

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 MSL-1 @ 250 °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 ultra low resistance of these diodes (1.5 Ω maximum at 1 mA and 0.5 Ω typical at 10 mA) make the SMP1322 series particularly 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 ultra low 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 2 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 “environmentally friendly” packaging that is RoHS compliant (European Parliament for the Restriction of Hazardous Substances).



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, 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 must be employed at all times.

			
Single	Common Anode	Common Cathode	Series Pair
SOT-23	SOT-23	SOT-23	SOT-23
SMP1322-001 Marking: PN1	SMP1322-003 Marking: PN9	SMP1322-004 Marking: PN3	SMP1322-005 Marking: PN2
SMP1322-001LF Marking: RN1	SMP1322-003LF Marking: RN9	SMP1322-004LF Marking: RN3	SMP1322-005LF Marking: RN2
$L_S = 1.5 \text{ nH}$	$L_S = 1.5 \text{ nH}$	$L_S = 1.5 \text{ nH}$	$L_S = 1.5 \text{ nH}$
		SC-70	SC-70
		SMP1322-074 Marking: PN3	
		SMP1322-074LF Marking: RN3	
		$L_S = 1.4 \text{ nH}$	

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

			
Single	T/R Switch	Ultra Low Inductance	Single
SOD-323	SOT-143	SOT-143	SC-79
SMP1322-011 Marking: PN	SMP1322-016 Marking: PN6	SMP1322-017 Marking: PNF	SMP1322-079
SMP1322-011LF Marking: RN		SMP1322-017LF Marking: RNF	SMP1322-079LF
$L_S = 1.5 \text{ nH}$	$L_S = 1.5 \text{ nH}$	$L_S = 0.2 \text{ nH}$	$L_S = 0.7 \text{ nH}$

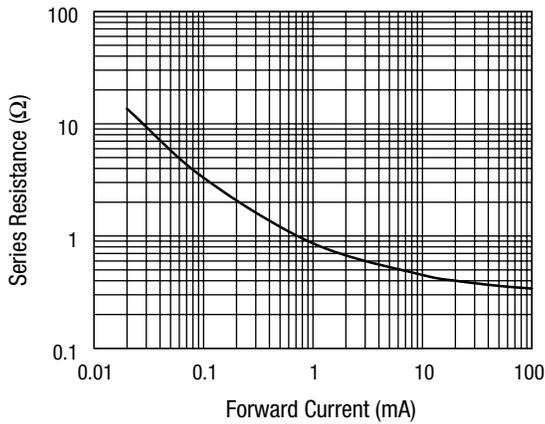
 LF denotes lead (Pb)-free packaging option as an alternative to our standard tin/lead (Sn/Pb) packaging.

Electrical Specifications at 25 °C

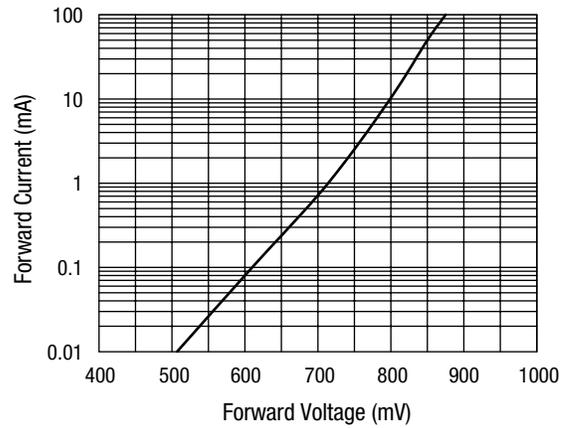
Parameter	Condition	Typ.	Max.	Unit
Reverse current (I_R)	$V_R = 50 \text{ V}$		10	μA
Capacitance (C_T) ⁽¹⁾	$F = 1 \text{ MHz}, V = 30 \text{ V}$		1.0	pF
Resistance (R_S)	$F = 100 \text{ MHz}, I = 1 \text{ mA}$		1.5	Ω
Resistance (R_S)	$F = 100 \text{ MHz}, I = 10 \text{ mA}$	0.50		Ω
Forward voltage (V_F)	$I_F = 10 \text{ mA}$	0.85		V
Carrier lifetime (TI)	$I_F = 10 \text{ mA}$	0.40		μs
I region width		8.00		μm

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

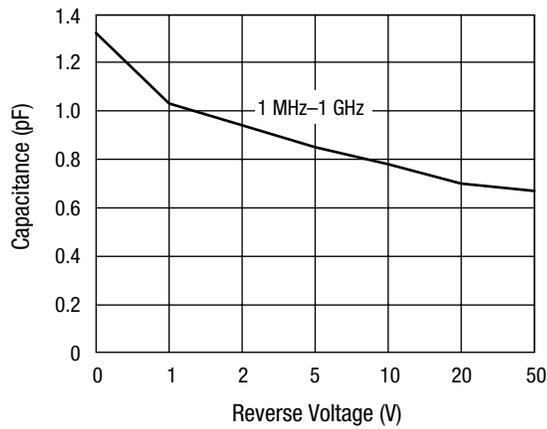
Typical Performance Data



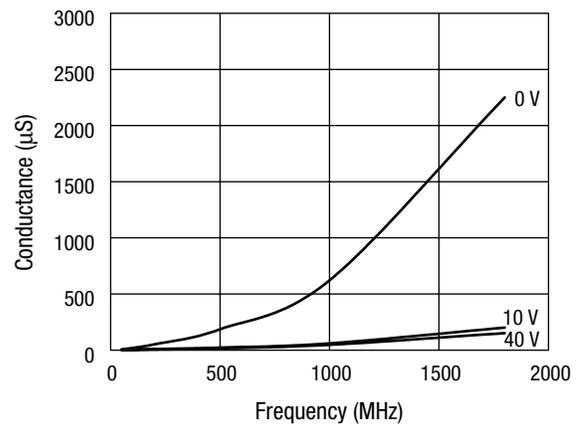
Series Resistance vs. Current @ 100 MHz



DC Characteristic



Capacitance vs. Reverse Voltage



Conductance vs. Frequency and Reverse Voltage

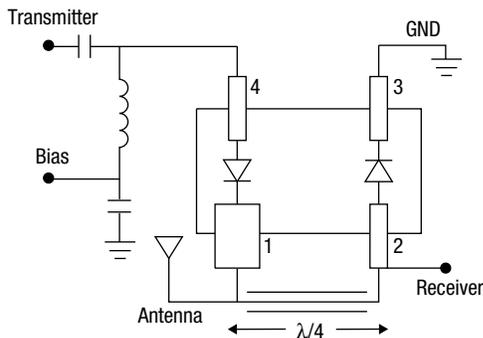
Resistance vs. Temperature @ 500 MHz

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	9.500	9.400	9.900	10.500	10.900
0.10	3.000	3.000	3.000	3.300	3.500
0.30	1.500	1.500	1.500	1.600	1.800
0.50	1.100	1.100	1.200	1.200	1.400
1.00	0.922	0.914	0.902	0.963	1.100
10.00	0.568	0.559	0.533	0.563	0.655
20.00	0.532	0.520	0.494	0.521	0.610
100.00	0.483	0.469	0.440	0.464	0.565

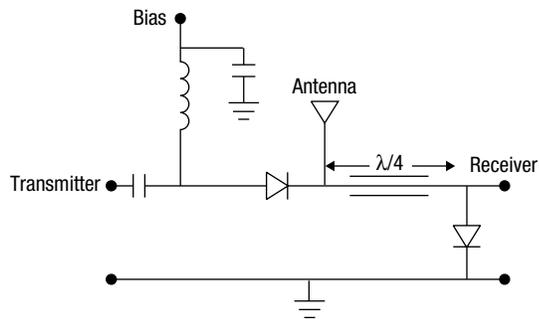
SMP1322-016 SOT-143 T/R Switch

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

SMP1322-016 in $\lambda/4$ T/R Switch

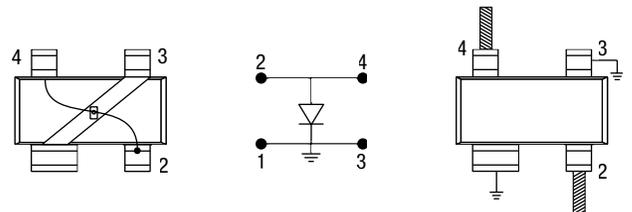


$\lambda/4$ T/R Switch



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.

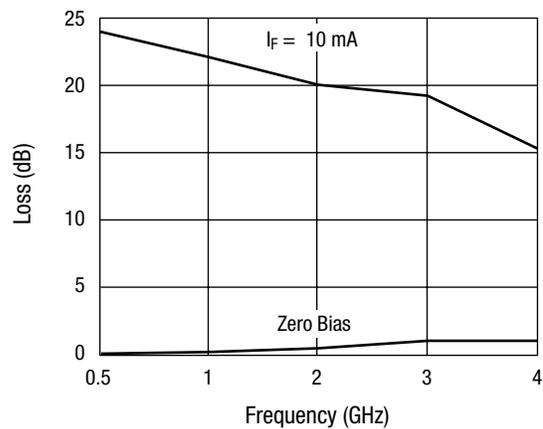
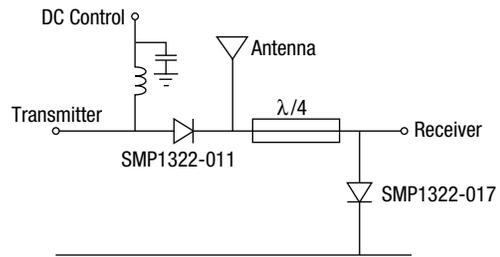


Lead Configuration

Schematic

Switch Connection

T/R Switch Design

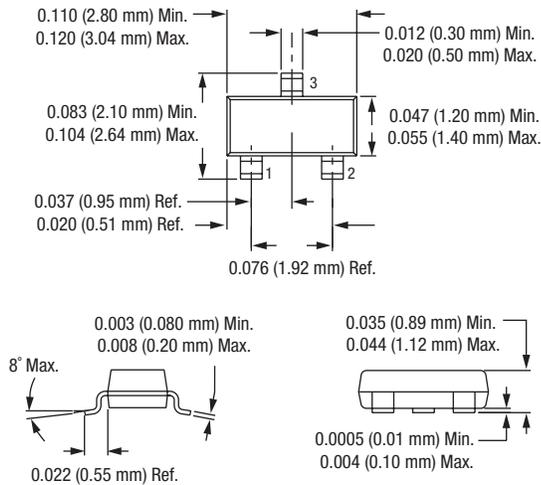


SMP1322-017 Typical SPST Switch Performance

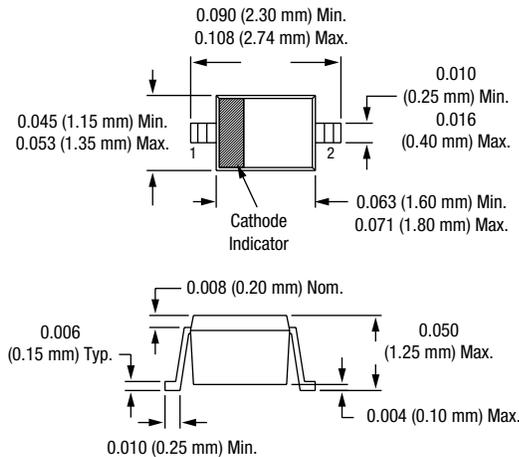
Recommended Solder Reflow Profiles

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

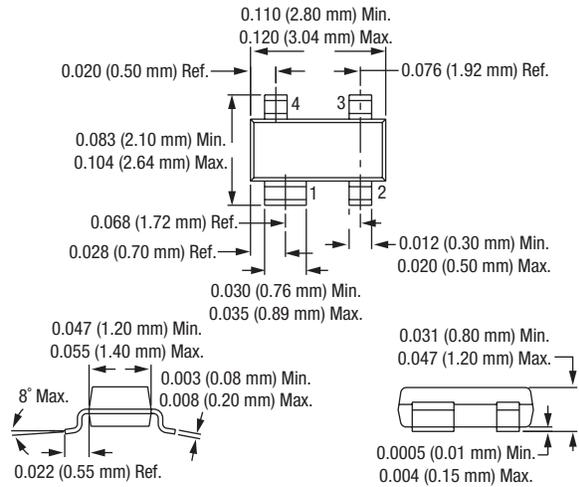
SOT-23



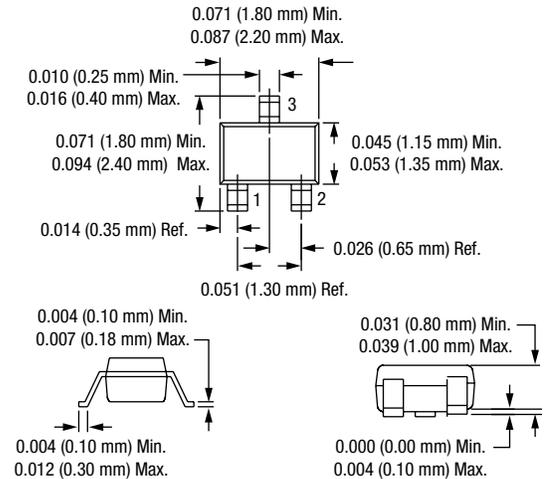
SOD-323



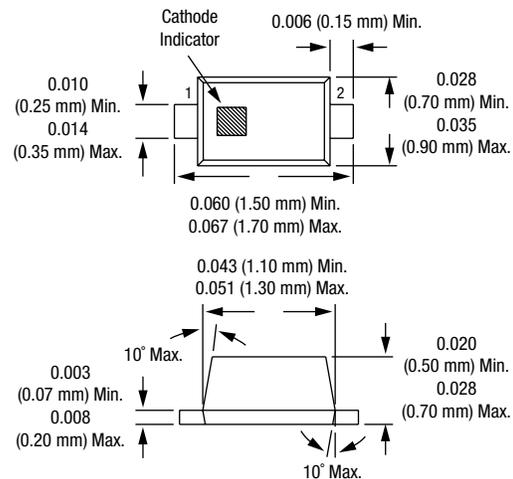
SOT-143



SC-70



SC-79



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