Features

- Low Distortion
- Low Noise Figure
- Push Pull Design
- Single Positive Supply
- Lead-Free 4 mm 20-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MAAMSS0003

Description

M/A-COM’s MAAMSS0067 is a GaAs PHEMT MMIC amplifier in a lead-free 4 mm 20-lead PQFN package. The MMIC design is configured as a pair of cascode PHEMT amplifiers for broadband performance. It is designed for integration in a 75-ohm push-pull, low distortion, amplifier circuit. The device is ideally suited for use in CATV, DBS, and HDTV applications where low noise figure and low distortion are required.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAMSS0067</td>
<td>Bulk Packaging</td>
</tr>
<tr>
<td>MAAMSS0067TR-3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MAAMSS0067SMB</td>
<td>Sample Test Board</td>
</tr>
<tr>
<td></td>
<td>(Includes 5 Samples)</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power</td>
<td>+20 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>

2. Exceeding any one or combination of these limits may cause permanent damage to this device.
3. M/A-COM does not recommend sustained operation near these survivability limits.

Functional Schematic

![Functional Schematic]( Functional Schematic Image )

Pin Configuration

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>3</td>
<td>FB1</td>
<td>Feedback 1</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>6</td>
<td>RI1</td>
<td>RF Input 1</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>10</td>
<td>RI2</td>
<td>RF Input 2</td>
</tr>
<tr>
<td>11</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>12</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>13</td>
<td>FB2</td>
<td>Feedback 2</td>
</tr>
<tr>
<td>14</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>15</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>16</td>
<td>RO2</td>
<td>RF Output 2</td>
</tr>
<tr>
<td>17</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>18</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>19</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>20</td>
<td>RO1</td>
<td>RF Output 1</td>
</tr>
</tbody>
</table>

4. The exposed pad centered on the package bottom must be connected to RF and DC ground.

MAAMSS0067

Low Noise CATV Amplifier
50 - 1000 MHz

Electrical Specifications:  \( T_A = 25^\circ C, \text{Freq: 50 - 1000 MHz, V}_{DD} = +5 \text{ Volts, } Z_0 = 75 \text{ ohms} \)

Test Circuit with M/A-COM Balun ETN1-1-13

<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>11.5</td>
<td>12.2</td>
<td>13.0</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td></td>
<td>dB</td>
<td>—</td>
<td>0.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Noise Figure</td>
<td></td>
<td>dB</td>
<td>—</td>
<td>3.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Input VSWR</td>
<td></td>
<td>Ratio</td>
<td>—</td>
<td>1.3:1</td>
<td>—</td>
</tr>
<tr>
<td>Output VSWR</td>
<td></td>
<td>Ratio</td>
<td>—</td>
<td>1.5:1</td>
<td>—</td>
</tr>
<tr>
<td>Output IP3</td>
<td>Two tones at 397 &amp; 403 MHz, +4 dBm output per tone</td>
<td>dBm</td>
<td>—</td>
<td>32</td>
<td>—</td>
</tr>
<tr>
<td>Composite Triple Beat, CTB</td>
<td>135 Channels, +13 dBm/V/Channel at the input</td>
<td>dBC</td>
<td>—</td>
<td>-78</td>
<td>-70</td>
</tr>
<tr>
<td>Composite Second Order, CSO</td>
<td>135 Channels, +13 dBm/V/Channel at the input</td>
<td>dBC</td>
<td>—</td>
<td>-78</td>
<td>-70</td>
</tr>
<tr>
<td>Cross modulation</td>
<td></td>
<td>dBC</td>
<td>—</td>
<td>-73</td>
<td>-64</td>
</tr>
<tr>
<td>P1dB</td>
<td>400 MHz</td>
<td>dBm</td>
<td>—</td>
<td>24</td>
<td>—</td>
</tr>
<tr>
<td>( I_{DD} )</td>
<td>+5 Volts</td>
<td>mA</td>
<td>—</td>
<td>190</td>
<td>225</td>
</tr>
</tbody>
</table>

Test Circuit Schematic

5. The 1:1 baluns, T1 & T2, are M/A-COM part number ETN1-1-13.

Recommended Test Circuit Layout

6. Reference M/A-COM Application Note S2083 for recommended PCB configuration. R1 and R2 are 0 ohms.

External Circuitry Parts List

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Capacitor, 0.01 uF, 0603, SMT, 10% (C1-C8)</td>
</tr>
<tr>
<td>2</td>
<td>Capacitor, 2 pF, 0402, SMT, ± 0.25pF (C9-C10)</td>
</tr>
<tr>
<td>2</td>
<td>Inductor, 390 nH, 1008, SMT, 10% (L1, L2)</td>
</tr>
<tr>
<td>2</td>
<td>Balun, 1:1, M/A-COM, ETN1-1-13, SMT (T1,T2)</td>
</tr>
<tr>
<td>2</td>
<td>Resistor, 0 ohms, 0603, SMT (R1, R2)</td>
</tr>
</tbody>
</table>

Handling Procedures

Please observe the following precautions to avoid damage:

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 devices.
Low Noise CATV Amplifier
50 - 1000 MHz

Typical Performance Curves

**Gain**

![Gain vs. Frequency to 3 GHz](image)

**Input Return Loss**

![Input Return Loss](image)

**Output Return Loss**

![Output Return Loss](image)

**OIP3 vs. Pin at 400 MHz, 25°C**

![OIP3 vs. Pin at 400 MHz, 25°C](image)

**Noise Figure vs. Frequency, 25°C**

![Noise Figure vs. Frequency, 25°C](image)
Typical Performance Curves (continued)

Gain vs $P_{\text{OUT}}$ at 400 MHz

![Gain vs P_OUT at 400 MHz graph]

Lead-Free 4 mm 20-lead PQFN†

† Reference Application Note M538 for lead-free solder reflow recommendations. Meets JEDEC moisture sensitivity level 1 requirements.
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