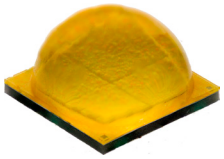
# XLamp® XHP70.2 LEDs



## PRODUCT DESCRIPTION

The XLamp XHP70.2 LED is the next generation of Extreme High Power LEDs that delivers the lowest system cost through the best lumen density, reliability and color consistency. Built on Cree LED's latest high-power LED technology, the XHP70.2 LED improves the lumen density, voltage characteristics, reliability and optical performance of the XHP70 LED in the same 7.0 mm x 7.0 mm footprint. The new XHP70.2 LED provides an easy drop-in upgrade to achieve higher system LPW for lighting manufacturers with existing XHP70 designs, eliminating redesign costs. Its unparalleled lumen density and longer lifetime at higher operating temperatures also enable new and innovative lighting designs at lower system costs.

## FEATURES

- Available in white, configurable to 6 V or 12 V by PCB layout
- Available in 5-step EasyWhite® bins at 3000 K to 5000 K CCT, 3-step EasyWhite bins at 2700 K to 5000 K and 2-step EasyWhite bins at 2700 K to 4000 K CCT
- Available in ANSI white bins at 3000 K to 7000 K CCT
- Available in standard, 70-, 80-, and 90-minimum CRI options
- Binned at 85 °C
- Maximum drive current: 4800 mA (6 V), 2400 mA (12 V)
- Low thermal resistance: 0.3 °C/W
- Wide viewing angle: 125°
- Unlimited floor life at ≤ 30 ºC/85% RH
- Reflow solderable - JEDEC J-STD-020C
- RoHS and REACH compliant
- UL® recognized component (E349212)

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## CHARACTERISTICS

XHP70.2 LEDs are tested and binned in the 12-V configuration. See the Mechanical Dimensions section on page 28 for pad layout options.

| Characteristics | Unit | Minimum | Typical | Maximum |
|---|---|---|---|---|
| Thermal resistance, junction to solder point◊ | °C/W | | 0.3 | |
| Viewing angle (FWHM) | degrees | | 125 | |
| Temperature coefficient of voltage (6 V)* | mV/°C | | -2.9 | |
| Temperature coefficient of voltage (12 V) | mV/°C | | -5.8 | |
| ESD withstand voltage (HBM per Mil-Std-883D) | | | Class 3B | |
| DC forward current (6 V)* | mA | | | 4800 |
| DC forward current (12 V) | mA | | | 2400 |
| Reverse voltage | V | | | 1 |
| Forward voltage (6 V, @ 2100 mA, 85 °C)* | V | | 5.6 | 6.1 |
| Forward voltage (12 V, @ 1050 mA, 85 °C) | V | | 11.2 | 12.2 |
| LED junction temperature | °C | | | 150 |

Note:

◊ Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the Thermal Resistance Measurement application note for more details.

* Data for the 6-V configuration is calculated and for reference only.

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## FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS

The following table provides order codes for XLamp XHP70.2 LEDs. For a complete description of how the flux and chromaticity groups are reflected in the bin code and order code nomenclature, please see the Bin and Order Code Formats section (page 24).

Binning condition: $T_J$ = 85 °C; 12 V, $I_F$ = 1050 mA
Reference condition: $T_J$ = 85 °C; 6 V, $I_F$ = 2100 mA

| 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 | | P4 | 1965 | 2164 | | | | | 50E | XHP70B-00-0000-0D0BP450E |
| | | | P2 | 1830 | 2015 | | | | | | XHP70B-00-0000-0D0BP250E |
| | | | N4 | 1710 | 1883 | | | | | | XHP70B-00-0000-0D0BN450E |
| | 80 | | P2 | 1830 | 2015 | | | 50G | XHP70B-00-0000-0D0HP250G | | |
| | | | N4 | 1710 | 1883 | | | | XHP70B-00-0000-0D0HN450G | | |
| | | | N2 | 1590 | 1751 | | | | XHP70B-00-0000-0D0HN250G | | |
| | 90 | | N2 | 1590 | 1751 | | | 50G | XHP70B-00-0000-0D0UN250G | | |
| | | | M4 | 1485 | 1635 | | | | XHP70B-00-0000-0D0UM450G | | |
| | | | M2 | 1380 | 1520 | | | | XHP70B-00-0000-0D0UM250G | | |
| 4500 K | 70 | | P4 | 1965 | 2164 | | | | | 45E | XHP70B-00-0000-0D0BP445E |
| | | | P2 | 1830 | 2015 | | | | | | XHP70B-00-0000-0D0BP245E |
| | | | N4 | 1710 | 1883 | | | | | | XHP70B-00-0000-0D0BN445E |
| | 80 | | N4 | 1710 | 1883 | | | 45G | XHP70B-00-0000-0D0HN445G | | |
| | | | N2 | 1590 | 1751 | | | | XHP70B-00-0000-0D0HN245G | | |
| | | | M4 | 1485 | 1635 | | | | XHP70B-00-0000-0D0HM445G | | |
| | 90 | | N2 | 1590 | 1751 | | | 45G | XHP70B-00-0000-0D0UM445G | | |
| | | | M4 | 1485 | 1635 | | | | XHP70B-00-0000-0D0UM245G | | |
| | | | M2 | 1380 | 1520 | | | | XHP70B-00-0000-0D0UK445G | | |

Notes

- Cree LED 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 26).
- XLamp XHP70.2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED 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.

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## FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 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 |
| 4000 K | 70 | | P4 | 1965 | 2164 | | | | | 40E | XHP70B-00-0000-0D0BP440E |
| | | | P2 | 1830 | 2015 | | | | | | XHP70B-00-0000-0D0BP240E |
| | | | N4 | 1710 | 1883 | | | | | | XHP70B-00-0000-0D0BN440E |
| | 80 | | N4 | 1710 | 1883 | 40H | XHP70B-00-0000-0D0HN440H | 40G | XHP70B-00-0000-0D0HN440G | | |
| | | | N2 | 1590 | 1751 | | XHP70B-00-0000-0D0HN240H | | XHP70B-00-0000-0D0HN240G | | |
| | | | M4 | 1485 | 1635 | | XHP70B-00-0000-0D0HM440H | | XHP70B-00-0000-0D0HM440G | | |
| | 90 | | M4 | 1485 | 1635 | 40H | XHP70B-00-0000-0D0UM440H | 40G | XHP70B-00-0000-0D0UM440G | | |
| | | | M2 | 1380 | 1520 | | XHP70B-00-0000-0D0UM240H | | XHP70B-00-0000-0D0UM240G | | |
| | | | K4 | 1290 | 1420 | | XHP70B-00-0000-0D0UK440H | | XHP70B-00-0000-0D0UK440G | | |
| 3500 K | 70 | | P2 | 1830 | 2015 | | | | | 35E | XHP70B-00-0000-0D0BP235E |
| | | | N4 | 1710 | 1883 | | | | | | XHP70B-00-0000-0D0BN435E |
| | | | N2 | 1590 | 1751 | | | | | | XHP70B-00-0000-0D0BN235E |
| | 80 | | N4 | 1710 | 1883 | 35H | XHP70B-00-0000-0D0HN435H | 35G | XHP70B-00-0000-0D0HN435G | | |
| | | | N2 | 1590 | 1751 | | XHP70B-00-0000-0D0HN235H | | XHP70B-00-0000-0D0HN235G | | |
| | | | M4 | 1485 | 1635 | | XHP70B-00-0000-0D0HM435H | | XHP70B-00-0000-0D0HM435G | | |
| | 90 | | M4 | 1485 | 1635 | 35H | XHP70B-00-0000-0D0UM435H | 35G | XHP70B-00-0000-0D0UM435G | | |
| | | | M2 | 1380 | 1520 | | XHP70B-00-0000-0D0UM235H | | XHP70B-00-0000-0D0UM235G | | |
| | | | K4 | 1290 | 1420 | | XHP70B-00-0000-0D0UK435H | | XHP70B-00-0000-0D0UK435G | | |

Notes

- Cree LED 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 26).
- XLamp XHP70.2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED 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.

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## FLUX CHARACTERISTICS, EASYWHITE® ORDER CODES AND BINS - 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 |
| 3000 K | 70 | | P2 | 1830 | 2015 | | | | | 30E | XHP70B-00-0000-0D0BP230E |
| | | | N4 | 1710 | 1883 | | | | | | XHP70B-00-0000-0D0BN430E |
| | | | N2 | 1590 | 1751 | | | | | | XHP70B-00-0000-0D0BN230E |
| | 80 | | N2 | 1590 | 1751 | 30H | XHP70B-00-0000-0D0HN230H | 30G | XHP70B-00-0000-0D0HN230G | | |
| | | | M4 | 1485 | 1635 | | XHP70B-00-0000-0D0HM430H | | XHP70B-00-0000-0D0HM430G | | |
| | 90 | | M2 | 1380 | 1520 | 30H | XHP70B-00-0000-0D0UM230H | 30G | XHP70B-00-0000-0D0UM230G | | |
| | | | K4 | 1290 | 1420 | | XHP70B-00-0000-0D0UK430H | | XHP70B-00-0000-0D0UK430G | | |
| | | | K2 | 1200 | 1321 | | XHP70B-00-0000-0D0UK230H | | XHP70B-00-0000-0D0UK230G | | |
| 2700 K | 80 | | M4 | 1485 | 1635 | 27H | XHP70B-00-0000-0D0HM427H | 27G | XHP70B-00-0000-0D0HM427G | | |
| | | | M2 | 1380 | 1520 | | XHP70B-00-0000-0D0HM227H | | XHP70B-00-0000-0D0HM227G | | |
| | 90 | | K4 | 1290 | 1420 | 27H | XHP70B-00-0000-0D0UK427H | 27G | XHP70B-00-0000-0D0UK427G | | |
| | | | K2 | 1200 | 1321 | | XHP70B-00-0000-0D0UK227H | | XHP70B-00-0000-0D0UK227G | | |
| | | | J4 | 1120 | 1233 | | XHP70B-00-0000-0D0UJ427H | | XHP70B-00-0000-0D0UJ427G | | |

Notes

- Cree LED 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 26).
- XLamp XHP70.2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED 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.

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## FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS

The following table provides order codes for XLamp XHP70.2 LEDs. For a complete description of how the flux and chromaticity groups are reflected in the bin code and order code nomenclature, please see the Bin and Order Code Formats section (page 24).

Binning condition: $T_J$ = 85 °C; 12 V, $I_F$ = 1050 mA
Reference condition: $T_J$ = 85 °C; 6 V, $I_F$ = 2100 mA

| Nominal CCT | Chromaticity Regions | CRI | | Minimum Luminous Flux | | | Order Code |
|---|---|---|---|---|---|---|---|
| | | Min | Typ | Group | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | |
| 7000 K | 0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U | 0 | 68 | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20DT |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40DT |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D00N20DT |
| | | 70 | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20DT |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40DT |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0BN20DT |
| | | 80 | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20DT |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0HM40DT |
| 6500 K | 1A, 1B, 1C, 1D | 0 | 68 | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20E1 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40E1 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D00N20E1 |
| | | 70 | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20E1 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E1 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0BN20E1 |
| | | 80 | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20E1 |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0HM40E1 |
| 6000 K | 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 2U | 0 | 68 | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20DV |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40DV |
| | | 70 | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20DV |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40DV |
| | | 80 | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20DV |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0HM40DV |
| | | 90 | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0UM40DV |
| | | | | M2 | 1380 | 1520 | XHP70B-00-0000-0D0UM20DV |

Notes
- Cree LED 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 26).
- XLamp XHP70.2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED 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.

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## FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS - CONTINUED

| Nominal CCT | Chromaticity Regions | CRI | | Minimum Luminous Flux | | | Order Code |
|---|---|---|---|---|---|---|---|
| | | Min | Typ | Group | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | |
| 5700 K | 2A, 2B, 2C, 2D | 0 | 68 | P4 | 1965 | 2164 | XHP70B-00-0000-0D00P40E2 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20E2 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40E2 |
| | | 70 | | P4 | 1965 | 2164 | XHP70B-00-0000-0D0BP40E2 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20E2 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E2 |
| | | 80 | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0HN40E2 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20E2 |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0HM40E2 |
| | | 90 | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0UN20E2 |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0UM40E2 |
| | | | | M2 | 1380 | 1520 | XHP70B-00-0000-0D0UM20E2 |
| 5000 K | 3A, 3B, 3C, 3D | 0 | 68 | P4 | 1965 | 2164 | XHP70B-00-0000-0D00P40E3 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20E3 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40E3 |
| | | 70 | | P4 | 1965 | 2164 | XHP70B-00-0000-0D0BP40E3 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20E3 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E3 |
| | | 80 | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0HP20E3 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0HN40E3 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20E3 |
| | | 90 | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0UN20E3 |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0UM40E3 |
| | | | | M2 | 1380 | 1520 | XHP70B-00-0000-0D0UM20E3 |
| 4500 K | 4A, 4B, 4C, 4D | 0 | 68 | P4 | 1965 | 2164 | XHP70B-00-0000-0D00P40E4 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20E4 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40E4 |
| | | 70 | | P4 | 1965 | 2164 | XHP70B-00-0000-0D0BP40E4 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20E4 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E4 |
| | | 80 | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0HN40E4 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20E4 |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0HM40E4 |
| | | 90 | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0UM40E4 |
| | | | | M2 | 1380 | 1520 | XHP70B-00-0000-0D0UM20E4 |
| | | | | K4 | 1290 | 1420 | XHP70B-00-0000-0D0UK40E4 |

Notes

- Cree LED 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 26).
- XLamp XHP70.2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED 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.

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## FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS - CONTINUED

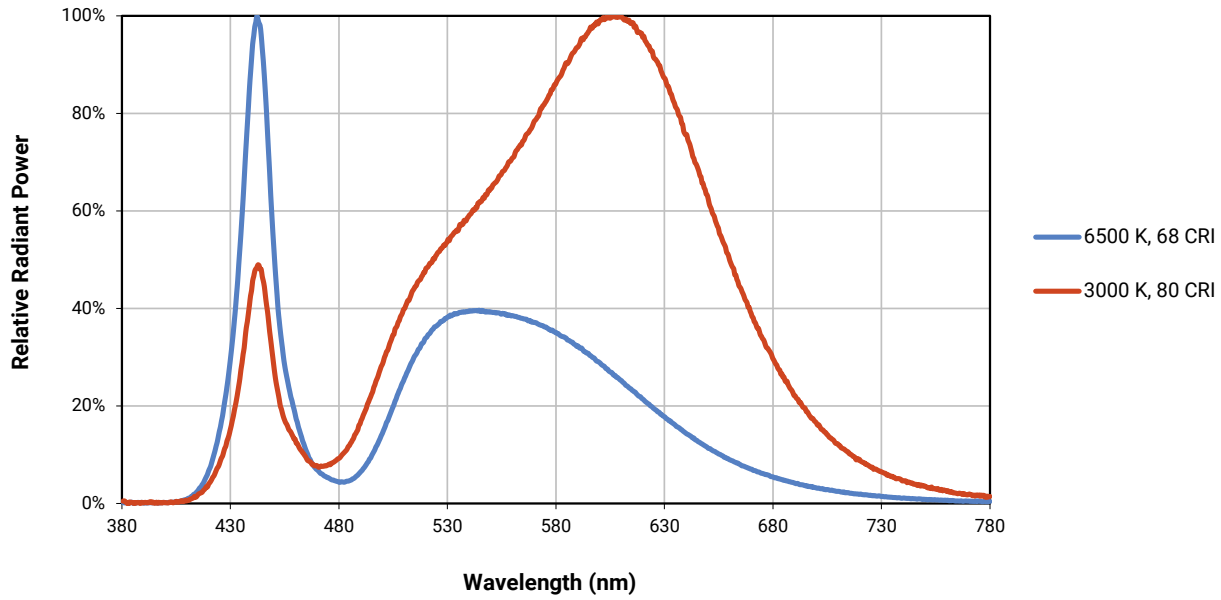
| Nominal CCT | Chromaticity Regions | CRI | | Minimum Luminous Flux | | | Order Code |
|---|---|---|---|---|---|---|---|
| | | Min | Typ | Group | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | |
| 4000 K | 5A, 5B, 5C, 5D | 0 | 68 | P4 | 1965 | 2164 | XHP70B-00-0000-0D00P40E5 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D00P20E5 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D00N40E5 |
| | | 70 | | P4 | 1965 | 2164 | XHP70B-00-0000-0D0BP40E5 |
| | | | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20E5 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E5 |
| | | 80 | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0HN40E5 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0HN20E5 |
| | | | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0HM40E5 |
| | | 90 | | M4 | 1485 | 1635 | XHP70B-00-0000-0D0UM40E5 |
| | | | | M2 | 1380 | 1520 | XHP70B-00-0000-0D0UM20E5 |
| | | | | K4 | 1290 | 1420 | XHP70B-00-0000-0D0UK40E5 |
| 3500 K | 6A, 6B, 6C, 6D | 70 | | P2 | 1830 | 2015 | XHP70B-00-0000-0D0BP20E6 |
| | | | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E6 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0BN20E6 |
| 3000 K | 7A, 7B, 7C, 7D | 70 | | N4 | 1710 | 1883 | XHP70B-00-0000-0D0BN40E7 |
| | | | | N2 | 1590 | 1751 | XHP70B-00-0000-0D0BN20E7 |

Notes

- Cree LED 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 26).
- XLamp XHP70.2 LED order codes specify only a minimum flux bin and not a maximum. Cree LED 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.

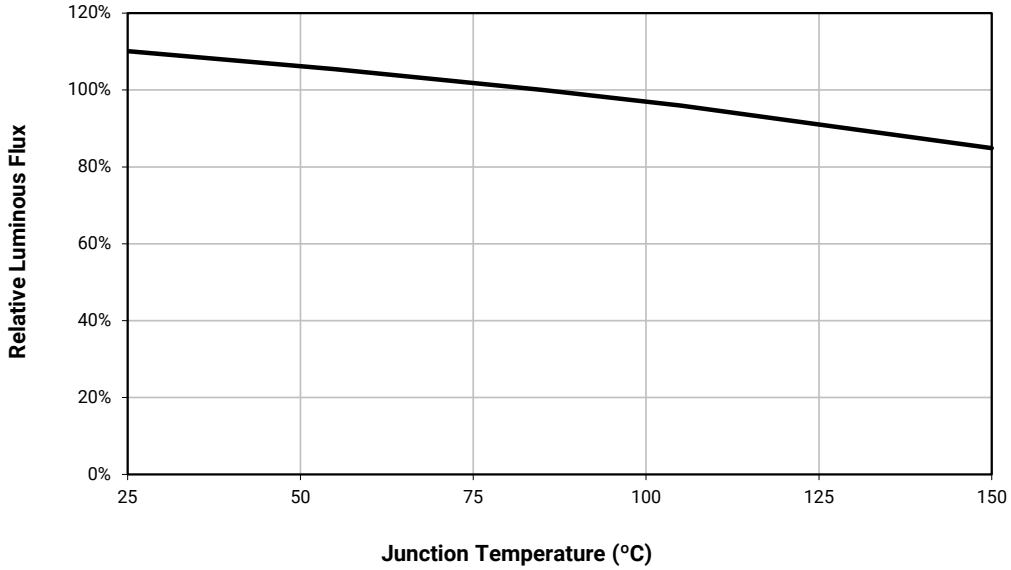
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## RELATIVE SPECTRAL POWER DISTRIBUTION



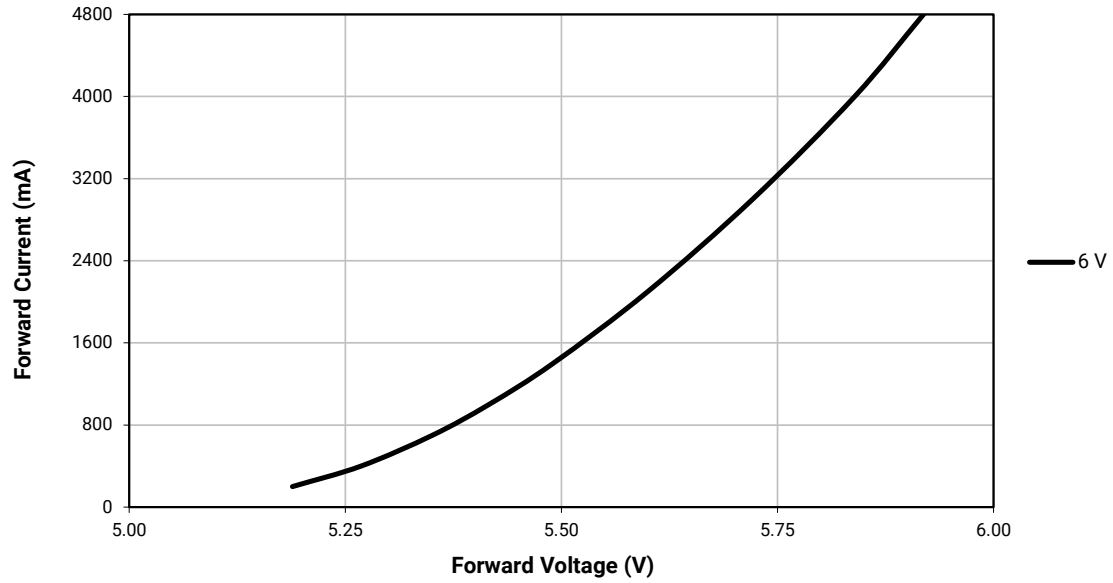

## RELATIVE FLUX VS. JUNCTION TEMPERATURE

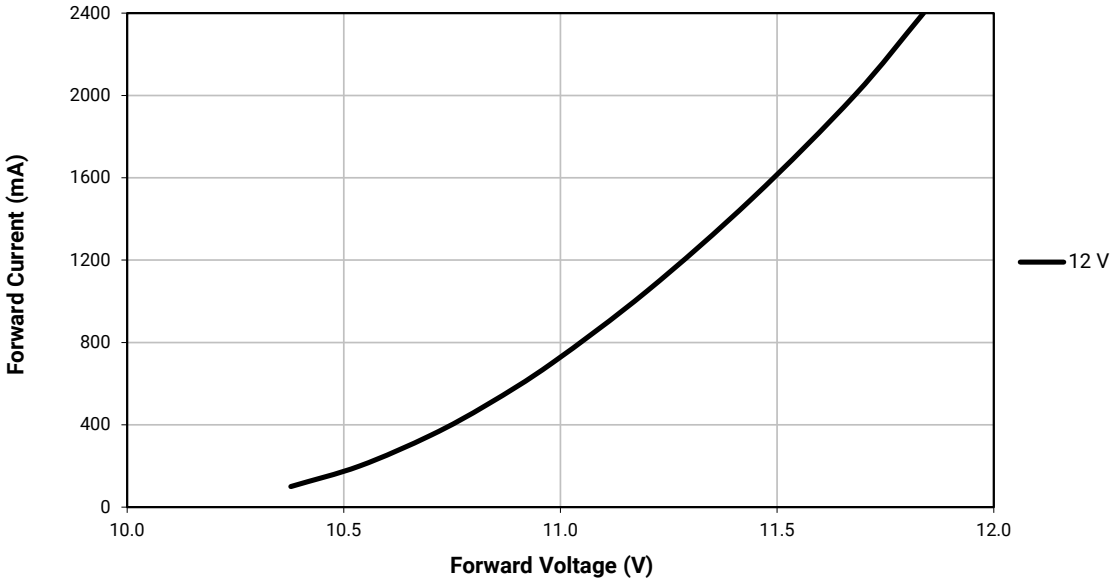
Reference condition: 6 V, $I_F$ = 2100 mA; 12 V, $I_F$ = 1050 mA




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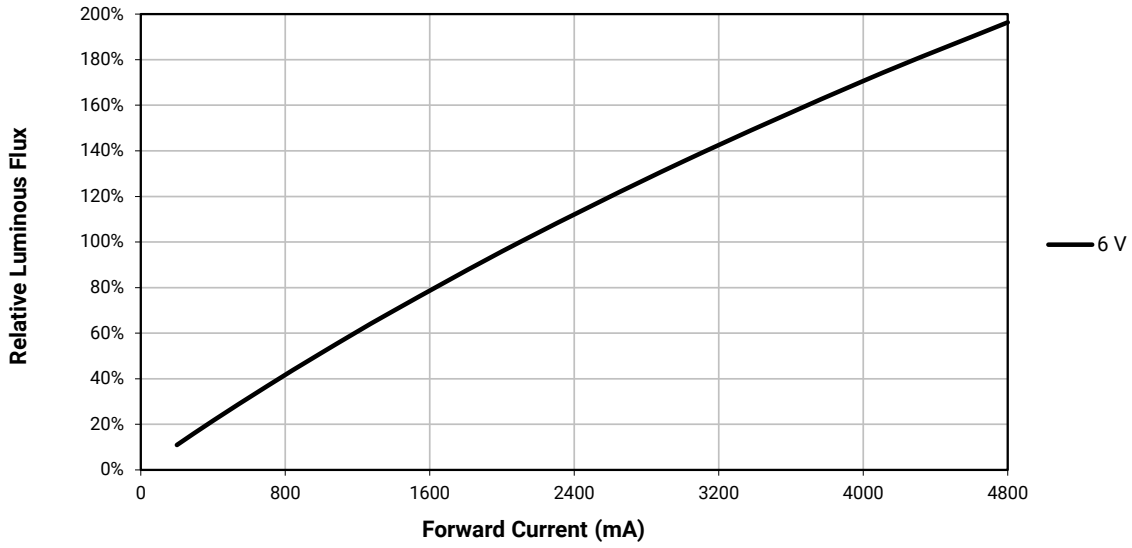
## ELECTRICAL CHARACTERISTICS ($T_J$ = 85 °C)

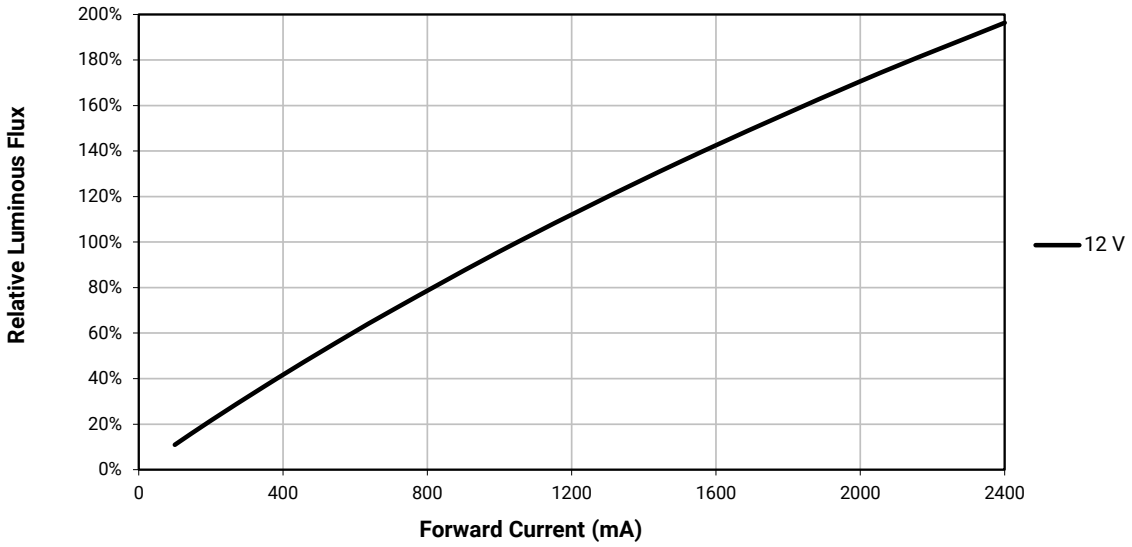



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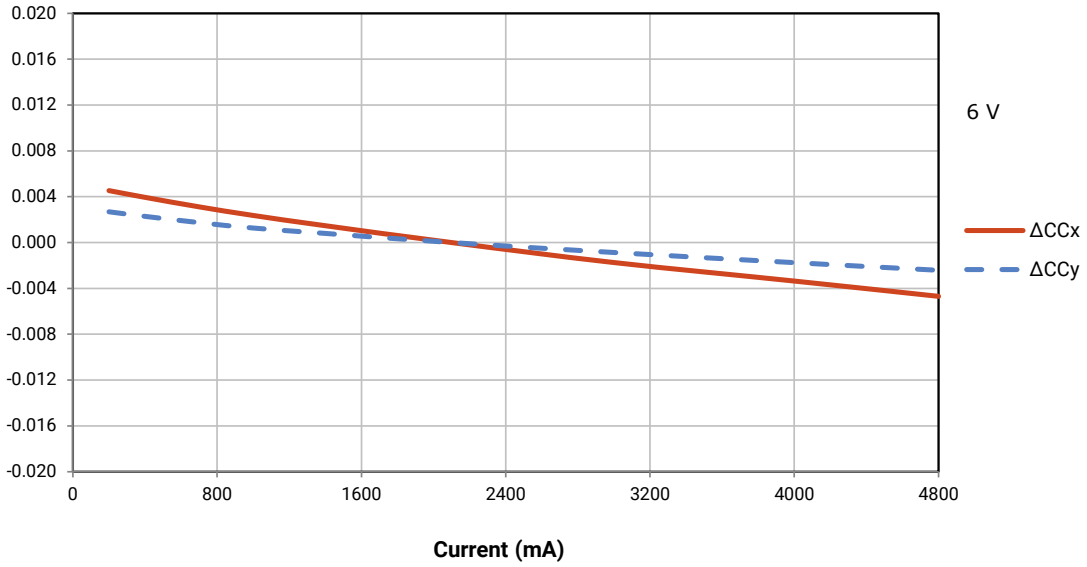
## RELATIVE FLUX VS. CURRENT ($T_J$ = 85 °C)

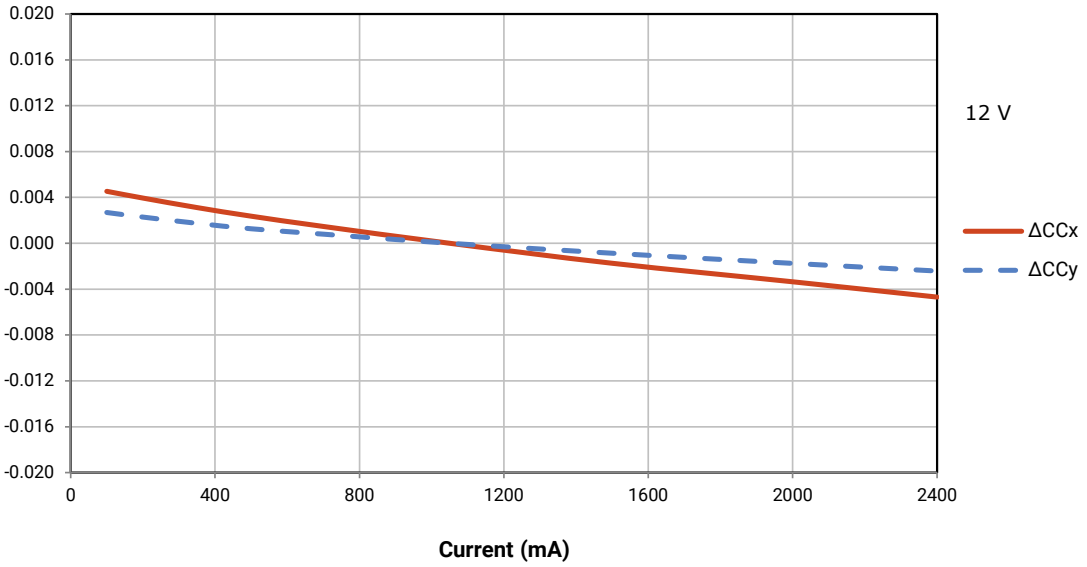



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## RELATIVE CHROMATICITY VS CURRENT (WARM WHITE)

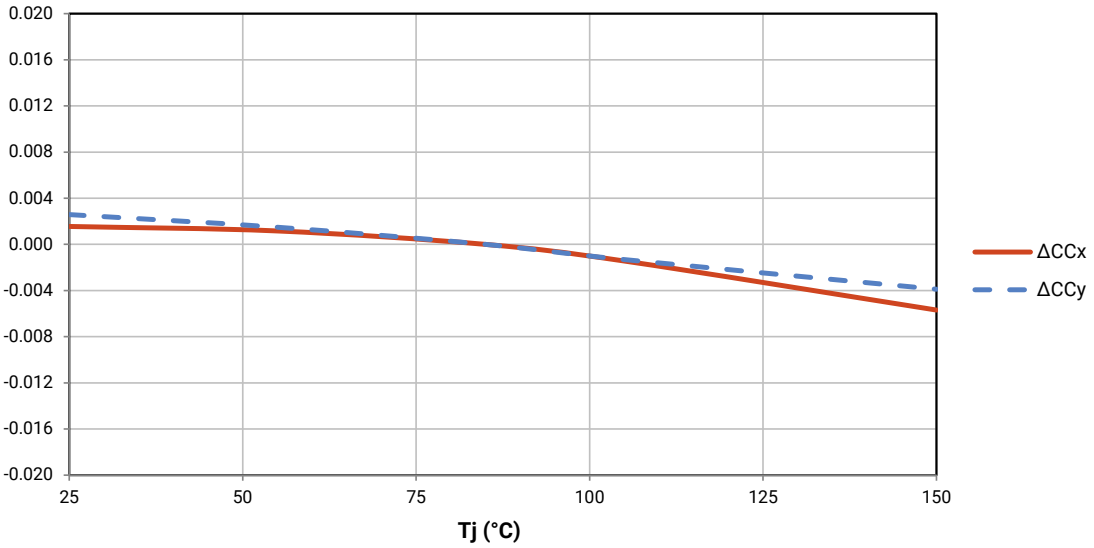



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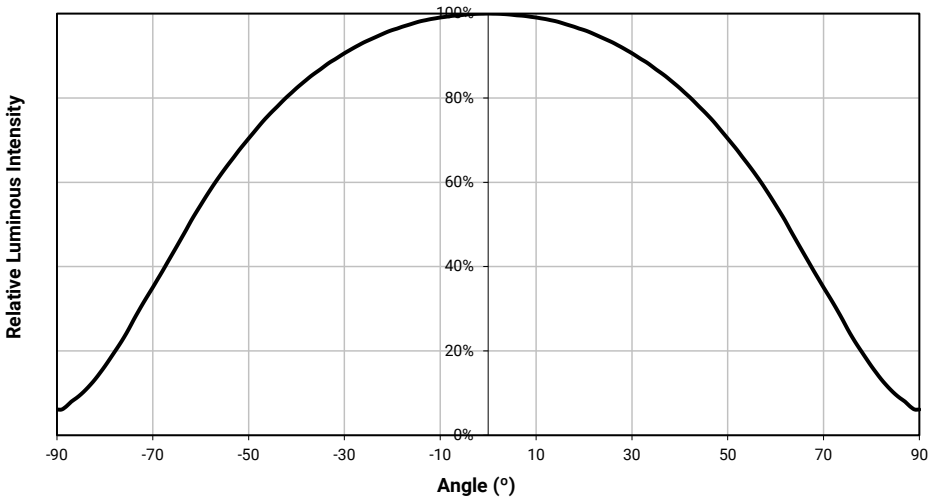
## RELATIVE CHROMATICITY VS TEMPERATURE (WARM WHITE)

Reference condition: 6 V, $I_F$ = 2100 mA; 12 V, $I_F$ = 1050 mA




## TYPICAL SPATIAL DISTRIBUTION

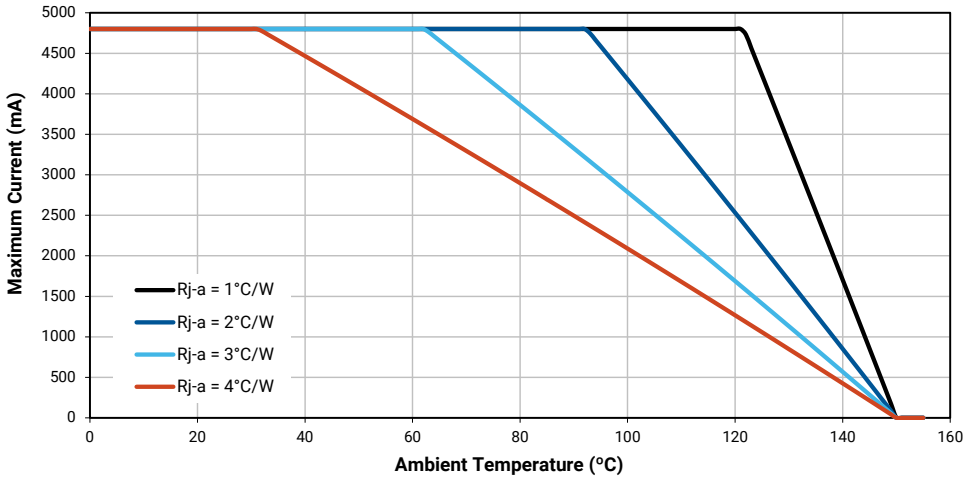
Reference condition: $T_J$ = 85 °C; 6 V, $I_F$ = 2100 mA; 12 V, $I_F$ = 1050 mA

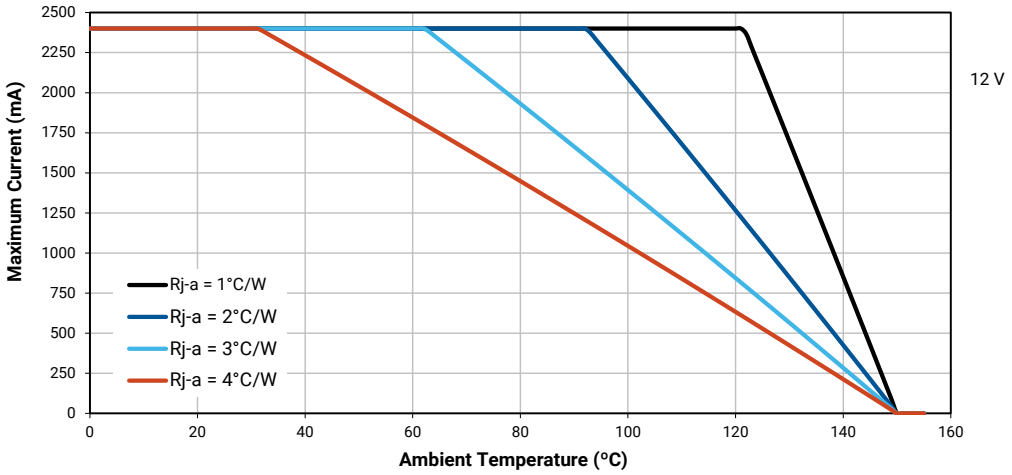



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## THERMAL DESIGN

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.




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

XLamp XHP70.2 LEDs are tested for luminous flux and placed into one of the following luminous-flux groups.

| Group Code | Minimum Luminous Flux | Maximum Luminous Flux |
|---|---|---|
| J4 | 1120 | 1200 |
| K2 | 1200 | 1290 |
| K4 | 1290 | 1380 |
| M2 | 1380 | 1485 |
| M4 | 1485 | 1590 |
| N2 | 1590 | 1710 |
| N4 | 1710 | 1830 |
| P2 | 1830 | 1965 |
| P4 | 1965 | 2100 |
| Q2 | 2100 | 2260 |

## PERFORMANCE GROUPS - CHROMATICITY

XLamp XHP70.2 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 |

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## 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 | |
| 50G | 5000 K | 0.3447 | 0.3553 | 0.00840 | 0.00312 | 65.0 |
| 45G | 4500 | 0.3611 | 0.3658 | 0.00852 | 0.00330 | 61.5 |
| 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 |

| EasyWhite Color Temperatures – 5-Step Ellipse | | | | | | |
|---|---|---|---|---|---|---|
| Bin Code | CCT | Center Point | | Major Axis | Minor Axis | Rotation Angle (°) |
| | | x | y | a | b | |
| 50E | 5000 K | 0.3447 | 0.3553 | 0.01400 | 0.00520 | 65.0 |
| 45E | 4500 K | 0.3611 | 0.3658 | 0.01420 | 0.00550 | 61.5 |
| 40E | 4000 K | 0.3818 | 0.3797 | 0.01565 | 0.00670 | 53.7 |
| 35E | 3500 K | 0.4073 | 0.3917 | 0.01545 | 0.00690 | 54.0 |
| 30E | 3000 K | 0.4338 | 0.4030 | 0.01390 | 0.00680 | 53.2 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 7000 K | 0A0 | 0.2950 | 0.2970 |
| | | 0.2920 | 0.3060 |
| | | 0.2984 | 0.3133 |
| | | 0.3009 | 0.3042 |
| | 0B0 | 0.2920 | 0.3060 |
| | | 0.2895 | 0.3135 |
| | | 0.2962 | 0.3220 |
| | | 0.2984 | 0.3133 |
| | 0C0 | 0.2984 | 0.3133 |
| | | 0.2962 | 0.3220 |
| | | 0.3028 | 0.3304 |
| | | 0.3048 | 0.3207 |
| | 0D0 | 0.2984 | 0.3133 |
| | | 0.3048 | 0.3207 |
| | | 0.3068 | 0.3113 |
| | | 0.3009 | 0.3042 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 7000 K | 0R0 | 0.2980 | 0.2880 |
| | | 0.2950 | 0.2970 |
| | | 0.3009 | 0.3042 |
| | | 0.3037 | 0.2937 |
| | 0S0 | 0.2895 | 0.3135 |
| | | 0.2870 | 0.3210 |
| | | 0.2937 | 0.3312 |
| | | 0.2962 | 0.3220 |
| | 0T0 | 0.2962 | 0.3220 |
| | | 0.2937 | 0.3312 |
| | | 0.3005 | 0.3415 |
| | | 0.3028 | 0.3304 |
| | 0U0 | 0.3037 | 0.2937 |
| | | 0.3009 | 0.3042 |
| | | 0.3068 | 0.3113 |
| | | 0.3093 | 0.2993 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 7000 K | 1A0 | 0.3048 | 0.3207 |
| | | 0.3130 | 0.3290 |
| | | 0.3144 | 0.3186 |
| | | 0.3068 | 0.3113 |
| | 1B0 | 0.3028 | 0.3304 |
| | | 0.3115 | 0.3391 |
| | | 0.3130 | 0.3290 |
| | | 0.3048 | 0.3207 |
| | 1C0 | 0.3115 | 0.3391 |
| | | 0.3205 | 0.3481 |
| | | 0.3213 | 0.3373 |
| | | 0.3130 | 0.3290 |
| | 1D0 | 0.3130 | 0.3290 |
| | | 0.3213 | 0.3373 |
| | | 0.3221 | 0.3261 |
| | | 0.3144 | 0.3186 |

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## PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 7000 K | 1R0 | 0.3068 | 0.3113 |
| | | 0.3144 | 0.3186 |
| | | 0.3161 | 0.3059 |
| | | 0.3093 | 0.2993 |
| | 1S0 | 0.3005 | 0.3415 |
| | | 0.3099 | 0.3509 |
| | | 0.3115 | 0.3391 |
| | | 0.3028 | 0.3304 |
| | 1T0 | 0.3099 | 0.3509 |
| | | 0.3196 | 0.3602 |
| | | 0.3205 | 0.3481 |
| | | 0.3115 | 0.3391 |
| | 1U0 | 0.3144 | 0.3186 |
| | | 0.3221 | 0.3261 |
| | | 0.3231 | 0.3120 |
| | | 0.3161 | 0.3059 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 6000 K | 2A0 | 0.3215 | 0.3350 |
| | | 0.3290 | 0.3417 |
| | | 0.3290 | 0.3300 |
| | | 0.3222 | 0.3243 |
| | 2B0 | 0.3207 | 0.3462 |
| | | 0.3290 | 0.3538 |
| | | 0.3290 | 0.3417 |
| | | 0.3215 | 0.3350 |
| | 2C0 | 0.3290 | 0.3538 |
| | | 0.3376 | 0.3616 |
| | | 0.3371 | 0.3490 |
| | | 0.3290 | 0.3417 |
| | 2D0 | 0.3290 | 0.3417 |
| | | 0.3371 | 0.3490 |
| | | 0.3366 | 0.3369 |
| | | 0.3290 | 0.3300 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 6000 K | 2R0 | 0.3222 | 0.3243 |
| | | 0.3290 | 0.3300 |
| | | 0.3290 | 0.3180 |
| | | 0.3231 | 0.3120 |
| | 2S0 | 0.3196 | 0.3602 |
| | | 0.3290 | 0.3690 |
| | | 0.3290 | 0.3538 |
| | | 0.3207 | 0.3462 |
| | 2T0 | 0.3290 | 0.3690 |
| | | 0.3381 | 0.3762 |
| | | 0.3376 | 0.3616 |
| | | 0.3290 | 0.3538 |
| | 2U0 | 0.3290 | 0.3300 |
| | | 0.3366 | 0.3369 |
| | | 0.3361 | 0.3245 |
| | | 0.3290 | 0.3180 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 5000 K | 3A0 | 0.3371 | 0.3490 |
| | | 0.3451 | 0.3554 |
| | | 0.3440 | 0.3427 |
| | | 0.3366 | 0.3369 |
| | 3B0 | 0.3376 | 0.3616 |
| | | 0.3463 | 0.3687 |
| | | 0.3451 | 0.3554 |
| | | 0.3371 | 0.3490 |
| | 3C0 | 0.3463 | 0.3687 |
| | | 0.3551 | 0.3760 |
| | | 0.3533 | 0.3620 |
| | | 0.3451 | 0.3554 |
| | 3D0 | 0.3451 | 0.3554 |
| | | 0.3533 | 0.3620 |
| | | 0.3515 | 0.3487 |
| | | 0.3440 | 0.3427 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 4500 K | 4A0 | 0.3530 | 0.3597 |
| | | 0.3615 | 0.3659 |
| | | 0.3512 | 0.3465 |
| | | 0.3515 | 0.3487 |
| | 4B0 | 0.3548 | 0.3736 |
| | | 0.3641 | 0.3804 |
| | | 0.3530 | 0.3597 |
| | | 0.3533 | 0.362 |
| | 4C0 | 0.3641 | 0.3804 |
| | | 0.3736 | 0.3874 |
| | | 0.3702 | 0.3722 |
| | | 0.3615 | 0.3659 |
| | 4D0 | 0.3615 | 0.3659 |
| | | 0.3702 | 0.3722 |
| | | 0.3670 | 0.3578 |
| | | 0.3590 | 0.3521 |

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## PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 4000 K | 5A0 | 0.3670 | 0.3578 |
| | | 0.3702 | 0.3722 |
| | | 0.3825 | 0.3798 |
| | | 0.3783 | 0.3646 |
| | 5B0 | 0.3702 | 0.3722 |
| | | 0.3736 | 0.3874 |
| | | 0.3869 | 0.3958 |
| | | 0.3825 | 0.3798 |
| | 5C0 | 0.3825 | 0.3798 |
| | | 0.3869 | 0.3958 |
| | | 0.4006 | 0.4044 |
| | | 0.3950 | 0.3875 |
| | 5D0 | 0.3783 | 0.3646 |
| | | 0.3825 | 0.3798 |
| | | 0.3950 | 0.3875 |
| | | 0.3898 | 0.3716 |

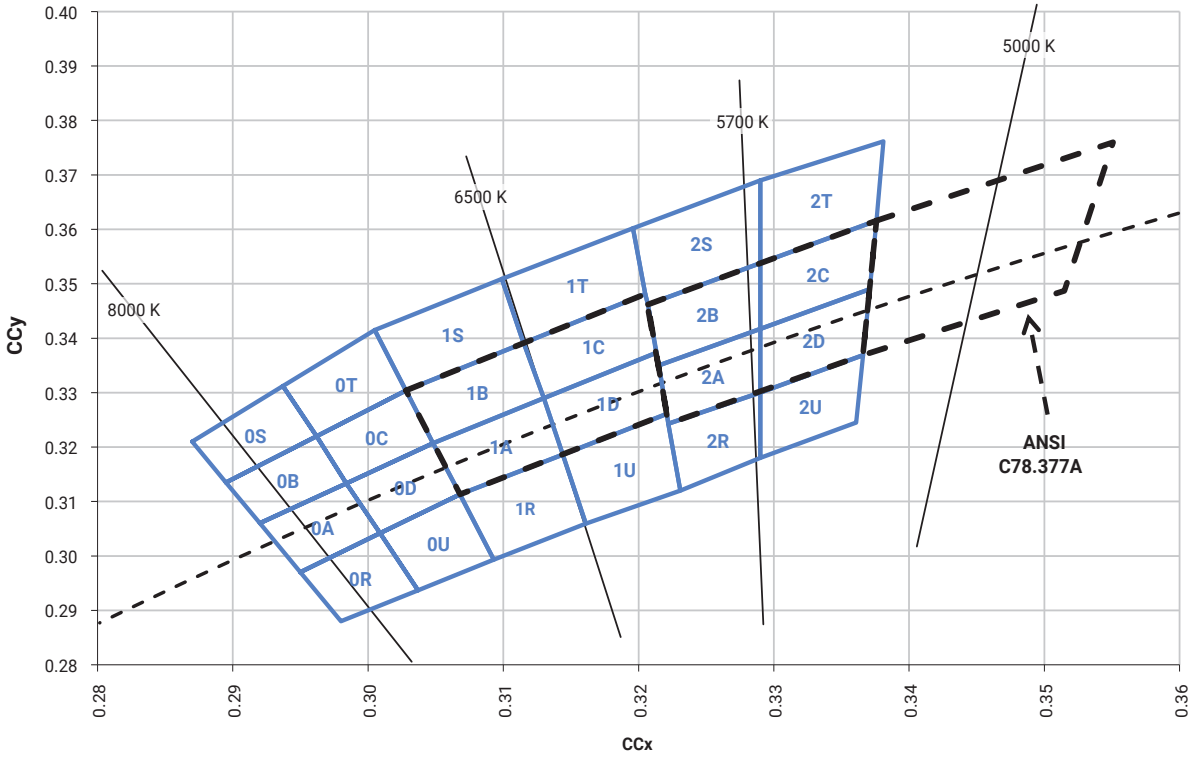
| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 3500 K | 6A0 | 0.3889 | 0.3690 |
| | | 0.3941 | 0.3848 |
| | | 0.4080 | 0.3916 |
| | | 0.4017 | 0.3751 |
| | 6B0 | 0.3]941 | 0.3848 |
| | | 0.3996 | 0.4015 |
| | | 0.4146 | 0.4089 |
| | | 0.4080 | 0.3916 |
| | 6C0 | 0.4080 | 0.3916 |
| | | 0.4146 | 0.4089 |
| | | 0.4299 | 0.4165 |
| | | 0.4221 | 0.3984 |
| | 6D0 | 0.4017 | 0.3751 |
| | | 0.4080 | 0.3916 |
| | | 0.4221 | 0.3984 |
| | | 0.4147 | 0.3814 |

| ANSI White Bins | | | |
|---|---|---|---|
| CCT | Bin Code | x | y |
| 3000 K | 7A0 | 0.4147 | 0.3814 |
| | | 0.4221 | 0.3984 |
| | | 0.4342 | 0.4028 |
| | | 0.4259 | 0.3853 |
| | 7B0 | 0.4221 | 0.3984 |
| | | 0.4299 | 0.4165 |
| | | 0.4430 | 0.4212 |
| | | 0.4342 | 0.4028 |
| | 7C0 | 0.4342 | 0.4028 |
| | | 0.4430 | 0.4212 |
| | | 0.4562 | 0.4260 |
| | | 0.4465 | 0.4071 |
| | 7D0 | 0.4259 | 0.3853 |
| | | 0.4342 | 0.4028 |
| | | 0.4465 | 0.4071 |
| | | 0.4373 | 0.3893 |

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## STANDARD WHITE CHROMATICITY REGIONS PLOTTED ON THE CIE 1931 CURVE

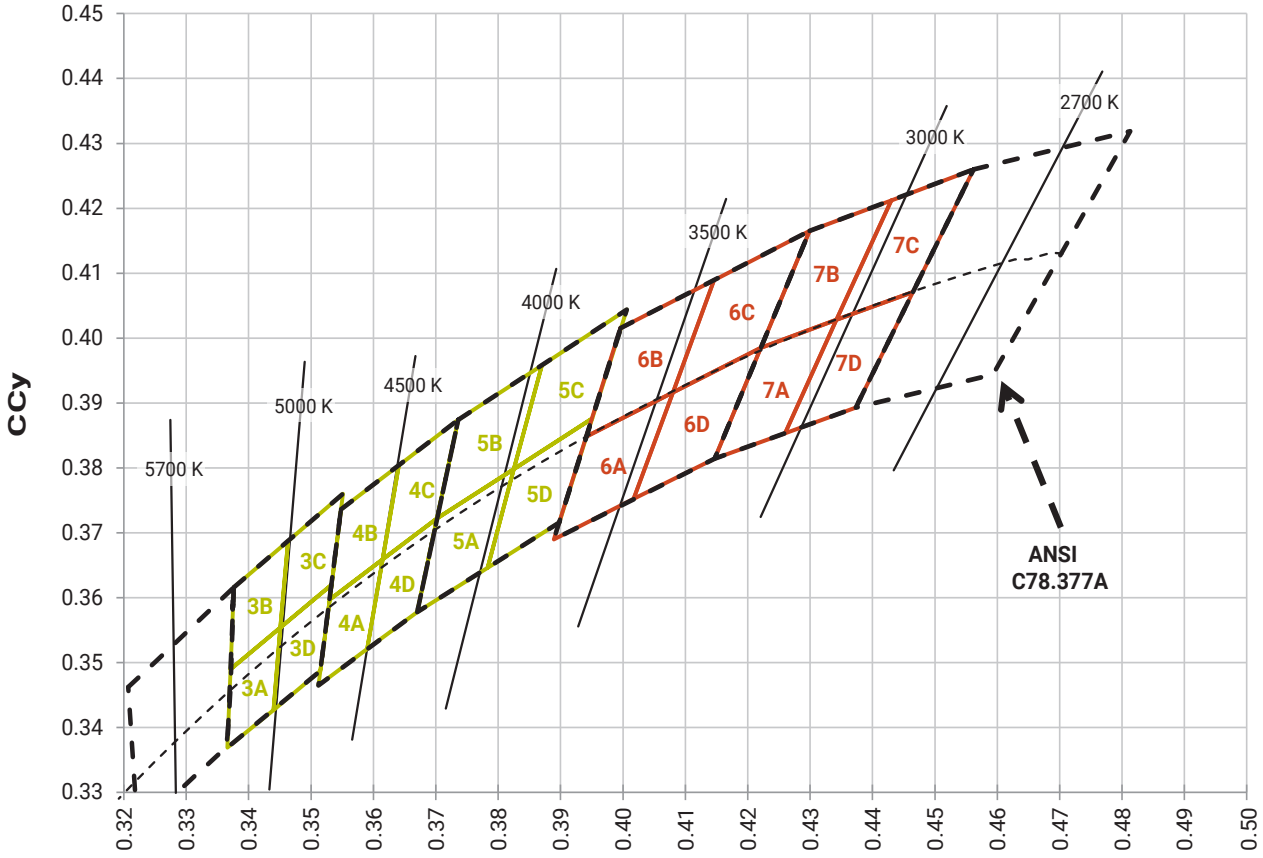
ANSI Cool White




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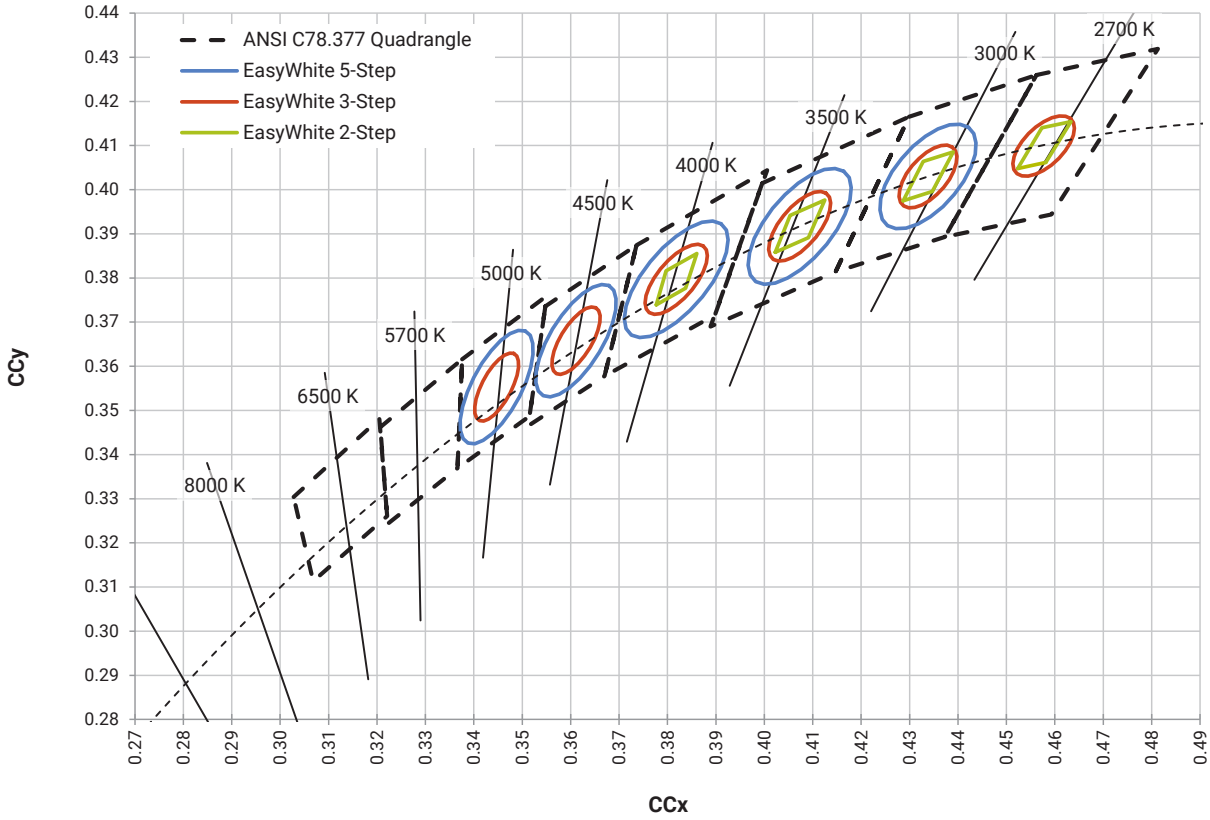
## STANDARD WHITE CHROMATICITY REGIONS PLOTTED ON THE CIE 1931 CURVE - CONTINUED

ANSI Neutral White and ANSI Warm White



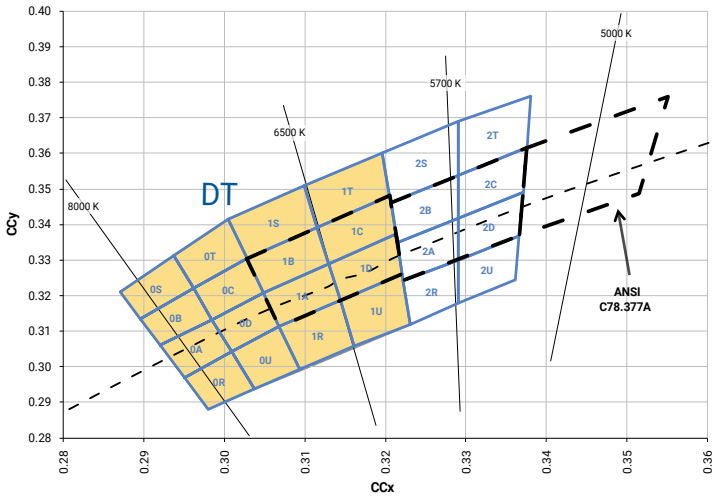

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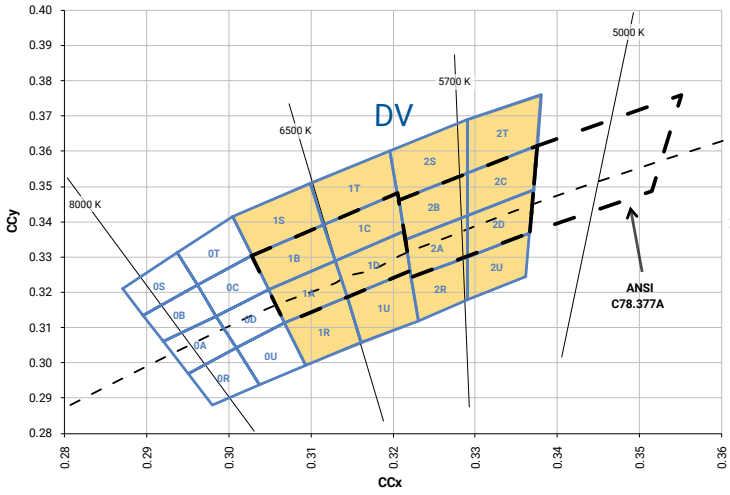
## STANDARD WHITE CHROMATICITY REGIONS PLOTTED ON THE CIE 1931 CURVE - CONTINUED

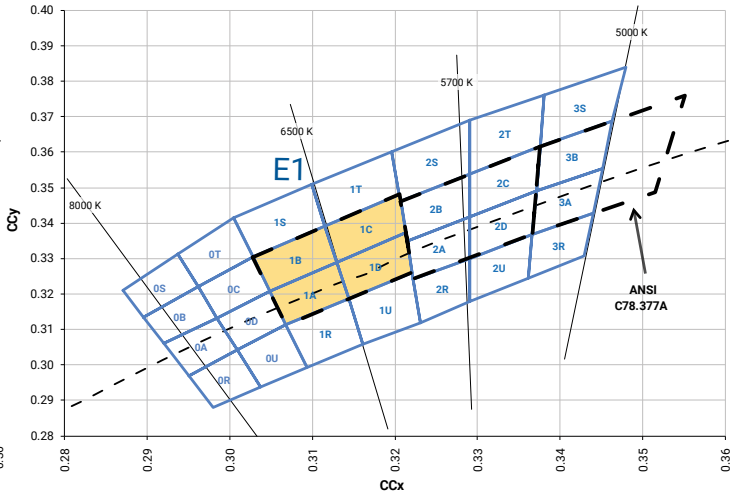


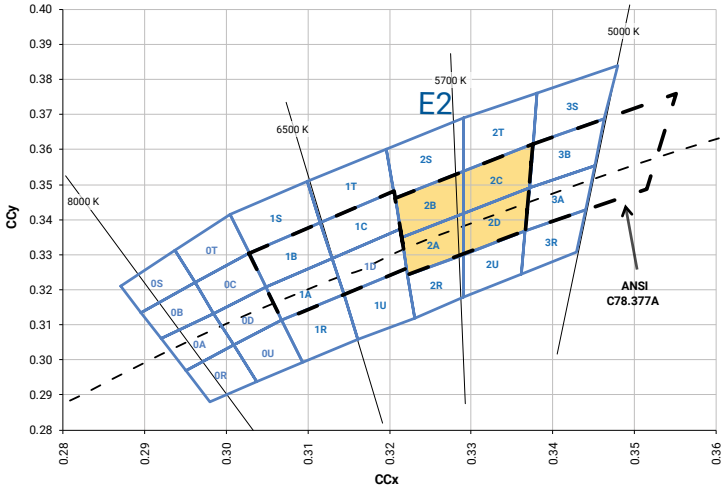

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## STANDARD COOL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS



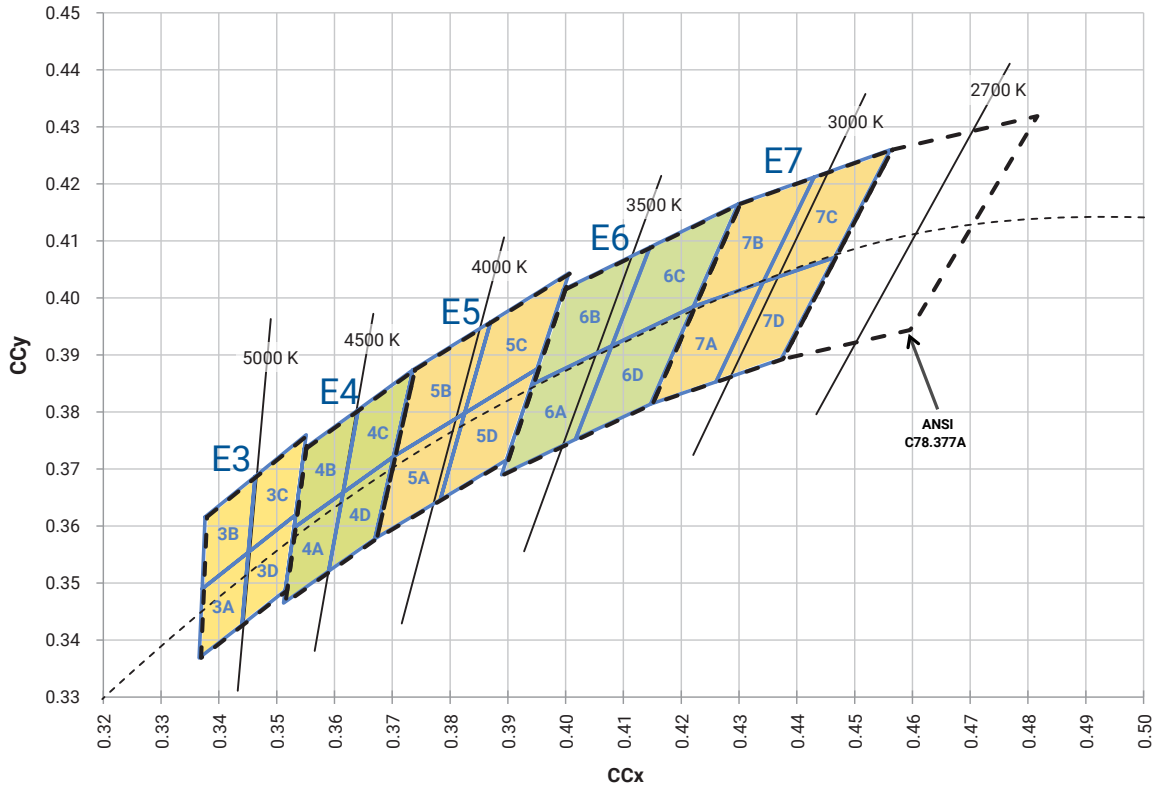




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## STANDARD WARM AND NEUTRAL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS

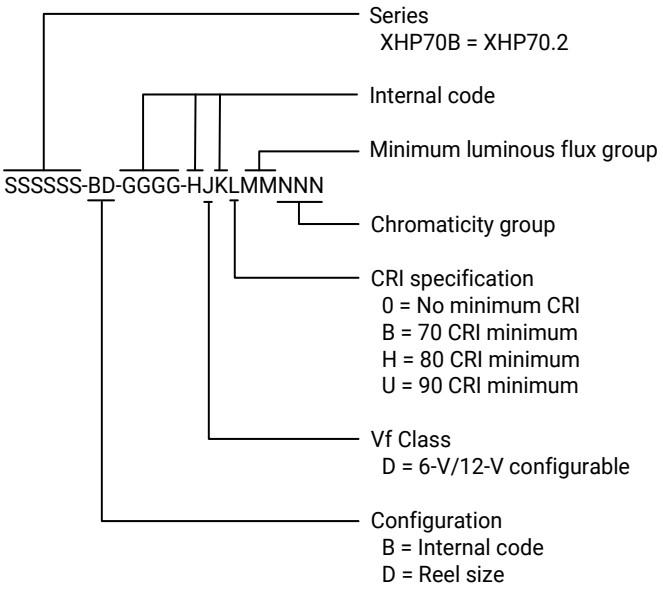



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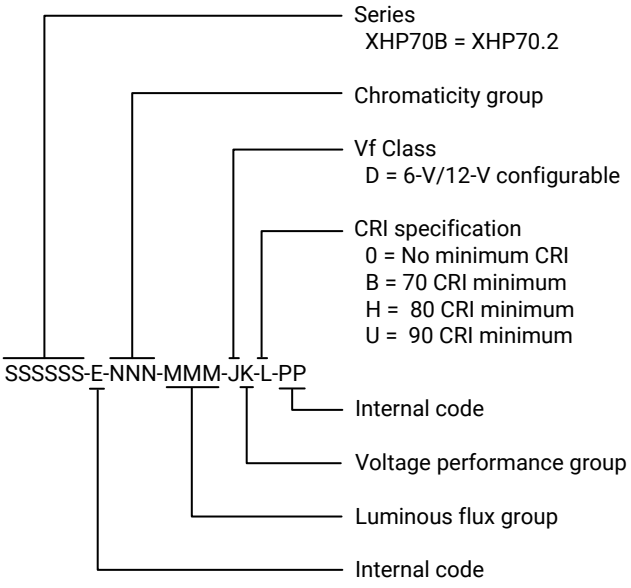
## BIN AND ORDER-CODE FORMAT

Bin codes and order codes for XHP70.2 LEDs are configured in the following manner:

**Order Code**




**Bin Code**

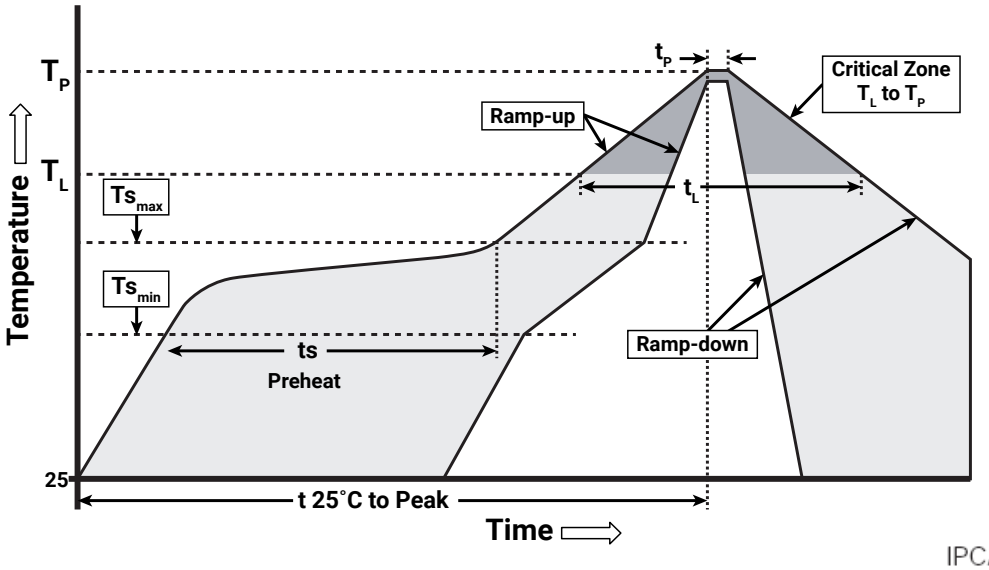



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## REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XHP70.2 LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree LED 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 $T_p$) | 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 the topside of the package, measured on the package body surface.

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## 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 LED'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 LED applies to ensure long-term reliability for XLamp LEDs and details of Cree LED's pre-release qualification testing for XLamp LEDs. Cree LED did not perform Room Temperature Operating Life (RTOL) testing on the XHP70.2 LED.

**Lumen Maintenance**

Cree LED 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 LED'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 LED 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 XHP70.2 LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of ≤ 30 °C/85% relative humidity (RH). Regardless of the storage condition, Cree LED 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 LED representative or from the Product Ecology section of the Cree LED 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 LED representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

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## NOTES - CONTINUED

**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**

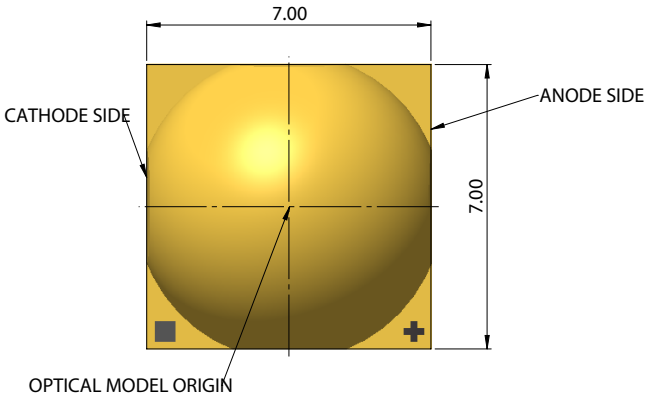
WARNING: Do not look at an exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

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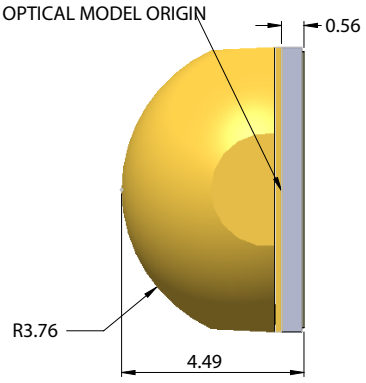
## MECHANICAL DIMENSIONS

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

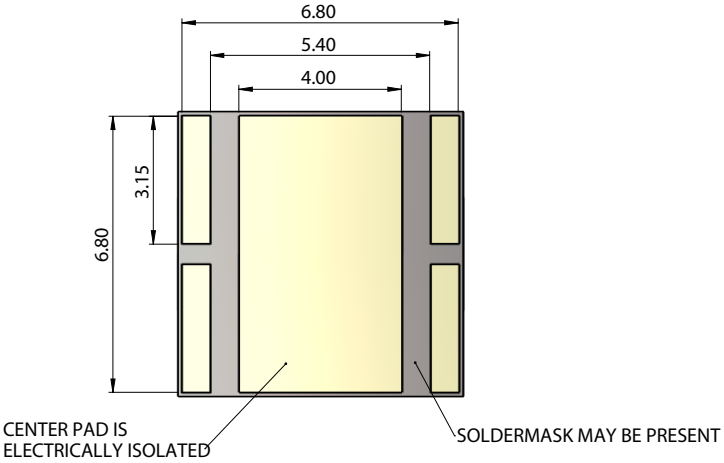
All dimensions are ±.13 mm unless otherwise indicated.




**Top View**



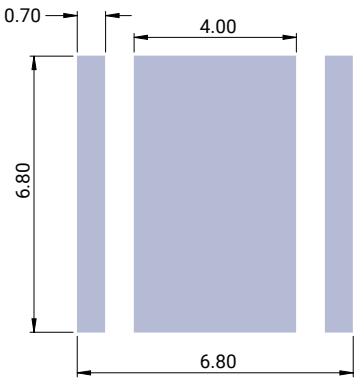

**Side View**



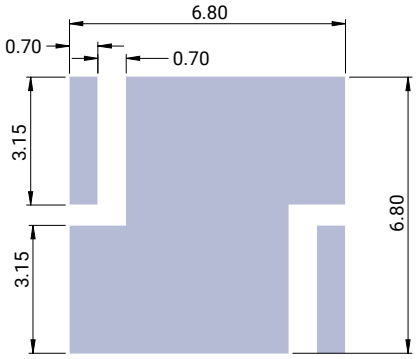

**Bottom View**

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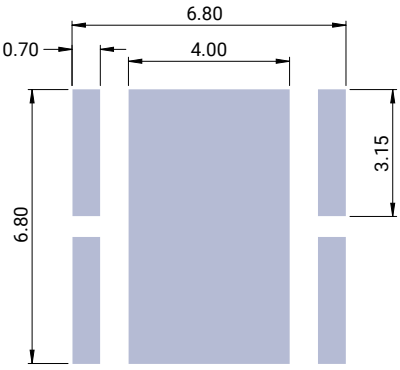
## MECHANICAL DIMENSIONS - CONTINUED



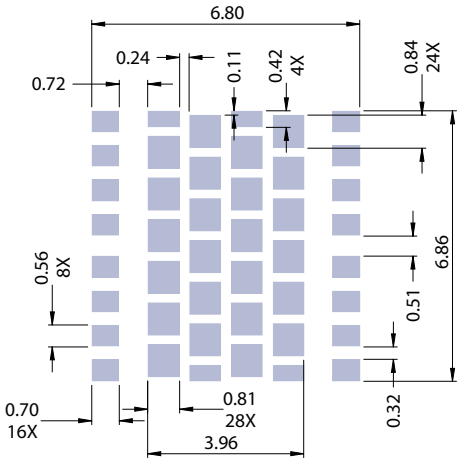

**Recommended 6-V PCB Footprint (Thermal pad is electrically isolated)**




**Recommended 12-V PCB Footprint (Thermal pad is connected to anode and cathode and is not electrically isolated)**



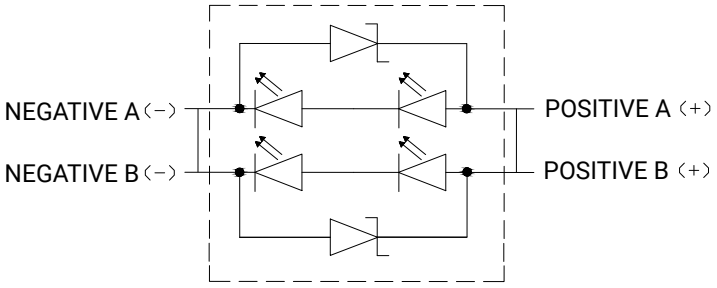

**Recommended 6-V & 12-V PCB Solder Mask Opening**



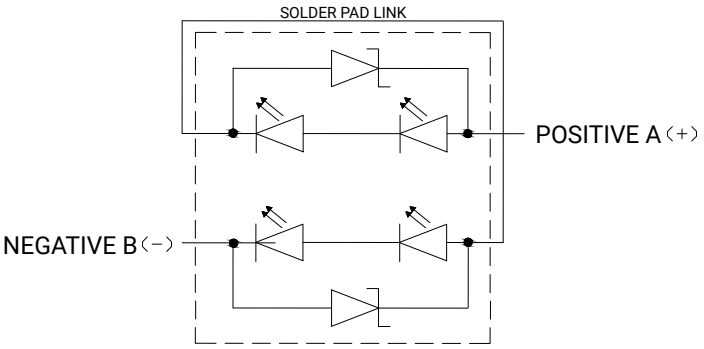

**Recommended 6-V & 12-V Stencil Openings**

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## ELECTRICAL CONFIGURATION




6-V Configuration



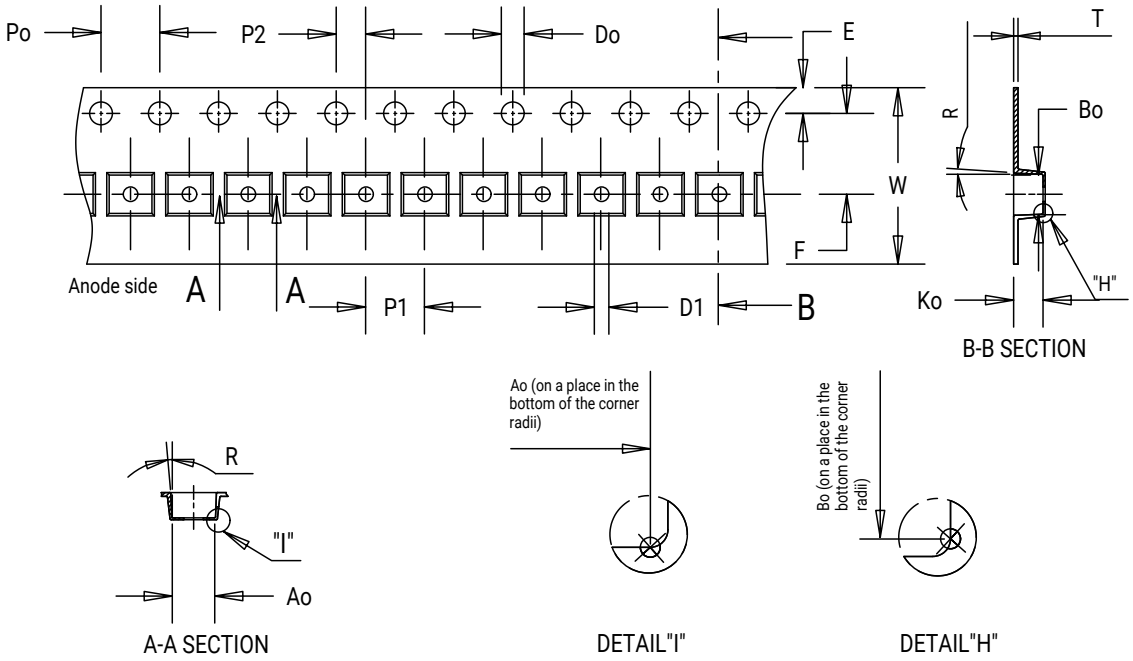

12-V Configuration

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## TAPE AND REEL

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

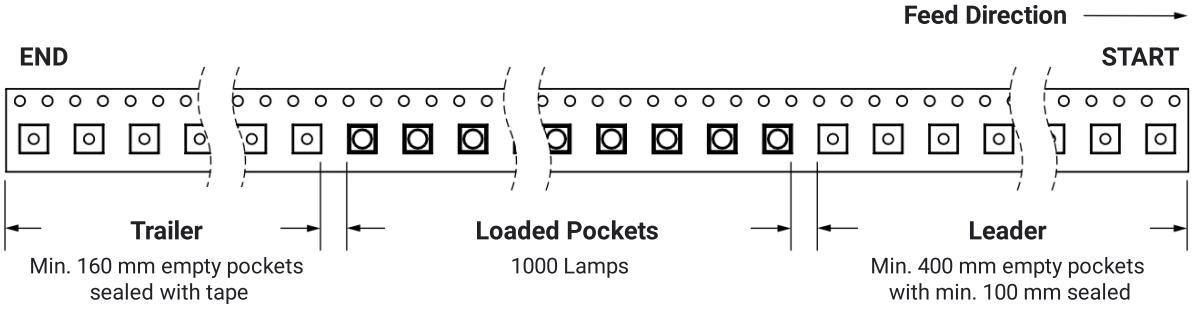
All dimensions are ±.13 mm unless otherwise indicated.

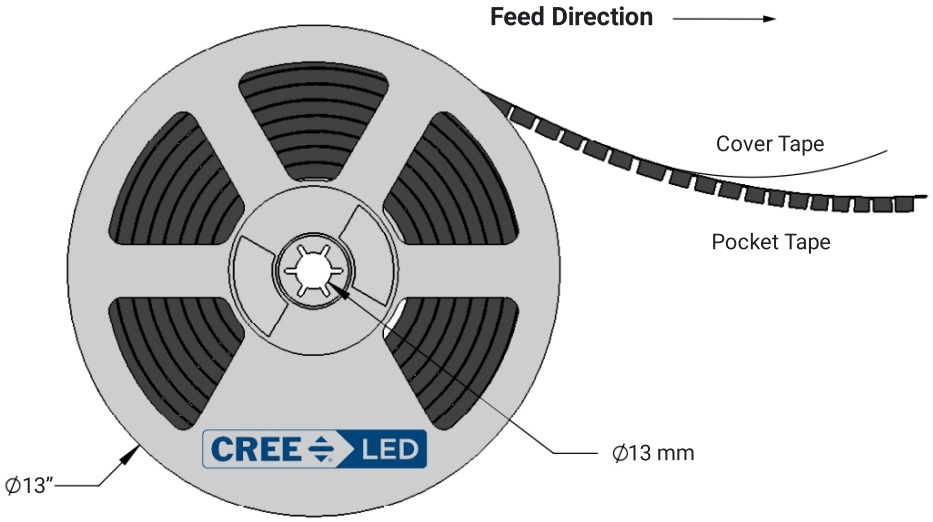



| Item | Ao | Bo | Ko | Po | P1 | P2 | T | E | F | Do | D1 | W | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dim. | 7.40 | 7.40 | 4.60 | 4.00 | 12.00 | 2.00 | 0.36 | 1.75 | 7.50 | 1.50 | 1.50 | 16.00 | 5° |

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## TAPE AND REEL - CONTINUED

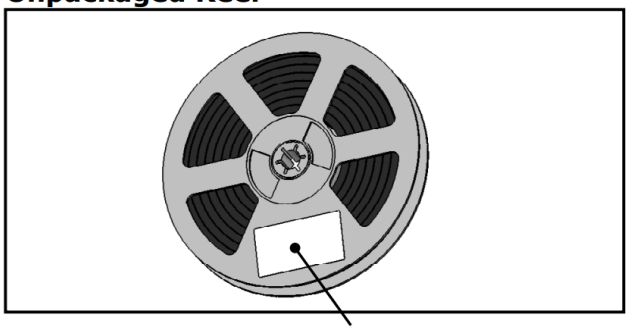


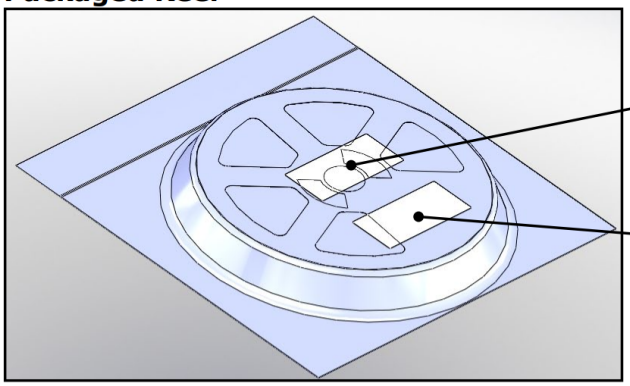

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## PACKAGING

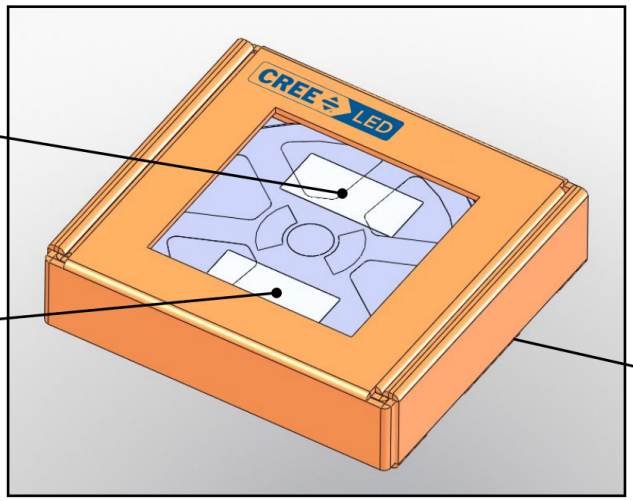
**Unpackaged Reel**




**Packaged Reel**




**Boxed Reel**




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