

Cree® XLamp® XP-G2 LEDs



PRODUCT DESCRIPTION

The XLamp XP-G2 LED builds on the unprecedented performance of the original XP-G by increasing lumen output up to 20% while providing a single die LED point source for precise optical control. The XP-G2 LED shares the same footprint as the original XP-G, providing a seamless upgrade path and shortening the design cycle.

XLamp XP-G2 LEDs are the ideal choice for lighting applications where high light output and maximum efficacy are required, such as LED light bulbs, outdoor lighting, portable lighting, indoor lighting and solar-powered lighting.

FEATURES

- Available in white, outdoor white and 80-CRI white
- ANSI-compatible chromaticity bins
- Maximum drive current: 1500 mA
- Low thermal resistance: 4 °C/W
- Wide viewing angle: 115°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C
- Electrically neutral thermal path
- UL-recognized component (E349212)



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FLUX CHARACTERISTICS (T_j = 85 °C)

The following table provides several base order codes for XLamp XP-G2 LEDs. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family.

| Color | CCT Range | | Base Order Codes Min. Luminous Flux @ 350 mA | | | Calculated Minimum Luminous Flux (lm)* @ 85 °C | | | Order Code |
|---------------|-----------|--------|----------------------------------------------|-------------------|--------------------|------------------------------------------------|-------|-------|----------------------|
| | Min. | Max. | Group | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | 700 mA | 1.0 A | 1.5 A | |
| Cool White | 5000 K | 8300 K | R3 | 122 | 138 | 223 | 297 | 402 | XPGBWT-L1-0000-00F51 |
| | | | R4 | 130 | 147 | 237 | 316 | 429 | XPGBWT-L1-0000-00G51 |
| | | | R5 | 139 | 158 | 254 | 338 | 458 | XPGBWT-L1-0000-00H51 |
| Outdoor White | 3200 K | 5300 K | R2 | 114 | 129 | 208 | 277 | 376 | XPGBWT-01-0000-00EC2 |
| | | | R3 | 122 | 138 | 223 | 297 | 402 | XPGBWT-01-0000-00FC2 |
| | | | R4 | 130 | 147 | 237 | 316 | 429 | XPGBWT-01-0000-00GC2 |
| Neutral White | 3700 K | 5300 K | Q5 | 107 | 121 | 195 | 260 | 353 | XPGBWT-L1-0000-00DE4 |
| | | | R2 | 114 | 129 | 208 | 277 | 376 | XPGBWT-L1-0000-00EE4 |
| | | | R3 | 122 | 138 | 223 | 297 | 402 | XPGBWT-L1-0000-00FE4 |
| 80-CRI White | 2600 K | 4300 K | Q4 | 100 | 113 | 182 | 243 | 330 | XPGBWT-H1-0000-00CE7 |
| | | | Q5 | 107 | 121 | 195 | 260 | 353 | XPGBWT-H1-0000-00DE7 |
| | | | R2 | 114 | 129 | 208 | 277 | 376 | XPGBWT-H1-0000-00EE7 |
| Warm White | 2600 K | 3700 K | Q4 | 100 | 113 | 182 | 243 | 330 | XPGBWT-L1-0000-00CE7 |
| | | | Q5 | 107 | 121 | 195 | 260 | 353 | XPGBWT-L1-0000-00DE7 |
| | | | R2 | 114 | 129 | 208 | 277 | 376 | XPGBWT-L1-0000-00EE7 |
| | | | R3 | 122 | 138 | 223 | 297 | 402 | XPGBWT-L1-0000-00FE7 |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements.
- Typical CRI for Cool White (5000 K - 8300 K CCT) is 70.
- Typical CRI for Neutral White (3700 K - 5300 K CCT) is 75.
- Typical CRI for Outdoor White (4000 K - 5300 K CCT) is 70.
- Typical CRI for Warm White (2600 K - 3700 K CCT) is 80.
- Minimum CRI for 80-CRI White is 80.

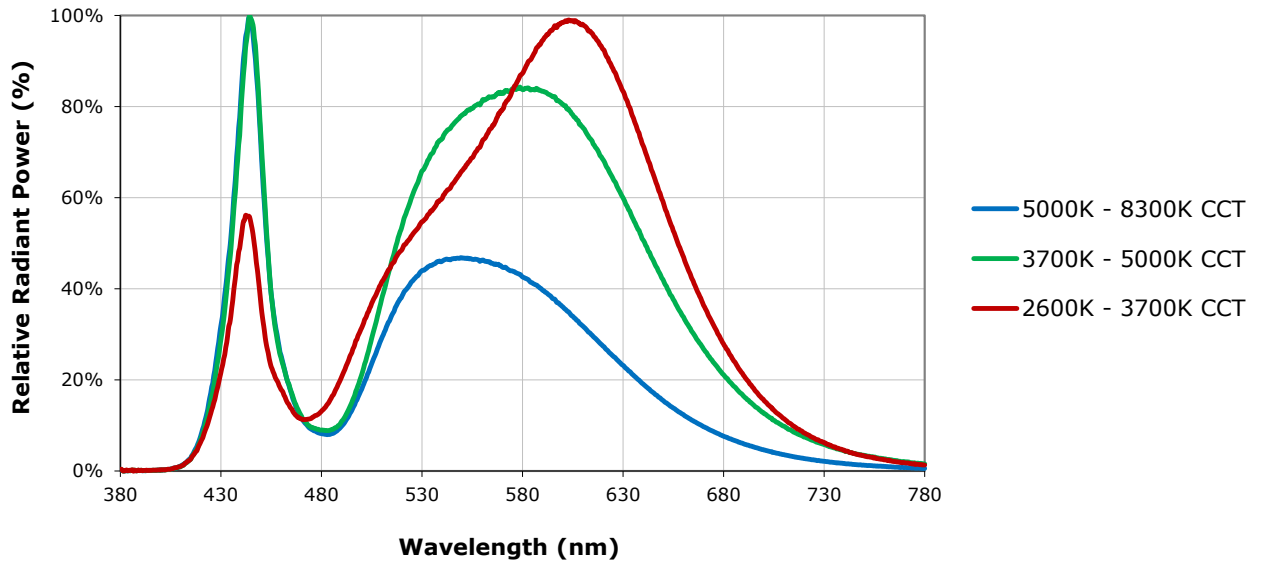
* Flux values @ 25 °C are calculated and for reference only.

* Calculated flux values are for reference only.

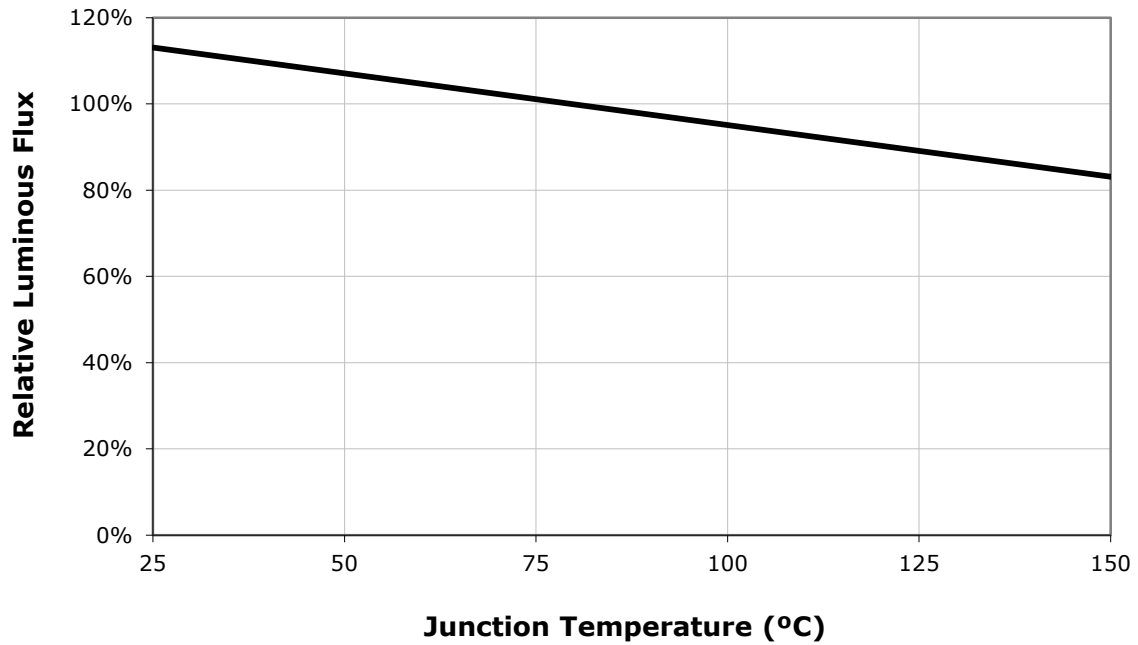
CHARACTERISTICS

| Characteristics | Unit | Minimum | Typical | Maximum |
|----------------------------------------------|---------|---------|---------|---------|
| Thermal resistance, junction to solder point | °C/W | | 4 | |
| Viewing angle (FWHM) | degrees | | 115 | |
| Temperature coefficient of voltage | mV/°C | | -1.8 | |
| ESD classification (HBM per Mil-Std-883D) | | | Class 2 | |
| DC forward current | mA | | | 1500 |
| Reverse voltage | V | | | 5 |
| Forward voltage (@ 350 mA, 85 °C) | V | | 2.8 | 3.5 |
| Forward voltage (@ 700 mA, 85 °C) | V | | 2.9 | |
| Forward voltage (@ 1000 mA, 85 °C) | V | | 3.0 | |
| Forward voltage (@ 1500 mA, 85 °C) | V | | 3.1 | |
| LED junction temperature | °C | | | 150 |

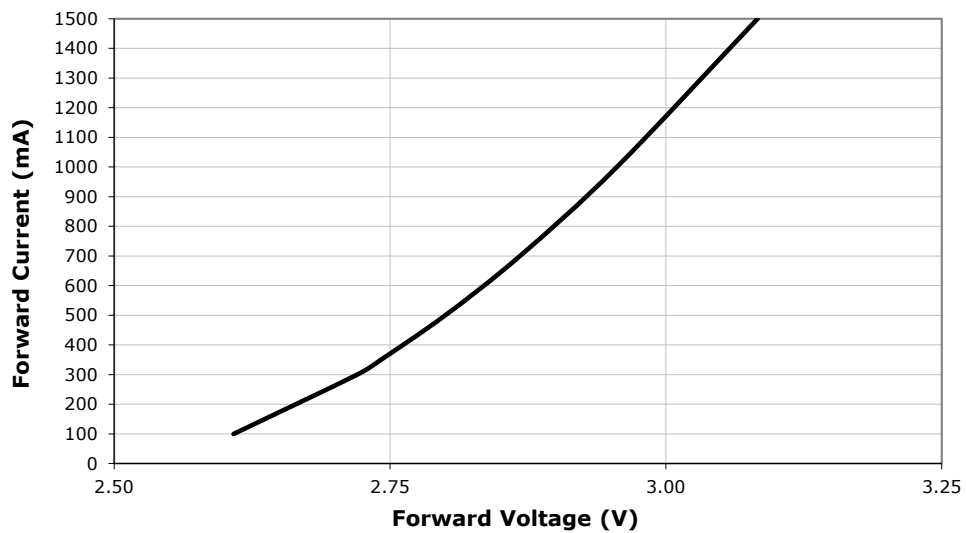
RELATIVE SPECTRAL POWER DISTRIBUTION



RELATIVE FLUX VS. JUNCTION TEMPERATURE ($I_F = 350 \text{ mA}$)

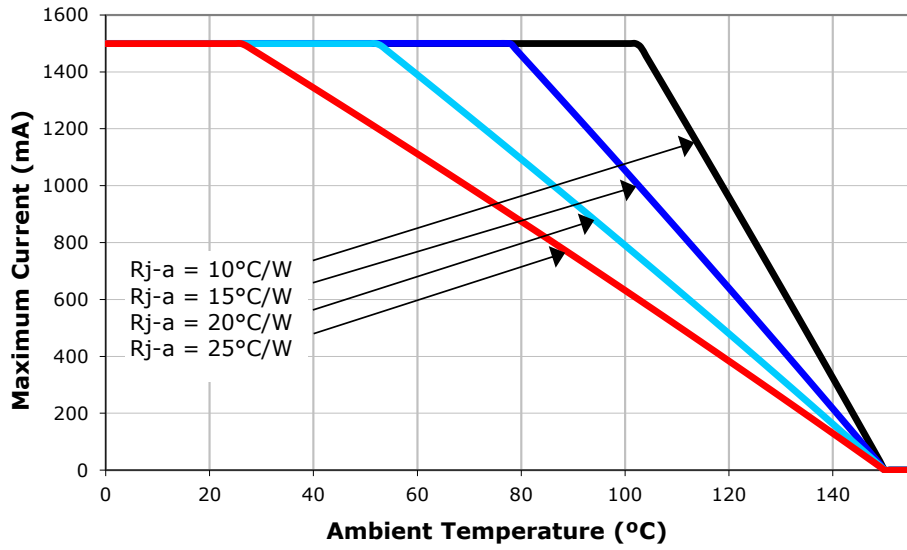


ELECTRICAL CHARACTERISTICS ($T_J = 85 \text{ °C}$)

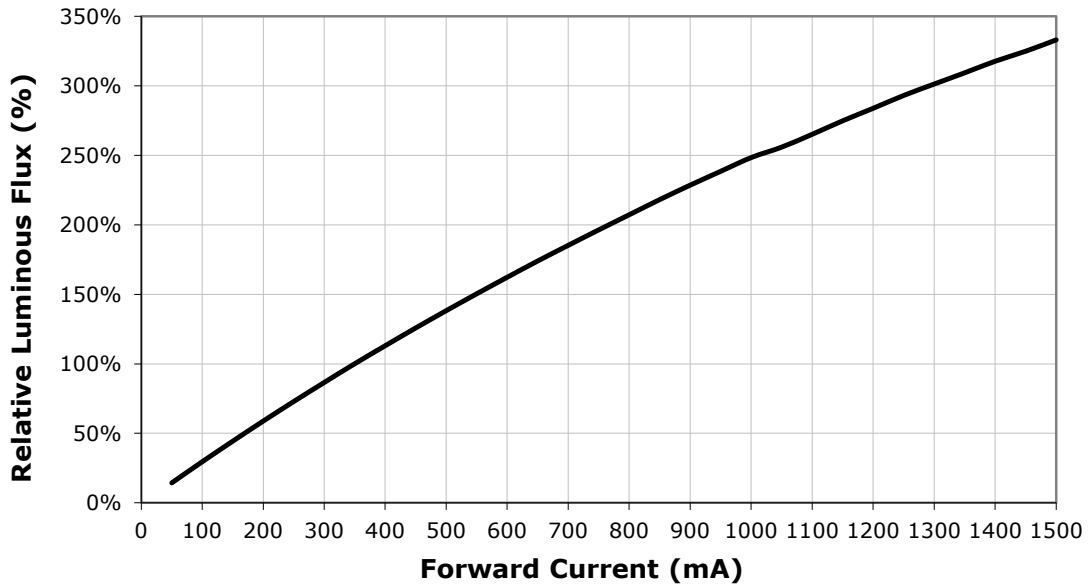


THERMAL DESIGN

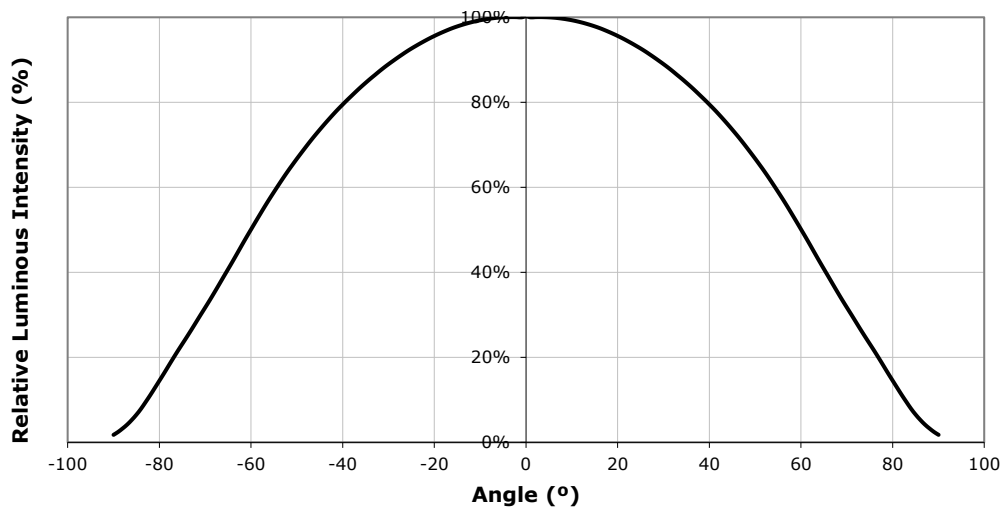
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



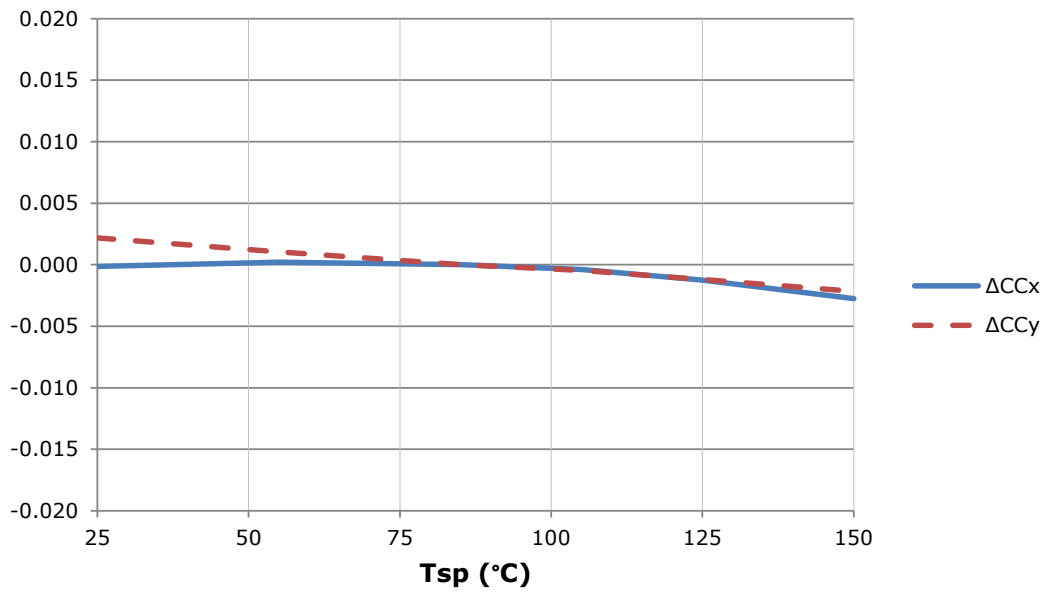
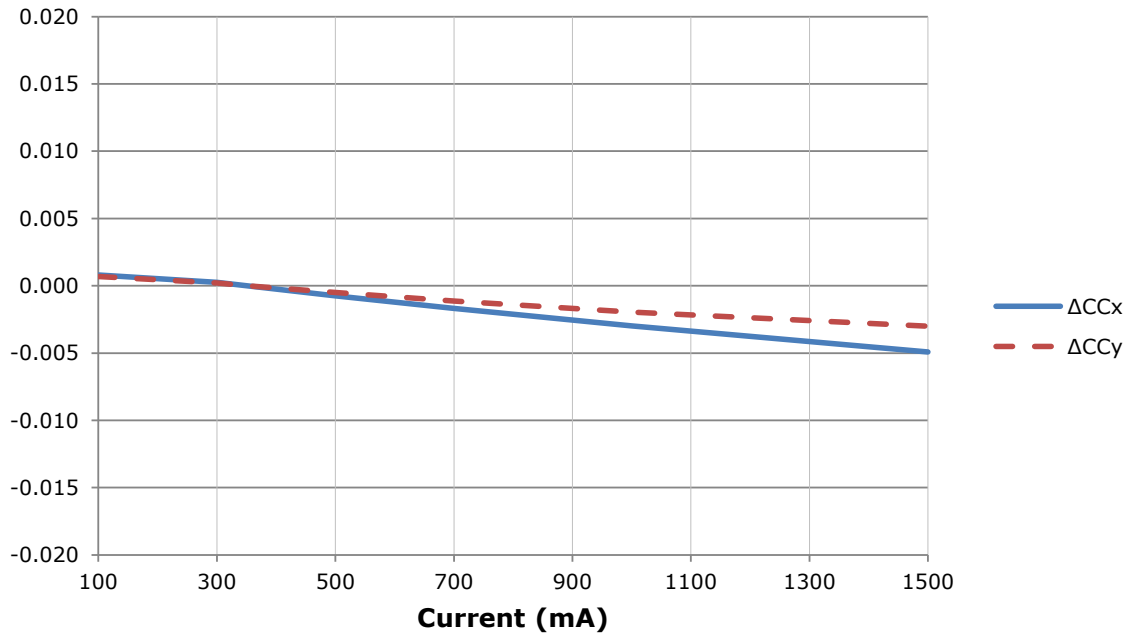
RELATIVE FLUX VS. CURRENT ($T_j = 85\text{ }^\circ\text{C}$)



TYPICAL SPATIAL DISTRIBUTION



RELATIVE CHROMATICITY VS CURRENT AND TEMPERATURE (WARM WHITE*)

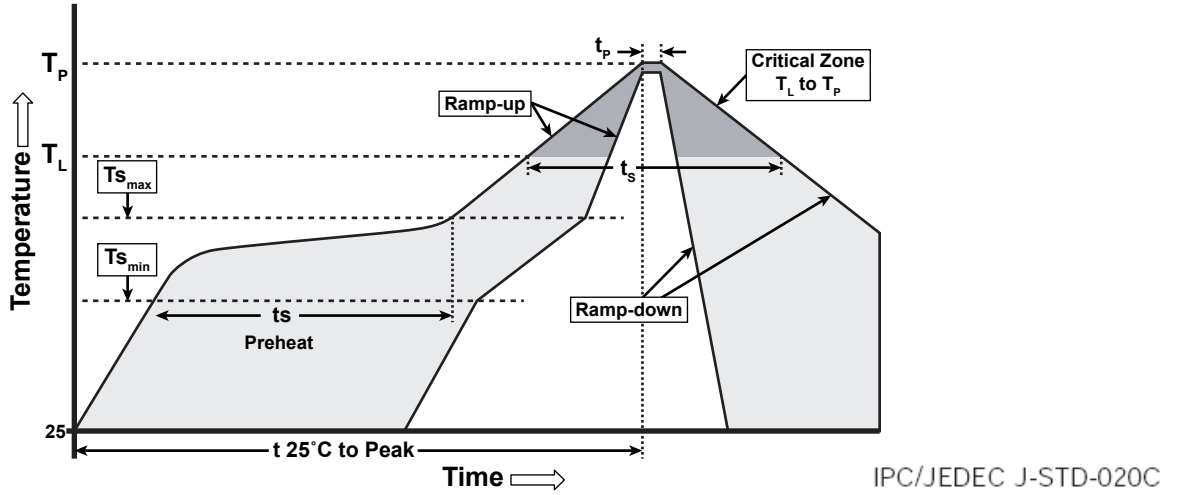


* Warm White XLamp XP-G2 LEDs have a typical CRI of 80.

REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XP-G2 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 solder paste used.

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



| Profile Feature | Lead-Based Solder | Lead-Free Solder |
|-------------------------------------------------------|-------------------|------------------|
| Average Ramp-Up Rate ($T_{s_{max}}$ to T_p) | 3 °C/second max. | 3 °C/second max. |
| Preheat: Temperature Min ($T_{s_{min}}$) | 100 °C | 150 °C |
| Preheat: Temperature Max ($T_{s_{max}}$) | 150 °C | 200 °C |
| Preheat: Time ($t_{s_{min}}$ to $t_{s_{max}}$) | 60-120 seconds | 60-180 seconds |
| Time Maintained Above: Temperature (T_L) | 183 °C | 217 °C |
| Time Maintained Above: Time (t_p) | 60-150 seconds | 60-150 seconds |
| Peak/Classification Temperature (T_p) | 215 °C | 260 °C |
| Time Within 5 °C of Actual Peak Temperature (t_p) | 10-30 seconds | 20-40 seconds |
| Ramp-Down Rate | 6 °C/second max. | 6 °C/second max. |
| Time 25 °C to Peak Temperature | 6 minutes max. | 8 minutes max. |

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

NOTES

Lumen Maintenance Projections

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 at www.cree.com/xlamp_app_notes/LM80_results.

Please read the XLamp Long-Term Lumen Maintenance application note at www.cree.com/xlamp_app_notes/XRE_lumen_maintenance for more details on Cree's lumen maintenance testing and forecasting. Please read the XLamp Thermal Management application note at www.cree.com/xlamp_app_notes/thermal_management for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

Moisture Sensitivity

In testing, Cree has found XLamp XP-G2 LEDs to have unlimited floor life in conditions ≤ 30 °C/85% relative humidity (RH). Moisture testing included a 168-hour soak at 85 °C/85% RH followed by 3 reflow cycles, with visual and electrical inspections at each stage.

Cree recommends keeping XLamp LEDs in their sealed moisture-barrier packaging until immediately prior to use. Cree also recommends returning any unused LEDs to the resealable moisture-barrier bag and closing the bag immediately after use.

UL Recognized Component

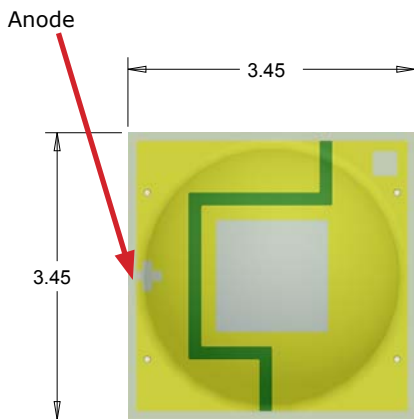
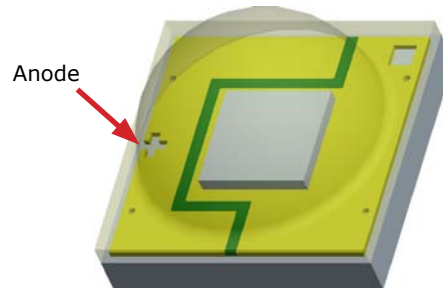
Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

Vision Advisory Claim

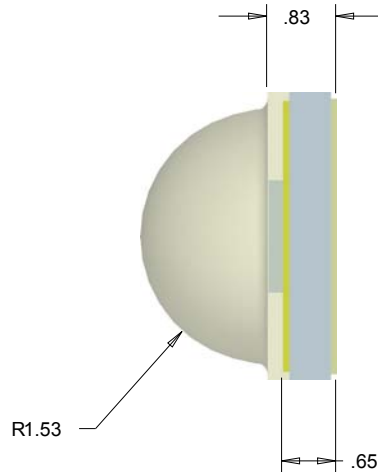
WARNING: Do not look at exposed lamp in operation. Eye injury can result. See LED Eye Safety at www.cree.com/xlamp_app_notes/led_eye_safety.

MECHANICAL DIMENSIONS ($T_A = 25\text{ }^\circ\text{C}$)

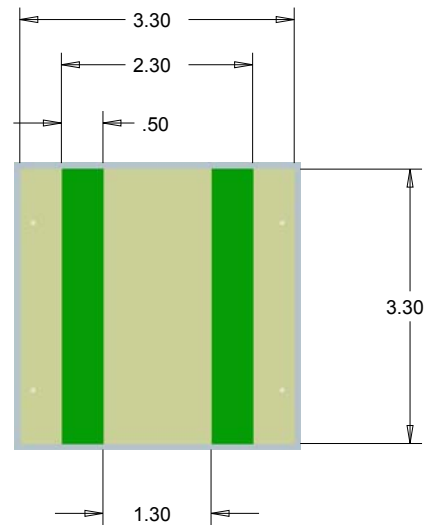
All measurements are $\pm .25\text{ mm}$ unless otherwise indicated.



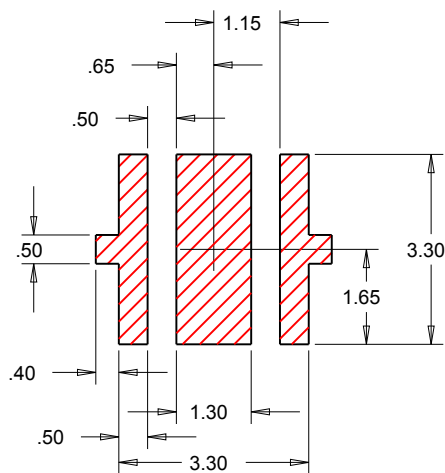
Top View



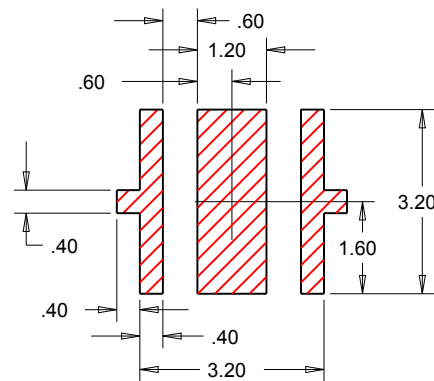
Side View



Bottom View



RECOMMENDED PCB SOLDER PAD

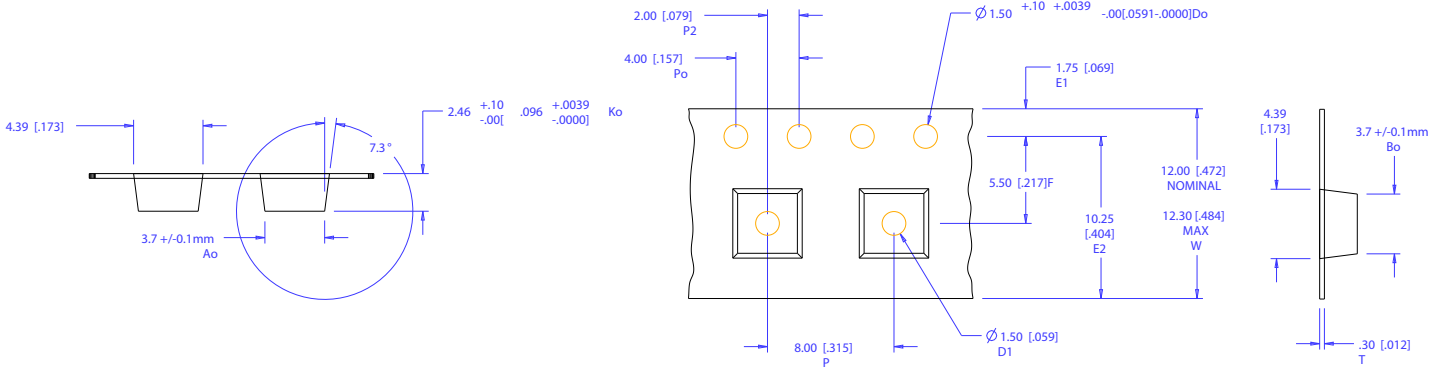


**RECOMMENDED STENCIL PATTERN
(HATCHED AREA IS OPENING)**

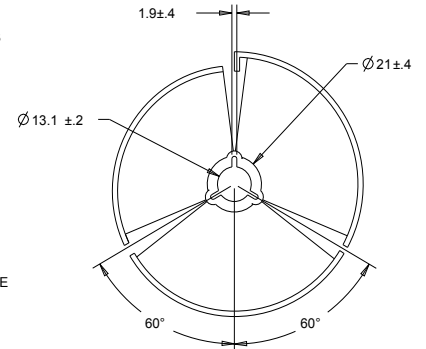
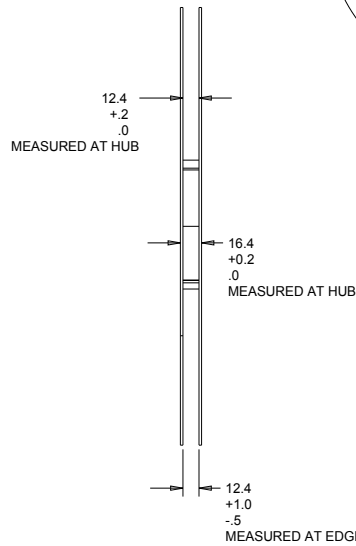
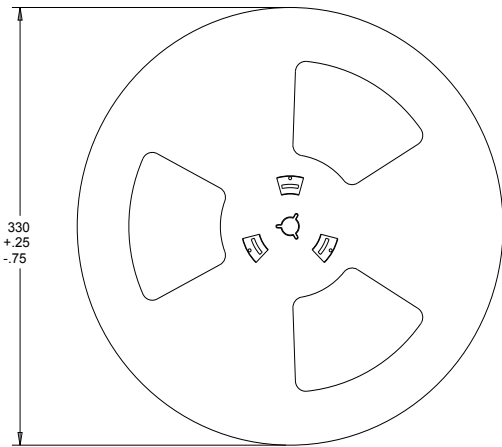
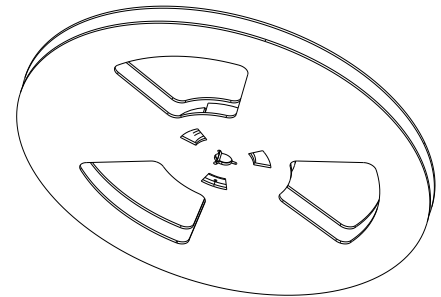
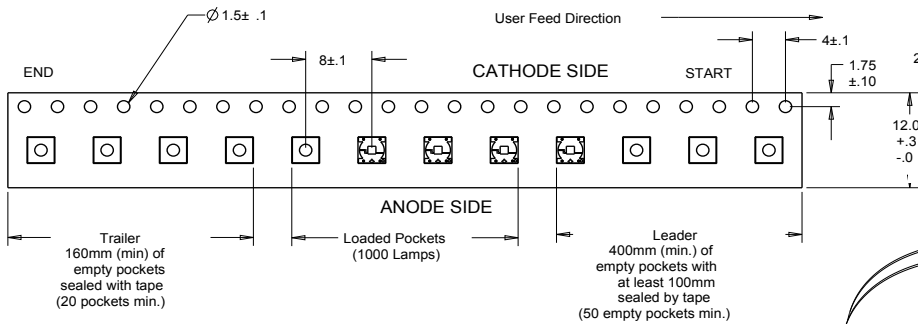
TAPE AND REEL

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

All dimensions in mm.

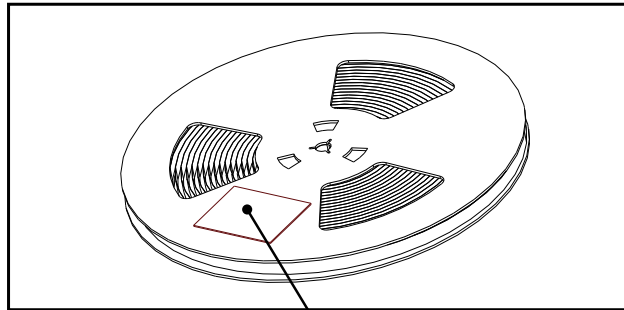


| POCKET SIZE | |
|-------------|------------------------|
| Ao - | 3.7mm ± 0.1 mm |
| Bo - | 3.7mm ± 0.1 mm |
| Ko - | 2.46mm $\pm 0.1/-0$ mm |



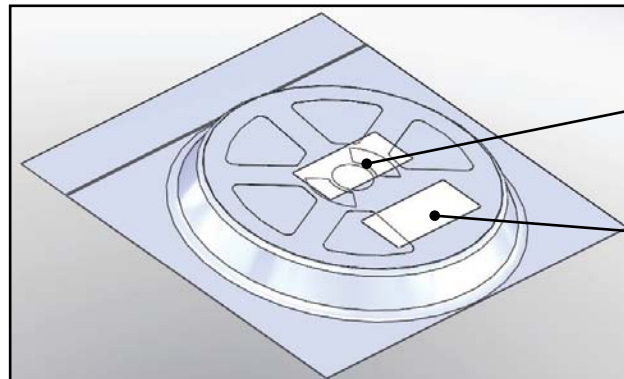
PACKAGING

Unpackaged Reel



Label with Cree Bin Code, Qty, Reel ID

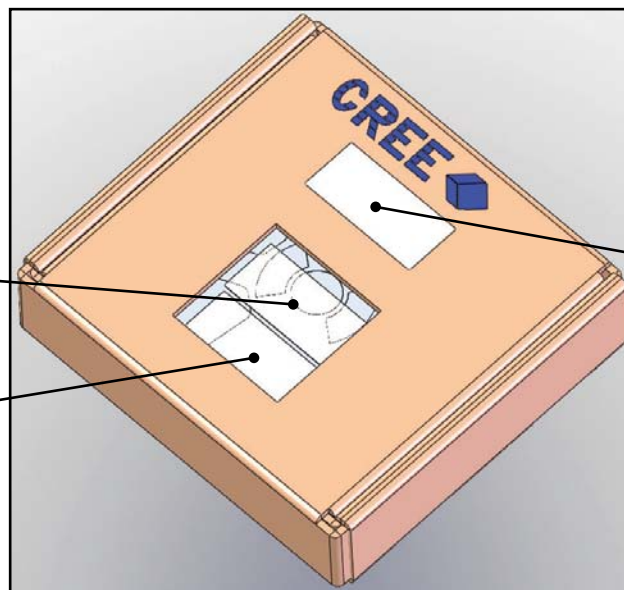
Packaged Reel



Label with Cree Order Code, Qty, Reel ID, PO #

Label with Cree Bin Code, Qty, Reel ID

Boxed Reel



Label with Cree Order Code, Qty, Reel ID, PO #

Label with Cree Bin Code, Qty, Reel ID

Patent Label