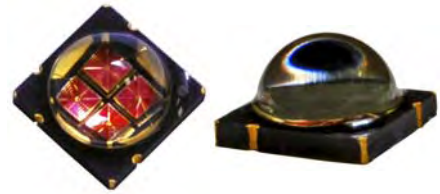


High Luminous Efficacy  
Deep Red LED Emitter  
**LZ4-00R210**



### Key Features

- High Efficacy 10W Deep Red LED
- Ultra-small foot print – 7.0mm x 7.0mm x 4.3mm
- Surface mount ceramic package with integrated glass lens
- Very low Thermal Resistance (2.7°C/W)
- Individually addressable die
- Very high Radiant Flux density
- New industry standard for Radiant Flux Maintenance (>90% at 100,000 Hours)
- Autoclave compliant (JEDEC JESD22-A102-C)
- JEDEC Level 2 for Moisture Sensitivity Level
- Lead (Pb) free and RoHS compliant
- Reflow solderable (up to 6 cycles)
- Emitter available on [Standard](#) or Serially [Connected](#) MCPCB (optional)

### Typical Applications

- Horticulture
- Photo Therapy
- Machine Vision

### Description

The LZ4-00R210 Deep Red LED emitter provides 10W power in an extremely small package. The LZ4-00R210 LED provides superior radiometric power in the wavelength range specifically required for plants' chlorophyll *a* absorption. With a 7.0mm x 7.0mm x 4.3mm ultra-small footprint, this package provides exceptional radiant flux density. LedEngin's LZ4-00R210 LED offers ultimate design flexibility with individually addressable die. The patent-pending design has unparalleled thermal and optical performance. The high quality materials used in the package are chosen to optimize light output and minimize stresses which results in monumental reliability and lumen maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.

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## Product Nomenclature

The LZ Series part number designation is defined as follows:



## Radiant Flux Bins

Table 2:

Bin Code	Minimum Radiant Flux ( $\Phi$ ) @ $I_F = 700\text{mA}$ <sup>[1,2]</sup> (W)	Maximum Radiant Flux ( $\Phi$ ) @ $I_F = 700\text{mA}$ <sup>[1,2]</sup> (W)	Typical Radiant Flux ( $\Phi$ ) @ $I_F = 1000\text{mA}$ <sup>[2]</sup> (W)
N	1.25	1.6	2.0
P	1.6	2.0	2.4
Q	2.0	2.4	3.0

Notes for Table 2:

1. Radiant flux performance guaranteed within published operating conditions. LedEngin maintains a tolerance of  $\pm 10\%$  on flux measurements.
2. Future products will have even higher levels of radiant flux performance. Contact LedEngin Sales for updated information.

## Peak Wavelength Bin

Table 3:

Bin Code	Minimum Peak Wavelength ( $\lambda_P$ ) @ $I_F = 700\text{mA}$ <sup>[1]</sup> (nm)	Maximum Peak Wavelength ( $\lambda_P$ ) @ $I_F = 700\text{mA}$ <sup>[1]</sup> (nm)
0	655	670

Notes for Table 3:

1. LedEngin maintains a tolerance of  $\pm 2.0\text{nm}$  on peak wavelength measurements.

## Forward Voltage Bins

Table 4:

Bin Code	Minimum Forward Voltage ( $V_F$ ) @ $I_F = 700\text{mA}$ <sup>[1,2]</sup> (V)	Maximum Forward Voltage ( $V_F$ ) @ $I_F = 700\text{mA}$ <sup>[1,2]</sup> (V)
0	9.92	13.76

Notes for Table 4:

1. Forward Voltage is binned with all four LED dice connected in series.
2. LedEngin maintains a tolerance of  $\pm 0.16\text{V}$  for forward voltage measurements for the four LEDs.

## Absolute Maximum Ratings

Table 5:

Parameter	Symbol	Value	Unit
DC Forward Current <sup>[1]</sup>	$I_F$	1000	mA
Peak Pulsed Forward Current <sup>[2]</sup>	$I_{FP}$	1500	mA
Reverse Voltage	$V_R$	See Note 3	V
Storage Temperature	$T_{stg}$	-40 ~ +125	°C
Junction Temperature	$T_J$	125	°C
Soldering Temperature <sup>[4]</sup>	$T_{sol}$	260	°C
Allowable Reflow Cycles		6	
Autoclave Conditions <sup>[5]</sup>		121°C at 2 ATM, 100% RH for 168 hours	
ESD Sensitivity <sup>[6]</sup>		> 8,000 V HBM Class 3B JESD22-A114-D	

Notes for Table 5:

- 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.
- Pulse forward current conditions: Pulse Width  $\leq$  10msec and Duty Cycle  $\leq$  10%.
- LEDs are not designed to be reverse biased.
- Solder conditions per JEDEC 020D. See Reflow Soldering Profile Figure 3.
- Autoclave Conditions per JEDEC JESD22-A102-C.
- LedEngin recommends taking reasonable precautions towards possible ESD damages and handling the LZ4-00R210 in an electrostatic protected area (EPA). An EPA may be adequately protected by ESD controls as outlined in ANSI/ESD S6.1.

## Optical Characteristics @ $T_C = 25^\circ\text{C}$

Table 6:

Parameter	Symbol	Typical	Unit
Radiant Flux (@ $I_F = 700\text{mA}$ ) <sup>[1]</sup>	$\Phi$	1.8	W
Radiant Flux (@ $I_F = 1000\text{mA}$ ) <sup>[1]</sup>	$\Phi$	2.5	W
Peak Wavelength	$\lambda_P$	660	nm
Viewing Angle <sup>[2]</sup>	$2\Theta_{1/2}$	95	Degrees
Total Included Angle <sup>[3]</sup>	$\Theta_{0.9}$	110	Degrees

Notes for Table 6:

- Radiant flux typical value is for all four LED dice operating concurrently at rated current.
- Viewing Angle is the off axis angle from emitter centerline where the radiant power is  $\frac{1}{2}$  of the peak value.
- Total Included Angle is the total angle that includes 90% of the total radiant flux.

## Electrical Characteristics @ $T_C = 25^\circ\text{C}$

Table 7:

Parameter	Symbol	Typical	Unit
Forward Voltage (@ $I_F = 700\text{mA}$ ) <sup>[1]</sup>	$V_F$	10.5	V
Forward Voltage (@ $I_F = 1000\text{mA}$ ) <sup>[1]</sup>	$V_F$	11.4	V
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_J$	-14.0	mV/°C
Thermal Resistance (Junction to Case)	$R\Theta_{J-C}$	2.7	°C/W

Notes for Table 7:

- Forward Voltage typical value is for all four LED dice connected in series.

## Mechanical Dimensions (mm)

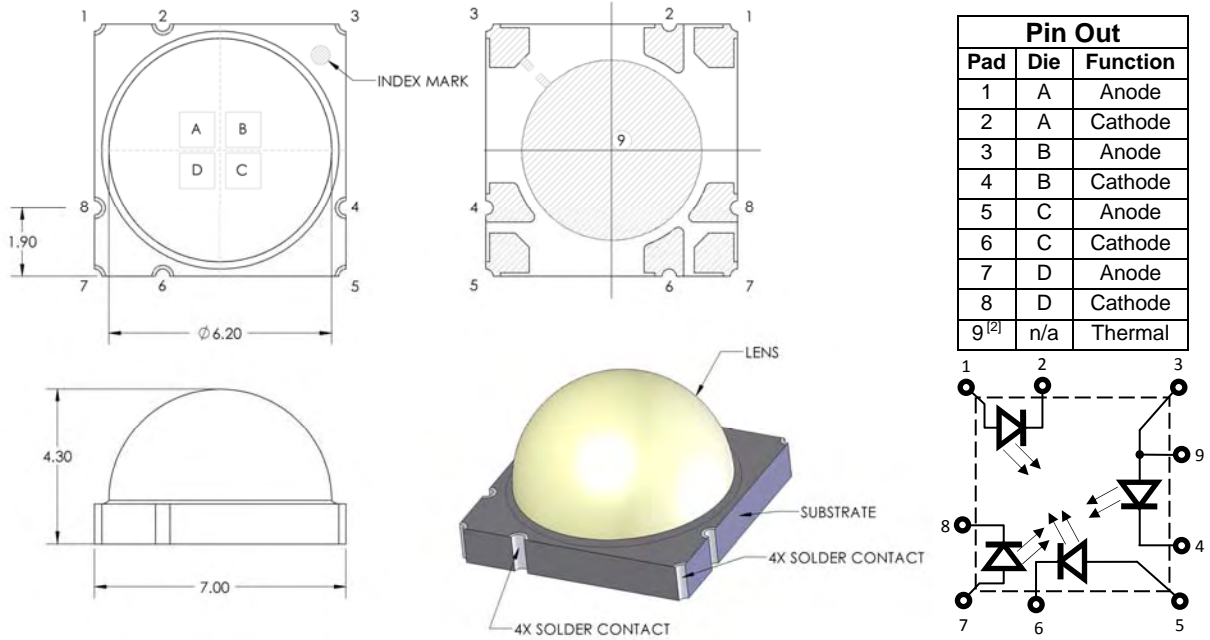


Figure 1: Package outline drawing.

Notes for Figure 1:

1. Unless otherwise noted, the tolerance =  $\pm 0.20$  mm.
2. Thermal contact, Pad 9, is electrically connected to Pad 3. Do not connect any pad to the thermal contact, Pad 9. When mounting the LZ4-00R210 onto a MCPCB, by default its dielectric layer provides for the necessary electrical insulation in between all contact pads. LedEngin offers [LZ4-20R210](#) and [LZ4-40R210](#) MCPCB options which provide for electrical insulation between all contact pads. Please refer to Application Note MCPCB Option 2 and Option 4, or contact a LedEngin sales representative for more information.

## Recommended Solder Pad Layout (mm)

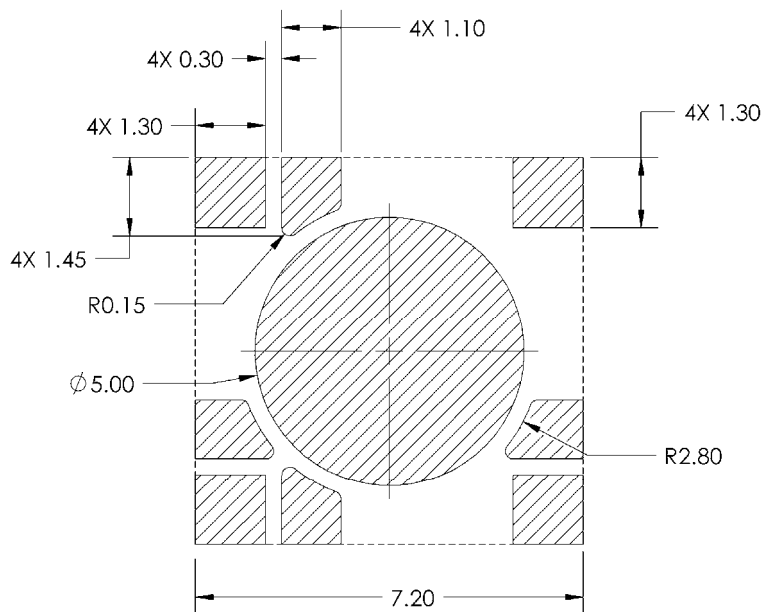


Figure 2: Recommended solder mask opening (hatched area) for anode, cathode, and thermal pad.

Note for Figure 2:

1. Unless otherwise noted, the tolerance =  $\pm 0.20$  mm.

## Reflow Soldering Profile

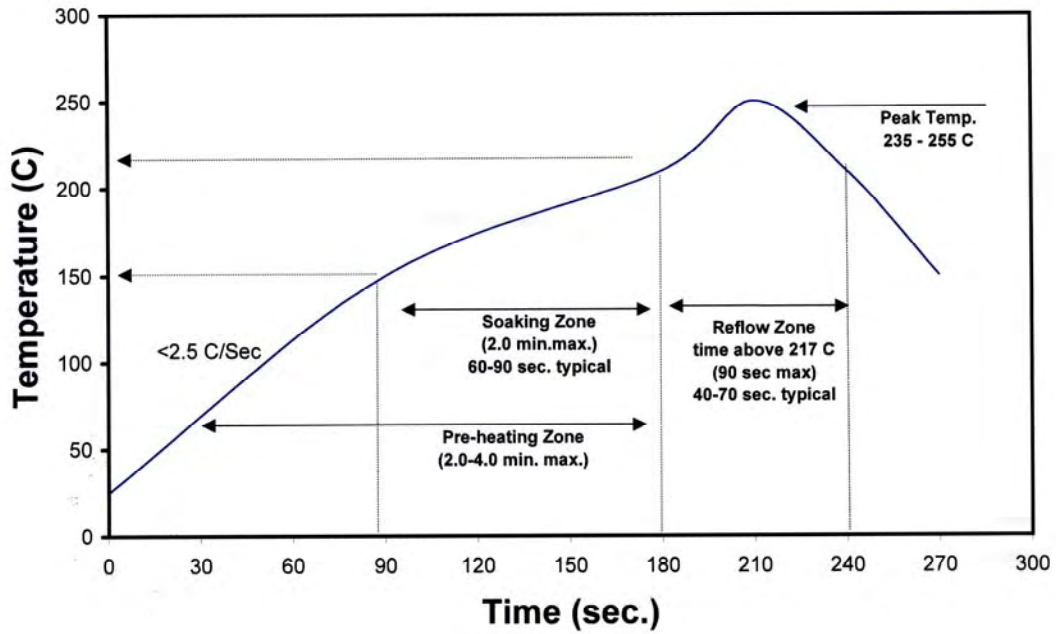


Figure 3: Reflow soldering profile for lead free soldering.

## Typical Radiation Pattern

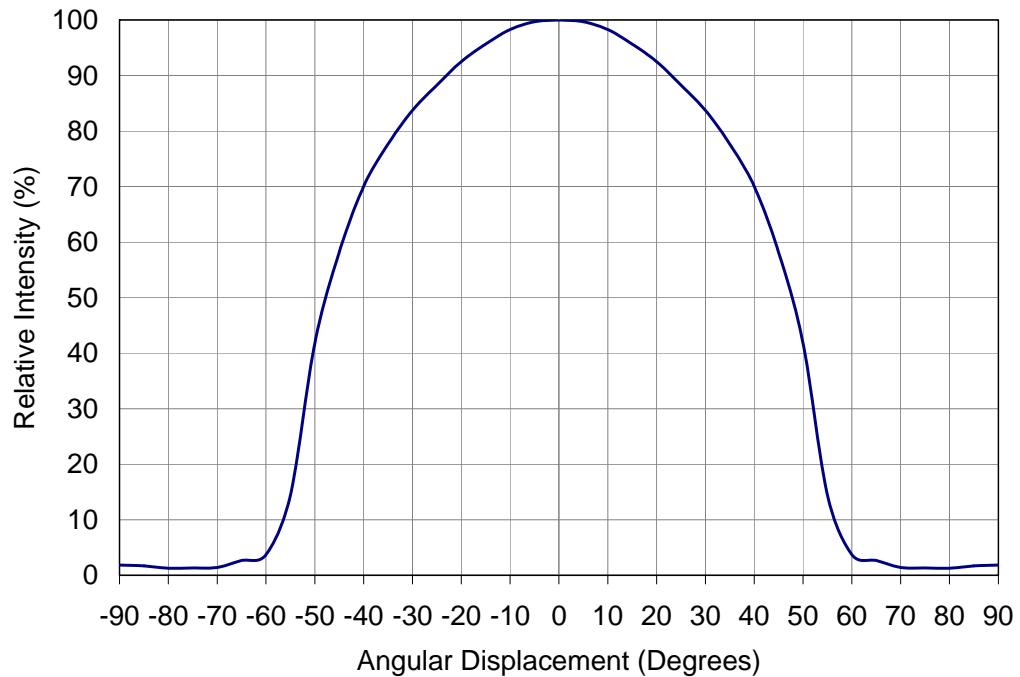


Figure 4: Typical representative spatial radiation pattern.

## Typical Relative Spectral Power Distribution

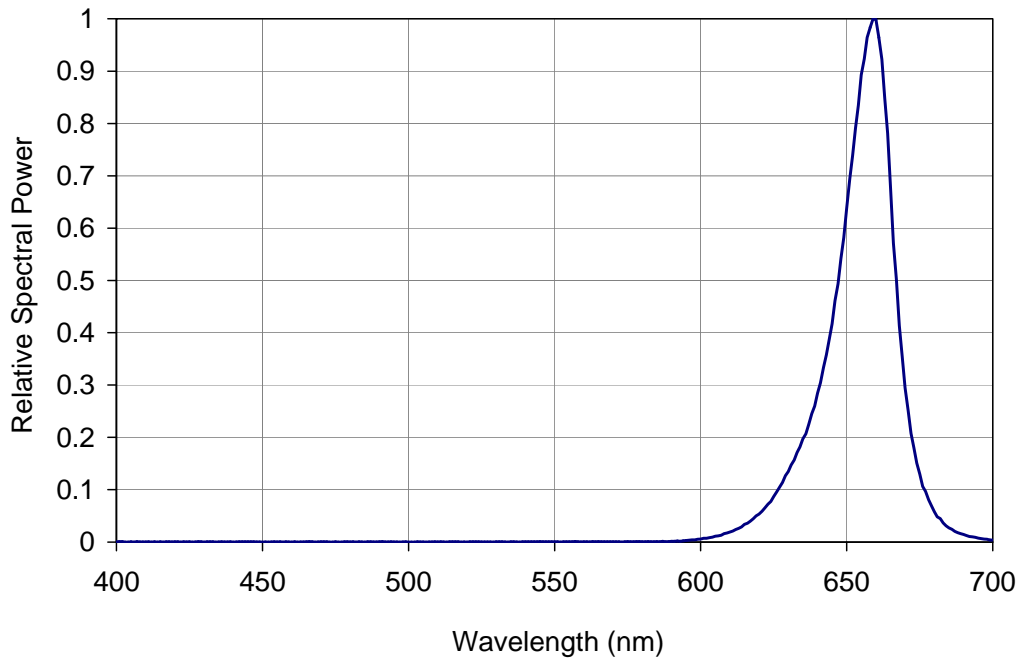


Figure 5: Relative spectral power vs. wavelength @  $T_c = 25^\circ\text{C}$ .

## Typical Peak Wavelength Shift over Temperature

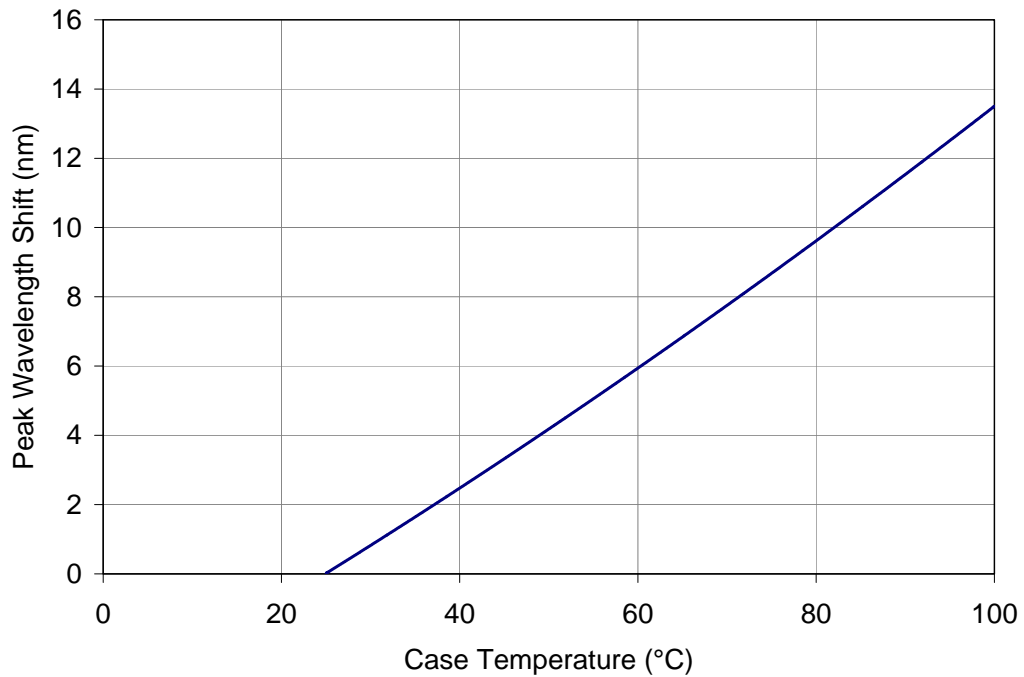


Figure 6: Typical peak wavelength shift vs. case temperature.

## Typical Normalized Radiant Flux

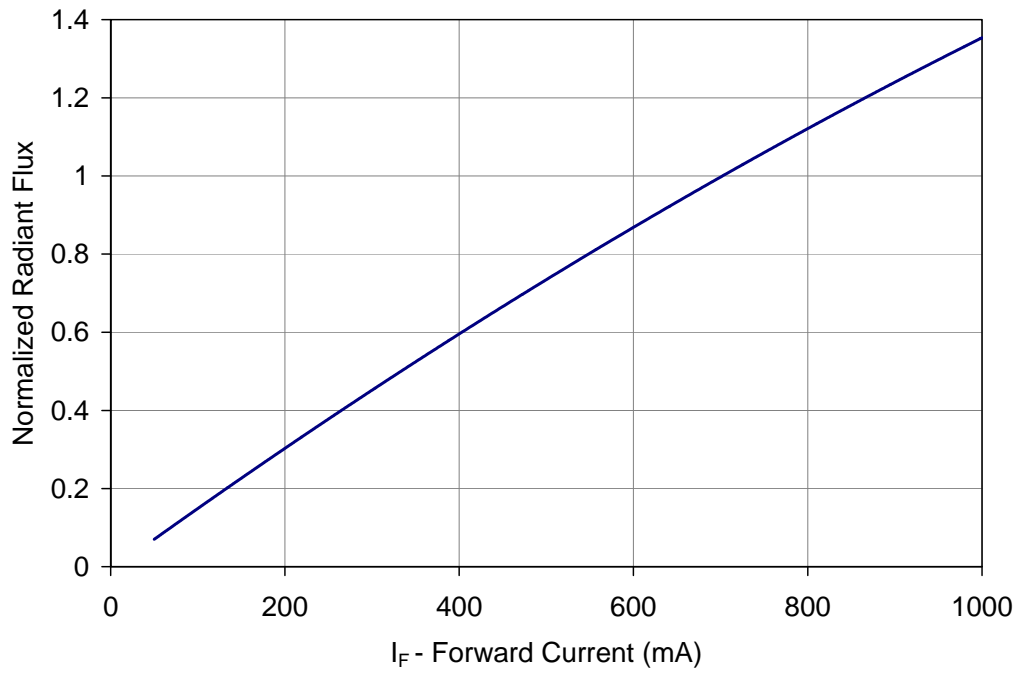


Figure 7: Typical normalized radiant flux vs. forward current @  $T_C = 25^\circ\text{C}$ .

## Typical Normalized Radiant Flux over Temperature

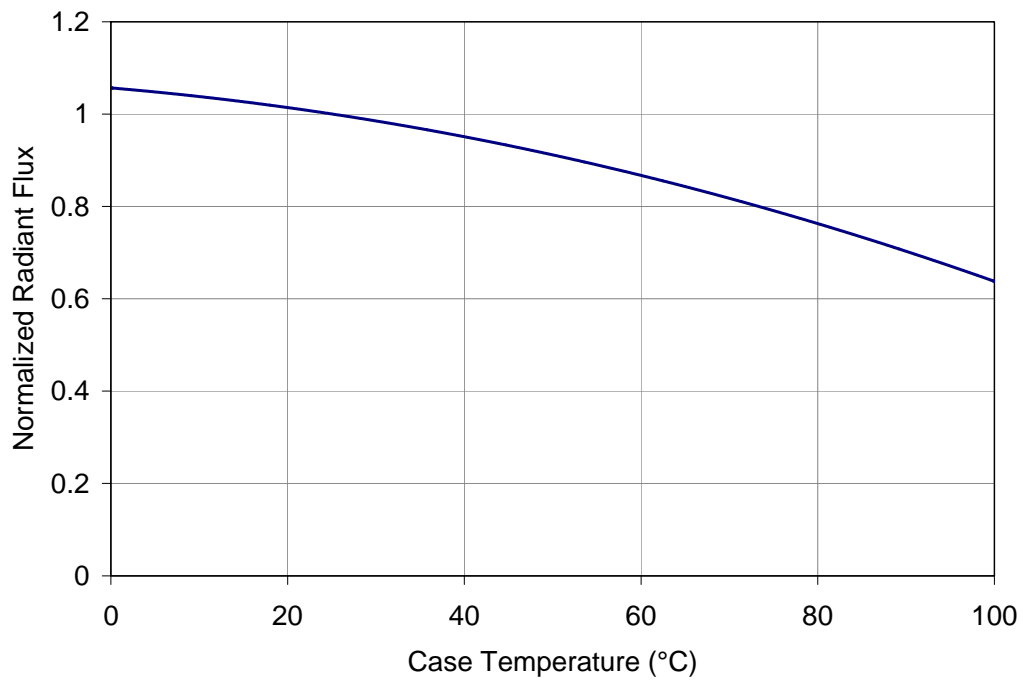


Figure 8: Typical normalized radiant flux vs. case temperature.

## Typical Forward Current Characteristics

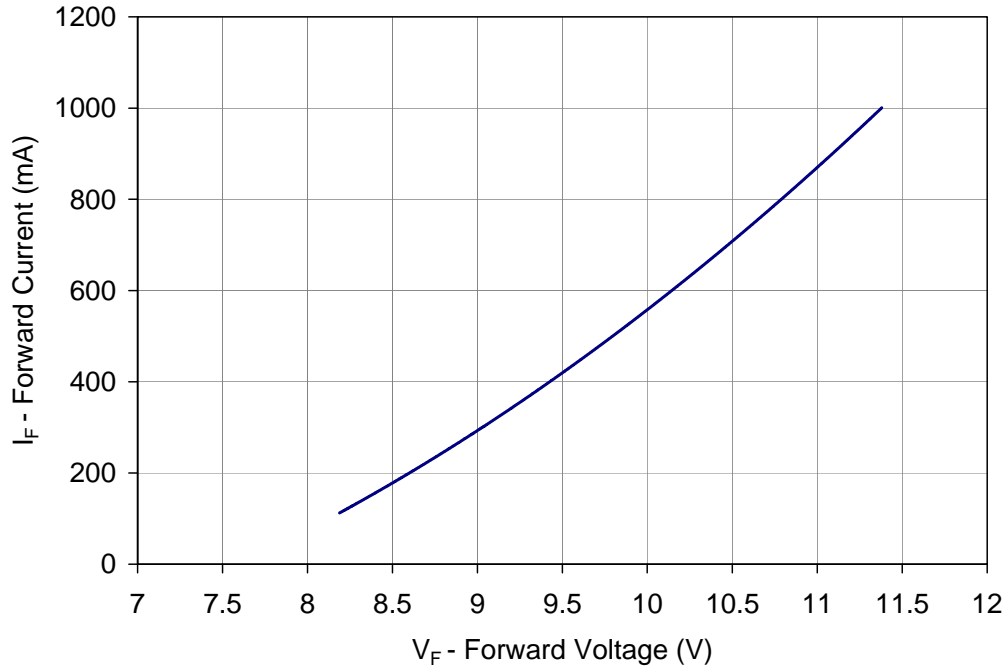


Figure 9: Typical forward current vs. forward voltage @  $T_C = 25^\circ\text{C}$ .

Note for Figure 9:

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

## Current Derating

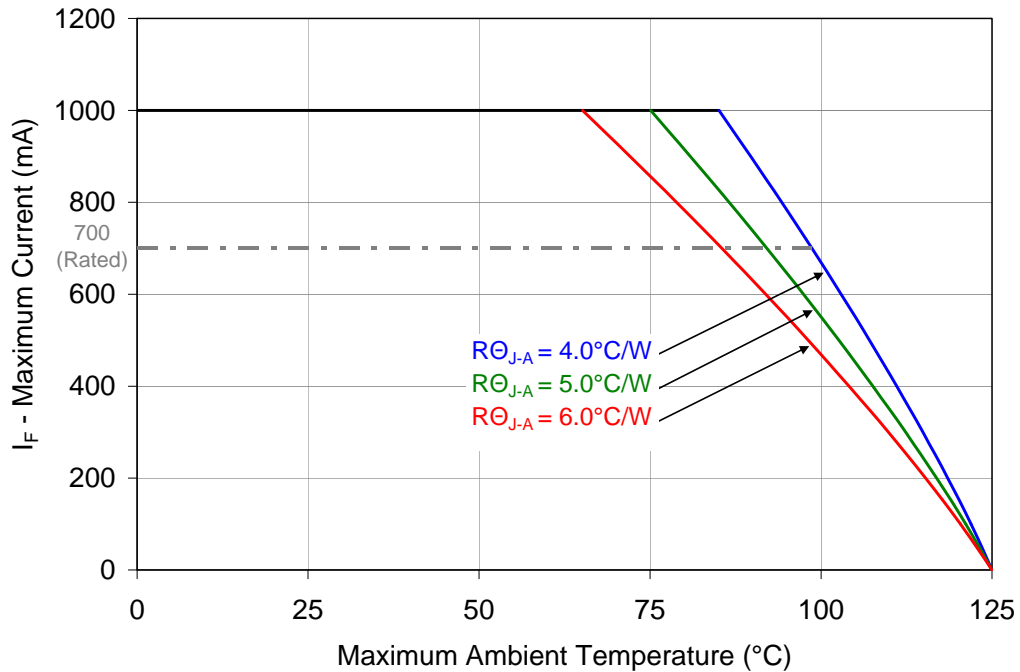


Figure 10: Maximum forward current vs. ambient temperature based on  $T_{J(\text{MAX})} = 125^\circ\text{C}$ .

Notes for Figure 10:

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 LZ4-00R210 is typically 2.7°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].

## Emitter Tape and Reel Specifications (mm)

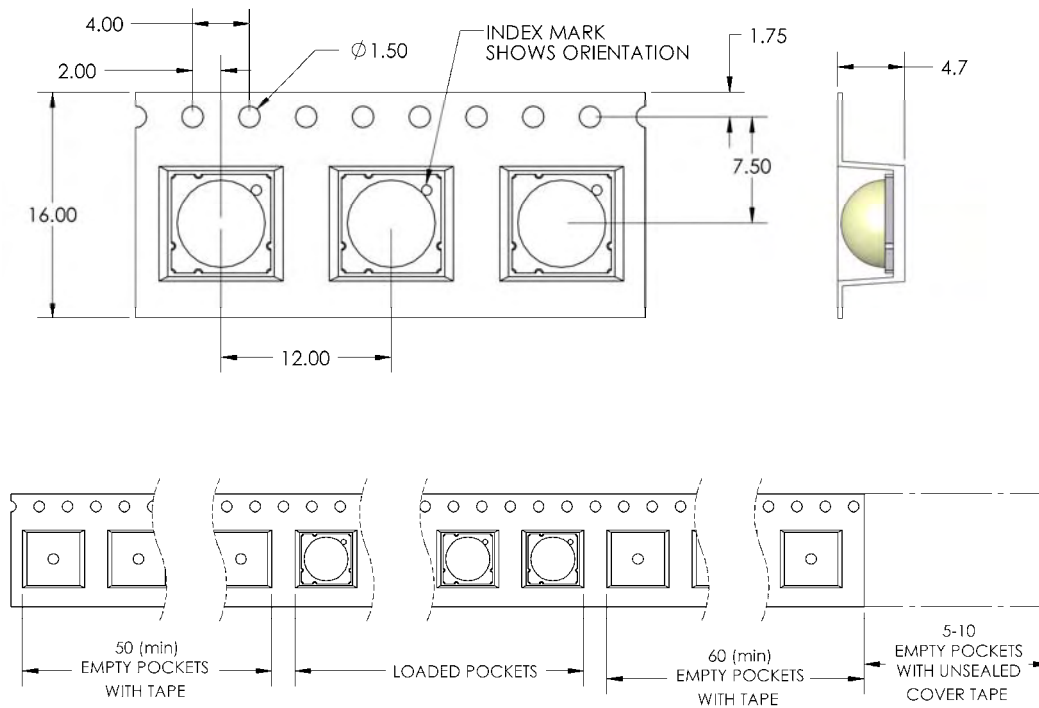


Figure 11: Emitter carrier tape specifications (mm).

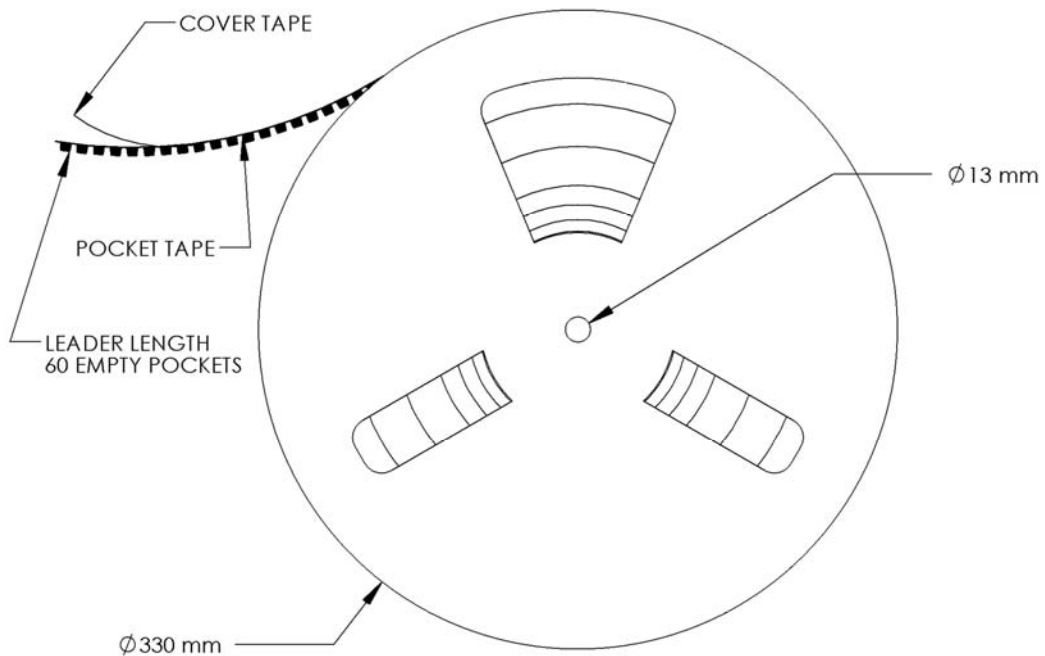


Figure 12: Emitter Reel specifications (mm).

## Company Information

The LZ4-00R210 LED emitter is developed, manufactured, and marketed by LedEngin, Inc., located in Santa Clara, CA. LedEngin is a global market leader in advanced high-power LED emitters and light-source modules. LedEngin provides total solutions from 3W to 15W in single packages with ultra-small footprints in all colors from Cool White, Neutral White, Warm White, Red, Green, Blue, Amber, RGB, RGBA, Deep Red, Dental Blue and UV. LedEngin supports customers to generate solid-state lighting designs that conserve natural resources. LedEngin is focused on differentiated Ultra High-Brightness LED solutions for diverse global markets using its patent-pending package designs and manufacturing processes. LedEngin offers catalog as well as full custom solutions to enable flexible system designs for its customers. LedEngin is dedicated to long-term win-win partnering with its customers and suppliers.

LedEngin reserves the right to make changes to improve performance without notice.

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