GaAs SPDT Non-Reflective Switch
0.05-26.5 GHz

Features
• Broadband Performance
• Low Insertion Loss: 1.7 dB @ 20 GHz
• High Isolation: 48 dB @ 20 GHz
• Fast Switching Speed
• Non-Reflective Configuration
• Ultra Low DC Power Consumption
• Size: 1.3 × 0.85 × 0.1 mm
• RoHS* Compliant

Applications
• Test & Measurement
• EW
• Broadband Communications Systems

Description
The MASW-011128-DIE is a versatile, broadband, non-reflective SPDT switch offered as bare die part. The switch operates from 0.05 to 26.5 GHz and provides less than 2 dB insertion loss and 50 dB isolation.

The combination of broadband performance along with very fast switching and excellent settling time make this device ideal for many applications, including Test & Measurement, EW and broadband communication systems.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASW-011028-DIE</td>
<td>Die in Gel Pak</td>
</tr>
</tbody>
</table>

Functional Schematic

Bondpad Configuration

<table>
<thead>
<tr>
<th>Pad Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>RF1</td>
<td>RF 1</td>
</tr>
<tr>
<td>V1</td>
<td>Control Voltage 1</td>
</tr>
<tr>
<td>V2</td>
<td>Control Voltage 2</td>
</tr>
<tr>
<td>RFC</td>
<td>RF Common</td>
</tr>
<tr>
<td>RF2</td>
<td>RF 2</td>
</tr>
</tbody>
</table>

1. Backside of die must be connected to RF, DC and thermal ground.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.
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0.05-26.5 GHz

Electrical Specifications: $T_A = +25°C$, $V1, V2 = -5 V / 0 V$, $Z_0 = 50 \Omega$

<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</td>
<td>0.05 GHz</td>
<td>dB</td>
<td>0.9</td>
<td>1.3</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>12 GHz</td>
<td>dB</td>
<td>1.5</td>
<td>1.7</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>18 GHz</td>
<td>dB</td>
<td>1.9</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>20 GHz</td>
<td>dB</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>26.5 GHz</td>
<td>dB</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Isolation</td>
<td>0.05 GHz</td>
<td>dB</td>
<td>64</td>
<td>60</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>12 GHz</td>
<td>dB</td>
<td>54</td>
<td>48</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>18 GHz</td>
<td>dB</td>
<td>42</td>
<td>42</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>20 GHz</td>
<td>dB</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>26.5 GHz</td>
<td>dB</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>RFC, RF1, RF2 &quot;on state&quot;</td>
<td>dB</td>
<td>15</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>RF1, RF2 &quot;off state&quot;</td>
<td>dB</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Input P1dB</td>
<td>1.0 - 26.5 GHz</td>
<td>dBm</td>
<td>27</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Input IP3</td>
<td>2 Tone, 5 dBm/Tone, 5 MHz spacing, 1 - 26.5 GHz</td>
<td>dBm</td>
<td>42</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>$T_{\text{RISE}}, T_{\text{FALL}}$</td>
<td>10% to 90% RF and 90% to 10% RF</td>
<td>ns</td>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>$T_{\text{ON}}, T_{\text{OFF}}$</td>
<td>50% control to 90% RF and 50% control to 10% RF</td>
<td>ns</td>
<td>15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Control Current (Complementary Logic)</td>
<td>—</td>
<td>µA</td>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Absolute Maximum Ratings\(^2,3\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage</td>
<td>-8.5 V</td>
</tr>
<tr>
<td>Input Power</td>
<td>27 dBm</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\(^4,5\)

<table>
<thead>
<tr>
<th>Control Input</th>
<th>Condition of Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>V2</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

4. $V_{\text{low}} = -5 V$, $V_{\text{high}} = 0 V$.
5. All V1 bondpads and V2 bondpads are connected on die, respectively. Bias voltages can be supplied to any combination of V1 and V2 bondpads.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity (ESD)

This device is sensitive to electrostatic discharge and can be damaged by static electricity. Proper ESD control techniques should be used when handling these class 1A devices.

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

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Typical RF Performance Curves, (RF Symmetrical)

**Insertion Loss, (S21)**

![Insertion Loss Graph](image)

**Isolation, (S31)**

![Isolation Graph](image)

**RFc R. Loss, (S11)**

![RFc R. Loss Graph](image)

**Isolation, (S32)**

![Isolation Graph](image)

**RF1 or RF2 R. Loss, (S22)**

![RF1 or RF2 R. Loss Graph](image)

**Isolated Port R. Loss, (S22)**

![Isolated Port R. Loss Graph](image)
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Typical RF Performance Curves

12 GHz Input Compression

2 GHz Input Compression

Input Compression (0.1dB & 1dB)

Input IP3

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Die Dimensions\(^6,7,8\)

6. All units are in \(\mu\)m, unless otherwise noted, with a tolerance of ±5 \(\mu\)m.
7. Die thickness is 100±10 \(\mu\)m.
8. All square bond pads are 100 \(\mu\)m by 100 \(\mu\)m.

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**BOND PAD DIM (\(\mu\)m)**

<table>
<thead>
<tr>
<th>PAD</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 16</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**NOTES:**

1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS SHOWN ARE \(\mu\)m WITH A TOLERANCE OF ±15 \(\mu\)m.
2. DIE THICKNESS IS 100±10 \(\mu\)m
3. BOND PAD/BACKSIDE METALIZATION: GOLD
4. DIE SIZE REFLECTS NOT ROUNDED. SAW OR LASER KERF REDUCES DIE SIZE BY ~25 \(\mu\)m EACH DIMENSION.