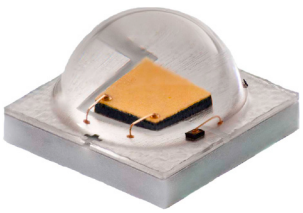
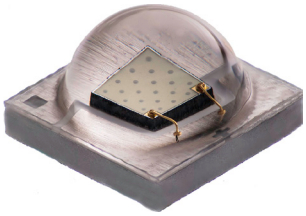
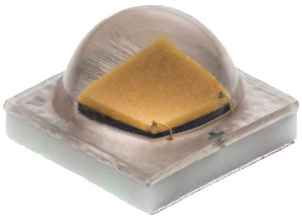
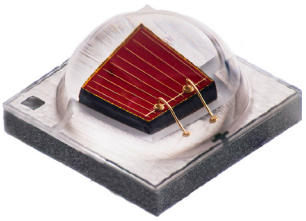
# Cree® XLamp® XP-E2 LEDs

## PRODUCT DESCRIPTION

The XLamp® XP-E2 LED builds on the unprecedented performance of the original XP-E by increasing lumen output up to 20% while providing a single die LED point source for precise optical control. The XP-E2 LED shares the same footprint as the original XP-E, providing a seamless upgrade path to more lumens and/or greater efficiency while shortening the design cycle for existing XP customers.

XLamp XP-E2 LEDs are the ideal choice for lighting applications where high light output and maximum efficacy are required, such as LED retrofit lamps, outdoor, portable, indoor directional, emergency vehicle or architectural.

## FEATURES

- Available in white, outdoor white, 80-CRI, 85-CRI, 90-CRI white, royal blue, blue, green, PC amber, amber, red-orange, red, photo red & far red
- ANSI-compatible chromaticity bins
- White binned at 85 °C
- Maximum drive current: 1 A
- Low thermal resistance: as low as 5 °C/W
- Wide viewing angle: 110°-140°
- Unlimited floor life at ≤ 30 °C/85% RH
- Reflow solderable - JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- RoHS and REACh compliant
- UL® recognized component (E349212)



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## CHARACTERISTICS

| Characteristics | Unit | Minimum | Typical | Maximum |
|---|---|---|---|---|
| Thermal resistance, junction to solder point - white, royal blue, blue | °C/W | | 9 | |
| Thermal resistance, junction to solder point - green | °C/W | | 15 | |
| Thermal resistance, junction to solder point - PC amber | °C/W | | 9 | |
| Thermal resistance, junction to solder point - amber | °C/W | | 7 | |
| Thermal resistance, junction to solder point - red-orange, red | °C/W | | 5 | |
| Thermal resistance, junction to solder point - photo red, far red | °C/W | | 8 | |
| Viewing angle (FWHM) - white | degrees | | 110 | |
| Viewing angle (FWHM) - royal blue, blue, green | degrees | | 135 | |
| Viewing angle (FWHM) - PC amber | degrees | | 110 | |
| Viewing angle (FWHM) - amber, red-orange, red, photo red | degrees | | 130 | |
| Viewing angle (FWHM) - far red | degrees | | 140 | |
| Temperature coefficient of voltage - white | mV/°C | | -2.3 | |
| Temperature coefficient of voltage - royal blue, blue | mV/°C | | -3.3 | |
| Temperature coefficient of voltage - green | mV/°C | | -3.8 | |
| Temperature coefficient of voltage - PC amber | mV/°C | | -2.5 | |
| Temperature coefficient of voltage - amber, red-orange, red | mV/°C | | -1.8 | |
| Temperature coefficient of voltage - photo red | mV/°C | | -1.6 | |
| Temperature coefficient of voltage - far red | mV/°C | | -1.0 | |
| ESD withstand voltage (HBM per Mil-Std-883D)- white, royal blue, blue, green | V | | | 8000 |
| ESD classification (HBM per Mil-Std-883D) - PC amber, amber, red-orange, red, photo red, far red | | | Class 2 | |
| DC forward current | mA | | | 1000 |
| Reverse voltage | V | | | 5 |
| Forward voltage (@ 350 mA, 85 °C) - white | V | | 2.9 | 3.25 |
| Forward voltage (@ 700 mA, 85 °C) - white | V | | 3.05 | |
| Forward voltage (@ 1000 mA, 85 °C) - white | V | | 3.15 | |
| Forward voltage (@ 350 mA, 25 °C) - royal blue, blue | V | | 3.1 | 3.5 |
| Forward voltage (@ 1000 mA, 25 °C) - royal blue, blue | V | | 3.4 | |
| Forward voltage (@ 350 mA, 25 °C) - green | V | | 3.2 | 3.8 |
| Forward voltage (@ 1000 mA, 25 °C) - green | V | | 3.7 | |
| Forward voltage (@ 350 mA, 25 °C) - PC amber | V | | 3.05 | 3.5 |
| Forward voltage (@ 1000 mA, 25 °C) - PC amber | V | | 3.28 | |
| Forward voltage (@ 350 mA, 25 °C) - amber, red-orange, red, | V | | 2.2 | 2.6 |
| Forward voltage (@ 1000 mA, 25 °C) - amber, red-orange, red | V | | 2.65 | |
| Forward voltage (@ 350 mA, 25 °C) - photo red | V | | 2.05 | 2.5 |
| Forward voltage (@ 1000 mA, 25 °C) - photo red | V | | 2.42 | |
| Forward voltage (@ 350 mA, 25 °C) - far red | V | | 1.85 | 2.4 |
| Forward voltage (@ 1000 mA, 25 °C) - far red | V | | 2.24 | |
| LED junction temperature | °C | | | 150 |

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## FLUX CHARACTERISTICS - WHITE ($T_J$ = 85 °C)

The following tables provide order codes for XLamp XP-E2 white LEDs. For a complete description of the order code nomenclature, please see the Bin and Order Code Formats section (page 37). For definitions of the chromaticity kits, please see the Cree's Standard Chromaticity Kits section (page 36).

| Chromaticity | | Minimum Luminous Flux @ 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 | 70 CRI Typical |
| 51 | 6200 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-L1-0000-00G51 |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-L1-0000-00F51 |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-L1-0000-00E51 |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-L1-0000-00D51 |
| | | Q4 | 100 | 116 | 171 | 218 | XPEBWT-L1-0000-00C51 |
| 53 | 6000 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-L1-0000-00G53 |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-L1-0000-00F53 |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-L1-0000-00E53 |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-L1-0000-00D53 |
| | | Q4 | 100 | 116 | 171 | 218 | XPEBWT-L1-0000-00C53 |
| 50 | 6200 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-L1-0000-00G50 |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-L1-0000-00F50 |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-L1-0000-00E50 |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-L1-0000-00D50 |
| | | Q4 | 100 | 116 | 171 | 218 | XPEBWT-L1-0000-00C50 |
| E1 | 6500 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-L1-0000-00GE1 |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-L1-0000-00FE1 |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-L1-0000-00EE1 |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-L1-0000-00DE1 |
| | | Q4 | 100 | 116 | 171 | 218 | XPEBWT-L1-0000-00CE1 |
| E2 | 5700 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-L1-0000-00GE2 |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-L1-0000-00FE2 |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-L1-0000-00EE2 |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-L1-0000-00DE2 |
| | | Q4 | 100 | 116 | 171 | 218 | XPEBWT-L1-0000-00CE2 |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

** Calculated flux values at 700 mA and 1 A are for reference only.

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## FLUX CHARACTERISTICS - WHITE ($T_J$ = 85 °C) - CONTINUED

| Chromaticity | | Minimum Luminous Flux @ 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 | 70 CRI Typical | 75 CRI Typical | 80 CRI Minimum |
| E3 | 5000 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-01-0000-00GE3 | | |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FE3 | XPEBWT-L1-0000-00FE3 | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EE3 | XPEBWT-L1-0000-00EE3 | |
| | | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DE3 | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CE3 | |
| F4 | 4750 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-01-0000-00GF4 | | |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FF4 | XPEBWT-L1-0000-00FF4 | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EF4 | XPEBWT-L1-0000-00EF4 | |
| | | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DF4 | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CF4 | |
| E4 | 4500 K | R4 | 130 | 151 | 223 | 284 | XPEBWT-01-0000-00GE4 | | |
| | | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FE4 | XPEBWT-L1-0000-00FE4 | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EE4 | XPEBWT-L1-0000-00EE4 | |
| | | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DE4 | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CE4 | |
| F5 | 4250 K | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FF5 | | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EF5 | XPEBWT-L1-0000-00EF5 | |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-01-0000-00DF5 | XPEBWT-L1-0000-00DF5 | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CF5 | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BF5 | |
| E5 | 4000 K | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FE5 | | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EE5 | XPEBWT-L1-0000-00EE5 | XPEBWT-H1-0000-00EE5 |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-01-0000-00DE5 | XPEBWT-L1-0000-00DE5 | XPEBWT-H1-0000-00DE5 |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CE5 | XPEBWT-H1-0000-00CE5 |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BE5 | XPEBWT-H1-0000-00BE5 |
| Z5 | 4000 K | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DZ5 | XPEBWT-H1-0000-00DZ5 |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CZ5 | XPEBWT-H1-0000-00CZ5 |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BZ5 | XPEBWT-H1-0000-00BZ5 |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

** Calculated flux values at 700 mA and 1 A are for reference only.

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## FLUX CHARACTERISTICS - WHITE ($T_J$ = 85 °C) - CONTINUED

| Chromaticity | | Minimum Luminous Flux @ 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 | 70 CRI Typical | 80 CRI Typical | 80 CRI Minimum | 85 CRI Minimum | 90 CRI Minimum |
| F6 | 3750 K | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FF6 | | | | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EF6 | XPEBWT-L1-0000-00EF6 | | | |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-01-0000-00DF6 | XPEBWT-L1-0000-00DF6 | XPEBWT-H1-0000-00DF6 | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CF6 | XPEBWT-H1-0000-00CF6 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BF6 | XPEBWT-H1-0000-00BF6 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AF6 | XPEBWT-H1-0000-00AF6 | | |
| E6 | 3500 K | R3 | 122 | 142 | 209 | 266 | XPEBWT-01-0000-00FE6 | | | | |
| | | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EE6 | XPEBWT-L1-0000-00EE6 | | | |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-01-0000-00DE6 | XPEBWT-L1-0000-00DE6 | XPEBWT-H1-0000-00DE6 | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CE6 | XPEBWT-H1-0000-00CE6 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BE6 | XPEBWT-H1-0000-00BE6 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AE6 | XPEBWT-H1-0000-00AE6 | | |
| Z6 | 3500 K | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DZ6 | | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CZ6 | XPEBWT-H1-0000-00CZ6 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BZ6 | XPEBWT-H1-0000-00BZ6 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AZ6 | XPEBWT-H1-0000-00AZ6 | | |
| F7 | 3250 K | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EF7 | XPEBWT-L1-0000-00EF7 | | | |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-01-0000-00DF7 | XPEBWT-L1-0000-00DF7 | XPEBWT-H1-0000-00DF7 | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CF7 | XPEBWT-H1-0000-00CF7 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BF7 | XPEBWT-H1-0000-00BF7 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AF7 | XPEBWT-H1-0000-00AF7 | | |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

** Calculated flux values at 700 mA and 1 A are for reference only.

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## FLUX CHARACTERISTICS - WHITE ($T_J$ = 85 °C) - CONTINUED

| Chromaticity | | Minimum Luminous Flux @ 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 | 70 CRI Typical | 80 CRI Typical | 80 CRI Minimum | 85 CRI Minimum | 90 CRI Minimum |
| E7 | 3000 K | R2 | 114 | 132 | 195 | 249 | XPEBWT-01-0000-00EE7 | XPEBWT-L1-0000-00EE7 | | | |
| | | Q5 | 107 | 124 | 183 | 233 | XPEBWT-01-0000-00DE7 | XPEBWT-L1-0000-00DE7 | XPEBWT-H1-0000-00DE7 | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CE7 | XPEBWT-H1-0000-00CE7 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BE7 | XPEBWT-H1-0000-00BE7 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AE7 | XPEBWT-H1-0000-00AE7 | XPEBWT-P1-0000-00AE7 | XPEBWT-U1-0000-00AE7 |
| | | P4 | 80.6 | 93.6 | 138 | 176 | | | | XPEBWT-P1-0000-009E7 | XPEBWT-U1-0000-009E7 |
| | | P3 | 73.9 | 85.8 | 127 | 161 | | | | XPEBWT-P1-0000-008E7 | XPEBWT-U1-0000-008E7 |
| | | P2 | 67.2 | 78.0 | 115 | 147 | | | | XPEBWT-P1-0000-007E7 | XPEBWT-U1-0000-007E7 |
| Z7 | 3000 K | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DZ7 | | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CZ7 | XPEBWT-H1-0000-00CZ7 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BZ7 | XPEBWT-H1-0000-00BZ7 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AZ7 | XPEBWT-H1-0000-00AZ7 | XPEBWT-P1-0000-00AZ7 | |
| | | P4 | 80.6 | 93.6 | 138 | 176 | | | | XPEBWT-P1-0000-009Z7 | XPEBWT-U1-0000-009Z7 |
| | | P3 | 73.9 | 85.8 | 127 | 161 | | | | XPEBWT-P1-0000-008Z7 | XPEBWT-U1-0000-008Z7 |
| | | P2 | 67.2 | 78.0 | 115 | 147 | | | | XPEBWT-P1-0000-007Z7 | XPEBWT-U1-0000-007Z7 |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

** Calculated flux values at 700 mA and 1 A are for reference only.

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## FLUX CHARACTERISTICS - WHITE ($T_J$ = 85 °C) - CONTINUED

| Chromaticity | | Minimum Luminous Flux @ 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 | 70 CRI Typical | 80 CRI Typical | 80 CRI Minimum | 85 CRI Minimum | 90 CRI Minimum |
| F8 | 2850 K | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DF8 | | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CF8 | XPEBWT-H1-0000-00CF8 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BF8 | XPEBWT-H1-0000-00BF8 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AF8 | XPEBWT-H1-0000-00AF8 | XPEBWT-P1-0000-00AF8 | |
| | | P4 | 80.6 | 93.6 | 138 | 176 | | XPEBWT-L1-0000-009F8 | XPEBWT-H1-0000-009F8 | XPEBWT-P1-0000-009F8 | XPEBWT-U1-0000-009F8 |
| | | P3 | 73.9 | 85.8 | 127 | 161 | | | | XPEBWT-P1-0000-008F8 | XPEBWT-U1-0000-008F8 |
| | | P2 | 67.2 | 78 | 115 | 147 | | | | XPEBWT-P1-0000-007F8 | XPEBWT-U1-0000-007F8 |
| | | N4 | 62 | 72 | 106 | 135 | | | | XPEBWT-P1-0000-006F8 | XPEBWT-U1-0000-006F8 |
| E8 | 2700 K | Q5 | 107 | 124 | 183 | 233 | | XPEBWT-L1-0000-00DE8 | | | |
| | | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CE8 | XPEBWT-H1-0000-00CE8 | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BE8 | XPEBWT-H1-0000-00BE8 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AE8 | XPEBWT-H1-0000-00AE8 | | |
| | | P4 | 80.6 | 93.6 | 138 | 176 | | XPEBWT-L1-0000-009E8 | XPEBWT-H1-0000-009E8 | XPEBWT-P1-0000-009E8 | XPEBWT-U1-0000-009E8 |
| | | P3 | 73.9 | 85.8 | 127 | 161 | | | | XPEBWT-P1-0000-008E8 | XPEBWT-U1-0000-008E8 |
| | | P2 | 67.2 | 78 | 115 | 147 | | | | XPEBWT-P1-0000-007E8 | XPEBWT-U1-0000-007E8 |
| | | N4 | 62 | 72 | 106 | 135 | | | | XPEBWT-P1-0000-006E8 | XPEBWT-U1-0000-006E8 |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

** Calculated flux values at 700 mA and 1 A are for reference only.

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## FLUX CHARACTERISTICS - WHITE ($T_J$ = 85 °C) - CONTINUED

| Chromaticity | | Minimum Luminous Flux @ 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 | 70 CRI Typical | 80 CRI Typical | 80 CRI Minimum | 85 CRI Minimum | 90 CRI Minimum |
| Z8 | 2700 K | Q4 | 100 | 116 | 171 | 218 | | XPEBWT-L1-0000-00CZ8 | | | |
| | | Q3 | 93.9 | 109 | 161 | 205 | | XPEBWT-L1-0000-00BZ8 | XPEBWT-H1-0000-00BZ8 | | |
| | | Q2 | 87.4 | 102 | 150 | 191 | | XPEBWT-L1-0000-00AZ8 | XPEBWT-H1-0000-00AZ8 | | |
| | | P4 | 80.6 | 93.6 | 138 | 176 | | XPEBWT-L1-0000-009Z8 | XPEBWT-H1-0000-009Z8 | XPEBWT-P1-0000-009Z8 | |
| | | P3 | 73.9 | 85.8 | 127 | 161 | | | | XPEBWT-P1-0000-008Z8 | XPEBWT-U1-0000-008Z8 |
| | | P2 | 67.2 | 78 | 115 | 147 | | | | XPEBWT-P1-0000-007Z8 | XPEBWT-U1-0000-007Z8 |
| | | N4 | 62 | 72 | 106 | 135 | | | | XPEBWT-P1-0000-006Z8 | XPEBWT-U1-0000-006Z8 |
| EA | 2200 K | P3 | 73.9 | 85.8 | 127 | 161 | | XPEBWT-L1-0000-008EA | XPEBWT-H1-0000-008EA | | |
| | | P2 | 67.2 | 78 | 115 | 147 | | XPEBWT-L1-0000-007EA | XPEBWT-H1-0000-007EA | | |
| | | N4 | 62 | 72 | 106 | 135 | | XPEBWT-L1-0000-006EA | XPEBWT-H1-0000-006EA | | |
| ZA | 2200 K | P3 | 73.9 | 85.8 | 127 | 161 | | XPEBWT-L1-0000-008ZA | XPEBWT-H1-0000-008ZA | | |
| | | P2 | 67.2 | 78 | 115 | 147 | | XPEBWT-L1-0000-007ZA | XPEBWT-H1-0000-007ZA | | |
| | | N4 | 62 | 72 | 106 | 135 | | XPEBWT-L1-0000-006ZA | XPEBWT-H1-0000-006ZA | | |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

** Calculated flux values at 700 mA and 1 A are for reference only.

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## FLUX CHARACTERISTICS - COLOR ($T_J$ = 25 °C)

The following tables provide order codes for XLamp XP-E2 color LEDs. For a complete description of the order-code nomenclature, please see the Bin and Order Code Formats section (page 37).

| Color | Minimum Radiant Flux @ 350 mA | | Calculated Minimum PPF (µmol/s)* | Dominant Wavelength (nm) | | | | Order Codes |
|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | | Maximum | | |
| | Group | Flux (mW) | | Group | DWL (nm) | Group | DWL (nm) | |
| Royal Blue | 30 | 450 | 1.71 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00J01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00J02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00J03 |
| | 31 | 475 | 1.80 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00K01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00K02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00K03 |
| | 32 | 500 | 1.90 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00L01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00L02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00L03 |
| | 33 | 525 | 1.99 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00M01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00M02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00M03 |
| | 34 | 550 | 2.08 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00N01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00N02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00N03 |
| | 35 | 575 | 2.18 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00P01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00P02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00P03 |
| | 36 | 600 | 2.27 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00Q01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00Q02 |
| | | | | D4 | 455 | D5 | 465 | XPEBRY-L1-0000-00Q03 |
| | 37 | 625 | 2.37 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00R01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00R02 |
| | 38 | 650 | 2.46 | D3 | 450 | D5 | 465 | XPEBRY-L1-0000-00S01 |
| | | | | D3 | 450 | D4 | 460 | XPEBRY-L1-0000-00S02 |

Note:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements, ±2 on CRI measurements and ±1 on dominant wavelength measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

* Calculated Photosynthetic Photon Flux (PPF) values are for reference only.

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## FLUX CHARACTERISTICS - COLOR ($T_J$ = 25 °C) - CONTINUED

| Color | Minimum Luminous Flux (lm) @ 350 mA | | Dominant Wavelength (nm) | | | | Order Codes |
|---|---|---|---|---|---|---|---|
| | | | Minimum | | Maximum | | |
| | Group | Flux (lm) | Group | DWL (nm) | Group | DWL (nm) | |
| Blue | K2 | 30.6 | B3 | 465 | B6 | 485 | XPEBBL-L1-0000-00Y01 |
| | | | B3 | 465 | B5 | 480 | XPEBBL-L1-0000-00Y02 |
| | | | B4 | 470 | B5 | 480 | XPEBBL-L1-0000-00Y05 |
| | K3 | 35.2 | B3 | 465 | B6 | 485 | XPEBBL-L1-0000-00Z01 |
| | | | B3 | 465 | B5 | 480 | XPEBBL-L1-0000-00Z02 |
| | | | B4 | 470 | B5 | 480 | XPEBBL-L1-0000-00Z05 |
| | M2 | 39.8 | B3 | 465 | B6 | 485 | XPEBBL-L1-0000-00201 |
| | | | B3 | 465 | B5 | 480 | XPEBBL-L1-0000-00202 |
| | | | B4 | 470 | B5 | 480 | XPEBBL-L1-0000-00205 |
| | M3 | 45.7 | B3 | 465 | B6 | 485 | XPEBBL-L1-0000-00301 |
| | | | B3 | 465 | B5 | 480 | XPEBBL-L1-0000-00302 |
| | | | B4 | 470 | B5 | 480 | XPEBBL-L1-0000-00305 |

Note:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements, ±2 on CRI measurements and ±1 on dominant wavelength measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

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## FLUX CHARACTERISTICS - COLOR ($T_J$ = 25 °C) - CONTINUED

| Color | Minimum Luminous Flux (lm) @ 350 mA | | Calculated Minimum PPF (µmol/s)* | Dominant Wavelength (nm) | | | | Order Codes |
|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | | Maximum | | |
| | Group | Flux (lm) | | Group | DWL (nm) | Group | DWL (nm) | |
| Green | Q2 | 87.4 | 0.80 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00A01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00A02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00A03 |
| | Q3 | 93.9 | 0.86 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00B01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00B02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00B03 |
| | Q4 | 100 | 0.91 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00C01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00C02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00C03 |
| | Q5 | 107 | 0.98 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00D01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00D02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00D03 |
| | R2 | 114 | 1.04 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00E01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00E02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00E03 |
| | R3 | 122 | 1.11 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00F01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00F02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00F03 |
| | R4 | 130 | 1.18 | G2 | 520 | G4 | 535 | XPEBGR-L1-0000-00G01 |
| | | | | G2 | 520 | G3 | 530 | XPEBGR-L1-0000-00G02 |
| | | | | G3 | 525 | G4 | 535 | XPEBGR-L1-0000-00G03 |

| Color | Color Bin | Minimum Luminous Flux (lm) @ 350 mA | | Order Codes |
|---|---|---|---|---|
| | | Group | Flux (lm) | |
| PC Amber | Y2 | Q2 | 87.4 | XPEBPA-L1-0000-00A01 |
| | | Q3 | 93.9 | XPEBPA-L1-0000-00B01 |
| | | Q4 | 100 | XPEBPA-L1-0000-00C01 |
| | | Q5 | 107 | XPEBPA-L1-0000-00D01 |

Note:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements, ±2 on CRI measurements and ±1 on dominant wavelength measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

* Calculated Photosynthetic Photon Flux (PPF) values are for reference only.

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## FLUX CHARACTERISTICS - COLOR ($T_J$ = 25 °C) - CONTINUED

| Color | Minimum Luminous Flux (lm) @ 350 mA | | Dominant Wavelength (nm) | | | | Order Codes |
|---|---|---|---|---|---|---|---|
| | | | Minimum | | Maximum | | |
| | Group | Flux (lm) | Group | DWL (nm) | Group | DWL (nm) | |
| Amber | N4 | 62.0 | A2 | 585 | A3 | 595 | XPEBAM-L1-0000-00601 |
| | | | A2 | 585 | A2 | 590 | XPEBAM-L1-0000-00602 |
| | | | A3 | 590 | A3 | 595 | XPEBAM-L1-0000-00603 |
| | P2 | 67.2 | A2 | 585 | A3 | 595 | XPEBAM-L1-0000-00701 |
| | | | A2 | 585 | A2 | 590 | XPEBAM-L1-0000-00702 |
| | | | A3 | 590 | A3 | 595 | XPEBAM-L1-0000-00703 |
| | P3 | 73.9 | A2 | 585 | A3 | 595 | XPEBAM-L1-0000-00801 |
| | | | A2 | 585 | A2 | 590 | XPEBAM-L1-0000-00802 |
| | | | A3 | 590 | A3 | 595 | XPEBAM-L1-0000-00803 |
| | P4 | 80.6 | A2 | 585 | A3 | 595 | XPEBAM-L1-0000-00901 |
| | | | A2 | 585 | A2 | 590 | XPEBAM-L1-0000-00902 |
| | | | A3 | 590 | A3 | 595 | XPEBAM-L1-0000-00903 |
| | Q2 | 87.4 | A2 | 585 | A3 | 595 | XPEBAM-L1-0000-00A01 |

Note:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements, ±2 on CRI measurements and ±1 on dominant wavelength measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

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## FLUX CHARACTERISTICS - COLOR ($T_J$ = 25 °C) - CONTINUED

| Color | Minimum Luminous Flux (lm) @ 350 mA | | Dominant Wavelength (nm) | | | | Order Codes |
|---|---|---|---|---|---|---|---|
| | | | Minimum | | Maximum | | |
| | Group | Flux (lm) | Group | DWL (nm) | Group | DWL (nm) | |
| Red-Orange | P2 | 67.2 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00701 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00702 |
| | | | O4 | 615 | O4 | 620 | XPEBRO-L1-0000-00703 |
| | P3 | 73.9 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00801 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00802 |
| | | | O4 | 615 | O4 | 620 | XPEBRO-L1-0000-00803 |
| | P4 | 80.6 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00901 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00902 |
| | | | O4 | 615 | O4 | 620 | XPEBRO-L1-0000-00903 |
| | Q2 | 87.4 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00A01 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00A02 |
| | | | O4 | 615 | O4 | 620 | XPEBRO-L1-0000-00A03 |
| | Q3 | 93.9 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00B01 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00B02 |
| | | | O3 | 615 | O4 | 620 | XPEBRO-L1-0000-00B03 |
| | Q4 | 100 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00C01 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00C02 |
| | Q5 | 107 | O3 | 610 | O4 | 620 | XPEBRO-L1-0000-00D01 |
| | | | O3 | 610 | O3 | 615 | XPEBRO-L1-0000-00D02 |

| Color | Minimum Luminous Flux (lm) @ 350 mA | | Calculated Minimum PPF (µmol/s)* | Dominant Wavelength (nm) | | | | Order Codes |
|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | | Maximum | | |
| | Group | Flux (lm) | | Group | DWL (nm) | Group | DWL (nm) | |
| Red | N3 | 56.8 | 1.48 | R2 | 620 | R3 | 630 | XPEBRD-L1-0000-00501 |
| | | | | R2 | 620 | R2 | 625 | XPEBRD-L1-0000-00502 |
| | N4 | 62 | 1.61 | R2 | 620 | R3 | 630 | XPEBRD-L1-0000-00601 |
| | | | | R2 | 620 | R2 | 625 | XPEBRD-L1-0000-00602 |
| | P2 | 67.2 | 1.75 | R2 | 620 | R3 | 630 | XPEBRD-L1-0000-00701 |
| | | | | R2 | 620 | R2 | 625 | XPEBRD-L1-0000-00702 |
| | P3 | 73.9 | 1.92 | R2 | 620 | R3 | 630 | XPEBRD-L1-0000-00801 |
| | | | | R2 | 620 | R2 | 625 | XPEBRD-L1-0000-00802 |
| | P4 | 80.6 | 2.10 | R2 | 620 | R3 | 630 | XPEBRD-L1-0000-00901 |
| | | | | R2 | 620 | R2 | 625 | XPEBRD-L1-0000-00902 |

Note:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements, ±2 on CRI measurements and ±1 on dominant wavelength measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

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## FLUX CHARACTERISTICS - COLOR ($T_J$ = 25 °C) - CONTINUED

| Color | Minimum Radiant Flux (mW) @ 350 mA | | Calculated Minimum PPF (µmol/s)* | Peak Wavelength (nm) | | | | Color Order Codes |
|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | | Maximum | | |
| | Group | Flux (mW) | | Group | PWL (nm) | Group | PWL (nm) | |
| Photo Red | 29 | 425 | 2.3 | P2 | 650 | P5 | 670 | XPEBPR-L1-0000-00C01 |
| | 30 | 450 | 2.5 | P2 | 650 | P5 | 670 | XPEBPR-L1-0000-00D01 |

| Color | Minimum Radiant Flux (mW) @ 350 mA | | Calculated Minimum $PF_{FR}$ (µmol/s)* | Peak Wavelength (nm) | | | | Color Order Codes |
|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | | Maximum | | |
| | Group | Flux (mW) | | Group | PWL (nm) | Group | PWL (nm) | |
| Far Red | 26 | 350 | 2.0 | F2 | 720 | F5 | 740 | XPEBFR-L1-0000-00901 |
| | 27 | 375 | 2.1 | F2 | 720 | F5 | 740 | XPEBFR-L1-0000-00A01 |
| | 28 | 400 | 2.2 | F2 | 720 | F5 | 740 | XPEBFR-L1-0000-00B01 |

Note:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 39).
- Cree XLamp XP-E2 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.

* Calculated Photosynthetic Photon Flux (PPF) and Far-Red Photon Flux ($PF_{FR}$) values are for reference only.

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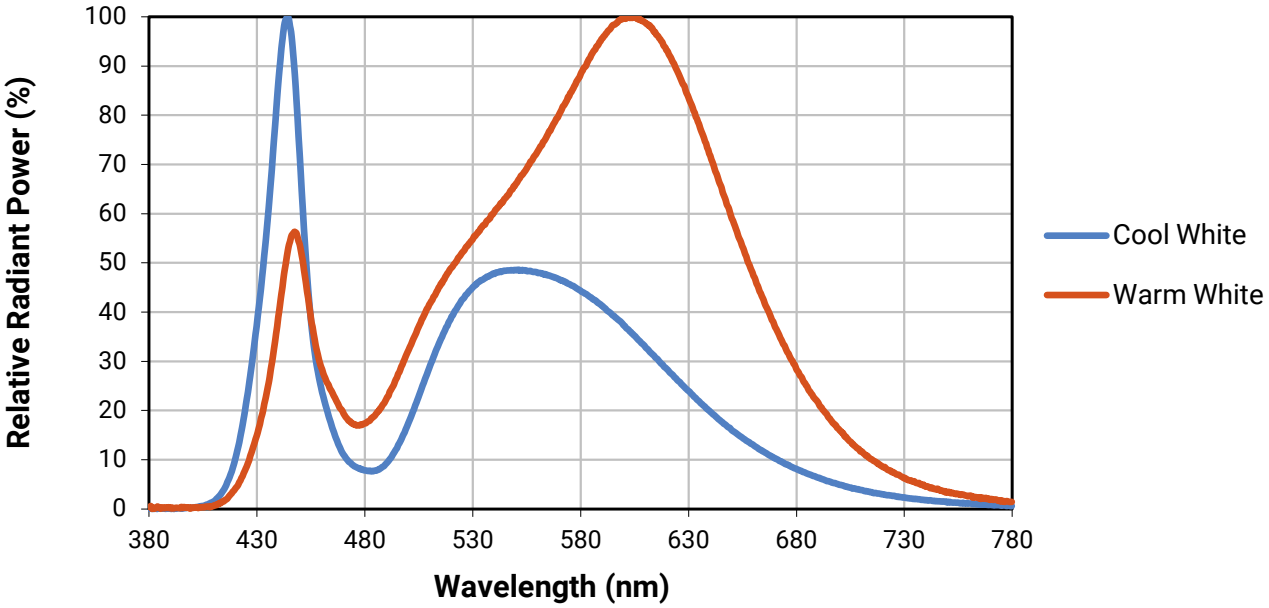


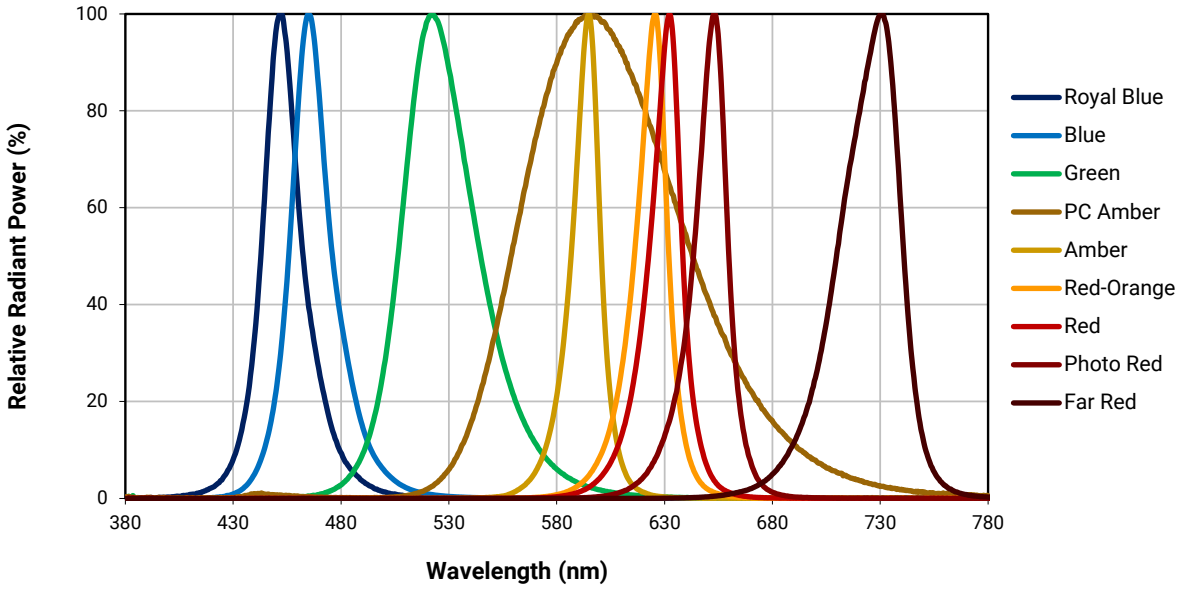


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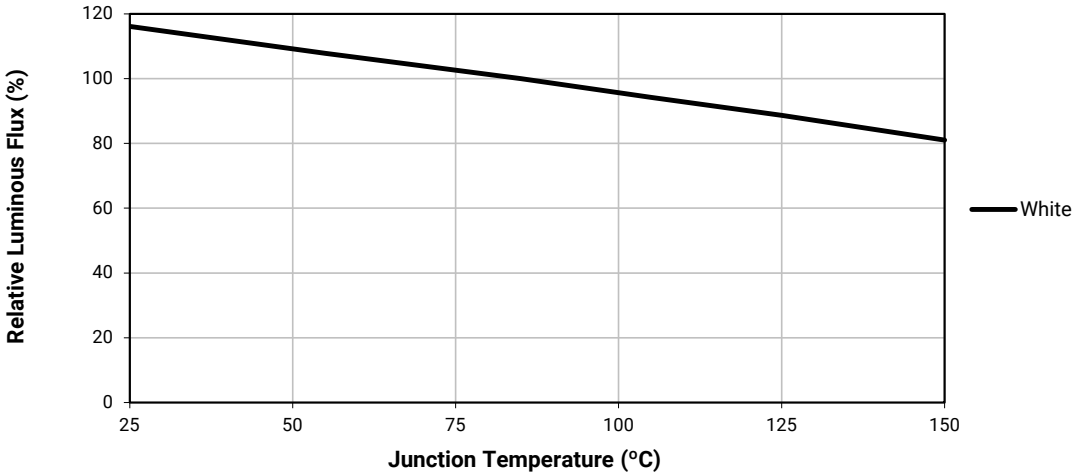
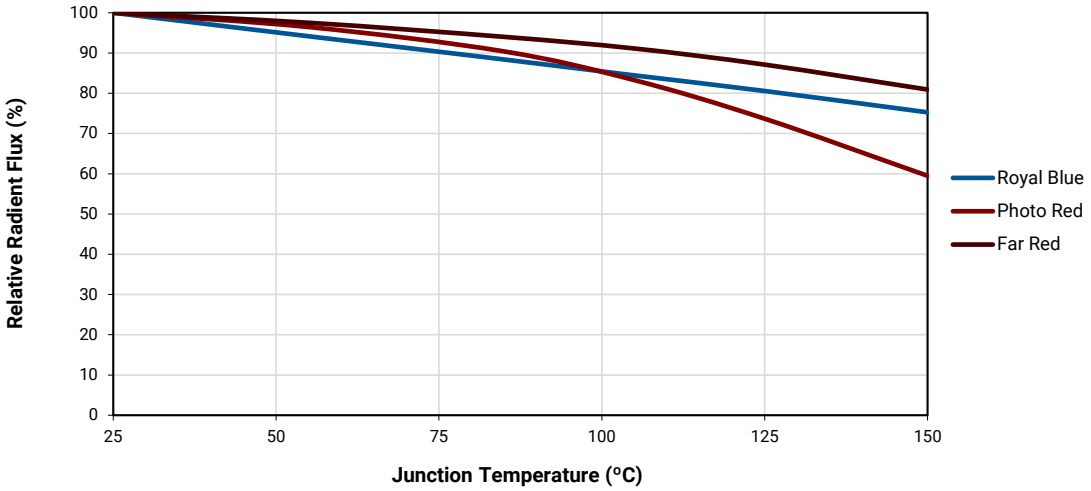
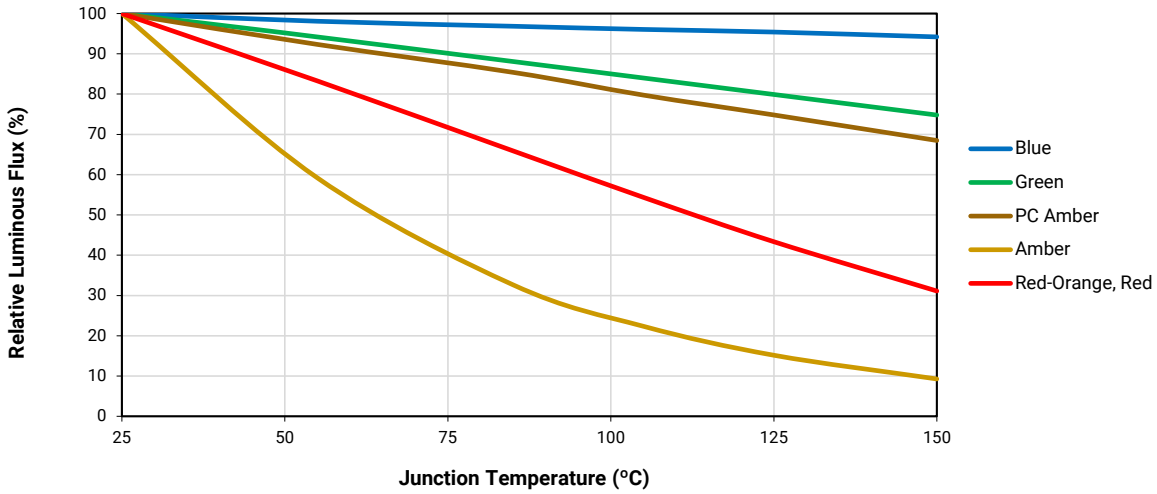
## RELATIVE FLUX VS. JUNCTION TEMPERATURE ($I_F$ = 350 mA)

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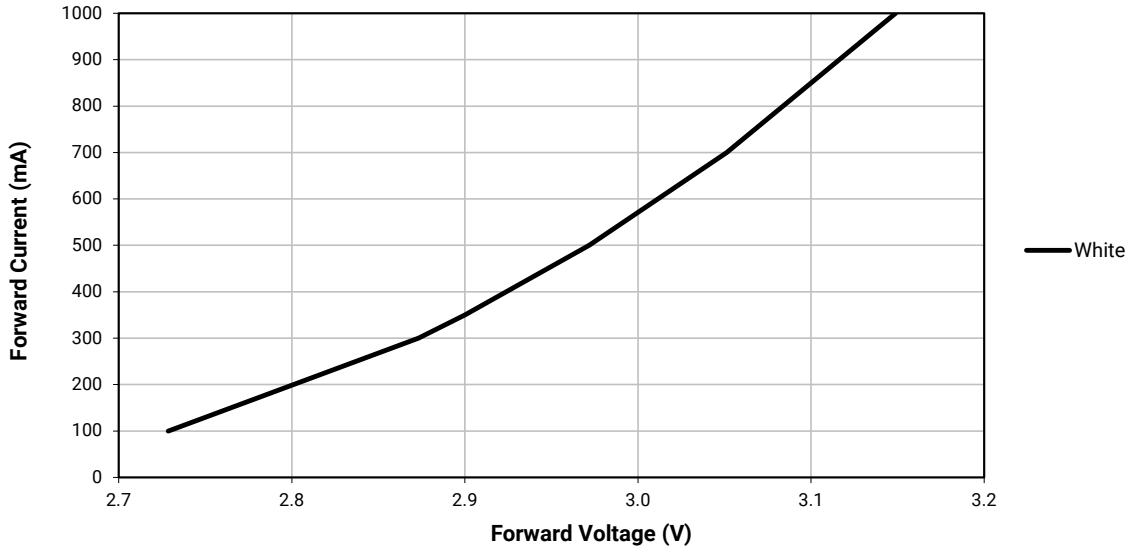
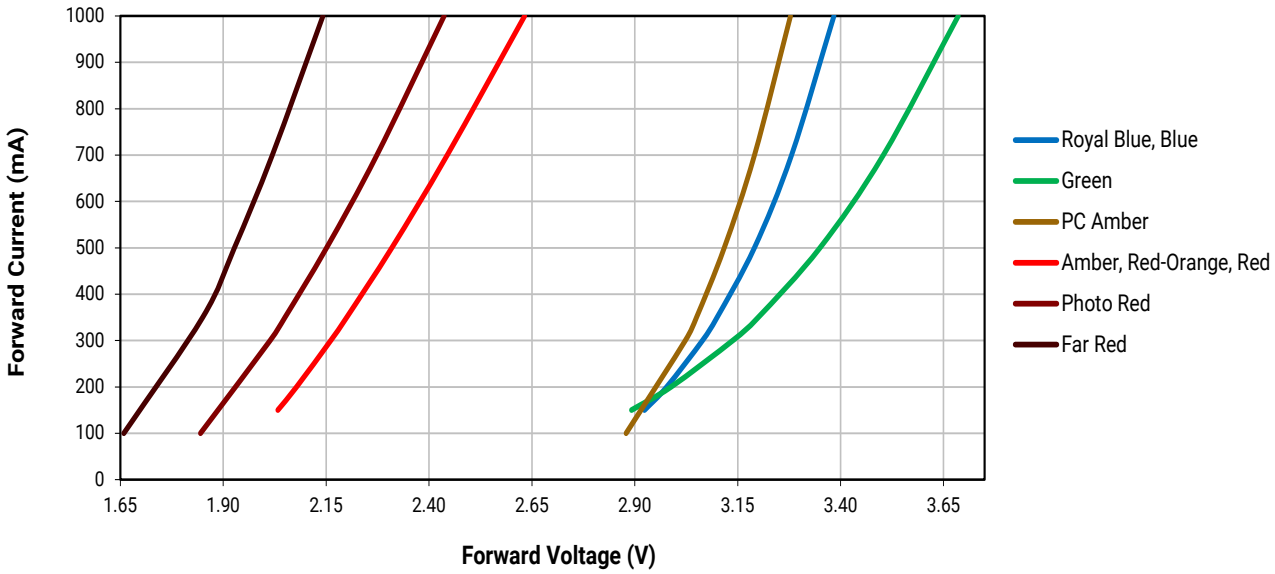
## ELECTRICAL CHARACTERISTICS - WHITE ($T_J$ = 85 °C)




## ELECTRICAL CHARACTERISTICS - COLOR ($T_J$ = 25 °C)

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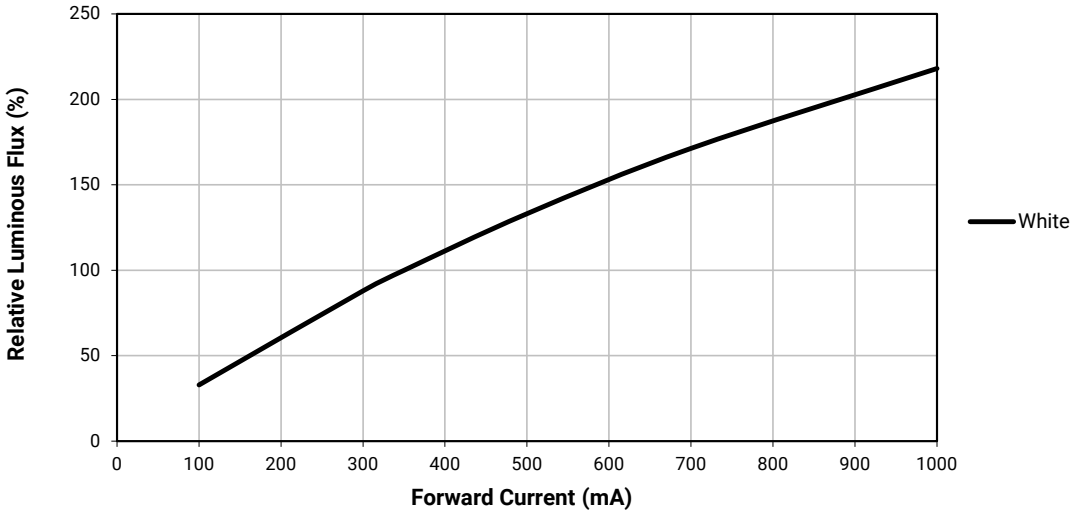
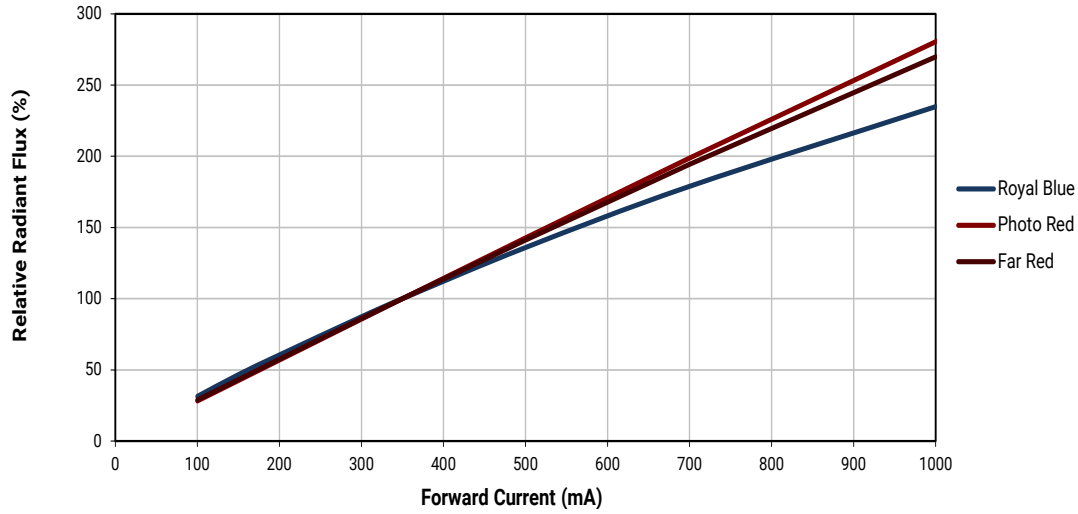
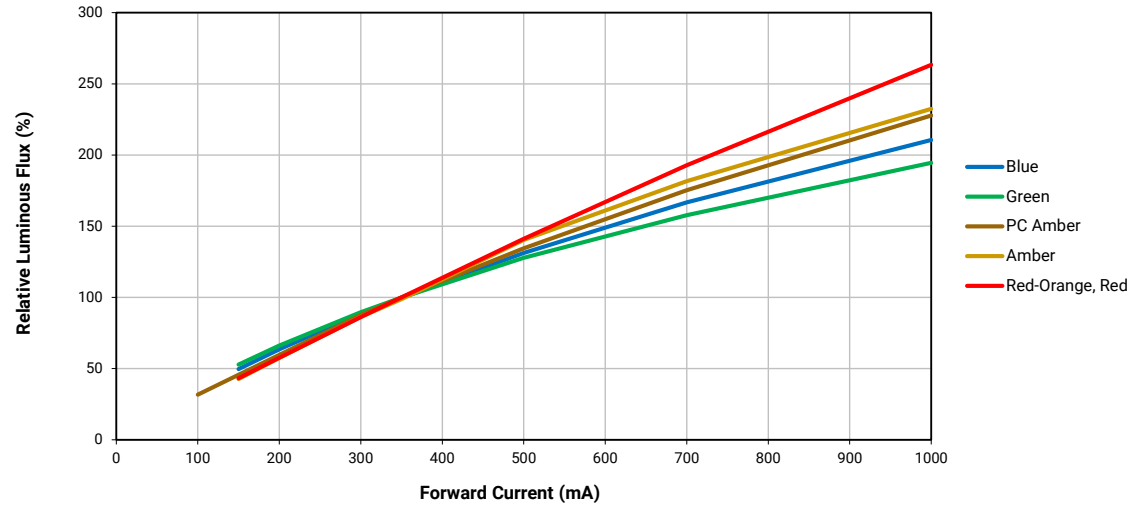
## RELATIVE FLUX VS. CURRENT - WHITE ($T_J$ = 85 °C)




## RELATIVE FLUX VS. CURRENT - COLOR ($T_J$ = 25 °C)

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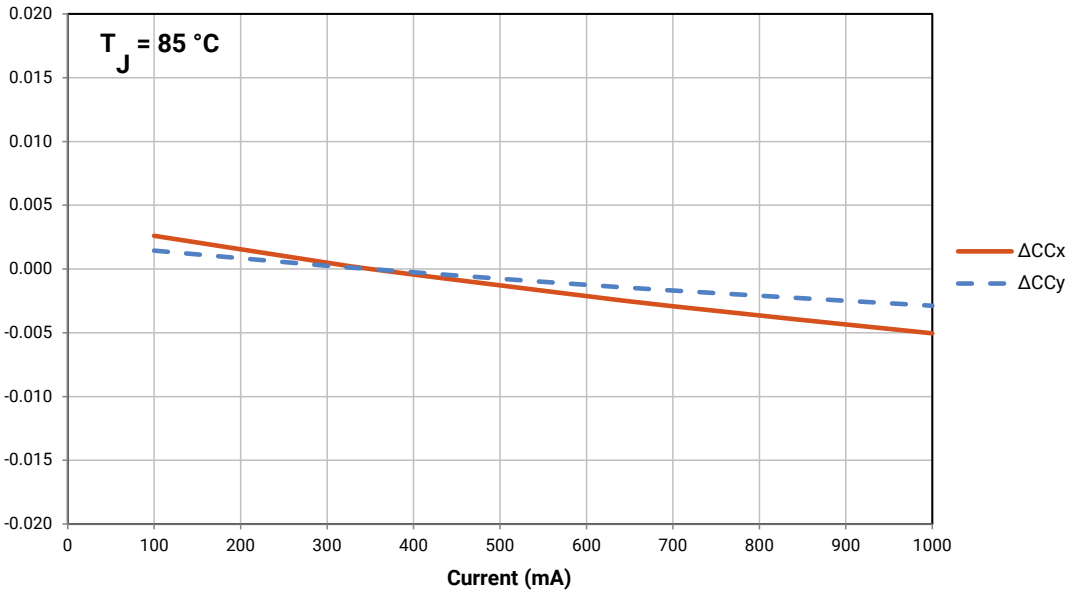
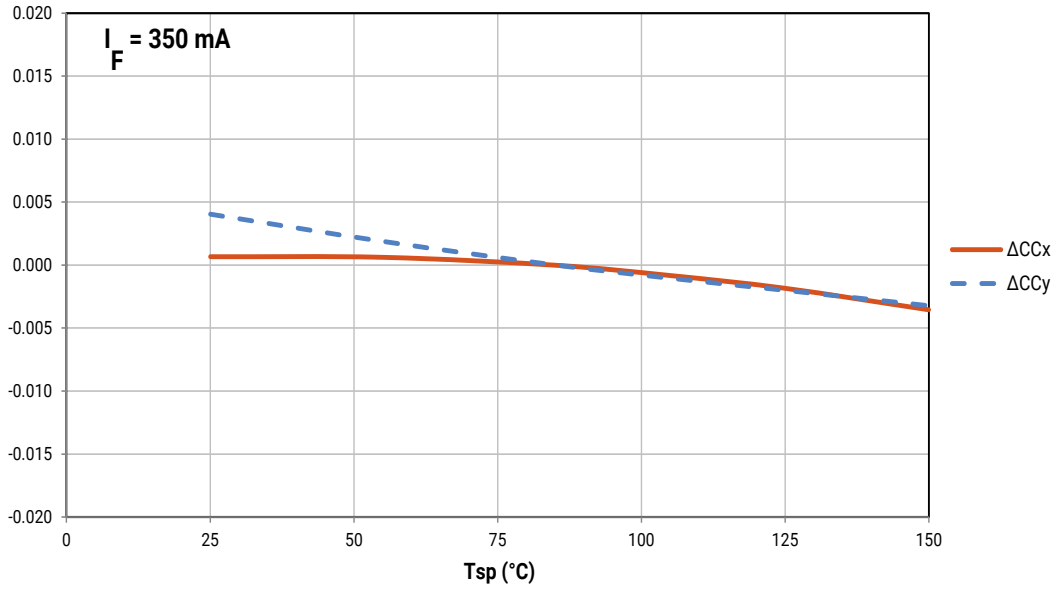
## RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE - WARM WHITE*




* Warm White XLamp XP-E2 LEDs have a typical CRI of 80.

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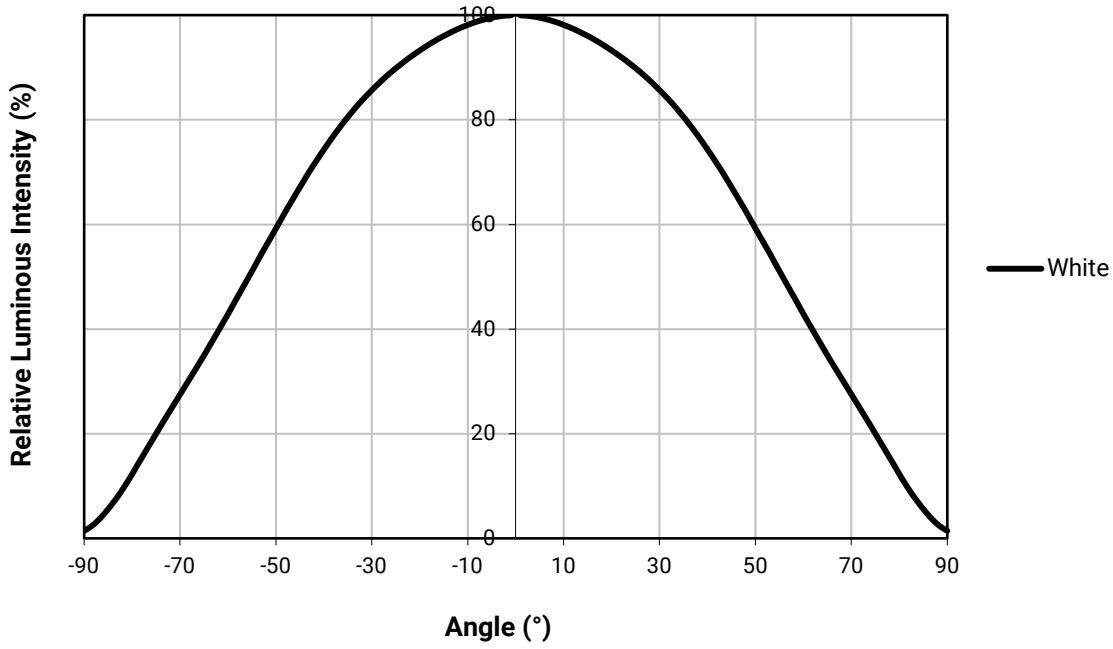


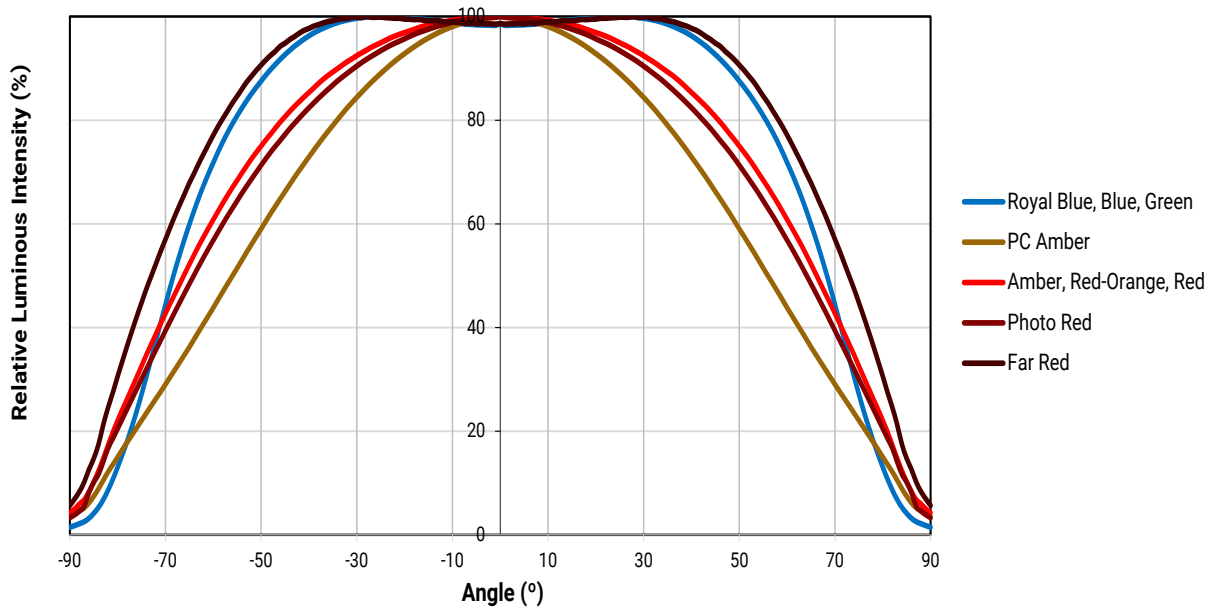


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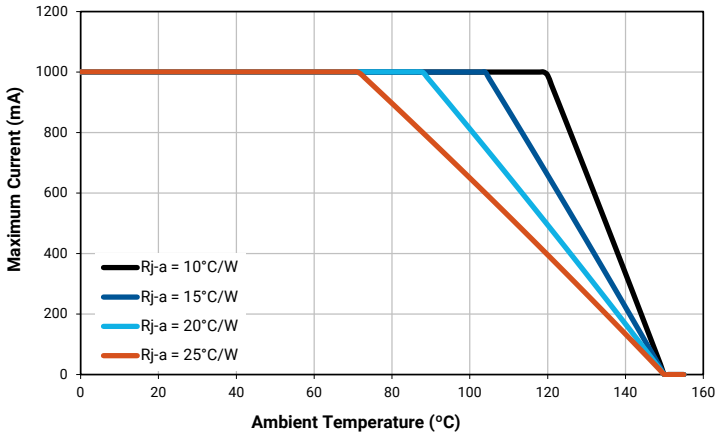
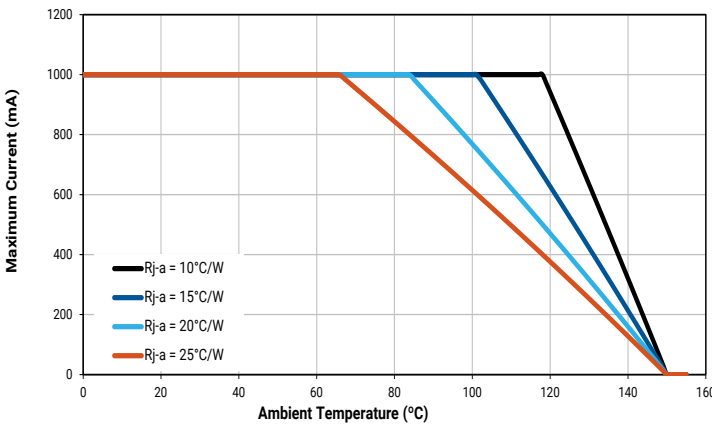
## THERMAL DESIGN

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.

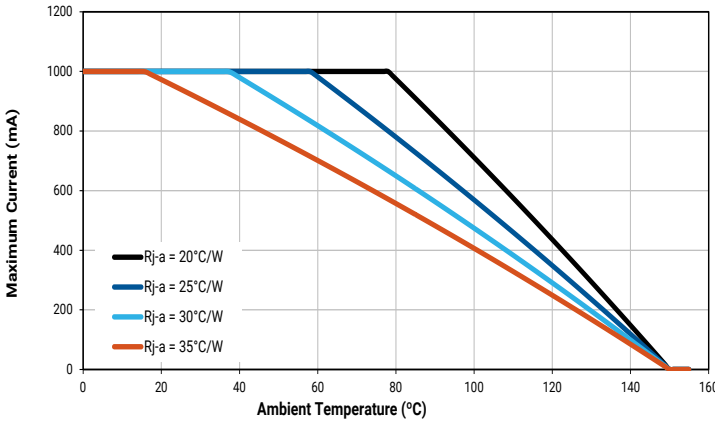
### White



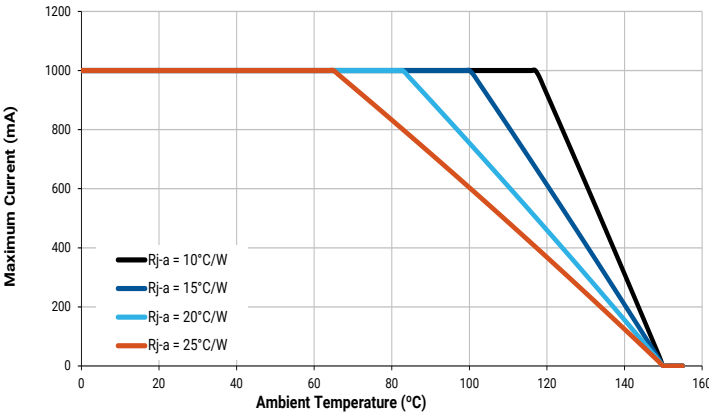

### Royal Blue, Blue



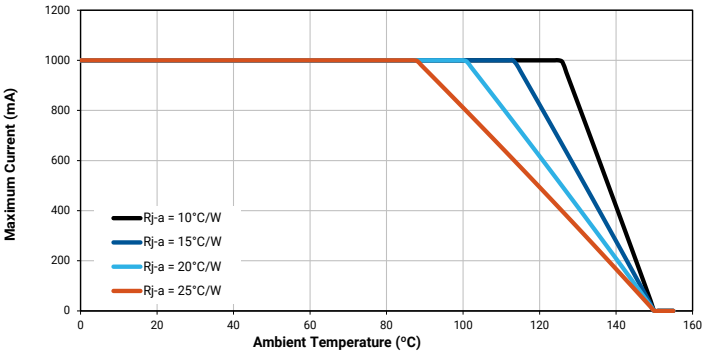

### Green



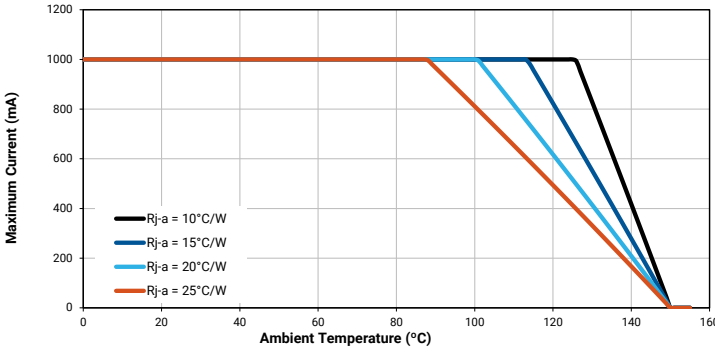

### PC Amber




### Amber




### Red-Orange, Red

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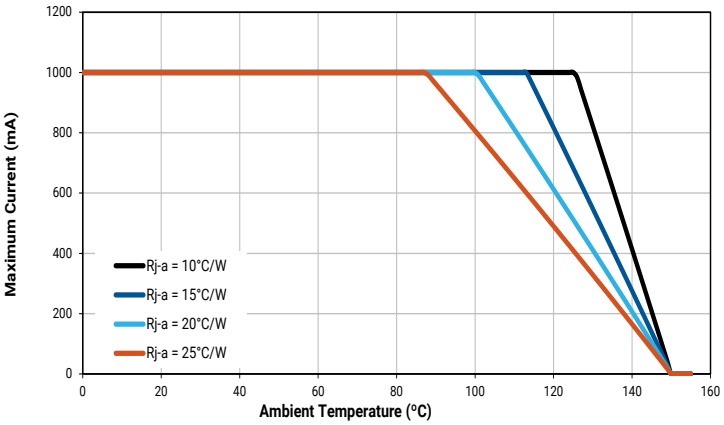
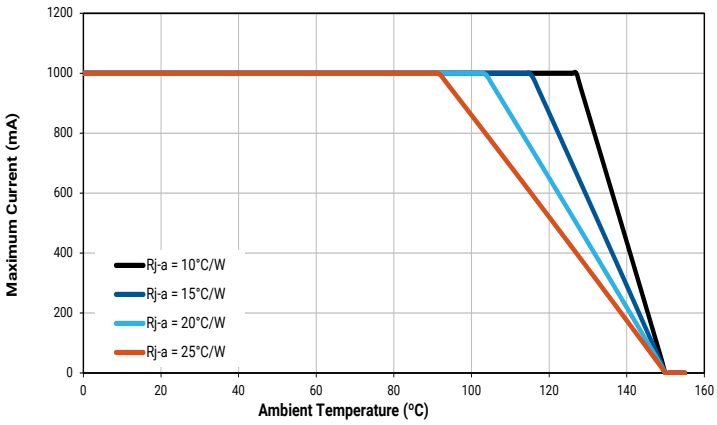
## THERMAL DESIGN - CONTINUED

### Photo Red




### Far Red

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## PERFORMANCE GROUPS - LUMINOUS FLUX

XLamp XP-E2 LEDs (except royal blue, photo red and far red) are tested for luminous flux and placed into one of the following luminous-flux groups:

| Group Code | Minimum Luminous Flux (lm) @ 350 mA | Maximum Luminous Flux (lm) @ 350 mA |
|---|---|---|
| K2 | 30.6 | 35.2 |
| K3 | 35.2 | 39.8 |
| M2 | 39.8 | 45.7 |
| M3 | 45.7 | 51.7 |
| N2 | 51.7 | 56.8 |
| N3 | 56.8 | 62.0 |
| N4 | 62.0 | 67.2 |
| P2 | 67.2 | 73.9 |
| P3 | 73.9 | 80.6 |
| P4 | 80.6 | 87.4 |
| Q2 | 87.4 | 93.9 |
| Q3 | 93.9 | 100 |
| Q4 | 100 | 107 |
| Q5 | 107 | 114 |
| R2 | 114 | 122 |
| R3 | 122 | 130 |
| R4 | 130 | 139 |

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## PERFORMANCE GROUPS - RADIANT FLUX ($T_J$ = 25 °C)

XLamp XP-E2 royal blue and photo red LEDs are tested for radiant flux and placed into one the following bins:

| Group | Minimum Radiant Flux (mW) @ 350 mA | Maximum Radiant Flux (mW) @ 350 mA |
|---|---|---|
| 29 | 425 | 450 |
| 30 | 450 | 475 |
| 31 | 475 | 500 |
| 32 | 500 | 525 |
| 33 | 525 | 550 |
| 34 | 550 | 575 |
| 35 | 575 | 600 |
| 36 | 600 | 625 |
| 37 | 625 | 650 |
| 38 | 650 | 675 |
| 39 | 675 | 700 |

XLamp XP-E2 far red LEDs are tested for radiant flux and sorted into one of the following radiant-flux bins:

| Group | Minimum Radiant Flux (mW) @ 350 mA | Maximum Radiant Flux (mW) @ 350 mA |
|---|---|---|
| 26 | 350 | 375 |
| 27 | 375 | 400 |
| 28 | 400 | 425 |

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## PERFORMANCE GROUPS - CHROMATICITY

White XLamp XP-E2 LEDs are tested for chromaticity and placed into one of the regions defined by the bounding coordinates on the following pages.

| 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 |
| 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 |
| 3R | 0.3366 | 0.3369 | 3S | 0.3381 | 0.3762 | | | | | | |
| | 0.3440 | 0.3428 | | 0.3480 | 0.3840 | | | | | | |
| | 0.3429 | 0.3307 | | 0.3463 | 0.3687 | | | | | | |
| | 0.3361 | 0.3245 | | 0.3376 | 0.3616 | | | | | | |
| 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 |

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## PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

| Region | x | y | Region | x | y | Region | x | y | Region | x | y |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5A1 | 0.3670 | 0.3578 | 5A2 | 0.3686 | 0.3649 | 5A3 | 0.3744 | 0.3685 | 5A4 | 0.3726 | 0.3612 |
| | 0.3686 | 0.3649 | | 0.3702 | 0.3722 | | 0.3763 | 0.3760 | | 0.3744 | 0.3685 |
| | 0.3744 | 0.3685 | | 0.3763 | 0.3760 | | 0.3825 | 0.3798 | | 0.3804 | 0.3721 |
| | 0.3726 | 0.3612 | | 0.3744 | 0.3685 | | 0.3804 | 0.3721 | | 0.3783 | 0.3646 |
| 5B1 | 0.3702 | 0.3722 | 5B2 | 0.3719 | 0.3797 | 5B3 | 0.3782 | 0.3837 | 5B4 | 0.3763 | 0.3760 |
| | 0.3719 | 0.3797 | | 0.3736 | 0.3874 | | 0.3802 | 0.3916 | | 0.3782 | 0.3837 |
| | 0.3782 | 0.3837 | | 0.3802 | 0.3916 | | 0.3869 | 0.3958 | | 0.3847 | 0.3877 |
| | 0.3763 | 0.3760 | | 0.3782 | 0.3837 | | 0.3847 | 0.3877 | | 0.3825 | 0.3798 |
| 5C1 | 0.3825 | 0.3798 | 5C2 | 0.3847 | 0.3877 | 5C3 | 0.3912 | 0.3917 | 5C4 | 0.3887 | 0.3836 |
| | 0.3847 | 0.3877 | | 0.3869 | 0.3958 | | 0.3937 | 0.4001 | | 0.3912 | 0.3917 |
| | 0.3912 | 0.3917 | | 0.3937 | 0.4001 | | 0.4006 | 0.4044 | | 0.3978 | 0.3958 |
| | 0.3887 | 0.3836 | | 0.3912 | 0.3917 | | 0.3978 | 0.3958 | | 0.3950 | 0.3875 |
| 5D1 | 0.3783 | 0.3646 | 5D2 | 0.3804 | 0.3721 | 5D3 | 0.3863 | 0.3758 | 5D4 | 0.3840 | 0.3681 |
| | 0.3804 | 0.3721 | | 0.3825 | 0.3798 | | 0.3887 | 0.3836 | | 0.3863 | 0.3758 |
| | 0.3863 | 0.3758 | | 0.3887 | 0.3836 | | 0.3950 | 0.3875 | | 0.3924 | 0.3794 |
| | 0.3840 | 0.3681 | | 0.3863 | 0.3758 | | 0.3924 | 0.3794 | | 0.3898 | 0.3716 |
| 6A1 | 0.3889 | 0.3690 | 6A2 | 0.3915 | 0.3768 | 6A3 | 0.3981 | 0.3800 | 6A4 | 0.3953 | 0.3720 |
| | 0.3915 | 0.3768 | | 0.3941 | 0.3848 | | 0.4010 | 0.3882 | | 0.3981 | 0.3800 |
| | 0.3981 | 0.3800 | | 0.4010 | 0.3882 | | 0.4080 | 0.3916 | | 0.4048 | 0.3832 |
| | 0.3953 | 0.3720 | | 0.3981 | 0.3800 | | 0.4048 | 0.3832 | | 0.4017 | 0.3751 |
| 6B1 | 0.3941 | 0.3848 | 6B2 | 0.3968 | 0.3930 | 6B3 | 0.4040 | 0.3966 | 6B4 | 0.4010 | 0.3882 |
| | 0.3968 | 0.3930 | | 0.3996 | 0.4015 | | 0.4071 | 0.4052 | | 0.4040 | 0.3966 |
| | 0.4040 | 0.3966 | | 0.4071 | 0.4052 | | 0.4146 | 0.4089 | | 0.4113 | 0.4001 |
| | 0.4010 | 0.3882 | | 0.4040 | 0.3966 | | 0.4113 | 0.4001 | | 0.4080 | 0.3916 |
| 6C1 | 0.4080 | 0.3916 | 6C2 | 0.4113 | 0.4001 | 6C3 | 0.4186 | 0.4037 | 6C4 | 0.4150 | 0.3950 |
| | 0.4113 | 0.4001 | | 0.4146 | 0.4089 | | 0.4222 | 0.4127 | | 0.4186 | 0.4037 |
| | 0.4186 | 0.4037 | | 0.4222 | 0.4127 | | 0.4299 | 0.4165 | | 0.4259 | 0.4073 |
| | 0.4150 | 0.3950 | | 0.4186 | 0.4037 | | 0.4259 | 0.4073 | | 0.4221 | 0.3984 |
| 6D1 | 0.4017 | 0.3751 | 6D2 | 0.4048 | 0.3832 | 6D3 | 0.4116 | 0.3865 | 6D4 | 0.4082 | 0.3782 |
| | 0.4048 | 0.3832 | | 0.4080 | 0.3916 | | 0.4150 | 0.3950 | | 0.4116 | 0.3865 |
| | 0.4116 | 0.3865 | | 0.4150 | 0.3950 | | 0.4221 | 0.3984 | | 0.4183 | 0.3898 |
| | 0.4082 | 0.3782 | | 0.4116 | 0.3865 | | 0.4183 | 0.3898 | | 0.4147 | 0.3814 |
| 7A1 | 0.4147 | 0.3814 | 7A2 | 0.4183 | 0.3898 | 7A3 | 0.4242 | 0.3919 | 7A4 | 0.4203 | 0.3833 |
| | 0.4183 | 0.3898 | | 0.4221 | 0.3984 | | 0.4281 | 0.4006 | | 0.4242 | 0.3919 |
| | 0.4242 | 0.3919 | | 0.4281 | 0.4006 | | 0.4342 | 0.4028 | | 0.4300 | 0.3939 |
| | 0.4203 | 0.3833 | | 0.4242 | 0.3919 | | 0.4300 | 0.3939 | | 0.4259 | 0.3853 |
| 7B1 | 0.4221 | 0.3984 | 7B2 | 0.4259 | 0.4073 | 7B3 | 0.4322 | 0.4096 | 7B4 | 0.4281 | 0.4006 |
| | 0.4259 | 0.4073 | | 0.4299 | 0.4165 | | 0.4364 | 0.4188 | | 0.4322 | 0.4096 |
| | 0.4322 | 0.4096 | | 0.4364 | 0.4188 | | 0.4430 | 0.4212 | | 0.4385 | 0.4119 |
| | 0.4281 | 0.4006 | | 0.4322 | 0.4096 | | 0.4385 | 0.4119 | | 0.4342 | 0.4028 |

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## PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

| Region | x | y | Region | x | y | Region | x | y | Region | x | y |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7C1 | 0.4342 | 0.4028 | 7C2 | 0.4385 | 0.4119 | 7C3 | 0.4449 | 0.4141 | 7C4 | 0.4403 | 0.4049 |
| | 0.4385 | 0.4119 | | 0.4430 | 0.4212 | | 0.4496 | 0.4236 | | 0.4449 | 0.4141 |
| | 0.4449 | 0.4141 | | 0.4496 | 0.4236 | | 0.4562 | 0.4260 | | 0.4513 | 0.4164 |
| | 0.4403 | 0.4049 | | 0.4449 | 0.4141 | | 0.4513 | 0.4164 | | 0.4465 | 0.4071 |
| 7D1 | 0.4259 | 0.3853 | 7D2 | 0.4300 | 0.3939 | 7D3 | 0.4359 | 0.3960 | 7D4 | 0.4316 | 0.3873 |
| | 0.4300 | 0.3939 | | 0.4342 | 0.4028 | | 0.4403 | 0.4049 | | 0.4359 | 0.3960 |
| | 0.4359 | 0.3960 | | 0.4403 | 0.4049 | | 0.4465 | 0.4071 | | 0.4418 | 0.3981 |
| | 0.4316 | 0.3873 | | 0.4359 | 0.3960 | | 0.4418 | 0.3981 | | 0.4373 | 0.3893 |
| 8A1 | 0.4373 | 0.3893 | 8A2 | 0.4418 | 0.3981 | 8A3 | 0.4475 | 0.3994 | 8A4 | 0.4428 | 0.3906 |
| | 0.4418 | 0.3981 | | 0.4465 | 0.4071 | | 0.4523 | 0.4085 | | 0.4475 | 0.3994 |
| | 0.4475 | 0.3994 | | 0.4523 | 0.4085 | | 0.4582 | 0.4099 | | 0.4532 | 0.4008 |
| | 0.4428 | 0.3906 | | 0.4475 | 0.3994 | | 0.4532 | 0.4008 | | 0.4483 | 0.3919 |
| 8B1 | 0.4465 | 0.4071 | 8B2 | 0.4513 | 0.4164 | 8B3 | 0.4573 | 0.4178 | 8B4 | 0.4523 | 0.4085 |
| | 0.4513 | 0.4164 | | 0.4562 | 0.4260 | | 0.4624 | 0.4274 | | 0.4573 | 0.4178 |
| | 0.4573 | 0.4178 | | 0.4624 | 0.4274 | | 0.4687 | 0.4289 | | 0.4634 | 0.4193 |
| | 0.4523 | 0.4085 | | 0.4573 | 0.4178 | | 0.4634 | 0.4193 | | 0.4582 | 0.4099 |
| 8C1 | 0.4582 | 0.4099 | 8C2 | 0.4634 | 0.4193 | 8C3 | 0.4695 | 0.4207 | 8C4 | 0.4641 | 0.4112 |
| | 0.4634 | 0.4193 | | 0.4687 | 0.4289 | | 0.4750 | 0.4304 | | 0.4695 | 0.4207 |
| | 0.4695 | 0.4207 | | 0.4750 | 0.4304 | | 0.4813 | 0.4319 | | 0.4756 | 0.4221 |
| | 0.4641 | 0.4112 | | 0.4695 | 0.4207 | | 0.4756 | 0.4221 | | 0.4700 | 0.4126 |
| 8D1 | 0.4483 | 0.3919 | 8D2 | 0.4532 | 0.4008 | 8D3 | 0.4589 | 0.4021 | 8D4 | 0.4538 | 0.3931 |
| | 0.4532 | 0.4008 | | 0.4582 | 0.4099 | | 0.4641 | 0.4112 | | 0.4589 | 0.4021 |
| | 0.4589 | 0.4021 | | 0.4641 | 0.4112 | | 0.4700 | 0.4126 | | 0.4646 | 0.4034 |
| | 0.4538 | 0.3931 | | 0.4589 | 0.4021 | | 0.4646 | 0.4034 | | 0.4593 | 0.3944 |
| AA1 | 0.4822 | 0.3973 | AA2 | 0.4884 | 0.4067 | AA3 | 0.4942 | 0.4066 | AA4 | 0.4879 | 0.3972 |
| | 0.4884 | 0.4067 | | 0.4946 | 0.4162 | | 0.5006 | 0.4160 | | 0.4942 | 0.4066 |
| | 0.4942 | 0.4066 | | 0.5006 | 0.4160 | | 0.5066 | 0.4158 | | 0.5001 | 0.4064 |
| | 0.4879 | 0.3972 | | 0.4942 | 0.4066 | | 0.5001 | 0.4064 | | 0.4936 | 0.3970 |
| AB1 | 0.4946 | 0.4162 | AB2 | 0.5008 | 0.4256 | AB3 | 0.5069 | 0.4254 | AB4 | 0.5006 | 0.4160 |
| | 0.5008 | 0.4256 | | 0.5070 | 0.4350 | | 0.5133 | 0.4348 | | 0.5069 | 0.4254 |
| | 0.5069 | 0.4254 | | 0.5133 | 0.4348 | | 0.5196 | 0.4346 | | 0.5131 | 0.4252 |
| | 0.5006 | 0.4160 | | 0.5069 | 0.4254 | | 0.5131 | 0.4252 | | 0.5066 | 0.4158 |
| AC1 | 0.5066 | 0.4158 | AC2 | 0.5131 | 0.4252 | AC3 | 0.5192 | 0.4250 | AC4 | 0.5126 | 0.4156 |
| | 0.5131 | 0.4252 | | 0.5196 | 0.4346 | | 0.5258 | 0.4343 | | 0.5192 | 0.4250 |
| | 0.5192 | 0.4250 | | 0.5258 | 0.4343 | | 0.5321 | 0.4341 | | 0.5253 | 0.4248 |
| | 0.5126 | 0.4156 | | 0.5192 | 0.4250 | | 0.5253 | 0.4248 | | 0.5186 | 0.4154 |
| AD1 | 0.4936 | 0.3970 | AD2 | 0.5001 | 0.4064 | AD3 | 0.5059 | 0.4062 | AD4 | 0.4993 | 0.3969 |
| | 0.5001 | 0.4064 | | 0.5066 | 0.4158 | | 0.5126 | 0.4156 | | 0.5059 | 0.4062 |
| | 0.5059 | 0.4062 | | 0.5126 | 0.4156 | | 0.5186 | 0.4154 | | 0.5118 | 0.4061 |
| | 0.4993 | 0.3969 | | 0.5059 | 0.4062 | | 0.5118 | 0.4061 | | 0.5050 | 0.3967 |

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## PERFORMANCE GROUPS - CHROMATICITY (CONTINUED)

XLamp XP-E2 PC amber LEDs are placed into the region defined by the following bounding coordinates.

| Region | x | y |
|---|---|---|
| Y2 | 0.5469 | 0.4249 |
| | 0.5700 | 0.4100 |
| | 0.5900 | 0.4100 |
| | 0.5610 | 0.4390 |

## PERFORMANCE GROUPS - DOMINANT WAVELENGTH

Color XLamp XP-E2 LEDs are tested for dominant wavelength (DWL) and sorted into one of the DWL bins defined below.

| Color | DWL Group | Minimum DWL (nm) @ 350 mA | Maximum DWL (nm) @ 350 mA |
|---|---|---|---|
| Royal Blue | D3 | 450 | 455 |
| | D4 | 455 | 460 |
| | D5 | 460 | 465 |
| Blue | B3 | 465 | 470 |
| | B4 | 470 | 475 |
| | B5 | 475 | 480 |
| | B6 | 480 | 485 |
| Green | G2 | 520 | 525 |
| | G3 | 525 | 530 |
| | G4 | 530 | 535 |
| Amber | A2 | 585 | 590 |
| | A3 | 590 | 595 |
| Red-Orange | O3 | 610 | 615 |
| | O4 | 615 | 620 |
| Red | R2 | 620 | 625 |
| | R3 | 625 | 630 |

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## PERFORMANCE GROUPS - PEAK WAVELENGTH

Photo red and far red XLamp XP-E2 LEDs are tested for peak wavelength (PWL) and sorted into one of the PWL bins defined below.

| Color | PWL Group | Minimum PWL (nm) @ 350 mA | Maximum PWL (nm) @ 350 mA |
|---|---|---|---|
| Photo Red | P2 | 650 | 655 |
| | P3 | 655 | 660 |
| | P4 | 660 | 665 |
| | P5 | 665 | 670 |
| Far Red | F2 | 720 | 725 |
| | F3 | 725 | 730 |
| | F4 | 730 | 735 |
| | F5 | 735 | 740 |

## PERFORMANCE GROUPS - FORWARD VOLTAGE

Amber, red-orange, red, photo red and far red XLamp XP-E2 LEDs are tested for forward voltage and sorted into one of the forward voltage bins defined below.

| Forward Voltage Group | Minimum Forward Voltage (V) @ 350 mA | Maximum Forward Voltage (V) @ 350 mA |
|---|---|---|
| A | 1.5 | 1.75 |
| B | 1.75 | 2.0 |
| C | 2.0 | 2.25 |
| D | 2.25 | 2.5 |
| E | 2.5 | 2.75 |
| F | 2.75 | 3.0 |
| G | 3.0 | 3.25 |
| H | 3.25 | 3.5 |
| J | 3.5 | 3.75 |

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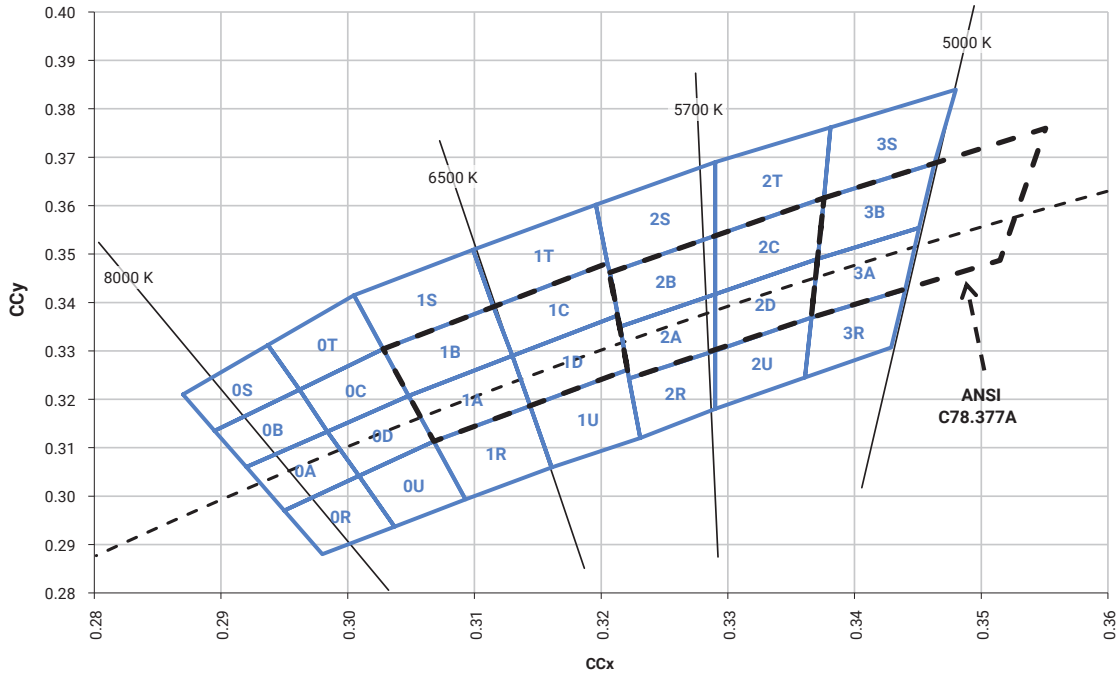
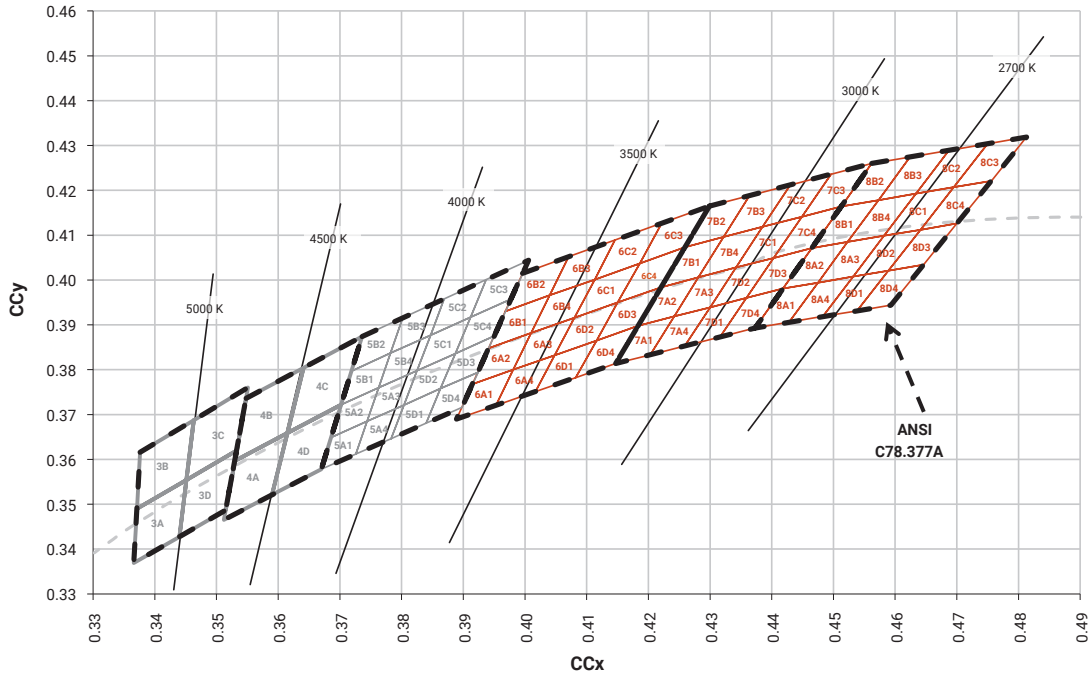
## CREE'S STANDARD CHROMATICITY REGIONS PLOTTED ON THE 1931 CIE CURVE

ANSI Cool White




ANSI Neutral White and ANSI Warm White

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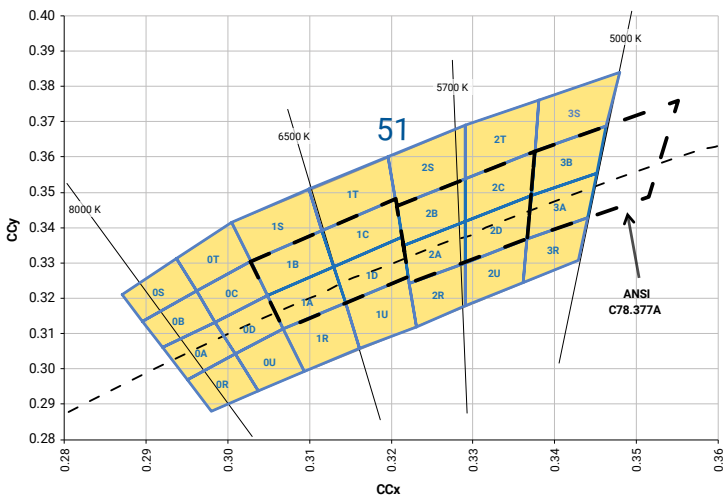
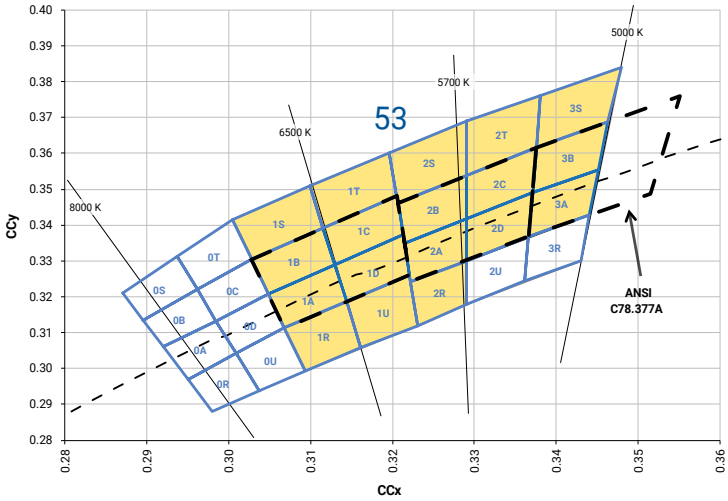
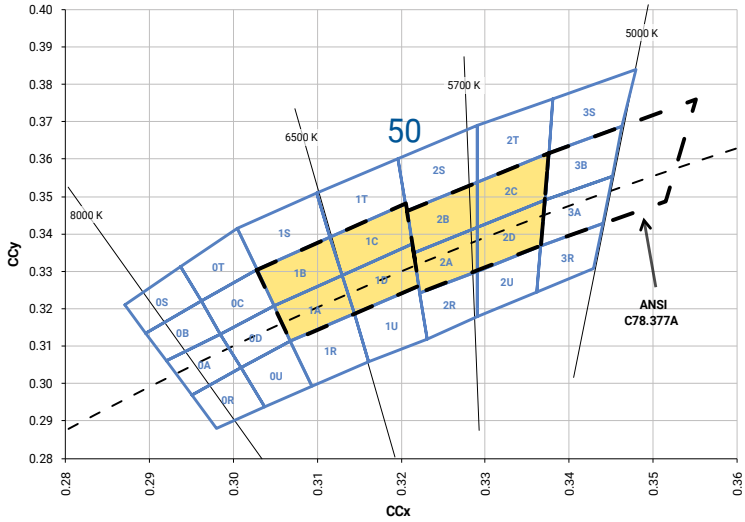
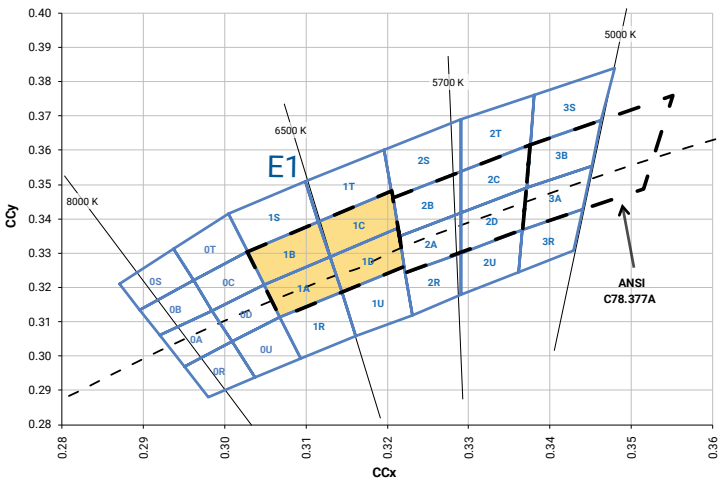
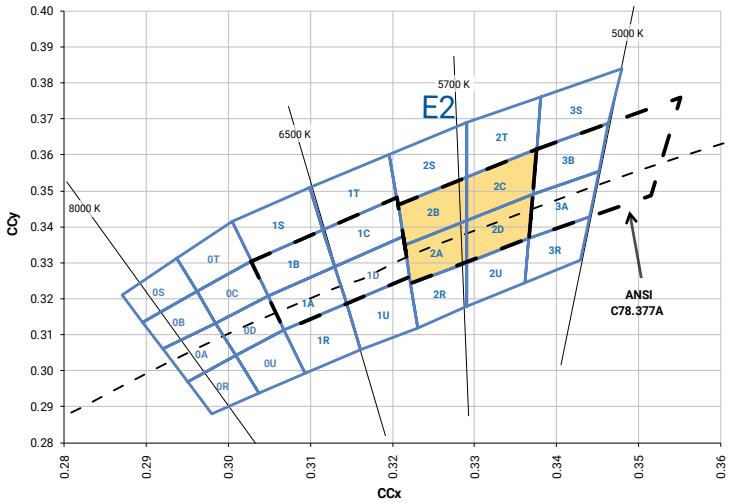
## CREE'S STANDARD COOL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS

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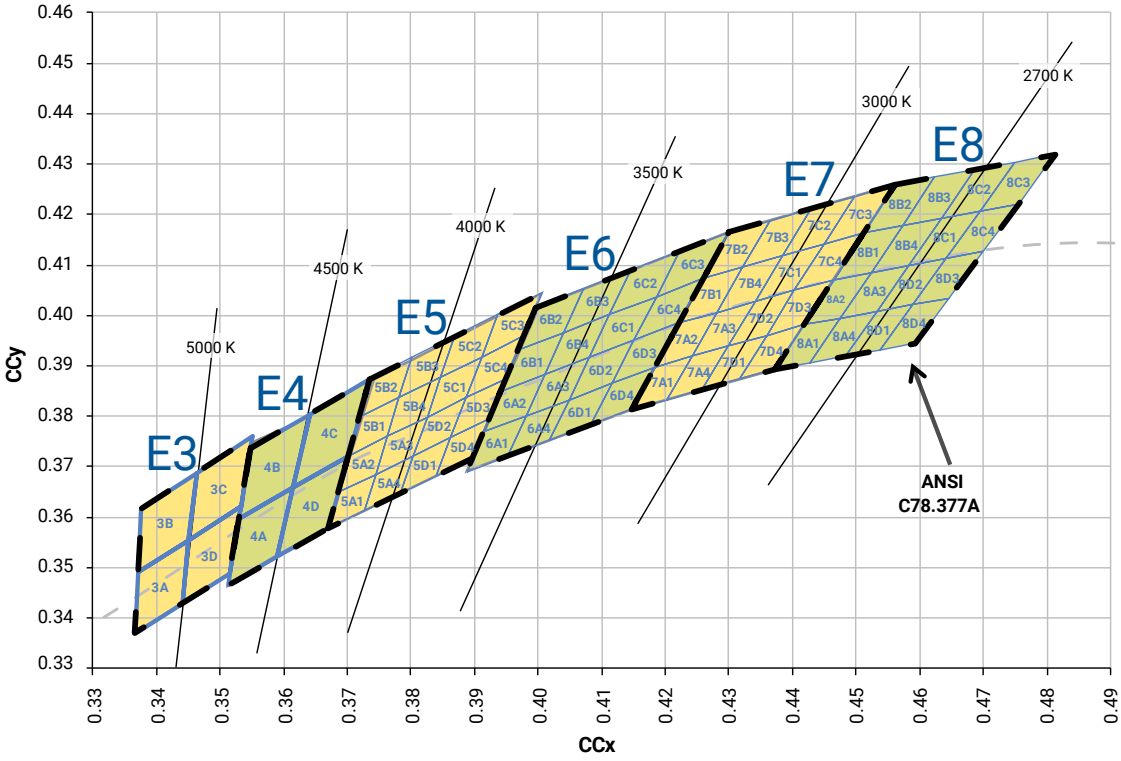
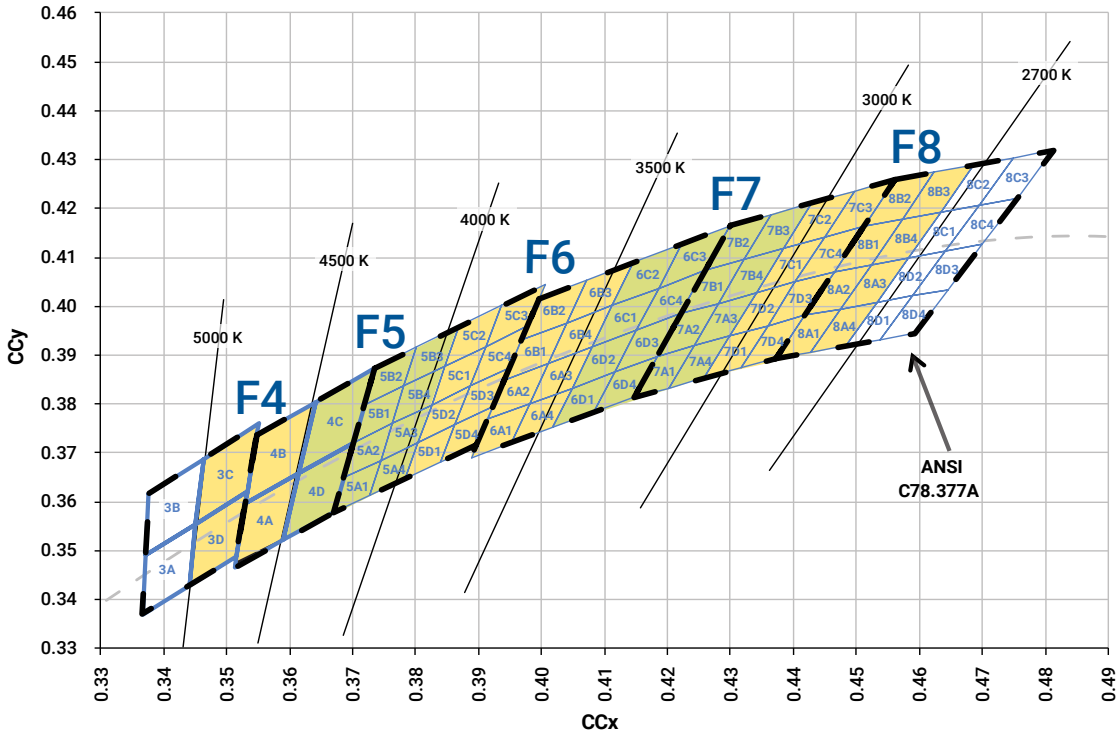
## CREE'S STANDARD WARM AND NEUTRAL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS

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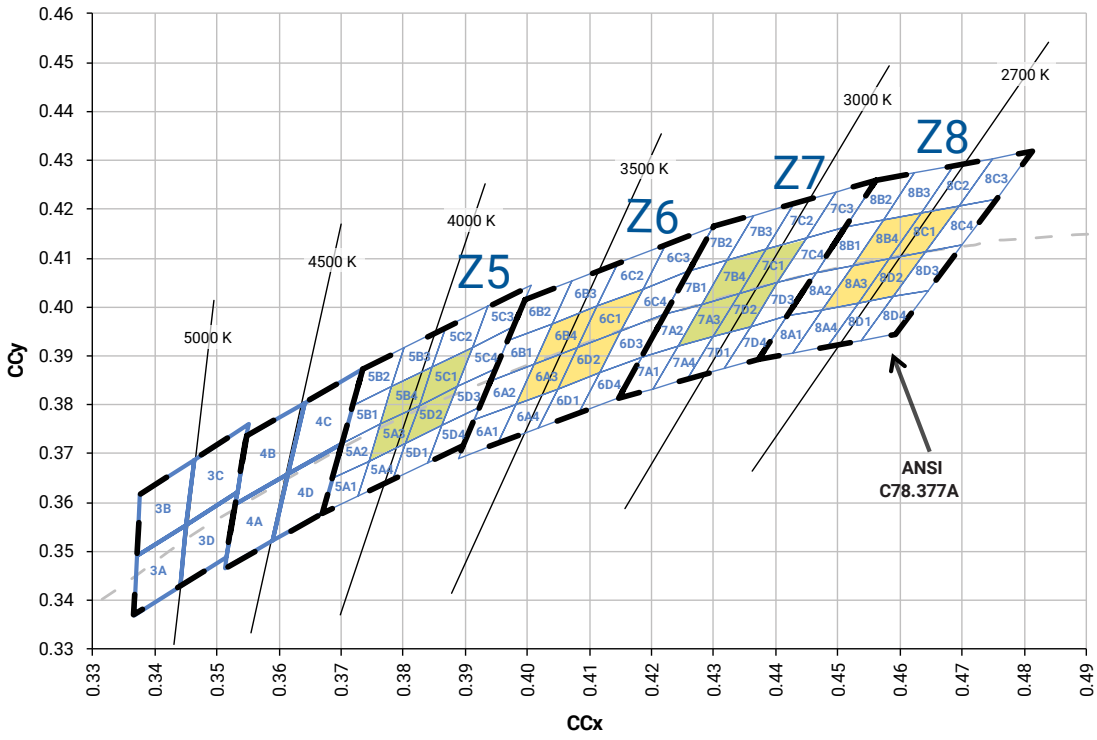
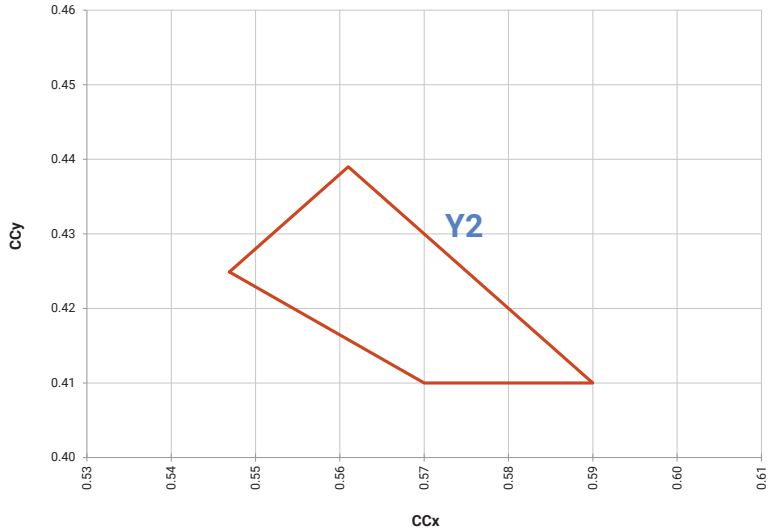
## CREE'S STANDARD WARM AND NEUTRAL WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS - CONTINUED




## CREE'S PC AMBER KIT PLOTTED ON THE 1931 CIE CURVE

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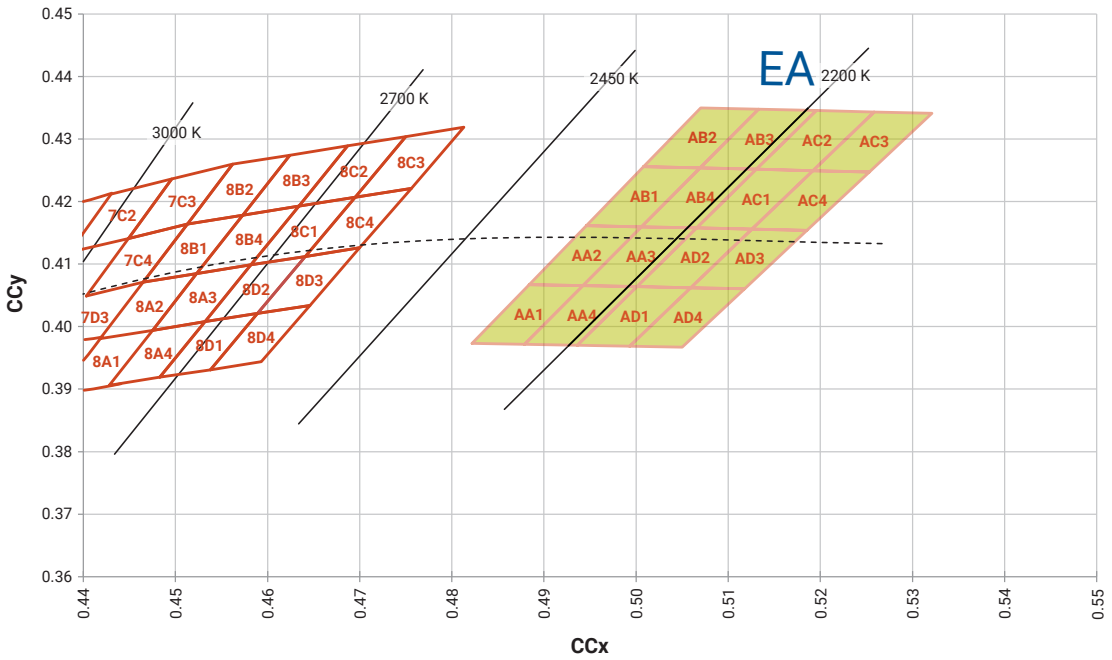
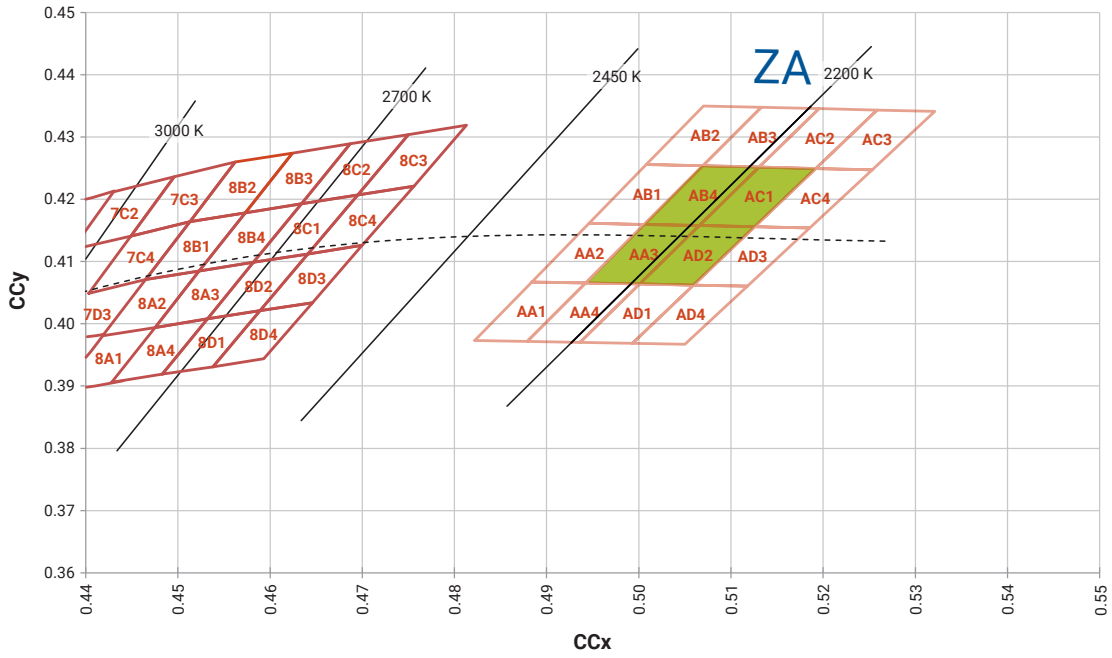
## CREE'S 2200 K CCT WHITE KITS PLOTTED ON ANSI STANDARD CHROMATICITY REGIONS

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## CREE'S STANDARD CHROMATICITY KITS

The following table provides the chromaticity bins associated with chromaticity kits.

| Color | CCT | Kit | Chromaticity Bins |
|---|---|---|---|
| Cool White | 6200 K | 51 | 0A, 0B, 0C, 0D, 0R, 0S, 0T, 0U, 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 2U, 3A, 3B, 3R, 3S |
| | 6000 K | 53 | 1A, 1B, 1C, 1D, 1R, 1S, 1T, 1U, 2A, 2B, 2C, 2D, 2R, 2S, 2T, 3A, 3B, 3S |
| | 6200 K | 50 | 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D |
| | 6500 K | E1 | 1A, 1B, 1C, 1D |
| | 5700 K | E2 | 2A, 2B, 2C, 2D |
| Neutral White | 5000 K | E3 | 3A, 3B, 3C, 3D |
| | 4750 K | F4 | 3C, 3D, 4A, 4B |
| | 4500 K | E4 | 4A, 4B, 4C, 4D |
| | 4250 K | F5 | 4C, 4D, 5A1, 5A2, 5A3, 5A4, 5B1, 5B2, 5B3, 5B4 |
| | 4000 K | E5 | 5A1, 5A2, 5A3, 5A4, 5B1, 5B2, 5B3, 5B4, 5C1, 5C2, 5C3, 5C4, 5D1, 5D2, 5D3, 5D4 |
| | 4000 K | Z5 | 5A3, 5B4, 5C1, 5D2 |
| Warm White | 3750 K | F6 | 5C1, 5C2, 5C3, 5C4, 5D1, 5D2, 5D3, 5D4, 6A1, 6A2, 6A3, 6A4, 6B1, 6B2, 6B3, 6B4 |
| | 3500 K | E6 | 6A1, 6A2, 6A3, 6A4, 6B1, 6B2, 6B3, 6B4, 6C1, 6C2, 6C3, 6C4, 6D1, 6D2, 6D3, 6D4 |
| | 3500 K | Z6 | 6A3, 6B4, 6C1, 6D2 |
| | 3250 K | F7 | 6C1, 6C2, 6C3, 6C4, 6D1, 6D2, 6D3, 6D4, 7A1, 7A2, 7A3, 7A4, 7B1, 7B2, 7B3, 7B4 |
| | 3000 K | E7 | 7A1, 7A2, 7A3, 7A4, 7B1, 7B2, 7B3, 7B4, 7C1, 7C2, 7C3, 7C4, 7D1, 7D2, 7D3, 7D4 |
| | 3000 K | Z7 | 7A3, 7B4, 7C1, 7D2 |
| | 2850 K | F8 | 7C1, 7C2, 7C3, 7C4, 7D1, 7D2, 7D3, 7D4, 8A1, 8A2, 8A3, 8A4, 8B1, 8B2, 8B3, 8B4 |
| | 2700 K | E8 | 8A1, 8A2, 8A3, 8A4, 8B1, 8B2, 8B3, 8B4, 8C1, 8C2, 8C3, 8C4, 8D1, 8D2, 8D3, 8D4 |
| | 2700 K | Z8 | 8A3, 8B4, 8C1, 8D2 |
| | 2200 K | EA | AA1, AA2, AA3, AA4, AB1, AB2, AB3, AB4, AC1, AC2, AC3, AC4, AD1, AD2, AD3, AD4 |
| | 2200 K | ZA | AA3, AB4, AC1, AD2 |

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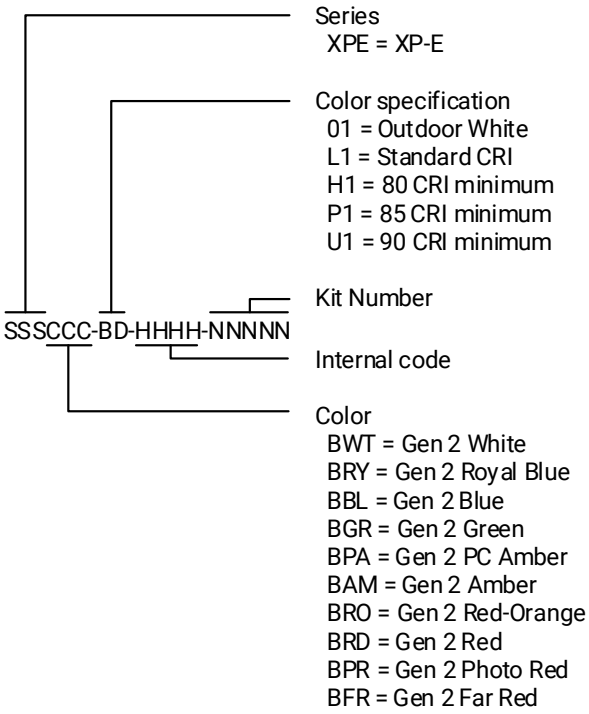
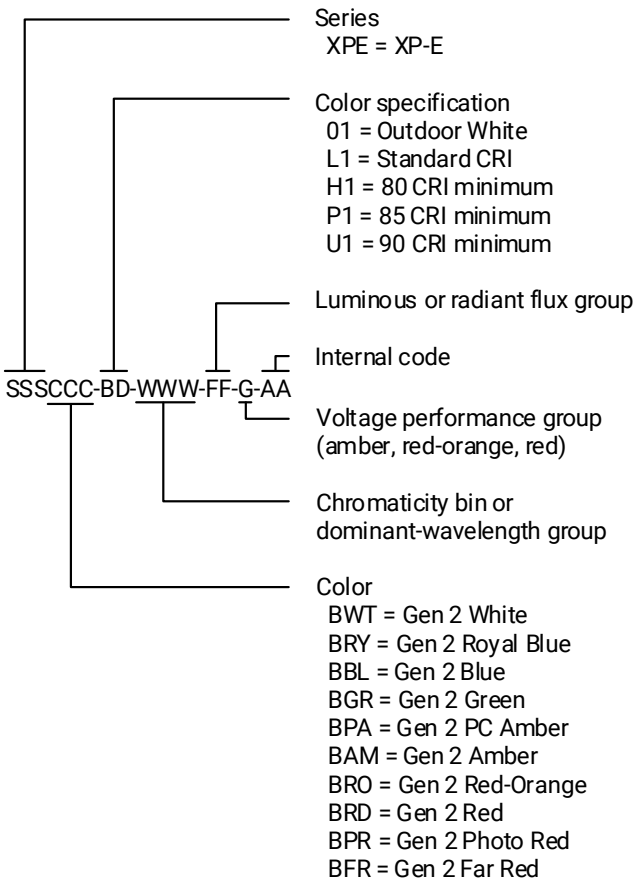
## BIN AND ORDER CODE FORMATS

XP-E2 bin codes and order codes are configured in the following manner:

**Order Code**




**Bin Code**

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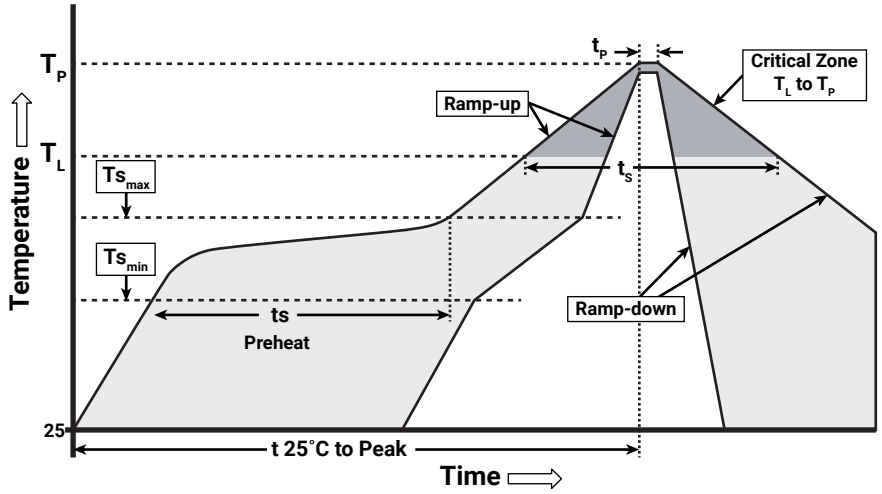
## REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XP-E2 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.

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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'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.

### 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 XP-E2 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 the 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.

### 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 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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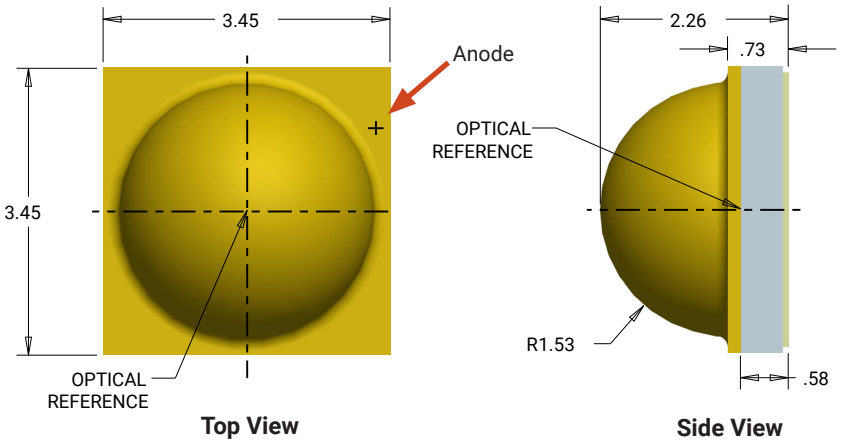
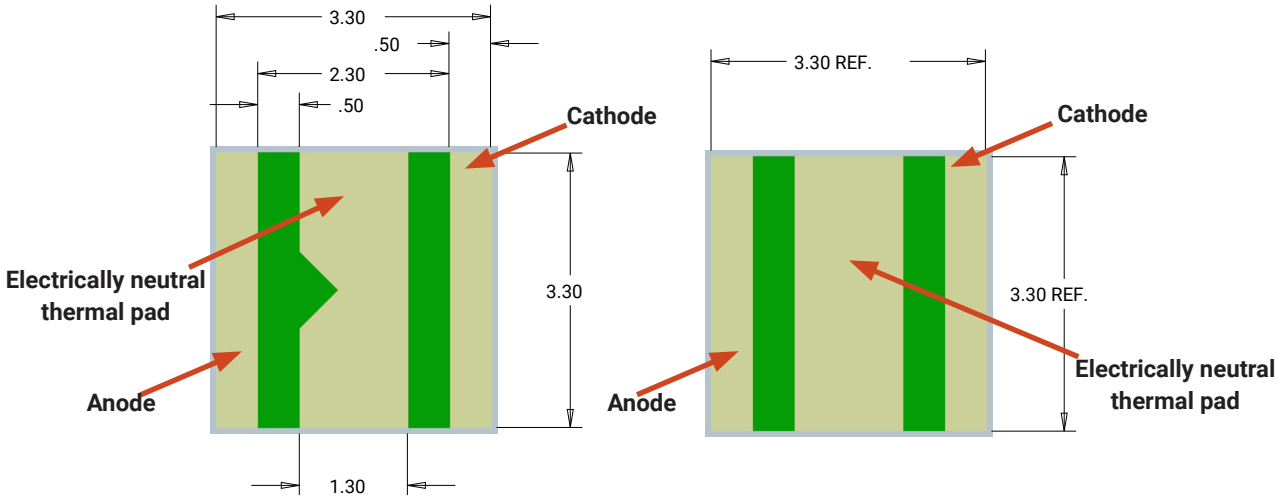
## MECHANICAL DIMENSIONS

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

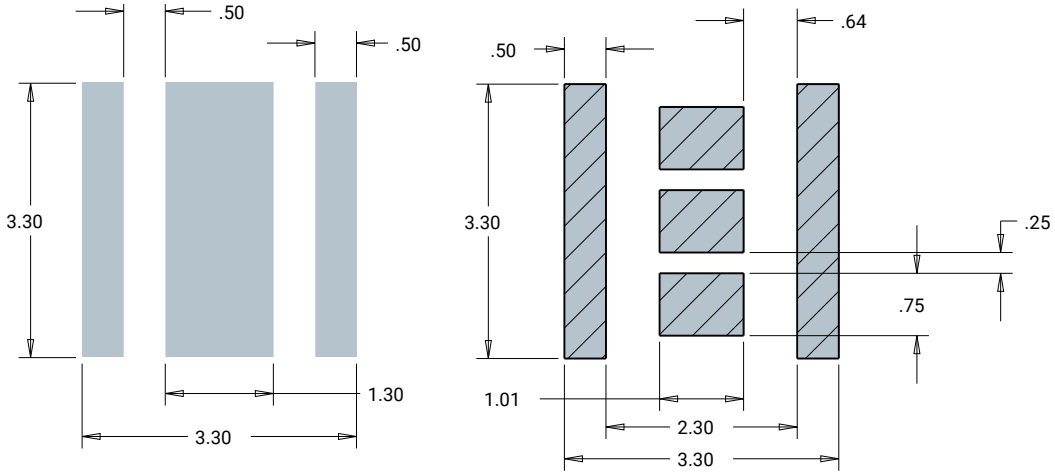
All measurements are ±.13 mm unless otherwise indicated.




**Top View** **Side View**




**Bottom View** **Alternate Bottom View**




**Recommended PCB Solder Pad** **Recommended Stencil Pattern (Hatched Area is Open)**

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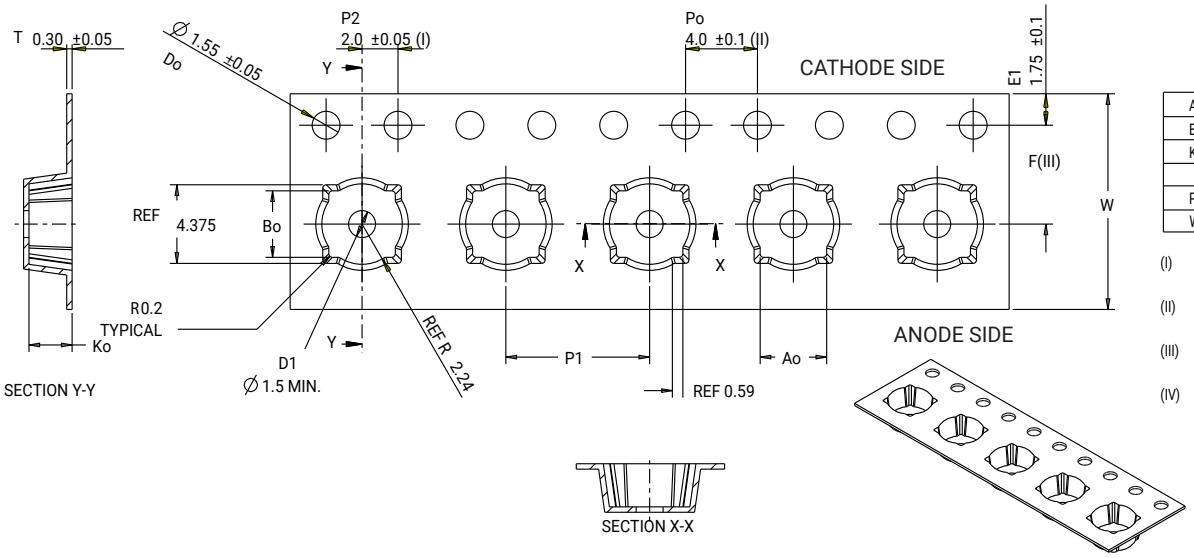
## TAPE AND REEL

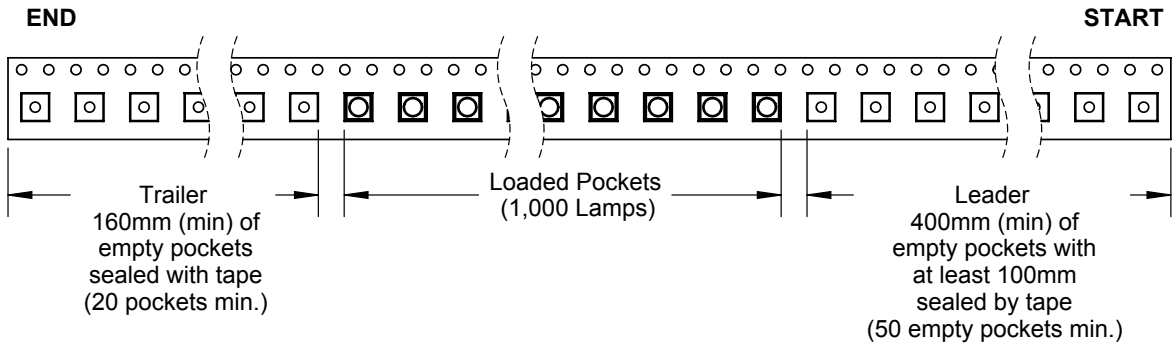
All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

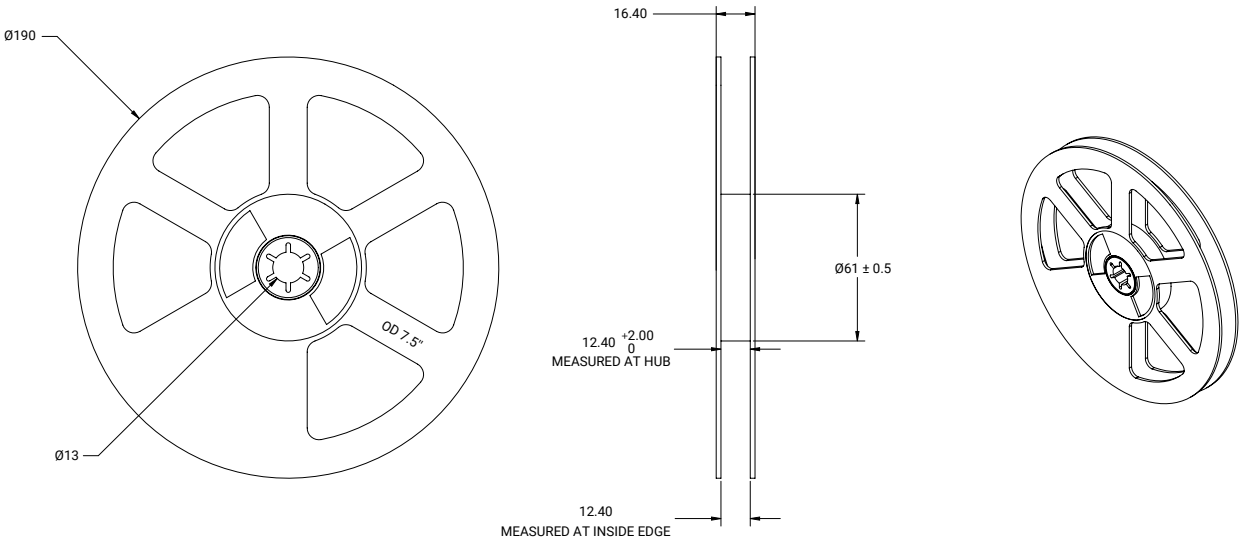
All dimensions in mm.




| | | |
|---|---|---|
| Ao | 3.70 | +/- 0.1 |
| Bo | 3.70 | +/- 0.1 |
| Ko | 2.40 | +0.0/-0.1 |
| F | 5.50 | +/- 0.05 |
| P 1 | 8.00 | +/- 0.1 |
| W | 12.00 | +0.3/-0.1 |

(I) Measured from centerline of sprocket hole to centerline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20.
(III) Measured from centerline of sprocket hole to centerline of pocket.
(IV) Other material available.

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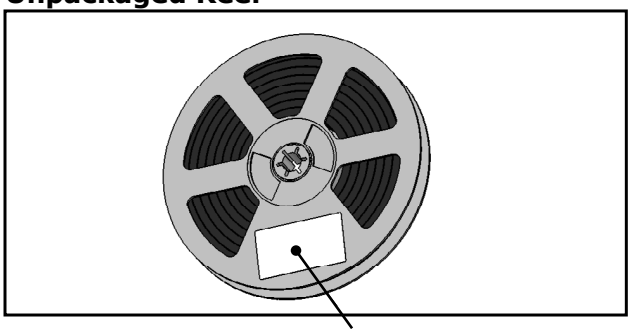
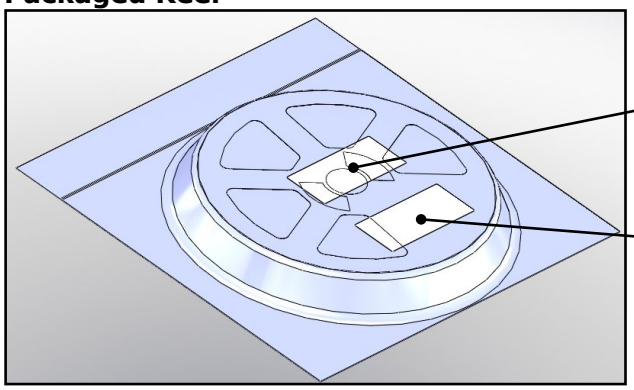
## PACKAGING

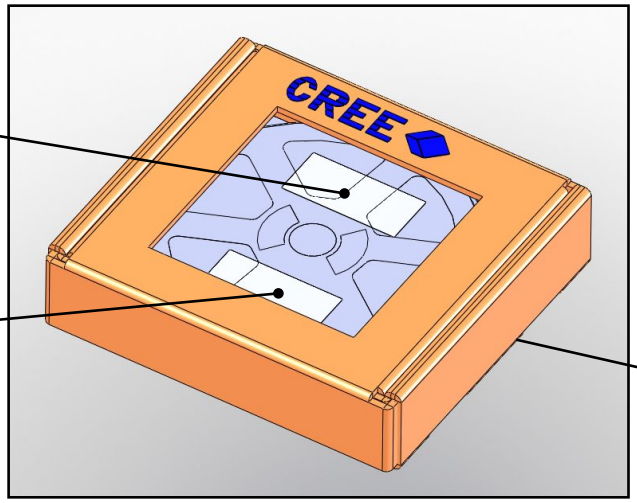
**Unpackaged Reel**




**Packaged Reel**




**Boxed Reel**

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