

GaAs MMIC SMT DOUBLE-BALANCED MIXER, 1.7 - 4.5 GHz



Typical Applications

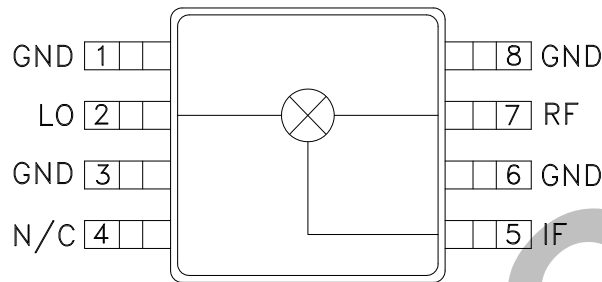
The HMC175MS8 / HMC175MS8E is ideal for:

- Mini-Base Stations
- Portable Wireless
- PCMCIA

Features

- Ultra Small Package: MSOP8
- Conversion Loss: 8 dB
- LO / IF Isolation: 32 dB
- LO / RF Isolation: 30 dB
- Input IP3: +18 dBm

Functional Diagram



General Description

The HMC175MS8 & HMC175MS8E are miniature double-balanced mixers in 8-lead plastic surface mount Mini Small Outline Packages (MSOP). The device can be used as an upconverter or downconverter. The mixer provides exceptional isolation and intermodulation performance for applications in high signal density environments. This device can also be used as a biphase modulator or demodulator. The MSOP8 is the smallest footprint available for a complete double-balanced mixer (0.118" x 0.190" x 0.040").

Electrical Specifications, $T_A = +25^\circ \text{C}$, LO Drive = +13 dBm

| Parameter | Broadband | | | PCS Band | | | ISM Band | | | Units |
|-------------------------------|-----------|------|------|-----------|------|------|-----------|------|------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Frequency Range, RF & LO | 1.7 - 4.5 | | | 1.7 - 2.0 | | | 2.2 - 2.6 | | | GHz |
| Frequency Range, IF | DC - 1.0 | | | DC - 1.0 | | | DC - 1.0 | | | GHz |
| Conversion Loss | | 8 | 11 | | 9 | 11 | | 8 | 10 | dB |
| Noise Figure (SSB) | | 8 | 11 | | 9 | 11 | | 8 | 10 | dB |
| LO to RF Isolation | 25 | 30 | | 35 | 40 | | 30 | 35 | | dB |
| LO to IF Isolation | 27 | 32 | | 28 | 32 | | 28 | 32 | | dB |
| IP3 (Input) | 15 | 20 | | 15 | 18 | | 15 | 18 | | dBm |
| 1 dB Gain Compression (Input) | 9 | 12 | | 9 | 11 | | 9 | 11 | | dBm |

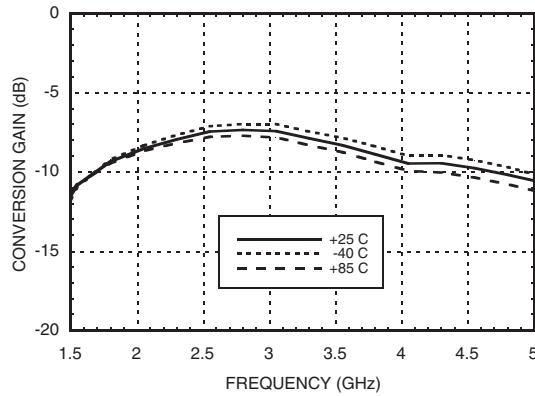
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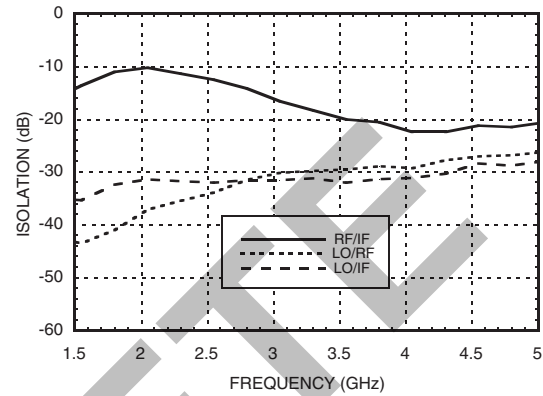


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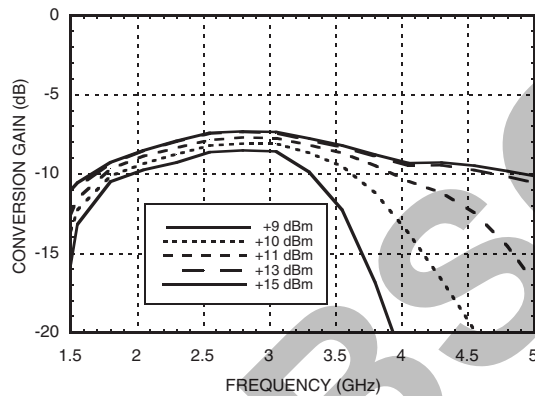
Conversion Gain vs Temperature @ LO = +13 dBm



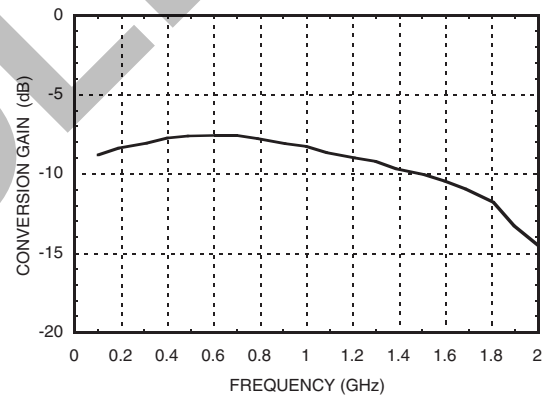
Isolation @ LO = +13 dBm



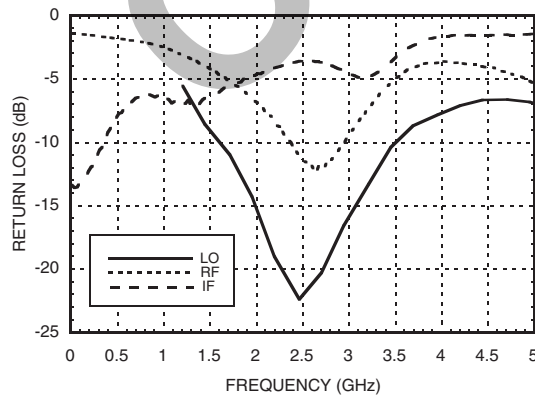
Conversion Gain vs LO Power



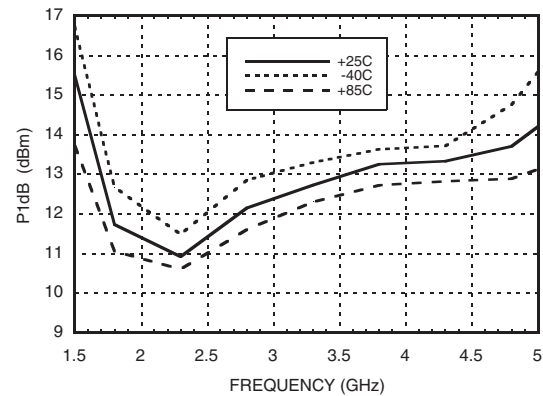
IF Bandwidth @ LO = +13 dBm



Return Loss @ LO = +13 dBm



P1dB vs Temperature @ LO = +13 dBm



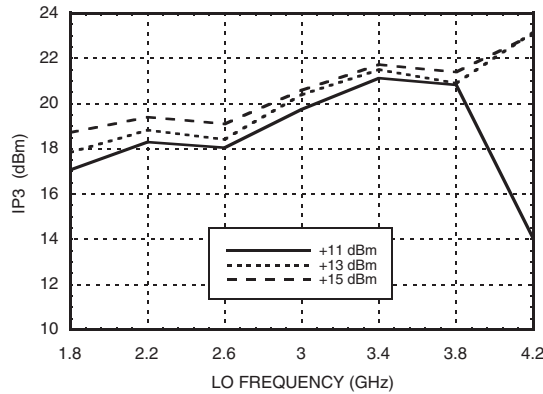
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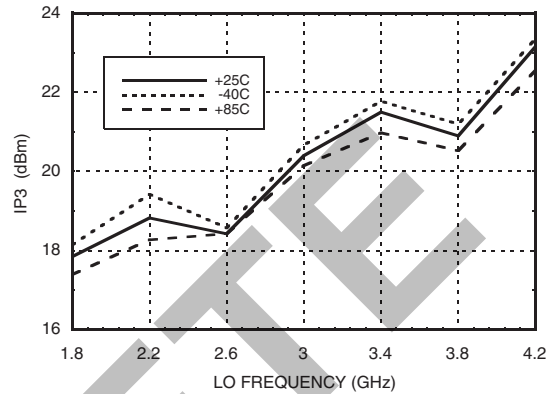


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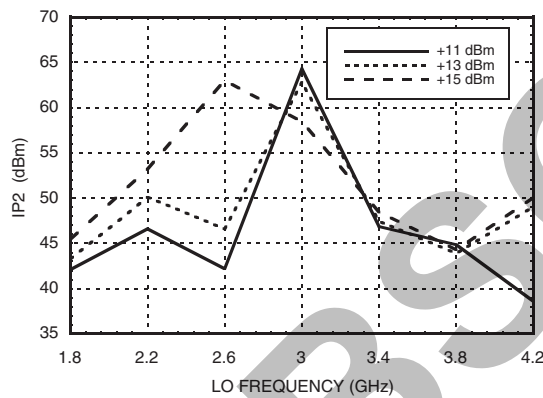
Input IP3 vs. LO Drive



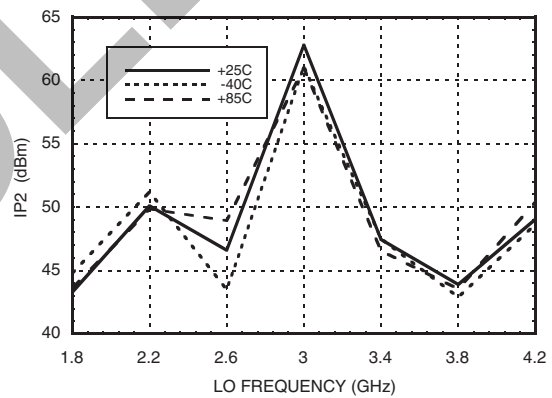
Input IP3 vs. Temperature @ LO = +13 dBm



Input IP2 vs. LO Drive



Input IP2 vs. Temperature @ LO = +13 dBm



MxN Spurious Outputs

| RF Frequency = 2.3 GHz @ -10 dBm | | | | | |
|----------------------------------|------|------|------|------|------|
| LO Frequency = 2.4 GHz @ 13 dBm | | | | | |
| | | nLO | | | |
| mRF | 0 | 1 | 2 | 3 | 4 |
| 0 | xx | 1 | 12 | 12 | 37 |
| 1 | 4 | 0 | 27 | 39 | 38 |
| 2 | 74 | 53 | 56 | 60 | 67 |
| 3 | 78 | >105 | 73 | 72 | 79 |
| 4 | >105 | >105 | >105 | >105 | >105 |

All values in dBc below IF power level.

Harmonics of LO

| LO Freq. (GHz) | nLO Spur at RF Port | | | |
|----------------|---------------------|----|----|----|
| | 1 | 2 | 3 | 4 |
| 1.8 | 37 | 32 | 63 | 53 |
| 2.2 | 35 | 30 | 37 | 63 |
| 2.6 | 32 | 28 | 33 | 55 |
| 3 | 30 | 29 | 53 | 52 |
| 3.1 | 29 | 30 | 56 | 51 |
| 3.6 | 29 | 39 | 52 | 53 |
| 4.2 | 27 | 46 | 48 | 61 |

LO = +13 dBm
Values in dBc below input LO level measured at RF Port.

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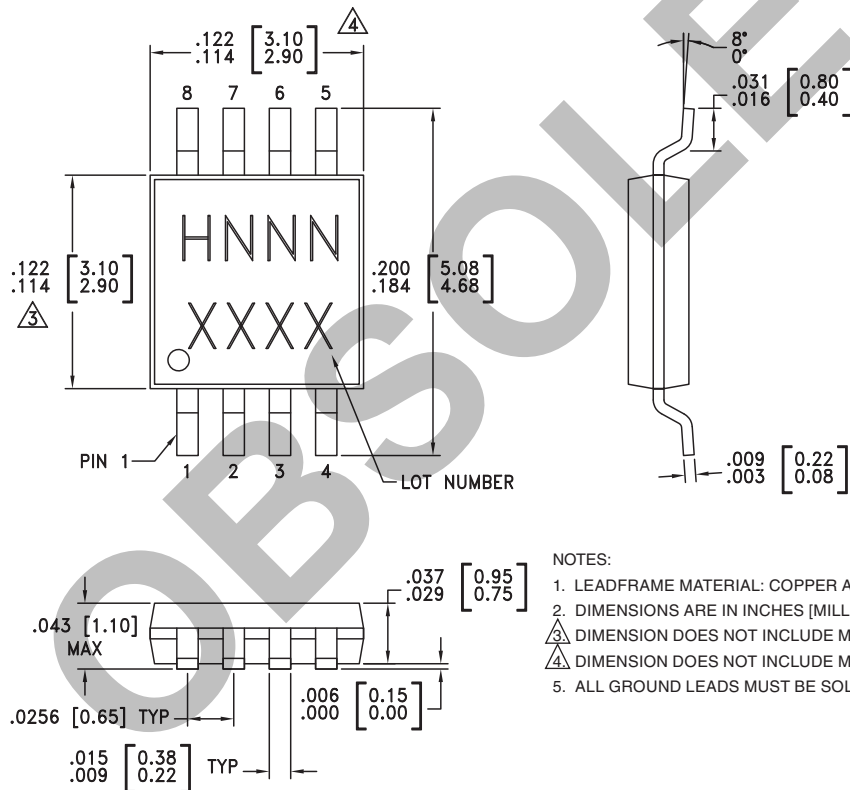
Absolute Maximum Ratings

| | |
|-----------------------|----------------|
| RF / IF Input | +13 dBm |
| LO Drive | +27 dBm |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 1A |



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Outline Drawing



NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
- ⚠ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- ⚠ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

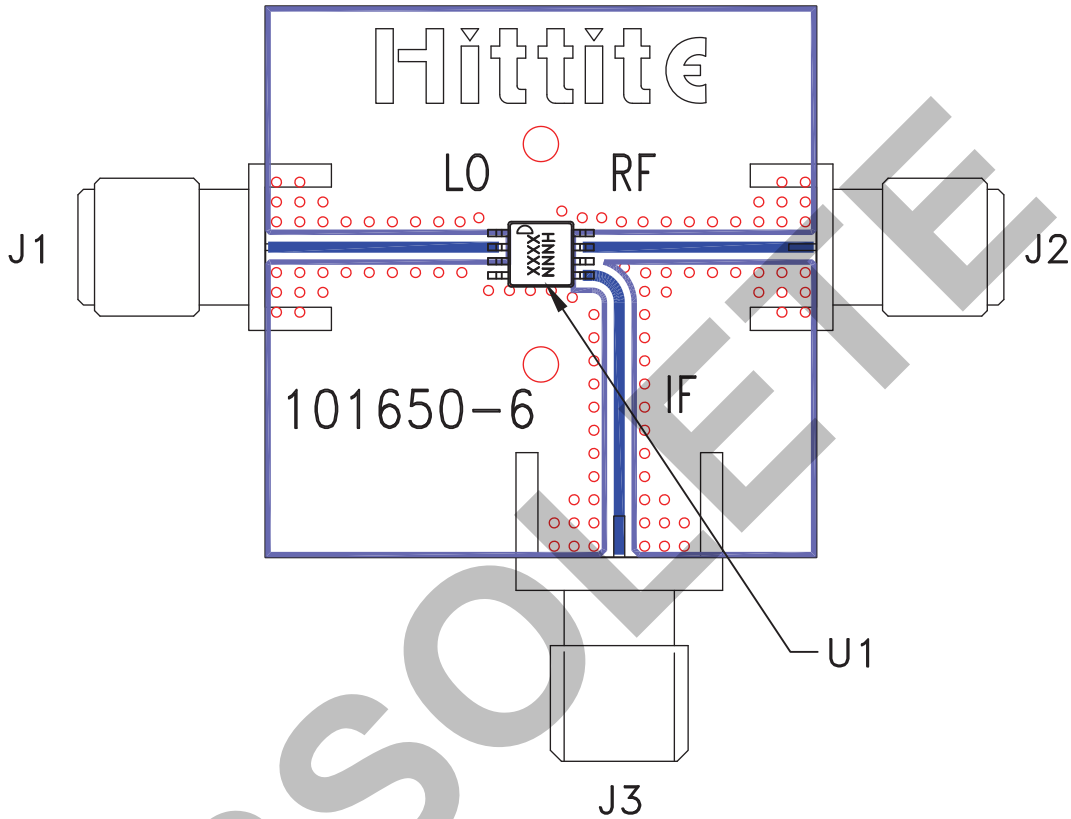
Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[3] |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC175MS8 | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 ^[1] | H175 XXXX |
| HMC175MS8E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | H175 XXXX |

[1] Max peak reflow temperature of 235 °C
 [2] Max peak reflow temperature of 260 °C
 [3] 4-Digit lot number XXXX



Evaluation Circuit Board



List of Materials for Evaluation PCB 103350 [1]

| Item | Description |
|---------|------------------------------|
| J1 - J3 | PCB Mount SMA RF Connector |
| U1 | HMC175MS8 / HMC175MS8E Mixer |
| PCB [2] | 101650 Evaluation Board |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

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:**

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[HMC175MS8E](#) [HMC175MS8](#) [103350-HMC175MS8](#) [HMC175MS8ETR](#) [HMC175MS8TR](#)