

Low Resistance Low Capacitance Plastic Packaged PIN Diodes



SMP1320 Series

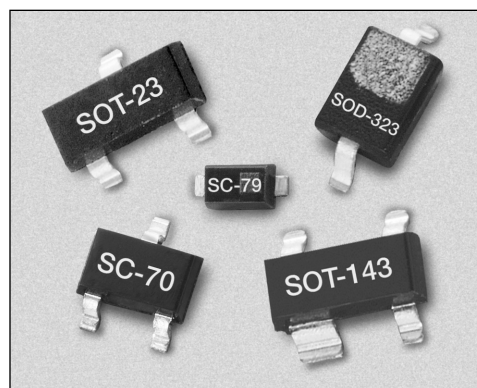
Features

- Designed for High Performance Wireless Switch Applications
- 0.9 Ω Resistance, 0.3 pF Capacitance
- Available Lead (Pb)-Free MSL-1 @ 250°C per JEDEC J-STD-020
- Available in Tape and Reel Packaging

Description

The SMP1320 series of plastic packaged, surface mountable PIN diodes are designed for high volume switch applications from 10 MHz to beyond 2 GHz. The low current performance of these diodes (0.9 Ω maximum at 10 mA and 2 Ω typical at 1 mA) make the SMP1320 series particularly suited to battery operated circuits. Available in a selection of plastic packages and in a variety of configurations including a low inductance (0.4 nH) SOT-23 (SMP1320-007), the small footprint SC-79 and the miniature SC-70.

NEW Lead (Pb)-Free “environmentally friendly” packaging available: Skyworks offers the SMP1320-079LF Lead (Pb)-Free package as a green alternative.



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

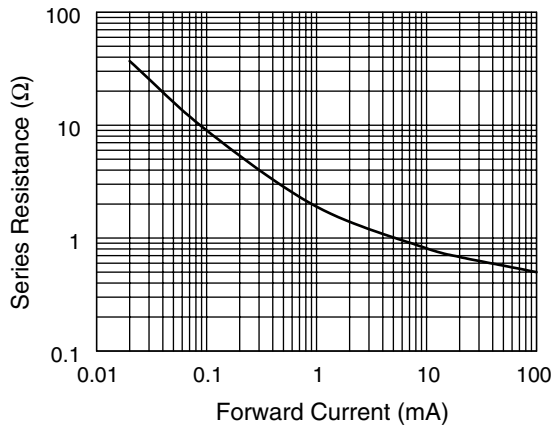
Single	Common Anode	Common Cathode	Series Pair	Low Inductance	Single	Ultra Low Inductance	Single
Marking: PL1	Marking: PL9	Marking: PL3	Marking: PL2	Marking: PLB		Marking: PLF	
SOT-23	SOT-23	SOT-23	SOT-23	SOT-23	SOD-323	SOT-143	SC-79
SMP1320-001	SMP1320-003	SMP1320-004	SMP1320-005	SMP1320-007	SMP1320-011	SMP1320-017	SMP1320-079
							SMP1320-079LF
$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 1.5$ nH	$L_S = 0.4$ nH	$L_S = 1.5$ nH	$L_S = 0.2$ nH	$L_S = 0.7$ nH
		SC-70	SC-70	SC-70			
		SMP1320-074	SMP1320-075	SMP1320-077			
		$L_S = 1.4$ nH	$L_S = 1.4$ nH	$L_S = 0.4$ nH			

LF denotes Lead (Pb)-Free packaging.

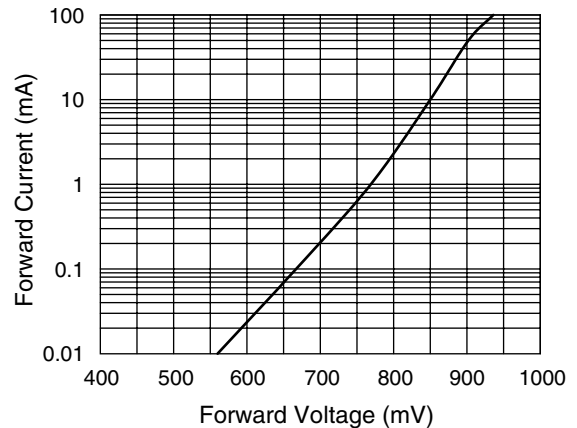
Electrical Specifications at 25°C

Parameter	Condition	Typ.	Max.	Unit
Reverse Current (I_R)	$V_R = 50\text{ V}$		10	μA
Capacitance (C_T)	$F = 1\text{ MHz}, V = 30\text{ V}$		0.30	pF
Resistance (R_S)	$F = 100\text{ MHz}, I = 1\text{ mA}$	2.0		Ω
Resistance (R_S)	$F = 100\text{ MHz}, I = 10\text{ mA}$		0.9	Ω
Forward Voltage (V_F)	$I_F = 10\text{ mA}$	0.85		V
Carrier Lifetime (τ_I)	$I_F = 10\text{ mA}$	0.4		μs
I Region Width		8		μm

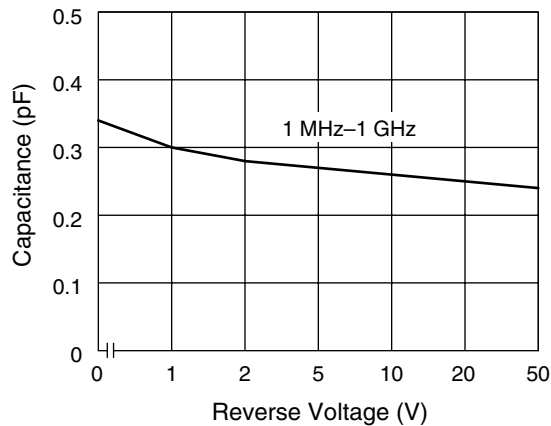
Typical Performance Data



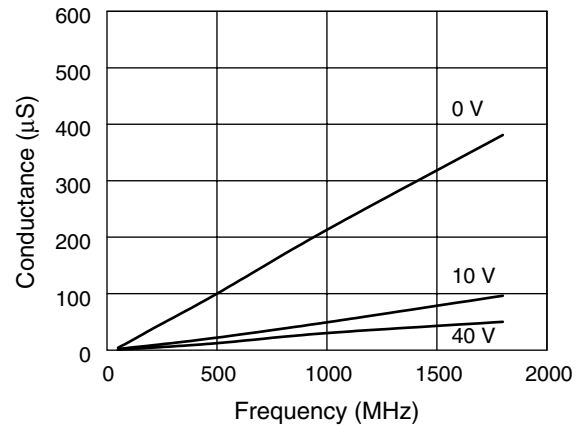
Series Resistance vs. Current @ 100 MHz



DC Characteristic



Capacitance vs. Reverse Voltage

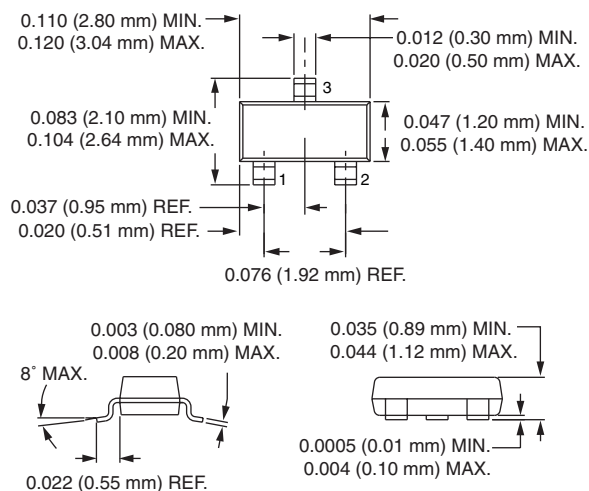


Conductance vs. Frequency and Reverse Voltage

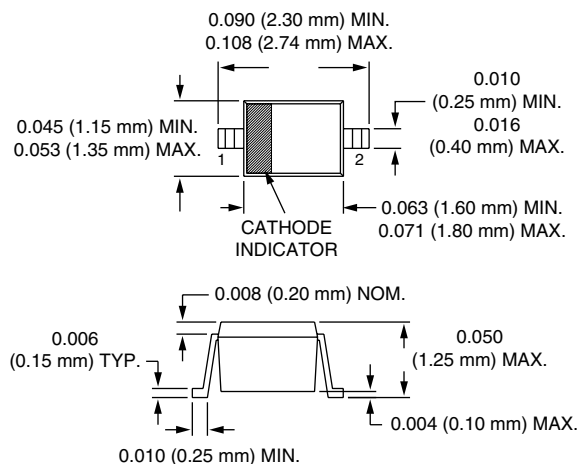
Resistance vs. Temperature @ 500 MHz

I _F (mA)	R _S -55°C (Ω)	R _S -15°C (Ω)	R _S +25°C (Ω)	R _S +65°C (Ω)	R _S +100°C (Ω)
0.02	29.60	29.20	30.80	32.00	32.70
0.10	7.20	7.70	8.30	8.80	8.80
0.30	3.40	3.60	3.80	4.00	4.10
0.50	2.50	2.70	2.80	2.90	3.00
1.00	1.70	1.80	1.90	2.00	1.90
10.00	0.84	0.85	0.76	0.76	0.67
20.00	0.73	0.73	0.64	0.64	0.56
100.00	0.59	0.57	0.47	0.48	0.40

SOT-23



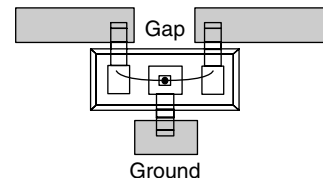
SOD-323



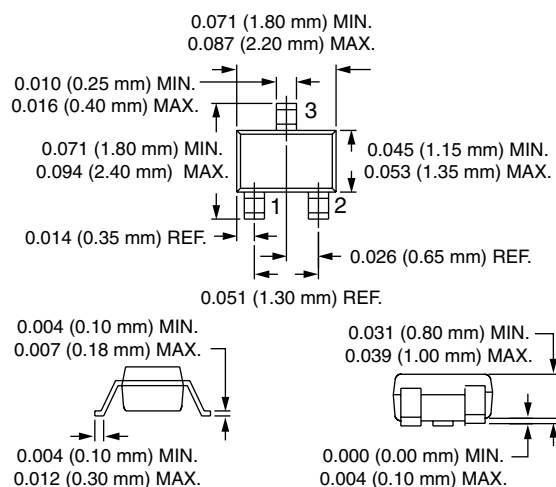
SMP1320-007

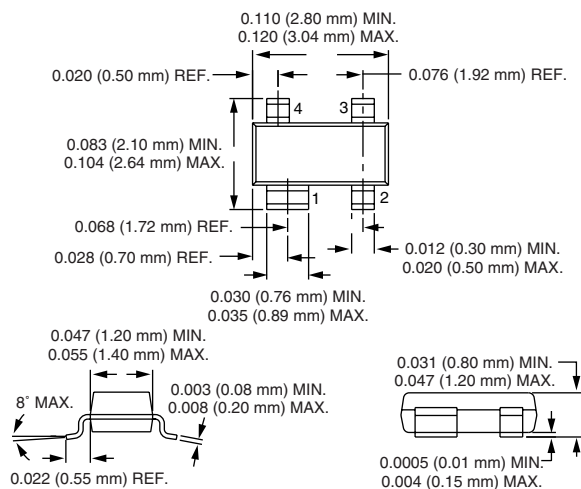
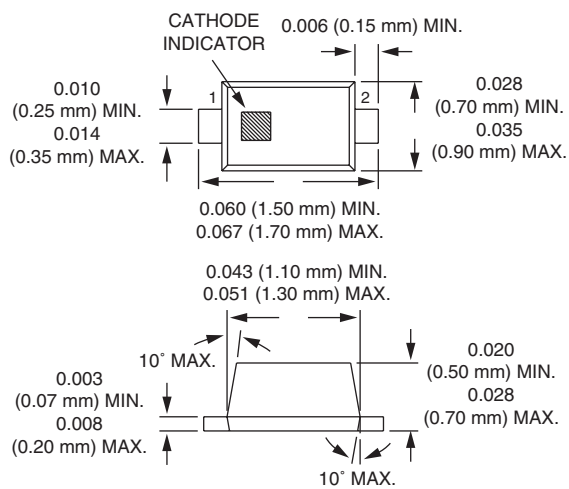
In the -007 configuration of the SOT-23 package, the package inductance is effectively reduced to 0.4 nH, in comparison to the 1.5 nH value of the standard configuration. This lower inductance will be particularly beneficial when the diodes are used as shunt connected switches at frequencies higher than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



SC-70

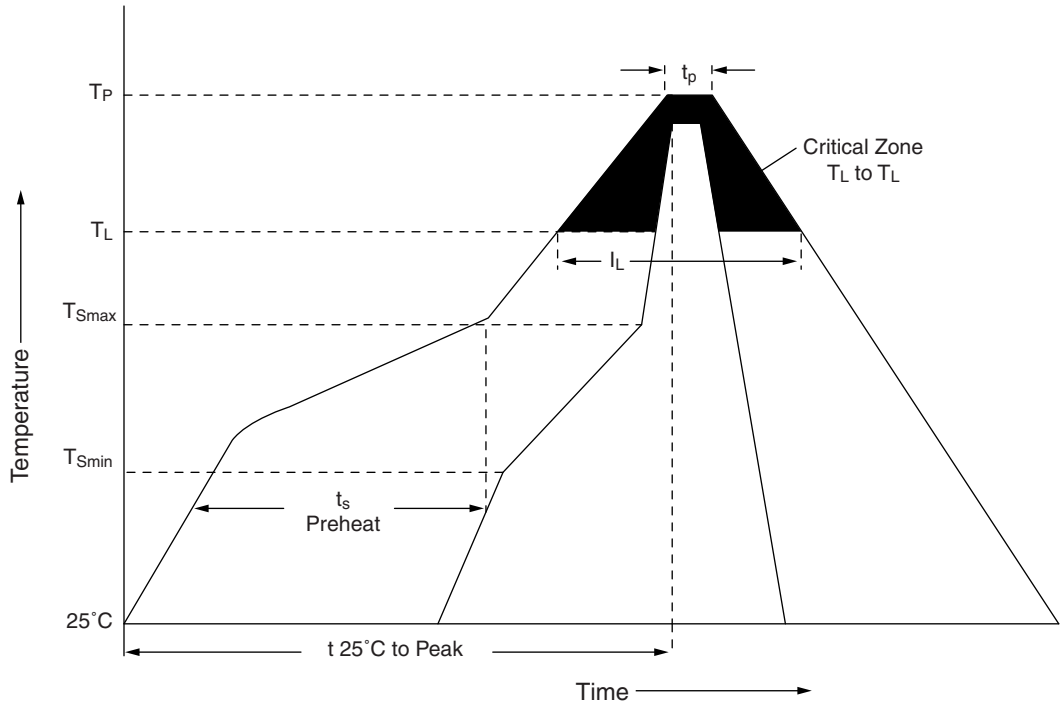


SOT-143**SC-79**

Recommended Solder Reflow Profiles

Profile Feature	SnPb Eutectic Assembly	Lead (Pb)-Free Assembly 100% Sn
Average Ramp-Up Rate (T_L to T_P)	3°C/Second Max.	3°C/Second Max.
Preheat Temperature Min. (T_{Smin}) Temperature Max. (T_{Smax}) Time (Min. to Max.) (t_s)	100°C 150°C 60–120 Seconds	150°C 200°C 60–80 Seconds
T_{Smax} to T_L Ramp-up Rate	—	3°C/Second Max.
Time Maintained Above: Temperature (T_L) Time (t_L)	183°C 60–150 Seconds	217°C 60–150 Seconds
Peak Temperature (T_P)	240 +0/-5°C	250 +0/-5°C
Time Within 5°C of Actual Peak Temperature (t_p)	10–30 Seconds	20–40 Seconds
Ramp-Down Rate	6°C/Second Max.	6°C/Second Max.
Time 25°C to Peak Temperature	6 Minutes Max.	8 Minutes Max.

All temperatures refer to the topside of the package, measured on the package body surface.
Reference JEDEC J-STD-020B.



Reference JEDEC J-STD-020