Light is OSRAM

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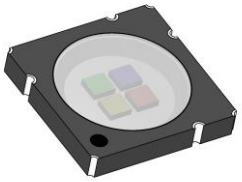
Our Brand
LED ENGIN

LuxiGen™ Multi-Color Emitter Series

LZ4 RGB Warm White LED Emitter

LZ4-01MWCA



Key Features

- RGB Warm White LED integrated in one surface mount ceramic LED package with integrated flat glass lens.
- Individually addressable die
- Electrically neutral thermal path
- Ultra-small foot-print – 7.0mm x 7.0mm
- Low Thermal Resistance (1.1°C/W)
- JEDEC Level 1 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)

Typical Applications

- Architectural Lighting
- Retail Spot and Display Lighting
- Stage and Studio Lighting

Part number options

Base part number

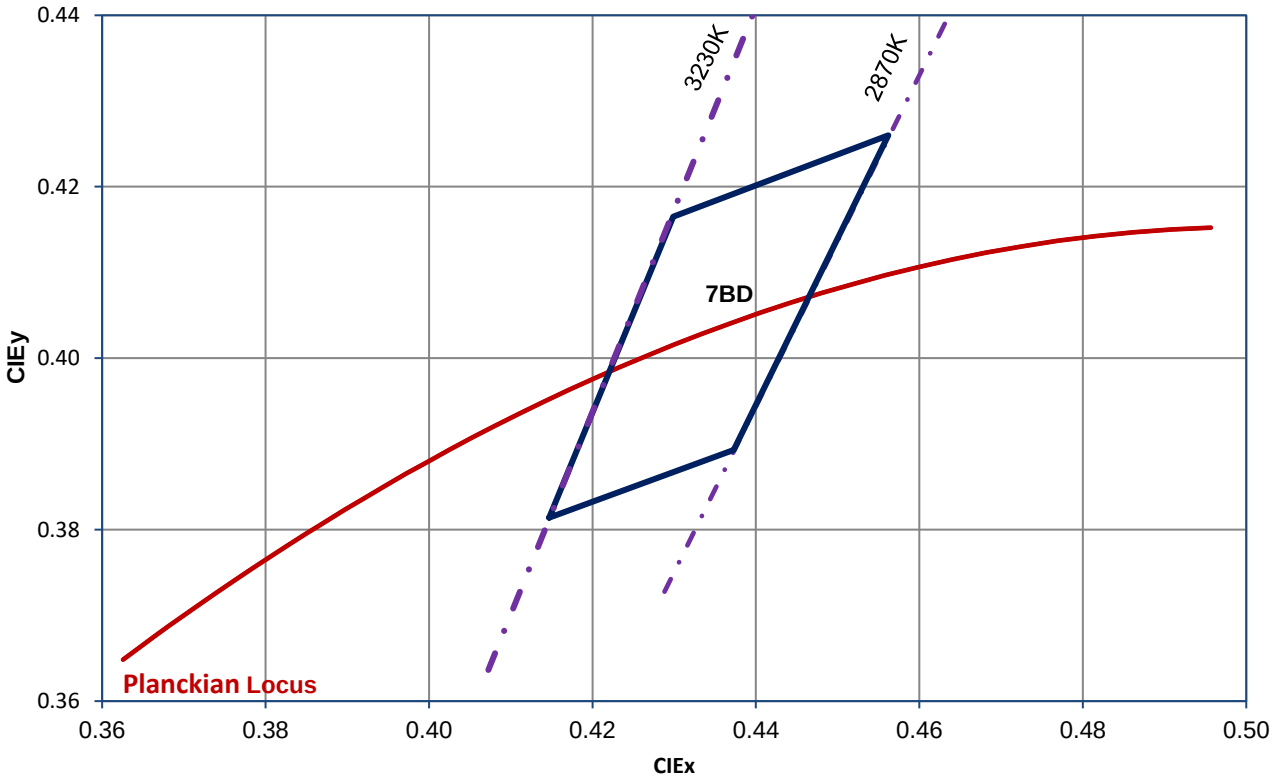
Part number	Description
LZ4-01MWCA-xxxx	LZ4 RGB + Warm White Emitter

Bin kit option codes

MW, Red-Green-Blue-Warm White (typ. 3000K)

Kit number suffix	Min flux bin	Wavelength bin range	Description
0000	27R	R03	Red, full distribution flux; full distribution wavelength
	23G	G04	Green, full distribution flux; full distribution wavelength
	19B	B05-B08	Blue, full distribution flux; full distribution wavelength
	11W	7BD	White full distribution flux; typ. 3000K bin

Warm White Chromaticity Group



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

Warm White Bin Coordinates

Bin code	CIEx	CIEy
7BD	0.4147	0.3814
	0.4299	0.4165
	0.4562	0.4260
	0.4373	0.3893
	0.4147	0.3814

Luminous Flux Bins

Table 1:

Bin Code	Minimum Flux @ I_F = 1000mA [1]				Maximum Flux @ I_F = 1000mA [1]			
	(lm) Red	(lm) Green	(W) Blue	(lm) WW	(lm) Red	(lm) Green	(W) Blue	(lm) WW
27R	85				130			
23G		160				280		
19B			1.0				1.5	
11W				140				225

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 = 1000mA [1] (nm)			Maximum Dominant Wavelength (λ_D) @ I_F = 1000mA [1] (nm)		
	Red	Green	Blue	Red	Green	Blue
R03	620			628		
G04		519			525	
B05			449			453
B08			453			458

Note for Table 2:

1. Dominant wavelength is measured at 10ms pulse, Tc=25°C. LED Engin maintains a tolerance of ± 1nm on Dominant Wavelength measurements.

Forward Voltage Bin

Table 3:

Bin Code	Minimum Forward Voltage (V_F) @ I_F = 1000mA [1] (V)				Maximum Forward Voltage (V_F) @ I_F = 1000mA [1] (V)			
	Red	Green	Blue	WW	Red	Green	Blue	WW
0	1.8	3.0	2.7	2.8	2.8	4.1	3.4	3.8

Note for Table 3:

1. Forward voltage is measured at 10ms pulse, Tc=25°C. LED Engin maintains a tolerance of ± 0.04V on forward voltage measurements.

Absolute Maximum Ratings

Table 4:

Parameter	Symbol	Value	Unit
DC Forward Current - Red[1]	I_F	2500	mA
DC Forward Current – Green, Blue [1]	I_F	3000	mA
DC Forward Current – Warm White[1]	I_F	1500	mA
Peak Pulsed Forward Current – Red, Green Blue [2]	I_{FP}	3000	mA
Peak Pulsed Forward Current – Warm White [2]	I_{FP}	1500	mA
Reverse Voltage	V_R	See Note 3	V
Storage Temperature	T_{std}	-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 reversing biased.
4. Solder conditions per JEDEC 020D. See Reflow Soldering Profile Figure 4.
5. LED Engin recommends taking reasonable precautions towards possible ESD damages and handling the emitter 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
		Red	Green	Blue[1]	WW	
Luminous Flux (@ I_F = 1000mA)	Φ_V	105	200	42 (1.2 W)	180	lm
Luminous Flux (@ I_F_Max)	Φ_V	205	380	97 (2.8 W)	250	lm
Dominant Wavelength (@ I_F = 1000mA)	λ_D	623	520	451	-	nm
Correlated Color Temperature	CCT				3000	K
Color Rendering Index (CRI)	R_a				85	
Viewing Angle[2]	$2\Theta_{½}$		110			Degrees
Total Included Angle[3]	$\Theta_{0.9}$		150			Degrees

Notes for Table 5:

1. When operating the Blue LED observe IEC 62471 Risk Group 2. Avoid exposure to the beam. Wear protective eyewear.
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 solid cone angle that includes 90% of the total luminous flux.

Electrical Characteristics @ T_C = 25°C

Table 6:

Parameter	Symbol	Typical				Unit
		Red	Green	Blue	WW	
Forward Voltage (@ I_F = 1000mA)	VF	2.4	3.5	3.0	3.0	V
Temperature Coefficient of Forward Voltage	ΔVF/ΔTJ	-1.9	-4.2	-1.8	-2.0	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 MSL Classification:

	Floor Life		Soak Requirements			
			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)

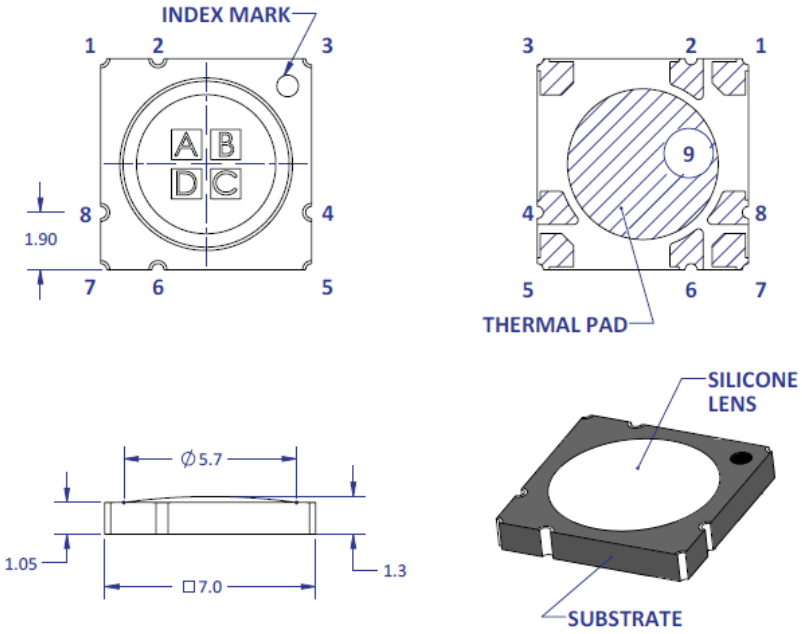
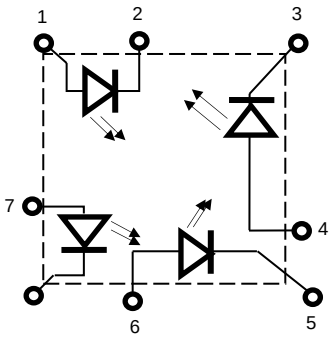


Figure 1: Package Outline Drawing.

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



Notes for Figure 1:

1. Unless otherwise noted, the tolerance = ± 0.20 mm.
2. Nominal die spacing is 0.15mm.
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) – Pedestal MCPCB Design

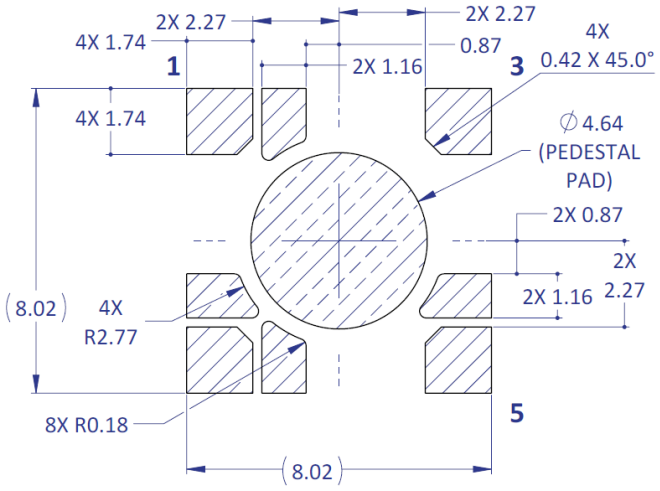


Figure 2a: Recommended solder pad layout for anode, cathode, and thermal pad for pedestal design

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) – Pedestal MCPCB Design

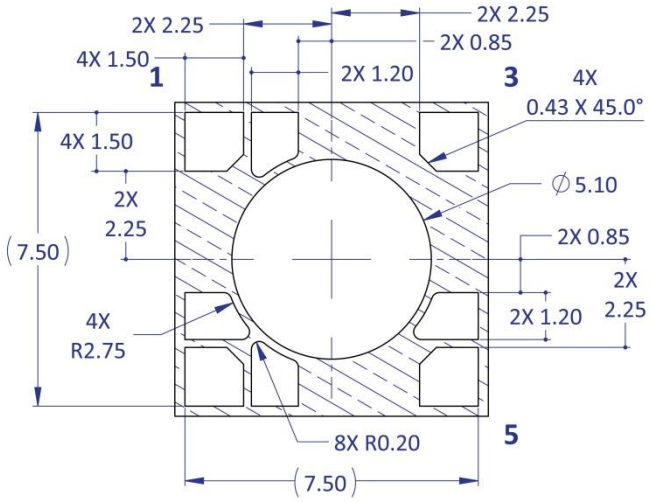


Figure 2b: Recommended solder mask opening for anode, cathode, and thermal pad for pedestal design

Note for Figure 2b:

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

Recommended 8 mil Stencil Apertures Layout (mm) – Pedestal MCPCB Design

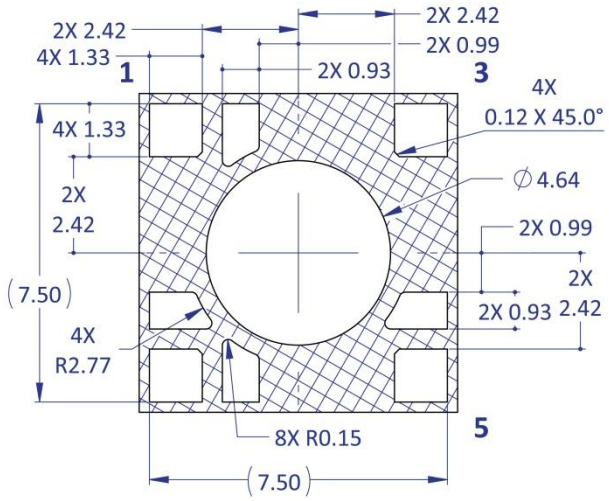
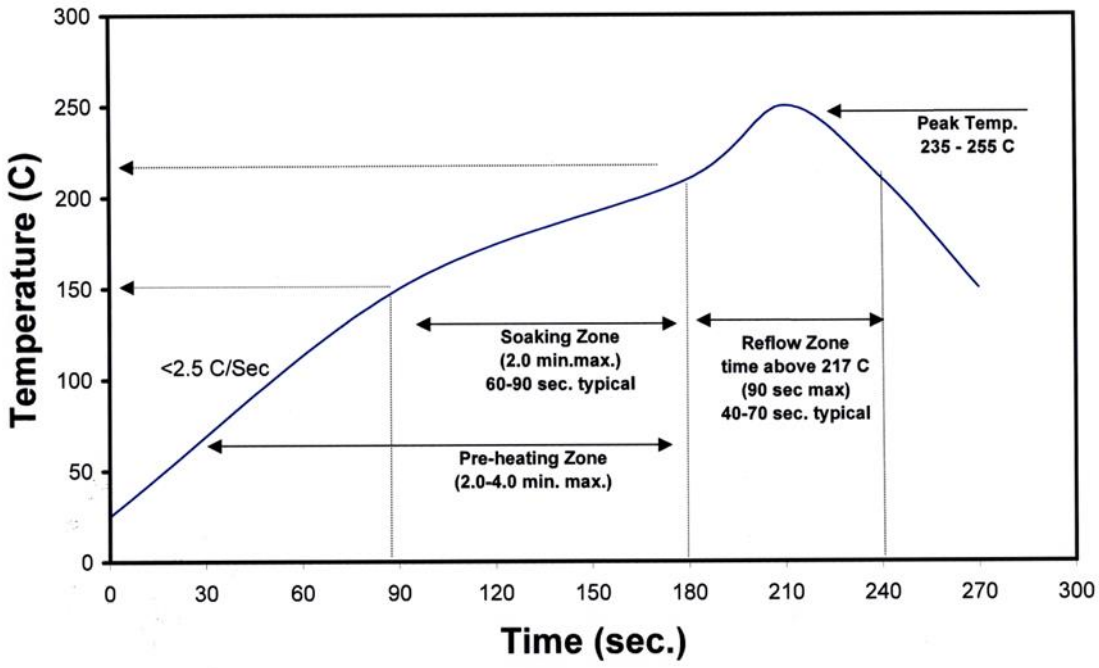


Figure 2c: Recommended 8mil stencil apertures for anode, cathode, and thermal pad for pedestal design

Note for Figure 2c:

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

Reflow Soldering Profile



Typical Radiation Pattern

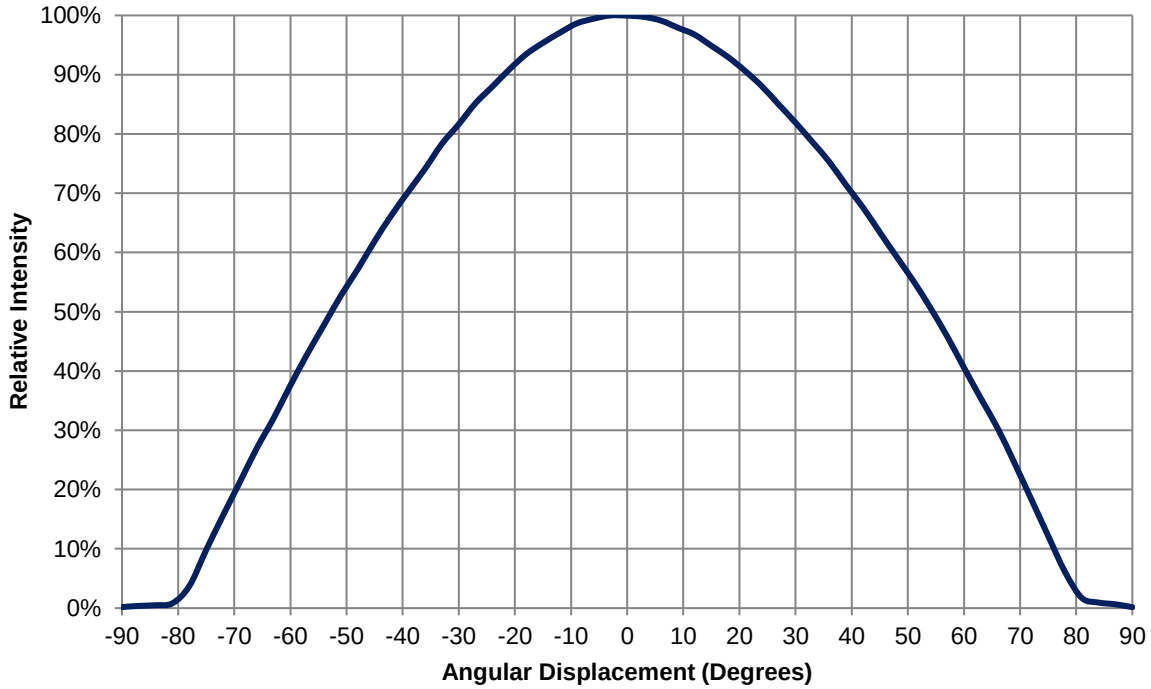


Figure 4: Typical representative spatial radiation pattern

Typical Relative Spectral Power Distribution

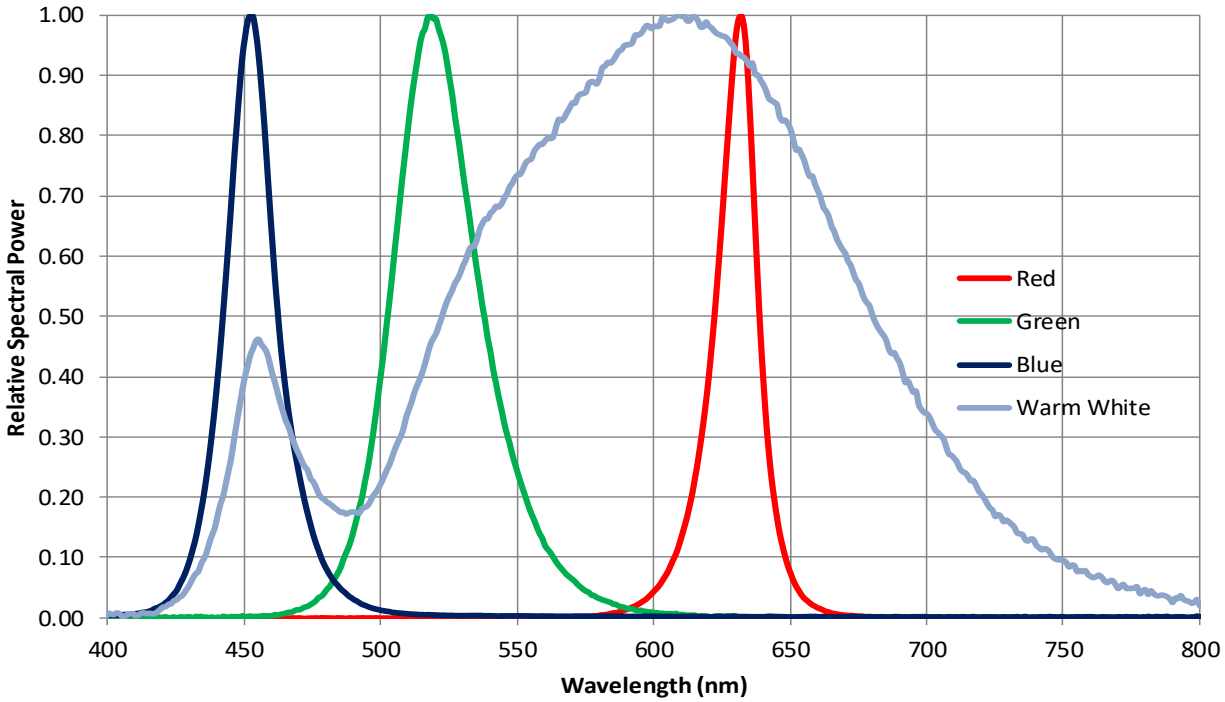


Figure 5: Typical relative spectral power vs. wavelength @ T_C = 25°C.

Typical Forward Current Characteristics

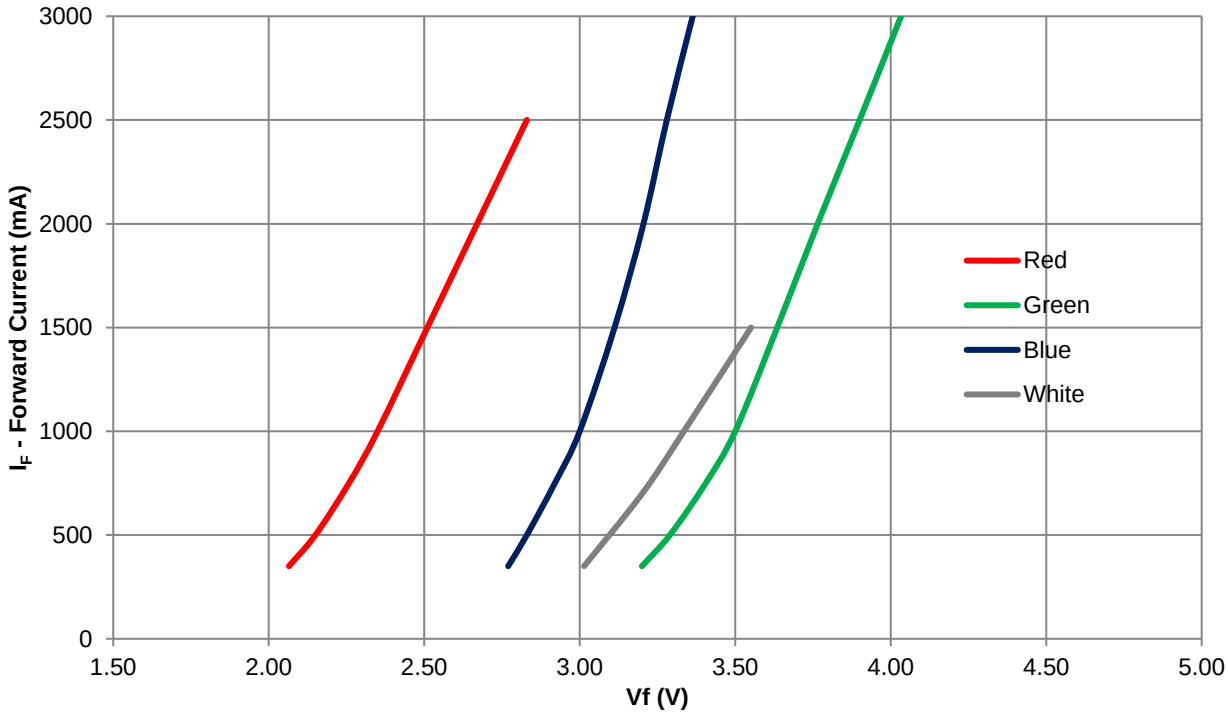


Figure 6: Typical forward current vs. forward voltage @ T_C = 25°C

Typical Relative Light Output over Current

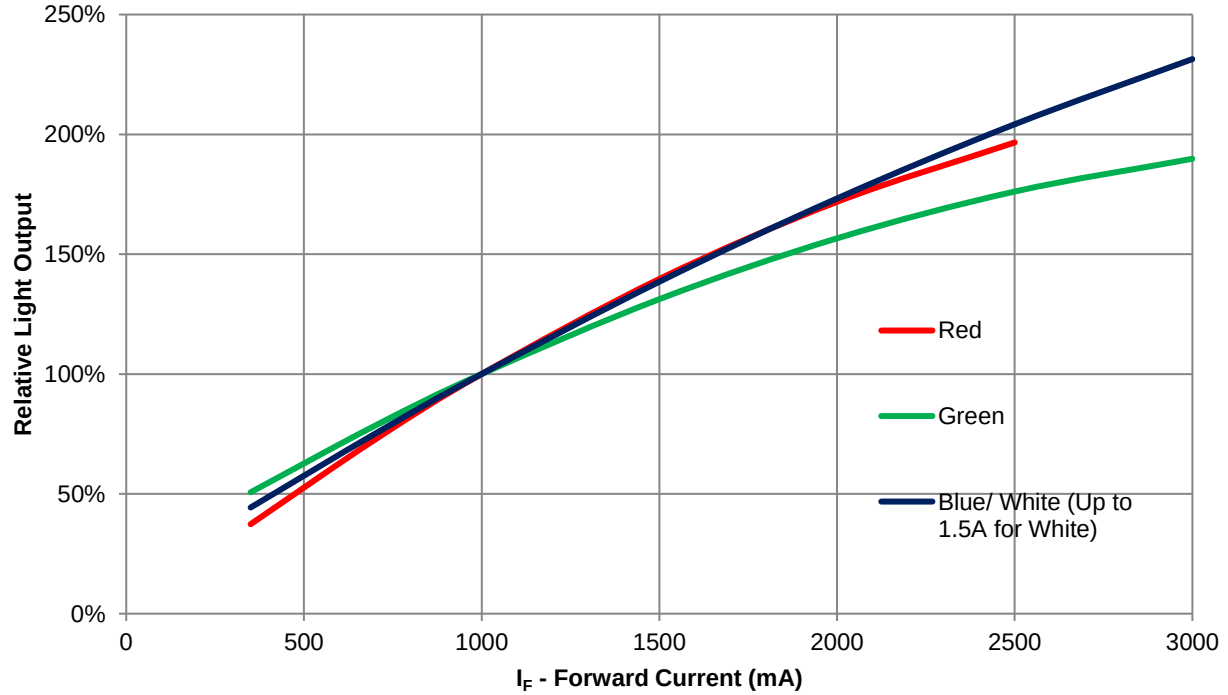


Figure 7: Typical relative light output vs. forward current @ T_C = 25°C

Typical Relative Light Output over Temperature

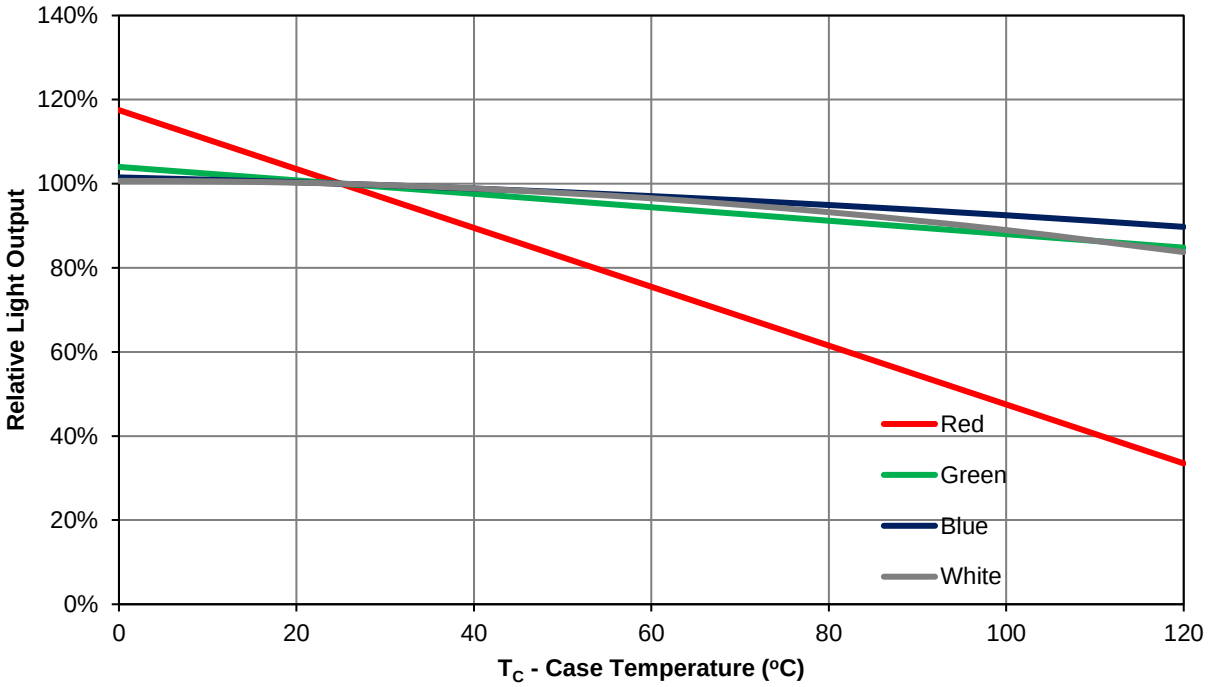


Figure 8: Typical relative light output vs. case temperature.

Typical Dominant Wavelength Shift over Current

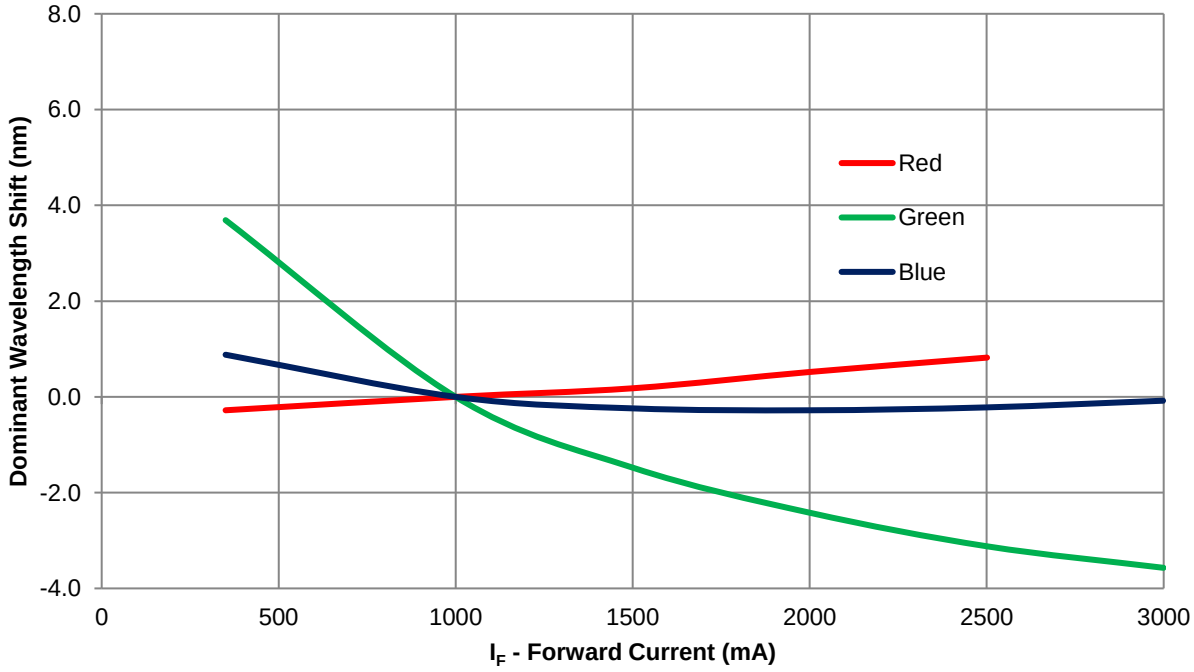


Figure 9: Typical dominant wavelength shift vs. forward current @ T_C = 25°C.

Typical Dominant Wavelength over Temperature

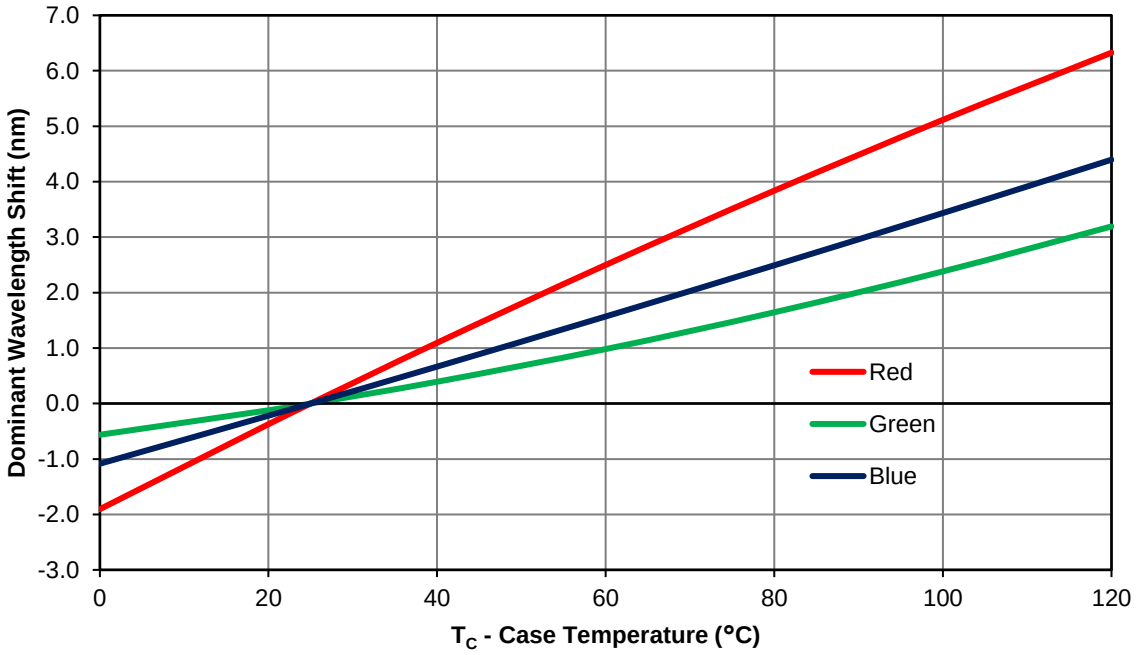


Figure 10: Typical dominant wavelength shift vs. case temperature

Current De-rating

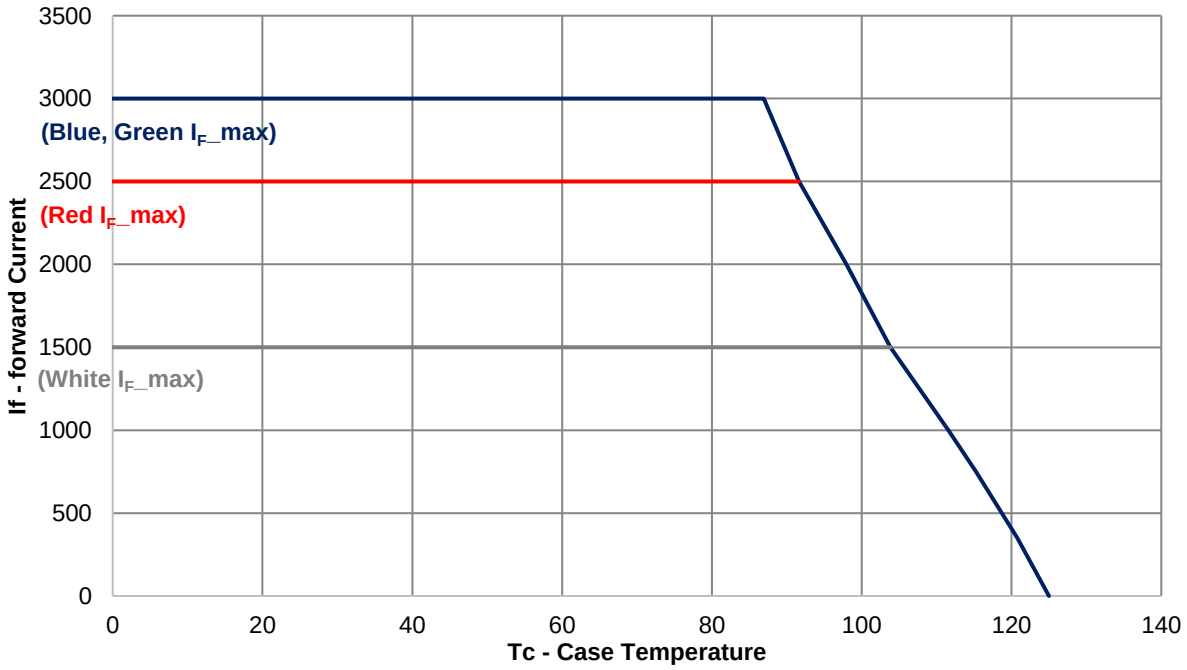


Figure 11: Maximum forward current vs. ambient temperature based on TJ(MAX) = 125°C

Notes for Figure 11:

1. Above 1.5A, it is assumed that the White die is kept running at 1.5A.
2. Above 2.5A, it is assumed that the White die is kept running at 1.5A, and the Red at 2.5A.
3. $R\Theta_{J\text{-}C}$ [Junction to Case Thermal Resistance] for the LZ4-01MWCA is typically 1.1°C/W

Emitter Tape and Reel Specifications (mm)

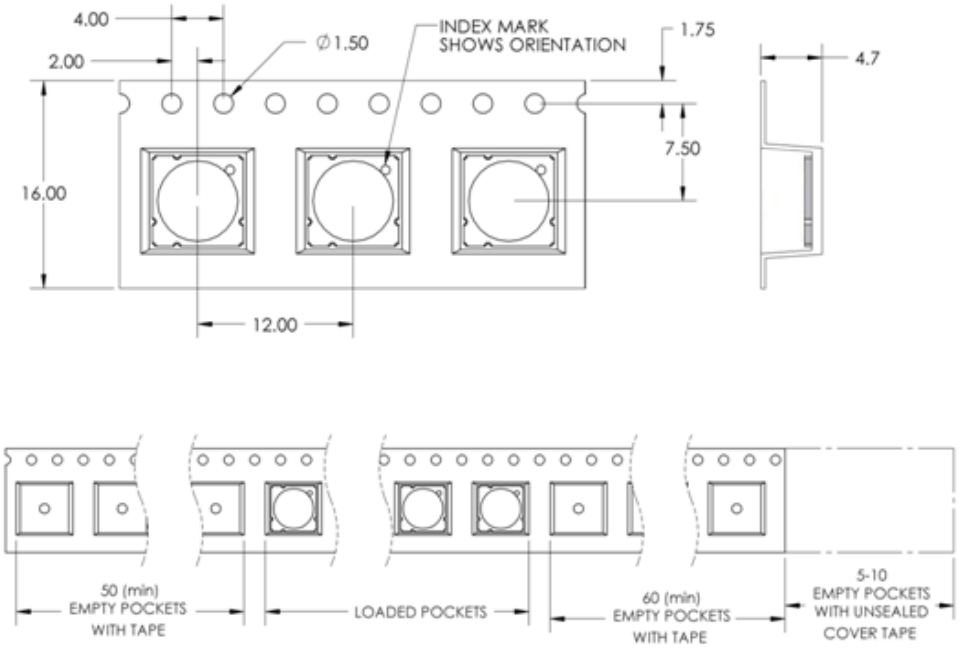


Figure 12: Emitter carrier tape specifications (mm).

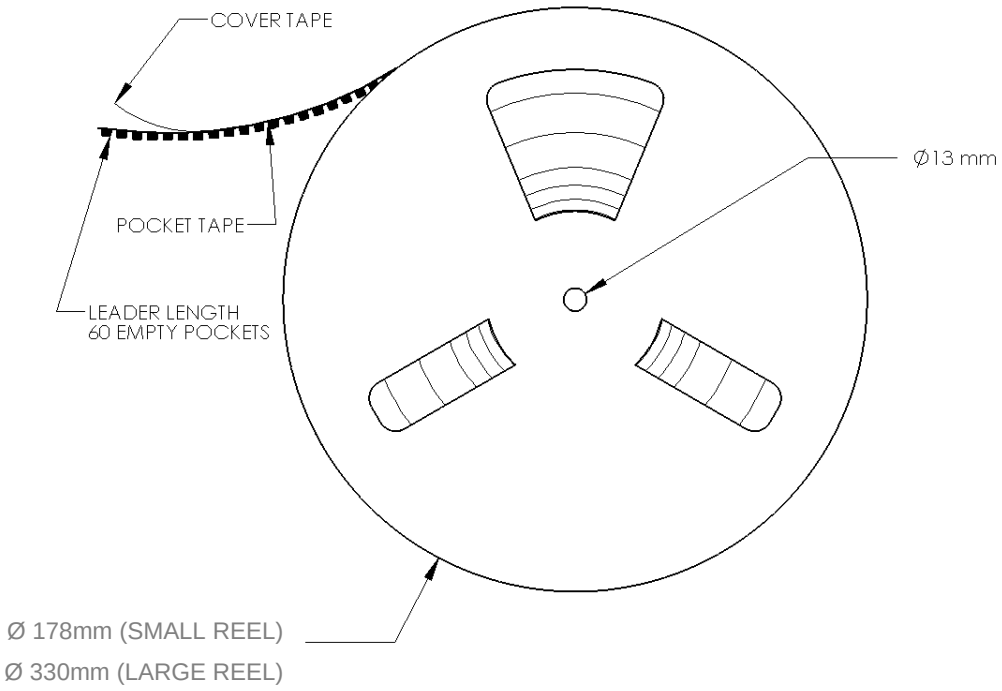


Figure 13: Emitter reel specifications (mm).

Notes for Figure 13:

1. Small reel quantity: up to 500 emitters
2. Large reel quantity: 500-2000 emitters.
3. Single flux bin and single wavelength bin per reel.

LZ4-01MWCA

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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