# HMC296MS8

## LOW LO DRIVE DOUBLE-BALANCED FET MIXER, 1.1 - 1.7 GHz

### Typical Applications

The HMC296MS8 is ideal for:

- Miniature Basestations
- PCMCIA
- Portable Wireless
- WirelessLAN

### Features

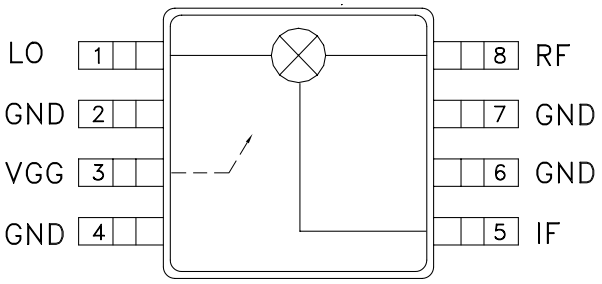
IP3 (Input): +24 dBm @ +11 dBm LO

LO Range = +3 to +11 dBm

Conversion Loss: 7 dB

LO/RF Isolation: 40 dB

### Functional Diagram




### General Description

The HMC296MS8 is a low LO drive, high IP3 double-balanced FET mixer in an 8 lead plastic surface mount MSOP package. 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. The consistent MMIC performance will improve system operation. The package dimensions are 0.118" x 0.192" (3.0mm x 4.9mm).

### Electrical Specifications, $T_A$ = +25° C, As a Function of LO Drive, Vgg = -1.5 Vdc

| 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 | 10 | | 7.5 | 10.5 | | 7.5 | 11.5 | dB |
| Noise Figure (SSB) | | 7 | 10 | | 7.5 | 10.5 | | 7.5 | 11.5 | 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) | 20 | 24 | | 15 | 18 | | 11 | 14 | | dBm |
| 1 dB Gain Compression (Input) | 10 | 14 | | 6 | 9 | | 2 | 4 | | dBm |

**Unless otherwise noted, all measurements performed as downconverter, IF= 70 MHz.*



*For price, delivery, and to place orders, please contact Hittite Microwave Corporation:*
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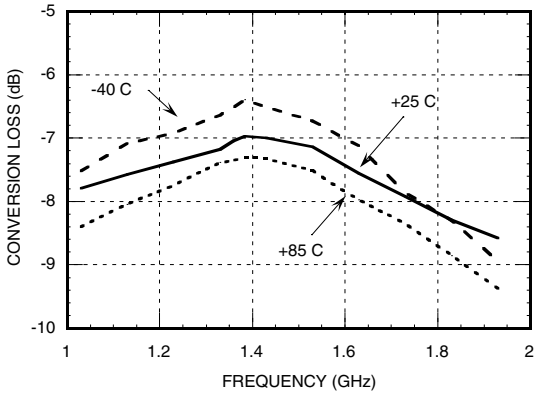
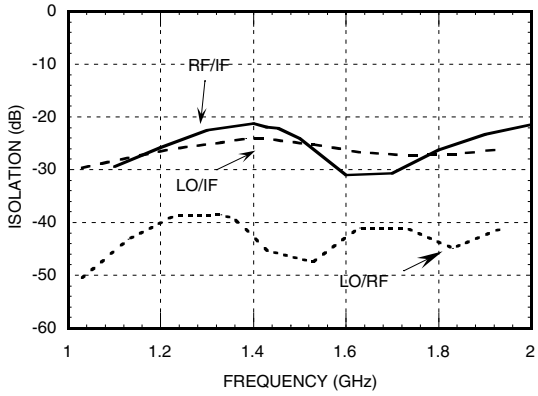
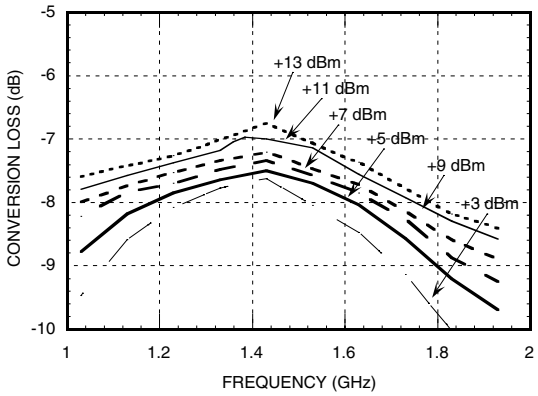
### Conversion Loss vs. Temperature @ LO = 11 dBm



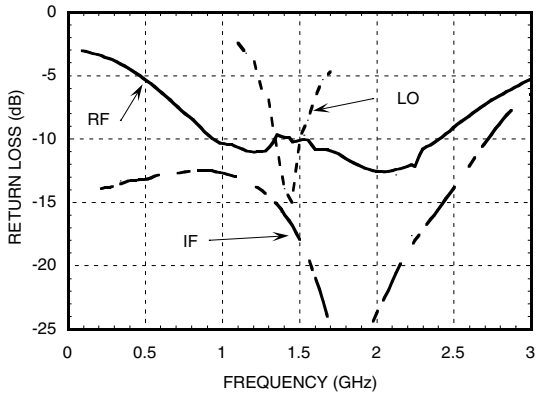

### Isolation @ LO = 11 dBm



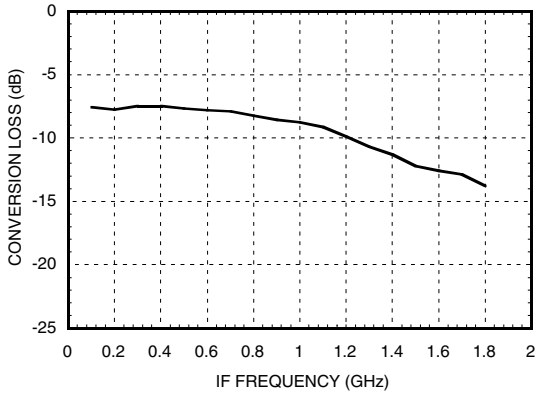

### Conversion Loss vs. LO Drive




### Return Loss @ LO = 11 dBm



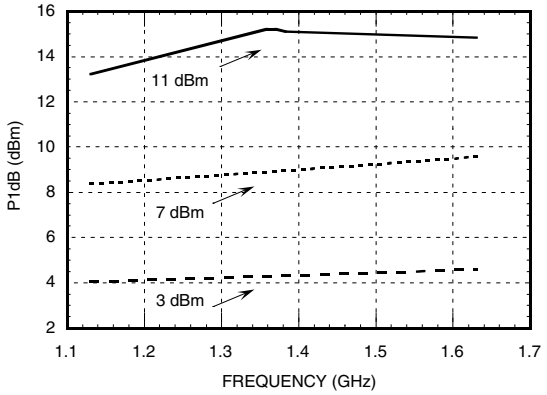

### If Bandwidth @ LO = 11 dBm



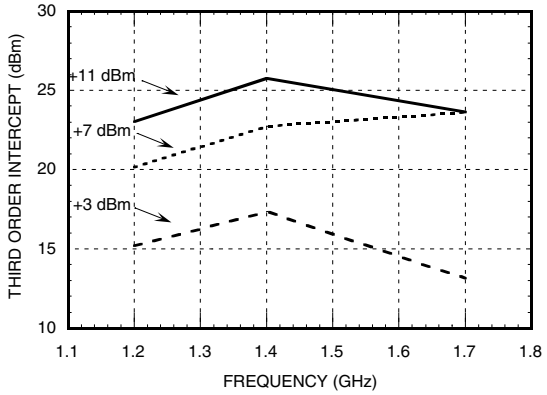
# LOW LO DRIVE DOUBLE-BALANCED FET MIXER, 1.1 - 1.7 GHz



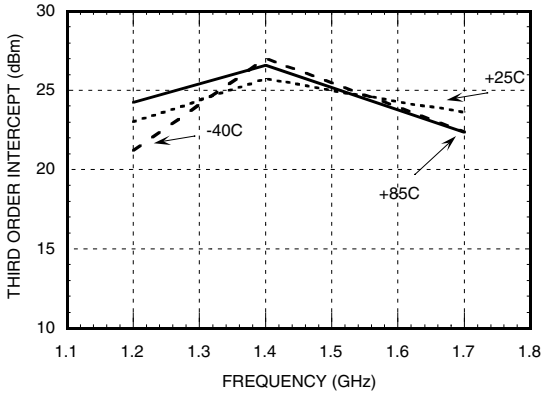
### P1dB vs. LO Level, Vgg = -1.5 V



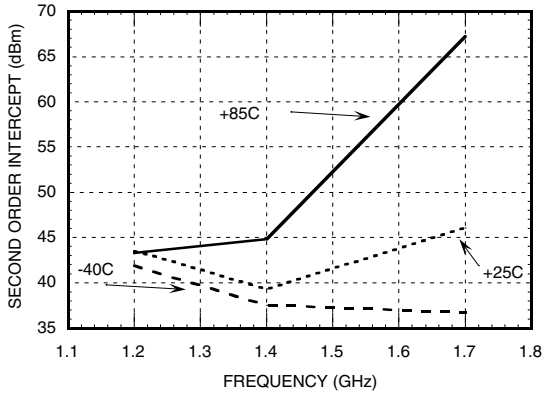

### Input IP3 vs. LO Drive *




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




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




### MxN Spurious Outputs

| | nLO | | | | |
|---|---|---|---|---|---|
| mRF | 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, Vgg= -1.5V
All values in dBc relative to the IF

### Harmonics of LO

| | nLO Spur at RF Port | | | |
|---|---|---|---|---|
| LO Frequency (GHz) | 1 | 2 | 3 | 4 |
| 1 | 41 | 27 | 47 | 45 |
| 1.2 | 27 | 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 |

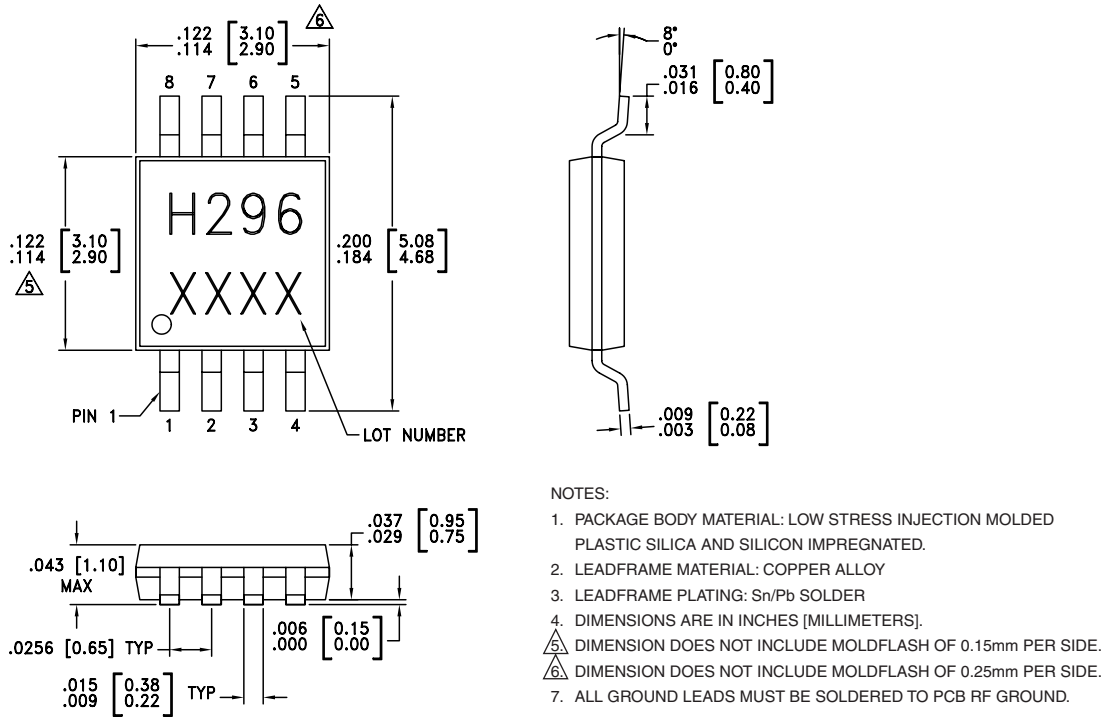
LO = 11 dBm, Vgg= -1.5V
Values in dBc below input LO level measured at the RF port.

** Two-tone input power = 0 dBm each tone, 1 MHz spacing.*

## Absolute Maximum Ratings

| | |
|---|---|
| RF / IF Input | +20 dBm |
| LO Drive | +27 dBm |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| Vgg | -10V |

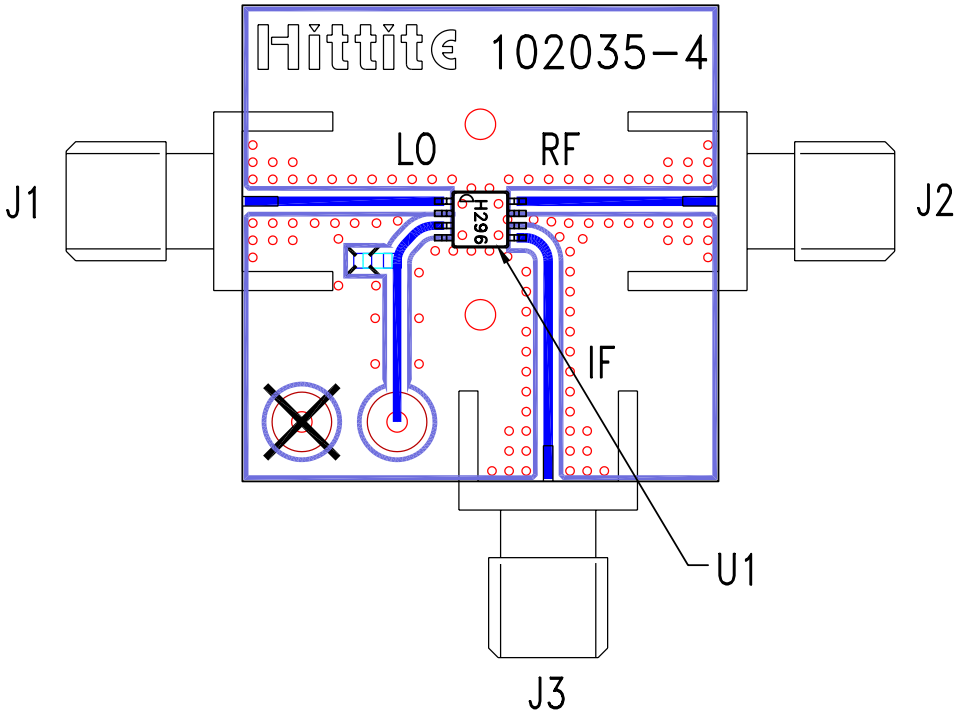
## Outline Drawing




NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

## Evaluation PCB




## List of Material

| Item | Description |
|---|---|
| J1 - J3 | PC Mount SMA F Connector |
| U1 | HMC296MS8 Mixer |
| PCB* | 102035 Eval Board |
| * Circuit Board Material: FR4 | |

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 and exposed paddle 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 shown is available from Hittite upon request.

**Notes:**