

## Features

- Low Conversion Loss
- Input Power @ 1 dB Compression: +21 dBm
- Typical Two-Tone IM Ratio:  $\geq 50$  dBc
- LO Drive Level: +11 to +23 dBm
- DC - 200 MHz IF Bandwidth
- Lead-Free SOIC-8 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of MD54-0003

## Description

M/A-COM's MAMXSS0010 is a passive mixer that achieves the performance of a double balanced diode mixer in a lead-free surface mount plastic SOIC-8 package. The MAMXSS0010 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, demodulation in systems such as base station receivers and transmitters for DCS1800, PCS and PHS applications.

The MAMXSS0010 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 +11 dBm to +23 dBm. No DC bias is required.

M/A-COM's MAMXSS0010 is fabricated using a mature 1-micron GaAs process. The process features full IC passivation for increased performance and reliability.

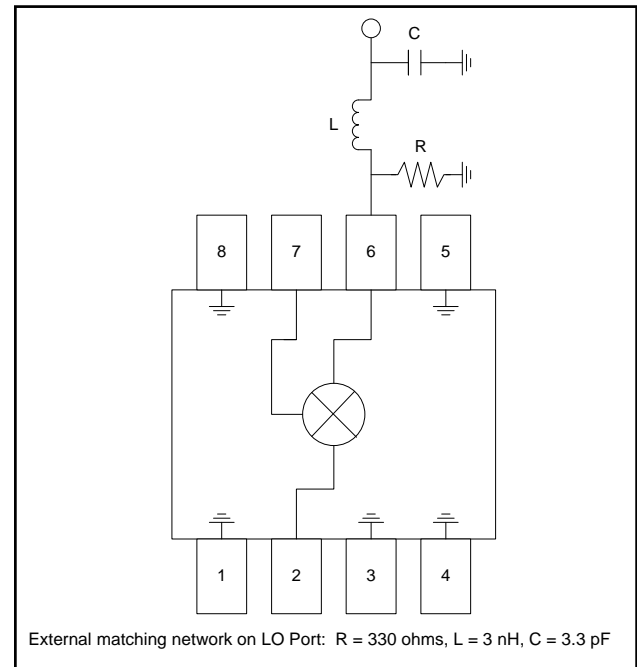
## Ordering Information

| Part Number   | Package         |
|---------------|-----------------|
| MAMXSS0010    | Bulk Packaging  |
| MAMXSS0010TR  | 1000 piece reel |
| MAMXSS0010SMB | Designer's Kit  |

1. Reference Application Note M513 for reel size information.

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

## Functional Diagram



## Pin Configuration

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | Ground   | 5       | Ground   |
| 2       | RF Port  | 6       | LO Port  |
| 3       | Ground   | 7       | IF Port  |
| 4       | Ground   | 8       | Ground   |

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## Electrical Specifications:

Test Conditions: RF = 1850 MHz (-10 dBm), LO = 1710 MHz (13 dBm), IF = 140 MHz, T<sub>A</sub> = +25°C

| Parameter                      | Test Conditions  | Units | Min | Typ   | Max |
|--------------------------------|--|-------|-----|-------|-----|
| Conversion Loss                | —  | dB    | —   | 8.5   | 9.5 |
| Isolation                      | LO to RF   | dB    | —   | 27    | —   |
|                                | LO to IF   | dB    | —   | 12    | —   |
|                                | RF to IF   | dB    | —   | 10    | —   |
| VSWR                           | LO Port  | Ratio | —   | 2.5:1 | —   |
|                                | RF Port  | Ratio | —   | 2.0:1 | —   |
|                                | IF Port  | Ratio | —   | 2.0:1 | —   |
| Input 1 dB Compression         | RF Freq. = 1800 MHz, LO = +13 dBm                                | dBm   | —   | +21   | —   |
| Two-Tone IM Ratio <sup>2</sup> | Two tones at -10 dBm each,<br>Tone spacing 100 kHz, IF = 140 MHz | dBc   | 50  | 65    | —   |

2. IMR vs RF drive level can be calculated by the formula:  $IMR = 50 - (1.5 \times P_{IN})$

## Absolute Maximum Ratings<sup>3,4</sup>

| Parameter                   | Absolute Maximum |
|-----------------------------|------------------|
| RF Input Power <sup>5</sup> | +22 dBm          |
| LO Drive Power <sup>5</sup> | +23 dBm          |
| Operating Temperature       | -40°C to +85°C   |
| Storage Temperature         | -65°C to +150°C  |

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM does not recommend sustained operation near these survivability limits.
- Total combined power for RF and LO ports should not exceed +23 dBm.

## 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.

## Spurious Table

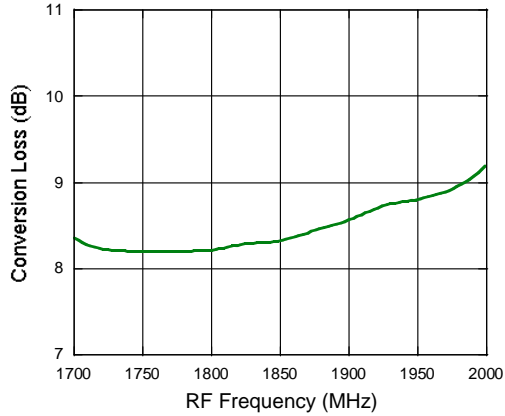
| Harmonic of LO        | 4x | 17<br>6.9      | 48.2<br>47.2  | 62.3<br>61.1 | 71.7<br>61.7 | 73.4<br>63.4 |
|-----------------------|----|----------------|---------------|--------------|--------------|--------------|
|                       | 3x | 10.3<br>0.3    | 28.9<br>28.9  | 63.0<br>61.3 | 71.3<br>63.5 | 70.6<br>61.6 |
|                       | 2x | -8.8<br>-18.8  | -25.7<br>25.9 | 52.1<br>61.3 | 71.5<br>61.5 | 72.1<br>62.1 |
|                       | 1x | -13.1<br>-23.1 | 0<br>0        | 67.5<br>61.1 | 71.3<br>61.9 | 72.6<br>62.6 |
|                       | 0x | X<br>X         | 2.1<br>2.1    | 56.8<br>61.7 | 72.3<br>62.3 | 69.3<br>59.8 |
|                       |    | 0x             | 1x            | 2x           | 3x           | 4x           |
| <b>Harmonic of RF</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 by the number of dB below the conversion loss. The lower frequency mixing term is shown for two different RF input levels. The top number is for an RF input power of -5 dBm, the lower number is for -15 dBm.

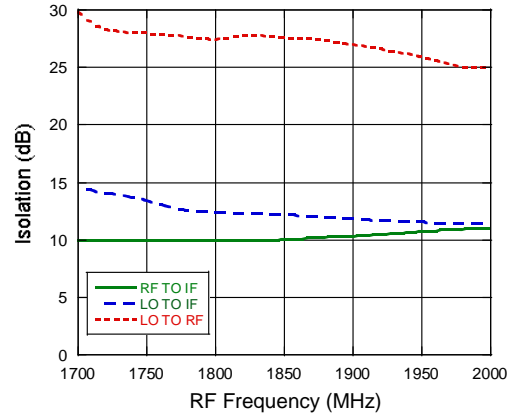
$|m_{RF} - n_{F_{LO}}|$ , RF = -5 dBm  
 $|m_{RF} - n_{F_{LO}}|$ , RF = -15 dBm  
 RF Frequency = 1850 MHz  
 LO Frequency = 1710 MHz

## Typical Performance Curves

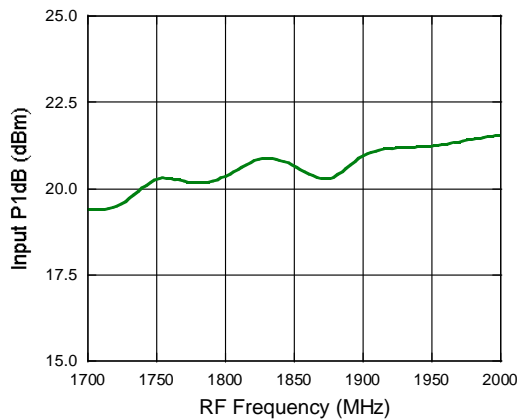
### Conversion Loss



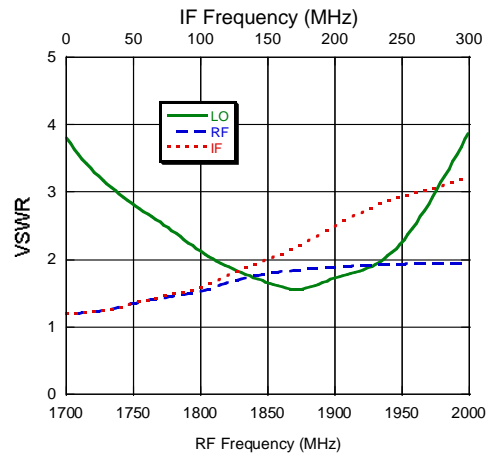
### Isolation



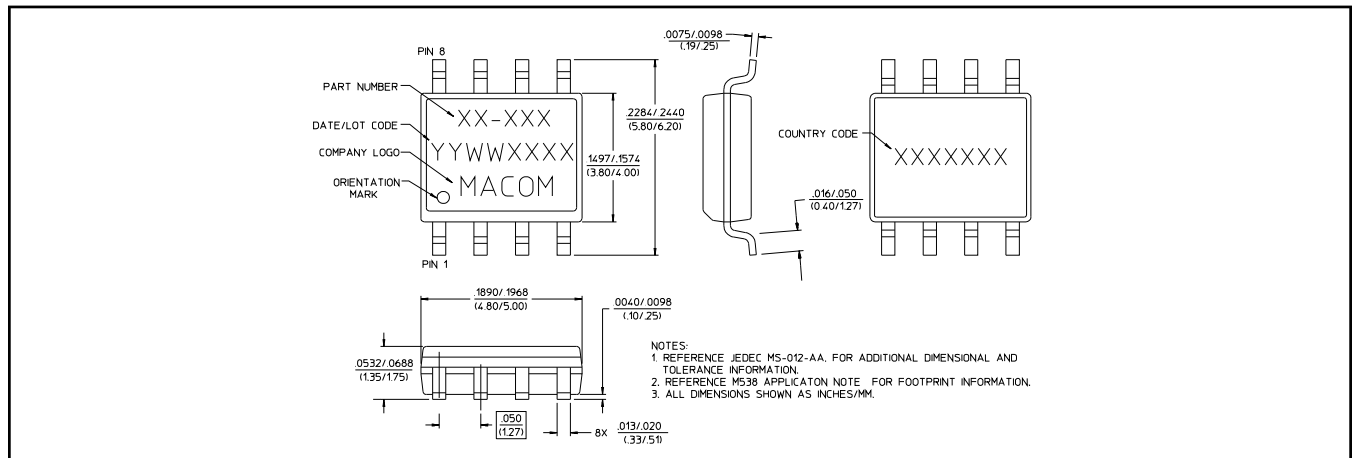
### Input P1dB



### RF, LO and IF VSWR



## Lead-Free SOIC-8†



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

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