

# Cree® XLamp® CXA3070 LED



## PRODUCT DESCRIPTION

The XLamp® CXA3070 LED array expands Cree's family of high-flux, multi-die integrated arrays, offering high performance in an easy-to-use platform. With XLamp LED lighting-class reliability, the CXA3070's uniform emitting surface enables both directional and non-directional lighting applications and luminaire and lamp designs. Available in 2-step, 3-step and 4-step color consistency, and featuring a 23-mm optical source, the CXA3070 brings new levels of flux and efficacy to this form factor.

The [CX Family LED Design Guide](#) provides basic information on the requirements to use the CXA3070 LED successfully in luminaire designs.

## FEATURES

- Available in 4-step, 3-step and 2-step EasyWhite® bins at 2700 K, 3000 K, 3500 K, 4000 K & 5000 K CCT and 4-step EasyWhite bins at 5700 K & 6500 K CCT
- Available in ANSI white bins at 4000 K, 5000 K, 5700 K & 6500 K CCT
- Available in 70-, 80-, 90- and 93-minimum CRI options
- Forward voltage option: 36-V class
- 85 °C binning and characterization
- Maximum drive current: 2800 mA
- 115° viewing angle, uniform chromaticity profile
- Top-side solder connections
- Thermocouple attach point
- NEMA SSL-3 2011 standard flux bins
- RoHS and REACH compliant
- UL® recognized component (E349212)

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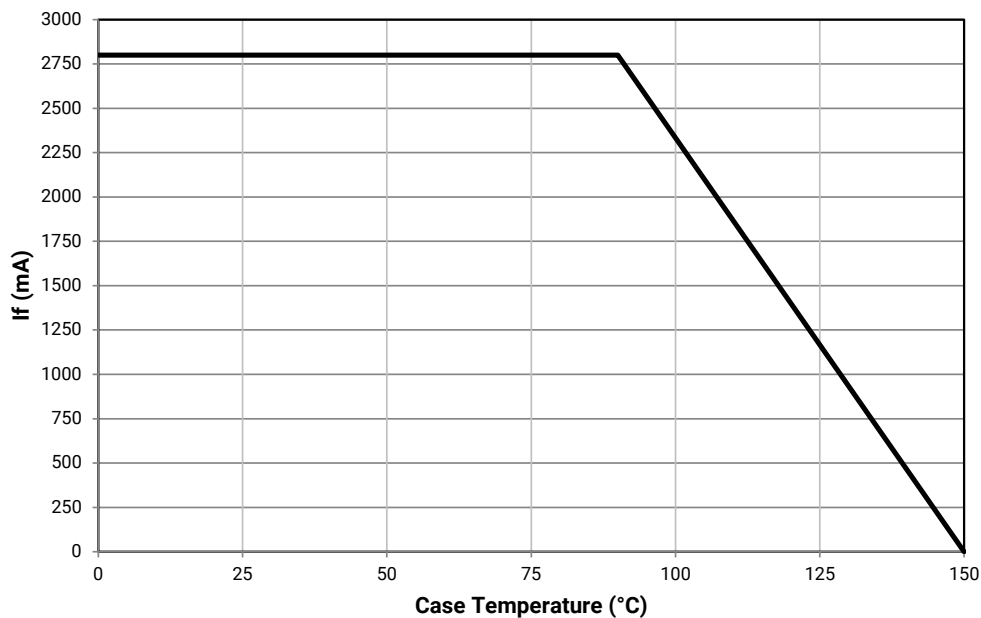
## CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			2800*
Reverse current	mA			0.1
Forward voltage (@ 1900 mA, $T_j = 85^\circ\text{C}$ )	V		38.5	
Forward voltage (@ 1900 mA, $T_j = 25^\circ\text{C}$ )	V			42

\* Refer to the Operating Limits section.

## OPERATING LIMITS

The maximum current rating of the CXA3070 is dependent on the case temperature ( $T_c$ ) when the LED has reached thermal equilibrium under steady-state operation. The graph shown below assumes that the system design employs good thermal management (thermal interface material and heat sink) and may vary when poor thermal management is employed. Please refer to the Mechanical Drawings section on page 13 for the location of the  $T_c$  measurement point.



**FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS ( $I_F = 1900 \text{ mA}$ ,  $T_J = 85^\circ \text{C}$ )**

The following table provides order codes for XLamp CXA3070 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 13).

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		4-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
6500 K	70	75	AB	8500	9130					65F	CXA3070-0000-000N00AB65F
			AD	9000	9667						CXA3070-0000-000N00AD65F
			BB	9500	10,204						CXA3070-0000-000N00BB65F
	80	---	Z4	7945	8534					65F	CXA3070-0000-000N0HZ465F
			AB	8500	9130						CXA3070-0000-000N0HAB65F
			AD	9000	9667						CXA3070-0000-000N0HAD65F
5700 K	70	75	AB	8500	9130					57F	CXA3070-0000-000N00AB57F
			AD	9000	9667						CXA3070-0000-000N00AD57F
			BB	9500	10,204						CXA3070-0000-000N00BB57F
	80	---	Z4	7945	8534					57F	CXA3070-0000-000N0HZ457F
			AB	8500	9130						CXA3070-0000-000N0HAB57F
			AD	9000	9667						CXA3070-0000-000N0HAD57F
5000 K	70	75	AB	8500	9130	50H	CXA3070-0000-000N00AB50H			50F	CXA3070-0000-000N00AB50F
			AD	9000	9667		CXA3070-0000-000N00AD50H				CXA3070-0000-000N00AD50F
			BB	9500	10,204		CXA3070-0000-000N00BB50H				CXA3070-0000-000N00BB50F
	80	---	Z4	7945	8534	50H	CXA3070-0000-000N0HZ450H	50G	CXA3070-0000-000N0HZ450G	50F	CXA3070-0000-000N0HZ450F
			AB	8500	9130		CXA3070-0000-000N0HAB50H		CXA3070-0000-000N0HAB50G		CXA3070-0000-000N0HAB50F
			AD	9000	9667		CXA3070-0000-000N0HAD50H		CXA3070-0000-000N0HAD50G		CXA3070-0000-000N0HAD50F
	90	95	Y2	6430	6907	50H	CXA3070-0000-000N0UY250H	50G	CXA3070-0000-000N0UY250G	50F	CXA3070-0000-000N0UY250F
			Y4	6910	7422		CXA3070-0000-000N0UY450H		CXA3070-0000-000N0UY450G		CXA3070-0000-000N0UY450F
			Z2	7390	7938		CXA3070-0000-000N0UZ250H		CXA3070-0000-000N0UZ250G		CXA3070-0000-000N0UZ250F

- Notes
- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and a tolerance of  $\pm 2$  on CRI measurements. See the Measurements section (page 15).
  - Cree XLamp CXA3070 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.
  - \* Flux values @ 25 °C are calculated and for reference only.

**FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS ( $I_F = 1900 \text{ mA}$ ,  $T_J = 85^\circ \text{C}$ ) - CONTINUED**

Nominal CCT	CRI		Minimum Luminous Flux			2-Step		3-Step		4-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70	75	AB	8500	9130	40H	CXA3070-0000-000N00AB40H			40F	CXA3070-0000-000N00AB40F
			AD	9000	9667		CXA3070-0000-000N00AD40H				CXA3070-0000-000N00AD40F
			BB	9500	10,204		CXA3070-0000-000N00BB40H				CXA3070-0000-000N00BB40F
	80	---	Z4	7945	8534	40H	CXA3070-0000-000N0HZ440H	40G	CXA3070-0000-000N0HZ440G	40F	CXA3070-0000-000N0HZ440F
			AB	8500	9130		CXA3070-0000-000N0HAB40H		CXA3070-0000-000N0HAB40G		CXA3070-0000-000N0HAB40F
			AD	9000	9667		CXA3070-0000-000N0HAD40H		CXA3070-0000-000N0HAD40G		CXA3070-0000-000N0HAD40F
	90	95	Y2	6430	6907	40H	CXA3070-0000-000N0UY240H	40G	CXA3070-0000-000N0UY240G	40F	CXA3070-0000-000N0UY240F
			Y4	6910	7422		CXA3070-0000-000N0UY440H		CXA3070-0000-000N0UY440G		CXA3070-0000-000N0UY440F
	3500 K	80	---	Z2	7390	7938	35H	CXA3070-0000-000N00Z235H	35G	CXA3070-0000-000N00Z235G	35F
Z4				7945	8534	CXA3070-0000-000N00Z435H		CXA3070-0000-000N00Z435G		CXA3070-0000-000N00Z435F	
AB				8500	9130	CXA3070-0000-000N00AB35H		CXA3070-0000-000N00AB35G		CXA3070-0000-000N00AB35F	
93		95	X4	6010	6456	35H	CXA3070-0000-000N0YX435H	35G	CXA3070-0000-000N0YX435G	35F	CXA3070-0000-000N0YX435F
			Y2	6430	6907		CXA3070-0000-000N0YY235H		CXA3070-0000-000N0YY235G		CXA3070-0000-000N0YY235F
3000 K	80	---	Z2	7390	7938	30H	CXA3070-0000-000N00Z230H	30G	CXA3070-0000-000N00Z230G	30F	CXA3070-0000-000N00Z230F
			Z4	7945	8534		CXA3070-0000-000N00Z430H		CXA3070-0000-000N00Z430G		CXA3070-0000-000N00Z430F
			AB	8500	9130		CXA3070-0000-000N00AB30H		CXA3070-0000-000N00AB30G		CXA3070-0000-000N00AB30F
	93	95	X4	6010	6456	30H	CXA3070-0000-000N0YX430H	30G	CXA3070-0000-000N0YX430G	30F	CXA3070-0000-000N0YX430F
			Y2	6430	6907		CXA3070-0000-000N0YY230H		CXA3070-0000-000N0YY230G		CXA3070-0000-000N0YY230F
2700 K	80	---	Y4	6910	7422	27H	CXA3070-0000-000N00Y427H	27G	CXA3070-0000-000N00Y427G	27F	CXA3070-0000-000N00Y427F
			Z2	7390	7938		CXA3070-0000-000N00Z227H		CXA3070-0000-000N00Z227G		CXA3070-0000-000N00Z227F
			Z4	794	8534		CXA3070-0000-000N00Z427H		CXA3070-0000-000N00Z427G		CXA3070-0000-000N00Z427F
	93	95	X2	5590	6005	27H	CXA3070-0000-000N0YX227H	27G	CXA3070-0000-000N0YX227G	27F	CXA3070-0000-000N0YX227F
			X4	6010	6456		CXA3070-0000-000N0YX427H		CXA3070-0000-000N0YX427G		CXA3070-0000-000N0YX427F

**Notes**

- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and a tolerance of  $\pm 2$  on CRI measurements. See the Measurements section (page 15).
- Cree XLamp CXA3070 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.
- \* Flux values @ 25 °C are calculated and for reference only.

## FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS ( $I_F = 1900 \text{ mA}$ , $T_J = 85^\circ\text{C}$ )

The following table provides order codes for XLamp CXA3070 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 13).

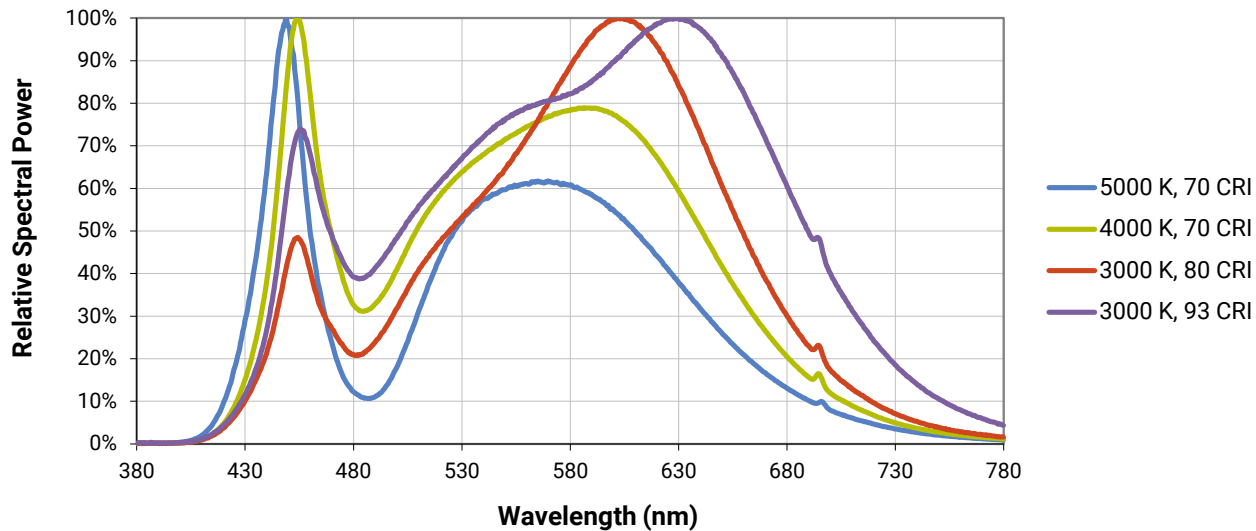
Nominal CCT	CRI		Minimum Luminous Flux			Chromaticity Regions	Order Code
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*		
6500 K	70	75	Z4	7945	8534	1A0, 1B0, 1C0, 1D0, 65F	CXA3070-0000-000N00Z40E1
			AB	8500	9130		CXA3070-0000-000N00AB0E1
			AD	9000	9667		CXA3070-0000-000N00AD0E1
			BB	9500	10,204		CXA3070-0000-000N00BB0E1
	80	---	Z4	7945	8534	1A0, 1B0, 1C0, 1D0, 65F	CXA3070-0000-000N0HZ40E1
			AB	8500	9130		CXA3070-0000-000N0HAB0E1
			AD	9000	9667		CXA3070-0000-000N0HAD0E1
5700 K	70	75	Z4	7945	8534	2A0, 2B0, 2C0, 2D0, 57F	CXA3070-0000-000N00Z40E2
			AB	8500	9130		CXA3070-0000-000N00AB0E2
			AD	9000	9667		CXA3070-0000-000N00AD0E2
			BB	9500	10,204		CXA3070-0000-000N00BB0E2
	80	---	Z4	7945	8534	2A0, 2B0, 2C0, 2D0, 57F	CXA3070-0000-000N0HZ40E2
			AB	8500	9130		CXA3070-0000-000N0HAB0E2
			AD	9000	9667		CXA3070-0000-000N0HAD0E2
	90	95	Z2	7390	7938	2A0, 2B0, 2C0, 2D0, 57F	CXA3070-0000-000N0UZ20E2
5000 K	70	75	AB	8500	9130	3A0, 3B0, 3C0, 3D0, 50F	CXA3070-0000-000N00AB0E3
			AD	9000	9667		CXA3070-0000-000N00AD0E3
			BB	9500	10,204		CXA3070-0000-000N00BB0E3
	80	---	Z4	7945	8534	3A0, 3B0, 3C0, 3D0, 50F	CXA3070-0000-000N0HZ40E3
			AB	8500	9130		CXA3070-0000-000N0HAB0E3
			AD	9000	9667		CXA3070-0000-000N0HAD0E3
4000 K	70	75	AB	8500	9130	5A0, 5B0, 5C0, 5D0, 40F	CXA3070-0000-000N00AB0E5
			AD	9000	9667		CXA3070-0000-000N00AD0E5
			BB	9500	10,204		CXA3070-0000-000N00BB0E5

### Notes

- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and a tolerance of  $\pm 2$  on CRI measurements. See the Measurements section (page 15).
- Cree XLamp CXA3070 LED order codes specify only a minimum flux bin and not a maximum. Cree may ship reels in flux bins higher than the minimum specified by the order code without advance notice. Shipments will always adhere to the chromaticity bin restrictions specified by the order code.
- \* Flux values @ 25 °C are calculated and for reference only.

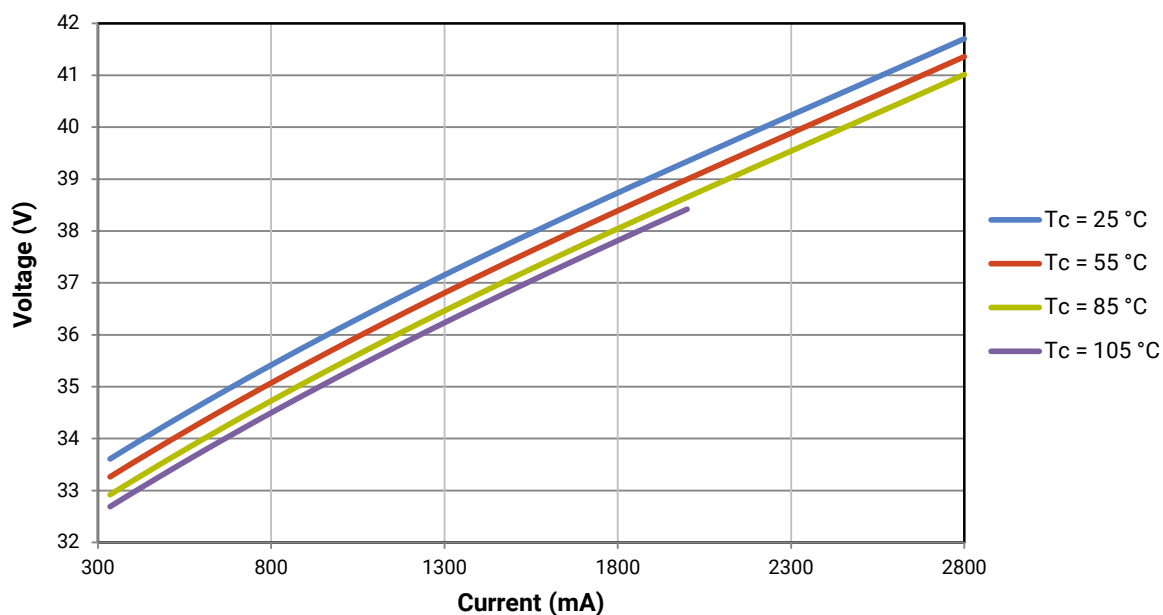
## RELATIVE SPECTRAL POWER DISTRIBUTION

The following graph is the result of a series of pulsed measurements at 1900 mA and  $T_j = 85^\circ\text{C}$ .



## ELECTRICAL CHARACTERISTICS

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

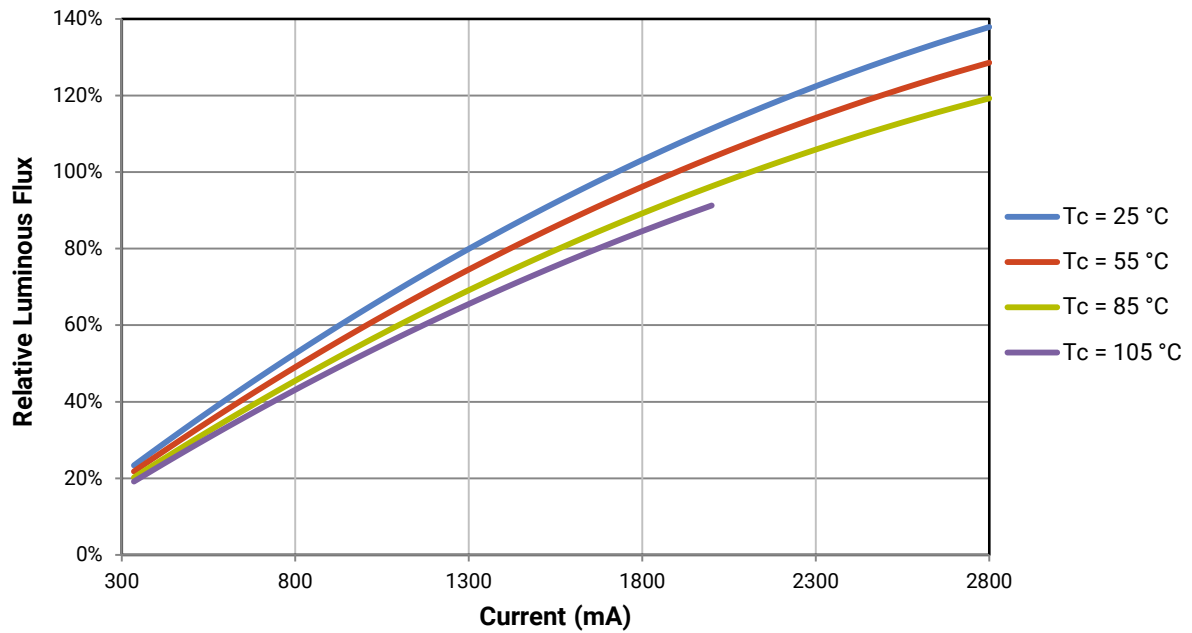


## RELATIVE LUMINOUS FLUX

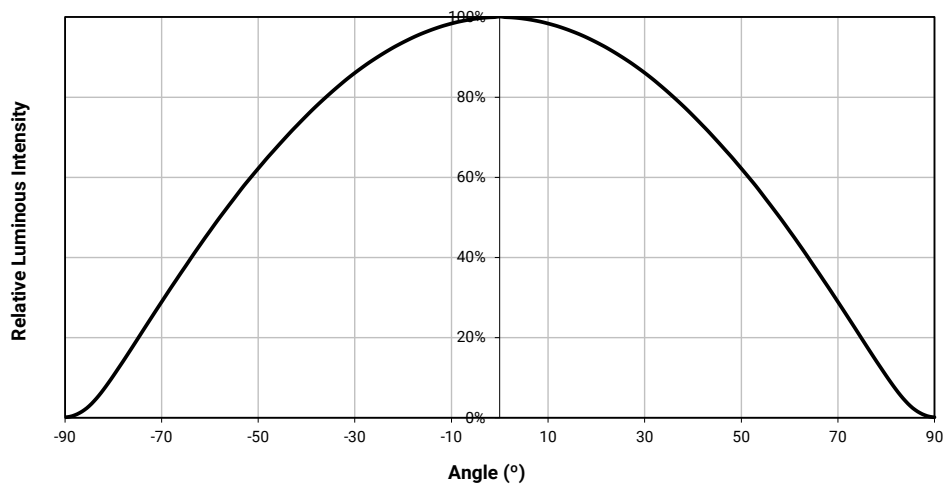
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA3070 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 1900 mA at  $T_J = 85^\circ\text{C}$ .

For example, at steady-state operation of  $T_c = 25^\circ\text{C}$ ,  $I_F = 1300\text{ mA}$ , the relative luminous flux ratio is 80% in the chart below. A CXA3070 LED that measures 8500 lm during binning will deliver 6800 lm ( $8500 \times 0.8$ ) at steady-state operation of  $T_c = 25^\circ\text{C}$ ,  $I_F = 1300\text{ mA}$ .



## TYPICAL SPATIAL DISTRIBUTION



## PERFORMANCE GROUPS - BRIGHTNESS ( $I_F = 1900 \text{ mA}$ , $T_J = 85^\circ \text{C}$ )

XLamp CXA3070 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Minimum Luminous Flux	Maximum Luminous Flux
X2	5590	6010
X4	6010	6430
Y2	6430	6910
Y4	6910	7390
Z2	7390	7945
Z4	7945	8500
AB	8500	9000
AD	9000	9500
BB	9500	10,000
BD	10,000	11,000
CB	11,000	12,000



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

XLamp CXA3070 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

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

EasyWhite Color Temperatures – 3-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
50G	5000 K	0.3447	0.3553	0.00840	0.00312	65.0
40G	4000 K	0.3818	0.3797	0.00939	0.00402	53.7
35G	3500 K	0.4073	0.3917	0.00927	0.00414	54.0
30G	3000 K	0.4338	0.4030	0.00834	0.00408	53.2
27G	2700 K	0.4577	0.4099	0.00834	0.00420	48.5

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

EasyWhite Color Temperatures – 4-Step			
Code	CCT	x	y
65F	6500 K	0.3097	0.3196
		0.3079	0.3297
		0.3164	0.3382
		0.3176	0.3275
57F	5700 K	0.3253	0.3325
		0.3249	0.3439
		0.3331	0.3514
		0.3330	0.3393
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

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

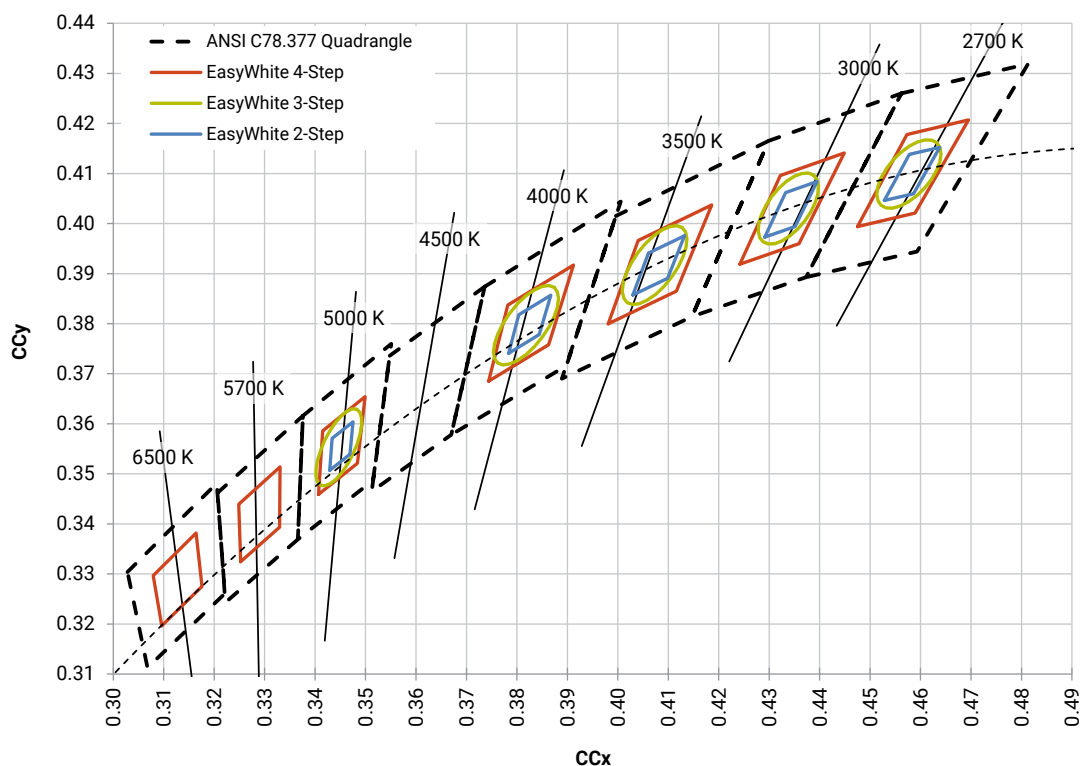
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E1	6500 K	1A0	0.3048	0.3207
			0.3130	0.3290
			0.3144	0.3186
			0.3068	0.3113
		1B0	0.3028	0.3304
			0.3115	0.3391
			0.3130	0.3290
			0.3048	0.3207
		1C0	0.3115	0.3391
			0.3205	0.3481
			0.3213	0.3373
			0.3130	0.3290
		1D0	0.3130	0.3290
			0.3213	0.3373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

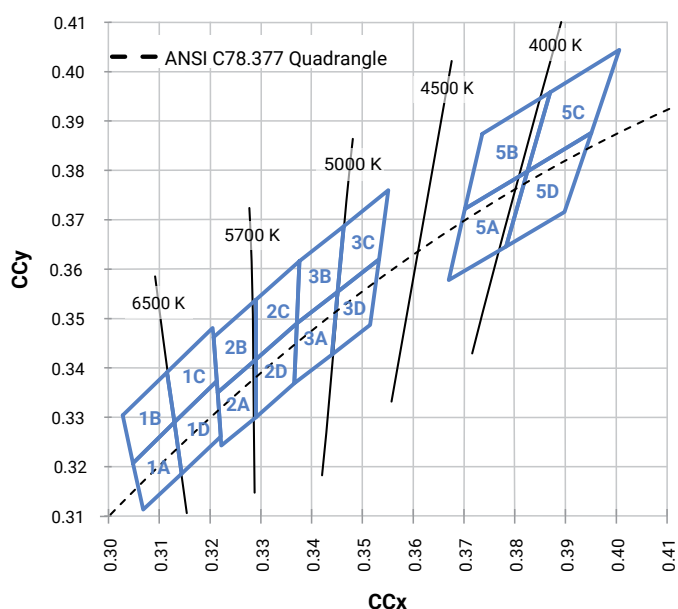
ANSI White Bins				
Code	CCT	Bin Code	x	y
0E3	5000 K	3A0	.3371	.3490
			.3451	.3554
			.3440	.3427
			.3366	.3369
		3B0	.3376	.3616
			.3463	.3687
			.3451	.3554
			.3371	.3490
		3C0	.3463	.3687
			.3551	.3760
			.3533	.3620
			.3451	.3554
		3D0	.3451	.3554
			.3533	.3620
			.3515	.3487
			.3440	.3427

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 1931 CIE COLOR SPACE ( $T_j = 85^\circ\text{C}$ )

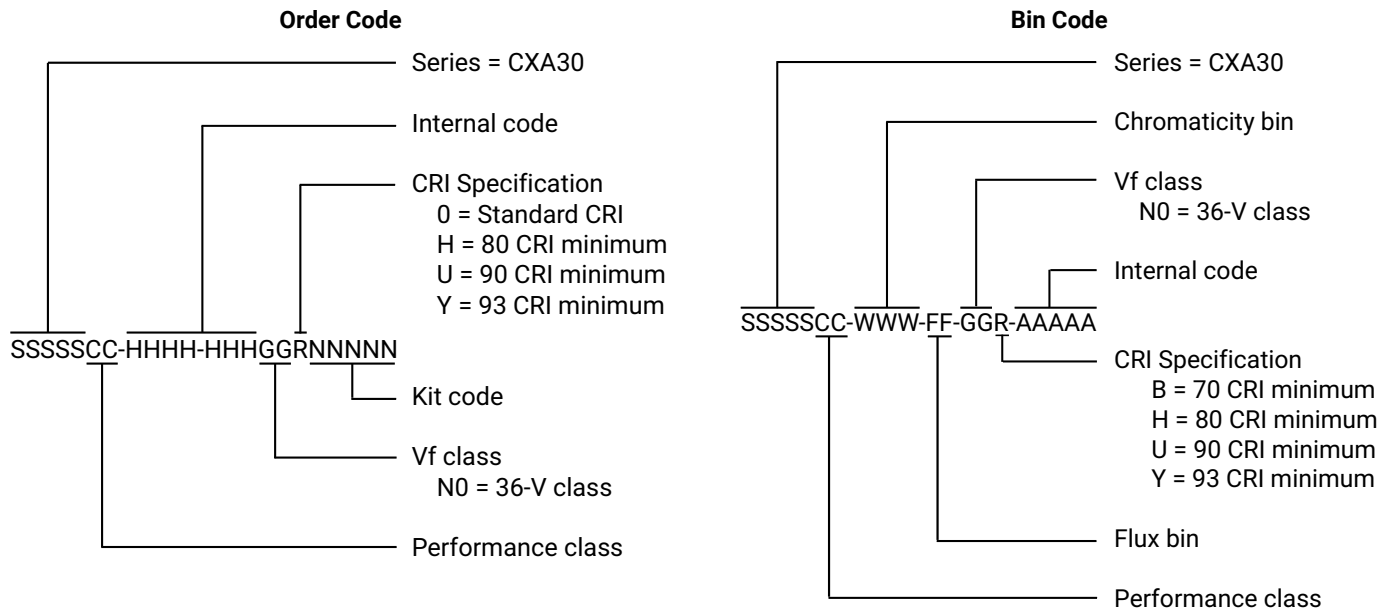


## CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ( $T_j = 85^\circ\text{C}$ )



## BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:



## MECHANICAL DIMENSIONS

Dimensions are in mm.

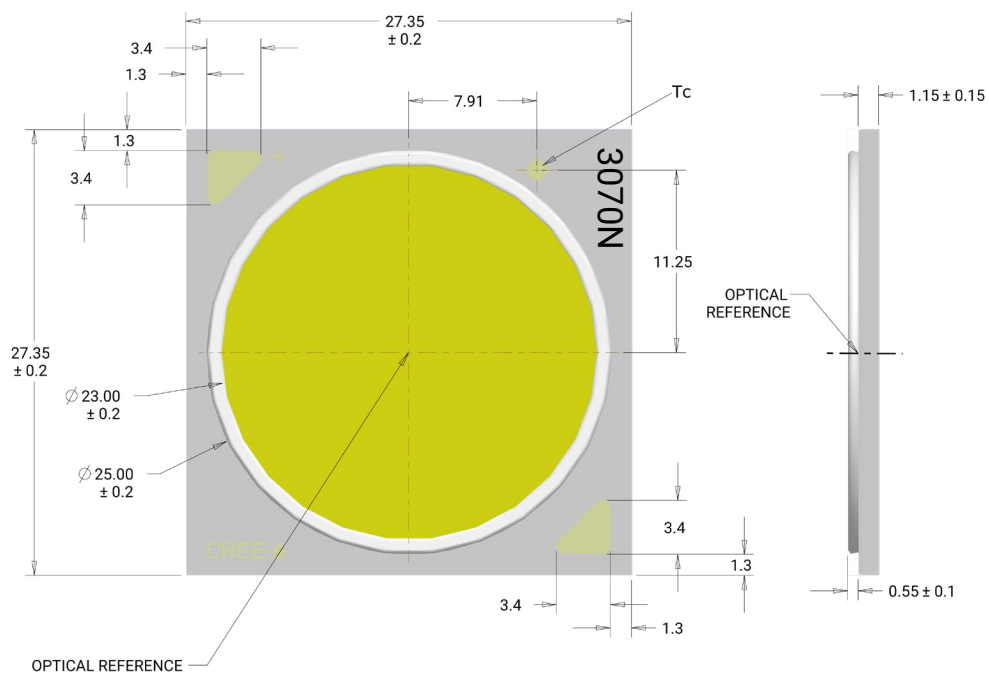
Tolerances unless otherwise

specified:  $\pm 0.13$

$\alpha^\circ \pm 1^\circ$

### Meaning of 3070N

3070N = 36-V CXA3070



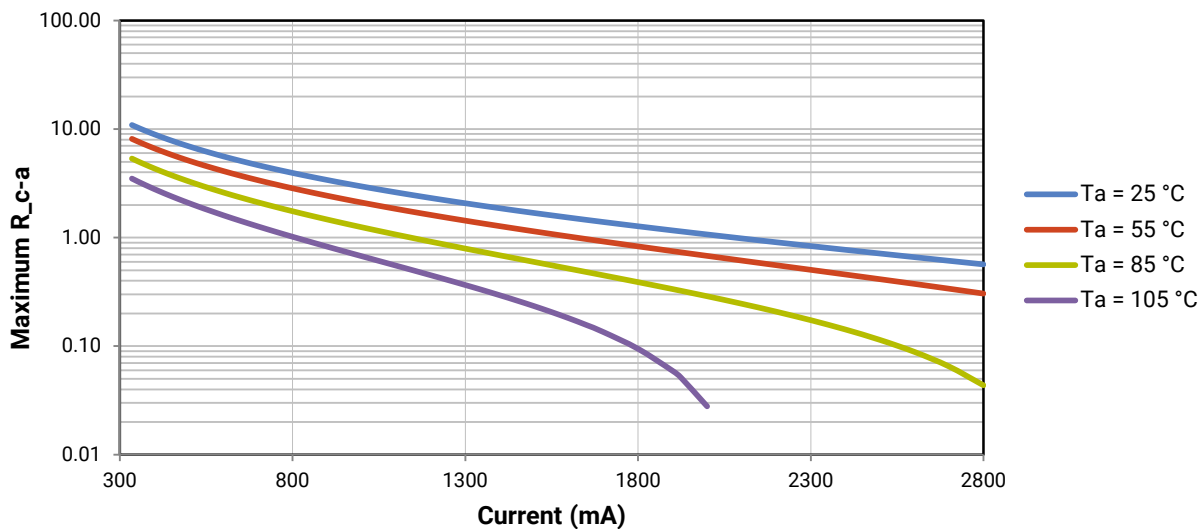
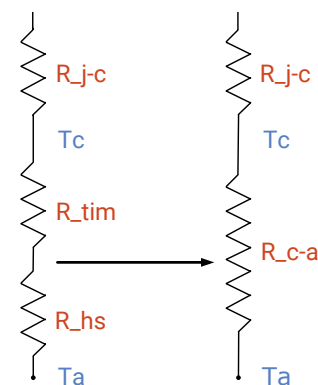
## THERMAL DESIGN

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.

There is no need to calculate for  $T_j$  inside the package, as the thermal management design process, specifically from solder point ( $T_{sp}$ ) 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 [Thermal Management application note](#). For CXA soldering recommendations and more information on thermal interface materials (TIM) and connection methods, please refer to the [Cree XLamp CX Family LEDs soldering and handling document](#). The [CX Family LED Design Guide](#) provides basic information on the requirements to use Cree XLamp CXA LEDs successfully in luminaire designs.

To keep the CXA3070 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 ( $R_{hs}$ ).



## NOTES

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### Measurements

The luminous flux, radiant power, chromaticity, forward voltage and CRI measurements in this document are binning specifications only and solely represent product measurements as of the date of shipment. These measurements will change over time based on a number of factors that are not within Cree's control and are not intended or provided as operational specifications for the products. Calculated values are provided for informational purposes only and are not intended as specifications.

### Pre-Release Qualification Testing

Please read the [LED Reliability Overview](#) for details of the qualification process Cree applies to ensure long-term reliability for XLamp LEDs and details of Cree's pre-release qualification testing for XLamp LEDs.

### Lumen Maintenance

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](#).

Please read the [Long-Term Lumen Maintenance application note](#) for more details on Cree's lumen maintenance testing and forecasting. Please read the [Thermal Management application note](#) 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](http://www.cree.com).

### REACH Compliance

REACH substances of very high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree representative to insure you get the most up-to-date REACH Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

### 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

**WARNING:** Do not look at exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the [LED Eye Safety application note](#).

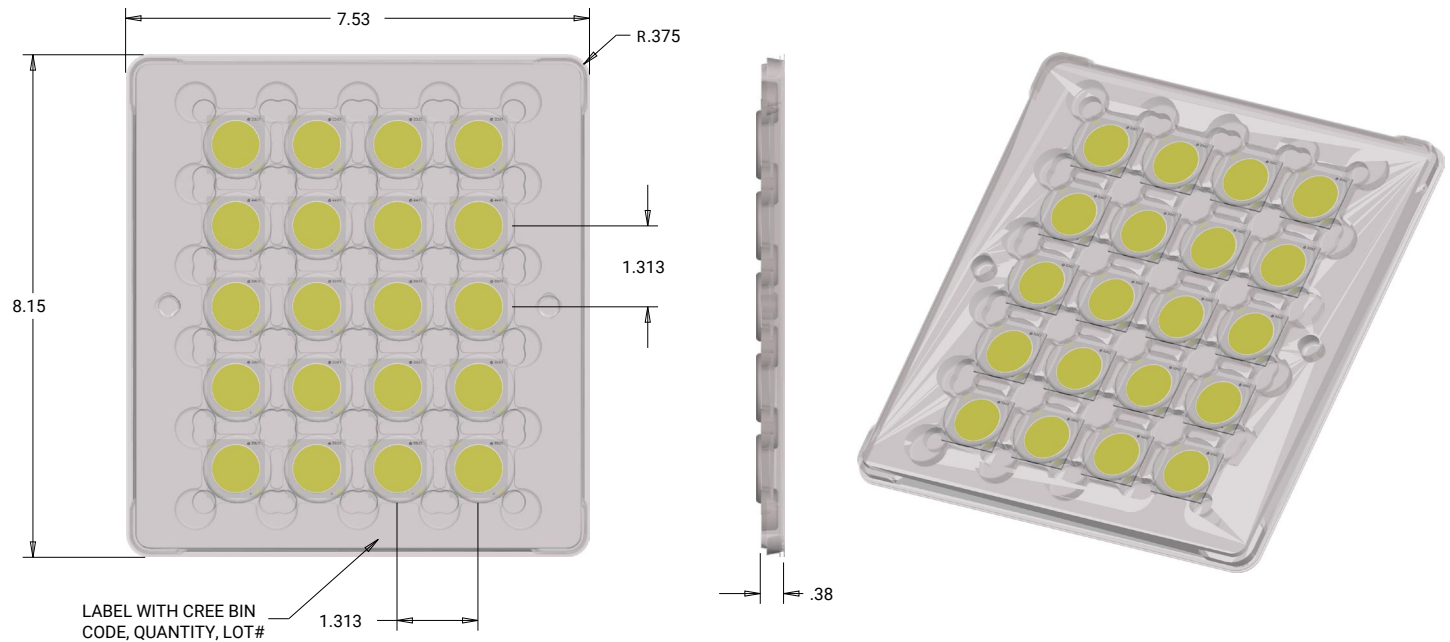
## PACKAGING

Cree CXA3070 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.

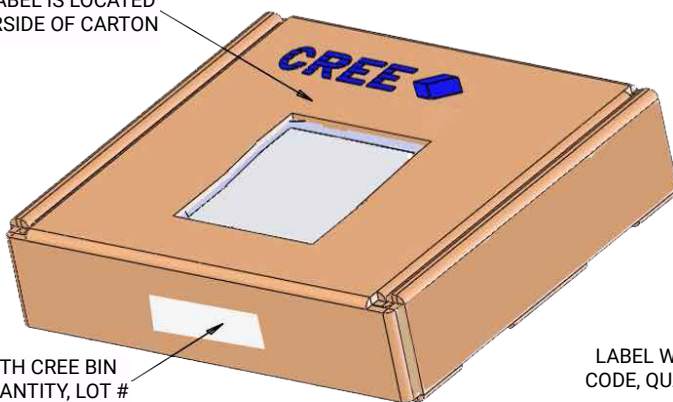
Tolerances:  $\pm .13$

$x^{\circ} \pm 1^{\circ}$



PATENT LABEL IS LOCATED ON UNDERSIDE OF CARTON

LABEL WITH CREE BIN CODE, QUANTITY, LOT #



BAG

LABEL WITH CREE BIN CODE, QUANTITY, LOT #

