Anti-Parallel Pair Non-Magnetic PIN
5 - 400 MHz

Features
- Designed for MRI applications
- Non-Magnetic Surface Mount Package
- Anti-Parallel Self Bias Configuration
- \( R_P = 20 \, k\Omega, \; C_T = 2 \, pF, \; V_B = 50 \, V \)
- >50 W CW Incident Power Handling @ 400 MHz
- Lead-Free 4 mm 8-lead HQFN Package
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant

Description
The MADP-011084 acts as a passive switch using silicon PIN diodes in a non-magnetic surface mount package. There is one pair of diodes constructed in an electrically isolated anti-parallel configuration that operate from 5 to 400 MHz.

The MADP-011084 is well suited for MRI passive switching applications. The PIN diodes become a high Q R-C network under small signal and behave as an effective passive rectifier or short circuit under high RF signal to tune and de-tune the resonant MRI tank circuit.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MADP-011084-TR0500</td>
<td>500 piece reel</td>
</tr>
<tr>
<td>MADP-011084-TR3000</td>
<td>3000 piece reel</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.
## Electrical Specifications

Electrical Specifications are provided under the conditions:
\[ T_A = 25^\circ C, \ Z_0 = 50 \ \Omega \]

<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>Total Capacitance (C_T)</td>
<td>100 MHz, 0 V</td>
<td>pF</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Series Resistance (R_S)</td>
<td>100 MHz, +10 mA</td>
<td>Ω</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Parallel Resistance (R_P)</td>
<td>100 MHz, 0 V</td>
<td>kΩ</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Reverse Breakdown Voltage</td>
<td>-10 μA</td>
<td>V</td>
<td></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>+10 mA</td>
<td>V</td>
<td></td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Carrier Lifetime</td>
<td>1 kHz, +10 mA, -6 mA (50% Control Voltage, 90% Output Voltage)</td>
<td>ns</td>
<td></td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>CW Thermal Resistance (Θ_JC)</td>
<td>(Infinite heat sink at thermal ground plane)</td>
<td>°C/W</td>
<td></td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>100 MHz, +10 mA</td>
<td>dB</td>
<td></td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Return Loss</td>
<td>100 MHz, +10 mA</td>
<td>dB</td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>100 MHz, 0 V</td>
<td>dB</td>
<td></td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

4. Per diode D1 or D2.

### Absolute Maximum Ratings

Absolute Maximum Ratings are provided under the conditions:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW Incident Power +50 mA, 400 MHz @ 85°C</td>
<td>+50 dBm</td>
</tr>
<tr>
<td>DC Reverse Voltage</td>
<td>-50 V</td>
</tr>
<tr>
<td>AC RMS + DC Forward Current (per diode D1 or D2)</td>
<td>1.8 A</td>
</tr>
<tr>
<td>Power Dissipation @ 85°C (per diode D1 or D2)</td>
<td>4 W</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>+175°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55°C to +125°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55°C to +125°C</td>
</tr>
</tbody>
</table>

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. MACOM does not recommend sustained operation near these survivability limits.
7. Operating at nominal conditions with \( T_J \leq +175^\circ C \) will ensure MTTF > 1 x 10^6 hours.

### Handling Procedures

Please observe the following precautions to avoid damage:

#### Static Sensitivity

These devices 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 1C devices.
Typical Performance Curves: Freq. = 100 MHz

**Series Resistance vs. Forward Current**

**Capacitance vs. Reverse Voltage**

**Parallel Resistance vs. Reverse Voltage**
Typical Performance Curves:

**Insertion Loss @ 10 mA Forward Bias**

-5.0 -4.5 -4.0 -3.5 -3.0 -2.5 -2.0 -1.5 -1.0 -0.5 0 0 200 400 600 800 1000 Frequency (MHz)

**Return Loss @ 10 mA Forward Bias**

-40 -30 -20 -10 0 0 200 400 600 800 1000 Frequency (MHz)

**Isolation @ 10 V Reverse Bias**

-50 -40 -30 -20 -10 0 0 200 400 600 800 1000 Frequency (MHz)

**Isolation @ 20 V Reverse Bias**

-50 -40 -30 -20 -10 0 0 200 400 600 800 1000 Frequency (MHz)

**Isolation @ 40 V Reverse Bias**

-50 -40 -30 -20 -10 0 0 200 400 600 800 1000 Frequency (MHz)

**Output Power vs. Input Power @ 50 mA, 400 MHz CW**

0 10 20 30 40 50 0 10 20 30 40 50 Input Power (dBm) Output Power (dBm)
Lead-Free 4 mm 8-Lead HQFN†

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.
MADP-011084

Anti-Parallel Pair Non-Magnetic PIN
5 - 400 MHz

Rev. V2

MACOM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with MACOM 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

DC-0019133