

For **NEW** designs consider these replacement products:

- LUXEON CoB Compact Range (Gen 2)
- LUXEON CoB 205 and LUXEON CoB 209

## LUXEON CoB Compact Range

Unsurpassed light quality and CBCP due to small LES

LUXEON CoB Compact Range offers the industry's smallest Light Emitting Surface (LES) that enables more cost effective designs and provides good Center Beam Candle Power (CBCP) for crisp light beams with the best luminance and color uniformity. LUXEON CoB Compact parts are available in 3-step (80CRI and 90CRI) MacAdam ellipse, ensuring uniform optical performance in retrofit lamps and spotlight applications.

LUXEON CoB Compact LEDs are all hot-tested at 85°C—real world operating conditions—which means that luminaire design is simplified and testing can be minimized.

### FEATURES AND BENEFITS

- Highest flux densities with industry's smallest LES, 6.5mm
- Industry leading thermal resistance allows for smaller heat sinks
- Ceramic substrate that offers better protection in Hi Pot testing
- Supported by a comprehensive optical, mechanical and electrical ecosystem
- 3-step MacAdam ellipse color definition: *Freedom from Binning* for color consistency from luminaire to luminaire
- Tested at  $T_j=85^\circ\text{C}$  for accurate color in application

### PRIMARY APPLICATIONS

- Downlights
- High Bay & Low Bay
- Lamps
  - Directional
- Spotlights

# Table of Contents

<b>General Product Information</b> .....	<b>2</b>
Nomenclature Test Conditions .....	2
Part Number Nomenclature .....	2
Lumen Maintenance .....	2
Environmental Compliance .....	2
<b>Performance Characteristics</b> .....	<b>3</b>
Product Selection Guide .....	3
Optical Characteristics .....	4
Electrical Characteristics .....	4
<b>Absolute Maximum Ratings</b> .....	<b>5</b>
<b>Characteristics Curves</b> .....	<b>6</b>
Spectral Distribution Characteristics .....	6
Light Output Characteristics .....	7
Forward Current Characteristics .....	10
Radiation Patterns .....	13
Color Bin Definition .....	14
<b>Mechanical Dimensions</b> .....	<b>15</b>
<b>Packaging Information</b> .....	<b>16</b>
Tube Dimensions .....	16

# General Product Information

## Nomenclature Test Conditions

LUXEON CoB Compact LEDs are tested and binned with a DC drive current specified below at a junction temperature,  $T_j$  of 85°C.

150mA	-	LUXEON CoB 105 36V
200mA	-	LUXEON CoB 107 36V
250mA	-	LUXEON CoB 109 36V
350mA	-	LUXEON CoB 105 12V
350mA	-	LUXEON CoB 109 12V

## Part Number Nomenclature

The part number designation for LUXEON CoB Compact LEDs is explained as follows:

L 2 C 3 - **A A B B D D D E** 0 6 0 0 0

Where:

- A A** - designates nominal ANSI CCT (22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K)
- B B** - designates minimum CRI (80=80CRI, 90=90CRI)
- D D D** - designates LUXEON CoB product number (105, 107, 109)
- E** - designates forward voltage (B=12V, D=24V, E=36V)

Therefore, a LUXEON CoB 105 3000K, 80CRI 12V will have the following part number:

L 2 C 3 - **3 0 8 0 1 0 5 B** 0 6 0 0 0

## Lumen Maintenance

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. Based on historical data Lumileds projects that LUXEON CoB Compact 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

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON LEDs are 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 material 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 Compact at test current,  $T_j=85^\circ\text{C}$ .

PRODUCT	FORWARD VOLTAGE (V <sub>f</sub> )	NOMINAL CCT	MINIMUM CRI <sup>[1, 2]</sup>	LUMINOUS FLUX <sup>[1]</sup> (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	TEST CURRENT (mA)	LES (mm)	PART NUMBER
				MINIMUM	TYPICAL				
LUXEON CoB 105	12V	2700K	80	405	450	112	350	6.5	L2C3-2780105B06000
		3000K	80	425	472	117	350	6.5	L2C3-3080105B06000
		3500K	80	435	493	122	350	6.5	L2C3-3580105B06000
		4000K	80	457	507	126	350	6.5	L2C3-4080105B06000
		2700K	90	347	385	96	350	6.5	L2C3-2790105B06000
		3000K	90	369	410	102	350	6.5	L2C3-3090105B06000
		3500K	90	378	419	104	350	6.5	L2C3-3590105B06000
		4000K	90	395	439	109	350	6.5	L2C3-4090105B06000
		2200K	80	375	425	79	150	6.5	L2C3-2280105E06000
		2700K	80	525	575	106	150	6.5	L2C3-2780105E06000
LUXEON CoB 107	36V	3000K	80	525	600	111	150	6.5	L2C3-3080105E06000
		3500K	80	525	600	111	150	6.5	L2C3-3580105E06000
		4000K	80	550	625	116	150	6.5	L2C3-4080105E06000
		5000K	80	600	650	120	150	6.5	L2C3-5080105E06000
		5700K	80	600	650	120	150	6.5	L2C3-5780105E06000
		2200K	90	350	400	74	150	6.5	L2C3-2290105E06000
		2700K	90	450	500	93	150	6.5	L2C3-2790105E06000
		3000K	90	475	500	93	150	6.5	L2C3-3090105E06000
		3500K	90	475	525	97	150	6.5	L2C3-3590105E06000
		4000K	90	525	575	106	150	6.5	L2C3-4090105E06000
LUXEON CoB 107	36V	2200K	80	500	550	77	200	6.5	L2C3-2280107E06000
		2700K	80	625	725	102	200	6.5	L2C3-2780107E06000
		3000K	80	650	750	106	200	6.5	L2C3-3080107E06000
		3500K	80	675	750	106	200	6.5	L2C3-3580107E06000
		4000K	80	700	775	109	200	6.5	L2C3-4080107E06000
		5000K	80	700	800	113	200	6.5	L2C3-5080107E06000
		5700K	80	700	800	113	200	6.5	L2C3-5780107E06000
		2200K	90	450	500	70	200	6.5	L2C3-2290107E06000
		2700K	90	550	625	88	200	6.5	L2C3-2790107E06000
		3000K	90	550	650	92	200	6.5	L2C3-3090107E06000
		3500K	90	575	675	95	200	6.5	L2C3-3590107E06000
		4000K	90	600	675	95	200	6.5	L2C3-4090107E06000

Notes for Table 1 continued on next page:

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 more than the CRI minimum, but not guaranteed.

Table 1. Product performance of LUXEON CoB Compact at test current,  $T_j=85^\circ\text{C}$  (continued).

PRODUCT	FORWARD VOLTAGE ( $\text{V}_f$ )	NOMINAL CCT	MINIMUM CRI <sup>[1, 2]</sup>	LUMINOUS FLUX <sup>[1]</sup> (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	TEST CURRENT (mA)	LES (mm)	PART NUMBER
				MINIMUM	TYPICAL				
LUXEON CoB 109	24V	2700K	80	792	880	109	350	6.5	L2C3-2780109D06000
		3000K	80	810	900	112	350	6.5	L2C3-3080109D06000
		3500K	80	842	936	117	350	6.5	L2C3-3580109D06000
		4000K	80	871	968	120	350	6.5	L2C3-4080109D06000
		2700K	90	680	755	94	350	6.5	L2C3-2790109D06000
		3000K	90	710	789	98	350	6.5	L2C3-3090109D06000
		3500K	90	720	800	99	350	6.5	L2C3-3590109D06000
		4000K	90	753	837	104	350	6.5	L2C3-4090109D06000
		2200K	80	700	775	87	250	6.5	L2C3-2280109E06000
		2700K	80	875	975	110	250	6.5	L2C3-2780109E06000
LUXEON CoB 109	36V	3000K	80	900	1025	115	250	6.5	L2C3-3080109E06000
		3500K	80	950	1075	121	250	6.5	L2C3-3580109E06000
		4000K	80	950	1075	121	250	6.5	L2C3-4080109E06000
		5000K	80	1000	1100	124	250	6.5	L2C3-5080109E06000
		5700K	80	1000	1100	124	250	6.5	L2C3-5780109E06000
		2200K	90	625	700	79	250	6.5	L2C3-2290109E06000
		2700K	90	775	850	96	250	6.5	L2C3-2790109E06000
		3000K	90	775	875	99	250	6.5	L2C3-3090109E06000
		3500K	90	800	875	99	250	6.5	L2C3-3590109E06000
		4000K	90	825	925	104	250	6.5	L2C3-4090109E06000

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 more than the CRI minimum, but not guaranteed.

## Optical Characteristics

Table 2. Optical characteristics for LUXEON CoB Compact at test current,  $T_j=85^\circ\text{C}$ .

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE	TYPICAL VIEWING ANGLE
L2C3-xxx10xx06000	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. Forward voltage and typical thermal resistance for LUXEON CoB Compact at test current,  $T_j=85^\circ\text{C}$ .

PART NUMBER	TEST CURRENT (mA)	FORWARD VOLTAGE ( $\text{V}_f$ )			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE (mV/°C)	TYPICAL THERMAL RESISTANCE JUNCTION TO CASE (°C/W)
		MINIMUM	TYPICAL	MAXIMUM		
L2C3-xxxx105B06000	350	10.5	11.5	12.5	-16	2.7
L2C3-xxxx105E06000	150	33.0	36.0	39.0	-16	2.7
L2C3-xxxx107E06000	200	33.0	35.5	39.0	-16	1.5
L2C3-xxxx109D06000	350	21.0	23.0	25.0	-16	1.5
L2C3-xxxx109E06000	250	33.0	35.5	39.0	-16	1.5

Notes for Table 3:

1. Lumileds maintains a voltage tolerance of  $\pm 10\%$ .
2. Measured between 25°C and 85°C for coefficient of forward current.
3. Thermal resistance is measured between junction and the bottom of the LUXEON CoB Compact substrate.

# Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON CoB Compact.

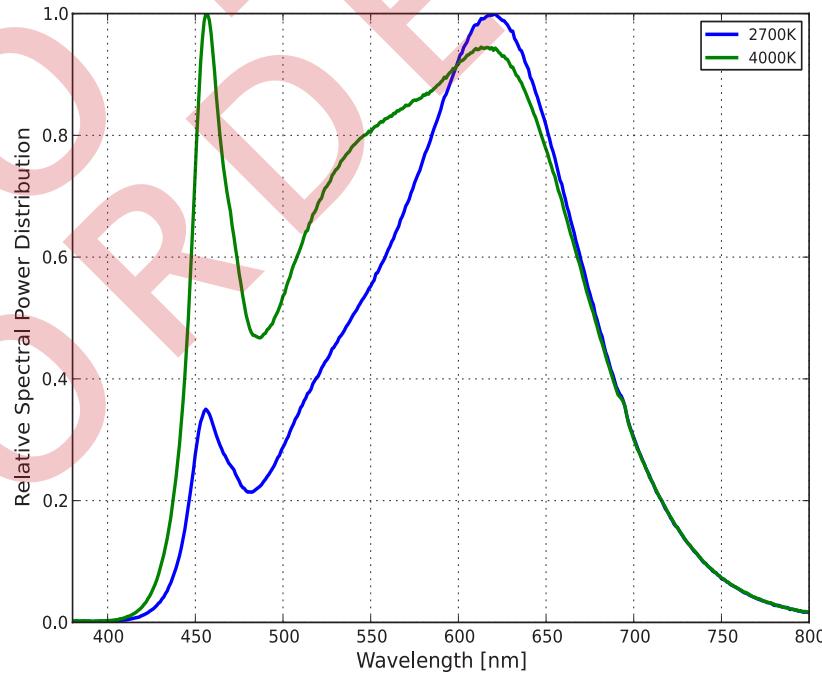
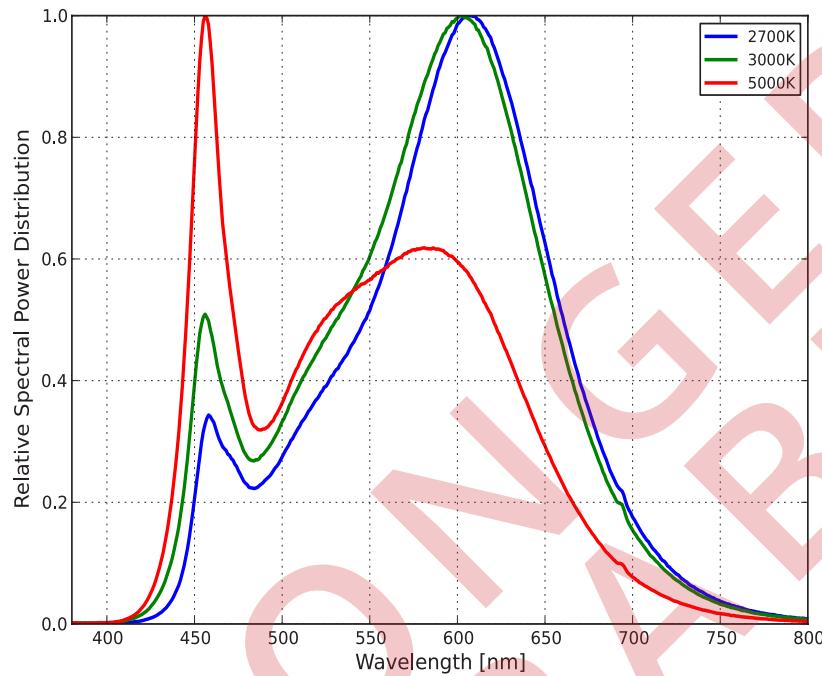
PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current <sup>[1,2]</sup>	LUXEON Cob 105 B: 600mA , LUXEON CoB 105 E: 200mA LUXEON Cob 107 E: 300mA LUXEON Cob 109 D: 600mA , LUXEON CoB 109 E: 400mA
LED Junction Temperature <sup>[1]</sup> (DC & Pulse)	125°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 3B
Operating Case Temperature <sup>[1]</sup>	-40°C to 105°C
Storage Temperature	-40°C to 105°C
Reserve Voltage (V <sub>reverse</sub> )	LUXEON LEDs are not designed to be driven in reverse bias

Notes for 4:

1. Proper current derating must be observed to maintain junction temperature below the maximum.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple," with frequencies  $\geq 100\text{Hz}$  and amplitude  $\leq 15\%$  of the maximum allowable DC forward current are acceptable, assuming the average current throughout each cycle does not exceed the maximum allowable DC forward current at the corresponding maximum junction temperature.
3. Pulsed operation with a peak drive current equal to the stated peak pulsed forward current is acceptable if the pulse on-time is  $\leq 5\text{ms}$  per cycle and the duty cycle is  $\leq 50\%$ .

# Characteristics Curves

## Spectral Distribution Characteristics



## Light Output Characteristics

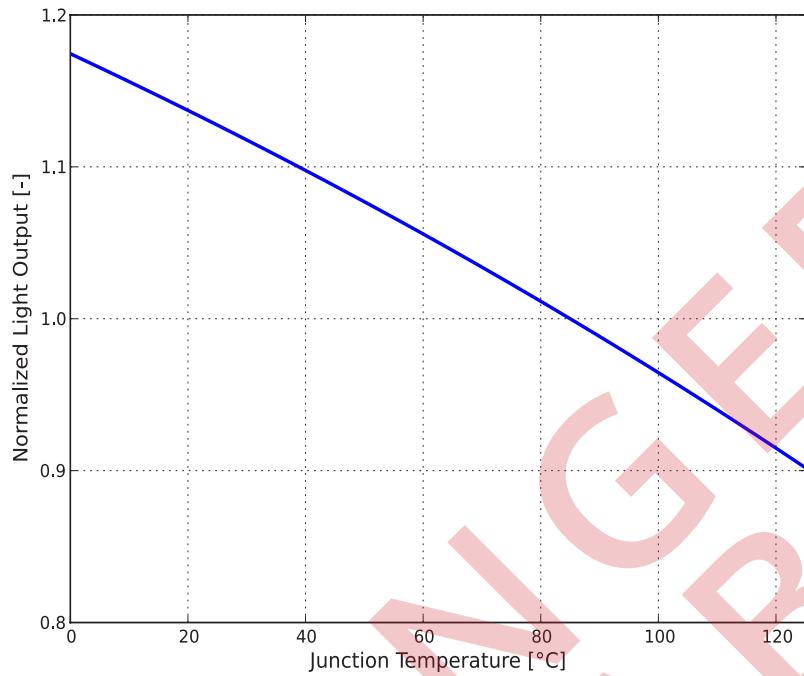


Figure 2: Typical normalized light output vs. junction temperature for L2C3-xxxx10xx06000 at test current.



Figure 3a: Typical normalized light output vs. forward current for L2C3-xxxx105B06000 at  $T_j=85^\circ\text{C}$ .

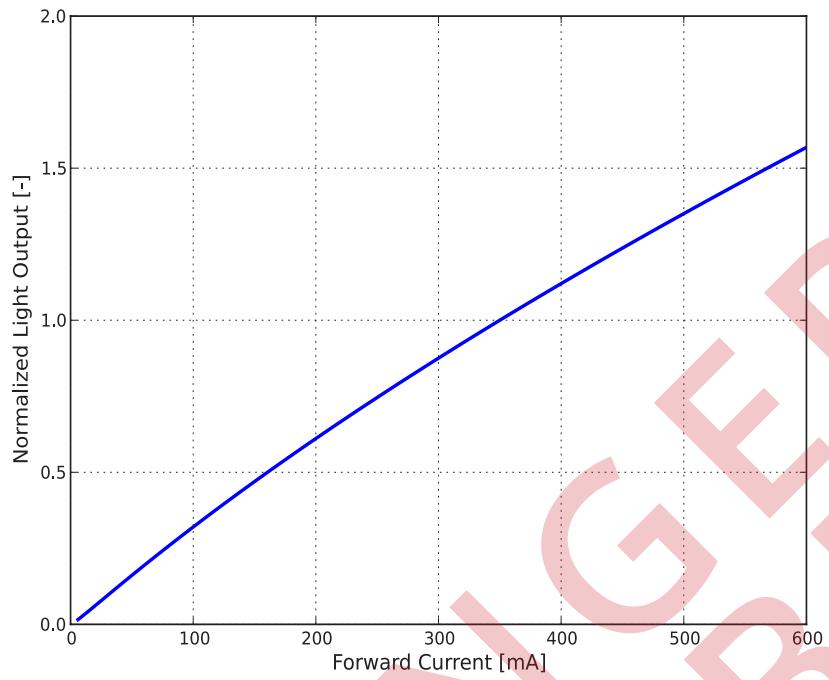


Figure 3b: Typical normalized light output vs. forward current for L2C3-xxxx109D06000 at  $T_j=85^\circ\text{C}$ .

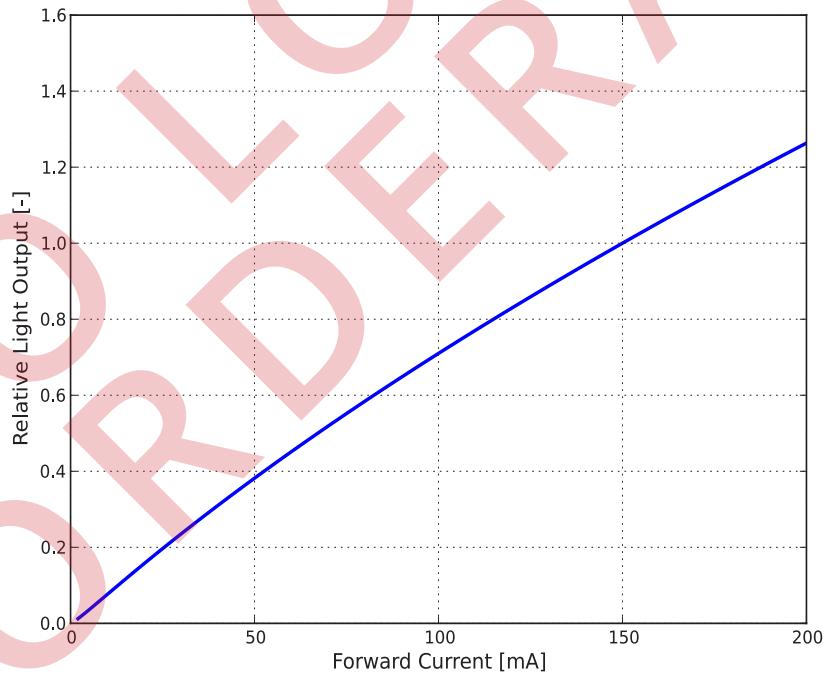


Figure 3c: Typical normalized light output vs. forward current for L2C3-xxxx105E06000 at  $T_j=85^\circ\text{C}$ .

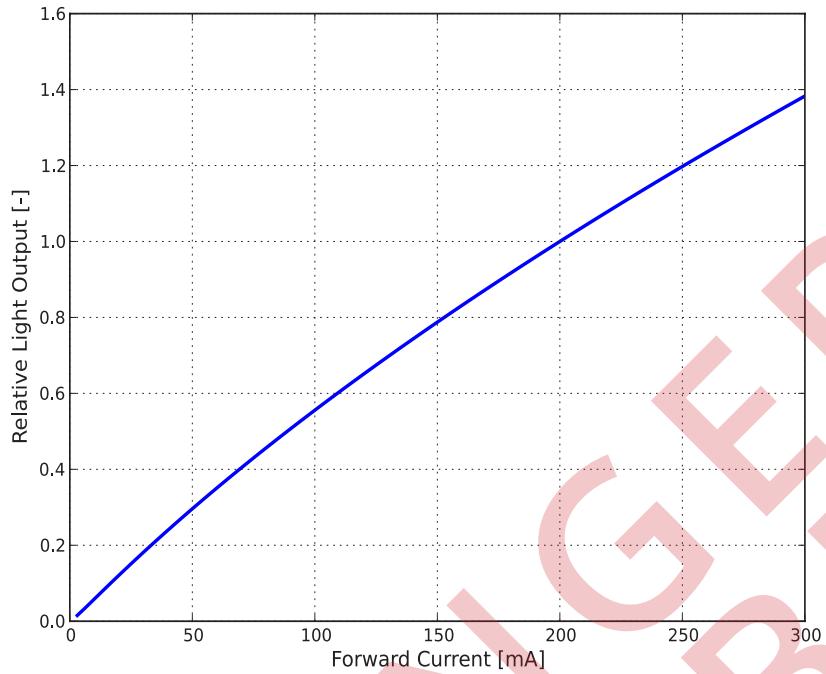


Figure 3d: Typical normalized light output vs. forward current for L2C3-xxxx107E06000 at  $T_j=85^\circ\text{C}$ .

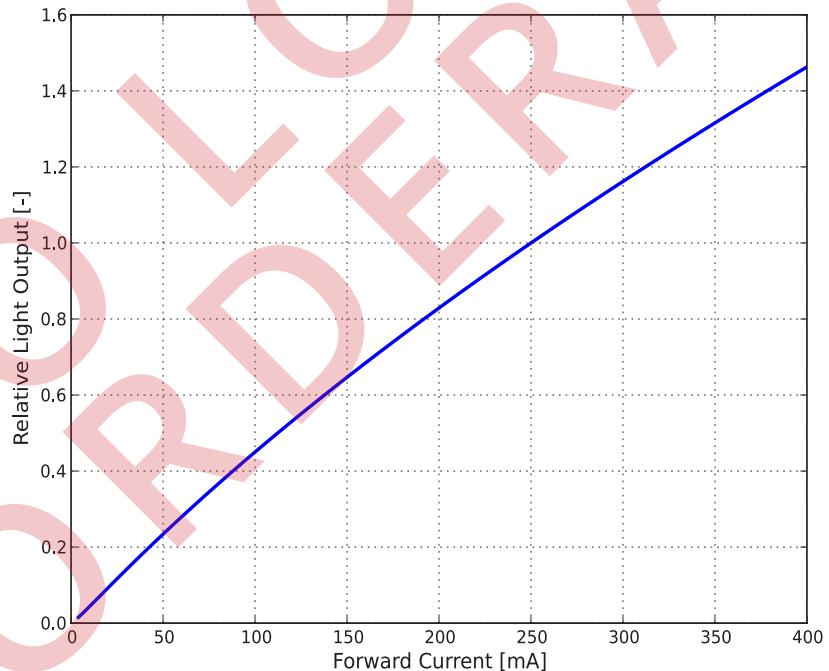


Figure 3e: Typical normalized light output vs. forward current for L2C3-xxxx109E06000 at  $T_j=85^\circ\text{C}$ .

## Forward Current Characteristics

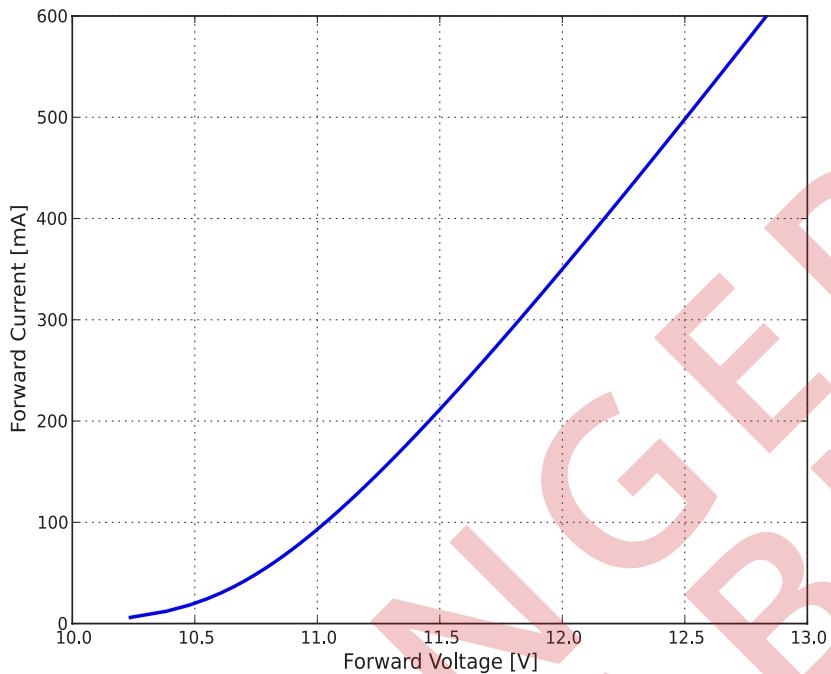


Figure 4a: Typical forward current vs. forward voltage for L2C3-xxxx105B06000 at  $T_j = 85^\circ\text{C}$ .



Figure 4b: Typical forward current vs. forward voltage for L2C3-xxxx109D06000 at  $T_j = 85^\circ\text{C}$ .

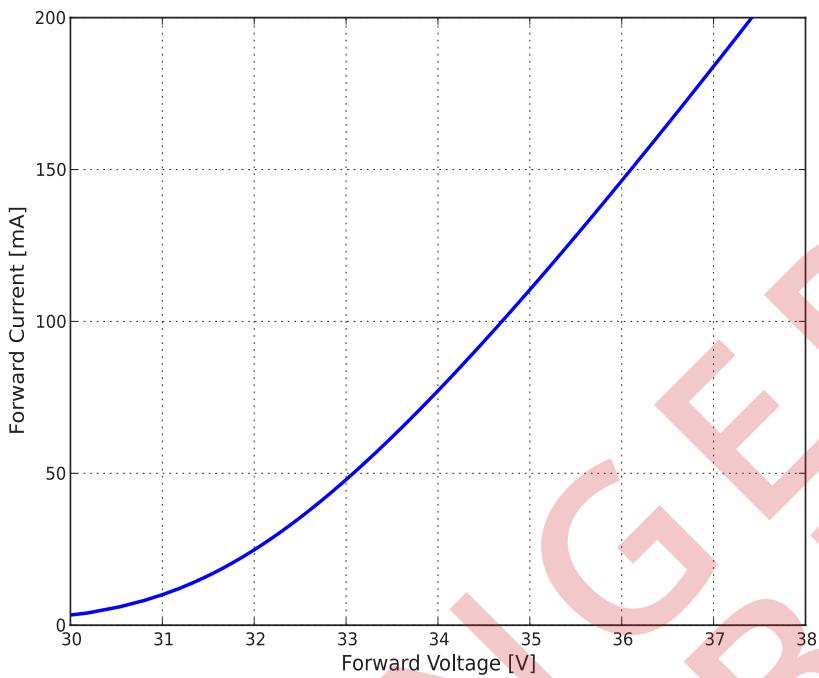


Figure 4c: Typical forward current vs. forward voltage for L2C3-xxxx105E06000 at  $T_j=85^\circ\text{C}$ .

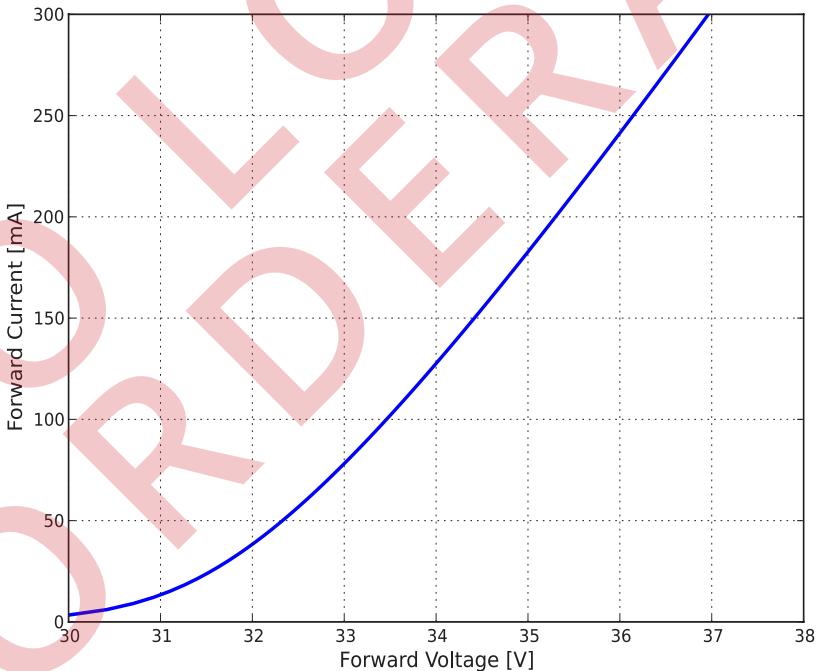


Figure 4d: Typical forward current vs. forward voltage for L2C3-xxxx107E06000 at  $T_j=85^\circ\text{C}$ .



Figure 4e: Typical forward current vs. forward voltage for L2C3-xxxx109E06000 at  $T_j=85^\circ\text{C}$ .

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## Radiation Patterns



Figure 5a: Typical radiation pattern for L2C3-xxxx10xE06000 at test current,  $T_j=85^\circ\text{C}$ .

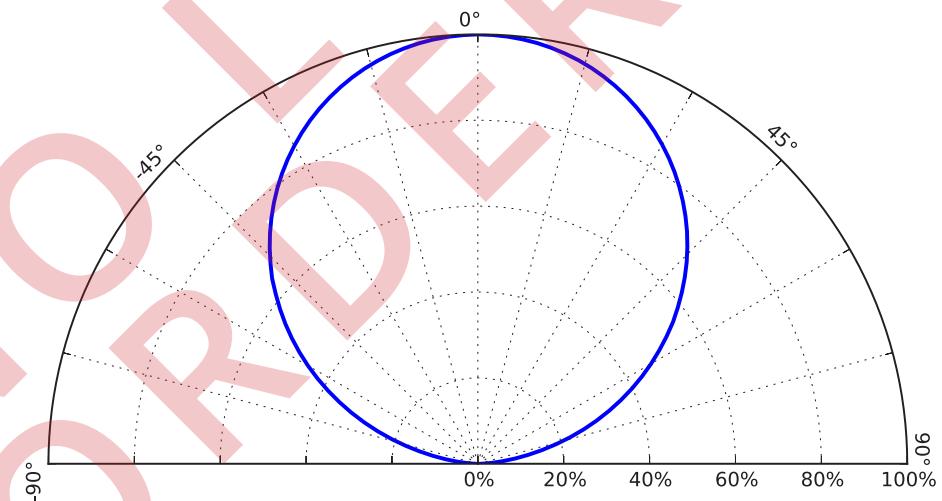


Figure 5b: Typical polar radiation pattern for L2C3-xxxx10xE06000 at test current,  $T_j=85^\circ\text{C}$ .

## Color Bin Definition

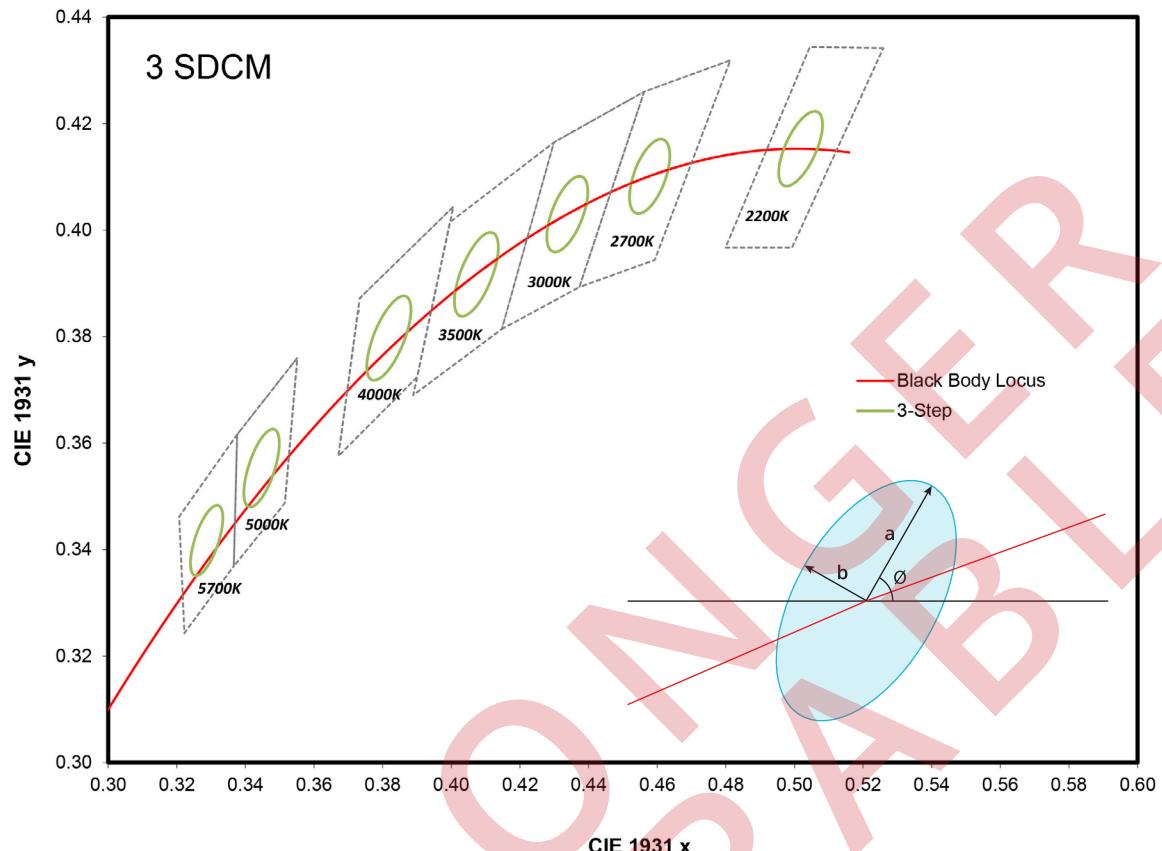


Figure 6: 3-step MacAdam ellipse illustration for Table 5.

Table 5. 3-step MacAdam ellipse color bin definitions for LUXEON CoB Compact at test current,  $T_j=85^\circ\text{C}$ .

NOMINAL CCT	COLOR SPACE	CENTER POINT (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, $\theta$
2200K	Single 3-step MacAdam ellipse	(0.5020, 0.4155)	0.00862	0.00397	49.3°
2700K	Single 3-step MacAdam ellipse	(0.4578, 0.4101)	0.00810	0.00420	53.7°
3000K	Single 3-step MacAdam ellipse	(0.4338, 0.4030)	0.00834	0.00408	53.2°
3500K	Single 3-step MacAdam ellipse	(0.4073, 0.3917)	0.00927	0.00414	54.0°
4000K	Single 3-step MacAdam ellipse	(0.3818, 0.3797)	0.00939	0.00402	53.7°
5000K	Single 3-step MacAdam ellipse	(0.3447, 0.3553)	0.00822	0.00354	59.6°
5700K	Single 3-step MacAdam ellipse	(0.3287, 0.3417)	0.00745	0.00320	59.1°

Notes for Table 5:

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

## Mechanical Dimensions

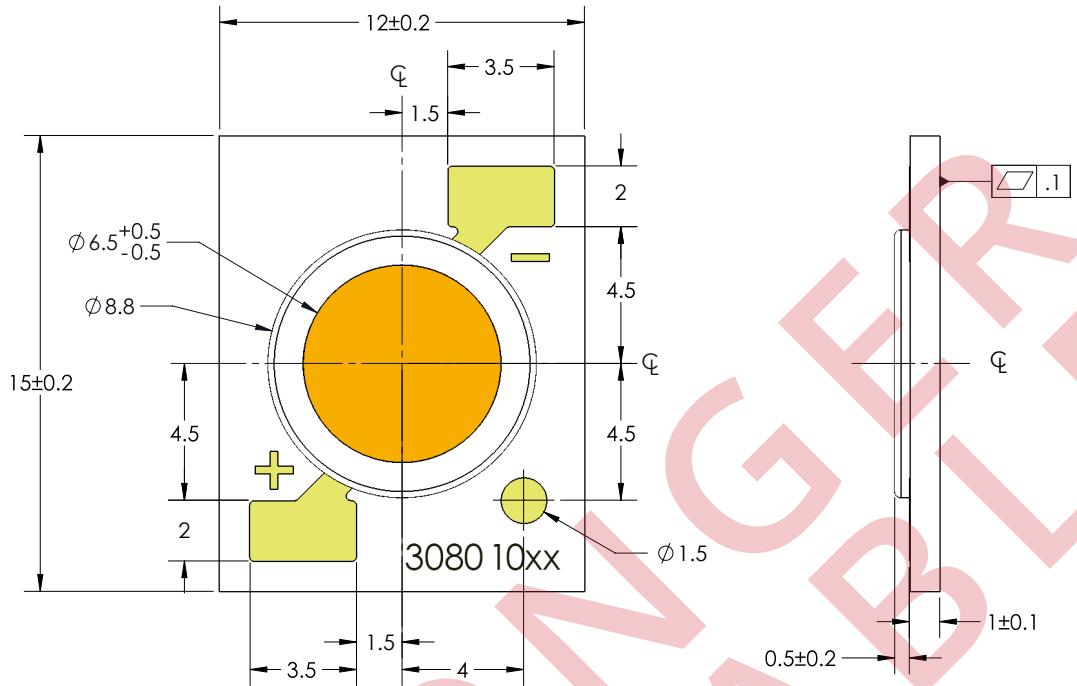


Figure 7: Mechanical dimensions for LUXEON CoB Compact.

Notes for Figure 7:

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

# Packaging Information

Table 6. Package information for LUXEON CoB Compact.

PACKAGING	L2C3-XXXX10XX06000
Total Units per Tube	20
Total Tubes per Box	5
Total Units per Box	100

## Tube Dimensions



Figure 8: Tape dimensions for LUXEON CoB Compact.

### Notes for Figure 8:

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

## About Lumileds

Lumileds is the global leader in light engine technology. The company develops, manufactures and distributes groundbreaking LEDs and automotive lighting products that shatter the status quo and help customers gain and maintain a competitive edge.

With a rich history of industry “firsts,” Lumileds is uniquely positioned to deliver lighting advancements well into the future by maintaining an unwavering focus on quality, innovation and reliability.

To learn more about our portfolio of light engines, visit [lumileds.com](http://lumileds.com).

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DS139 LUXEON CoB Compact Range Product  
Datasheet 20161003

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