GaAs MMIC SMT DOUBLE-BALANCED MIXER 1.5 - 4.5 GHz

FEBRUARY 2001

Features

ULTRA SMALL PACKAGE: MSOP8

CONVERSION LOSS: 8 dB

LO/RF ISOLATION: 40 dB

VSAT & LMDS SOLUTION

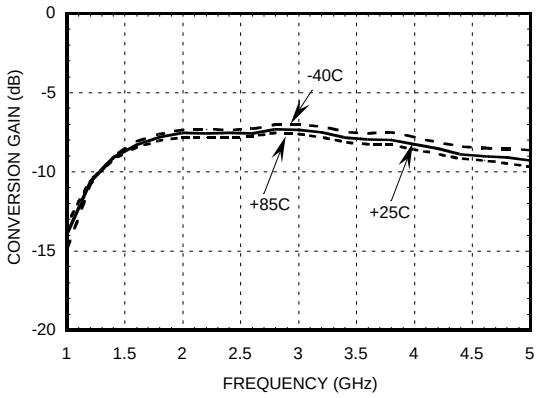
General Description

The HMC213MS8 is an ultra miniature double-balanced mixer in an 8 lead plastic surface mount package (MSOP). This passive MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip. The device can be used as an up or downconverter, bi-phase (de)modulator, or phase comparator for 1900, 2400, 3500 MHz applications. It is especially suited for miniature basestations, PCMCIA transceivers, and WLL applications because of its high dynamic input signal range, small size, and zero DC bias requirement. The consistent MMIC performance will improve system operation and assure regulatory compliance. The MSOP8 package is the smallest footprint available for a complete double-balanced mixer, 0.118" x 0.190" (3.0mm x 4.9mm). At a height of 0.040" (1.0mm) this is the *thinnest* mixer package available today.

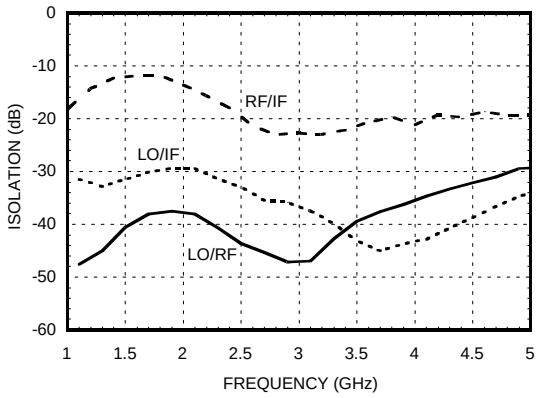
Guaranteed Performance, *As a Function of LO Drive, - 40 to + 85 deg. C*

Parameter	LO = +13 dBm IF = 100 MHz			LO = +10 dBm IF = 100 MHz			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO		1.5 - 4.5			1.7 - 3.6		GHz
Frequency Range, IF		DC - 1.5			DC - 1.5		GHz
Conversion Loss		8.5	10		9	10.5	dB
Noise Figure (SSB)		8.5	10		9	10.5	dB
LO to RF Isolation	29	40		32	40		dB
LO to IF Isolation	27	35		26	35		dB
IP3 (Input)	16	19		14	18		dBm
1 dB Gain Compression (Input)	7	10		5	8		dBm
Local Oscillator Drive Level	9		17	9		17	dBm

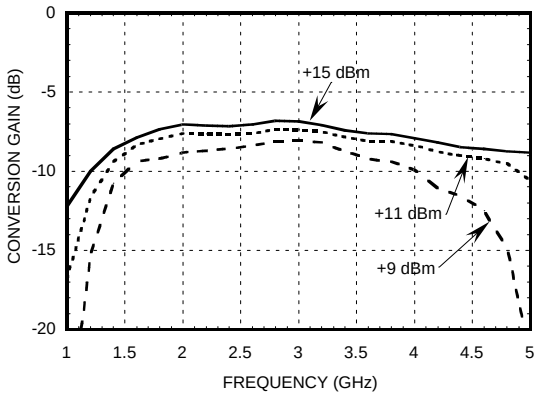
Conversion Gain vs. Temperature @ LO = +13 dBm



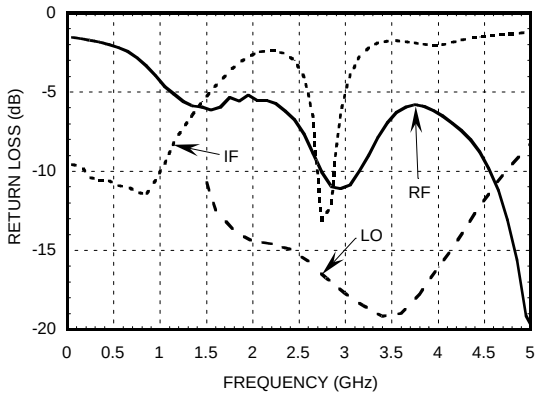
Isolation @ LO = +13 dBm



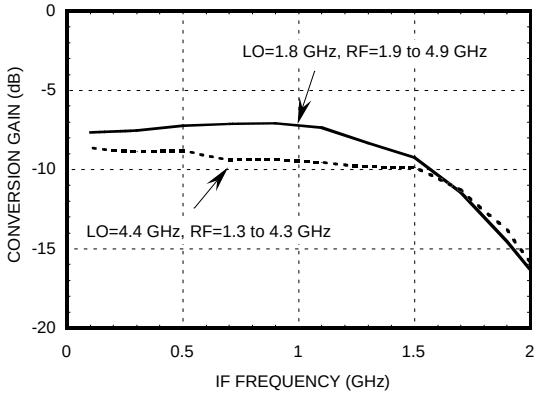
Conversion Gain vs. LO Drive



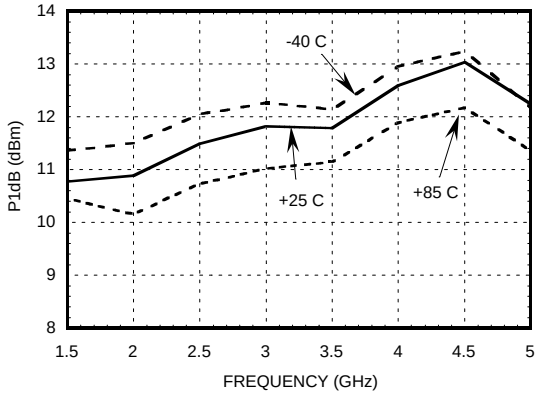
Return Loss @ LO = + 13dBm



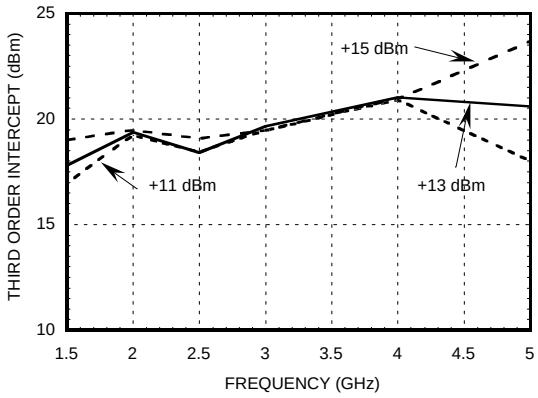
IF Bandwidth @ LO = +13 dBm



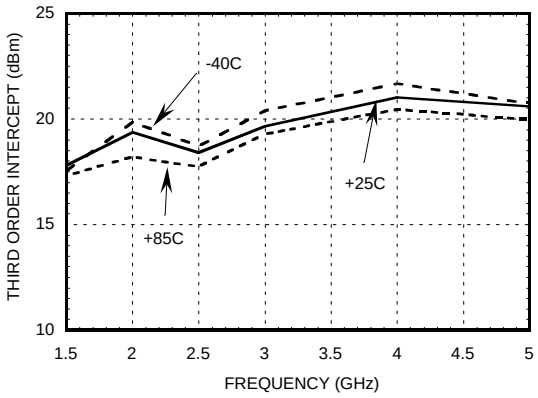
P1dB vs. Temperature @ LO= +13 dBm



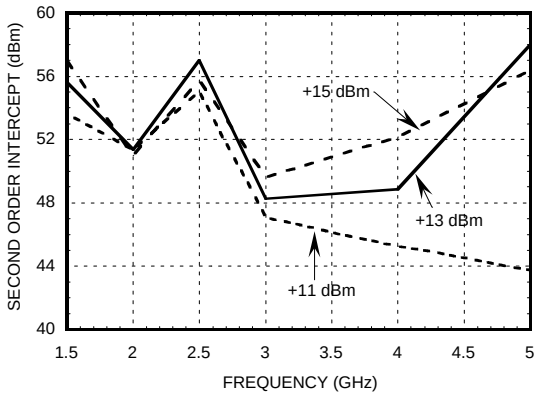
Input IP3 vs. LO Drive



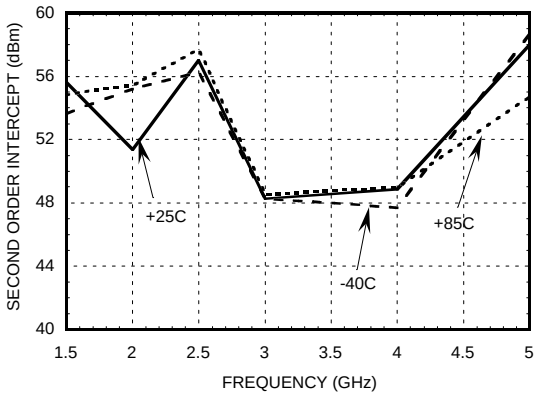
Input IP3 vs. Temperature@ LO = +13 dBm



Input IP2 vs. LO Drive



Input IP2 vs. Temperature@ LO = +13 dBm



MXN Spurious Outputs

	nLO				
mRF	0	1	2	3	4
0	xx	14.4	19.5	16.8	41.5
1	15.6	0	51.7	47.9	68.3
2	72.8	84.3	71.1	85.6	68.1
3	>105	>105	>105	77.2	>105
4	>105	>105	>105	>105	>105

RF= 3.5 GHz @ -10 dBm
LO= 3.6 GHz @ +13 dBm
All values in dBc below IF power level (-1RF + 1LO).

Harmonics or LO

	nLO Spur at RF Port			
LO Frequency (GHz)	1	2	3	4
1.5	42	35	53	52
2.0	38	28	57	60
2.5	43	28	34	60
3.0	49	33	34	62
3.5	40	41	46	64
4.0	36	45	54	62
4.5	32	54	55	75
5.0	29	53	55	70

LO= +13 dBm
Values in dBc below input LO level measured at the RF port

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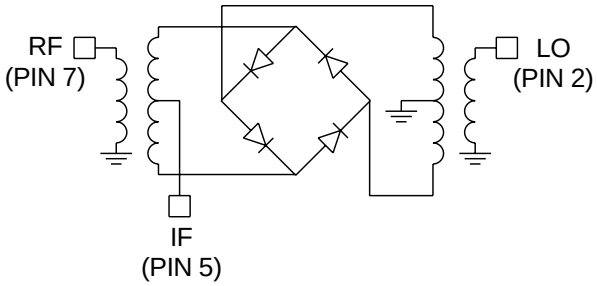
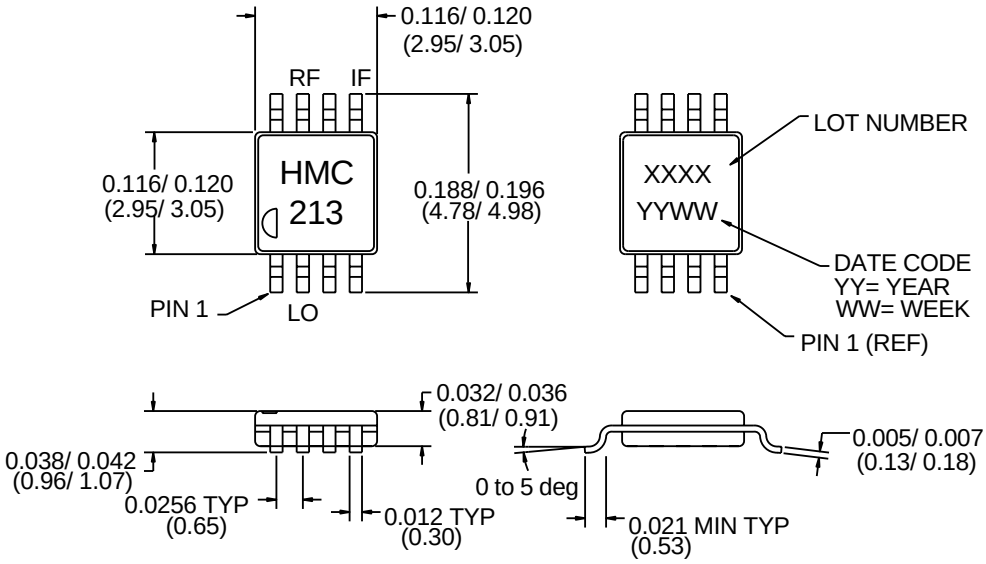
Schematic



Absolute Maximum Ratings

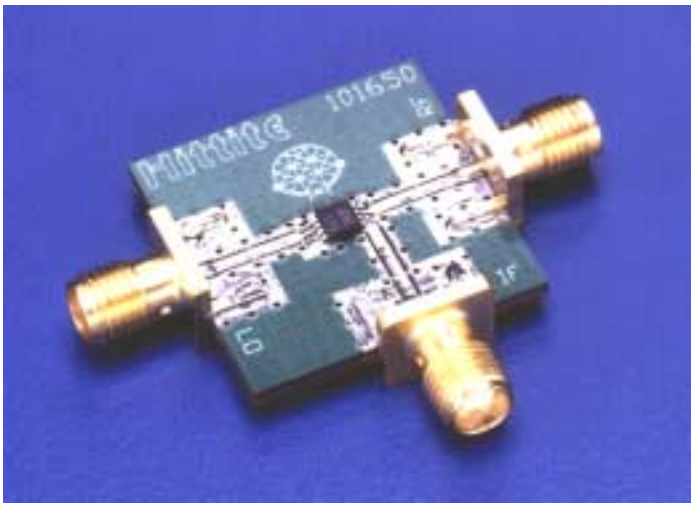
RF / IF Input	+13 dBm
LO Drive	+27 dBm
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +85 deg C

Outline Drawing



1. MATERIAL:
   A) PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
   B) LEADFRAME MATERIAL: COPPER ALLOY
2. PLATING: LEAD-TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS), UNLESS OTHERWISE SPECIFIED TOL. ARE ±0.005 (±0.13)
4. ALL UNMARKED PINS (1,3,4,6,8) ARE RF GROUND

Evaluation Circuit Board



The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board as shown is available from Hittite upon request.

Evaluation Circuit Board Layout Design Details

Layout Technique	Grounded Co-Planar Waveguide (GCPW)
Material	FR4
Dielectric Thickness	0.028" (0.71 mm)
50 Ohm Line Width	0.037" (0.94 mm)
Gap to Ground Edge	0.010" (0.25 mm)
Ground via Hole Diameter	0.014" (0.36 mm)
Connectors	SMA-F (EF - Johnson P/N 142-0701-806)

MICROWAVE CORPORATION

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NOTES: