MASW-007921

High Power GaAs SPDT Switch
DC - 7.0 GHz

Features

- Ideal for high power SPDT switch applications including WiMAX, WLAN, Mesh Networks, and Fixed Wireless Access
- Broadband Performance: DC - 7.0 GHz
- Low Insertion Loss:
  - 0.65 dB @ 3.5 GHz, RFC to TX
  - 0.70 dB @ 3.5 GHz, RCF to RX
- High P0.1dB Compression:
  - 40 dBm @ 3V, 3.5 GHz, RFC to TX
- Fast Settling for Low Gate Lag requirements
- Lead-Free 2 mm 8-Lead PDFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible
- Asymmetrical Design for optimized performance

Description

M/A-COM’s MASW-007921 is a broadband GaAs pHEMT MMIC SPDT switch available in a lead-free 2 mm 8-lead PDFN package. The MASW-007921 is ideally suited for applications where very small size and high linearity are required.

Typical applications include WiMAX, WLAN, Mesh networks, fixed wireless access, and other higher power systems. This switch has a very high initial compression point, ideal for complex modulations such as OFDM, with large peak average power levels.

The MASW-007921 is fabricated using a 0.5 micron gate length GaAs 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>MASW-007921-TR3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MASW-007921-001SMB</td>
<td>Sample Board 2.0 - 6.0 GHz Tuning</td>
</tr>
<tr>
<td>MASW-007921-002SMB</td>
<td>Sample Board 0.05 - 2.0 GHz Tuning</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.


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

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. Visit www.macom.com for additional data sheets and product information.
## Electrical Specifications:  $T_A = 25^\circ C$, $Z_0 = 50 \, \Omega$, $V_C = 0 \, V$ / $3 \, V$, 4.7 pF Capacitor

<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 RX</td>
<td>0.05 - 2 GHz$^{10}$</td>
<td>dB</td>
<td>—</td>
<td>0.5</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.6</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.70</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>5.8 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.8</td>
<td>—</td>
</tr>
<tr>
<td>Insertion Loss RFC to TX</td>
<td>0.05 - 2 GHz$^{10}$</td>
<td>dB</td>
<td>—</td>
<td>0.5</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.65</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.65</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>5.8 GHz</td>
<td>dB</td>
<td>—</td>
<td>1.2</td>
<td>—</td>
</tr>
<tr>
<td>Isolation</td>
<td>0.05 - 2 GHz$^{10}$</td>
<td>dB</td>
<td>—</td>
<td>27</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dB</td>
<td>21</td>
<td>25</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dB</td>
<td>—</td>
<td>26</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>5.8 GHz</td>
<td>dB</td>
<td>—</td>
<td>30</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>DC - 6.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>15</td>
<td>—</td>
</tr>
<tr>
<td>Input IP2 RX</td>
<td>10 MHz Spacing, +20 dBm</td>
<td>dBm</td>
<td>—</td>
<td>102</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dBm</td>
<td>—</td>
<td>99</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dBm</td>
<td>—</td>
<td>84</td>
<td>—</td>
</tr>
<tr>
<td>Input IP2 TX</td>
<td>10 MHz Spacing, +20 dBm</td>
<td>dBm</td>
<td>—</td>
<td>104</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dBm</td>
<td>—</td>
<td>101</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dBm</td>
<td>—</td>
<td>88</td>
<td>—</td>
</tr>
<tr>
<td>Input IP3 RX</td>
<td>10 MHz Spacing, +20 dBm</td>
<td>dBm</td>
<td>—</td>
<td>59</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dBm</td>
<td>—</td>
<td>57</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dBm</td>
<td>—</td>
<td>51</td>
<td>—</td>
</tr>
<tr>
<td>Input IP3 TX</td>
<td>10 MHz Spacing, +20 dBm</td>
<td>dBm</td>
<td>—</td>
<td>62</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.4 GHz</td>
<td>dBm</td>
<td>—</td>
<td>58</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dBm</td>
<td>—</td>
<td>52</td>
<td>—</td>
</tr>
<tr>
<td>Input P0.1dB RX</td>
<td>2.4 GHz</td>
<td>dBm</td>
<td>—</td>
<td>38</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dBm</td>
<td>—</td>
<td>37</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>5.8 GHz</td>
<td>dBm</td>
<td>—</td>
<td>39</td>
<td>—</td>
</tr>
<tr>
<td>Input P0.1dB TX</td>
<td>2.4 GHz</td>
<td>dBm</td>
<td>—</td>
<td>38</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>dBm</td>
<td>—</td>
<td>40</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>5.8 GHz</td>
<td>dBm</td>
<td>—</td>
<td>39</td>
<td>—</td>
</tr>
<tr>
<td>Trise, Tfall</td>
<td>10% to 90% RF</td>
<td>nS</td>
<td>—</td>
<td>21</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>90% to 10% RF</td>
<td>nS</td>
<td>—</td>
<td>18</td>
<td>—</td>
</tr>
<tr>
<td>Ton, Toff</td>
<td>50% control to 90% and 50% control to 10% RF</td>
<td>nS</td>
<td>—</td>
<td>40</td>
<td>—</td>
</tr>
<tr>
<td>Transients</td>
<td></td>
<td>mV</td>
<td>—</td>
<td>100</td>
<td>—</td>
</tr>
<tr>
<td>Control Current</td>
<td></td>
<td>µA</td>
<td>—</td>
<td>2.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

8. For positive voltage control, external DC blocking capacitors are required on all RF ports.
9. Performance can be optimized by varying the DC blocking capacitor value. See application schematic for details.
10. 0.05 - 2.0 GHz specifications apply with 1000 pF blocking capacitors. See applications section for typical data.
Typical Performance Curves Over Temp.: $Z_0 = 50$ Ω, 4.7 pF Blocking Caps on all RF Ports

**RFC to Rx Insertion Loss**

![Graph showing insertion loss vs. frequency for different temperatures.]

**RFC to Tx Insertion Loss**

![Graph showing insertion loss vs. frequency for different temperatures.]

**RFC to Rx Isolation**

![Graph showing isolation vs. frequency for different temperatures.]

**RFC to Tx Isolation**

![Graph showing isolation vs. frequency for different temperatures.]

**Rx Return Loss**

![Graph showing return loss vs. frequency for different temperatures.]

**Tx Return Loss**

![Graph showing return loss vs. frequency for different temperatures.]

---

**M/A-COM Technology Solutions Inc. (MACOM)** and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

For further information and support please visit: [https://www.macom.com/support](https://www.macom.com/support)
High Power GaAs SPDT Switch
DC - 7.0 GHz

Application Schematic

Truth Table

<table>
<thead>
<tr>
<th>Control Vc1</th>
<th>Control Vc2</th>
<th>RFC - TX</th>
<th>RFC - RX</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>

12. Differential voltage, V (state 1) - V (state 0), must be +2.7 V minimum and must not exceed 8.0 V.
13. Positive Control: 1 = +2.9 V to +8 V, 0 = 0 V ± 0.2 V. Negative Control: 1 = 0 V ± 0.2 V, 0 = -2.9V to -8.0 V.

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.

11. M/A-COM recommends connecting unused package pins (N/C) to ground as shown.
High Power GaAs SPDT Switch
DC - 7.0 GHz

Lead Free 2 mm 8-lead PDFN †

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

Typical Low Frequency Performance Curves: $T_A = 25^\circ C$, $Z_0 = 50 \Omega$, 1000 pF Blocking Caps on all RF Ports

**Insertion Loss**

**RFC Return Loss**

**Isolation**

**Tx and Rx Return Loss**
High Power GaAs SPDT Switch
DC - 7.0 GHz

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

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