

LUXEON Neo PC-Amber 1 mm²

Industry-leading solutions for turn applications

LUXEON Neo LEDs with their miniaturized form factor are designed to meet present and future Automotive requirements. The Lumileds automotive binning structure meets both SAE and ECE color specifications and is hot binned at 85°C, consistent with actual automotive operational environments. LUXEON Neo PC-Amber provides industry-leading solutions for your front and rear turn applications. LUXEON Neo PCA 1 mm² is qualified according AEC-Q102.



FEATURES AND BENEFITS

- Higher drive current capability for increased flux performance
- Low thermal resistance for better hot lumen performance
- Miniaturized package for dense population of boards
- Hot binned at 85 °C monopulse (MP) to match closer to operating conditions

PRIMARY APPLICATIONS

- Front turn
- Rear turn
- Daytime running lights
- Side Marker

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General Information

Product Test Conditions

LUXEON Neo PC-Amber 1 mm² is binned using a 20 ms monopulse (MP) of 1000 mA drive current. The case temperature T_c is set to 85 °C at the beginning of the pulse. Unless otherwise noted, the same test conditions apply to all data in this document.

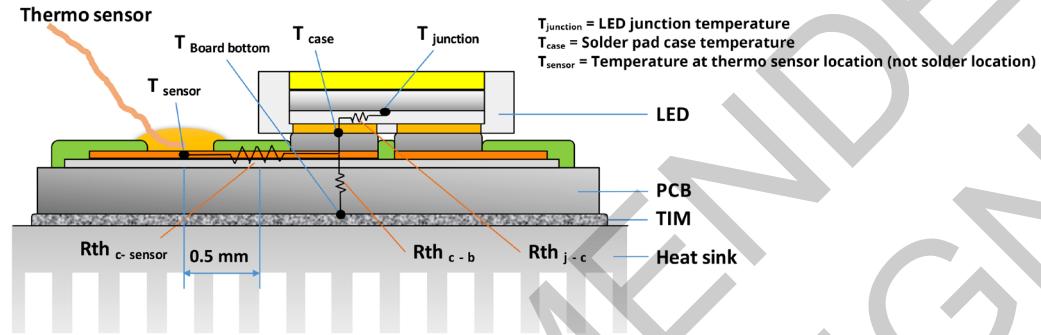


Figure 1. Example of case temperature location on sample board for LUXEON Neo PC-Amber 1 mm²

Part Number Nomenclature

Part numbers for LUXEON Neo PC-Amber 1 mm² follow the convention below:

A 1 N 1 – **B B B B** C D E **F G G G G** H

Where:

- A 1 – designates Automotive LED
- N 1 – designates LUXEON Neo product family
- B B B B** – designates color temperature
- C – designates die size (1 = 1.0 mm²)
- D – designates binning current (D = 1000 mA)
- E – designates binning condition (H = 85 °C)
- F** – designates product generation
- G G G G** – designates minimum luminous flux or custom part number
- H** – designates options for detailed product specification (default 0)

Therefore, the following part number is used for a LUXEON Neo PC-Amber 1 mm² with a minimum luminous flux of 180 lumens, hot binned at 1000 mA:

A 1 N 1 – 0 5 9 1 **1 D H** 0 **0 1 8 0 0**

Environmental Compliance

Lumileds LLC is committed to provide environmentally friendly products to the solid-state lighting market. LUXEON Neo PCA 1 mm² 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 as well as the directive on End-of Live Vehicle 2005/53/EC. Lumileds LLC will not intentionally add the following restricted materials to UXEON Neo PCA 1 mm²: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Performance Characteristics

Product Selection Guide

Table 1. Product selection for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA, $T_c = 85^\circ\text{C}$

MINIMUM LUMINOUS FLUX ^[1] (lm)	TEST CURRENT (mA)	PART NUMBER
180	1000	A1N1-05911DH001800
190	1000	A1N1-05911DH001900
200	1000	A1N1-05911DH002000
210	1000	A1N1-05911DH002100

Notes for Table 1:

1. Lumileds maintains a tolerance of $\pm 6.5\%$ on luminous flux measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA, $T_c = 85^\circ\text{C}$

PART NUMBER	DOMINANT WAVELENGTH (NM)		SPECTRAL HALF-WIDTH ^[1] (NM) $\Delta\lambda_{1/2}$	TOTAL INCLUDED ANGLE ^[2] $\theta_{0.90\text{ V}}$	TYPICAL VIEWING ANGLE ^[3] $2\theta_{1/2}$
	MINIMUM	MAXIMUM			
A1N1-05911DH0XXXX0	588.8	592.6	77	140°	120°

Notes for Table 2:

1. Spectral width at 1/2 of the peak intensity.
2. Total angle at which 90% of total luminous flux is captured.
3. Viewing angle is the off axis angle from the LED centerline where the luminous intensity is 1/2 of the peak value.

Electrical and Thermal Characteristics

Table 3. Electrical Characteristics for LUXEON Neo PCA-Amber 1 mm² at <20 ms MP, 1000 mA, T_c = 85 °C

PART NUMBER	THERMAL RESISTANCE JUNCTION TO CASE (K/W)			
	R θ_{j-c} el ^[1]		R θ_{j-c} real ^[2]	
	TYPICAL	MAXIMUM ^[3]	TYPICAL	MAXIMUM ^[3]
A1N1-05911DH0xxxx0	3.2	3.9	4.1	4.9

- Notes for Table 3:
- 1. Lumileds maintains a tolerance of ± 0.06 V on forward voltage measurements.
 - 2. R θ_{j-c} el: Electrical thermal resistance (junction to case).
 - 3. R θ_{j-c} real: Real thermal resistance (junction to case) with wall plug efficiency included. Reference JESD51-51, JESD51-14, 4.1.3.
 - 4. Calculated (5s)

Absolute Ratings

Table 4. Absolute ratings for LUXEON Neo PC-Amber 1 mm²

PARAMETER	PERFORMANCE
Minimum DC Forward Current	50 mA
Maximum DC Forward Current	1000 mA
Maximum Junction Temperature ^[1,2]	150 °C
Case Temperature Range ^[1,2]	-40°C to 135 °C
Maximum Junction Temperature for <200 Hours (1000 mA) ^[3]	180 °C
LED Storage Temperature	-40°C to 130°C
ESD Sensitivity ^[4]	HBM class 0, CDM class C0a
Reverse Voltage (V _{reverse})	LUXEON LEDs are not designed to be driven in reverse bias

- Notes for Table 4:
- 1. Proper current derating must be observed to maintain junction temperature below the maximum allowable temperature. LEDs driven at or above maximum LED case temperature may have shorter lifetime.
 - 2. Please consult with Lumileds for more information on maximum time durations and forward currents for these temperatures.
 - 3. Short time operations of less than 200 hours.
 - 4. Measured using human body model (per ANSI/ANSI/ESDA/JEDEC JS-001-2010), charged device model (AEC Q101-005 rev A).

JEDEC Moisture Sensitivity

Table 5. Moisture sensitivity levels for LUXEON Neo PC-Amber 1 mm²

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

Characteristic Curves

Spectral Power Distribution Characteristics

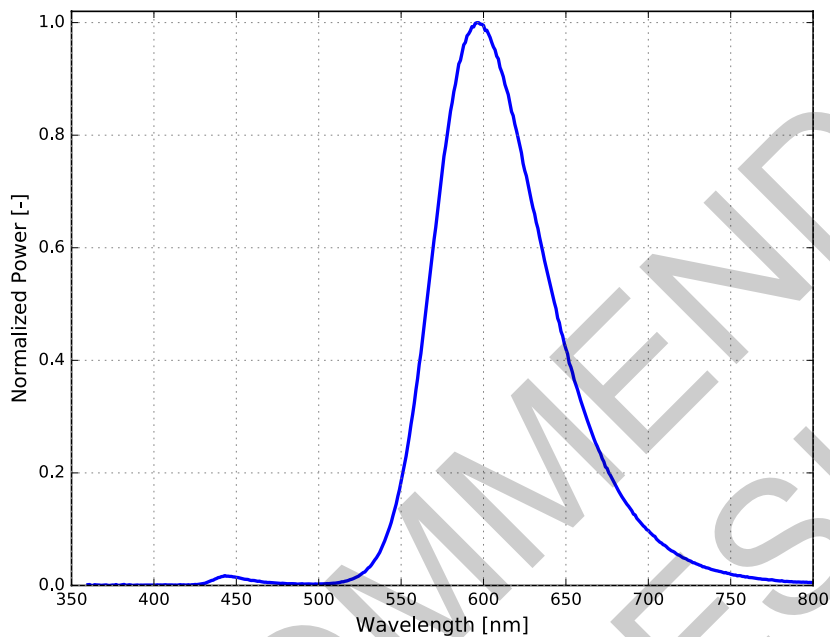


Figure 2. Typical normalized power vs. wavelength for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA, $T_c = 85\text{ }^{\circ}\text{C}$

Light Output Characteristics

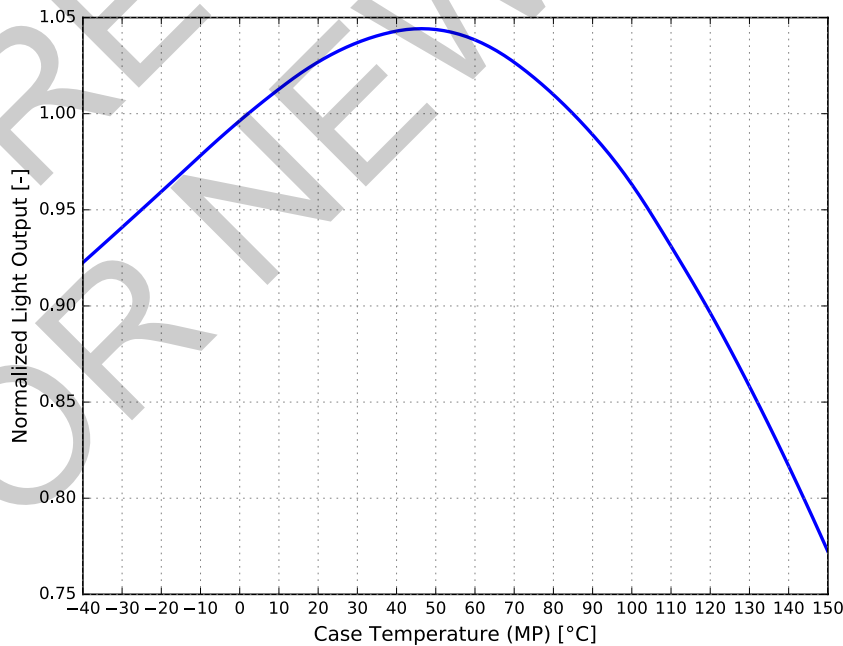


Figure 3a. Typical normalized light output vs. case temperature for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA

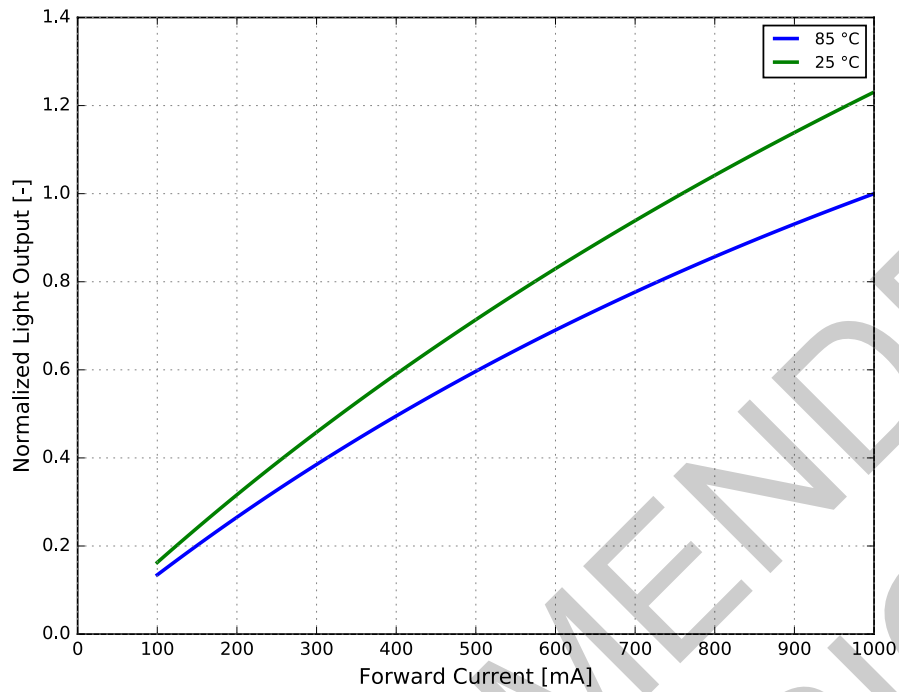


Figure 3b. Typical normalized light output vs. forward current for LUXEON Neo PC-Amber 1 mm²

Forward Current and Forward Voltage Characteristics

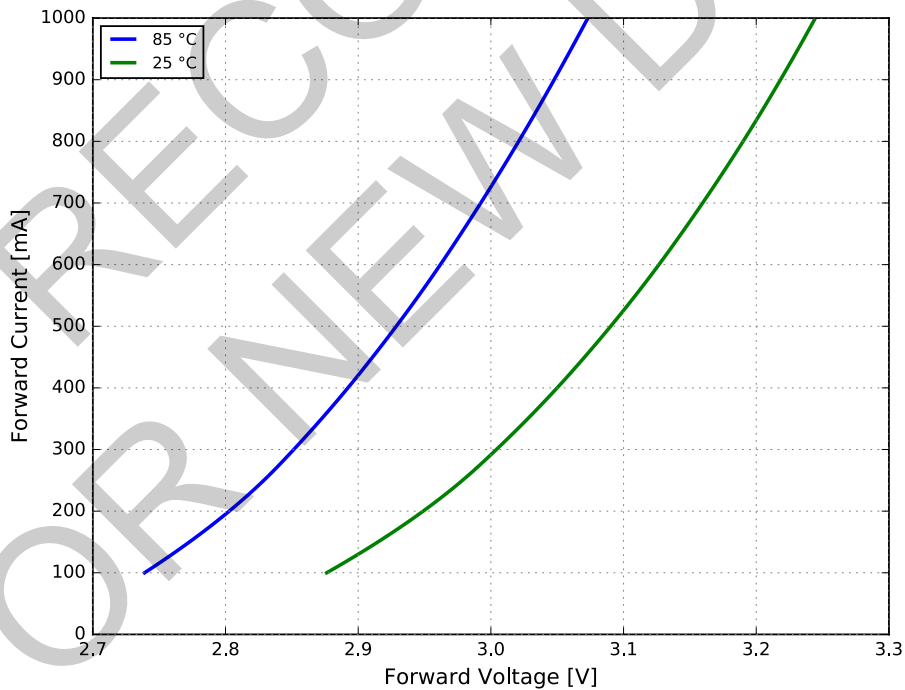


Figure 4a. Typical forward current vs. forward voltage for LUXEON Neo PC-Amber 1 mm² at $T_c = 85\text{ °C}$

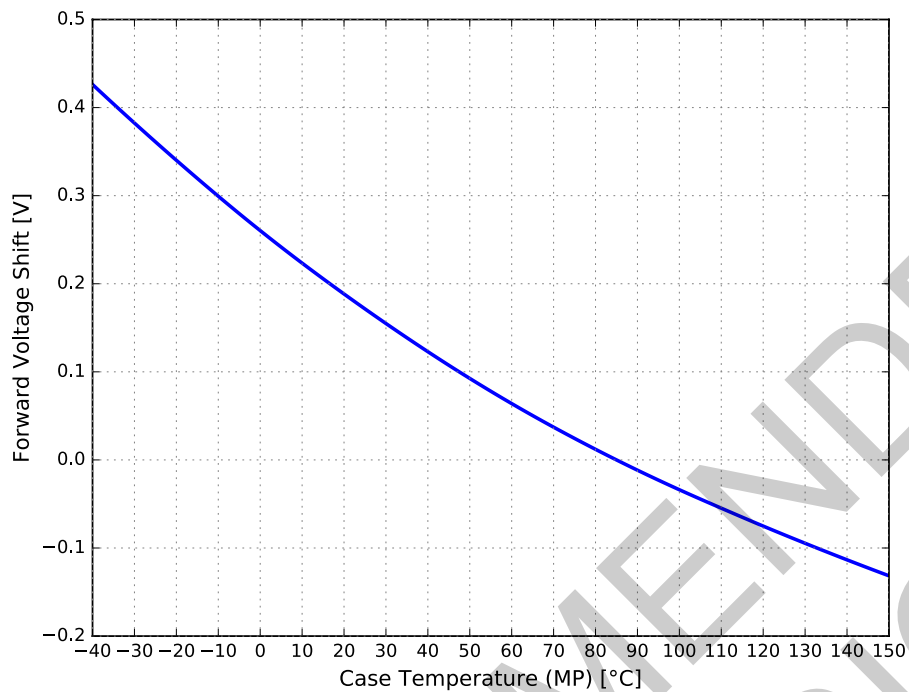


Figure 4b. Typical forward voltage shift vs. case temperature for LUXEON Neo PC-Amber 1 mm²

Color Shift Characteristics

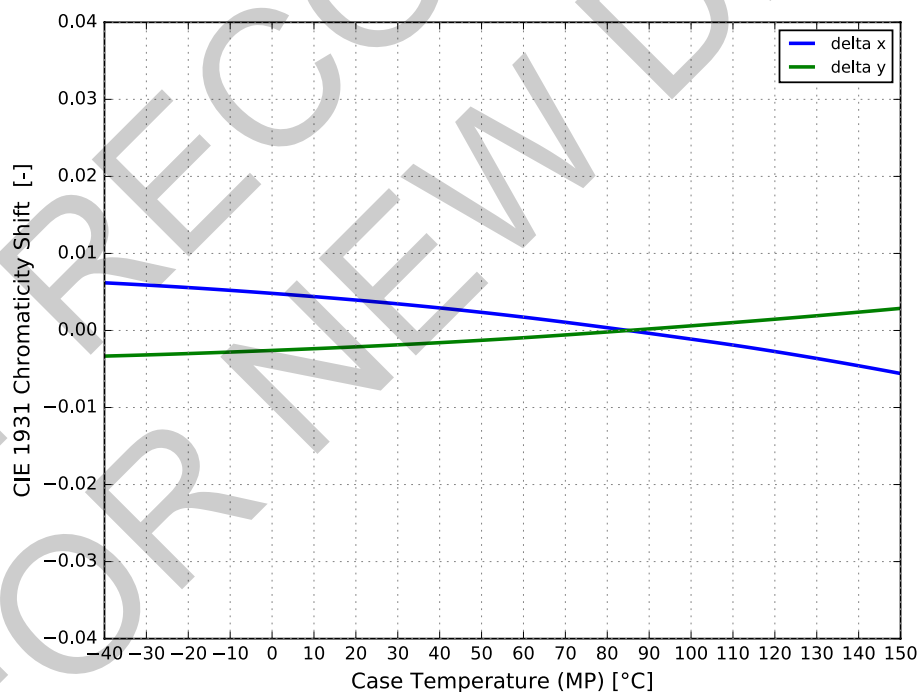


Figure 5a. Typical color shift in CIE 1931 x and y coordinates vs. case temperature for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA

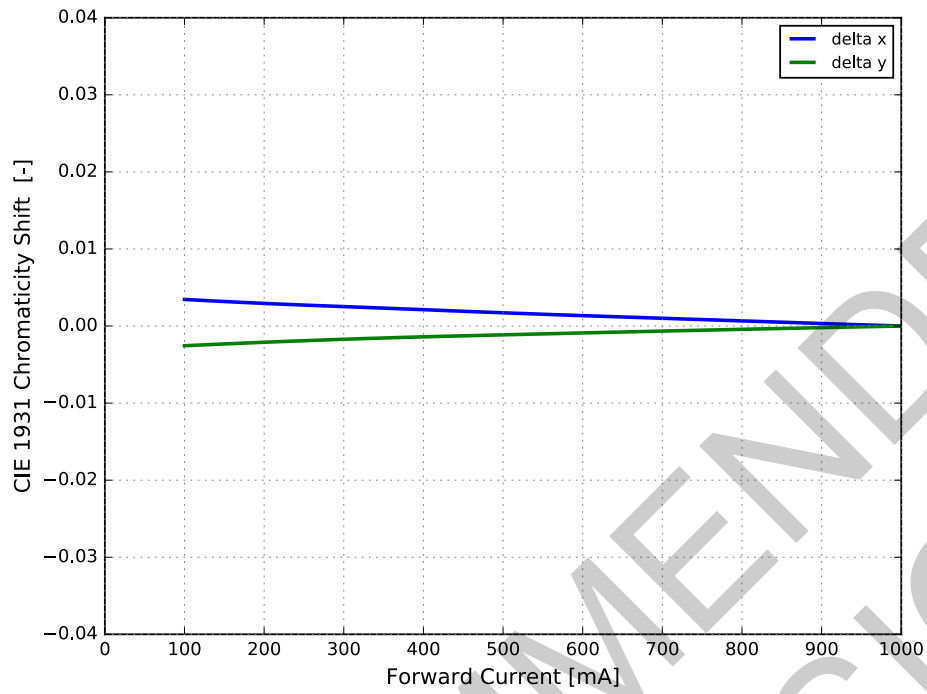


Figure 5b. Typical color shift in CIE 1931 x and y coordinates vs. forward current for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, $T_c = 85\text{ }^{\circ}\text{C}$

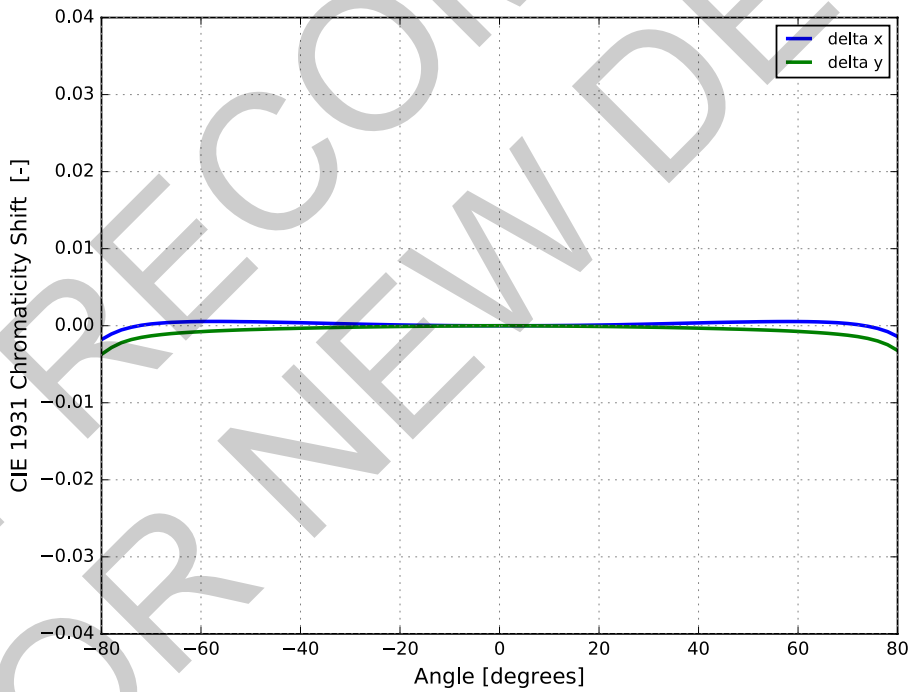


Figure 5c. Typical color shift in CIE 1931 x and y coordinates vs. angle for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA

Radiation Pattern Characteristics

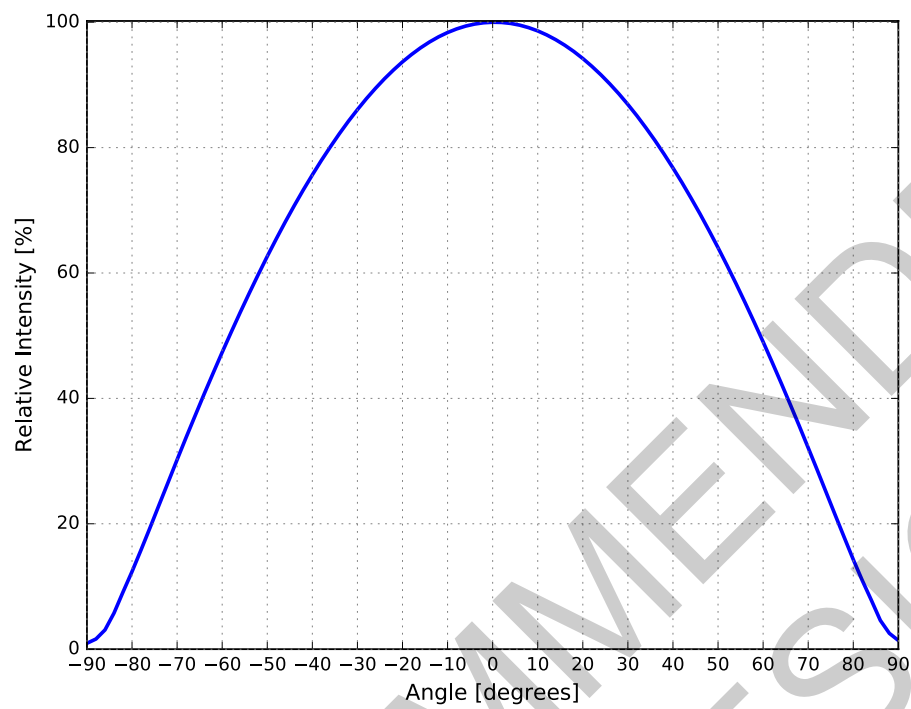


Figure 6. Typical radiation pattern for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA, $T_c = 85^\circ\text{C}$

Operating Limits Characteristics

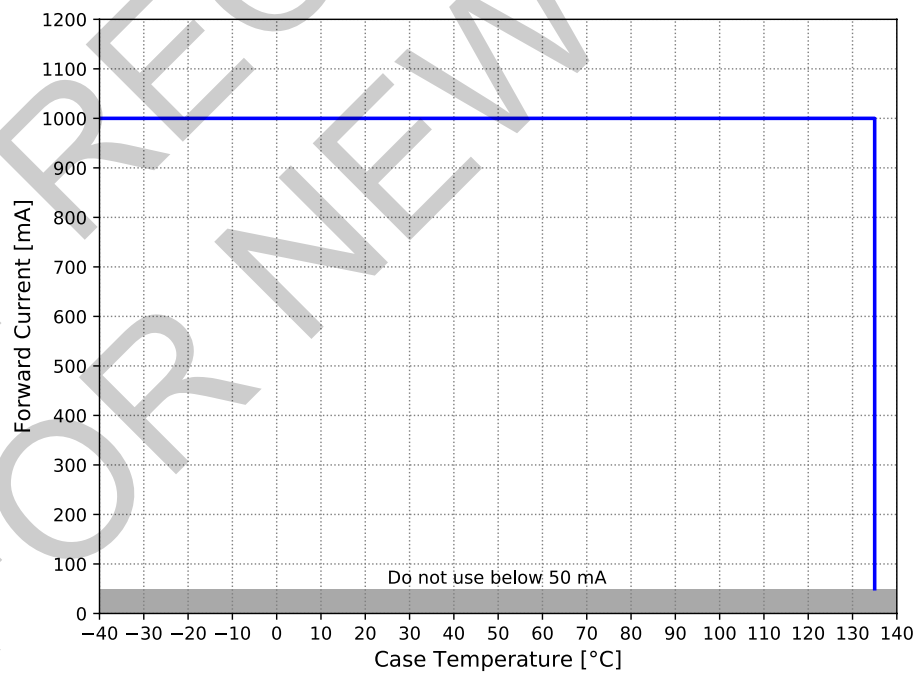


Figure 7. Maximum forward current vs. case temperature for LUXEON Neo PC-Amber 1 mm²

Permissible Pulse Handling Characteristics

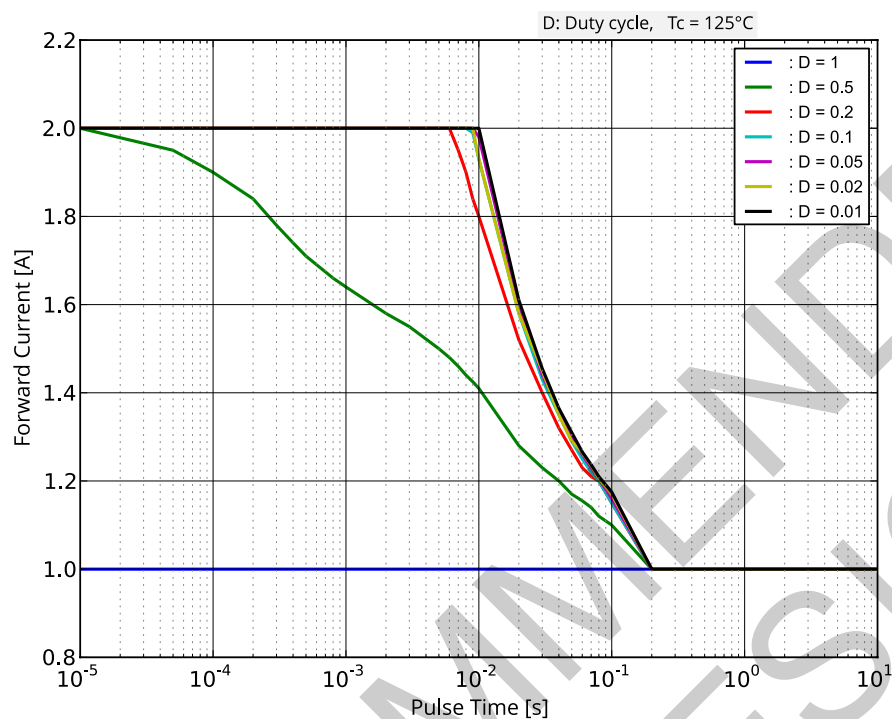


Figure 8. Permissible pulse handling capability for LUXEON Neo PC-Amber 1 mm²

Product Bin and Labeling Definitions

Designing with LUXEON Neo PC-Amber 1 mm²

Flux bins supportable for car programs depend on product color and program start- and end-of-production date. Flux roadmaps by year and product color are maintained and available from the sales representative. Please contact your local sales representative to request the flux bin range with best supportability for program timing.

Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheets. For this reason, Lumileds bins the LED components for luminous flux, color and forward voltage.

LUXEON Neo PC-Amber 1 mm² are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C

Where:

- A** – designates luminous flux bin (example: B = 180 to 190 lumens)
- B** – designates color code (A or B)
- C** – designates forward voltage bin (example: B = 2.55 to 2.79 V)

Therefore, a LUXEON Neo PC-Amber 1 mm² with a lumen range of 190 lm to 200 lm, color bin of A and a forward voltage of 2.55 V to 2.79 V has the following CAT code:

C A B

Luminous Flux Bins

Table 6. Luminous flux bins for LUXEON Neo PC-Amber 1 mm² at <20 ms MP, 1000 mA, $T_c = 85^\circ\text{C}$

BIN	LUMINOUS FLUX ^[1] (lm)	
	MINIMUM	MAXIMUM
B	180	190
C	190	200
D	200	210
E	210	220

Notes for Table 6:

1. Lumileds maintains a tolerance of $\pm 6.5\%$ on luminous flux measurements.

Color Codes

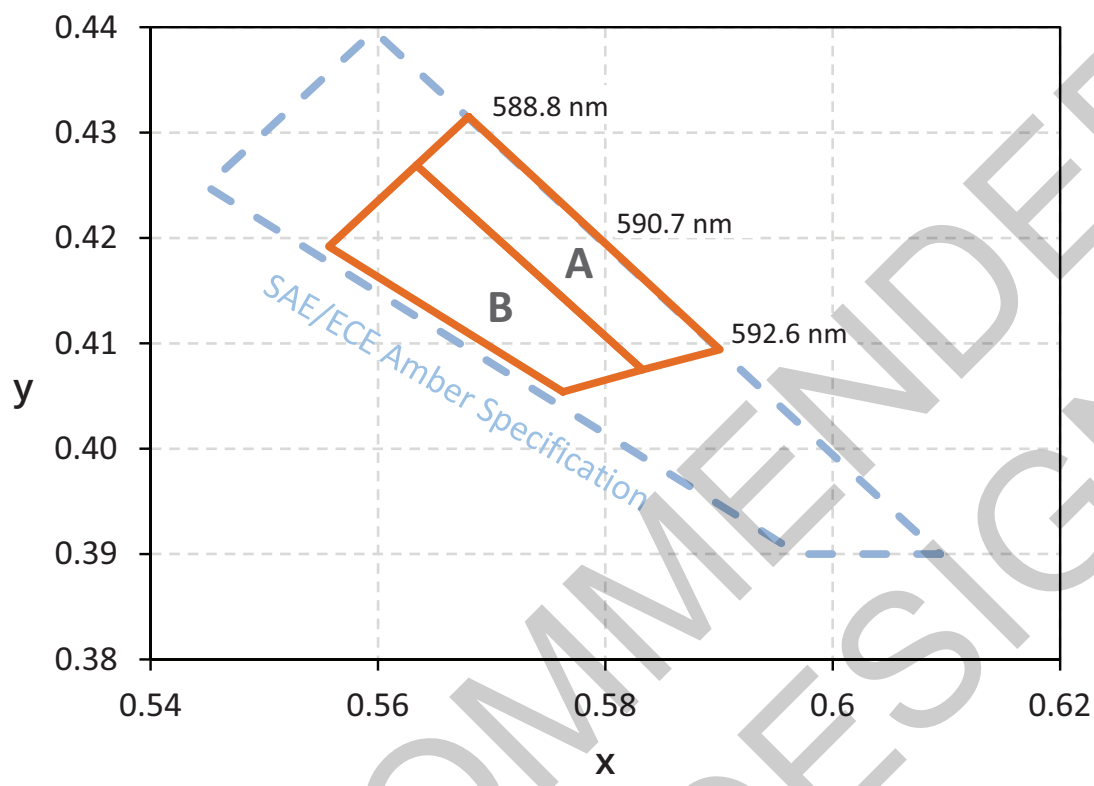


Figure 9. Color bin structure in CIE 1931 color space for LUXEON Neo PC-Amber 1 mm²

Color Bin Definitions

Table 7. Color bin definitions for LUXEON Neo PC-Amber 1 mm²

BIN	x	y
A	0.5680	0.4315
	0.5634	0.4269
	0.5833	0.4075
	0.5901	0.4094
B	0.5763	0.4054
	0.5833	0.4075
	0.5634	0.4269
	0.5557	0.4192

Notes for Table 7:
1. Lumileds maintains a tester tolerance of ±0.005 on x and y color coordinates.
2. CIE 1931 x and y coordinate frame.
3. Test conditions at test current with a pulse duration of 20 ms.

Forward Voltage Bins

Table 8. Forward voltage bin definitions for LUXEON Neo PC-Amber 1 mm²

BIN	FORWARD VOLTAGE ⁽¹⁾ (V _f)	
	MINIMUM	MAXIMUM
B	2.55	2.79
C	2.79	3.03
D	3.03	3.27
E	3.27	3.51

Notes for Table 8:

- 1. Lumileds maintains a tolerance of ±0.06 V on forward voltage measurements.
- 2. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Mechanical Dimensions

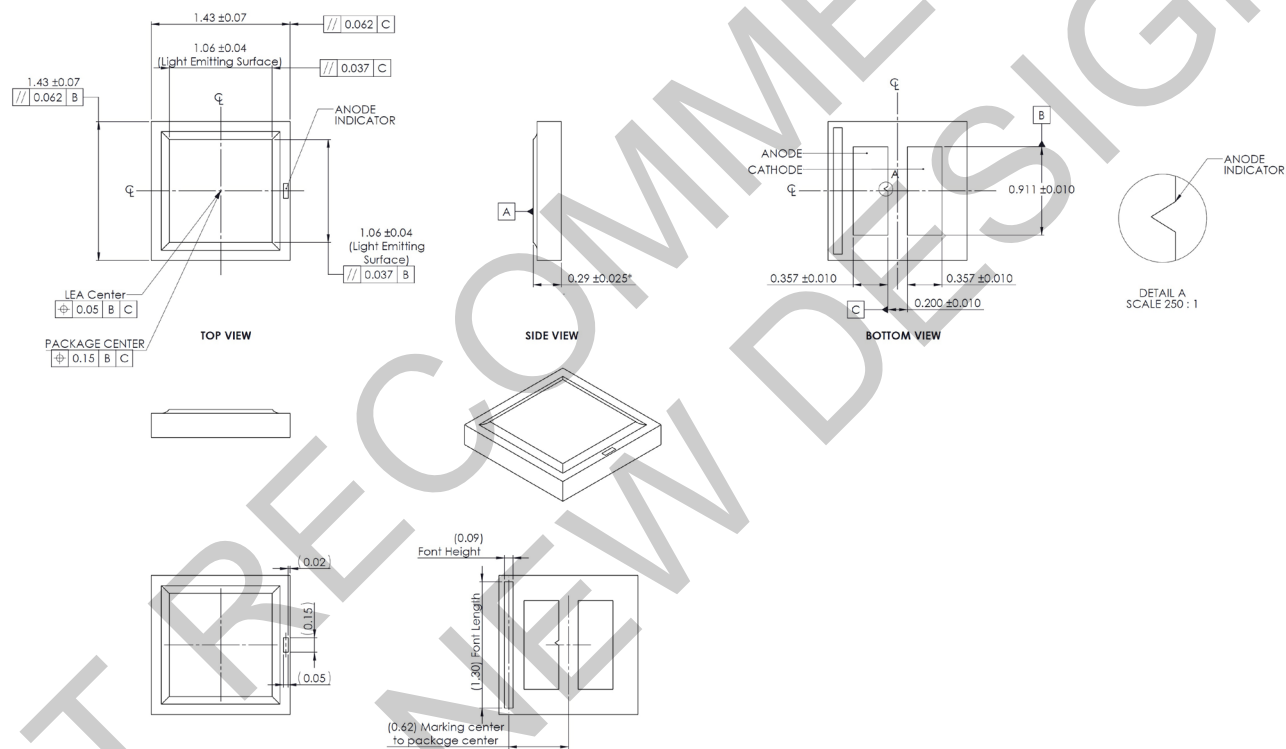


Figure 10. Mechanical dimensions for LUXEON Neo PC-Amber 1 mm²

Notes for Figure 10:

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

Packaging and Labeling Information

Pocket Tape Dimensions

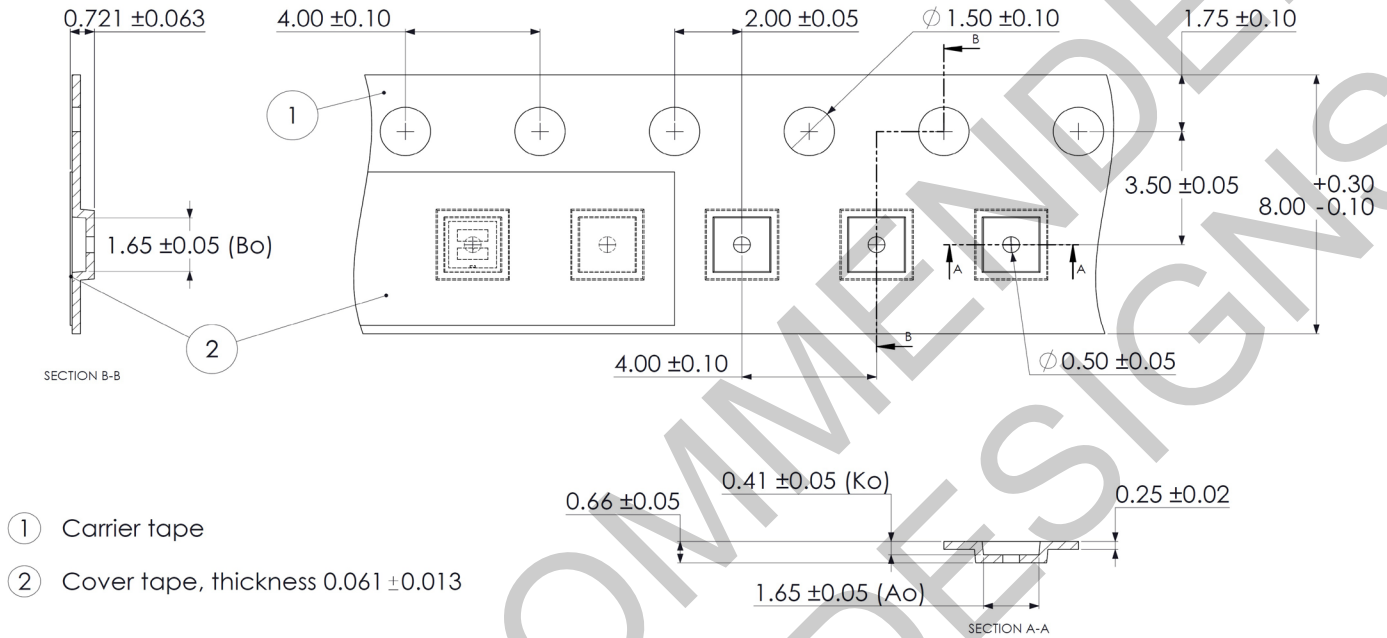


Figure 11. Pocket tape dimensions for LUXEON Neo PC-Amber 1 mm²

Notes for Figure 11:

1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Ao is the length of pocket, Bo is the width of pocket and Ko is the depth of pocket.

Reel Dimensions

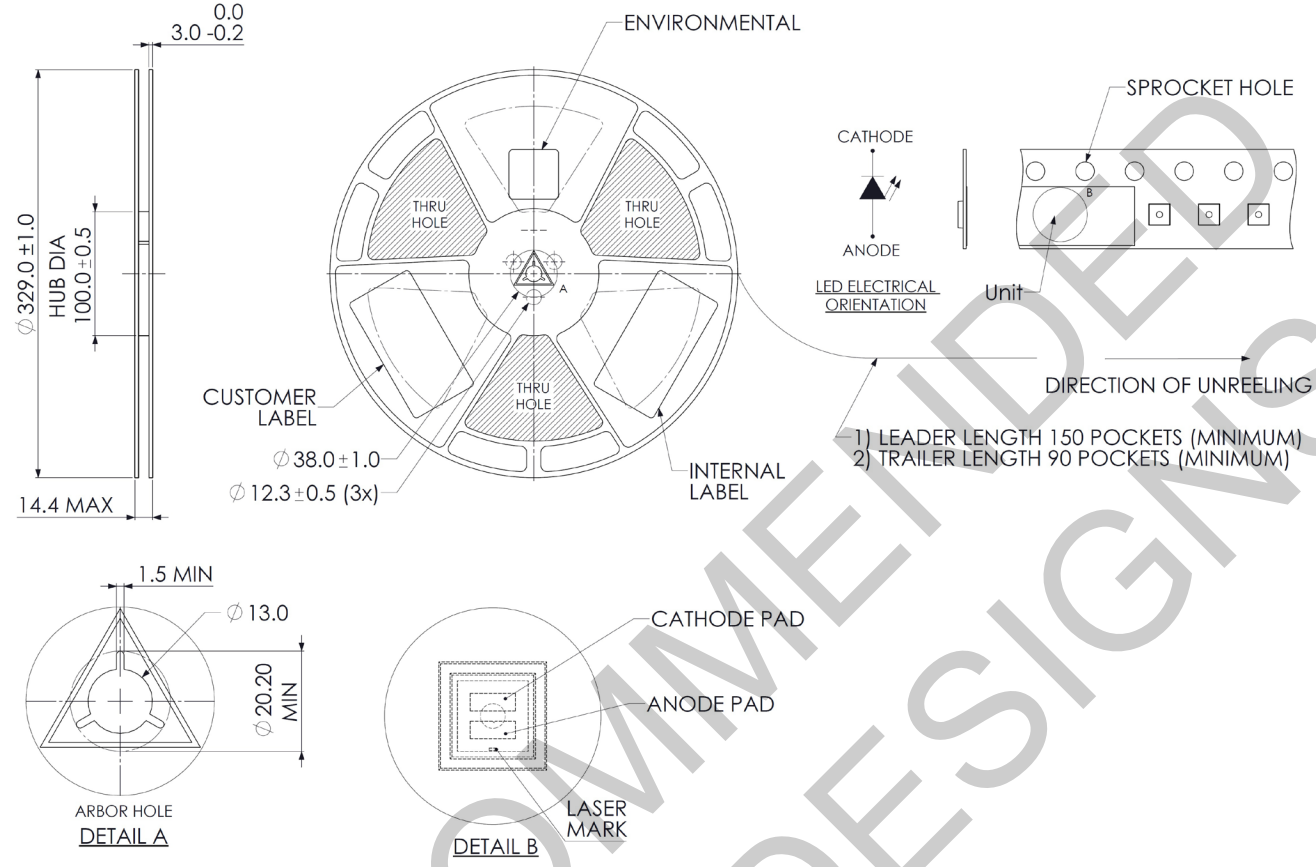


Figure 12. Reel dimensions for LUXEON Neo PC-Amber 1 mm²

Notes for Figure 12:

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

Product Labeling

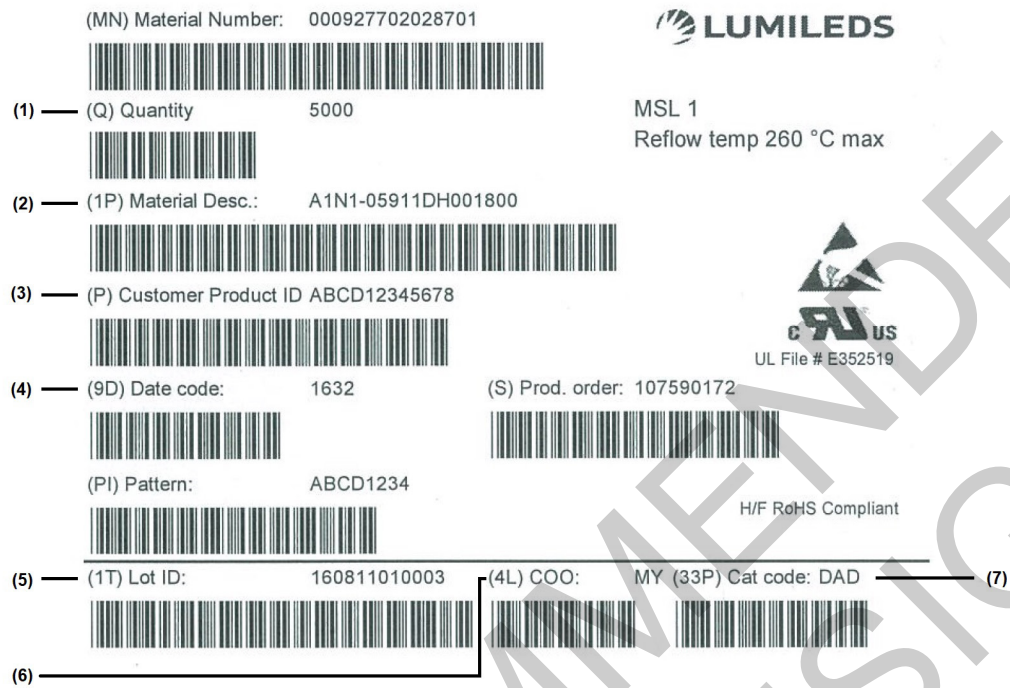


Figure 13. Example of a reel label for LUXEON Neo PC-Amber 1 mm²

Notes for Figure 13 – Reel label descriptions for customer use:
Field labels not described are for Lumileds internal use only.

- 1. Total number of LED emitters in a shipment box.
- 2. Lumileds part number
- 3. Customer part number for custom requests only.
- 4. LED test date in YYWW format.
- 5. Unique product lot identification number. This number is required for traceability purposes.
- 6. Country code of origin of manufacturing of part (e.g. MY for Malaysia, CN for China) according to ISO 3166-1 alpha-2 document.
- 7. Product bin 3-digit alphanumeric CAT code.

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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