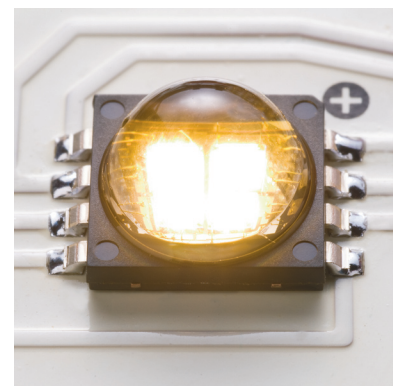


# Cree® XLamp® MC-E LED

## Data Sheet

Cree XLamp MC-E LED is a lighting-class multi-chip LED that provides four times the flux of the XLamp XR-E LED in the same footprint. XLamp MC-E LEDs can reduce LED system complexity by reducing the number of components required.

Cree XLamp LEDs bring high performance and quality of light to a wide range of lighting applications, including color-changing lighting, portable and personal lighting, outdoor lighting, indoor directional lighting, commercial lighting and emergency-vehicle lighting.



### FEATURES

- Industry’s first lighting-class multi-chip LED
- Individually addressable LEDs
- Available in white (2,600 K to 10,000 K CCT)
- Maximum drive current: 700 mA per LED die
- Lowest XLamp thermal resistance: 3°C/W
- Electrically neutral thermal path

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## Flux Characteristics (T<sub>j</sub> = 25°C)

The following tables provide several base order codes for XLamp MC-E. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family. For more order codes, as well as a complete description of the order-code nomenclature, please consult the XLamp MC-E Binning and Labeling document.

Color	CCT Range		Base order codes Min Luminous Flux (lm) @ 350 mA*		Order Code
	Min.	Max.	Group	Flux (lm)	
Cool White	5,000 K	10,000 K	K	370	MCE4WT-A2-0000-000K01
Neutral White	3,700 K	5,000 K	J	320	MCE4WT-A2-0000-000JE4
Warm White	2,600 K	3,700 K	G	240	MCE4WT-A2-0000-000GE7
			H	280	MCE4WT-A2-0000-000HE7

### Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements.
- Typical CRI for cool white and neutral white (3,700 K - 10,000 K CCT) is 75.
- Typical CRI for warm white (2,600 K - 3,700 K CCT) is 80.
- Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350 mA. The flux and chromaticity are measured with all LEDs lit simultaneously.

## Characteristics - Complete Package

The following table lists the product characteristics for the XLamp MC-E LED package.

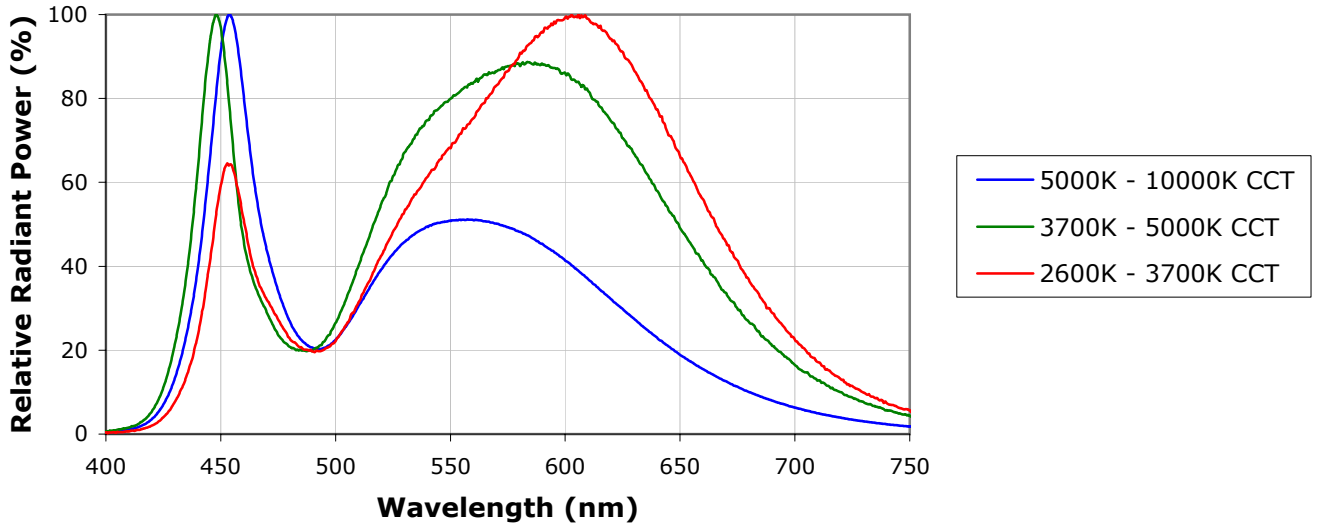
Characteristics	Unit	Minimum	Typical	Maximum
Thermal Resistance, junction to solder point	°C/W		3	
Viewing Angle (FWHM)	degrees		110	
ESD Classification (HBM per Mil-Std-883D)			Class 2	
LED Junction Temperature	°C			150

## Characteristics - Per LED Die

The following table lists the product characteristics of each individual LED die within the XLamp MC-E LED package.

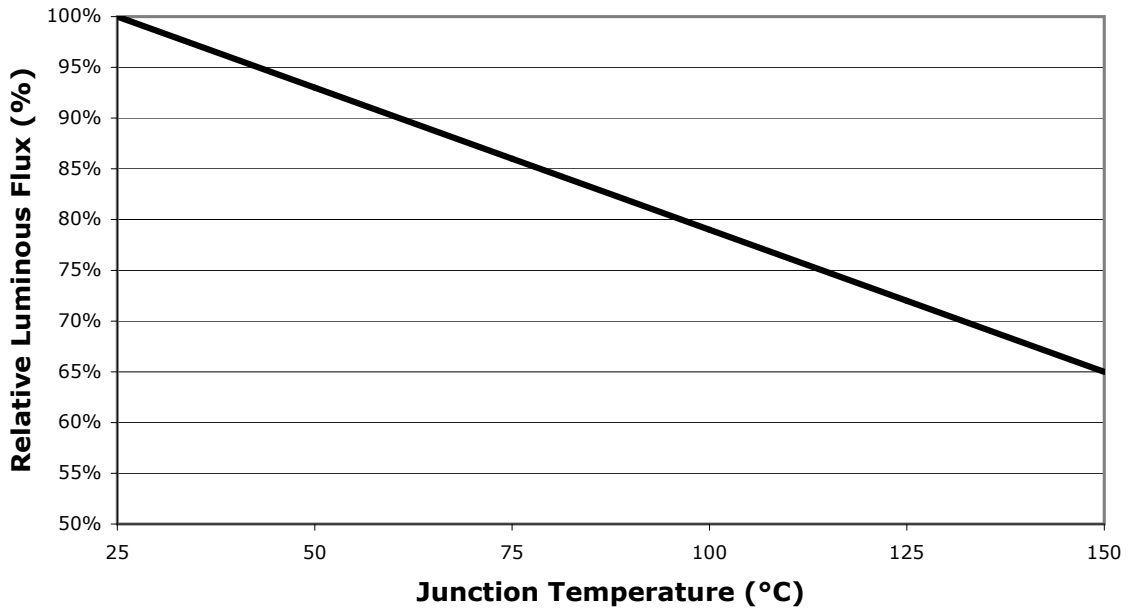
Characteristics	Unit	Minimum	Typical	Maximum
Temperature Coefficient of Voltage	mV/°C		-4	
DC Forward Current	mA			700
Reverse Voltage	V			5
Forward Voltage (@ 350 mA)	V		3.2	3.9
Forward Voltage (@ 700 mA)	V		3.4	

**Relative Spectral Power Distribution ( $I_f = 350$  mA per LED)**



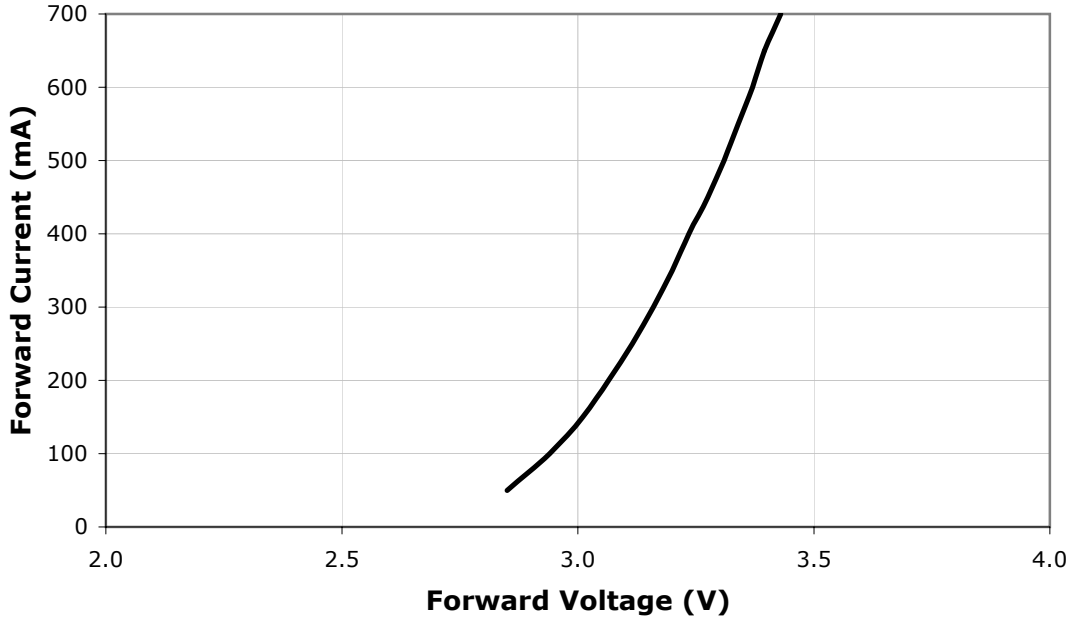
**Relative Flux vs Junction Temperature ( $I_f = 350$  mA)**

The following graph represents typical performance of XLamp MC-E LEDs with all four LEDs driven in series at 350 mA.



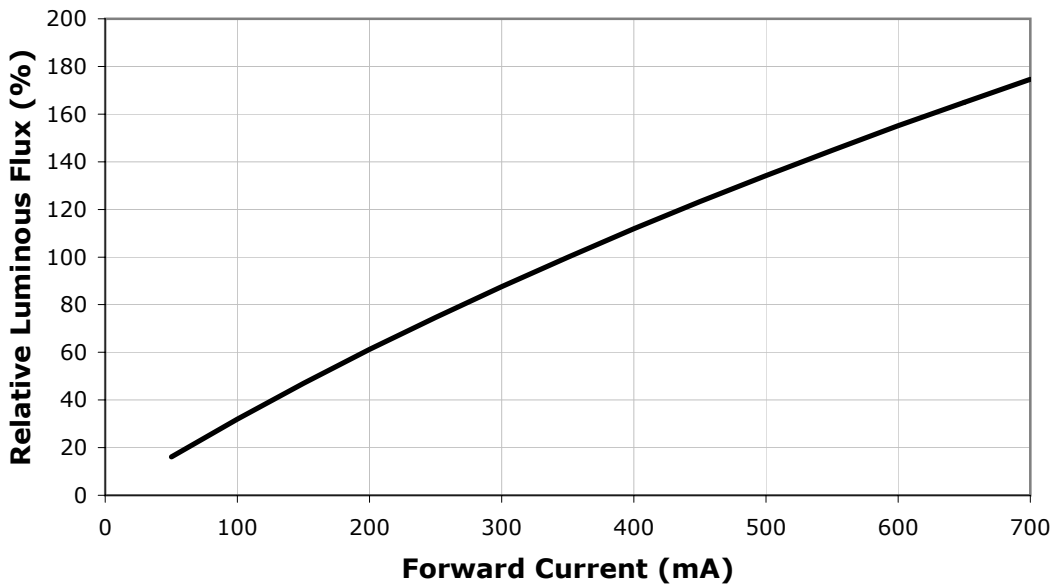
## Electrical Characteristics ( $T_j = 25^\circ\text{C}$ )

The following graph shows the electrical characteristics of one LED die in the XLamp MC-E LED.

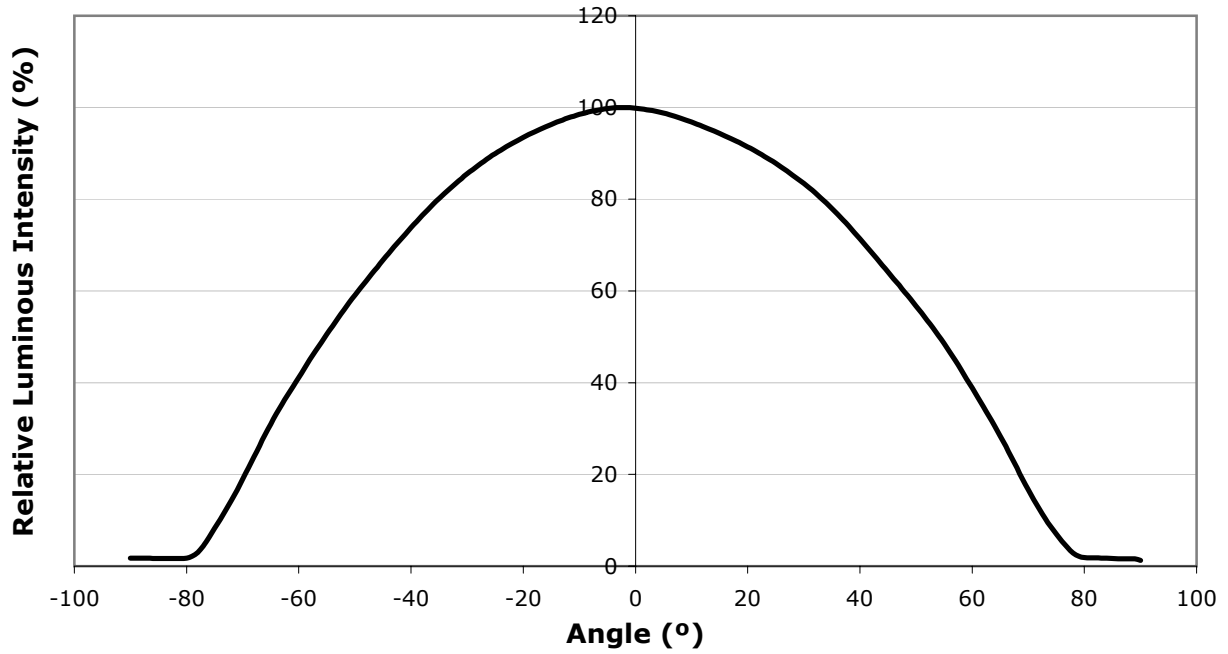


## Relative Luminous Flux vs. Current ( $T_j = 25^\circ\text{C}$ )

The following graph represents typical performance of XLamp MC-E LEDs with all four LEDs driven in series.



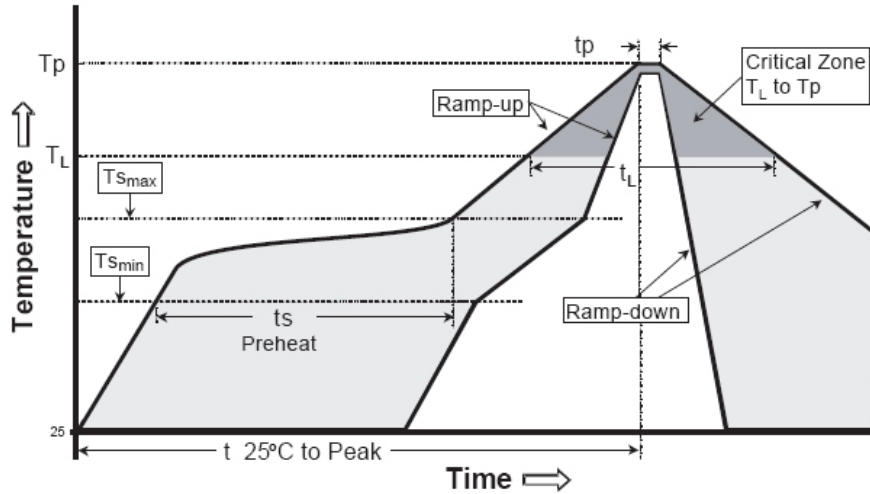
## Typical Spatial Radiation Pattern



## Reflow Soldering Characteristics

In testing, Cree has found XLamp MC-E LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree recommends that users follow the recommended soldering profile provided by the manufacturer of solder paste used.

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-Based Solder	Lead-Free Solder
Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_{p}$ )	3°C/second max.	3°C/second max.
Preheat: Temperature Min ( $T_{s_{min}}$ )	100°C	150°C
Preheat: Temperature Max ( $T_{s_{max}}$ )	150°C	200°C
Preheat: Time ( $t_{s_{min}}$ to $t_{s_{max}}$ )	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature ( $T_{l}$ )	183°C	217°C
Time Maintained Above: Time ( $t_{l}$ )	60-150 seconds	60-150 seconds
Peak/Classification Temperature ( $T_{p}$ )	215°C	260°C
Time Within 5°C of Actual Peak Temperature ( $t_{p}$ )	10-30 seconds	20-40 seconds
Ramp-Down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

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

## Notes

### Moisture Sensitivity

XLamp MC-E LEDs are shipped in sealed, moisture-barrier bags (MBB) designed for long shelf life. If XLamp MC-E LEDs are exposed to moist environments after opening the MBB packaging but before soldering, damage to the LED may occur during the soldering operation. The following derating table defines the maximum exposure time (in days) for an XLamp MC-E LED in the listed humidity and temperature conditions. LEDs with exposure time longer than the time specified below must be baked according to the baking conditions listed below.

Temperature	Maximum Percent Relative Humidity						
	30%	40%	50%	60%	70%	80%	90%
30°C	9	5	4	3	1	1	1
25°C	12	7	5	4	2	1	1
20°C	17	9	7	6	2	2	1

### Baking Conditions

It is not necessary to bake all XLamp MC-E LEDs. Only the LEDs that meet all of the following criteria must be baked:

1. LEDs that have been removed from the original MBB packaging
2. LEDs that have been exposed to a humid environment longer than listed in the Moisture Sensitivity section above
3. LEDs that have not been soldered

LEDs should be baked at 80°C for 24 hours. LEDs may be baked on the original reels. Remove LEDs from MBB packaging before baking. Do not bake parts at temperatures higher than 80°C. This baking operation resets the exposure time as defined in the Moisture Sensitivity section above.

### Storage Conditions

XLamp MC-E LEDs that have been removed from original MBB packaging but not soldered yet should be stored in a room or cabinet that will maintain an atmosphere of  $25 \pm 5^\circ\text{C}$  and no greater than 10% RH (relative humidity). For LEDs stored in these conditions, storage time does not add to exposure time as defined in the Moisture Sensitivity section above.

### RoHS Compliance

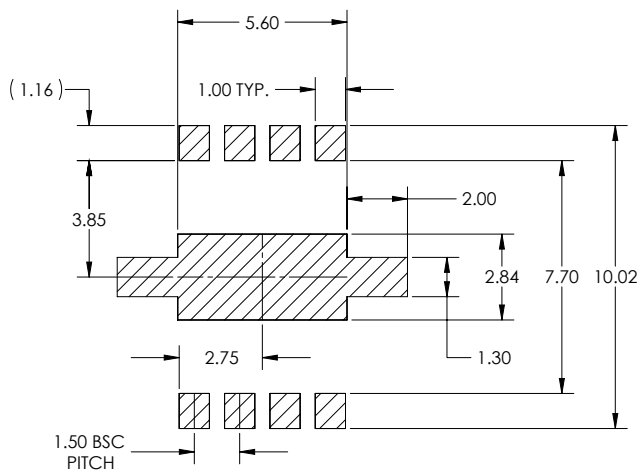
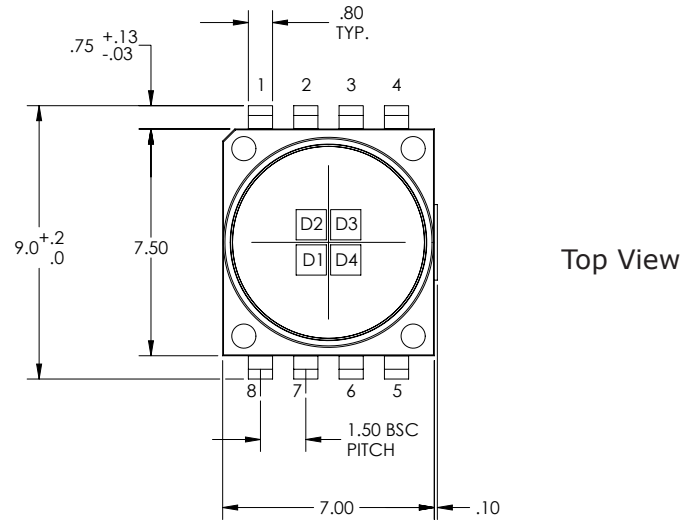
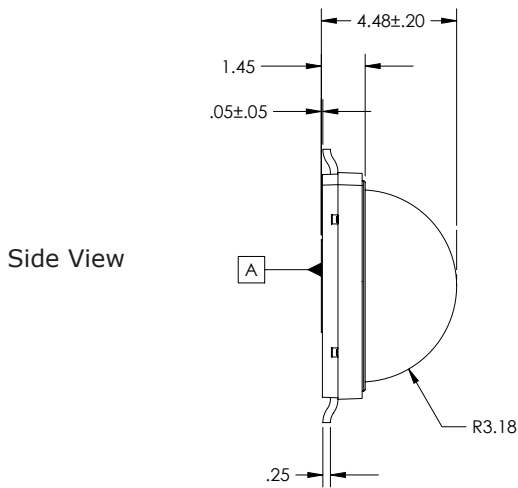
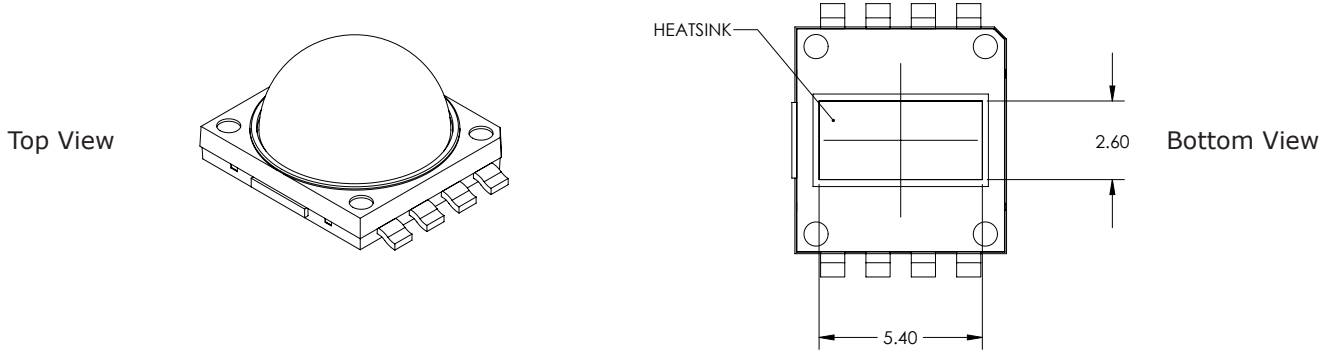
The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.

### Vision Advisory Claim

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

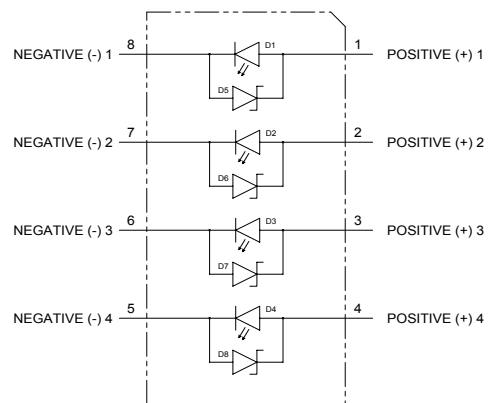
## Mechanical Dimensions

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



### RECOMMENDED PCB SOLDER PAD

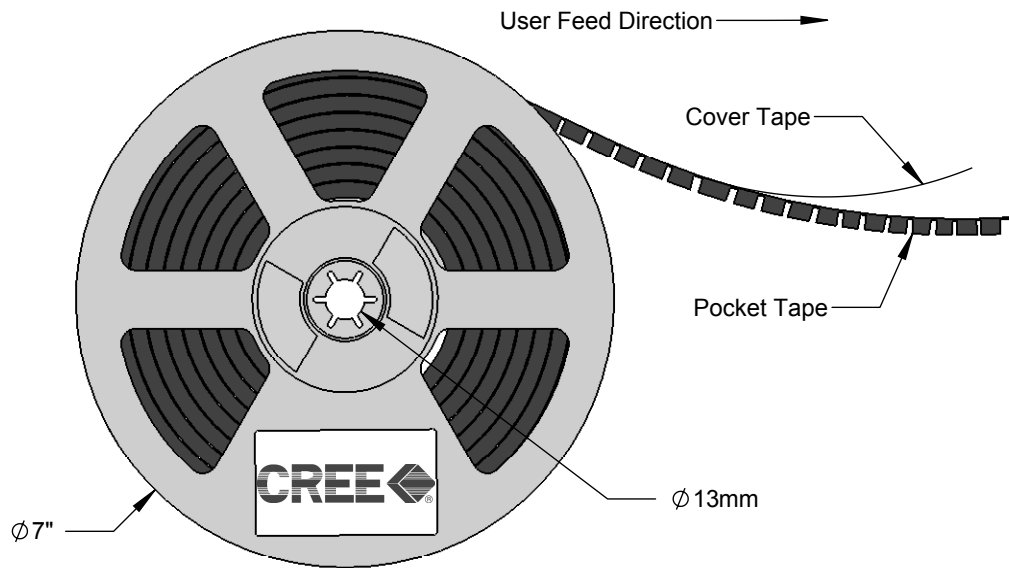
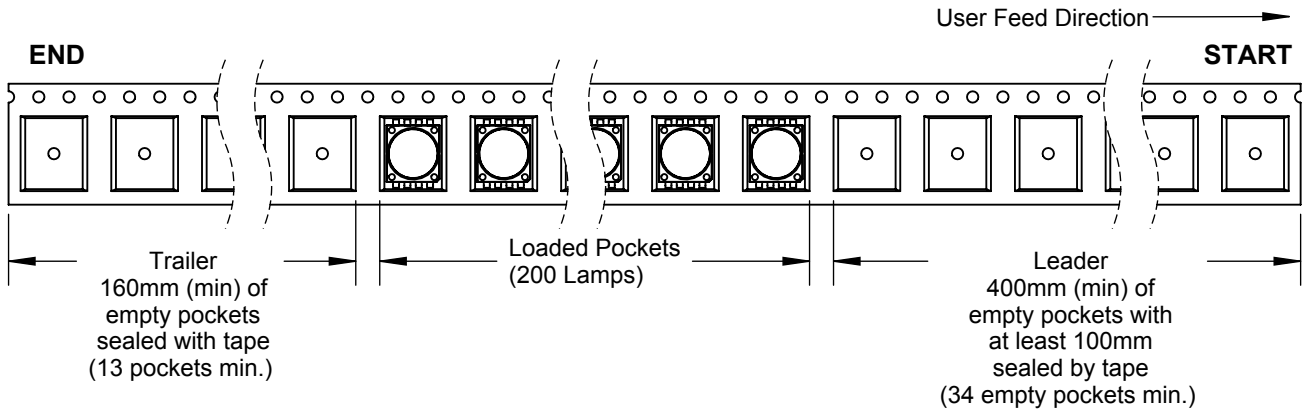
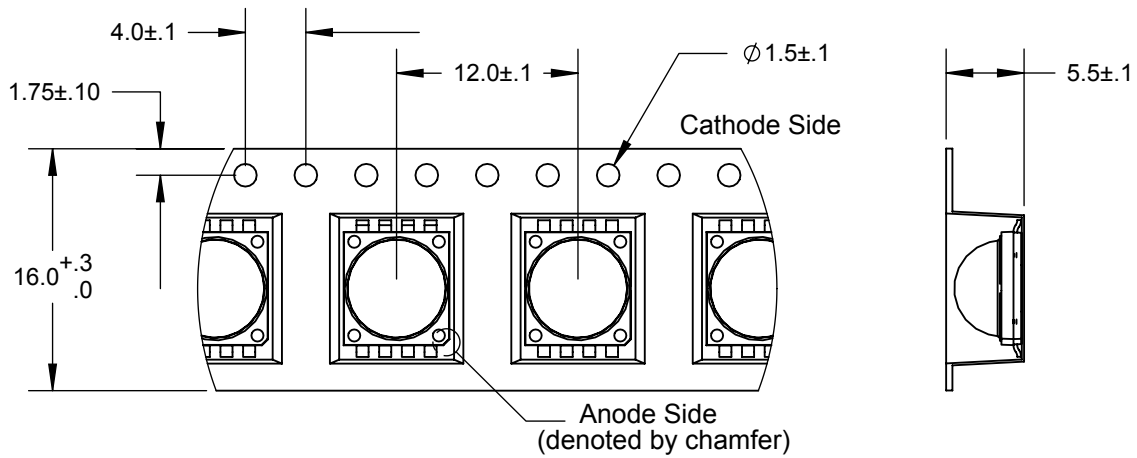
1. Tolerances:  $\pm 0.10$
2. Solder mask windows must be  $.05\text{ mm}$  bigger than PCB Solder Pad.





## Tape and Reel

All measurements in mm.



## Dry Packaging and Packaging

