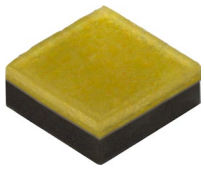
Cree® XLamp® XD16 LEDs



PRODUCT DESCRIPTION

The XLamp® XD16 LEDs are the industry's first Extreme Density LEDs, delivering up to 5½ times higher lumen density than Cree's previous generation of high-power LEDs. The ceramic-based XD16 LED is built on Cree's groundbreaking NX Technology Platform to address challenges with luminaire manufacturing, thermal design, optical design and reliability that have been experienced with competing LEDs. The XD16 LED enables lighting manufacturers to achieve dramatic improvements in lumen output and efficacy, without increasing the size of the LED array, for a wide spectrum of lighting applications such as color tuning, directional lighting and industrial lighting.

FEATURES

- Available in outdoor white and 70-, 80- and 90-CRI white
- ANSI-compatible chromaticity bins
- 3-step and 5-step options
- Binned at 85 °C
- Maximum drive current: 2000 mA
- Low thermal resistance: 6 °C/W
- Wide viewing angle: 135°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C
- RoHS compliant
- UL® recognized component (E349212)

TABLE OF CONTENTS

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

CHARACTERISTICS

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	°C/W		6	
Viewing angle (FWHM)	degrees		135	
Temperature coefficient of voltage	mV/°C		-1.3	
DC forward current	mA			2000
Reverse voltage	V			5
Forward voltage (@ 350 mA, 85 °C)	V		2.73	3
Forward voltage (@ 700 mA, 85 °C)	V		2.83	
Forward voltage (@ 1000 mA, 85 °C)	V		2.90	
Forward voltage (@ 1500 mA, 85 °C)	V		3.00	
Forward voltage (@ 2000 mA, 85 °C)	V		3.07	
LED junction temperature	°C			150

FLUX CHARACTERISTICS (T_J = 85 °C)

The following table provides order codes for XLamp XD16 LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 23). For definitions of the chromaticity kits, please see the Cree's Standard Chromaticity Kits section (page 22).

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
DT	7000 K	S2	148	162	272	365	XD16AWT-H0-0000-000000JDT	XD16AWT-H0-0000-00000BJDT	XD16AWT-H0-0000-00000HJDT	
		R5	139	152	255	343	XD16AWT-H0-0000-000000HDT	XD16AWT-H0-0000-00000BHDT	XD16AWT-H0-0000-00000HHDT	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGDT	
E1	6500 K	S2	148	162	272	365	XD16AWT-H0-0000-000000JE1	XD16AWT-H0-0000-00000BJE1	XD16AWT-H0-0000-00000HJE1	
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE1	XD16AWT-H0-0000-00000BHE1	XD16AWT-H0-0000-00000HHE1	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGE1	
50	6200 K	S3	156	170	287	385	XD16AWT-H0-0000-000000K50			
		S2	148	162	272	365	XD16AWT-H0-0000-000000J50		XD16AWT-H0-0000-00000HJ50	
		R5	139	152	255	343	XD16AWT-H0-0000-000000H50		XD16AWT-H0-0000-00000HH50	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG50	
DV	6000 K	S3	156	170	287	385	XD16AWT-H0-0000-000000KDV	XD16AWT-H0-0000-00000BKDV		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JDV	XD16AWT-H0-0000-00000BJDV	XD16AWT-H0-0000-00000HJDV	
		R5	139	152	255	343	XD16AWT-H0-0000-000000HDV	XD16AWT-H0-0000-00000BHDV	XD16AWT-H0-0000-00000HHDV	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGDV	
		R3	122	133	224	301				XD16AWT-H0-0000-00000UFDV
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEDV

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
E2	5700 K	S3	156	170	287	385	XD16AWT-H0-0000-000000KE2	XD16AWT-H0-0000-00000BKE2		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JE2	XD16AWT-H0-0000-00000BJE2	XD16AWT-H0-0000-00000HJE2	
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE2	XD16AWT-H0-0000-00000BHE2	XD16AWT-H0-0000-00000HHE2	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGE2	
		R3	122	133	224	301				XD16AWT-H0-0000-00000UFE2
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEE2
2E	5700 K	S3	156	170	287	385		XD16AWT-H0-0000-00000BK2E		
		S2	148	162	272	365		XD16AWT-H0-0000-00000BJ2E	XD16AWT-H0-0000-00000HJ2E	
		R5	139	152	255	343		XD16AWT-H0-0000-00000BH2E	XD16AWT-H0-0000-00000HH2E	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG2E	
		R3	122	133	224	301				XD16AWT-H0-0000-00000UF2E
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE2E
3E	5000 K	S3	156	170	287	385		XD16AWT-H0-0000-00000BK3E		
		S2	148	162	272	365		XD16AWT-H0-0000-00000BJ3E		
		R5	139	152	255	343		XD16AWT-H0-0000-00000BH3E	XD16AWT-H0-0000-00000HH3E	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG3E	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF3E	XD16AWT-H0-0000-00000UF3E
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE3E

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
E3	5000 K	S3	156	170	287	385	XD16AWT-H0-0000-000000KE3	XD16AWT-H0-0000-00000BKE3		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JE3	XD16AWT-H0-0000-00000BJE3		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE3	XD16AWT-H0-0000-00000BHE3	XD16AWT-H0-0000-00000HHE3	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGE3	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFE3	XD16AWT-H0-0000-00000UFE3
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEE3
F4	4750K	S3	156	170	287	385	XD16AWT-H0-0000-000000KF4	XD16AWT-H0-0000-00000BKF4		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JF4	XD16AWT-H0-0000-00000BJF4		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HF4	XD16AWT-H0-0000-00000BHF4	XD16AWT-H0-0000-00000HHF4	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGF4	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFF4	XD16AWT-H0-0000-00000UFF4
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEF4
4E	4500K	S3	156	170	287	385		XD16AWT-H0-0000-00000BK4E		
		S2	148	162	272	365		XD16AWT-H0-0000-00000BJ4E		
		R5	139	152	255	343		XD16AWT-H0-0000-00000BH4E	XD16AWT-H0-0000-00000HH4E	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG4E	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF4E	XD16AWT-H0-0000-00000UF4E
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE4E
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD4E

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
E4	4500 K	S3	156	170	287	385	XD16AWT-H0-0000-000000KE4	XD16AWT-H0-0000-00000BKE4		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JE4	XD16AWT-H0-0000-00000BJE4		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE4	XD16AWT-H0-0000-00000BHE4	XD16AWT-H0-0000-00000HHE4	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGE4	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFE4	XD16AWT-H0-0000-00000UFE4
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEE4
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDE4
F5	4200 K	S3	156	170	287	385	XD16AWT-H0-0000-000000KF5	XD16AWT-H0-0000-00000BKF5		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JF5	XD16AWT-H0-0000-00000BJF5		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HF5	XD16AWT-H0-0000-00000BHF5	XD16AWT-H0-0000-00000HHF5	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGF5	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFF5	XD16AWT-H0-0000-00000UFF5
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEF5
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDF5

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
5E	4000 K	S3	156	170	287	385		XD16AWT-H0-0000-00000BK5E		
		S2	148	162	272	365		XD16AWT-H0-0000-00000BJ5E		
		R5	139	152	255	343		XD16AWT-H0-0000-00000BH5E	XD16AWT-H0-0000-00000HH5E	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG5E	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF5E	XD16AWT-H0-0000-00000UF5E
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE5E
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD5E
5G	4000 K	R5	139	152	255	343			XD16AWT-H0-0000-00000HH5G	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG5G	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF5G	XD16AWT-H0-0000-00000UF5G
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE5G
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD5G
E5	4000 K	S3	156	170	287	385	XD16AWT-H0-0000-000000KE5	XD16AWT-H0-0000-00000BKE5		
		S2	148	162	272	365	XD16AWT-H0-0000-000000JE5	XD16AWT-H0-0000-00000BJE5		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE5	XD16AWT-H0-0000-00000BHE5	XD16AWT-H0-0000-00000HHE5	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGE5	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFE5	XD16AWT-H0-0000-00000UFE5
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEE5
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDE5

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
F6	3700 K	S2	148	162	272	365	XD16AWT-H0-0000-000000JF6	XD16AWT-H0-0000-00000BJF6		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HF6	XD16AWT-H0-0000-00000BHF6	XD16AWT-H0-0000-00000HHF6	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGF6	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFF6	
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEF6
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDF6
6E	3500 K	S2	148	162	272	365		XD16AWT-H0-0000-00000BJ6E		
		R5	139	152	255	343		XD16AWT-H0-0000-00000BH6E	XD16AWT-H0-0000-00000HH6E	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG6E	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF6E	
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE6E
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD6E
6G	3500 K	R5	139	152	255	343			XD16AWT-H0-0000-00000HH6G	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HG6G	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF6G	
		R2	114	125	209	281				XD16AWT-H0-0000-00000UE6G
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD6G

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
E6	3500 K	S2	148	162	272	365	XD16AWT-H0-0000-000000JE6	XD16AWT-H0-0000-00000BJE6		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE6	XD16AWT-H0-0000-00000BHE6	XD16AWT-H0-0000-00000HHE6	
		R4	130	142	239	321			XD16AWT-H0-0000-00000HGE6	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFE6	
		R2	114	125	209	281				XD16AWT-H0-0000-00000UEE6
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDE6
F7	3200 K	S2	148	162	272	365	XD16AWT-H0-0000-000000JF7	XD16AWT-H0-0000-00000BJF7		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HF7	XD16AWT-H0-0000-00000BHF7		
		R4	130	142	239	321	XD16AWT-H0-0000-000000GF7	XD16AWT-H0-0000-00000BGF7	XD16AWT-H0-0000-00000HGF7	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFF7	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HEF7	XD16AWT-H0-0000-00000UEF7
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDF7
7E	3000 K	S2	148	162	272	365		XD16AWT-H0-0000-00000BJ7E		
		R5	139	152	255	343		XD16AWT-H0-0000-00000BH7E		
		R4	130	142	239	321		XD16AWT-H0-0000-00000BG7E	XD16AWT-H0-0000-00000HG7E	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF7E	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HE7E	XD16AWT-H0-0000-00000UE7E
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD7E

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
7G	3000 K	R4	130	142	239	321			XD16AWT-H0-0000-00000HG7G	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF7G	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HE7G	XD16AWT-H0-0000-00000UE7G
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD7G
E7	3000 K	S2	148	162	272	365	XD16AWT-H0-0000-000000JE7	XD16AWT-H0-0000-00000BJE7		
		R5	139	152	255	343	XD16AWT-H0-0000-000000HE7	XD16AWT-H0-0000-00000BHE7		
		R4	130	142	239	321	XD16AWT-H0-0000-000000GE7	XD16AWT-H0-0000-00000BGE7	XD16AWT-H0-0000-00000HGE7	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFE7	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HEE7	XD16AWT-H0-0000-00000UEE7
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDE7
F8	2850 K	R4	130	142	239	321			XD16AWT-H0-0000-00000HGF8	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFF8	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HEF8	
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDF8
		Q4	100	109	184	247				XD16AWT-H0-0000-00000UCF8
		Q3	93.9	103	172	232				XD16AWT-H0-0000-00000UBF8

Note

- 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 25).
- Cree XLamp XD16 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 values @ 700 mA and 1.0 A are calculated and for reference only.

FLUX CHARACTERISTICS (T_J = 85 °C) - CONTINUED

Chromaticity		Minimum Luminous Flux (lm) @ 350 mA			Calculated Minimum Luminous Flux (lm) @ 85 °C**		Order Codes			
Kit	CCT	Code	Flux (lm) @ 85 °C	Flux (lm) @ 25 °C*	700 mA	1.0 A	No Minimum CRI	70 CRI Minimum	80 CRI Minimum	90 CRI Minimum
8E	2700 K	R4	130	142	239	321			XD16AWT-H0-0000-00000HG8E	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF8E	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HE8E	
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD8E
		Q4	100	109	184	247				XD16AWT-H0-0000-00000UC8E
		Q3	93.9	103	172	232				XD16AWT-H0-0000-00000UB8E
8G	2700 K	R4	130	142	239	321			XD16AWT-H0-0000-00000HG8G	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HF8G	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HE8G	
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UD8G
		Q4	100	109	184	247				XD16AWT-H0-0000-00000UC8G
		Q3	93.9	103	172	232				XD16AWT-H0-0000-00000UB8G
E8	2700K	R4	130	142	239	321			XD16AWT-H0-0000-00000HGE8	
		R3	122	133	224	301			XD16AWT-H0-0000-00000HFE8	
		R2	114	125	209	281			XD16AWT-H0-0000-00000HEE8	
		Q5	107	117	197	264				XD16AWT-H0-0000-00000UDE8
		Q4	100	109	184	247				XD16AWT-H0-0000-00000UCE8
		Q3	93.9	103	172	232				XD16AWT-H0-0000-00000UBE8

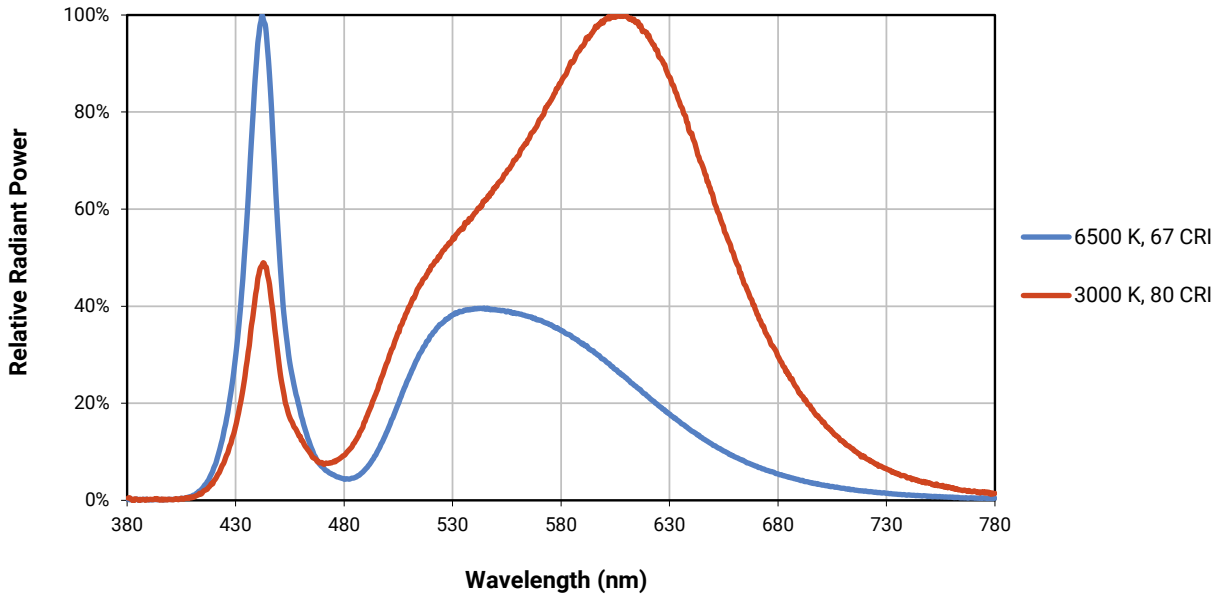
Note

- 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 25).
- Cree XLamp XD16 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.

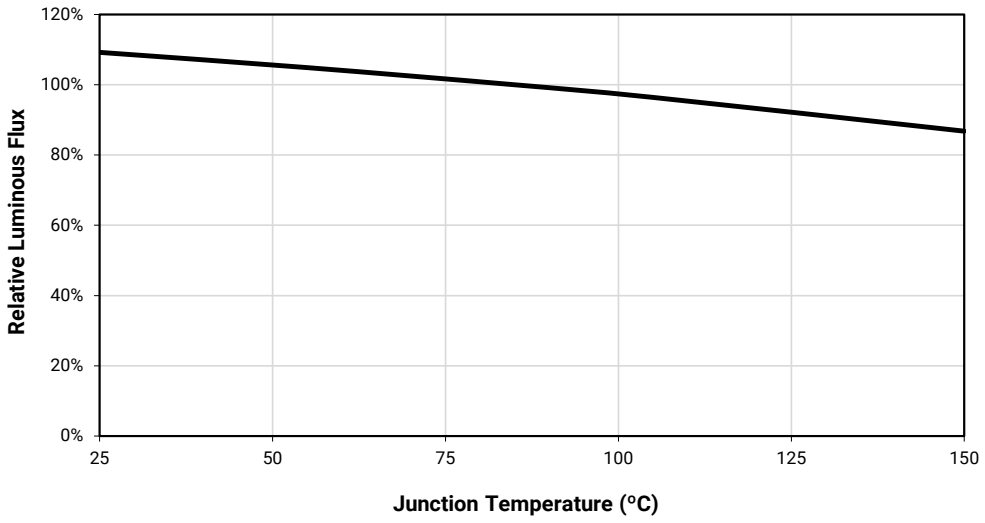
* Flux values @ 25 °C are calculated and for reference only.

** Flux values @ 700 mA and 1.0 A are calculated and for reference only.

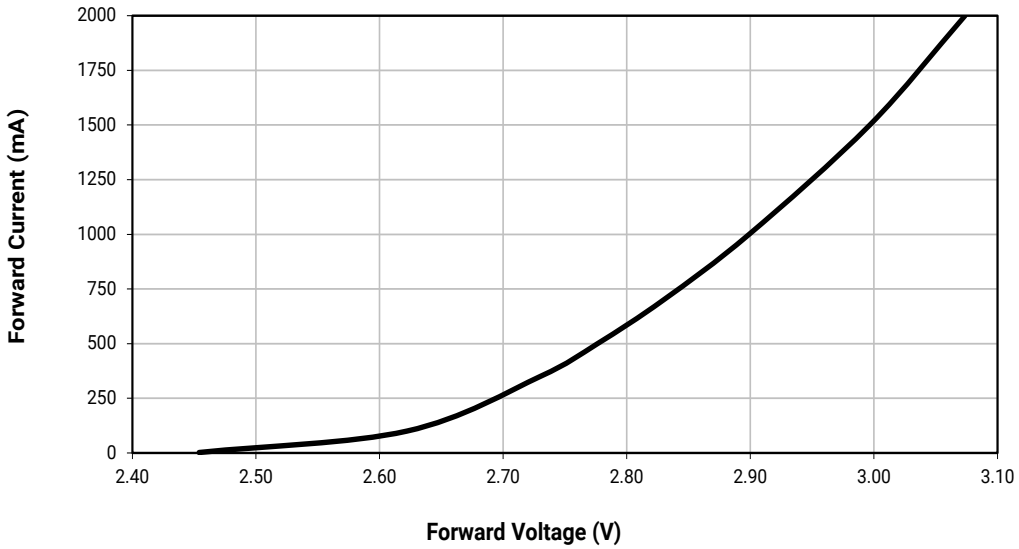
RELATIVE SPECTRAL POWER DISTRIBUTION



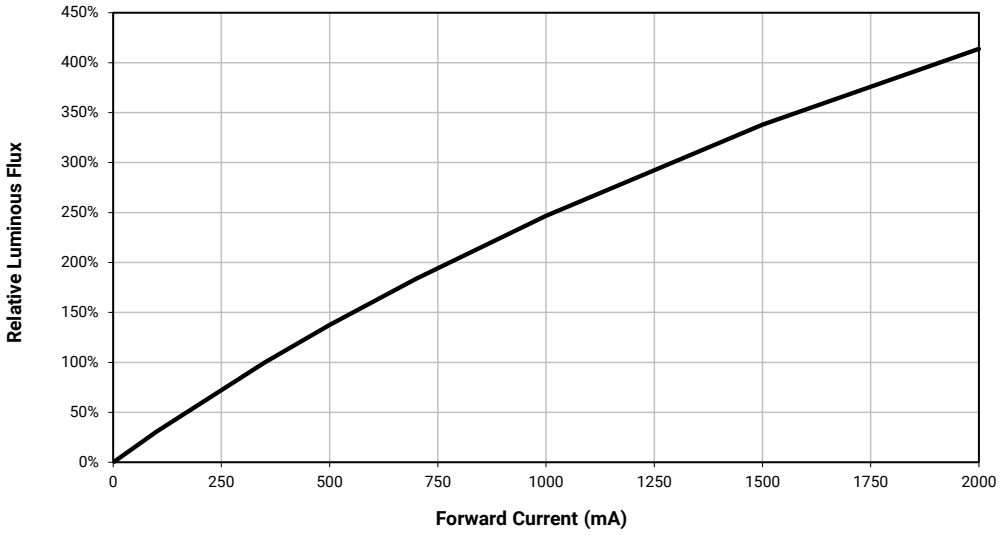
RELATIVE FLUX VS. JUNCTION TEMPERATURE (I_F = 350 mA)



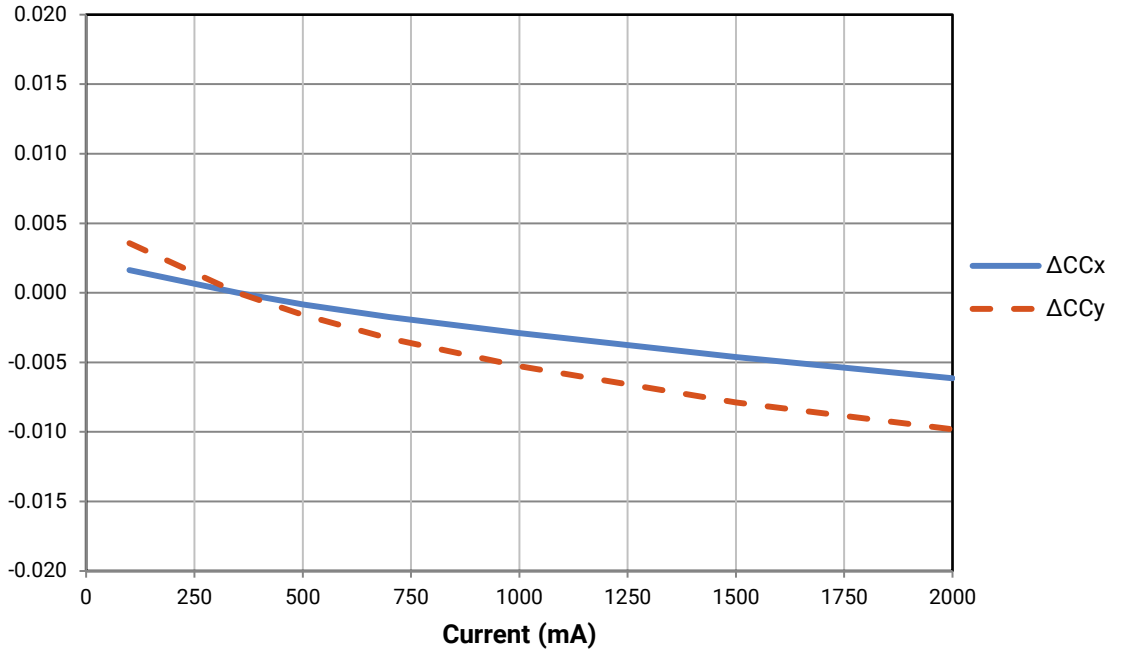
ELECTRICAL CHARACTERISTICS (T_J = 85 °C)

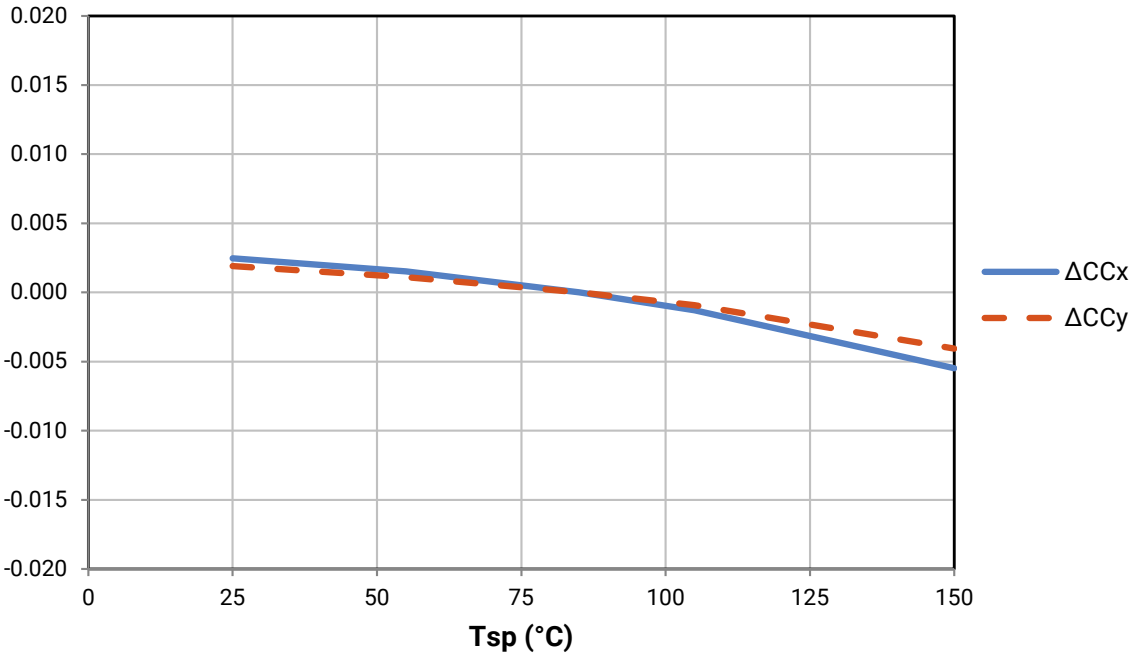


RELATIVE FLUX VS. CURRENT (T_J = 85 °C)

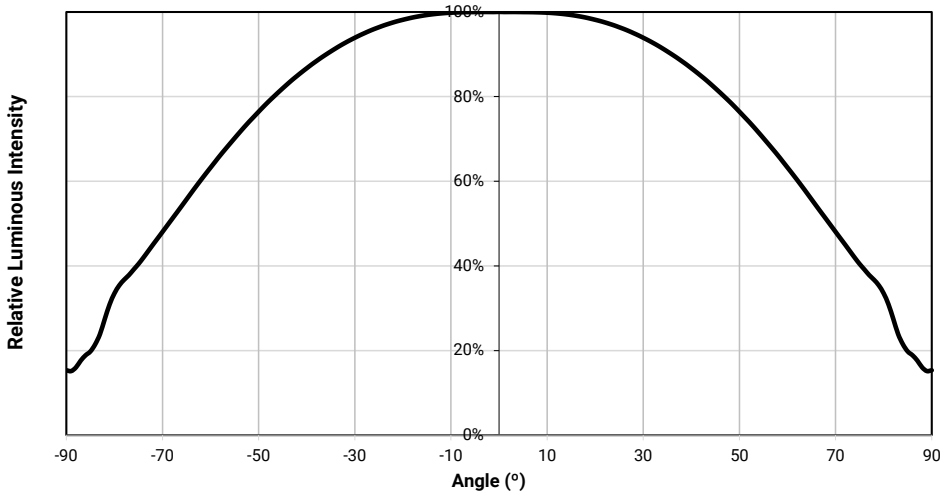


RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE



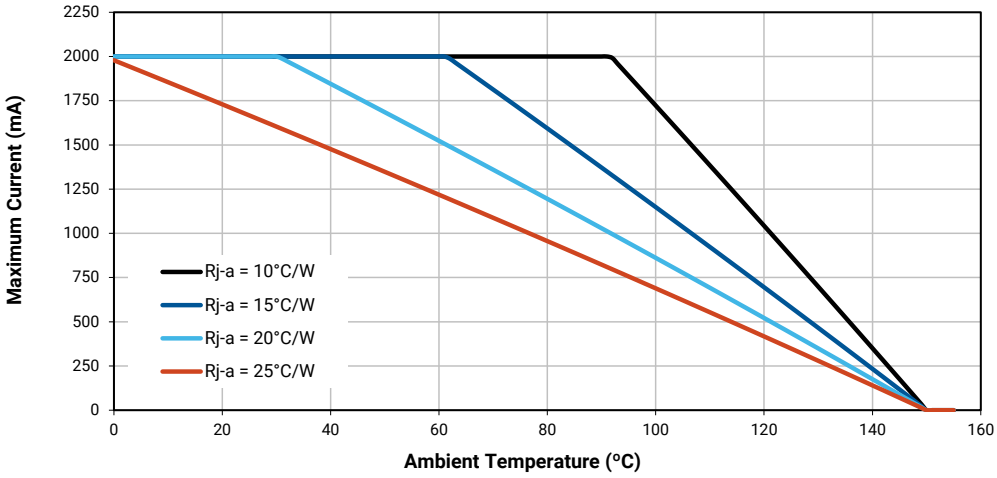


TYPICAL SPATIAL DISTRIBUTION



THERMAL DESIGN

The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



PERFORMANCE GROUPS - LUMINOUS FLUX (T_J = 85 °C)

XLamp XD16 LEDs are tested for luminous flux and placed into one of the following luminous-flux groups. The group codes, with a zero appended, are used in the bin code "Luminous flux group." The flux groups are used in the order code "Minimum luminous flux group code."

Group Code	Flux Group	Minimum Luminous Flux (lm) @ 350 mA	Maximum Luminous Flux (lm) @ 350 mA
Q3	B	93.9	100
Q4	C	100	107
Q5	D	107	114
R2	E	114	122
R3	F	122	130
R4	G	130	139
R5	H	139	148
S2	J	148	156
S3	K	156	164
S4	L	164	172

PERFORMANCE GROUPS - CHROMATICITY

XLamp XD16 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

Region	x	y	Region	x	y	Region	x	y	Region	x	y
0A	0.2950	0.2970	0B	0.2920	0.3060	0C	0.2984	0.3133	0D	0.2984	0.3133
	0.2920	0.3060		0.2895	0.3135		0.2962	0.3220		0.3048	0.3207
	0.2984	0.3133		0.2962	0.3220		0.3028	0.3304		0.3068	0.3113
	0.3009	0.3042		0.2984	0.3133		0.3048	0.3207		0.3009	0.3042
0R	0.2980	0.2880	0S	0.2895	0.3135	0T	0.2962	0.3220	0U	0.3037	0.2937
	0.2950	0.2970		0.2870	0.3210		0.2937	0.3312		0.3009	0.3042
	0.3009	0.3042		0.2937	0.3312		0.3005	0.3415		0.3068	0.3113
	0.3037	0.2937		0.2962	0.3220		0.3028	0.3304		0.3093	0.2993
1A	0.3048	0.3207	1B	0.3028	0.3304	1C	0.3115	0.3391	1D	0.3130	0.3290
	0.3130	0.3290		0.3115	0.3391		0.3205	0.3481		0.3213	0.3373
	0.3144	0.3186		0.3130	0.3290		0.3213	0.3373		0.3221	0.3261
	0.3068	0.3113		0.3048	0.3207		0.3130	0.3290		0.3144	0.3186
1R	0.3068	0.3113	1S	0.3005	0.3415	1T	0.3099	0.3509	1U	0.3144	0.3186
	0.3144	0.3186		0.3099	0.3509		0.3196	0.3602		0.3221	0.3261
	0.3161	0.3059		0.3115	0.3391		0.3205	0.3481		0.3231	0.3120
	0.3093	0.2993		0.3028	0.3304		0.3115	0.3391		0.3161	0.3059

PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

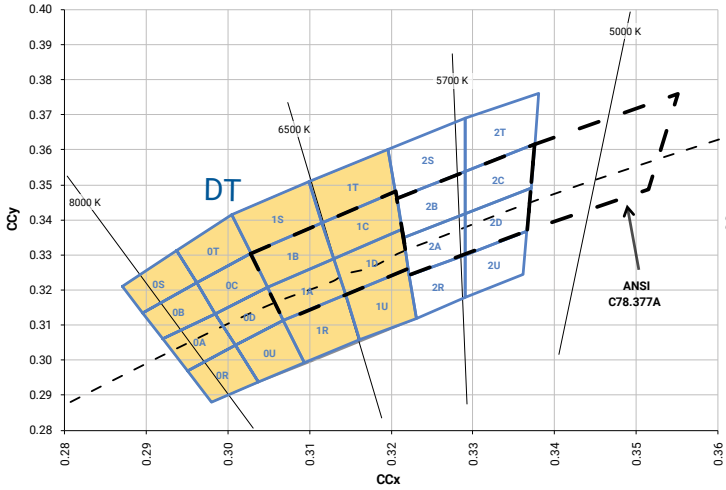
Region	x	y	Region	x	y	Region	x	y	Region	x	y
2A	0.3215	0.3350	2B	0.3207	0.3462	2C	0.3290	0.3538	2D	0.3290	0.3417
	0.3290	0.3417		0.3290	0.3538		0.3376	0.3616		0.3371	0.3490
	0.3290	0.3300		0.3290	0.3417		0.3371	0.3490		0.3366	0.3369
	0.3222	0.3243		0.3215	0.3350		0.3290	0.3417		0.3290	0.3300
2R	0.3222	0.3243	2S	0.3196	0.3602	2T	0.3290	0.3690	2U	0.3290	0.3300
	0.3290	0.3300		0.3290	0.3690		0.3381	0.3762		0.3366	0.3369
	0.3290	0.3180		0.3290	0.3538		0.3376	0.3616		0.3361	0.3245
	0.3231	0.3120		0.3207	0.3462		0.3290	0.3538		0.3290	0.3180
3A	0.3371	0.3490	3B	0.3376	0.3616	3C	0.3463	0.3687	3D	0.3451	0.3554
	0.3451	0.3554		0.3463	0.3687		0.3551	0.3760		0.3533	0.3620
	0.3440	0.3427		0.3451	0.3554		0.3533	0.3620		0.3515	0.3487
	0.3366	0.3369		0.3371	0.3490		0.3451	0.3554		0.3440	0.3427
4A	0.3530	0.3597	4B	0.3548	0.3736	4C	0.3641	0.3804	4D	0.3615	0.3659
	0.3615	0.3659		0.3641	0.3804		0.3736	0.3874		0.3702	0.3722
	0.3590	0.3521		0.3615	0.3659		0.3702	0.3722		0.3670	0.3578
	0.3512	0.3465		0.3530	0.3597		0.3615	0.3659		0.3590	0.3521
5A	0.3670	0.3578	5B	0.3702	0.3722	5C	0.3825	0.3798	5D	0.3783	0.3646
	0.3702	0.3722		0.3736	0.3874		0.3869	0.3958		0.3825	0.3798
	0.3825	0.3798		0.3869	0.3958		0.4006	0.4044		0.3950	0.3875
	0.3783	0.3646		0.3825	0.3798		0.3950	0.3875		0.3898	0.3716
6A	0.3889	0.3690	6B	0.3941	0.3848	6C	0.4080	0.3916	6D	0.4017	0.3751
	0.3941	0.3848		0.3996	0.4015		0.4146	0.4089		0.4080	0.3916
	0.4080	0.3916		0.4146	0.4089		0.4299	0.4165		0.4221	0.3984
	0.4017	0.3751		0.4080	0.3916		0.4221	0.3984		0.4147	0.3814
7A	0.4221	0.3985	7B	0.4299	0.4165	7C	0.4430	0.4212	7D	0.4342	0.4028
	0.4342	0.4028		0.443	0.4212		0.4562	0.4260		0.4465	0.4071
	0.426	0.3853		0.4342	0.4028		0.4465	0.4071		0.4373	0.3893
	0.4147	0.3814		0.4221	0.3985		0.4342	0.4028		0.4260	0.3853
8A	0.4221	0.3985	8B	0.4562	0.426						
	0.4582	0.4099		0.4687	0.4289						
	0.4483	0.3918		0.4582	0.4099						
	0.4373	0.3893		0.4465	0.4071						

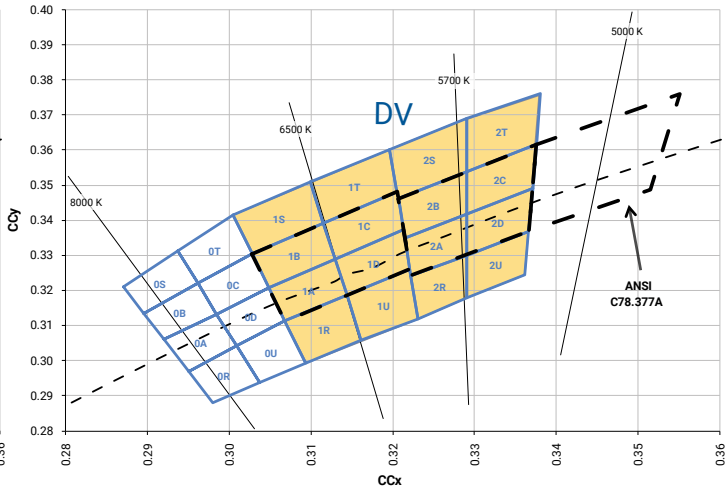
PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

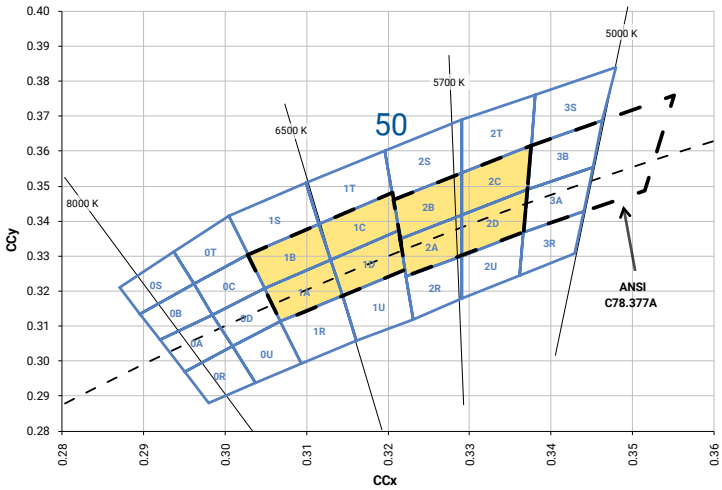
EasyWhite Color Temperatures – 3-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
5G	4000 K	0.3818	0.3797	0.0094	0.0040	53.72
6G	3500 K	0.4073	0.3917	0.0093	0.0041	53.22
7G	3000 K	0.4338	0.4030	0.0083	0.0041	53.20
8G	2700 K	0.4578	0.4101	0.0081	0.0042	53.70

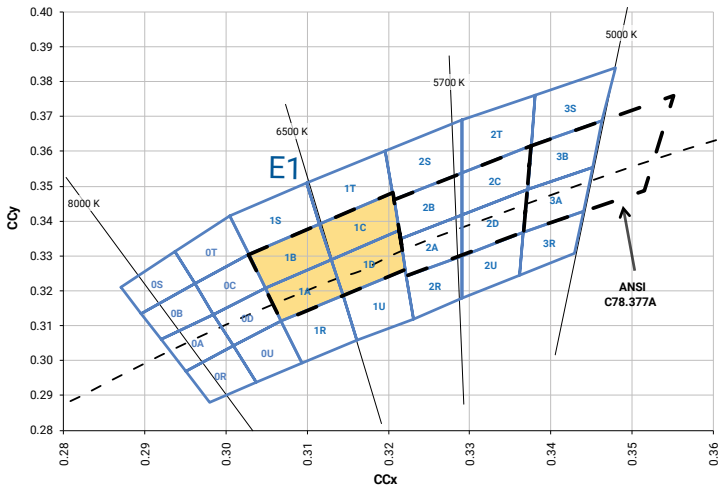
EasyWhite Color Temperatures – 5-Step Ellipse						
Bin Code	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle (°)
		x	y	a	b	
2E	5700 K	0.3287	0.3417	0.01230	0.00600	72.0
3E	5000 K	0.3447	0.3553	0.01400	0.00520	65.0
4E	4500 K	0.3611	0.3658	0.01420	0.00550	61.5
5E	4000 K	0.3818	0.3797	0.01565	0.00670	53.7
6E	3500 K	0.4073	0.3917	0.01545	0.00690	54.0
7E	3000 K	0.4338	0.4030	0.01390	0.00680	53.2
8E	2700 K	0.4577	0.4099	0.01350	0.00700	48.5

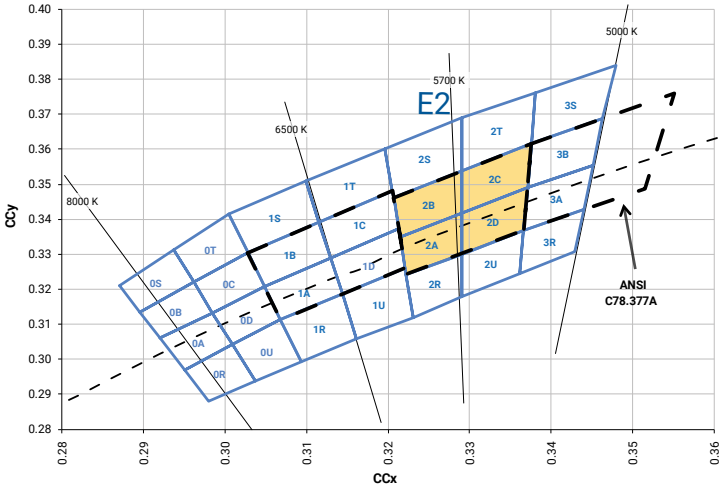
CREE'S COOL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS



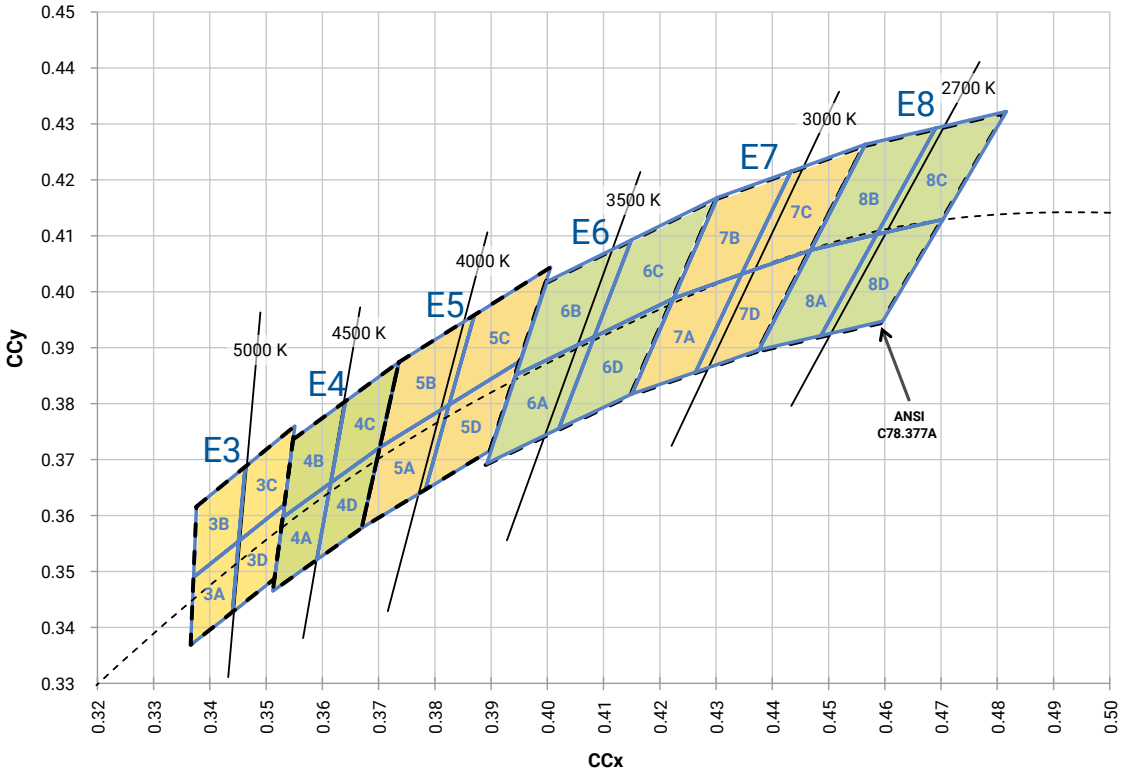


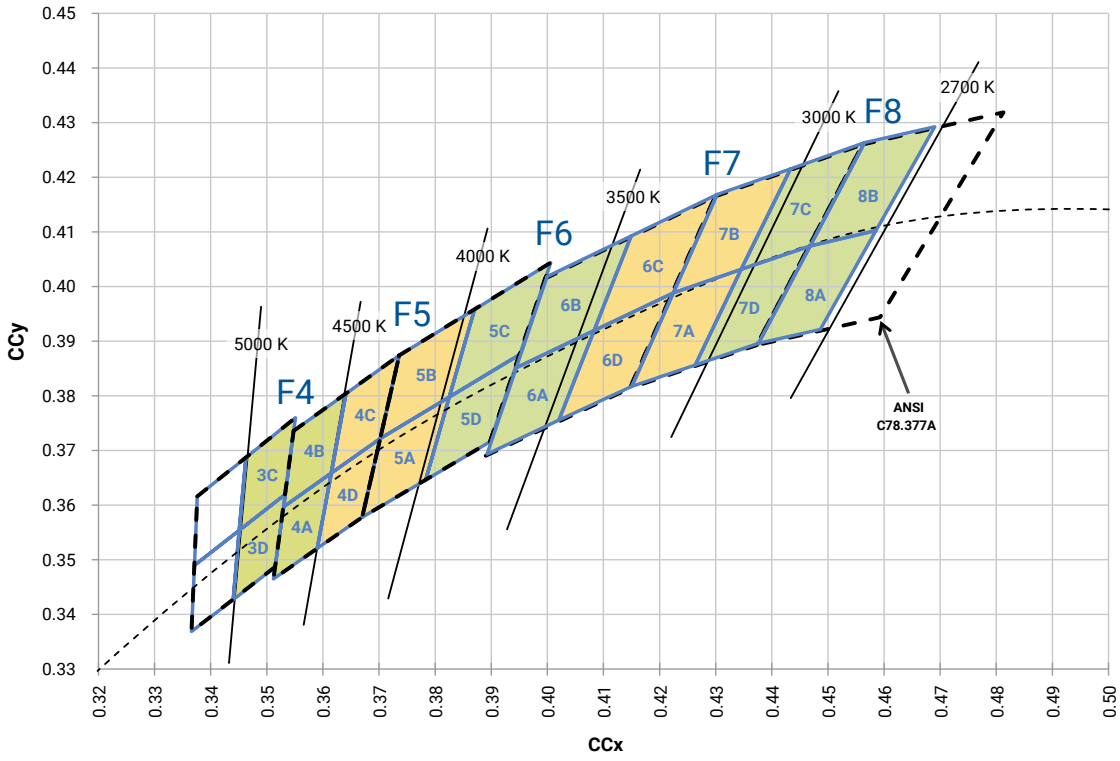




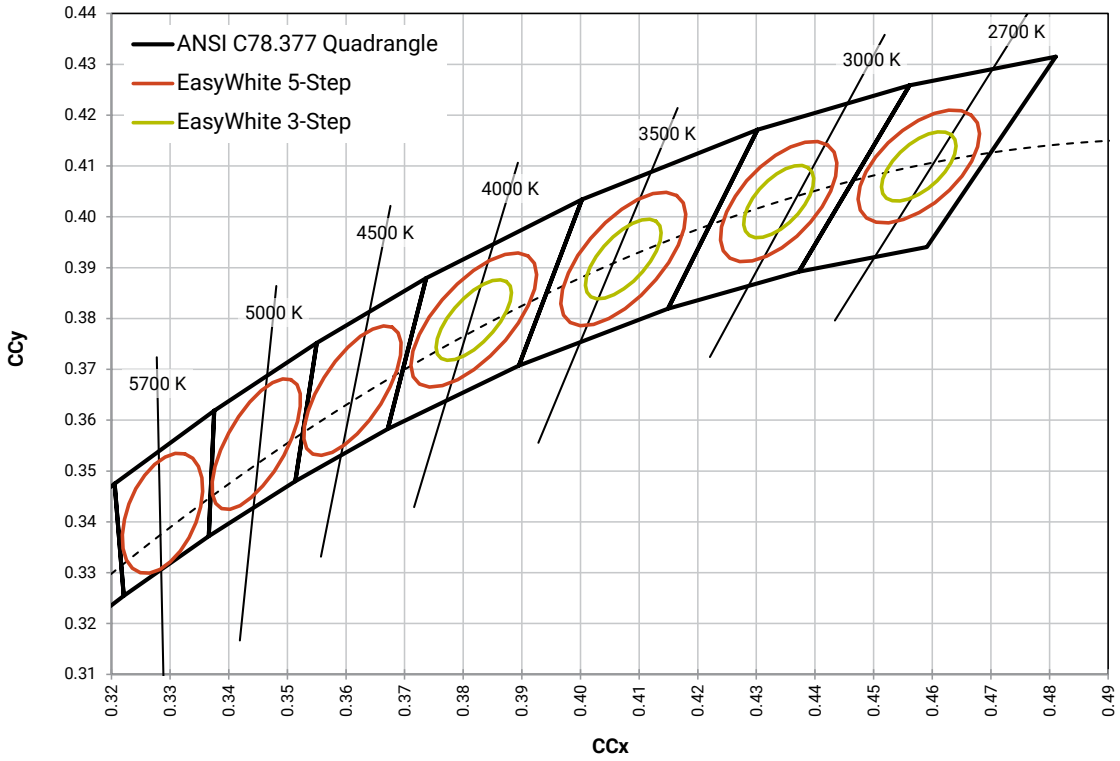


CREE'S WARM AND NEUTRAL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS





CREE'S EASYWHITE® WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS



CREE'S STANDARD CHROMATICITY KITS

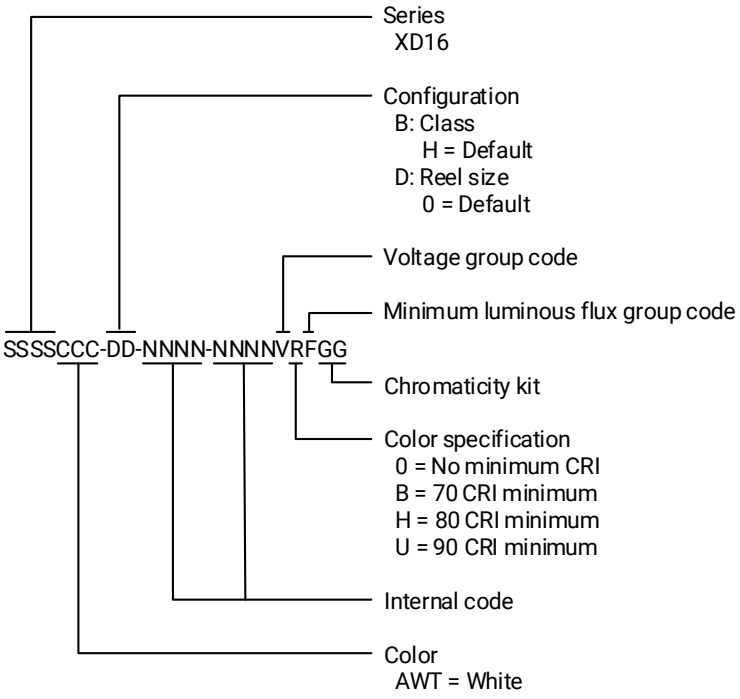
The following table provides the chromaticity bins associated with chromaticity kits for XD16 LEDs.

Color	CCT	Kit	Chromaticity Bins
Cool White	7000 K	DT	0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U
	6500 K	E1	1A, 1B, 1C, 1D
	6200 K	50	1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D
	6000 K	DV	1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 2U
	5700 K	E2	2A, 2B, 2C, 2D
	5700 K	2E	57E
Neutral White	5000 K	3E	50E
	5000 K	E3	3A, 3B, 3C, 3D
	4750 K	F4	3C, 3D, 4A, 4B
	4500 K	4E	45E
	4500 K	E4	4A, 4B, 4C, 4D
	4250 K	F5	4C, 4D, 5A, 5B
	4000 K	5E	40E, 40G
	4000 K	5G	40G
	4000 K	E5	5A 5B, 5C, 5D
Warm White	3750 K	F6	5C, 5D, 6A, 6B
	3500 K	6E	35E, 35G
	3500 K	6G	35G
	3500 K	E6	6A, 6B, 6C, 6D
	3250 K	F7	6C, 6D, 7A, 7B
	3000 K	7E	30E, 30G
	3000 K	7G	30G
	3000 K	E7	7A, 7B, 7C, 7D
	2850 K	F8	7C, 7D, 8A, 8B
	2700 K	8E	27E, 27G
	2700 K	8G	27G
	2700 K	E8	8A, 8B, 8C, 8D

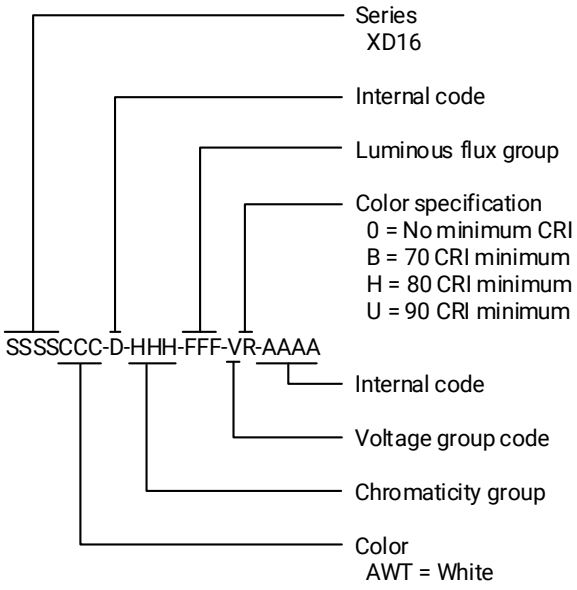
BIN AND ORDER CODE FORMATS

Bin codes and order codes for XD16 LEDs are configured in the following manner:

Order Code



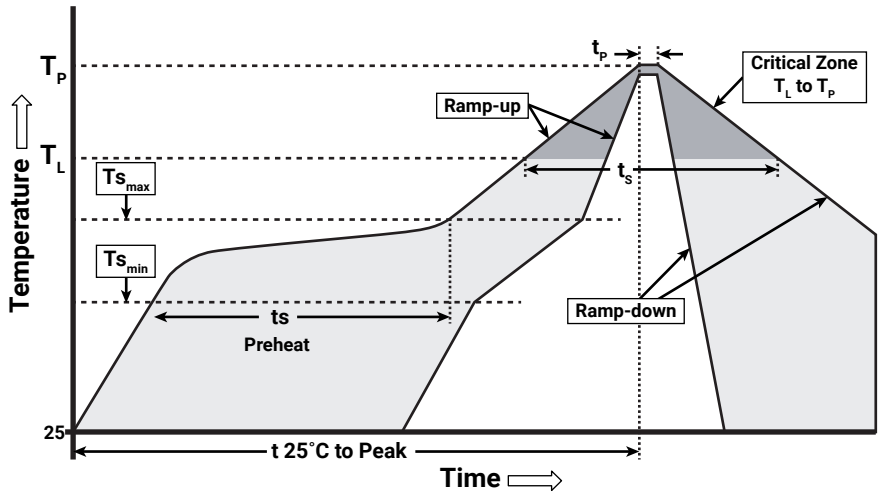
Bin Code



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XD16 LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree recommends that users follow the recommended soldering profile provided by the manufacturer of the solder paste used, and therefore it is the lamp or luminaire manufacturer's responsibility to determine applicable soldering requirements.

Note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment.



IPC/JEDEC J-STD-020C

Profile Feature	Lead-Free Solder
Average Ramp-Up Rate (Ts_{max} to Tp)	1.2 °C/second
Preheat: Temperature Min (Ts_{min})	120 °C
Preheat: Temperature Max (Ts_{max})	170 °C
Preheat: Time (Ts_{min} to Ts_{max})	65-150 seconds
Time Maintained Above: Temperature (T_L)	217 °C
Time Maintained Above: Time (t_L)	45-90 seconds
Peak/Classification Temperature (Tp)	235 - 245 °C
Time Within 5 °C of Actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	1 - 6 °C/second
Time 25 °C to Peak Temperature	4 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

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. Cree did not perform Room Temperature Operating Life (RTOL) testing on the XD16 LED.

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.

Moisture Sensitivity

Cree recommends keeping XLamp LEDs in the provided, resealable moisture-barrier packaging (MBP) until immediately prior to soldering. Unopened MBPs that contain XLamp LEDs do not need special storage for moisture sensitivity.

Once the MBP is opened, XLamp XD16 LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of ≤ 30 ºC/85% relative humidity (RH). Regardless of storage condition, Cree recommends sealing any unsoldered LEDs in the original MBP.

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.

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 not been investigated as a fire enclosure or a fire and electrical enclosure per ANSI/UL 8750.

NOTES - CONTINUED

Vision Advisory

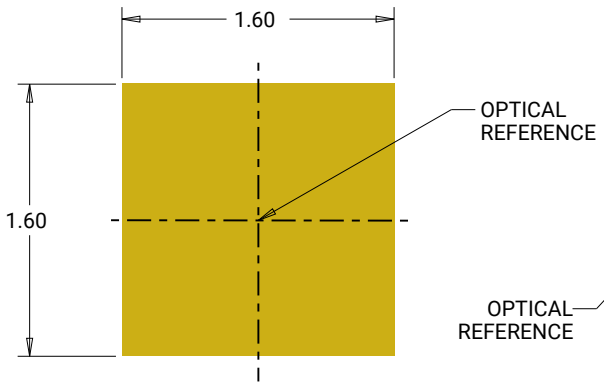
WARNING: Do not look at an exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

MECHANICAL DIMENSIONS

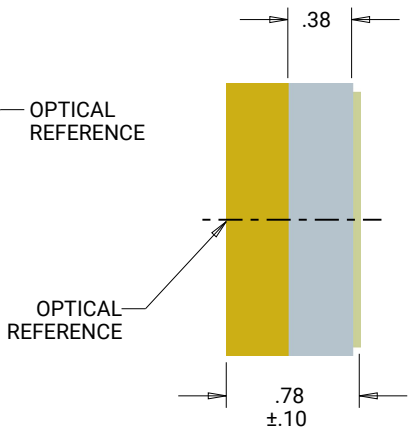
Thermal vias, if present, are not shown on these drawings.

All dimensions in mm.

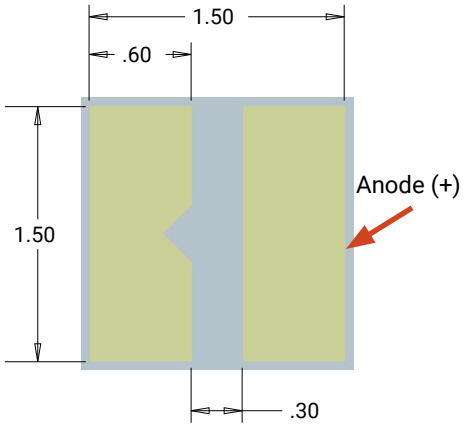
Measurement tolerances unless indicated otherwise: ±.13 mm



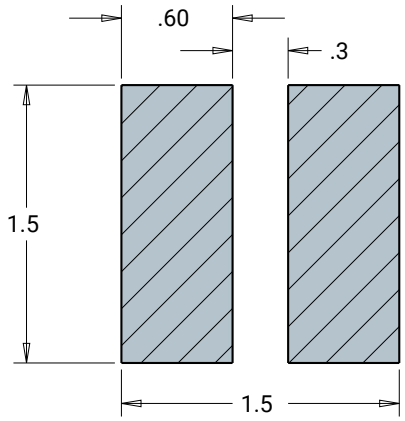
Top View



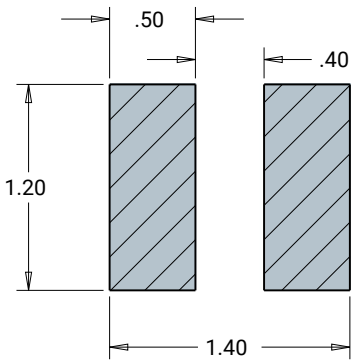
Side View



Bottom View



Recommended PC Board Solder Pad



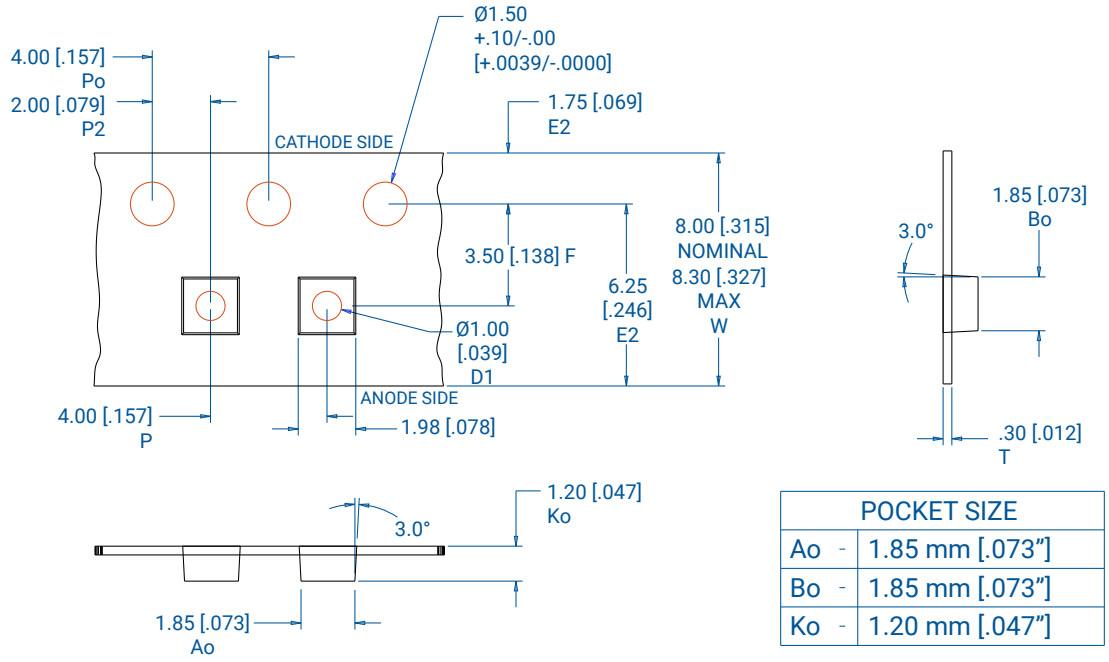
Recommended Stencil Pattern

TAPE AND REEL

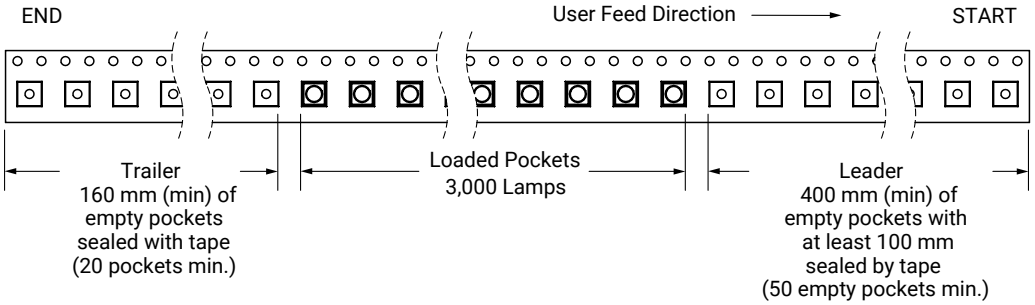
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

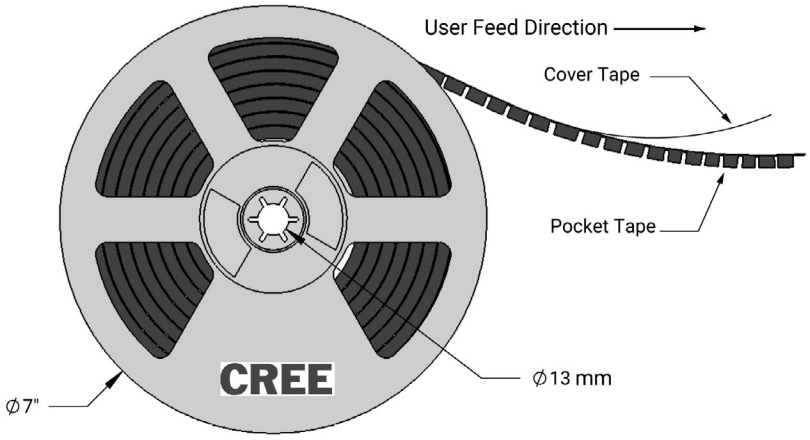
Except as noted, all dimensions in mm [in].

Measurement tolerances unless indicated otherwise: .xx = ±.10 mm



POCKET SIZE	
Ao -	1.85 mm [.073"]
Bo -	1.85 mm [.073"]
Ko -	1.20 mm [.047"]

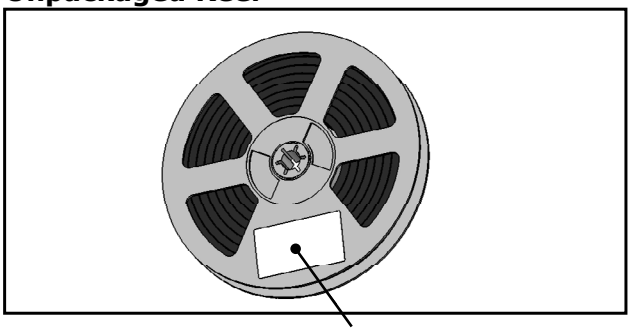




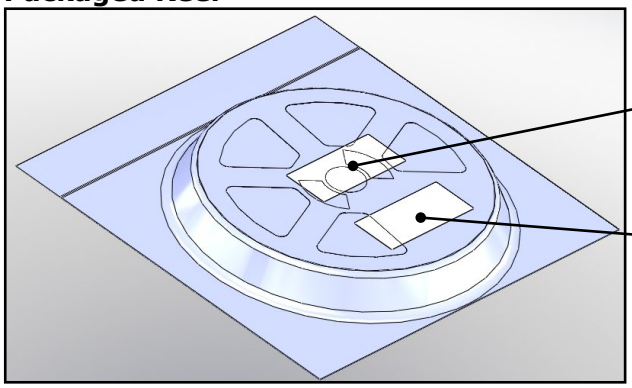
PACKAGING

The diagrams below show the packaging and labels Cree uses to ship XLamp XD16 LEDs. XLamp XD16 LEDs are shipped in tape loaded on a reel. Each box contains only one reel in a moisture barrier bag.

Unpackaged Reel



Packaged Reel



Boxed Reel