

GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz

Typical Applications

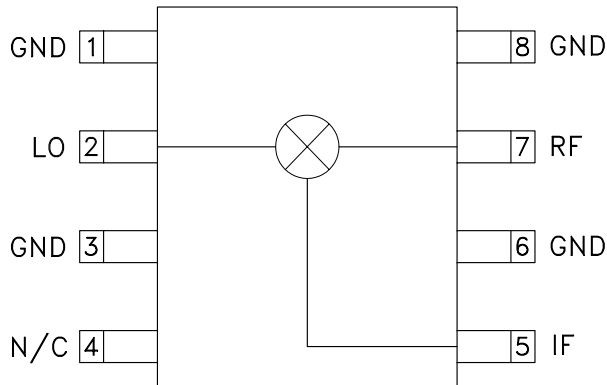
The HMC207S8 is ideal for:

- Base Stations
- Cable Modems
- Portable Wireless

Features

- Conversion Loss: 9.0 dB
- LO / IF Isolation: 45 dB
- LO / RF Isolation: 40 dB
- IP3 (Input): +17 dBm

Functional Diagram



General Description

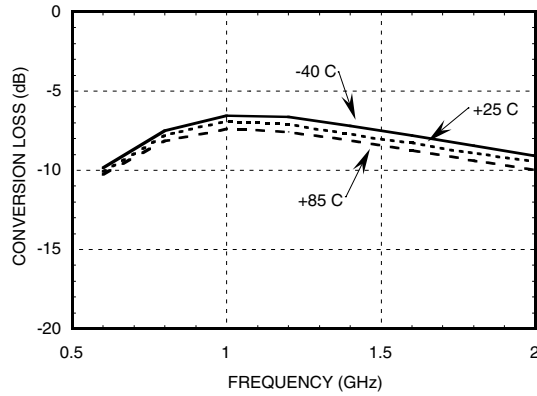
The HMC207S8 is a miniature double-balanced mixer in an 8 lead plastic surface mount Small Outline IC (SOIC) package. This passive MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip. The device can be used as an upconverter, down-converter, biphas modulator (de)modulator, or phase comparator. The consistent MMIC performance will improve system operation and assure regulatory compliance. The high LO suppression of 45 to 50 dB yields excellent carrier suppression for modulator applications.

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

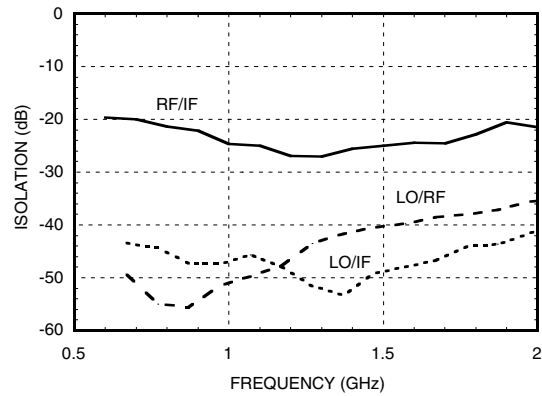
| Parameter | LO = +13 dBm IF = 70 MHz | | | LO = +10 dBm IF = 70 MHz | | | Units |
|-------------------------------|-----------------------------|------|------|-----------------------------|------|------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Frequency Range, RF & LO | 0.7 - 2.0 | | | 0.8 - 1.2 | | | GHz |
| Frequency Range, IF | DC - 0.3 | | | DC - 0.3 | | | GHz |
| Conversion Loss | | 9 | 10.5 | | 7.5 | 10 | dB |
| Noise Figure (SSB) | | 9 | 10.5 | | 7.5 | 10 | dB |
| LO to RF Isolation | 32 | 40 | | 40 | 45 | | dB |
| LO to IF Isolation | 38 | 45 | | 40 | 45 | | dB |
| RF to IF Isolation | 17 | 23 | | 18 | 22 | | dB |
| IP3 (Input) | 14 | 17 | | 12 | 15 | | dBm |
| 1 dB Gain Compression (Input) | 8 | 11 | | 7 | 10 | | dBm |

GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz

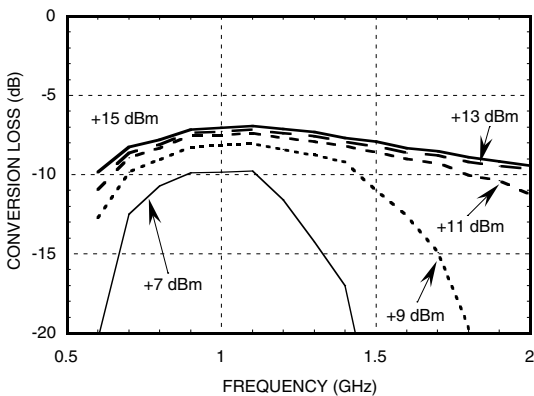
Conversion Loss vs Temperature @ LO = +13 dBm



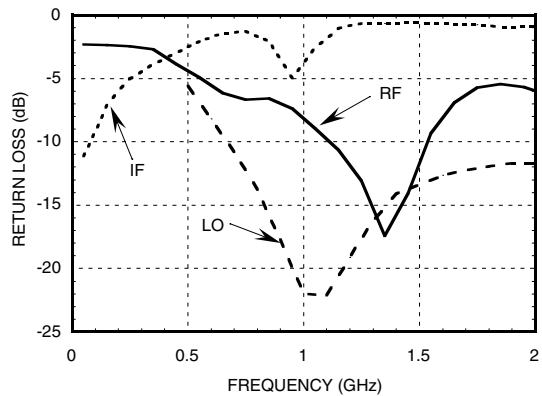
Isolation @ LO = +13 dBm



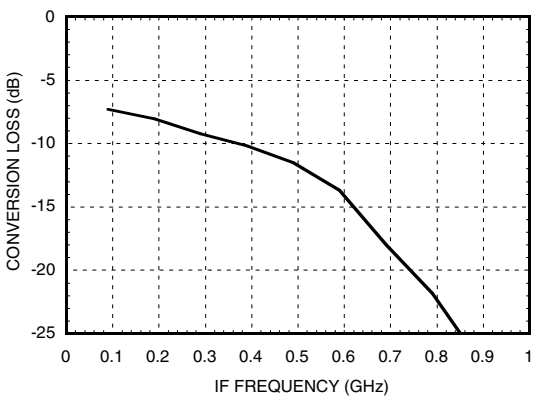
Conversion Loss vs. LO Drive



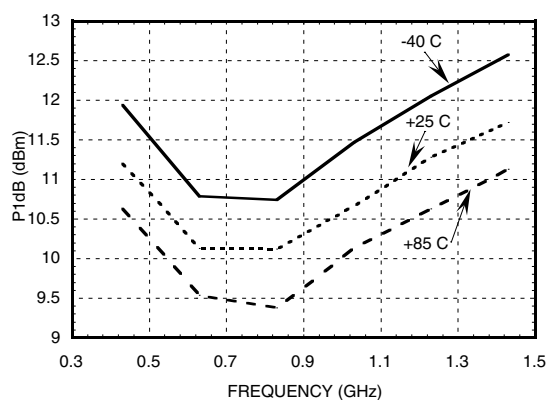
Return Loss @ LO = +13 dBm



IF Bandwidth @ LO = +13 dBm

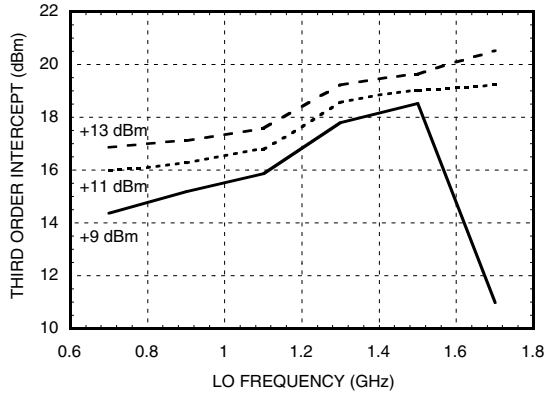


P1dB vs. Temperature @ LO = +13 dBm

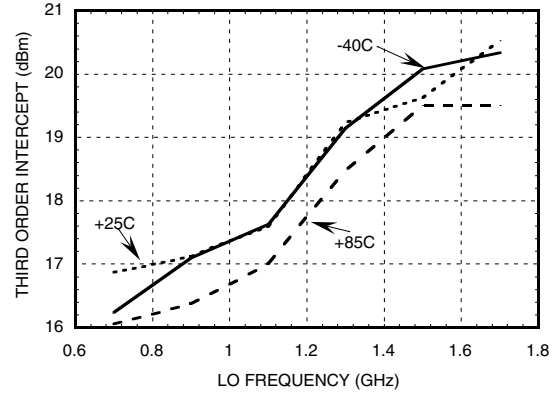


GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz

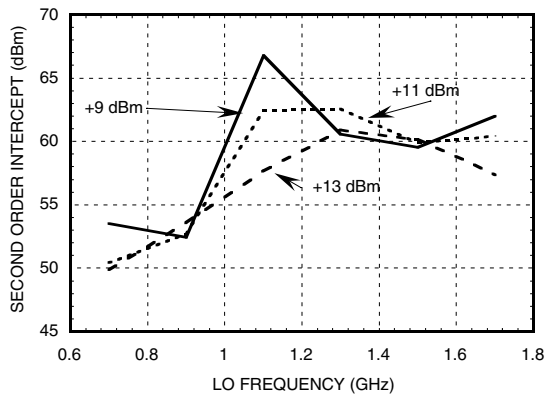
Input IP3 vs. LO Drive



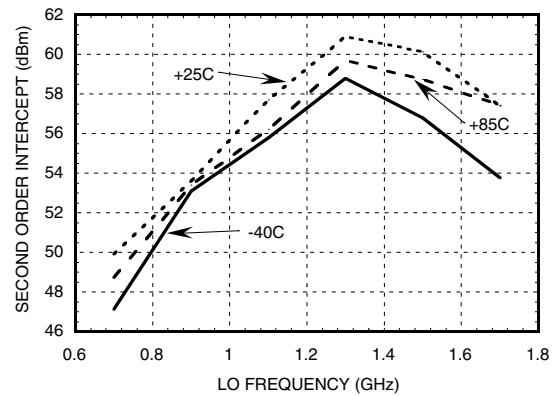
Input IP3 vs. Temperature @ LO = +13 dBm



Input IP2 vs. LO Drive



Input IP2 vs. Temperature @ LO = +13 dBm



MxN Spurious Outputs

| mRF | nLO | | | | |
|-----|------|------|------|----|----|
| | 0 | 1 | 2 | 3 | 4 |
| 0 | xx | 19 | 27 | 20 | 36 |
| 1 | 17 | 0 | 43 | 43 | 39 |
| 2 | 64 | 66 | 63 | 74 | 75 |
| 3 | 91 | 94 | 92 | 65 | 86 |
| 4 | >105 | >105 | >105 | 97 | 97 |

RF = 0.9 GHz @ -10 dBm
 LO = 0.97 GHz @ +13 dBm
 All values in dBc relative to the IF

Harmonics of LO

| LO Freq. (GHz) | nLO Spur at RF Port | | | |
|----------------|---------------------|----|----|----|
| | 1 | 2 | 3 | 4 |
| 0.7 | 49 | 38 | 54 | 50 |
| 0.9 | 54 | 35 | 53 | 59 |
| 1.1 | 49 | 34 | 53 | 57 |
| 1.3 | 42 | 34 | 46 | 56 |
| 1.5 | 40 | 36 | 43 | 58 |
| 1.7 | 38 | 42 | 40 | 61 |

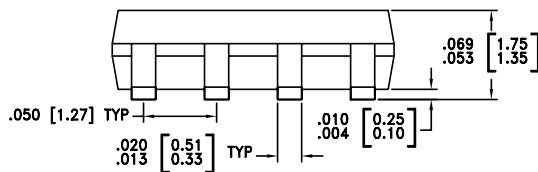
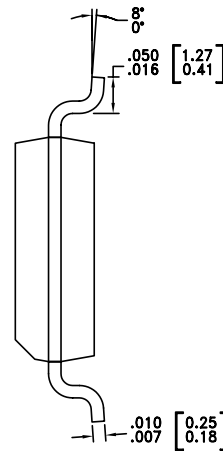
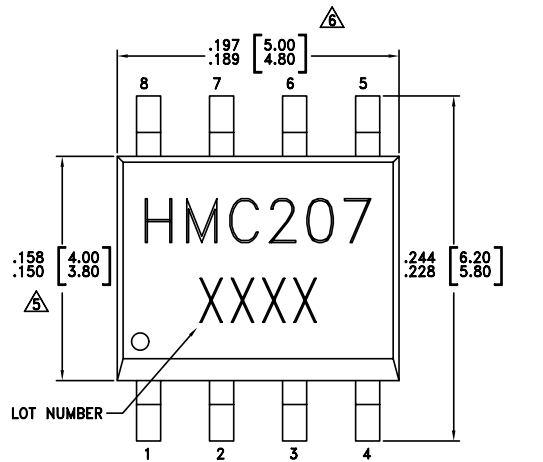
LO = +13 dBm
 Values in dBc below input LO level measured at RF Port.

GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz



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

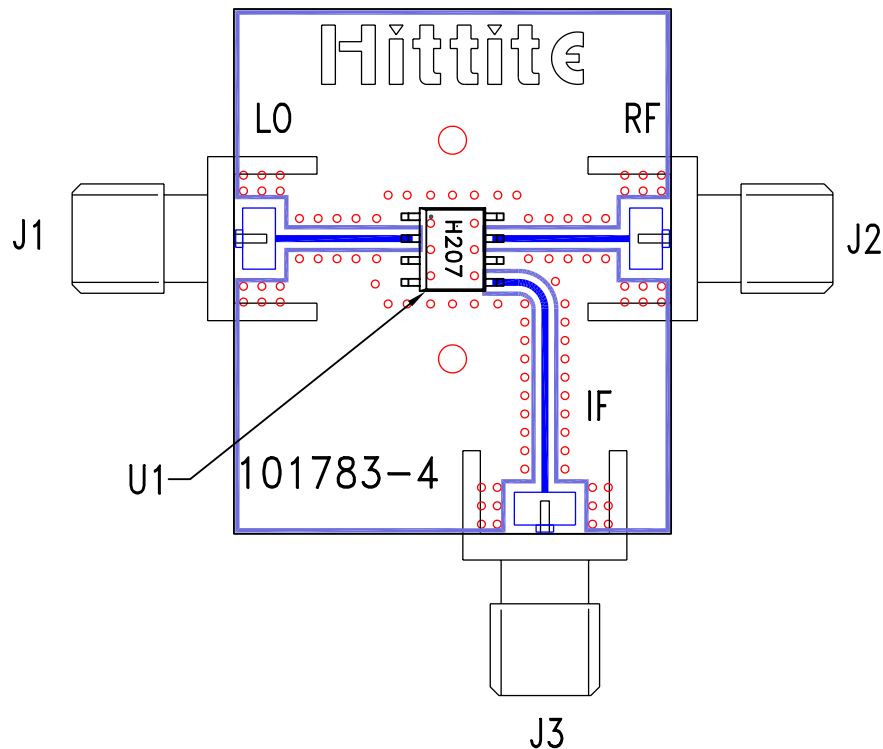


NOTES:

- PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
- LEADFRAME MATERIAL: COPPER ALLOY
- LEADFRAME PLATING: Sn/Pb SOLDER
- 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.
- ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz

Evaluation PCB



List of Material

| Item | Description |
|---------------------------------------|---------------------------|
| J1 - J3 | PC Mount SMA RF Connector |
| U1 | HMC207S8 Mixer |
| PCB* | 101783 Evaluation Board |
| * 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 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.

GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz

Notes: