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GaAs SPDT Terminated Switch DC - 2.5 GHz

Rev. V2

Features

- Very Low Power Consumption
- High Isolation: 30 dB up to 2 GHz
- Very High Intercept Point: 46 dBm IP₃
- Nanosecond Switching Speed
- Temperature Range: -40°C to +85°C
- Lead-Free SOIC-8 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of SW-338

Description

M/A-COM’s MASWSS0180 is a GaAs MMIC SPDT terminated switch in a lead-free SOIC 8-lead surface mount plastic package. The MASWSS0180 is ideally suited for use where very low power consumption is required.

Typical applications include transmit/receive switching, switch matrices, and filter banks in systems such as radio and cellular equipment, PCM, GPS, fiber optic modules, and other battery powered radio equipment.

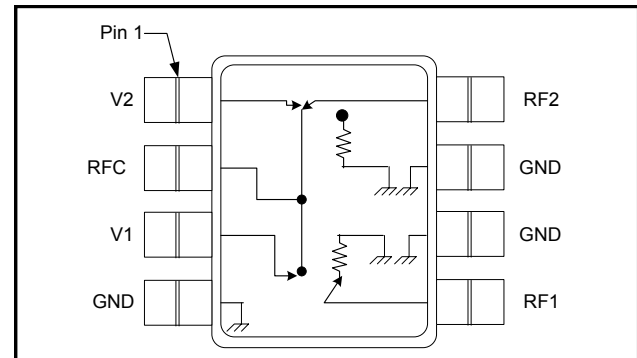
The MASWSS0180 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information ^{1,2}

| Part Number | Package |
|---------------|-------------------|
| MASWSS0180 | Bulk Packaging |
| MASWSS0180TR | 1000 piece reel |
| MASWSS0180SMB | Sample Test Board |

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

Functional Schematic



Pin Configuration

| Pin No. | Function | Pin No. | Function |
|---------|-----------|---------|-----------|
| 1 | V2 | 5 | RF Port 1 |
| 2 | RF Common | 6 | Ground |
| 3 | V1 | 7 | Ground |
| 4 | Ground | 8 | RF Port 2 |

Absolute Maximum Ratings ^{3,4}

| Parameter | Absolute Maximum |
|--|--------------------------------|
| Input Power 0.05 GHz 0.5 - 2.0 GHz | +27 dBm +34 dBm |
| Control Voltage | -8.5 V ≤ V _C ≤ +5 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: $T_A = 25^\circ\text{C}$, $V_C = 0\text{ V} / -2.9\text{ V}$, $Z_0 = 50\ \Omega$

| Parameter | Test Conditions | Units | Min. | Typ. ⁵ | Max. |
|------------------------|---|---------------|------|-------------------|------|
| Insertion Loss | DC - 0.5 GHz | dB | — | 0.55 | — |
| | 0.5 - 1.0 GHz | dB | — | 0.60 | 0.7 |
| | 1.0 - 2.0 GHz | dB | — | 0.65 | — |
| Isolation | DC - 0.5 GHz | dB | — | 50 | — |
| | 0.5 - 1.0 GHz | dB | 36 | 43 | — |
| | 1.0 - 2.0 GHz | dB | — | 35 | — |
| VSWR On/Off | DC - 2.0 GHz | Ratio | — | 1.1:1 | — |
| Trise, Tfall | 10% to 90% RF, 90% to 10 % RF | nS | — | 10 | — |
| Ton, Toff | 50% Control to 90% RF, 50% Control to 10% RF | nS | — | 20 | — |
| Transients | In-Band | mV | — | 25 | — |
| 1 dB Compression Point | Input Power | dBm | — | 15 | — |
| | 50 MHz @ 2.9V | dBm | — | 16 | — |
| | 1.0 GHz @ 2.9V | dBm | — | 26 | — |
| | 50 MHz @ 5.0V | dBm | — | 27 | — |
| 2nd Order Intercept | Measured Relative to Input Power (for two-tone input power up to +5 dBm) | | | | |
| | 50 MHz @ 2.9V | dBm | — | 46 | — |
| | 1.0 GHz @ 2.9V | dBm | — | 52 | — |
| | 50 MHz @ 5.0V | dBm | — | 63 | — |
| 3rd Order Intercept | Measured Relative to Input Power (for two-tone input power up to +5 dBm) | | | | |
| | 50 MHz @ 2.9V | dBm | — | 27 | — |
| | 1.0 GHz @ 2.9V | dBm | — | 27 | — |
| | 50 MHz @ 5.0V | dBm | — | 47 | — |
| Control Current | $ V_C = 2.9\text{ V}$ | μA | — | 15 | 35 |

5. Typical values represent performance at middle of frequency range noted.

Truth Table⁶

| Control Inputs | | Condition of Switch RF Common to Each RF Port | |
|----------------|----|--|---------|
| V1 | V2 | RFC-RF1 | RFC-RF2 |
| 1 | 0 | ON | OFF |
| 0 | 1 | OFF | ON |

6. 0 = 0 V \pm 0.2 V, 1 = -2.9 V to -5.0 V

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

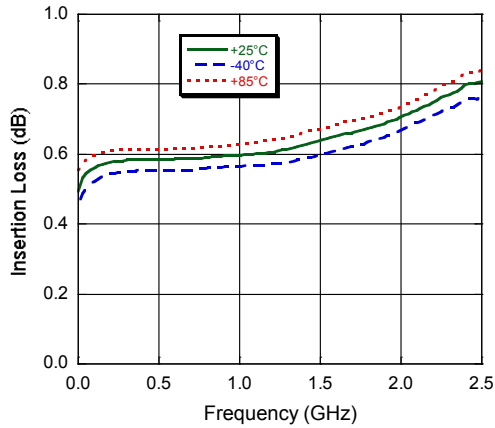
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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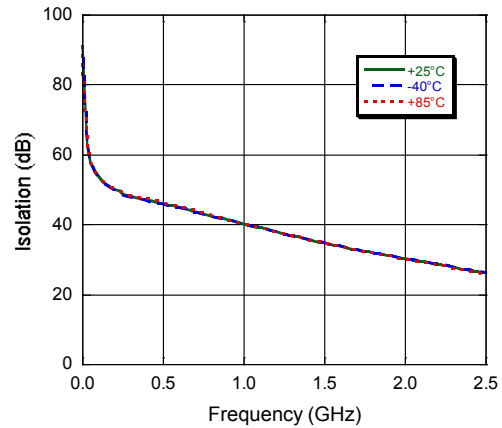
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Typical Performance Curves

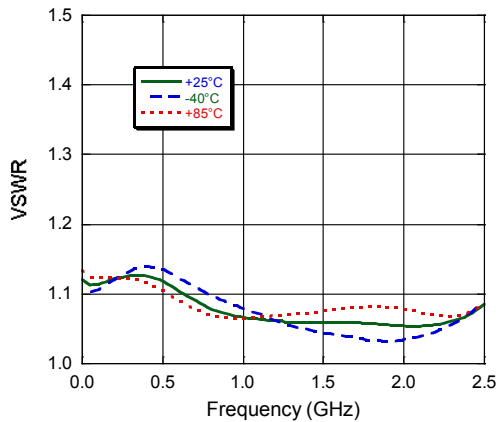
Insertion Loss



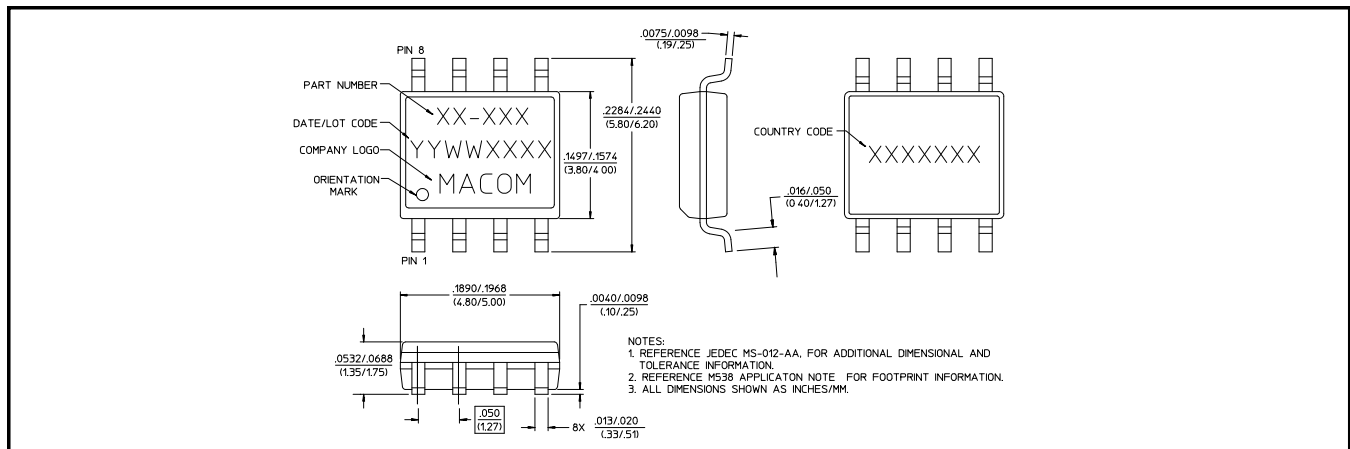
Isolation



VSWR



Lead-Free SOIC-8†



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

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