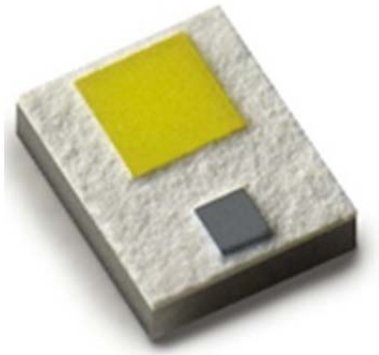
LUMILEDS

Automotive

LUXEON F Plus Cool White

Industry-leading solutions for low and high beam lamps

LUXEON F Plus Cool White LEDs are the only automotive LEDs that deliver design flexibility and advanced functionality. These products, with their miniaturized form factor, are designed to support daytime running lamps, front fog and low and high beam applications. The Lumileds automotive binning structure meets both SAE and ECE color specifications and is hot binned at 85°C, consistent with actual automotive operational environments. LUXEON F Plus Cool White provides an industry-leading solution for your front and rear applications. All LUXEON F LEDs are AEC-Q101 qualified.



FEATURES AND BENEFITS	PRIMARY APPLICATIONS
Higher drive current capability for increased flux performance	Daytime Running Lamp
Low thermal resistance for better hot lumen performance	Front Fog
Standard packaging for low cost and ease of manufacturability	Headlamp - High Beam - Low Beam - Cornering Light
Hot binned at 85°C MP to match closer to operating conditions	
IEC/PAS 62707-1 White LED	

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General Information

Product Test Conditions

LUXEON F Plus Cool White is tested and binned using a 20ms mono pulse (MP) at 1000mA drive current, case temperature, T_C, set at 85°C.

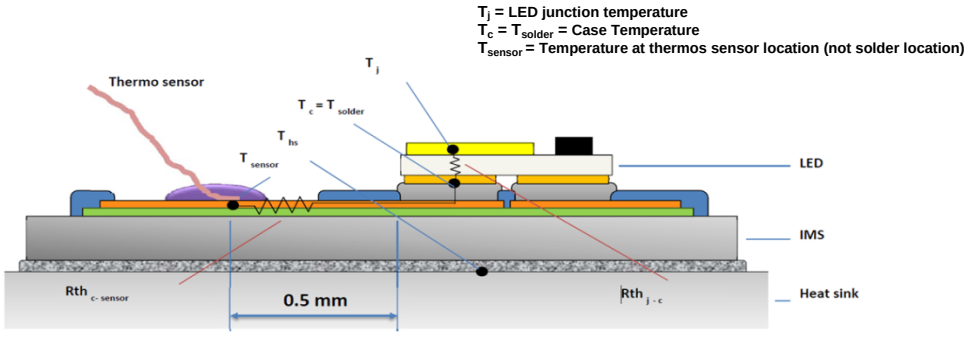

Figure 1. Example of case temperature location on sample board for LUXEON F Plus.

Part Number Nomenclature

Part numbers for LUXEON F Plus Cool White follow the convention below:

L F M H – A B **C** – **E F G H**

Where:

L	-	designates LUXEON
F	-	designates LUXEON F product family
M H	-	designates hot binning
A	-	designates color variant (C=White)
B	-	designates die size (1=1mm^2)
C	-	designates binning current (C=1000mA)
E	-	designates future product offerings
F G H	-	designates minimum luminous flux

Therefore, the following part number is used for a LUXEON F Plus Cool White with a minimum luminous flux of 227 lumens:

L F M H – C 1 **C** – **0 2 2 7**

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON F 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 material to this LUXEON F: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

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Performance Characteristics

Product Selection Guide

Table 1. Product Selection for LUXEON F Plus Cool White at MP test current, T_C=85°C.

MINIMUM LUMINOUS FLUX[1] (lm)	TEST CURRENT (mA)	PART NUMBER
227	1000	LFMH-C1C-0227
247	1000	LFMH-C1C-0247
268	1000	LFMH-C1C-0268
288	1000	LFMH-C1C-0288
309	1000	LFMH-C1C-0309

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

Optical Characteristics

Table 2. Optical characteristics for LUXEON F Plus Cool White at MP test current, T_C=85°C.

PART NUMBER	CORRELATED COLOR TEMPERATURE		TOTAL INCLUDED ANGLE[1] $\theta_{0.90V}$	VIEWING ANGLE[2] $2\theta_{1/2}$
	MINIMUM	MAXIMUM		
LFMH-C1C-0XXX	5500K	6250K	142°	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 Characteristics

Table 3. Electrical Characteristics for LUXEON F Plus Cool White at MP test current, T_C=85°C.

PART NUMBER	FORWARD VOLTAGE [1] (V)		DYNAMIC RESISTANCE[2] (Ω) R_D	TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE[3] (mV/°C) $\Delta V_f / \Delta T_j$	THERMAL RESISTANCE - JUNCTION TO CASE (°C/W)			
					$R\theta_{j-c}$ el[4]		$R\theta_{j-c}$ real[5]	
	MINIMUM	MAXIMUM			TYPICAL	MAXIMUM	TYPICAL	MAXIMUM
LFMH-C1C-0XXX	2.55	3.27	0.3	-2.1	2.30	2.60	3.27	3.69

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.06 V on forward voltage measurements.
2. Dynamic resistance is the inverse of the slope in linear forward voltage model for LEDs. See forward voltage vs. forward current Figure 4.
3. Measured between T_c=80°C and T_c=90°C at binning current.
4. $R\theta_{j-c}$ el: Electrical thermal resistance (junction to case).
5. $R\theta_{j-c}$ 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 F Plus Cool White.

PARAMETER	PERFORMANCE
Minimum DC Forward Current	50mA
Maximum DC Forward Current	1500mA
Maximum Junction Temperature [1]	150°C
Operating Case Temperature at Test Current[1]	-40°C to 130°C
Operating Case Temperature at Maximum Current[1]	-40°C to 130°C
Storage Temperature	-40°C to 130°C
Soldering Temperature	240°C
Allowable Reflow Cycles	3
ESD Sensitivity [2]	±8 kV HBM, ±400 V MM, ±2kV CDM
Reverse Voltage (V_r)	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. Proper current derating must be used to maintain junction temperature below the maximum. LUXEON F 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).

JEDEC Moisture Sensitivity

Table 5. Moisture sensitivity levels for LUXEON F Plus Cool White.

LEVEL	FLOOR LIFE		STANDARD SOAK REQUIREMENT	
	TIME	CONDITION	TIME	CONDITION
1	Unlimited	≤30°C / 85% RH	168 Hrs +5 /-0	85°C / 85% RH

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Characteristic Curves

Spectral Power Distribution Characteristics

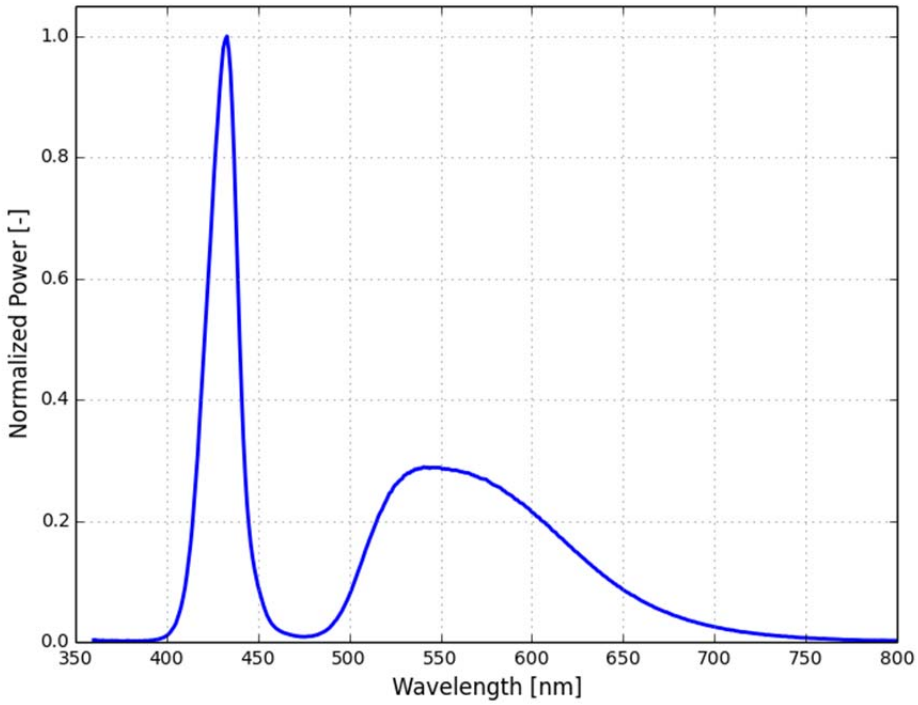

Figure 2. Typical normalized power vs. wavelength for LUXEON F Plus Cool White at 20ms MP 1000mA, T_C=85°C.

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Light Output Characteristics

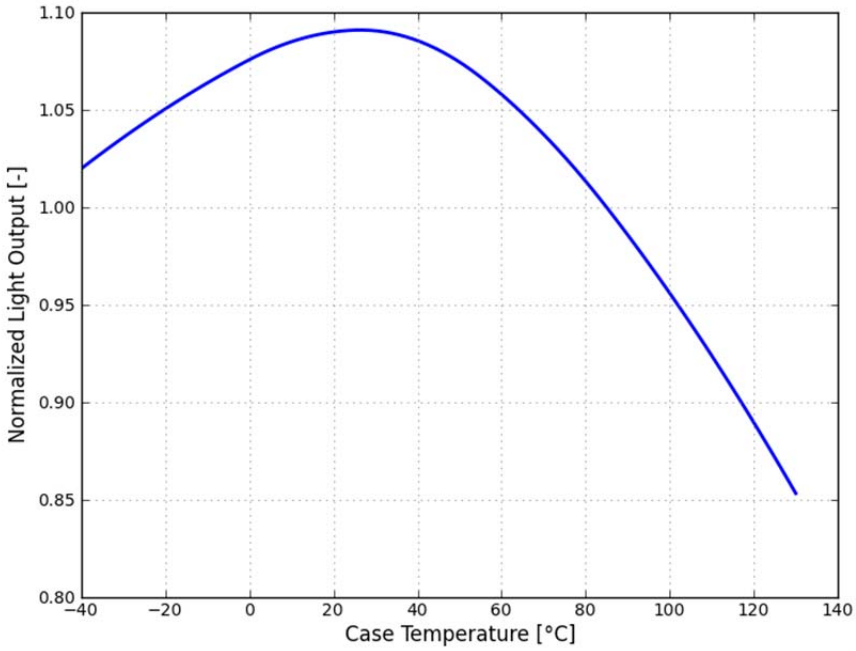

Figure 3a. Typical normalized light output vs. case temperature for LUXEON F Plus Cool White at 20ms MP, 1000mA.

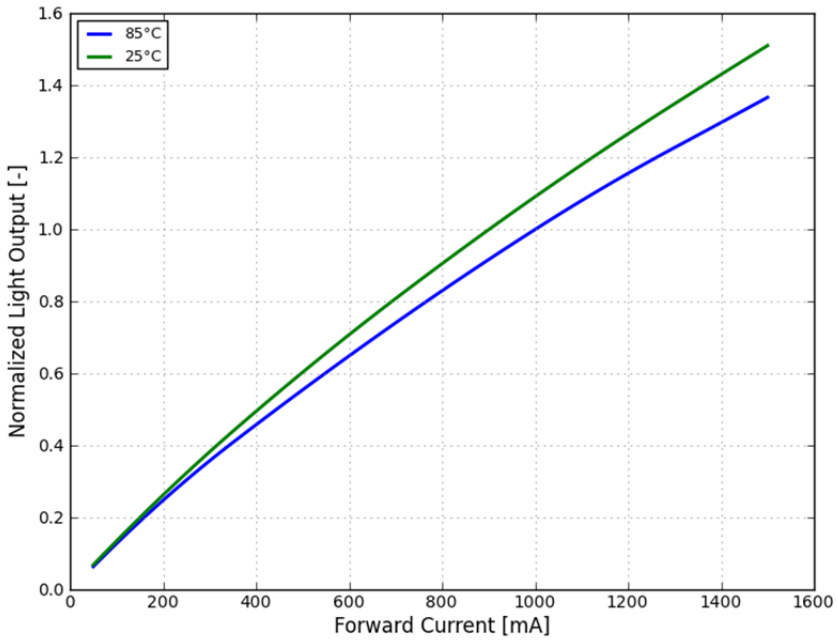

Figure 3b. Typical normalized light output vs. forward current for LUXEON F Plus Cool White at T_C=85°C.

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Forward Current and Forward Voltage Characteristics

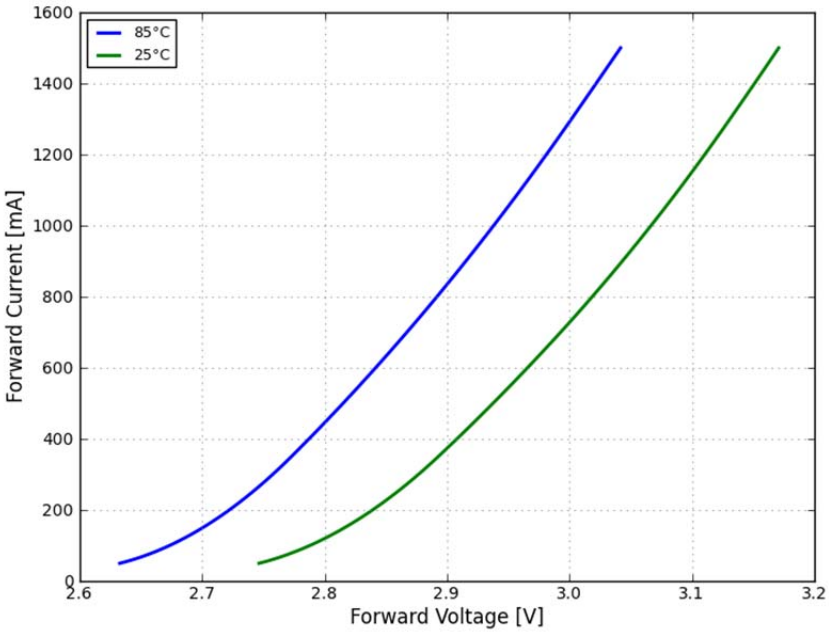

Figure 4a. Typical forward current vs. forward voltage for LUXEON F Plus Cool White at T_C=85°C.

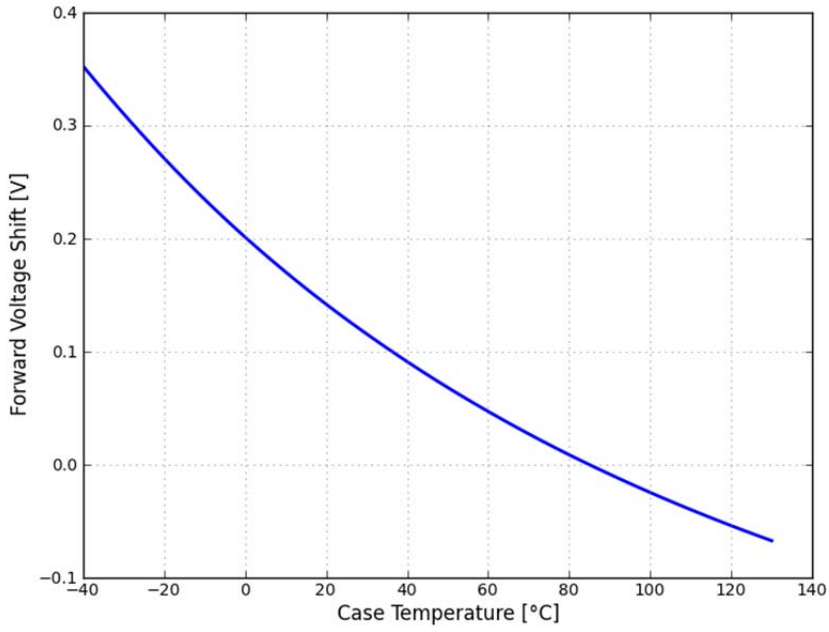

Figure 4b. Typical forward voltage shift vs. case temperature for LUXEON F Plus Cool White.

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Color Shift Characteristics

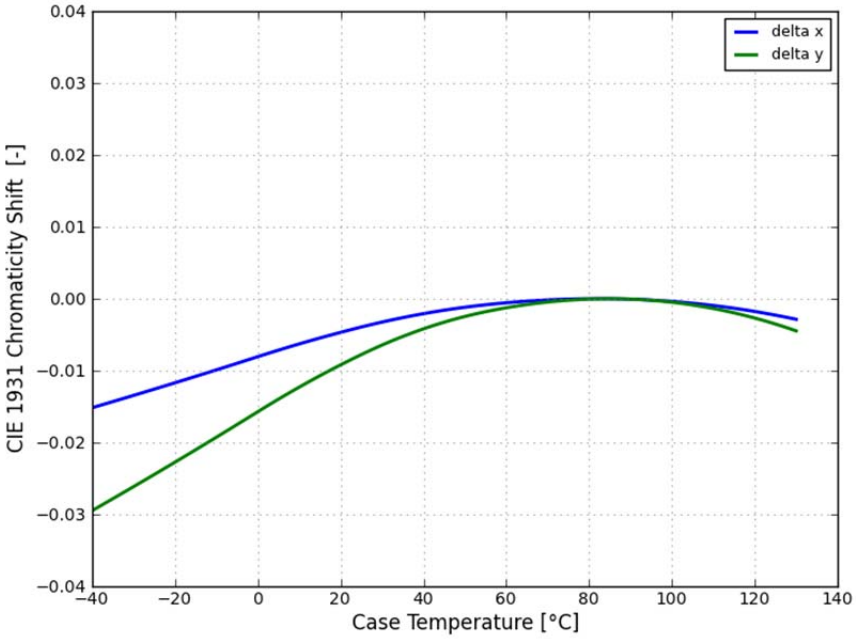

Figure 5a. Typical color shift in CIE 1931 x, y coordinates for LUXEON F Plus Cool White at 20ms MP, 1000mA.

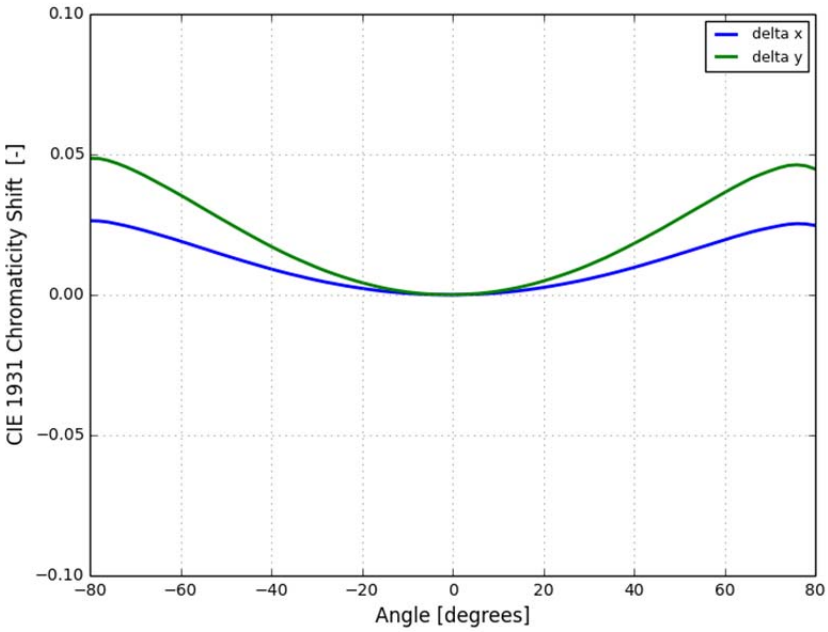

Figure 5b. Typical color shift in CIE 1931 x, y coordinates over angle for LUXEON F Plus Cool White at 20ms MP, 1000mA.

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Radiation Pattern Characteristics

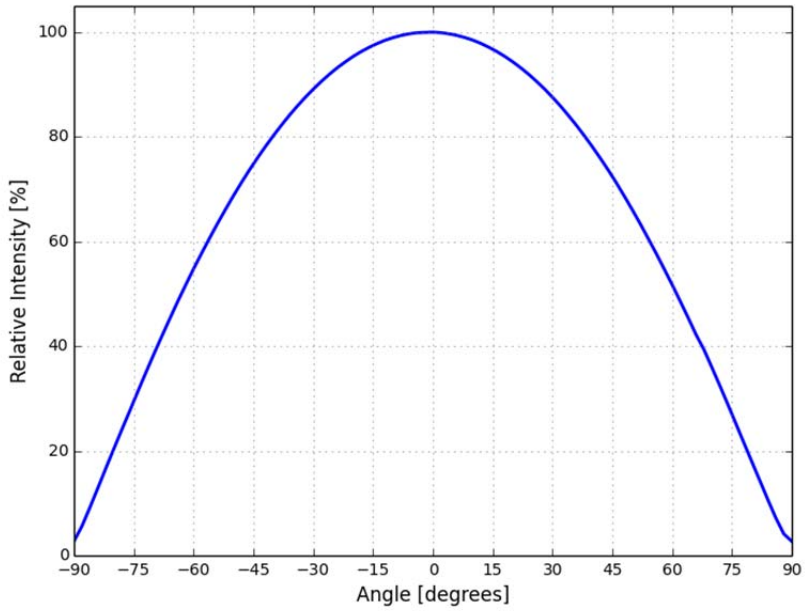

Figure 6. Typical Radiation Pattern for LUXEON F Plus Cool White at 20ms MP 1000mA, T_C=85°C.

Operating Limits Characteristic

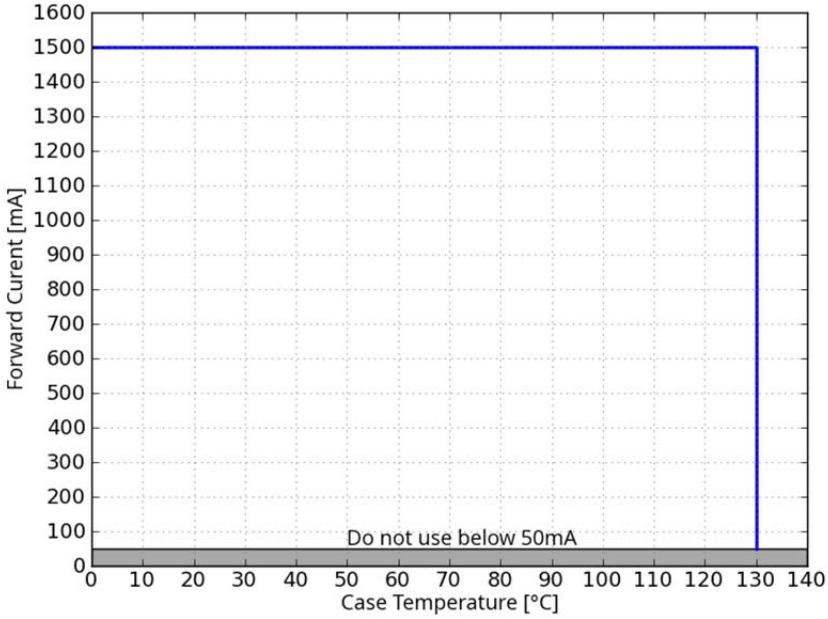

Figure 7. Maximum forward current vs. case temperature for LUXEON F Plus Cool White.

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Permissible Pulse Handling Characteristic

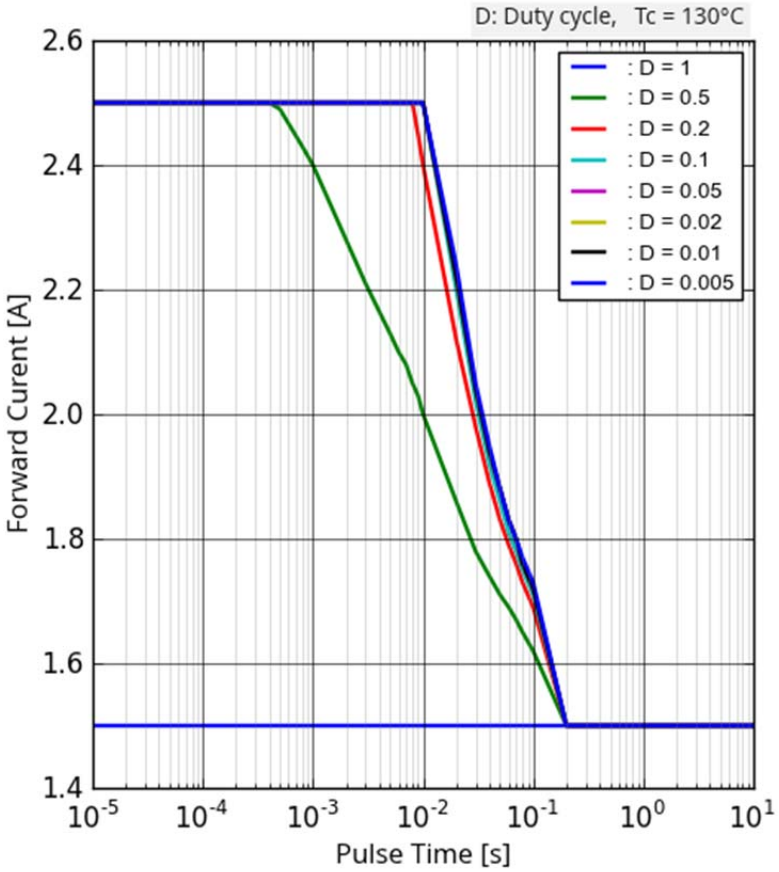

Figure 8. Permissible pulse handling capability for LUXEON F Plus Cool White.

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Product Bin and Labeling Definitions

Designing with LUXEON F Plus Cool White

Flux bins supportable for car programs depend on product color and program start and end of production date. Flux roadmaps by year and product color are maintained and available from the sales representative. Please contact your 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, color and forward voltage.

LUXEON F Plus Cool White is labeled using a 4-digit alphanumeric CAT code following the format below.

A B C D

A - designates luminous flux bin (example: T=227 lumens to 247 lumens)

B C - designates color code (1A, 1B, 1C, 1D… etc.)

D - designates forward voltage bin (example: B = 2.55V to 2.79V)

Therefore, a LUXEON F Plus Cool White with a lumen range of 227 to 247, color bin of 1D and a forward voltage of 2.55V to 2.79V has the following CAT code:

T 1 D B

Luminous Flux Bins

Table 6. Luminous flux bins for LUXEON F Plus Cool White at MP test current, T_C=85°C.

BIN	MINIMUM LUMINOUS FLUX (lm)	MAXIMUM LUMINOUS FLUX (lm)
T	227	247
V	247	268
W	268	288
X	288	309
Y	309	330
Z	330	350

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

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Color Codes

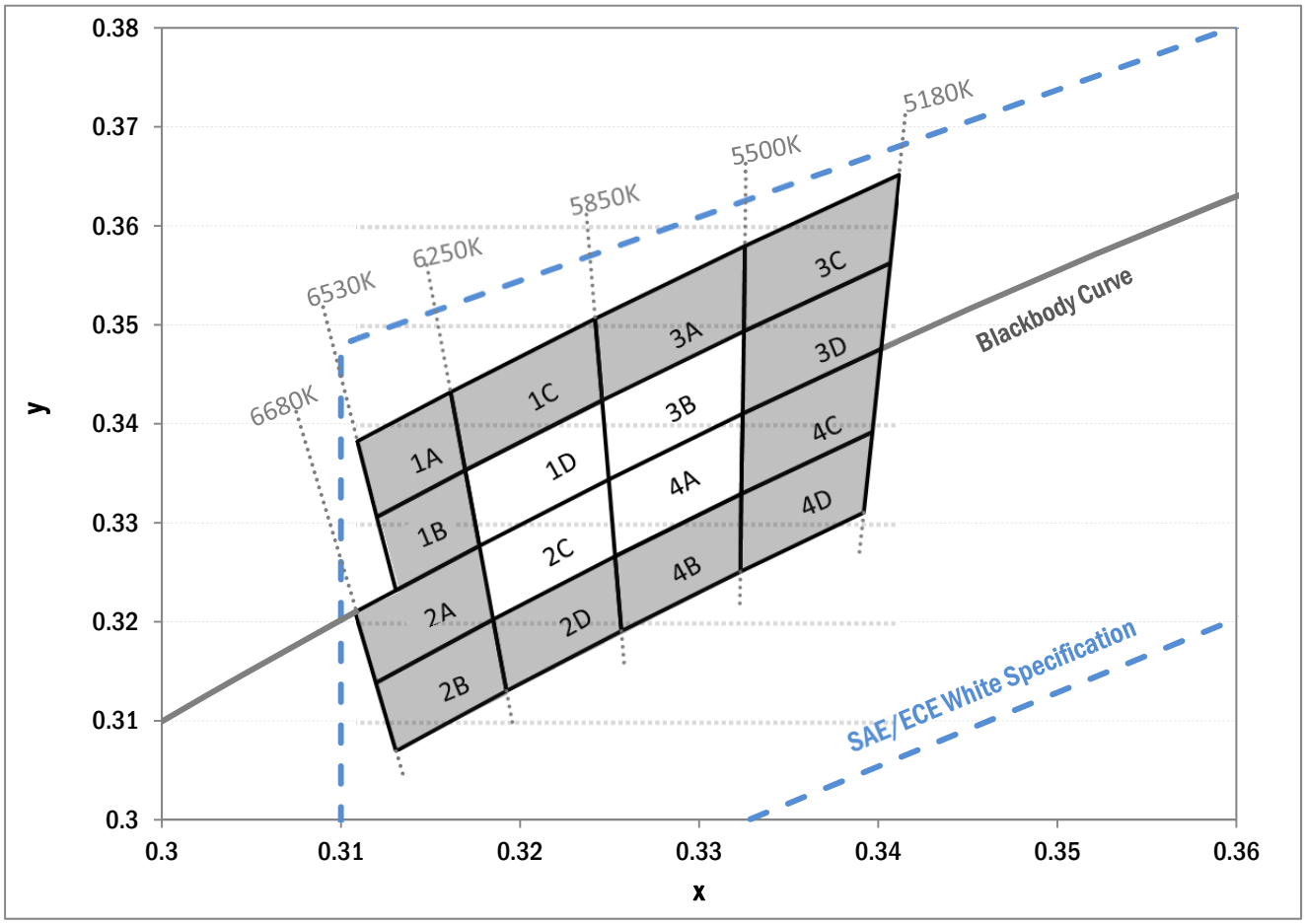

Figure 9. Color bin structure in CIE 1931 color space for LUXEON F Plus Cool White.

Note for Figure 9:
1. Lumileds supports the following bins for LUXEON F Plus Cool White: 1D, 2C, 3B and 4A.
2. LUXEON F historical large color notations. Color bins must be ordered by fine bin designators, shown below.
   H1 = 1A, 1B, 1C, 1D
   H2 = 2A, 2B, 2C, 2D
   H3 = 3A, 3B, 3C, 3D
   H4 = 4A, 4B, 4C, 4D
   HC = 1D, 2C, 3B, 4A

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Table 7. Color bin definitions for LUXEON F Plus Cool White.

Color Bin	x	y	6 Digit IEC Code	Typical CCT	Color Bin	x	y	6 Digit IEC Code3	Typical CCT
2B	0.3120	0.3139	ebvG33	6460K	1B	0.3120	0.3306	fbwA23	6390K
	0.3185	0.3203				0.3169	0.3353		
	0.3192	0.3131				0.3177	0.3277		
	0.3131	0.3070				0.3131	0.3232		
2D	0.3185	0.3203	ebyG33	6050K	1D	0.3169	0.3353	fbyA33	6050K
	0.3253	0.3266				0.3246	0.3424		
	0.3256	0.3191				0.3249	0.3344		
	0.3192	0.3131				0.3177	0.3277		
4B	0.3253	0.3266	ecbG33	5680K	3B	0.3246	0.3424	fcbA33	5680K
	0.3323	0.3329				0.3325	0.3493		
	0.3323	0.3251				0.3324	0.3410		
	0.3256	0.3191				0.3249	0.3344		
4D	0.3323	0.3329	eceG33	5350K	3D	0.3325	0.3493	fceA33	5350K
	0.3396	0.3392				0.3406	0.3562		
	0.3392	0.3310				0.3401	0.3476		
	0.3323	0.3251				0.3324	0.3410		
2A	0.3109	0.3211	ebvD33	6460K	1A	0.3109	0.3382	fbwD23	6390K
	0.3177	0.3277				0.3161	0.3432		
	0.3185	0.3203				0.3169	0.3353		
	0.3120	0.3139				0.3120	0.3306		
2C	0.3177	0.3277	ebyD33	6050K	1C	0.3161	0.3432	fbyD33	6050K
	0.3249	0.3344				0.3242	0.3506		
	0.3253	0.3266				0.3246	0.3424		
	0.3185	0.3203				0.3169	0.3353		
4A	0.3249	0.3344	ecbD33	5680K	3A	0.3242	0.3506	fcbD33	5680K
	0.3324	0.3410				0.3325	0.3579		
	0.3323	0.3329				0.3325	0.3493		
	0.3253	0.3266				0.3246	0.3424		
4C	0.3324	0.3410	eceD33	5350K	3C	0.3325	0.3579	fceD33	5350K
	0.3401	0.3476				0.3412	0.3652		
	0.3396	0.3392				0.3406	0.3562		
	0.3323	0.3329				0.3325	0.3493		

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

Forward Voltage Bins

Table 8. Forward voltage bin definitions for LUXEON F Plus Cool White.

BIN	MINIMUM FORWARD VOLTAGE [1] (V)	MAXIMUM FORWARD VOLTAGE [1] (V)
B	2.55	2.79
C	2.79	3.03
D	3.03	3.27

Note for Table 8:
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.

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Mechanical Dimensions

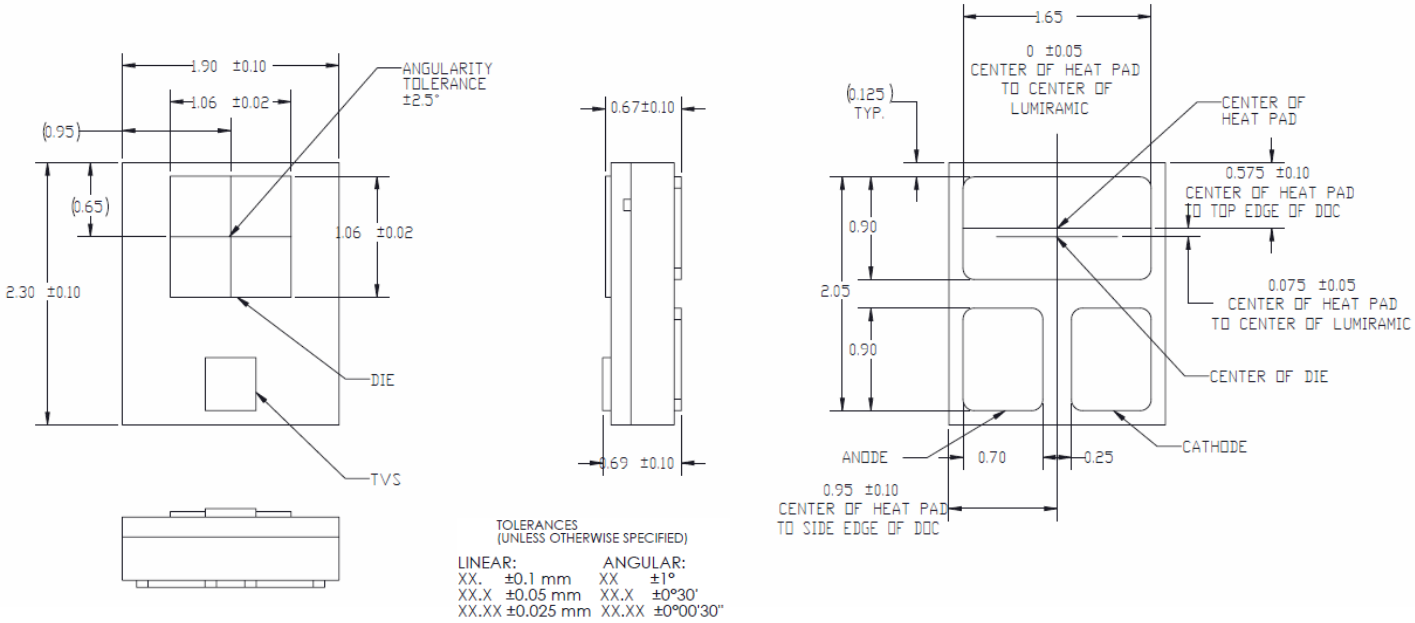


Figure 10. Mechanical dimensions for LUXEON F Plus Cool White.

Notes for Figure 10:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Packaging Information

Pocket Tape Dimensions

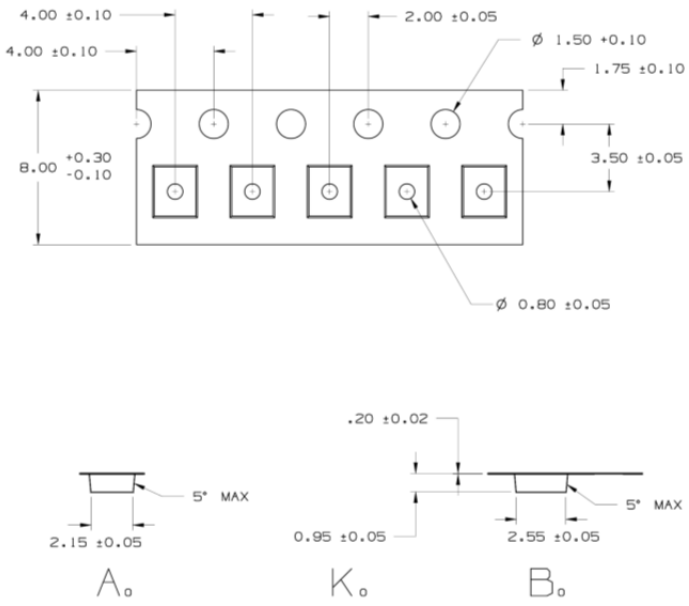
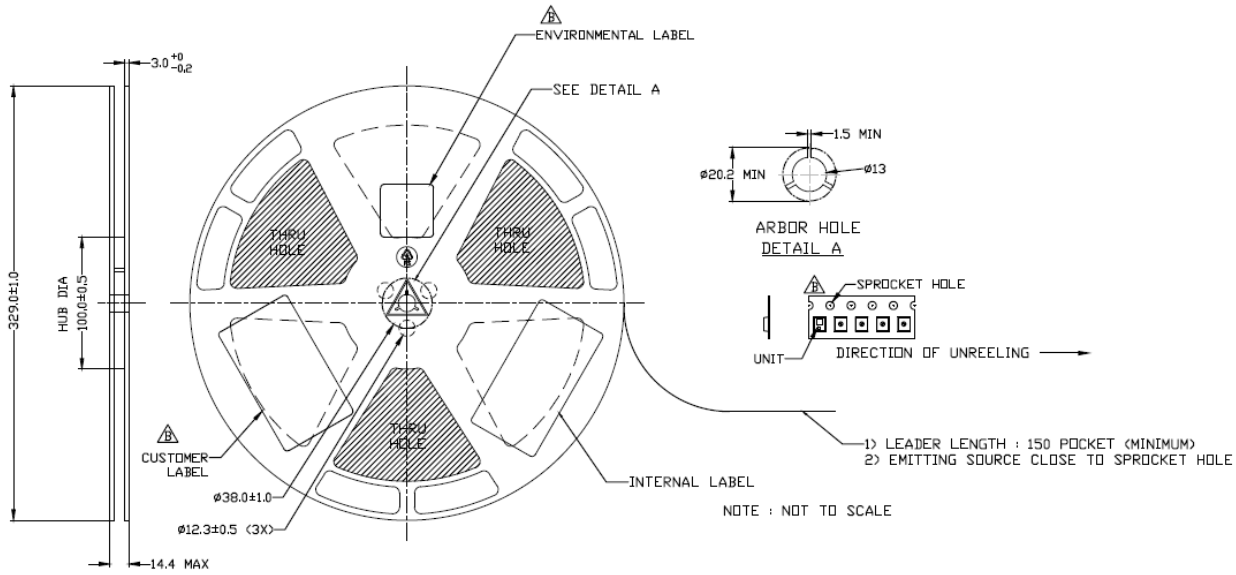


Figure 11. Emitter pocket tape packaging

Notes for Figure 9 & 10:

1. All dimensions are in millimeters.
2. Ao is the width of pocket Ko is the depth of pocket. Bo is the height of pocket.

Reel Dimensions



SPI 1000

SPI is the number of LEDS per reel. For LUXEON F, all reels ship with 1000 LEDs.

Figure 12. Reel dimensions for LUXEON F Plus Cool White.

About Lumileds

Lumileds is the light engine leader, delivering innovation, quality and reliability.

For 100 years, Lumileds commitment to innovation has helped customers pioneer breakthrough products in the automotive consumer and illumination market.

Lumileds is shaping the future of light with our LEDs and automotive lamps, and helping our customers illuminate how people see the world around them.

To learn more about our portfolio of light engines, visit lumileds.com

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Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

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