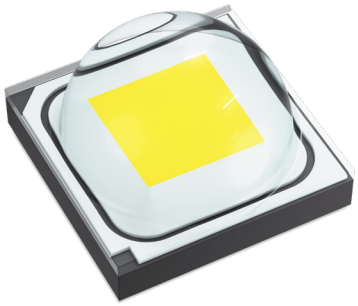
LUXEON HL2X-V

Higher performance, high quality of light and low thermal resistance



LUXEON HL2X-V is a high-power domed emitter designed for applications like streetlights and high bay luminaires. The package is designed to deliver superior output, efficacy, color stability and longevity.

LUXEON HL2X-V utilizes an industry standard 3535 package with 3-stripe footprint. This compatibility allows for efficient and simpler conversion to the better performing LUXEON HL2X-V from any other similar platform.

FEATURES AND BENEFITS

- Most usable light in application with design emphasis on Beam Angle, Field Angle, Color Over Angle and Optical Efficiency performance
- Industry standard 3535 package with 3-stripe footprint
- Offered in multiple Luminous Flux Performance categories for customer flexibility in design and application
- Superior thermal management for extended operating lifespan

PRIMARY APPLICATIONS

- High Mast
- Floodlights
- Spotlights
- High Bay
- Low Bay
- Torch
- More...

Table of Contents

General Product Information

Product Test Conditions

LUXEON HL2X-V LEDs are tested and binned with a DC drive current of 700mA, at a junction temperature, T_j, of 85°C.

Part Number Nomenclature

Part numbers for LUXEON HL2X-V LEDs follow the convention below:

L 1 H X – **A A B B** 2 **V** z z z z z z z

Where:

A A – can be any alphanumeric character that designates nominal ANSI CCT (for example, 27=2700K, 30=3000K, 40=4000K, 50=5000K, 57=5700K, 65=6500K)

B B – can be any alphanumeric character that designates minimum CRI (for example, 70=70CRI, 80=80CRI)

zzzzzzz – can be any alphanumeric character that can be used to designate customer-specific options

Therefore, the following part number is used for a LUXEON HL2X-V 4000K 70CRI LED:

L 1 H X – **4 0 7 0** 2 **V** 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 LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON HL2X-V 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 LLC will not intentionally add the following restricted materials 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 HL2X-V at 700mA, 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		
			700mA			
2700K	-43	70	300	325	168	L1HX-27702V0000000
3000K	-43	70	310	335	173	L1HX-30702V0000000
4000K	-43	70	330	355	183	L1HX-40702V0000000
5000K	-43	70	330	355	183	L1HX-50702V0000000
5700K	-43	70	330	355	183	L1HX-57702V0000000
6500K	-43	70	330	350	181	L1HX-65702V0000000
2700K	0	80	265	283	146	L1HX-27802V0000000
3000K	0	80	282	305	157	L1HX-30802V0000000
4000K	0	80	300	323	167	L1HX-40802V0000000
5000K	0	80	300	323	167	L1HX-50802V0000000
5700K	0	80	300	323	167	L1HX-57802V0000000
6500K	0	80	300	319	165	L1HX-65802V0000000

Notes for Table 1.1:
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 HL2X-V at 700mA, T_j=85°C

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE [1]	TYPICAL VIEWING ANGLE [2]
L1HX-xxxx2V0000000	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 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 HL2X-V at 700mA, 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		
L1HX-xxxx2V0000000	2.65	2.77	3.00	-1.25	1.1

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.1V on forward voltage measurements.
2. Measured between 25°C and 110°C.

Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON HL2X-V

PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current [1, 2, 5]	2.0 A
LED Junction Temperature [1] (DC & Pulse)	135 °C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 3B (8 KV)
Operating Case Temperature [1]	-40 °C to 135 °C
LED Storage Temperature	-40 °C to 135 °C
Soldering Temperature	JEDEC 020c 260 °C
Allowable Reflow Cycles	3
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 ≤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%.
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.

Operating Conditions

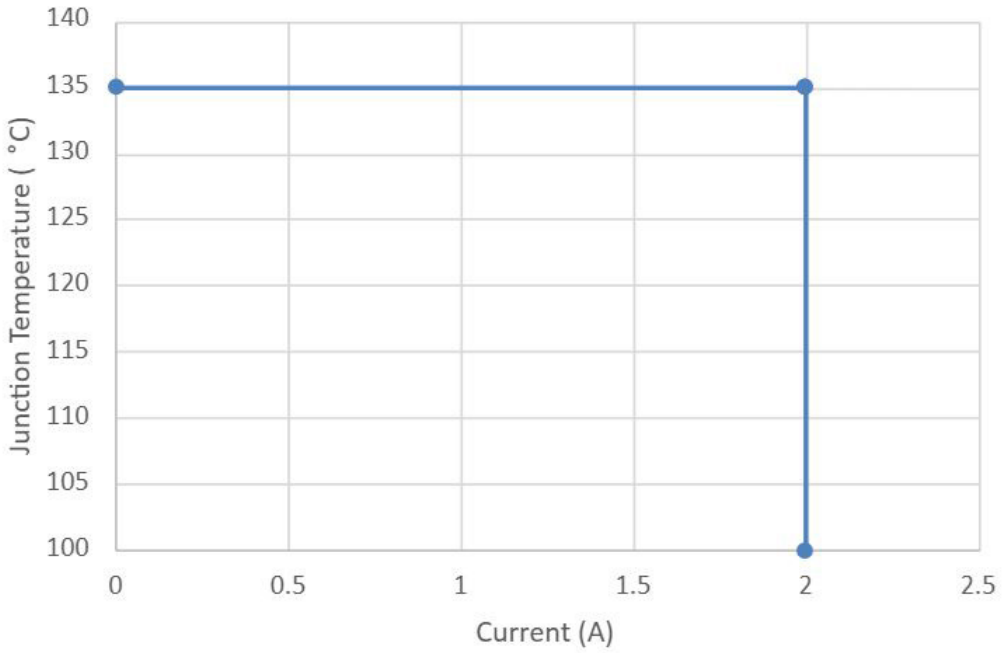


Figure 1. Maximum permissible operating conditions for LUXEON HL2X-V

Characteristic Curves

Spectral Power Distribution Characteristics

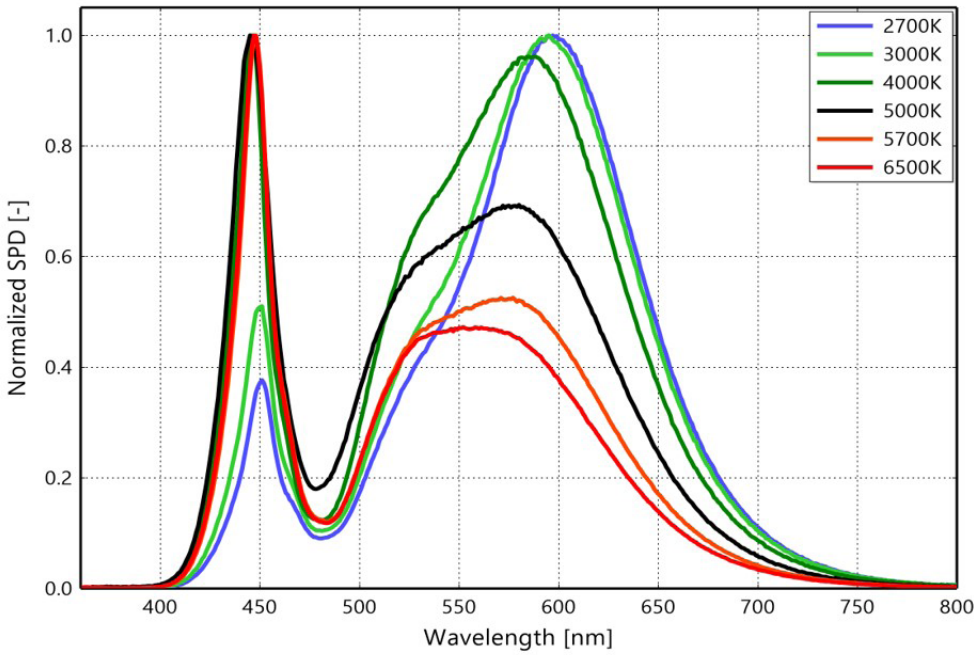


Figure 2a. Typical normalized power vs. wavelength for LUXEON HL2X-V 70 CRI at 700mA, Tj=85°C

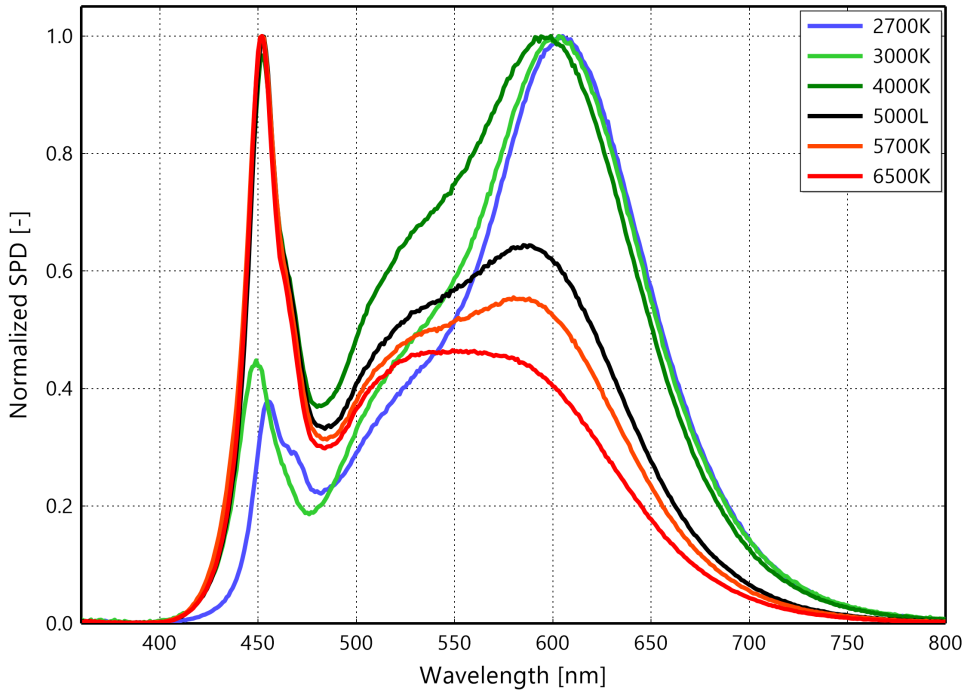


Figure 2b. Typical normalized power vs. wavelength for LUXEON HL2X-V 80 CRI at 700mA, Tj=85°C

Light Output Characteristics

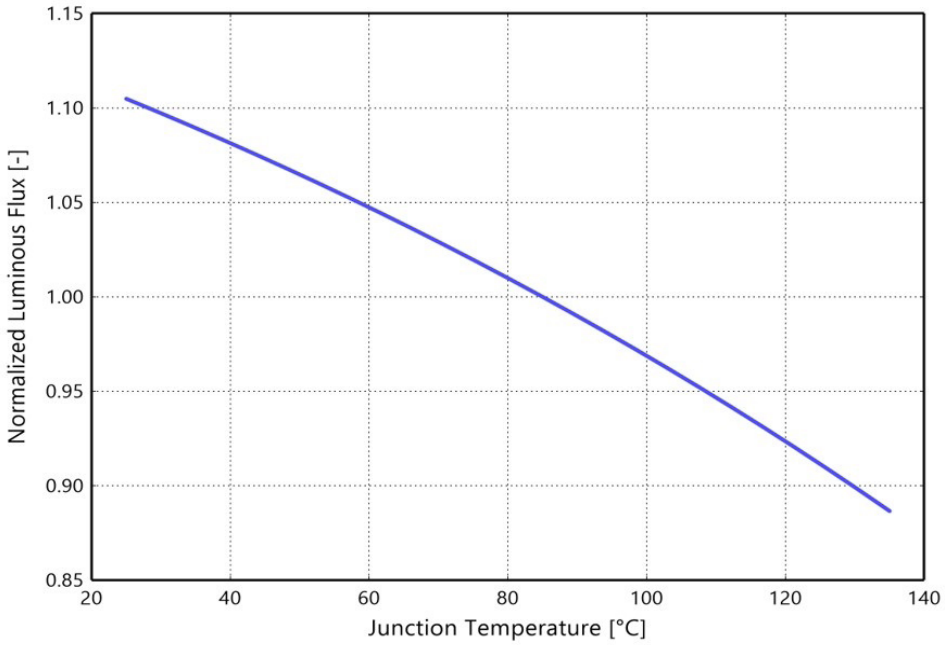


Figure 3. Typical normalized light output vs. junction temperature for LUXEON HL2X-V at 700mA

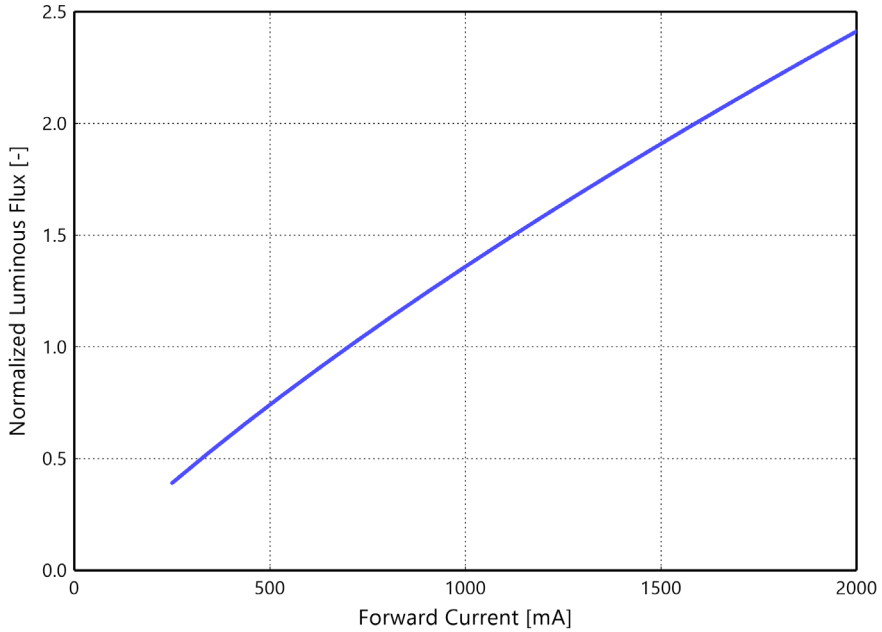


Figure 4. Typical normalized light output vs. forward current for LUXEON HL2X-V at 700mA, Tj=85°C

Forward Current Characteristics

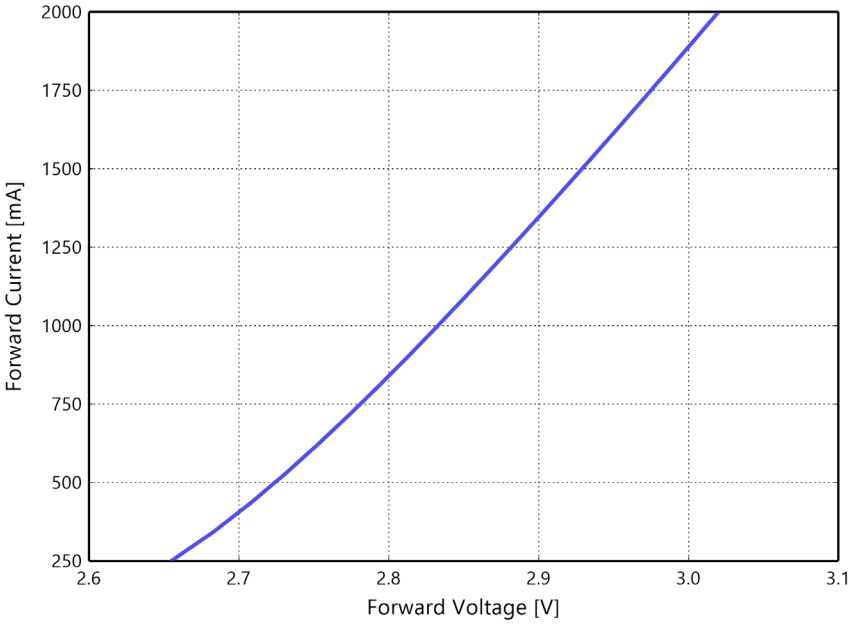


Figure 5. Typical forward current vs. forward voltage for LUXEON HL2X-V at Tj=85°C

Radiation Pattern Characteristics

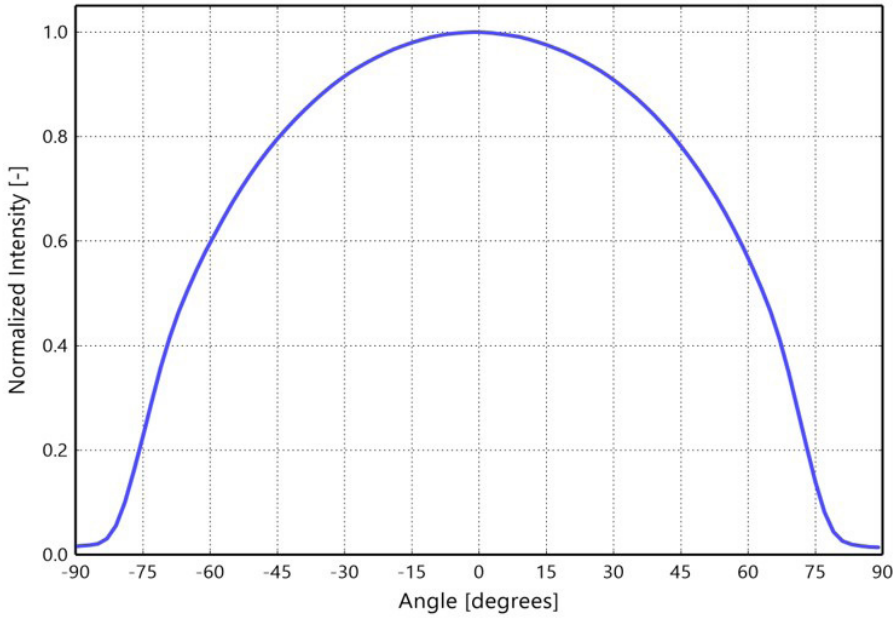


Figure 6. Typical radiation pattern for LUXEON HL2X-V at 700mA, Tj=85°C

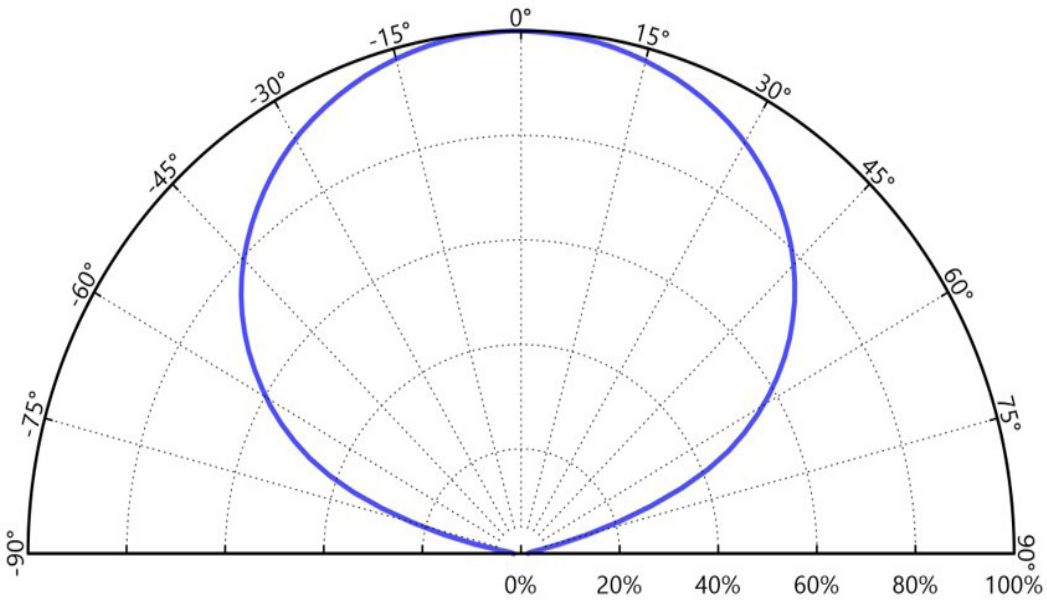


Figure 7. Typical polar radiation pattern for LUXEON HL2X-V at 700mA, Tj=85°C

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 HL2X-V 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: Z=330 to 340 lm, A=340 to 350 lm)
- **B** – designates color bin (example: 1=6500K, 2=5700K, 3=5000K, 5=4000K, 7=3000K, 8=2700K)
- **C** – designates color space (example: 5=5-step MacAdam ellipse, 3=3-step MacAdam ellipse)
- **D** – designates forward voltage bin (example: X=2.65 to 2.85V, Y=2.85 to 3.00V)

Therefore, a LUXEON HL2X-V with a lumen range of 340 to 350 lm, CCT 4000K, 5-step McAdam ellipse and a forward voltage range of 2.65 to 2.85V has the following:

A 5 5 X

Luminous Flux Bins

Table 5 lists the standard luminous flux bins for LUXEON HL2X-V 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 HL2X-V

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
N	220	230
P	230	230
Q	240	250
R	250	260
S	260	270
T	270	280
U	280	290
V	290	300
W	300	310
X	310	320
Y	320	330
Z	330	340
A	340	350
B	350	360
C	360	370
D	370	380
E	380	390

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

Color Bin Definitions

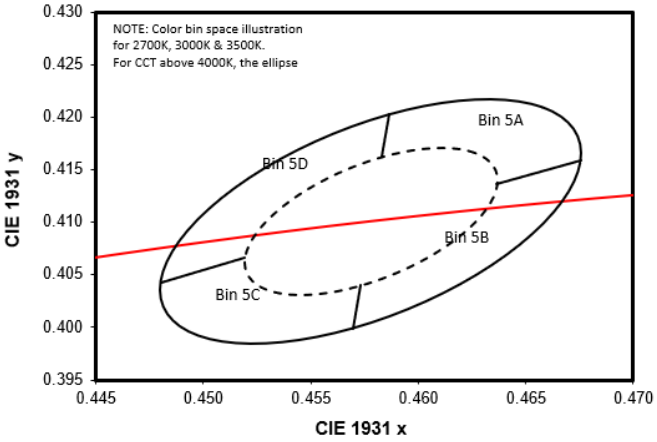


Figure 8. Color space definition for LUXEON HL2X-V

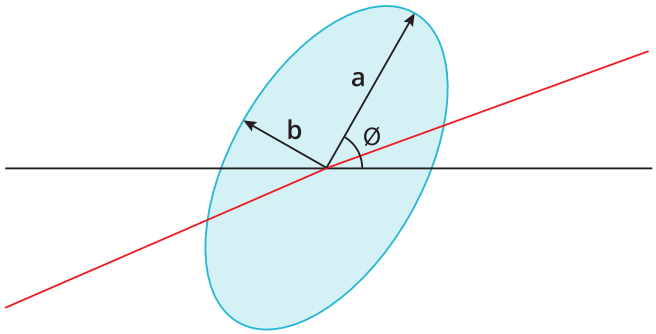


Figure 9. 5-step MacAdam ellipse illustration for Table 6

Table 6. 5-step MacAdam ellipse color bin definitions for LUXEON HL2X-V

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	Single 3-step, 5-step MacAdam ellipse	(0.4578, 0.4101)	0.00810	0.01350	0.00420	0.00700	53.70°
3000K	Single 3-step, 5-step MacAdam ellipse	(0.4338, 0.4030)	0.00834	0.01390	0.00408	0.00680	53.22°
3500K	Single 3-step, 5-step MacAdam ellipse	(0.4073, 0.3917)	0.00927	0.01545	0.00414	0.00690	54.00°
4000K	Single 3-step, 5-step MacAdam ellipse	(0.3818, 0.3797)	0.00939	0.01565	0.00402	0.00670	53.72°
5000K	Single 3-step, 5-step MacAdam ellipse	(0.3447, 0.3553)	0.00822	0.01370	0.00354	0.00590	59.62°
5700K	Single 3-step, 5-step MacAdam ellipse	(0.3287, 0.3417)	0.00745	0.01243	0.00320	0.00533	59.09°
6500K	Single 3-step, 5-step MacAdam ellipse	(0.3123, 0.3282)	0.06690	0.01115	0.00285	0.00475	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 HL2X-V

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

Table 8. MacAdam ellipse color space definitions for LUXEON HL2X-V

BIN	SDCM
3	3-step MacAdam ellipse (70,80,90 CRI)
5	5-step MacAdam ellipse (70 CRI)
A	5-step MacAdam ellipse (80,90 CRI)
B	5-step MacAdam ellipse (80,90 CRI)
C	5-step MacAdam ellipse (80,90 CRI)
D	5-step MacAdam ellipse (80,90 CRI)

Forward Voltage Bins

Table 9. Forward voltage bin definitions for LUXEON HL2X-V

BIN	FORWARD VOLTAGE [1] (V_f)	
	MINIMUM	MAXIMUM
X	2.65	2.85
Y	2.85	3.00

Notes for Table 9:
1. Lumileds maintains a tolerance of ±0.1V on forward voltage measurements.

Mechanical Dimensions

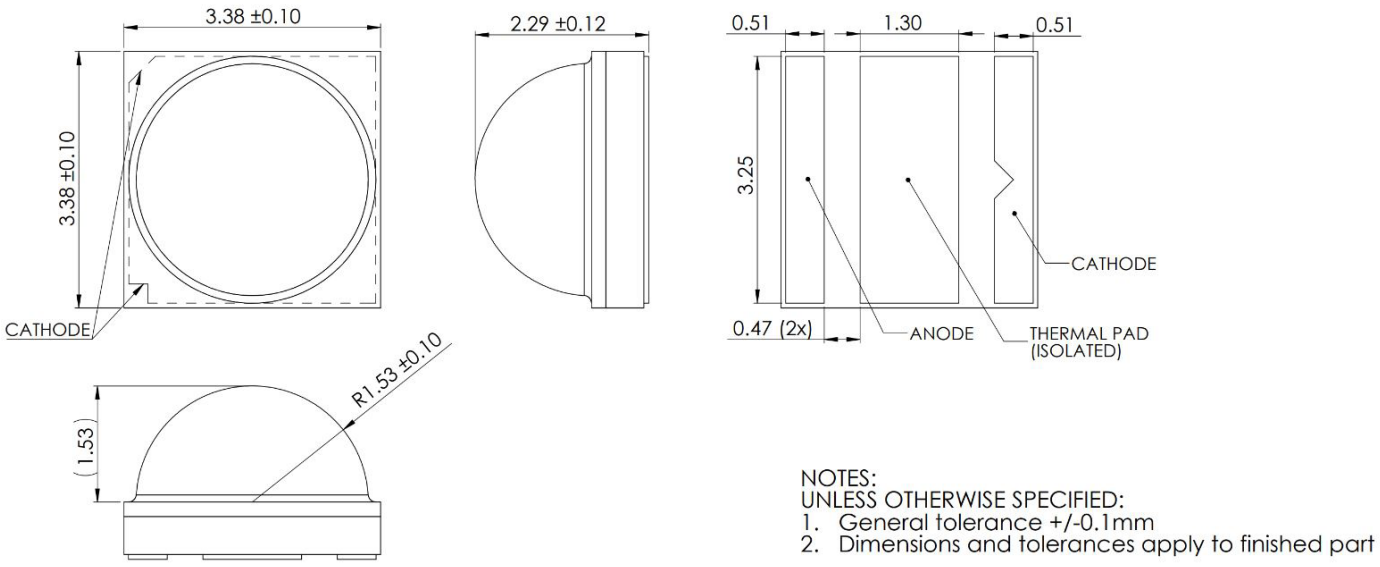


Figure 10. Mechanical dimensions for LUXEON HL2X-V

Notes for Figure 10:
1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Do not handle the device by the dome. Excessive force on the dome may damage the dome itself or the interior of the device.

Reflow Soldering Guidelines

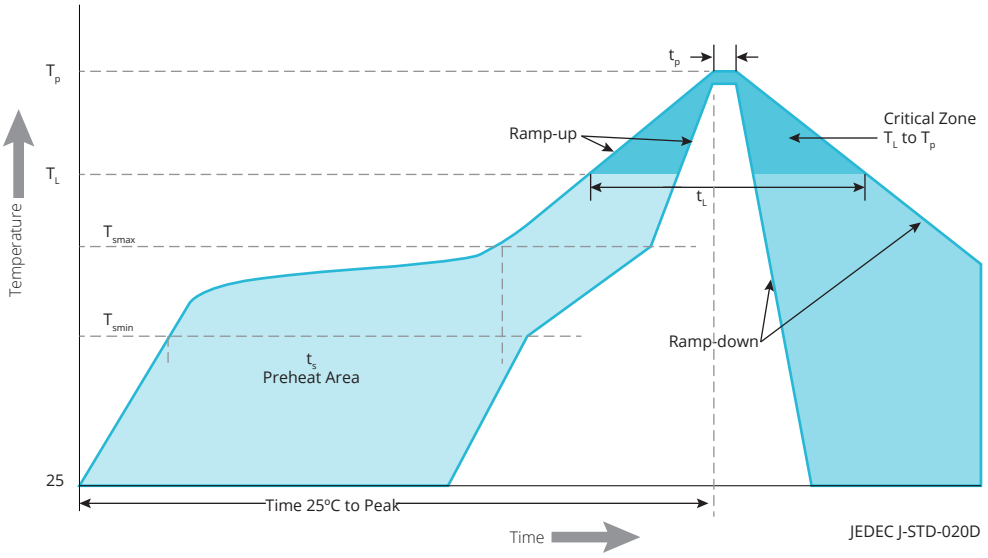


Figure 11. Visualization of the acceptable reflow temperature profile as specified in Table 10

Table 10. Reflow profile characteristics for LUXEON HL2X-V

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 HL2X-V

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

Solder Pad Design

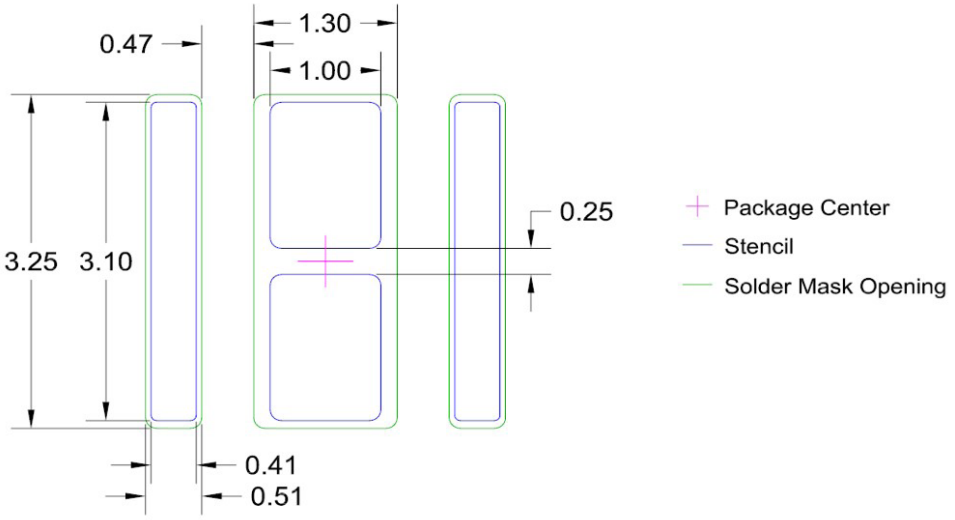


Figure 12. Recommended PCB solder pad layout for LUXEON HL2X-V

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

Packaging Information

Pocket Tape Dimensions

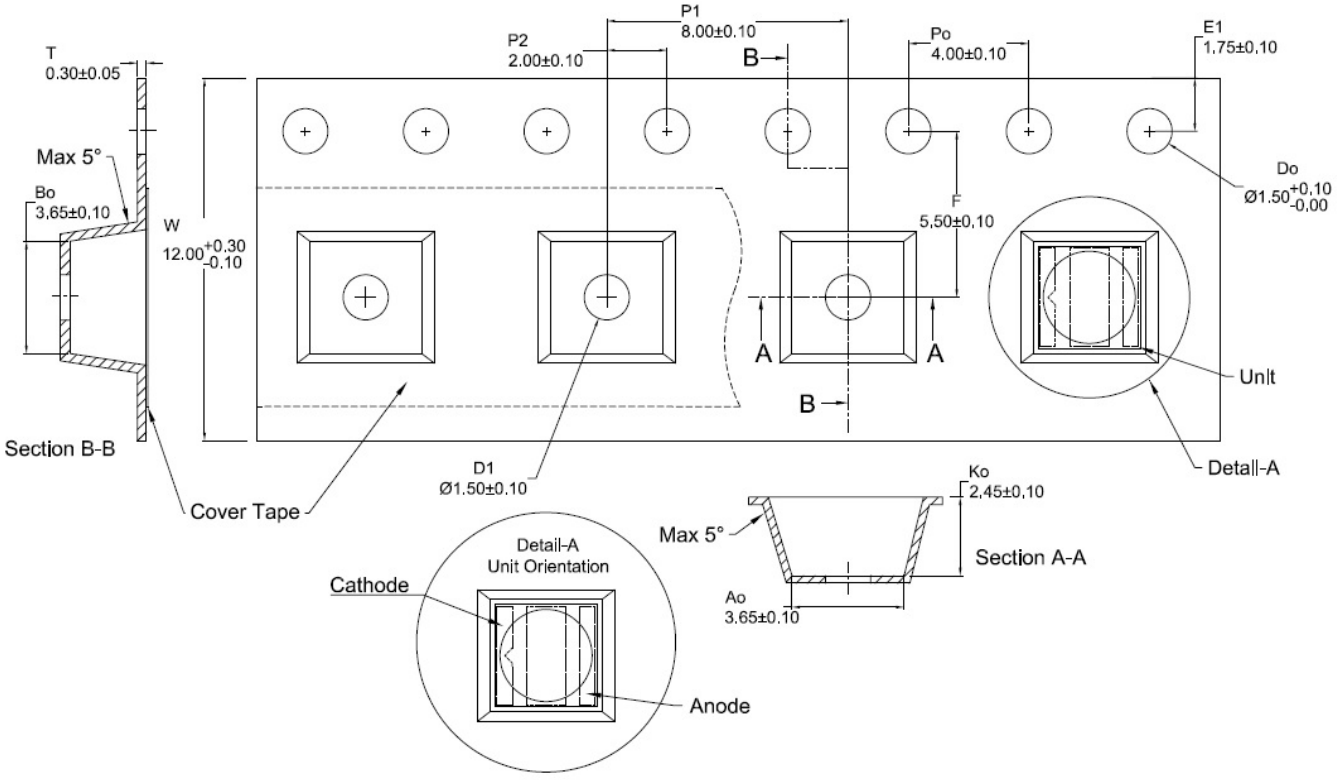
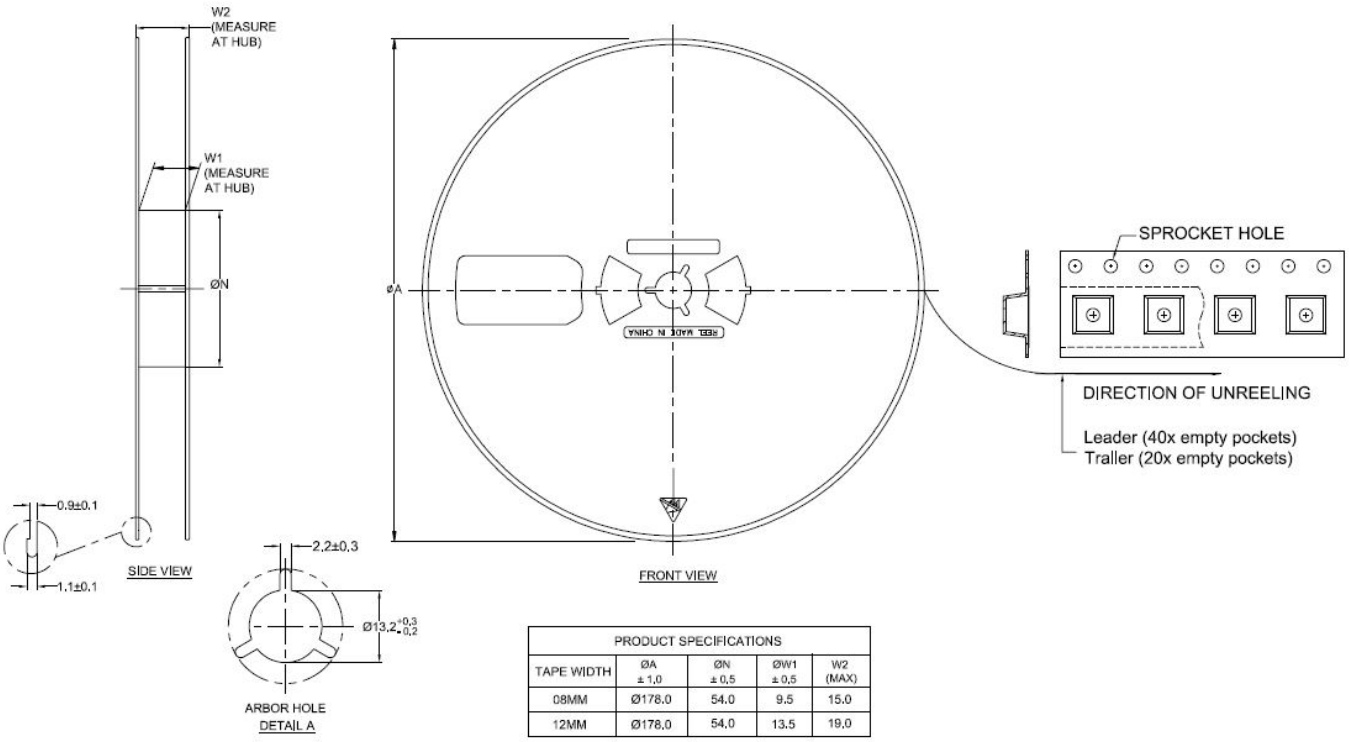


Figure 13. Pocket tape dimensions for LUXEON HL2X-V

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

Reel Dimensions



PRODUCT SPECIFICATIONS				
TAPE WIDTH	ØA ± 1,0	ØN ± 0,5	ØW1 ± 0,5	W2 (MAX)
08MM	Ø178.0	54.0	9.5	15.0
12MM	Ø178.0	54.0	13.5	19.0

Figure 14. Reel dimensions for LUXEON HL2X-V

Notes for Figure 14:
1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. 1,000 pieces per reel for LUXEON HL2X-V.

About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world better, safer, more beautiful—with light.

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

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DS549 LUXEON HL2X-V
Product Datasheet 20250701