

DATA SHEET

# SMP1302 Series: Switch and Attenuator Plastic Packaged PIN Diodes

## Features

- Designed for base station and handset applications
- Low-distortion design
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C<sup>(1)</sup> per JEDEC J-STD-020
- Available in tape and reel 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. Available as 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. Available in a SOT-5 (SMP1302-027) package as a four-diode array designed for insertion in the commonly used four-diode PI attenuator circuit.

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



## Absolute Maximum Ratings

Characteristic	Value
Reverse voltage ( $V_R$ )	200 V
Power dissipation @ 25 °C lead temperature ( $P_D$ )	250 mW
Storage temperature ( $T_{ST}$ )	-65 °C to +150 °C
Operating temperature ( $T_{OP}$ )	-65 °C to +150 °C
ESD human body model	Class 1C

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

**CAUTION:** Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) 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 must be employed at all times.

1. SOT-5 (-027) MSL to be defined.

Single	Common Anode	Common Cathode	Series Pair	Single	Ultralow Inductance	PI	Single
SOT-23	SOT-23	SOT-23	SOT-23	SOD-323	SOT-143	SOT-5	SC-79
<b>SMP1302-001</b> Marking: PF1	<b>SMP1302-003</b> Marking: PF9	<b>SMP1302-004</b> Marking: PF3	<b>SMP1302-005</b> Marking: PF2	<b>SMP1302-011</b> Marking: PF	<b>SMP1302-017</b> Marking: PFF	<b>SMP1302-027</b> Marking: PFM	◆ <b>SMP1302-079</b>
<b>SMP1302-001LF</b> Marking: RF1	<b>SMP1302-003LF</b> Marking: RF9	<b>SMP1302-004LF</b> Marking: RF3	<b>SMP1302-005LF</b> Marking: RF2	<b>SMP1302-011LF</b> Marking: RF	<b>SMP1302-017LF</b> Marking: RFF	<b>SMP1302-027LF</b> Marking: RFM	◆ <b>SMV1302-079LF</b>
$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 0.2$ nH		$L_S = 0.7$ nH
		SC-70	SC-70				
		<b>SMP1302-074</b> Marking: PF3					
		<b>SMP1302-074LF</b> Marking: RF3	<b>SMP1302-075LF</b> Marking: RF2				
		$L_S = 1.4$ nH	$L_S = 1.4$ nH				

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

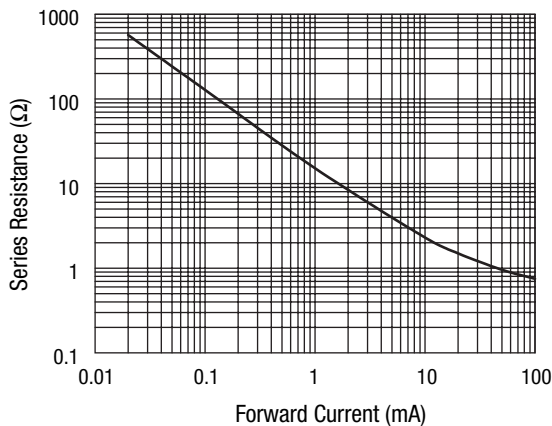
**Innovation to Go™**  
Select Linear Products (indicated by ◆) now available for purchase online.

### Electrical Specifications at 25 °C

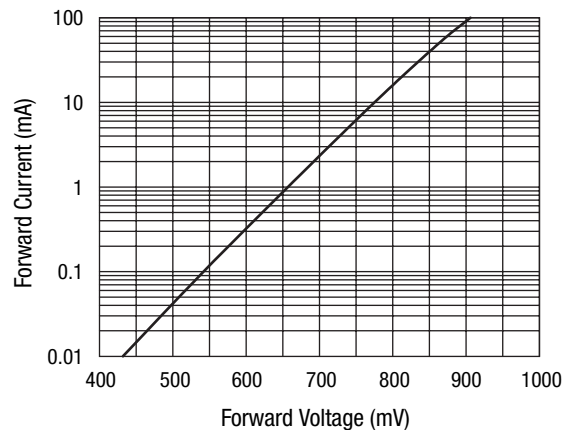
Parameter	Condition	Typ.	Max.	Unit
Reverse current ( $I_R$ )	$V_R = 200$ V		10	$\mu$ A
Capacitance ( $C_T$ ) <sup>(1)</sup>	$F = 1$ MHz, $V = 30$ V		0.3	pF
Resistance ( $R_S$ )	$F = 100$ MHz, $I = 1$ mA	15	20	$\Omega$
Resistance ( $R_S$ )	$F = 100$ MHz, $I = 10$ mA		3	$\Omega$
Resistance ( $R_S$ )	$F = 100$ MHz, $I = 100$ mA		1.5	$\Omega$
Forward voltage ( $V_F$ )	$I_F = 10$ mA	0.8		V
Carrier lifetime (TI)	$I_F = 10$ mA	0.7		$\mu$ s
I region width		50		$\mu$ m

1. The SMP1302-017 and SMP1302-027 maximum capacitance is 0.45 pF.

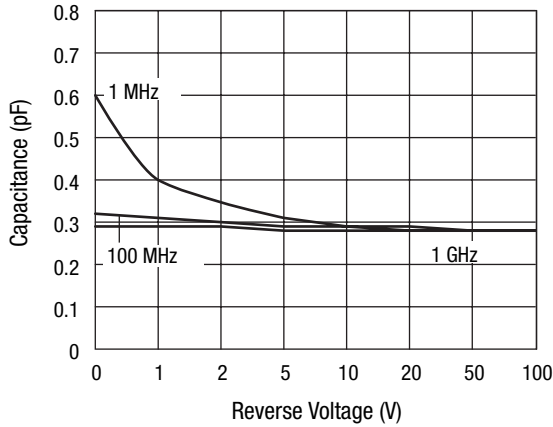
### Typical Performance Data



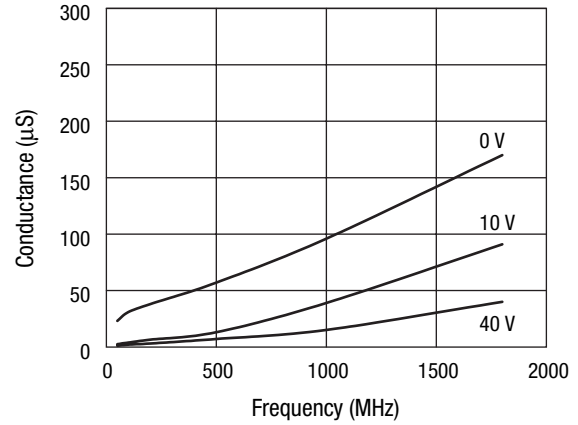
**Series Resistance vs. Current @ 100 MHz**



**DC Characteristic**



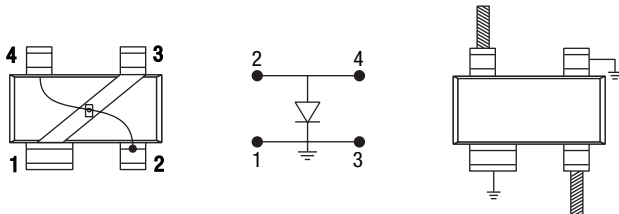
Capacitance vs. Reverse Voltage



Conductance vs. Frequency and Reverse Voltage

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

The SMP1302-017 utilizes the SMP1302 PIN diode chip 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 less than 0.2 nH.



Lead Configuration

Schematic

Switch Connection

**Resistance vs. Temperature @ 100 MHz**

$I_F$ (mA)	R -55 °C (Ω)	R -15 °C (Ω)	R 25 °C (Ω)	R 65 °C (Ω)	R 100 °C (Ω)
	-55	-15	25	65	100
0.02	599	653	692	715	722
0.1	123	135	143	154	161
0.3	42.2	46.6	49.7	54.3	56.8
1	13.5	15	16.2	17.9	18.8
10	2	2.3	2.6	2.9	3
20	1.34	1.5	1.7	2	2
100	0.6	0.74	1	1.1	1.1

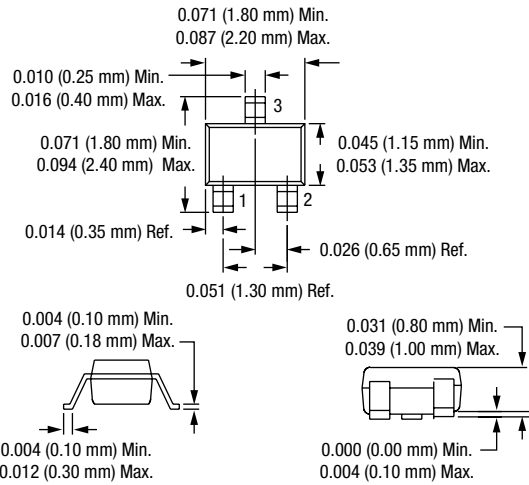
**Recommended Solder Reflow Profiles**

Refer to the [“Recommended Solder Reflow Profile”](#) Application Note.

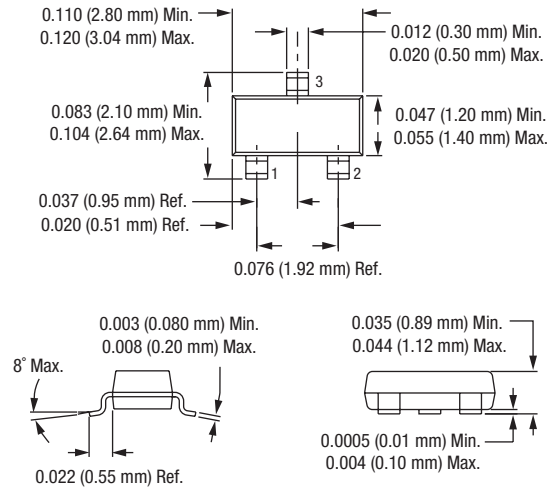
**Tape and Reel Information**

Refer to the [“Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation”](#) Application Note.

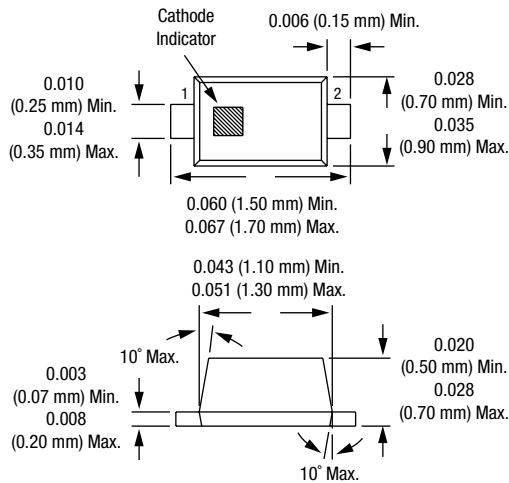
**SC-70**



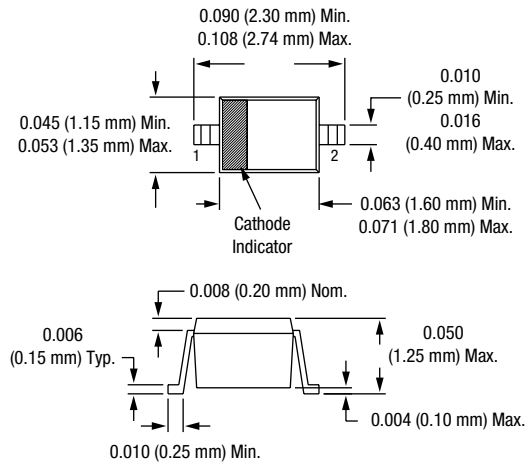
**SOT-23**



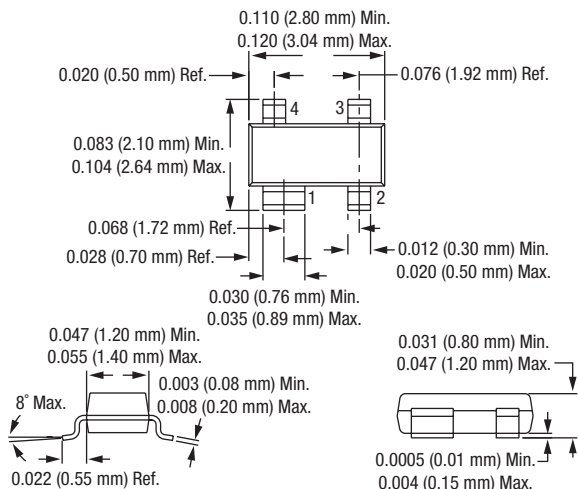
**SC-79**



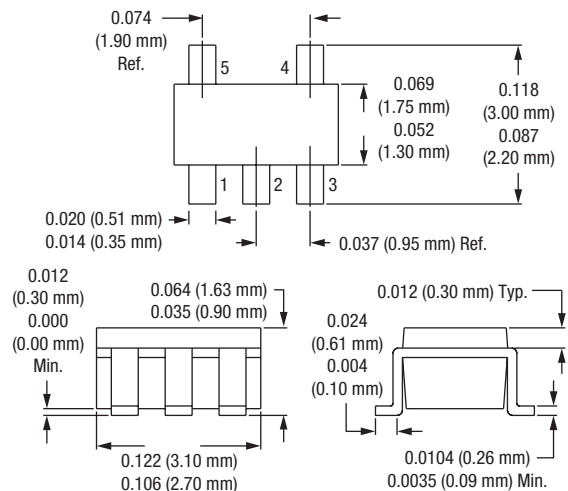
**SOD-323**



**SOT-143**



**SOT-5**



Copyright © 2002, 2003, 2004, 2005, 2006, Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks, the Skyworks symbol, "Breakthrough Simplicity" and "Innovation to Go" are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at [www.skyworksinc.com](http://www.skyworksinc.com), are incorporated by reference.