



**THE DATASHEET OF
SMP1302-075LF**



DATA SHEET

SMP1302 Series: Switch and Attenuator Plastic Packaged PIN Diodes

Applications

- TV distribution and cellular base stations
- High volume switch and attenuators

Features

- Designed for base station and handset applications
- Low-distortion design
- Available in tape and reel packaging
- Packages rated MSL1 @ 260 °C per JEDEC J-STD-020

NEW

Skyworks offers lead (Pb)-free RoHS (Restriction of Hazardous Substances) compliant packaging.



Description

The SMP1302 series of plastic packaged, surface mountable, low capacitance (0.3 pF) silicon PIN diodes is designed for high-volume switch and attenuator applications from 10 MHz to beyond 2 GHz.

These diodes are designed for use in low- distortion PI and TEE attenuators with low drive current (maximum resistance at 1 mA is 10 Ω) commonly used in TV distribution and cellular base station applications. The nominal 50 μm I region width, combined with a maximum resistance of 3 Ω at 10 mA, makes these diodes useful in large signal switch applications.

The SMP1302 series provides single and dual diodes in a selection of plastic packages including SOT-23, SOD-323, small footprint SC-79, an ultralow inductance (0.2 nH) SOT-143 (SMP1302-017), and miniature SC-70.

A four-diode array is available in an SOT-5 package (SMP1302-027) designed for insertion in the commonly used four-diode PI attenuator circuits.

Table 1 describes the various packages and marking of the SMP1302 series.

Table 1. SMP1302 Series Packaging and Marking

| | | | | | | | | |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------|
| | | | | | | | | |
| Single | Common Anode | Common Cathode | Series Pair | Reverse Series Pair | Single | Ultralow Inductance | PI | Single |
| SOT-23 | SOT-23 | SOT-23 | SOT-23 | SOT-23 | SOD-323 | SOT-143 | SOT-5 | SC-79 |
| SMP1302-001 Marking: PF1 | SMP1302-003 Marking: PF9 | SMP1302-004 Marking: PF3 | SMP1302-005 Marking: PFS | | | SMP1302-017 Marking: PFF | SMP1302-027 Marking: PFM | |
| SMP1302-001LF Marking: RF1 | SMP1302-003LF Marking: RF9 | SMP1302-004LF Marking: RF3 | SMP1302-005LF Marking: RF2 | SMP1302-006LF Marking: RF8 | SMP1302-011LF Marking: RF | SMP1302-017LF Marking: RFF | SMP1302-027LF Marking: RFM | ◆ SMP1302-079LF |
| $L_S = 1.5 \text{ nH}$ | $L_S = 1.5 \text{ nH}$ | $L_S = 1.5 \text{ nH}$ | $L_S = 1.5 \text{ nH}$ | $L_S = 1.5 \text{ nH}$ | $L_S = 1.5 \text{ nH}$ | $L_S = 0.2 \text{ nH}$ | | $L_S = 0.7 \text{ nH}$ |
| | | SC-70 | SC-70 | | | | | |
| | | SMP1302-074 Marking: PF3 | | | | | | |
| | | SMP1302-074LF Marking: RF3 | SMP1302-075LF Marking: RF2 | | | | | |
| | | $L_S = 1.4 \text{ nH}$ | $L_S = 1.4 \text{ nH}$ | | | | | |



LF denotes lead (Pb)-free, RoHS-compliant packaging option as an alternative to their standard Skyworks tin/lead (Sn/Pb) packaging.



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SMP1302-017: Low Inductance PIN Diode in SOT-143 Package

The SMP1302-017 uses the SMP1302 PIN diode in a customized SOT-143 plastic package designed for high performance in high-frequency applications. Its effective inductance, based on the 3 GHz isolation, is <math><0.2 \text{ nH}</math>. The SOT-143 package is diagrammed in Figure 1.

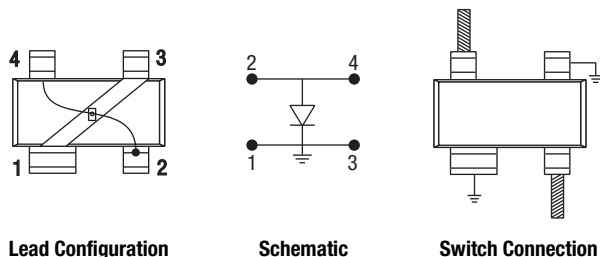


Figure 1. SOT-143 Package

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMP1302 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 SMP1302 series are illustrated in Figures 2 to 5. Package dimensions are shown in Figures 6 to 11.

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 SMP1302 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. For packaging details, refer to the Skyworks Application Note *Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation*, document number 200083.

Table 2. SMP1302 Series Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Maximum | Units |
|--|-----------|---------|---------|-------|
| Reverse voltage | V_R | | 200 | 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 SMP1302 series PIN diodes are Class 1C ESD devices.

Table 3. SMP1302 Series Electrical Specifications (Note 1)**($T_A = +25\text{ °C}$, Unless Otherwise Noted)**

| Parameter | Symbol | Test Condition | Min | Typical | Max | Units |
|----------------------|----------|--|-----|---------|----------------|----------------------------------|
| Reverse current | I_R | $V_R = 200\text{ V}$ | | | 10 | μA |
| Capacitance (Note 2) | C_T | $f = 1\text{ MHz}, V = 30\text{ V}$ | | | 0.3 | pF |
| Resistance | R_S | $f = 100\text{ MHz}$ $I = 1\text{ mA}$ $I = 10\text{ mA}$ $I = 100\text{ mA}$ | | 15 | 20 3 1.5 | Ω Ω Ω |
| Forward voltage | V_F | $I_F = 10\text{ mA}$ | | 0.8 | | V |
| Carrier lifetime | τ_I | $I_F = 10\text{ mA}$ | | 0.7 | | μs |
| I region width | | | | 50 | | μm |

Note 1: Performance is guaranteed only under the conditions listed in this Table and is not guaranteed over the full operating or storage temperature ranges. Operation at elevated temperatures may reduce reliability of the device.

Note 2: The SMP1302-017 and SMP1302-027 maximum capacitance is 0.45 pF.

Table 4. Resistance vs Temperature @ 100 MHz

| I_F (mA) | $R_S @ -55\text{ °C}$ (Ω) | $R_S @ -15\text{ °C}$ (Ω) | $R_S @ +25\text{ °C}$ (Ω) | $R_S @ +65\text{ °C}$ (Ω) | $R_S @ +100\text{ °C}$ (Ω) |
|---------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--|
| 0.02 | 599 | 653 | 692 | 715 | 722 |
| 0.10 | 123 | 135 | 143 | 154 | 161 |
| 0.3 | 42.2 | 46.6 | 49.7 | 54.3 | 56.8 |
| 1.0 | 13.5 | 15.0 | 16.2 | 17.9 | 18.8 |
| 10 | 2.0 | 2.3 | 2.6 | 2.9 | 3.0 |
| 20 | 1.34 | 1.50 | 1.70 | 2.00 | 2.00 |
| 100 | 0.60 | 0.74 | 1.00 | 1.10 | 1.10 |

Typical Performance Data

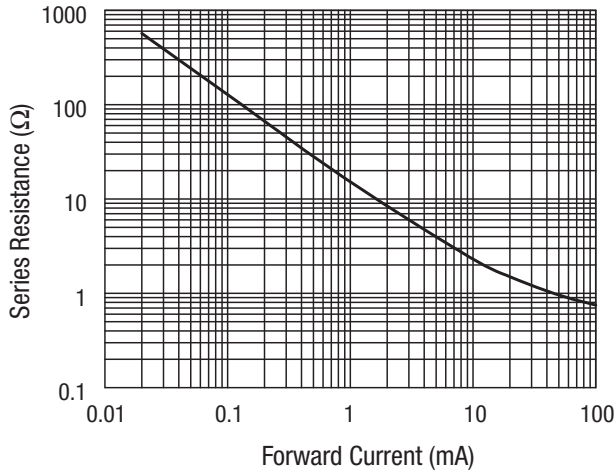


Figure 2. Series Resistance vs Current @ 100 MHz

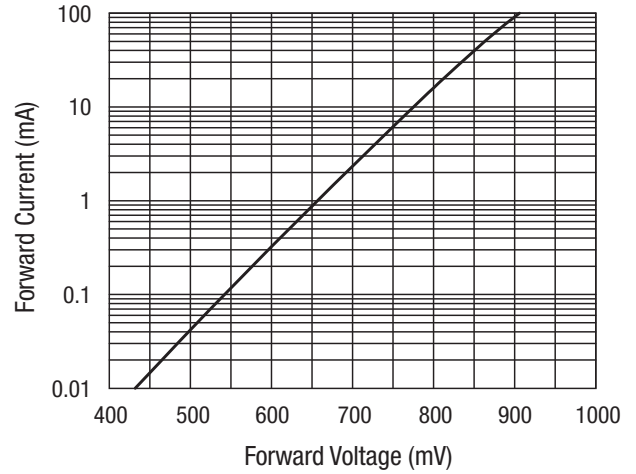


Figure 3. DC Characteristic

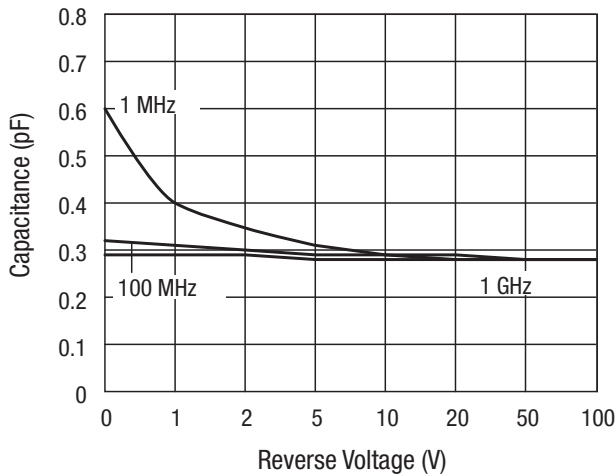


Figure 4. Capacitance vs Reverse Voltage

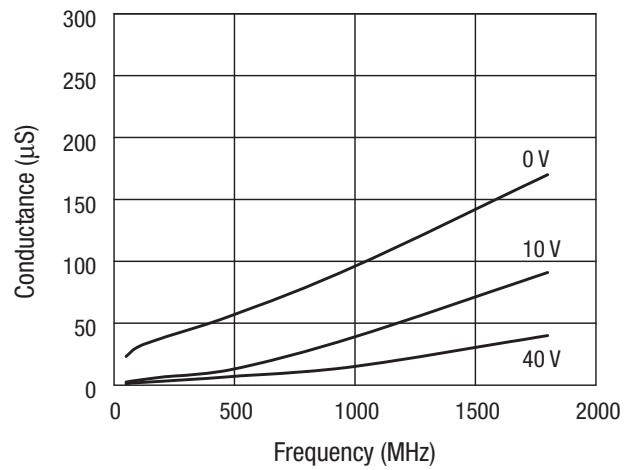


Figure 5. Conductance vs Frequency and Reverse Voltage

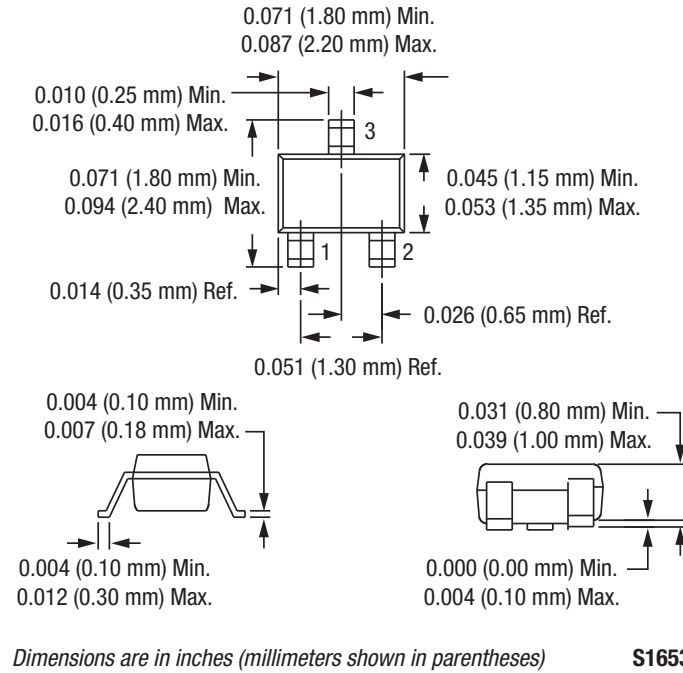


Figure 6. SC-70 Package Dimension Drawing

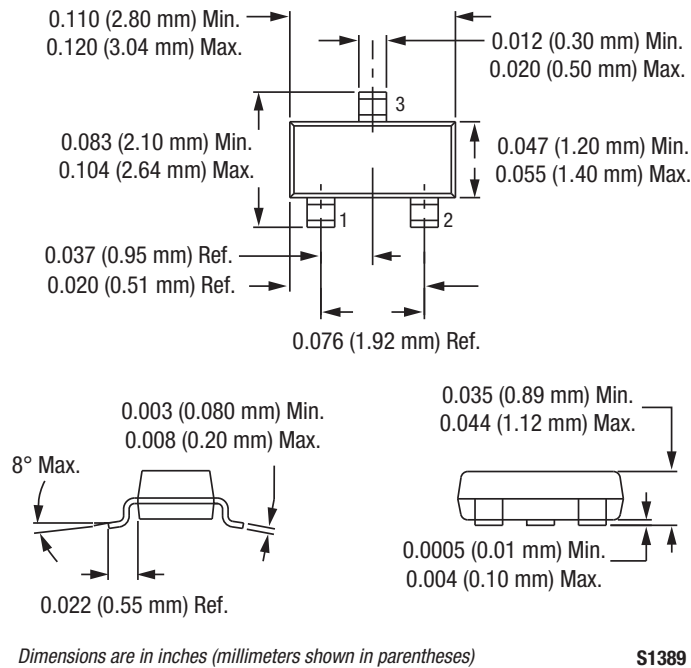
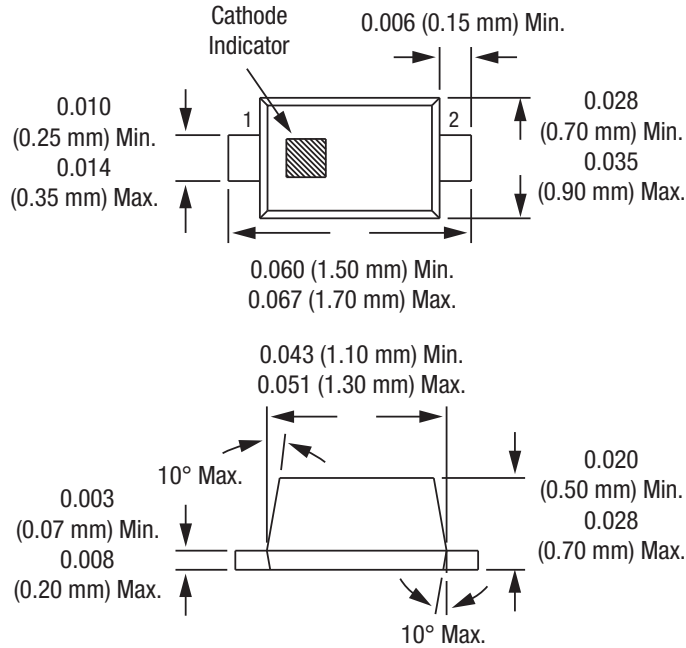
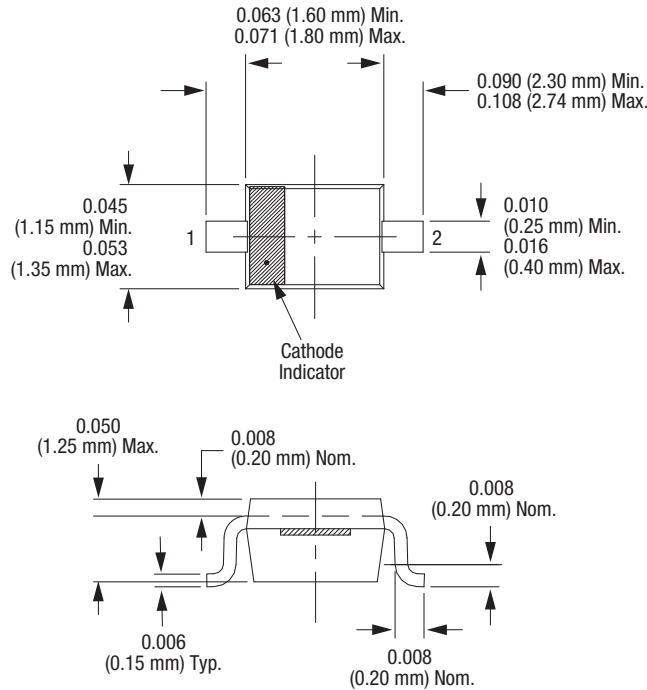


Figure 7. SOT-23 Package Dimension Drawing



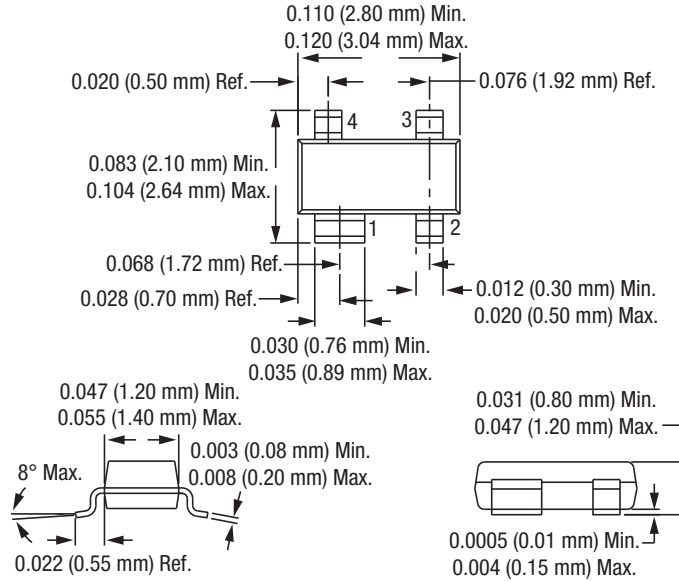
Dimensions are in inches (millimeters shown in parentheses) **S1652**

Figure 8. SC-79 Package Dimension Drawing



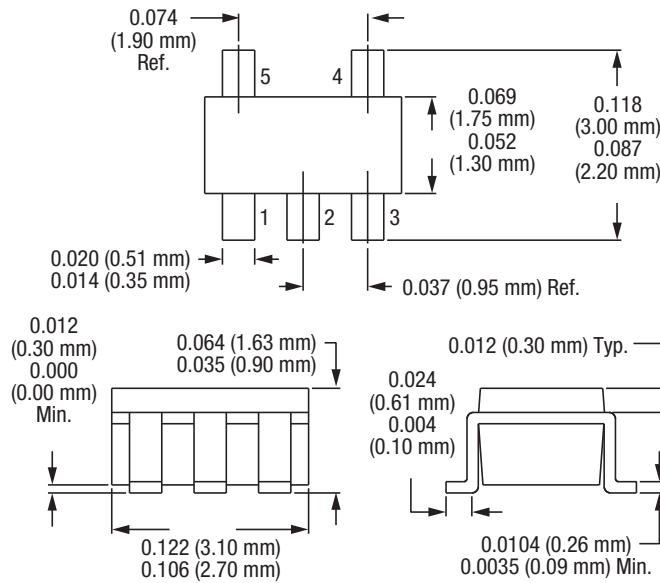
Dimensions are in inches (millimeters shown in parentheses) **S1619**

Figure 9. SOD-323 Package Dimension Drawing



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

Figure 10. SOT-143 Package Dimension Drawing



Dimensions are in inches (millimeters shown in parentheses) **S1657**

Figure 11. SOT-5 Package Dimension Drawing

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