

## GaAs SPDT Switch DC - 3.0 GHz

Rev. V2

### Features

- Low Insertion Loss: 0.4 dB @ 2.4 GHz
- Moderate Isolation: 27 dB @ 2.4 GHz
- Low Power Consumption: 5  $\mu$ A @ +3.0 V
- Reduced Gate Lag for Fast Settling Time
- Lead-Free SC70-6LD Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

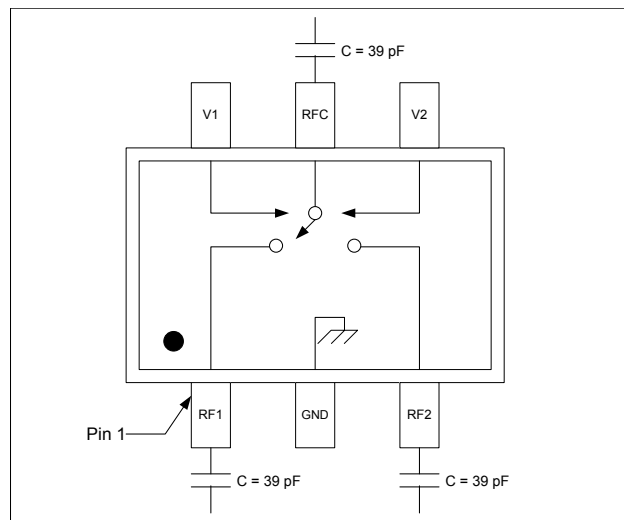
### Description

M/A-COM's MASW-008899 is a GaAs PHEMT MMIC SPDT switch in a lead-free SC-70 (SOT-363) surface mount plastic package. The MASW-008899 is ideally suited for applications where very small size and low cost are required.

Typical applications are transmit / receive (Tx / Rx) switching in linear systems such as WLAN 802.11b/g. Other applications include 1.9 GHz and 2.4 GHz DECT and linear systems operating up to 3.0 GHz.

The MASW-008899 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

### Functional Schematic



### Pin Configuration

| Pin No. | Pin Name | Description |
|---------|----------|-------------|
| 1       | RF1      | RF Port 1   |
| 2       | GND      | Ground      |
| 3       | RF2      | RF Port 2   |
| 4       | V2       | Control 2   |
| 5       | RFC      | RF Input    |
| 6       | V1       | Control 1   |

### Ordering Information<sup>1,2</sup>

| Part Number        | Package                              |
|--------------------|--------------------------------------|
| MASW-008899-000000 | Bulk packaging                       |
| MASW-008899-TR3000 | 3000 piece reel                      |
| MASW-008899-001SMB | Sample Board,<br>DC - 3.0 GHz Tuning |

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

### Absolute Maximum Ratings<sup>3,4</sup>

| Parameter                                  | Absolute Maximum                              |
|--|---|
| Input Power (0.5 - 3.0 GHz)<br>3 V Control | +30 dBm                                       |
| Voltage                                    | $-8.5 \text{ V} \leq V_c \leq +8.5 \text{ V}$ |
| Operating Temperature                      | -40°C to +85°C                                |
| Storage Temperature                        | -65°C to +150°C                               |

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

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

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Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $V_C = 0\text{ V} / 3\text{ V}$ ,  $Z_0 = 50\ \Omega$ <sup>5</sup>

| Parameter                   | Test Conditions   | Units         | Min. | Typ.  | Max. |
|-----------------------------|---|---------------|------|-------|------|
| Insertion Loss <sup>6</sup> | 1.0 GHz   | dB            | —    | 0.3   | —    |
|                             | 2.4 GHz   | dB            | —    | 0.4   | 0.5  |
| Isolation                   | 1.0 GHz   | dB            | —    | 24    | —    |
|                             | 2.4 GHz   | dB            | 25   | 27    | —    |
| VSWR                        | 0.05 - 3.0 GHz  | Ratio         | —    | 1.2:1 | —    |
| IP2                         | Two Tone, +5 dBm / Tone, 5 MHz Spacing<br>2.4 GHz                               | dBm           | —    | 80    | —    |
| IP3                         | Two Tone, +5 dBm / Tone, 5 MHz Spacing<br>2.4 GHz                               | dBm           | —    | 48    | —    |
| Linear Pout                 | 2.5 GHz, OFDM, QAM-64, 54Mbps, EVM=2.5%<br>3.0 V<br>3.3 V<br>5.0 V              | dBm           | —    | 22.5  | —    |
|                             |   | dBm           | —    | 24.0  | —    |
|                             |   | dBm           | —    | 28.5  | —    |
| P1dB                        | —   | dBm           | —    | 28    | —    |
| Trise, Tfall                | 10% to 90% RF and 90% to 10% RF   | ns            | —    | 35    | —    |
| Ton, Toff                   | 50% control to 90% RF, 50% control to 10% RF                                    | ns            | —    | 40    | —    |
| Transients                  | —   | mV            | —    | 10    | —    |
| Current                     | $V_C = 3.0\text{ V}$  | $\mu\text{A}$ | —    | 5     | 10   |
| $R_{ON}$                    | $t > 10\text{ ms}$ after OFF to ON Switching (settled)                          | $\Omega$      | —    | 1.5   | 2.5  |
| Gate Lag                    | $ \Delta R_{on} $ between 200 $\mu\text{s}$ and 10 ms after OFF to ON Switching | $\Omega$      | —    | 0.15  | 0.25 |

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

6. Insertion Loss can be optimized by varying the DC blocking capacitor value, e.g. 1000 pF for 100 MHz – 1.0 GHz, 39 pF for 0.5 - 3.0 GHz.

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

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

7. Differential voltage,  $V$  (state 1) -  $V$  (state 0), must be +2.3 V minimum and must not exceed 8.5 V.

8. 0 = 0 V  $\pm$  0.2 V, 1 = +2.5 V to 5.0 V

### Qualification

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

### Handling Procedures

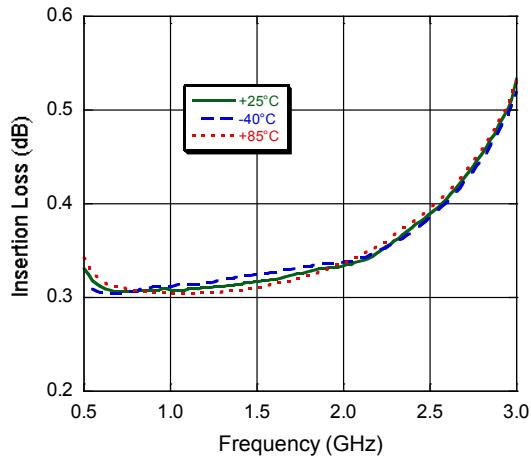
The following precautions should be observed to avoid damage:

### Static Sensitivity

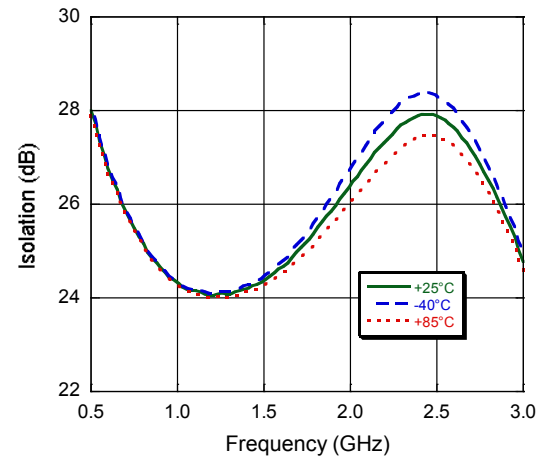
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Performance Curves

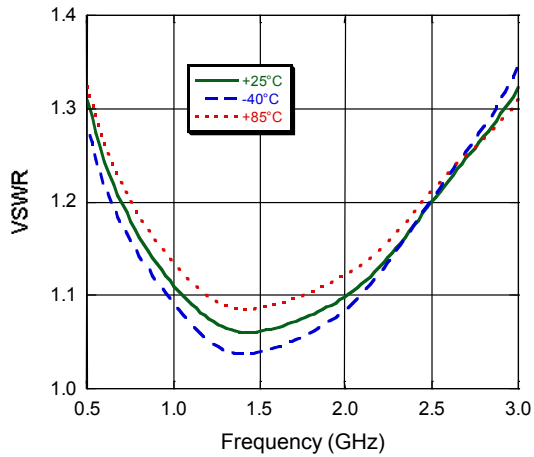
**Insertion Loss**



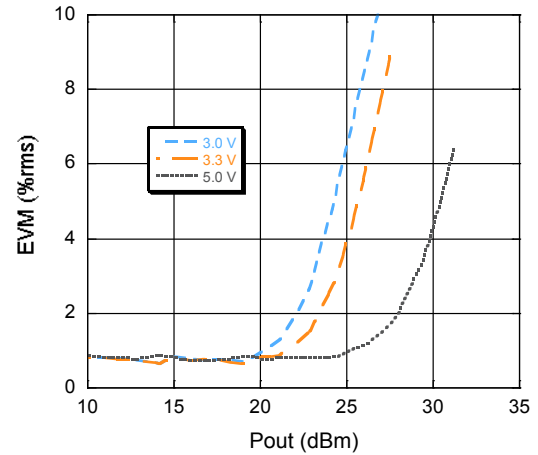
**Isolation**



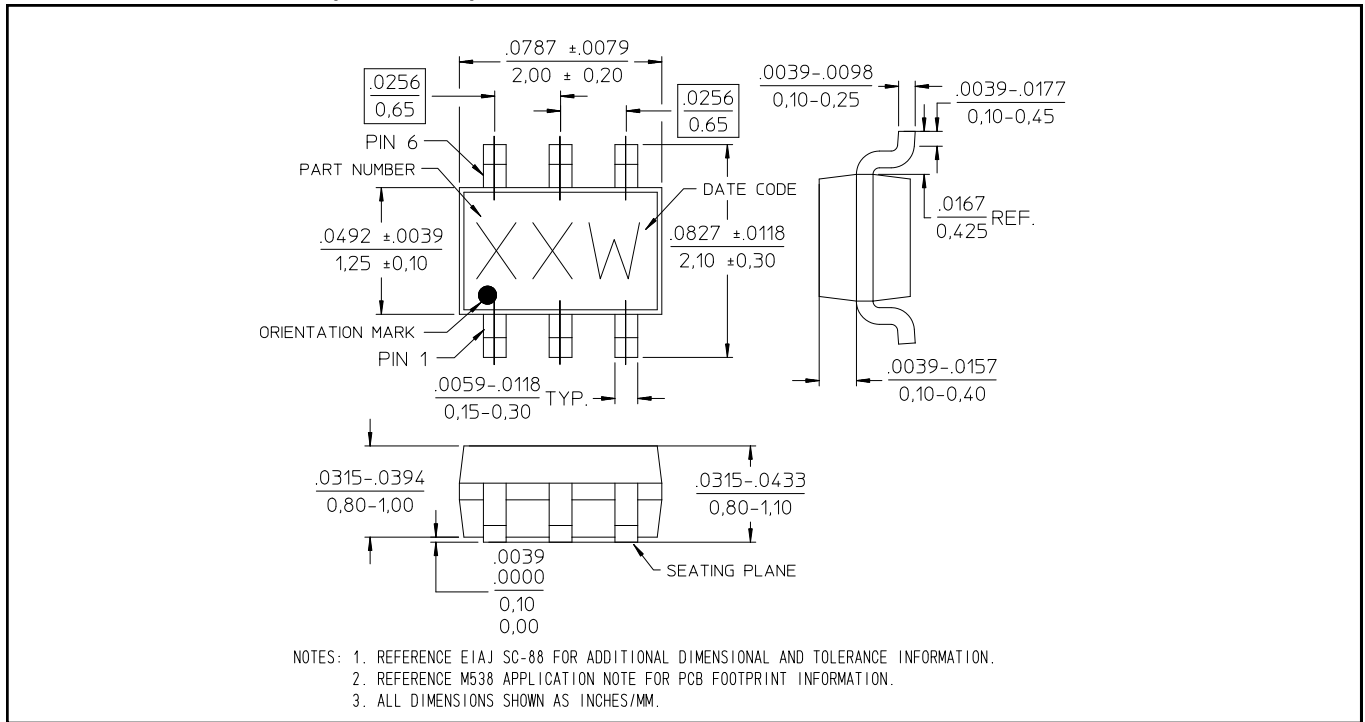
**VSWR**



**EVM vs. Pout @ 2.5 GHz**



**Lead-Free SC70-6LD (SOT-363)<sup>†</sup>**



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.  
Meets JEDEC moisture sensitivity level 1 requirements.

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