**High Directivity**  
**Monolithic Amplifier**  
0.5-2.5 GHz

**Product Features**
- 3V & 5V operation  
- no external biasing circuit required  
- internal DC blocking at RF input and output  
- high directivity, 20 dB typ.  
- wide bandwidth, 0.5 to 2.5 GHz  
- low noise figure, 5.5 dB typ.  
- output power, up to +18.2 dBm typ.  
- low cost

**Typical Applications**
- buffer amplifier  
- cellular  
- PCN

**General Description**
VNA-25+ is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in an 8-lead SOIC package. VNA-25+ is fabricated using GaAs MESFET technology. Expected MTBF at 85°C case temperature is 40,000 years at 2.8V, 2,000 at 5V.

**Pin Description**

<table>
<thead>
<tr>
<th>Function</th>
<th>Pin Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF IN</td>
<td>3</td>
<td>RF input pin.</td>
</tr>
<tr>
<td>RF OUT</td>
<td>6</td>
<td>RF output pin.</td>
</tr>
<tr>
<td>DC</td>
<td>1</td>
<td>Bias pin</td>
</tr>
<tr>
<td>GND</td>
<td>2, 4, 5, 7, 8</td>
<td>Connections to ground. Use via holes as shown in “Suggested Layout for PCB Design” to reduce ground path inductance for best performance.</td>
</tr>
</tbody>
</table>

Notes
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### Monolithic MMIC Amplifier

#### VNA-25+

**Electrical Specifications at 25°C**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range at DC Volts</td>
<td>0.5</td>
<td>2.5</td>
<td></td>
<td>GHz</td>
</tr>
<tr>
<td>Gain</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>f=0.5 GHz</td>
<td>15.5</td>
<td>14.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f=1.0 GHz</td>
<td>18.0</td>
<td>16.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f=1.5 GHz</td>
<td>18.6</td>
<td>17.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f=2.0 GHz</td>
<td>17.8</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f=2.5 GHz</td>
<td>16</td>
<td>15.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Return Loss</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>f=0.75 to 2.5 GHz</td>
<td>14</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Return Loss</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>f=0.75 to 2.5 GHz</td>
<td>12.5</td>
<td>12.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Power @ 1 dB compression</td>
<td></td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>f=0.5 to 2.5 GHz</td>
<td>18.2</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output IP3</td>
<td></td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>f=0.5 to 2.5 GHz</td>
<td>29</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise Figure</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>f=0.5 to 2.5 GHz</td>
<td>5.5</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directivity (Isolation-Gain)</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>f=0.5 to 2.5 GHz</td>
<td>18-24</td>
<td>16-25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC Current</td>
<td></td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Thermal Resistance, junction-to-case</td>
<td></td>
<td></td>
<td></td>
<td>°C/W</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>80</td>
<td>105</td>
<td></td>
</tr>
</tbody>
</table>

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40°C to 85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55°C to 150°C</td>
</tr>
<tr>
<td>DC Voltage</td>
<td>+7V, -1.0V reverse</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>1000mW</td>
</tr>
<tr>
<td>Input Power</td>
<td>10dBm</td>
</tr>
</tbody>
</table>

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Monolithic MMIC Amplifier

Product Marking

MCL 25
(pin1)

Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs, s-parameter data set (.zip file)

Case Style: XX211-1
VNA-25+: Plastic molded, 8-lead SOIC, lead finish: Tin Plate

Tape & Reel: F16
7" reels with 20, 50, 100, 200, 500 or 1K devices.
13" reel with 2.5K devices.

Suggested Layout for PCB Design: PL-077

Evaluation Board: TB-01

Environmental Ratings: ENV08T1

Recommended Application Circuit

![Recommended Application Circuit Diagram]

\[ C_b = 100pF \text{ to } 10 \text{nF} \]

Test Board includes case, connectors, and components (in bold) soldered to PCB.
Monolithic MMIC Amplifier

ESD Rating

Human Body Model (HBM): Class 1A (250 v to < 500 v) in accordance with ANSI/ESD STM 5.1 - 2001

Charged Device Model (CDM): Class III (500 v to 1000v) in accordance with JESD22-C101A

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC-J-STD-020C

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Required</th>
<th>Condition</th>
<th>Standard</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visual Inspection</td>
<td>Low Power Microscope Magnification 40x</td>
<td>MIP-IN-0003 (MCT spec)</td>
<td>10 units</td>
</tr>
<tr>
<td>2</td>
<td>Electrical Test</td>
<td>Room Temperature</td>
<td>SCD (MCL spec)</td>
<td>10 units</td>
</tr>
<tr>
<td>3</td>
<td>SAM Analysis</td>
<td>Less than 10% growth in term of delamination</td>
<td>J-Std-020C (Jedec Standard)</td>
<td>10 units</td>
</tr>
<tr>
<td>4</td>
<td>Moisture Sensitivity</td>
<td>Bake at 125°C for 24 hours Soak at 85°C/85%RH for 168 hours Reflow 3 cycles at 260°C peak</td>
<td>J-Std-020C (Jedec Standard)</td>
<td>10 units</td>
</tr>
</tbody>
</table>

MSL Test Flow Chart

- Start
- Visual Inspection
- Electrical Test
- SAM Analysis
- Reflow 3 cycles, 260°C
- Soak 85°C/85%RH 168 hours
- Bake at 125°C, 24 hours

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