

# Cree® LMH2 LED Modules

**LMH2 Light Source with Flat Lens**



**LMH2 Light Source with Dome Lens**



## PRODUCT DESCRIPTION

Cree LED modules provide lighting designers and manufacturers with simple, easy-to-adopt LED lighting solutions that reduce luminaire development time and speed time-to-market. Cree LMH2 LED modules are the ideal choice for enabling rapid luminaire development where bright, beautiful, long-life lighting is required. The ease of use of the LMH series of modules enables this versatile LED lighting module to jump-start the design process for recessed downlights, wall sconces or pendant lights in demanding end markets such as retail, museums, hospitality and restaurants.

## FEATURES

- Industry-leading light-source efficacy of 97 lm/W (steady state)
- Available in 2700 K, 3000 K, 3500 K and 4000 K CCT
- $\geq 90$  CRI for all CCTs
- Broad selection of mounting and wiring options
- Industry-leading 5-year limited system warranty
- Designed to last 50,000 hours at  $L_{70}$
- No UV in light output
- No mercury in light source

## TABLE OF CONTENTS

|   |   |
|---|---|
| Characteristics .....                                       | 2 |
| Order Codes .....   | 2 |
| Thermal Management Guidelines .....                         | 3 |
| Relative Spectral Power Distribution .                      | 4 |
| Relative Luminous Flux vs. Case Temperature .....           | 4 |
| Typical Voltage vs. Case Temperature .....                  | 5 |
| Notes.....  | 5 |
| Photometry.....   | 6 |
| Performance Groups - Chromaticity..                         | 7 |
| Chromaticity Bins Plotted on the 1931 CIE Color Space ..... | 7 |
| Mechanical Dimensions.....                                  | 8 |
| Packaging.....  | 8 |

**CHARACTERISTICS**

| Characteristics                                     | Unit            | Minimum | Typical | Maximum |
|---|-----------------|---------|---------|---------|
| Viewing angle (FWHM) - 850- & 1250-lm flat lens     | degrees         |         | 82      |         |
| Viewing angle (FWHM) - 850- & 1250-lm dome lens     | degrees         |         | 96      |         |
| Viewing angle (FWHM) - 2000- & 3000-lm flat lens    | degrees         |         | 82      |         |
| Viewing angle (FWHM) - 2000- & 3000-lm dome lens    | degrees         |         | 105     |         |
| DC forward current - 850 & 1250 lm                  | mA              | 400     | 440     | 480     |
| DC forward current - 2000 & 3000 lm                 | mA              | 810     | 900     | 990     |
| Forward voltage - 850 lm (@ 440 mA, 55 °C)          | V               |         | 19.9    | 21.2    |
| Forward voltage - 1250 lm (@ 440 mA, 55 °C)         | V               |         | 29.3    | 31.6    |
| Forward voltage - 2000 lm (@ 900 mA, 55 °C)         | V               |         | 22.9    | 24.7    |
| Forward voltage - 3000 lm (@ 900 mA, 55 °C)         | V               |         | 34.4    | 37.0    |
| Luminous flux - 850-lm flat lens(@ 440 mA, 55 °C)   | lm              | 790     | 850     | 909     |
| Luminous flux - 1250-lm flat lens (@ 440 mA, 55 °C) | lm              | 1163    | 1250    | 1337    |
| Luminous flux - 2000-lm flat lens (@ 900 mA, 55 °C) | lm              | 1860    | 2000    | 2140    |
| Luminous flux - 3000-lm flat lens (@ 900 mA, 55 °C) | lm              | 2790    | 3000    | 3210    |
| LED module case temperature (Tc)                    | °C              | 0       |         | 70      |
| CRI   | 100-point scale | 90      |         |         |

**Notes:**

- LMH2 modules are not designed for reverse bias operation.
- Cree maintains a tolerance of  $\pm 7\%$  on flux measurements,  $\pm 10\%$  on power measurements,  $\pm 0.005$  on chromaticity (CCx, CCy) measurements and a tolerance of  $\pm 2$  on CRI measurements.
- 55 °C measured at case temperature (Tc) point shown on page 8.
- Luminous flux values for the dome lens LMH2 LED module can be up to 3% higher.

**ORDER CODES**

| Typical Luminous Flux (lm) | Typical Light Source Efficacy (lm/W) | CCT (K) | Order Code               |                          |
|----------------------------|--------------------------------------|---------|--------------------------|--------------------------|
|                            |                                      |         | Flat Lens                | Dome Lens                |
| 850                        | 97                                   | 4000    | LMH020-0850-40G9-00000TW | LMH020-0850-40G9-00001TW |
|                            |                                      | 3500    | LMH020-0850-35G9-00000TW | LMH020-0850-35G9-00001TW |
|                            |                                      | 3000    | LMH020-0850-30G9-00000TW | LMH020-0850-30G9-00001TW |
|                            |                                      | 2700    | LMH020-0850-27G9-00000TW | LMH020-0850-27G9-00001TW |
| 1250                       | 97                                   | 4000    | LMH020-1250-40G9-00000TW | LMH020-1250-40G9-00001TW |
|                            |                                      | 3500    | LMH020-1250-35G9-00000TW | LMH020-1250-35G9-00001TW |
|                            |                                      | 3000    | LMH020-1250-30G9-00000TW | LMH020-1250-30G9-00001TW |
|                            |                                      | 2700    | LMH020-1250-27G9-00000TW | LMH020-1250-27G9-00001TW |
| 2000                       | 97                                   | 4000    | LMH020-2000-40G9-00000TW | LMH020-2000-40G9-00001TW |
|                            |                                      | 3500    | LMH020-2000-35G9-00000TW | LMH020-2000-35G9-00001TW |
|                            |                                      | 3000    | LMH020-2000-30G9-00000TW | LMH020-2000-30G9-00001TW |
|                            |                                      | 2700    | LMH020-2000-27G9-00000TW | LMH020-2000-27G9-00001TW |
| 3000                       | 97                                   | 4000    | LMH020-3000-40G9-00000TW | LMH020-3000-40G9-00001TW |
|                            |                                      | 3500    | LMH020-3000-35G9-00000TW | LMH020-3000-35G9-00001TW |
|                            |                                      | 3000    | LMH020-3000-30G9-00000TW | LMH020-3000-30G9-00001TW |
|                            |                                      | 2700    | LMH020-3000-27G9-00000TW | LMH020-3000-27G9-00001TW |

### THERMAL MANAGEMENT GUIDELINES

The Cree LMH2 module is designed to perform in a variety of environments without the need for active cooling. To achieve lifetime and performance estimates, and to maintain the warranty, the final luminaire design cannot allow the Tc point shown on page 8 to exceed 70 °C for the light source when the luminaire is at thermal equilibrium. Follow the mechanical and thermal design guidelines listed in the “Cree LMH2 LED Module Design Guide” to ensure proper thermal management.<sup>1</sup> An optional heat sink is available.

Note: The heat sink is designed to work with all LMH2 lumen levels.

| Optional Heat Sink Order Code |
|-------------------------------|
| LMH020-HS00-0000-0000001      |

**Optional Heat Sink<sup>2</sup>**



1 [www.cree.com/modules\\_guides/lmh2](http://www.cree.com/modules_guides/lmh2)

2 Dimensions for the diagram are in mm and are for reference only. For exact dimensions and tolerances, refer to the 3-D model (.STEP file) for the optional heat sink available by selecting the Documentation tab at [www.cree.com/modules/lmh2](http://www.cree.com/modules/lmh2).

### RELATIVE SPECTRAL POWER DISTRIBUTION

Test Conditions:  $I_f = 440 \text{ mA}$ : 850 & 1250 lm;  $I_f = 900 \text{ mA}$ : 2000 & 3000 lm;  $T_c = 55 \text{ }^\circ\text{C}$ ; Steady-state operation



### RELATIVE LUMINOUS FLUX VS. CASE TEMPERATURE

Test Conditions:  $I_f = 440 \text{ mA}$ : 850 & 1250 lm;  $I_f = 900 \text{ mA}$ : 2000 & 3000 lm; Steady-state operation



**TYPICAL VOLTAGE VS. CASE TEMPERATURE**

Test Conditions:  $I_f = 440 \text{ mA}$ : 850 & 1250 lm;  $I_f = 900 \text{ mA}$ : 2000 & 3000 lm; Steady-state operation



**NOTES**

**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 amended through June 8, 2011. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Ecology section of [www.cree.com](http://www.cree.com).

**Vision Advisory Claim**

Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye. See the Eye Safety application note at [www.cree.com/xlamp\\_app\\_notes/led\\_eye\\_safety](http://www.cree.com/xlamp_app_notes/led_eye_safety).

PHOTOMETRY

With Flat Lens

Intensity (Candlepower)

| Angle | 850 | 1250 |
|-------|-----|------|
| 0°    | 402 | 575  |
| 5°    | 399 | 571  |
| 15°   | 375 | 539  |
| 25°   | 331 | 479  |
| 35°   | 270 | 394  |
| 45°   | 202 | 297  |
| 55°   | 136 | 202  |
| 65°   | 79  | 118  |
| 75°   | 30  | 45   |
| 85°   | 3   | 5    |
| 90°   | 0   | 0    |



Zonal Lumens - 850

| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 295    | 34  |
| 0-40°  | 464    | 54  |
| 0-60°  | 742    | 87  |
| 0-90°  | 858    | 100 |
| 0-180° | 858    | 100 |

Zonal Lumens - 1250

| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 426    | 34  |
| 0-40°  | 672    | 54  |
| 0-60°  | 1082   | 86  |
| 0-90°  | 1256   | 100 |
| 0-180° | 1256   | 100 |

With Dome Lens

Intensity (Candlepower)

| Angle | 850 | 1250 |
|-------|-----|------|
| 0°    | 309 | 461  |
| 5°    | 307 | 457  |
| 15°   | 297 | 442  |
| 25°   | 272 | 405  |
| 35°   | 229 | 339  |
| 45°   | 177 | 262  |
| 55°   | 126 | 187  |
| 65°   | 84  | 124  |
| 75°   | 53  | 78   |
| 85°   | 34  | 50   |
| 90°   | 27  | 39   |



Zonal Lumens - 850

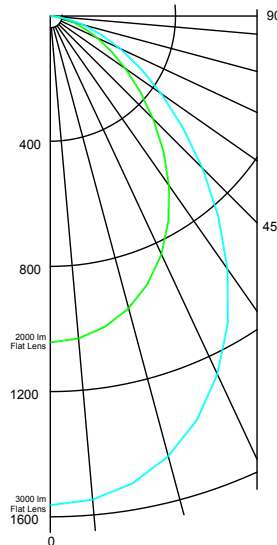
| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 233    | 27  |
| 0-40°  | 375    | 44  |
| 0-60°  | 631    | 73  |
| 0-90°  | 818    | 95  |
| 0-180° | 862    | 100 |

Zonal Lumens - 1250

| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 349    | 27  |
| 0-40°  | 561    | 44  |
| 0-60°  | 945    | 73  |
| 0-90°  | 1224   | 95  |
| 0-180° | 1289   | 100 |

Intensity (Candlepower)

| Angle | 2000 | 3000 |
|-------|------|------|
| 0°    | 1043 | 1563 |
| 5°    | 1034 | 1551 |
| 15°   | 967  | 1456 |
| 25°   | 840  | 1263 |
| 35°   | 661  | 987  |
| 45°   | 464  | 688  |
| 55°   | 293  | 433  |
| 65°   | 166  | 245  |
| 75°   | 73   | 110  |
| 85°   | 11   | 17   |
| 90°   | 0    | 0    |



Zonal Lumens - 2000

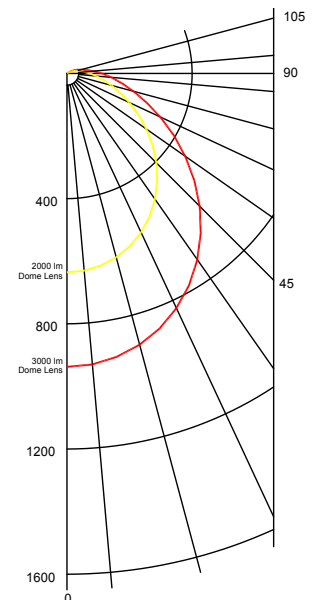
| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 755    | 37  |
| 0-40°  | 1168   | 57  |
| 0-60°  | 1790   | 87  |
| 0-90°  | 2049   | 100 |
| 0-180° | 2049   | 100 |

Zonal Lumens - 3000

| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 1136   | 37  |
| 0-40°  | 1752   | 57  |
| 0-60°  | 2673   | 87  |
| 0-90°  | 3058   | 100 |
| 0-180° | 3058   | 100 |

Intensity (Candlepower)

| Angle | 2000 | 3000 |
|-------|------|------|
| 0°    | 683  | 1008 |
| 5°    | 680  | 1003 |
| 15°   | 654  | 965  |
| 25°   | 603  | 890  |
| 35°   | 527  | 781  |
| 45°   | 435  | 645  |
| 55°   | 334  | 496  |
| 65°   | 237  | 354  |
| 75°   | 158  | 236  |
| 85°   | 101  | 153  |
| 90°   | 79   | 120  |



Zonal Lumens - 2000

| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 527    | 25  |
| 0-40°  | 856    | 40  |
| 0-60°  | 1490   | 70  |
| 0-90°  | 2006   | 94  |
| 0-180° | 2129   | 100 |

Zonal Lumens - 3000

| Zone   | Lumens | %   |
|--------|--------|-----|
| 0-30°  | 777    | 25  |
| 0-40°  | 1266   | 40  |
| 0-60°  | 2207   | 70  |
| 0-90°  | 2977   | 94  |
| 0-180° | 3165   | 100 |

**PERFORMANCE GROUPS - CHROMATICITY**

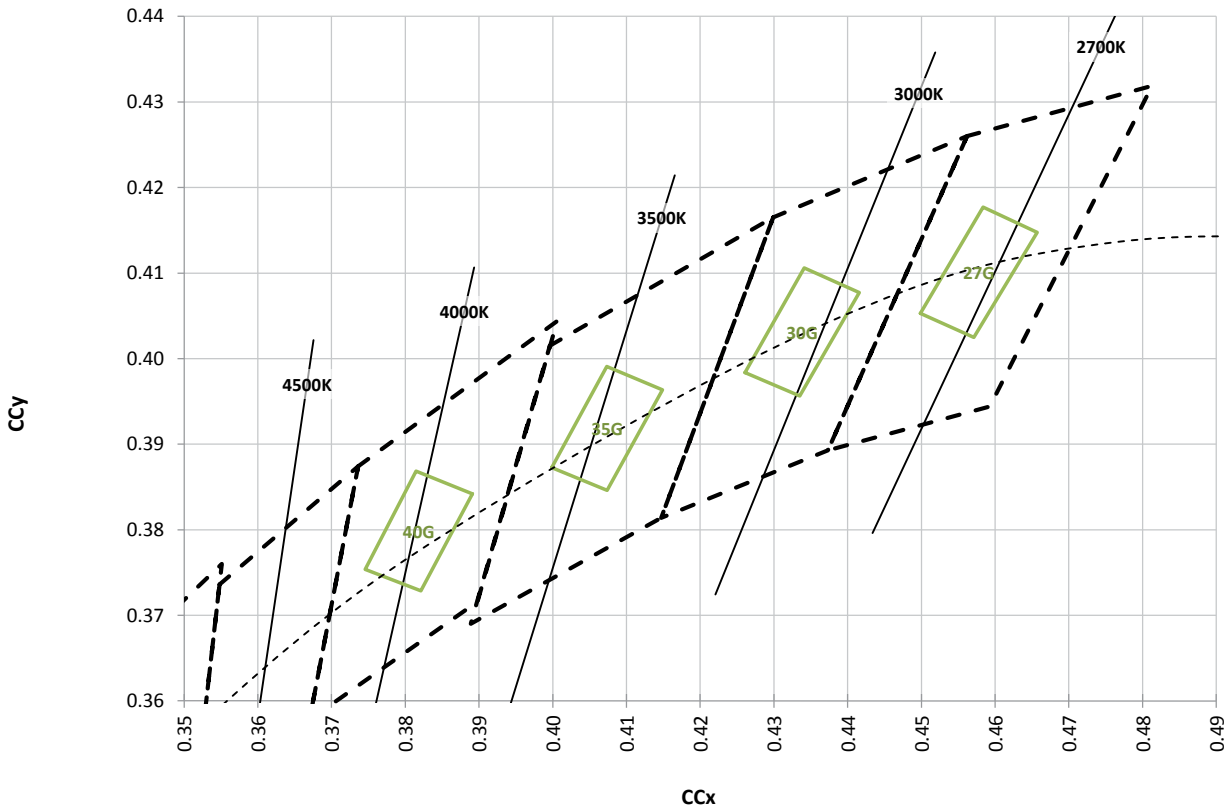
Test Conditions:  $I_f = 440 \text{ mA}$ : 850 & 1250 lm;  $I_f = 900 \text{ mA}$ : 2000 & 3000 lm;  $T_c = 55 \text{ }^\circ\text{C}$ ; Steady-state operation

LMH2 modules are tested for chromaticity and placed into one of the regions defined by the following bounding coordinates. LMH2 modules will remain within their target ANSI C78.377A bin as long as the operating limits listed in the Characteristics section on page 2 are followed.

| Code | ccx      | ccy      |
|------|----------|----------|
| 27G  | 0.449861 | 0.405292 |
|      | 0.458373 | 0.417692 |
|      | 0.465712 | 0.414749 |
|      | 0.457123 | 0.40249  |
| 30G  | 0.426097 | 0.398383 |
|      | 0.434118 | 0.410588 |
|      | 0.441589 | 0.40771  |
|      | 0.433486 | 0.395642 |

| Code | ccx      | ccy      |
|------|----------|----------|
| 35G  | 0.399878 | 0.387249 |
|      | 0.407316 | 0.399101 |
|      | 0.414884 | 0.396337 |
|      | 0.40736  | 0.384615 |
| 40G  | 0.389091 | 0.384195 |
|      | 0.381449 | 0.386838 |
|      | 0.374578 | 0.375366 |
|      | 0.382129 | 0.372847 |

**CHROMATICITY BINS PLOTTED ON THE 1931 CIE COLOR SPACE**

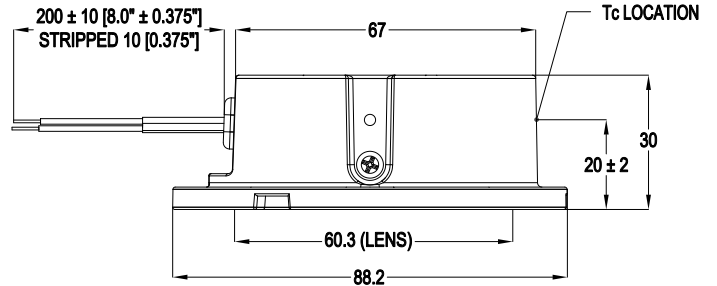


**MECHANICAL DIMENSIONS<sup>1</sup>**

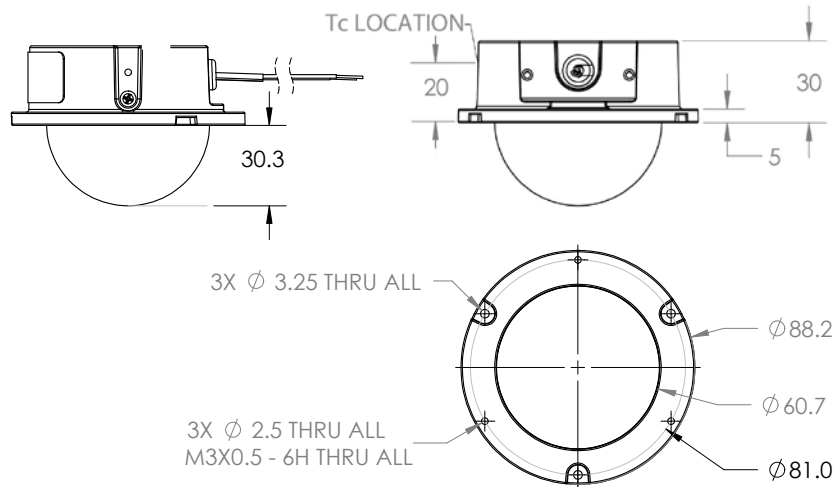
**LMH2 Light Source (Common)**



**LMH2 Light Source (Flat Lens)**



**LMH2 Light Source (Dome Lens)**



**PACKAGING**

LMH2 light sources are packaged in boxes of 10, which are then combined in cartons of 5 boxes, or 50 LMH2 light sources. Box and carton sizes are as follows.

Box of 10 LMH2 light sources: 321 x 281 x 116 mm

Carton of 5 LMH2 boxes: 599 x 299 x 347 mm

<sup>1</sup> Dimensions for the LMH2 diagrams are in mm and are for reference only. For exact dimensions and tolerances, refer to the 3-D models (.STEP files) for the LMH2 light sources available by selecting the Documentation tab at [www.cree.com/modules/lmh2](http://www.cree.com/modules/lmh2).