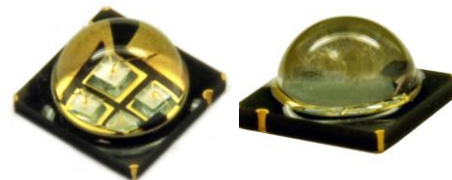


High Efficacy 365nm UV LED Emitter **LZ4-00U600**



Key Features

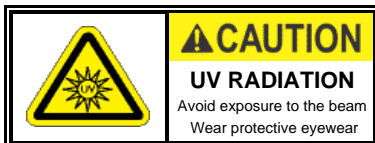
- High Efficacy 365nm 11W UV LED
- Ultra-small foot print – 7.0mm x 7.0mm
- Surface mount ceramic package with integrated glass lens
- Very low Thermal Resistance (1.1°C/W)
- Individually addressable die
- Electrically neutral thermal path
- Highest Radiant Flux density
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on Standard and Serially connected MCPCB (optional)

Typical Applications

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

Description

The LZ4-00U600 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 7.0mm x 7.0mm 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.



LZ4-00U600 (5.0-09/06/12)

Part number options

Base part number

Part number	Description
LZ4-00U600-xxxx	LZ4 emitter
LZ4-40U600-xxxx	LZ4 emitter on Standard Star 1 channel 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	K	U0 - U1	full distribution flux; full distribution wavelength
L000	L	U0 - U1	L minimum flux bin; full distribution wavelength
00U0	K	U0 - U0	full distribution flux; wavelength U0 bin only
L0U0	L	U0 - U0	L minimum flux bin; wavelength U0 bin only
00U1	K	U1 - U1	full distribution flux; wavelength U1bin only
L0U1	L	U1 - U1	L minimum flux bin; wavelength U1 bin only

Notes:

1. Default bin kit option is -0000

Radiant Flux Bins

Table 1:

Bin Code	Minimum Radiant Flux (Φ) @ $I_F = 700\text{mA}$ ^[1,2] (mW)	Maximum Radiant Flux (Φ) @ $I_F = 700\text{mA}$ ^[1,2] (mW)
K	640	800
L	800	1000
M	1000	1250
N	1250	1600

Notes for Table 1:

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

Peak Wavelength Bins

Table 2:

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

Notes for Table 2:

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

Forward Voltage Bins

Table 3:

Bin Code	Minimum Forward Voltage (V_F) @ $I_F = 700\text{mA}$ ^[1,2] (V)	Maximum Forward Voltage (V_F) @ $I_F = 700\text{mA}$ ^[1,2] (V)
0	14.72	19.52

Notes for Table 3:

1. Forward Voltage is binned with all four LED dice connected in series.
2. LED Engin maintains a tolerance of $\pm 0.16\text{V}$ for forward voltage measurements for the four LEDs.

Absolute Maximum Ratings

Table 4:

Parameter	Symbol	Value	Unit
DC Forward Current at $T_{jmax}=100^{\circ}\text{C}$ ^[1]	I_F	700	mA
Peak Pulsed Forward Current ^[2]	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 ^[4]	T_{sol}	180	$^{\circ}\text{C}$
Allowable Reflow Cycles		6	
ESD Sensitivity ^[5]		> 2,000 V HBM Class 2 JESD22-A114-D	

Notes for Table 4:

- Maximum DC forward current is determined by the overall thermal resistance and ambient temperature. Follow the curves in Figure 10 for current derating.
- Pulse forward current conditions: Pulse Width $\leq 10\text{msec}$ and Duty Cycle $\leq 10\%$.
- LEDs are not designed to be reverse biased.
- Use low temperature solders. LED Engin recommends 58Bi-42Sn (wt.%) Solder. See Reflow Soldering Profile Figure 3.
- LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the LZ4-00U610 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 5:

Parameter	Symbol	Typical	Unit
Radiant Flux (@ $I_F = 700\text{mA}$)	Φ	1200	mW
Peak Wavelength ^[1]	λ_p	365	nm
Viewing Angle ^[2]	$2\theta_{1/2}$	115	Degrees
Total Included Angle ^[3]	$\theta_{0.9}$	175	Degrees

Notes for Table 5:

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

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

Table 6:

Parameter	Symbol	Typical		Unit
		1 Die	4 Dice	
Forward Voltage (@ $I_F = 700\text{mA}$)	V_F	4.1	16.4	V
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_J$	-14.8		mV/ $^{\circ}\text{C}$
Thermal Resistance (Junction to Case)	RO_{J-C}	1.1		$^{\circ}\text{C}/\text{W}$

IPC IPC/JEDEC Moisture Sensitivity Level

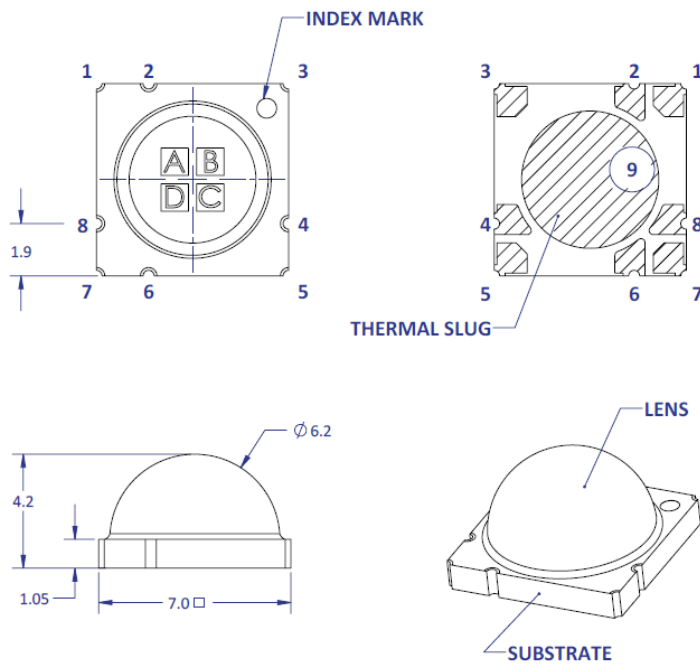
Table 7 - IPC/JEDEC J-STD-20D.1 MSL Classification:

Level	Soak Requirements					
	Floor Life		Standard		Accelerated	
	Time	Conditions	Time (hrs)	Conditions	Time (hrs)	Conditions
1	Unlimited	$\leq 30^{\circ}\text{C}/$ 85% RH	168 +5/-0	$85^{\circ}\text{C}/$ 85% RH	n/a	n/a

Notes for Table 7:

- 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)



Pin Out		
Pad	Die	Function
1	A	Anode
2	A	Cathode
3	B	Anode
4	B	Cathode
5	C	Anode
6	C	Cathode
7	D	Anode
8	D	Cathode
9 ⁽²⁾	n/a	Thermal

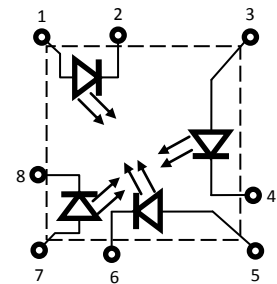


Figure 1: Package outline drawing.

Notes for Figure 1:

1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Thermal contact, Pad 9, is electrically neutral.

Recommended Solder Pad Layout (mm)

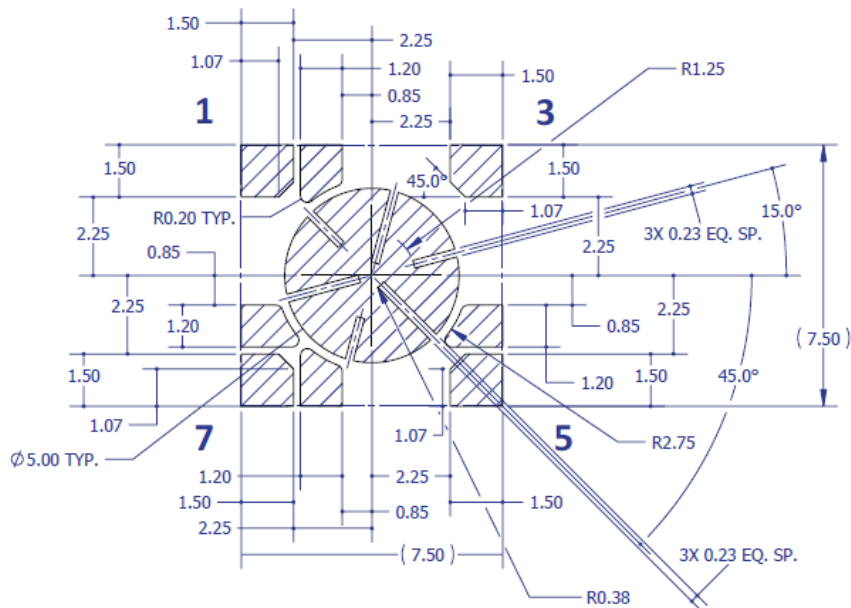


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad.

Note for Figure 2a:

1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. This pad layout is "patent pending".

Recommended Solder Mask Layout (mm)

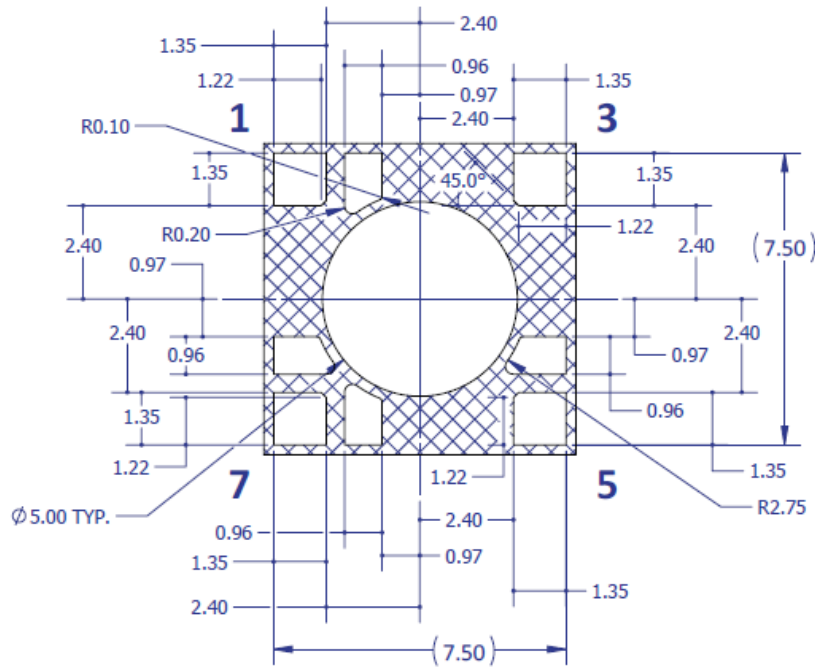


Figure 2b: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 2b:

1. Unless otherwise noted, the tolerance = ± 0.20 mm.

Reflow Soldering Profile

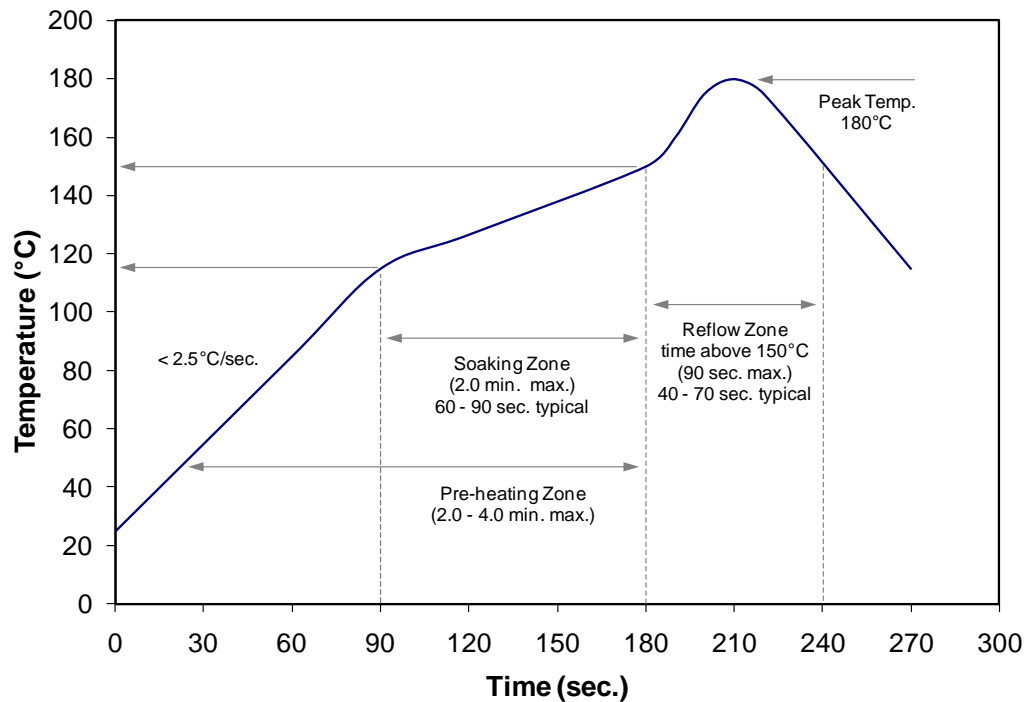


Figure 3: Reflow soldering profile for low temperature lead free soldering.

Typical Radiation Pattern

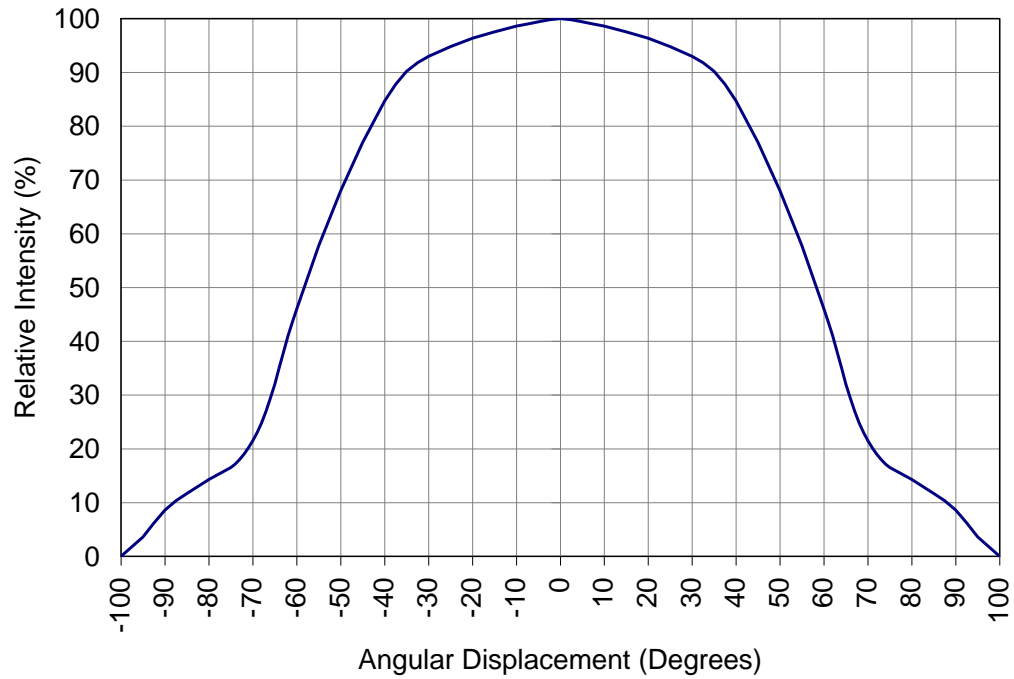


Figure 4: Typical representative spatial radiation pattern.

Typical Relative Spectral Power Distribution

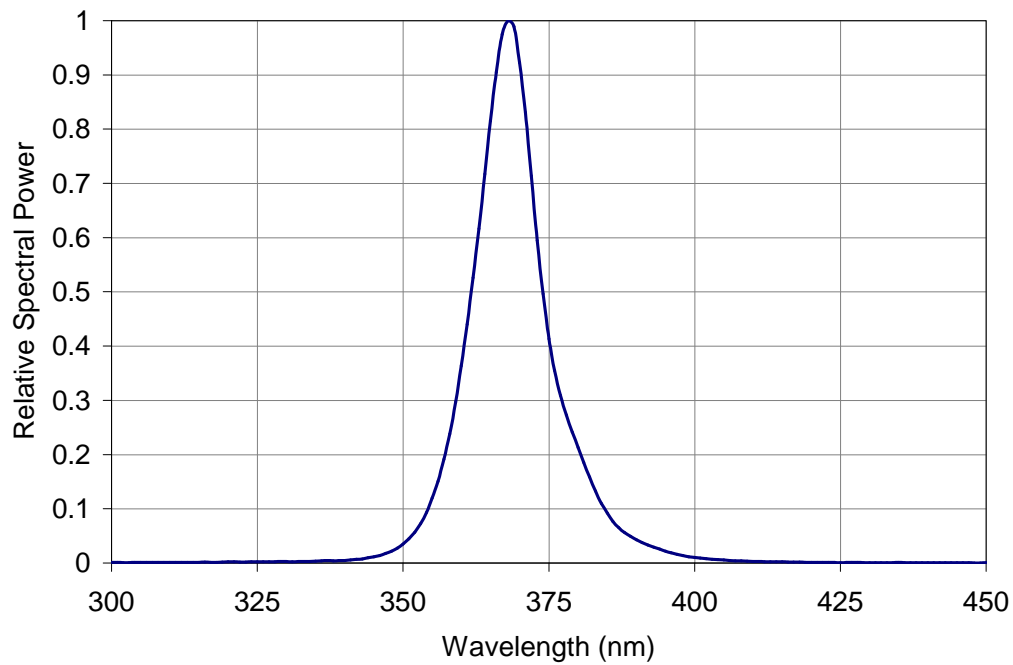


Figure 5: Typical relative spectral power vs. wavelength @ $T_c = 25^\circ\text{C}$.

Typical Peak Wavelength Shift over Temperature

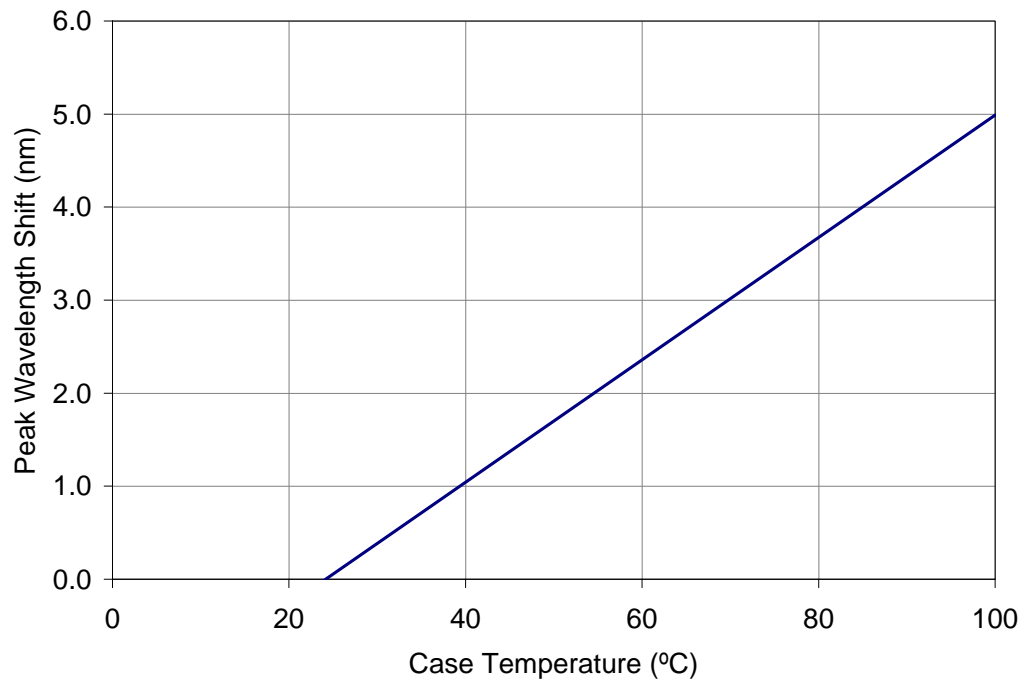


Figure 6: Typical peak wavelength shift vs. case temperature.

Typical Normalized Radiant Flux

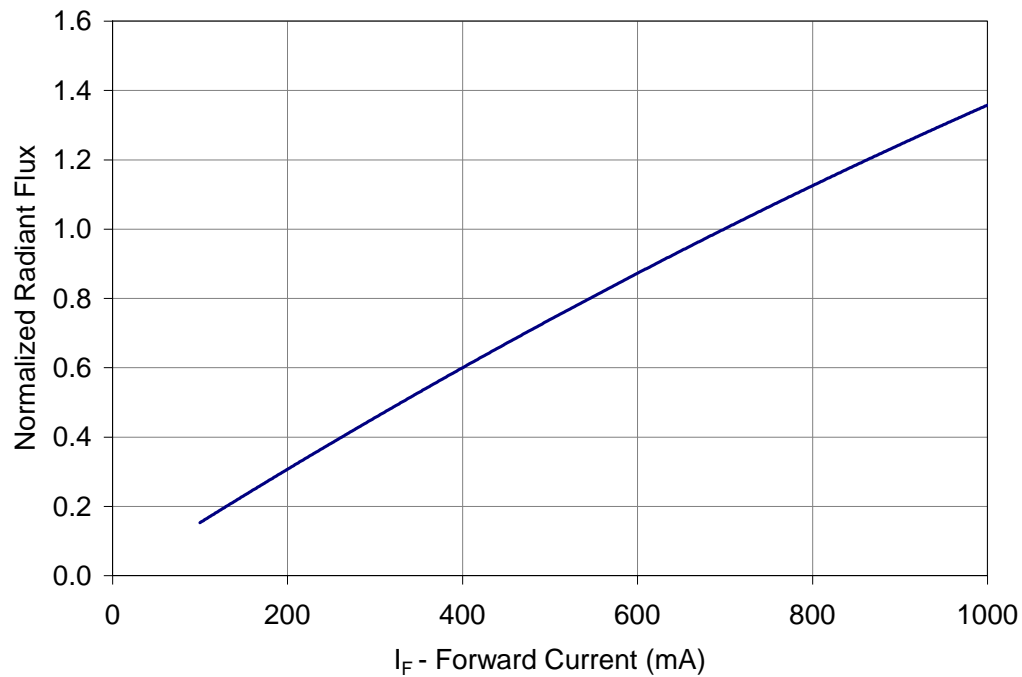


Figure 7: Typical normalized radiant flux vs. forward current @ $T_c = 25^\circ\text{C}$.

Typical Normalized Radiant Flux over Temperature

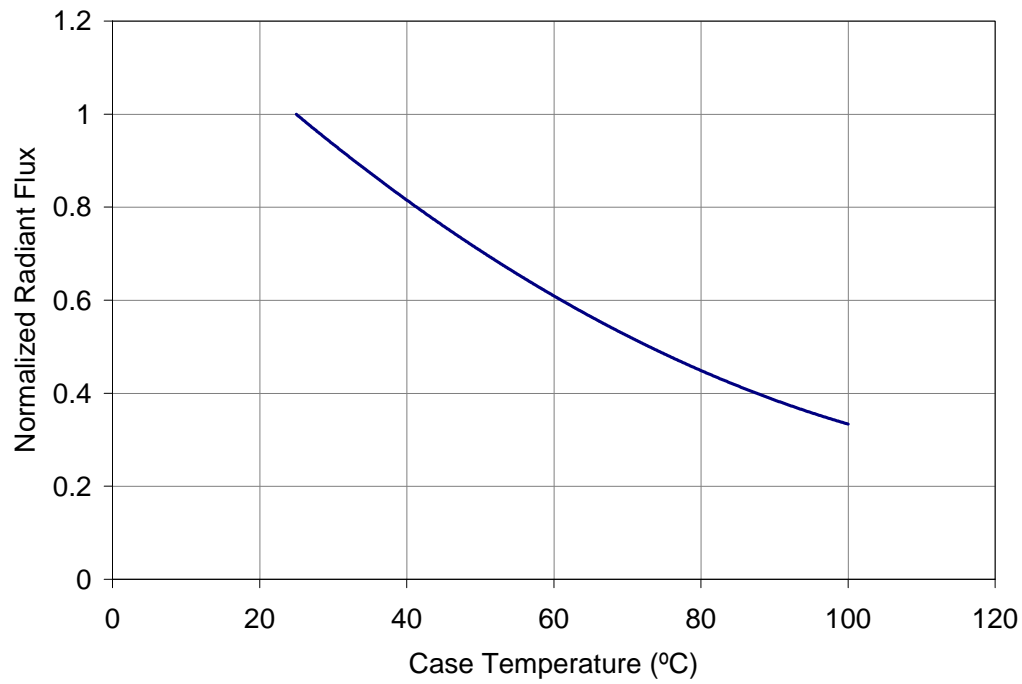


Figure 8: Typical normalized radiant flux vs. case temperature.

Typical Forward Current Characteristics

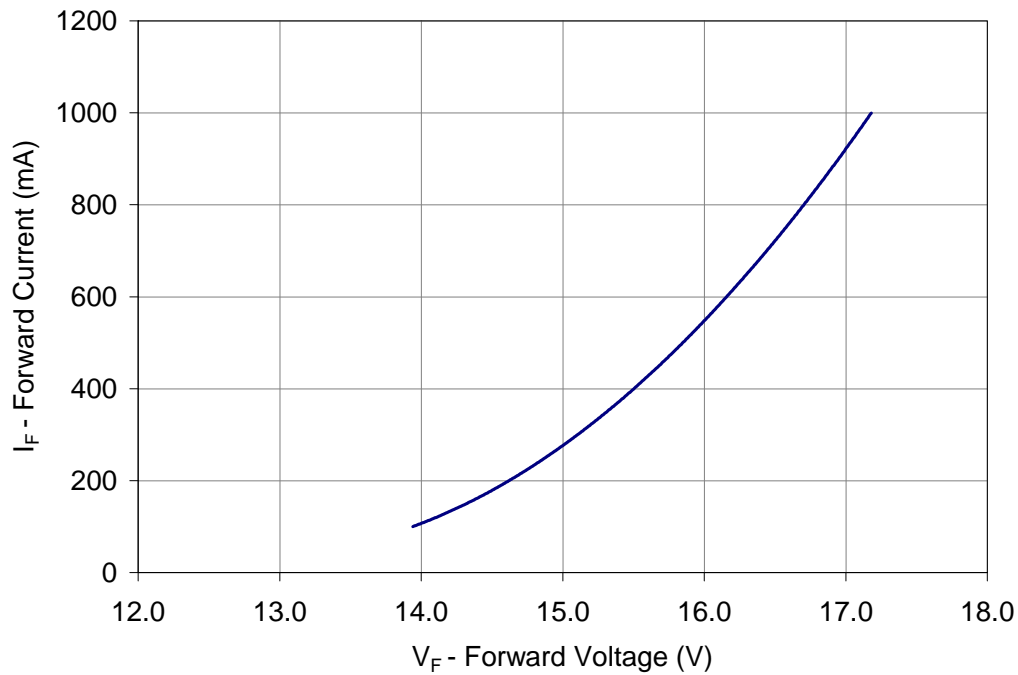


Figure 9: Typical forward current vs. forward voltage @ $T_C = 25^\circ\text{C}$.

Current De-rating

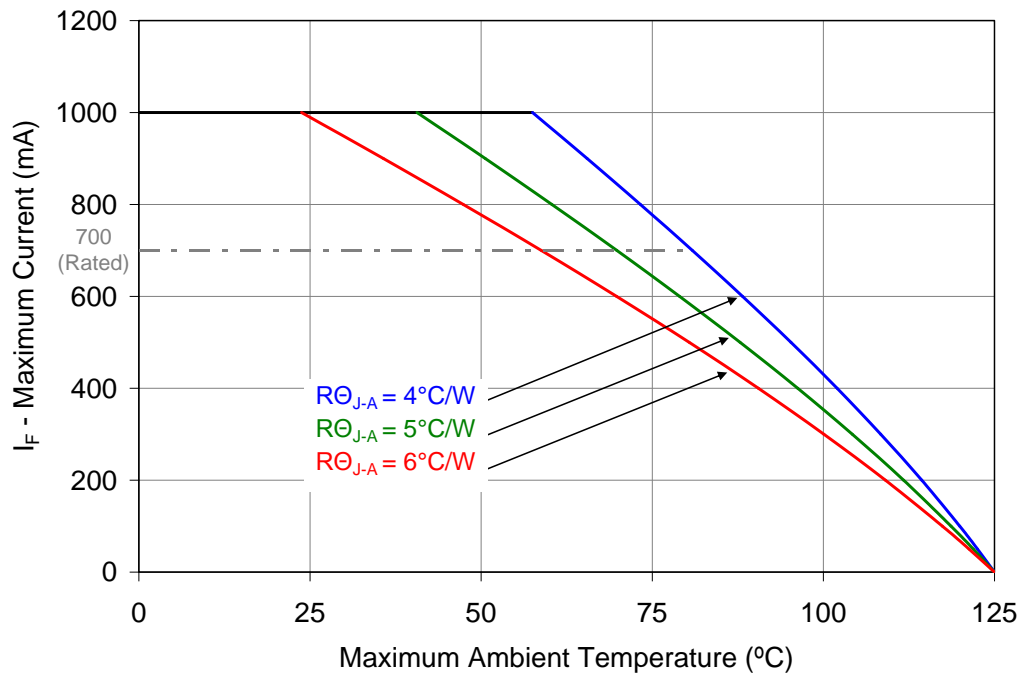


Figure 10: Maximum forward current vs. ambient temperature based on $T_{J(\text{MAX})} = 125^{\circ}\text{C}$.

Notes for Figure 10:

1. RO_{J-C} [Junction to Case Thermal Resistance] for the LZ4-00UA00 is typically 1.1°C/W .
2. RO_{J-A} [Junction to Ambient Thermal Resistance] = $RO_{J-C} + RO_{C-A}$ [Case to Ambient Thermal Resistance].

Emitter Tape and Reel Specifications (mm)

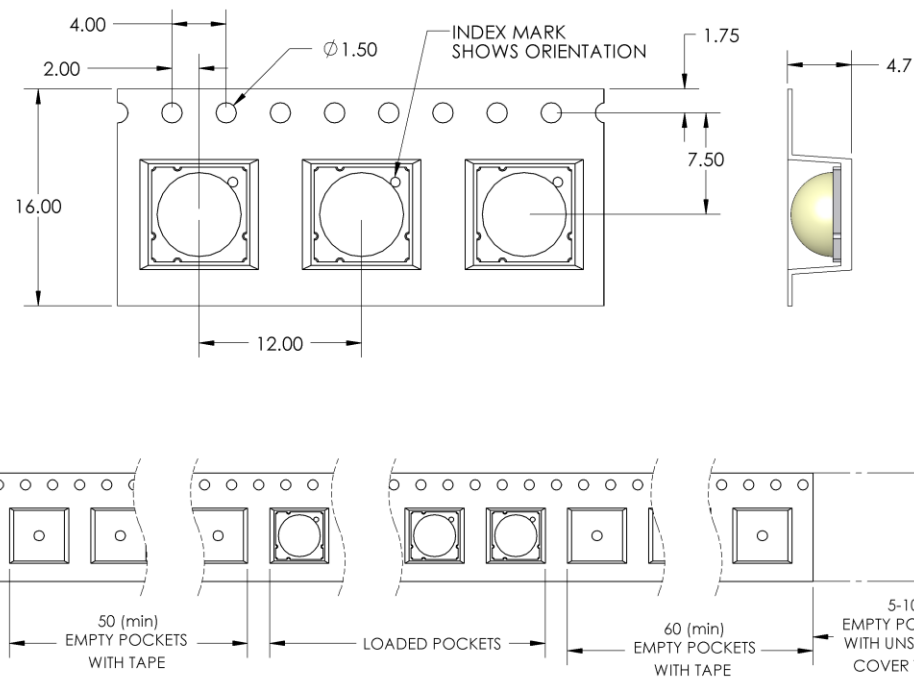


Figure 11: Emitter carrier tape specifications (mm).

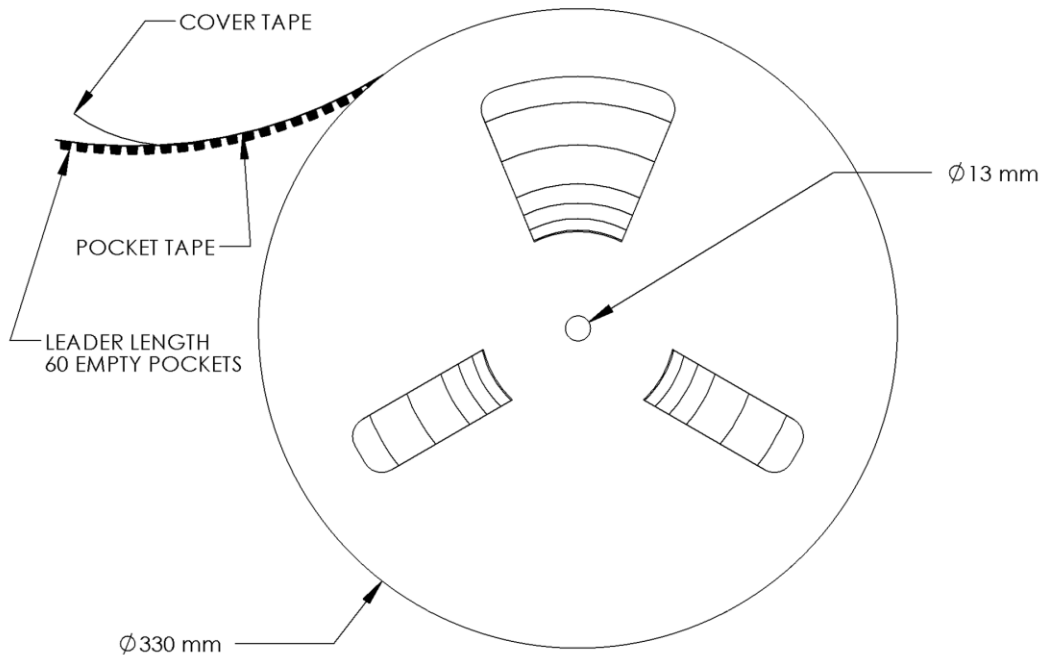


Figure 12: Emitter Reel specifications (mm).

Notes:

1. Packaging contains UV caution labels. Avoid exposure to the beam and wear appropriate protective eyewear when operating the UV LED.

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 (2700K-3500K)
- W9 Warm White CRI 90 Minimum (2700K-3500K)
- NW Neutral White (4000K)
- CW Cool White (5500K-6500K)
- 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

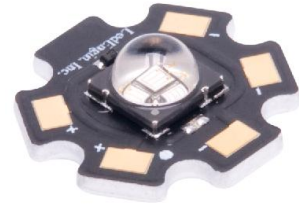
See “Bin kit options” on page 2 for details. Default is “0000”

Ordering information:

For ordering LED Engin 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 LED Engin sales representative or authorized distributor.

LZ4 Emitter on 1 channel star MCPCB

LZ4-4xxxxx



Key Features

- Supports 4 LED dies in series
- Very low thermal Resistance for MCPCB adds only 1.1°C/W
- Multiple mounting and attachment options
- MCPCB contains Zener Diode for ESD protection
- LED Engin LZ4 Lens family (12 to 37deg) aligns with the MCPCB cutouts
- 19.6mm diameter standard star MCPCB

Description

The LZ4-4xxxxx Standard MCPCB option provides a convenient method to mount LED Engin's LZ4 emitters. The MCPCB connects all 4 LED die in series and provides 2 anode and 3 cathode contact pads. The six recessed features allow the use of M3 or #4 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 θ_{J-B} Lookup Table

Product	Emitter θ_{J-C}		MCPCB $R\theta_{C-B}$		Emitter + MCPCB $R\theta_{J-B}$
LZ4	1.1°C/W	+	1.1°C/W	=	2.2°C/W

Note:

- $R\theta_{J-B}$ 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

LED Engin, 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. LED Engin'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.

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

LED Engin reserves the right to make changes to improve performance without notice.

Please contact sales@ledengin.com or (408) 922-7200 for more information.