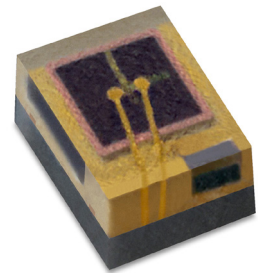




# LUXEON IR Compact Line

High power infrared emitters enabling the next level of design flexibility

The LUXEON IR Compact Line is a product line of high power infrared emitters specifically designed for high efficiency as required in a small spaces. Their compact and well-defined light source geometry allows them to be easily coupled into secondary optics for tight beam control. LUXEON IR Compact Line is designed with innovative LUXEON technology to provide industry-leading performance. Through best-in-class thermal conductivity, LUXEON IR Compact Line has excellent performance at actual operating conditions.



## FEATURES AND BENEFITS

Available in 850nm and 940nm wavelengths to provide optimized performance for each type of application

Radiant Power: 1050mW (850nm) and 1150mW (940nm) for a greater system performance

Compact package of 1.9mm x 1.37mm with a 2-pad configuration provides the highest power density in the industry for a new level of miniaturization

Ultra-low  $R_{th}$  of 2.8°C/W, solves thermal challenges and supports space saving designs

## PRIMARY APPLICATIONS

Surveillance / CCTV

Machine Vision

3D Scanning / Time of Flight

Biometric Identification

User Interface Control

Augmented / Virtual Reality

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# General Product Information

## Product Test Conditions

LUXEON IR Compact Line emitters are tested and binned with a 20ms monopulse of 1000mA at a junction temperature,  $T_j$ , of 25°C.

## Part Number Nomenclature

Part numbers for LUXEON IR Compact Line follow the convention below:

L 1 | Z - 0 **A A A** X X X X X X X X

Where:

**A A A** - designates nominal peak wavelength

X X X X X X X X - reserved for further customization

Therefore, the following part number is used for a LUXEON IR Compact emitter with a peak wavelength of 850nm:

L 1 | Z - 0 **8 5 0** 0 0 0 0 0 0 0 0

## Radiometric Power Maintenance

Please contact your local Sales Representative or Lumileds Technical Solutions Manager for more information about the long-term performance of this product.

## Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON IR Compact Line is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006. Lumileds LLC will not intentionally add the following restricted materials to its products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

# Performance Characteristics

## Product Selection Guide

Table 1. Product performance and optical characteristics of LUXEON IR Compact Line at 1000mA, T<sub>j</sub>=25°C.

PEAK WAVELENGTH <sup>[1]</sup> (nm)	TYPICAL FWHM BEAM ANGLE (°)	RADIOMETRIC POWER <sup>[2]</sup> (mW)		TYPICAL RADIANT INTENSITY (mW/sr)	TYPICAL SPECTRUM FWHM (nm)	PART NUMBER
		MINIMUM	TYPICAL			
850	150	900	1050	250	35	L1IZ-0850000000000
940	150	1000	1150	300	50	L1IZ-0940000000000

**Notes for Table 1:**

- Lumileds maintains a tolerance of ±0.5nm on peak wavelength measurements.
- Lumileds maintains a tolerance of ±7% on radiometric power measurements.

## Electrical and Thermal Characteristics

Table 2. Electrical and thermal characteristics for LUXEON IR Compact Line at 1000mA, T<sub>j</sub>=25°C.

PART NUMBER	FORWARD VOLTAGE <sup>[1]</sup> (V <sub>f</sub> )			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE <sup>[2]</sup> (mV/°C)	TYPICAL TEMPERATURE COEFFICIENT OF PEAK WAVELENGTH <sup>[2]</sup> (nm/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	TYPICAL	MAXIMUM			
L1IZ-0850000000000	2.7	3.2	3.7	-4.6	0.26	2.8
L1IZ-0940000000000	2.3	2.9	3.4	-2.6	0.29	2.8

**Notes for Table 2:**

- Lumileds maintains a tolerance of ±1% on forward voltage measurements.
- Measured between 25°C and 85°C.

## Absolute Maximum Ratings

Table 3. Absolute maximum ratings for LUXEON IR Compact Line.

PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current <sup>[1,2]</sup>	1000mA
Peak Pulsed Forward Current <sup>[1,3]</sup>	3000mA
Emitter Junction Temperature <sup>[1]</sup> (DC & Pulse)	145°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 3B
Operating Case Temperature <sup>[1]</sup>	-40°C to 125°C
Emitter Storage Temperature	-40°C to 125°C
SMD Process Classification Temperature	260°C per JEDEC J-STD-020E
Allowable Reflow Cycles	3
Reverse Voltage (V <sub>reverse</sub> )	LUXEON IR LEDs are not designed to be driven in reverse bias

**Notes for Table 3:**

- Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
- Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple," are acceptable if the following conditions are met:
  - The frequency of the ripple current is 100Hz or higher
  - The average current for each cycle does not exceed the maximum allowable DC forward current
  - The maximum amplitude of the ripple does not exceed the maximum peak pulsed forward current
- For pulse handling capability details see figure 9.

# Characteristic Curves

## Spectral Power Distribution Characteristics

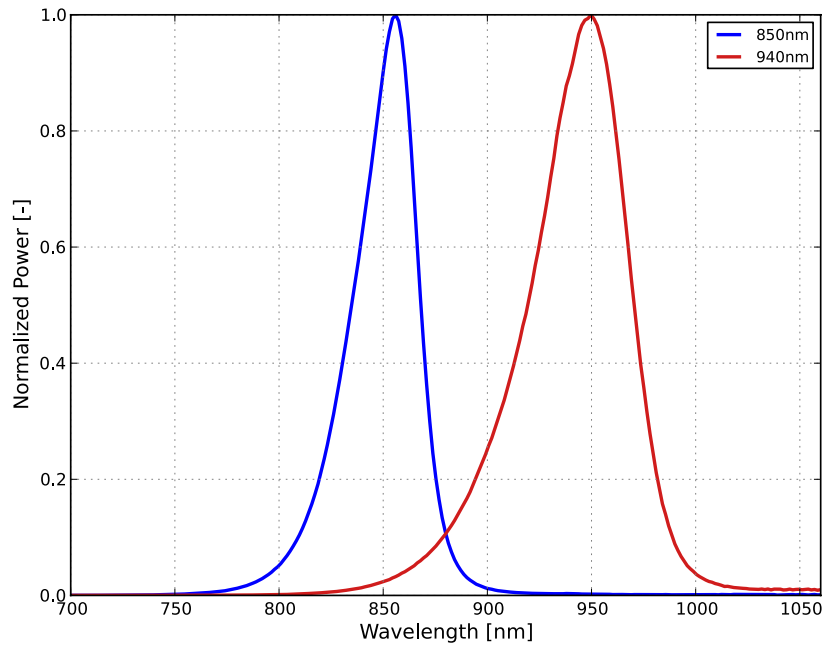


Figure 1. Typical normalized power vs. wavelength for LUXEON IR Compact Line at 1000mA,  $T_j=25^{\circ}\text{C}$ .

## Light Output Characteristics

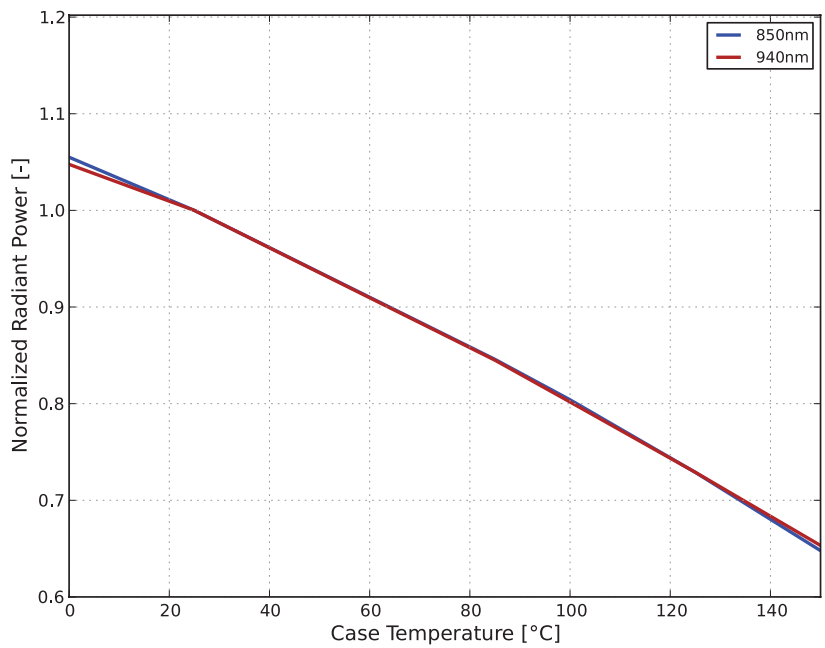


Figure 2. Typical normalized radiant power vs. case temperature for LUXEON IR Compact Line at 1000mA.

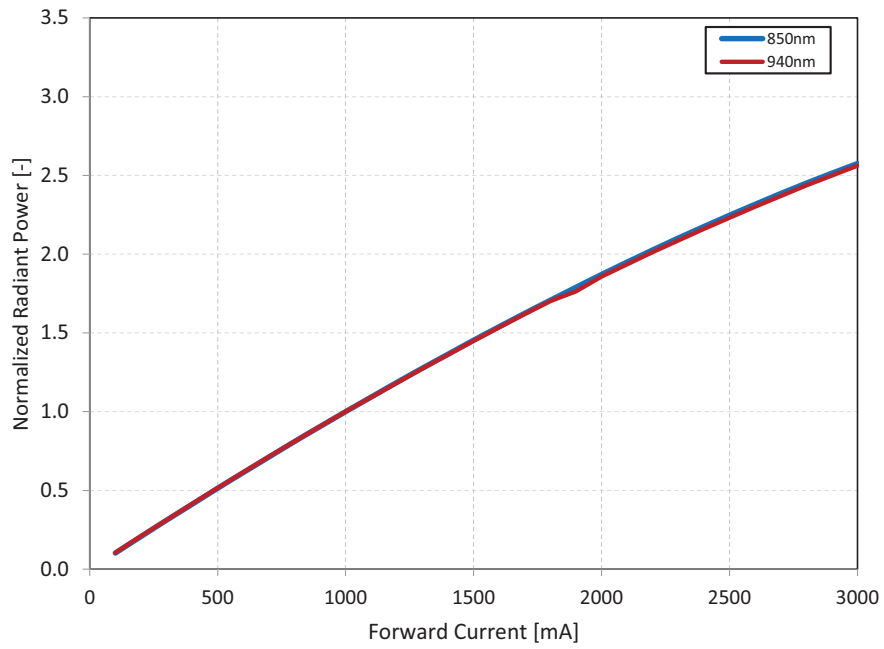


Figure 3. Typical normalized radiant power vs. forward current for LUXEON IR Compact Line at  $T_j=25^\circ\text{C}$ .

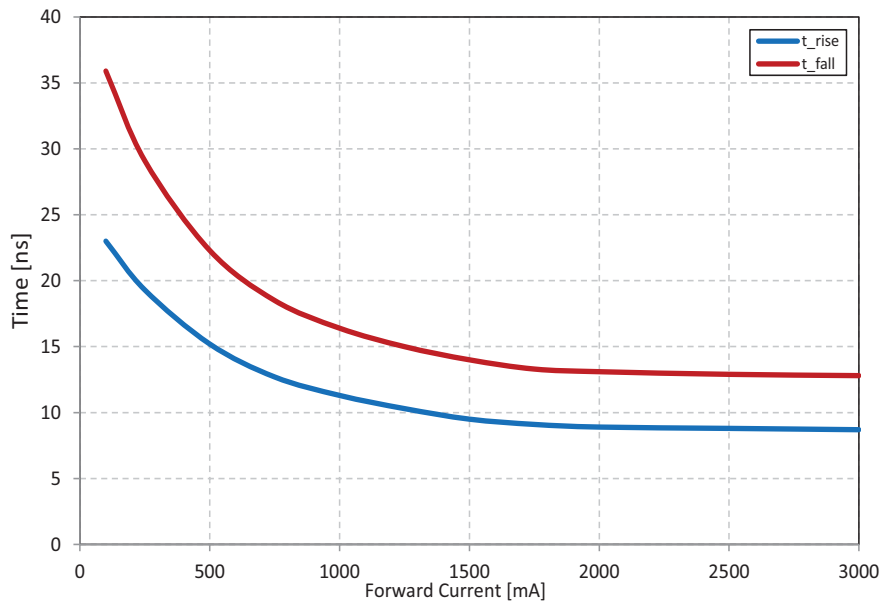


Figure 4. Typical rise and fall times of optical signal vs. forward current for LUXEON IR Compact Line at  $T_j=25^\circ\text{C}$ .

## Forward Current Characteristics

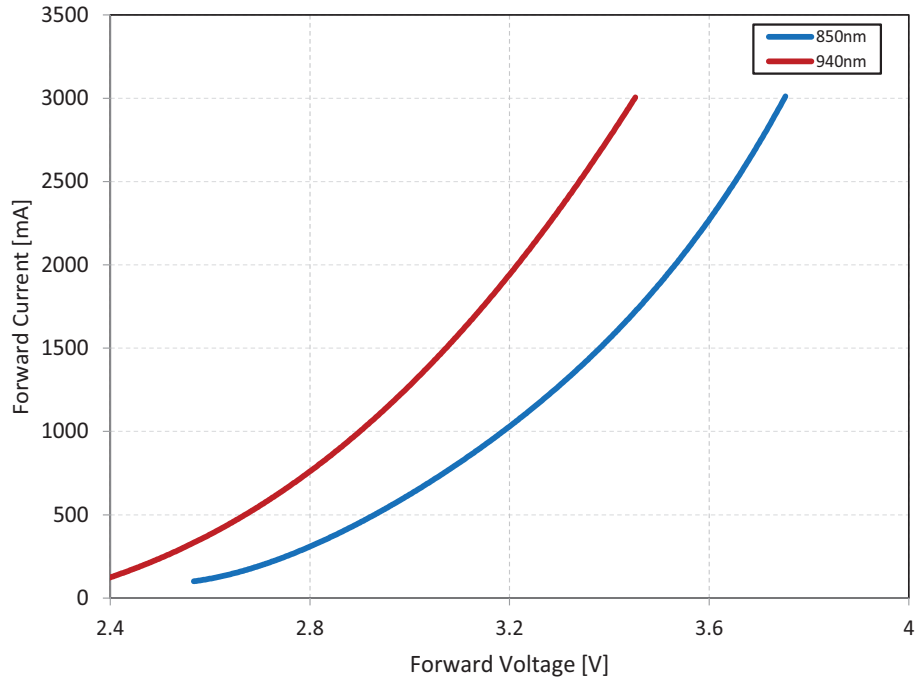


Figure 5. Typical forward current vs. forward voltage for LUXEON IR Compact Line at  $T_j = 25^\circ\text{C}$ .

## Wavelength Shift Characteristics

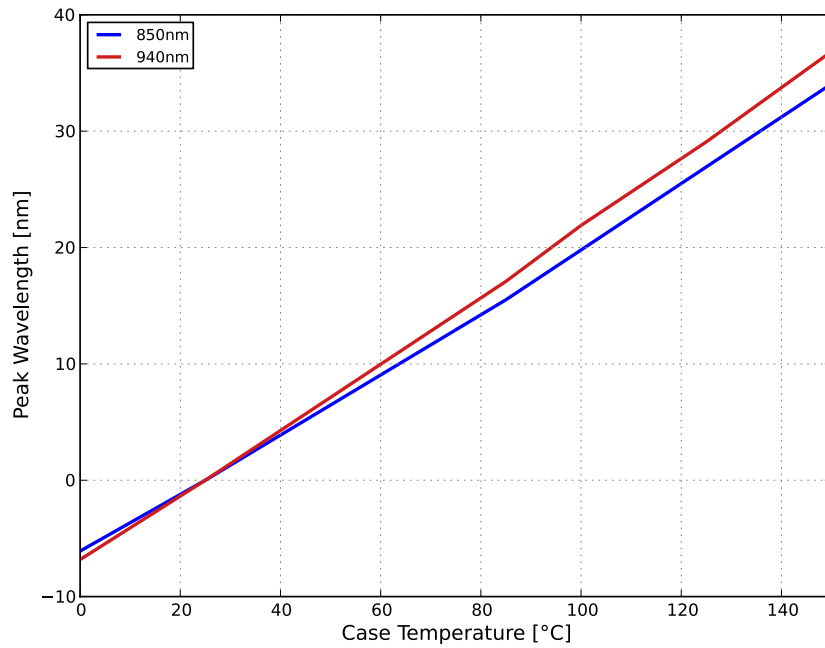


Figure 6. Typical peak wavelength shift vs. case temperature for LUXEON IR Compact Line at 1000mA.

# Radiation Pattern Characteristics

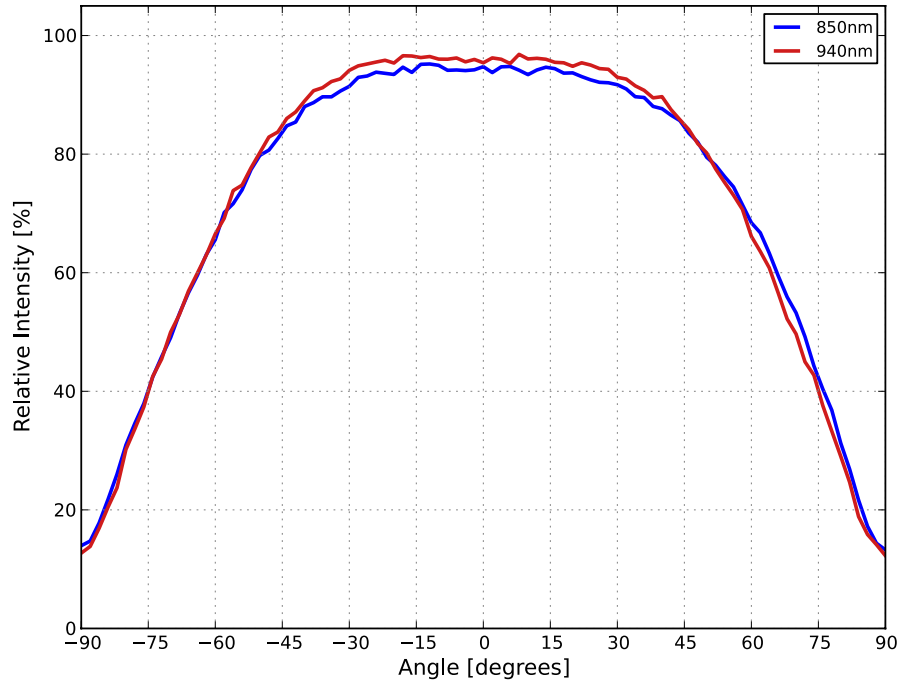


Figure 7. Typical radiation pattern for LUXEON IR Compact Line at 1000mA,  $T_j=25^{\circ}\text{C}$ .

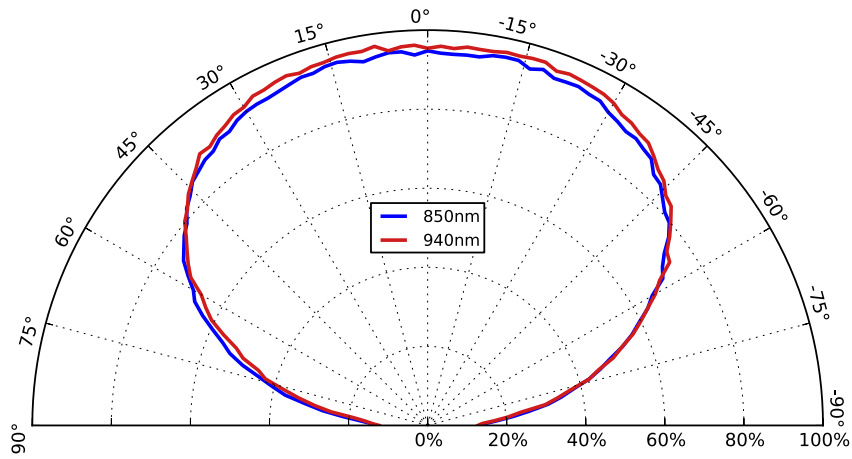


Figure 8. Typical polar radiation pattern for LUXEON IR Compact Line at 1000mA,  $T_j=25^{\circ}\text{C}$ .



# Permissible Pulse Handling Characteristics

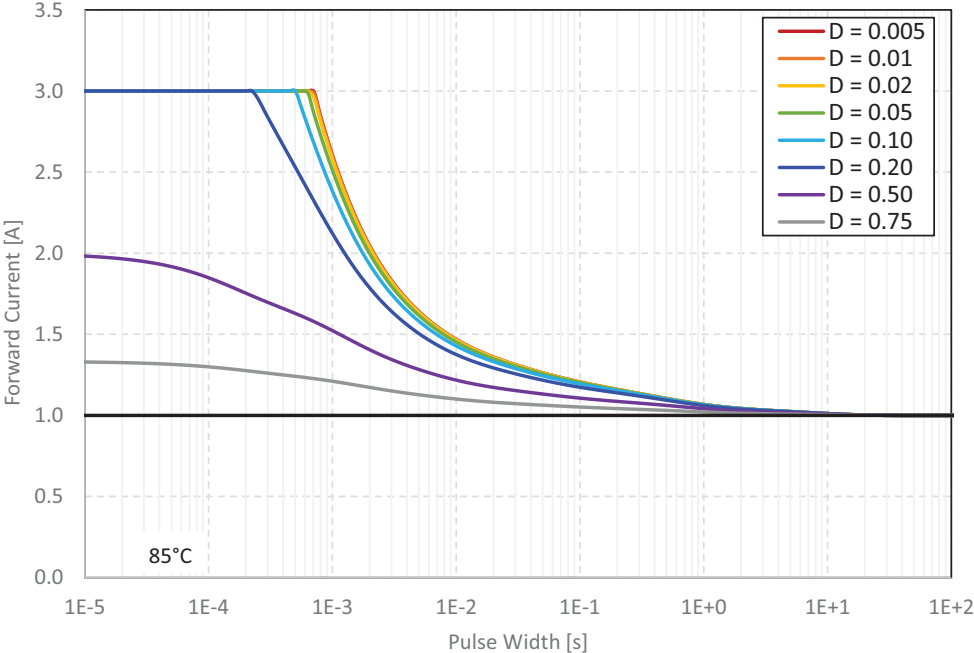


Figure 9. Permissible pulse handling capability for LUXEON IR Compact Line at  $T_j=85^\circ\text{C}$  for various duty cycles (D).

# Product Bin and Labeling Definitions

## Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Lumileds bins components for luminous flux or radiometric power, color point, peak or dominant wavelength and forward voltage.

LUXEON IR Compact Line emitters are labeled using a 4-digit alphanumeric CAT code following the format below:

**A B C D**

Where:

- A** – designates radiometric power bin (example: J=900 to 950mW, N=1200 to 1300mW)
- B C** – designates peak wavelength bin (example: 8K=845nm to 850nm, 9H=935nm to 940nm)
- D** – designates forward voltage bin (example: D=2.5 to 3.0V, F=3.5 to 4.0V)

Therefore, a LUXEON IR Compact emitter with a radiometric power range of 1200 to 1300mW, peak wavelength range of 845 to 850nm and a forward voltage range of 2.5 to 3.0V has the following CAT code:

**N 8 K D**

## Radiometric Power Bins

Table 4 lists the standard radiometric power bins for LUXEON IR Compact Line emitters. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance. Not all bins are available in all CCTs.

**Table 4. Radiometric power bin definitions for LUXEON IR Compact Line at 1000mA,  $T_j=25^\circ\text{C}$ .**

BIN	RADIOMETRIC POWER <sup>(1)</sup> (mW)	
	MINIMUM	MAXIMUM
J	900	950
K	950	1000
L	1000	1100
M	1100	1200
N	1200	1300

Notes for Table 4:

1. Lumileds maintains a tolerance of  $\pm 7\%$  on radiometric power measurements.

## Peak Wavelength Bins

Table 5. Peak wavelength bins for LUXEON IR Compact Line at 1000mA,  $T_j=25^{\circ}\text{C}$ .

BIN	PEAK WAVELENGTH <sup>(1)</sup> (nm)	
	MINIMUM	MAXIMUM
8J	840	845
8K	845	850
8L	850	855
8M	855	860
8N	860	865
8P	865	870
8Q	870	875
9F	925	930
9G	930	935
9H	935	940
9J	940	945
9K	945	950
9L	950	955
9M	955	960

**Notes for Table 5:**

1. Lumileds maintains a tolerance of  $\pm 0.5\text{nm}$  on peak wavelength measurements.

## Forward Voltage Bins

Table 6. Forward voltage bin definitions for LUXEON IR Compact Line at 1000mA,  $T_j=25^{\circ}\text{C}$ .

BIN	FORWARD VOLTAGE <sup>(1)</sup> ( $V_f$ )	
	MINIMUM	MAXIMUM
C	2.0	2.5
D	2.5	3.0
E	3.0	3.5
F	3.5	4.0

**Notes for Table 6:**

1. Lumileds maintains a tolerance of  $\pm 1\%$  on forward voltage measurements.

# Mechanical Dimensions

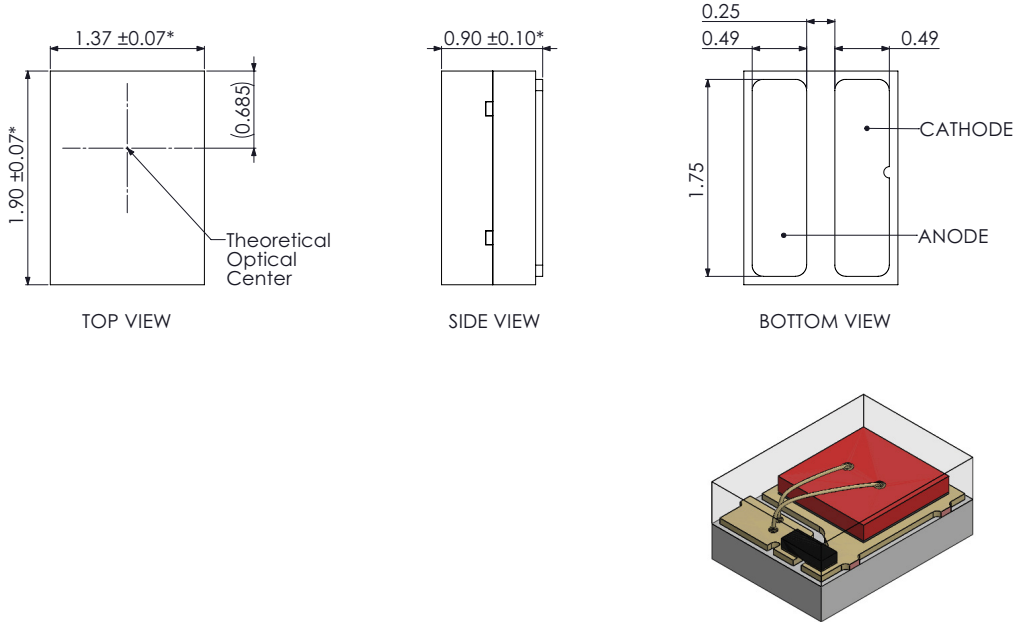


Figure 10. Mechanical dimensions for LUXEON IR Compact Line.

- Notes for Figure 10:
- 1. Drawings are not to scale.
  - 2. All dimensions are in millimeters.

# Reflow Soldering Guidelines



Figure 11. Visualization of the acceptable reflow temperature profile as specified in Table 7.

Table 7. Reflow profile characteristics for LUXEON IR Compact Line.

PROFILE FEATURE	LEAD-FREE ASSEMBLY
Preheat Minimum Temperature ( $T_{smin}$ )	150°C
Preheat Maximum Temperature ( $T_{smax}$ )	200°C
Preheat Time ( $t_{smin}$ to $t_{smax}$ )	120 seconds
Ramp-Up Rate ( $T_L$ to $T_p$ )	3°C / second maximum
Liquidus Temperature ( $T_L$ )	217°C
Time Maintained Above Temperature $T_L$ ( $t_t$ )	150 seconds
Peak / Classification Temperature ( $T_p$ )	260°C
Time Within 5°C of Actual Temperature ( $t_p$ )	10 to 30 seconds
Ramp-Down Rate ( $T_p$ to $T_L$ )	6°C / second maximum
Time 25°C to Peak Temperature	8 minutes maximum

## JEDEC Moisture Sensitivity

Table 8. Moisture sensitivity levels for LUXEON IR Compact Line.

LEVEL	FLOOR LIFE		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
1	Unlimited	≤30°C / 85% RH	168 Hours +5 / -0	85°C / 85% RH

## Solder Pad Design

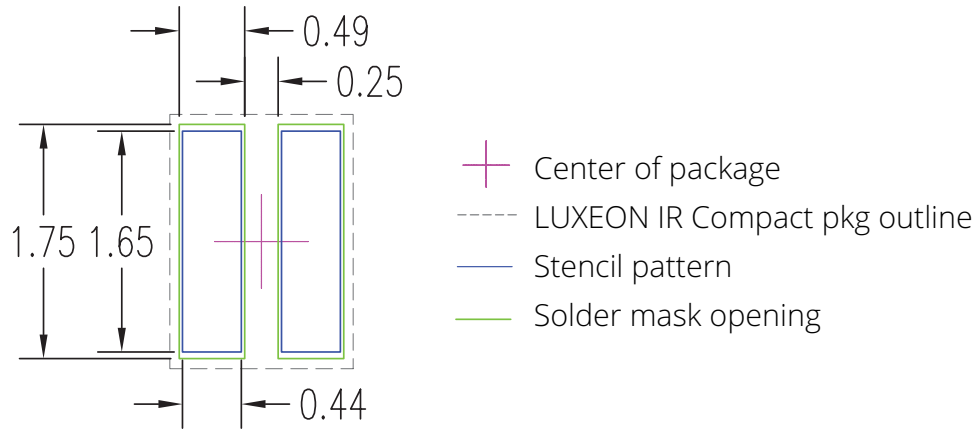


Figure 12. Recommended PCB solder pad layout for LUXEON IR Compact Line.

### Notes for Figure 12:

1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Electrode pads are symmetric.

## Packaging Information

### Pocket Tape Dimensions

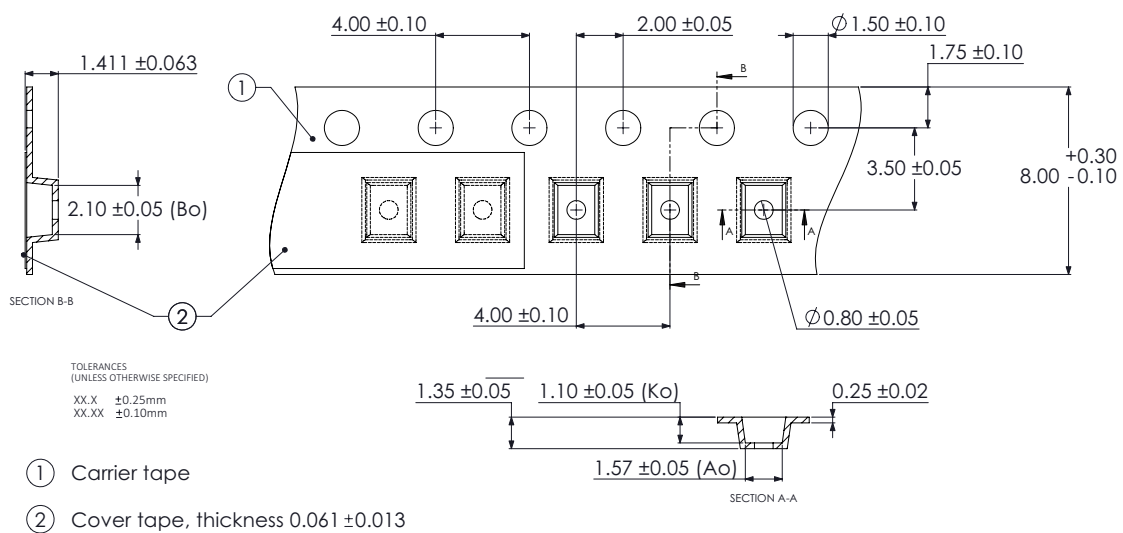


Figure 13. Pocket tape dimensions for LUXEON IR Compact Line.

### Notes for Figure 13:

1. Drawings are not to scale.
2. All dimensions are in millimeters.

# Reel Dimensions

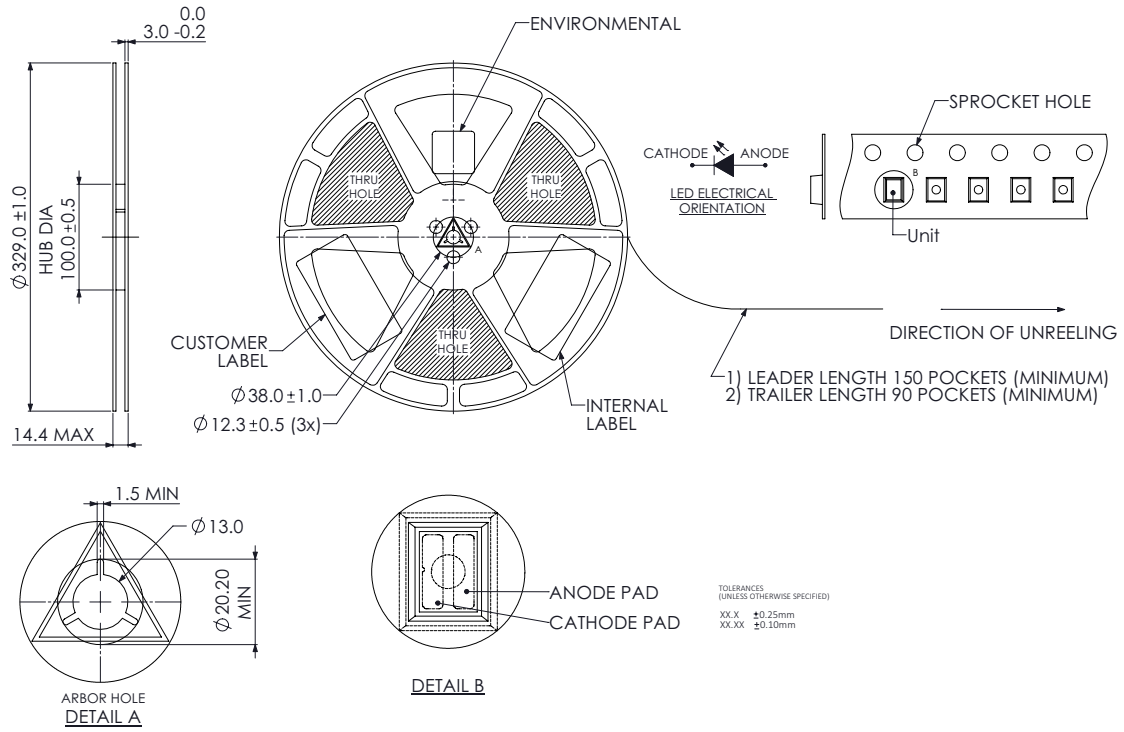


Figure 14. Reel dimensions for LUXEON IR Compact Line.

**Notes for Figure 14:**

- 1. Drawings are not to scale.
- 2. All dimensions are in millimeters.

## About Lumileds

Companies developing automotive, mobile, IoT and illumination lighting applications need a partner who can collaborate with them to push the boundaries of light. With over 100 years of inventions and industry firsts, Lumileds is a global lighting solutions company that helps customers around the world deliver differentiated solutions to gain and maintain a competitive edge. As the inventor of Xenon technology, a pioneer in halogen lighting and the leader in high performance LEDs, Lumileds builds innovation, quality and reliability into its technology, products and every customer engagement. Together with its customers, Lumileds is making the world safer, better and more beautiful—with light.

To learn more about our lighting solutions, visit [lumileds.com](http://lumileds.com).



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