Low Noise Amplifier
1.5 - 1.6 GHz

Features
- Low Noise Figure: 1.55 dB
- High Gain: 21 dB
- Low Power Consumption: 3 to 5 V, 8 mA
- High Dynamic Range
- DC Decoupled RF Input and Output
- No External RF Tuning Elements Necessary
- Lead-Free SOIC-8 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MAAM12021

Description
M/A-COM’s MAALSS0044 is a high performance GaAs MMIC low noise amplifier in a lead-free SOIC-8 surface mount package. The MAALSS0044 employs a fully monolithic design which eliminates the need for external tuning networks. It can be biased using 3- or 5-volt supplies and has an option for biasing at higher currents for increased dynamic range.

The MAALSS0044 is ideally suited for use where low noise figure, high gain, high dynamic range and low power consumption are required. Typical applications include receiver front ends in the Global Positioning System (GPS) and Japanese Personal Digital Cellular (PDC-1500) markets, as well as standard gain blocks, buffer amps, driver amps and IF amps in both fixed and portable systems.

M/A-COM’s MAALSS0044 is fabricated using a mature 0.5-micron gate length GaAs process. The process features full passivation for increased performance reliability.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAALSS0044</td>
<td>Bulk Packaging</td>
</tr>
<tr>
<td>MAALSS0044TR-3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MAALSS0044SMB</td>
<td>Sample Test Board</td>
</tr>
</tbody>
</table>

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

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Electrical Specifications: $T_A = 25^\circ \text{C}$, $V_{DD} = +5 \text{V}$, $Z_0 = 50 \Omega$

<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>1.5 - 1.6 GHz, $P_{IN} = -30 \text{dBm}$</td>
<td>dB</td>
<td>19</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>1.5 - 1.6 GHz</td>
<td>dB</td>
<td>—</td>
<td>1.55</td>
<td>1.9</td>
</tr>
<tr>
<td>Input VSWR</td>
<td>1.5 - 1.6 GHz, $P_{IN} = -30 \text{dBm}$</td>
<td>Ratio</td>
<td>—</td>
<td>1.5:1</td>
<td>—</td>
</tr>
<tr>
<td>Output VSWR</td>
<td>1.5 - 1.6 GHz, $P_{IN} = -30 \text{dBm}$</td>
<td>Ratio</td>
<td>—</td>
<td>1.5:1</td>
<td>—</td>
</tr>
<tr>
<td>Output 1 dB Compression</td>
<td>1.5 - 1.6 GHz</td>
<td>dBm</td>
<td>—</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>Input IP3</td>
<td>1.5 - 1.6 GHz, $P_{IN} = -30 \text{dBm}$</td>
<td>dBm</td>
<td>—</td>
<td>-2</td>
<td>—</td>
</tr>
<tr>
<td>Reverse Isolation</td>
<td>1.5 - 1.6 GHz, $P_{IN} = -30 \text{dBm}$</td>
<td>dB</td>
<td>—</td>
<td>40</td>
<td>—</td>
</tr>
<tr>
<td>Bias Current</td>
<td>—</td>
<td>mA</td>
<td>5</td>
<td>8</td>
<td>11</td>
</tr>
</tbody>
</table>

7. See plots for 3-volt performance.

Component List

<table>
<thead>
<tr>
<th>Part</th>
<th>Value</th>
<th>Case Size</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>500 pF</td>
<td>0603</td>
<td>Murata</td>
</tr>
<tr>
<td>L1</td>
<td>15 nH</td>
<td>0805</td>
<td>Coilcraft</td>
</tr>
<tr>
<td>R1 (optional)</td>
<td>35 to 40 $\Omega$</td>
<td>0603</td>
<td>Panasonic</td>
</tr>
</tbody>
</table>

Recommended PCB Configuration

Application Schematic

8. Pins 1, 4, 5 and 8 must be RF and DC grounded as shown.
9. Pin 3 is the RF input; pin 6 is the RF output. $V_{DD}$ is applied on pin 7. This pin must be bypassed with a 500 pF surface mount MLC capacitor, mounted as close as possible to pin 7, and RF decoupled with a chip inductor having a minimum value of 15 nH (as shown in the Recommended PCB Configuration).
10. Pin 2 allows use of an external resistor to ground for optional, higher current bias. For nominal current operation no resistor is used. For optional 20-mA current operation, connect a 35 to 40 $\Omega$ chip resistor (as shown in the Recommended PCB Configuration).
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Typical Performance Curves

**Gain @ +25°C**

![Gain Graph](image)

**Noise Figure @ +25°C**

![Noise Figure Graph](image)

**VSWR @ 5 V, 8 mA, +25°C**

![VSWR Graph](image)

**Input IP3 @ +25°C**

![Input IP3 Graph](image)

**Gain @ 5 V, 8 mA**

![Gain Graph](image)

**Noise Figure @ 5 V, 8 mA**

![Noise Figure Graph](image)
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.