

## Features

- High Performance
  - 3.5mW (450nm) Deep Blue
  - 3.0mW (460nm) Deep Blue
  - 2.5mW (470nm) Blue
  - 2.5mW (490nm) Aqua Blue
  - 2.0mW (505nm) Signal Green
  - 1.5mW (525nm) Green
- Single Wire Bond Structure
- Class II ESD Rating

## Applications

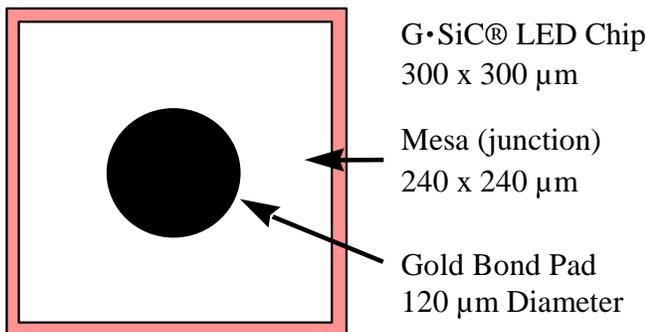
- Outdoor LED Video Displays
- White LEDs
- Automotive Dashboard Lighting
- Cellular Phone Backlighting
- Audio Product Display Lighting
- Traffic Signals

## Description

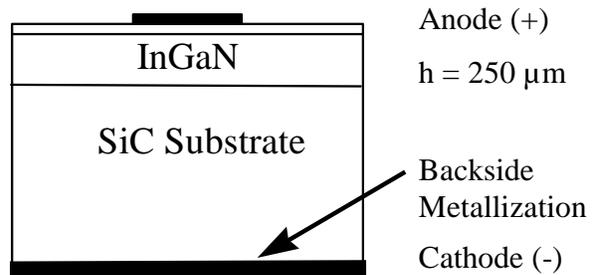
Cree's CB™ series of SuperBright™ LEDs combine highly efficient InGaN materials with Cree's proprietary SiC substrate to deliver excellent price performance for high intensity blue and green LEDs. These LED chips have an industry standard vertical chip structure which requires only a single wire bond connection. Cree's CB series chips are individually tested for conformity to optical and electrical specifications and the ability to withstand 1000V ESD. These LEDs are useful in a broad range of applications such as outdoor and indoor full motion LED video signs, transportation signaling and white LEDs, yet can also be used in high volume applications such as LCD backlighting. Cree's CB series chips are compatible with most radial and SMT LED assembly processes.

## CXXX-CB290-E1000 Chip Diagram

### Topside View



### Die Cross Section



# G-SiC<sup>®</sup> Technology SuperBright™ LEDs CXXX-CB290-E1000

*Maximum Ratings at T<sub>A</sub> = 25°C* <sup>Notes 1&3</sup>

| <b>CXXX-CB290-E1000</b>   |                 |
|---|-----------------|
| 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   | -20°C to +80°C  |
| Storage Temperature Range   | -30°C to +100°C |
| 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<sub>A</sub> = 25°C, I<sub>f</sub> = 20mA* <sup>Note 3</sup>

| Part Number | Forward Voltage (V <sub>f</sub> , V) |     | Radiant Flux (P, mW) |     | Reverse Current [I(V <sub>r</sub> =5V), μA] | Flux (mIm) | Peak Wavelength (λ <sub>p</sub> , nm) | Dominant Wavelength (λ <sub>d</sub> , nm) |     |     | Halfwidth (λ <sub>D</sub> , nm) | Optical Rise Time (τ, ns) |
|-------------|--------------------------------------|-----|----------------------|-----|---|------------|---------------------------------------|---|-----|-----|---------------------------------|---------------------------|
|             | Typ                                  | Max | Min                  | Typ |   |            |                                       | Max                                       | Typ | Min |                                 |                           |
| C450        | 3.3                                  | 3.7 | 2.5                  | 3.5 | 10  | 133        | 445                                   | 445                                       | 450 | 455 | 20                              | 30                        |
| C460        | 3.3                                  | 3.7 | 2.0                  | 3.0 | 10  | 96         | 458                                   | 455                                       | 460 | 465 | 26                              | 30                        |
| C470        | 3.3                                  | 3.7 | 2.0                  | 2.5 | 10  | 150        | 468                                   | 465                                       | 470 | 475 | 26                              | 30                        |
| C490        | 3.3                                  | 3.7 | 2.0                  | 2.5 | 10  | 400        | 488                                   | 485                                       | 490 | 495 | 26                              | 30                        |
| C505        | 3.3                                  | 3.7 | 1.5                  | 2.0 | 10  | 485        | 502                                   | 500                                       | 505 | 510 | 30                              | 30                        |
| C525        | 3.3                                  | 3.7 | 1.0                  | 1.5 | 10  | 477        | 523                                   | 520                                       | 525 | 535 | 36                              | 30                        |

## Mechanical Specifications

| <b>CXXX-CB290-E1000</b>        |           |           |
|--------------------------------|-----------|-----------|
| Description                    | Dimension | Tolerance |
| P-N Junction Area (μm)         | 240 x 240 | ± 25      |
| Bottom Area (μm)               | 300 x 300 | ± 25      |
| Chip Thickness (μm)            | 250       | ± 25      |
| Au Bond Pad Diameter (μm)      | 120       | ± 20      |
| Au Bond Pad Thickness (μm)     | 1.2       | ± 0.5     |
| Back Contact Grid Spacing (μm) | 140       | ± 15      |
| Back Contact Metal Width (μm)  | 19.8      | -5,+10    |

### 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 350°C (< 15 minutes).
- 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. The RAET procedure is performed on each die. The ESD classification of Class II is based on sample testing according to MIL-STD 883E.
- 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 the 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 were measured in a Photoresearch Spectrascan Integrating Sphere. Illuminance E.
- 4) Specifications are subject to change without notice.