75 Ω, 5 V RF Amplifier
50 - 2700 MHz

Features
- Low Power Consumption: 5 V, 85 mA.
- 16 dB Flat Gain: 50 MHz - 2700 MHz
- Low Noise: 2.7 dB
- Power Down Control: I_{DD} < 4 mA
- Current Adjust
- Low Distortion Performance
- Lead-Free 2 mm PDFN-8LD Plastic Package
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant

Description
The MAAM-011117 provides high gain, low noise and low distortion amplification for 75 Ω customer premises equipment (CPE).

The MAAM-011117 incorporates a power-down function to reduce the overall current consumption to less than 4 mA for standby operation.

The MAAM-011117 is packaged in a 2 mm 8-lead package and requires a minimal number of off-chip components resulting in a highly integrated low cost solution.

Ordering Information¹,²

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAM-011117-TR3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MAAM-011117-001SMB</td>
<td>Sample Board</td>
</tr>
</tbody>
</table>

¹. Reference Application Note M513 for reel size information.
². All sample boards include 5 loose parts.

Functional Schematic

Pin Configuration³

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I_{ADJ}</td>
<td>Current Control</td>
</tr>
<tr>
<td>2</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>3</td>
<td>V_{CTRL}</td>
<td>Power Down LO: 0 V; HI: 3.3 V</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>RF_{IN}</td>
<td>RF Input (75 Ω)</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>RF_{OUT}</td>
<td>RF Output (75 Ω)</td>
</tr>
<tr>
<td>9</td>
<td>Paddle</td>
<td>RF and DC Ground</td>
</tr>
</tbody>
</table>

³. MACOM recommends connecting unused package pins to ground.
⁴. The exposed pad centered on the package bottom must be connected to RF and DC ground.

75 Ω, 5 V RF Amplifier
50 - 2700 MHz

Electrical Specifications: \( T_A = 25^\circ C, \) Freq: 50 - 2700 MHz, \( V_{DD} = +5 \) Volts, \( Z_0 = 75 \) 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>Gain</td>
<td>—</td>
<td>dB</td>
<td>14.7</td>
<td>16</td>
<td>17.2</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>50 MHz - 1.2 GHz, 1.2 GHz - 2.7 GHz</td>
<td>dB</td>
<td>—</td>
<td>2.7</td>
<td>—</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>—</td>
<td>dB</td>
<td>—</td>
<td>3.0</td>
<td>—</td>
</tr>
<tr>
<td>Reverse Isolation</td>
<td>—</td>
<td>dB</td>
<td>—</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>—</td>
<td>dB</td>
<td>—</td>
<td>12</td>
<td>—</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>—</td>
<td>dB</td>
<td>—</td>
<td>16</td>
<td>—</td>
</tr>
<tr>
<td>Output IP2(^5)</td>
<td>Swept frequency: 50 MHz - 870 GHz, IM Tone at 100 MHz</td>
<td>dBm</td>
<td>—</td>
<td>58</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Input tones at 2.5 GHz and 2.6 GHz, IM Tone at 100 MHz</td>
<td>dBm</td>
<td>—</td>
<td>45</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Input tones at 1.0 GHz and 1.1 GHz, Input Power = -15 dBm, Output tone 2.1 GHz</td>
<td>dBm</td>
<td>—</td>
<td>50</td>
<td>—</td>
</tr>
<tr>
<td>Output IP3(^5)</td>
<td>Swept frequency from 50 MHz - 870 MHz, Swept frequency from 870 MHz - 2 GHz, Swept frequency from 2.0 - 2.7 GHz</td>
<td>dBm</td>
<td>—</td>
<td>35</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>79 Channels, +15 dBmV / Channel at I/P</td>
<td>dBc</td>
<td>—</td>
<td>-75</td>
<td>—</td>
</tr>
<tr>
<td>Composite Triple Beat, CTB</td>
<td>79 Channels, +15 dBmV / Channel at I/P</td>
<td>dBc</td>
<td>—</td>
<td>-65</td>
<td>—</td>
</tr>
<tr>
<td>Composite Second Order, CSO</td>
<td>79 Channels, +15 dBmV / Channel at I/P</td>
<td>dBc</td>
<td>—</td>
<td>-65</td>
<td>—</td>
</tr>
<tr>
<td>Cross Modulation, XMOD</td>
<td>79 Channels, +15 dBmV / Channel at I/P</td>
<td>dBc</td>
<td>—</td>
<td>-65</td>
<td>—</td>
</tr>
<tr>
<td>Output P1dB</td>
<td>Power Up: ( V_{DD} = 5 ) V, ( V_{CTRL} = 3.3 ) V</td>
<td>dBm</td>
<td>—</td>
<td>19.5</td>
<td>—</td>
</tr>
<tr>
<td>( I_{DD} )</td>
<td>Power Down: ( V_{DD} = 5 ) V, ( V_{CTRL} = 0 ) V</td>
<td>mA</td>
<td>—</td>
<td>85</td>
<td>105</td>
</tr>
</tbody>
</table>

5. Measured with two tones, 100 MHz spacing, -15 dBm input power per tone.

\( V_{CTRL} \) Logic Voltages (\( V_{DD} = +5 \) V)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{CTRL} ) Logic Low</td>
<td>V</td>
<td>-0.5</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>( V_{CTRL} ) Logic High</td>
<td>V</td>
<td>1.2</td>
<td>3.3</td>
<td>3.47</td>
</tr>
<tr>
<td>( I_{CTRL} ) Logic Low</td>
<td>mA</td>
<td>-0.5</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>( I_{CTRL} ) Logic High</td>
<td>mA</td>
<td>-0.5</td>
<td>—</td>
<td>1</td>
</tr>
</tbody>
</table>

Handling Procedure - Static Sensitivity
Gallium Arsenide Integrated Circuits 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 0A, CDM Class II devices.

Absolute Maximum Ratings\(^6,7,8\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power</td>
<td>7 dBm</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>10 volts</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>

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.
8. Junction Temperature (\( T_J \)) = \( T_C + \Theta_{jc} \times (V \times I) \)
   Typical thermal resistance (\( \Theta_{jc} \)) = 73° CW.
   a) For \( T_C = +25°C, \)
      \( T_J = 57°C @ 5 \) V, 85 mA
   b) For \( T_C = +85°C, \)
      \( T_J = 117°C @ 5 \) V, 85 mA

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

Schematic Including Off-Chip Components

PCB Land Pattern

Parts List

Component | Value | Package
--- | --- | ---
C1 - C3 | 10 nF | 0402
C4 | 220 pF | 0402
C5 | 0.7 pF | 0402
C6 | 0.2 pF | 0402
C7 | 100 nF | 0603
C8 | 1 µF | 0603
R1 | 510 Ω | 0402
R2 | 510 kΩ | 0402
L1 | Ferrite Bead | 0402
L2 | 3.0 nH | 0402
L3 | 3.3 nH | 0402

9. Ferrite Bead from Murata, part number BLM15HD182SN.
Typical Performance Curves: $V_{DD} = +5 \text{ V}; I_{DD} = 85 \text{ mA}$, Power-Up Mode

**Gain to 2.7 GHz**

- $+25 \degree C$
- $-40 \degree C$
- $+85 \degree C$

**Gain to 5 GHz**

- $+25 \degree C$
- $-40 \degree C$
- $+85 \degree C$

**Input Return Loss**

- $+25 \degree C$
- $-40 \degree C$
- $+85 \degree C$

**Output Return Loss**

- $+25 \degree C$
- $-40 \degree C$
- $+85 \degree C$

**Noise Figure**

- $+25 \degree C$
- $-40 \degree C$
- $+85 \degree C$

**Reverse Isolation**

- $+25 \degree C$
- $-40 \degree C$
- $+85 \degree C$
Typical Performance Curves: $V_{DD} = +5 \text{ V}; I_{DD} = 85 \text{ mA}$, Power-Up Mode

**CSO Lower**

79ch, +15 dBmV/ch Flat Input Power

**CSO Upper**

79ch, +15 dBmV/ch Flat Input Power

**CTB**

79ch, +15 dBmV/ch Flat Input Power

**Cross Modulation**

79ch, +15 dBmV/ch Flat Input Power

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**Lead Free 2 mm 8-lead PDFN†**

† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.
Reference JEDEC MO-229 for additional dimensional and tolerance information
All dimensions shown as in/mm
MAAM-011117

75 Ω, 5 V RF Amplifier
50 - 2700 MHz

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