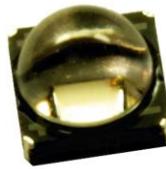


High Efficacy  
365nm UV LED Emitter

**LED ENGIN**  
BRIGHT LIGHT. TINY PACKAGE.

# LZ1-00U600



## Key Features

- High Efficacy 365nm 3W UV LED
- Ultra-small foot print – 4.4mm x 4.4mm
- Surface mount ceramic package with integrated glass lens
- Very low Thermal Resistance (4.2°C/W)
- Very high Radiant Flux density
- Electrically neutral thermal path
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on Standard or Miniature MCPCB (optional)

## Typical Applications

- Curing
- Sterilization
- Medical
- Currency Verification
- Fluorescence Microscopy
- Inspection of dyes, rodent and animal contamination
- Leak detection
- Forensics

## Description

The LZ1-00U600 UV LED emitter provides superior radiometric power in the wavelength range specifically required for applications like curing, sterilization, currency verification, and various medical applications. With a 4.4mm x 4.4mm ultra-small footprint, this package provides exceptional optical power density. The patented design has unparalleled thermal and optical performance. The high quality materials used in the package are chosen to optimize light output, have excellent UV resistance, and minimize stresses which results in monumental reliability and radiant flux maintenance.



## Part number options

### Base part number

Part number	Description
LZ1-00U600-xxxx	LZ1 emitter
LZ1-10U600-xxxx	LZ1 emitter on Standard Star MCPCB
LZ1-30U600-xxxx	LZ1 emitter on Miniature round MCPCB

Notes:

1. See "Part Number Nomenclature" for full overview on LED Engin part number nomenclature.

### Bin kit option codes:

U6, Ultra-Violet (365nm)			
Kit number suffix	Min flux Bin	Color Bin Range	Description
0000	C	U0 - U1	full distribution flux; full distribution wavelength
E000	E	U0 - U1	E minimum flux bin; full distribution wavelength
00U0	C	U0 - U0	full distribution flux; wavelength U0 bin only
E0U0	E	U0 - U0	E minimum flux bin; wavelength U0 bin only
00U1	C	U1 - U1	full distribution flux; wavelength U1bin only
E0U1	E	U1 - U1	E minimum flux bin; wavelength U1 bin only

Notes:

1. Default bin kit option is -0000

## Radiant Flux Bins

Table 2:

Bin Code	Minimum	Maximum
	Radiant Flux ( $\Phi$ ) @ $I_F = 700\text{mA}^{[1,2]}$ (mW)	Radiant Flux ( $\Phi$ ) @ $I_F = 700\text{mA}^{[1,2]}$ (mW)
C	134	168
D	168	210
E	210	262
F	262	328
G	328	410
H	410	512

Notes for Table 2:

1. Radiant flux performance guaranteed within published operating conditions. LedEngin maintains a tolerance of  $\pm 10\%$  on flux measurements.
2. Future products will have even higher levels of radiant flux performance. Contact LedEngin Sales for updated information.

## Peak Wavelength Bins

Table 3:

Bin Code	Minimum	Maximum
	Peak Wavelength ( $\lambda_p$ ) @ $I_F = 700\text{mA}^{[1]}$ (nm)	Peak Wavelength ( $\lambda_p$ ) @ $I_F = 700\text{mA}^{[1]}$ (nm)
U0	365	370
U1	370	375

Notes for Table 3:

1. LedEngin maintains a tolerance of  $\pm 2.0\text{nm}$  on peak wavelength measurements.

## Forward Voltage Bins

Table 4:

Bin Code	Minimum	Maximum
	Forward Voltage ( $V_F$ ) @ $I_F = 700\text{mA}^{[1]}$ (V)	Forward Voltage ( $V_F$ ) @ $I_F = 700\text{mA}^{[1]}$ (V)
0	3.68	4.88

Notes for Table 4:

1. LedEngin maintains a tolerance of  $\pm 0.04\text{V}$  for forward voltage measurements.

## Absolute Maximum Ratings

Table 5:

Parameter	Symbol	Value	Unit
DC Forward Current at $T_{jmax}=100^{\circ}\text{C}$ <sup>[1]</sup>	$I_F$	700	mA
Peak Pulsed Forward Current <sup>[2]</sup>	$I_{FP}$	850	mA
Reverse Voltage	$V_R$	See Note 3	V
Storage Temperature	$T_{stg}$	-40 ~ +150	$^{\circ}\text{C}$
Junction Temperature	$T_J$	100	$^{\circ}\text{C}$
Soldering Temperature <sup>[4]</sup>	$T_{sol}$	180	$^{\circ}\text{C}$
Allowable Reflow Cycles		6	
ESD Sensitivity <sup>[5]</sup>		> 2,000 V HBM Class 2 JESD22-A114-D	

Notes for Table 5:

1. Maximum DC forward current is determined by the overall thermal resistance and ambient temperature. Follow the curves in Figure 10 for current derating.
2. Pulse forward current conditions: Pulse Width  $\leq 10\text{msec}$  and Duty Cycle  $\leq 10\%$ .
3. LEDs are not designed to be reverse biased.
4. Use low temperature solders. LedEngin recommends 58Bi-42Sn (wt.%) Solder. See Reflow Soldering Profile Figure 3.
5. LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZ1-00U600 in an electrostatic protected area (EPA). An EPA may be adequately protected by ESD controls as outlined in ANSI/ESD S6.1.

## Optical Characteristics @ $T_c = 25^{\circ}\text{C}$

Table 6:

Parameter	Symbol	Typical	Unit
Radiant Flux (@ $I_F = 700\text{mA}$ )	$\Phi$	260	mW
Peak Wavelength <sup>[1]</sup>	$\lambda_p$	365	nm
Viewing Angle <sup>[2]</sup>	$2\Theta_{1/2}$	85	Degrees
Total Included Angle <sup>[3]</sup>	$\Theta_{0.9V}$	100	Degrees

Notes for Table 6:

1. When operating the UV LED, observe IEC 60825-1 class 3B rating. Avoid exposure to the beam.
2. Viewing Angle is the off axis angle from emitter centerline where the radiometric power is  $\frac{1}{2}$  of the peak value.
3. Total Included Angle is the total angle that includes 90% of the total radiant flux.

## Electrical Characteristics @ $T_c = 25^{\circ}\text{C}$

Table 7:

Parameter	Symbol	Typical	Unit
Forward Voltage (@ $I_F = 700\text{mA}$ )	$V_F$	4.1	V
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_J$	-3.7	$\text{mV}/^{\circ}\text{C}$
Thermal Resistance (Junction to Case)	$R\Theta_{J-C}$	4.2	$^{\circ}\text{C}/\text{W}$

## IPC/JEDEC Moisture Sensitivity Level

Table 1 - IPC/JEDEC J-STD-20D.1 MSL Classification:

Level	Time	Conditions	Soak Requirements			
			Standard		Accelerated	
1	Unlimited	≤ 30°C/ 85% RH	168 +5/-0	85°C/ 85% RH	n/a	n/a

Notes for Table 1:

1. The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag and includes the maximum time allowed out of the bag at the distributor's facility.

## Mechanical Dimensions (mm)

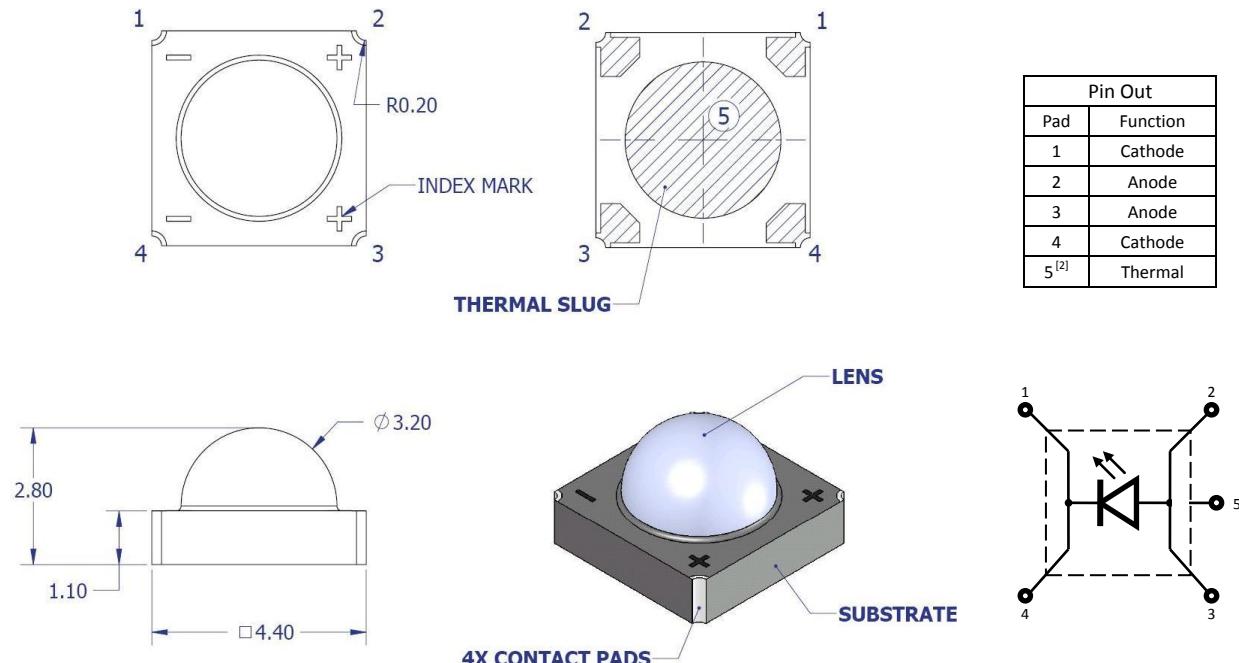


Figure 3: Package outline drawing.

Notes for Figure 3:

1. Unless otherwise noted, the tolerance =  $\pm 0.20$  mm.

## Recommended Solder Pad Layout (mm)

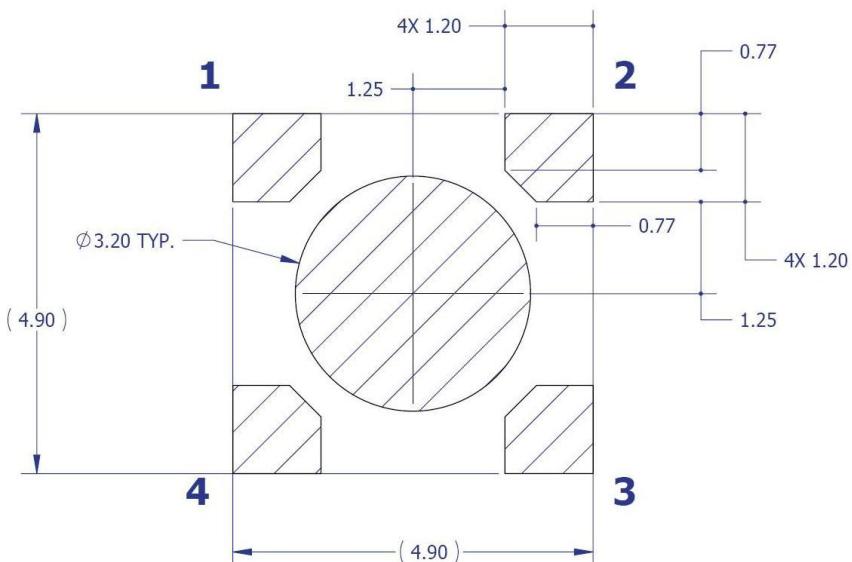


Figure 4: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 4:

1. Unless otherwise noted, the tolerance =  $\pm 0.20$  mm.

## Reflow Soldering Profile

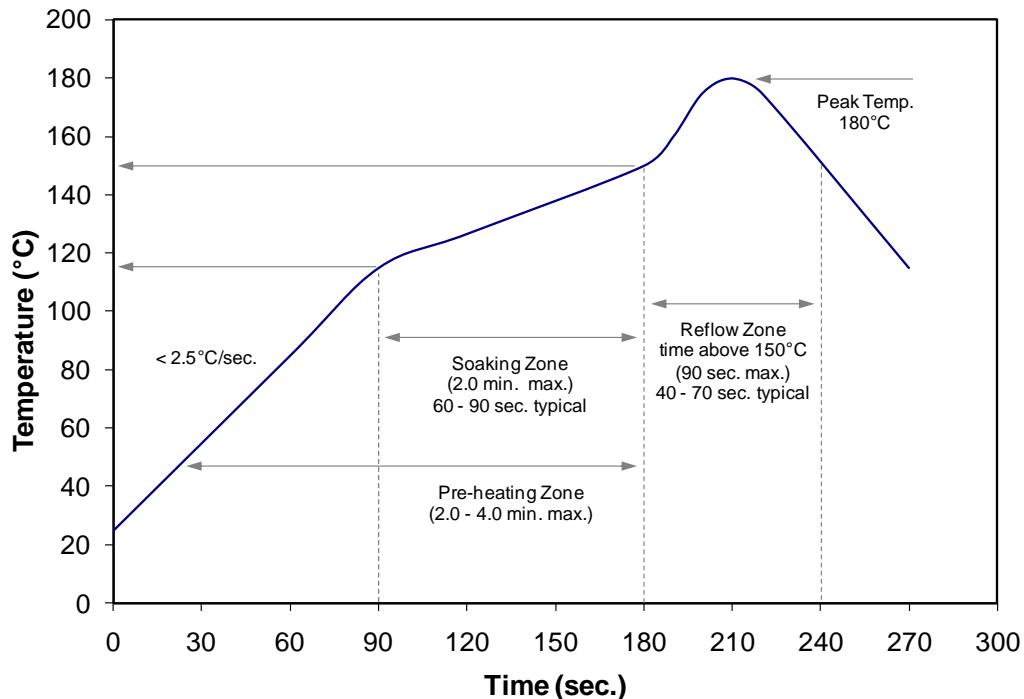


Figure 3: Reflow soldering profile for low temperature lead free soldering.

### Notes for Figure 3:

1. Solder profile for low temperature solder. LedEngin recommends 58Bi-42Sn (wt.%) Solder for the LZ4-00UA05.

## Typical Radiation Pattern

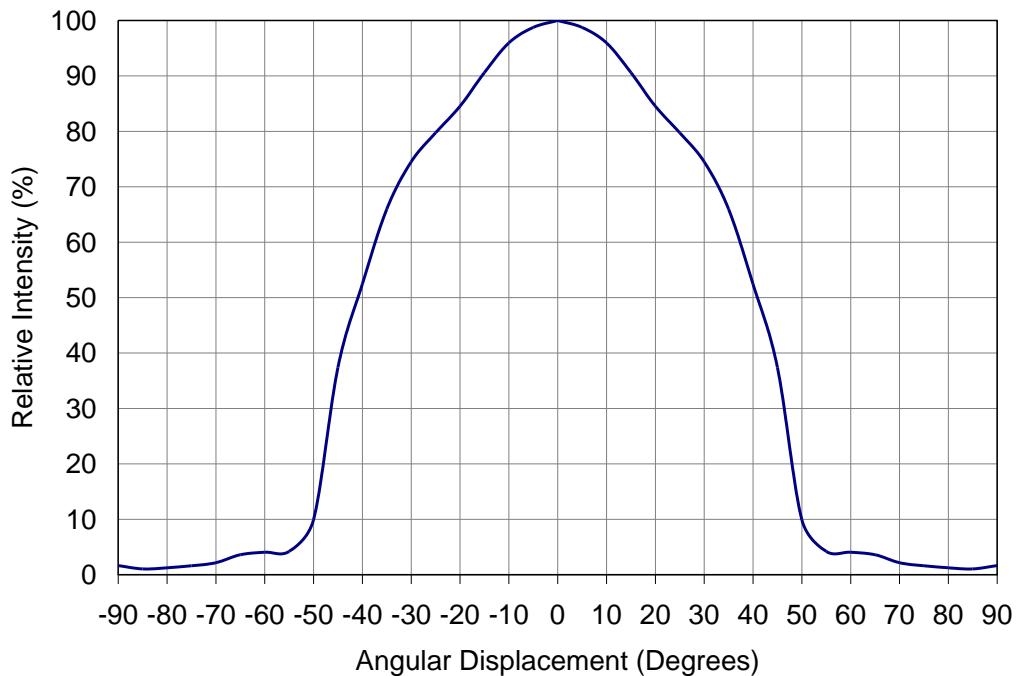


Figure 4: Typical representative spatial radiation pattern.

## Typical Relative Spectral Power Distribution

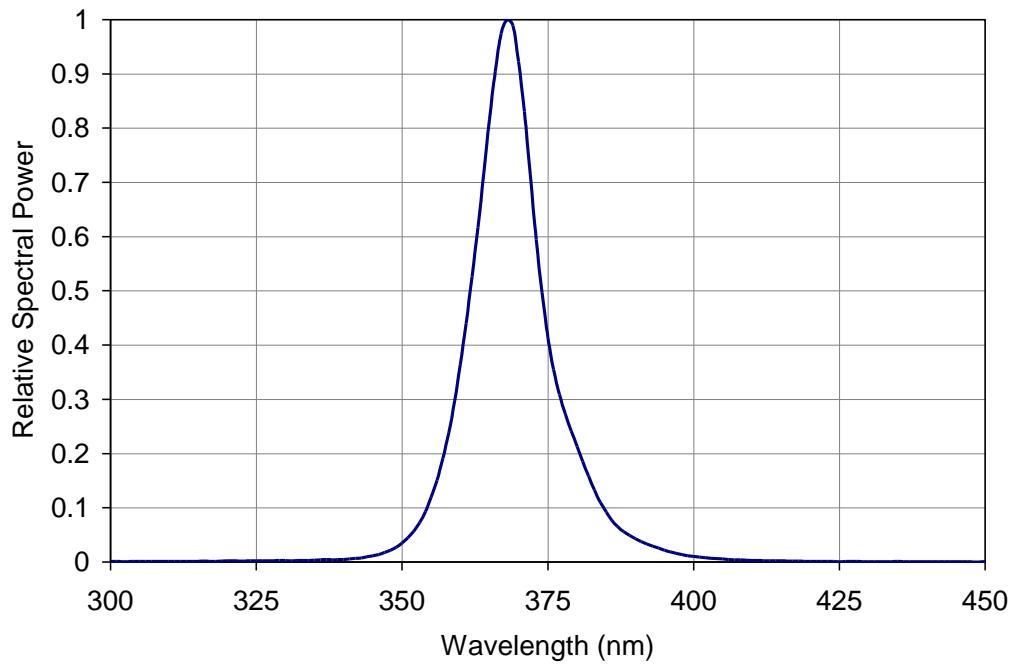


Figure 5: Typical relative spectral power vs. wavelength @  $T_c = 25^\circ\text{C}$ .

## Typical Peak Wavelength Shift over Temperature

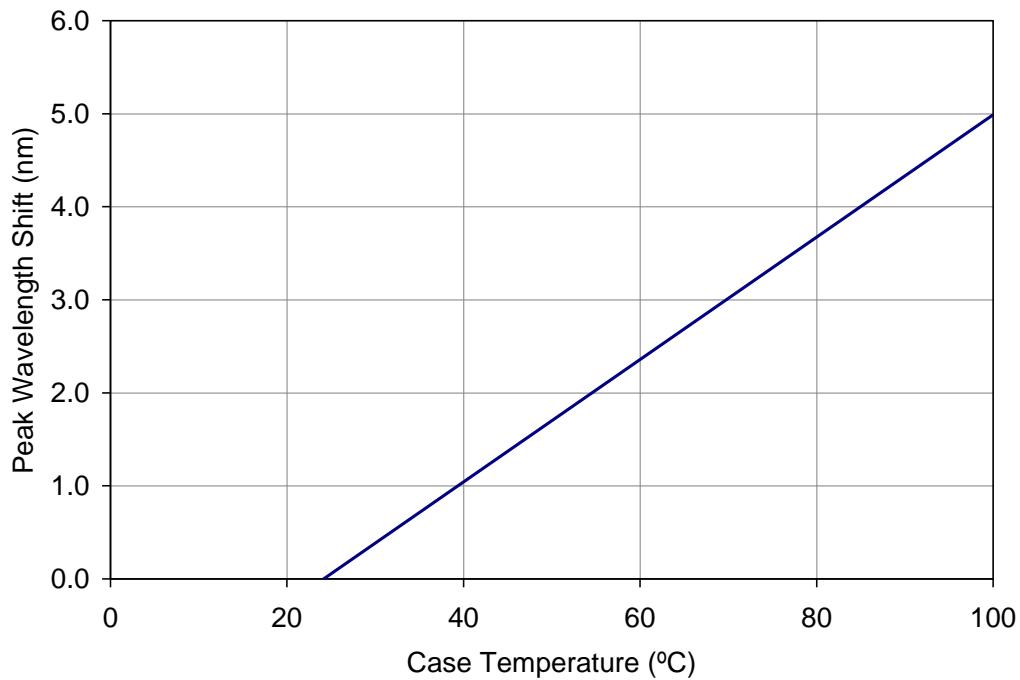


Figure 6: Typical peak wavelength shift vs. case temperature.

## Typical Normalized Radiant Flux

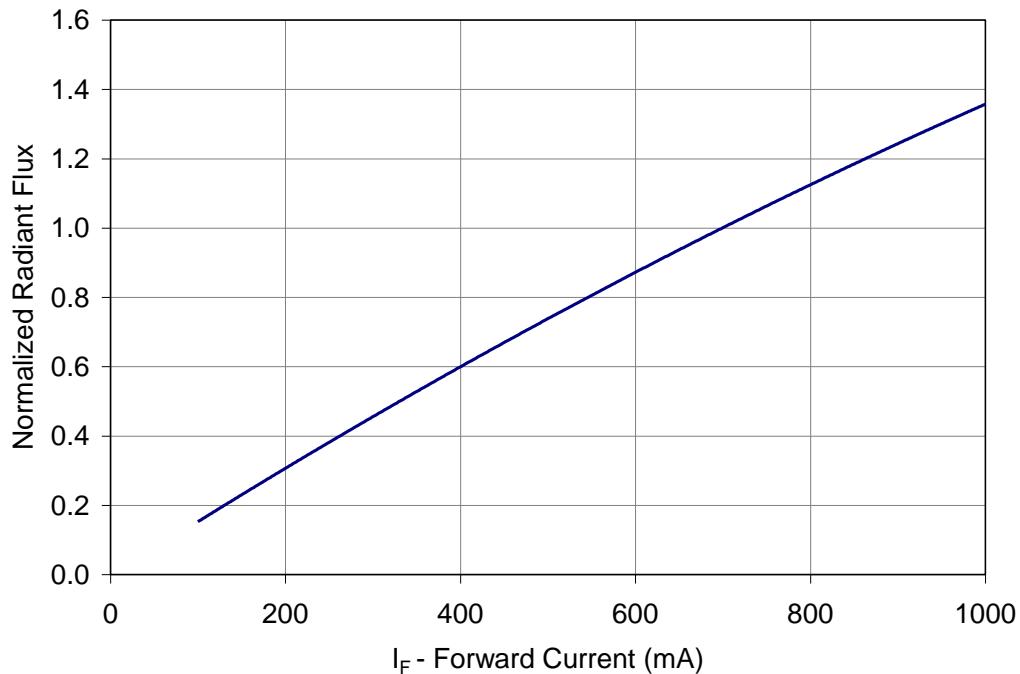


Figure 7: Typical normalized radiant flux vs. forward current @  $T_c = 25^\circ\text{C}$ .

## Typical Normalized Radiant Flux over Temperature

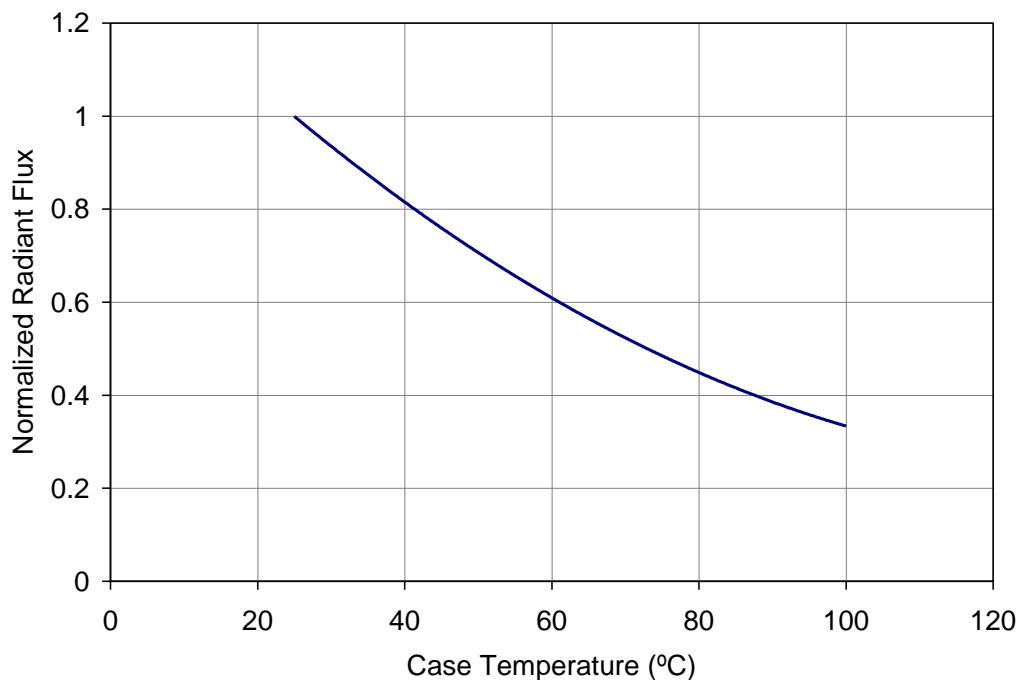


Figure 8: Typical normalized radiant flux vs. case temperature.

## Typical Forward Current Characteristics

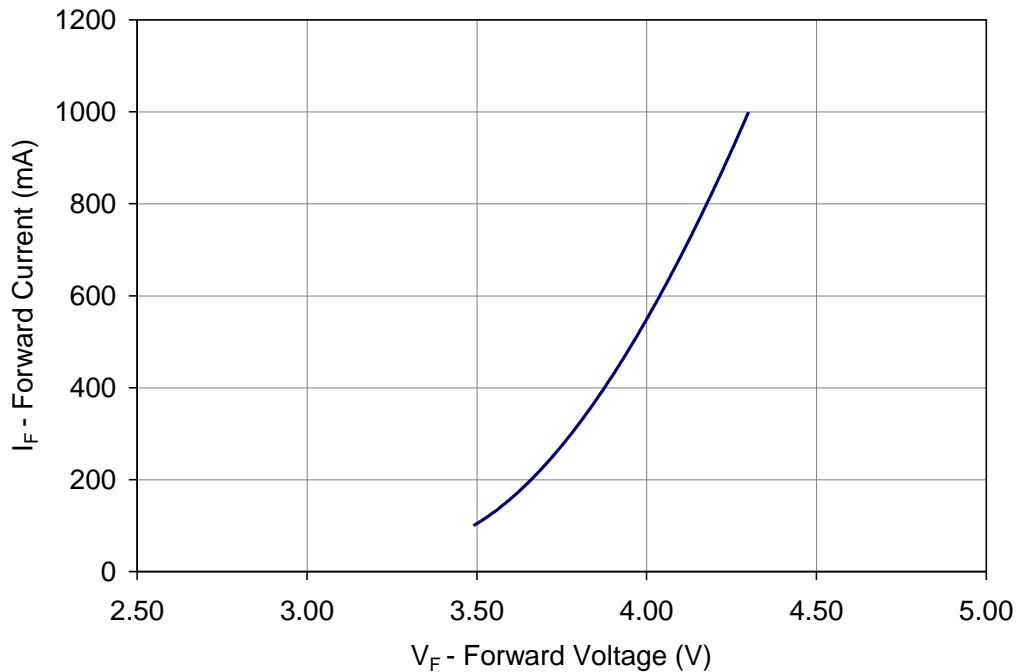


Figure 9: Typical forward current vs. forward voltage @  $T_c = 25^\circ\text{C}$ .

## Current De-rating

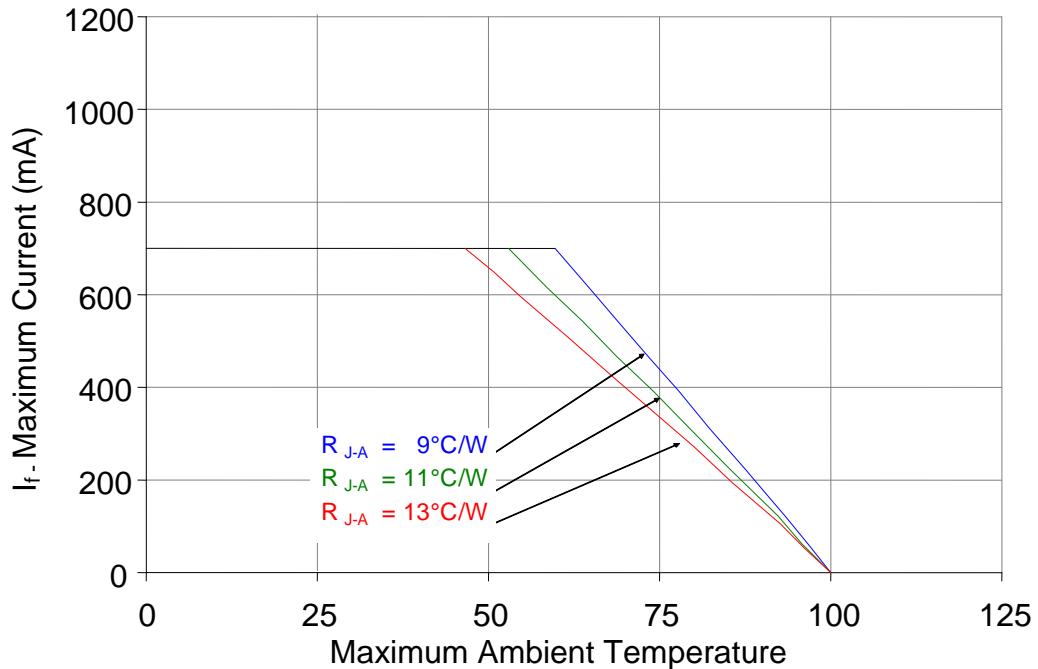


Figure 10: Maximum forward current vs. ambient temperature based on  $T_{J(MAX)} = 125^\circ\text{C}$ .

### Notes for Figure 10:

1.  $R\Theta_{J-C}$  [Junction to Case Thermal Resistance] for the LZ1-00U600 is typically  $4.2^\circ\text{C/W}$ .
2.  $R\Theta_{J-A}$  [Junction to Ambient Thermal Resistance] =  $R\Theta_{J-C} + R\Theta_{C-A}$  [Case to Ambient Thermal Resistance].

## Emitter Tape and Reel Specifications (mm)

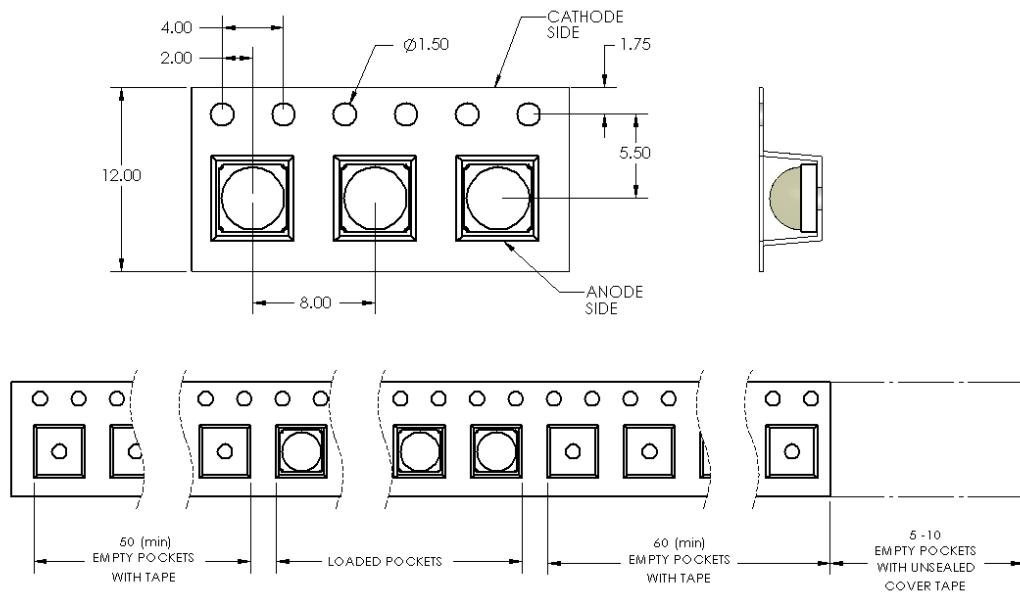


Figure 11: Emitter carrier tape specifications (mm).

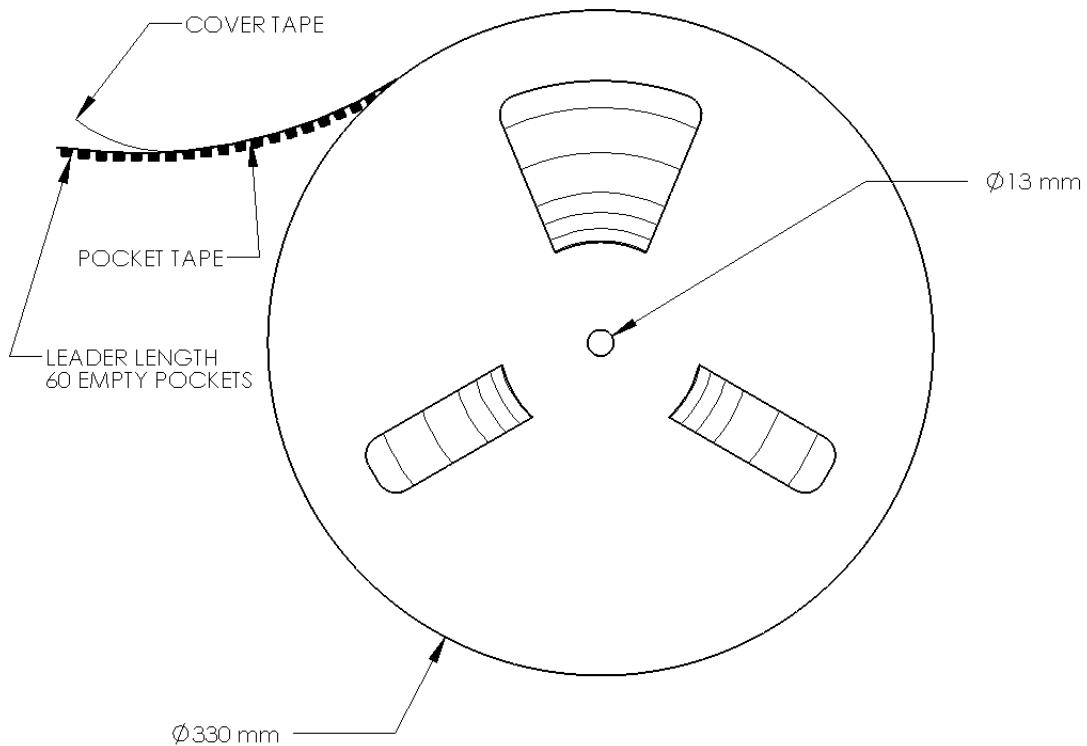


Figure 12: Emitter reel specifications (mm).

Notes:

1. Reel quantity minimum: 100 emitters. Reel quantity maximum: 2000 emitters

## Part-number Nomenclature

The LZ Series base part number designation is defined as follows:

**L Z A – B C D E F G – H I J K**

**A** – designates the number of LED die in the package

- 1 for single die emitter package
- 4 for 4-die emitter package
- 9 for 9-die emitter package
- C for 12-die emitter package
- P for 25-die emitter package

**B** – designates the package level

- 0 for Emitter only

Other letters indicate the addition of a MCPCB. See appendix "MCPCB options" for details

**C** – designates the radiation pattern

- 0 for Clear domed lens (Lambertian radiation pattern)
- 1 for Flat-top
- 3 for Frosted domed lens

**D and E** – designates the color

- U6 Ultra Violet (365nm)
- UA Violet (400nm)
- DB Dental Blue (460nm)
- B2 Blue (465nm)
- G1 Green (525nm)
- A1 Amber (590nm)
- R1 Red (623nm)
- R2 Deep Red (660nm)
- R3 Far Red (740nm)
- WW Warm White (3100K)
- NW Neutral White (4100K)
- CW Cool White (5500K)
- W2 Warm & Cool White mixed dies
- MC RGB
- MA RGBA
- MD RGBW (6500K)

**F and G** – designates the package options if applicable

See "Base part number" on page 2 for details. Default is "00"

**H, I, J, K** – designates kit options

See "Bin kit options" on page 2 for details. Default is "0000"

**Ordering information:**

For ordering LedEngin products, please reference the base part number above. The base part number represents our standard full distribution flux and wavelength range. Other standard bin combinations can be found on page 2. For ordering products with custom bin selections, please contact a LedEngin sales representative or authorized distributor.

## LZ1 Emitter on Standard star MCPCB

# LZ1-1xxxxx

### Key Features

- Supports one single LED die
- Very low thermal Resistance for MCPCB adds only 1.5°C/W
- Multiple mounting and attachment options
- MCPCB contains Zener Diode for ESD protection
- 19.6mm diameter standard star MCPCB



### Description

The LZ1-1xxxxx Standard MCPCB option provides a convenient method to mount LED Engin's LZ1 emitters. The six recessed features allow the use of M3 or #4-40 screws to attach the MCPCB to a heat sink. The MCPCB has three sets of "+" (Anode) and "-" (Cathode) solder pads for electrical connections. The MCPCB also contains a Zener diode for enhanced ESD protection.

### R $\Theta$ <sub>J-B</sub> Lookup Table

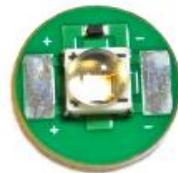
Product	Emitter R $\Theta$ <sub>J-C</sub>		MCPCB R $\Theta$ <sub>C-B</sub>		Emitter + MCPCB R $\Theta$ <sub>J-B</sub>
LZ1-1xxxxx	4.2°C/W	+	1.5°C/W	=	5.7°C/W

Note for Table 1:

- R $\Theta$ <sub>J-B</sub> is the combined thermal resistance from the LED die junction to the Aluminum core on MCPCB (R $\Theta$ <sub>J-C</sub> + R $\Theta$ <sub>C-B</sub> = R $\Theta$ <sub>J-B</sub>).

## LZ1 Emitter on mini round MCPCB

# LZ1-3xxxxx



### Key Features

- Supports one single LED die
- Very low thermal Resistance for MCPCB adds only 2°C/W
- MCPCB contains Zener Diode for ESD protection
- 11.5mm diameter Miniature MCPCB

### Description

The LZ1-3xxxxx Miniature MCPCB option provides a convenient method to mount LED Engin's LZ1 emitters in many portable applications including dental wands. The MCPCB contains a Zener diode for enhanced ESD protection.

### R $\Theta$ <sub>J-B</sub> Lookup Table

Product	Emitter $\Theta_{J-C}$		MCPCB $R\Theta_{C-B}$		Emitter + MCPCB $R\Theta_{J-B}$
LZ1-3xxxxx	4.2°C/W	+	2°C/W	=	6.2°C/W

Note for table 1

- $R\Theta_{J-B}$  is the combined thermal resistance from the LED die junction to the Aluminum core on MCPCB ( $R\Theta_{J-C} + R\Theta_{C-B} = R\Theta_{J-B}$ ).

## Company Information

LedEngin, Inc., based in California's Silicon Valley, specializes in ultra-bright, ultra compact solid state lighting solutions allowing lighting designers & engineers the freedom to create uncompromised yet energy efficient lighting experiences. The LuxiGen™ Platform — an emitter and lens combination or integrated module solution, delivers superior flexibility in light output, ranging from 3w to 90w, a wide spectrum of available colors, including whites, multi-color and UV, and the ability to deliver upwards of 5,000 high quality lumens to a target. The small size combined with powerful output allows for a previously unobtainable freedom of design wherever high-flux density, directional light is required. LedEngin's packaging technologies lead the industry with products that feature lowest thermal resistance, highest flux density and consummate reliability, enabling compact and efficient solid state lighting solutions.

LedEngin is committed to providing products that conserve natural resources and reduce greenhouse emissions.

LedEngin reserves the right to make changes to improve performance without notice.

Please contact [Sales@ledengin.com](mailto:Sales@ledengin.com) or (408) 922-7200 for more information.