

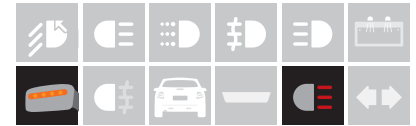
# SignalSure 30

## Low power solution

SignalSure 30 is a compact, surface-mount, low 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 30 is AEC-Q101D qualified.

SignalSure 30 is available in the following color wavelengths:

- Red Orange (615nm)
- Super Red (630nm)
- Super Red (635nm)



### FEATURES AND BENEFITS

- Higher drive current capability for increased flux performance
- Low thermal resistance for better hot lumen performance
- Economic package for high quantity Tail Lamp solutions
- Available in 615nm, 630nm and 635nm colors for increased design options
- AEC-Q101D qualified

### PRIMARY APPLICATIONS

- Mirror/Side Repeater
- Stop/Tail
  - CHMSL

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# General Product Information

## Product Test Conditions

SignalSure 30 LEDs are tested and binned using a 20ms monopulse (MP) at 30mA drive current, junction temperature,  $T_j$ , of 25°C.

## Part Number Nomenclature

Part numbers for SignalSure 30 follow the convention below:

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

Where:

- B** – designates color (O=Red Orange and S=Super Red)
- C C C** – designates minimum dominant wavelength (612=612nm, 627=627nm and 632=632nm)
- D** – designates minimum flux bin (see Product Bin and Labeling section)
- E** – designates the flux bin range (3=3 subsequent flux bins including the minimum bin)
- F G** – designates forward voltage range in which F is the minimum  $V_f$  bin and G is the maximum  $V_f$  bin (see Product Bin and Labeling Definitions section)

Therefore, the following part number is used for a SignalSure 30 Super Red, 632nm minimum wavelength, luminous flux range of 1.5 lumens to 2.6 lumens and forward voltage range of 2.00 volts to 2.45 volts:

A 1 D T – **S 6 3 2 L 1 1 1 3 A C 0 0**

## Environmental Compliance

Lumileds LLC is committed to providing environmentally friendly products to the solid-state lighting market. SignalSure 30 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 30 at 20ms MP, 30mA,  $T_j=25^\circ\text{C}$ .

COLOR	DOMINANT WAVELENGTH <sup>[1,2]</sup> (nm)	PART NUMBER
Red Orange	615	A1DT - O612L
Super Red	630	A1DT - S627L
Super Red	635	A1DT - S632L

**Notes for 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. Typical optical characteristics for SignalSure 30 at 20ms MP, 30mA,  $T_j=25^\circ\text{C}$ .

PART NUMBER	TYPICAL TOTAL INCLUDED ANGLE <sup>[1]</sup> $\theta_{0,90V}$	TYPICAL VIEWING ANGLE <sup>[2]</sup> $2\theta_{1/2}$
A1DT - O612L	140°	120°
A1DT - S627L	140°	120°
A1DT - S632L	140°	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 lamp center line where the luminous intensity is  $\frac{1}{2}$  of the peak value.

## Electrical and Thermal Characteristics

Table 3. Typical electrical and thermal characteristics for SignalSure 30 at 20ms MP, 30mA,  $T_j=25^\circ\text{C}$ .

PARAMETER	PERFORMANCE
Forward Voltage, $V_f$	2.1V
Electrical Thermal Resistance, $R_{th\text{-}j\text{-}c\text{-}electr}$ <sup>[1]</sup> (Maximum)	100°C/W
Real Thermal Resistance, $R_{th\text{-}j\text{-}c\text{-}real}$ <sup>[2]</sup> (Maximum)	125°C/W
Temperature Coefficient of $V_f$ , $I_f = 30\text{mA}$ , $10^\circ\text{C} \leq T_j \leq 110^\circ\text{C}$	-3.0mV/°C

**Notes for Table 3:**

1.  $R_{th\text{-}j\text{-}c\text{-}electr}$ : Electrical thermal resistance (junction to case).
2.  $R_{th\text{-}j\text{-}c\text{-}real}$ : Real thermal resistance (junction to case) with wall plug efficiency included. Reference JE5D51-51, JE5D51-14, 4.1.3.

# Absolute Ratings

Table 4. Absolute ratings for SignalSure 30.

PARAMETER	PERFORMANCE
Minimum DC Forward Current	3mA
Maximum DC Forward Current	60mA
Maximum Junction Temperature <sup>[1]</sup>	125°C
Operating Case Temperature at Test Current <sup>[1]</sup>	-40°C to 110°C
Operating Case Temperature at Maximum Current <sup>[1]</sup>	-40°C to 110°C
LED Storage Temperature	-40°C to 110°C
Soldering Temperature	JEDEC 020c 260°C
Allowable Reflow Cycles	3
Minimum ESD performance <sup>[2]</sup>	2kV HBM (Class 2), 1kV CDM (Class III)
Reverse Voltage (V <sub>r</sub> )	-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).

## Characteristic Curves

### Spectral Power Distribution Characteristics

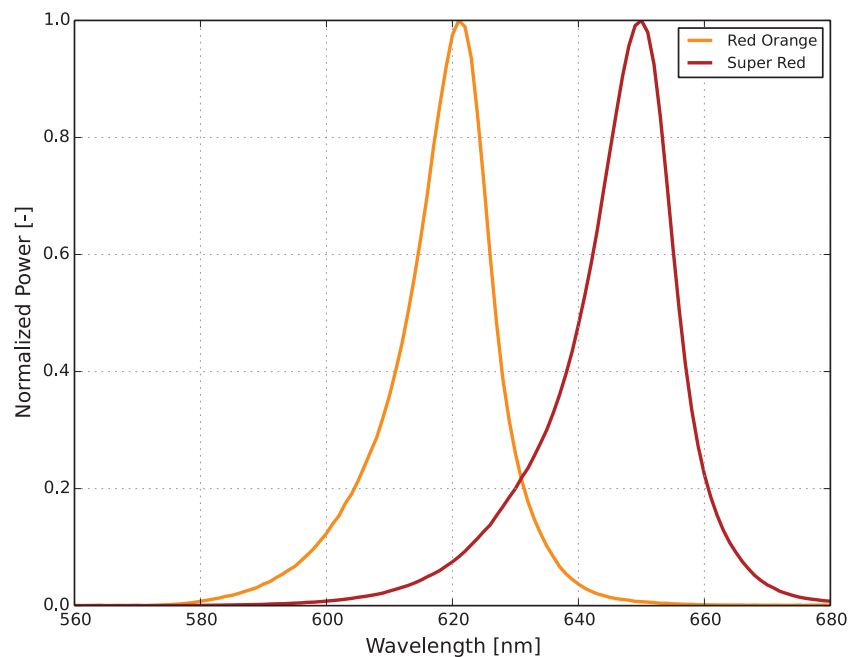


Figure 1. Typical normalized power vs. wavelength for SignalSure 30 at 20ms MP, 30mA, T<sub>j</sub>=25°C.

# Light Output Characteristics

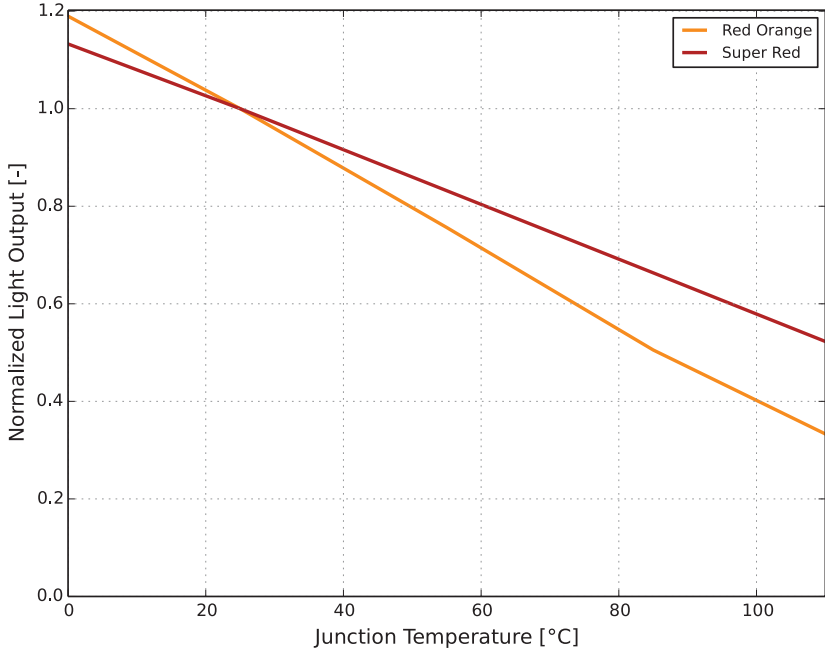


Figure 2. Typical normalized light output vs. junction temperature for SignalSure 30 at 20ms MP, 30mA.

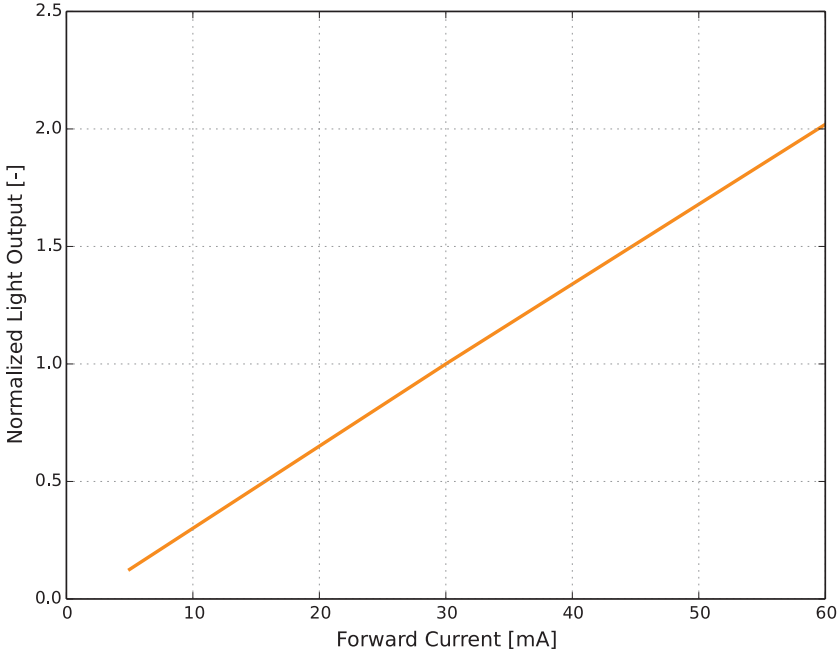


Figure 3. Typical normalized light output vs. forward current for SignalSure 30 at  $T_j=25^{\circ}\text{C}$ .

# Forward Current Characteristics

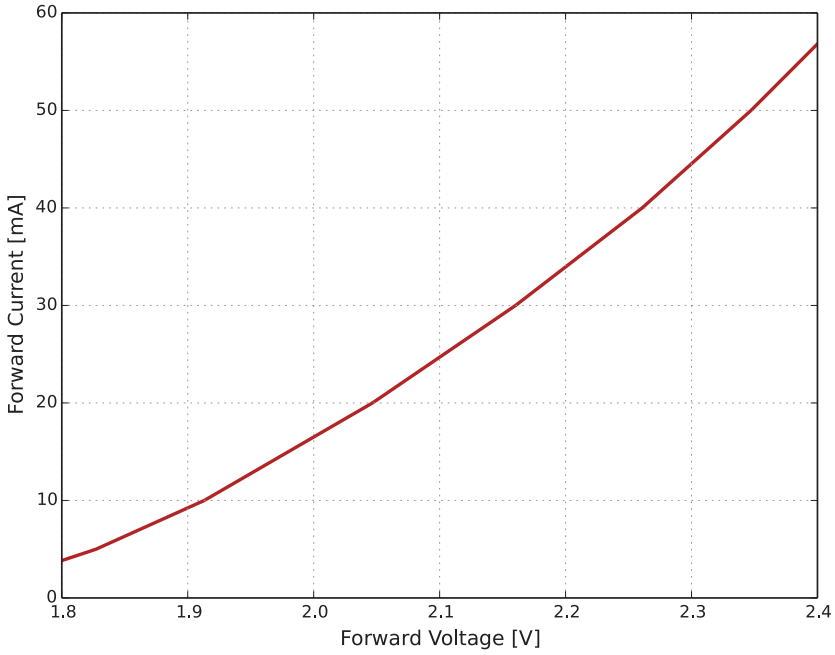


Figure 4a. Typical forward current vs. forward voltage for SignalSure 30 at  $T_j=25^\circ\text{C}$ .

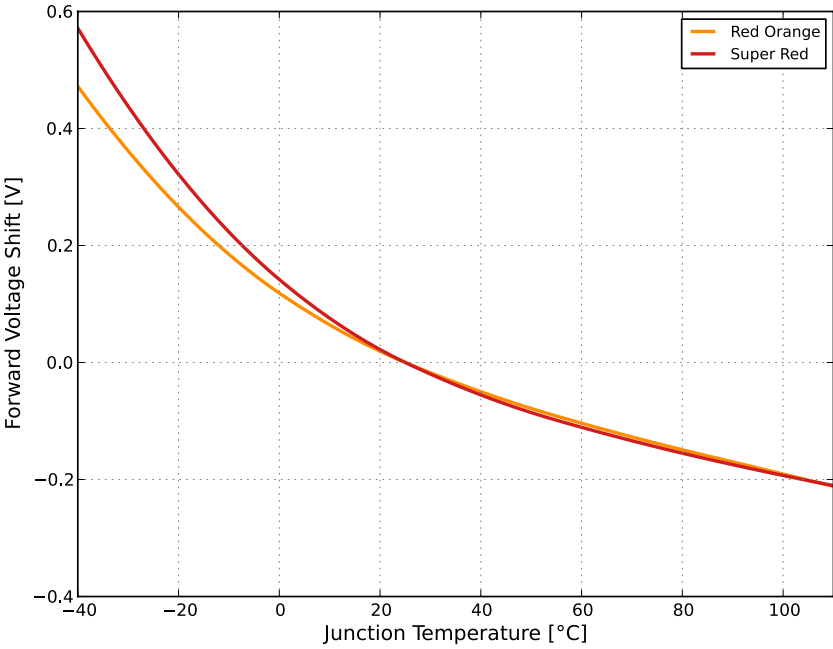


Figure 4b. Typical forward voltage shift vs. junction temperature for SignalSure 30 at 20ms MP, specified test current.

## Radiation Pattern Characteristics

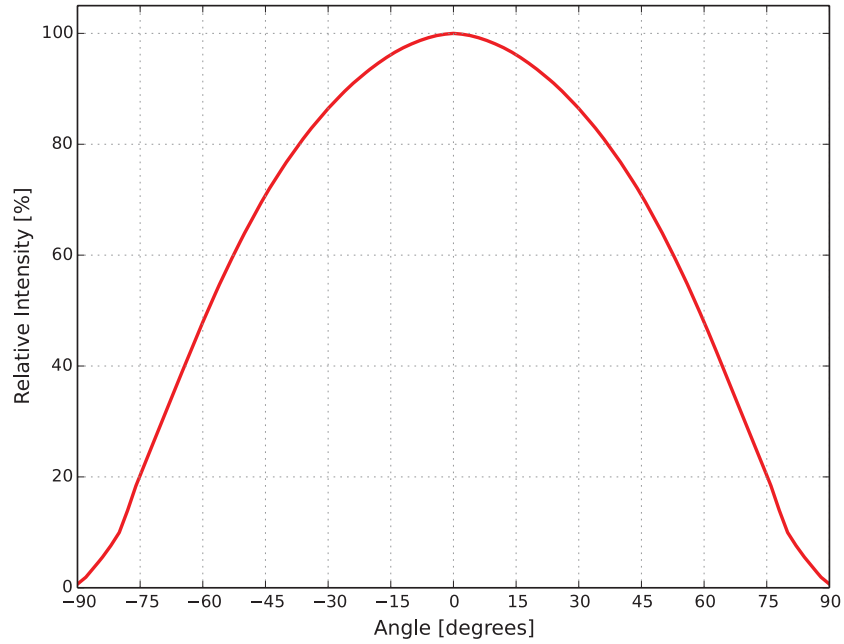


Figure 5. Typical radiation pattern for SignalSure 30 at 20ms MP, 30mA.

## Operating Limits Characteristics

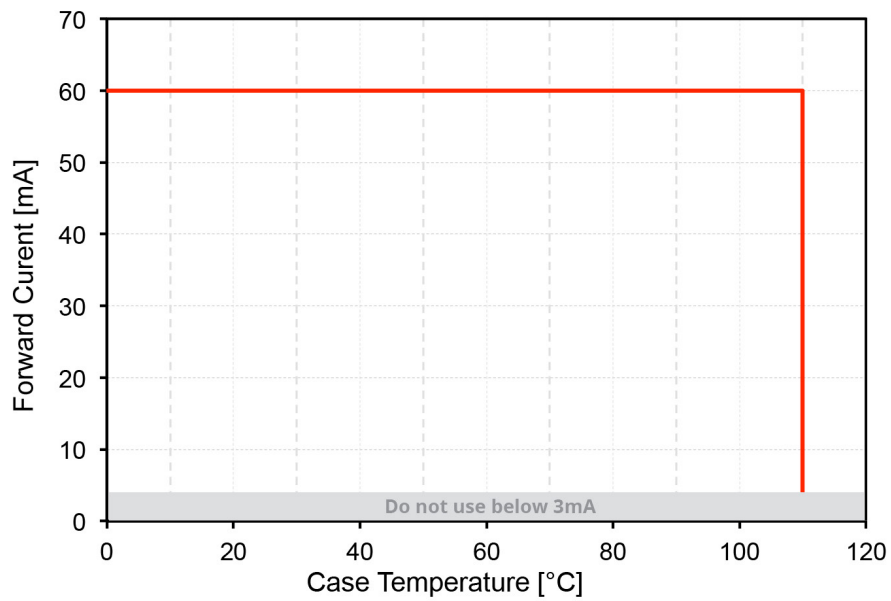


Figure 6. Maximum forward current vs. case temperature for SignalSure 30.



# Permissible Pulse Handling Characteristics

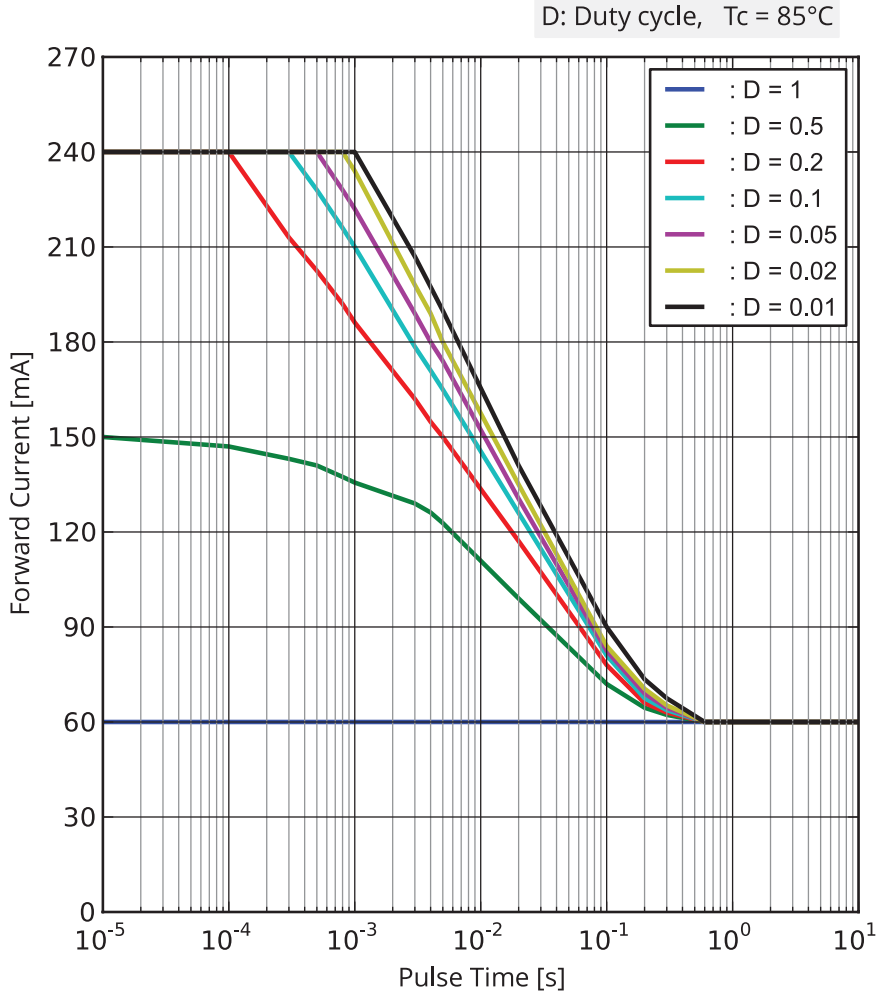


Figure 7. Permissible pulse handling capability for SignalSure 30.

# 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 a 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 or radiometric power, color point, peak or dominant wavelength and forward voltage.

SignalSure 30 LEDs are labeled using a 3-digit alphanumeric CAT code following the format below:

### A B C

Where:

- A** – designates luminous flux bin (example: 4=2.6 lumens to 3.0 lumens)
- B** – designates color code (example: 3=612nm to 618nm)
- C** – designates forward voltage bin (example: B=2.15V to 2.30V)

Therefore, a SignalSure 30 with a lumen range of 2.6 to 3.0, color code of 3 and a forward voltage of 2.15V to 2.30V has the following CAT code:

### 4 3 B

## Luminous Flux Bins

Table 5 lists the standard luminous flux bins for SignalSure 30 LEDs. 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 30 at 20ms MP, 30mA, T<sub>j</sub>=25°C.

BIN	LUMINOUS FLUX (lm)	
	MINIMUM	MAXIMUM
1	1.5	1.8
2	1.8	2.1
3	2.1	2.6
4	2.6	3.0
5	3.0	3.6
A	3.6	4.3
B	4.3	5.1
C	5.1	6.1

**Notes for Table 5:**

1. Lumileds maintains a tolerance of ±10% on luminous flux measurements.

## Color Codes

Table 6. Color code definitions for SignalSure 30 at 20ms MP, 30mA,  $T_j=25^\circ\text{C}$ .

CODE	DOMINANT WAVELENGTH (nm)	
	MINIMUM	MAXIMUM
3	612	618
4	627	632
5	632	638

Notes for Table 6:

1. Lumileds maintains a tolerance of  $\pm 1\text{nm}$  on dominant wavelength measurements.

## Forward Voltage Bins

Table 7. Forward voltage bin definitions for SignalSure 30 at 20ms MP, 30mA,  $T_j=25^\circ\text{C}$ .

BIN	FORWARD VOLTAGE ( $V_f$ )	
	MINIMUM	MAXIMUM
A	2.00	2.15
B	2.15	2.30
C	2.30	2.45

Notes for Table 7:

1. Lumileds maintains a tolerance of  $\pm 0.06\text{V}$  on forward voltage measurements.

## Mechanical Dimensions

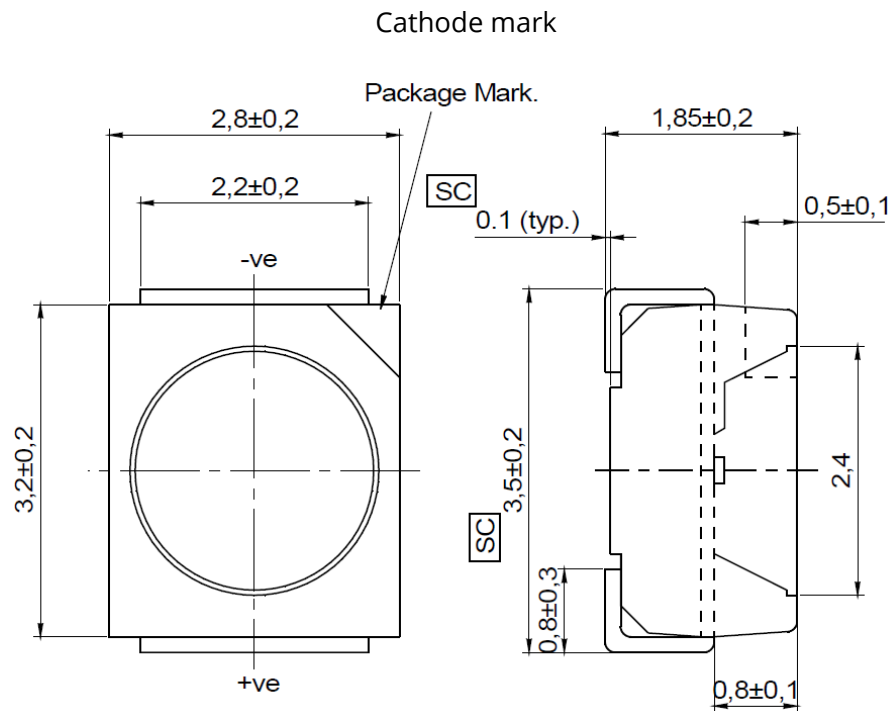


Figure 8. Mechanical dimensions for SignalSure 30.

Notes for Figure 8:

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

# Reflow Soldering Guidelines

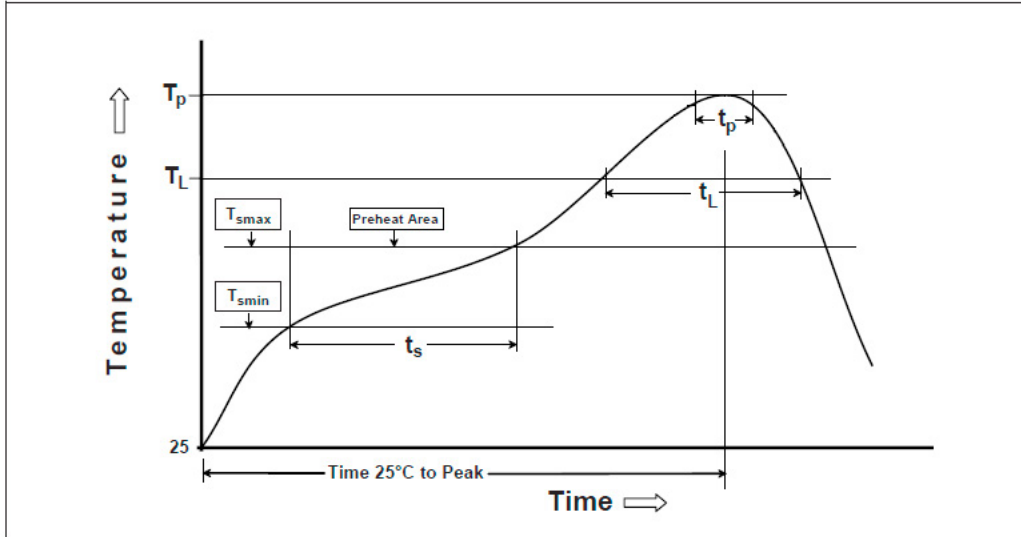


Figure 9. Visualization of the acceptable reflow temperature profile as specified in Table 8.

Table 8. Reflow profile characteristics for SignalSure 30.

PROFILE FEATURE	LEAD FREE ASSEMBLY
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

**Notes for 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 30.

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

**Notes for Table 9:**

1. Shelf life 2 years

# Solder Pad Design

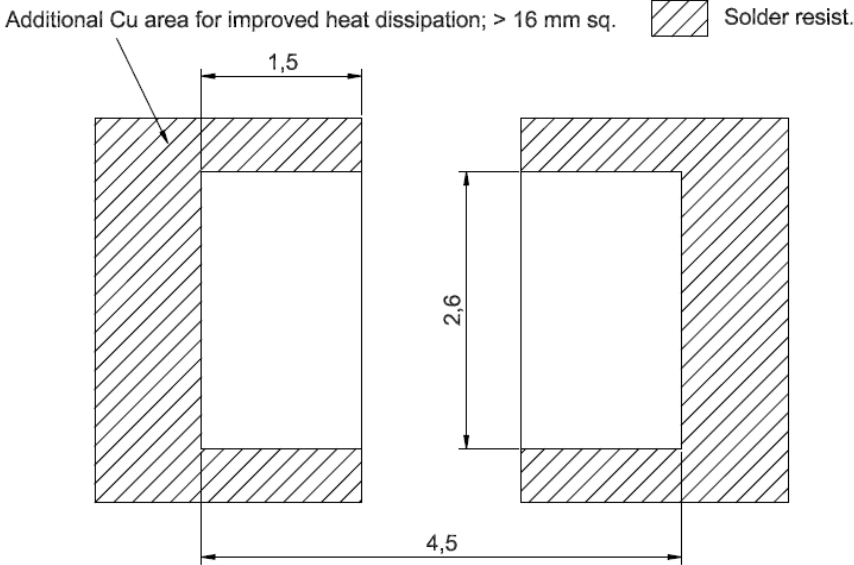


Figure 10. Recommended PCB solder pad layout for SignalSure 30.

- Notes for Figure 10:
- 1. The drawing shows the recommended SignalSure 30 layout on Printed Circuit Board (PCB).
  - 2. All dimensions are in millimeters.

# Packaging Information

## Pocket Tape Dimensions

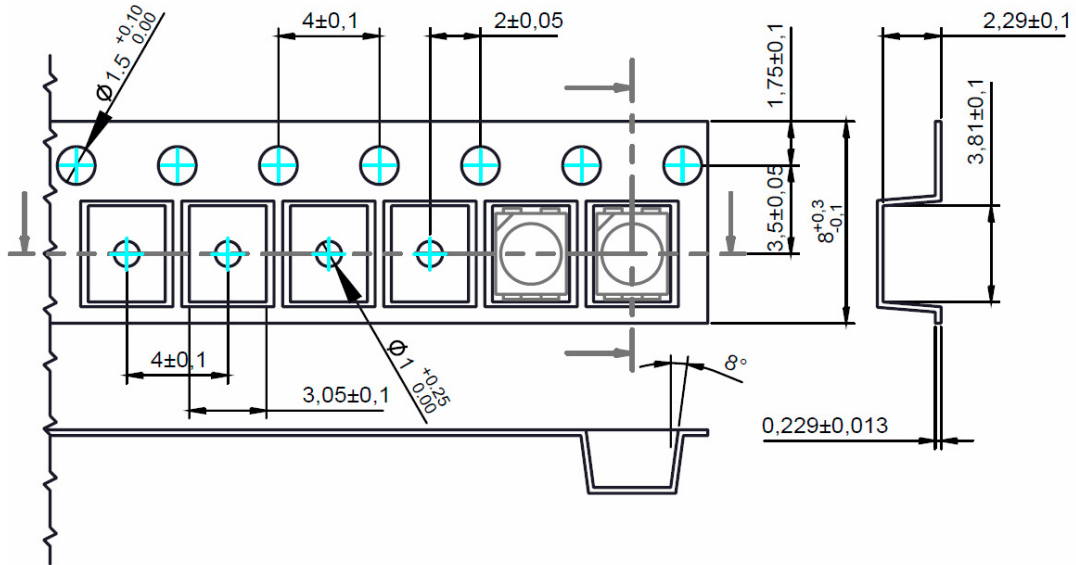


Figure 11. Pocket Tape dimensions for SignalSure 30.

## Reel Dimensions

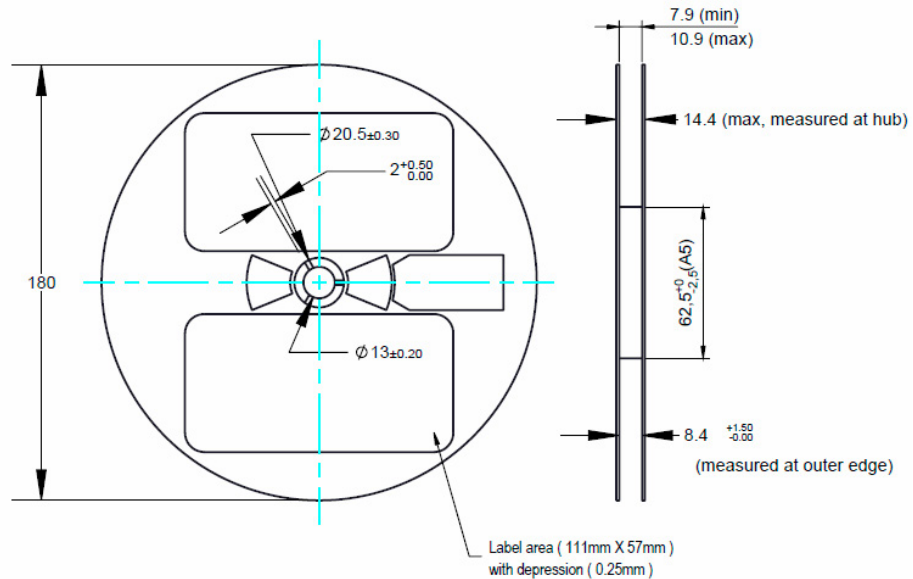


Figure 12. Reel dimensions for SignalSure 30.

Notes for Figures 11 and 12:

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

# Product Labeling







SignalSure 30 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, color and forward voltage bins.

(1P) PART #: **A1DL-0612L12U3AF00**   
  
(30P) PART OPT#: **A1DL-0612L12U3AF00U3A** RoHS Compliant  
  
(Q) QTY : **2000** LOT NO : EE150042.01 S/N : 462  
  
(9D) DTE : **1514** LUMILEDS P/N :  
 **A1DL-0612L12U3AF00**  
(P) CUST PROD ID : CAT : U3A  
 BIN :  
(K) PO NO : **APR**  


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**BUNDLE ID 150401282202** MADE IN : MALAYSIA CAT : U3A  
 MFG DATE : 1514  
TAP DATE : 1514  
QA DATE : 20150414  
FGI POOL :  
 U3A 

Figure 13. Example of a moisture barrier bag label.

(1P) PART # : **A1DL-0612L12U3AF00**   
  
(30P) PART OPT # : **A1DL-0612L12U3AF00U3A** RoHS Compliant  
  
(Q) QUANTITY : **2000** LUMILEDS P/N :  
 **A1DL-0612L12U3AF00**  
(9D) DTE : **1514** LOT NO : EE150042.01  
 CAT : U3A  
(P) CUST PROD ID : S/N : 471 BIN :  
 **APR**

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**150401282211** MADE IN : MALAYSIA  
 DEPT ID : P04 CAT : U3A  
MFG DATE : 1514  
TAP DATE : 1514  
QA DATE : 20150414  
FGI POOL :  
 U3A

Figure 14. Example of a product reel label.

## 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](http://lumileds.com).



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