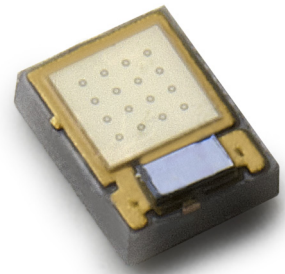


# LUXEON UV

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 ( $\text{W}/\text{cm}^2$ ) systems. The product delivers superior efficiency, undomed for precise optical control, and a portfolio covering ultraviolet (380-400nm) and violet (400-430nm) light.

### Features

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

### Benefits

- Industry's highest array  $\text{W}/\text{cm}^2$
- More flux per LED
- $R_{\text{th}}$  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 UV – 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, $T_j = 25^\circ\text{C}$

**Table 1.**

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

**Notes for Table 1:**

1. Philips Lumileds maintains a tolerance of  $\pm 2\text{nm}$  for peak wavelength measurements.
2. Philips Lumileds maintains a tolerance of  $\pm 10\%$  for radiometric power measurements.

## Other Characteristics, $T_j=25^{\circ}\text{C}$ , Test Current = 500 mA

**Table 2.**

| Wavelength Bin <sup>[1]</sup> | Part Number | Forward Voltage, V |         |         | Typical Spectral Half-width, nm <sup>[2]</sup><br>$\Delta\lambda_{1/2}$ | Typical Viewing Angle, degrees <sup>[3]</sup><br>$2\theta_{1/2}$ | Thermal Resistance $R_{th}$ , <sup>[4]</sup><br>$^{\circ}\text{C/W}$ |
|-------------------------------|-------------|--------------------|---------|---------|-------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------|
|                               |             | 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  $\pm 2\text{nm}$  for peak wavelength measurements.
2. Spectral width at  $1/2$  of the peak intensity.
3. Viewing angle is the off axis angle from lamp centerline where the radiometric power intensity is  $1/2$  of the peak value.
4.  $R_{th}$  between junction and electrode pads.

## Absolute Maximum Ratings

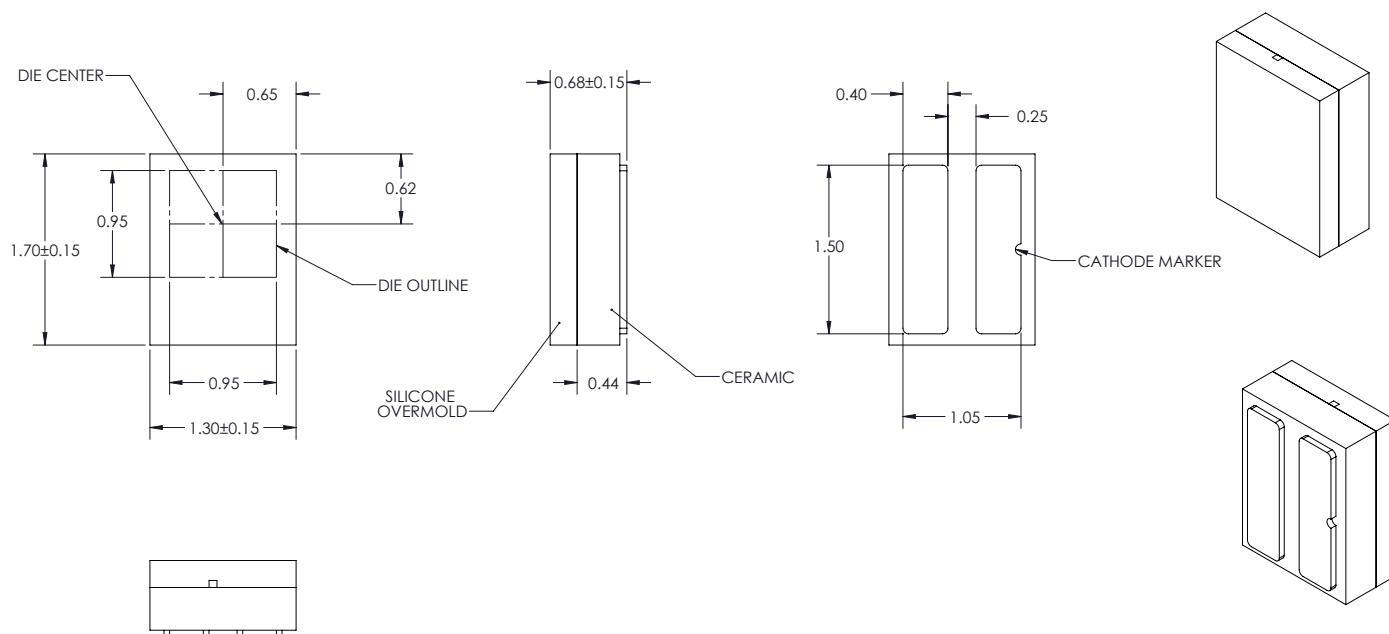
**Table 3.**

| Condition                           | Absolute Maximum Rating                                       |
|-------------------------------------|---------------------------------------------------------------|
| Forward Current (mA)                | 1000 mA                                                       |
| Junction Temperature <sup>[1]</sup> | 135 $^{\circ}\text{C}$                                        |
| ESD Sensitivity                     | Class 3B 8kV HBM JEDEC JS-001-2012                            |
| Operating Temperature               | -40 $^{\circ}\text{C}$ – 135 $^{\circ}\text{C}$               |
| Storage Temperature                 | -40 $^{\circ}\text{C}$ – 135 $^{\circ}\text{C}$               |
| 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 ABI 14 for derating curve.

# Mechanical Dimensions

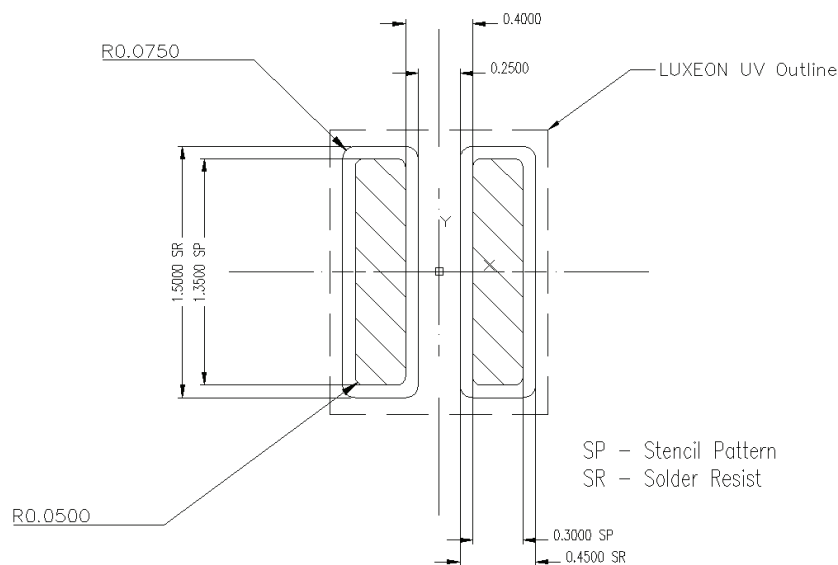


**Figure 1. Package outline drawing.**

## Notes for Figure 1:

1. All dimensions are in millimeters.
2. To avoid damage, do not manually exert force to the top surface. See ABI 14 for handling precautions.
3. Drawings not to scale.

# Solder Pad Design



**Figure 2. Solder pad layout.**

## Notes for Figure 2:

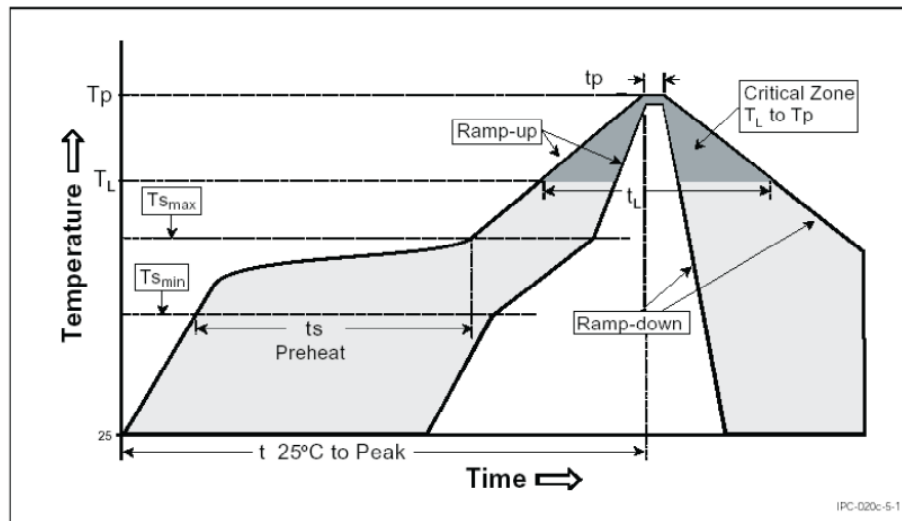
1. All dimensions are in millimeters.

# JEDEC Moisture Sensitivity

**Table 4.**

| Level | Floor Life |                                       | Soak Requirements Standard |                                  |
|-------|------------|---------------------------------------|----------------------------|----------------------------------|
|       | Time       | Conditions                            | Time                       | Conditions                       |
| I     | unlimited  | $\leq 30^{\circ}\text{C}$ /<br>85% RH | 168h<br>+ 5 / - 0          | $85^{\circ}\text{C}$ / 85%<br>RH |

## Reflow Soldering Characteristics



**Figure 3. Reflow soldering conditions.**

**Table 5.**

| Profile Feature                                                      | Lead Free Assembly               |
|----------------------------------------------------------------------|----------------------------------|
| Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_p$ )                      | $3^{\circ}\text{C}$ / second max |
| Preheat Temperature Min ( $T_{s_{min}}$ )                            | $150^{\circ}\text{C}$            |
| Preheat Temperature Max ( $T_{s_{max}}$ )                            | $200^{\circ}\text{C}$            |
| Preheat Time ( $t_{s_{min}}$ to $t_{s_{max}}$ )                      | 60 - 180 seconds                 |
| Temperature $T_L$ ( $t_L$ )                                          | $217^{\circ}\text{C}$            |
| Time Maintained Above Temperature $T_L$ ( $t_L$ )                    | 60 - 150 seconds                 |
| Peak / Classification Temperature ( $T_p$ )                          | $260^{\circ}\text{C}$            |
| Time Within $5^{\circ}\text{C}$ of Actual Peak Temperature ( $t_p$ ) | 20 - 40 seconds                  |
| Ramp-Down Rate                                                       | $6^{\circ}\text{C}$ / second max |
| Time $25^{\circ}\text{C}$ 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

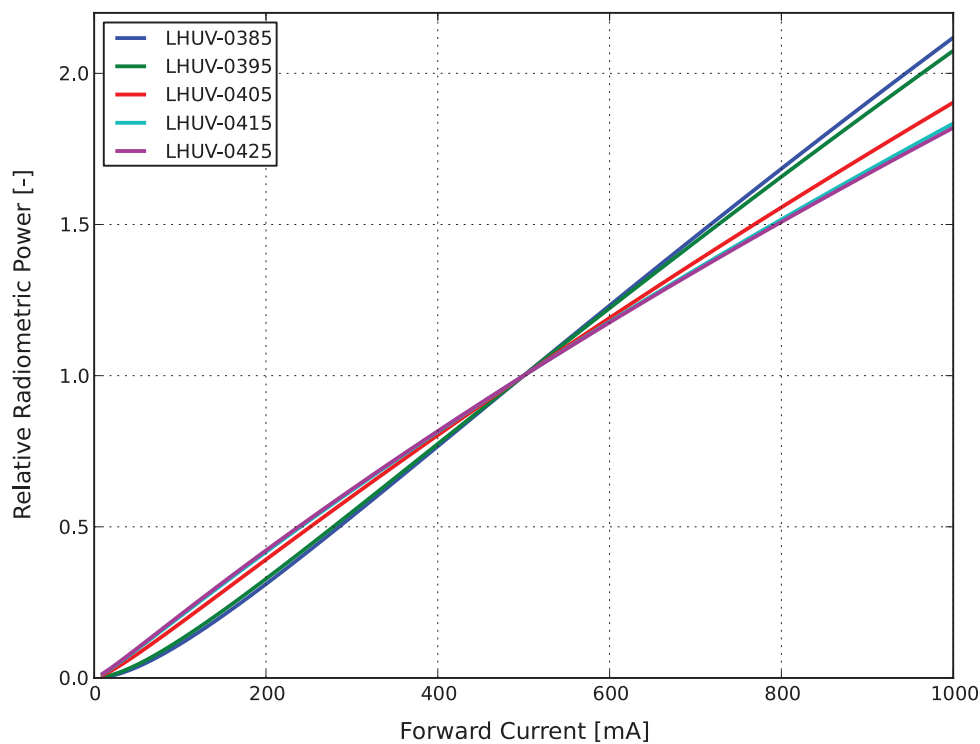


Figure 4. Typical relative radiant flux vs. forward current,  $T_j = 25^{\circ}\text{C}$ .

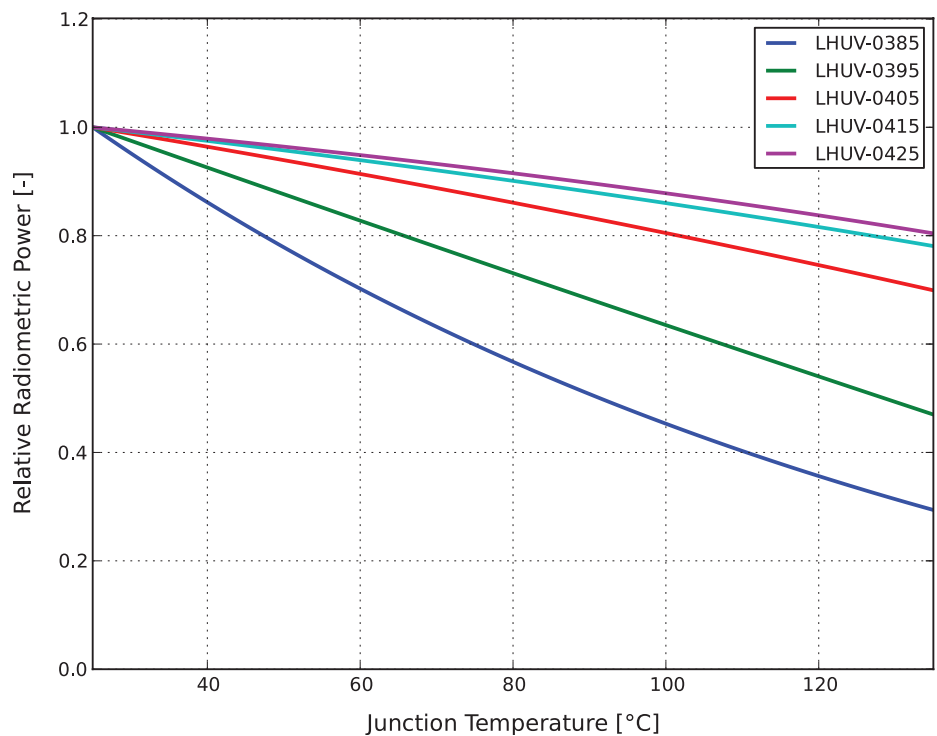


Figure 5. Typical relative radiant flux vs. junction temperature, test current = 500 mA.

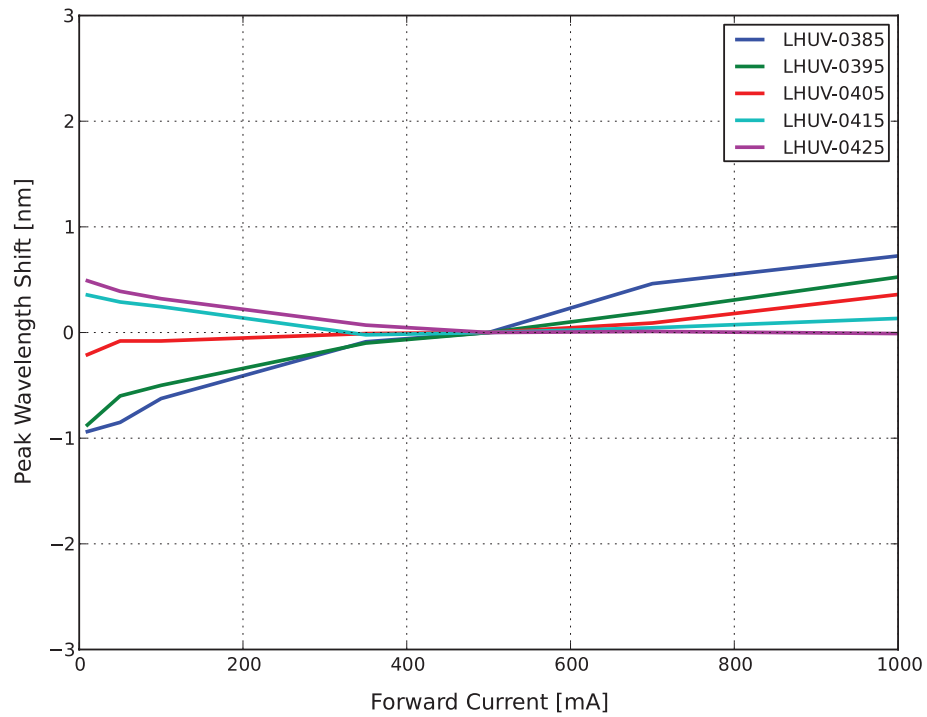


Figure 6. Typical peak wavelength vs. forward current,  $T_j = 25^\circ\text{C}$ .

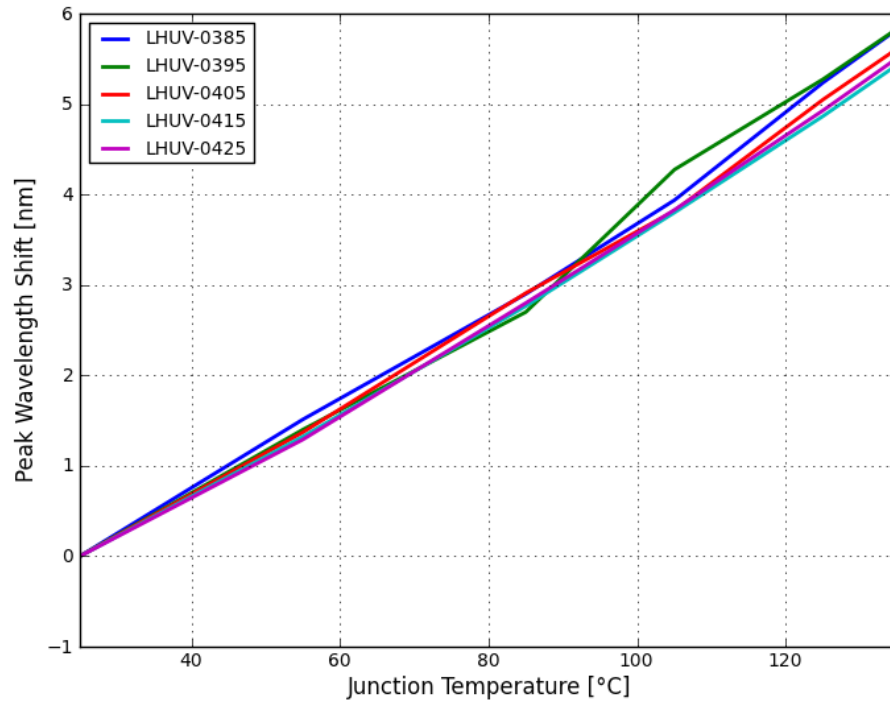


Figure 7. Typical peak wavelength vs. junction temperature.

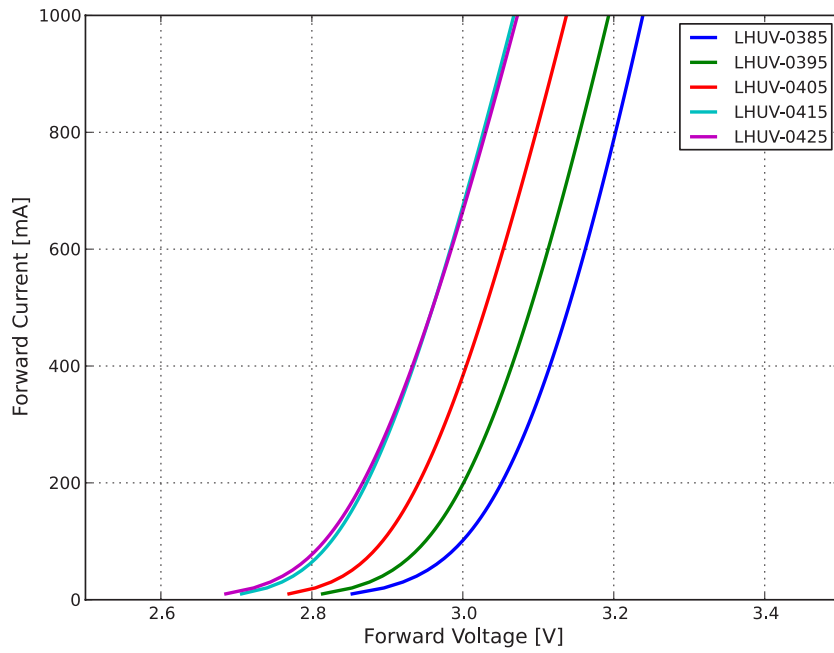


Figure 8. Typical forward current vs. forward voltage,  $T_j = 25^\circ\text{C}$ .

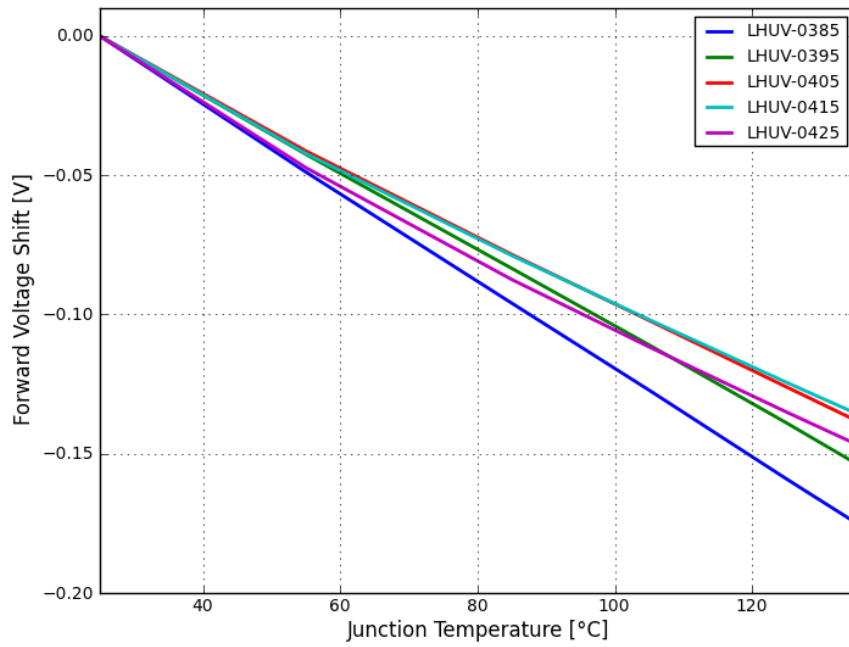


Figure 9. Typical forward voltage vs. junction temperature.

# Typical Radiation Patterns

## Typical Spatial Radiation Pattern

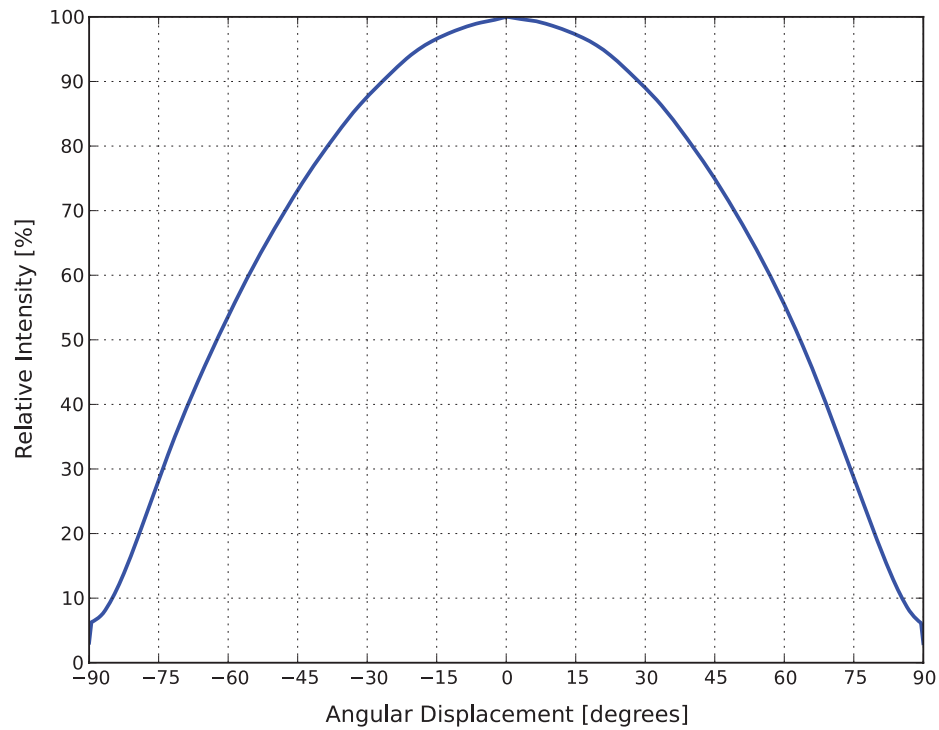


Figure 10. Typical spatial radiation pattern.

## Typical Polar Radiation Pattern

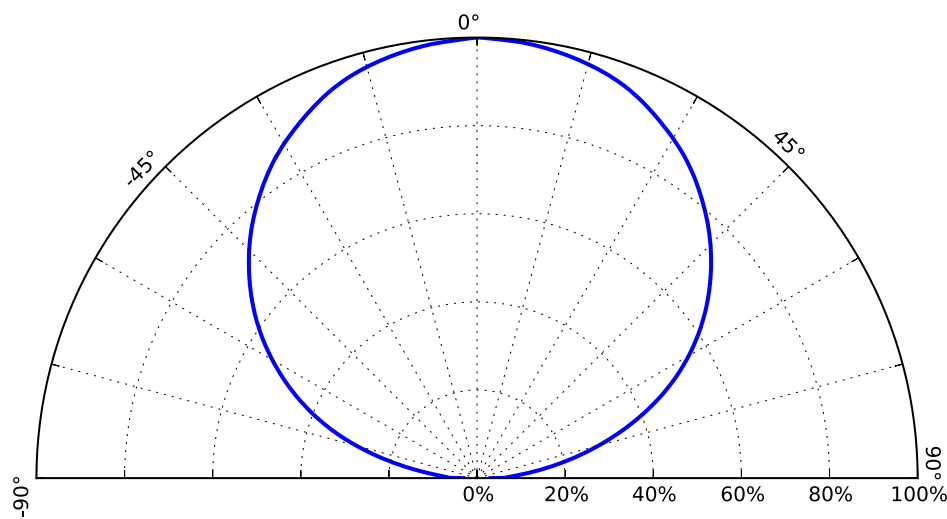


Figure 11. Typical polar radiation pattern.

# 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

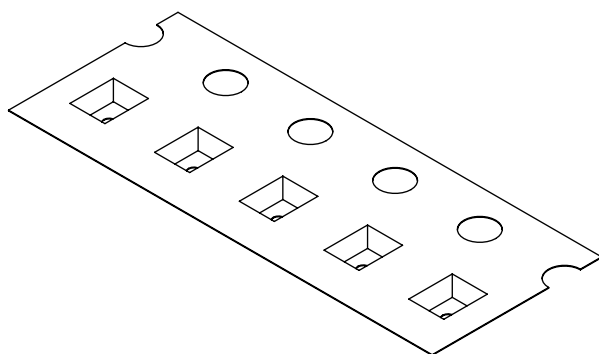
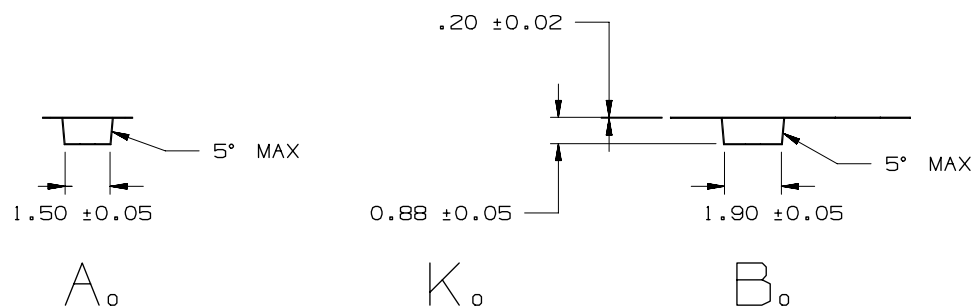
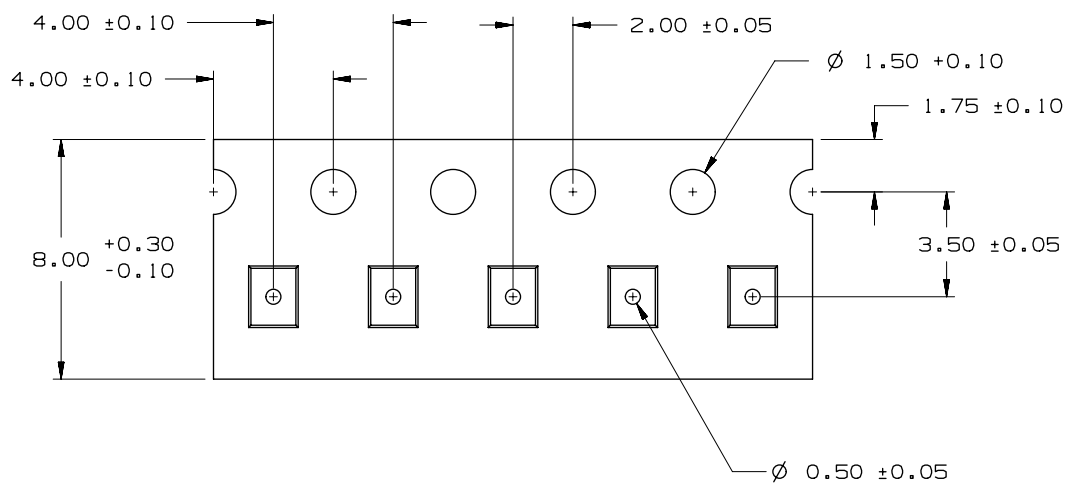


Figure 12. Emitter pocket tape packaging.

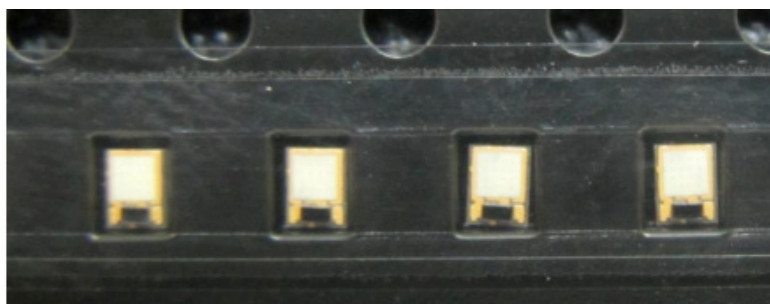
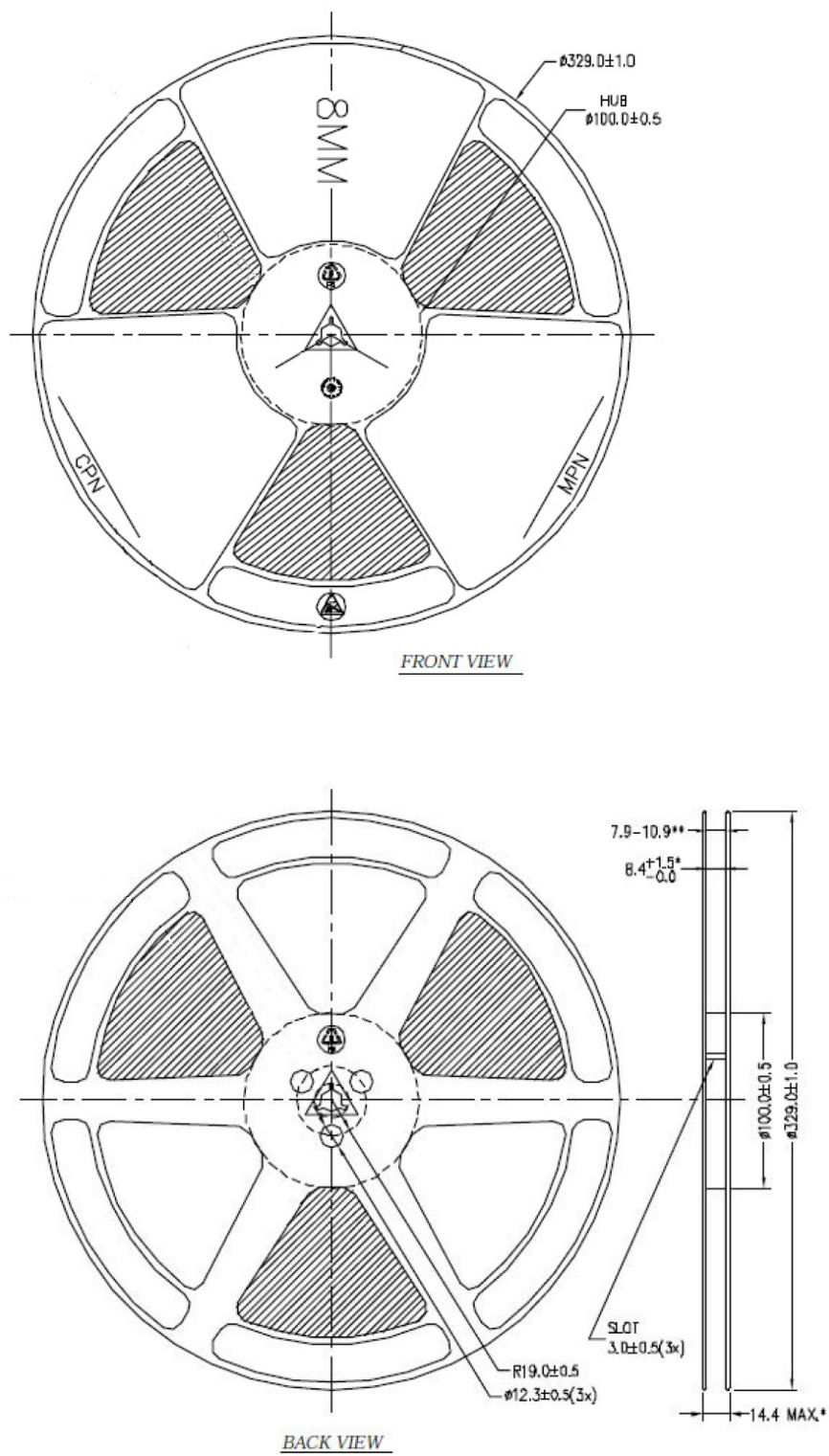


Figure 13. Orientation of LEDs inside carrier tape.

## Emitter Reel Packaging



**Figure 14. Emitter reel packaging.**

## 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](http://www.philipslumileds.com).



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