

Analog Devices Welcomes Hittite Microwave Corporation

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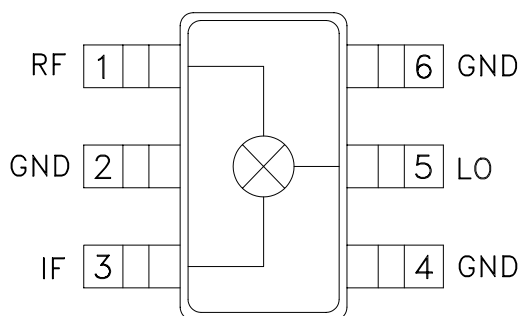
GaAs MMIC SMT
SINGLE-BALANCED MIXER, 1.7 - 3.5 GHz
Typical Applications

The HMC285 / HMC285E is ideal for:

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

Features

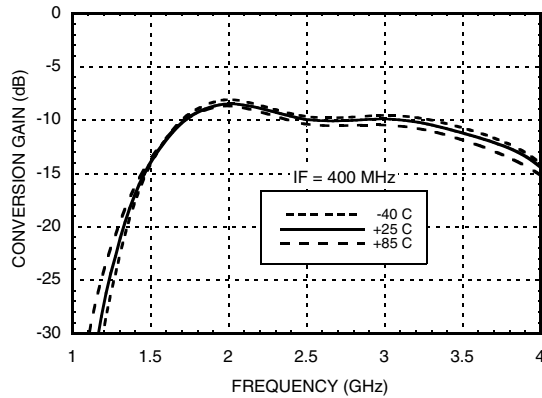
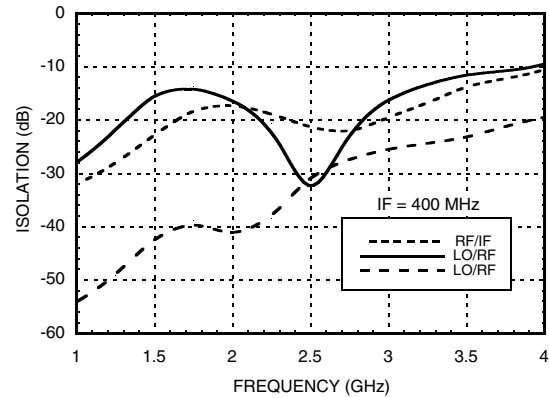
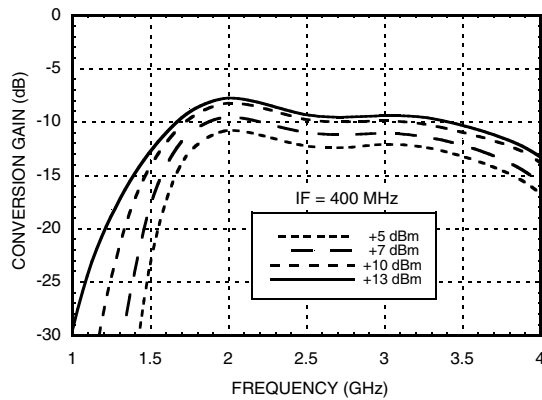
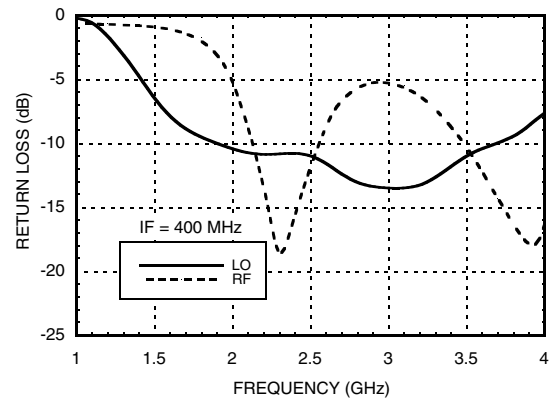
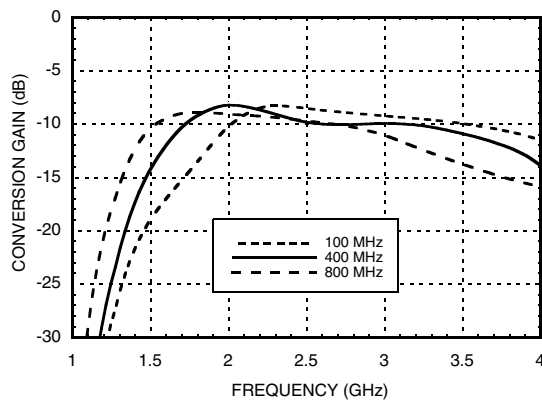
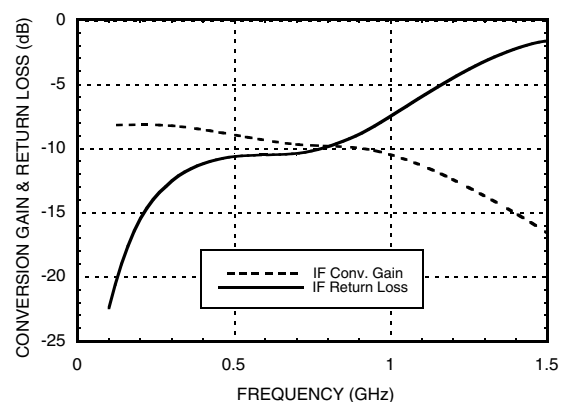
- No External Components Required
- LO / RF Isolation: 30 dB
- Input IP3: +21 dBm
- Ultra Small SOT26 Package

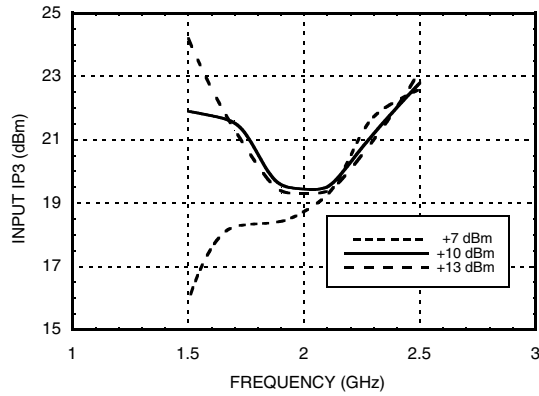
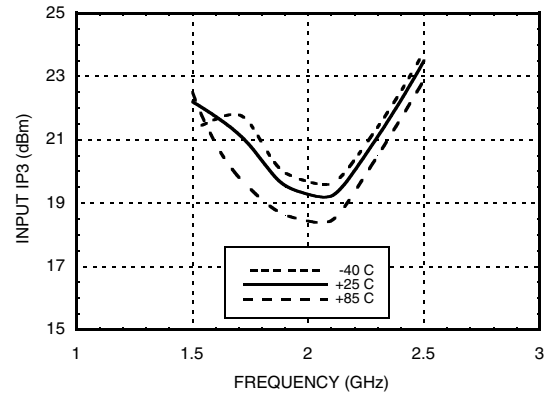
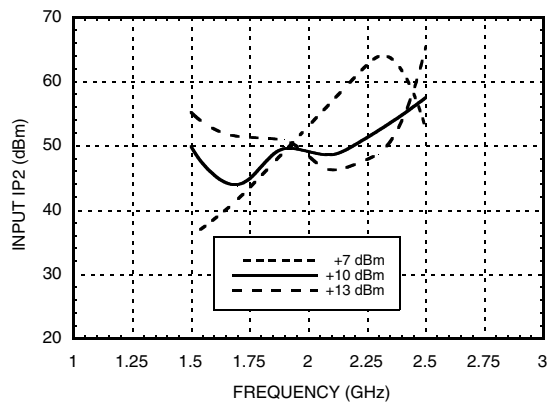
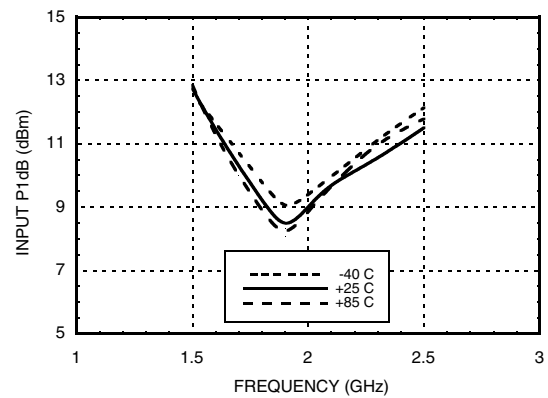
Functional Diagram

General Description

The HMC285 & HMC285E are ultra miniature single balanced mixers in 6 lead plastic surface mount SOT26 packages. 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 x 3 mm).

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

| Parameter | LO = +10 dBm IF = 100 MHz | | | LO = +10 dBm 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
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**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



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

Absolute Maximum Ratings

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

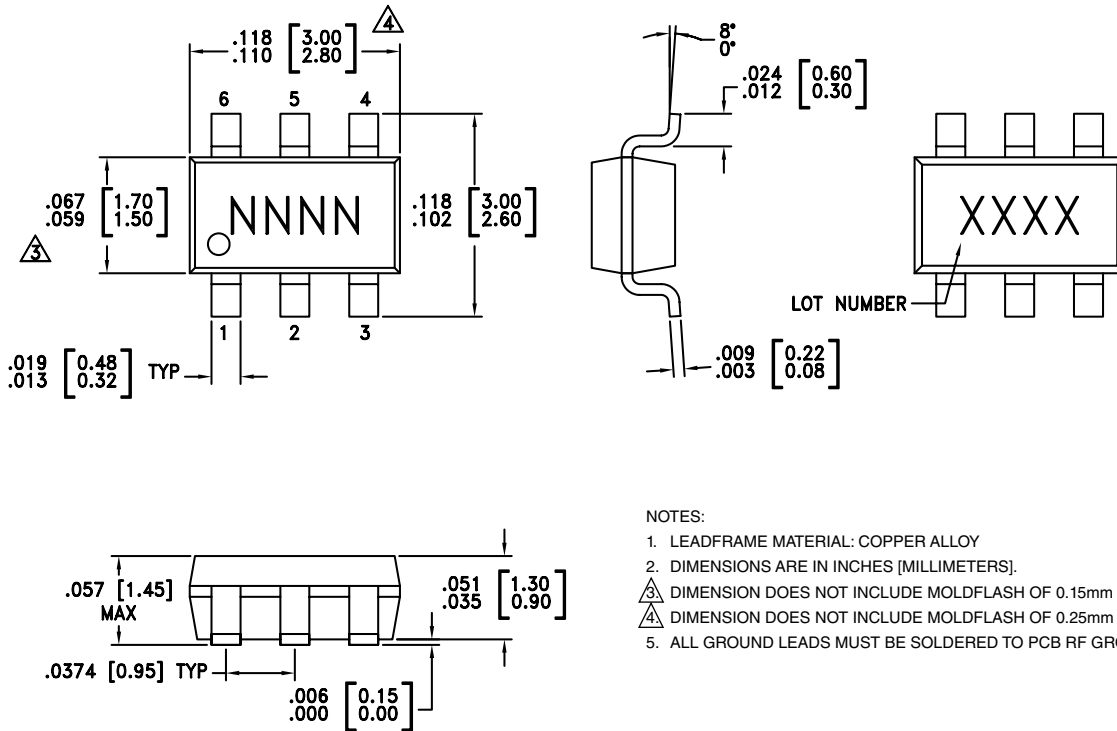


**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**



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

Outline Drawing



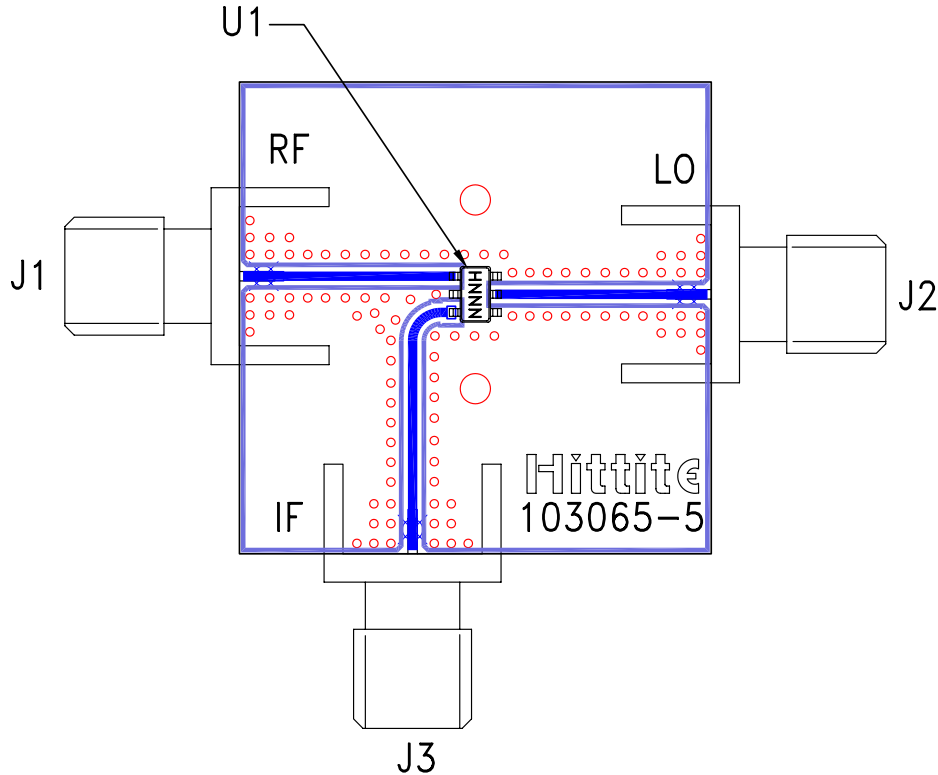
- NOTES:
1. LEADFRAME MATERIAL: COPPER ALLOY
 2. DIMENSIONS ARE IN INCHES [MILLIMETERS].
 3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
 4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
 5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[3] |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC285 | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 ^[1] | H285 XXXX |
| HMC285E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | 285E XXXX |

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

Evaluation Board Layout



List of Materials for Evaluation PCB 103240 [1]

| Item | Description |
|---------|------------------------|
| J1 - J3 | PC Mount SMA Connector |
| U1 | HMC285 / HMC285E Mixer |
| PCB [2] | 103065 Eval Board |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the 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.