LUMILEDS

AUTOMOTIVE

LUXEON Versat 3030 ST PCA 350

Industry-leading solutions for exterior automotive lighting

LUXEON Versat is perfect for high-volume assembly where consistency is never compromised. 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 3030 ST PCA 350 LED is designed to meet the needs of exterior automotive front and rear lighting applications. All LUXEON Versat 3030 LEDs are AEC-Q102 qualified and cold binned at 25 °C.

FEATURES AND BENEFITS

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

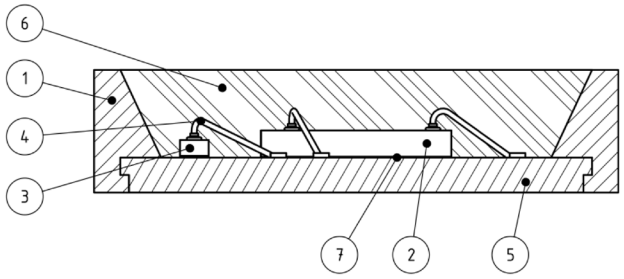
PRIMARY APPLICATIONS

- Side Marker
- Turn
  - Front Turn
  - Rear Turn

Table of Contents

General Information

LUXEON Versat 3030 ST PCA 350 emitters are mid-power phosphor converted amber emitters mounted on an EMC leadframe package. All LUXEON Versat 3030 ST emitters contain a TVS chip for ESD protection.



1) EMC Package
2) InGaN die
3) TVS chip
4) Wirebonds
5) Solder pads
6) Dispensed phosphor in silicone
7) Silicone glue

Figure 1. Schematic cross section LUXEON Versat 3030 ST PC Amber

Product Test Conditions

LUXEON Versat 3030 ST PCA 350 is binned using a 20 ms monopulse (MP) of 350 mA drive current. The case temperature is set to T_j = 25 °C at the beginning of the pulse.

Part Number Nomenclature

Part numbers for LUXEON Versat 3030 ST PCA 350 follow the convention below:

A 1 V C – **P 5 9 1 C 0 1 0 J K M N 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 type (C = 3030 ST)
P 5 9 1	–	designates the dominant wavelength (P591 = PC Amber)
C	–	designates binning current (C = 350 mA)
0	–	Reserved for future customization
1	–	designates generation (1 = first generation)
0	–	Reserved for future customization
J K M N	–	designates minimum luminous flux (0070 = 70 lumens, 0082 = 82 lumens etc.)
0	–	Reserved for future customization

Therefore, the following part number is used for a LUXEON Versat 3030 ST PCA 350 with a minimum luminous flux of 82 lumens:

A 1 V C – **P 5 9 1 C 0 1 0 0 0 8 2 0**

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON Versat 3030 ST PCA 350 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

LUXEON Versat 3030 ST PCA 350 emitters are tested and binned with a 20 ms monopulse of 350 mA at a junction temperature, T_j, of 25 °C.

Table 1. Product performance and optical characteristics of LUXEON Versat 3030 ST PCA 350 at 350 mA, T_c = 25 °C

COLOR	MINIMUM LUMINOUS FLUX [1] (lm)	PART NUMBER
PC Amber	72	A1VC-P591C01000720
	76	A1VC-P591C01000760
	82	A1VC-P591C01000820

Notes for Table 1:
1. Lumileds maintains a tolerance of ±10 % on luminous flux measurements.

Optical Characteristics

Table 2. Optical characteristics for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_c = 25 °C

PART NUMBER	DOMINANT WAVELENGTH [1, 2] (nm)		TOTAL INCLUDED ANGLE [4] $\theta_{0.90V}$	TYPICAL VIEWING ANGLE [5] $2\theta_{1/2}$
	MINIMUM	MAXIMUM		
A1VC-P591C010xxxx0	587.5	592.6	138°	120 °

Notes for Table 2:
1. Total angle at which 90% of total luminous flux is captured.
2. 2θ1/2 denotes the viewing angle, with θ1/2 being the off-axis angle from the LED centerline where the luminous intensity is ½ of the peak value.

Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_c = 25 °C

PART NUMBER	FORWARD VOLTAGE [1] (V_f)			THERMAL RESISTANCE— JUNCTION TO CASE (K/W)			
				$R\theta_{j\text{-}c}$ el [2]		$R\theta_{j\text{-}c}$ real [3]	
	MINIMUM	TYPICAL	MAXIMUM	TYPICAL	MAXIMUM	TYPICAL	MAXIMUM
A1VC-P591C010xxxx0	2.7	3.20	3.49	11.0	14.0	15.0	22.0

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.06 V on forward voltage measurements.
2. Ratio between temperature difference (junction ↔ case) and electrical input power (references JESD51-51, JESD51-14)
3. 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 Versat 3030 ST PCA 350

PARAMETER	PERFORMANCE
Minimum DC Forward Current	20 mA
Maximum DC Forward Current [1]	500 mA
Maximum Peak Pulsed Forward Current [1]	1000 mA
Operating Case Temperature [1]	-40 °C to 132 °C
LED Storage Temperature	-40 °C to 135 °C
Soldering Temperature	260 °C per JEDEC J-STD-020E
Allowable Reflow Cycles	3
ESD Sensitivity [2]	±8 kV HBM, ±2 kV CDM
Reverse Voltage (Vreverse)	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
Maximum Emitter Junction Temperature [1] (DC & Pulse)	150 °C

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

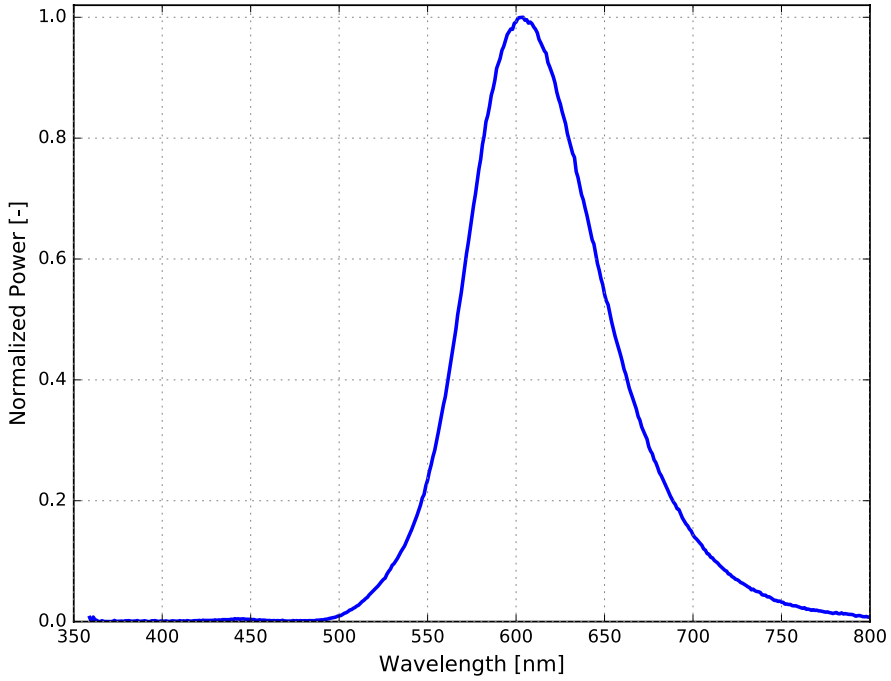


Figure 2. Typical normalized power vs. wavelength for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_C = 25 °C

Light Output Characteristics

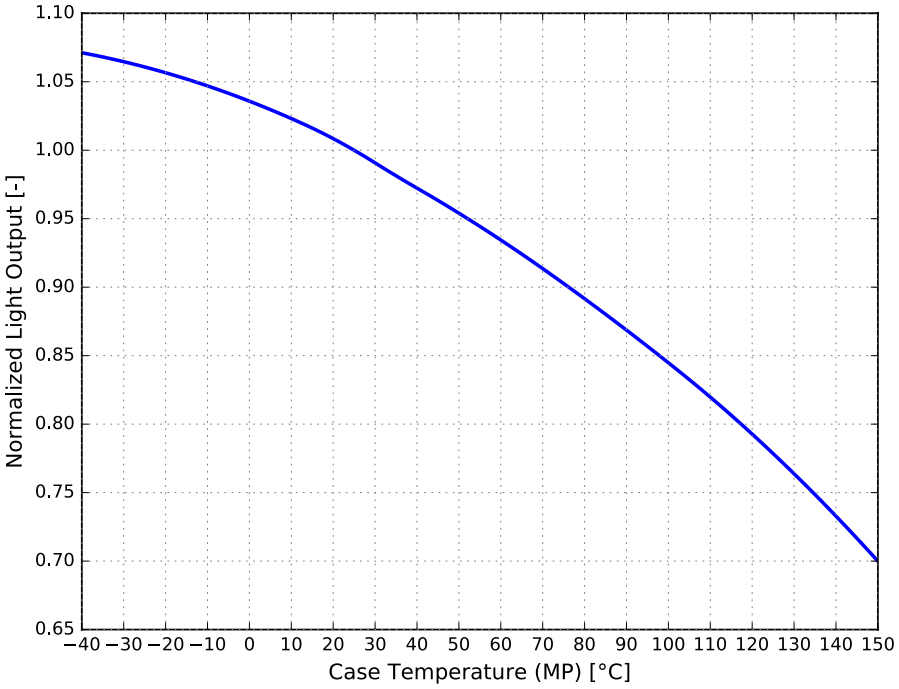


Figure 3. Typical normalized light output vs. case temperature for LUXEON Versat 3030 ST PCA 350 at 350 mA

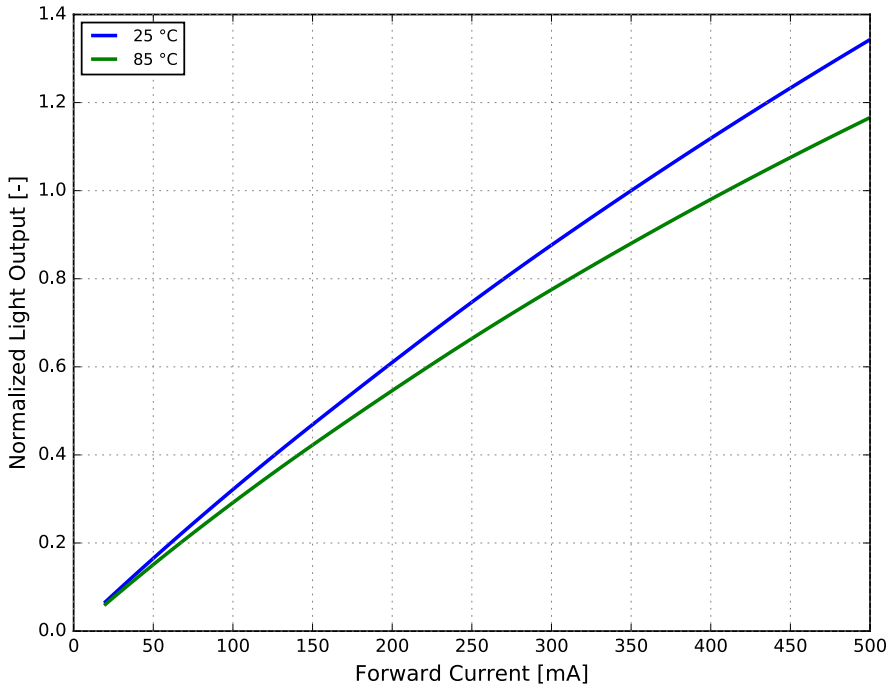


Figure 4. Typical normalized light output vs. forward current for LUXEON Versat 3030 ST PCA 350 at T_C = 25 °C

Forward Current and Forward Voltage Characteristics

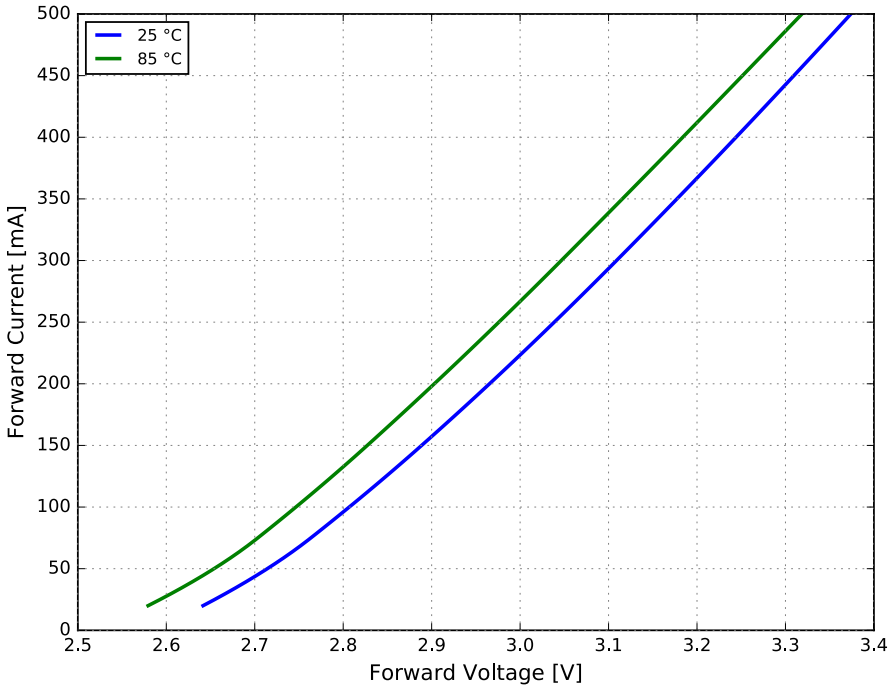


Figure 5. Typical forward current vs. forward voltage for LUXEON Versat 3030 ST PCA 350 at T_C = 25 °C

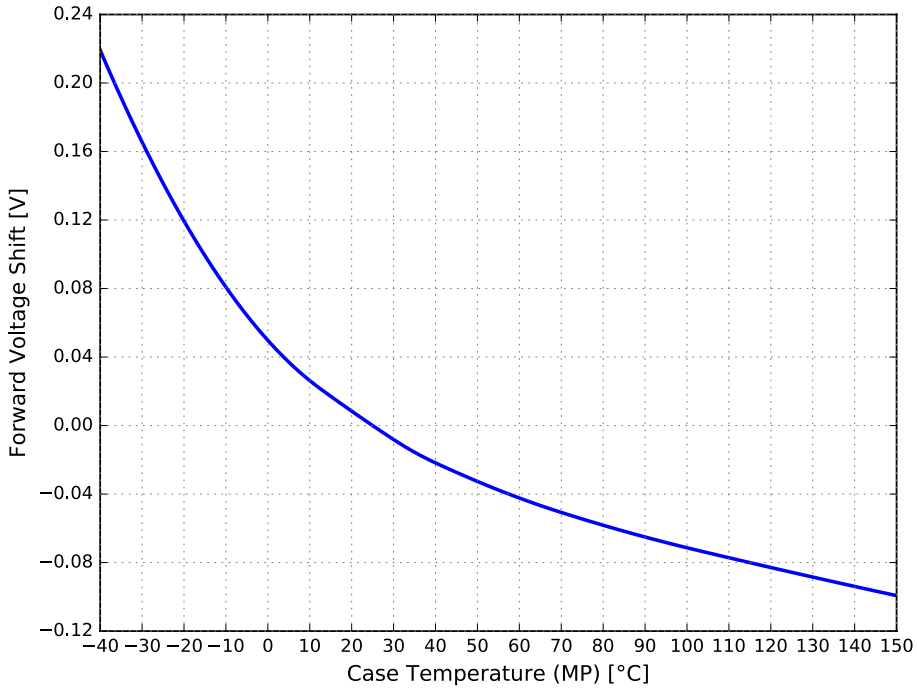


Figure 6. Typical forward voltage shift vs. case temperature for LUXEON Versat 3030 ST PCA 350 at 20 ms MP, 350 mA

Color Shift Characteristics

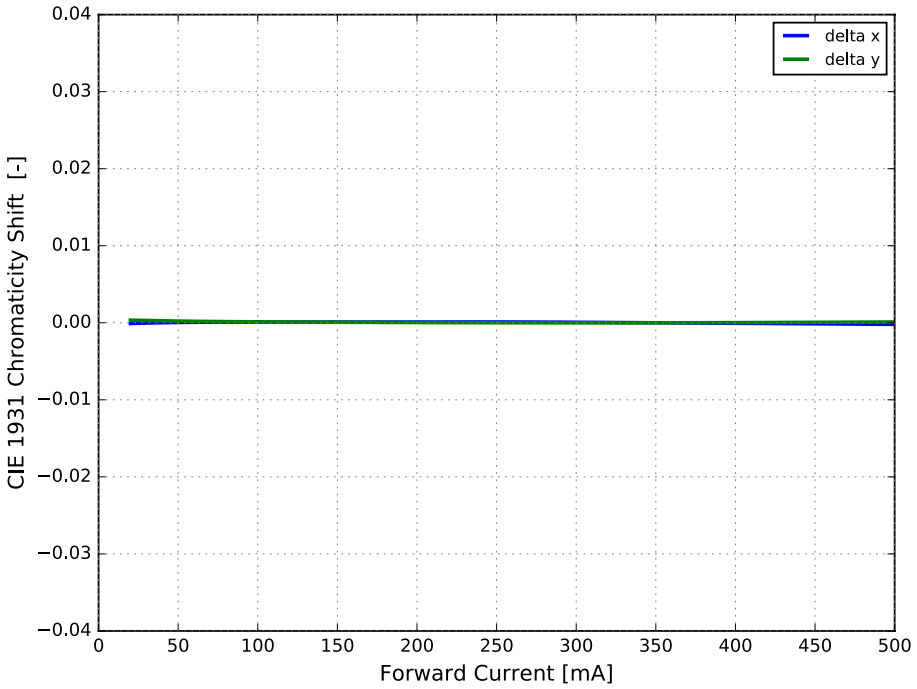


Figure 7. Typical color shift in CIE 1931 *x*, *y* coordinates vs forward current for LUXEON Versat 3030 ST PCA 350 at 20 ms MP, 350 mA

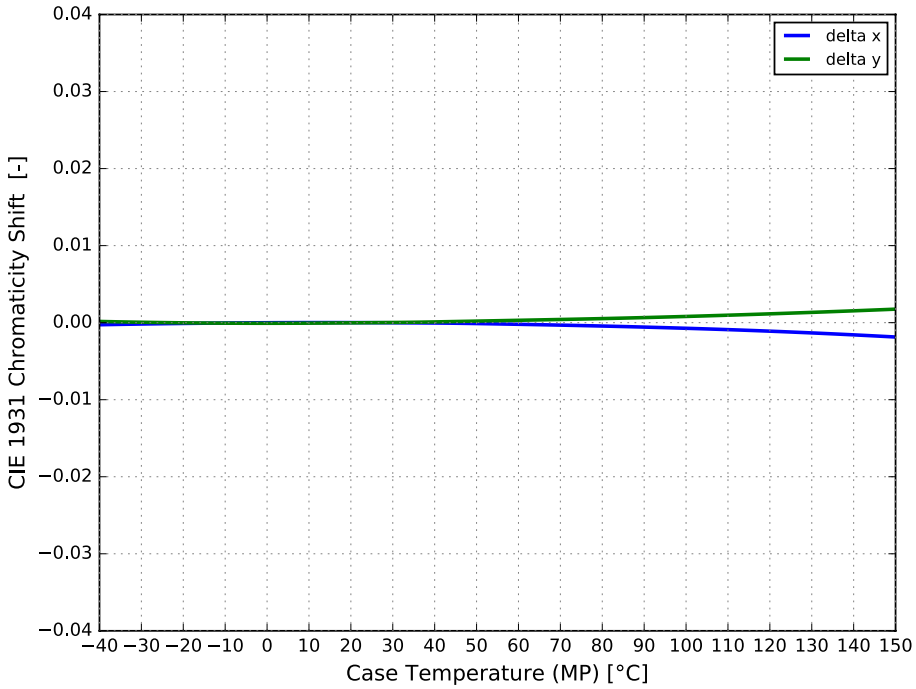


Figure 8. Typical color shift in CIE 1931 x and y coordinates for LUXEON Versat 3030 ST PCA 350 at 20 ms MP, 350 mA

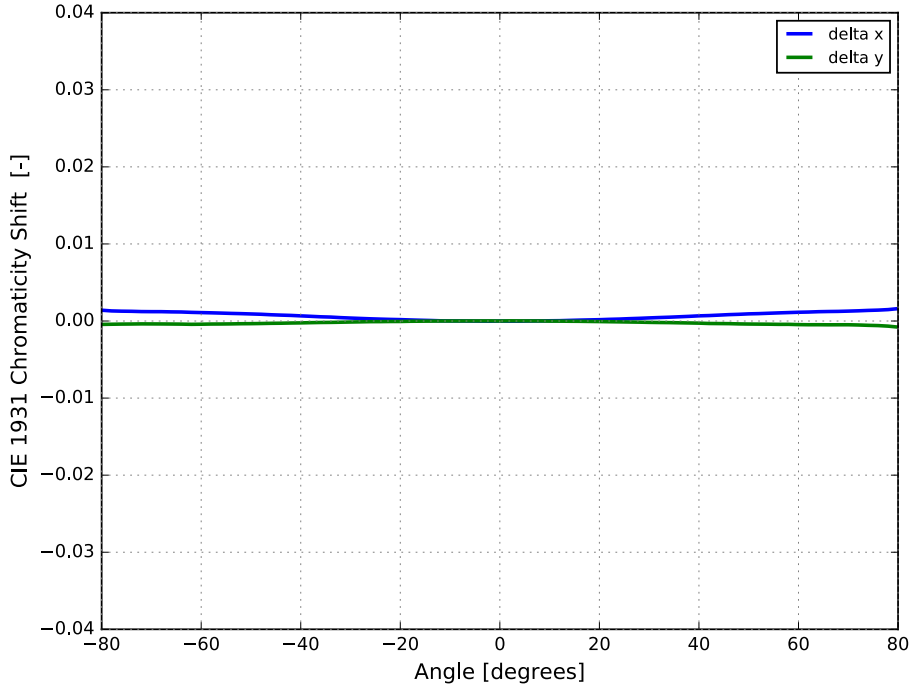


Figure 9. Typical color shift in CIE 1931 *x* and *y* coordinates over angle for LUXEON Versat 3030 ST PCA 350 at 20 ms MP, 350 mA

Radiation Pattern Characteristics

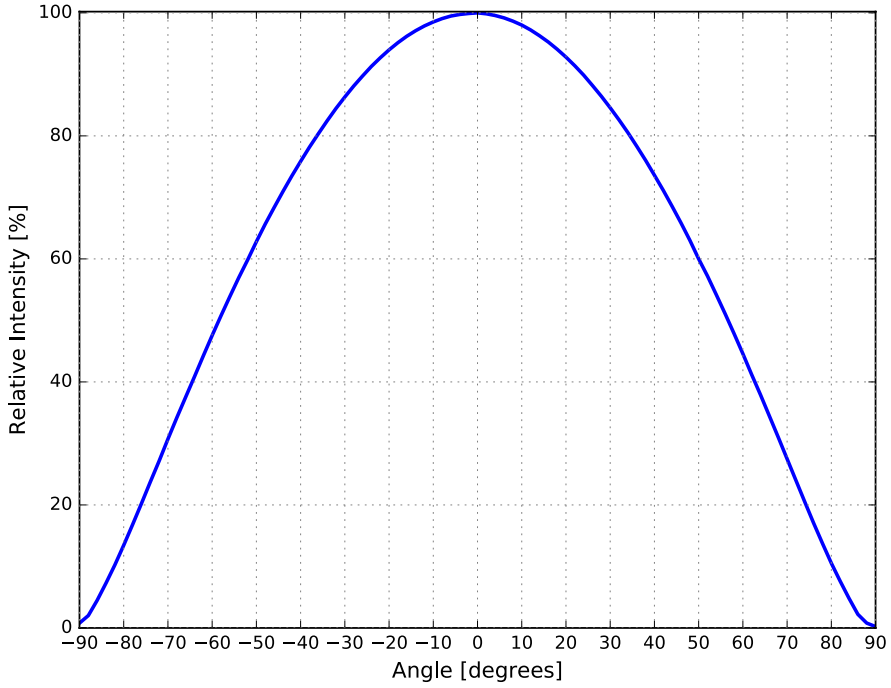


Figure 10. Typical radiation pattern for LUXEON Versat 3030 ST PCA 350 at 20 ms MP, 350 mA, T_c = 25 °C

Operating Limits Characteristics

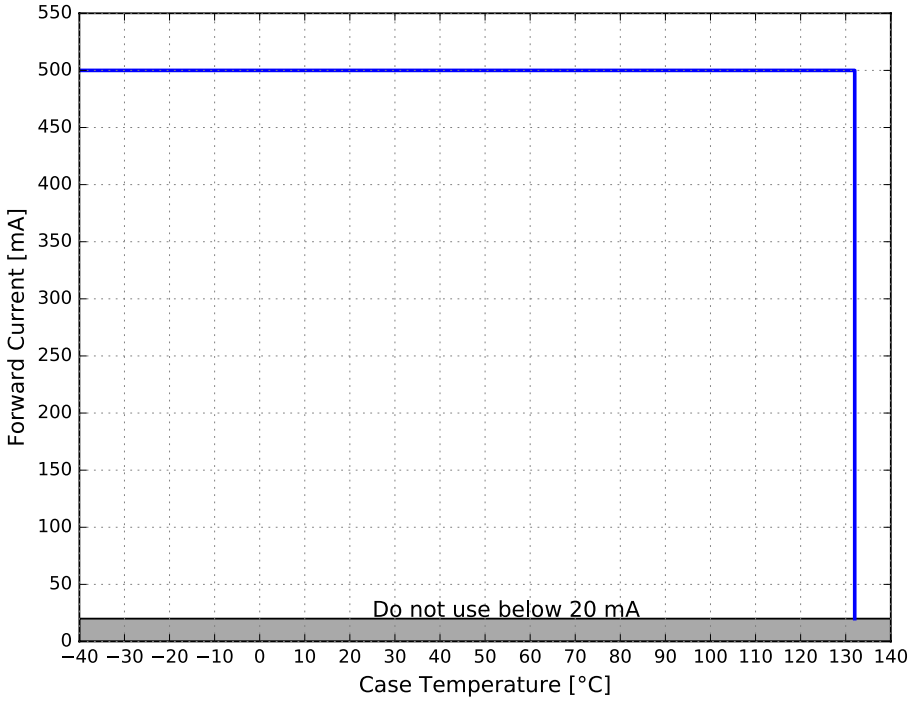


Figure 11. Maximum forward current vs. case temperature for LUXEON Versat 3030 ST PCA 350

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

Permissible Pulse Handling Characteristics

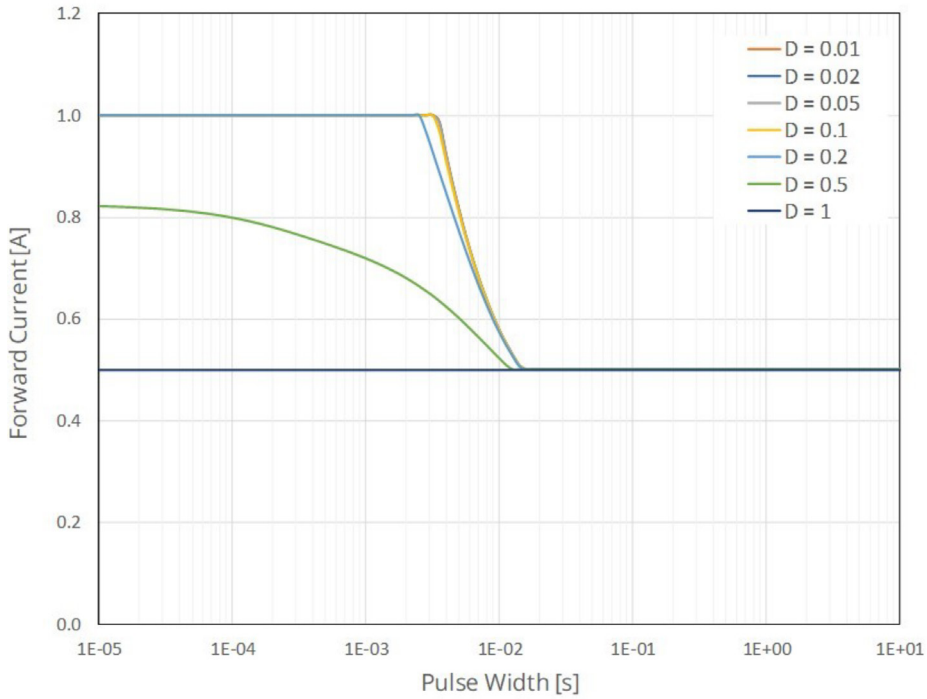


Figure 12. Permissible pulse handling capability for LUXEON Versat 3030 ST PCA 350

Product Bin and Labeling Definitions

Decoding Product Bin Labeling

In the manufacturing of semiconductor products, there are variations in performance around the average values given in the technical datasheet. For this reason, Lumileds bins components for luminous flux or radiometric power, color point, peak or dominant wavelength and forward voltage.

LUXEON Versat 3030 ST PCA 350 emitters are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C

Where:

A – designates luminous flux bin (example: L=76 to 82 lumens)

B – designates color code

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

Therefore, a LUXEON Versat 3030 ST PCA 350 with a lumen range of 76 to 82, color code of A and a forward voltage range of 2.94 to 3.20 V has the following CAT code:

L A B

LUXEON Versat 3030 ST PCA 350 LEDs with split flux bins are labeled using a 4-digit alphanumeric CAT code following the format below:

A B C D

Where:

A B – designates luminous flux bin (example: M1 = 82.0 lumens to 85.0 lumens, M0 = 82.0 lumens to 88.0 lumens)

C – designates color code

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

Therefore, a LUXEON Versat 3030 ST PCA 350 with a lumen range of 82.0 lumens to 88.0 lumens, a color code of A, a forward voltage of 2.94 to 3.20 has the following CAT code:

M 0 A B

Luminous Flux Bins

Table 5 lists the standard luminous flux bins for LUXEON Versat 3030 ST PCA 350 emitters. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Table 5a. Luminous flux bin definitions for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_C = 25 °C

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
K	70	76
L	76	82
M	82	88
N	88	94
P	94	100

Notes for Table 5a:
1. Lumileds maintains a tolerance of ±10 % on luminous flux measurements.

Table 5b. Luminous flux bin definitions for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_C = 25 °C

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
K1	70.0	73.0
K2	73.0	76.0
L1	76.0	79.0
L2	79.0	82.0
M1	82.0	85.0
M2	85.0	88.0
N1	88.0	91.0
N2	91.0	94.0
P1	94.0	97.0
P2	97.0	100.0

Notes for Table 5b:
1. Lumileds maintains a tolerance of ±10 % on luminous flux measurements.

Color Codes

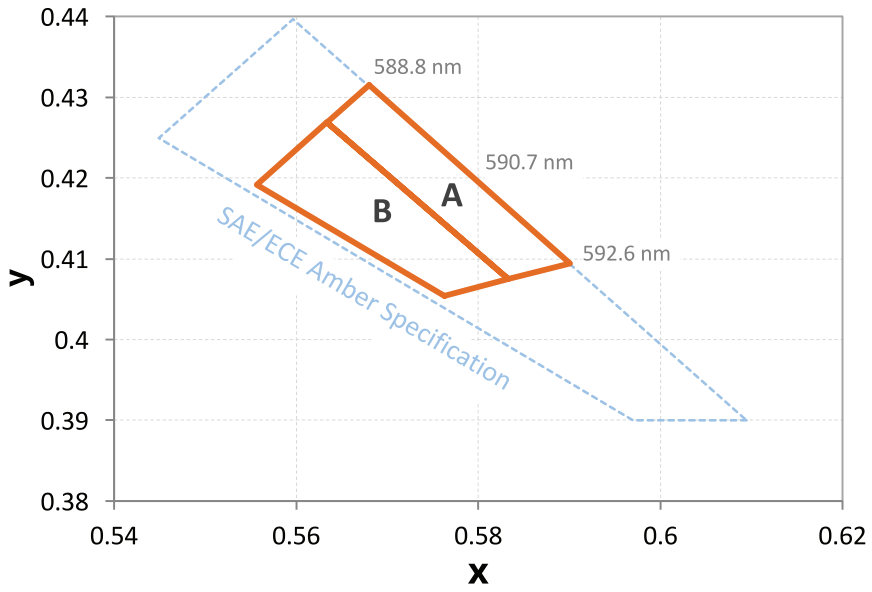


Figure 13. Color bin structure in CIE 1931 color space for LUXEON Versat 3030 ST PCA 350

Table 6. Color code definitions for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_c = 25 °C

CODE	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 6:
1. Lumileds maintains a tolerance of ±0.005 on *x* and *y* coordinates.
2. CIE 1931 x and y coordinate frame

Forward Voltage Bins

Table 7. Forward voltage bin definitions for LUXEON Versat 3030 ST PCA 350 at 350 mA, T_c = 25 °C

BIN [1]	FORWARD VOLTAGE [2] (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 ±0.06 V on forward voltage measurements.

Mechanical Dimensions

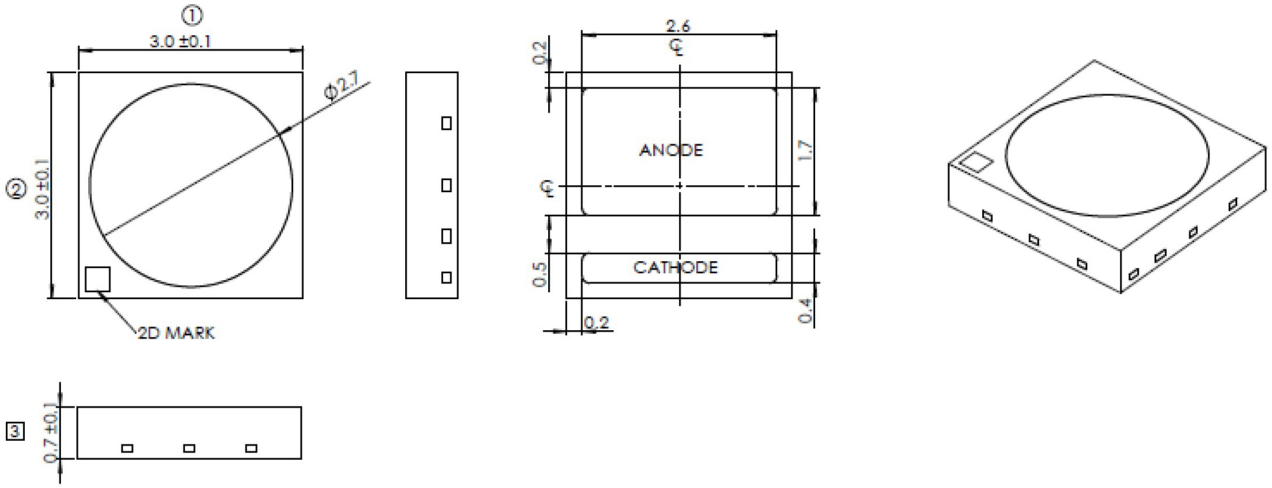


Figure 14. Mechanical dimensions for LUXEON Versat 3030 ST PCA 350

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

Package weight

Table 8. Approximate weight of LUXEON Versat 3030 ST PCA 350

PART NUMBER	PACKAGE WEIGHT [mg]
A1VC-P591C010xxxx0	3.20

JEDEC Moisture Sensitivity

Table 9. Moisture sensitivity levels for LUXEON Versat 3030 ST PCA 350

LEVEL	LEAD-FREE ASSEMBLY		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
2	1 year	≤ 30 °C / 60% RH	168 hours +5 / -0	85 °C / 60% RH

Packaging Information

Pocket Tape Dimensions

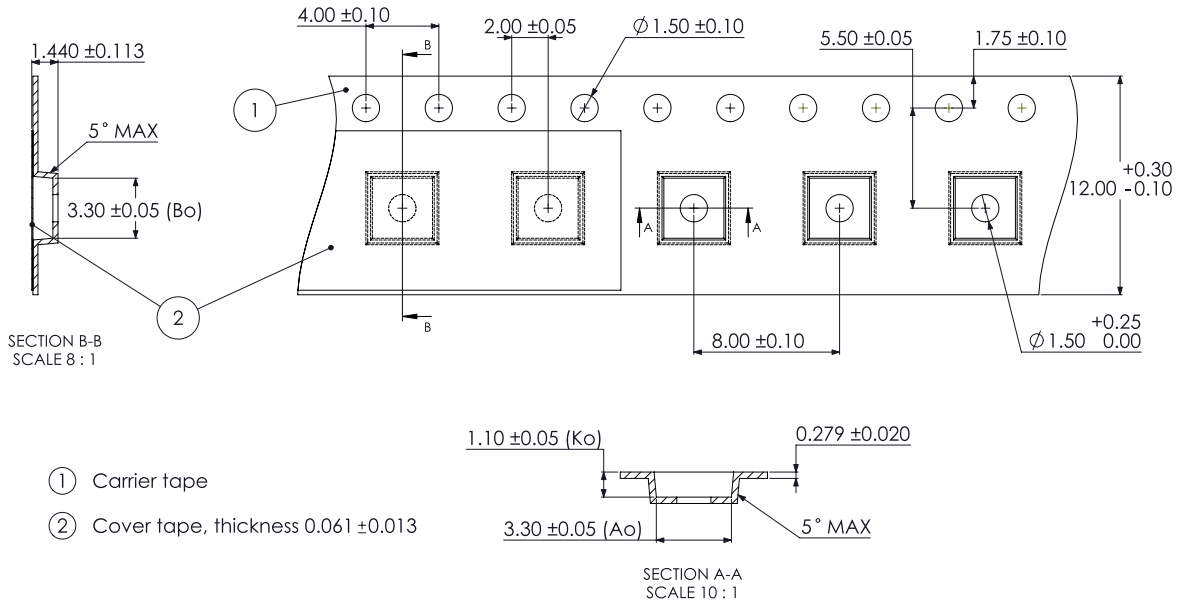


Figure 15. Pocket tape dimensions for LUXEON Versat 3030 ST PCA 350

Notes for Figure 15:
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

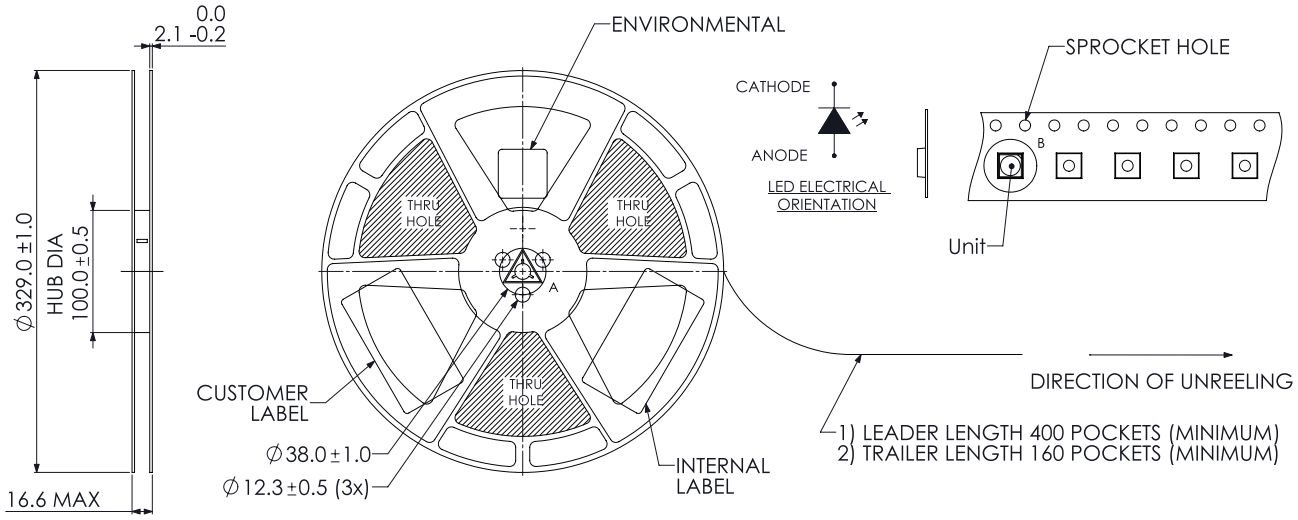


Figure 16. Reel dimensions for LUXEON Versat 3030 ST PCA 350

Notes for Figure 16:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Product Labeling

LUXEON Versat 3030 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.

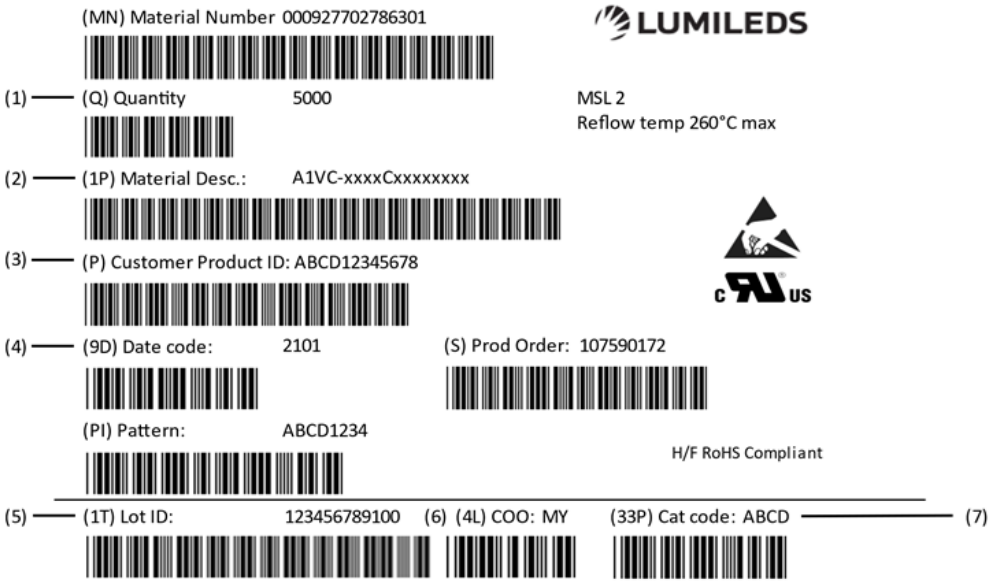


Figure 17. Example of a reel label LUXEON Versat 3030 ST PCA 350

Notes for Figure 17 – 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 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.

LUMILEDS

lumileds.com

DS297 LUXEON Versat 3030 ST PCA 350
Product Datasheet 20211011