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OSRAM

Our Brand

LED ENGIN

LuxiGen™ Multi Color Emitter

LZ4 RGB LED Emitter

LZ4-00MC08

Key Features

— RGB multi-channel surface mount ceramic LED package with integrated glass lens
— Individually addressable die
— Thermal resistance of 2.8°C/W; 1.0A maximum current
— Small foot print – 7.0mm x 7.0mm
— Electrically neutral thermal path
— JEDEC Level 1 for Moisture Sensitivity Level
— RoHS compliant
— Reflow solderable (up to 6 cycles)

Typical Applications

— Machine Vision
— Medical Illumination
— Microscope Illumination
— Architectural/ Entertainment Lighting

Part number options

Base part number

Part number	Description
LZ4-00MC08-xxxx	LZ4 emitter

Bin kit option codes

MC, Red-Green-Blue (RGB)

Kit number suffix	Min flux bin	Color bin range	Description
0000	17R	R2	Red full distribution flux; full distribution wavelength
	29G	G2 – G3	Green full distribution flux; full distribution wavelength
	18B	B03	Blue full distribution flux; full distribution wavelength

Luminous Flux Bins

Table 1:

Bin Code	Minimum Luminous Flux (Φ_V) @ I_F = 700mA[1] (lm)			Maximum Luminous Flux (Φ_V) @ I_F = 700mA[1] (lm)		
	1Red	2 Green	1 Blue	1Red	2 Green	1 Blue
17R	105			160		
29G		250			390	
18B			30			47
31B			47			74

Note for Table 1:

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

Dominant Wavelength Bins

Table 2:

Bin Code	Minimum Dominant Wavelength (λ_D) @ I_F = 700mA[1] (nm)			Maximum Dominant Wavelength (λ_D) @ I_F = 700mA[1] (nm)		
	1Red	2 Green	1 Blue	1Red	2 Green	1 Blue
R2	618			630		
G2		520			525	
G3		525			530	
B03			453			460

Note for Table 2:

1. Dominant wavelength is measured at 10ms pulse, T_C = 25°C. LED Engin maintains a tolerance of ± 1.0nm on dominant 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)		
	1Red	2 Green	1 Blue	1Red	2 Green	1 Blue
0	2.1	6.4	2.8	2.9	8.4	3.8

Notes for Table 3:

1. Forward voltage is measured at 10ms pulse, T_C = 25°C. LED Engin maintains a tolerance of ± 0.04V on forward voltage measurements for the Red and Blue LEDs.
2. For binning purposes, Forward Voltage for Green is binned with both LED dice connected in series. LED Engin maintains a tolerance of ± 0.08V on forward voltage measurements for the two Green LEDs.

Absolute Maximum Ratings

Table 4:

Parameter	Symbol	Value	Unit
DC Forward Current [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	125	°C
Soldering Temperature [4]	T_{sol}	260	°C
Allowable Reflow Cycles		6	
ESD Sensitivity [5]		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 11 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. LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the LZ4-00MC08 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
		1 Red	2 Green	1 Blue [1]	
Luminous Flux (@ I_F = 700mA)	Φ_V	130	330	39	lm
Luminous Flux (@ I_F = 1000mA)	Φ_V	180	430	50	lm
Dominant Wavelength	λ_D	623	523	457	nm
Viewing Angle [2]	$2\Theta_{½}$		95		Degrees
Total Included Angle [3]	$\Theta_{0.9}$		125		Degrees

Notes for Table 5:

1. When operating the Blue LED, observe IEC 62471 Risk Group 2 rating. Do not stare into the beam.
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 6:

Parameter	Symbol	Typical			Unit
		1 Red	2 Green	1 Blue	
Forward Voltage (@ I_F = 700mA)	V_F	2.5	7.2	3.2	V
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_J$	-1.9	-5.8	-2.0	mV/°C
Thermal Resistance, electrical (Junction to Case)	$R\Theta_{J-C}$		2.8		°C/W

IPC/JEDEC Moisture Sensitivity Level

Table 7 - 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

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)

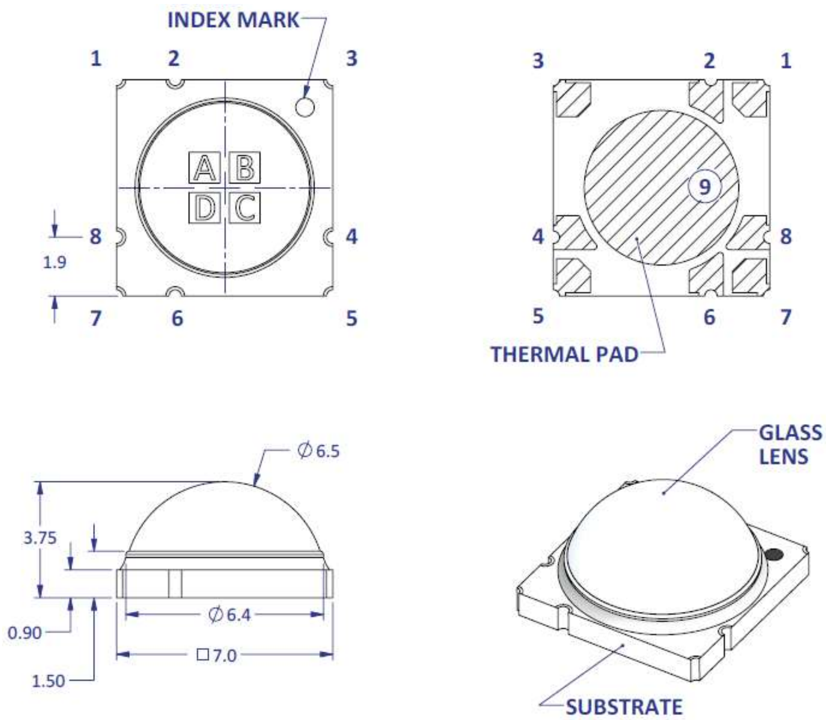
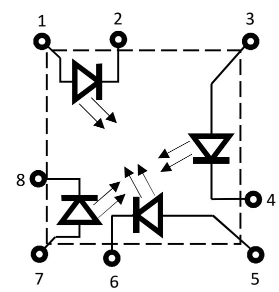


Figure 1: Package outline drawing

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.

		Pin Out	
Pad	Die	Color	Function
1	A	Green 2	Anode
2	A	Green 2	Cathode
3	B	Red	Anode
4	B	Red	Cathode
5	C	Green 1	Anode
6	C	Green 1	Cathode
7	D	Blue	Anode
8	D	Blue	Thermal
9 [2]	n/a	n/a	Thermal



Recommended Solder Pad Layout (mm)

Non-pedestal MCPCB Design | **Pedestal MCPCB Design**

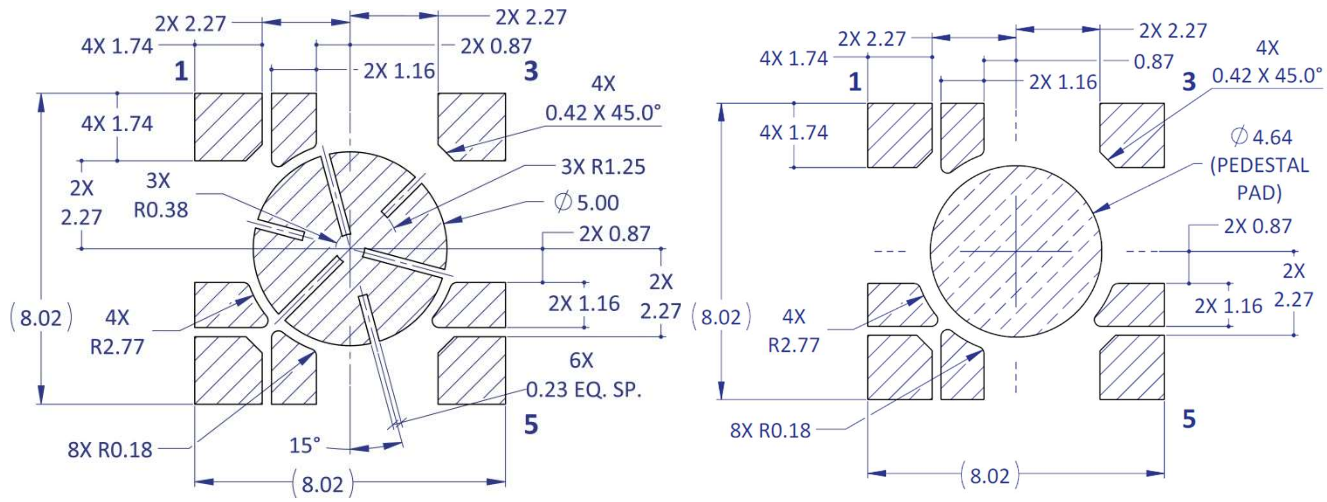


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad for non-pedestal and pedestal design

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)

Non-pedestal MCPCB Design | **Pedestal MCPCB Design**

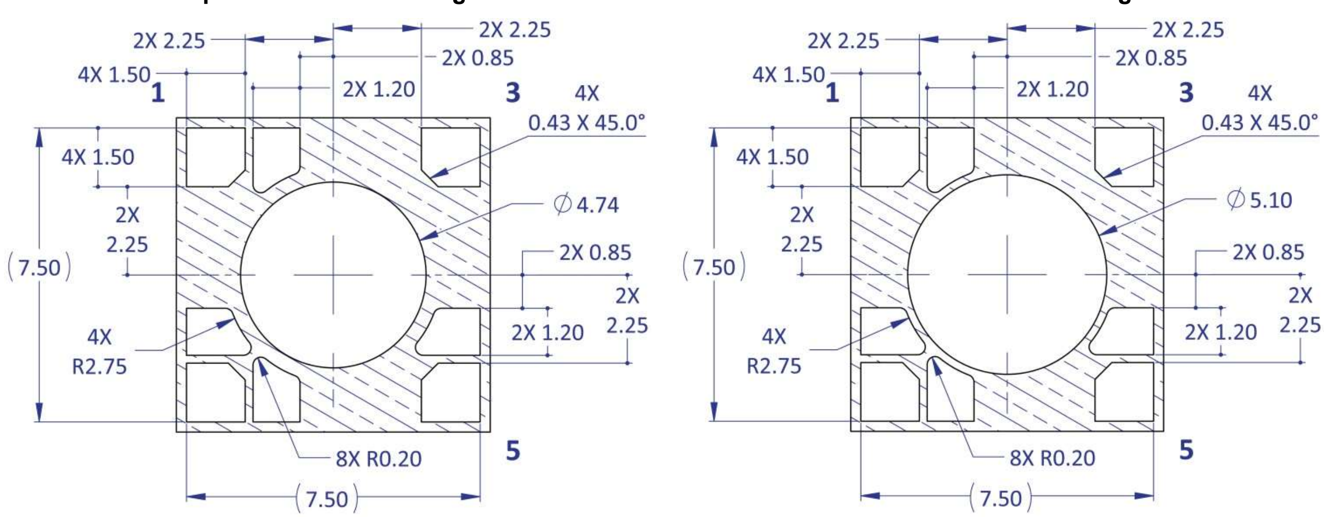


Figure 2b: Recommended solder mask opening for anode, cathode, and thermal pad for non-pedestal and pedestal design

Note for Figure 2b:

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

Recommended 8mil Stencil Apertures Layout (mm)

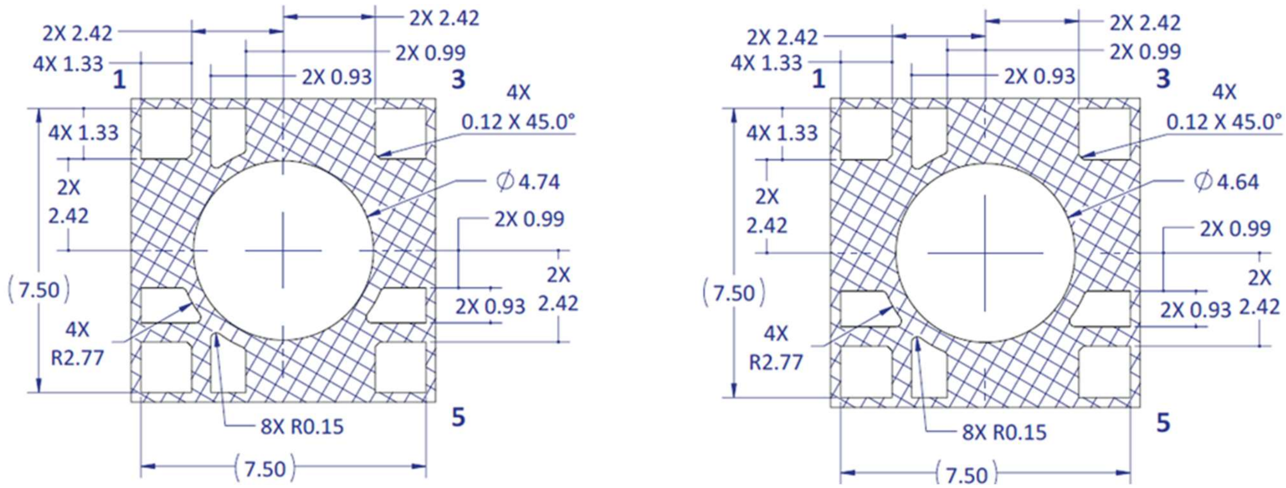


Figure 2c: Recommended 8mil stencil apertures for anode, cathode, and thermal pad for non-pedestal and pedestal design

Note for Figure 2c:

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

Reflow Soldering Profile

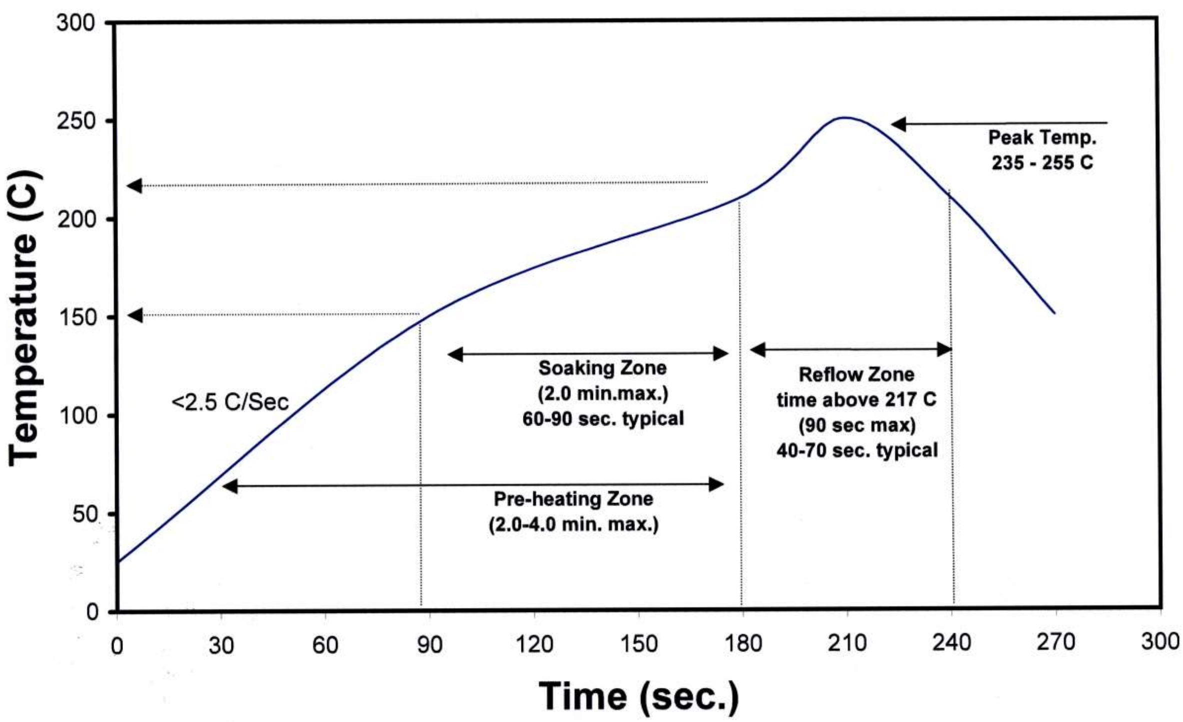


Figure 3: Reflow soldering profile for lead free soldering

Typical Radiation Pattern

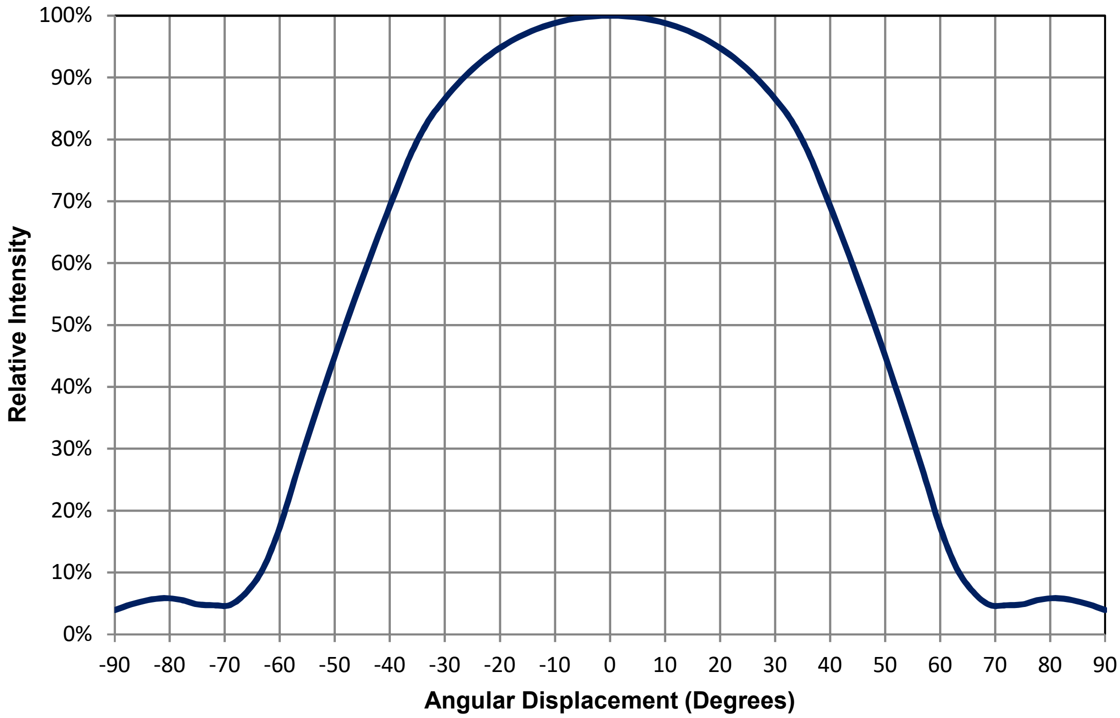


Figure 4: Typical representative spatial radiation pattern

Typical Relative Spectral Power Distribution

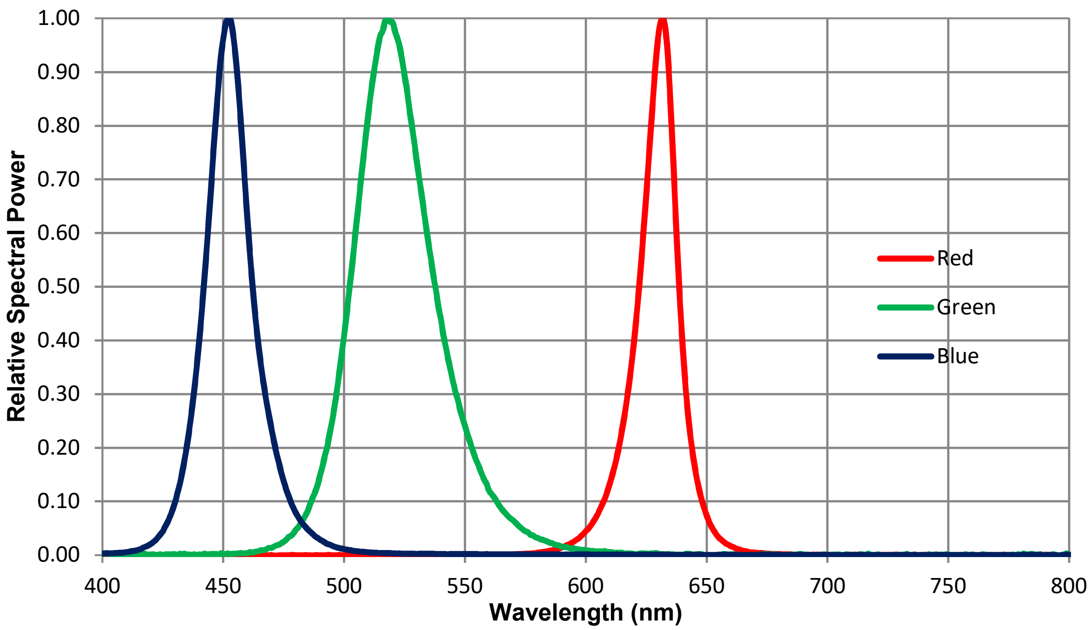


Figure 5: Typical relative spectral power vs. wavelength @ T_C = 25°C

Typical Dominant Wavelength Shift over Current

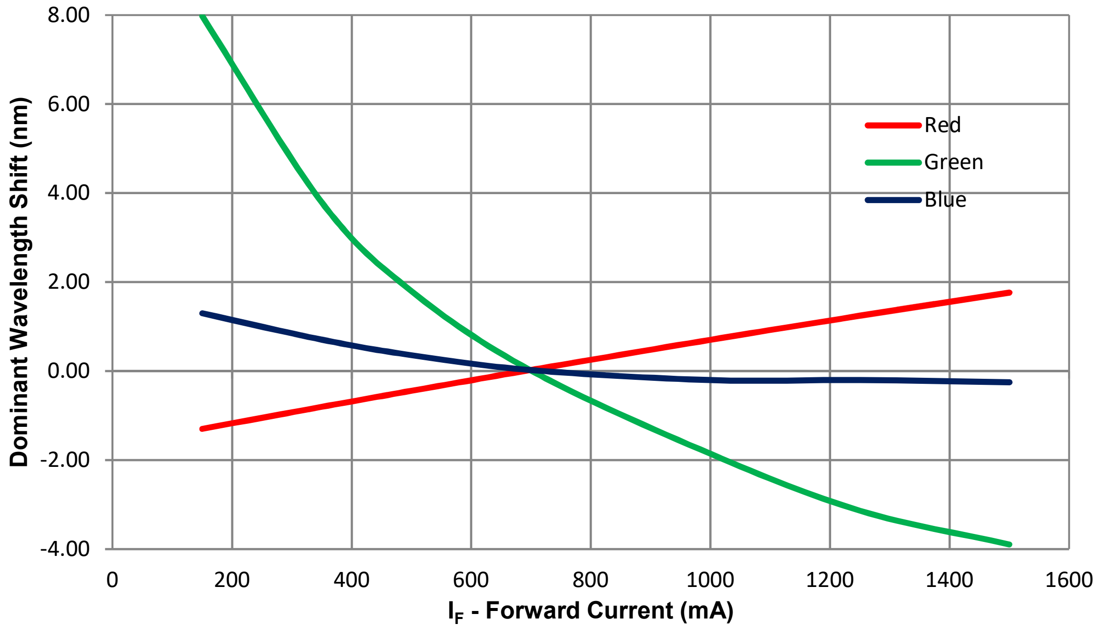


Figure 6: Typical dominant wavelength shift vs. forward current @ T_C = 25°C

Typical Dominant Wavelength Shift over Temperature

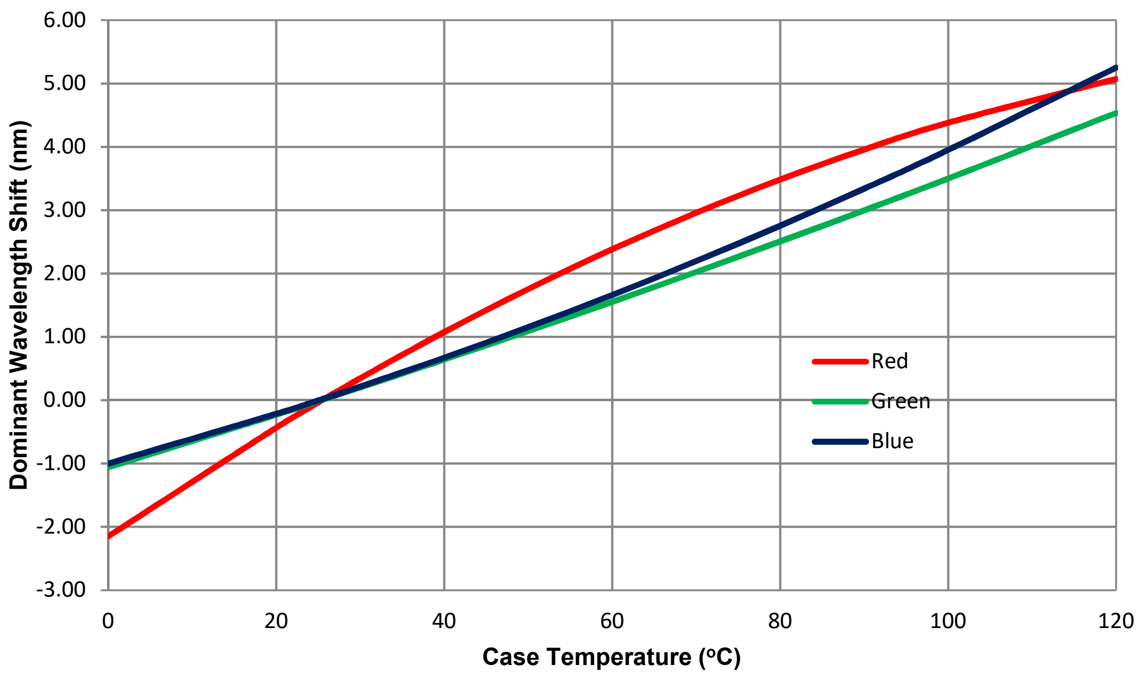


Figure 7: Typical dominant wavelength shift vs. case temperature

Typical Relative Light Output

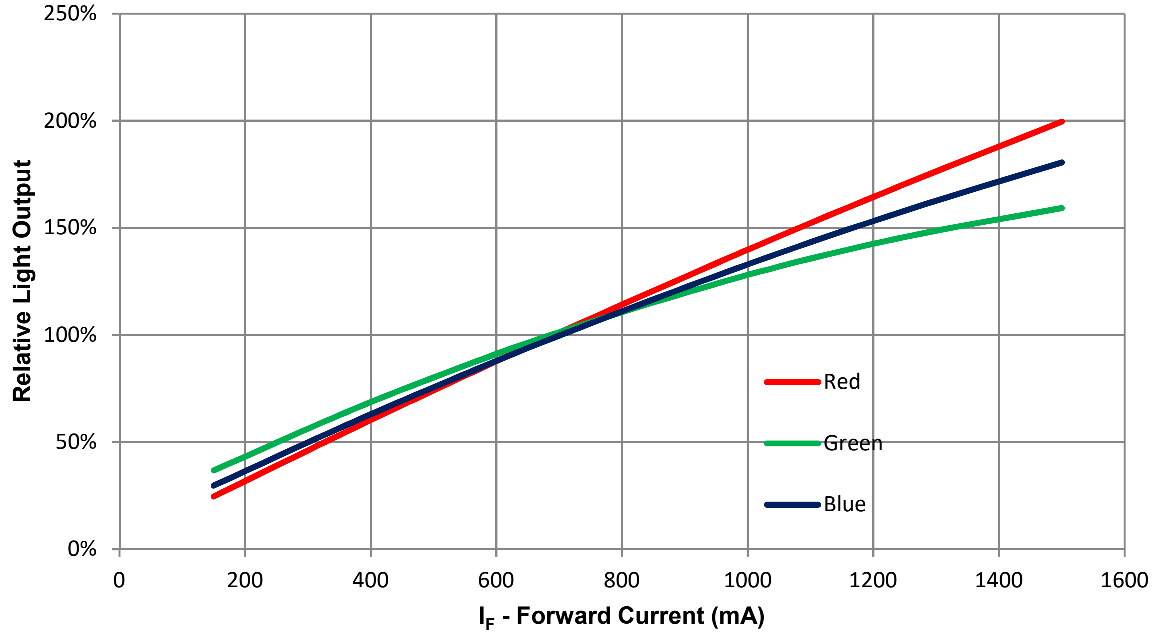


Figure 8: Typical relative light output vs. forward current @ T_C = 25°C

Typical Relative Light Output over Temperature

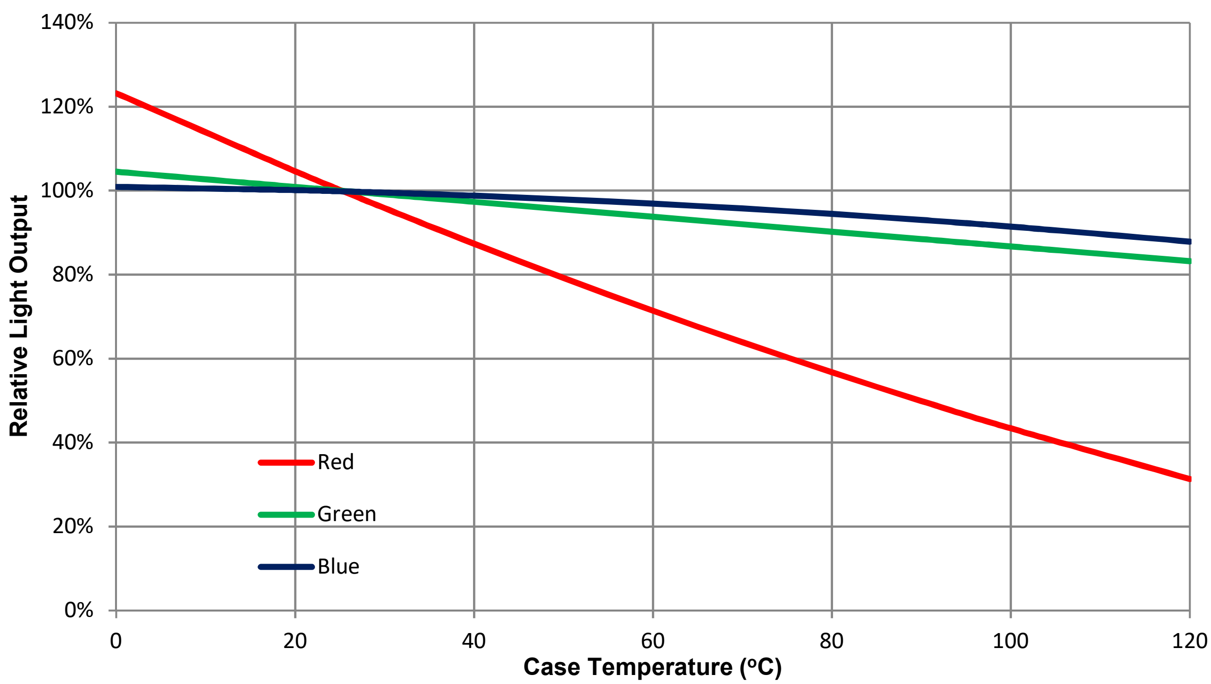


Figure 9: Typical relative light output vs. case temperature

Typical Forward Current Characteristics

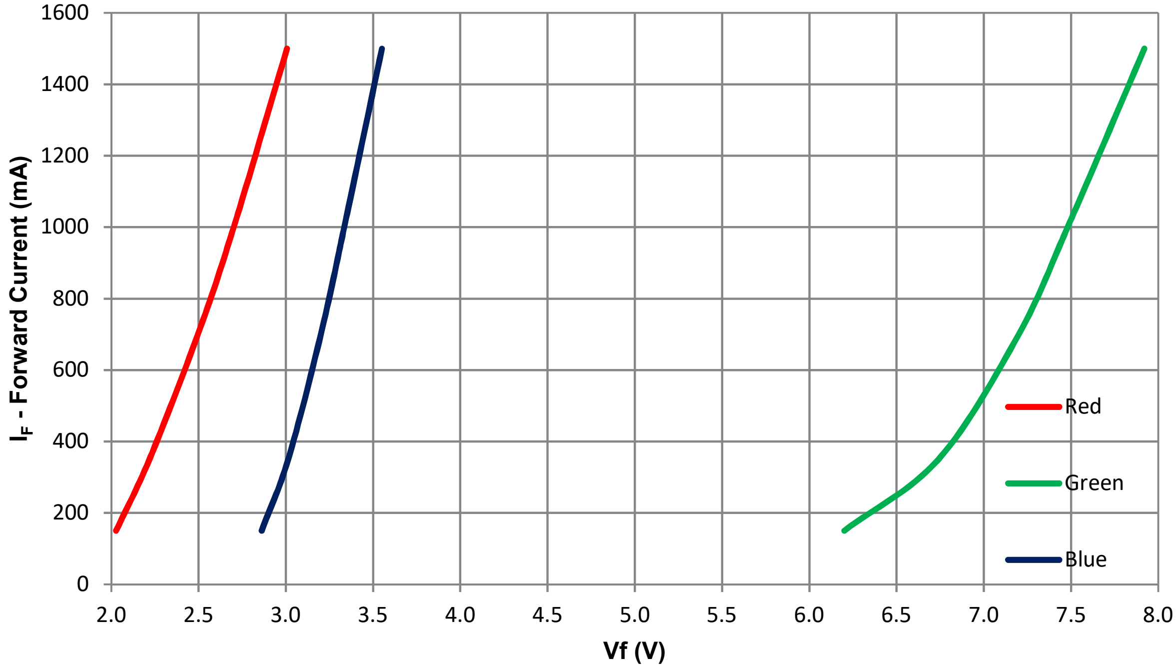


Figure 10: Typical forward current vs. forward voltage @ T_C = 25°C

Current De-rating

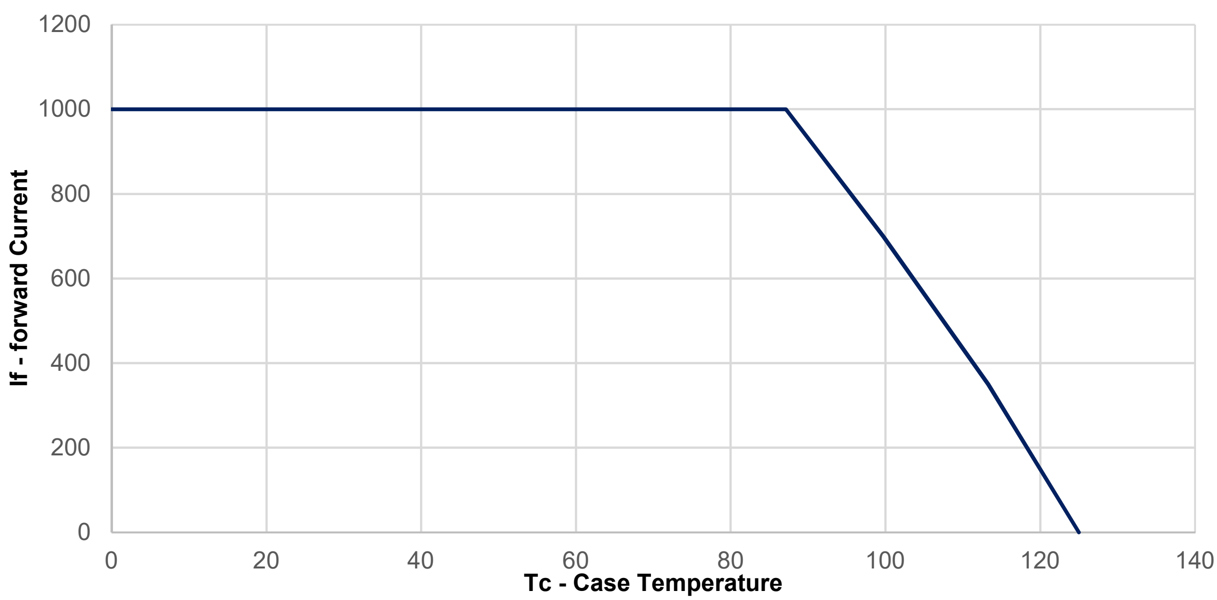


Figure 11: Maximum forward current vs. case temperature based on $T_{J(MAX)}$ = 125°C

Notes for Figure 11:

1. Maximum current assumes that all four LED dice are operating concurrently at the same current.
2. $R\Theta_{J-C}$ [Junction to Case Thermal Resistance] for the LZ4-00MC08 is typically 2.8°C/W.

Emitter Tape and Reel Specifications (mm)

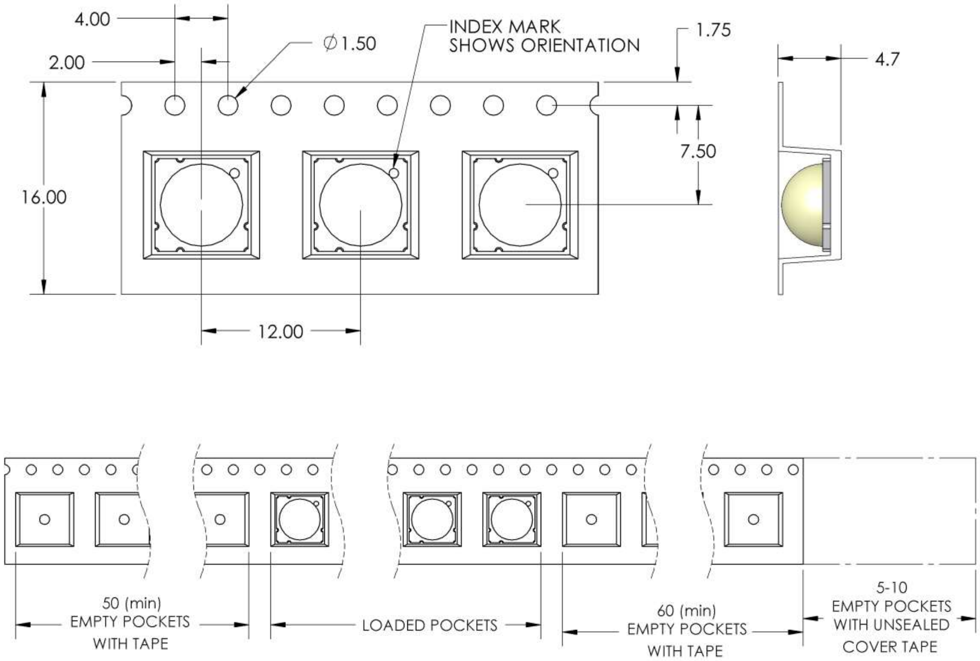


Figure 12: Emitter carrier tape specifications (mm)

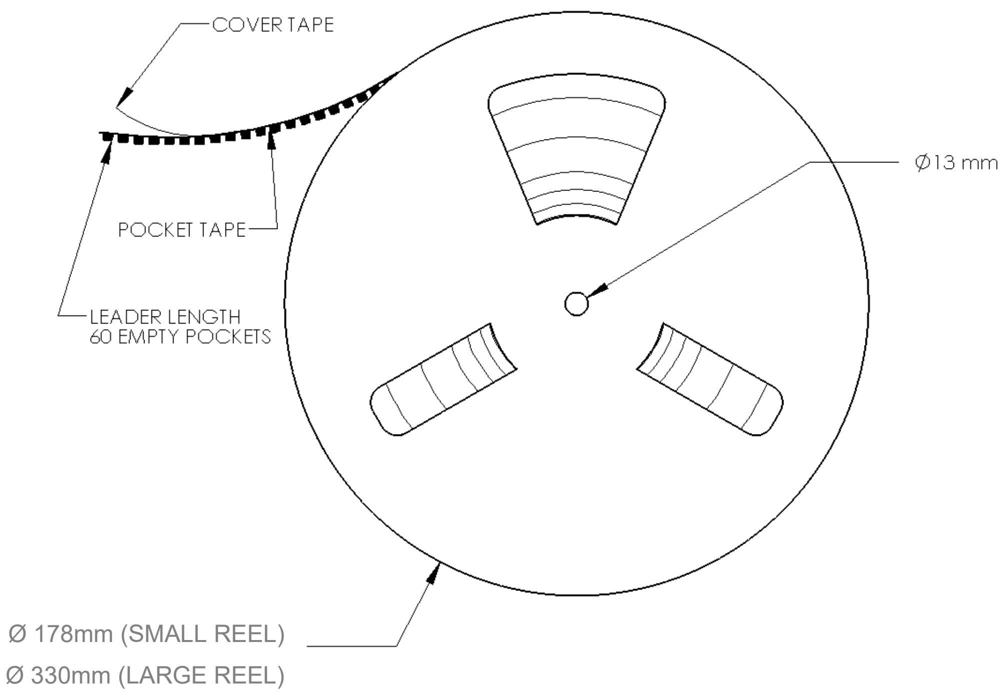


Figure 13: Emitter reel specifications (mm)

Notes for Figure 13:

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.

Application Guidelines

Mechanical Mounting of MCPCB

- MCPCB bending should be avoided as it will cause mechanical stress on the emitter, which could lead to substrate cracking and subsequently LED dies cracking.
- To avoid MCPCB bending:
  - Special attention needs to be paid to the flatness of the heat sink surface and the torque on the screws.
  - Care must be taken when securing the board to the heat sink. This can be done by tightening three M3 screws (or #4-40) in steps and not all the way through at once. Using fewer than three screws will increase the likelihood of board bending.
  - It is recommended to always use plastics washers in combinations with the three screws.
  - If non-taped holes are used with self-tapping screws, it is advised to back out the screws slightly after tightening (with controlled torque) and then re-tighten the screws again.

Thermal interface material

- To properly transfer heat from LED emitter to heat sink, a thermally conductive material is required when mounting the MCPCB on to the heat sink.
- There are several varieties of such material: thermal paste, thermal pads, phase change materials and thermal epoxies. An example of such material is Electrolube EHTC.
- It is critical to verify the material's thermal resistance to be sufficient for the selected emitter and its operating conditions.

Wire Soldering

- To ease soldering wire to MCPCB process, it is advised to preheat the MCPCB on a hot plate of 125-150°C. Subsequently, apply the solder and additional heat from the solder iron will initiate a good solder reflow. It is recommended to use a solder iron of more than 60W.
- It is advised to use lead-free, no-clean solder. For example: SN-96.5 AG-3.0 CU 0.5 #58/275 from Kester (pn: 24-7068-7601)

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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