**Features**
- Input Power: -15 to +15 dBm
- Dynamic Range: 30 dB
- DC supply: 4.5 V, 70 µA
- Die size: 1.00 × 0.75 × 0.1 mm
- Passivated Die
- ESD Protected
- RoHS* Compliant

**Description**
MADT-011000-DIE is a single-ended, internally-matched power detector with wide frequency range and high dynamic range. The circuit consumes 70 µA from a 4.5 V supply, while matched detector and reference diodes provide temperature compensation in differential operation.

The 100 µm thick GaAs die is fully passivated for reliability and ease of handling.

MADT-011000-DIE is well suited for power control in microwave radios, test and measurement equipment, and radar applications.

MADT-011000-DIE is also available in a 3 mm QFN package. Refer to datasheet MADT-011000.

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MADT-011000-DIE</td>
<td>Vacuum release gel pack¹</td>
</tr>
<tr>
<td>MADT-011000-SB2</td>
<td>Sample Board</td>
</tr>
</tbody>
</table>

¹ Die quantity varies.

**Functional Schematic**

**Bond-pad Configuration**

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND/NC</td>
</tr>
<tr>
<td>2</td>
<td>RFIN</td>
</tr>
<tr>
<td>3</td>
<td>GND/NC</td>
</tr>
<tr>
<td>4</td>
<td>VDET</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
</tr>
<tr>
<td>6</td>
<td>VDC</td>
</tr>
<tr>
<td>7</td>
<td>VREF</td>
</tr>
<tr>
<td>8</td>
<td>GND²</td>
</tr>
</tbody>
</table>

² The die backside must be connected to RF, DC and thermal ground.

Power Detector Bare Die
5 - 44 GHz

Electrical Specifications:
Freq. = 5 - 44 GHz, $T_A = +25^\circ$C, $V_{DC} = 4.5$ 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>Input Power</td>
<td>—</td>
<td>dBm</td>
<td>-15</td>
<td>—</td>
<td>+15</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>Vref - Vdet &gt; 5 mV</td>
<td>dB</td>
<td>30</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Vdelta</td>
<td>Vdelta = Vref - Vdet</td>
<td>mV</td>
<td>5</td>
<td>—</td>
<td>2200</td>
</tr>
<tr>
<td>Return Loss</td>
<td>5 - 10 GHz</td>
<td>dB</td>
<td>—</td>
<td>-11</td>
<td>-9</td>
</tr>
<tr>
<td></td>
<td>10 - 12 GHz</td>
<td></td>
<td>-12</td>
<td>-11</td>
<td>-11</td>
</tr>
<tr>
<td></td>
<td>12 - 36 GHz</td>
<td></td>
<td>-12</td>
<td>-12</td>
<td>-9</td>
</tr>
<tr>
<td></td>
<td>36 - 42 GHz</td>
<td></td>
<td>-9</td>
<td>-9</td>
<td>-6.5</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>—</td>
<td>V</td>
<td>—</td>
<td>4.5</td>
<td>—</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>—</td>
<td>µA</td>
<td>60</td>
<td>70</td>
<td>80</td>
</tr>
</tbody>
</table>

3. All specifications refer to CW input signal.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power</td>
<td>18 dBm</td>
</tr>
<tr>
<td>VDC</td>
<td>6 V</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55°C to +85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65°C to +150°C</td>
</tr>
</tbody>
</table>

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

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1B devices.

Application Circuit

6. External 27 kΩ resistors are required for optimum performance.
7. Typical Vref = 0.83V
8. Attach bare die to PCB or carrier using conductive epoxy
Power Detector Bare Die
5 - 44 GHz

Typical Performance Curves

Vdelta vs. Input Power, 5 - 10 GHz

Vdelta vs. Input Power, 11 - 17 GHz

Vdelta vs. Input Power, 18 - 24 GHz

Vdelta vs. Input Power, 25 - 31 GHz

Vdelta vs. Input Power, 32 - 38 GHz

Vdelta vs. Input Power, 39 - 44 GHz

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Typical Performance Curves

V\_delta vs. Temperature, 5 GHz

V\_delta vs. Temperature, 15 GHz

V\_delta vs. Temperature, 23 GHz

V\_delta vs. Temperature, 30 GHz

V\_delta vs. Temperature, 38 GHz

V\_delta vs. Temperature, 44 GHz

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Power Detector Bare Die
5 - 44 GHz

Typical Performance Curves

V_{delta} vs. Frequency, P_{IN} = -15 dBm

V_{delta} vs. Frequency, P_{IN} = 0 dBm

V_{delta} vs. Frequency, P_{IN} = +15 dBm

Input Return Loss vs. Frequency

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DC-0012069
Power Detector Bare Die
5 - 44 GHz

Outline Drawing

Notes:
All units are in microns, unless otherwise noted, with a tolerance of ±5 µm.
Die thickness is 100 ±10 µm
RF bond-pad is 100 × 200 µm.
All other bond-pads are 100 × 100 µm.