

# LUXEON CoB Core Range – High Density

Double the flux in the same form factor

LUXEON CoB Core Range – High Density focuses on achieving the highest Center Beam Candle Power (CBCP). With a focus on 6, 9 and 11mm Light Emitting Surfaces, we can cover a flux range as high as 8,000 lumens. Using the mechanical dimensions of our LUXEON CoB Core Range, the High Density range will also benefit from the ability to utilize existing an ecosystem of holders, optics and drivers.



## FEATURES AND BENEFITS

- Highest flux densities with industry's smallest LES
- 3-step MacAdam ellipse color definition: *Freedom from Binning* for color consistency from luminaire to luminaire
- Up to 4x lower thermal resistance than competition, enabling smaller heatsinks and higher lumens
- Supported by a comprehensive optical, mechanical and electrical ecosystem

## PRIMARY APPLICATIONS

- Spotlights
- Track Lights
- Downlights

# Table of Contents

- General Product Information . . . . . 2**
  - Product Test Conditions . . . . . 2
  - Part Number Nomenclature . . . . . 2
  - Lumen Maintenance . . . . . 2
  - Environmental Compliance . . . . . 2
- Performance Characteristics . . . . . 3**
  - Product Selection Guide . . . . . 3
  - Optical Characteristics . . . . . 4
  - Electrical and Thermal Characteristics . . . . . 4
- Absolute Maximum Ratings . . . . . 5**
- Characteristic Curves . . . . . 6**
  - Spectral Power Distribution Characteristics . . . . . 6
  - Light Output Characteristics . . . . . 6
  - Forward Current Characteristics . . . . . 8
  - Radiation Pattern Characteristics . . . . . 9
- Color Bin Definitions . . . . . 10**
- Mechanical Dimensions . . . . . 11**
- Packaging Information . . . . . 12**
  - Tube Dimensions . . . . . 12

# General Product Information

## Product Test Conditions

LUXEON CoB Core Range – High Density LEDs are tested and binned with a DC drive current specified below at a junction temperature,  $T_j$ , of 85°C:

|       |   |                   |
|-------|---|-------------------|
| 350mA | – | LUXEON CoB 1202HD |
| 700mA | – | LUXEON CoB 1204HD |
| 900mA | – | LUXEON CoB 1205HD |

## Part Number Nomenclature

Part numbers for LUXEON CoB Core Range – High Density follow the convention below:

L 2 C 5 – **A A B B C C C C E D D F F**

Where:

- A A** – designates nominal CCT (22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K, 65=6500K)
- B B** – designates minimum CRI (70=70CRI, 80=80CRI, 90=90CRI)
- C C C C** – designates product configuration (1202, 1204, 1205)
- D D** – designates light emitting surface (LES) size (06=6mm, 09=9mm, 11=11mm)
- F F** – designates options for product specification

Therefore, the following part number is used for a LUXEON CoB 1204, 3000K 80CRI, with a 9mm LES:

L 2 C 5 – **3 0 8 0 1 2 0 4 E 0 9 0 0**

## Lumen Maintenance

Please contact your local Sales Representative or Lumileds Technical Solutions Manager for more information about the long-term performance of this product.

## Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON CoB Core Range – High Density is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006. Lumileds LLC will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

# Performance Characteristics

## Product Selection Guide

Table 1. Product performance of LUXEON CoB Core Range – High Density at specified test current, T<sub>j</sub>=85°C.

| PRODUCT           | NOMINAL CCT | MINIMUM CRI <sup>[1, 2, 3]</sup> | LUMINOUS FLUX <sup>[1]</sup> (lm) |         | TYPICAL LUMINOUS EFFICACY (lm/W) | TEST CURRENT (mA) | LES <sup>[4]</sup> (mm) | ENERGY EFFICIENCY CLASS <sup>[5]</sup> | PART NUMBER        |
|-------------------|-------------|----------------------------------|-----------------------------------|---------|----------------------------------|-------------------|-------------------------|----------------------------------------|--------------------|
|                   |             |                                  | MINIMUM                           | TYPICAL |                                  |                   |                         |                                        |                    |
| LUXEON CoB 1202HD | 4000K       | 70                               | 1505                              | 1673    | 129                              | 350               | 6                       | Note 6                                 | L2C5-40701202EH600 |
|                   | 5000K       | 70                               | 1505                              | 1673    | 129                              | 350               | 6                       | Note 6                                 | L2C5-50701202EH600 |
|                   | 2700K       | 80                               | 1240                              | 1378    | 106                              | 350               | 6                       | F                                      | L2C5-27801202EH600 |
|                   | 3000K       | 80                               | 1368                              | 1520    | 117                              | 350               | 6                       | F                                      | L2C5-30801202EH600 |
|                   | 3500K       | 80                               | 1406                              | 1562    | 121                              | 350               | 6                       | E                                      | L2C5-35801202EH600 |
|                   | 4000K       | 80                               | 1438                              | 1598    | 123                              | 350               | 6                       | E                                      | L2C5-40801202EH600 |
|                   | 5000K       | 80                               | 1425                              | 1583    | 122                              | 350               | 6                       | E                                      | L2C5-50801202EH600 |
|                   | 5700K       | 80                               | 1432                              | 1591    | 123                              | 350               | 6                       | E                                      | L2C5-57801202EH600 |
|                   | 2700K       | 90                               | 1134                              | 1260    | 97                               | 350               | 6                       | Note 6                                 | L2C5-27901202EH600 |
|                   | 3000K       | 90                               | 1211                              | 1345    | 104                              | 350               | 6                       | F                                      | L2C5-30901202EH600 |
|                   | 3500K       | 90                               | 1223                              | 1359    | 105                              | 350               | 6                       | F                                      | L2C5-35901202EH600 |
|                   | 4000K       | 90                               | 1218                              | 1353    | 104                              | 350               | 6                       | F                                      | L2C5-40901202EH600 |
| LUXEON CoB 1204HD | 3000K       | 70                               | 2887                              | 3207    | 124                              | 700               | 9                       | Note 6                                 | L2C5-30701204E0900 |
|                   | 3500K       | 70                               | 2800                              | 3111    | 120                              | 700               | 9                       | Note 6                                 | L2C5-35701204E0900 |
|                   | 4000K       | 70                               | 3011                              | 3345    | 129                              | 700               | 9                       | Note 6                                 | L2C5-40701204E0900 |
|                   | 5000K       | 70                               | 3011                              | 3345    | 129                              | 700               | 9                       | Note 6                                 | L2C5-50701204E0900 |
|                   | 5700K       | 70                               | 2866                              | 3185    | 123                              | 700               | 9                       | Note 6                                 | L2C5-57701204E0900 |
|                   | 6500K       | 70                               | 2824                              | 3137    | 121                              | 700               | 9                       | Note 6                                 | L2C5-65701204E0900 |
|                   | 2200K       | 80                               | 2140                              | 2378    | 92                               | 700               | 9                       | Note 6                                 | L2C5-22801204E0900 |
|                   | 2700K       | 80                               | 2554                              | 2838    | 110                              | 700               | 9                       | Note 6                                 | L2C5-27801204E0900 |
|                   | 3000K       | 80                               | 2688                              | 2987    | 115                              | 700               | 9                       | F                                      | L2C5-30801204E0900 |
|                   | 3500K       | 80                               | 2742                              | 3047    | 118                              | 700               | 9                       | F                                      | L2C5-35801204E0900 |
|                   | 4000K       | 80                               | 2850                              | 3167    | 122                              | 700               | 9                       | E                                      | L2C5-40801204E0900 |
|                   | 5000K       | 80                               | 2850                              | 3167    | 122                              | 700               | 9                       | E                                      | L2C5-50801204E0900 |
|                   | 5700K       | 80                               | 2891                              | 3212    | 124                              | 700               | 9                       | E                                      | L2C5-57801204E0900 |
|                   | 2200K       | 90                               | 1864                              | 2071    | 80                               | 700               | 9                       | Note 6                                 | L2C5-22901204E0900 |
|                   | 2700K       | 90                               | 2187                              | 2430    | 94                               | 700               | 9                       | Note 6                                 | L2C5-27901204E0900 |
|                   | 3000K       | 90                               | 2306                              | 2562    | 99                               | 700               | 9                       | Note 6                                 | L2C5-30901204E0900 |
|                   | 3200K       | 90                               | 2340                              | 2600    | 100                              | 700               | 9                       | Note 6                                 | L2C5-32901204E0900 |
|                   | 3500K       | 90                               | 2520                              | 2800    | 108                              | 700               | 9                       | F                                      | L2C5-35901204E0900 |
|                   | 4000K       | 90                               | 2551                              | 2834    | 109                              | 700               | 9                       | F                                      | L2C5-40901204E0900 |

**Notes for Table 1:**

1. Lumileds maintains a tolerance of ±2 on CRI and ±6.5% on luminous flux measurements.
2. Typical CRI is approximately 2 points higher than the minimum CRI specified, but this is not guaranteed.
3. R9 value of 90CRI products are >50.
4. Light Emitting Surface (LES) is the inner diameter (phosphor area) inside the dam.
5. Energy efficiency class as specified in Commission Delegated Regulation (EU) 2019/2015. The available range of energy efficiency classes is A-G.
6. Exception: Not available in EU or UK.

Table 1. Product performance of LUXEON CoB Core Range – High Density at specified test current,  $T_j=85^{\circ}\text{C}$ , Continued.

| PRODUCT           | NOMINAL CCT | MINIMUM CRI <sup>[1, 2, 3]</sup> | LUMINOUS FLUX <sup>[1]</sup> (lm) |         | TYPICAL LUMINOUS EFFICACY (lm/W) | TEST CURRENT (mA) | LES <sup>[4]</sup> (mm) | ENERGY EFFICIENCY CLASS <sup>[5]</sup> | PART NUMBER        |
|-------------------|-------------|----------------------------------|-----------------------------------|---------|----------------------------------|-------------------|-------------------------|----------------------------------------|--------------------|
|                   |             |                                  | MINIMUM                           | TYPICAL |                                  |                   |                         |                                        |                    |
| LUXEON CoB 1205HD | 4000K       | 70                               | 3780                              | 4200    | 126                              | 900               | 11                      | Note 6                                 | L2C5-40701205E1100 |
|                   | 5000K       | 70                               | 3780                              | 4200    | 126                              | 900               | 11                      | Note 6                                 | L2C5-50701205E1100 |
|                   | 2700K       | 80                               | 3306                              | 3673    | 110                              | 900               | 11                      | Note 6                                 | L2C5-27801205E1100 |
|                   | 3000K       | 80                               | 3463                              | 3848    | 116                              | 900               | 11                      | Note 6                                 | L2C5-30801205E1100 |
|                   | 3500K       | 80                               | 3546                              | 3940    | 118                              | 900               | 11                      | Note 6                                 | L2C5-35801205E1100 |
|                   | 4000K       | 80                               | 3650                              | 4056    | 122                              | 900               | 11                      | Note 6                                 | L2C5-40801205E1100 |
|                   | 5000K       | 80                               | 3545                              | 3939    | 118                              | 900               | 11                      | Note 6                                 | L2C5-50801205E1100 |
|                   | 5700K       | 80                               | 3703                              | 4114    | 124                              | 900               | 11                      | Note 6                                 | L2C5-57801205E1100 |
|                   | 2700K       | 90                               | 2763                              | 3070    | 92                               | 900               | 11                      | Note 6                                 | L2C5-27901205E1100 |
|                   | 3000K       | 90                               | 2925                              | 3250    | 98                               | 900               | 11                      | Note 6                                 | L2C5-30901205E1100 |
|                   | 4000K       | 90                               | 3176                              | 3529    | 106                              | 900               | 11                      | Note 6                                 | L2C5-40901205E1100 |

Notes for Table 1:

1. Lumileds maintains a tolerance of  $\pm 2$  on CRI and  $\pm 6.5\%$  on luminous flux measurements.
2. Typical CRI is approximately 2 points higher than the minimum CRI specified, but this is not guaranteed.
3. R9 value of 90CRI products are  $>50$ .
4. Light Emitting Surface (LES) is the inner diameter (phosphor area) inside the dam.
5. Energy efficiency class as specified in Commission Delegated Regulation (EU) 2019/2015. The available range of energy efficiency classes is A-G.
6. Exception: Not available in EU or UK.

## Optical Characteristics

Table 2. Optical characteristics for LUXEON CoB Core Range – High Density at specified test current,  $T_j=85^{\circ}\text{C}$ .

| PART NUMBER        | TYPICAL TOTAL INCLUDED ANGLE <sup>[1]</sup> | TYPICAL VIEWING ANGLE <sup>[2]</sup> |
|--------------------|---------------------------------------------|--------------------------------------|
| L2C5-xxxx12xxExx00 | 135°                                        | 115°                                 |

Notes for Table 2:

1. Total angle at which 90% of total luminous flux is captured.
2. Viewing angle is the off axis angle from the LED centerline where the luminous intensity is  $\frac{1}{2}$  of the peak value.

## Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for LUXEON CoB Core Range – High Density at specified test current,  $T_j=85^{\circ}\text{C}$ .

| PART NUMBER        | FORWARD VOLTAGE <sup>[1]</sup> ( $V_f$ ) |         |         | TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE <sup>[2]</sup> (mV/°C) | TYPICAL THERMAL RESISTANCE—JUNCTION TO CASE <sup>[3]</sup> (°C/W) |
|--------------------|------------------------------------------|---------|---------|---------------------------------------------------------------------------|-------------------------------------------------------------------|
|                    | MINIMUM                                  | TYPICAL | MAXIMUM |                                                                           |                                                                   |
| L2C5-xxxx1202EH600 | 34.5                                     | 37.0    | 39.5    | -16                                                                       | 0.98                                                              |
| L2C5-xxxx1204E0900 | 34.5                                     | 37.0    | 39.5    | -16                                                                       | 0.55                                                              |
| L2C5-xxxx1205E1100 | 34.5                                     | 37.0    | 39.5    | -16                                                                       | 0.51                                                              |

Notes for Table 3:

1. Lumileds maintains a tolerance of  $\pm 2\%$  on forward voltage measurements.
2. Measured between  $25^{\circ}\text{C}$  and  $85^{\circ}\text{C}$ .
3. Thermal resistance is measured between junction and the bottom of the LUXEON CoB substrate.

# Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON CoB Core Range – High Density.

| PARAMETER                                            | MAXIMUM PERFORMANCE                                       |
|------------------------------------------------------|-----------------------------------------------------------|
| DC Forward Current <sup>[1, 2]</sup>                 | 700mA (1202HD), 1350mA (1204HD), 1650mA (1205HD)          |
| LED Junction Temperature <sup>[1]</sup> (DC & Pulse) | 150°C                                                     |
| ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)        | Class 3B                                                  |
| Operating Case Temperature <sup>[1]</sup>            | -40°C to 105°C                                            |
| LED Storage Temperature                              | -40°C to 120°C                                            |
| Allowable Reflow Cycles                              | 3                                                         |
| Reverse Voltage ( $V_{reverse}$ )                    | LUXEON LEDs are not designed to be driven in reverse bias |

**Notes for Table 4:**

1. Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple," are acceptable if the following conditions are met:
  - The frequency of the ripple current is 100Hz or higher
  - The average current for each cycle does not exceed the maximum allowable DC forward current
  - The maximum amplitude of the ripple does not exceed the maximum peak pulsed forward current

# Characteristic Curves

## Spectral Power Distribution Characteristics

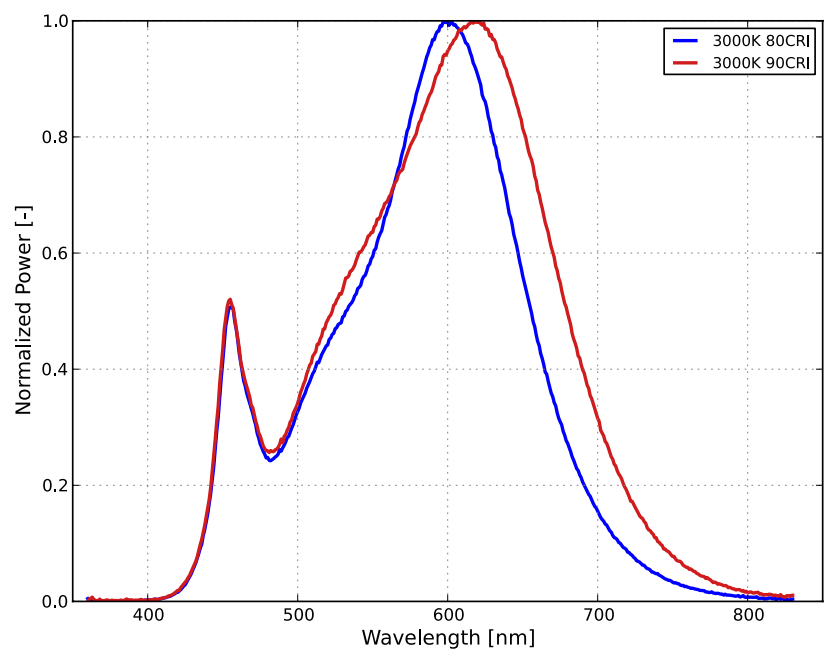


Figure 1. Typical normalized power vs. wavelength for L2C5-xxxx12xxExx00 at specified test current,  $T_j=85^{\circ}\text{C}$ .

## Light Output Characteristics

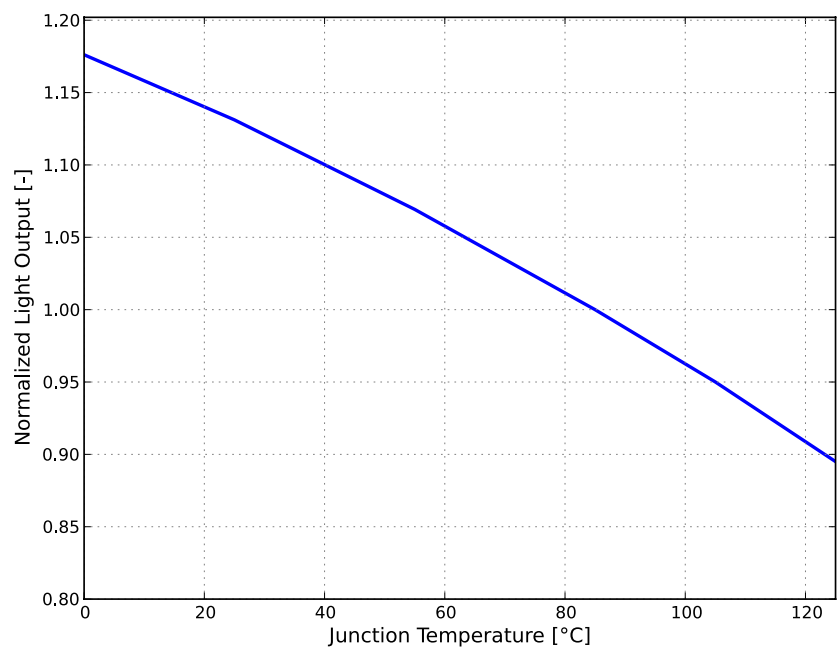
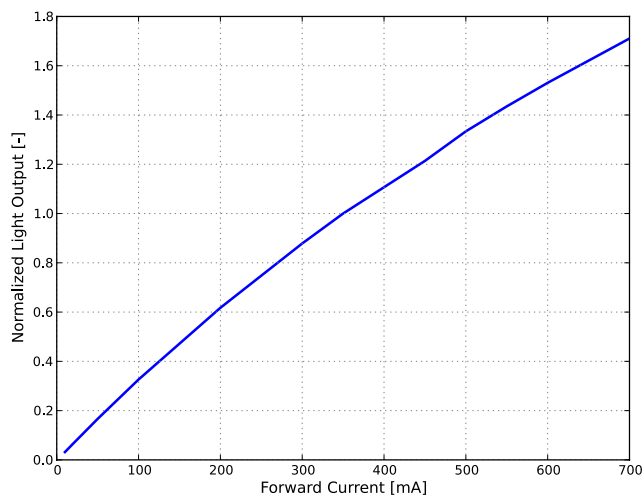
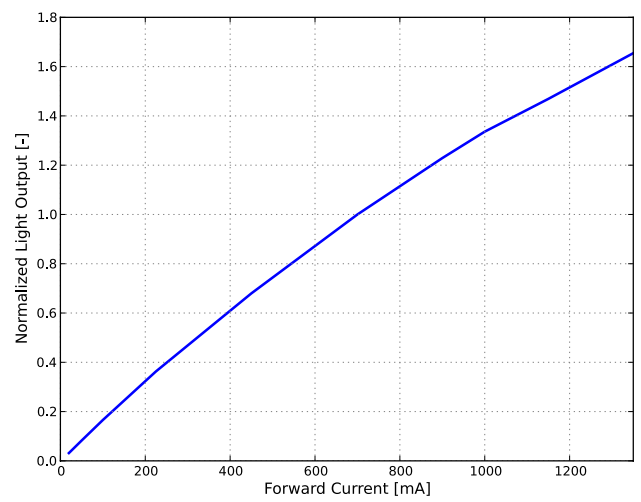


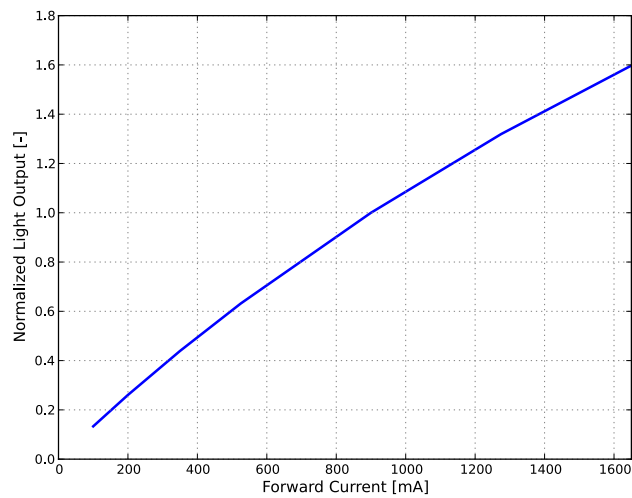
Figure 2. Typical normalized light output vs. junction temperature for L2C5-xxxx12xxExx00 at specified test current.



L2C5-xxxx1202EH600



L2C5-xxxx1204E0900

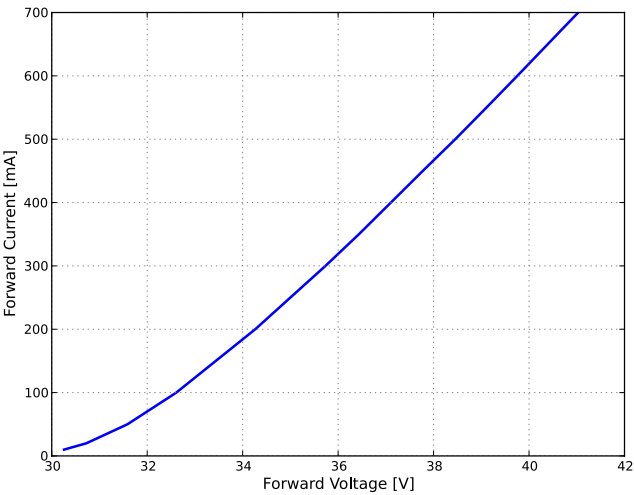


L2C5-xxxx1205E1100

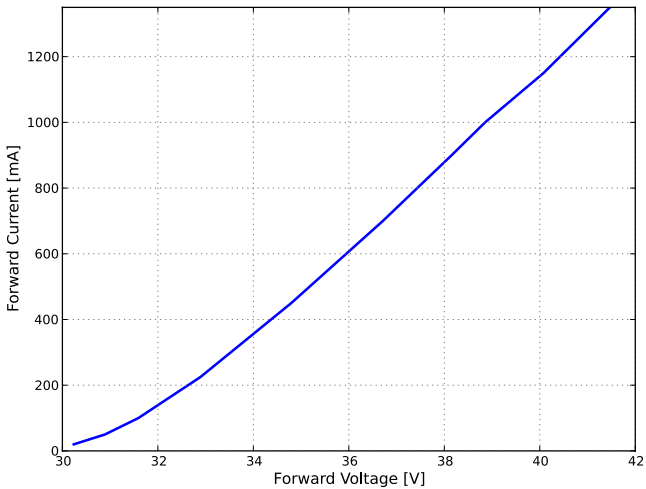
Figure 3. Typical normalized light output vs. forward current for LUXEON CoB Core Range – High Density at  $T_J=85^{\circ}\text{C}$ .



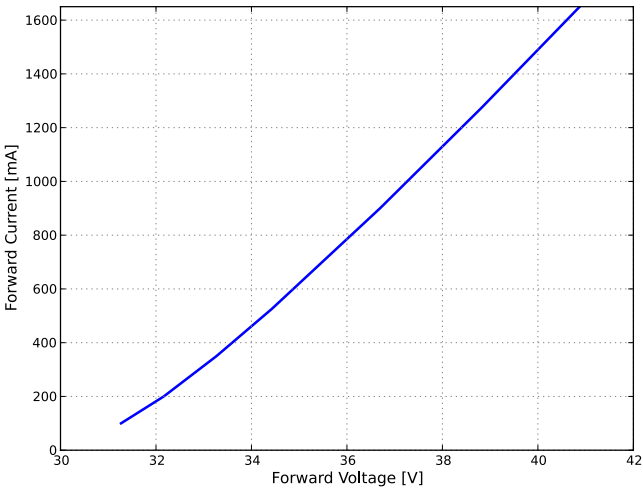
# Forward Current Characteristics



L2C5-xxxx1202EH600



L2C5-xxxx1204E0900



L2C5-xxxx1205E1100

Figure 4. Typical forward current vs. forward voltage for LUXEON CoB Core Range – High Density at  $T_j=85^{\circ}\text{C}$ .

# Radiation Pattern Characteristics

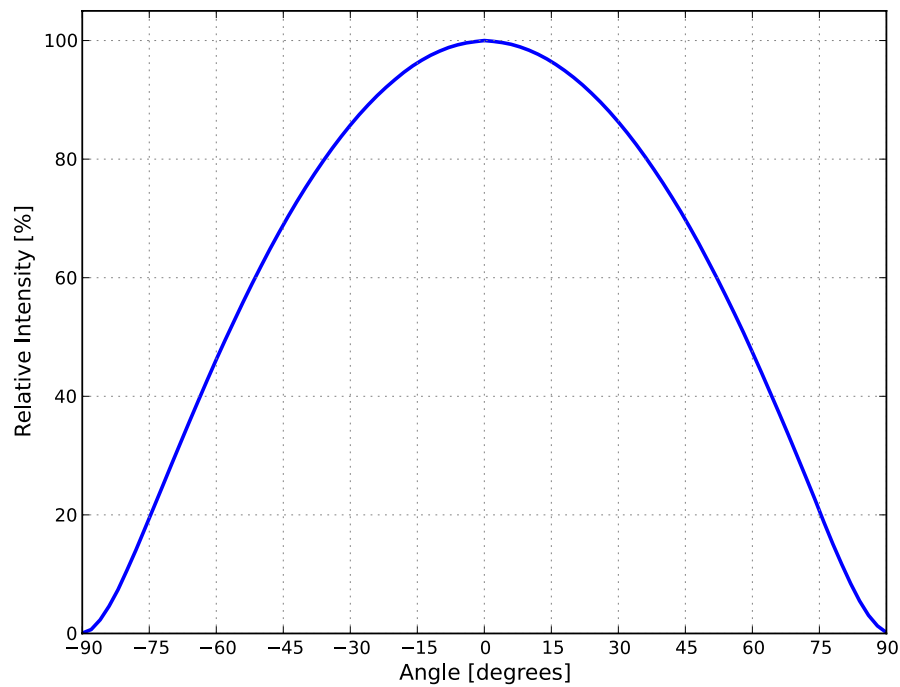


Figure 5. Typical radiation pattern for LUXEON CoB Core Range - High Density at specified test current,  $T_j=85^{\circ}\text{C}$ .

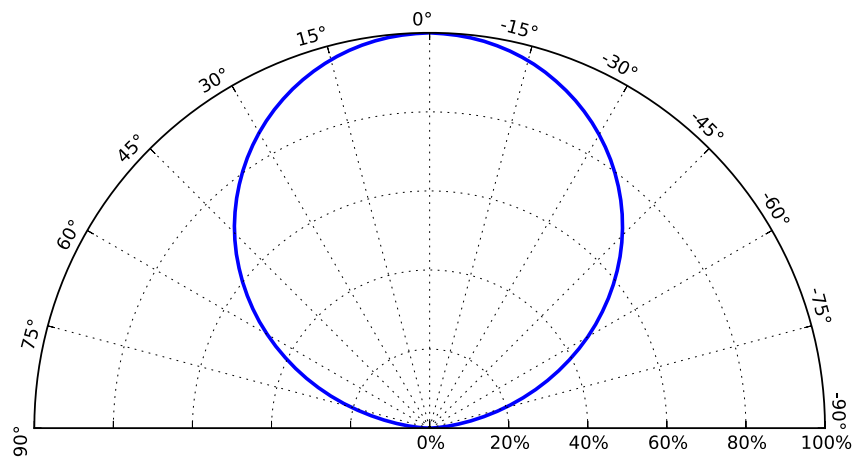


Figure 6. Typical polar radiation pattern for LUXEON CoB Core Range - High Density at specified test current,  $T_j=85^{\circ}\text{C}$ .

## Color Bin Definitions

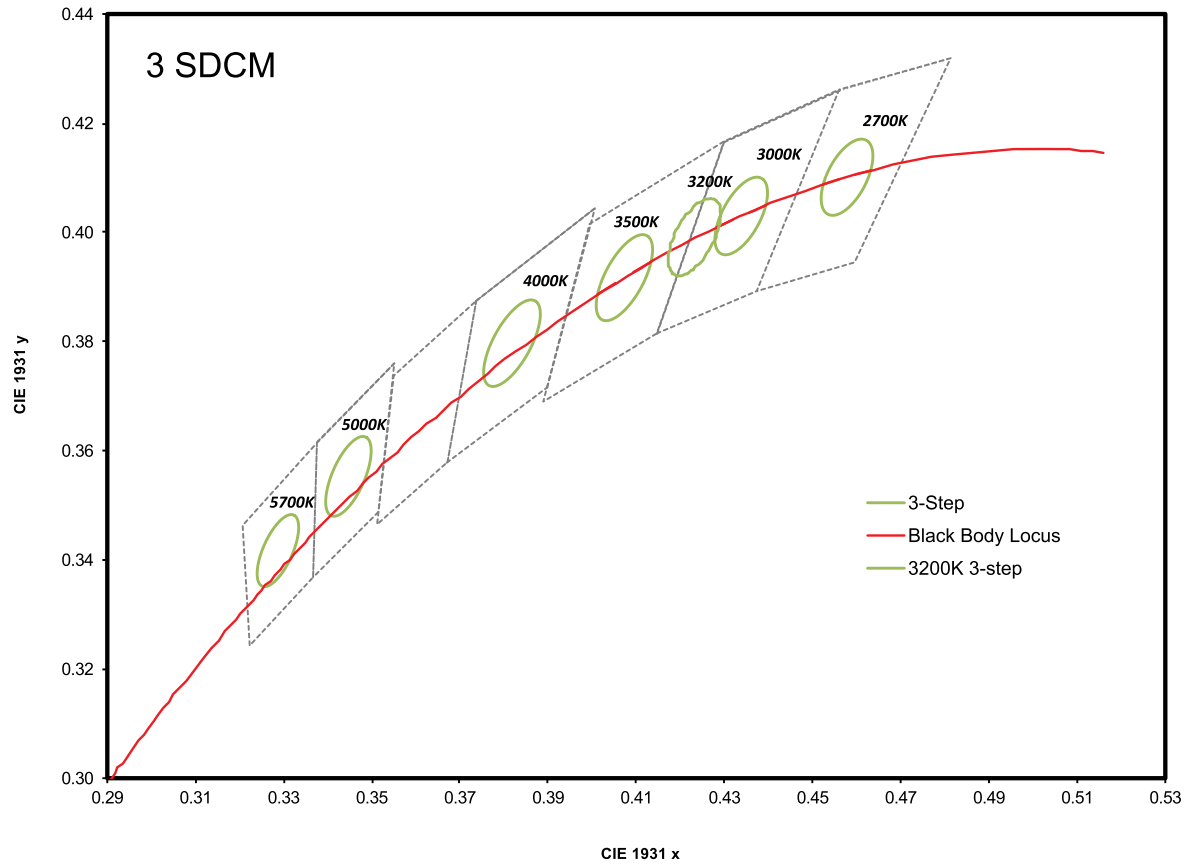


Figure 7. 3-step MacAdam ellipse illustration for Table 5.

Table 5. 3-step MacAdam ellipse color bin definitions for LUXEON CoB Core Range – High Density.

| NOMINAL CCT | COLOR SPACE                   | CENTER POINT <sup>(1)</sup><br>(cx, cy) | MAJOR AXIS,<br>a | MINOR AXIS,<br>b | ELLIPSE ROTATION<br>ANGLE, θ |
|-------------|-------------------------------|-----------------------------------------|------------------|------------------|------------------------------|
| 2200K       | Single 3-step MacAdam ellipse | (0.5020, 0.4155)                        | 0.00862          | 0.00397          | 49.30°                       |
| 2700K       | Single 3-step MacAdam ellipse | (0.4578, 0.4101)                        | 0.00810          | 0.00420          | 53.70°                       |
| 3000K       | Single 3-step MacAdam ellipse | (0.4338, 0.4030)                        | 0.00834          | 0.00408          | 53.20°                       |
| 3200K       | Single 3-step MacAdam ellipse | (0.4232, 0.3991)                        | 0.00834          | 0.00408          | 53.20°                       |
| 3500K       | Single 3-step MacAdam ellipse | (0.4073, 0.3917)                        | 0.00927          | 0.00414          | 54.00°                       |
| 4000K       | Single 3-step MacAdam ellipse | (0.3818, 0.3797)                        | 0.00939          | 0.00402          | 53.70°                       |
| 5000K       | Single 3-step MacAdam ellipse | (0.3447, 0.3553)                        | 0.00822          | 0.00354          | 59.60°                       |
| 5700K       | Single 3-step MacAdam ellipse | (0.3287, 0.3417)                        | 0.00745          | 0.00320          | 59.09°                       |
| 6500K       | Single 3-step MacAdam ellipse | (0.3123, 0.3282)                        | 0.00669          | 0.00285          | 58.57°                       |

Notes for Table 5:

1. Lumileds maintains a tolerance of ±0.005 on x and y coordinates in the CIE 1931 color space.

# Mechanical Dimensions

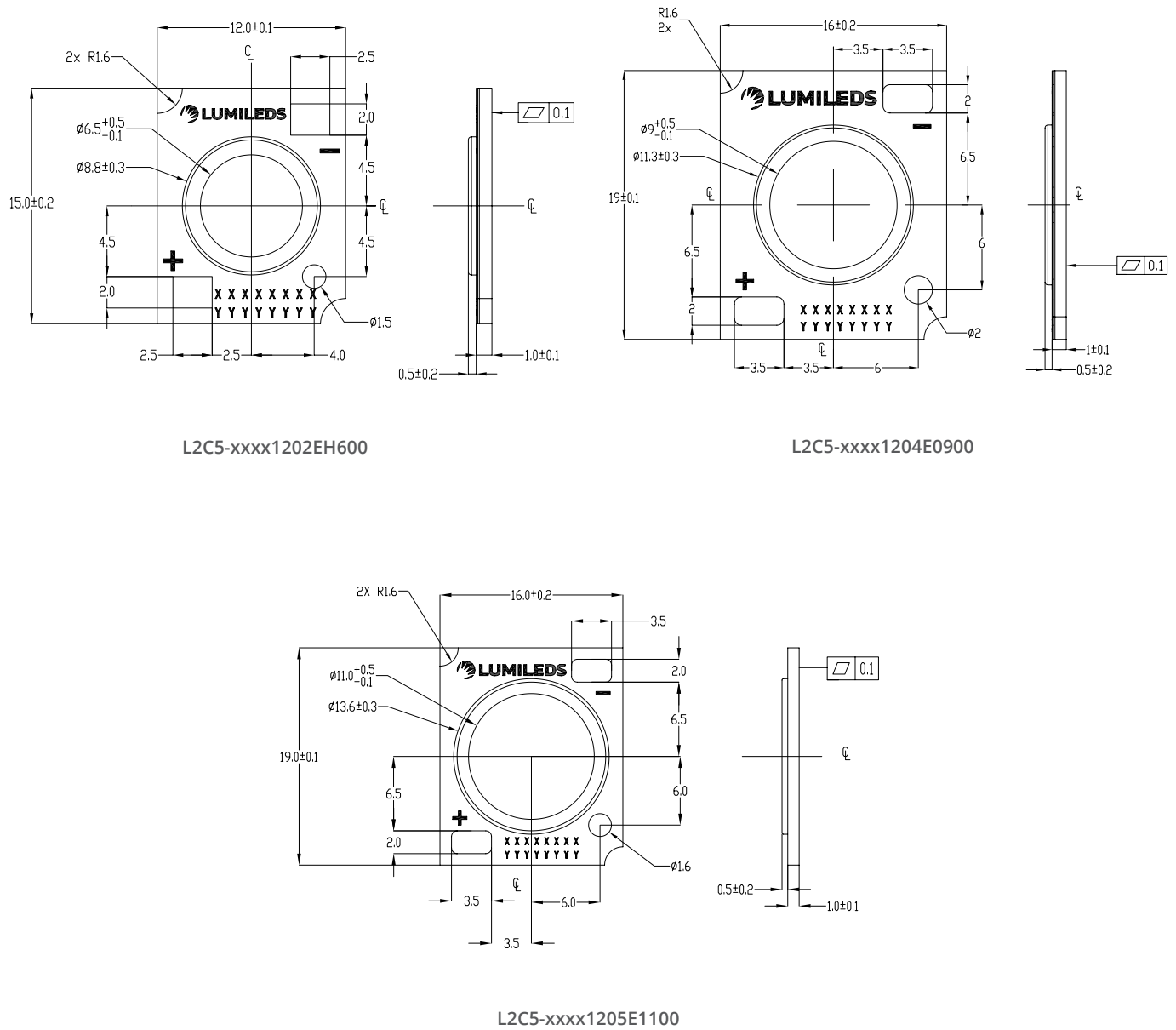


Figure 8. Mechanical dimensions for LUXEON CoB Core Range – High Density.

## Notes for Figure 8:

1. Drawings are not to scale.
2. All dimensions are in millimeters.

# Packaging Information

LUXEON CoB Core Range – High Density LEDs are packaged in tubes then in a carton box. Each tube contains a specified number of LEDs. The LEDs in each tube come from a single category code, ensuring they are all well-matched for light output, color, and forward voltage. Each tube contains a rubber stopper at one end. The tube label has both alphanumeric and bar code information. The carton boxes have printed information providing part numbers with CAT codes that indicate luminous flux, color and forward voltage bins.

Table 6. Number of LEDs per tube for LUXEON CoB Core Range – High Density.

| PART NUMBER        | TOTAL UNITS PER TUBE | TOTAL TUBES PER INNER BOX | TOTAL UNITS PER INNER BOX |
|--------------------|----------------------|---------------------------|---------------------------|
| L2C5-xxxx1202EH600 | 20                   | 5                         | 100                       |
| L2C5-xxxx1204E0900 | 20                   | 5                         | 100                       |
| L2C5-xxxx1205E1100 | 20                   | 5                         | 100                       |

## Tube Dimensions

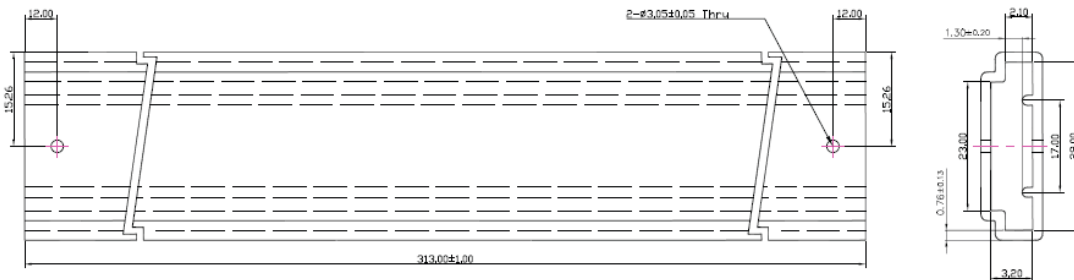


Figure 9a. Tube dimensions for L2C5-xxxx1202EH600.

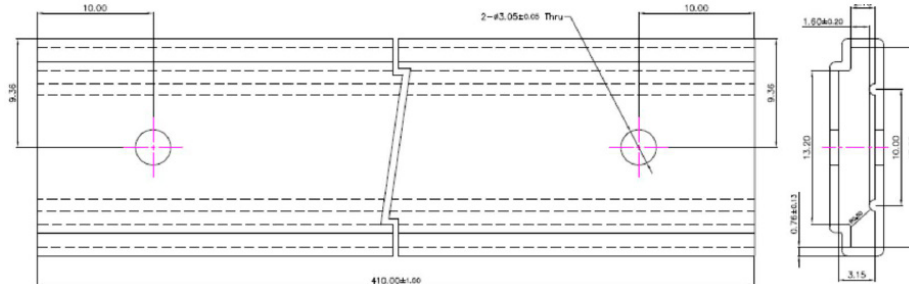


Figure 9b. Tube dimensions for L2C5-xxxx1204E0900.

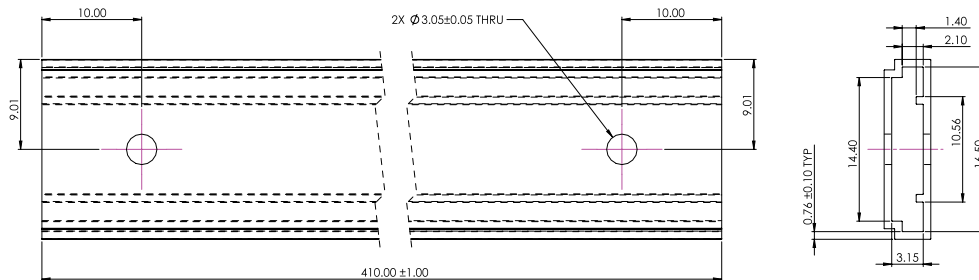


Figure 9c. Tube dimensions for L2C5-xxxx1205E1100.

Notes for Figures 9a, 9b and 9c:  
 1. Drawings not to scale.  
 2. All dimensions are in millimeters.

## About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world safer, better and more beautiful—with light.

To learn more about our lighting solutions, visit [lumileds.com](https://lumileds.com).



©2021 Lumileds Holding B.V. All rights reserved.  
LUXEON is a registered trademark of the Lumileds Holding B.V. in the United States and other countries.  
[lumileds.com](https://lumileds.com)

Neither Lumileds Holding B.V. nor its affiliates shall be liable for any kind of loss of data or any other damages, direct, indirect or consequential, resulting from the use of the provided information and data. Although Lumileds Holding B.V. and/or its affiliates have attempted to provide the most accurate information and data, the materials and services information and data are provided “as is,” and neither Lumileds Holding B.V. nor its affiliates warrants or guarantees the contents and correctness of the provided information and data. Lumileds Holding B.V. and its affiliates reserve the right to make changes without notice. You as user agree to this disclaimer and user agreement with the download or use of the provided materials, information and data. A listing of Lumileds product/patent coverage may be accessed at [lumileds.com/patents](https://lumileds.com/patents).