

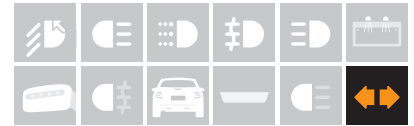
SignalSure 150 Amber

Mid power solution

SignalSure 150 Amber is a compact, surface-mount, mid power LED signaling solution that delivers an elevated standard of light output, flux density, and color uniformity. SignalSure's robust design structure, coupled with high performance specifications, ensures high quality and reliability.

SignalSure 150 is available in the following color wavelengths:

- Amber (586 nm)
- Amber (590 nm)



FEATURES AND BENEFITS

- Higher drive current capability for increased flux performance
- Low thermal resistance for better hot lumen performance
- Shorter wavelength capability enables enhanced lens cover flexibility
- Standard packaging for low cost and ease of manufacturing

PRIMARY APPLICATIONS

- Mirror/Side Repeater
- Turn

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General Product Information

Product Test Conditions

SignalSure 150 AM LEDs are tested and binned using a 20 ms monopulse (MP) at 150 mA drive current, junction temperature, T_j , of 25°C.

Part Number Nomenclature

Part numbers for SignalSure 150 AM follow the convention below:

A 1 D E – **B C C C** L 1 5 **E F G H** 0 0

Where:

- B** – designates color (A=Amber)
- C C C** – designates minimum dominant wavelength (584=584 nm, 588=588 nm)
- E** – designates minimum flux bin (See Product Bin and Labeling section)
- F** – designates the flux bin range (3=3 subsequent flux bins including the minimum bin)
- G H** – designates forward voltage range in which G is the minimum V_f bin and H is the maximum V_f bin (See Product Bin and Labeling Definitions section)

Therefore, the following part number is used for a SignalSure 150 Amber, 588 nm minimum wavelength, single binned at 150 mA, luminous flux range of 21 lumens to 36 lumens and forward voltage range of 2.07 volts to 2.79 volts:

A 1 D E – **A 5 8 8** L 1 5 **N 3 A F** 0 0

Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. SignalSure 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 SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

COLOR	DOMINANT WAVELENGTH ^[1,2] (nm)	PART NUMBER
Amber	586	A1DE - A584L
Amber	590	A1DE - A588L

Notes Table 1:

1. Dominant wavelength is derived from the CIE 1931 Chromaticity diagram and represents perceived color.
2. Lumileds maintains a tolerance of $\pm 1\text{ nm}$ for dominant wavelength measurements.

Optical Characteristics

Table 2. Optical characteristics for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE ^[1] $\theta_{0.90V}$	TYPICAL VIEWING ANGLE ^[2] $2\theta_{1/2}$
A1DE - A584L	140°	110°
A1DE - A588L	140°	110°

Notes Table 2:

1. Total angle at which 90% of total luminous flux is captured.
2. Viewing angle is the off axis angle from lamp center line where the luminous intensity is $\frac{1}{2}$ of the peak value.

Electrical and Thermal Characteristics

Table 3. Electrical and thermal characteristics for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

PART NUMBER	FORWARD VOLTAGE (V)		THERMAL RESISTANCE - JUNCTION TO CASE ($^\circ\text{C}/\text{W}$)			
			$R\theta_{J-C\text{ EL}}$ ^[2]		$R\theta_{J-C\text{ REAL}}$ ^[3]	
	MINIMUM	MAXIMUM	TYPICAL	MAXIMUM ^[4]	TYPICAL	MAXIMUM ^[4]
A1DE-A58xL15xxxxxx	2.07	2.79	43.2	47.15	54.7	59.7

Notes Table 3:

1. All values are typical unless otherwise stated.
2. $R_{\theta_{j-c\text{ elect}}}$: Electrical thermal resistance (junction to case).
3. $R_{\theta_{j-c\text{ real}}}$: Real thermal resistance (junction to case) with wall plug efficiency included. Reference JESD51-51, JESD51-14, 4.1.3.
4. The Max Rth values are calculated (3 σ).

Absolute Ratings

Table 4. Absolute ratings for SignalSure 150 AM

PARAMETER	PERFORMANCE
Minimum DC Forward Current	10 mA
Maximum DC Forward Current	200 mA
Maximum Junction Temperature ^[1]	135 °C
Operating Case Temperature at Test Current ^[1]	-40 °C to 115 °C
Operating Case Temperature at Maximum Current ^[1]	-40 °C to 115 °C
Storage Temperature	-40 °C to 115 °C
Soldering Temperature	JEDEC 020c 260 °C
Allowable Reflow Cycles	3
Minimum ESD performance ^[2]	2kV HBM (Class 2), 1kV CDM (Class III)
Reverse Voltage (V _r)	-10V

Notes for 4:

1. Proper current derating must be observed to maintain junction temperature below the maximum, so that the LED is maintained below the maximum rated operating case temperature. SignalSure LEDs driven at or above the maximum rated operating case temperature may have shorter lifetime.
2. Measured using human body model (per ANSI/ESDA/JEDEC JS-001-2010) and charged device model (per JESD22-C101F).
3. SignalSure is not designed to be driven in reverse bias.

Characteristic Curves

Spectral Power Distribution Characteristics

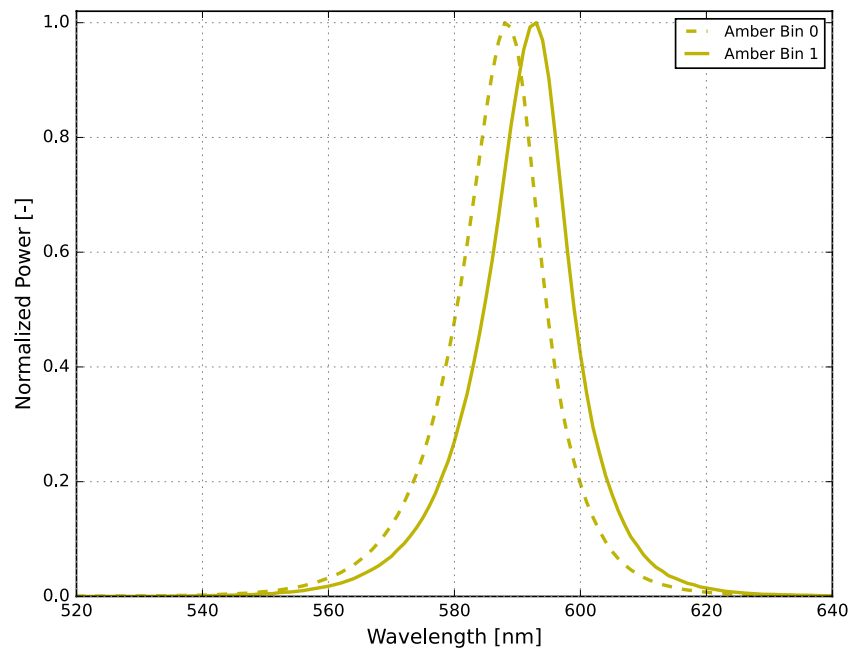


Figure 1a. Typical normalized power vs. wavelength for SignalSure 150 AM at 20 ms MP, 150 mA, T_j = 25 °C

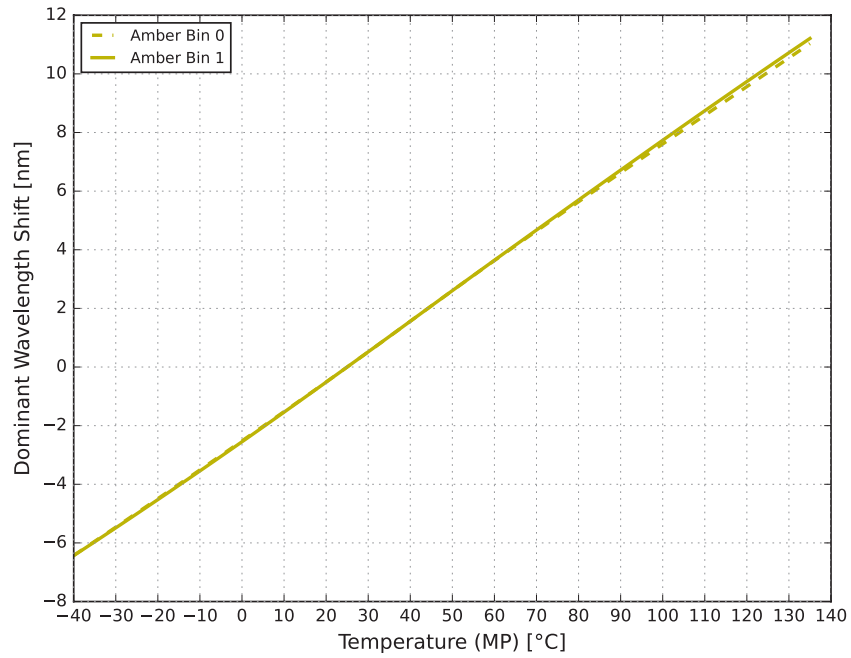


Figure 1b. Typical dominant wavelength vs. junction temperature for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

Light Output Characteristics

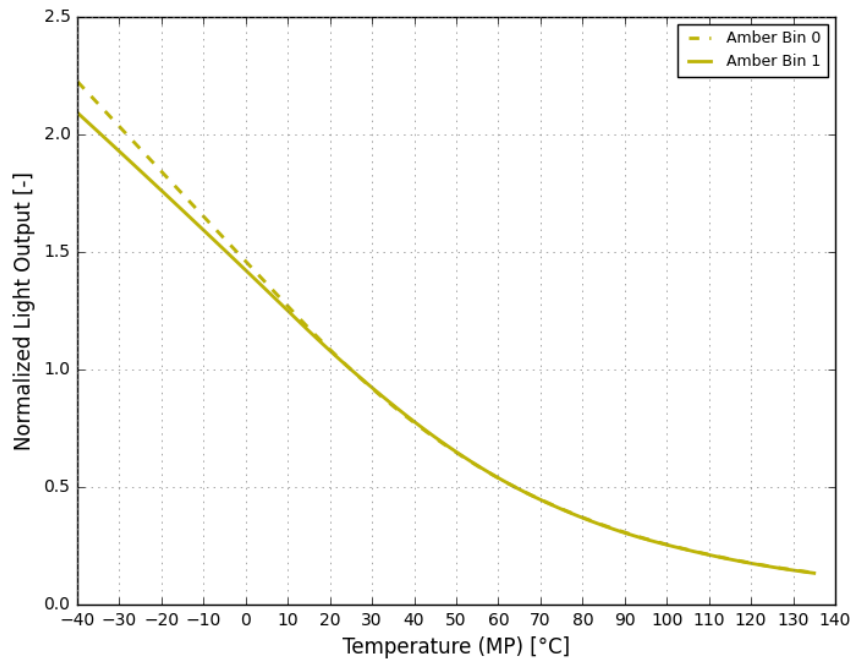


Figure 2. Typical normalized light output vs. junction temperature for SignalSure 150 AM at 20 ms MP, 150 mA

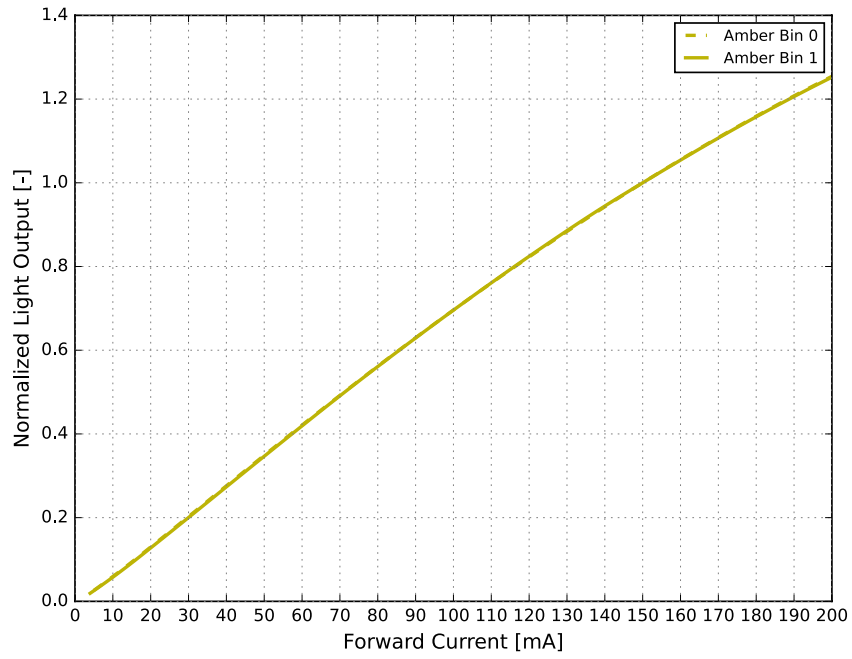


Figure 3. Typical normalized light output vs. forward current for SignalSure 150 AM at $T_j = 25\text{ }^\circ\text{C}$

Forward Current Characteristics

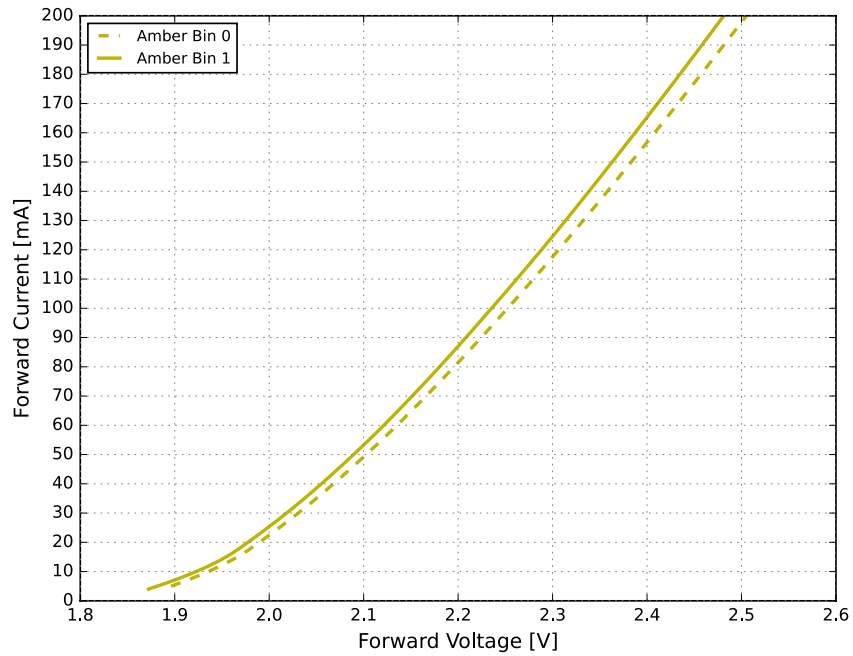


Figure 4a. Typical forward current vs. forward voltage for SignalSure 150 AM at $T_j = 25\text{ }^\circ\text{C}$

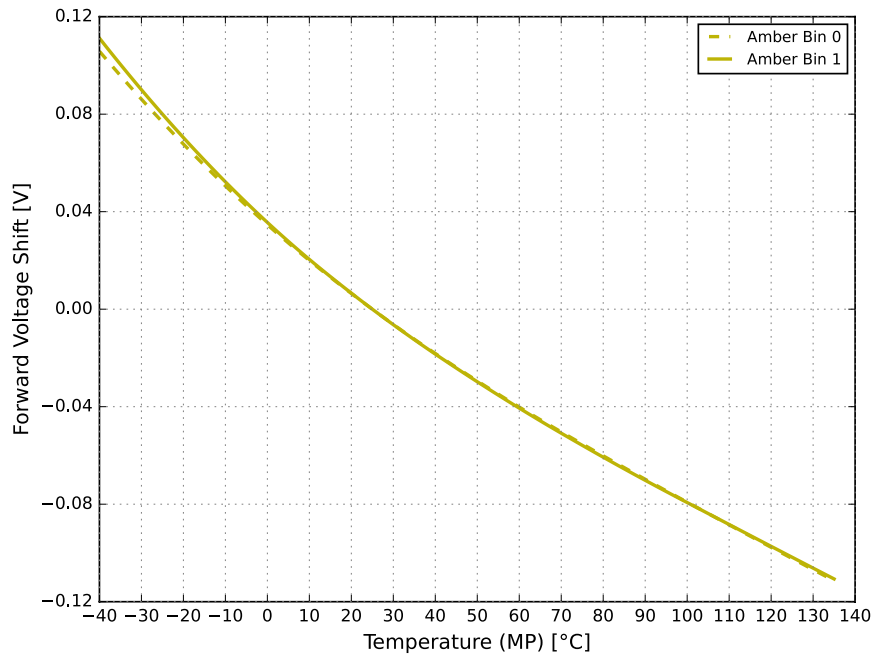


Figure 4b. Typical forward voltage shift vs. junction temperature for SignalSure 150 AM at 20 ms MP, specified test current

Radiation Pattern Characteristics

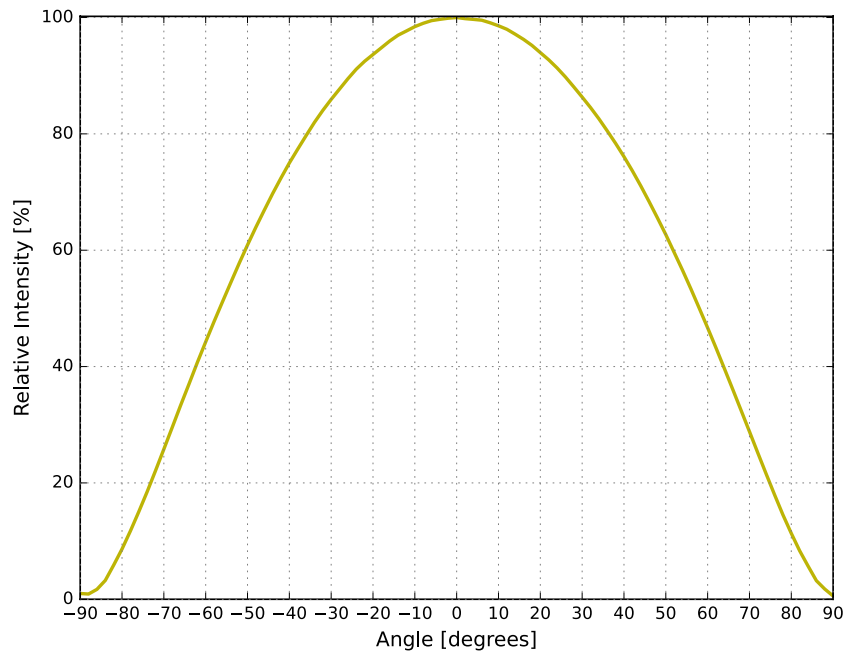


Figure 5. Typical radiation pattern for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25^\circ\text{C}$

Operating Limits Characteristics

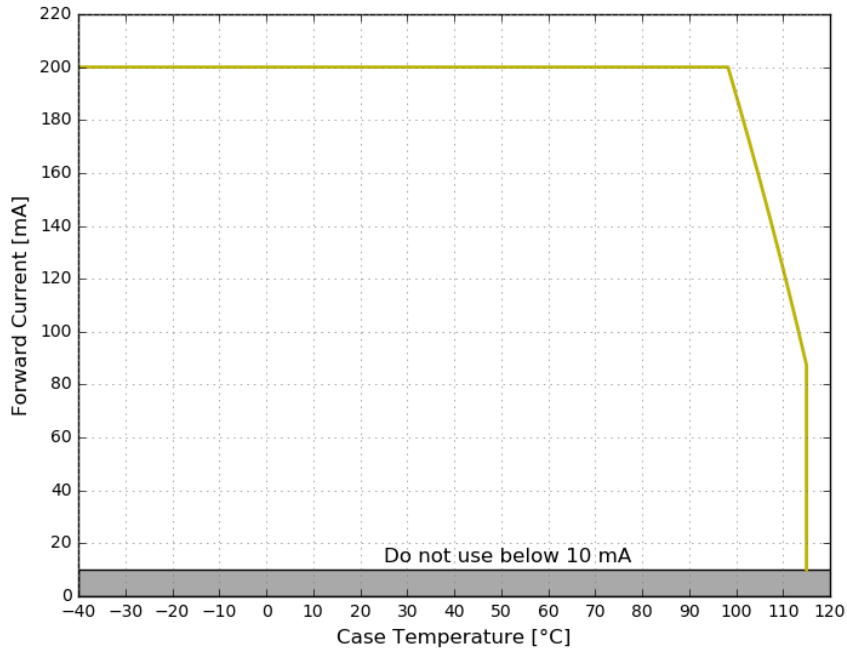


Figure 6. Maximum forward current vs. case temperature for SignalSure 150 AM

Permissible Pulse Handling Characteristics

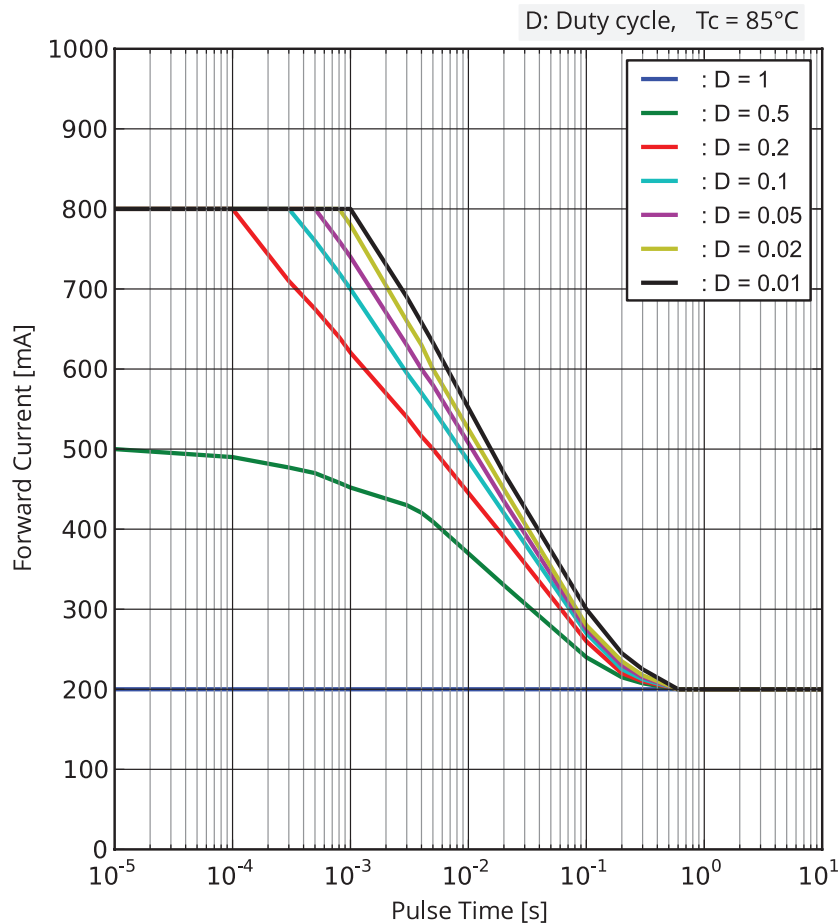


Figure 7. Permissible pulse handling capability for SignalSure 150 AM

Product Bin and Labeling Definitions

Designing with SignalSure

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.

SignalSure 150 AM single binned LEDs are labeled using a 3-digit alphanumeric CAT code following the format below:

A B C

- A** – designates luminous flux bin at 150 mA (example: N=21.0 lumens to 25.0 lumens)
- B** – designates color code (example: 1=588 nm to 592 nm)
- C** – designates forward voltage bin at 150 mA (example: A=2.07V to 2.19V)

Luminous Flux Bins

Table 5 lists the standard luminous flux bins for SignalSure 150 AM emitters. Product availability in a particular bin varies by color and platform start-of-production date. Contact your local sales representative for best supportability of programs.

Table 5. Luminous flux bin definitions for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

BIN	LUMINOUS FLUX (lm)	
	MINIMUM	MAXIMUM
M	18.0	21.0
N	21.0	25.0
P	25.0	30.0
R	30.0	36.0

Notes Table 5:

1. Lumileds maintains a tolerance of $\pm 10\%$ on luminous flux measurements.

Color Codes

Table 6. Color code definitions for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

CODE	DOMINANT WAVELENGTH (nm)	
	MINIMUM	MAXIMUM
0	584	588
1	588	592
2	592	595

Notes Table 6:

1. Lumileds maintains a tolerance of ± 1 nm on dominant wavelength measurements.

Forward Voltage Bins

Table 7a. Forward voltage bin definitions for SignalSure 150 AM at 20 ms MP, 150 mA, $T_j = 25\text{ }^\circ\text{C}$

BIN	FORWARD VOLTAGE (V_f) ^[1]	
	MINIMUM	MAXIMUM
A	2.07	2.19
B	2.19	2.31
C	2.31	2.43
D	2.43	2.55
E	2.55	2.67
F	2.67	2.79

Notes Table 7a:

1. Lumileds maintains a tolerance of $\pm 0.06\text{V}$ on forward voltage measurements.
 2. Applies to dual binning option only.

Table 7b. Forward voltage bin definitions for SignalSure 150 AM at 20 ms MP, 5 mA, $T_j = 25\text{ }^\circ\text{C}$

BIN	FORWARD VOLTAGE (V_f) ^[1]	
	MINIMUM	MAXIMUM
a	1.66	1.72
b	1.72	1.78
c	1.78	1.84
d	1.84	1.90
e	1.90	1.96
f	1.96	2.02

Notes Table 7b:

1. Lumileds maintains a tolerance of $\pm 0.06\text{V}$ on forward voltage measurements.
 2. Applies to dual binning option only.

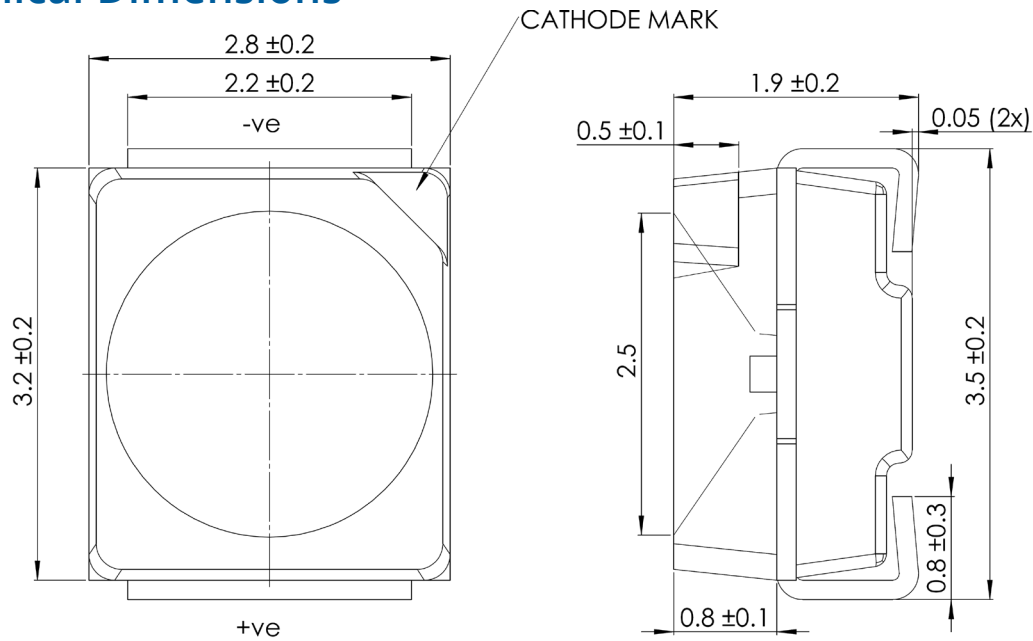
Table 7c. Forward voltage bin paring for SignalSure 150 AM at 20 ms MP, 150 mA and 5 mA, $T_j = 25\text{ }^\circ\text{C}$

BIN	MINIMUM FORWARD VOLTAGE (V_f)	MAXIMUM FORWARD VOLTAGE (V_f)	PAIRING BIN	MINIMUM FORWARD VOLTAGE (V_f)	MAXIMUM FORWARD VOLTAGE (V_f)
150 MA			5 MA		
A	2.07	2.19	a	1.66	1.72
B	2.19	2.31	a, b	1.66	1.78
C	2.31	2.43	a, b, c	1.66	1.84
D	2.43	2.55	a, b, c, d	1.66	1.90
E	2.55	2.67	a, b, c, d, e	1.66	1.96
F	2.67	2.79	a, b, c, d, e, f	1.66	2.02

Notes Table 7c:

1. Lumileds maintains a tolerance of $\pm 0.06\text{V}$ on forward voltage measurements.
2. Applies to dual binning option only.

Mechanical Dimensions



Note:
 Unless otherwise specified:
 - Dimensions are in mm
 - General Tolerance: ± 0.1

Figure 8. Mechanical dimensions for SignalSure 150 AM

Notes for Figure 8:

1. Drawings are not to scale.
2. All dimensions are in millimeters.

Reflow Soldering Guidelines

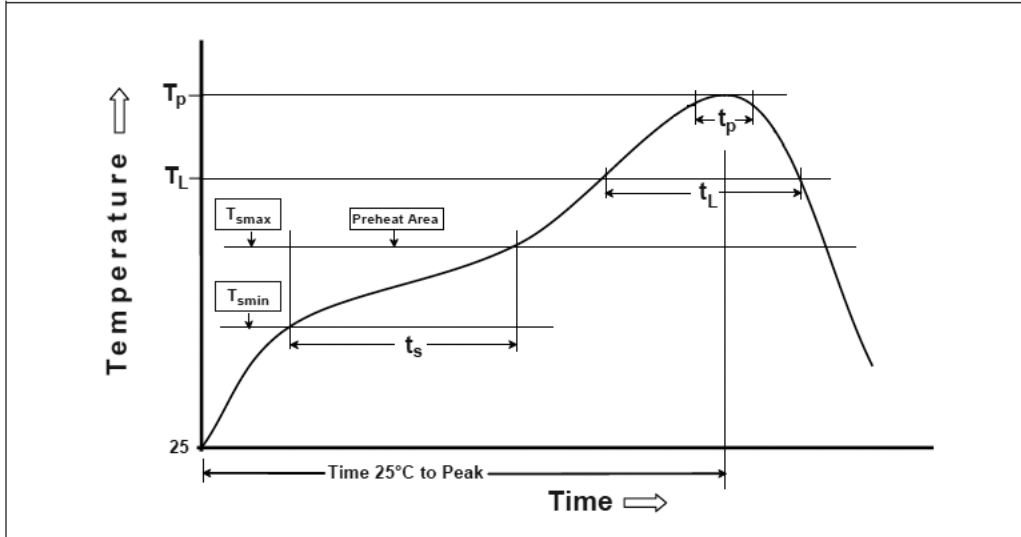


Figure 9. Temperature profile for Table 8

Table 8. Reflow profile characteristics for SignalSure 150 AM

PROFILE FEATURE	TYPICAL	MAXIMUM ACC. JEDEC J-STD-020E
Preheat Minimum Temperature (T_{smin})	150 °C	150 °C
Preheat Maximim Temperature (T_{smax})	200 °C	200 °C
Preheat Time (t_{smin} to t_{smax})	100 seconds	60 to 120 seconds
Ramp-Up Rate (T_L to T_p)	2 °C / second	3 °C/second
Liquidous Temperature (T_L)	217 °C	217 °C
Time Maintained Above Temperature T_L (t_L)	60 seconds	120 to 150 seconds
Peak / Classification Temperature (T_p)	240 °C	245 °C
Time Within 5 °C of Actual Peak Temperature (t_p)	20 seconds	30 to 50 seconds
Ramp-Down Rate (T_p to T_L)	2.5 °C / second	6 °C/second
Time 25 °C to Peak Temperature	310 seconds	480 seconds

Notes Table 8:

1. All temperatures refer to the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

JEDEC Moisture Sensitivity

Table 9. Moisture sensitivity levels for SignalSure 150

LEVEL	FLOOR LIFE ⁽¹⁾		SOAK REQUIREMENTS STANDARD	
	TIME	CONDITIONS	TIME	CONDITIONS
2	1 Year	≤30 °C / 60% RH	168 Hours +5 / -0	85 °C / 60% RH

Notes Table 9:

1. Shelf life 2 years.

Solder Pad Design

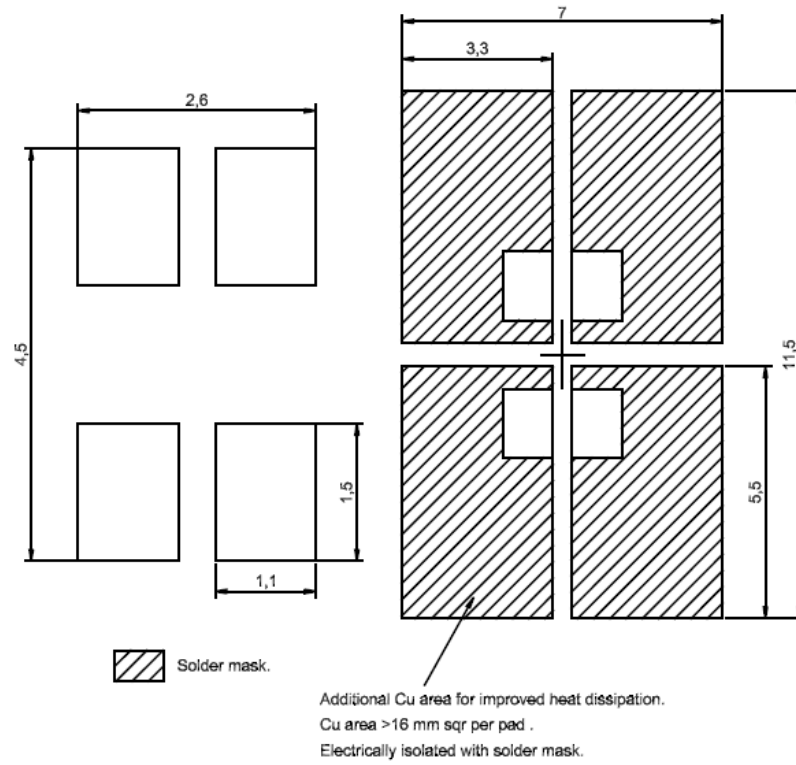


Figure 10. Recommended PCB solder pad layout for SignalSure 150 AM

Notes for Figure 10:

1. The drawing shows the recommended SignalSure 150 AM layout on Printed Circuit Board (PCB).
2. All dimensions are in millimeters.

Packaging Information

Pocket Tape Dimensions

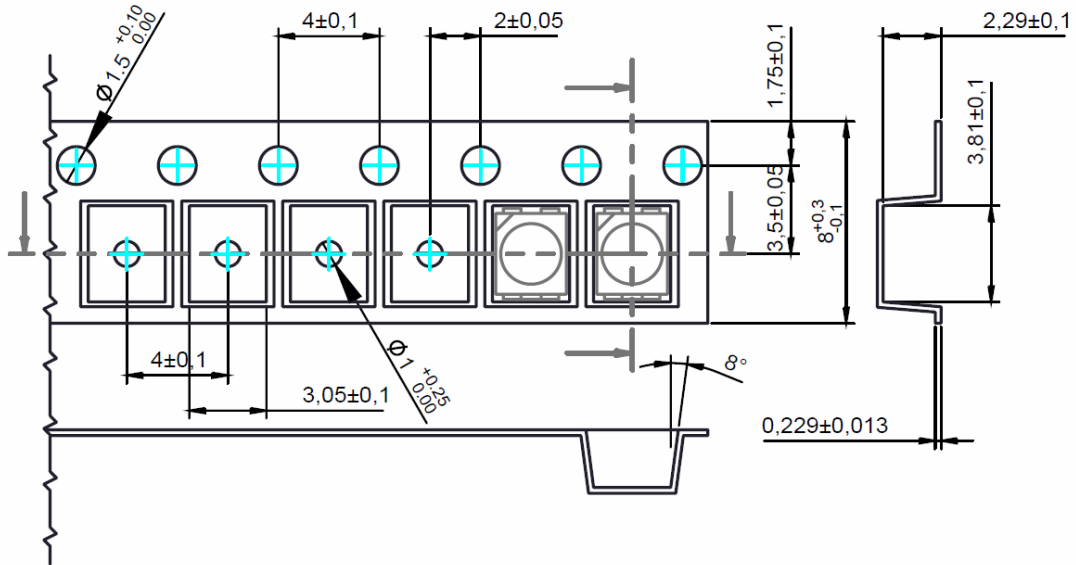


Figure 11. Pocket tape dimensions for SignalSure 150 AM

Reel Dimensions

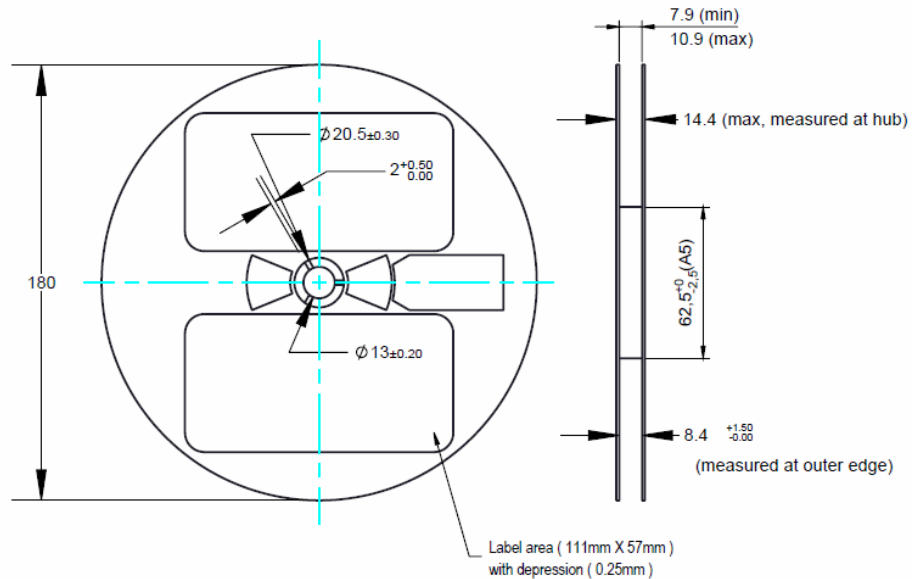


Figure 12. Reel dimensions for SignalSure 150 AM

Notes for Figures 11 and 12:

1. Drawings are not to scale.
2. All dimensions are in millimeters.

Product Labeling

SignalSure 150 AM 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.

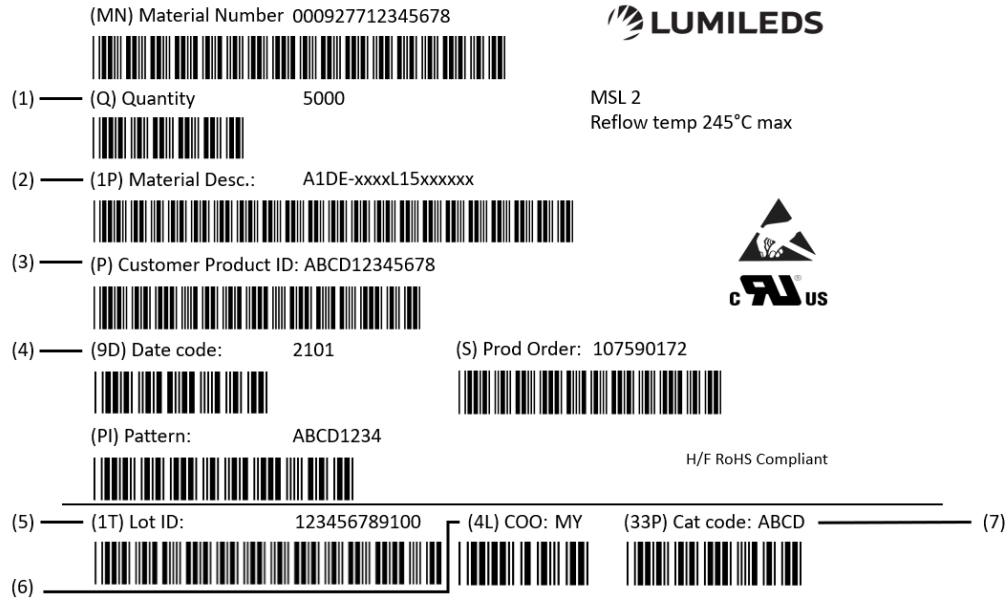


Figure 13. Example moisture barrier bag label

Notes for Figures 13:

1. Notes for Figure 13 – Moisture barrier bag & Reel label descriptions for customer use:
2. Field labels not described are for Lumileds internal use only.
3. Total number of LED emitters in a shipment box.
4. Lumileds part number
5. Customer part number for custom requests only.
6. LED test date in YYYY format.
7. Unique product lot identification number. This number is required for traceability purposes.
8. Country code of origin of manufacturing of part (e.g. MY for Malaysia, CN for China) according to ISO 3166-1 alpha-2 document.
9. Product bin n-digit alphanumeric CAT code.

About Lumileds

Lumileds is the global leader in light engine technology. The company develops, manufactures and distributes groundbreaking LEDs and automotive lighting products that shatter the status quo and help customers gain and maintain a competitive edge.

With a rich history of industry “firsts,” Lumileds is uniquely positioned to deliver lighting advancements well into the future by maintaining an unwavering focus on quality, innovation and reliability.

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



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