DATA SHEET

SMP1345 Series: Very Low Capacitance, Plastic Packaged Silicon PIN Diodes

Applications

- High isolation LNBs, WLANs, and wireless switches

Features

- Very low insertion loss: 0.4 dB
- Capacitance: 0.15 pF
- Packages rated MSL1, 260 °C per JEDEC J-STD-020

Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

Description

The SMP1345 series of plastic packaged, surface mountable PIN diodes is designed for high volume Low-Noise Block (LNB), Wireless Local Area Network (WLAN), and switch applications from 10 MHz to 6 GHz. The short carrier lifetime of 100 ns (typical), combined with their thin I-region width of 10 μm (nominal) results in a group of fast speed RF switching PIN diodes.

The RF performance of the SMP1345 series is assured by virtue of their very low capacitance (0.15 pF) and low resistance (1.5 Ω at 10 mA). The SMP1345-518 has been specifically designed for WLAN 802.11 a/b/g applications. It is ideally suited for diversity switch applications.

Table 1 describes the various packages and marking of the SMP1345 series.

Table 1. SMP1345 Series Packaging and Marking

					
Common Anode	Common Cathode	Series Pair	Single	Ring	Single
SOT-23	SOT-23	SOT-23	SC-79 Green™	MIS Green™	SOD-882 Green™
SMP1345-003 Marking: PU9	**SMP1345-004** Marking: PU3	**SMP1345-005** Marking: PU2		**♦SMP1345-518** Marking: 0 Pb-Free	
SMP1345-003LF Green™ Marking: RU9	**SMP1345-004LF** Green™ Marking: RU3	**SMP1345-005LF** Green™ Marking: RU2	**SMP1345-079LF** Marking: Cathode		**SMP1345-040LF** Marking: U
L_S = 1.5 nH	L_S = 1.5 nH	L_S = 1.5 nH	L_S = 0.7 nH	L_S = 0.6 nH	L_S = 0.45 nH
		SC-70 Green™			
		SMP1345-075LF Marking: RU2			
		L_S = 1.4 nH			

The Pb-free symbol or "LF" in the part number denotes a lead-free, RoHS-compliant package unless otherwise noted as Green™. Tin/lead (Sn/Pb) packaging is not recommended for new designs.

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Table 2. SMP1345 Series Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V_R		50	V
Power dissipation @ 25 °C lead temperature	P_D		250	mW
Storage temperature	T_{STG}	–65	+150	°C
Operating temperature	T_A	–65	+150	°C

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

***CAUTION**: Although this device is designed to be as robust as possible, Electrostatic Discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times. The SMP1345 series PIN diodes are Class 1B ESD devices.*

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMP1345 series are provided in Table 2. Electrical specifications are provided in Table 3.

The state of the SMP1345-518 series diode is determined by the logic provided in Table 4. Typical performance characteristics of the SMP1345 series are illustrated in Figures 1 to 5.

Table 3. SMP1345 Series Electrical Specifications (Note 1)
(T_A = +25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Reverse current	I_R	V_R = 50 V			10	µA
Capacitance	C_T	F = 1 MHz				
		V = 1 V		0.19		pF
		V = 5 V		0.18	0.20	pF
Resistance	R_S	F = 100 MHz				
		I = 1 mA		3.5		Ω
		I = 10 mA		1.5	2.0	Ω
Forward voltage	V_F	I_F = 10 mA		0.89		V
Carrier lifetime	Tl	I_F = 10 mA		100		ns
I region width				10		µm

Note 1: Performance is guaranteed only under the conditions listed in this Table.

Table 4. SMP1345-518 PIN Diode Truth Table

CTR1 (V)	CTR2 (V)	Low Loss Paths
3.3	0	RF1 to RF4 RF2 to RF3
0	3.3	RF1 to RF3 RF2 to RF4

Typical Performance Characteristics of the SMP1345-079LF

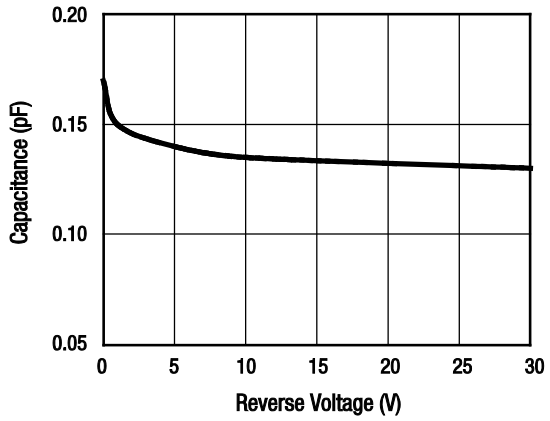


Figure 1. Total Capacitance vs Reverse Voltage

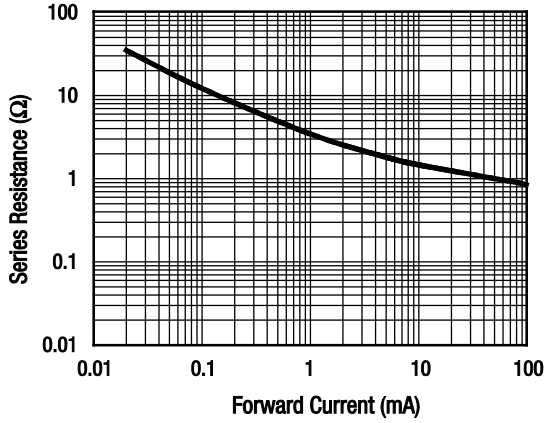


Figure 2. Series Resistance vs Current @ 100 MHz

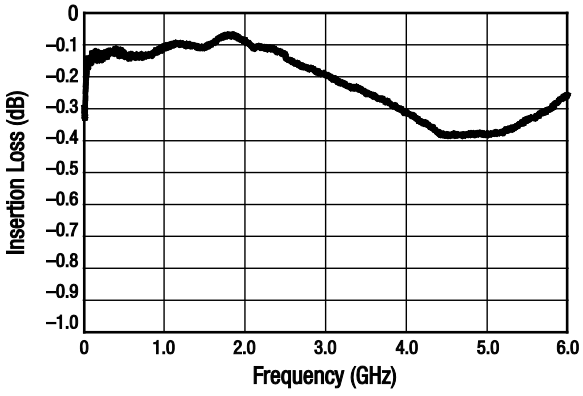


Figure 3. Insertion Loss vs Frequency
(I_F = 10 mA)

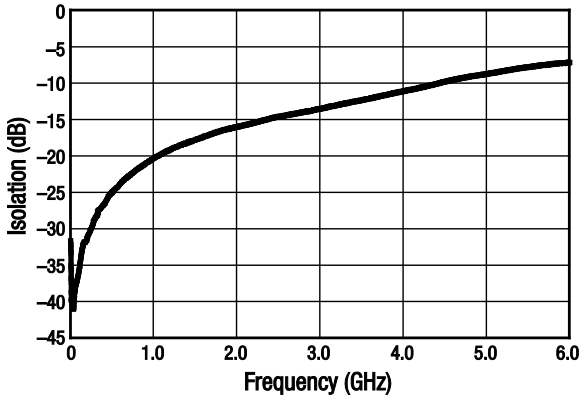


Figure 4. Isolation vs Frequency
(V_R = 0 V)

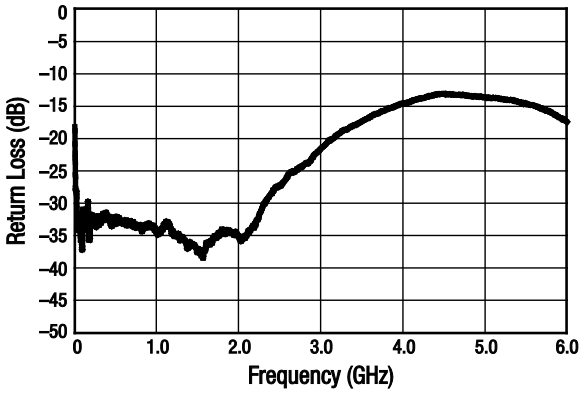


Figure 5. Return Loss vs Frequency
(I_F = 10 mA)

Evaluation Board Description

An Evaluation Board is used to test the performance of the SMP1345 series PIN diodes. An assembly drawing for the Evaluation Board is shown in Figure 6. A typical application circuit diagram for a DPDT diversity switch using the SMP1345-518 is provided in Figure 7.

Package and Handling Information

Package dimensions are shown in Figures 8 to 16 (even numbers), and tape and reel dimensions are provided in Figures 9 to 17 (odd numbers).

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SMP1345 series is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.

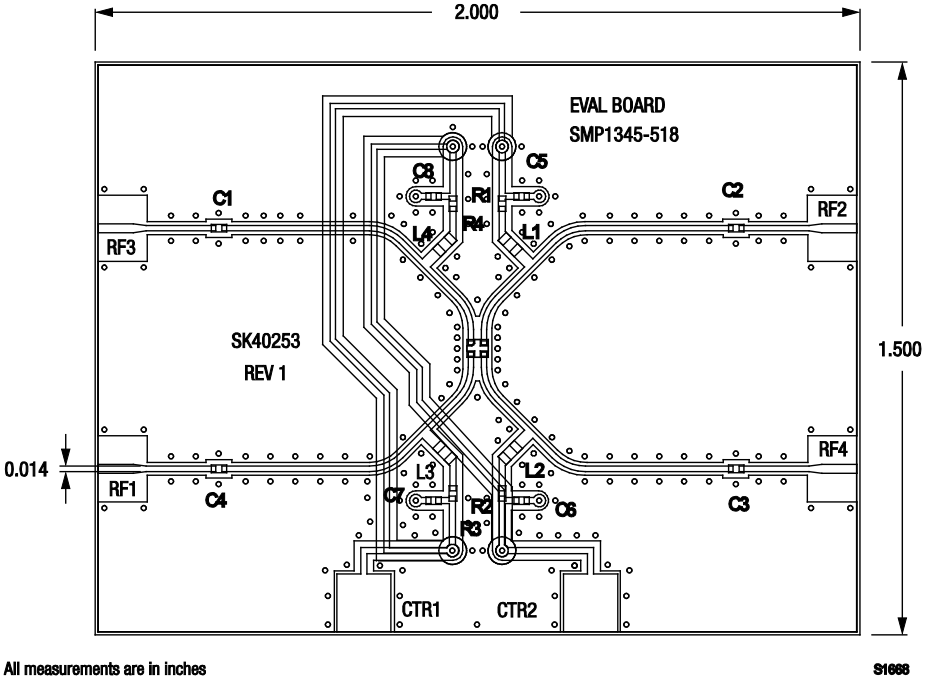


Figure 6. SMP1345 Series PIN Diode Evaluation Board Assembly Diagram

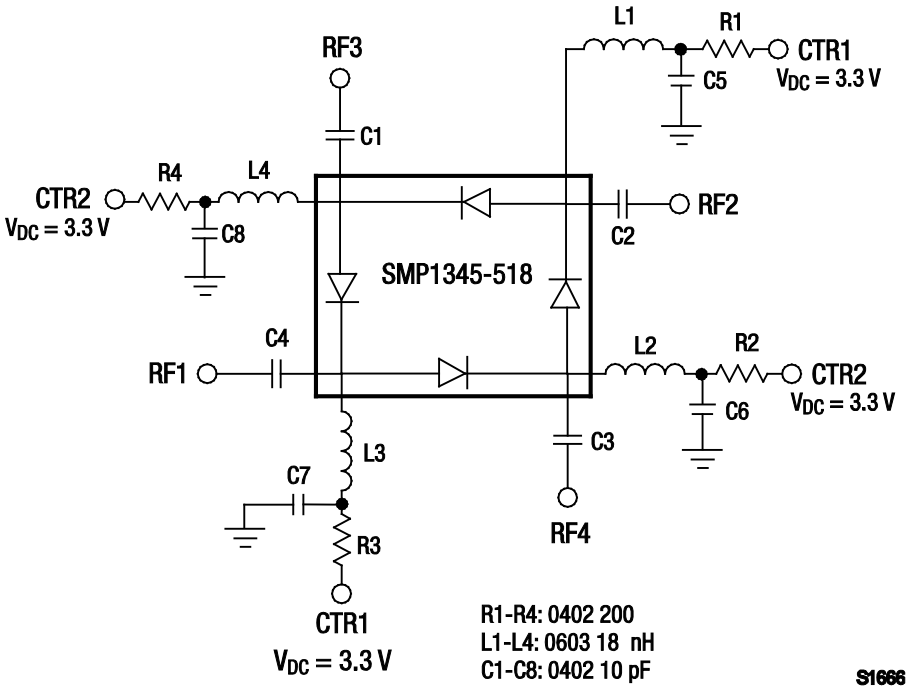


Figure 7. WLAN Application Circuit for DPDT Diversity Switch Using The SMP1345-518

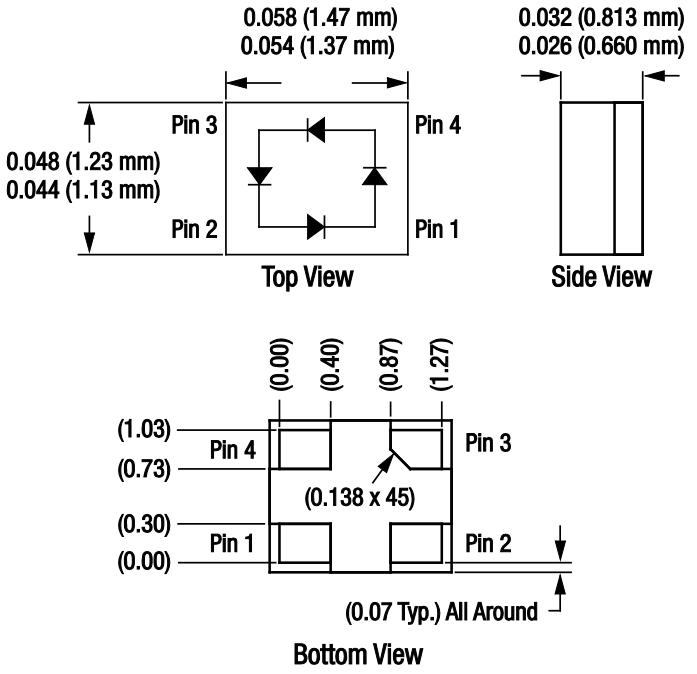


Figure 8. MIS Package Dimension Drawing

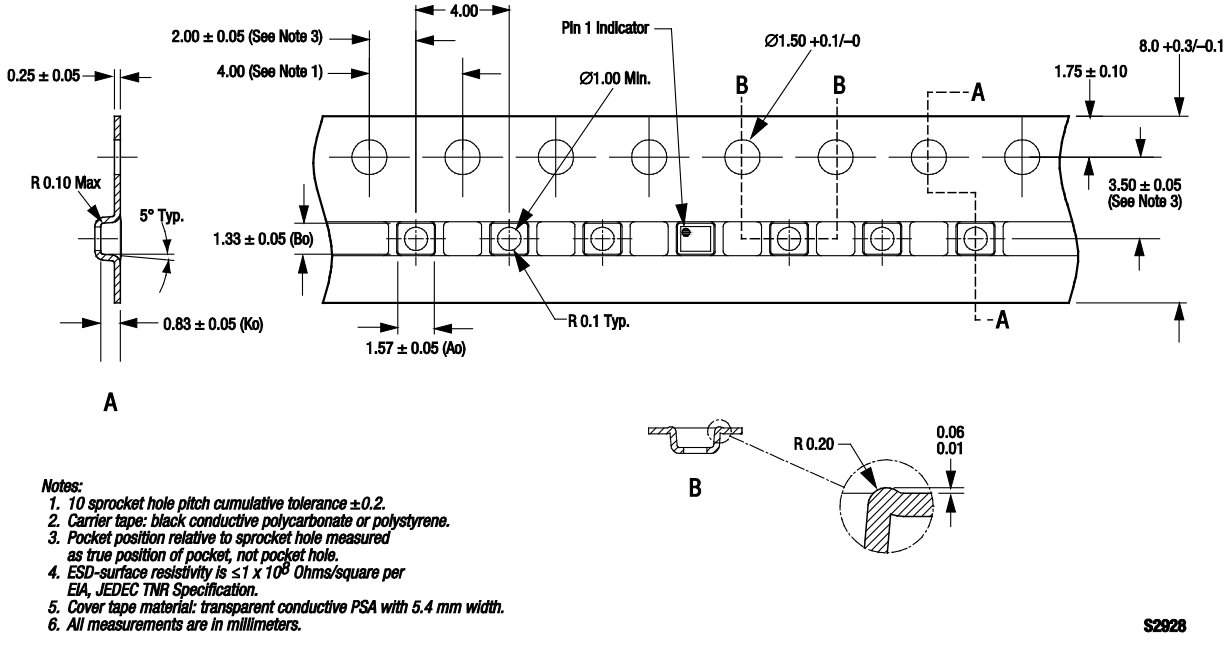
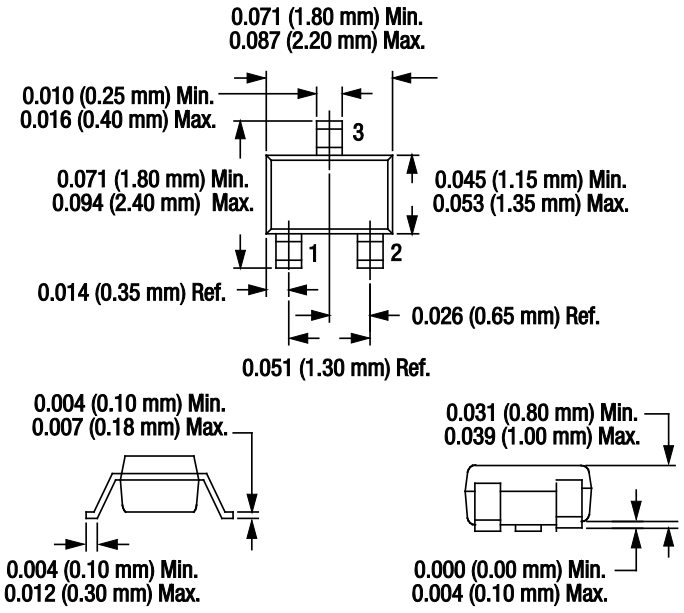
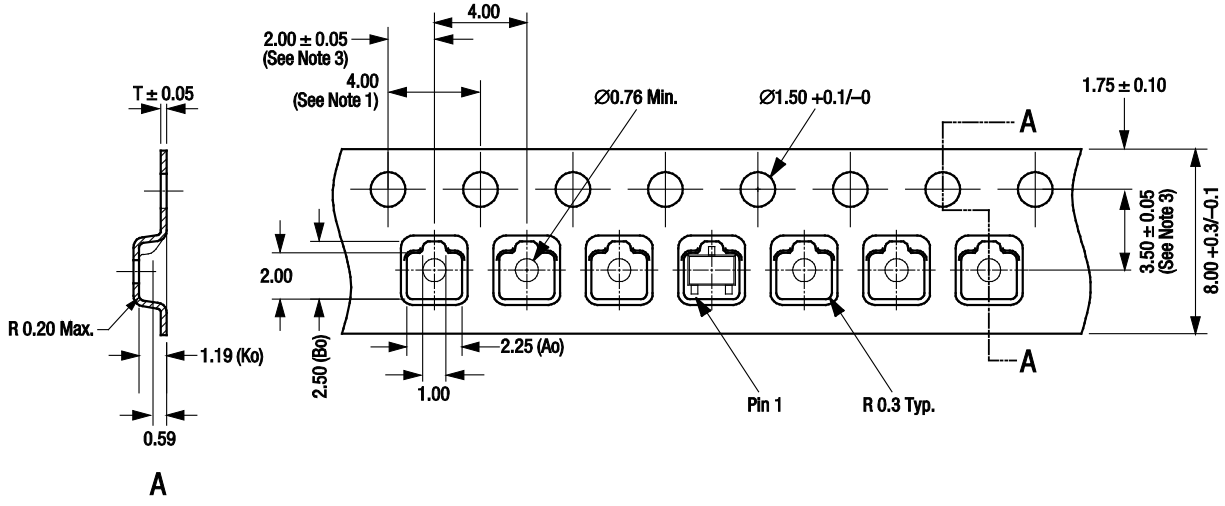


Figure 9. MIS Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) **S1653**

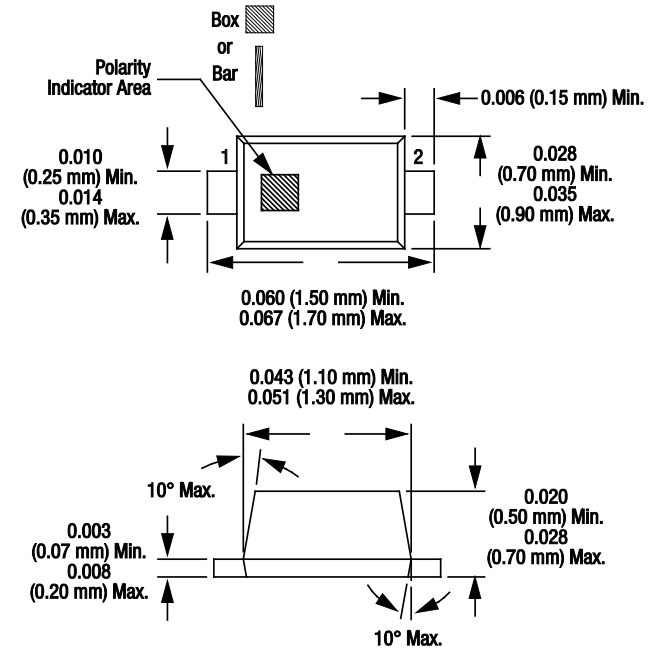
Figure 10. SC-70 Package Dimension Drawing



Notes:
1. *Sprocket hole pitch cumulative tolerance ±0.2.*
2. *Carrier tape: black conductive polystyrene.*
3. *Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.*
4. *Cover tape material: transparent conductive PSA with 9.2 mm width.*
5. *All measurements are in millimeters.*

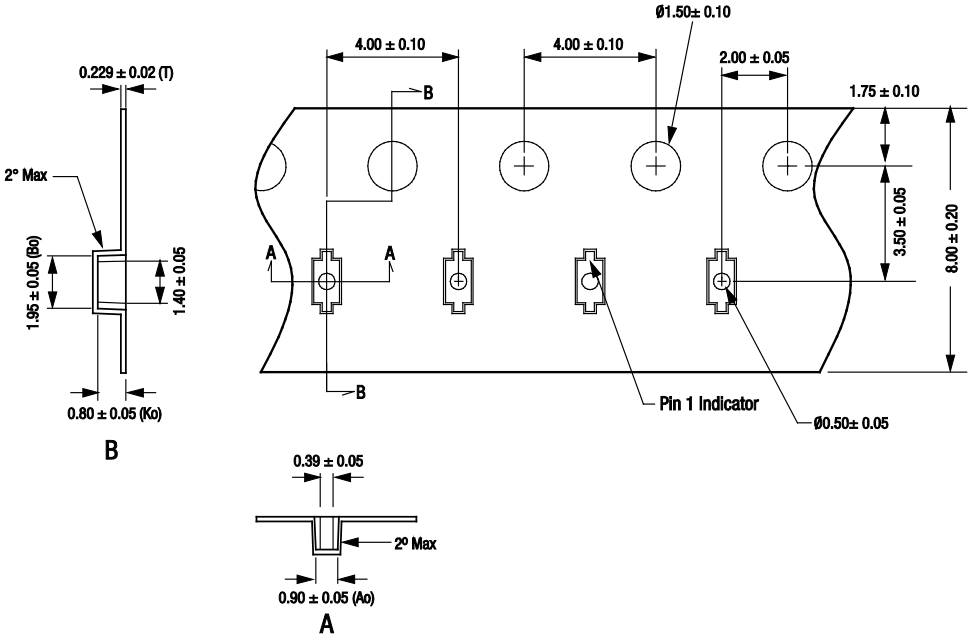
S1685c

Figure 11. SC-70 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) S1652

Figure 12. SC-79 Package Dimension Drawing



Notes:
1. *Carrier tape: black conductive polycarbonate or polystyrene.*
2. *Cover tape material: transparent conductive PSA.*
3. *Cover tape size: 5.4 mm width.*
4. *ESD-surface resistivity is ≤1 x 10^8 Ohms/square per EIA, JEDEC TNR Specification.*
4. *All measurements are in millimeters.*

S2929

Figure 13. SC-79 Tape and Reel Dimensions

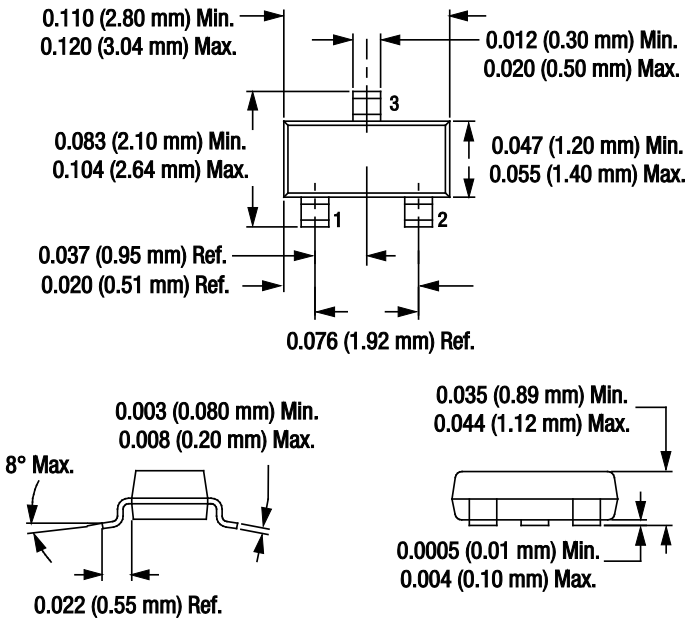
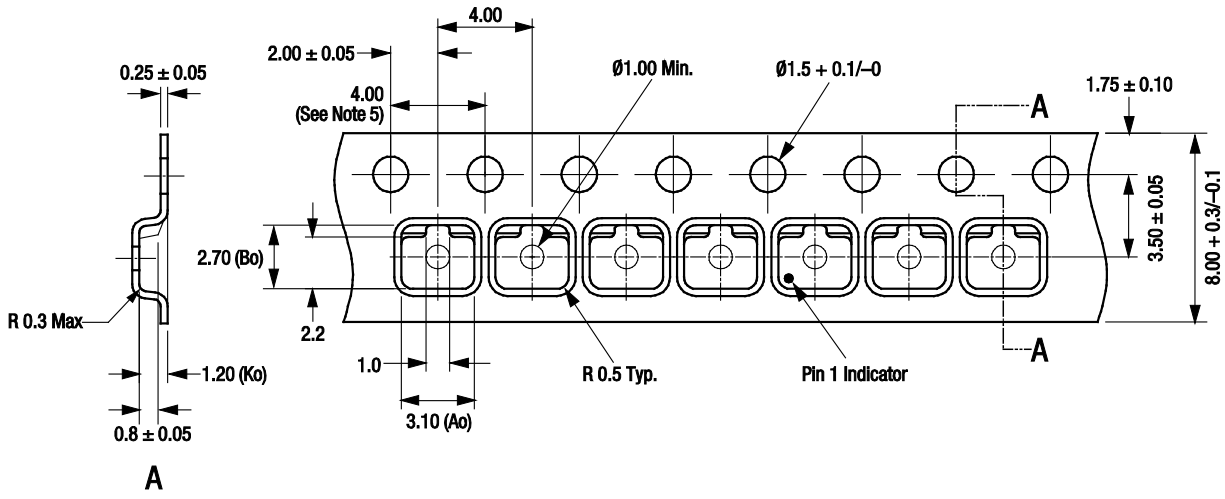


Figure 14. SOT-23 Package Dimension Drawing



Notes:
1. *Carrier tape: black conductive polycarbonate.*
2. *Cover tape material: transparent conductive PSA.*
3. *Cover tape size: 5.40 mm width.*
4. *Tolerance ±0.10 mm.*
5. *Ten sprocket hole pitch cumulative tolerance: ±0.2 mm.*
6. *All measurements are in millimeters.*

S1684b

Figure 15. SOT-23 Tape and Reel Dimensions

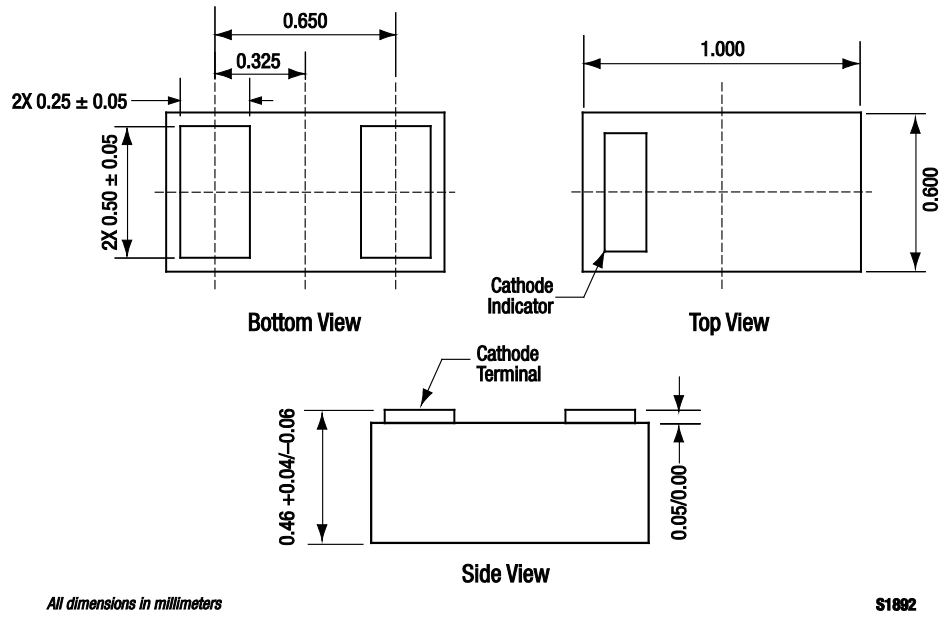


Figure 16. SOD-882 Package Dimension Drawing

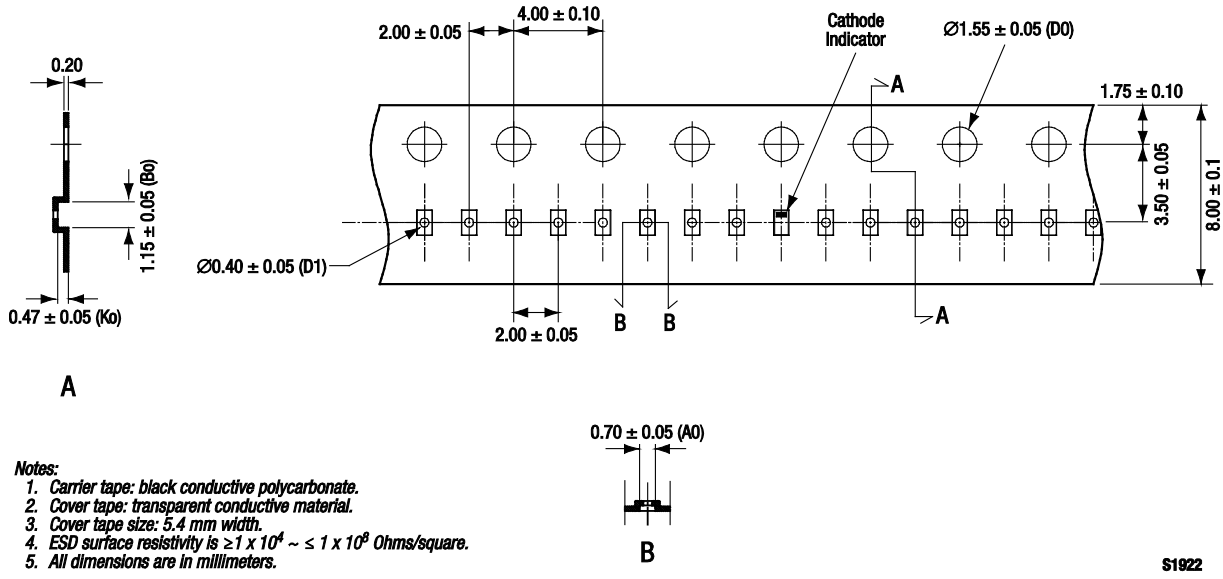


Figure 17. SOD-882 Tape and Reel Drawing