

**High Power GaAs DPDT Diversity Switch  
DC - 4.0 GHz**

MASW-007587  
V1

**Features**

- Ideal for high power diversity switch applications including WiMax, WLAN MESH Networks, and Fixed Wireless Access
- Broadband Performance: DC - 4.0 GHz
- Low Insertion Loss: 0.8 dB @ 2.5 GHz and 1.2 dB @ 3.5 GHz
- High P1dB Compression: 39.5 dBm @ 5 V
- Fast Settling for Low Gate Lag Requirements
- 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 MASW-007587 is a broadband GaAs PHEMT MMIC diversity switch available in a lead-free 3 mm 12-lead PQFN package. The MASW-007587 is ideally suited for applications where very small size and high linear power are required.

Typical applications include 2.5 & 3.5 GHz WiMax, WLAN MESH networks, fixed wireless access, and other higher power systems. Designed for high power, this DPDT switch maintains high linearity up to 4.0 GHz.

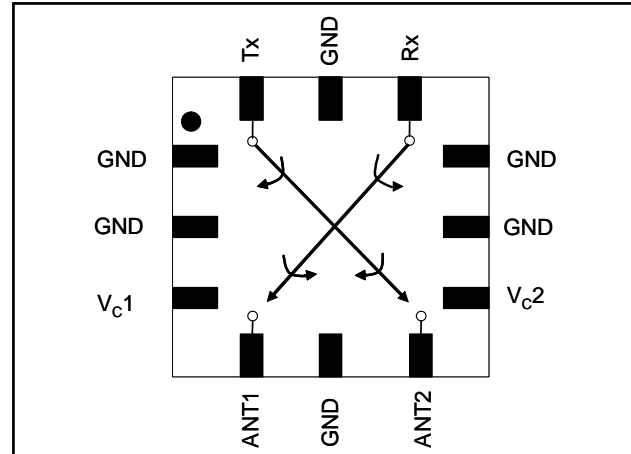
The MASW-007587 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

**Ordering Information <sup>1</sup>**

| Part Number        | Package                                |
|--------------------|--|
| MASW-007587-TR3000 | 3000 piece reel                        |
| MASW-007587-000SMB | 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       | GND                 | Ground           |
| 2       | GND                 | Ground           |
| 3       | V <sub>c1</sub>     | Control 1        |
| 4       | ANT1                | Antenna Port 1   |
| 5       | GND                 | Ground           |
| 6       | ANT2                | Antenna Port 2   |
| 7       | V <sub>c2</sub>     | Control 2        |
| 8       | GND                 | Ground           |
| 9       | GND                 | Ground           |
| 10      | Rx                  | Receive Port     |
| 11      | GND                 | Ground           |
| 12      | Tx                  | Transmit Port    |
| 13      | Paddle <sup>2</sup> | RF and DC 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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**Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 50 \Omega$ ,  $V_C = 0 \text{ V} / 3 \text{ V}$ , 39 pF Capacitor <sup>3</sup>**

| Parameter  | Test Conditions   | Units         | Min. | Typ. | Max. |
|--|---|---------------|------|------|------|
| Insertion Loss <sup>4</sup>  | 0.5 - 1 GHz   | dB            | —    | 0.6  | —    |
|  | 1 - 2 GHz   | dB            | —    | 0.7  | —    |
|  | 2 - 3 GHz   | dB            | —    | 0.8  | —    |
|  | 2.45 GHz  | dB            | —    | 0.8  | 1.2  |
|  | 3 - 4 GHz   | dB            | —    | 1.2  | —    |
| Isolation (on/off or off/on)<br>Iso @ Tx when IL from Ant 2 to Rx<br>Iso @ Rx when IL from Ant 1 to Tx | 0.5 - 1 GHz   | dB            | —    | 41.5 | —    |
|  | 1 - 2 GHz   | dB            | —    | 35   | —    |
|  | 2 - 3 GHz   | dB            | —    | 30   | —    |
|  | 2.45 GHz  | dB            | 24   | 30   | —    |
|  | 3 - 4 GHz   | dB            | —    | 27   | —    |
| Isolation (on/off or off/on)<br>Iso @ Tx when IL from Ant 1 to Rx<br>Iso @ Rx when IL from Ant 2 to Tx | 0.5 - 1 GHz   | dB            | —    | 46.5 | —    |
|  | 1 - 2 GHz   | dB            | —    | 43   | —    |
|  | 2 - 3 GHz   | dB            | —    | 38   | —    |
|  | 2.45 GHz  | dB            | 29   | 38   | —    |
|  | 3 - 4 GHz   | dB            | —    | 32   | —    |
| Return Loss  | 0.5 - 1 GHz   | dB            | —    | 14   | —    |
|  | 1 - 2 GHz   | dB            | —    | 15   | —    |
|  | 2 - 3 GHz   | dB            | —    | 19.5 | —    |
|  | 3 - 4 GHz   | dB            | —    | 14   | —    |
| IP3  | Two Tone, +15 dBm/Tone, 5 MHz Spacing, 2.4 GHz<br>$V_C = 3 \text{ V}$<br>$V_C = 5 \text{ V}$<br>$V_C = 8 \text{ V}$ | dBm           | —    | 57.5 | —    |
|  |   | dBm           | —    | 59   | —    |
|  |   | dBm           | —    | 60   | —    |
|  |   | dBm           | —    | 60   | —    |
| Input P1dB   | 2.4 GHz, $V_C = 3 \text{ V}$  | dBm           | —    | 34   | —    |
|  | 2.4 GHz, $V_C = 5 \text{ V}$  | dBm           | —    | 39.5 | —    |
|  | 2.4 GHz, $V_C = 8 \text{ V}$  | dBm           | —    | 41   | —    |
| 2 <sup>nd</sup> Harmonic   | 2.4 GHz, Pin = 15 dBm   | dBc           | —    | -86  | —    |
| 3 <sup>rd</sup> Harmonic   | 2.4 GHz, Pin = 15 dBm   | dBc           | —    | -91  | —    |
| Trise, Tfall   | 10% to 90% RF<br>90% to 10% RF  | nS            | —    | 64   | —    |
|  |   | nS            | —    | 80   | —    |
| Ton, Toff  | 50% control to 90% RF and 50% control to 10% RF   | nS            | —    | 90   | —    |
| Transients   | —   | mV            | —    | 5    | —    |
| Control Current  | —   | $\mu\text{A}$ | —    | 5    | 10   |

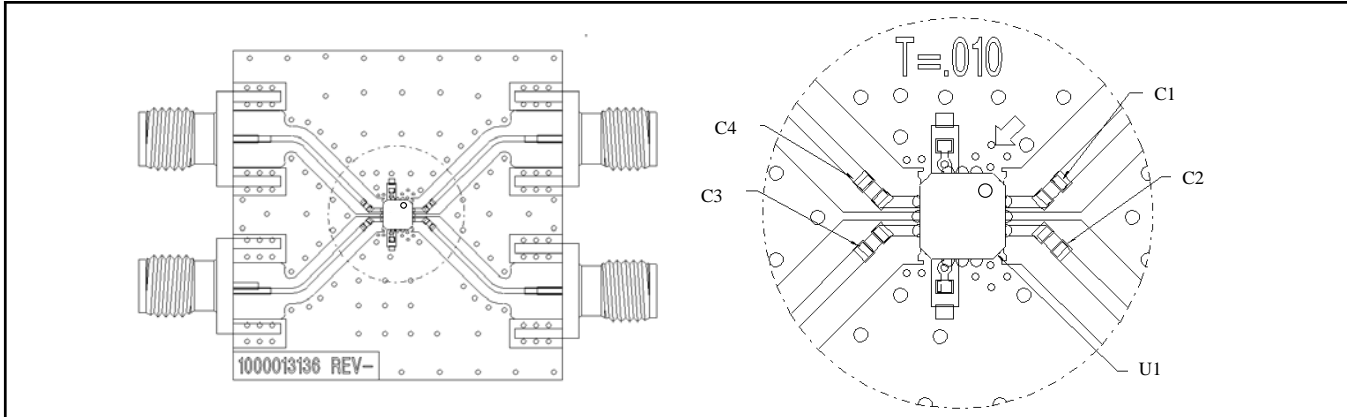
3. For positive voltage control, external DC blocking capacitors are required on all RF ports.

4. Insertion loss can be optimized by varying the DC blocking capacitor value. For use above 2.5 GHz, M/A-COM recommends using smaller capacitor values. For example, use 5 pF for 3.2 GHz.

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**Evaluation Board for 3 mm 12-Lead PQFN**

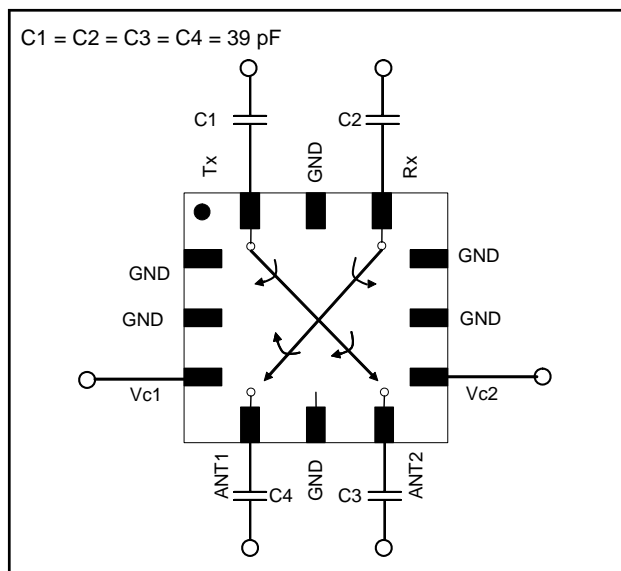


**Absolute Maximum Ratings** <sup>5,6</sup>

| Parameter                 | Absolute Maximum |
|---------------------------|------------------|
| Input Power @ 3 V Control | +35 dBm CW       |
| Input Power @ 5 V Control | +37 dBm CW       |
| Voltage                   | ≤ 8 volts        |
| Operating Temperature     | -40°C to +85°C   |
| Storage Temperature       | -65°C to +150°C  |

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

**Application Schematic**



**Truth Table** <sup>7,8</sup>

| Control V <sub>c1</sub> | Control V <sub>c2</sub> | ANT 1 - Rx | ANT 1 - Tx | ANT 2 - Tx | ANT 2 - Rx |
|-------------------------|-------------------------|------------|------------|------------|------------|
| 1                       | 0                       | On         | Off        | On         | Off        |
| 0                       | 1                       | Off        | On         | Off        | On         |

- Differential voltage, V (state 1) - V (state 0), must be +2.7 V minimum and must not exceed 8.0 V.
- 1 = +2.9 V to +8 V, 0 = 0 V ± 0.2 V.

**Qualification**

Qualified to M/A-COM specification REL-201, Process Flow -2.

**Handling Procedures**

Please observe the following precautions to avoid damage:

**Static Sensitivity**

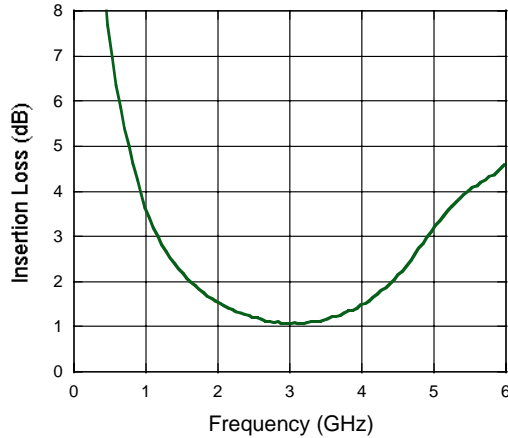
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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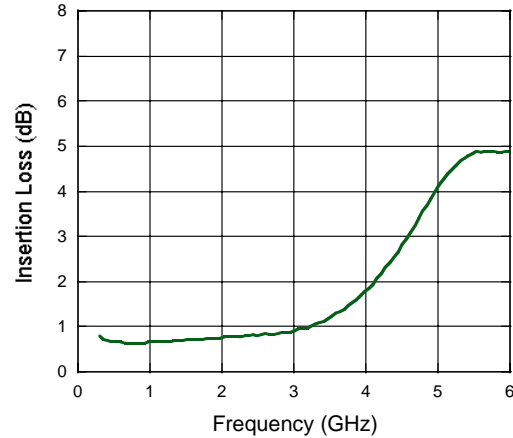
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**Typical Performance Curves**

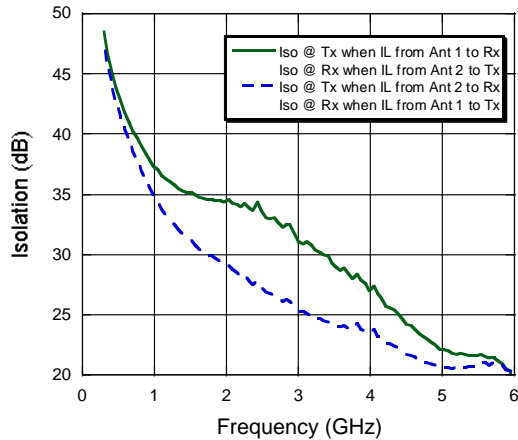
**Insertion Loss, 4 pF Capacitors**



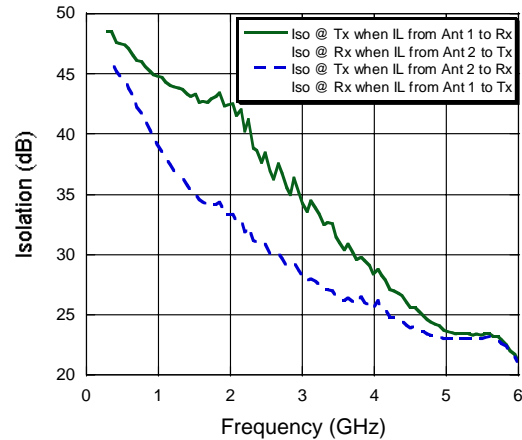
**Insertion Loss, 39 pF Capacitors**



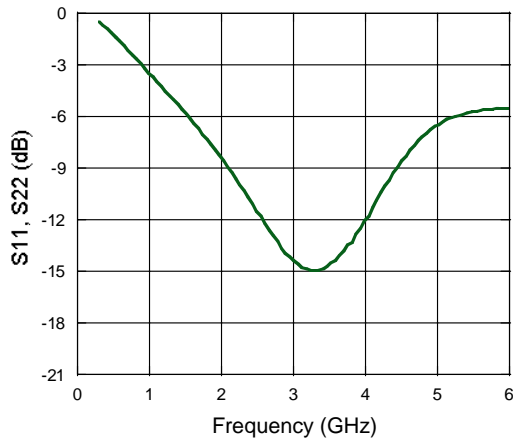
**Isolation, 4 pF Capacitors**



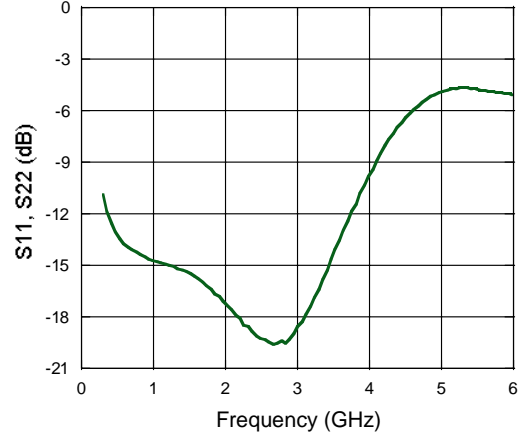
**Isolation, 39 pF Capacitors**



**S11, S22 vs. Temperature, 4 pF Capacitors**



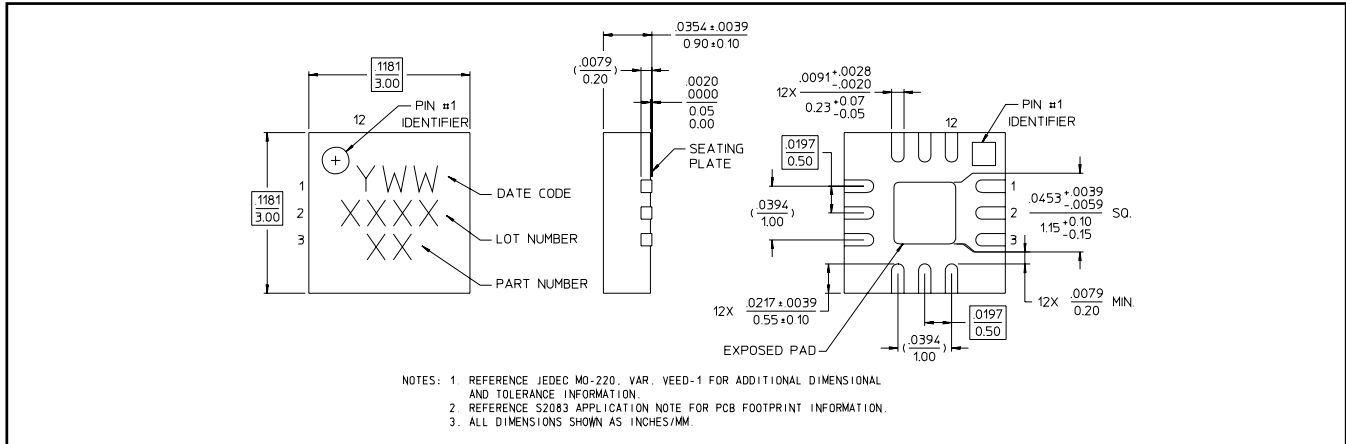
**S11, S22 vs. Temperature, 39 pF Capacitors**



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**Lead-Free 3 mm 12-Lead PQFN†**



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