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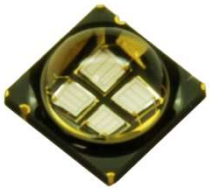
Our Brand
LED ENGIN

LuxiGen™ LZ4 Emitter Series

4-die Dental Blue LED Emitter

LZ4-00DB0R



Key Features

- Dental Blue surface mount ceramic LED package with integrated glass lens
- High Radiant Flux density
- Compact foot-print – 7.0mm x 7.0mm
- Very low Thermal Resistance (1.1°C/W)
- Individually addressable die
- JEDEC Level 1 for Moisture Sensitivity Level
- Autoclave compliant (JEDEC JESD22-A102-C)
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on Standard MCPCB (optional)

Typical Applications

- Dental Curing
- Teeth Whitening

Part number options

Base part number

Part number	Description
LZ4-00DB0R-xxxx	LZ4 Dental Blue Emitter

Bin kit option codes

DB, Dental-Blue (460nm)

Kit number suffix	Min flux bin	Color bin range	Description
0000	R	D1	full distribution flux; full distribution wavelength

Radiant Flux Bins

Table 1:

Bin Code	Minimum Radiant Flux (Φ) @ I_F = 700mA[1] (mW)	Maximum Radiant Flux (Φ) @ I_F = 700mA[1] (mW)
R	2.4	3.0
S	3.0	3.8

Note for Table 1:

1. Flux performance is measured at 10ms pulse, T_C = 25°C. LED Engin maintains a tolerance of ±10% on flux measurements.

Peak Wavelength Bins

Table 2:

Bin Code	Minimum Peak Wavelength (λ_P) @ I_F = 700mA[1] (nm)	Maximum Peak Wavelength (λ_P) @ I_F = 700mA[1] (nm)
D1	457	463

Note for Table 2:

1. Peak wavelength is measured at 10ms pulse, T_C = 25°C. LED Engin maintains a tolerance of ± 2.0nm on peak wavelength measurements.

Forward Voltage Bins

Table 3:

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	11.2	15.2

Notes for Table 3:

1. Forward Voltage is binned with all four LED dice connected in series.
2. Forward voltage is measured at 10ms pulse, T_C = 25ºC. LED Engin maintains a tolerance of ± 0.16V for forward voltage measurements for the four LEDs.

Absolute Maximum Ratings

Table 4:

Parameter	Symbol	Value	Unit
DC Forward Current [1]	I_F	1500	mA
Peak Pulsed Forward Current [2]	I_{FP}	2500	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	
Autoclave Conditions [5]		121°C at 2 ATM, 100% RH for 168 hours	
ESD Sensitivity [6]		ESD Sensitive Device Class 0 ANSI/ ESDA/ JEDEC JS-001 HBM	

Notes for Table 4:

1. Maximum DC forward current is determined by thermal resistance and case temperature. Follow Figure 10 for current derating.
2. Pulse forward current conditions: Pulse Width ≤ 1msec and Duty Cycle ≤ 10%.
3. LEDs are not designed to be reverse biased.
4. Solder conditions per JEDEC 020c. See Reflow Soldering Profile Figure 3.
5. Autoclave Conditions per JEDEC JESD22-A102-C.
6. LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the LZ4-00DB0R 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 5:

Parameter	Symbol	Typical	Unit
Radiant Flux (@ I_F = 700mA)[1]	Φ	3.2	W
Radiant Flux (@ I_F = 1500mA)[1]	Φ	5.7	W
Peak Wavelength (@ I_F = 700mA)	λ_P	460	nm
Viewing Angle[2]	$2\Theta_{½}$	95	Degrees
Total Included Angle[3]	$\Theta_{0.9}$	125	Degrees

Notes for Table 5:

1. Observe IEC 62471 Risk Group 2 rating for eye safety. Do not stare into the beam.
2. Viewing Angle is the off axis angle from emitter centerline where the radiant intensity is ½ 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°C

Table 6:

Parameter	Symbol	Typical		Unit
		1 Die	4 Dice	
Forward Voltage (@ I_F = 700mA)	V_F	3.2	12.8	V
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_J$	-8.0		mV/°C
Thermal Resistance, electrical (Junction to Case)	$R\Theta_{J\text{-}C,\ el}$	1.1		°C/W

IPC/JEDEC Moisture Sensitivity Level

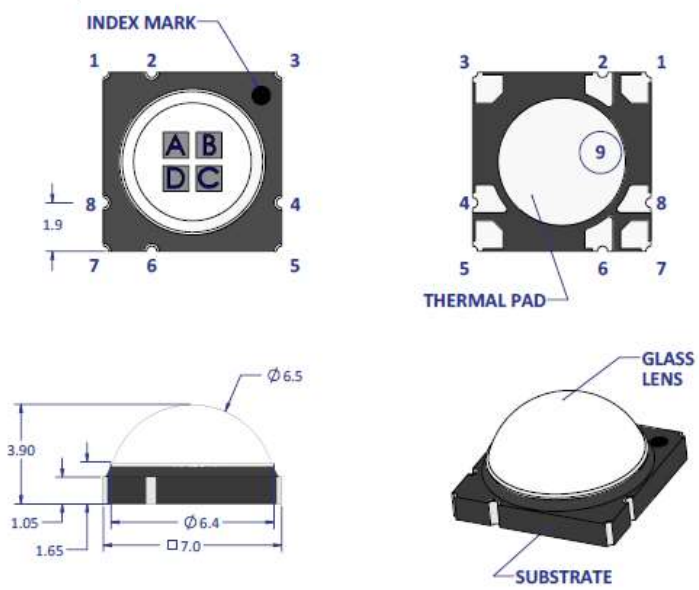
Table 7 - IPC/JEDEC J-STD-20 Classification:

			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

Note for Table 7:

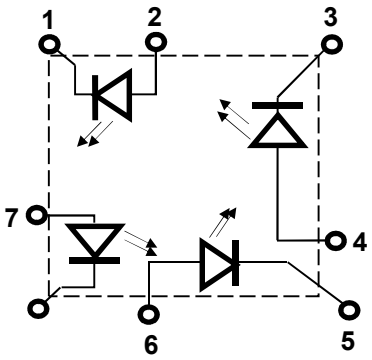
1. The standard soak time is the sum of the default value of 24 hours for the semiconductor manufacturer's exposure time (MET) between bake and bag and the floor life of maximum time allowed out of the bag at the end user of distributor's facility.

Mechanical Dimensions (mm)



Pin Out		
Pad	**Die**	**Function**
1	A	Cathode
2	A	Anode
3	B	Cathode
4	B	Anode
5	C	Cathode
6	C	Anode
7	D	Cathode
8	D	Anode
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.
3. Tc (case temperature) point is Pad 9. Because it is not easily accessible, the recommended temperature measurement point is side of the substrate.

Recommended Solder Pad Layout (mm)

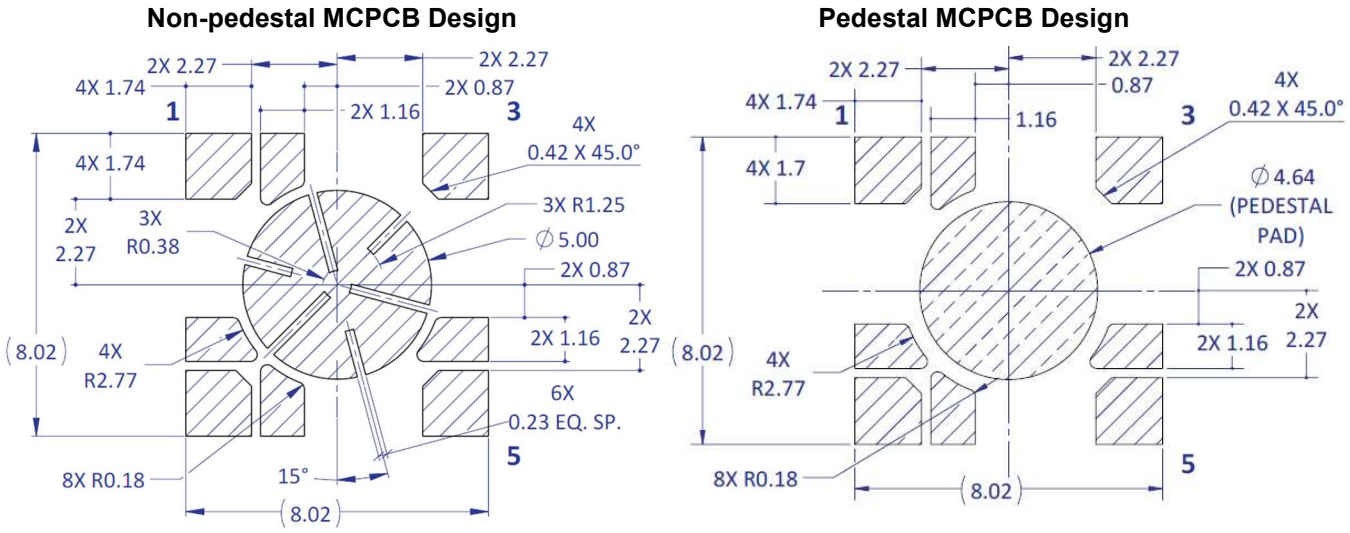


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad for non-pedestal and pedestal design

Notes for Figure 2a:

1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Pedestal MCPCB allows the emitter thermal slug to be soldered directly to the metal core of the MCPCB. Such MCPCB eliminate the high thermal resistance dielectric layer that standard MCPCB technologies use in between the emitter thermal slug and the metal core of the MCPCB, thus lowering the overall system thermal resistance.
3. LED Engin recommends x-ray sample monitoring for solder voids underneath the emitter thermal slug. The total area covered by solder voids should be less than 20% of the total emitter thermal slug area. Excessive solder voids will increase the emitter to MCPCB thermal resistance and may lead to higher failure rates due to thermal over stress.

Recommended Solder Mask Layout (mm)

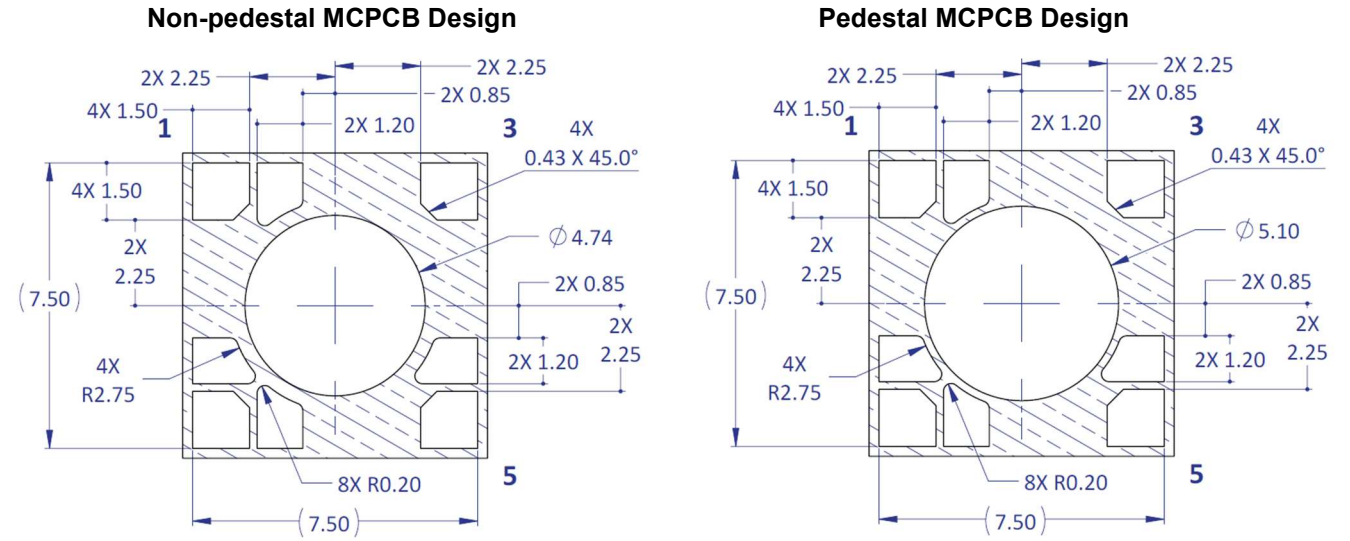


Figure 2b: Recommended solder mask opening for anode, cathode, and thermal pad for non-pedestal and pedestal design

Note for Figure 2b:

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

Recommended 8 mil Stencil Apertures Layout (mm)

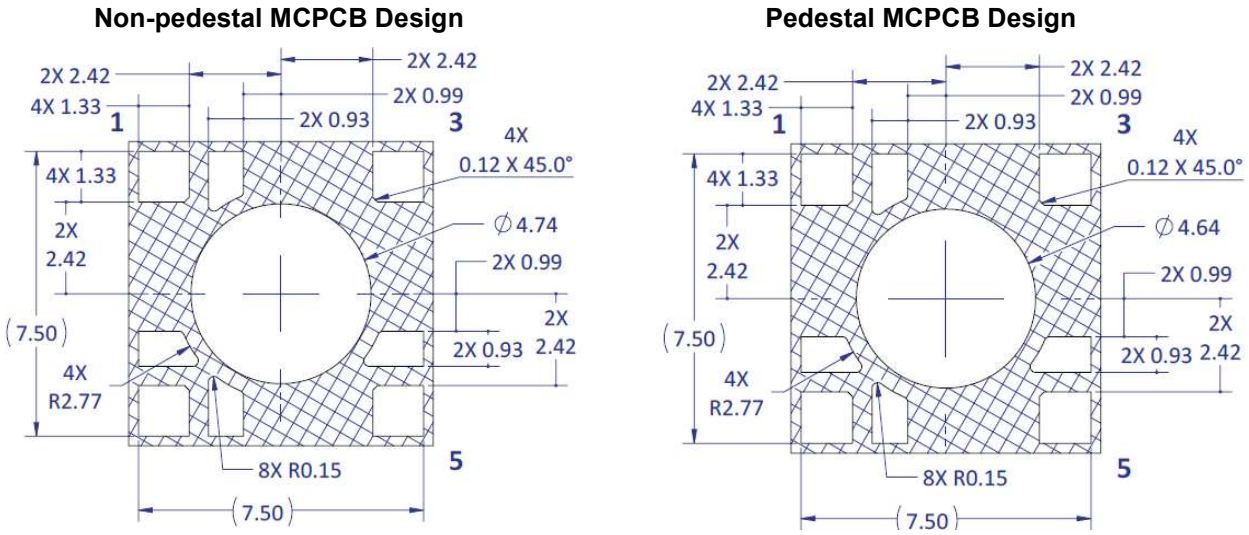


Figure 2c: Recommended 8mil stencil apertures for anode, cathode, and thermal pad for non-pedestal and pedestal design

Note for Figure 2c:

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

Reflow Soldering Profile

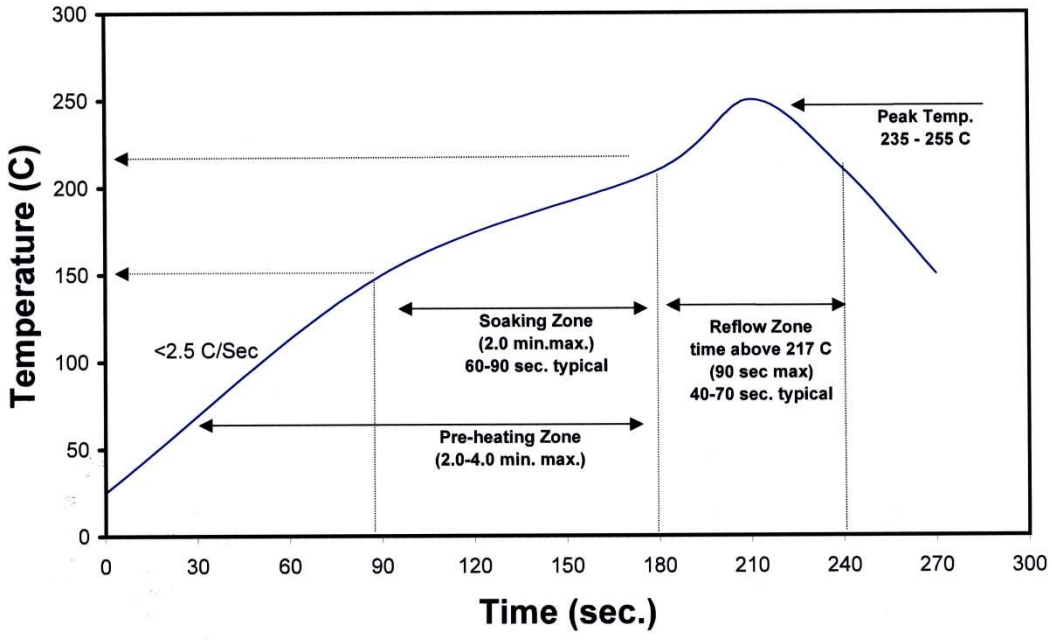


Figure 3: Reflow soldering profile for lead free soldering

Typical Radiation Pattern

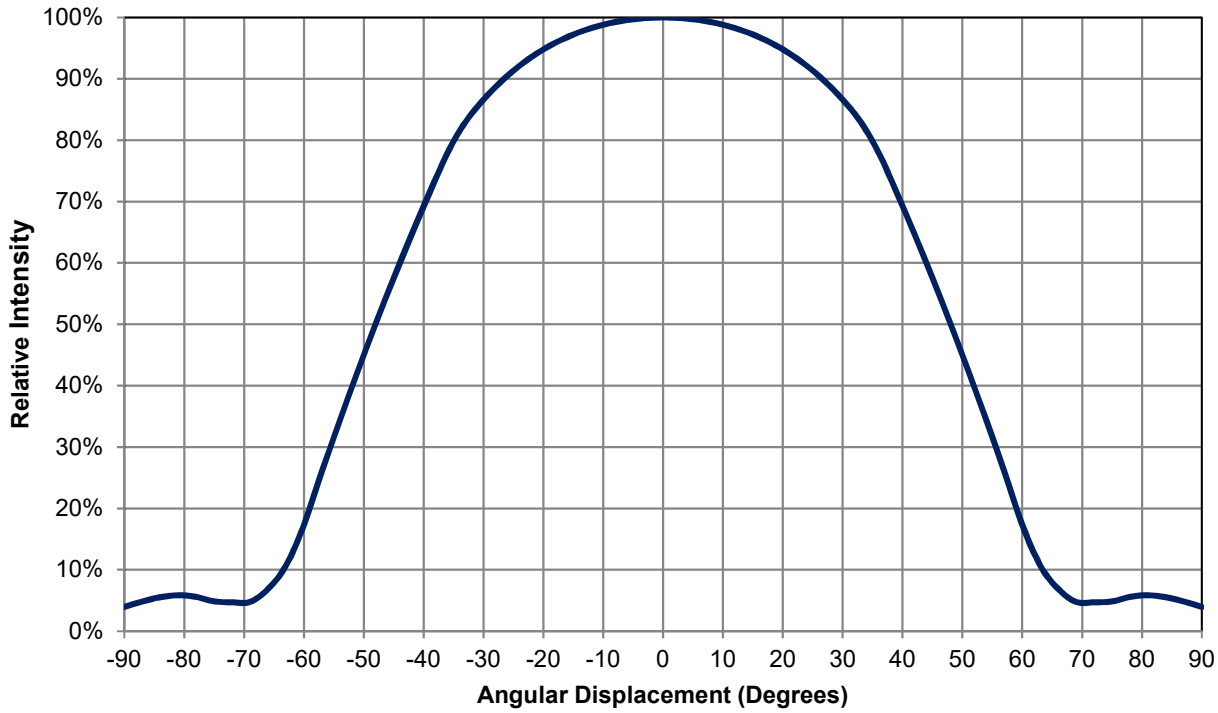


Figure 4: Typical representative spatial radiation pattern

Typical Relative Spectral Power Distribution

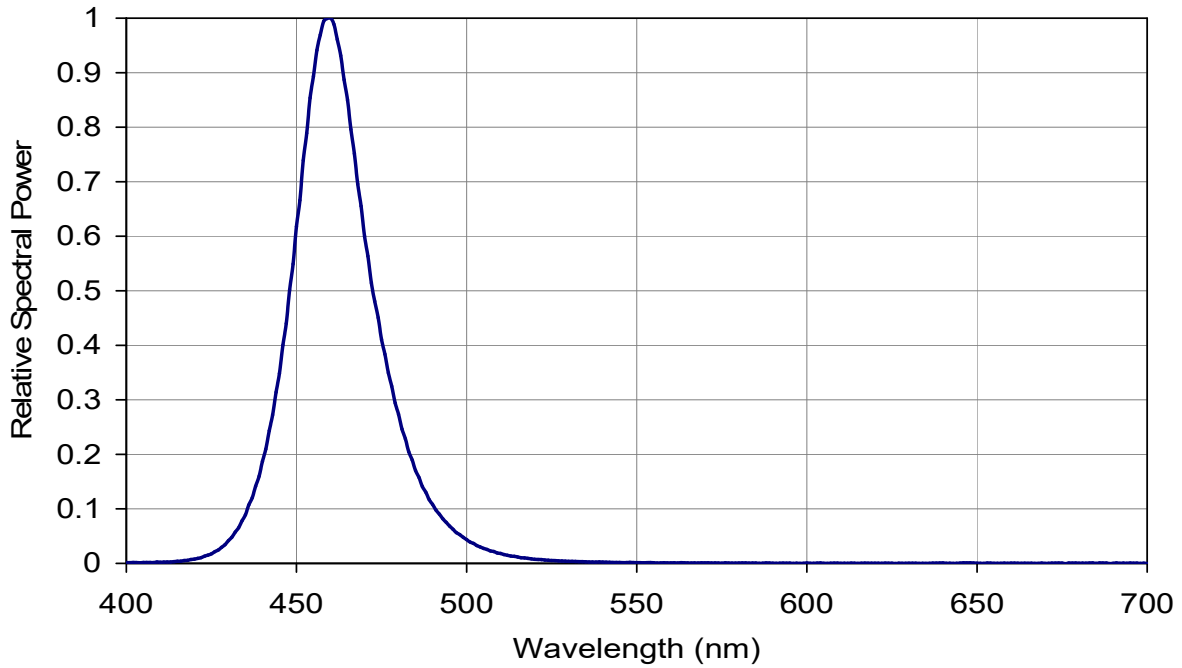


Figure 5: Typical relative spectral power vs. wavelength @ T_C = 25°C

Typical Peak Wavelength Shift over Temperature

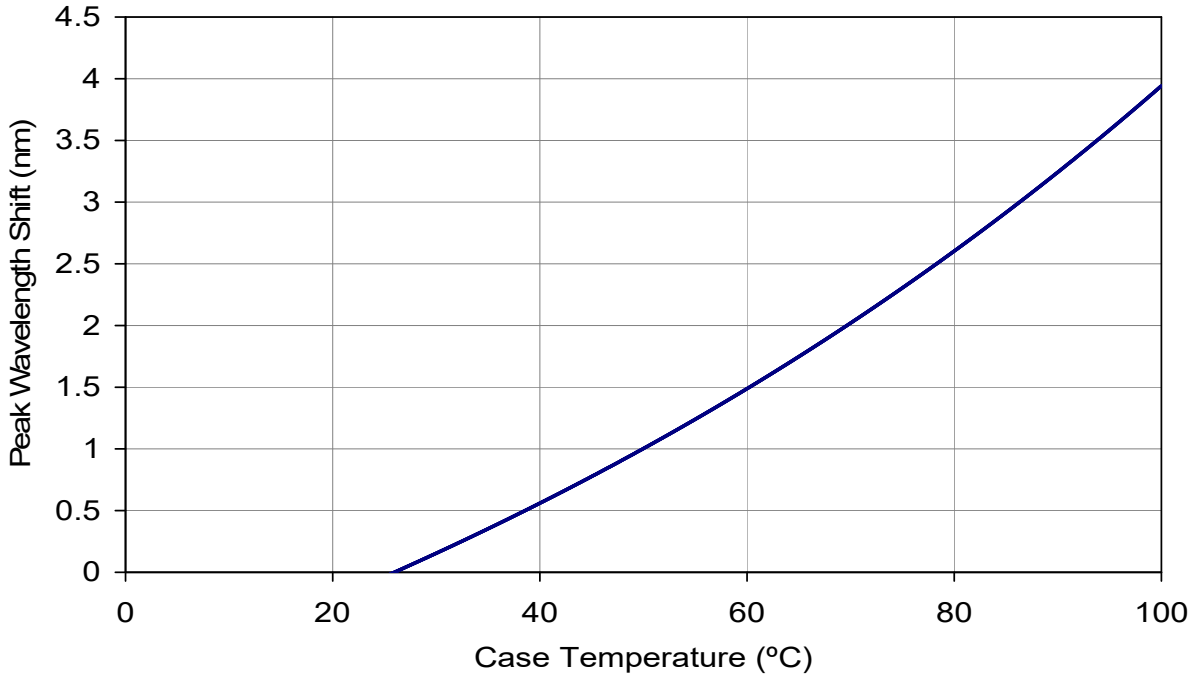


Figure 6: Typical peak wavelength shift vs. case temperature

Typical Normalized Radiant Flux

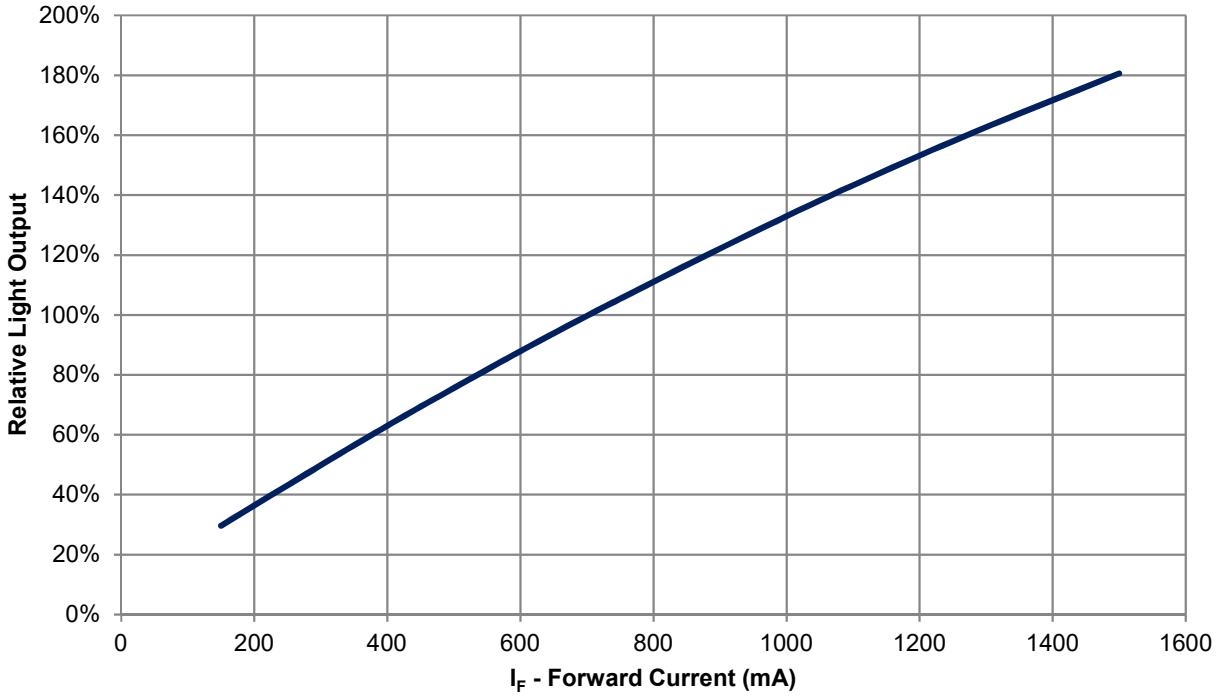


Figure 7: Typical normalized radiant flux vs. forward current @ T_C = 25°C

Typical Normalized Radiant Flux over Temperature

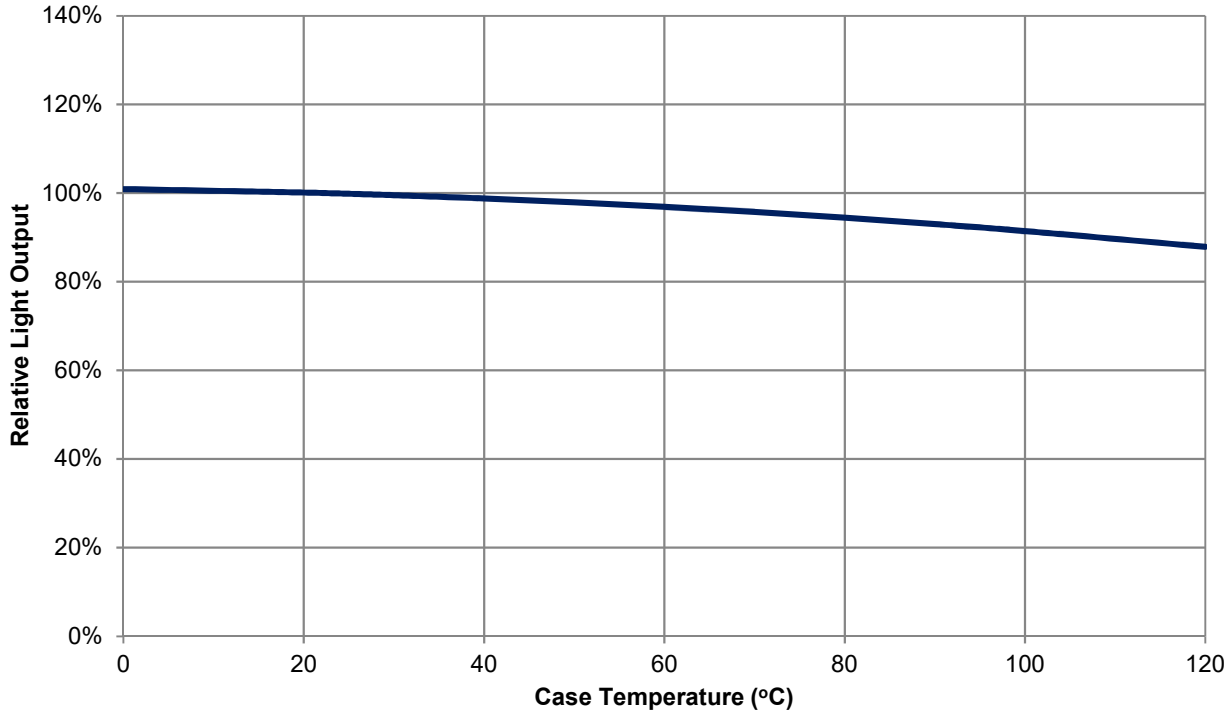


Figure 8: Typical normalized radiant flux vs. case temperature

Typical Forward Current Characteristics

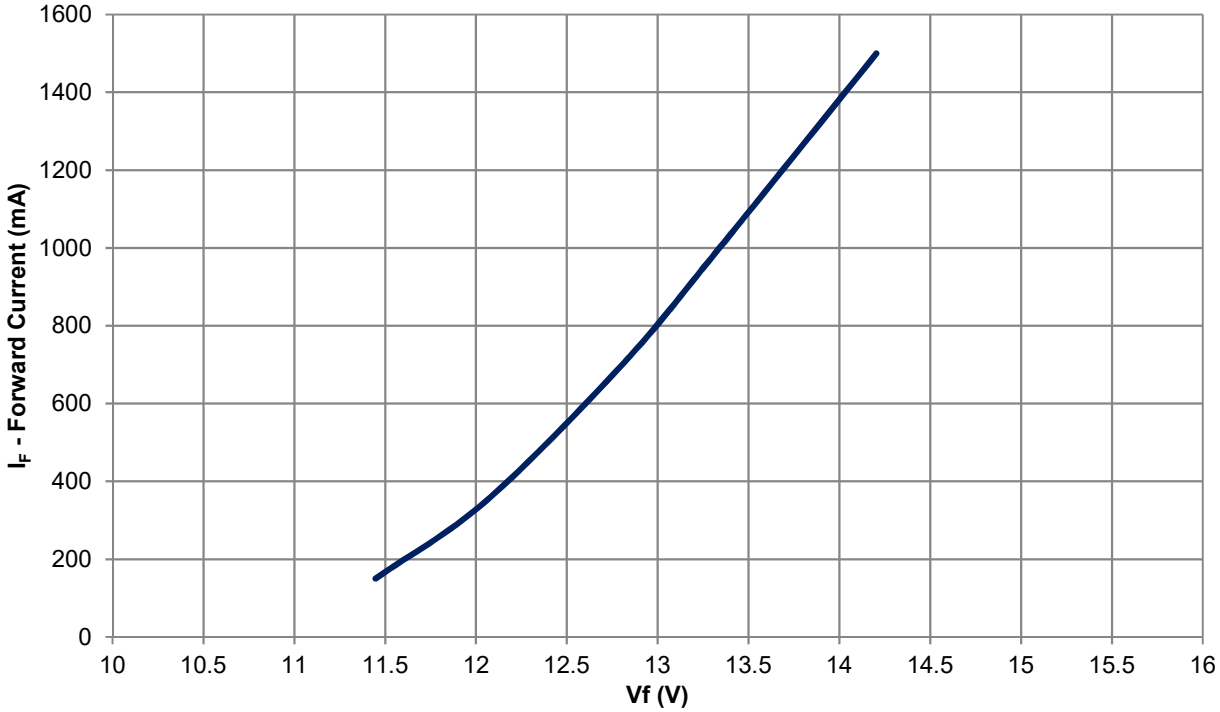


Figure 9: Typical forward current vs. forward voltage @ T_C = at 25°C

Current De-rating

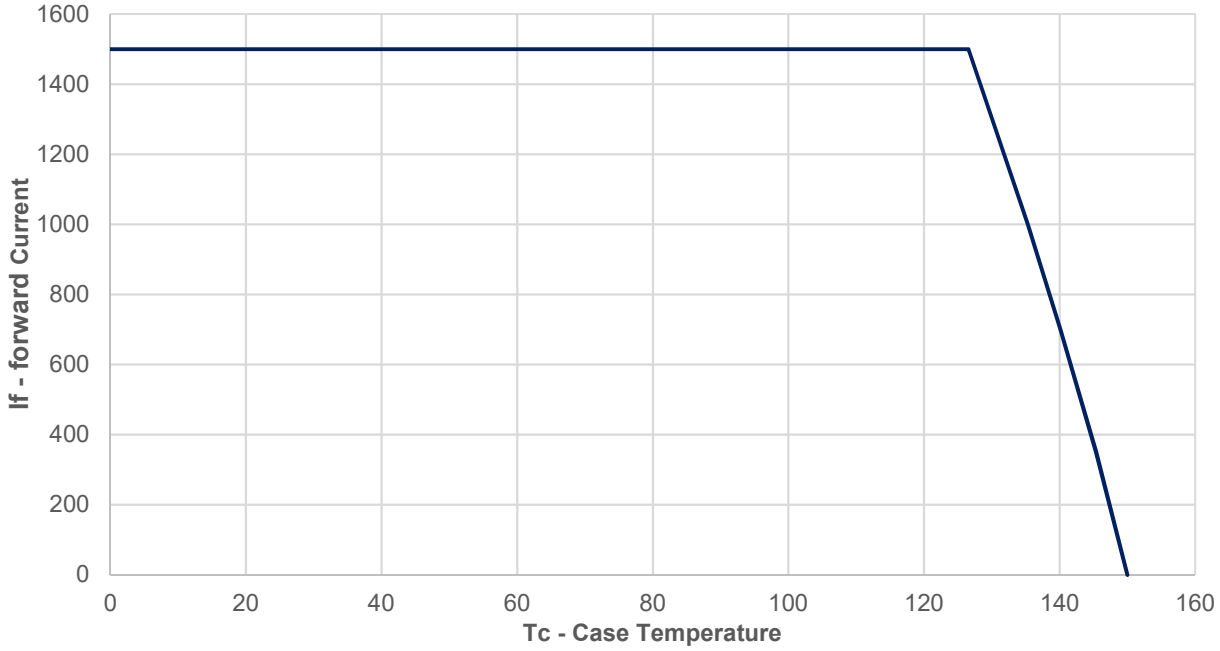


Figure 10: Maximum forward current vs. case temperature based on $T_{J(MAX)}$ = 150°C

Notes for Figure 10:

1. Maximum current assumes that all four LED dies are operating concurrently at the same current.
2. $R\Theta_{J-C}$ [Junction to Case Thermal Resistance] for the LZ4-00DB0R is typically 1.1°C/W .

Emitter Tape and Reel Specifications (mm)

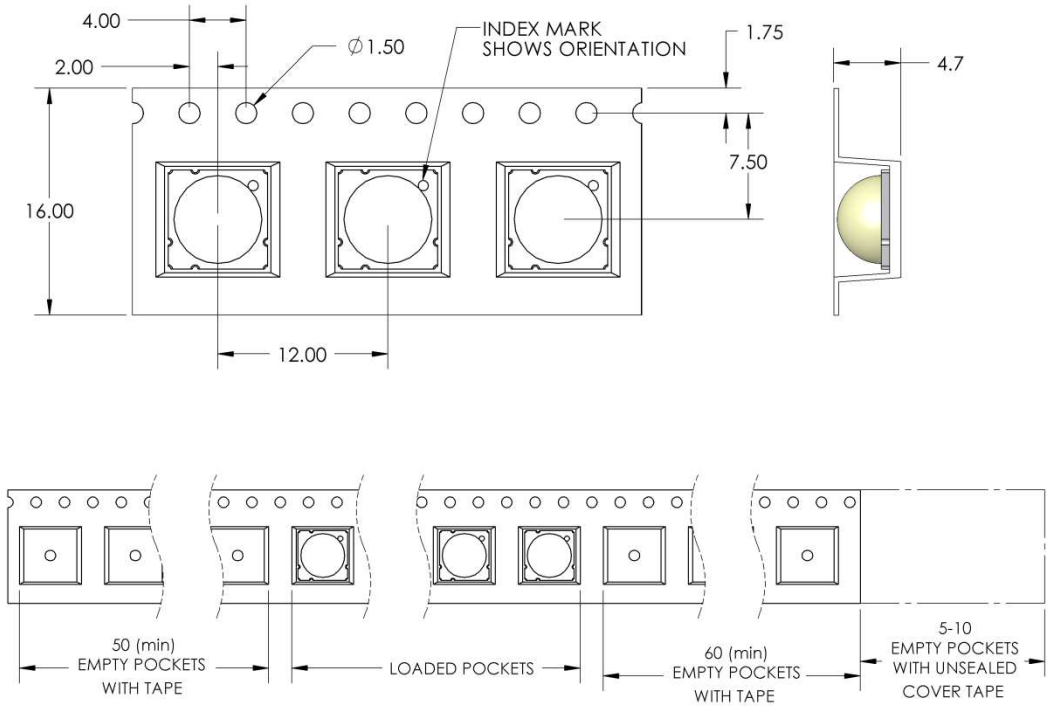


Figure 11: Emitter carrier tape specifications (mm)

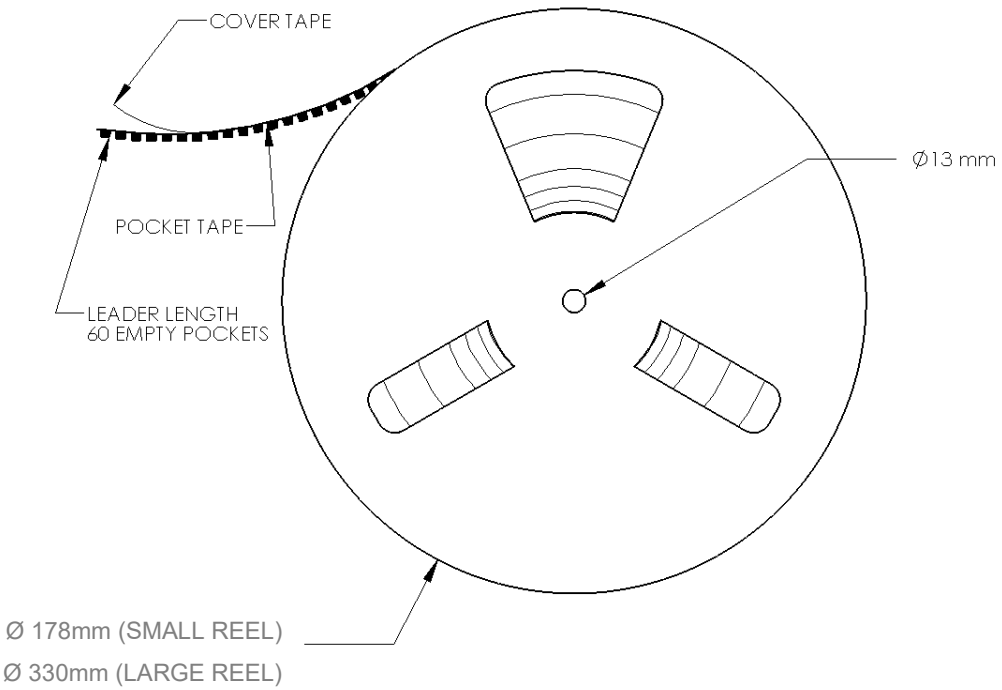


Figure 12: Emitter reel specifications (mm).

Notes for Figure 12:

1. Small reel quantity: up to 250 emitters
2. Large reel quantity: 250-1200 emitters.
3. Single flux bin and single wavelength bin per reel.

LZ4-00DB0R

About LED Engin

LED Engin, an OSRAM brand based in California's Silicon Valley, develops, manufactures, and sells advanced LED emitters, optics and light engines to create uncompromised lighting experiences for a wide range of entertainment, architectural, general lighting and specialty applications. LuxiGen™ multi-die emitter and secondary lens combinations reliably deliver industry-leading flux density, upwards of 5000 quality lumens to a target, in a wide spectrum of colors including whites, tunable whites, multi-color and UV LEDs in a unique patented compact ceramic package. Our LuxiTune™ series of tunable white lighting modules leverage our LuxiGen emitters and lenses to deliver quality, control, freedom and high density tunable white light solutions for a broad range of new recessed and downlighting applications. The small size, yet remarkably powerful beam output and superior in-source color mixing, allows for a previously unobtainable freedom of design wherever high-flux density, directional light is required. LED Engin is committed to providing products that conserve natural resources and reduce greenhouse emissions; and reserves the right to make changes to improve performance without notice.

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