

Introduction

Purpose

- Provide an Overview of Cree's XLamp XP Family of LED Components

Objective

- Give a brief summary of each XP product performance
- Highlight targeted applications
- Summarize XP characteristics, order codes and bins
- Provide details on XPs Lifetime Projections

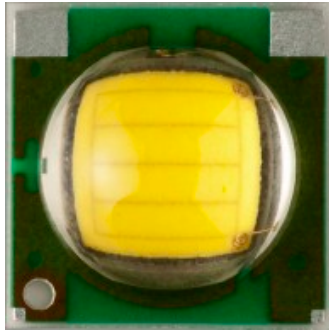
Content

- 26 slides

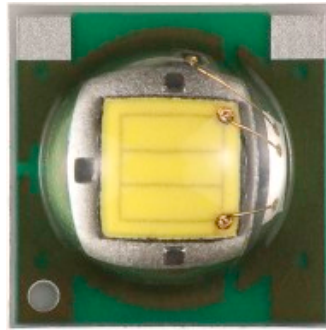
Content

- 15 Minutes

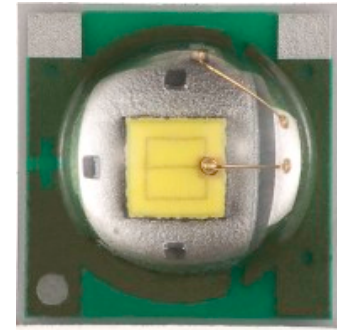
XLamp XP Standard White



XP-G

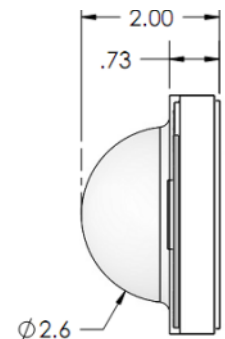
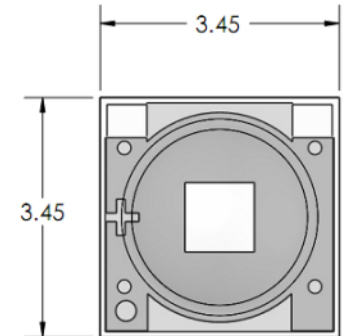


XP-E



XP-C

- **Industry's highest performance lighting-class LEDs**
 - XP-G: Up to 148 lm @ 141 LPW; up to 493 lm @ 92 LPW
 - XP-E: Up to 130 lm @ 116 LPW; up to 291 lm @ 84 LPW
- **Design flexibility with one footprint**
 - Reduce system cost by using fewer LEDs & fewer optics
 - Easily create different price / performance levels
- **Superior optical control – put light where it is needed**
 - Small optical source size works well with reflector & TIR solutions



XLamp XP White Applications

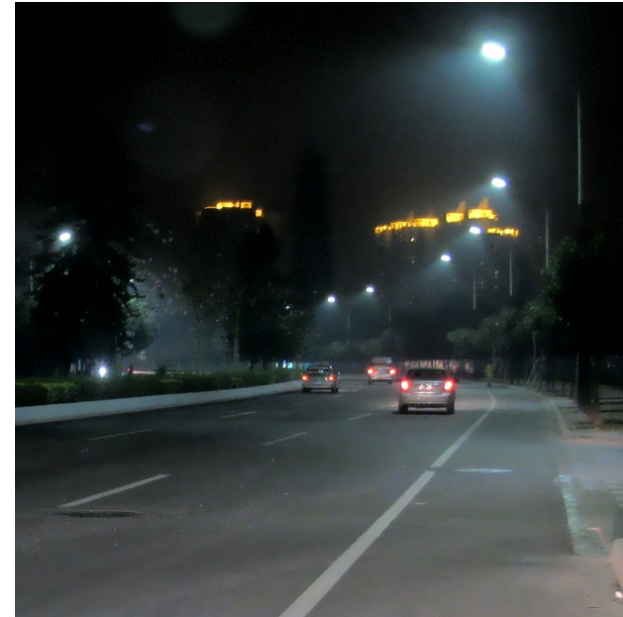
Indoor lighting

- LED bulbs
- Accent & track
- High-bay



Outdoor lighting

- Street & tunnel
- Parking area



Portable lighting

- High-end flashlight
- Bicycle lighting




Off-grid lighting

- Solar-powered outdoor
- Battery-powered indoor



XLamp XP Standard White Characteristics



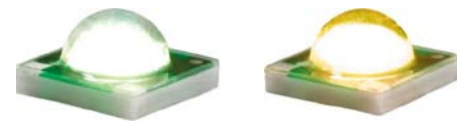
	XP-G 	XP-E 	XP-C
Max Current	1500 mA	1000 mA	500 mA
Thermal Resistance	6 °C/W	9 °C/W	12 °C/W
Viewing Angle	125°	115°	110°
Typ. Vf @ 350 mA	3.0 V	3.2 V	3.4 V

- ANSI-compatible chromaticity bins
- Electrically neutral thermal path
- ENERGY STAR approved lumen maintenance (XP-G & XP-E)
- Symmetric design: matching optical & mechanical centers
- UL 8750 recognized component (E326295)
- **Unlimited floor life at ≤30°C / 85% RH**
- Reflow solderable JEDEC J-STD-020C compatible
- RoHS- & REACH-compliant

Standard White	Cool White	Neutral White	Warm White
CCT (K)	10,000K – 5,000K	5,000K – 3,700K	3,700K – 2,600K
CRI (typ)	75	75	80

XLamp XP Standard White

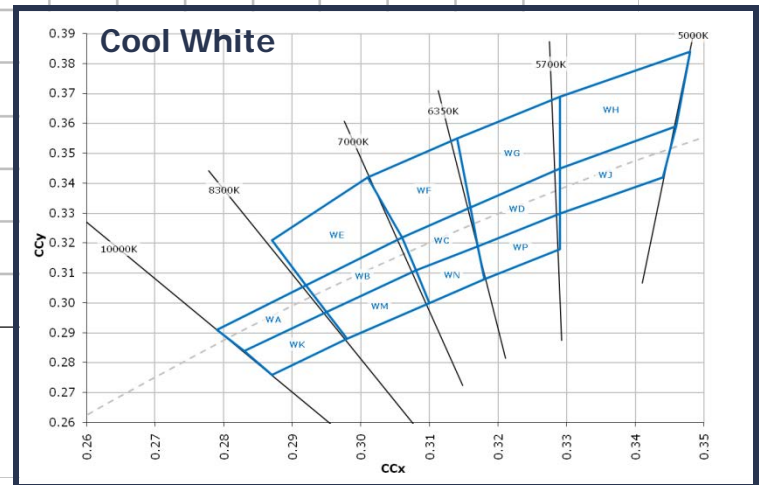
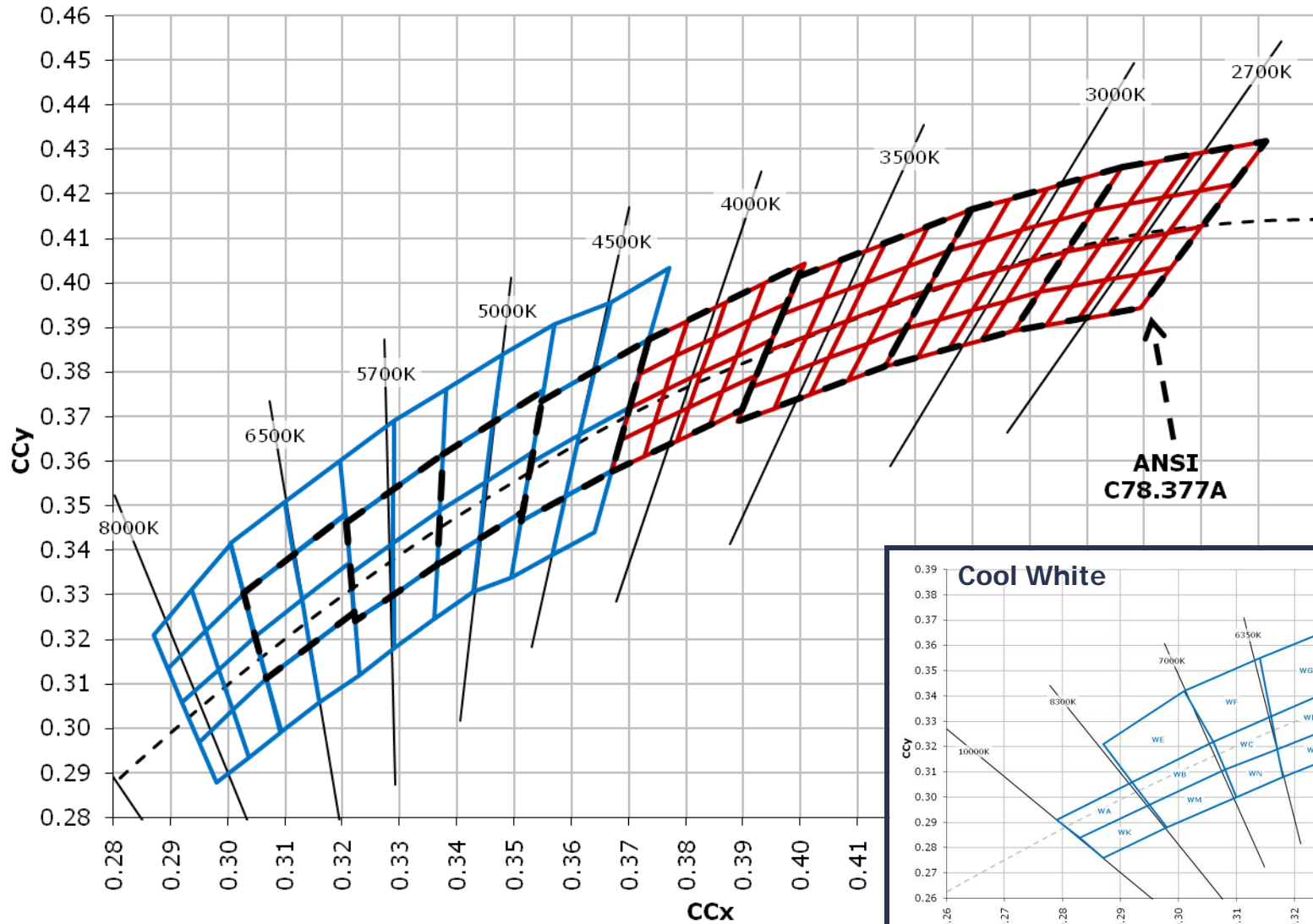
Standard Order Codes



Min. Flux Bin	10,000K – 5,000K	5,000K – 4,200K	4,200K – 3,500K	3,500K – 3,200K	3,200K – 2,900K	2,900K – 2,700K	
	01, 02, 03, ...	E3, F4, E4	F5, E5	F6, E6	F7, E7	F8	
S2 (J)							XP-G
R5 (H)	139						XP-E & XP-G
R4 (G)	130						XP-E
R3 (F)	122	122	122				XP-E & XP-C
R2 (E)	114	114	114	114			XP-C
Q5 (D)	107	107	107	107	107		
Q4 (C)	100	100	100	100	100	100	
Q3 (B)	93.9	93.9	93.9	93.9	93.9	93.9	
Q2 (A)	87.4	87.4	87.4	87.4	87.4	87.4	
P4 (9)		80.6	80.6	80.6	80.6	80.6	
P3 (8)		73.9	73.9	73.9	73.9	73.9	
P2 (7)			67.2	67.2	67.2	67.2	
N4 (6)					62.0	62.0	
N3 (5)						56.8	

Minimum luminous flux @ 350 mA (lm)

XLamp XP Std. White Chromaticity Bins (ANSI)



Registration of Optics Easier with XLamp XP

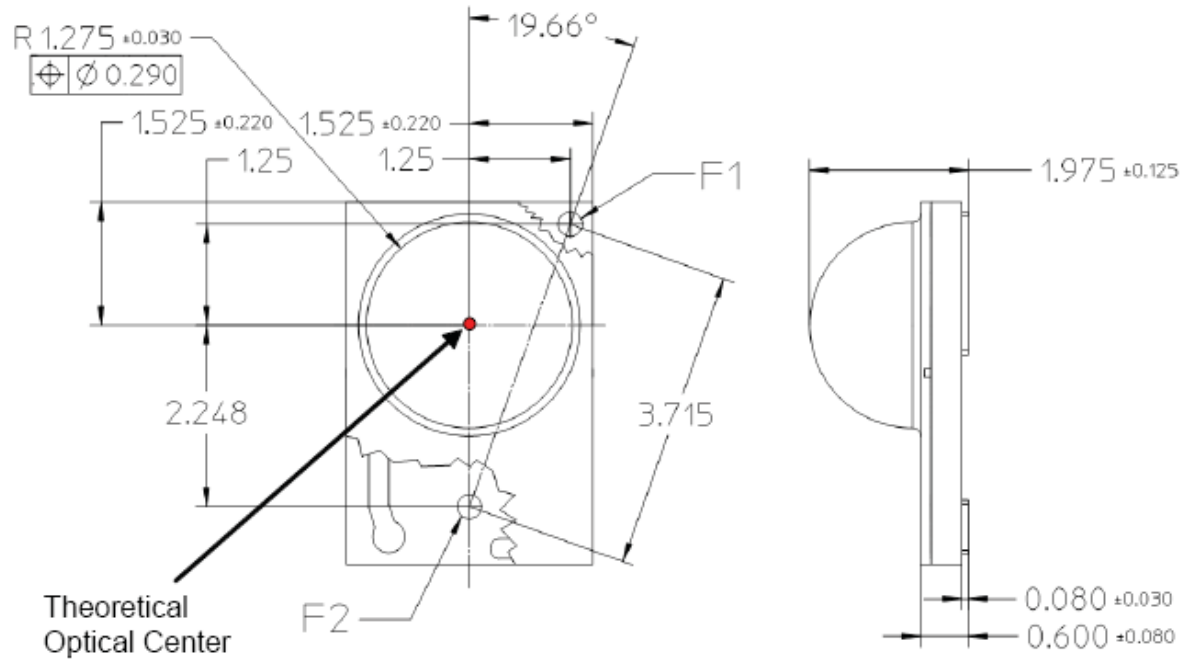
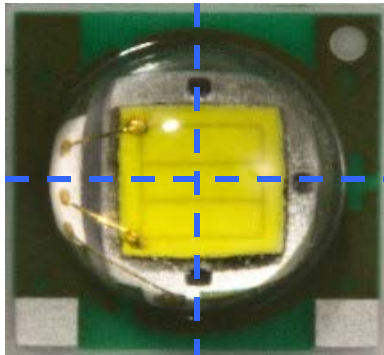


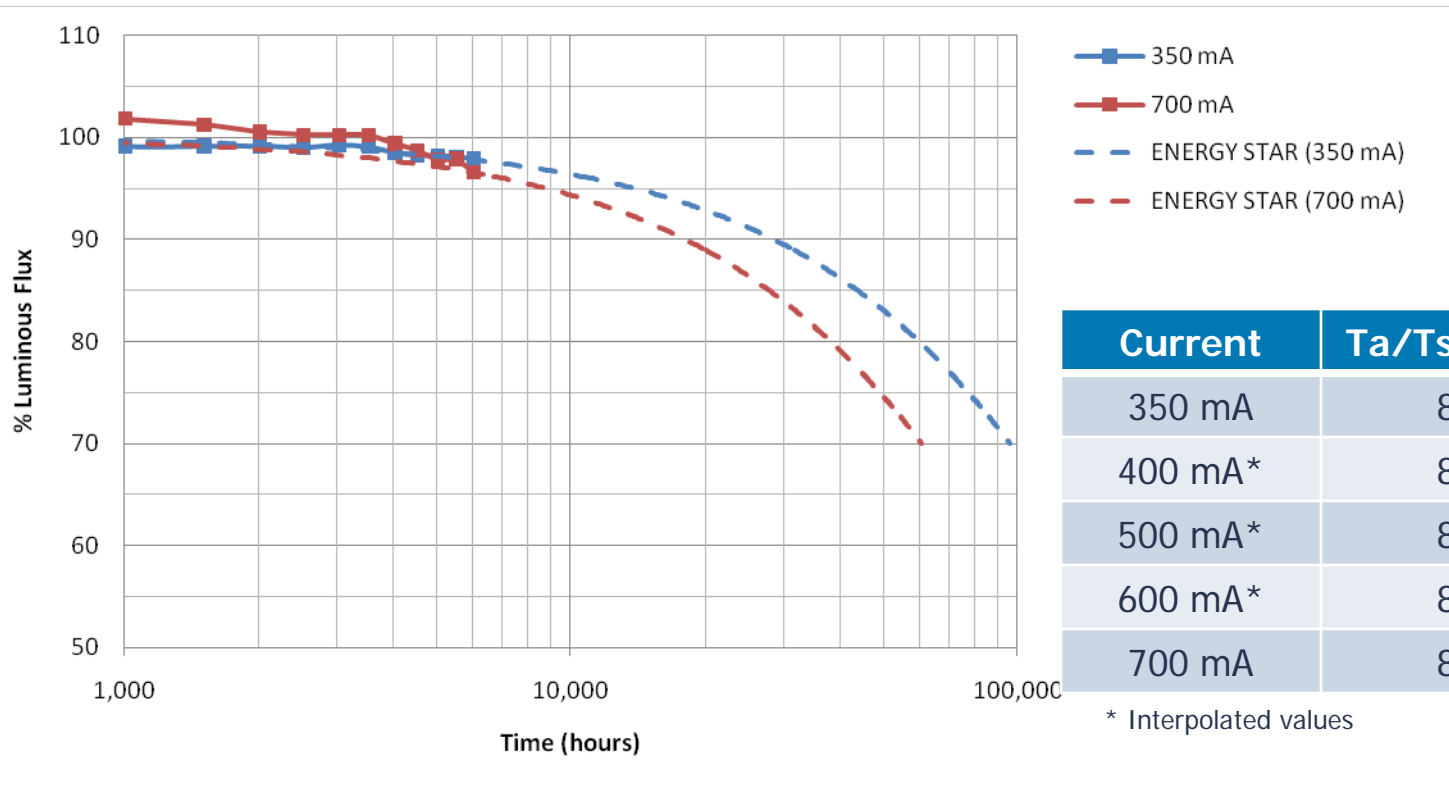
Figure 2. The most accurate method to find the theoretical optical center and the center of the dome is by using the fiducials located on the front side of the LUXEON Rebel LED. Dimensions in mm.



On XLamp XP, the mechanical & optical centers match, which means:

- More efficient secondary optics
- Easier optic registration
- More accuracy in optic placement

XLamp XP-E White L70 Lifetime ($T_a=85^\circ\text{C}$)



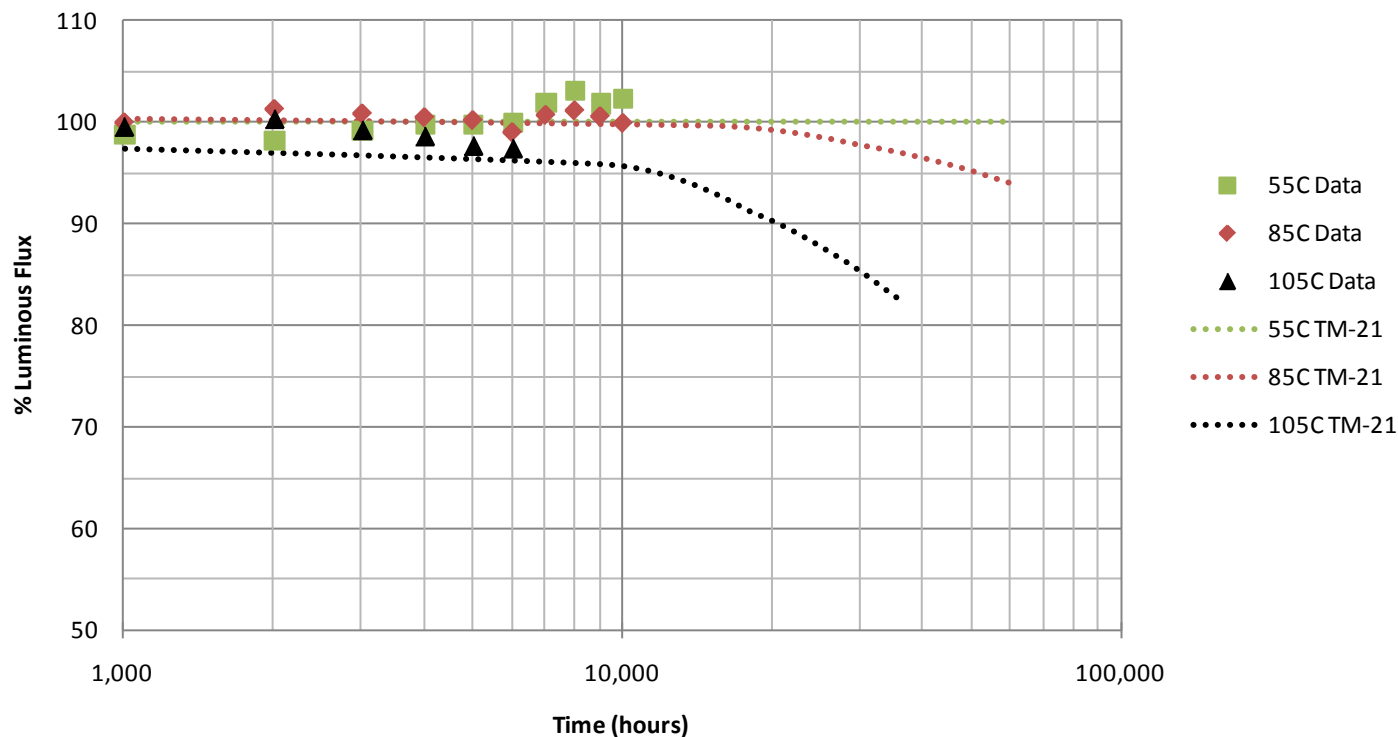
Current	T_a/T_{sp} ($^\circ\text{C}$)	L70 (hours)
350 mA	85	96,294
400 mA*	85	90,234*
500 mA*	85	79,234*
600 mA*	85	69,575*
700 mA	85	61,094

* Interpolated values

Notes:

- These extrapolations are for informational purposes only and are not a warranty or a specification.
- Extrapolated lifetimes are subject to change without notice.
- Extrapolations are performed using ENERGY STAR exponential method (fit to last data point).
- Notice: Cree will revise L70 lifetimes to those calculated by IES TM-21 methods once TM-21 is finalized.

XLamp XP-G White L70 Lifetime (TM-21)

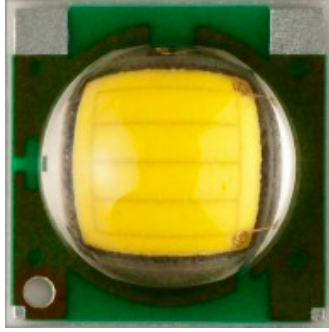


Current	Ta/Tsp	Test Duration	α	β	Calculated L70	Reported L70
1000 mA	55°C	10,080 hrs	-4.219E-06	9.847E-01	---	L70 (10k) > 60,500 hrs
1000 mA	85°C	10,080 hrs	1.284E-06	1.016E+00	290,000 hrs	L70 (10k) > 60,500 hrs
1000 mA	105°C	6,048 hrs	5.561E-06	1.007E+00	65,500 hrs	L70 (6k) > 36,300 hrs

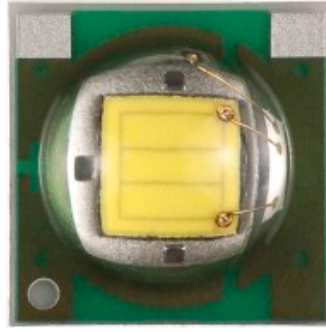
Notes:

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- *Extrapolated lifetimes are subject to change without notice.*

XLamp XP High CRI White



XP-G



XP-E



Breakthrough performance for high CRI white LEDs

- **Get both high efficacy and high CRI**
 - XP-G: Up to 107 lm (3000K) @ 350 mA, 102 LPW
- **Available in 80, 85 & 90 CRI minimums**
 - Better color rendering than fluorescent; no UV, no IR
- **Extension of existing XLamp XP family**
 - Same beam angle, drops into existing optical designs; LM-80; UL 8750



XLamp XP High CRI White Applications

Retail lighting

- Clothing
- Display case
- Spot lights



Halogen replacement lamps

- PAR, R, MR style lamps
- Accent & track



High-end indoor lighting

- Architectural lighting
- Museum lighting





Medical lighting

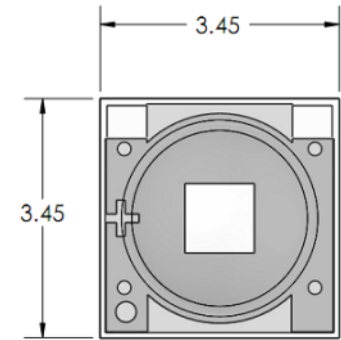
- Examination lighting
- Surgical head lamp



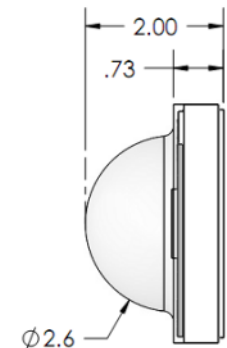
XLamp XP High CRI White Characteristics



	XP-G 	XP-E 
Max Current	1500 mA	1000 mA
Thermal Resistance	6 °C/W	9 °C/W
Viewing Angle	125°	115°
Typ. Vf @ 350 mA	3.0 V	3.2 V



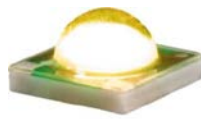
- ANSI-compatible chromaticity bins
- Electrically neutral thermal path
- ENERGY STAR approved lumen maintenance
- Symmetric design: matching optical & mechanical centers
- UL 8750 recognized component (E326295)
- **Unlimited floor life at ≤30°C / 85% RH**
- Reflow solderable JEDEC J-STD-020C compatible
- RoHS- & REACH-compliant



High CRI White	Warm White
CCT (K)	3,200K – 2,600K
CRI (min)	80, 85 or 90

XLamp XP High CRI White

Standard Order Codes



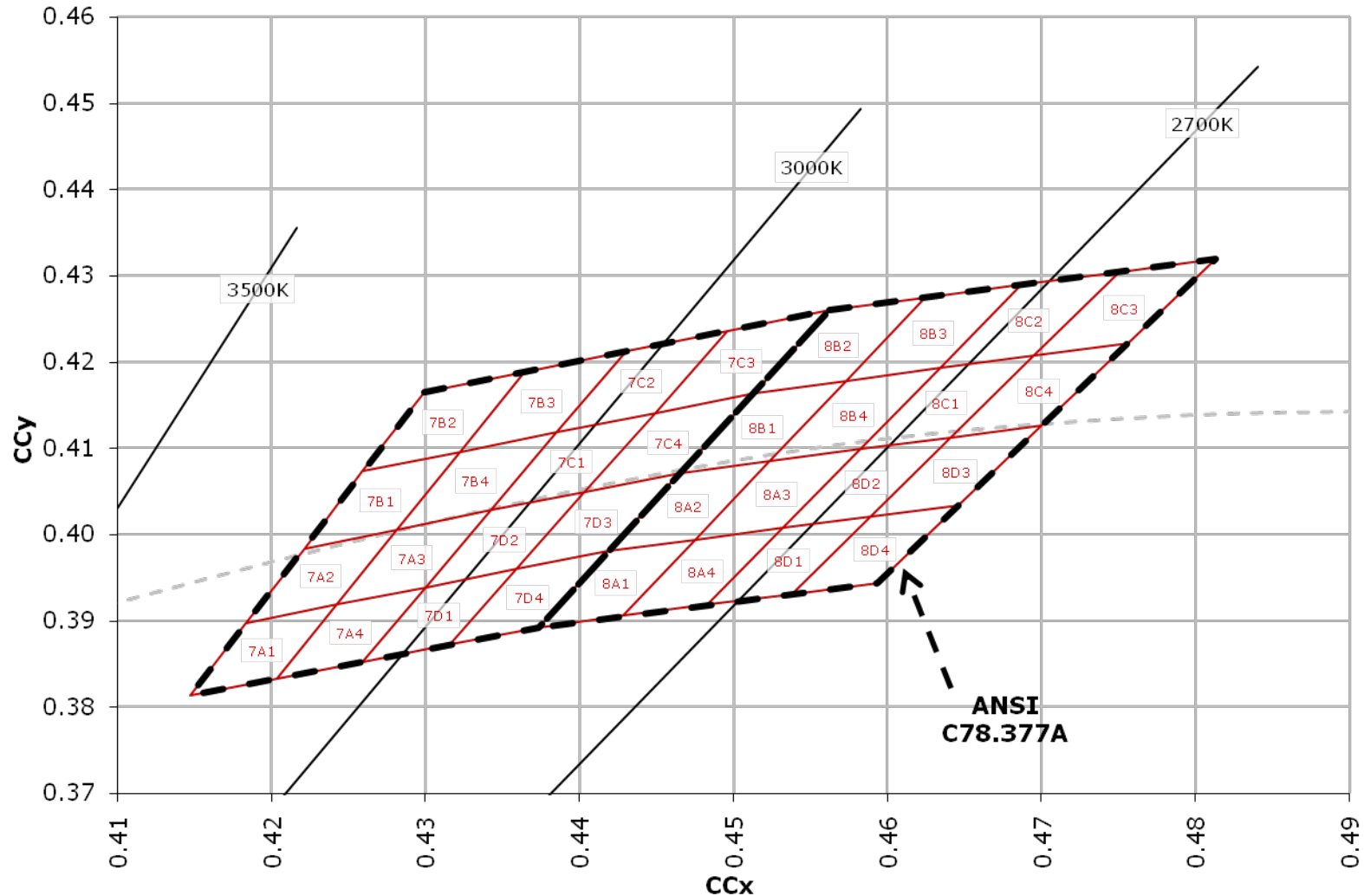
Min. Flux Bin	3000K (E7)				2900K (F8)				2700K (E8)			
	Std	80 CRI	85 CRI	90 CRI	Std	80 CRI	85 CRI	90 CRI	Std	80 CRI	85 CRI	90 CRI
Q5 (D)	107				107							
Q4 (C)	100	100			100	100			100			
Q3 (B)	93.9	93.9	93.9		93.9	93.9	93.9		93.9	93.9		
Q2 (A)	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	
P4 (9)	80.6	80.6	80.6	80.6	80.6	80.6	80.6	80.6	80.6	80.6	80.6	80.6
P3 (8)	73.9	73.9	73.9	73.9	73.9	73.9	73.9	73.9	73.9	73.9	73.9	73.9
P2 (7)			67.2	67.2			67.2	67.2	67.2		67.2	67.2
N4 (6)							62.0	62.0			62.0	62.0

Minimum luminous flux @ 350 mA (lm)

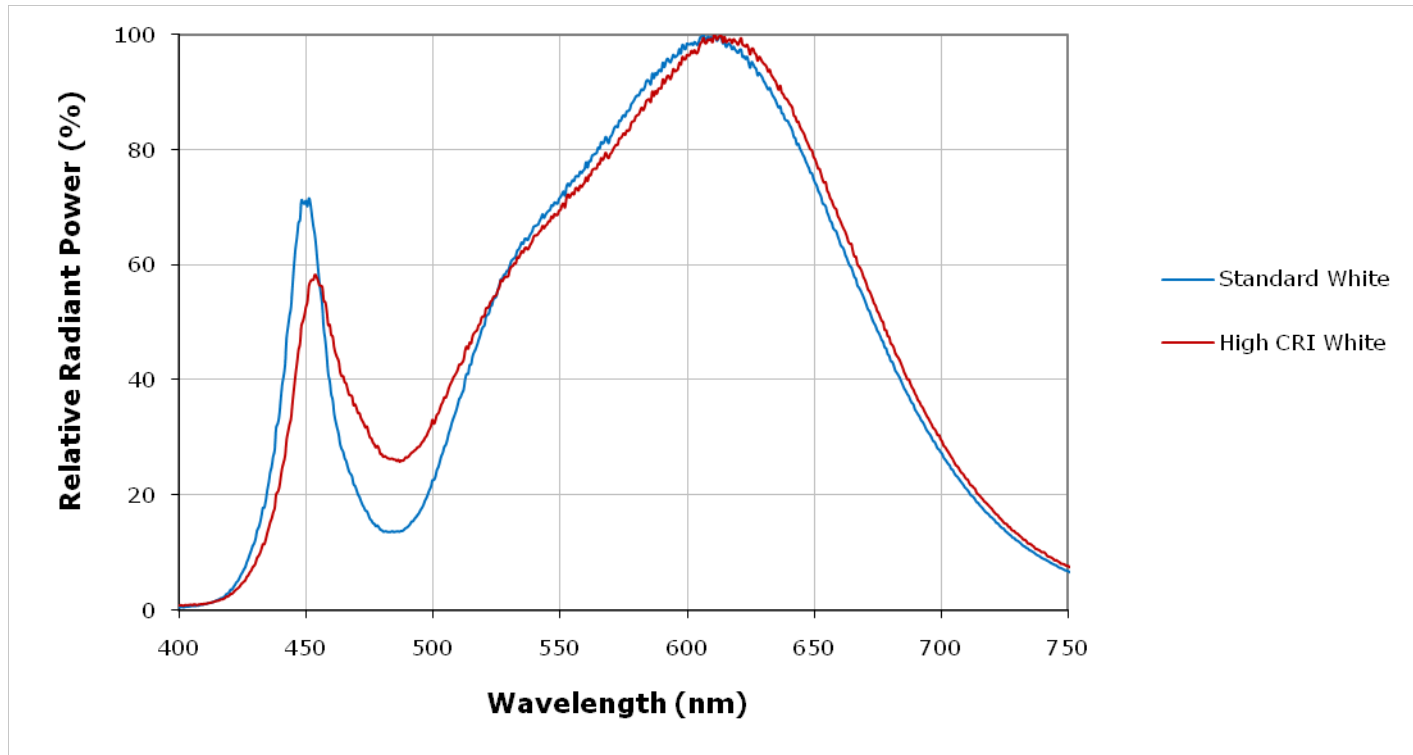
Standard : XPxWHT-**L**1-0000-xxxxx
80 CRI : XPxWHT-**H**1-0000-xxxxx
85 CRI : XPxWHT-**P**1-0000-xxxxx
90 CRI : XPxWHT-**U**1-0000-xxxxx

XP-G
XP-E & XP-G
XP-E

Cree High CRI White Chromaticity Bins (ANSI)



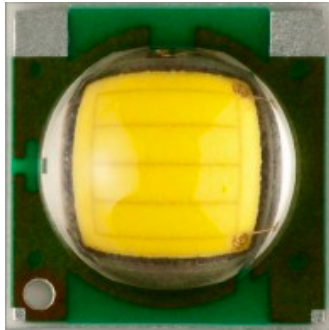
Cree Detailed CRI Values (3000K)



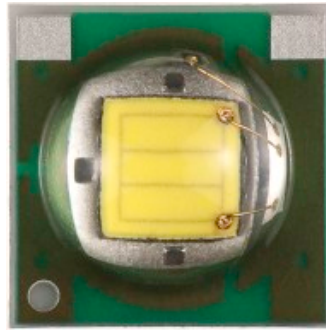
Phosphor	Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
Standard	82	81	87	90	81	79	80	88	69	24	66	76	57	81	93
High CRI	88	88	93	95	86	86	89	90	75	43	81	85	71	89	97

CRI values were measured from large numbers of production samples. These values are presented for informational purposes only and are not a warranty or a specification.

XLamp XP Outdoor White

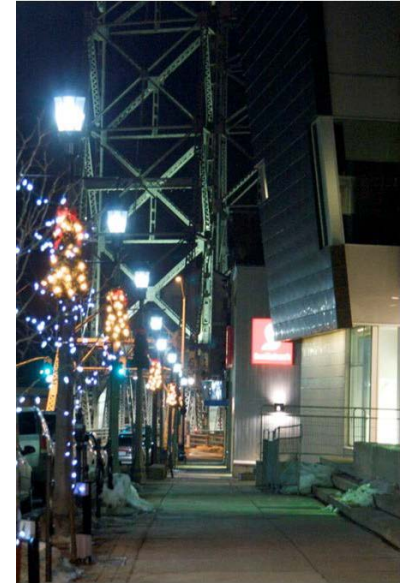


XP-G



XP-E

- **Higher flux, lower CRI option for white light**
 - Same flux & efficacy as cool white
- **Designed to match existing HID installations**
 - Available in 5300K – 4000K CCT
- **Maintains existing XLamp XP specs & reliability**
 - Same beam angle, drops into existing optical designs



Courtesy of CRS Electronics

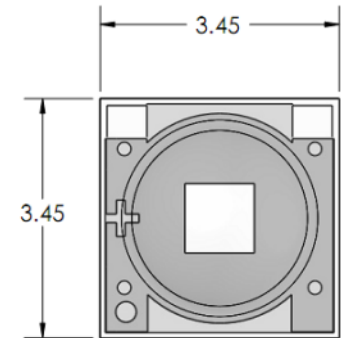


Courtesy of Indal Industrial

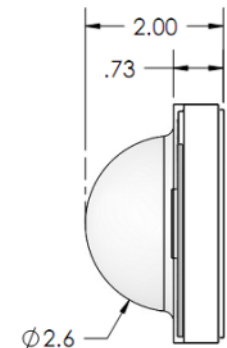
XLamp XP Outdoor White Characteristics



	XP-G 	XP-E 
Max Current	1500 mA	1000 mA
Thermal Resistance	6 °C/W	9 °C/W
Viewing Angle	125°	115°
Typ. Vf @ 350 mA	3.0 V	3.2 V



- ANSI-compatible chromaticity bins
- Electrically neutral thermal path
- ENERGY STAR approved lumen maintenance
- Symmetric design: matching optical & mechanical centers
- UL 8750 recognized component (E326295)
- **Unlimited floor life at $\leq 30^{\circ}\text{C}$ / 85% RH**
- Reflow solderable JEDEC J-STD-020C compatible
- RoHS- & REACH-compliant



Outdoor White	Neutral White
CCT (K)	5,300K – 4,000K
CRI (typ)	70

XLamp XP Outdoor White

Standard Order Codes



3S	3T	4S	4T	5S
3B	3C	4B	4C	5B
3A	3D	4A	4D	5A
3R	3U	4R	4U	5R

3S	3T	4S	4T	5S
3B	3C	4B	4C	5B
3A	3D	4A	4D	5A
3R	3U	4R	4U	5R

3S	3T	4S	4T	5S
3B	3C	4B	4C	5B
3A	3D	4A	4D	5A
3R	3U	4R	4U	5R

3S	3T	4S	4T	5S
3B	3C	4B	4C	5B
3A	3D	4A	4D	5A
3R	3U	4R	4U	5R

3S	3T	4S	4T	5S
3B	3C	4B	4C	5B
3A	3D	4A	4D	5A
3R	3U	4R	4U	5R

Min. Flux Bin	C1	D1	C2	D2	C3
	5000K	4750K	4500K	4500K	4300K
R4 (G)	130	130	130	130	130
R3 (F)	122	122	122	122	122
R2 (E)	114	114	114	114	114
Q5 (D)	107	107	107	107	107
Q4 (C)	100	100	100	100	100
Q3 (B)	93.9	93.9	93.9	93.9	93.9

Minimum luminous flux @ 350 mA (lm)

Outdoor White = XPEWHT-01-0000-xxxxx
XPGWHT-01-0000-xxxxx

XP-G
XP-E & XP-G
XP-E



XLamp XP Family – Summary

- The Cree XLamp XP Family includes the industry's highest performance lighting class LEDs on the market
- XP Standard White offers a wide range of color temperatures suitable for almost any white light lighting applications
- The XP Family has excellent long term lumen maintenance even at high drive currents and temperatures
- XP High CRI represents a break through in efficacy for a High CRI Components
- High CRI components are particularly well suited for retail and other display applications
- XP Outdoor White is an application optimized component designed specifically to provide optimal outdoor light



PORTABLE



RESIDENTIAL



OFFICE



RETAIL



ARCHITECTURAL



OUTDOOR

LED lighting: Energy efficient & planet friendly.

Cree. Leading the LED lighting revolution.

Join Cree's LED lighting revolution. We invite you to see how our high-performance, high-efficiency LEDs are lighting up the world.

