

# Cree® MegaBright® LEDs

## Datasheet

### CxxxMB290-Sxx00

Cree's MB™ series of MegaBright® LEDs combine highly efficient InGaN materials with Cree's proprietary G•SiC® substrate to deliver superior price/performance for high-intensity LEDs. These LED chips have a geometrically enhanced vertical chip structure to maximize light extraction efficiency and require only a single wire bond connection. These LEDs are useful in a broad range of applications such as outdoor full-motion LED video signs, automotive lighting and white LEDs. Cree's MB series chips are compatible with most radial and SMT LED assembly processes.

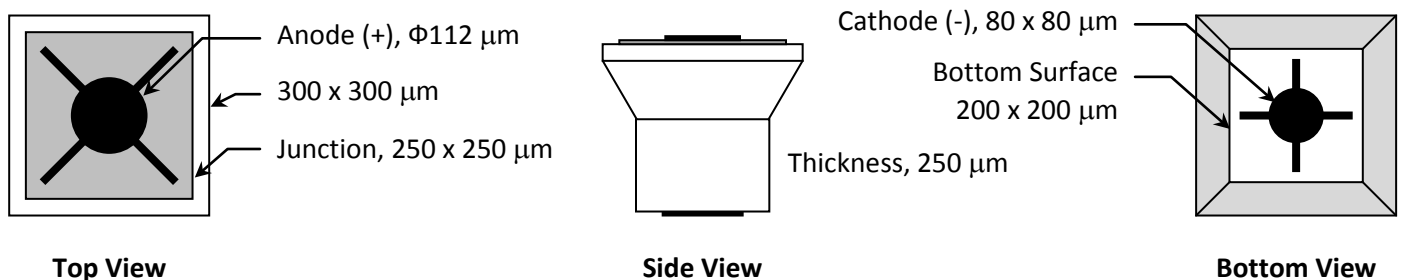
#### FEATURES

- MegaBright LED Performance
  - 460 nm - 8+ mW
  - 470 nm - 8+ mW
  - 527 nm - 5+ mW
- Single Wire Bond Structure
- Low Forward Voltage
  - 3.2 V Typical at 20 mA
- Class 2 ESD Rating

#### APPLICATIONS

- White LEDs
- LCD Backlighting Units
- Outdoor LED Video Displays
- Automotive Interior Lighting

#### CxxxMB290-Sxx00 Chip Diagram



Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1&amp;3</small>		CxxxMB290-Sxx00
DC Forward Current		30 mA
Peak Forward Current (1/10 duty cycle @ 1kHz)		100 mA
LED Junction Temperature		125°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
Electrostatic Discharge Threshold (HBM) <sup>Note 2</sup>		1000 V
Electrostatic Discharge Classification (MIL-STD-883E) <sup>Note 2</sup>		Class 2

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 [ $I(V_r=5V)$ , $\mu\text{A}$ ]	Full Width Half Max. ( $\lambda_D$ , nm)
	Min.	Typ.	Max.	Max.	Typ.
C460MB290-Sxxxx	2.9	3.2	3.7	2	21
C470MB290-Sxxxx	2.9	3.2	3.7	2	22
C527MB290-Sxxxx	2.9	3.3	3.9	2	35

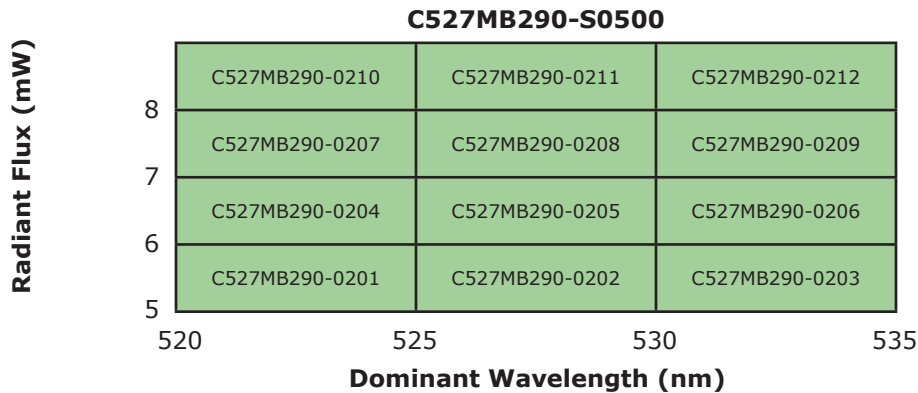
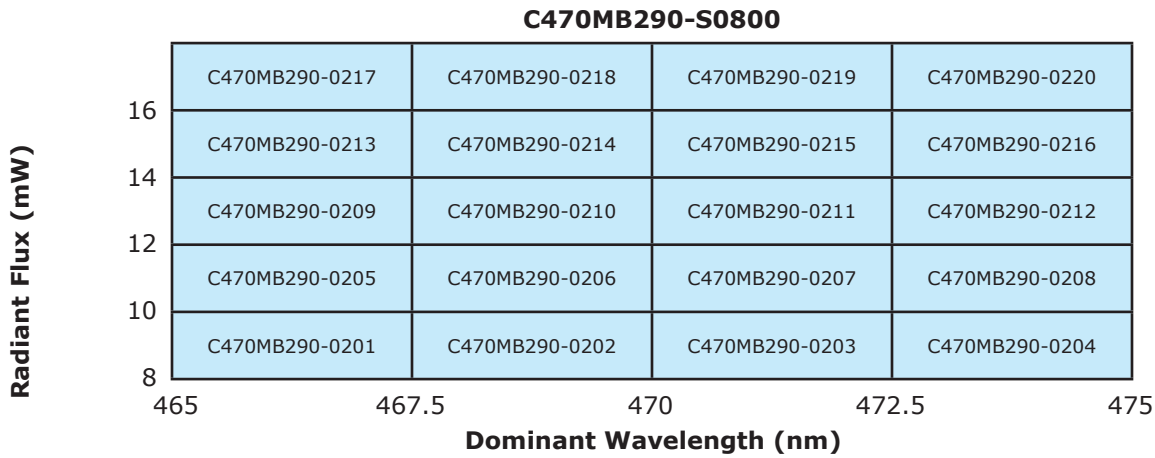
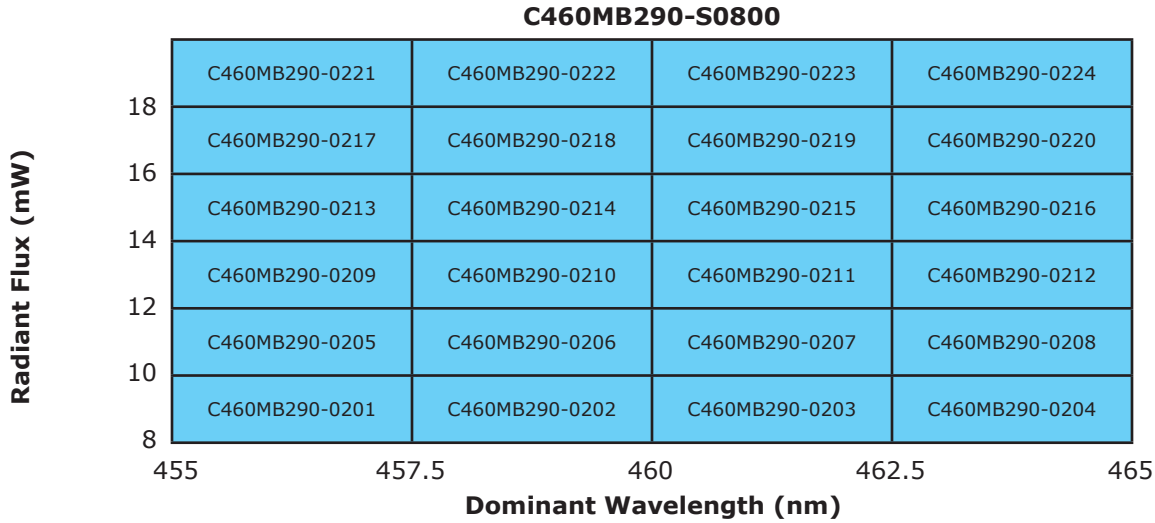
Mechanical Specifications		CxxxMB290-Sxx00	
Description	Dimension	Tolerance	
P-N Junction Area ( $\mu\text{m}$ )	250 x 250	$\pm 25$	
Top Area ( $\mu\text{m}$ )	300 x 300	$\pm 25$	
Chip Thickness ( $\mu\text{m}$ )	250	$\pm 25$	
Bottom Area ( $\mu\text{m}$ )	200 x 200	$\pm 25$	
Au Bond Pad Diameter ( $\mu\text{m}$ )	112	$\pm 20$	
Au Bond Pad Thickness ( $\mu\text{m}$ )	1.2	$\pm 0.5$	
Backside Metal Diameter ( $\mu\text{m}$ )	104	$\pm 20$	

### Notes:

- Maximum ratings are package dependent. The above ratings were determined using a thru-hole package (with Hysol® OS4000 encapsulant) 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 thru-hole package; junction temperature should be characterized in a specific package to determine limitations. Assembly processing temperature must not exceed 325°C (< 5 seconds).
- 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 performed on each die and are designed to approximate the minimum ESD ratings shown. 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 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 thru-hole packages (with Hysol OS4000 encapsulant). The amount of die attach adhesive used will affect light output; it is recommended that the adhesive amount be optimized to meet the requirements of each specific application. Optical characteristics measured in an integrating sphere using Illuminance E.
- To obtain optimum output efficiency, the maximum height of die attach epoxy on the side of the chip should not exceed 80  $\mu\text{m}$ .
- Specifications are subject to change without notice.

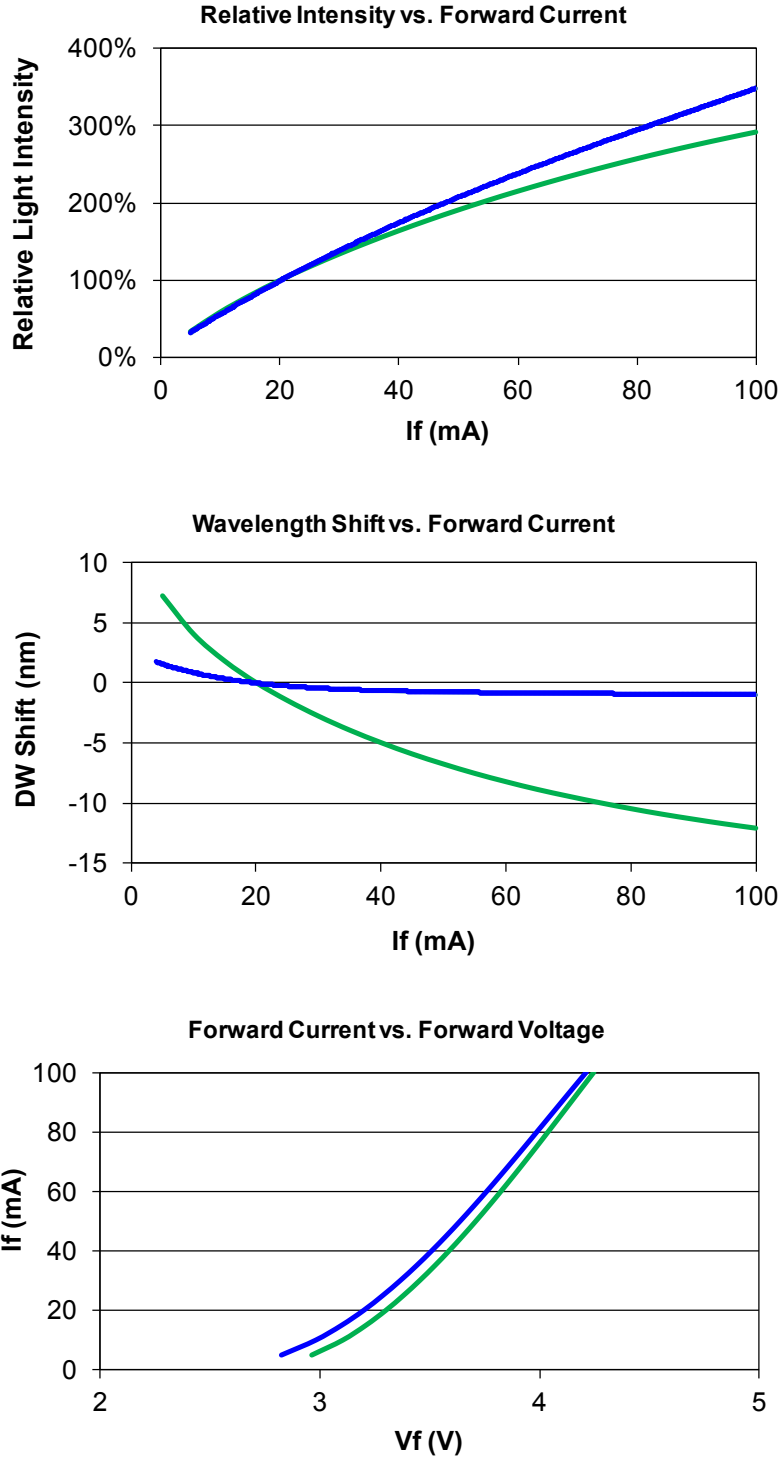
## Standard Bins for CxxxMB290-Sxx00

LED chips are sorted to the **radiant flux** (RF) and **dominant wavelength** (DW) bins shown. Sorted die sheets contain die from only one bin. Sorted die kit (CxxxMB290-Sxxxx) orders may be filled with any or all bins (CxxxMB290-xxxx) contained in the kit. All RF values and DW values are measured at  $I_f = 20 \text{ mA}$ .



## Characteristic Curves

These are representative measurements for the MB 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 MB LED product. Actual patterns will vary slightly for each chip.

