

Cree® XLamp® XB-H LEDs



PRODUCT DESCRIPTION

The XLamp XB-H LED delivers a breakthrough combination of lumen output and efficacy in a small package. Delivering more than 500 lumens at 1.5 A, 25 °C in a 2.45 mm² package, the Cree XB-H LED offers triple the lumen density of competing high-power LEDs to significantly increase the performance of today's lighting designs. The XB-H LED joins a new generation of directionally optimized LEDs that offers the industry's highest optical control factor (OCF), a measurement of how LED size and performance benefit directional lighting applications. High-OCF LEDs enable lighting manufacturers to improve the performance of any lighting design, create smaller and less expensive systems, and develop new lighting solutions that were previously not possible.

FEATURES

- Available in white, outdoor white and 80-, 85- and 90-CRI white
- ANSI-compatible chromaticity bins
- Binned at 85 °C
- Maximum drive current: 1500 mA
- Low thermal resistance: 4 °C/W
- Wide viewing angle: 110°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C
- Electrically neutral thermal path

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CHARACTERISTICS

| Characteristics | Unit | Minimum | Typical | Maximum |
|--|---------|---------|---------|---------|
| Thermal resistance, junction to solder point | °C/W | | 4 | |
| Viewing angle (FWHM) | degrees | | 110 | |
| Temperature coefficient of voltage | mV/°C | | -2.2 | |
| ESD withstand voltage (HBM per Mil-Std-883D) | V | | | 8000 |
| DC forward current | mA | | | 1500 |
| Reverse voltage | V | | | 5 |
| Forward voltage (@ 700 mA, 85 °C) | V | | 2.9 | 3.3 |
| Forward voltage (@ 1000 mA, 85 °C) | V | | 3.0 | |
| Forward voltage (@ 1500 mA, 85 °C) | V | | 3.15 | |
| LED junction temperature | °C | | | 150 |

FLUX CHARACTERISTICS ($T_j = 85\text{ }^{\circ}\text{C}$)

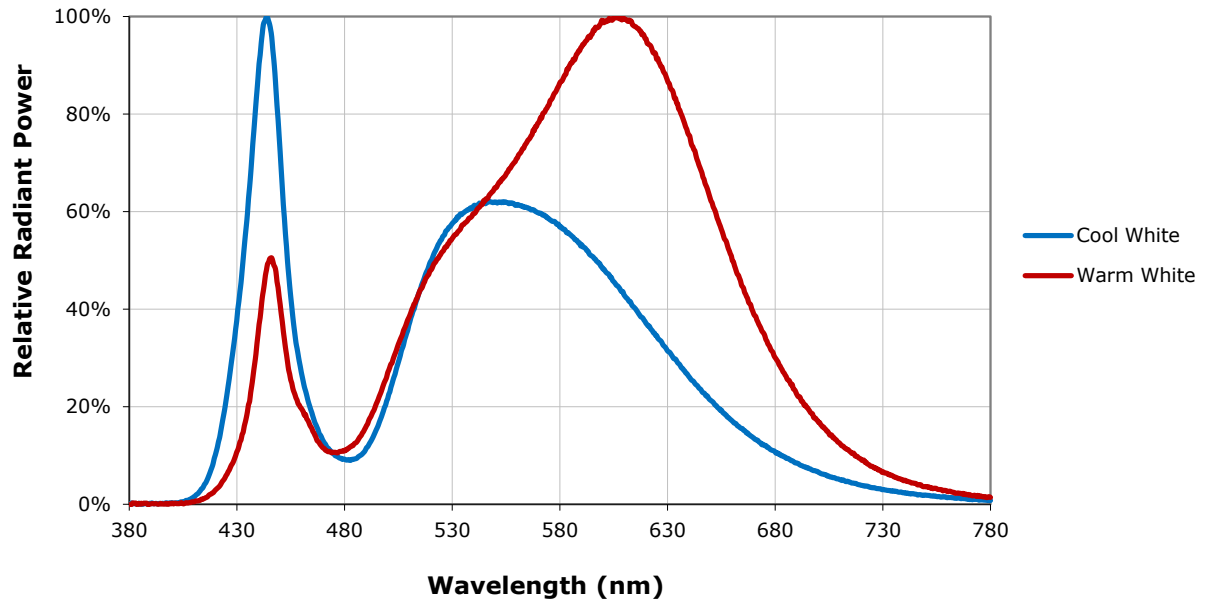
The following table provides several base order codes for XLamp XB-H LEDs. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family. For more order codes, as well as a complete description of the order-code nomenclature, please consult the XLamp XB Family Binning and Labeling document.

| Color | CCT Range | | Base Order Codes Min. Luminous Flux @ 700 mA | | | Calculated Minimum Luminous Flux (lm)** @ 85 °C | | Order Code |
|----------------------|-----------|--------|--|-------------------|--------------------|---|-------|--------------------------|
| | Min. | Max. | Group | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | 1.0 A | 1.5 A | |
| Cool White | 5000 K | 8300 K | T5 | 260 | 299 | 345 | 463 | XBHAWT-00-0000-000LT50E1 |
| | | | T4 | 240 | 276 | 318 | 428 | XBHAWT-00-0000-000LT40E1 |
| | | | T3 | 220 | 253 | 292 | 392 | XBHAWT-00-0000-000LT30E1 |
| Outdoor White | 3200 K | 5300 K | T5 | 260 | 299 | 345 | 463 | XBHAWT-00-0000-0000T50C2 |
| | | | T4 | 240 | 276 | 318 | 428 | XBHAWT-00-0000-0000T40C2 |
| | | | T3 | 220 | 253 | 292 | 392 | XBHAWT-00-0000-0000T30C2 |
| Neutral White | 3700 K | 5300 K | T5 | 260 | 299 | 345 | 463 | XBHAWT-00-0000-0000T50E4 |
| | | | T4 | 240 | 276 | 318 | 428 | XBHAWT-00-0000-0000T40E4 |
| | | | T3 | 220 | 253 | 292 | 392 | XBHAWT-00-0000-0000T30E4 |
| 80-CRI Minimum White | 2600 K | 4300 K | T4 | 240 | 276 | 318 | 428 | XBHAWT-00-0000-000HT40E5 |
| | | | T3 | 220 | 253 | 292 | 392 | XBHAWT-00-0000-000HT30E5 |
| Warm White | 2600 K | 3700 K | T4 | 240 | 276 | 318 | 428 | XBHAWT-00-0000-0000T40E7 |
| | | | T3 | 220 | 253 | 292 | 392 | XBHAWT-00-0000-0000T30E7 |
| 85-CRI Minimum White | 2600 K | 3200 K | T2 | 200 | 230 | 265 | 356 | XBHAWT-00-0000-000PT20E7 |
| | | | S6 | 182 | 209 | 242 | 324 | XBHAWT-00-0000-000PS60E7 |
| | | | S5 | 172 | 198 | 228 | 306 | XBHAWT-00-0000-000PS50E7 |
| 90-CRI Minimum White | 2600 K | 3200 K | S6 | 182 | 209 | 242 | 324 | XBHAWT-00-0000-000US60E7 |
| | | | S5 | 172 | 198 | 228 | 306 | XBHAWT-00-0000-000US50E7 |
| | | | S4 | 164 | 186 | 218 | 292 | XBHAWT-00-0000-000US40E7 |

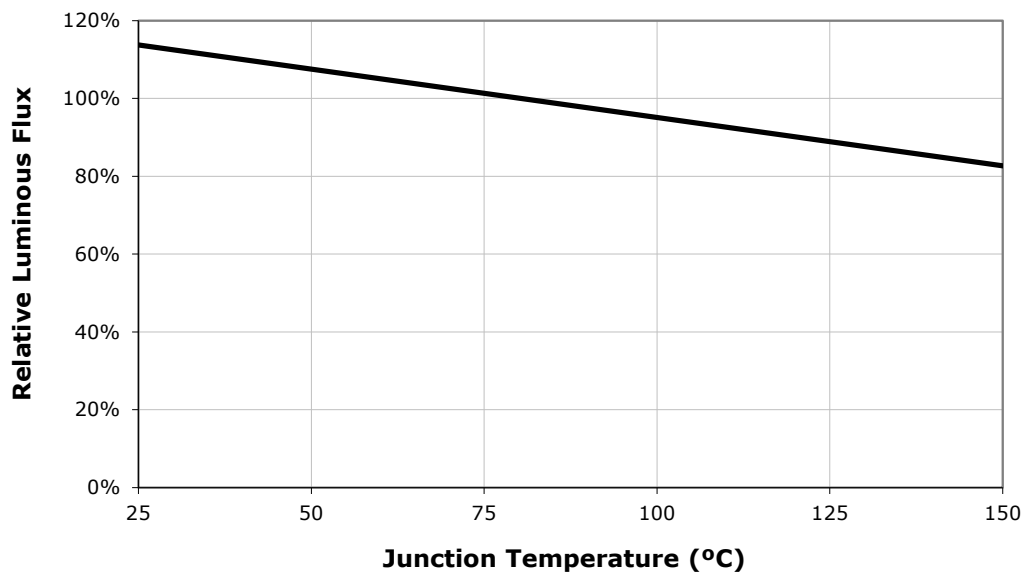
Notes:

- Cree maintains a tolerance of $\pm 7\%$ 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 Warm White (2600 K - 3700 K CCT) is 80.
- * Flux values @ 25 °C are calculated and for reference only.
- ** Calculated flux values at 1 A and 1.5 A are for reference only.

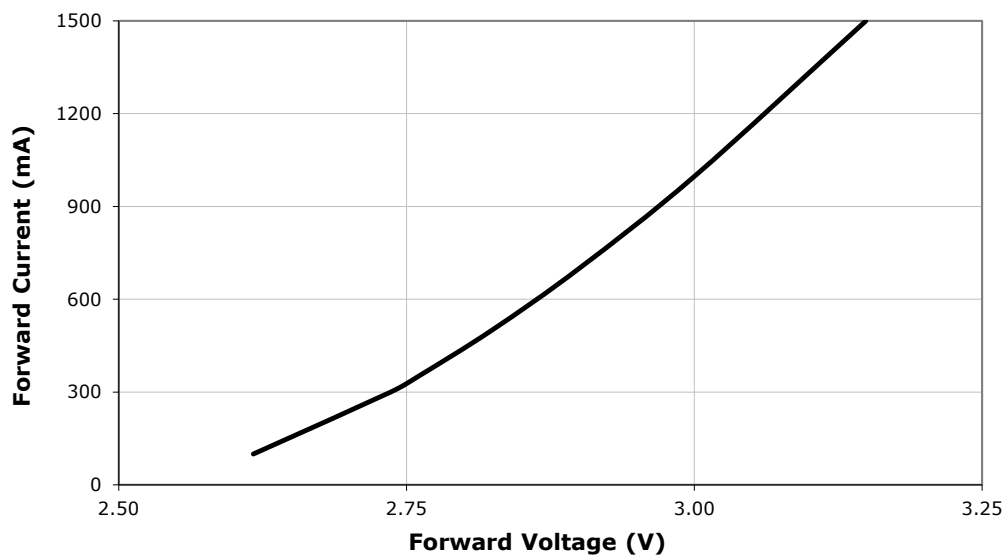
RELATIVE SPECTRAL POWER DISTRIBUTION



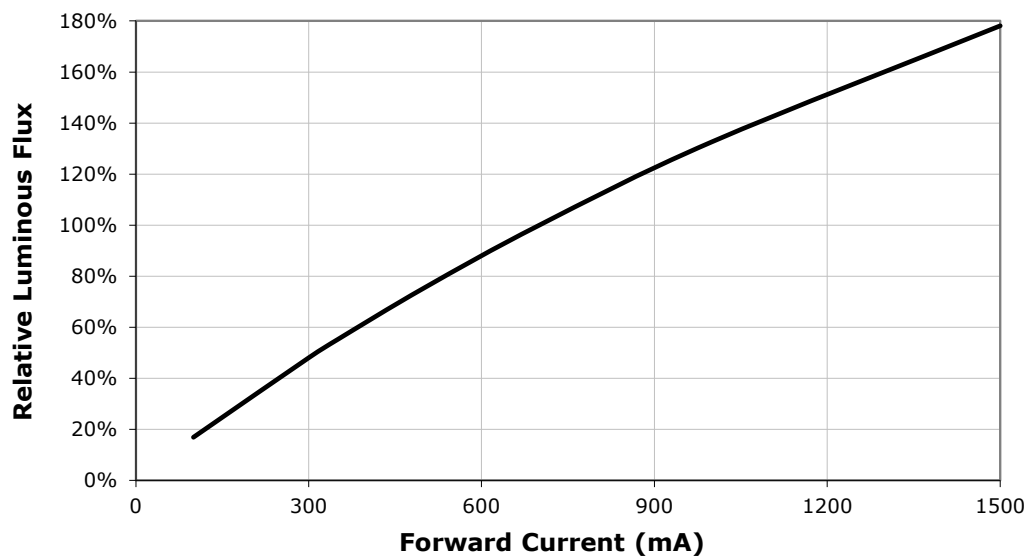
RELATIVE FLUX VS. JUNCTION TEMPERATURE ($I_F = 700$ mA)



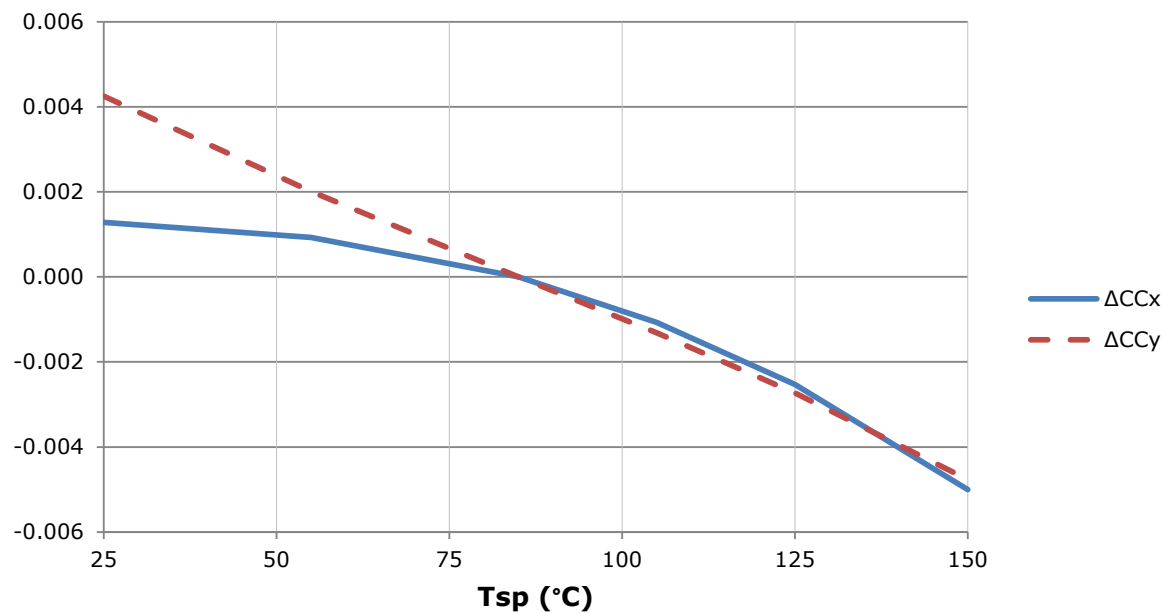
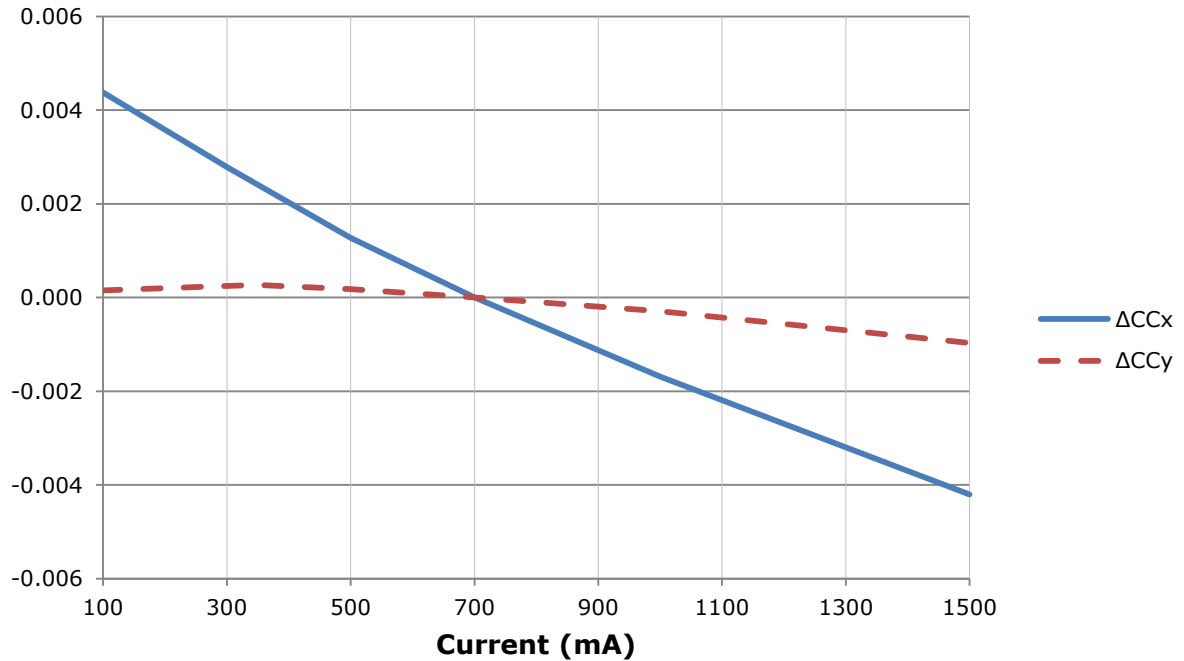
ELECTRICAL CHARACTERISTICS ($T_j = 85\text{ }^{\circ}\text{C}$)



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

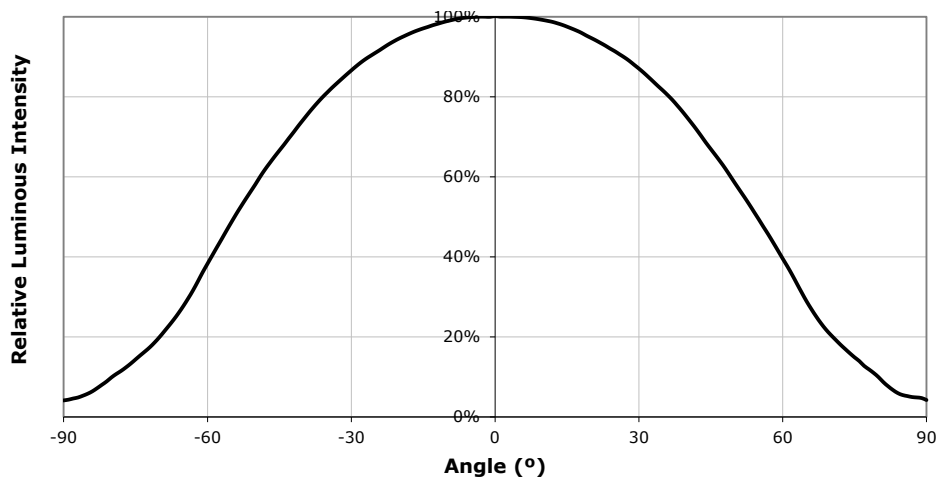


RELATIVE CHROMATICITY VS CURRENT AND TEMPERATURE (WARM WHITE*)



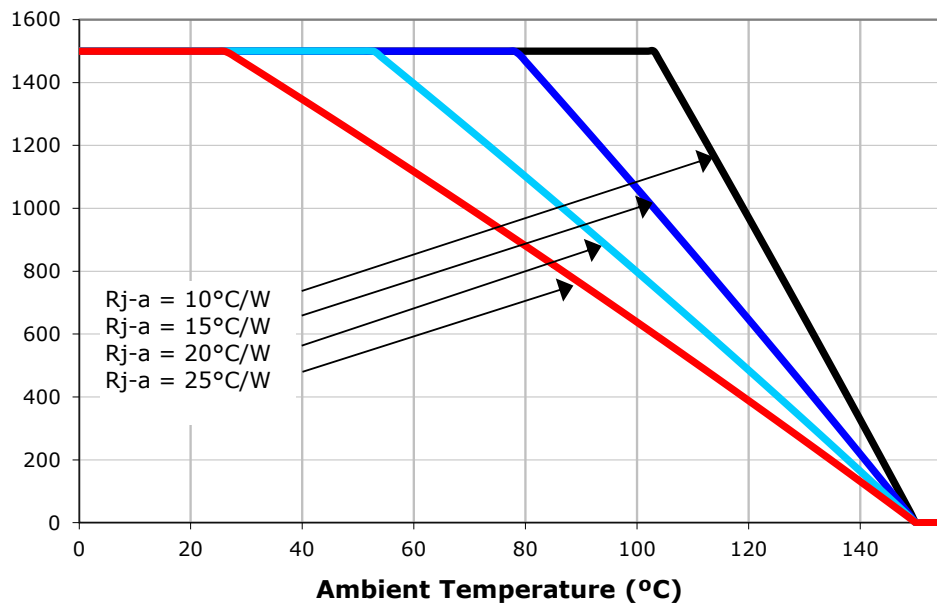
* Warm White XLamp XB-H LEDs have a typical CRI of 80.

TYPICAL SPATIAL DISTRIBUTION



THERMAL DESIGN

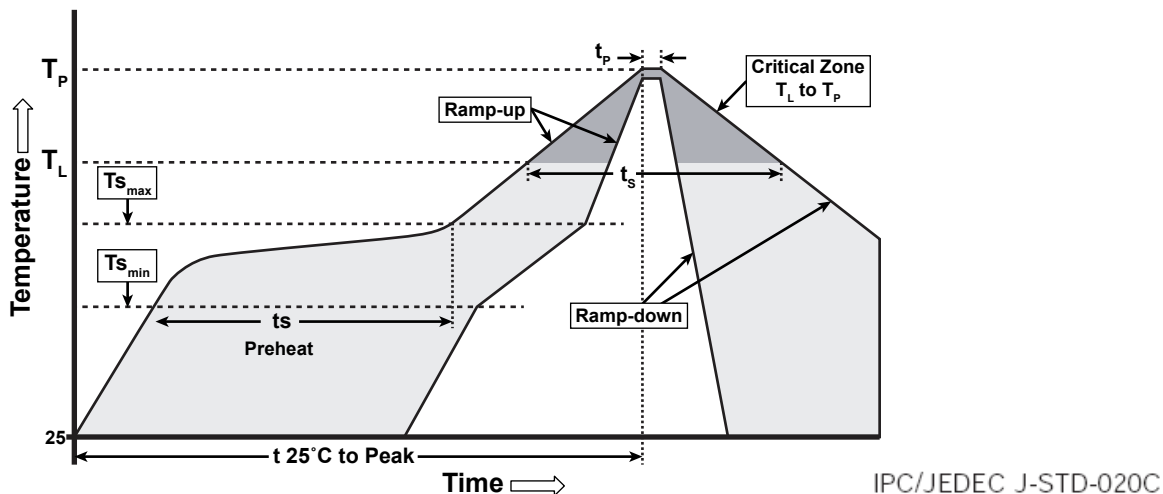
The maximum forward current is determined by the thermal resistance between the LED junction and ambient. It is crucial for the end product to be designed in a manner that minimizes the thermal resistance from the solder point to ambient in order to optimize lamp life and optical characteristics.



REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XB-H 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_L) | 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/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 XB-H LEDs to have unlimited floor life in conditions $\leq 30\text{ }^{\circ}\text{C}/85\%$ relative humidity (RH). Moisture testing included a 168-hour soak at $85\text{ }^{\circ}\text{C}/85\%$ 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.

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.

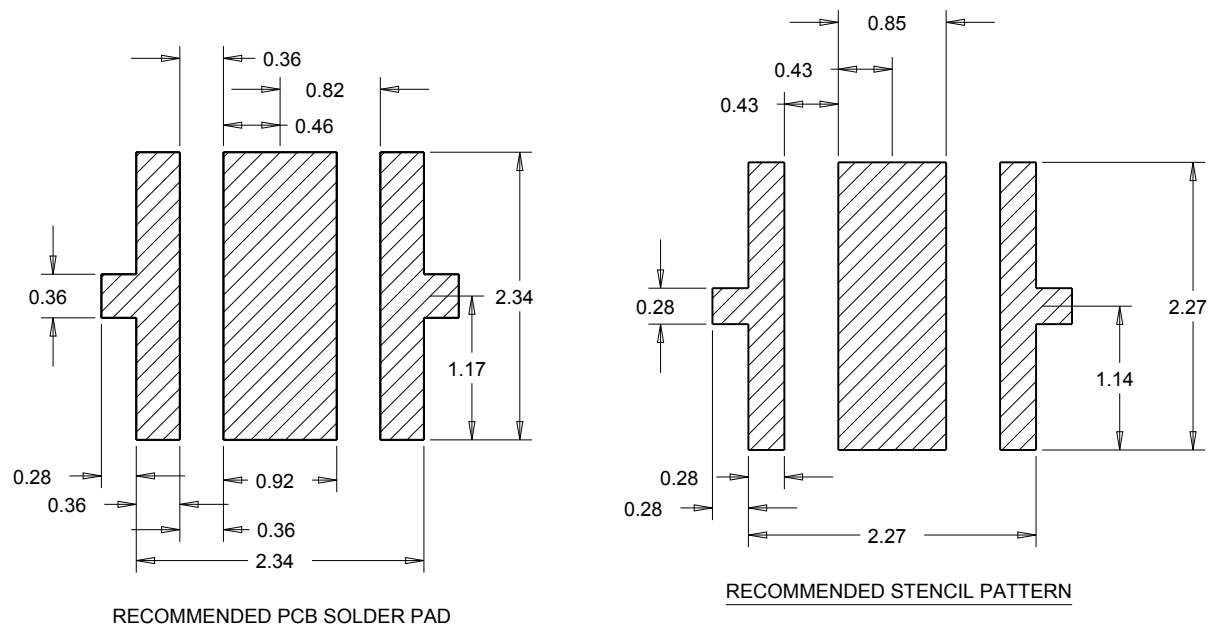
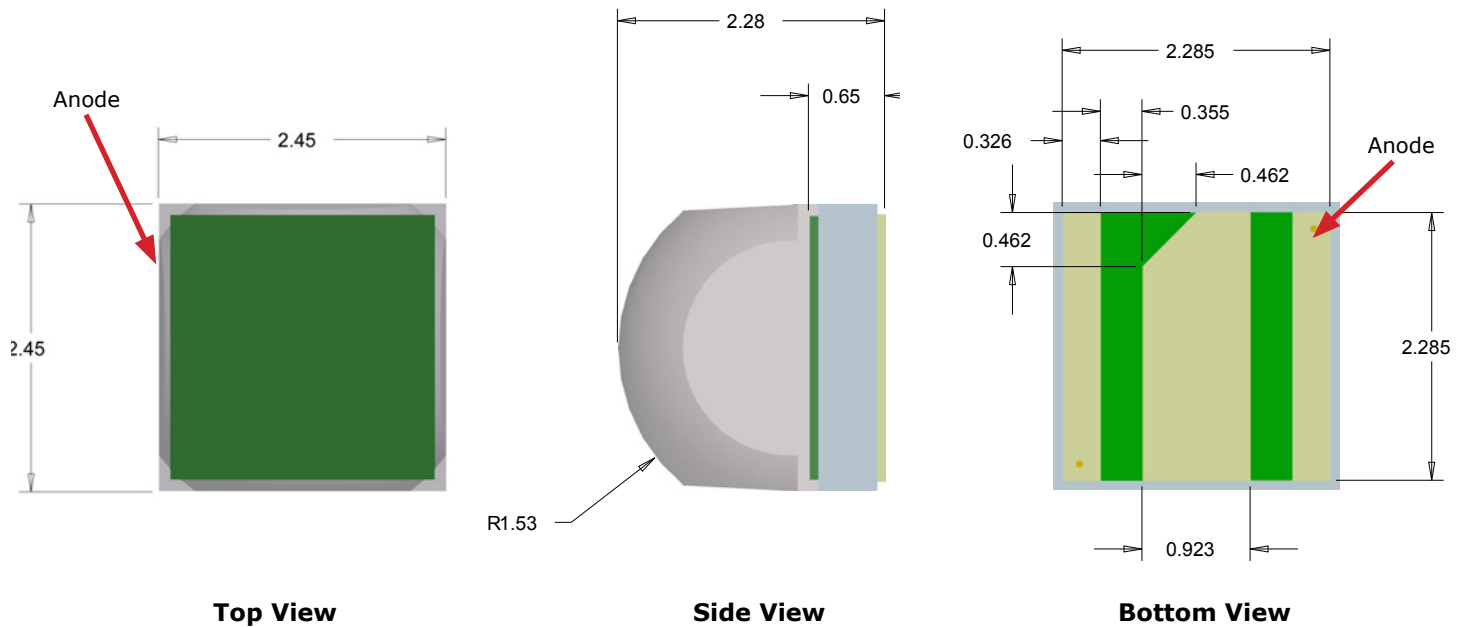
MECHANICAL DIMENSIONS

Dimensions are in mm.

Tolerances unless otherwise indicated.

.xx ± .25

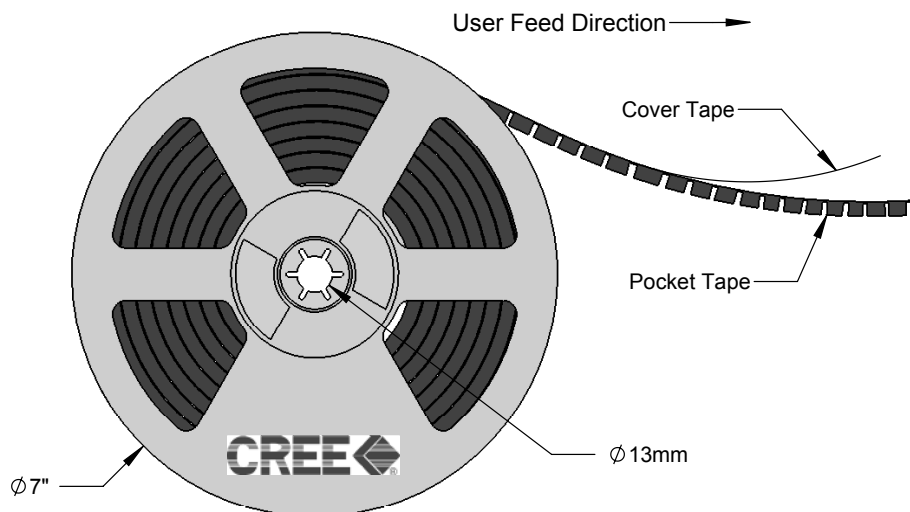
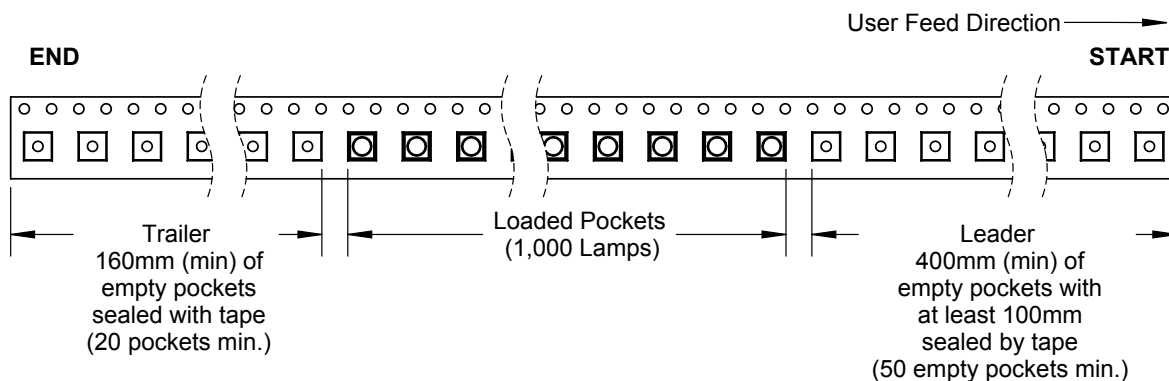
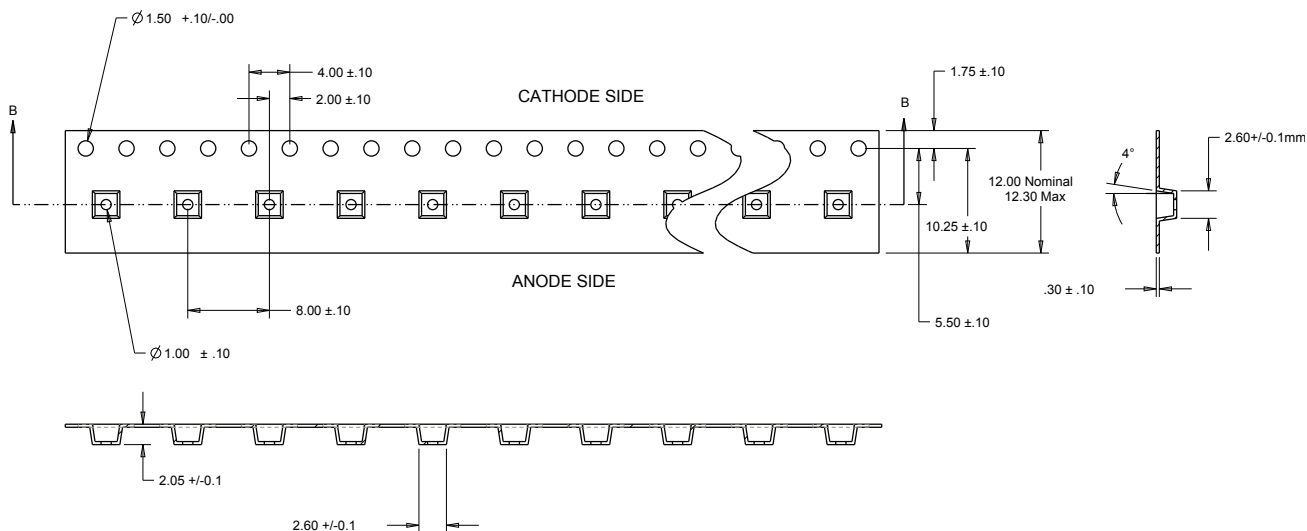
.xxx ± .125



TAPE AND REEL

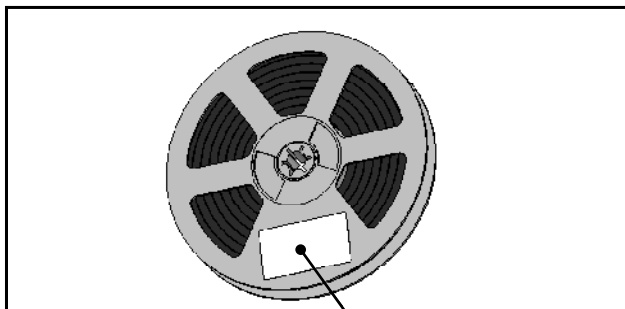
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

All dimensions in mm.



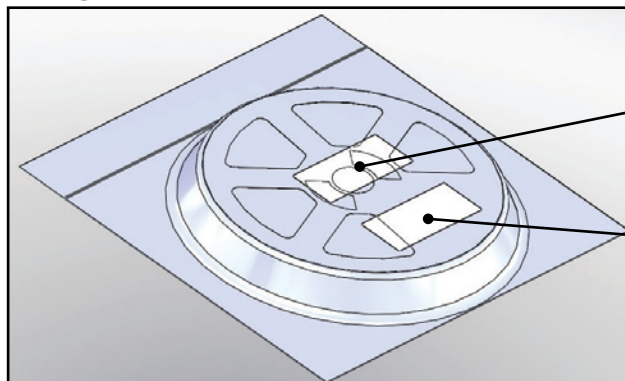
PACKAGING

Unpackaged Reel



Label with Cree Bin
Code, Qty, Reel ID

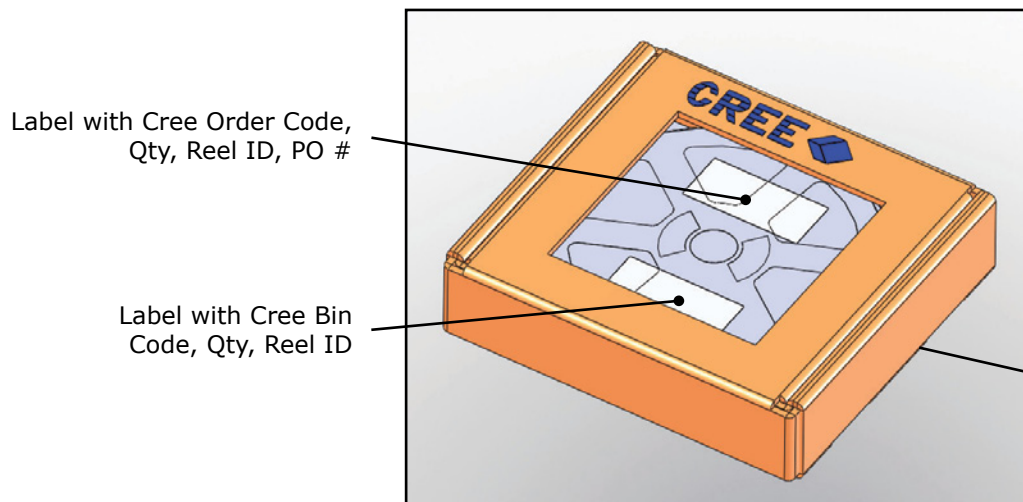
Packaged Reel



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
(on bottom of box)