

Cree® EZBright290™ LEDs

Data Sheet

CxxxEZ290-Sxx00

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. These vertically structured, low forward voltage LED chips are approximately 100 microns in height and require only a single wire bond connection. Cree's EZ™ LED chips are tested for conformity to optical and electrical specifications. Applications for EZ LEDs include next-generation mobile appliances for use in their LCD backlights and digital camera flash where brightness, subminiaturization, and low power consumption are required. Additional applications include indoor and outdoor displays.

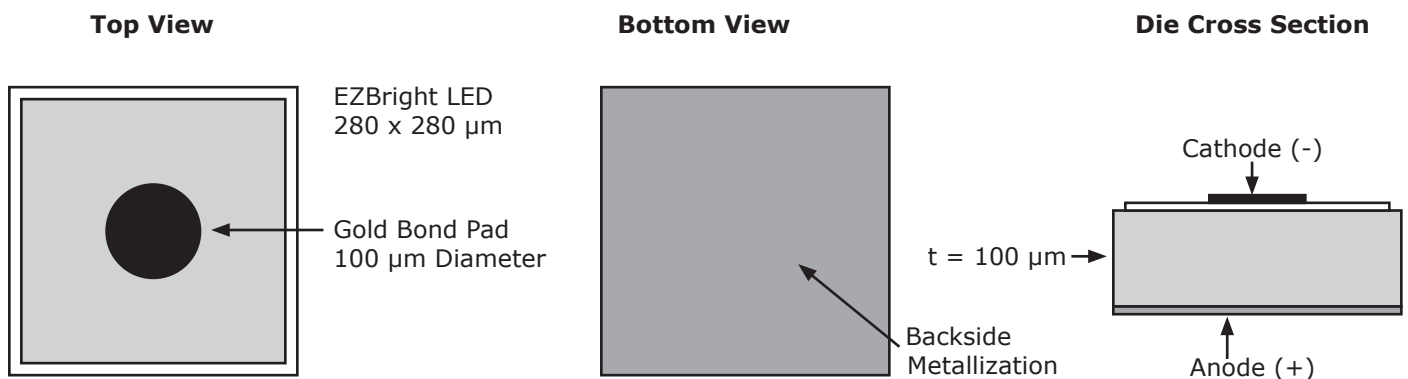
FEATURES

- EZBright LED Rf Performance
 - 460 & 470 nm
 - ◆ EZ-18™ - 18 mW min. (470 nm only)
 - ◆ EZ-21™ - 21 mW min.
 - ◆ EZ-24™ - 24 mW min. (460 nm only)
 - 505 nm - EZ-10™ - 10 mW min.
 - 527 nm - EZ-8™ - 8.0 mW min.
- Lambertian Radiation
- Conductive-Epoxy Die Attach
- Low Forward Voltage - 3.2 V Typical at 20 mA

APPLICATIONS

- LCD Backlighting
 - Mobile Appliances
 - Digital Still Cameras
 - Monitors
- Digital Camera Flash
- LED Video Displays
- Audio Product Display Lighting
- Automotive

CxxxEZ290-Sxx00 Chip Diagram



Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1&3</small>		CxxxEZ290-Sxx00
DC Forward Current		50 mA
Peak Forward Current (1/10 duty cycle @ 1 kHz)		100 mA
LED Junction Temperature		125°C
Reverse Voltage		5 V
Operating Temperature Range		-40°C to +100°C
Storage Temperature Range		-40°C to +100°C
Electrostatic Discharge Threshold (HBM) <small>Note 2</small>		1000 V

Typical Electrical/Optical Characteristics at $T_A = 25^\circ\text{C}$, $I_f = 20\text{ mA}$ <small>Note 3</small>					
Part Number	Forward Voltage (V_f , V)			Reverse Current [$I(V_r=5V)$, μA]	Full Width Half Max (λ_{DF} , nm)
	Min.	Typ.	Max.	Max.	Typ.
C460EZ290-Sxx00	2.7	3.2	3.7	2	21
C470EZ290-Sxx00	2.7	3.2	3.7	2	22
C505EZ290-Sxx00	2.7	3.2	3.7	2	30
C527EZ290-Sxx00	2.7	3.2	3.7	2	35

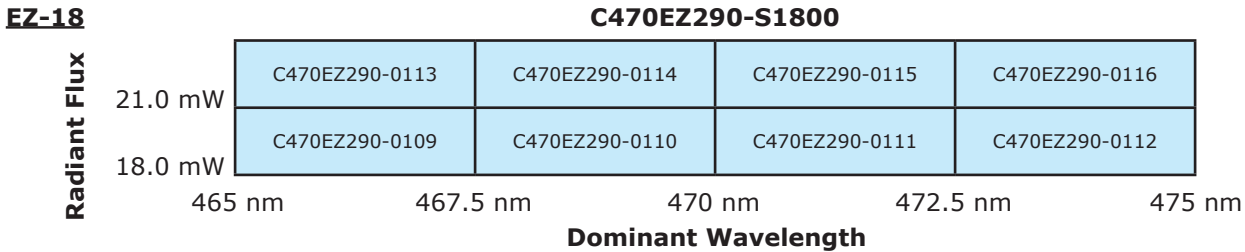
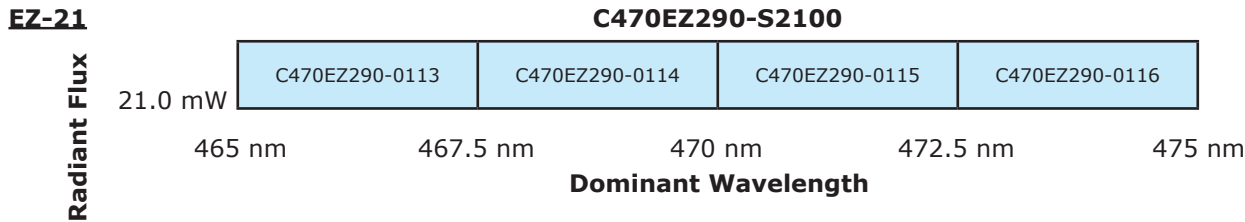
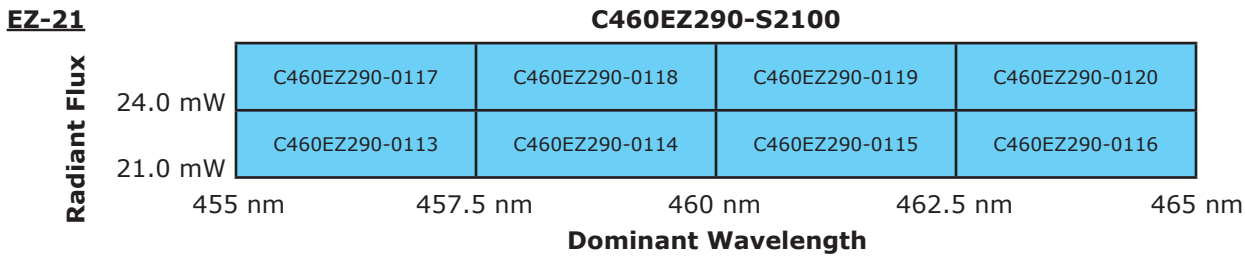
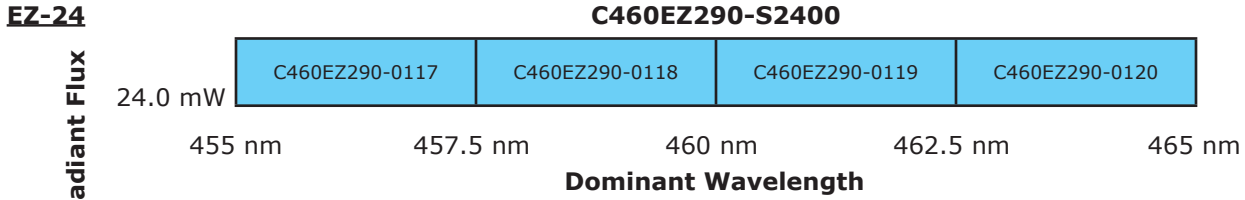
Mechanical Specifications		CxxxEZ290-Sxx00	
Description	Dimension	Tolerance	
P-N Junction Area (μm)	250 x 250	± 25	
Top Area (μm)	280 x 280	± 25	
Bottom Area (μm)	280 x 280	± 25	
Chip Thickness (μm)	100	± 15	
Au Bond Pad Diameter (μm)	100	-15, +5	
Au Bond Pad Thickness (μm)	3.0	± 1.0	
Back Contact Metal Area (μm)	280 x 280	± 25	

Notes:

1. Maximum ratings are package dependent. The above ratings were determined using a T-1 3/4 package (with Hysol OS4000 epoxy) for characterization. Ratings for other packages may differ. The forward currents (DC and Peak) are not limited by the die but by the effect of the LED junction temperature on the package. The junction temperature limit of 125°C is a limit of the T-1 3/4 package; 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.
2. Product resistance to electrostatic discharge (ESD) according to the HBM is measured by simulating ESD using a rapid avalanche energy test (RAET). The RAET procedures are designed to approximate the maximum ESD ratings shown.
3. All products conform to the listed minimum and maximum specifications for electrical and optical characteristics when assembled and operated at 20 mA within the maximum ratings shown above. Efficiency decreases at higher currents. Typical values given are within the range of average values expected by manufacturer in large quantities and are provided for information only. All measurements were made using lamps in T-1 3/4 packages (with Hysol OS4000 epoxy). Optical characteristics measured in an integrating sphere using Illuminance E.
4. Specifications are subject to change without notice.

Standard Bins for CxxxEZ290-Sxx00

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 (CxxxEZ290-Sxxxx) orders may be filled with any or all bins (CxxxEZ290-xxxx) contained in the kit. All radiant flux and dominant wavelength values shown and specified are at If = 20 mA.



Standard Bins for CxxxEZ290-Sxx00 (continued)

EZ-10.0

C505EZ290-S1000

Radiant Flux	11.5 mW	C505EZ290-0105	C505EZ290-0106
	10.0 mW	C505EZ290-0103	C505EZ290-0104
		500 nm	510 nm

Dominant Wavelength

EZ-8

C527EZ290-S0800

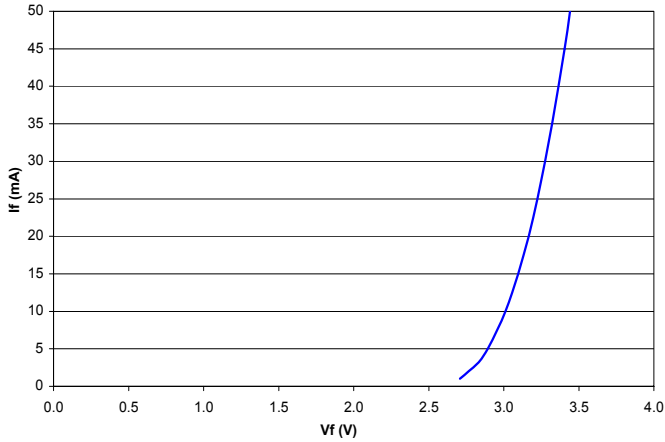
Radiant Flux	11.0 mW	C527EZ290-0113	C527EZ290-0114	C527EZ290-0115
	10.0 mW	C527EZ290-0110	C527EZ290-0111	C527EZ290-0112
	9.0 mW	C527EZ290-0107	C527EZ290-0108	C527EZ290-0109
	8.0 mW	C527EZ290-0104	C527EZ290-0105	C527EZ290-0106
		520 nm	530 nm	535 nm

Dominant Wavelength

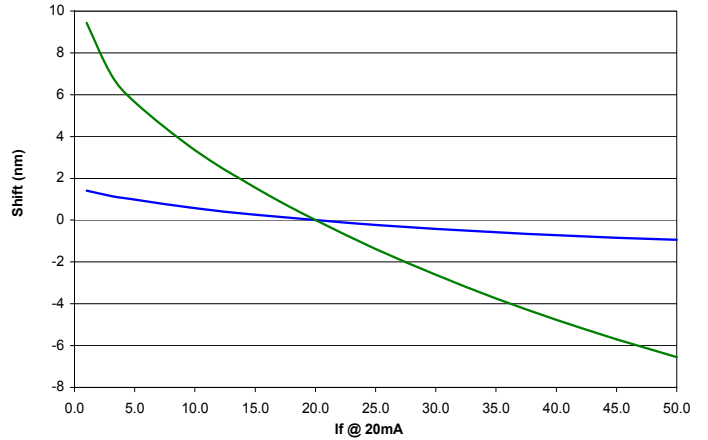
Characteristic Curves

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

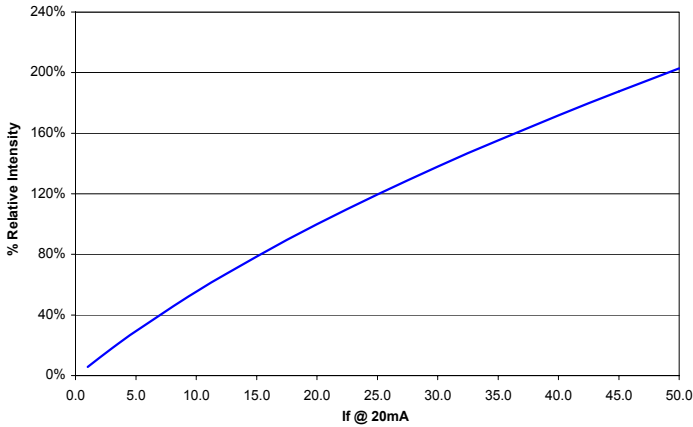
Forward Current vs Forward Voltage



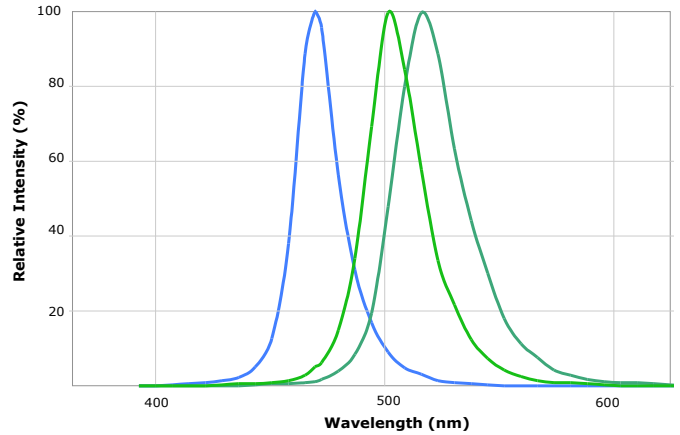
Wavelength Shift vs Forward Current



Relative Intensity vs Forward Current



Relative Intensity vs Peak Wavelength



Radiation Pattern

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

