

HMIC™ PIN Diode SPDT 80 Watt Switch for 0.01 - 6.0 GHz Higher Power Applications

Rev. V2

Features

- Exceptional Broadband Performance
- Low Loss: $T_x = 0.25$ dB @ 2010 MHz
- High Isolation: $R_x = 43$ dB @ 2010 MHz
- Suitable for High Power LTE, TD-SCDMA, WiMAX, and Military Radio Applications
- Surface Mount 4 mm PQFN Package
- RoHS* Compliant
- Class 2 ESD Rating (HBM 2kv)

Description

The MASW-000932 is a SPDT high power, broadband, high linearity, PIN diode T/R switch for 0.01 - 4.0 GHz applications, including WiMAX & WiFi. The device is provided in an industry standard lead free 4mm PQFN plastic package. This device incorporates a PIN diode die fabricated with MACOM Technology Solutions' patented Silicon-Glass HMIC™ process. This chip features two silicon pedestals embedded in a low loss, low dispersion glass. The diodes are formed on the top of each pedestal. The topside is fully encapsulated with silicon nitride and has an additional polymer passivation layer. These polymer protective coatings prevent damage and contamination during handling and assembly.

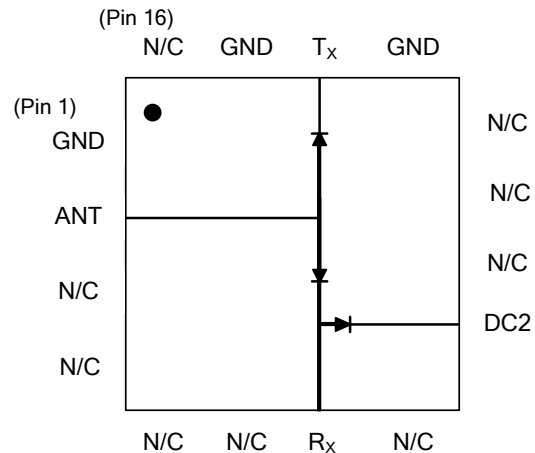
This compact SPDT switch offers wideband performance with excellent isolation to loss ratio for both T_x and R_x states. The PIN diode provides 45 W typical CW power handling at an 85°C baseplate temperature and 72 dBm IIP3 at 2010 MHz for maximum switch performance.

Ordering Information¹

Part Number	Package
MASW-000932-13560T	1000 piece reel
MASW-000932-001SMB	Sample Board

1. Reference Application Note M513 for reel size information.

Functional Diagram (Top View)



Pin Configuration²

Pin	Function	Pin	Function
1	GND	9	DC2
2	ANT	10	N/C
3	N/C	11	N/C
4	N/C	12	N/C
5	N/C	13	GND
6	N/C	14	TX
7	RX	15	GND
8	N/C	16	N/C

2. 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 Specifications³: Freq. = 2.0, 2.7, 3.5 GHz, $T_A = 25^\circ\text{C}$, Bias = 100 mA / 28 V

Parameter	100 mA / 28V Conditions	Units	Min.	Typ.	Max.
Insertion Loss ³ , R_X $P_{IN} = 0$ dBm	R_X , 2.0 GHz T_X , 2.0 GHz R_X , 2.7 GHz T_X , 2.7 GHz R_X , 3.5 GHz T_X , 3.5 GHz	dB	—	0.60 0.25 0.72 0.35 0.80 0.45	0.80 — 0.90 — 0.95 —
Isolation ³ $P_{IN} = 0$ dBm	R_X to Antenna, 2.0 GHz T_X to Antenna, 2.0 GHz R_X to Antenna, 2.7 GHz T_X to Antenna, 2.7 GHz R_X to Antenna, 3.5 GHz T_X to Antenna, 3.5 GHz	dB	40.0 — 39.0 — 34.0 —	43.0 14.0 41.5 12.0 35.0 10.0	—
Input Return Loss ³	$P_{IN} = 0$ dBm R_X T_X	dB	—	34 17	—
T_X Input P0.1dB	T_X to Antenna	dBm	—	49	—
T_X 2 nd Harmonic	$P_{IN} = +30$ dBm	dBc	—	80	—
T_X 3 rd Harmonic	$P_{IN} = +30$ dBm	dBc	—	95	—
T_X IIP3	$P_{IN} = +10$ dBm, $F_1 = 2010$ MHz, $F_2 = 2020$ MHz	dBm	—	72	—
T_X CW Input Power	25°C Base plate, 2.01 GHz	dBm / W	—	49 / 80	—
T_X CW Input Power	85°C Base plate, 2.01 GHz	dBm / W	—	46.5 / 45.0	—
R_X CW Input Power	—	dBm / W	—	41.5 / 14.0	—
T_X RF Switching Speed	(10-90% RF Voltage) 1 MHz Rep Rate in Modulating Mode	ns	—	200	—

3. See Bias Table

Absolute Maximum Ratings^{4,5} @ $T_A = +25^\circ\text{C}$ (unless otherwise specified)

Parameter	Absolute Maximum
Forward Current	125 mA
RF & DC Reverse Voltage	-200 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C
Junction Temperature	+175°C
T_X Incident CW Power	80 W (49 dBm) ⁶ @ 2010 MHz
T_X Peak Incident Power	>2000 W, 5 μs , 1% duty ⁷

4. Exceeding these limits may cause permanent damage.

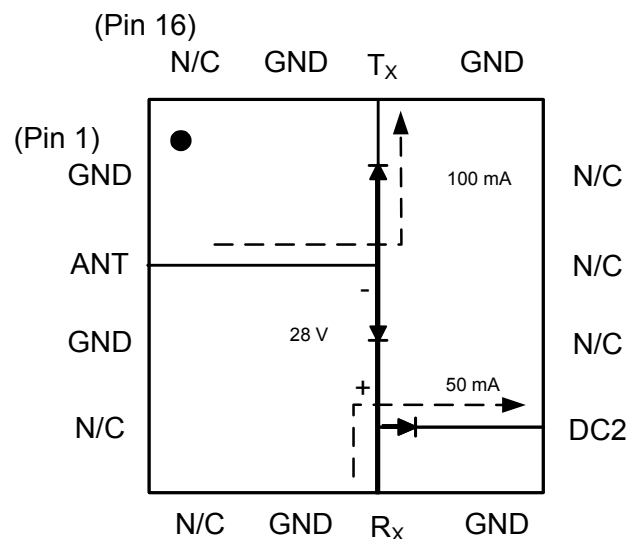
5. MACOM does not recommend sustained operation near these survivability limits.

6. Baseplate temperature must be controlled to a constant +25°C.

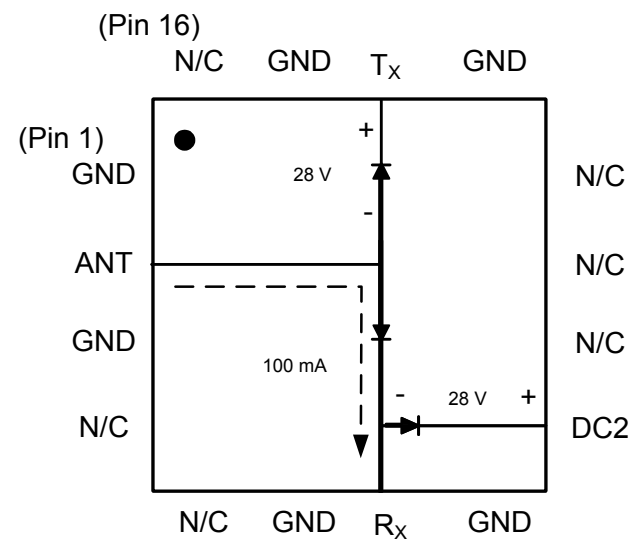
7. This rating is guaranteed if the RF ports are terminated.

Bias Diagrams & Tables

T_X-ANT Insertion Loss, R_X-ANT Isolation



R_X-ANT Insertion Loss, T_X-ANT Isolation



Bias Table

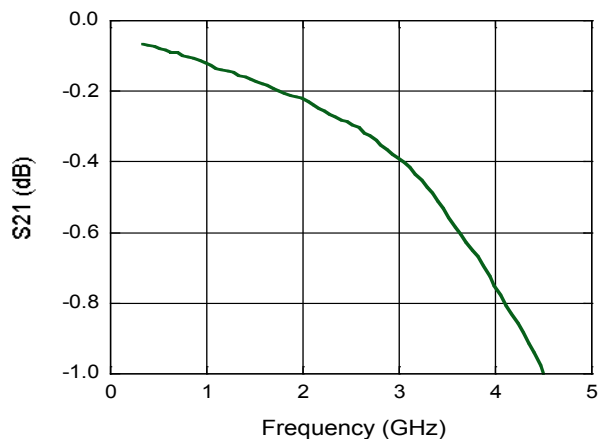
Bias Table	T _X	R _X	DC2	ANT
Pin	Pin 14	Pin 7	Pin 9	Pin 2
T _X -ANT Isolation	+28 V, 0 mA	-100 mA	+28 V, 0 mA	0 V, +100 mA
T _X -ANT Insertion Loss	-100 mA	+28 V, +50 mA	-50 mA	0 V, +100 mA
R _X -ANT Isolation	-100 mA	+28 V, +50 mA	-50 mA	0 V, +100 mA
R _X -ANT Insertion Loss	+28 V, 0 mA	-100 mA	+28 V, 0 mA	0 V, +100 mA

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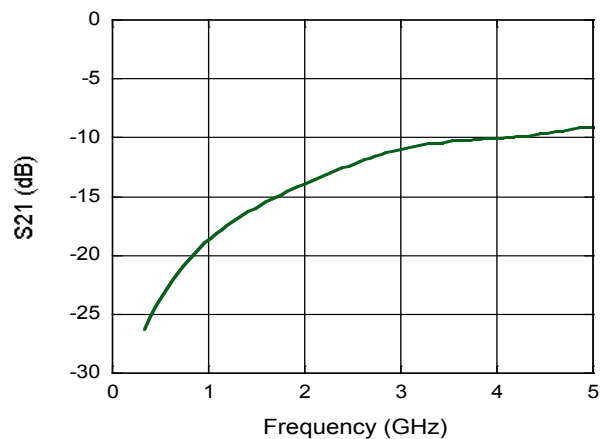
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Typical Performance Curves, T_x (100 mA Bias Current)

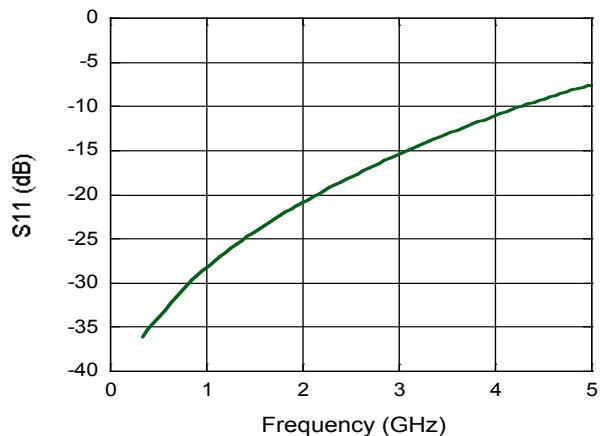
Insertion Loss, T_x



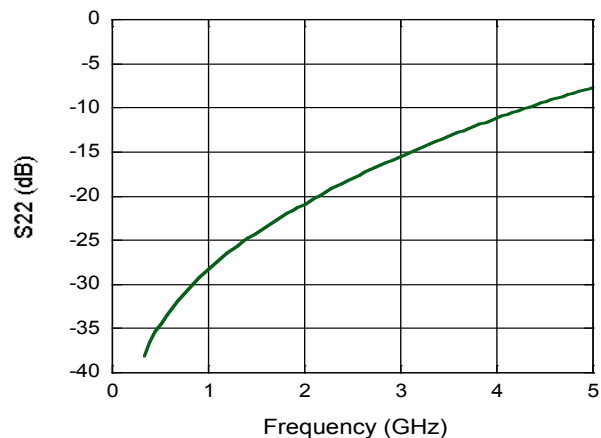
Isolation, T_x



Input Return Loss, T_x



Output Return Loss, T_x

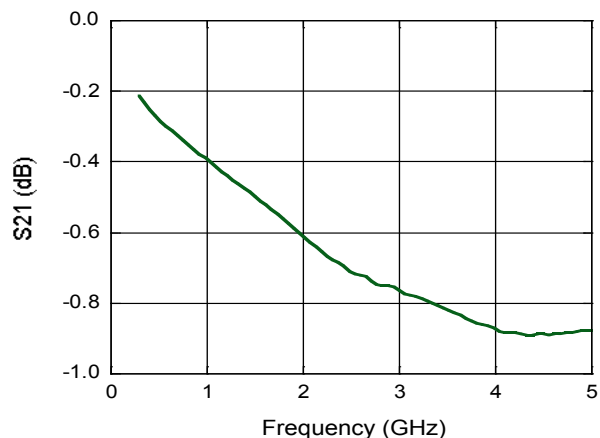


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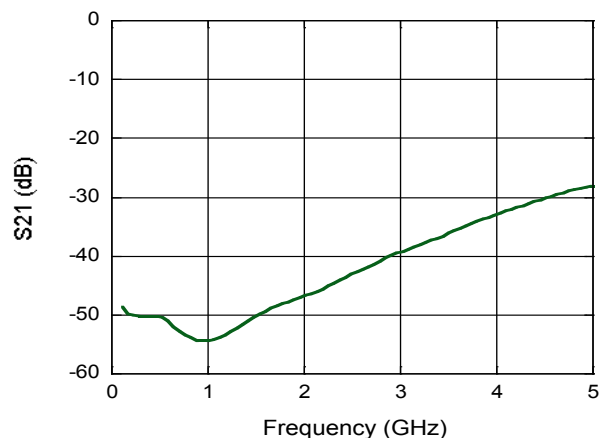
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Typical Performance Curves, R_X (100 mA Bias Current)

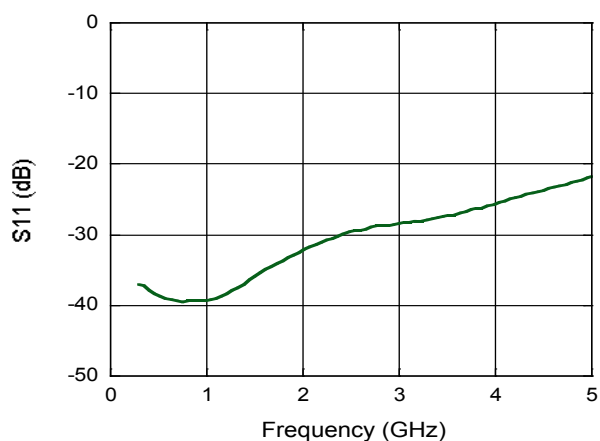
Insertion Loss, R_X



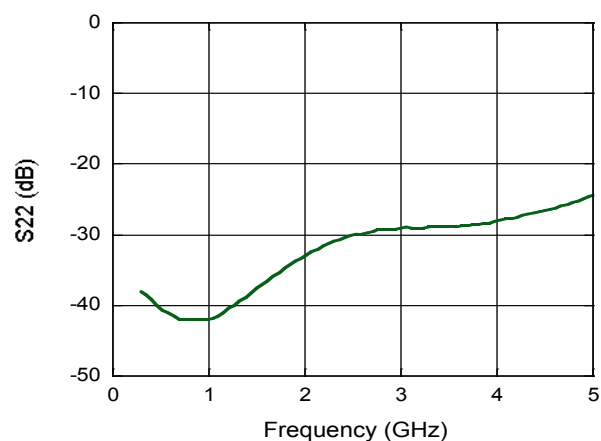
Isolation, R_X



Input Return Loss, R_X



Output Return Loss, R_X

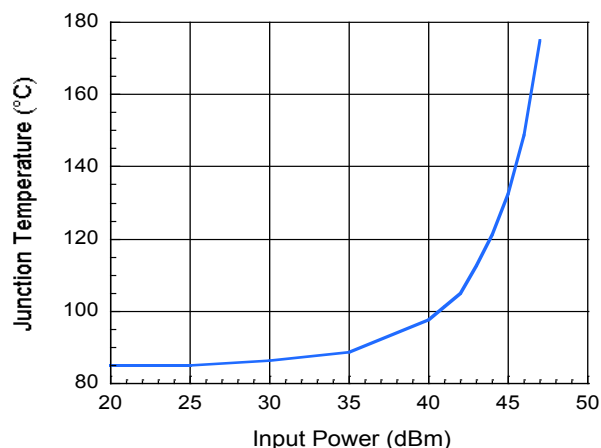


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Typical Performance Curves⁸: +85°C base plate temperature, 2000 MHz

Power



Handling Procedures

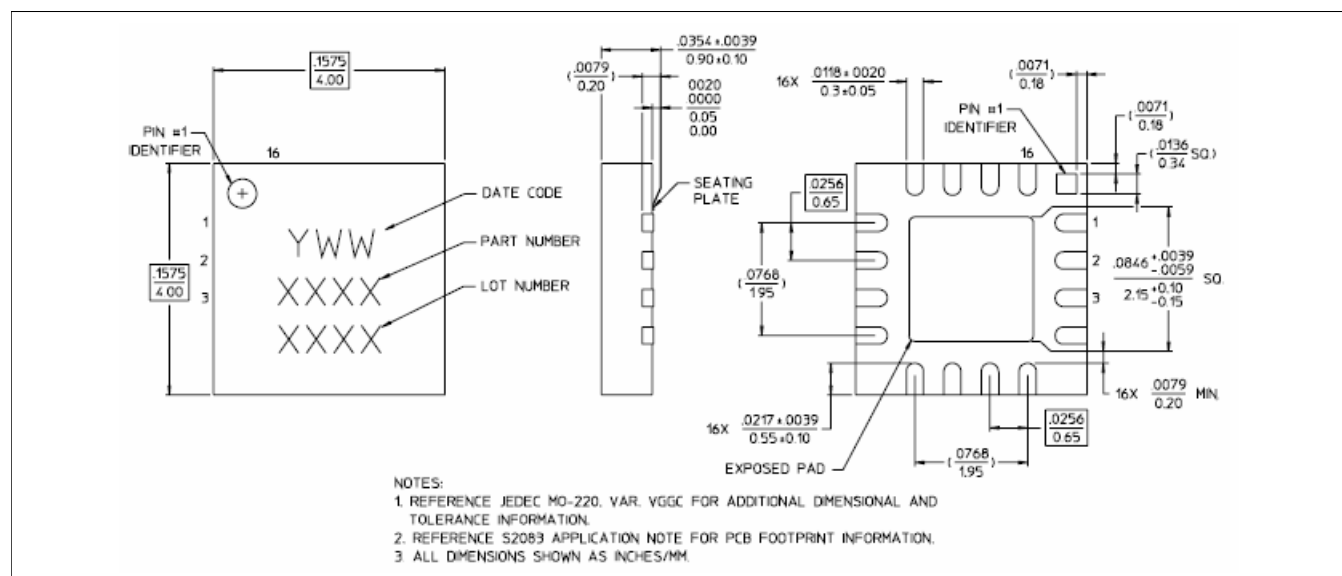
Please observe the following precautions to avoid damage:

Static Sensitivity

Silicon Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 2 devices.

8. Maximum Junction Temperature for this device is 175°C.

Lead Free 4 mm 16-Lead PQFN[†]



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

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