

## GaAs MMIC SMT SINGLE BALANCED MIXER 1.7 - 3 GHz

FEBRUARY 2001

### Features

ULTRA SMALL PACKAGE: MSOP8

LO/RF ISOLATION: 35 dB

IP3 (INPUT): +20 dBm

IDEAL FOR MMDS & W-CDMA

### General Description

The HMC272MS8 is an ultra miniature single balanced mixer in an 8 lead plastic surface mount Mini Small Outline Package (MSOP). This passive MMIC mixer is constructed of GaAs Schottky diodes and a novel planar transformer balun on the chip. The RF port is balanced via the MMIC balun while the LO port is connected directly to the diodes. The device can be used as an up or downconverter for PCS, W-CDMA, 2.4 ISM, or MMDS applications. The consistent MMIC performance will improve system operation and assure regulatory compliance. The MSOP8 package is the smallest footprint available for a complete single-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.



4

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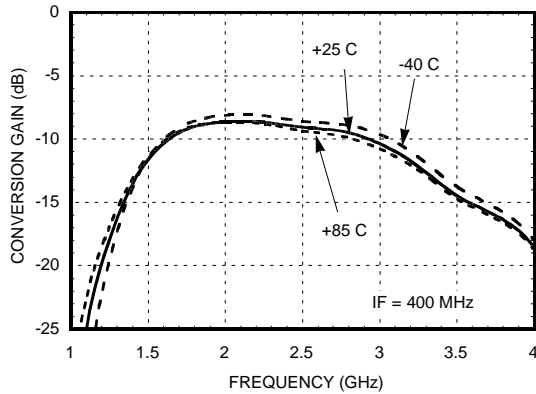
### Guaranteed Performance, As a Function of IF Frequency, -40 to +85 deg C

Parameter	LO = +10 dBm IF = 100 MHz			LO = +10 dBm IF = 400 MHz			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO	2 - 3			1.7 - 2.8			GHz
Frequency Range, IF	DC - 0.8			DC - 0.8			GHz
Conversion Loss		9	10.5		9	11	dB
Noise Figure (SSB)		9	10.5		9	11	dB
LO to RF Isolation	22	30		24	32		dB
LO to IF Isolation	12	20		11	18		dB
IP3 (Input)	17	21		16	20		dBm
1 dB Gain Compression (Input)	8	11		7	10		dBm
Local Oscillator Drive Level	7	10	15	7	10	15	dBm

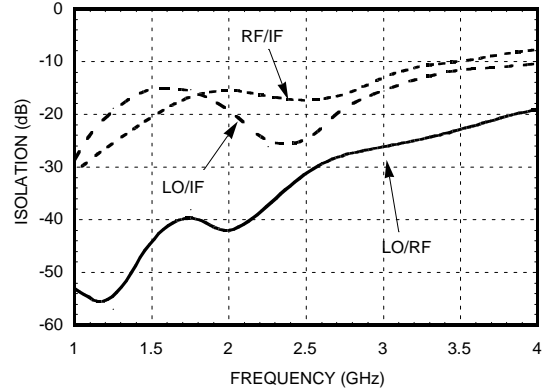
## HMC272MS8 SMT SINGLE-BALANCED MIXER 1.7 - 3. GHz

FEBRUARY 2001

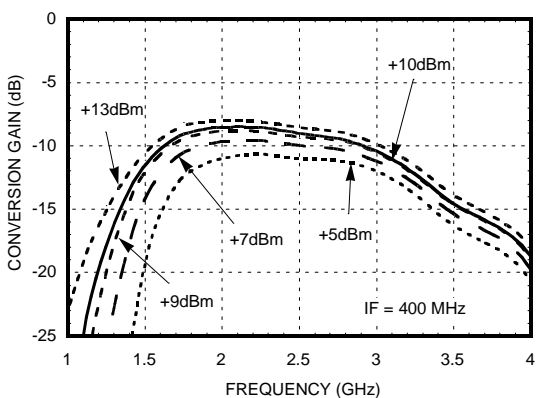
**Conversion Gain vs. Temperature @ LO = +10 dBm**



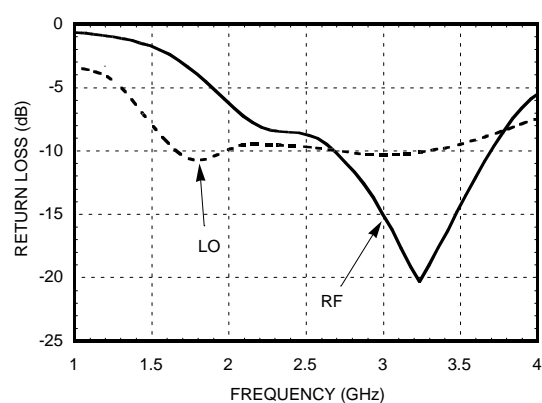
**Isolation @ LO = +10 dBm**



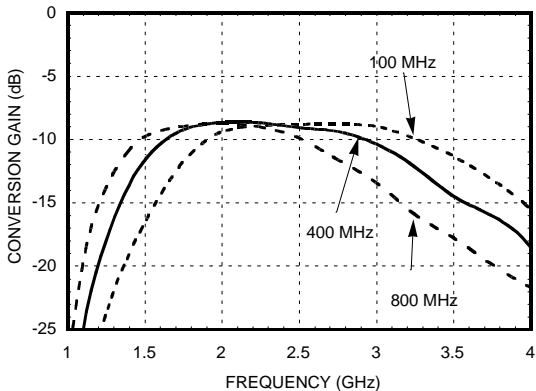
**Conversion Gain vs. LO Drive**



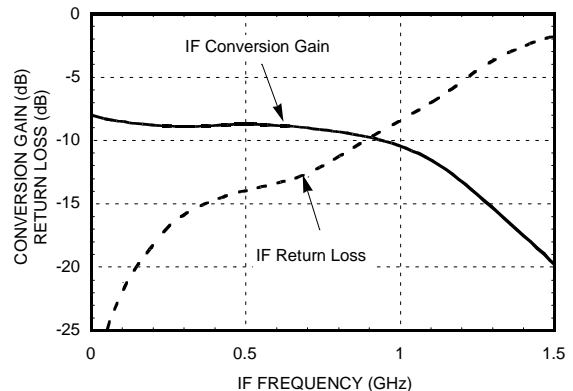
**Return Loss @ LO = +10 dBm**



**Conversion Gain vs. IF Frequency**



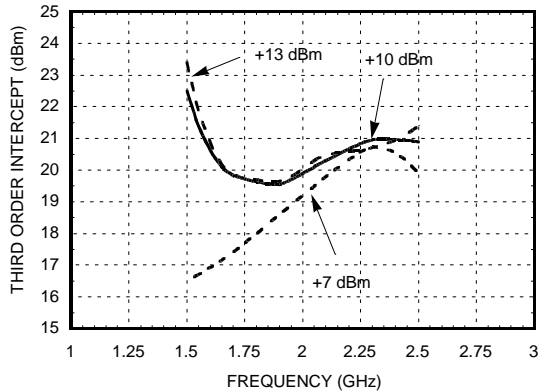
**IF Bandwidth @ LO = +10 dBm, Conversion Gain & Return Loss**



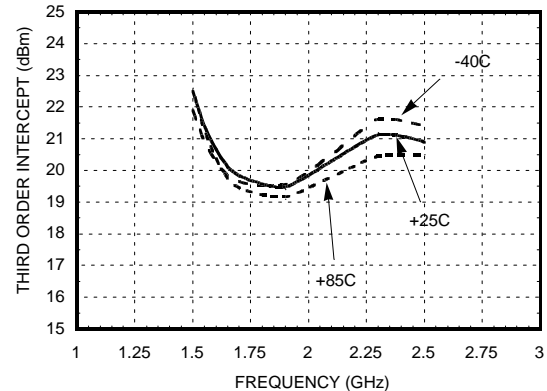
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FEBRUARY 2001

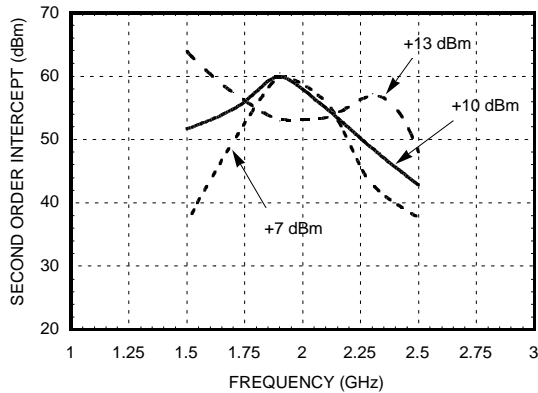
### Input IP3 vs. LO Drive



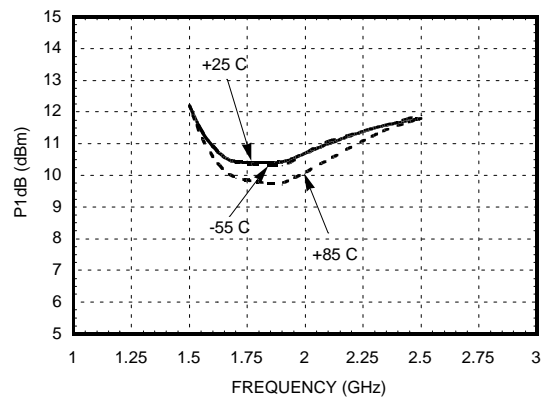
### Input IP3 vs. Temperature @ LO = +10 dBm



### Input IP2 vs. LO Drive



### P1dB vs. Temperature LO = +10 dBm



### MXN Spurious Outputs

mRF	nLO				
	0	1	2	3	4
0	xx	-8	4	3	27
1	9	0	38	28	43
2	64	58	61	44	67
3	82	89	95	92	87
4	106	> 110	>110	>107	>110

RF= 2.6 GHz @ -10 dBm  
 LO= 2.2 GHz @ +13 dBm  
 All values in dBc relative to the IF

### Harmonics of LO

LO Frequency (GHz)	nLO Spur at RF Port			
	1	2	3	4
1.5	44	18	42	50
1.7	40	16	42	53
1.9	39	18	40	53
2.1	42	20	35	55
2.3	43	23	36	55
2.5	35	26	37	56

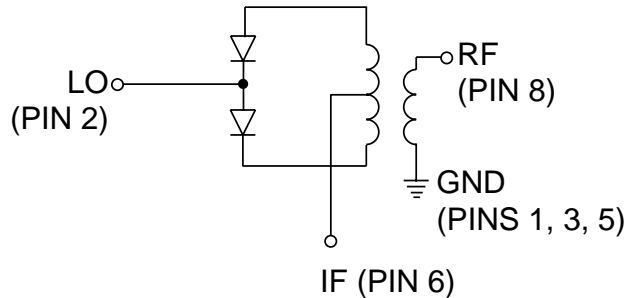
LO= +10 dBm  
 Values in dBc below input LO level measured at the RF port



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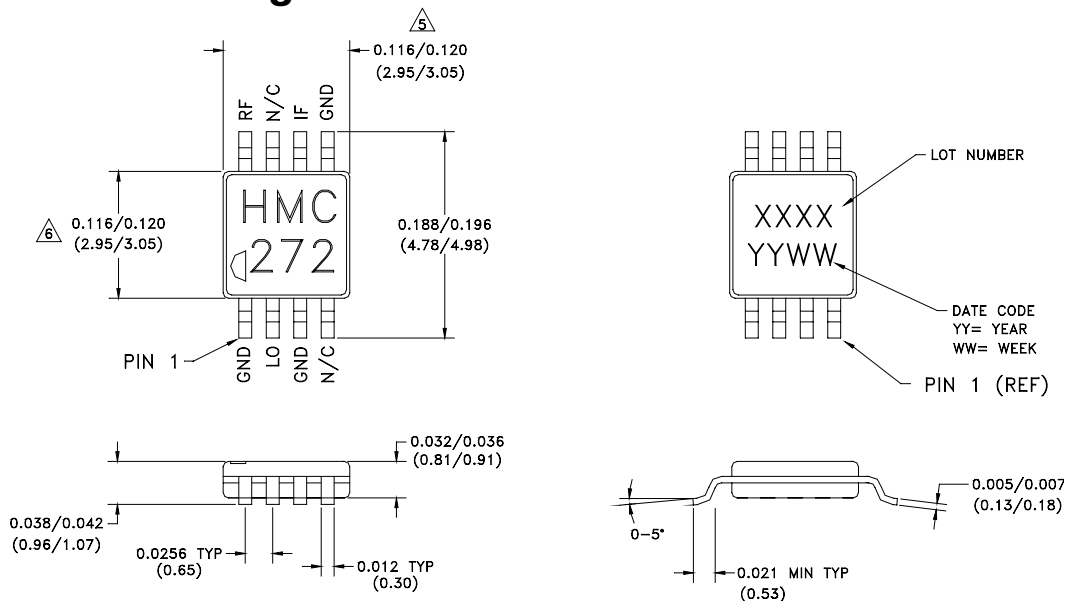
### Schematic



### 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

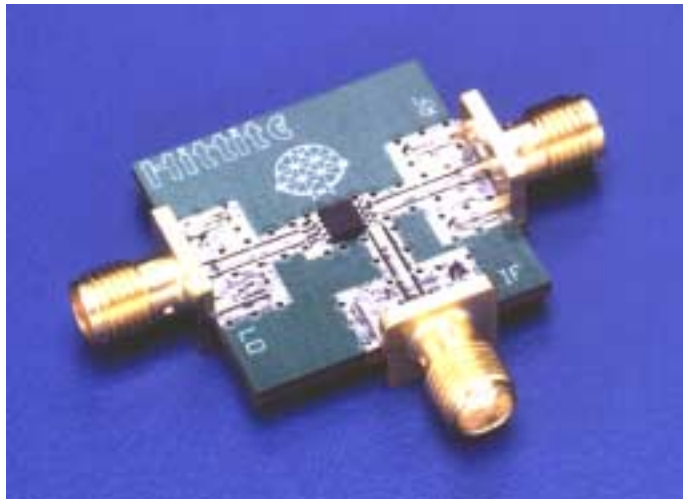


1. MATERIAL:
  - A) PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
  - B) LEADFRAME MATERIAL: COPPER ALLOY
2. PLATING: LEAD-TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS), UNLESS OTHERWISE SPECIFIED TOL. ARE  $\pm 0.005$  ( $\pm 0.13$ )
4. CHARACTERS TO BE HELVETICA MEDIUM, 0.030 HIGH
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.006 (0.15mm) PER SIDE
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.010 (0.25mm) PER SIDE
7. N/C=NO CONNECTION, RF GROUND THESE PINS

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## ***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 below. 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.

4

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## ***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)

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**NOTES:**

4

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