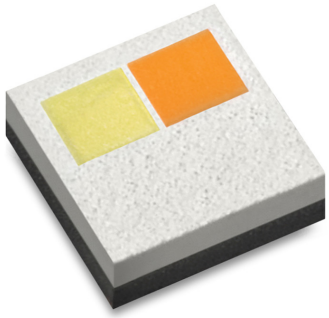
LUMILEDS

AUTOMOTIVE

LUXEON Altilon SMD DT

Industry-leading dual color SMD solutions for daytime running and front turn lamps



LUXEON Altilon SMD DT is a single source, dual color LED designed to provide industry-leading luminance in Cool White and PC Amber color for daytime running and front turn lamps. Engineered with Chip Scale Packaging (CSP) technology, LUXEON Altilon SMD DT is a compact, robust package enabling cost effective automotive lighting solutions. The Lumileds automotive LED binning structure is tailor-made for both SAE and ECE color specifications and hot binned at 85°C to represent actual operating conditions. LUXEON Altilon SMD DT is AEC-Q102 qualified.

FEATURES AND BENEFITS

- Single source, dual color SMD streamlines lamp integration and design flexibility
- Advanced CSP technology provides leading performance in a cost-effective package
- Higher drive current capability enables superior flux output
- Hot binned at 85°C MP to represent actual operating conditions
- Low thermal resistance for optimized thermal performance and lower system costs

PRIMARY APPLICATIONS

- Daytime Running Lights
- Front
  - Front Turn

RoHS COMPLIANT

Table of Contents

General Product Information

Product Test Conditions

LUXEON Altilon SMD DT LEDs are tested and binned using a 20 ms monopulse (MP) at 1000mA drive current, case temperature, T_c, of 85°C.

Part Number Nomenclature

Part numbers for LUXEON Altilon SMD DT follow the convention below:

A 1 S B – D T 0 1 2 D H 0 **A** 0 0 0 0

Where:

A – designates luminous flux bin (1, 2, 4, 5)

Therefore, the following part number is used for a LUXEON Altilon SMD DT with a luminous flux range of 270 lumen to 300 lumen for Cool White and 190 lumen to 220 lumen for PC Amber:

A 1 S B – D T 0 1 2 D H 0 **1** 0 0 0 0

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON Altilon SMD DT 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 selection for LUXEON Altilon SMD DT at 20 ms MP, 1000mA, T_c=85°C.

COOL WHITE LUMINOUS FLUX [1] (lm)	PC AMBER LUMINOUS FLUX [1] (lm)	TEST CURRENT (mA)	PART NUMBER
270–300	190–220	1000	A1SB-DT012DH010000
270–300	210–240	1000	A1SB-DT012DH020000
290–320	190–220	1000	A1SB-DT012DH040000
290–320	210–240	1000	A1SB-DT012DH050000

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

Optical Characteristics

Table 2. Typical optical characteristics for LUXEON Altilon SMD DT at 20 ms MP, 1000mA, T_c=85°C.

PART NUMBER	CORRELATED COLOR TEMPERATURE (CCT)		DOMINANT WAVELENGTH (nm)		SPECTRAL HALF-WIDTH [3] (nm) Δλ1/2	TYPICAL TOTAL INCLUDED ANGLE [1] $\theta_{0.90V}$	TYPICAL VIEWING ANGLE [2] $2\theta_{1/2}$
	COOL WHITE		PC AMBER		PC AMBER		
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM			
A1SB-DT012DH0xxxxx	5500K	6250K	588.8	592.6	77	140°	120°

Notes for Table 2:
1. Total angle at which 90% of total luminous flux is captured.
2. Viewing angle is the off axis angle from the LED centerline where the luminous intensity is ½ of the peak value.
3. Spectral width at ½ of the peak intensity.

Electrical and Thermal Characteristics

Table 3. Typical electrical and thermal characteristics for LUXEON Altilon SMD DT at 20 ms MP, 1000mA, T_c=85°C.

COLOR	FORWARD VOLTAGE [1] (V_f)		ELECTRICAL THERMAL RESISTANCE, $R_{th\ j\text{-}c\ electr}$ [2] (K/W)		REAL THERMAL RESISTANCE, $R_{th\ j\text{-}c\ real}$ [3] (K/W)	
	MINIMUM	MAXIMUM	TYPICAL	MAXIMUM	TYPICAL	MAXIMUM
Cool White	2.55	3.51	3.6	4.3	5.1	6.2
PC Amber	2.55	3.51	3.9	4.7	5.1	6.2

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.
2. $R_{th\ j\text{-}c\ el}$: Electrical thermal resistance (junction to case).
3. $R_{th\ j\text{-}c\ real}$: Real thermal resistance (junction to case) with wall plug efficiency included (reference JESD51-51, JESD51-14, 4.1.3).

Absolute Ratings

Table 4. Absolute ratings for LUXEON Altilon SMD DT.

PARAMETER	PERFORMANCE
Minimum DC Forward Current	50mA
Maximum DC Forward Current Cool White/PC Amber	1500mA/1000mA
Maximum Junction Temperature [1]	150°C
Maximum Junction Temperature at 1000mA for <200 Hours	180°C
Operating Case Temperature at Test Current for Cool White	-40°C to 130°C
Operating Case Temperature at Test Current for PC Amber and Dual Operation	-40°C to 125°C
Operating Case Temperature at Maximum Current for Cool White	-40°C to 130°C
Operating Case Temperature at Maximum Current for PC Amber and Dual Operation	-40°C to 125°C
Storage Temperature	-40°C to 130°C
Soldering Temperature	260°C
Allowable Reflow Cycles	3
ESD Sensitivity [2]	±8 kV HBM, ±400 V MM, ±2kV CDM
Reverse Voltage ($V_{reverse}$)	LUXEON LEDs are not designed to be driven in reverse bias
Autoclave Conditions	121°C at 2 ATM 100% Relative Humidity for 96 Hours Maximum

Notes for Table 4:
1. Given for reference only, LUXEON Altilon SMD DT LEDs driven above maximum LED case temperature and/or maximum If may have shorter lifetime.
2. Measured using human body model (per JESD22 A114), machine model (per JESD22 A115) and charged device model (per JESD22 C101).

JEDEC Moisture Sensitivity

Table 5. Moisture sensitivity levels for LUXEON Altilon SMD DT

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

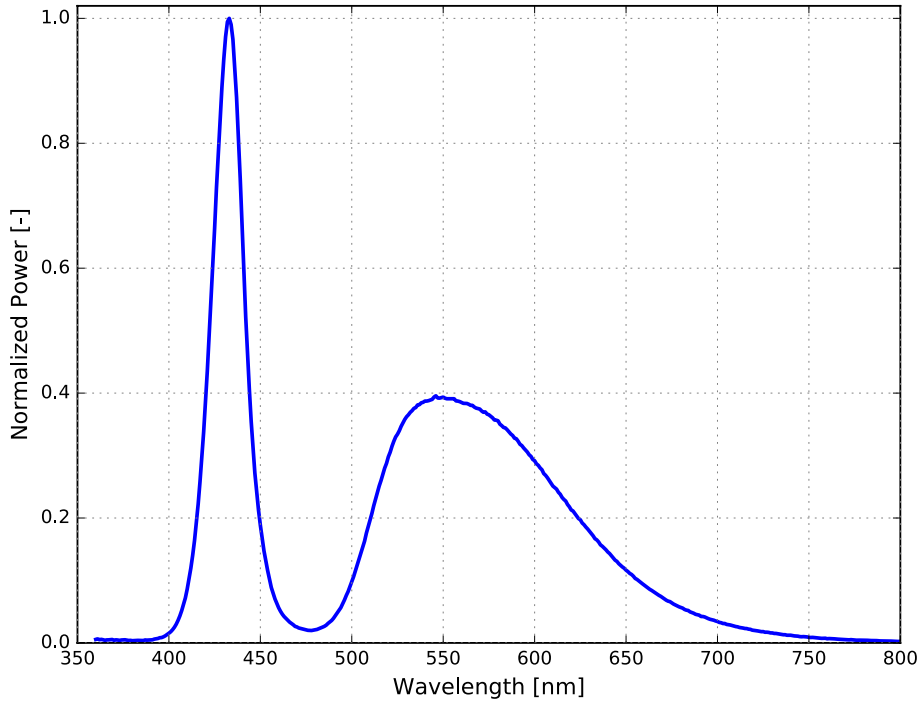


Figure 1a. Typical normalized power vs. wavelength for LUXEON Altilon SMD DT Cool White at 20 ms MP, 1000mA, T_C=85°C.

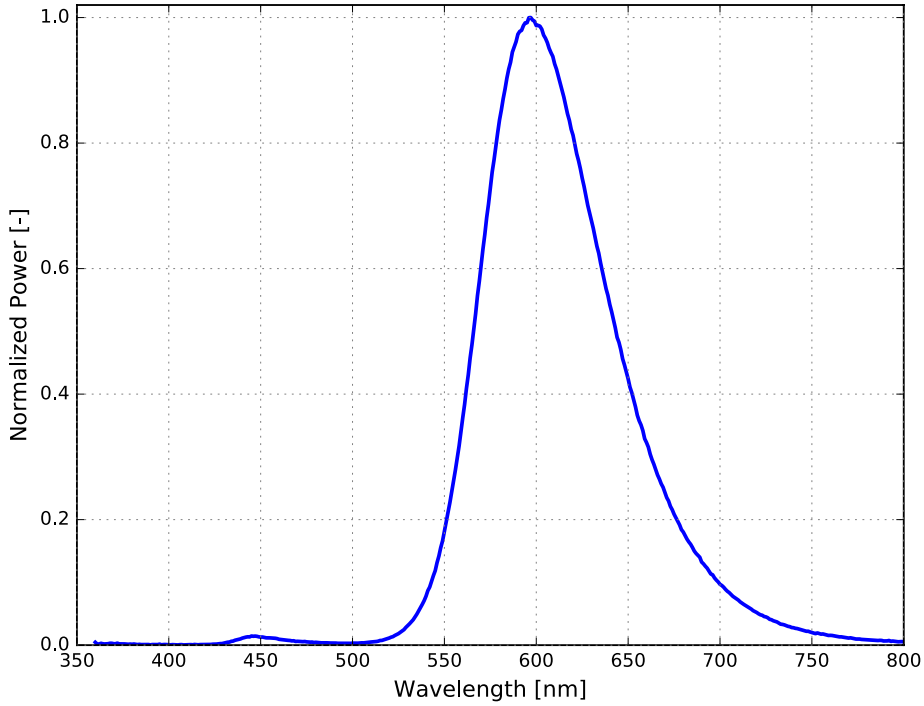


Figure 1b. Typical normalized power vs. wavelength for LUXEON Altilon SMD DT PC Amber at 20 ms MP, 1000mA, T_C=85°C.

Light Output Characteristics

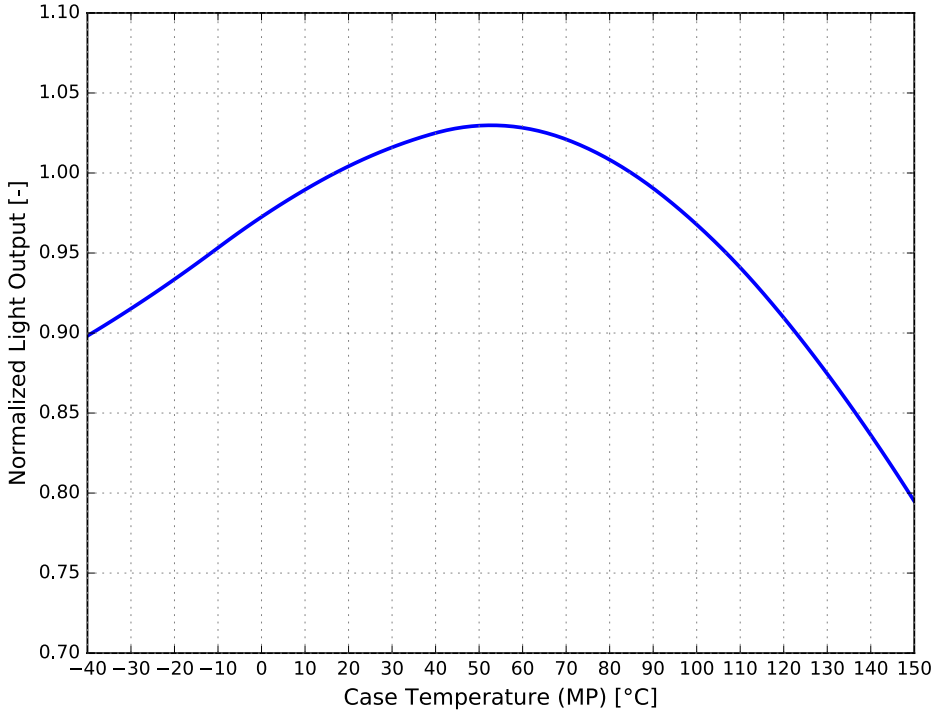


Figure 2a. Typical normalized light output vs. case temperature for LUXEON Altilon SMD DT Cool White at 20 ms MP, 1000mA.

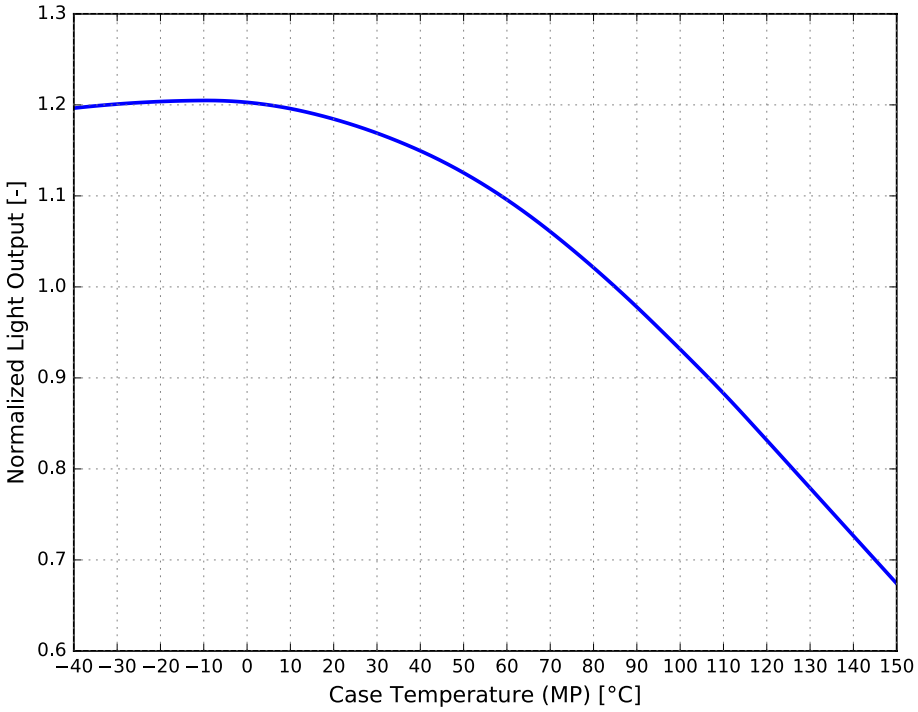


Figure 2b. Typical normalized light output vs. case temperature for LUXEON Altilon SMD DT PC Amber at 20 ms MP, 1000mA.

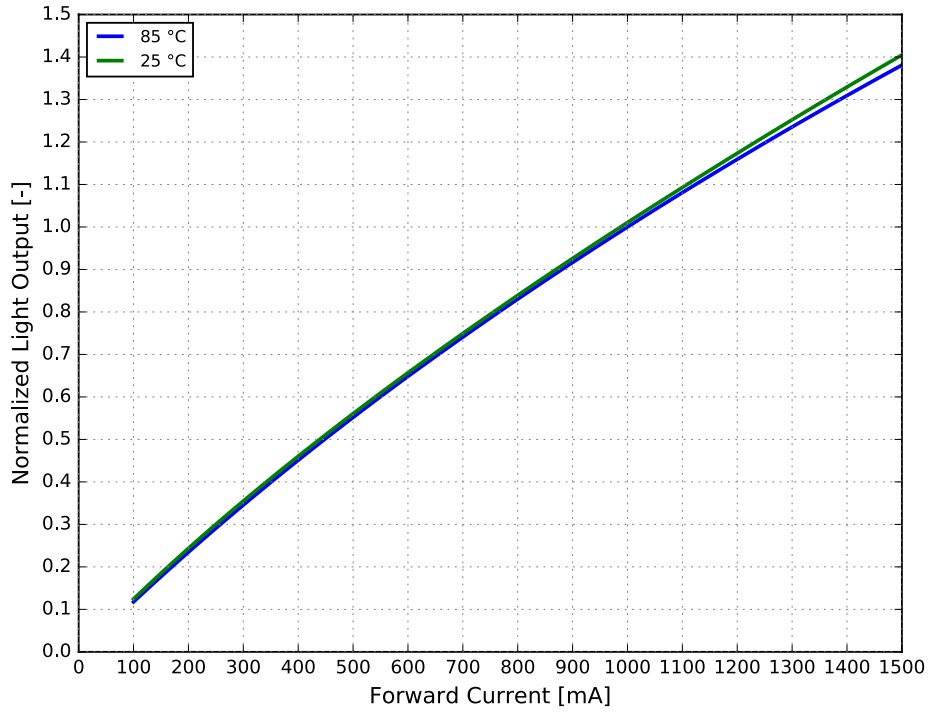


Figure 3a. Typical normalized light output vs. forward current for LUXEON Altilon SMD DT Cool White at T_C=85°C.

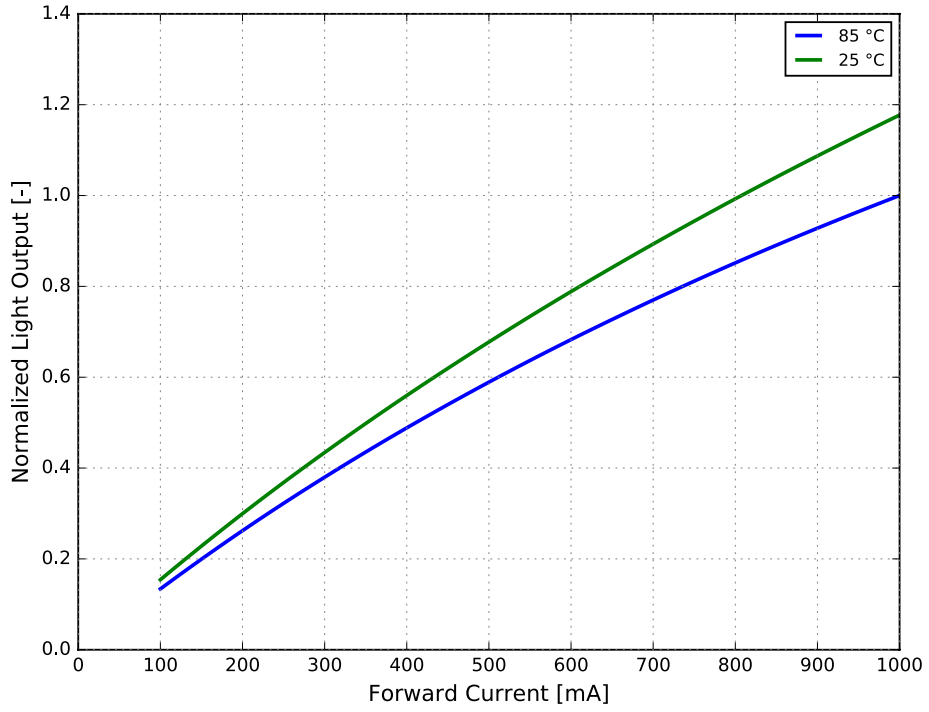


Figure 3b. Typical normalized light output vs. forward current for LUXEON Altilon SMD DT PC Amber at T_C=85°C.

Forward Current and Voltage Characteristics

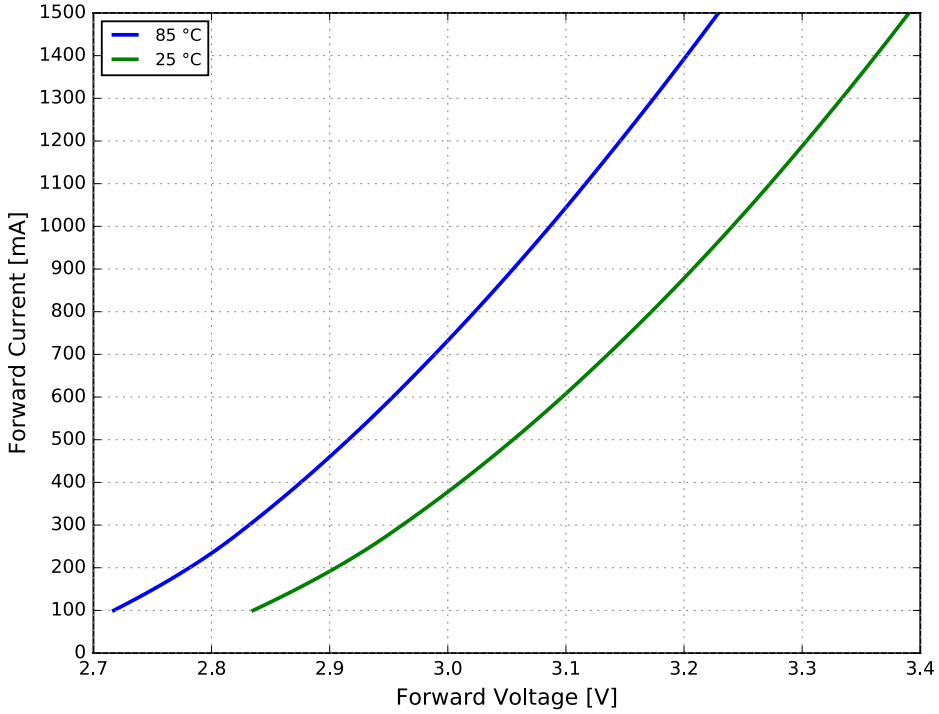


Figure 4a. Typical forward current vs. forward voltage for LUXEON Altilon SMD DT Cool White at T_C=85°C.

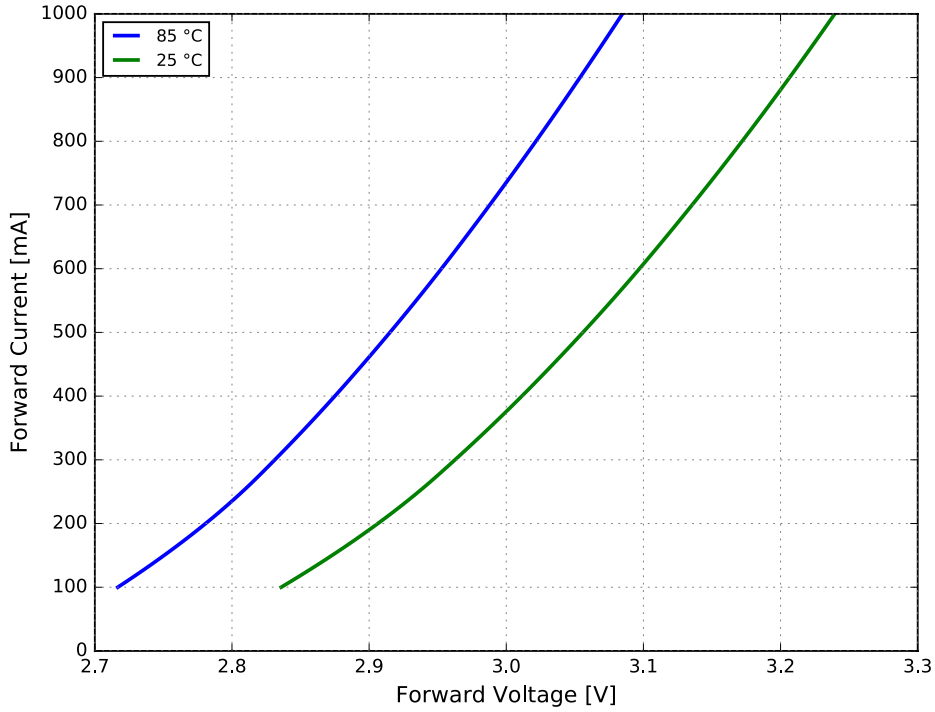


Figure 4b. Typical forward current vs. forward voltage for LUXEON Altilon SMD DT PC Amber at T_C=85°C.

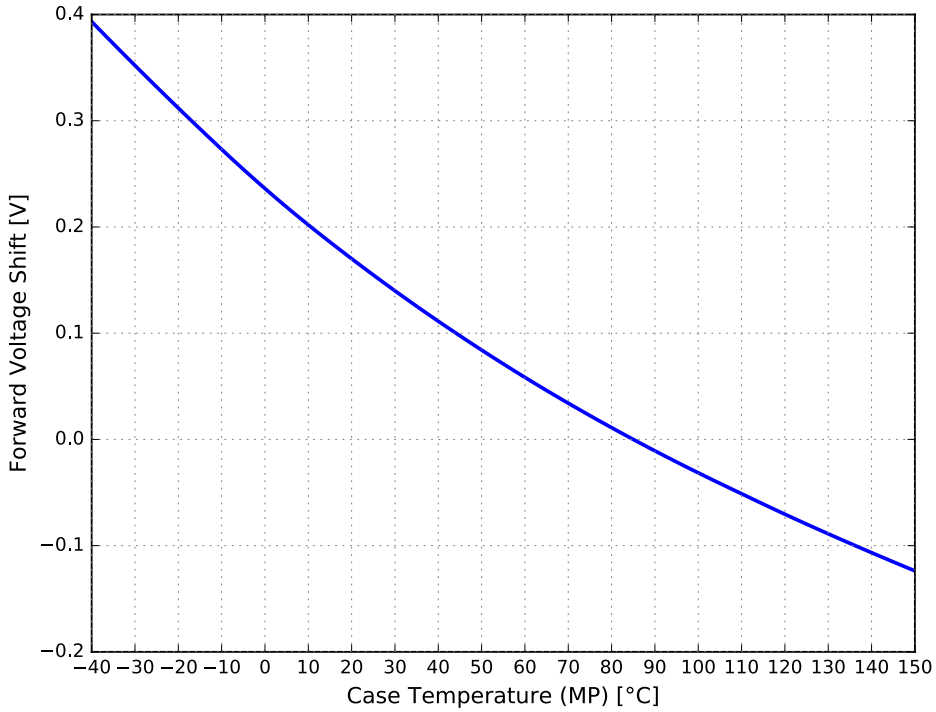


Figure 5a. Typical forward voltage shift vs. case temperature for LUXEON Altilon SMD DT Cool White.

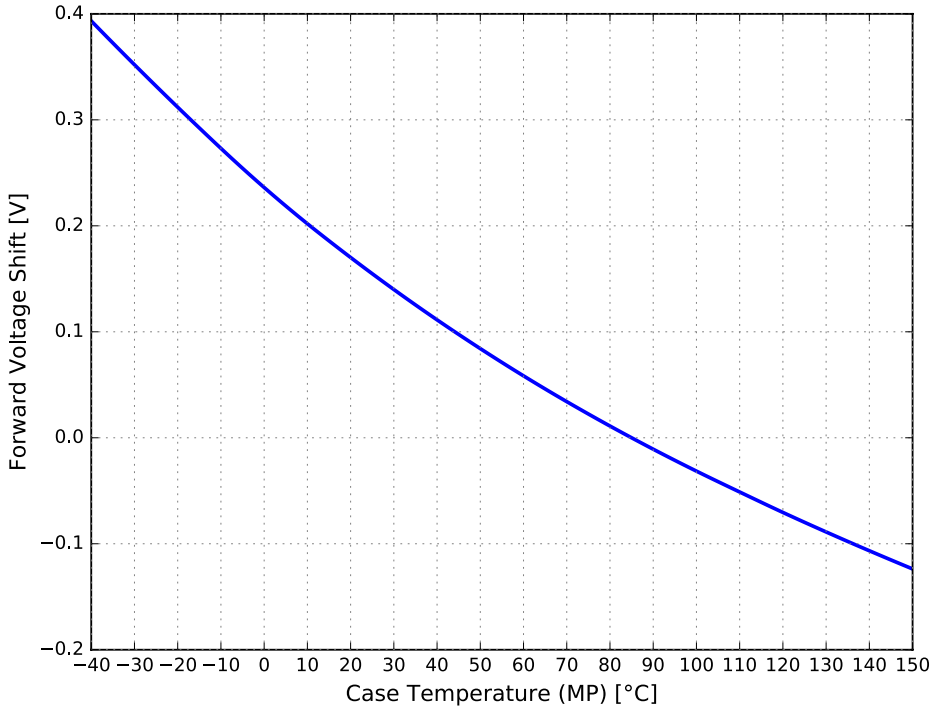


Figure 5b. Typical forward voltage shift vs. case temperature for LUXEON Altilon SMD DT PC Amber.

Color Shift Characteristics

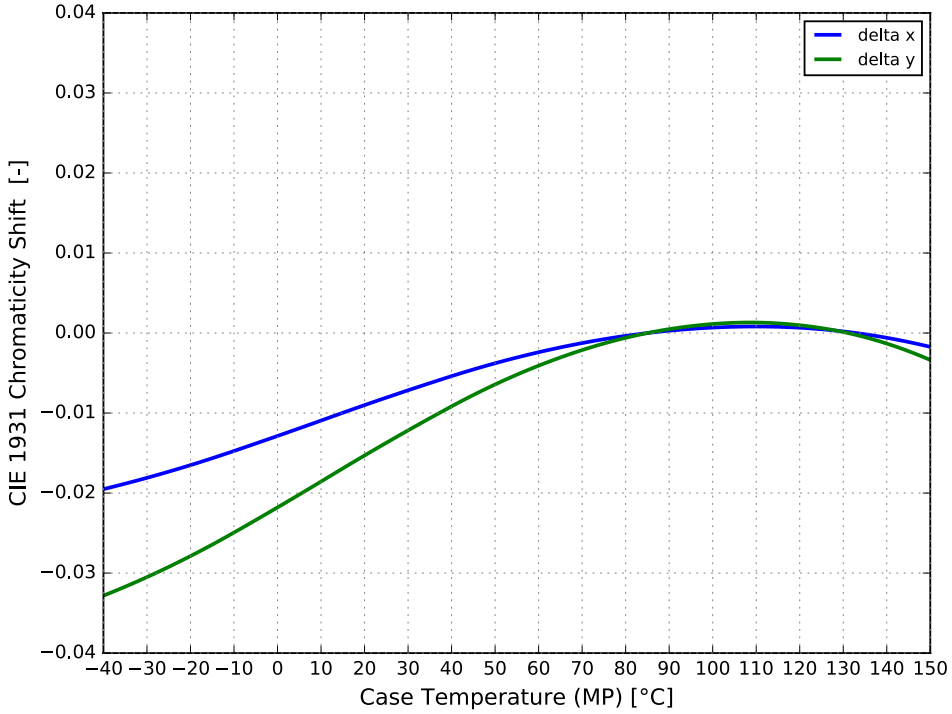


Figure 6a. Typical color shift in CIE 1931 x and y coordinates vs. case temperature for LUXEON Altilon SMD DT Cool White at 20 ms MP, 1000mA.

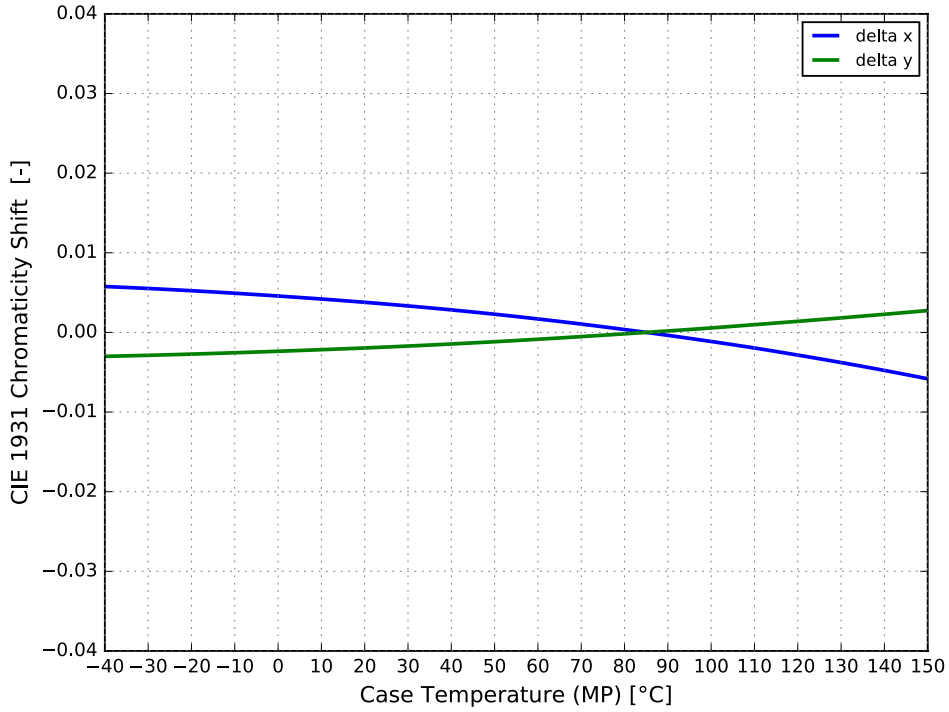


Figure 6b. Typical color shift in CIE 1931 x and y coordinates vs. case temperature for LUXEON Altilon SMD DT PC Amber at 20 ms MP, 1000mA.

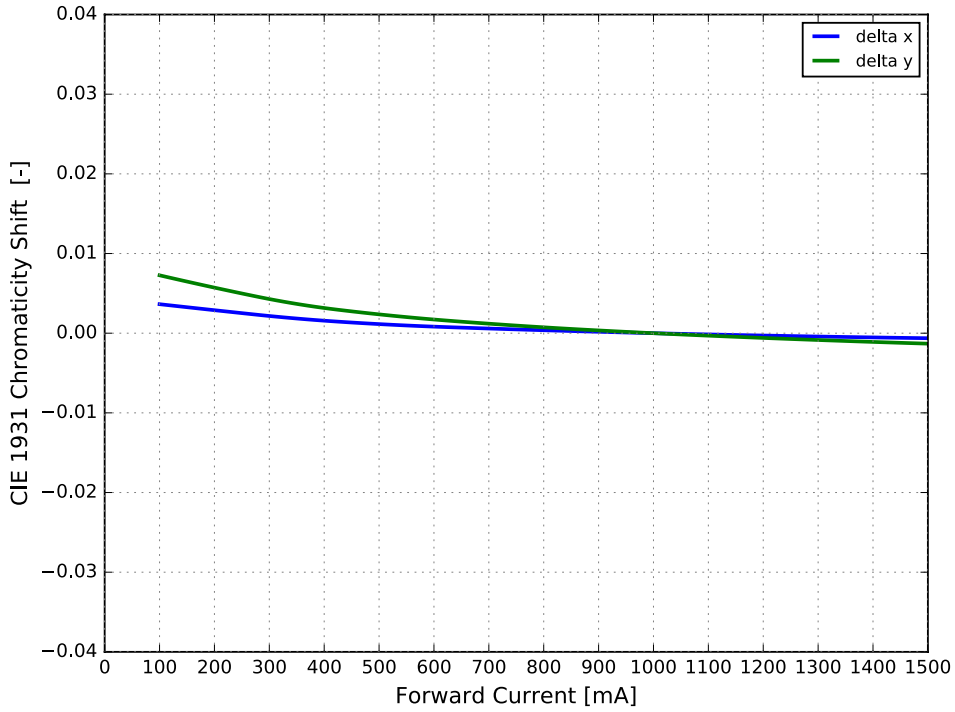


Figure 7a. Typical color shift in CIE 1931 x and y coordinates vs. forward current for LUXEON Altilon SMD DT Cool White at 20 ms MP, T_C=85°C.

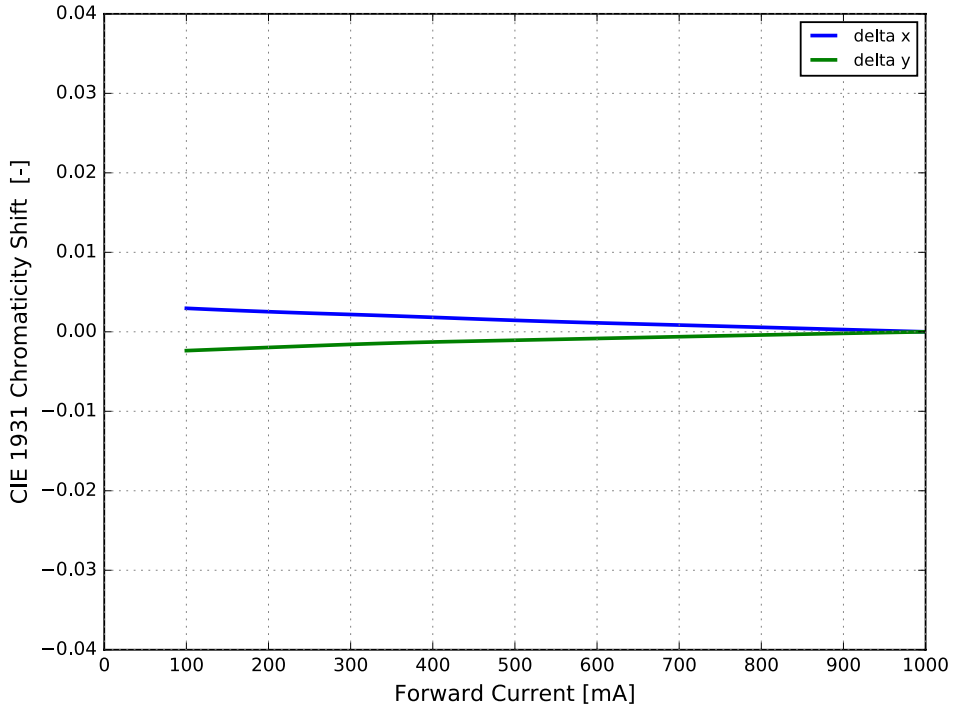


Figure 7b. Typical color shift in CIE 1931 x and y coordinates vs. forward current for LUXEON Altilon SMD DT PC Amber at 20 ms MP, T_C=85°C.

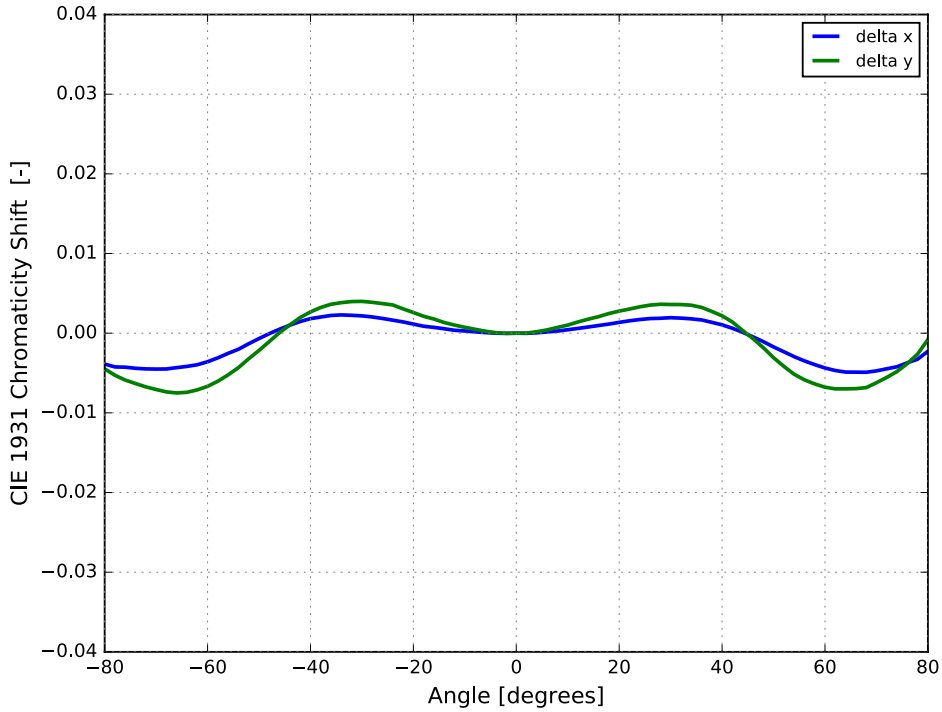


Figure 8a. Typical color shift in CIE 1931 x and y coordinates vs. angle for LUXEON Altilon SMD DT Cool White at 20 ms MP, 1000mA.

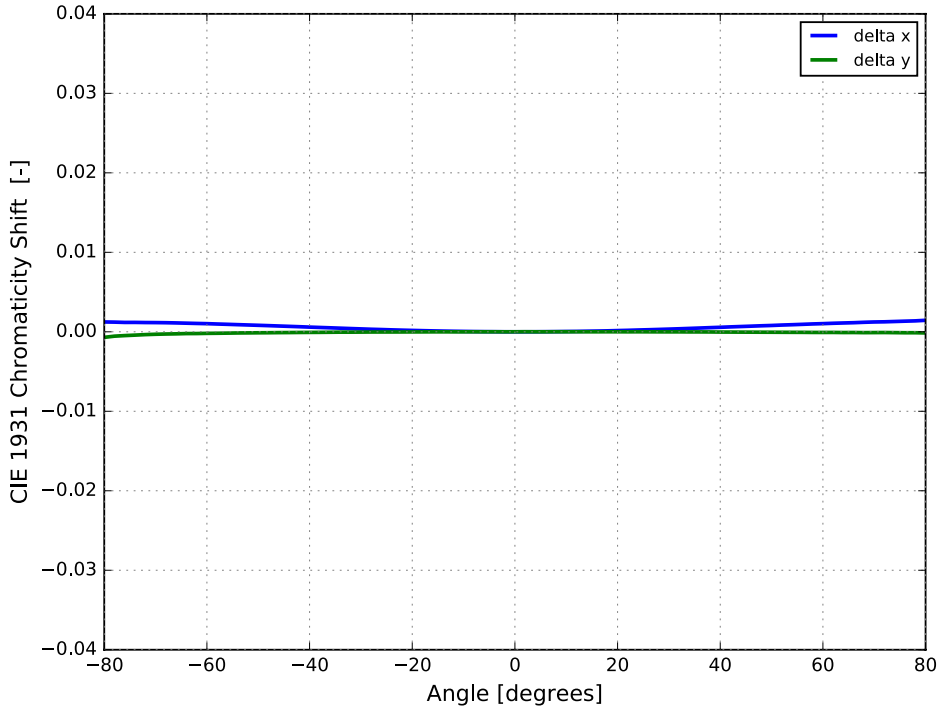


Figure 8b. Typical color shift in CIE 1931 x and y coordinates vs. angle for LUXEON Altilon SMD DT at 20 ms MP, 1000mA.

Radiation Pattern Characteristics

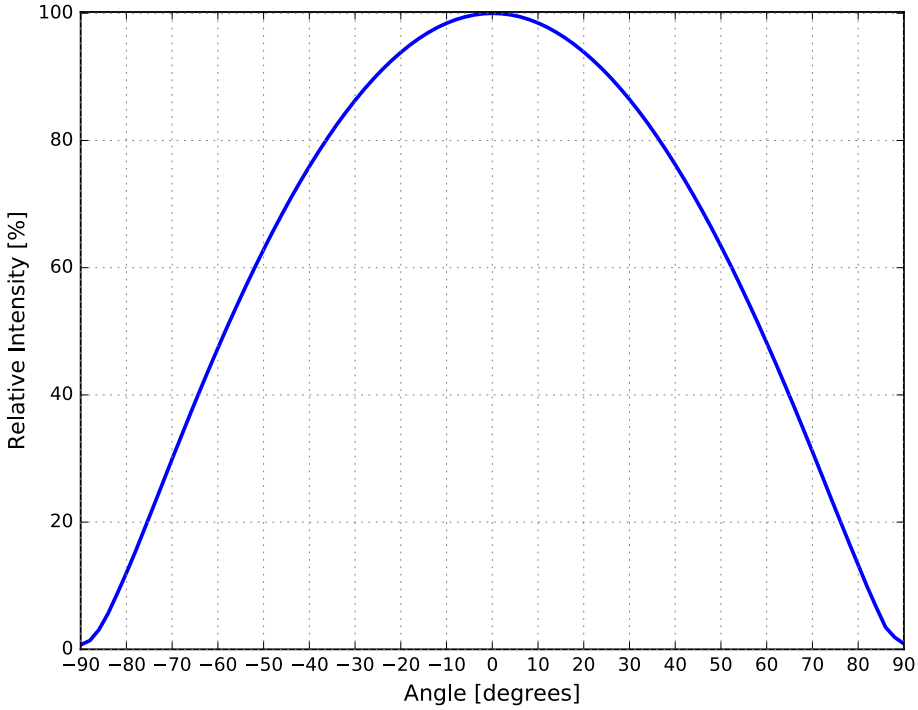


Figure 9. Typical radiation pattern for LUXEON Altilon SMD DT Cool White and PC Amber.

Operating Limits Characteristics

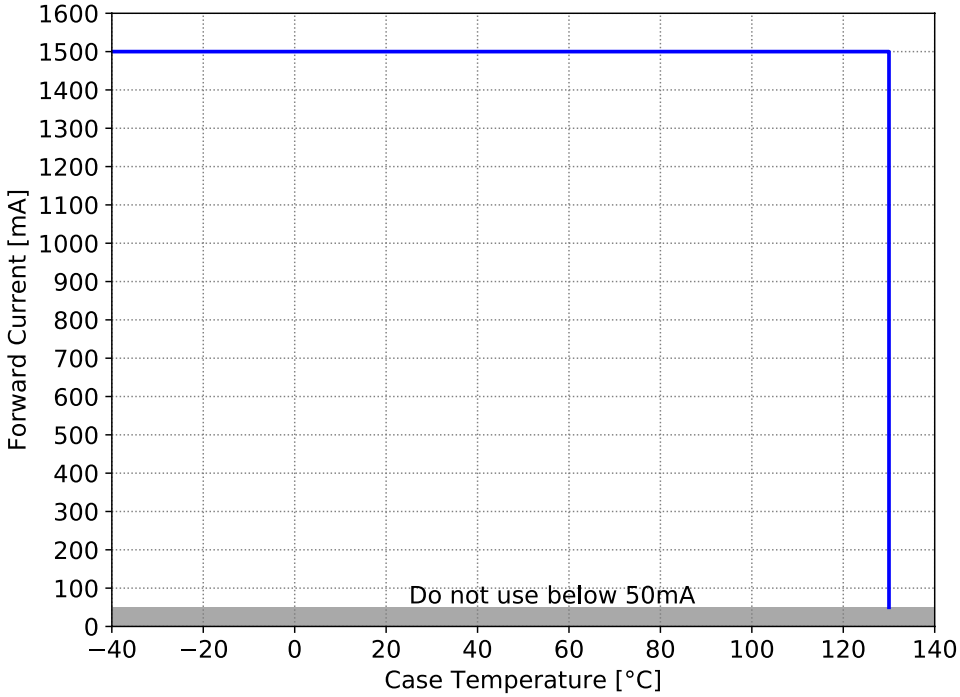


Figure 10a. Maximum forward current vs. case temperature for LUXEON Altilon SMD DT Cool White.

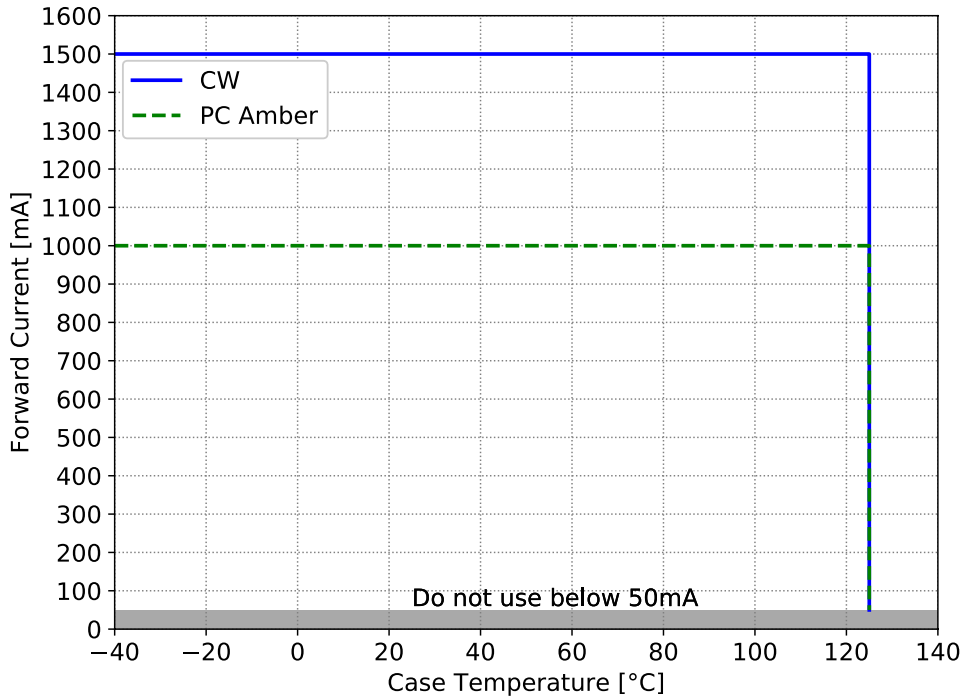


Figure 10b. Maximum forward current vs. case temperature for LUXEON Altilon SMD DT PC Amber and Dual Operation.

Product Bin and Labeling Definitions

Designing with LUXEON Altilon SMD DT

Flux bins supportable for car programs depend on product color and program start-of-production and end-of-production dates. 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 or radiometric power, color point, peak or dominant wavelength and forward voltage.

LUXEON Altilon SMD DT LEDs are labeled using a 5-digit alphanumeric CAT code following the format below:

A B C D E

Where:

- **A** – designates luminous flux bin (example: 1=270 lumens to 300 lumens for Cool White and 190 lumens to 220 lumens for PC Amber)
- **B C** – designates color bin (example: 51=color bin 5 for Cool White and color bin 1 for PC Amber)
- **D** – designates forward voltage bin for Cool White (example: A=2.55V to 3.30V)
- **E** – designates forward voltage bin for PC Amber (example: B=3.30V to 3.51V)

Therefore, a LUXEON Altilon SMD DT with a lumen range of 270 to 300 for Cool White and 190 to 220 for PC Amber, color bin of 5 for Cool White and 1 for PC Amber, and a forward voltage range of 2.55V to 3.30V for Cool White and PC Amber has the following CAT code:

1 5 1 A A

Luminous Flux Bins

Table 6 lists the standard luminous flux bins for LUXEON Altilon SMD DT emitters. 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 SMD DT, at 20 ms MP, 1000mA, T_c=85°C.

BIN	COOL WHITE LUMINOUS FLUX [1] (lm)		PC AMBER LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
1	270	300	190	220
2	270	300	210	240
4	290	320	190	220
5	290	320	210	240

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

Color Codes

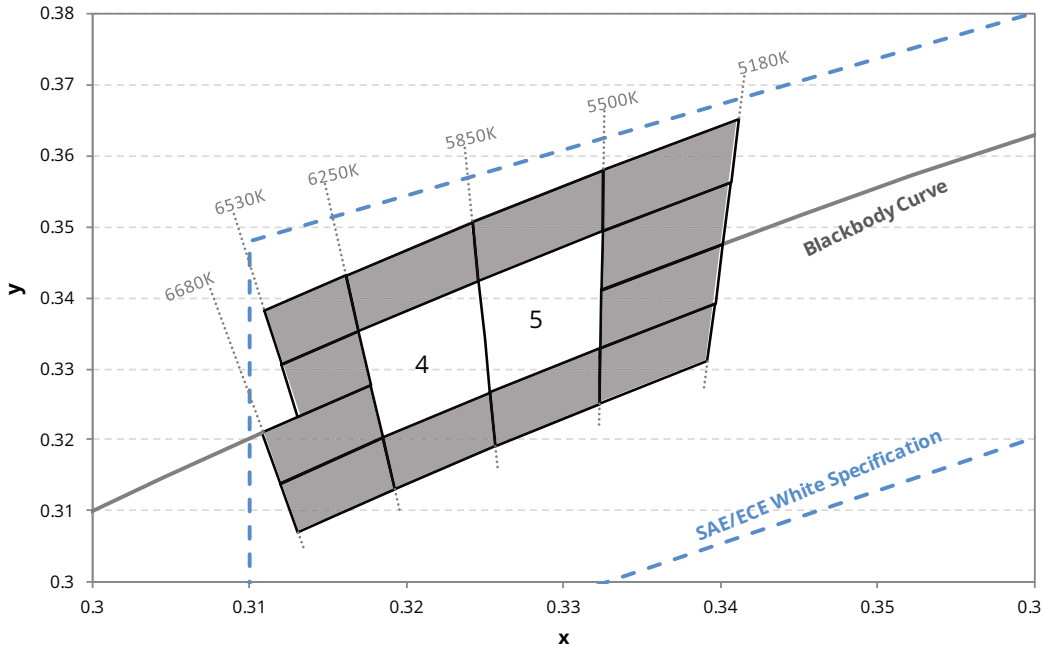


Figure 11a. Color bin structure in CIE 1931 color space for LUXEON Altilon SMD DT Cool White.

Notes for Figure 11a:
1. LUXEON Altilon SMD DT Cool White color bins must be ordered by fine bin designators, shown below.
   6 = 4, 5

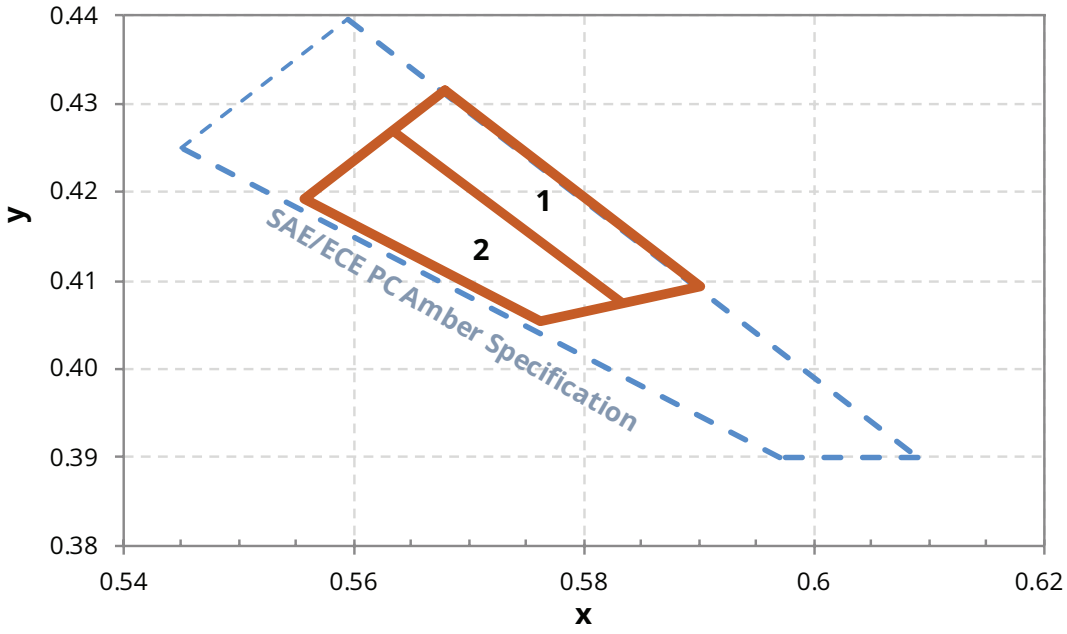


Figure 11b. Color bin structure in CIE 1931 color space for LUXEON Altilon SMD DT PC Amber.

Notes for Figure 11b:
1. LUXEON Altilon SMD DT PC Amber color bins must be ordered by fine bin designators, shown below.
   3 = 1, 2

Color Bin Definitions

Table 7a. Color bin definitions for LUXEON Altilon SMD DT Cool White, at 20 ms MP, 1000mA, T_c=85°C.

BIN	x [1, 2]	y [1, 2]	TYPICAL CCT
4	0.3185	0.3202	6050K
	0.3253	0.3266	
	0.3246	0.3424	
	0.3169	0.3353	
5	0.3253	0.3266	5680K
	0.3323	0.3329	
	0.3325	0.3493	
	0.3246	0.3424	

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

Table 7b. Color bin definitions for LUXEON Altilon SMD DT PC Amber, at 20 ms MP, 1000mA, T_c=85°C.

BIN	x [1, 2]	y [1, 2]
1	0.5680	0.4315
	0.5634	0.4269
	0.5833	0.4075
	0.5901	0.4094
2	0.5763	0.4054
	0.5833	0.4075
	0.5634	0.4269
	0.5557	0.4192

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

Forward Voltage Bins

Table 8. Forward voltage bin definitions for LUXEON Altilon SMD DT, at 20 ms MP, 1000mA, T_c=85°C.

BIN	FORWARD VOLTAGE [1] (V_f)	
	MINIMUM	MAXIMUM
A	2.55	3.30
B	3.30	3.51

Notes for Table 8:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.
2. Several bins are outlined; product availability in a particular bin varies by production run and product performance.

Mechanical Dimensions

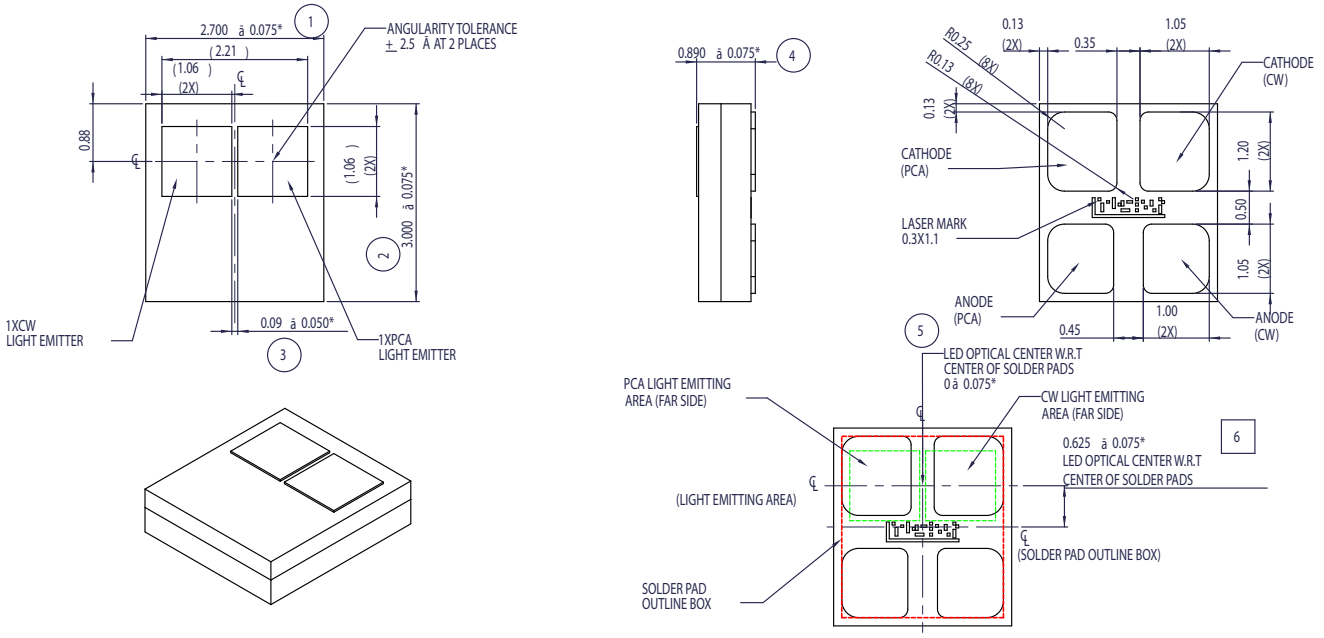


Figure 12. Mechanical dimensions for LUXEON Altilon SMD DT.

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

Reflow Soldering Guidelines

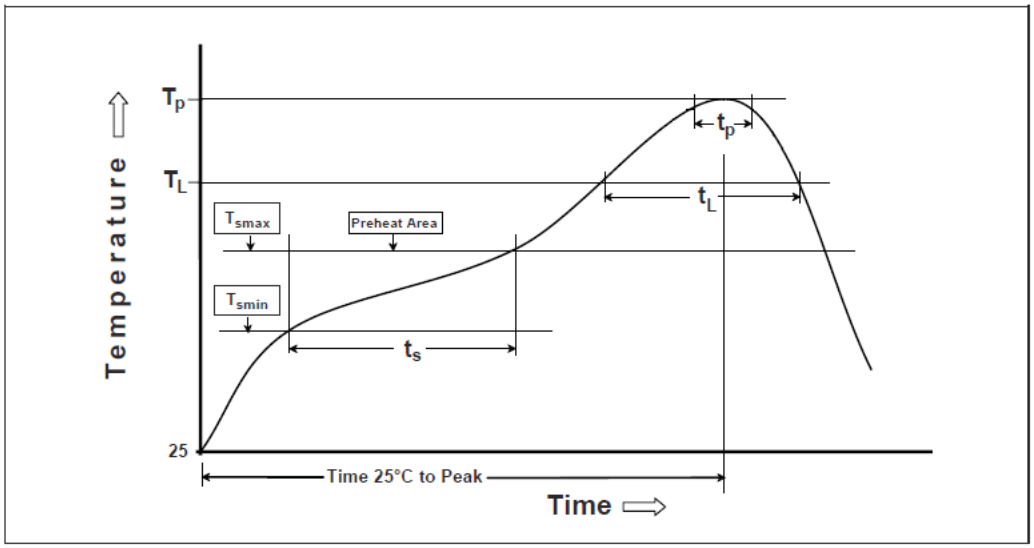


Figure 13. Visualization of the acceptable reflow temperature profile as specified in Table 9.

Table 9. Reflow profile characteristics for LUXEON Altilon SMD DT.

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})	60 to 180 seconds
Ramp-Up Rate (T_{smax} to T_p)	3°C / second maximum
Liquidus Temperature (T_L)	217°C
Time Maintained Above Temperature T_L (t_L)	60 to 150 seconds
Peak / Classification Temperature (T_p)	260°C
Time Within 5°C of Actual Temperature (t_p)	20 to 40 seconds
Ramp-Down Rate	6°C / second maximum
Time 25°C to Peak Temperature	8 minutes maximum

Notes for Table 9:
1. All temperatures refer to the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

Packaging and Labeling Information

Pocket Tape Dimensions

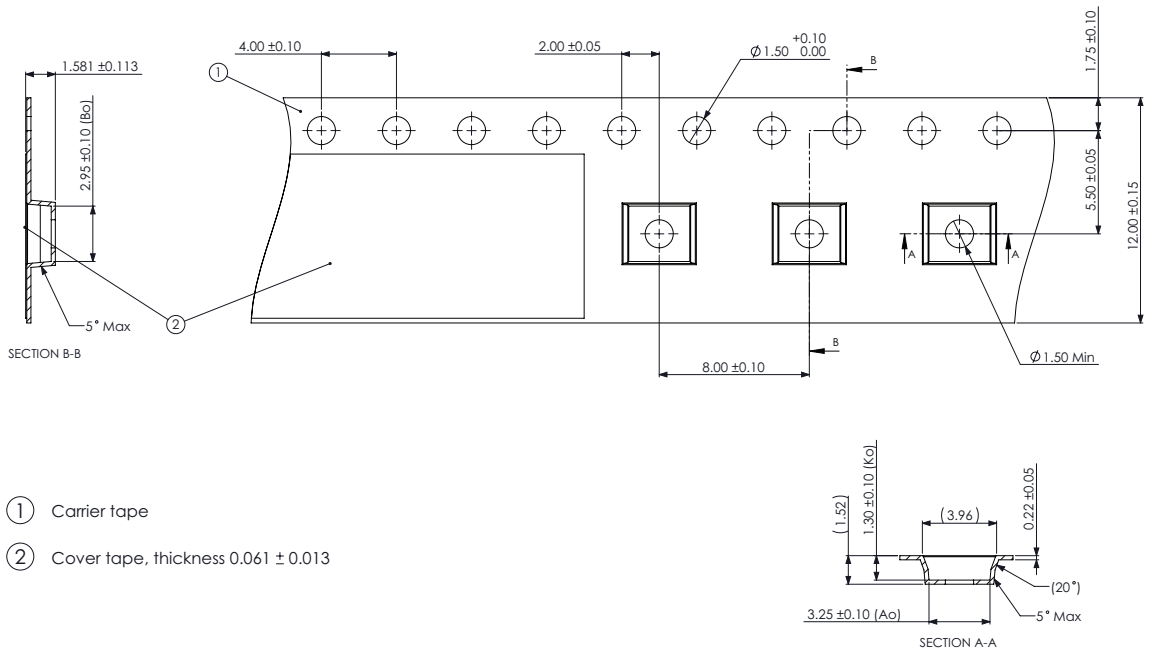


Figure 14. Pocket tape dimensions for LUXEON Altilon SMD DT.

Notes for Figure 14:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reel Dimensions

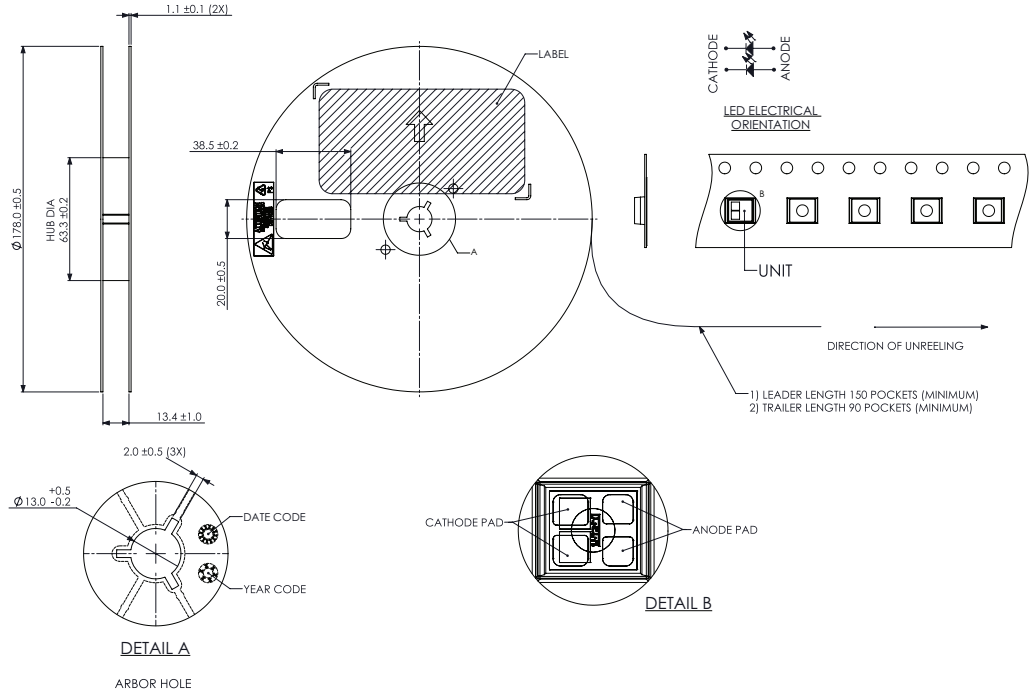


Figure 15. Reel dimensions for LUXEON Altilon SMD DT.

Notes for Figure 15:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Product Labeling

Figure 16. Example of box label for LUXEON Altilon SMD DT.

Notes for Figure 16 – Box Label descriptions for customer use:
Field labels not described are for Lumileds internal use only.

1. Material number
2. Total number of LED emitters in a box
3. Lumileds part number
4. Customer part number
5. LED test date in YYWW format
6. Pattern
7. Lot identification number. This number is required for traceability purposes
8. Country of origin
9. Product bin 5-digit
10. Production order

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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