



v01.0801

# HMC207S8

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

### Typical Applications

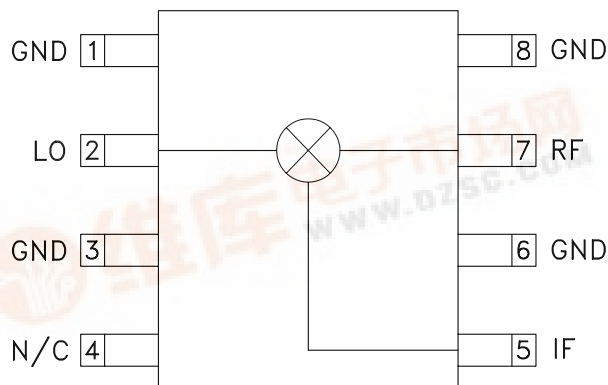
The HMC207S8 is ideal for:

- 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, biphase 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.

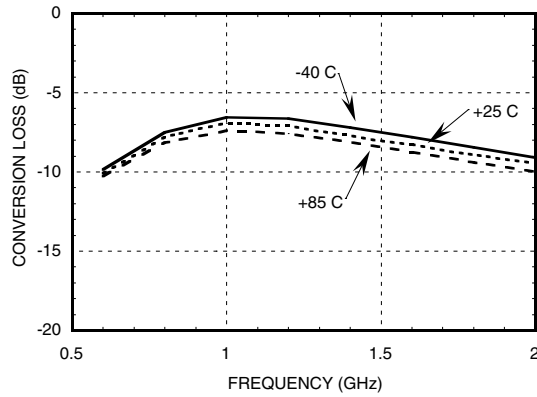
### Electrical Specifications, $T_A = +25^\circ C$ , As a Function of LO Drive

| Parameter                     | LO = +13 dBm<br>IF = 70 MHz |      |      | LO = +10 dBm<br>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   |

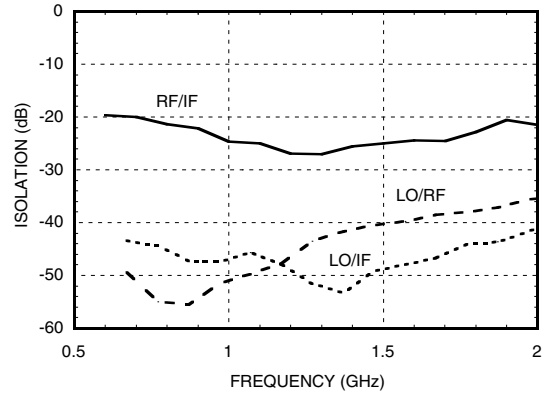


**GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz**

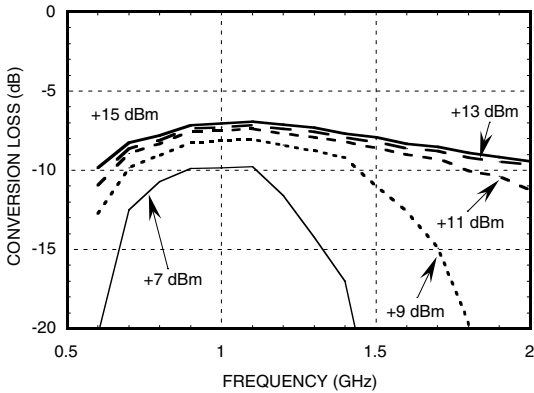
**Conversion Loss vs Temperature @ LO = +13 dBm**



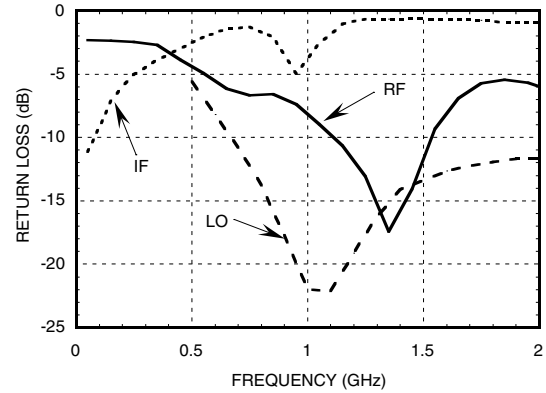
**Isolation @ LO = +13 dBm**



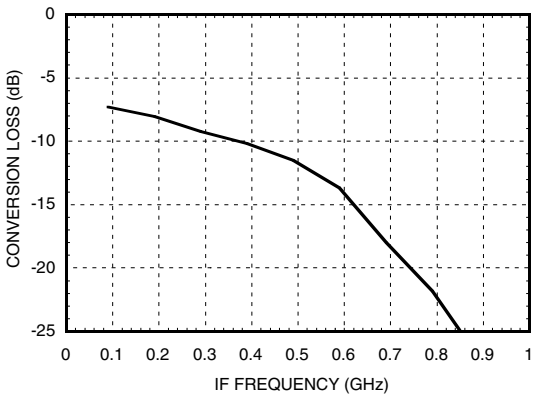
**Conversion Loss vs. LO Drive**



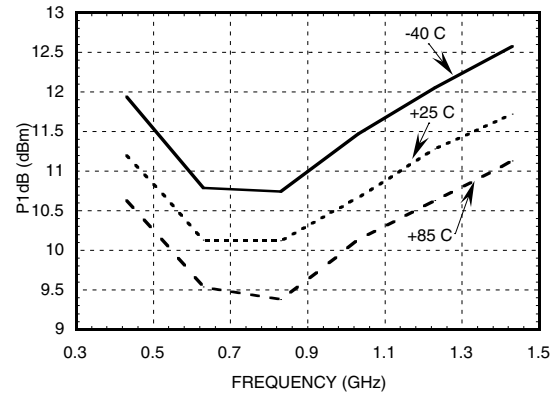
**Return Loss @ LO = +13 dBm**



**IF Bandwidth @ LO = +13 dBm**

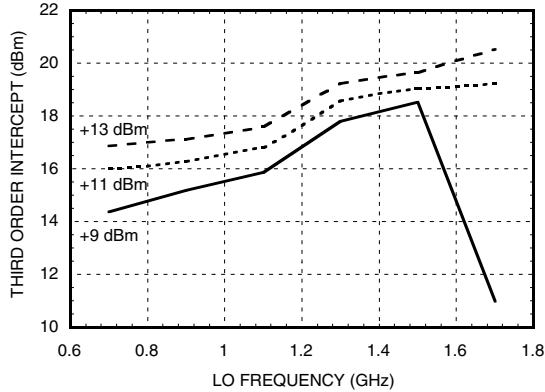


**P1dB vs. Temperature @ LO = +13 dBm**

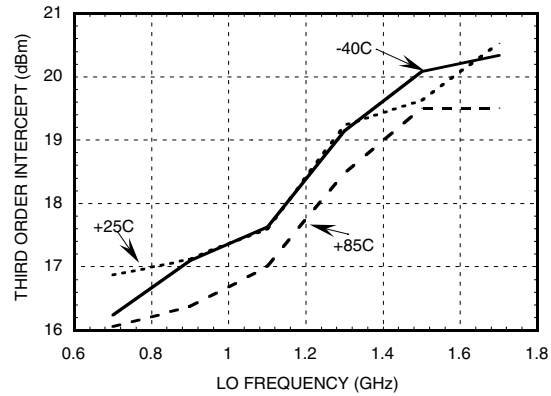


## GaAs MMIC SMT DOUBLE-BALANCED MIXER, 0.7 - 2.0 GHz

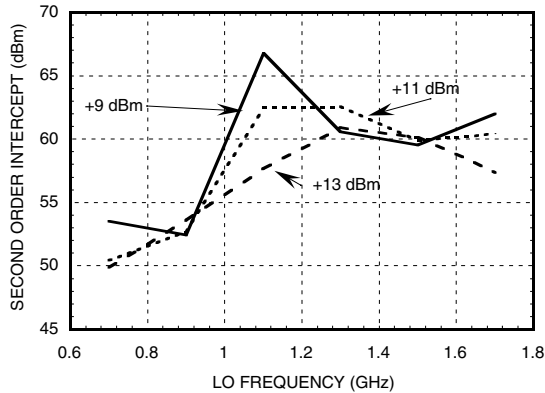
**Input IP3 vs. LO Drive**



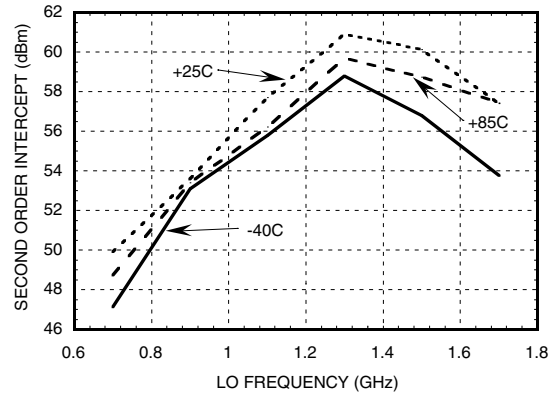
**Input IP3 vs. Temperature @ LO = +13 dBm**



**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 |

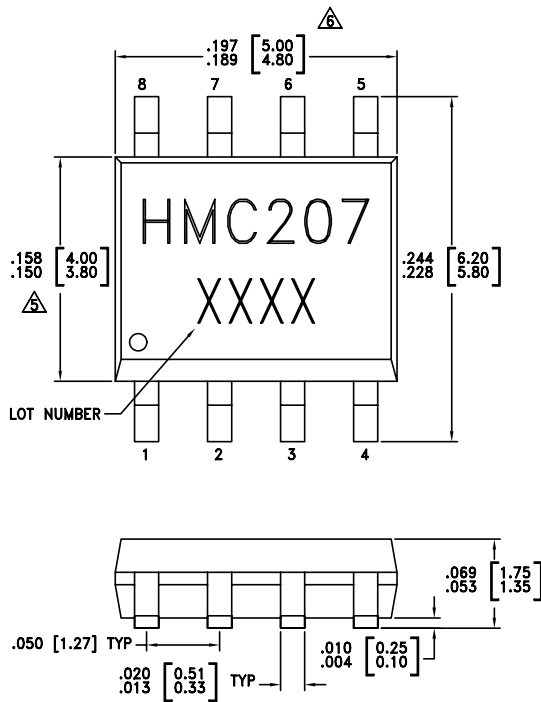
LO = +13 dBm  
 Values in dBc below input LO level measured at RF Port.

## 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

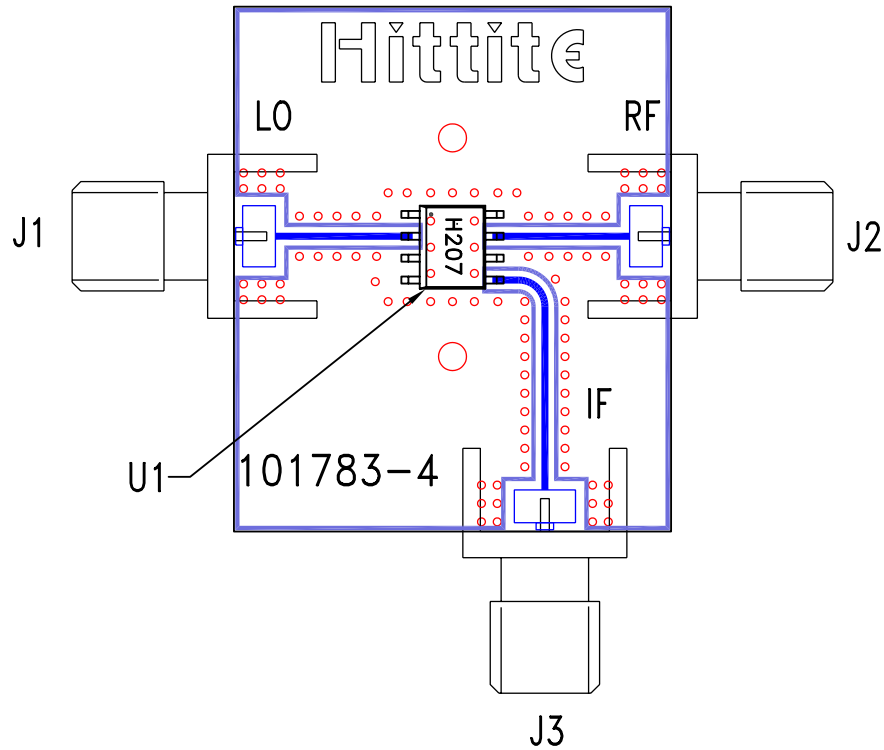


NOTES:

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].
- △ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- △ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. 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.



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***Notes:***

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MIXERS - SMT