LUMILEDS

ILLUMINATION

LUXEON HL1Z

High current density Chip Scale Package (CSP) LED

LUXEON HL1Z LEDs offer high flux density performance in a compact footprint, enabling elegant and superior luminaire designs. A wide range of CCTs in 80 and 90CRI options make them ideal for high performance indoor lighting applications, designed into tunable and white color mixing solutions. Best-in-class Color over Angle, and top emission only light output, provides designers with leading Quality of Light performance for dramatic lighting designs and small fixtures. The compact package size and high punch allows design flexibility, beam steering, and white tuning versus traditional LED light sources.

FEATURES AND BENEFITS

- Small package size (1.4 x 1.4 x 0.36 mm) allows closely packed arrays for narrow beam spots
- Enables color mixing in CCT tunable applications B5
- High current densities for high lumen output and lm/$ at high lm/W
- CSP 1mm^2 with 2 pads for direct attach enables ease of assembly
- Surface emission only for directional lighting without side light leakage
- High package densities

PRIMARY APPLICATIONS

- Panel / Soft Lights
- Wall Grazer
- Track Lights
- Linear
- Wall Wash
- Downlights

c UL us No. E352519 RoHS COMPLIANT

DS386 LUXEON HL1Z Product Datasheet ©2026 Lumileds Holding B.V. All rights reserved.

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 3
- Electrical and Thermal Characteristics 3

Absolute Maximum Ratings **4**

Characteristic Curves **5**
- Spectral Power Distribution Characteristics 5
- Light Output Characteristics 6
- Forward Current Characteristics 7
- Radiation Pattern Characteristics 8

Product Bin and Labeling Definitions **9**
- Decoding Product Bin Labeling 9

Luminous Flux Bins **10**
- Color Bin Definitions 11
- Forward Voltage Bins 12

Mechanical Dimensions **12**

Reflow Soldering Guidelines **13**
- JEDEC Moisture Sensitivity 13
- Solder Pad Design 14

Packaging Information **14**
- Pocket Tape Dimensions 14
- Reel Dimensions 15

About Lumileds **16**

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General Product Information

Product Test Conditions

LUXEON HL1Z LEDs are tested and binned with a DC drive current of 350mA at a junction temperature, T_j, of 85°C.

Part Number Nomenclature

Part numbers for LUXEON HL1Z follow the convention below:

L 1 H Z – **A A B B** 1 z z z z z z z z

Where:

L 1	–	designates L1 packaging in Tape and Reel
A A	–	any alphanumeric character that designates nominal ANSI CCT (For example, 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57 = 5700K, 65=6500K)
B B	–	any alphanumeric character that designates CRI (80=80CRI, 90=90CRI)
1	–	designates 1.0mm^2 die size
zzzz zzzz	–	any alphanumeric character that designates Option Codes for customization / bin selections / etc

Therefore, the following part number is used for a LUXEON HL1Z, 3000K 80CRI LED:

L 1 H Z – **3 0 8 0** 1 0 0 0 0 0 0 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 Holding B.V. is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON HL1Z 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 Holding B.V. will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

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Performance Characteristics

Product Selection Guide

Table 1. Product performance of LUXEON HL1Z at 350mA, T_j=85°C

NOMINAL CCT	MINIMUM R9 [3]	MINIMUM CRI [1]	LUMINOUS FLUX [2] (lm)		TYPICAL LUMINOUS EFFICACY (lm/W)	PART NUMBER
			MINIMUM	TYPICAL		
1800	0	80	70	89	91	L1HZ-1880100000000
2200	0	80	90	108	110	L1HZ-2280100000000
2700	0	80	100	127	130	L1HZ-2780100000000
3000	0	80	110	134	137	L1HZ-3080100000000
3500	0	80	110	141	144	L1HZ-3580100000000
4000	0	80	120	144	147	L1HZ-4080100000000
5000	0	80	120	143	146	L1HZ-5080100000000
5700	0	80	120	145	148	L1HZ-5780100000000
6500	0	80	120	143	146	L1HZ-6580100000000
2700	50	90	80	103	105	L1HZ-2790100000000
3000	50	90	90	108	110	L1HZ-3090100000000
3500	50	90	95	116	118	L1HZ-3590100000000
4000	50	90	100	118	120	L1HZ-4090100000000
5000	50	90	100	121	123	L1HZ-5090100000000
5700	50	90	100	124	127	L1HZ-5790100000000
6500	50	90	100	123	126	L1HZ-6590100000000

Notes for Table 1:
1. Lumileds maintains a tolerance of ±2 on CRI.
2. Lumileds maintains a tester tolerance of ±6.5% on luminous flux measurements.
3. Lumileds maintains a tester tolerance of ±6.5 on R9 measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON HL1Z at 350mA, T_j=85°C

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE [1]	TYPICAL VIEWING ANGLE [2]
L1HZ-xxxx100000000	140°	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 the LED centerline where the luminous intensity is ½ of the peak value.

Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for LUXEON HL1Z at 350mA, T_j=85°C

PART NUMBER	FORWARD VOLTAGE [1] (V_f)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE [2] (mV/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	TYPICAL	MAXIMUM		
L1HZ-xxxx100000000	2.65	2.80	3.00	-2.0	3.0

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.1V on forward voltage measurements.
2. Measured between 25°C and 85°C.

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Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON HL1Z

PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current [1, 2]	500mA
Peak Pulsed Forward Current [1, 3]	850mA
LED Junction Temperature [1] (DC & Pulse)	135°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	2000V (Class 1C)
Operating Case Temperature [1]	-40°C to 125°C
LED Storage Temperature	-40°C to 125°C
Soldering Temperature	JEDEC 020D.1 260°C
Allowable Reflow Cycles	3
Autoclave Conditions	NA
Reverse Voltage [4] ($V_{reverse}$)	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," with frequencies ≥100Hz and amplitude ≤850mA 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%.
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 220uA.

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Characteristic Curves

Spectral Power Distribution Characteristics

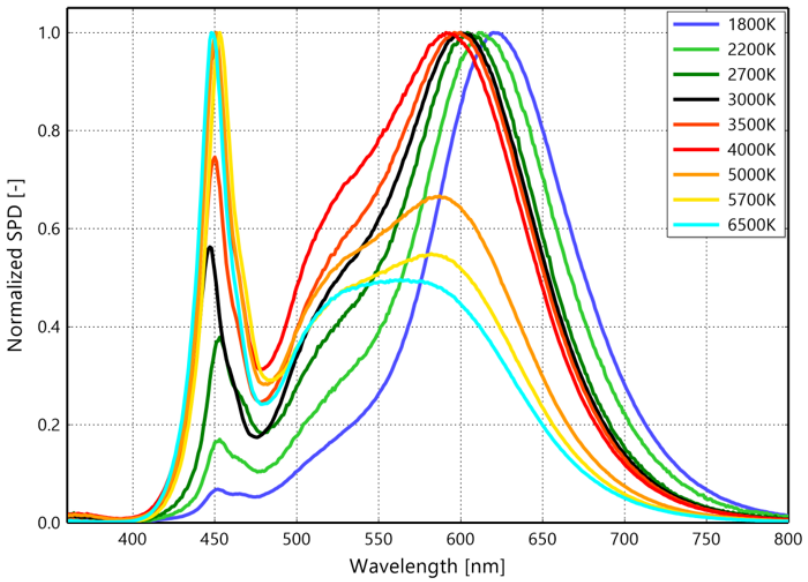

Figure 1a. Typical normalized power vs. wavelength for HL1Z 80 CRI at 350mA, T_j=85°C

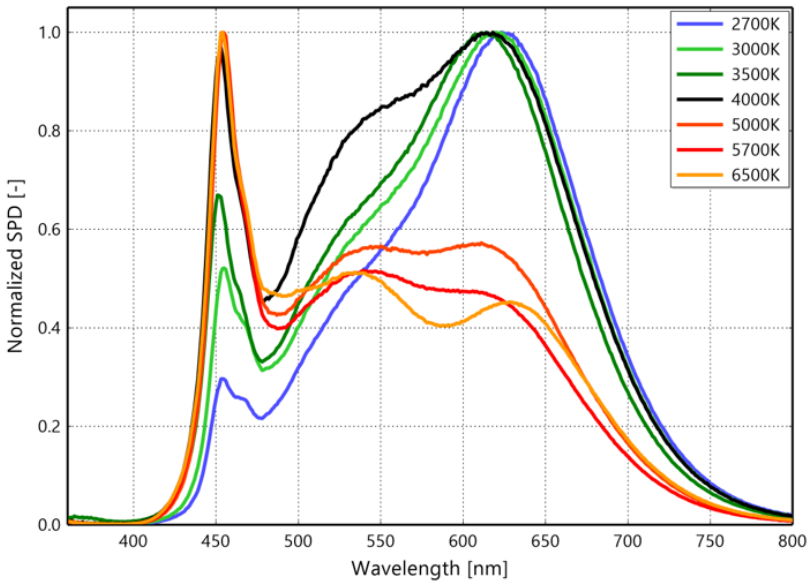

Figure 1b. Typical normalized power vs. wavelength for HL1Z 90 CRI at 350mA, T_j=85°C

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Light Output Characteristics

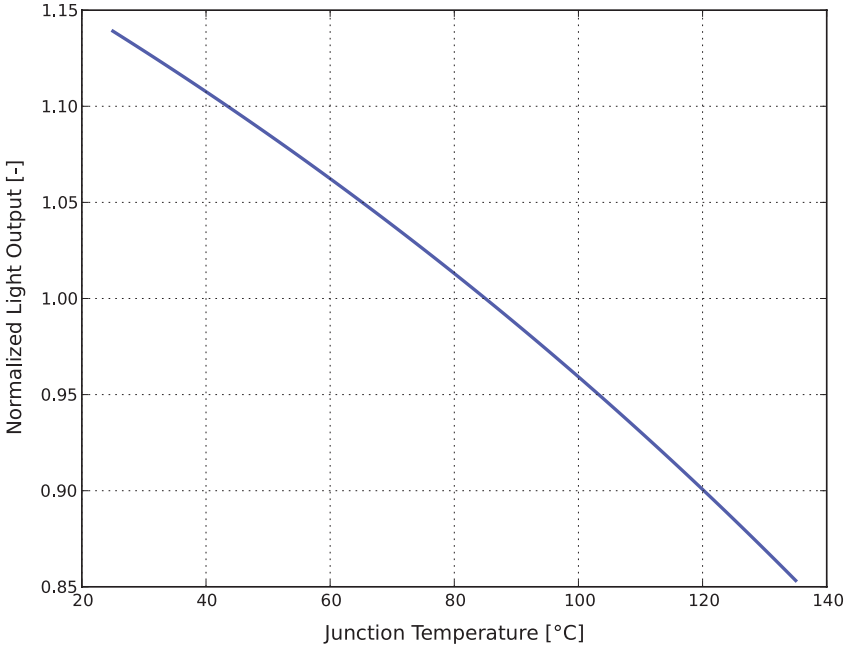

Figure 2. Typical normalized light output vs. junction temperature for LUXEON HL1Z at 350mA

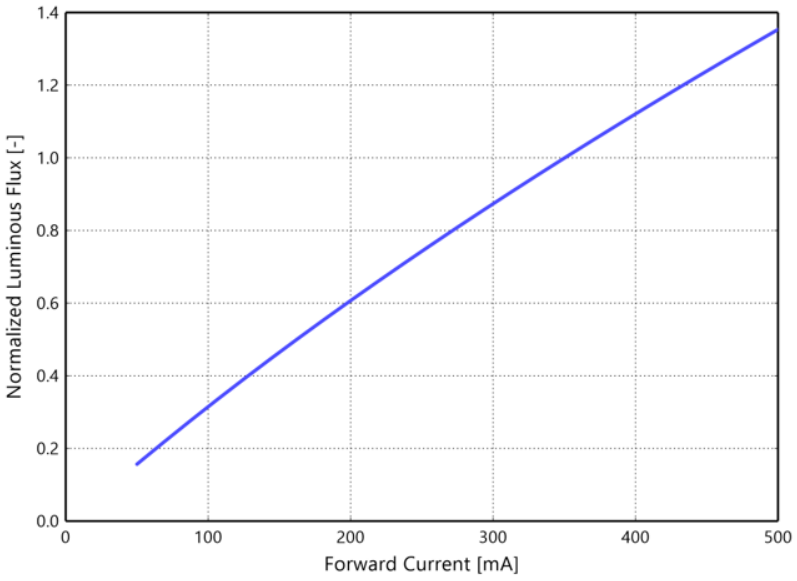

Figure 3. Typical normalized light output vs. forward current for LUXEON HL1Z at T_j=85°C

Forward Current Characteristics

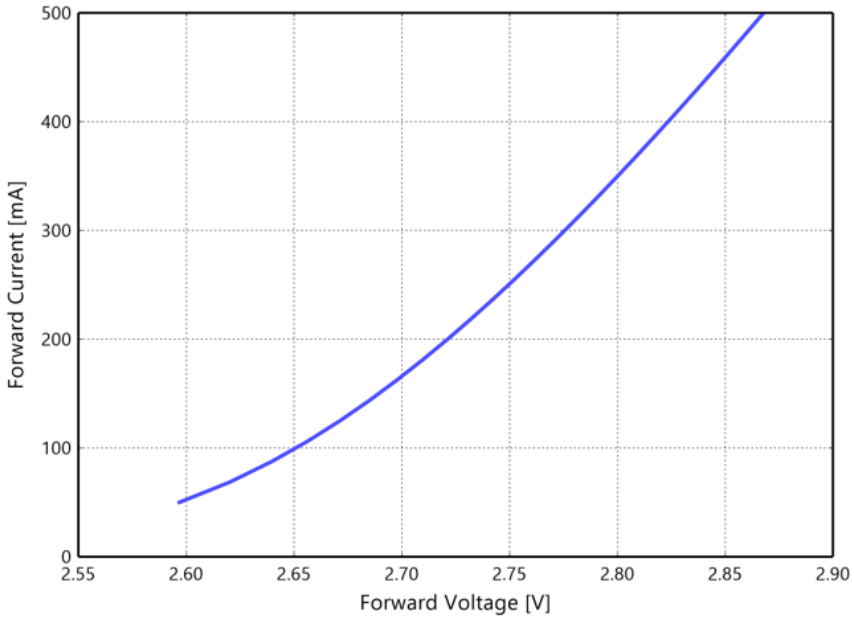

Figure 4. Typical forward current vs. forward voltage for LUXEON HL1Z at T_j=85°C

Radiation Pattern Characteristics

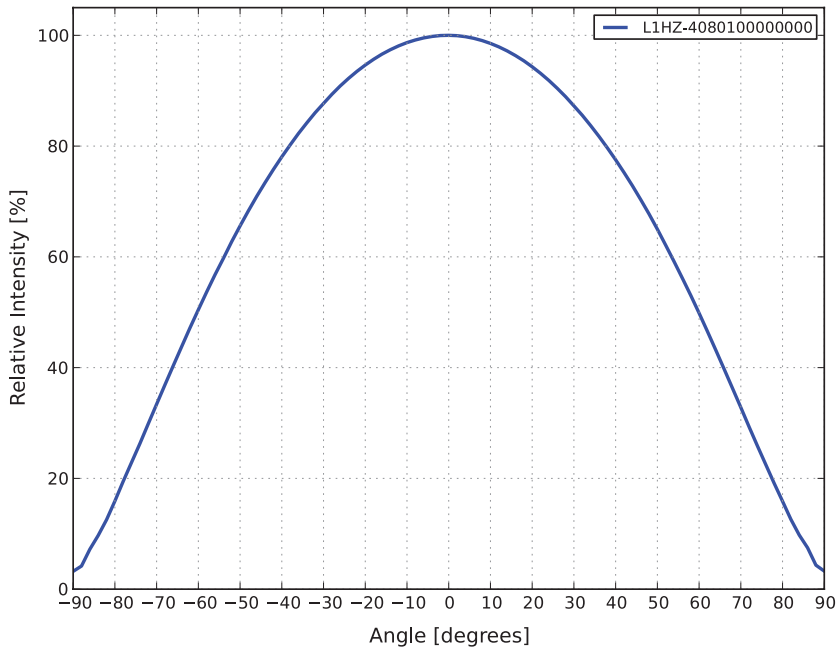

Figure 5. Typical radiation pattern for LUXEON HL1Z at 350mA, T_j=85°C

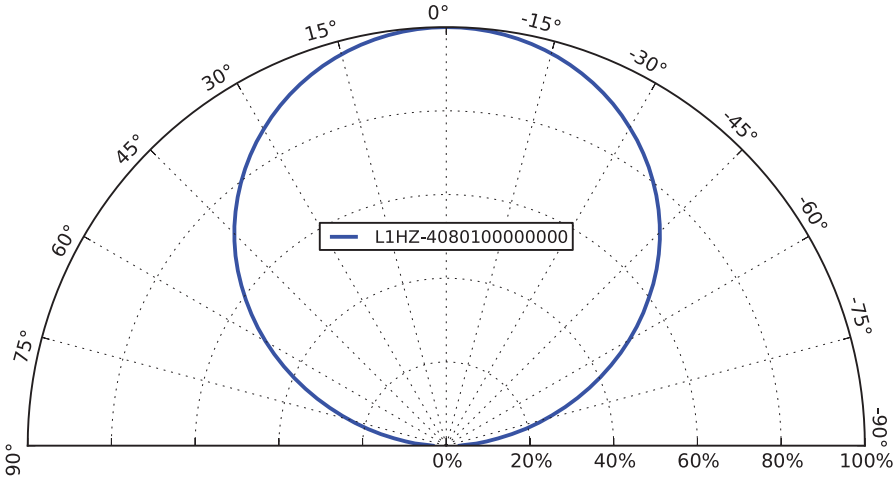

Figure 6. Typical polar radiation pattern for LUXEON HL1Z at 350mA, T_j=85°C

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Product Bin and Labeling Definitions

Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Lumileds bins LED components for luminous flux or radiometric power, color point, peak or dominant wavelength and forward voltage.

LUXEON HL1Z LEDs are labeled using a 4-digit alphanumeric CAT code following the format below:

A B C D

Where:

- **A** – designates luminous flux bin (example: H=100 to 110 lm, K=120 to 130 lm)
- **B** – designates color bin (example: 1=6500K, 3=5000K, 5=4000K, 6 = 3500K, 7=3000K, 8=2700K)
- **C** – designates color space (example: 3, U, or L for 3-step MacAdam ellipse; A, B, C, or D for 5-step MacAdam ellipse)
- **D** – designates forward voltage bin (example: X=2.65 to 2.80V, Y=2.80 to 3.00V)

Therefore, a LUXEON HL1Z with a lumen range of 100 to 110 lm, CCT of 5000K, 5-step McAdam ellipse color bin C, and a forward voltage range of 2.80 to 3.00V has the following CAT code:

H 3 C Y

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Luminous Flux Bins

Table 5 lists the standard luminous flux bins for LUXEON HL1Z emitters. 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 CCTs.

Table 5. Luminous flux bin definitions for LUXEON HL1Z, T_j=85°C

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
A	30	40
B	40	50
C	50	60
D	60	70
E	70	80
F	80	90
G	90	100
H	100	110
J	110	120
K	120	130
L	130	140
M	140	150
N	150	160
P	160	170

Notes for Table 5:
1. Lumileds maintains a tolerance of ±6.5% on luminous flux measurements.

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Color Bin Definitions

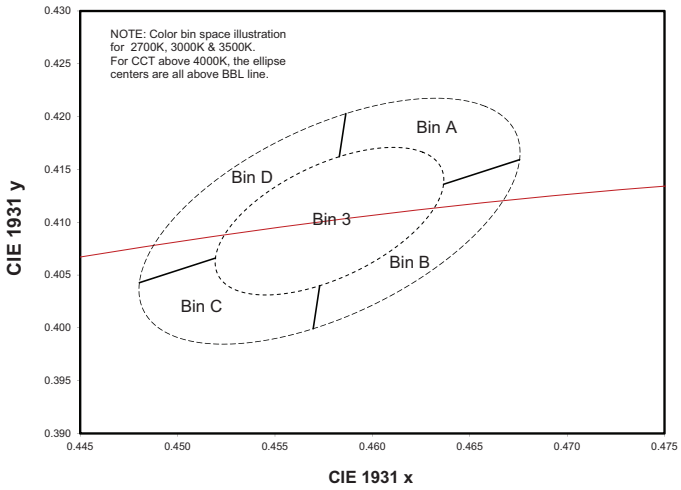

Figure 7. Color space definition for LUXEON HL1Z

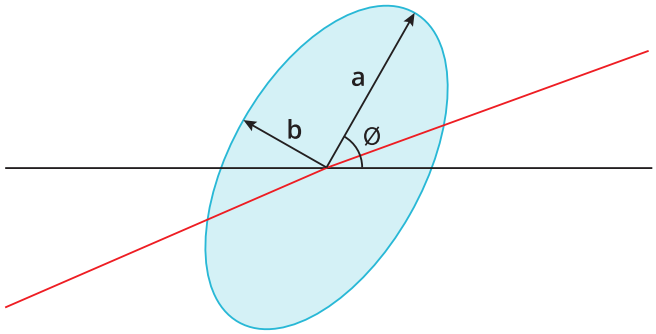

Figure 8. 5-step MacAdam ellipse illustration for Table 6

Table 6. 3- and 5-step MacAdam ellipse color bin definitions for LUXEON HL1Z

NOMINAL CCT	COLOR SPACE	CENTER POINT [1] (cx, cy)	MAJOR AXIS, a		MINOR AXIS, b		ELLIPSE ROTATION ANGLE, θ
			3-step	5-step	3-step	5-step	
2700K	3-step, 5-step MacAdam ellipse	(0.4578, 0.4101)	0.008 100	0.013 500	0.004 200	0.007 000	53.70°
3000K	Single 3-step MacAdam ellipse	(0.4338, 0.4030)	0.008 340	0.013 900	0.004 080	0.006 800	53.22°
3500K	Single 3-step MacAdam ellipse	(0.4073, 0.3917)	0.009 270	0.015 450	0.004 140	0.006 900	54.00°
4000K	Single 3-step MacAdam ellipse	(0.3818, 0.3797)	0.009 390	0.015 650	0.004 020	0.006 700	53.72°
5000K	Single 3-step MacAdam ellipse	(0.3447, 0.3553)	0.008 220	0.013 700	0.003 540	0.005 900	59.62°
5700K	Single 3-step MacAdam ellipse	(0.3287, 0.3417)	0.007 460	0.012 425	0.003 200	0.005 325	59.09°
6500K	Single 3-step MacAdam ellipse	(0.3123, 0.3282)	0.006 690	0.011 150	0.002 850	0.004 750	58.57°

Notes for Table 6:
1. Lumileds maintains a tolerance of ±0.005 on x and y coordinates in the CIE 1931 color space.

Table 7. Correlated color temperature bin definitions for LUXEON HL1Z

BIN	CCT
1	6500K
2	5700K
3	5000K
5	4000K
6	3500K
7	3000K
8	2700K

Table 8. MacAdam ellipse color space definitions for LUXEON HL1Z

BIN	SDCM
3	3-step MacAdam ellipse (all CCT-CRI)
A	5-step MacAdam ellipse (all CCT-CRI)
B	5-step MacAdam ellipse (all CCT-CRI)
C	5-step MacAdam ellipse (all CCT-CRI)
D	5-step MacAdam ellipse (all CCT-CRI)

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Forward Voltage Bins

Table 9. Forward voltage bin definitions for LUXEON HL1Z

BIN	FORWARD VOLTAGE [1] (V_f)	
	MINIMUM	MAXIMUM
R	2.65	2.80
S	2.80	2.95

Notes for Table 9:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.

Mechanical Dimensions

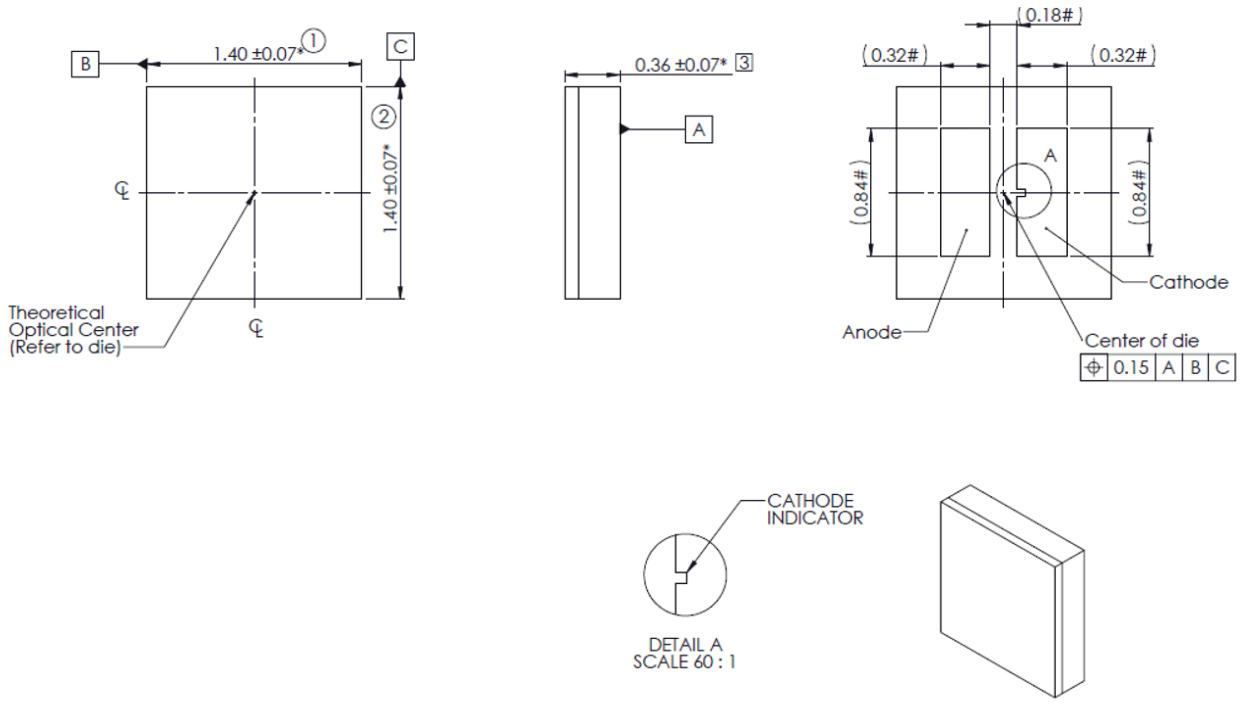

Figure 9. Mechanical dimensions for LUXEON HL1Z

Notes for Figure 9:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reflow Soldering Guidelines

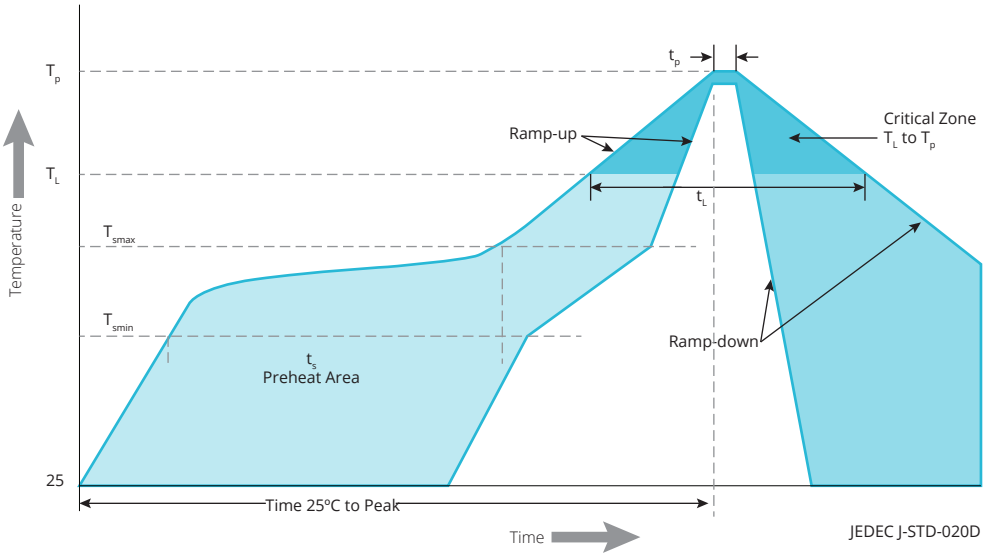

Figure 10. Visualization of the acceptable reflow temperature profile as specified in Table 10

Table 10. Reflow profile characteristics for LUXEON HL1Z

PROFILE FEATURE	LEAD-FREE ASSEMBLY
Preheat Minimum Temperature (T_{smin})	150°C
Preheat Maximum Temperature (T_{smax})	200°C
Preheat Time (t_{smin} to t_{smax})	60 to 180 seconds
Ramp-Up Rate (T_L to T_p)	3°C / second maximum
Liquidous Temperature (T_L)	217°C
Time Maintained Above Temperature T_L (t_L)	60 to 150 seconds
Peak / Classification Temperature (T_p)	260°C
Time Within 5°C of Actual Peak Temperature (t_p)	20 to 40 seconds
Ramp-Down Rate (T_p to T_L)	6°C / second maximum
Time 25°C to Peak Temperature	8 minutes maximum

Notes for Table 10:
1. All temperatures refer to the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

JEDEC Moisture Sensitivity

Table 11. Moisture sensitivity levels for LUXEON HL1Z

LEVEL	FLOOR LIFE		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
1	Unlimited	≤30°C / 85% RH	168 Hours +5 / -0	85°C / 85% RH

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Solder Pad Design

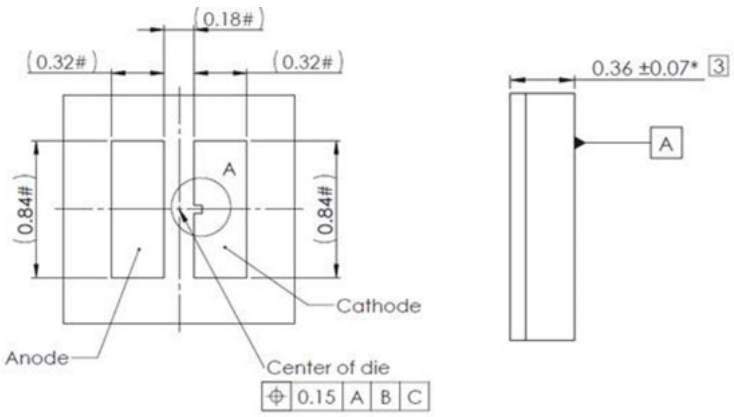


Figure 11. Recommended PCB solder pad layout for LUXEON HL1Z

Notes for Figure 11:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Packaging Information

Pocket Tape Dimensions

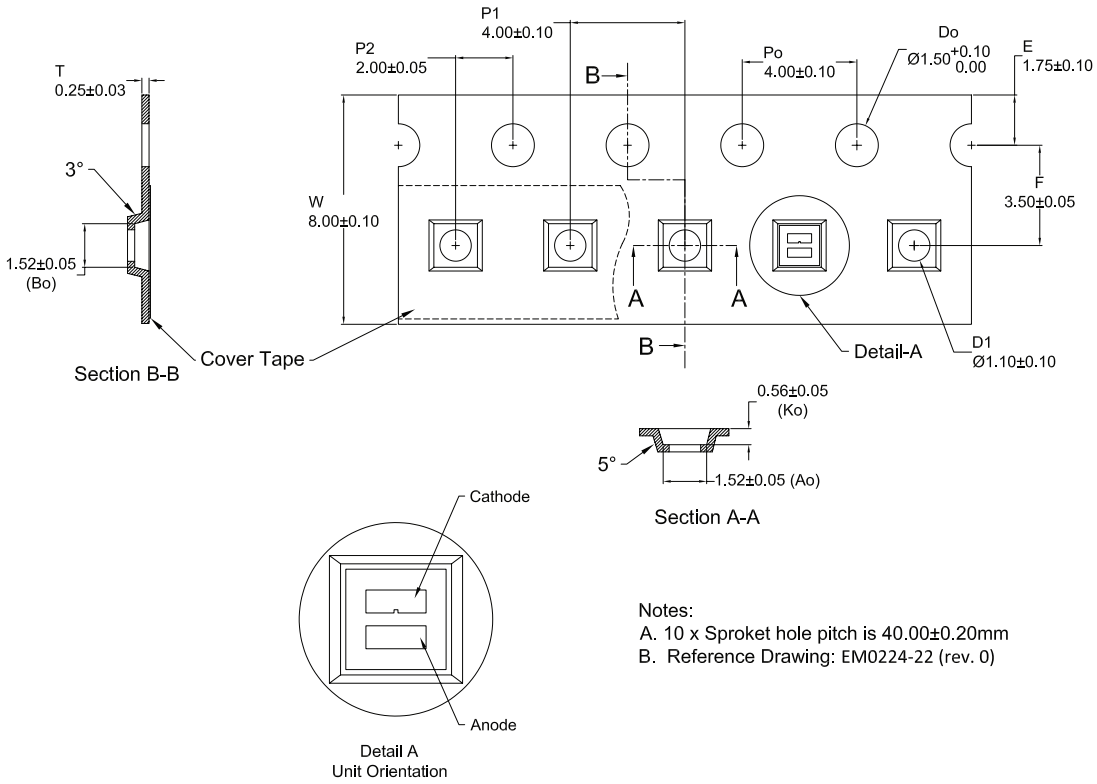
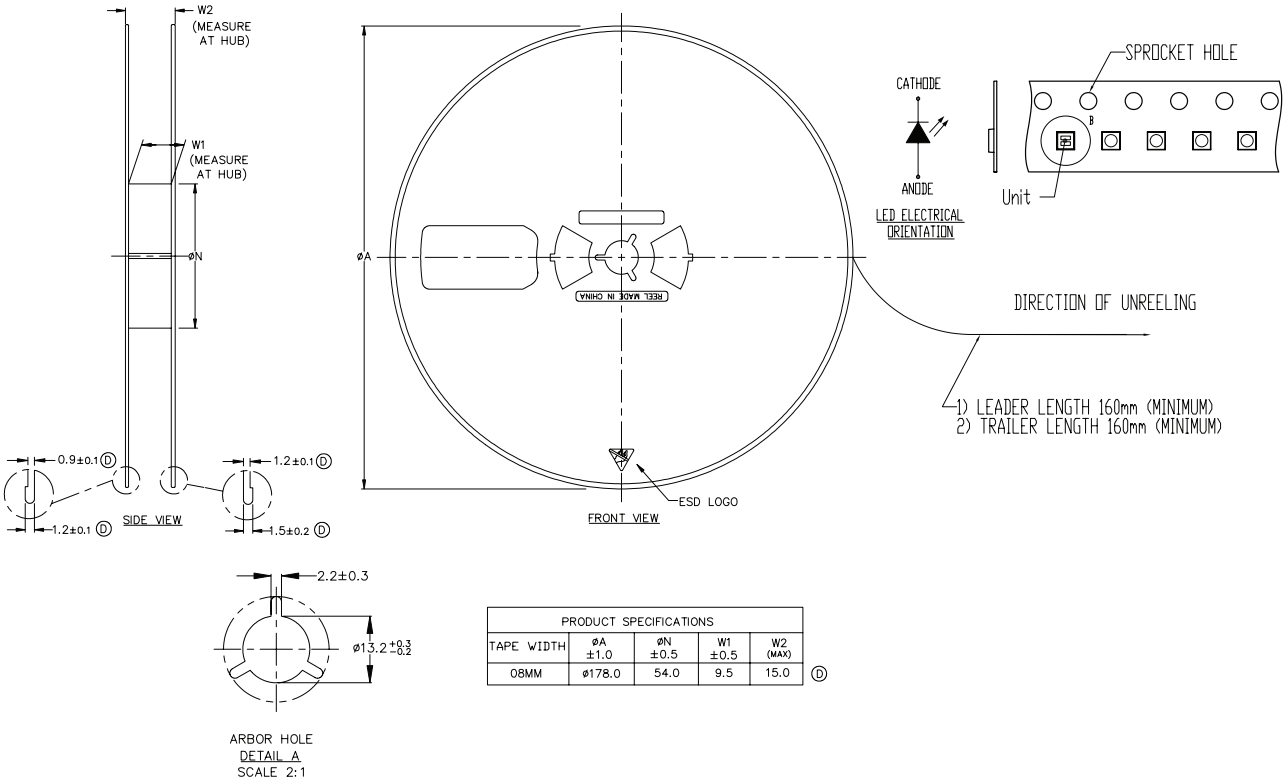


Figure 12. Pocket tape dimensions for LUXEON HL1Z

Notes for Figure 12:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reel Dimensions



PRODUCT SPECIFICATIONS					
TAPE WIDTH	øA ±1.0	øN ±0.5	W1 ±0.5	W2 (MAX)	
08MM	ø178.0	54.0	9.5	15.0	D

Figure 13. Reel dimensions for LUXEON HL1Z

Notes for Figure 13:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

About Lumileds

Lumileds is a global leader in LED and microLED technology, innovation, and solutions for the automotive, display, illumination, mobile, and other markets where light sources are essential. Our approximately 3,500 employees operate in over 15 countries and partner with our customers to deliver never before possible solutions for lighting, safety, and well-being.

To learn more about our lighting solutions, visit lumileds.com.

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