



# LUXEON IR Domed Line

High power infrared emitters with engineered primary optics for high efficiency and beam control

The LUXEON IR Domed Line high power infrared emitters are tailored to application needs by offering a variety of products at multiple infrared wavelengths and optical radiation patterns. LUXEON IR Domed Line is designed with innovative LUXEON technology to provide industry-leading performance. Through best-in-class thermal conductivity, LUXEON IR Domed Line has excellent performance at actual operating conditions. The LUXEON IR Domed Line uses an industry standard footprint for ease of integration and upgrading existing system designs.



## FEATURES AND BENEFITS

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

Radiant Power of 1350mW (850nm) and 1450mW (940nm) for a greater system performance

Option for higher drive current (up to 1.5A DC and 5A pulsed) available for applications requiring more performance

Five emission patterns: 50°, 60°, 90°, 150° and an asymmetric radiation pattern of 95° x 58°

The five emission patterns address diverse application needs, high punch, long range and high uniformity

3.7mm x 3.7mm package with 3 pad configuration compatible with the industry standard footprint, enabling a direct upgrade in existing designs

Ultra-low  $R_{th}$  of 2.5°C/W typ, the industry's best thermal conductivity, 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

# Table of Contents

<b>General Product Information</b> .....	<b>2</b>
Product Test Conditions .....	2
Part Number Nomenclature .....	2
Radiometric Power Maintenance .....	2
Environmental Compliance .....	3
<b>Performance Characteristics</b> .....	<b>3</b>
Product Selection Guide .....	3
Optical Characteristics .....	3
Electrical and Thermal Characteristics .....	4
<b>Absolute Maximum Ratings</b> .....	<b>4</b>
<b>Characteristic Curves</b> .....	<b>5</b>
Spectral Power Distribution Characteristics .....	5
Light Output Characteristics .....	5
Forward Current Characteristics .....	6
Wavelength Shift Characteristics .....	7
Radiation Pattern Characteristics .....	7
Permissible Pulse Handling Characteristics .....	10
<b>Product Bin and Labeling Definitions</b> .....	<b>11</b>
Decoding Product Bin Labeling .....	11
Radiometric Power Bins .....	11
Peak Wavelength Bins .....	12
Forward Voltage Bins .....	12
<b>Mechanical Dimensions</b> .....	<b>13</b>
<b>Reflow Soldering Guidelines</b> .....	<b>15</b>
JEDEC Moisture Sensitivity .....	15
Solder Pad Design .....	16
<b>Packaging Information</b> .....	<b>16</b>
Pocket Tape Dimensions .....	16
Reel Dimensions .....	18

# General Product Information

## Product Test Conditions

LUXEON IR Domed 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 Domed Line (max drive current (DC) of 1A) follow the convention below:

L 1 | 1 0 – 0 **A A A B B B B** 0 0 0 0 0

Where:

- A A A** – designates nominal peak wavelength
- B B B B** – designates full width half maximum (FWHM) of the emitter's radiation pattern (60°=0600, 90°=0900, 150°=1500, 95 x 58°=9558)
- 0 0 0 0 0 – reserved for further customization

Therefore, the following part number is used for a LUXEON IR Domed emitter with a peak wavelength of 850nm and a FWHM beam angle of 60°:

L 1 | 1 0 – 0 **8 5 0 0 6 0 0** 0 0 0 0 0

Part numbers for LUXEON IR Domed Line (max drive current (DC) of 1.5A) follow the convention below:

L 1 | 1 0 – 0 **A A A B B B C** 0 0 0 0 0

Where:

- A A A** – designates nominal peak wavelength
- B B B** – designates full width half maximum (FWHM) of the emitter's radiation pattern (50°=050, 60°=060, 90°=090, 150°=150)
- C** – designates max drive current capability (2=1.5A)
- 0 0 0 0 0 – reserved for further customization

Therefore, the following part number is used for a LUXEON IR Domed emitter with a peak wavelength of 850nm, a FWHM beam angle of 60° and a max driving current of 1.5A:

L 1 | 1 0 – 0 **8 5 0 0 6 0 2** 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 Domed 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 Domed 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)	MAX DRIVE CURRENT (DC)/(PULSE)	PART NUMBER
		MINIMUM	TYPICAL			
850	150	1000	1350	335	1A/3A	L110-0850150000000
850	90	1000	1350	750	1A/3A	L110-0850090000000
850	60	1000	1350	1150	1A/3A	L110-0850060000000
850	95 x 58	1000	1350	650	1A/3A	L110-0850955800000
940	150	1100	1450	350	1A/3A	L110-0940150000000
940	90	1100	1450	780	1A/3A	L110-0940090000000
940	60	1100	1450	1190	1A/3A	L110-0940060000000
940	95 x 58	1100	1450	700	1A/3A	L110-0940955800000
850	150	1050	1350	335	1.5A/5A	L110-0850150200000
850	90	1050	1350	750	1.5A/5A	L110-0850090200000
850	60	1050	1350	1150	1.5A/5A	L110-0850060200000
850	50	1050	1350	1255	1.5A/5A	L110-0850050200000
940	150	1125	1450	350	1.5A/5A	L110-0940150200000
940	90	1125	1450	780	1.5A/5A	L110-0940090200000
940	60	1125	1450	1190	1.5A/5A	L110-0940060200000
940	50	1125	1450	1335	1.5A/5A	L110-0940050200000

**Notes for Table 1:**

- Lumileds maintains a tolerance of ±2nm on peak wavelength measurements.
- Lumileds maintains a tolerance of ±7% on radiometric power measurements.

## Optical Characteristics

Table 2. Optical characteristics for LUXEON IR Domed Line at 1000mA, T<sub>j</sub>=25°C.

PART NUMBER	PEAK WAVELENGTH <sup>[1]</sup> (nm)			TYPICAL SPECTRUM FWHM (nm)	TYPICAL TEMPERATURE COEFFICIENT OF PEAK WAVELENGTH (nm/°C)
	MINIMUM	TYPICAL	MAXIMUM		
L110-0850xxxx00000	835	850	870	35	0.26
L110-0940xxxx00000	925	940	955	50	0.29

**Notes for Table 2:**

- Lumileds maintains a tolerance of ±2nm on peak wavelength measurements.

## Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for LUXEON IR Domed 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 THERMAL RESISTANCE— JUNCTION TO SOLDER PAD (°C/W)	TYPICAL RISE TIME (ns)	TYPICAL FALL TIME (ns)
	MINIMUM	TYPICAL	MAXIMUM				
L110-0850xxxx00000	2.7	3.2	3.7	-4.6	2.5	12	16
L110-0940xxxx00000	2.3	2.9	3.4	-2.6	2.5	12	16

**Notes for Table 3:**

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

## Absolute Maximum Ratings

Table 4. Absolute maximum ratings for LUXEON IR Domed Line.

PARAMETER	MAXIMUM PERFORMANCE
DC Forward Current <sup>(1,2)</sup>	L110-0xxxxxx000000: 1000mA L110-0xxxxxx2000000: 1500mA
Peak Pulsed Forward Current <sup>(1,3)</sup>	L110-0xxxxxx000000: 3000mA L110-0xxxxxx2000000: 5000mA
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 4:**

1. Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
2. 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
3. For pulse handling capability details see figures 8a and 8b.

# Characteristic Curves

## Spectral Power Distribution Characteristics

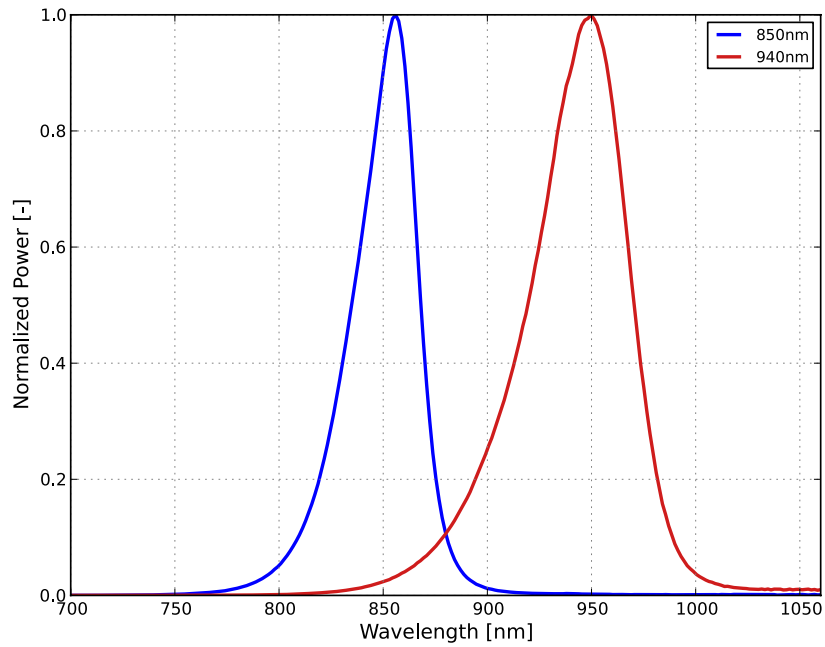


Figure 1. Typical normalized power vs. wavelength for LUXEON IR Domed Line at 1000mA,  $T_j=25^{\circ}\text{C}$ .

## Light Output Characteristics

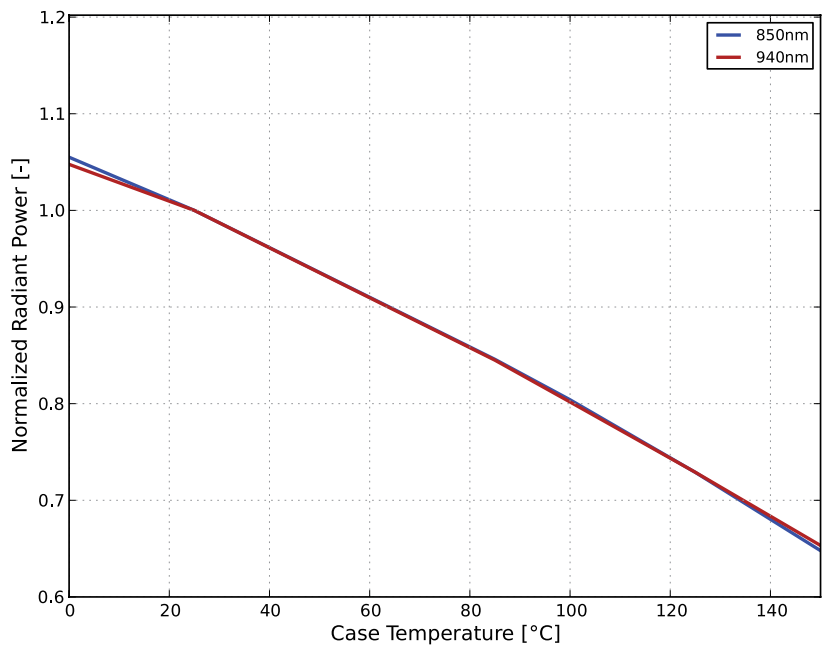


Figure 2. Typical normalized radiant power vs. case temperature for LUXEON IR Domed Line at 1000mA.

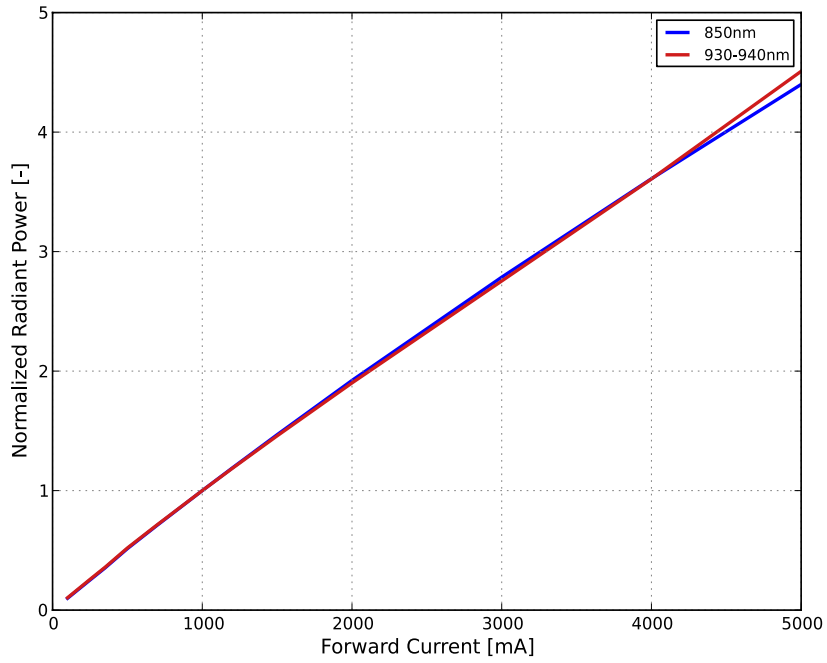


Figure 3. Typical normalized radiant power vs. forward current for LUXEON IR Domed Line at  $T_j=25^\circ\text{C}$ .

## Forward Current Characteristics

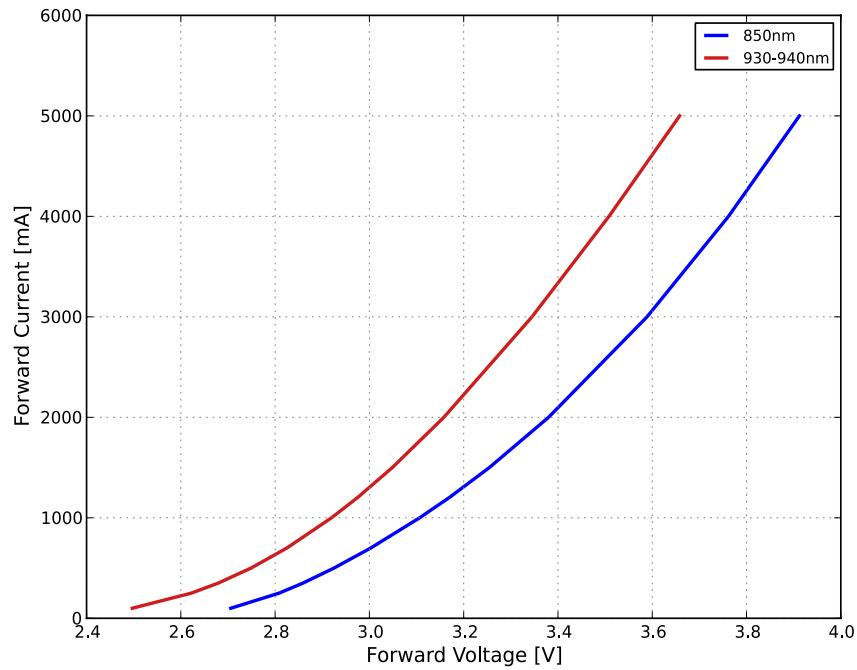


Figure 4. Typical forward current vs. forward voltage for LUXEON IR Domed Line at  $T_j=25^\circ\text{C}$ .

# Wavelength Shift Characteristics

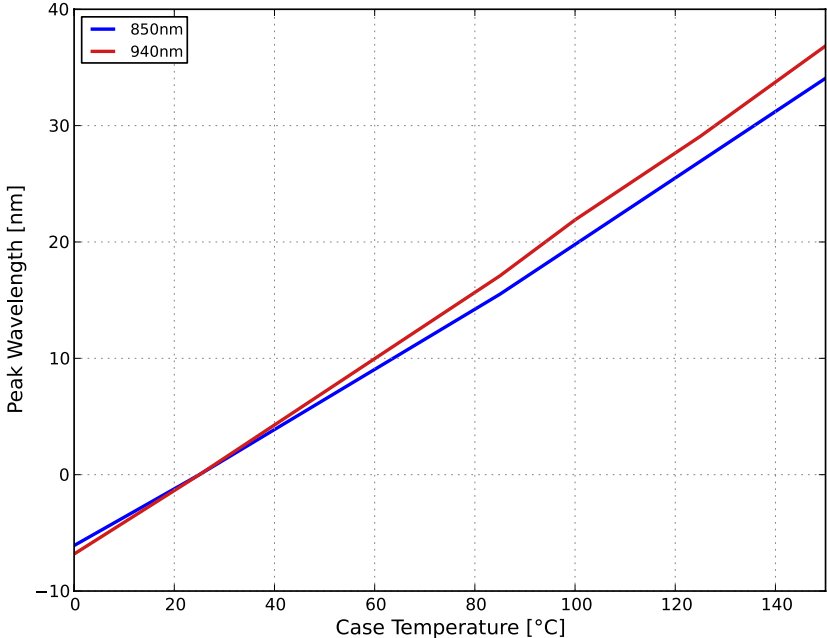


Figure 5. Typical peak wavelength shift vs. case temperature for LUXEON IR Domed Line at 1000mA.

# Radiation Pattern Characteristics

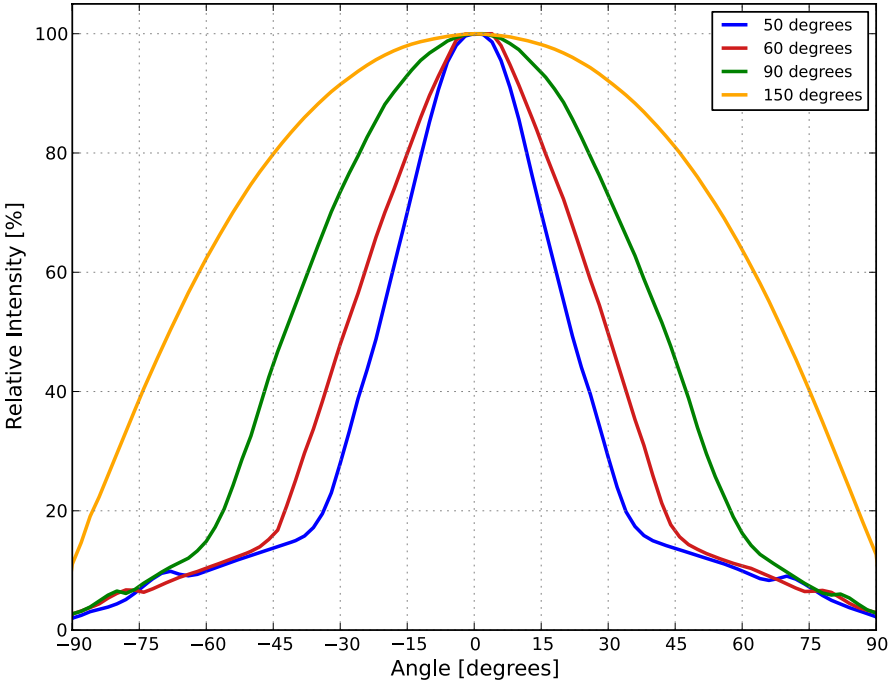


Figure 6a. Typical radiation pattern for LUXEON IR Domed L110-0xxxxxx200000 at 1000mA, T<sub>j</sub>=25°C.



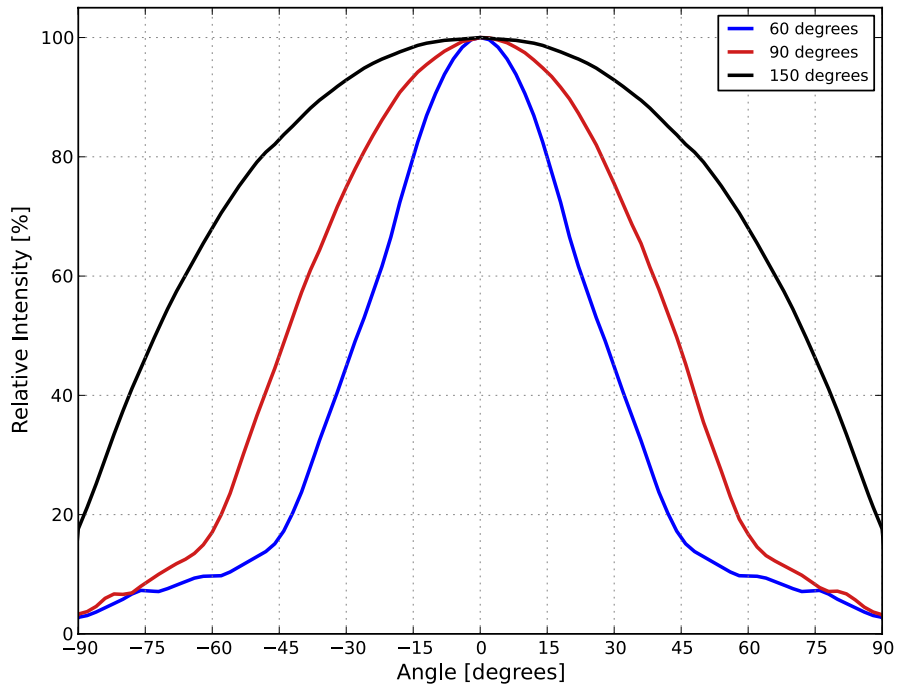


Figure 6b. Typical radiation pattern for LUXEON IR Domed L110-0xxx060000000, L110-0xxx090000000 and L110-0xxx150000000 at 1000mA,  $T_j=25^\circ\text{C}$ .

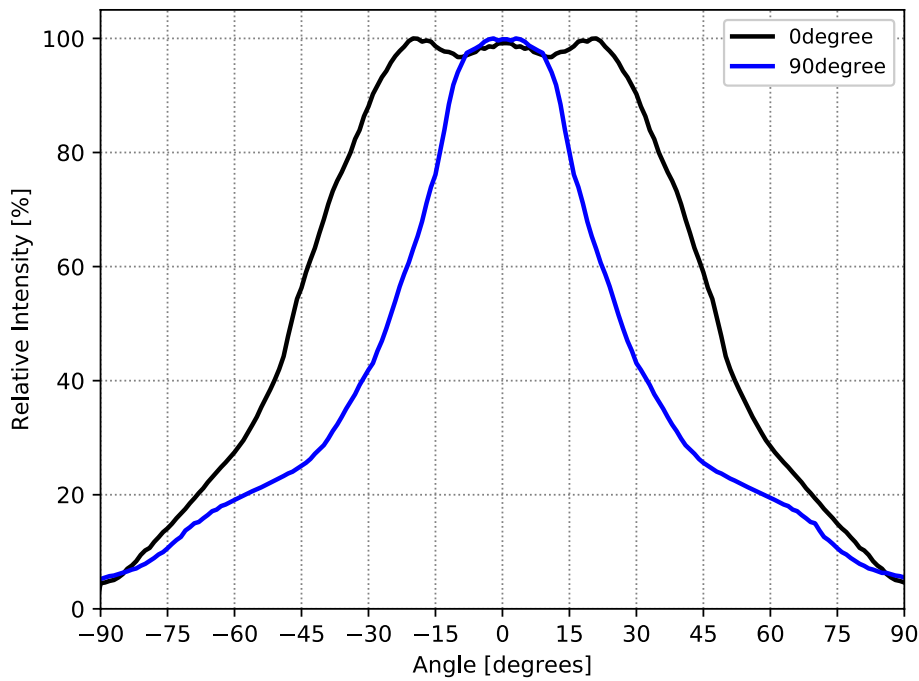


Figure 6c. Typical radiation pattern for LUXEON IR Domed L110-0xxx955800000 at 1000mA,  $T_j=25^\circ\text{C}$ .

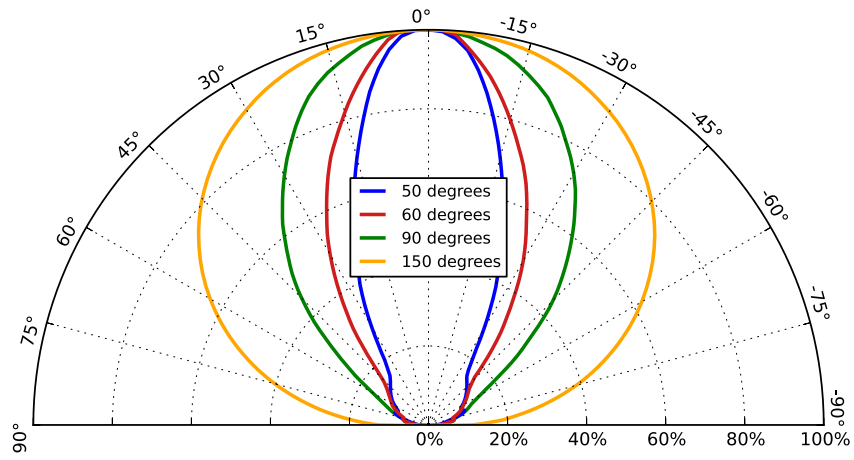


Figure 7a. Typical polar radiation pattern for LUXEON IR Domed L110-0xxxxxx200000 at 1000mA,  $T_j=25^\circ\text{C}$ .

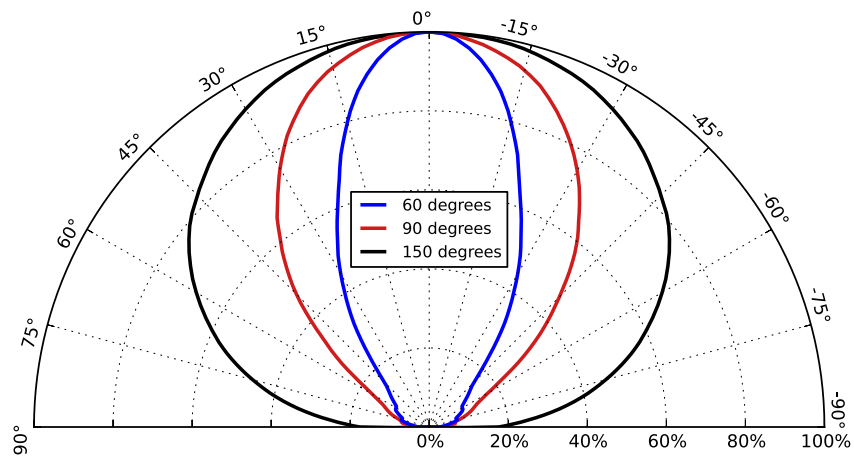


Figure 7b. Typical polar radiation pattern for LUXEON IR Domed L110-0xxx060000000, L110-0xxx090000000 and L110-0xxx150000000 at 1000mA,  $T_j=25^\circ\text{C}$ .

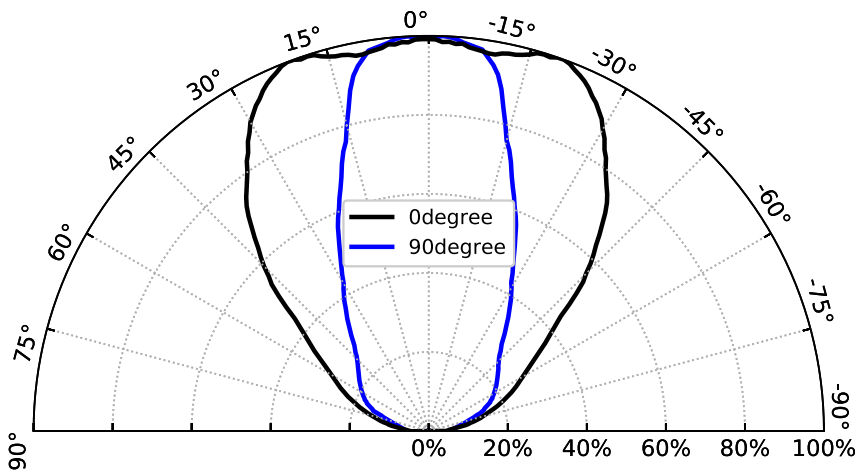


Figure 7c. Typical radiation pattern for LUXEON IR Domed L110-0xxx955800000 at 1000mA,  $T_j=25^\circ\text{C}$ .

# Permissible Pulse Handling Characteristics

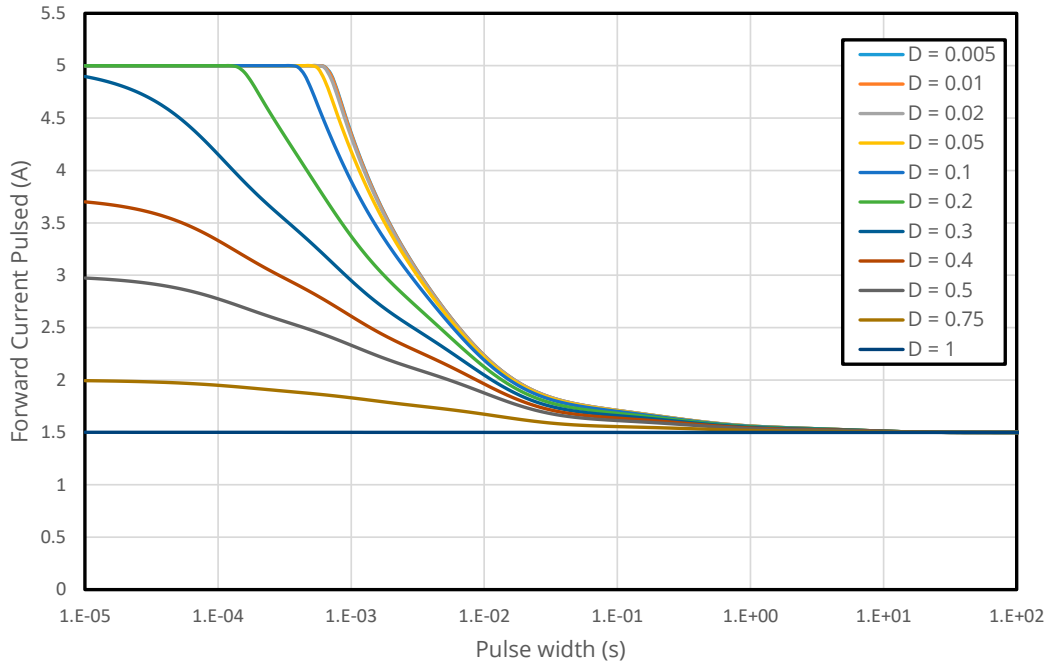


Figure 8a. Permissible pulse handling capability for LUXEON IR Domed L110-0xxxxxx200000 at  $T_c$  up to 85°C for various duty cycles (D).

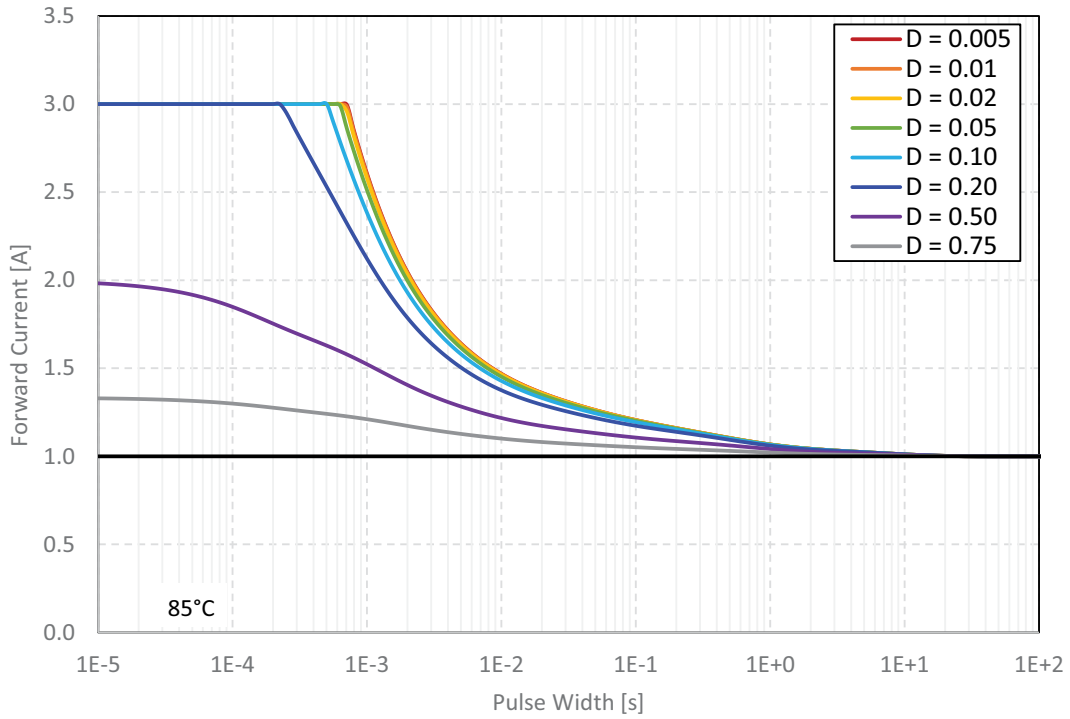


Figure 8b. Permissible pulse handling capability for LUXEON IR Domed L110-0xxxxxx00000 at  $T_c$  up to 85°C for various duty cycles (D).

# 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 Domed 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 Domed 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**

Note: Product bins are a performance classification, not all bins listed are available.

## Radiometric Power Bins

Table 5 lists the standard radiometric power bins for LUXEON IR Domed 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 5. Radiometric power bin definitions for LUXEON IR Domed 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
P	1300	1400
Q	1400	1500
R	1500	1600

Notes for Table 5:

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

## Peak Wavelength Bins

Table 6. Peak wavelength bins for LUXEON IR Domed Line at 1000mA,  $T_j=25^\circ\text{C}$ .

BIN	PEAK WAVELENGTH <sup>(1)</sup> (nm)	
	MINIMUM	MAXIMUM
8H	835	840
8J	840	845
8K	845	850
8L	850	855
8M	855	860
8N	860	865
8P	865	870
8Q	870	875
9D	915	920
9E	920	925
9F	925	930
9G	930	935
9H	935	940
9J	940	945
9K	945	950
9L	950	955
9M	955	960

**Notes for Table 6:**

1. Lumileds maintains a tolerance of  $\pm 2\text{nm}$  on peak wavelength measurements.

## Forward Voltage Bins

Table 7. Forward voltage bin definitions for LUXEON IR Domed 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 7:**

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

# Mechanical Dimensions

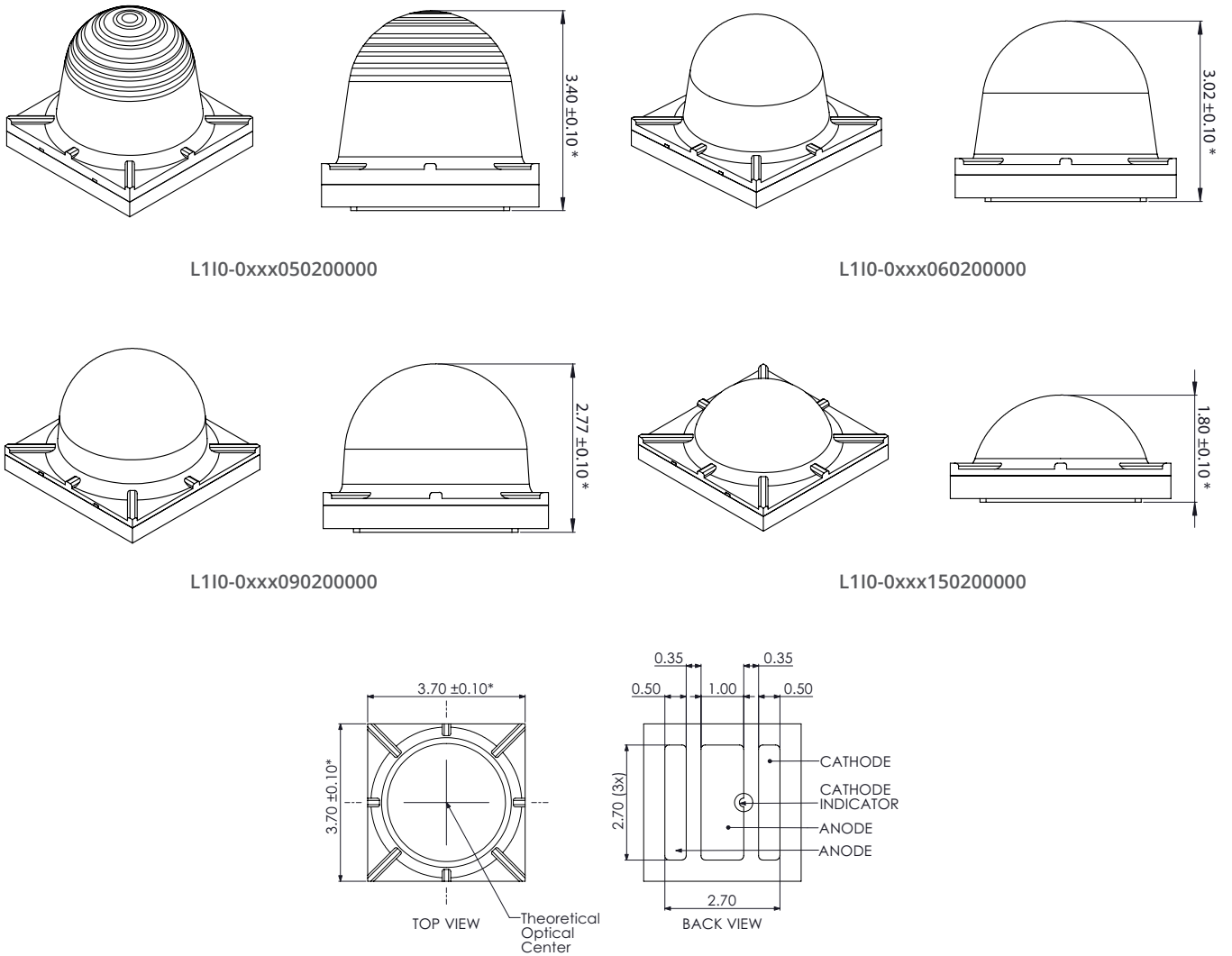


Figure 9a. Mechanical dimensions for LUXEON IR Domed L110-0xxxxxx200000.

**Notes for Figure 9a:**

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

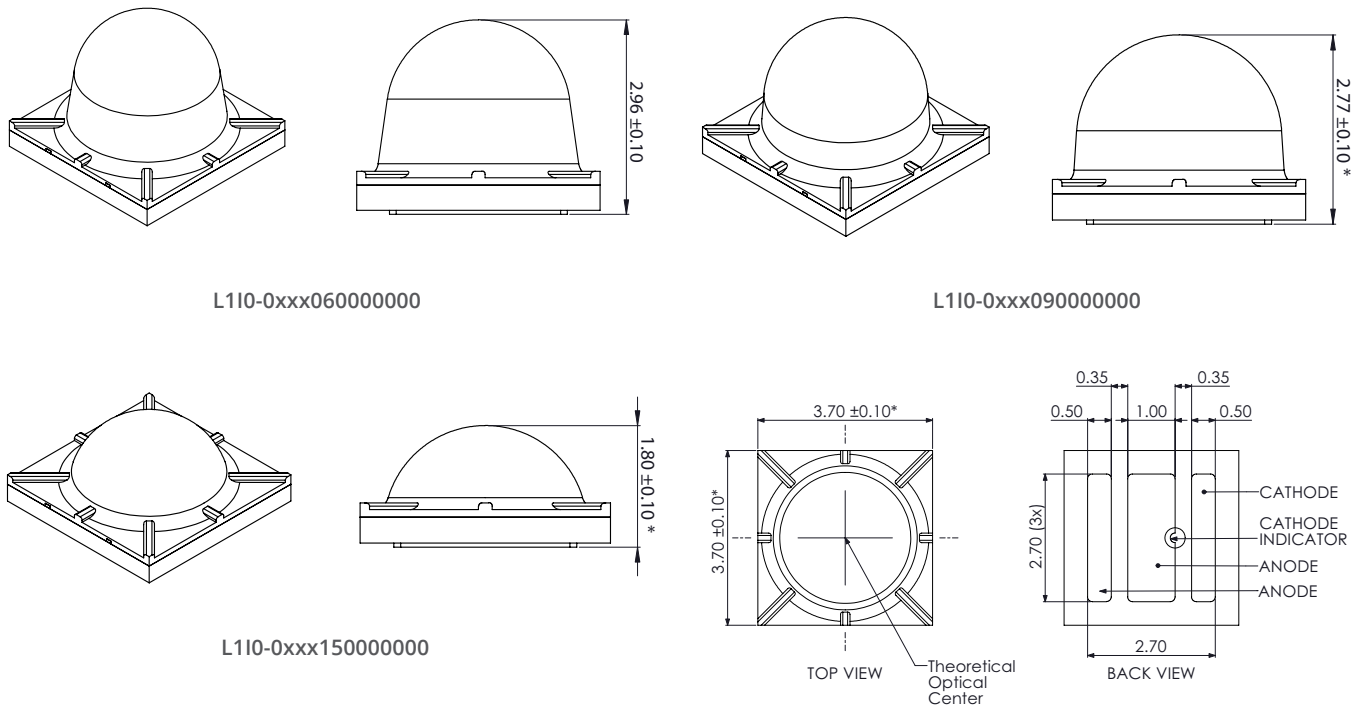


Figure 9b. Mechanical dimensions for LUXEON IR Domed L110-0xxx060000000, L110-0xxx090000000 and L110-0xxx150000000.

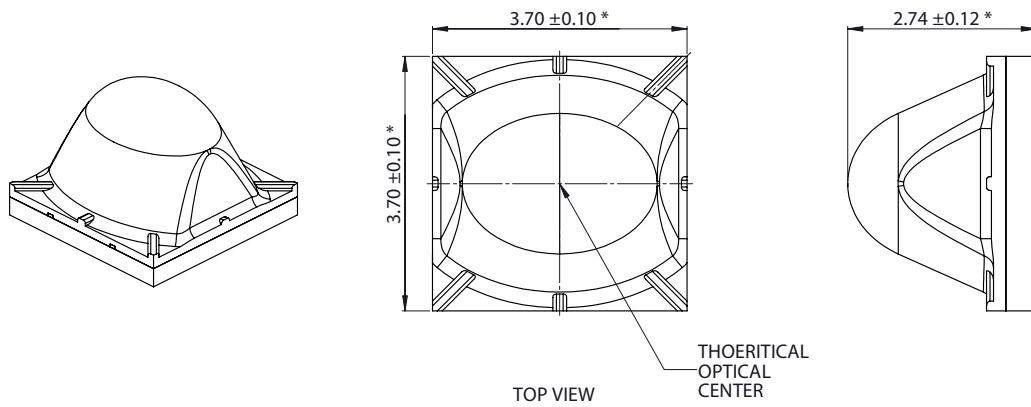


Figure 9c. Mechanical dimensions for LUXEON IR Domed L110-0xxx955800000.

- Notes for Figures 9b and 9c:
1. Drawings are not to scale.
  2. All dimensions are in millimeters.

# Reflow Soldering Guidelines

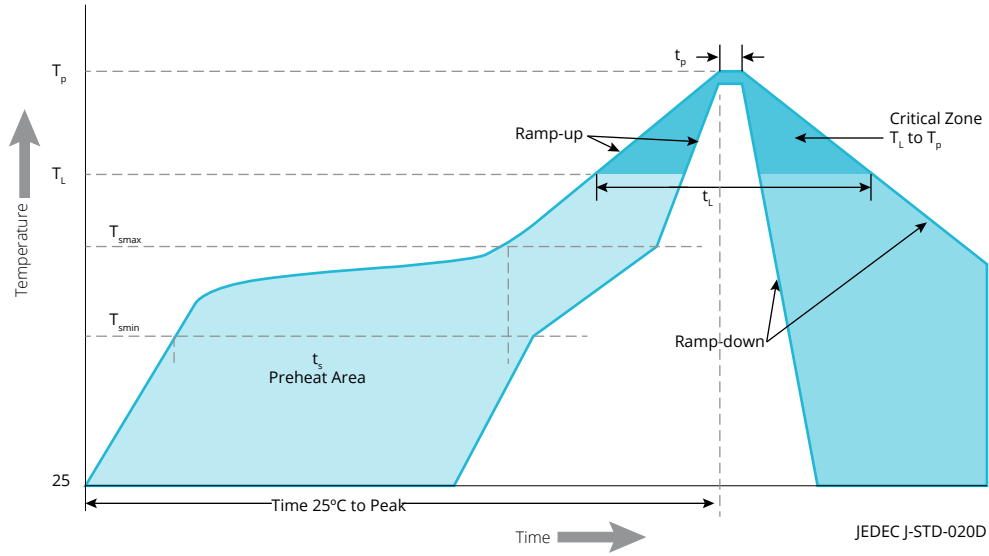


Figure 10. Visualization of the acceptable reflow temperature profile as specified in Table 8.

Table 8. Reflow profile characteristics for LUXEON IR Domed 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
Liquidous Temperature ( $T_L$ )	217°C
Time Maintained Above Temperature $T_L$ ( $t_L$ )	150 seconds
Peak / Classification Temperature ( $T_p$ )	260°C
Time Within 5°C of Actual Peak 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 9. Moisture sensitivity levels for LUXEON IR Domed 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

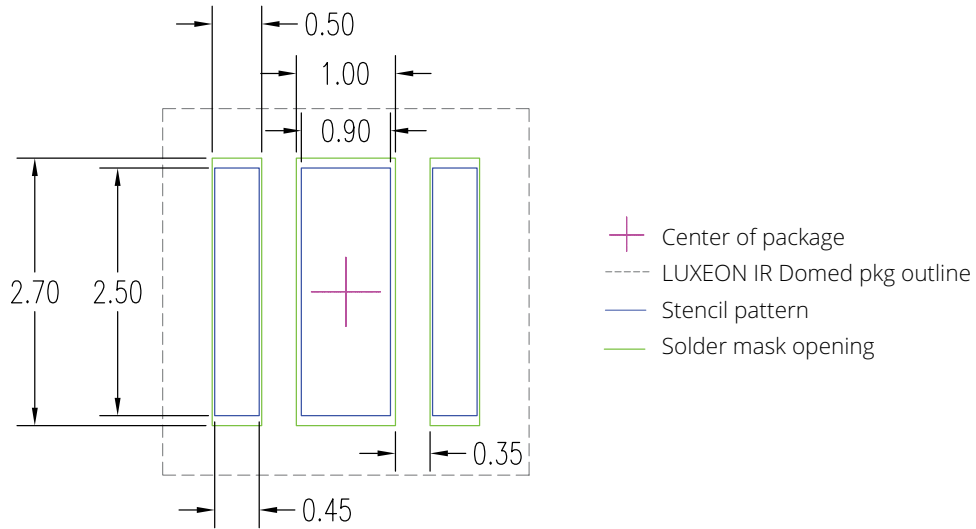


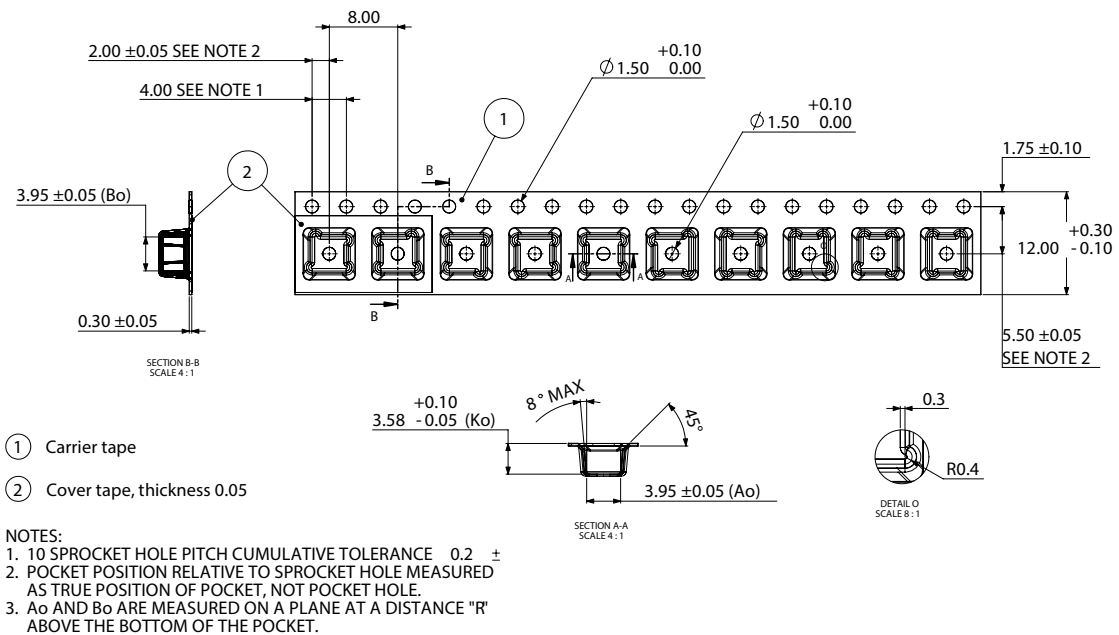
Figure 11. Recommended PCB solder pad layout for LUXEON IR Domed Line.

## Notes for Figure 11:

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

# Packaging Information

## Pocket Tape Dimensions



- 1 Carrier tape
- 2 Cover tape, thickness 0.05

- NOTES:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE  $0.2 \pm$
  2. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE.
  3. Ao AND Bo ARE MEASURED ON A PLANE AT A DISTANCE "R" ABOVE THE BOTTOM OF THE POCKET.

Figure 12a. Pocket tape dimensions for L110-0xxx050x00000.

## Notes for Figure 12a:

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

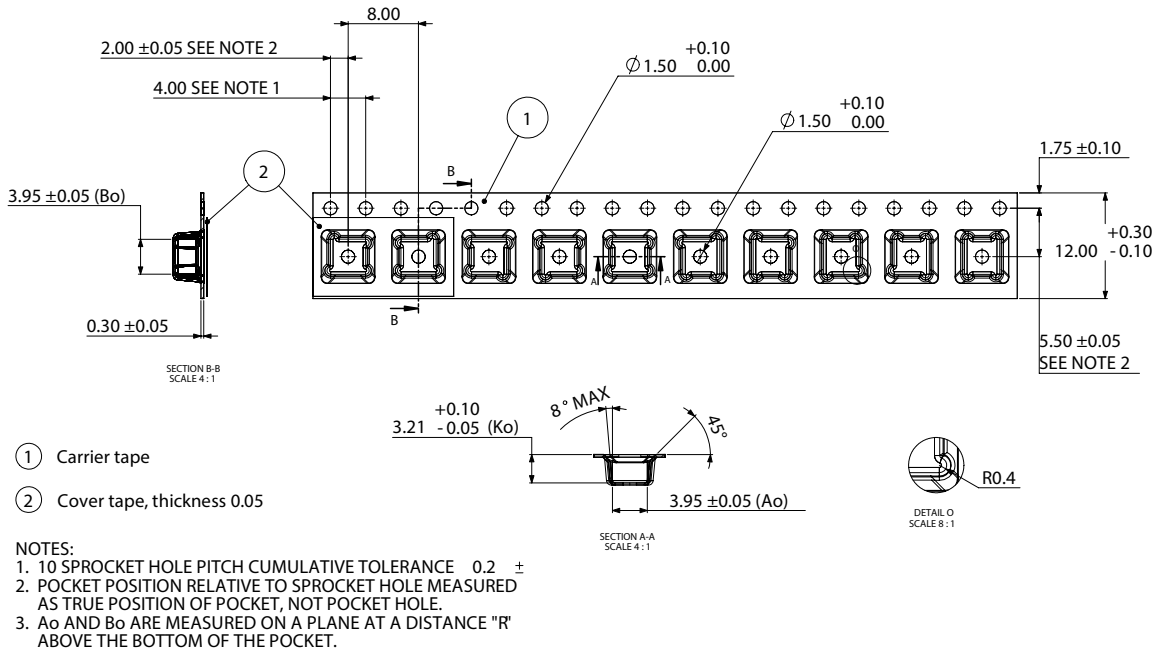


Figure 12b. Pocket tape dimensions for L110-0xxx060x00000.

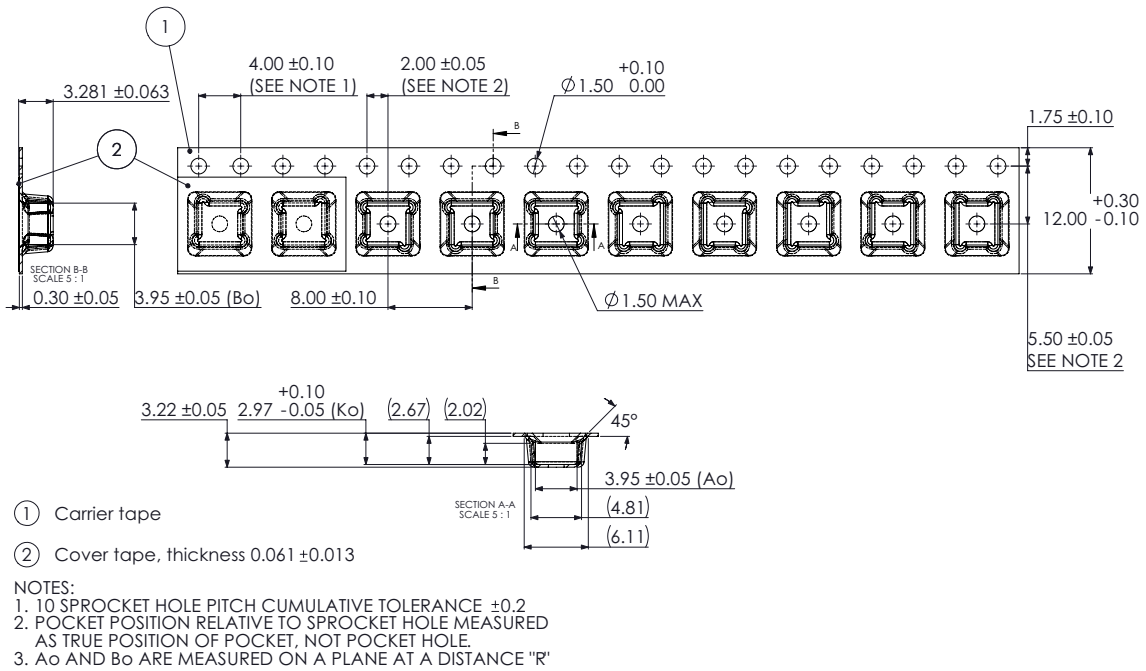


Figure 12c. Pocket tape dimensions for L110-0xxx090x00000 and L110-0xxx955800000.

Notes for Figures 12b and 12c:  
1. Drawings are not to scale.  
2. All dimensions are in millimeters.

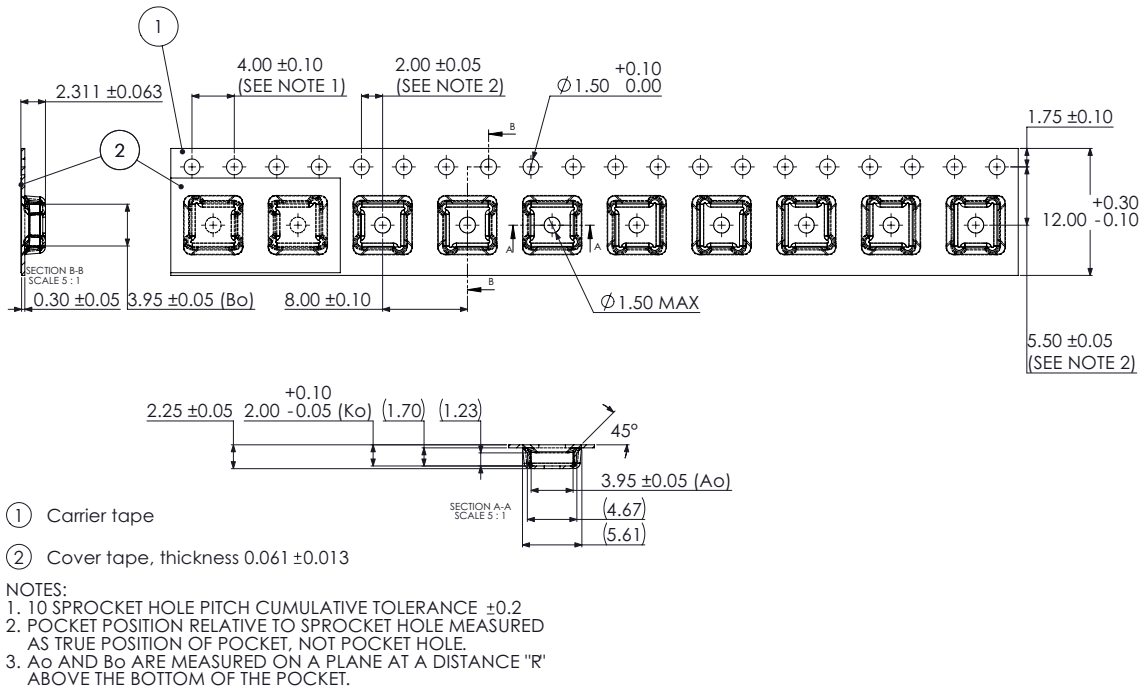


Figure 12d. Pocket tape dimensions for L110-0xxx150x00000.

Notes for Figure 12d:

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

## Reel Dimensions

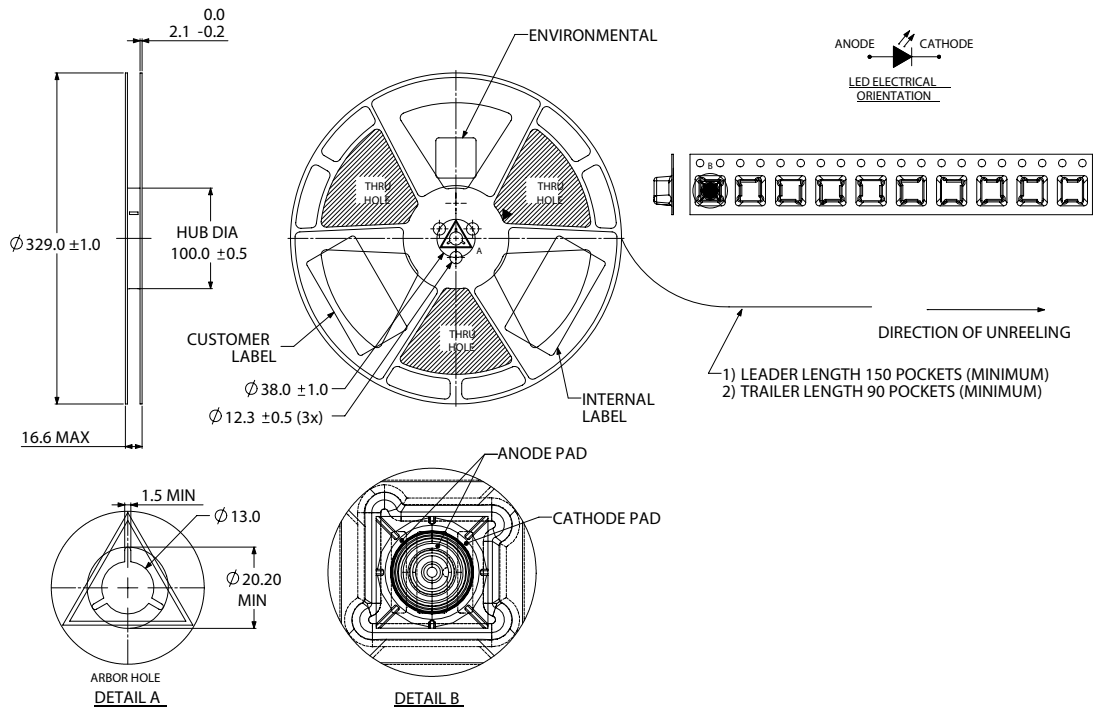


Figure 13. Reel dimensions for LUXEON IR Domed Line.

Notes for Figure 13:

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 better, safer, more beautiful—with light.

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



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