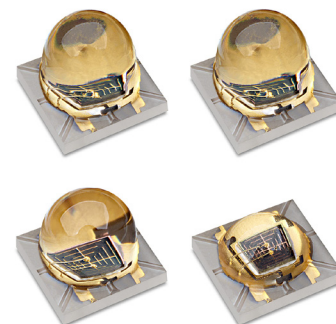


LUXEON IR Domed for Automotive Line

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

LUXEON IR Domed for Automotive Line are high power infrared emitters tailored to application needs by offering a variety of products at multiple infrared wavelengths and optical radiation patterns. Through best-in-class thermal conductivity, LUXEON IR Domed for Automotive Line has excellent performance at actual operating conditions. Its industry standard footprint allows ease of integration and upgrading existing system designs. All LUXEON IR Domed for Automotive Line emitters are AEC-Q102 and USCAR33 qualified and are designed with innovative LUXEON technology to provide industry leading performance.



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

Four emission patterns of 50°, 60°, 90°, and 150° to address diverse application needs, high punch, long range, and high uniformity

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

Ultra-low R_{th} of 2-3.1°C/W, the industry's best thermal conductivity, solves thermal challenges and supports space saving designs

PRIMARY APPLICATIONS

Driver Monitoring Systems

Biometric Identification

Exterior Sensing Applications

Interior Presence Detection

Gesture Control

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General Product Information

Product Test Conditions

LUXEON IR Domed for Automotive 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 for Automotive Line follow the convention below:

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

Where:

- A** – designates automotive
- B B B** – designates nominal peak wavelength
- C C C** – designates full width half maximum of the emitter's radiation pattern
- 0 0 0 0 0 0 – reserved for further customization

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

L 1 I 0 – **A 8 5 0 0 6 0** 0 0 0 0 0 0

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON IR Domed for Automotive 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 for Automotive Line at 1000mA, $T_j=25^{\circ}\text{C}$.

PEAK WAVELENGTH ^[1] (nm)	TYPICAL FWHM BEAM ANGLE (°)	RADIOMETRIC POWER ^[2] (mW)		TYPICAL RADIANT INTENSITY (mW/sr)	PART NUMBER
		MINIMUM	TYPICAL		
850	150	1050	1350	335	L110-A850150000000
850	90	1050	1350	750	L110-A850090000000
850	60	1050	1350	1150	L110-A850060000000
850	50	1050	1350	1255	L110-A850050000000
930	150	1125	1450	350	L110-A930150000000
940	150	1125	1450	350	L110-A940150000000
940	90	1125	1450	780	L110-A940090000000
940	60	1125	1450	1190	L110-A940060000000
940	50	1125	1450	1335	L110-A940050000000

Notes for Table 1:

1. Lumileds maintains a tolerance of $\pm 2\text{nm}$ on peak wavelength measurements.
2. Lumileds maintains a tolerance of $\pm 7\%$ on radiometric power measurements.

Optical Characteristics

Table 2. Optical characteristics of the LUXEON IR Domed for Automotive Line at 1000mA, $T_j=25^{\circ}\text{C}$.

PART NUMBER	PEAK WAVELENGTH ^[1] (nm)			TYPICAL SPECTRUM FWHM (nm)	TYPICAL TEMPERATURE COEFFICIENT OF PEAK WAVELENGTH ^[2] (nm/°C)
	MINIMUM	TYPICAL	MAXIMUM		
L110-A850xxx000000	835	850	870	35	0.26
L110-A930xxx000000	915	930	945	45	0.29
L110-A940xxx000000	925	940	955	50	0.29

Notes for Table 2:

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

Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for LUXEON IR Domed for Automotive Line at 1000mA, $T_j=25^{\circ}\text{C}$.

PART NUMBER	FORWARD VOLTAGE ^[1] (V_f)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE ^[2] (mV/°C)	TYPICAL THERMAL ELECTRICAL RESISTANCE— JUNCTION TO SOLDER PAD (°C/W)	RISE TIME (ns)	FALL TIME (ns)
	MINIMUM	TYPICAL	MAXIMUM				
L110-A8xxxxx000000	2.7	3.2	3.7	-4.6	3.1	12	16
L110-A9xxxxx000000	2.3	2.9	3.4	-2.6	2.0	12	16

Notes for Table 3:

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

Absolute Ratings

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

PARAMETER	MAXIMUM PERFORMANCE
Minimum DC Forward Current ^[1, 2]	500mA
Maximum DC Forward Current ^[1, 2]	1500mA
Maximum Peak Pulsed Forward Current ^[1, 3]	5000mA
Maximum 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 8.

Characteristic Curves

Spectral Power Distribution Characteristics

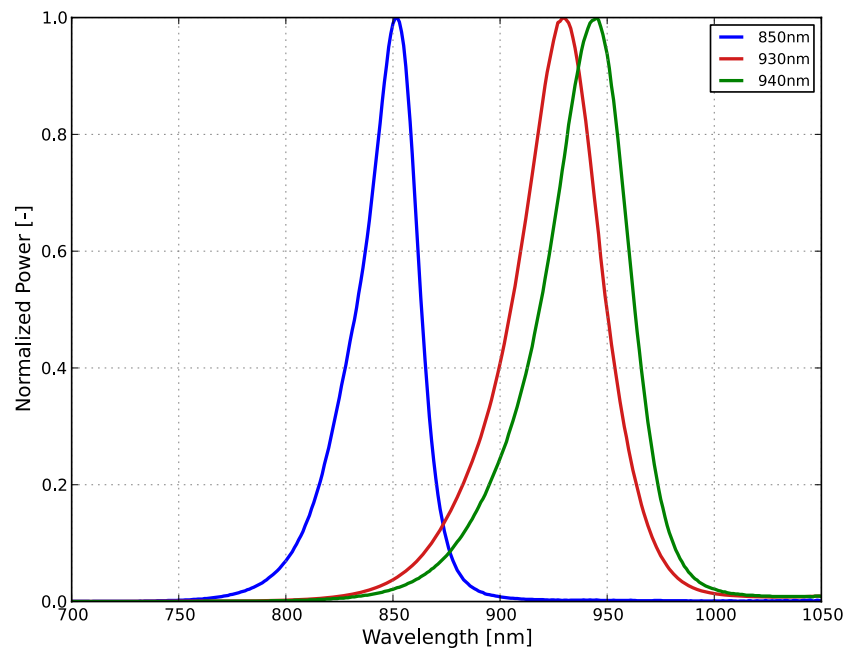


Figure 1. Typical normalized power vs. wavelength for LUXEON IR Domed for Automotive Line at 1000mA, $T_j=25^{\circ}\text{C}$.

Light Output Characteristics

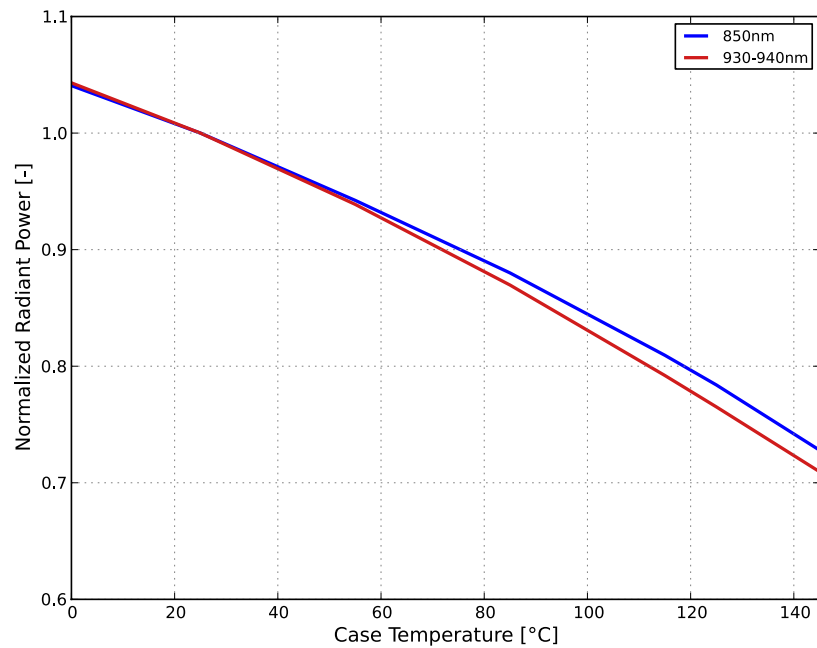


Figure 2. Typical normalized radiant power vs. case temperature for LUXEON IR Domed for Automotive Line at 1000mA.

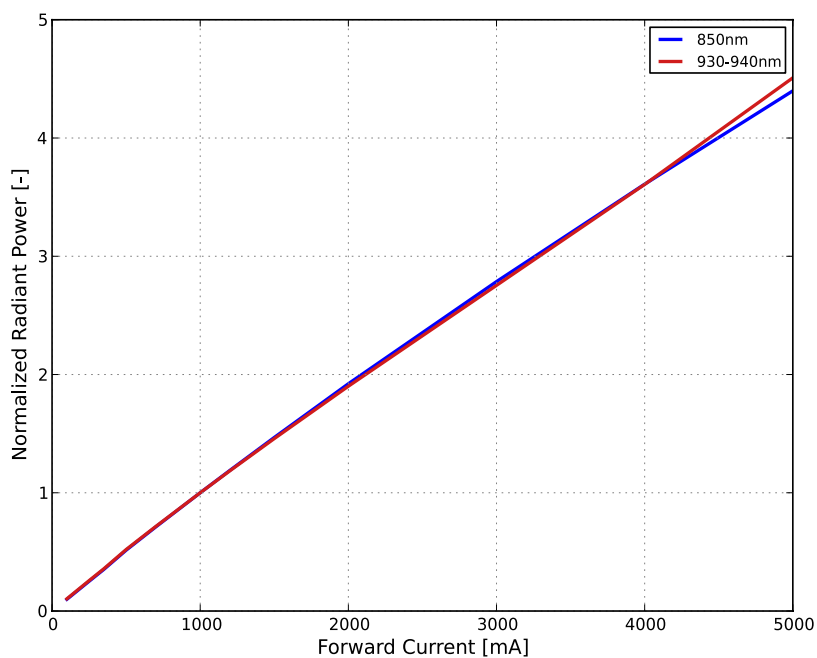


Figure 3. Typical normalized radiant power vs. forward current for LUXEON IR Domed for Automotive Line at $T_j=25^{\circ}\text{C}$.

Forward Current Characteristics

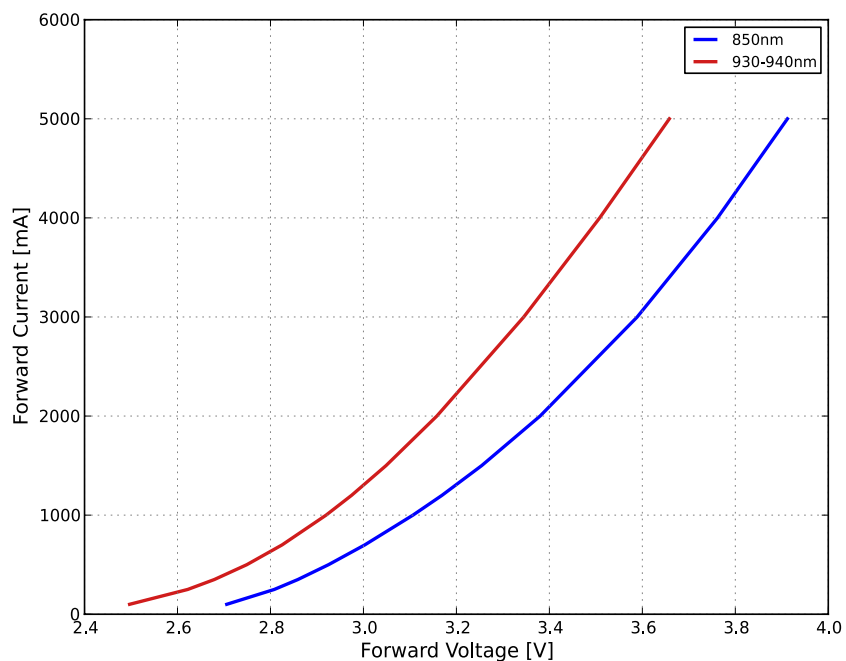


Figure 4. Typical forward current vs. forward voltage for LUXEON IR Domed for Automotive Line at $T_j=25^{\circ}\text{C}$.

Wavelength Shift Characteristics

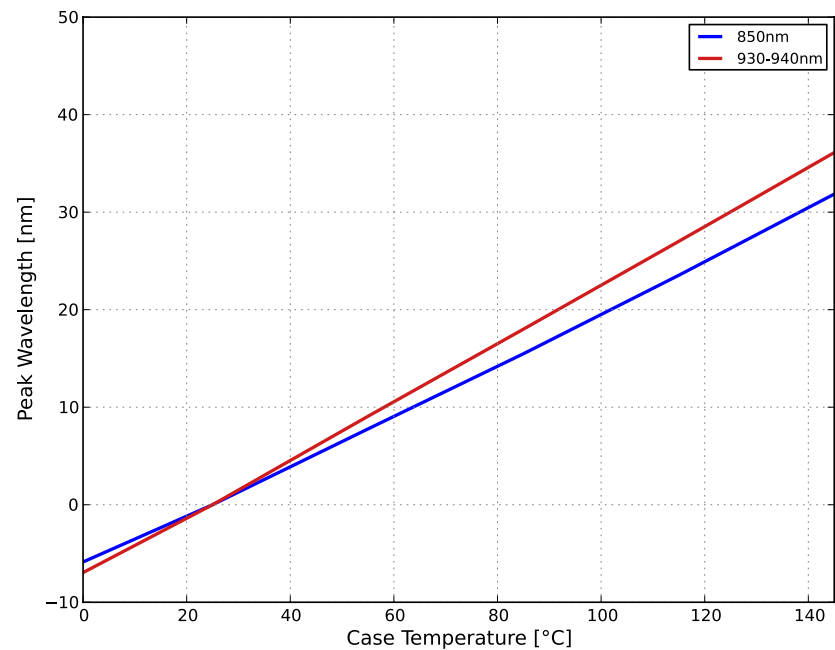


Figure 5. Typical peak wavelength shift vs. case temperature for LUXEON IR Domed for Automotive Line at 1000mA.

Radiation Pattern Characteristics

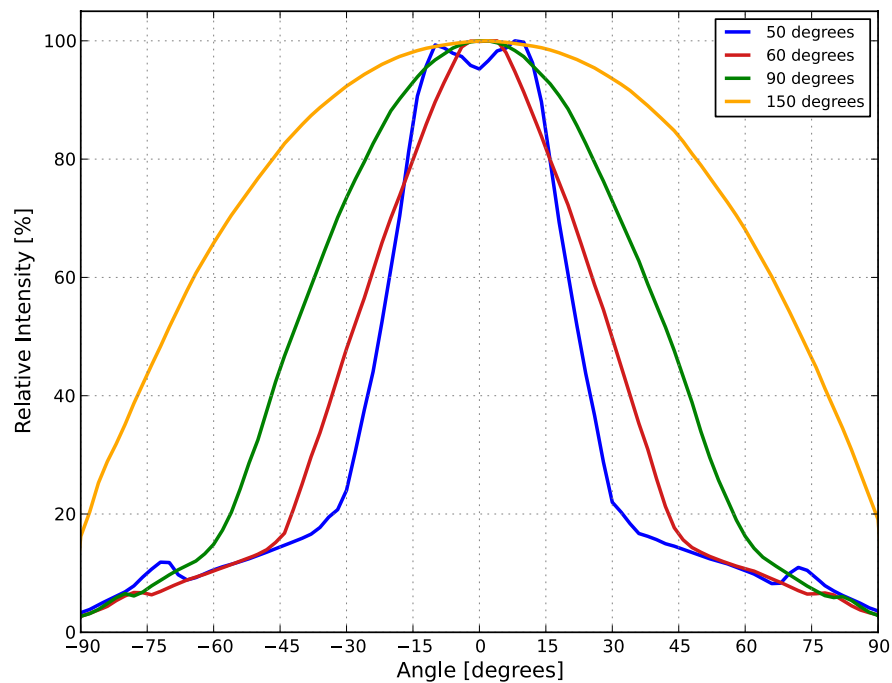


Figure 6. Typical radiation pattern for LUXEON IR Domed for Automotive Line at 1000mA, T_j=25°C.

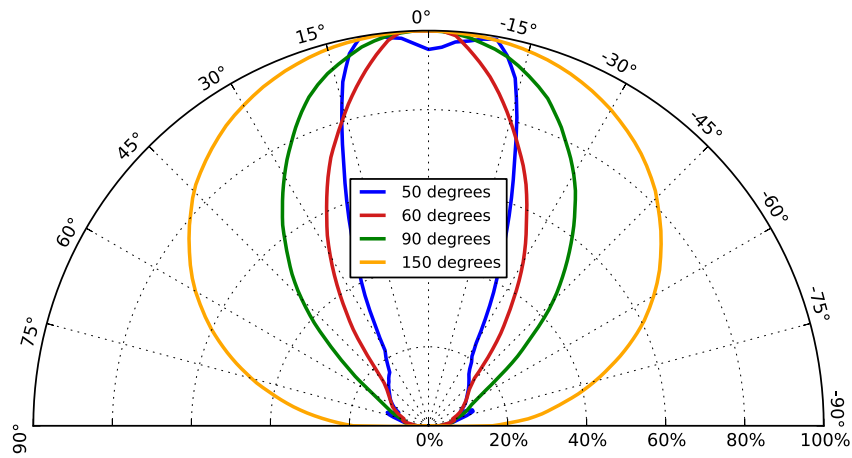


Figure 7. Typical polar radiation pattern for LUXEON IR Domed for Automotive Line at 1000mA, $T_j = 25^\circ\text{C}$.

Permissible Pulse Handling Characteristics

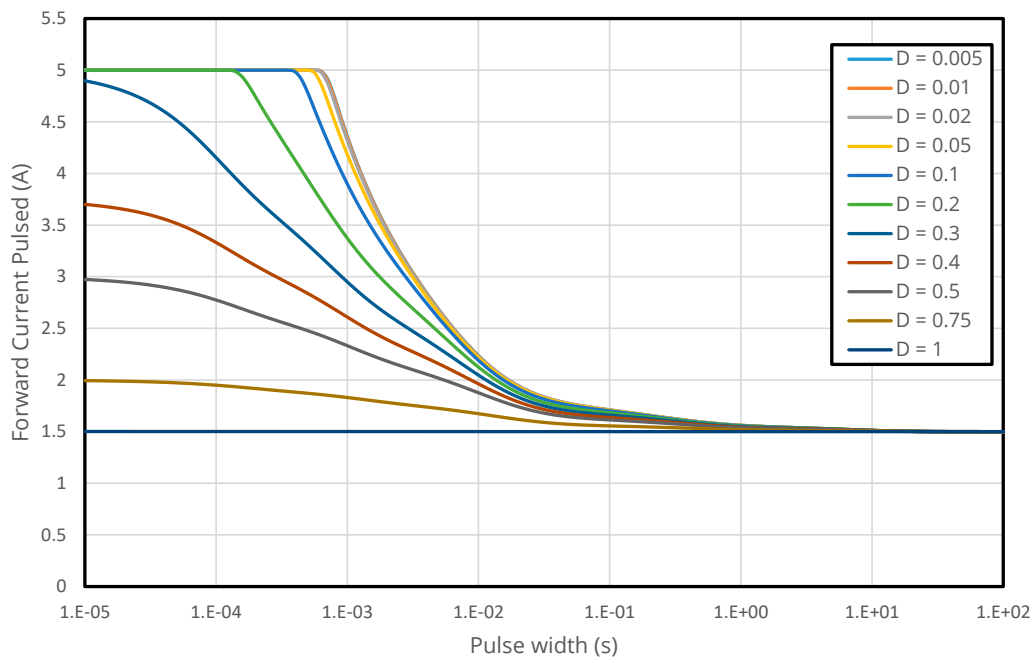


Figure 8. Permissible pulse handling capability for LUXEON IR Domed for Automotive Line at $T_c = \text{up to } 125^\circ\text{C}$.

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 for Automotive 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: L=1000 to 1100mW, 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 for Automotive 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 5 lists the standard radiometric power bins for LUXEON IR Domed for Automotive 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 peak wavelengths.

Table 5. Radiometric power bin definitions for LUXEON IR Domed for Automotive Line at 1000mA, $T_j=25^{\circ}\text{C}$.

BIN	RADIOMETRIC POWER ⁽¹⁾ (mW)	
	MINIMUM	MAXIMUM
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 for Automotive 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 for Automotive 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

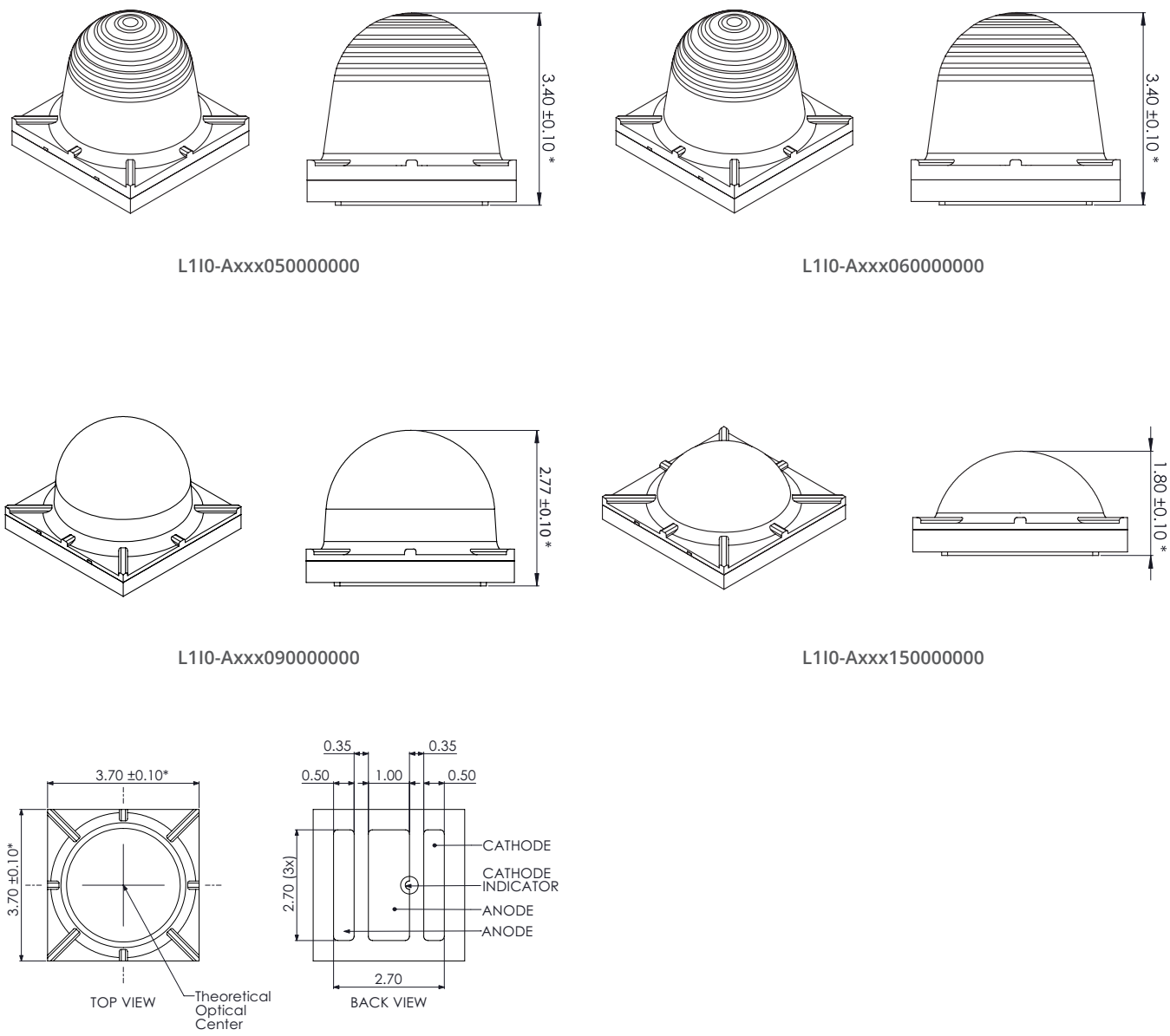


Figure 9. Mechanical dimensions for LUXEON IR Domed for Automotive Line.

Notes for Figure 9:

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

Reflow Soldering Guidelines

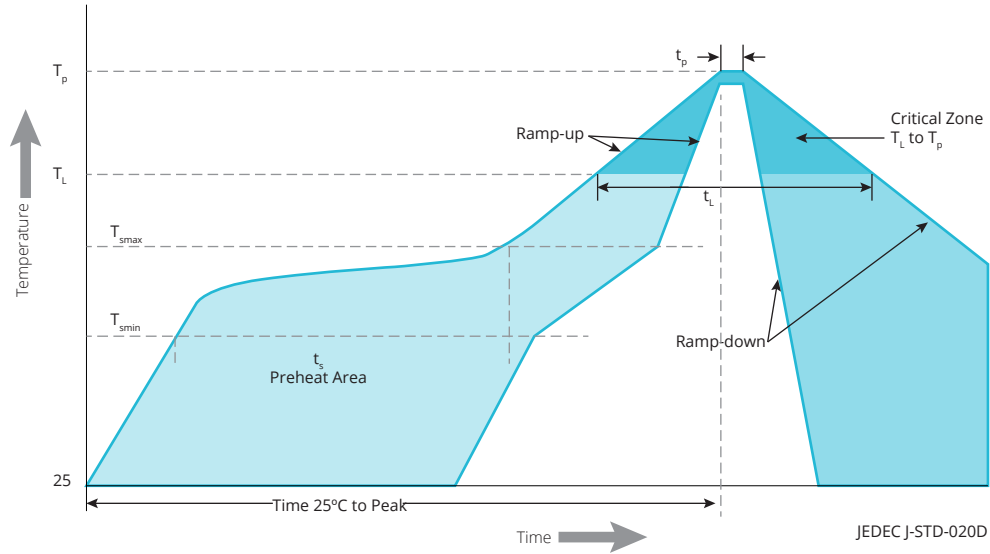


Figure 10. Visualization of the acceptable reflow temperature profile as specified in Table 8.

Table 8. Reflow profile characteristics for LUXEON IR Domed for Automotive 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 for Automotive 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

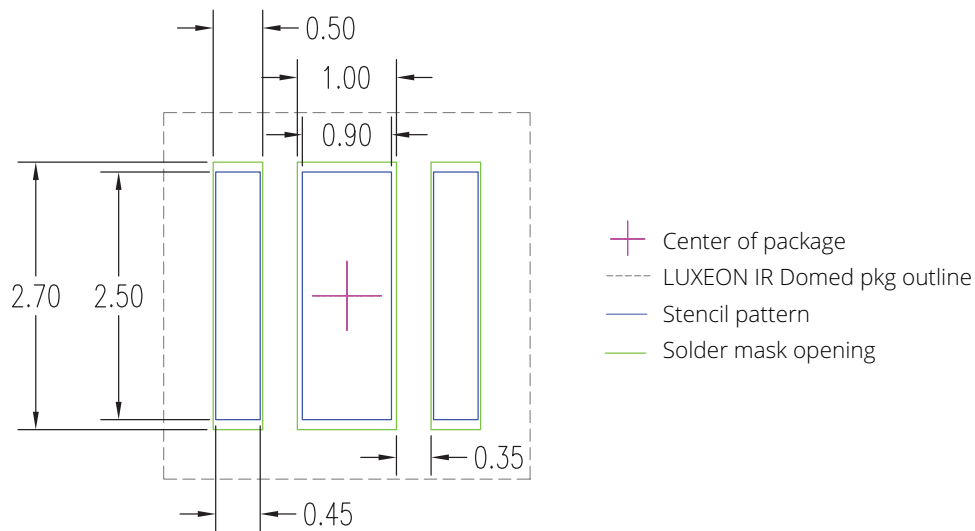


Figure 11. Recommended PCB solder pad layout for LUXEON IR Domed for Automotive Line.

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

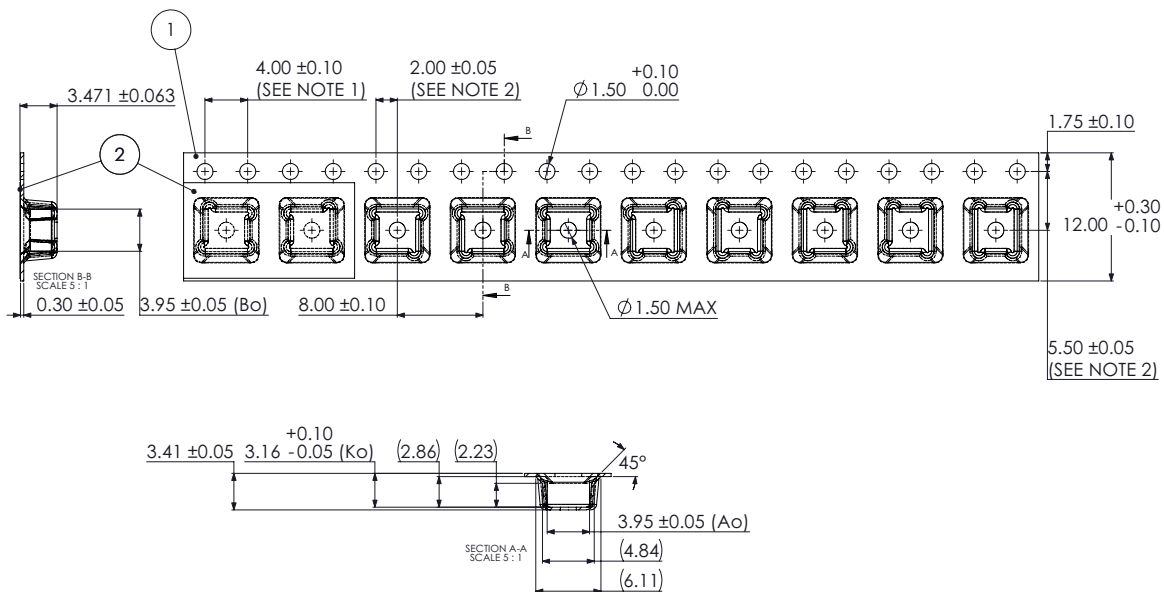


Figure 12a. Pocket tape dimensions for L110-Axxx050000000 and L11A-0xxx060000000.

Notes for Figure 12a:

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

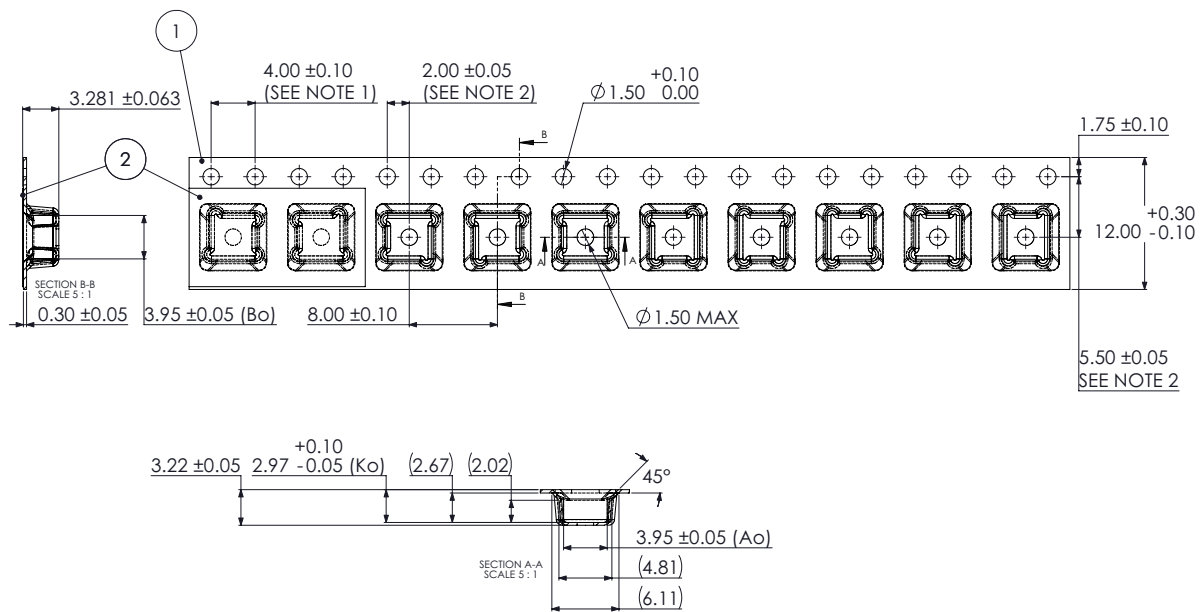


Figure 12b. Pocket tape dimensions for L110-Axxx090000000.

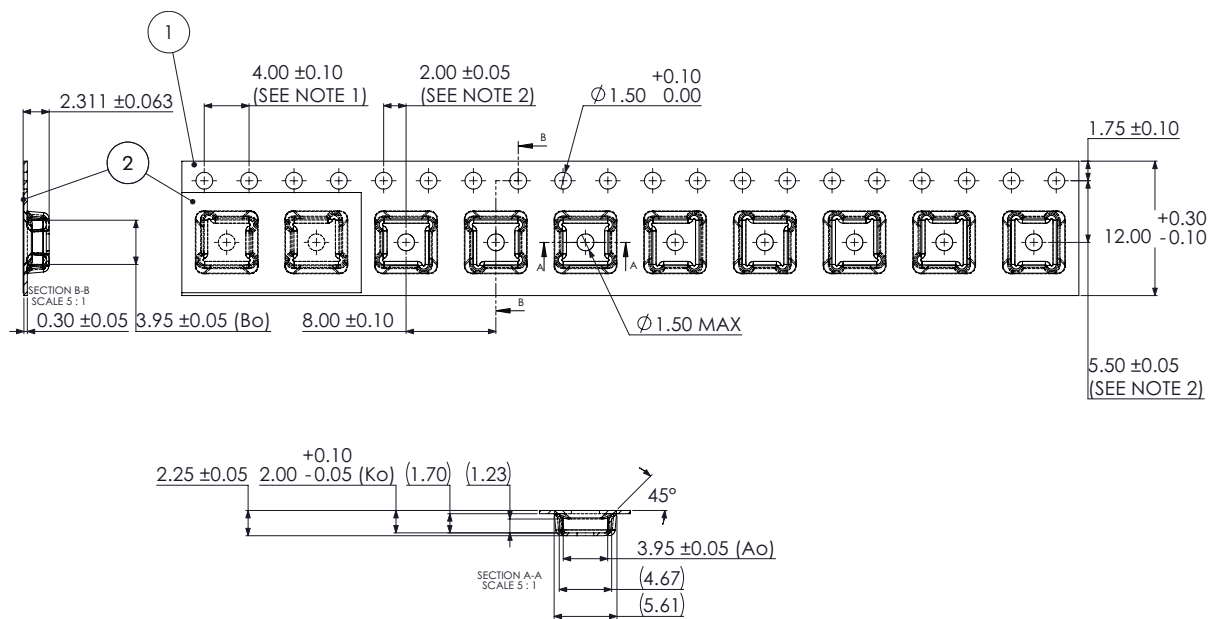


Figure 12c. Pocket tape dimensions for L110-Axxx150000000.

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

Reel Dimensions

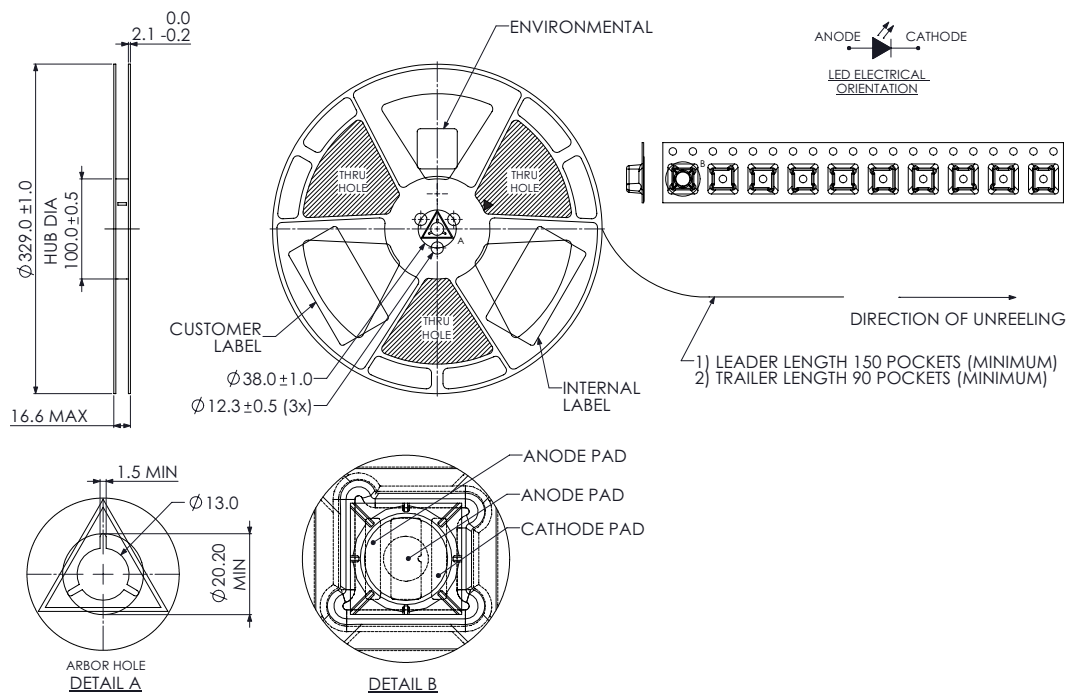


Figure 13a. Reel dimensions for L110-Axxx050000000 and L110-Axxx060000000.

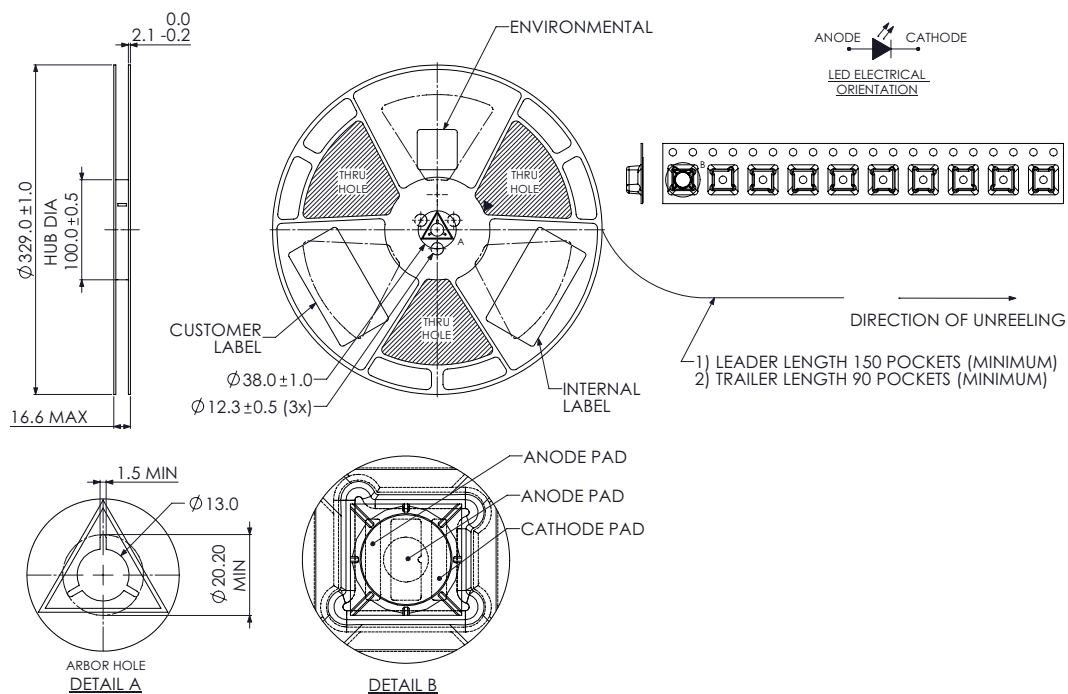


Figure 13b. Reel dimensions for L110-Axxx090000000.

Notes for Figures 13a and 13b:

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

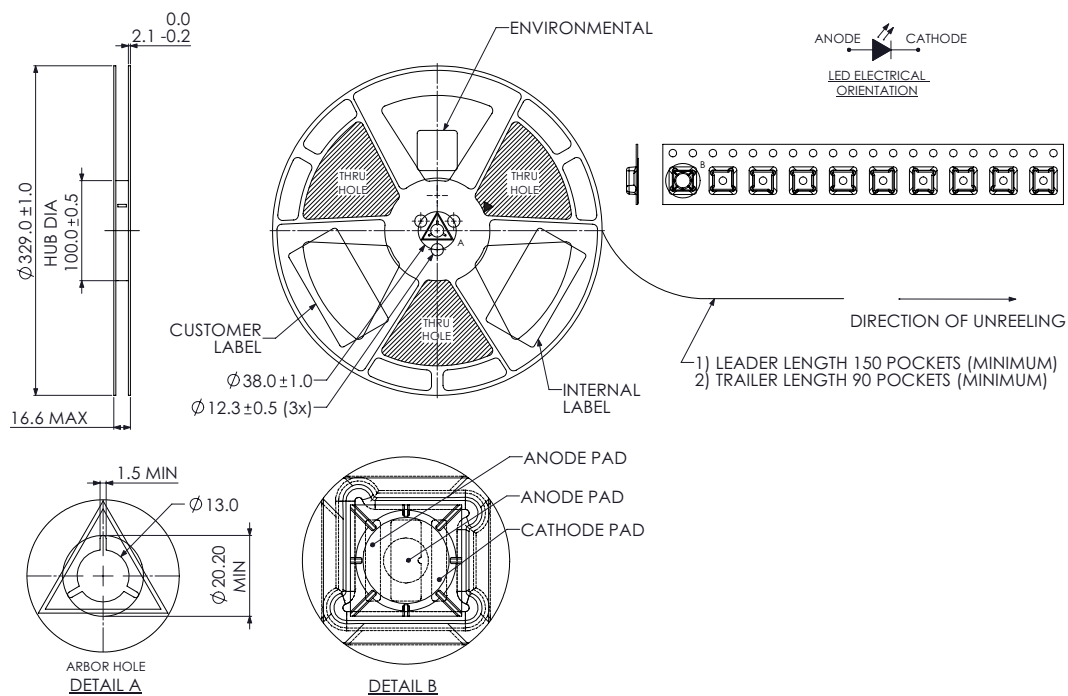


Figure 13c. Reel dimensions for L1I0-Axxx150000000.

Notes for Figure 13c:

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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