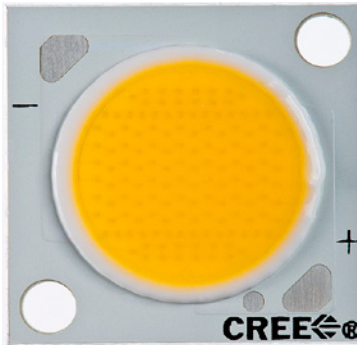


# Cree® XLamp® CXA2011 LED



## PRODUCT DESCRIPTION

The Cree XLamp CXA2011 LED brings lighting-class reliability and performance to easy-to-use LED arrays. The XLamp CXA2011 expands Cree’s lighting-class leadership to multi-die, high-flux arrays. With XLamp lighting-class reliability, a wide viewing angle, uniform light output, and industry-leading chromaticity binning in a 16-mm diameter optical source, the XLamp CXA2011 LED continues Cree’s history of segment-focused product innovation in LEDs for lighting applications.

The XLamp CXA2011 LED brings high performance and a smooth look to a wide range of lighting applications, including downlighting, recessed fixtures, can lights and retrofit bulbs.

## FEATURES

- Available in ANSI white bins as well as 4-step and 2-step EasyWhite bins at 2700K, 3000K, 3500K, 4000K and 5000K CCT
- 90 minimum CRI available in 2700K and 3000K CCT
- Forward Voltage: 40 V
- 85 °C binning and characterization
- NEMA SSL-3 2011 standard flux bins
- Max drive current: 1000 mA
- 120° viewing angle, uniform chromaticity profile
- Top-side solder connections
- Thermocouple attach point
- Screw-down attachment
- Unlimited shelf life at ≤ 30°C/85% RH
- RoHS- and REACh-compliant
- UL-recognized component (E349212)

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**CHARACTERISTICS**

| Characteristics                                | Unit    | Minimum | Typical | Maximum |
|--|---------|---------|---------|---------|
| Effective thermal resistance, junction to case | °C/W    |         | 0.4     |         |
| Viewing angle (FWHM)                           | degrees |         | 120     |         |
| ESD withstand voltage (HBM per Mil-Std-883D)   | V       |         |         | 8000    |
| DC forward current                             | mA      |         |         | 1,000   |
| Reverse current                                | mA      |         |         | 0.1     |
| Forward voltage (@ 270 mA, 85 °C)              | V       |         | 40      | 48      |
| LED junction temperature                       | °C      |         |         | 150     |
| Temperature coefficient of voltage             | mV/°C   |         | -35     |         |

**FLUX CHARACTERISTICS, STANDARD ORDER CODES AND BINS ( $I_f = 270 \text{ mA}$ ,  $T_j = 85 \text{ }^\circ\text{C}$ )**

The following tables provide order codes for XLamp CXA2011 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 11).

| Color     | CCT Range | Base Order Codes<br>Min. Luminous Flux<br>@ 270 mA |                   |                    | 2-Step Order Code   |                          | 4-Step Order Code   |                          |
|-----------|-----------|--|-------------------|--------------------|---------------------|--------------------------|---------------------|--------------------------|
|           |           | Group  | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | Chromaticity Region |                          | Chromaticity Region |                          |
| EasyWhite | 5000K     | H0   | 900               | 1036               | 50H                 | CXA2011-0000-000P00H050H | 50F                 | CXA2011-0000-000P00H050F |
|           |           | J0   | 1040              | 1197               |                     | CXA2011-0000-000P00J050H |                     | CXA2011-0000-000P00J050F |
|           | 4000K     | G0   | 780               | 898                | 40H                 | CXA2011-0000-000P00G040H | 40F                 | CXA2011-0000-000P00G040F |
|           |           | H0   | 900               | 1036               |                     | CXA2011-0000-000P00H040H |                     | CXA2011-0000-000P00H040F |
|           | 3500K     | G0   | 780               | 898                | 35H                 | CXA2011-0000-000P00G035H | 35F                 | CXA2011-0000-000P00G035F |
|           |           | H0   | 900               | 1036               |                     | CXA2011-0000-000P00H035H |                     | CXA2011-0000-000P00H035F |
|           | 3000K     | G0   | 780               | 898                | 30H                 | CXA2011-0000-000P00G030H | 30F                 | CXA2011-0000-000P00G030F |
|           |           | H0   | 900               | 1036               |                     | CXA2011-0000-000P00H030H |                     | CXA2011-0000-000P00H030F |
|           | 2700K     | F0   | 680               | 783                | 27H                 | CXA2011-0000-000P00F027H | 27F                 | CXA2011-0000-000P00F027F |
|           |           | G0   | 780               | 898                |                     | CXA2011-0000-000P00G027H |                     | CXA2011-0000-000P00G027F |

| Color      | CCT Range | Base Order Codes<br>Min. Luminous Flux<br>@ 270 mA |                   |                    | Chromaticity Regions | Order Code               |
|------------|-----------|--|-------------------|--------------------|----------------------|--------------------------|
|            |           | Group  | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* |                      |                          |
| ANSI White | 5000K     | H0   | 900               | 1036               | 3A0, 3B0, 3C0, 3D0   | CXA2011-0000-000P00H00E3 |
|            |           | J0   | 1040              | 1197               |                      | CXA2011-0000-000P00J00E3 |
|            | 4000K     | G0   | 780               | 898                | 5A0, 5B0, 5C0, 5D0   | CXA2011-0000-000P00G00E5 |
|            |           | H0   | 900               | 1036               |                      | CXA2011-0000-000P00H00E5 |
|            | 3500K     | G0   | 780               | 898                | 6A0, 6B0, 6C0, 6D0   | CXA2011-0000-000P00G00E6 |
|            |           | H0   | 900               | 1036               |                      | CXA2011-0000-000P00H00E6 |
|            | 3000K     | G0   | 780               | 898                | 7A0, 7B0, 7C0, 7D0   | CXA2011-0000-000P00G00E7 |
|            |           | H0   | 900               | 1036               |                      | CXA2011-0000-000P00H00E7 |
|            | 2700K     | F0   | 680               | 783                | 8A0, 8B0, 8C0, 8D0   | CXA2011-0000-000P00F00E8 |
|            |           | G0   | 780               | 898                |                      | CXA2011-0000-000P00G00E8 |

**Notes:**

- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and a tolerance of  $\pm 2$  on CRI measurements.
- Minimum CRI for chromaticity kits 27F, 27H, 30F, 30H, 0E8, 0E7 is 80.
- Minimum CRI for chromaticity kit 35F, 35H, 0E6 is 77 and typical CRI is 80.
- Minimum CRI for chromaticity kits 40F, 40H, 50F, 50H, 0E5, 0E3 is 70 and typical CRI is 75.
- \* Flux values @ 25 °C are calculated and for reference only.

**FLUX CHARACTERISTICS, STANDARD ORDER CODES AND BINS, 90 CRI ( $I_F = 270 \text{ mA}$ ,  $T_J = 85 \text{ }^\circ\text{C}$ )**

The following tables provide order codes for XLamp CXA2011 90 CRI minimum LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 11).

| Color     | CCT Range | Base Order Codes<br>Min Luminous Flux<br>@ 270 mA |                   |                    | 2-Step Order Code   |                          | 4-Step Order Code   |                           |
|-----------|-----------|---|-------------------|--------------------|---------------------|--------------------------|---------------------|---------------------------|
|           |           | Group   | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | Chromaticity Region |                          | Chromaticity Region |                           |
| EasyWhite | 3000K     | F0  | 680               | 783                | 30H                 | CXA2011-0000-000P0UF030H | 30F                 | CXA2011-0000-000P0UF030F  |
|           |           | G0  | 780               | 898                |                     | CXA2011-0000-000P0UG030H |                     | CXA2011-0000-000P0UG030F  |
|           | 2700K     | F0  | 680               | 783                | 27H                 | CXA2011-0000-000P0UF027H | 27F                 | CXA2011-0000-000P0U0F027F |

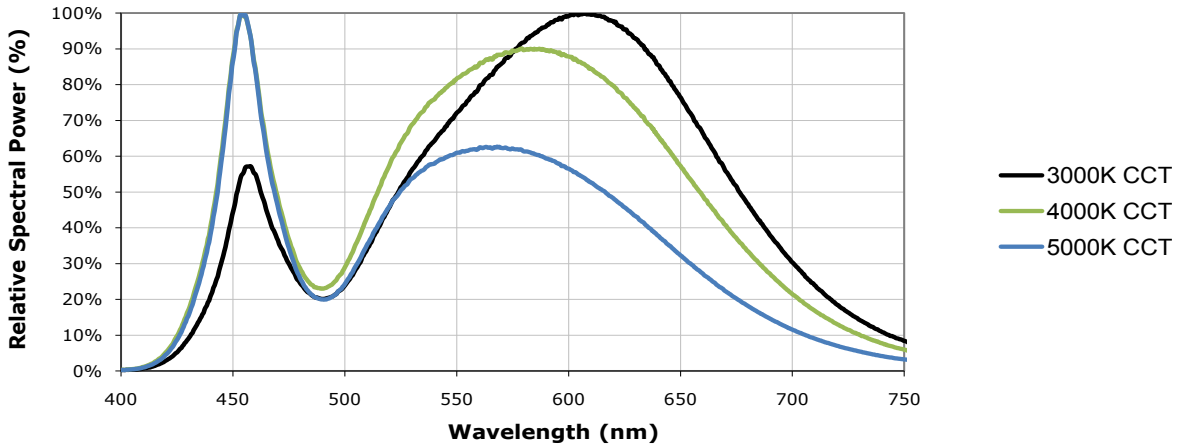
| Color      | CCT Range | Base Order Codes<br>Min Luminous Flux<br>@ 270 mA, 85 °C |                   |                    | Chromaticity Regions | Order Code               |
|------------|-----------|--|-------------------|--------------------|----------------------|--------------------------|
|            |           | Group  | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* |                      |                          |
| ANSI White | 3000K     | F0   | 680               | 783                | 7A0, 7B0, 7C0, 7D0   | CXA2011-0000-000P0UF00E7 |
|            |           | G0   | 780               | 898                |                      | CXA2011-0000-000P0UG00E7 |
|            | 2700K     | F0   | 680               | 783                | 8A0, 8B0, 8C0, 8D0   | CXA2011-0000-000P0UF00E8 |

**Notes:**

- Cree maintains a tolerance of  $\pm 7\%$  on flux and power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and a tolerance of  $\pm 2$  on CRI measurements.
- Minimum CRI for chromaticity kits 30H, 30F, 27H, 27F, 0E7, 0E8 is 90.
- \* Flux values @ 25 °C are calculated and for reference only.

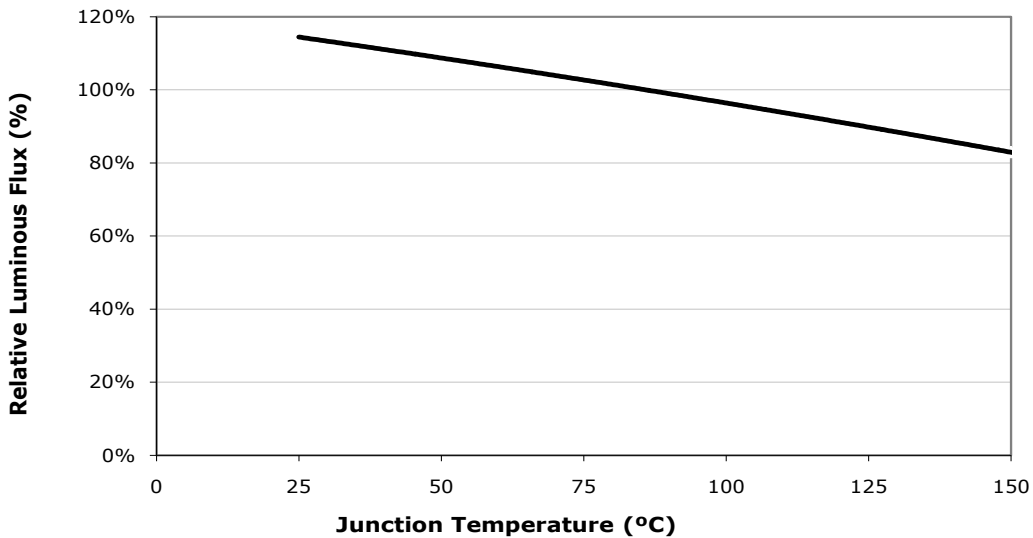
**RELATIVE SPECTRAL POWER DISTRIBUTION ( $I_f = 270 \text{ mA}$ ,  $T_j = 85 \text{ }^\circ\text{C}$ )**

The following graph represents typical spectral emission of standard CRI XLamp CXA2011 LEDs.



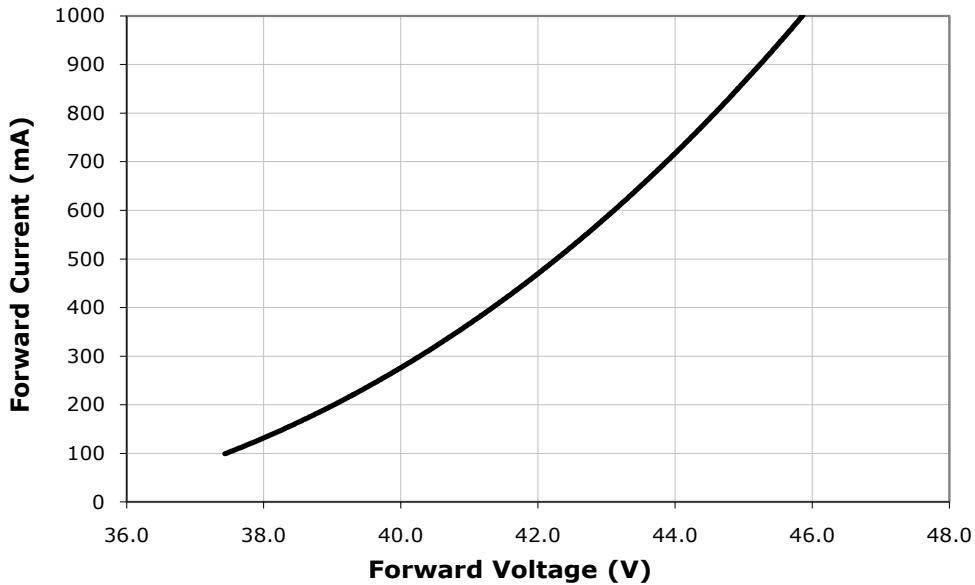
**RELATIVE LUMINOUS FLUX VS. JUNCTION TEMPERATURE ( $I_f = 270 \text{ mA}$ )**

The following graph represents typical performance of the XLamp CXA2011 LED.



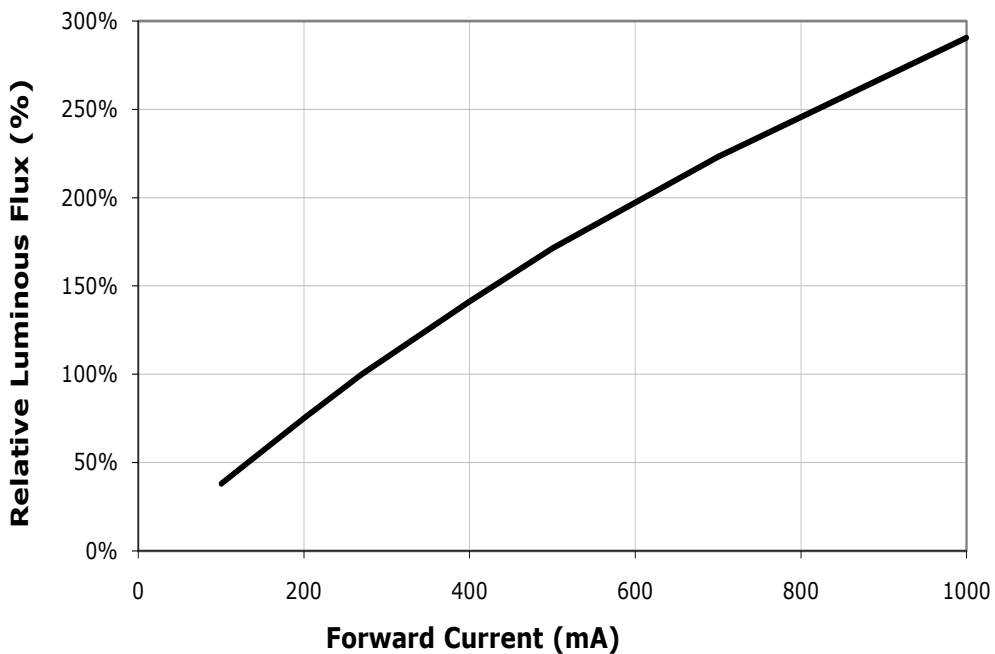
**ELECTRICAL CHARACTERISTICS ( $T_j = 85\text{ }^\circ\text{C}$ )**

The following graph represents typical electrical characteristics of the XLamp CXA2011 LED.



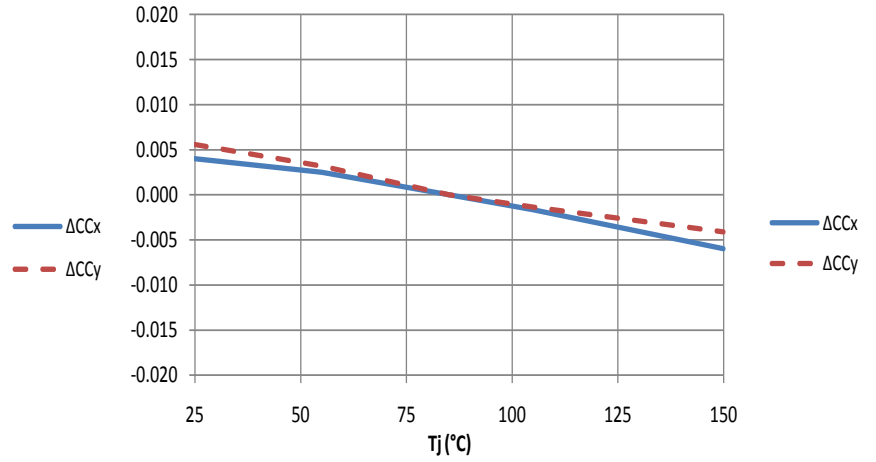
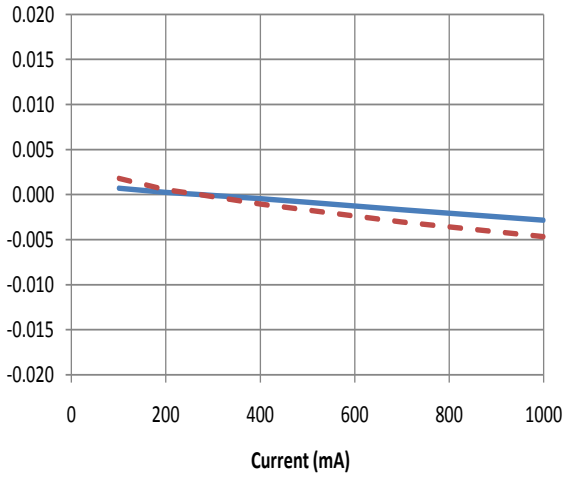
**RELATIVE LUMINOUS FLUX VS. CURRENT ( $T_j = 85\text{ }^\circ\text{C}$ )**

The following graph represents typical performance of the XLamp CXA2011 LED.

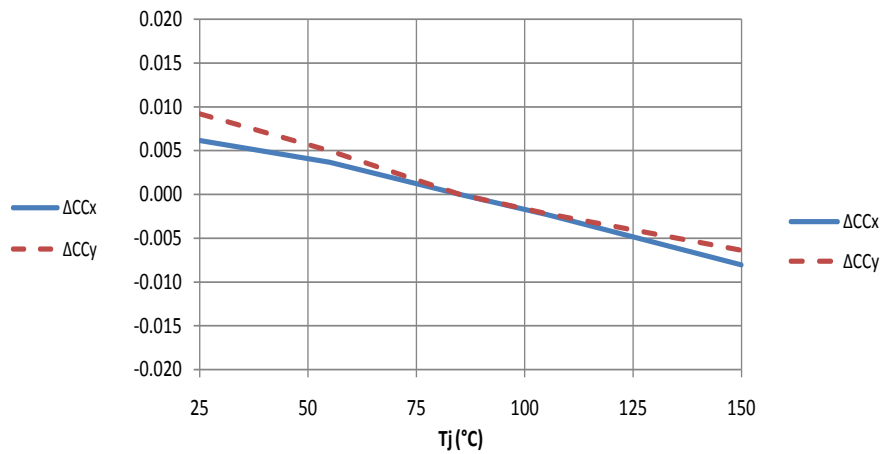
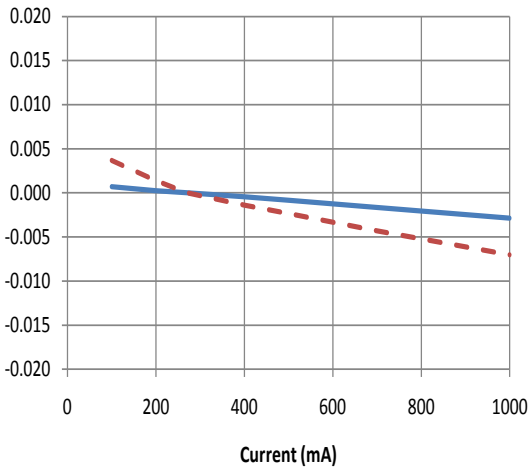


**RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE**

The following graphs represent typical chromaticity vs current and temperature for the standard CRI version of the XLamp CXA2011 at **3000K** CCT.

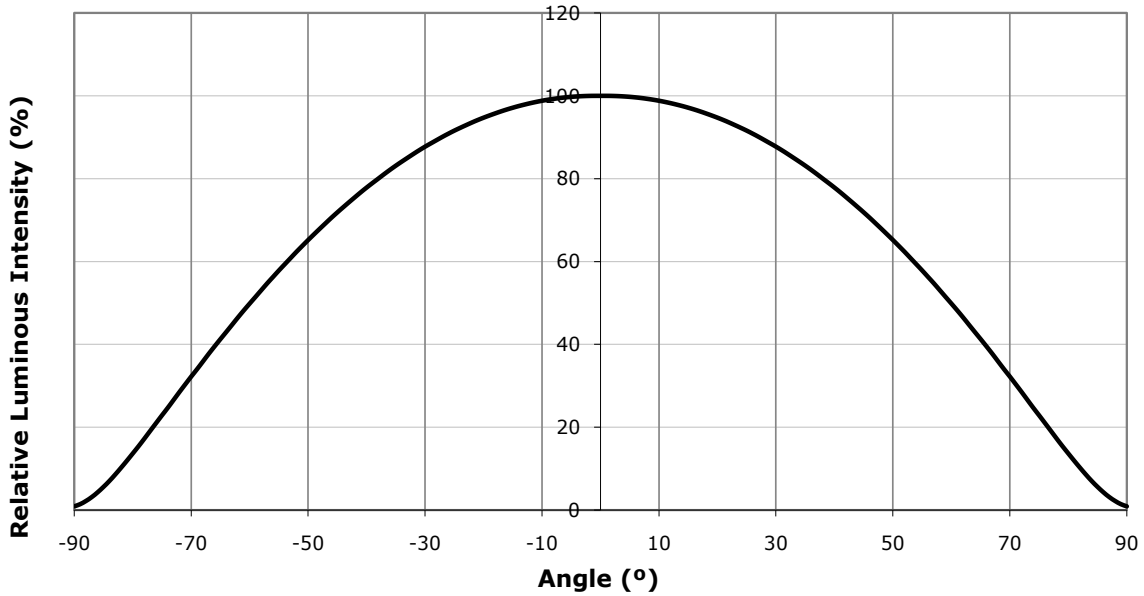


The following graphs represent typical chromaticity vs current and temperature for the XLamp CXA2011 at **5000K** CCT.



**TYPICAL SPATIAL DISTRIBUTION**

The following graph represents the typical spatial distribution of the XLamp CXA2011 LED.


**PERFORMANCE GROUPS - BRIGHTNESS ( $I_f = 270 \text{ mA}$ ,  $T_j = 85 \text{ °C}$ )**

XLamp CXA2011 LEDs are tested for luminous flux and placed into one of the following bins.

| Group Code | Min. Luminous Flux @ 270 mA, $T_j = 85 \text{ °C}$ | Max. Luminous Flux @ 270 mA, $T_j = 85 \text{ °C}$ |
|------------|--|--|
| E0         | 590  | 680  |
| F0         | 680  | 780  |
| G0         | 780  | 900  |
| H0         | 900  | 1040   |
| J0         | 1040   | 1200   |
| K0         | 1200   | 1380   |



**PERFORMANCE GROUPS - CHROMATICITY ( $T_j = 85\text{ }^\circ\text{C}$ )**

XLamp CXA2011 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

| EasyWhite Color Temperatures - 4-Step |       |        |        |
|---------------------------------------|-------|--------|--------|
| Code                                  | CCT   | x      | y      |
| 50F                                   | 5000K | 0.3407 | 0.3459 |
|                                       |       | 0.3415 | 0.3586 |
|                                       |       | 0.3499 | 0.3654 |
|                                       |       | 0.3484 | 0.3521 |
| 40F                                   | 4000K | 0.3744 | 0.3685 |
|                                       |       | 0.3782 | 0.3837 |
|                                       |       | 0.3912 | 0.3917 |
|                                       |       | 0.3863 | 0.3758 |
| 35F                                   | 3500K | 0.3981 | 0.3800 |
|                                       |       | 0.4040 | 0.3966 |
|                                       |       | 0.4186 | 0.4037 |
|                                       |       | 0.4116 | 0.3865 |
| 30F                                   | 3000K | 0.4242 | 0.3919 |
|                                       |       | 0.4322 | 0.4096 |
|                                       |       | 0.4449 | 0.4141 |
|                                       |       | 0.4359 | 0.3960 |
| 27F                                   | 2700K | 0.4475 | 0.3994 |
|                                       |       | 0.4573 | 0.4178 |
|                                       |       | 0.4695 | 0.4207 |
|                                       |       | 0.4589 | 0.4021 |

| EasyWhite Color Temperatures - 2-Step |       |        |        |
|---------------------------------------|-------|--------|--------|
| Code                                  | CCT   | x      | y      |
| 50H                                   | 5000K | 0.3429 | 0.3507 |
|                                       |       | 0.3434 | 0.3571 |
|                                       |       | 0.3475 | 0.3604 |
|                                       |       | 0.3469 | 0.3539 |
| 40H                                   | 4000K | 0.3784 | 0.3741 |
|                                       |       | 0.3804 | 0.3818 |
|                                       |       | 0.3867 | 0.3857 |
|                                       |       | 0.3844 | 0.3778 |
| 35H                                   | 3500K | 0.4030 | 0.3857 |
|                                       |       | 0.4061 | 0.3941 |
|                                       |       | 0.4132 | 0.3976 |
|                                       |       | 0.4099 | 0.3890 |
| 30H                                   | 3000K | 0.4291 | 0.3973 |
|                                       |       | 0.4333 | 0.4062 |
|                                       |       | 0.4395 | 0.4084 |
|                                       |       | 0.4351 | 0.3994 |
| 27H                                   | 2700K | 0.4528 | 0.4046 |
|                                       |       | 0.4578 | 0.4138 |
|                                       |       | 0.4638 | 0.4152 |
|                                       |       | 0.4586 | 0.4060 |

| ANSI White Bins |       |          |       |       |
|-----------------|-------|----------|-------|-------|
| Code            | CCT   | Bin Code | x     | y     |
| 0E3             | 5000K | 3A0      | .3371 | .3490 |
|                 |       |          | .3451 | .3554 |
|                 |       |          | .3440 | .3427 |
|                 |       |          | .3366 | .3369 |
|                 |       | 3B0      | .3376 | .3616 |
|                 |       |          | .3463 | .3687 |
|                 |       |          | .3451 | .3554 |
|                 |       |          | .3371 | .3490 |
|                 |       | 3C0      | .3463 | .3687 |
|                 |       |          | .3551 | .3760 |
|                 |       |          | .3533 | .3620 |
|                 |       |          | .3451 | .3554 |
|                 |       | 3D0      | .3451 | .3554 |
|                 |       |          | .3533 | .3620 |
|                 |       |          | .3515 | .3487 |
|                 |       |          | .3440 | .3427 |

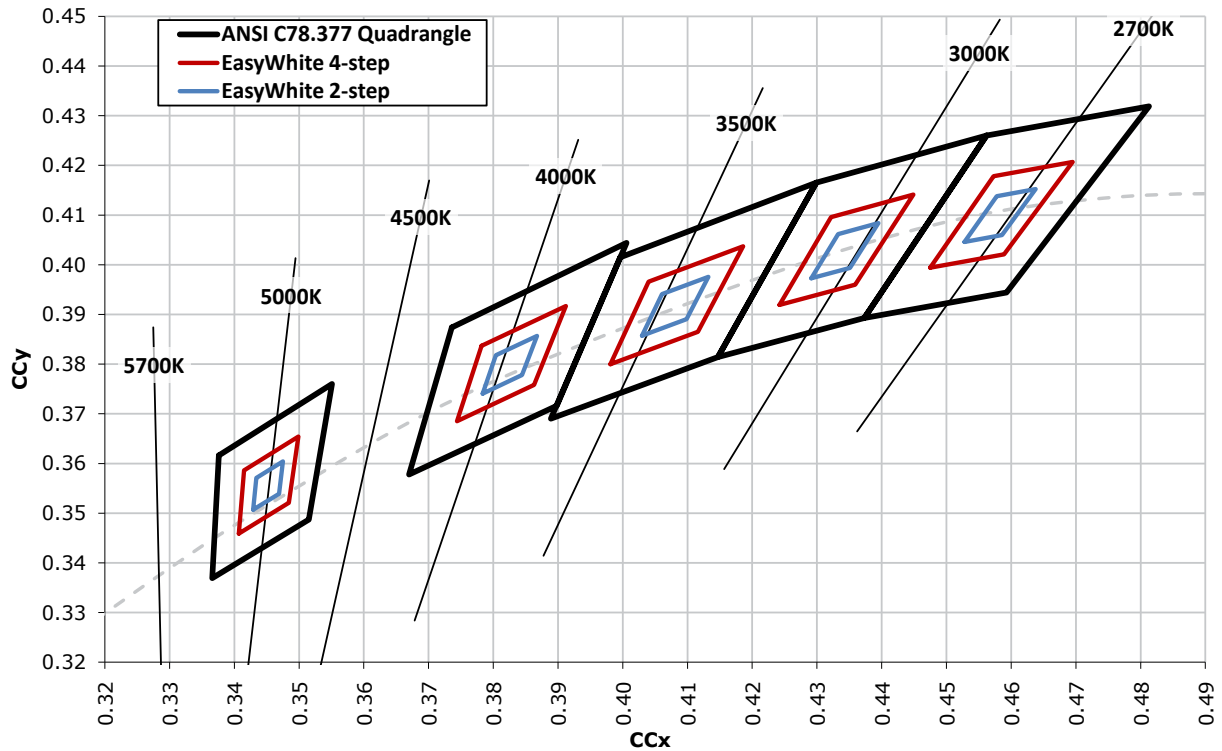
| ANSI White Bins |       |          |       |       |
|-----------------|-------|----------|-------|-------|
| Code            | CCT   | Bin Code | x     | y     |
| 0E5             | 4000K | 5A0      | .3670 | .3578 |
|                 |       |          | .3702 | .3722 |
|                 |       |          | .3825 | .3798 |
|                 |       |          | .3783 | .3646 |
|                 |       | 5B0      | .3702 | .3722 |
|                 |       |          | .3736 | .3874 |
|                 |       |          | .3869 | .3958 |
|                 |       |          | .3825 | .3798 |
|                 |       | 5C0      | .3825 | .3798 |
|                 |       |          | .3869 | .3958 |
|                 |       |          | .4006 | .4044 |
|                 |       |          | .3950 | .3875 |
|                 |       | 5D0      | .3783 | .3646 |
|                 |       |          | .3825 | .3798 |
|                 |       |          | .3950 | .3875 |
|                 |       |          | .3898 | .3716 |

| ANSI White Bins |       |          |       |       |
|-----------------|-------|----------|-------|-------|
| Code            | CCT   | Bin Code | x     | y     |
| 0E6             | 3500K | 6A0      | .3889 | .3690 |
|                 |       |          | .3941 | .3848 |
|                 |       |          | .4080 | .3916 |
|                 |       |          | .4017 | .3751 |
|                 |       | 6B0      | .3941 | .3848 |
|                 |       |          | .3996 | .4015 |
|                 |       |          | .4146 | .4089 |
|                 |       |          | .4080 | .3916 |
|                 |       | 6C0      | .4080 | .3916 |
|                 |       |          | .4146 | .4089 |
|                 |       |          | .4299 | .4165 |
|                 |       |          | .4221 | .3984 |
|                 |       | 6D0      | .4017 | .3751 |
|                 |       |          | .4080 | .3916 |
|                 |       |          | .4221 | .3984 |
|                 |       |          | .4147 | .3814 |

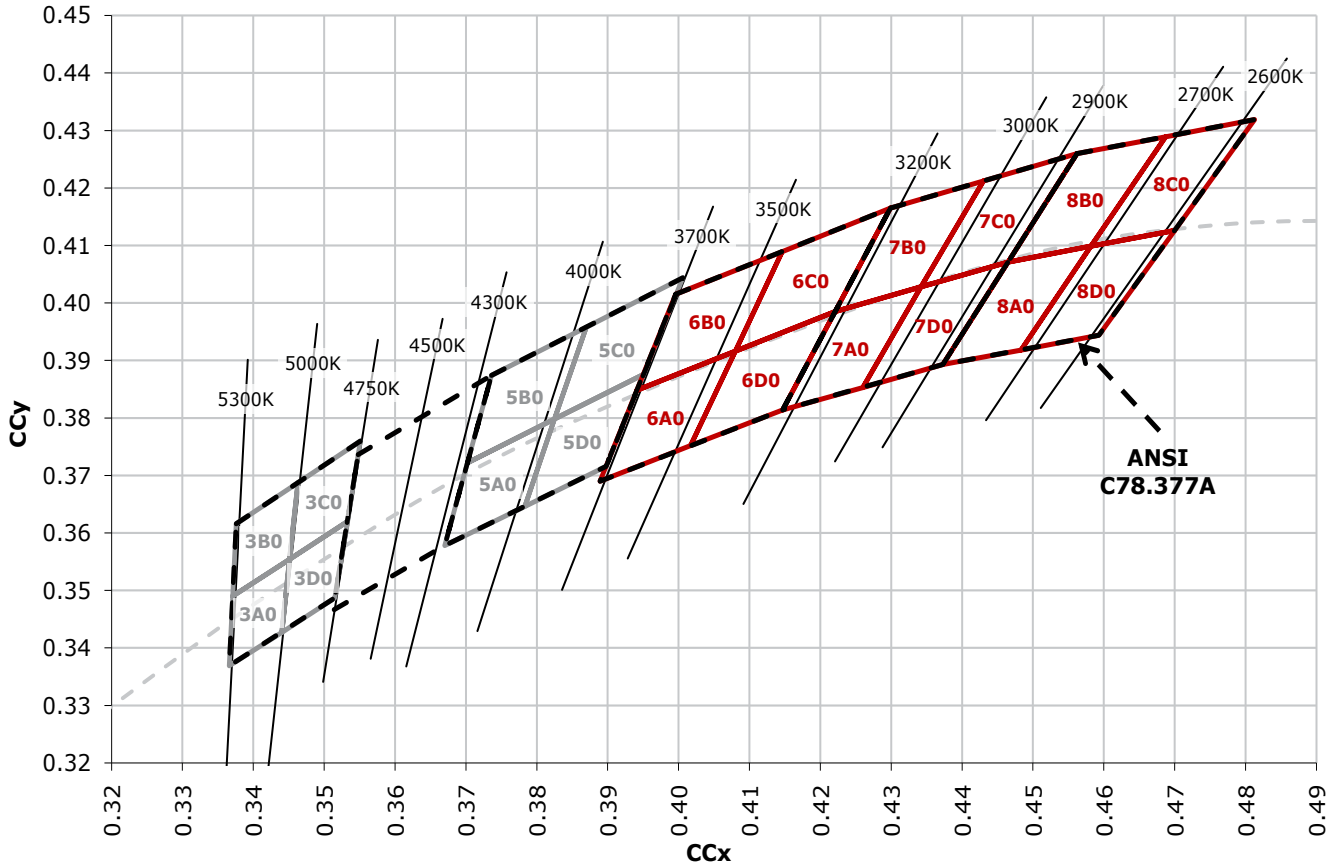
| ANSI White Bins |       |          |       |       |
|-----------------|-------|----------|-------|-------|
| Code            | CCT   | Bin Code | x     | y     |
| 0E7             | 3000K | 7A0      | .4147 | .3814 |
|                 |       |          | .4221 | .3984 |
|                 |       |          | .4342 | .4028 |
|                 |       |          | .4259 | .3853 |
|                 |       | 7B0      | .4221 | .3984 |
|                 |       |          | .4299 | .4165 |
|                 |       |          | .4430 | .4212 |
|                 |       |          | .4342 | .4028 |
|                 |       | 7C0      | .4342 | .4028 |
|                 |       |          | .4430 | .4212 |
|                 |       |          | .4562 | .4260 |
|                 |       |          | .4465 | .4071 |
|                 |       | 7D0      | .4259 | .3853 |
|                 |       |          | .4342 | .4028 |
|                 |       |          | .4465 | .4071 |
|                 |       |          | .4373 | .3893 |

| ANSI White Bins |       |          |       |       |
|-----------------|-------|----------|-------|-------|
| Code            | CCT   | Bin Code | x     | y     |
| 0E8             | 2700K | 8A0      | .4373 | .3893 |
|                 |       |          | .4465 | .4071 |
|                 |       |          | .4582 | .4099 |
|                 |       |          | .4483 | .3919 |
|                 |       | 8B0      | .4465 | .4071 |
|                 |       |          | .4562 | .4260 |
|                 |       |          | .4687 | .4289 |
|                 |       |          | .4582 | .4099 |
|                 |       | 8C0      | .4582 | .4099 |
|                 |       |          | .4687 | .4289 |
|                 |       |          | .4813 | .4319 |
|                 |       |          | .4700 | .4126 |
|                 |       | 8D0      | .4483 | .3919 |
|                 |       |          | .4582 | .4099 |
|                 |       |          | .4700 | .4126 |
|                 |       |          | .4593 | .3944 |

**CREE EASYWHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ( $T_j = 85^\circ\text{C}$ )**

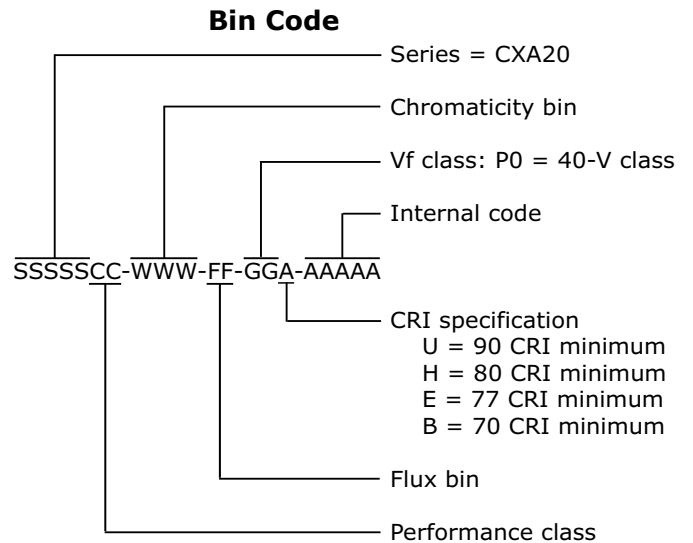
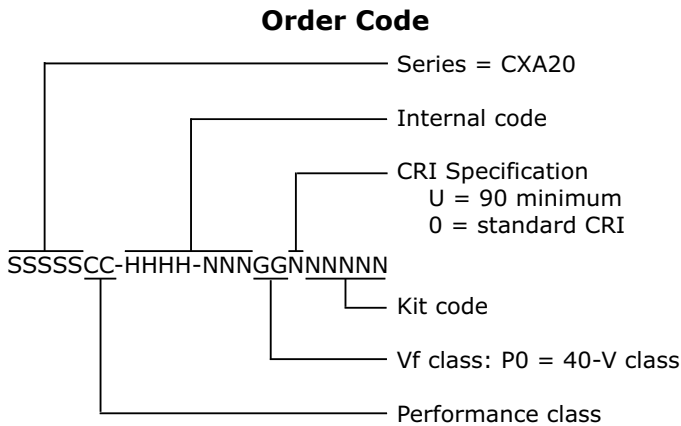


**CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ( $T_j = 85\text{ }^\circ\text{C}$ )**



**BIN AND ORDER CODE FORMATS**

Bin codes and order codes are configured as follows:



## NOTES

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### **Lumen Maintenance Projections**

Cree now uses standardized IES LM-80-08 and TM-21-11 methods for collecting long-term data and extrapolating LED lumen maintenance. For information on the specific LM-80 data sets available for this LED, refer to the public LM-80 results document at [www.cree.com/xlamp\\_app\\_notes/LM80\\_results](http://www.cree.com/xlamp_app_notes/LM80_results).

Please read the XLamp Long-Term Lumen Maintenance application note at [www.cree.com/xlamp\\_app\\_notes/lumen\\_maintenance](http://www.cree.com/xlamp_app_notes/lumen_maintenance) for more details on Cree's lumen maintenance testing and forecasting. Please read the XLamp Thermal Management application note at [www.cree.com/xlamp\\_app\\_notes/thermal\\_management](http://www.cree.com/xlamp_app_notes/thermal_management) for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

### **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 [www.cree.com](http://www.cree.com).

### **REACH Compliance**

REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notices 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 Declaration. Historical REACH banned substance information (substances restricted or banned in the EU prior to 2010) is also available upon request.

### **UL Recognized Component**

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

### **Vision Advisory Claim**

Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye. See the LED Eye Safety application note at [www.cree.com/xlamp\\_app\\_notes/led\\_eye\\_safety](http://www.cree.com/xlamp_app_notes/led_eye_safety).



**PACKAGING**

Cree CXA2011 LEDs are packaged in tubes of 20, which are then combined in boxes of 5 tubes, or 100 LEDs. Boxes of 100 LEDs are of the same performance bin.

