

High Power GaAs SPDT Switch DC - 2.0 GHz

Rev. V6

Features

- Positive Supply and Control Voltages
- 1 dB Compression Point: +36 dBm Typical, 8 V
- 3rd Order Intercept Point: +65 dBm Typical, 8 V
- Low Insertion Loss: 0.4 dB Typical
- Low Power Consumption: 100 μ W
- Fast Switching Speed

Description

M/A-COM's SW-277 is a GaAs MMIC SPDT switch in a SOIC-8 lead surface mount plastic package. The SW-277 is ideally suited for use where low power consumption is required.

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

The SW-277 is fabricated using a monolithic GaAs MMIC using a mature 1 micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information¹

| Part Number | Package |
|-------------|-----------------|
| SW-277 | Bulk Packaging |
| SW-277TR | 1000 piece reel |

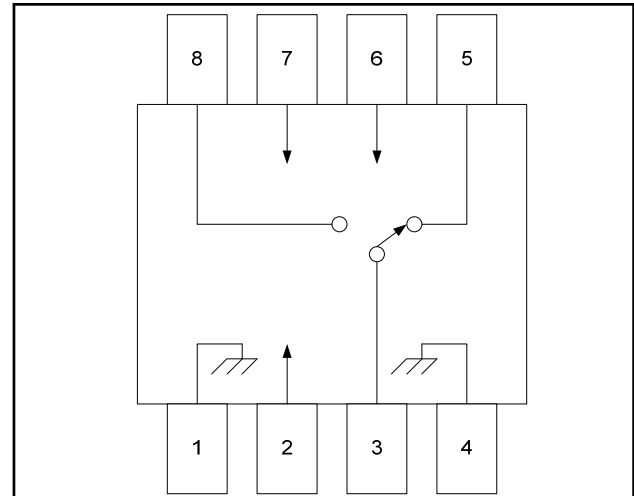
1. Reference Application Note M513 for reel size information.

Truth Table²

| Control Inputs | | Condition of Switch RF Common to Each RF Port | |
|----------------|---|---|-----|
| A | B | RF1 | RF2 |
| 1 | 0 | Off | On |
| 0 | 1 | On | Off |

2. "0" = 0 to +0.2 V @ 20 μ A maximum.
"1" = +5 V @ 20 μ A typical to 10 V @ 500 μ A maximum.

Functional Schematic



Pin Configuration

| Pin No. | Description | Pin No. | Description |
|---------|-------------------------|---------|------------------------|
| 1 | Ground, Thermal Contact | 5 | RF Port 1 ³ |
| 2 | V _{DD} | 6 | Control A |
| 3 | RFC ³ | 7 | Control B |
| 4 | Ground, Thermal Contact | 8 | RF Port 2 ³ |

3. External DC blocking capacitors required on all RF ports.

Absolute Maximum Ratings^{4,5}

| Parameter | Absolute Maximum |
|--|---|
| Input Power - 0.5 - 2.0 GHz 5 V Control and Supply 8 V Control and Supply 10 V Control and Supply | +37 dBm +40 dBm +42 dBm |
| Power Dissipation | 1.0 W |
| Supply Voltage | -1 V \leq V _{DD} \leq +12 V |
| Control Voltage | -1 V \leq V _C \leq V _{DD} + 0.2 V |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |
| Thermal Resistance ⁶ | θ_{jc} = 87°C/W |

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. M/A-COM does not recommend sustained operation near these survivability limits.
6. Thermal resistance is given for T_A = 25°C. T_{CASE} is the temperature of leads 1 and 4.

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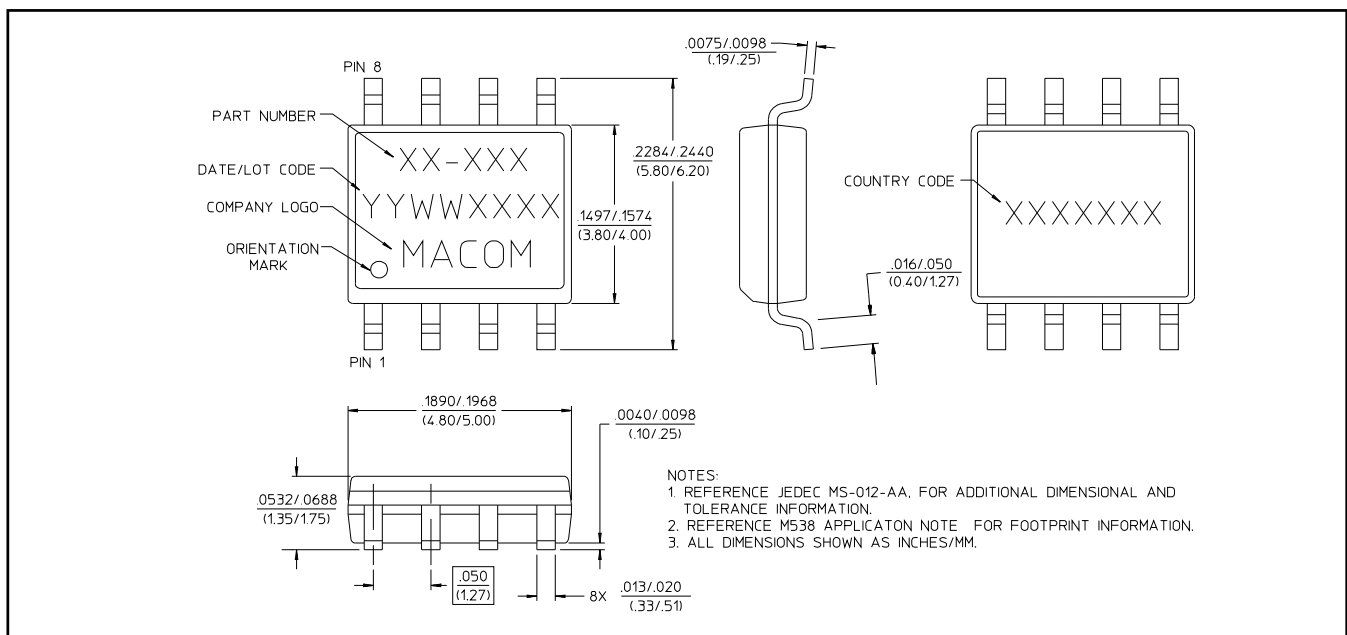
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Electrical Specifications ⁷: $T_A = +25^\circ\text{C}$, $V_{DD} = +5\text{ V}$, $V_C = +5\text{ V} / 0\text{ V}$, $P_{IN} = +30\text{ dBm}$

| Parameter | Test Conditions | Units | Min. | Typ. ⁸ | Max. |
|---------------------|--|---------------|------|-------------------|------|
| Insertion Loss | DC - 0.5 GHz | dB | — | 0.45 | — |
| | 0.5 - 1.0 GHz | dB | — | 0.55 | 0.65 |
| | 1.0 - 2.0 GHz | dB | — | 0.6 | — |
| Isolation | DC - 0.5 GHz | dB | — | 30 | — |
| | 0.5 - 1.0 GHz | dB | 27 | 32 | — |
| | 1.0 - 2.0 GHz | dB | — | 27 | — |
| VSWR | DC - 2.0 GHz | Ratio | — | 1.2:1 | — |
| 1 dB Compression | Input Power (5 V Supply/Control) 0.9 GHz | dBm | — | 33 | — |
| | Input Power (8 V Supply/Control) 0.9 GHz | dBm | — | 35.8 | — |
| Trise, Tfall | 10% to 90% RF, 90% to 10% RF | nS | — | 30 | — |
| Ton, Toff | 50% Control to 90% RF, 50% Control to 10% RF | nS | — | 35 | — |
| Transients | In-Band | mV | — | 12 | — |
| 3rd Order Intercept | Measured Relative to Input Power, two-tone up to +10 dBm (5 V Supply/Control) 0.9 GHz (8 V Supply/Control) 0.9 GHz | dBm | — | 55 | — |
| | | dBm | — | 65 | — |
| Control Current | $V_C = +5\text{ V}$ | μA | — | — | 20 |
| Supply Current | $V_{DD} = +5\text{ V}$ | μA | — | — | 60 |

- All specifications apply when operated with control voltages of 0 V for V_C low and 5 to 10 V for V_C high, and $50\ \Omega$ impedance at all RF ports, unless otherwise specified. High power (greater than 1 W) handling specifications apply to cold switching only. For input powers under 1 W, hot switching can be used. The high control voltage must be within $\pm 0.2\text{ V}$ of the supply voltage. External DC blocking capacitors are required on all RF ports.
- Typical values listed for middle of frequency range noted.

SOIC-8



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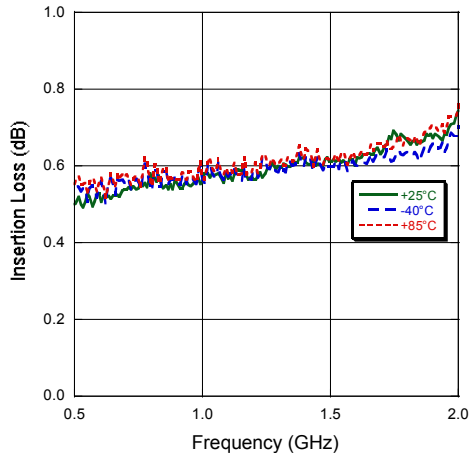
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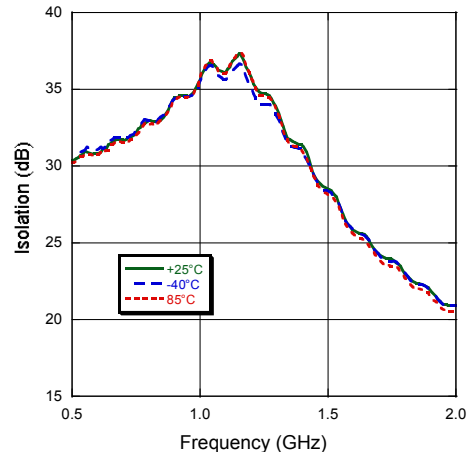
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Typical Performance Curves

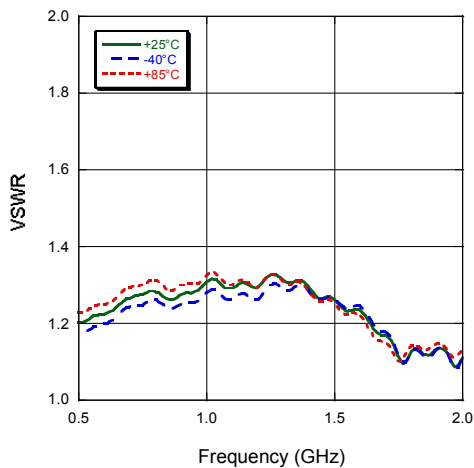
Insertion Loss



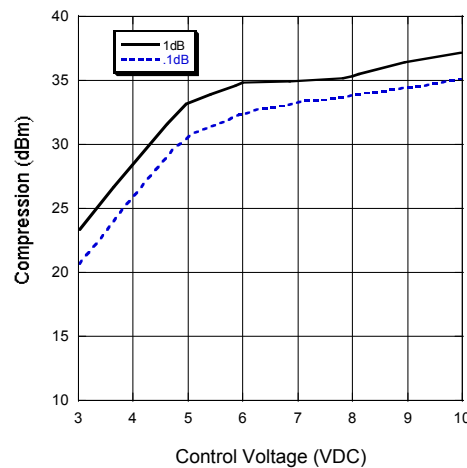
Isolation



VSWR



Compression vs. Control Voltage @ 900 MHz



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.