

DATA SHEET

# SMP1322 Series: Low Resistance, Plastic Packaged PIN Diodes

## Applications

- High-performance wireless switch applications

## Features

- Resistance: 0.5  $\Omega$  typical @ 10 mA
- Capacitance: 1 pF max @ 30 V
- 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 SMP1322 series of plastic packaged, surface mountable PIN diodes is designed for use in high volume switch applications from 10 MHz to more than 10 GHz. The ultra-low resistance of these diodes (1.5  $\Omega$  maximum at 1 mA and 0.5  $\Omega$  typical at 10 mA) makes the SMP1322 series particularly suited for low-loss PIN diode switches in battery operated circuits.

The SMP1322 series is available in a selection of plastic packages and a variety of configurations that include an SOT-23, an SC-70, a small footprint SC-79, and a miniature SOD-882.

Table 1 describes the various packages and marking of the SMP1322 series.

**Table 1. SMP1322 Series Packaging and Marking**

|   |   |   |   |
|---|---|---|---|
|  |  |  |  |
| Single  | Series Pair   | Single  | Single  |
| SOT-23  | SOT-23  | SC-79<br>Green™   | SOD-882<br>Green™   |
| <b>SMP1322-001LF</b><br>Green™<br>Marking: RN1                                    | <b>SMP1322-005LF</b><br>Green™<br>Marking: RN2                                    | <b>SMP1322-079LF</b><br>Marking: Cathode and CC                                   | <b>SMP1322-040LF</b><br>Marking: T  |
| $L_S = 1.5 \text{ nH}$  | $L_S = 1.5 \text{ nH}$  | $L_S = 0.7 \text{ nH}$  | $L_S = 0.45 \text{ nH}$   |
|   | SC-70   |   |   |
|   | <b>SMP1322-075LF</b><br>Green™<br>Marking: RN2                                    |   |   |
|   | $L_S = 1.4 \text{ nH}$  |   |   |



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 SMP1322 series are provided in Table 2. Electrical specifications are provided in Table 3. Resistance versus temperature measurements are provided in Table 4.

Typical performance characteristics of the SMP1322 series are illustrated in Figures 1 to 4. Package dimensions are shown in Figures 5 to 11 (odd numbers), and tape and reel dimensions are provided in Figures 6 to 12 (even numbers).

**Table 2. SMP1322 Series Absolute Maximum Ratings<sup>1</sup>**

| Parameter                                  | Symbol    | Minimum | Maximum | Units |
|--|-----------|---------|---------|-------|
| Reverse voltage                            | $V_R$     |         | 50      | V     |
| Power dissipation @ 25 °C lead temperature | $P_D$     |         | 430     | mW    |
| Storage temperature                        | $T_{STG}$ | -65     | +150    | °C    |
| Operating temperature                      | $T_A$     | -65     | +150    | °C    |
| Electrostatic discharge:                   | ESD       |         |         |       |
| Charged Device Model (CDM), Class 4        |           |         | 1000    | V     |
| Human Body Model (HBM), Class 1B           |           |         | 1000    | V     |

<sup>1</sup> 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.

**Table 3. SMP1322 Series Electrical Specifications<sup>1</sup>**  
(T<sub>A</sub> = +25 °C, Unless Otherwise Noted)

| Parameter        | Symbol         | Test Condition                       | Min | Typical | Max | Units  |
|------------------|----------------|--------------------------------------|-----|---------|-----|--------|
| Reverse current  | I <sub>R</sub> | V <sub>R</sub> = 50 V                |     |         | 10  | μA     |
| Capacitance      | C <sub>T</sub> | F = 1 MHz, V = 30 V                  |     |         | 1   | pF     |
| Resistance       | R <sub>S</sub> | F = 100 MHz<br>I = 1 mA<br>I = 10 mA |     | 0.5     | 1.5 | Ω<br>Ω |
| Forward voltage  | V <sub>F</sub> | I <sub>F</sub> = 10 mA               |     | 0.85    |     | V      |
| Carrier lifetime | τ <sub>I</sub> | I <sub>F</sub> = 10 mA               |     | 0.4     |     | μs     |
| I region width   |                |                                      |     | 7       |     | μm     |

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**ESD HANDLING:** 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 when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.

## 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 SMP1322 series is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering.

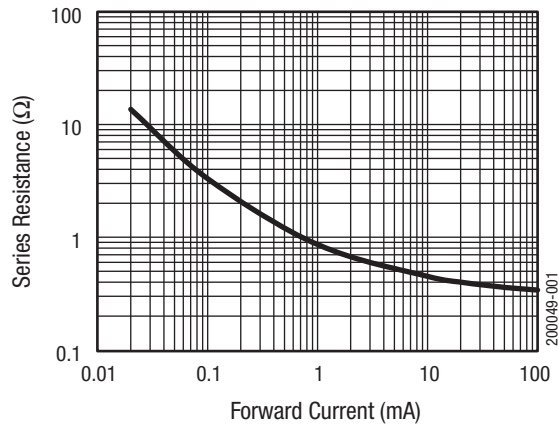
For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

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.

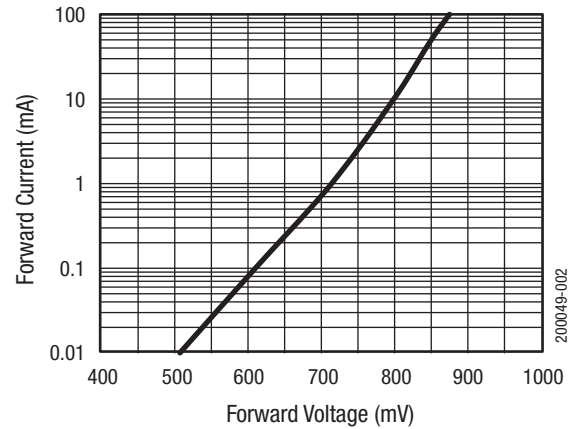
**Table 4. Resistance vs Temperature @ 500 MHz**

| I <sub>F</sub><br>(mA) | R <sub>S</sub> @ -55 °C<br>(Ω) | R <sub>S</sub> @ -15 °C<br>(Ω) | R <sub>S</sub> @ +25 °C<br>(Ω) | R <sub>S</sub> @ +65 °C<br>(Ω) | R <sub>S</sub> @ +100 °C<br>(Ω) |
|------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 0.02                   | 9.5                            | 9.4                            | 9.9                            | 10.5                           | 10.9                            |
| 0.10                   | 3.0                            | 3.0                            | 3.0                            | 3.3                            | 3.5                             |
| 0.30                   | 1.5                            | 1.5                            | 1.5                            | 1.6                            | 1.8                             |
| 0.50                   | 1.1                            | 1.1                            | 1.2                            | 1.2                            | 1.4                             |
| 1.0                    | 0.922                          | 0.914                          | 0.902                          | 0.963                          | 1.100                           |
| 10                     | 0.568                          | 0.559                          | 0.533                          | 0.563                          | 0.655                           |
| 20                     | 0.532                          | 0.520                          | 0.494                          | 0.521                          | 0.610                           |
| 100                    | 0.483                          | 0.469                          | 0.440                          | 0.464                          | 0.565                           |

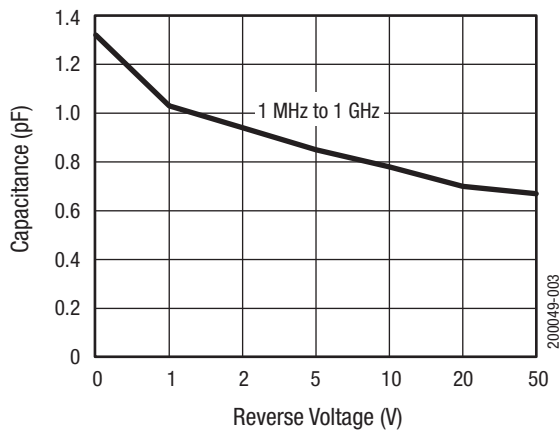
## Typical Performance Characteristics



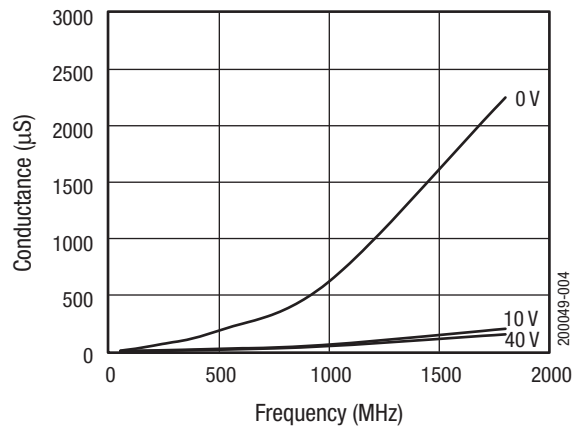
**Figure 1. Series Resistance vs Current @ 100 MHz**



**Figure 2. Forward Current vs Voltage**



**Figure 3. Capacitance vs Reverse Voltage**



**Figure 4. Conductance vs Frequency and Reverse Voltage**







Dimensions are in inches (millimeters shown in parentheses)

200049-009

Figure 9. 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  $\pm 0.10$  mm.
5. Ten sprocket hole pitch cumulative tolerance:  $\pm 0.2$  mm.
6. All measurements are in millimeters.
7. Alternative carrier tape dimensions are:  
 $A_o = 3.3$   
 $B_o = 2.9$   
 $K_o = 1.22$

200049-011

Figure 10. SOT-23 Tape and Reel Dimensions





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