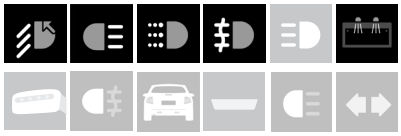
LUMILEDS

AUTOMOTIVE



LUXEON Versat 2016 60 2790

Extremely compact low-power solutions for a variety of styling

LUXEON Versat 2016 60 2790 is engineered to complement the expanding styling functions of the newest vehicles, inside and out. It is also the industry leading compact solution for modern automotive signaling application.

LUXEON Versat 2016 60 2790 is AEC-Q102 qualified and USCAR33 tested.

FEATURES AND BENEFITS

- Comprehensive coverage of CCTs and CRIs for true lighting differentiation
- Minimal footprint for maximum flexibility, measuring only 2.0 mm x 1.6 mm
- High maximum drive current capability for operational versatility

PRIMARY APPLICATIONS

- Car body lighting
- Welcome/position light/Cabin Light
- Backup/Reverse/License Plate
- Daytime running light

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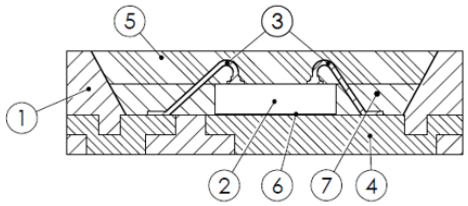
General Information

LUXEON Versat 2016 60 2790 emitters are mid-power phosphor converted InGaN emitters mounted on an Au-plated EMC leadframe. LUXEON Versat 2016 60 2790 emitters do not contain a separate ESD protection device.



1) EMC package
2) InGaN die
3) Wire bond
4) Solder pad
5) Dispensed phosphor in silicone
6) Silicone glue
7) Side Coat

Figure 1. Schematic cross section LUXEON Versat 2016 60 2790

Product Test and Binning Conditions

Monopulse (MP) testing for LUXEON Versat 2016 60 2790 is done with a pulse of 20 ms. The binning condition for LUXEON Versat 2016 60 2790 is MP testing at 60 mA at a temperature of 25 °C.

Part Number Nomenclature

Part numbers for LUXEON Versat 2016 60 2790 follow the convention below:

A 1 V S – 2 7 9 0 **B C D E F G G G H**

Where:

A 1 V S	-	designates LUXEON Versat 2016 package product family
2 7 9 0	-	designates color temperature and CRI, (27 = 2700K, 90 = CRI 90)
B	-	designates binning current (C = 60mA)
C	-	designates options code for product specification (B = 0.2W)
D	-	designates product generation (1 = Generation 1)
E	-	designates options code for product specification (default = 0)
F	-	designates internal custom Sold-To Code
G G G	-	designates custom option code in running number
H	-	designates options code for product specification (default = 0)

Therefore, the following part number is used for a LUXEON Versat 2016 60 2790 with running number (eg: 001) and custom sold to code (eg: 0)

A 1 V S - 2 7 9 0 C B 1 0 0 0 0 1 0

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Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON Versat 2016 60 2790 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

Optical Characteristics

Table 1. Optical characteristics for LUXEON Versat 2016 60 2790 at MP binning condition and far-field optical characteristics

PART NUMBER	CORRELATED COLOR TEMPERATURE[1] (nm)		TOTAL INCLUDED ANGLE [3] $2\theta_{0.90V}$	TYPICAL VIEWING ANGLE [4] $2\theta_{1/2}$
	MINIMUM	MAXIMUM		
A1VS-2790CBxxxxxxx	Refer Figure 12		140°	120°

Notes for Table 1:
1. Total angle at which 90% of total luminous flux is captured
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.

Electrical Characteristics

Table 2. Electrical characteristics for LUXEON Versat 2016 60 2790 at MP binning condition

PART NUMBER	FORWARD VOLTAGE[1] [V]		
	MINIMUM	TYPICAL	MAXIMUM
A1VS-2790CBxxxxxx	2.60	2.74	3.10

Notes for Table 2:
1. Lumileds maintains a tolerance of ±0.06 V on forward voltage measurements.

Thermal Characteristics

Table 3. Thermal characteristics for LUXEON Versat 2016 60 2790 at binning current and 25°C stage temperature

PART NUMBER	THERMAL RESISTANCE JUNCTION TO CASE (K/W)			
	$R\Theta_{J\text{-}C}$ ELECTRICAL [1]		$R\Theta_{J\text{-}C}$ REAL [2]	
	TYPICAL	MAXIMUM	TYPICAL	MAXIMUM
A1VS-2790CBxxxxxx	25	31	39	49

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

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Absolute Ratings

Table 4. Absolute ratings for LUXEON Versat 2016 60 2790

PARAMETER	PERFORMANCE
Minimum DC Forward Current	10 mA
Maximum DC Forward Current [1]	90 mA
Maximum Emitter Junction Temperature [1] (DC & Pulse)	150 °C
ESD Sensitivity [2]	HBM +/- 2 kV
Operating Case Temperature [1]	-40 °C to 125 °C
Emitter Storage Temperature	-40 °C to 135 °C
SMD Process Classification Temperature	260 °C
Allowable Reflow Cycles	3
Reverse Voltage ($V^{reverse}$)	Not designed to be driven in reverse bias

Notes for Table 4:
1. Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
2. Measured using human body model (per ANSI/ANSI/ESDA/JEDEC JS-001-2010), charged device model (AEC Q101-005 rev A).

Characteristic Curves

Spectral Power Distribution Characteristics

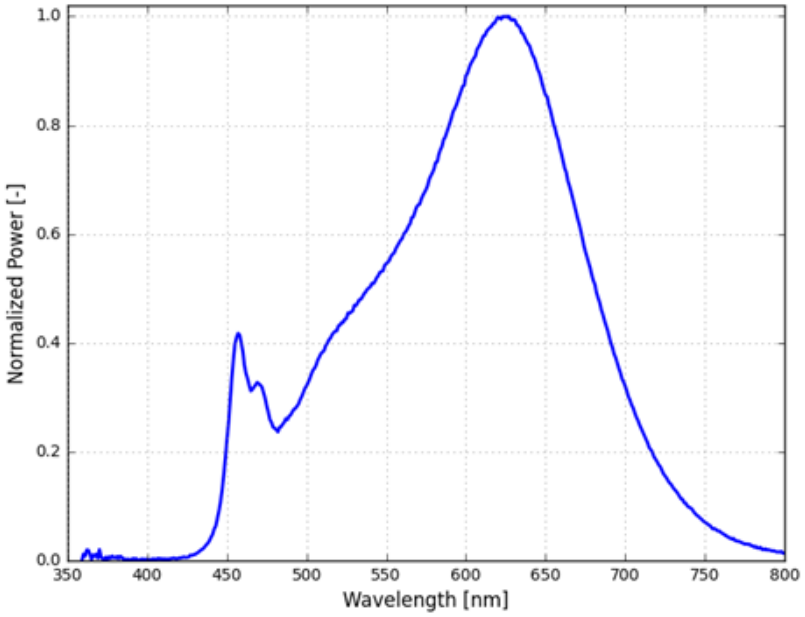

Figure 2. Typical normalized power vs. wavelength for LUXEON Versat 2016 60 2790 at MP binning condition

Light Output Characteristics

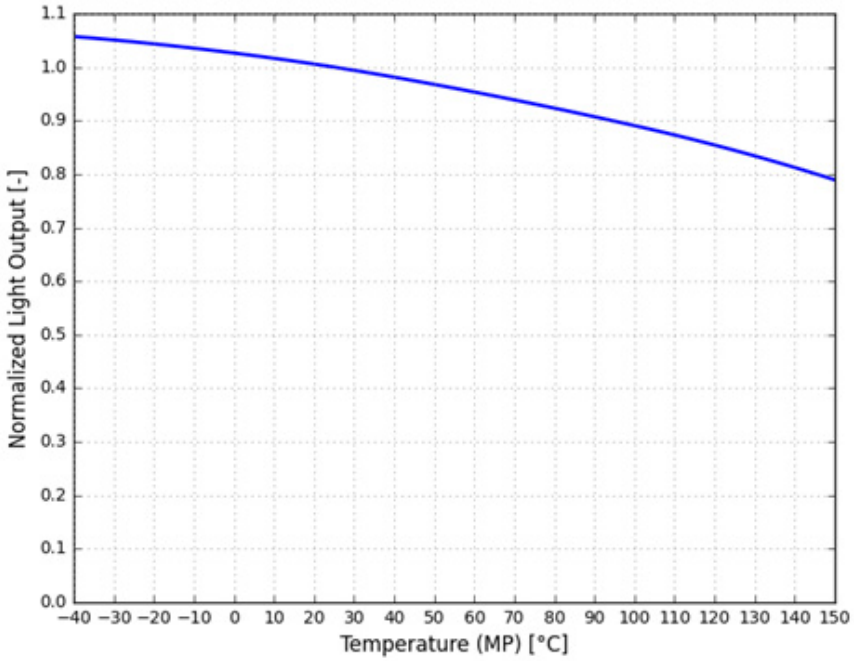

Figure 3. Typical normalized light output vs. temperature for LUXEON Versat 2016 60 2790 at MP binning current

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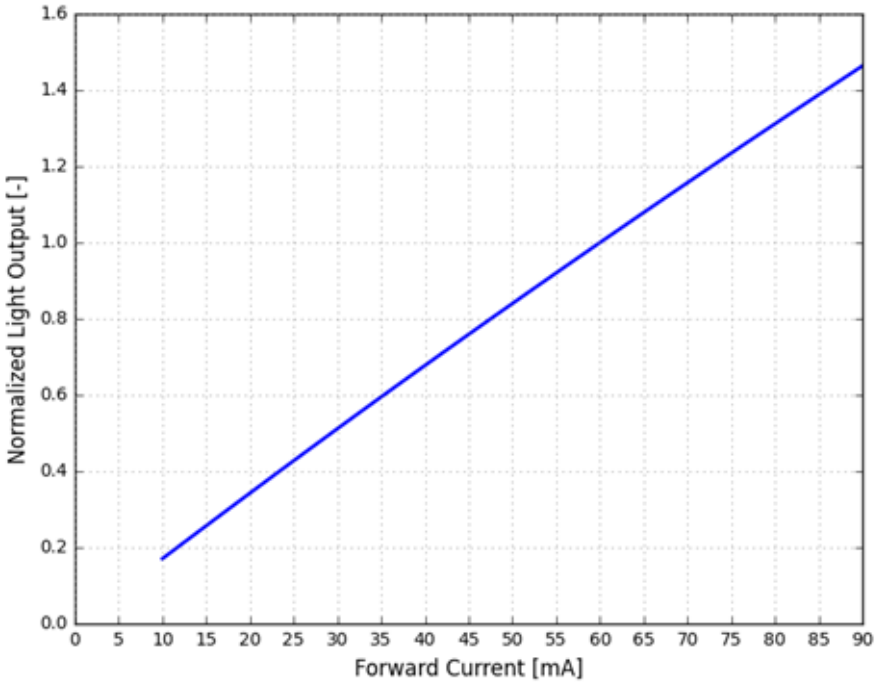

Figure 4. Typical normalized light output vs. forward current for LUXEON Versat 2016 60 2790 at MP binning temperature

Forward Current and Forward Voltage Characteristics

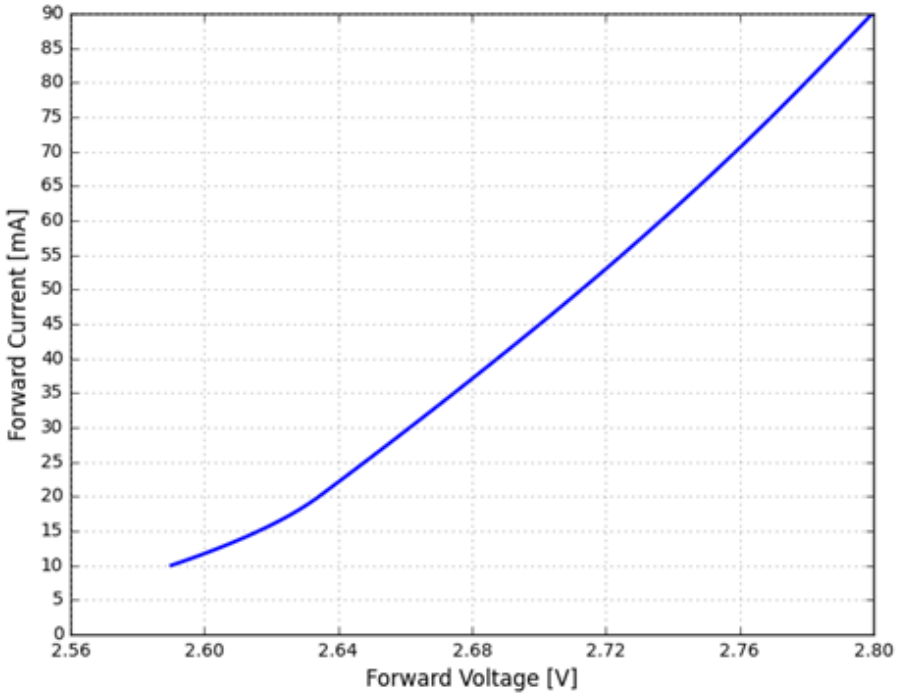

Figure 5. Typical forward current vs. forward voltage for LUXEON Versat 2016 60 2790 at MP binning temperature

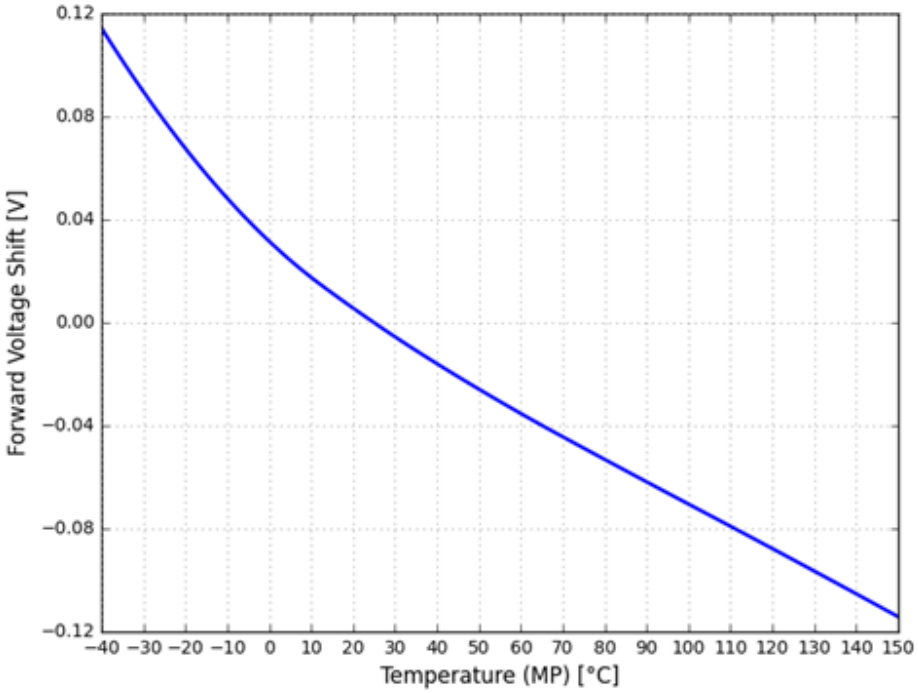

Figure 6. Typical forward voltage shift vs. temperature for LUXEON Versat 2016 60 2790 at MP binning current

Color Shift Characteristics

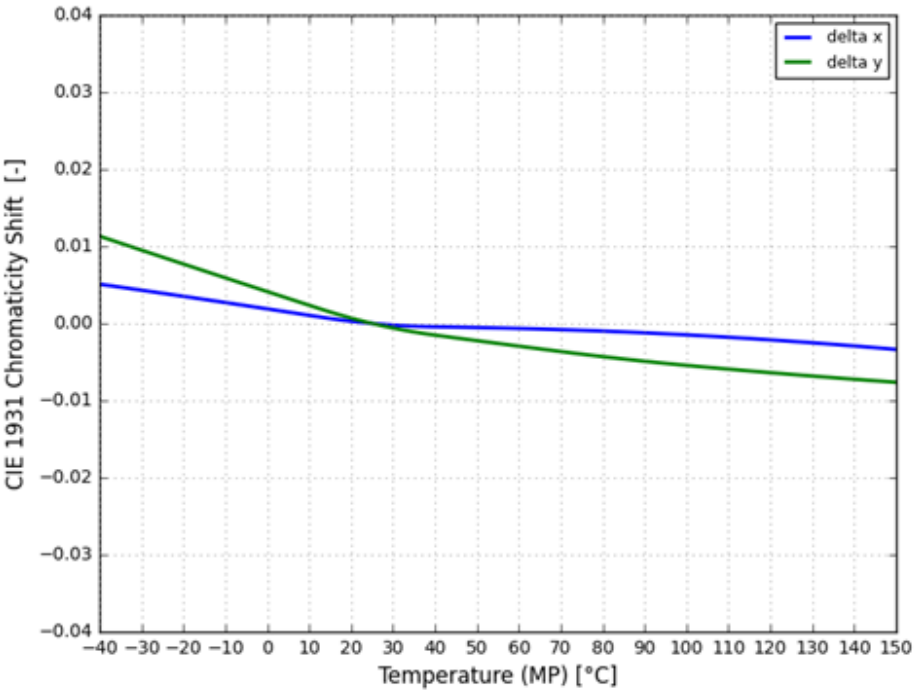

Figure 7. Typical color shift in CIE1931 x, y coordinates vs. temperature for LUXEON Versat 2016 60 2790 at MP binning current

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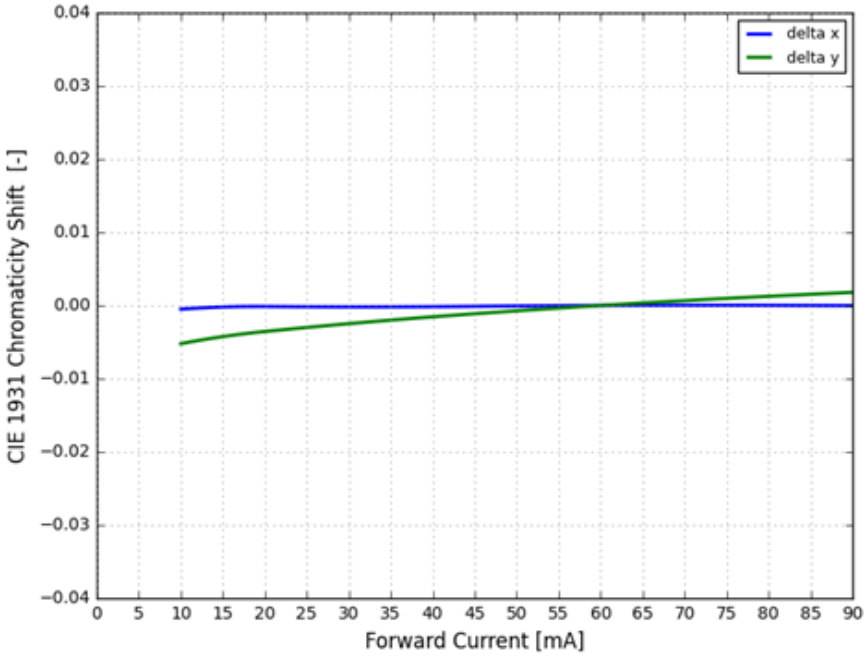

Figure 8. Typical color shift in CIE1931 x, y coordinates vs. forward current for LUXEON Versat 2016 60 2790 at MP binning temperature

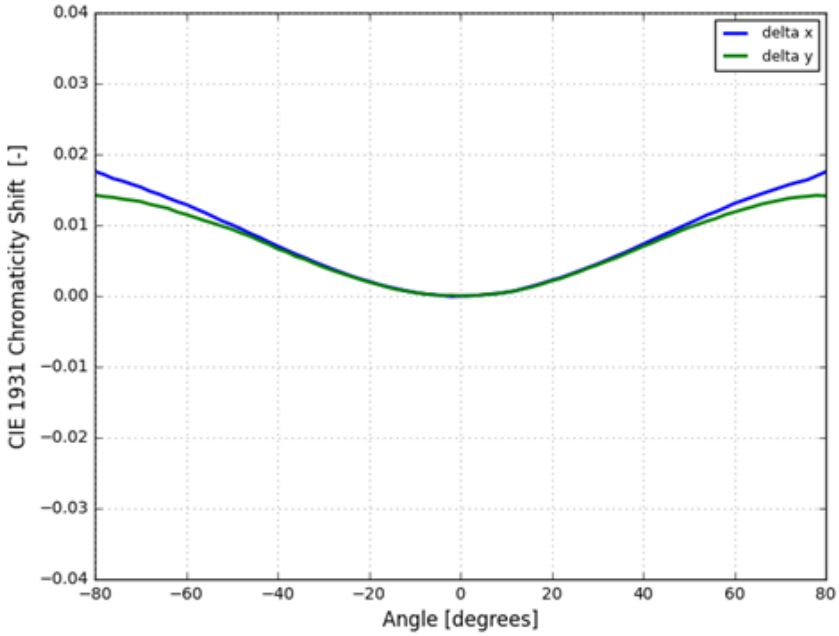

Figure 9. Typical color shift over angle for LUXEON Versat 2016 60 2790

Radiation Pattern Characteristics

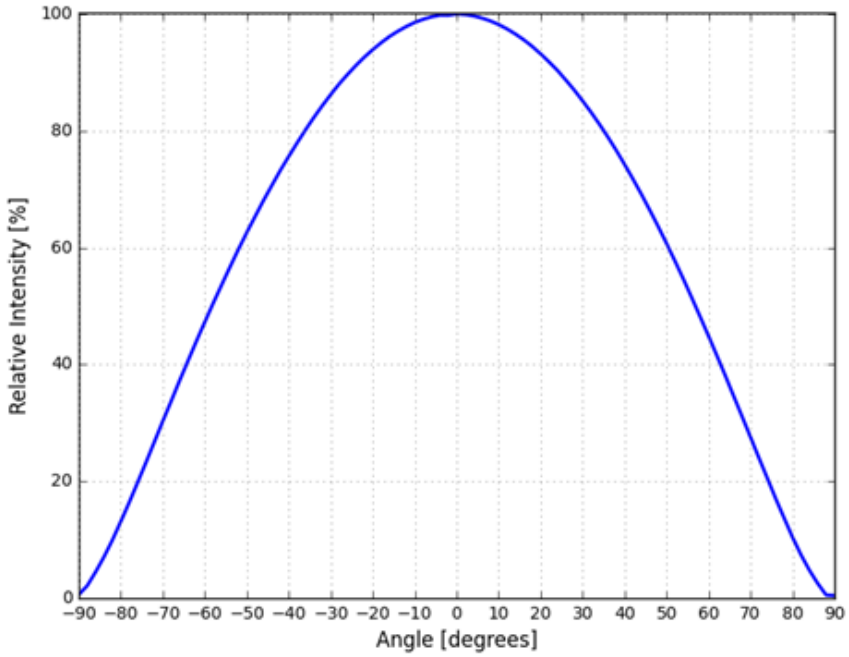

Figure 10. Typical radiation pattern for LUXEON Versat 2016 60 2790

Operating Limits Characteristics

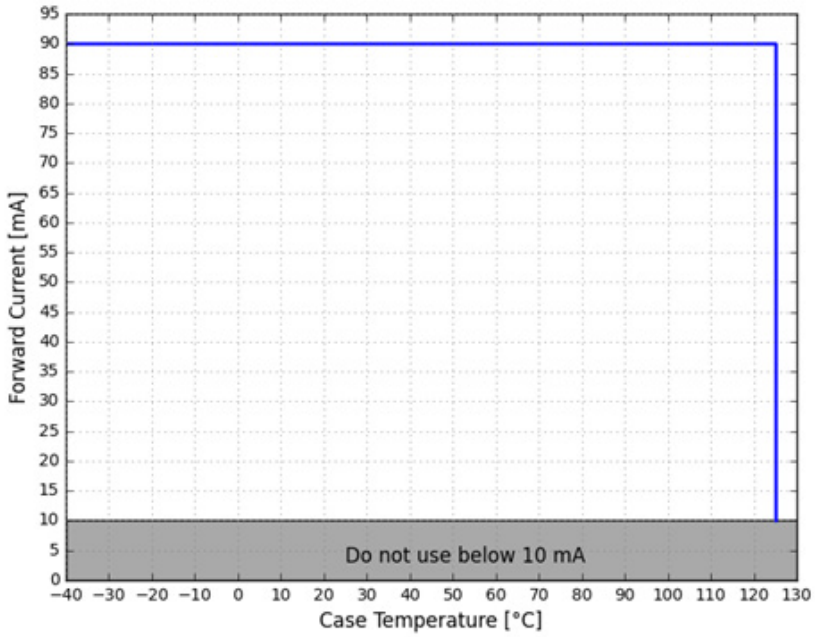

Figure 11. Maximum forward current vs. case temperature for LUXEON Versat 2016 60 2790

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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 2016 60 2790 emitters are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C

Where:

A – designates luminous flux bin (4 = 14 to 16 lumens)

B – designates color bin (bin 5)

C – designates forward voltage bin (A = 2.60 V to 2.84 V)

Therefore, a LUXEON Versat 2016 60 2790 with a lumen range of 14 to 16 lumens, color code 5 and a forward voltage of 2.60 V to 2.84 V has the following CAT code:

4 5 A

Luminous Flux Bins

Table 5 lists the standard luminous flux bins for LUXEON Versat 2016 60 2790 emitters. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Table 5. Luminous flux bin definitions for LUXEON Versat 2016 60 2790 at MP binning condition

BIN	LUMINOUS FLUX [1] (lm)	
	MINIMUM	MAXIMUM
3	12	14
4	14	16
5	16	18
6	18	21
7	21	24

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

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Color Codes

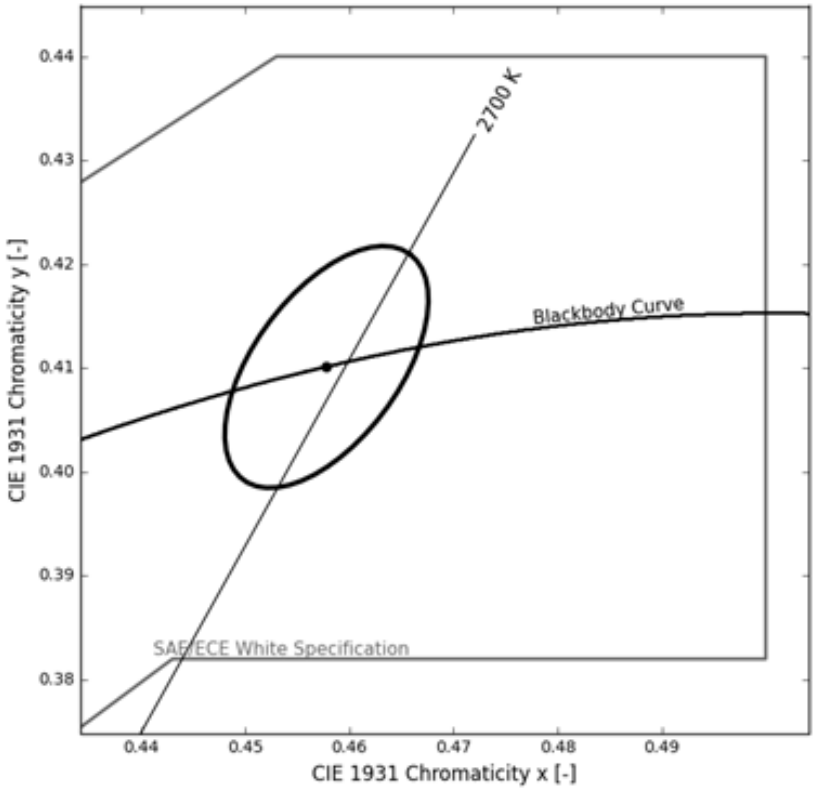

Figure 12. Color bin structure for LUXEON Versat 2016 60 2790

Color Bin Definitions

Table 6. Color bin definitions for LUXEON Versat 2016 60 2790 [1]

BIN	NOMINAL CCT	COLOR SPACE	CENTER POINT (CX,CY)	MAJOR AXIS, A	MINOR AXIS, B	ELLIPSE ROTATION ANGLE, θ
5	2700K	Single 5-step MacAdam ellipse	(0.4578, 0.4101)	0.013500	0.00700	53.70°

Notes for Table 6:
1. Lumileds maintains a tester tolerance of ± 0.005 on CIE1931 x, y color coordinates.

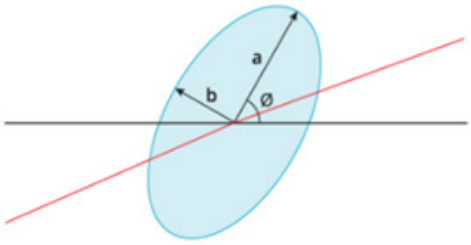

Figure 13. Definitions

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Forward Voltage Bins

Forward voltage distribution of Lumileds LEDs is very narrow, nevertheless for some applications the restriction of forward voltage is beneficial. On request individual bins are available according to Table 7.

Table 7. Forward voltage bin definitions for LUXEON Versat 2016 60 2790 at MP binning condition

BIN	FORWARD VOLTAGE [1] (V_f)	
	MINIMUM	MAXIMUM
A	2.60	2.84
B	2.84	3.10

Notes for Table 7:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.

Mechanical Dimensions

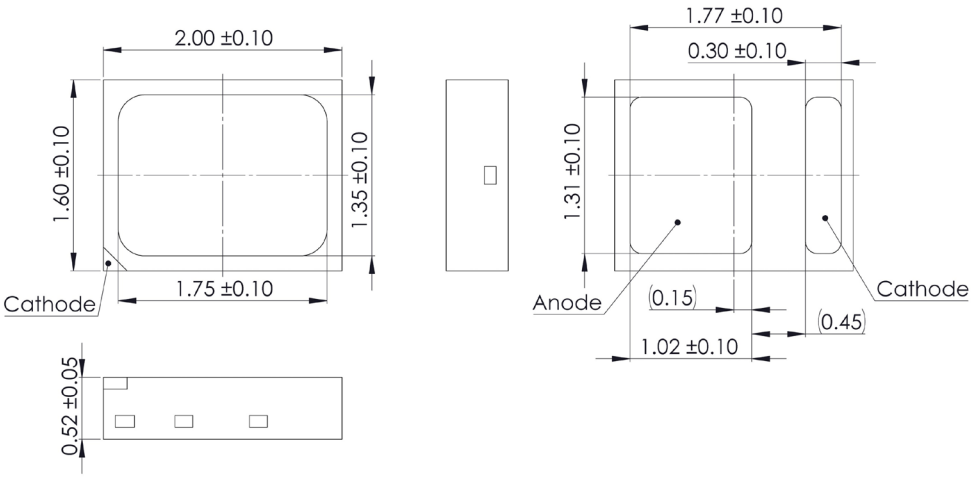

Figure 14. Mechanical dimensions for LUXEON Versat 2016 60 2790

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 2016 60 2790

PART NUMBER	PACKAGE WEIGHT [mg]
A1VS-2790CBxxxxxxx	5.2

JEDEC Moisture Sensitivity

Table 9. Moisture sensitivity levels for LUXEON Versat 2016 60 2790

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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Packaging Information

Pocket Tape Dimensions

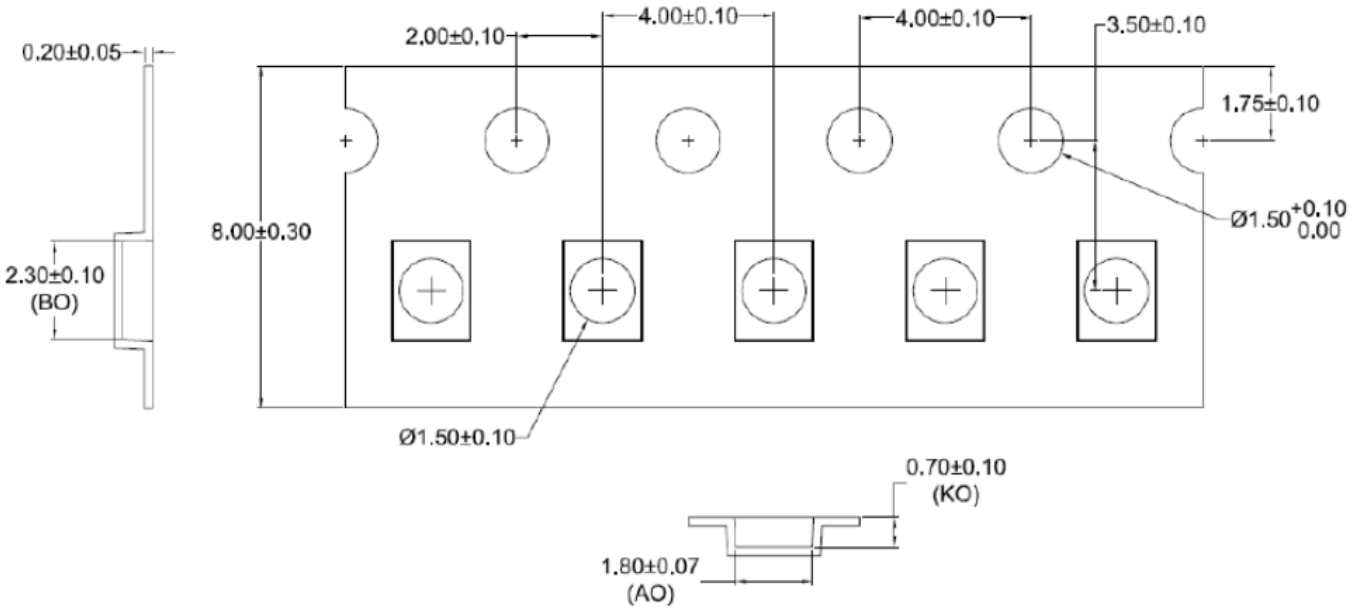

Figure 15. Pocket tape dimensions for LUXEON Versat 2016 60 2790

Notes for Figure 15:
1. Drawings are not to scale.
2. All dimensions are in millimeters.
3. Ao is the width of pocket and Ko is the depth of pocket. Bo is the height of pocket.

Reel Dimensions

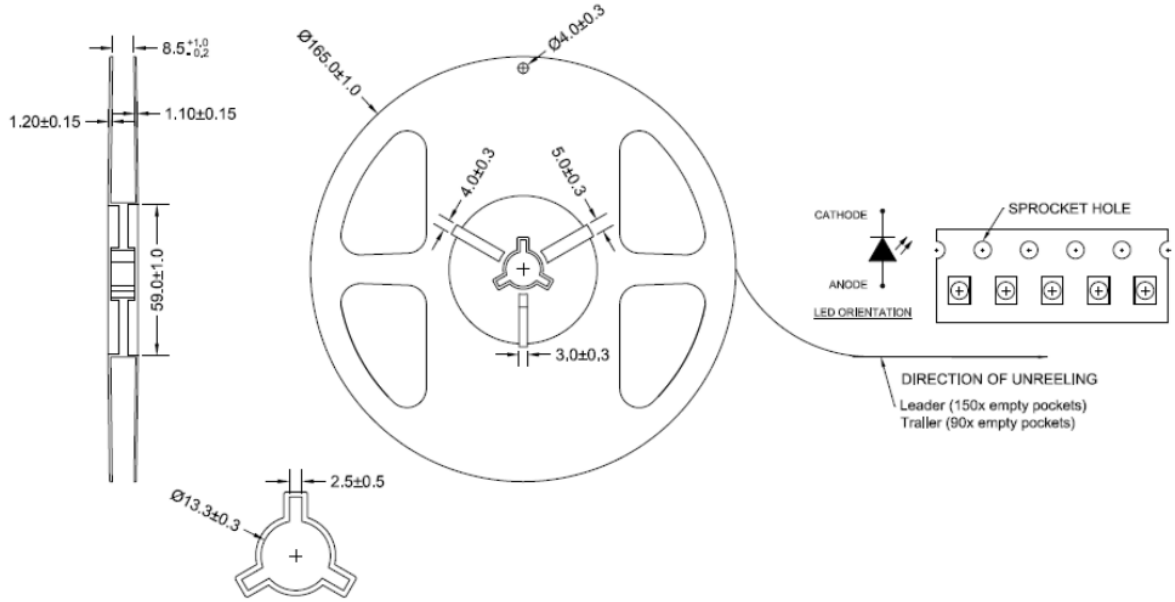

Figure 16. Reel dimensions for LUXEON Versat 2016 60 2790

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

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Product Labeling

Figure 17. Example of a product label for LUXEON Versat 2016 60 2790

Notes for Figure 17 - Reel label descriptions for customer use:
Field labels not described are for Lumileds internal use only.

1. Lumileds 12NC Part Number
2. Total number of LED in reel
3. Lumileds part number
4. Customer Specific Part Number
5. Manufacturing Date (seal date) in YYWW format
6. Unique product lot identification number..
7. Country code of origin of manufacturing of part (e.g. MY for Malaysia, CN for China).
8. Product bin 4-digit alphanumeric CAT code

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About Lumileds

Lumileds is a global leader in LED and microLED technology, innovation, and solutions for the automotive, display, illumination, mobile, and other markets where light sources are essential. Our approximately 3,500 employees operate in over 15 countries and partner with our customers to deliver never before possible solutions for lighting, safety, and well-being.

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

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