CLD-DS116 REV 5C

Cree® XLamp® CXB1304 LED

PRODUCT DESCRIPTION

XLamp® CXA2 LED Arrays lead the industry in efficacy and reliability for ceramic-based COB LEDs. Cree CXA2 LEDs easily deliver TM-21 lifetimes well beyond L90 60,000 hours under a wide range of operating conditions. CXA2 LED Arrays share the same physical design as XLamp CXA and CMA LED families, allowing lighting manufacturers to leverage the existing optical, mechanical and electrical design elements to accelerate time to market without additional cost.

CXA2 Standard Density LED Arrays are now available in two different versions: Standard and eTone™ LEDs. The eTone version delivers beautiful 90 CRI light quality at the same efficacy as today's standard 80 CRI LEDs.

FEATURES

- 6-mm optical source
- Mechanical and optical design consistent with other CXA13 LEDs
- Cree EasyWhite® 2-, 3- and 5-step binning
- Premium Color 2- and 3-step binning
- Standard & Premium Color LEDs available in 70, 80, 90 and 95 CRI minimum options
- eTone™ LEDs available in 90 CRI minimum option
- 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 and REACh compliant
- UL® recognized component (E349212)

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300

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CHARACTERISTICS

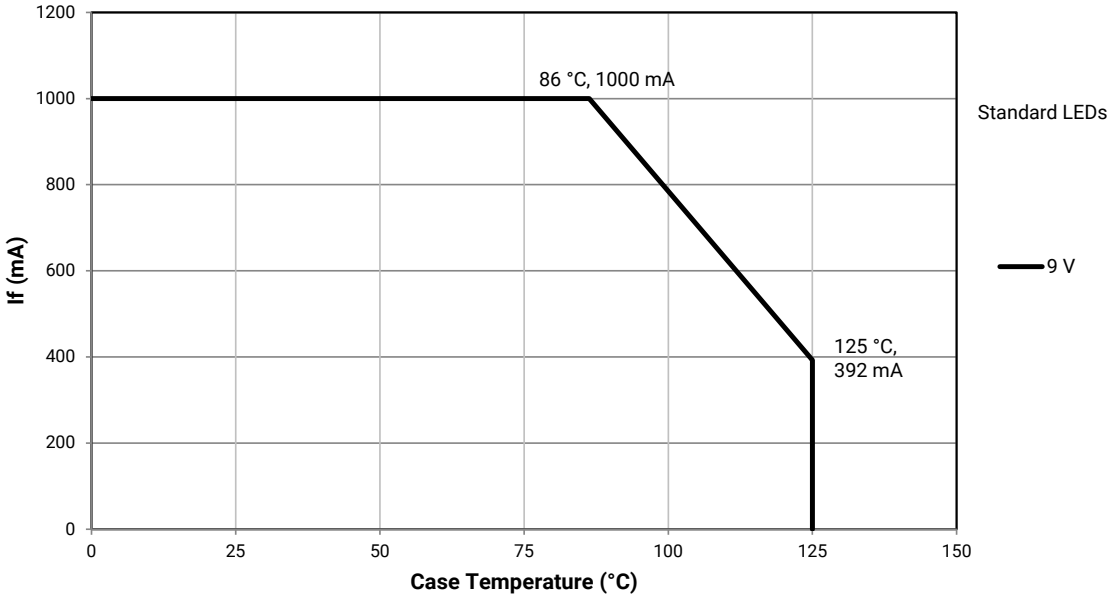
Characteristics	Unit	Minimum	Typical	Maximum
Viewing angle (FWHM)	degrees		115	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current (9 V) - Standard	mA			1000*
DC forward current (9 V) - eTone	mA			916*
DC forward current (18 V) - Standard	mA			500*
DC forward current (18 V) - eTone	mA			458*
DC forward current (36 V) - Standard	mA			250*
DC forward current (36 V) - eTone	mA			229*
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

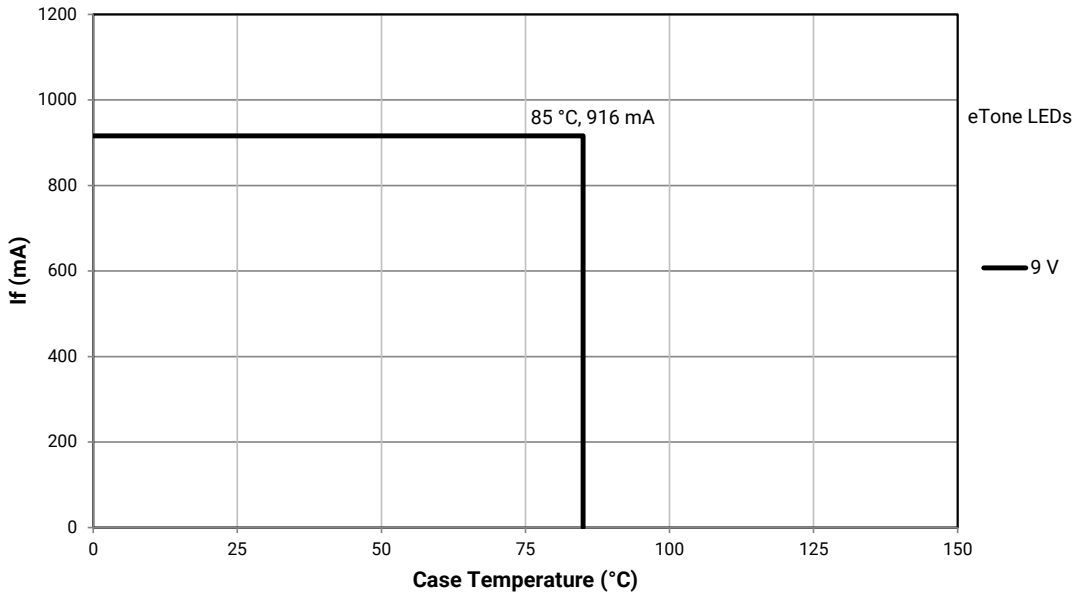
* Refer to the Operating Limits section.

OPERATING LIMITS

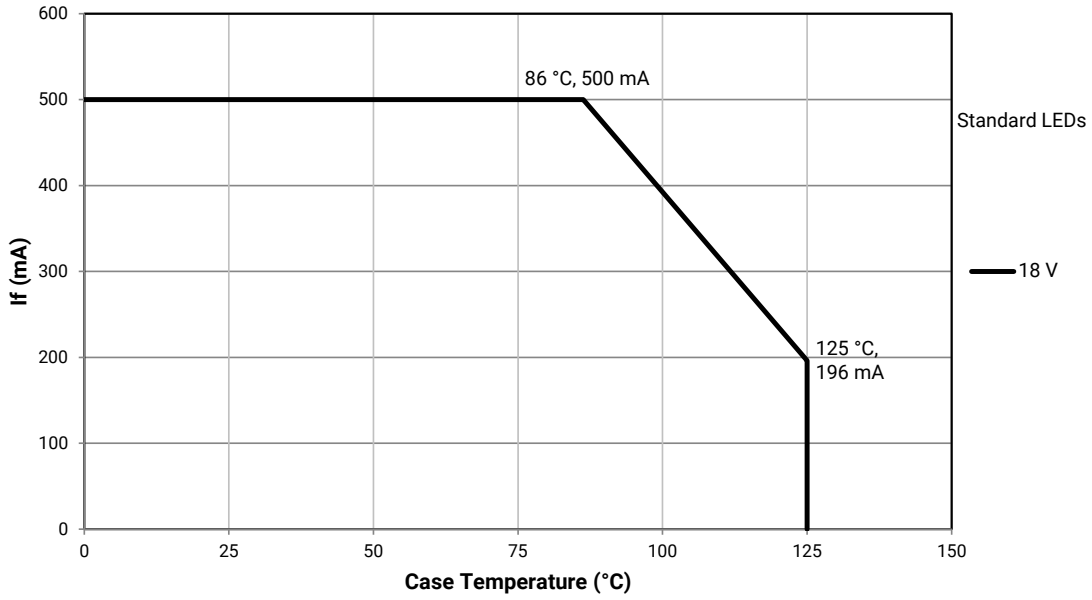
The maximum current rating of the CXB1304 depends on the case temperature (Tc) when the LED has reached thermal equilibrium under steady-state operation. The graphs shown below assume that the system design employs good thermal management (thermal interface material and heat sink) and may vary when poor thermal management is employed. Please refer to the Mechanical Dimensions section on page 37 for the location of the Tc measurement point.

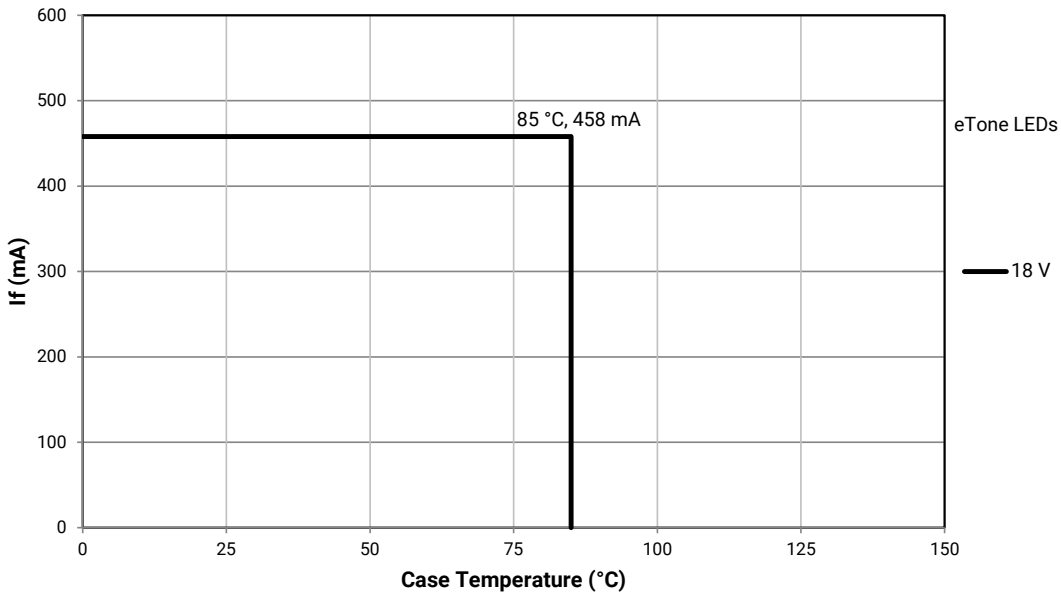
Another important factor in good thermal management is the temperature of the Light Emitting Surface (LES). Cree recommends a maximum LES temperature of 135 °C to ensure optimal LED lifetime. Please refer to the Thermal Design section on page 38 for more information on LES temperature measurement.



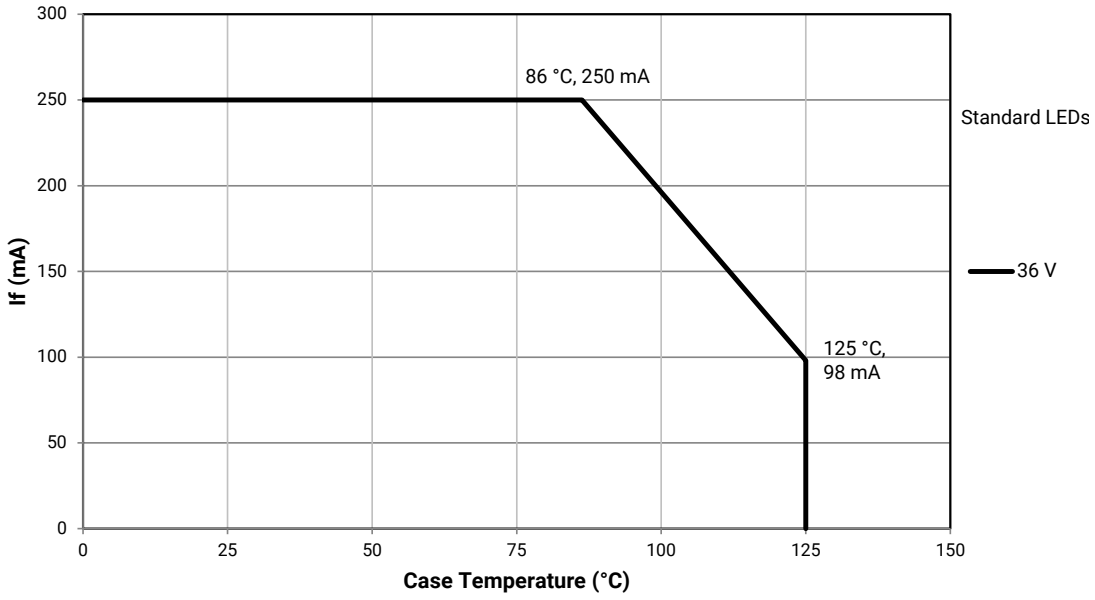


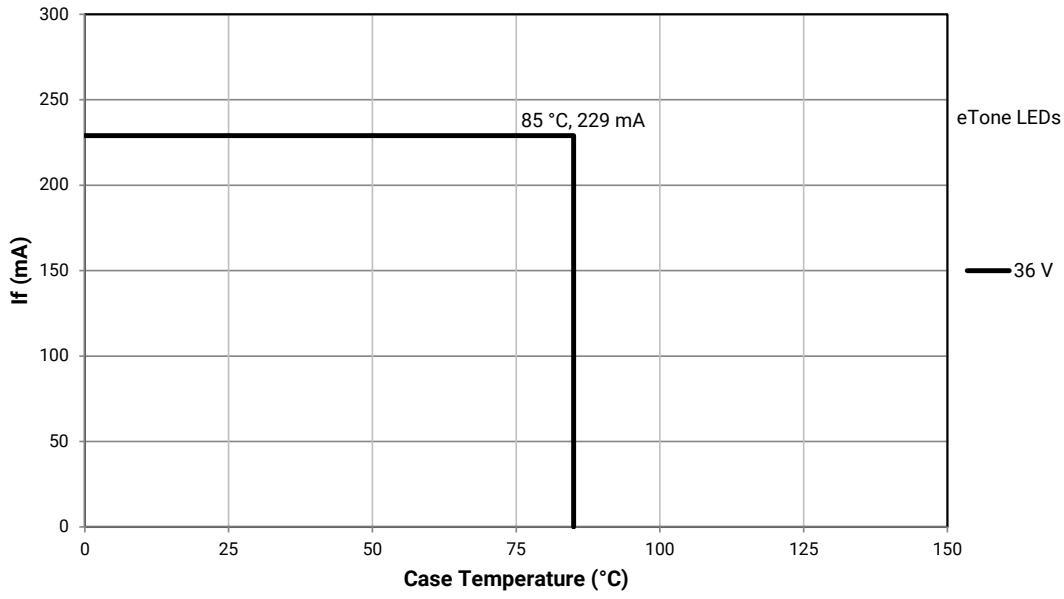
OPERATING LIMITS - CONTINUED





OPERATING LIMITS - CONTINUED





FLUX CHARACTERISTICS, ORDER CODES & BINS - STANDARD LEDS - 9 V (I_F = 400 mA, T_J = 85 °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 36).

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
			D4	550	607						CXB1304-0000-000C0BD465E
	80	---	C2	440	486					65E	CXB1304-0000-000C0HC265E
			C4	475	525						CXB1304-0000-000C0HC465E
			D2	510	563						CXB1304-0000-000C0HD265E
5700 K	70	---	C4	475	525					57E	CXB1304-0000-000C0BC457E
			D2	510	563						CXB1304-0000-000C0BD257E
			D4	550	607						CXB1304-0000-000C0BD457E
	80	---	C2	440	486					57E	CXB1304-0000-000C0HC257E
			C4	475	525						CXB1304-0000-000C0HC457E
			D2	510	563						CXB1304-0000-000C0HD257E

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS - 9 V (I_F = 400 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
5000 K	70	---	C4	475	525					50E	CXB1304-0000-000C0BC450E
			D2	510	563						CXB1304-0000-000C0BD250E
			D4	550	607						CXB1304-0000-000C0BD450E
	80	---	C2	440	486			50G	CXB1304-0000-000C0HC250G	50E	CXB1304-0000-000C0HC250E
			C4	475	525				CXB1304-0000-000C0HC450G		CXB1304-0000-000C0HC450E
			D2	510	563				CXB1304-0000-000C0HD250G		
	90	92	B4	410	453			50G	CXB1304-0000-000C0UB450G		
			C2	440	486				CXB1304-0000-000C0UC250G		
			C4	475	525				CXB1304-0000-000C0UC450G		
4000 K	70	---	C4	475	525					40E	CXB1304-0000-000C0BC440E
			D2	510	563						CXB1304-0000-000C0BD240E
			D4	550	607						CXB1304-0000-000C0BD440E
	80	---	C2	440	486	40H	CXB1304-0000-000C0HC240H	40G	CXB1304-0000-000C0HC240G		
			C4	475	525		CXB1304-0000-000C0HC440H		CXB1304-0000-000C0HC440G		
			D2	510	563		CXB1304-0000-000C0HD240H		CXB1304-0000-000C0HD240G		
	90	92	B2	380	420	40H	CXB1304-0000-000C0UB240H	40G	CXB1304-0000-000C0UB240G		
			B4	410	453		CXB1304-0000-000C0UB440H		CXB1304-0000-000C0UB440G		
			C2	440	486		CXB1304-0000-000C0UC240H		CXB1304-0000-000C0UC240G		

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS - 9 V (I_F = 400 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
3500 K	80	---	B4	410	453	35H	CXB1304-0000-000C0HB435H	35G	CXB1304-0000-000C0HB435G		
			C2	440	486		CXB1304-0000-000C0HC235H		CXB1304-0000-000C0HC235G		
			C4	475	525		CXB1304-0000-000C0HC435H		CXB1304-0000-000C0HC435G		
	90	92	A4	355	392	35H	CXB1304-0000-000C0UA435H	35G	CXB1304-0000-000C0UA435G		
			B2	380	420		CXB1304-0000-000C0UB235H		CXB1304-0000-000C0UB235G		
			B4	410	453		CXB1304-0000-000C0UB435H		CXB1304-0000-000C0UB435G		
			C2	440	486		CXB1304-0000-000C0UC235H		CXB1304-0000-000C0UC235G		
3000 K	80	---	B4	410	453	30H	CXB1304-0000-000C0HB430H	30G	CXB1304-0000-000C0HB430G		
			C2	440	486		CXB1304-0000-000C0HC230H		CXB1304-0000-000C0HC230G		
			C4	475	525		CXB1304-0000-000C0HC430H		CXB1304-0000-000C0HC430G		
	90	92	A4	355	392	30H	CXB1304-0000-000C0UA430H	30G	CXB1304-0000-000C0UA430G		
			B2	380	420		CXB1304-0000-000C0UB230H		CXB1304-0000-000C0UB230G		
			B4	410	453		CXB1304-0000-000C0UB430H		CXB1304-0000-000C0UB430G		
2700 K	80	---	B4	410	453	27H	CXB1304-0000-000C0HB427H	27G	CXB1304-0000-000C0HB427G		
			C2	440	486		CXB1304-0000-000C0HC227H		CXB1304-0000-000C0HC227G		
			C4	475	525		CXB1304-0000-000C0HC427H		CXB1304-0000-000C0HC427G		
	90	92	A2	330	364	27H	CXB1304-0000-000C0UA227H	27G	CXB1304-0000-000C0UA227G		
			A4	355	392		CXB1304-0000-000C0UA427H		CXB1304-0000-000C0UA427G		
			B2	380	420		CXB1304-0000-000C0UB227H		CXB1304-0000-000C0UB227G		
2200 K	80	---	B2	380	420			22G	CXB1304-0000-000C0HB222G		

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS, PREMIUM COLOR - 9 V (I_F = 400 mA, T_J = 85 °C)

Fidelity

Nominal CCT	CRI*		Minimum Luminous Flux			Typical Luminous Flux (lm) @ 85 °C	2-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**		Group	Order Code
4000 K	95	98	B2	380	420	402	L5A	CXB1304-0000-000C0ZB2L5A
3500 K	95	98	A4	355	392	387	35H	CXB1304-0000-000C0ZA435H
3000 K	95	98	A4	355	392	372	30H	CXB1304-0000-000C0ZA430H
2700 K	95	98	A2	330	361	351	27H	CXB1304-0000-000C0ZA227H

Specialty

Nominal CCT	CRI		Minimum Luminous Flux			Typical Luminous Flux (lm) @ 85 °C	2-Step		3-Step			
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**		Group	Order Code	Group	Order Code	Group	Order Code
3100 K	90	92	B4	410	453	430			31Q	CXB1304-0000-000C0UB431Q		
3000 K	80	---	C2	440	486	490	L7B	CXB1304-0000-000C0HC2L7B				
	90	92	B4	410	453	425			30Q	CXB1304-0000-000C0UB430Q	30U	CXB1304-0000-000C0UB430U
	95	98	A2	330	361	355	L7C	CXB1304-0000-000C0ZA2L7C				

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. See the Measurements section (page 40).
- 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, ORDER CODES AND BINS - ETONE™ LEDS - 9 V (I_F = 400 mA, T_J = 85 °C)

Nominal CCT	CRI*		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	2-Step		3-Step	
	Min.	Typ			Group	Order Code	Group	Order Code
4000 K	90	92	405	488	40H	CXB1304-0000-00PC0U0A40H	40G	CXB1304-0000-00PC0U0A40G
3500 K	90	92	381	480	35H	CXB1304-0000-00PC0U0A35H	35G	CXB1304-0000-00PC0U0A35G
3000 K	90	92	390	475	30H	CXB1304-0000-00PC0U0A30H	30G	CXB1304-0000-00PC0U0A30G
2700 K	90	92	390	456	27H	CXB1304-0000-00PC0U0A27H	27G	CXB1304-0000-00PC0U0A27G

Specialty

Nominal CCT	CRI		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	3-Step			
	Min.	Typ			Group	Order Code	Group	Order Code
3100 K	90	92	385	470	31Q	CXB1304-0000-00PC0U0A31Q		
3000 K	90	92	390	475	30Q	CXB1304-0000-00PC0U0A30Q	30U	CXB1304-0000-00PC0U0A30U

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. See the Measurements section (page 40).
- 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 CHARACTERISTICS, ORDER CODES & BINS - STANDARD LEDS - 18 V (I_F = 200 mA, T_J = 85 °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 36).

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
			D4	550	607						CXB1304-0000-000F0BD465E
	80	---	C2	440	486					65E	CXB1304-0000-000F0HC265E
			C4	475	525						CXB1304-0000-000F0HC465E
			D2	510	563						CXB1304-0000-000F0HD265E
5700 K	70	---	C4	475	525					57E	CXB1304-0000-000F0BC457E
			D2	510	563						CXB1304-0000-000F0BD257E
			D4	550	607						CXB1304-0000-000F0BD457E
	80	---	C2	440	486					57E	CXB1304-0000-000F0HC257E
			C4	475	525						CXB1304-0000-000F0HC457E
			D2	510	563						CXB1304-0000-000F0HD257E

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS - 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
5000 K	70	---	C4	475	525					50E	CXB1304-0000-000F0BC450E
			D2	510	563						CXB1304-0000-000F0BD250E
			D4	550	607						CXB1304-0000-000F0BD450E
	80	---	C2	440	486			50G	CXB1304-0000-000F0HC250G	50E	CXB1304-0000-000F0HC250E
			C4	475	525				CXB1304-0000-000F0HC450G		CXB1304-0000-000F0HC450E
			D2	510	563				CXB1304-0000-000F0HD250G		
	90	92	B4	410	453			50G	CXB1304-0000-000F0UB450G		
			C2	440	486				CXB1304-0000-000F0UC250G		
			C4	475	525				CXB1304-0000-000F0UC450G		
4000 K	70	---	C4	475	525					40E	CXB1304-0000-000F0BC440E
			D2	510	563						CXB1304-0000-000F0BD240E
			D4	550	607						CXB1304-0000-000F0BD440E
	80	---	C2	440	486	40H	CXB1304-0000-000F0HC240H	40G	CXB1304-0000-000F0HC240G		
			C4	475	525		CXB1304-0000-000F0HC440H		CXB1304-0000-000F0HC440G		
			D2	510	563		CXB1304-0000-000F0HD240H		CXB1304-0000-000F0HD240G		
	90	92	B2	380	420	40H	CXB1304-0000-000F0UB240H	40G	CXB1304-0000-000F0UB240G		
			B4	410	453		CXB1304-0000-000F0UB440H		CXB1304-0000-000F0UB440G		
			C2	440	486		CXB1304-0000-000F0UC240H		CXB1304-0000-000F0UC240G		

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS - 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
3500 K	80	---	B4	410	453	35H	CXB1304-0000-000F0HB435H	35G	CXB1304-0000-000F0HB435G		
			C2	440	486		CXB1304-0000-000F0HC235H		CXB1304-0000-000F0HC235G		
			C4	475	525		CXB1304-0000-000F0HC435H		CXB1304-0000-000F0HC435G		
	90	92	A4	355	392	35H	CXB1304-0000-000F0UA435H	35G	CXB1304-0000-000F0UA435G		
			B2	380	420		CXB1304-0000-000F0UB235H		CXB1304-0000-000F0UB235G		
			B4	410	453		CXB1304-0000-000F0UB435H		CXB1304-0000-000F0UB435G		
			C2	440	486		CXB1304-0000-000F0UC235H		CXB1304-0000-000F0UC235G		
3000 K	80	---	B4	410	453	30H	CXB1304-0000-000F0HB430H	30G	CXB1304-0000-000F0HB430G		
			C2	440	486		CXB1304-0000-000F0HC230H		CXB1304-0000-000F0HC230G		
			C4	475	525		CXB1304-0000-000F0HC430H		CXB1304-0000-000F0HC430G		
	90	92	A4	355	392	30H	CXB1304-0000-000F0UA430H	30G	CXB1304-0000-000F0UA430G		
			B2	380	420		CXB1304-0000-000F0UB230H		CXB1304-0000-000F0UB230G		
			B4	410	453		CXB1304-0000-000F0UB430H		CXB1304-0000-000F0UB430G		
2700 K	80	---	B4	410	453	27H	CXB1304-0000-000F0HB427H	27G	CXB1304-0000-000F0HB427G		
			C2	440	486		CXB1304-0000-000F0HC227H		CXB1304-0000-000F0HC227G		
			C4	475	525		CXB1304-0000-000F0HC427H		CXB1304-0000-000F0HC427G		
	90	92	A2	330	364	27H	CXB1304-0000-000F0UA227H	27G	CXB1304-0000-000F0UA227G		
			A4	355	392		CXB1304-0000-000F0UA427H		CXB1304-0000-000F0UA427G		
			B2	380	420		CXB1304-0000-000F0UB227H		CXB1304-0000-000F0UB227G		
2200 K	80	---	B2	380	420			22G	CXB1304-0000-000F0HB222G		

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS, PREMIUM COLOR - 18 V (I_F = 200 mA, T_J = 85 °C)

Fidelity

Nominal CCT	CRI*		Minimum Luminous Flux			Typical Luminous Flux (lm) @ 85 °C	2-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**		Group	Order Code
4000 K	95	98	B2	380	420	402	L5A	CXB1304-0000-000F0ZB2L5A
3500 K	95	98	A4	355	392	387	35H	CXB1304-0000-000F0ZA435H
3000 K	95	98	A4	355	392	372	30H	CXB1304-0000-000F0ZA430H
2700 K	95	98	A2	330	361	351	27H	CXB1304-0000-000F0ZA227H

Specialty

Nominal CCT	CRI		Minimum Luminous Flux			Typical Luminous Flux (lm) @ 85 °C	2-Step		3-Step			
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**		Group	Order Code	Group	Order Code	Group	Order Code
3100 K	90	92	B4	410	453	430			31Q	CXB1304-0000-000F0UB431Q		
3000 K	80	---	C2	440	486	490	L7B	CXB1304-0000-000F0HC2L7B				
	90	92	B4	410	453	425			30Q	CXB1304-0000-000F0UB430Q	30U	CXB1304-0000-000F0UB430U
	95	98	A2	330	361	355	L7C	CXB1304-0000-000F0ZA2L7C				

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. See the Measurements section (page 40).
- 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, ORDER CODES AND BINS - ETONE™ LEDS - 18 V (I_F = 200 mA, T_J = 85 °C)

Nominal CCT	CRI*		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	2-Step		3-Step	
	Min.	Typ			Group	Order Code	Group	Order Code
4000 K	90	92	405	488	40H	CXB1304-0000-00PF0U0A40H	40G	CXB1304-0000-00PF0U0A40G
3500 K	90	92	381	480	35H	CXB1304-0000-00PF0U0A35H	35G	CXB1304-0000-00PF0U0A35G
3000 K	90	92	390	475	30H	CXB1304-0000-00PF0U0A30H	30G	CXB1304-0000-00PF0U0A30G
2700 K	90	92	390	456	27H	CXB1304-0000-00PF0U0A27H	27G	CXB1304-0000-00PF0U0A27G

Specialty

Nominal CCT	CRI		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	3-Step			
	Min.	Typ			Group	Order Code	Group	Order Code
3100 K	90	92	385	470	31Q	CXB1304-0000-00PF0U0A31Q		
3000 K	90	92	390	475	30Q	CXB1304-0000-00PF0U0A30Q	30U	CXB1304-0000-00PF0U0A30U

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. See the Measurements section (page 40).
- 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 CHARACTERISTICS, ORDER CODES & BINS - STANDARD LEDS - 36 V (I_F = 100 mA, T_J = 85 °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 36).

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
			D4	550	607						CXB1304-0000-000N0BD465E
	80	---	C2	440	486					65E	CXB1304-0000-000N0HC265E
			C4	475	525						CXB1304-0000-000N0HC465E
			D2	510	563						CXB1304-0000-000N0HD265E
5700 K	70	---	C4	475	525					57E	CXB1304-0000-000N0BC457E
			D2	510	563						CXB1304-0000-000N0BD257E
			D4	550	607						CXB1304-0000-000N0BD457E
	80	---	C2	440	486					57E	CXB1304-0000-000N0HC257E
			C4	475	525						CXB1304-0000-000N0HC457E
			D2	510	563						CXB1304-0000-000N0HD257E

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS - 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
5000 K	70	---	C4	475	525					50E	CXB1304-0000-000N0BC450E
			D2	510	563						CXB1304-0000-000N0BD250E
			D4	550	607						CXB1304-0000-000N0BD450E
	80	---	C2	440	486			50G	CXB1304-0000-000N0HC250G	50E	CXB1304-0000-000N0HC250E
			C4	475	525				CXB1304-0000-000N0HC450G		CXB1304-0000-000N0HC450E
			D2	510	563				CXB1304-0000-000N0HD250G		
	90	92	B4	410	453			50G	CXB1304-0000-000N0UB450G		
			C2	440	486				CXB1304-0000-000N0UC250G		
			C4	475	525				CXB1304-0000-000N0UC450G		
4000 K	70	---	C4	475	525					40E	CXB1304-0000-000N0BC440E
			D2	510	563						CXB1304-0000-000N0BD240E
			D4	550	607						CXB1304-0000-000N0BD440E
	80	---	C2	440	486	40H	CXB1304-0000-000N0HC240H	40G	CXB1304-0000-000N0HC240G		
			C4	475	525		CXB1304-0000-000N0HC440H		CXB1304-0000-000N0HC440G		
			D2	510	563		CXB1304-0000-000N0HD240H		CXB1304-0000-000N0HD240G		
	90	92	B2	380	420	40H	CXB1304-0000-000N0UB240H	40G	CXB1304-0000-000N0UB240G		
			B4	410	453		CXB1304-0000-000N0UB440H		CXB1304-0000-000N0UB440G		
			C2	440	486		CXB1304-0000-000N0UC240H		CXB1304-0000-000N0UC240G		

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS - 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
3500 K	80	---	B4	410	453	35H	CXB1304-0000-000N0HB435H	35G	CXB1304-0000-000N0HB435G		
			C2	440	486		CXB1304-0000-000N0HC235H		CXB1304-0000-000N0HC235G		
			C4	475	525		CXB1304-0000-000N0HC435H		CXB1304-0000-000N0HC435G		
	90	92	A4	355	392	35H	CXB1304-0000-000N0UA435H	35G	CXB1304-0000-000N0UA435G		
			B2	380	420		CXB1304-0000-000N0UB235H		CXB1304-0000-000N0UB235G		
			B4	410	453		CXB1304-0000-000N0UB435H		CXB1304-0000-000N0UB435G		
			C2	440	486		CXB1304-0000-000N0UC235H		CXB1304-0000-000N0UC235G		
3000 K	80	---	B4	410	453	30H	CXB1304-0000-000N0HB430H	30G	CXB1304-0000-000N0HB430G		
			C2	440	486		CXB1304-0000-000N0HC230H		CXB1304-0000-000N0HC230G		
			C4	475	525		CXB1304-0000-000N0HC430H		CXB1304-0000-000N0HC430G		
	90	92	A4	355	392	30H	CXB1304-0000-000N0UA430H	30G	CXB1304-0000-000N0UA430G		
			B2	380	420		CXB1304-0000-000N0UB230H		CXB1304-0000-000N0UB230G		
			B4	410	453		CXB1304-0000-000N0UB430H		CXB1304-0000-000N0UB430G		
2700 K	80	---	B4	410	453	27H	CXB1304-0000-000N0HB427H	27G	CXB1304-0000-000N0HB427G		
			C2	440	486		CXB1304-0000-000N0HC227H		CXB1304-0000-000N0HC227G		
			C4	475	525		CXB1304-0000-000N0HC427H		CXB1304-0000-000N0HC427G		
	90	92	A2	330	364	27H	CXB1304-0000-000N0UA227H	27G	CXB1304-0000-000N0UA227G		
			A4	355	392		CXB1304-0000-000N0UA427H		CXB1304-0000-000N0UA427G		
			B2	380	420		CXB1304-0000-000N0UB227H		CXB1304-0000-000N0UB227G		
2200 K	80	---	B2	380	420			22G	CXB1304-0000-000N0HB222G		

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. See the Measurements section (page 40).
- 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, ORDER CODES & BINS - STANDARD LEDS, PREMIUM COLOR - 36 V (I_F = 100 mA, T_J = 85 °C)

Fidelity

Nominal CCT	CRI*		Minimum Luminous Flux			Typical Luminous Flux (lm) @ 85 °C	2-Step	
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**		Group	Order Code
4000 K	95	98	B2	380	420	402	L5A	CXB1304-0000-000N0ZB2L5A
3500 K	95	98	A4	355	392	387	35H	CXB1304-0000-000N0ZA435H
3000 K	95	98	A4	355	392	372	30H	CXB1304-0000-000N0ZA430H
2700 K	95	98	A2	330	361	351	27H	CXB1304-0000-000N0ZA227H

Specialty

Nominal CCT	CRI		Minimum Luminous Flux			Typical Luminous Flux (lm) @ 85 °C	2-Step		3-Step			
	Min	Typ	Group	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C**		Group	Order Code	Group	Order Code	Group	Order Code
3100 K	90	92	B4	410	453	430			31Q	CXB1304-0000-000N0UB431Q		
3000 K	80	---	C2	440	486	490	L7B	CXB1304-0000-000N0HC2L7B				
	90	92	B4	410	453	425			30Q	CXB1304-0000-000N0UB430Q	30U	CXB1304-0000-000N0UB430U
	95	98	A2	330	361	355	L7C	CXB1304-0000-000N0ZA2L7C				

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. See the Measurements section (page 40).
- 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, ORDER CODES AND BINS - ETONE™ LEDS - 36 V (I_F = 100 mA, T_J = 85 °C)

Nominal CCT	CRI*		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	2-Step		3-Step	
	Min.	Typ			Group	Order Code	Group	Order Code
4000 K	90	92	405	488	40H	CXB1304-0000-00PN0U0A40H	40G	CXB1304-0000-00PN0U0A40G
3500 K	90	92	381	480	35H	CXB1304-0000-00PN0U0A35H	35G	CXB1304-0000-00PN0U0A35G
3000 K	90	92	390	475	30H	CXB1304-0000-00PN0U0A30H	30G	CXB1304-0000-00PN0U0A30G
2700 K	90	92	390	456	27H	CXB1304-0000-00PN0U0A27H	27G	CXB1304-0000-00PN0U0A27G

Specialty

Nominal CCT	CRI		Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	3-Step			
	Min.	Typ			Group	Order Code	Group	Order Code
3100 K	90	92	385	470	31Q	CXB1304-0000-00PN0U0A31Q		
3000 K	90	92	390	475	30Q	CXB1304-0000-00PN0U0A30Q	30U	CXB1304-0000-00PN0U0A30U

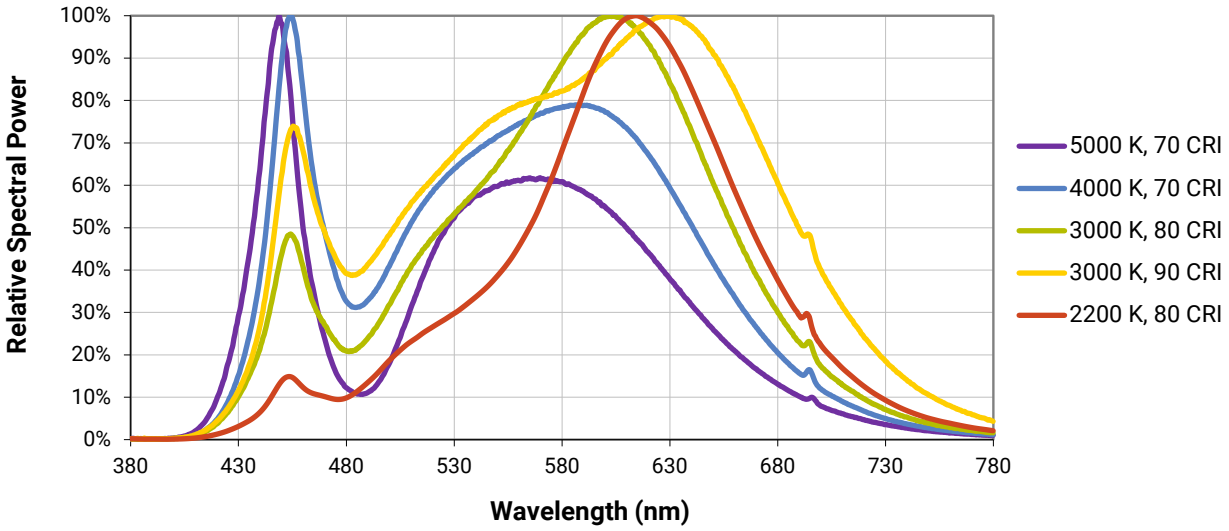
Notes

- 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. See the Measurements section (page 40).
- 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.

RELATIVE SPECTRAL POWER DISTRIBUTION - STANDARD LEDS

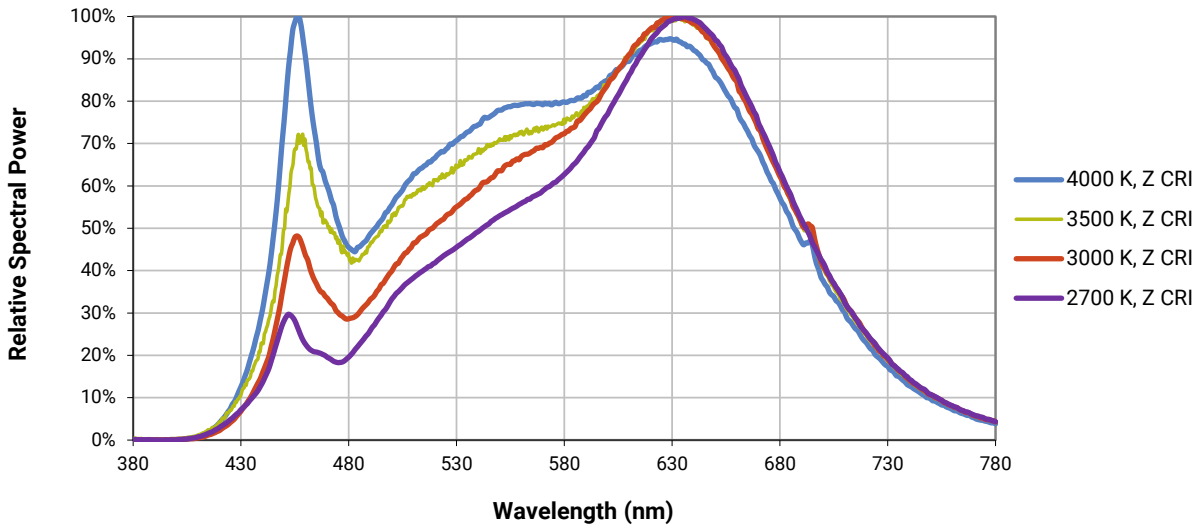
The following graph is the result of a series of pulsed measurements at 400 mA for the 9-V CXB1304 LED, 200 mA for the 18-V CXB1304 LED and 100 mA for the 36-V CXB1304 LED and T_J = 85 °C.



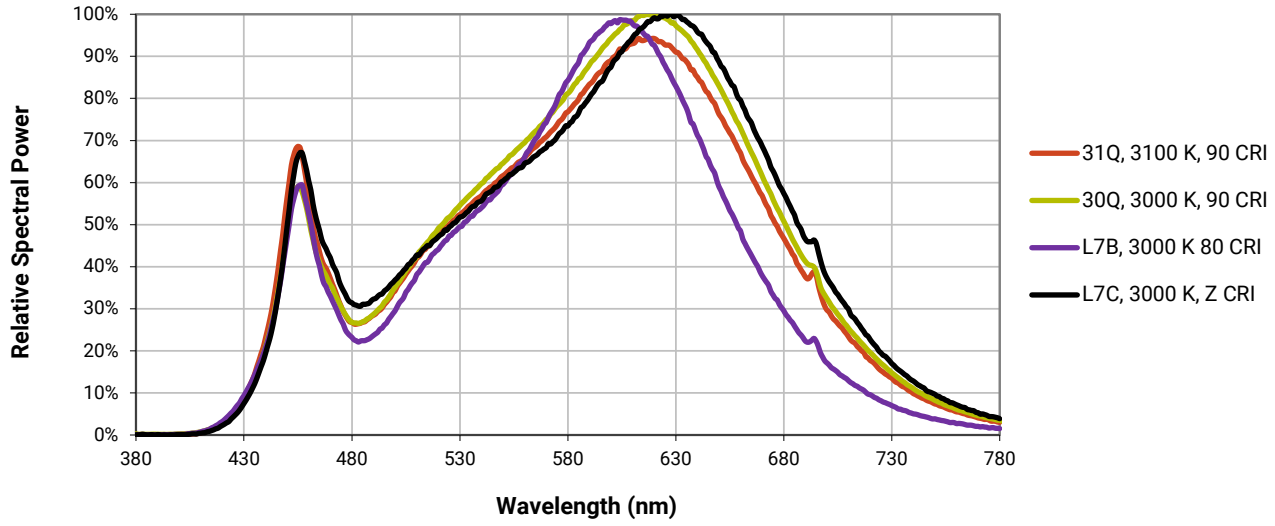
RELATIVE SPECTRAL POWER DISTRIBUTION - STANDARD LEDS, PREMIUM COLOR

The following graphs are 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 °C.

Fidelity

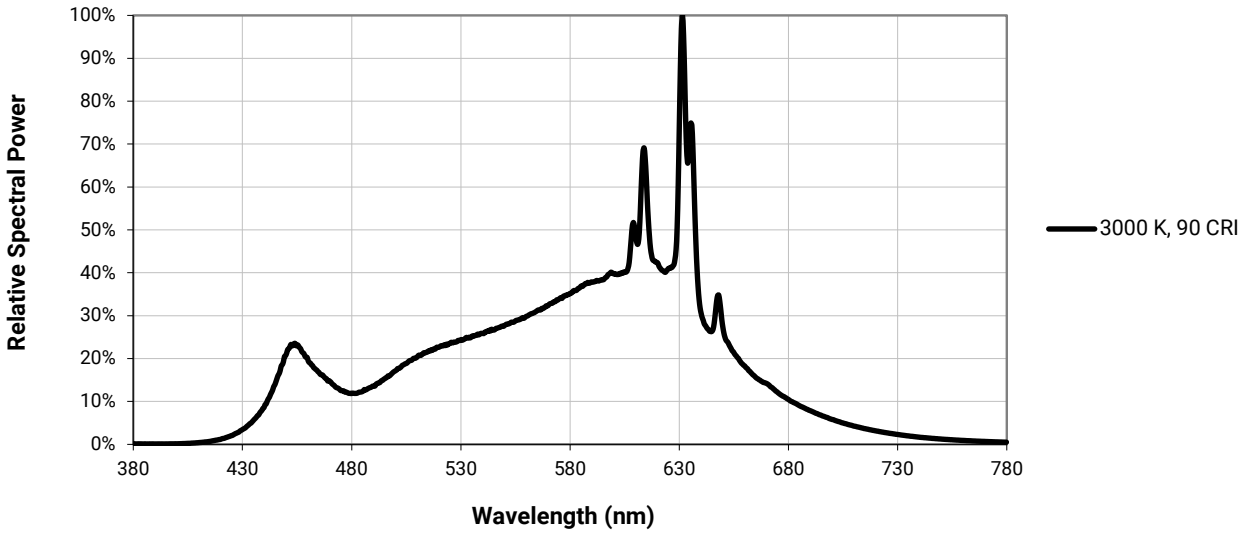


Specialty



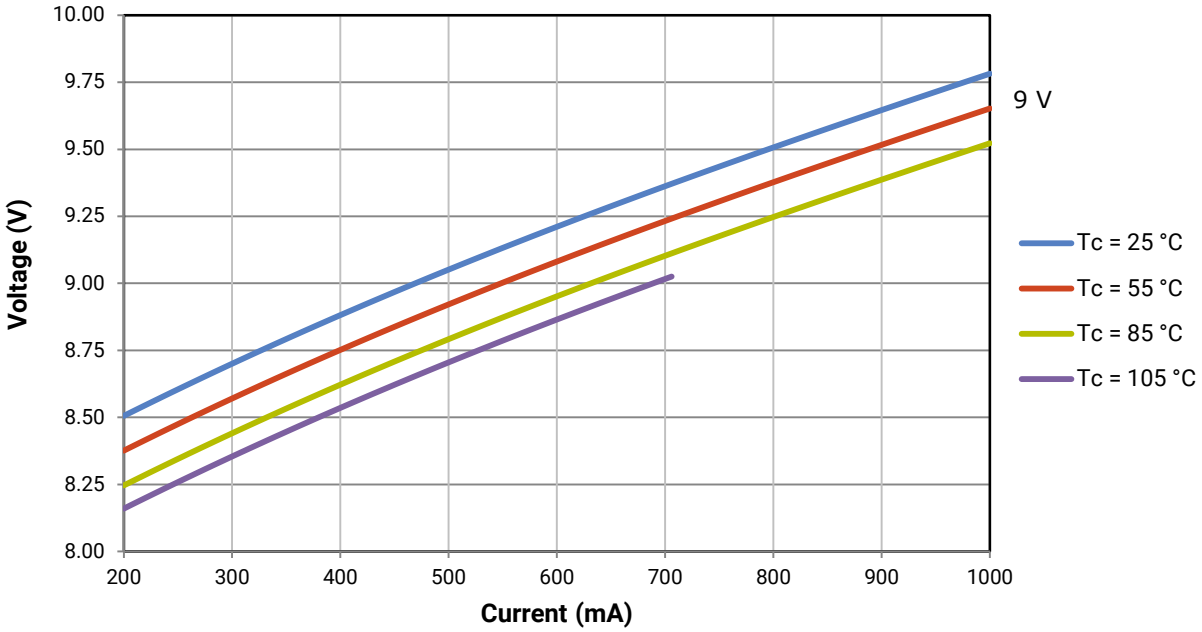
RELATIVE SPECTRAL POWER DISTRIBUTION - ETONE™ LEDS

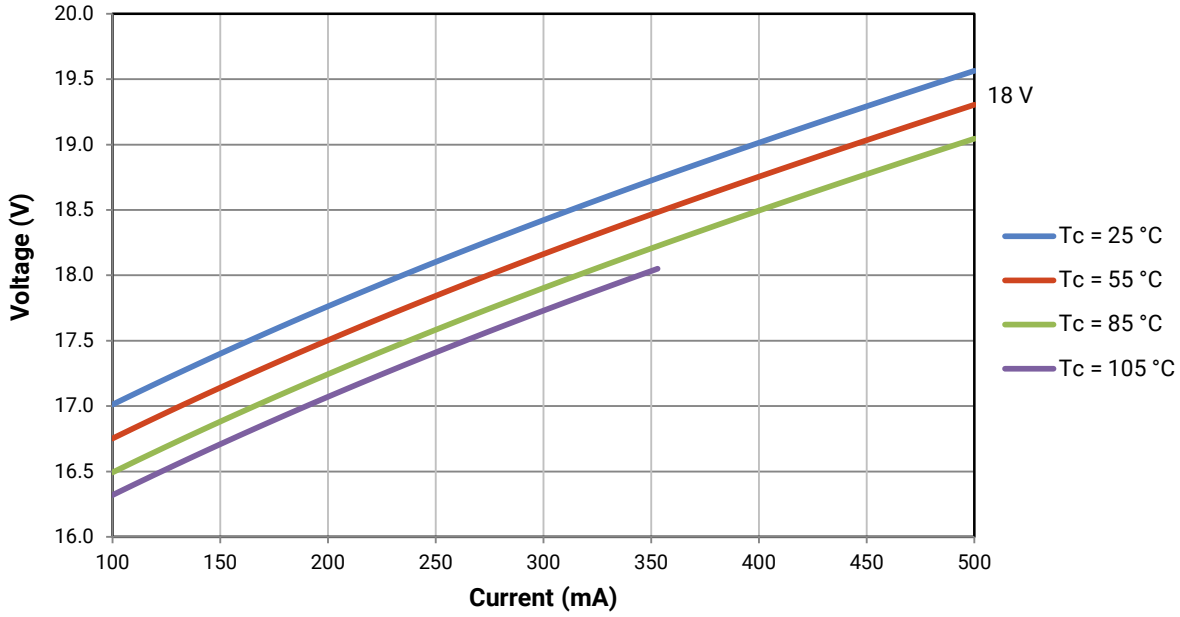
The following graph is the result of a series of pulsed measurements at 400 mA for the 9-V CXB1304 LED, 200 mA for the 18-V CXB1304 LED and 100 mA for the 36-V CXB1304 LED and T_J = 85 °C.



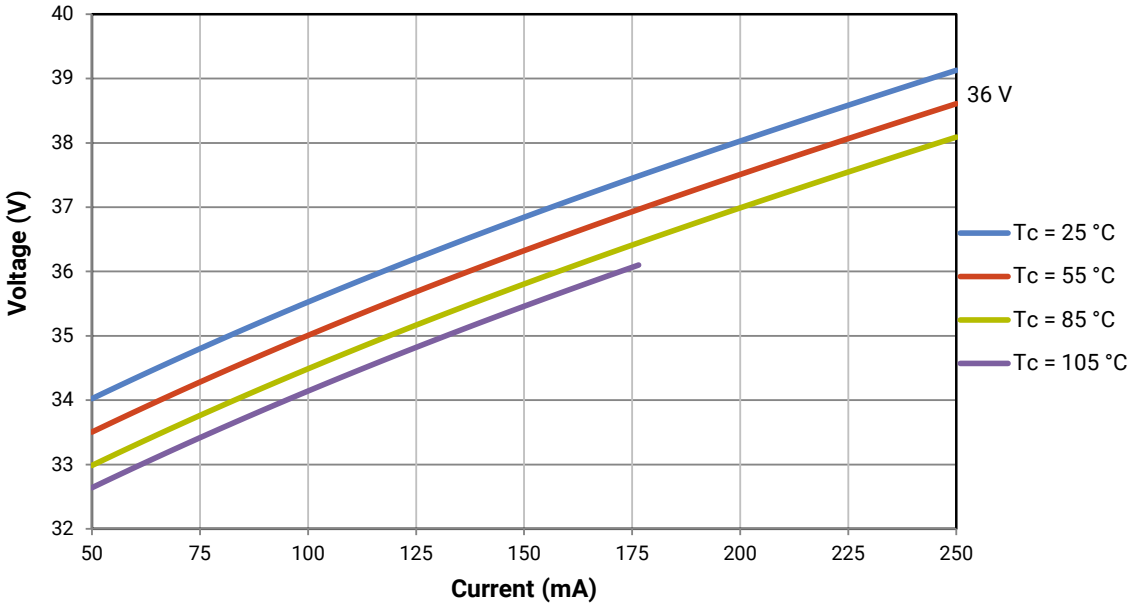
ELECTRICAL CHARACTERISTICS

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





ELECTRICAL CHARACTERISTICS - CONTINUED

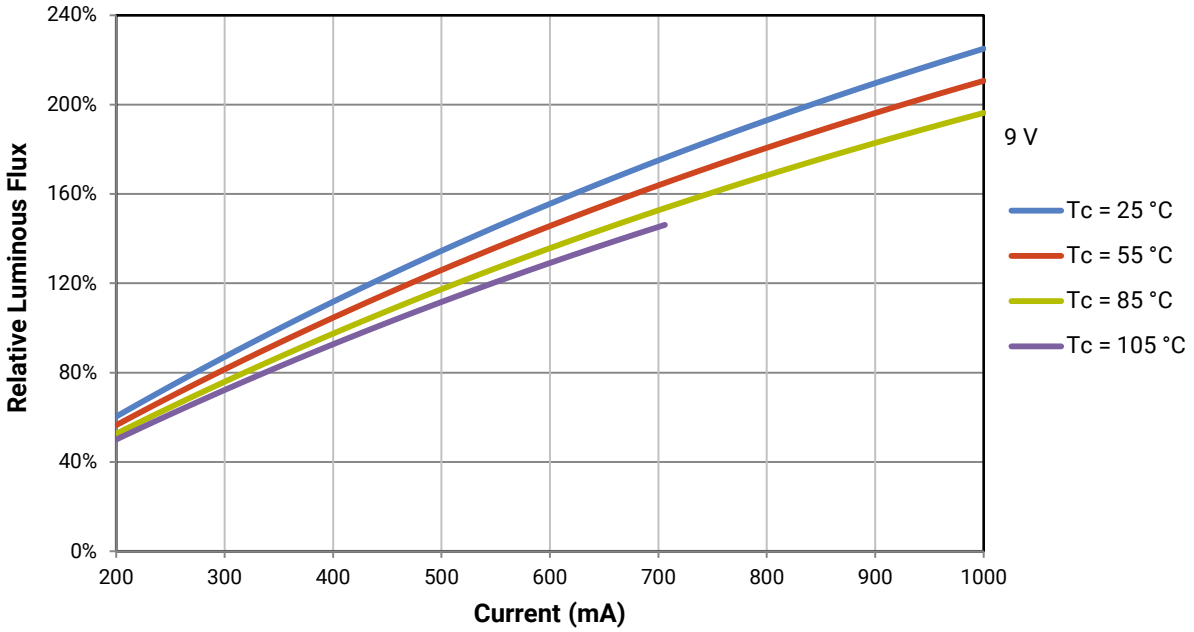


RELATIVE LUMINOUS FLUX

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 °C for the 9-V CXB1304 LED.

Using the 9-V CXB1304 LED as an example, at steady-state operation of Tc = 55 °C, I_F = 300 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 Tc = 55 °C, I_F = 300 mA.

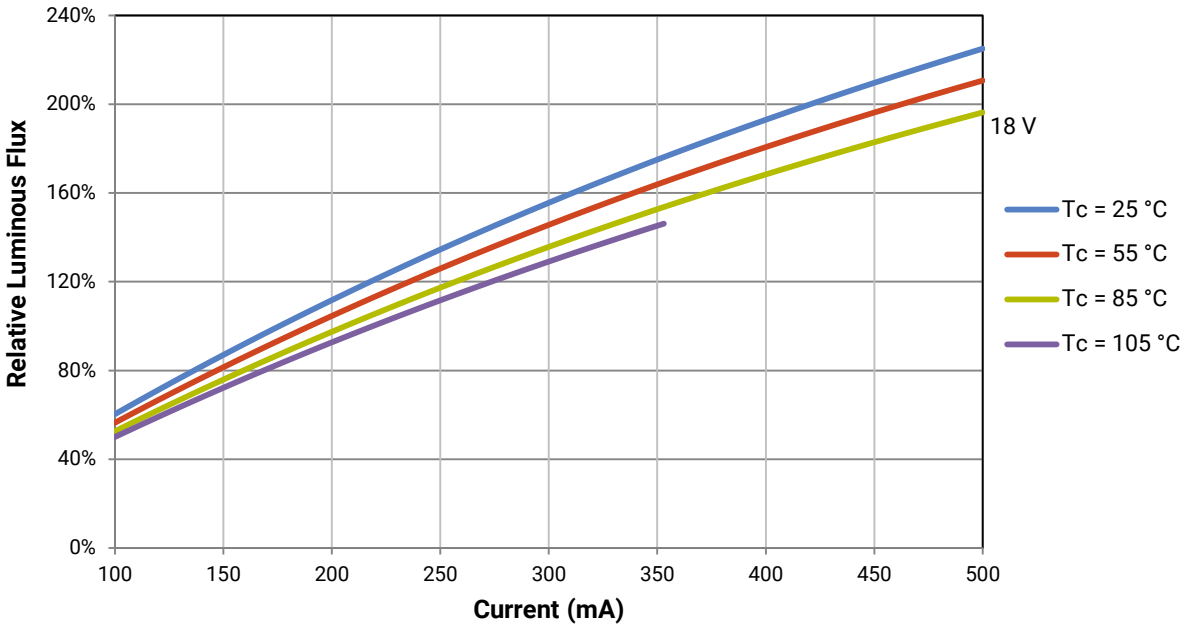


RELATIVE LUMINOUS FLUX - CONTINUED

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 °C for the 18-V CXB1304 LED.

Using the 18-V CXB1304 LED as an example, at steady-state operation of Tc = 55 °C, I_F = 150 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 Tc = 55 °C, I_F = 150 mA.

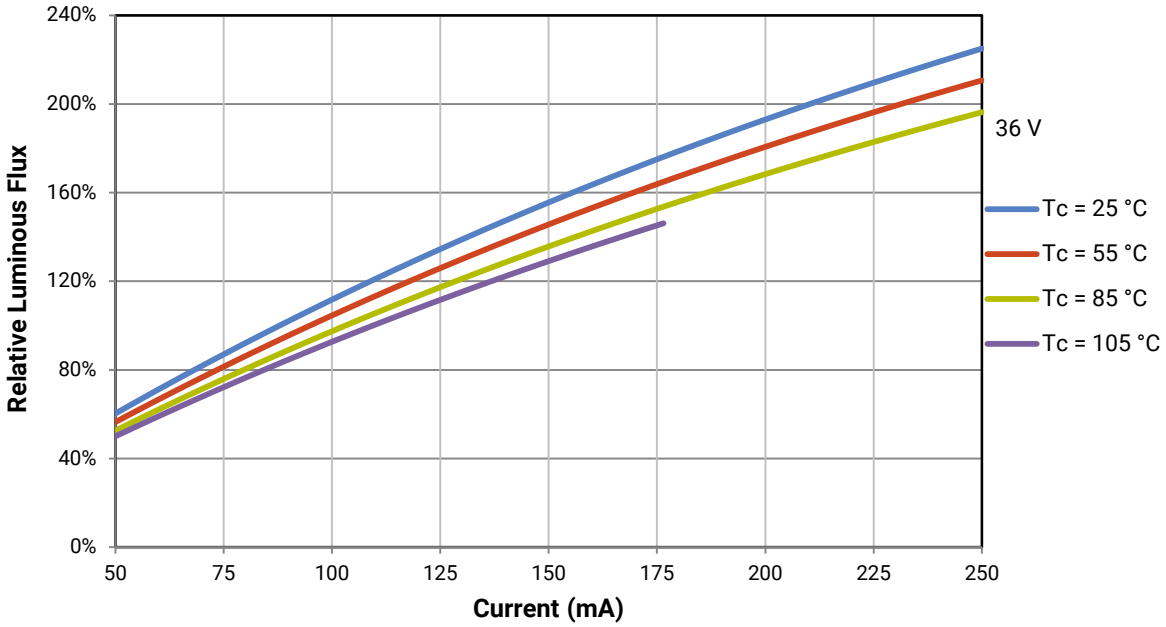


RELATIVE LUMINOUS FLUX - CONTINUED

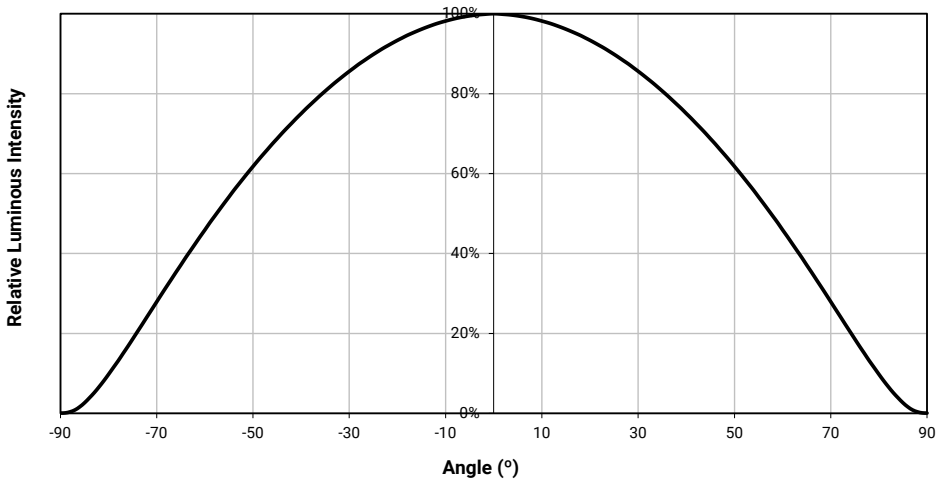
The relative luminous flux values provided below are the ratio of:

- 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 °C for the 36-V CXB1304 LED.

Using the 36-V CXB1304 LED as an example, at steady-state operation of Tc = 55 °C, I_F = 75 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 Tc = 55 °C, I_F = 75 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	Minimum Luminous Flux	Maximum 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
E2	590	635

PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °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
22G	2200 K	0.5066	0.4158	0.00980	0.00480	45.5

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

PREMIUM COLOR PERFORMANCE GROUPS - CHROMATICITY (T_J = 85 °C)

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

Fidelity

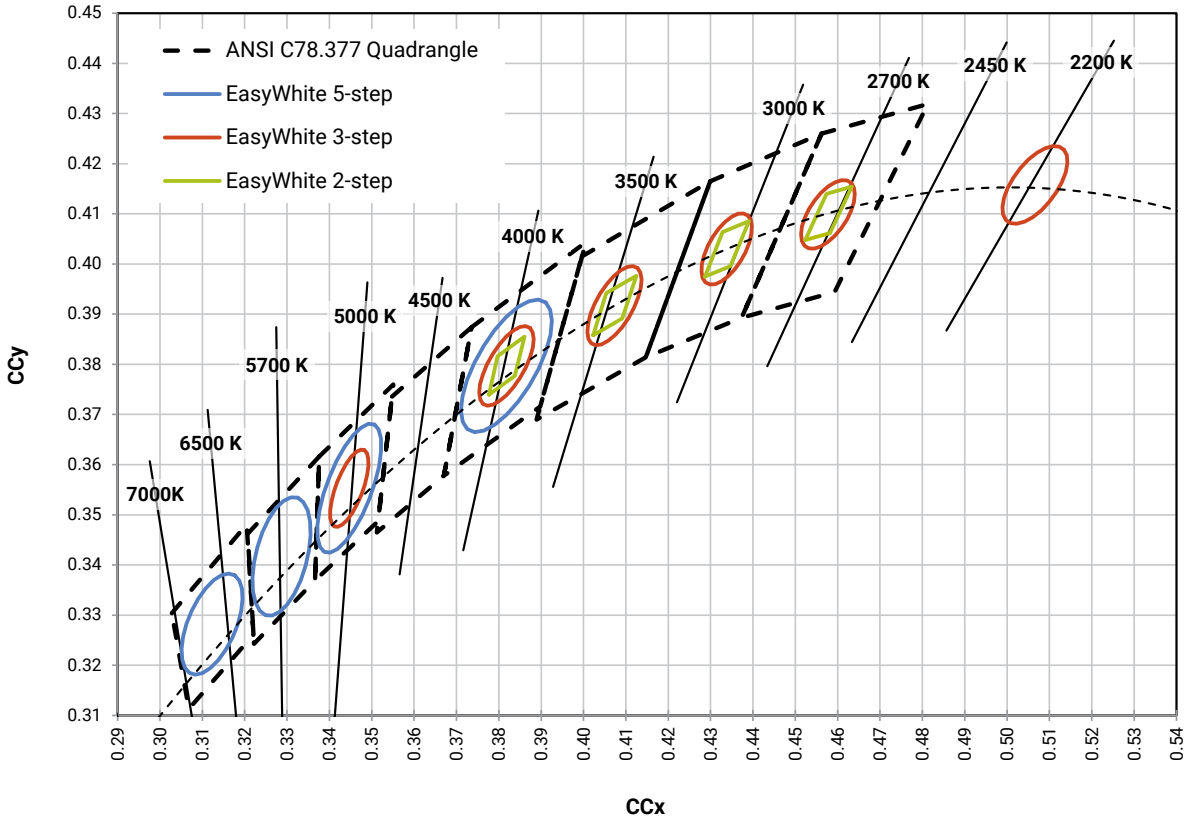
EasyWhite Color Temperatures – 2-Step			
Code	CCT	x	y
L5A	4000 K	0.3764	0.3711
		0.3784	0.3787
		0.3847	0.3826
		0.3825	0.3748
35H	3500 K	0.4022	0.3858
		0.4053	0.3942
		0.4125	0.3977
		0.4091	0.3891
30H	3000 K	0.4287	0.3975
		0.4328	0.4064
		0.4390	0.4086
		0.4347	0.3996
27H	2700 K	0.4524	0.4048
		0.4574	0.4140
		0.4633	0.4154
		0.4581	0.4062

Specialty

EasyWhite Color Temperatures – 2-Step			
Code	CCT	x	y
L7B	3000 K	0.4263	0.3848
		0.4296	0.3916
		0.4361	0.3938
		0.4326	0.3868
L7C	3000 K	0.4192	0.3754
		0.4224	0.3823
		0.4291	0.3847
		0.4257	0.3777

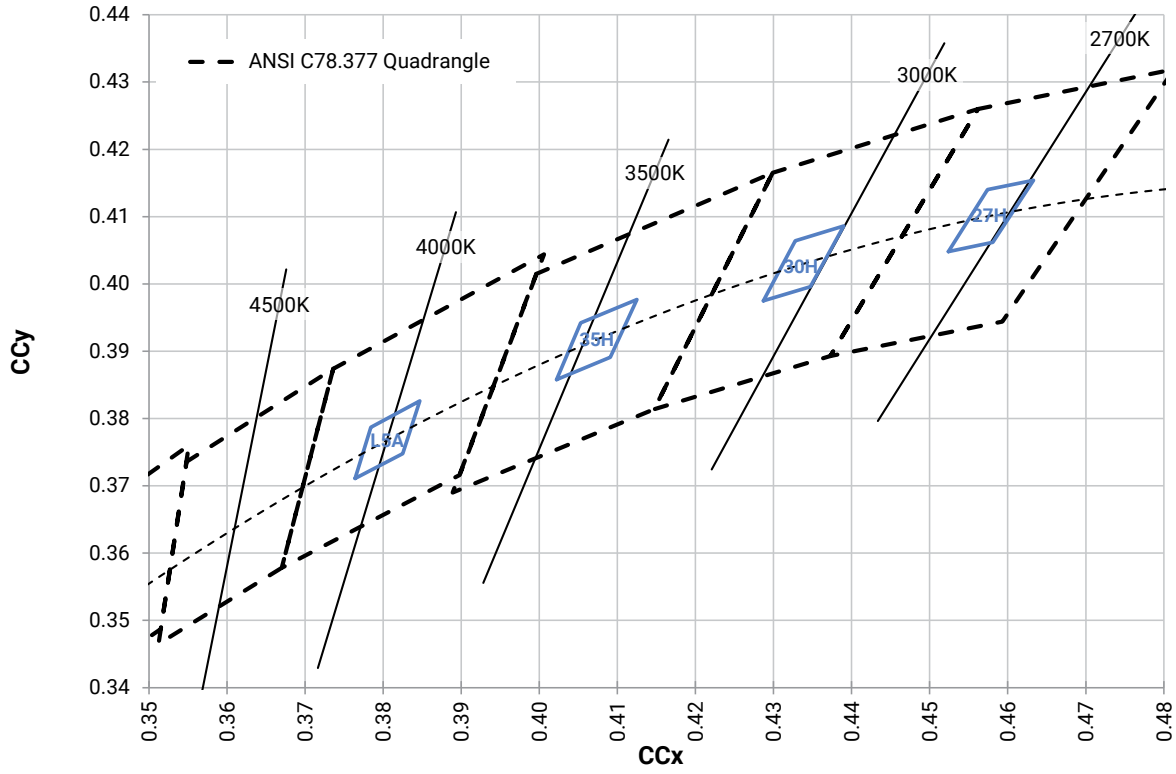
EasyWhite Color Temperatures – 3-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
31Q	3100 K	0.4236	0.3888	0.00848	0.00455	50.3
30Q	3000 K	0.4305	0.3935	0.00834	0.00408	53.2

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



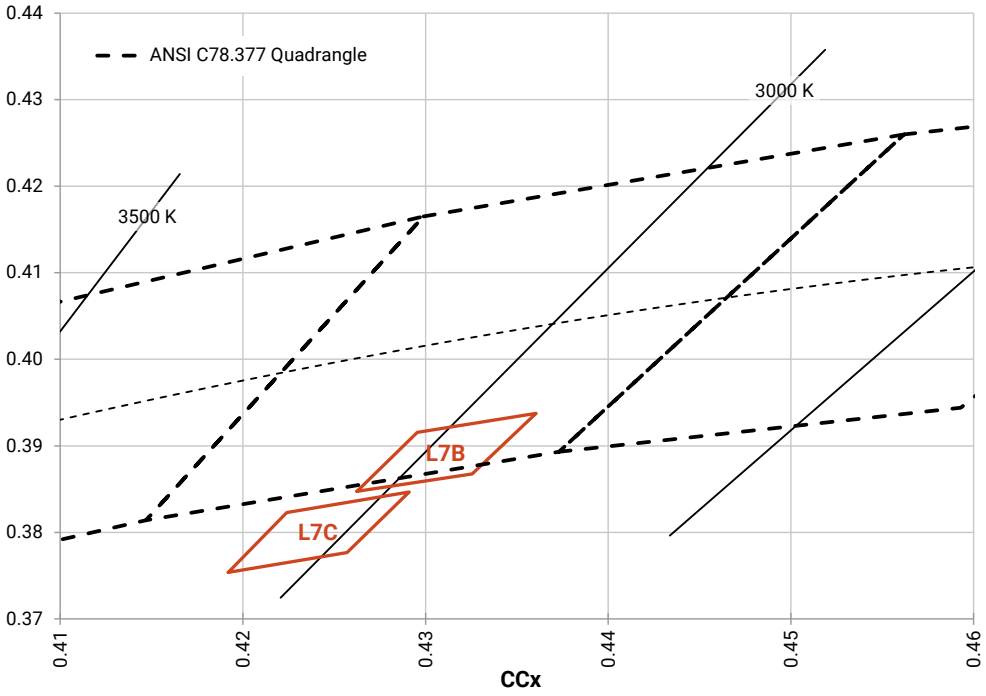
CREE PREMIUM COLOR BINS PLOTTED ON THE 1931 CIE COLOR SPACE (T_J = 85 °C)

Fidelity (2-step)

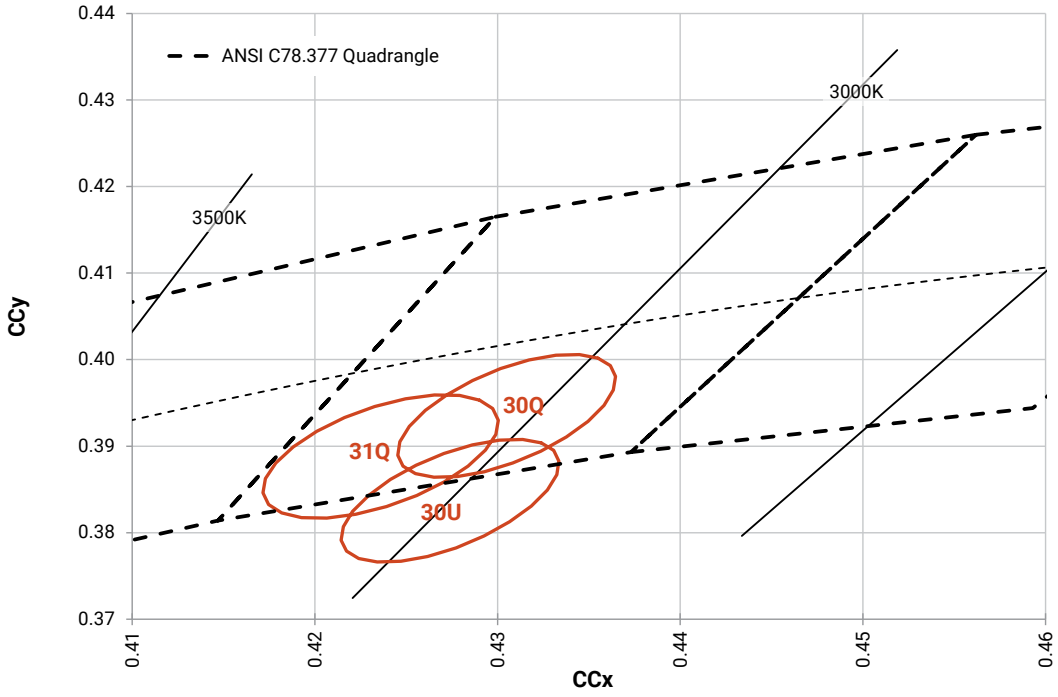


CREE PREMIUM COLOR BINS PLOTTED ON THE 1931 CIE COLOR SPACE (T_J = 85 °C) - CONTINUED

Speciality (2-step)



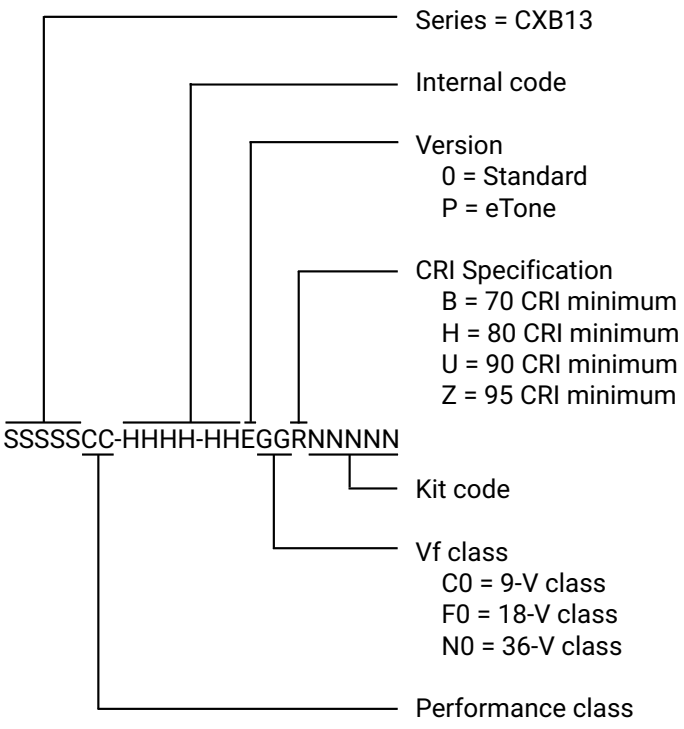
Speciality (3-step)



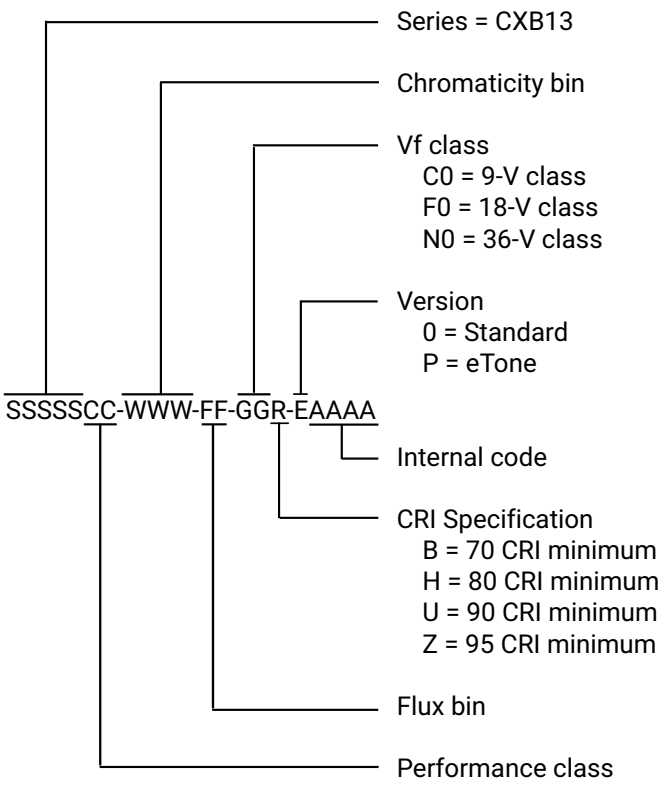
BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:

Order Code



Bin Code



MECHANICAL DIMENSIONS

Dimensions are in mm.

Tolerances unless otherwise specified: ±.13

x° ±1°

Meaning of LED marking

B1304C = 9-V CXB1304

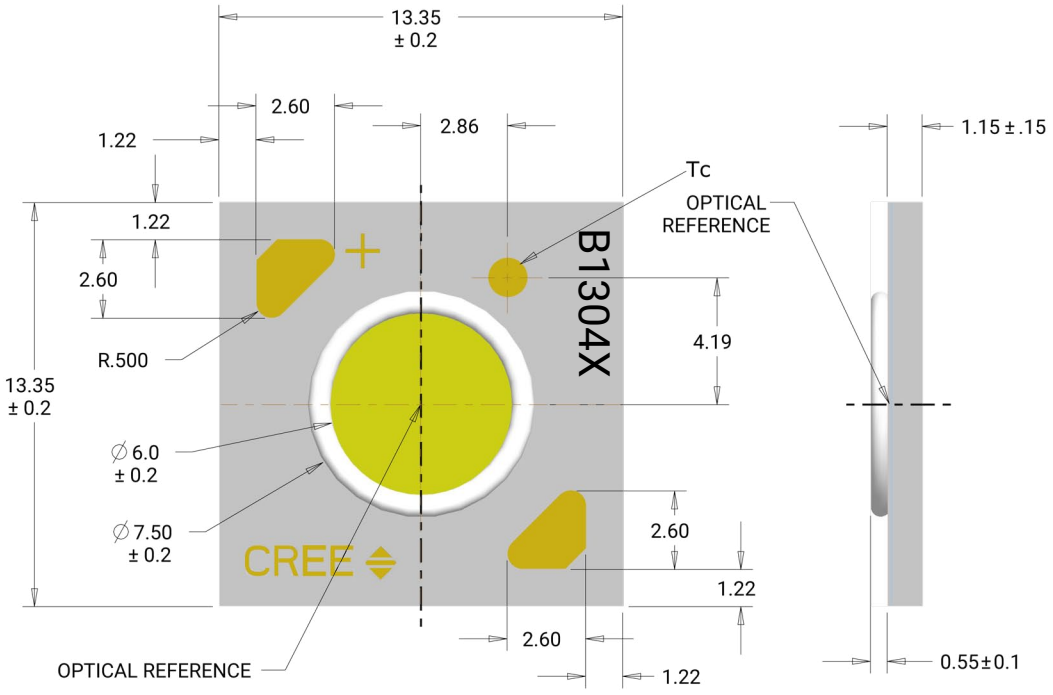
B1304F = 18-V CXB1304

B1304N = 36-V CXB1304

B1304Ce = 9-V CXB1304 eTone

B1304Fe = 18-V CXB1304 eTone

B1304Ne = 36-V CXB1304 eTone



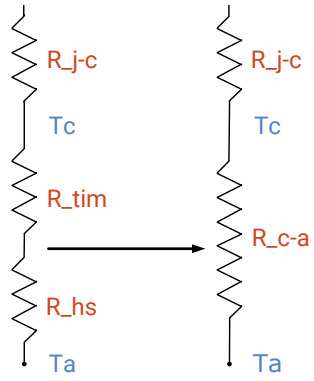
THERMAL DESIGN

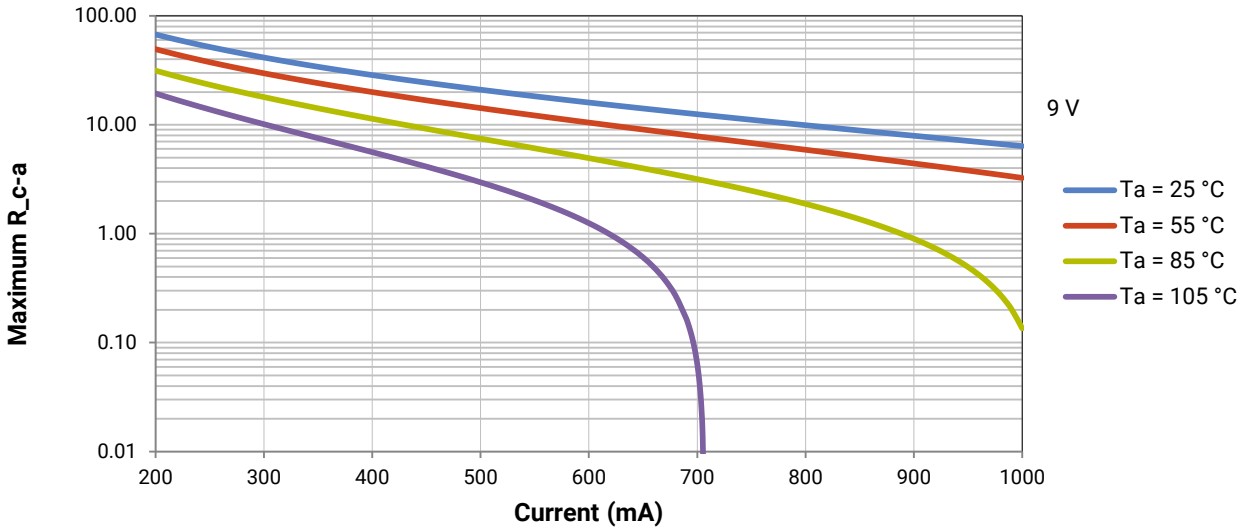
The CXB family of LED arrays can include over a hundred different LED die inside one package, and thus over a hundred different junction temperatures (T_J). Cree has intentionally removed junction-temperature-based operating limits and replaced the commonplace maximum T_J calculations with maximum ratings based on forward current (I_F) and case temperature (Tc). No additional calculations are required to ensure that the CXB LED is being operated within its designed limits. LES temperature measurement provides additional verification of good thermal design. Please refer to page 4 for the Operating Limit specifications.

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 Thermal Management application note. For CXB soldering recommendations and more information on thermal interface materials (TIM), LES temperature measurement, 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.

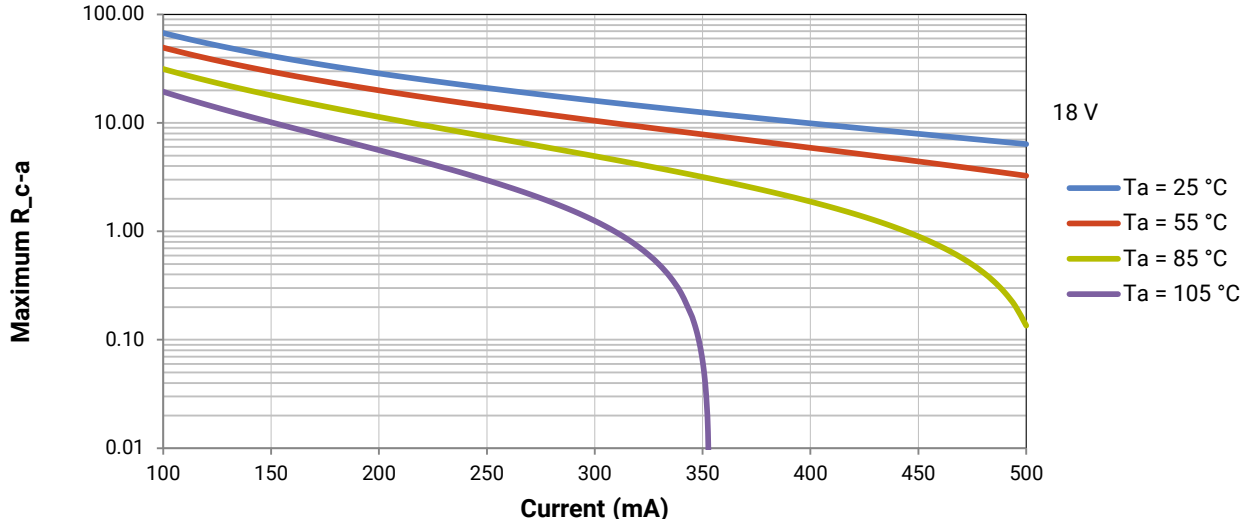
To keep the CXB1304 LED at or below the maximum rated Tc, the case to ambient temperature thermal resistance (R_c-a) must be at or below the maximum R_c-a value shown on the following graphs, depending on the operating environment. The y-axis in each graph is a base 10 logarithmic scale.

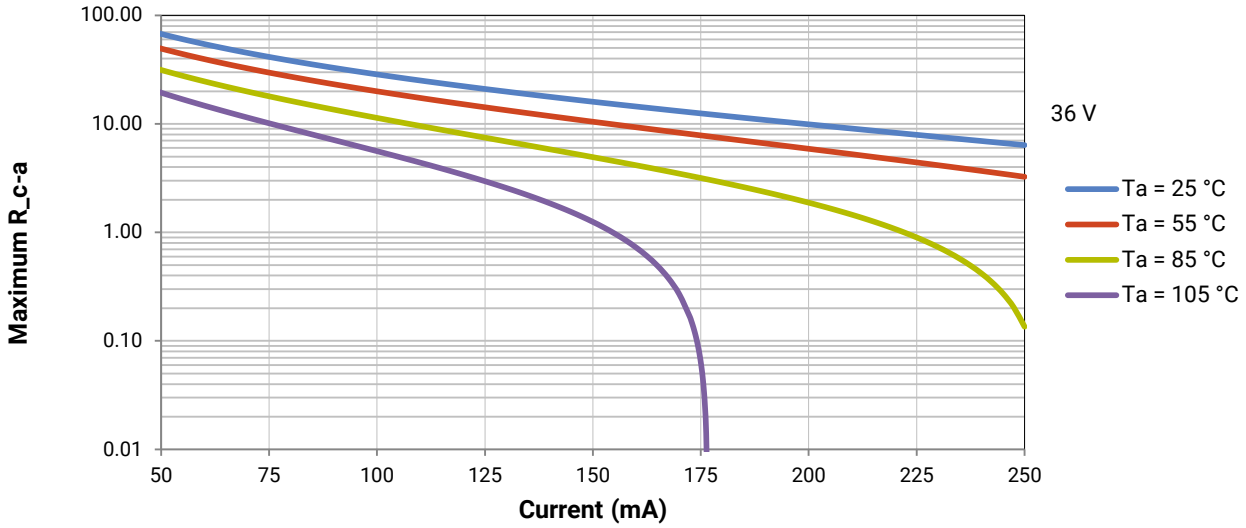
As the figure at right shows, the R_c-a value is the sum of the thermal resistance of the TIM (R_tim) plus the thermal resistance of the heat sink (R_hs).





THERMAL DESIGN - CONTINUED





NOTES

Measurements

The luminous flux, radiant power, chromaticity, 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 or provided 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 Ecology section of the Cree website.

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

This product meets the requirements to be considered a UL Recognized Component with 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: ±.13
x° ±1°