

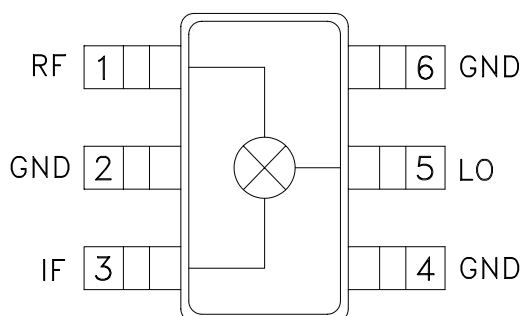
## **GaAs MMIC SMT SINGLE BALANCED MIXER, 1.7 - 3.5 GHz**

### **Typical Applications**

The HMC285 is ideal for:

- PCS
- W-CDMA
- 2.4 GHz ISM
- MMDS

### **Functional Diagram**



### **Features**

No External Components Required

LO / RF Isolation: 30 dB

Input IP3: +20 dBm

Ultra Small SOT26 Package

### **General Description**

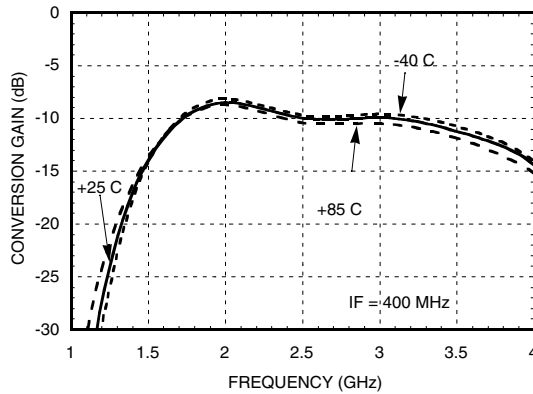
The HMC285 is an ultra miniature single balanced mixer in an 6 lead plastic surface mount SOT26 package. This passive MMIC mixer is constructed of GaAs Schottky diodes and a novel planar transformer balun on the chip. The RF port is balanced via the MMIC balun while the LO port is connected directly to the diodes. The consistent MMIC performance will improve system operation without the need for external components. The SOT26 package is the smallest footprint available for a complete single-balanced mixer, 0.118" x 0.118" (3.0mm x 3.0mm).

### **Electrical Specifications, $T_A = +25^\circ\text{C}$ , As a Function of IF Frequency**

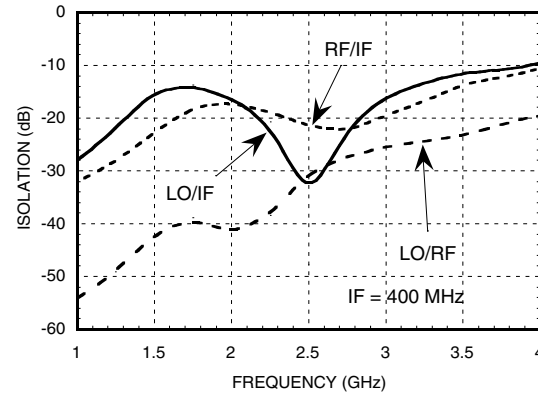
| Parameter                | LO = +10 dBm<br>IF = 100 MHz |      |      | LO = +10 dBm<br>IF = 400 MHz |      |      | Units |
|--------------------------|------------------------------|------|------|------------------------------|------|------|-------|
|                          | Min.                         | Typ. | Max. | Min.                         | Typ. | Max. |       |
| Frequency Range, RF & LO | 2 - 3.5                      |      |      | 1.7 - 2.8                    |      |      | GHz   |
| Frequency Range, IF      | DC - 0.9                     |      |      | DC - 0.9                     |      |      | GHz   |
| Conversion Loss          |                              | 9    | 11   |                              | 9.5  | 11.5 | dB    |
| Noise Figure (SSB)       |                              | 9    | 11   |                              | 9.5  | 11.5 | dB    |
| LO to RF Isolation       | 20                           | 30   |      | 25                           | 35   |      | dB    |
| LO to IF Isolation       | 11                           | 20   |      | 14                           | 20   |      | dB    |
| IP3 (Input)              | 17                           | 21   |      | 16                           | 20   |      | dBm   |
| 1 dB Compression (Input) | 7                            | 11   |      | 6                            | 10   |      | dBm   |

## GaAs MMIC SMT SINGLE BALANCED MIXER, 1.7 - 3.5 GHz

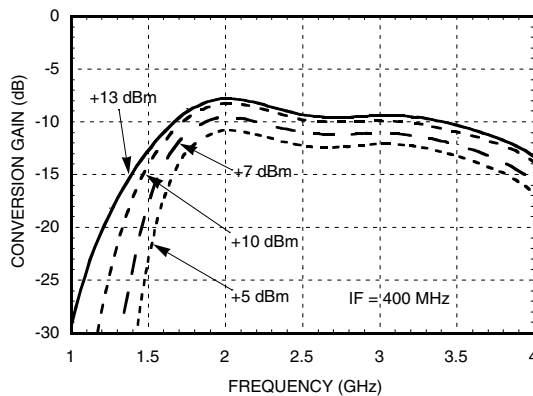
**Conversion Gain vs.  
Temperature @ LO = +10 dBm**



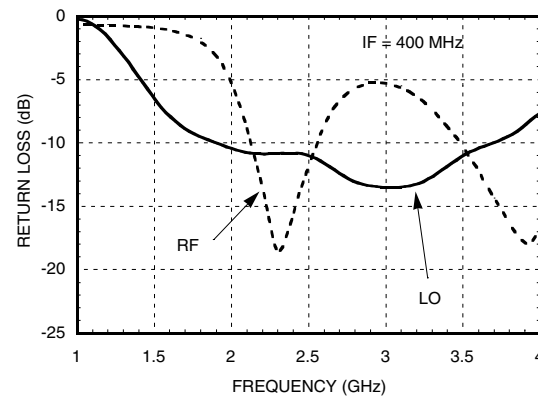
**Isolation @ LO = +10 dBm**



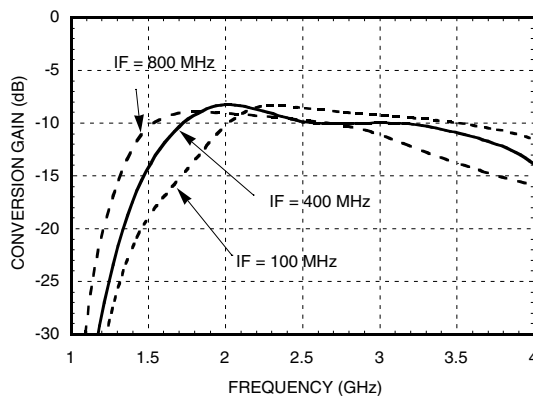
**Conversion Gain vs. LO Drive**



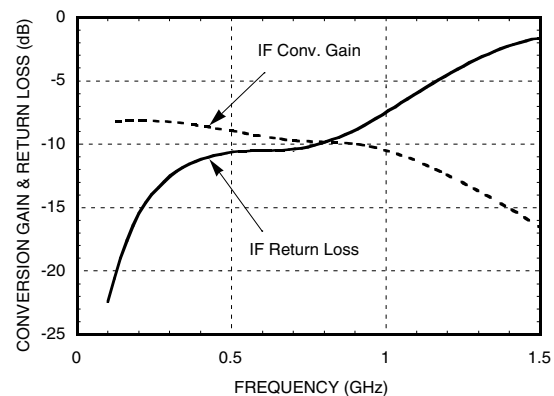
**Return Loss @ LO = +10 dBm**



**Conversion Gain vs. IF Frequency**

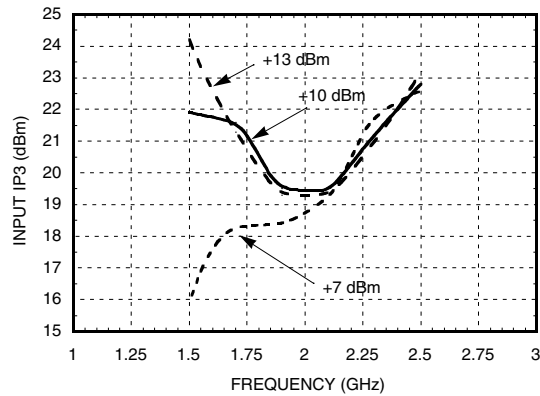


**IF Bandwidth @ LO = +10 dBm.  
Conversion Gain & Return Loss**

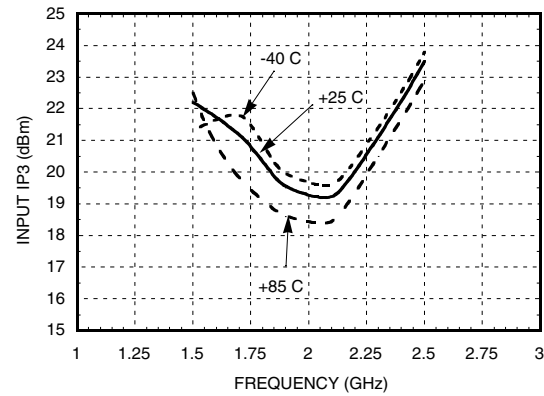


## GaAs MMIC SMT SINGLE BALANCED MIXER, 1.7 - 3.5 GHz

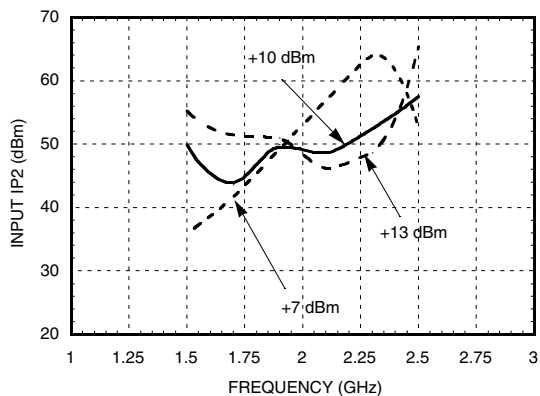
**Input IP3 vs. LO Drive**



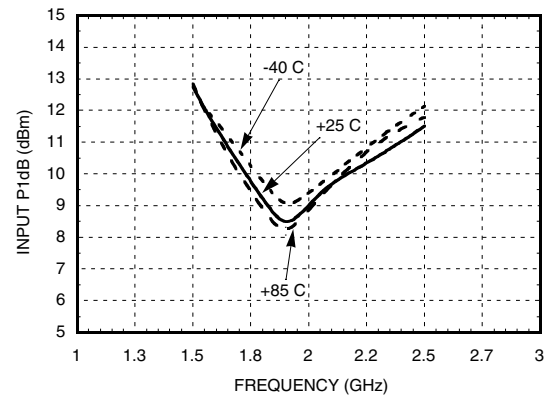
**Input IP3 vs.  
Temperature @ LO = +10 dBm**



**Input IP2 vs. LO Drive**



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



**MxN Spurious Outputs**

| mRF | nLO  |       |      |      |      |
|-----|------|-------|------|------|------|
|     | 0    | 1     | 2    | 3    | 4    |
| 0   | xx   | -12.4 | 1    | 1    | 33   |
| 1   | 10   | 0     | 38   | 23   | 43   |
| 2   | 59   | 60    | 61   | 43   | 62   |
| 3   | >110 | 87    | 90   | 80   | 88   |
| 4   | >110 | >110  | >110 | >110 | >110 |

RF = 2.6 GHz @ -10 dBm  
LO = 2.2 GHz @ +10 dBm  
All values in dBc relative to the IF

**Harmonics of LO**

| LO Frequency (GHz) | nLO Spur at RF Port |    |    |    |
|--------------------|---------------------|----|----|----|
|                    | 1                   | 2  | 3  | 4  |
| 1.5                | 42                  | 17 | 47 | 47 |
| 1.7                | 39                  | 16 | 41 | 44 |
| 1.9                | 39                  | 15 | 37 | 44 |
| 2.1                | 47                  | 16 | 35 | 45 |
| 2.3                | 36                  | 18 | 32 | 48 |
| 2.5                | 30                  | 21 | 32 | 50 |

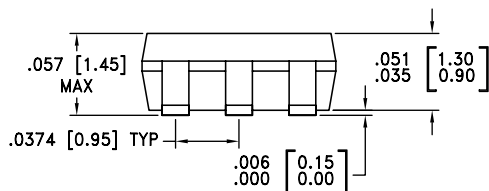
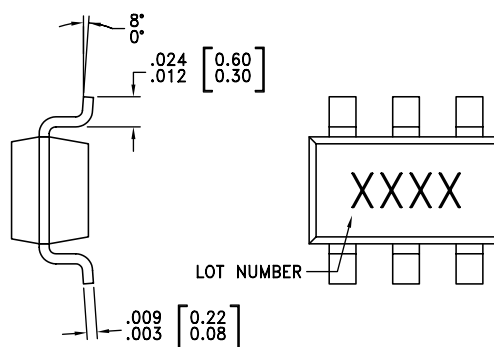
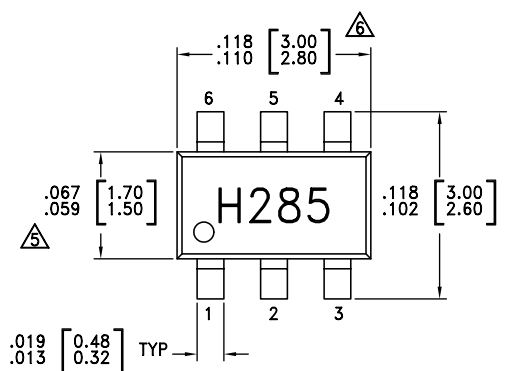
LO = +10 dBm  
Values in dBc below input LO level measured at the RF port

## GaAs MMIC SMT SINGLE BALANCED MIXER, 1.7 - 3.5 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

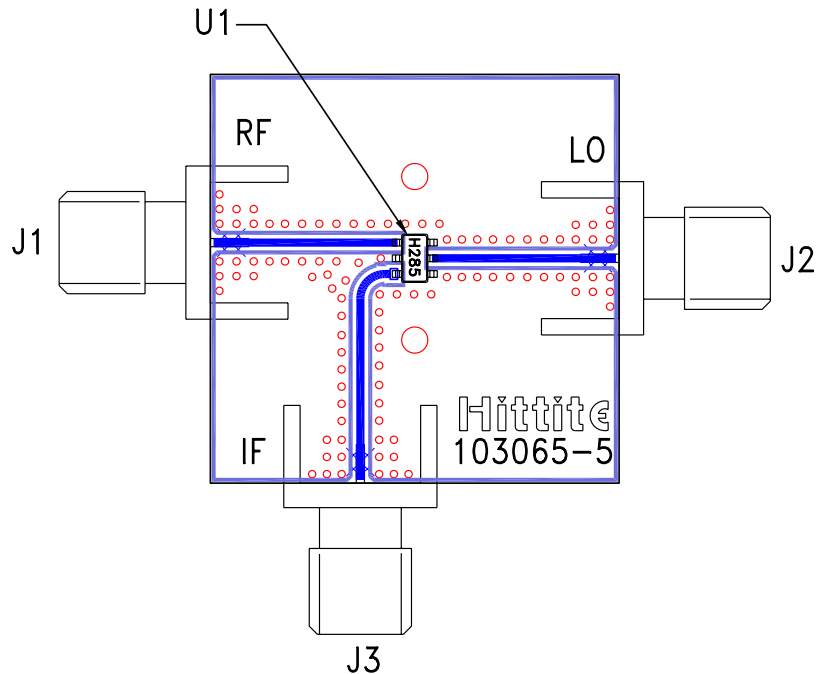


#### NOTES:

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].
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.

## *GaAs MMIC SMT SINGLE BALANCED MIXER, 1.7 - 3.5 GHz*

### *Evaluation Board Layout*



### *List of Materials*

|                                |                        |
|--------------------------------|------------------------|
| J1 - J3                        | PC Mount SMA Connector |
| U1                             | HMC285 Mixer           |
| PCB                            | 103065 Eval Board      |
| * Circuit Board Material: 4350 |                        |

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines should have 50 ohm impedance and the package ground leads should be connected directly to the ground plane similar to that shown above. The evaluation circuit board as shown is available from Hittite upon request.

## ***GaAs MMIC SMT SINGLE BALANCED MIXER, 1.7 - 3.5 GHz***

### ***Notes:***