

Cree® RazerThin® RT230™ LEDs

CxxxRT230-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 85 microns in height and feature a low forward voltage. As with all of Cree's vertical LED chips, the RazerThin series LEDs have the ability to withstand 2000 V ESD. Applications for RazerThin LEDs include a wide range of indicator lighting where sub-miniaturization and thinner form factors are preferred or required.

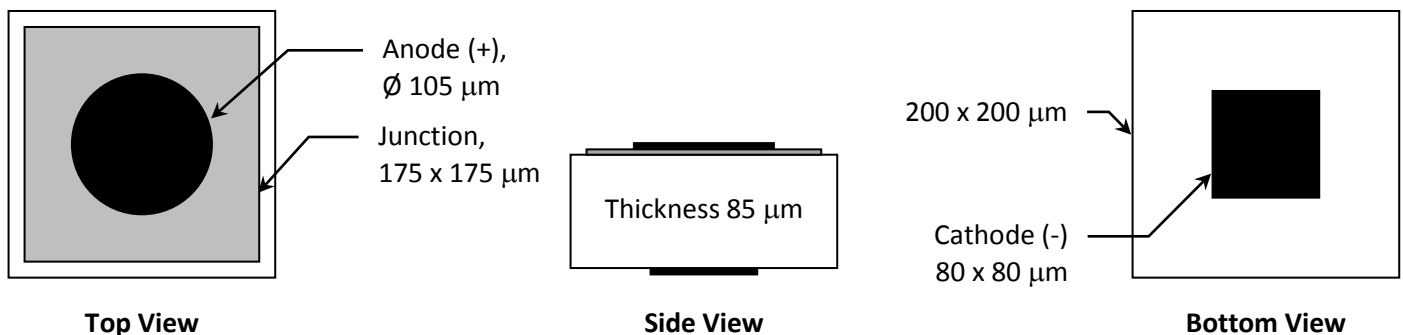
FEATURES

- 85 µm Chip Thickness
- Dominant Wavelength and Forward Voltage binned at 5 mA or 20 mA
- Low Forward Voltage
 - 2.9 V Typical at 5 mA
 - 3.2 V Typical at 20 mA
- RazerThin RF Performance (@ 20 mA)
 - 460 nm - 2.0+ mW
 - 470 nm - 2.0+ mW
 - 527 nm - 1.5+ mW
- Single Wire Bond Structure
- 2kV Class-2 ESD Rating

APPLICATIONS

- White Goods Indicators
 - Blue LEDs
 - Green LEDs
 - Blue for White LEDs
- Automotive Indicators
 - Meter Cluster
 - Center Console
 - Switch Illumination
- LED Video Displays
- Audio Product Displays

CxxxRT230-Sxxxx Chip Diagram



Maximum Ratings at $T_A = 25^\circ\text{C}$ <small>Notes 1&3</small>		CxxxRT230-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.
C460RT230-Sxxxx	2.6	2.9	3.1	2.7	3.2	3.7	2	21
C470RT230-Sxxxx	2.6	2.9	3.1	2.7	3.2	3.7	2	22
C527RT230-Sxxxx	2.6	2.9	3.2	2.7	3.3	3.7	2	35

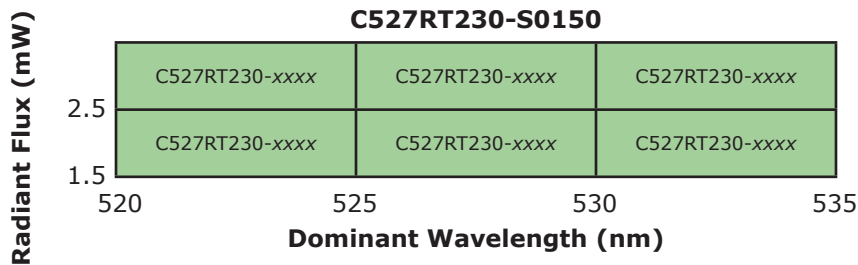
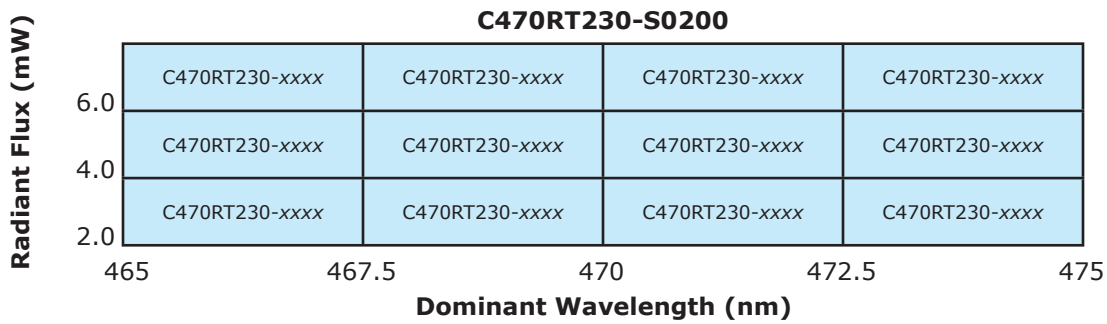
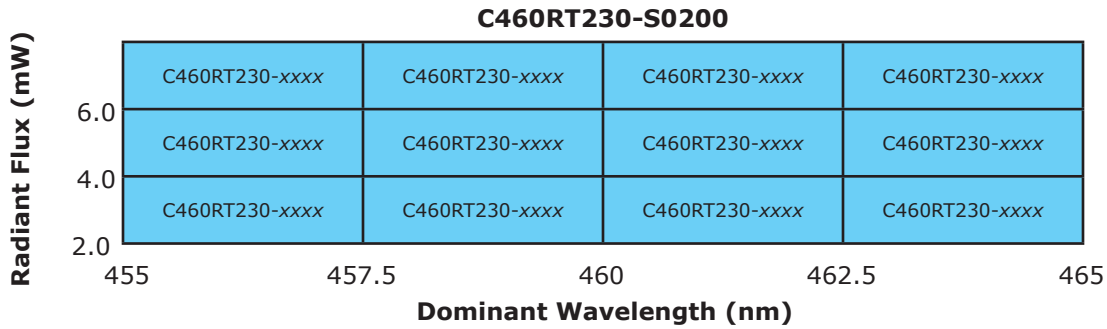
Mechanical Specifications		CxxxRT230-Sxxxx	
Description	Dimension	Tolerance	
P-N Junction Area (μm)	175 x 175	± 25	
Top Area (μm)	200 x 200	± 25	
Bottom Area (μm)	200 x 200	± 25	
Chip Thickness (μm)	85	± 15	
Au Bond Pad Diameter (μm)	105	-5/+15	
Au Bond Pad Thickness (μm)	1.2	± 0.5	
Back Contact Metal Area (μm)	80 x 80	± 25	

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 RT230

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 (CxxxRT230-Sxxxx) may be filled with any or all bins (CxxxRT230-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).



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 RT230 products. Actual curves will vary slightly for the various radiant flux and dominant wavelength bins.

