LUMILEDS

ILLUMINATION

LUXEON SunPlus Series for Horticulture

LEDs engineered to deliver the precise wavelengths of light needed to improve crop yield



The LUXEON SunPlus Series is purpose-built to enable ease of system design for Horticulture applications. The LUXEON SunPlus Series offers the only LEDs available today that are binned and tested based on Photosynthetic Photon Flux (PPF). The LUXEON SunPlus Series includes two different packages: LUXEON SunPlus 20 Line, which is 2.0mm x 2.0mm and LUXEON SunPlus 35 Line, which is 3.5mm x 3.5mm. The LUXEON SunPlus Series includes options for single driver solutions and multi-channel, color tunable solutions.

FEATURES AND BENEFITS

- 120° and 150° viewing angle of choice for various design needs
- Two package options 2.0mm x 2.0mm and 3.5mm x 3.5mm for design freedom

PRIMARY APPLICATIONS

- Horticulture

No. E352519 / E507562

DS171 LUXEON SunPlus Series for Horticulture Product Datasheet ©2025 Lumileds Holding B.V. All rights reserved.

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General Product Information

Product Test Conditions

LUXEON SunPlus Series LEDs are tested and binned with a DC drive current and junction temperature specified below:

LUXEON SunPlus 20 Line – 350mA, T_j=85°C

LUXEON SunPlus 35 Line – 100mA, T_j=25°C

Part Number Nomenclature

Part numbers for LUXEON SunPlus Series follow the convention below:

L 1 S P – **A A A B B** 0 **C C D** 0 0 0 0

Where:

A A A – designates color (FRD=Far Red, DRD=Deep Red, PRP=Purple, RYL=Royal Blue, LME=Lime and CW9=Cool White)

B B – designates typical percentage of PPF in the blue spectrum (420 to 480nm) vs. the total PPF in the Photosynthetic Active Radiation (PAR) region (400 to 700nm), which applies only to purple LEDs (00=2.5%, 10=12.5% and 20=25%)

C C – designates package size (20=2.0mm^2 in 150° dome, 2F=2.0mm^2 in 120° dome and 35=3.5mm^2)

D – designates polarity (R=reverse polarity)

Therefore, the following part number is used for a LUXEON SunPlus 20 Royal Blue LED with a package size of 2.0mm^2 in 150° dome:

L 1 S P – **R Y L** 0 0 0 **2 0 0** 0 0 0 0

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. LUXEON SunPlus Series 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 1a. Product performance of LUXEON SunPlus 20 Line at 350mA, T_j=85°C

COLOR	PEAK WAVELENGTH (nm)		PPF (µmol/s) [1] in PAR (400 to 700nm) [2]		PPF/W TYPICAL (µmol/J)	PART NUMBER
	MINIMUM	MAXIMUM	MINIMUM	TYPICAL		
Far Red	720	750	1.10	1.37 [3]	2.26	L1SP-FRD0002000000
			1.60	1.96	2.95	L1SP-FRD0002F00000
Deep Red	655	670	1.60	1.81	2.65	L1SP-DRD0002000000
			1.70	2.08	2.90	L1SP-DRD0002F00000
Royal Blue	445	455	1.90	2.04	2.11	L1SP-RYL0002000000
			1.90	2.25	2.30	L1SP-RYL0002F00000
Lime	–	–	1.50	1.59	1.66	L1SP-LME0002000000
			1.50	1.62	1.66	L1SP-LME0002F00000
Cool White	–	–	1.40	1.51	1.57	L1SP-CW90002000000
			1.60	1.70	1.73	L1SP-CW90002F00000

Table 1b. Product performance of LUXEON SunPlus 35 Line at 100mA, T_j=25°C

COLOR	PEAK WAVELENGTH (nm)		PPF (µmol/s) [1] in PAR (400 to 700nm) [2]		PPF/W TYPICAL (µmol/J)	PART NUMBER
	MINIMUM	MAXIMUM	MINIMUM	TYPICAL		
Purple (2.5% Blue) [4]	–	–	0.45	0.51	1.80	L1SP-PRP0003500000
Purple (12.5% Blue) [5]	–	–	0.50	0.58	2.02	L1SP-PRP1003500000
Purple (25% Blue) [6]	–	–	0.55	0.63	2.24	L1SP-PRP2003500000
Lime	–	–	0.60	0.65	2.13	L1SP-LME0003500000

Notes for Tables 1a and 1b:
1. Lumileds maintains a tolerance of ±6.5% on µmol/s for LUXEON SunPlus 20 Line and ±7.5% on µmol/s measurements for LUXEON SunPlus 35 Line.
2. PAR is the photosynthetic active radiation from 400 to 700nm.
3. PPF in blue spectrum (420–480nm) ranges from 0–5% of total PPF in PAR (400–700nm). Typical PPF in the blue spectrum is 2.5%.
4. PPF in blue spectrum (420–480nm) ranges from 10–15% of total PPF in PAR (400–700nm). Typical PPF in the blue spectrum is 12.5%.
5. PPF in blue spectrum (420–480nm) ranges from 20–30% of total PPF in PAR (400–700nm). Typical PPF in the blue spectrum is 25%

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Optical Characteristics

Table 2. Optical characteristics for LUXEON SunPlus Series at specified test conditions

PART NUMBER	TYPICAL SPECTRAL HALF-WIDTH [1] (nm)	TYPICAL TEMPERATURE COEFFICIENT OF PEAK WAVELENGTH (nm/°C)	TYPICAL TOTAL INCLUDED ANGLE [2]	TYPICAL VIEWING ANGLE [3]
L1SP-FRD0002000000	34	0.18	175°	162°
L1SP-FRD0002F00000	34	0.18	161°	122°
L1SP-DRD0002000000	22	0.16	175°	162°
L1SP-DRD0002F00000	22	0.16	160°	122°
L1SP-RYL0002000000	20	0.07	175°	165°
L1SP-RYL0002F00000	20	0.07	163°	123°
L1SP-LME0002000000	–	–	170°	145°
L1SP-LME0002F00000	–	–	160°	114°
L1SP-CW90002000000	–	–	170°	150°
L1SP-CW90002F00000	–	–	152°	110°
L1SP-PRPxx03500000	–	–	140°	115°
L1SP-LMExxx3500000	110	0.01	140°	115°

Notes for Table 2:
1. Spectral half-width is the spectral bandwidth at 50% of the peak intensity.
2. Total angle at which 90% of the total luminous flux is captured.
3. 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. Electrical and thermal characteristics for LUXEON SunPlus Series at specified test conditions

PART NUMBER	FORWARD VOLTAGE [1] (V_f)			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE [2] (mV/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	TYPICAL	MAXIMUM		
L1SP-FRD0002x00000	1.50	1.90	2.30	-2.8	3.5
L1SP-DRD0002x00000	1.50	2.05	2.30	-2.3	3.5
L1SP-RYL0002x00000	2.50	2.80	3.50	-2.2	2.8
L1SP-LME0002x00000	2.50	2.80	3.50	-2.8	2.8
L1SP-CW90002x00000	2.50	2.80	3.50	-2.2	2.8
L1SP-PRPxx03500000	2.70	2.80	3.10	-2.0 to -4.0	8.0
L1SP-LME0003500000	2.80	3.05	3.50	-1.7	25.0

Notes for Table 3:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements.
2. Measured between 25°C and 85°C.

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Absolute Maximum Ratings

Table 4a. Absolute maximum ratings for LUXEON SunPlus 20 Line

PARAMETER	FAR RED		DEEP RED		ROYAL BLUE	LIME	COOL WHITE
DC Forward Current [1, 2]	700mA	1050mA	700mA	1050mA	1050mA	1225mA	1225mA
Peak Pulsed Forward Current [1, 3]	875mA	1300mA	875mA	1300mA	1300mA	1550mA	1550mA
LED Junction Temperature [1] (DC & Pulse)	135°C	120°C	135°C	120°C	135°C	135°C	135°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 3B						
Operating Case Temperature [1]	-40 to 125°C		-40 to 125°C		-40 to 125°C	-40 to 110°C	-40 to 125°C
LED Storage Temperature	-40°C to 135°C						
Soldering Temperature	20°C to 260°C						
Allowable Reflow Cycles	3						
Reverse Voltage ($V_{reverse}$)	LUXEON LEDs are not designed to be driven in reverse bias						

Table 4b. Absolute maximum ratings for LUXEON SunPlus 35 Line

PARAMETER	PURPLE	LIME
DC Forward Current [1, 2]	300mA	200mA
Peak Pulsed Forward Current [1, 3]	350mA	240mA
LED Junction Temperature [1] (DC & Pulse)	125°C	125°C
ESD Sensitivity (ANSI/ESDA/JEDEC JS-001-2012)	Class 2	
Operating Case Temperature [1]	-40°C to 105°C	-40°C to 105°C
LED Storage Temperature	-40°C to 105°C	-40°C to 105°C
Soldering Temperature	20°C to 260°C	
Allowable Reflow Cycles	3	
Reverse Voltage ($V_{reverse}$)	LUXEON LEDs are not designed to be driven in reverse bias	

Notes for Tables 4a and 4b:
1. Proper current derating must be observed to maintain the junction temperature below the maximum allowable junction temperature.
2. Residual periodic variations due to power conversion from alternating current (AC) to direct current (DC), also called "ripple," with frequencies ≥100Hz and amplitude of ≤15% of the maximum allowable DC forward current are acceptable, assuming the average current throughout each cycle does not exceed the maximum allowable DC forward current at the corresponding maximum junction temperature.
3. Pulsed operation with a peak drive current equal to the stated peak pulsed forward current is acceptable if the pulse-on time is ≤5ms per cycle and the duty cycle is ≤50%.
4. Transient reverse voltages and surge currents due to electrical switching or supply interruptions are acceptable if these events do not last for more than 10ms, the amplitude of the reverse voltage does not exceed 5V and the reverse current is less than 220uA.
5. Max 5V reverse for up to 10s is an acceptable beginning of life, one time test condition.

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Characteristic Curves

Spectral Power Distribution Characteristics

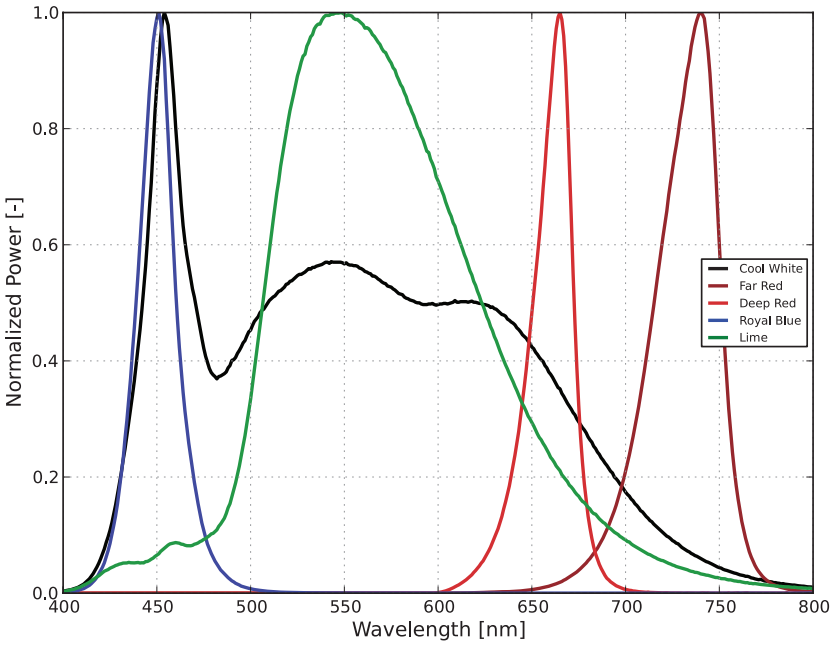


Figure 1a. Typical normalized power vs. wavelength for LUXEON SunPlus 20 Line at 350mA, T_j=85°C

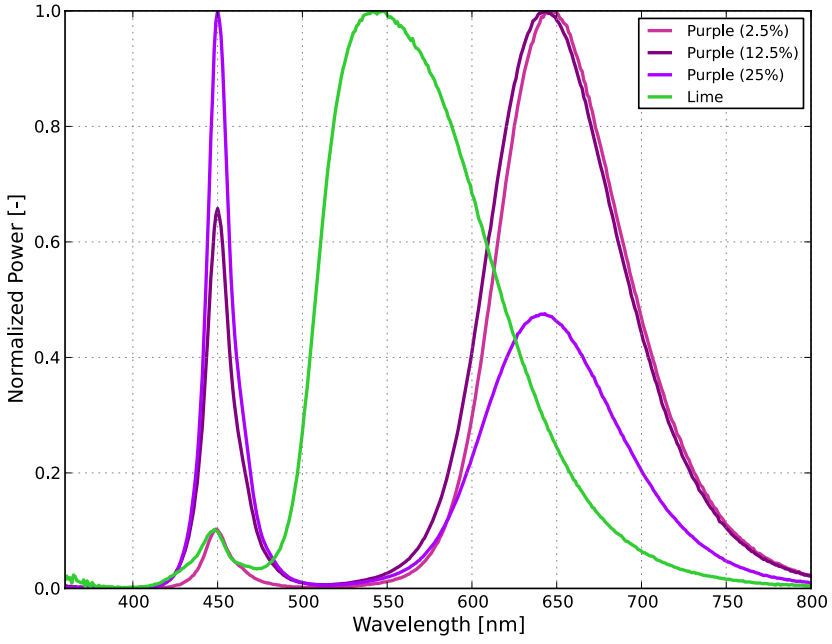


Figure 1b. Typical normalized power vs. wavelength for LUXEON SunPlus 35 Line at 100mA, T_j=25°C

Photon Output Characteristics

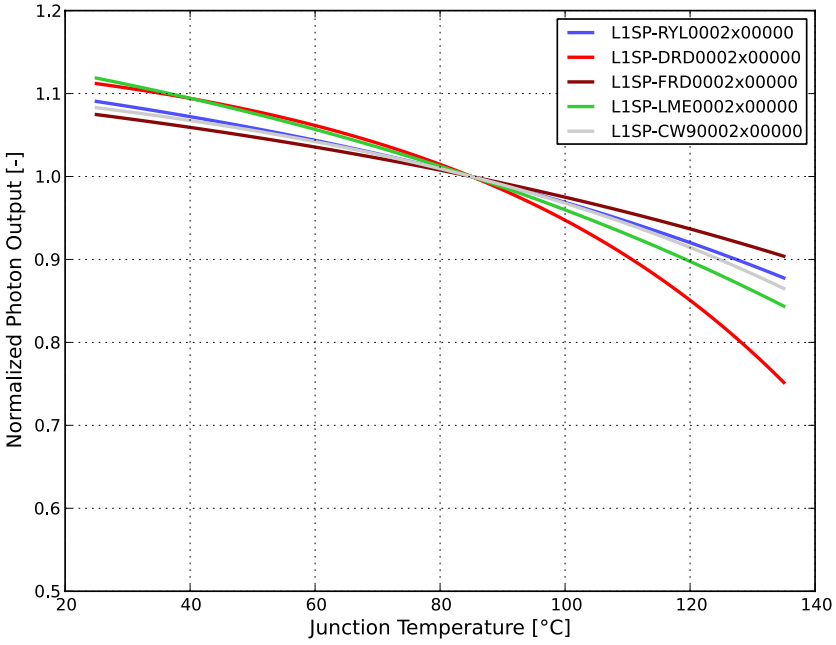


Figure 2a. Typical normalized photon output vs. junction temperature for LUXEON SunPlus 20 Line at 350mA

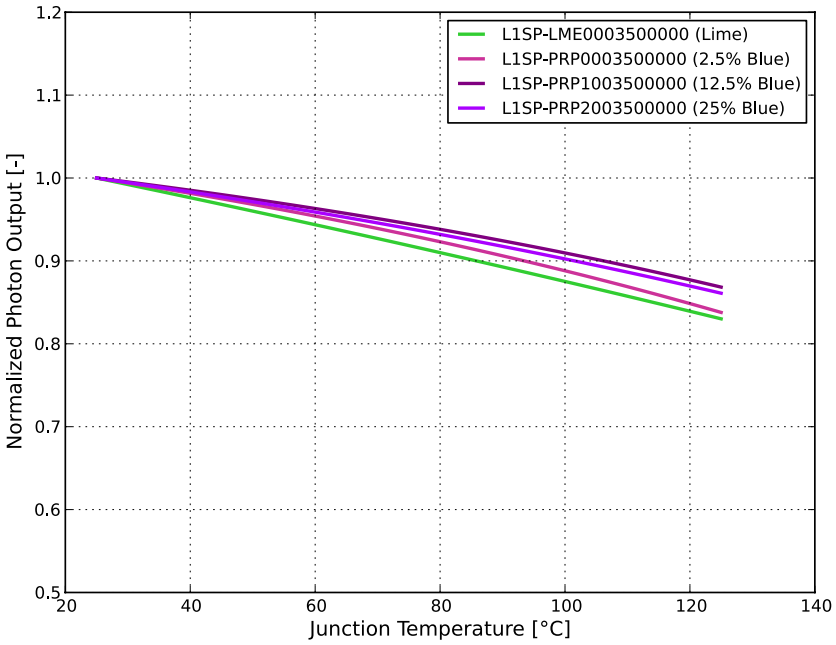


Figure 2b. Typical normalized photon output vs. junction temperature for LUXEON SunPlus 35 Line at 100mA

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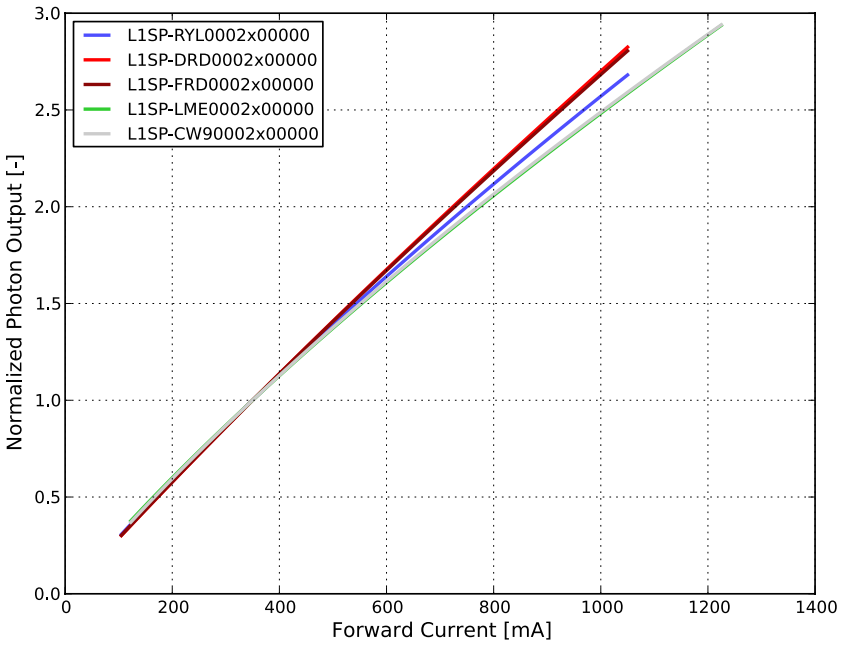


Figure 2c. Typical normalized photon output vs. forward current for LUXEON SunPlus 20 Line at T_j=85ºC

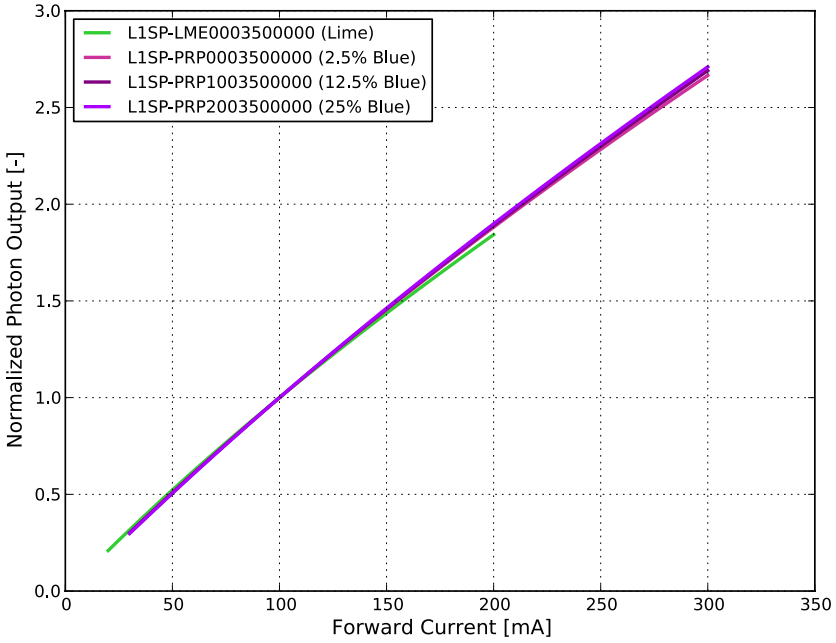


Figure 2d. Typical normalized photon output vs. forward current for LUXEON SunPlus 35 Line at T_j=25°C

Forward Current Characteristics

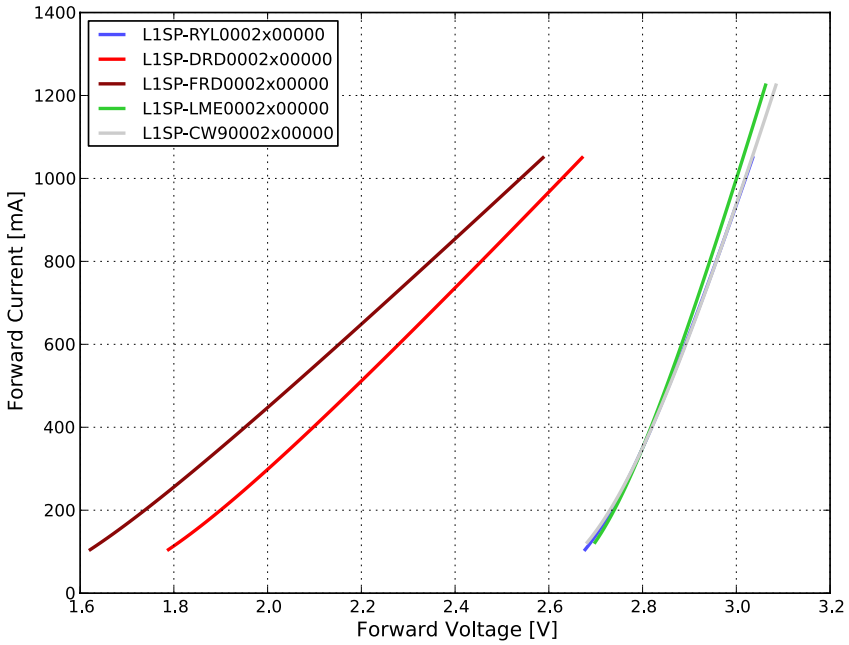


Figure 3a. Typical forward current vs. forward voltage for LUXEON SunPlus 20 Line at T_j=85°C

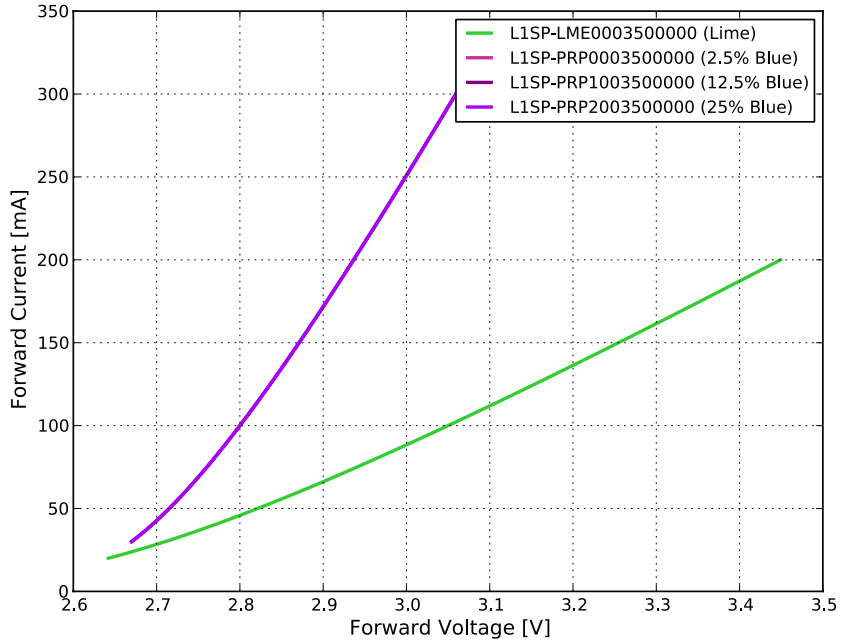


Figure 3b. Typical forward current vs. forward voltage for LUXEON SunPlus 35 Line at T_j=25°C

Radiation Pattern Characteristics

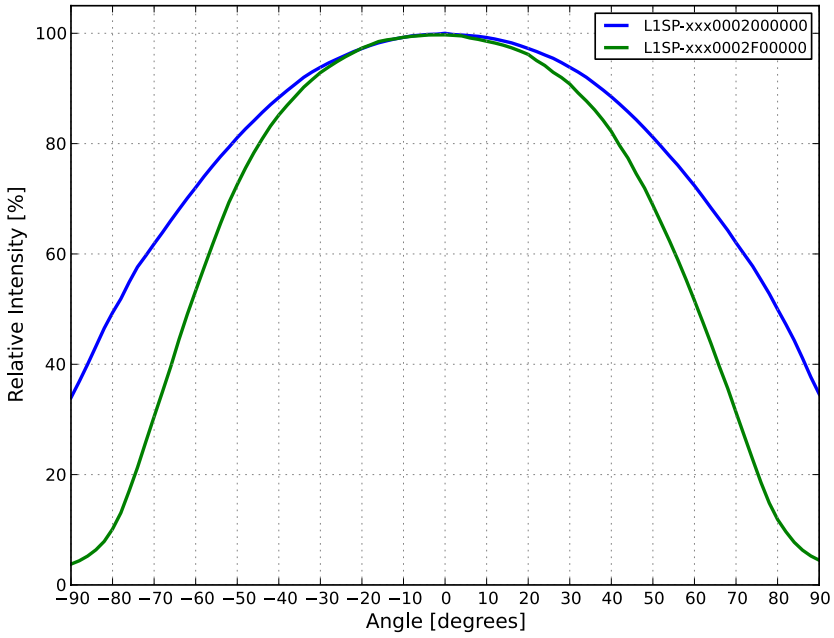


Figure 4a. Typical radiation pattern for LUXEON SunPlus 20 Line at 350mA, T_j=85°C

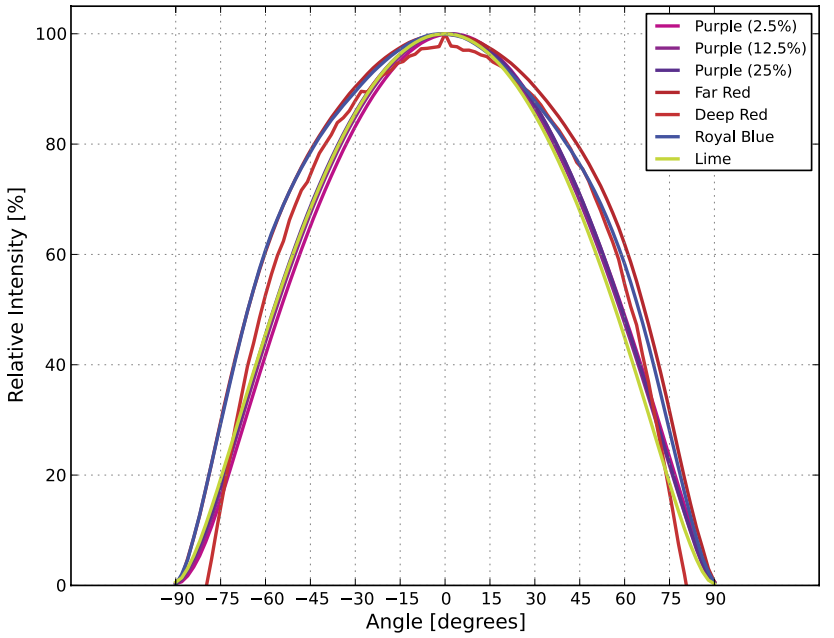


Figure 4b. Typical radiation pattern for LUXEON SunPlus 35 Line at 100mA, T_j=25°C

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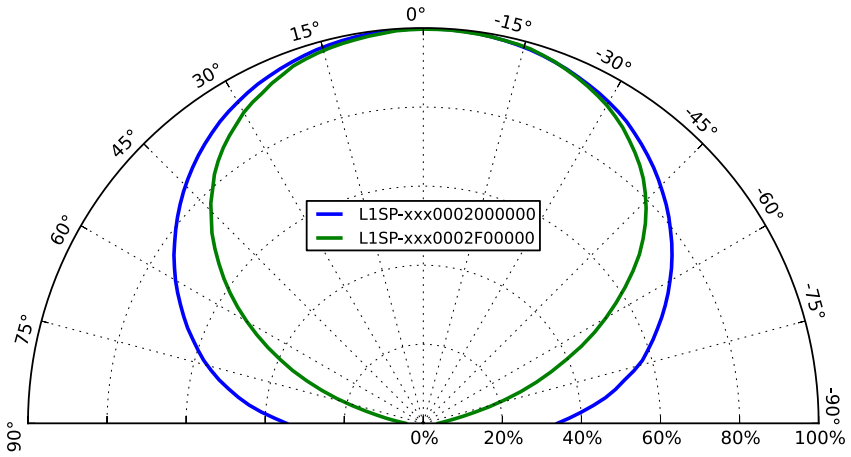


Figure 5a. Typical polar radiation pattern for LUXEON SunPlus 20 Line at 350mA, T_j=85°C

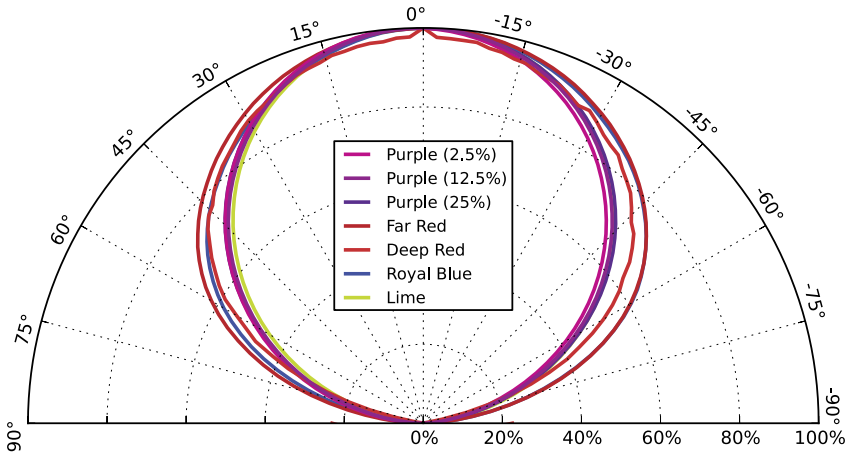


Figure 5b. Typical polar radiation pattern for LUXEON SunPlus 35 Line at 100mA, T_j=25°C

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 LED components for luminous flux or radiometric power, color point, peak or dominant wavelength and forward voltage.

All emitters packaged within a reel are of the same bin combination.

LUXEON SunPlus 20 Line and LUXEON SunPlus 35 Line LEDs are labeled using a 4-digit alphanumeric CAT code following the format below:

A B B C

Where:

- **A** – designates PPF bin (example: L=1.80 to 1.90 µmol/s, M=1.90 to 2.00 µmol/s)
- **B B** – designates color or peak wavelength bin (example: 40=445 to 450nm, 50=450 to 455nm)
- **C** – designates forward voltage bin (example: E=2.50 to 2.70V, F=2.70 to 2.90V)

Therefore, LUXEON SunPlus 20 Royal Blue with a PPF range of 1.90 to 2.00 µmol/s, peak wavelength of 445 to 450nm and a forward voltage range of 2.70 to 2.90V has the following CAT code:

M 4 0 F

PPF Bins

Tables 5a and 5b list the standard PPF bins for LUXEON SunPlus Series. Although several bins are outlined, product availability in a particular bin varies by production run and by product performance.

Table 5a. PPF bin definitions for LUXEON SunPlus 20 Line

BIN	PPF [1] (µmol/s)	
	MINIMUM	MAXIMUM
A	0.80	0.90
B	0.90	1.00
C	1.00	1.10
D	1.10	1.20
E	1.20	1.30
F	1.30	1.40
G	1.40	1.50
H	1.50	1.60
J	1.60	1.70
K	1.70	1.80
L	1.80	1.90
M	1.90	2.00
N	2.00	2.10
P	2.10	2.20
Q	2.20	2.30
R	2.30	2.40
S	2.40	2.50

Notes for Table 5a:
1. Lumileds maintains a tolerance of ±6.5% on µmol/s measurements.

Table 5b. PPF bin definitions for LUXEON SunPlus 35 Line

BIN	PPF [1] (µmol/s)	
	MINIMUM	MAXIMUM
X	0.30	0.35
Y	0.35	0.40
Z	0.40	0.45
A	0.45	0.50
B	0.50	0.55
C	0.55	0.60
D	0.60	0.65
E	0.65	0.70
F	0.70	0.75
G	0.75	0.80
H	0.80	0.85
J	0.85	0.90
K	0.90	0.95
L	0.95	1.00

Notes for Table 5b:
1. Lumileds maintains a tolerance of ±7.5% on µmol/s measurements.

Color Bin Definitions

Table 6. Color bin definitions for LUXEON SunPlus Series

PRODUCT	COLOR	BIN [1]
LUXEON SunPlus 20	Lime	10
	Cool White	50
LUXEON SunPlus 35	Purple (2.5% Blue)	H1
	Purple (12.5% Blue)	H3
	Purple (25% Blue)	H5
	Lime	L1

Notes for Table 6:
1. Lumileds maintains a tester tolerance of + 0.005 on color bin coordinates

Peak Wavelength Bins

Table 7. Peak wavelength bins for LUXEON SunPlus Series at specified test conditions

PRODUCT	COLOR	BIN	PEAK WAVELENGTH [1] (nm)	
			MINIMUM	MAXIMUM
LUXEON SunPlus 20	Far Red	10	720	750
	Deep Red	10	655	670
	Royal Blue	40	445	450
		50	450	455

Notes for Table 7:
1. Lumileds maintains a tolerance of ±2.0nm on peak wavelength measurements.

Forward Voltage Bins

Table 8. Forward voltage bin definitions for LUXEON SunPlus Series at specified test conditions

PRODUCT	COLOR	BIN	FORWARD VOLTAGE [1] (V_f)	
			MINIMUM	MAXIMUM
LUXEON SunPlus 20 Line	Far Red Deep Red Royal Blue Lime Cool White	Z	1.50	1.70
		A	1.70	1.90
		B	1.90	2.10
		C	2.10	2.30
		D	2.30	2.50
		E	2.50	2.70
		F	2.70	2.90
		G	2.90	3.10
		H	3.10	3.30
		J	3.30	3.50
LUXEON SunPlus 35 Line	Purple Lime	S	2.70	2.80
		T	2.80	2.90
		V	2.90	3.00
		W	3.00	3.10
		X	3.10	3.20
		Y	3.20	3.30
		Z	3.30	3.50

Notes for Table 8:
1. Lumileds maintains a tolerance of ±0.06V on forward voltage measurements for LUXEON SunPlus 20 Line and ±0.1V for LUXEON SunPlus 35 Line.

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Mechanical Dimensions

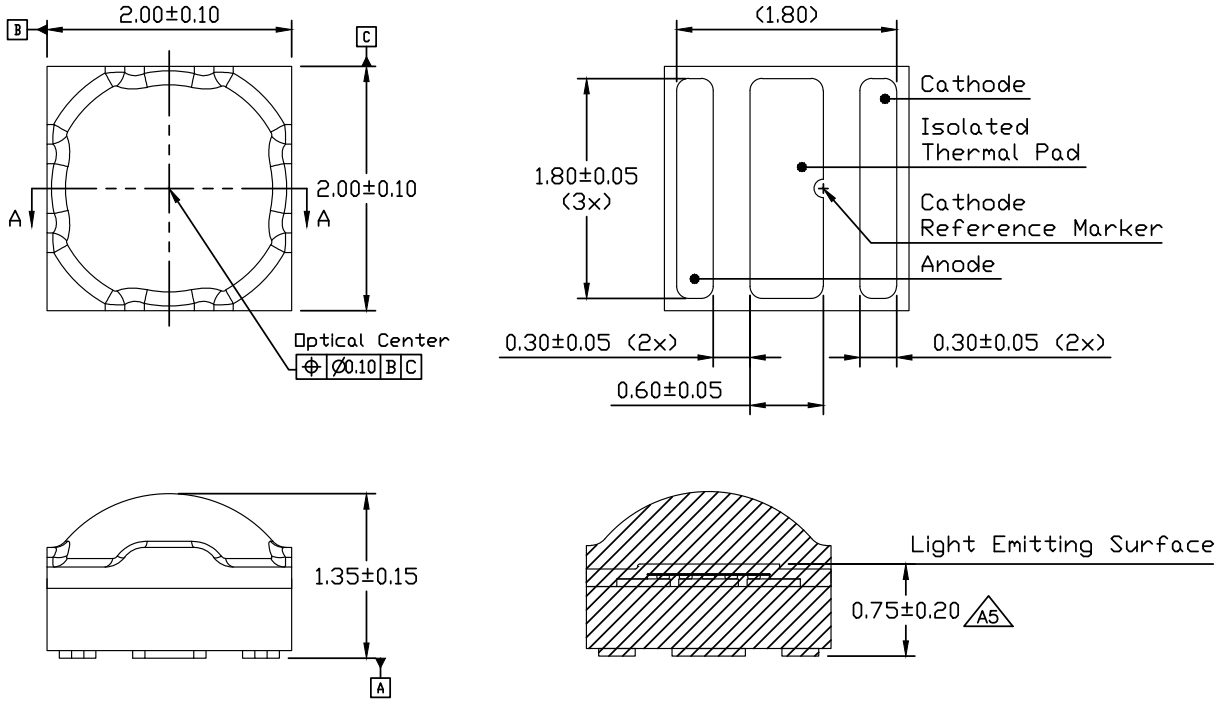


Figure 6a. Mechanical dimensions for L1SP-xxx0002000000

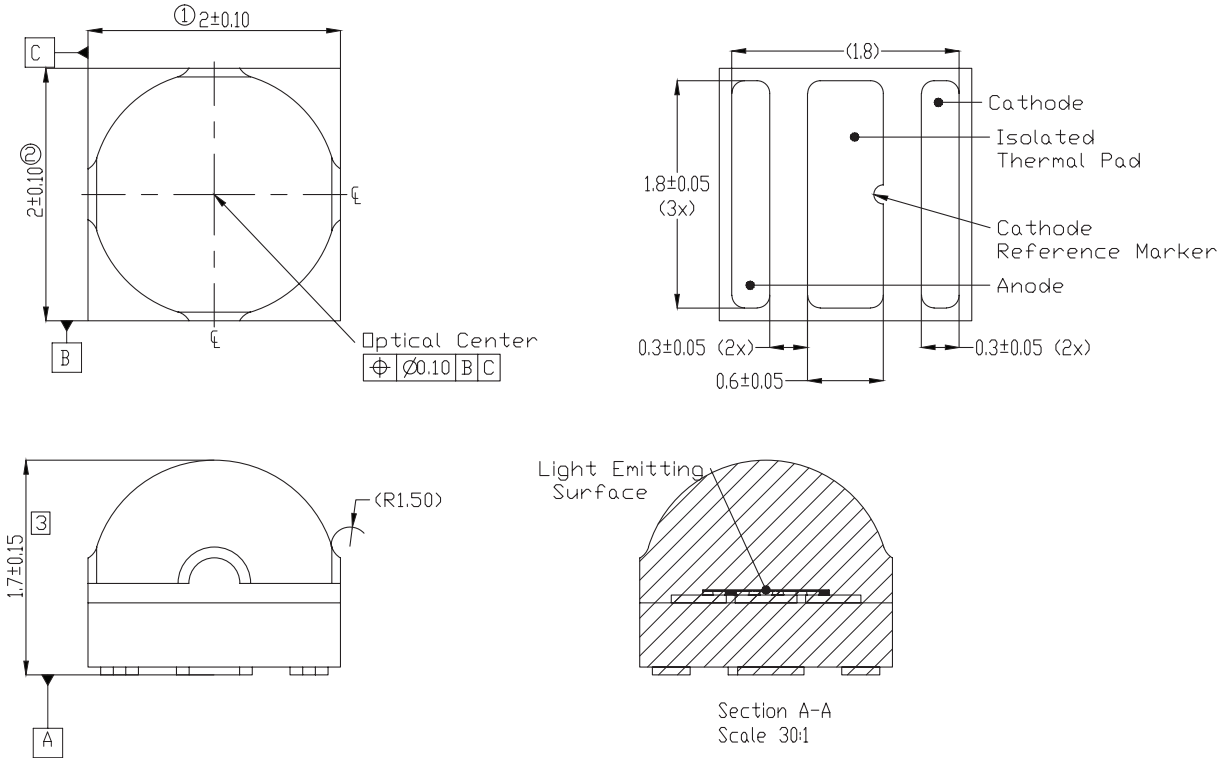


Figure 6b. Mechanical dimensions for L1SP-xxx0002F00000

Notes for Figures 6a and 6b:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

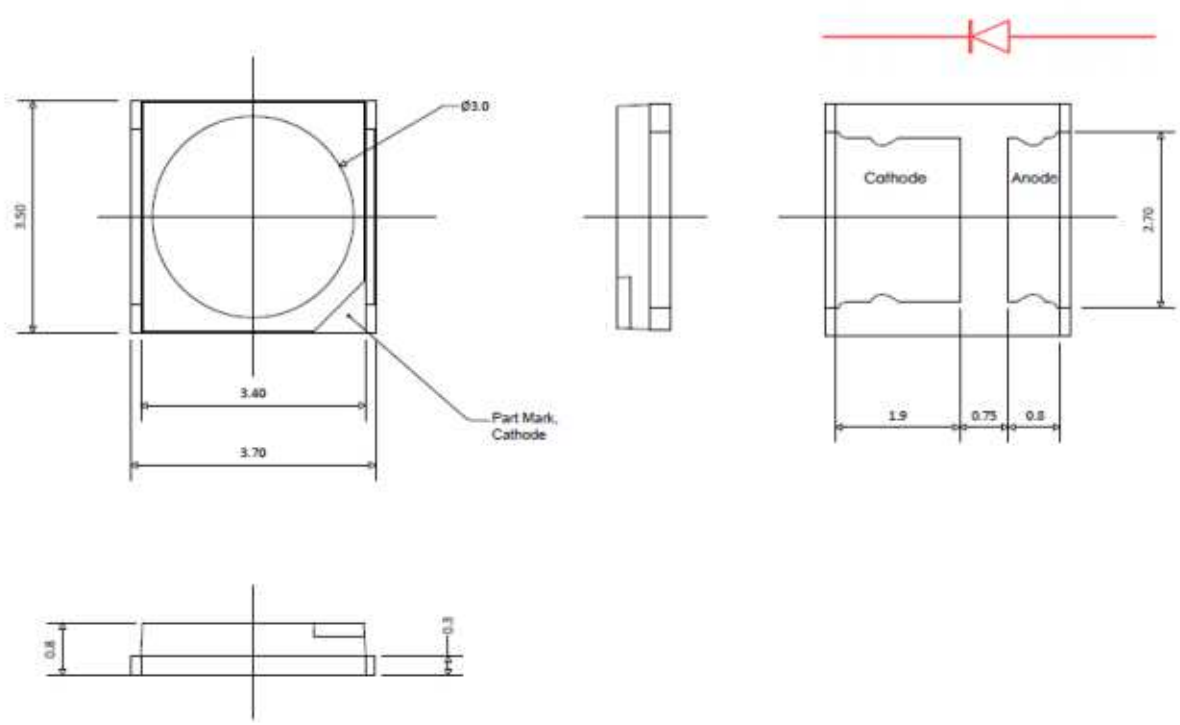


Figure 6c. Mechanical dimensions for L1SP-PRPxx03500000

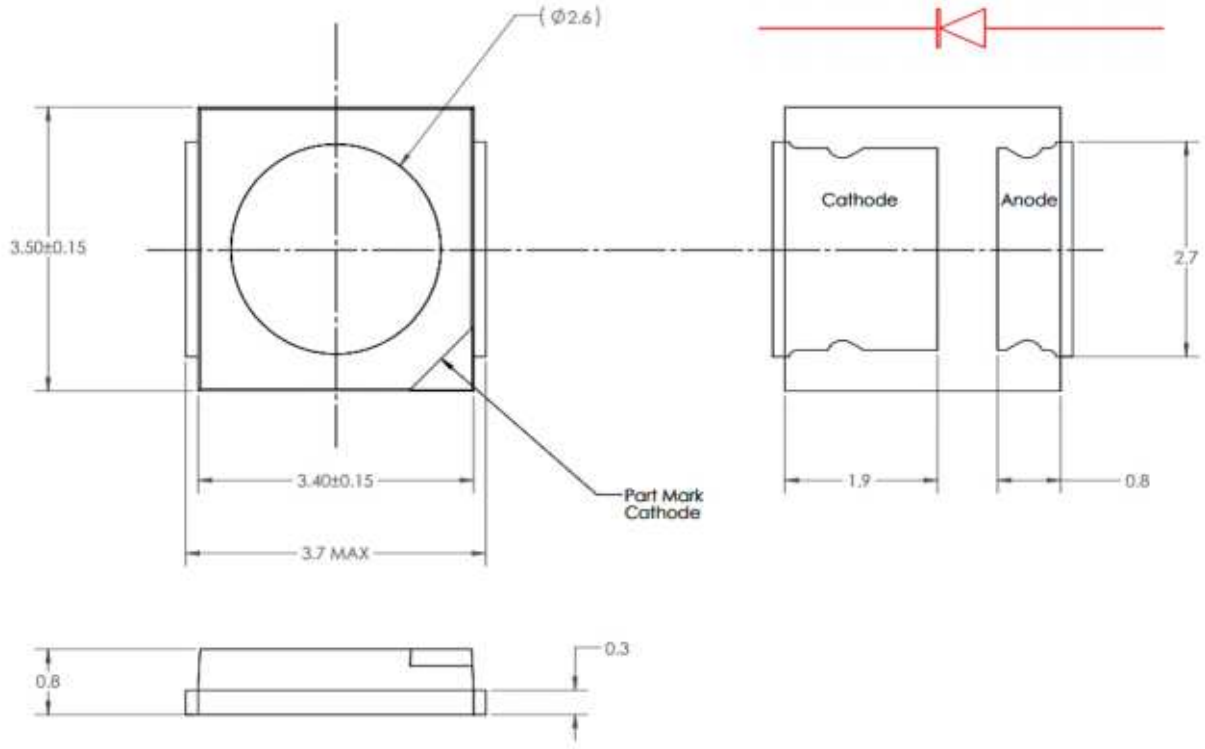


Figure 6d. Mechanical dimensions for L1SP-LME0003500000

Notes for Figures 6c and 6d:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reflow Soldering Guidelines

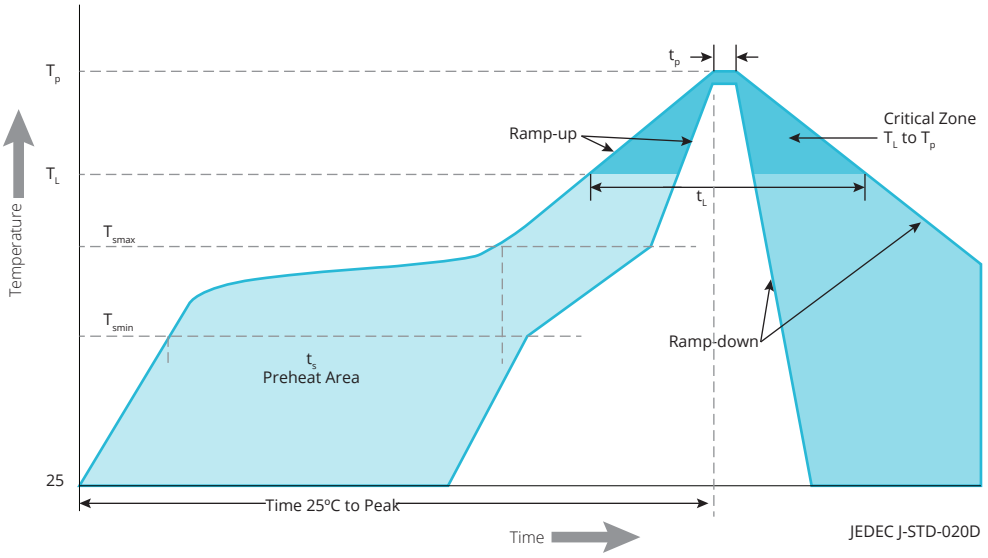


Figure 7. Visualization of the acceptable reflow temperature profile as specified in Table 9

Table 9. Reflow profile characteristics for LUXEON SunPlus Series

PROFILE FEATURE	LEAD-FREE ASSEMBLY	
	LUXEON SUNPLUS 20 LINE	LUXEON SUNPLUS 35 LINE
Preheat Minimum Temperature (T_{smin})	150°C	
Preheat Maximum Temperature (T_{smax})	200°C	
Preheat Time (t_{smin} to t_{smax})	60 to 120 seconds	
Ramp-Up Rate (T_L to T_p)	3°C / second maximum	
Liquidus Temperature (T_L)	217°C	
Time Maintained Above Temperature T_L (t_L)	60 to 150 seconds	
Peak / Classification Temperature (T_p)	260°C	
Time Within 5°C of Actual Temperature (t_p)	20 to 40 seconds	
Ramp-Down Rate (T_p to T_L)	6°C / second maximum	
Time 25°C to Peak Temperature	8 minutes maximum	

JEDEC Moisture Sensitivity

Table 10. Moisture sensitivity levels for LUXEON SunPlus Series

PRODUCT	LEVEL	FLOOR LIFE		SOAK REQUIREMENTS STANDARD	
		TIME	CONDITIONS	TIME	CONDITIONS
LUXEON SunPlus 20 Line	1	Unlimited	≤30°C / 85% RH	168 Hours +5 / -0	85°C / 85% RH
LUXEON SunPlus 35 Line	2	1 Year	≤30°C / 60% RH	168 Hours +5 / -0	85°C / 60% RH

Solder Pad Design

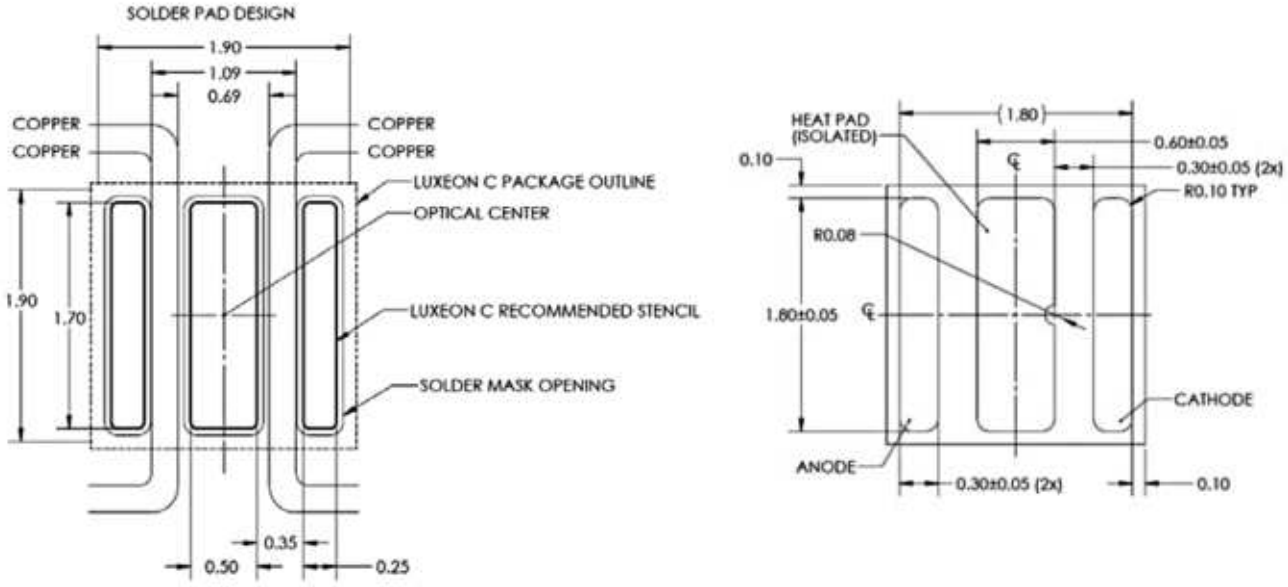


Figure 8a. Recommended PCB solder pad layout for LUXEON SunPlus 20 Line

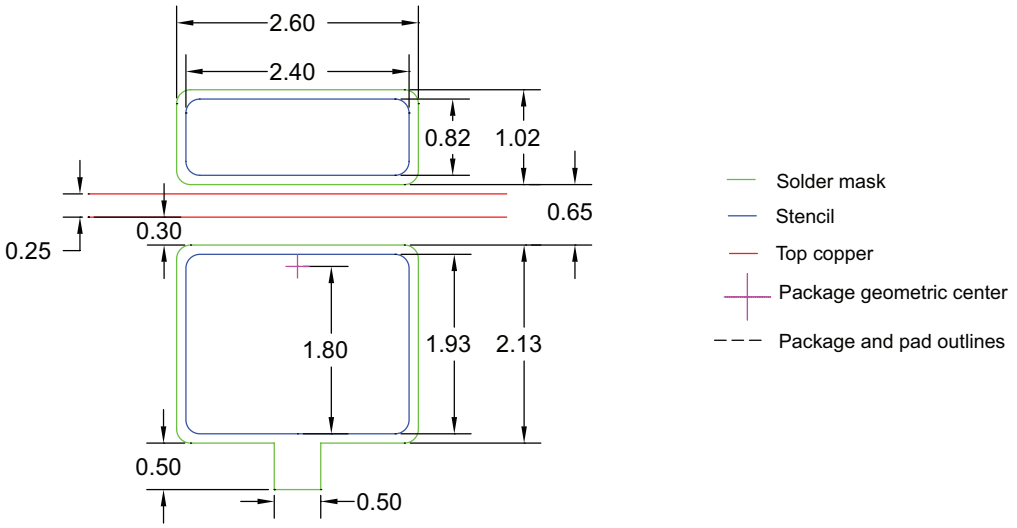


Figure 8b. Recommended PCB solder pad layout for LUXEON SunPlus 35 Line

Notes for Figures 8a and 8b:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Packaging Information

Pocket Tape Dimensions

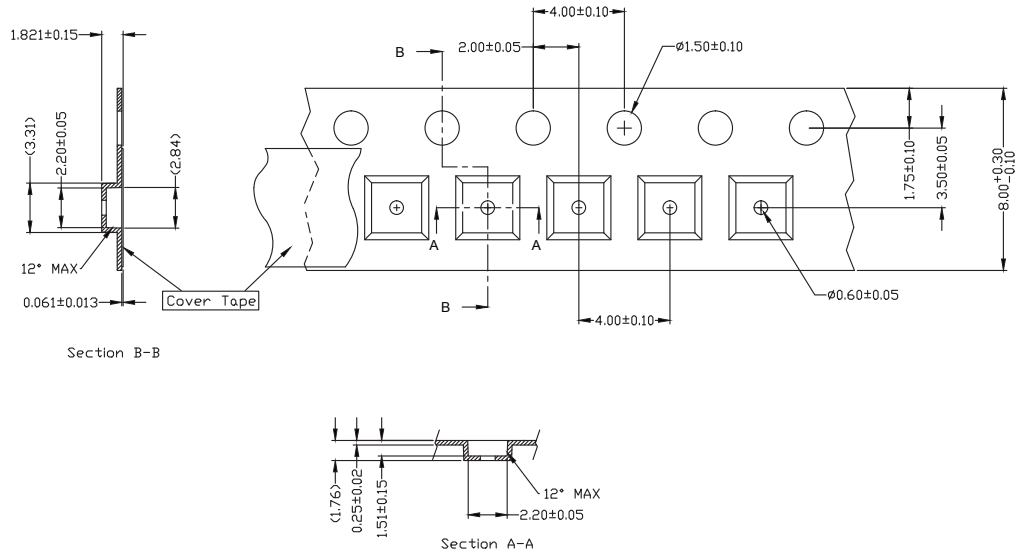


Figure 9a. Pocket tape dimensions for L1SP-xxx0002000000

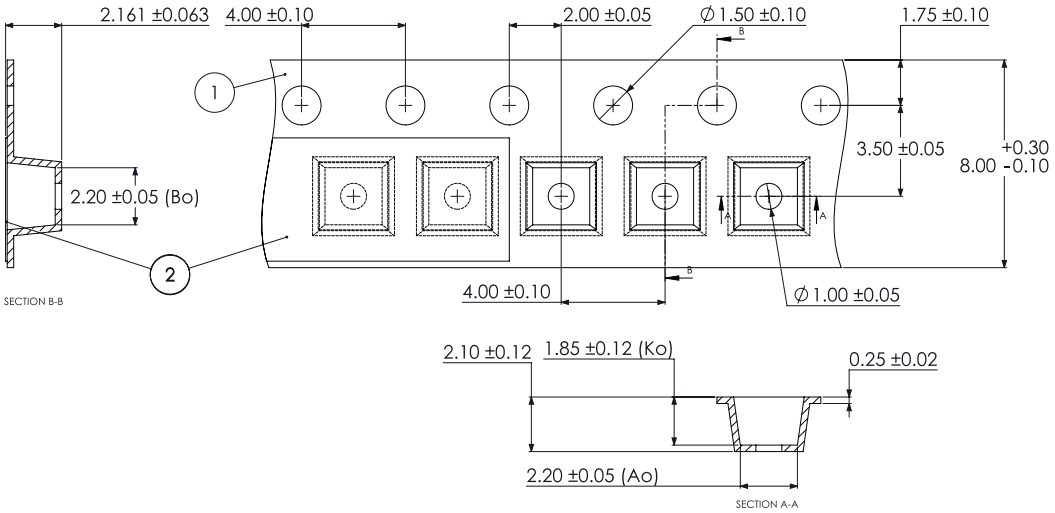


Figure 9b. Pocket tape dimensions for L1SP-xxx0002F00000

Notes for Figures 9a and 9b:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

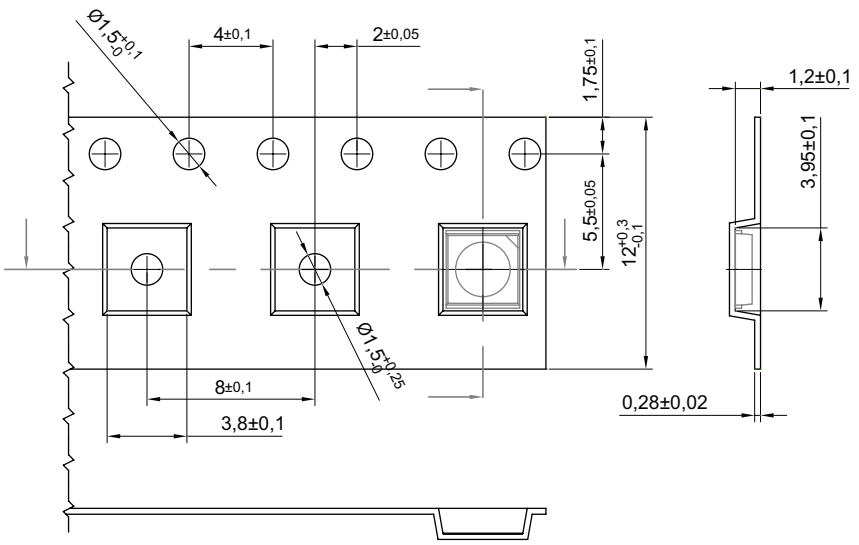


Figure 9c. Pocket tape dimensions for LUXEON SunPlus 35 Line

Notes for Figure 9c:
1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reel Dimensions

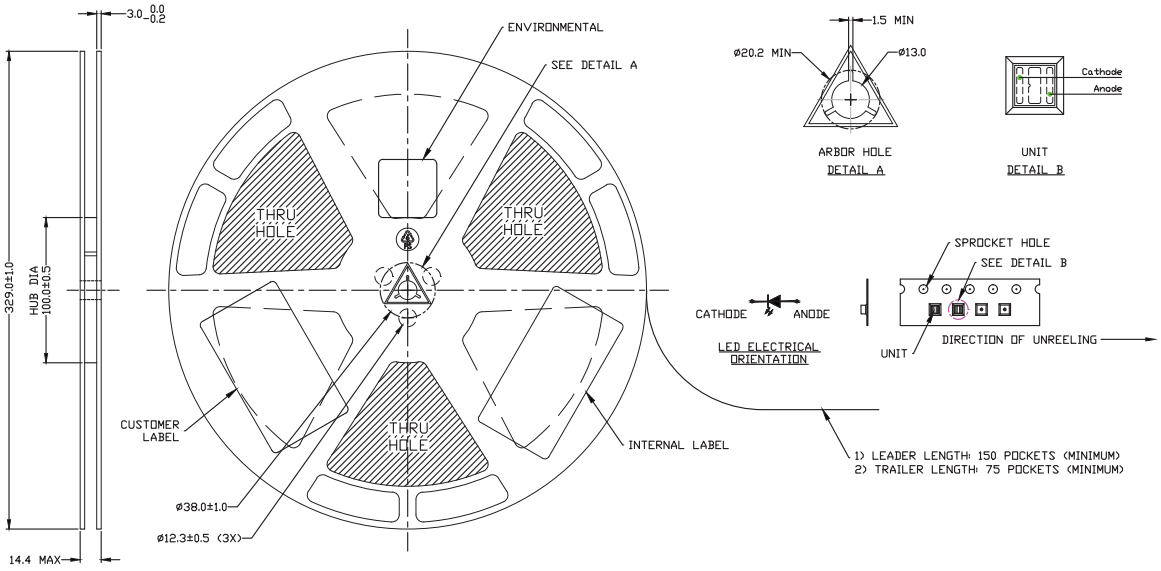


Figure 10a. Reel dimensions for LUXEON SunPlus 20 Line

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

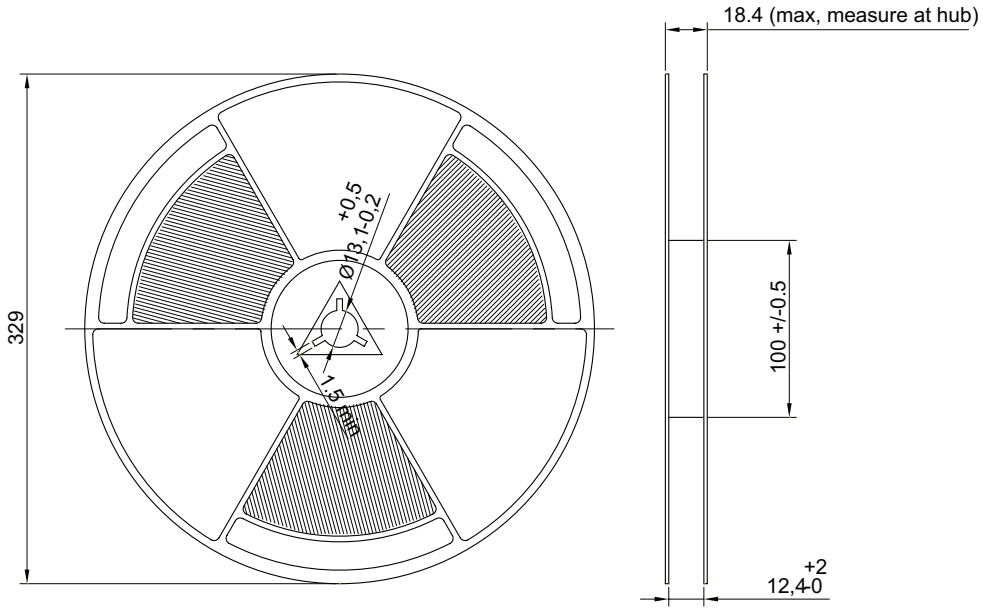


Figure 10b. Reel dimensions for LUXEON SunPlus 35 Line

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

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