Cree® XLamp® CXA1310 LED

PRODUCT DESCRIPTION

The XLamp CXA1310 is Cree's newest High Density (HD) LED array, featuring a 6-mm optical source and enabling lighting manufacturers to create a new generation of products that delivers the same intensity and light quality as 20-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 CXA1310 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, 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 options: 18 V & 36 V
- 85 °C binning and characterization
- Maximum drive current: 1050 mA (18 V), 525mA (36 V)
- 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

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

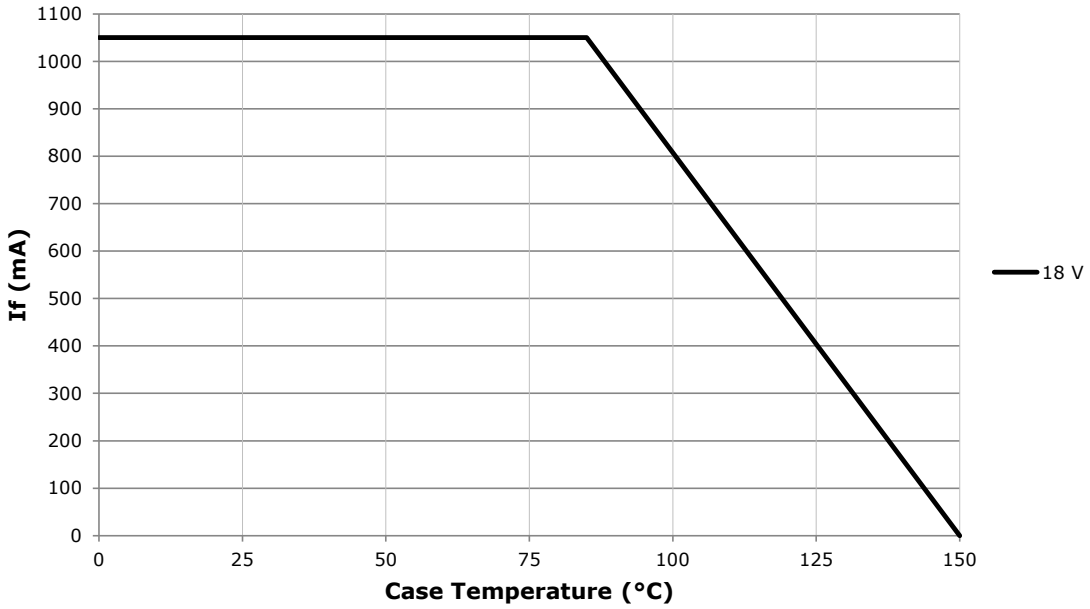
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current (18 V)	mA			1050*
DC forward current (36 V)	mA			525*
Reverse current	mA			0.1
Forward voltage (18 V, @ 700 mA, 85 °C)	V		17.8	
Forward voltage (18 V, @ 700 mA, 25 °C)	V			21
Forward voltage (36 V, @ 350 mA, 85 °C)	V		35.6	
Forward voltage (36 V, @ 350 mA, 25 °C)	V			42

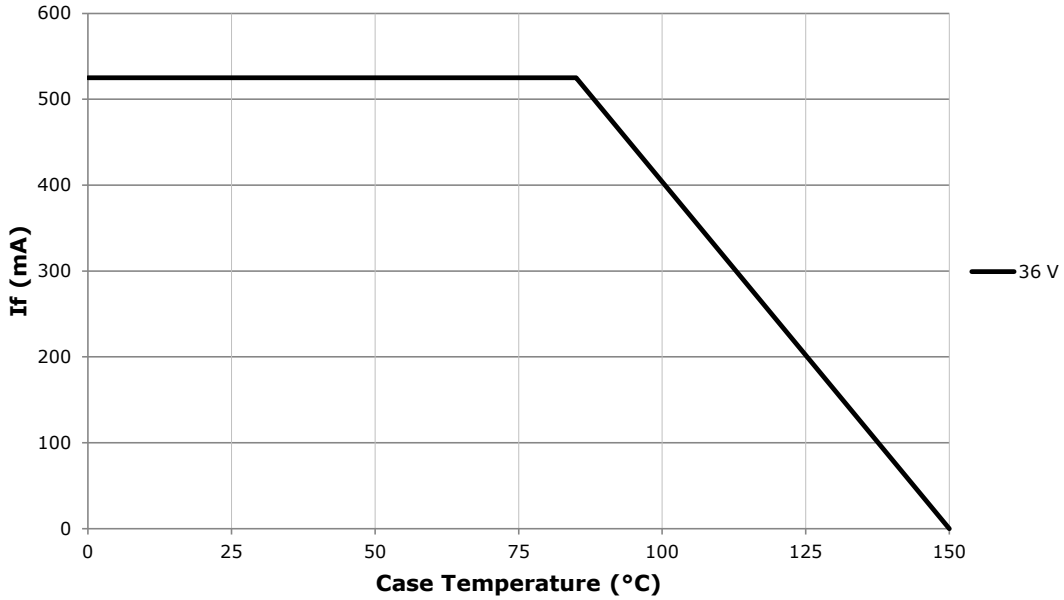
* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA1310 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 16 for the location of the Tc measurement point.



XA1310-36V



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

The following tables provide order codes for XLamp CXA1310 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 16).

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 700 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	K2	1200	1344			65F	CXA1310-0000-000F00K265F
			K4	1290	1445				CXA1310-0000-000F00K465F
	80	---	J4	1120	1255			65F	CXA1310-0000-000F0HJ465F
			K2	1200	1344				CXA1310-0000-000F0HK265F
5700 K	70	75	K2	1200	1344			57F	CXA1310-0000-000F00K257F
			K4	1290	1445				CXA1310-0000-000F00K457F
	80	---	J4	1120	1255			57F	CXA1310-0000-000F0HJ457F
			K2	1200	1344				CXA1310-0000-000F0HK257F
5000 K	70	75	K2	1200	1344	50H	CXA1310-0000-000F00K250H	50F	CXA1310-0000-000F00K250F
			K4	1290	1445		CXA1310-0000-000F00K450H		CXA1310-0000-000F00K450F
	80	---	J4	1120	1255	50H	CXA1310-0000-000F0HJ450H	50F	CXA1310-0000-000F0HJ450F
			K2	1200	1344		CXA1310-0000-000F0HK250H		CXA1310-0000-000F0HK250F
4000 K	70	75	K2	1200	1344	40H	CXA1310-0000-000F00K240H	40F	CXA1310-0000-000F00K240F
			K4	1290	1445		CXA1310-0000-000F00K440H		CXA1310-0000-000F00K440F
	80	---	J4	1120	1255	40H	CXA1310-0000-000F0HJ440H	40F	CXA1310-0000-000F0HJ440F
			K2	1200	1344		CXA1310-0000-000F0HK240H		CXA1310-0000-000F0HK240F
3500 K	80	---	J2	1040	1165	35H	CXA1310-0000-000F00J235H	35F	CXA1310-0000-000F00J235F
			J4	1120	1255		CXA1310-0000-000F00J435H		CXA1310-0000-000F00J435F
	93	95	G4	840	941	35H	CXA1310-0000-000F0YG435H	35F	CXA1310-0000-000F0YG435F
			H2	900	1008		CXA1310-0000-000F0YH235H		CXA1310-0000-000F0YH235F
3000 K	80	---	J2	1040	1165	30H	CXA1310-0000-000F00J230H	30F	CXA1310-0000-000F00J230F
			J4	1120	1255		CXA1310-0000-000F00J430H		CXA1310-0000-000F00J430F
	93	95	G2	780	881	30H	CXA1310-0000-000F0YG230H	30H	CXA1310-0000-000F0YG230F
			G4	840	941		CXA1310-0000-000F0YG430H		CXA1310-0000-000F0YG430F
2700 K	80	---	H4	970	1086	27H	CXA1310-0000-000F00H427H	27F	CXA1310-0000-000F00H427F
			J2	1040	1165		CXA1310-0000-000F00J227H		CXA1310-0000-000F00J227F
	93	95	F4	730	831	27H	CXA1310-0000-000F0YF427H	27F	CXA1310-0000-000F0YF427F
			G2	780	881		CXA1310-0000-000F0YG227H		CXA1310-0000-000F0YG227F

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 - 18 V (I_F = 700 mA, T_J = 85 °C)

The following tables provide order codes for XLamp CXA1310 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 16).

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 700 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
6500 K	70	75	K2	1200	1344	1A0, 1B0, 1C0, 1D0	CXA1310-0000-000F00K20E1
			K4	1290	1445		CXA1310-0000-000F00K40E1
	80	---	J4	1120	1255	1A0, 1B0, 1C0, 1D0	CXA1310-0000-000F0HJ40E1
			K2	1200	1344		CXA1310-0000-000F0HK20E1
5700 K	70	75	K2	1200	1344	2A0, 2B0, 2C0, 2D0	CXA1310-0000-000F00K20E2
			K4	1290	1445		CXA1310-0000-000F00K40E2
	80	---	J4	1120	1255	2A0, 2B0, 2C0, 2D0	CXA1310-0000-000F0HJ40E2
			K2	1200	1344		CXA1310-0000-000F0HK20E2
5000 K	70	75	K2	1200	1344	3A0, 3B0, 3C0, 3D0	CXA1310-0000-000F00K20E3
			K4	1290	1445		CXA1310-0000-000F00K40E3
	80	---	J4	1120	1255	3A0, 3B0, 3C0, 3D0	CXA1310-0000-000F0HJ40E3
			K2	1200	1344		CXA1310-0000-000F0HK20E3
4000 K	70	75	K2	1200	1344	5A0, 5B0, 5C0, 5D0	CXA1310-0000-000F00K20E5
			K4	1290	1445		CXA1310-0000-000F00K40E5
	80	---	J4	1120	1255	5A0, 5B0, 5C0, 5D0	CXA1310-0000-000F0HJ40E5
			K2	1200	1344		CXA1310-0000-000F0HK20E5

Notes

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

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

The following tables provide order codes for XLamp CXA1310 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 16).

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 350 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	K2	1200	1344			65F	CXA1310-0000-000N00K265F
			K4	1290	1445				CXA1310-0000-000N00K465F
	80	---	J4	1120	1255			65F	CXA1310-0000-000N0HJ465F
			K2	1200	1344				CXA1310-0000-000N0HK265F
5700 K	70	75	K2	1200	1344			57F	CXA1310-0000-000N00K257F
			K4	1290	1445				CXA1310-0000-000N00K457F
	80	---	J4	1120	1255			57F	CXA1310-0000-000N0HJ457F
			K2	1200	1344				CXA1310-0000-000N0HK257F
5000 K	70	75	K2	1200	1344	50H	CXA1310-0000-000N00K250H	50F	CXA1310-0000-000N00K250F
			K4	1290	1445		CXA1310-0000-000N00K450H		CXA1310-0000-000N00K450F
	80	---	J4	1120	1255	50H	CXA1310-0000-000N0HJ450H	50F	CXA1310-0000-000N0HJ450F
			K2	1200	1344		CXA1310-0000-000N0HK250H		CXA1310-0000-000N0HK250F
4000 K	70	75	K2	1200	1344	40H	CXA1310-0000-000N00K240H	40F	CXA1310-0000-000N00K240F
			K4	1290	1445		CXA1310-0000-000N00K440H		CXA1310-0000-000N00K440F
	80	---	J4	1120	1255	40H	CXA1310-0000-000N0HJ440H	40F	CXA1310-0000-000N0HJ440F
			K2	1200	1344		CXA1310-0000-000N0HK240H		CXA1310-0000-000N0HK240F
3500 K	80	---	J2	1040	1165	35H	CXA1310-0000-000N00J235H	35F	CXA1310-0000-000N00J235F
			J4	1120	1255		CXA1310-0000-000N00J435H		CXA1310-0000-000N00J435F
	93	95	G4	840	941	35H	CXA1310-0000-000N0YG435H	35F	CXA1310-0000-000N0YG435F
			H2	900	1008		CXA1310-0000-000N0YH235H		CXA1310-0000-000N0YH235F
3000 K	80	---	J2	1040	1165	30H	CXA1310-0000-000N00J230H	30F	CXA1310-0000-000N00J230F
			J4	1120	1255		CXA1310-0000-000N00J430H		CXA1310-0000-000N00J430F
	93	95	G2	780	881	30H	CXA1310-0000-000N0YG230H	30H	CXA1310-0000-000N0YG230F
			G4	840	941		CXA1310-0000-000N0YG430H		CXA1310-0000-000N0YG430F
2700 K	80	---	H4	970	1086	27H	CXA1310-0000-000N00H427H	27F	CXA1310-0000-000N00H427F
			J2	1040	1165		CXA1310-0000-000N00J227H		CXA1310-0000-000N00J227F
	93	95	F4	730	831	27H	CXA1310-0000-000N0YF427H	27F	CXA1310-0000-000N0YF427F
			G2	780	881		CXA1310-0000-000N0YG227H		CXA1310-0000-000N0YG227F

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 - 36 V (I_F = 350 mA, T_J = 85 °C)

The following tables provide order codes for XLamp CXA1310 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 16).

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 350 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
6500 K	70	75	K2	1200	1344	1A0, 1B0, 1C0, 1D0	CXA1310-0000-000N00K20E1
			K4	1290	1445		CXA1310-0000-000N00K40E1
	80	---	J4	1120	1255	1A0, 1B0, 1C0, 1D0	CXA1310-0000-000N0HJ40E1
			K2	1200	1344		CXA1310-0000-000N0HK20E1
5700 K	70	75	K2	1200	1344	2A0, 2B0, 2C0, 2D0	CXA1310-0000-000N00K20E2
			K4	1290	1445		CXA1310-0000-000N00K40E2
	80	---	J4	1120	1255	2A0, 2B0, 2C0, 2D0	CXA1310-0000-000N0HJ40E2
			K2	1200	1344		CXA1310-0000-000N0HK20E2
5000 K	70	75	K2	1200	1344	3A0, 3B0, 3C0, 3D0	CXA1310-0000-000N00K20E3
			K4	1290	1445		CXA1310-0000-000N00K40E3
	80	---	J4	1120	1255	3A0, 3B0, 3C0, 3D0	CXA1310-0000-000N0HJ40E3
			K2	1200	1344		CXA1310-0000-000N0HK20E3
4000 K	70	75	K2	1200	1344	5A0, 5B0, 5C0, 5D0	CXA1310-0000-000N00K20E5
			K4	1290	1445		CXA1310-0000-000N00K40E5
	80	---	J4	1120	1255	5A0, 5B0, 5C0, 5D0	CXA1310-0000-000N0HJ40E5
			K2	1200	1344		CXA1310-0000-000N0HK20E5

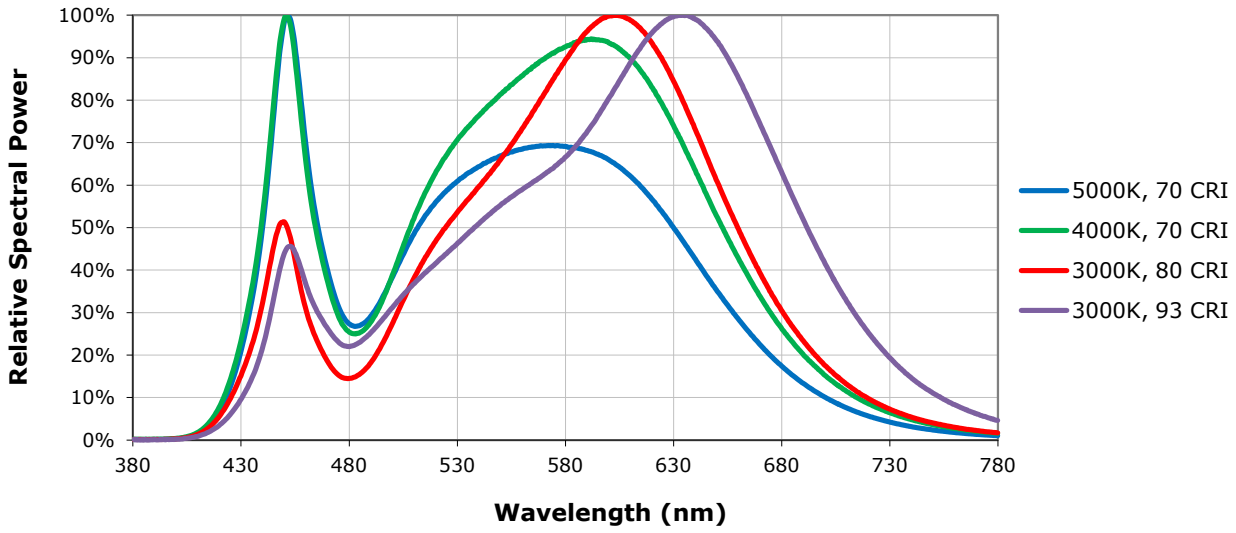
Notes

- 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.

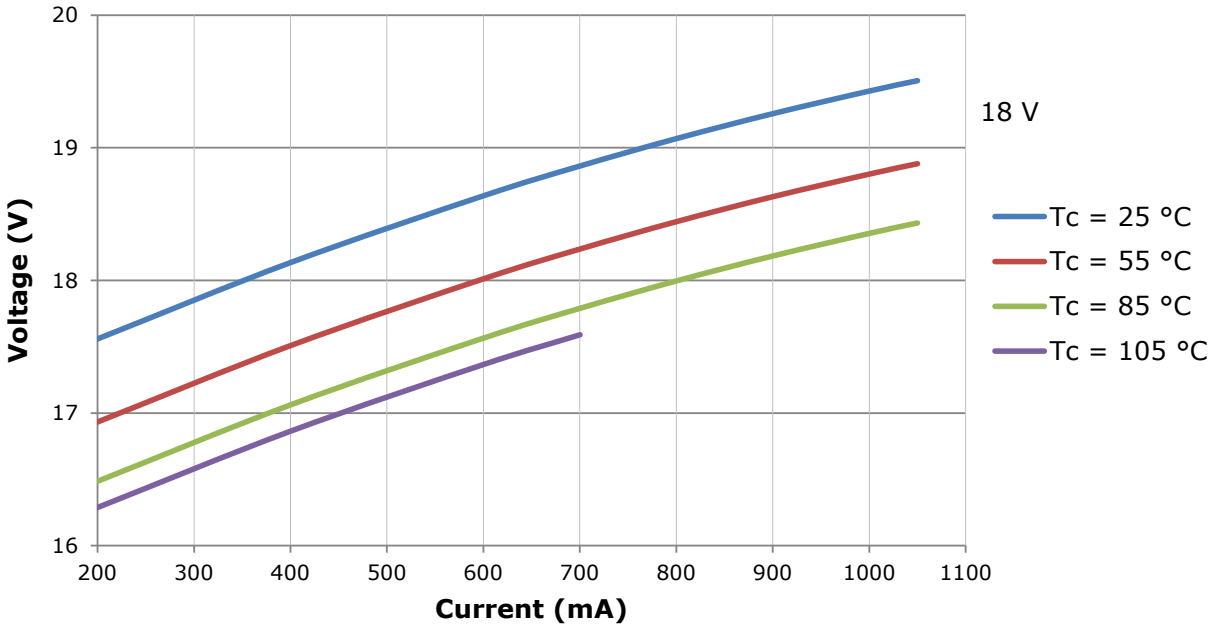
RELATIVE SPECTRAL POWER DISTRIBUTION (18 V, I_F = 700 mA; 36 V, I_F = 350 mA, T_J = 85 °C)

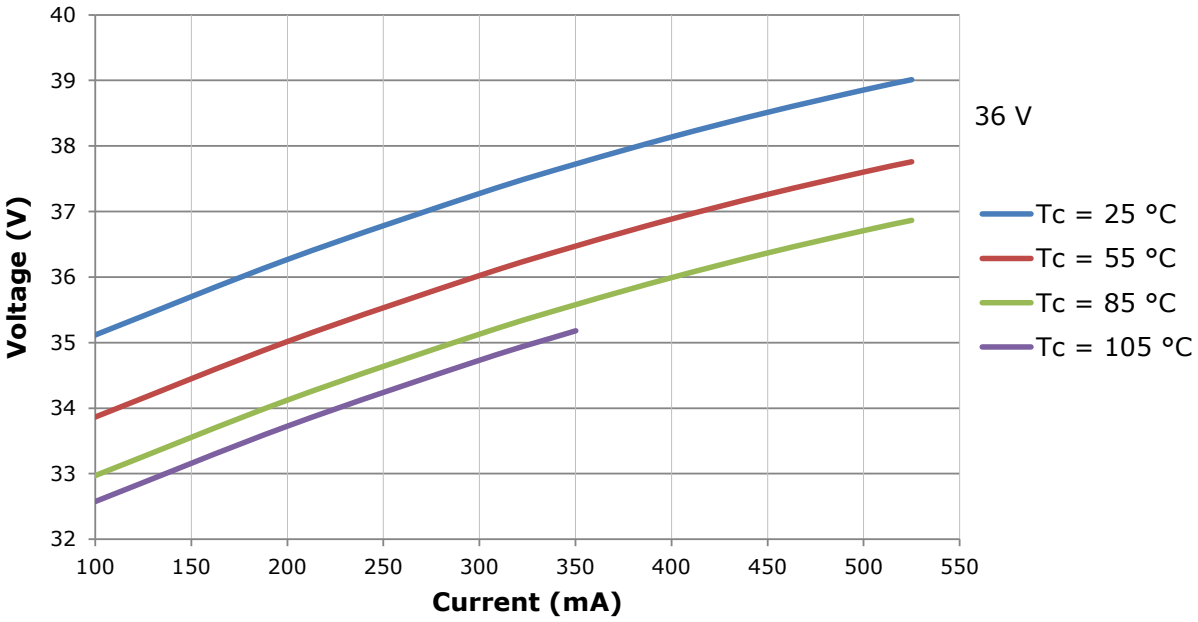
The following graph is the result of a series of pulsed measurements at 350 mA for the 18-V CXA1310 LED and 700 mA for the 36-V CXA1310 LED and T_J = 85 °C.



ELECTRICAL CHARACTERISTICS

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



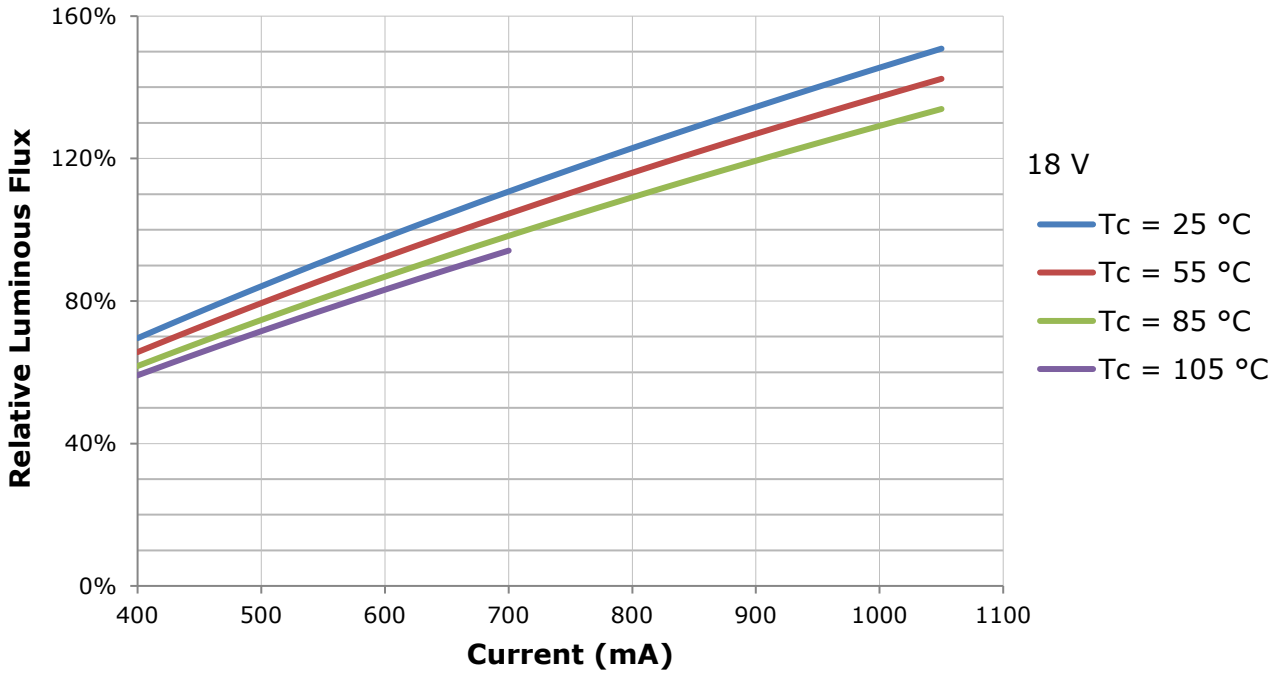


RELATIVE LUMINOUS FLUX

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

- Measurements of CXA1310 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 CXA1310 LED.

For example, at steady-state operation of Tc = 55 °C, I_F = 500 mA, the relative luminous flux ratio is 80% in the chart below. A CXA1310 LED that measures 1200 lm during binning will deliver 960 lm (1200 * 0.8) at steady-state operation of Tc = 55 °C, I_F = 500 mA.

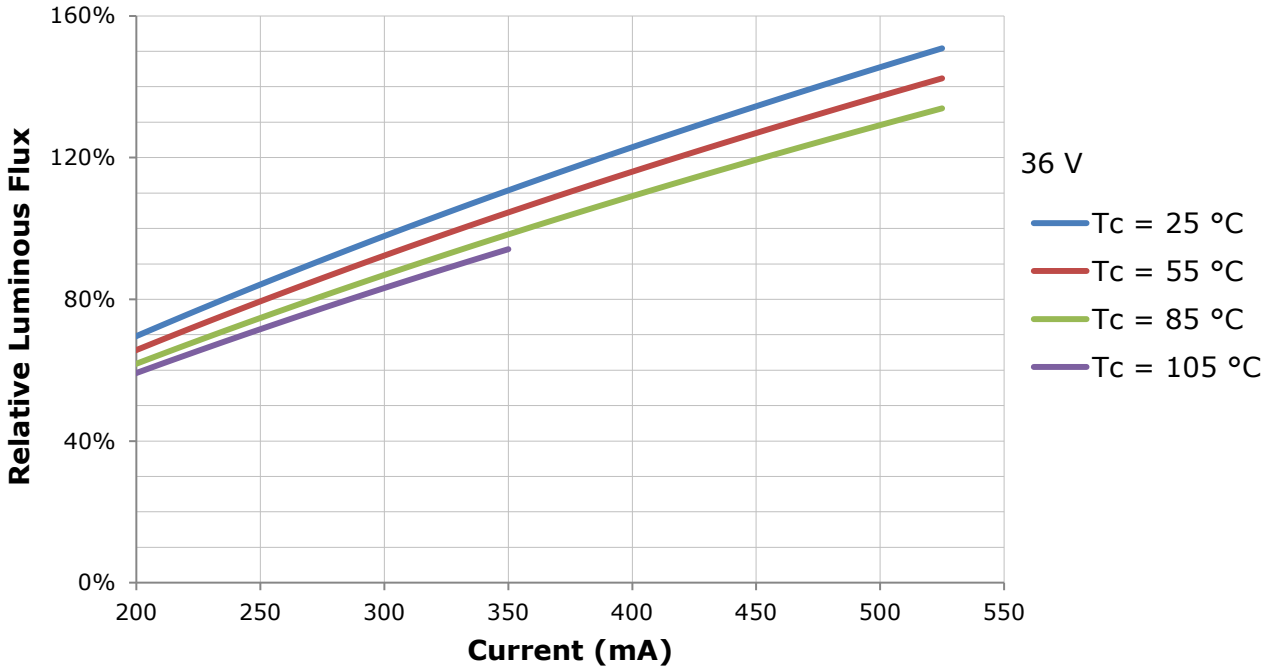


RELATIVE LUMINOUS FLUX - CONTINUED

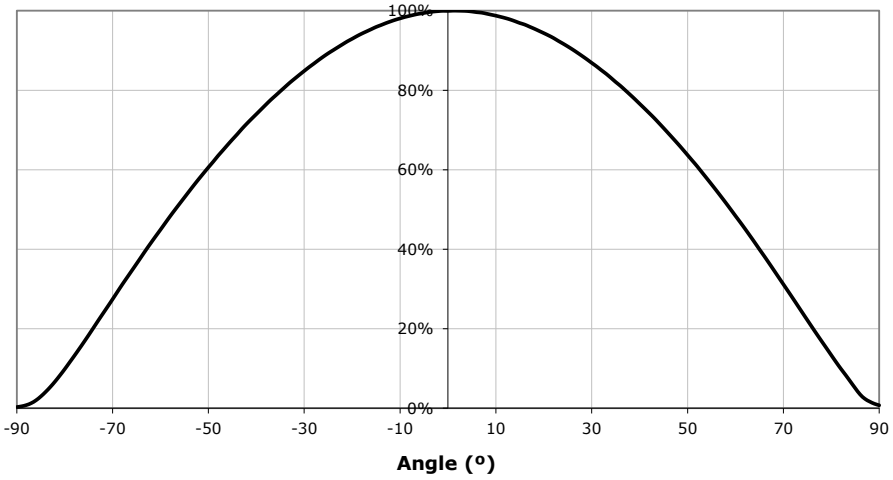
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA1310 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 CXA1310 LED.

For example, at steady-state operation of Tc = 55 °C, I_F = 250 mA, the relative luminous flux ratio is 80% in the chart below. A CXA1310 LED that measures 1200 lm during binning will deliver 960 lm (1200 * 0.8) at steady-state operation of Tc = 55 °C, I_F = 250 mA.



TYPICAL SPATIAL DISTRIBUTION



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

XLamp CXA1310 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Min. Luminous Flux	Max. Luminous Flux
F4	730	780
G2	780	840
G4	840	900
H2	900	970
H4	970	1040
J2	1040	1120
J4	1120	1200
K2	1200	1290
K4	1290	1380

PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C)

XLamp CXA1310 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	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

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

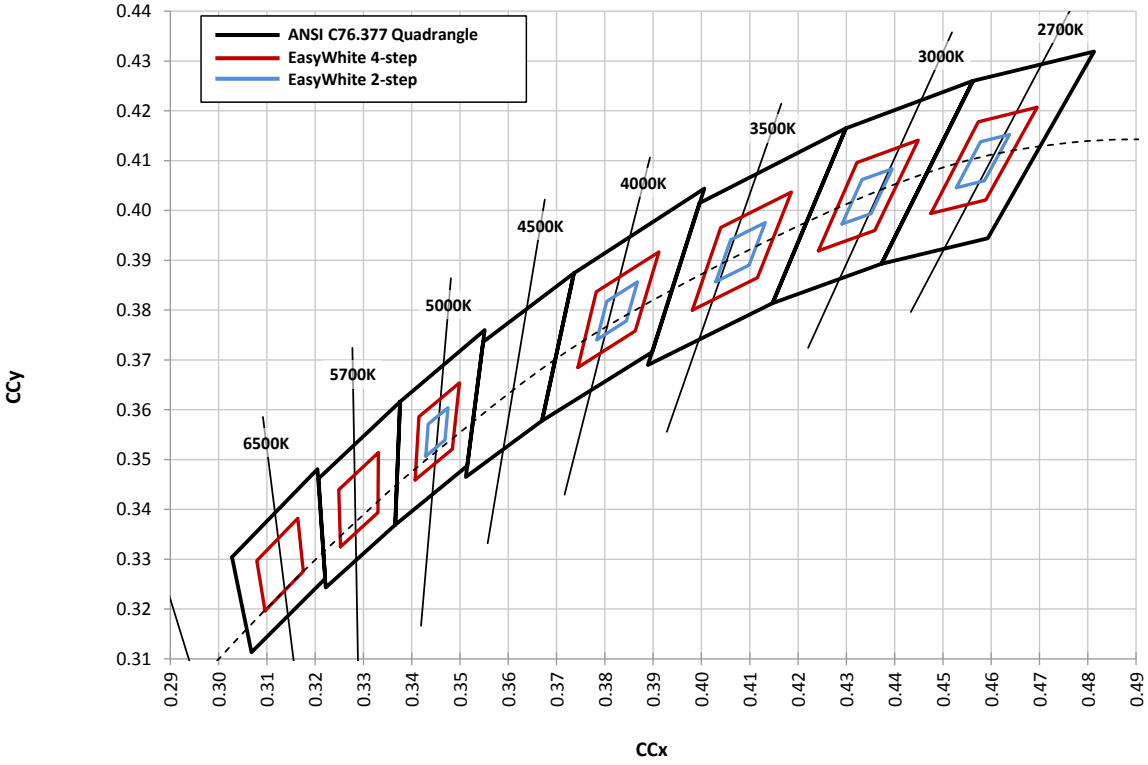
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E1	6500 K	1A0	0.3048	0.3207
			0.3130	0.3290
			0.3144	0.3186
			0.3068	0.3113
		1B0	0.3028	0.3304
			0.3115	0.3391
			0.3130	0.3290
			0.3048	0.3207
		1C0	0.3115	0.3391
			0.3205	0.3481
			0.3213	0.3373
			0.3130	0.3290
		1D0	0.3130	0.3290
			0.3213	0.3373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

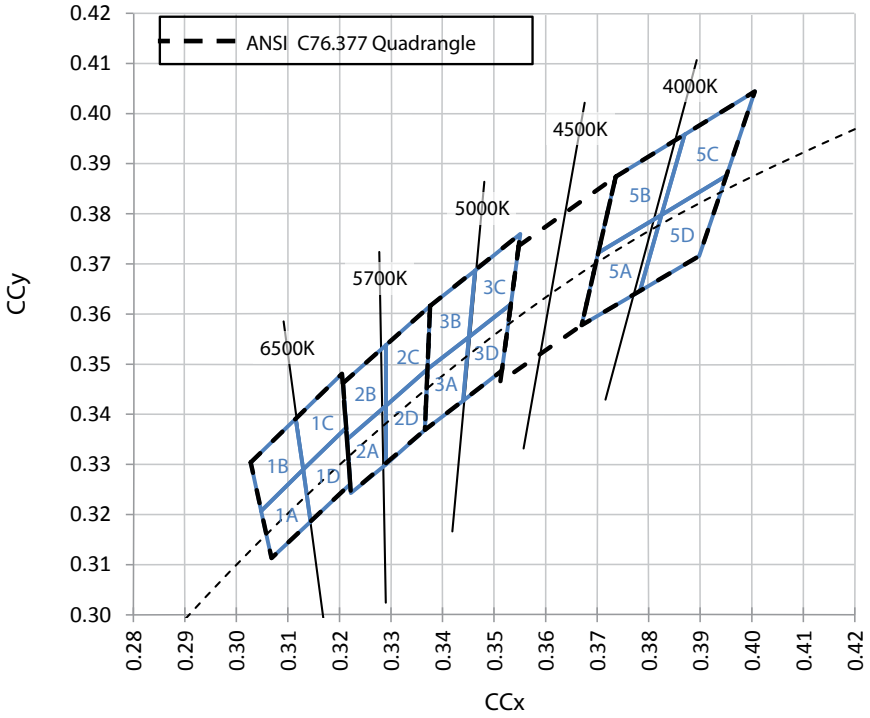
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E3	5000K	3A0	.3371	.3490
			.3451	.3554
			.3440	.3427
			.3366	.3369
		3B0	.3376	.3616
			.3463	.3687
			.3451	.3554
			.3371	.3490
		3C0	.3463	.3687
			.3551	.3760
			.3533	.3620
			.3451	.3554
		3D0	.3451	.3554
			.3533	.3620
			.3515	.3487
			.3440	.3427

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 °C)



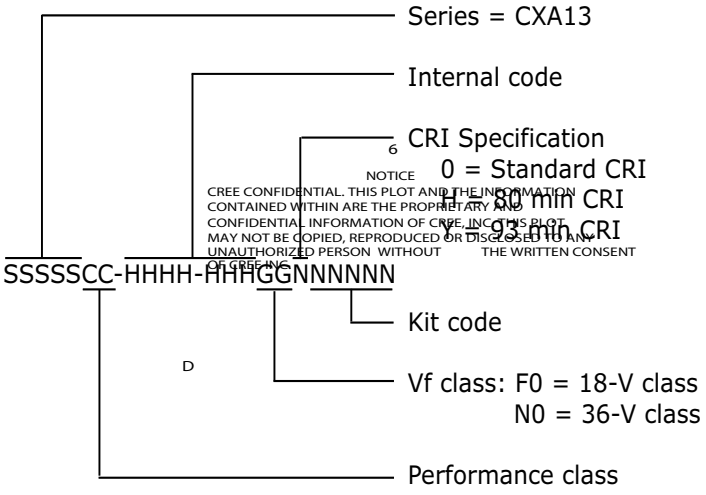
CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE (T_J = 85 °C)



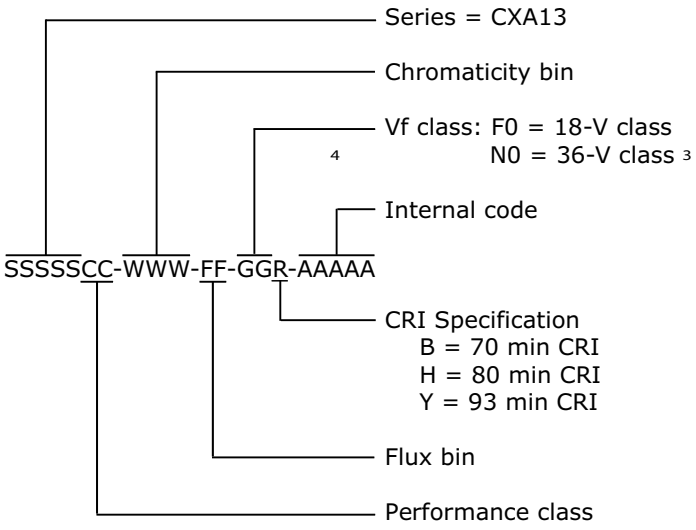
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code



Bin Code



MECHANICAL DIMENSIONS

Dimensions are in mm.

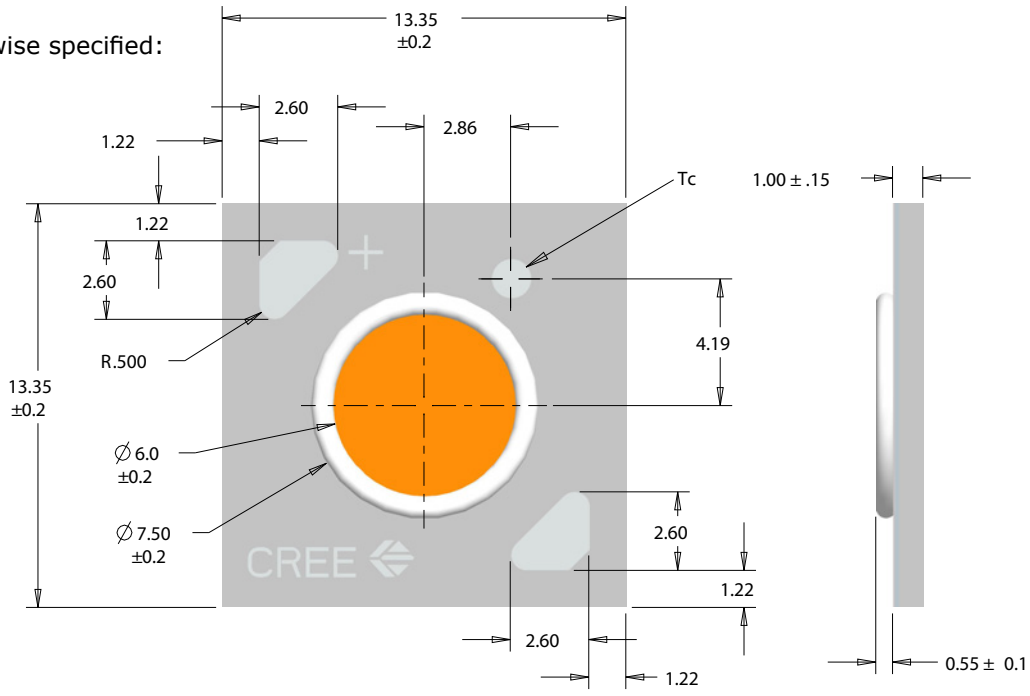
Tolerances unless otherwise specified:

.x ± .10

.xx ± .03

.xxx ± .010

x° ± 1°



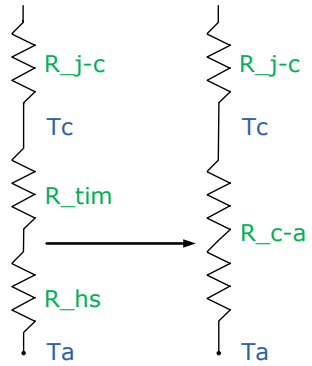
THERMAL DESIGN

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.

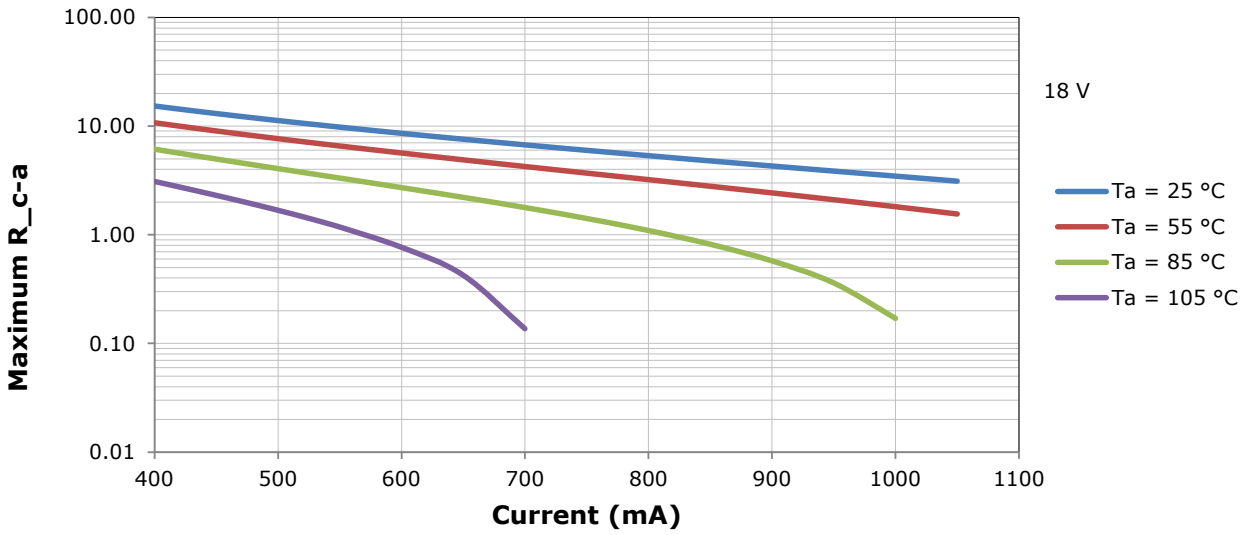
Cree has measured the temperature at the bottom of the package, commonly referred to as the solder point (T_{SP}), and found this value to be equivalent to the temperature at the Tc location at the top of the package once the LED has reached thermal equilibrium. There is no need to calculate for T_J 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 CXA1310 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.

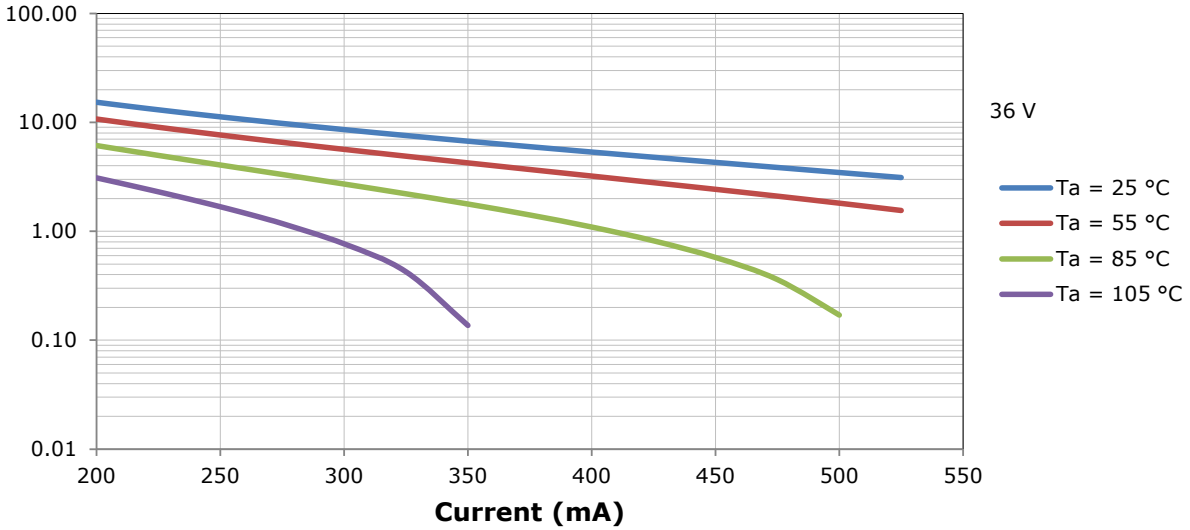
As the figure at right shows, the R_c-a value is the sum of the thermal resistance of the TIM (R_tim) plus the thermal resistance of the heat sink (R_hs).



CXA1310-1



THERMAL DESIGN - CONTINUED



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.

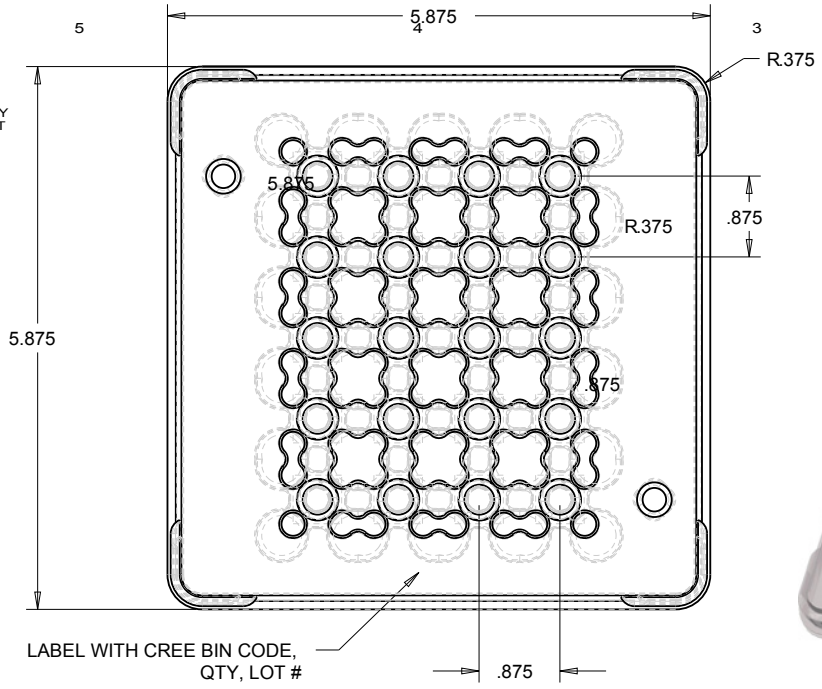
Please read the XLamp Long-Term Lumen Maintenance application note at www.cree.com/xlamp_app_notes/lumen_maintenance for more details on Cree's lumen maintenance testing and forecasting. Please read the XLamp Thermal Management application note at www.cree.com/xlamp_app_notes/thermal_management for details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

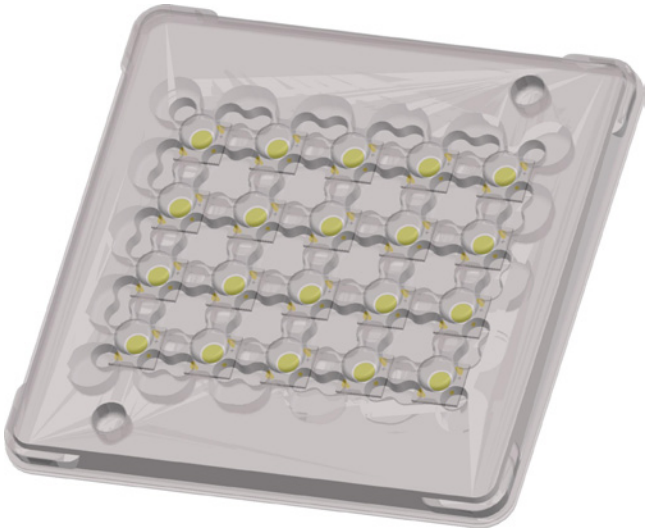
Vision Advisory Claim

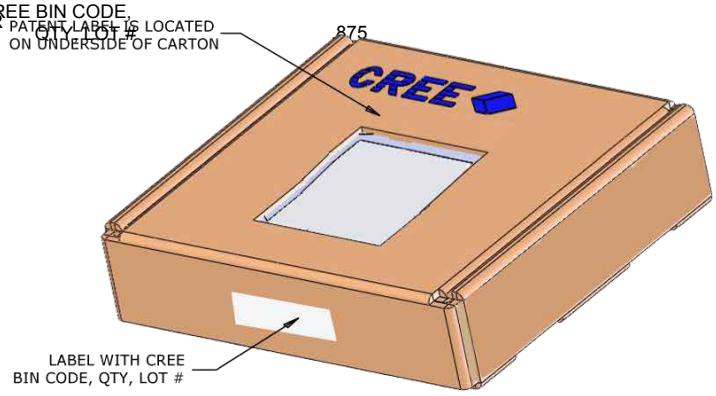
Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

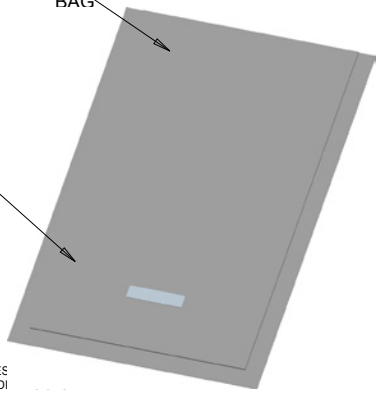
PACKAGING

Cree CXA1310 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 ± .03
.xxx ± .010
x° ± 1°