

High Power Shunt PIN Diode 50 MHz - 5 GHz

Rev. V1

Features

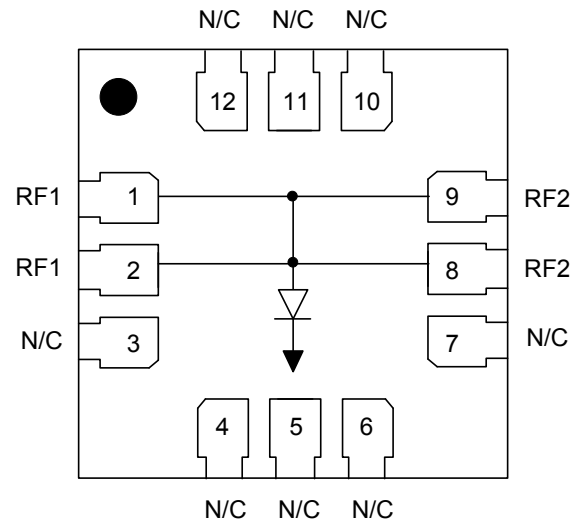
- 350 W CW Incident Power Handling @ 3 GHz
- 0.15 dB Insertion Loss @ 3 GHz
- 29 dB Isolation @ 3 GHz
- Lead-Free 3 mm 12-lead QFN Package
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant

Description

The MADP-011104 is a high-power PIN diode assembled in a lead-free 3 mm 12-lead QFN plastic package. This shunt device provides exceptional switch or attenuator performance from 50 MHz to 5 GHz.

This compact device is ideally suited to switch and attenuator applications from HF through S band, where higher peak and CW power, lower loss, and higher linearity surface-mount diode assemblies are required.

Functional Schematic



Ordering Information^{1,2}

Part Number	Package
MADP-011104-TR500	500 Piece Tape and Reel
MADP-011104-TR3000	3000 Piece Tape and Reel
MADP-011104-000SMB	Sample Board

1. Reference Application Note M513 for reel size information
2. All sample boards include 5 loose parts.

Pin Configuration³

Pin #	Function
1, 2	RF1
3 - 7, 10 - 12	N/C
8, 9	RF2
Paddle ⁴	Ground

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

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

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Electrical Specifications: $T_A = +25^\circ\text{C}$, $Z_0 = 50 \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	-40 V, 3 GHz	dB	—	0.15	—
Isolation	+100 mA, 3 GHz	dB	27	29	—
Return Loss	-40 V, 3 GHz	dB	—	21	—
Forward Voltage, V_F	+100 mA	V	—	0.91	—
Reverse Leakage, I_R	-800 V	nA	—	6	—
Shunt Capacitance, C_T	-40 V, 15 MHz -40 V, 3 GHz	pF	—	0.45 0.40	—
Shunt Resistance, R_S	+10 mA, 3 GHz +50 mA, 3 GHz +100 mA, 3 GHz	ohm	—	2.21 1.08 0.95	—
Thermal Resistance, $R_{th_{JC}}$	+85°C, 3 GHz	°C/W	—	10	—
Carrier Lifetime, TL	$I_F = +10 \text{ mA}$, $I_R = -6 \text{ mA}$	μs	—	2	—

Absolute Maximum Ratings^{5,6,7}

Parameter	Absolute Maximum
CW Incident Power ⁸ -40 V, 3 GHz @ +85°C	350 W
CW Incident Power ⁸ +100 mA, 3 GHz @ +85°C	45 W
DC Forward Current	250 mA
DC Reverse Voltage	-800 V
Junction Temperature ⁸	+175°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°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. Power levels specified are for cold switching. MACOM recommends cold switching only.
8. Operating at nominal conditions with $T_J \leq +175^\circ\text{C}$ will ensure $\text{MTTF} > 1 \times 10^6$ hours.

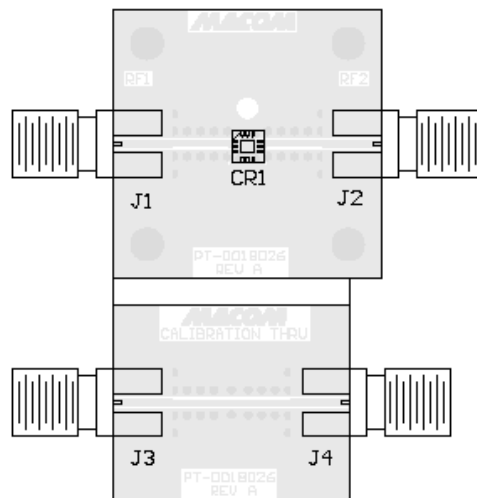
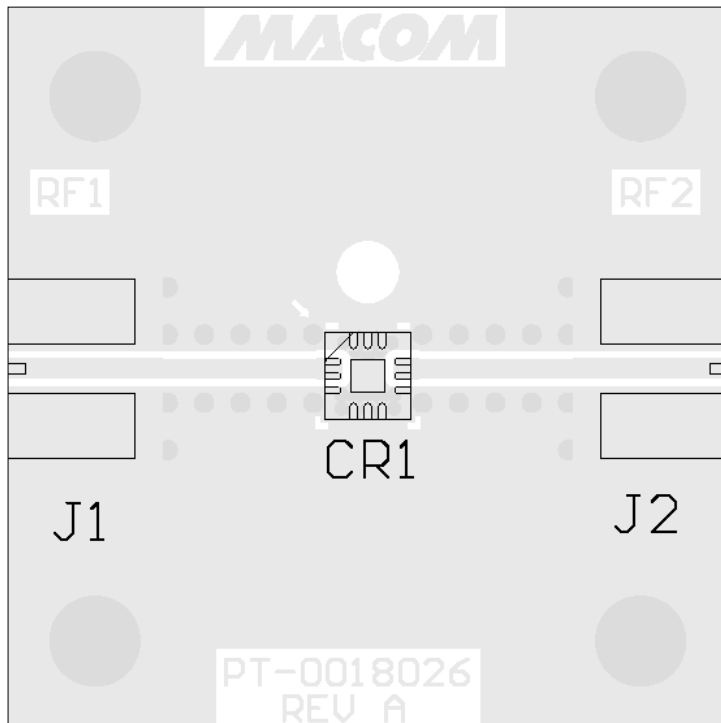
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic 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 and CDM Class C5 devices.

PCB Outline: MADP-011104 Sample Board

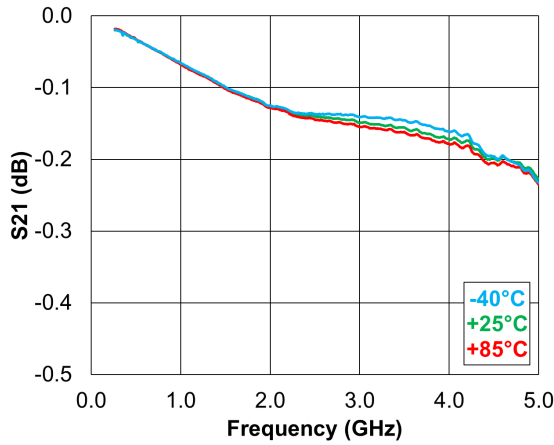


Parts List

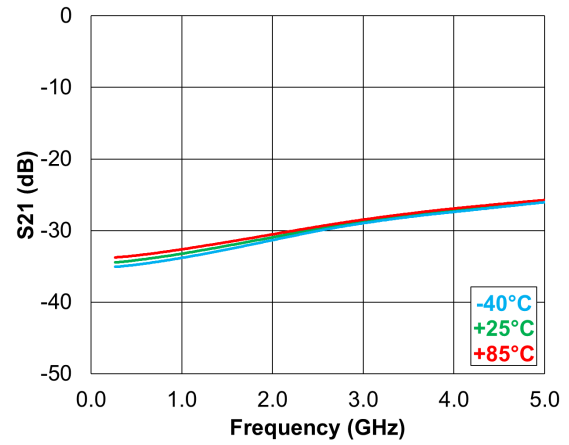
Part #	Case Style
MADP-011104	3 mm 12-lead QFN
Emerson 142-0761-861 142-0761-871 142-0771-831	SMA

Typical Performance Curves

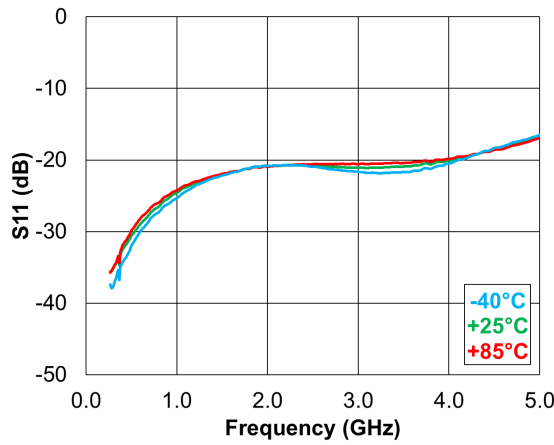
Insertion Loss (Over Temperature)



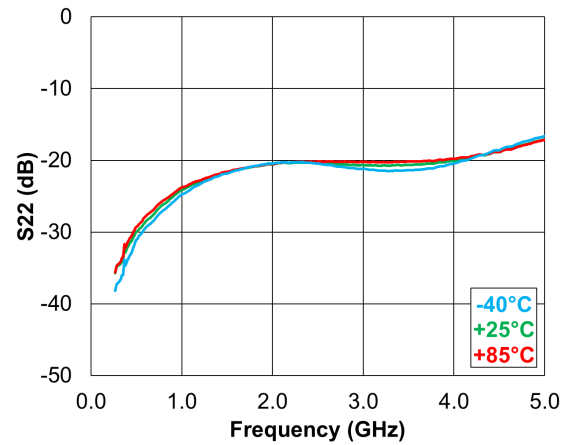
Isolation at 100 mA (Over Temperature)



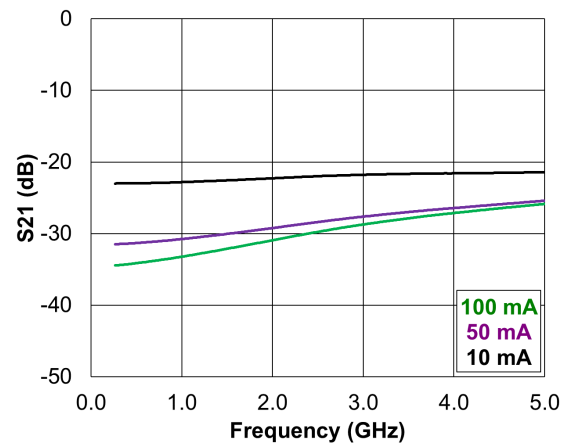
Input Return Loss (Over Temperature)



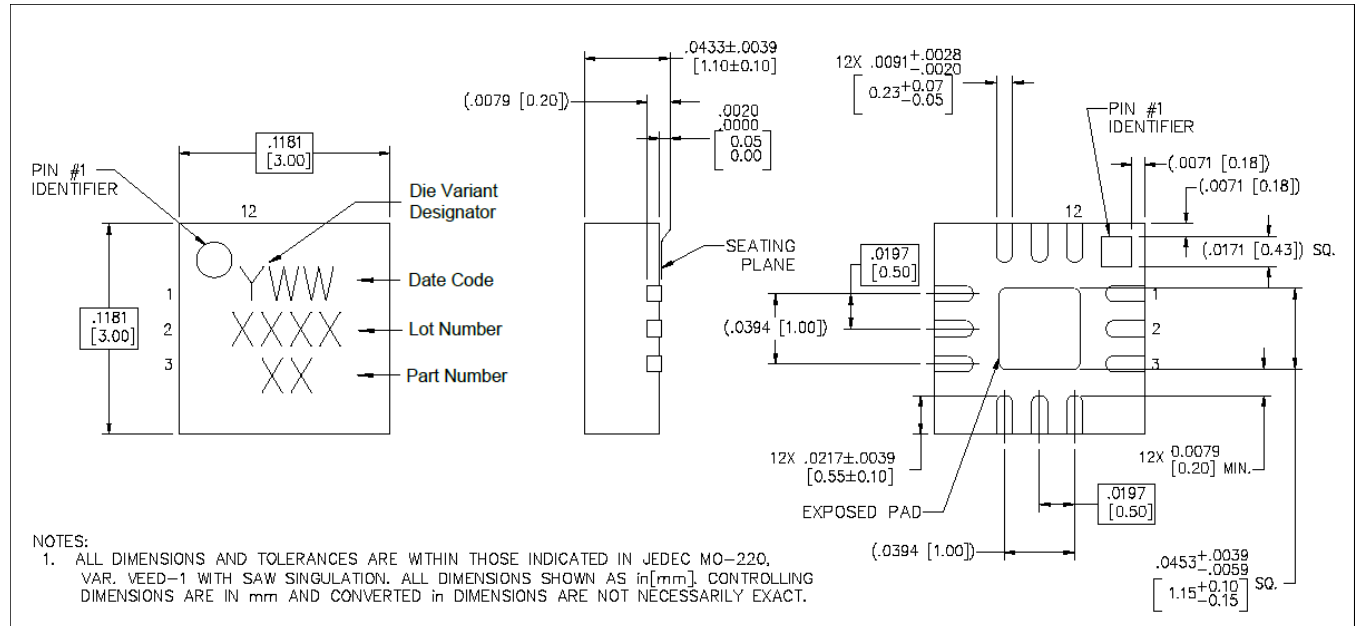
Output Return Loss (Over Temperature)



Isolation (Over Current)



Lead-Free 3 mm 12-Lead PQFN[†]



[†] Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is Matte Tin plate

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