



MICROWAVE CORPORATION v03.0714



# HMC189AMS8 / 189AMS8E

## GaAs MMIC SMT PASSIVE FREQUENCY DOUBLER, 2 - 4 GHz INPUT

### Typical Applications

The HMC189AMS8(E) is suitable for:

- Wireless Local Loop
- LMDS, VSAT, and Point-to-Point Radios
- UNII & HiperLAN
- Test Equipment

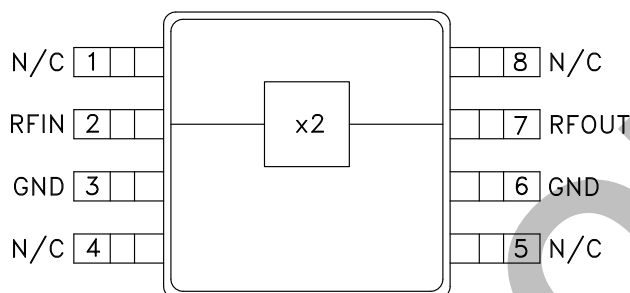
### Features

Conversion Loss: 13 dB

Fo, 3Fo, 4Fo Isolation: 33 dB

Input Drive Level: +10 to +15 dBm

### Functional Diagram

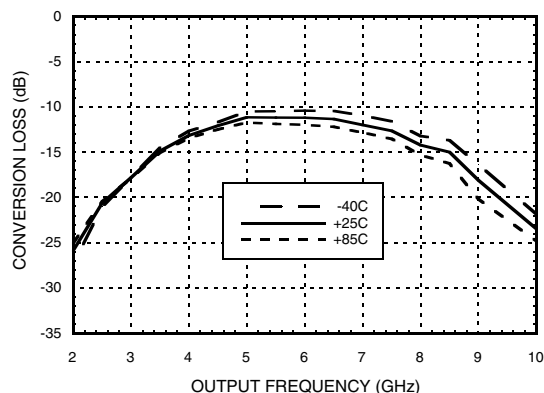
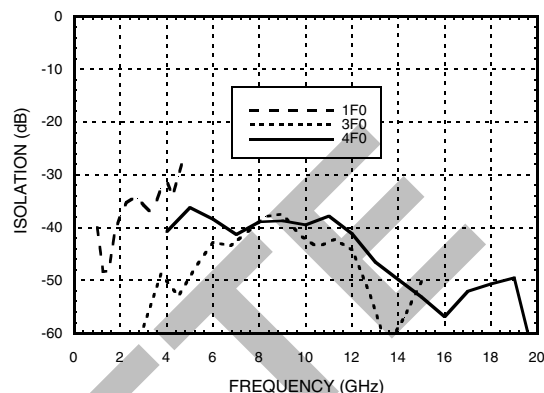


### General Description

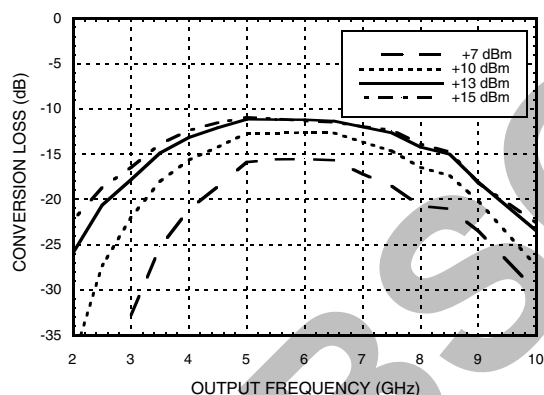
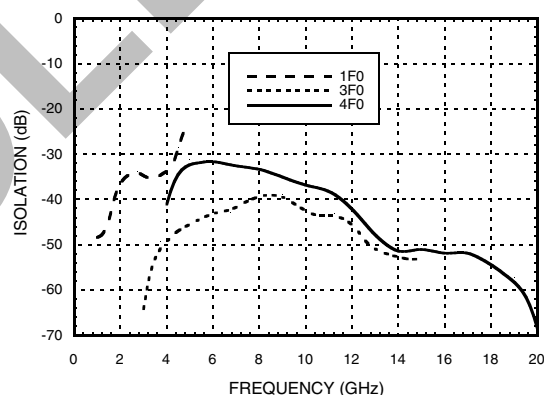
The HMC189AMS8(E) is a miniature passive frequency doublers in plastic 8-lead MSOP packages. The suppression of undesired fundamental and higher order harmonics is 33 dB typical with respect to input signal levels. The doubler uses the same diode/balun technology used in Hittite MMIC mixers. The doubler 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.

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

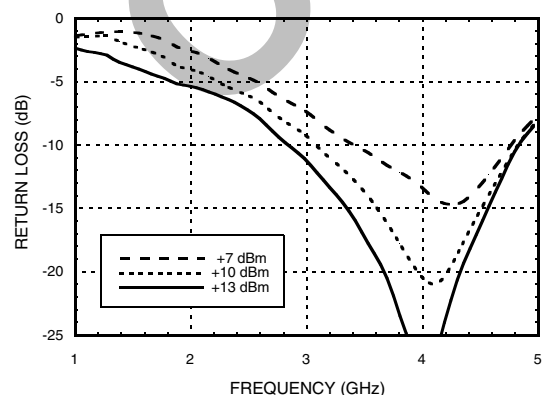
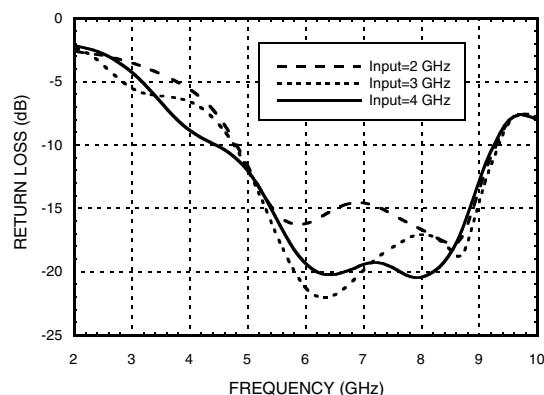
| Parameter                                      | Input = +10 dBm |      |      | Input = +13 dBm |      |      | Input = +15 dBm |      |      | Units |
|--|-----------------|------|------|-----------------|------|------|-----------------|------|------|-------|
|  | Min.            | Typ. | Max. | 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<br>(with respect to input level)  | 29              | 32   |      | 30              | 33   |      | 31              | 34   |      | dB    |
| 3FO Isolation<br>(with respect to input level) | 37              | 43   |      | 35              | 42   |      | 33              | 40   |      | dB    |
| 4FO Isolation<br>(with respect to input level) | 32              | 40   |      | 33              | 40   |      | 31              | 40   |      | dB    |

**GaAs MMIC SMT PASSIVE FREQUENCY DOUBLER, 2 - 4 GHz INPUT**
**Conversion Loss @ +13 dBm Drive Level**

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


\* With respect to input level

**Conversion Loss vs. Drive Level**

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


\* With respect to input level

**Input Return Loss vs. Drive Level**

**Output Return Loss for Several Input Frequencies**




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## HMC189AMS8 / 189AMS8E

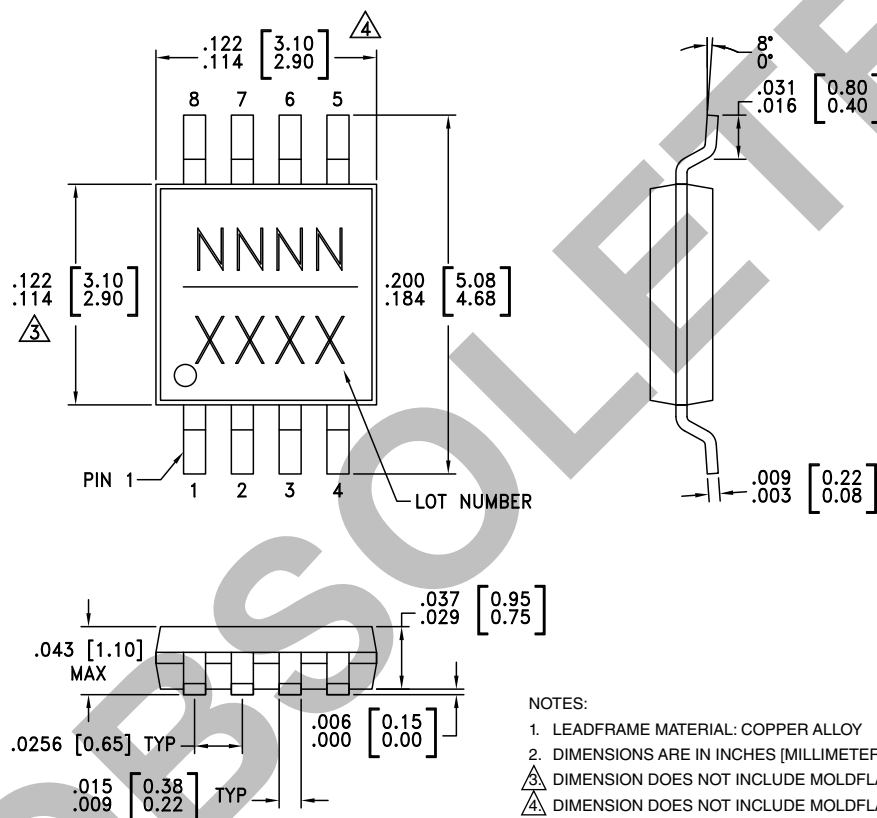
GaAs MMIC SMT PASSIVE FREQUENCY  
DOUBLER, 2 - 4 GHz INPUT

## Absolute Maximum Ratings

|                       |                |
|-----------------------|----------------|
| Input Drive           | +27 dBm        |
| Storage Temperature   | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C  |
| ESD Sensitivity (HBM) | Class 1B       |

ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

## Outline Drawing



## Package Information

| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC189AMS8  | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | 189A<br>XXXX                   |
| HMC189AMS8E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | 189A<br>XXXX                   |

[1] Max peak reflow temperature of 235 °C

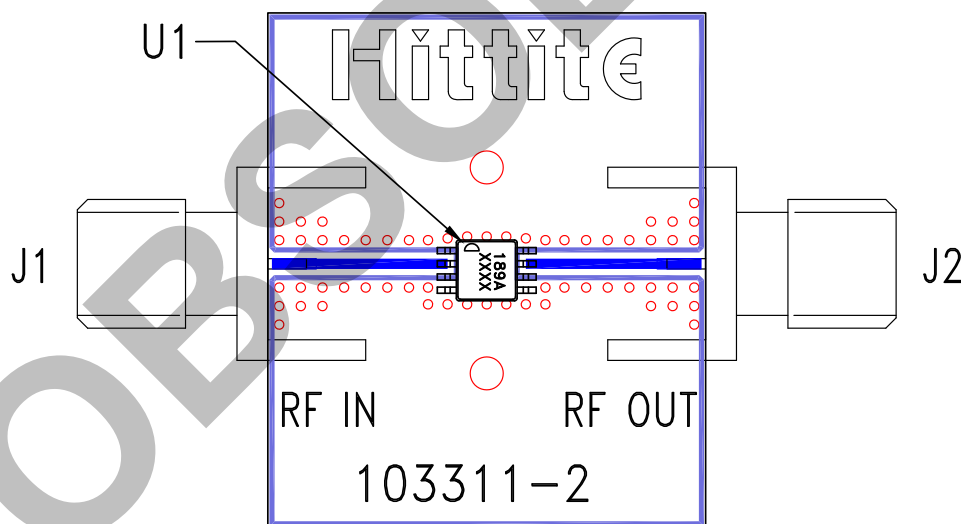
[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

### Pin Description

| Pin Number | Function | Description  | Interface Schematic |
|------------|----------|--|---------------------|
| 1, 4, 5, 8 | N/C      | These pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally. |                     |
| 2          | RFIN     | Pin is DC coupled and matched to 50 Ohms from 2.0 to 4.0 GHz   | RFIN                |
| 3, 6       | GND      | All ground leads must be soldered to PCB RF/DC ground.   | GND                 |
| 7          | RFOUT    | Pin is DC coupled and matched to 50 Ohms from 4.0 to 8.0 GHz   | RFOUT               |

### Evaluation PCB



### List of Materials for Evaluation PCB 103313 <sup>[1]</sup>

| Item    | Description             |
|---------|-------------------------|
| J1, J2  | PCB Mount SMA Connector |
| U1      | HMC189AMS8(E) Doubler   |
| PCB [2] | 103311 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 at the RF port 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 shown above is available from Hittite Microwave Corporation upon request.