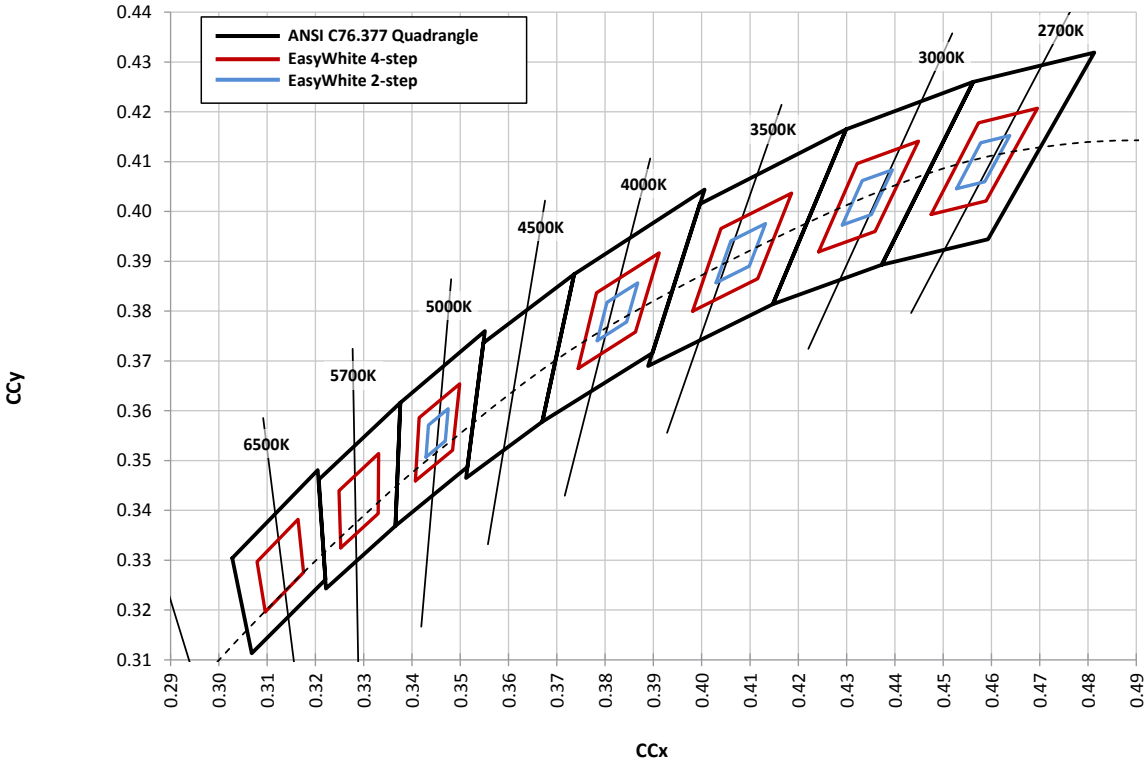
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E1	6500 K	1A0	0.3048	0.3207
			0.3130	0.3290
			0.3144	0.3186
			0.3068	0.3113
		1B0	0.3028	0.3304
			0.3115	0.3391
			0.3130	0.3290
			0.3048	0.3207
		1C0	0.3115	0.3391
			0.3205	0.3481
			0.3213	0.3373
			0.3130	0.3290
		1D0	0.3130	0.3290
			0.3213	0.3373
			0.3221	0.3261
			0.3144	0.3186

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E2	5700 K	2A0	0.3215	0.3350
			0.3290	0.3417
			0.3290	0.3300
			0.3222	0.3243
		2B0	0.3207	0.3462
			0.3290	0.3538
			0.3290	0.3417
			0.3215	0.3350
		2C0	0.3290	0.3538
			0.3376	0.3616
			0.3371	0.3490
			0.3290	0.3417
		2D0	0.3290	0.3417
			0.3371	0.3490
			0.3366	0.3369
			0.3290	0.3300

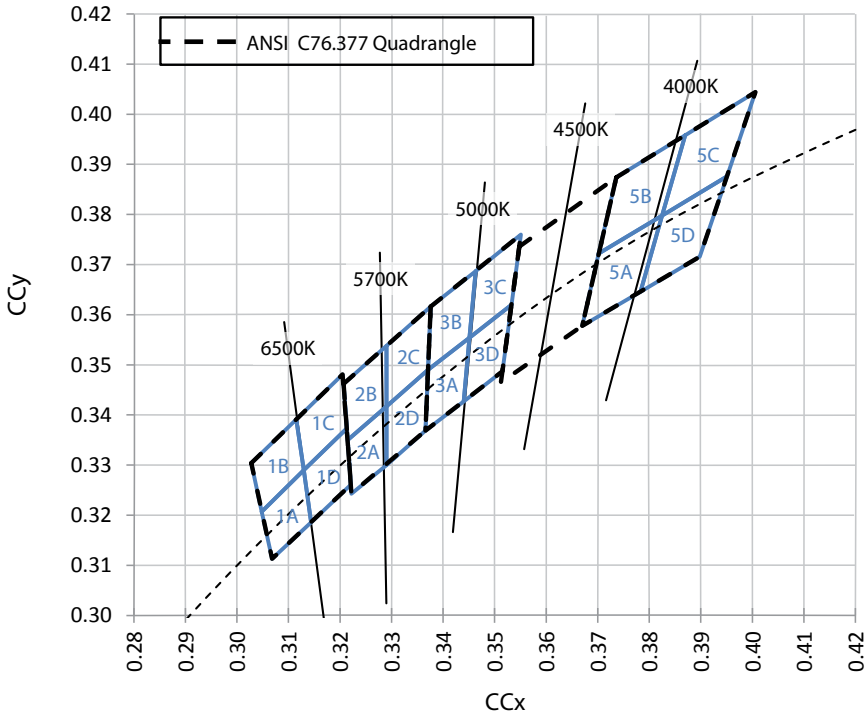
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E3	5000 K	3A0	.3371	.3490
			.3451	.3554
			.3440	.3427
			.3366	.3369
		3B0	.3376	.3616
			.3463	.3687
			.3451	.3554
			.3371	.3490
		3C0	.3463	.3687
			.3551	.3760
			.3533	.3620
			.3451	.3554
		3D0	.3451	.3554
			.3533	.3620
			.3515	.3487
			.3440	.3427

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E5	4000 K	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 CIE 1931 COLOR SPACE (T_J = 85 °C)



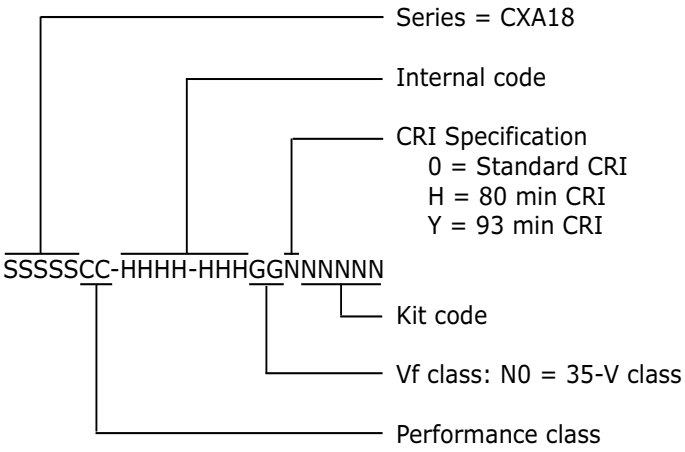
CREE ANSI WHITE BINS PLOTTED ON THE CIE 1931 COLOR SPACE (T_J = 85 °C)



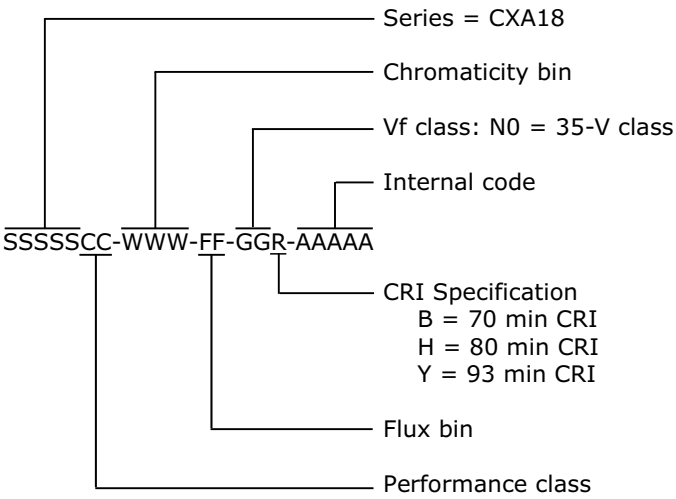
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code



Bin Code



MECHANICAL DIMENSIONS

Dimensions are in mm.

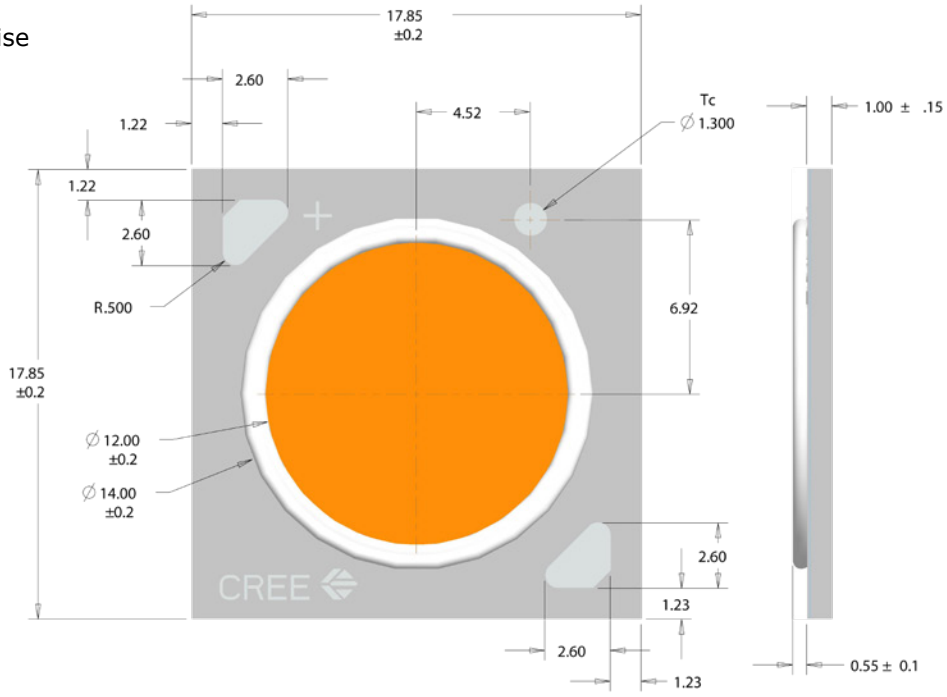
Tolerances unless otherwise specified:

.x ± .10

.xx ± .03

.xxx ± .010

x° ± 1°



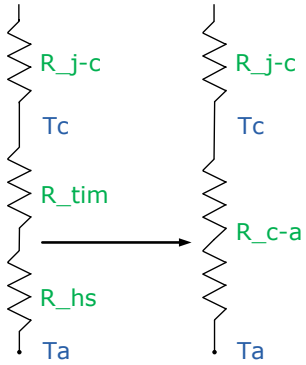
THERMAL DESIGN

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 (Tc). 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.

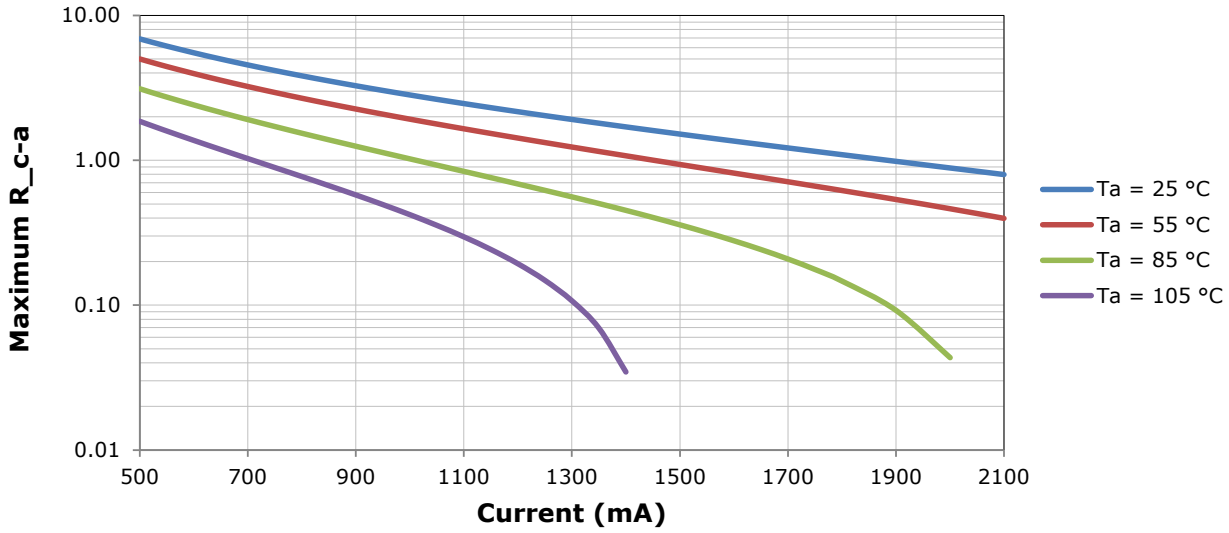
Cree has measured the temperature at the bottom of the package, commonly referred to as the solder point (T_{SP}), and found this value to be equivalent to the temperature at the Tc location at the top of the package once the LED has reached thermal equilibrium. There is no need to calculate for T_J 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 CXA1850 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).



CXA1



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 CXA1850 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.

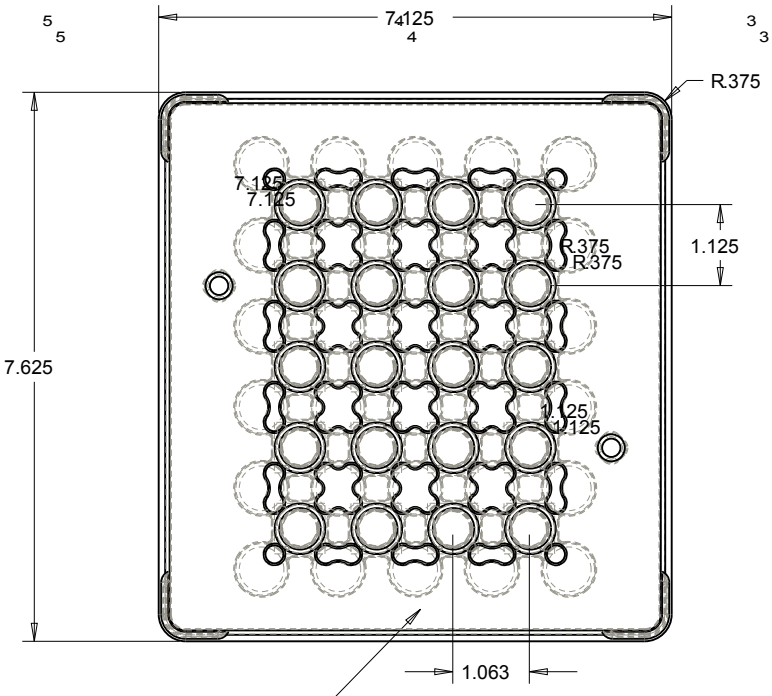
Tolerances:

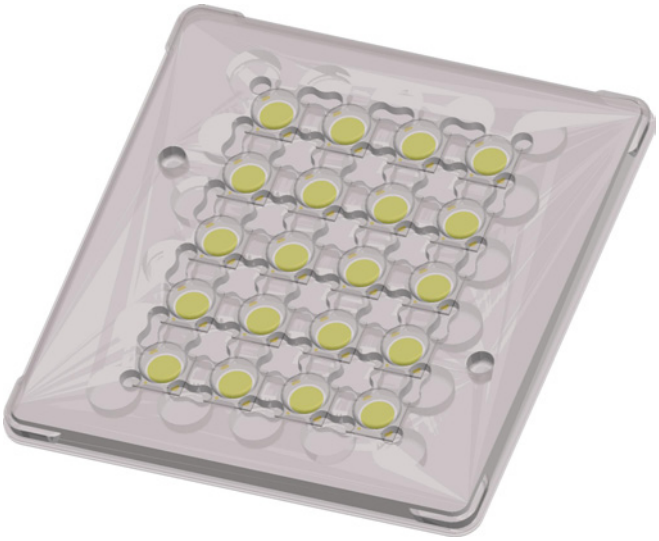
x ± .1

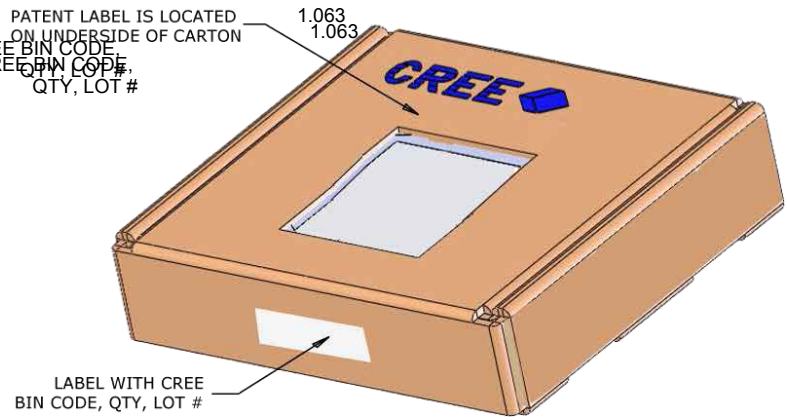
.xx ± .05

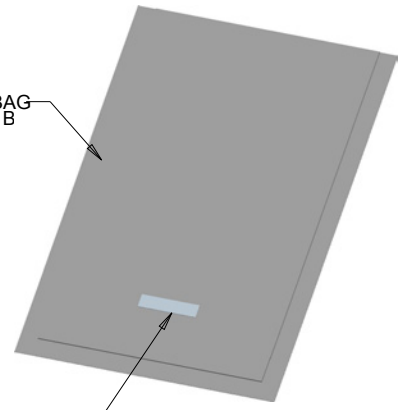
.xxx ± .005

x° ± 1°









LABEL WITH CREE BIN CODE,
QTY, LOT #