

# LUXEON CoB with CrispWhite Technology

*Retail lighting that makes an impact*



## Introduction

LUXEON CoB with CrispWhite Technology delivers the warm saturated colors of high 90 CRI solutions while creating the natural crisp whiteness required of merchandise in retail shops. As part of the LUXEON CoB family, it benefits from its industry-leading small Light-Emitting Surface (LES) as well as its world-class low thermal resistance.

LUXEON CoB with CrispWhite Technology creates the most impactful retail lighting ever available, by revealing the richest whites, vibrant reds and colors that pop.

### Features

- 90 CRI with CrispWhite Technology
- Hot targeted within a 3 SDCM below the BBL
- Creating a second blue peak (~410-415nm) in the spectrum
- Efficacies of >90 lm/W
- Lumen packages from 1,000 to >5,000 lumens
- Tested at  $T_j = 85^{\circ}\text{C}$
- Robust MCPCB solution
- Mousebites for M2/M3 screws

### Benefits

- Perfect combination of warm saturated colors and white that stands out!
- Ideal for CDM-CMH replacement
- Activates the fluorescent whitening agents in paints/fabrics
- High efficacy
- Real world application testing
- Easy to handle in manufacturing and operations
- Easy to screw down arrays
- Drivers, holders and optics available

### Key Applications

- Downlight
- High Bay & Low Bay
- Lamps
- Spotlight

# Table of Contents

- General Information ..... 2
  - Product Nomenclature ..... 2
  - Average Lumen Maintenance Characteristics..... 2
  - Environmental Compliance ..... 2
- Product Performance and Characterization Guide ..... 3
- Electrical Characteristics ..... 3
- Absolute Maximum Ratings ..... 4
- Mechanical Dimensions ..... 5
- Characteristic Curves ..... 6
- Typical Forward Current Characteristics ..... 7
- Typical Relative Luminous Flux vs. Forward Current ..... 8
- Typical Radiation Patterns ..... 9
- Color Bin Definition..... 10
- Package Info and Dimensions ..... 11

# General Information

## Product Nomenclature

LUXEON CoB with CrispWhite Technology is tested and binned hot at  $T_j = 85^\circ\text{C}$  with a current pulse duration of 20ms.

The part number designation is explained as follows:

L H C A – B B C C – D D E E C R S P

Where:

A — designates the generation of the product family

B B — designates ANSI color point (e.g. 30 for 3000K)

C C — designates minimum CRI level (e.g. 90 for minimum 90 CRI)

D D E E — designates product configuration (e.g. 1203 for the 1,000 – 2,000 lm package)

C R S P — designates LUXEON CoB with CrispWhite Technology

Therefore 3000K, 90 CRI LUXEON CoB with CrispWhite Technology products will be:

L H C 1 – 3 0 9 0 – 1 2 0 3 C R S P

CAT codes of LUXEON CoB with CrispWhite Technology:

3S: color within 3 SDCM

## Average Lumen Maintenance Characteristics

Lumen maintenance for solid-state lighting devices (LEDs) is typically defined in terms of the percentage of initial light output remaining after a specified period of time. Philips Lumileds projects that LUXEON CoB with CrispWhite Technology will deliver—on average—70% lumen maintenance (L70) at 50,000 hours of operation at its nominal, tested conditions. Observation of design limits included in this data sheet is required in order to achieve this projected lumen maintenance

## Environmental Compliance

Philips Lumileds is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON CoB with CrispWhite Technology is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS and REACH directives. Philips Lumileds will not intentionally add the following restricted material to the LUXEON CoB with CrispWhite Technology: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

# Product Performance and Characterization Guide

**Table 1. Performance and Electrical Characteristics**

Part Number	Nominal CCT	CRI <sup>[1]</sup>		Test Current I <sub>f</sub> (mA)	Luminous Flux <sup>[1, 2]</sup>		Efficacy	LES <sup>[3]</sup>
		Minimum	Typical		Minimum (lm)	Typical (lm)	Typical (lm/W)	(mm)
LHC1-3090-1202CRSP	3000K	90	92	200	550	625	90	9
LHC1-3090-1203CRSP	3000K	90	92	300	850	950	90	9
LHC1-3090-1204CRSP	3000K	90	92	450	1250	1400	90	13
LHC1-3090-1205CRSP	3000K	90	92	600	1700	1900	90	13
LHC1-3090-1208CRSP	3000K	90	92	900	2500	2800	90	15
LHC1-3090-1211CRSP	3000K	90	92	1200	3400	3750	90	19

Notes for Table 1:

1. Philips Lumileds maintains a tolerance of  $\pm 6.5\%$  on luminous flux,  $\pm 2$  on CRI.
2. Maximum luminous flux is 10% above typical luminous flux.
3. Light Emitting Surface (LES) is the inner diameter (phosphor area) inside the dam.

**Table 2. Optical Characteristics**

Nominal CCT	Typical Total Included Angle <sup>[1]</sup>	Typical Viewing Angle <sup>[2]</sup>
	$\theta_{0.90V}$	$2\theta^{1/2}$
LHC1 - xxxx - xxxxCRSP	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 lamp centerline where the luminous intensity is  $\frac{1}{2}$  of the peak value.

## Electrical Characteristics

**Table 3. Electrical Characteristics**

Part Number	Nominal CCT	Forward Voltage (V) <sup>[1, 2]</sup>			Typical Temperature Coefficient of Forward Voltage <sup>[1]</sup> (mV/°C) $\Delta V_F / \Delta T_J$	Typical Thermal Resistance Junction to Case <sup>[3]</sup> (°C/W) $R\theta_{J-C}$
		Minimum	Typical	Maximum		
LHC1-xxxx-1202CRSP	3000K	33	35.5	38	-16	0.91
LHC1-xxxx-1203CRSP	3000K	33	35.5	38	-16	0.70
LHC1-xxxx-1204CRSP	3000K	33	35.5	38	-16	0.53
LHC1-xxxx-1205CRSP	3000K	33	35.5	38	-16	0.45
LHC1-xxxx-1208CRSP	3000K	33	35.5	38	-16	0.29
LHC1-xxxx-1211CRSP	3000K	33	35.5	38	-16	0.23

Notes for Table 3:

1. Measured between  $T_J = 25^\circ\text{C}$  and  $T_J = 105^\circ\text{C}$  at test current.
2. Voltage tolerance  $\pm 10\%$ .
3. Junction temperature to back of the PCB and measurement tolerance of  $\sim 10\%$ .

# Absolute Maximum Ratings

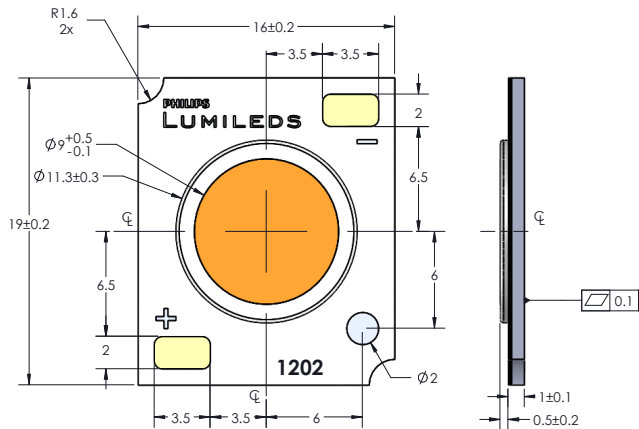
**Table 4. Operating Condition and Ratings**

Parameter	Maximum Performance
DC Forward Current	1.5x test current <sup>[2]</sup>
ESD Sensitivity	< 8000V Human Body Model (HBM) Class 3A JESD22-A114-E < 400V Machine Model (MM) Class B JESD22-A115-B
Storage Temperature	-40°C - 120°C
LED Junction Temperature <sup>[1]</sup>	125°C <sup>[3]</sup>
Operating Case Temperature at Nominal Current	-40°C - 105°C
Reverse Voltage	LUXEON CoB with CrispWhite Technology is not designed to be driven in reverse bias

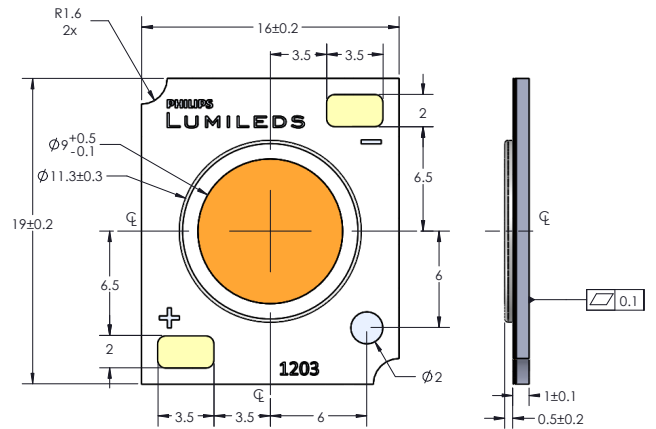
**Notes for Table 4:**

1. Proper current derating must be observed to maintain junction temperature below the maximum, please see preliminary application brief for additional information on thermal measurement guidelines.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple", with frequencies  $\geq 100$  Hz and amplitude  $\pm 20\%$  are acceptable, assuming the average current throughout each cycle does not exceed 2x test  $I_f$ .

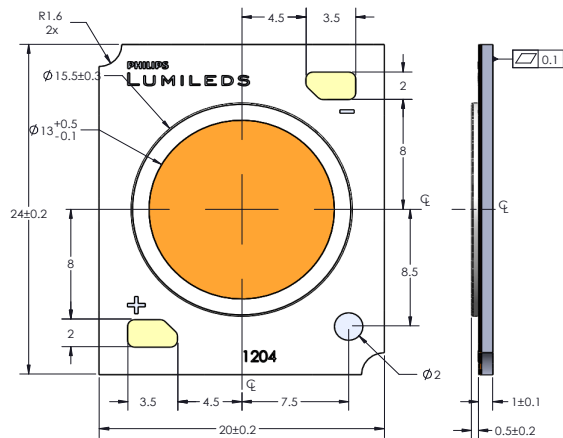
# Mechanical Dimensions



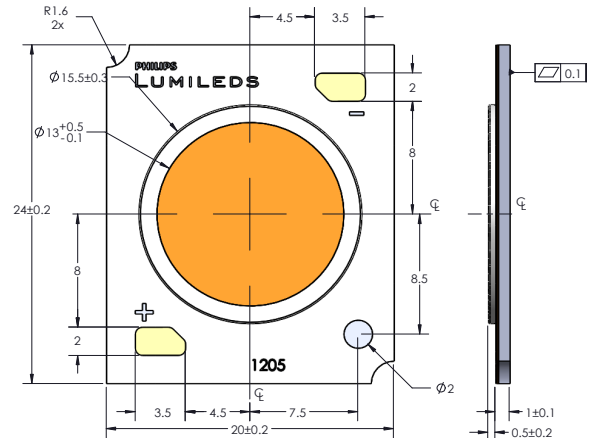
LHC1 – xxxx – 1202CRSP



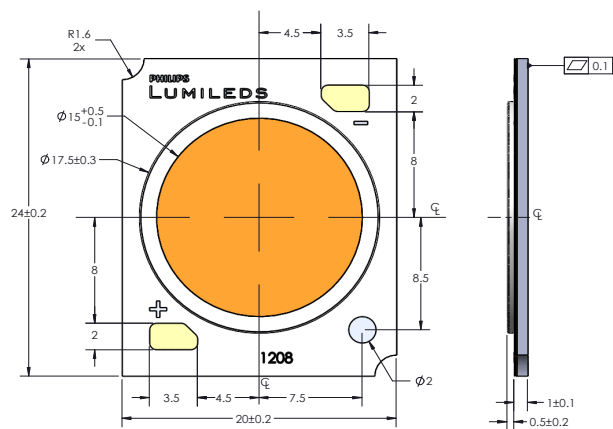
LHC1 – xxxx – 1203CRSP



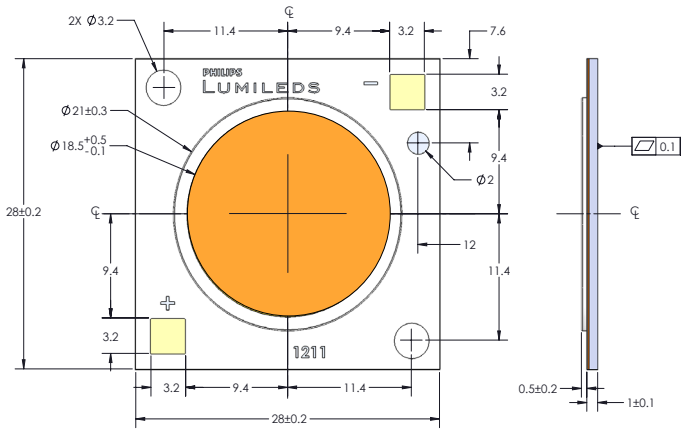
LHC1 – xxxx – 1204CRSP



LHC1 – xxxx – 1205CRSP



LHC1 – xxxx – 1208CRSP



LHC1 – xxxx – 1211CRSP

# Characteristic Curves

Relative Spectral Distribution vs. Wavelength  
Junction Temperature = 85°C, at Test Current

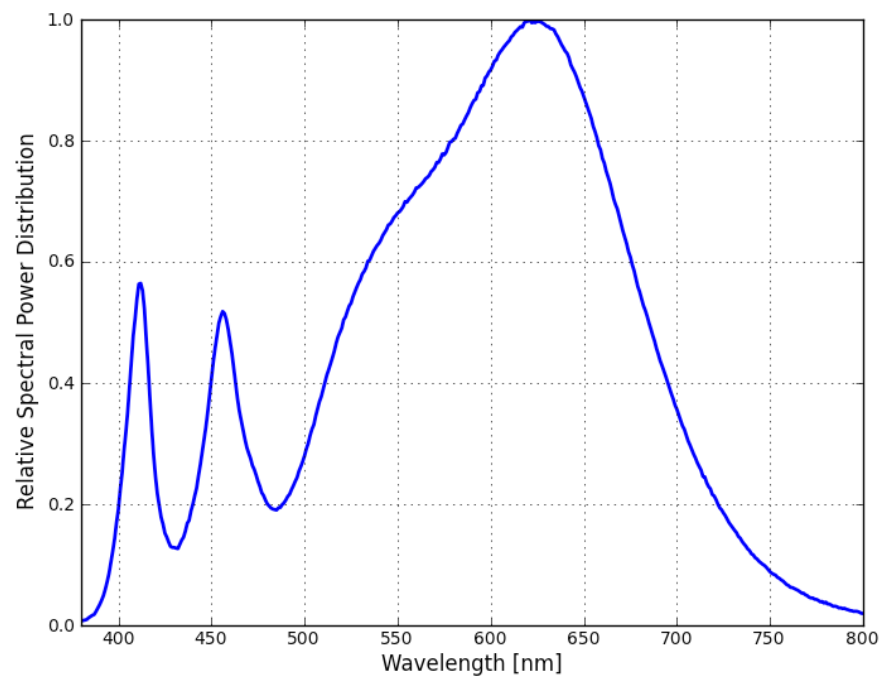


Figure 1. Color spectrum of 3000K, 90 minimum CRI CrispWhite, integrated measurement.

Relative Light Output Characteristics over Temperature at Test Current

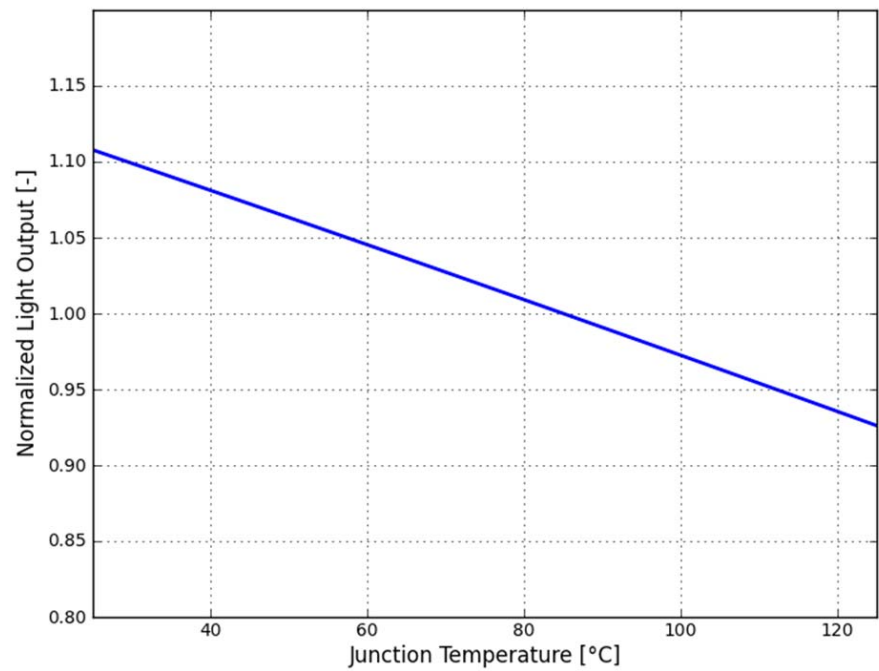
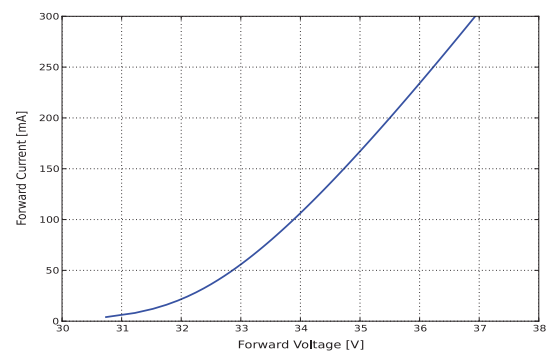


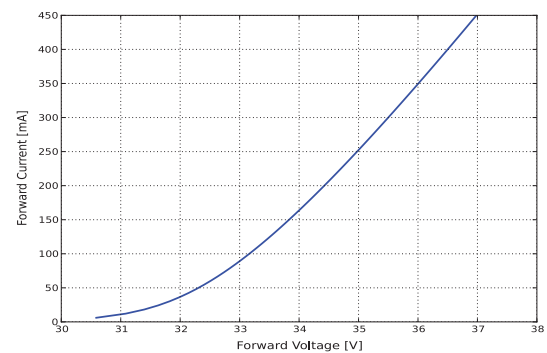
Figure 2. Relative light output vs. junction temperature.

# Typical Forward Current Characteristics

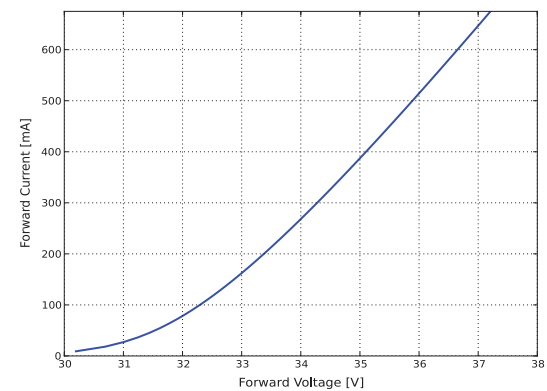
LUXEON CoB with CrispWhite Technology  
LHC1 – xxxx – xxxx, Junction Temperature = 85°C



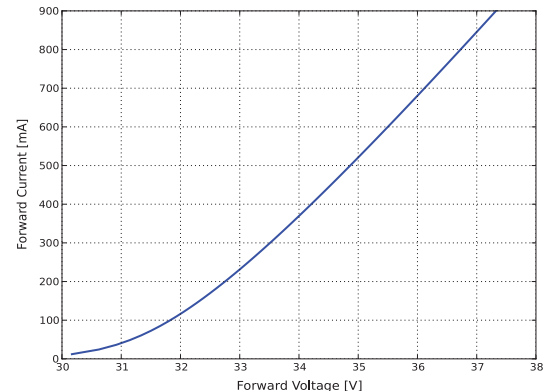
LHC1 – xxxx – 1202CRSP



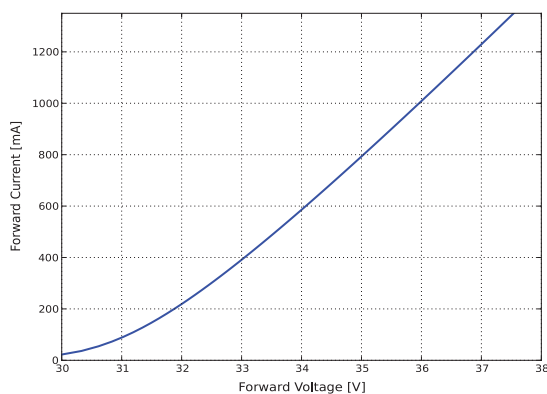
LHC1 – xxxx – 1203CRSP



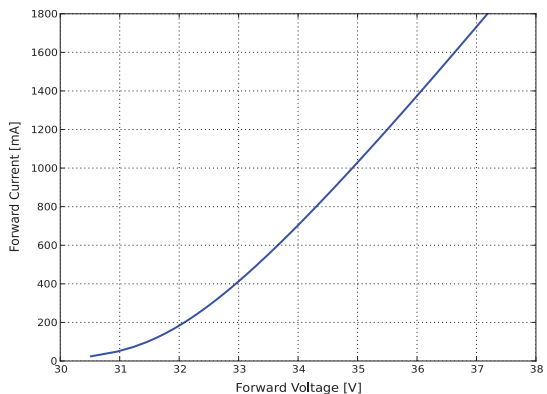
LHC1 – xxxx – 1204CRSP



LHC1 – xxxx – 1205CRSP



LHC1 – xxxx – 1208CRSP



LHC1 – xxxx – 1211CRSP

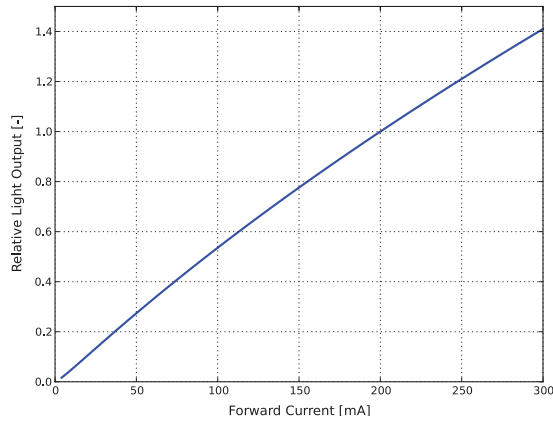
Figure 3. Forward current vs. forward voltage.



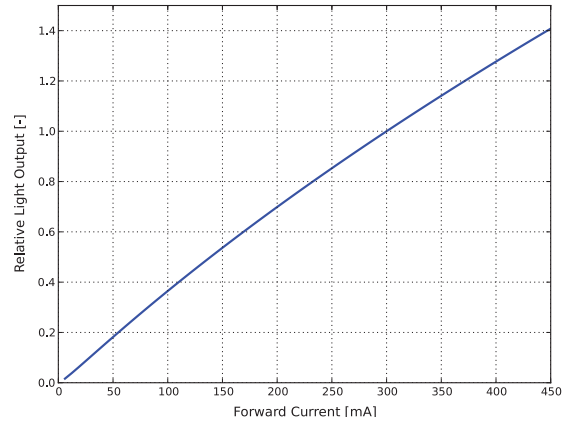
# Typical Relative Luminous Flux vs. Forward Current

LUXEON CoB with CrispWhite Technology

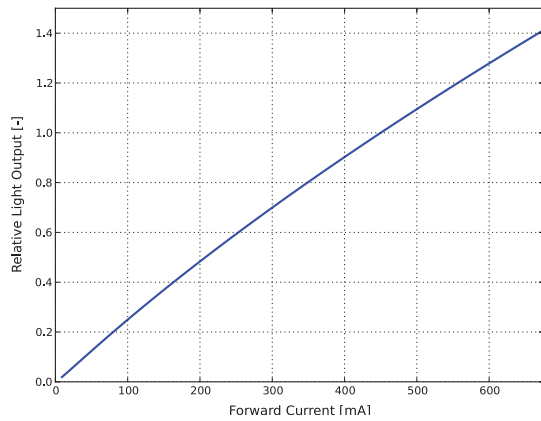
LHC1 – xxxx – xxxx, Junction Temperature = 85°C



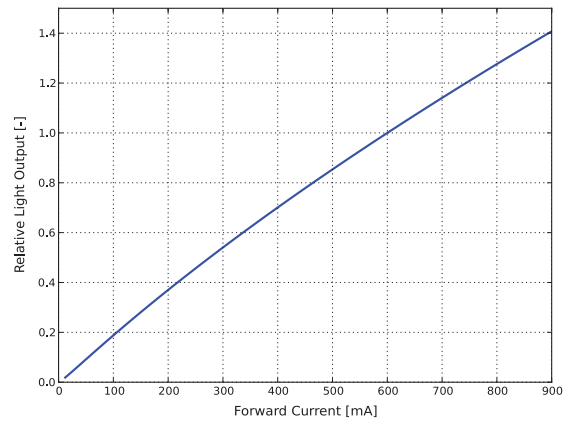
LHC1 – xxxx – 1202CRSP



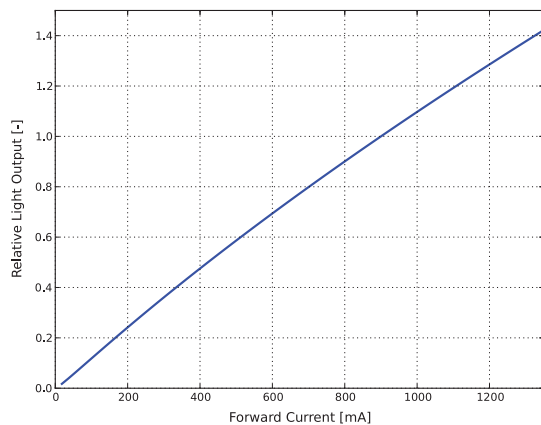
LHC1 – xxxx – 1203CRSP



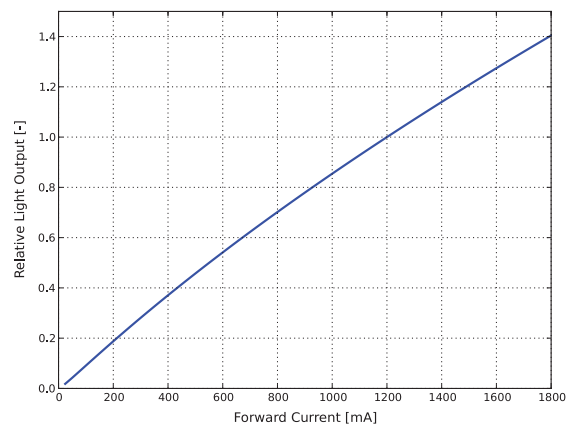
LHC1 – xxxx – 1204CRSP



LHC1 – xxxx – 1205CRSP



LHC1 – xxxx – 1208CRSP



LHC1 – xxxx – 1211CRSP

Figure 4. Typical relative luminous flux vs. current.

# Typical Radiation Patterns

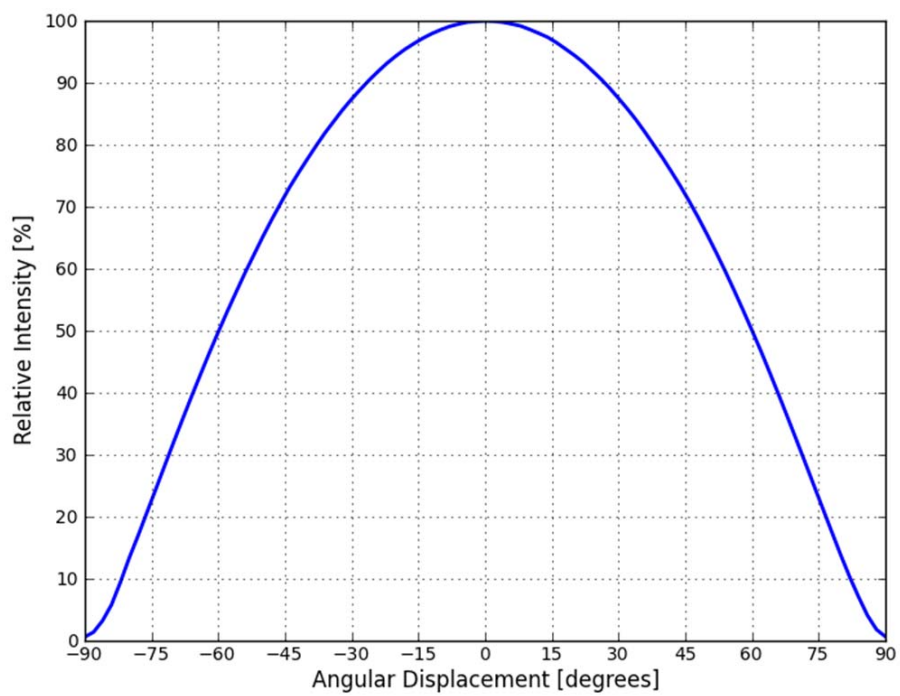


Figure 5. Radiation pattern for LHC1 – xxxx – 120xCRSP.

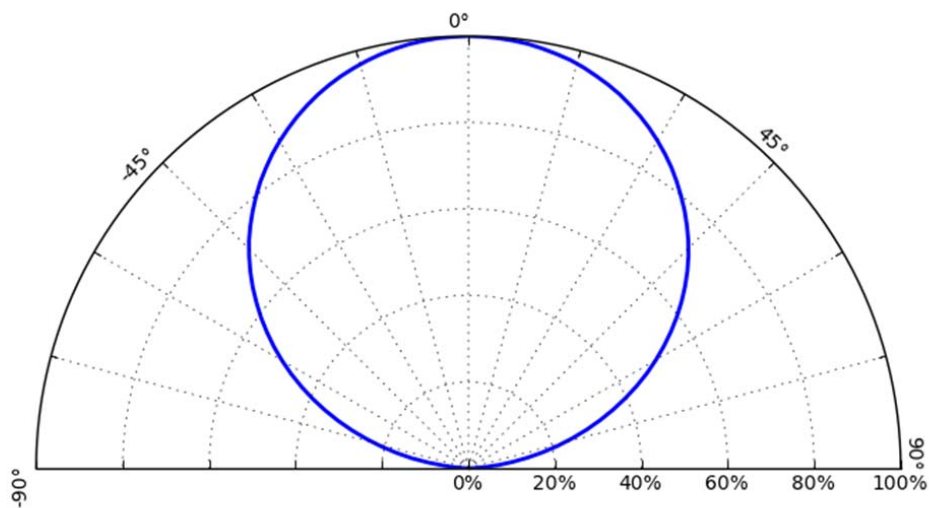


Figure 6. Polar radiation pattern for LHC1 – xxxx – 120xCRSP.

# Color Bin Definition

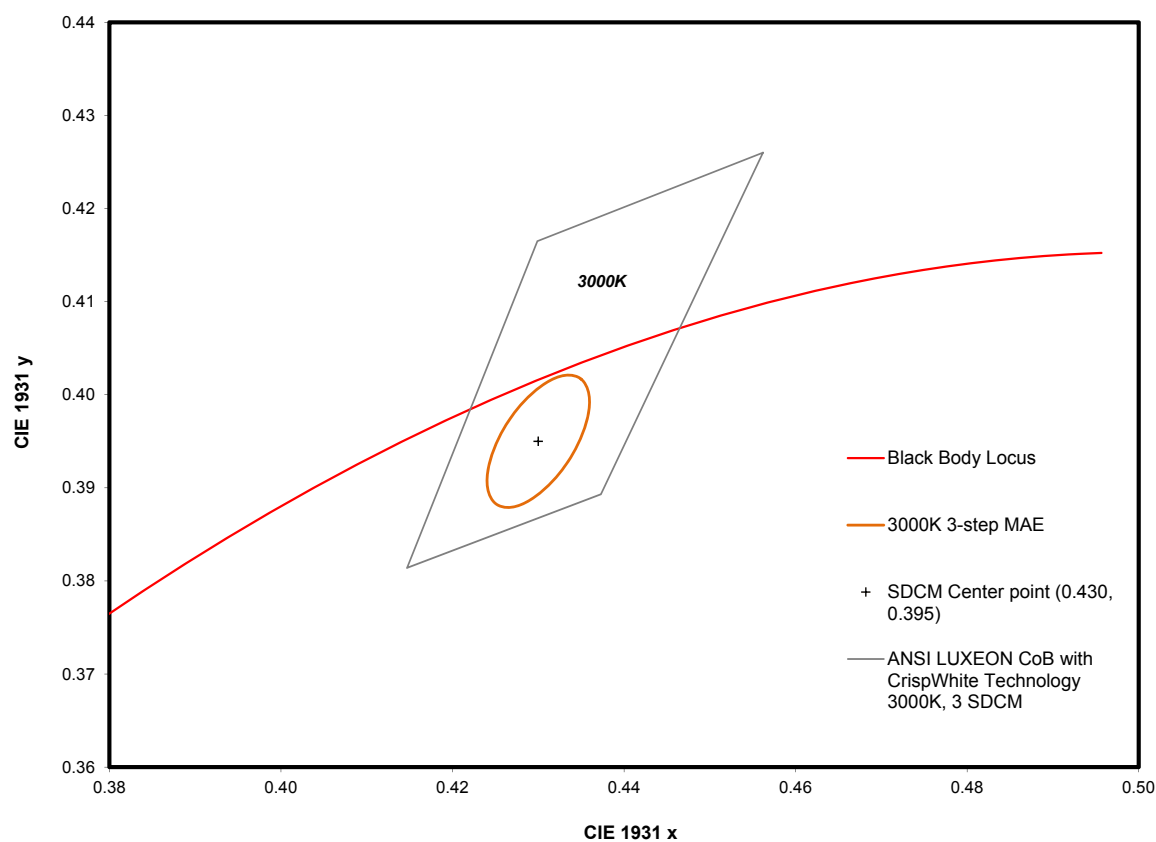


Figure 7. 3-step MacAdam Ellipse color bin.

Table 5. 3-step MacAdam Ellipse Color Definition

Nominal ANSI CCT	Color Space	Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle
3000K	Single 3 Step MacAdam Ellipse	(0.430, 0.395)	0.00834	0.00408	53.2°

Notes for Table 5:

- 1. Philips Lumileds maintains a tester tolerance of ±0.005 on x,y coordinates.
- 2. Major and minor axis (a,b) from table 5 are a reference as depicted in figure 7.

# Package Info and Dimensions

**Table 6. Package Info**

	LHC1 – xxxx – 1202CRSP	LHC1 – xxxx – 1203CRSP	LHC1 – xxxx – 1204CRSP	LHC1 – xxxx – 1205CRSP	LHC1 – xxxx – 1208CRSP	LHC1 – xxxx – 1211CRSP
Total Units per Tube	20	20	20	20	20	10
Total Tubes per Box	5	5	5	5	5	5
Total Units per Box	100	100	100	100	100	50

## LHC1 – xxxx – 1202CRSP and 1203CRSP

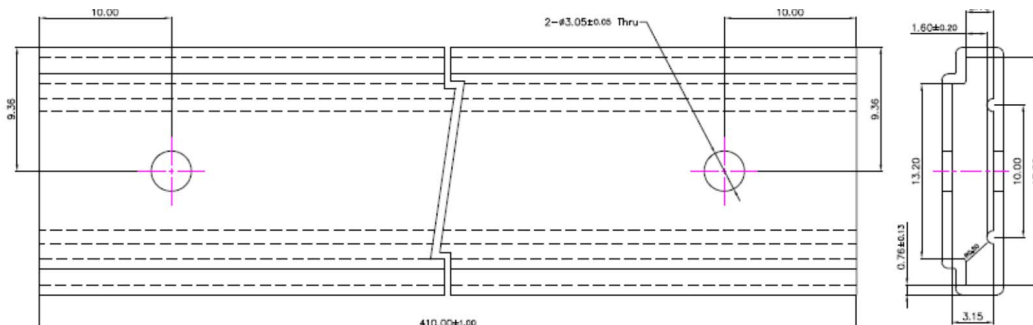


Figure 8. Package ray dimension for LUXEON CoB with CrispWhite Technology LHC1 – xxxx – 1202CRSP and 1203CRSP.

## LHC1 – xxxx – 1204CRSP, 1205CRSP and 1208CRSP

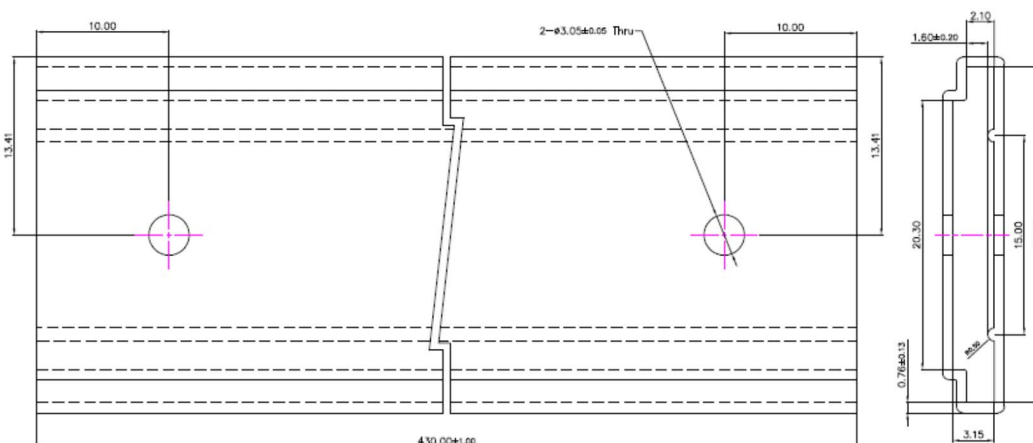


Figure 9. Package ray dimension for LUXEON CoB with CrispWhite Technology LHC1 – xxxx – 1204CRSP, 1205CRSP and 1208CRSP.

## LHC1 – xxxx – 1211CRSP

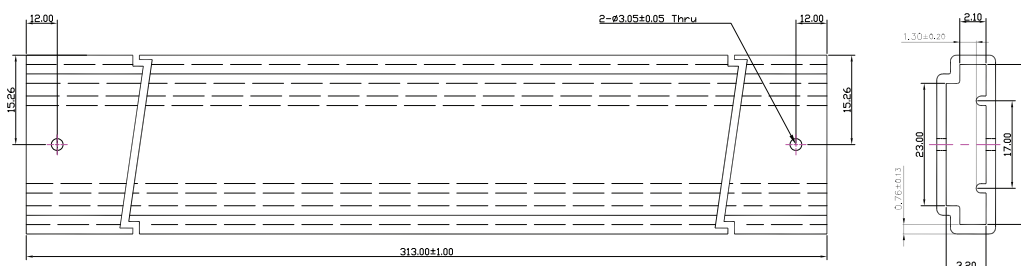


Figure 10. Package ray dimension for LUXEON CoB with CrispWhite Technology LHC1 – xxxx – 1211CRSP.

## Who We Are

Philips Lumileds focuses on one goal: Creating the world's highest performing LEDs. The company pioneered the use of solid-state lighting in breakthrough products such as the first LED backlit TV, the first LED flash in camera phones, and the first LED daytime running lights for cars. Today we offer the most comprehensive portfolio of high quality LEDs and uncompromising service.

Philips Lumileds brings LED's qualities of energy efficiency, digital control and long life to spotlights, downlights, high bay and low bay lighting, indoor area lighting, architectural and specialty lighting as well as retrofit lamps. Our products are engineered for optimal light quality and unprecedented efficacy at the lowest overall cost. By offering LEDs in chip, packaged and module form, we deliver supply chain flexibility to the inventors of next generation illumination.

Philips Lumileds understands that solid state lighting is not just about energy efficiency. It is about elegant design. Reinventing form. Engineering new materials. Pioneering markets and simplifying the supply chain. It's about a shared vision. Learn more about our comprehensive portfolio of LEDs at [www.philipslumileds.com](http://www.philipslumileds.com).



Philips Lumileds Lighting Company shall not 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 Philips Lumileds Lighting Company has attempted to provide the most accurate information and data, the materials and services information and data are provided "as is" and Philips Lumileds Lighting Company neither warranties, nor guarantees the contents and correctness of the provided information and data. Philips Lumileds Lighting Company reserves 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.



©2014 Philips Lumileds Lighting Company. All rights reserved.  
LUXEON is a registered trademark of the Philips Lumileds Lighting Company in the United States and other countries.

[www.philipslumileds.com](http://www.philipslumileds.com)  
[www.philipslumileds.cn.com](http://www.philipslumileds.cn.com)

LUXEON CoB with CrispWhite Technology Datasheet DS138 20140703