

## GaAs MMIC SMT DOUBLE-BALANCED MIXER, 5 - 12 GHz

### Typical Applications

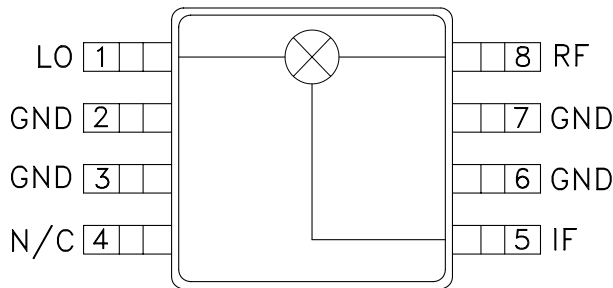
The HMC220MS8 is ideal for:

- Microwave Radios
- VSAT

### Features

- Ultra Small Package: MSOP8
- Conversion Loss: 8.5 dB
- Wideband IF: DC - 4 GHz

### Functional Diagram



### General Description

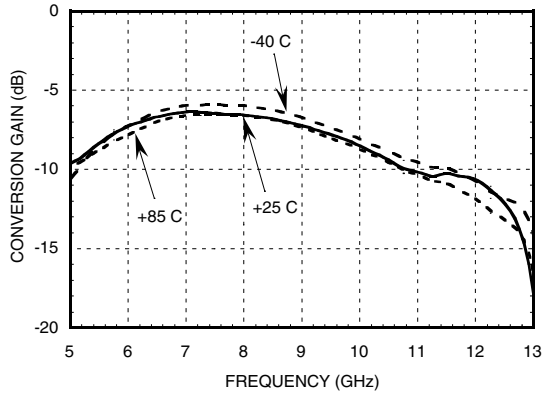
The HMC220MS8 is an ultra miniature double-balanced mixer in an 8 lead plastic surface mount package (MSOP). This passive MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip. The device can be used as an upconverter, downconverter, bi-phase (de)modulator, or phase comparator. The consistent MMIC performance will improve system operation and assure regulatory compliance.

### Electrical Specifications, $T_A = +25^\circ C$ , As a Function of LO Drive

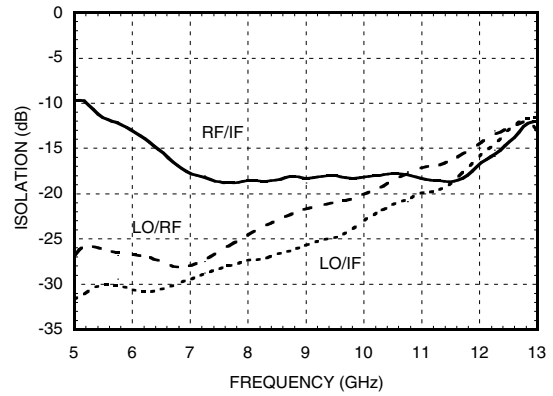
| Parameter                     | LO = +13 dBm<br>IF = 100 MHz |      |      | LO = +13 dBm<br>IF = 100 MHz |      |      | LO = +10 dBm<br>IF = 100 MHz |      |      | Units |
|-------------------------------|------------------------------|------|------|------------------------------|------|------|------------------------------|------|------|-------|
|                               | Min.                         | Typ. | Max. | Min.                         | Typ. | Max. | Min.                         | Typ. | Max. |       |
| Frequency Range, RF & LO      | 5 - 10                       |      |      | 10 - 12                      |      |      | 5.9 - 10                     |      |      | GHz   |
| Frequency Range, IF           | DC - 4                       |      |      | DC - 4                       |      |      | DC - 3.5                     |      |      | GHz   |
| Conversion Loss               |                              | 7.0  | 10   |                              | 8.5  | 10.5 |                              | 7.5  | 10   | dB    |
| Noise Figure (SSB)            |                              | 7.0  | 10   |                              | 8.5  | 10.5 |                              | 7.5  | 10   | dB    |
| LO to RF Isolation            | 17                           | 25   |      | 13                           | 18   |      | 17                           | 25   |      | dB    |
| LO to IF Isolation            | 20                           | 28   |      | 14                           | 20   |      | 20                           | 28   |      | dB    |
| IP3 (Input)                   | 14                           | 17   |      | 16                           | 21   |      | 13                           | 16   |      | dBm   |
| 1 dB Gain Compression (Input) | 4                            | 8    |      | 4                            | 8    |      | 5                            | 8    |      | dBm   |

## GaAs MMIC SMT DOUBLE-BALANCED MIXER, 5 - 12 GHz

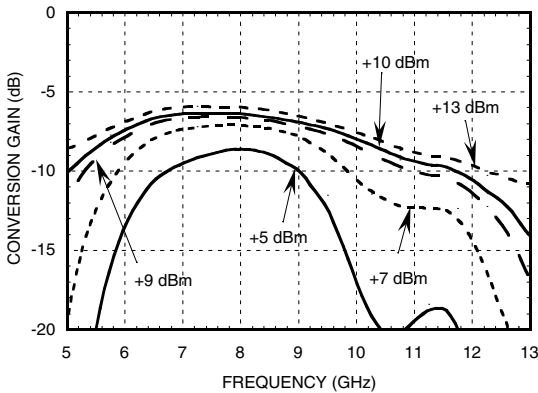
**Conversion Gain vs Temperature @ LO = +10 dBm**



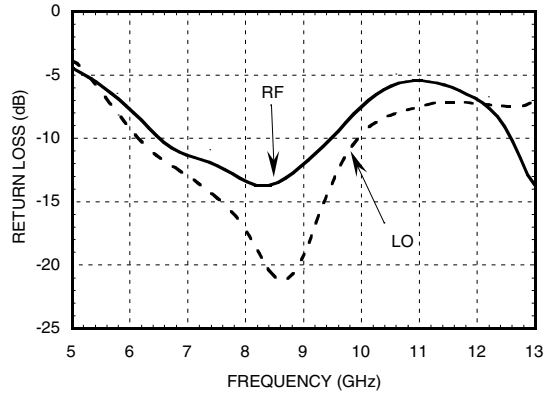
**Isolation @ LO = +10 dBm**



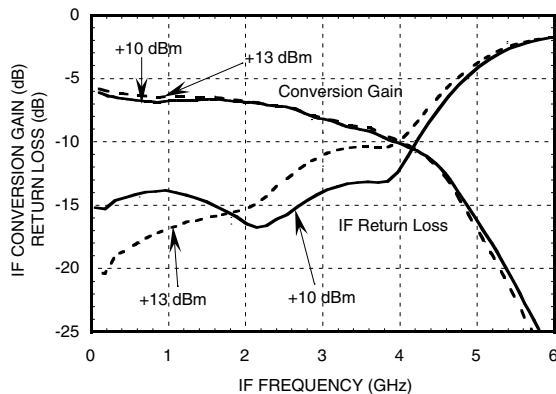
**Conversion Gain vs. LO Drive**



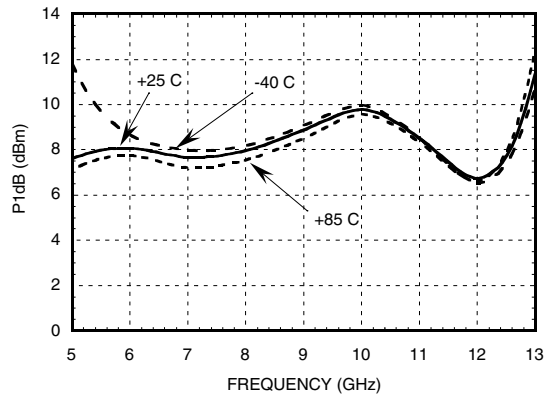
**Return Loss @ LO = +10 dBm**



**IF Bandwidth vs LO Drive Conversion Gain and Return Loss**

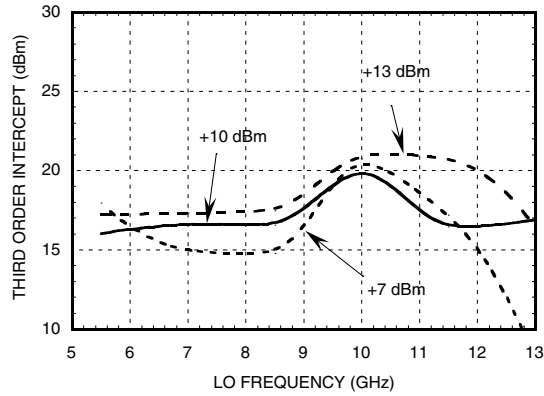


**P1dB vs. Temperature LO = +10 dBm**

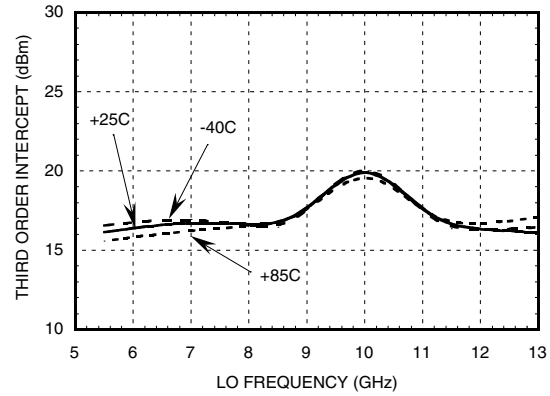


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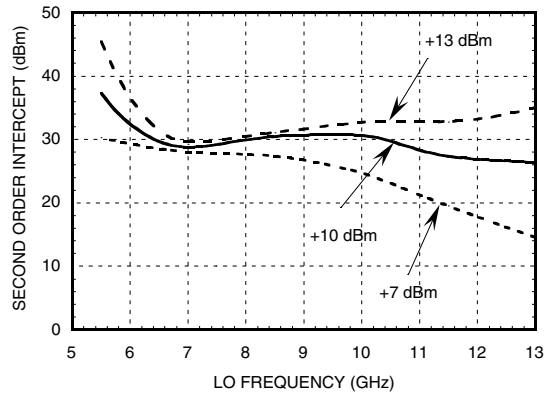
**Input IP3 vs. LO Drive**



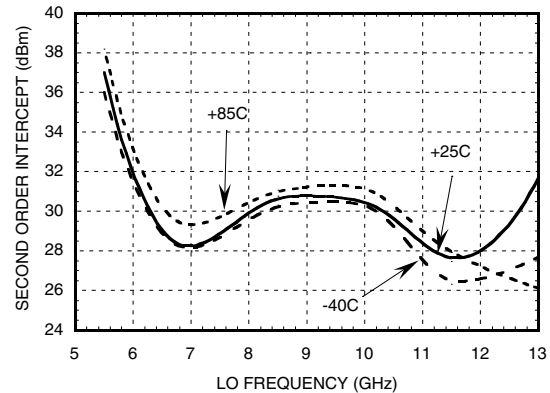
**Input IP3 vs. Temperature @ LO = +10 dBm**



**Input IP2 vs. Drive**



**Input IP2 vs. Temperature @ LO = +10 dBm**



**MxN Spurious Outputs**

| mRF | nLO |     |    |    |    |
|-----|-----|-----|----|----|----|
|     | 0   | 1   | 2  | 3  | 4  |
| 0   | xx  | 5   | 10 | 22 | 35 |
| 1   | 14  | 0   | 28 | 38 | 38 |
| 2   | 57  | 56  | 47 | 60 | 58 |
| 3   | 74  | 80  | 78 | 62 | 72 |
| 4   | 108 | 104 | 97 | 99 | 84 |

RF = 7.5 GHz @ -10 dBm  
LO = 7.6 GHz @ +10 dBm  
All values in dBc below the IF power level (-1RF + 1LO)

**Harmonics of LO**

| LO Freq. (GHz) | nLO Spur at RF Port |    |    |    |
|----------------|---------------------|----|----|----|
|                | 1                   | 2  | 3  | 4  |
| 5.5            | 27                  | 29 | 35 | 67 |
| 7              | 29                  | 25 | 38 | 58 |
| 8.5            | 24                  | 30 | 60 | 58 |
| 10             | 22                  | 44 | 63 | 60 |
| 11.5           | 16                  | 49 | 51 | xx |
| 13             | 14                  | 58 | 50 | xx |

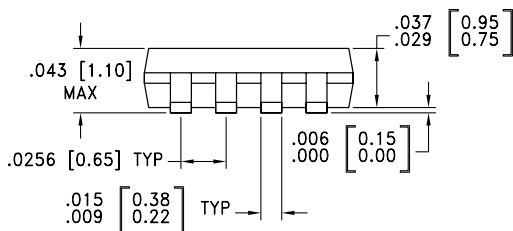
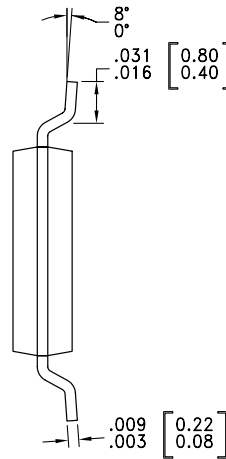
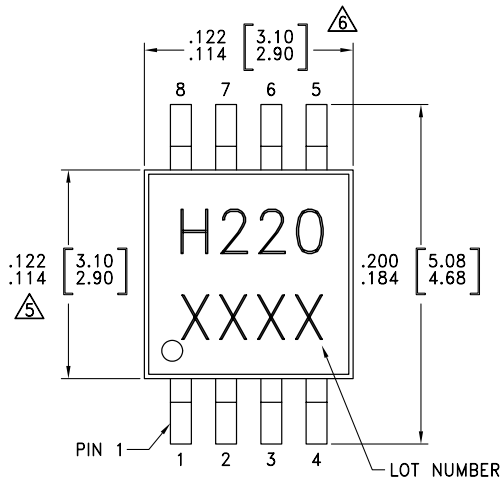
LO = +10 dBm  
Values in dBc below input LO level measured at the RF port.

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### Absolute Maximum Ratings

|                       |                |
|-----------------------|----------------|
| RF / IF Input         | +13 dBm        |
| LO Drive              | +27 dBm        |
| Storage Temperature   | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C  |

### 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.