

## SPDT High Isolation CATV Switch 5 – 1000 MHz

Rev V1

### Features

- 75 Ohm Impedance
- Input Terminated
- Positive Voltage Control
- High Isolation: 65 dB at 870 MHz
- 0.5 micron GaAs PHEMT Process
- Lead-Free 4 mm 20-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 MASWSS0103 is a GaAs PHEMT MMIC single pole double throw (SPDT) switch in a lead-free 4 mm 20-lead PQFN package. The MASWSS0103 is ideally suited for applications where low control voltage, high isolation, small size and low cost are required.

Typical applications are to replace mechanical relays in CATV systems. This part can be used in all 75  $\Omega$  systems operating up to 1 GHz.

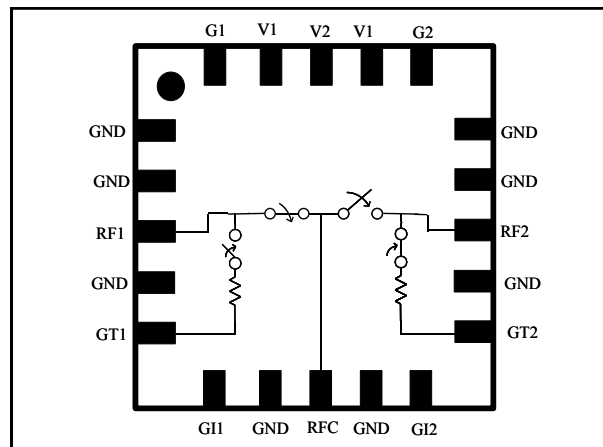
The MASWSS0103 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

### Ordering Information

| Part Number       | Package                                   |
|-------------------|---|
| MASWSS0103TR-3000 | 13 inch, 3000 piece reel                  |
| MASWSS0103SMB     | Sample Test Board<br>(Includes 5 Samples) |

1: Reference Application Note M513 for reel size information.

### Functional Schematic



### Pin Configuration <sup>1</sup>

| Pin No. | Pin Name | Description    |
|---------|----------|----------------|
| 1       | GND      | Ground         |
| 2       | GND      | Ground         |
| 3       | RF1      | RF Port 1      |
| 4       | GND      | Ground         |
| 5       | GT1      | RF Ground      |
| 6       | GI1      | RF Ground      |
| 7       | GND      | Ground         |
| 8       | RFC      | RF Common Port |
| 9       | GND      | Ground         |
| 10      | GI2      | RF Ground      |
| 11      | GT2      | RF Ground      |
| 12      | GND      | Ground         |
| 13      | RF2      | RF Port 2      |
| 14      | GND      | Ground         |
| 15      | GND      | Ground         |
| 16      | G2       | RF Ground      |
| 17      | V1       | Control 1      |
| 18      | V2       | Control 2      |
| 19      | V1       | Control 1      |
| 20      | G1       | RF Ground      |

1. 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:**  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 75 \Omega^2$ ,  $V_C = 0 \text{ V} / 2.9 \text{ V}$ ,  $P_{IN} = 10 \text{ dBm}$

| Parameter         | Test Conditions   | Units         | Min. | Typ. | Max. |
|-------------------|---|---------------|------|------|------|
| Insertion Loss    | 5 - 50 MHz  | dB            | —    | 0.75 | —    |
|                   | 50 - 1000 MHz   | dB            | —    | 1.0  | 1.2  |
| Isolation         | 5 - 50 MHz  | dB            | —    | 100  | —    |
|                   | 50 - 1000 MHz   | dB            | 60   | 63   | —    |
| Return Loss (On)  | 5 - 50 MHz  | dB            | —    | 28   | —    |
|                   | 50 - 1000 MHz   | dB            | —    | 16   | —    |
| Return Loss (Off) | 5 - 50 MHz  | dB            | —    | 26   | —    |
|                   | 50 - 1000 MHz   | dB            | —    | 16   | —    |
| IP3               | Two Tone, +15 dBm/tone, 6 MHz spacing, > 50 MHz<br>$V_C = 0 \text{ V} / 2.9 \text{ V}$<br>$V_C = 0 \text{ V} / 5.0 \text{ V}$ | dBm           | —    | 47   | —    |
|                   |   | dBm           | —    | 52   | —    |
| Trise, Tfall      | 10% to 90% RF, 90% to 10% RF  | nS            | —    | 8    | —    |
| Ton, Toff         | 50% control to 90% RF, 50% control to 10% RF  | nS            | —    | 18   | —    |
| Transients        | In Band   | mV            | —    | 70   | —    |
| Control Current   | $ V_C  = 2.9 \text{ V}$   | $\mu\text{A}$ | —    | 5    | 10   |

2. External 0.01  $\mu\text{F}$  DC blocking capacitors are required on all RF In/Out and RF ground ports. See Application Schematic.

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

| Parameter                                    | Absolute Maximum |
|--|------------------|
| Input Power<br>(5 - 1000 MHz, 2.9 V Control) | +32 dBm          |
| Operating Voltage                            | +8.5 volts       |
| Operating Temperature                        | -40°C to +85°C   |
| Storage Temperature                          | -65°C to +150°C  |

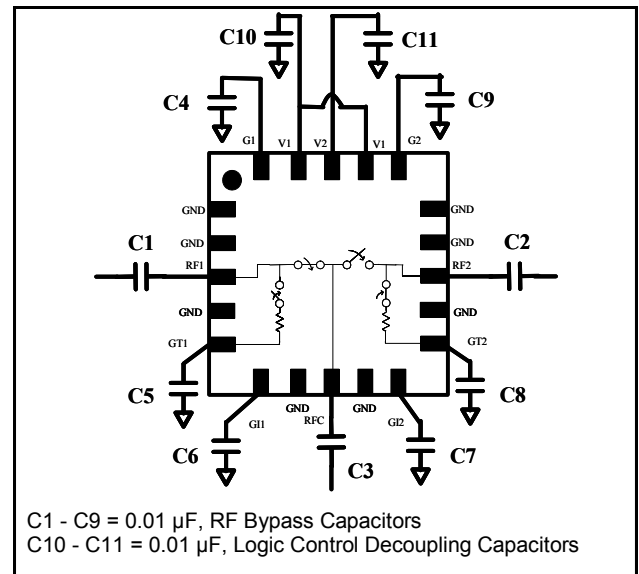
- Exceeding any one or combination of these limits may cause permanent damage.
- M/A-COM does not recommend sustained operation near these survivability limits.

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

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

5. 1 = +2.9 to +5 V, 0 = 0  $\pm$  0.2 V.

### Application Schematic

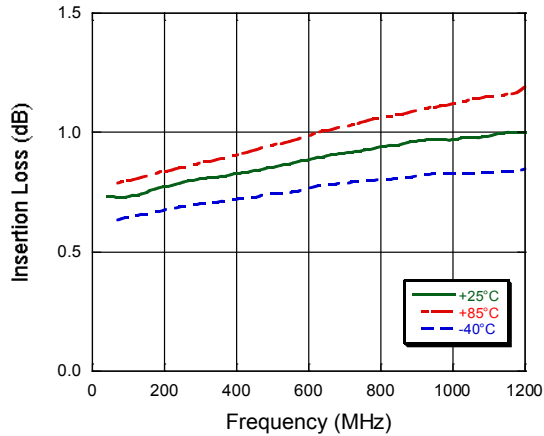


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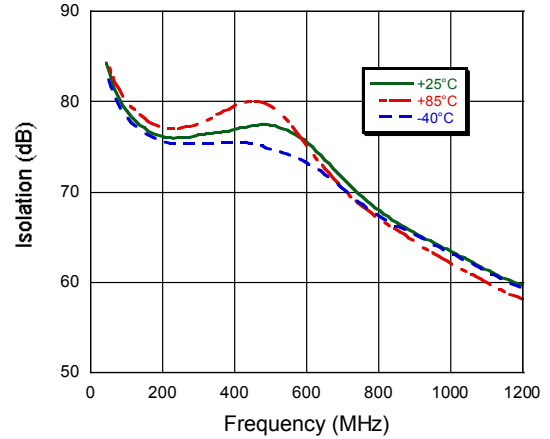
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### Typical Performance Curves

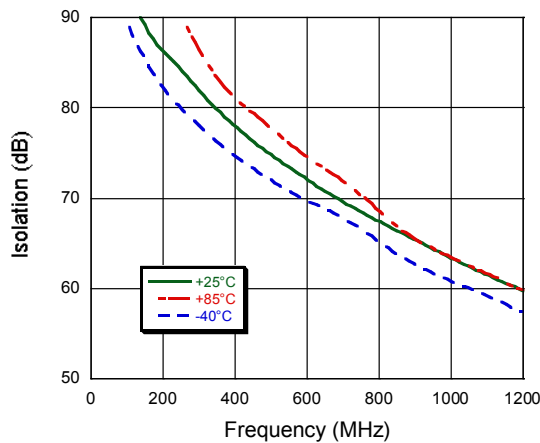
#### Insertion Loss



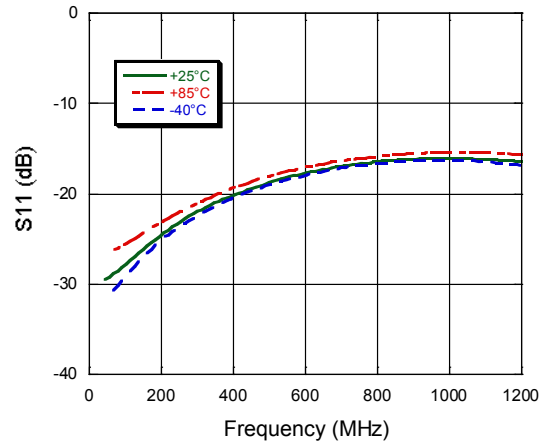
#### RF1 Isolation



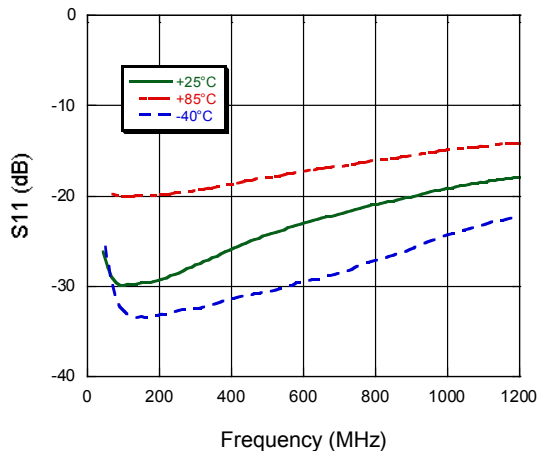
#### RF2 Isolation



#### On Return Loss



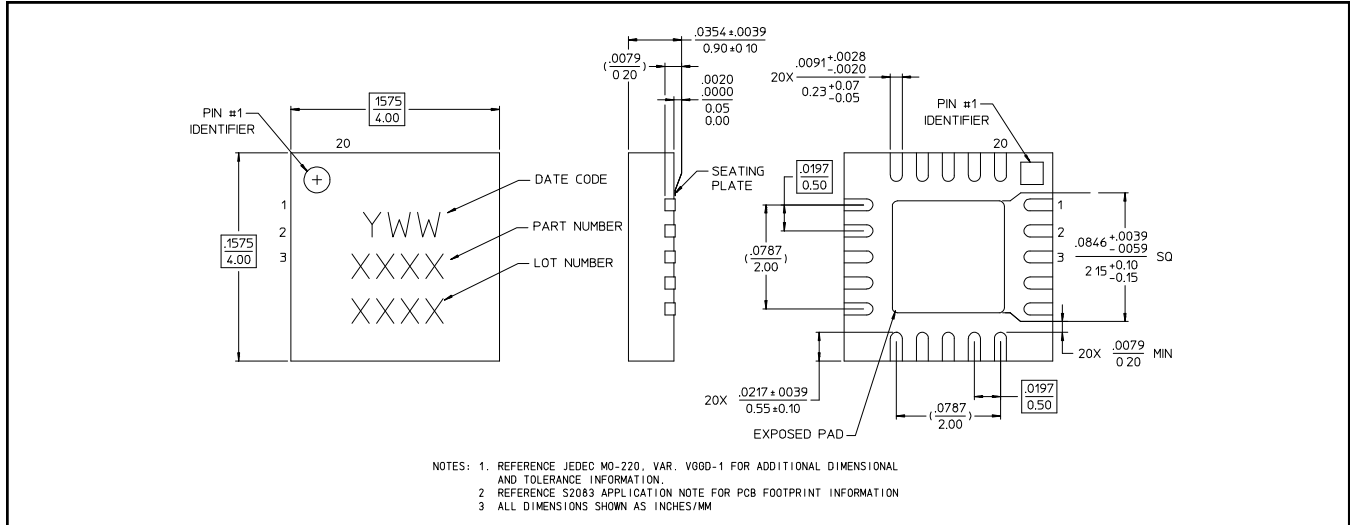
#### Off Return Loss



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### Lead-Free 4 mm 20-Lead PQFN†



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

## 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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