

Features

- Input Power @ 1 dB Compression: +15 dBm
- High LO to RF Isolation: 35 dB
- LO Drive Level: +3 to +8 dBm
- DC - 200 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 MD54-0005

Description

M/A-COM's MAMXSS0012 is a passive mixer that achieves the performance of a double balanced diode mixer in a lead-free SOT-25 package. The MAMXSS0012 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 MAMXSS0012 employs GaAs FETs as mixing elements to achieve a 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.

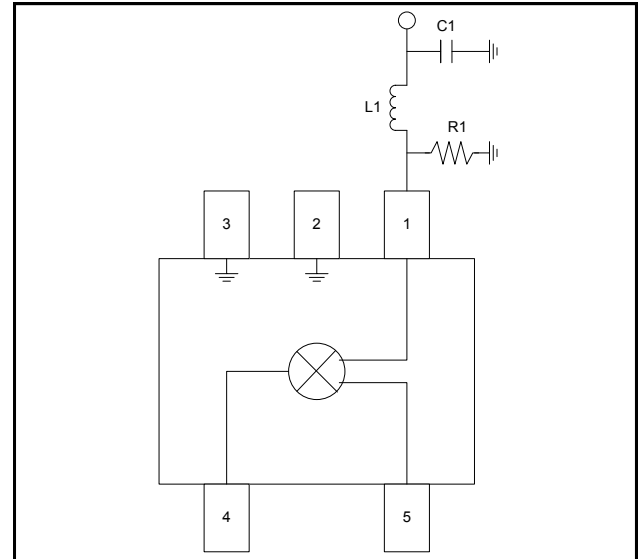
M/A-COM's GaAs IC is fabricated using a mature 0.5 micron gate length GaAs MESFET process. The process features full passivation for increased performance and reliability.

Ordering Information ¹

| Part Number | Package |
|-------------------|-----------------|
| MAMXSS0012 | Bulk Packaging |
| MAMXSS0012TR-3000 | 3000 piece reel |
| MAMXSS0012SMB | Designers Kit |

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1 | LO | 4 | RF |
| 2 | Ground | 5 | IF |
| 3 | Ground | | |

External Circuitry Parts List ²

| Ref. Designation | LO = 840 MHz | LO = 900 MHz |
|------------------|--------------|--------------|
| R1 | 820 Ohms | 820 Ohms |
| L1 | 22 nH | 18 nH |
| C1 | 3.3 pF | 4 pF |

2. All off-chip components are low-cost surface mount components obtainable from multiple sources (0.060 in. x 0.030 in. or 0.080 in. x 0.050 in.).

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

Low Cost MMIC Mixer 800 - 1000 MHz

Rev. V2

Electrical Specifications: RF=900 MHz (-10 dBm), LO=840 MHz (+5 dBm), IF=60 MHz, T_A = 25°C

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|--------------------------------|---|-------|------|-------|------|
| Conversion Loss | — | dB | — | 8.0 | 9.0 |
| Isolation | LO to RF | dB | — | 35 | — |
| | LO to IF | dB | — | 25 | — |
| | RF to IF | dB | — | 20 | — |
| VSWR | RF Port | Ratio | — | 2.0:1 | — |
| | LO Port ² | Ratio | — | 2.0:1 | — |
| | IF Port | Ratio | — | 2.0:1 | — |
| Input 1 dB Compression | RF Freq. = 900 MHz, LO = +5 dBm | dBm | — | 15 | — |
| Two-Tone IM Ratio ⁴ | Two tones at -10 dBm each, Tone spacing = 100 KHz, IF = 60 MHz | dBc | — | 55 | — |

3. With external LO Port matching. See functional schematic.

4. IMR vs. RF Drive can be calculated by the formula: $IMR = 40 - 1.5 * P_{IN}$

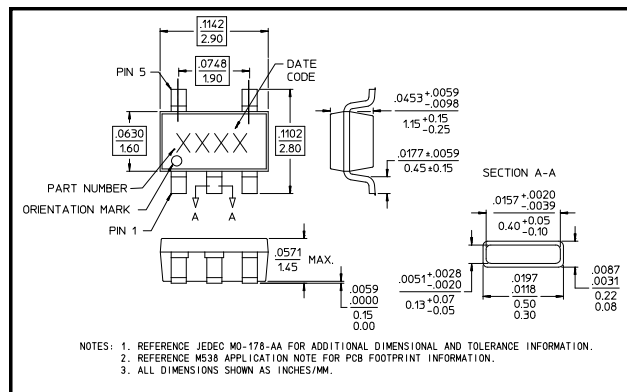
Absolute Maximum Ratings ^{5,6}

| Parameter | Absolute Maximum |
|-----------------------|------------------|
| RF Input Power | +27 dBm |
| Low Drive Power | +27 dBm |
| Storage Temperature | -65°C to +150°C |
| Operating Temperature | -40°C to +85°C |

5. Exceeding any one or combination of these limits may cause permanent damage to this device.

6. M/A-COM does not recommend sustained operation near these survivability limits.

Lead-Free SOT-25 Plastic Package †



† Reference Application Note M538 for lead-free solder reflow recommendations.

Spurious Table

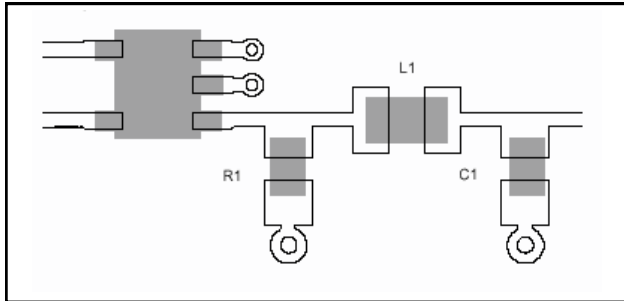
| Harmonic of LO | 4x | 3x | 2x | 1x | 0x |
|----------------|--------------|--------------|--------------|--------------|--------------|
| | 23.0 10.6 | 34.1 21.3 | 17.7 6.6 | 14.3 4.0 | X X |
| 36.5 39.9 | 21.6 21.8 | 44.0 44.8 | 0 0 | 13.9 13.4 | 67.3 57.2 |
| 53.8 56.1 | 53.9 57.6 | 51.6 55.5 | 57.0 57.6 | 50.2 53.1 | 66.2 56.3 |
| 63.8 58.3 | 53.4 59.3 | 65.2 58.4 | 63.7 56.3 | 59.1 56.5 | 67.0 56.9 |
| 67.2 57.1 | 67.2 57.1 | 67.2 57.1 | 67.2 57.1 | 67.2 57.1 | 67.2 57.1 |
| | 0x | 1x | 2x | 3x | 4x |
| Harmonic of RF | | | | | |

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.

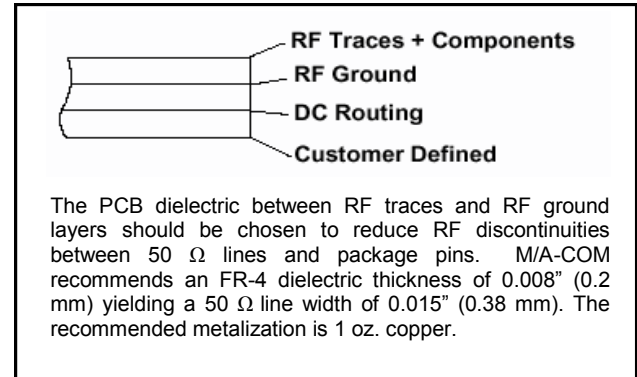
$|nF_{RF} - mF_{LO}|$, RF = 0 dBm
 $|nF_{RF} - mF_{LO}|$, RF = -10 dBm
 RF Frequency = 900 MHz
 LO Frequency = 840 MHz

Recommended PCB Configuration

Layout View



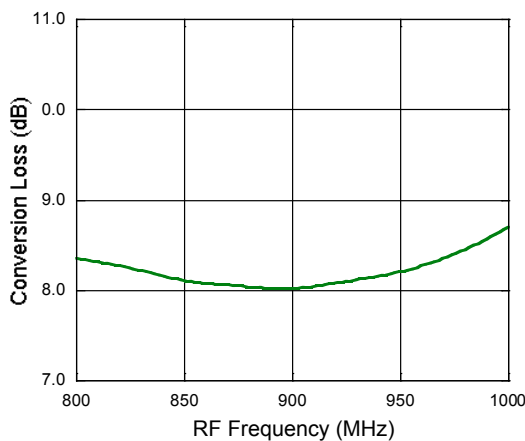
Cross Section View



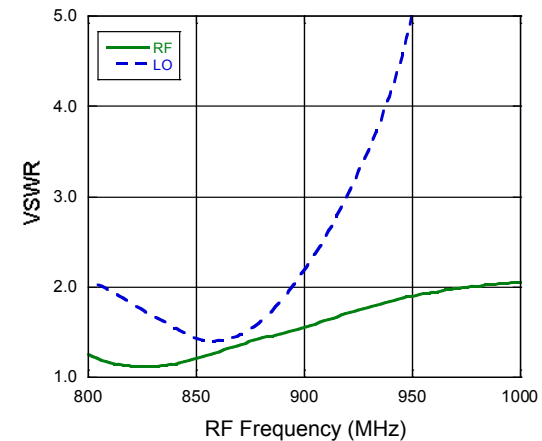
Typical Performance Curves

- **Test Conditions for Down Converter Application:** RF=900 MHz (-10 dBm), IF=60 MHz, LO=840 MHz (+5 dBm), LO Port match shown herein.
- **Test Conditions for Up Converter Application:** LO=840 MHz (+5 dBm), IF=60 MHz (-10 dBm), RF=900 MHz, LO Port match shown herein.

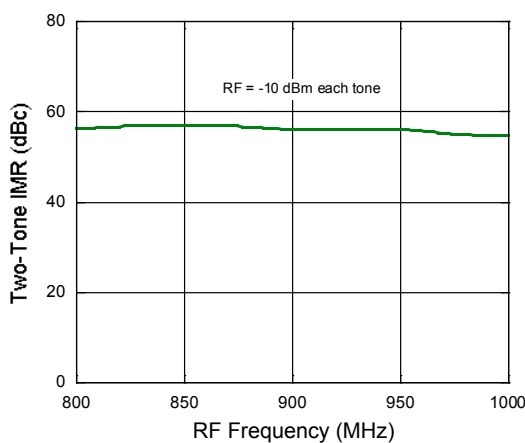
Conversion Loss



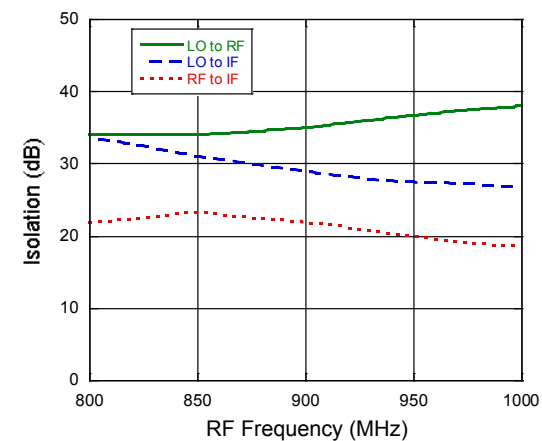
VSWR



Two-Tone IMR



Isolation



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