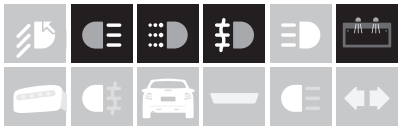
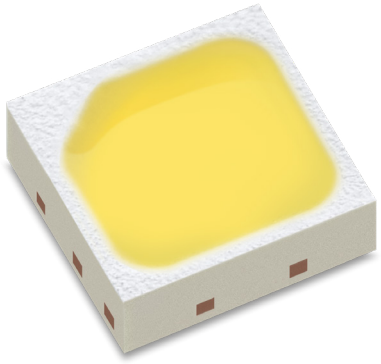
LUMILEDS

AUTOMOTIVE



LUXEON Versat 2020 CW 150

Industry-leading solutions for exterior automotive lighting



LUXEON Versat 2020 is the industry-leading compact solution for modern automotive signaling applications. This family of products provides design flexibility, automotive reliability and ease of integration / manufacturing to facilitate simplified system integration for high volume automotive designs. The LUXEON Versat 2020 CW 150 LED is designed to meet the needs of exterior automotive front lighting applications. All LUXEON Versat 2020 LEDs are AEC-Q102 qualified and cold binned at 25 °C.

FEATURES AND BENEFITS

- Industry standard footprint for simple integration
- Optimized package drives efficient light extraction
- Low Z profile simplifies optical design and minimizes design space
- Industry leading efficacy

PRIMARY APPLICATIONS

- Backup/Reverse
- Daytime Running Lights
- Front Fog
- License Plate

Table of Contents

General Information

Product Test Conditions

LUXEON Versat 2020 CW 150 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 2020 CW 150 follow the convention below:

A 1 V B – **A B C D E F G H J K M N P**

Where:

A	–	designates product segment (A = Automotive)
1	–	designates product level (1 = Level 1)
V	–	designates product line/family (V = LUXEON Versat)
B	–	designates package size (B = 2020)
A B C D	–	designates correlated color temperature (5850 = White)
E	–	designates binning current (A = 150 mA)
F	–	open space (0 = standard part)
G	–	designates generation (1 = first generation)
H	–	designates option for selective binning (0 = standard part)
J K M N	–	designates minimum luminous flux (0048 = 48 lumens, 0058 = 58 lumens, etc.)
P	–	open space (0 = standard part)

Therefore, the following part number is used for a LUXEON Versat 2020 CW 150 with a minimum luminous flux of 53 lumens:

A 1 V B –**5 8 5 0 A 0 1 0 0 0 5 3 0**

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON Versat 2020 CW 150 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 2020 CW 150 at 20 ms MP, 150 mA, T_c = 25 °C

COLOR	MINIMUM LUMINOUS FLUX [1] (lm)	TEST CURRENT (mA)	PART NUMBER
Cool White	48	150	A1VB-5850A01000480
	53	150	A1VB-5850A01000530
	58	150	A1VB-5850A01000580

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 2020 CW 150 at 20 ms MP, 150 mA, T_c = 25 °C

PART NUMBER	CORRELATED COLOR TEMPERATURE (K)		TOTAL INCLUDED ANGLE [1] $\theta_{0.90V}$	VIEWING ANGLE [2] $2\theta_{1/2}$
	MINIMUM	MAXIMUM		
A1VB-5850A010xxxx0	5500	6250	138°	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.

Electrical and Thermal Characteristics

Table 3. Typical electrical and thermal characteristics for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA, T_c = 25 °C

PART NUMBER	FORWARD VOLTAGE [1] (V_f)		THERMAL RESISTANCE— JUNCTION TO CASE (°C/W)			
			$R\theta_{j\text{-}c}$ el [2]		$R\theta_{j\text{-}c}$ real [3]	
	MINIMUM	MAXIMUM	TYPICAL	MAXIMUM	TYPICAL	MAXIMUM
A1VB-5850A010xxxx0	2.70	3.49	13.0	20.0	22.0	34.0

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.
2. $R\theta_{j\text{-}c}$ el: Electrical thermal resistance (junction to case).
3. $R\theta_{j\text{-}c}$ 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 Versat 2020 CW 150

PARAMETER	PERFORMANCE
Minimum DC Forward Current	30 mA
Maximum DC Forward Current	250 mA
Maximum Junction Temperature [1]	150 °C
Operating Case Temperature at Test Current [1]	-40 °C to 125 °C
Operating Case Temperature at Maximum Current [1]	-40 °C to 125 °C
LED Storage Temperature	-40 °C to 130 °C
Soldering Temperature	260 °C
Allowable Reflow Cycles	3
ESD Sensitivity [2]	±8 kV HBM, ±400 V MM, ±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 used to maintain junction temperature below the maximum. LUXEON Versat LEDs driven at or above maximum LED case temperature 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).

Characteristic Curves

Spectral Power Distribution Characteristics

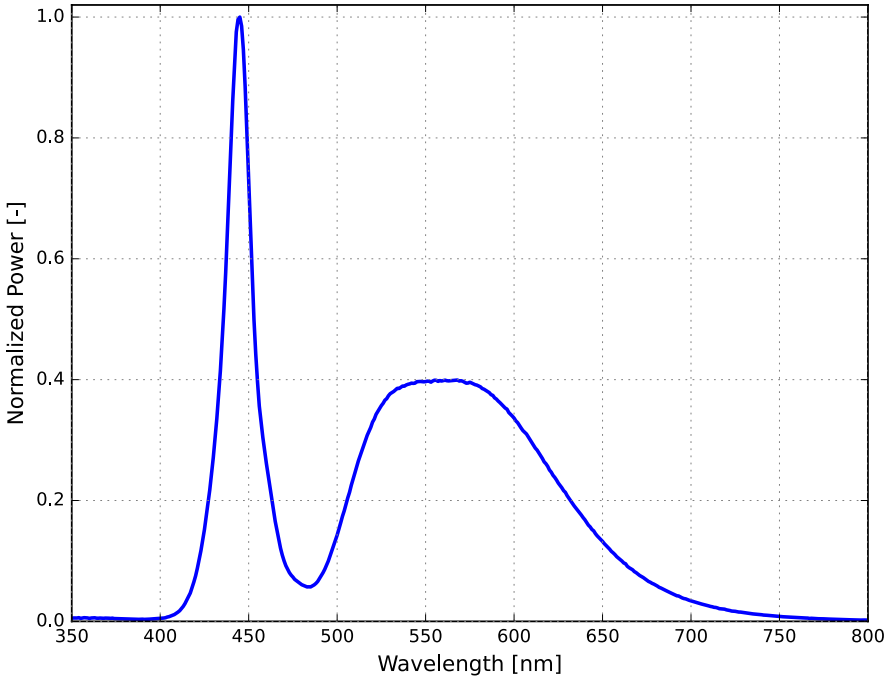


Figure 1. Typical normalized power vs. wavelength for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA, T_c = 25 °C

Light Output Characteristics

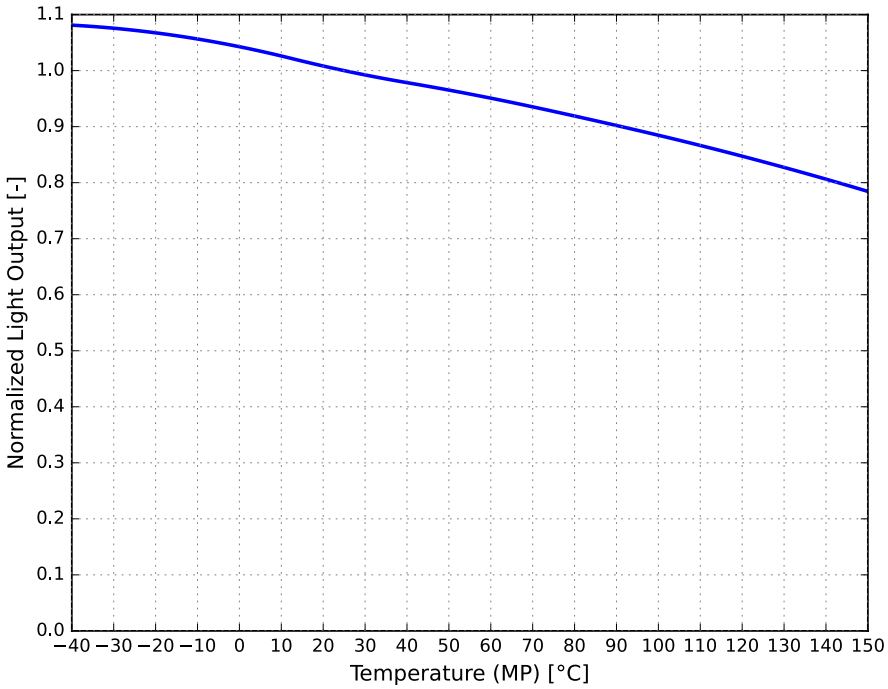


Figure 2. Typical normalized light output vs. case temperature for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA

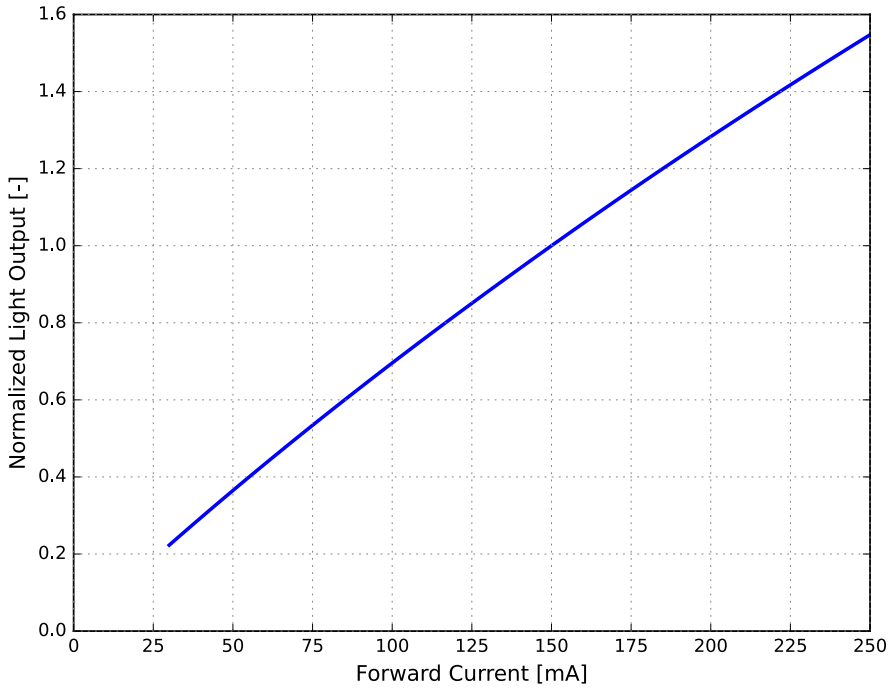


Figure 3. Typical normalized light output vs. forward current for LUXEON Versat 2020 CW 150 at T_c = 25 °C

Forward Current and Forward Voltage Characteristics

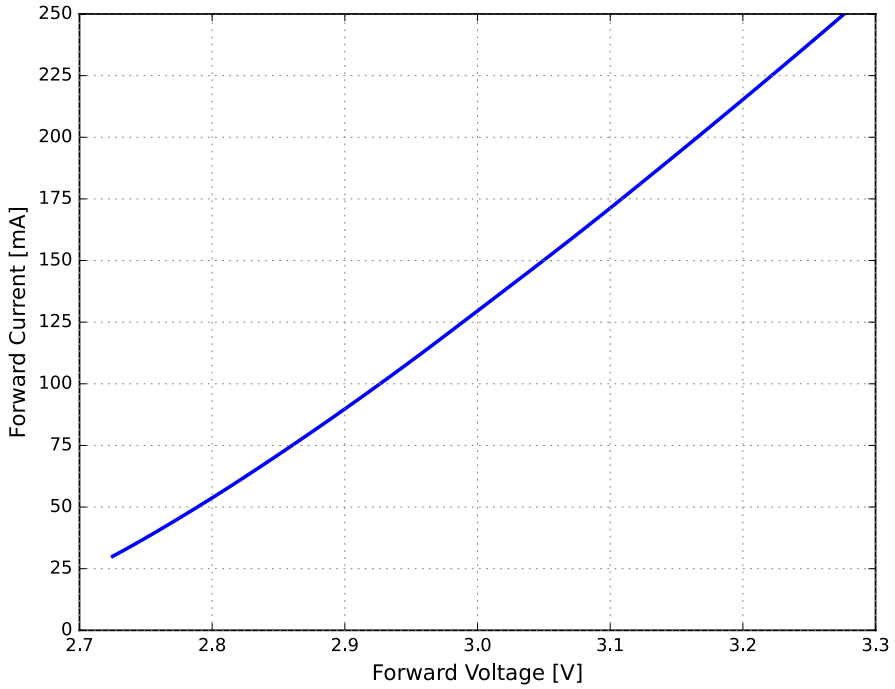


Figure 4. Typical forward current vs. forward voltage for LUXEON Versat 2020 CW 150 at T_c = 25 °C

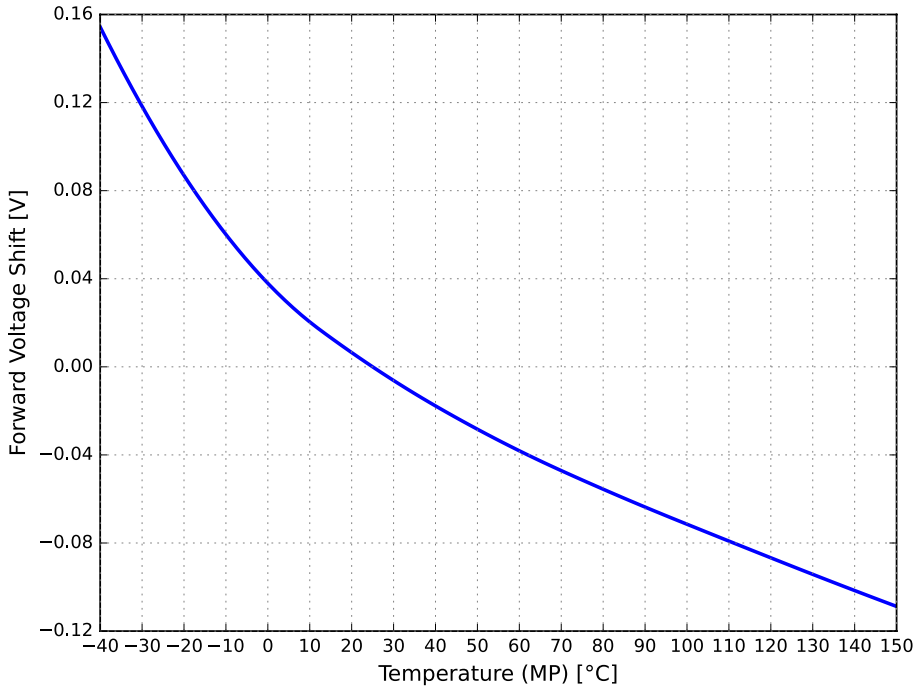


Figure 5. Typical forward voltage shift vs. case temperature for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA

Color Shift Characteristics

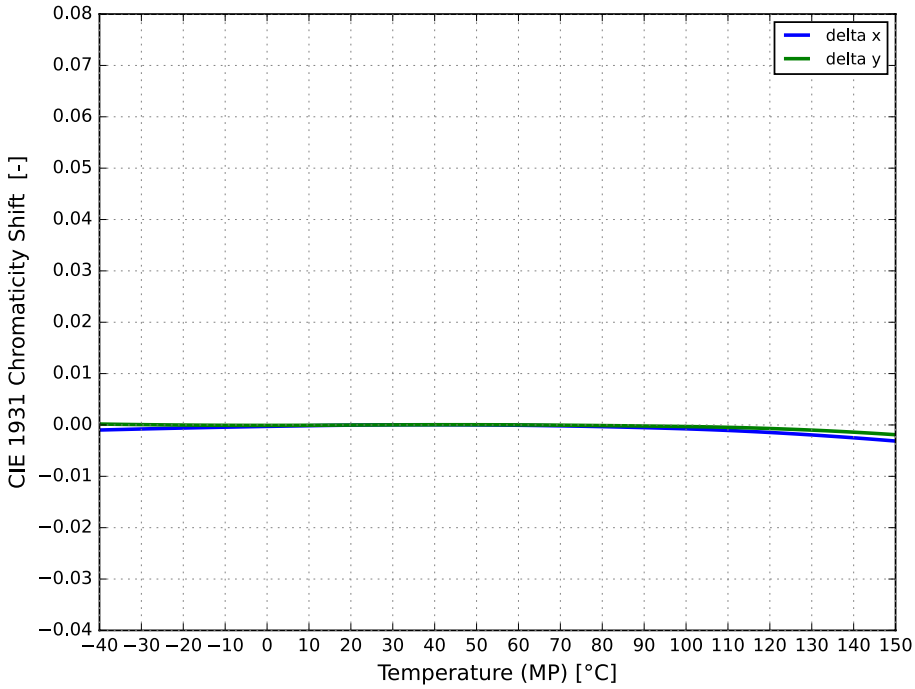


Figure 6. Typical color shift in CIE 1931 *x* and *y* coordinates for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA

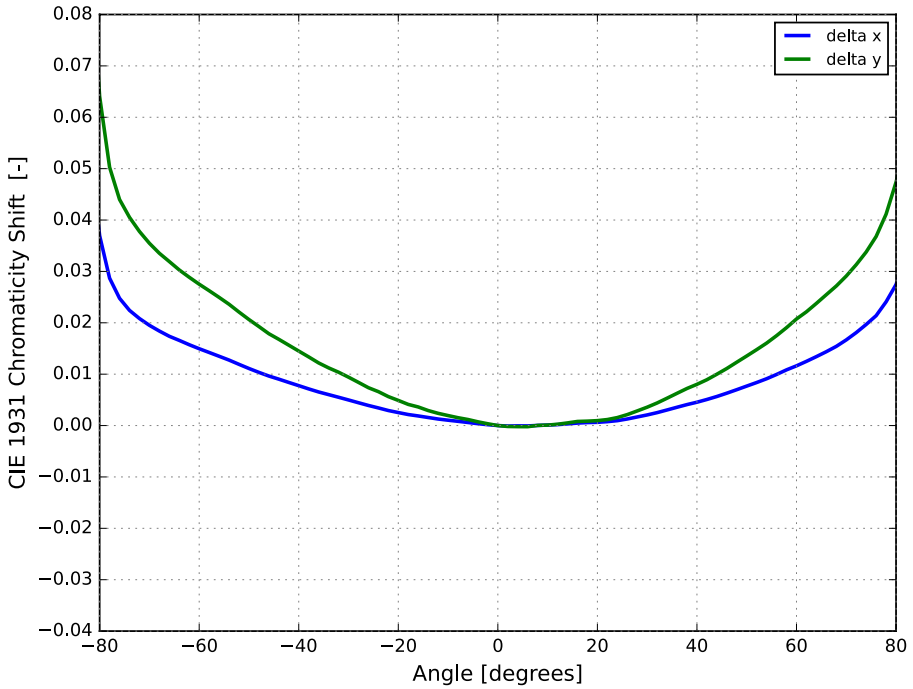


Figure 7. Typical color shift in CIE 1931 *x* and *y* coordinates over angle for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA

Radiation Pattern Characteristics

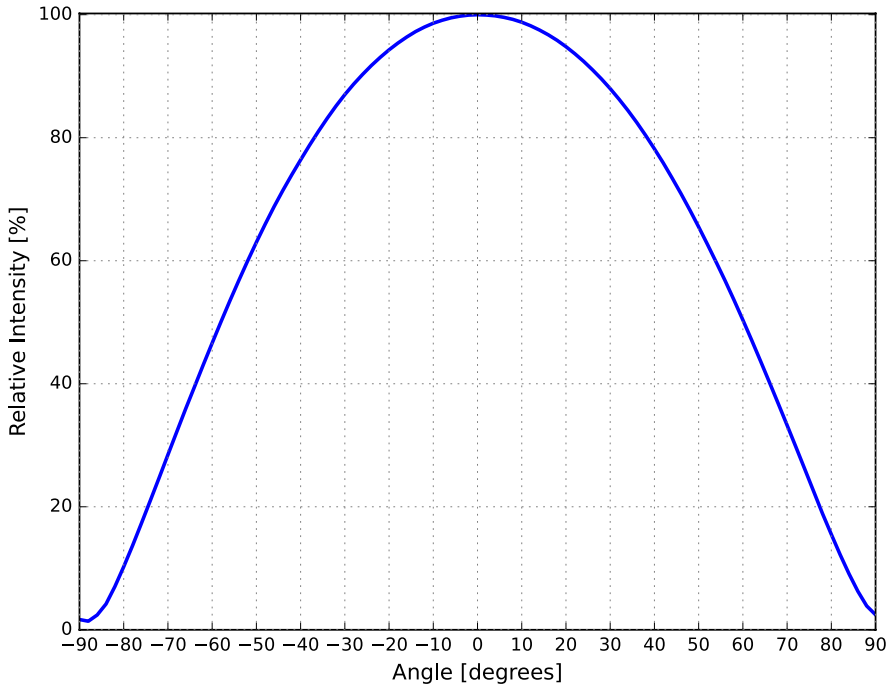


Figure 8. Typical radiation pattern for LUXEON Versat 2020 CW 150 at 20 ms MP, 150 mA, T_c = 25 °C

Operating Limits Characteristics

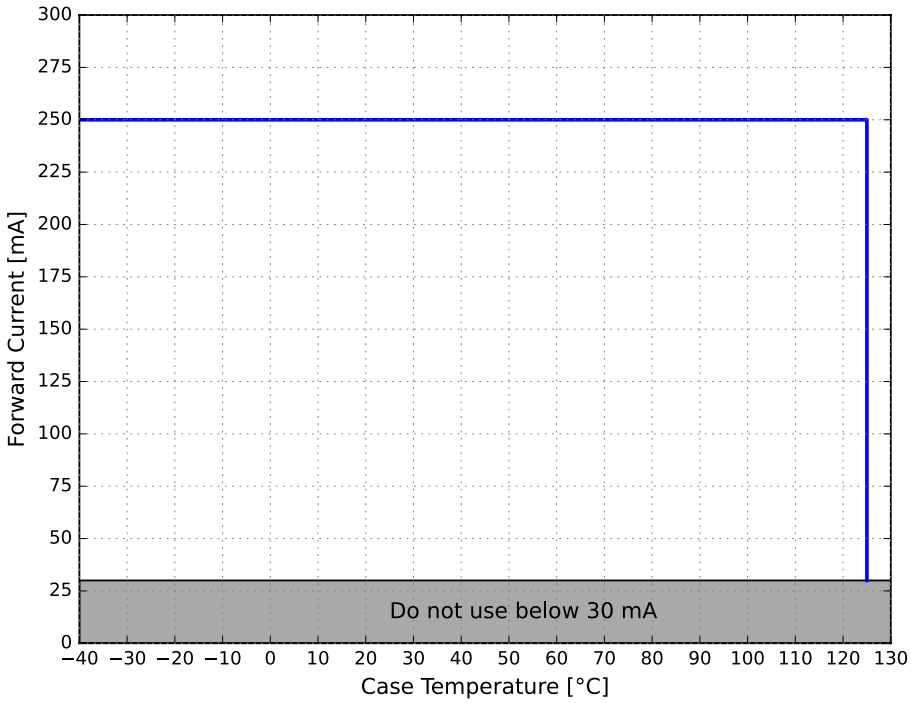


Figure 9. Maximum forward current vs. case temperature for LUXEON Versat 2020 CW 150

Notes for Figure 9:
1. LUXEON Versat LEDs driven at or above maximum LED case temperature may have shorter lifetime. Lumileds does not guarantee reliability of the board interconnect e.g. solder joint cracks caused by thermal mismatch.

Permissible Pulse Handling Characteristics

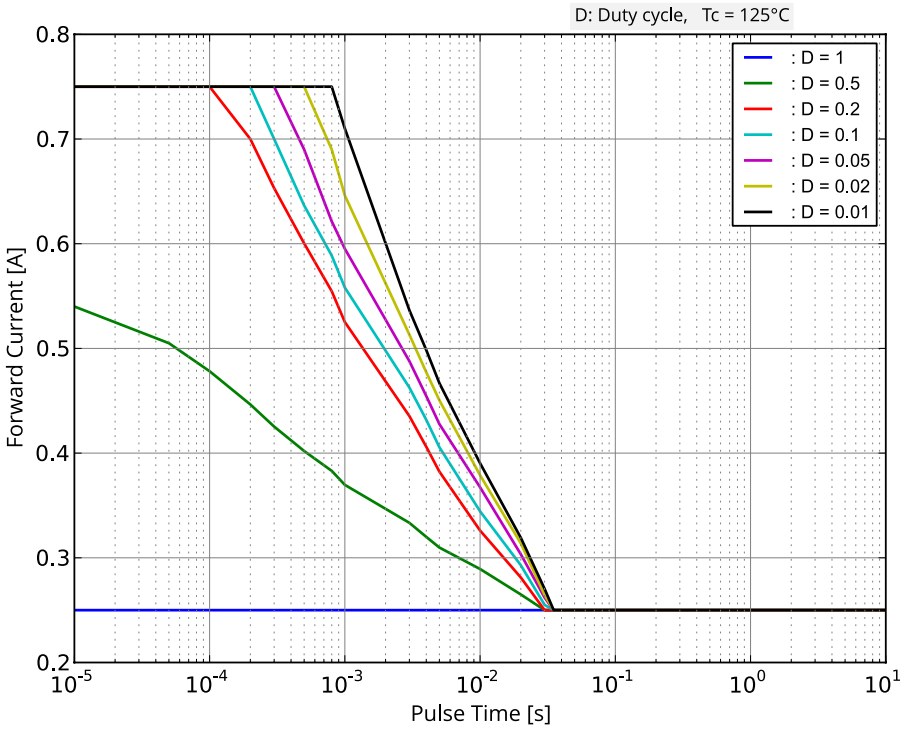


Figure 10. Permissible pulse handling capability for LUXEON Versat 2020 CW 150

Product Bin and Labeling Definitions

Designing with LUXEON Versat 2020 CW 150

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 2020 CW 150 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: H = 58 lumens to 64 lumens)

B C – designates color code (1D, 2C, 3B, 4A)

D – designates forward voltage bin (example: B = 2.94 V to 3.20 V)

Therefore, a LUXEON Versat 2020 CW 150 with a lumen range of 58 to 64, color code of 3B and a forward voltage of 2.94 to 3.20 has the following CAT code:

H 3 B B

Luminous Flux Bins

Table 6 lists the standard luminous flux bins for LUXEON Versat 2020 CW 150 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 5. Luminous flux bin definitions for LUXEON Versat 2020 CW 150, T_c = 25 °C

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
F	48	53
G	53	58
H	58	64
J	64	70
K	70	76

Notes for Table 5:
1. Lumileds maintains a tolerance of ±6.5% on luminous flux measurements.

Color Codes

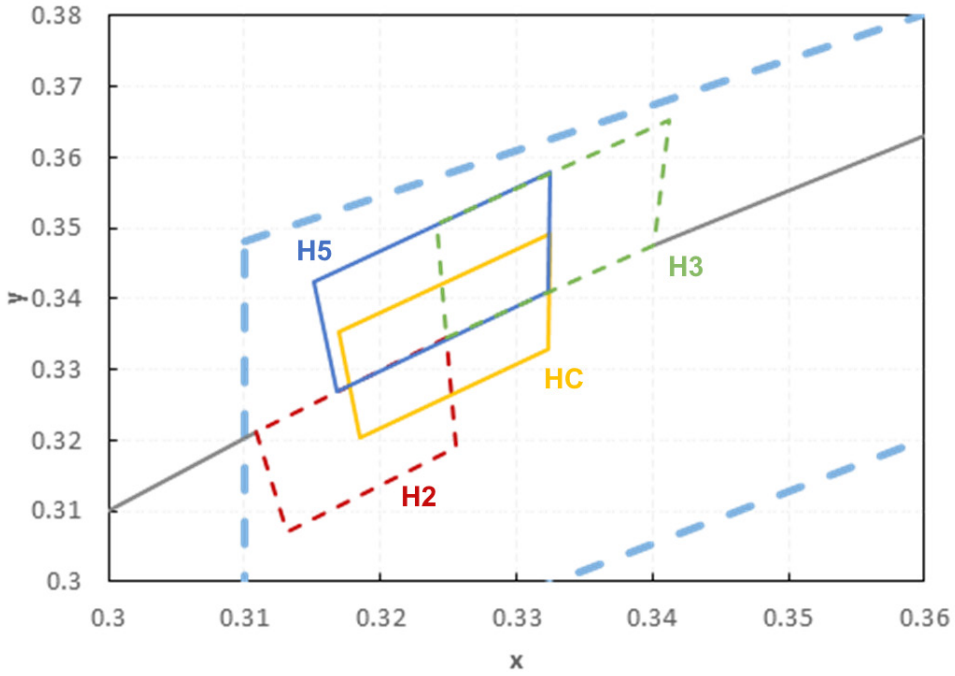


Figure 11. Color bin structure in CIE 1931 color space for LUXEON Versat 2020 CW 150

Notes for Figure 11:
1. Lumileds supports the following bins for LUXEON Versat 2020 CW 150: HC, H5, H2 and H3.

Color Bin Definitions

Table 6. Color bin definitions for LUXEON Versat 2020 CW 150

COLOR BIN	*x*	*y*
HC	0.3325	0.3493
	0.3169	0.3353
	0.3185	0.3203
	0.3323	0.3329
H5	0.3325	0.3579
	0.3151	0.3423
	0.3168	0.3268
	0.3324	0.3410
H2	0.3109	0.3211
	0.3131	0.3070
	0.3256	0.3191
	0.3249	0.3344
H3	0.3249	0.3344
	0.3401	0.3476
	0.3412	0.3652
	0.3242	0.3506

Notes for Table 6:
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 7. Forward voltage bin definitions for LUXEON Versat 2020 CW 150

BIN	FORWARD VOLTAGE [1] (V_f)	
	MINIMUM	MAXIMUM
A	2.70	2.94
B	2.94	3.20
C	3.20	3.49

Notes for Table 7:
1. Lumileds maintains a tolerance of ±0.06V 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

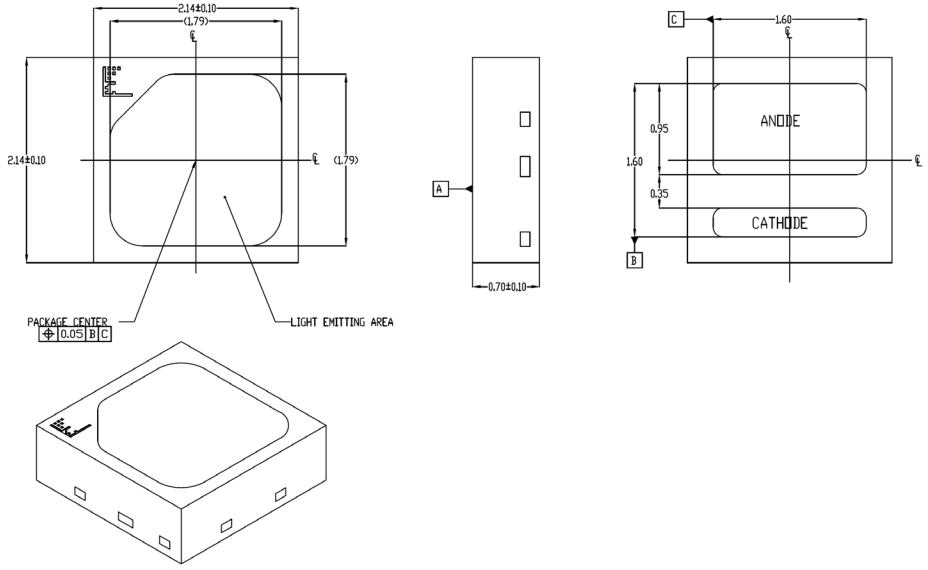


Figure 12. Mechanical dimensions for LUXEON Versat 2020 CW 150

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

JEDEC Moisture Sensitivity

Table 8. Moisture sensitivity levels for LUXEON Versat 2020 CW 150

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

Packaging Information

Pocket Tape Dimensions

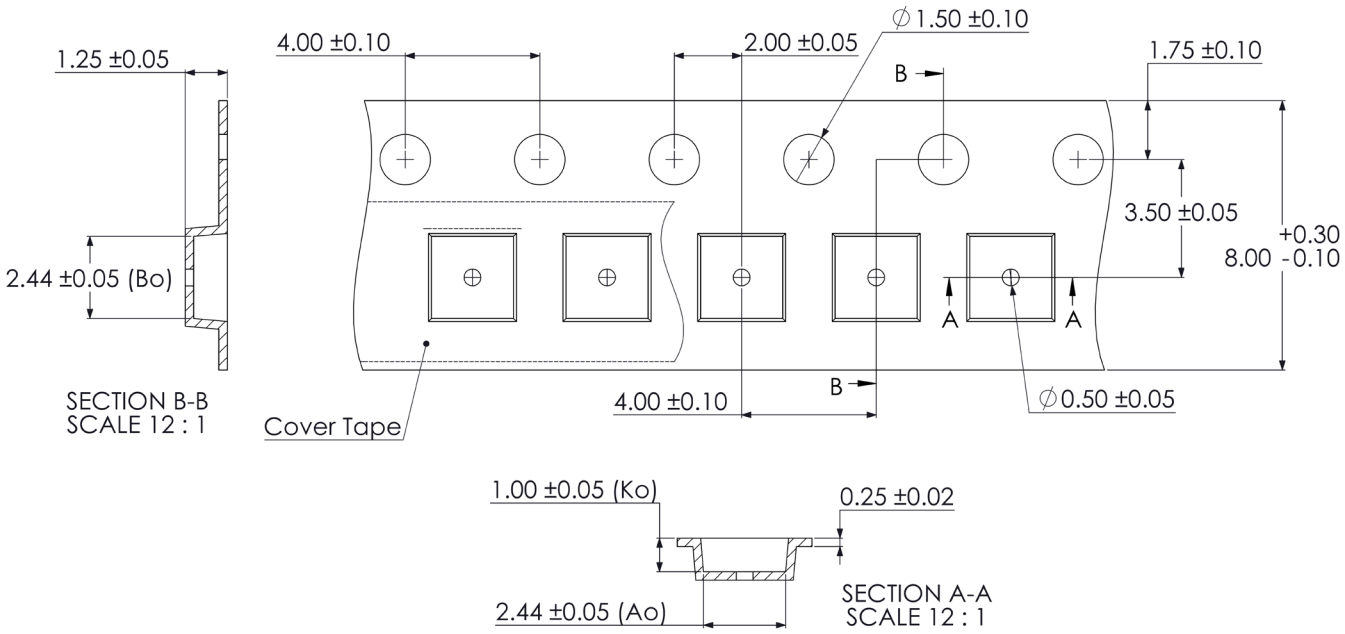


Figure 13. Pocket tape dimensions for LUXEON Versat 2020 CW 150

Notes for Figure 13:
1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Ao is the width of pocket, Ko is the depth of pocket, and Bo is the height of pocket.

Reel Dimensions

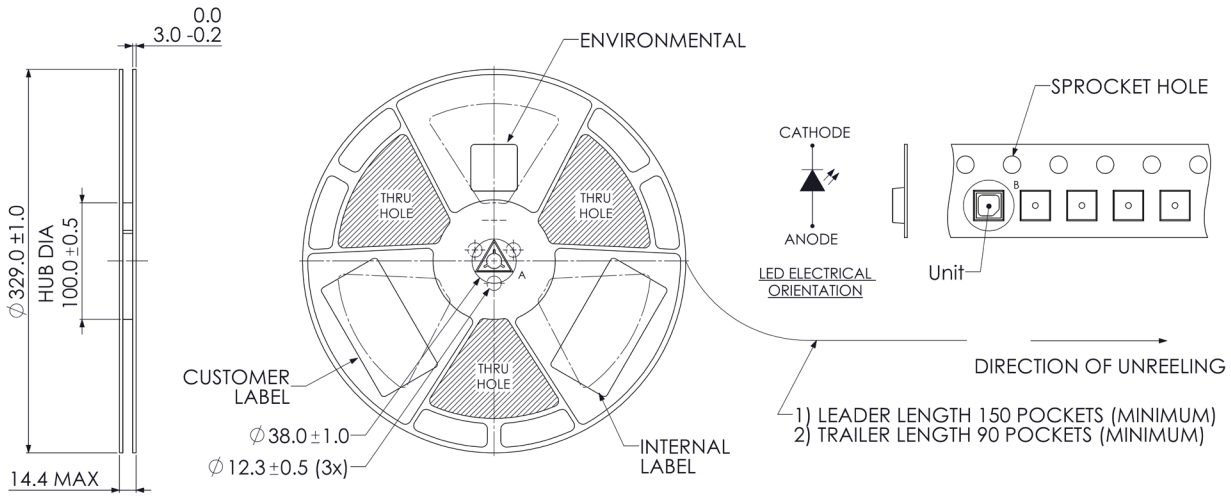


Figure 14. Reel dimensions for LUXEON Versat 2020 CW 150

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

Product Labelling

LUXEON Versat 2020 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 bin, color bins and forward voltage bins.

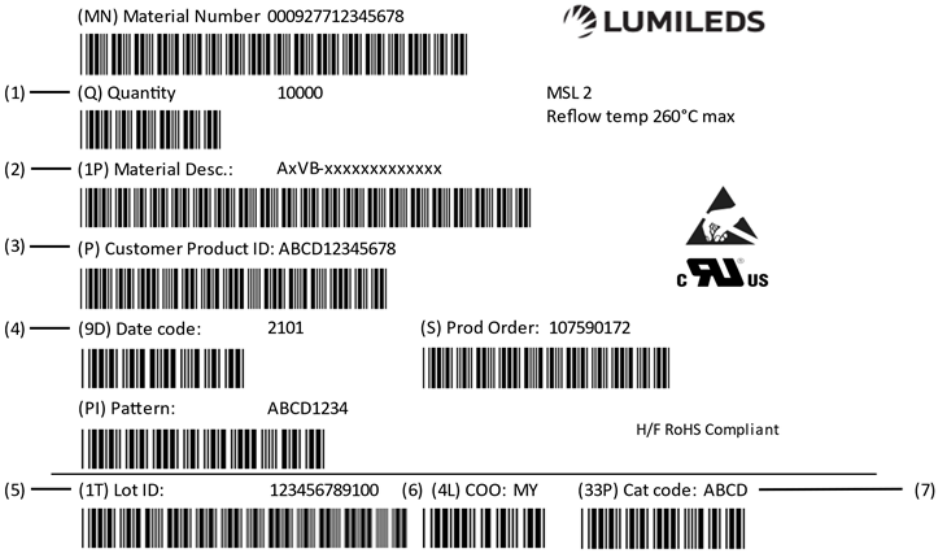


Figure 15. Example of a reel label LUXEON Versat 2020 CW 150

Notes for Figure 15:
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 n-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 safer, better and more beautiful—with light.

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

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DS294 LUXEON Versat 2020 CW 150
Product Datasheet 20211115