MAMXSS0013

Low Cost MMIC Mixer
1400 - 2100 MHz

Features
- +12 dBm Input Power @ 1 dB Compression
- High Isolation, 28 dB LO to RF
- +3 to +8 dBm LO Drive Level
- DC - 500 MHz 3 dB IF Bandwidth
- Does not require DC bias
- Lead-Free SOT-25 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MD54-0006

Description
M/A-COM's MAMXSS0013 is a passive mixer that achieves the performance of a double balanced diode mixer in a lead-free SOT-25 package. The MAMXSS0013 is ideally suited for use where high level RF signals and very wide dynamic range are required. Typical applications include frequency up/down conversion, modulation and demodulation in receivers and transmitters for base station and portable systems.

The MAMXSS0013 uses FETs as mixing elements to achieve very wide dynamic range in a low cost plastic package. The mixer operates with LO drive levels of +3 dBm to +8 dBm. The LO port may be externally tuned for operation in various frequency bands.

M/A-COM’s MAMXSS0013 is fabricated using a mature 0.5 micron gate length GaAs MESFET process. The process features full passivation for increased performance and reliability. The MAMXSS0013 is 100% RF tested to ensure performance specification compliance.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAMXSS0013</td>
<td>Bulk Packaging</td>
</tr>
<tr>
<td>MAMXSS0013TR-3000</td>
<td>3000 piece reel</td>
</tr>
<tr>
<td>MAMX-000013-001SMB</td>
<td>Sample Board 1500 MHz</td>
</tr>
<tr>
<td>MAMX-000013-002SMB</td>
<td>Sample Board 1710 MHz</td>
</tr>
<tr>
<td>MAMX-000013-003SMB</td>
<td>Sample Board 2300 MHz</td>
</tr>
</tbody>
</table>

1. Reference Application Note M513 for reel size information.

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Electrical Specifications:
RF = 1850 MHz (-10 dBm), LO = 1710 MHz (+5 dBm), IF = 140 MHz, T_A = 25°C

<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>Conversion Loss</td>
<td>LO to RF, LO to IF, RF to IF</td>
<td>dB</td>
<td>—</td>
<td>8.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Isolation</td>
<td>LO to RF, LO to IF, RF to IF</td>
<td>dB</td>
<td>—</td>
<td>28</td>
<td>—</td>
</tr>
<tr>
<td>VSWR</td>
<td>RF Port, LO Port, IF Port</td>
<td>Ratio</td>
<td>—</td>
<td>2.0:1</td>
<td>—</td>
</tr>
<tr>
<td>Input 1 dB Compression</td>
<td>LO = +5 dBm, RF Freq: 1850 MHz</td>
<td>dBm</td>
<td>—</td>
<td>12</td>
<td>—</td>
</tr>
<tr>
<td>Two-Tone IM Ratio</td>
<td>Two Tones at -10 dBm each, Tone spacing = 100 KHz, IF = 140 MHz</td>
<td>dBc</td>
<td>—</td>
<td>55</td>
<td>—</td>
</tr>
</tbody>
</table>

5. IMR vs. RF drive can be calculated by the formula: IMR = 40 - 1.5*Pin.

Absolute Maximum Ratings:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Input Power</td>
<td>+27 dBm</td>
</tr>
<tr>
<td>LO Drive Power</td>
<td>+27 dBm</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. M/A-COM does not recommend sustained operation near these survivability limits.

Spurious Table

<table>
<thead>
<tr>
<th>Harmonic of LO</th>
<th>Harmonic of RF</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x</td>
<td>8.1</td>
</tr>
<tr>
<td>3x</td>
<td>10.5</td>
</tr>
<tr>
<td>2x</td>
<td>19.0</td>
</tr>
<tr>
<td>1x</td>
<td>44.6</td>
</tr>
<tr>
<td>0x</td>
<td>8.1</td>
</tr>
<tr>
<td>0x</td>
<td>8.1</td>
</tr>
</tbody>
</table>

The spurious table shows the spurious signals resulting from the mixing of the RF and LO input signals, assuming down conversion. Mixing products are indicated relative to the IF. The lower frequency mixing term is shown for two different RF input levels. The top number is for an RF input power of 0 dBm, the lower number is for -10 dBm.

\[
|n_{RF} - m_{LO} |, RF = 0 \text{ dBm}
\]

\[
|n_{RF} - m_{LO} |, RF = -10 \text{ dBm}
\]

RF Frequency = 1850 MHz
LO Frequency = 1710 MHz
Recommended PCB Configuration

The PCB dielectric between RF traces and RF ground layers should be chosen to reduce RF discontinuities between 50 Ohm lines and package pins. M/A-COM recommends an FR-4 dielectric thickness of 0.008" (0.2 mm) yielding a 50 Ohm line width of 0.015" (0.38). The recommended metalization is 1 ounce copper.

Lead-Free SOT-25†

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

- Test Conditions for Down Converter Application: RF = 1850 MHz (-10 dBm), IF = 140 MHz, LO = 1710 MHz (+5 dBm).
- Test Conditions for Up Converter Application: LO = 1710 MHz (+5 dBm), IF = 140 MHz (-10 dBm), RF = 1850 MHz.

Conversion Loss (Up/Down)

VSWR

Two-Tone IMR

Isolation

Wide-

- Test Conditions for Wide-Band Application: RF = -10 dBm, IF = 140 MHz, LO = +11 dBm, LO Port resistively matched. Lower LO drive operation is available for narrow band performance using external reactive matching. The 3 dB IF bandwidth is 500 MHz. IF frequencies above 200 MHz can be optimized for low conversion loss by using external matching components.

Conversion Loss

Two-Tone IMR

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