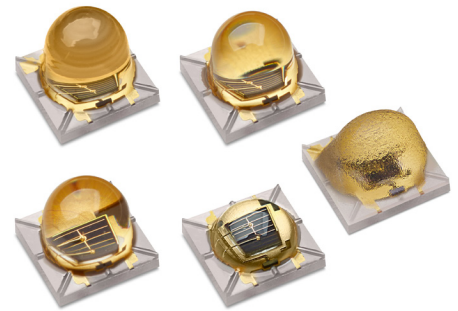




LUXEON IR Domed Line

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

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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** 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_j=25°C.

| PEAK WAVELENGTH ^[1] (nm) | TYPICAL FWHM BEAM ANGLE (°) | RADIOMETRIC POWER ^[2] (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_j=25°C.

| PART NUMBER | PEAK WAVELENGTH ^[1] (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_j=25°C.

| PART NUMBER | FORWARD VOLTAGE ⁽¹⁾ (V _f) | | | TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE ⁽²⁾ (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 ^(1,2) | L110-0xxxxxx000000: 1000mA L110-0xxxxxx2000000: 1500mA |
| Peak Pulsed Forward Current ^(1,3) | L110-0xxxxxx000000: 3000mA L110-0xxxxxx2000000: 5000mA |
| Emitter Junction Temperature ⁽¹⁾ (DC & Pulse) | 145°C |
| ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012) | Class 3B |
| Operating Case Temperature ⁽¹⁾ | -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 _{reverse}) | 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 figure 9.

Characteristic Curves

Spectral Power Distribution Characteristics

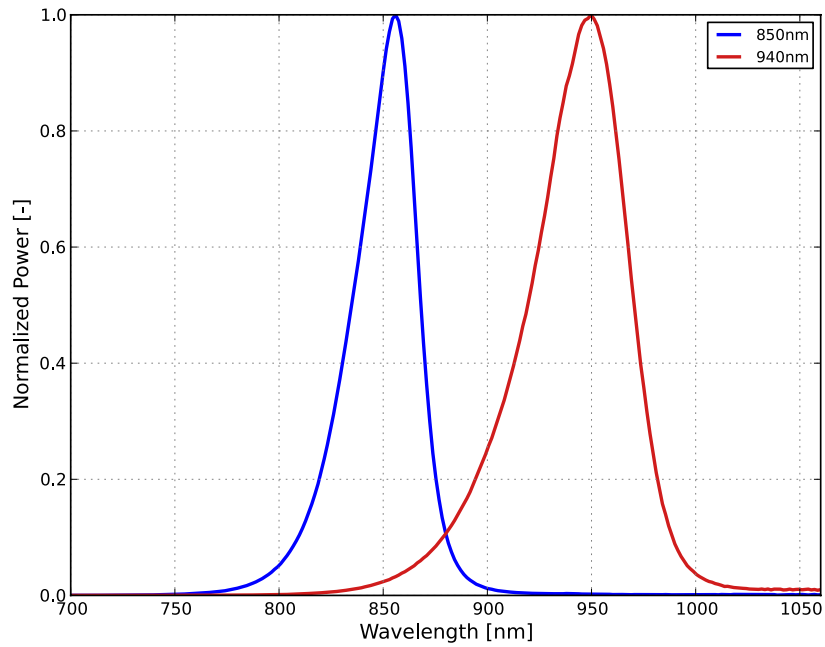


Figure 1. Typical normalized power vs. wavelength for LUXEON IR Domed Line at 1000mA, $T_j=25^{\circ}\text{C}$.

Light Output Characteristics

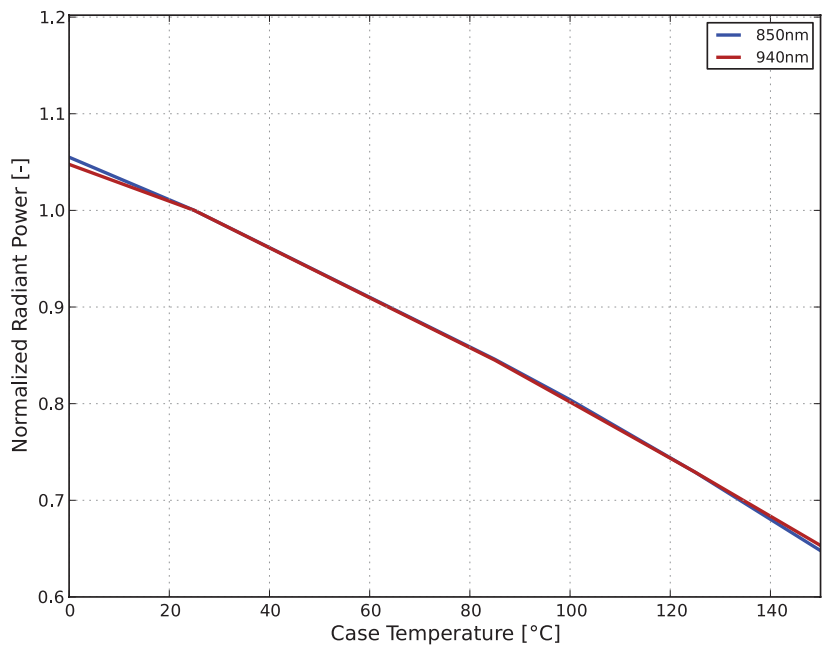


Figure 2. Typical normalized radiant power vs. case temperature for LUXEON IR Domed Line at 1000mA.

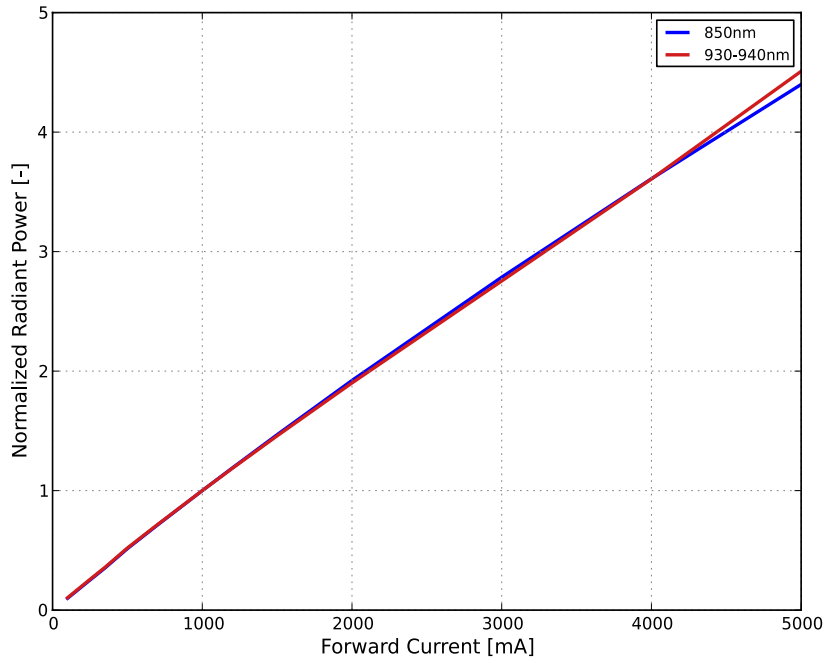


Figure 3. Typical normalized radiant power vs. forward current for LUXEON IR Domed Line at $T_j=25^\circ\text{C}$.

Forward Current Characteristics

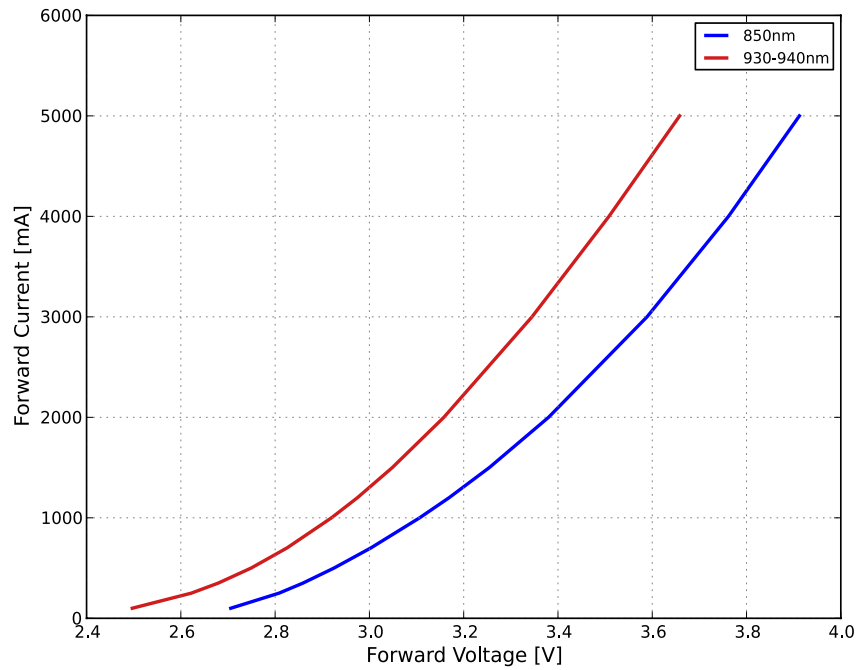


Figure 4. Typical forward current vs. forward voltage for LUXEON IR Domed Line at $T_j=25^\circ\text{C}$.

Wavelength Shift Characteristics

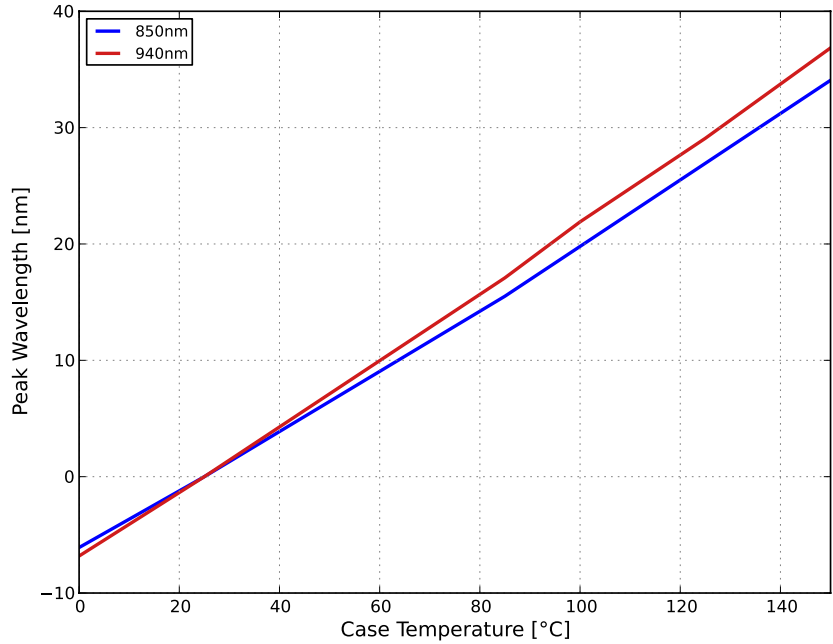


Figure 5. Typical peak wavelength shift vs. case temperature for LUXEON IR Domed Line at 1000mA.

Radiation Pattern Characteristics

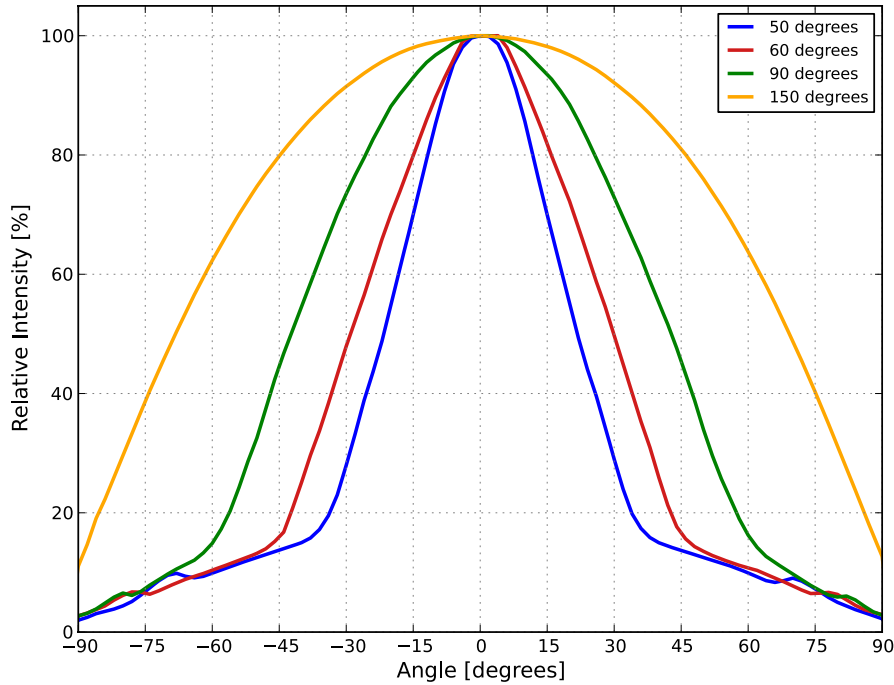


Figure 6a. Typical radiation pattern for LUXEON IR Domed L110-0xxxxxx200000 at 1000mA, T_j=25°C.

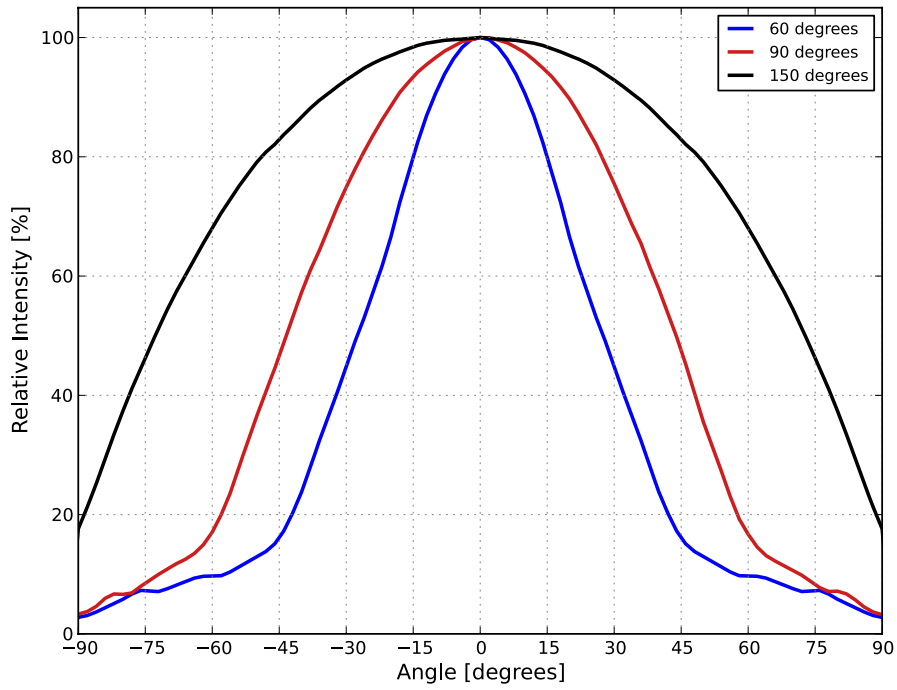


Figure 6b. Typical radiation pattern for LUXEON IR Domed L110-0xxx060000000, L110-0xxx090000000 and L110-0xxx150000000 at 1000mA, $T_j=25^\circ\text{C}$.

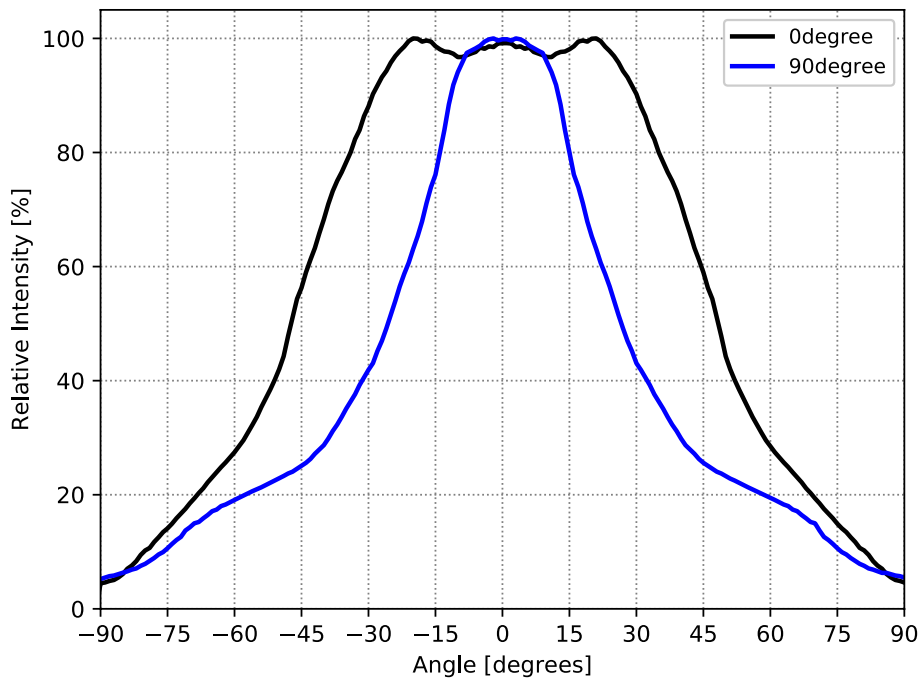


Figure 6c. Typical radiation pattern for LUXEON IR Domed L110-0xxx955800000 at 1000mA, $T_j=25^\circ\text{C}$.

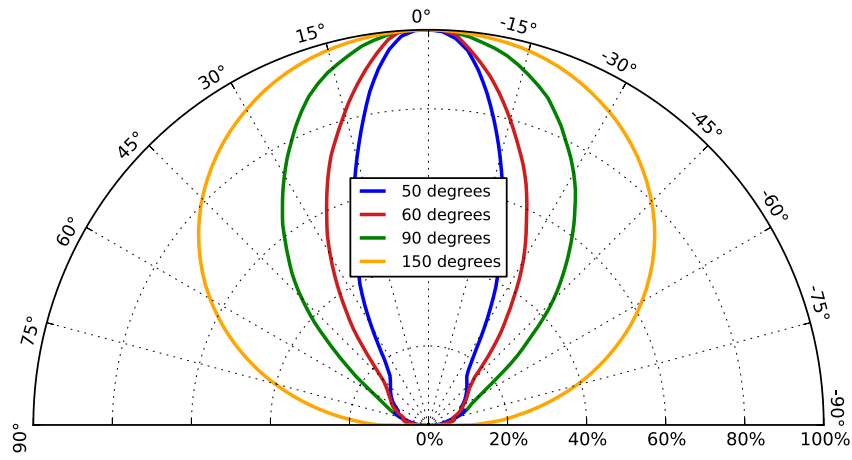


Figure 7a. Typical polar radiation pattern for LUXEON IR Domed L110-0xxxxxx200000 at 1000mA, $T_j=25^\circ\text{C}$.

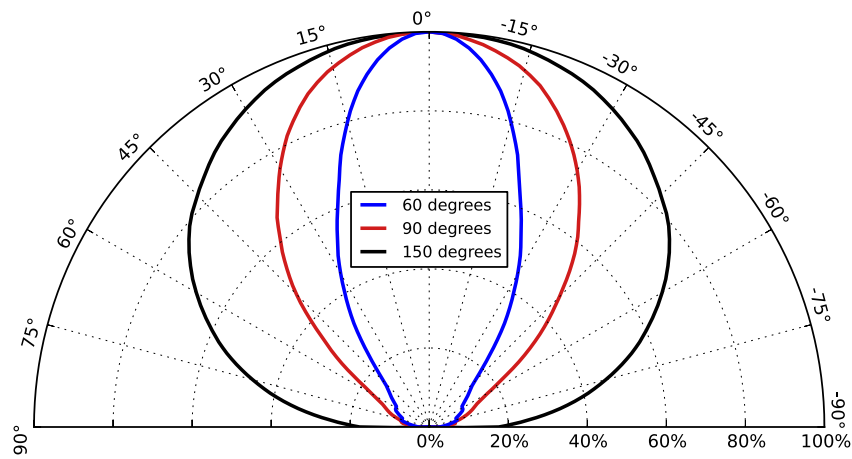


Figure 7b. Typical polar radiation pattern for LUXEON IR Domed L110-0xxx060000000, L110-0xxx090000000 and L110-0xxx150000000 at 1000mA, $T_j=25^\circ\text{C}$.

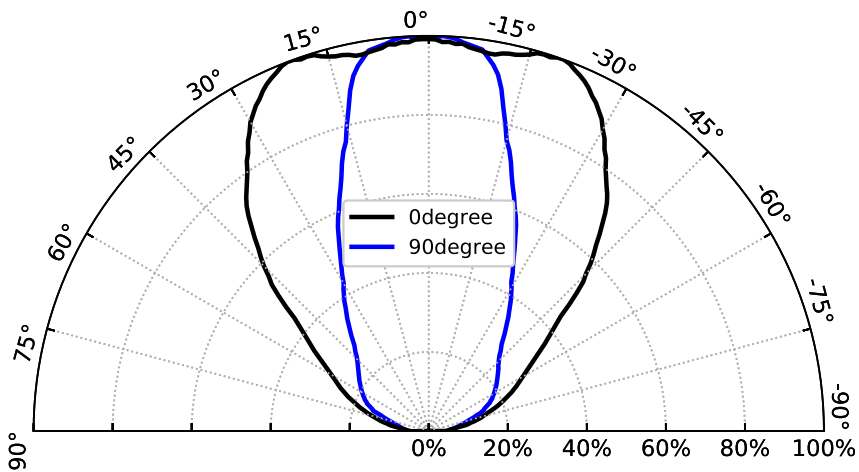


Figure 7c. Typical radiation pattern for LUXEON IR Domed L110-0xxx955800000 at 1000mA, $T_j=25^\circ\text{C}$.

Permissible Pulse Handling Characteristics

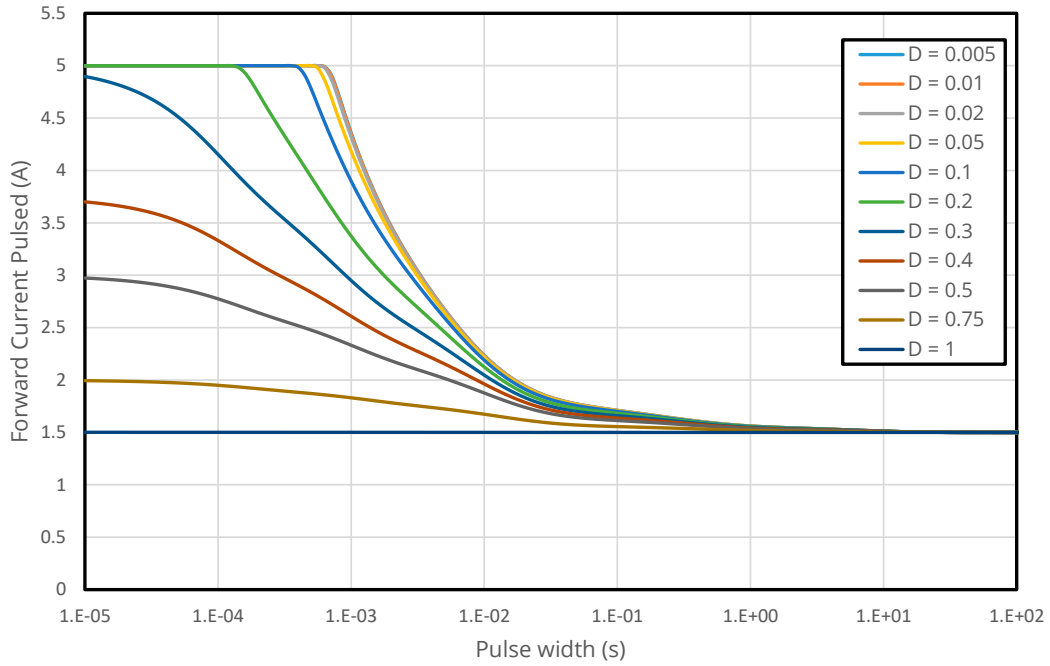


Figure 8a. Permissible pulse handling capability for LUXEON IR Domed L110-0xxxxxx200000 at T_c up to 25°C for various duty cycles (D).

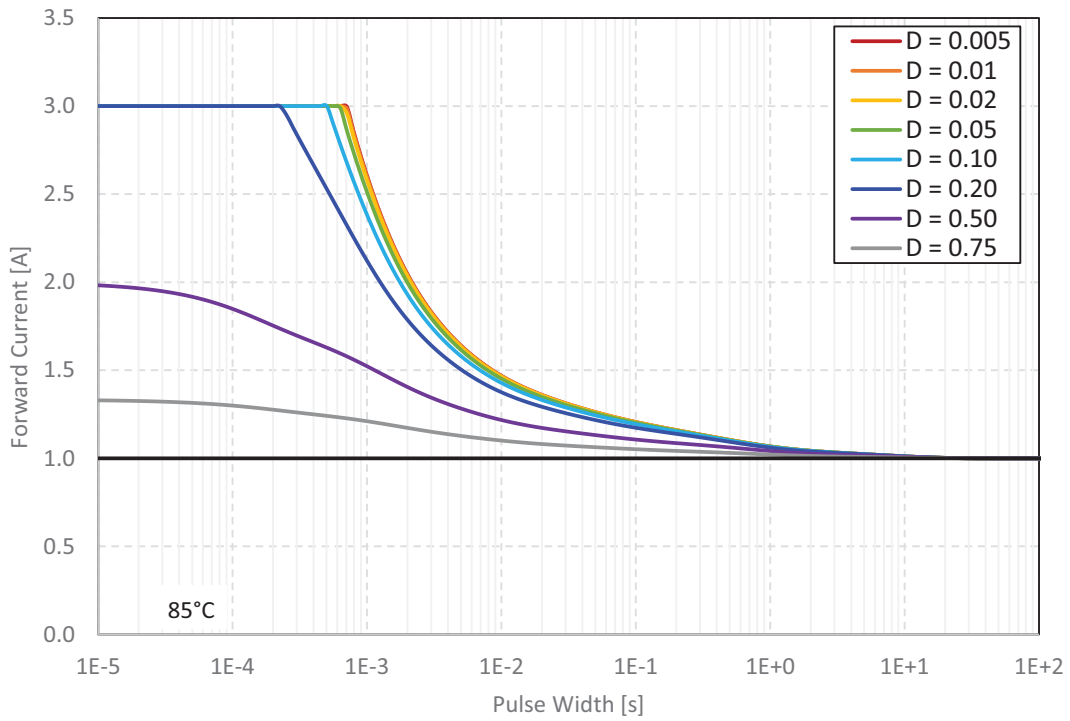


Figure 8b. Permissible pulse handling capability for LUXEON IR Domed L110-0xxxxxx00000 at T_c up to 25°C for various duty cycles (D).

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°C.

| BIN | RADIOMETRIC POWER ⁽¹⁾ (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 ±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 ⁽¹⁾ (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 ⁽¹⁾ (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

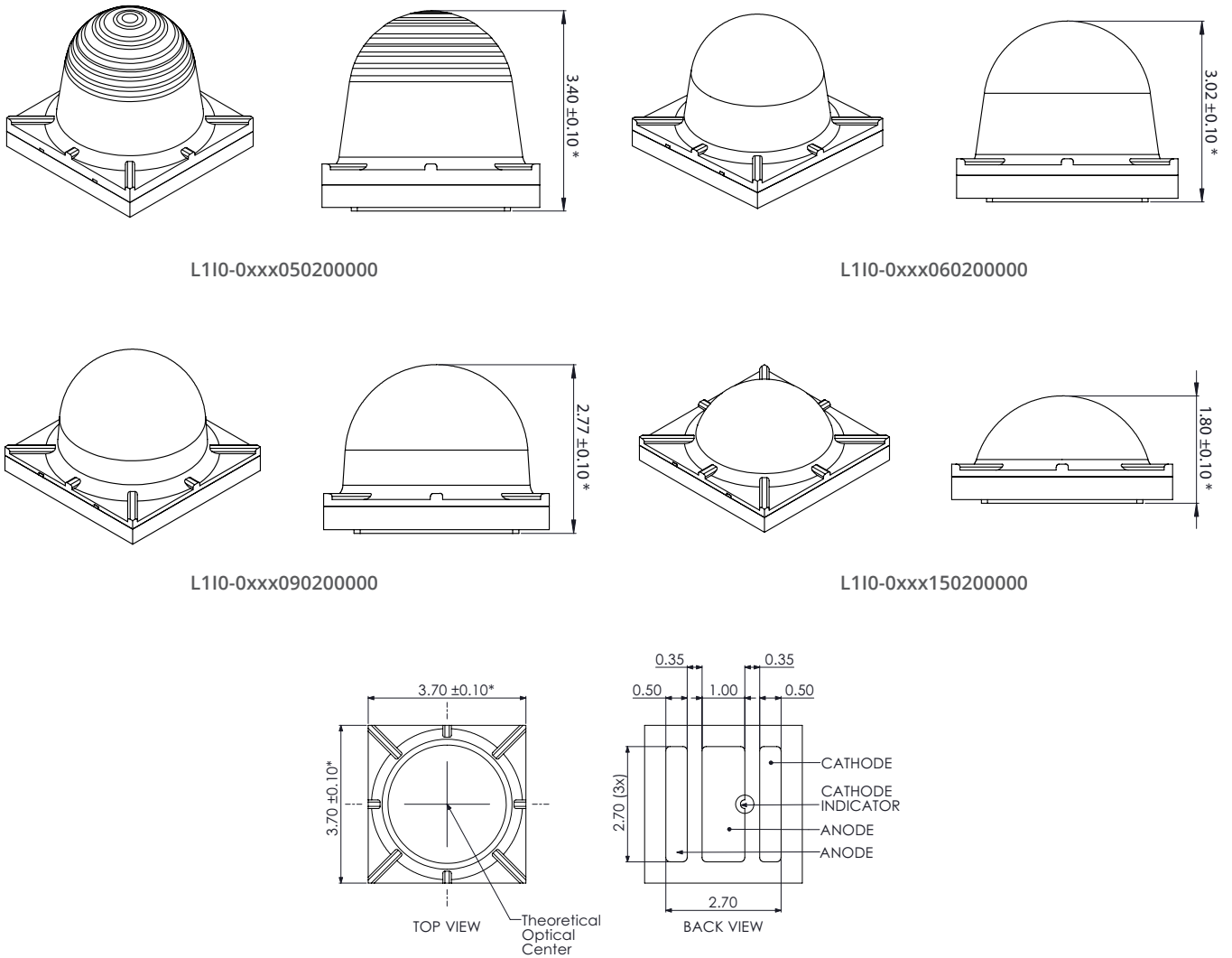


Figure 9a. Mechanical dimensions for LUXEON IR Domed L110-0xxxxxx200000.

Notes for Figure 9a:

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

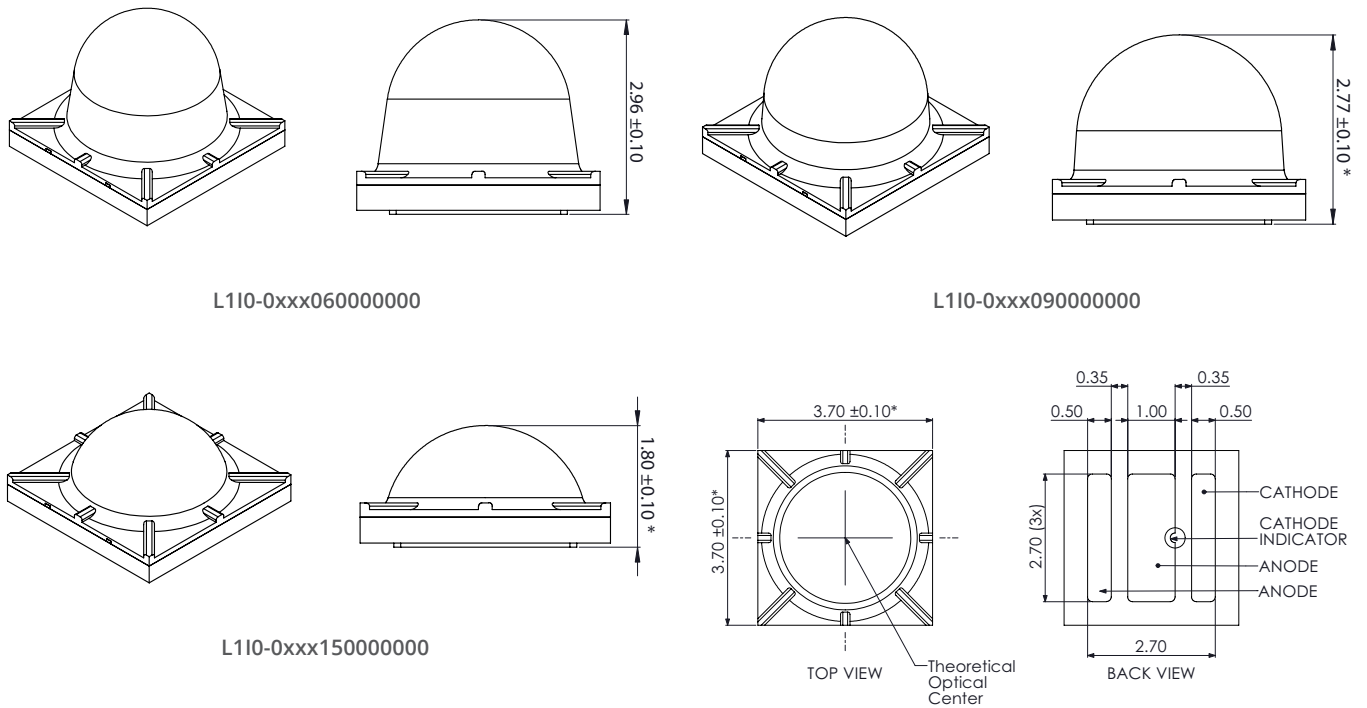


Figure 9b. Mechanical dimensions for LUXEON IR Domed L110-0xxx060000000, L110-0xxx090000000 and L110-0xxx150000000.

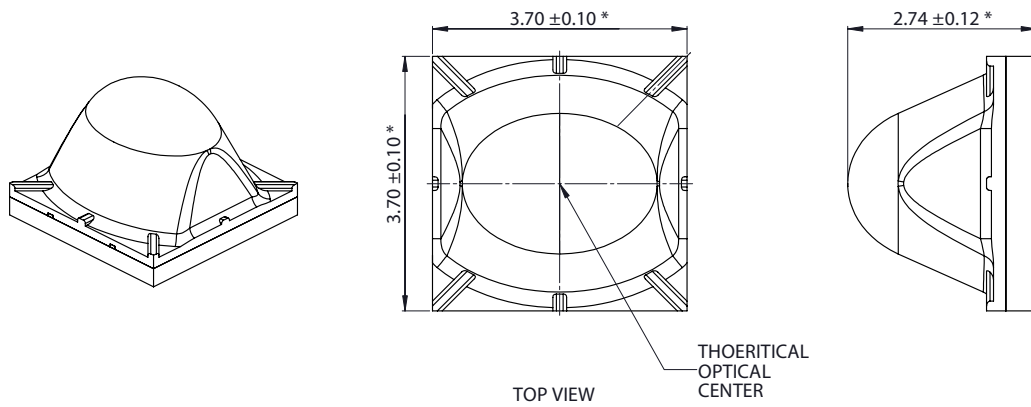


Figure 9c. Mechanical dimensions for LUXEON IR Domed L110-0xxx955800000.

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

Reflow Soldering Guidelines

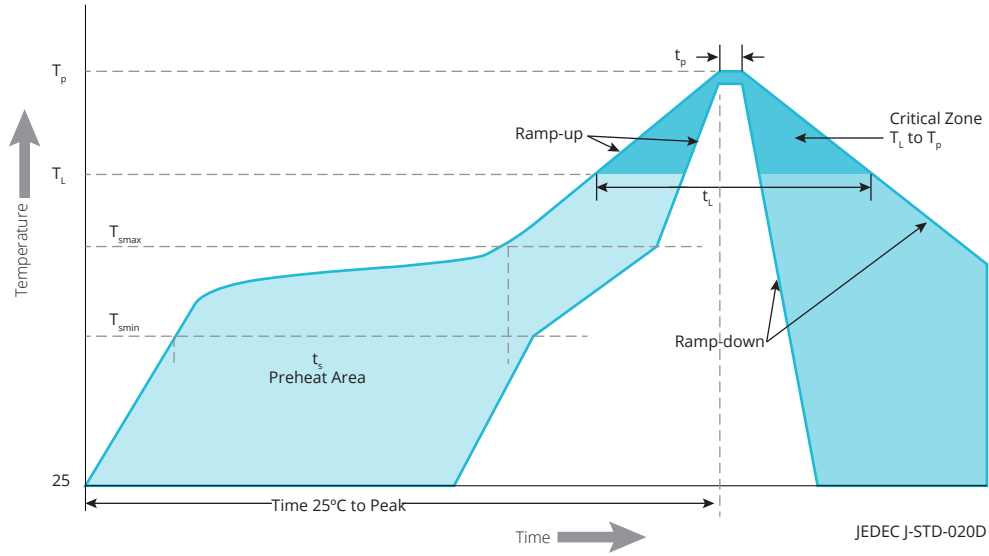


Figure 10. Visualization of the acceptable reflow temperature profile as specified in Table 8.

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_t) | 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

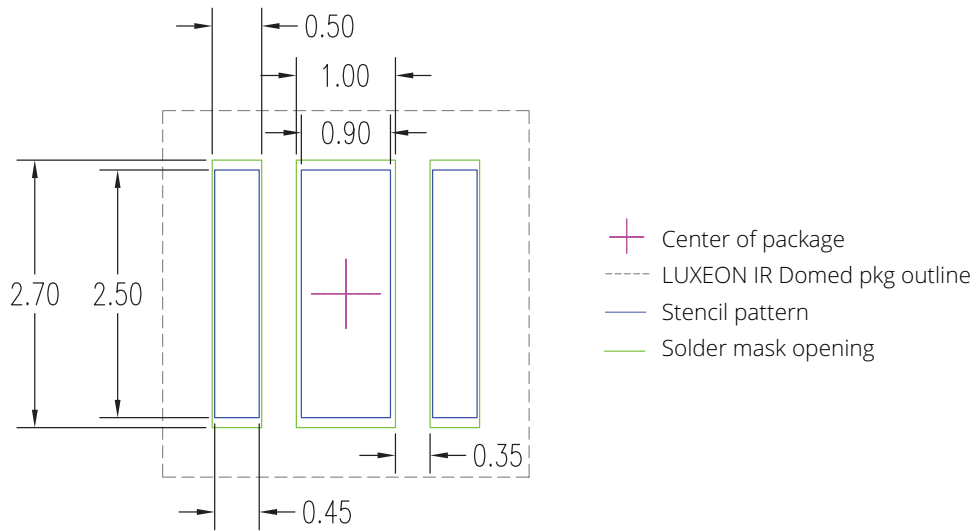


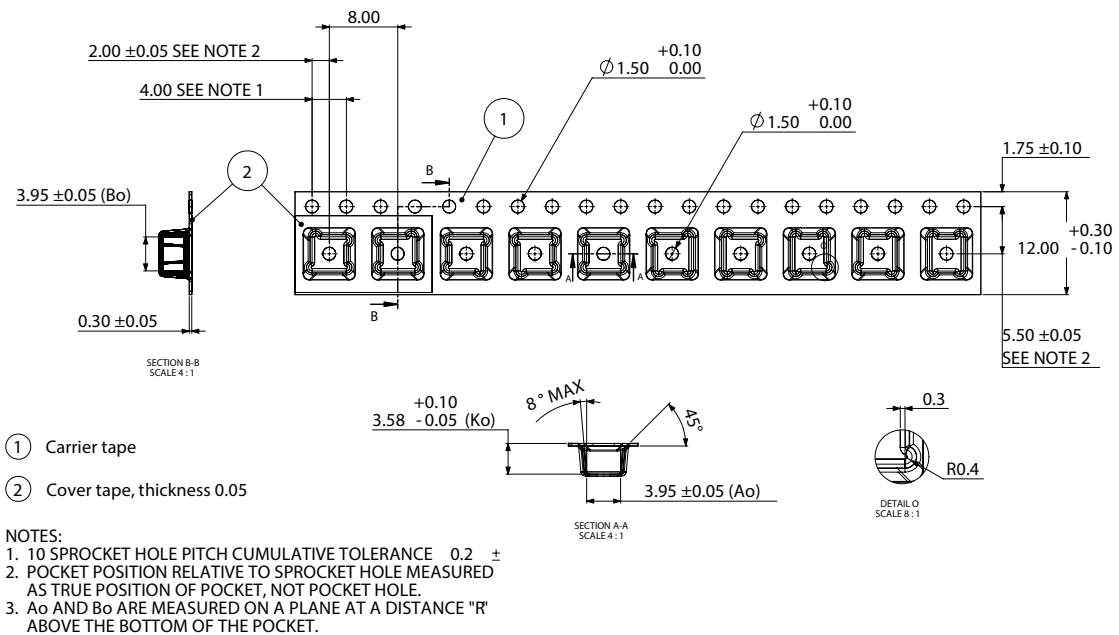
Figure 11. Recommended PCB solder pad layout for LUXEON IR Domed Line.

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.

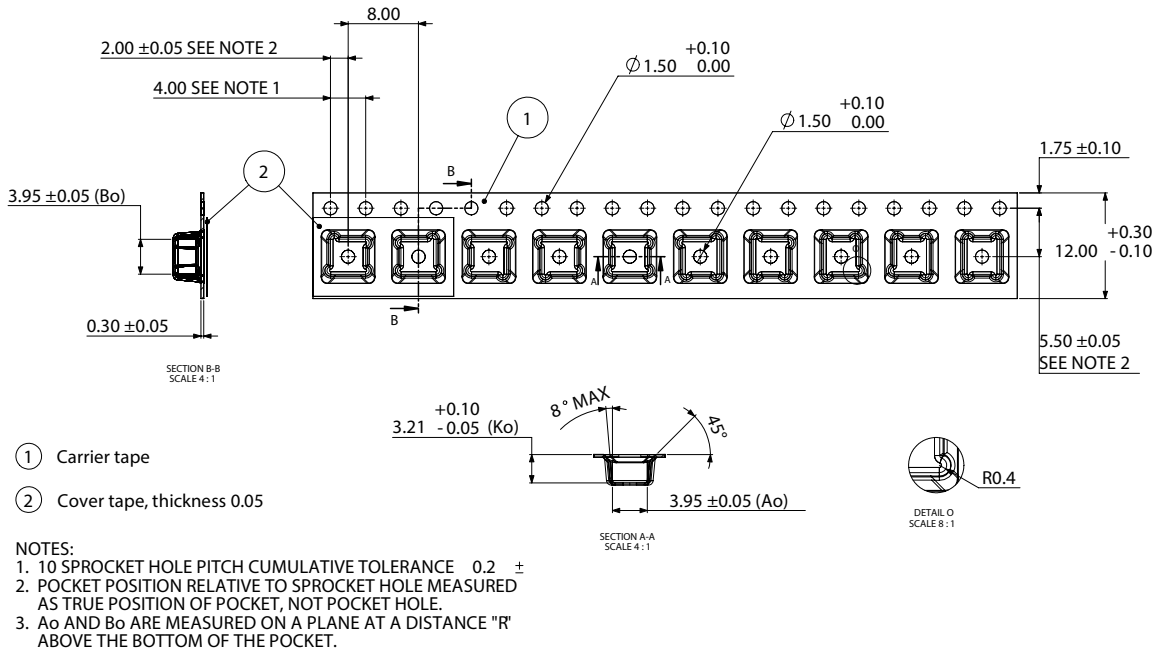


Figure 12b. Pocket tape dimensions for L110-0xxx060x00000.

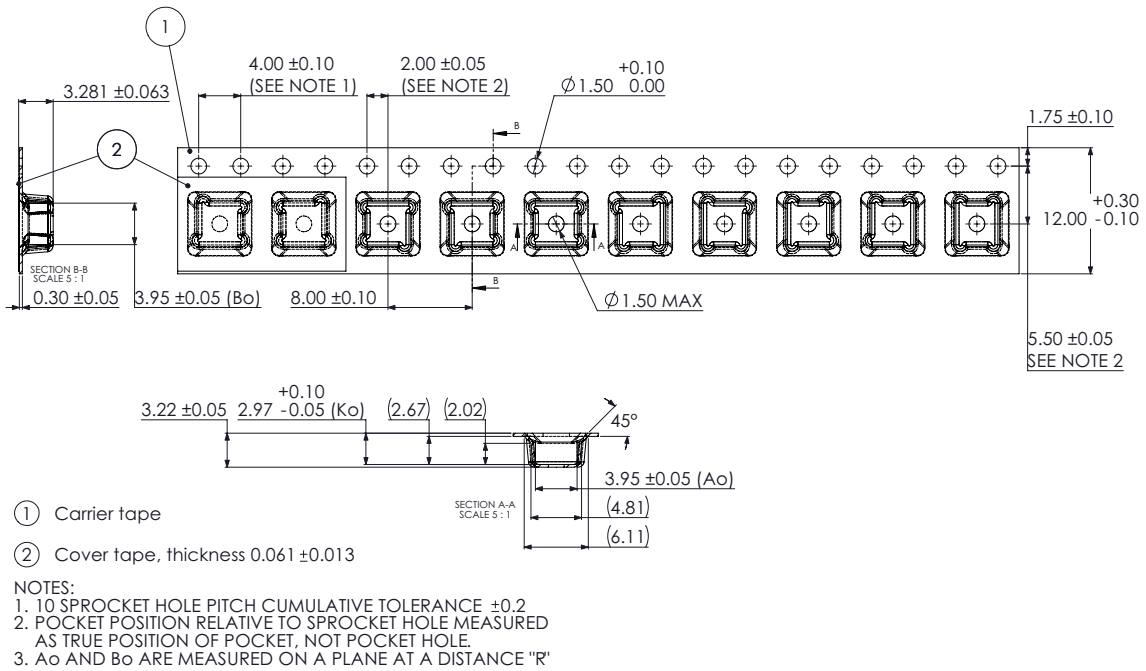


Figure 12c. Pocket tape dimensions for L110-0xxx090x00000 and L110-0xxx955800000.

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

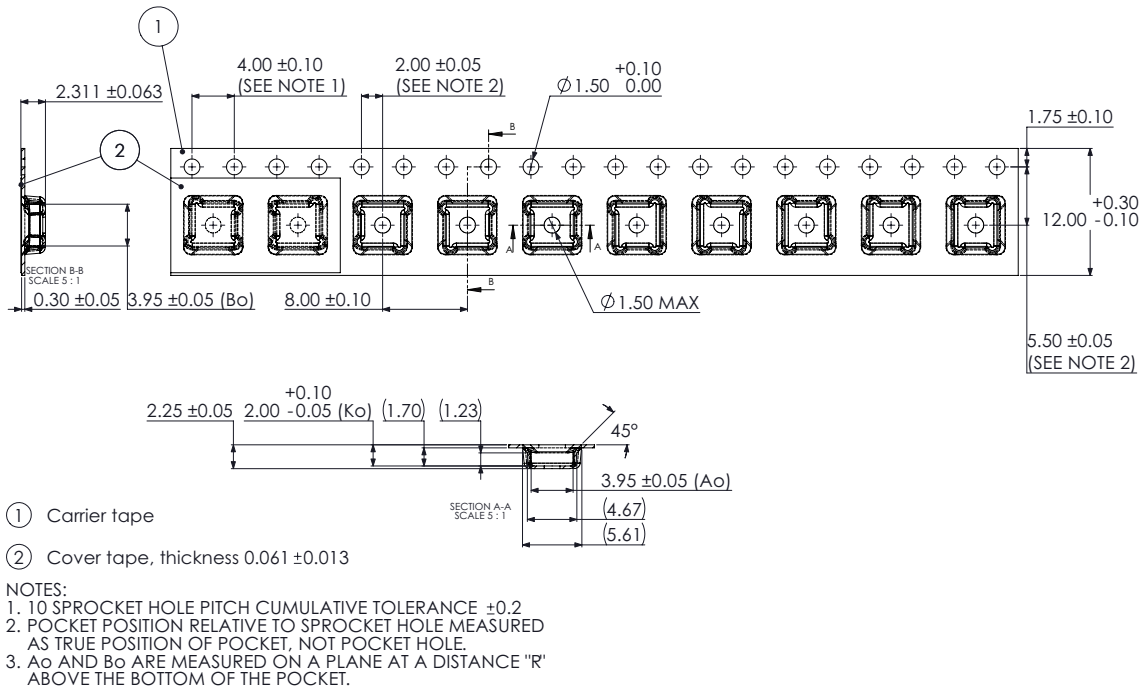


Figure 12d. Pocket tape dimensions for L110-0xxx150x00000.

Notes for Figure 12d:

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

Reel Dimensions

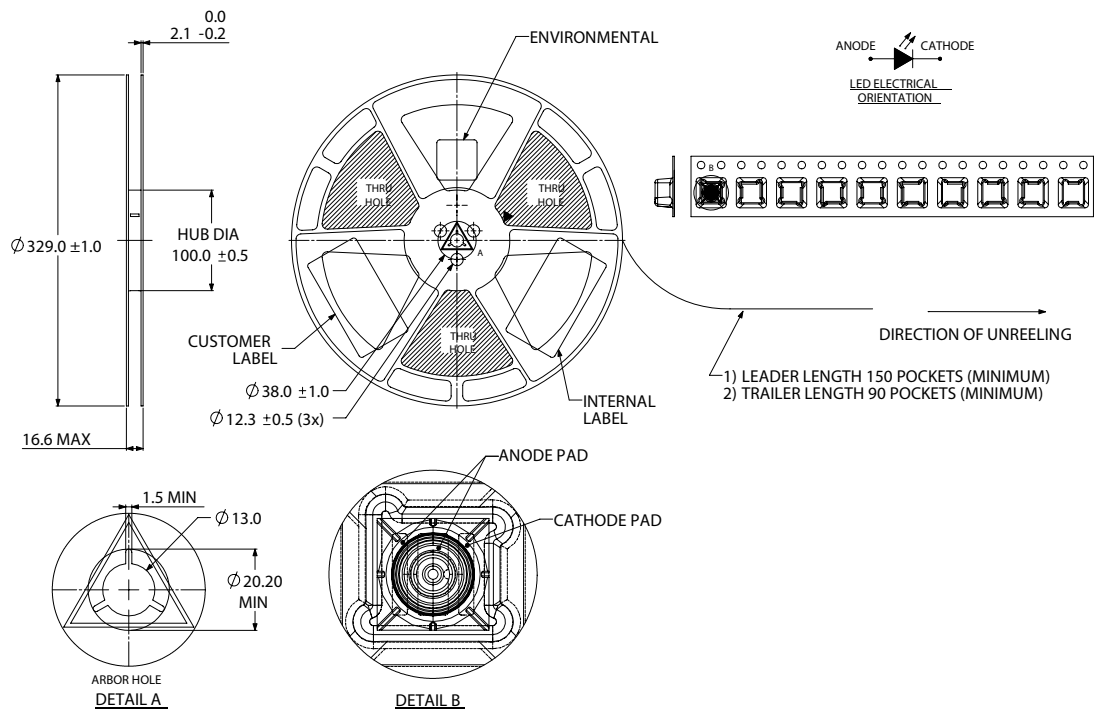


Figure 13. Reel dimensions for LUXEON IR Domed Line.

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.



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