![CREE logo]

Cree® XLamp® CXA2540 LED

PRODUCT DESCRIPTION

The XLamp CXA2540 LED array expands Cree's family of high-flux, multi-die integrated arrays, offering high performance in an easy-to-use platform. With XLamp lighting-class reliability, the CXA2540's uniform emitting surface enables both directional and non-directional lighting applications and luminaire and lamp designs. Available in 2-step and 4-step color consistency, and featuring a 19-mm optical source, the CXA2540 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: 37 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
- Mechanical and optical footprint consistent with CXA2520 and CXA2530
- RoHS-compliant
- UL-recognized component (E349212)

TABLE OF CONTENTS

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 (@ 1100 mA, T_j = 85 °C)	V		37	
Forward voltage (@ 1100 mA, T_j = 25 °C)	V			42

*   Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXA2540 is dependent on the case temperature (Tc) when the LED has reached thermal equilibrium under steady-state operation. Please refer to the Mechanical Drawings section on page 13 for the location of the Tc measurement point.

FLUX CHARACTERISTICS, EASYWHITE ORDER CODES AND BINS (I_F = 1100 mA, T_J = 85 °C)

The following tables provide order codes for XLamp CXA2540 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 @ 1100 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	V4	4545	5083	50H	CXA2540-0000-000N00V450H	50F	CXA2540-0000-000N00V450F
			W2	4860	5435		CXA2540-0000-000N00W250H		CXA2540-0000-000N00W250F
			W4	5225	5843		CXA2540-0000-000N00W450H		CXA2540-0000-000N00W450F
	80	---	V2	4230	4730	50H	CXA2540-0000-000N0HV250H	50F	CXA2540-0000-000N0HV250F
			V4	4545	5083		CXA2540-0000-000N0HV450H		CXA2540-0000-000N0HV450F
			W2	4860	5435		CXA2540-0000-000N0HW250H		CXA2540-0000-000N0HW250F
	90	95	T4	3440	3818	50H	CXA2540-0000-000N0UT450H	50F	CXA2540-0000-000N0UT450F
			U2	3680	4115		CXA2540-0000-000N0UU250H		CXA2540-0000-000N0UU250F
			U4	3955	4391		CXA2540-0000-000N0UU450H		CXA2540-0000-000N0UU450F
4000 K	70	75	V2	4230	4730	40H	CXA2540-0000-000N00V240H	40F	CXA2540-0000-000N00V240F
			V4	4545	5083		CXA2540-0000-000N00V440H		CXA2540-0000-000N00V440F
			W2	4860	5435		CXA2540-0000-000N00W240H		CXA2540-0000-000N00W240F
	80	---	U4	3955	4423	40H	CXA2540-0000-000N0HU440H	40F	CXA2540-0000-000N0HU440F
			V2	4230	4730		CXA2540-0000-000N0HV240H		CXA2540-0000-000N0HV240F
			V4	4545	5083		CXA2540-0000-000N0HV440H		CXA2540-0000-000N0HV440F
	90	95	T2	3200	3552	40H	CXA2540-0000-000N0UT240H	40F	CXA2540-0000-000N0UT240F
			T4	3440	3818		CXA2540-0000-000N0UT440H		CXA2540-0000-000N0UT440F
			U2	3680	4115		CXA2540-0000-000N0UU240H		CXA2540-0000-000N0UU240F
3500 K	80	---	U4	3955	4423	35H	CXA2540-0000-000N00U435H	35F	CXA2540-0000-000N0HU435F
			V2	4230	4730		CXA2540-0000-000N00V235H		CXA2540-0000-000N0HV235F
			V4	4545	5083		CXA2540-0000-000N00V435H		CXA2540-0000-000N0HV435F
	93	95	T2	3200	3552	35H	CXA2540-0000-000N0YT235H	35F	CXA2540-0000-000N0YT235F
			T4	3440	3818		CXA2540-0000-000N0YT435H		CXA2540-0000-000N0YT435F
			U2	3680	4115		CXA2540-0000-000N0YU235H		CXA2540-0000-000N0YU235F

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$_F$ = 1100 mA, T$_J$ = 85 °C) - CONTINUED

CCT Range	CRI		Base Order Codes Min. Luminous Flux @ 1100 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	---	U4	3955	4423	30H	CXA2540-0000-000N00U430H	30F	CXA2540-0000-000N0HU430F
			V2	4230	4730		CXA2540-0000-000N00V230H		CXA2540-0000-000N0HV230F
			V4	4545	5083		CXA2540-0000-000N00V430H		CXA2540-0000-000N0HV430F
	90	---	T2	3200	3552	30H	CXA2540-0000-000N0UT230H	30F	CXA2540-0000-000N0UT230F
			T4	3440	3818		CXA2540-0000-000N0UT430H		CXA2540-0000-000N0UT430F
			U2	3680	4115		CXA2540-0000-000N0UU230H		CXA2540-0000-000N0UU230F
	93	95	S4	2990	3319	30H	CXA2540-0000-000N0YS430H	30F	CXA2540-0000-000N0YS430F
			T2	3200	3552		CXA2540-0000-000N0YT230H		CXA2540-0000-000N0YT230F
			T4	3440	3818		CXA2540-0000-000N0YT430H		CXA2540-0000-000N0YT430F
2700 K	80	---	U2	3680	4115	27H	CXA2540-0000-000N00U227H	27F	CXA2540-0000-000N0HU227F
			U4	3955	4423		CXA2540-0000-000N00U427H		CXA2540-0000-000N0HU427F
			V2	4230	4730		CXA2540-0000-000N00V227H		CXA2540-0000-000N0HV227F
	90	---	S4	2990	3319	27H	CXA2540-0000-000N0US427H	27F	CXA2540-0000-000N0US427F
			T2	3200	3552		CXA2540-0000-000N0UT227H		CXA2540-0000-000N0UT227F
			T4	3440	3818		CXA2540-0000-000N0UT427H		CXA2540-0000-000N0UT427F
	93	95	S2	2780	3086	27H	CXA2540-0000-000N0YS227H	27F	CXA2540-0000-000N0YS227F
			S4	2990	3319		CXA2540-0000-000N0YS427H		CXA2540-0000-000N0YS427F
			T2	3200	3552		CXA2540-0000-000N0YT227H		CXA2540-0000-000N0YT227F

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 = 1100 mA, T_J = 85 °C)

The following tables provide order codes for XLamp CXA2540 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 @ 1100 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
5000 K	70	75	V4	4545	5083	3A0, 3B0, 3C0, 3D0	CXA2540-0000-000N00V40E3
			W2	4860	5435		CXA2540-0000-000N00W20E3
			W4	5225	5843		CXA2540-0000-000N00W40E3
	80	---	V2	4230	4730	3A0, 3B0, 3C0, 3D0	CXA2540-0000-000N0HV20E3
			V4	4545	5083		CXA2540-0000-000N0HV40E3
			W2	4860	5435		CXA2540-0000-000N0HW20E3
	90	95	T4	3440	3818	3A0, 3B0, 3C0, 3D0	CXA2540-0000-000N0UT40E3
			U2	3680	4115		CXA2540-0000-000N0UU20E3
			U4	3955	4391		CXA2540-0000-000N0UU40E3
4000 K	70	75	V2	4230	4730	5A0, 5B0, 5C0, 5D0	CXA2540-0000-000N00V20E5
			V4	4545	5083		CXA2540-0000-000N00V40E5
			W2	4860	5435		CXA2540-0000-000N00W20E5
	80	---	U4	3955	4423	5A0, 5B0, 5C0, 5D0	CXA2540-0000-000N0HU40E5
			V2	4230	4730		CXA2540-0000-000N0HV20E5
			V4	4545	5083		CXA2540-0000-000N0HV40E5
	90	95	T2	3200	3552	5A0, 5B0, 5C0, 5D0	CXA2540-0000-000N0UT20E5
			T4	3440	3818		CXA2540-0000-000N0UT40E5
			U2	3680	4115		CXA2540-0000-000N0UU20E5
3500 K	80	---	U4	3955	4423	6A0, 6B0, 6C0, 6D0	CXA2540-0000-000N0HU40E6
			V2	4230	4730		CXA2540-0000-000N0HV20E6
			V4	4545	5083		CXA2540-0000-000N0HV40E6
	93	95	T2	3200	3552	6A0, 6B0, 6C0, 6D0	CXA2540-0000-000N0YT20E6
			T4	3440	3818		CXA2540-0000-000N0YT40E6
			U2	3680	4115		CXA2540-0000-000N0YU20E6

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 = 1100 mA, T_J = 85 °C) - CONTINUED

CCT Range	CRI		Base Order Codes Min Luminous Flux @ 1100 mA			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
3000 K	80	---	U4	3955	4423	7A0, 7B0, 7C0, 7D0	CXA2540-0000-000N0HU40E7
			V2	4230	4730		CXA2540-0000-000N0HV20E7
			V4	4545	5083		CXA2540-0000-000N0HV40E7
	90	---	T2	3200	3552	7A0, 7B0, 7C0, 7D0	CXA2540-0000-000N0UT23E7
			T4	3440	3818		CXA2540-0000-000N0UT43E7
			U2	3680	4115		CXA2540-0000-000N0UU23E7
	93	95	S4	2990	3319	7A0, 7B0, 7C0, 7D0	CXA2540-0000-000N0YS40E7
			T2	3200	3552		CXA2540-0000-000N0YT20E7
			T4	3440	3818		CXA2540-0000-000N0YT20E7
2700 K	80	---	U2	3680	4115	8A0, 8B0, 8C0, 8D0	CXA2540-0000-000N0HU20E8
			U4	3955	4423		CXA2540-0000-000N0HU40E8
			V2	4230	4730		CXA2540-0000-000N0HV20E8
	90	---	S4	2990	3319	8A0, 8B0, 8C0, 8D0	CXA2540-0000-000N0US43E8
			T2	3200	3552		CXA2540-0000-000N0UT23E8
			T4	3440	3818		CXA2540-0000-000N0UT43E8
	93	95	S2	2780	3086	8A0, 8B0, 8C0, 8D0	CXA2540-0000-000N0YS20E8
			S4	2990	3319		CXA2540-0000-000N0YS40E8
			T2	3200	3552		CXA2540-0000-000N0YT20E8

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.

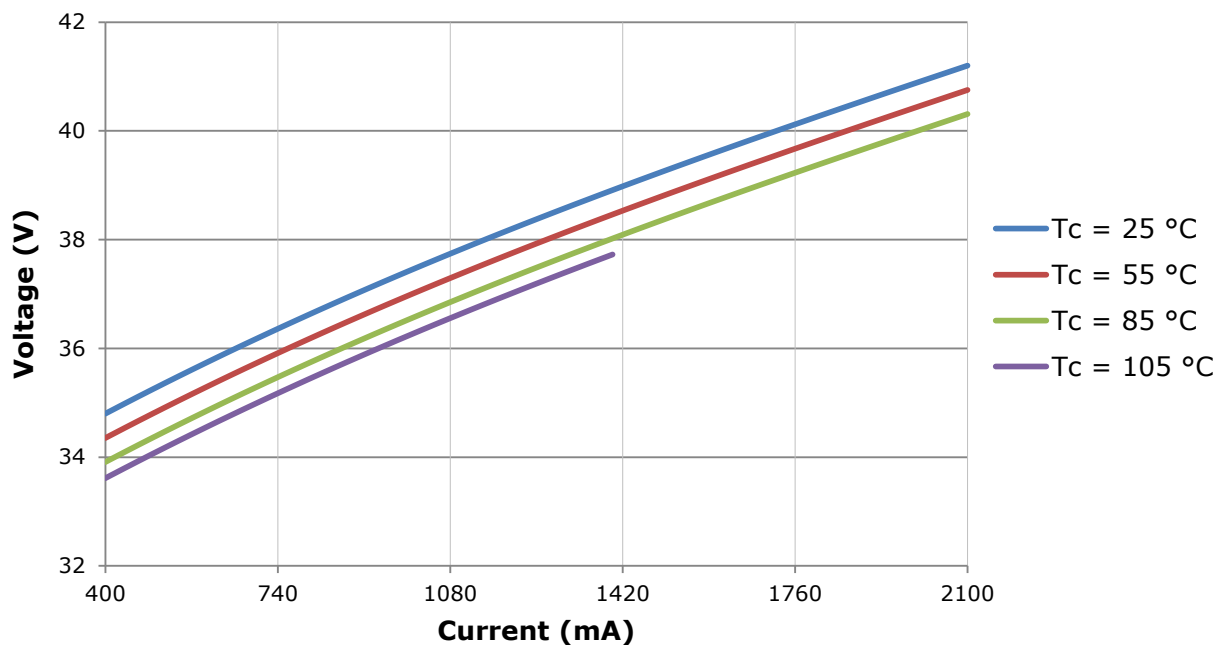## RELATIVE SPECTRAL POWER DISTRIBUTION (I_F = 1100 mA, T_J = 85 °C)

The following graph is the result of a series of pulsed measurements at 1100 mA and T_J = 85 °C.
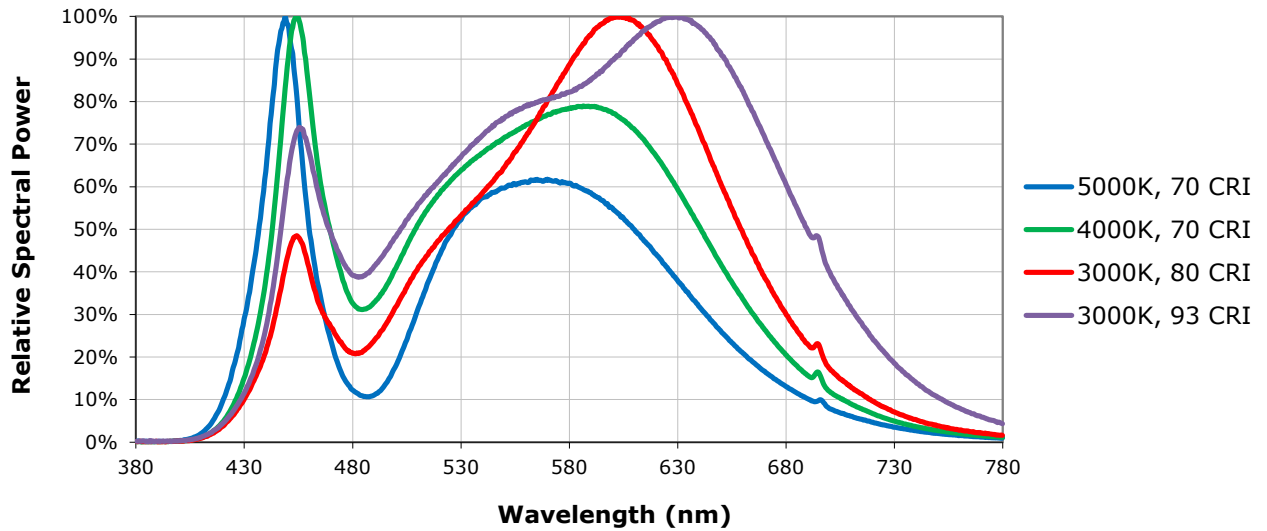
ELECTRICAL CHARACTERISTICS

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 CXA2540 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 1100 mA at T_J = 85 °C.

For example, at steady-state operation of Tc = 55 °C, I_F = 1760 mA, the relative luminous flux ratio is 140% in the chart below. A CXA2540 LED that measures 4600 lm during binning will deliver 6440 lm (4600 * 1.4) at steady-state operation of Tc = 55 °C, I_F = 1760 mA.
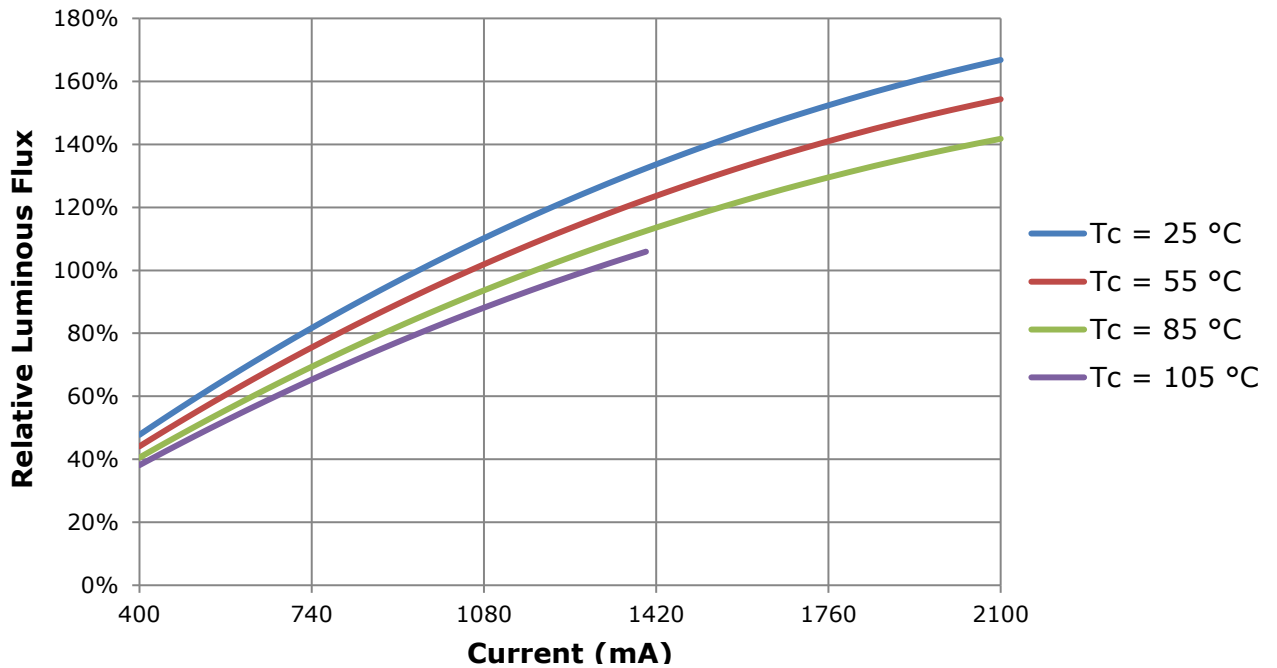
TYPICAL SPATIAL DISTRIBUTION
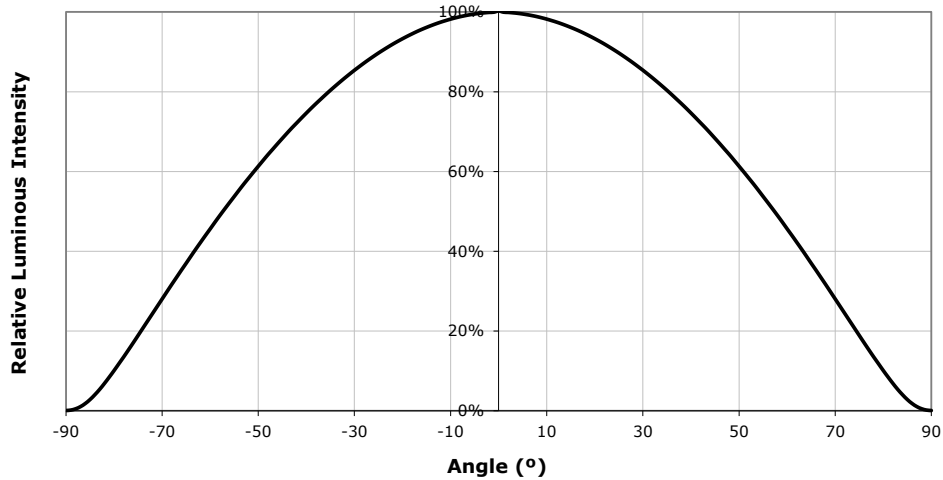
PERFORMANCE GROUPS - BRIGHTNESS (I_F = 1100 mA, T_J = 85 °C)

XLamp CXA2540 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Min. Luminous Flux @ 1100 mA	Max. Luminous Flux @ 1100 mA
S2	2780	2600
S4	2600	3200
T2	3200	3440
T4	3440	3680
U2	3680	3955
U4	3955	4230
V2	4230	4545
V4	4545	4860
W2	4860	5225
W4	5225	5590

PERFORMANCE GROUPS - CHROMATICITY (T$_J$ = 85 °C)

XLamp CXA2540 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				
Code	CCT	Bin Code	x	y
0E7	3000K	7A0	.4147	.3814
			.4221	.3984
			.4342	.4028
			.4259	.3853
		7B0	.4221	.3984
			.4299	.4165
			.4430	.4212
			.4342	.4028
		7C0	.4342	.4028
			.4430	.4212
			.4562	.4260
			.4465	.4071
		7D0	.4259	.3853
			.4342	.4028
			.4465	.4071
			.4373	.3893

ANSI White Bins				
Code	CCT	Bin Code	x	y
0E8	2700K	8A0	.4373	.3893
			.4465	.4071
			.4582	.4099
			.4483	.3919
		8B0	.4465	.4071
			.4562	.4260
			.4687	.4289
			.4582	.4099
		8C0	.4582	.4099
			.4687	.4289
			.4813	.4319
			.4700	.4126
		8D0	.4483	.3919
			.4582	.4099
			.4700	.4126
			.4593	.3944

CREE EASYWHITE BINS PLOTTED ON THE CIE 1931 COLOR SPACE (T$_J$ = 85 °C)
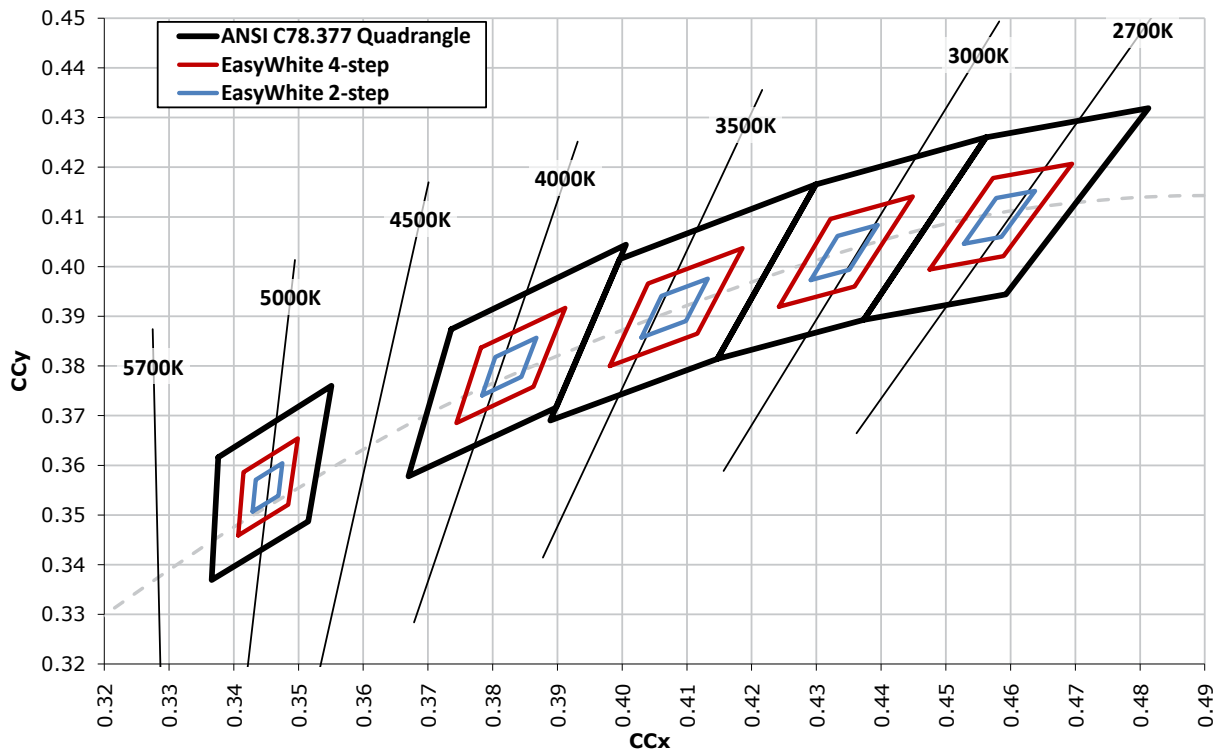
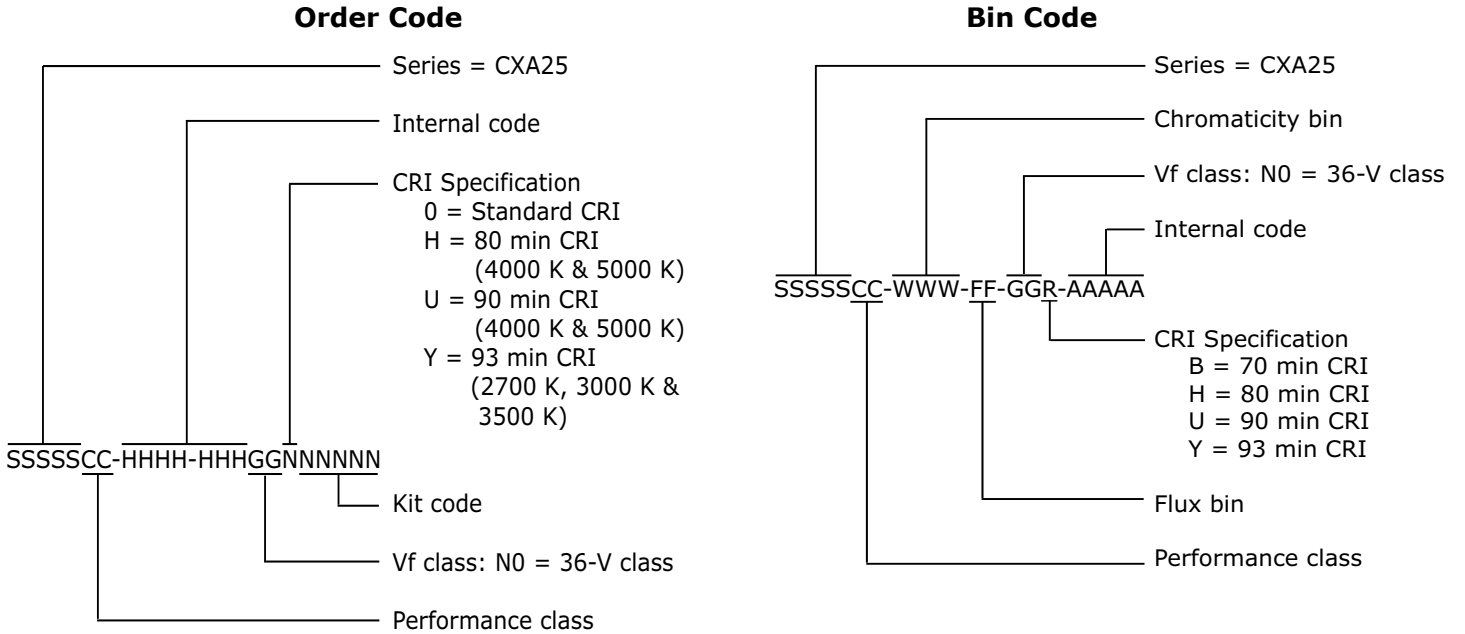## CREE ANSI WHITE BINS PLOTTED ON THE CIE 1931 COLOR SPACE (T_J = 85 °C)
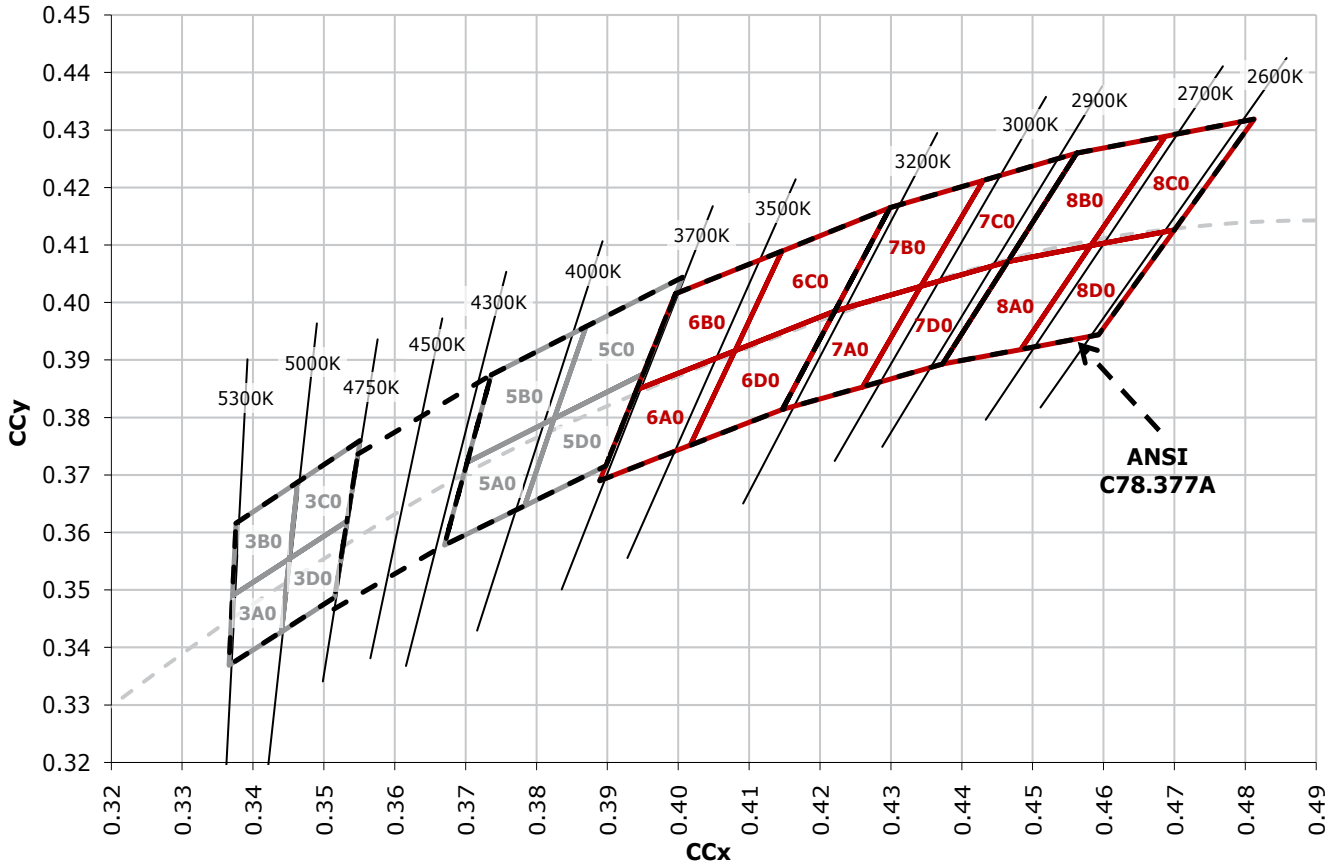
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code

- Series = CXA25
- Internal code
- CRI Specification
  - 0 = Standard CRI
  - H = 80 min CRI (4000 K & 5000 K)
  - U = 90 min CRI (4000 K & 5000 K)
  - Y = 93 min CRI (2700 K, 3000 K & 3500 K)

SSSSSCC-HHHH-HHHGGNNNNNN

- Kit code
- Vf class: N0 = 36-V class
- Performance class

Bin Code

- Series = CXA25
- Chromaticity bin
- Vf class: N0 = 36-V class
- Internal code

SSSSSCC-WWW-FF-GGR-AAAAA

- CRI Specification
  - B = 70 min CRI
  - H = 80 min CRI
  - U = 90 min CRI
  - Y = 93 min CRI
- Flux bin
- Performance class

MECHANICAL DIMENSIONS

Dimensions are in mm.
Tolerances unless otherwise specified:
.x ± .10
.xx ± .03
.xxx ± .010
x° ± 1° x ± .10
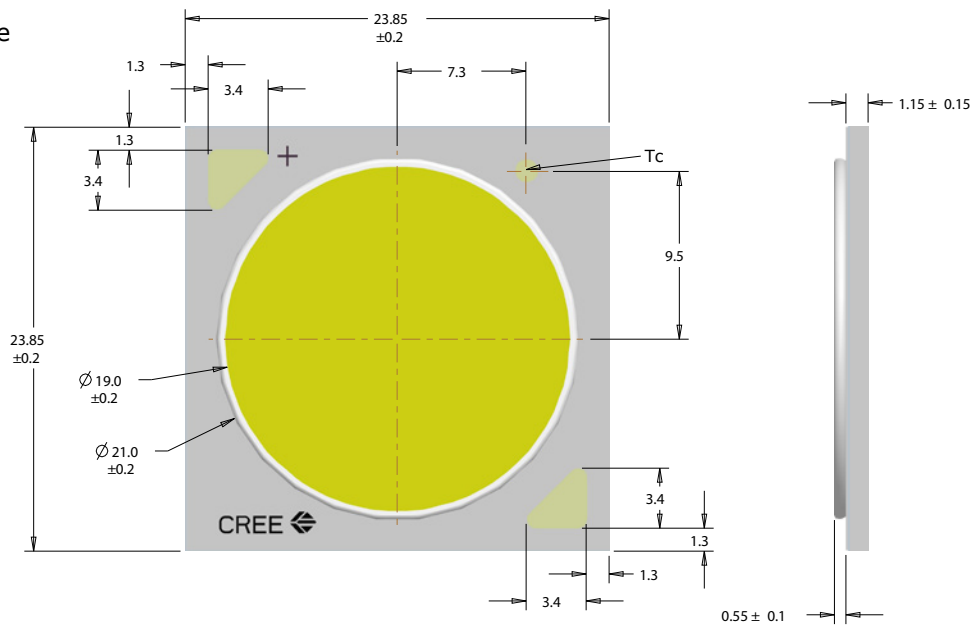
THERMAL DESIGN

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 (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 CXA2540 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).
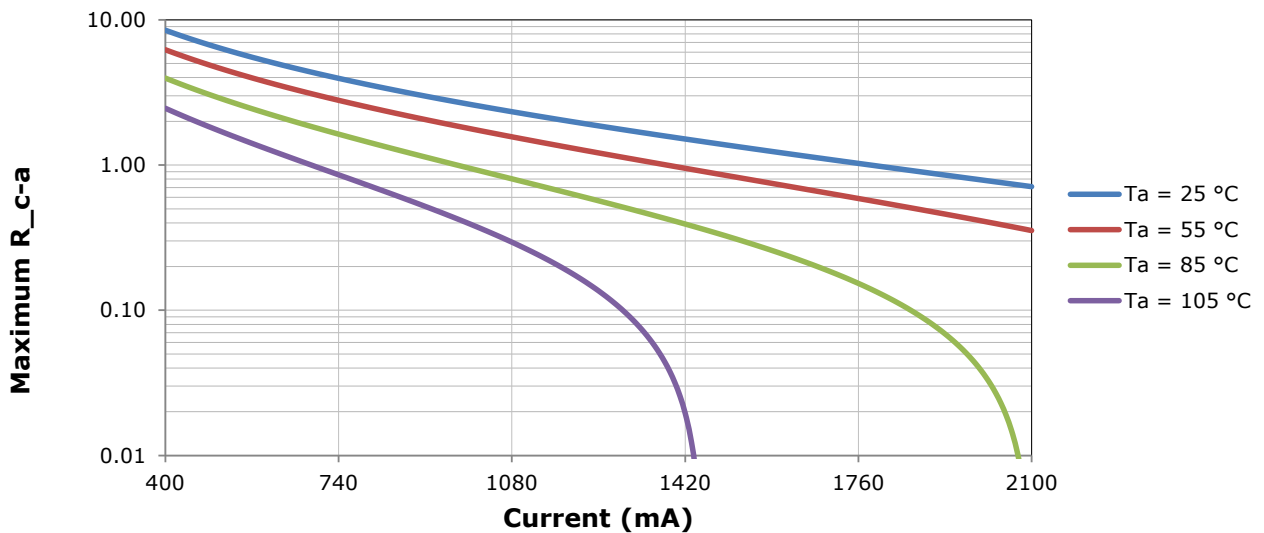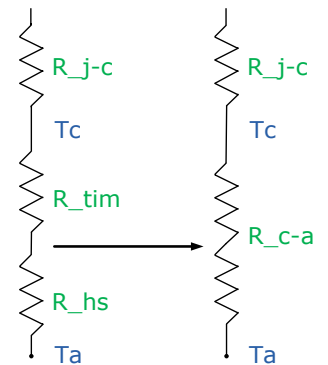
NOTES

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.

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of www.cree.com.

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 CXA2540 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°

7.125

R.375

1.188

7.625

1.188

.38

LABEL WITH CREE
BIN CODE, QTY, LOT#

PATENT LABEL
IS LOCATED ON UNDERSIDE OF
CARTON

BAG

LABEL WITH CREE
BIN CODE, QTY, LOT#

LABEL WITH CREE
BIN CODE, QTY, LOT#