SKYWORKS®

DATA SHEET

SMP1322 Series: Low Resistance, Plastic Packaged PIN Diodes

Features

- Designed for high-performance wireless switch applications
- R_S @ 1 mA 0.8 Ω typical
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020
- Available in tape and reel packaging

Description

The SMP1322 series of plastic packaged, surface mountable PIN diodes are designed for high-volume switch applications from 10 MHz to beyond 2 GHz. The ultralow resistance of these diodes (1.5 Ω maximum at 1 mA and 0.5 Ω typical at 10 mA) makes the SMP1322 series suited to low-loss PIN diode switches in battery operated circuits. Available in a selection of plastic packages and in a variety of configurations including an ultralow inductance (0.2 nH) SOT-143 (SMP1322-017), the small footprint SC-79 and the miniature SC-70. In addition, the SMP1322-016 consists of two diodes in a SOT-143 package configured to enable insertion in a quarter-wave T/R switch with no crossover connections.

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



Absolute Maximum Ratings

Characteristic	Value
Reverse voltage (V_R)	50 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 1B

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.*

							
Single	Common Anode	Common Cathode	Series Pair	Single	T/R Switch	Ultralow Inductance	Single
SOT-23	SOT-23	SOT-23	SOT-23	SOD-323	SOT-143	SOT-143	SC-79
SMP1322-001 Marking: PN1	**SMP1322-003** Marking: PN9	**SMP1322-004** Marking: PN3	**SMP1322-005** Marking: PN2	**SMP1322-011** Marking: PN	**SMP1322-016** Marking: PN6	**♦SMP1322-017** Marking: PNF	**SMP1322-079**
SMP1322-001LF Marking: RN1	**SMP1322-003LF** Marking: RN9	**SMP1322-004LF** Marking: RN3	**SMP1322-005LF** Marking: RN2	**SMP1322-011LF** Marking: RN	**SMP1322-016LF** Marking: RN6	**♦SMP1322-017LF** Marking: RNF	**SMP1322-079LF**
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 = 1.5 nH	L_S = 0.2 nH	L_S = 0.7 nH
		SC-70					
		SMP1322-074 Marking: PN3					
		SMP1322-074LF Marking: RN3					
		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.

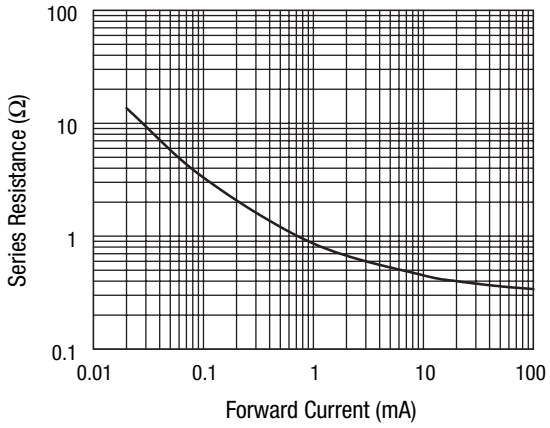
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Electrical Specifications at 25 °C

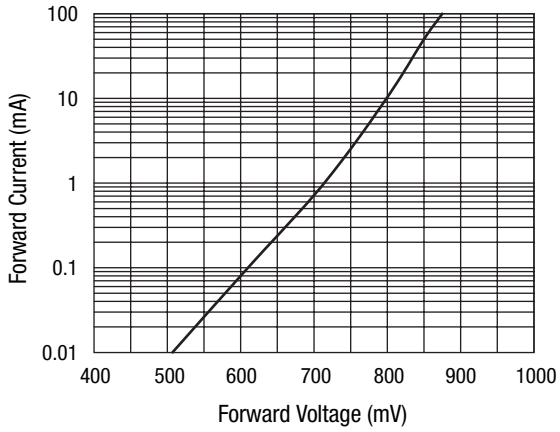
Parameter	Condition	Typ.	Max.	Unit
Reverse current (I_R)	V_R = 50 V		10	µA
Capacitance (C_T)[1]	F = 1 MHz, V = 30 V		1	pF
Resistance (R_S)	F = 100 MHz, I = 1 mA		1.5	Ω
Resistance (R_S)	F = 100 MHz, I = 10 mA	0.5		Ω
Forward voltage (V_F)	I_F = 10 mA	0.85		V
Carrier lifetime (TI)	I_F = 10 mA	0.4		µs
I region width		8		µm

1. The SMP1322-016, SMP1322-017 and SMP1322-017LF maximum capacitance is 1.15 pF.

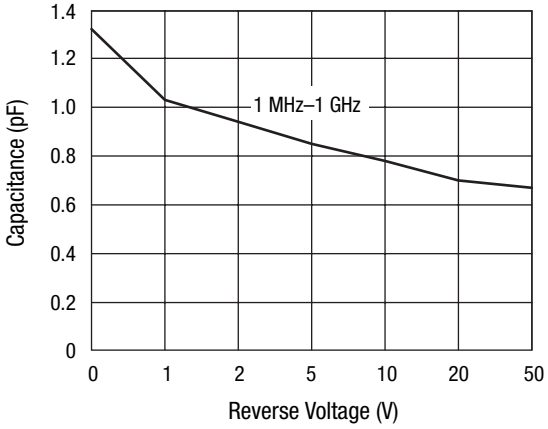
Typical Performance Data



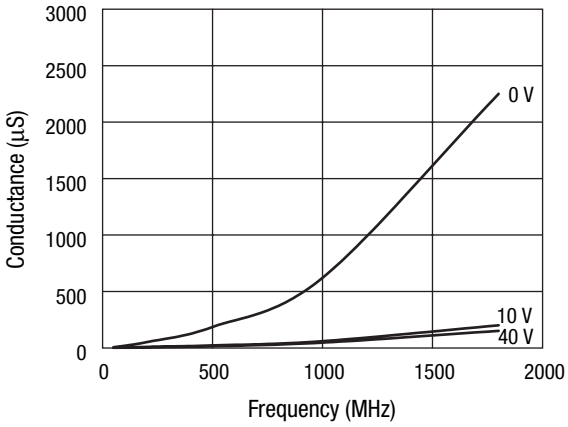
Series Resistance vs. Current @ 100 MHz



DC Characteristic



Capacitance vs. Reverse Voltage



Conductance vs. Frequency and Reverse Voltage

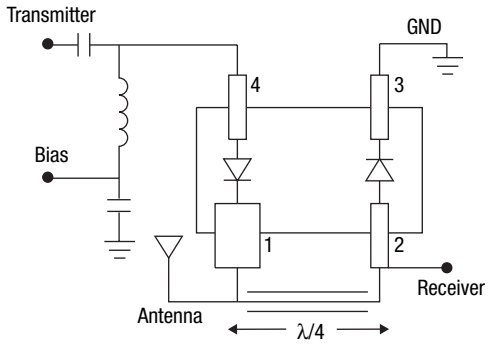
Resistance vs. Temperature @ 500 MHz

I_F (mA)	R -55 °C (Ω)	R -15 °C (Ω)	R 25 °C (Ω)	R 65 °C (Ω)	R 100 °C (Ω)
0.02	9.5	9.4	9.9	10.5	10.9
0.1	3	3	3	3.3	3.5
0.3	1.5	1.5	1.5	1.6	1.8
0.5	1.1	1.1	1.2	1.2	1.4
1	0.922	0.914	0.902	0.963	1.1
10	0.568	0.559	0.533	0.563	0.655
20	0.532	0.52	0.494	0.521	0.61
100	0.483	0.469	0.44	0.464	0.565

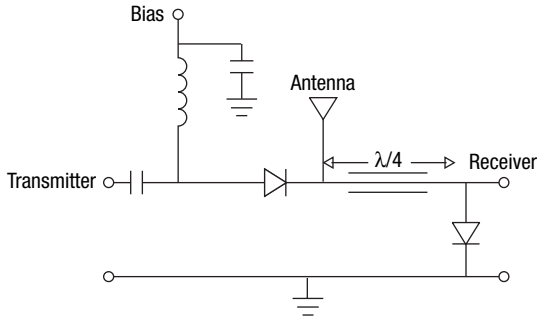
SMP1322-016 SOT-143 T/R Switch

The SMP1322-016 is a low-cost PIN diode unconnected pair specifically designed for low-current drain antenna T/R switches in handheld wireless suits. In the specifically configured SOT-143 package, the PIN diodes are oriented to enable connection as a λ/4 switch with no external crossover connections.

SMP1322-016 in λ/4 T/R Switch



λ/4 T/R Switch



Recommended Solder Reflow Profiles

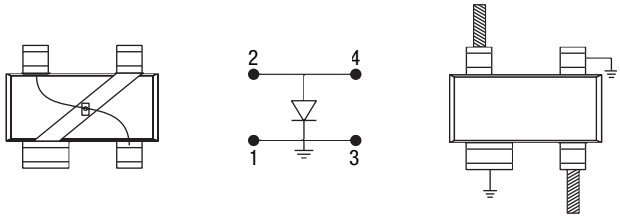
Refer to the *"Recommended Solder Reflow Profile"* Application Note.

Tape and Reel Information

Refer to the *"Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation"* Application Note.

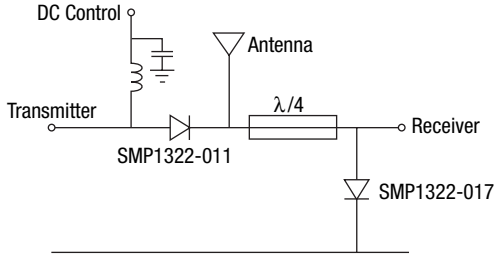
SMP1322-017 SOT-143 Low Inductance PIN Diode

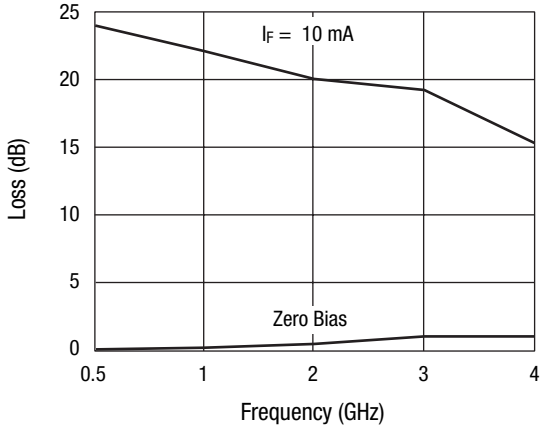
The SMP1322-017 utilizes the SMP1322 PIN diode chip in a customized SOT-143 plastic package designed for high-isolation performance in a shunt connected switch. Its effective inductance, based on the 3 GHz isolation, is less than 0.2 nH. This diode is designed to work effectively as a shunt element in SPDT switches, covering the wireless frequencies from 900 MHz to beyond 2 GHz. Excellent performance is achievable when used in a quarter-wave T/R switch with the SMP1322-001 (SOT-23) or SMP1322-011 (SOD-323) PIN diode as the series connected diode.



Lead Configuration **Schematic** **Switch Connection**

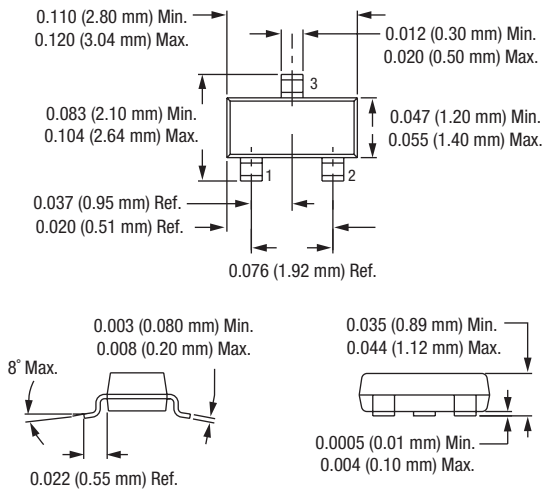
T/R Switch Design



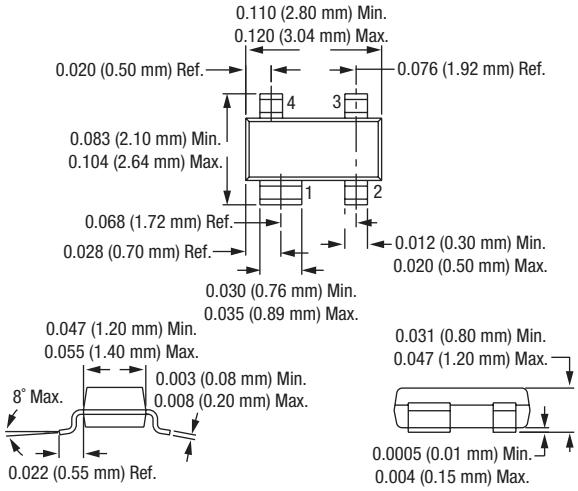


SMP1322-017 Typical SPST Switch Performance

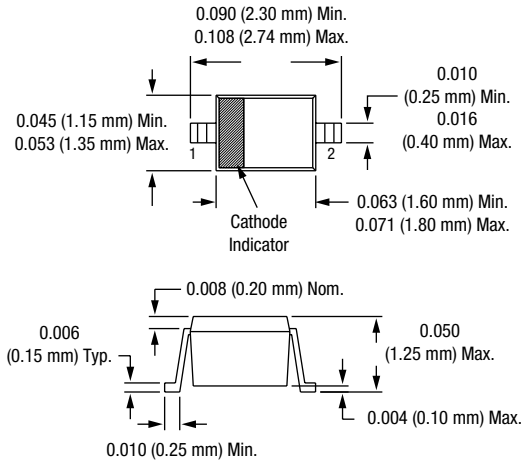
SOT-23



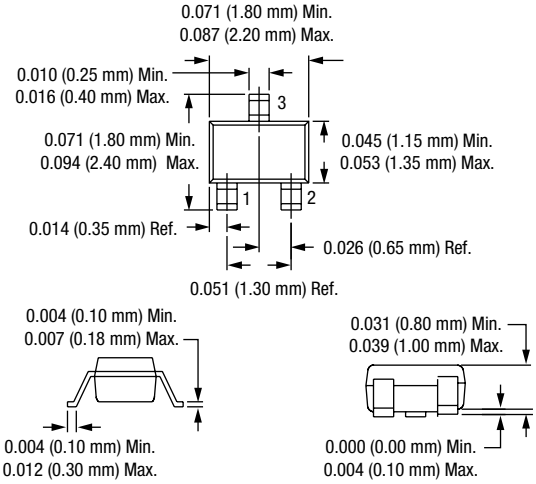
SOT-143



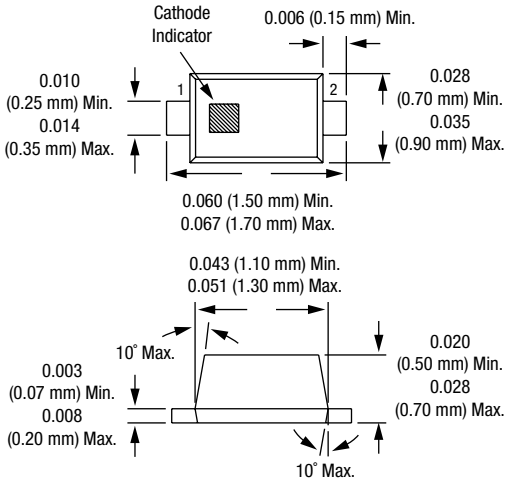
SOD-323



SC-70



SC-79



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