High Radiant Flux Density
365nm UV LED Emitter

LZC-00U600

Key Features

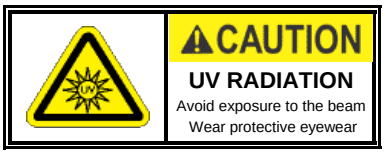
- Ultra-bright, compact 12-die, 365nm UV LED
- Very high Radiant Flux density, 10 W/cm^2
- Small high density foot print, 9.0mm x 9.0mm
- Surface mount ceramic package with integrated glass lens
- Exceptionally low Thermal Resistance (0.7°C/W)
- Electrically neutral thermal slug
- Autoclave complaint (JEDEC JESD22-A102-C)
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on MCPCB (optional)

Typical Applications

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

Description

The LZC-series emitter is rated for 40W power handling in an ultra compact package. With a small 9.0mm x 9.0mm footprint, this package provides exceptional radiant flux density. The patented design has unparalleled thermal and optical performance. The high quality materials used in the package are chosen to optimize Radiant Flux and minimize stresses which results in monumental reliability and radiant flux maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.



Part number options

Base part number

Part number	Description
LZC-00U600-xxxx	LZC emitter
LZC-70U600-xxxx	LZC emitter on 1 channel 1x12 Star MCPCB
LZC-C0U600-xxxx	LZC emitter on 2 channel 2x6 Star 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	P	U0 - U1	full distribution flux; full distribution wavelength
R000	R	U0 - U1	R minimum flux bin; full distribution wavelength
00U0	P	U0 - U0	full distribution flux; wavelength U0 bin only
R0U0	R	U0 - U0	R minimum flux bin; wavelength U0 bin only
00U1	P	U1 - U1	full distribution flux; wavelength U1bin only
R0U1	R	U1 - U1	R minimum flux bin; wavelength U1 bin only

Notes:
1. Default bin kit option is -0000

Luminous Flux Bins

Table 2:

Bin Code	Minimum Radiant Flux (Φ) @ I_F = 700mA [1,2] (W)	Maximum Radiant Flux (Φ) @ I_F = 700mA [1,2] (W)
P	1.60	2.00
Q	2.00	2.40
R	2.40	3.00
S	3.00	3.80

Notes for Table 2:
1. Luminous flux performance guaranteed within published operating conditions. LedEngin maintains a tolerance of ± 10% on flux measurements.
2. Future products will have even higher levels of luminous flux performance. Contact LedEngin Sales for updated information.

Dominant Wavelength Bins

Table 3:

Bin Code	Minimum Peak Wavelength (λ_P) @ I_F = 700mA [1] (nm)	Maximum Peak Wavelength (λ_P) @ I_F = 700mA [1] (nm)
U0	365	370
U1	370	375

Notes for Table 3:
1. Dominant wavelength is derived from the CIE 1931 Chromaticity Diagram and represents the perceived hue.
2. LedEngin maintains a tolerance of ± 0.5nm on dominant wavelength measurements.

Forward Voltage Bins

Table 4:

Bin Code	Minimum Forward Voltage (V_F) @ I_F = 700mA [1,2] (V)	Maximum Forward Voltage (V_F) @ I_F = 700mA [1,2] (V)
0	41.28	55.68

Notes for Table 4:
1. Forward Voltage is binned with all 12 LED dice connected in series.
2. LedEngin maintains a tolerance of ± 0.48V for forward voltage measurements (± 0.04V per die).

Absolute Maximum Ratings

Table 5:

Parameter	Symbol	Value	Unit
DC Forward Current[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	°C
Junction Temperature	T_J	100	°C
Soldering Temperature[4]	T_{sol}	180	°C
Allowable Reflow Cycles		6	
ESD Sensitivity[5]		> 2,000 V HBM Class 2B JESD22-A114-D	

Notes for Table 5:
1. Maximum DC forward current (per die) 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 ≤ 10msec and Duty Cycle ≤ 10%.
3. LEDs are not designed to be reverse biased.
4. Solder conditions per JEDEC 020D. See Reflow Soldering Profile Figure 3.
5. LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZC-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°C

Table 6:

Parameter	Symbol	Typical	Unit
Radiant Flux (@ I_F = 700mA)[1]	Φ_V	2.80	mW
Peak Wavelength	λ_D	365	nm
Viewing Angle[2]	$2\Theta_{1/2}$	95	Degrees
Total Included Angle[3]	$\Theta_{0.9V}$	115	Degrees

Notes for Table 6:
1. Luminous flux typical value is for all four LED dice operating concurrently at rated current.
2. Viewing Angle is the off axis angle from emitter centerline where the luminous intensity is ½ of the peak value.
3. Total Included Angle is the total angle that includes 90% of the total luminous flux.

Electrical Characteristics @ T_C = 25°C

Table 7:

Parameter	Symbol	Typical	Unit
Forward Voltage (@ I_F = 700mA)[1]	V_F	49	V
Temperature Coefficient of Forward Voltage[1]	$\Delta V_F/\Delta T_J$	-14.8	mV/°C
Thermal Resistance (Junction to Case)	$R\Theta_{J-C}$	0.7	°C/W

Notes for Table 7:
1. Typical values for Forward Voltage and Temperature Coefficient of Forward Voltage is shown for with all 12 LED dice connected in series.

IPC/JEDEC Moisture Sensitivity Level

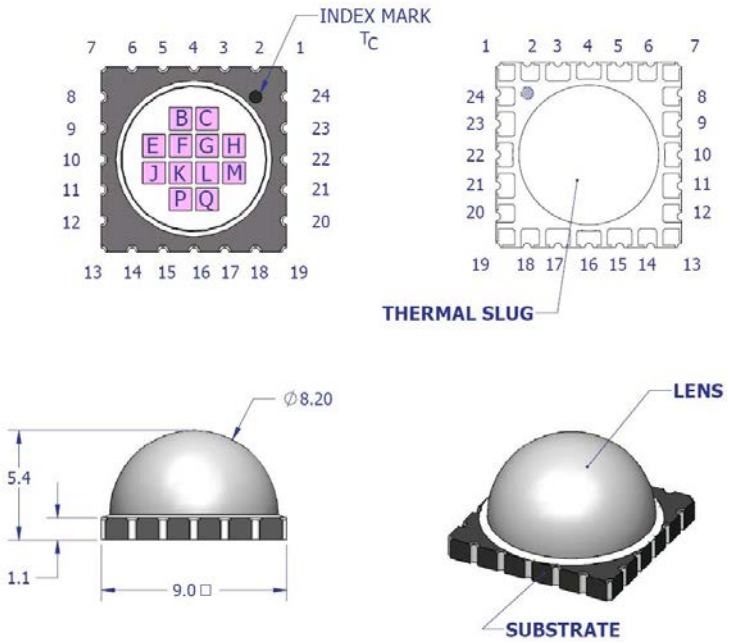
Table 1 - IPC/JEDEC J-STD-20D.1 MSL Classification:

			Soak Requirements			
	Floor Life		Standard		Accelerated	
Level	Time	Conditions	Time (hrs)	Conditions	Time (hrs)	Conditions
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)



Pin Out		
Pad	**Series**	**Function**
2	1	Cathode
3	1	Cathode
5	2	Cathode
6	2	Cathode
14	2	Anode
15	2	Anode
17	1	Anode
18	1	Anode

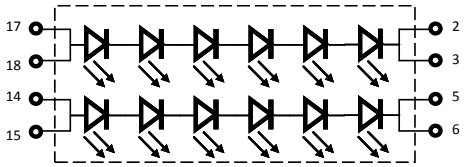


Figure 1: Package outline drawing.

Notes for Figure 1:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Thermal contact, Pad is electrically neutral.

Recommended Solder Pad Layout (mm)

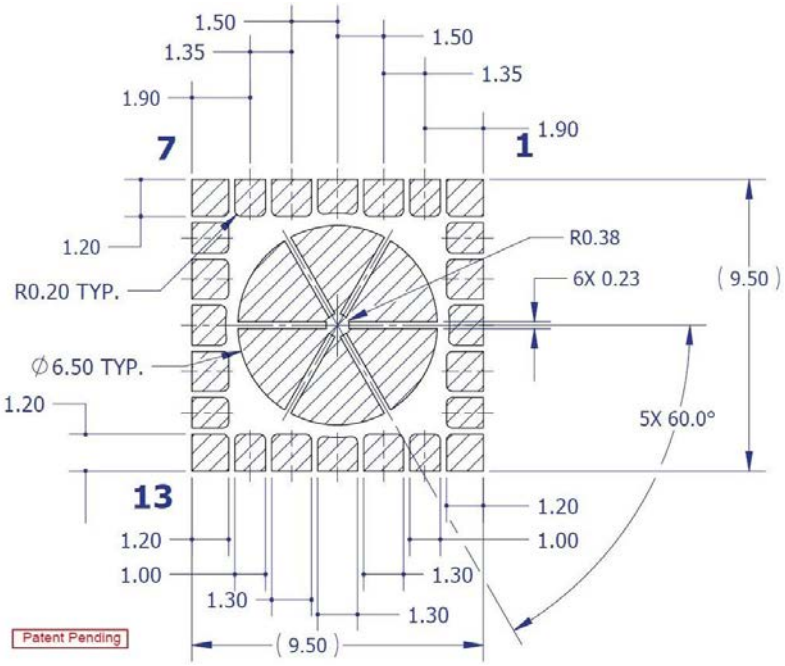


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad.

Note for Figure 2a:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.

Recommended Solder Mask Layout (mm)

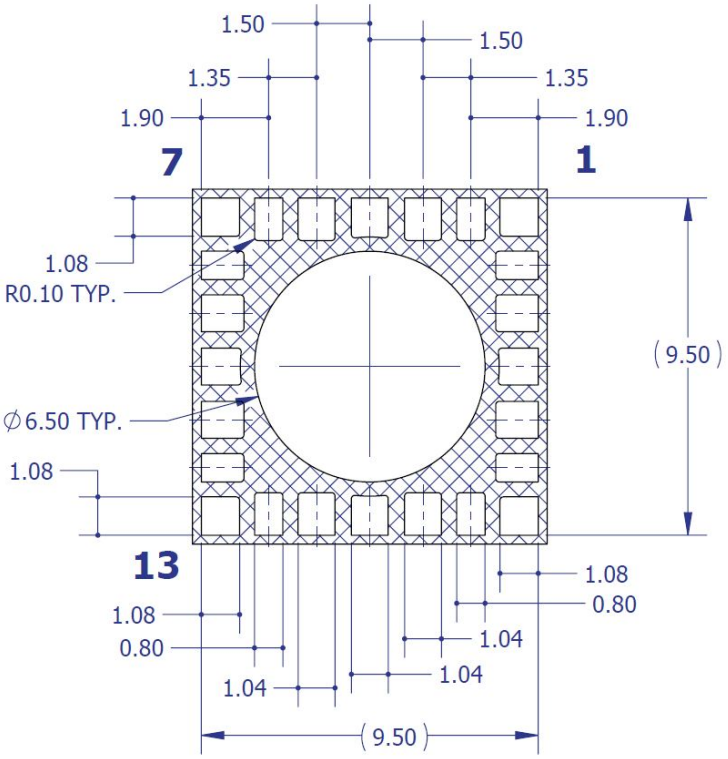


Figure 2b: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 2b:

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

Reflow Soldering Profile

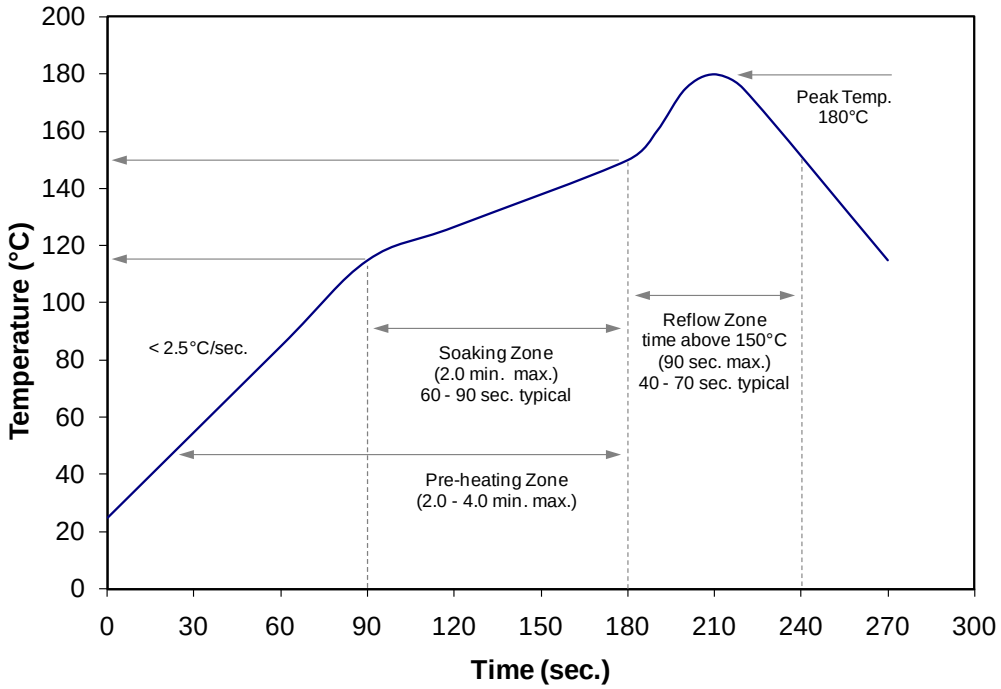


Figure 3: Reflow soldering profile for lead free soldering.

Notes for Figure 3:

1. Solder profile for low temperature solder. LedEngin recommends 58Bi-42Sn (wt.%) Solder for our low temperature solder profile.

Typical Radiation Pattern

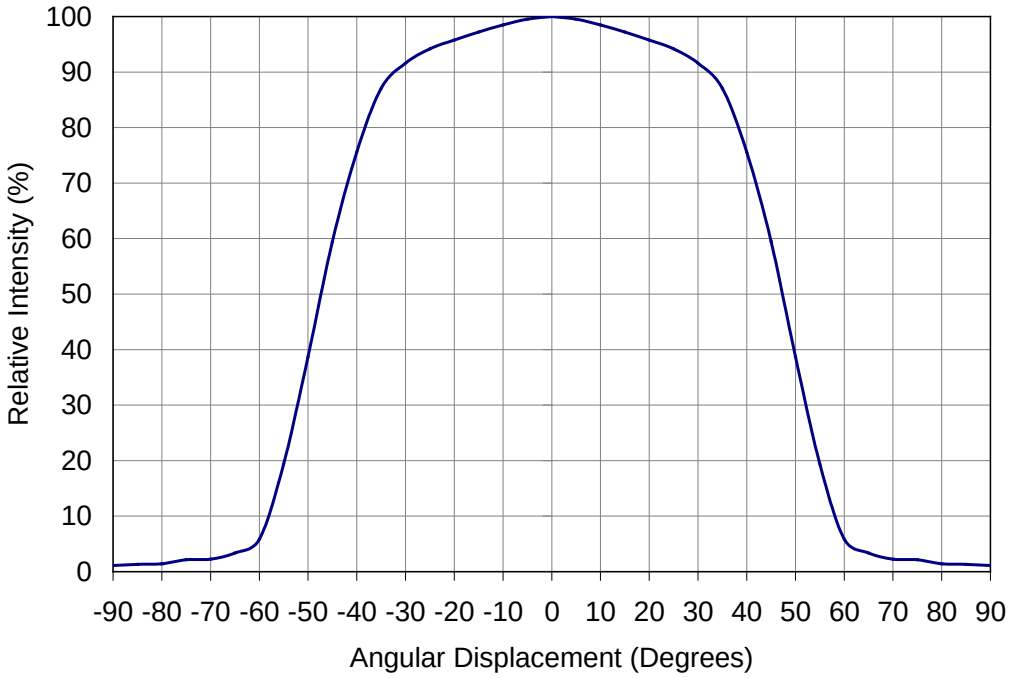


Figure 4: Typical representative spatial radiation pattern.

Typical Relative Spectral Power Distribution

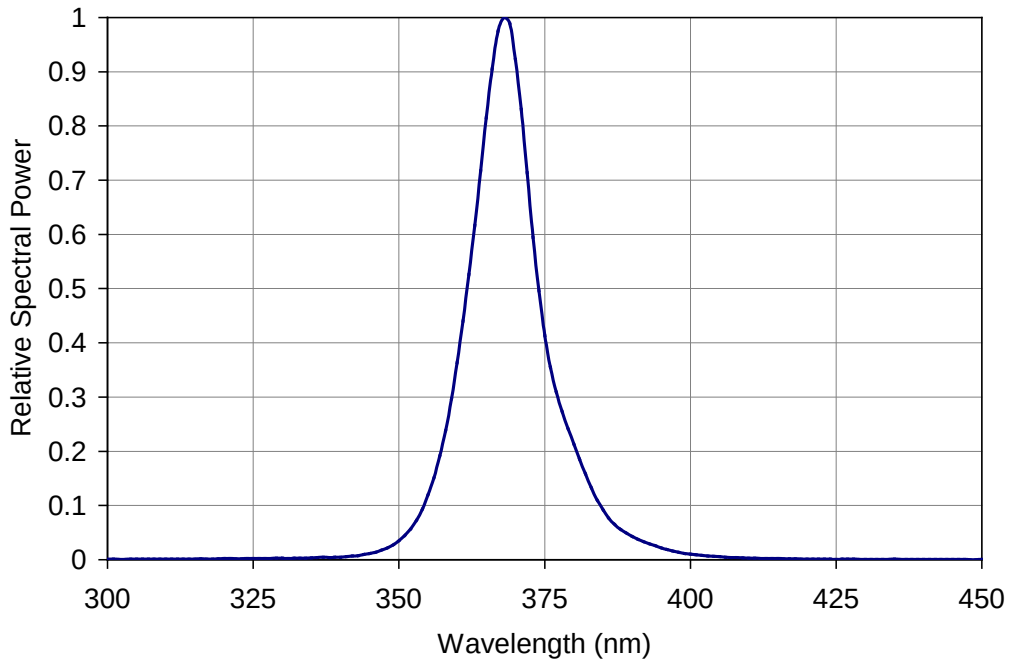


Figure 5: Relative spectral power vs. wavelength @ T_C = 25°C.

Typical Relative Dominant Wavelength Shift over Temperature

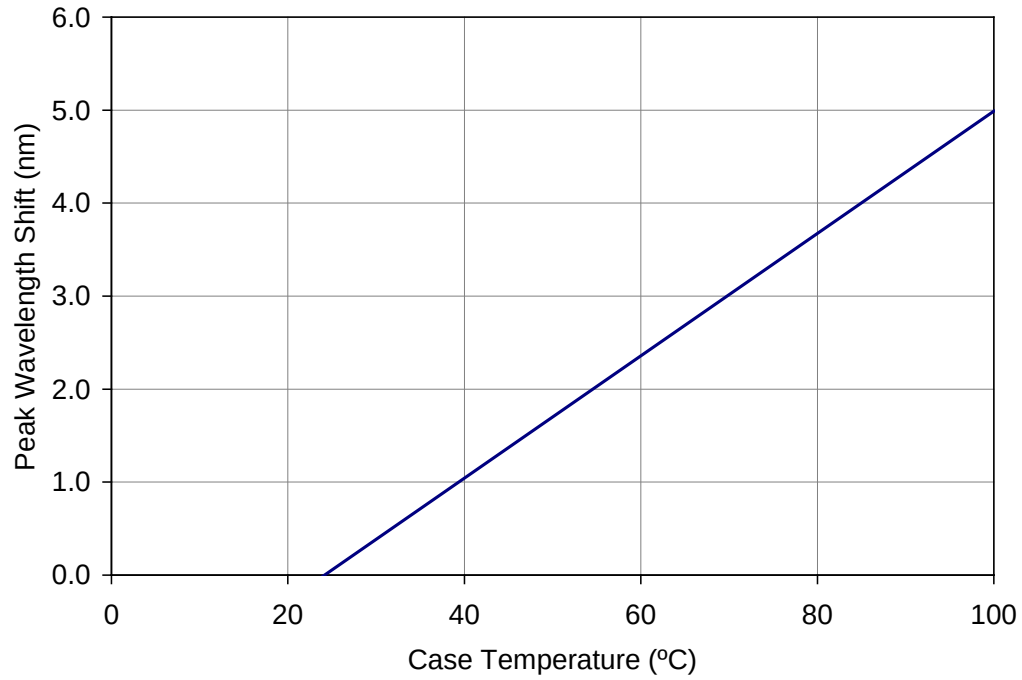


Figure 6: Typical dominant wavelength shift vs. case temperature.

Typical Relative Radiant Flux

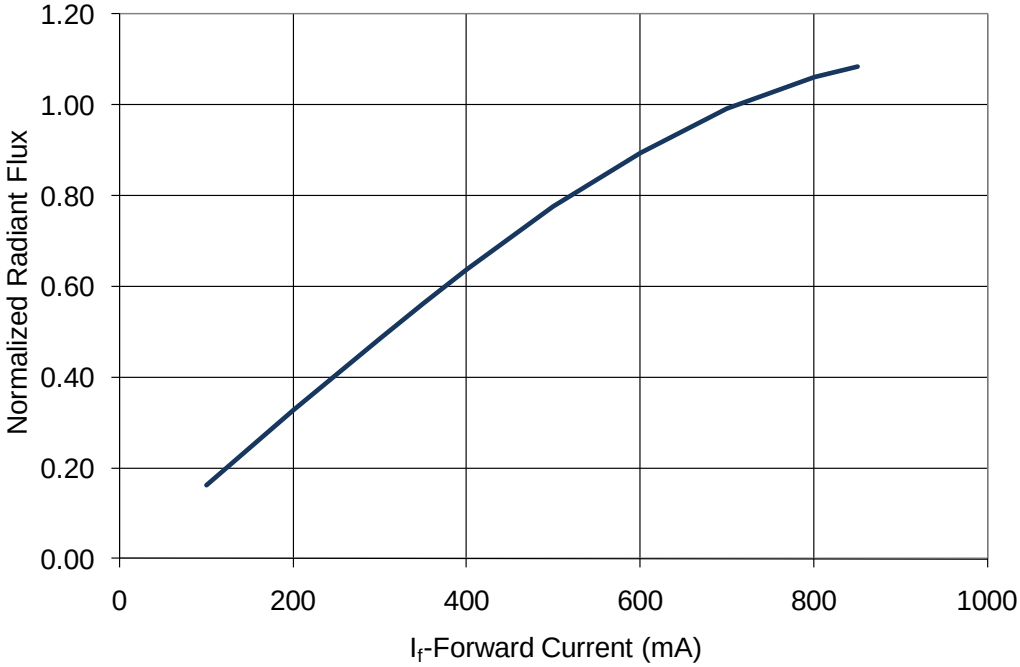


Figure 7: Typical relative Radiant Flux vs. forward current @ T_C = 25°C.

Typical Relative Radiant Flux over Temperature

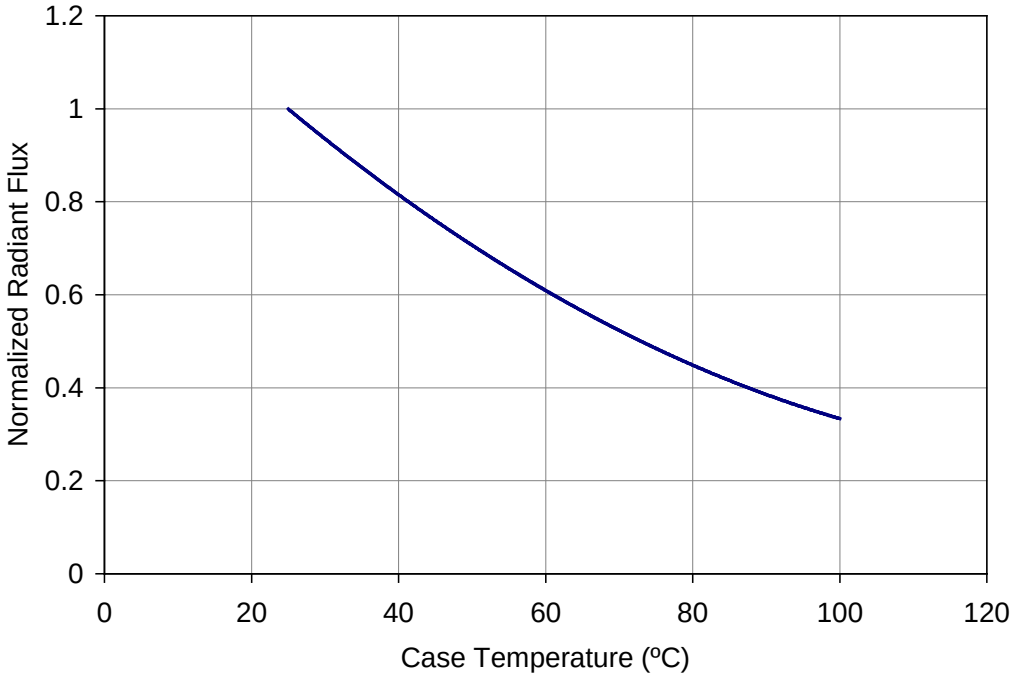


Figure 8: Typical relative Radiant Flux vs. case temperature.

Typical Forward Current Characteristics

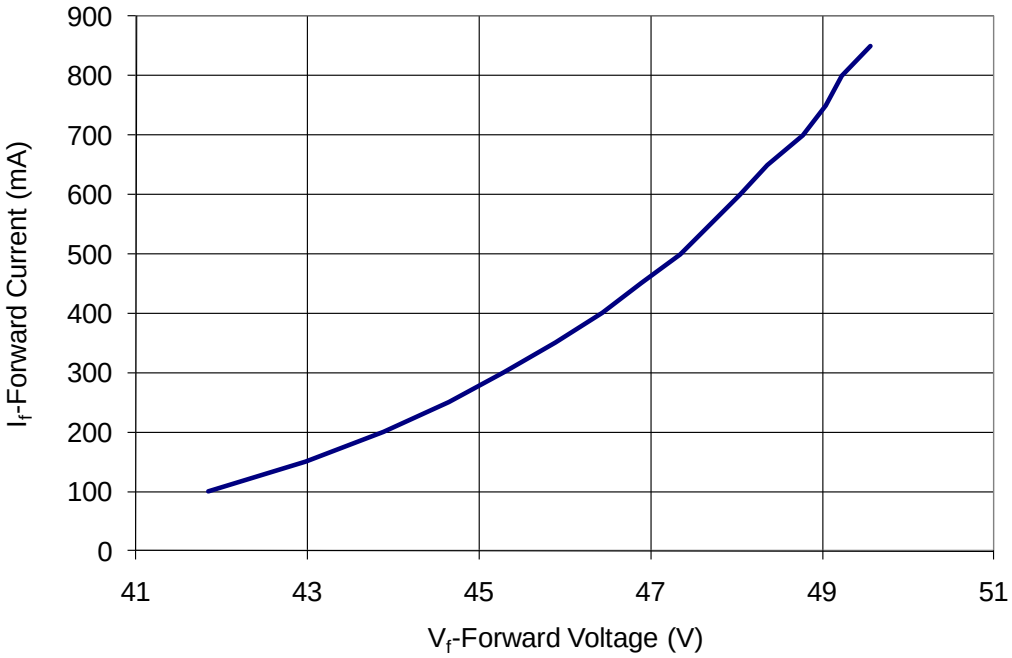


Figure 9: Typical forward current vs. forward voltage @ T_C = 25°C.

Note for Figure 9:

1. Forward Voltage curve is assumes that all twelve LED dice are connected in series.

Current De-rating

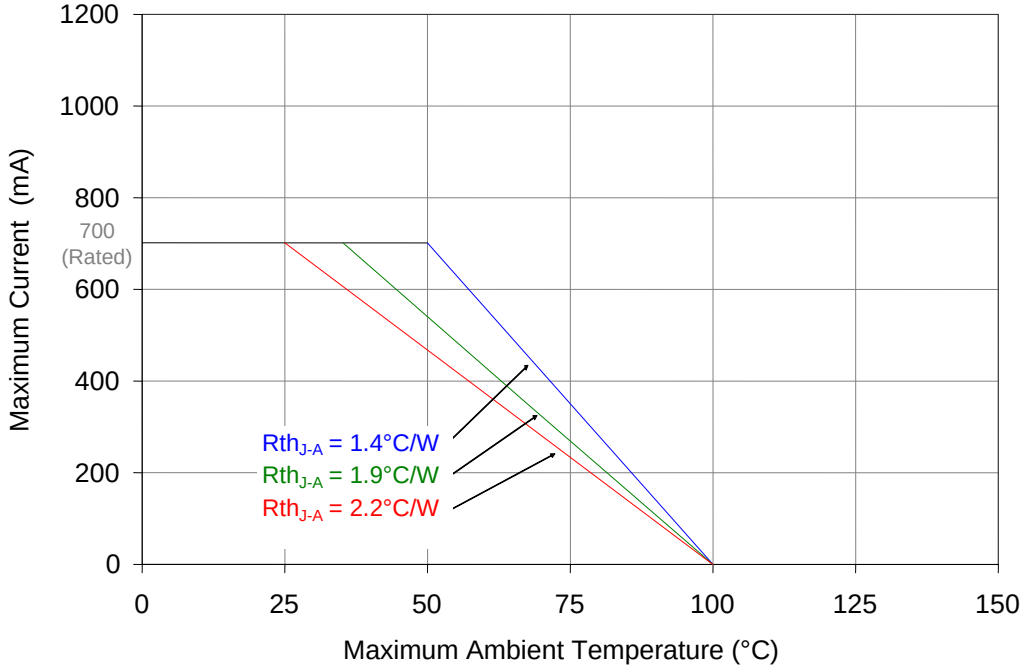


Figure 10: Maximum forward current vs. ambient temperature based on $T_{J(MAX)}$ = 100°C.

Notes for Figure 10:

2. Maximum current assumes that all four LED dice are operating concurrently at the same current.
3. $R\Theta_{J\text{-}C}$ [Junction to Case Thermal Resistance] for the LZC-series is typically 0.7°C/W.
4. $R\Theta_{J\text{-}A}$ [Junction to Ambient Thermal Resistance] = $R\Theta_{J\text{-}C}$ + $R\Theta_{C\text{-}A}$ [Case to Ambient Thermal Resistance].

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
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

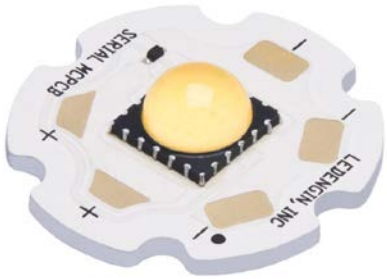
See “Bin kit options” on page 2 for details. Default is “0000”

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.

LZC Emitter on

1 channel star MCPCB (1x12)

LZC-7xxxxx



Key Features

- Supports 12 LED dies in series
- Very low thermal Resistance for MCPCB adds only 0.6°C/W
- Multiple mounting and attachment options
- 1-channel configuration allows for easy driver control
- MCPCB contains Zener Diode for ESD protection
- LED Engin LZC Lens family (8 to 45deg) aligns with the MCPCB cutouts
- 28.3mm diameter star MCPCB

Description

The LZC-7xxxxx Standard MCPCB option provides a convenient method to mount LED Engin's LZC emitters. 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.

RΘJ-B Lookup Table

Product	**Emitter Θ_{J-C}**		**MCPCB $R\Theta_{C-B}$**		**Emitter + MCPCB $R\Theta_{J-B}$**
LZC	0.7°C/W	+	0.6°C/W	=	1.3°C/W

Note for table 1:

- RΘJ-B is the combined thermal resistance from the LED die junction to the Aluminum core on MCPCB (RΘJ-C + RΘC-B = RΘJ-B).

LZC emitter on
2 channel star MCPCB (2x6)

LZC-Cxxxxx

Key Features

- Supports 6 LED dies in series twice
- Very low thermal Resistance for MCPCB adds only 0.6°C/W
- Multiple mounting and attachment options
- 2-channel configuration allows for easy driver control
- MCPCB contains Zener Diode for ESD protection
- LED Engin LZC Lens family (8 to 45deg) aligns with the MCPCB cutouts
- 28.3mm diameter star MCPCB

Description

The LZC-Cxxxxx Standard MCPCB option provides a convenient method to mount LED Engin's LZC 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.

RΘJ-B Lookup Table

Product	Emitter Θ_{J-C}		MCPCB $R\Theta_{C-B}$		Emitter + MCPCB $R\Theta_{J-B}$
LZC-Cxxxxx	0.7°C/W	+	0.6°C/W	=	1.3°C/W

Note for table 1

- RΘJ-B is the combined thermal resistance from the LED die junction to the Aluminum core on MCPCB (RΘJ-C + RΘC-B = RΘJ-B).

Company Information

LedEngin, Inc. is a Silicon Valley based solid-state lighting company specializing in the development and manufacturing of unprecedented high-power LED emitters, modules and replacement lamps. 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's LED emitters range from 5W to 90W with ultra-compact footprints and are available in single color products including Cool White, Neutral White, Warm White, Red, Green, Blue, Amber, Deep Red, Far Red, Dental Blue and UV as well as multi-color products with RGB, RGBA and RGBW options. LedEngin's brightest White LEDs are capable of emitting 4,600 lumens.

LedEngin's robust emitters are at the core of its unique line of modules and replacement lamps producing unmatched beam quality resulting in true Lux on Target™ for a wide variety of spot and narrow flood directional lighting applications.

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 or (408) 492-0620 for more information.