

Cree® RazerThin® RT290™ LEDs

CxxxRT290-Sxxxx

Data Sheet

Cree's RazerThin LEDs are a new generation of solid-state LED emitters that combine highly efficient InGaN materials with Cree's proprietary G•SiC® substrate to deliver superior price/performance for high-intensity blue and green LEDs. These vertically structured LED chips are approximately 95 microns in height and require a low forward voltage. Cree's RazerThin series chips have the ability to withstand 2000 V ESD. Applications for RazerThin LEDs include next-generation keypad backlighting where sub-miniaturization and thinner form factors are required.

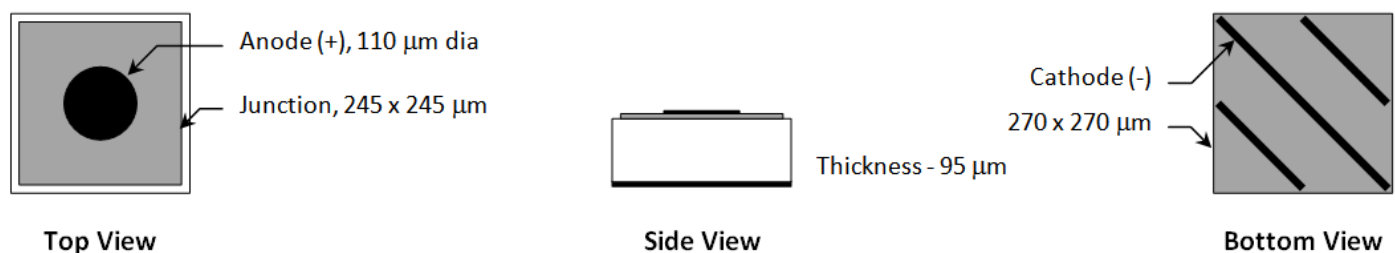
FEATURES

- 95 µm Chip Thickness
- Dominant Wavelength and Forward Voltage binned at 5 mA or 20 mA
- Low Forward Voltage
 - 2.8 V Typical at 5 mA
 - 3.1 V Typical at 20 mA
- RazerThin LED Performance
 - 460 nm - 5.0+ mW
 - 470 nm - 5.0+ mW
 - 527 nm - 1.5+ mW
- Single Wire Bond Structure
- 2kV Class-2 ESD Rating

APPLICATIONS

- Mobile Phone Key Pads
 - Blue LEDs
 - Green LEDs
 - Blue for White LEDs
- Cellular Phone LCD Backlighting
- Automotive Applications
 - Dashboard Lighting
 - Indicator Lighting
- LED Video Displays
- Audio Product Display Lighting

CxxxRT290-Sxxxx Chip Diagram



Top View

Side View

Bottom View

Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1&3</small>		CxxxRT290-Sxxxx
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
Storage Temperature Range		-40°C to +100°C
Recommended Die Sheet Storage Conditions		$\leq 30^\circ\text{C}$ / $\leq 85\%$ RH
Electrostatic Discharge Threshold (HBM) ^{Note 2}		2000 V
Electrostatic Discharge Classification (MIL-STD-883E) ^{Note 2}		Class 2

Typical Electrical/Optical Characteristics at $T_A = 25^\circ\text{C}$ <small>Note 3</small>								
Part Number	Forward Voltage (V_F , V), 5 mA			Forward Voltage (V_F , V), 20 mA			Reverse Current [$I(V_F=5V)$, μA]	Full Width Half Max (λ_D , nm)
	Min.	Typ.	Max.	Min.	Typ.	Max.	Max.	Typ.
C460RT290-Sxxxx	2.7	2.9	3.1	2.7	3.1	3.7	1	21
C470RT290-Sxxxx	2.7	2.9	3.1	2.7	3.1	3.7	1	22
C527RT290-Sxxxx	2.7	2.9	3.1	2.7	3.1	3.7	1	35

Mechanical Specifications		CxxxRT290-Sxxxx	
Description	Dimension	Tolerance	
P-N Junction Area (μm)	245 x 245	± 25	
Top Area (μm)	270 x 270	± 25	
Bottom Area (μm)	270 x 270	± 25	
Chip Thickness (μm)	95	± 15	
Au Bond Pad Diameter (μm)	110	± 20	
Au Bond Pad Thickness (μm)	1.2	± 0.5	
Back Contact Metal Width (μm)	20	± 10	

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 within the maximum ratings shown above at 5 mA or 20 mA. 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 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 are measured in an integrating sphere using Illuminance E.
- Specifications are subject to change without notice.

Standard Bins for RT290

All LED chips are sorted by Dominant Wavelength (DW) and Radiant Flux (RF) onto Sorted Die Sheets (SDSs). Binning examples are shown below. Sorted die kits (CxxxRT290-Sxxxx) may be filled with any or all bins (CxxxRT290-xxxx) contained in the kit. RF values are specified at $I_f = 20$ mA. DW values are specified at $I_f = 5$ or 20 mA (see Note).

C460RT290-S0500

Radiant Flux (mW)	10.4	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	
	9.0	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	
	7.5	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	
	6.7	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	
	5.0	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	C460RT290-xxxx	
		455	457.5	460	462.5	465
		Dominant Wavelength (nm)				

C470RT290-S0500

Radiant Flux (mW)	9.0	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	
	7.5	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	
	6.7	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	
	5.0	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	C470RT290-xxxx	
		465	467.5	470	472.5	475
		Dominant Wavelength (nm)				

C527RT290-S0100

Radiant Flux (mW)	3.5	C527RT290-xxxx	C527RT290-xxxx	C527RT290-xxxx	
	2.5	C527RT290-xxxx	C527RT290-xxxx	C527RT290-xxxx	
	1.7	C527RT290-xxxx	C527RT290-xxxx	C527RT290-xxxx	
		520	525	530	535
		Dominant Wavelength (nm)			

Note - Dominant Wavelength shifts shorter with increased forward current (I_f). For reference only, the typical DW shift from 5 to 20 mA is -2 nm for Blue LEDs (4xx nm) and -7 nm for Green LEDs (5xx nm).

Characteristic Curves

These are representative measurements for RT290 products. Actual curves will vary slightly for the various radiant flux and dominant wavelength bins.

