GaAs DPDT Diversity Switch
0.5 - 3.0 GHz

Features
- Low Insertion Loss 0.7 dB at 2.4 GHz
- Ideal for WLAN IEEE 802.11b
- 0.5 micron GaAs pHEMT Process
- Lead-Free 3 mm 12-Lead PQFN Package
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant version of MASWSS0040

Description
M/A-COM’s MASW-009460 is a GaAs pHEMT MMIC DPDT diversity switch in a lead-free 3 mm 12-lead PQFN package. The MASW-009460 is ideally suited for applications where very small size and low cost are required.

Typical applications are for WLAN IEEE 802.11b/g systems that employ two antennas for transmit and receive diversity. This part is designed for low insertion loss and allows for independent control and selection of each switch path. This part can be used in all systems operating up to 3.0 GHz requiring moderate power and diversity switching.

The MASW-009460 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-009460-TR1000</td>
<td>1000 piece reel</td>
</tr>
<tr>
<td>MASW-009460-TR3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MASW-009460-001SMB</td>
<td>Sample Test Board</td>
</tr>
</tbody>
</table>

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


Visit www.macom.com for additional data sheets and product information.
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Electrical Specifications: $T_A = 25^\circ C$, $V_C = 3$ V, $P_{IN} = 10$ dBm, $Z_0 = 50 \, \Omega$

<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$^4$</td>
<td>0.5 - 1.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.5</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>1.0 - 2.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.6</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.0 - 2.5 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.7</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>2.5 - 3.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>0.8</td>
<td>—</td>
</tr>
<tr>
<td>Isolation$^5$</td>
<td>0.5 - 1.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>28.0</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>1.0 - 2.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>21.0</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.0 - 2.5 GHz</td>
<td>dB</td>
<td>17.0</td>
<td>19.0</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2.5 - 3.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>18.0</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>0.5 - 3.0 GHz</td>
<td>dB</td>
<td>—</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>IP3</td>
<td>Two Tone +5 dBm, 5 MHz Spacing, &gt; 50 MHz $V_C = 0.2 , \text{V} / 2.3 , \text{V}$</td>
<td>dBm</td>
<td>—</td>
<td>47</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>$V_C = 0.2 , \text{V} / 3.0 , \text{V}$</td>
<td>dBm</td>
<td>—</td>
<td>52</td>
<td>—</td>
</tr>
<tr>
<td>P1dB</td>
<td>$V_C = 0.2 , \text{V} / 2.3 , \text{V}$</td>
<td>dBm</td>
<td>—</td>
<td>26</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>$V_C = 0.2 , \text{V} / 3.0 , \text{V}$</td>
<td>dBm</td>
<td>—</td>
<td>31</td>
<td>—</td>
</tr>
<tr>
<td>2$^{nd}$ Harmonic</td>
<td>2.4 GHz, $P_{IN} = 20$ dBm, $V_C = 0.2 , \text{V} / 2.5 , \text{V}$</td>
<td>dBc</td>
<td>—</td>
<td>70</td>
<td>—</td>
</tr>
<tr>
<td>3$^{rd}$ Harmonic</td>
<td>2.4 GHz, $P_{IN} = 20$ dBm, $V_C = 0.2 , \text{V} / 2.5 , \text{V}$</td>
<td>dBc</td>
<td>—</td>
<td>60</td>
<td>—</td>
</tr>
<tr>
<td>$T_{RISE}$, $T_{FALL}$</td>
<td>10% to 90% RF and 90% to 10% RF</td>
<td>ns</td>
<td>—</td>
<td>12/20</td>
<td>—</td>
</tr>
<tr>
<td>$T_{ON}$, $T_{OFF}$</td>
<td>50% Control to 90% RF, 50% Control to 10% RF</td>
<td>ns</td>
<td>—</td>
<td>35</td>
<td>—</td>
</tr>
<tr>
<td>Control Current</td>
<td>$</td>
<td>V_C</td>
<td>= 3$ V</td>
<td>µA</td>
<td>—</td>
</tr>
</tbody>
</table>

4. Insertion Loss can be optimized by varying the DC Blocking Capacitor value, i.e. 1000 pF for 100 MHz - 1.0 GHz, 27 pF for 0.5 - 3.0 GHz.
5. Isolation of two paths on either side of the selected path.

**Absolute Maximum Ratings**$^6,7$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power 3V Control</td>
<td>+32 dBm</td>
</tr>
<tr>
<td>Input Power 5V Control</td>
<td>+34 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.

**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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Circuit Block Diagram

Parts List

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 – C4</td>
<td>27 pF Decoupling Capacitor</td>
</tr>
<tr>
<td>C5 – C8</td>
<td>27 pF DC Blocking Capacitor</td>
</tr>
<tr>
<td>RF1 – RF4</td>
<td>RF connector</td>
</tr>
<tr>
<td>Item 3</td>
<td>10-pin solder connector</td>
</tr>
</tbody>
</table>

Evaluation Board

Truth Table

<table>
<thead>
<tr>
<th>Control V1</th>
<th>Control V2</th>
<th>Control V3</th>
<th>Control V4</th>
<th>Port 1 - Port 3</th>
<th>Port 1 - Port 4</th>
<th>Port 2 - Port 4</th>
<th>Port 2 - Port 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Off</td>
<td>Off</td>
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<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>Off</td>
<td>Off</td>
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</tr>
<tr>
<td>1</td>
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<td>1</td>
<td>0</td>
<td>On</td>
<td>Off</td>
<td>On</td>
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<tr>
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<td>0</td>
<td>1</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>On</td>
</tr>
</tbody>
</table>

8. External DC blocking capacitors are required on all RF ports.
9. 0 = 0 V ± 0.2 V, 1 = +2.3 V to 5.0 V

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Typical Performance Curves

**Insertion Loss, 27 pF**

![Insertion Loss Graph](image)

**Isolation, 27 pF**

![Isolation Graph](image)

**Input Return Loss**

![Input Return Loss Graph](image)

**Output Return Loss**

![Output Return Loss Graph](image)
Lead-Free 3 mm 12-Lead PQFN†

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.