

DATA SHEET

# SMP1320 Series: Low Resistance, Low Capacitance, Plastic Packaged PIN Diodes

## Applications

- High-volume wireless applications

## Features

- Resistance: 0.75  $\Omega$  typical @ 10 mA
- Capacitance: 0.23 pF typical @ 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 SMP1320 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 low capacitance of these diodes (0.3 pF maximum at 30 V), combined with a low resistance (0.9  $\Omega$  maximum at 10 mA), makes the SMP1320 series particularly suited for high-isolation, series-connected PIN diode switches in battery-operated circuits.

The SMP1320 series is available in a selection of plastic packages and a variety of configurations that include an SC-70, a small footprint SC-79, and a miniature SOD-882. Table 1 describes the various packages and markings of the SMP1320 series.

**Table 1. SMP1320 Series Packaging and Marking**

|   |   |   |   |   |
|---|---|---|---|---|
|  |  |  |  |  |
| Series Pair   | Low Inductance  | Single  | Single  | Single  |
| SC-70   | SC-70   | SOD-323<br>Green™   | SC-79<br>Green™   | SOD-882<br>Green™   |
| <b>SMP1320-075LF</b><br>Green™<br>Marking: RL2                                    | <b>SMP1320-077LF</b><br>Green™<br>Marking: RLB                                    | <b>SMP1320-011LF</b><br>Marking: RL   | <b>◆ SMP1320-079LF</b><br>Marking: Cathode and C5                                   | <b>SMP1320-040LF</b><br>Marking: N  |
| L <sub>S</sub> = 1.4 nH   | L <sub>S</sub> = 0.4 nH   | L <sub>S</sub> = 1.5 nH   | L <sub>S</sub> = 0.7 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 SMP1320 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 SMP1320 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).

### 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 SMP1320 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 2. SMP1320 Series Absolute Maximum Ratings<sup>1</sup>**

| Parameter                                  | Symbol    | Minimum | Maximum | Units |
|--|-----------|---------|---------|-------|
| Reverse voltage                            | $V_R$     |         | 50      | V     |
| Power dissipation @ 25 °C lead temperature | $P_D$     |         | 400     | 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 2            |           |         | 2000    | V     |
| Machine Model (MM), Class B                |           |         | 200     | 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.

**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.

**Table 3. SMP1320 Series Electrical Specifications<sup>1</sup>**  
( $T_A = +25\text{ °C}$ , Unless Otherwise Noted)

| Parameter                | Symbol   | Test Condition  | Min | Typical      | Max  | Units                |
|--------------------------|----------|---|-----|--------------|------|----------------------|
| Reverse current          | $I_R$    | $V_R = 50\text{ V}$   |     |              | 10   | $\mu\text{A}$        |
| Capacitance <sup>2</sup> | $C_T$    | $F = 1\text{ MHz}, V = 30\text{ V}$                             |     | 0.23         | 0.30 | pF                   |
| Resistance               | $R_S$    | $F = 100\text{ MHz}$<br>$I = 1\text{ mA}$<br>$I = 10\text{ mA}$ |     | 2.00<br>0.75 | 0.90 | $\Omega$<br>$\Omega$ |
| Forward voltage          | $V_F$    | $I_F = 10\text{ mA}$  |     | 0.85         |      | V                    |
| Carrier lifetime         | $\tau_I$ | $I_F = 10\text{ mA}$  |     | 0.4          |      | $\mu\text{s}$        |
| I region width           |          |   |     | 7            |      | $\mu\text{m}$        |

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

<sup>2</sup>  $C_T$  @ 30 V is 0.45 pF maximum for the SMP1320-077LF.

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

| $I_F$<br>(mA) | $R_S$ @ -55 °C<br>( $\Omega$ ) | $R_S$ @ -15 °C<br>( $\Omega$ ) | $R_S$ @ +25 °C<br>( $\Omega$ ) | $R_S$ @ +65 °C<br>( $\Omega$ ) | $R_S$ @ +100 °C<br>( $\Omega$ ) |
|---------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 0.02          | 29.6                           | 29.2                           | 30.8                           | 32.0                           | 32.7                            |
| 0.10          | 7.2                            | 7.7                            | 8.3                            | 8.8                            | 8.8                             |
| 0.3           | 3.4                            | 3.6                            | 3.8                            | 4.0                            | 4.1                             |
| 0.5           | 2.5                            | 2.7                            | 2.8                            | 2.9                            | 3.0                             |
| 1.0           | 1.7                            | 1.8                            | 1.9                            | 2.0                            | 1.9                             |
| 10            | 0.84                           | 0.85                           | 0.76                           | 0.76                           | 0.67                            |
| 20            | 0.73                           | 0.73                           | 0.64                           | 0.64                           | 0.56                            |
| 100           | 0.59                           | 0.57                           | 0.47                           | 0.48                           | 0.40                            |

### Typical Performance Characteristics



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



**Figure 2. Forward Current vs Voltage**



**Figure 3. Capacitance vs Reverse Voltage (1 MHz to 1 GHz)**



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

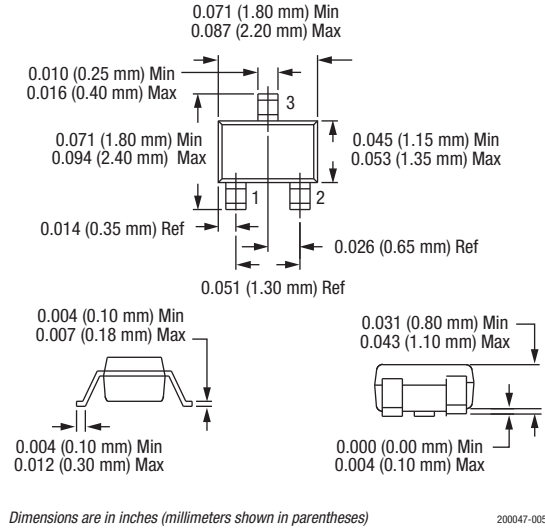
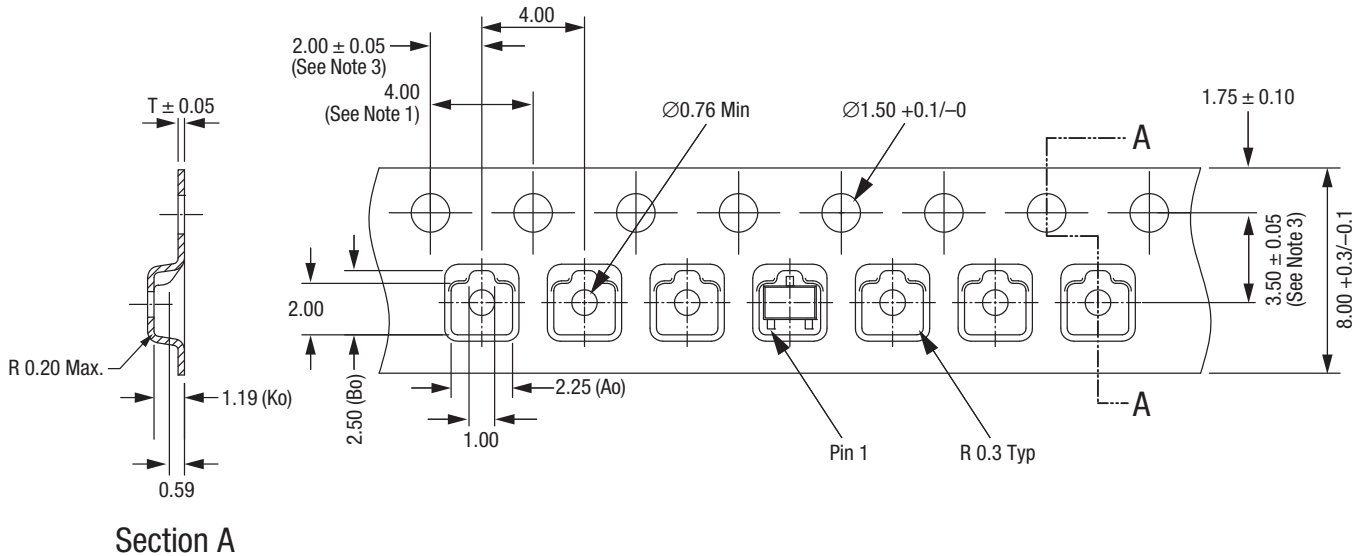


Figure 5. SC-70 Package Dimension Drawing



Notes:

1. Sprocket hole pitch cumulative tolerance  $\pm 0.2$  mm.
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 and conductive material.
5. All measurements are in millimeters.

200047-006

Figure 6. SC-70 Tape and Reel Dimensions



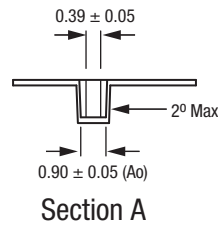
Dimensions are in inches (millimeters shown in parentheses) 200047-007

Figure 7. SC-79 Package Dimension Drawing



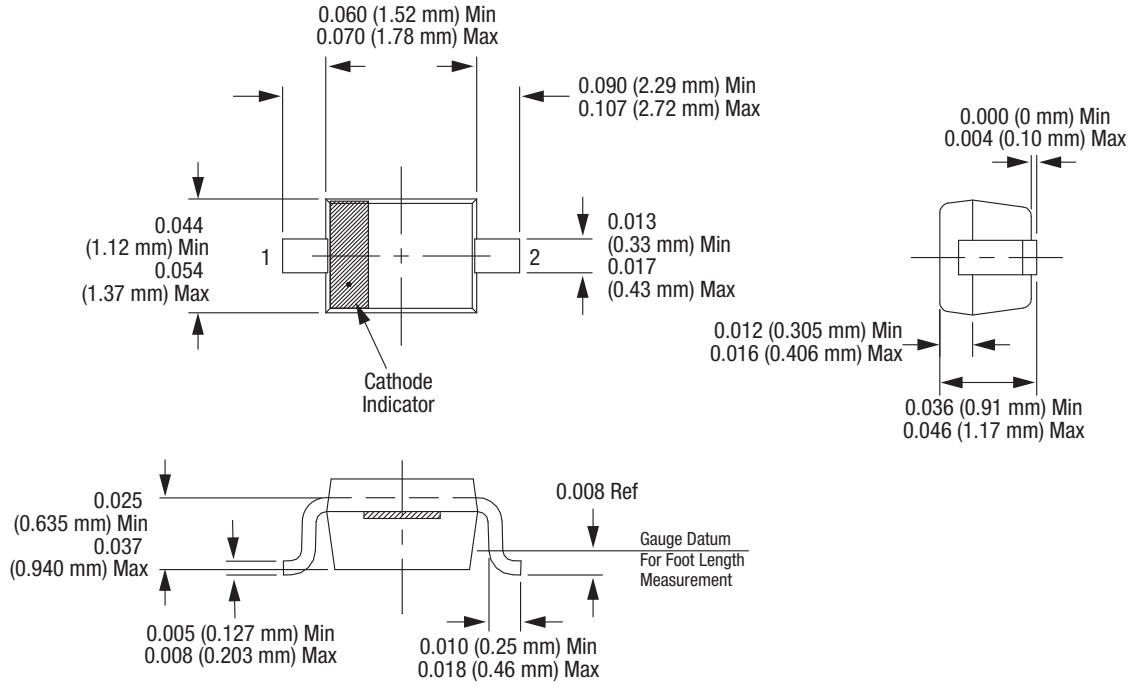
Notes:

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.



200047-008

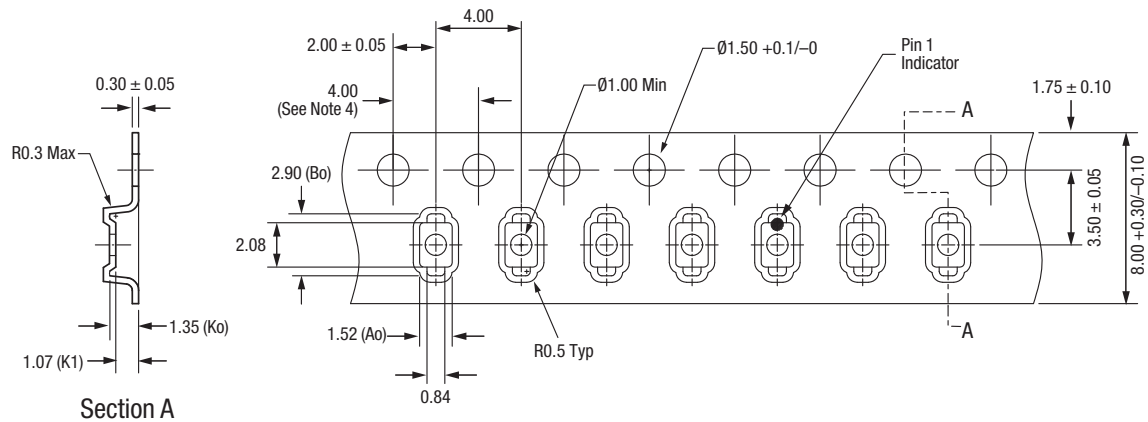
Figure 8. SC-79 Tape and Reel Dimensions



Dimensions are in inches (millimeters shown in parentheses)

200047-009

Figure 9. SOD-323 Package Dimension Drawing



Notes:

1. Carrier tape: black conductive polystyrene.
2. Cover tape: transparent conductive PSA.
3. Cover tape size: 5.4 mm width.
4. 10 sprocket hole pitch cumulative tolerance: ±0.20 mm.
5. All measurements are in millimeters.

200047-010

Figure 10. SOD-323 Tape and Reel Dimensions

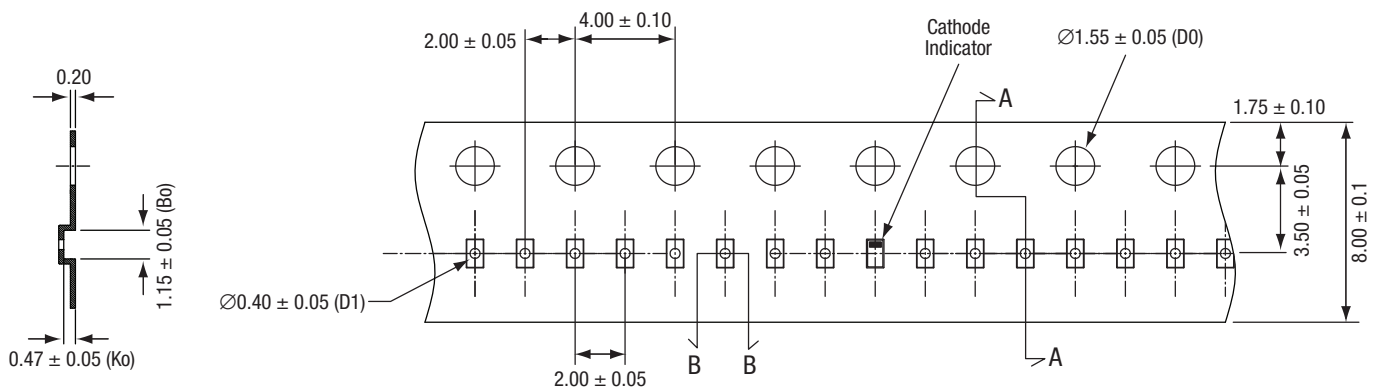


Notes:

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.

200047-011

Figure 11. SOD-882 Package Dimension Drawing



Section A

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  $\geq 1 \times 10^4 \sim \leq 1 \times 10^8$  Ohms/square.
5. All dimensions are in millimeters.

0.70 ± 0.05 (A0)

Section B

200047-012

Figure 12. SOD-882 Tape and Reel Dimensions



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