Agilent HSMP-383x Surface Mount RF PIN Diodes

Data Sheet

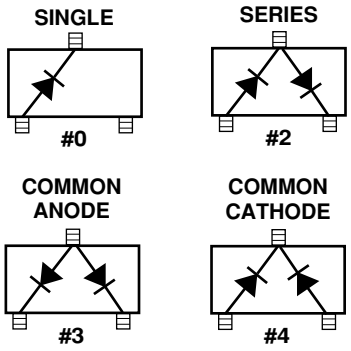
Description/Applications

The HSMP-383x series of general purpose PIN diodes are designed for two classes of applications. The first is attenuators where current consumption is the most important design consideration. The second application for this series of diodes is in switches where low capacitance is the driving issue for the designer.

The HSMP-386x series Total Capacitance (C_T) and Total Resistance (R_T) are typical specifications. For applications that require guaranteed performance, the general purpose HSMP-383x series is recommended.

A SPICE model is not available for PIN diodes as SPICE does not provide for a key PIN diode characteristic, carrier lifetime.

Package Lead Code Identification (Top View)



Features

- **Diodes Optimized for:**
  Low Capacitance Switching
  Low Current Attenuator
- **Surface Mount SOT-23 Package**
  Single and Dual Versions
  Tape and Reel Options Available
- **Low Failure in Time (FIT) Rate**[1]
- **Lead-free Option Available**

Note:

1. For more information see the Surface Mount PIN Reliability Data Sheet.

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Absolute Maximum Ratings[1] T_C = 25°C

Symbol	Parameter	Units	Absolute Maximum
I_f	Forward Current (1 ms Pulse)	Amp	1
P_t	Total Device Dissipation	mW[2]	250
P_{iv}	Peak Inverse Voltage	—	Same as V_{BR}
T_j	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150

Notes:
1. Operation in excess of any one of these conditions may result in permanent damage to this device.
2. CW Power Dissipation at T_{LEAD} = 25°C. Derate to zero at maximum rated temperature.

PIN General Purpose Diodes, Electrical Specifications T_C = 25°C

Part Number HSMP-	Package Marking Code	Lead Code	Configuration	Minimum Breakdown Voltage V_{BR} (V)	Maximum Series Resistance R_S (Ω)	Maximum Total Capacitance C_T (pF)
3830 3832 3833 3834	K0 K2 K3 K4	0 2 3 4	Single Series Common Anode Common Cathode	200	1.5	0.3
Test Conditions				$V_R = V_{BR}$ Measure $I_R \leq 10$ mA	I_F = 100 mA f = 100 MHz	V_R = 50 V f = 1 MHz

Typical Parameters at T_C = 25°C

Part Number HSMP-	Series Resistance R_S (Ω)	Carrier Lifetime τ (ns)	Reverse Recovery Time T_{rr} (ns)	Total Capacitance C_T (pF)
383x	20	500	80	0.20 @ 50 V
Test Conditions	I_F = 1 mA f = 100 MHz	I_F = 50 mA I_R = 250 mA	V_R = 10 V I_F = 20 mA 90% Recovery	

Typical Parameters at T_C = 25°C (unless otherwise noted), Single Diode

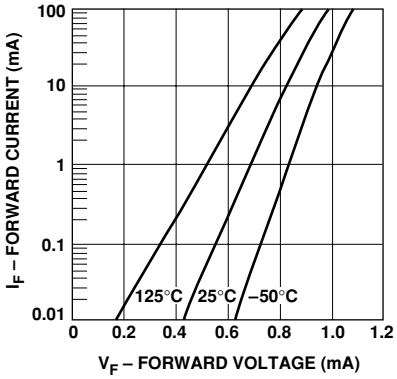


Figure 1. Forward Current vs. Forward Voltage.

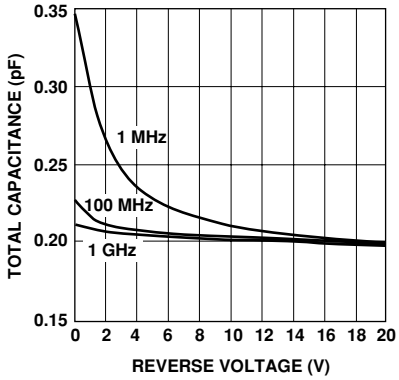


Figure 2. RF Capacitance vs. Reverse Bias.

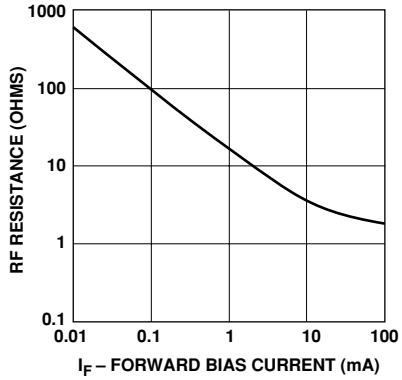


Figure 3. RF Resistance at 25°C vs. Forward Bias Current.

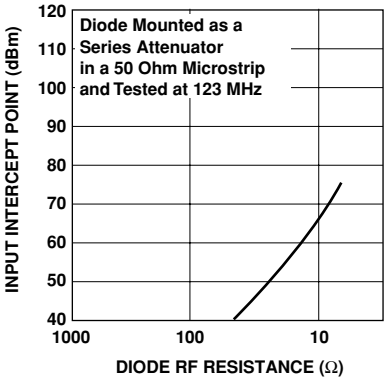


Figure 4. 2nd Harmonic Input Intercept Point vs. Diode RF Resistance for Attenuators.

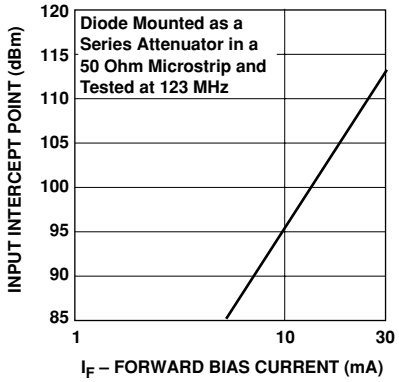


Figure 5. 2nd Harmonic Input Intercept Point vs. Forward Bias Current for Switches.

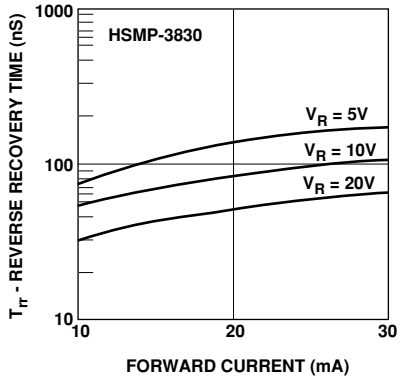


Figure 6. Reverse Recovery Time vs. Forward Current for Various Reverse Voltage.

Typical Applications for Multiple Diode Products

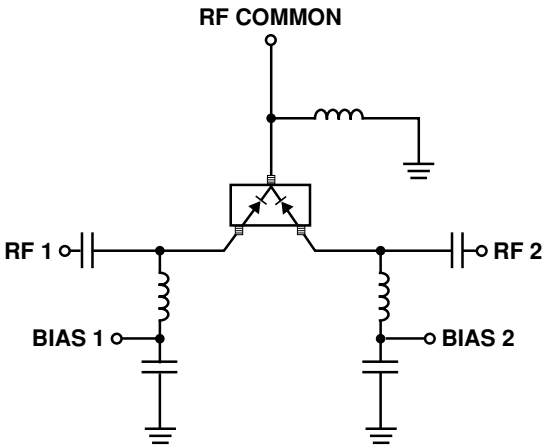


Figure 7. Simple SPDT Switch, Using Only Positive Current.

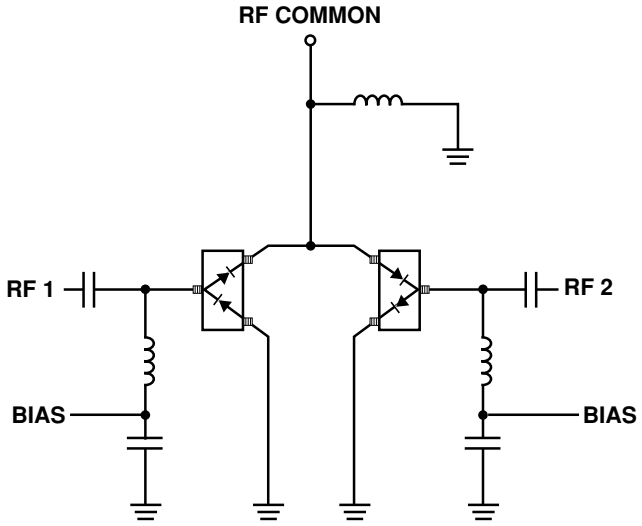


Figure 8. High Isolation SPDT Switch, Dual Bias.

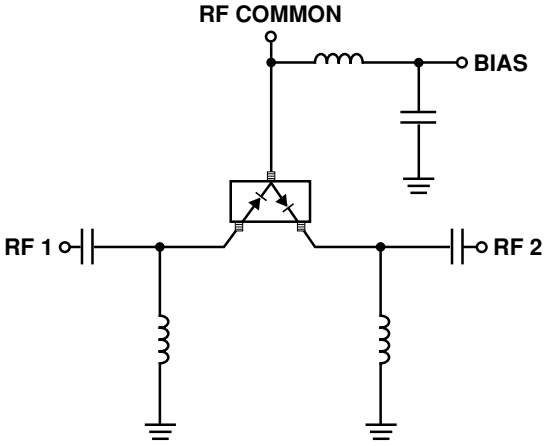


Figure 9. Switch Using Both Positive and Negative Current.

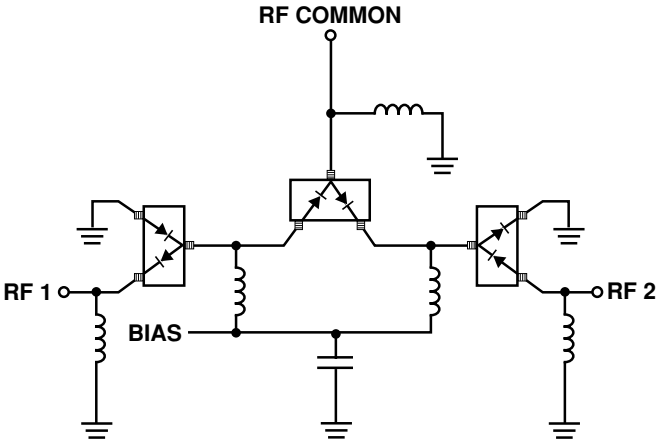


Figure 10. Very High Isolation SPDT Switch, Dual Bias.

Typical Applications for Multiple Diode Products (continued)

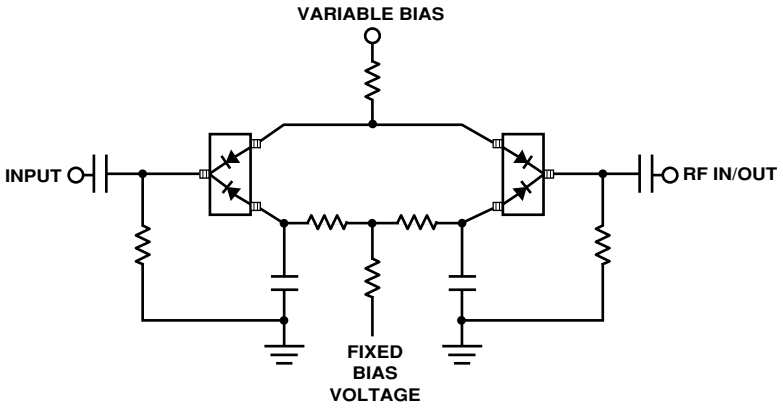


Figure 11. Four Diode π Attenuator. See AN1048 for details.

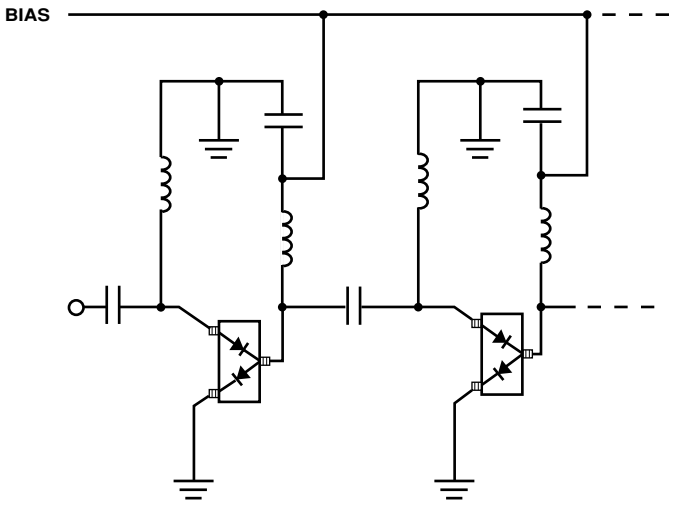
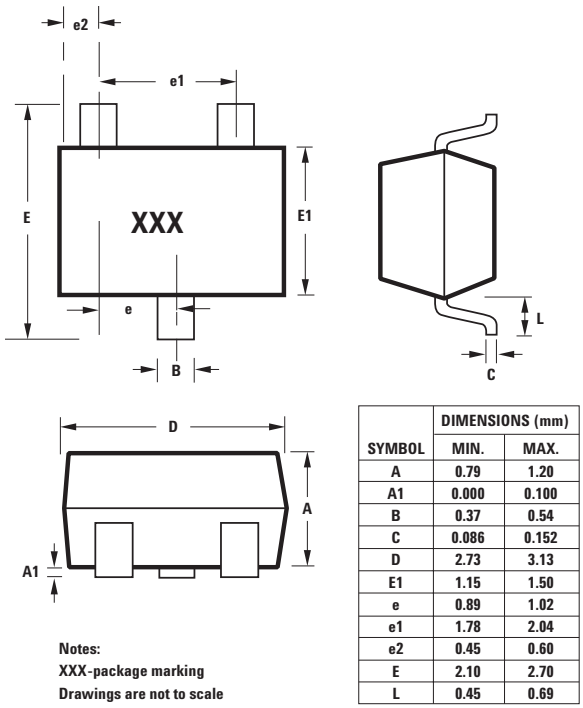


Figure 12. High Isolation SPST Switch (Repeat Cells as Required).

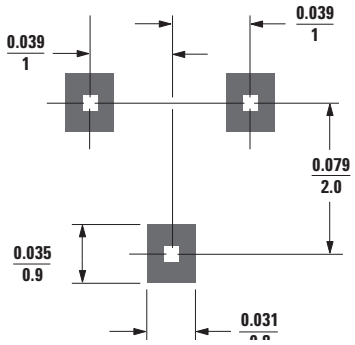
Package Dimensions Outline 23 (SOT-23)



Notes:
XXX-package marking
Drawings are not to scale

SYMBOL	DIMENSIONS (mm) MIN.	MAX.
A	0.79	1.20
A1	0.000	0.100
B	0.37	0.54
C	0.086	0.152
D	2.73	3.13
E1	1.15	1.50
e	0.89	1.02
e1	1.78	2.04
e2	0.45	0.60
E	2.10	2.70
L	0.45	0.69

Recommended PCB Pad Layout for Agilent's SOT-23 Products



Package Characteristics

Lead Material ..... Alloy 42
Lead Finish ..... Tin-Lead 85-15% (Non lead-free option)
or Tin 100% (Lead-free option)
Maximum Soldering Temperature ..... 260°C for 5 seconds
Minimum Lead Strength ..... 2 pounds pull
Typical Package Inductance ..... 2 nH
Typical Package Capacitance ..... 0.08 pF (opposite leads)

Ordering Information

Specify part number followed by option. For example:

HSMP - 383x - XXX

Bulk or Tape and Reel Option
Part Number
Surface Mount PIN Diode

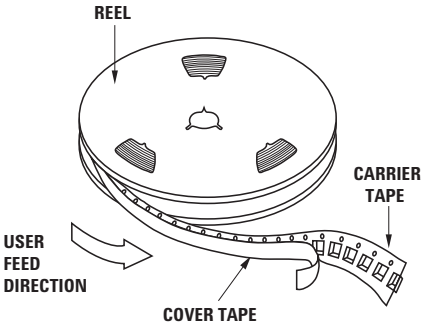
Profile Option Descriptions

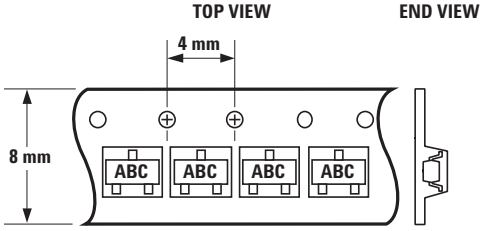
-BLK = Bulk
-TR1 = 3K pc. Tape and Reel, Device Orientation; See Figure 13
-TR2 = 10K pc. Tape and Reel, Device Orientation; See Figure 13

Tape and Reeling conforms to Electronic Industries RS-481, "Taping of Surface Mounted Components for Automated Placement."

For lead-free option, the part number will have the character "G" at the end, eg. -TR2G for a 10K pc lead-free reel.

Device Orientation
For Outlines SOT-23

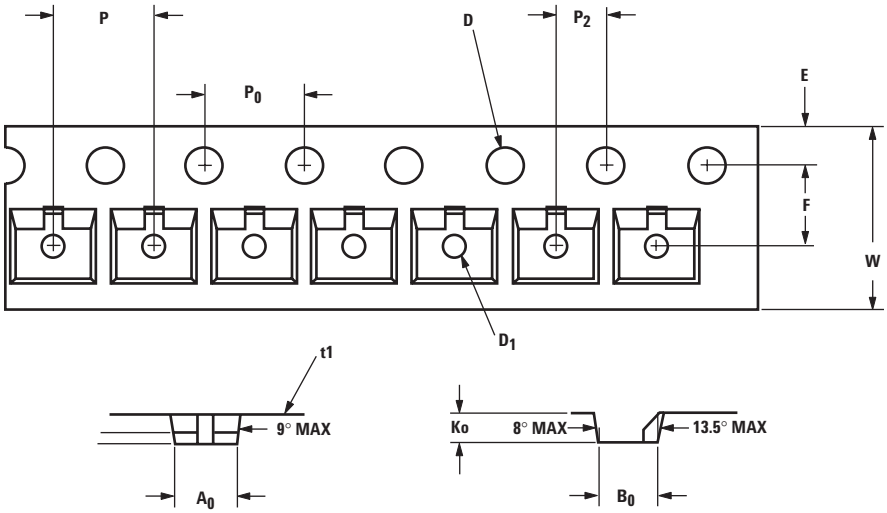




Note: "AB" represents package marking code.
"C" represents date code.

Figure 13. Options -TR1, -TR2 for SOT-23 Packages.

Tape Dimensions and Product Orientation
For Outline SOT-23



DESCRIPTION		SYMBOL	SIZE (mm)	SIZE (INCHES)
CAVITY	LENGTH	A_0	3.15 ± 0.10	0.124 ± 0.004
	WIDTH	B_0	2.77 ± 0.10	0.109 ± 0.004
	DEPTH	K_0	1.22 ± 0.10	0.048 ± 0.004
	PITCH	P	4.00 ± 0.10	0.157 ± 0.004
	BOTTOM HOLE DIAMETER	D_1	1.00 + 0.05	0.039 ± 0.002
PERFORATION	DIAMETER	D	1.50 + 0.10	0.059 + 0.004
	PITCH	P_0	4.00 ± 0.10	0.157 ± 0.004
	POSITION	E	1.75 ± 0.10	0.069 ± 0.004
CARRIER TAPE	WIDTH	W	8.00 +0.30 –0.10	0.315 +0.012 –0.004
	THICKNESS	t1	0.229 ± 0.013	0.009 ± 0.0005
DISTANCE BETWEEN CENTERLINE	CAVITY TO PERFORATION (WIDTH DIRECTION)	F	3.50 ± 0.05	0.138 ± 0.002
	CAVITY TO PERFORATION (LENGTH DIRECTION)	P_2	2.00 ± 0.05	0.079 ± 0.002

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Data subject to change.

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