Switch, SP2T 100 W Reflective 0.03 - 3.0 GHz

MASW-011055
Rev. V3

Features

- Suitable for High Power Military and Civilian Radio Applications
- Power Handling: 100 W @ 85°C
- Insertion Loss: 0.35 dB @ 2 GHz
- Isolation: 51 dB @ 2 GHz
- Lead-Free 5 mm HQFN-12LD Package
- RoHS* Compliant

Applications

- ISM / MM

Description

The MASW-011055 is a high power PIN diode SP2T switch in a common anode configuration, operating from 30 MHz to 3 GHz. It features low insertion loss and excellent linearity. 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.

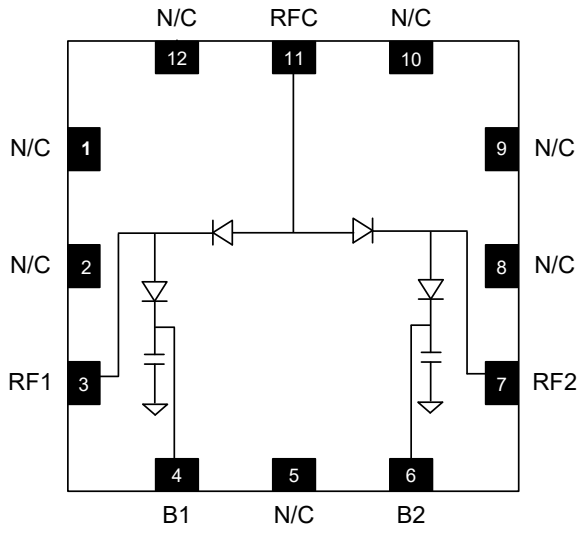
The MASW-011055 is manufactured using MACOM's hybrid manufacturing process featuring high voltage PIN diodes and passive devices integrated in a 5 mm HQFN 12-lead plastic package.

Ordering Information[1]

Part Number	Package
MASW-011055-TR0500	500 piece reel
MASW-011055-SMB	Sample Board 0.5 - 3 GHz

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

Pin #	Function
1, 2, 5, 8, 9, 10, 12	No Connection
3	RF1 / V1 Bias
4	B1 Bias
6	B2 Bias
7	RF2 / V2 Bias
11	RFC / V3 Bias
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, compliant to current RoHS EU directive.

Electrical Specifications: T_A = 25°C, Bias[3] = +5 / 0 V, 50 mA / 100 mA

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss P_{IN} = 0 dBm	0.5 GHz 1 GHz 2 GHz	dB	—	0.10 0.20 0.35	— 0.50 —
Isolation P_{IN} = 0 dBm	0.5 GHz 1 GHz 2 GHz	dB	— 48 —	52 54 51	—
Input Return Loss	P_{IN} = 0 dBm	dB	—	>15	—
CW Input Power	25°C base plate, 2 GHz	dBm W	—	52 158	—
CW Input Power	85°C base plate, 2 GHz	dBm W	—	50 100	—
P0.1dB	25°C base plate, 2 GHz	dBm	—	>52	—
Input IP3	F1 = 2000 MHz, F2 = 2010 MHz P_{IN} = 40 dBm/Tone, 28 V	dBm	—	66	—
RF Switching Speed	(10-90% RF Voltage) 1 MHz Rep Rate in Modulating Mode	ns	—	500	—

3. See Bias table.

Bias (+5 V / 0 V for Small Signal Testing)[4]

RF State	V1 Bias (V)	V2 Bias (V)	V3 Bias (V)	B1 Bias (V)	B2 Bias (V)
RFC – RF1 Low Loss RFC – RF2 Isolation	0 V @ -100 mA	+5 V @ 50 mA	+5 V @ 100 mA	+5 V @ 0 mA	0 V @ -50 mA
RFC – RF2 Low Loss RFC – RF1 Isolation	+5 V @ 50 mA	0 V @ -100 mA	+5 V @ 100 mA	0 V @ -50 mA	+5 V @ 0 mA

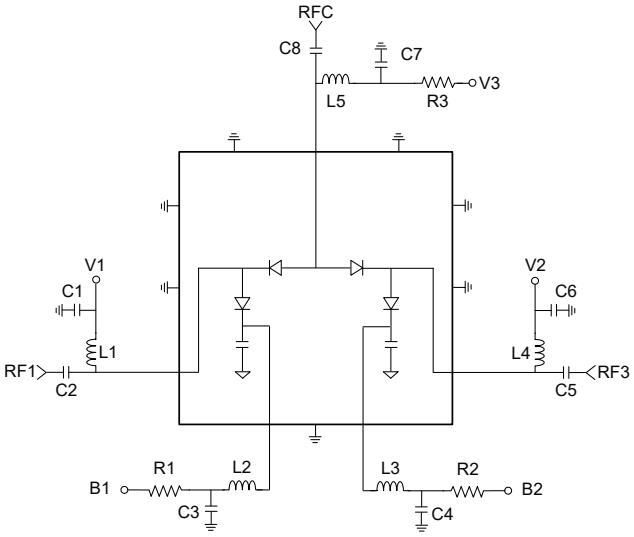
4. DC reverse bias of a PIN Diode operating at a high power is dependent on RF frequency, incident power, and VSWR. See Minimum Reverse DC Voltage table for high power operation.

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

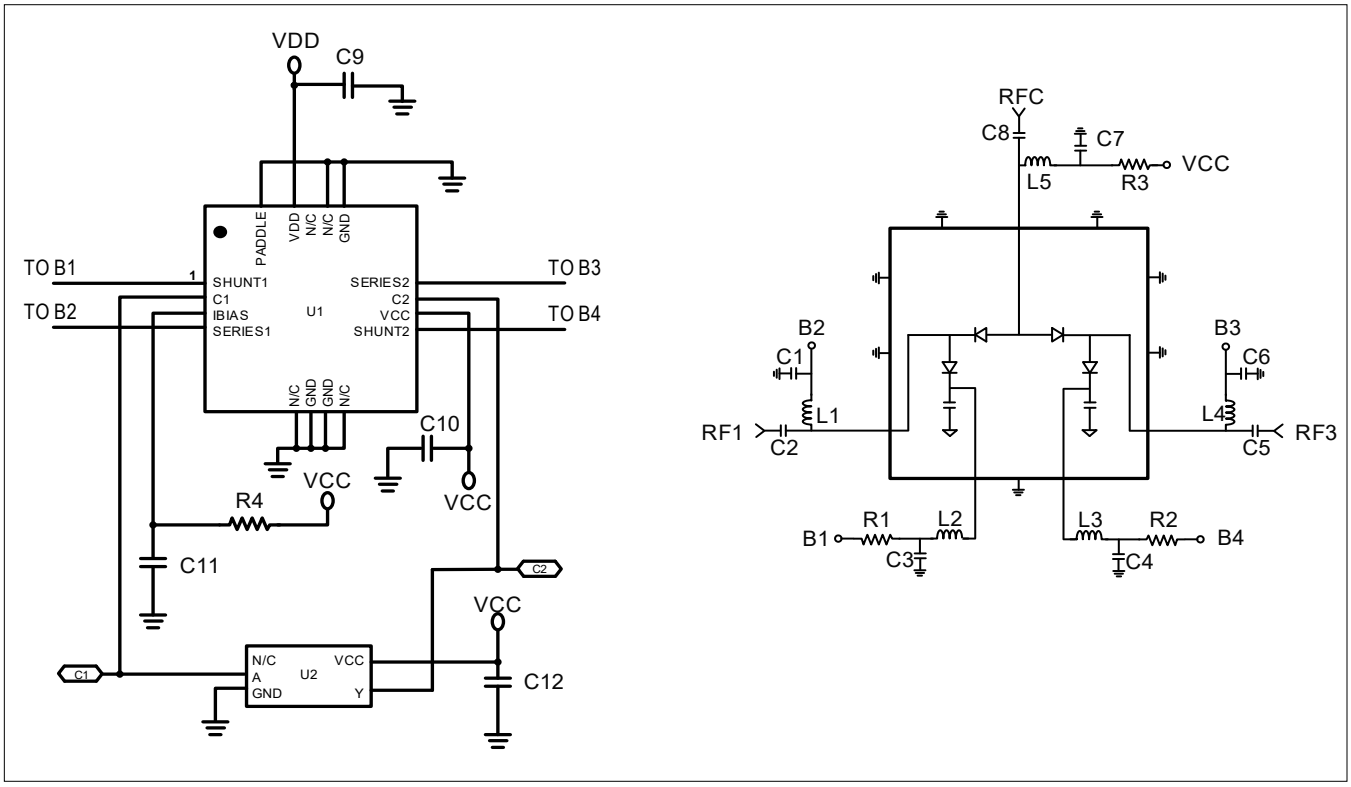
6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.

Off-Chip Component Values

Component	Operating Frequency		Size
	0.03 - 1.0 GHz	0.5 - 3.0 GHz	
C1, C3, C4, C6, C7, C8	0.1 µF	270 pF	0603
C2, C5, C8	0.1 µF	27 pF	0603
L1 - L5	3.3 µH	82 nH	0603
R1 - R2[8]	82 Ω	82 Ω	1210
R3[8]	39 Ω	39 Ω	1210

8. Resistance values are used for small signal testing under +5 V / 0 V bias conditions.

MASW-011055 with MADR-010574 Driver Application Schematic[9]



9. See page 3 for R3, L1 - L5 and C1 - C8 values.

Parts List

Part	Value
C9	0.01 µF
C10 - C12	0.1 µF
R1, R2[10]	12 kΩ
R4	499 kΩ
U2	SN74AHC1G

10. Resistor values calculated to provide ~10 mA of shunt diode bias current given V_{CC} = 5 V and V_{DD} = 120 V.

Handling Procedures

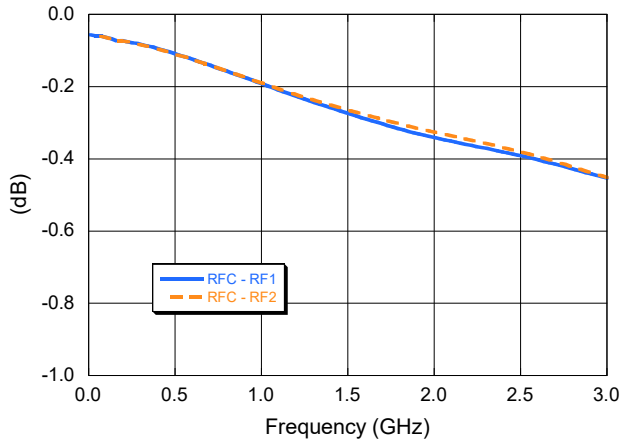
Please observe the following precautions to avoid damage:

Static Sensitivity

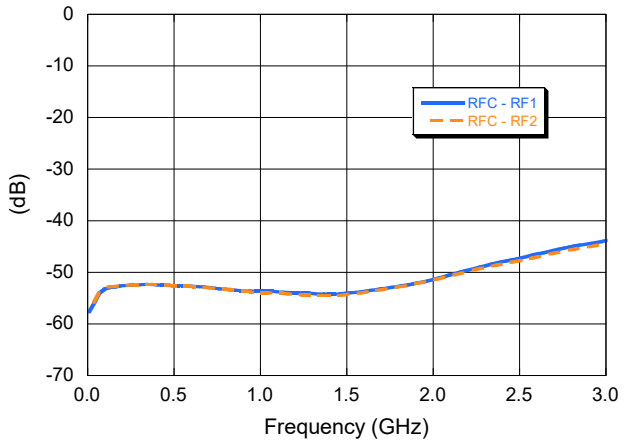
Silicon Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1B HBM devices.

Typical Performance Curves @ +25°C (using external bias tees):

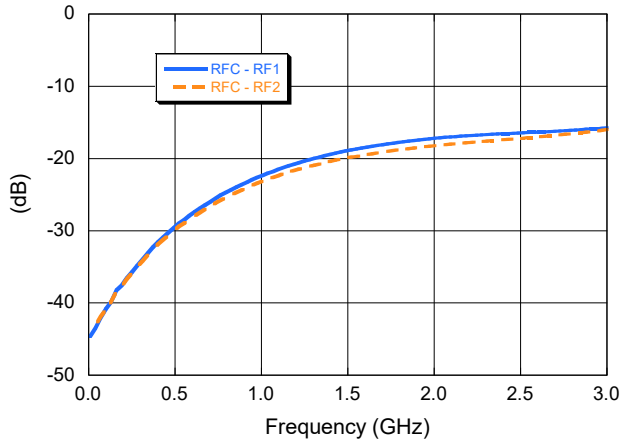
Insertion Loss



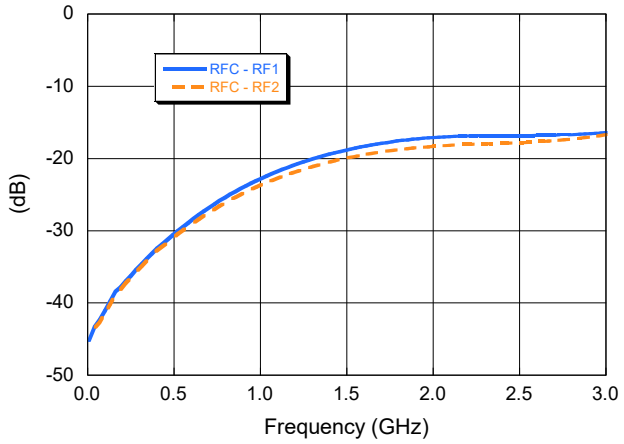
Isolation



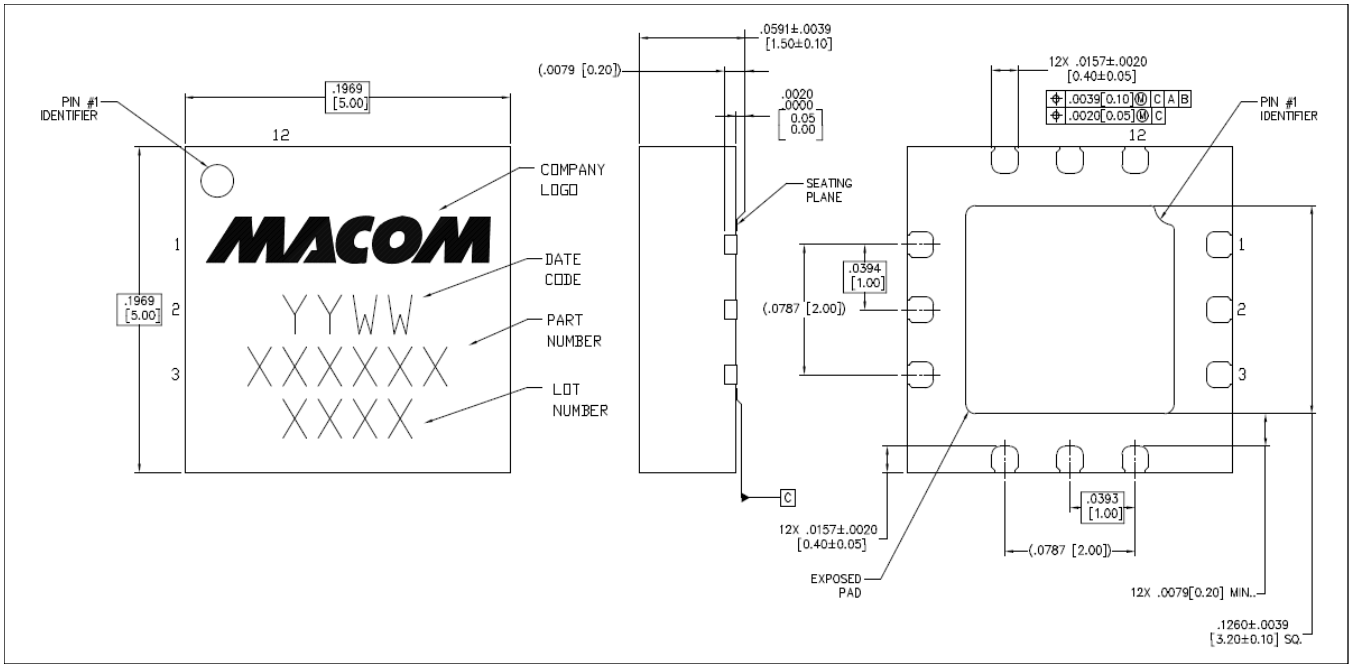
Input Return Loss



Output Return Loss



Lead Free 5 mm 12-Lead HQFN †



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is NiPdAuAg.

Mouser Electronics

Authorized Distributor

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MACOM:

MASW-011055-TR0500