MASW-011032

Switch, SP3T 100 Watt Reflective
0.05 - 2.5 GHz

Rev. V3

Features

- Suitable for High Power Military and Civilian Radio Applications
- Power Handling: 100 W @ 85°C
- Insertion Loss: 0.45 dB @ 2 GHz
- Isolation: 27 dB @ 2 GHz
- Surface Mount 7 mm 16-lead HQFN Package
- RoHS* Compliant and 260°C Reflow Compatible
- Class 1B HBM ESD Rating

Description

The MASW-011032 is a high power PIN diode SP3T switch in a common cathode configuration, operating from 50 MHz to 2.5 GHz. It features low insertion loss and excellent linearity with low DC consumption. This device is capable of handling 100 Watts CW incident power at a base plate temperature of 85ºC.

This high power switch is ideal for use on land mobile radio and MIL-COM applications that require higher CW and pulsed power operation.

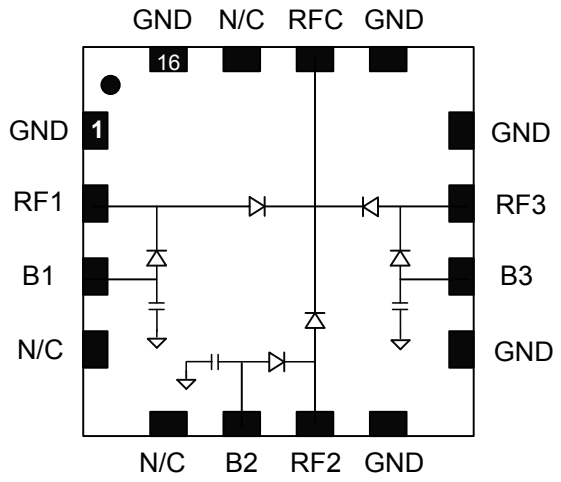
The MASW-011032 is manufactured using MACOM's hybrid manufacturing process featuring high voltage PIN diodes and passive devices integrated in a 7 mm HQFN 16-lead plastic package.

Ordering Information[1]

Part Number	Package
MASW-011032-14040T	500 piece reel
MASW-011032-001SMB	Sample Board

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

Pin	Function	Pin	Function
1	Ground	9	Ground
2	RF1 / V1 Bias	10	B3 Bias
3	B1 Bias	11	RF3 / V3 Bias
4	No Connection	12	Ground
5	No Connection	13	Ground
6	B2 Bias	14	RFC / V4 Bias
7	RF2 / V2 Bias	15	No Connection
8	Ground	16	Ground
		Paddle[2]	Ground

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.

Electrical Specifications: T_A = 25°C, Bias[3] = +5 / -5 V, 100 mA

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss P_{IN} = 0 dBm	0.5 GHz 1.0 GHz 2.0 GHz	dB	—	0.2 0.3 0.45	— 0.45 —
Isolation P_{IN} = 0 dBm	0.5 GHz 1.0 GHz 2.0 GHz	dB	— 27 —	30 32 27	—
Input Return Loss	P_{IN} = 0 dBm	dB	—	>15	—
CW Input Power	25°C base plate, 2.0 GHz	dBm W	—	52 158	—
CW Input Power	85°C base plate, 2.0 GHz	dBm W	—	50 100	—
P0.1dB	25°C base plate, 2.0 GHz	dBm	—	>52	—
Input IP3	F1 = 2.00 GHz, F2 = 2.01 GHz P_{IN} = 40 dBm/Tone, 28 V	dBm	—	77	—
RF Switching Speed	(10-90% RF Voltage) 1 MHz Rep Rate in Modulating Mode	ns	—	250	—

3. See Bias table.

Bias (+5 V / -5 V)

RF State	V1 Bias (V)	V2 Bias (V)	V3 Bias (V)	B1 Bias (V)	B2 Bias (V)	B3 Bias (V)	V4 Bias (V)
RFC – RF1 Low Loss RFC – RF2 Isolation RFC – RF3 Isolation	+5 V @ 100 mA	-5 V @ 100 mA	-5 V @ 100 mA	0 V	0 V	0 V	0 V
RFC – RF2 Low Loss RFC – RF1 Isolation RFC – RF3 Isolation	-5 V @ 100 mA	+5 V @ 100 mA	-5 V @ 100 mA	0 V	0 V	0 V	0 V
RFC – RF3 Low Loss RFC – RF1 Isolation RFC – RF2 Isolation	-5 V @ 100 mA	-5 V @ 100 mA	+5 V @ 100 mA	0 V	0 V	0 V	0 V

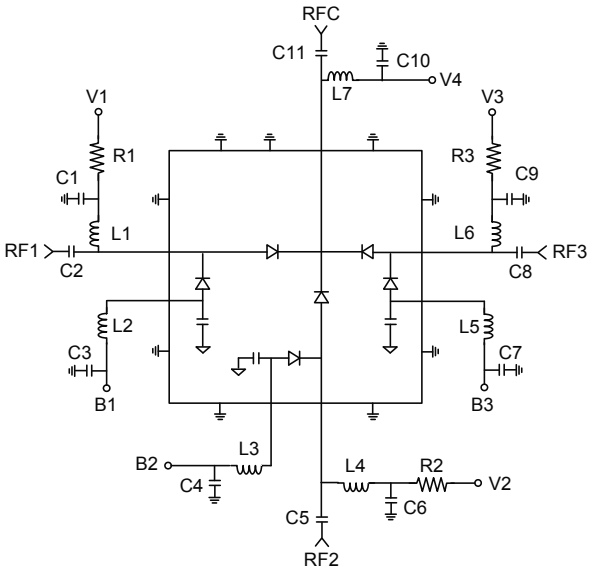
4. DC reverse bias of a PIN Diode operating at a high power is dependent on RF frequency, incident power, and VSWR. See Minimum Reverse DC Voltage table for high power operation.

Minimum Reverse DC Voltage[5]

Frequency (MHz)	Minimum Reverse DC Voltage
30	| -120 V |
100	| -119 V |
200	| -114 V |
300	| -106 V |
500	| -90 V |
1000	| -59 V |
1500	| -43 V |
2000	| -33 V |

5. Required to maintain low loss under 100 W of incident power with 1.5:1 VSWR.

Application Schematic



Absolute Maximum Ratings[6,7]

Parameter	Absolute Maximum
Forward Current	200 mA
Reverse DC Voltage	-150 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C
Junction Temperature	+175°C

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.

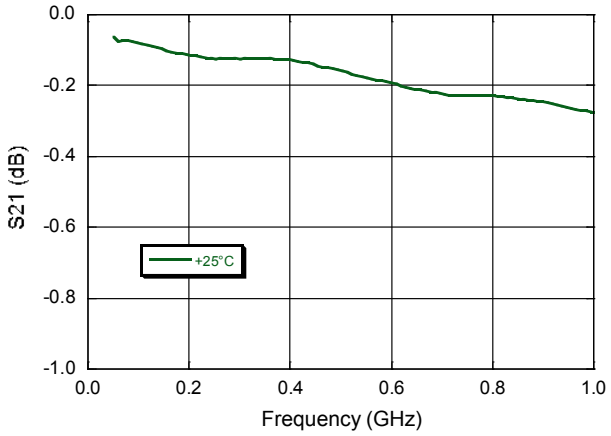
Off-Chip Component Values

Component	Value	Size
C1, C3, C4, C6, C7, C9, C10	270 pF	0603
C2, C5, C8, C11	27 pF	0603
L1 - L7	82 nH	0603
R1 - R3[8]	39 Ω	1210

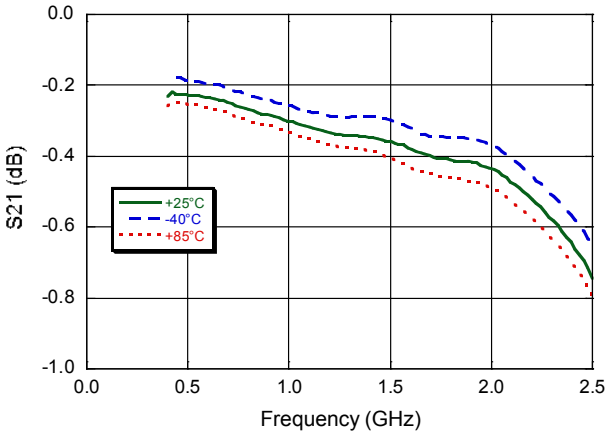
8. Resistance values are used for small signal testing under +5 V / -5 V bias conditions.

Typical Performance Curves: Bias = +5 / -5 V, 100 mA

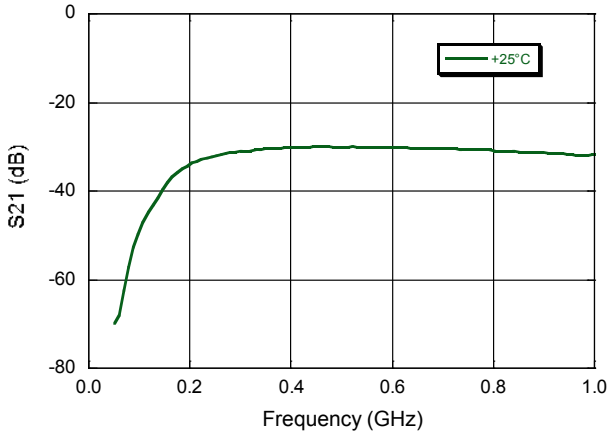
***Insertion Loss** (using external bias tee (ZFBT-4R2G))*



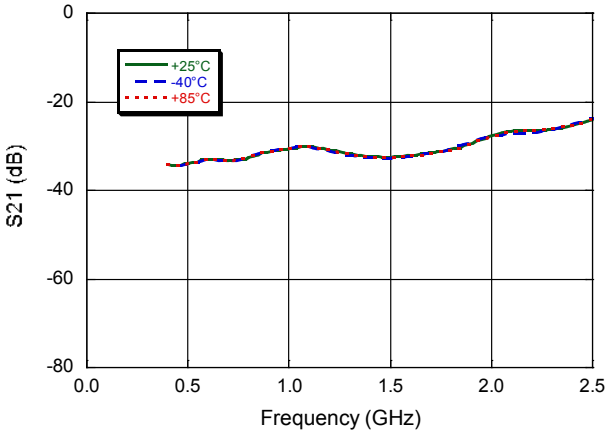
***Insertion Loss** (using off-chip components)*



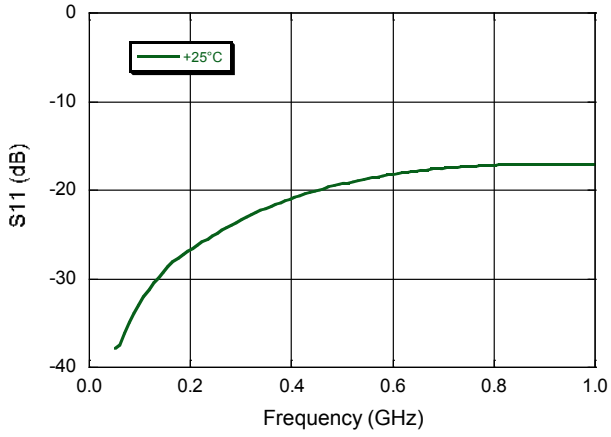
***Isolation** (using external bias tee (ZFBT-4R2G))*



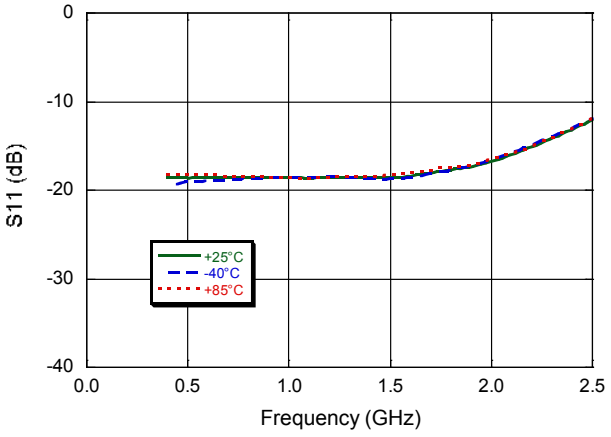
***Isolation** (using off-chip components)*



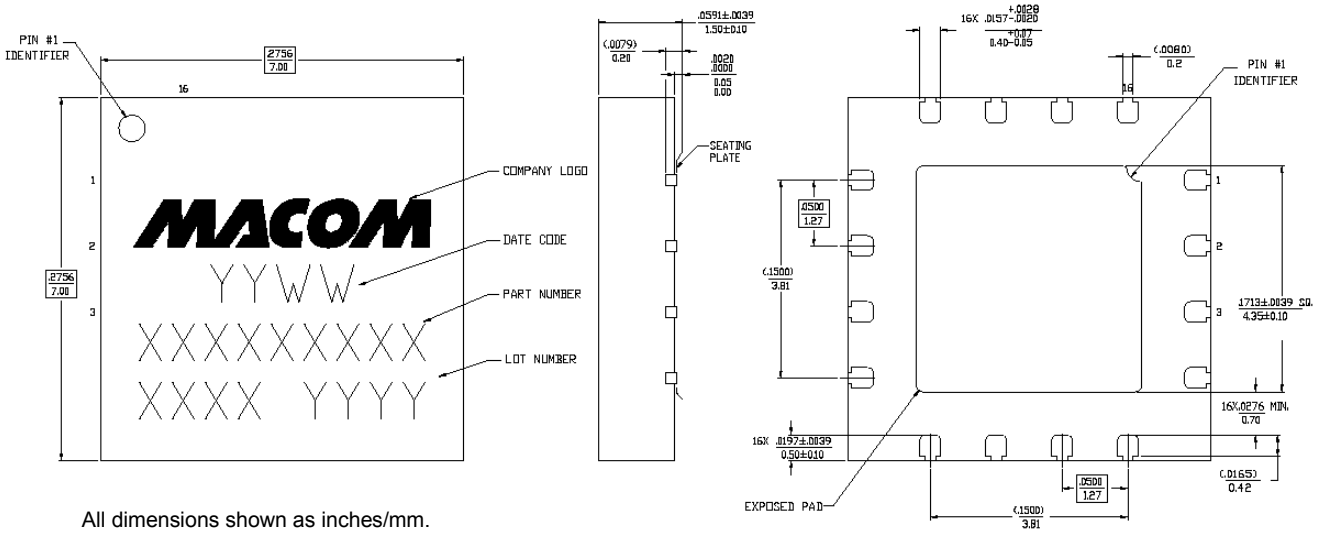
***Return Loss** (using external bias tee (ZFBT-4R2G))*



***Return Loss** (using off-chip components)*



Lead Free 7 mm 16-Lead HQFN †



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level TBD requirements.
Plating is NiPdAuAg.

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 1B HBM devices.