

**Low Cost MMIC Mixer  
800 - 1000 MHz**

**MAMXSS0012  
V1**

**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.

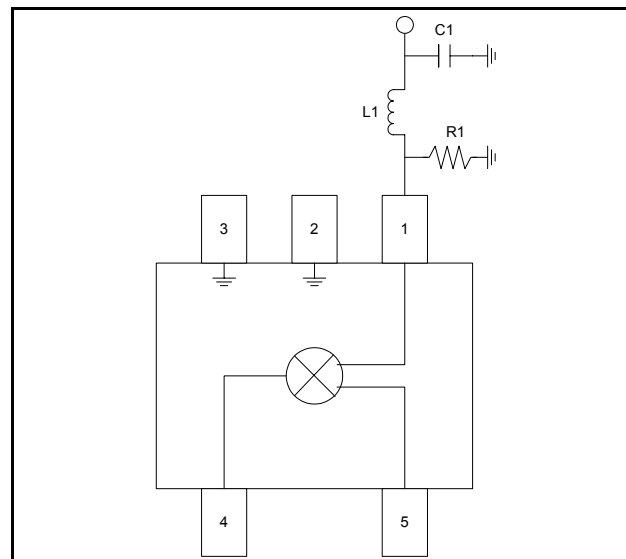
M/A-COM's GaAs IC is fabricated using a mature 0.5 micron gate length GaAs MESFET process. The process features full passivation for increased performance and reliability.

**Ordering Information**

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

Note: 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 <sup>1</sup>**

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

1. 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**

**MAMXSS0012  
V1**

**Electrical Specifications: RF=900 MHz (-10 dBm), LO=840 MHz (+5 dBm), IF=60 MHz, T<sub>A</sub> = 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 <sup>2</sup>  | 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 <sup>3</sup> | Two tones at -10 dBm each,<br>Tone spacing = 100 KHz, IF = 60 MHz | dBc   | —    | 55    | —    |

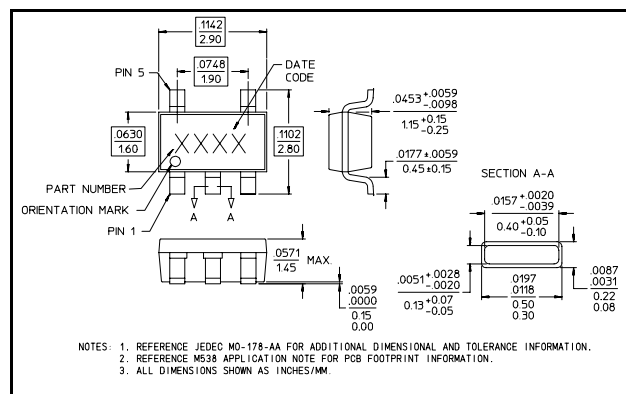
2. With external LO Port matching. See functional schematic.  
3. IMR vs. RF Drive can be calculated by the formula:  $IMR = 40 - 1.5 * P_{IN}$

**Absolute Maximum Ratings<sup>4,5</sup>**

| 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   |

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

**Lead-Free SOT-25 Plastic Package<sup>†</sup>**



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.

**Spurious Table**

| Harmonic of LO |      | Harmonic of RF |           |           |           |           |
|----------------|------|----------------|-----------|-----------|-----------|-----------|
|                |      | 0x             | 1x        | 2x        | 3x        | 4x        |
| 4x             | 23.0 | 36.5           | 53.8      | 63.8      | 68.6      |           |
|                | 10.6 | 39.9           | 56.1      | 58.3      | 58.8      |           |
| 3x             | 34.1 | 21.6           | 53.9      | 53.4      | 67.3      |           |
|                | 21.3 | 21.8           | 57.6      | 59.3      | 57.2      |           |
| 2x             | 17.7 | 44.0           | 51.6      | 65.2      | 66.2      |           |
|                | 6.6  | 44.8           | 55.5      | 58.4      | 56.3      |           |
| 1x             | 14.3 | 0              | 57.0      | 63.7      | 67.0      |           |
|                | 4.0  | 0              | 57.6      | 56.3      | 56.9      |           |
| 0x             | X    | 13.9           | 50.2      | 59.1      | 67.2      |           |
|                | X    | 13.4           | 53.1      | 56.5      | 57.1      |           |
|                |      | <b>0x</b>      | <b>1x</b> | <b>2x</b> | <b>3x</b> | <b>4x</b> |

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.

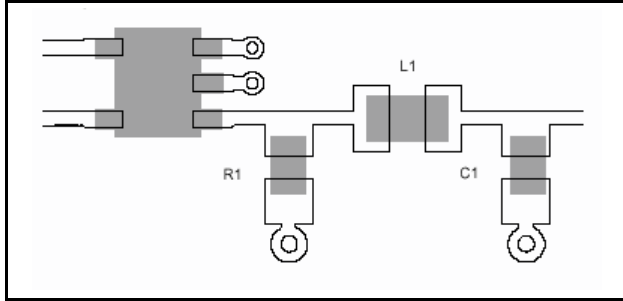
$|nF_{RF} - mF_{LO}|$ , RF = 0 dBm  
 $|nF_{RF} - mF_{LO}|$ , RF = -10 dBm  
 RF Frequency = 900 MHz  
 LO Frequency = 840 MHz

**Low Cost MMIC Mixer  
800 - 1000 MHz**

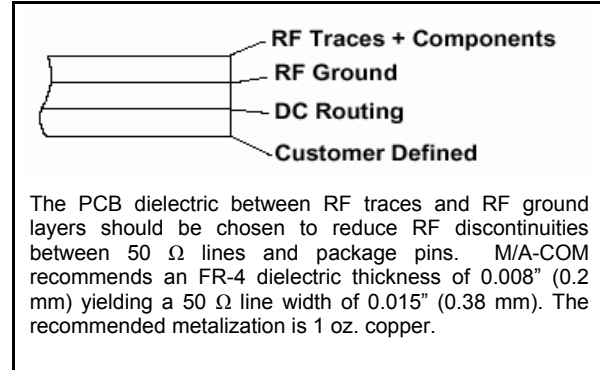
**MAMXSS0012  
V1**

**Recommended PCB Configuration**

**Layout View**



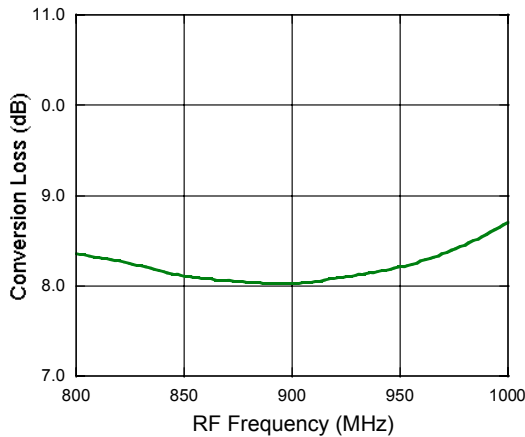
**Cross Section View**



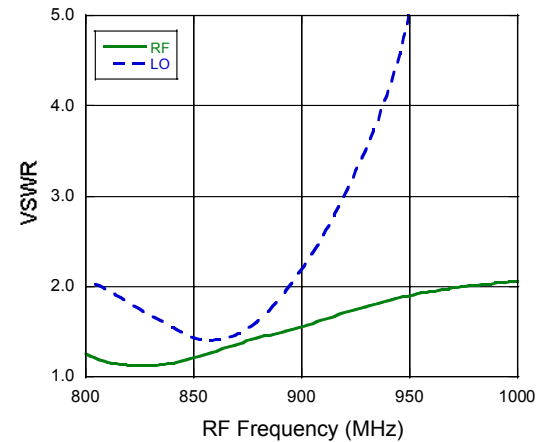
**Typical Performance Curves**

- **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.

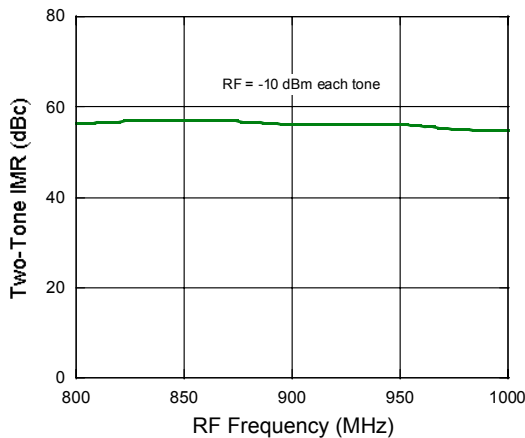
**Conversion Loss**



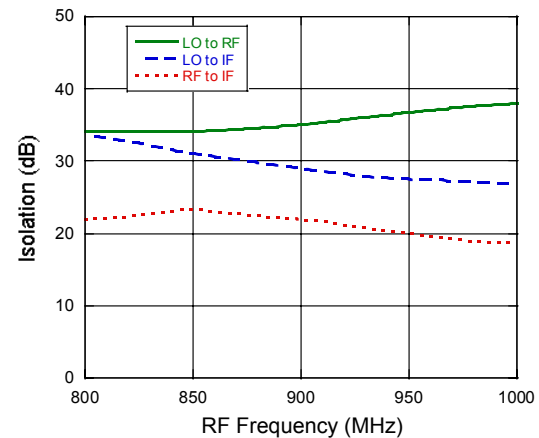
**VSWR**



**Two-Tone IMR**



**Isolation**





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.