MASW-007588

GaAs Broadband SPDT Switch
DC - 6.0 GHz

Features
- UNII, Hiperlan, and 802.11a/b/g Applications
- Broadband Performance: DC-6 GHz
- Low Insertion Loss: 0.9 dB at 6 GHz
- High Isolation: 28 dB Typical
- Fast Switching Speed: 0.5 μm GaAs PHEMT
- High Power: 36 dBm P1dB
- Fast Settling for Low Gate Lag Requirements
- 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

Description
M/A-COM’s MASW-007588 is a broadband GaAs PHEMT MMIC SPDT switch in a low cost, lead-free 3 mm 12-lead PQFN package. The MASW-007588 is ideally suited for applications where very small size and low cost are required.

The MASW-007588, with its small size and low height, is ideal for 802.11a and 802.11b/g PC card and access point applications.

The MASW-007588 delivers high isolation, low insertion loss and high linearity up to 6 GHz.

The MASW-007588 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

Ordering Information1

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASW-007588-TR3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MASW-007588-000SMB</td>
<td>Sample Test Board (Includes 5 Samples)</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.

Functional Schematic

![Functional Schematic Diagram]

Pin Configuration

<table>
<thead>
<tr>
<th>PIN No.</th>
<th>PIN Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VC1</td>
<td>Control 1</td>
</tr>
<tr>
<td>2</td>
<td>RF1</td>
<td>RF Port 1</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>RF2</td>
<td>RF Port 2</td>
</tr>
<tr>
<td>9</td>
<td>VC2</td>
<td>Control 2</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. The exposed pad centered on the package bottom must be connected to RF and DC ground.

Absolute Maximum Ratings3,4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power @ 3 V Control</td>
<td>+37 dBm</td>
</tr>
<tr>
<td>Input Power @ 5 V Control</td>
<td>+39 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>

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

* Restrictions on Hazardous Substances, European Union Directive 002/95/EC.

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

### Parameter | Test Conditions | Units | Min. | Typ. | Max. |
--- | --- | --- | --- | --- | --- |
**Insertion Loss** | 2.4 GHz | dB | — | 0.70 | 1.05 |
| 5.3 GHz | dB | — | 0.85 | 1.2 |
| 5.8 GHz | dB | — | 0.85 | 1.2 |
**Isolation** | 2.4 GHz | dB | 24 | 29 | — |
| 5.3 GHz | dB | 23 | 28 | — |
| 5.8 GHz | dB | 21 | 26 | — |
**Return Loss** | DC - 6 GHz | dB | — | 20 | — |
**IP2** | Two Tone, +15 dBm/Tone, 5 MHz Spacing, >50 MHz | dBm | — | 98 | — |
| 2.4 GHz, Vc = 3.0 V | dBm | — | 81 | — |
| 5.8 GHz, Vc = 3.0 V | dBm | — | 107 | — |
**IIP3** | Two Tone, +15 dBm/Tone, 5 MHz Spacing, >50 MHz | dBm | — | 57 | — |
| 2.4 GHz, Vc = 3.0 V | dBm | — | 53 | — |
| 5.8 GHz, Vc = 3.0 V | dBm | — | 57 | — |
| 2.4 GHz, Vc = 5.0 V | dBm | — | 54 | — |
| 5.8 GHz, Vc = 5.0 V | dBm | — | — | — |
**Input P-1dB** | 2.4 GHz | dBm | — | 40 | — |
| 5.3 GHz | dBm | — | 36 | — |
| 5.8 GHz | dBm | — | 37 | — |
**2nd Harmonic** | 2.4 GHz, Pin = +20 dBm | dBm | — | -72 | — |
| 5.8 GHz, Pin = +20 dBm | dBm | — | -69 | — |
**3rd Harmonic** | 2.4 GHz, Pin = +20 dBm | dBm | — | -85 | — |
| 5.8 GHz, Pin = +20 dBm | dBm | — | -75 | — |
**T-rise, T-fall** | 10% to 90% RF and 90% to 10% RF | nS | — | 55 | — |
**Ton, Toff** | 50% control to 90% RF, and 50% control to 10% RF | nS | — | 80 | — |
**Transients** | — | mV | — | 14 | — |
**Control Current** | | µA | — | 15 | 25 |

### Truth Table

<table>
<thead>
<tr>
<th>Control V1</th>
<th>Control V2</th>
<th>RFC—RF1</th>
<th>RFC—RF2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>Off</td>
<td>On</td>
</tr>
</tbody>
</table>

5. For positive voltage control, external DC blocking capacitors are required on all RF ports.
6. Differential voltage, V(state 1) - V(state 0), must be +2.7 V minimum and must not exceed +5 V.
7. 0 = 0 ± 0.2 V, 1 = +2.9 V to +5 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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Typical Performance Curves

**Insertion Loss**

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Insertion Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>3</td>
<td>0.8</td>
</tr>
<tr>
<td>4</td>
<td>1.0</td>
</tr>
<tr>
<td>5</td>
<td>1.2</td>
</tr>
<tr>
<td>6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**Isolation**

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Isolation (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
</tr>
</tbody>
</table>

**Return Loss**

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-40</td>
</tr>
<tr>
<td>2</td>
<td>-35</td>
</tr>
<tr>
<td>3</td>
<td>-30</td>
</tr>
<tr>
<td>4</td>
<td>-25</td>
</tr>
<tr>
<td>5</td>
<td>-20</td>
</tr>
<tr>
<td>6</td>
<td>-15</td>
</tr>
</tbody>
</table>

**Application Schematic**

- C1, C2, C3 = 8 pF
- Lead-Free 3 mm 12-lead PQFN†

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