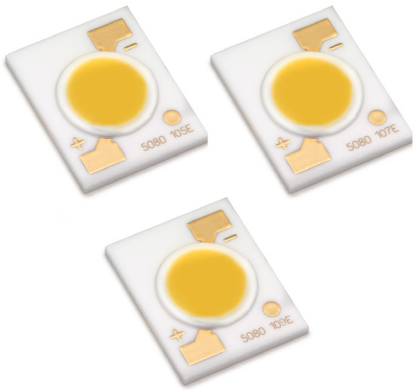
LUMILEDS

ILLUMINATION

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°C for accurate color in application

PRIMARY APPLICATIONS

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

c UL us No. E352519 RoHS COMPLIANT

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General Product Information

Nomenclature Test Conditions

LUXEON CoB Compact LEDs are tested and binned at 150mA for LUXEON CoB 105, 200mA for LUXEON CoB 107 and 250mA for LUXEON CoB 109, T_j=85ºC.

Part Number Nomenclature

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

L 2 C 3 – **B B C C D D D E** 0 6 0 0 0

Where:

- **B** – designates nominal ANSI CCT (22=2200K, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K)
- **CC** – designates minimum CRI (80=80CRI, 90=90CRI)
- **DDD** – designates LUXEON CoB product number (105, 107, 109)
- **E** – designates forward voltage (e.g. E for 36V)

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

L 2 C 3 – **3 0 8 0 1 0 5 E** 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=85ºC.

PRODUCT	NOMINAL CCT	MINIMUM CRI [1, 2]	LUMINOUS FLUX [1] (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	TEST CURRENT (mA)	LES (mm)	PART NUMBER
			MINIMUM	TYPICAL				
LUXEON CoB 105	2200K	80	375	425	79	150	6.5	L2C3-2280105E06000
	2700K	80	525	575	106	150	6.5	L2C3-2780105E06000
	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	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
LUXEON CoB 109	2200K	80	700	775	87	250	6.5	L2C3-2280109E06000
	2700K	80	875	975	110	250	6.5	L2C3-2780109E06000
	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 ±2 on CRI and ±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=85ºC.

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE	TYPICAL VIEWING ANGLE
L2C3-xxx10xE06000	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 ½ of the peak value.

Electrical Characteristics

Table 3. Forward voltage and typical thermal resistance for LUXEON CoB Compact at test current, T_j=85ºC.

PART NUMBER	TEST CURRENT (mA)	FORWARD VOLTAGE (V)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE (mV/°C)	TYPICAL THERMAL RESISTANCE JUNCTION TO CASE (°C/W)
		MINIMUM	TYPICAL	MAXIMUM		
L2C3-xxxx105E06000	150	33	36	39	-16	2.7
L2C3-xxxx107E06000	200	33	35.5	39	-16	1.5
L2C3-xxxx109E06000	250	33	35.5	39	-16	1.5

Notes for Table 3:
1. Lumileds maintains a voltage tolerance of ±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 [1,2]	LUXEON CoB 105: 200mA LUXEON CoB 107: 300mA LUXEON CoB 109: 400mA
LED Junction Temperature [1] (DC & Pulse)	125°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 3B
Operating Case Temperature [1]	-40°C to 105°C
Storage Temperature	-40°C to 105°C
Reserve Voltage ($V_{reverse}$)	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 ≥100Hz and amplitude ≤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 ≤5ms per cycle and the duty cycle is ≤50%.

Characteristics Curves

Spectral Distribution Characteristics

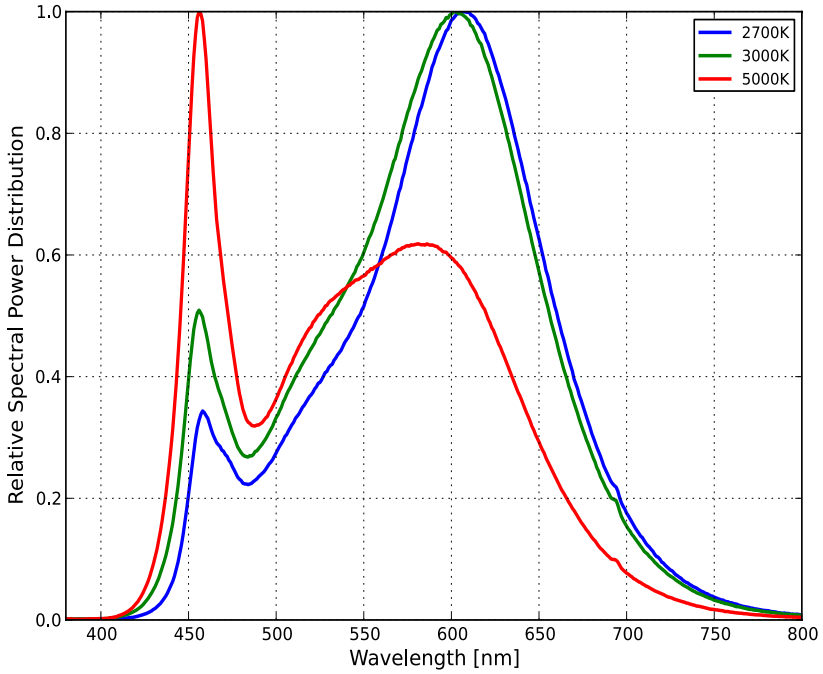

Figure 1a: Typical normalized power vs. wavelength for LXHx-FWxx at test current, T_j=85°C.

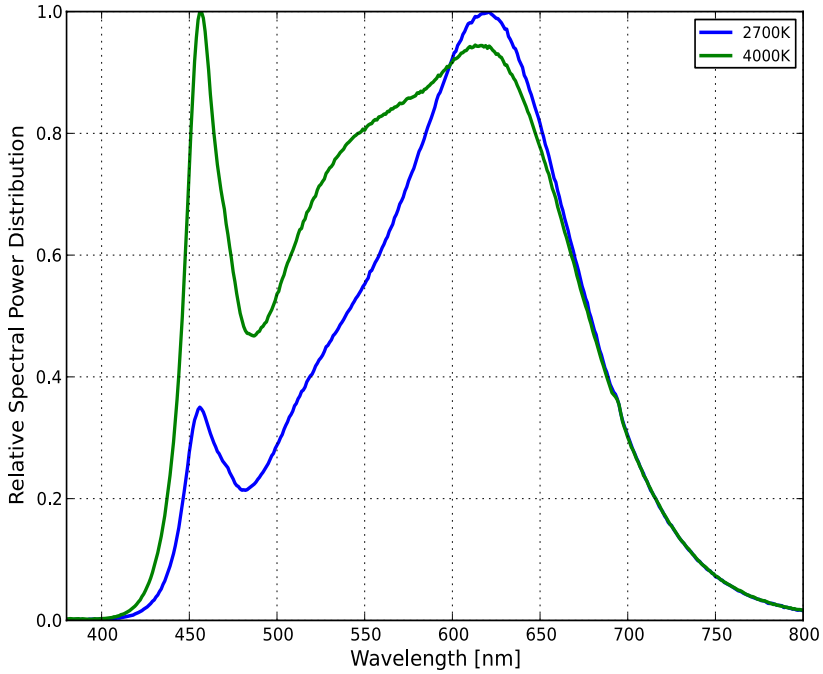

Figure 1b: Typical normalized power vs. wavelength for L2C3-xx9010xE06000 at test current, T_j=85°C.

Light Output Characteristics

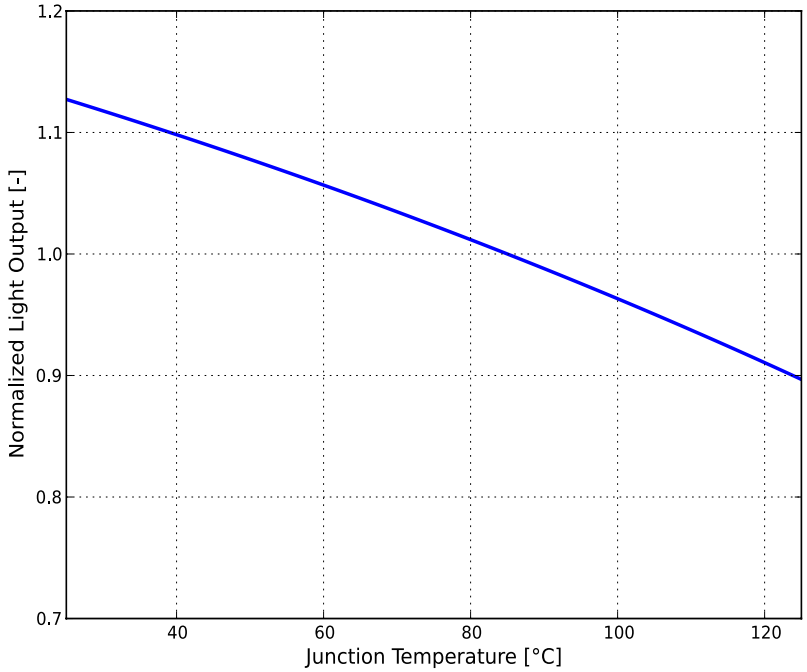

Figure 2a: Typical normalized light output vs. junction temperature for L2C3-xxxx10xE06000 at test current.

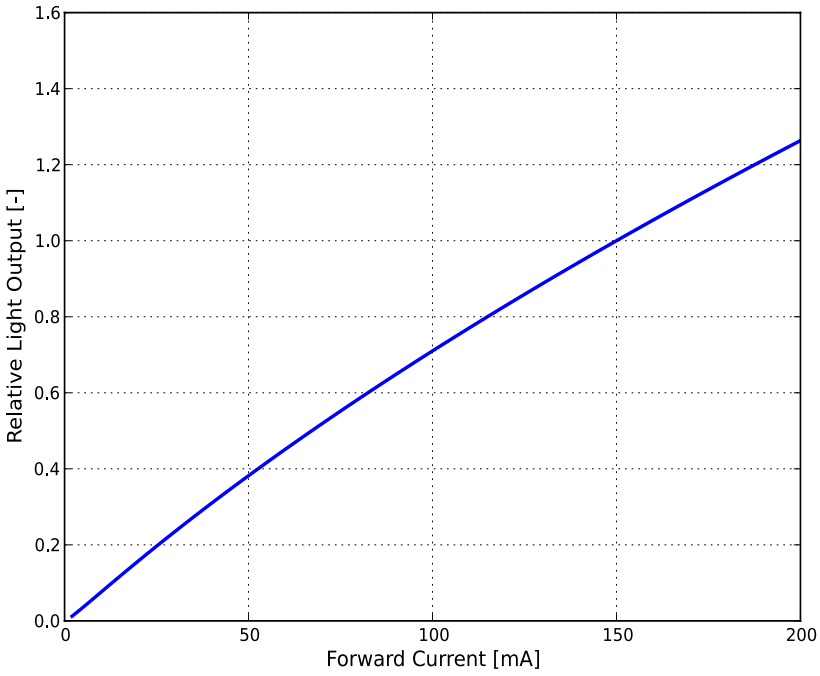

Figure 2b: Typical normalized light output vs. forward current for L2C3-xxxx105E06000 at T_j=85°C.

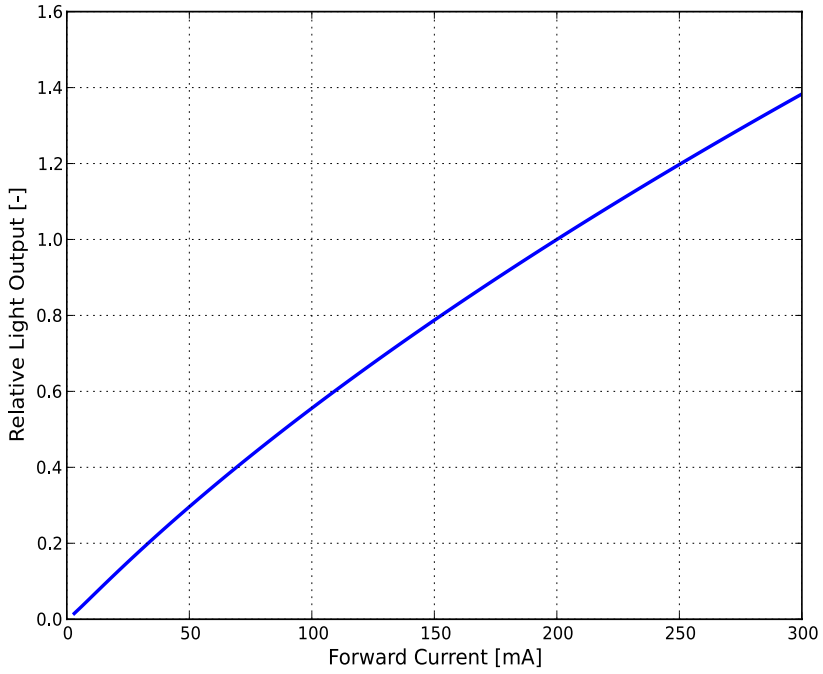

Figure 2c: Typical normalized light output vs. forward current for L2C3-xxxx107E06000 at T_j=85°C.

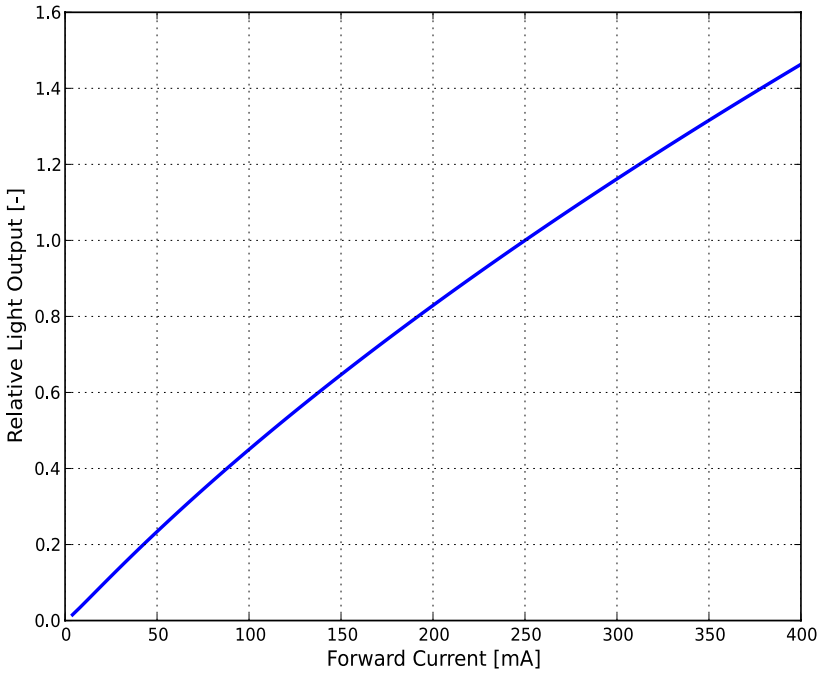

Figure 2d: Typical normalized light output vs. forward current for L2C3-xxxx109E06000 at T_j=85°C.

Forward Current Characteristics

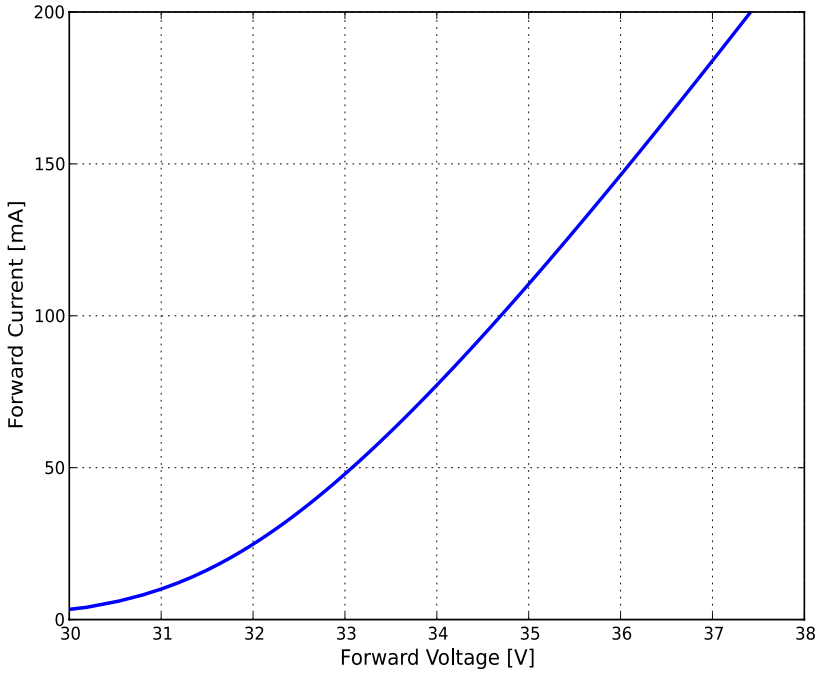

Figure 3a: Typical forward current vs. forward voltage for L2C3-xxxx105E06000 at T_j=85°C.

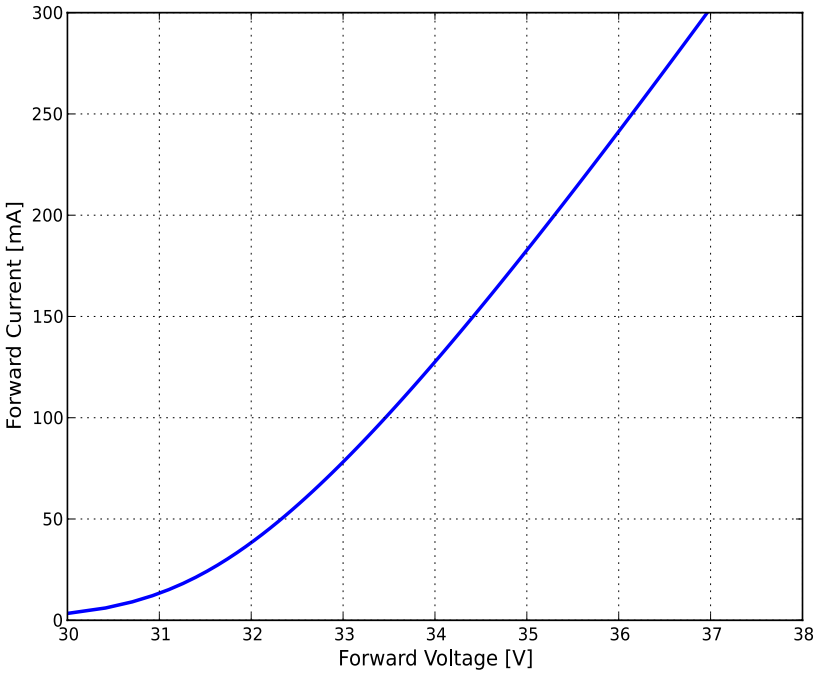

Figure 3b: Typical forward current vs. forward voltage for L2C3-xxxx107E06000 at T_j=85°C.

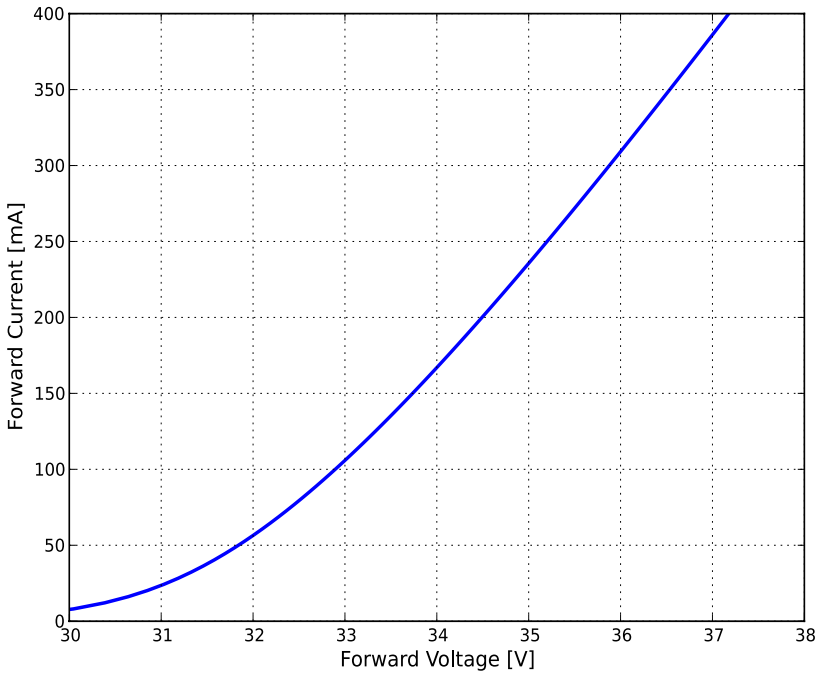

Figure 3c: Typical forward current vs. forward voltage for L2C3-xxxx109E06000 at T_j=85°C.

Radiation Patterns

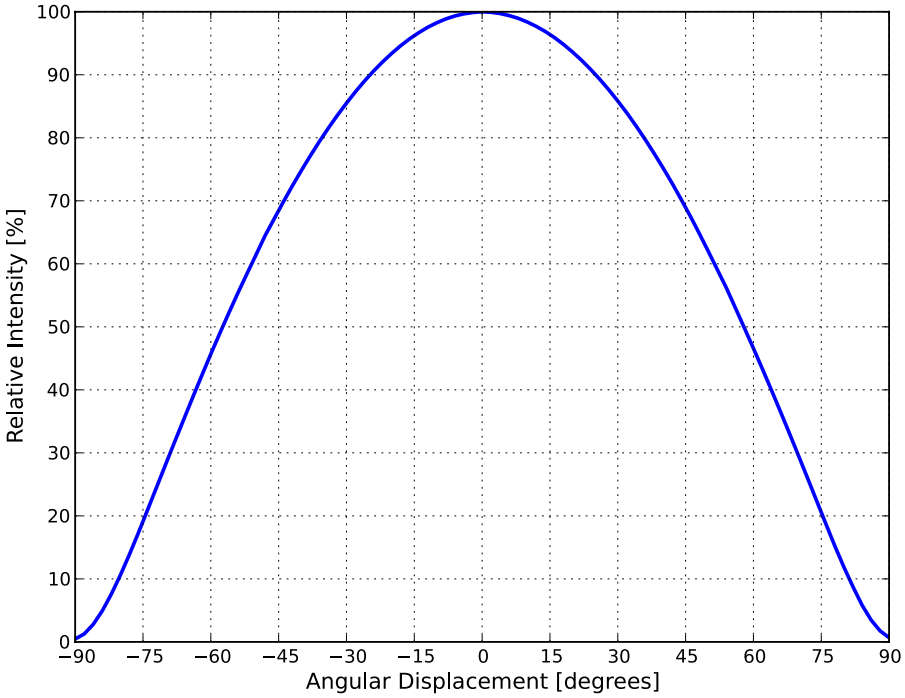

Figure 4a: Typical radiation pattern for L2C3-xxxx10xE06000 at test current, T_j=85°C.

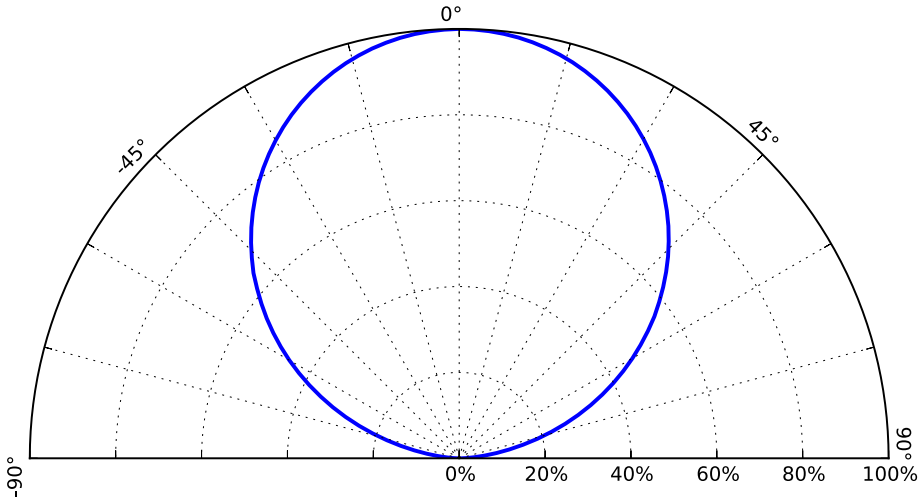

Figure 4b: Typical polar radiation pattern for L2C3-xxxx10xE06000 at test current, T_j=85°C.

Color Bin Definition

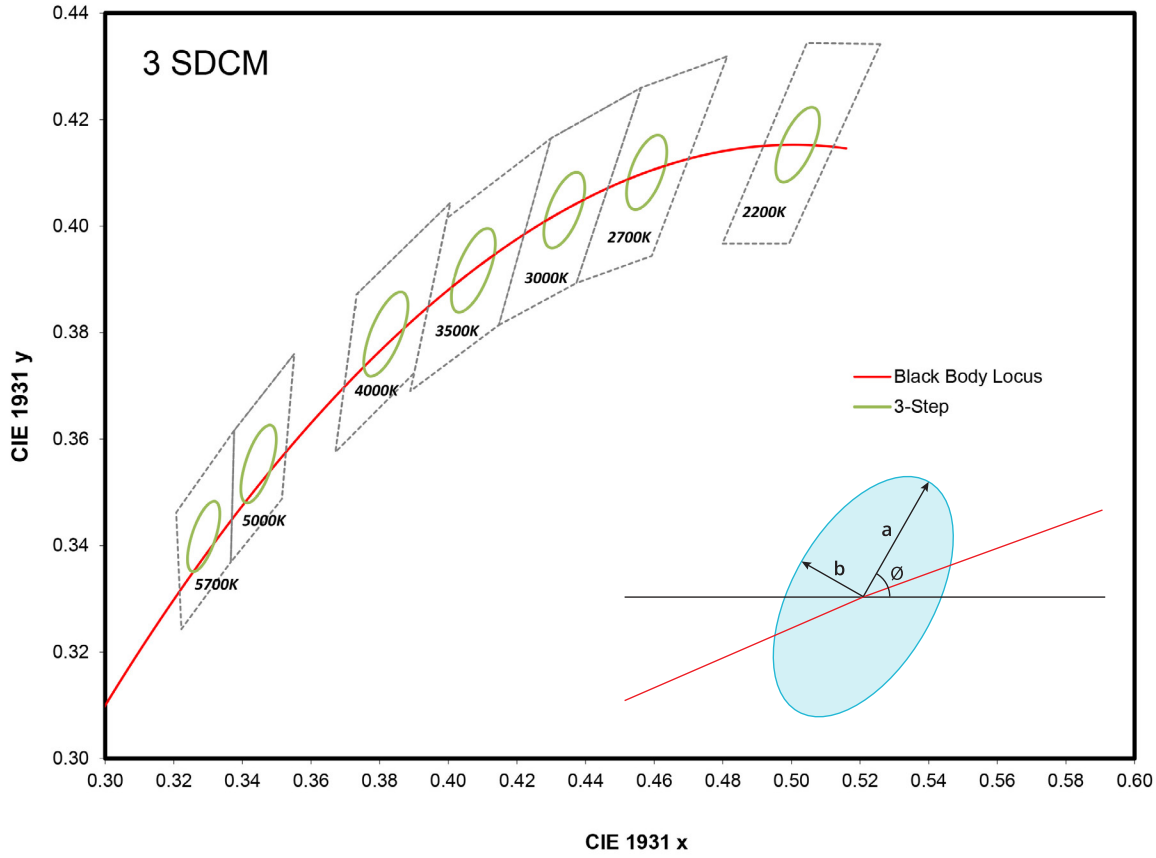

Figure 5: 3-step MacAdam ellipse illustration for Table 5.

Table 5. 3-step MacAdam ellipse color bin definitions for LUXEON CoB Compact at test current, T_j=85ºC.

NOMINAL CCT	COLOR SPACE	CENTER POINT (cx, cy)	MAJOR AXIS, a	MINOR AXIS, b	ELLIPSE ROTATION ANGLE, θ
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 ±0.005 on x and y coordinates in the CIE 1931 color space.

Mechanical Dimensions

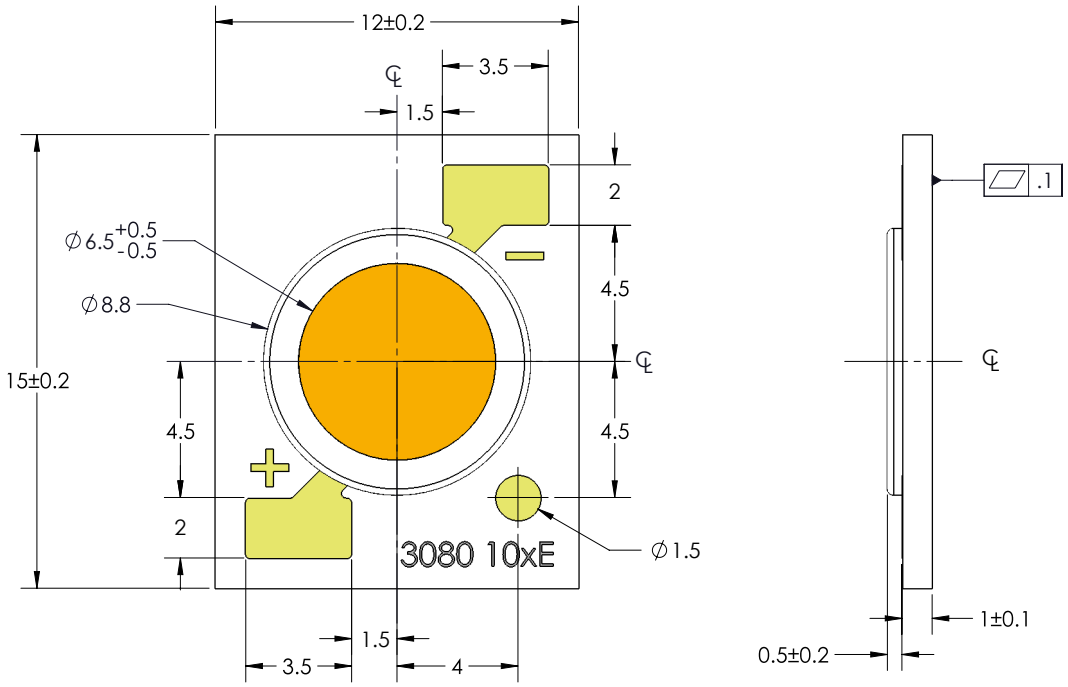

Figure 6: Mechanical dimensions for LUXEON CoB Compact.

Notes for Figure 6:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Packaging Information

Table 6. Package information for LUXEON CoB Compact.

PACKAGING	L2C3-XXXX10XE06000
Total Units per Tube	20
Total Tubes per Box	5
Total Units per Box	100

Tube Dimensions

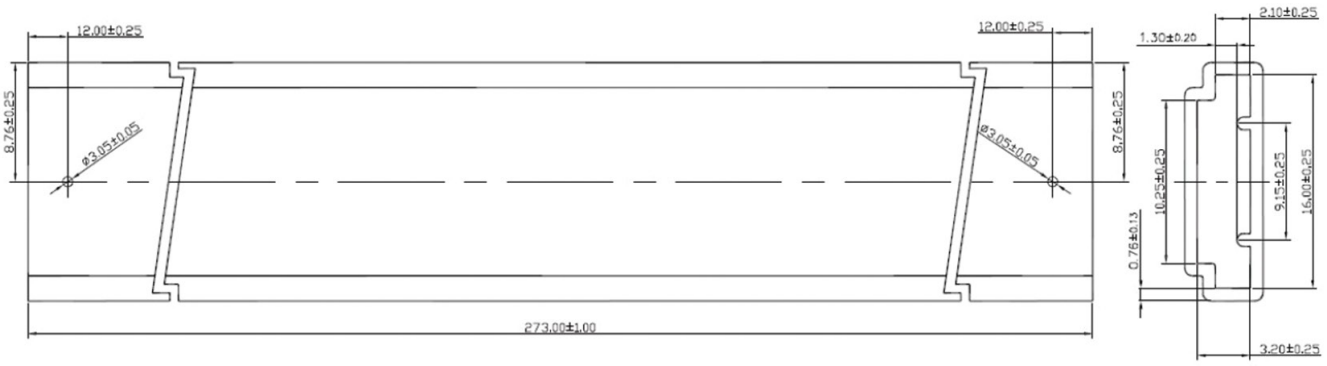

Figure 7: Tape dimensions for LUXEON CoB Compact.

Notes for Figure 7:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

About Lumileds

Lumileds is the light engine leader, delivering innovation, quality and reliability.

For 100 years, Lumileds commitment to innovation has helped customers pioneer breakthrough products in the automotive, consumer and illumination markets.

Lumileds is shaping the future of light with our LEDs and automotive lamps, and helping our customers illuminate how people see the world around them.

To learn more about our portfolio of light engines, visit lumileds.com.

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