

## GaAs SPDT Switch DC - 3.0 GHz

Rev. V2

### Features

- Low Insertion Loss: 0.3 dB @ 900 MHz
- Low Current Consumption: <15  $\mu$ A @ +2.5 V
- Positive or Negative 2.5 to 8 V Control
- Lead-Free SOT-363 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of SW-437

### Description

M/A-COM's MASWSS0166 is a GaAs monolithic switch in a lead-free SOT-363 surface mount plastic package. The MASWSS0166 is ideally suited for applications where very low power consumption, low insertion loss, very small size and low cost are required.

Typical applications are dual band systems that require switching between small signal components such as filter banks, single band LNA's and converters. The MASWSS0166 can be used in applications up to 0.25 Watts in systems such as cellular, PCS, DCS1800, GSM, CDMA, W-CDMA and other analog/digital wireless communications systems.

The MASWSS0166 is fabricated using a mature 0.5 micron GaAs PHEMT process. The process features full passivation for increased performance and reliability.

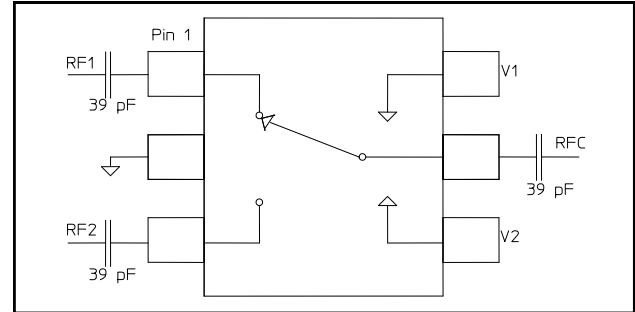
### Absolute Maximum Ratings <sup>1,2</sup>

| Parameter   | Absolute Maximum   |
|---|--------------------|
| Input Power (0.5-3.0 GHz)<br>3 V Control<br>5 V Control | +30 dBm<br>+33 dBm |
| Operating Voltage                                       | +8.5 Volts         |
| Operating Temperature                                   | -40°C to +85°C     |
| Storage Temperature                                     | -65°C to +150°C    |

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

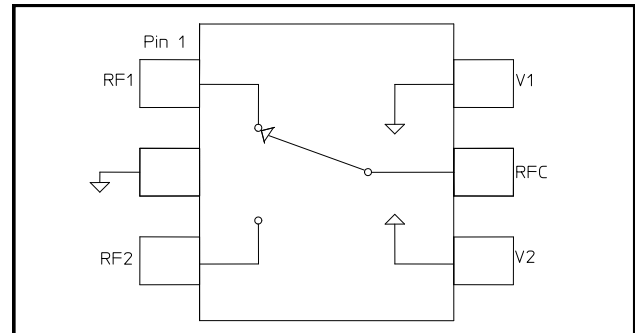
### Functional Schematic:

#### Positive Control Voltage



### Functional Schematic:

#### Negative Control Voltage



### Pin Configuration

| Pin No. | Function | Description |
|---------|----------|-------------|
| 1       | RF1      | RF in/out   |
| 2       | GND      | RF Ground   |
| 3       | RF2      | RF in/out   |
| 4       | V2       | V Control 2 |
| 5       | RFC      | RF Common   |
| 6       | V1       | V Control 1 |

### Ordering Information <sup>3</sup>

| Part Number       | Package           |
|-------------------|-------------------|
| MASWSS0166        | Bulk Packaging    |
| MASWSS0166TR-3000 | 3000 piece reel   |
| MASWSS0166SMB     | Sample Test Board |

3. Reference Application Note M513 for reel size information.

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

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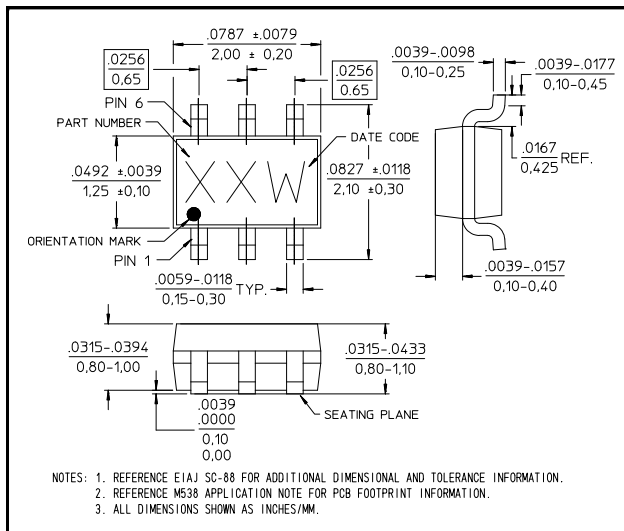
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Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $V_c = 0\text{ V} / -2.5\text{ V}$ ,  $Z_0 = 50\Omega$ <sup>4</sup>

| Parameter                               | Test Conditions  | Units         | Min. | Typ.  | Max. |
|---|--|---------------|------|-------|------|
| Insertion Loss                          | DC - 1 GHz   | dB            | —    | 0.3   | 0.4  |
|   | 1 - 2 GHz  | dB            | —    | 0.4   | 0.5  |
|   | 2 - 3 GHz  | dB            | —    | 0.55  | 0.7  |
| Isolation                               | DC - 1 GHz   | dB            | 19   | 21    | —    |
|   | 1 - 2 GHz  | dB            | 13   | 15    | —    |
|   | 2 - 3 GHz  | dB            | 10   | 12    | —    |
| VSWR                                    | DC - 3 GHz   | Ratio         | —    | 1.2:1 | —    |
| $P_{1dB}$                               | 500 MHz - 3 GHz, $ V_c  = 2.7\text{ V}$                | dBm           | —    | 24    | —    |
| $P_{1dB}$                               | 500 MHz - 3 GHz, $ V_c  = 5\text{ V}$                  | dBm           | —    | 27    | —    |
| Input $IP_2$                            | 2-Tone, 900 MHz, 5 MHz spacing, $ V_c  = 2.7\text{ V}$ | dBm           | —    | 81    | —    |
| Input $IP_3$                            | 2-Tone 900 MHz, 5 MHz spacing, $ V_c  = 2.7\text{ V}$  | dBm           | —    | 55    | —    |
| Trise, Tfall<br>Ton, Toff<br>Transients | 10% to 90% RF, 90% to 10% RF                           | nS            | —    | 10    | —    |
|   | 50% Control to 90% RF, 50% Control to 10% RF           | nS            | —    | 20    | —    |
|   | In-Band  | mV            | —    | 10    | —    |
| Control Current                         | $ V_c  = 2.5\text{ V}$                                 | $\mu\text{A}$ | —    | 4     | 15   |

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

### Lead-Free SOT-363 Plastic Package<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.

### Truth Table<sup>5,6</sup>

| V1 | V2 | RFC-RF1 | RFC-RF2 |
|----|----|---------|---------|
| 0  | 1  | On      | Off     |
| 1  | 0  | Off     | On      |

- Differential voltage,  $V(\text{state } 1) - V(\text{state } 0)$ , must be +2.5 V minimum and must not exceed 8 V.
- 0 = -8 V to 0 V, 1 = -5.5 V to 8 V

### Handling Procedures

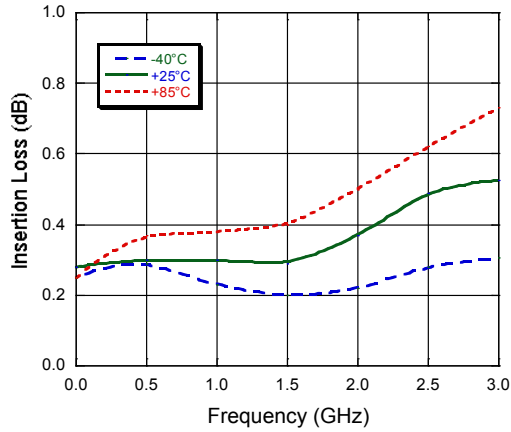
Please observe the following precautions to avoid damage:

### Static Sensitivity

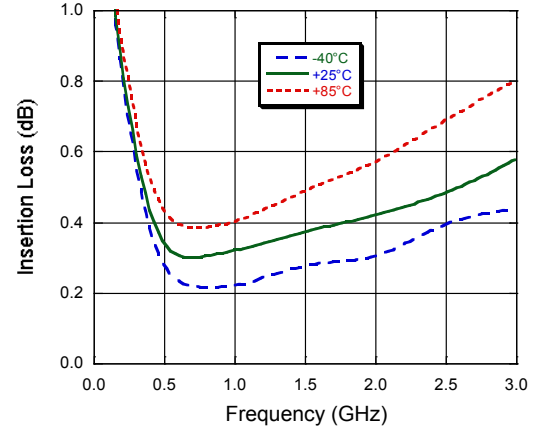
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Performance Curves

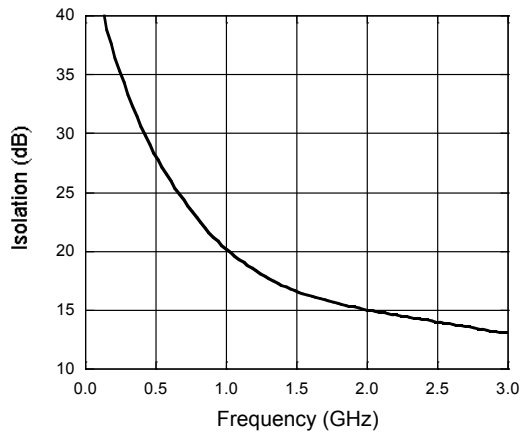
*Insertion Loss (Negative Voltage Control)*



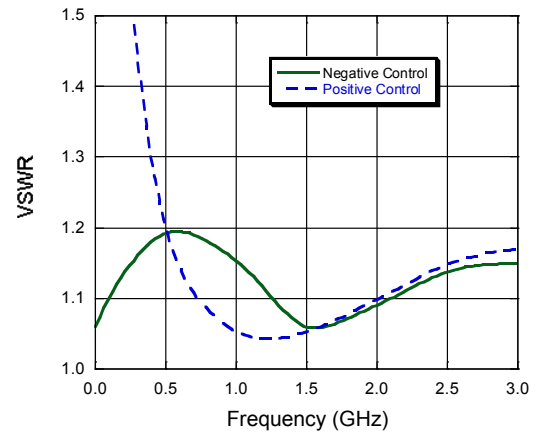
*Insertion Loss (Positive Voltage Control)*



*Isolation*



*VSWR*



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