

Cree® XLamp® CXB1304 LED



PRODUCT DESCRIPTION

The XLamp® CXB1304 LED Array is the most compact member of the second generation of the CXA family that delivers up to 30% higher efficacy and up to 20% higher lumens than the first generation in the same small LES. The higher performance second generation CXA LED Arrays are compatible with the first generation, providing a drop-in performance upgrade to existing CXA LED designs to shorten the luminaire design cycle and improve time to market. Available in 2-step, 3-step and 5-step EasyWhite® bins, the CXB1304 LED delivers high lumen output and high efficacy in a single, easy-to-use package that eliminates the need for reflow soldering, enabling lighting manufacturers to rapidly address small form factor lighting applications.

The [CX Family LED Design Guide](#) provides basic information on the requirements to use the CXB1304 LED successfully in luminaire designs.

FEATURES

- 6-mm optical source
- Mechanical and optical design consistent with other CXA13 LEDs
- Available in 70-, 80- and 90-minimum CRI options
- Cree EasyWhite® 2-, 3- and 5-step binning
- Forward voltage options: 9-V class, 18-V class & 36-V class
- 85 °C binning and characterization
- Extremely uniform color over viewing angle
- Top-side solder connections
- Thermocouple attach point
- NEMA SSL-3 2011 standard flux bins
- RoHS-compliant
- UL® recognized component (E349212)



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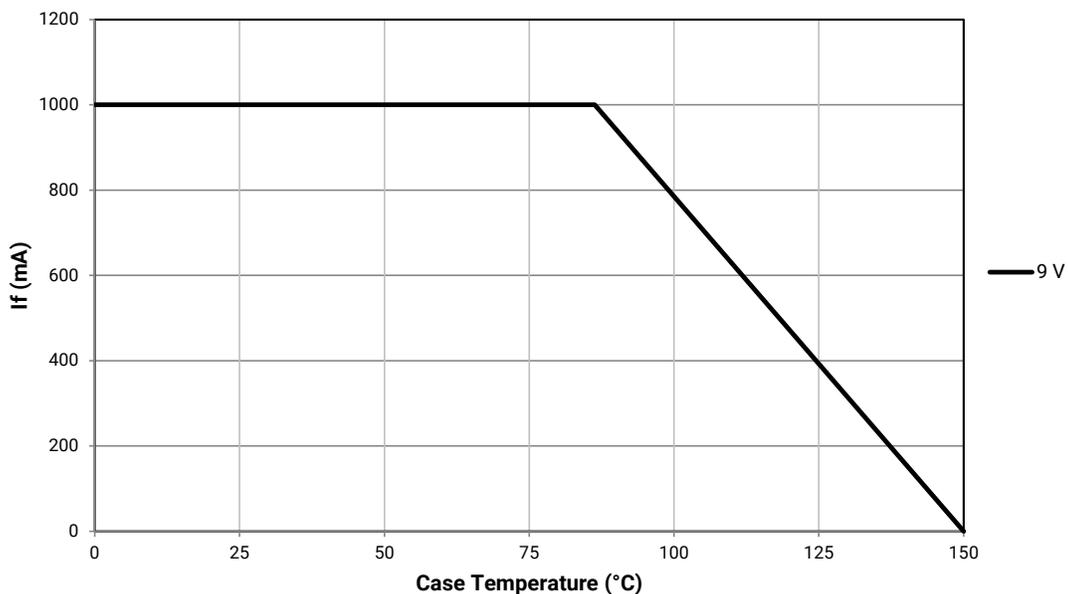
CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current (9 V)	mA			1000*
DC forward current (18 V)	mA			500*
DC forward current (36 V)	mA			250*
Reverse current (9 V, 18V, 36 V)	mA			0.1
Forward voltage (9 V, 400 mA, 85 °C)	V		8.6	9.5
Forward voltage (18 V, 200 mA, 85 °C)	V		17.3	19
Forward voltage (36 V, 100 mA, 85 °C)	V		34.5	38

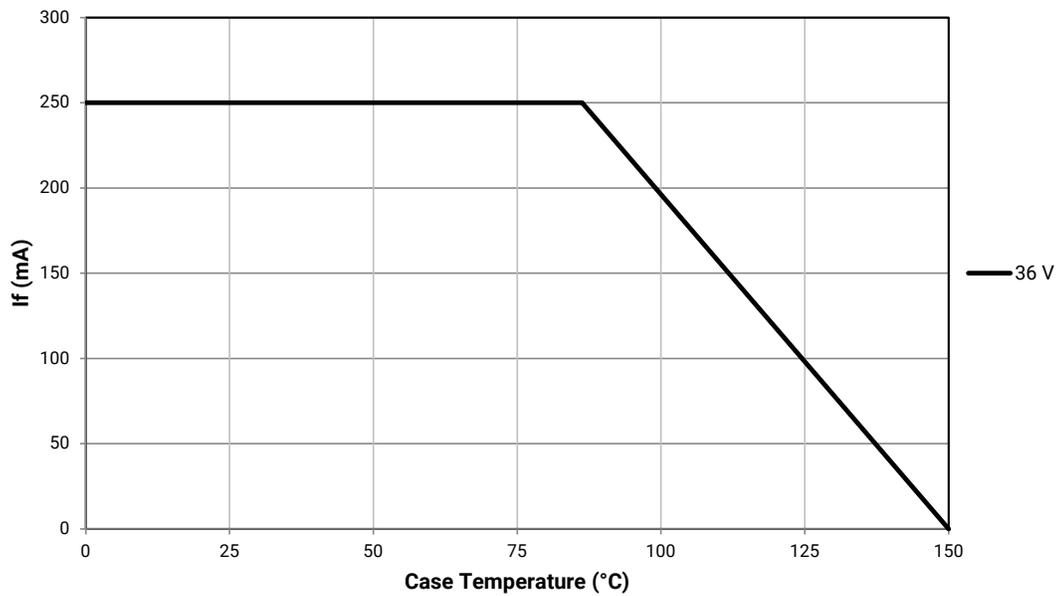
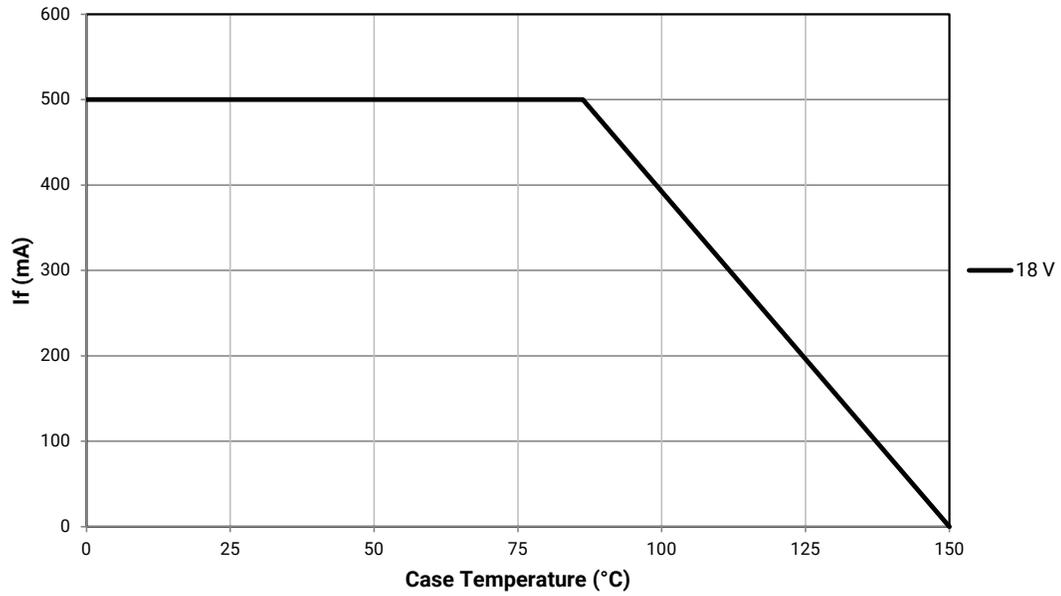
* Refer to the Operating Limits section.

OPERATING LIMITS

The maximum current rating of the CXB1304 is dependent on the case temperature (Tc) when the LED has reached thermal equilibrium under steady-state operation. The graphs shown below assume 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 Dimensions section on page 18 for the location of the Tc measurement point.



OPERATING LIMITS - CONTINUED



FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 9 V ($I_F = 400 \text{ mA}$, $T_J = 85 \text{ °C}$)

The following table provides order codes for XLamp CXB1304 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 18).

Nominal CCT	CRI*		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**	Group	Order Code	Group	Order Code	Group	Order Code
6500 K	70	---	C4	475	525					65E	CXB1304-0000-000C0BC465E
			D2	510	563				CXB1304-0000-000C0BD265E		
	80	---	C2	440	486					65E	CXB1304-0000-000C0HC265E
			C4	475	525				CXB1304-0000-000C0HC465E		
5700 K	70	---	C4	475	525					57E	CXB1304-0000-000C0BC457E
			D2	510	563				CXB1304-0000-000C0BD257E		
	80	---	C2	440	486					57E	CXB1304-0000-000C0HC257E
			C4	475	525				CXB1304-0000-000C0HC457E		
5000 K	70	---	C4	475	525					50E	CXB1304-0000-000C0BC450E
			D2	510	563				CXB1304-0000-000C0BD250E		
	80	---	C2	440	486			50G	CXB1304-0000-000C0HC250G	50E	CXB1304-0000-000C0HC250E
			C4	475	525				CXB1304-0000-000C0HC450G		CXB1304-0000-000C0HC450E
	90	92	B4	410	453			50G	CXB1304-0000-000C0UB450G		
			C2	440	486				CXB1304-0000-000C0UC250G		

- 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. See the Measurements section (page 21).
 - Cree XLamp CXB1304 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.
- * For 80 CRI minimum LEDs, CRI R9 minimum is 0 with a ± 2 tolerance. For 90 CRI minimum LEDs, CRI R9 typical is 60.
- ** Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 9 V ($I_F = 400 \text{ mA}$, $T_J = 85 \text{ °C}$) - CONTINUED

Nominal CCT	CRI*		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70	---	C4	475	525					40E	CXB1304-0000-000C0BC440E
			D2	510	563		CXB1304-0000-000C0BD240E				
	80	---	C2	440	486	40H	CXB1304-0000-000C0HC240H	40G	CXB1304-0000-000C0HC240G		
			C4	475	525		CXB1304-0000-000C0HC440H		CXB1304-0000-000C0HC440G		
	90	92	B2	380	420	40H	CXB1304-0000-000C0UB240H	40G	CXB1304-0000-000C0UB240G		
			B4	410	453		CXB1304-0000-000C0UB440H		CXB1304-0000-000C0UB440G		
3500 K	80	---	B4	410	453	35H	CXB1304-0000-000C0HB435H	35G	CXB1304-0000-000C0HB435G		
			C2	440	486		CXB1304-0000-000C0HC235H		CXB1304-0000-000C0HC235G		
	90	92	A4	355	392	35H	CXB1304-0000-000C0UA435H	35G	CXB1304-0000-000C0UA435G		
			B2	380	420		CXB1304-0000-000C0UB235H		CXB1304-0000-000C0UB235G		
3000 K	80	---	B4	410	453	30H	CXB1304-0000-000C0HB430H	30G	CXB1304-0000-000C0HB430G		
			C2	440	486		CXB1304-0000-000C0HC230H		CXB1304-0000-000C0HC230G		
	90	92	A4	355	392	30H	CXB1304-0000-000C0UA430H	30G	CXB1304-0000-000C0UA430G		
			B2	380	420		CXB1304-0000-000C0UB230H		CXB1304-0000-000C0UB230G		
2700 K	80	---	B4	410	453	27H	CXB1304-0000-000C0HB427H	27G	CXB1304-0000-000C0HB427G		
			C2	440	486		CXB1304-0000-000C0HC227H		CXB1304-0000-000C0HC227G		
	90	92	A2	330	364	27H	CXB1304-0000-000C0UA227H	27G	CXB1304-0000-000C0UA227G		
			A4	355	392		CXB1304-0000-000C0UA427H		CXB1304-0000-000C0UA427G		

- 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. See the Measurements section (page 21).
 - Cree XLamp CXB1304 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.
- * For 80 CRI minimum LEDs, CRI R9 minimum is 0 with a ± 2 tolerance. For 90 CRI minimum LEDs, CRI R9 typical is 60.
- ** Flux values @ 25 °C are calculated and for reference only.

FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 18 V ($I_F = 200 \text{ mA}$, $T_J = 85 \text{ °C}$)

The following table provides order codes for XLamp CXB1304 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 18).

Nominal CCT	CRI*		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**	Group	Order Code	Group	Order Code	Group	Order Code
6500 K	70	---	C4	475	525					65E	CXB1304-0000-000F0BC465E
			D2	510	563				CXB1304-0000-000F0BD265E		
	80	---	C2	440	486					65E	CXB1304-0000-000F0HC265E
			C4	475	525				CXB1304-0000-000F0HC465E		
5700 K	70	---	C4	475	525					57E	CXB1304-0000-000F0BC457E
			D2	510	563				CXB1304-0000-000F0BD257E		
	80	---	C2	440	486					57E	CXB1304-0000-000F0HC257E
			C4	475	525				CXB1304-0000-000F0HC457E		
5000 K	70	---	C4	475	525					50E	CXB1304-0000-000F0BC450E
			D2	510	563				CXB1304-0000-000F0BD250E		
	80	---	C2	440	486			50G	CXB1304-0000-000F0HC250G	50E	CXB1304-0000-000F0HC250E
			C4	475	525				CXB1304-0000-000F0HC450G		CXB1304-0000-000F0HC450E
	90	92	B4	410	453			50G	CXB1304-0000-000F0UB450G		
			C2	440	486				CXB1304-0000-000F0UC250G		

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FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 18 V (I_F = 200 mA, T_J = 85 °C) - CONTINUED

Nominal CCT	CRI*		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70	---	C4	475	525					40E	CXB1304-0000-000F0BC440E
			D2	510	563		CXB1304-0000-000F0BD240E				
	80	---	C2	440	486	40H	CXB1304-0000-000F0HC240H	40G	CXB1304-0000-000F0HC240G		
			C4	475	525		CXB1304-0000-000F0HC440H		CXB1304-0000-000F0HC440G		
	90	92	B2	380	420	40H	CXB1304-0000-000F0UB240H	40G	CXB1304-0000-000F0UB240G		
			B4	410	453		CXB1304-0000-000F0UB440H		CXB1304-0000-000F0UB440G		
3500 K	80	---	B4	410	453	35H	CXB1304-0000-000F0HB435H	35G	CXB1304-0000-000F0HB435G		
			C2	440	486		CXB1304-0000-000F0HC235H		CXB1304-0000-000F0HC235G		
	90	92	A4	355	392	35H	CXB1304-0000-000F0UA435H	35G	CXB1304-0000-000F0UA435G		
			B2	380	420		CXB1304-0000-000F0UB235H		CXB1304-0000-000F0UB235G		
3000 K	80	---	B4	410	453	30H	CXB1304-0000-000F0HB430H	30G	CXB1304-0000-000F0HB430G		
			C2	440	486		CXB1304-0000-000F0HC230H		CXB1304-0000-000F0HC230G		
	90	92	A4	355	392	30H	CXB1304-0000-000F0UA430H	30G	CXB1304-0000-000F0UA430G		
			B2	380	420		CXB1304-0000-000F0UB230H		CXB1304-0000-000F0UB230G		
2700 K	80	---	B4	410	453	27H	CXB1304-0000-000F0HB427H	27G	CXB1304-0000-000F0HB427G		
			C2	440	486		CXB1304-0000-000F0HC227H		CXB1304-0000-000F0HC227G		
	90	92	A2	330	364	27H	CXB1304-0000-000F0UA227H	27G	CXB1304-0000-000F0UA227G		
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FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 36 V ($I_F = 100 \text{ mA}$, $T_J = 85 \text{ °C}$)

The following table provides order codes for XLamp CXB1304 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 18).

Nominal CCT	CRI*		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**	Group	Order Code	Group	Order Code	Group	Order Code
6500 K	70	---	C4	475	525					65E	CXB1304-0000-000N0BC465E
			D2	510	563				CXB1304-0000-000N0BD265E		
	80	---	C2	440	486					65E	CXB1304-0000-000N0HC265E
			C4	475	525				CXB1304-0000-000N0HC465E		
5700 K	70	---	C4	475	525					57E	CXB1304-0000-000N0BC457E
			D2	510	563				CXB1304-0000-000N0BD257E		
	80	---	C2	440	486					57E	CXB1304-0000-000N0HC257E
			C4	475	525				CXB1304-0000-000N0HC457E		
5000 K	70	---	C4	475	525					50E	CXB1304-0000-000N0BC450E
			D2	510	563				CXB1304-0000-000N0BD250E		
	80	---	C2	440	486			50G	CXB1304-0000-000N0HC250G	50E	CXB1304-0000-000N0HC250E
			C4	475	525				CXB1304-0000-000N0HC450G		CXB1304-0000-000N0HC450E
	90	92	B4	410	453			50G	CXB1304-0000-000N0UB450G		
			C2	440	486				CXB1304-0000-000N0UC250G		

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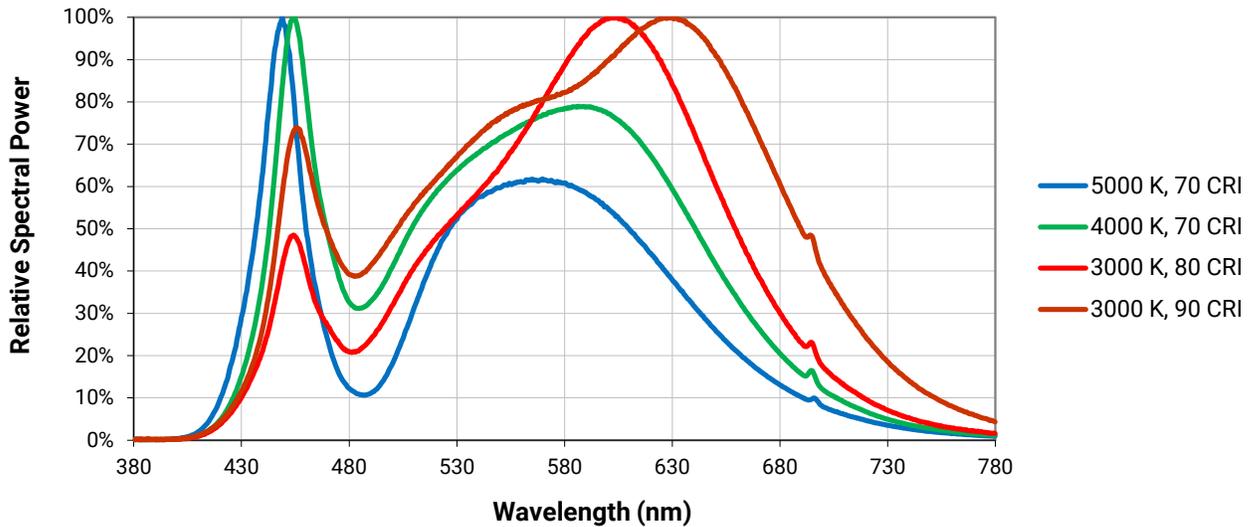
FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 36 V (I_F = 100 mA, T_J = 85 °C) - CONTINUED

Nominal CCT	CRI*		Minimum Luminous Flux			2-Step		3-Step		5-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**	Group	Order Code	Group	Order Code	Group	Order Code
4000 K	70	---	C4	475	525					40E	CXB1304-0000-000N0BC440E
			D2	510	563		CXB1304-0000-000N0BD240E				
	80	---	C2	440	486	40H	CXB1304-0000-000N0HC240H	40G	CXB1304-0000-000N0HC240G		
			C4	475	525		CXB1304-0000-000N0HC440H		CXB1304-0000-000N0HC440G		
	90	92	B2	380	420	40H	CXB1304-0000-000N0UB240H	40G	CXB1304-0000-000N0UB240G		
			B4	410	453		CXB1304-0000-000N0UB440H		CXB1304-0000-000N0UB440G		
3500 K	80	---	B4	410	453	35H	CXB1304-0000-000N0HB435H	35G	CXB1304-0000-000N0HB435G		
			C2	440	486		CXB1304-0000-000N0HC235H		CXB1304-0000-000N0HC235G		
	90	92	A4	355	392	35H	CXB1304-0000-000N0UA435H	35G	CXB1304-0000-000N0UA435G		
			B2	380	420		CXB1304-0000-000N0UB235H		CXB1304-0000-000N0UB235G		
3000 K	80	---	B4	410	453	30H	CXB1304-0000-000N0HB430H	30G	CXB1304-0000-000N0HB430G		
			C2	440	486		CXB1304-0000-000N0HC230H		CXB1304-0000-000N0HC230G		
	90	92	A4	355	392	30H	CXB1304-0000-000N0UA430H	30G	CXB1304-0000-000N0UA430G		
			B2	380	420		CXB1304-0000-000N0UB230H		CXB1304-0000-000N0UB230G		
2700 K	80	---	B4	410	453	27H	CXB1304-0000-000N0HB427H	27G	CXB1304-0000-000N0HB427G		
			C2	440	486		CXB1304-0000-000N0HC227H		CXB1304-0000-000N0HC227G		
	90	92	A2	330	364	27H	CXB1304-0000-000N0UA227H	27G	CXB1304-0000-000N0UA227G		
			A4	355	392		CXB1304-0000-000N0UA427H		CXB1304-0000-000N0UA427G		

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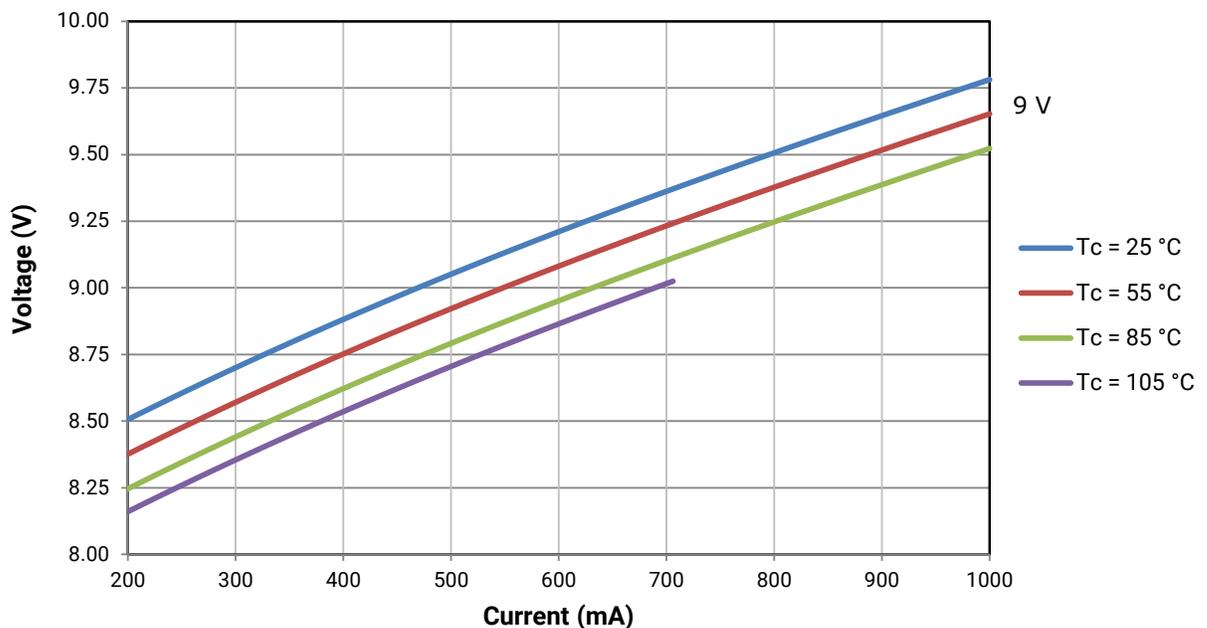
RELATIVE SPECTRAL POWER DISTRIBUTION

The following graph is the result of a series of pulsed measurements at 400 mA for the 9-V CXB1304 LED, 200 mA for the 18-V CXB1304 LED and 100 mA for the 36-V CXB1304 LED and $T_j = 85^\circ\text{C}$.

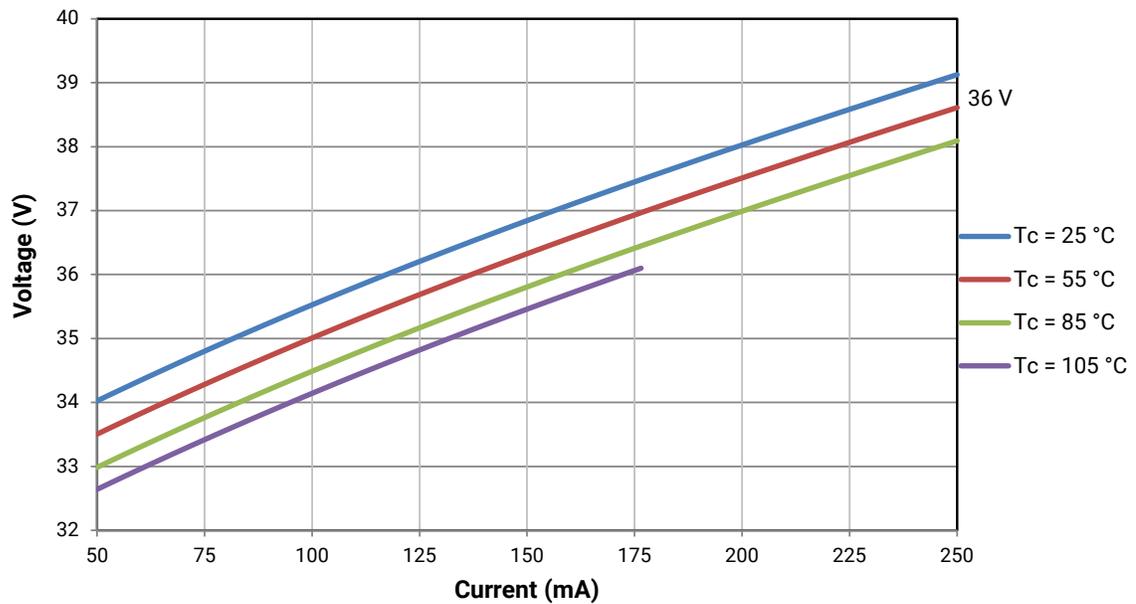
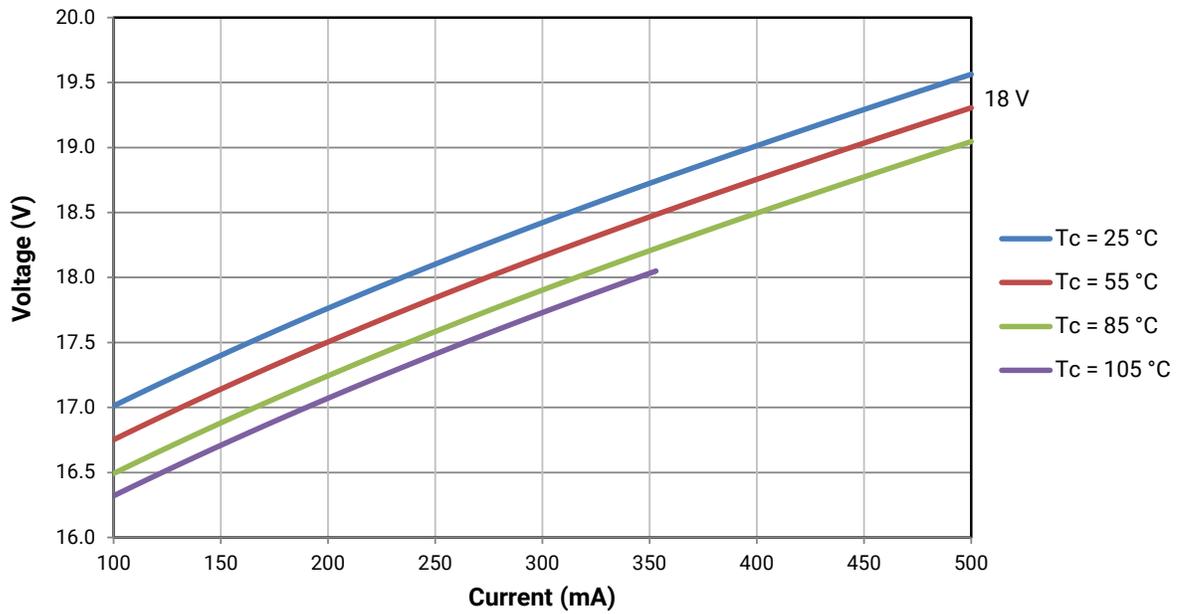


ELECTRICAL CHARACTERISTICS

The following graphs are the result of a series of steady-state measurements.



ELECTRICAL CHARACTERISTICS - CONTINUED

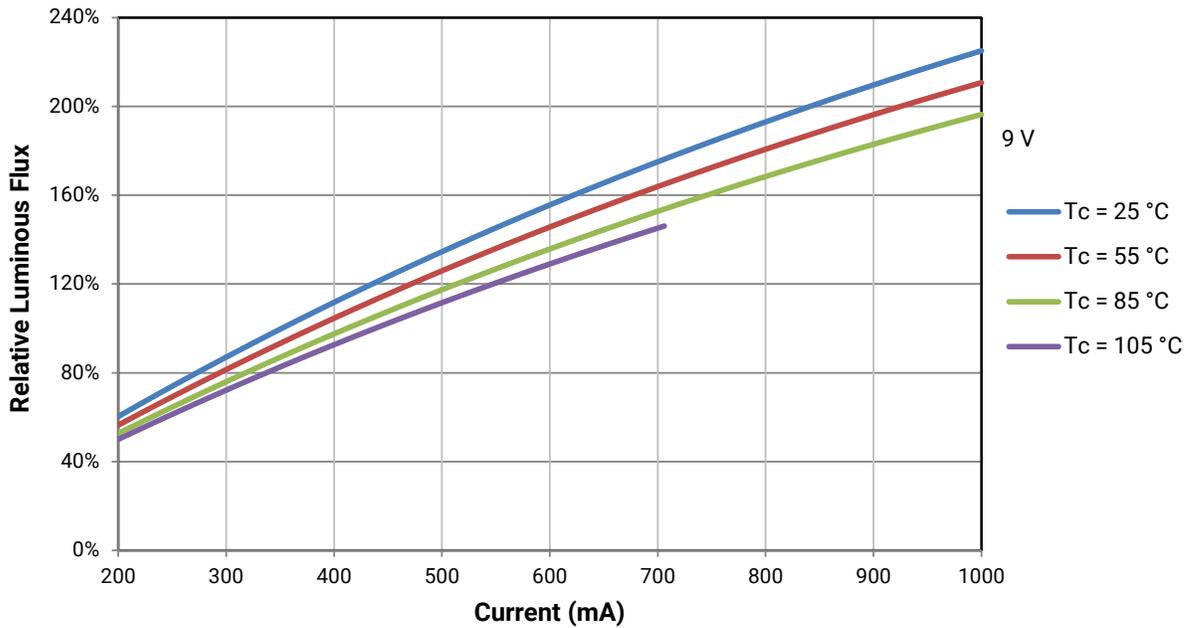


RELATIVE LUMINOUS FLUX

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

- Measurements of CXB1304 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 400 mA at $T_j = 85\text{ }^\circ\text{C}$ for the 9-V CXB1304 LED.

Using the 9-V CXB1304 LED as an example, at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 300\text{ mA}$, the relative luminous flux ratio is 80% in the chart below. A 9-V CXB1304 LED that measures 380 lm during binning will deliver 304 lm (380×0.8) at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 300\text{ mA}$.

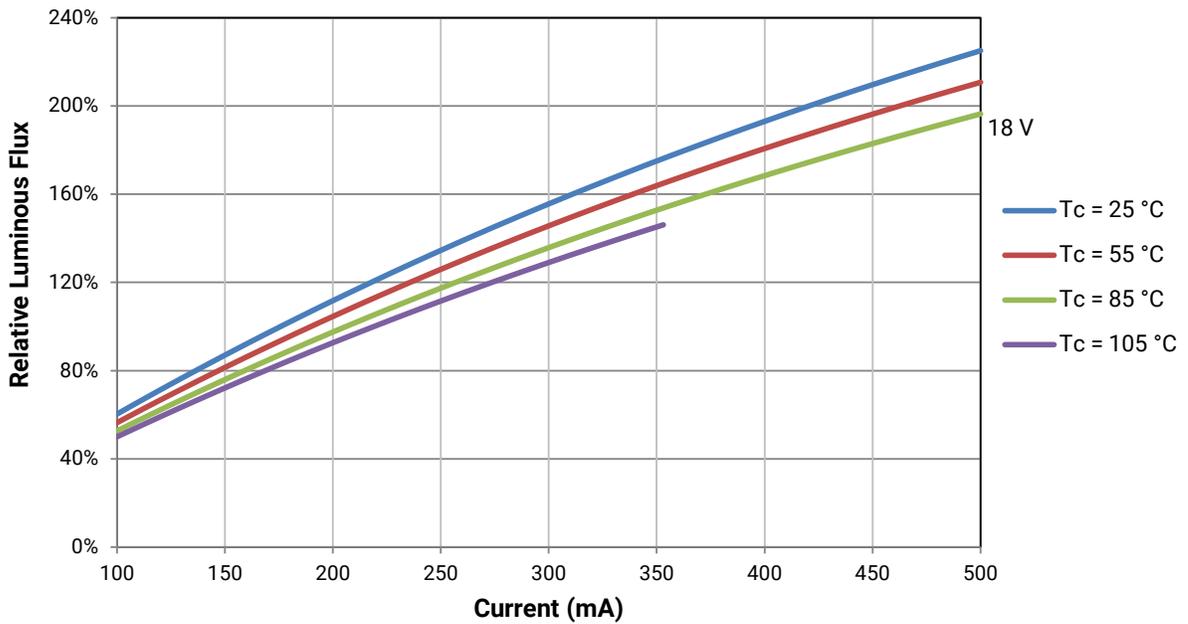


RELATIVE LUMINOUS FLUX - CONTINUED

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

- Measurements of CXB1304 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 200 mA at $T_j = 85\text{ }^\circ\text{C}$ for the 18-V CXB1304 LED.

Using the 18-V CXB1304 LED as an example, at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 150\text{ mA}$, the relative luminous flux ratio is 80% in the chart below. An 18-V CXB1304 LED that measures 380 lm during binning will deliver 304 lm ($380 * 0.8$) at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 150\text{ mA}$.

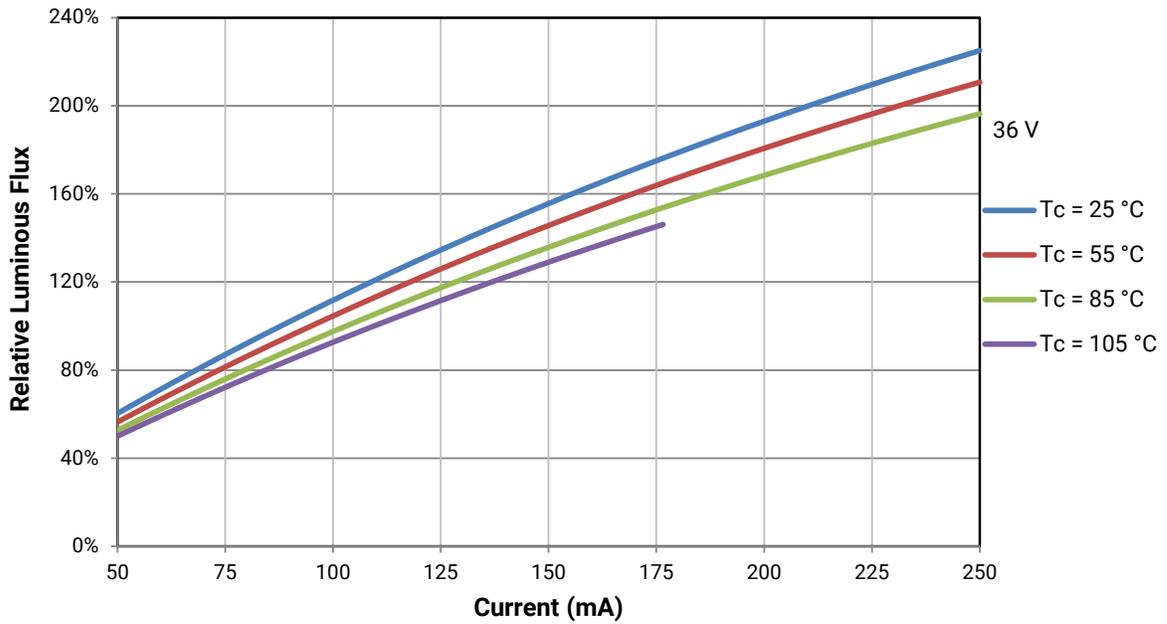


RELATIVE LUMINOUS FLUX - CONTINUED

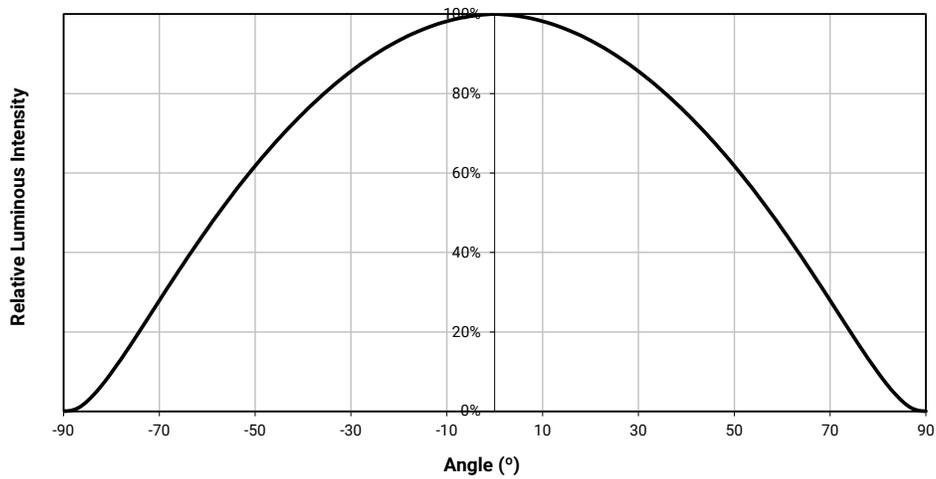
The relative luminous flux values provided below are the ratio of:

- Measurements of CXB1304 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 100 mA at $T_j = 85\text{ }^\circ\text{C}$ for the 36-V CXB1304 LED.

Using the 36-V CXB1304 LED as an example, at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 75\text{ mA}$, the relative luminous flux ratio is 80% in the chart below. A 36-V CXB1304 LED that measures 380 lm during binning will deliver 304 lm (380×0.8) at steady-state operation of $T_c = 55\text{ }^\circ\text{C}$, $I_f = 75\text{ mA}$.



TYPICAL SPATIAL DISTRIBUTION



PERFORMANCE GROUPS - BRIGHTNESS (9 V, I_F = 400 mA; 18 V, I_F = 200 mA; 36 V, I_F = 100 mA, T_J = 85 °C)

XLamp CXB1304 LEDs are tested for luminous flux and placed into one of the following bins.

Group Code	Min. Luminous Flux	Max. Luminous Flux
A2	330	355
A4	355	380
B2	380	410
B4	410	440
C2	440	475
C4	475	510
D2	510	550
D4	550	590

PERFORMANCE GROUPS - CHROMATICITY ($T_j = 85\text{ °C}$)

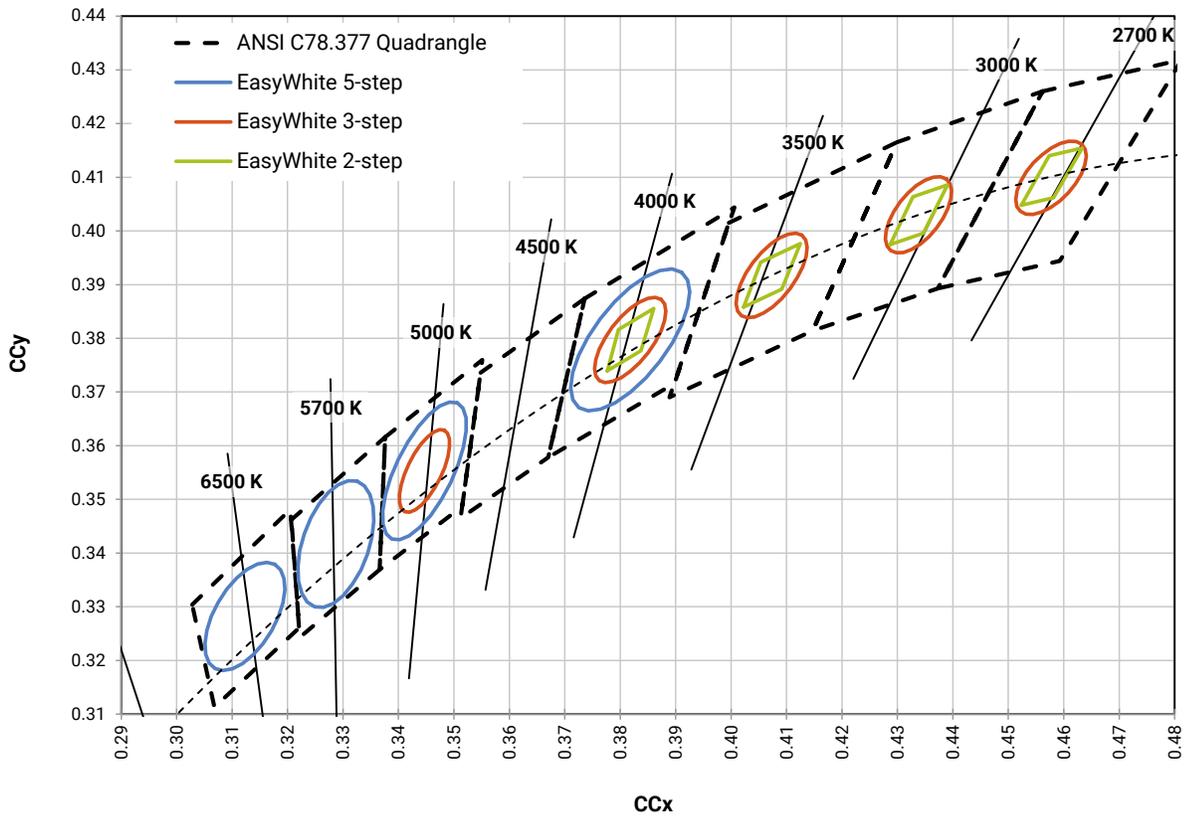
XLamp CXB1304 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

EasyWhite Color Temperatures – 2-Step			
Code	CCT	x	y
40H	4000 K	0.3777	0.3739
		0.3797	0.3816
		0.3861	0.3855
		0.3838	0.3777
35H	3500 K	0.4022	0.3858
		0.4053	0.3942
		0.4125	0.3977
		0.4091	0.3891
30H	3000 K	0.4287	0.3975
		0.4328	0.4064
		0.4390	0.4086
		0.4347	0.3996
27H	2700 K	0.4524	0.4048
		0.4574	0.4140
		0.4633	0.4154
		0.4581	0.4062

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

EasyWhite Color Temperatures – 5-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
65E	6500 K	0.3123	0.3282	0.01110	0.00550	61.0
57E	5700 K	0.3287	0.3417	0.01230	0.00600	72.0
50E	5000 K	0.3447	0.3553	0.01400	0.00520	65.0
40E	4000 K	0.3818	0.3797	0.01565	0.00670	53.7

CREE EASYWHITE® BINS PLOTTED ON THE 1931 CIE COLOR SPACE



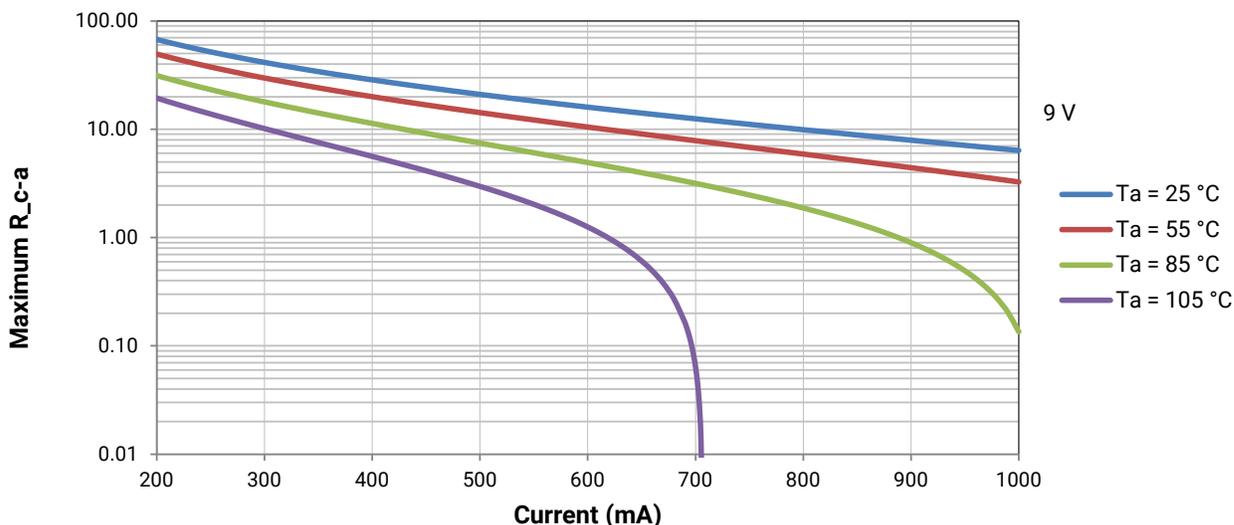
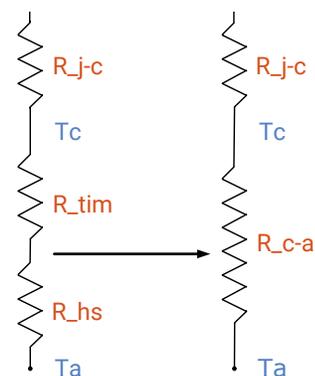
THERMAL DESIGN

The CXB 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 CXB LED is being operated within its designed limits. Please refer to page 2 for the Operating Limit specification.

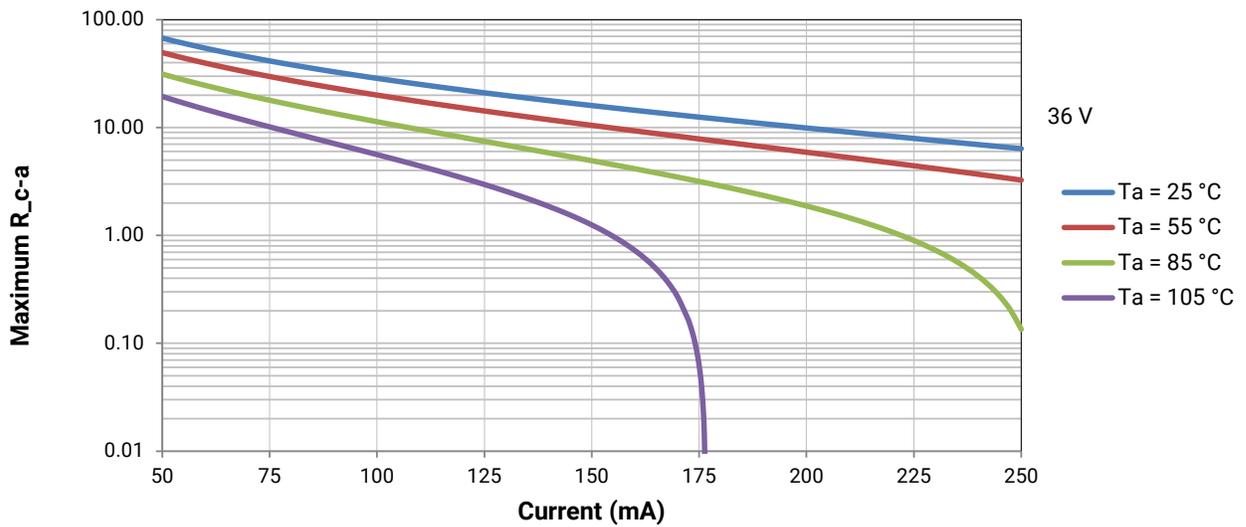
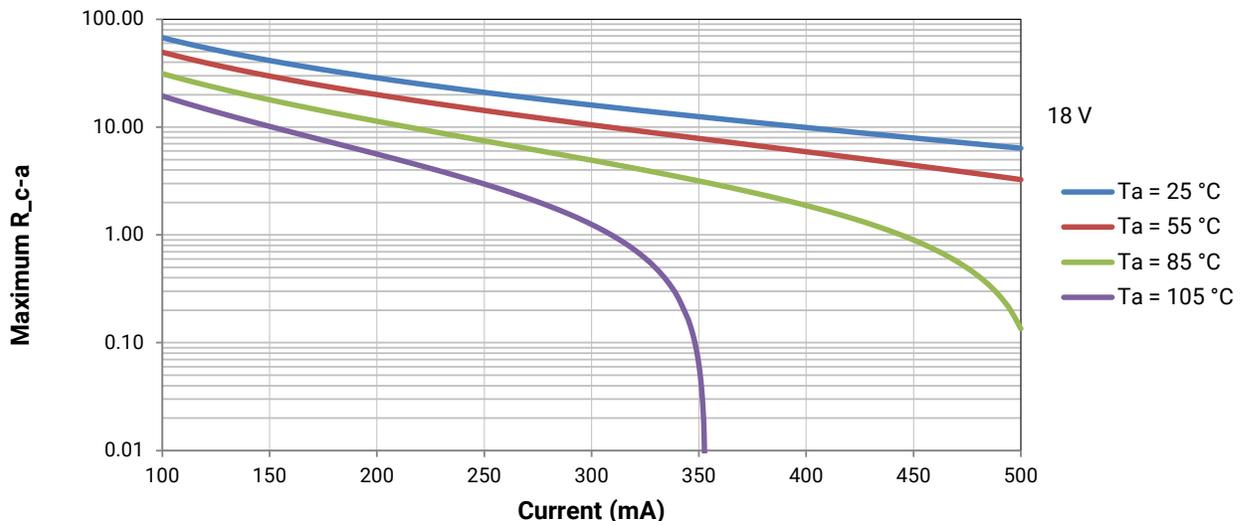
There is no need to calculate for T_j inside the package, as the thermal management design process, specifically from solder point (T_{sp}), to ambient (T_a), remains identical to any other LED component. For more information on thermal management of Cree XLamp LEDs, please refer to the [Thermal Management application note](#). For CXB 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 CXB LEDs successfully in luminaire designs.

To keep the CXB1304 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 graphs, depending on the operating environment. The y-axis in each 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}).



THERMAL DESIGN - CONTINUED



NOTES

Measurements

The luminous flux, radiant power, chromaticity 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.

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.

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.

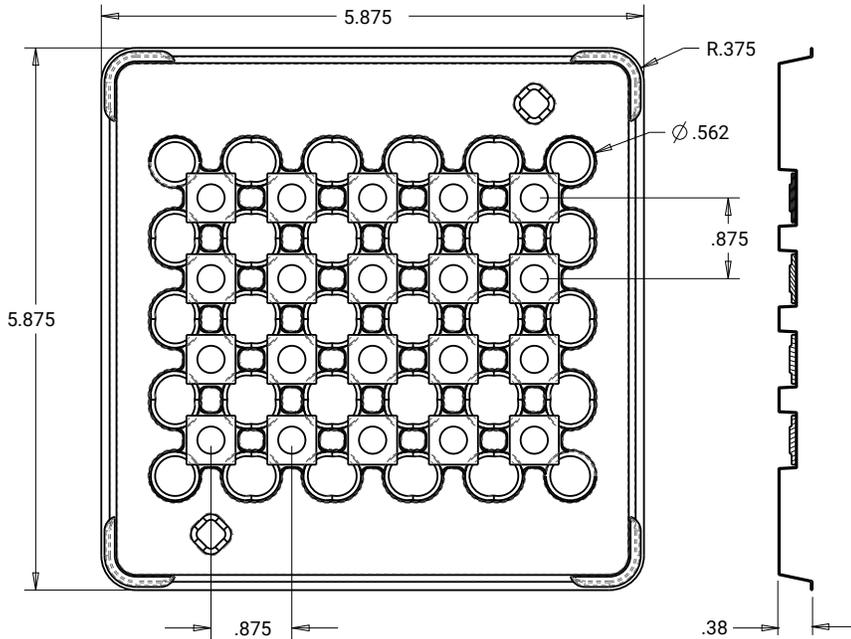
Vision Advisory

WARNING: Do not look at an 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](#).

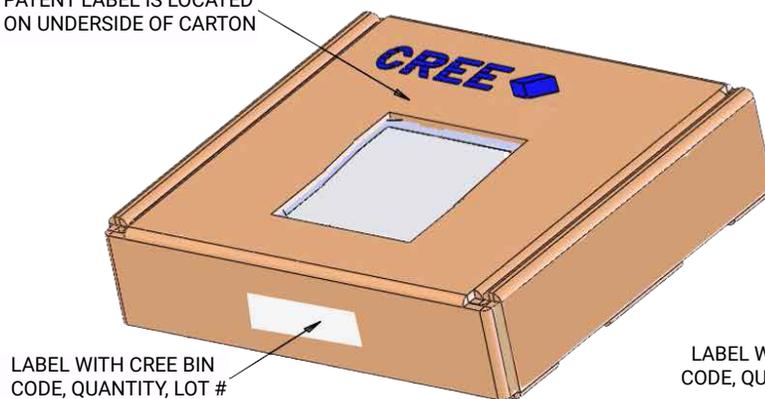
PACKAGING

Cree CXB1304 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.

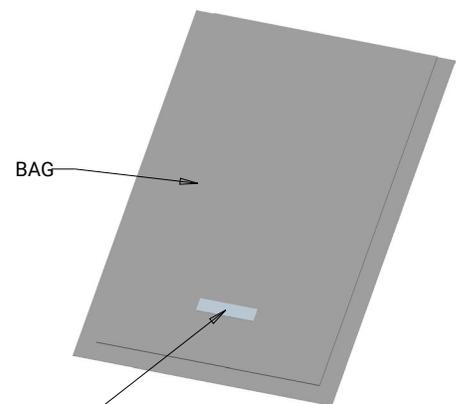
Dimensions are in inches.
Tolerances: $\pm .13$
 $x^\circ \pm 1^\circ$



PATENT LABEL IS LOCATED ON UNDERSIDE OF CARTON



LABEL WITH CREE BIN CODE, QUANTITY, LOT #



BAG

LABEL WITH CREE BIN CODE, QUANTITY, LOT #