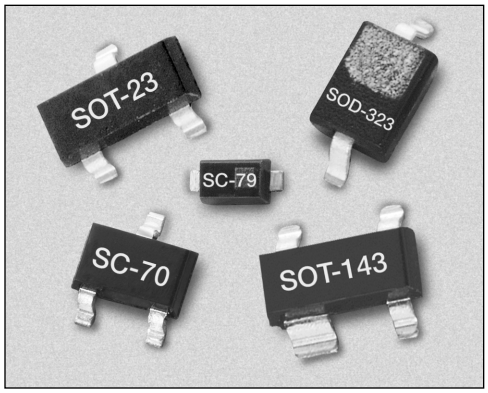
Low Resistance
Plastic Packaged PIN Diodes

Alpha

SMP1322 Series

Features

- Designed for High Performance Wireless Switch Applications
- Specified 1.5 Ω @ 1 mA
- Multiple Package Configurations



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.

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

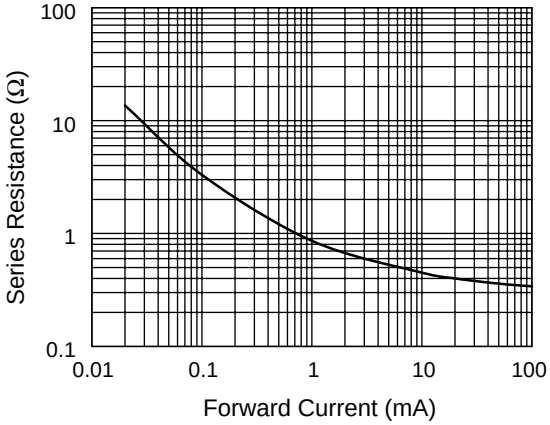
							
Single	Common Cathode	Series Pair	Low Inductance	Single	T/R Switch	Ultra Low Inductance	Single
Marking: PN1	Marking: PN3	Marking: PN2	Marking: PNB		Marking: PN6	Marking: PNC	
SOT-23	SOT-23	SOT-23	SOT-23	SOD-323	SOT-143	SOT-143	SC-79
♦ **SMP1322-001**	♦ **SMP1322-004**	♦ **SMP1322-005**	♦ **SMP1322-007**	♦ **SMP1322-011**	♦ **SMP1322-016**	♦ **SMP1322-017**	♦ **SMP1322-079**
L_S = 1.5 nH	L_S = 1.5 nH	L_S = 1.5 nH	L_S = 0.4 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					
	♦ **SMP1322-074**	♦ **SMP1322-075**					
	L_S = 1.4 nH	L_S = 1.4 nH					

♦ Available through distribution.

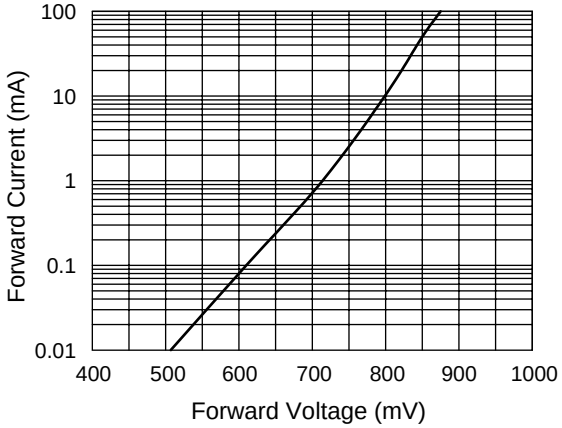
Electrical Specifications at 25°C

Parameter	Condition	Typ.	Max.	Unit
Reverse Current (I_R)	V_R = 50 V		10	µA
Capacitance (C_T)	F = 1 MHz, V = 30 V		1.0	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)	IF = 10 mA	0.85		V
Carrier Lifetime (TI)	IF = 10 mA	0.4		µS
I Region Width		8		µm

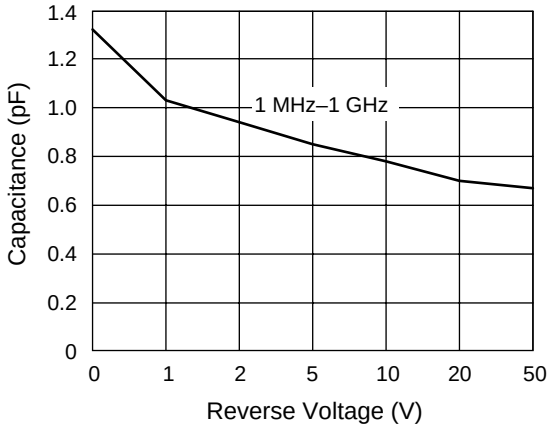
Typical Performance Data



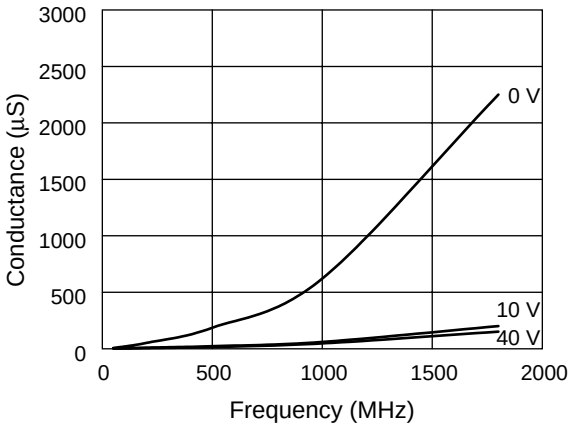
Series Resistance vs. Current @ 100 MHz



DC Characteristic



Capacitance vs. Reverse Voltage



Conductance vs. Frequency and Reverse Voltage

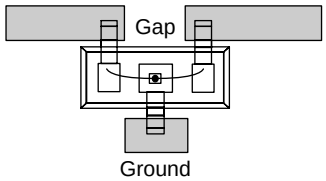
Resistance vs. Temperature @ 500 MHz

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

SMP1322-007

In the -007 configuration of the SOT-23 package, the package inductance is effectively reduced to 0.4 nH, in comparison to the 1.5 nH value of the standard configuration. This lower inductance will be particularly beneficial when the diodes are used as shunt connected switches at frequencies higher than 500 MHz, where inductance is the primary limitation on maximum switch isolation.

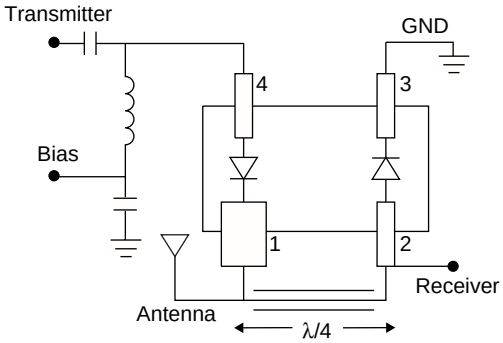
To achieve the effective 0.4 nH, the SOT-23 package must be inserted in the microstrip circuit board with a gap in the trace, as shown in the figure. Because of the polarity of the diode junction, this low inductance feature is only realizable with the cathode connected to ground.



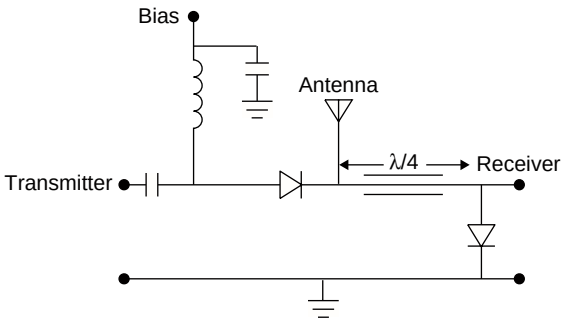
SMP1322-016 SOT-143 T/R Switch

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 λ/4 switch with no external crossover connections.

SMP1322-016 in λ/4 T/R Switch

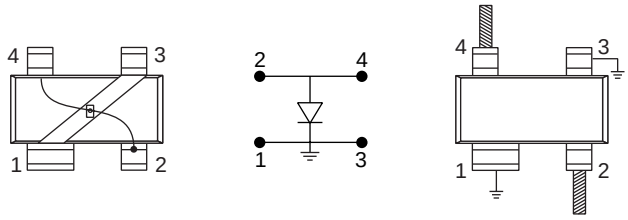


λ/4 T/R Switch



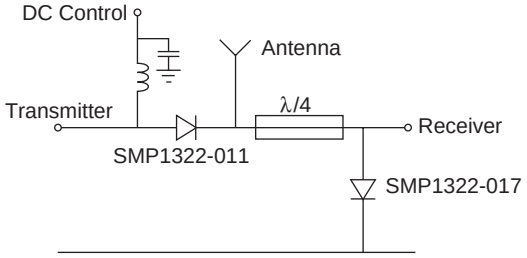
SMP1322-017 SOT-143 Low Inductance PIN Diode

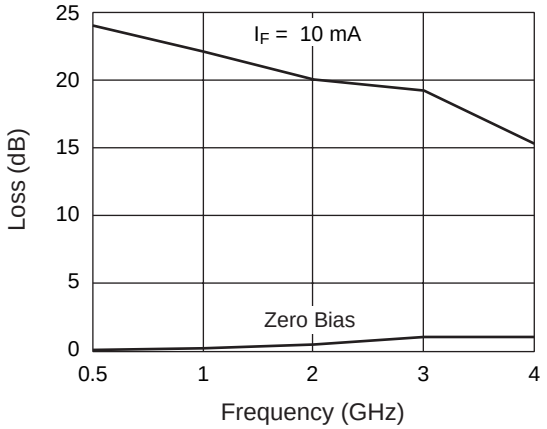
The SMP1322-017 utilizes the SMP1322 PIN diode chip in a customized SOT-143 plastic package designed for high isolation performance in a shunt connected switch. Its effective inductance, based on the 3 GHz isolation, is less than 0.2 nH. This diode is designed to work effectively as a shunt element in 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**

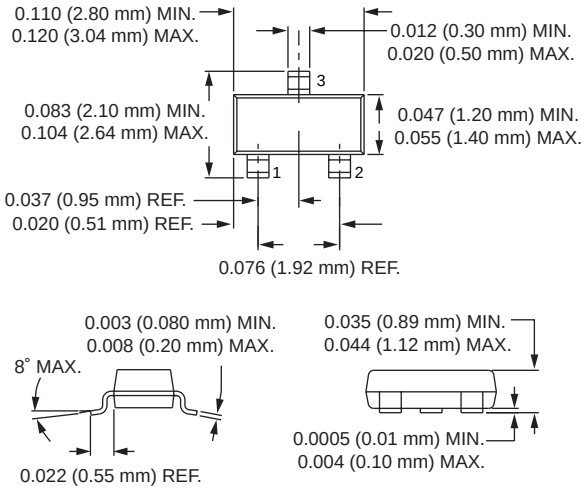
T/R Switch Design



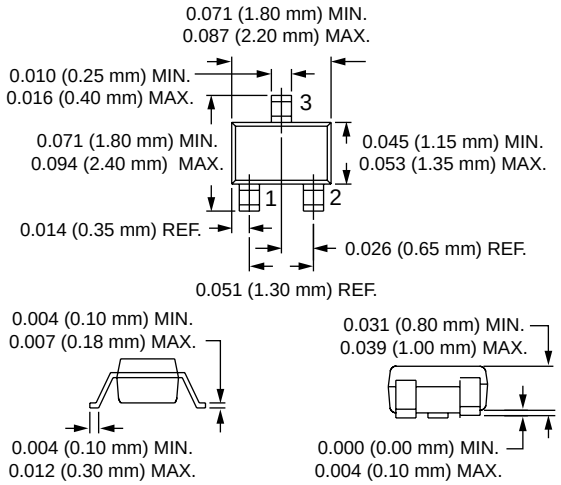


SMP1322-017 Typical SPST Switch Performance

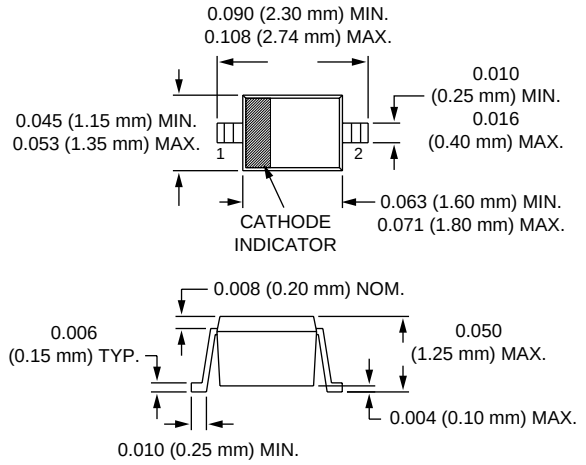
SOT-23



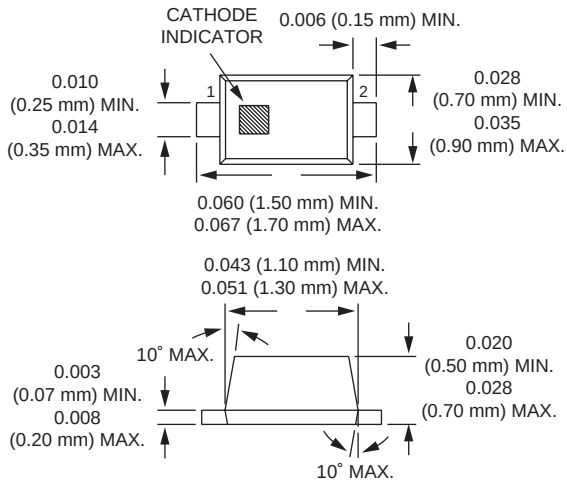
SC-70



SOD-323



SC-79



SOT-143

