LUMILEDS

AUTOMOTIVE



LUXEON Versat Dual Color

Industry-leading dual color solutions

LLUXEON Versat Dual Color is a single source, dual color LED product family designed for dual function automotive signaling applications. This family of dual products provides design flexibility, automotive reliability and ease of integration/manufacturing to facilitate simplified system integration for high-volume automotive designs. All LUXEON Versat Dual Color LEDs are AEC-Q102 qualified and cold binned at 25 °C.



FEATURES AND BENEFITS

- Single source, dual color LED streamlines lamp integration and design flexibility
- Optimized package drives efficient light extraction
- Industry standard footprint for simple integration
- Low Z profile simplifies optical design and minimizes design space
- Low thermal resistance for optimized thermal performance and lower system cost

PRIMARY APPLICATIONS

- Daytime Running Lights
- Back-up lamp
- Rear Turn
- Front Turn

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Table of Contents

General Product Information . . . 2
- Product Test Conditions . . . 2
- Environmental Compliance . . . 2

Performance Characteristics . . . 3
- Product Selection Guide . . . 3
- Optical Characteristics . . . 3
- Electrical and Thermal Characteristics . . . 3
- Absolute Ratings . . . 4
- JEDEC Moisture Sensitivity . . . 4

Characteristic Curves CW . . . 5
- Spectral Power Distribution Characteristics . . . 5
- Light Output Characteristics . . . 6
- Forward Current and Voltage Characteristics . . . 7
- Color Shift Characteristics . . . 8

Characteristic Curves PCA . . . 9
- Spectral Power Distribution Characteristics . . . 9
- Light Output Characteristics . . . 10
- Forward Current and Voltage Characteristics . . . 11
- Color Shift Characteristics . . . 12
- Radiation Pattern Characteristics CW/PCA . . . 13
- Operating Limits Characteristics CW/PCA . . . 13
- Permissible Pulse Handling Characteristics CW/PCA . . . 14

Product Bin and Labeling Definitions . . . 15
- Designing with LUXEON Versat Dual Color . . . 15
- Decoding Product Bin Labeling . . . 15
- Luminous Flux Bins . . . 15
- Color Codes . . . 16
- Color Bin Definitions . . . 17
- Forward Voltage Bins . . . 17

Mechanical Dimensions . . . 18

Packaging Information . . . 19
- Pocket Tape Dimensions . . . 19
- Reel Dimensions . . . 19

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General Product Information

Product Test Conditions

LUXEON Versat Dual Color is tested and binned using a 20 ms monopulse (MP) at 150 mA drive current, case temperature, T_C, of 25 °C.

Part Number Nomenclature

Part numbers for LUXEON Versat Dual Color follow the convention below:

A 1 V C – **A B** 0 0 **C** D **E** 0 0 0 0 **F** 0

Where:

A	–	designates product segment (A = Automotive)
1	–	designates product level (1 = Level 1)
V	–	designates product line/family (V = LUXEON Versat)
C	–	designates package size (C = Standard)
A B	–	designates color (DT = Dual Color)
C	–	designates binning current (A = 150 mA)
D	–	open space
E	–	designates generation (1 = first generation)
F	–	designates luminous flux bin (2, 3)

Therefore, the following part number is used for a LUXEON Versat Dual Color CW/PCA with a minimum luminous flux of 48 lumens for CW and 30 lumens for PCA:

A 1 V C – D T 0 0 A 0 1 0 0 0 0 2 0

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON Versat Dual Color CW/PCA 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 Versat Dual Color at 20 ms MP, 150 mA, T_c = 25 °C

COOL WHITE LUMINOUS FLUX [1] (lm)	PC AMBER LUMINOUS FLUX [1] (lm)	TEST CURRENT (mA)	PART NUMBER
48-64	30-40	150	A1VC-DT00A01000020
53-70	33-44	150	A1VC-DT00A01000030
58-76	36-48	150	A1VC-DT00A01000040

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 Versat Dual Color at 20 ms MP

PART NUMBER	CORRELATED COLOR TEMPERATURE (K)		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				
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM			
A1VC–DT00A010000x0	5500	6250	587.0	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 Versat Dual Color

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	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
Cool White	2.70	3.20	13	20	22	34
PC Amber	2.70	3.20	16	20	22	27

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.
2. $R_{th\ j\text{-}c\ electr}$: 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.

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Absolute Ratings

Table 4. Absolute ratings for LUXEON Versat Dual Color

PARAMETER	PERFORMANCE
Minimum DC Forward Current	30 mA
Maximum DC Forward Current Cool White/PC Amber	250 mA
Maximum Junction Temperature [1]	150 °C
Operating Case Temperature at test current [1]	-40 to 125 °C
Operating Case Temperature at maximum current	-40 to 125 °C
Storage Temperature	-40 to 130 °C
Soldering Temperature	260 °C
Allowable Reflow Cycles	3
ESD Sensitivity [2]	±8kV HBM, ±2kV CDM
Reverse Voltage ($V_{reverse}$)	LUXEON LEDs are not designed to be driven in reverse bias

Notes for Table 4:
1. Given for reference only, LUXEON Versat Dual Color 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 Versat Dual Color

LEVEL	FLOOR LIFE		STANDARD SOAK REQUIREMENTS	
	TIME	CONDITIONS	TIME	CONDITIONS
2	1 Year	≤30 °C / 60 % RH	168 Hours +5 / -0	85 °C / 60 % RH

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Characteristic Curves CW

Spectral Power Distribution Characteristics

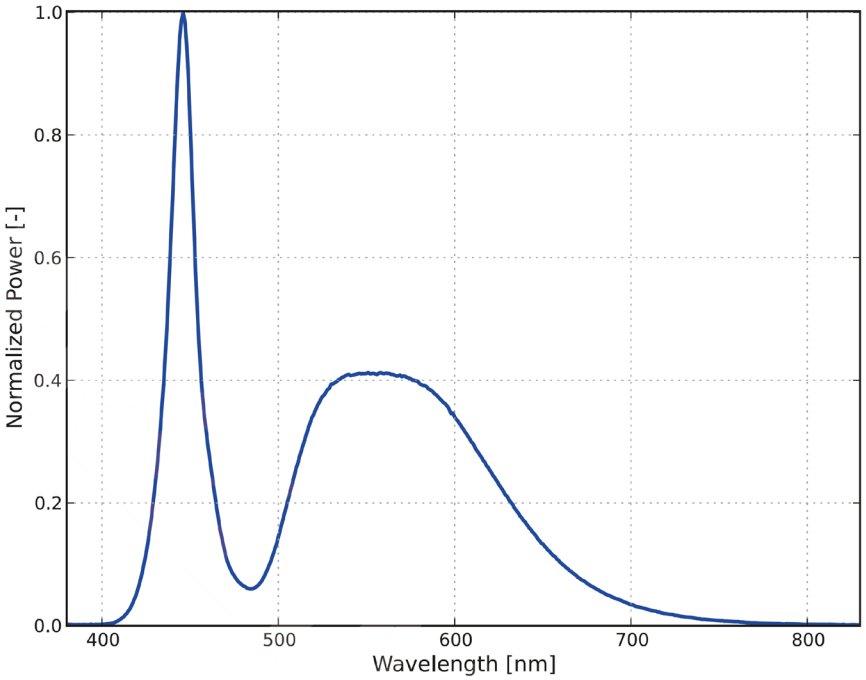


Figure 1. Typical normalized power vs. wavelength for LUXEON Versat Dual Color CW at 20 ms MP, 150 mA, T_c= 25 °C

Light Output Characteristics

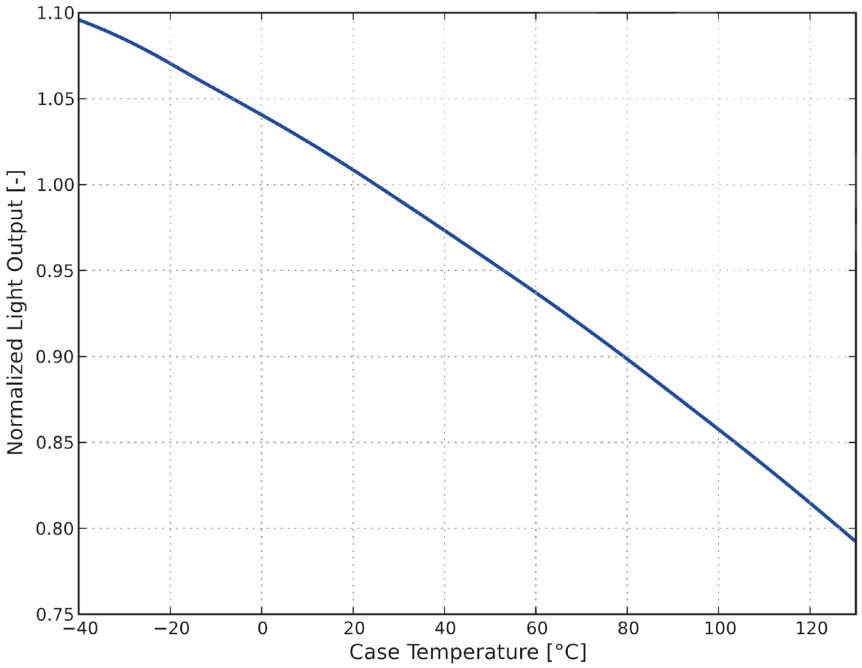


Figure 2. Typical normalized light output vs. case temperature for LUXEON Versat Dual Color CW 20 ms MP, 150 mA

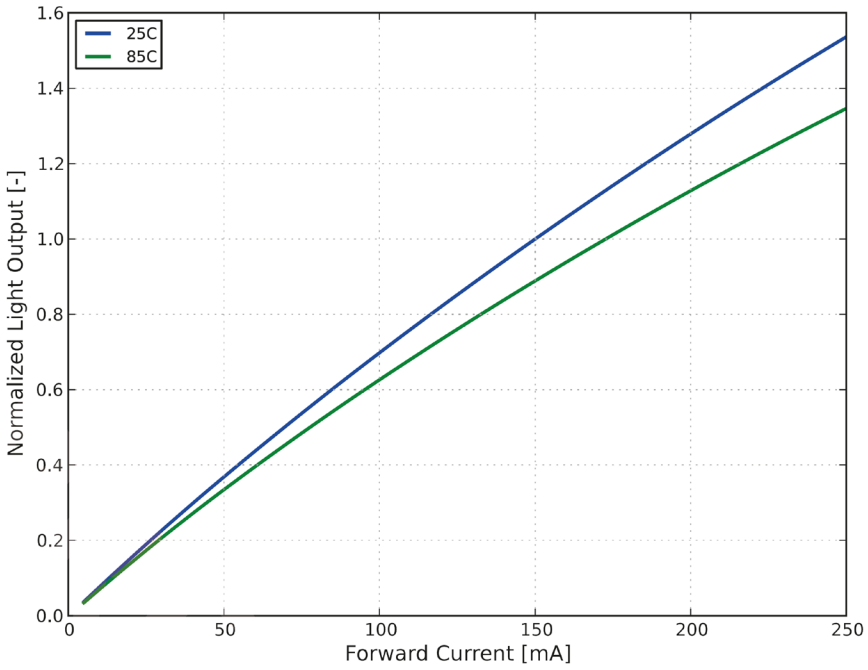


Figure 3. Typical normalized light output vs. forward current for LUXEON Versat Dual Color CW at T_c= 25 °C

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Forward Current and Voltage Characteristics

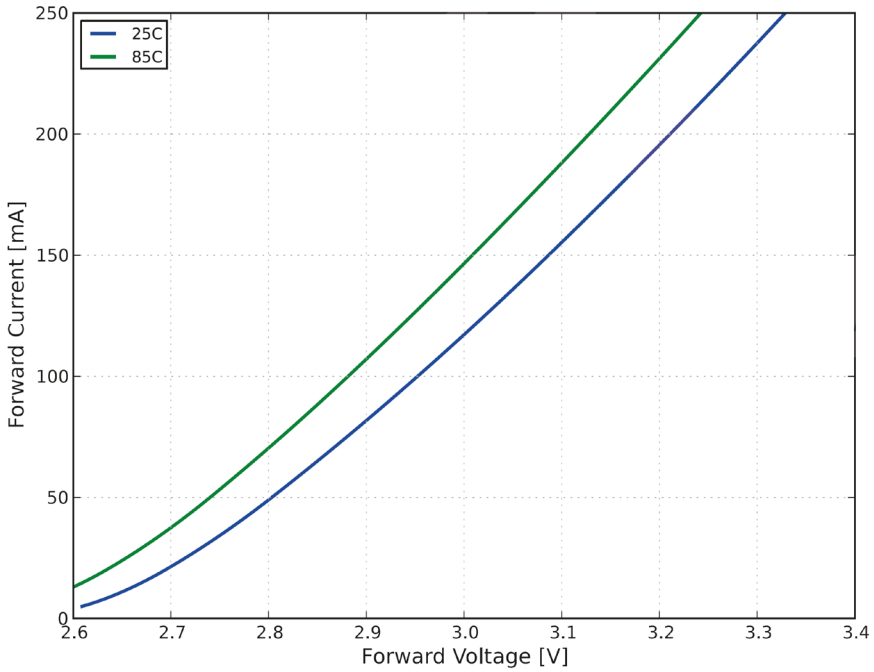


Figure 4. Typical forward current vs. forward voltage for LUXEON Versat Dual Color CW at T_c= 25 °C

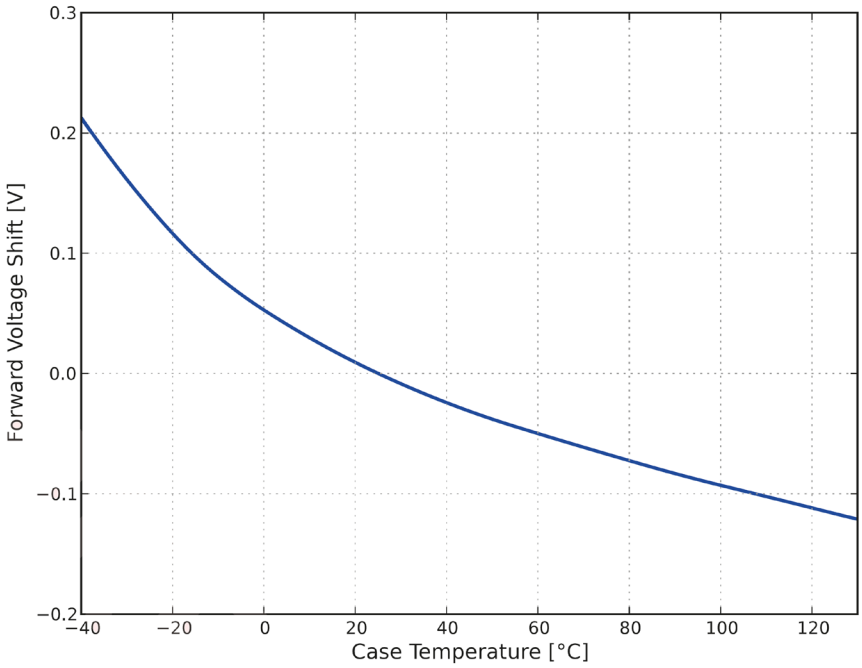


Figure 5. Typical forward voltage shift vs. case temperature for LUXEON Versat Dual Color CW at 20 ms MP, 150 mA

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Color Shift Characteristics

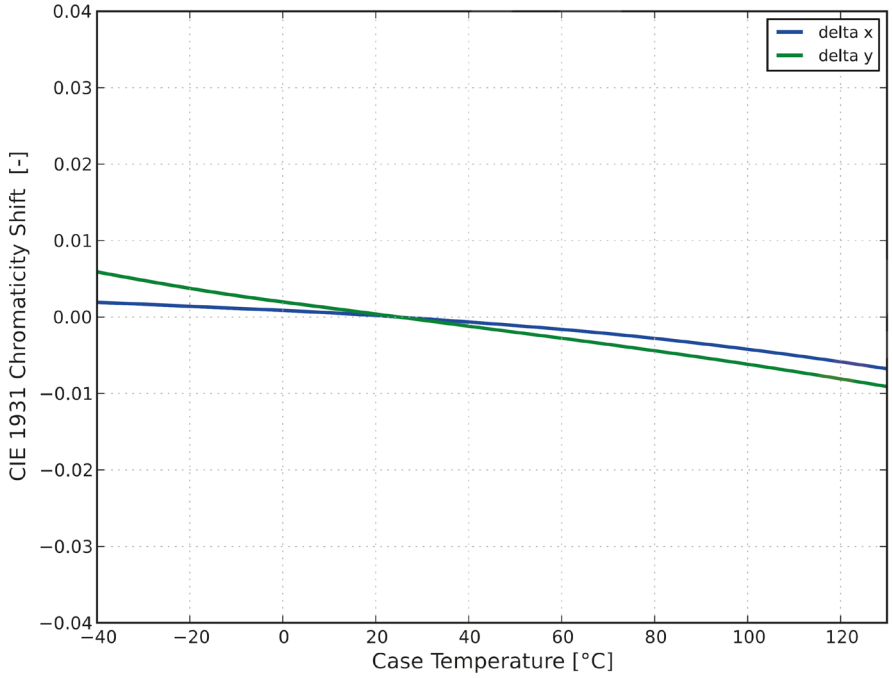


Figure 6. Typical color shift in CIE 1931 *x* and *y* coordinates for LUXEON Versat Dual Color CW at 20 ms MP, 150 mA

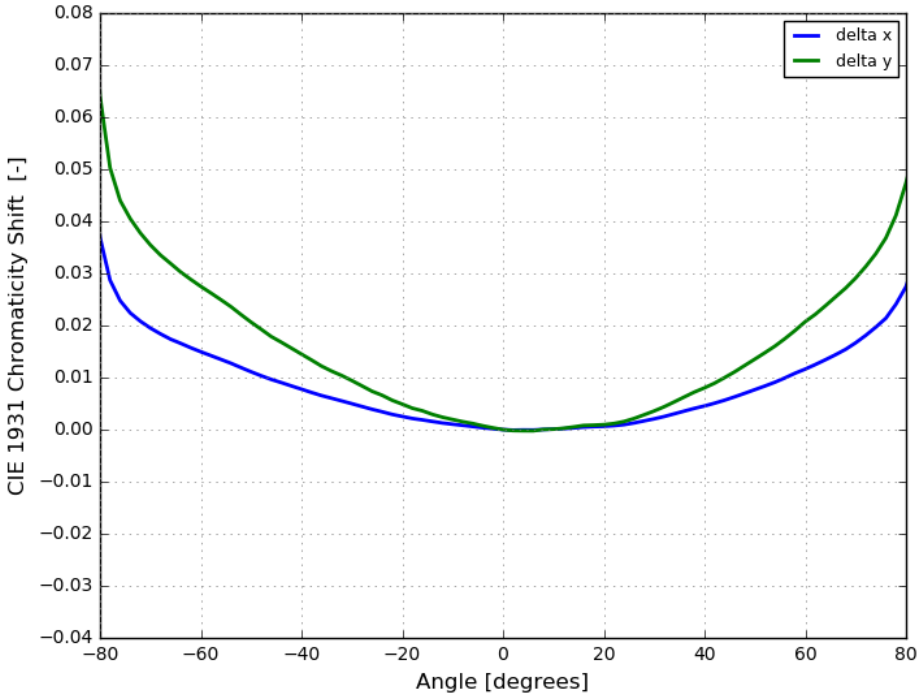


Figure 7. Typical color shift in CIE 1931 *x* and *y* coordinates over angle for LUXEON Versat Dual Color CW at 20 ms MP, 150 mA

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Characteristic Curves PCA

Spectral Power Distribution Characteristics

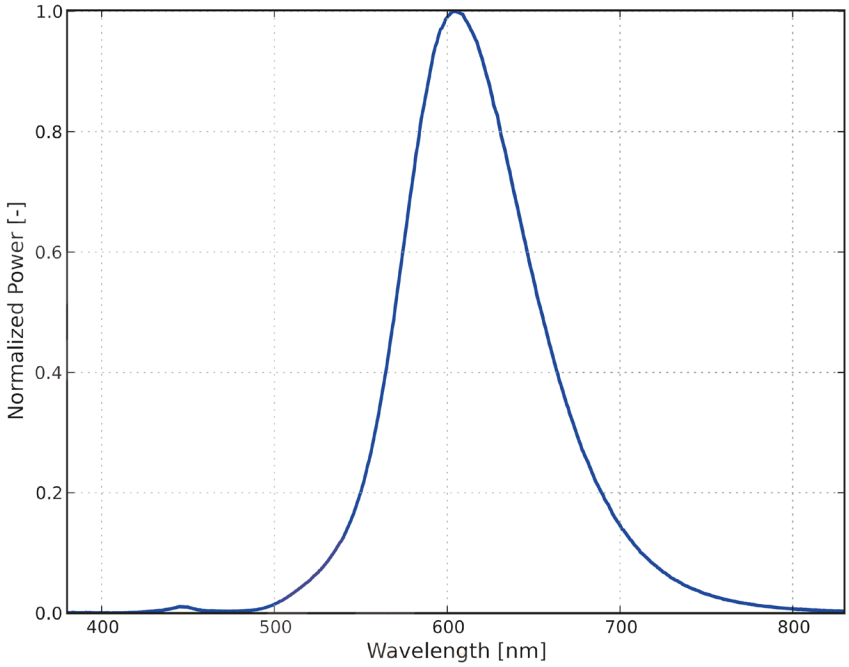


Figure 8. Typical normalized power vs wavelength for LUXEON Versat Dual Color PCA at 20 ms MP, 150 mA, T_c= 25 °C

Light Output Characteristics

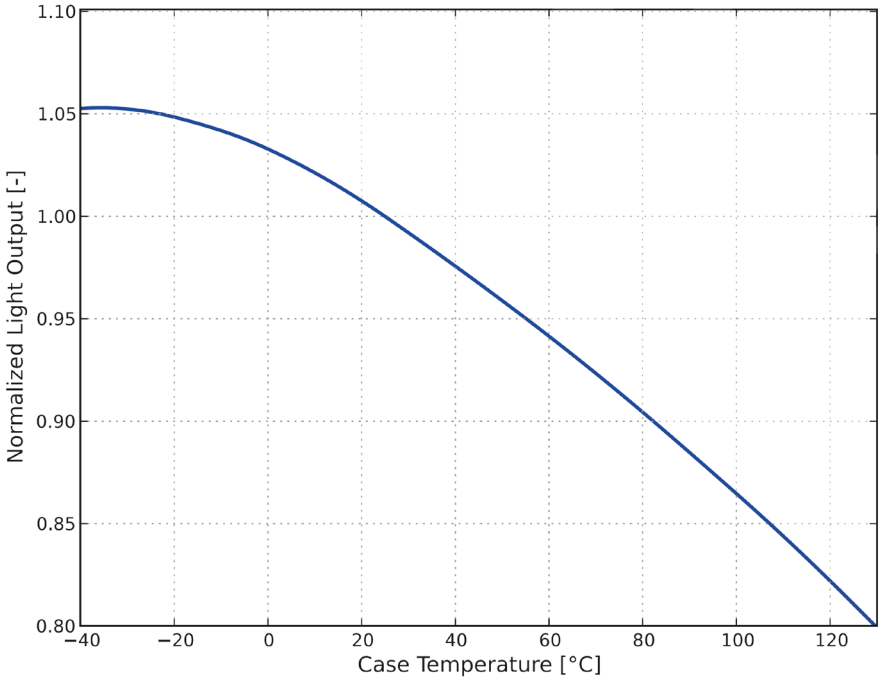


Figure 9. Typical normalized light output vs case temperature for LUXEON Versat Dual Color PCA at 20 ms MP, 150 mA

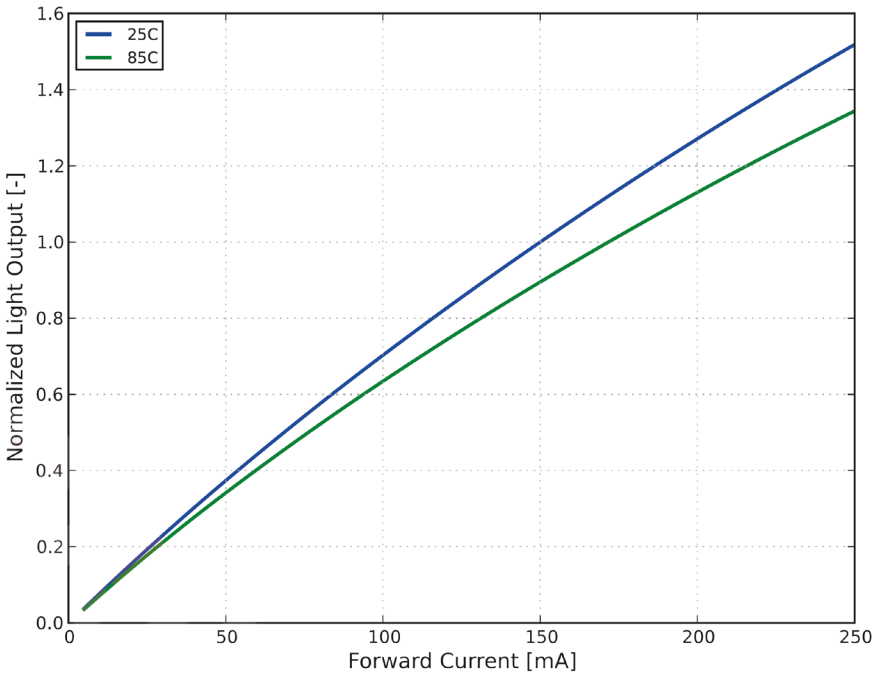


Figure 10. Typical normalized light output vs forward current for LUXEON Versat Dual Color PCA at TC= 25 °C

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Forward Current and Voltage Characteristics

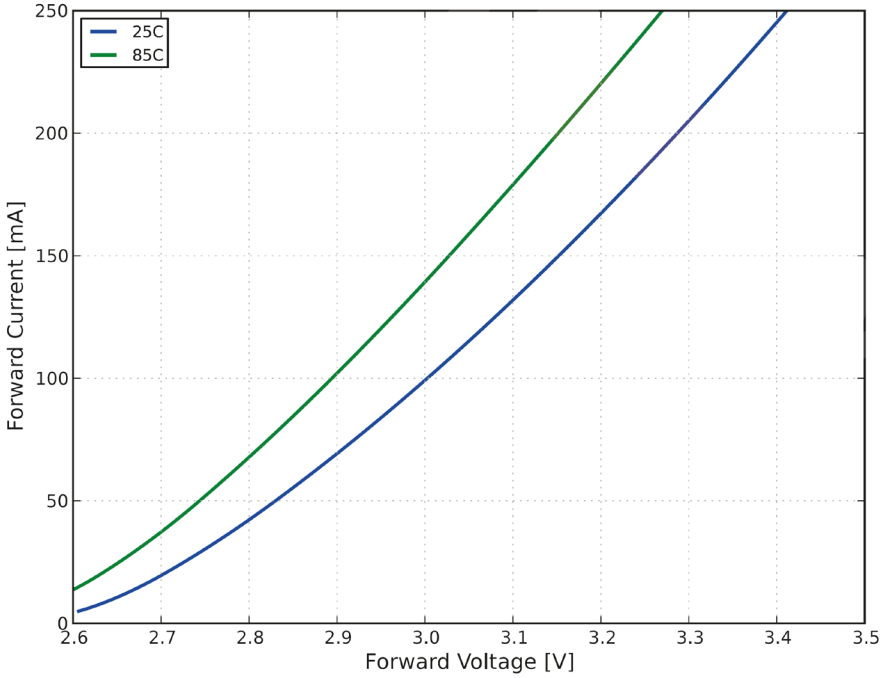


Figure 11. Typical forward current vs forward voltage for LUXEON Versat Dual Color PCA at TC= 25 °C

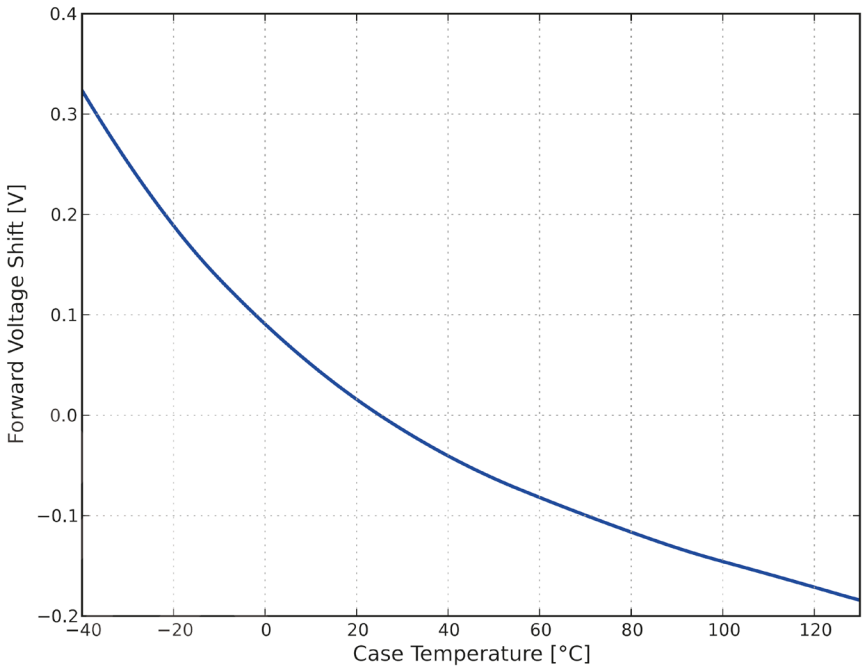


Figure 12. Typical forward voltage shift vs case temperature for LUXEON Versat Dual Color PCA

Color Shift Characteristics

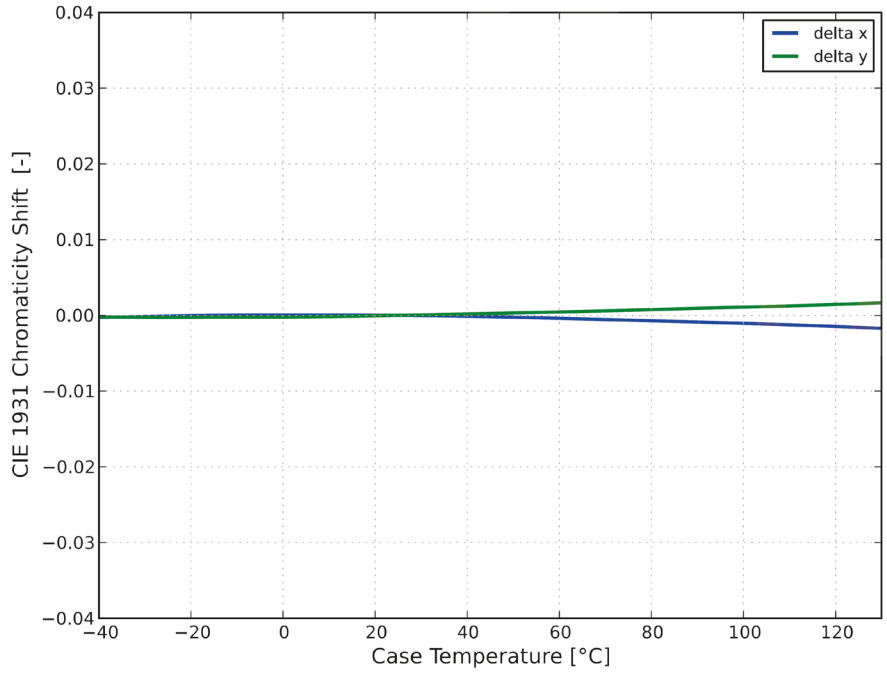


Figure 13. Typical color shift in CIE 1931 *x* and *y* coordinates for LUXEON Versat 3030 Dual Color PCA at 20 ms MP, 150 mA

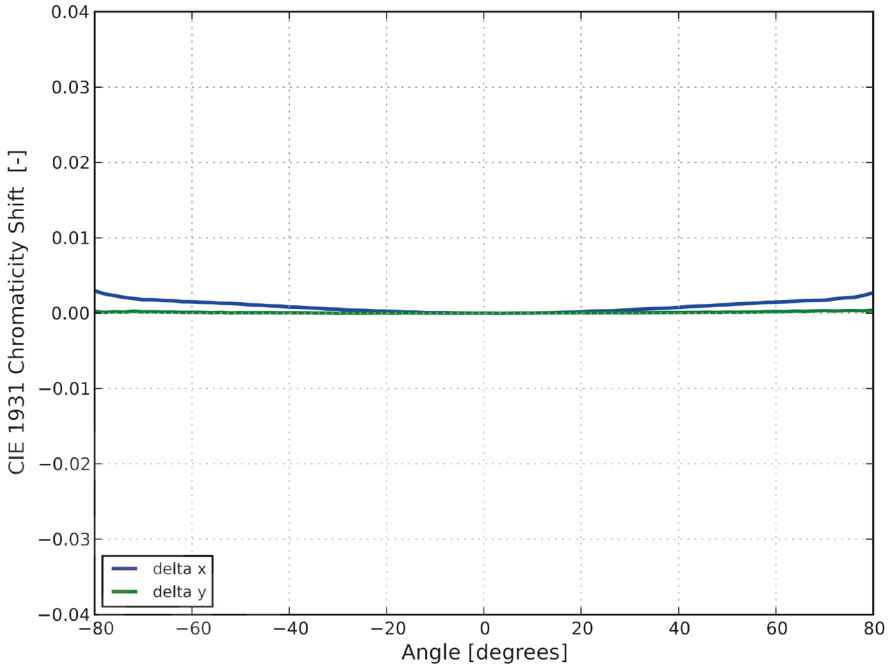


Figure 14. Typical color shift in CIE 1931 *x* and *y* coordinates over angle for LUXEON Versat Dual Color PCA at 20 ms MP, 150 mA

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Radiation Pattern Characteristics CW/PCA

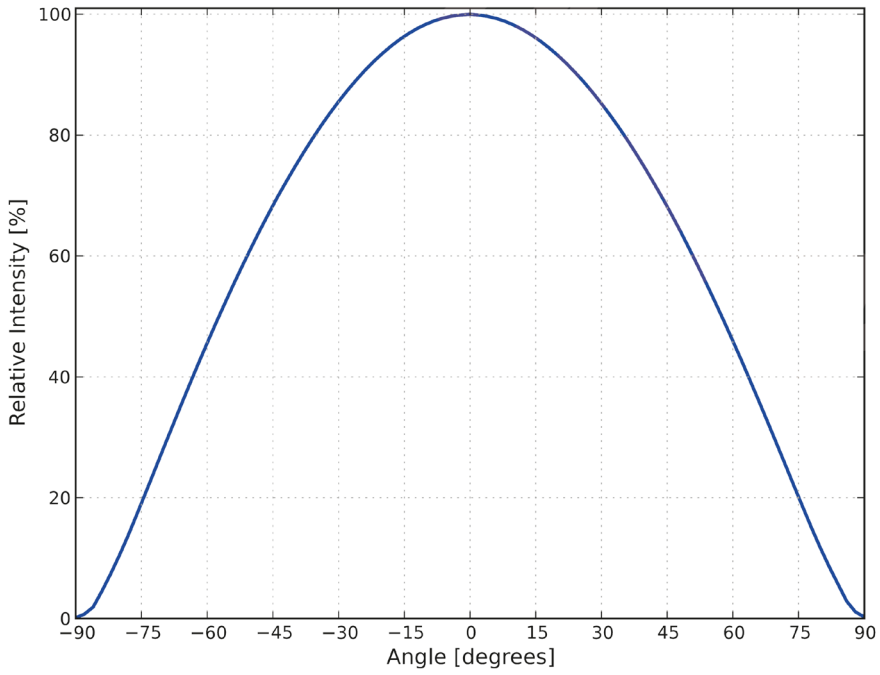


Figure 15. Typical radiation pattern for LUXEON Versat Dual Color CW/PCA at 20 ms MP, 150 mA, TC= 25 °C

Operating Limits Characteristics CW/PCA

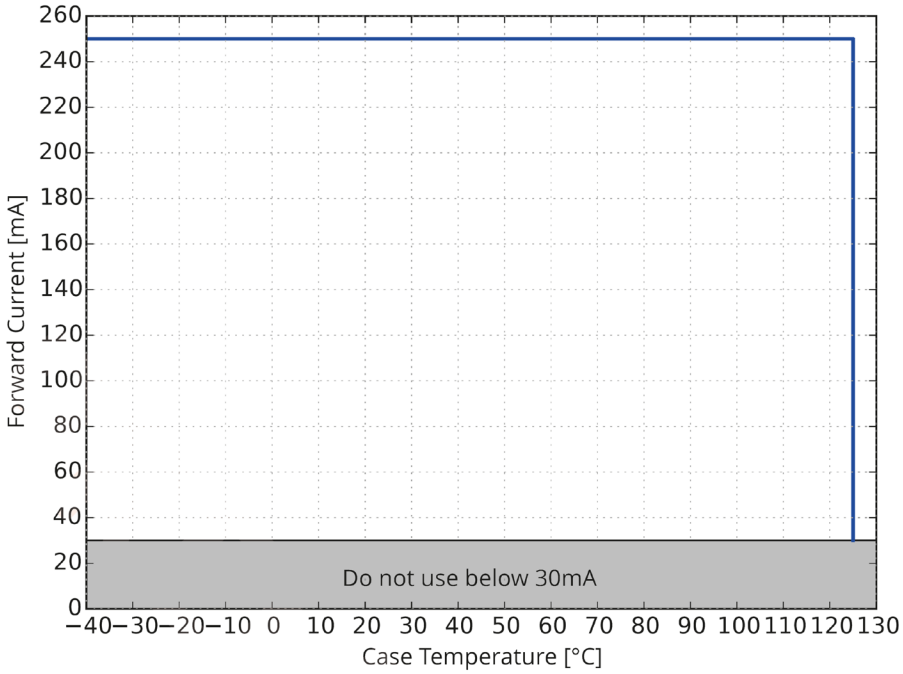


Figure 16 Maximum forward current vs case temperature for LUXEON Versat Dual Color CW/PCA

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Permissible Pulse Handling Characteristics CW/PCA

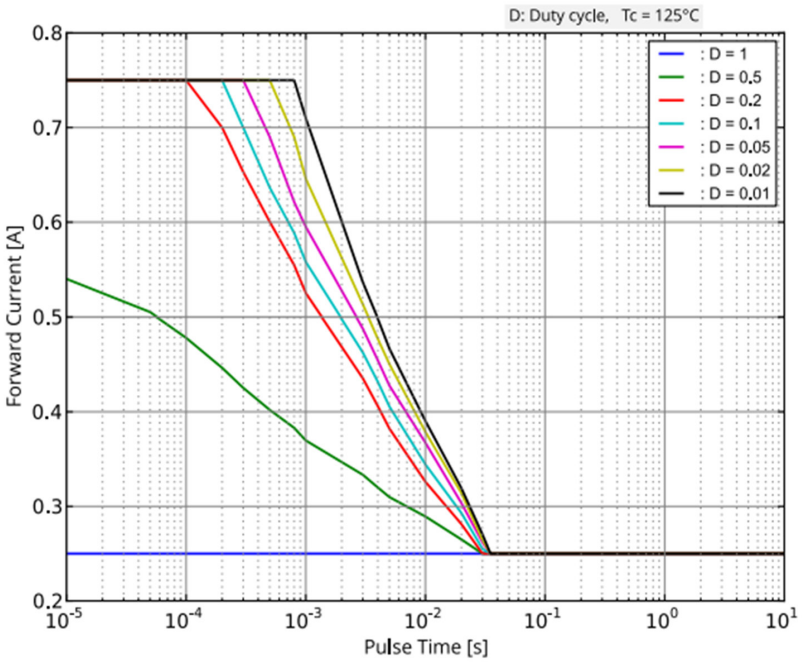


Figure 17 Permissible pulse handling capability for LUXEON Versat Dual Color CW/PCA

Product Bin and Labeling Definitions

Designing with LUXEON Versat Dual Color

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 Versat Dual Color LEDs are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C D E

Where:

- **A** – designates luminous flux bin (example: 2 =48 lumens to 64 lumens for Cool White and 30 lumens to 40 lumens for PC Amber)
- **B** – designates color bin for Cool White
- **C** – designates color bin for PC Amber
- **D** – designates forward voltage bin for Cool White (example: A = 2.7 V to 2.94 V)
- **E** – designates forward voltage bin for PC Amber (example: A = 2.7 V to 2.94 V)

Luminous Flux Bins

Table 6 lists the standard luminous flux bins for LUXEON Versat Dual Color CW/PCA emitters. Product availability in a particular bin varies by color and platform start of production date. Contact local sales representative for best supportability of programs.

Table 6. Luminous flux bin definitions for LUXEON Versat Dual Color, 150 mA, T_c= 25 °C

BIN	COOL WHITE LUMINOUS FLUX [1] (lm)		PC AMBER LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
2	48	64	30	40
3	53	70	33	44
4	58	76	36	48
5	64	82	40	53
6	70	88	44	58

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

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Color Codes

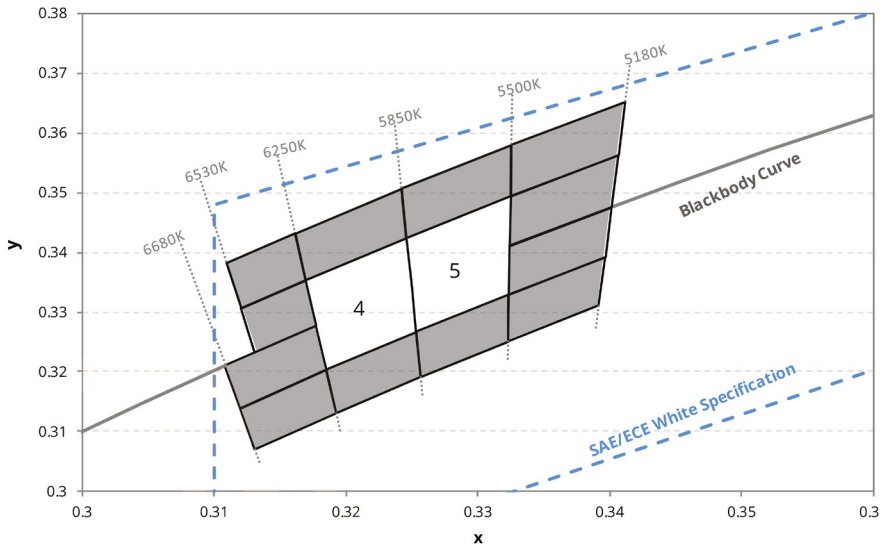


Figure 18a. Color bin structure in CIE 1931 color space for LUXEON Versat Dual Color Cool White

Notes for Figure 18a:
1. LUXEON Versat Dual Color CW color bins must be ordered by fine bin designators, shown below.
   6 = 4, 5

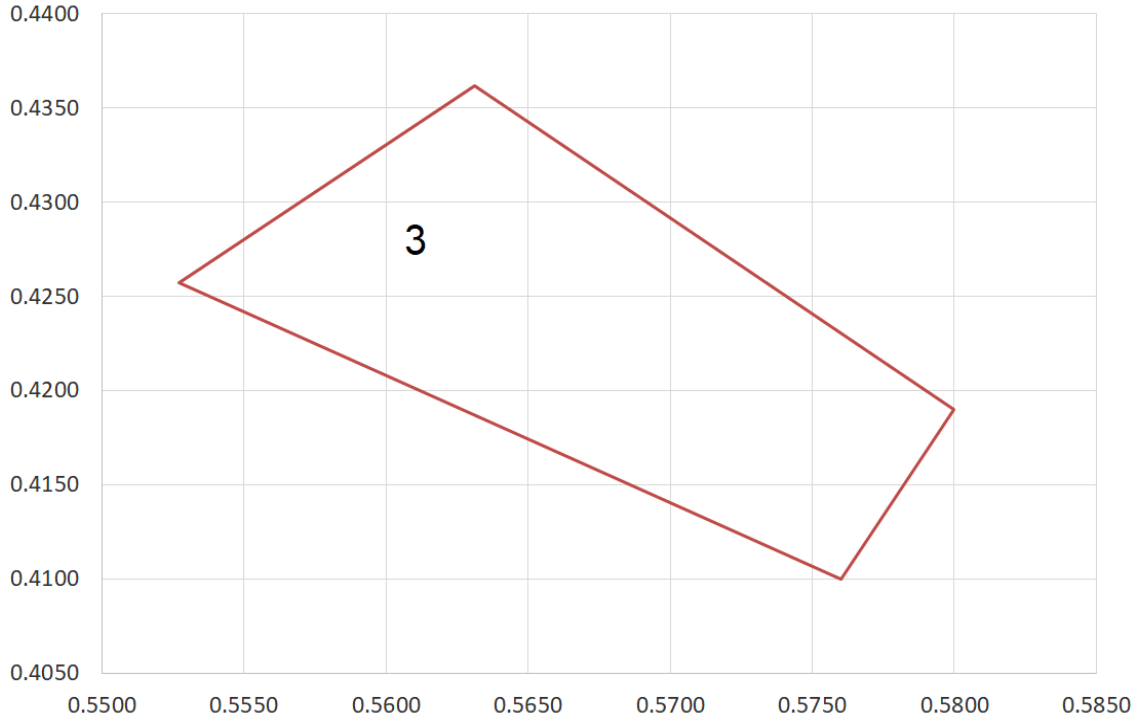


Figure 18b. Color bin structure in CIE 1931 color space for LUXEON Versat Dual Color PC Amber

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Color Bin Definitions

Table 7a. Color bin definitions for LUXEON Versat Dual Color Cool White

BIN	x [1, 2]	y [1, 2]	TYPICAL CCT (K)
4	0.3169	0.3353	6050
	0.3246	0.3424	
	0.3253	0.3266	
	0.3185	0.3203	
5	0.3246	0.3424	5680
	0.3325	0.3493	
	0.3323	0.3329	
	0.3253	0.3266	

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 Versat Dual Color PC Amber

BIN	x [1, 2]	y [1, 2]
3	0.5527	0.4257
	0.5631	0.4362
	0.5800	0.4190
	0.5760	0.4100

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 Versat Dual Color CW/PCA

BIN [1]	FORWARD VOLTAGE [2] (V_f)	
	MINIMUM	MAXIMUM
A	2.70	2.94
B	2.94	3.20

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

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Mechanical Dimensions

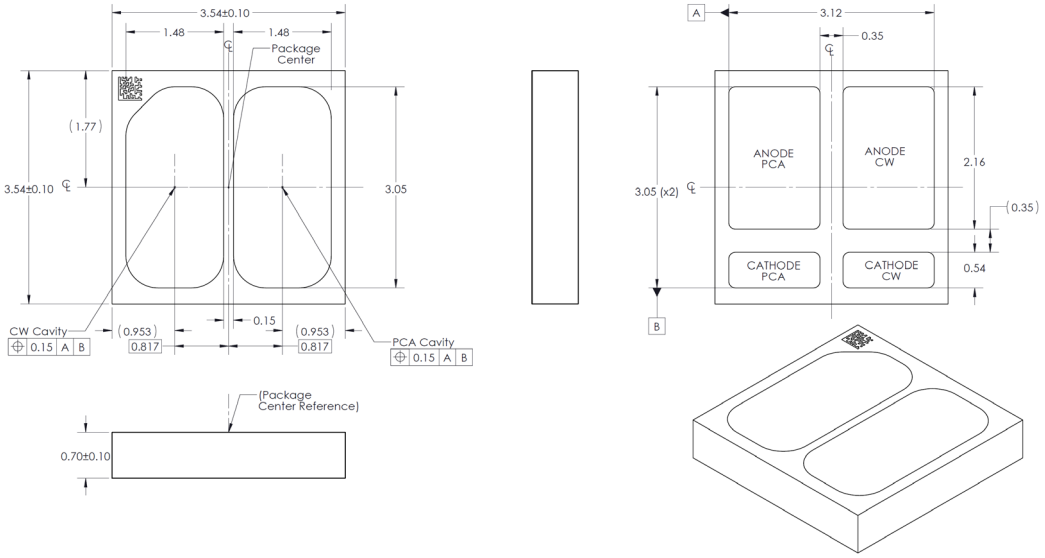


Figure 19. Mechanical dimensions for LUXEON Versat Dual Color CW/PCA

Notes for Figure 19:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

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Packaging Information

Pocket Tape Dimensions

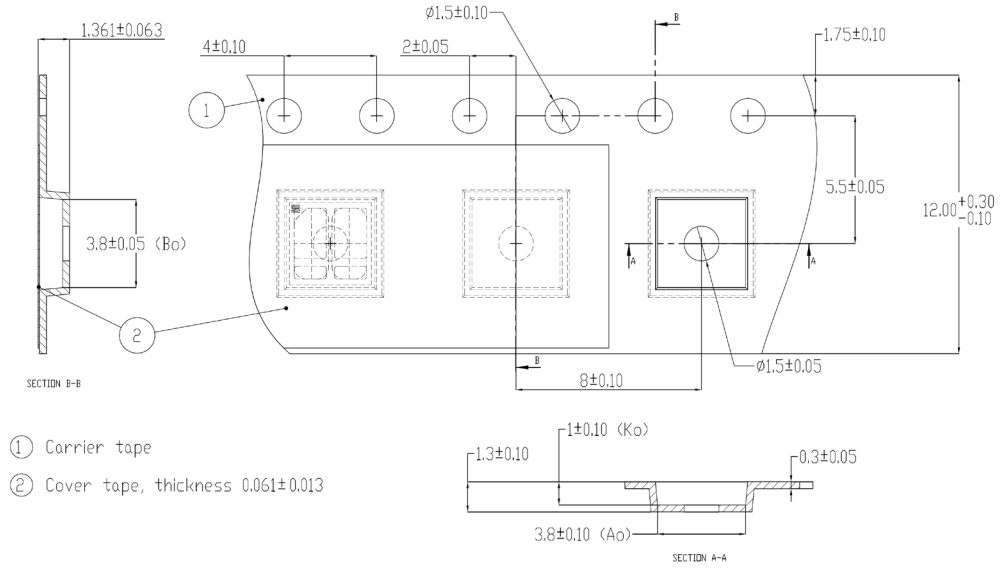


Figure 20. Pocket tape dimensions for LUXEON Versat Dual Color

Notes for Figure 20:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reel Dimensions

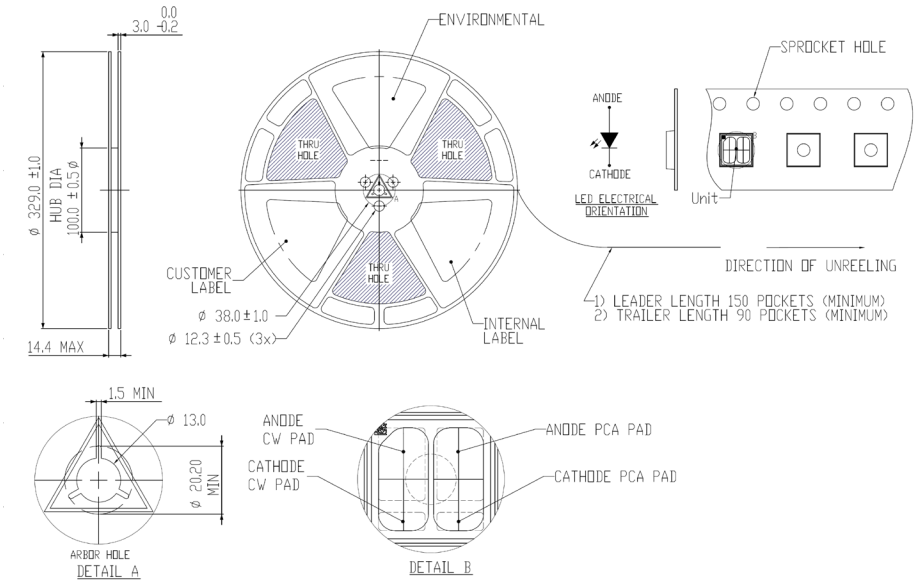


Figure 21. Reel dimensions for LUXEON Versat Dual Color

Notes for Figure 21:
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 safer, better and more beautiful—with light.

To learn more about our lighting solutions, visit lumileds.com.

LUMILEDS

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