MASWSS0201

GaAs Broadband 75 Ohm Default-On, SPDT Terminated Switch
DC - 2.5 GHz

Features
- Ideal for CATV, DTV, DVR, STB Applications
- Default-On in Unpowered State (RFC-RF1 Path)
- Broadband Performance: DC-2.5 GHz
- Low Insertion Loss: 1.1 dB at 1 GHz
- High Isolation: > 60dB @ 100MHz
- Single Control Operation
- Power Handling: > 20 dBm P1dB
- Lead-Free 3 mm 12-lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible
- Configurable for Non-terminated Operation

Description
M/A-COM’s MASWSS0201 is a broadband GaAs PHEMT MMIC SPDT terminated switch in a low cost, lead-free 3 mm 12-lead PQFN package. The MASWSS0201 is ideally suited for applications where an unpowered on state is critical in a single control line SPDT terminated switch. The unpowered condition is the same as the $V_C = 0$ condition. This part can also be configured as a reflective switch with minimal impact to the RF performance.

The MASWSS0201 delivers high isolation, low insertion loss and high linearity up to 2.5 GHz.

The MASWSS0201 is fabricated using a 0.5 micron gate length GaAs E/D PHEMT process. The process features full passivation for performance and reliability.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASWSS0201TR-3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MASWSS0201SMB</td>
<td>Sample Test Board (Includes 5 Samples)</td>
</tr>
</tbody>
</table>

Pin Configuration

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>RF1</td>
<td>RF Port 1</td>
</tr>
<tr>
<td>3</td>
<td>Term 1 GND</td>
<td>Termination 1 Ground</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>7</td>
<td>Term 2 GND</td>
<td>Termination 2 Ground</td>
</tr>
<tr>
<td>8</td>
<td>RF2</td>
<td>RF Port 2</td>
</tr>
<tr>
<td>9</td>
<td>VC</td>
<td>Control</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>11</td>
<td>RFC</td>
<td>RF Input</td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>13</td>
<td>Paddle</td>
<td>RF and DC Ground</td>
</tr>
</tbody>
</table>

2. M/A-COM recommends that all unused (N/C) pins be connected to ground. All data on this datasheet was taken with N/C pins connected to ground.
3. Terminated grounds require DC blocking capacitors; see application schematic.
4. The exposed pad centered on the package bottom must be connected to RF and DC ground.

### Electrical Specifications:  \( T_A = 25^\circ C, \ Z_0 = 75 \ \Omega, \ V_C = 0 \ V/3 \ V, \ P_{IN} = 0 \ \text{dBm} \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
</table>
| Insertion Loss RFC to RF1  
(\( V_C = 0V \)) | 100 MHz  
1.0 GHz  
2.0 GHz | dB | — | 0.9 | 1.75 |
| Insertion Loss RFC to RF2  
(\( V_C = 3V \)) | 100 MHz  
1.0 GHz  
2.0 GHz (RFC - RF1)  
2.0 GHz (RFC - RF2) | dB | — | 1.0 | 1.65 |
| Isolation  
100 MHz  
1.0 GHz  
2.0 GHz | dB | 60 | 65 | — |
| Return Loss  
DC - 2.0 GHz | dB | — | 25 | — |
| IIP2  
(\( V_C = 0V/3V/5V \)) | Two Tone, +5 dBm/Tone, 10 MHz Spacing  
100 MHz  
1.0 GHz | dBm | — | 54/51/53 | — |
| IIP3  
(\( V_C = 0V/3V/5V \)) | Two Tone, +5 dBm/Tone, 10 MHz Spacing  
100 MHz  
1.0 GHz | dBm | — | 38/38/39 | — |
| Input P1dB  
(\( V_C = 0V/3V/5V \)) | 100 MHz  
1.0 GHz | dBm | — | 21/21/22 | — |
| T-rise  
T-fall  
10% to 90% RF  
90% to 10% RF | µS  
μS | — | 1.4 | — |
| Ton  
Toff  
50% control to 90% RF  
50% control to 10% RF | µS  
μS | — | 1.6 | — |
| Transients | — | mV | — | 550 | — |
| Control Current | \( V_C = 3V \) | µA | — | 250 | 500 |

5. Electrical specifications apply to terminated configuration only.

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power @ 100 MHz</td>
<td>+22 dBm</td>
</tr>
<tr>
<td>Input Power @ 1 GHz</td>
<td>+29 dBm</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>+8.5 volts</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65°C to +150°C</td>
</tr>
</tbody>
</table>

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

### Truth Table

<table>
<thead>
<tr>
<th>Control ( V_C )</th>
<th>RFC-RF1</th>
<th>RFC-RF2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>1</td>
<td>Off</td>
<td>On</td>
</tr>
</tbody>
</table>

8. External DC blocking capacitors are required on all RF ports.
9. \( 0 = 0 \pm 0.1 \ V, \ 1 = +2.9 \ V \) to +5 V.
10. The unpowered on state is the same as \( V_C = 0 \).
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Typical Performance Curves: $T_A = 25^\circ C$, $Z_0 = 75$ $\Omega$, Components per Application Schematic

**Insertion Loss**

**RFC Return Loss**

**Isolation (Below 200 MHz)**

**RF1 Return Loss**

**Isolation (Above 200 MHz)**

**RF2 Return Loss**
GaAs Broadband 75 Ohm Default-On, SPDT Terminated Switch
DC - 2.5 GHz

Rev. V1

Lead-Free 3 mm 12-lead PQFN†

Application Schematic 11,12

11. Non-connected pins (P1 and P5) are shown connected to ground as recommended. All data on this datasheet was taken with N/C pins connected to ground.
12. Application schematic shown is for terminated configuration. For non-terminated operation Term 1 and Term 2 ground pins are left open. See application section for data in unterminated configuration.

Qualification

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.

M/A-COM’s AN3007 Application Note outlines a method for ESD sensitivity mitigation. It can be found at the Tech/Apps section of the MACOM.COM website.

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

Typical Performance Curves:
$T_a = 25^\circ C$, $Z_0 = 75 \ \Omega$, Unterminated Configuration (Term 1&2 GND pins open)

- **Insertion Loss**
  - RFC to RFC (Vc=0V)
  - RFC to RFC (Vc=3V)

- **Isolation (Below 200 MHz)**
  - RFC to RFC (Vc=0V)
  - RFC to RFC (Vc=3V)

- **Isolation (Above 200 MHz)**
  - RFC to RFC (Vc=0V)
  - RFC to RFC (Vc=3V)

- **RF1 Return Loss**
  - RF1 to RFC (Vc=0V)
  - RF1 to RFC (Vc=3V)

- **RF2 Return Loss**
  - RF2 to RFC (Vc=3V)
  - RF2 to RFC (Vc=0V)

For further information and support please visit: [https://www.macom.com/support](https://www.macom.com/support)
Application Section

Application Schematic – Unterminated Configuration

C1-C3 = 10000 pf
C4 = 100 pf