

## Features

- Suitable for High Power Military and Civilian Radio Applications
- Power Handling: 100 W @ 85°C
- Insertion Loss: 0.35 dB @ 2 GHz
- Isolation: 40 dB @ 2 GHz
- Surface Mount 7 mm 16-lead HQFN Package
- RoHS\* Compliant
- Class 1B HBM ESD Rating

## Description

The MASW-011030 is a high power PIN diode SP3T switch in a common anode configuration, operating from 30 MHz to 3 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 85°C.

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

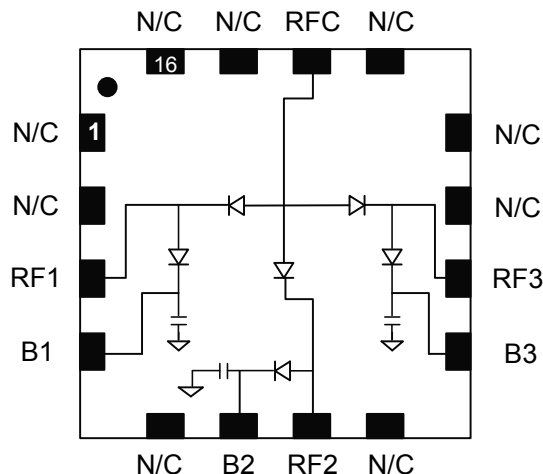
The MASW-011030 is manufactured using MACOM's hybrid manufacturing process featuring high voltage PIN diodes and passive devices integrated in a 7 mm HQFN 16-lead plastic package.

## Ordering Information<sup>1</sup>

| Part Number        | Package        |
|--------------------|----------------|
| MASW-011030-14040T | 500 piece reel |
| MASW-011030-001SMB | Sample Board   |

1. Reference Application Note M513 for reel size information.

## Functional Schematic



## Pin Configuration

| Pin | Function      | Pin                 | Function      |
|-----|---------------|---------------------|---------------|
| 1   | No Connection | 9                   | B3 Bias       |
| 2   | No Connection | 10                  | RF3 / V3 Bias |
| 3   | RF1 / V1 Bias | 11                  | No Connection |
| 4   | B1 Bias       | 12                  | No Connection |
| 5   | No Connection | 13                  | No Connection |
| 6   | B2 Bias       | 14                  | RFC / V4 Bias |
| 7   | RF2 / V2 Bias | 15                  | No Connection |
| 8   | No Connection | 16                  | No Connection |
|     |               | Paddle <sup>2</sup> | 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.

## Switch, SP3T 100 Watt Reflective 0.03 - 3.0 GHz

Rev. V1

Electrical Specifications:  $T_A = 25^\circ\text{C}$ , Bias<sup>3</sup> = +5 / -5 V, 50 mA / 100 mA

| Parameter                          | Test Conditions  | Units    | Min. | Typ.                 | Max.              |
|------------------------------------|--|----------|------|----------------------|-------------------|
| Insertion Loss<br>$P_{IN} = 0$ dBm | 0.5 GHz<br>1.0 GHz<br>2.0 GHz                                | dB       | —    | 0.15<br>0.20<br>0.35 | —<br>0.35<br>0.50 |
| Isolation<br>$P_{IN} = 0$ dBm      | 0.5 GHz<br>1.0 GHz<br>2.0 GHz                                | dB       | 45   | 50<br>50<br>40       | —                 |
| Input Return Loss                  | $P_{IN} = 0$ dBm   | dB       | —    | >15                  | —                 |
| CW Input Power                     | 25°C base plate, 2.0 GHz                                     | dBm<br>W | —    | 52<br>158            | —                 |
| CW Input Power                     | 85°C base plate, 2.0 GHz                                     | dBm<br>W | —    | 50<br>100            | —                 |
| P0.1dB                             | 25°C base plate, 2.0 GHz                                     | dBm      | —    | >52                  | —                 |
| Input IP3                          | F1 = 2.00 GHz, F2 = 2.01 GHz<br>$P_{IN} = 40$ dBm/Tone, 28 V | dBm      | —    | 62                   | —                 |
| RF Switching Speed                 | (10-90% RF Voltage)<br>1 MHz Rep Rate in Modulating Mode     | ns       | —    | 800                  | —                 |

3. See Bias table.

### Bias (+5 V / -5 V)<sup>4</sup>

| 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<br>RFC – RF2 Isolation<br>RFC – RF3 Isolation | -5 V @<br>100 mA | +5 V @<br>50 mA  | +5 V @<br>50 mA  | 0 V         | 0 V         | 0 V         | 0 V         |
| RFC – RF2 Low Loss<br>RFC – RF1 Isolation<br>RFC – RF3 Isolation | +5 V @<br>50 mA  | -5 V @<br>100 mA | +5 V @<br>50 mA  | 0 V         | 0 V         | 0 V         | 0 V         |
| RFC – RF3 Low Loss<br>RFC – RF1 Isolation<br>RFC – RF2 Isolation | +5 V @<br>50 mA  | +5 V @<br>50 mA  | -5 V @<br>100 mA | 0 V         | 0 V         | 0 V         | 0 V         |

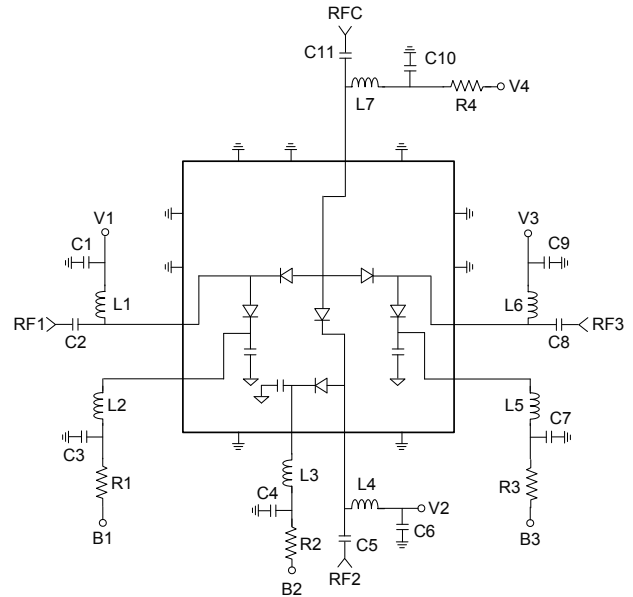
4. DC reverse bias of a PIN Diode operating at a high power is dependent on RF frequency, incident power, and VSWR. See Minimum Reverse DC Voltage table for high power operation.

## Minimum Reverse DC Voltage<sup>5</sup>

| 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<sup>6,7</sup>

| 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.

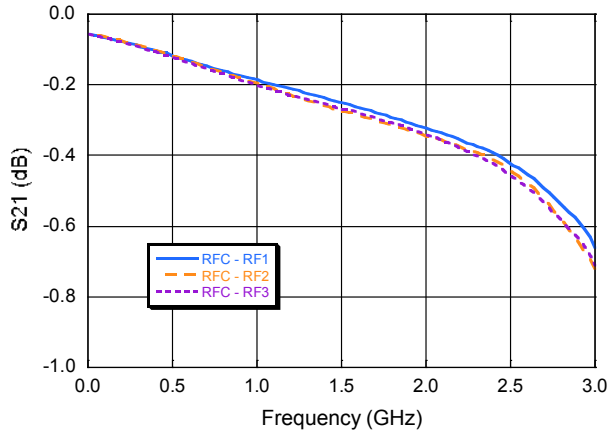
## Off-Chip Component Values

| Component                   | Operating Frequency |               | Size |
|-----------------------------|---------------------|---------------|------|
|                             | 0.03 - 1.0 GHz      | 0.5 - 3.0 GHz |      |
| C1, C3, C4, C6, C7, C9, C10 | 0.1 $\mu$ F         | 270 pF        | 0603 |
| C2, C5, C8, C11             | 0.1 $\mu$ F         | 27 pF         | 0603 |
| L1 - L7                     | 3.3 $\mu$ H         | 82 nH         | 0603 |
| R1 - R3 <sup>8</sup>        | 82 $\Omega$         | 82 $\Omega$   | 1210 |
| R4 <sup>8</sup>             | 39 $\Omega$         | 39 $\Omega$   | 1210 |

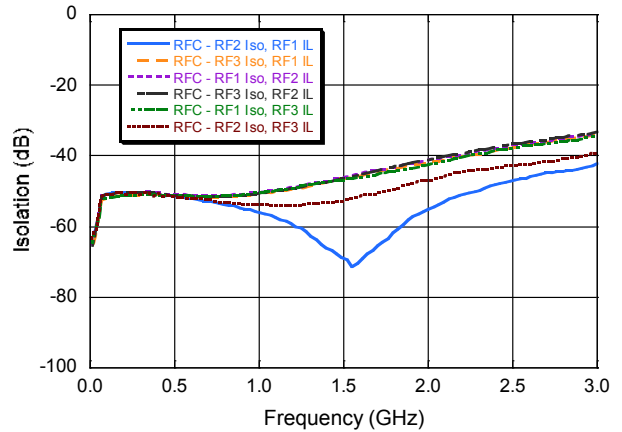
8. Resistance values are used for small signal testing under +5 V / -5 V bias conditions.

## Typical Performance Curves (using external bias tees):

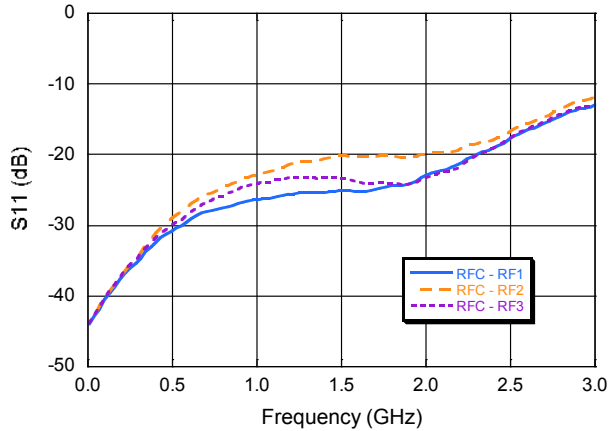
**Insertion Loss**



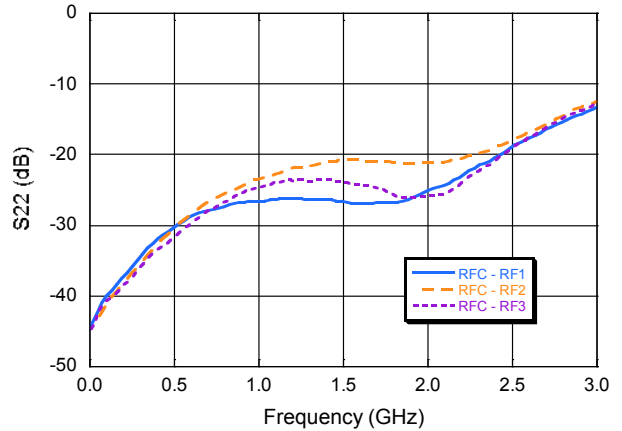
**Isolation**



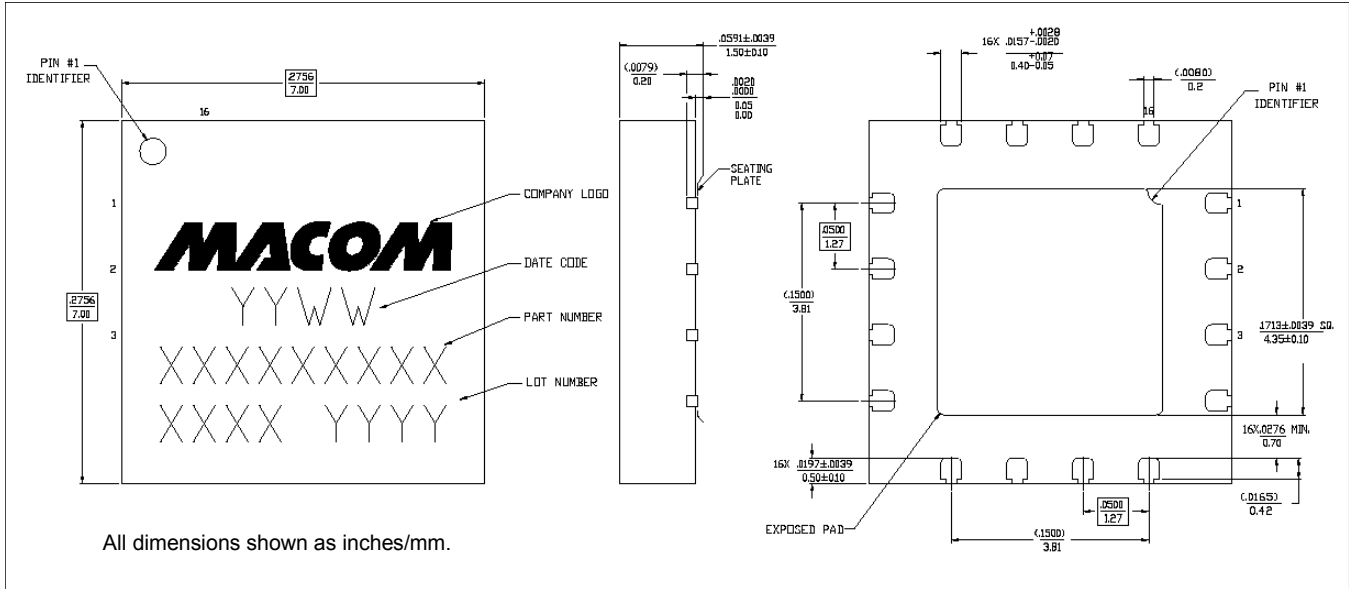
**Input Return Loss**



**Output Return Loss**



## 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

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 Class 1B HBM devices.

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