

SPST High Isolation CATV Switch 5 - 1000 MHz

Rev. V1

Features

- 75 Ohm Impedance
- Positive Voltage Control (0 / +5 V)
- Input Terminated (Off State)
- Low Insertion Loss: 0.62 dB at 870 MHz
- High Isolation: 54 dB at 870 MHz
- 0.5 micron GaAs PHEMT Process
- Lead-Free 3 mm 12-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MASWSS0067

Description

M/A-COM's MASW-008177 is a GaAs PHEMT MMIC single pole single throw (SPST) switch in a low cost 3 mm 12-lead PQFN package. The MASW-008177 is ideally suited for applications where low control voltage, low insertion loss, 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 ohm systems operating up to 1.0 GHz.

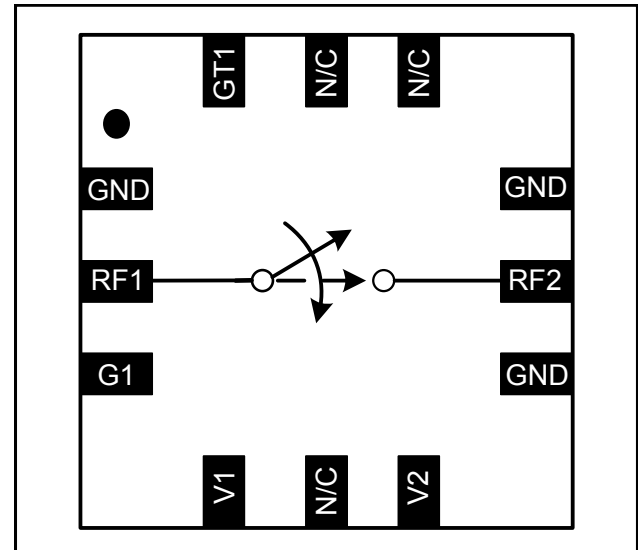
The MASW-008177 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

Ordering Information ¹

| Part Number | Package |
|--------------------|--|
| MASW-008177-000000 | Bulk Packaging |
| MASW-008177-TR1000 | 1000 piece reel |
| MASW-008177-TR3000 | 3000 piece reel |
| MASW-008177-001SMB | 5-1000 MHz Configuration, Sample Board |

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration ²

| Pin No. | Pin Name | Description |
|---------|----------|---------------|
| 1 | GND | Ground |
| 2 | RF1 | RF In |
| 3 | G1 | RF Ground |
| 4 | V1 | Control 1 |
| 5 | N/C | No Connection |
| 6 | V2 | Control 2 |
| 7 | GND | Ground |
| 8 | RF2 | RF Out |
| 9 | GND | Ground |
| 10 | N/C | No Connection |
| 11 | N/C | No Connection |
| 12 | GT1 | RF Ground |

2. The exposed pad centered on the package bottom must be connected to both RF and DC ground.

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

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $V_C = 0\text{V} / 5\text{V}$, $Z_0 = 75 \Omega$ ³

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---------------------------------|---|-------|------|------|------|
| Insertion Loss | 5 - 50 MHz | dB | — | 0.45 | — |
| | 50 - 1000 MHz | dB | — | 0.65 | 0.9 |
| Isolation | 5 - 50 MHz | dB | — | 70 | — |
| | 50 - 1000 MHz | dB | 50 | 53 | — |
| Return Loss (On) | 5 - 50 MHz | dB | — | 30 | — |
| | 50 - 1000 MHz | dB | — | 16 | — |
| Return Loss (Off) (RF1 only) | 5 - 50 MHz | dB | — | 30 | — |
| | 50 - 1000 MHz | dB | — | 18 | — |
| IP3 | Two Tone, +10 dBm / tone, 6 MHz Spacing, > 50 MHz | dBm | — | 52 | — |
| Trise, Tfall | 10% to 90% RF, 90% to 10% RF | nS | — | 20 | — |
| Ton, Toff | 50% control to 90% RF, and 50% control to 10% RF | nS | — | 40 | — |
| Transients | In Band | mV | — | 30 | — |
| Control Current | Vc = 5V | μA | — | 10 | 25 |

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

Absolute Maximum Ratings^{4,5}

| Parameter | Absolute Maximum |
|---|-------------------|
| Input Power (5 - 1000 MHz, 2.5V 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 to this device.
- M/A-COM does not recommend sustained operation near these survivability limits.

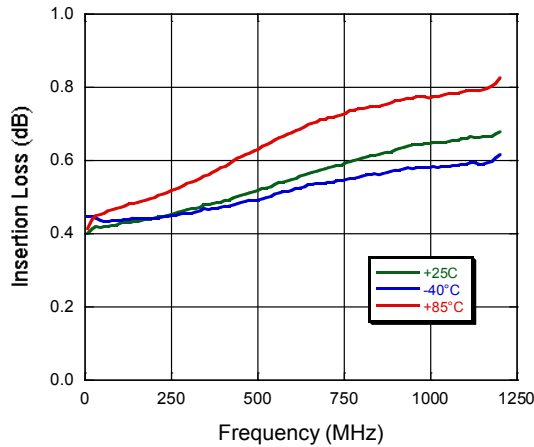
Truth Table⁶

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

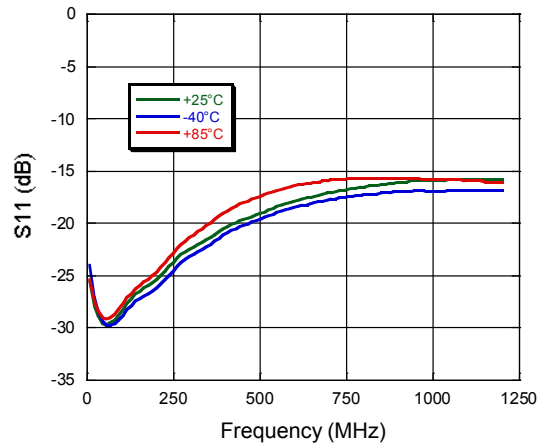
6. 0 = 0 V +/- 0.2 V; 1 = +2.5 V to +5.0 V.

Typical Performance Curves

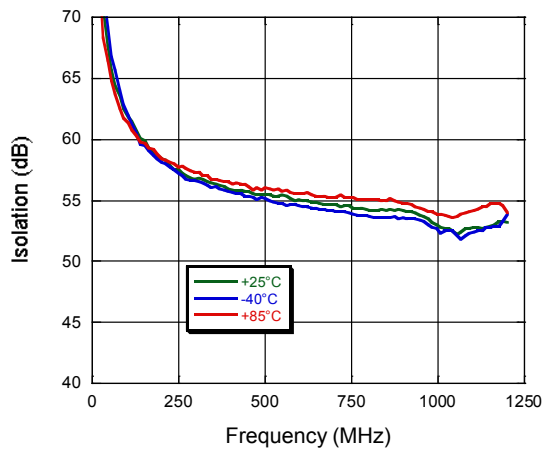
Insertion Loss vs. Frequency over Temperature



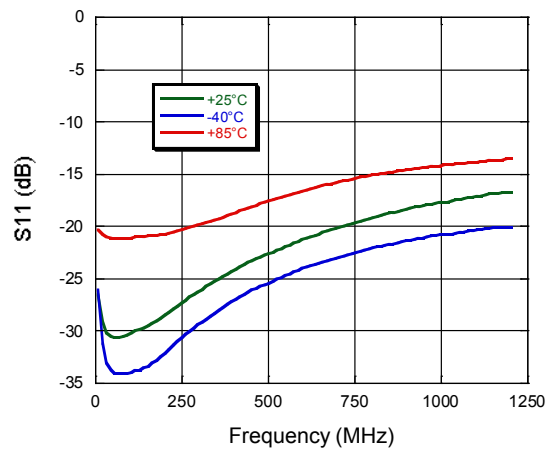
S11 (Switch On) vs. Frequency over Temperature



Isolation vs. Frequency over Temperature



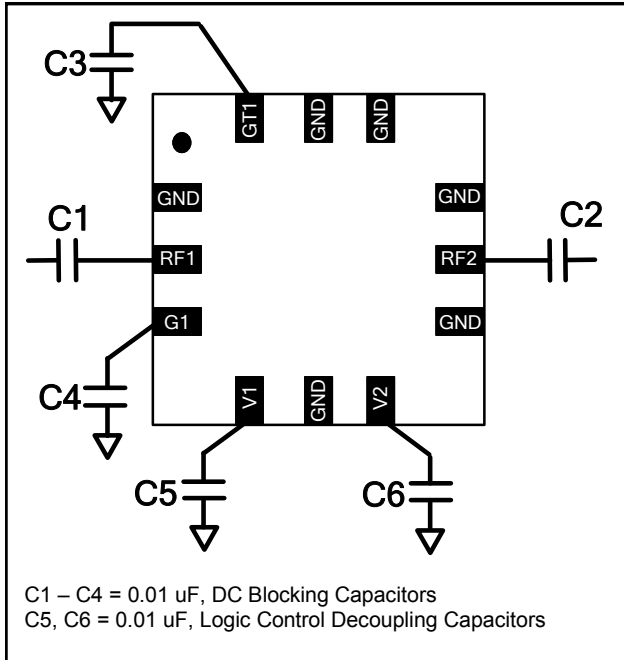
S11 (Switch Off) vs. Frequency over Temperature



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Application Schematic



Qualification

Qualified to M/A-COM Specification Rel 201, Process Flow –2.

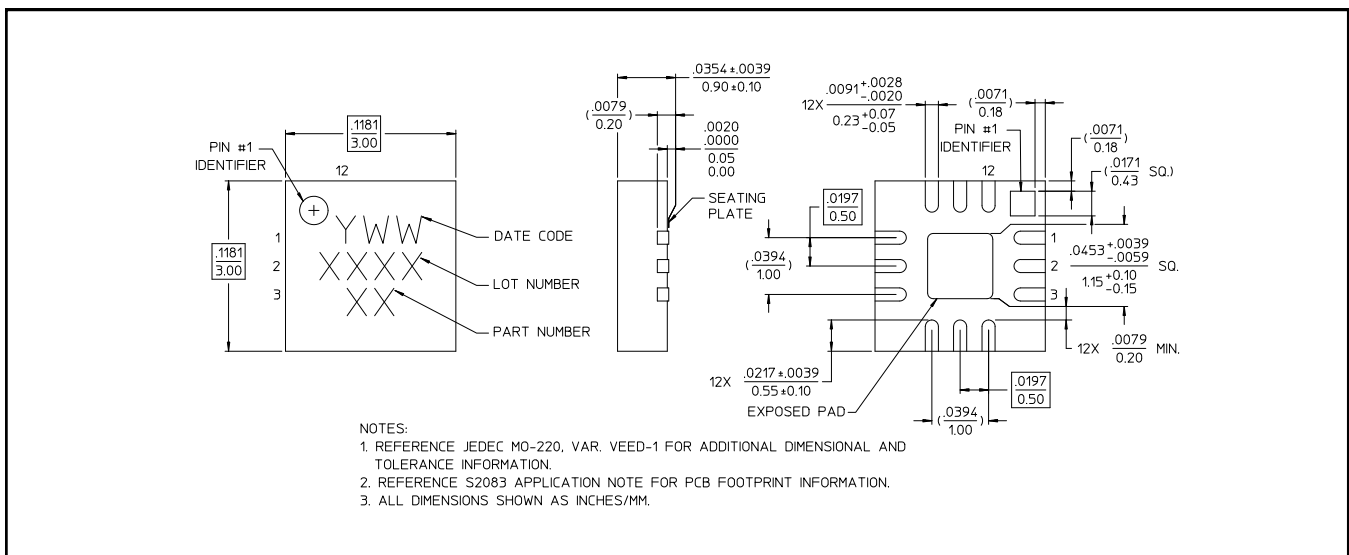
Handling Procedures

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. Use proper ESD control precautions when handling these devices.

Lead-Free 3 mm 12-Lead PQFN[†]



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

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