

## GaAs MMIC SMT DOUBLE-BALANCED FET MIXER 1.1 - 1.7 GHz

FEBRUARY 2001

v00.0700

### Features

IP3 (INPUT): +24 dBm @ +11 dBm LO

LO RANGE = +3 to +11 dBm

CONVERSION LOSS: 7 dB

LO/RF ISOLATION: 35 dB

### General Description

The HMC296MS8 is an ultra miniature double-balanced FET mixer in an 8 lead plastic surface mount Mini Small Outline Package (MSOP). This MMIC mixer is constructed of switched GaAs FETs and novel planar transformer baluns on the chip. The device can be used as an up or downconverter for 1.1 to 1.7 GHz applications. It is especially suited for miniature basestations, WLAN, PCMCIA, and portable wireless applications. The consistent MMIC performance will improve system operation. The mixer implements a MSOP8 package which is 0.118" x 0.192" (3.0mm x 4.9mm) in size.



### Guaranteed Performance,

As a Function of LO Drive, IF = 70 MHz, V<sub>gg</sub> = -1.5 Vdc, - 40 to + 85 deg. C

| Parameter                              | LO = +11 dBm |      |      | LO = +7 dBm |      |      | LO = +3 dBm |      |      | Units |
|----------------------------------------|--------------|------|------|-------------|------|------|-------------|------|------|-------|
|                                        | Min.         | Typ. | Max. | Min.        | Typ. | Max. | Min.        | Typ. | Max. |       |
| Frequency Range, RF & LO               | 1.1 - 1.7    |      |      | 1.1 - 1.7   |      |      | 1.2 - 1.6   |      |      | GHz   |
| Frequency Range, IF                    | DC - 0.7     |      |      | DC - 0.5    |      |      | DC - 0.4    |      |      | GHz   |
| Conversion Loss                        |              | 7    | 9    |             | 7.5  | 10   |             | 7.5  | 11   | dB    |
| Noise Figure (SSB)                     |              | 7    | 9    |             | 7.5  | 10   |             | 7.5  | 11   | dB    |
| LO to RF Isolation                     | 30           | 40   |      | 35          | 40   |      | 35          | 40   |      | dB    |
| LO to IF Isolation                     | 21           | 26   |      | 22          | 26   |      | 22          | 26   |      | dB    |
| IP3 (Input) V <sub>gg</sub> = -1.5 Vdc | 20           | 24   |      | 15          | 18   |      | 11          | 14   |      | dBm   |
| 1 dB Gain Compression (Input)          | 10           | 14   |      | 6           | 9    |      | 2           | 4    |      | dBm   |

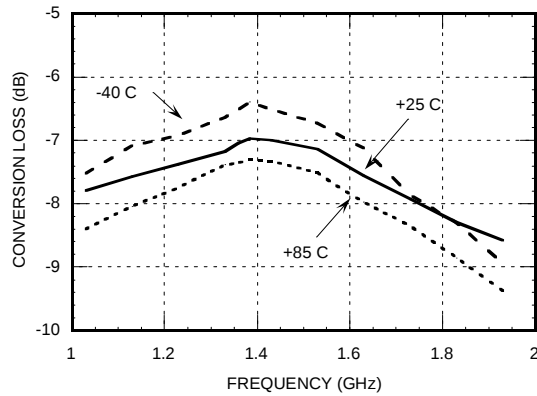


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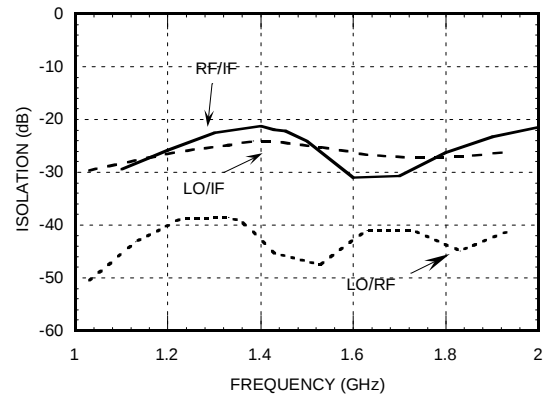
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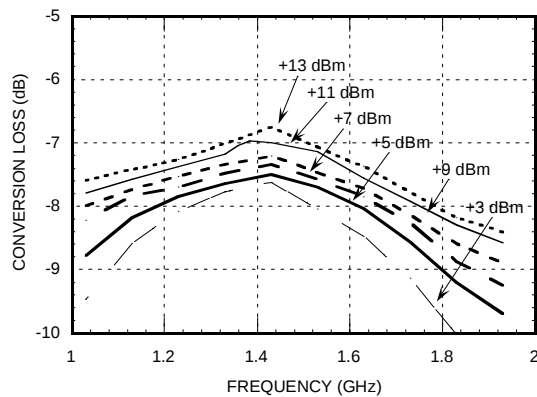
**Conversion Loss vs.  
Temperature @ LO = 11 dBm**



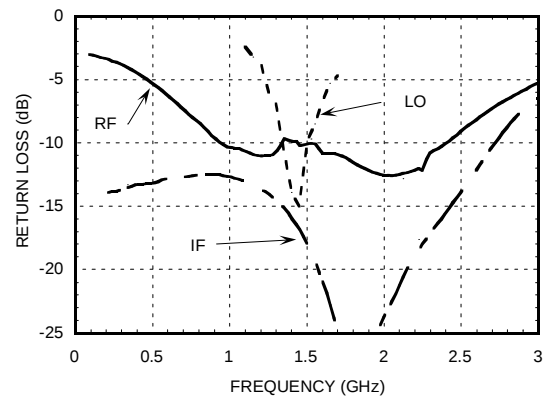
**Isolation @ LO = 11 dBm**



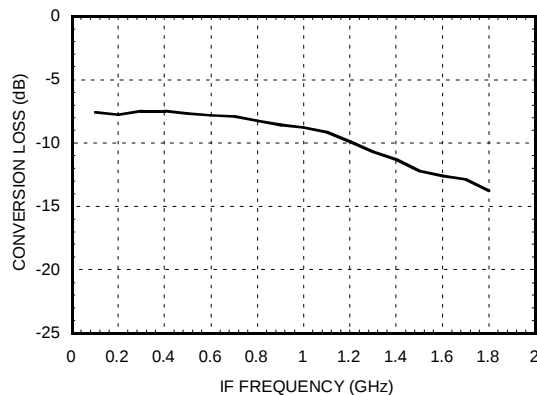
**Conversion Loss vs. LO Drive**



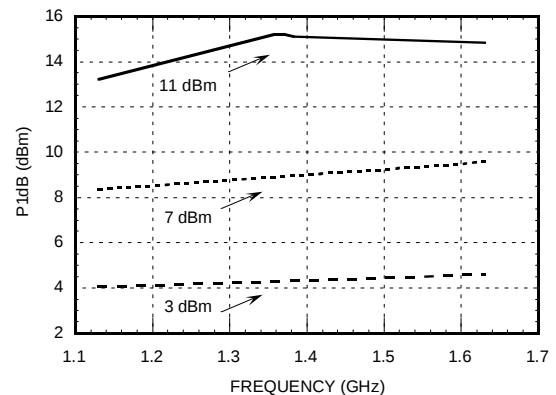
**Return Loss @ LO = 11 dBm**



**IF Bandwidth @ LO = 11dBm**



**P1dB vs. LO Level, V<sub>gg</sub> = -1.5 V**

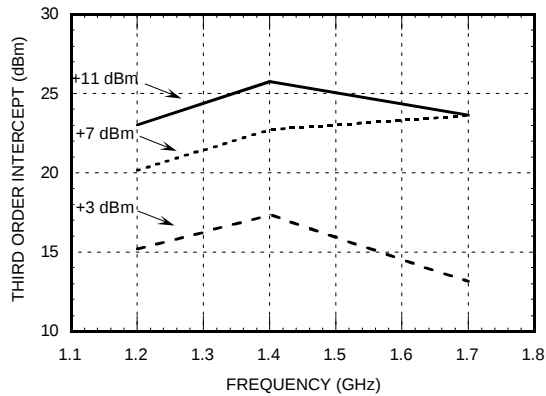


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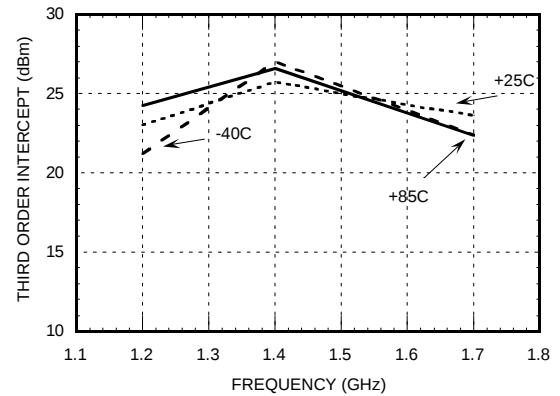
FEBRUARY 2001

v00.0700

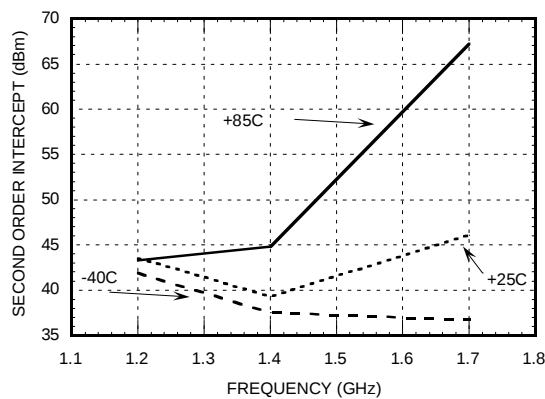
### Input IP3 vs. LO Drive



### Input IP3 vs. Temperature @ LO = 11 dBm



### Input IP2 vs. Temperature @ LO = +11 dBm



### MXN Spurious Outputs

| mRF | nLO   |       |       |    |    |
|-----|-------|-------|-------|----|----|
|     | 0     | 1     | 2     | 3  | 4  |
| 0   | xx    | -35   | 0     | 29 | 18 |
| 1   | 17    | 0     | 33    | 14 | 34 |
| 2   | 48    | 67    | 47    | 55 | 51 |
| 3   | 79    | 76    | 70    | 89 | 72 |
| 4   | > 105 | > 106 | > 102 | 99 | 92 |

RF= 1.47 GHz @ -10 dBm  
LO= 1.4 GHz @ 11 dBm, V<sub>gg</sub> = -1.5 V  
All values in dBc relative to the IF

### Harmonics of LO

| LO Frequency (GHz) | nLO Spur at RF Port |    |    |    |
|--------------------|---------------------|----|----|----|
|                    | 1                   | 2  | 3  | 4  |
| 1                  | 41                  | 27 | 47 | 45 |
| 1.2                | 28                  | 25 | 41 | 47 |
| 1.4                | 30                  | 22 | 42 | 44 |
| 1.6                | 29                  | 23 | 54 | 52 |
| 1.8                | 36                  | 29 | 57 | 57 |
| 2                  | 27                  | 29 | 60 | 59 |

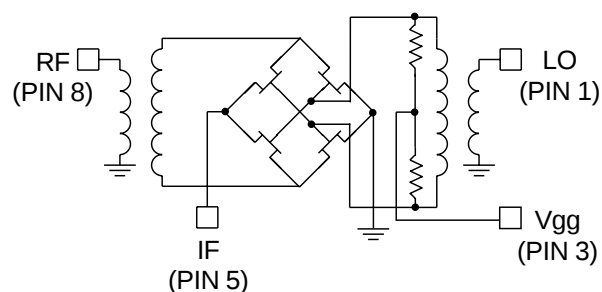
LO= 11 dBm, V<sub>gg</sub> = -1.5 V  
Values in dBc below input LO level measured at the RF port

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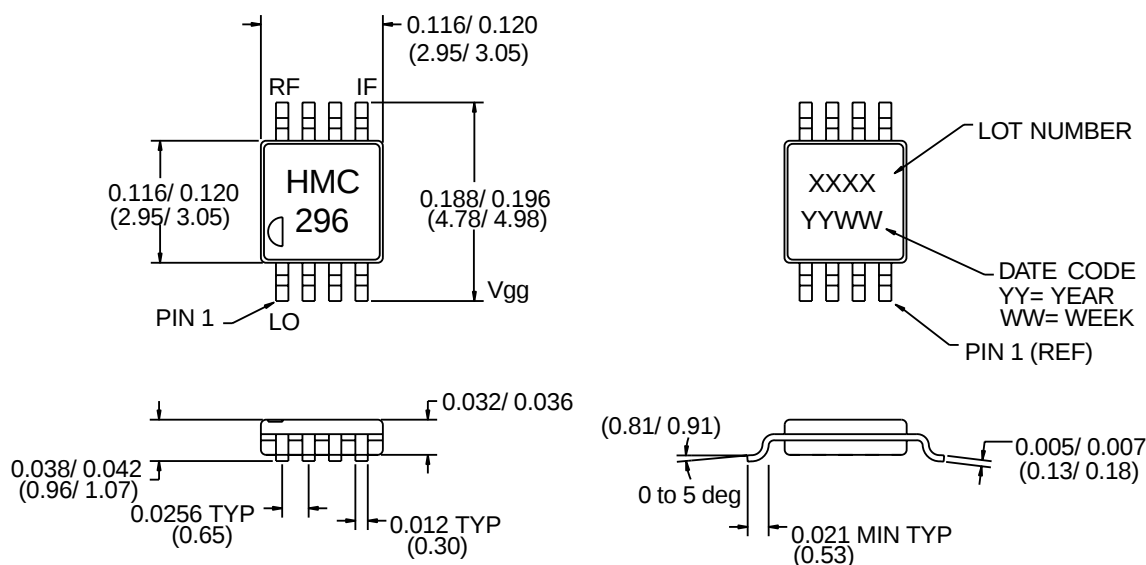
### Schematic



### 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



- MATERIAL:
  - PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
  - LEADFRAME MATERIAL: COPPER ALLOY
- PLATING: LEAD-TIN SOLDER PLATE
- DIMENSIONS ARE IN INCHES (MILLIMETERS), UNLESS OTHERWISE SPECIFIED TOL. ARE  $\pm 0.005$  ( $\pm 0.13$ )
- ALL UNLABELED LEADS ARE GROUND

4

MIXERS

SMT

