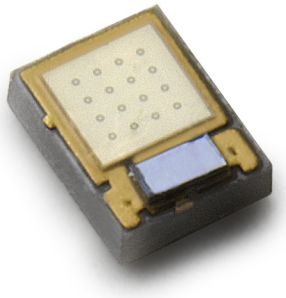
LUXEON UV

Superior Flux Density, Efficiency and Design Freedom – in the Industry's Only Micro-Package UV LED



Introduction

At 1/5 the size of other ultraviolet and violet LEDs, LUXEON® UV is the industry's smallest footprint high-power emitter. LUXEON UV LEDs can be assembled in tight arrays with spacing of only 200 microns, which enables highest power density (W/cm^2) systems. The product delivers superior efficiency, undomed for precise optical control, and a portfolio covering ultraviolet (380-400nm) and violet (400-430nm) light.

Features

- 2.2mm^2 micro footprint
- 1A max drive current
- AlN substrate
- Up to 45+% wall plug efficiency
- Undomed

Benefits

- Industry's highest array W/cm^2
- More flux per LED
- R_{th} as low as 3.5 K/W
- Less heat to manage
- Precise optical control

Key Applications

- Curing
- Medical
- Scientific
- Security/Forensic
- Specialty Lighting

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General Information

Test Conditions

LUXEON UV emitters are specified and binned at 500 mA, 20ms monopulse, and junction temperature of 25°C.

Product Nomenclature

The part number designation for LUXEON UV is as follows:

L H U V – a B B B – c D D D

Where:

a — open slot to accommodate additional requirements per product and part number. a is 0 by default

BBB — designates beginning of 5nm wavelength bin (for example, 395 for 395-400nm)

c — open slot to accommodate additional requirements per product and part number. c is 0 by default

DDD — designates minimum radiometric power in mW (for example, 500 for 500mW)

Safety

WARNING: LUXEON UV products emit ultraviolet light. Do not look at operating LEDs. Eye injury may result. Use necessary skin and eye protection. Assume IEC62471 Risk Group 3.

Radiant Flux Characteristics, T_J = 25°C

Table 1.

Wavelength Bin [1]	Part Number	Typ Radiometric Power [2], mW		Max Wall-Plug Efficiency, %
		500 mA	1000 mA	
380-385nm	LHUV-0380-0150 LHUV-0380-0200	175 225	370 475	12 15
385-390nm	LHUV-0385-0200 LHUV-0385-0250	225 275	470 570	15 18
390-395nm	LHUV-0390-0300 LHUV-0390-0350 LHUV-0390-0400 LHUV-0390-0450	330 375 425 470	695 790 900 1000	22 25 28 32
395-400nm	LHUV-0395-0350 LHUV-0395-0400 LHUV-0395-0450 LHUV-0395-0500	375 425 475 525	765 870 970 1075	25 28 31 35
400-405nm	LHUV-0400-0400 LHUV-0400-0450 LHUV-0400-0500	435 475 525	875 960 1055	28 31 34
405-410nm	LHUV-0405-0500 LHUV-0405-0550 LHUV-0405-0600 LHUV-0405-0650	525 575 625 675	1005 1100 1195 1295	35 38 41 45
410-415nm	LHUV-0410-0500 LHUV-0410-0550 LHUV-0410-0600 LHUV-0410-0650	525 575 625 675	985 1080 1160 1255	35 38 41 45
415-420nm	LHUV-0415-0550 LHUV-0415-0600 LHUV-0415-0650	575 625 675	1070 1160 1250	39 42 46
420-425nm	LHUV-0420-0550 LHUV-0420-0600 LHUV-0420-0650	575 625 675	1060 1150 1245	39 42 46
425-430nm	LHUV-0425-0550 LHUV-0425-0600 LHUV-0425-0650	575 625 675	1070 1165 1260	39 42 46

Notes for Table 1:

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

Other Characteristics, T_J=25°C, Test Current = 500 mA

Table 2.

Wavelength Bin [1]	Part Number	Forward Voltage, V			Typical Spectral Half-width, nm [2] $\Delta\lambda_{1/2}$	Typical Viewing Angle, degrees [3] $2\theta_{1/2}$	Thermal Resistance R_{th}, [4] °C/W
		Minimum	Typical	Maximum			
380-385nm	LHUV-0380	2.5	3.2	3.5	9	125	6
385-390nm	LHUV-0385	2.5	3.1	3.5	10	125	6
390-395nm	LHUV-0390	2.5	3.1	3.5	10	125	5
395-400nm	LHUV-0395	2.5	3.1	3.5	11	125	4.5
400-405nm	LHUV-0400	2.5	3.1	3.5	11	125	4.5
405-410nm	LHUV-0405	2.5	3.0	3.5	12	125	4.5
410-415nm	LHUV-0410	2.5	3.0	3.5	13	125	4
415-420nm	LHUV-0415	2.5	3.0	3.5	14	125	3.5
420-425nm	LHUV-0420	2.5	3.0	3.5	14	125	3.5
425-430nm	LHUV-0425	2.5	3.0	3.5	14	125	3.5

Notes for Table 2:

1. Philips Lumileds maintains a tolerance of ± 2nm for peak wavelength measurements.
2. Spectral width at ½ of the peak intensity.
3. Viewing angle is the off axis angle from lamp centerline where the radiometric power intensity is ½ of the peak value.
4. R_{th} between junction and electrode pads.

Absolute Maximum Ratings

Table 3.

Condition	Absolute Maximum Rating
Forward Current (mA)	1000 mA
Junction Temperature [1]	135°C
ESD Sensitivity	Class 3B 8kV HBM JEDEC JS-001-2012
Operating Temperature	-40°C – 135°C
Storage Temperature	-40°C – 135°C
Reverse Voltage	LUXEON UV LEDs are not designed to be driven in reverse bias.

Notes for Table 3:

1. Proper current derating must be observed to maintain junction temperature below the maximum. Maximum junction temperature dependant on wavelegnth bin and drive current. See AB114 for derating curve.

Mechanical Dimensions

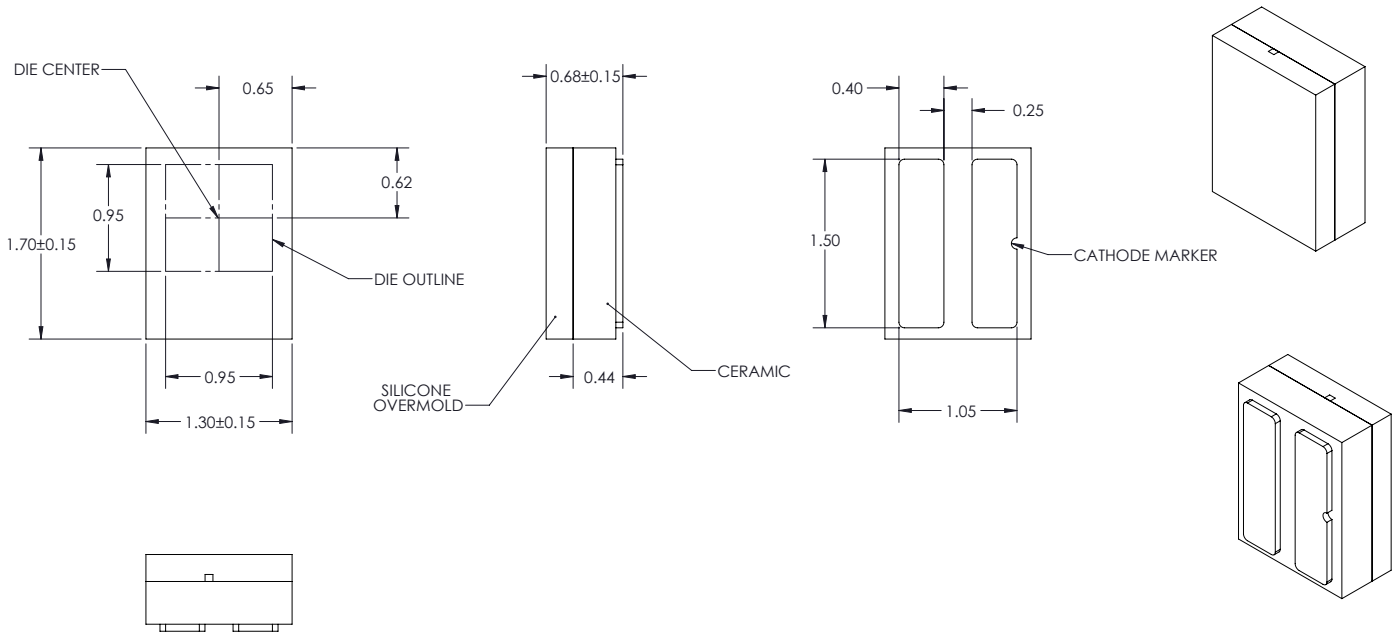

Figure 1. Package outline drawing.

Notes for Figure 1:

1. All dimensions are in millimeters.
2. To avoid damage, do not manually exert force to the top surface. See AB114 for handling precautions.
3. Drawings not to scale.

Solder Pad Design

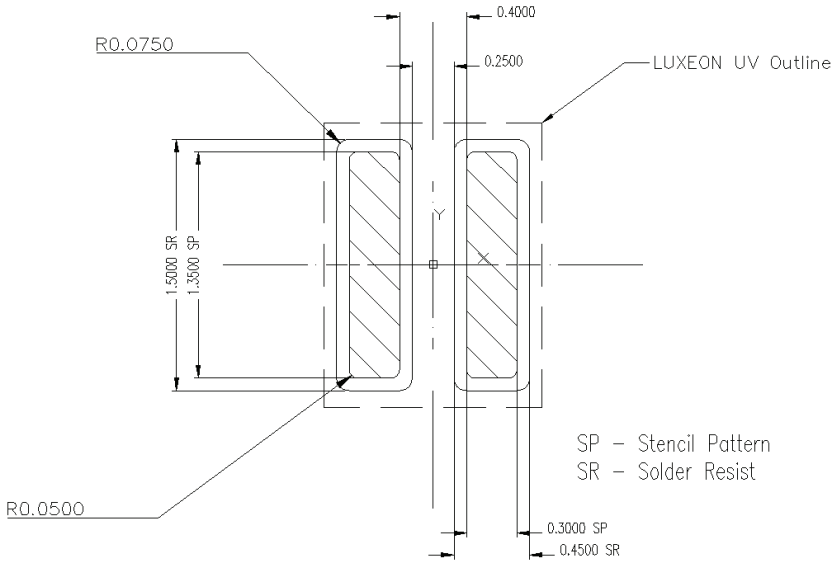

Figure 2. Solder pad layout.

Notes for Figure 2:

1. All dimensions are in millimeters.

JEDEC Moisture Sensitivity

Table 4.

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

Reflow Soldering Characteristics

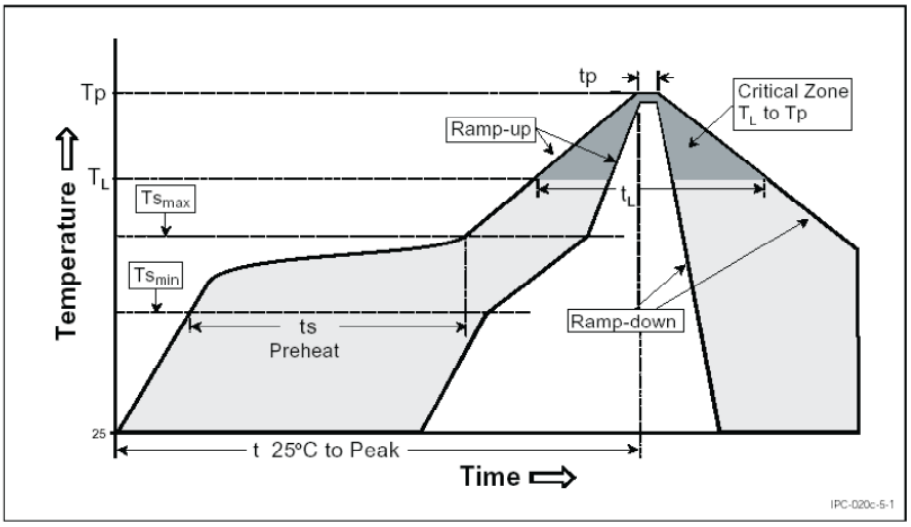

Figure 3. Reflow soldering conditions.

Table 5.

Profile Feature	Lead Free Assembly
Average Ramp-Up Rate (Ts_{max} to T_P)	3°C / second max
Preheat Temperature Min (T_{smin})	150°C
Preheat Temperature Max (Ts_{max})	200°C
Preheat Time (ts_{min} to ts_{max})	60 - 180 seconds
Temperature T_L (t_L)	217°C
Time Maintained Above Temperature T_L (t_L)	60 - 150 seconds
Peak / Classification Temperature (T_P)	260°C
Time Within 5°C of Actual Peak Temperature (t_P)	20 - 40 seconds
Ramp-Down Rate	6°C / second max
Time 25°C to Peak Temperature	8 minutes max

Note for Table 5:

- All temperatures refer to the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

Typical Characteristic Curves

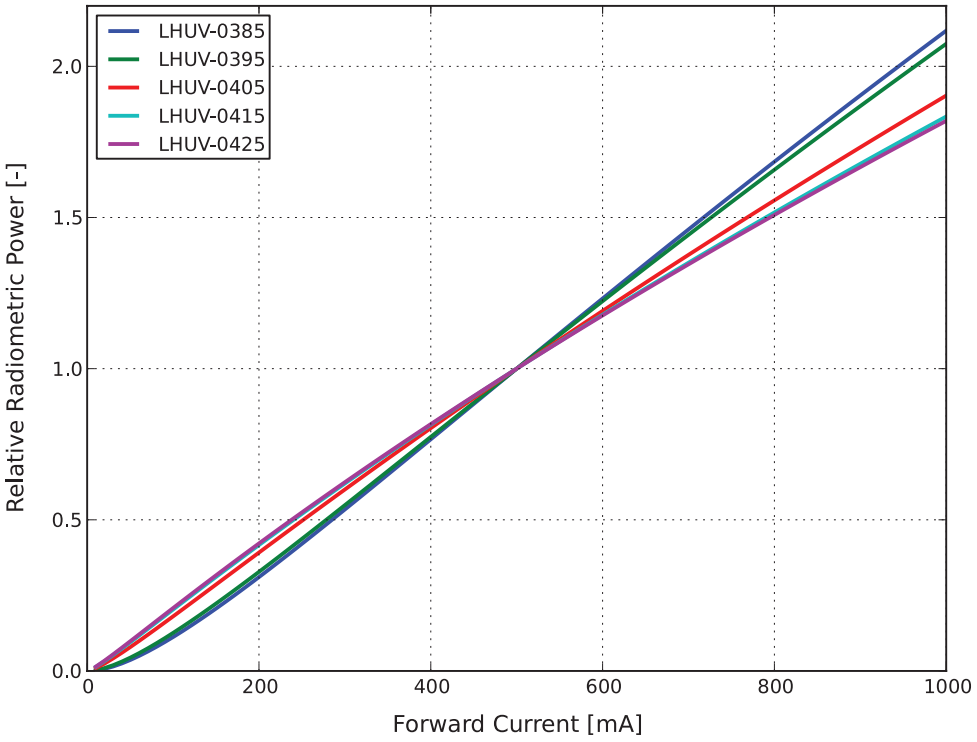

Figure 4. Typical relative radiant flux vs. forward current, T_j = 25°C.

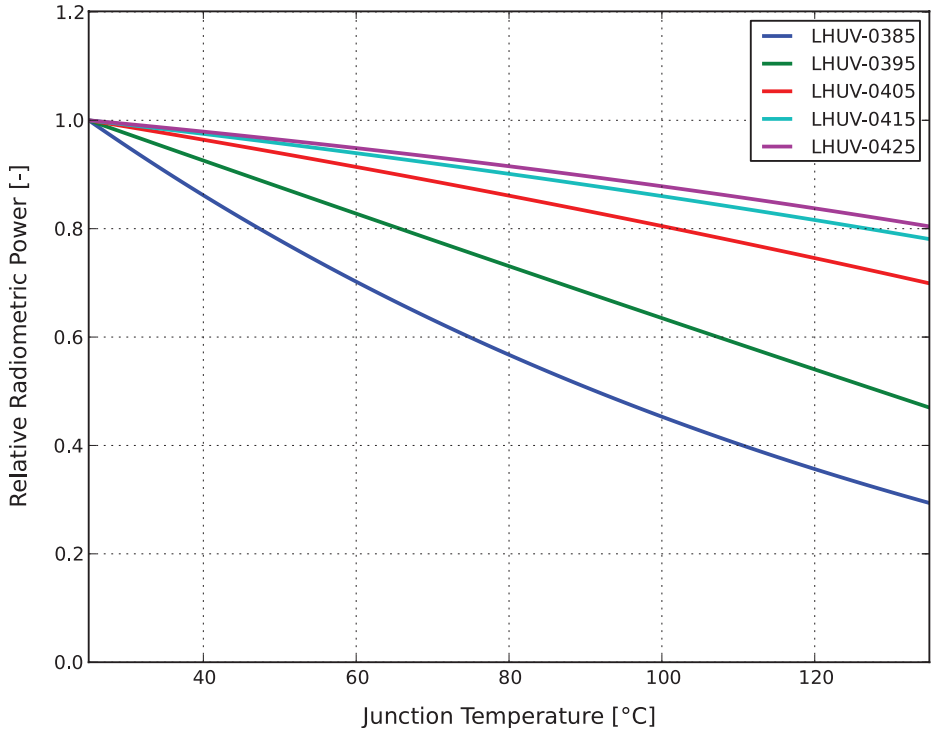

Figure 5. Typical relative radiant flux vs. junction temperature, test current = 500 mA.

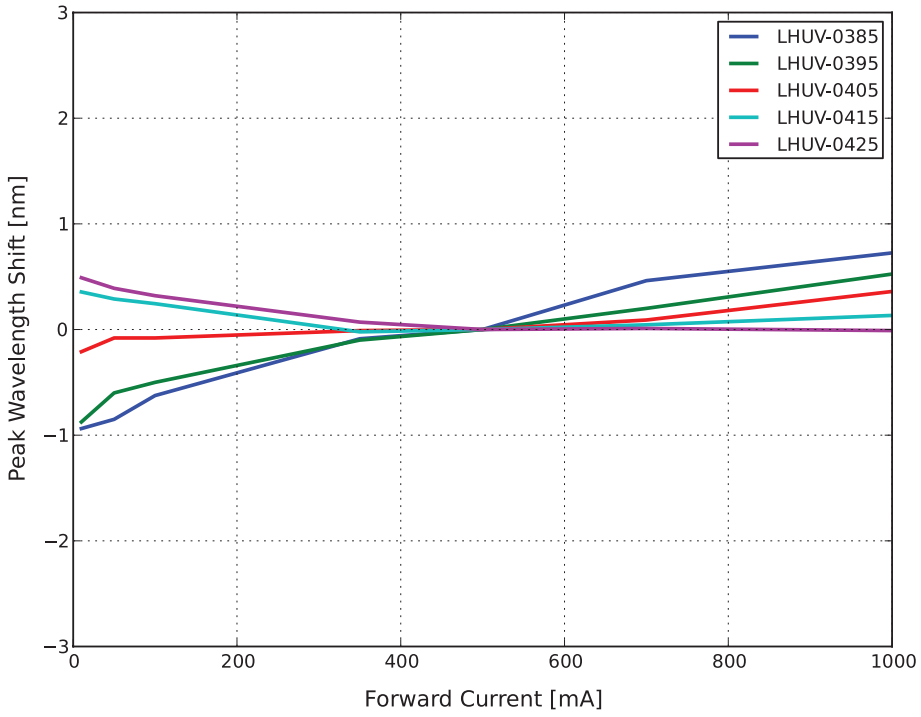

Figure 6. Typical peak wavelength vs. forward current, T_j = 25°C.

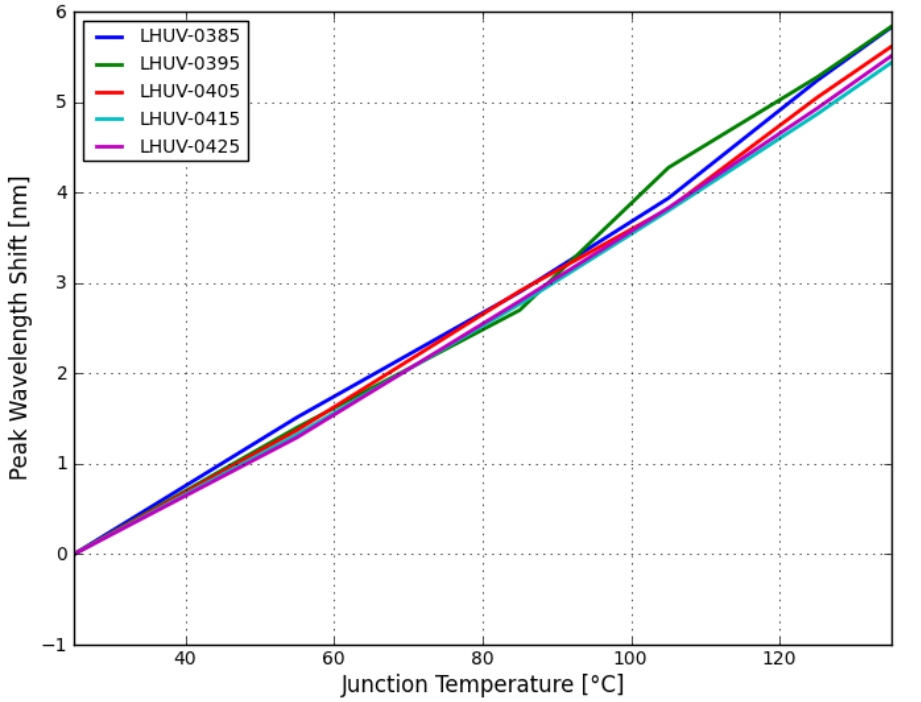

Figure 7. Typical peak wavelength vs. junction temperature.

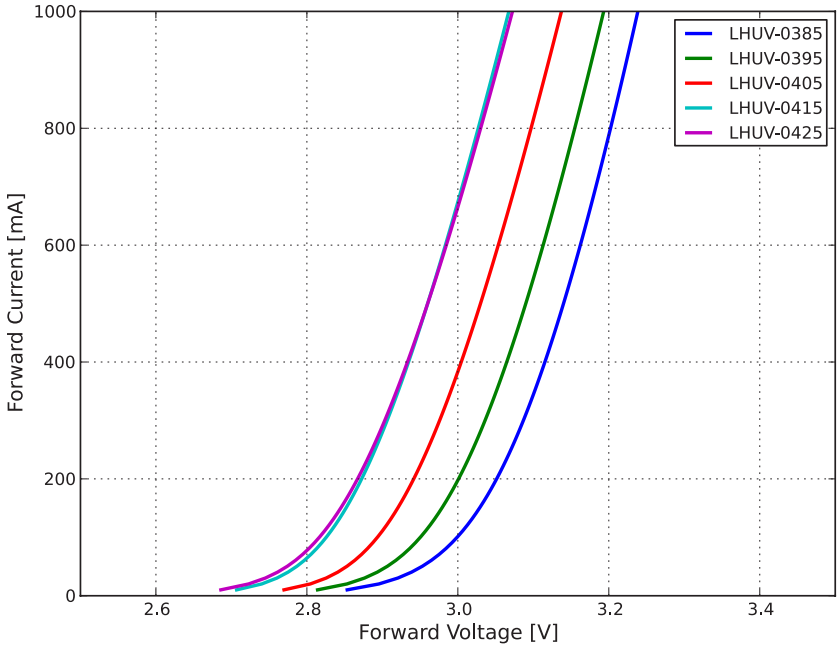

Figure 8. Typical forward current vs. forward voltage, T_j = 25°C.

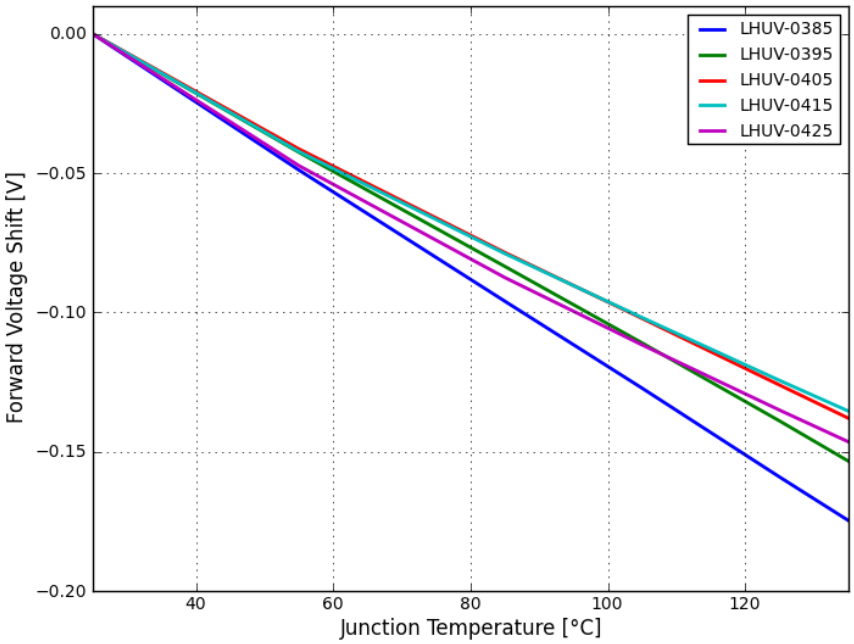

Figure 9. Typical forward voltage vs. junction temperature.

Typical Radiation Patterns

Typical Spatial Radiation Pattern

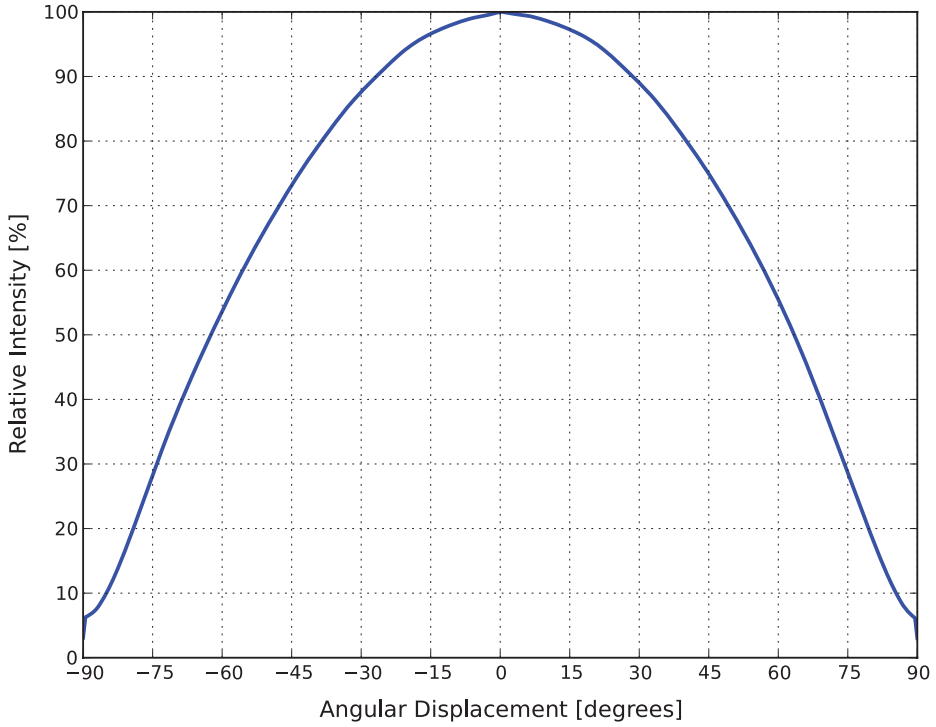

Figure 10. Typical spatial radiation pattern.

Typical Polar Radiation Pattern

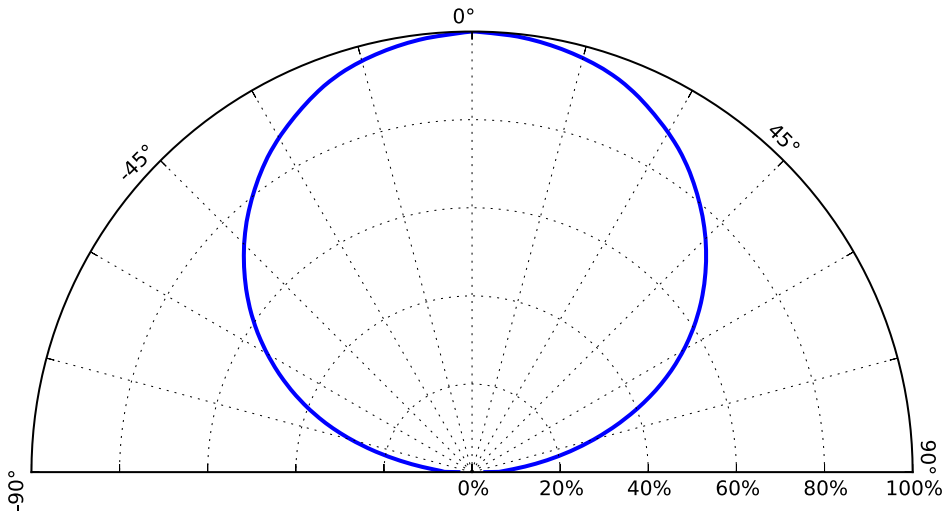

Figure 11. Typical polar radiation pattern.

Flux and Wavelength Bin Availability

Table 6 highlights standard radiometric power and wavelength bins in grey. Although several bins are outlined, product availability in a particular bin varies by production run.

Table 6.

Minimum Radiometric Power	Wavelength Bin / Part Number									
	380-385nm	385-390nm	390-395nm	395-400nm	400-405nm	405-410nm	410-415nm	415-420nm	420-425nm	425-430nm
	LHUV-0380	LHUV-0385	LHUV-0390	LHUV-0395	LHUV-0400	LHUV-0405	LHUV-0410	LHUV-0415	LHUV-0420	LHUV-0425
150mW										
200mW										
250mW										
300mW										
350mW										
400mW										
450mW										
500mW										
550mW										
600mW										
650mW										

Emitter Pocket Tape Packaging

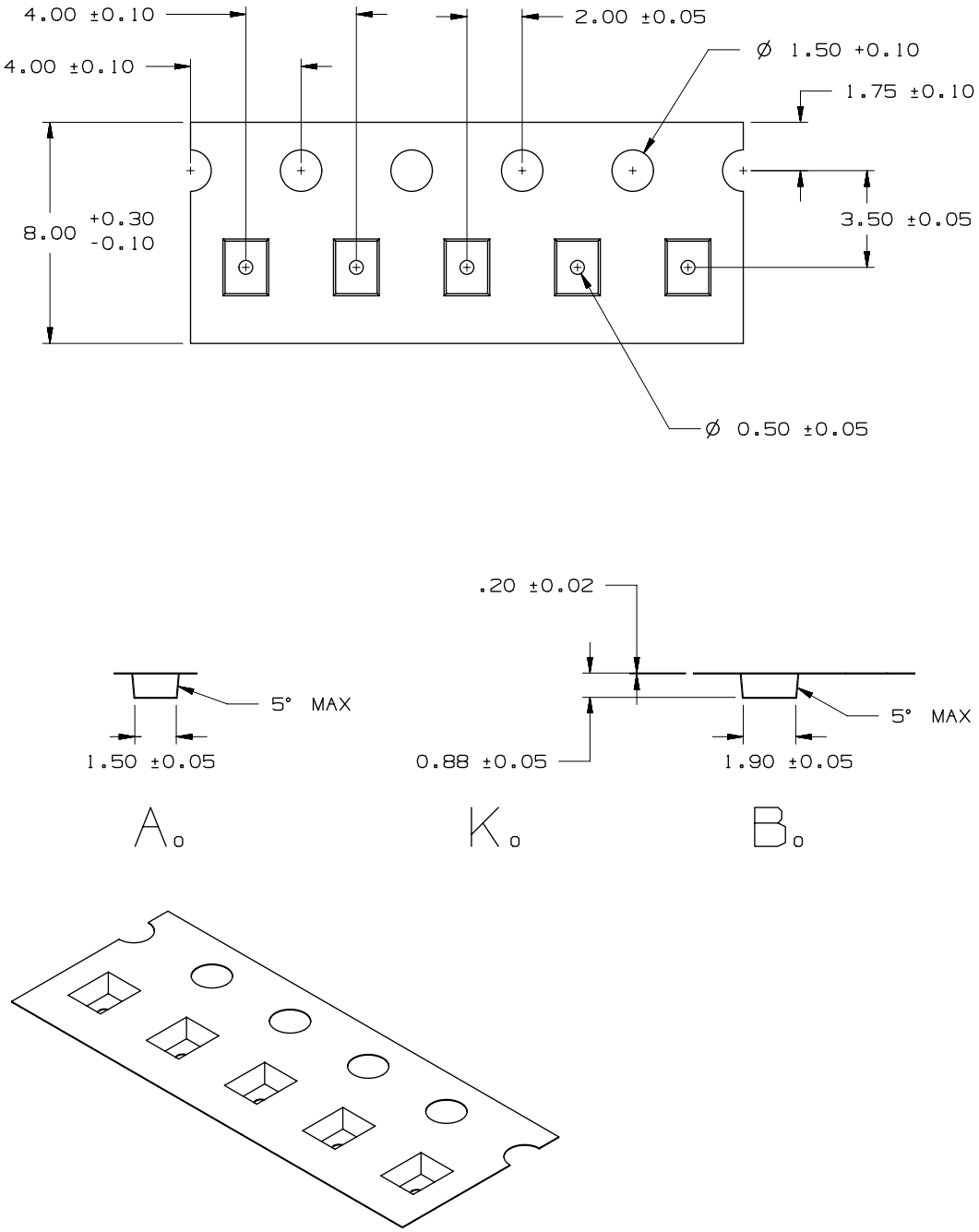

Figure 12. Emitter pocket tape packaging.

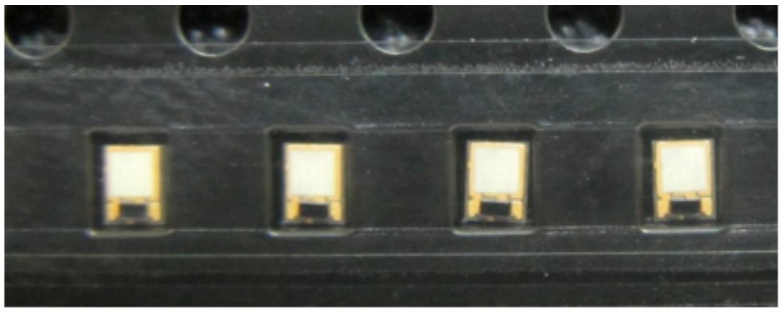

Figure 13. Orientation of LEDs inside carrier tape.

Emitter Reel Packaging

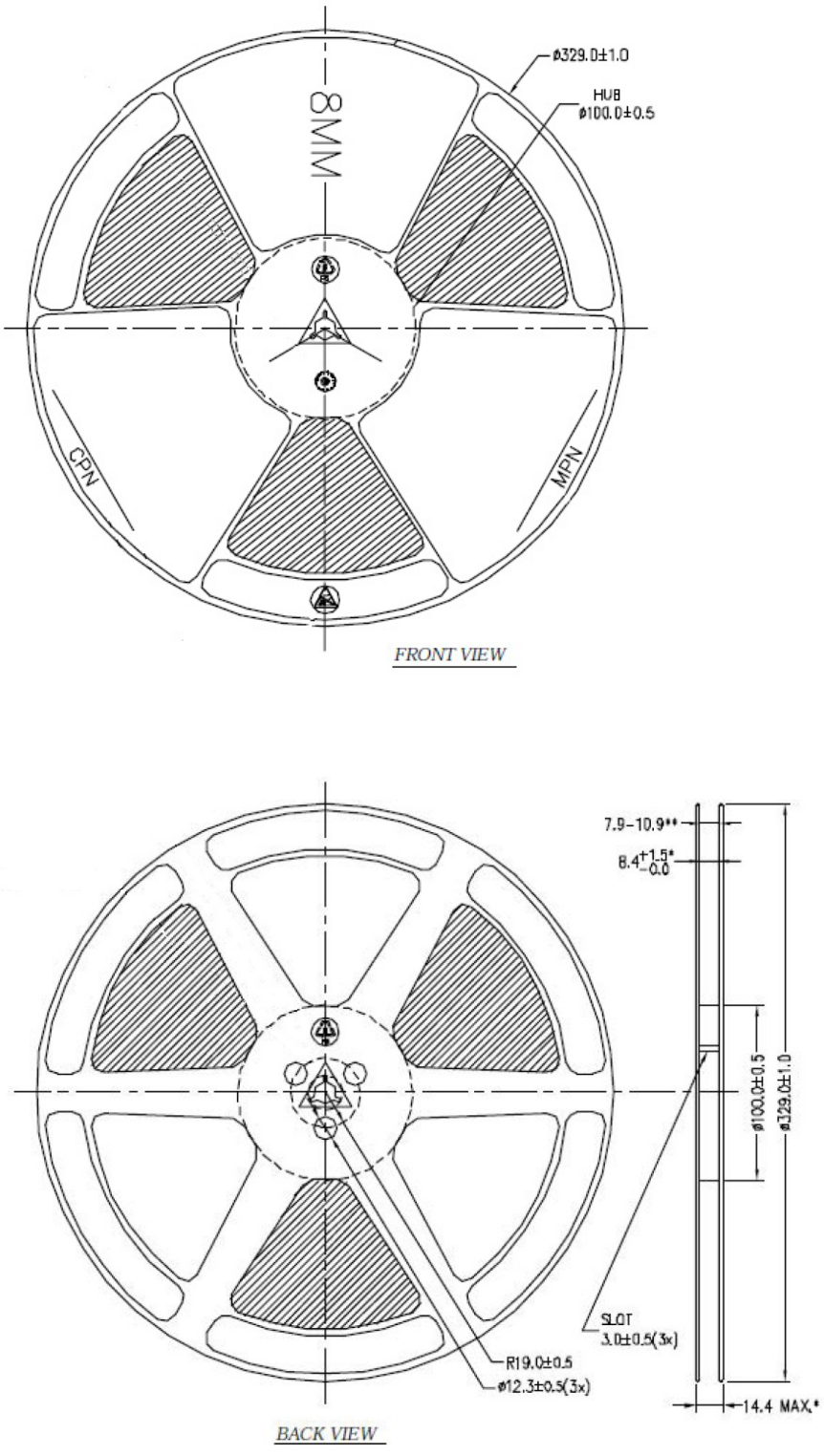

Figure 14. Emitter reel packaging.

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Who We Are

Philips Lumileds focuses on one goal: Creating the world's highest performing LEDs. The company pioneered the use of solid-state lighting in breakthrough products such as the first LED backlit TV, the first LED flash in camera phones, and the first LED daytime running lights for cars. Today we offer the most comprehensive portfolio of high quality LEDs and uncompromising service.

Philips Lumileds brings LED's qualities of energy efficiency, digital control and long life to spotlights, downlights, high bay and low bay lighting, indoor area lighting, architectural and specialty lighting as well as retrofit lamps. Our products are engineered for optimal light quality and unprecedented efficacy at the lowest overall cost. By offering LEDs in chip, packaged and module form, we deliver supply chain flexibility to the inventors of next generation illumination.

Philips Lumileds understands that solid state lighting is not just about energy efficiency. It is about elegant design. Reinventing form. Engineering new materials. Pioneering markets and simplifying the supply chain. It's about a shared vision. Learn more about our comprehensive portfolio of LEDs at www.philipslumileds.com.

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