MASW-000936

PIN Diode SPDT 120 Watt Switch for 0.05 - 6.0 GHz Higher Power Applications

Rev. V6

Features

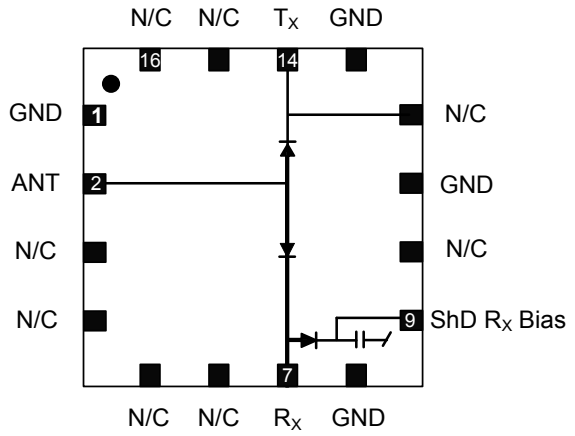
- Exceptional Broadband Performance
- Low Insertion Loss: T_X = 0.20 dB @ 2.7 GHz
- High Isolation: R_X = 50 dB @ 2.7 GHz
- High T_X RF Input Power = 120 W CW @ 2.0 GHz, 85°C
- High TX RF Input Peak Power: 1000 W
- Suitable for High Power LTE, TD-SCDMA, WiMAX, and Military Radio Applications
- Surface Mount 4 mm PQFN Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MASW-000936 is a SPDT high power, broadband, high linearity, PIN diode T/R switch for 0.05 - 6.0 GHz applications, including WiMAX & WiFi. The device is provided in an industry standard lead free 4 mm PQFN plastic package.

This device incorporates PIN diode die fabricated with a low loss, high isolation switching diode processes.

Functional Diagram (Top View)



Ordering Information[1]

Part Number	Package
MASW-000936-14000T	1000 piece reel
MASW-000936-001SMB	Sample Board

1. Reference Application Note M513 for reel size information.

Pin Configuration[2]

Pin	Pin Name	Description
1	GND	Ground
2	ANT	Antenna
3	N/C	Connect to Ground
4	N/C	No Connection
5	N/C	No Connection
6	N/C	Connect to Ground
7	RX	Receive
8	GND	Ground
9	ShD R_X Bias	ShD R_X Bias
10	N/C	No Connection
11	GND	Ground
12	N/C[3]	Do Not Use
13	GND	Ground
14	TX	Transmit
15	N/C	Connect to Ground
16	N/C	No Connection

2. The exposed pad centered on the package bottom must be connected to RF, DC and Thermal ground.
3. Do not ground pin 12.

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

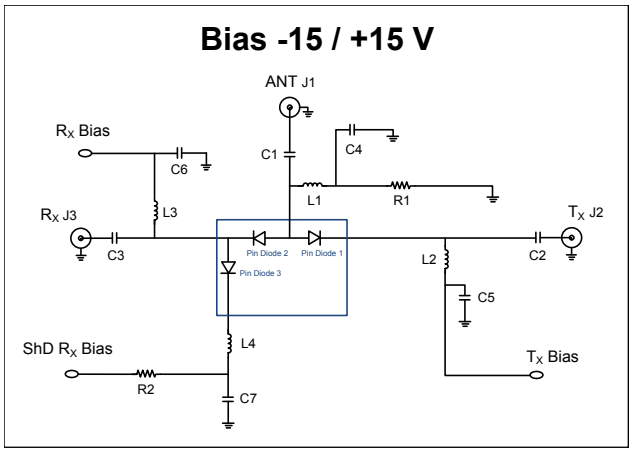
Electrical Specifications[4]: Freq. = 2.0, 2.7, 3.5 GHz, T_A = 25°C, Bias = 100 mA / 28 V

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss[4] P_{IN} = 0 dBm	R_X, 0.8 GHz T_X, 0.8 GHz 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	—	0.20 0.07 0.35 0.15 0.50 0.20 0.70 0.25	— — 0.55 — 0.75 — 0.90 —
Isolation[4] 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	41 — 40 — 33 —	45 16 50 13 40 11	—
Input Return Loss[4] P_{IN} = 0 dBm	R_X T_X	dB	—	23 34	—
T_X Input P0.1 dB	T_X to Antenna	dBm	—	>50	—
T_X IIP3 P_{IN} = +30 dBm	F1 = 2010 MHz, F2 = 2020 MHz	dBm	—	72	—
T_X CW Input Power	85°C Base plate 2.0 GHz 2.7 GHz 3.5 GHz	 dBm / W dBm / W dBm / W	—	 50.8 / 120 50 / 100 49 / 80	—
R_X CW Input Power	85°C Base plate 2.0 GHz	dBm W	—	41.5 14	—
T_X RF Switching Speed	(10 - 90% RF Voltage) 1 MHz Rep Rate in Modulating Mode	ns	—	200	—

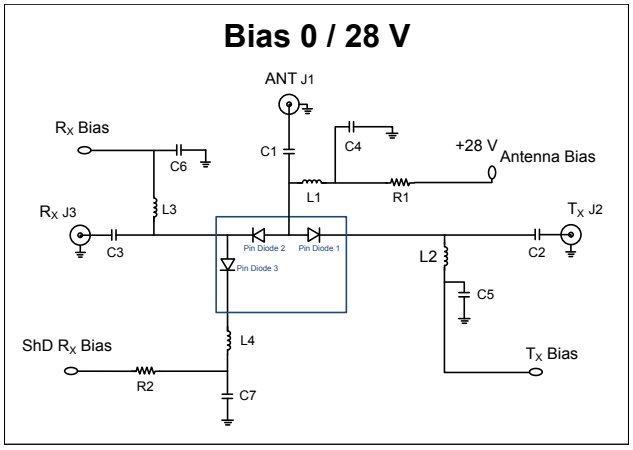
4. See Bias Table

Bias Diagrams & Tables

Bias -15 / +15 V



Bias 0 / 28 V



Bias -15 / +15 V

Bias Table	T_X	R_X	R_X ShDBias	ANT
Pin	**Pin 14**	**Pin 7**	**Pin 9**	**Pin 2**
T_X-ANT Isolation	(+15 V), 0 mA	(-15 V), -100 mA	GND	GND
T_X-ANT Insertion Loss	(-15 V), -100 mA	(+15 V), 100 mA	GND	GND
R_X-ANT Isolation	(-15 V), -100 mA	(+15 V), 100 mA	GND	GND
R_X-ANT Insertion Loss	(+15 V), 0 mA	(-15 V), 100 mA	GND	GND

Bias 0 / 28 V

Bias Table	T_X	R_X	R_X ShDBias	ANT
Pin	**Pin 14**	**Pin 7**	**Pin 9**	**Pin 2**
T_X-ANT Isolation	(+28 V), 0 mA	(GND), -100 mA	(+28 V), 0 mA	+28 V
T_X-ANT Insertion Loss	(GND), -100 mA	(+28 V), 100 mA	(GND), -100 mA	+28 V
R_X-ANT Isolation	(GND), -100 mA	(+28 V), 100 mA	(GND), -100 mA	+28 V
R_X-ANT Insertion Loss	(+28 V), 0 mA	(GND), -100 mA	(+28 V), 0 mA	+28 V

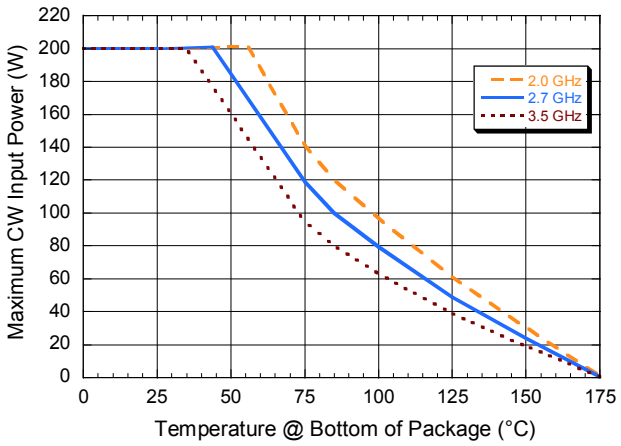
Absolute Maximum Ratings[5,6,7]

@ T_A = +25°C (unless otherwise specified)

Parameter	Absolute Maximum
Forward Current	150 mA
Reverse Voltage (RF & DC)	200 V
T_X Incident CW Power	See Power De-rating Curve
T_X Incident Peak Power (10 µs Pulse Width[8])	1000 W
R_X Incident CW Power	41.5 dBm (14 W) @ 2 GHz, 85°C
Junction Temperature	+175°C
Operating Temperature	-40°C to +100°C
Storage Temperature	-55°C to +150°C

5. Exceeding these limits may cause permanent damage.
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.
8. Measured with 4 ms pulse period, up to 100°C case temperature.

T_X Input Power De-rating @ 20 dB I/O Return Loss



Handling Procedures

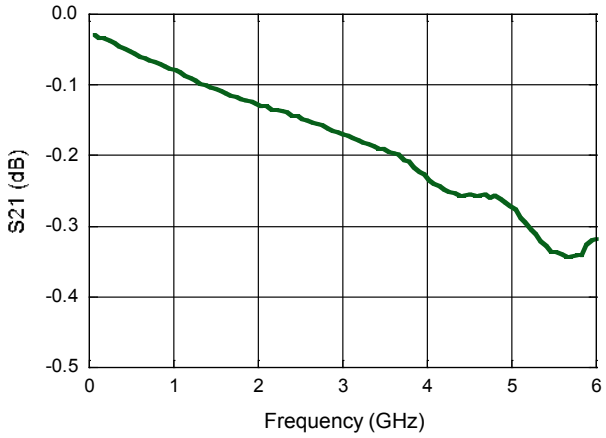
Please observe the following precautions to avoid damage:

Static Sensitivity

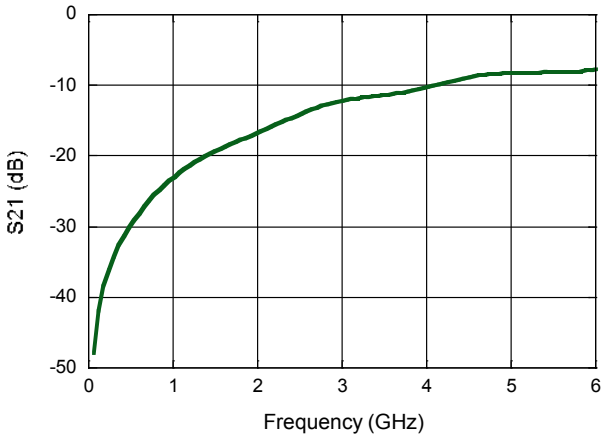
Silicon Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1C Human Body devices.

Typical Performance Curves (RF-probed parts), T_X (100 mA Bias Current)

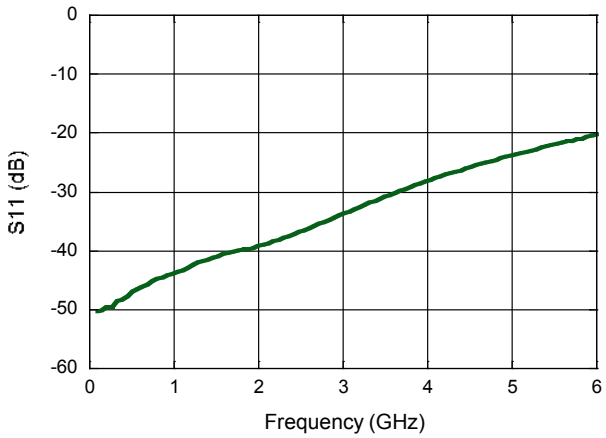
Insertion Loss, T_X



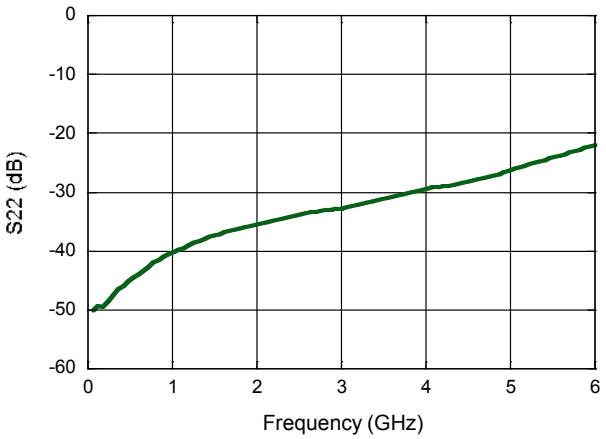
Isolation, T_X



Input Return Loss, T_X

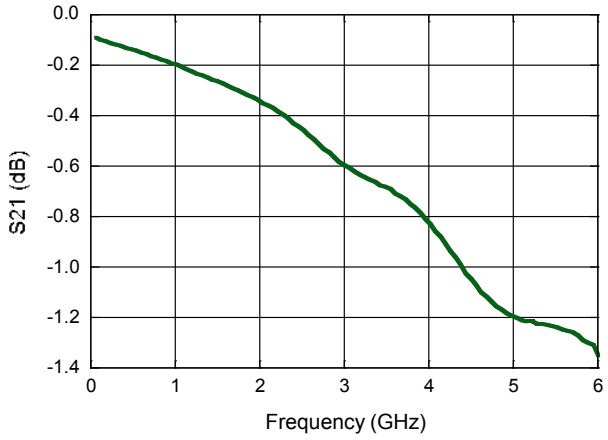


Output Return Loss, T_X

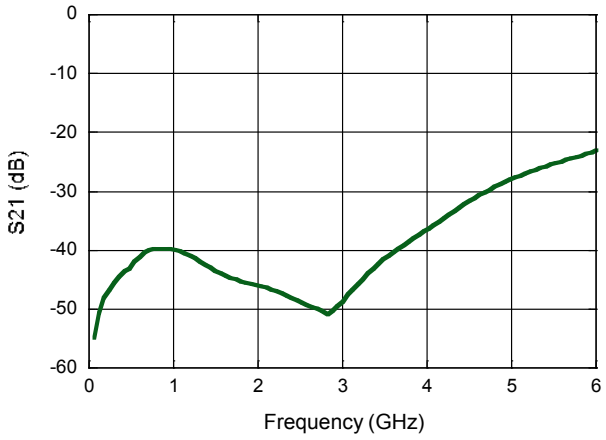


Typical Performance Curves (RF-probed parts), R_X (100 mA Bias Current)

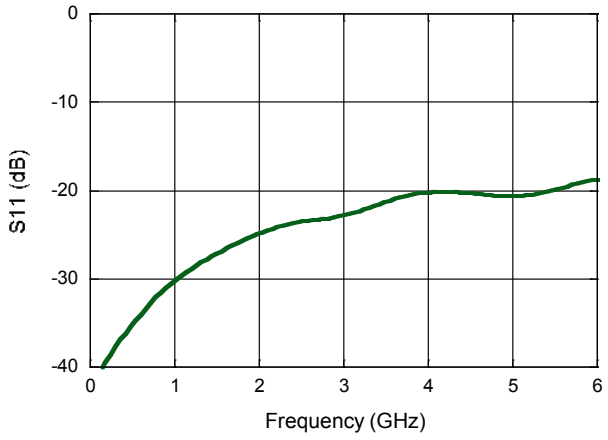
Insertion Loss, R_X



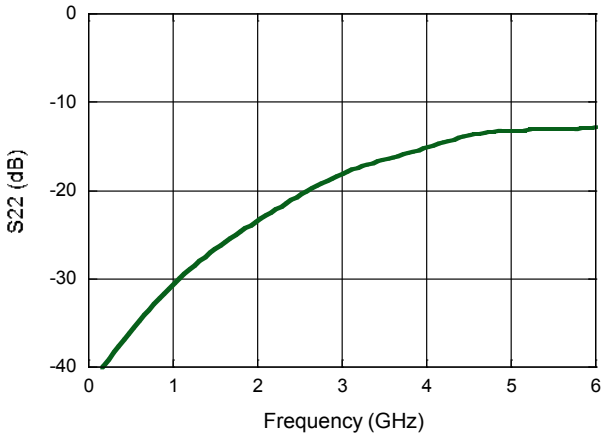
Isolation, R_X



Input Return Loss, R_X



Output Return Loss, R_X



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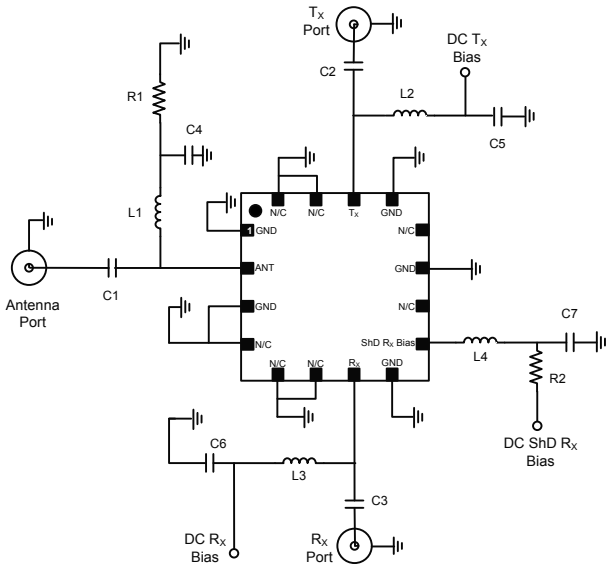
Application Schematic[9]

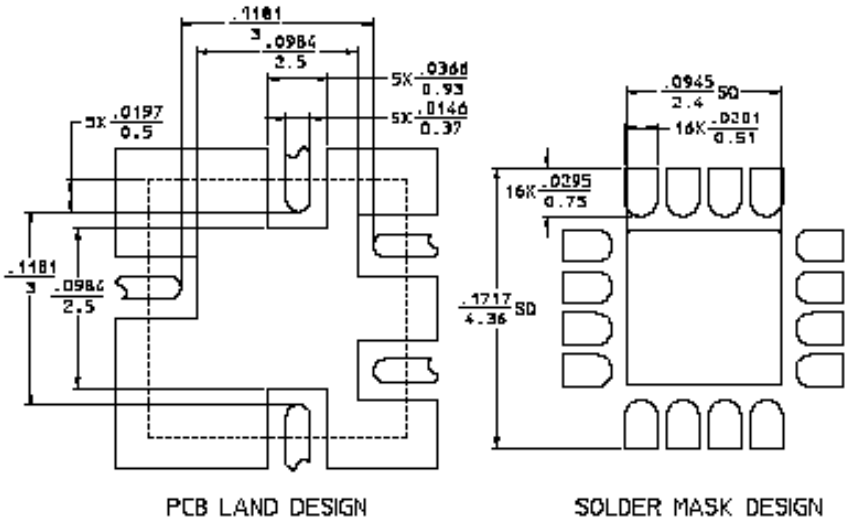


9. Adding an LC network to pin 12 can improve R_X performance between 2.0 and 2.7 GHz but may limit performance above 3 GHz. For broadband applications MACOM recommends not using pin 12 and not connecting it to any metal trace.

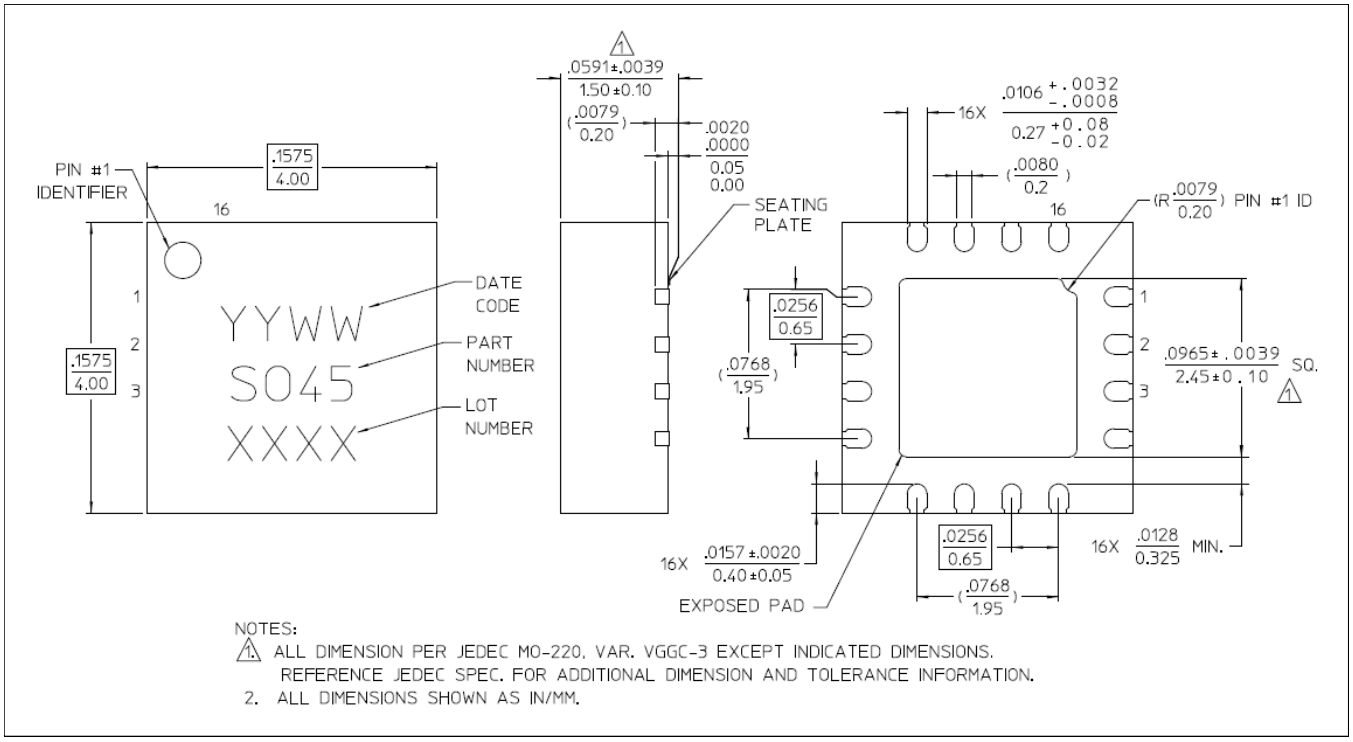
Parts List

Component	Value	Package
C1-C3	22 pF	0603
C4-C6	27 pF	0603
L1-L4	68 nH	0603
R1, R2	137 Ω	0603

PCB Footprint



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 NiPdAuAg.