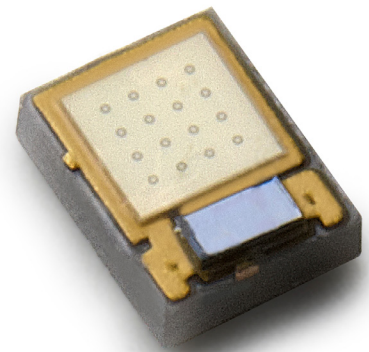




## LUXEON Z UV

Superior flux density, efficiency and design freedom — in the industry's only micro-package UV LED

At 1/5<sup>th</sup> the size of other ultraviolet and violet LEDs, LUXEON Z UV LEDs, a SMT device, can be assembled in tight arrays with spacing of only 200 microns, which enables high power density (W/cm<sup>2</sup>) 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 quality of light, volume of lumens, and real world efficacy enable leading performance and efficient solution development in a wide variety of indoor and outdoor lighting segments.



### FEATURES AND BENEFITS

Offering ultraviolet in 380-400nm and violet (400-430nm) for a range of options

Small 2.2mm<sup>2</sup> SMT footprint enables highest W/cm<sup>2</sup> systems, design flexibility

1A max drive current allows more flux per LED

Up to 45%+ efficiency reduces heat output

AlN package of as low as 3.5 K/W for better thermal management

### PRIMARY APPLICATIONS

Specialty Lighting

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# General Information

## Test Conditions

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

## Product Nomenclature

The part number designation for LUXEON Z 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 Z 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, % |
|-------------------------------|----------------|-------------------------------------------|--------|-----------------------------|
|                               |                | 500mA                                     | 1000mA |                             |
| 380-385nm                     | LHUV-0380-0150 | 175                                       | 370    | 12                          |
|                               | LHUV-0380-0200 | 225                                       | 475    | 15                          |
|                               | LHUV-0380-0250 | 275                                       | 580    | 18                          |
|                               | LHUV-0380-0300 | 325                                       | 685    | 21                          |
| 385-390nm                     | LHUV-0385-0200 | 225                                       | 470    | 15                          |
|                               | LHUV-0385-0250 | 275                                       | 570    | 18                          |
|                               | LHUV-0385-0300 | 325                                       | 675    | 22                          |
|                               | LHUV-0385-0350 | 375                                       | 780    | 25                          |
| 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. Lumileds maintains a tolerance of  $\pm 2\text{nm}$  for peak wavelength measurements.
2. Lumileds maintains a tolerance of  $\pm 10\%$  for radiometric power measurements.

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

**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. 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

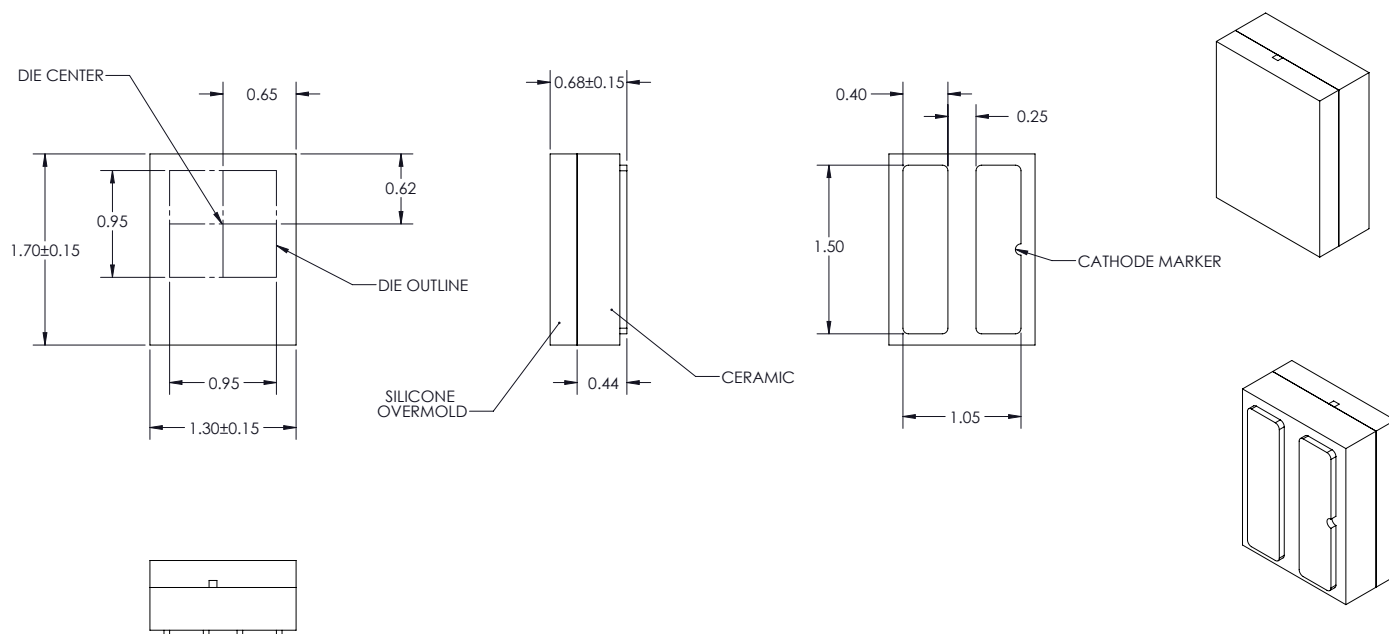
**Table 3.**

| Condition                           | Absolute Maximum Rating                                         |
|-------------------------------------|-----------------------------------------------------------------|
| Forward Current (mA)                | 1000mA                                                          |
| Junction Temperature <sup>[1]</sup> | 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 Z 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

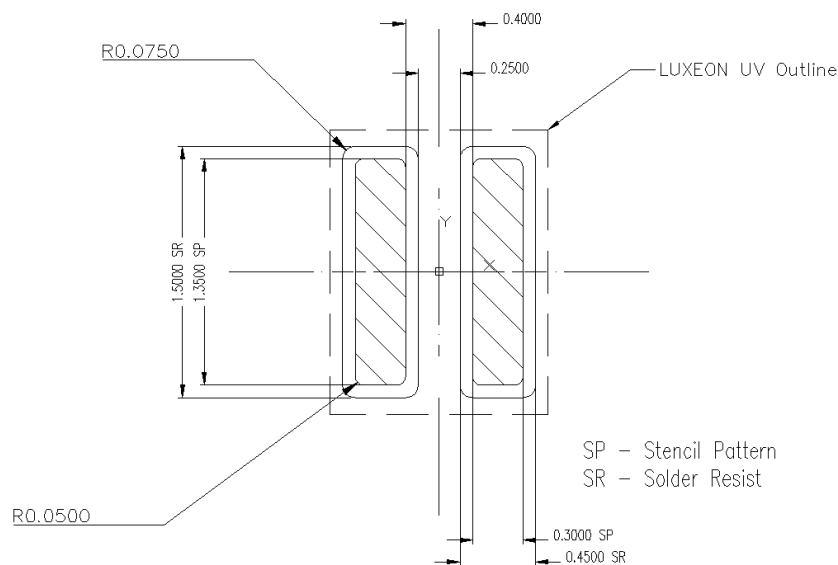


**Figure 1. Package outline drawing.**

## 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.

Table 4.

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

Reflow Soldering Characteristics

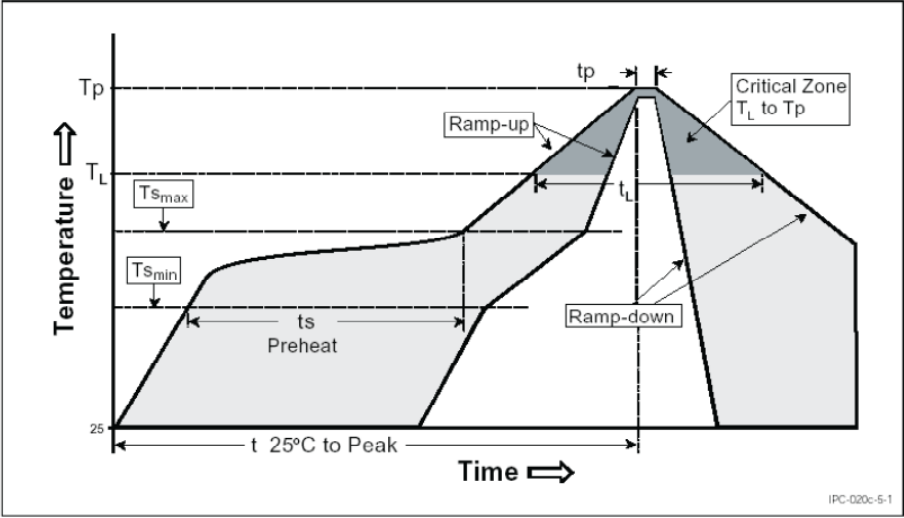


Figure 3. Reflow soldering conditions.

Table 5.

| Profile Feature                                      | Lead Free Assembly |
|------------------------------------------------------|--------------------|
| Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_p$ )      | 3°C / second max   |
| Preheat Temperature Min ( $T_{s_{min}}$ )            | 150°C              |
| Preheat Temperature Max ( $T_{s_{max}}$ )            | 200°C              |
| Preheat Time ( $t_{s_{min}}$ to $t_{s_{max}}$ )      | 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

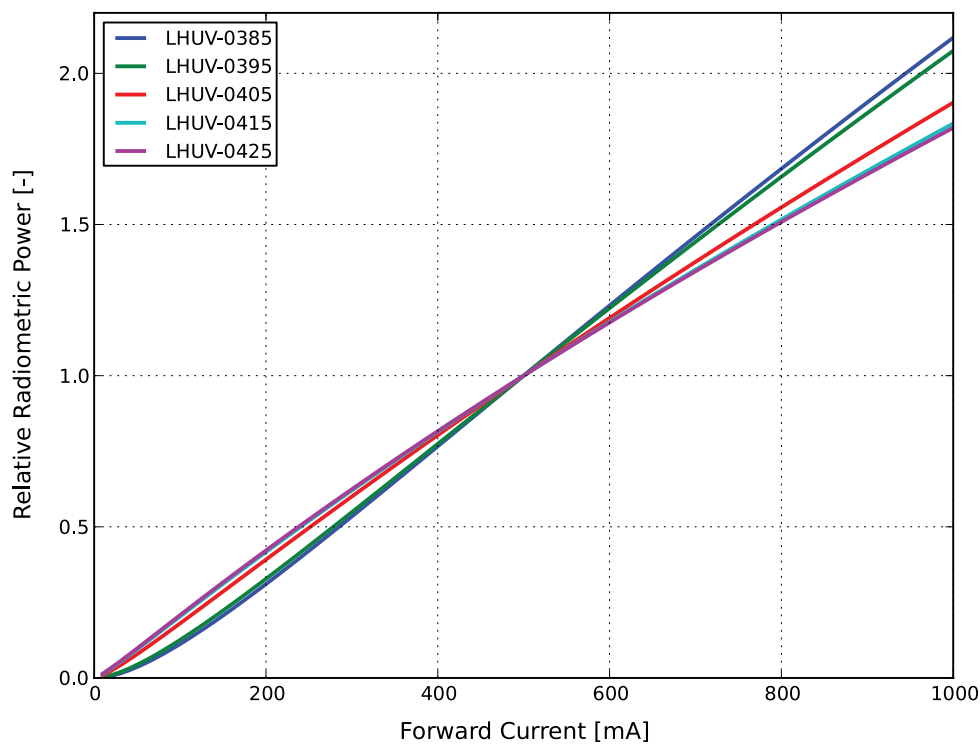


Figure 4. Typical relative radiant flux vs. forward current,  $T_j = 25^{\circ}\text{C}$ .

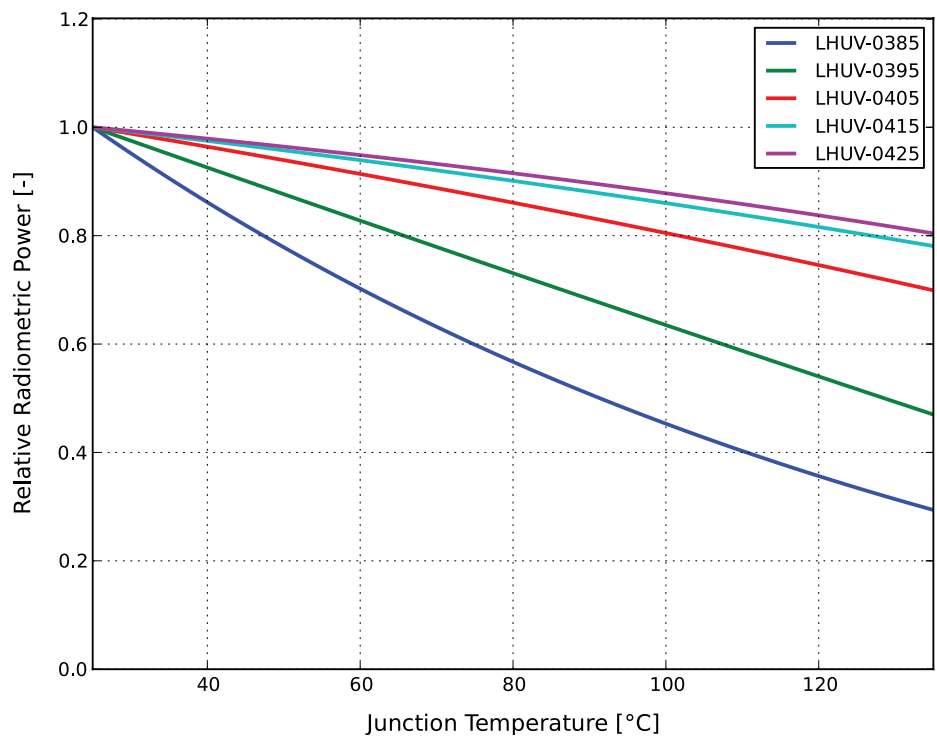


Figure 5. Typical relative radiant flux vs. junction temperature, test current = 500mA.



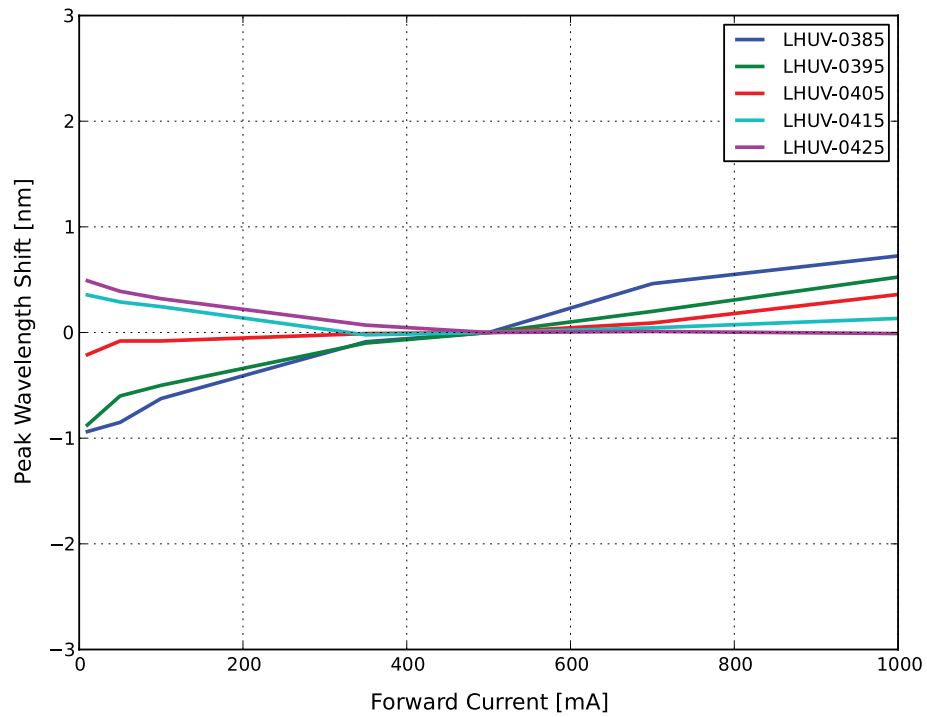


Figure 6. Typical peak wavelength vs. forward current,  $T_j = 25^\circ\text{C}$ .

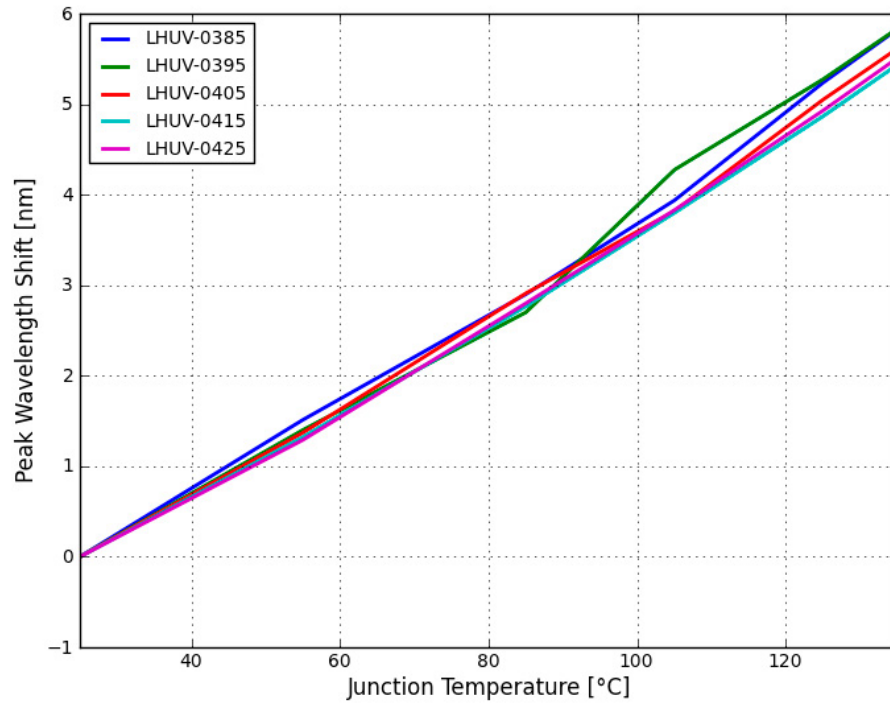


Figure 7. Typical peak wavelength vs. junction temperature.

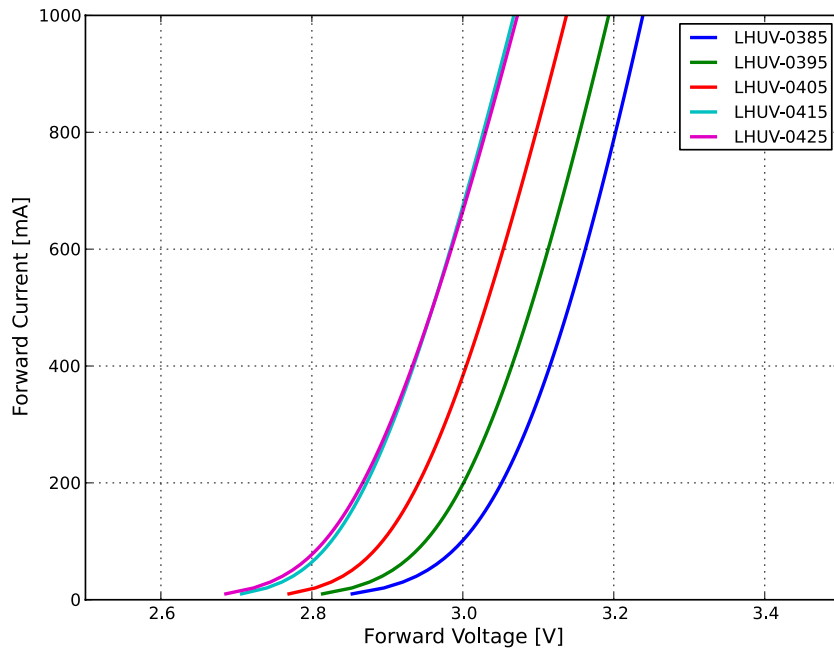


Figure 8. Typical forward current vs. forward voltage,  $T_j = 25^\circ\text{C}$ .

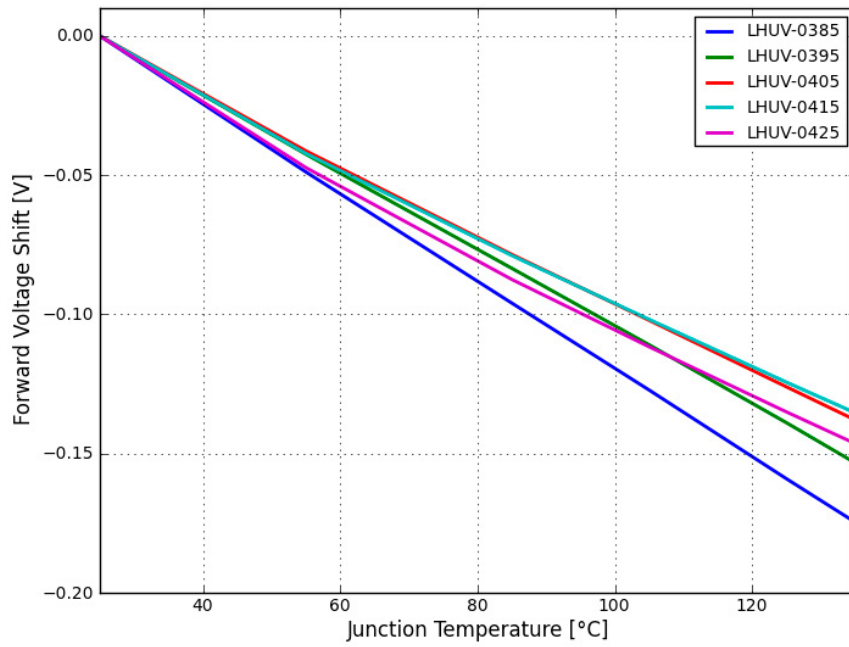


Figure 9. Typical forward voltage vs. junction temperature.

# Typical Radiation Patterns

## Typical Spatial Radiation Pattern

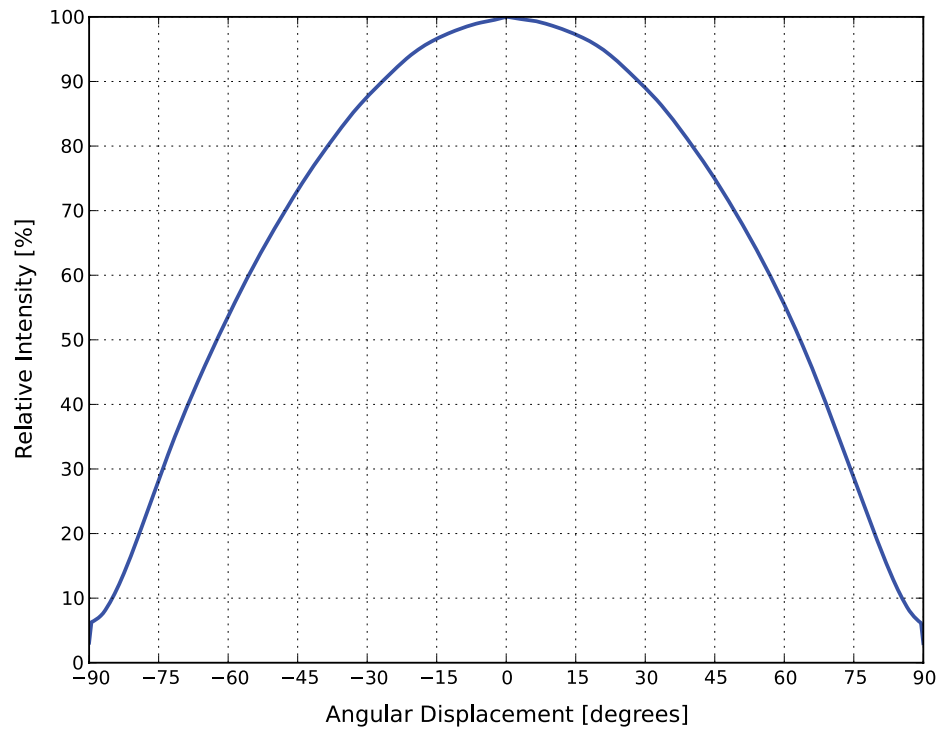


Figure 10. Typical spatial radiation pattern.

## Typical Polar Radiation Pattern

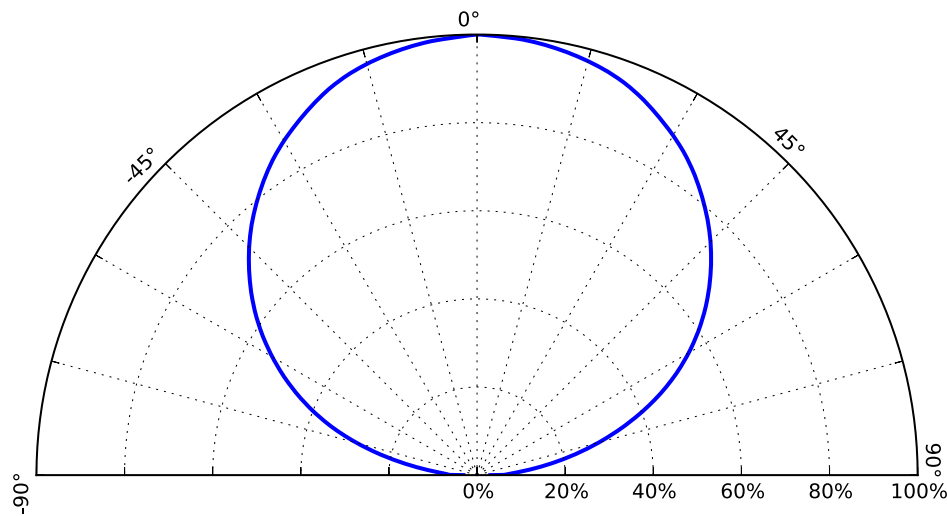


Figure 11. Typical polar radiation pattern.

## 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

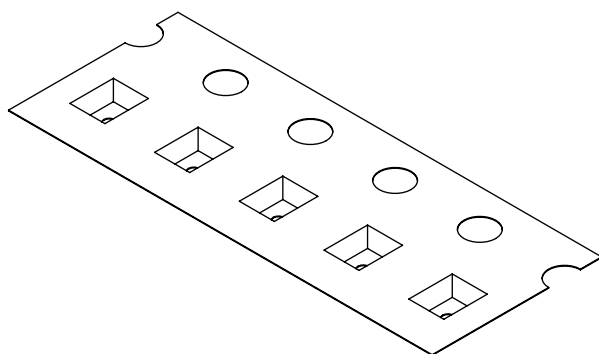
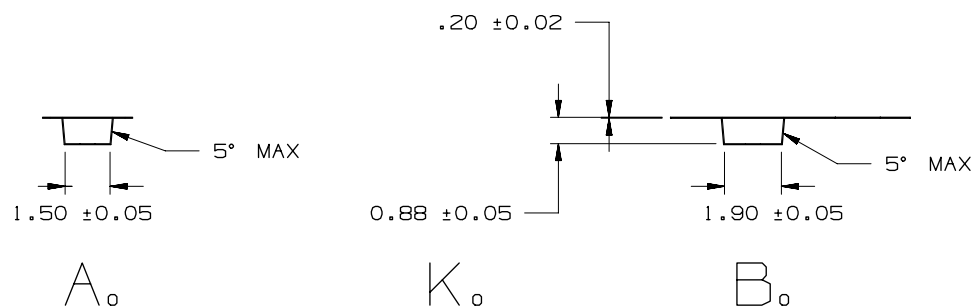
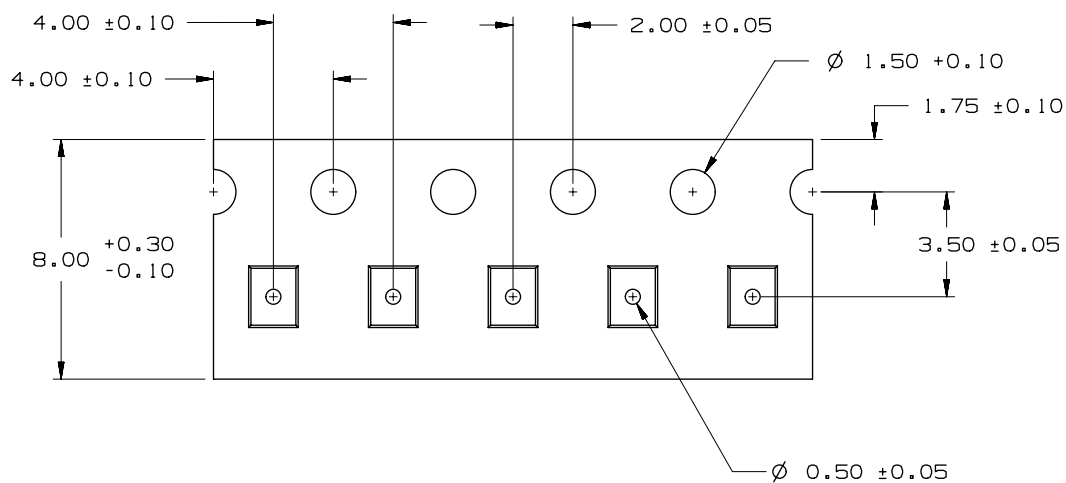


Figure 12. Emitter pocket tape packaging.

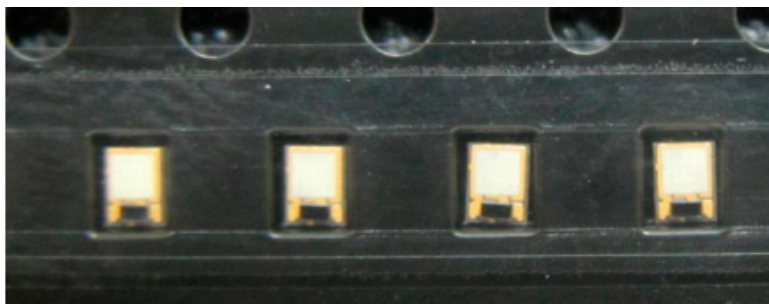


Figure 13. Orientation of LEDs inside carrier tape.

# Emitter Reel Packaging

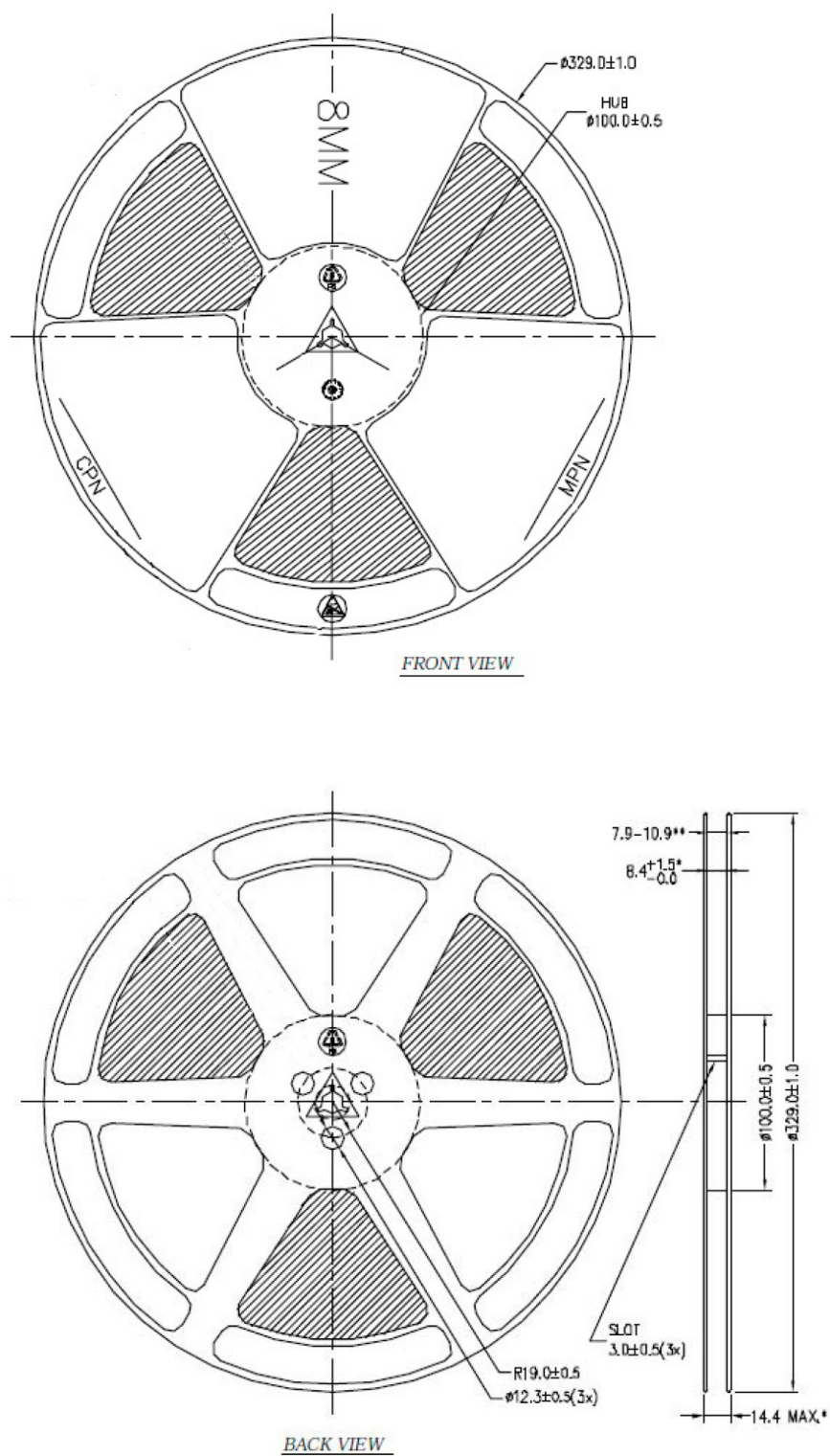


Figure 14. Emitter reel packaging.

# About Lumileds

Lumileds is the light engine leader, delivering innovation, quality, and reliability.

For 100 years, Lumileds commitment to innovation has helped customers pioneer breakthrough products in the automotive, consumer and illumination markets.

Lumileds is shaping the future of light with our LEDs and automotive lamps, and helping our customers illuminate how people see the world around them.

To learn more about our portfolio of light engines visit [www.lumileds.com](http://www.lumileds.com).



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