

Cree® Direct Attach™ SA1400™ LEDs

CxxxSA1400-Sxx00-x

Data Sheet

Cree's Direct Attach™ SA1400™ LEDs are the next generation of solid-state LED emitters that combine highly efficient InGaN materials with Cree's proprietary device technology to deliver superior value for the general-illumination markets. The SA1400 LEDs are among the brightest in the market while delivering a low forward voltage, resulting in a very bright and highly efficient solution. The bondpad-down design allows for eutectic die attach, eliminating the need for wire bonds, enabling superior performance, improved thermal management and high reliability. The design is optimally suited for industry-standard top-view packages.

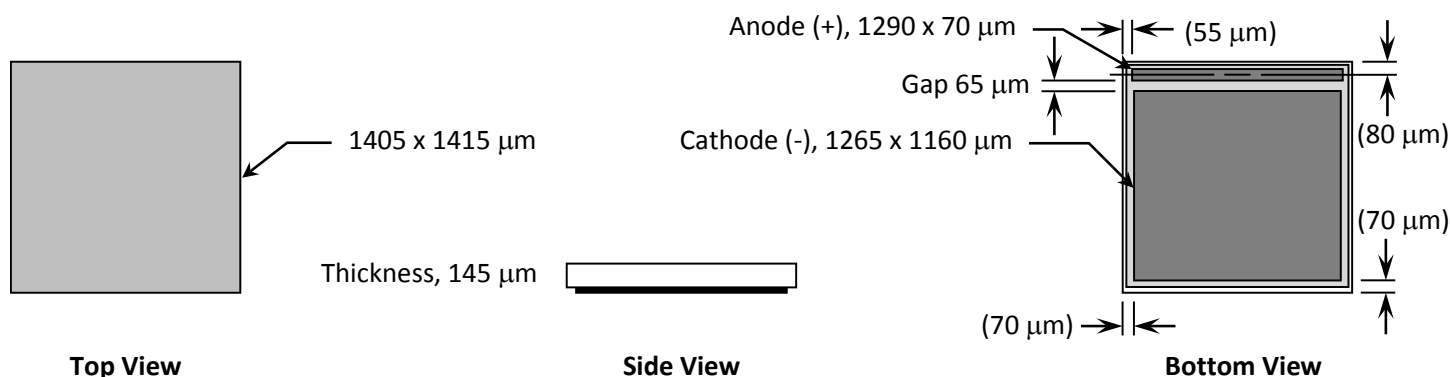
FEATURES

- Direct Attach LED Technology, no wire bonding
- High Reliability - Flux Eutectic Attach
- Junction-Down for Improved Thermal Management
- Direct Attach LED RF Performance:
 - 450 nm - 675+ mW
- Low Forward Voltage (Vf) - 3.0 V Typical at 350 mA
- Maximum DC Forward Current - 2000 mA
- Designed for flux eutectic attach

APPLICATIONS

- General Illumination
 - White LEDs
 - Chip-on-Board (COB)
 - Multi-chip Arrays
 - High Voltage Arrays
- Automotive Exterior
 - Headlamps
 - Daytime Running Lights
 - Fog lamps
 - After-market

CxxxSA1400-Sxx00-x Chip Diagram



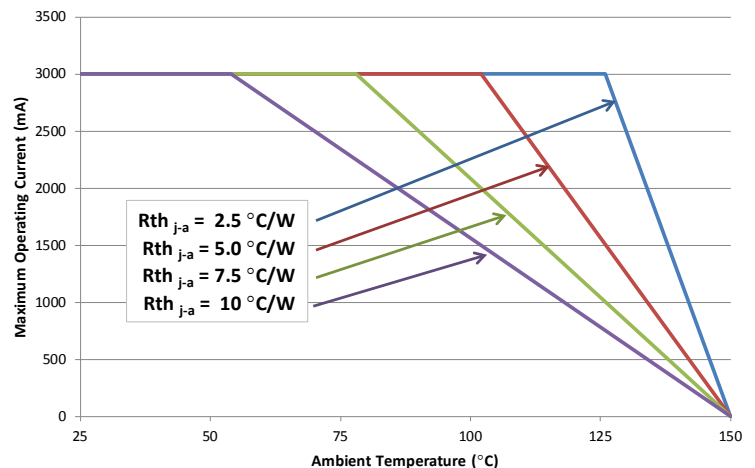
| Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1,3, & 4</small> | | CxxxSA1400-Sxx00-x |
|---|--|--|
| DC Forward Current | | 2000 mA |
| Peak Forward Current (1/10 duty cycle @ 1 kHz) | | 3000 mA |
| LED Junction Temperature | | 150°C |
| Reverse Voltage | | 5 V |
| Operating Temperature 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 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. |
| C450SA1400-Sxx00-x | 2.6 | 3.0 | 3.2 | 2 | 20 |
| | | | | | |
| | | | | | |
| | | | | | |

| Mechanical Specifications | | CxxxSA1400-Sxx00-x | |
|---|-------------|--------------------|--|
| Description | Dimension | Tolerance | |
| P-N Junction Area (μm) | 1360 x 1360 | ± 25 | |
| Chip Bottom Area (μm) | 1405 x 1415 | ± 25 | |
| Chip Top Area (μm) | 1405 x 1415 | ± 25 | |
| Chip Thickness (μm) | 145 | ± 15 | |
| Bond Pad Width – Anode (μm) | 70 | ± 15 | |
| Bond Pad Length – Anode (μm) | 1290 | ± 15 | |
| Bond Pad Width – Cathode (μm) | 1160 | ± 15 | |
| Bond Pad Length – Cathode (μm) | 1265 | ± 15 | |
| Bond Pad Gap (μm) | 65 | ± 15 | |
| Bond Pad Thickness (μm) - "-J" (AuSn/Sn) | 3.2 | ± 0.5 | |

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 the 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 values 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 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 CxxxSA1400-Sxx00-x

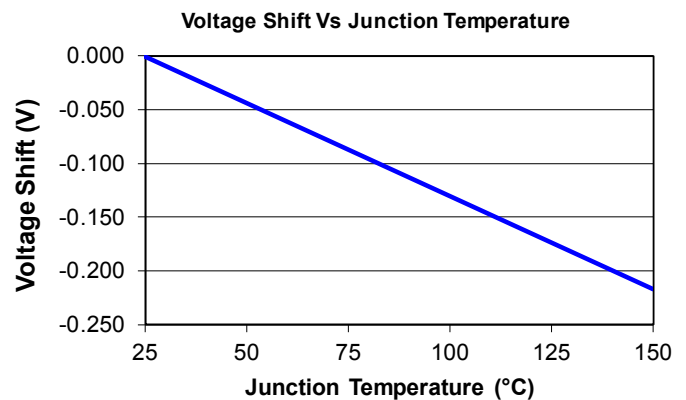
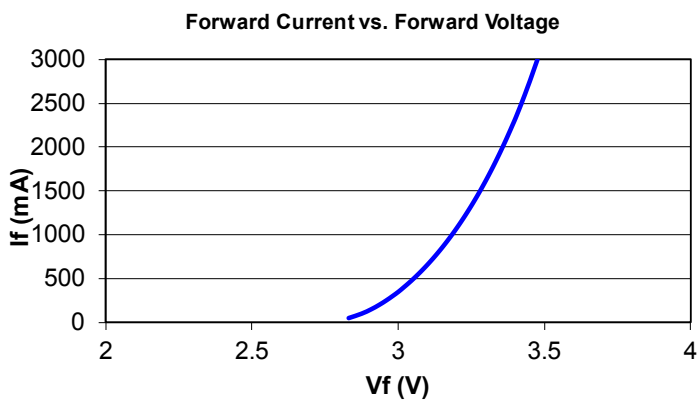
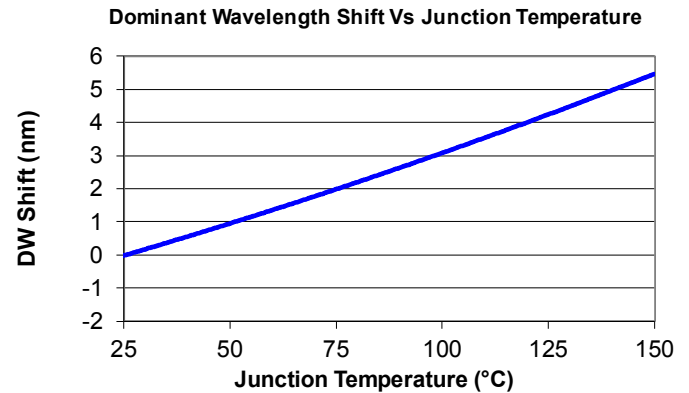
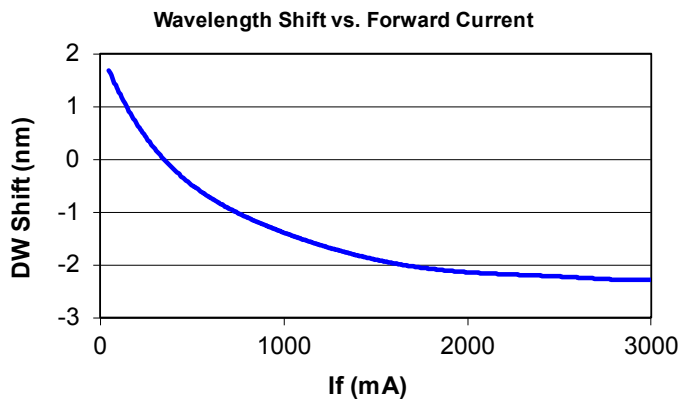
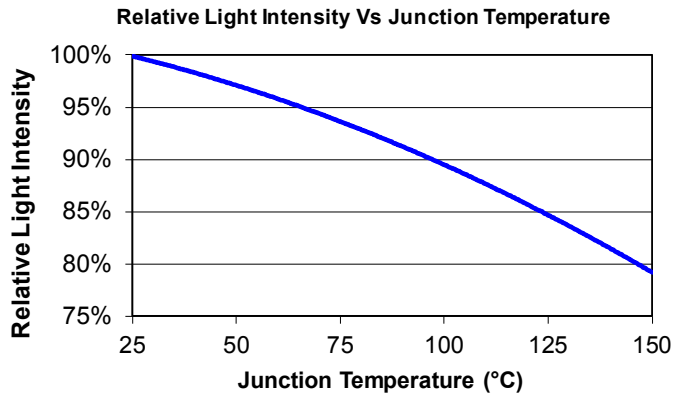
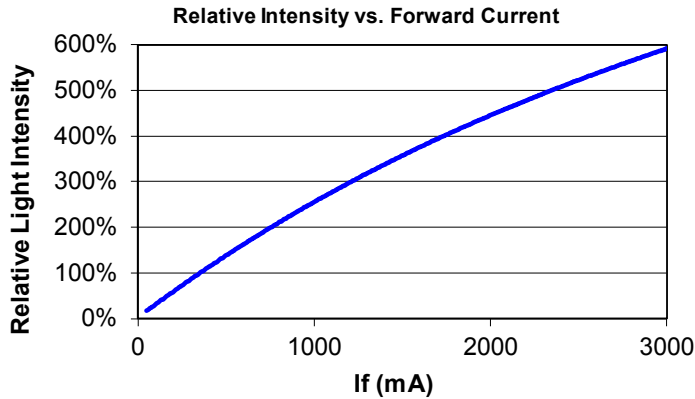
LED chips are sorted to the **radiant flux** and **dominant wavelength** bins shown. A sorted die sheet contains die from only one bin. Sorted die kit (CxxxSA1400-Sxxxx-x) orders may be filled with any or all bins (CxxxSA1400-xxxx-x) contained in the kit. All radiant flux and dominant wavelength values shown and specified are at $I_f = 350$ mA.

C450SA1400-S67500-x

| | | | | | | |
|--------------------------|-----|---------------------------------|-------------------|-------------------|-------------------|-------|
| Radiant Flux (mW) | 775 | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | |
| | 750 | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | |
| | 725 | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | |
| | 700 | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | |
| | 675 | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | C450SA1400-xxxx-x | |
| | | | 445 | 447.5 | 450 | 452.5 |
| | | Dominant Wavelength (nm) | | | | |

Characteristic Curves

These are representative measurements for the SA1400 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 DA LED product. Actual patterns will vary slightly for each chip.

