

Cree® EZ400-n™ Gen 2 LEDs

Data Sheet (Cathode-up)

CxxxEZ400-Sxx00-2

Cree's EZBright® LEDs are the latest generation of solid-state n-pad up 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, as well as 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, including wearable devices, video displays and LCD backlighting.

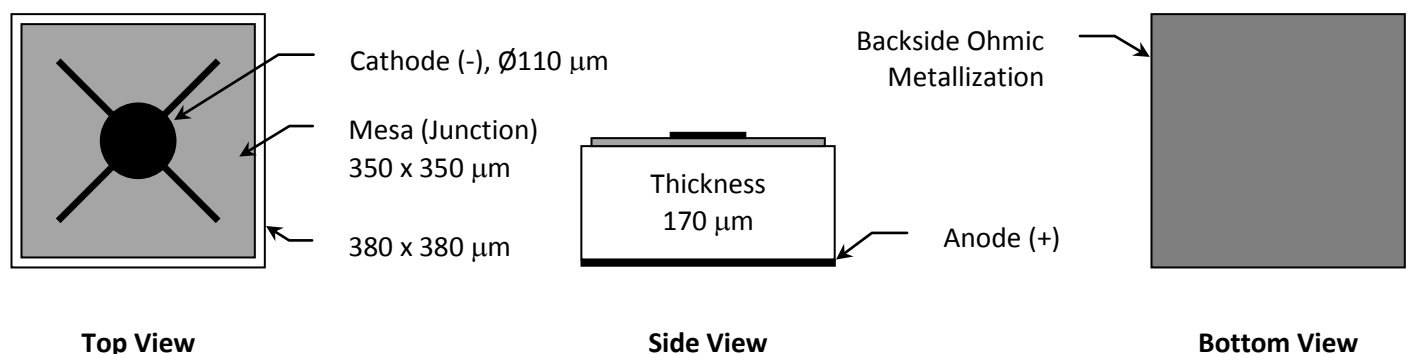
FEATURES

- Lambertian Radiation Pattern
- Cathode-up design (n-pad up)
- EZBright LED Technology, binned @ 150 mA
 - 450 nm - 120+ mW
 - 460 nm - 120+ mW
 - 470 nm - 105+ mW
 - 527 nm - 25+ mW
- Low Forward Voltage (Vf) - 3.25 V Typical at 150 mA
- Maximum DC Forward Current - 200 mA
- AuSn Backside Metal for use with Conductive Adhesives, Flux Eutectic Attach, Solder Paste & Solder Preforms
- 2 kV Class 2 ESD Rating

APPLICATIONS

- General Illumination
 - Aircraft
 - Decorative Lighting
 - Task Lighting
 - Outdoor Illumination
- Single Color & RGB Packages
- White-converted LEDs
- Wearable Devices
- Automotive Interior

CxxxEZ400-Sxx00-2 Chip Diagram



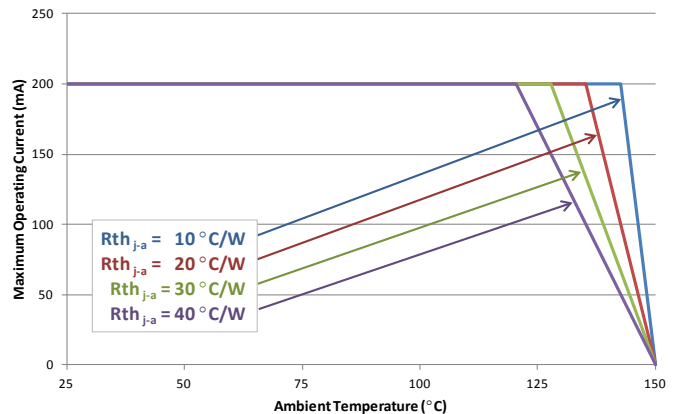
Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1&3</small>		CxxxEZ400-Sxx00-2
DC Forward Current		200 mA
Peak Forward Current (1/10 duty cycle @ 1 kHz)		350 mA
LED Junction Temperature		150°C
Reverse Voltage		5 V
Operating Temperature Range		-40°C to +100°C
LED Chip Storage Temperature Range		-40°C to +120°C
Recommended Die Sheet Storage Conditions		$\leq 30^\circ\text{C}$ / $\leq 85\%$ RH
Electrostatic Discharge Threshold (HBM) <small>Note 2</small>		2000 V
Electrostatic Discharge Classification (MIL-STD-883E) <small>Note 2</small>		Class 2

Typical Electrical/Optical Characteristics at $T_A = 25^\circ\text{C}$, $I_f = 150\text{ mA}$ <small>Note 3</small>					
Part Number	Forward Voltage (V_f , V)			Reverse Current [$I_r(V_r=5V)$, μA]	Full Width Half Max (λ_D , nm)
	Min.	Typ.	Max.	Max.	Typ.
C450EZ400-Sxx00-2	2.9	3.25	3.6	2	21
C460EZ400-Sxx00-2	2.9	3.25	3.6	2	21
C470EZ400-Sxx00-2	2.9	3.25	3.6	2	22
C527EZ400-Sxx00-2	3.0	3.35	3.8	2	35

Mechanical Specifications		CxxxEZ400-Sxx00-2	
Description	Dimension	Tolerance	
P-N Junction Area (μm)	350 x 350	± 25	
Top Area (μm)	380 x 380	± 25	
Bottom Area (μm)	380 x 380	± 25	
Chip Thickness (μm)	170	± 25	
Au Bond Pad Diameter (μm)	110	-15, +5	
Au Bond Pad Thickness (μm)	3.0	± 1.0	
Back Ohmic Metal Area (μm)	380 x 380	± 25	
Back Ohmic Metal Thickness (μm)	3.0	± 0.3	

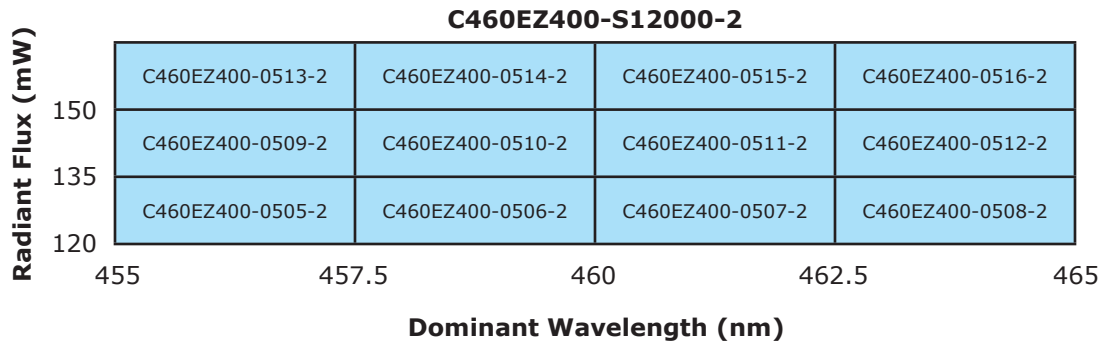
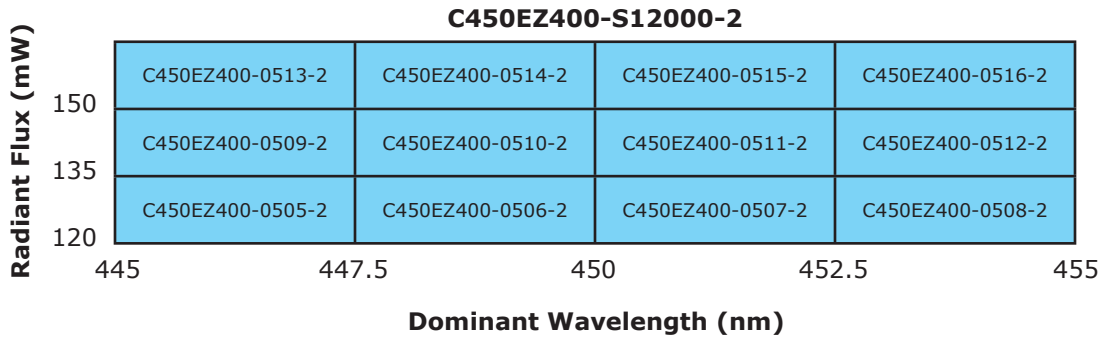
Notes:

- Maximum ratings are package-dependent. The above ratings were determined using a silicone encapsulated chip on MCPCB for characterization. The junction temperature should be characterized in a specific package to determine limitations. Assembly processing temperature limit is $< 325^\circ\text{C}$ (< 5 seconds). See the Cree EZBright Applications Note for assembly-process information.
- 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. The RAET procedure is performed on each die. The ESD classification of Class 2 is based on sample testing according to MIL-STD-883E.
- All products conform to the listed minimum and maximum specifications for electrical and optical characteristics when assembled and operated at 150 mA within the maximum ratings shown above. Efficiency decreases at higher currents. Typical values given are within the range of average values expected by the manufacturer in large quantities and are provided for information only. All measurements were made using a Au-plated header without an encapsulant. Optical characteristics were 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.
- Specifications are subject to change without notice.



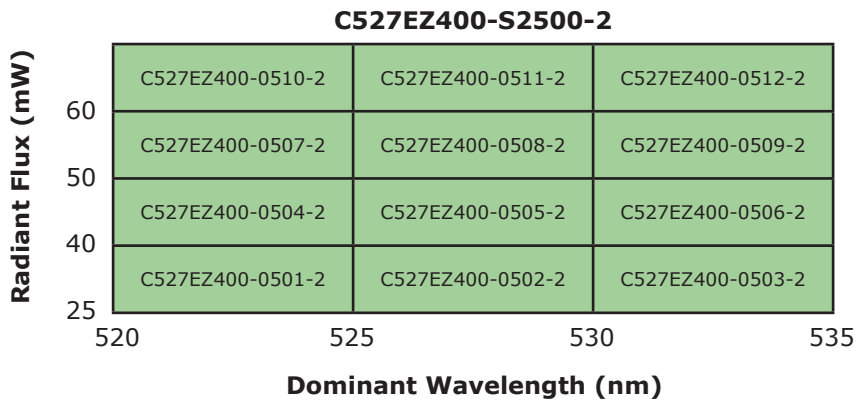
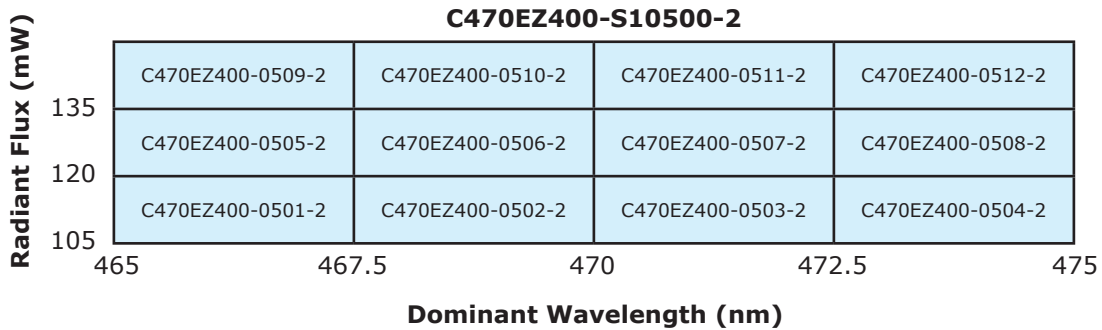
Standard Bins for CxxxEZ400-Sxx00-2

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 (CxxxEZ400-Sxxxx-2) orders may be filled with any or all bins (CxxxEZ400-xxxx-2) contained in the kit. All radiant flux and dominant wavelength values shown are specified at $I_f = 20 \text{ mA}$.



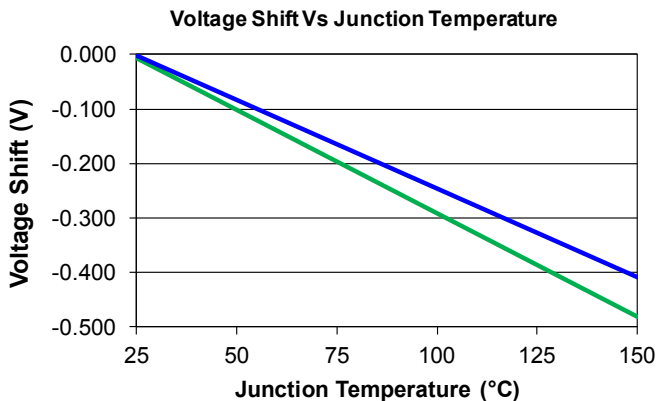
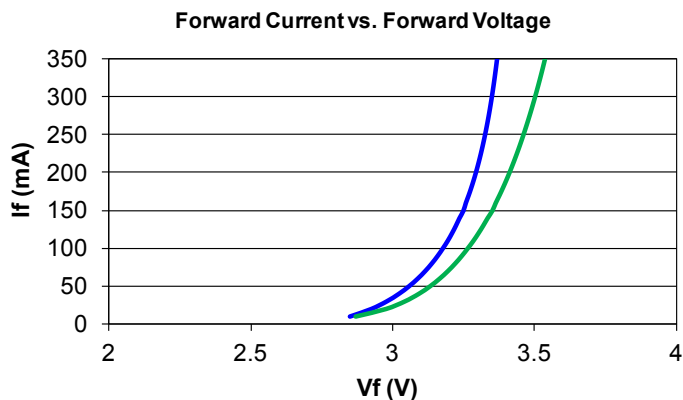
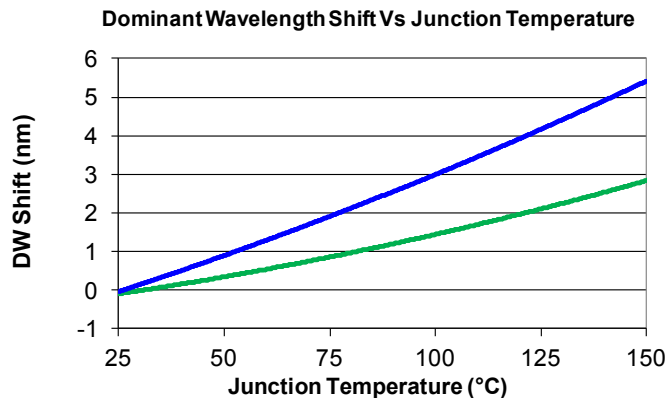
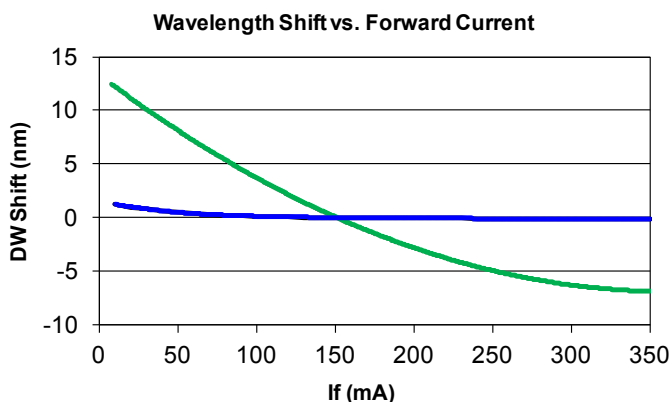
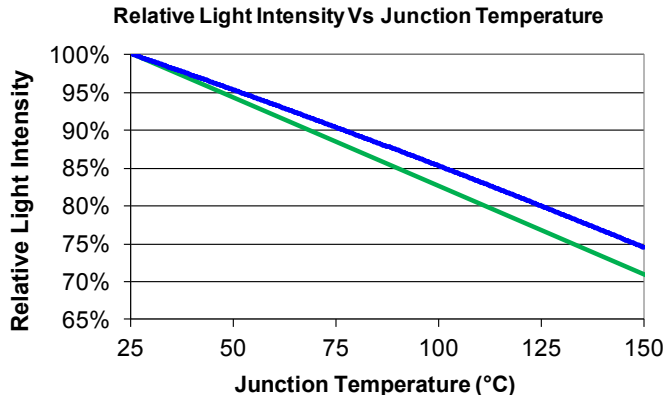
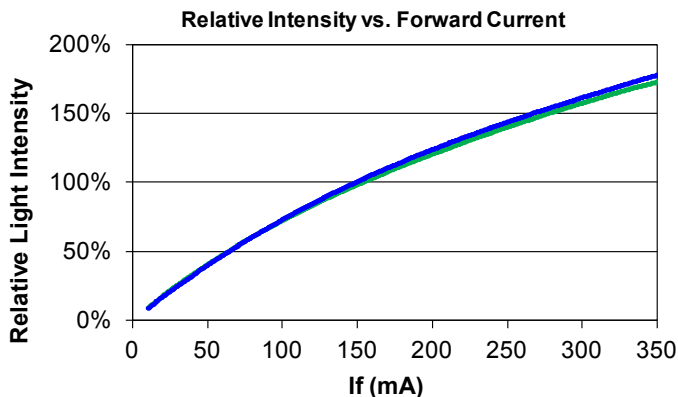
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Characteristic Curves

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



Radiation Pattern

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

