

# Cree® XLamp® CXA1820 LED



## PRODUCT DESCRIPTION

The XLamp CXA1820 LED array expands Cree's family of high-flux, multi-die arrays, offering high performance in an easy-to-use platform. With XLamp lighting-class reliability, the CXA1820's uniform emitting surface enables both directional and non-directional lighting applications and luminaire designs. Available in 2-step and 4-step color consistency, and featuring a 12-mm optical source, the CXA1820 brings new levels of flux and efficacy to this form factor.

## FEATURES

- Available in 4-step and 2-step EasyWhite® bins at 2700 K, 3000 K, 3500 K, 4000 K and 5000 K CCT
- Available in ANSI white bins at 4000 K and 5000 K CCT
- Available in 70-, 80-, 90- and 93-minimum CRI options
- Forward voltage: 37 V
- 85 °C binning and characterization
- Maximum drive current: 1050 mA
- 115° viewing angle, uniform chromaticity profile
- Top-side solder connections
- Thermocouple attach point
- NEMA SSL-3 2011 standard flux bins

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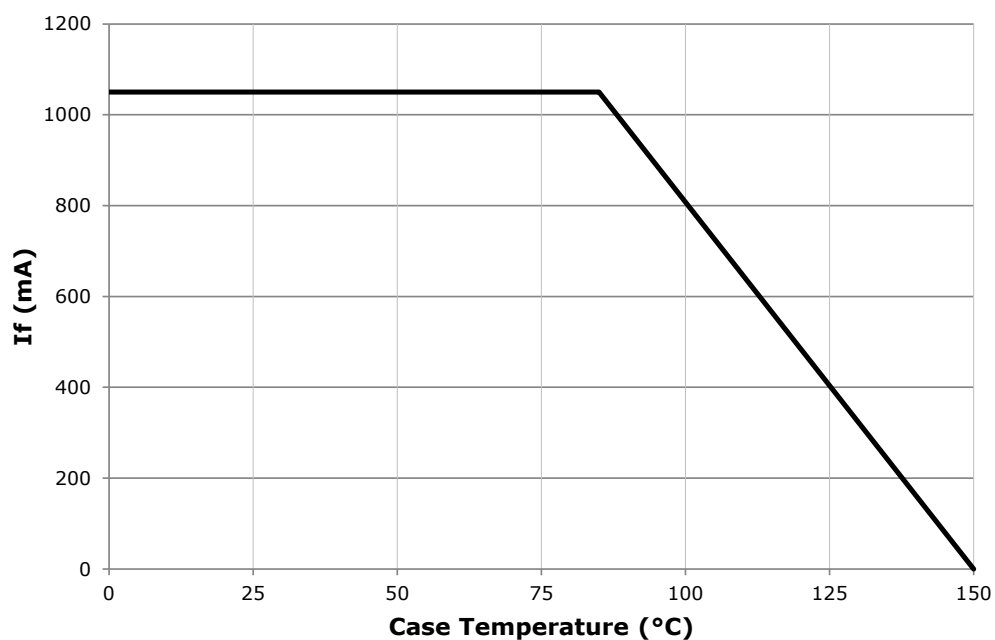
## CHARACTERISTICS

| Characteristics                              | Unit    | Minimum | Typical | Maximum |
|--|---------|---------|---------|---------|
| Viewing angle (FWHM)                         | degrees |         | 115     |         |
| ESD withstand voltage (HBM per Mil-Std-883D) | V       |         |         | 8000    |
| DC forward current                           | mA      |         |         | 1050*   |
| Reverse current                              | mA      |         |         | 0.1     |
| Forward voltage (@ 550 mA, 85 °C)            | V       |         | 37      |         |
| Forward voltage (@ 550 mA, 25 °C)            | V       |         |         | 42      |

\* Refer to the Operating Limits section.

## OPERATING LIMITS

The maximum current rating of the CXA1820 is dependent on the case temperature ( $T_c$ ) when the LED has reached thermal equilibrium under steady-state operation. Please refer to the Mechanical Dimensions section on page 12 for the location of the  $T_c$  measurement point.



## FLUX CHARACTERISTICS, EASYWHITE ORDER CODES AND BINS ( $I_f = 550 \text{ mA}$ , $T_j = 85 \text{ }^\circ\text{C}$ )

The following tables provide order codes for XLamp CXA1820 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 12).

| CCT Range | CRI |     | Base Order Codes<br>Min. Luminous Flux<br>@ 550 mA |                   |                    | 2-Step Order Code   |                          | 4-Step Order Code   |                          |
|-----------|-----|-----|--|-------------------|--------------------|---------------------|--------------------------|---------------------|--------------------------|
|           | Min | Typ | Group  | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | Chromaticity Region |                          | Chromaticity Region |                          |
| 5000 K    | 70  | 75  | Q4   | 2260              | 2560               | 50H                 | CXA1820-0000-000N00Q450H | 50F                 | CXA1820-0000-000N00Q450F |
|           |     |     | R2   | 2420              | 2741               |                     | CXA1820-0000-000N00R250H |                     | CXA1820-0000-000N00R250F |
|           |     |     | R4   | 2600              | 2916               |                     | CXA1820-0000-000N00R450H |                     | CXA1820-0000-000N00R450F |
|           | 80  | --- | P4   | 1965              | 2226               | 50H                 | CXA1820-0000-000N0HP450H | 50F                 | CXA1820-0000-000N0HP450F |
|           |     |     | Q2   | 2100              | 2379               |                     | CXA1820-0000-000N0HQ250H |                     | CXA1820-0000-000N0HQ250F |
|           |     |     | Q4   | 2260              | 2560               |                     | CXA1820-0000-000N0HQ450H |                     | CXA1820-0000-000N0HQ450F |
|           |     |     | R2   | 2420              | 2741               |                     | CXA1820-0000-000N0HR250H |                     | CXA1820-0000-000N0HR250F |
|           | 90  | 95  | N4   | 1710              | 1937               | 50H                 | CXA1820-0000-000N0UN450H | 50F                 | CXA1820-0000-000N0UN450F |
|           |     |     | P2   | 1830              | 2073               |                     | CXA1820-0000-000N0UP250H |                     | CXA1820-0000-000N0UP250F |
|           |     |     | P4   | 1965              | 2226               |                     | CXA1820-0000-000N0UP450H |                     | CXA1820-0000-000N0UP450F |
| 4000 K    | 70  | 75  | Q2   | 2100              | 2379               | 40H                 | CXA1820-0000-000N00Q240H | 40F                 | CXA1820-0000-000N00Q240F |
|           |     |     | Q4   | 2260              | 2560               |                     | CXA1820-0000-000N00Q440H |                     | CXA1820-0000-000N00Q440F |
|           |     |     | R2   | 2420              | 2741               |                     | CXA1820-0000-000N00R240H |                     | CXA1820-0000-000N00R240F |
|           | 80  | --- | P4   | 1965              | 2226               | 40H                 | CXA1820-0000-000N0HP440H | 40F                 | CXA1820-0000-000N0HP440F |
|           |     |     | Q2   | 2100              | 2379               |                     | CXA1820-0000-000N0HQ240H |                     | CXA1820-0000-000N0HQ240F |
|           |     |     | Q4   | 2260              | 2560               |                     | CXA1820-0000-000N0HQ440H |                     | CXA1820-0000-000N0HQ440F |
|           | 90  | 95  | N2   | 1590              | 1801               | 40H                 | CXA1820-0000-000N0UN240H | 40F                 | CXA1820-0000-000N0UN240F |
|           |     |     | N4   | 1710              | 1937               |                     | CXA1820-0000-000N0UN440H |                     | CXA1820-0000-000N0UN440F |
|           |     |     | P2   | 1830              | 2073               |                     | CXA1820-0000-000N0UP240H |                     | CXA1820-0000-000N0UP240F |
| 3500 K    | 80  | --- | P4   | 1965              | 2226               | 35H                 | CXA1820-0000-000N00P435H | 35F                 | CXA1820-0000-000N00P435F |
|           |     |     | Q2   | 2100              | 2379               |                     | CXA1820-0000-000N00Q235H |                     | CXA1820-0000-000N00Q235F |
|           |     |     | Q4   | 2260              | 2560               |                     | CXA1820-0000-000N00Q435H |                     | CXA1820-0000-000N00Q435F |
|           | 93  | 95  | M4   | 1485              | 1685               | 35H                 | CXA1820-0000-000N0YM435h | 35F                 | CXA1820-0000-000N0YM435F |
|           |     |     | N2   | 1590              | 1801               |                     | CXA1820-0000-000N0YN235H |                     | CXA1820-0000-000N0YN235F |
|           |     |     | N4   | 1710              | 1937               |                     | CXA1820-0000-000N0YN435H |                     | CXA1820-0000-000N0YN435F |
|           |     |     |  |                   |                    |                     |                          |                     |                          |

### 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.
- \* Flux values @ 25 °C are calculated and for reference only.

**FLUX CHARACTERISTICS, EASYWHITE ORDER CODES AND BINS ( $I_f = 550 \text{ mA}$ ,  $T_j = 85 \text{ }^\circ\text{C}$ ) - CONTNUED**

| CCT Range | CRI |     | Base Order Codes<br>Min. Luminous Flux<br>@ 550 mA |                   |                    | 2-Step Order Code   |                          | 4-Step Order Code   |                          |
|-----------|-----|-----|--|-------------------|--------------------|---------------------|--------------------------|---------------------|--------------------------|
|           | Min | Typ | Group  | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | Chromaticity Region |                          | Chromaticity Region |                          |
| 3000 K    | 80  | --- | P4   | 1965              | 2226               | 30H                 | CXA1820-0000-000N00P430H | 30F                 | CXA1820-0000-000N00P430F |
|           |     |     | Q2   | 2100              | 2379               |                     | CXA1820-0000-000N00Q230H |                     | CXA1820-0000-000N00Q230F |
|           |     |     | Q4   | 2260              | 2535               |                     | CXA1820-0000-000N00Q430H |                     | CXA1820-0000-000N00Q430F |
|           | 90  | --- | M4   | 1485              | 1682               | 30H                 | CXA1820-0000-000N00M430H | 30F                 | CXA1820-0000-000N00M430F |
|           |     |     | N2   | 1590              | 1801               |                     | CXA1820-0000-000N00N230H |                     | CXA1820-0000-000N00N230F |
|           |     |     | N4   | 1710              | 1937               |                     | CXA1820-0000-000N00N430H |                     | CXA1820-0000-000N00N430F |
|           |     |     | P2   | 1830              | 2073               |                     | CXA1820-0000-000N00P230H |                     | CXA1820-0000-000N00P230F |
|           | 93  | 95  | M2   | 1380              | 1563               | 30H                 | CXA1820-0000-000N00M230H | 30F                 | CXA1820-0000-000N00M230F |
|           |     |     | M4   | 1485              | 1682               |                     | CXA1820-0000-000N00M430H |                     | CXA1820-0000-000N00M430F |
|           |     |     | N2   | 1590              | 1801               |                     | CXA1820-0000-000N00N230H |                     | CXA1820-0000-000N00N230F |
| 2700 K    | 80  | --- | P2   | 1830              | 2073               | 27H                 | CXA1820-0000-000N00P227H | 27F                 | CXA1820-0000-000N00P227F |
|           |     |     | P4   | 1965              | 2226               |                     | CXA1820-0000-000N00P427H |                     | CXA1820-0000-000N00P427F |
|           |     |     | Q2   | 2100              | 2379               |                     | CXA1820-0000-000N00Q227H |                     | CXA1820-0000-000N00Q227F |
|           | 90  | --- | M2   | 1380              | 1563               | 27H                 | CXA1820-0000-000N00M227H | 27F                 | CXA1820-0000-000N00M227F |
|           |     |     | M4   | 1485              | 1682               |                     | CXA1820-0000-000N00M427H |                     | CXA1820-0000-000N00M427F |
|           |     |     | N2   | 1590              | 1801               |                     | CXA1820-0000-000N00N227H |                     | CXA1820-0000-000N00N227F |
|           |     |     | N4   | 1710              | 1937               |                     | CXA1820-0000-000N00N427H |                     | CXA1820-0000-000N00N427F |
|           | 93  | 95  | K4   | 1290              | 1436               | 27H                 | CXA1820-0000-000N00K427H | 27F                 | CXA1820-0000-000N00K427F |
|           |     |     | M2   | 1380              | 1563               |                     | CXA1820-0000-000N00M227H |                     | CXA1820-0000-000N00M227F |
|           |     |     | M4   | 1485              | 1682               |                     | CXA1820-0000-000N00M427H |                     | CXA1820-0000-000N00M427F |

**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.
- \* Flux values @ 25 °C are calculated and for reference only.

## FLUX CHARACTERISTICS, ANSI WHITE ORDER CODES AND BINS ( $I_F = 550 \text{ mA}$ , $T_J = 85 \text{ }^\circ\text{C}$ )

The following tables provide order codes for XLamp CXA1820 LEDs. For a complete description of the order code nomenclature, please reference Bin and Order Code Formats (page 12).

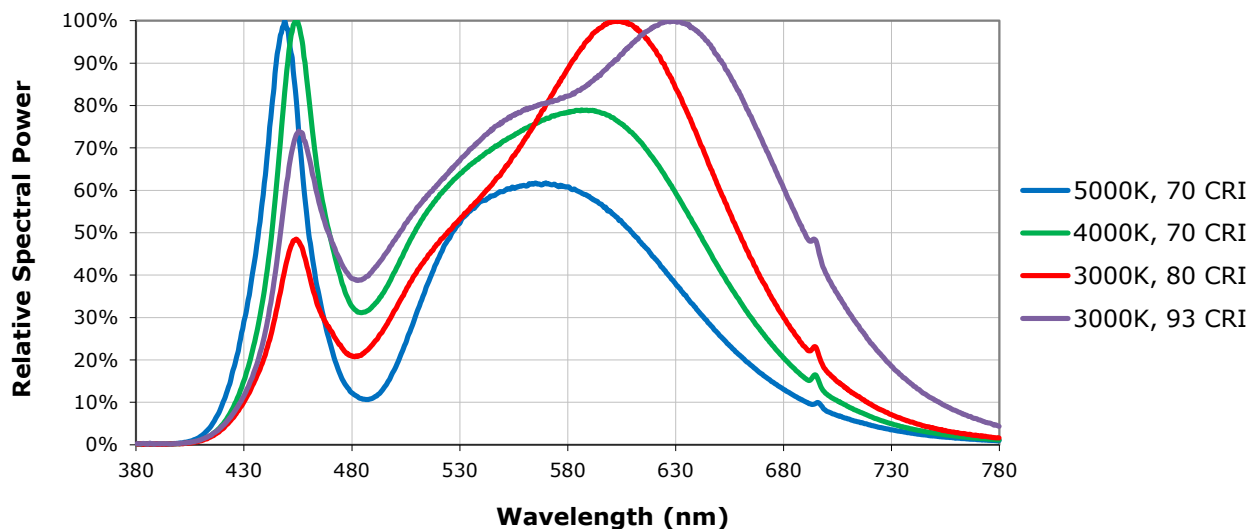
| CCT Range | CRI |     | Base Order Codes<br>Min. Luminous Flux<br>@ 550 mA |                      |                       | Chromaticity Regions | Order Code               |
|-----------|-----|-----|--|----------------------|-----------------------|----------------------|--------------------------|
|           | Min | Typ | Group  | Flux (lm)<br>@ 85 °C | Flux (lm)<br>@ 25 °C* |                      |                          |
| 5000 K    | 70  | 75  | Q4   | 2260                 | 2560                  | 3A0, 3B0, 3C0, 3D0   | CXA1820-0000-000N00Q40E3 |
|           |     |     | R2   | 2420                 | 2741                  |                      | CXA1820-0000-000N00R20E3 |
|           |     |     | R4   | 2600                 | 2916                  |                      | CXA1820-0000-000N00R40E3 |
|           | 80  | --- | P4   | 1965                 | 2226                  | 3A0, 3B0, 3C0, 3D0   | CXA1820-0000-000N0HP40E3 |
|           |     |     | Q2   | 2100                 | 2379                  |                      | CXA1820-0000-000N0HQ20E3 |
|           |     |     | Q4   | 2260                 | 2560                  |                      | CXA1820-0000-000N0HQ40E3 |
|           |     |     | R2   | 2420                 | 2741                  |                      | CXA1820-0000-000N0HR20E3 |
|           | 90  | 95  | N4   | 1710                 | 1937                  | 3A0, 3B0, 3C0, 3D0   | CXA1820-0000-000N0UN40E3 |
|           |     |     | P2   | 1830                 | 2073                  |                      | CXA1820-0000-000N0UP20E3 |
|           |     |     | P4   | 1965                 | 2226                  |                      | CXA1820-0000-000N0UP40E3 |
| 4000 K    | 70  | 75  | Q2   | 2100                 | 2379                  | 5A0, 5B0, 5C0, 5D0   | CXA1820-0000-000N00Q20E5 |
|           |     |     | Q4   | 2260                 | 2560                  |                      | CXA1820-0000-000N00Q40E5 |
|           |     |     | R2   | 2420                 | 2741                  |                      | CXA1820-0000-000N00R20E5 |
|           | 80  | --- | P4   | 1965                 | 2226                  | 5A0, 5B0, 5C0, 5D0   | CXA1820-0000-000N0HP40E5 |
|           |     |     | Q2   | 2100                 | 2379                  |                      | CXA1820-0000-000N0HQ20E5 |
|           |     |     | Q4   | 2260                 | 2560                  |                      | CXA1820-0000-000N0HQ40E5 |
|           | 90  | 95  | N2   | 1590                 | 1801                  | 5A0, 5B0, 5C0, 5D0   | CXA1820-0000-000N0UN20E5 |
|           |     |     | N4   | 1710                 | 1937                  |                      | CXA1820-0000-000N0UN40E5 |
|           |     |     | P2   | 1830                 | 2073                  |                      | CXA1820-0000-000N0UP20E5 |

### 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.
- \* Flux values @ 25 °C are calculated and for reference only.

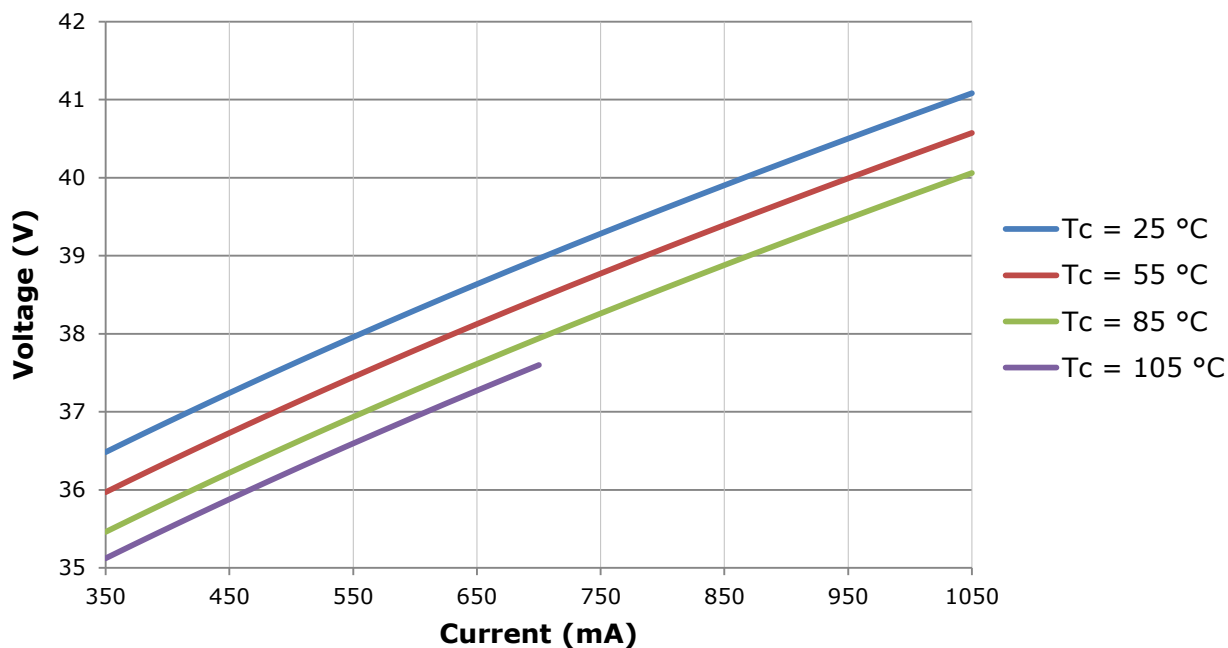
## RELATIVE SPECTRAL POWER DISTRIBUTION ( $I_F = 550 \text{ mA}$ , $T_J = 85^\circ\text{C}$ )

The following graph is the result of a series of pulsed measurements at 550 mA and  $T_J = 85^\circ\text{C}$ .



## ELECTRICAL CHARACTERISTICS

The following graph is the result of a series of steady-state measurements.

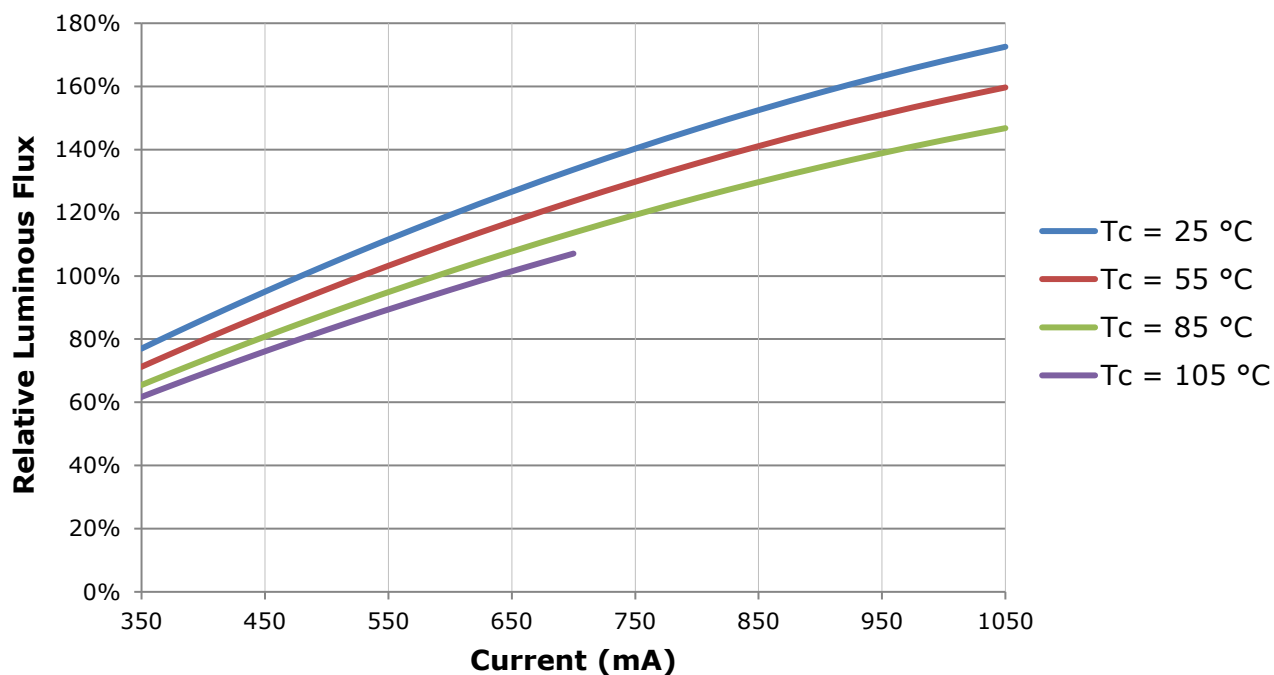


## RELATIVE LUMINOUS FLUX

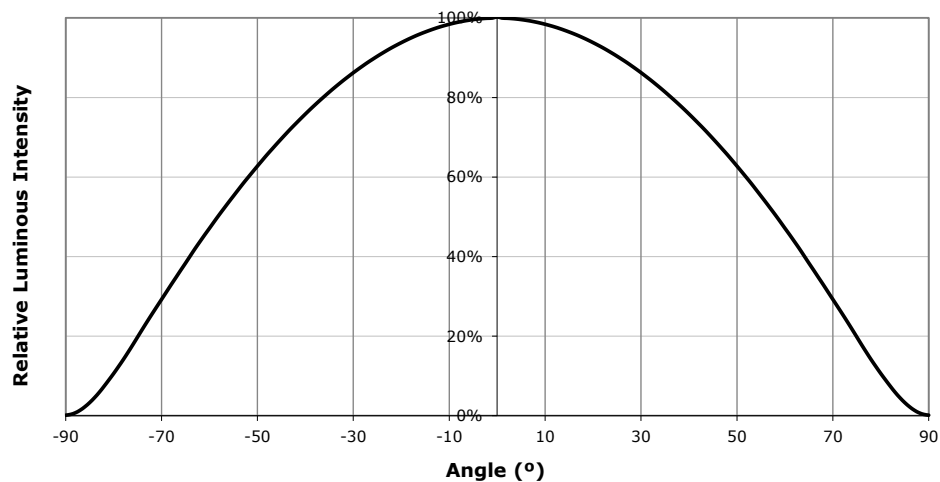
The relative luminous flux values provided below are the ratio of:

- Measurements of CXA1820 at steady-state operation at the given conditions, divided by
- Flux measured during binning, which is a pulsed measurement at 550 mA at  $T_j = 85^\circ\text{C}$ .

For example, at steady-state operation of  $T_c = 55^\circ\text{C}$ ,  $I_f = 850\text{ mA}$ , the relative luminous flux ratio is 140% in the chart below. A CXA1820 LED that measures 2100 lm during binning will deliver 2940 lm ( $2100 \times 1.4$ ) at steady-state operation of  $T_c = 55^\circ\text{C}$ ,  $I_f = 850\text{ mA}$ .



## TYPICAL SPATIAL DISTRIBUTION



## PERFORMANCE GROUPS - BRIGHTNESS ( $I_f = 550 \text{ mA}$ , $T_j = 85 \text{ °C}$ )

XLamp CXA1820 LEDs are tested for luminous flux and placed into one of the following bins.

| Group Code | Min. Luminous Flux<br>@ 550 mA | Max. Luminous Flux<br>@ 550 mA |
|------------|--------------------------------|--------------------------------|
| K4         | 1290                           | 1380                           |
| M2         | 1380                           | 1485                           |
| M4         | 1485                           | 1590                           |
| N2         | 1590                           | 1710                           |
| N4         | 1710                           | 1830                           |
| P2         | 1830                           | 1965                           |
| P4         | 1965                           | 2100                           |
| Q2         | 2100                           | 2260                           |
| Q4         | 2260                           | 2420                           |
| R2         | 2420                           | 2600                           |
| R4         | 2600                           | 2780                           |



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

XLamp CXA1820 LEDs are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates.

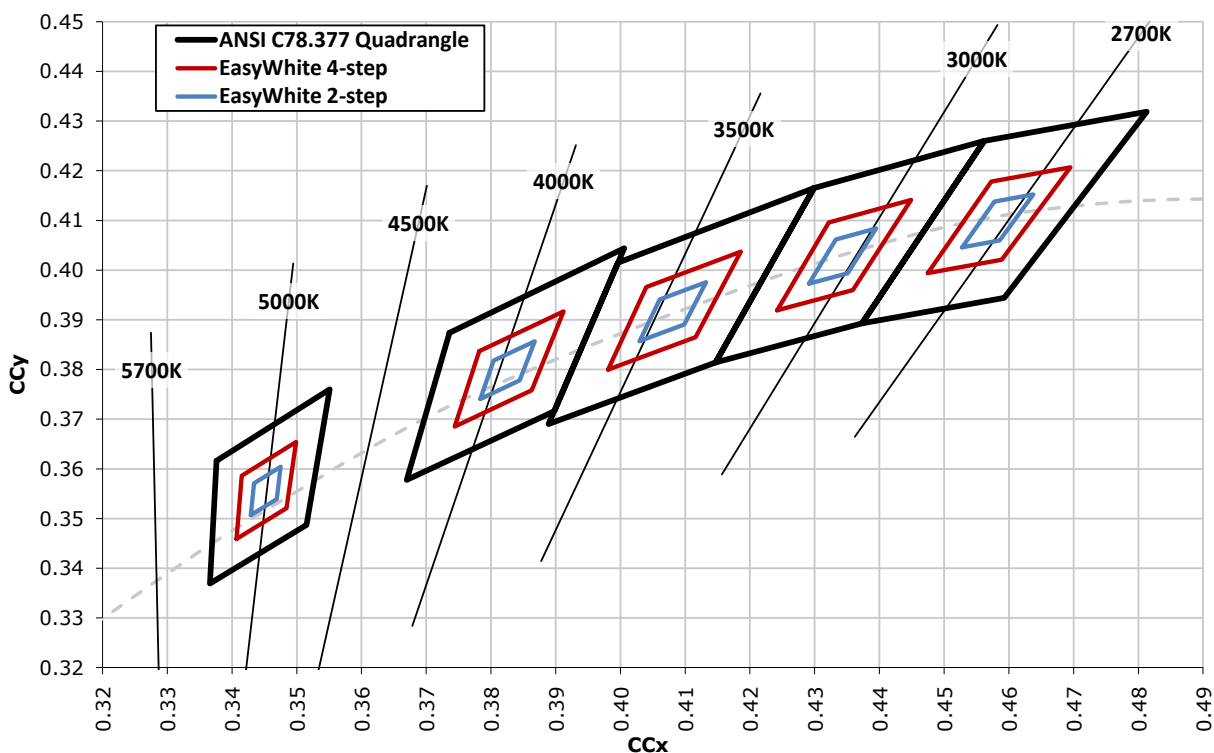
| EasyWhite Color Temperatures – 4-Step |       |        |        |
|---------------------------------------|-------|--------|--------|
| Code                                  | CCT   | x      | y      |
| 50F                                   | 5000K | 0.3407 | 0.3459 |
|                                       |       | 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 |

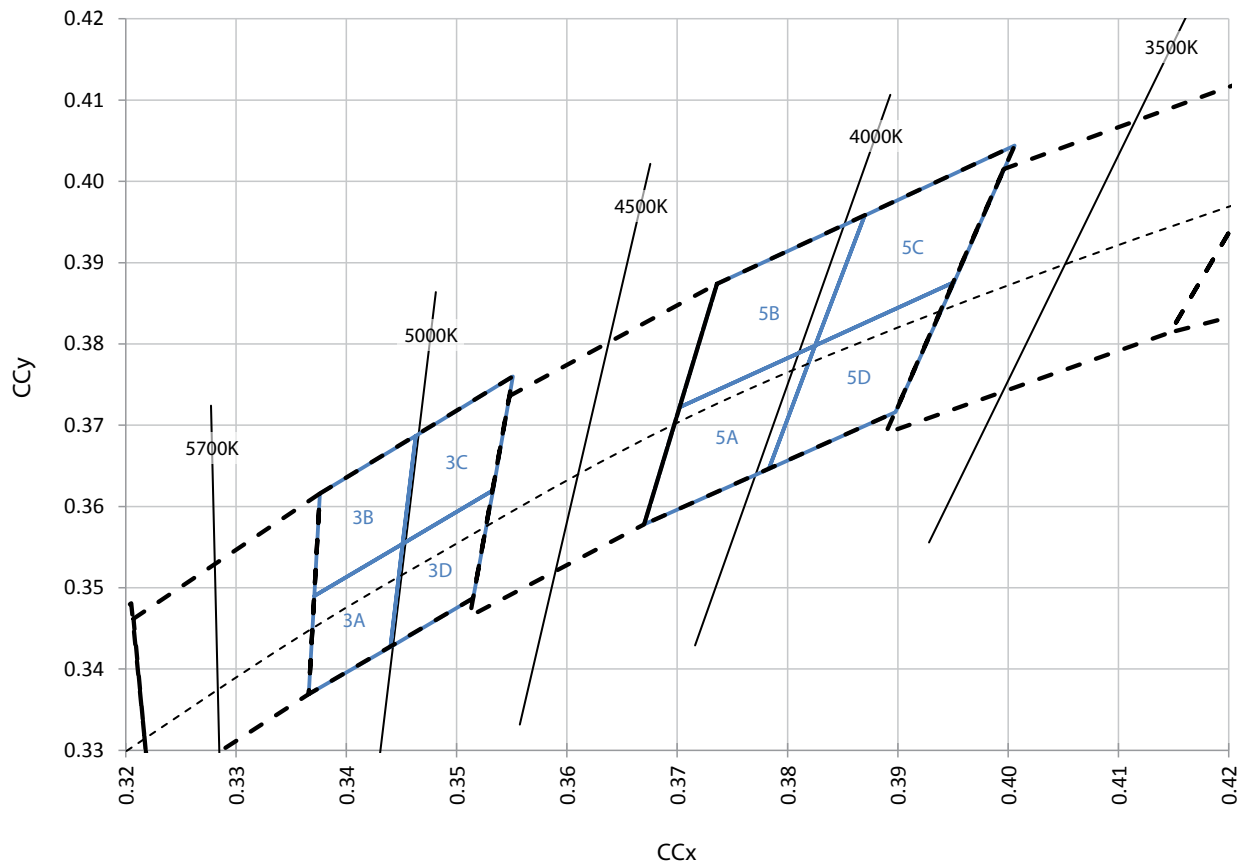
| ANSI White Bins |       |          |       |       |
|-----------------|-------|----------|-------|-------|
| Code            | CCT   | Bin Code | x     | y     |
| 0E3             | 5000K | 3A0      | .3371 | .3490 |
|                 |       |          | .3451 | .3554 |
|                 |       |          | .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 |

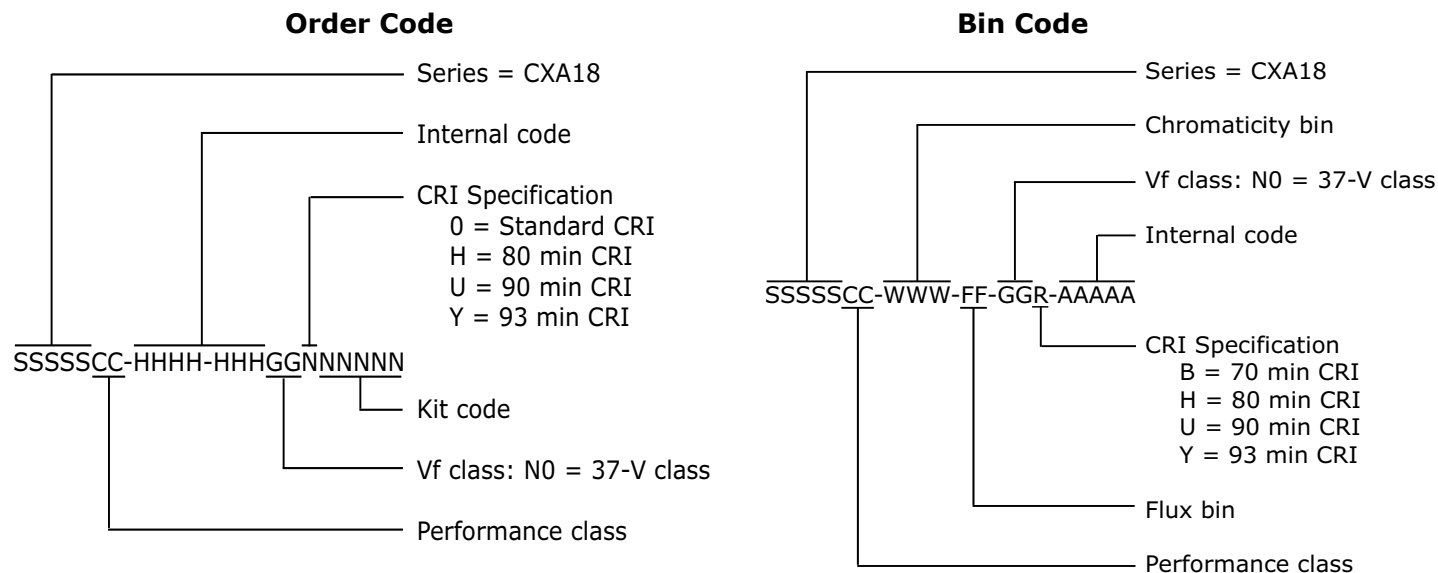
**CREE EASYWHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ( $T_j = 85\text{ }^{\circ}\text{C}$ )**



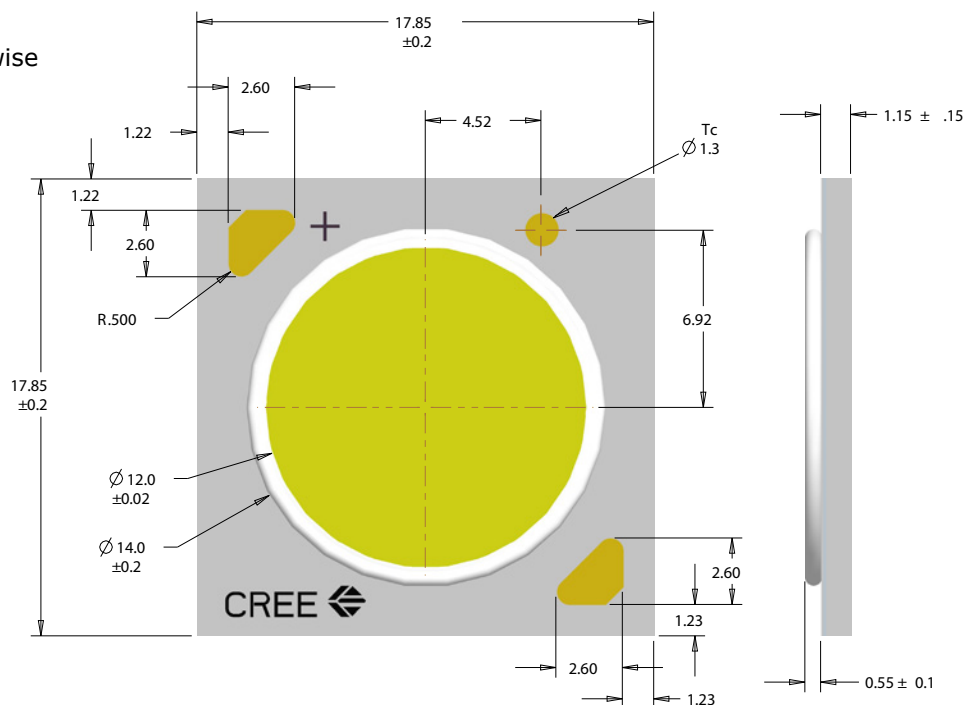
**CREE ANSI WHITE BINS PLOTTED ON THE 1931 CIE COLOR SPACE ( $T_j = 85^\circ\text{C}$ )**



Bin codes and order codes are configured as follows:



Dimensions are in mm.  
Tolerances unless otherwise  
specified:

$$\begin{array}{l} .x \pm .10 \\ .xx \pm .03 \\ .xxx \pm .010 \\ x^\circ \pm 1^\circ \end{array}$$


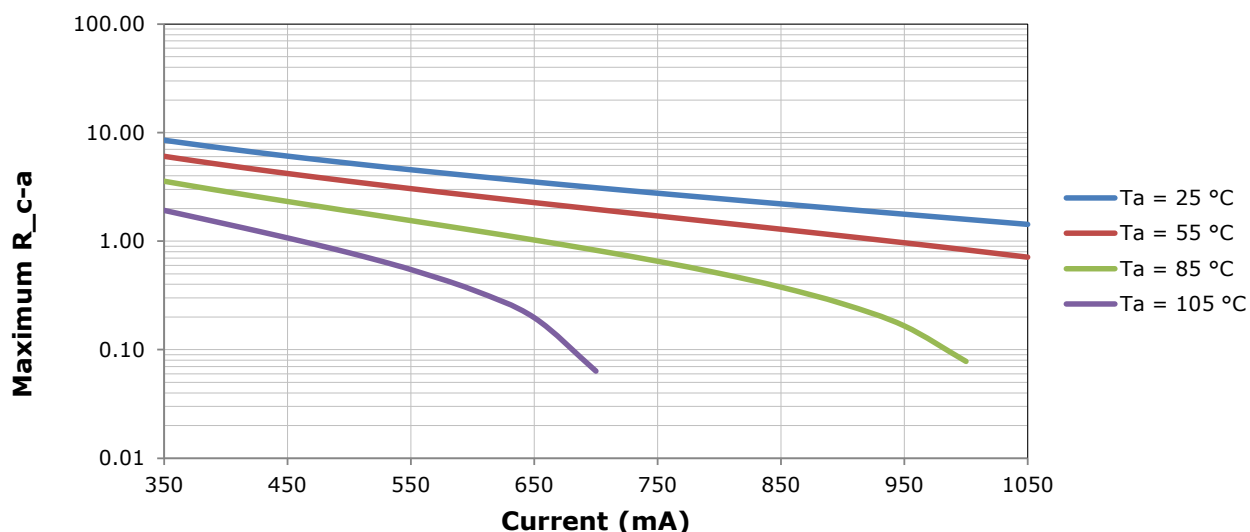
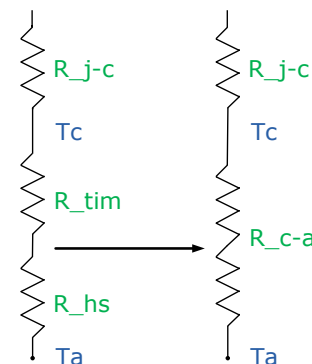
## THERMAL DESIGN

The CXA family of LED arrays can include over a hundred different LED die inside one package, and thus over a hundred different junction temperatures ( $T_j$ ). Cree has intentionally removed junction-temperature-based operating limits and replaced the commonplace maximum  $T_j$  calculations with maximum ratings based on forward current ( $I_f$ ) and case temperature ( $T_c$ ). No additional calculations are required to ensure the CXA LED is being operated within its designed limits. Please refer to page 2 for the Operating Limit specification.

Cree has measured the temperature at the bottom of the package, commonly referred to as the solder point ( $T_{sp}$ ), and found this value to be equivalent to the temperature at the  $T_c$  location at the top of the package once the LED has reached thermal equilibrium. There is no need to calculate for  $T_j$  inside the package, as the thermal management design process, specifically from  $T_{sp}$  to ambient ( $T_a$ ), remains identical to any other LED component. For more information on thermal management of Cree XLamp LEDs, please refer to 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 CXA soldering recommendations and more information on thermal interface materials (TIM) and connection methods, please refer to the Cree XLamp CXA Family LEDs soldering and handling document at [www.cree.com/xlamp\\_app\\_notes/CXA\\_SH](http://www.cree.com/xlamp_app_notes/CXA_SH).

To keep the CXA1820 LED at or below the maximum rated  $T_c$ , the case to ambient thermal resistance ( $R_{c-a}$ ) must be at or below the maximum  $R_{c-a}$  value shown on the following graph, depending on the operating environment. The y-axis in the graph is a base 10 logarithmic scale.

As the figure at right shows, the  $R_{c-a}$  value is the sum of the thermal resistance of the TIM ( $R_{tim}$ ) plus the thermal resistance of the heat sink ( $R_{hs}$ ).



## 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.

### **Vision Advisory Claim**

Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.

### PACKAGING

Cree CXA1820 LEDs are packaged in trays of 20. Five trays are sealed in an anti-static bag and placed inside a carton, for a total of 100 LEDs per carton. Each carton contains 100 LEDs from the same performance bin.

Dimensions are in inches.

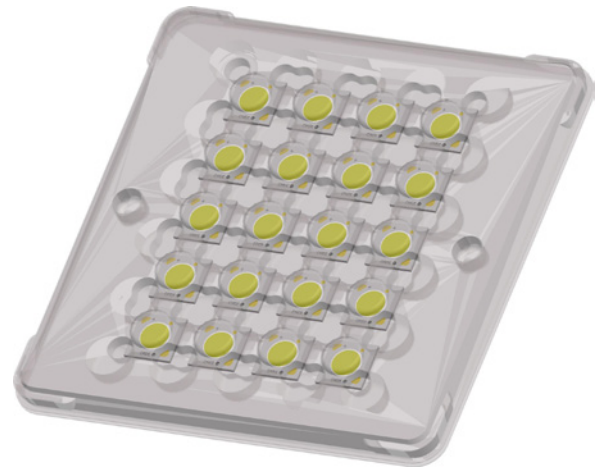
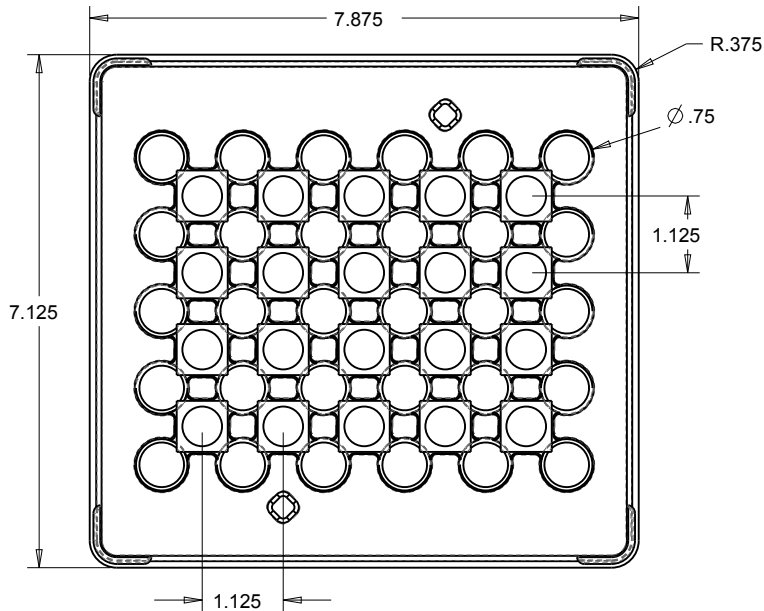
Tolerances:

.x  $\pm$  .1

.xx  $\pm$  .05

.xxx  $\pm$  .005

x°  $\pm$  1°

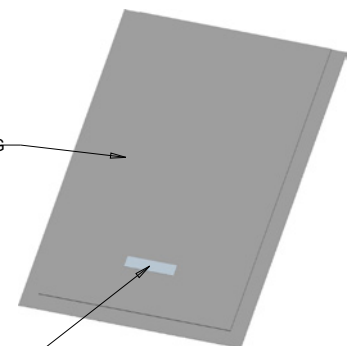


PATENT LABEL  
IS LOCATED ON UNDERSIDE OF  
CARTON



LABEL WITH CREE  
BIN CODE, QTY, LOT#

BAG



LABEL WITH CREE  
BIN CODE, QTY, LOT#