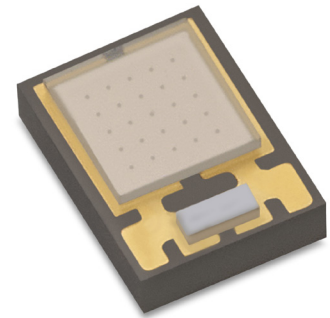




LUXEON UV U1

Highest power density, superior efficiency, powered by leading Chip Scale Package (CSP) technology

At 1/5th the size of other ultraviolet and violet LEDs, LUXEON UV U1 LEDs, a SMT device, can be assembled in tight arrays with spacing of only 200 microns, which enables high power density (W/cm²) system for superior efficiency and design freedom. The product is undomed for precise optical control, and a portfolio covering ultraviolet and violet light. The superior power density, excellent robustness of CSP technology, and real world efficacy enable leading performance and efficient solution development in a wide variety of UV specialty lighting applications.



FEATURES AND BENEFITS

Offering ultraviolet in 380-400nm and violet (400-420nm) for a range of options

Small 2.2mm² SMT footprint enables highest W/cm² power density, design freedom

1A max drive current allows more power per LED

Up to 50%+ efficiency reduces heat output

AlN package R_{th} as low as 3.5 K/W for better thermal management

PRIMARY APPLICATIONS

Specialty Lighting

- Analytical Instrumentation
- Curing
- Medical
- Security
- UV Photoreaction

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	4
Absolute Maximum Ratings	4
Characteristic Curves	5
Spectral Power Distribution Characteristics	5
Light Output Characteristics	5
Forward Current Characteristics	6
Wavelength Shift	8
Radiation Pattern Characteristics	9
Product Bin and Labeling Definitions	10
Decoding Product Bin Labeling	10
Radiometric Power Bins	10
Peak Wavelength Bins	11
Forward Voltage Bins	11
Mechanical Dimensions	12
Reflow Soldering Guidelines	13
Solder Pad Design	14
Packaging Information	14
Pocket Tape Dimensions	14
Reel Dimensions	15

General Product Information

Product Test Conditions

LUXEON UV U1 LEDs are tested and binned with a DC drive current of 500mA at a junction temperature, T_j , of 25°C.

Part Number Nomenclature

Part numbers for LUXEON UV U1 follow the convention below:

L H U V – **B B B B** – A **C C C**

Where:

- B B B B** – designates peak wavelength (0385=385nm ±5nm, 0395=395nm ±5nm, 0405=405nm ±5nm, 0415=415nm ±5nm)
- C C C** – designates minimum radiometric power bin (025=250mW, 030=300mW, 035=350mW, 040=400mW, 045=450mW, 050=500mW, 055=550mW, 060=600mW, 065=650mW, 070=700mW, 075=750mW, 080=800mW)

Therefore, the following part number is used for a LUXEON UV U1 with a peak wavelength of 395nm and a minimum radiometric power bin of 400mW:

L H U V – **0 3 9 5** – A **0 4 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 UV U1 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 UV U1 at 500mA and 1000mA, $T_j=25^\circ\text{C}$.

PEAK WAVELENGTH ^[1]	TYPICAL RADIOMETRIC POWER ^[2] (mW)		PART NUMBER
	500mA	1000mA	
415 ±5nm	575	1093	LHUV-0415-A055
	625	1188	LHUV-0415-A060
	675	1283	LHUV-0415-A065
	725	1378	LHUV-0415-A070
405 ±5nm	575	1093	LHUV-0405-A055
	625	1188	LHUV-0405-A060
	675	1283	LHUV-0405-A065
	725	1378	LHUV-0405-A070
395 ±5nm	525	998	LHUV-0395-A050
	575	1093	LHUV-0395-A055
	625	1188	LHUV-0395-A060
	675	1283	LHUV-0395-A065
385 ±5nm	275	523	LHUV-0385-A025
	325	618	LHUV-0385-A030
	375	713	LHUV-0385-A035
	425	808	LHUV-0385-A040
	475	903	LHUV-0385-A045
	525	998	LHUV-0385-A050
	575	1093	LHUV-0385-A055

Notes for Table 1:

1. Lumileds maintains a tolerance of ±2nm for peak wavelength measurements.
2. Lumileds maintains a tolerance of ±10% for radiometric power measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON UV U1 at 500mA, $T_j=25^\circ\text{C}$.

PART NUMBER	TYPICAL SPECTRAL HALF-WIDTH ^[1] (nm)	TYPICAL TEMPERATURE COEFFICIENT OF PEAK WAVELENGTH (nm/°C)	TYPICAL TOTAL INCLUDED ANGLE ^[2]	TYPICAL VIEWING ANGLE ^[3]
LHUV-0415-Axxx	13.7	0.05	170°	140°
LHUV-0405-Axxx	12.0	0.05	170°	140°
LHUV-0395-Axxx	11.0	0.05	170°	140°
LHUV-0385-Axxx	9.0	0.05	170°	140°

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 UV U1 at 500mA, T_j=25°C.

PART NUMBER	FORWARD VOLTAGE ^[1] (V)		TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE ^[2] (mV/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	MAXIMUM		
LHUV-0415-Axxx	2.9	3.4	-1.6	2.5
LHUV-0405-Axxx	2.9	3.4	-1.3	3.0
LHUV-0395-Axxx	2.9	3.4	-1.4	3.5
LHUV-0385-Axxx	2.9	3.4	-1.5	4.5

Notes for Table 3:

1. Lumileds maintains a tolerance of ±0.05V on forward voltage measurements.
2. Measured between 25°C and 85°C.

Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON UV U1.

PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current ^[1,2]	1000mA
Peak Pulsed Forward Current ^[1,3]	1300mA
LED Junction Temperature ^[1] (DC & Pulse)	135°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 3B
Operating Case Temperature ^[1]	-40°C to 135°C
LED Storage Temperature	-40°C to 135°C
Soldering Temperature	300 ±3°C (<30 second)
Allowable Reflow Cycles	3
Reverse Voltage (V _{reverse})	LUXEON UV U1 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," are acceptable if the following conditions are met:
 - The frequency of the ripple current is 100Hz or higher
 - The average current for each cycle does not exceed the maximum allowable DC forward current
 - The maximum amplitude of the ripple does not exceed 15% of the maximum allowable DC forward current
3. At 10% duty cycle with pulse width of 10ms.

Characteristic Curves

Spectral Power Distribution Characteristics

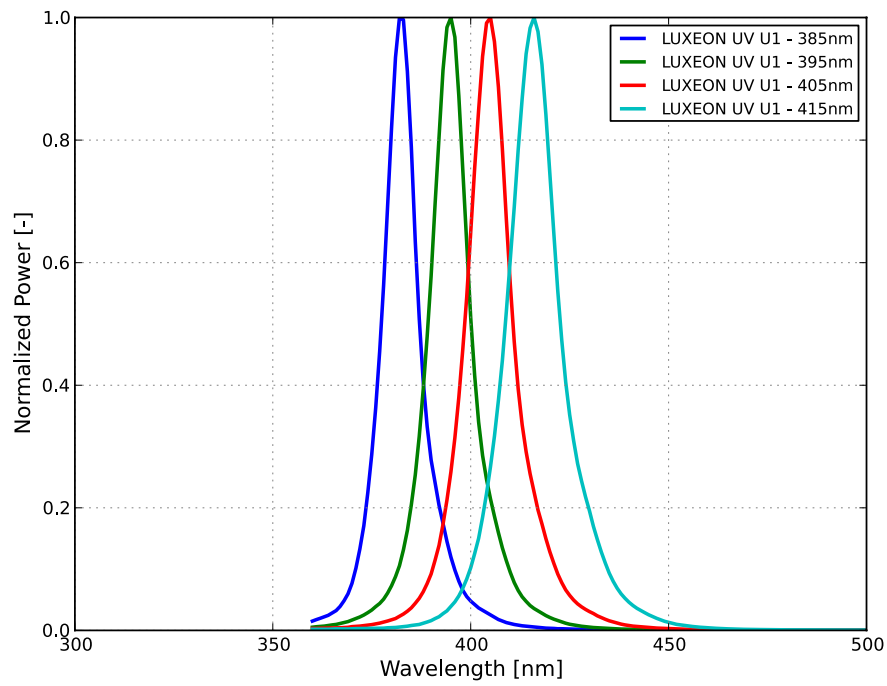


Figure 1. Typical normalized power vs. wavelength for LUXEON UV U1 at 500mA, $T_j=25^\circ\text{C}$.

Light Output Characteristics

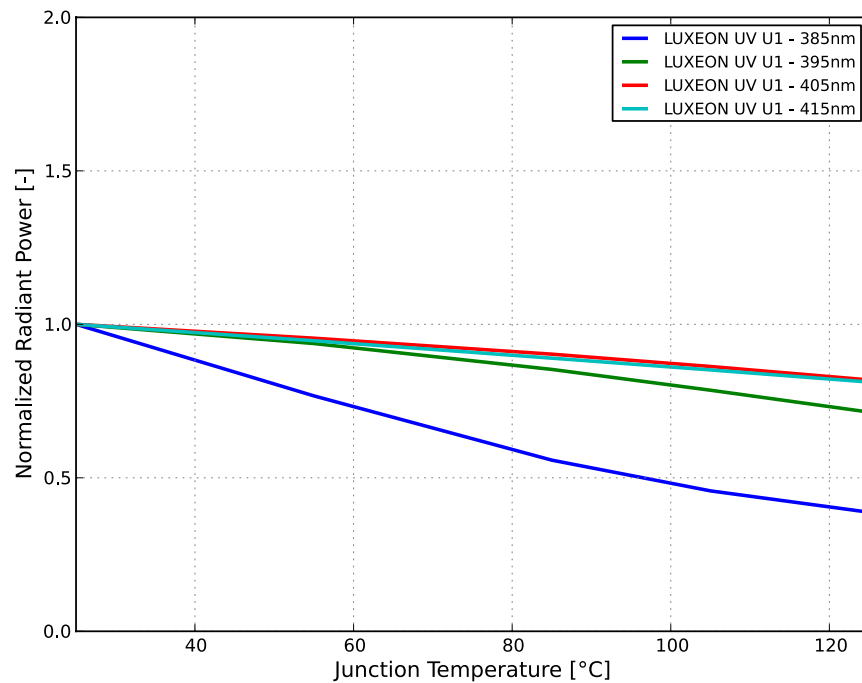


Figure 2. Typical normalized radiant power vs. junction temperature for LUXEON UV U1 at 500mA.

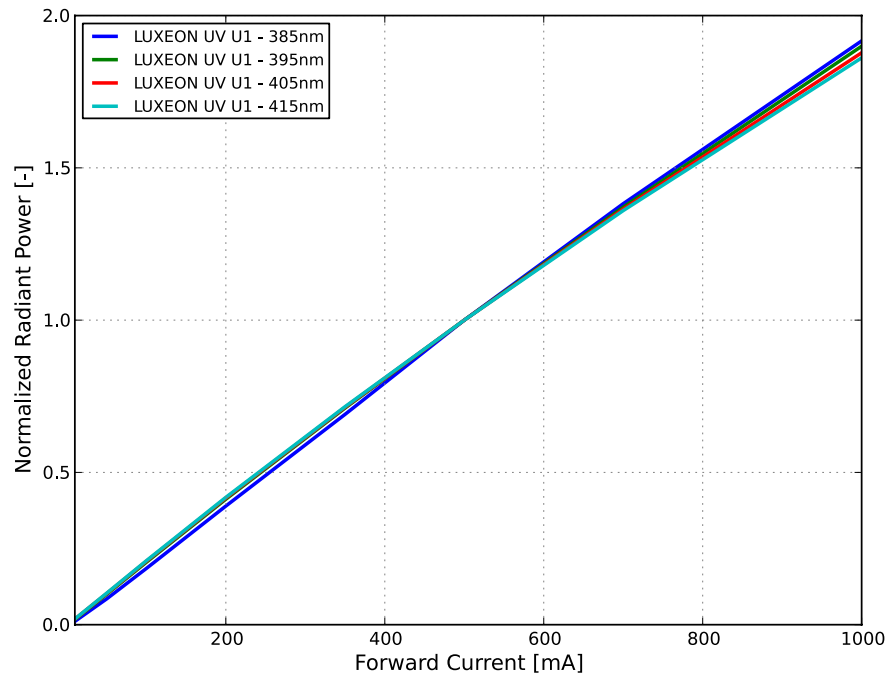


Figure 3. Typical normalized radiant power vs. forward current for LUXEON UV U1 at $T_j=25^\circ\text{C}$.

Forward Current Characteristics

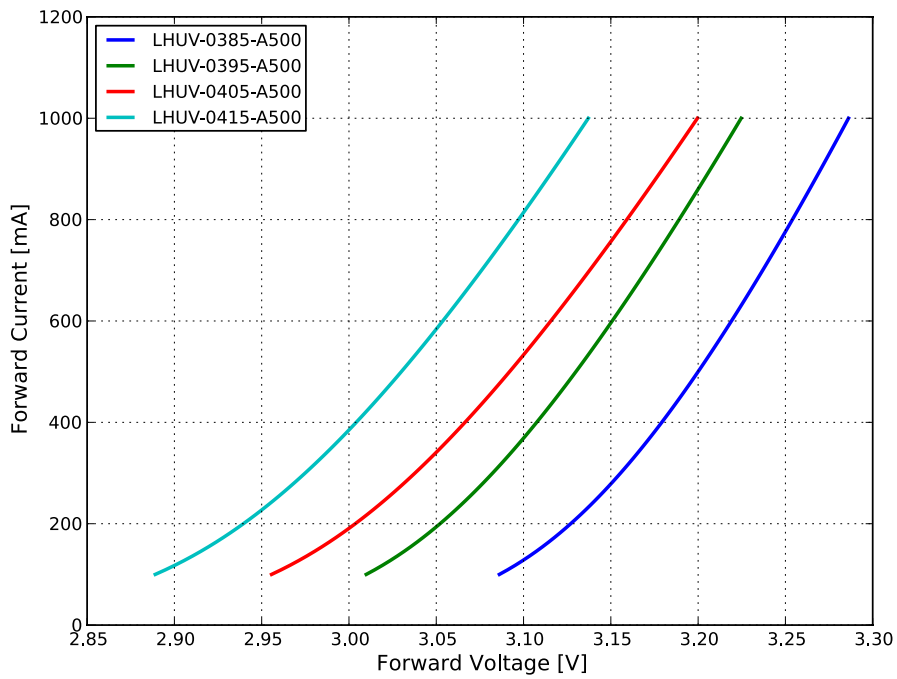


Figure 4. Typical forward current vs. forward voltage for LUXEON UV U1 at $T_j=25^\circ\text{C}$.

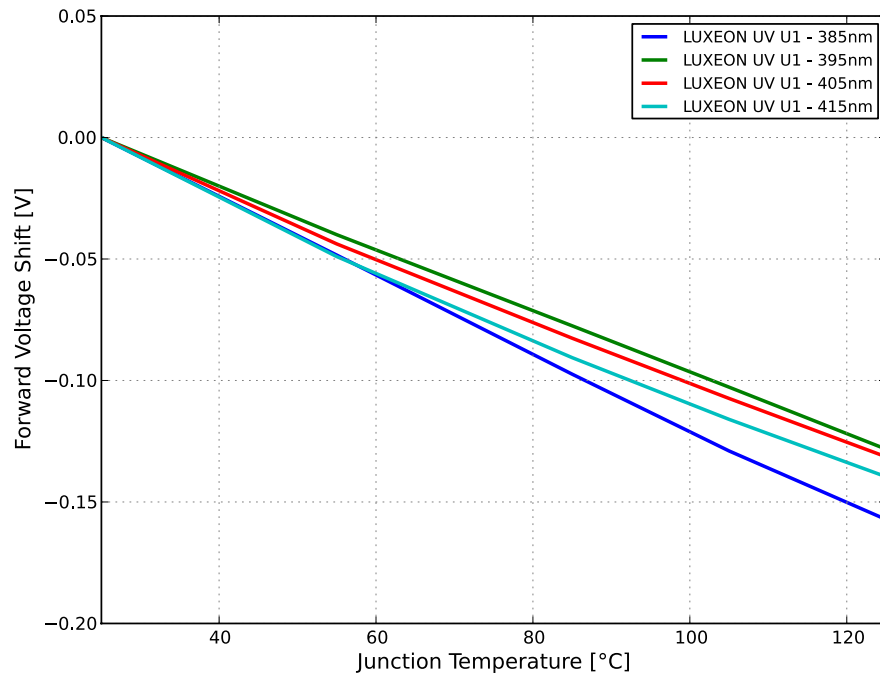


Figure 5. Typical forward voltage shift vs. junction temperature for LUXEON UV U1 at $T_j=25^\circ\text{C}$.

Wavelength Shift

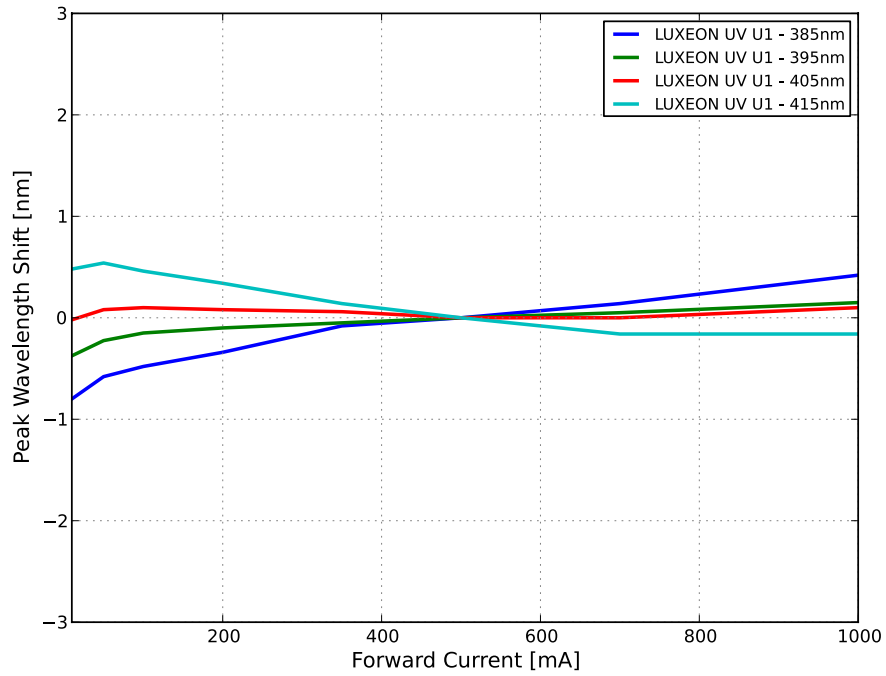


Figure 6. Typical peak wavelength shift vs. forward current for LUXEON UV U1 at $T_j=25^\circ\text{C}$.

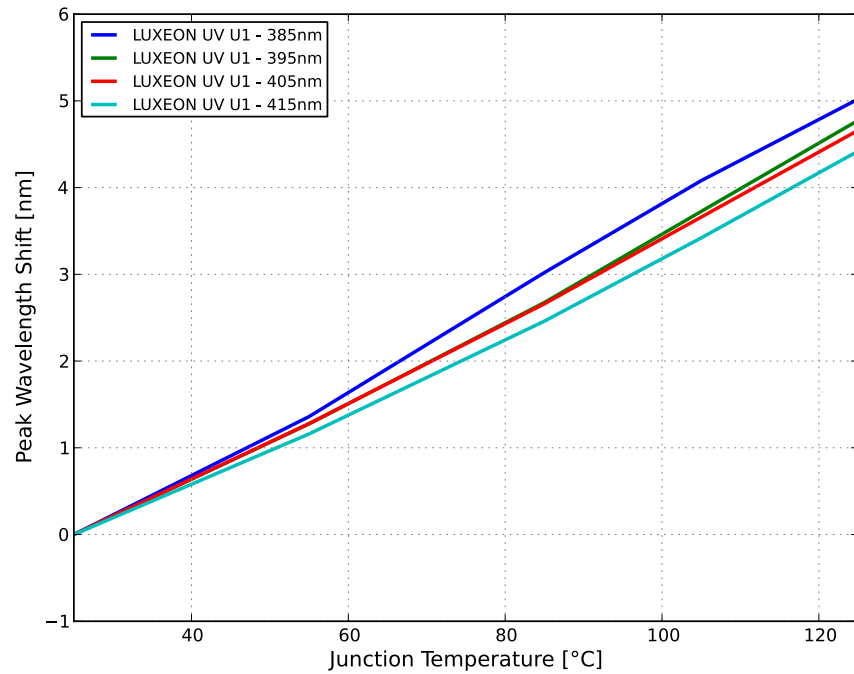


Figure 7. Typical peak wavelength vs. junction temperature for LUXEON UV U1 at 500mA.

Radiation Pattern Characteristics

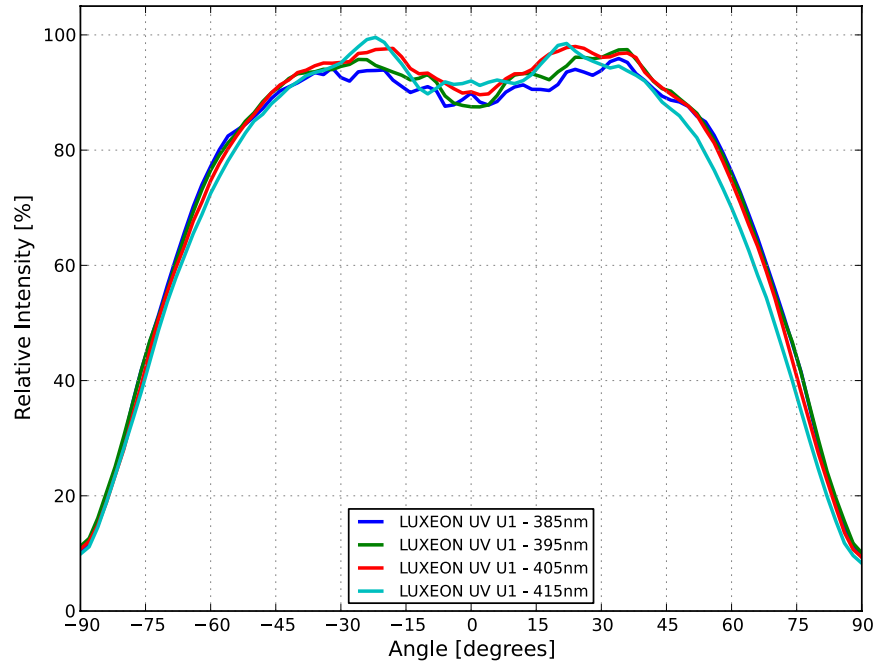


Figure 8. Typical radiation pattern for LUXEON UV U1 at 500mA, $T_j=25^{\circ}\text{C}$.

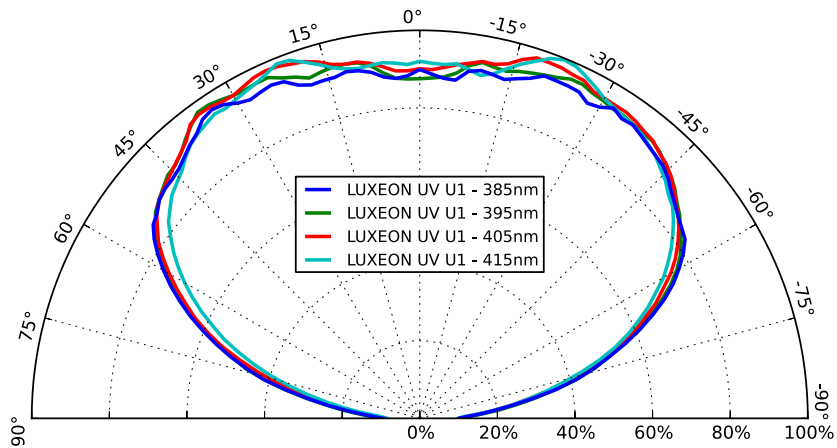


Figure 9. Typical polar radiation pattern for LUXEON UV U1 at 500mA, $T_j=25^{\circ}\text{C}$.

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 UV U1 LEDs are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C

- A** – designates radiometric power bin (example: D=400 to 450mW, J=700 to 750mW)
- B** – designates peak wavelength bin (example: A=380 to 385nm, E=400 to 405nm)
- C** – designates forward voltage bin (example: 8=2.8 to 2.9 volts, 0=3.0 to 3.1 volts)

Therefore, a LUXEON UV U1 with a radiometric power range of 400 to 450mW, peak wavelength range of 400 to 405nm and a forward voltage range of 3.0 to 3.1V has the following CAT code:

D E 0

Radiometric Power Bins

Table 5 lists the standard radiometric power bins for LUXEON UV U1 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. Radiometric power bin definitions for LUXEON UV U1.

BIN	RADIOMETRIC POWER ⁽¹⁾ (mW)	
	MINIMUM	MAXIMUM
A	250	300
B	300	350
C	350	400
D	400	450
E	450	500
F	500	550
G	550	600
H	600	650
I	650	700
J	700	750
K	750	800
L	800	850

Notes for Table 5:

1. Lumileds maintains a tolerance of $\pm 10\%$ on radiometric power measurements.

Peak Wavelength Bins

Table 6. Peak wavelength definitions for LUXEON UV U1.

BIN	PEAK WAVELENGTH ^[1] (nm)	
	MINIMUM	MAXIMUM
A	380	385
B	385	390
C	390	395
D	395	400
E	400	405
F	405	410
G	410	415
H	415	420

Notes for Table 6:

1. Lumileds maintains a tolerance of ± 2 nm on peak wavelength measurements.

Forward Voltage Bins

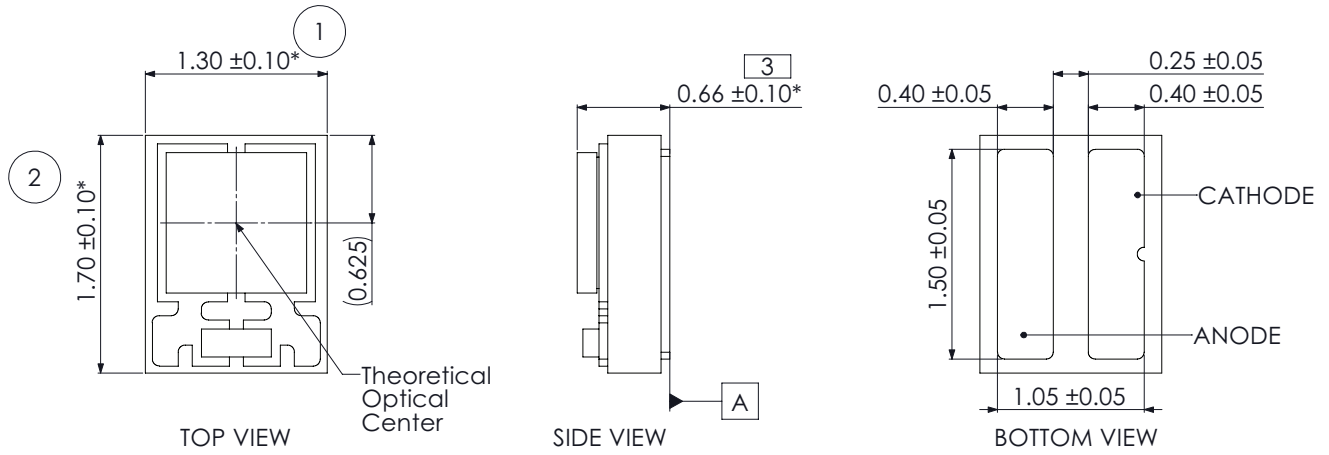
Table 7. Forward voltage bin definitions for LUXEON UV U1.

BIN	FORWARD VOLTAGE ^[1] (V)	
	MINIMUM	MAXIMUM
7	2.7	2.8
8	2.8	2.9
9	2.9	3.0
0	3.0	3.1
1	3.1	3.2
2	3.2	3.3
3	3.3	3.4
4	3.4	3.5

Notes for Table 7:

1. Lumileds maintains a tolerance of ± 0.05 V on forward voltage measurements.

Mechanical Dimensions



TOLERANCES
(UNLESS OTHERWISE SPECIFIED)

LINEAR:		ANGULAR:	
XX.	$\pm 0.25\text{mm}$	XX.	$\pm 1^\circ$
XX.X	$\pm 0.10\text{mm}$	XX.X	$\pm 0^\circ 30'$
XX.XX	$\pm 0.05\text{mm}$	XX.XX	$\pm 0^\circ 00' 30''$

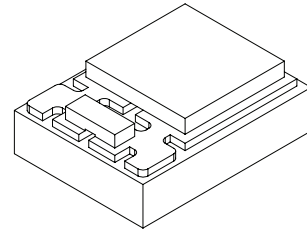


Figure 10. Mechanical dimensions for LUXEON UV U1.

Notes for Figure 10:

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

Reflow Soldering Guidelines

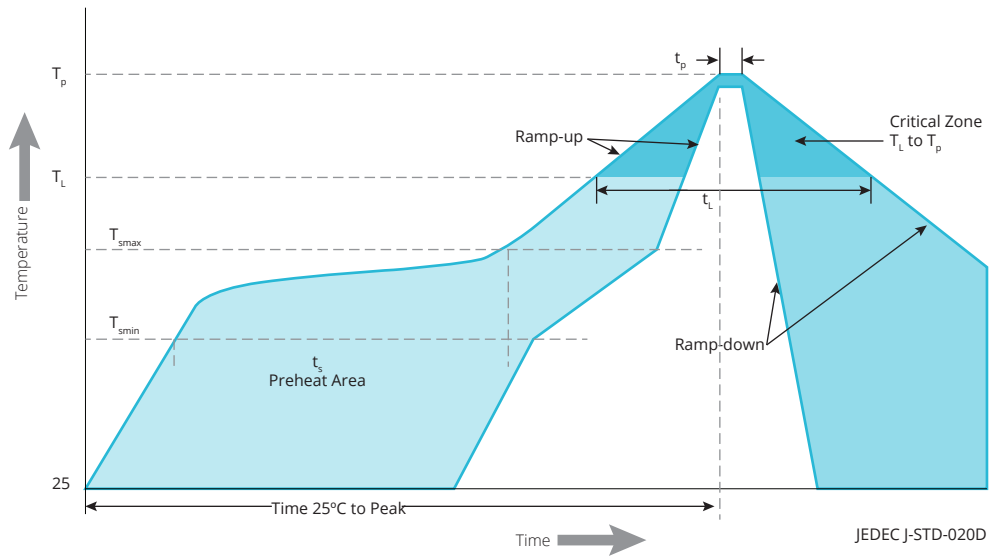


Figure 11. Visualization of the acceptable reflow temperature profile as specified in Table 8.

Table 8. Reflow profile characteristics for LUXEON UV U1.

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 120 seconds
Ramp-Up Rate (T_L to T_p)	3°C / second maximum
Liquidus 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 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

JEDEC Moisture Sensitivity

Table 9. Moisture sensitivity levels for LUXEON UV U1.

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

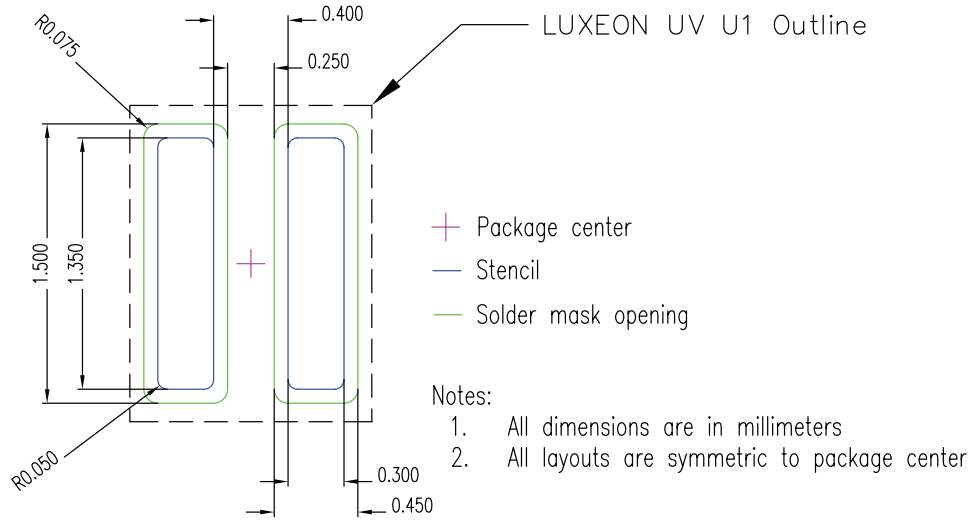


Figure 12. Recommended PCB solder pad layout for LUXEON UV U1.

Notes for Figure 12:

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

Packaging Information

Pocket Tape Dimensions

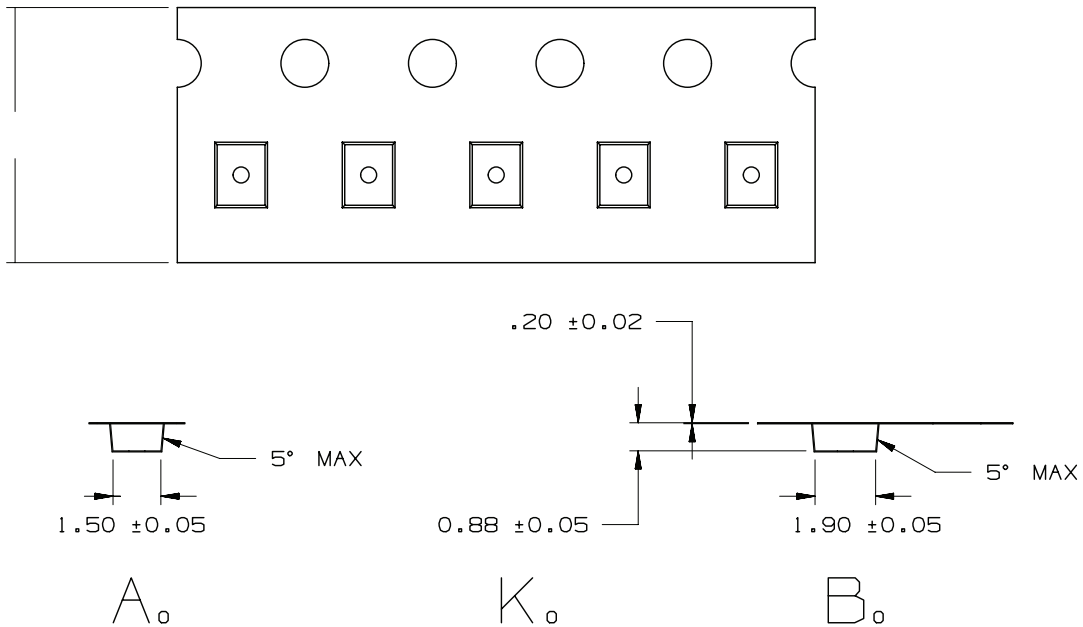


Figure 13. Pocket tape dimensions for LUXEON UV U1.

Notes for Figure 13:

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

Reel Dimensions

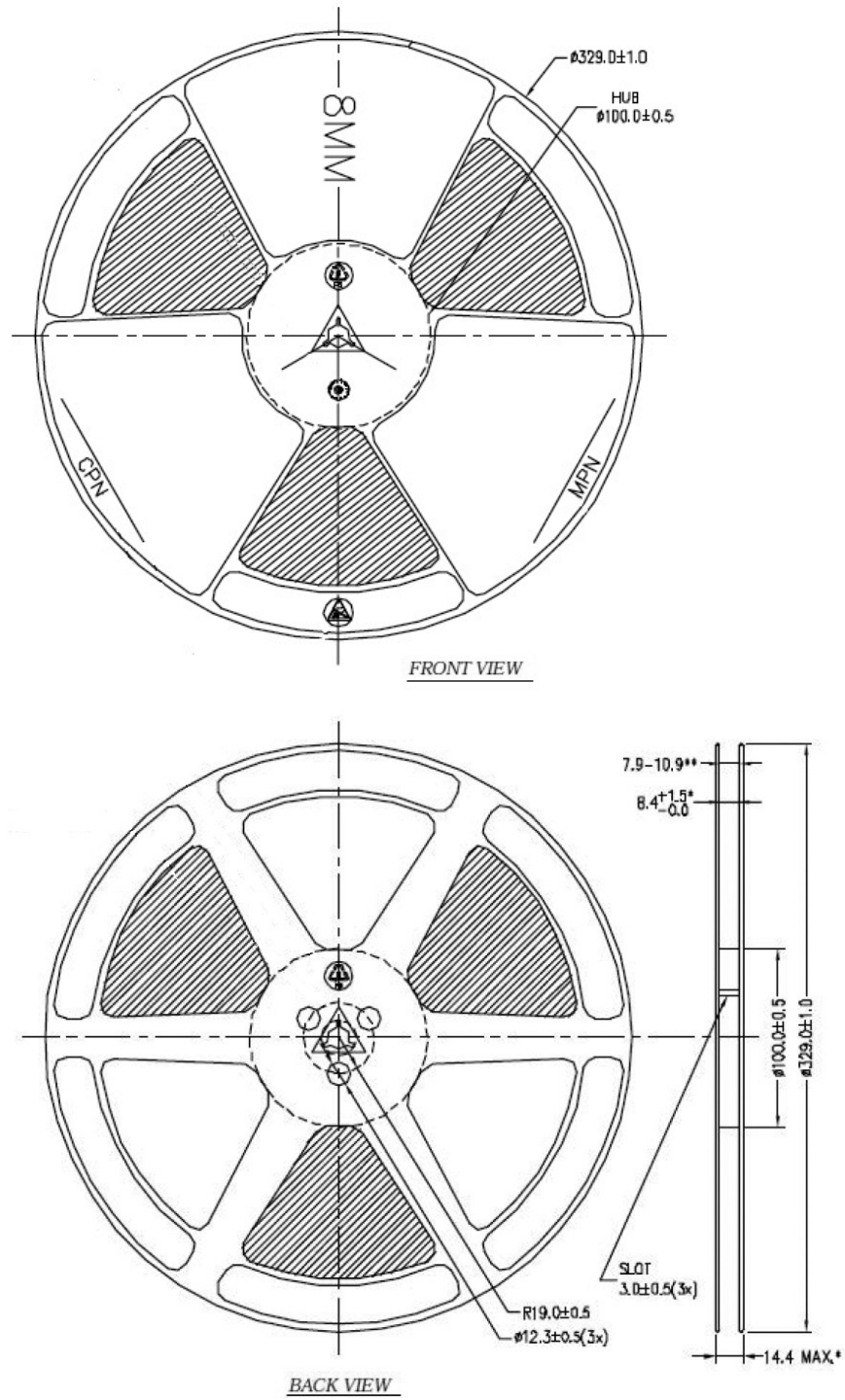


Figure 14. Reel dimensions for LUXEON UV U1.

- Notes for Figure 14:
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.



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