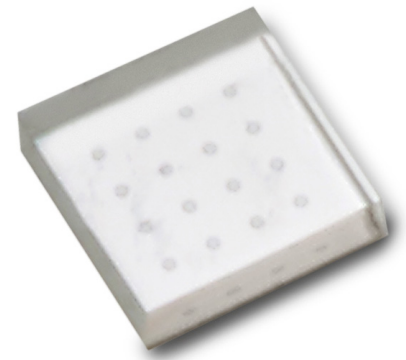




LUXEON FlipChip UV

Chip-scale package for maximum design flexibility in UV applications

LUXEON FlipChip UV is the smallest and highest power density (W/cm^2) ultraviolet with FlipChip Technology in a chip-scale package LED can be reflowed onto a substrate with a standard surface mount (SMT) equipment and process. LUXEON FlipChip UV LED enables tighter beam control and high packing density of LEDs on a chip-on-board solution and completely eliminates wire bonds in the system. LUXEON FlipChip UV is the ideal choice for cost sensitive applications to achieve high irradiance at high current density, maximizing $W/\$$ by taking the advantage of lowest thermal resistance of a chip-scale package device.



FEATURES AND BENEFITS

Ultraviolet wavelength range of 380–410nm for a range of options

Micro sized CSP: $1.0mm^2$ package for design flexibility and packing density

No wire bonds allows for direct attach and reflow

5-sided emitter with batwing radiation pattern enables wide viewing angles

Low thermal resistance for leading system level $lm/\$$

Maximum drive current of 1A for delivers superior lumens for reduced LED count

PRIMARY APPLICATIONS

Specialty Lighting

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General Information

Part Number Nomenclature

LUXEON FlipChip UV are specified and binned at 500mA and $T_j=25^{\circ}\text{C}$.

The alphanumeric part number designations for the LUXEON FlipChip UV are explained as follows:

L x F 2 – U y y y 1 0 0 0 z z z z 1

Where:

x — designates level (0 for die on blue bin tape, 1 for die on tape and reel)

U — designates for Ultraviolet color

yyy — designates minimum peak wavelength bin (390 for 390 nm minimum wavelength bin)

1000 — designates die dimension (1000 for 1.000 mm²)

zzzz — designates minimum radiometric power at test conditions (0500 for 500mW power bin)

Environmental Compliance

Lumileds is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON FlipChip White is compliant to the European Union directives on the restriction of hazardous substances in electronics equipment, namely the RoHS and REACH directives. Lumileds will not intentionally add the following restricted material to the LUXEON HIGH: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Product Characteristics ($T_{\text{junction}} = 25^{\circ}\text{C}$)

Product Selection

Table 1. LUXEON FlipChip UV Typical Performance

Peak Wavelength (500mA)	Typical Radiometric Power ^[1,2] (mW)		Typical V_f (V)		Part Number
	500mA	1000mA	500mA	1000mA	
380-390nm	250	473	3.2	3.3	LxF2-U380100002001
	350	662	3.2	3.3	LxF2-U380100003001
	450	852	3.2	3.3	LxF2-U380100004001
390-400nm	450	852	3.1	3.2	LxF2-U390100004001
	550	1042	3.1	3.2	LxF2-U390100005001
	650	1234	3.1	3.2	LxF2-U390100006001
400-410nm	550	1042	3.0	3.1	LxF2-U400100005001
	650	1232	3.0	3.1	LxF2-U400100006001
	750	1432	3.0	3.1	LxF2-U400100007001

Notes:

- Lumileds maintains a tolerance of $\pm 10\%$ on flux measurements.
- Radiometric power value is based upon mounted die on highly reflective surface at $T_j=25^{\circ}\text{C}$.

Optical Characteristics

Table 2. LUXEON FlipChip UV Wavelength and Spectrum (at 500mA)

Part Number	Wavelength Bin	Peak Wavelength ^[1] (nm)		Typical Spectra Half-Width (nm)	Typical Temperature Coefficient of Peak Wavelength ^[2] (nm/ $^{\circ}\text{C}$)
		Minimum	Maximum		
LxF2-U38010000xxxx1	380-390 nm	380	390	23	0.05
LxF2-U39010000xxxx1	390-400 nm	390	400	23	0.05
LxF2-U40010000xxxx1	400-410 nm	400	410	23	0.05

Notes for Table 2:

- Lumileds maintains a tolerance of $\pm 2\text{nm}$ on peak wavelength measurements.
- Measured between 25°C and 85°C at 500mA.

Electrical Characteristics

Table 3. LUXEON FlipChip UV Forward Voltage and Typical Thermal Resistance at 500mA

Part Number	Peak Wavelength	Forward Voltages ^[1] (V)			Typical Temperature Coefficient of Forward Voltage (mV/ $^{\circ}\text{C}$)	Typical Thermal Resistance Junction to Solder Pad ^[2] ($^{\circ}\text{C}/\text{W}$)
		Minimum	Typical	Maximum		
LxF2-U38010000xxxx1	380-390 nm	2.8	3.2	3.4	-2 to -3	2.0
LxF2-U39010000xxxx1	390-400 nm	2.8	3.1	3.4	-2 to -3	2.0
LxF2-U40010000xxxx1	400-410 nm	2.8	3.0	3.4	-2 to -3	2.0

Notes for Table 3:

- Lumileds maintains a tolerance of $\pm 0.06\text{V}$ on forward voltage measurements.
- Measured between $T_j = 25^{\circ}\text{C}$ and $T_j = 85^{\circ}\text{C}$ for coefficient of V_f .

Absolute Maximum Ratings

Table 4. LUXEON FlipChip UV Operating Condition and Ratings

Parameter	Maximum Ratings
DC Forward Current ^[1,2]	1000mA
Peak Pulsed Forward Current ^[1,3]	1200mA
ESD Sensitivity ^[4]	≤ 200V Human Body Model (HBM) Class 3A, JESD22-A114-E
LED Junction Temperature ^[1] (DC & pulse)	135°C
LED Operating Case Temperature ^[1]	105°C
Storage Temperature	-40°C - 135°C
Soldering Temperature	300 ±3°C (<30 second)
Allowable Reflow Cycles	3
Reserve Voltage ($V_{reverse}$)	LUXEON FlipChip UV LEDs are not designed to be driven in reverse bias

Notes for Table 4:

1. Proper current derating must be observed to maintain junction temperature below the maximum.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple", with frequencies ≥100Hz and amplitude ≤ 150mA 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 ≤ 5 ms per cycle and the duty cycle is ≤ 50%.
4. See LUXEON FlipChip Application Brief for additional information on ESD Protection

Typical Performance Graphs

Power Output (Test Current= 500mA)

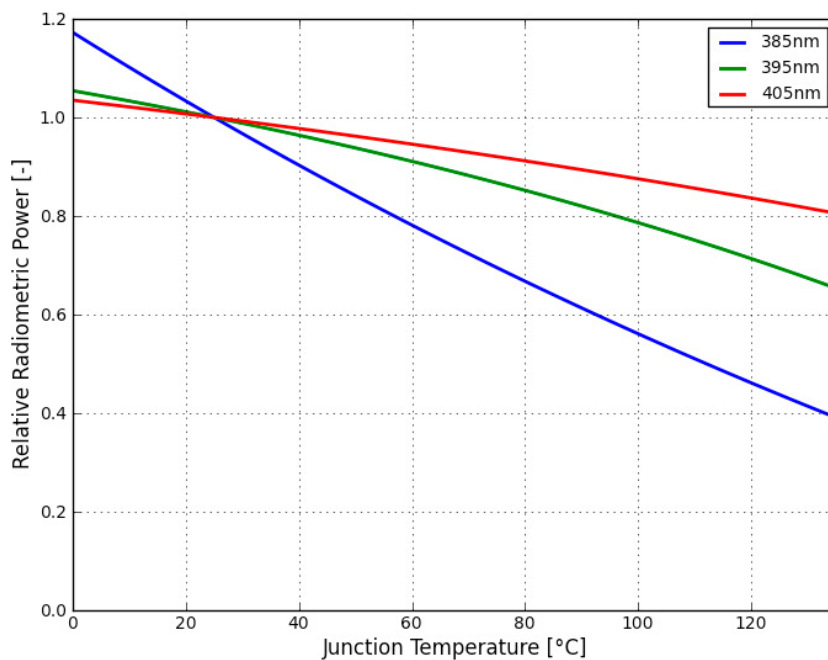


Figure 1. Typical radiometric power vs. T_{junction} .

Power Output ($T_{\text{junction}} = 25^{\circ}\text{C}$)

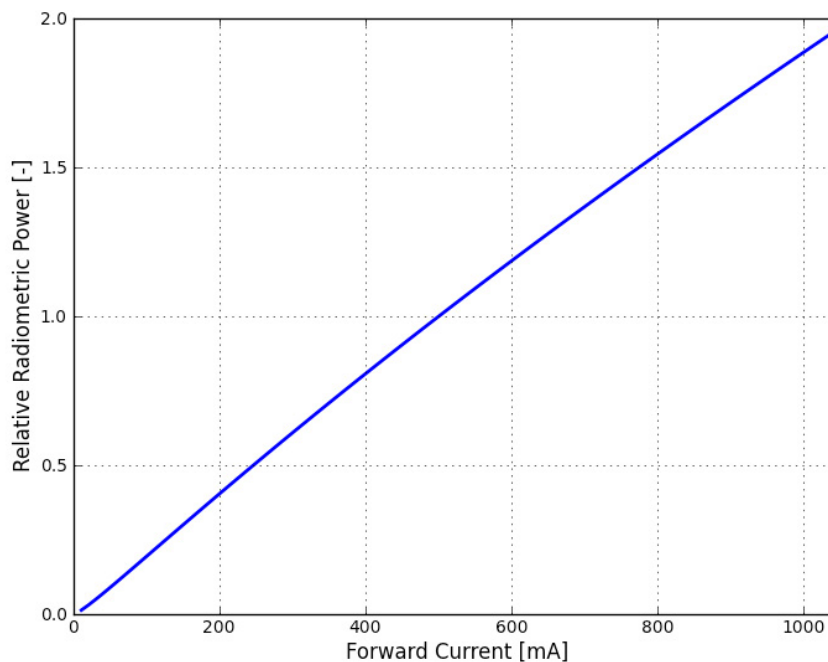


Figure 2. Typical radiometric power vs. forward current.

Wavelength Shift ($T_{\text{junction}} = 25^{\circ}\text{C}$)

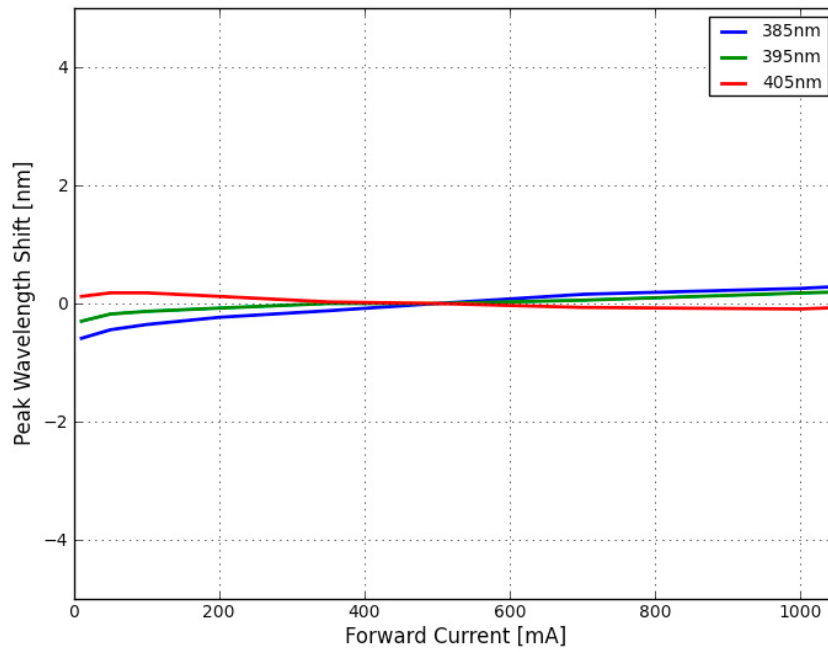


Figure 3. Typical peak wavelength shift vs. forward current.

Wavelength Shift (Test Current = 500mA)

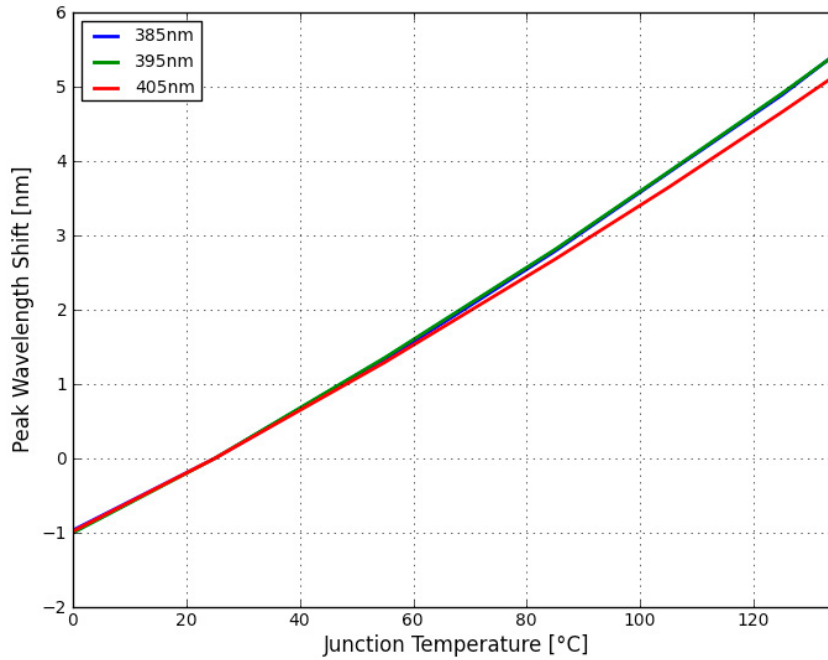


Figure 4. Typical peak wavelength shift vs. T_{junction} .

Forward Current ($T_{\text{junction}} = 25^{\circ}\text{C}$)

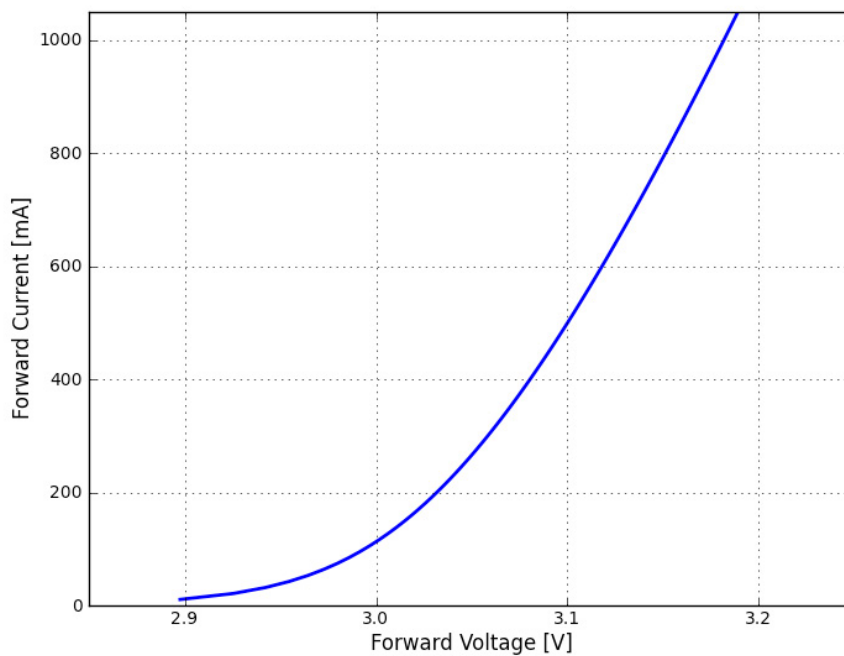


Figure 5. Forward current vs. V_f .

Spectral Distribution vs. Wavelength Characteristics

($T_{\text{junction}} = 25^{\circ}\text{C}$, Test Current = 500mA)

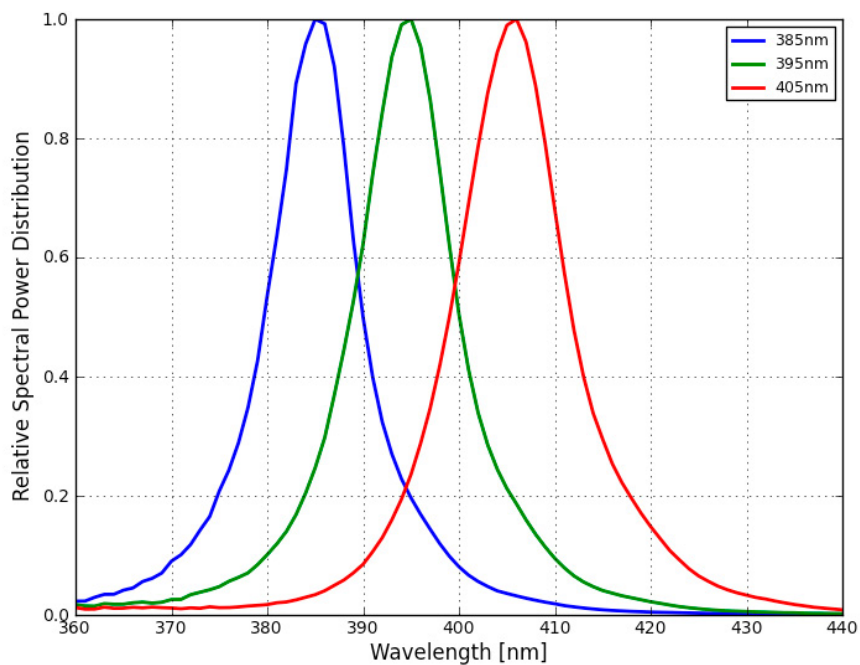


Figure 6. Spectral distribution vs. wavelength.

Spatial Radiation Patterns ($T_{\text{junction}} = 25^{\circ}\text{C}$, Test Current = 500mA)

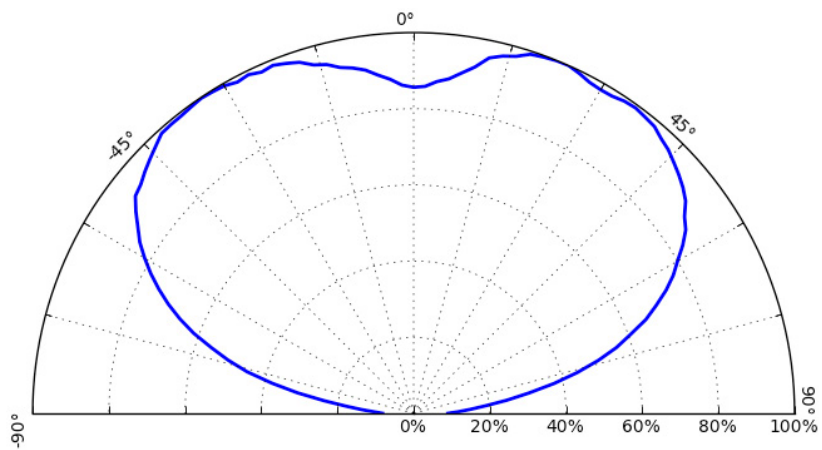


Figure 7. Intensity vs. angle.

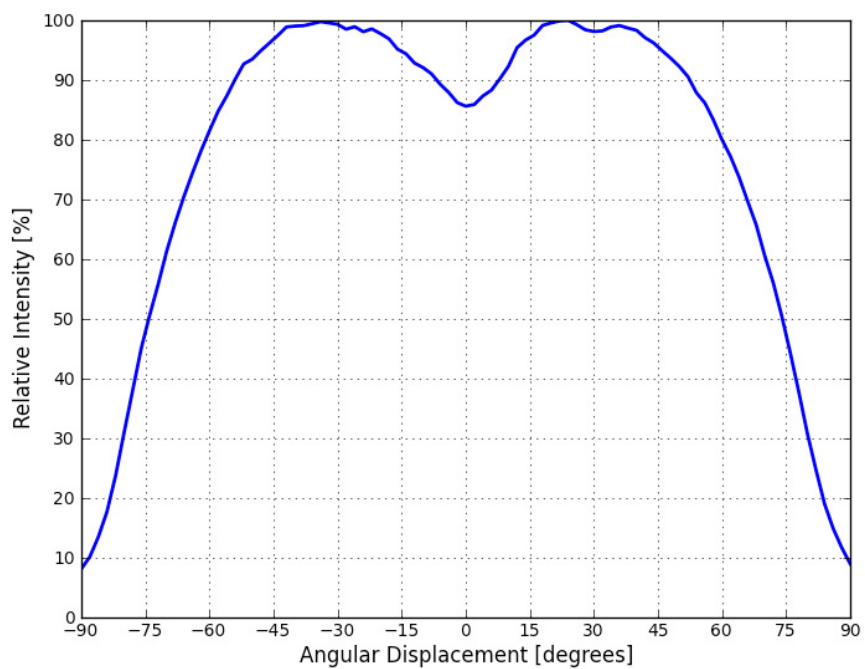


Figure 8. Angle vs. intensity.

Binning Definitions & Labeling

Purpose of Product Binning

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheets. For this reason, Lumileds bins the LED components for radiometric power and forward voltage, peak wavelength.

Decoding Product Bin Labeling

LUXEON FlipChip UV emitters are labeled using a four-digit alphanumeric CAT code following the format below:

ABCD

Where:

- A — Flux/Radiometric Bin (Z, A, B, C, etc.)
- B & C — Wavelength Bin (Ax, Bx, Cx, Dx, etc.)
- D — V_{forward} (8, 9, 0, 1, 2 etc.)

Radiometric Flux Bins

Table 5.

Bin Code	Radiometric Flux (mW)	
	Minimum	Maximum
Z	200	250
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

Forward Voltage Bins

Table 6.

Bin Code	Forward Voltage (V)	
	Minimum	Maximum
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

Peak Wavelength Bins

Table 7.

Bin Code	Peak Wavelength (nm)	
	Minimum	Maximum
Ax	380	385
Bx	385	390
Cx	390	395
Dx	395	400
Ex	400	405
Fx	405	410
Gx	410	415

Reflow Soldering Guidelines (Based Upon SAC Solder)

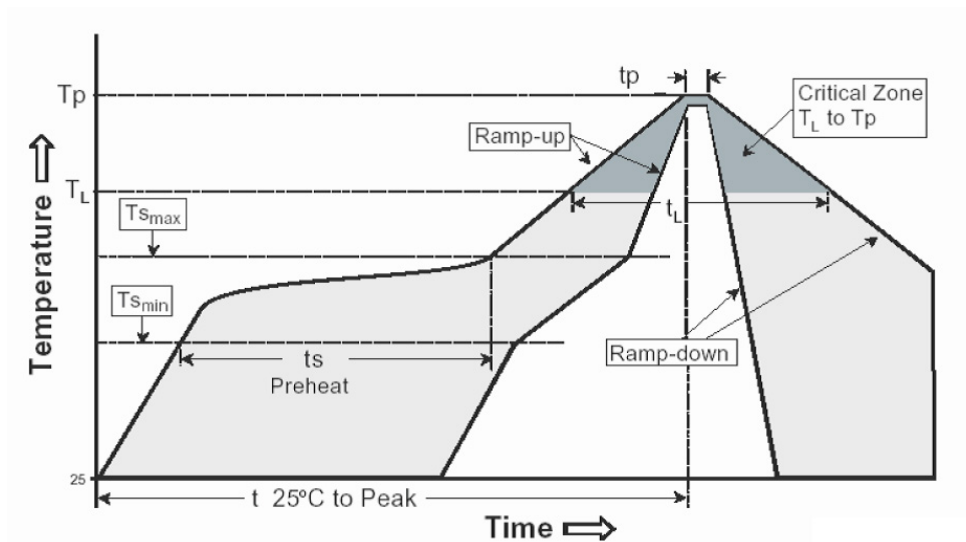


Table 8. (Based upon SAC solder)

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) from $T_{s_{min}}$ to $T_{s_{max}}$	60 – 180 seconds
Temperature (T_L)	217°C
Time Maintained Above Temperature (t_L)	60 -150 seconds
Peak / Classification Temperature (T_p)	260°C
Time within 5°C of Actual Temperature (t_p)	20 – 40 seconds
Ramp-Down Rate	6°C / second max
Time 25°C to Peak Temperature	8 minutes max

Notes for Table 8:

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

JEDEC Moisture Sensitivity

Table 9.

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

Solder Pad Design

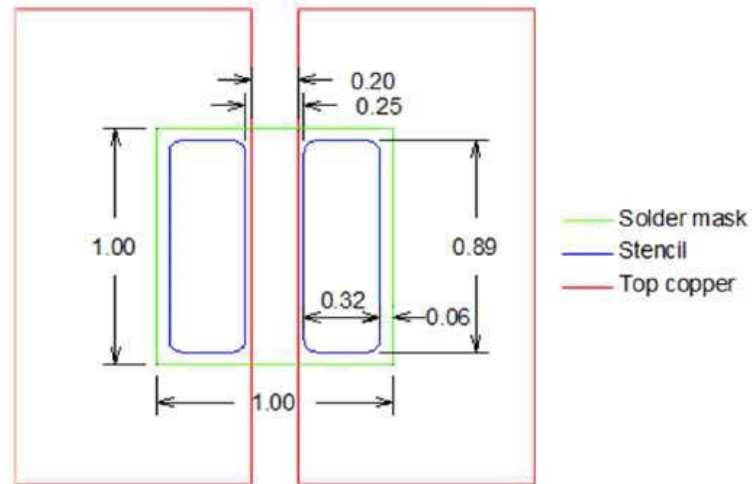


Figure 9. Solder pad layout of LxF2-Uzzz1000yyyy1.

Notes for Figure 9:

1. The drawing shows the recommended LUXEON FlipChip UV layout on Printed Circuit Board (PCB).
2. All dimensions are in millimeters.

Assembly Precautions

**Refer to Assembly Precautions and Material Safety documents

Mechanical & Packaging Dimensions

Mechanical Dimensions

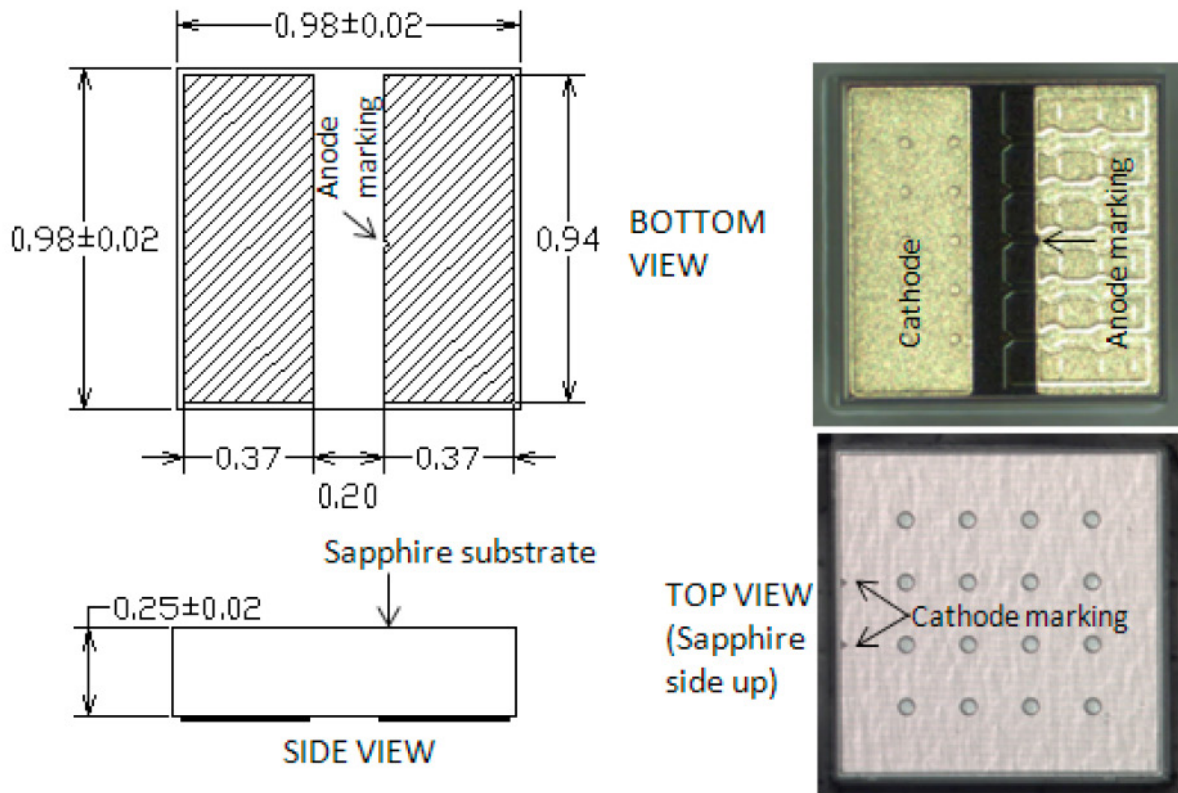


Figure 10. Mechanical dimensions for Lx2-Uxxx1000yyyy1.

Notes for Figure 10:

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

Packaging – Pocket Tape Dimensions

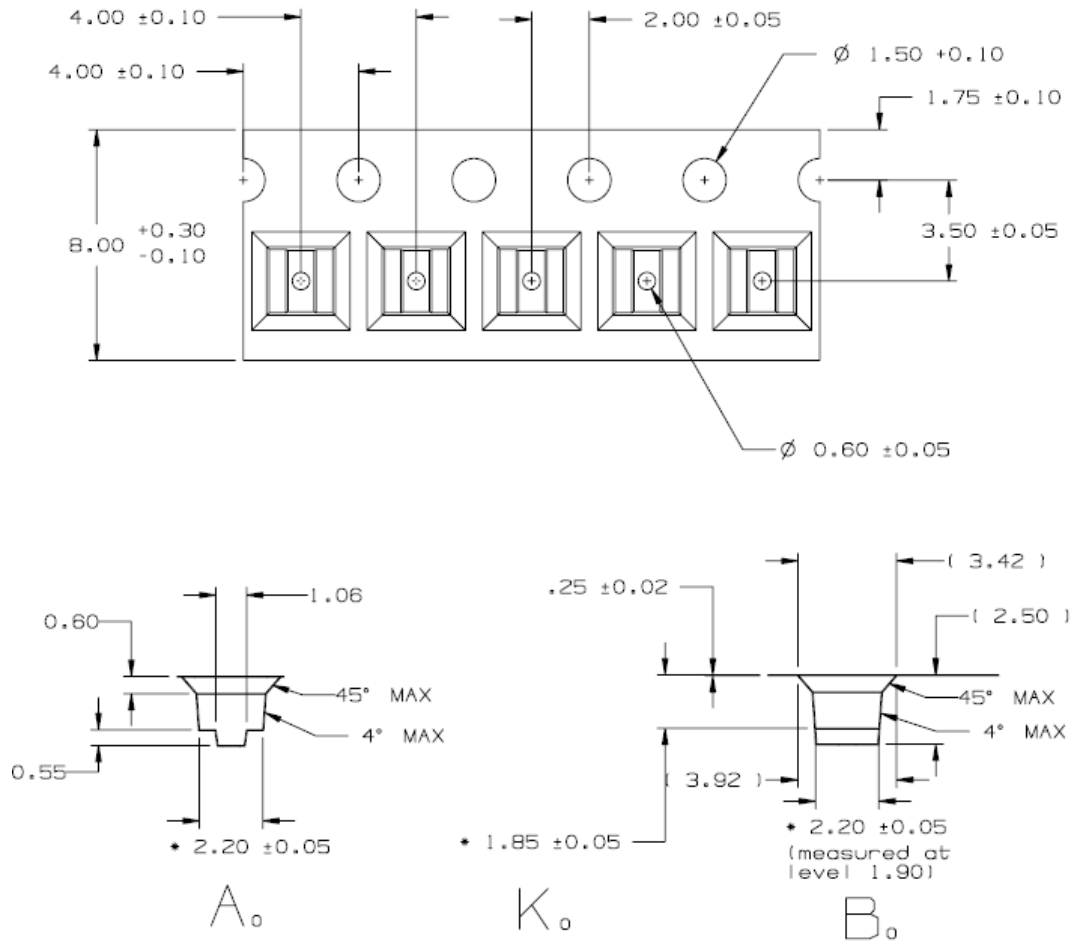


Figure 11. Emitter pocket tape packaging.

Packaging – Reel Dimensions

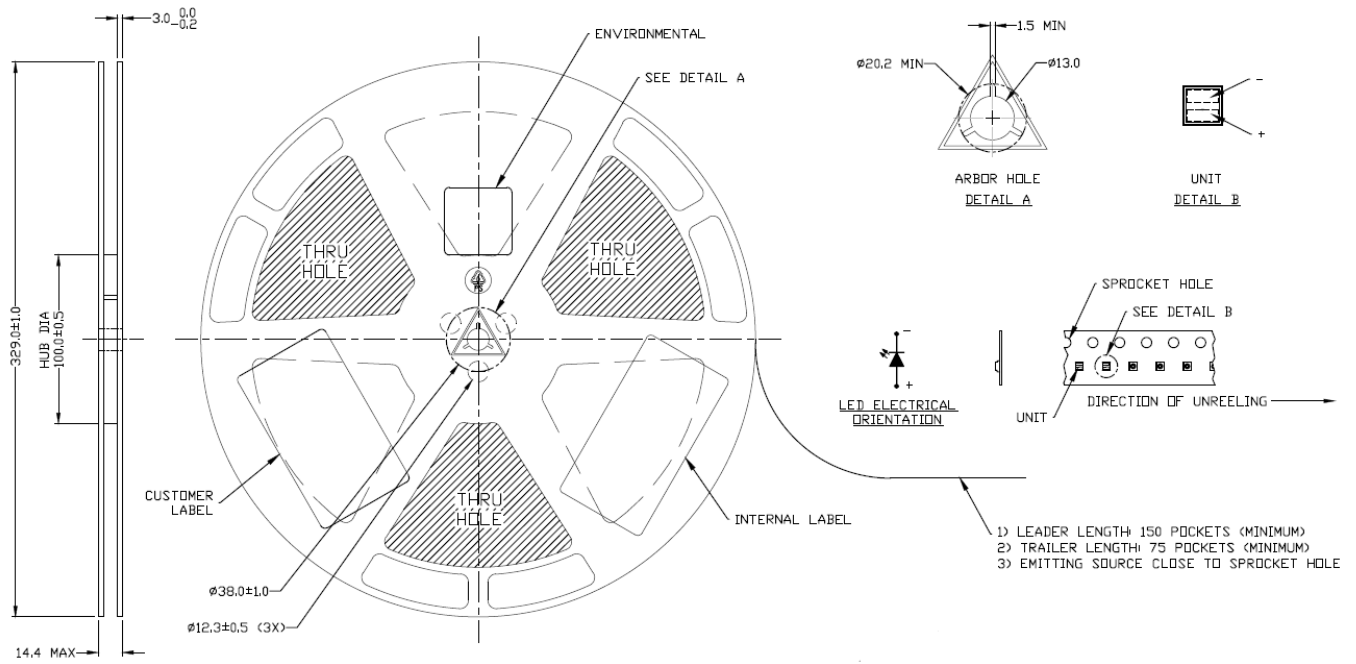


Figure 12. Emitter reel packaging.

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.



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