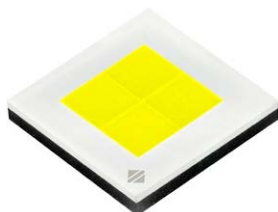


## XLamp® XFLMNA LEDs



### PRODUCT DESCRIPTION

XLamp® XFLMNA LEDs are fully optimized for flashlights and other portable lighting applications in terms of light output, optical performance and value. The compact and proven 5.00 mm platform has an excellent ecosystem of optics and system solutions available, enabling lighting manufacturers to simplify their design process and shorten time-to-market. The XFLMNA LED is offered as a high-intensity option to deliver maximum candela through secondary optics.

XLamp XFL LEDs are optimized for high-output flashlight and other portable lighting applications.

### FEATURES

- Available in ANSI white bins at 6500 K & 5700 K CCT
- Binned at 25 °C
- 3-V/6-V is configurable by PCB layout
- Reflow solderable - JEDEC J-STD-020C compatible
- Electrically neutral thermal path
- Unlimited floor life at  $\leq 30$  °C/85% RH
- RoHS and REACH compliant
- UL® recognized component (E349212)

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Cree LED / 4001 E. Hwy. 54, Suite 2000 / Durham, NC 27713 USA / +1.919.313.5330 / [www.cree-led.com](http://www.cree-led.com)

## CHARACTERISTICS

XLamp XFLMNA LEDs are tested and binned in production in the 6-V configuration. See the Mechanical Dimensions section on page 16 for pad layout options.

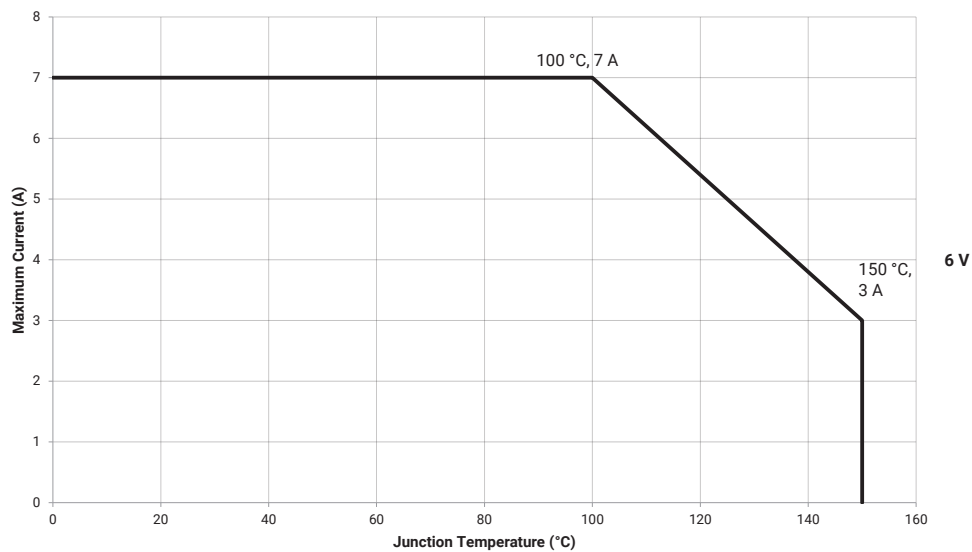
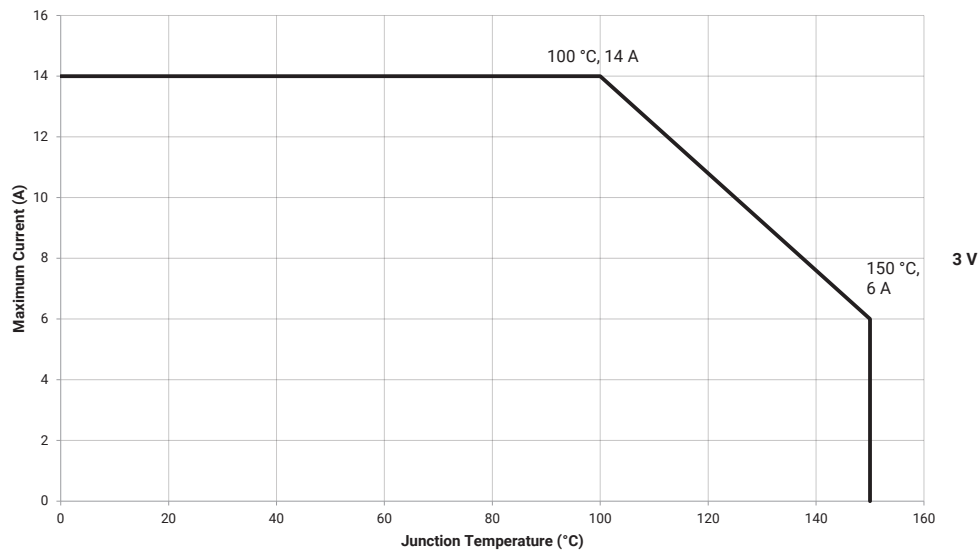
| Characteristics                              | Unit    | Minimum | Typical | Maximum |
|----------------------------------------------|---------|---------|---------|---------|
| Thermal resistance, junction to solder point | °C/W    |         | 0.4     |         |
| Viewing angle (FWHM)                         | degrees |         | 120     |         |
| Temperature coefficient of voltage (3 V)*    | mV/°C   |         | -1.35   |         |
| Temperature coefficient of voltage (6 V)     | mV/°C   |         | -2.7    |         |
| DC forward current (3 V)*                    | A       |         |         | 14      |
| DC forward current (6 V)                     | A       |         |         | 7       |
| Forward voltage (3 V @ 2100 mA, 25 °C)*      | V       |         | 2.9     | 3.2     |
| Forward voltage (6 V @ 1050 mA, 25 °C)       | V       |         | 5.9     | 6.4     |
| LED junction temperature                     | °C      |         |         | 150     |

### Note

- Thermal resistance measurement was performed per the JEDEC JESD51-14 standard. See the [Thermal Resistance Measurement application note](#) for more details.
- \* Data for the 3-V configuration are calculated and for reference only.

## MAXIMUM CURRENT VS. JUNCTION TEMPERATURE

XFLMNA LEDs should be driven at maximum current for only up to 60 seconds at a time with design measures taken to ensure the junction temperature ( $T_j$ ) never exceeds the  $T_j$  value at the operating drive current as shown in the Maximum Current vs. Junction Temperature graphs below. For applications requiring longer operating lifetime, please refer to the [LED Reliability Overview document](#) for guidance on drive currents for which XFLMNA LEDs have been tested for hours of continuous operation.



## FLUX CHARACTERISTICS

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

Binning condition:  $T_J = 25\text{ }^{\circ}\text{C}$ ; 6 V,  $I_F = 1050\text{ mA}$

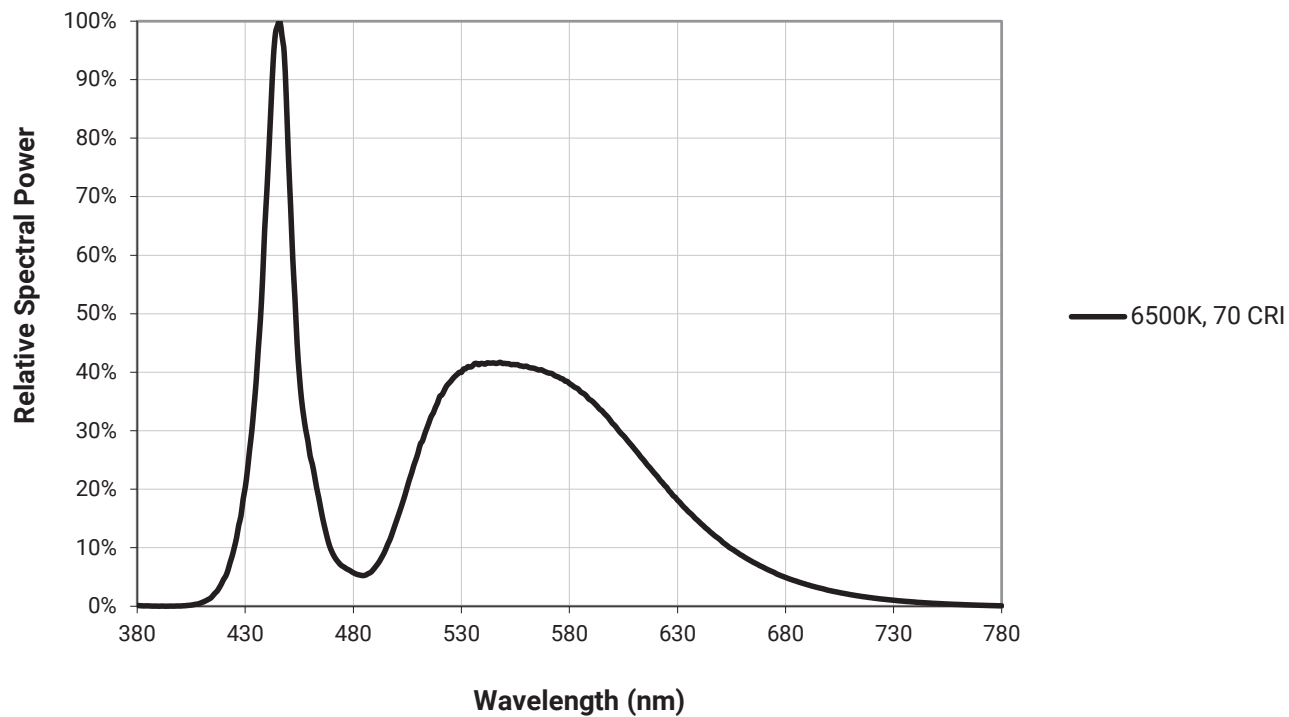
Reference condition:  $T_J = 25\text{ }^{\circ}\text{C}$ ; 3 V,  $I_F = 2100\text{ mA}$

| Nominal CCT | Chromaticity Bins | CRI     |         | Minimum Luminous Flux (lm) | Typical Luminous Flux (lm) | Order Code               |
|-------------|-------------------|---------|---------|----------------------------|----------------------------|--------------------------|
|             |                   | Minimum | Typical |                            |                            |                          |
| 6500 K      | 1A, 1B, 1C, 1D    | 0       |         | 1010                       | 1070                       | XFLMNA-H0-0000-0B000A0E1 |
| 5700 K      | 2A, 2B, 2C, 2D    | 0       |         | 1050                       | 1090                       | XFLMNA-H0-0000-0B000A0E2 |

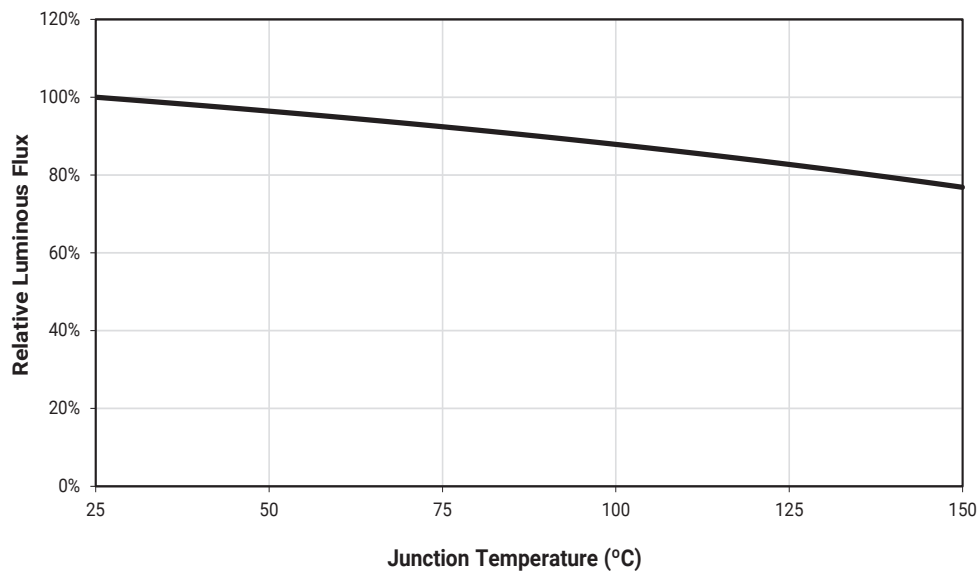
### Note

- Cree LED 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 14).

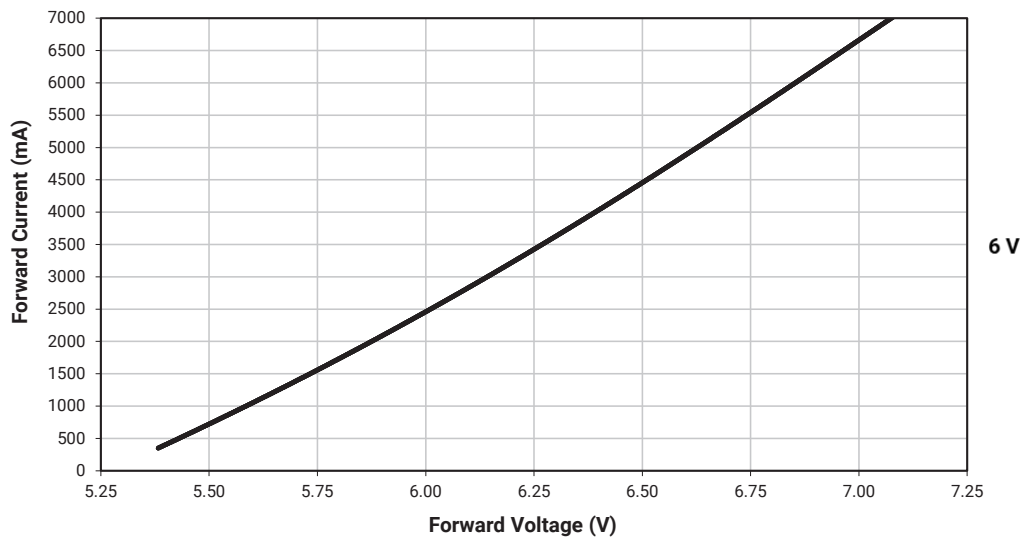
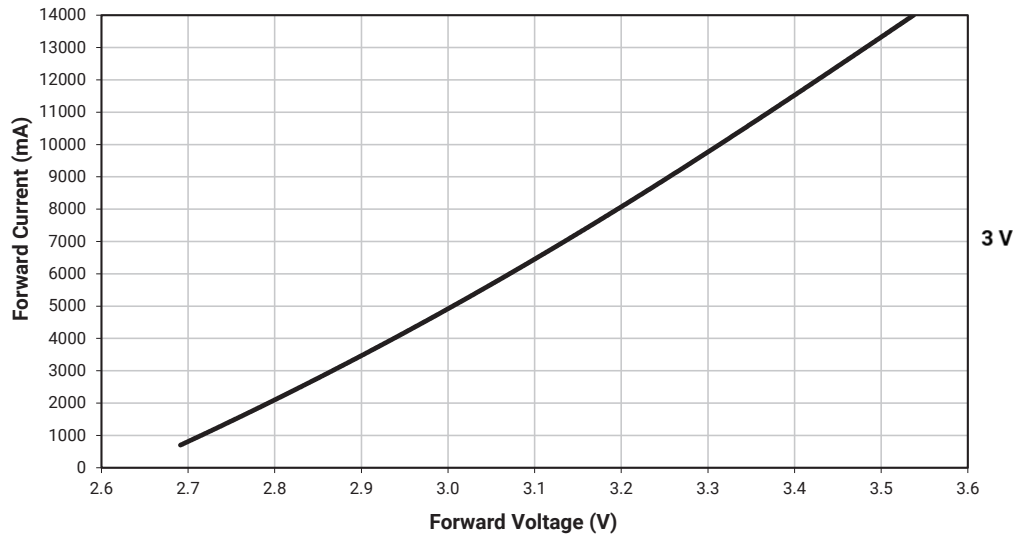
## RELATIVE SPECTRAL POWER DISTRIBUTION



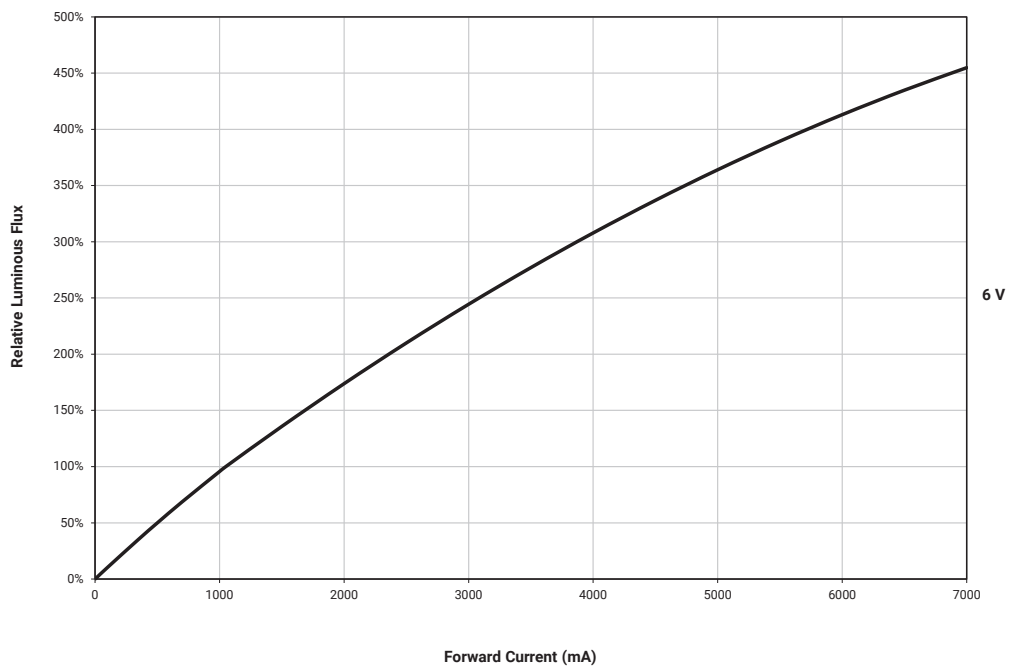
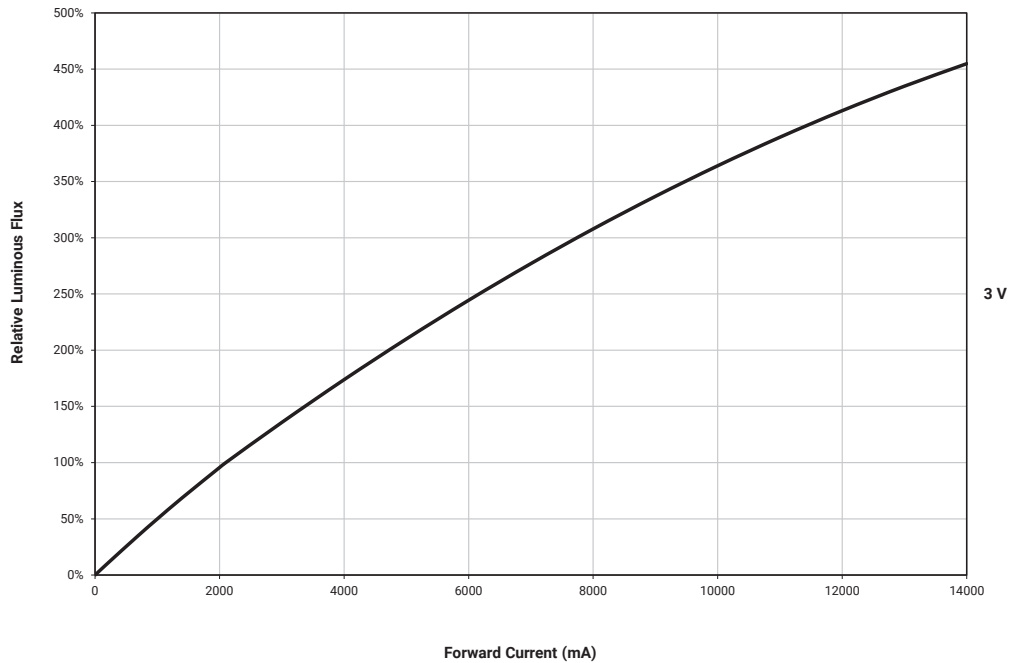
## RELATIVE FLUX VS. JUNCTION TEMPERATURE



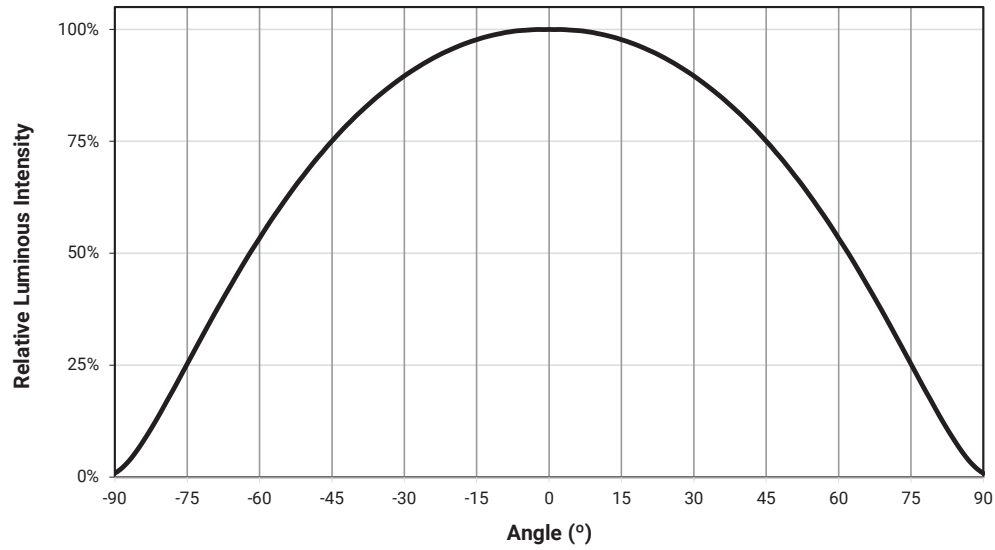
## ELECTRICAL CHARACTERISTICS



## RELATIVE FLUX VS. CURRENT

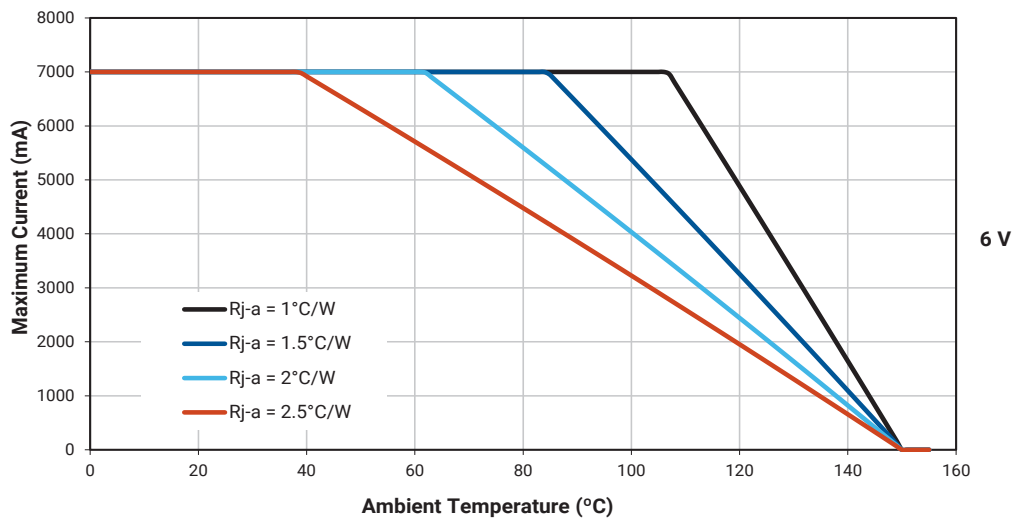
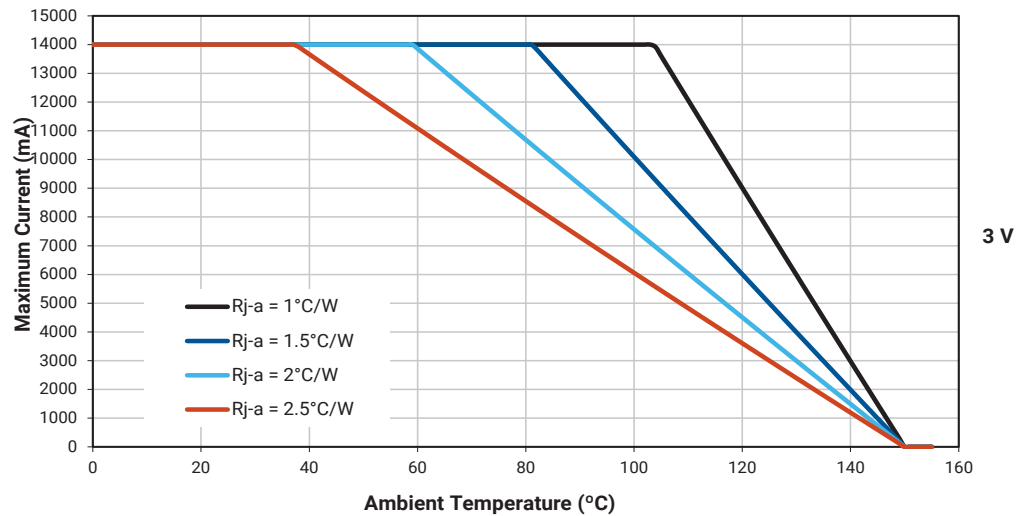


## TYPICAL SPATIAL DISTRIBUTION



## 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.



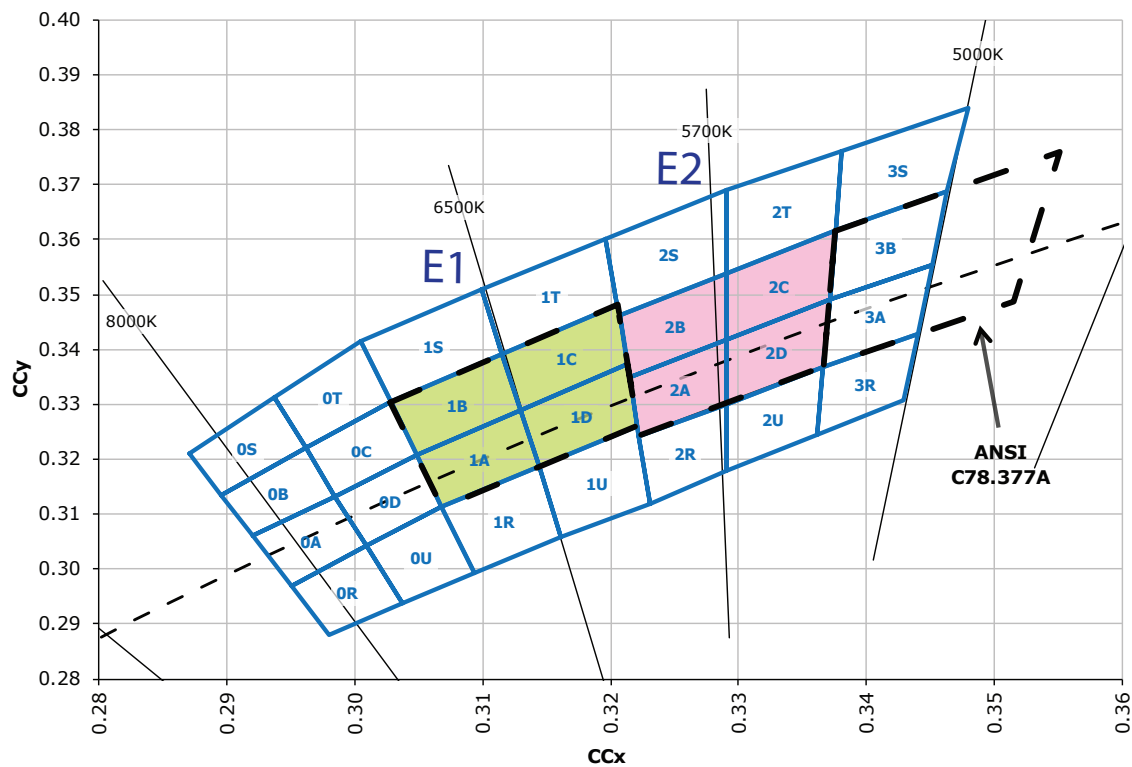
## PERFORMANCE GROUPS - FORWARD VOLTAGE ( $T_j = 25\text{ }^{\circ}\text{C}$ )

XFLMNA LEDs are tested for forward voltage and placed into one of the following voltage bins.

| Group Code | Minimum Forward Voltage (V) | Maximum Forward Voltage (V) |
|------------|-----------------------------|-----------------------------|
| B1         | 5.5                         | 5.8                         |
| B2         | 5.8                         | 6.1                         |
| B3         | 6.1                         | 6.4                         |

PERFORMANCE GROUPS - CHROMATICITY ( $T_J = 25\text{ }^{\circ}\text{C}$ )

| Region | x      | y      | Region | x      | y      | Region | x      | y      | Region | x      | y      |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1A     | 0.3144 | 0.3187 | 1B     | 0.3130 | 0.3290 | 1C     | 0.3213 | 0.3371 | 1D     | 0.3221 | 0.3261 |
|        | 0.3130 | 0.3288 |        | 0.3117 | 0.3393 |        | 0.3205 | 0.3481 |        | 0.3213 | 0.3371 |
|        | 0.3048 | 0.3209 |        | 0.3028 | 0.3304 |        | 0.3117 | 0.3393 |        | 0.3130 | 0.3290 |
|        | 0.3068 | 0.3113 |        | 0.3048 | 0.3209 |        | 0.3130 | 0.3290 |        | 0.3144 | 0.3187 |
| 2A     | 0.3294 | 0.3306 | 2B     | 0.3293 | 0.3422 | 2C     | 0.3371 | 0.3493 | 2D     | 0.3366 | 0.3369 |
|        | 0.3293 | 0.3422 |        | 0.3291 | 0.3539 |        | 0.3376 | 0.3616 |        | 0.3371 | 0.3493 |
|        | 0.3214 | 0.3352 |        | 0.3206 | 0.3462 |        | 0.3291 | 0.3539 |        | 0.3293 | 0.3422 |
|        | 0.3222 | 0.3243 |        | 0.3214 | 0.3352 |        | 0.3293 | 0.3422 |        | 0.3294 | 0.3306 |



## ORDER CODE FORMAT

### AAABBB-CD-GGGG-HJKLMMNNN

| Characters | Description         | Detail                       |
|------------|---------------------|------------------------------|
| AAA        | Product Series      | XFL                          |
| BBB        | Product Version     | MNA                          |
| C          | Configuration       | H = High Intensity           |
| D          | Reel Size           | 0 = 1000 pcs                 |
| GGGG       | Internal Code       |                              |
| H          | Internal Code       |                              |
| J          | Voltage Class       | B = 3V/6V                    |
| K          | Internal Code       |                              |
| L          | CRI Specification   | 0 = 0 CRI minimum            |
| MM         | Luminous Flux Group | 0A = not binned in flux bins |
| NNN        | Chromaticity Group  |                              |

## BIN CODE FORMAT

### AAABBB-C-PPP-QQQ-RR-L-SS

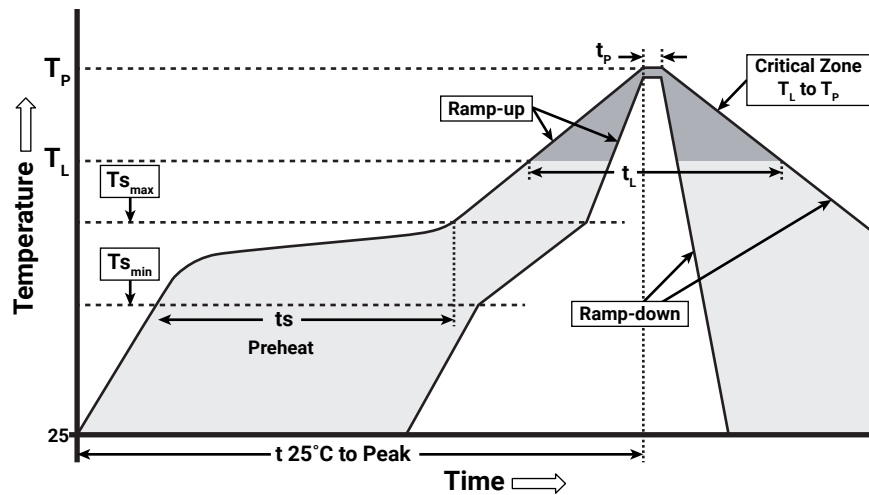
Characters A, B, C & L are identical to the definitions in the Order Code Format section.

| Characters | Description      | Detail                        |
|------------|------------------|-------------------------------|
| PPP        | Chromaticity Bin | See details on page 9         |
| QQQ        | Flux Bin         | 0A0 = not binned in flux bins |
| RR         | Voltage Bin      | See details on page 8         |
| SS         | Internal Code    |                               |

## REFLOW SOLDERING CHARACTERISTICS

In testing, Cree LED has found XLamp XFLMNA LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree LED recommends that users follow the recommended soldering profile provided by the manufacturer of the solder paste used, and therefore it is the lamp or luminaire manufacturer's responsibility to determine applicable soldering requirements.

Note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment.



IPC/JEDEC J-STD-020C

| Profile Feature                                       | Lead-Free Solder |
|-------------------------------------------------------|------------------|
| Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_P$ )       | 3 °C/second      |
| Preheat: Temperature Min ( $T_{s_{min}}$ )            | 150 °C           |
| Preheat: Temperature Max ( $T_{s_{max}}$ )            | 200 °C           |
| Preheat: Time ( $t_{s_{min}}$ to $t_{s_{max}}$ )      | 60-180 seconds   |
| Time Maintained Above: Temperature ( $T_L$ )          | 217 °C           |
| Time Maintained Above: Time ( $t_l$ )                 | 60-150 seconds   |
| Peak/Classification Temperature ( $T_P$ )             | 260 °C           |
| Time Within 5 °C of Actual Peak Temperature ( $t_p$ ) | 20-40 seconds    |
| Ramp-Down Rate                                        | 6 °C/second max. |
| Time 25 °C to Peak Temperature                        | 8 minutes max.   |

Note: All temperatures refer to topside of the package, measured on the package body surface.

## NOTES

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### Measurements

The luminous flux, radiant power, chromaticity, forward voltage and CRI measurements in this document are binning specifications only and solely represent product measurements as of the date of shipment. These measurements will change over time based on a number of factors that are not within Cree LED's control and are not intended or provided as operational specifications for the products. Calculated values are provided for informational purposes only and are not intended or provided as specifications.

### Pre-Release Qualification Testing

Please read the [LED Reliability Overview](#) for details on the qualification testing performed on XFLMNA LEDs.

### Moisture Sensitivity

Cree LED recommends keeping XLamp LEDs in the provided, resealable moisture-barrier packaging (MBP) until immediately prior to soldering. Unopened MBPs that contain XLamp LEDs do not need special storage for moisture sensitivity.

Once the MBP is opened, XLamp XFLMNA LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of  $\leq 30^{\circ}\text{C}/85\%$  relative humidity (RH). Regardless of the storage condition, Cree LED recommends sealing any unsoldered LEDs in the original MBP.

### RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree LED representative or from the [Product Ecology](#) section of the Cree LED website.

### REACH Compliance

REACH substances of very high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree LED representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

### 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.

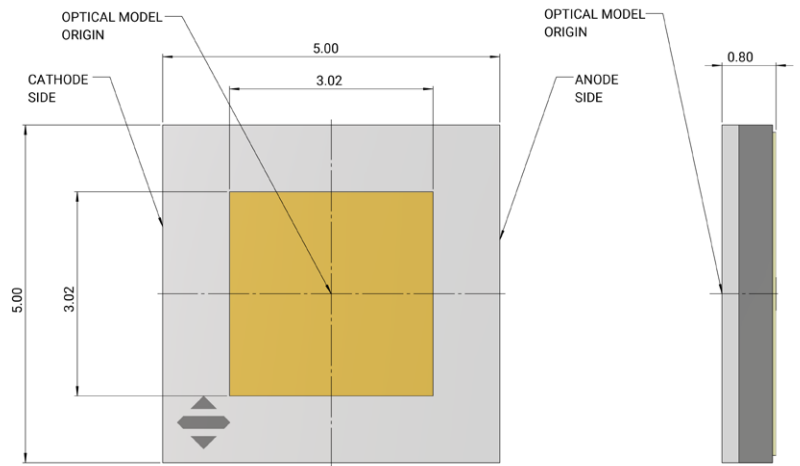
### Vision Advisory

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](#).

## MECHANICAL DIMENSIONS

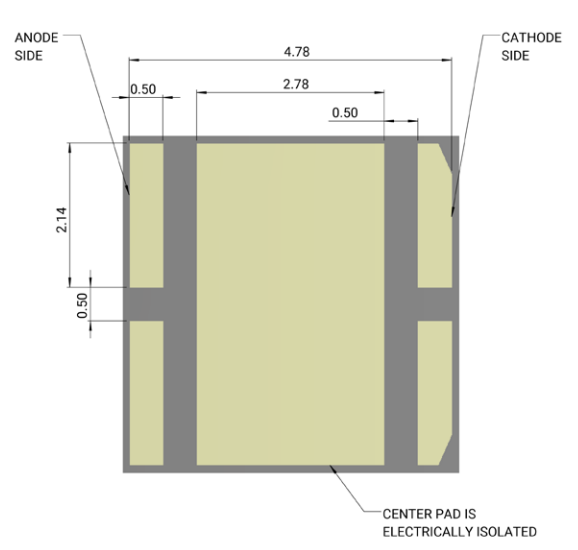
Thermal vias, if present, are not shown on these drawings.

All measurements are  $\pm 0.1$  mm unless otherwise indicated.



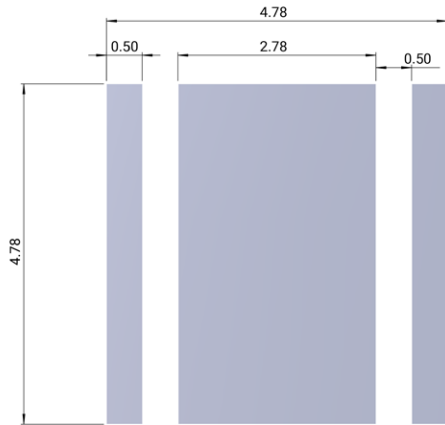
Top View

Side View

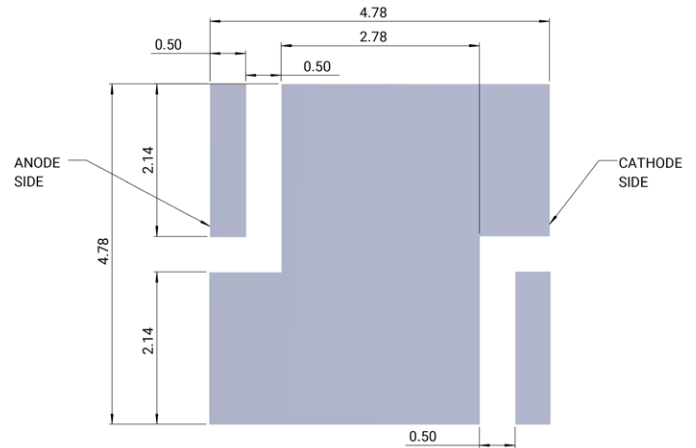


Bottom View

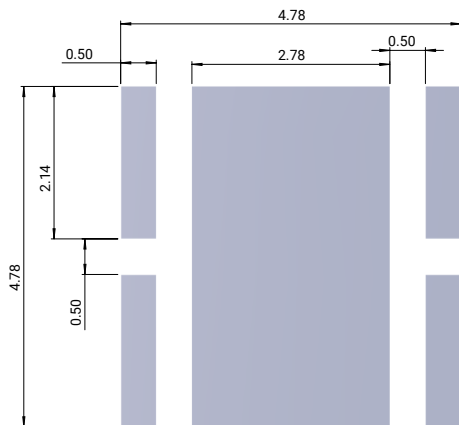
## MECHANICAL DIMENSIONS - CONTINUED



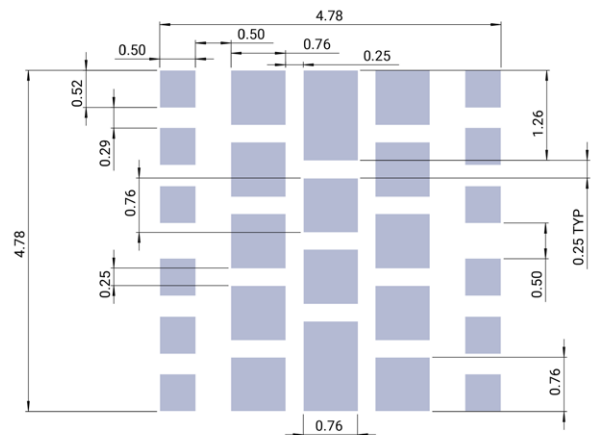
Recommended 3-V PCB Footprint



Recommended 6-V PCB Footprint



3-V and 6-V PCB Soldermask Opening



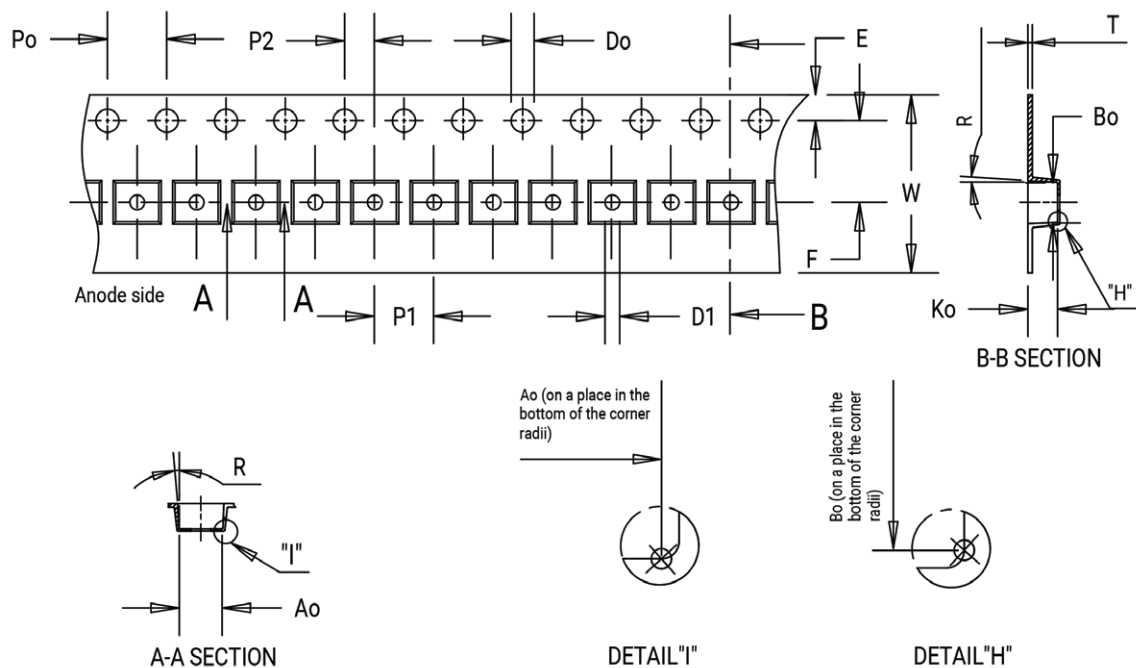
Recommended Stencil Opening

## TAPE AND REEL

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

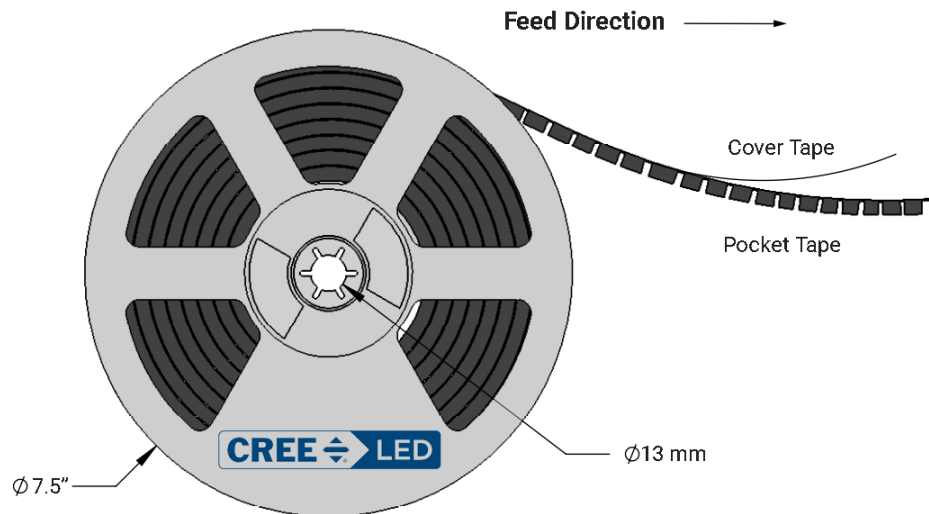
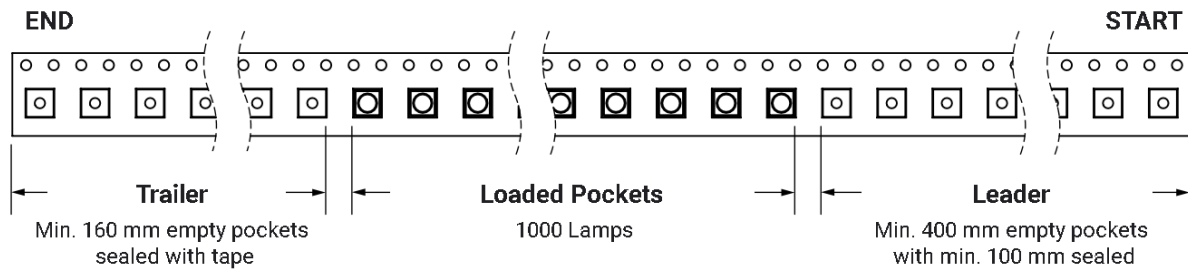
All dimensions in mm.

All dimensions are  $\pm 0.13$  mm unless otherwise indicated.



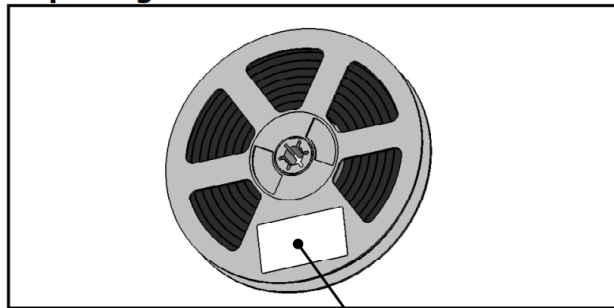
| Item      | $A_0$ | $B_0$ | $K_0$ | $P_0$ | $P_1$ | $P_2$ | $T$  | $E$  | $F$  | $D_0$ | $D_1$ | $W$   | $R$ |
|-----------|-------|-------|-------|-------|-------|-------|------|------|------|-------|-------|-------|-----|
| Dimension | 5.40  | 5.40  | 1.5   | 4.00  | 8.00  | 2.00  | 0.30 | 1.75 | 5.50 | 1.50  | 1.50  | 12.00 | 7°  |

## TAPE AND REEL - CONTINUED



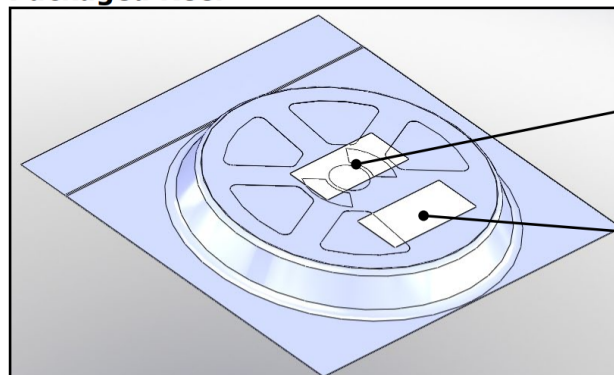
## PACKAGING

## Unpackaged Reel



Label with Cree LED Bin  
Code, Quantity, Reel ID

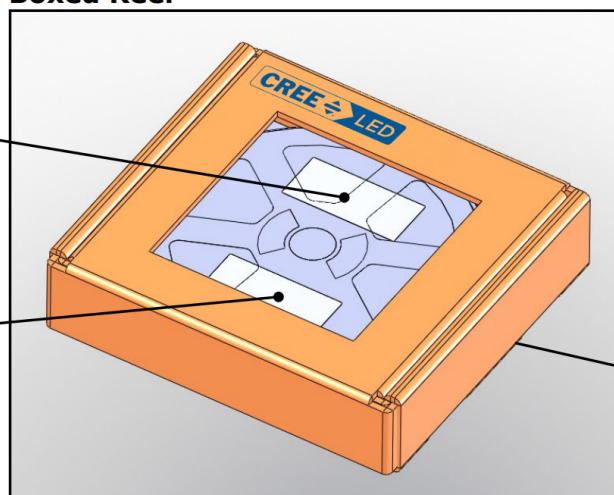
## Packaged Reel



Label with Cree LED Order  
Code, Quantity, Reel ID, PO#

Label with Cree LED Bin  
Code, Quantity, Reel ID

## Boxed Reel



Label with Cree LED Order  
Code, Quantity, Reel ID, PO#

Label with Cree LED Bin Code,  
Quantity, Reel ID

Patent Label  
(on bottom of box)