Preliminary
08-Sep, 2016

CREE

Cree® EZ400-p™ LEDs
Data Sheet (Anode-up)
C*xxx*EZ400-S*xxx*00-*x*

Cree's EZBright® LEDs are the latest generation of solid-state n-pad up LED emitters that combine highly efficient InGaN materials with Cree's proprietary optical design and device technology to deliver superior value for high-intensity LEDs. The optical design maximizes light extraction efficiency and enables a Lambertian radiation pattern. Additionally, these LEDs are die attachable with conductive epoxy, solder paste or solder preforms, as well as the flux eutectic method. These vertically structured, low forward voltage LED chips are approximately 170 microns in height. Cree's EZ™ chips are tested for conformity to optical and electrical specifications. These LEDs are useful in a broad range of applications, including wearable devices, video displays and LCD backlighting.

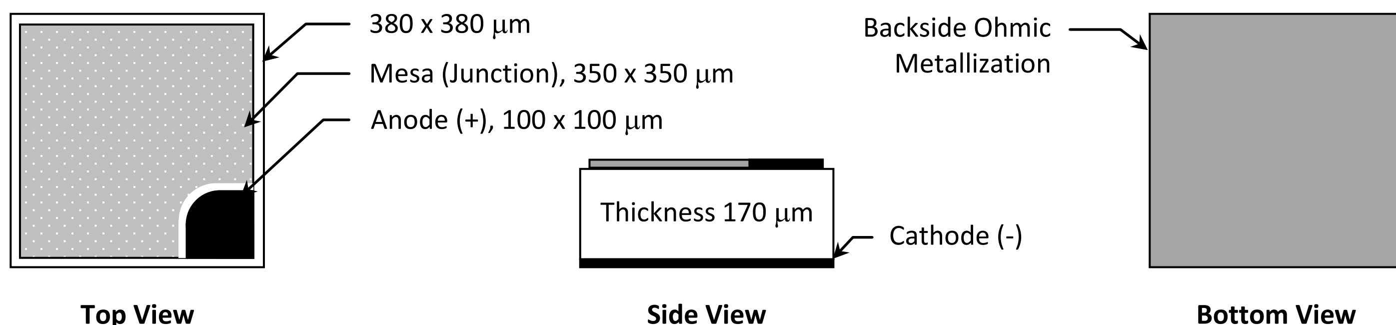
FEATURES

- Lambertian Radiation Pattern
- Anode-up design (p-pad up)
- EZBright LED Technology, binned @ 175 mA
  - 450 nm – 180+ mW
  - 460 nm – 180+ mW
  - 470 nm – 160+ mW
  - 527 nm – 40+ mW
- Forward Voltage (Vf) – 3.4 V Typical at 175 mA
- Maximum DC Forward Current – 200 mA
- Backside Metal versions for various attach methods:
  - -A (AuSn) for use with Conductive Adhesives, Flux Eutectic Attach, Solder Paste & Solder Preforms
  - -H (Au) for Conductive Adhesives (i.e. Ag paste)
- 2kV Class 2 ESD Rating

APPLICATIONS

- General Illumination
  - Aircraft
  - Decorative Lighting
  - Task Lighting
  - Outdoor Illumination
- White LEDs
- Wearable Devices
- Projection Displays
- Automotive Interior
- Automotive Exterior
- Mobile Flash

C*xxx*EZ400-S*xxx*00-*x* Chip Diagram



Maximum Ratings at T_A = 25°C Note 1	CxxxEZ400-Sxxx00-x
DC Forward Current	200 mA
Peak Forward Current (10% Duty Cycle @ 1 kHz)	350 mA Note 3
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	≤30°C / ≤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°C, If = 175 mA Note 2

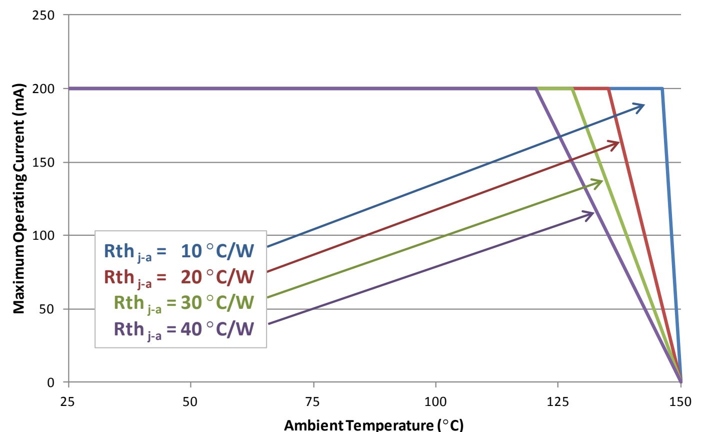
Part Number	Forward Voltage (V_F, V)			Reverse Current [I(Vr=5 V), μA]	Full Width Half Max (λ_D, nm)
	Min.	Typ.	Max.	Max.	Typ.
C450EZ400-Sxxx00-x	3.1	3.4	3.7	2	19
C460EZ400-Sxxx00-x	3.1	3.4	3.7	2	20
C470EZ400-Sxxx00-x	3.1	3.4	3.7	2	23
C527EZ400-Sxxx00-x	3.2	3.5	3.8	2	35

Mechanical Specifications — CxxxEZ400-Sxxx00-x

Description	Dimension	Tolerance
P-N Junction Area (μm)	350 x 350	±35
Chip Area (μm)	380 x 380	±35
Chip Thickness (μm)	170	±25
Top Au Bond Pad Diameter (μm)	100 x 100	-15/+5
Au Bond Pad Thickness (μm)	3.0	±1.0
Backside Ohmic Metal Area (μm)	380 x 380	± 35
Backside Ohmic Metal Thickness (μm) – "-A" (AuSn)	3.0	± 1.5
Backside Ohmic Metal Thickness (μm) – "-H" (Au)	0.050	

Notes:

1. Maximum ratings are package-dependent. The above ratings were determined using a silicone encapsulated chip on MCPCB for characterization. The junction temperature should be characterized in a specific package to determine limitations. Assembly processing temperature limit is <325°C (< 5 seconds). See the Cree EZBright Applications Note for assembly-process information.
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 2 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 175 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 header without an encapsulant. Optical characteristics were measured in an integrating sphere using Illuminance E.
4. 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.
5. Specifications are subject to change without notice.

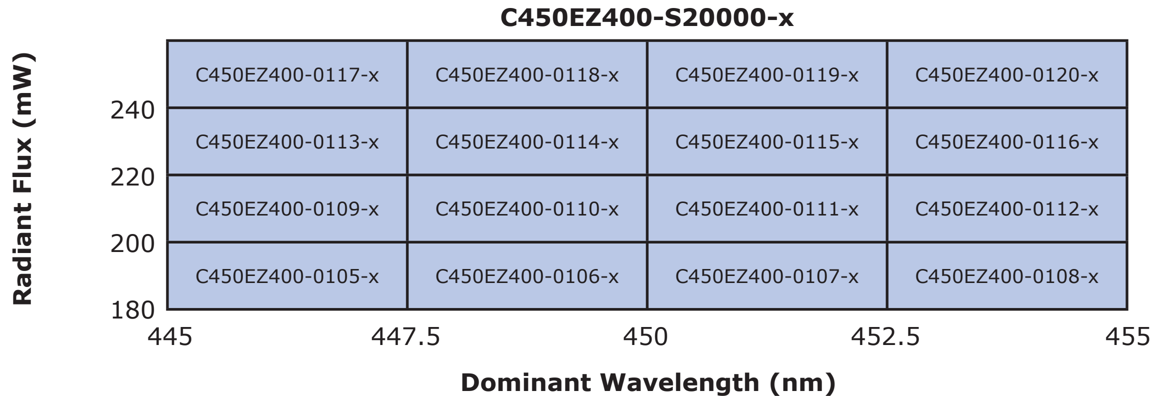


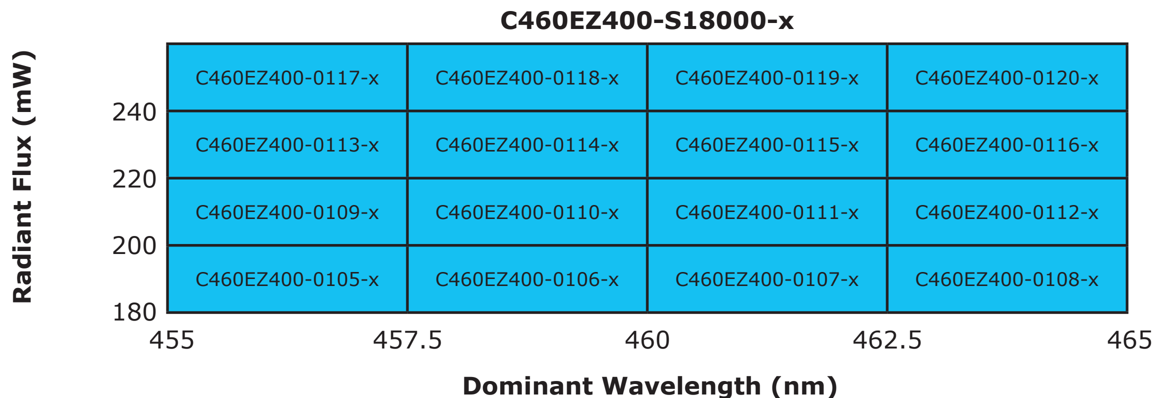
© 2016 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and EZBright® are registered trademarks, and EZ™ and EZ400-p™ are trademarks of Cree, Inc.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703-8475
USA Tel: +1.919.313.5300
Fax: +1-919-313-5870
www.cree.com/chips

Standard Bins for C*xxx*EZ400-S*xxx*00-*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 (C*xxx*EZ400-S*xxx*00-*x*) orders may be filled with any or all bins (C*xxx*EZ400-0*xxx*-*x*) contained in the kit. All radiant flux and all dominant wavelength values shown and specified are at If = 175 mA. Radiant flux values are measured using Au-plated headers without an encapsulant.



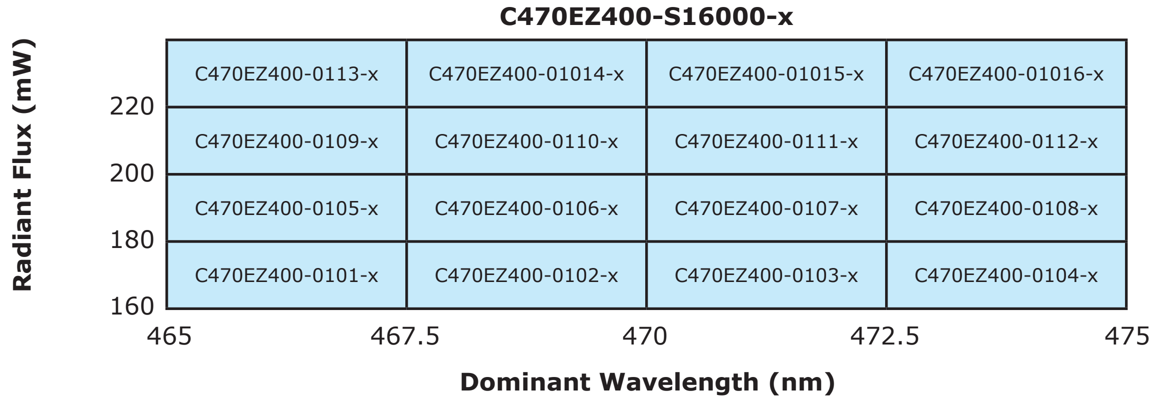


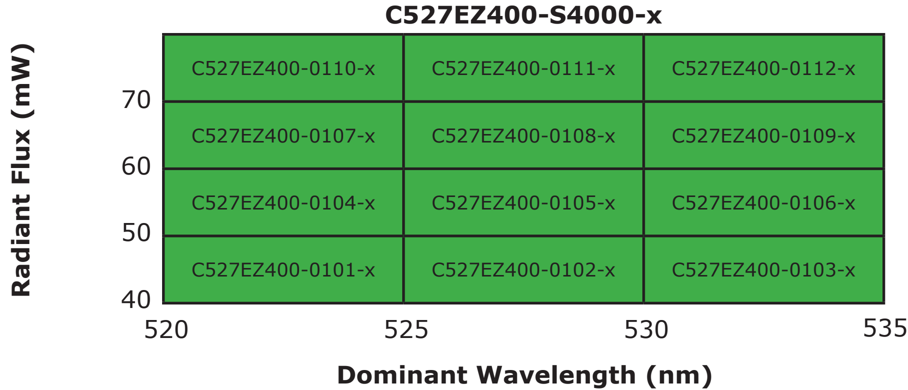
© 2016 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and EZBright® are registered trademarks, and EZ™ and EZ400-p™ are trademarks of Cree, Inc.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703-8475
USA Tel: +1.919.313.5300
Fax: +1-919-313-5870
www.cree.com/chips

Standard Bins for C*xxx*EZ400-S*xxx*00-*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 (C*xxx*EZ400-S*xxx*00-*x*) orders may be filled with any or all bins (C*xxx*EZ400-0*xxx*-*x*) contained in the kit. All radiant flux and all dominant wavelength values shown and specified are at If = 175 mA. Radiant flux values are measured using Au-plated headers without an encapsulant.



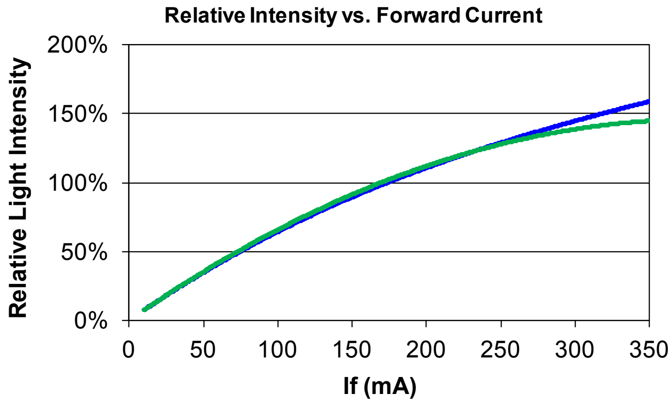


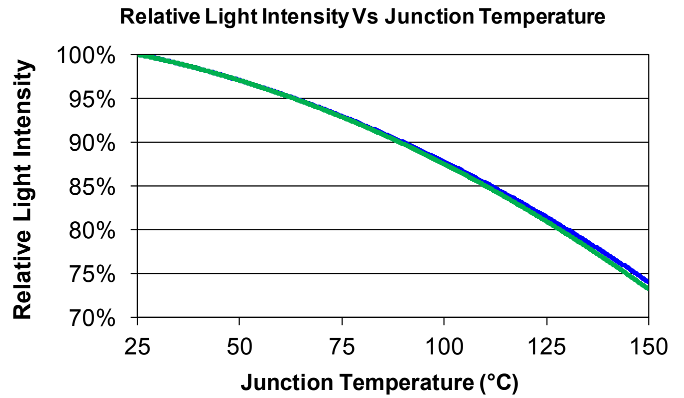
© 2016 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and EZBright® are registered trademarks, and EZ™ and EZ400-p™ are trademarks of Cree, Inc.

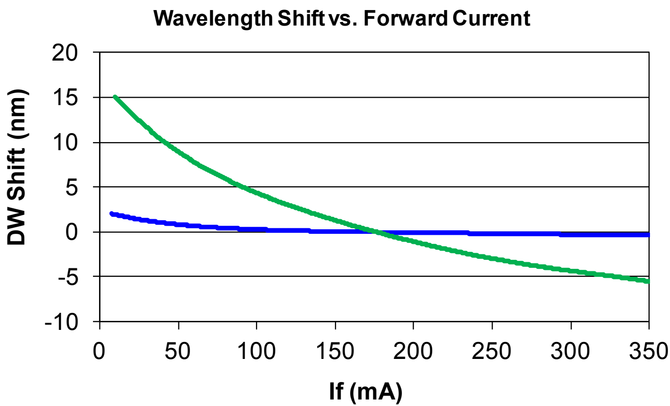
Cree, Inc.
4600 Silicon Drive
Durham, NC 27703-8475
USA Tel: +1.919.313.5300
Fax: +1-919-313-5870
www.cree.com/chips

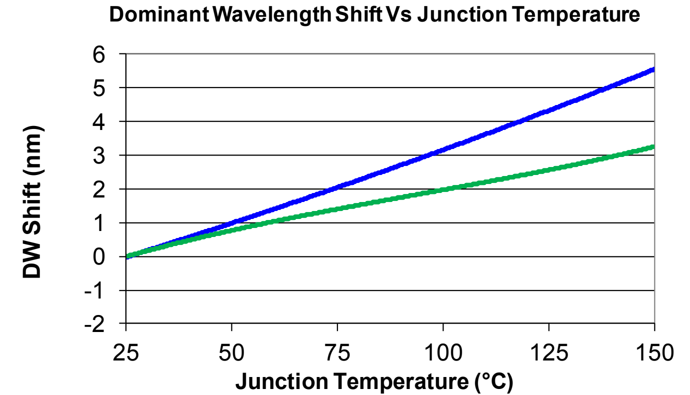
Characteristic Curves

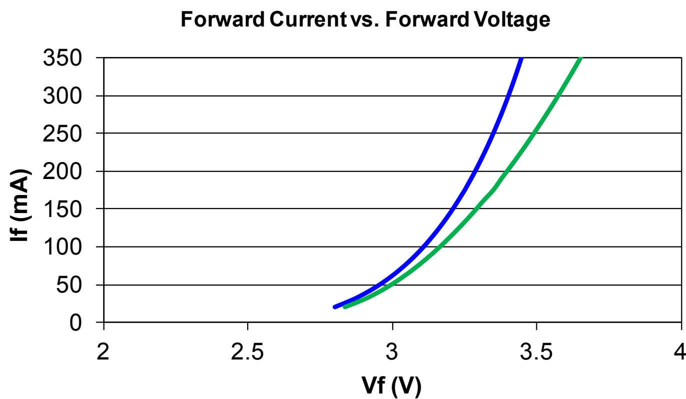
These are representative measurements for the EZBright Power Chip LED products. Actual curves will vary slightly for the various radiant flux and dominant wavelength bins.

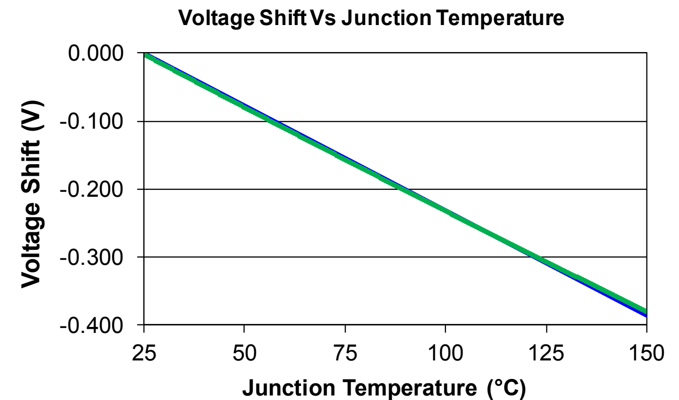










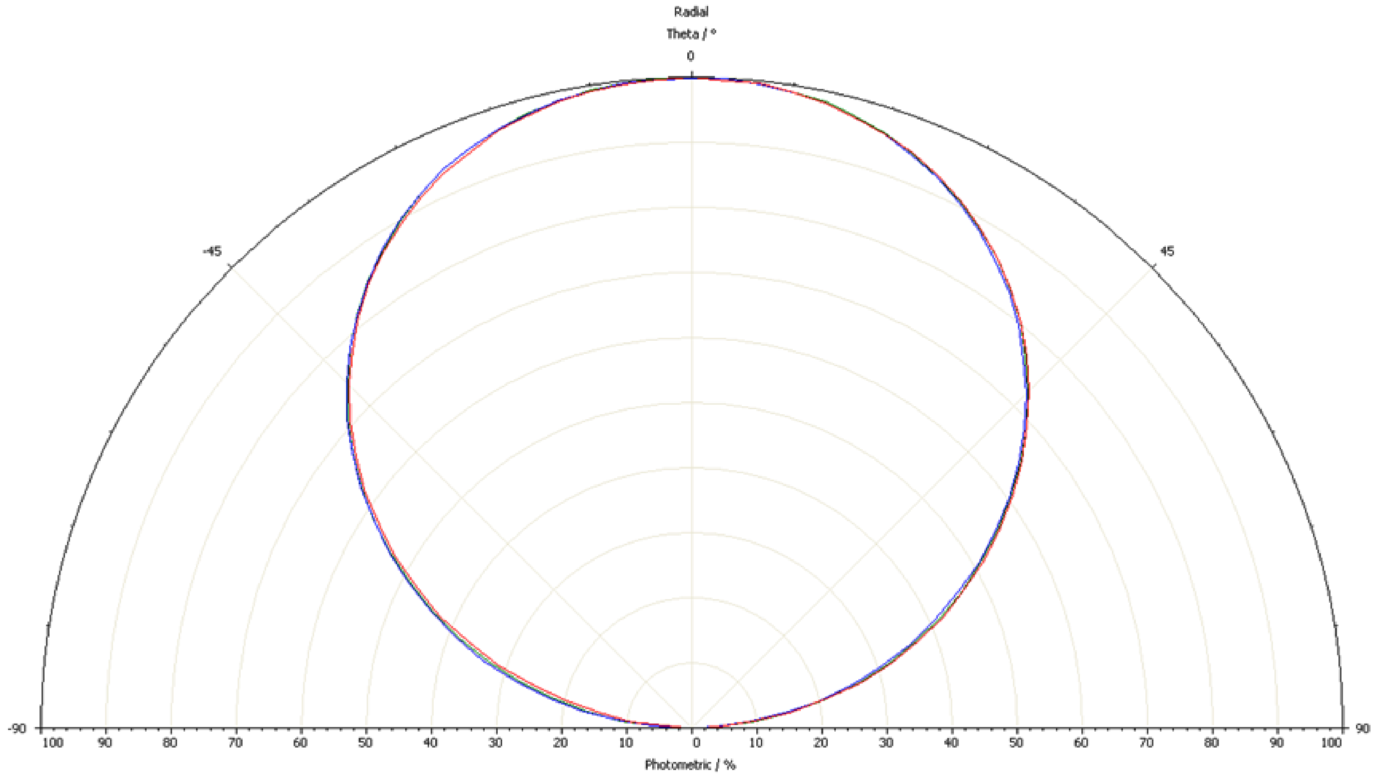


© 2016 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and EZBright® are registered trademarks, and EZ™ and EZ400-p™ are trademarks of Cree, Inc.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703-8475
USA Tel: +1.919.313.5300
Fax: +1-919-313-5870
www.cree.com/chips

Radiation Pattern

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



© 2016 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and EZBright® are registered trademarks, and EZ™ and EZ400-p™ are trademarks of Cree, Inc.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703-8475
USA Tel: +1.919.313.5300
Fax: +1-919-313-5870
www.cree.com/chips