

## GaAs MMIC SMT FREQUENCY DOUBLER 2.0 - 4.0 GHz INPUT

FEBRUARY 2001

### Features

CONVERSION LOSS: 13 dB

NO ADDITIVE PHASE NOISE

F<sub>0</sub>, 3F<sub>0</sub>, 4F<sub>0</sub> ISOLATION: >33 dB

INPUT DRIVE LEVEL: +10 to +15 dBm



### General Description

The HMC189MS8 is a miniature passive frequency doubler in a plastic 8-lead MSOP package. The suppression of the undesired fundamental and higher order harmonics is typically 40 to 45 dB with respect to input signal levels. The doubler uses same diode/balun structures used in Hittite MMIC mixers. The doubler is ideal for high volume applications where frequency doubling of a lower frequency is more economical than directly generating a higher frequency. The passive Schottky diode doubler technology contributes no measurable additive phase noise onto the multiplied signal. The HMC189MS8 is ideal for 5.2 UNII, 5.8 ISM, microwave radio and VSAT applications.

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MULTIPLIERS  
SMT

### Guaranteed Performance,

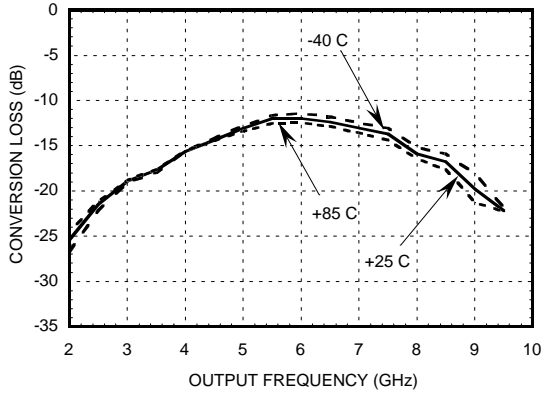
As a Function of Input Power, 50 Ohm system -40 to +85 deg C

Parameter	Input = +10 dBm			Input = +13 dBm			Input = +15 dBm			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, Input	2.5		3.5	2.5		3.75	2		4	GHz
Frequency Range, Output	5		7	5		7.5	4		8	GHz
Conversion Loss		13	17		13	15		13	17	dB
FO Isolation (with respect to input level)	29	32		30	33		31	34		dB
3FO Isolation (with respect to input level)	37	43		35	42		33	40		dB
4FO Isolation (with respect to input level)	32	40		33	40		31	40		dB

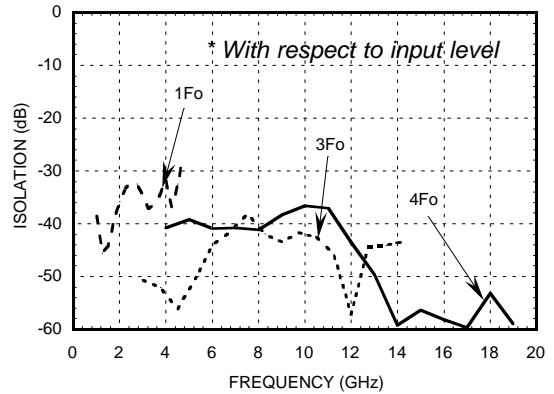
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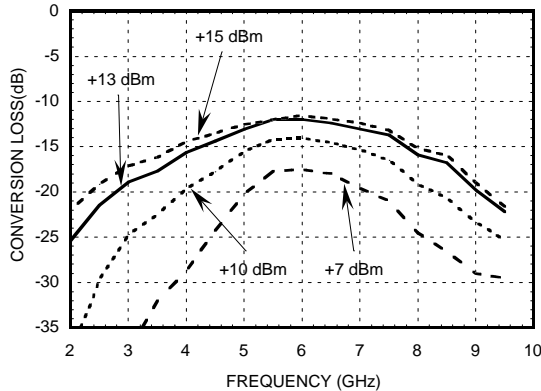
**Conversion Loss @ +13 dBm Drive Level**



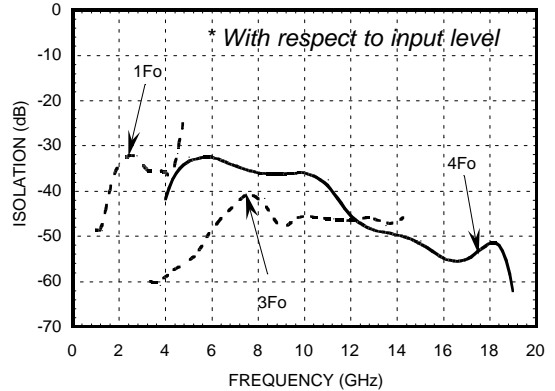
**Isolation\* @ +13 dBm Drive Level**



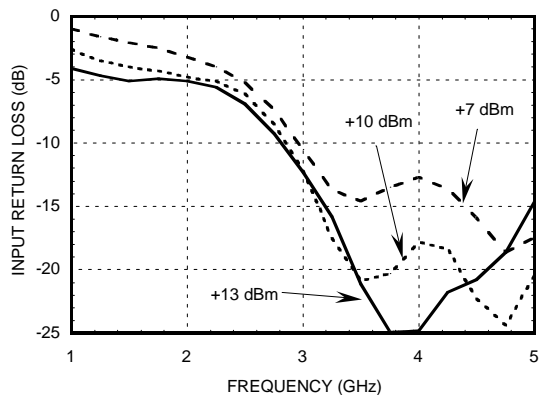
**Conversion Loss vs. Drive Level**



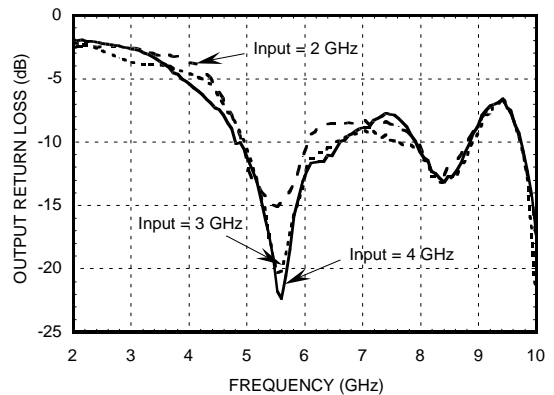
**Isolation\* @ +10 dBm Drive Level**



**Input Return Loss vs. Drive Level**



**Output Return Loss for Several Input Frequencies**

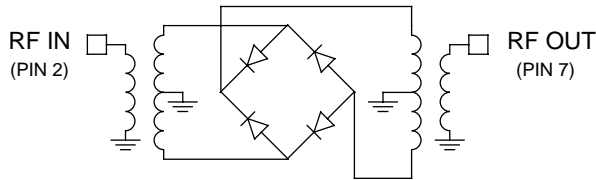


**Note:** Output return loss measured at 2fo, at different input frequencies and +10 dBm drive level.

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### Schematic



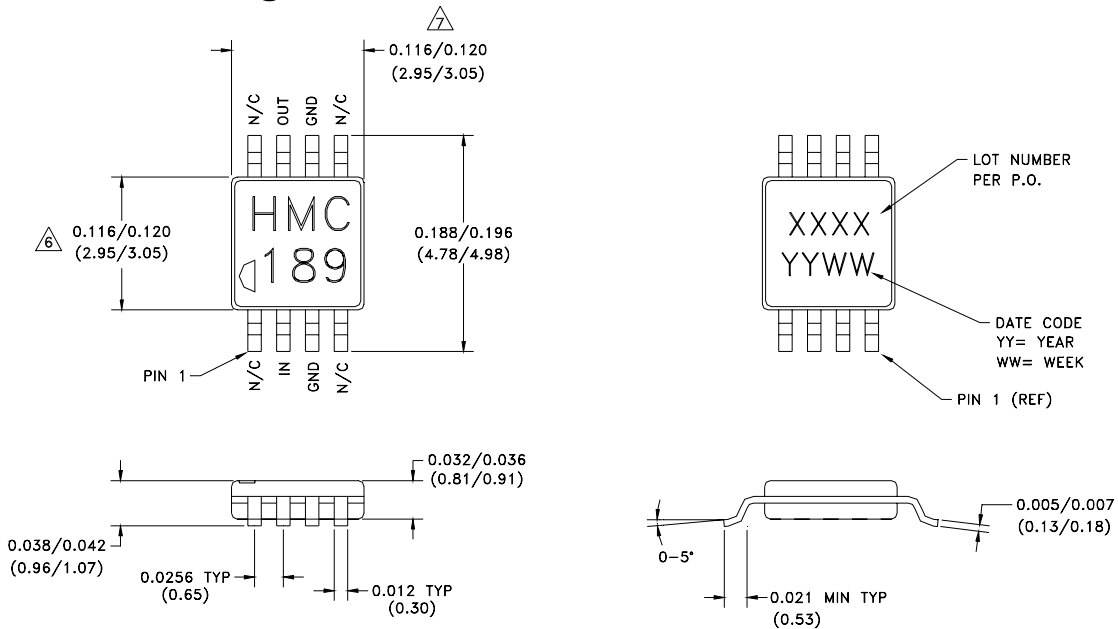
### Absolute Maximum Ratings

Input Drive	+27 dBm
Storage Temperature	-65 to +150 deg. C
Operating Temperature	-40c to +85 deg. C

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SMT MULTIPLIERS

### Outline Drawing

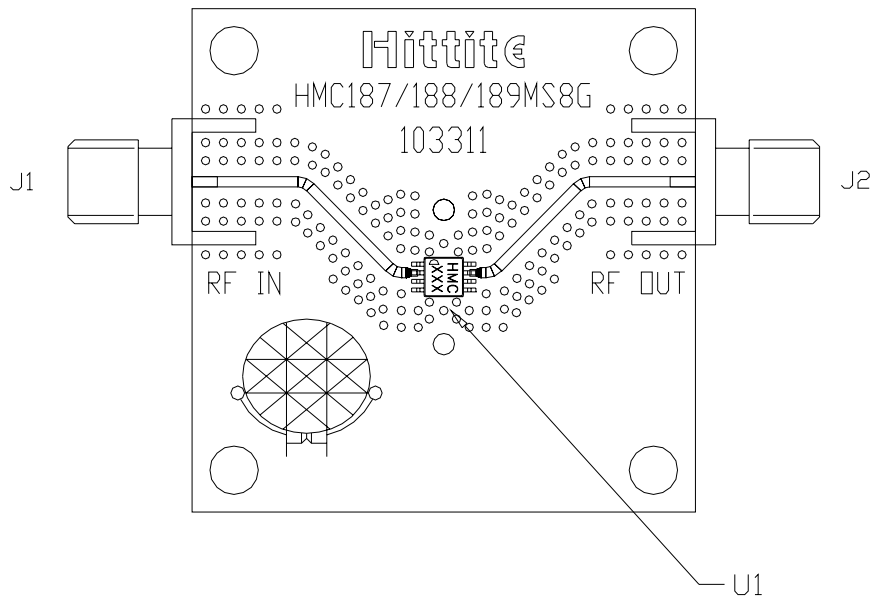


1. MATERIAL:
  - A) PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
  - B) LEADFRAME MATERIAL: COPPER ALLOY
2. PLATING: LEAD - TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS). UNLESS OTHERWISE SPECIFIED ALL TOLERANCES ARE ±0.005(±0.13).
4. LEADS LABELED "N/C" SHOULD BE GROUNDED TO PCB.

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### *Eval Board Layout (Top View)*



The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port 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**

Item	Description
J1, J2	PC Mount SMA Connector
U1	HMC189MS8 Doubler
PCB*	10311 Eval Board
* Circuit Board Material : 4350	

