

# Cree® EZ700-n™ Gen 2 LED

## Data Sheet (Cathode-up)

### CxxxEZ700-Sxx000-2

Cree's EZBright™ LEDs are the next generation of solid-state LED emitters that combine highly efficient InGaN materials with Cree's proprietary optical design and device technology to deliver superior value for high-intensity LEDs. The optical design maximizes light extraction efficiency and enables a Lambertian radiation pattern. Additionally, these LEDs are die attachable with conductive epoxy, solder paste or solder preforms, in addition to using the flux eutectic method. These vertically structured, low forward voltage LED chips are approximately 170 microns in height. Cree's EZ™ chips are tested for conformity to optical and electrical specifications. These LEDs are useful in a broad range of applications, such as general illumination, automotive lighting and LCD backlighting.

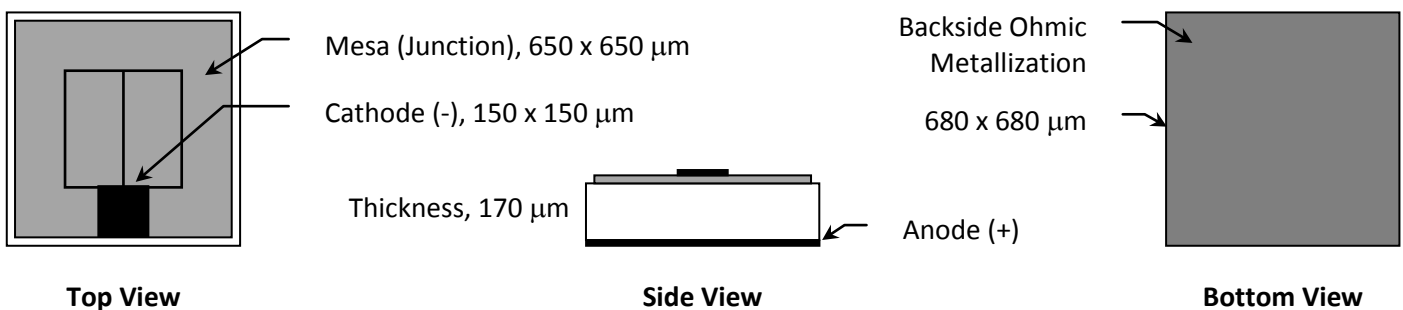
#### FEATURES

- EZBright Power Chip LED Rf Performance
  - 450 nm - 240+ mW
  - 460 nm - 240+ mW
  - 470 nm - 240+ mW
  - 527 nm - 90+ mW
- Lambertian Radiation
- Conductive Epoxy, Solder Paste or Preforms, or Flux Eutectic Attach
- Low Forward Voltage – 3.35 V typ at 350 mA
- Single Wire Bond Structure
- Dielectric Passivation Across Epi Surface

#### APPLICATIONS

- General Illumination
  - Aircraft
  - Decorative Lighting
  - Task Lighting
  - Outdoor Illumination
  - Projection Lighting
- White LEDs
- Crosswalk Signals
- Backlighting
- Automotive

#### CxxxEZ700-Sxx000-2 Chip Diagram



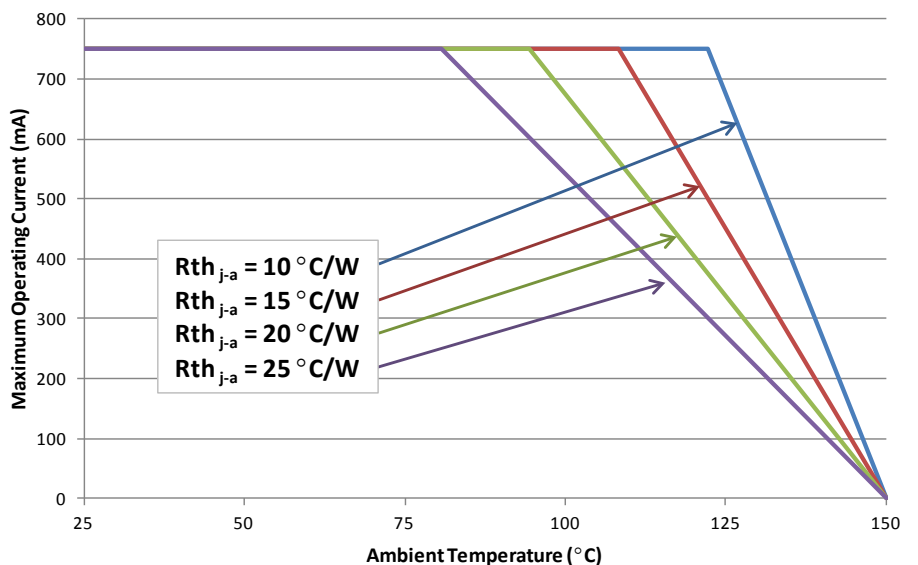
Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1, 2 &amp; 3</small>		CxxxEZ700-Sxx000-2
DC Forward Current		750 mA
Peak Forward Current (1/10 duty cycle @ 1 kHz)		1000 mA
LED Junction Temperature		150°C
Reverse Voltage		5 V
Operating Temperature Range		-40°C to +100°C
LED Chip Storage Temperature		-40°C to +120°C
Recommended Die Sheet Storage Conditions		$\leq 30^\circ\text{C}$ / $\leq 85\%$ RH

Typical Electrical/Optical Characteristics at $T_A = 25^\circ\text{C}$ , $I_f = 350\text{ mA}$ <small>Note 2</small>					
Part Number	Forward Voltage ( $V_f$ , V)			Reverse Current [ $I(V_r=5\text{ V})$ , $\mu\text{A}$ ]	Full Width Half Max ( $\lambda_d$ , nm)
	Min.	Typ.	Max.	Max.	Typ.
C450EZ700-Sxx000-2	3.0	3.35	3.7	2	20
C460EZ700-Sxx000-2	3.0	3.35	3.7	2	21
C470EZ700-Sxx000-2	3.0	3.35	3.7	2	22
C527EZ700-Sxx000-2	3.1	3.5	3.8	2	35

Mechanical Specifications		CxxxEZ700-Sxx000-2	
Description	Dimension	Tolerance	
P-N Junction Area ( $\mu\text{m}$ )	650 x 650	$\pm 35$	
Chip Area ( $\mu\text{m}$ )	680 x 680	$\pm 35$	
Chip Thickness ( $\mu\text{m}$ )	170	$\pm 25$	
Top Au Bond Pad ( $\mu\text{m}$ )	150 x 150	$\pm 25$	
Au Bond Pad Thickness ( $\mu\text{m}$ )	3.0	$\pm 1.5$	
Back Ohmic Metal Area ( $\mu\text{m}$ )	680 x 680	$\pm 35$	
Back Ohmic Metal Thickness ( $\mu\text{m}$ )	3.0	$\pm 1.5$	

**Notes:**

- Maximum ratings are package-dependent. The above ratings were determined using a silicone encapsulated chip on MCPCB for characterization. Ratings for other packages may differ. The junction temperature should be characterized in a specific package to determine limitations. Assembly processing temperature must not exceed 325°C (< 5 seconds). See Cree EZBright Applications Note for assembly-process information.
- All products conform to the listed minimum and maximum specifications for electrical and optical characteristics when assembled and operated at 350 mA within the maximum ratings shown above. Efficiency decreases at higher currents. Typical values given are within the range of average expected by the manufacturer in large quantities and are provided for information only. All measurements were made using a Au-plated TO header without an encapsulant. Optical characteristics measured in an integrating sphere using Illuminance E.
- 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 LED junction to ambient in order to optimize product performance.



## Standard Bins for CxxxEZ700-Sxx000-2

LED chips are sorted to the **radiant flux** and **dominant wavelength** bins shown. A sorted die sheet contains die from only one bin. Sorted die kit (CxxxEZ700-Sxx000-2) orders may be filled with any or all bins (CxxxEZ700-0xxx-2) contained in the kit. All radiant flux and all dominant wavelength values shown and specified are at  $I_f = 350$  mA. Radiant flux values are measured using Au-plated headers without an encapsulant.

### C450EZ700-S24000-2

	C450EZ700-0621-2	C450EZ700-0622-2	C450EZ700-0623-2	C450EZ700-0624-2	
350 mW	C450EZ700-0617-2	C450EZ700-0618-2	C450EZ700-0619-2	C450EZ700-0620-2	
330 mW	C450EZ700-0613-2	C450EZ700-0614-2	C450EZ700-0615-2	C450EZ700-0616-2	
310 mW	C450EZ700-0609-2	C450EZ700-0610-2	C450EZ700-0611-2	C450EZ700-0612-2	
280 mW	C450EZ700-0605-2	C450EZ700-0606-2	C450EZ700-0607-2	C450EZ700-0608-2	
240 mW					
	445 nm	447.5 nm	450 nm	452.5 nm	455 nm

**Dominant Wavelength**

### C460EZ700-S24000-2

	C460EZ700-0621-2	C460EZ700-0622-2	C460EZ700-0623-2	C460EZ700-0624-2	
350 mW	C460EZ700-0617-2	C460EZ700-0618-2	C460EZ700-0619-2	C460EZ700-0620-2	
330 mW	C460EZ700-0613-2	C460EZ700-0614-2	C460EZ700-0615-2	C460EZ700-0616-2	
310 mW	C460EZ700-0609-2	C460EZ700-0610-2	C460EZ700-0611-2	C460EZ700-0612-2	
280 mW	C460EZ700-0605-2	C460EZ700-0606-2	C460EZ700-0607-2	C460EZ700-0608-2	
240 mW					
	455 nm	457.5 nm	460 nm	462.5 nm	465 nm

**Dominant Wavelength**

## Standard Bins for CxxxEZ700-Sxx000-2

LED chips are sorted to the **radiant flux** and **dominant wavelength** bins shown. A sorted die sheet contains die from only one bin. Sorted die kit (CxxxEZ700-Sxx000-2) orders may be filled with any or all bins (CxxxEZ700-0xxx-2) contained in the kit. All radiant flux and all dominant wavelength values shown and specified are at  $I_f = 350$  mA. Radiant flux values are measured using Au-plated headers without an encapsulant.

**C470EZ700-S24000-2**

<b>Radiant Flux</b>	330 mW	C470EZ700-0617-2	C470EZ700-0618-2	C470EZ700-0619-2	C470EZ700-0620-2	
	310 mW	C470EZ700-0613-2	C470EZ700-0614-2	C470EZ700-0615-2	C470EZ700-0616-2	
	280 mW	C470EZ700-0609-2	C470EZ700-0610-2	C470EZ700-0611-2	C470EZ700-0612-2	
	240 mW	C470EZ700-0605-2	C470EZ700-0606-2	C470EZ700-0607-2	C470EZ700-0608-2	
		465 nm	467.5 nm	470 nm	472.5 nm	475 nm
		<b>Dominant Wavelength</b>				

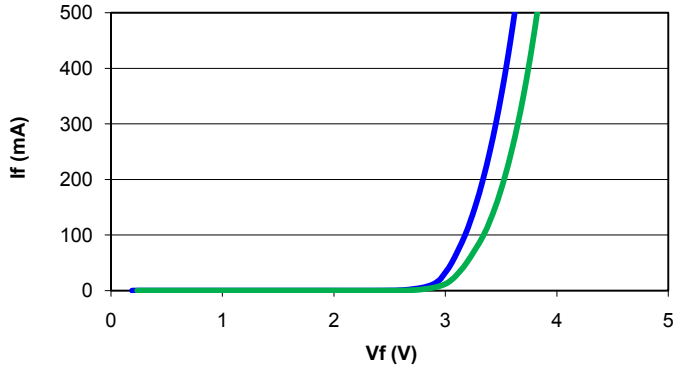
**C527EZ700-S9000-2**

<b>Radiant Flux</b>	150 mW	C527EZ700-0410-2	C527EZ700-0411-2	C527EZ700-0412-2	
	130 mW	C527EZ700-0407-2	C527EZ700-0408-2	C527EZ700-0409-2	
	110 mW	C527EZ700-0404-2	C527EZ700-0405-2	C527EZ700-0406-2	
	90 mW	C527EZ700-0401-2	C527EZ700-0402-2	C527EZ700-0403-2	
		520 nm	525 nm	530 nm	535 nm
		<b>Dominant Wavelength</b>			

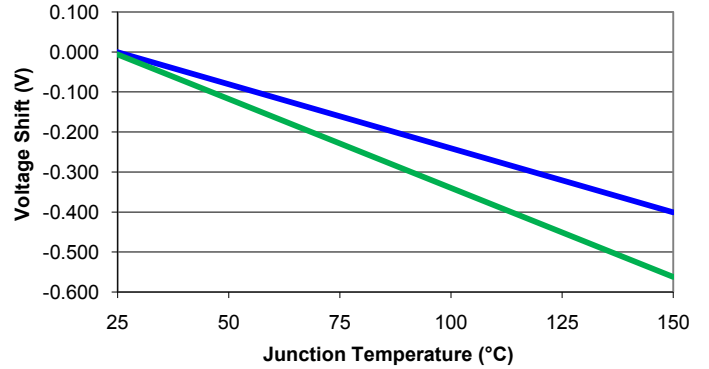
## Characteristic Curves

These are representative measurements for the EZBright Power Chip LED product. Actual curves will vary slightly for the various radiant flux and dominant wavelength bins.

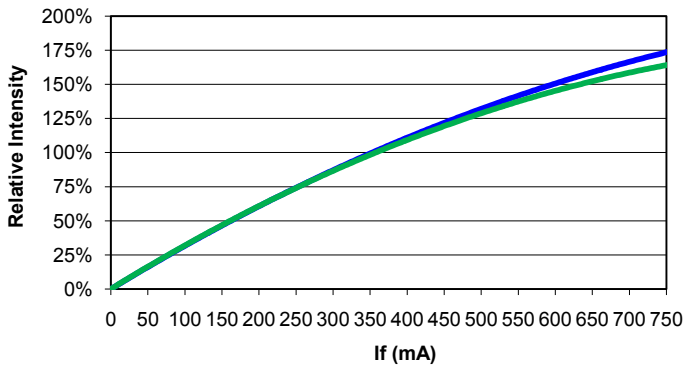
**Forward Current vs. Forward Voltage**



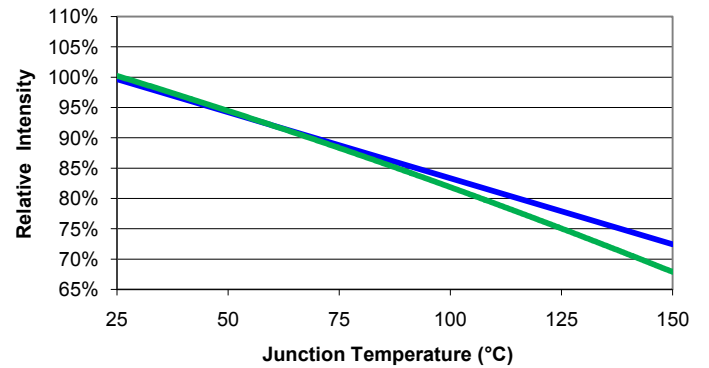
**Voltage Shift vs. Junction Temperature**



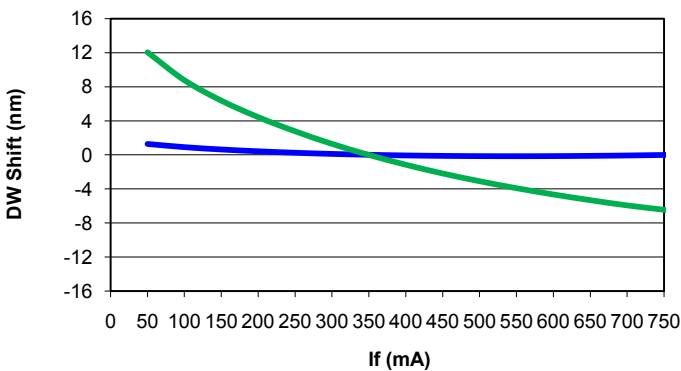
**Relative Intensity vs. Forward Current**



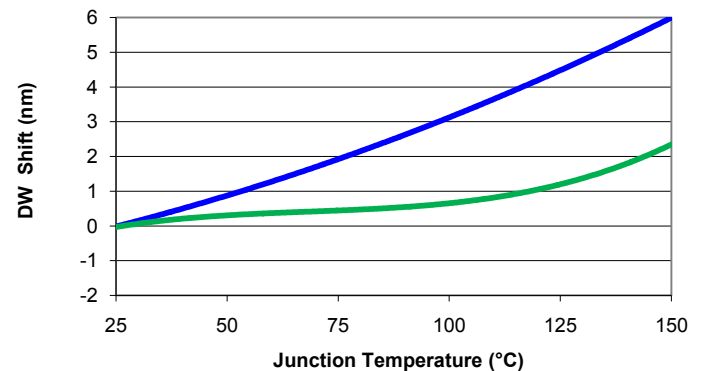
**Relative Light Intensity vs. Junction Temperature**



**Wavelength Shift vs. Forward Current**



**Dominant Wavelength Shift vs. Junction Temperature**



## Radiation Pattern

This is a representative radiation pattern for the EZBright Power Chip LED product. Actual patterns will vary slightly for each chip.

