

GaAs MMIC SMT SINGLE BALANCED MIXER 1.7 - 3.5 GHz

FEBRUARY 2001

v00.0700

Features

NO EXTERNAL COMPONENTS REQUIRED

LO/RF ISOLATION: 32 dB

INPUT IP3: +20 dBm

IDEAL FOR MMDS & W-CDMA

General Description

The HMC285 is an ultra miniature single balanced mixer in a 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 device can be used as an up or downconverter for PCS, W-CDMA, 2.4 ISM, or MMDS applications. 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).



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Guaranteed Performance, As a Function of IF Frequency, -40 to +85 deg C

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 - 900			DC - 900			MHz
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 Gain Compression (Input)	7	11		6	10		dBm
Local Oscillator Drive Level (Typical)	7 to 15			7 to 15			dBm

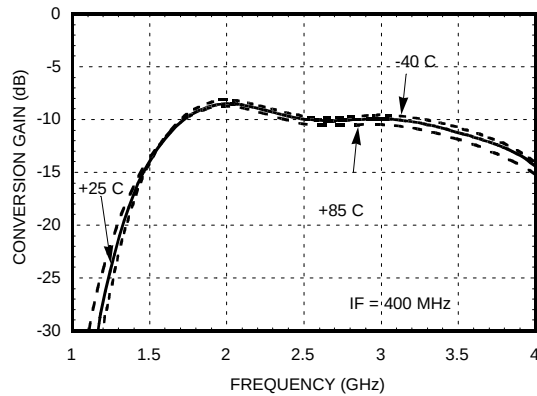
Note: The IF frequency may be used from 400 - 800 MHz if the RF/LO frequency range is 1.5 - 2.7 GHz with an LO drive = +10dBm. Increasing the LO drive increases the bandwidth for all frequency schemes.

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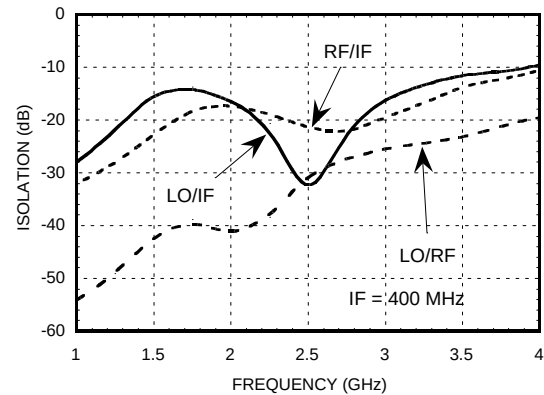
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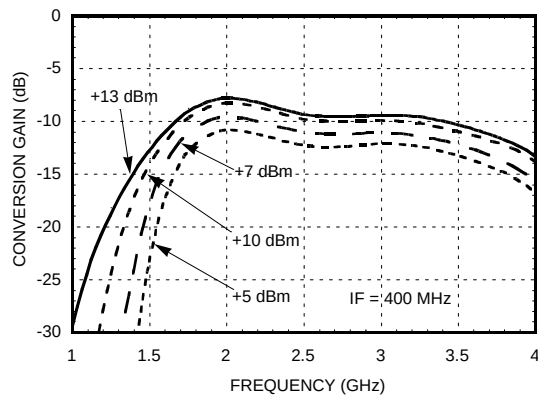
**Conversion Gain vs.
Temperature @ LO = +10 dBm**



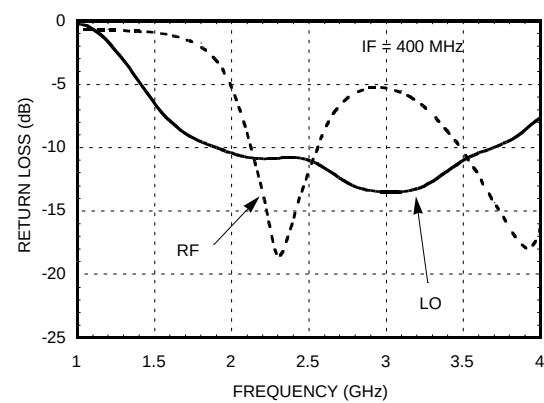
Isolation @ LO = +10 dBm



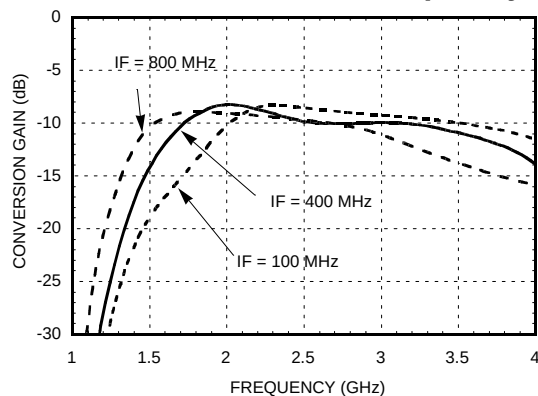
Conversion Gain vs. LO Drive



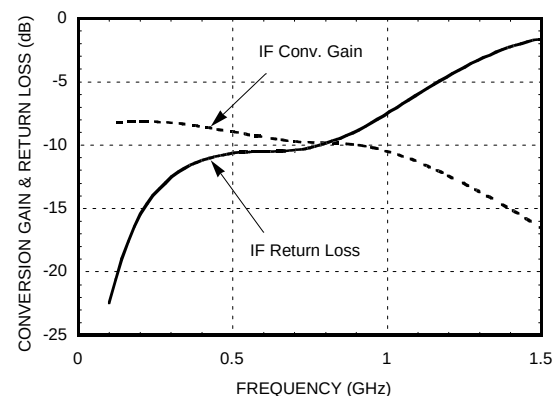
Return Loss @ LO = +10 dBm



Conversion Gain vs. IF Frequency



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



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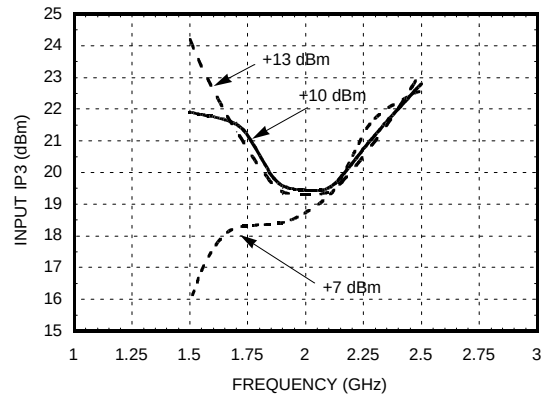


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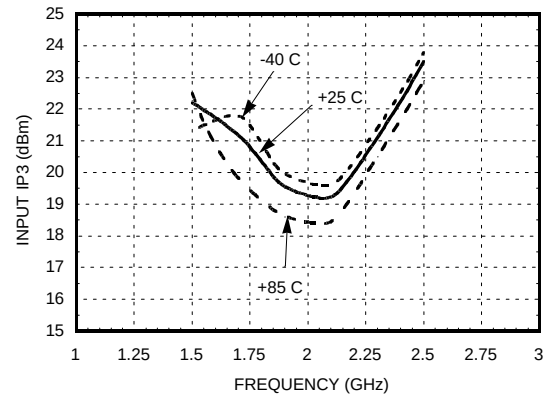
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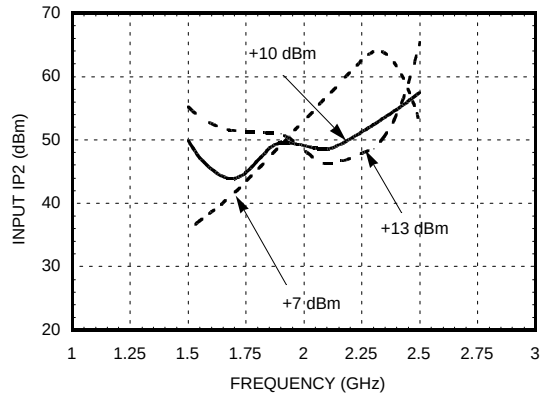
Input IP3 vs. LO Drive



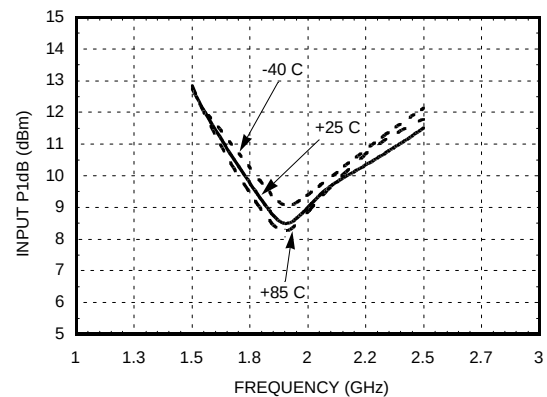
Input IP3 vs. Temperature @ LO = +10 dBm



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

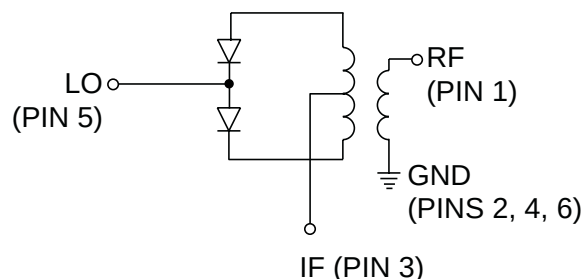
LO= +10 dBm
Values in dBc below input LO level measured at the RF port

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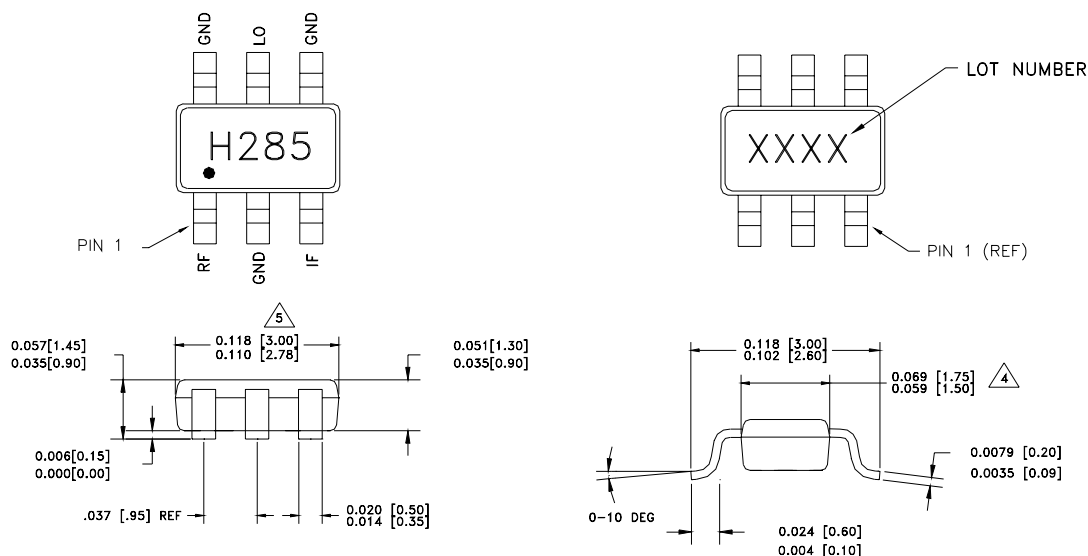
Schematic



Absolute Maximum Ratings

RF / IF Input	+13 dBm
LO Drive	+27 dBm
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +85 deg C

Outline Drawing



- MATERIAL:
 - PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
 - LEADFRAME MATERIAL: COPPER ALLOY
- PLATING: LEAD-TIN SOLDER PLATE
- DIMENSIONS ARE IN INCHES (MILLIMETERS), UNLESS OTHERWISE SPECIFIED TOL. ARE ± 0.005 (± 0.13)
 -  DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.006 (0.15mm) PER SIDE
 -  DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.010 (0.25mm) PER SIDE

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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. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation circuit board is available from Hittite upon request.

Evaluation Circuit Board Layout Design Details

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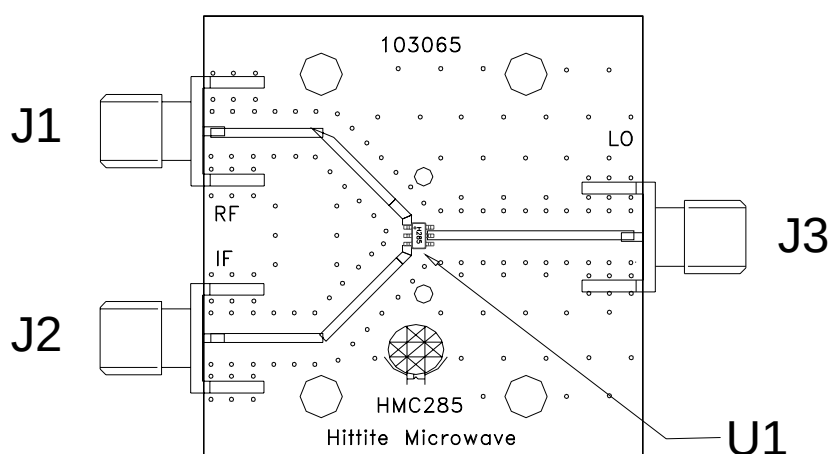
Layout Technique	Grounded Co-Planar Waveguide (GCPW)
Material	Rogers 4350
Dielectric Thickness	0.020" (0.51 mm)
50 Ohm Line Width	0.031" (0.79 mm)
Gap to Ground Edge	0.010" (0.25 mm)
Ground VIA Hole Diameter	0.014" (0.36 mm)
Connectors	SMA-F (EF - Johnson P/N 142-0701-806)

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Eval Board Layout



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

List of Material

J1, J2, J3	PC Mount SMA Connector
U1	HMC285 Mixer
PCB	103065 Eval Board
* Circuite Board Material: 4350	

