Features
- Low Loss: 1.1 dB @ 40 GHz
- High Isolation: 39 dB @ 40 GHz
- Up to 13 W CW Power Handling, +85°C
- Switching Speed <30 ns
- Integrated DC Blocks and RF Bias Networks
- 5 mm 20-lead Laminate Package
- RoHS* Compliant

Description
The MASW-011098 is a high power SPDT PIN diode switch in a 5 mm laminate package. This broadband, reflective, high linearity, switch was developed for 26 - 40 GHz applications that require up to 13 W of power handling while maintaining low insertion loss and high isolation.

The SPDT MMIC utilizes MACOM’s proven AlGaAs PIN diode technology.

This switch is ideally suited for 5G, Point-to-Point communications systems, radar systems, radiometers, test and instrumentation equipment and other high frequency applications.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASW-011098</td>
<td>Bulk Packaged part</td>
</tr>
<tr>
<td>MASW-011098-TR0500</td>
<td>500 Part Reel</td>
</tr>
<tr>
<td>MASW-011098-001SMB</td>
<td>Sample Board</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.

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Ka-Band High Power Reflective SPDT PIN Switch
26 - 40 GHz

Electrical Specifications: $T_A = +25^\circ$C, $I_F = 20$ mA, $V_R = -15$ V, $Z_0 = 50$ Ω

<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</td>
<td>26.0 GHz 30.0 GHz 38.5 GHz 40.0 GHz</td>
<td>dB</td>
<td>0.85</td>
<td>1.05</td>
<td>1.15</td>
</tr>
<tr>
<td>Isolation</td>
<td>26.0 GHz 30.0 GHz 38.5 GHz 40.0 GHz</td>
<td>dB</td>
<td>30 29 29 27</td>
<td>43 40 38 39</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>26.0 GHz 30.0 GHz 38.5 GHz 40.0 GHz</td>
<td>dB</td>
<td>20 21 23 19</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>26.0 GHz 30.0 GHz 38.5 GHz 40.0 GHz</td>
<td>dB</td>
<td>24 24 27 25</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>CW Power Handling (ON state)</td>
<td>26.5 GHz, $V_R = -25$ V, +85°C</td>
<td>dBm W</td>
<td>41.2 13</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Switching Speed</td>
<td>26.5 GHz 50% DC to 90% RF / 50% DC to 10% RF 10% to 90% RF / 90% to 10% RF</td>
<td>ns</td>
<td>30 / 21 10 / 8</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Reverse Bias Current</td>
<td>-15 V</td>
<td>nA</td>
<td>25</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

4. Forward bias current ($I_F$) is set using external bias resistors ($R_{BIAS}$) placed at pins B1 and B2, where $R_{BIAS} = (V_{CC} - 1.32$ V) / $I_F$.
5. Reverse bias voltage should be determined based on working conditions. For example, -25 V @ 41.2 dBm input power. For lower power applications, a less negative voltage can be used. R. Caverly and G. Hiller, "Establishing the Minimum Reverse Bias for a PIN Diode in a High Power Switch," IEEE Transactions on Microwave Theory and Techniques, Vol.38, No.12, December 1990.
6. Isolation defined with 1 port in low loss state.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Bias Voltage</td>
<td>-50 V</td>
</tr>
<tr>
<td>Forward Bias Current</td>
<td>25 mA</td>
</tr>
<tr>
<td>CW Incident Power</td>
<td>43 dBm @ 85°C</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>

7. Exceeding any one or combination of these limits may cause permanent damage to this device.
8. MACOM does not recommend sustained operation near these survivability limits.

Truth Table

<table>
<thead>
<tr>
<th>RFCOMMON Path</th>
<th>Bias 1</th>
<th>Bias 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF1 Insertion Loss</td>
<td>-15 V</td>
<td>20 mA</td>
</tr>
<tr>
<td>RF2 Insertion Loss</td>
<td>20 mA</td>
<td>-15 V</td>
</tr>
</tbody>
</table>

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26 - 40 GHz

Typical Performance Curves

Insertion Loss over Reverse Bias Voltage

![Graph showing Insertion Loss over Reverse Bias Voltage](image)

Insertion Loss over Temperature

![Graph showing Insertion Loss over Temperature](image)

$RF_{\text{COMMON}}$ Return Loss

![Graph showing $RF_{\text{COMMON}}$ Return Loss](image)

Isolation over Forward Bias Current

![Graph showing Isolation over Forward Bias Current](image)

$RF1, RF2$ Return Loss (Insertion Loss State)

![Graph showing $RF1, RF2$ Return Loss (Insertion Loss State)](image)

Compression vs. Reverse Bias Voltage @ 26.5 GHz

![Graph showing Compression vs. Reverse Bias Voltage @ 26.5 GHz](image)
Lead-Free 5 mm 20-Lead Laminate Package†

† All dimensions are in millimeters [inches].
Plating is gold.
This device is non-hermetic with an open vent hole. MACOM does not recommended performing any aqueous cleaning process post-assembly unless the vent hole has been filled post-reflow.

Recommended PCB Land Pattern and PCB construction
(Material : RO4350B LoPro, Dielectric thickness 10.7 mils, Top Metal thickness 1oz Cu)
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 HBM class 1A devices.