# Cree® XLamp® XM-L2 LEDs

## PRODUCT DESCRIPTION

The XLamp® XM-L2 LED builds on the unprecedented performance of the original XM-L, increasing lumen output up to 20% while providing a single die LED point source for precise optical control. The XM-L2 LED shares the same mechanical and optical footprint as the original XM-L, providing a seamless upgrade path and shortened design cycle.

XLamp XM-L2 LEDs are the ideal choice for lighting applications where high light output and maximum efficacy are required, such as LED light bulbs, outdoor lighting, portable lighting, indoor lighting and solar-powered lighting.

## FEATURES

- Available in white, 70-CRI white, 80-CRI white, 85-CRI white and 90-CRI white
- ANSI-compatible chromaticity bins
- Binned at 85 °C
- Maximum drive current: 3000 mA
- Low thermal resistance: 2.5 °C/W
- Wide viewing angle: 125°
- Unlimited floor life at ≤ 30 ºC/85% RH
- Reflow solderable - JEDEC J-STD-020C
- Electrically neutral thermal path
- RoHS- and REACh-compliant
- UL® recognized component (E349212)

## TABLE OF CONTENTS

Characteristics ..... 2
Flux Characteristics ..... 3
Relative Spectral Power Distribution ..... 4
Relative Flux vs. Junction Temperature. 4
Electrical Characteristics..... 5
Relative Flux vs. Current ..... 5
Relative Chromaticity vs. Current..... 6
Relative Chromaticity vs. Temperature.. 6
Typical Spatial Distribution..... 7
Thermal Design ..... 7
Reflow Soldering Characteristics..... 8
Notes ..... 9
Mechanical Dimensions ..... 11
Tape and Reel..... 12
Packaging..... 13



Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300

## CHARACTERISTICS

| Characteristics | Unit | Minimum | Typical | Maximum |
|---|---|---|---|---|
| Thermal resistance, junction to solder point | °C/W | | 2.5 | |
| Viewing angle (FWHM) | degrees | | 125 | |
| Temperature coefficient of voltage | mV/°C | | -1.6 | |
| ESD withstand voltage (HBM per Mil-Std-883D) | V | | | 8000 |
| DC forward current | mA | | | 3000 |
| Reverse voltage | V | | | -5 |
| Forward voltage (@ 700 mA, 85 °C) | V | | 2.85 | 3.15 |
| Forward voltage (@ 1500 mA, 85 °C) | V | | 3.05 | |
| Forward voltage (@ 3000 mA, 85 °C) | V | | 3.3 | |
| LED junction temperature | °C | | | 150 |

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## FLUX CHARACTERISTICS ($T_J$ = 85 °C)

The following table provides several base order codes for XLamp XM-L2 LEDs. It is important to note that the base order codes listed here are a subset of the total available order codes for the product family. For more order codes, as well as a complete description of the order-code nomenclature, please consult the XLamp XM LED Family Binning and Labeling document.

| Color | CCT Range | | Minimum Luminous Flux (lm) @ 700 mA | | | Calculated Minimum Luminous Flux (lm) @ 85 °C** | | | Order Code |
|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Group | Flux (lm) @ 85 °C | Flux (lm) @ 25 °C* | 1000 mA | 1500 mA | 2000 mA | |
| Cool White | 5000 K | 8300 K | T5 | 260 | 296 | 357 | 502 | 631 | XMLBWT-00-0000-0000T5051 |
| | | | T6 | 280 | 318 | 385 | 541 | 679 | XMLBWT-00-0000-0000T6051 |
| | | | U2 | 300 | 342 | 412 | 580 | 728 | XMLBWT-00-0000-0000U2051 |
| | | | U3 | 320 | 364 | 439 | 618 | 776 | XMLBWT-00-0000-0000U3051 |
| Neutral White | 3700 K | 5000 K | T4 | 240 | 273 | 330 | 464 | 582 | XMLBWT-00-0000-000LT40E4 |
| | | | T5 | 260 | 296 | 357 | 502 | 631 | XMLBWT-00-0000-000LT50E4 |
| | | | T6 | 280 | 318 | 385 | 541 | 679 | XMLBWT-00-0000-000LT60E4 |
| Warm White | 2600 K | 3700 K | T2 | 200 | 227 | 275 | 386 | 485 | XMLBWT-00-0000-000LT20E7 |
| | | | T3 | 220 | 250 | 302 | 425 | 534 | XMLBWT-00-0000-000LT30E7 |
| | | | T4 | 240 | 273 | 330 | 464 | 582 | XMLBWT-00-0000-000LT40E7 |
| 70-CRI White | 3700 K | 5000 K | T5 | 260 | 296 | 357 | 502 | 631 | XMLBWT-00-0000-000BT50E3 |
| | | | T6 | 280 | 318 | 385 | 541 | 679 | XMLBWT-00-0000-000BT60E3 |
| | | | U2 | 300 | 342 | 412 | 580 | 728 | XMLBWT-00-0000-000BU20E3 |
| 80-CRI White | 2600 K | 4300 K | T2 | 200 | 227 | 275 | 386 | 485 | XMLBWT-00-0000-000HT20E7 |
| | | | T3 | 220 | 250 | 302 | 425 | 534 | XMLBWT-00-0000-000HT30E7 |
| | | | T4 | 240 | 273 | 330 | 464 | 582 | XMLBWT-00-0000-000HT40E7 |
| | | | T5 | 260 | 296 | 357 | 502 | 631 | XMLBWT-00-0000-000HT50E7 |
| 85-CRI White | 2600 K | 3200 K | S4 | 164 | 186 | 225 | 317 | 398 | XMLBWT-00-0000-000PS40E7 |
| | | | S5 | 172 | 196 | 236 | 332 | 417 | XMLBWT-00-0000-000PS50E7 |
| | | | S6 | 182 | 207 | 250 | 352 | 442 | XMLBWT-00-0000-000PS60E7 |
| | | | T2 | 200 | 227 | 275 | 386 | 485 | XMLBWT-00-0000-000PT20E7 |
| 90-CRI White | 2600 K | 3200 K | S4 | 164 | 186 | 225 | 317 | 398 | XMLBWT-00-0000-000US40E7 |
| | | | S5 | 172 | 196 | 236 | 332 | 417 | XMLBWT-00-0000-000US50E7 |
| | | | S6 | 182 | 207 | 250 | 352 | 442 | XMLBWT-00-0000-000US60E7 |
| | | | T2 | 200 | 227 | 275 | 386 | 485 | XMLBWT-00-0000-000UT20E7 |

Notes:

- Cree maintains a tolerance of ±7% on flux and power measurements, ±0.005 on chromaticity (CCx, CCy) measurements and ±2 on CRI measurements. See the Measurements section (page 9).
- Typical CRI for Cool White (5000 K – 8300 K CCT) is 65.
- Typical CRI for Neutral White (3700 K – 5000 K CCT) is 75.
- Typical CRI for Warm White (2600 K – 3700 K CCT) is 80.
- Minimum CRI for 70-CRI White is 70.
- Minimum CRI for 80-CRI White is 80.
- Minimum CRI for 85-CRI White is 85.
- Minimum CRI for 90-CRI White is 90.

* Flux values @ 25 °C are calculated and are for reference only.

** Calculated flux values at 1000 mA, 1500 mA and 2000 mA are for reference only.

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## RELATIVE SPECTRAL POWER DISTRIBUTION

## RELATIVE FLUX VS. JUNCTION TEMPERATURE ($I_F$ = 700 mA)

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## ELECTRICAL CHARACTERISTICS ($T_J$ = 85 °C)

## RELATIVE FLUX VS. CURRENT ($T_J$ = 85 °C)

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## RELATIVE CHROMATICITY VS. CURRENT (WARM WHITE)

## RELATIVE CHROMATICITY VS. TEMPERATURE (WARM WHITE)

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## TYPICAL SPATIAL DISTRIBUTION

## THERMAL DESIGN

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 solder point to ambient in order to optimize lamp life and optical characteristics.

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## REFLOW SOLDERING CHARACTERISTICS

In testing, Cree has found XLamp XM-L2 LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, Cree recommends that users follow the recommended soldering profile provided by the manufacturer of the solder paste used.

Note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment.

IPC/JEDEC J-STD-020C

| Profile Feature | Lead-Free Solder |
|---|---|
| Average Ramp-Up Rate ($Ts_{max}$ to Tp) | 1.2 °C/second |
| Preheat: Temperature Min ($Ts_{min}$) | 120 °C |
| Preheat: Temperature Max ($Ts_{max}$) | 170 °C |
| Preheat: Time ($ts_{min}$ to $ts_{max}$) | 65-150 seconds |
| Time Maintained Above: Temperature ($T_L$) | 217 °C |
| Time Maintained Above: Time ($t_L$) | 45-90 seconds |
| Peak/Classification Temperature (Tp) | 235 - 245 °C |
| Time Within 5 °C of Actual Peak Temperature (tp) | 20-40 seconds |
| Ramp-Down Rate | 1 - 6 °C/second |
| Time 25 °C to Peak Temperature | 4 minutes max. |

Note: All temperatures refer to the topside of the package, measured on the package body surface.

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## NOTES

### Measurements

The luminous flux, radiant power, chromaticity and CRI measurements in this document are binning specifications only and solely represent product measurements as of the date of shipment. These measurements will change over time based on a number of factors that are not within Cree's control and are not intended or provided as operational specifications for the products. Calculated values are provided for informational purposes only and are not intended as specifications.

### Lumen Maintenance

Cree now uses standardized IES LM-80-08 and TM-21-11 methods for collecting long-term data and extrapolating LED lumen maintenance. For information on the specific LM-80 data sets available for this LED, refer to the public LM-80 results document.

Please read the Long-Term Lumen Maintenance application note for more details on Cree's lumen maintenance testing and forecasting. Please read the Thermal Management application note for details on how thermal design, ambient temperature, and drive current affect the LED junction temperature.

### Moisture Sensitivity

Cree recommends keeping XLamp LEDs in the provided, resealable moisture-barrier packaging (MBP) until immediately prior to soldering. Unopened MBPs that contain XLamp LEDs do not need special storage for moisture sensitivity.

Once the MBP is opened, XLamp XM-L2 LEDs may be stored as MSL 1 per JEDEC J-STD-033, meaning they have unlimited floor life in conditions of ≤ 30 °C/85% relative humidity (RH). Regardless of the storage condition, Cree recommends sealing any unsoldered LEDs in the original MBP.

### RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of www.cree.com.

### REACh Compliance

REACh substances of very high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree representative to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

### UL® Recognized Component

Level 4 enclosure consideration. The LED package or a portion thereof has been investigated as a fire and electrical enclosure per ANSI/UL 8750.

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## NOTES - CONTINUED

### Vision Advisory

WARNING: Do not look at exposed lamp in operation. Eye injury can result. For more information about LEDs and eye safety, please refer to the LED Eye Safety application note.

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## MECHANICAL DIMENSIONS

Thermal vias, if present, are not shown on these drawings.

All measurements are ±.13 mm unless otherwise indicated.

**Top View**

**Side View**

**Bottom View**

**Recommended PCB Solder Pad**

**Recommended Stencil Pattern (Shaded Area Is Open)**

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## TAPE AND REEL

All Cree carrier tapes conform to EIA-481D, Automated Component Handling Systems Standard.

Excep as noted, all dimensions in mm.

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

## PACKAGING

**Unpackaged Reel**

Label with Cree Bin Code, Quantity, Reel ID

**Packaged Reel**

Label with Cree Order Code, Quantity, Reel ID, PO #

Label with Cree Bin Code, Quantity, Reel ID

**Boxed Reel**

Patent Label

Label with Cree Order Code, Quantity, Reel ID, PO #

Label with Cree Bin Code, Quantity, Reel ID

Copyright © 2012-2015 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree®, the Cree logo, and XLamp® are registered trademarks of Cree, Inc. UL® and the UR logo are registered trademarks of UL LLC.

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** sales@st-electron.ru

**Адрес:** 198099, Санкт-Петербург, Промышленная ул, дом № 19, литера Н, помещение 100-Н Офис 331