DATA SHEET

SMS392x Series: Surface Mount General Purpose Schottky Diodes

Applications

- High volume commercial detectors, mixers, switches, and digital pulse forming systems

Features

- Tight parameter distribution
- Available as singles, pairs, and dual series pairs
- 100 percent DC tested
- 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 SMS3922, SMS3923, and SMS3924 series of 8, 20, and 70 V rated, low-cost plastic packaged Schottky diodes are designed for general purpose use in RF applications. All diodes are fully characterized, including SPICE model parameters, and deliver tight parameter distribution, which minimizes performance variability.

Wiring configurations include singles, common cathode, series pairs, unconnected pairs, and dual series pairs. The SMS392x series of diodes may be used at frequencies up to 6 GHz.

Table 1 describes the various packages and marking of the SMS392x series.

Table 1. SMS392x Series Packaging and Marking

					
Single	Single	Series Pair	Unconnected Pair	Dual Series Pair	Single
SC-79 Green™	SOT-23	SC-70	SOT-143	SC-88 Green™	SOD-882 Green™
	SMS3922-001 Marking: SA1				
SMS3922-079LF Marking: Cathode and S3	**SMS3922-001LF** Green™ Marking: XA1		**SMS3922-015LF** Marking: XA7		**SMS3922-040LF** Marking: V
					SMS3923-040LF Marking: X
SMS3923-079LF Marking: Cathode and S4				**SMS3923-081LF** Marking: XBQ	
♦ **SMS3924-079LF** Marking: Cathode and S5		**SMS3924-075** Marking: SC2	**SMS3924-015** Marking: SC7		
		SMS3924-075LF Green™ Marking: XC2	**SMS3924-015LF** Marking: XC7		**SMS3924-040LF** Marking: 1
L_S = 0.7 nH	L_S = 1.5 nH	L_S = 1.4 nH	L_S = 1.4 nH	L_S = 1.8 nH	L_S = 0.45 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.

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMS392x series are provided in Table 2. Electrical specifications are provided in Table 3. The associated SPICE model parameters are provided in Table 4.

A pinout and equivalent circuit diagram for the dual series pair Schottky diode (SMS3923-081LF) is shown in Figure 1. Typical performance characteristics of the SMS392x series are illustrated in Figures 2 to 6.

Package Dimensions

Package dimensions are shown in Figures 7 to 17 (odd numbers), and tape and reel dimensions are provided in Figures 8 to 18 (even numbers).

Package and Handling Information

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 SMS392x series is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C for five seconds. 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.

Table 2. SMS392x Series Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	c		Rated V_B	V
Forward current	I_F		50	mA
Power dissipation @ 25 °C lead temperature	P_D		75	mW
Storage temperature	T_{STG}	–65	+150	°C
Operating temperature	T_A	–65	+150	°C
Junction temperature	T_J		+150	°C
Electrostatic discharge:	ESD			
Charged Device Model (CDM), Class 1			<200	V
Human Body Model (HBM), Class 0			<50	V
Machine Model (MM), Class A			<50	V

Note 1: 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.*

Table 3. SMS392x Series Electrical Specifications (Note 1)
(T_A = +25 °C, Per Junction Unless Otherwise Noted)

Part Number	V_B @ 10 µA (V, Minimum)	I_R	C_T @ 0 V (pF)	V_F @ 1 mA (mV)	Pair Configuration ΔV_F @ 1 mA (mV, Maximum)	V_F, Maximum
SMS3922 series	8	<100 nA @ 1 V	0.63 to 1.03	280 to 340	10	<450 mV @ 10 mA
SMS3923 series	20	<500 nA @ 15 V	0.83 to 1.30	310 to 370	10	<1000 mV @ 35 mA
SMS3924 series	70	<200 nA @ 50 V	1.43 to 1.83	490 to 550	10	<1000 mV @ 15 mA

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

Table 4. SPICE Model Parameters

Parameter	Units	SMS3922 Series	SMS3923 Series	SMS3924 Series
Is	A	3E-8	5E-9	2E-11
Rs	Ω	9	10	11
N	–	1.08	1.05	1.08
TT	sec	8E-11	8E-11	8E-11
C_{JO}	pF	0.7	0.9	1.5
M	–	0.26	0.24	0.40
Eg	eV	0.69	0.69	0.69
XTI	–	2	2	2
Fc	–	0.5	0.5	0.5
Bv	V	20	46	100
Ibv	A	1E-5	1E-5	1E-5
V_J	V	0.595	0.640	0.840

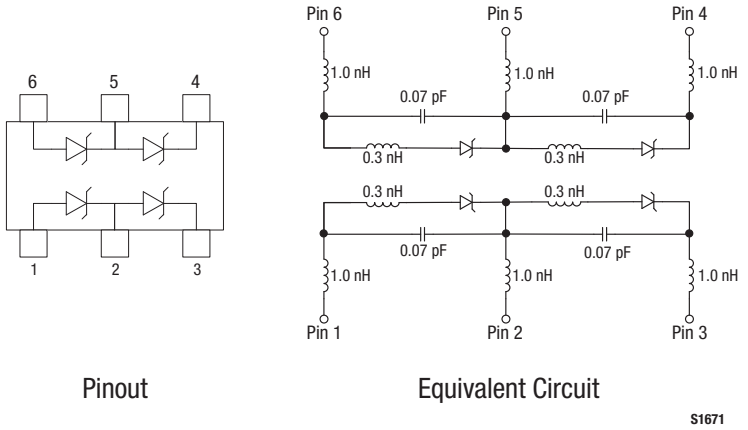


Figure 1. SMS3923-081 Dual Series Pair Pinout and Equivalent Circuit

Typical Performance Characteristics

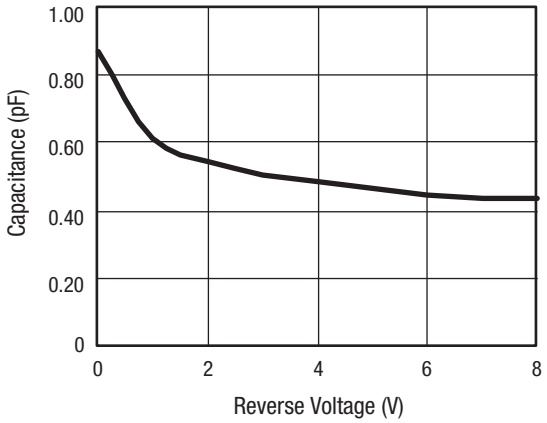


Figure 2. SMS3922 Series Total Capacitance vs Reverse Voltage

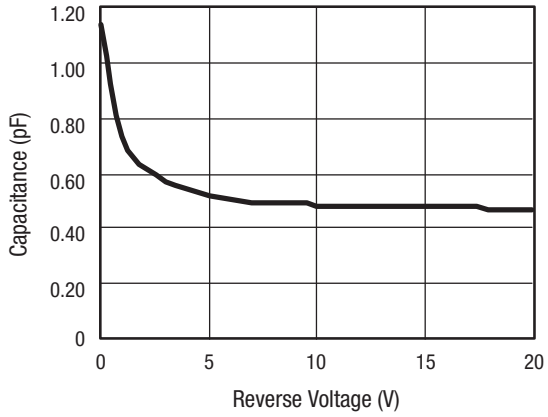


Figure 3. SMS3923 Series Total Capacitance vs Reverse Voltage

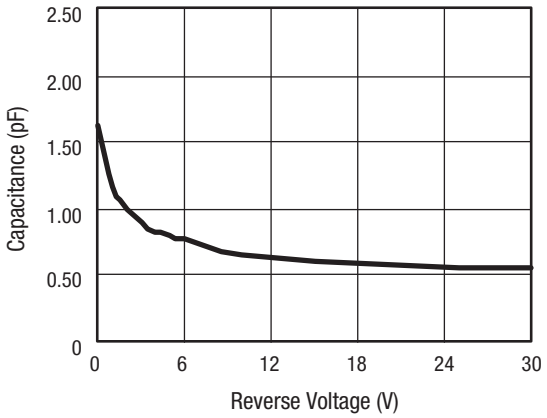


Figure 4. SMS3924 Total Capacitance vs Reverse Voltage

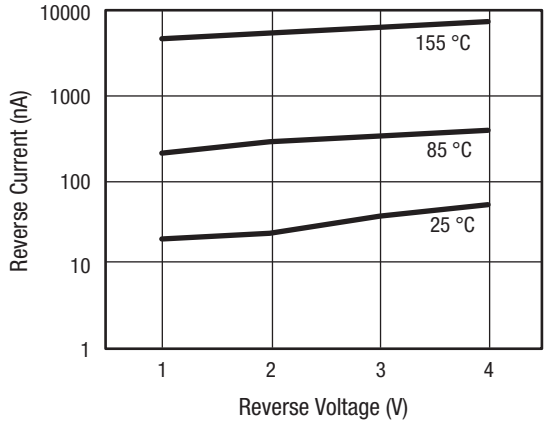


Figure 5. SMS3922 Reverse Current vs Reverse Voltage

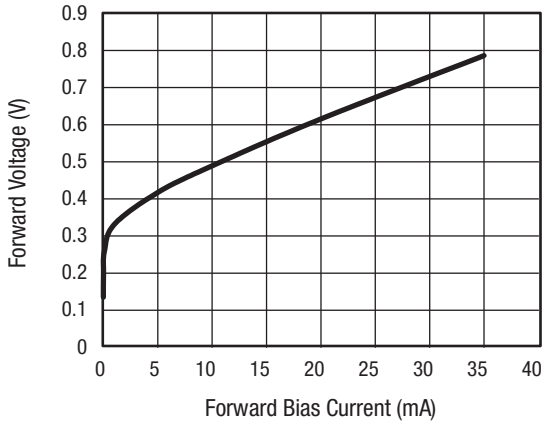
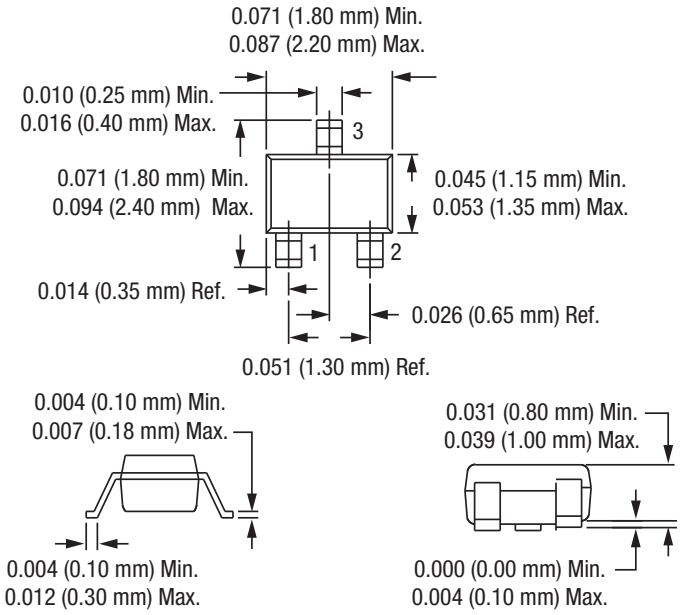
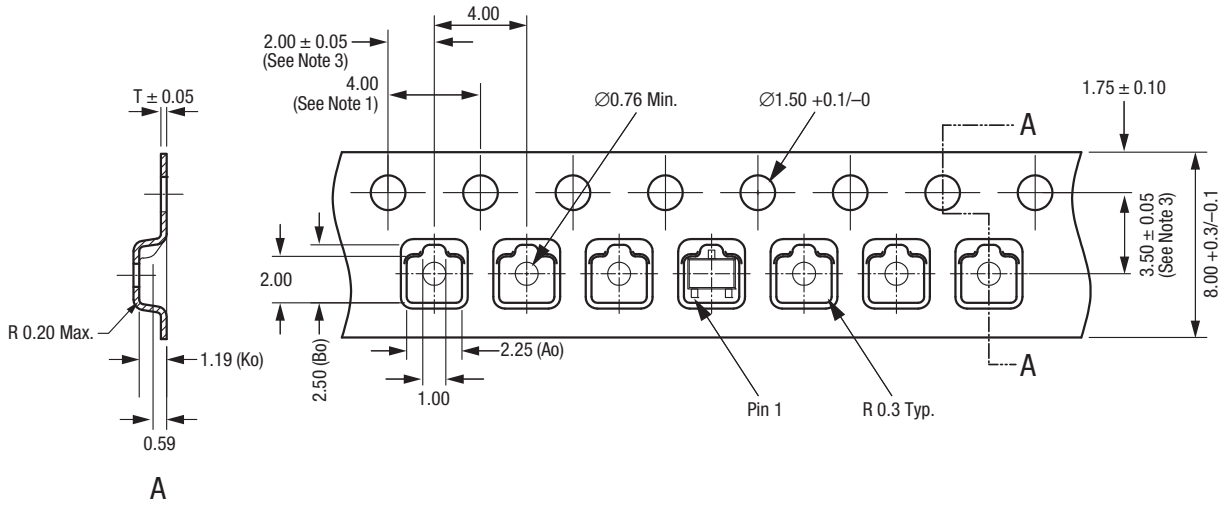


Figure 6. SMS3923-081LF Series Forward Voltage vs Forward Bias Current



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

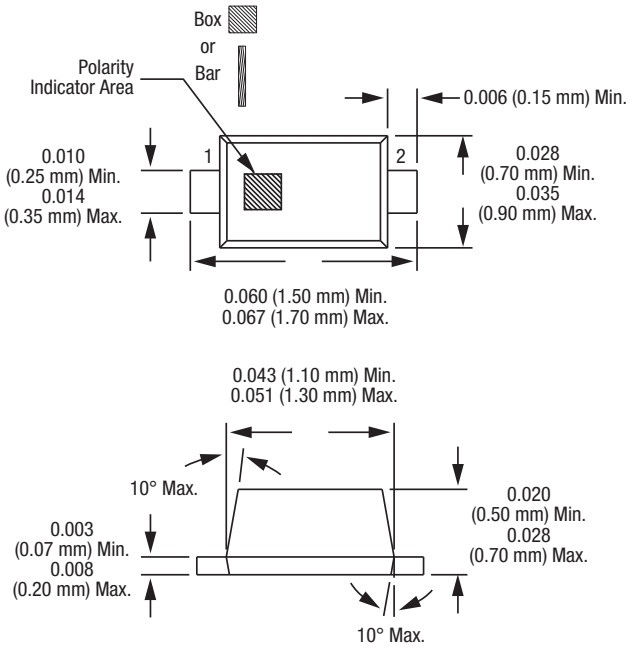
Figure 7. SC-70 Package Dimension Drawing



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.*

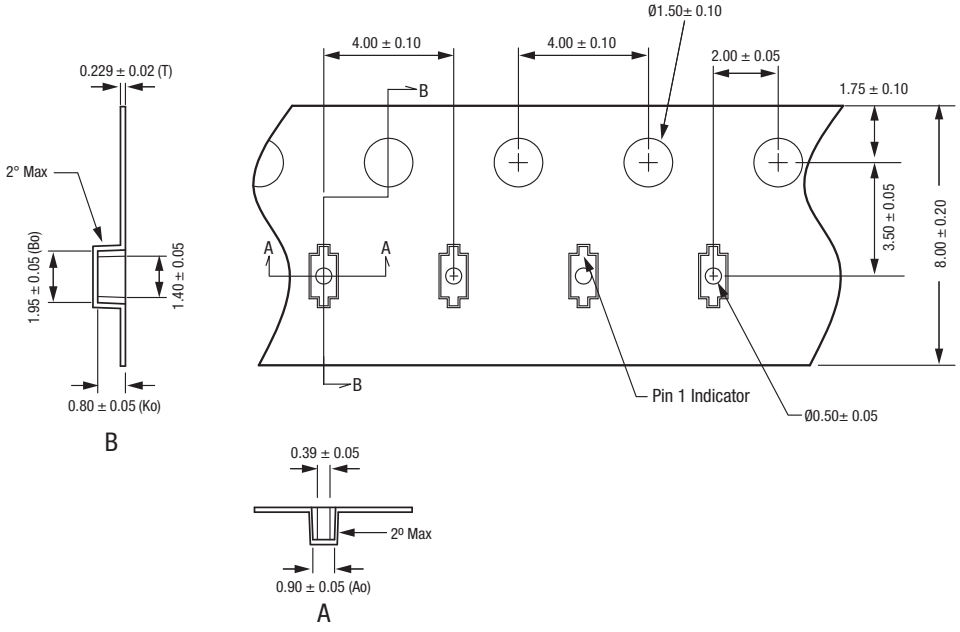
S1685c

Figure 8. SC-70 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) **S1652**

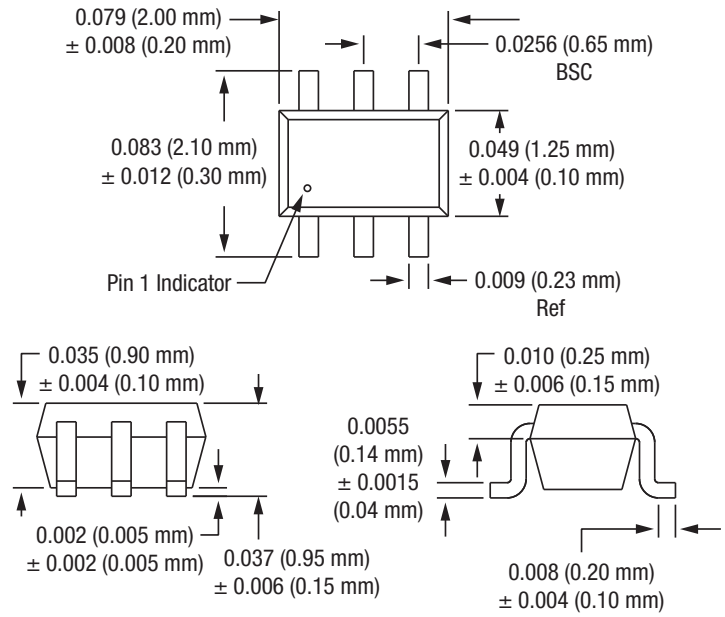
Figure 9. SC-79 Package Dimension Drawing



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.*
5. *All measurements are in millimeters.*

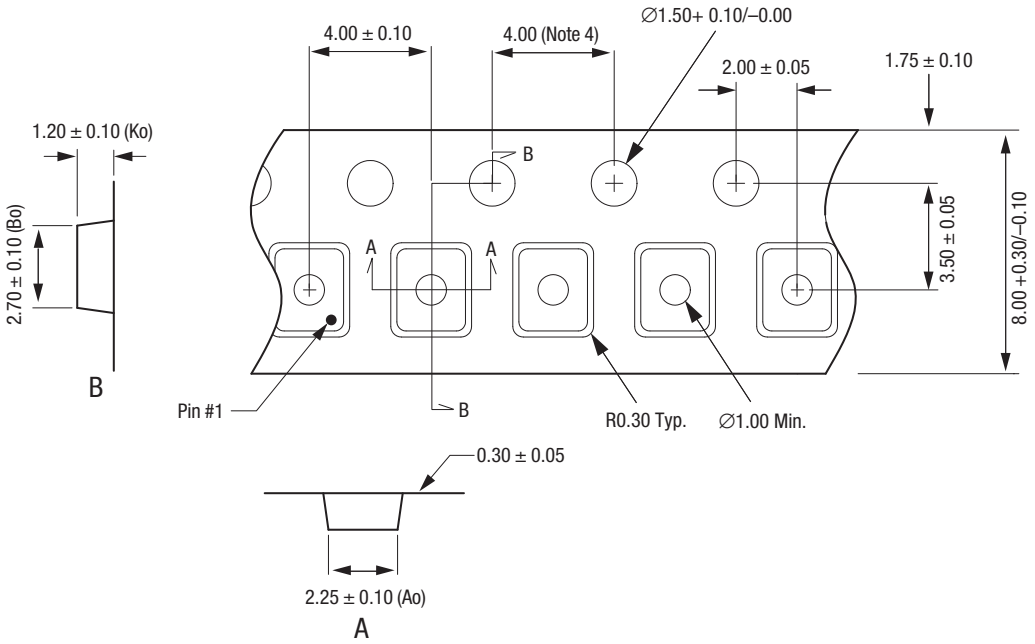
S2929

Figure 10. SC-79 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) **S1670**

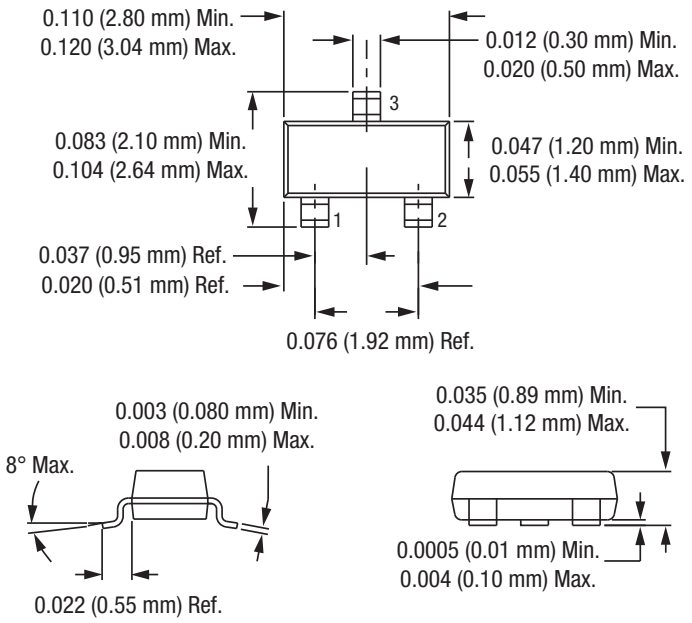
Figure 11. SC-88 Package Dimension Drawing



Notes:
1. *Carrier tape: black conductive polystyrene.*
2. *Cover tape material: transparent conductive HSA.*
3. *Cover tape size: 5.40 mm width.*
4. *Ten sprocket hole pitch cumulative tolerance ±0.20 mm.*
5. *All measurements are in millimeters.*
6. *Standard reel size in 7 inches. Standard reel quantity is 3000 pcs.*

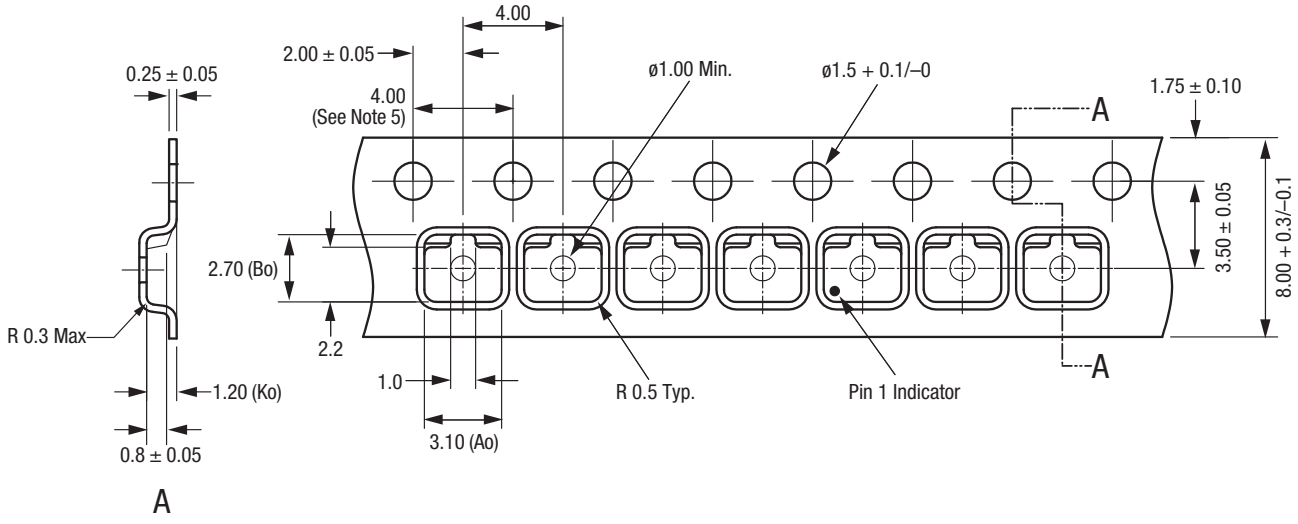
S1620

Figure 12. SC-88 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) **S1389**

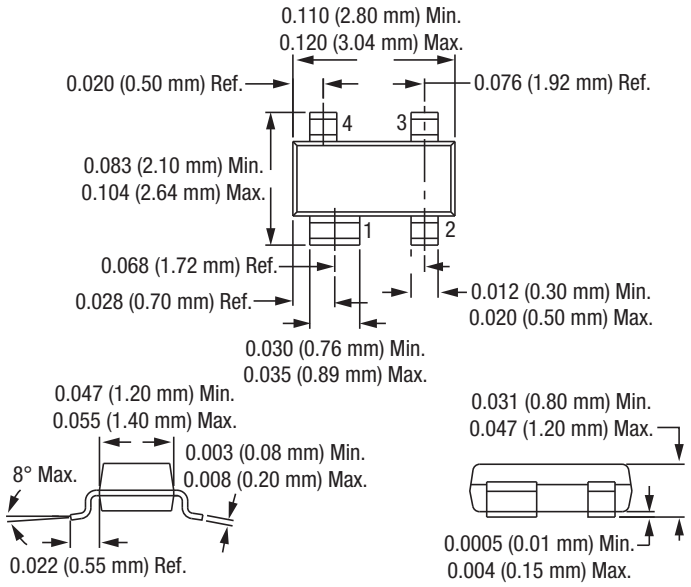
Figure 13. SOT-23 Package Dimension Drawing



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.*
7. *Alternative carrier tape dimensions are:*
   Ao = 3.3
   Bo = 2.9
   Ko = 1.22

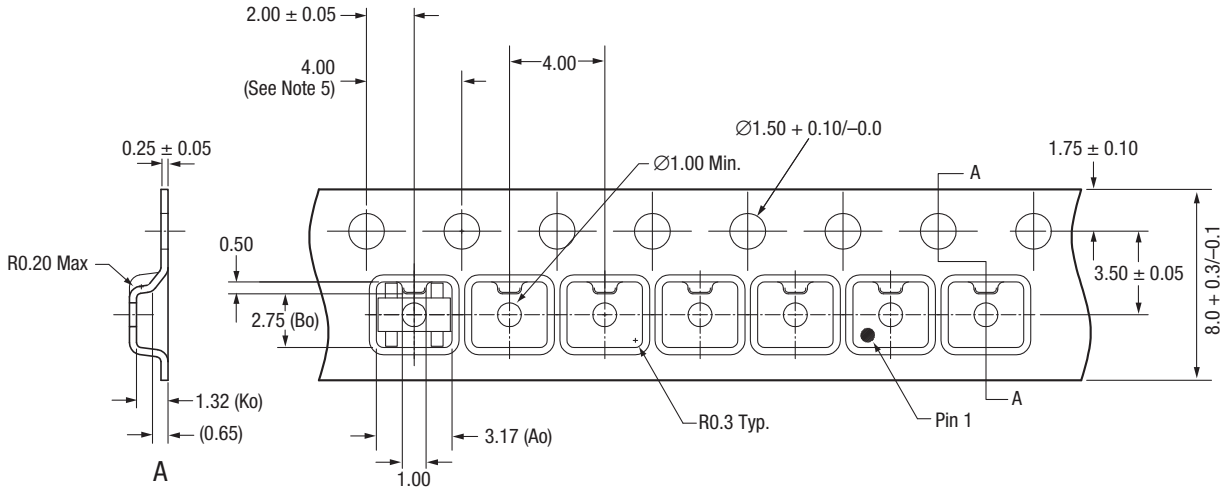
S1684b

Figure 14. SOT-23 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses) **S1651**

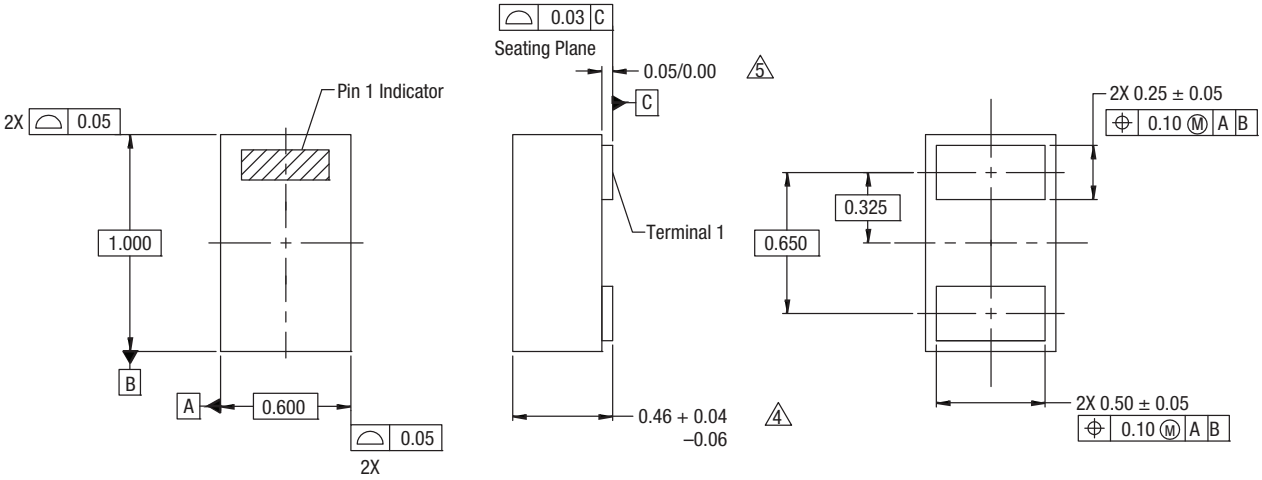
Figure 15. SOT-143 Package Dimension Drawing



Notes:
1. *Carrier tape: black conductive polycarbonate.*
2. *Cover tape material: transparent conductive PSA.*
3. *Cover tape size: 5.4 mm width.*
4. *Tolerance: .XX = ±0.10*
5. *Ten sprocket hole pitch cumulative tolerance: ±0.2 mm.*
6. *All measurements are in millimeters.*

S2515a

Figure 16. SOT-143 Tape and Reel Dimensions

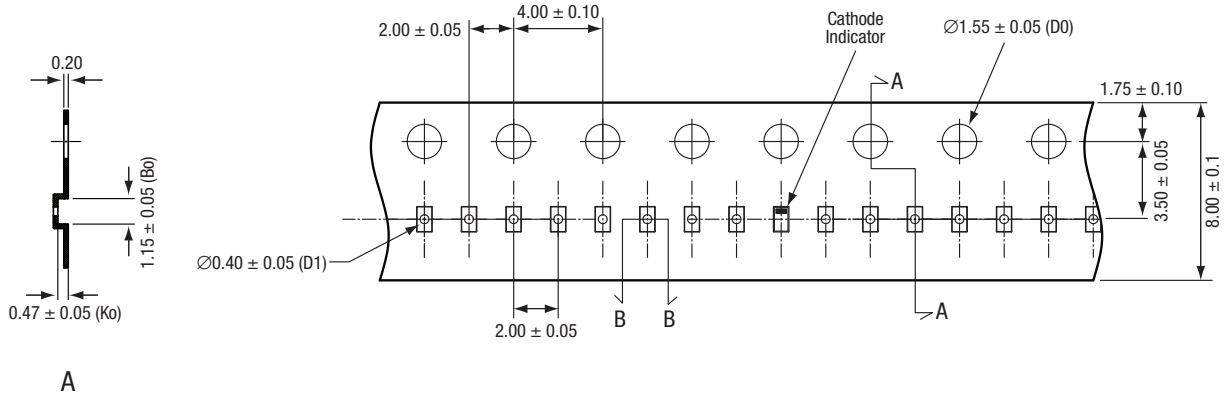


NOTES:

1. *All measurements are in millimeters.*
2. *Dimensions and tolerances according to ASME Y14.5M-1994.*
3. *These packages are used principally for discrete devices.*
4. *This dimension includes stand-off height and package body thickness, but does not include attached features, e.g., external heatsink or chip capacitors. An integral heatslug is not considered an attached feature.*
5. *This dimension is primarily terminal plating, but does not include small metal protrusion.*

Y1410

Figure 17. SOD-882 Package Dimension Drawing



Notes:

1. *Carrier tape: black conductive polycarbonate.*
2. *Cover tape: transparent conductive material.*
3. *Cover tape size: 5.4 mm width.*
4. *ESD surface resistivity is ≥1 x 10^4 ~ ≤ 1 x 10^8 Ohms/square.*
5. *All dimensions are in millimeters.*

S1922

Figure 18. SOD-882 Tape and Reel Dimensions

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