

SPDT High Isolation Terminated Switch 0.5 - 3.0 GHz

Rev. V3

Features

- Positive Voltage Control (0 / +5 V)
- High Isolation: 54 dB @ 0.9 GHz
52 dB @ 1.9 GHz
- 50-Ohm Internal Terminations
- Low Insertion Loss: 0.6 dB @ 0.9 GHz
0.7 dB @ 1.9 GHz
- Lead-Free Package: 4 mm 16-Lead PQFN
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of SW-475

Description

The M/A-COM MASWSS0121 GaAs monolithic switch provides high isolation in a low-cost, lead-free plastic surface mount package. The MASWSS0121 is ideal for applications across a broad range of frequencies including synthesizer switching, transmit / receive switching, switch matrices and filter banks in systems such as radio and cellular equipment, PCS, GPS, and fiber optic modules.

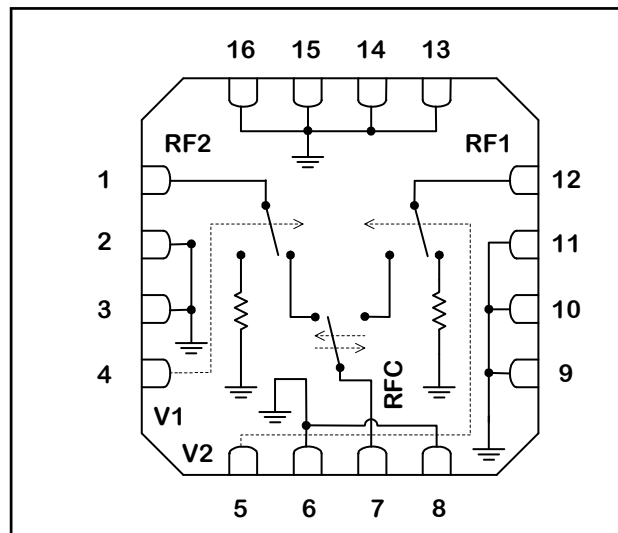
M/A-COM fabricates the MASWSS0121 using a 1.0-micron gate length MESFET process. The process features full chip passivation for performance and reliability.

Ordering Information ¹

| Part Number | Package |
|-------------------|-----------------|
| MASWSS0121 | Bulk Packaging |
| MASWSS0121TR | 1000 piece reel |
| MASWSS0121TR-3000 | 3000 piece reel |
| MASWSS0121SMB | Sample board |

1. Reference Application Note M513 for reel size information.

Functional Schematic



PIN Configuration

| Pin | Function | Description |
|-----------------------|----------|-------------|
| 1 | RF2 | RF port |
| 2 | GND | RF ground |
| 3 | GND | RF ground |
| 4 | V1 | Control 1 |
| 5 | V2 | Control 2 |
| 6 | GND | RF ground |
| 7 | RFC | RF port |
| 8 | GND | RF ground |
| 9 | GND | RF ground |
| 10 | GND | RF ground |
| 11 | GND | RF ground |
| 12 | RF1 | RF port |
| 13 | GND | RF ground |
| 14 | GND | RF ground |
| 15 | GND | RF ground |
| 16 | GND | RF ground |
| 17 (pad) ² | GND | RF ground |

2. 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: $T_A = 25\text{ }^\circ\text{C}$, $Z_0 = 50\text{ Ohms}$, $V_C = 0, 5.0\text{ V}^3$

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---------------------------------------|---|-------|------|------|------|
| Insertion Loss | 0.5 - 1 GHz | dB | — | 0.6 | 0.7 |
| | 1.0 - 2.0 GHz | dB | — | 0.7 | 0.8 |
| | 2.0 - 3.0 GHz | dB | — | 0.75 | 0.9 |
| Isolation | 0.5 - 1 GHz | dB | 51 | 54 | — |
| | 1.0 - 2.0 GHz | dB | 48 | 52 | — |
| | 2.0 - 3.0 GHz | dB | 45 | 50 | — |
| Return Loss | 0.5 - 1 GHz | dB | — | 20 | — |
| | 1.0 - 2.0 GHz | dB | — | 20 | — |
| | 2.0 - 3.0 GHz | dB | — | 20 | — |
| Input IP ₂ | 2-Tone 900 MHz, 5 MHz spacing | dBm | — | 83 | — |
| Input IP ₃ | 2-Tone 900 MHz, 5 MHz spacing | dBm | — | 46 | — |
| P1dB | 1 GHz, 5 V | dBm | — | 27 | — |
| | 1 GHz, 3 V | dBm | — | 18 | — |
| P0.1dB | 1 GHz, 5 V | dBm | — | 24 | — |
| | 1 GHz, 3 V | dBm | — | 11 | — |
| T _{RISE} , T _{FALL} | 10% to 90% RF & 90% to 10% RF | nS | — | 24 | — |
| T _{ON} , T _{OFF} | 50% of V _C to 10% / 90% RF | nS | — | 15 | — |
| Transients | V _C = 5.0 V square wave, in-band | mV | — | 12 | — |
| Control Current | V _C = 4.5 V, 0 dBm | μA | — | 2 | 13 |

3. External DC blocking capacitors are required on all RF ports (47 pF capacitors are recommended).

Absolute Maximum Ratings^{4,5}

| Parameter | Absolute Maximum |
|---|--------------------|
| Input Power (0.5 - 3.0 GHz) 3 V Control 5 V Control | +30 dBm +33 dBm |
| Operating Voltage | +8.5 volts |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |

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.

Truth Table

| V1 | V2 | RFC - RF1 | RFC - RF2 |
|----|----|-----------|-----------|
| 0 | 1 | ON | OFF |
| 1 | 0 | OFF | ON |

| Logic Level | Voltage Level |
|-------------|----------------|
| 0 | 0 V ± 0.2 V |
| 1 | 3.0 V to 8.0 V |

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

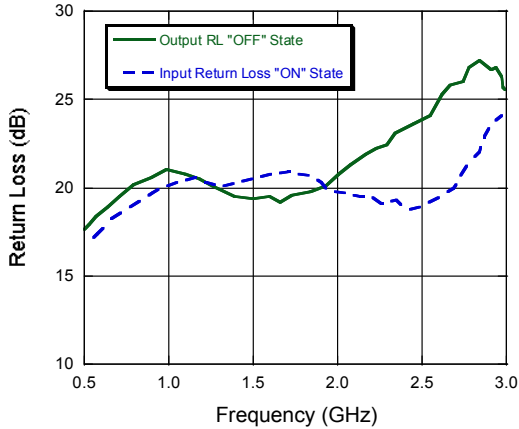
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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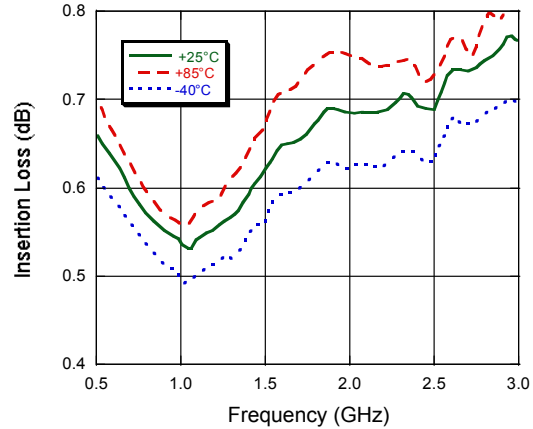
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Typical Performance Curves

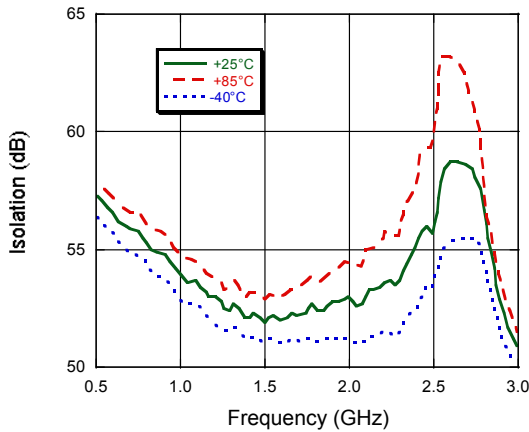
Return Loss



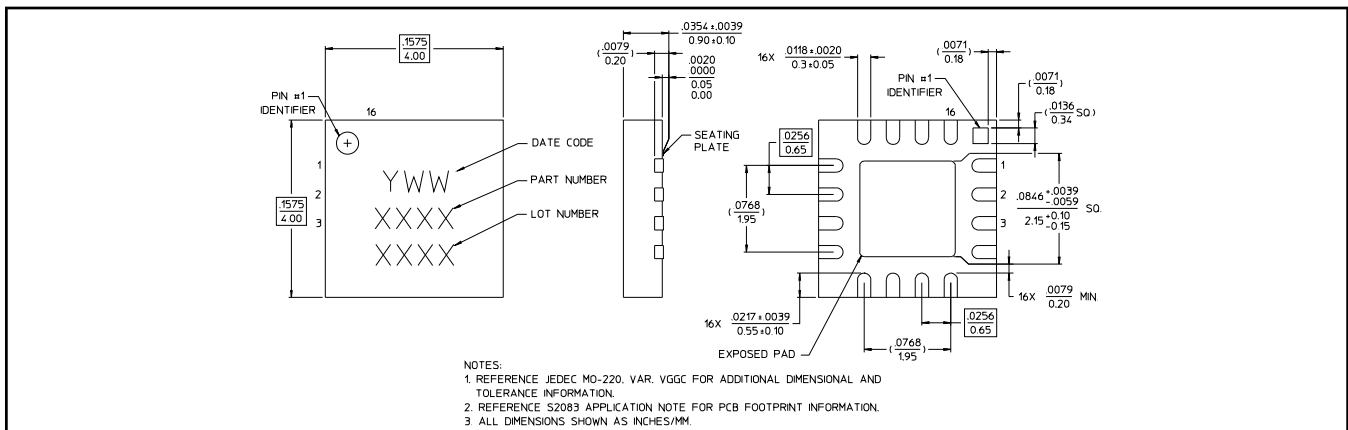
Insertion Loss Over Temperature



Isolation Over Temperature



Lead-Free 4 mm 16-Lead PQFN†



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

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