# MASWSS0107

## GaAs Broadband DPDT Diversity Switch
## 1.0 - 6.0 GHz

Rev. V1

### Features

- 802.11a + b/g Broadband Applications
- Broadband Performance: 1.0 - 6.0 GHz
- Low Insertion Loss: 1.0 dB @ 2.4 GHz
  1.2 dB @ 6.0 GHz
- High Isolation: 38 dB @ 2.4 GHz
  31 dB @ 6.0 GHz
- Fast Switching Speed: 0.5 µm GaAs PHEMT
- Lead-Free 3 mm 12-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

### Description

M/A-COM's MASWSS0107 is a broadband GaAs PHEMT MMIC diversity switch in a low cost, lead-free 3 mm 12-lead PQFN package. The MASWSS0107 is ideally suited for applications where very small size and low cost are required.

Typical applications are for WLAN IEEE 802.11a and 802.11b/g systems that employ two antennas for transmit and receive diversity. Other applications include cordless phones and base stations.Designed for high power, this DPDT switch maintains high linearity up to 6.0 GHz.

The MASWSS0107 can be controlled with either two or four control signals. With four control signals each of the four insertion paths can be controlled individually. To control the switch with only two signals, tie pairs of control lines together.

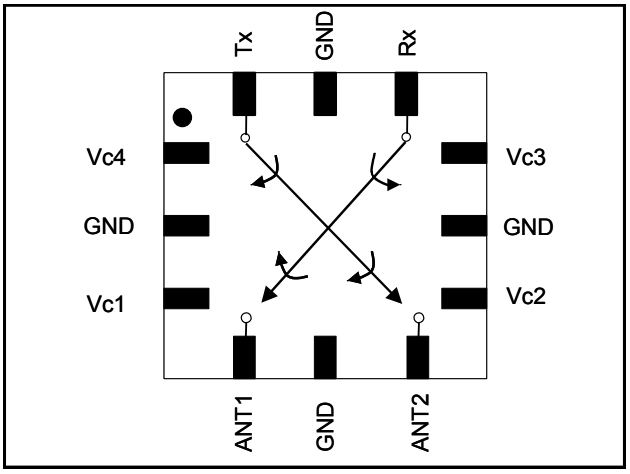
The MASWSS0107 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

### Ordering Information [1]

| Part Number | Package |
|---|---|
| MASWSS0107TR-3000 | 3000 piece reel |
| MASWSS0107SMB | Sample Test Board (Includes 5 Samples) |

1. Reference Application Note M513 for reel size information.

### Functional Schematic




### Pin Configuration

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | Vc4 | Control 4 |
| 2 | GND | Ground |
| 3 | $V_C1$ | Control 1 |
| 4 | ANT1 | Antenna Port 1 |
| 5 | GND | Ground |
| 6 | ANT2 | Antenna Port 2 |
| 7 | Vc2 | Control 2 |
| 8 | GND | Ground |
| 9 | Vc3 | Control 3 |
| 10 | Rx | Receive Port |
| 11 | GND | Ground |
| 12 | Tx | Transmit Port |
| 13 | Paddle[2] | DC and RF Ground |

2. The exposed pad centered on the package bottom must be connected to RF and DC ground.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.



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## GaAs Broadband DPDT Diversity Switch
## 1.0 - 6.0 GHz



### Electrical Specifications: $T_A$ = 25°C, $Z_0$ = 50 Ω , $V_C$ = 0 V / 3 V, 5 pF Capacitor [3]

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Insertion Loss[4] | 2.4 GHz<br>2 - 4 GHz<br>4 - 5 GHz<br>4.9 - 6 GHz | dB<br>dB<br>dB<br>dB | —<br>—<br>—<br>— | 1.0<br>1.1<br>1.2<br>1.2 | 1.3<br>—<br>—<br>— |
| Isolation<br>(Input to Output) | One Path Active<br>2.4 GHz<br>4.9 - 6 GHz | <br>dB<br>dB | <br>36<br>— | <br>38<br>32 | <br>—<br>— |
| Isolation<br>(Input to Output) | Both Paths Active<br>2.4 GHz<br>4.9 - 6 GHz | <br>dB<br>dB | <br>—<br>— | <br>33<br>27 | <br>—<br>— |
| Isolation<br>(Antenna to Antenna)<br><br>(Tx - Rx) | One Path Active<br>2.4 GHz<br>4.9 - 6 GHz<br>2.4 GHz<br>4.9 - 6 GHz | <br>dB<br>dB<br>dB<br>dB | <br>—<br>—<br>—<br>— | <br>31<br>22<br>30<br>27 | <br>—<br>—<br>—<br>— |
| Isolation<br>(Antenna to Antenna)<br><br>(Tx - Rx) | Both Paths Active<br>2.4 GHz<br>4.9 - 6 GHz<br>2.4 GHz<br>4.9 - 6 GHz | <br>dB<br>dB<br>dB<br>dB | <br>—<br>—<br>—<br>— | <br>25<br>20<br>25<br>27 | <br>—<br>—<br>—<br>— |
| Return Loss | 2.4 GHz<br>4.9 - 6 GHz | dB<br>dB | —<br>— | 21<br>19 | —<br>— |
| IP2 | Two Tone, 15 dBm/tone, 5 MHz Spacing<br>2.4 GHz<br>4.9 - 6 GHz | <br>dBm<br>dBm | <br>—<br>— | <br>91<br>90 | <br>—<br>— |
| IP3 | Two Tone, 15 dBm/tone, 5 MHz Spacing<br>2.4 GHz<br>4.9 - 6 GHz | <br>dBm<br>dBm | <br>—<br>— | <br>53<br>51 | <br>—<br>— |
| Input P0.1dB | 2.4 GHz<br>4.9 - 6 GHz | dBm<br>dBm | —<br>— | 27<br>29 | —<br>— |
| Input P1dB | 2.4 GHz<br>4.9 - 6 GHz | dBm<br>dBm | —<br>— | 33<br>32 | —<br>— |
| 2nd Harmonic | $P_{IN}$ = 20 dBm<br>2.4 GHz<br>5.8 GHz | <br>dBm<br>dBm | <br>—<br>— | <br>-77<br>-75 | <br>—<br>— |
| 3rd Harmonic | $P_{IN}$ = 20 dBm<br>2.4 GHz<br>5.8 GHz | <br>dBm<br>dBm | <br>—<br>— | <br>-76<br>-78 | <br>—<br>— |
| Trise, Tfall | 10% to 90% RF<br>90% to 10% RF | nS<br>nS | —<br>— | 80<br>70 | —<br>— |
| Ton, Toff | 50% control to 90% RF, and 50% control to 10% RF | nS | — | 97 | — |
| Transients | | mV | — | 14 | — |
| Control Current | \|Vc\| = 3 V | µA | — | 1 | 10 |

3. For positive voltage control, external DC blocking capacitors are required on all RF ports.
4. Insertion loss can be optimized by varying the DC blocking capacitor value.



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## Truth Table [5]

| Control Vc1 | Control Vc2 | Control Vc3 | Control Vc4 | ANT1 - Rx | ANT1 - Tx | ANT2 - Rx | ANT2 - Tx |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | Off | On | Off | Off |
| 0 | 1 | 0 | 0 | Off | Off | On | Off |
| 0 | 0 | 1 | 0 | On | Off | Off | Off |
| 0 | 0 | 0 | 1 | Off | Off | Off | On |
| 0 | 0 | 1 | 1 | On | Off | Off | On |
| 1 | 1 | 0 | 0 | Off | On | On | Off |

5. 1 = +2.7 V to +5 V, 0 = 0 V ± 0.2 V.

## Absolute Maximum Ratings [6,7]

| Parameter | Absolute Maximum |
|---|---|
| Input Power | +32 dBm |
| Operating Voltage | +8.5 volts |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |

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

## Handling Procedures

Please observe the following precautions to avoid damage:

## Static Sensitivity

Gallium Arsenide 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 devices.

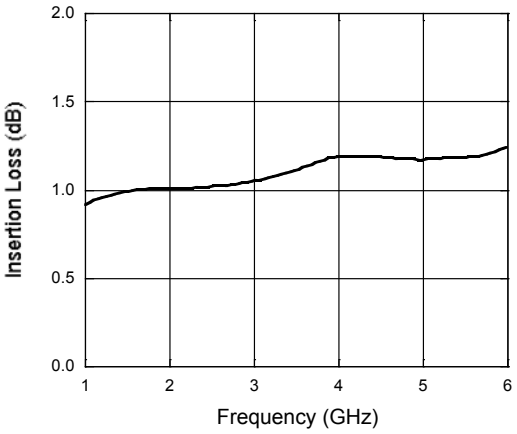


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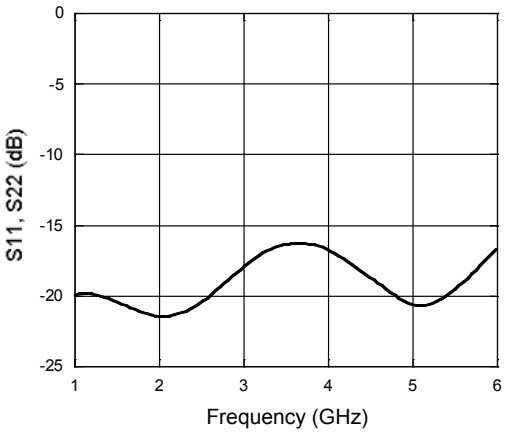
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## Typical Performance Curves, 5 pF Blocking Capacitors

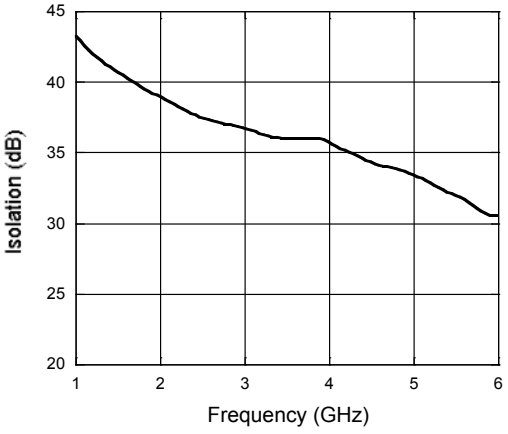
***Insertion Loss***



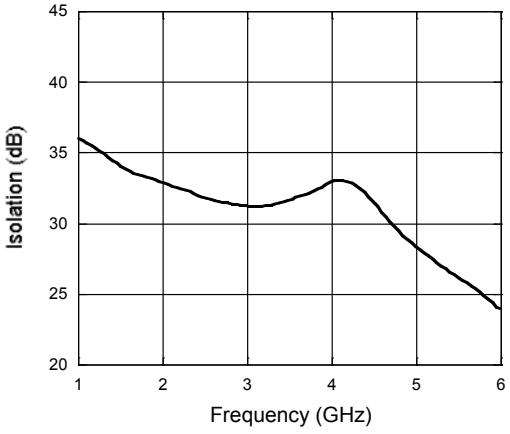

***Return Loss***



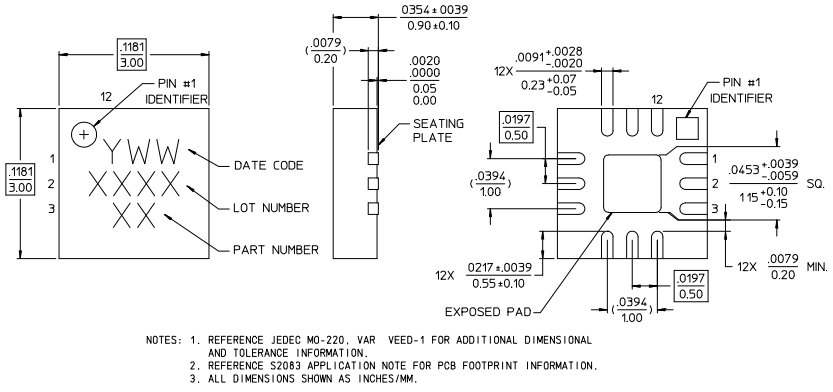

***Isolation (Input to Output, One Path Active)***




***Isolation (Input to Output, Both Paths Active)***




## *Lead-Free* 3 mm 12-Lead PQFN†




NOTES: 1. REFERENCE JEDEC MO-220, VAR VEED-1 FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. REFERENCE S2083 APPLICATION NOTE FOR PCB FOOTPRINT INFORMATION.
3. ALL DIMENSIONS SHOWN AS INCHES/MM.

† Reference Application Note M538 for lead-free solder reflow recommendations.



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