MADP-011084

Anti-Parallel Pair Non-Magnetic PIN
5 - 400 MHz

Rev. V2

Features

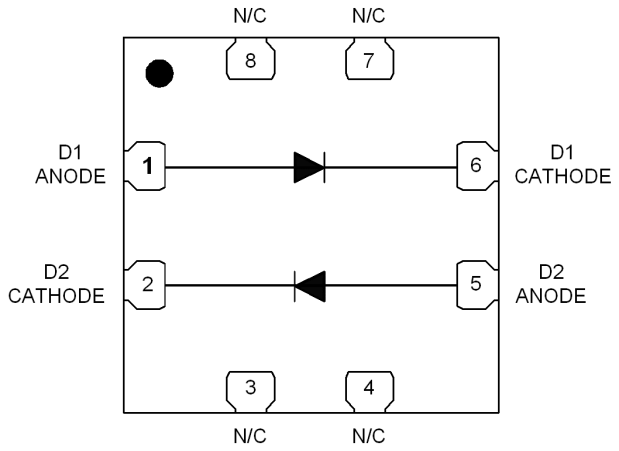
- Designed for MRI applications
- Non-Magnetic Surface Mount Package
- Anti-Parallel Self Bias Configuration
- R_P = 20 kΩ, C_T = 2 pF, V_B = 50 V
- >50 W CW Incident Power Handling @ 400 MHz
- Lead-Free 4 mm 8-lead HQFN Package
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant

Description

The MADP-011084 acts as a passive switch using silicon PIN diodes in a non-magnetic surface mount package. There is one pair of diodes constructed in an electrically isolated anti-parallel configuration that operate from 5 to 400 MHz.

The MADP-011084 is well suited for MRI passive switching applications. The PIN diodes become a high Q R-C network under small signal and behave as an effective passive rectifier or short circuit under high RF signal to tune and de-tune the resonant MRI tank circuit.

Functional Schematic



Ordering Information[1,2]

Part Number	Package
MADP-011084-TR0500	500 piece reel
MADP-011084-TR3000	3000 piece reel

1. Reference Application Note M513 for reel size information.

Pin Configuration[2]

Pin #	Function
1	D1 Anode
2	D2 Cathode
3, 4	No Connection
5	D2 Anode
6	D1 Cathode
7, 8	No Connection
Paddle[3]	Ground

2. MACOM recommends connecting unused package pins to ground.
3. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications[4]: T_A = 25°C, Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Total Capacitance (C_T)	100 MHz, 0 V	pF	—	2	3
Series Resistance (R_S)	100 MHz, +10 mA	Ω	—	1	—
Parallel Resistance (R_P)	100 MHz, 0 V	kΩ	—	20	—
Reverse Breakdown Voltage	-10 µA	V	—	50	—
Forward Voltage	+10 mA	V	—	0.8	—
Carrier Lifetime	1 kHz, +10 mA, -6 mA (50% Control Voltage, 90% Output Voltage)	ns	—	55	—
CW Thermal Resistance (Θ_{JC})	(Infinite heat sink at thermal ground plane)	°C/W	—	22	—
Insertion Loss	100 MHz, +10 mA	dB	—	0.1	—
Return Loss	100 MHz, +10 mA	dB	—	25	—
Isolation	100 MHz, 0 V	dB	—	18	—

4. Per diode D1 or D2.

Absolute Maximum Ratings[5,6]

Parameter	Absolute Maximum
CW Incident Power +50 mA, 400 MHz @ 85°C	+50 dBm
DC Reverse Voltage	|-50 V|
AC_{RMS} + DC Forward Current (per diode D1 or D2)	1.8 A
Power Dissipation @ 85°C (per diode D1 or D2)	4 W
Junction Temperature[7]	+175°C
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. MACOM does not recommend sustained operation near these survivability limits.
7. Operating at nominal conditions with $T_J \leq$ +175°C will ensure MTTF > 1 x 10^6 hours.

Handling Procedures

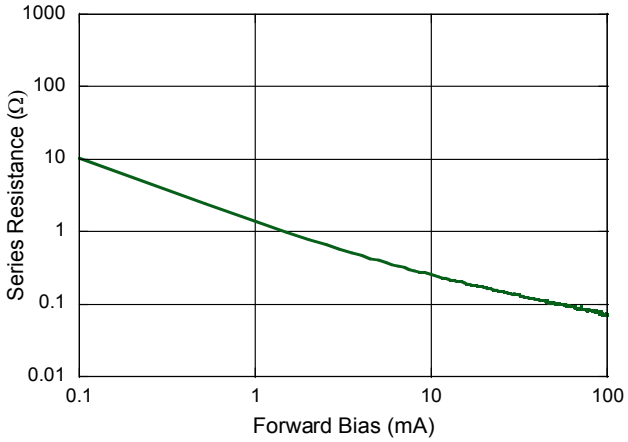
Please observe the following precautions to avoid damage:

Static Sensitivity

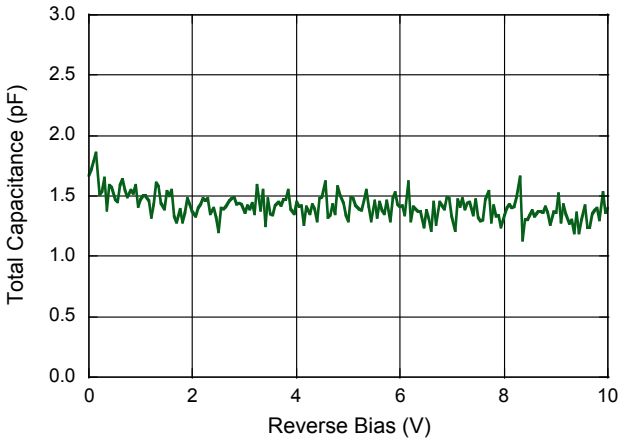
These devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1C devices.

Typical Performance Curves: Freq. = 100 MHz

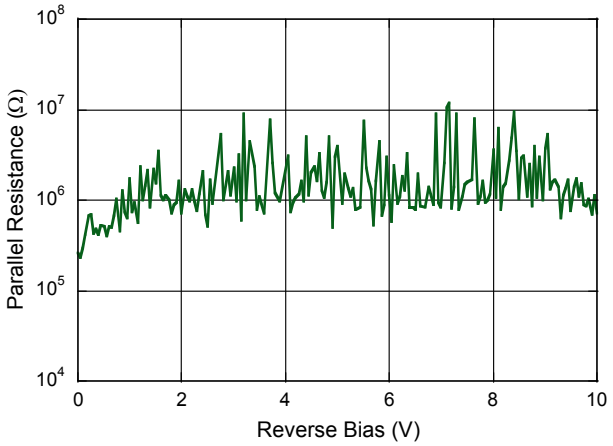
Series Resistance vs. Forward Current



Capacitance vs. Reverse Voltage

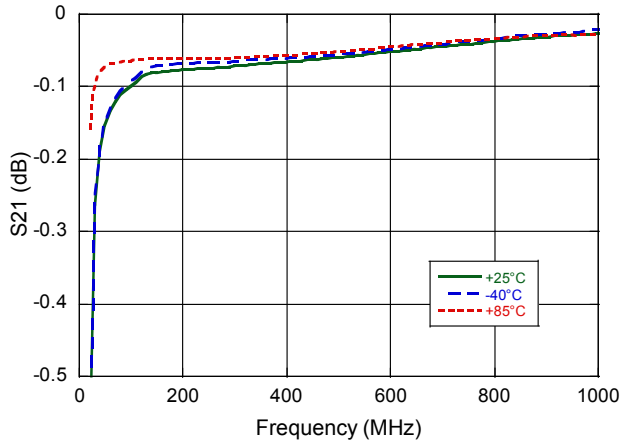


Parallel Resistance vs. Reverse Voltage

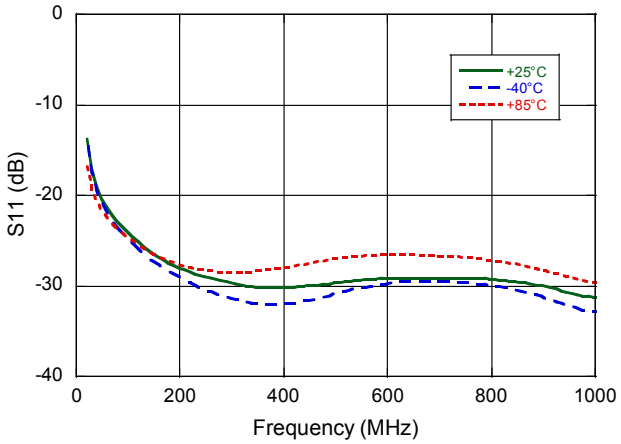


Typical Performance Curves:

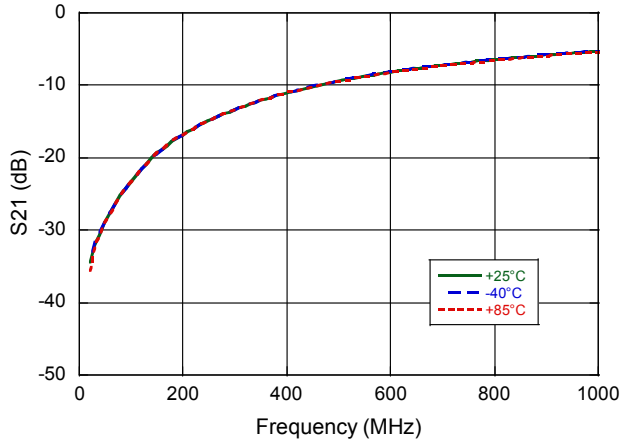
Insertion Loss @ 10 mA Forward Bias



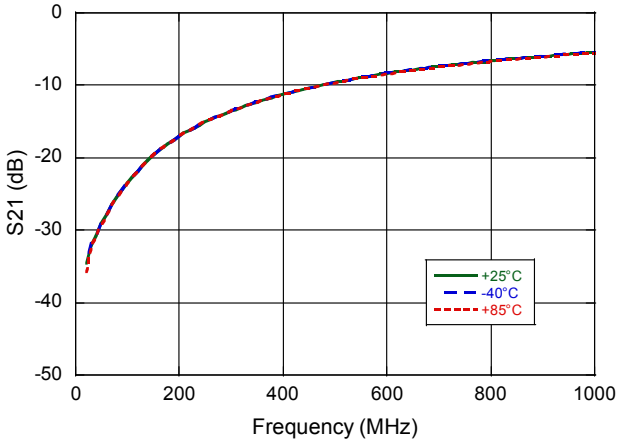
Return Loss @ 10 mA Forward Bias



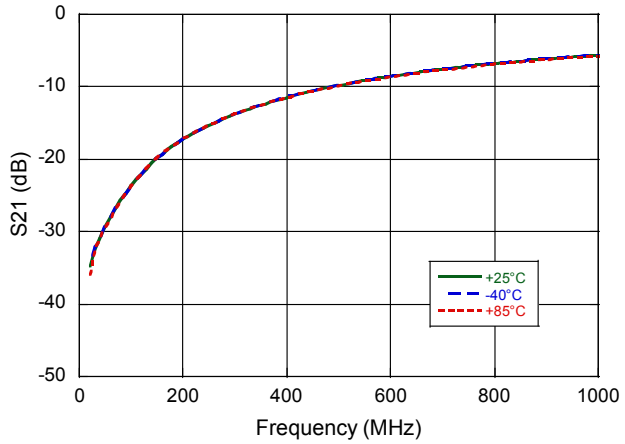
Isolation @ 10 V Reverse Bias



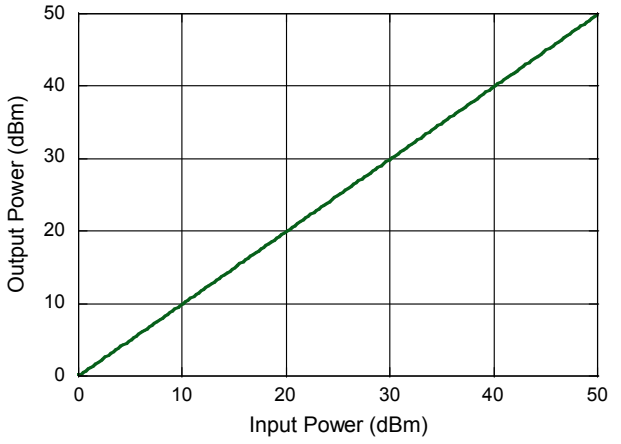
Isolation @ 20 V Reverse Bias



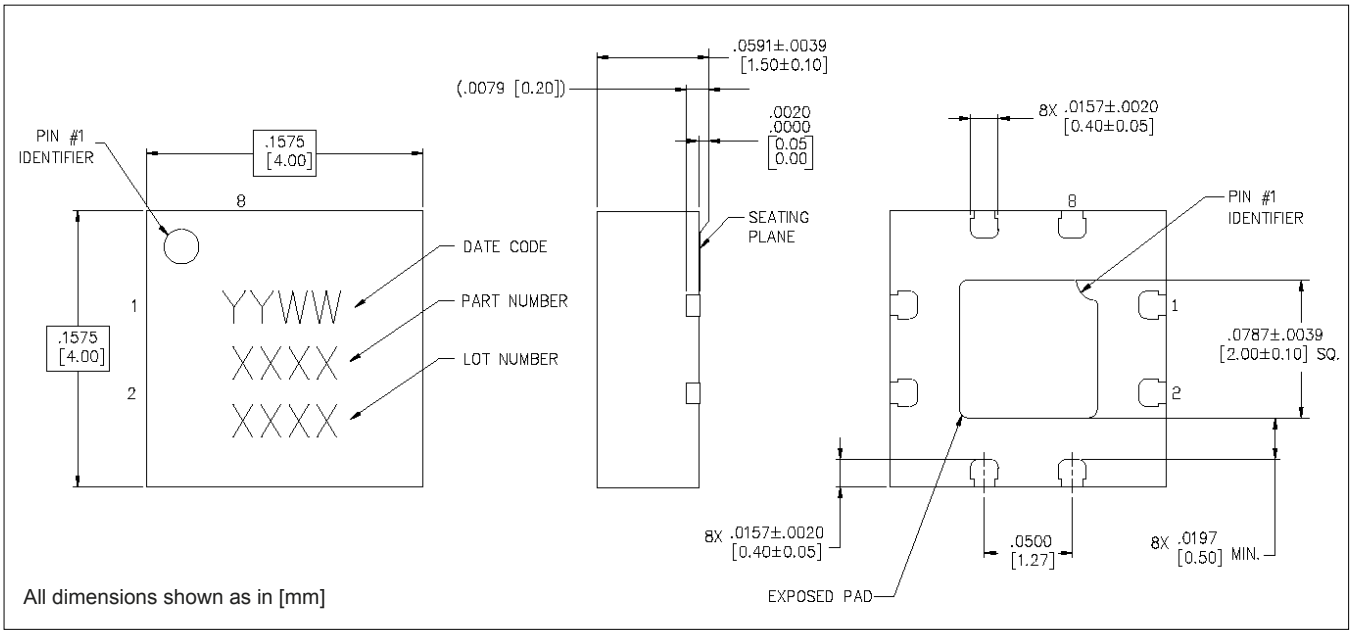
Isolation @ 40 V Reverse Bias



Output Power vs. Input Power @ 50 mA, 400 MHz CW



Lead-Free 4 mm 8-Lead HQFN†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.