

## 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 LED expands Cree's lighting-class leadership to multi-die, high-flux arrays. With XLamp LED 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 2700 K, 3000 K, 3500 K, 4000 K and 5000 K CCT
- 90 minimum CRI available in 2700 K and 3000 K 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  $\leq 30^{\circ}\text{C}/85\% \text{ RH}$
- 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 ( $I_F = 270 \text{ mA}$ , $T_J = 85^\circ \text{C}$ )

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

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

| Color      | CCT Range | Minimum Luminous Flux @ 270 mA |                   |                    | Chromaticity Regions | Order Code               |
|------------|-----------|--------------------------------|-------------------|--------------------|----------------------|--------------------------|
|            |           | Group                          | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* |                      |                          |
| ANSI White | 5000 K    | H0                             | 900               | 1036               | 3A0, 3B0, 3C0, 3D0   | CXA2011-0000-000P00H00E3 |
|            |           | J0                             | 1040              | 1197               |                      | CXA2011-0000-000P00J00E3 |
|            | 4000 K    | G0                             | 780               | 898                | 5A0, 5B0, 5C0, 5D0   | CXA2011-0000-000P00G00E5 |
|            |           | H0                             | 900               | 1036               |                      | CXA2011-0000-000P00H00E5 |
|            | 3500 K    | G0                             | 780               | 898                | 6A0, 6B0, 6C0, 6D0   | CXA2011-0000-000P00G00E6 |
|            |           | H0                             | 900               | 1036               |                      | CXA2011-0000-000P00H00E6 |
|            | 3000 K    | G0                             | 780               | 898                | 7A0, 7B0, 7C0, 7D0   | CXA2011-0000-000P00G00E7 |
|            |           | H0                             | 900               | 1036               |                      | CXA2011-0000-000P00H00E7 |
|            | 2700 K    | 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. See the Measurements section (page 12).
- 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 ( $I_F = 270 \text{ mA}$ , $T_J = 85^\circ\text{C}$ )**

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

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

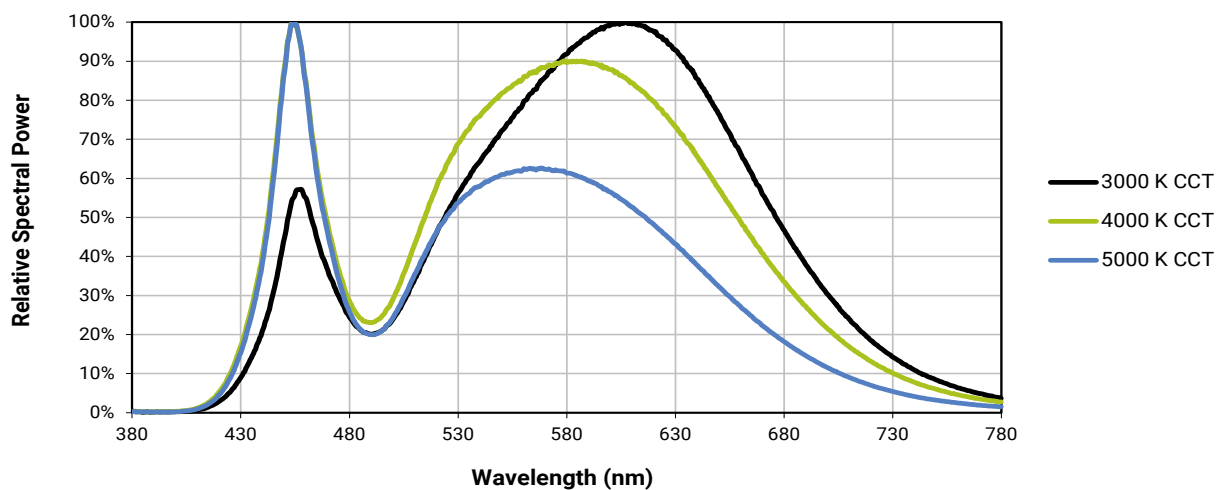
| Color      | CCT Range | Minimum Luminous Flux @ 270 mA, 85 °C |                   |                    | Chromaticity Regions | Order Code               |
|------------|-----------|---------------------------------------|-------------------|--------------------|----------------------|--------------------------|
|            |           | Group                                 | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* |                      |                          |
| ANSI White | 3000 K    | F0                                    | 680               | 783                | 7A0, 7B0, 7C0, 7D0   | CXA2011-0000-000P0UF00E7 |
|            |           | G0                                    | 780               | 898                |                      | CXA2011-0000-000P0UG00E7 |
|            | 2700 K    | 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. See the Measurements section (page 12).
- Minimum CRI for chromaticity kits 30H, 30F, 27H, 27F, 0E7, 0E8 is 90.
- \* Flux values @ 25 °C are calculated and for reference only.

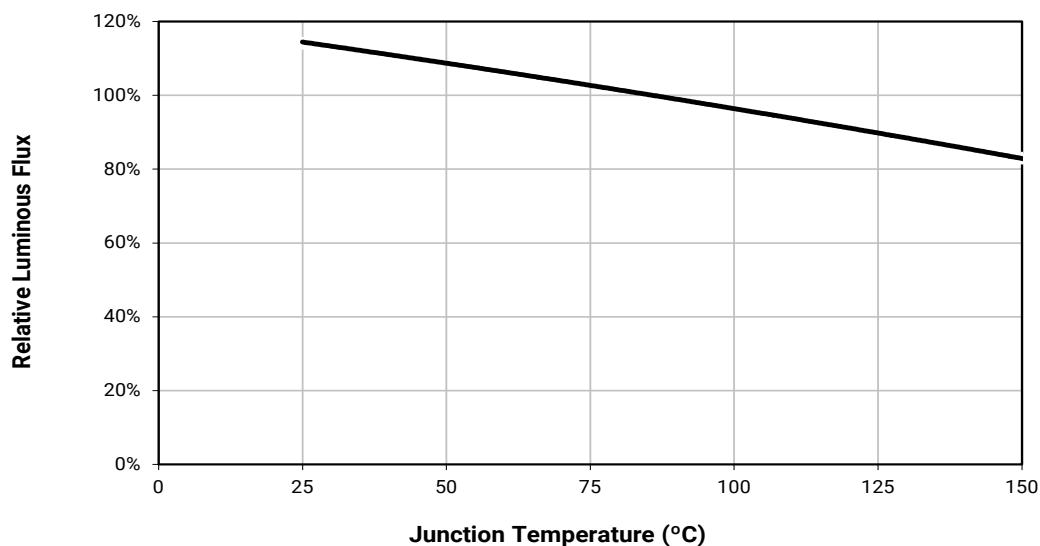
### RELATIVE SPECTRAL POWER DISTRIBUTION ( $I_F = 270 \text{ mA}$ , $T_J = 85^\circ\text{C}$ )

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



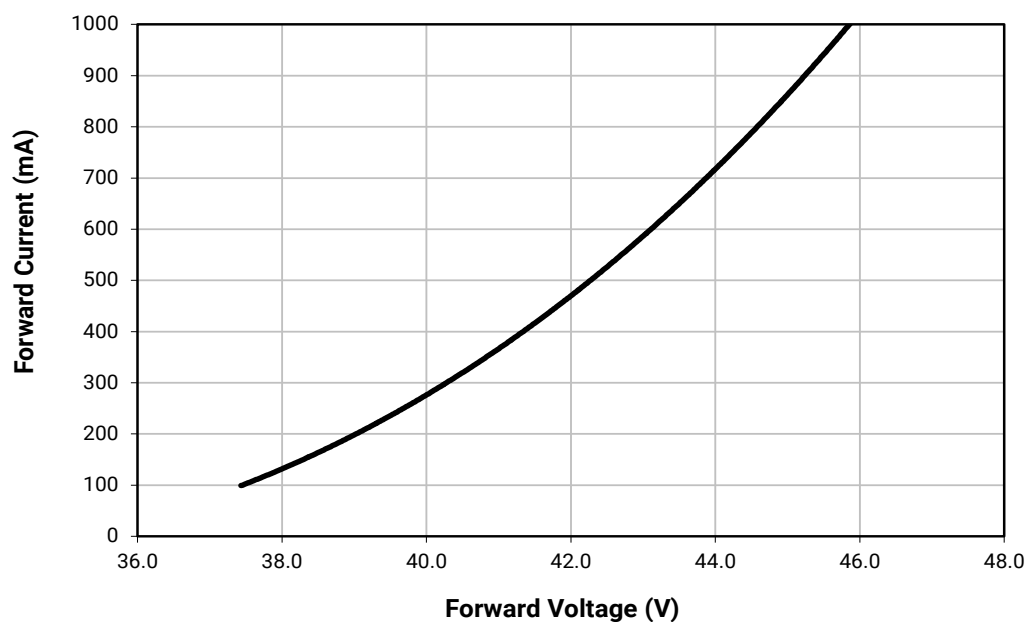
### RELATIVE LUMINOUS FLUX VS. JUNCTION TEMPERATURE ( $I_F = 270 \text{ mA}$ )

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



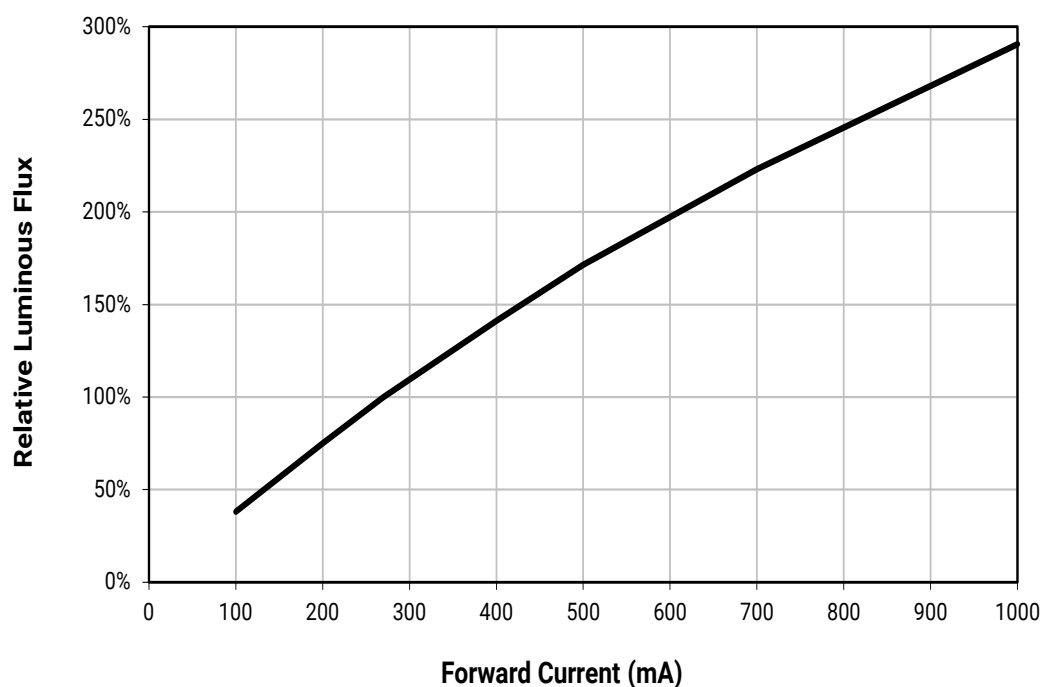
## ELECTRICAL CHARACTERISTICS ( $T_J = 85^\circ\text{C}$ )

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



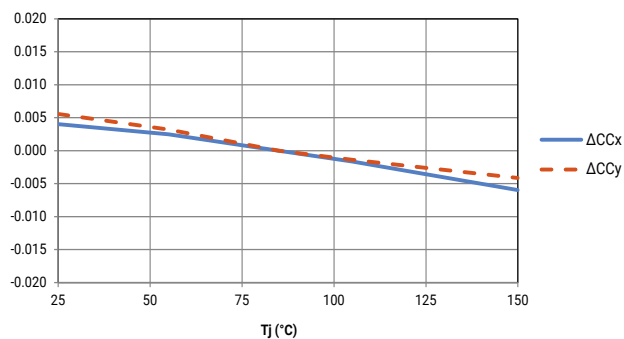
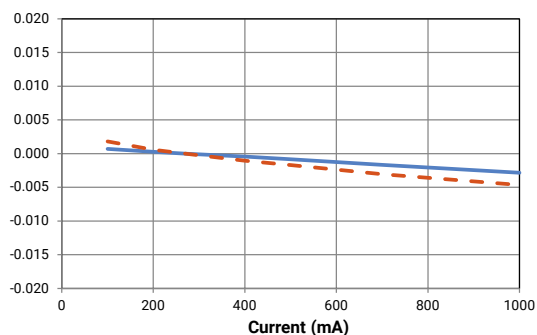
## RELATIVE LUMINOUS FLUX VS. CURRENT ( $T_J = 85^\circ\text{C}$ )

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

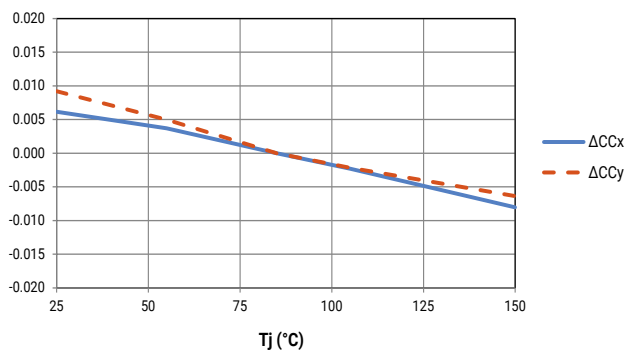
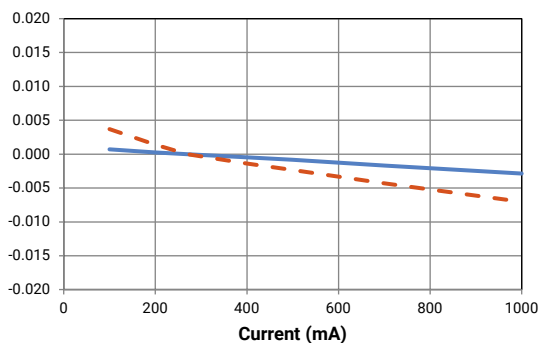


## RELATIVE CHROMATICITY VS. CURRENT AND TEMPERATURE

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

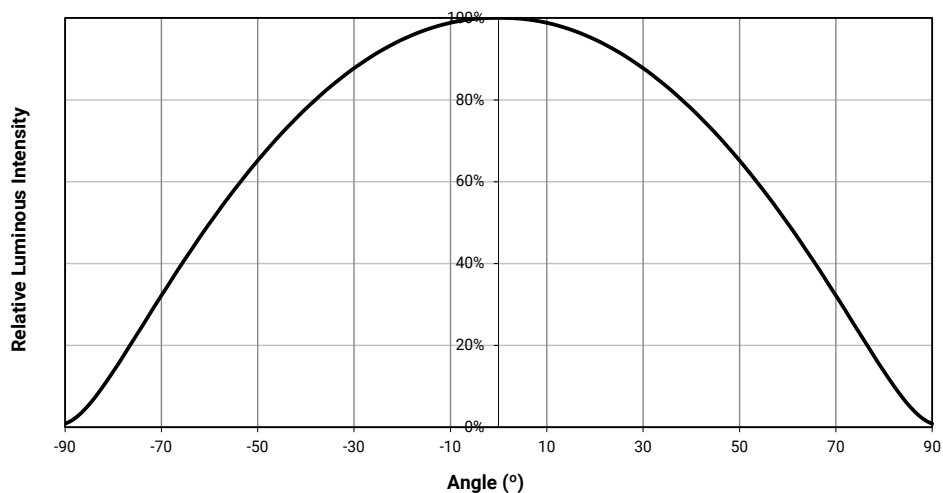


The following graphs represent typical chromaticity vs. current and temperature for the XLamp CXA2011 LED at 5000 K CCT.



## TYPICAL SPATIAL DISTRIBUTION

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



## PERFORMANCE GROUPS - BRIGHTNESS ( $I_F = 270 \text{ mA}$ , $T_J = 85^\circ\text{C}$ )

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

| Group Code | Minimum Luminous Flux<br>@ 270 mA, $T_J = 85^\circ\text{C}$ | Maximum Luminous Flux<br>@ 270 mA, $T_J = 85^\circ\text{C}$ |
|------------|-------------------------------------------------------------|-------------------------------------------------------------|
| E0         | 590                                                         | 680                                                         |
| F0         | 680                                                         | 780                                                         |
| G0         | 780                                                         | 900                                                         |
| H0         | 900                                                         | 1040                                                        |
| J0         | 1040                                                        | 1200                                                        |
| K0         | 1200                                                        | 1380                                                        |

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

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                                   | 5000 K | 0.3407 | 0.3459 |
|                                       |        | 0.3415 | 0.3586 |
|                                       |        | 0.3499 | 0.3654 |
|                                       |        | 0.3484 | 0.3521 |
| 40F                                   | 4000 K | 0.3744 | 0.3685 |
|                                       |        | 0.3782 | 0.3837 |
|                                       |        | 0.3912 | 0.3917 |
|                                       |        | 0.3863 | 0.3758 |
| 35F                                   | 3500 K | 0.3981 | 0.3800 |
|                                       |        | 0.4040 | 0.3966 |
|                                       |        | 0.4186 | 0.4037 |
|                                       |        | 0.4116 | 0.3865 |
| 30F                                   | 3000 K | 0.4242 | 0.3919 |
|                                       |        | 0.4322 | 0.4096 |
|                                       |        | 0.4449 | 0.4141 |
|                                       |        | 0.4359 | 0.3960 |
| 27F                                   | 2700 K | 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                                   | 5000 K | 0.3429 | 0.3507 |
|                                       |        | 0.3434 | 0.3571 |
|                                       |        | 0.3475 | 0.3604 |
|                                       |        | 0.3469 | 0.3539 |
| 40H                                   | 4000 K | 0.3784 | 0.3741 |
|                                       |        | 0.3804 | 0.3818 |
|                                       |        | 0.3867 | 0.3857 |
|                                       |        | 0.3844 | 0.3778 |
| 35H                                   | 3500 K | 0.4030 | 0.3857 |
|                                       |        | 0.4061 | 0.3941 |
|                                       |        | 0.4132 | 0.3976 |
|                                       |        | 0.4099 | 0.3890 |
| 30H                                   | 3000 K | 0.4291 | 0.3973 |
|                                       |        | 0.4333 | 0.4062 |
|                                       |        | 0.4395 | 0.4084 |
|                                       |        | 0.4351 | 0.3994 |
| 27H                                   | 2700 K | 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             | 5000 K | 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             | 4000 K | 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 |

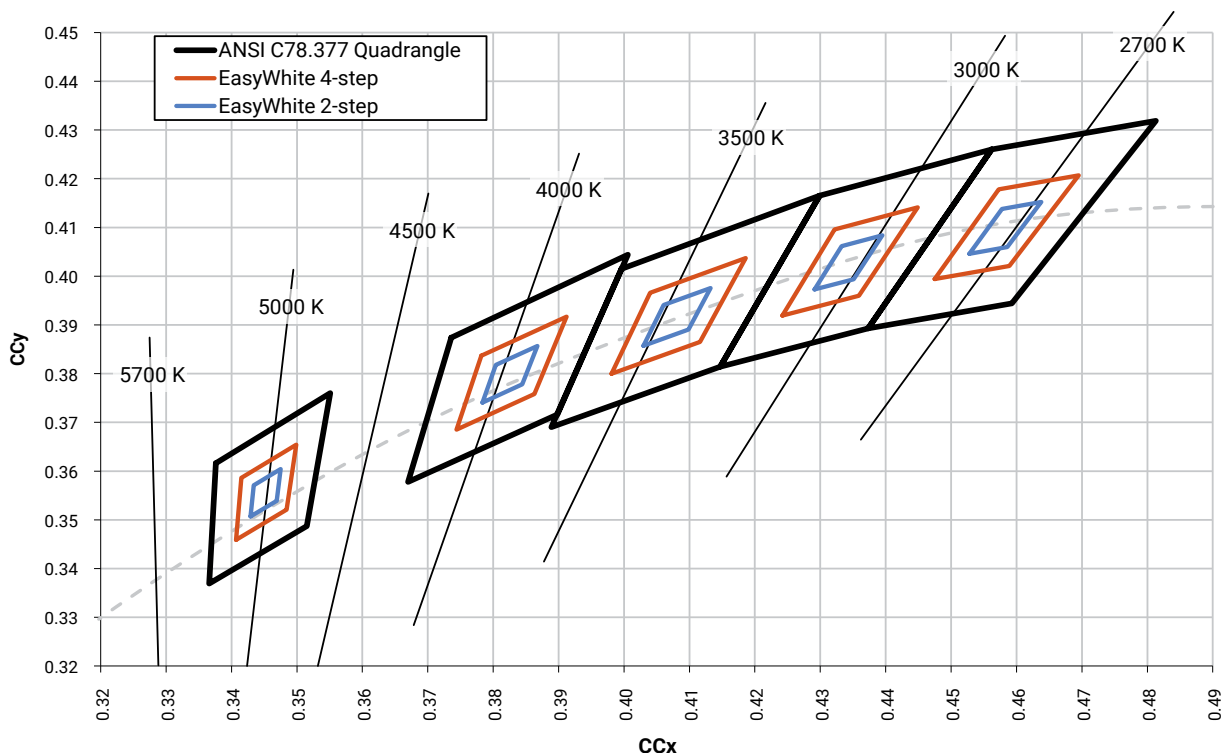
| ANSI White Bins |        |          |       |       |
|-----------------|--------|----------|-------|-------|
| Code            | CCT    | Bin Code | x     | y     |
| 0E6             | 3500 K | 6A0      | .3889 | .3690 |
|                 |        |          | .3941 | .3848 |
|                 |        |          | .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 |

PERFORMANCE GROUPS - CHROMATICITY (T<sub>J</sub> = 85 °C) - CONTNUED

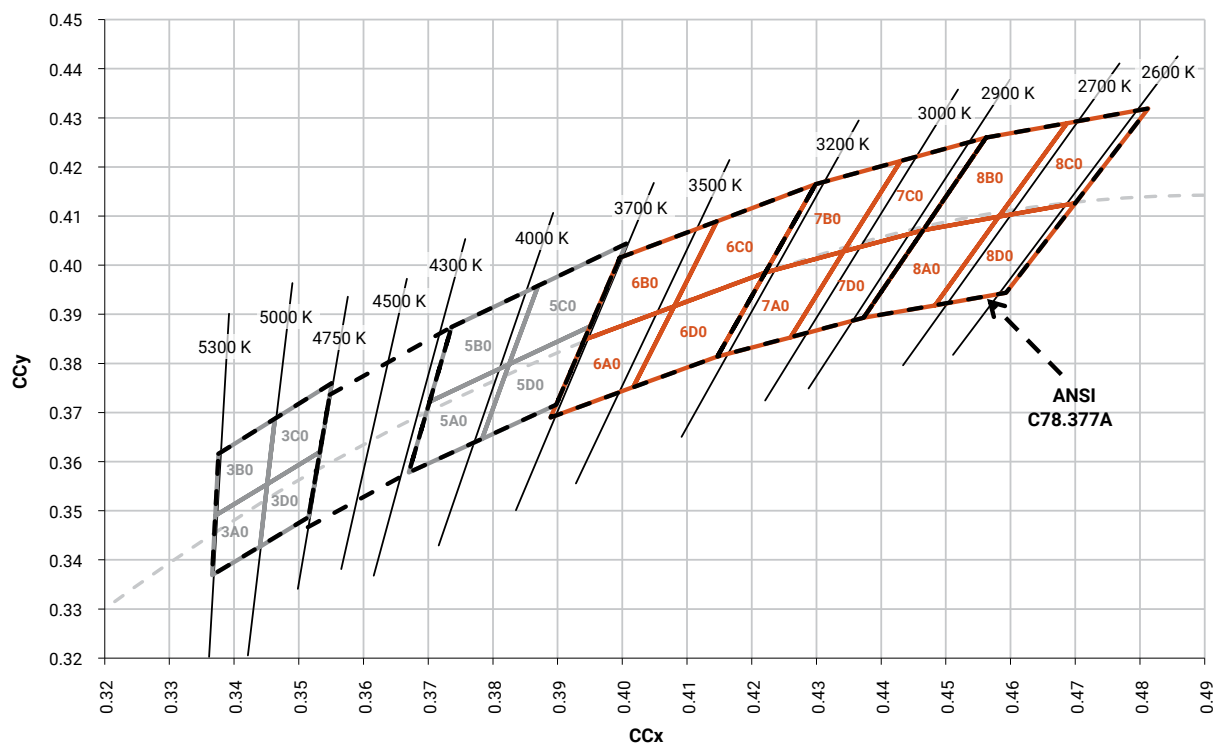
| ANSI White Bins |        |          |       |       |
|-----------------|--------|----------|-------|-------|
| Code            | CCT    | Bin Code | x     | y     |
| 0E7             | 3000 K | 7A0      | .4147 | .3814 |
|                 |        |          | .4221 | .3984 |
|                 |        |          | .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             | 2700 K | 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<sub>J</sub> = 85 °C)

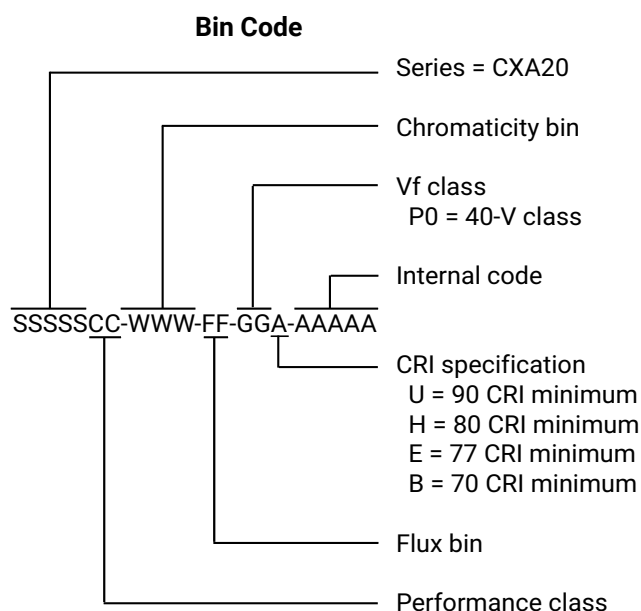
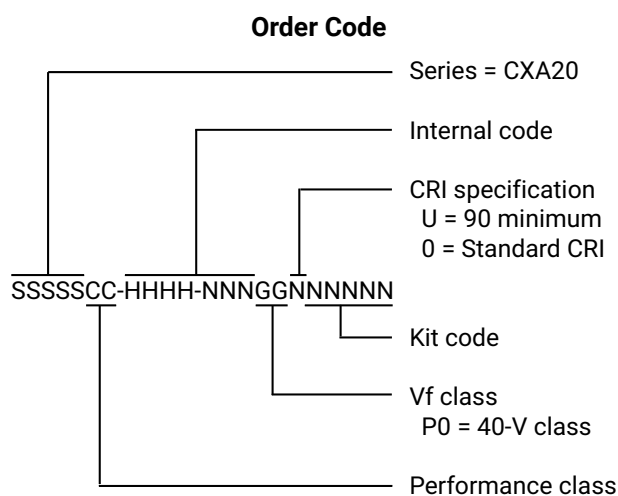


## CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ( $T_j = 85^\circ\text{C}$ )



## BIN AND ORDER CODE FORMATS

Bin codes and order codes are configured as follows:



## NOTES

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### Measurements

The luminous flux, radiant power, chromaticity 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 as specifications.

### 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.

### 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 very 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

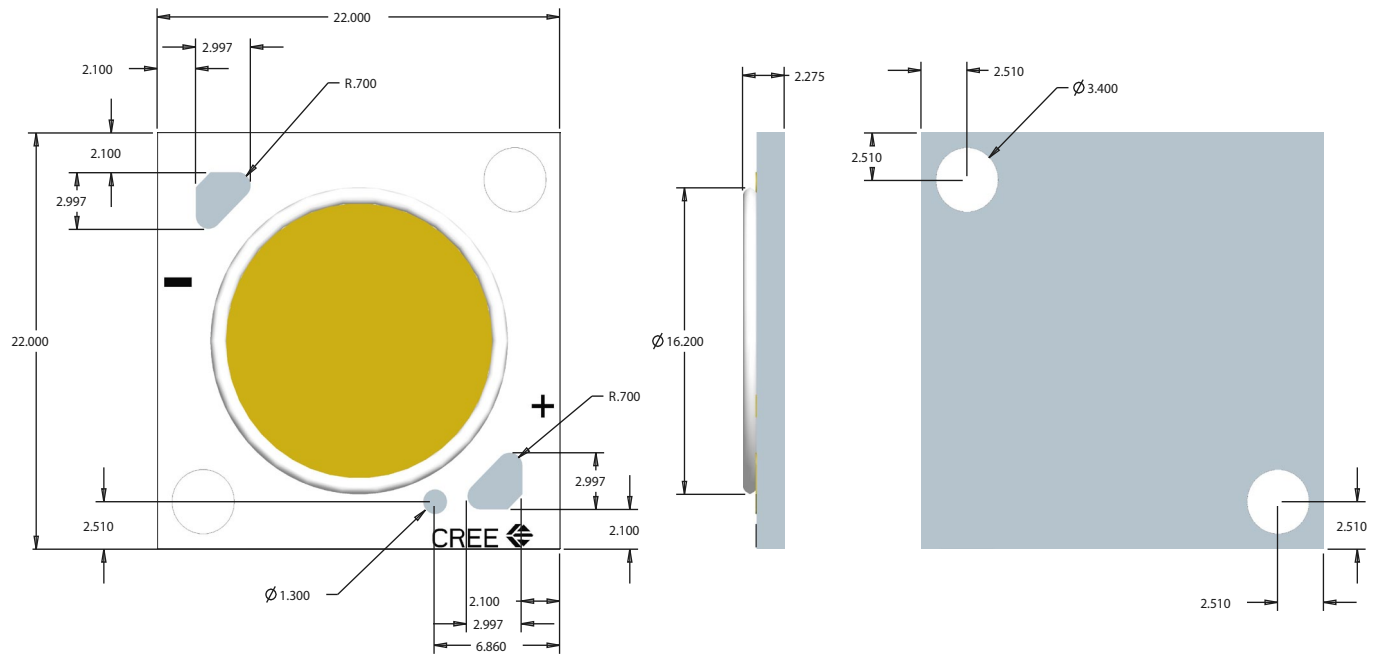
Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

### Vision Advisory

WARNING: Do not look at 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](#).

## MECHANICAL DIMENSIONS

All measurements are  $\pm 13$  mm unless otherwise indicated.



## 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.

