LUMILEDS

AUTOMOTIVE

LUXEON Altilon TopContact 1x1

Automotive Forward Lighting Source

LUXEON Altilon TopContact is specifically designed and tested to meet and exceed expectations for reliability, performance, and lifetime in automotive forward lighting applications. It is designed for ease of assembly with capability of direct mounting on heat sinks, and reduce overall system costs.

LUXEON Altilon TopContact provides industry-best thermal performance in LED forward lighting applications, meeting both SAE and ECE color specifications with finer granularity than existing systems. LUXEON Altilon TopContact is released according to AEC-Q102.

FEATURES AND BENEFITS

- Higher drive current capability for increased flux performance
- Low thermal resistance and power consumption results in simplified thermal management and system cost
- High flux output provides flexibility in styling and optical design
- Designed for direct heatsink mount
- Hot binned at 85 °C monopulse (MP) to match closer to operating conditions
- IEC/PAS 62707-1 White LED

PRIMARY APPLICATIONS

- Adaptive Lighting
  - AFS
- Daytime Running Lights
- Static Bending Lights
- Headlight
  - Low Beam
  - High Beam
  - Static Bending
- Fog Lights

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General Product Information

Product Test Conditions

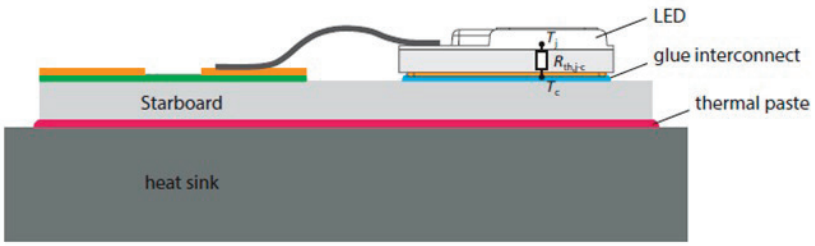

Figure 1. Case temperature measurement point for Luxeon Altilon TopContact 1x1

LUXEON Altilon TopContact 1x1 is tested and binned using a 20 ms monopulse (MP) at 1000 mA drive current. The case temperature is set to 85 °C at the beginning of the pulse.

Part Number Nomenclature

Part numbers for LUXEON Altilon TopContact follow the convention below:

A 1 S T – B B B B C D E F G G G G 0

Where:

A	–	Designates product segment (A = Automotive)
1	–	Designates product level (1 = Level 1)
S	–	Designates the product Line/Family (S = SMD)
T	–	Designates the deivative (T = TopContact)
B B B B	–	Designates correlated color temperature (5850 = 5850 K)
C	–	Designates number of die/chip (1 = 1 die)
D	–	Designates test current (D = 1000 mA)
E	–	Designates test temperature (H = 85 °C)
F	–	Product revision
G G G G	–	Designates minimum luminous flux
0	–	Blank

Therefore, the following part number is used for a LUXEON Altilon TopContact 1x1 with a minimum luminous flux of 330 lumens:

A 1 S T – 5 8 5 0 1 D H 3 0 3 3 0 0

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON Altilon TopContact 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 LUXEON Altilon TopContact: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

Performance Characteristics

Product Selection Guide

Table 1. Product selection for LUXEON AltilonTopContact at 1000 mA, 20 ms MP, T_c=85 °C

MINIMUM LUMINOUS FLUX [1] (lm)	PART NUMBER
320	A1ST-58501DH303200
330	A1ST-58501DH303300
340	A1ST-58501DH303400
350	A1ST-58501DH303500

Notes for Table 1:
1. Lumileds maintains a tolerance of ±6,5% on luminous flux measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON Altilon TopContact 1x1

PART NUMBER	CORRELATED COLOR TEMPERATURE (K)		TYPICAL TOTAL INCLUDED ANGLE [1] $\theta_{0.90V}$	TYPICAL VIEWING ANGLE [2] $\theta_{1/2}$
	MINIMUM	MAXIMUM		
A1ST-58501DHxxxxxx	5180	6680	140°	120°

Notes for Table 2:
1. Correlated color temperature is measured at binning condition.
2. $2\theta_{0.90V}$ denotes the total angle at which 90% of total luminous flux is captured, i.e. the cone defined by the off-axis angle $\theta_{0.90V}$ from the LED centerline includes 90% of the total flux.
3. $2\theta_{1/2}$ denotes the viewing angle, with $\theta_{1/2}$ being the off-axis angle from the LED centerline where the luminous intensity is ½ of the peak value.

Thermal Characteristics

Table 3. Thermal characteristics for LUXEON Altilon TopContact 1x1 derived from thermal transient measurements at 1000 mA (DC) and 25 °C stage temperature

PARAMETER	THERMAL RESISTANCE JUNCTION TO CASE (K/W)			
	$R\Theta_{J\text{-}C}$ el [1]		$R\Theta_{J\text{-}C}$ real [2]	
	TYPICAL	MAXIMUM	TYPICAL	MAXIMUM
A1ST-58501DHxxxxxx	3.5	5.2	5.2	7.7

Notes for Table 3:
1. Ratio between temperature difference (junction↔case) and electrical input power (references JESD51-51, JESD51-14).
2. Ratio between temperature difference (junction↔case) and dissipated heat, i.e. emitted light taken into account (references JESD51-51, JESD51-14)

Absolute Ratings

Table 4. Absolute ratings for LUXEON Altilon TopContact 1x1

PARAMETER	PERFORMANCE
Minimum DC Forward Current	50 mA
Maximum DC Forward Current	1500 mA
Maximum Junction Temperature [1, 2]	150 °C
Case Temperature Range [1]	-40 °C to 145 °C
Maximum Juction Temperature for Short Time Applications[3]	180 °C
LED Storage Temperature	-40 °C to 150 °C
Maximum Temperature for Glue Curing	210 °C for ≤30 min.
ESD Sensitivity [4]	±8 kV HBM, ±2 kV CDM
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. LUXEON Altilon TopContact 1x1 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 Altilon TopContact 1x1

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

Characteristic Curves

Spectral Power Distribution Characteristics

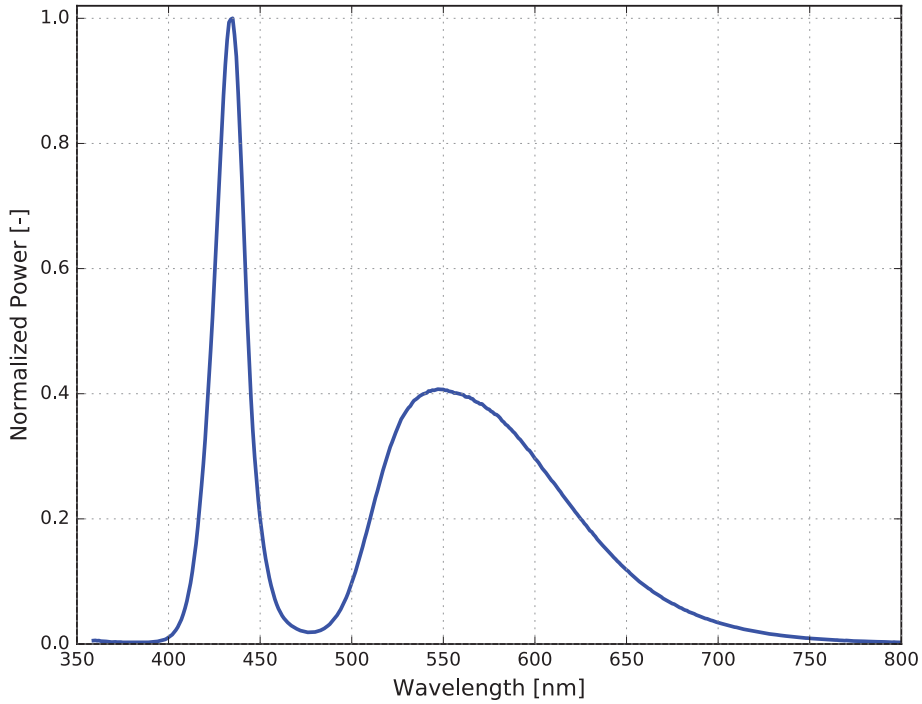

Figure 2. Typical normalized power vs. wavelength for LUXEON Altilon TopContact 1x1 at 20 ms MP, 1000 mA, 85 °C

Light Output Characteristics

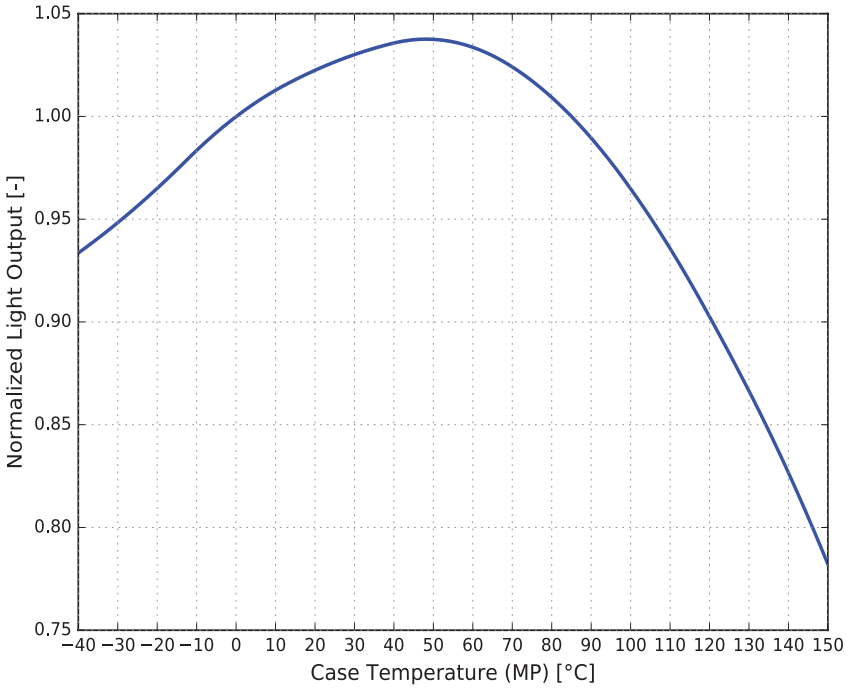

Figure 3a. Typical normalized light output vs. case temperature for LUXEON Altilon TopContact 1x1 at 20 ms MP, 1000 mA

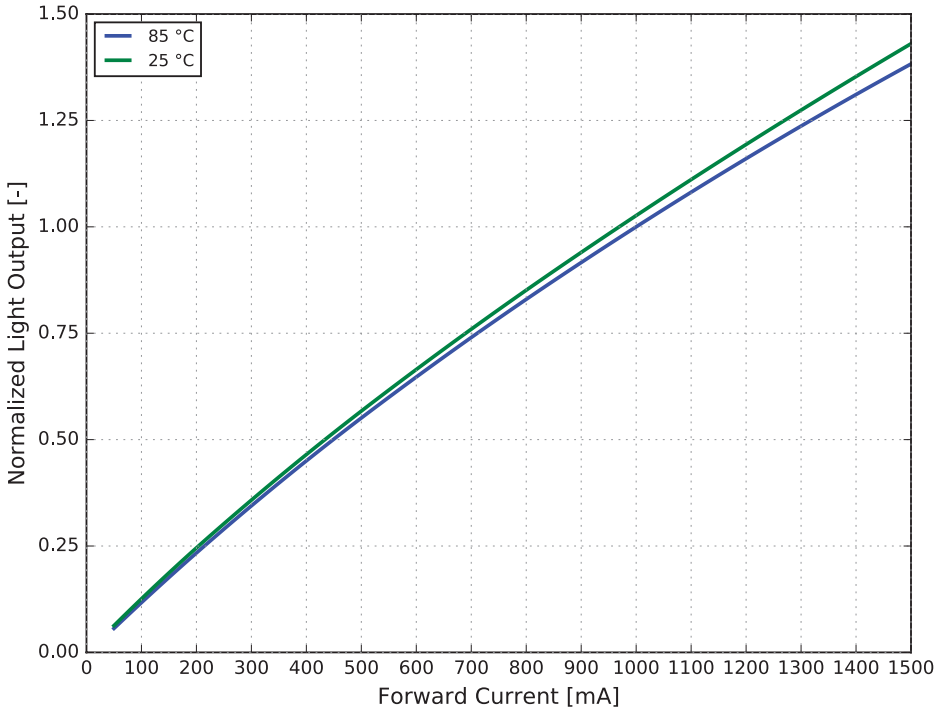

Figure 3b. Typical normalized light output vs. forward current for LUXEON Altilon TopContact 1x1 at 20 ms MP, 25 °C and 85 °C

Forward Current and Voltage Characteristics

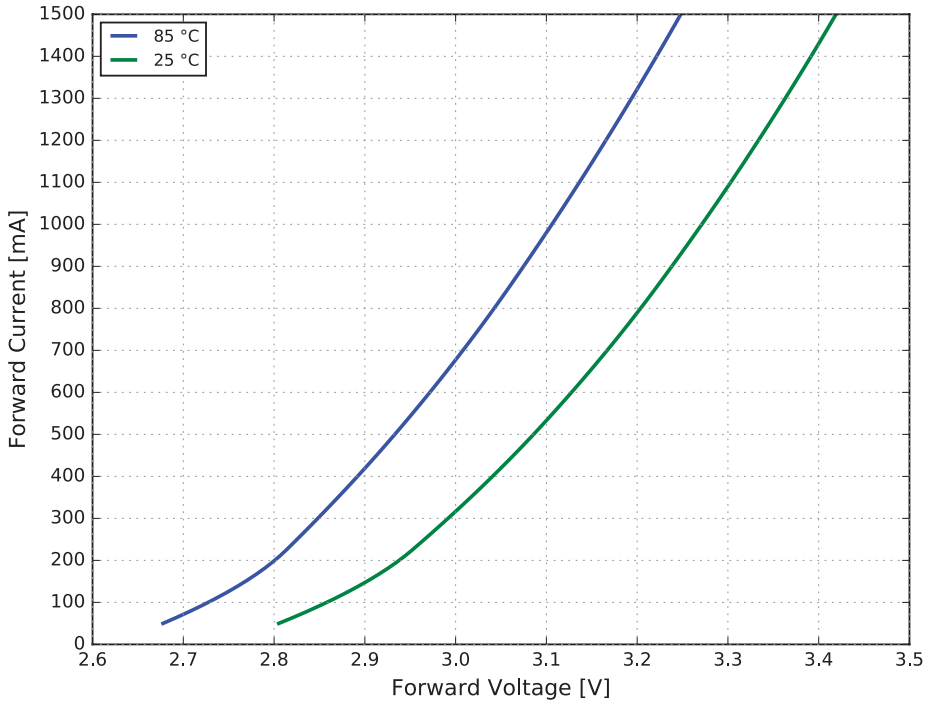

Figure 4a. Typical forward current vs. forward voltage for LUXEON Altilon TopContact 1x1 at 20 ms MP, 85 °C and 25 °C

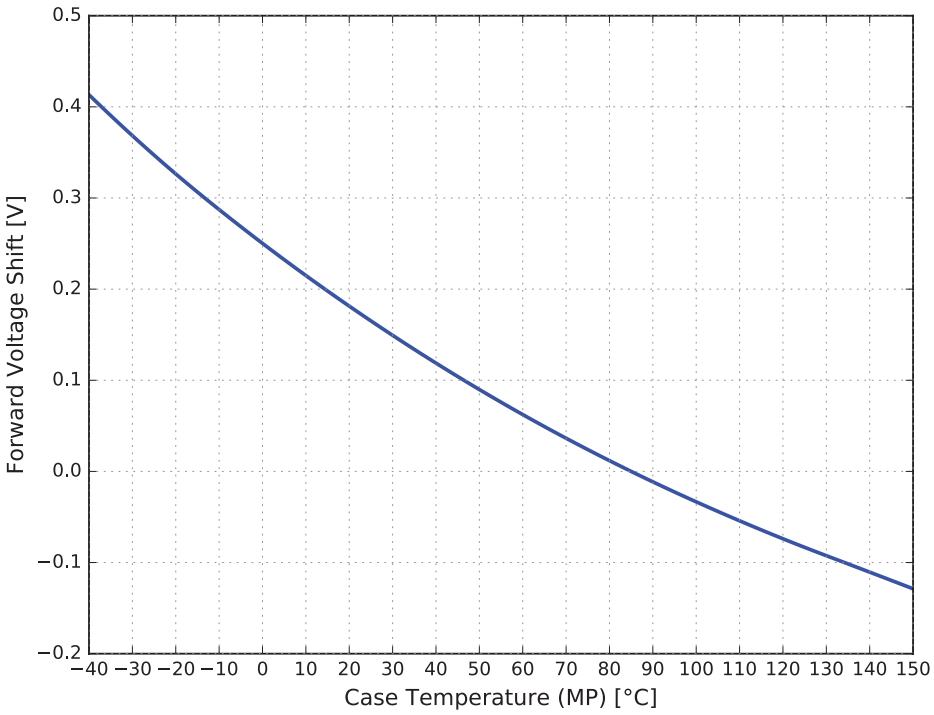

Figure 4b. Typical forward voltage shift vs. case temperature for LUXEON Altilon TopContact 1x1 at 1000 mA, 20 ms MP

Color Shift Characteristics

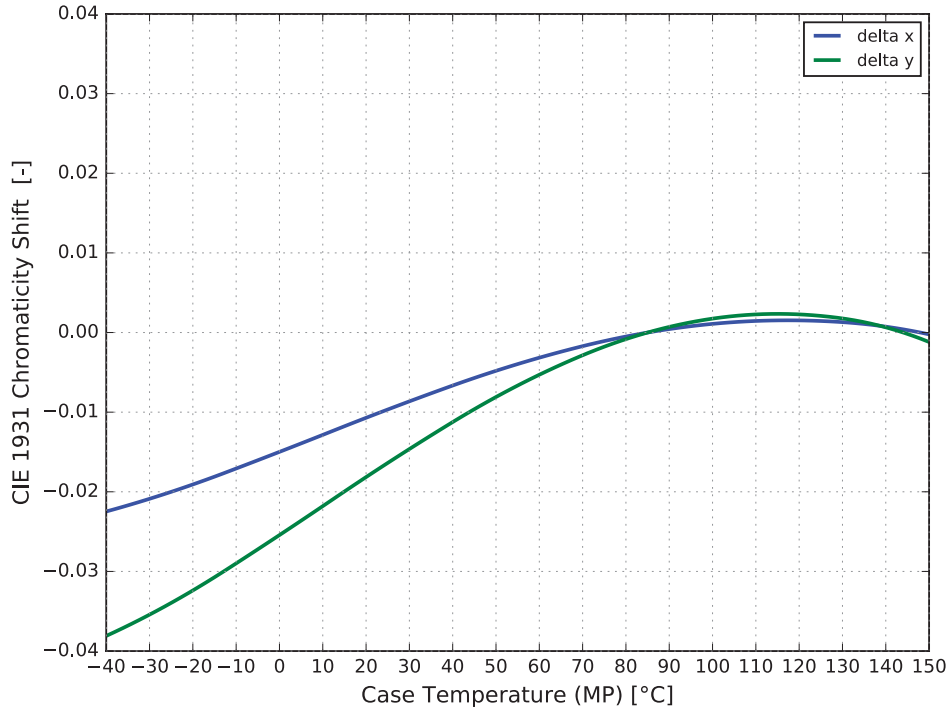

Figure 5a. Typical color shift in CIE 1931 coordinates over temperature for LUXEON Altilon TopContact 1x1 at 20 ms MP, 1000 mA

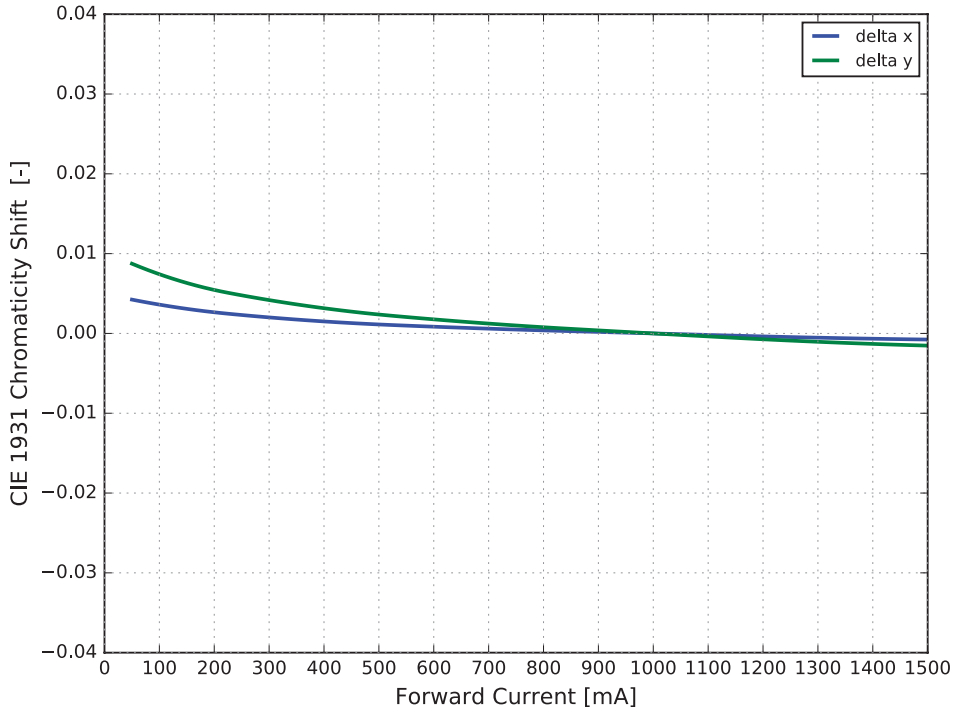

Figure 5b. Typical color shift in CIE 1931 x, y coordinates over current for LUXEON Altilon TopContact 1x1 at 20 ms MP, 85 °C

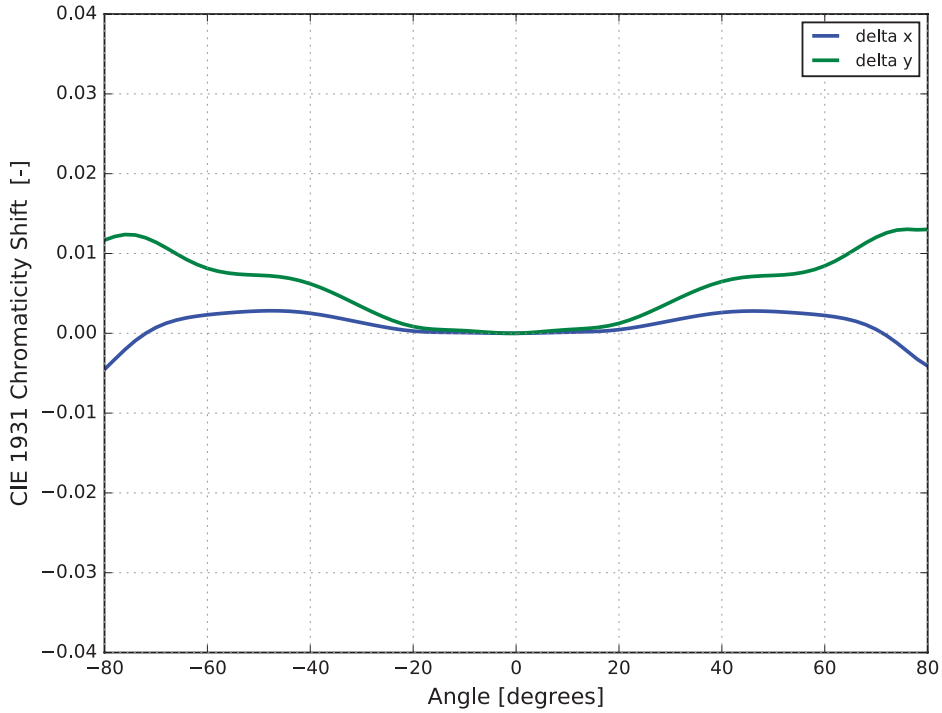

Figure 5c. Typical color shift in CIE 1931 x, y coordinates over angle for LUXEON Altilon TopContact 1x1 at 1000 mA

Radiation Pattern Characteristics

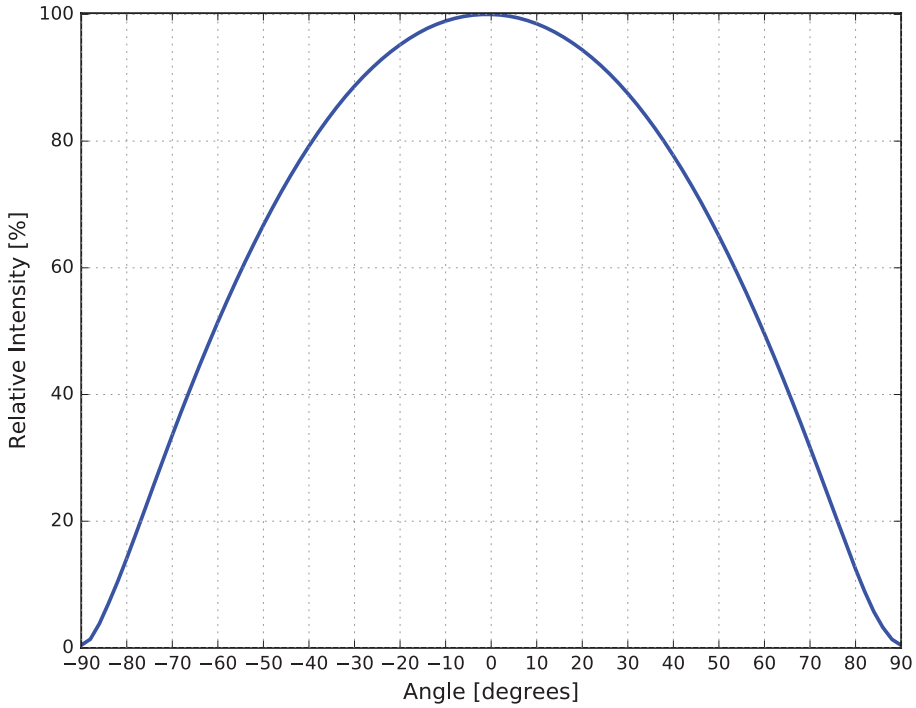

Figure 6. Typical radiation pattern for LUXEON Altilon TopContact 1x1 at 1000 mA

Operating Limits Characteristics

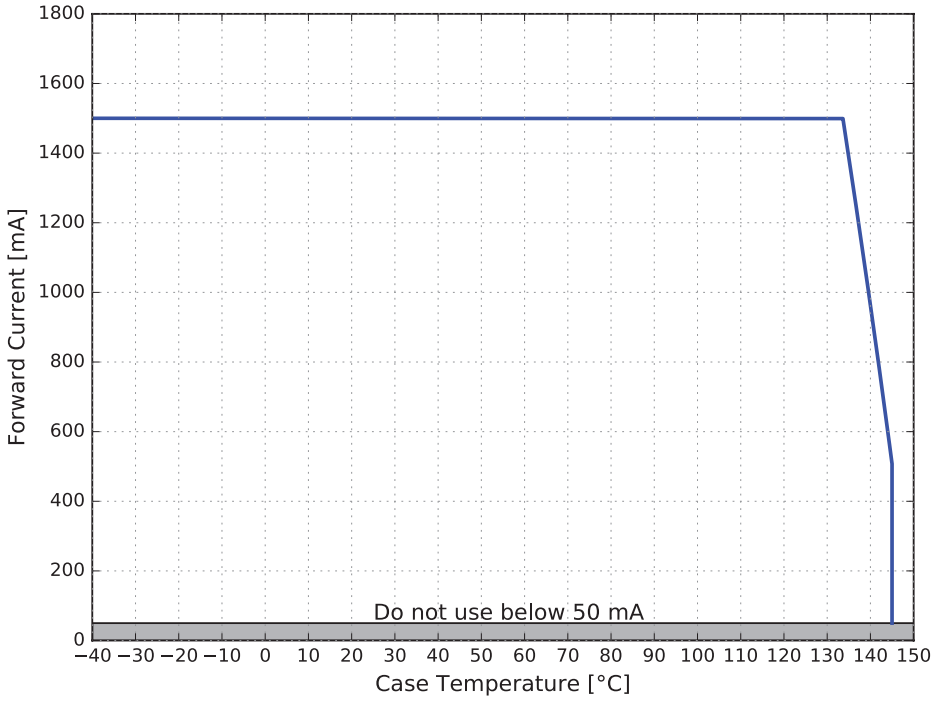

Figure 7. Maximum forward current vs. case temperature for LUXEON Altilon TopContact 1x1

Permissible Pulse Handling Characteristics

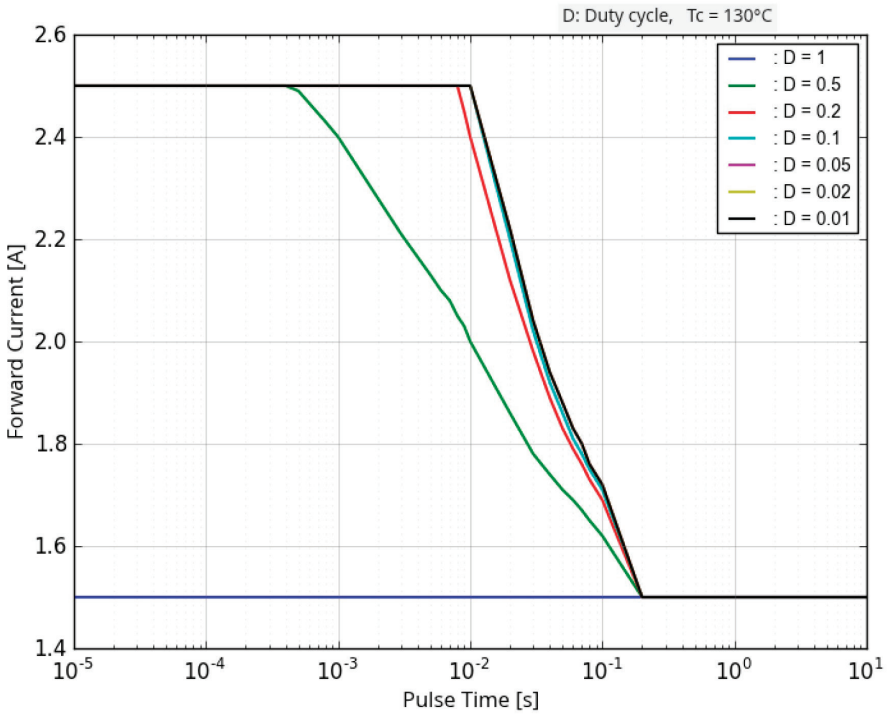

Figure 8. Permissible pulse handling capability for TopContact 1x1

Product Bin and Labeling Definitions

Designing with LUXEON Altilon TopContact 1x1

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 a 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 Altilon TopContact 1x1 LEDs are labeled using a 4-digit alphanumeric CAT code following the format below:

A B C D

Where:

A – designates luminous flux bin (example: K=320 to 330 lumens) per die

B C – designates color bin (example: HC)

D – designates forward voltage bin (example: B=6.40 V to 7.00 V)

Therefore, a LUXEON Altilon TopContact 1x1 with a lumen range of 320 to 330, color bin of HC, and a forward voltage range of 6.40 V to 7.00 V has the following CAT code:

K H C B

Luminous Flux Bins

Table 6 lists the standard luminous flux bins for LUXEON Altilon TopContact emitters. To obtain the flux of the product this number needs to be multiplied with the chip count. Product availability in a particular bin varies by color and platform start-of-production date. Contact your local sales representative for best supportability of programs.

Table 6. Luminous flux bin definitions for LUXEON Altilon TopContact 1x1 at 1000 mA, 20 ms MP, T_c=85 °C

BIN	LUMINOUS FLUX [1] (lm) PER DIE	
	MINIMUM	MAXIMUM
K	320	330
L	330	340
M	340	350
N	350	360
P	360	370
Q	370	380
R	380	390

Notes for Table 6:
1. Lumileds maintains a tolerance of ±6.5% on luminous flux measurements.

Color Bin Structure

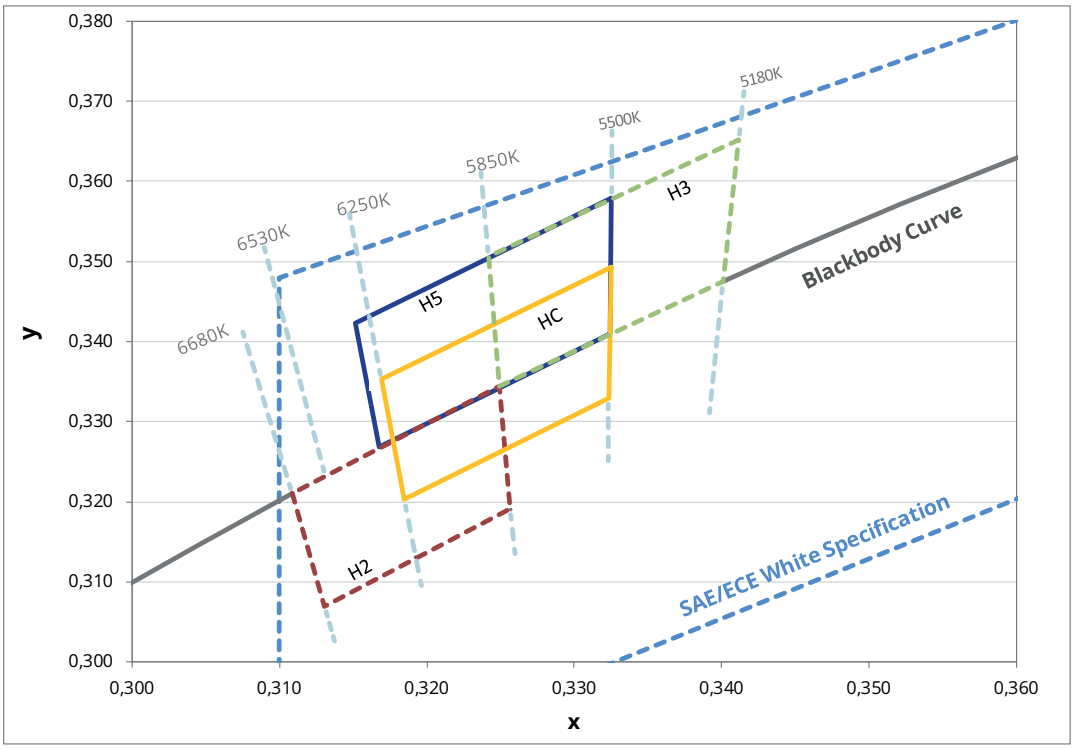

Figure 9. Color bin structure in CIE 1931 color space for LUXEON Altilon TopContact 1x1

Notes for Figure 9:
1. Lumileds supports the following bins for LUXEON Atlilon TopContact 1x1: H2, H3, HC, H5

Color Codes

Table 7a. Color bin definitions for LUXEON Altilon TopContact 1x1

BIN	x [1, 2]	y [1, 2]	TYPICAL CCT (K)
HC	0.3325	0.3493	5850
	0.3169	0.3353	
	0.3185	0.3203	
	0.3323	0.3329	
H5	0.3325	0.3579	5900
	0.3151	0.3423	
	0.3168	0.3268	
	0.3324	0.3410	
H2	0.3109	0.3211	6250
	0.3131	0.3070	
	0.3256	0.3191	
	0.3249	0.3344	
H3	0.3249	0.3344	5500
	0.3401	0.3476	
	0.3412	0.3652	
	0.3242	0.3506	

Notes for Table 7a:.
1. Lumileds maintains a tester tolerance of ±0.005 on *x* and *y* coordinates.
2. CIE 1931 *x* and *y* coordinates frame.

Table 7b. Optional color bin definitions for LUXEON Altilon TopContact 1x1.

CODE	x [1, 2]	y [1, 2]	TYPICAL CCT (K)	CODE	x [1, 2]	y [1, 2]	TYPICAL CCT (K)
1A	0.3109	0.3382	6390	3A	0.3242	0.3506	5680
	0.3161	0.3432			0.3325	0.3579	
	0.3169	0.3353			0.3325	0.3493	
	0.3120	0.3306			0.3246	0.3424	
1B	0.3120	0.3306	6390	3B	0.3246	0.3424	5680
	0.3169	0.3353			0.3325	0.3493	
	0.3177	0.3277			0.3324	0.3410	
	0.3131	0.3232			0.3249	0.3344	
1C	0.3161	0.3432	6050	3C	0.3325	0.3579	5350
	0.3242	0.3506			0.3412	0.3652	
	0.3246	0.3424			0.3406	0.3562	
	0.3169	0.3353			0.3325	0.3493	
1D	0.3169	0.3353	6050	3D	0.3325	0.3493	5350
	0.3246	0.3424			0.3406	0.3562	
	0.3249	0.3344			0.3401	0.3476	
	0.3177	0.3277			0.3324	0.3410	
2A	0.3109	0.3211	6460	4A	0.3249	0.3344	5680
	0.3177	0.3277			0.3324	0.3410	
	0.3185	0.3203			0.3323	0.3329	
	0.3120	0.3139			0.3253	0.3266	
2B	0.3120	0.3139	6460	4B	0.3253	0.3266	5680
	0.3185	0.3203			0.3323	0.3329	
	0.3192	0.3131			0.3323	0.3251	
	0.3131	0.3070			0.3256	0.3191	
2C	0.3177	0.3277	6050	4C	0.3324	0.3410	5350
	0.3249	0.3344			0.3401	0.3476	
	0.3253	0.3266			0.3396	0.3392	
	0.3185	0.3203			0.3323	0.3329	
2D	0.3185	0.3203	6050	4D	0.3323	0.3329	5350
	0.3253	0.3266			0.3396	0.3392	
	0.3256	0.3191			0.3392	0.3310	
	0.3192	0.3131			0.3323	0.3251	
1E	0.3169	0.3353	5970	1F	0.3208	0.3388	5780
	0.3285	0.3458			0.3325	0.3493	
	0.3288	0.3298			0.3323	0.3329	
	0.3185	0.3203			0.3219	0.3234	

Notes for Table 7b:
1. LUXEON Altilon emitters are tested and binned by *x* and *y* coordinates.
2. Lumileds maintains a tester tolerance of ±0.005 on *x* and *y* coordinates.

Forward Voltage Bins

Table 8. Forward voltage bin definitions for LUXEON Altilon TopContact 1x1

BIN	FORWARD VOLTAGE [1] (V_f)	
	MINIMUM	MAXIMUM
A	2.9	3.2
B	3.2	3.5
C	3.5	3.8

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

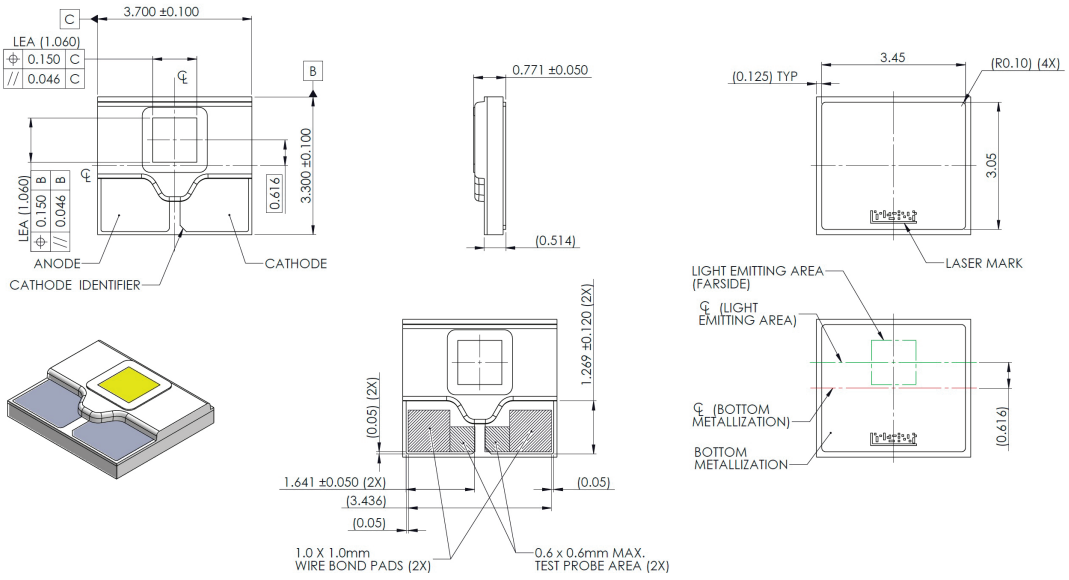

Figure 10. Mechanical dimensions for LUXEON Altilon TopContact 1x1

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

Packaging Information

Pocket Tape Dimensions

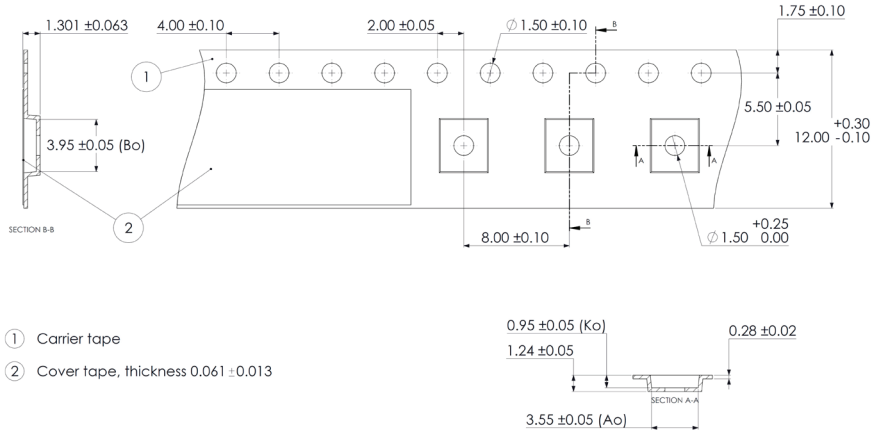

Figure 11. Pocket tape dimensions for LUXEON Altilon TopContact 1x1

Notes for Figures 11:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reel Dimensions

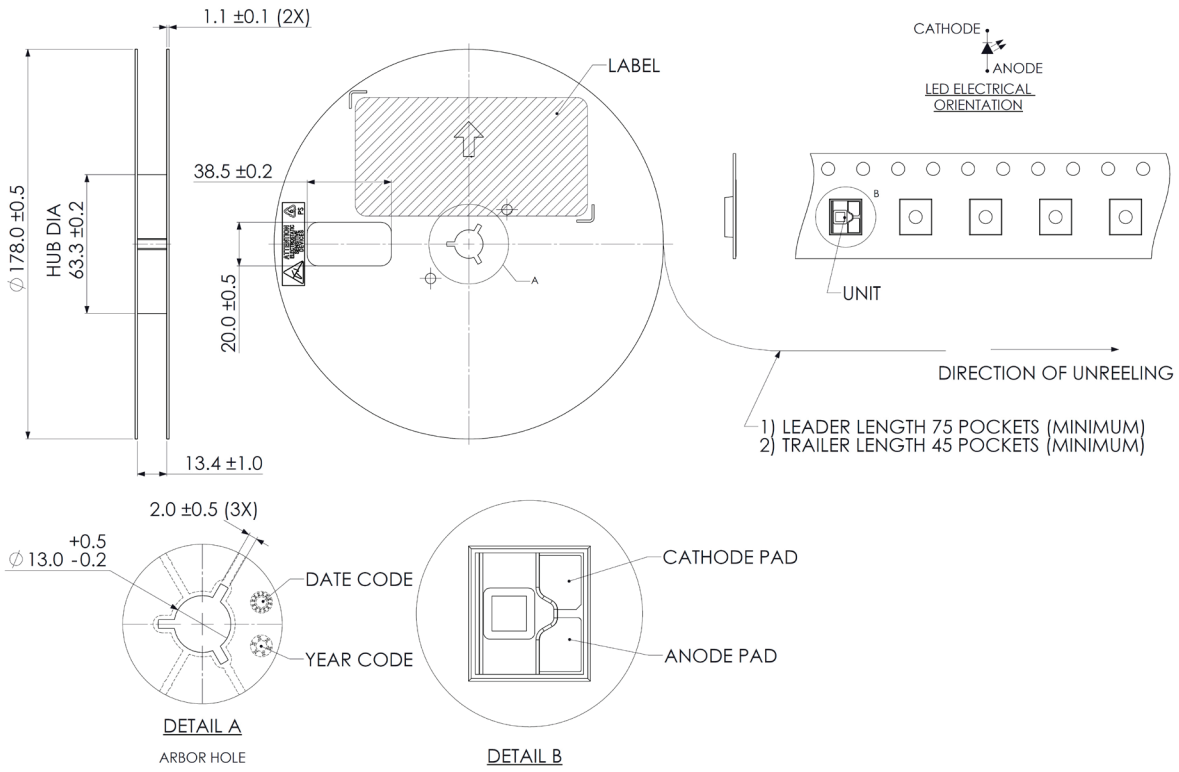

Figure 12. Reel dimensions for LUXEON Altilon TopContact 1x1

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

Product Labeling

LUXEON Altilon TopContact LEDs are packaged in moisture barrier bags on reels. Both moisture barrier bag and reels have printed information providing part numbers with CAT codes that indicate luminous flux, color and forward voltage bins.

Figure 13. Example of a product label for LUXEON Altilon TopContact

Notes for Figure 13 – Outer Box Label descriptions for customer use:
Field labels not described are for Lumileds internal use only.

1. (Q) Total number of LED emitters in a shipment box.
2. (1P) Lumileds part number
3. (P) Customer part number for custom requests only.
4. (9D) LED test date in YYWW format.
5. (1T) Unique product lot identification number. This number is required for traceability purposes.
6. (4L) 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. (33P) Product bin 4-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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