LUMILEDS

GENERAL ILLUMINATION

LUXEON Z

High-flux density in a micro footprint package for precise optimal control

LUXEON Z is a high-power 1.3mm x 1.7mm LED that enables never before seen color consistency, luminance, flux density and design flexibility for lighting solutions. LUXEON Z ES is undomed, a feature that provides un-matched optical flexibility for precise beam angle control. Tested and binned at application conditions, 85°C and available in 1-, 3- and 5-step MacAdam ellipse color binning. The LUXEON Z ES emitters are an ideal choice for indoor and outdoor light sources requiring superior beam angles, higher efficacy and lower costs.

FEATURES AND BENEFITS

- 1.3mm x 1.7mm micro footprint enables high degree of design flexibility
- Undomed design allows precise optical control
- 1A max drive current allows for more flux per LED
- 1-, 3- and 5-step MacAdam ellipse color binning for superior Quality of Light

PRIMARY APPLICATIONS

- Architectural
- Downlights
- Indoor Area Lighting
- Lamps
- Outdoor
- Specialty Lighting
- Spotlights

DS120 LUXEON Z Product Datasheet ©2015 Lumileds Holding B.V. All rights reserved.

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General Information

Product Nomenclature

LUXEON Z emitters are specified and binned under “hot” conditions comparable to those found in “real-world” lighting products. The test conditions for LUXEON Z is 500mA DC with junction temperature at 85°C.

The part number designation is explained as follows:

L X Z n - a b c d - y

Where:

- n — 1 for LUXEON Z
- a, b — designates nominal ANSI CCT (27 for 2700K, 30 for 3000K, RB for Royal Blue)
- c, d — designates minimum CRI performance (7 for 70 CRI, 8 for 80 CRI, 9 for 90 CRI)
- y — 1 designates 1 SDCM*, 3 designates 3 SDCM and 5 designates 5 SDCM (only for 80 and 90 CRI versions. 70 CRI parts or lower will not have a SDCM designation and all parts are binned within a 5 step SDCM).

Therefore, 5 SDCM 3000K/80 CRI LUXEON Z will have the following part number:

L X Z 1 – 3 0 8 0 - 5

Average Lumen Maintenance Characteristics

LUXEON Z products are tested in compliance with LM-80. Please visit www.lumileds.com or contact your local Lumileds Technical Solutions Manager for TM-21 extrapolations or other support.

Environmental Compliance

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

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* 1 SDCM is available on special request. Please contact your Sales representative.

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Product Selection

Product Selection for LUXEON Z Emitters
Junction Temperature = 85°C

Table 1. LUXEON Z

Part Number	Nominal CCT	Min CRI	500mA				700mA			1A		
			Min. Flux (lm)	Typical Flux (lm)	Typical Vf (V)	Typical Efficacy (lm/W)	Typical Flux (lm)	Typical Vf (V)	Typical Efficacy (lm/W)	Typical Flux (lm)	Typical Vf (V)	Typical Efficacy (lm/W)
LXZ1-2780-y	2700K	80	100	115	2.80	82	147	2.85	74	191	2.89	66
LXZ1-3080-y	3000K	80	110	124	2.80	89	159	2.85	80	206	2.89	71
LXZ1-3580-y	3500K	80	110	124	2.80	89	159	2.85	80	206	2.89	71
LXZ1-4080-y	4000K	80	120	130	2.80	93	166	2.85	83	216	2.89	75
LXZ1-4070	4000K	70	120	134	2.80	96	172	2.85	86	223	2.89	77
LXZ1-5070	5000K	70	130	148	2.80	106	189	2.85	95	246	2.89	85
LXZ1-5770	5700K	70	140	152	2.80	109	195	2.85	98	253	2.89	88
LXZ1-6565	6500K	65	140	154	2.80	110	197	2.85	99	256	2.89	89

Notes for Table 1:

1. All LUXEON Z emitters above are tested and binned at 500mA/85°C.
2. Lumileds maintains a tolerance of ±6.5% on luminous flux and ±2 on CRI measurements.
3. In the part number the -y is the designation for the color requirement. On 80 CRI versions -3 designates 3 SDCM and -5 designates 5 SDCM. 70CRI parts or lower will not have a SDCM designation and all parts are binned within a 5 step SDCM.

Optical Characteristics

LUXEON Z at Test Current 500mA, Junction Temperature 85°C

Table 2.

Nominal ANSI CCT	Color Temperature CCT Typical	Typical Total Included Angle[1] (degrees) $\theta_{0.90V}$	Typical Viewing Angle[2] (degrees) 2θ 1/2
2200K	2230K	160	120
2700K	2725K	160	120
3000K	3045K	160	120
3500K	3465K	160	120
4000K	3985K	160	120
5000K	5028K	160	120
5700K	5665K	160	120
6500K	6250K	160	120

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.

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Electrical Characteristics

LUXEON Z at Test Current 500mA, Junction Temperature 85°C

Table 3.

Nominal ANSI CCT	Forward Voltage Vf, [1] (V)		Typical Temperature Coefficient of Forward Voltage[2] (mV/°C) $\Delta V_F / \Delta T_J$	LUXEON Z Typical Thermal Resistance Junction to Electrical Pads (°C/W) $R\theta_{J-C}$
	Min.	Max.		
2200K	2.5	3.25	-1.6	N/A
2700K	2.5	3.25	-1.6	6
3000K	2.5	3.25	-1.6	6
3500K	2.5	3.25	-1.6	6
4000K	2.5	3.25	-1.6	6
5000K	2.5	3.25	-1.6	6
5700K	2.5	3.25	-1.6	6
6500K	2.5	3.25	-1.6	6

Notes for Table 3:

1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.
2. Measured between T_J = 25°C and T_J = 110°C at I_f = 500mA for LUXEON Z.

Absolute Maximum Ratings

Table 4.

Parameter	LUXEON Z
DC Forward Current (mA) [1, 2]	1000
Peak Pulsed Forward Current (mA) [1, 3]	1200
ESD Sensitivity	< 8000V Human Body Model (HBM) Class 3A JEDEC JS-001-2012
LED Junction Temperature [1]	135°C
Operating Case Temperature at 700mA	-40°C - 135°C
Storage Temperature	-40°C - 135°C
Soldering Temperature	JEDEC 020c 260°C
Allowable Reflow Cycles	3
Reverse Voltage (Vr) [5, 6]	LUXEON Z LEDs are 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. For additional information on thermal measurement guidelines please refer to Application Briefs AB105 and AB120.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple", with frequencies ≥ 100 Hz and amplitude ≤ 150mA and 200mA respectively are acceptable, assuming the average current throughout each cycle does not exceed 1200mA and 1000mA respectively.
3. Pulsed operation with a peak drive current of 1350mA and 1200mA respectively are is acceptable if the pulse on-time is ≤ 5 ms per cycle and the duty cycle is ≤ 50%.
4. Transient reverse voltages and surge currents due to electrical switching or supply interruptions are acceptable if these events do not last for more than 10ms, the amplitude of the reverse voltage does not exceed 5V and the reverse current is less than 200µA.
5. Maximum 5V reverse for up to 10s is an acceptable beginning of life, one time test condition.

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JEDEC Moisture Sensitivity

Table 5.

Level	Floor Life		Soak Requirements Standard	
	Time	Conditions	Time	Conditions
1	unlimited	≤ 30°C / 85% RH	168h + 5 / - 0	85°C / 85% RH

Mechanical Dimensions of LUXEON Z

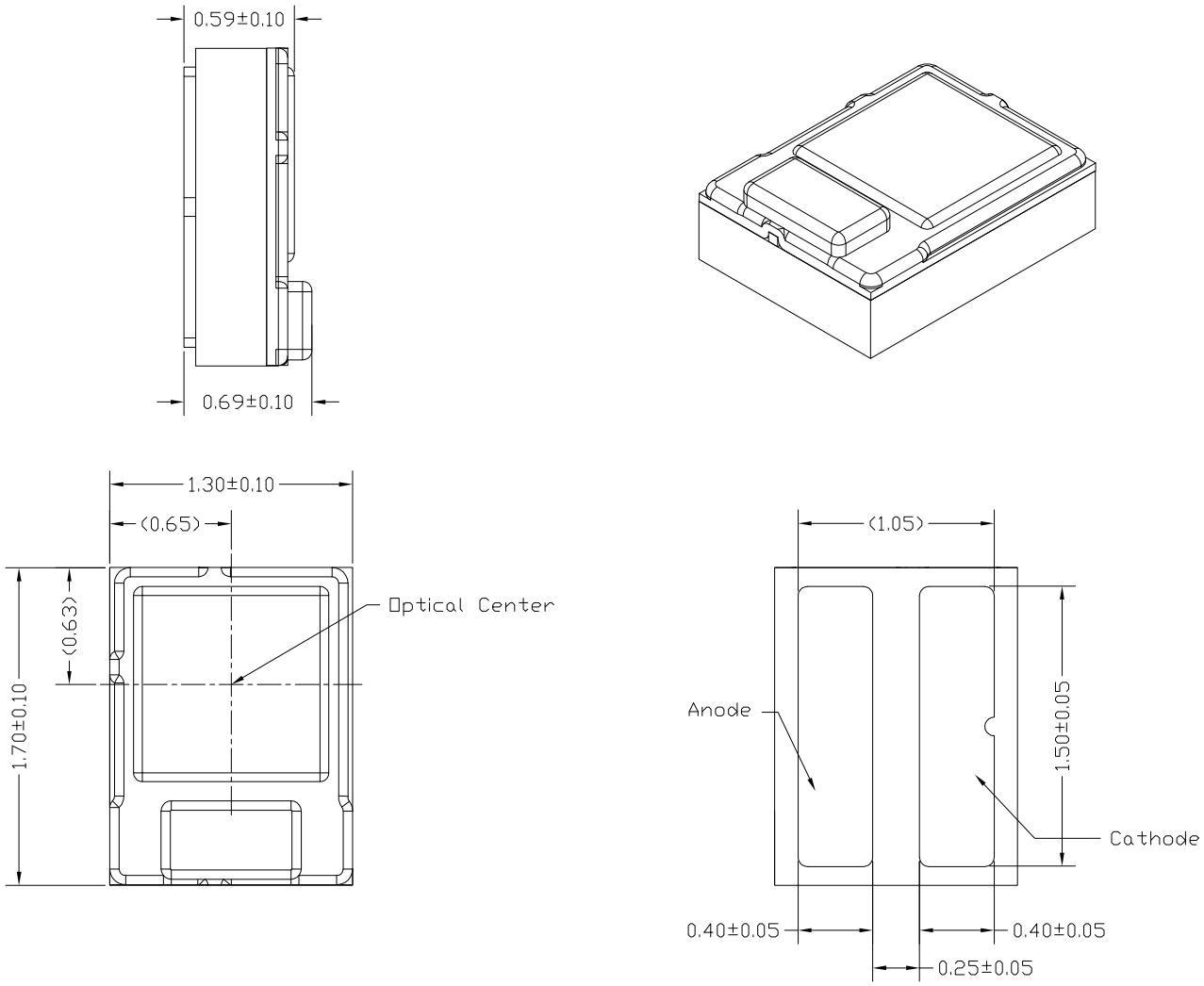

Figure 1. Package outline drawing for LUXEON Z.

Notes for Figure 1:

1. Do not handle the device by the top of package. Excessive force on the top of the package may damage the surface or the interior of the device.
2. Drawings not to scale.
3. All dimensions are in millimeters.
4. Both the anode and cathode contact pads are also the thermal pads.

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Solder Pad Design

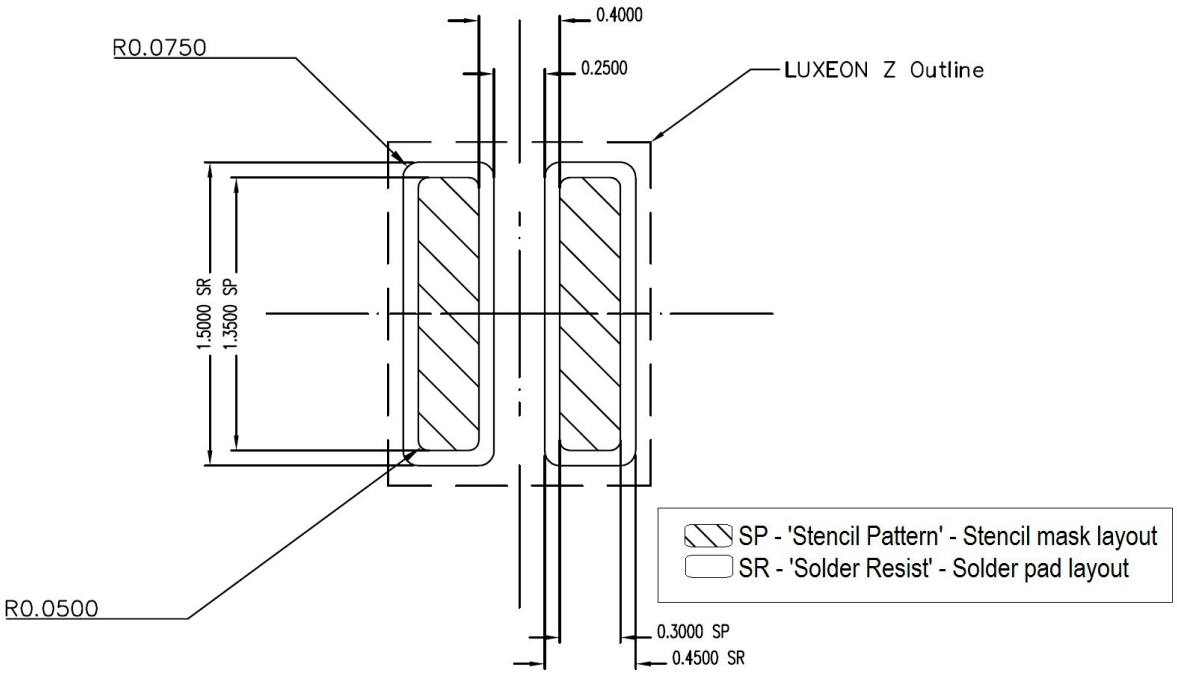

Figure 2. Solder pad layout for LUXEON Z.

Notes for Figure 2:

1. The drawing above shows the recommended solder pad layout on Printed Circuit Board (PCB).
2. Application Brief AB105 provides the details of the PCB board layout design. In addition, the .dwg files are available at www.lumileds.com.

Relative Spectral Distribution

Relative Spectral Distribution vs. Wavelength Characteristics

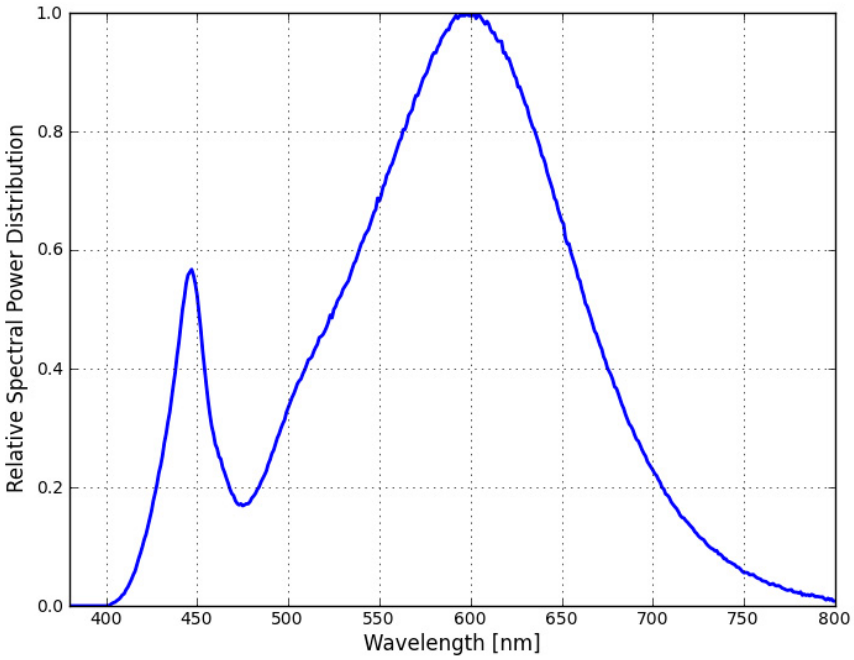

Figure 3.

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Light Output Characteristics

Relative Light Output vs. Junction Temperature for LUXEON Z White, Test Current at 500mA

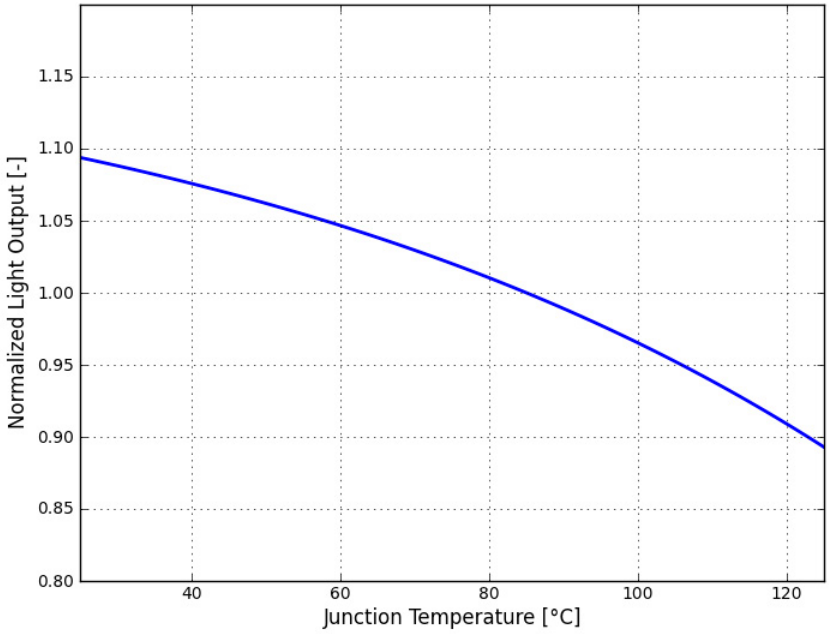

Figure 4.

Relative Light Output vs. Forward Current for LUXEON Z White, Junction Temperature = 85°C

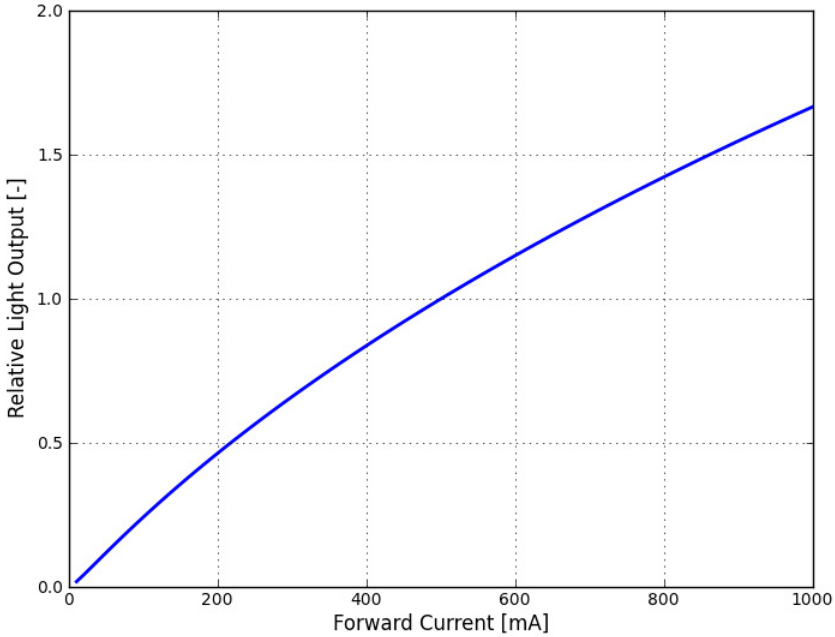

Figure 5.

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Forward Current Characteristics for LUXEON Z White, Junction Temperature = 85°C

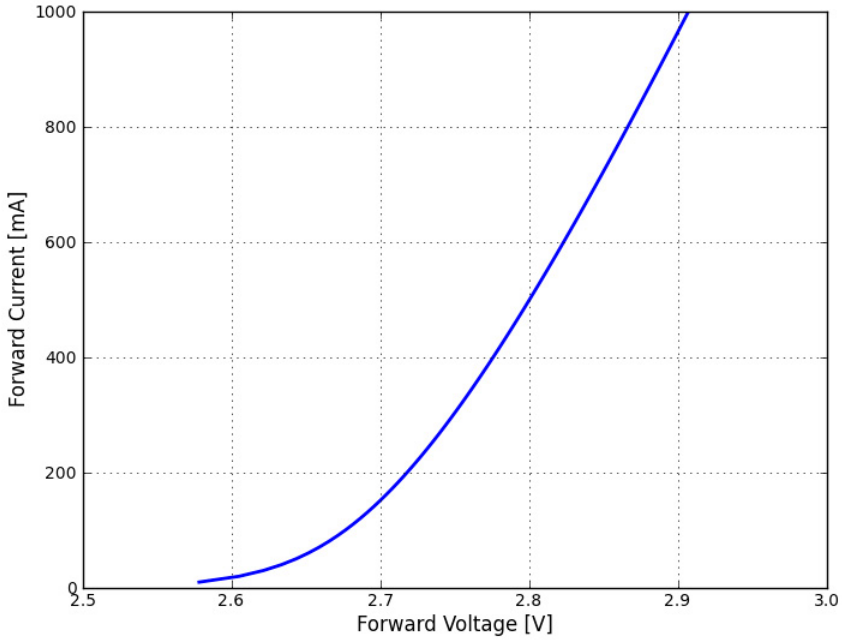

Figure 6.

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Typical Spatial Radiation Pattern

LUXEON Z

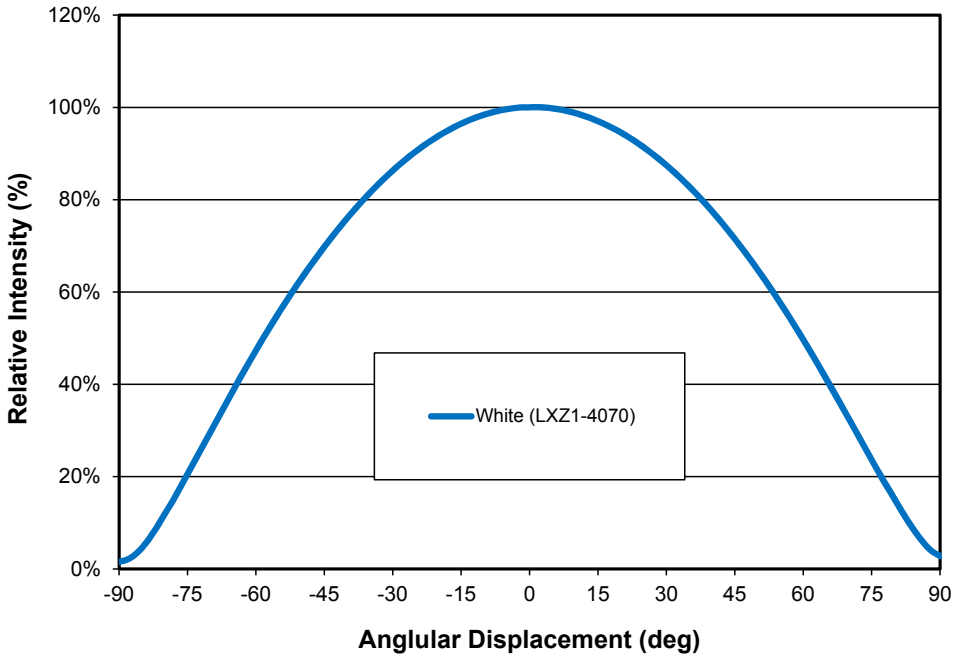

Figure 7.

LUXEON Z Typical Polar Radiation Pattern

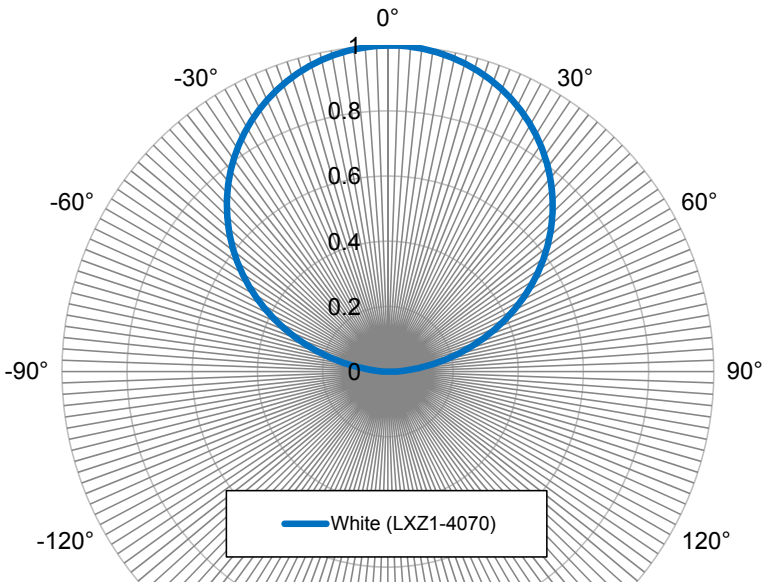

Figure 8.

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Emitter Pocket Tape Packaging for LUXEON Z

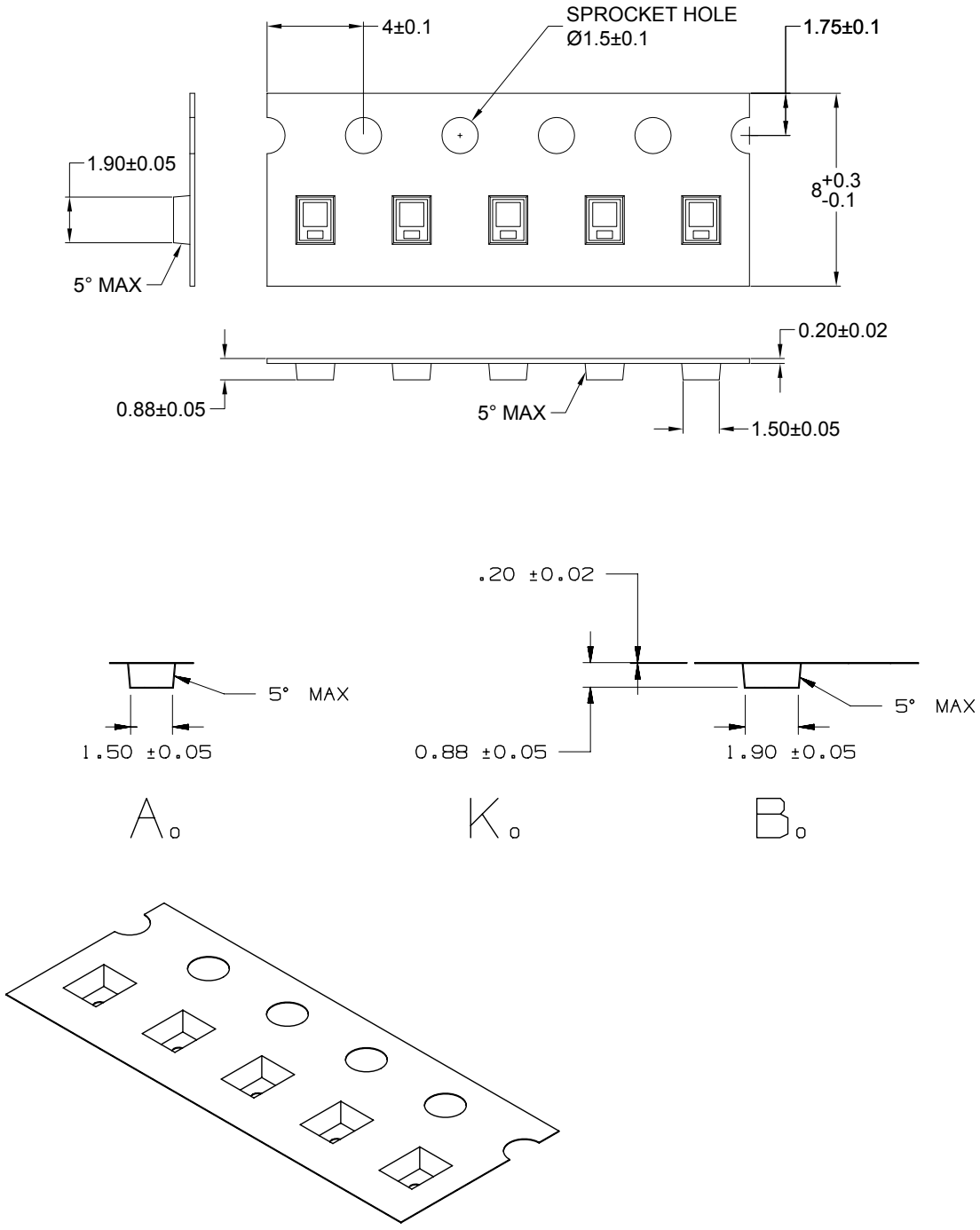

Figure 9. Emitter pocket tape packaging for LUXEON Z.

Notes for Figure 9:

1. All dimensions are in millimeters

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Emitter Reel Packaging for LUXEON Z

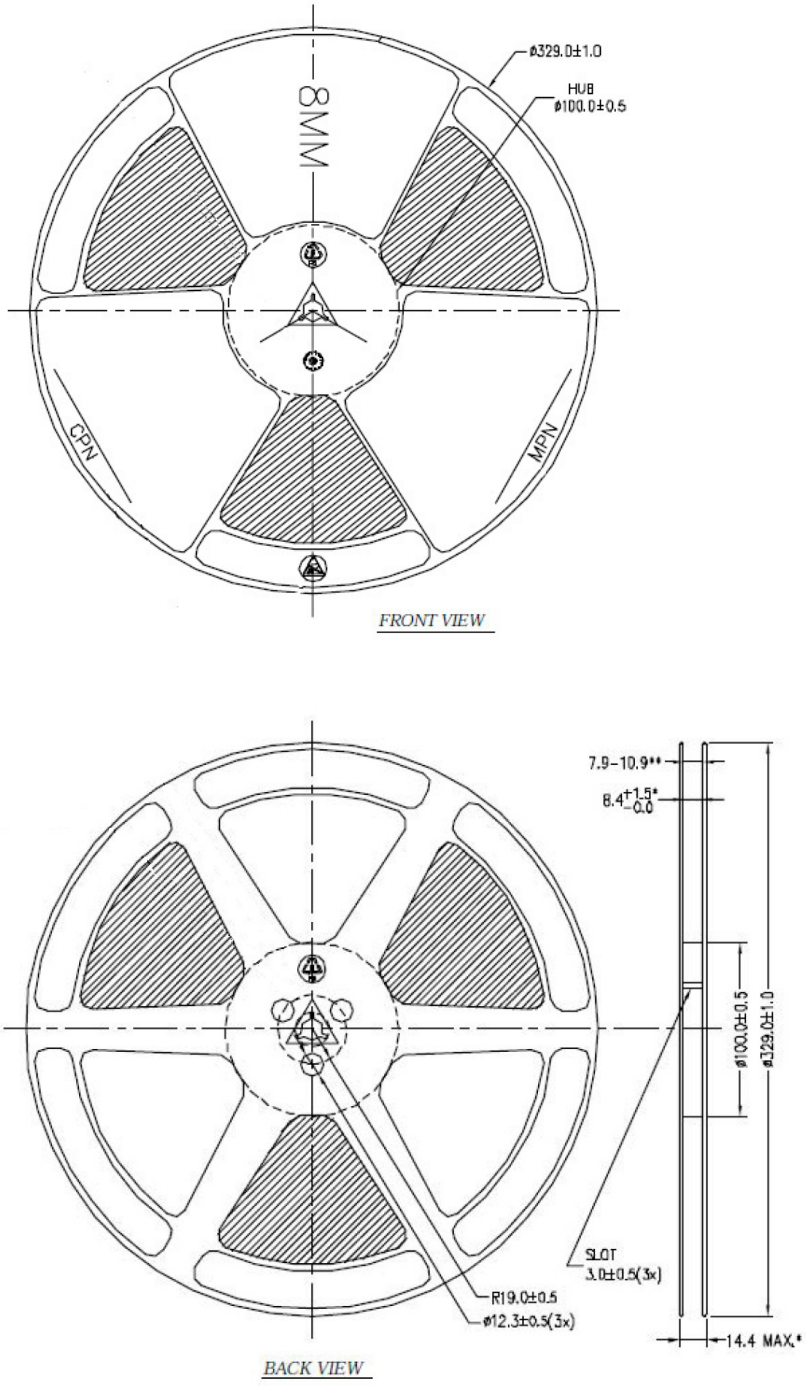

Figure 10. Emitter reel packaging for LUXEON Z.

Product Binning and Labeling

Purpose of Product Binning

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical data sheets. For this reason, Lumileds bins the LED components for luminous flux and forward voltage (V_f). Color is offered in a single 1 step, 3-step or 5-step MacAdam ellipse color space centered on the ANSI CCT color bins. For additional information please review the MacAdam ellipse technical definition section.

Decoding Product Bin Labeling

LUXEON Z emitters are labeled using a four digit alphanumeric code (CAT code) depicting the bin values for emitters packaged on a single reel. All emitters packaged within a reel are of the same 3-variable bin combination. Reels of LUXEON Z emitters are labeled with a four digit alphanumeric CAT code following the format below.

ABCD

A = Flux/Radiometric power bin (L, M, etc.)

B and C = Color Bin (5A, 5B, 5C, 5D, 50, 30, 3U, 3L, 10)

D = V_f bin (P, R, S)

Table 6. LUXEON Z Cat Code Logic

A	B	C	D
Flux bin per DS	1 for 1 step	0 for 1 step	V_f bin
	3 for 3 step	0 for 70CRI U or L (above (U) or below (L) black body line) for 80CRI	
	5 for 5 step	A/B/C/D (5 step quadrant for 80 and 90CRI), 0 for 70CRI or less	

70CRI:

1. Only 5 step available eg: LXZ2-4070 etc will, by default, mean 5 step.
2. 3 step and 1 step are sub sets of 5 step hence the cat code will state 30 or 10 if the part is actually 3 or 1 step .

80/90CRI:

1. 1 step available in 2280/90, 2780/90, 3080/90, 3580 only. Please contact your Philips Lumileds Sales representative for support.
2. 3U and 3L will be the color bin cat codes. For product below black body below work with your distribution representative on supportability per volume requirements.

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Luminous Flux and Forward Voltage Bins

Table 7 lists the standard photometric luminous flux bins for LUXEON Z emitters (tested and binned at 500mA, and T_j = 85°C). Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all colors.

Table 7. Flux Bins

Bin Code	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
D	130	140
E	140	150
F	150	160
G	160	170
H	170	180
J	180	190
K	190	200
L	200	210
M	210	220
N	220	230
P	230	240
Q	240	250
R	250	260
S	260	270

Table 8 lists minimum and maximum V_f bin values per emitter. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Table 8. V_f Bins

Bin Code	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
P	2.50	2.75
R	2.75	3.00
S	3.00	3.25

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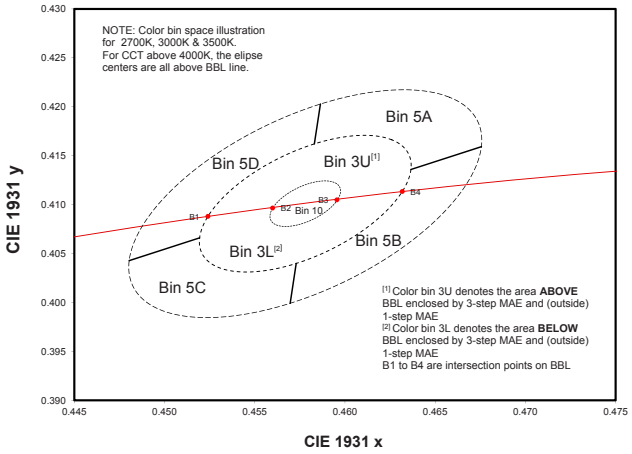
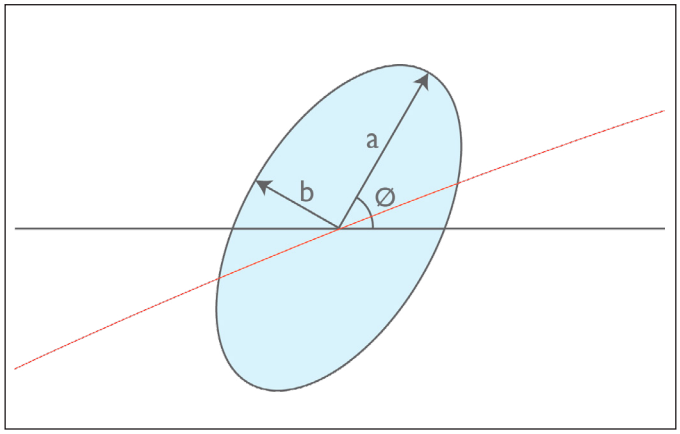
LUXEON Z: 1-step, 3-step (above and below blackbody) and 5-step MacAdam Ellipse Color Definition



Color Space Definition for Above and Below Blackbody



Parameter Definition of MacAdam Ellipse

Table 9. LUXEON Z 1-step MacAdam Ellipse Parameters

Nominal ANSI CCT	Color Space	Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle (degrees)
2200K	Single 1-step MacAdam ellipse	(0.5020, 0.4156)	0.00287	0.00132	49.27
2700K	Single 1-step MacAdam ellipse	(0.4578, 0.4101)	0.00270	0.00140	53.70
3000K	Single 1-step MacAdam ellipse	(0.4338, 0.4030)	0.00278	0.00136	53.22
3500K	Single 1-step MacAdam ellipse	(0.4073, 0.3917)	0.00309	0.00138	54.00

Only available in 80 and 90CRI.

Table 10. LUXEON Z 3-step MacAdam Ellipse Parameters

Nominal ANSI CCT	Color Space	Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle (degrees)
2200K	Single 3-step MacAdam ellipse	(0.5020, 0.4156)	0.00863	0.00398	49.27
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

Only available in 80 and 90CRI.

Table 11. LUXEON Z 5-step MacAdam Ellipse Parameters

Nominal ANSI CCT	Color Space	Center Point (cx, cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle (degrees)
2200K	Single 5-step MacAdam ellipse	(0.5020, 0.4156)	0.01438	0.00663	49.27
2700K	Single 5-step MacAdam ellipse	(0.4578, 0.4101)	0.01350	0.00700	53.7
3000K	Single 5-step MacAdam ellipse	(0.4338, 0.4030)	0.01390	0.00680	53.2
3500K	Single 5-step MacAdam ellipse	(0.4073, 0.3917)	0.01545	0.00690	54.0
4000K	Single 5-step MacAdam ellipse	(0.3818, 0.3797)	0.01565	0.00670	53.7
5000K	Single 5-step MacAdam ellipse	(0.3447, 0.3553)	0.01370	0.00590	59.6
5700K	Single 5-step MacAdam ellipse	(0.3287, 0.3417)	0.01243	0.00533	59.09
6500K	Single 5-step MacAdam ellipse	(0.3123, 0.3282)	0.01115	0.00475	58.57

Available in 70, 80 and 90CRI.

Note for Tables 9, 10 & 11:

- Lumileds maintains a tester tolerance of ±0.005 on x, y color coordinates.

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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 www.lumileds.com.

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
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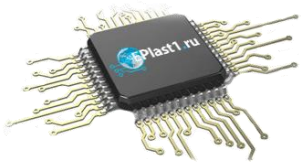
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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