**Product Features**

- High P1dB Output Power: +22 dBm
- High Gain: 17 dB
- Low Noise Figure: 2.5 dB
- DC Supply: +8 V @ 160 mA
- 50 Ohm Matched Input/Output
- Die size: 2.97 x 1.54 x 0.1 mm

**Applications**

- Test Instrumentation
- Microwave Radio
- Driver Amplifier
- Fiber Optics
- Compatible with Both Epoxy and Eutectic Die Attachment

**General Description**

The TM5010 is a GaAs MMIC medium power amplifier which operates from DC to 20 GHz. The amplifier delivers 17 dB of gain with a corresponding output 1 dB compression point of +22 dBm and a noise figure of 2.5 dB. The TM5010 is a 50 ohm matched design which eliminates the need for RF port matching. The die is 4 mil thick and the backside is plated for simultaneous RF and DC ground.

**Functional Diagram**

![Functional Diagram](image)

**Electrical Specifications, VDD = 8.0 V, VGG2 = 1.5V, T_A = 25 °C**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>DC</td>
<td>10</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>GHz</td>
</tr>
<tr>
<td>Gain</td>
<td>18</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>-25</td>
<td>-15</td>
<td>-20</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>-17</td>
<td>-20</td>
<td>-20</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Output P1dB</td>
<td>22.5</td>
<td>21.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dBm</td>
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<tr>
<td>Saturated Output Power</td>
<td>24</td>
<td>23.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dBm</td>
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<tr>
<td>Output Third Order Intercept (OIP 3)</td>
<td>33</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Noise Figure (NF)</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Supply Current</td>
<td>160</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mA</td>
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</table>
Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-65 to 150 °C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55 to 85 °C</td>
</tr>
<tr>
<td>Drain Voltage</td>
<td>+9 V</td>
</tr>
<tr>
<td>Gate Voltage VGG1</td>
<td>-2 to 0 V</td>
</tr>
<tr>
<td>Gate Voltage VGG2</td>
<td>VDD-8 to VDD</td>
</tr>
<tr>
<td>Channel Temperature</td>
<td>175 °C</td>
</tr>
<tr>
<td>Thermal Resistance (Channel to die bottom)</td>
<td>31 °C/W</td>
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</table>

Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>VDD</td>
<td>8</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>IDD</td>
<td>160</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>VGG2</td>
<td>1.5</td>
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<td>V</td>
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</tbody>
</table>

ATTENTION ELECTROSTATIC SENSITIVE DEVICE

Gain & Return Loss

Output Power

NF over Temperature
## Pin Description

<table>
<thead>
<tr>
<th>Pad</th>
<th>Function</th>
<th>Description</th>
<th>Interface Schematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RFIN</td>
<td>50 Ohm matched and DC coupled input</td>
<td><img src="image1" alt="Interface Schematic" /></td>
</tr>
<tr>
<td>2</td>
<td>VGG2</td>
<td>Gate control 2 for amplifier. Recommended voltage is 1.5V</td>
<td><img src="image2" alt="Interface Schematic" /></td>
</tr>
<tr>
<td>3, 4</td>
<td>ACG1, ACG2</td>
<td>Low frequency AC ground termination. Attach bypass capacitor per application circuit.</td>
<td><img src="image3" alt="Interface Schematic" /></td>
</tr>
<tr>
<td>5</td>
<td>RFOUT &amp; VDD</td>
<td>50 Ohm matched output and supply voltage. External bias-T required per application circuit.</td>
<td><img src="image4" alt="Interface Schematic" /></td>
</tr>
<tr>
<td>6, 7</td>
<td>ACG3, ACG4</td>
<td>Low frequency AC ground termination. Attach bypass capacitor per application circuit.</td>
<td><img src="image5" alt="Interface Schematic" /></td>
</tr>
<tr>
<td>8</td>
<td>VGG1</td>
<td>Gate control 1 for amplifier. Adjust this voltage for the desired IDD.</td>
<td><img src="image6" alt="Interface Schematic" /></td>
</tr>
</tbody>
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