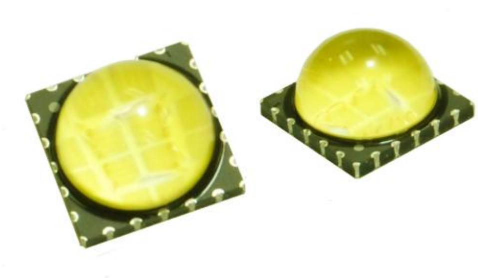
High Luminous Flux Density
Warm White LED Emitter

LZC-00WW00



Key Features

- High Luminous Flux Density 12-die Warm White LED
- More than 40 Watt power dissipation capability
- Ultra-small foot print – 9.0mm x 9.0mm
- Very low Thermal Resistance (0.7°C/W)
- Surface mount ceramic package with integrated glass lens
- Spatial color uniformity across radiation pattern
- Excellent Color Rendering Index
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available with several MCPCB options
- Recommend use with LL-3T08 lens family to provide standard beam patterns suitable for general lighting applications

Typical Applications

- General lighting
- Down lighting
- Architectural lighting
- Street lighting
- Stage and Studio lighting
- Refrigeration lighting
- Portable lighting

Description

The LZC-series 12-die White LED emitter has an electrical input power dissipation capability of more than 40 Watt electrical power in an extremely small package. With a small 9.0mm x 9.0mm ultra-small footprint, this package provides exceptional luminous flux density. LED Engin's patent-pending thermally insulated phosphor layer provides a spatial color uniformity across the radiation pattern and a consistent CCT over time and temperature. The high quality materials used in the package are chosen to minimize stresses and optimize light output which results in superior reliability and lumen maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.

Product Nomenclature

The LZ Series part number designation is defined as follows:

L Z A – B C D E F G

Where:
A – designates the number of LED die in the package ("C" for 12-die)
B – designates the package level ("0" for Emitter or other number for MCPC options)
C – designates the radiation pattern ("0" for Lambertian)
D and E – designate the color ("WW" for Warm White: 2600 K < CCT < 3800 K)

Luminous Flux Bins

Table 1:

Bin Code	Minimum Luminous Flux (Φ_V) @ I_F = 700mA [1,2] (lm)	Maximum Luminous Flux (Φ_V) @ I_F = 700mA [1,2] (lm)	Typical Luminous Flux (Φ_V) @ I_F = 1000mA [2] (lm)
X	1,085	1,357	1,540
Y	1,357	1,696	1,920
Z	1,696	2,120	2,400

Notes for Table 1:
1. Luminous flux performance guaranteed within published operating conditions. LedEngin maintains a tolerance of ± 10% on flux measurements.
2. Luminous Flux typical value is for all 12 LED dice operating concurrently at rated current.

Forward Voltage Bins

Table 2:

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	38.40	49.92

Notes for Table 2:
1. LedEngin maintains a tolerance of ± 0.04V for forward voltage measurements.
2. Forward Voltage is binned with 12 LED dice connected in series. The actual LED is configured with two strings of 6 dice in series.

Warm White Chromaticity Groups

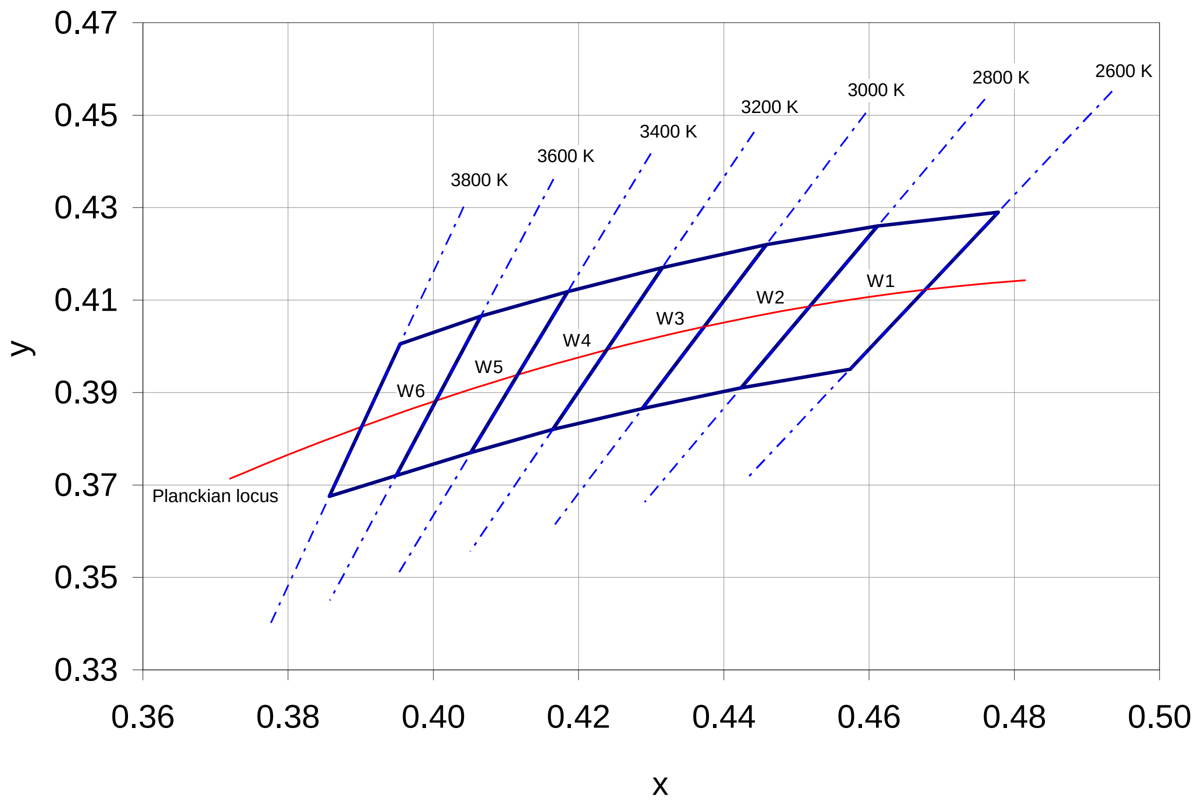


Figure 1: Standard Chromaticity Groups plotted on excerpt from the CIE 1931 (2°) x-y Chromaticity Diagram. Coordinates are listed below in Table 3.

Warm White Chromaticity Coordinates

Table 3:

Bin Code	**x**	**y**	**Typical CCT (K)**		**Bin Code**	**x**	**y**	**Typical CCT (K)**
W1	0.4574 0.4778 0.4612 0.4424	0.3950 0.4290 0.4260 0.3910	2700		W4	0.4165 0.4315 0.4185 0.4052	0.3820 0.4170 0.4118 0.3770	3300
W2	0.4424 0.4612 0.4459 0.4288	0.3910 0.4260 0.4220 0.3865	2900		W5	0.4052 0.4185 0.4066 0.3949	0.3770 0.4118 0.4065 0.3720	3500
W3	0.4288 0.4459 0.4315 0.4165	0.3865 0.4220 0.4170 0.3820	3100		W6	0.3949 0.4066 0.3954 0.3857	0.3720 0.4065 0.4005 0.3675	3700

IPC/JEDEC Moisture Sensitivity Level

Table 4 - IPC/JEDEC J-STD-20.1 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 4:

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.

Average Lumen Maintenance Projections

Lumen maintenance generally describes the ability of a lamp to retain its output over time. The useful lifetime for solid state lighting devices (Power LEDs) is also defined as Lumen Maintenance, with the percentage of the original light output remaining at a defined time period.

Based on long-term WHTOL testing, LedEngin projects that the LZ Series will deliver, on average, 70% Lumen Maintenance at 100,000 hours of operation at a forward current of 700 mA per die. This projection is based on constant current operation with junction temperature maintained at or below 125°C.

Typical Radiation Pattern

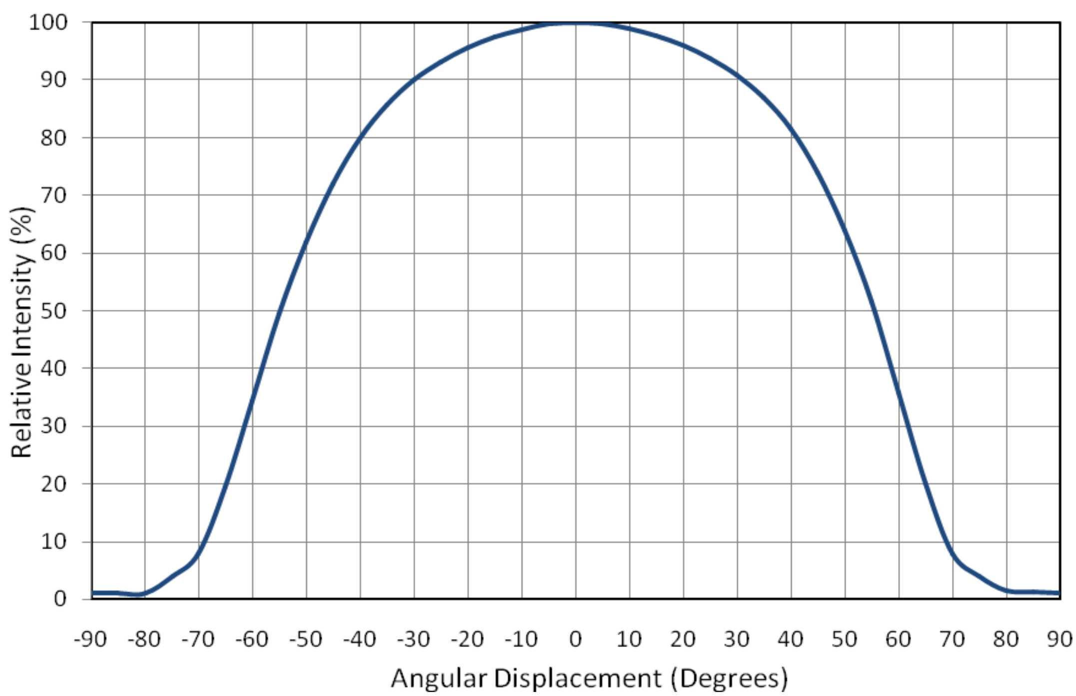


Figure 2: Typical representative spatial radiation pattern.

Absolute Maximum Ratings

Table 5:

Parameter	Symbol	Value	Unit
DC Forward Current at T_{jmax}=130C [1]	I_F	1200	mA
DC Forward Current at T_{jmax}=150C [1]	I_F	1000	mA
Peak Pulsed Forward Current [2]	I_{FP}	1500	mA
Reverse Voltage	V_R	See Note 3	V
Storage Temperature	T_{stg}	-40 ~ +150	°C
Junction Temperature	T_J	150	°C
Soldering Temperature [4]	T_{sol}	260	°C
Allowable Reflow Cycles		6	
ESD Sensitivity [5]		> 8,000 V HBM Class 3B 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 5.
5. LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZC-00WW00 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
Luminous Flux (@ I_F = 700mA) [1]	Φ_V	1400	lm
Luminous Flux (@ I_F = 1000mA) [1]	Φ_V	1800	lm
Luminous Efficacy (@ I_F = 350mA)		65	lm/W
Correlated Color Temperature [2]	CCT	3100	K
Chromaticity Coordinates	x,y	0.430, 0.402	
Color Rendering Index (CRI / R9)	R_a / R_9	85 / 30	
Viewing Angle [3]	$2\Theta_{1/2}$	110	Degrees

Notes for Table 6:
1. Luminous flux typical value is for all 12 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.

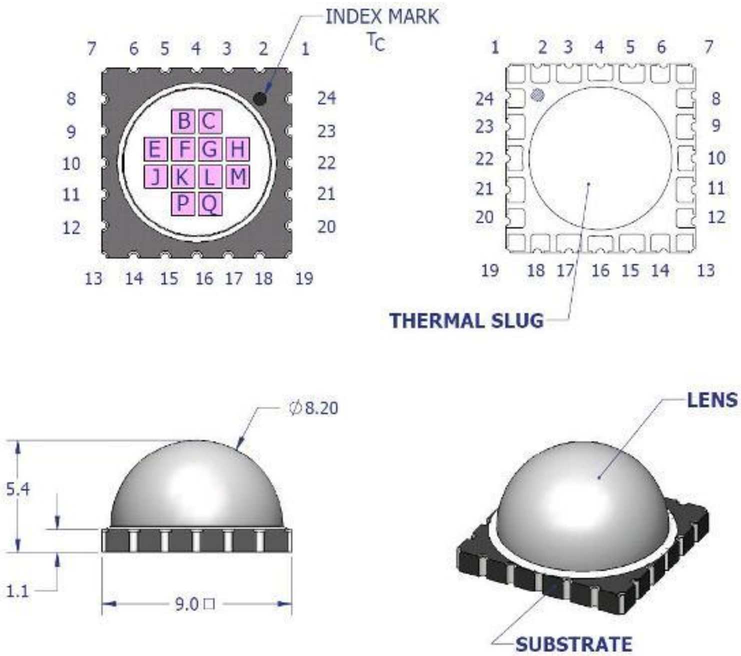
Electrical Characteristics @ T_C = 25°C

Table 7:

Parameter	Symbol	Typical	Unit
Forward Voltage (@ I_F = 700mA) [1]	V_F	42.0	V
Forward Voltage (@ I_F = 1000mA) [1]	V_F	43.8	V
Temperature Coefficient of Forward Voltage [1]	$\Delta V_F/\Delta T_J$	-33.6	mV/°C
Thermal Resistance (Junction to Case)	$R\Theta_{J-C}$	0.7	°C/W

Notes for Table 7:
1. Forward Voltage is binned with 12 LED dice connected in series. The actual LED is configured with two strings of 6 dice in series.

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

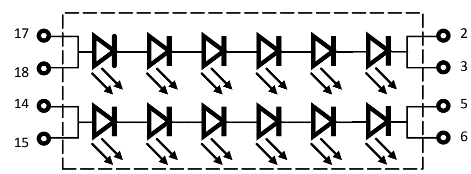


Figure 1: Package outline drawing.

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)

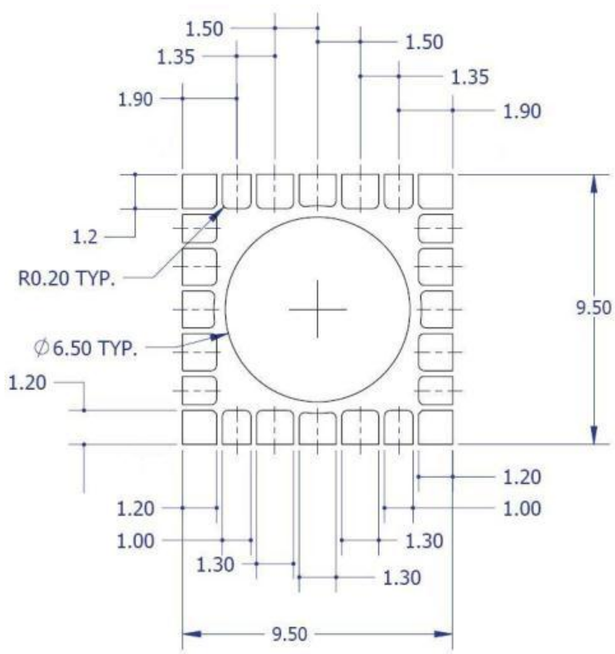


Figure 2: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 2:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Recommended stencil thickness is 125µm.

Reflow Soldering Profile

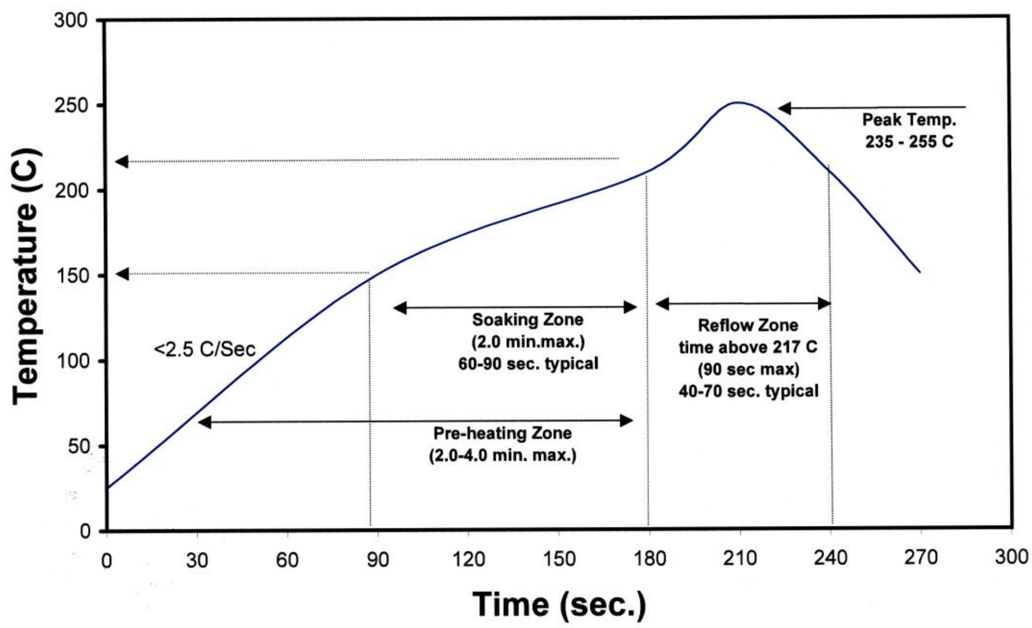


Figure 5: Reflow soldering profile for lead free soldering.

Typical Relative Spectral Power Distribution

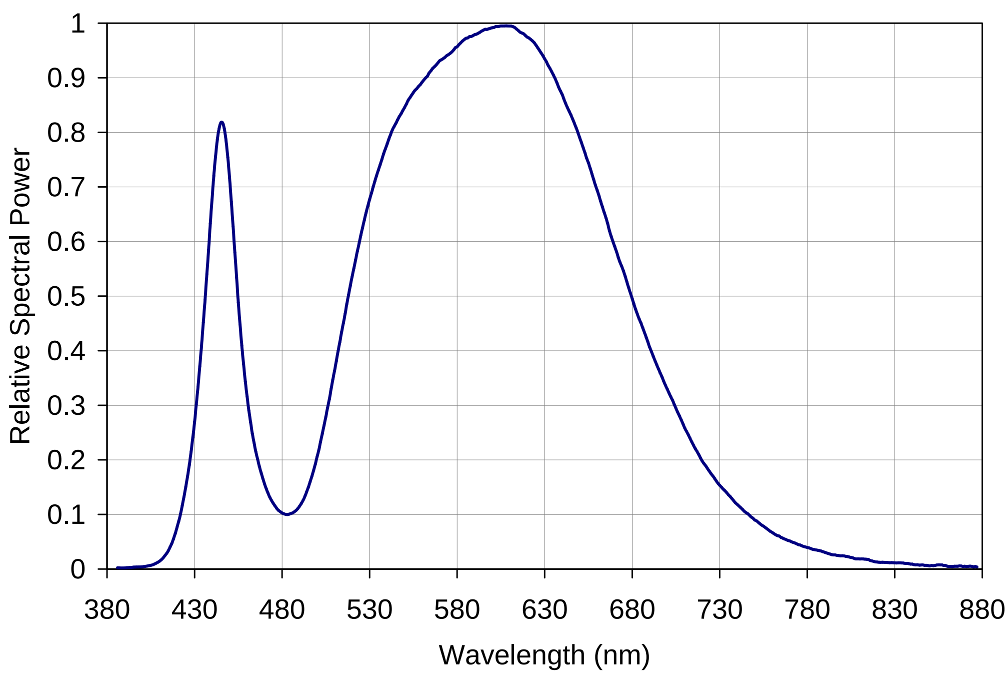


Figure 6: Typical relative spectral power vs. wavelength @ T_C = 25°C.

Typical Relative Light Output

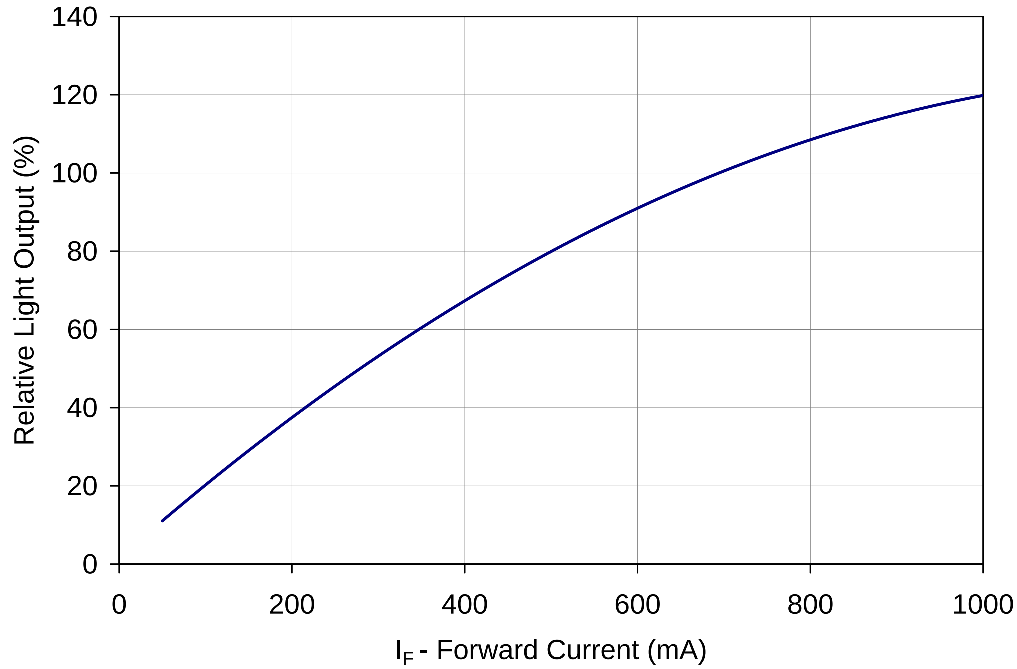


Figure 7: Typical relative light output vs. forward current @ T_C = 25°C.

Notes for Figure 7:
1. Luminous Flux typical value is for all 12 LED dice operating concurrently at rated current.

Typical Relative Light Output over Temperature

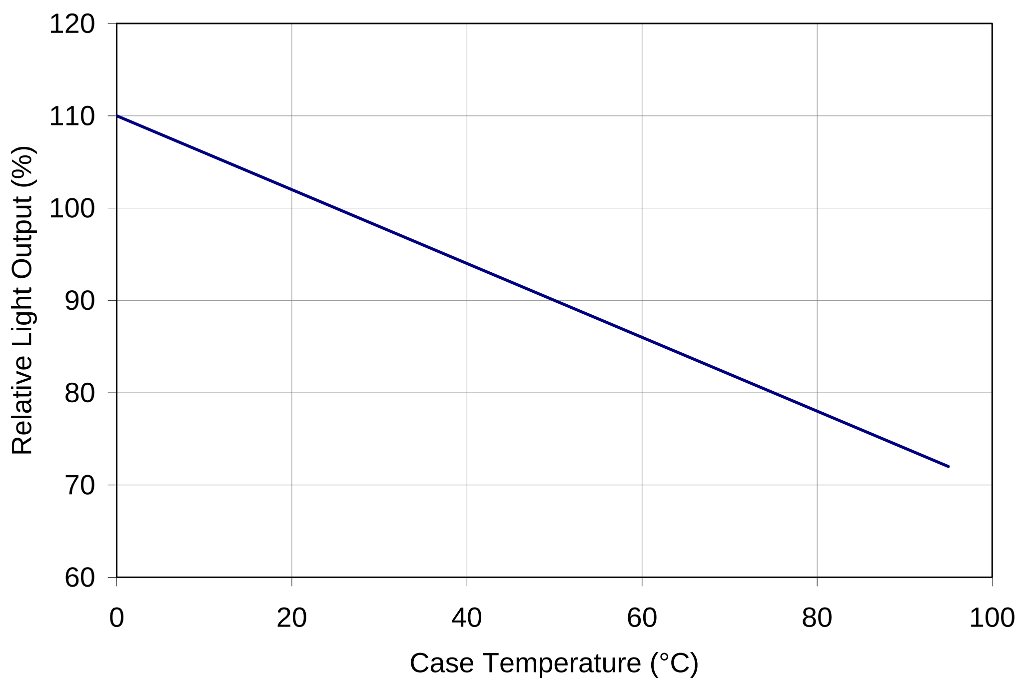


Figure 8: Typical relative light output vs. case temperature.

Notes for Figure 8:
1. Luminous Flux typical value is for all 12 LED dice operating concurrently at rated current.

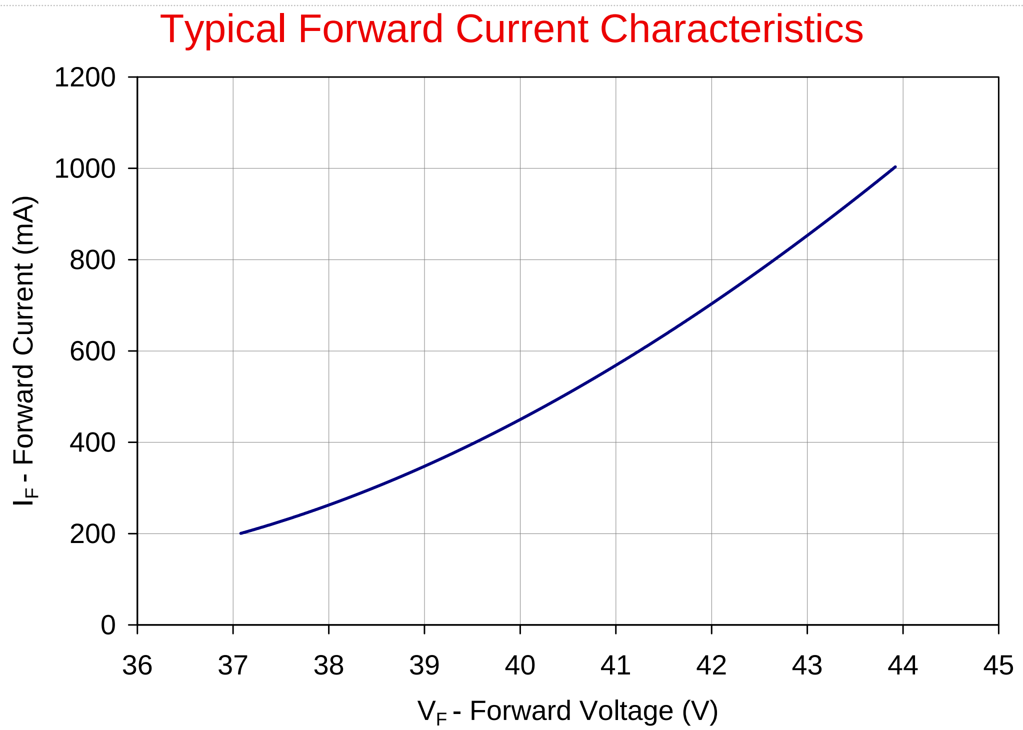


Figure 9: Typical forward current vs. forward voltage @ T_C = at 25°C.

Note for Figure 9:

1. Forward Voltage assumes 12 LED dice connected in series. The actual LED is configured with two strings of 6 dice in series.

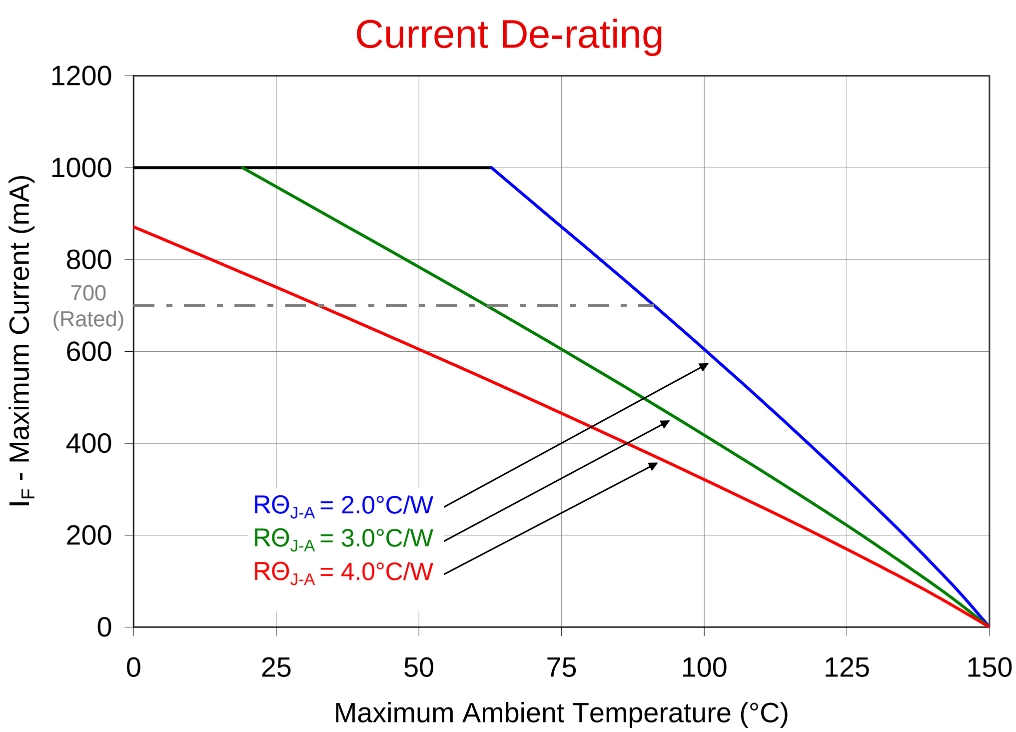


Figure 10: Maximum forward current vs. ambient temperature based on $T_{J(MAX)}$ = 150°C.

Notes for Figure 10:

1. Maximum current assumes that all LED dice are operating concurrently at the same current.
2. $R\Theta_{J-C}$ [Junction to Case Thermal Resistance] for the LZC-00xx00 is typically 0.7°C/W.
3. $R\Theta_{J-A}$ [Junction to Ambient Thermal Resistance] = $R\Theta_{J-C}$ + $R\Theta_{C-A}$ [Case to Ambient Thermal Resistance].

MCPCB Option – Serial 1x12 configuration
LZC-7xxxxx

- Typical Thermal Resistance for MCPCB adds only 0.6°C/W
- Serial configuration allows for easy driver control with low current
- MCPCB contains Zener Diodes for enhanced ESD protection

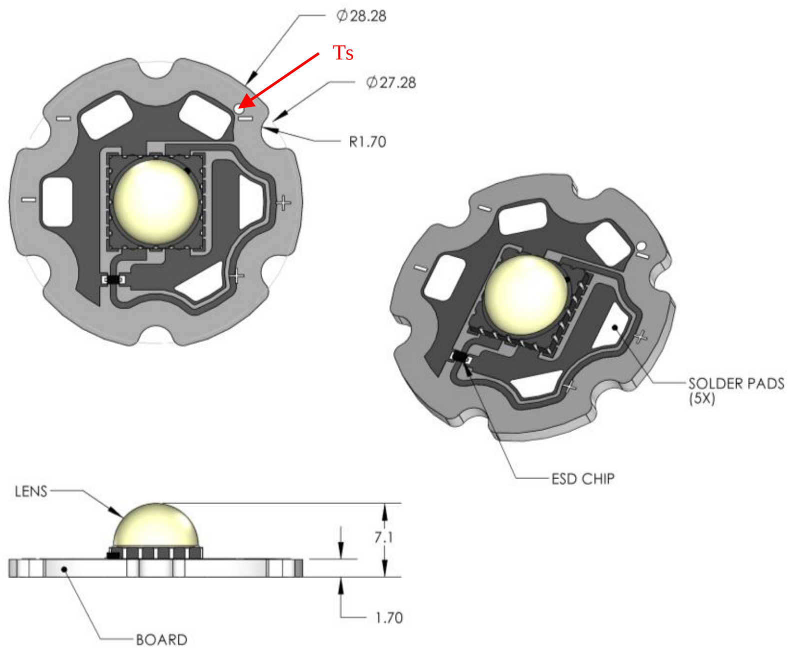
The LZC-7xxxxx Serial MCPCB option provides a convenient method to mount LedEngin's single color LZC emitters. The six recessed features allow the use of M3 or #4 screws to attach the MCPCB to a heat sink. The MCPCB also contains Zener diodes for enhanced ESD protection.

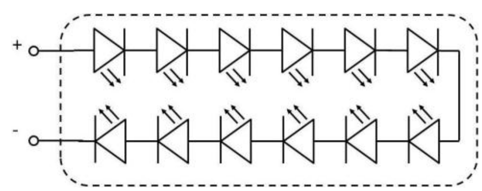
$R\Theta_{J-B}$ Lookup Table

Table 8:

Product	Typical Emitter $R\Theta_{J-C}$	+	Typical MCPCB $R\Theta_{C-B}$	=	Typical Emitter + MCPCB $R\Theta_{J-B}$ [1]
LZC-7	0.7°C/W	+	0.6°C/W	=	1.3°C/W

Pin Out	
Pad	**Function**
+	Anode Ch1
-	Cathode Ch1





Serial 1x12MCPCB outline dimensions (mm)

Notes for MCPCBs:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Slots in MCPCB are for M3 or #4 mounting screws.
3. LedEngin recommends using plastic washers to electrically insulate screws from solder pads and electrical traces.
4. LedEngin recommends using thermally conductive tape or adhesives when attaching MCPCB to a heat sink.
5. Check the compatibility of the MCPCB with the emitter datasheet.

MCPCB Option – Parallel 2x6 configuration
LZC-Cxxxxx

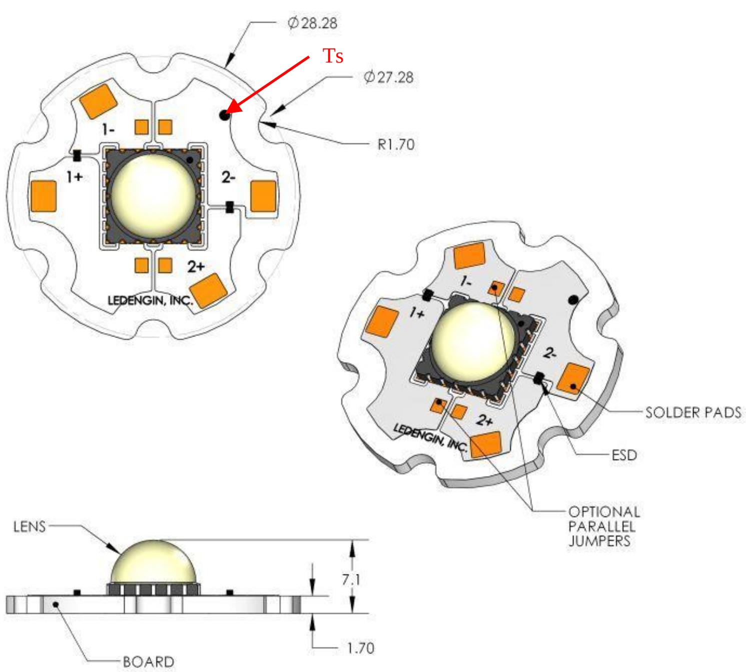
- Typical Thermal Resistance for MCPCB adds only 0.6°C/W
- Parallel configuration allows for easy driver control with low Vf
- MCPCB contains Zener Diodes for enhanced ESD protection

The LZC-Cxxxxx Parallel MCPCB option provides a convenient method to mount LedEngin's single color LZC emitters. The six recessed features allow the use of M3 or #4 screws to attach the MCPCB to a heat sink. The MCPCB also contains Zener diodes for enhanced ESD protection.

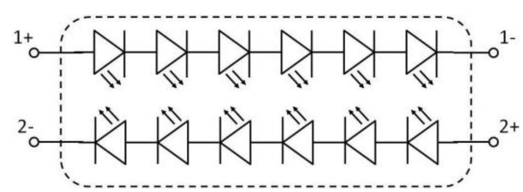
$R\Theta_{J\text{-}B}$ Lookup Table

Table 8:

Product	Typical Emitter $R\Theta_{J\text{-}C}$	+	Typical MCPCB $R\Theta_{C\text{-}B}$	=	Typical Emitter + MCPCB $R\Theta_{J\text{-}B}$ [1]
LZC-C	0.7°C/W	+	0.6°C/W	=	1.3°C/W



Pin Out	
Pad	**Function**
1+	Anode Ch1
1-	Cathode Ch1
2+	Anode Ch2
2-	Cathode Ch2



Parallel (2x6) MCPCB outline dimensions (mm)

Notes for MCPCBs:
1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Slots in MCPCB are for M3 or #4 mounting screws.
3. LedEngin recommends using plastic washers to electrically insulate screws from solder pads and electrical traces.
4. LedEngin recommends using thermally conductive tape or adhesives when attaching MCPCB to a heat sink.
5. Check the compatibility of the MCPCB with the emitter datasheet.

Company Information

LED Engin, 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.

Our 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, yet remarkably powerful output, allows for a previously unobtainable freedom of design wherever high-flux density, directional light is required.

Our LuxiLamp™_ Series of PAR and MR16 replacement lamps and SPOT lighting modules leverage our LuxiGen emitters and lenses to deliver quality, control and high density white light solutions for a broad range of recessed and downlighting applications. www.ledengin.com

Please contact Sales@ledengin.com or (408) 492-0620 for more information.