

### Features

- -5 to +5 dBm LO Drive Level
- High Isolation, 28 dB LO to RF
- Lead Free SOT-26 package
- Halogen-Free “Green” Mold Compound
- 260°C Re-flow Compatible
- RoHS\* Compliant Version of MD57-0001

### Description

The MAMX-008611 utilizes a patented “floating-FET” mixer architecture with an on-chip LO amplifier allowing it to operate with as little as -5 dBm of LO drive. This makes it an ideal choice for low power portable designs.

The MAMX-008611 is ideally suited for cellular band communications handsets that can provide only minimal amounts of LO drive. Typical applications include frequency up/down conversion and IQ modulation and demodulation in digital receivers and transmitters.

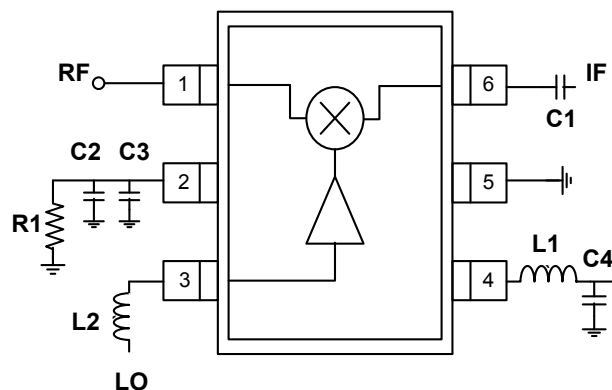
The MAMX-008611 is fabricated using MACOM’s 0.5 micron low noise GaAs MESFET process. This process features full passivation for increased performance and reliability. The device is 100% RF tested to ensure superior performance specification compliance.

### Ordering Information<sup>1</sup>

Part Number	Package
MAMX-008611-000000	SOT-26
MAMX-008611-TR3000	3000 piece reel

1. Reference Application Note M513 for reel size information.

### Functional Schematic



### Pin Configuration

Pin No.	Pin Name	Description
1	RF Port	RF Input / Output
2	Bias	LO Amplifier Bias Resistor
3	LO Port	LO Input
4	V <sub>DD</sub>	LO Amplifier V <sub>DD</sub>
5	GND	Ground
6	IF Port	IF Input / Output

\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

## MMIC Mixer with Local Oscillator Amplifier 0.8 - 1.0 GHz

Rev. V2

**Electrical Specifications<sup>2</sup>:  $T_A = +25^\circ\text{C}$ ,  $V_{DD} = 2.7\text{ V}$ , Typical  $I_{DD} = 5\text{ mA}$ ,  
RF = 900 MHz (-15 dBm), LO = 730 MHz (-5 dBm), IF = 170 MHz**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Conversion Loss	—	dB	—	9.3	11
Isolation	LO to RF LO to IF RF to IF	dB	20 10 —	28 12 20	—
VSWR	RF Port LO Port IF Port	Ratio	—	2.0:1 2.0:1 2.0:1	—
Input 1 dB Compression	RF Freq = 900 MHz, LO = -5 dBm	dBm	—	14	—
Two Tone IM Ratio	Two tones @ -10 dBm each; Two spacing = 1 MHz, IF = 170 MHz	dBc	—	59	—

2. IMR vs. RF drive can be calculated by the formula:  $\text{IMR} = [44 - 1.5 (\text{PIN})]$

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

Parameter	Absolute Maximum
Input RF/IF Power <sup>5</sup>	27 dBm
Input LO Power <sup>5</sup>	17 dBm
Operating Voltages <sup>5</sup>	$V_{DD} = 6\text{ V}$
Operating Temperature	$-30^\circ\text{C}$ to $+80^\circ\text{C}$
Storing Temperature	$-65^\circ\text{C}$ to $+150^\circ\text{C}$

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.
- Typical Thermal Resistance ( $\theta_{jc}$ ) =  $108^\circ\text{C/W}$  at nominal bias.

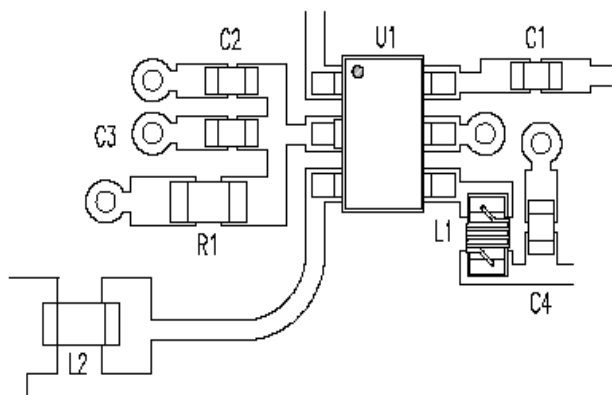
### Spurious Table<sup>6,7,8,9</sup>

LO Harmonic (n)		RF Harmonic (m)				
		0X	1X	2X	3X	4X
0X	-10 dBm	X	4.1	44.9	69.5	79.7
	0 dBm	X	3.9	31.9	48.4	70.0
1X	-10 dBm	13.8	0	47.6	82.0	76.6
	0 dBm	22.9	0	35.1	73.0	83.8
2X	-10 dBm	10.8	18.9	46.5	70.6	78.0
	0 dBm	20.4	18.9	36.6	55.9	84.0
3X	-10 dBm	12.1	23.8	41.5	76.9	77.1
	0 dBm	22.7	23.8	31.0	63.1	74.0
4X	-10 dBm	13.6	50.9	68.5	64.5	80.6
	0 dBm	24.0	49.4	58.9	45.4	63.4

- 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 level.
- The lower frequency mixing term is shown for two different RF input levels.
- The RF frequency is 900 MHz, the LO frequency is 730 MHz.

[nFRF - mFLO] RF = -10 dBm  
[nFRF - mFLO] RF = 0 dBm

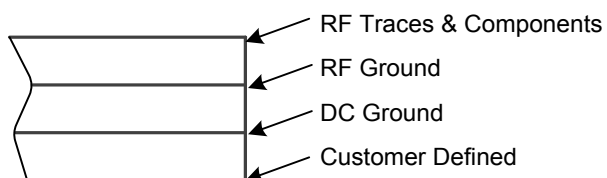
## Recommended PCB Configuration



## External Circuitry Parts List

Part	Value	Purpose
R1	200 $\Omega$	LO Amplifier Bias Resistor
L1	22 nH	LO Amplifier Bias Input
L2	10 nH	LO Port Matching
C1	10 nF	IF Port Matching
C2	10 nF	IF Bypass Capacitor
C3	22 pF	RF Bypass Capacitor
C4	47 pF	V <sub>DD</sub> Bypass

## PCB Cross Section View



PCB dielectric between RF traces and RF ground layers should be chosen to reduce RF discontinuities between 50  $\Omega$  lines and package pins. MACOM recommends an FR-4 dielectric thickness of 0.008" (0.2 mm) yielding a 50  $\Omega$  line width of 0.015" (0.38 mm). The recommended metallization thickness is 1 oz. copper.

## Handling Procedures

Please observe the following precautions to avoid damage:

## Static Sensitivity

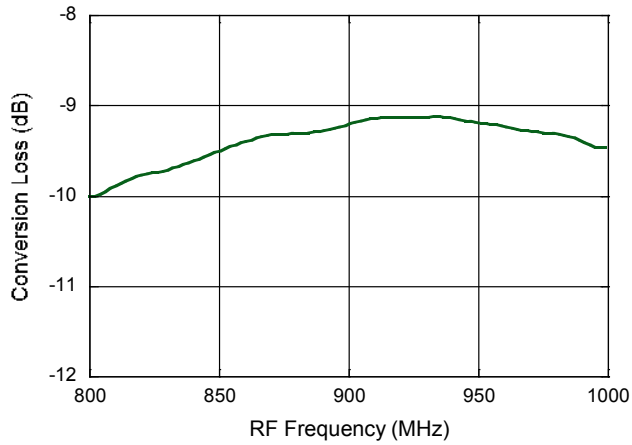
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Performance Data

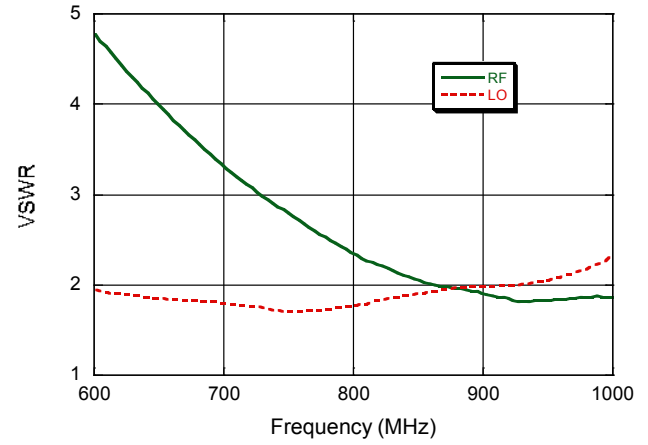
**Down Converter Application Test Conditions:**

**RF = 900 MHz, IF = 170 MHz, LO = 730 MHz (LO Power = -5 dBm)**

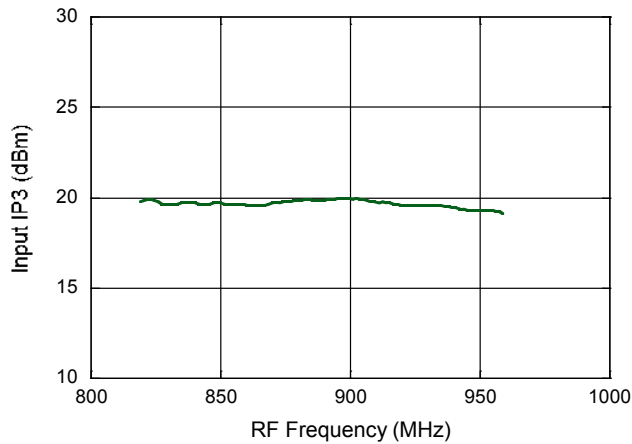
**Conversion Loss vs. Frequency**



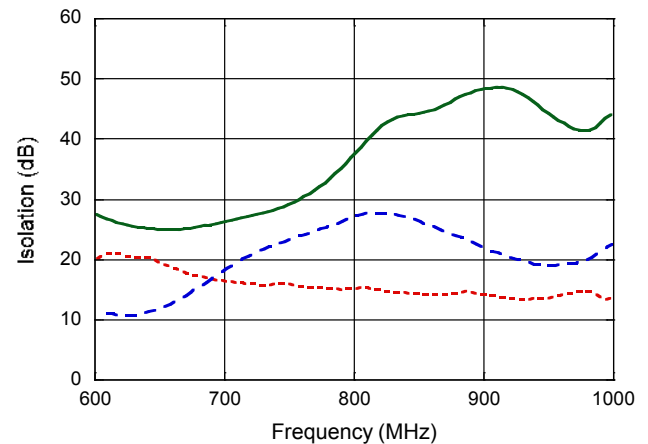
**VSWR vs. Frequency**



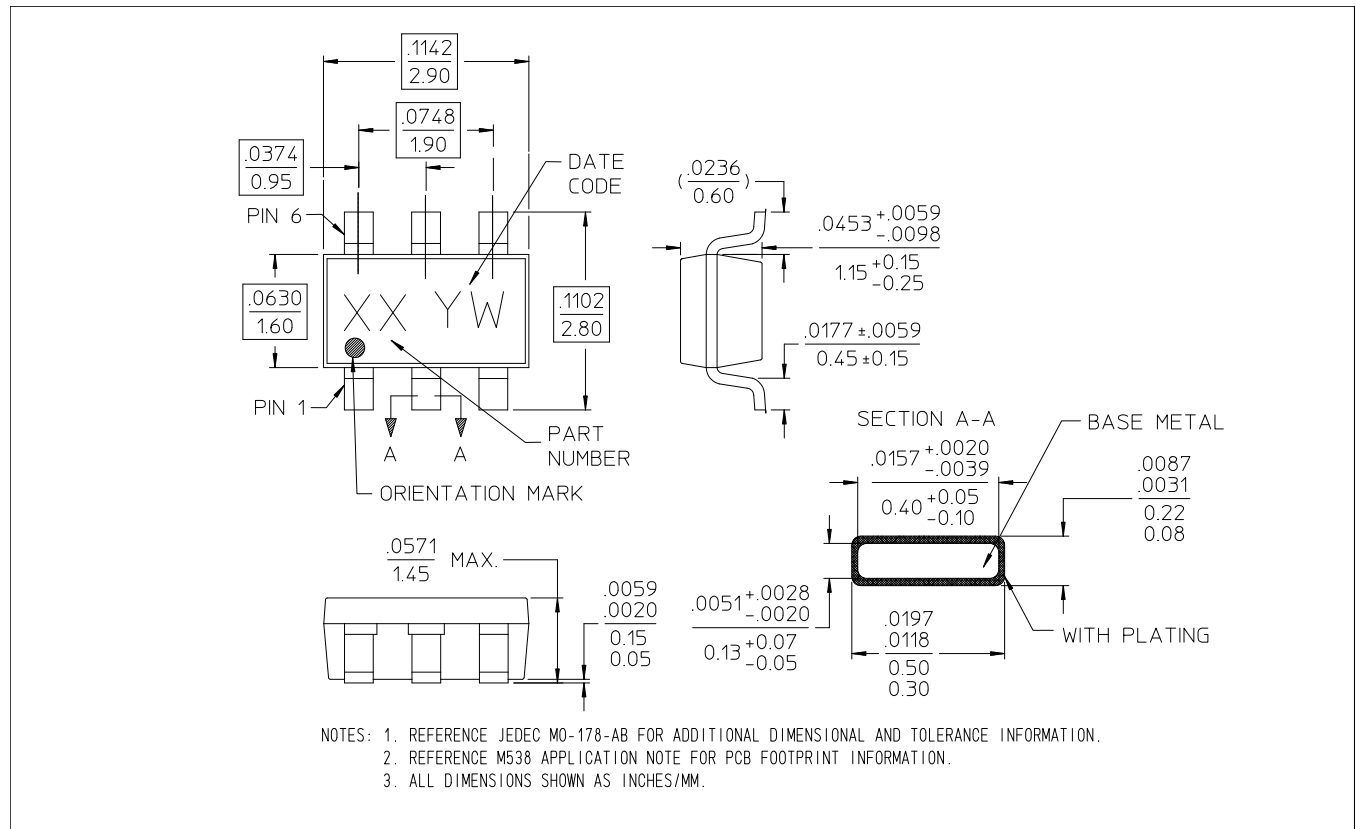
**Input IP3 vs. Frequency**



**Isolations vs. Frequency**



## Lead-Free SOT-26 Plastic Package<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.  
 Meets JEDEC moisture sensitivity level 1 requirements.  
 Plating is 100% matte tin plating over copper.

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