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>

1. Reference Application Note M513 for reel size information.

For further information and support please visit: https://www.macom.com/support

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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>
<tbody>
<tr>
<td>Insertion Loss RFC to RF1 (( V_C = 0V ))</td>
<td>100 MHz, 1.0 GHz, 2.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.9</td>
<td>1.75</td>
</tr>
<tr>
<td>Insertion Loss RFC to RF2 (( V_C = 3V ))</td>
<td>100 MHz, 1.0 GHz, 2.0 GHz (RFC - RF1), 2.0 GHz (RFC - RF2)</td>
<td>dB</td>
<td>—</td>
<td>1.0</td>
<td>1.65</td>
</tr>
<tr>
<td>Isolation</td>
<td>100 MHz, 1.0 GHz</td>
<td>dB</td>
<td>60</td>
<td>65</td>
<td>—</td>
</tr>
<tr>
<td>Isolation</td>
<td>2.0 GHz (RFC - RF1)</td>
<td>dB</td>
<td>40</td>
<td>45</td>
<td>—</td>
</tr>
<tr>
<td>Isolation</td>
<td>2.0 GHz (RFC - RF2)</td>
<td>dB</td>
<td>—</td>
<td>38</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>DC - 2.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>25</td>
<td>—</td>
</tr>
<tr>
<td>IIP2 (( V_C = 0V / 3V / 5V))</td>
<td>Two Tone, +5 dBm/Tone, 10 MHz Spacing</td>
<td>dBm</td>
<td>—</td>
<td>54</td>
<td>51 / 53</td>
</tr>
<tr>
<td>IIP3 (( V_C = 0V / 3V / 5V))</td>
<td>Two Tone, +5 dBm/Tone, 10 MHz Spacing</td>
<td>dBm</td>
<td>—</td>
<td>38</td>
<td>38 / 39</td>
</tr>
<tr>
<td>Input P1dB (( V_C = 0V / 3V / 5V))</td>
<td>100 MHz, 1.0 GHz</td>
<td>dBm</td>
<td>—</td>
<td>21</td>
<td>21 / 22</td>
</tr>
<tr>
<td>T-rise</td>
<td>10% to 90% RF</td>
<td>( \mu \text{S} )</td>
<td>—</td>
<td>1.4</td>
<td>—</td>
</tr>
<tr>
<td>T-fall</td>
<td>90% to 10% RF</td>
<td>nS</td>
<td>—</td>
<td>12</td>
<td>—</td>
</tr>
<tr>
<td>Ton</td>
<td>50% control to 90% RF</td>
<td>( \mu \text{S} )</td>
<td>—</td>
<td>1.6</td>
<td>—</td>
</tr>
<tr>
<td>Toff</td>
<td>50% control to 10% RF</td>
<td>nS</td>
<td>—</td>
<td>12</td>
<td>—</td>
</tr>
<tr>
<td>Transients</td>
<td></td>
<td>mV</td>
<td>—</td>
<td>550</td>
<td>—</td>
</tr>
<tr>
<td>Control Current</td>
<td>( V_C = 3V )</td>
<td>( \mu \text{A} )</td>
<td>—</td>
<td>250</td>
<td>500</td>
</tr>
</tbody>
</table>

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>

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>

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.
8. External DC blocking capacitors are required on all RF ports.
9. \( 0 = 0 \pm 0.1 \, \text{V}, 1 = +2.9 \, \text{V} \) to +5 \, \text{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, $Z_0 = 75$ Ω, Components per Application Schematic

**Insertion Loss**

- $S_{21}$ (dB)
- Frequency (GHz)

- $S_{21}$ (dB)
- Frequency (MHz)

**Isolation (Below 200 MHz)**

- $S_{21}$ (dB)
- Frequency (MHz)

**Isolation (Above 200 MHz)**

- $S_{21}$ (dB)
- Frequency (GHz)

**RFC Return Loss**

- $S_{11}$ (dB)
- Frequency (GHz)

**RF1 Return Loss**

- $S_{22}$ (dB)
- Frequency (GHz)

**RF2 Return Loss**

- $S_{22}$ (dB)
- Frequency (GHz)
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Lead-Free 3 mm 12-lead PQFN†

Application Schematic 11,12

C1-C5=10000 pf
C6=100 pf

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

**Insertion Loss**

**Isolation (Below 200 MHz)**

**Isolation (Above 200 MHz)**

**RFC Return Loss**

**RF1 Return Loss**

**RF2 Return Loss**
Application Schematic – Unterminated Configuration

C1-C3 = 10000 pf
C4 = 100 pf
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