

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<br>Green™   | SOT-23  | SC-70   | SOT-143   | SC-88<br>Green™   | SOD-882<br>Green™   |
|   | <b>SMS3922-001</b><br>Marking: SA1  |   |   |   |   |
| <b>SMS3922-079LF</b><br>Marking: Cathode and S3                                   | <b>SMS3922-001LF</b><br>Green™<br>Marking: XA1                                    |   | <b>SMS3922-015LF</b><br>Marking: XA7  |   | <b>SMS3922-040LF</b><br>Marking: V  |
|   |   |   |   |   | <b>SMS3923-040LF</b><br>Marking: X  |
| <b>SMS3923-079LF</b><br>Marking: Cathode and S4                                   |   |   |   | <b>SMS3923-081LF</b><br>Marking: XBQ  |   |
| ◆ <b>SMS3924-079LF</b><br>Marking: Cathode and S5                                 |   | <b>SMS3924-075</b><br>Marking: SC2  | <b>SMS3924-015</b><br>Marking: SC7  |   |   |
|   |   | <b>SMS3924-075LF</b><br>Green™<br>Marking: XC2                                    | <b>SMS3924-015LF</b><br>Marking: XC7  |   | <b>SMS3924-040LF</b><br>Marking: 1  |
| L <sub>s</sub> = 0.7 nH   | L <sub>s</sub> = 1.5 nH   | L <sub>s</sub> = 1.4 nH   | L <sub>s</sub> = 1.4 nH   | L <sub>s</sub> = 1.8 nH   | L <sub>s</sub> = 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.

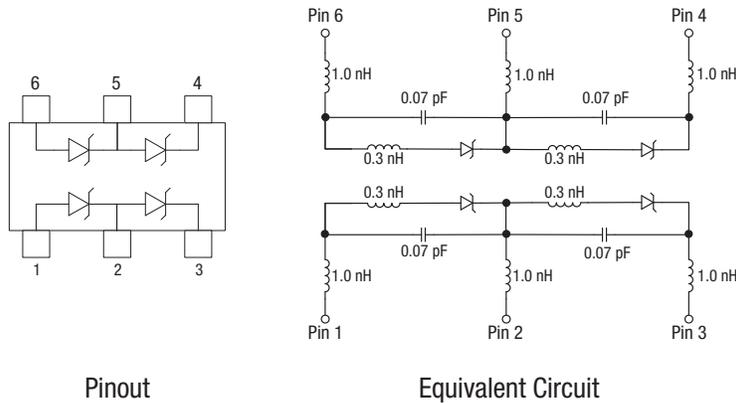
**Table 3. SMS392x Series Electrical Specifications (Note 1)****( $T_A = +25$  °C, Per Junction Unless Otherwise Noted)**

| Part Number    | $V_B @ 10 \mu A$<br>(V, Minimum) | $I_R$          | $C_T @ 0 V$<br>(pF) | $V_F @ 1 mA$<br>(mV) | Pair Configuration<br>$\Delta V_F @ 1 mA$<br>(mV, Maximum) | $V_F$ ,<br>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        | $\Omega$ | 9              | 10             | 11             |
| N         | -        | 1.08           | 1.05           | 1.08           |
| TT        | sec      | 8E-11          | 8E-11          | 8E-11          |
| CJO       | 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           |
| VJ        | V        | 0.595          | 0.640          | 0.840          |



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

Typical Performance Characteristics

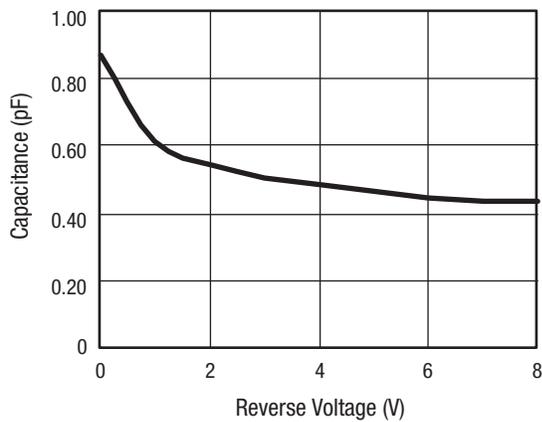


Figure 2. SMS3922 Series Total Capacitance vs Reverse Voltage

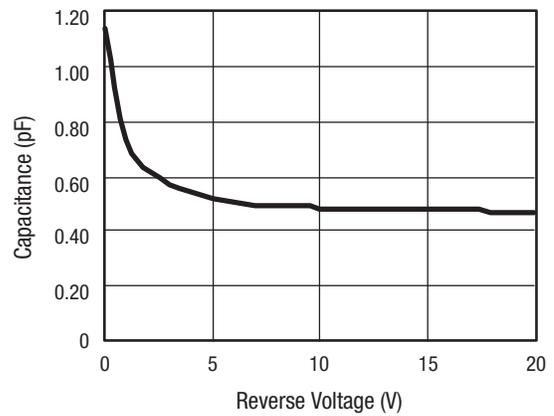


Figure 3. SMS3923 Series Total Capacitance vs Reverse Voltage

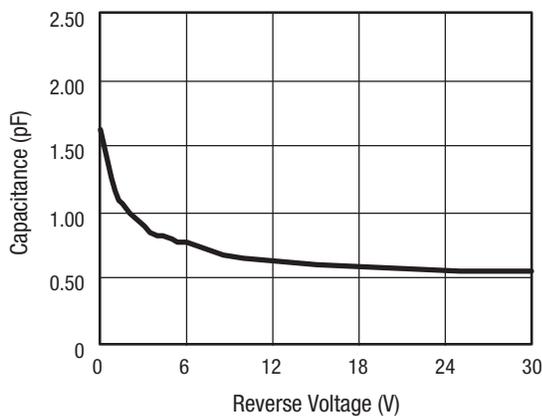


Figure 4. SMS3924 Total Capacitance vs Reverse Voltage

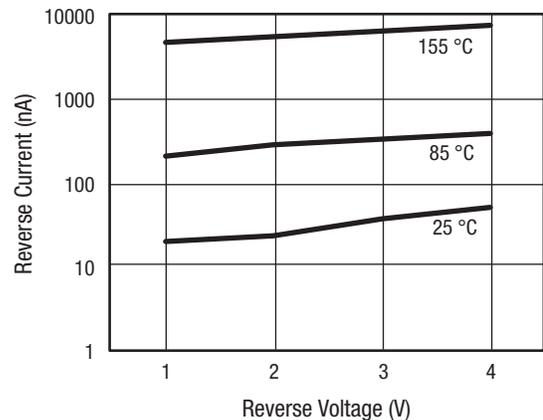
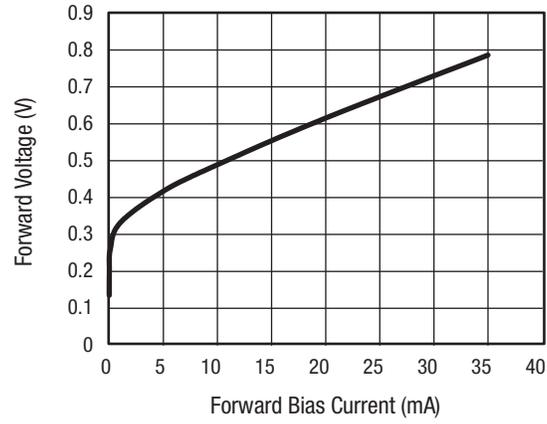
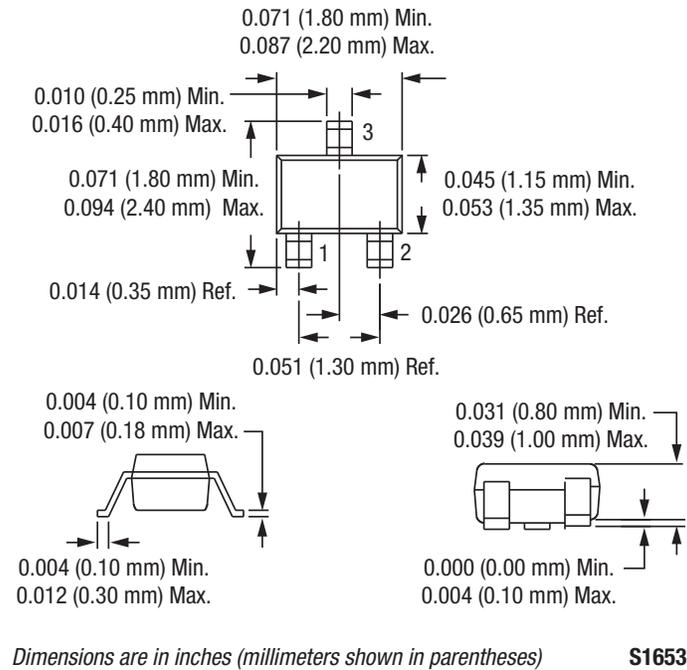


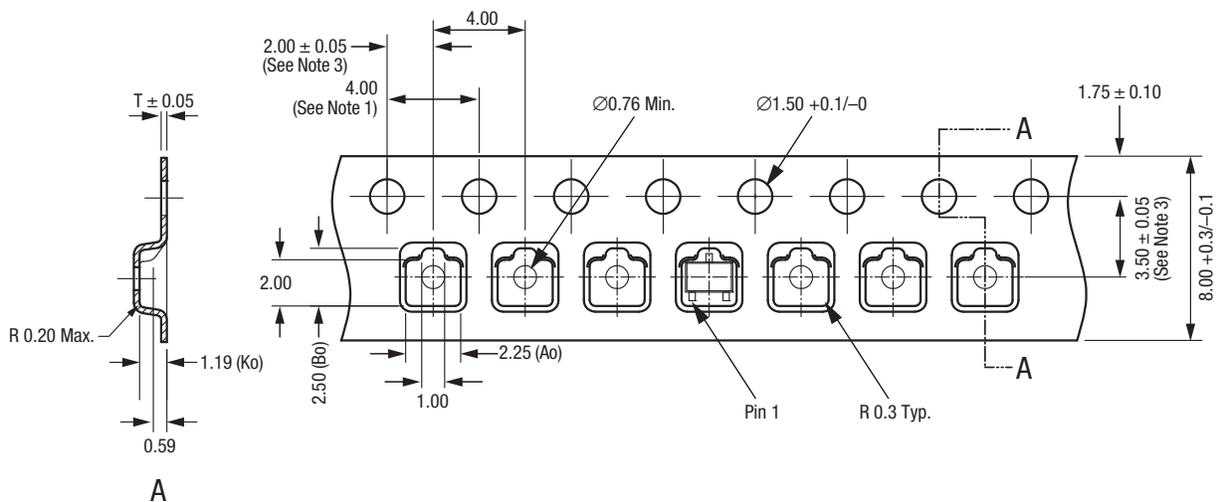
Figure 5. SMS3922 Reverse Current vs Reverse Voltage



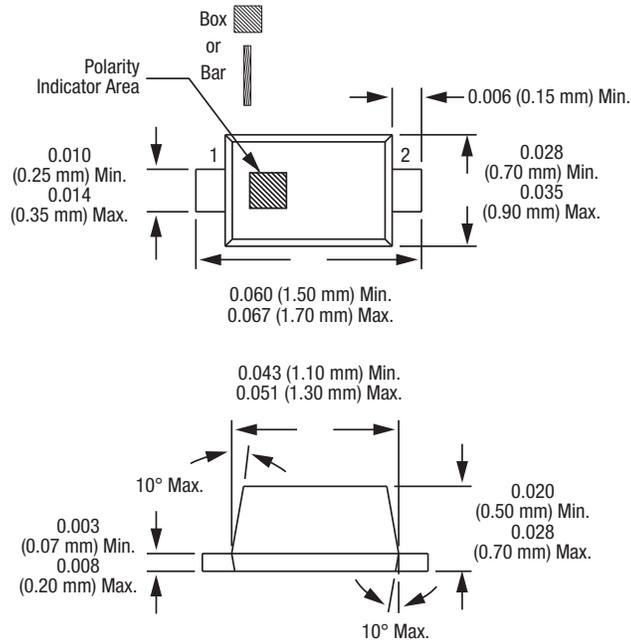
**Figure 6. SMS3923-081LF Series Forward Voltage vs Forward Bias Current**



**Figure 7. SC-70 Package Dimension Drawing**

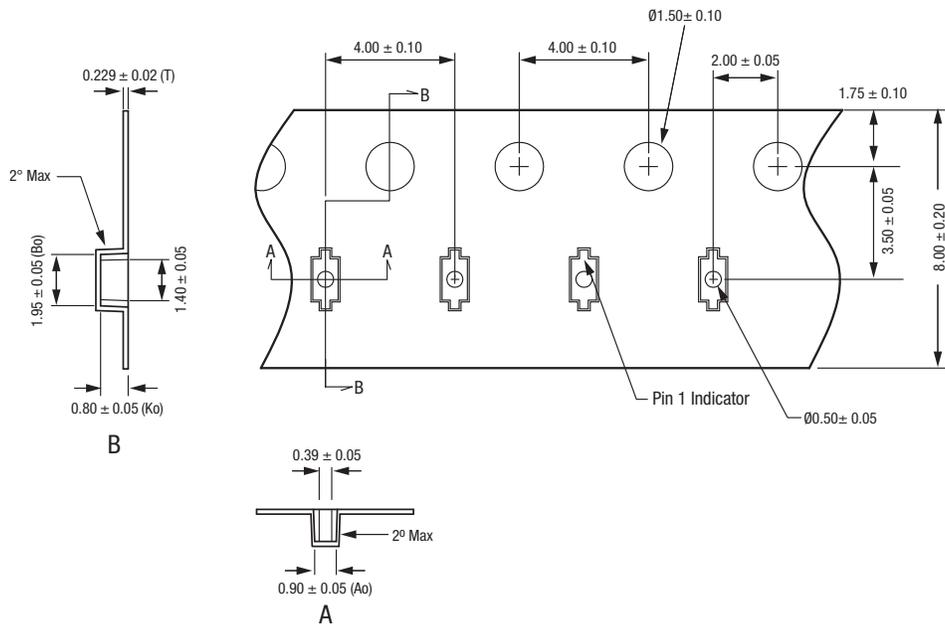


**Figure 8. SC-70 Tape and Reel Dimensions**



Dimensions are in inches (millimeters shown in parentheses) S1652

**Figure 9. SC-79 Package Dimension Drawing**

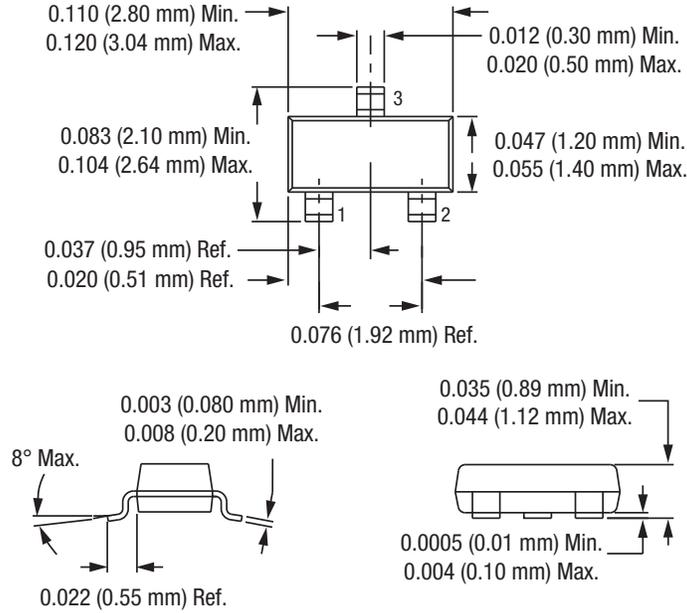


- Notes:
1. Carrier tape: black conductive polycarbonate or polystyrene.
  2. Cover tape material: transparent conductive PSA.
  3. Cover tape size: 5.4 mm width.
  4. ESD-surface resistivity is  $\leq 1 \times 10^8$  Ohms/square per EIA, JEDEC TNR Specification.
  5. All measurements are in millimeters.

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**Figure 10. SC-79 Tape and Reel Dimensions**

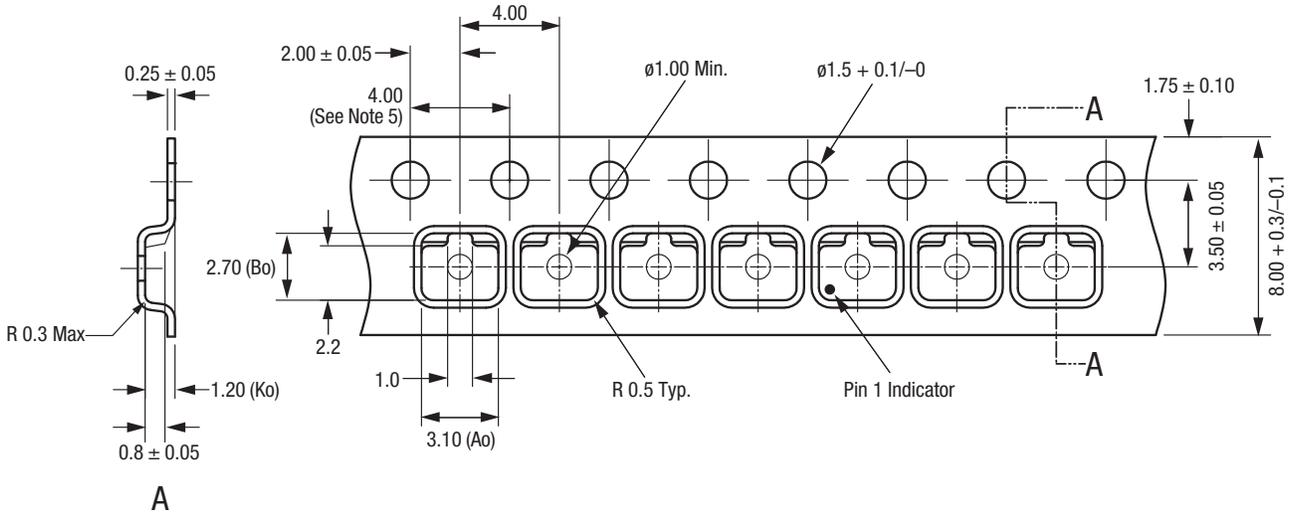




Dimensions are in inches (millimeters shown in parentheses)

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

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Figure 14. SOT-23 Tape and Reel Dimensions





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