Direct Attach DA1000™ LEDs

C*xxx*DA1000-S*xx*000

Data Sheet

Cree's Direct Attach DA1000 LEDs are the next generation of solid-state LED emitters that combine highly efficient InGaN materials with Cree's proprietary device technology and silicon-carbide substrates to deliver superior value for the general-illumination market. The DA1000 LEDs are among the brightest in the lighting market while delivering a low forward voltage, resulting in a very bright and highly efficient solution. The bondpad-down design allows for a eutectic direct die-attach process, eliminating the need for wire bonds, and enables superior performance from improved thermal management.

FEATURES

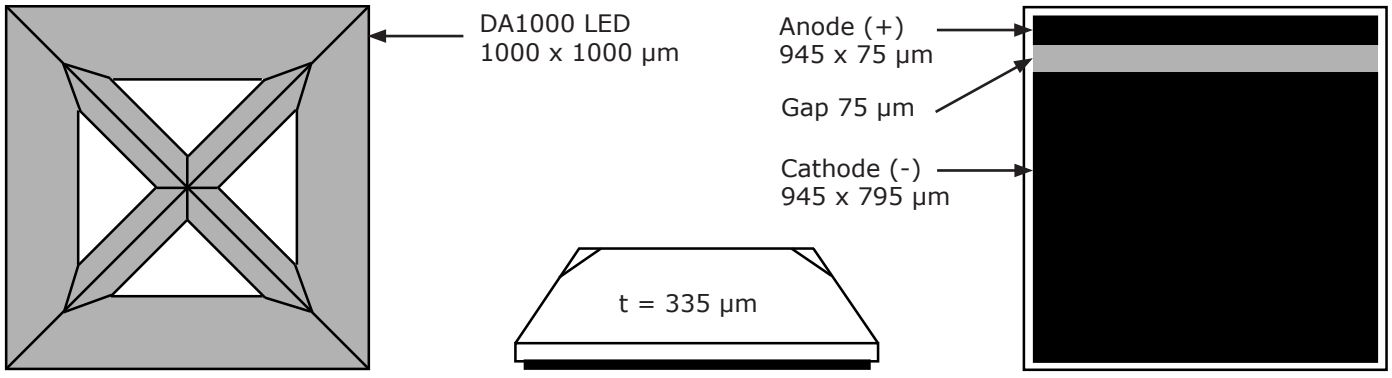
- Direct Attach LED Technology
- Rectangular LED RF Performance
  - 450 & 460 nm – 485 mW min
- High Reliability - Eutectic Attach
- Low Forward Voltage (Vf) – 3.15 V Typical at 350 mA
- Maximum DC Forward Current – 1000 mA
- InGaN Junction-Down Design for Improved Thermal Management
- No Wire Bonds Required

APPLICATIONS

- General Illumination
  - Aircraft
  - Decorative Lighting
  - Task Lighting
  - Outdoor Illumination
- White LEDs
- Camera Flash
- Projection Displays
- Automotive

C*xxx*DA1000-S*xx*000 Chip Diagram

Top View **Die Cross Section** **Bottom View**



Maximum Ratings at T_A = 25°C Notes 1,2 & 3	CxxxDA1000-Sxx000
DC Forward Current	1000 mA
Peak Forward Current (1/10 duty cycle @ 1 kHz)	1250 mA
LED Junction Temperature	150°C
Reverse Voltage	5 V
Operating Temperature Range	-40°C to +100°C
Storage Temperature Range	-40°C to +100°C

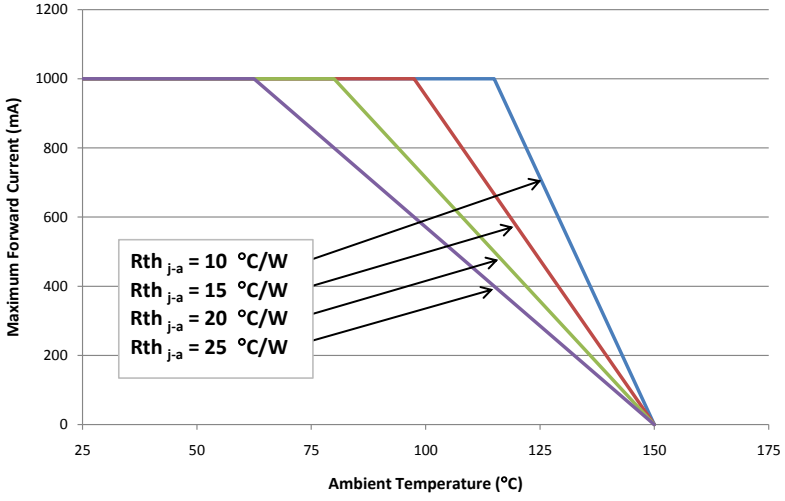
Typical Electrical/Optical Characteristics at T_A = 25°C, If = 350 mA Note 2

Part Number	Forward Voltage (V_f, V)			Reverse Current [I(Vr=5V), µA]	Full Width Half Max (λ_D, nm)
	Min.	Typ.	Max.	Max.	Typ.
C450DA1000-Sxx000	2.7	3.15	3.5	2	20
C460DA1000-Sxx000	2.7	3.15	3.5	2	21

Mechanical Specifications	CxxxDA1000-Sxx000	
Description	**Dimension**	**Tolerance**
P-N Junction Area (µm)	960 x 960	±35
Chip Bottom Area (µm)	1000 x 1000	±35
Chip Top Area (µm)	630 x 630	±45
Chip Thickness (µm)	335	±25
AuSn Bond Pad Width – Anode (um)	75	±15
AuSn Bond Pad Length – Anode (um)	945	±35
AuSn Bond Pad Width – Cathode (um)	795	±35
AuSn Bond Pad Length – Cathode (um)	945	±35
Bond Pad Gap (µm)	75	±15
AuSn Bond Pad Thickness (µm)	3	±0.5

Notes:

1. Maximum ratings are package-dependent. The above ratings were determined using a Cree 3.45-mm x 3.45-mm SMT package (with silicone encapsulation and intrinsic AuSn metal die attach) for characterization. Ratings for other packages may differ. Junction temperature should be characterized in a specific package to determine limitations. Assembly processing temperature must not exceed 325°C (< 5 seconds).
2. 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 manufacturer in large quantities and are provided for information only. All measurements were made using lamps in T-1¾ packages (with Hysol OS4000 epoxy encapsulant and intrinsic AuSn metal die attach). Optical characteristics measured in an integrating sphere using Illuminance E.
3. 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.



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Standard Bins for C*xxx*DA1000-S*xx*000

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 (C*xxx*DA1000-S*xxxxx*) orders may be filled with any or all bins (C*xxx*DA1000-*xxxxx*) contained in the kit. All radiant flux and dominant wavelength values shown and specified are at If = 350 mA.

C450DA1000-S48500

Radiant Flux (mW)	445 – 447.5	447.5 – 450	450 – 452.5	452.5 – 455
585 – 625	C450DA1000-0325	C450DA1000-0326	C450DA1000-0327	C450DA1000-0328
550 – 585	C450DA1000-0321	C450DA1000-0322	C450DA1000-0323	C450DA1000-0324
515 – 550	C450DA1000-0317	C450DA1000-0318	C450DA1000-0319	C450DA1000-0320
485 – 515	C450DA1000-0313	C450DA1000-0314	C450DA1000-0315	C450DA1000-0316
	C450DA1000-0309	C450DA1000-0310	C450DA1000-0311	C450DA1000-0312

Dominant Wavelength (nm)

C460DA1000-S48500

Radiant Flux (mW)	455 – 457.5	457.5 – 460	460 – 462.5	462.5 – 465
585 – 625	C460DA1000-0325	C460DA1000-0326	C460DA1000-0327	C460DA1000-0328
550 – 585	C460DA1000-0321	C460DA1000-0322	C460DA1000-0323	C460DA1000-0324
515 – 550	C460DA1000-0317	C460DA1000-0318	C460DA1000-0319	C460DA1000-0320
485 – 515	C460DA1000-0313	C460DA1000-0314	C460DA1000-0315	C460DA1000-0316
	C460DA1000-0309	C460DA1000-0310	C460DA1000-0311	C460DA1000-0312

Dominant Wavelength (nm)

Note: The radiant-flux values above are representative of the die in a T-1¾ encapsulated 5-mm lamp.

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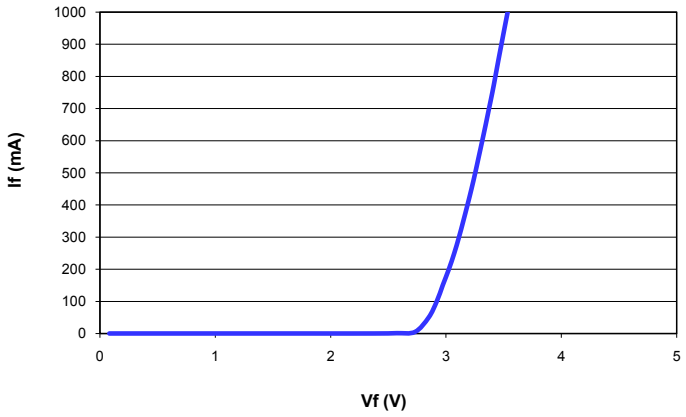
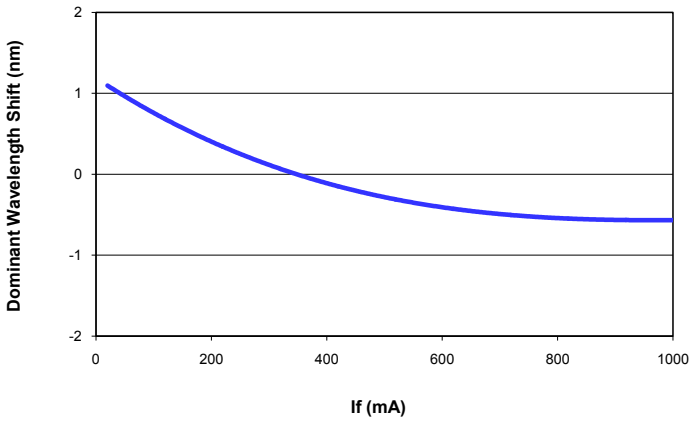
Characteristic Curves

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

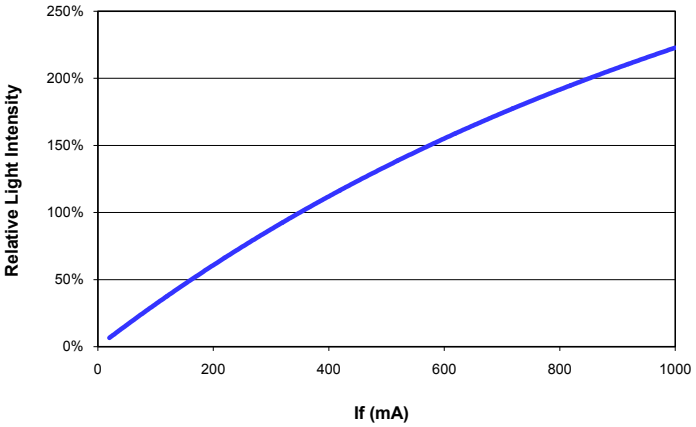
Forward Current vs. Forward Voltage



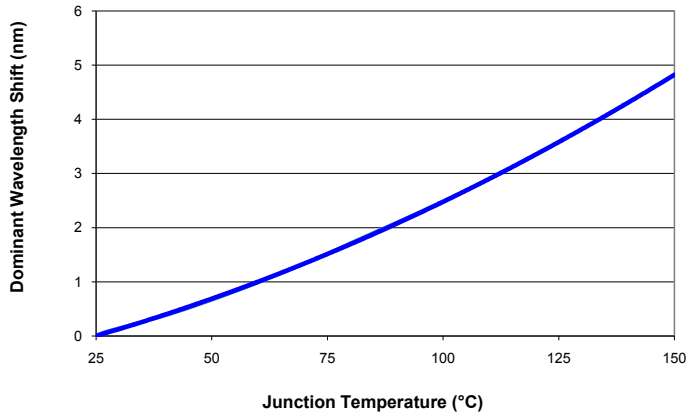
Wavelength Shift vs. Forward Current



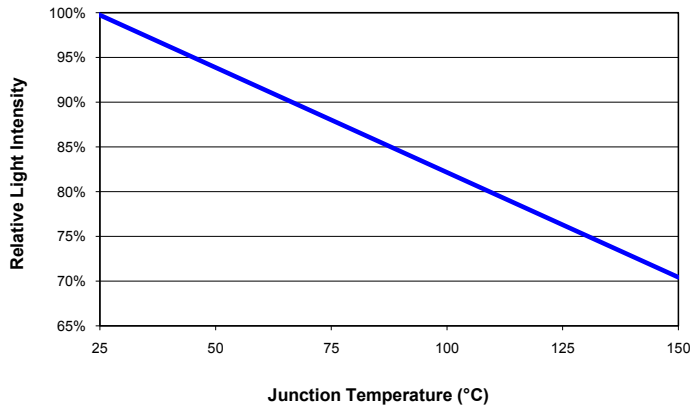
Relative Intensity vs. Forward Current



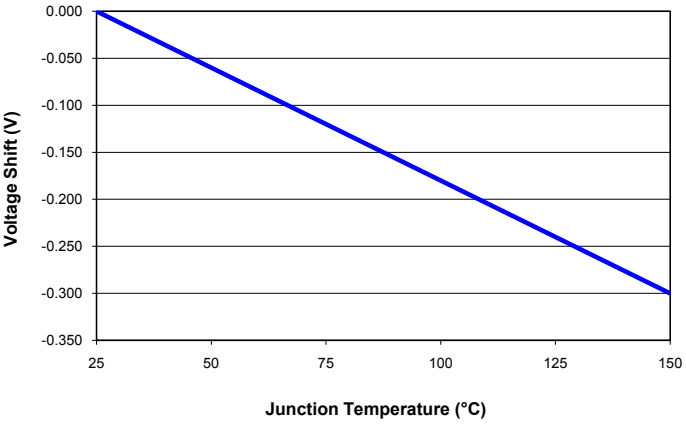
Dominant Wavelength Shift Vs Junction Temperature



Relative Light Intensity Vs Junction Temperature



Voltage Shift Vs Junction Temperature



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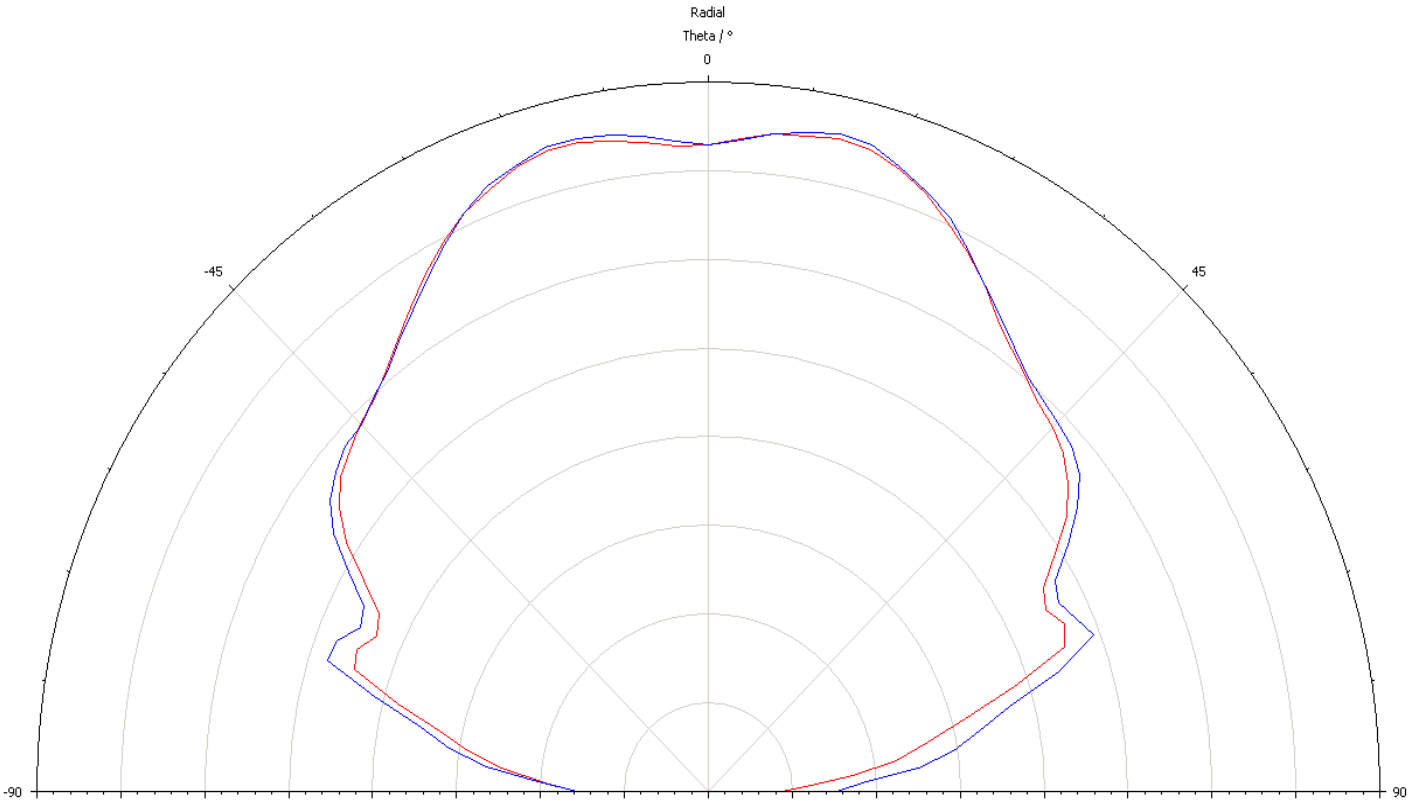
Radiation Pattern

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



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