

## GaAs MMIC HIGH IP3 SINGLE-BALANCED SMT MIXER, 1.7 - 3 GHz

### Typical Applications

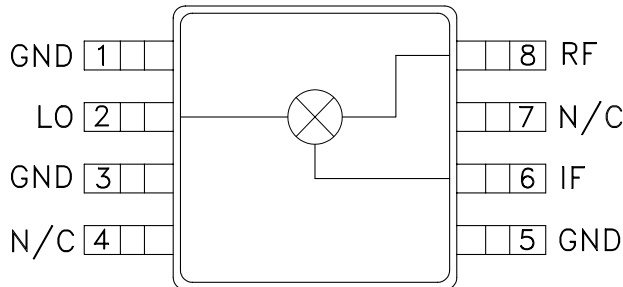
The HMC304MS8 is ideal for:

- PCS & 3G
- 2.4 GHz ISM
- MMDS

### Features

- High Dynamic Range: +30 dBm IIP3
- No External Components or Bias Required
- LO/RF Isolation: 30 dB
- Ultra Small MSOP8 Package: 14.8 mm<sup>2</sup>

### Functional Diagram



### General Description

The HMC304MS8 is a passive IP3 mixer in an 8 lead plastic surface mount Mini Small Outline Package (MSOP). This miniature single balanced MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip while not requiring any external components. The RF port is balanced via the MMIC balun while the LO port is connected directly to the diodes. LO isolations are typically 20 to 30 dB. Excellent input IP3 performance of +27 to +32 dBm makes the HMC304MS8 ideal for high dynamic range applications.

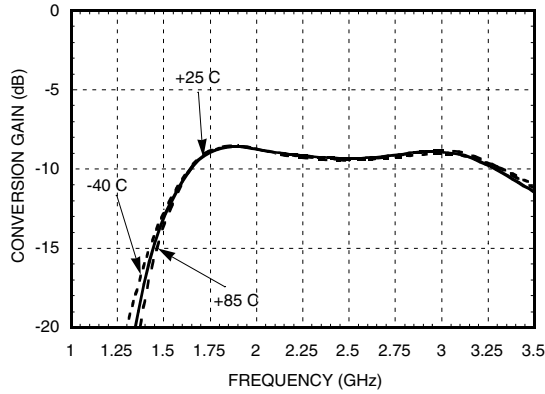
### Electrical Specifications\*, $T_A = +25^\circ C$

Parameter	LO = +17 dBm IF = 100 MHz			LO = +17 dBm IF = 100 MHz			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO	1.7 - 3.0			2.2 - 2.7			GHz
Frequency Range, IF	DC - 0.8			DC - 0.8			GHz
Conversion Loss		9	11		9	10.5	dB
Noise Figure (SSB)		9	11		9	10.5	dB
LO to RF Isolation	20	30		23	32		dB
LO to IF Isolation	12	20		17	25		dB
IP3 (Input)	25	30		27	32		dBm
1 dB Gain Compression (Input)	15	19		18	19.5		dBm

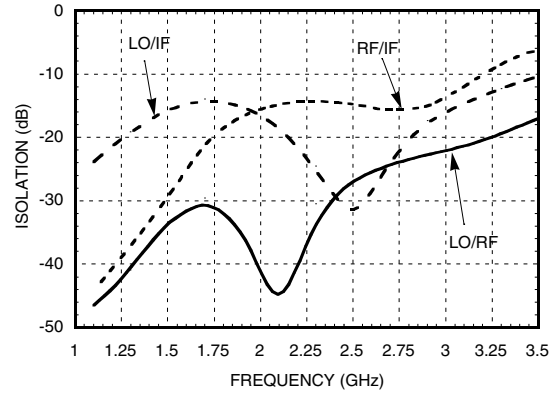
\*Specifications are for downconverter performance. Similar results are achieved when using mixer as an upconverter with a resulting input IP3 of 5dB less.

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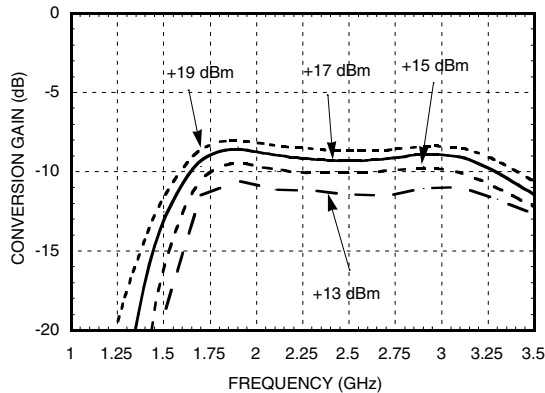
**Conversion Gain vs. Temperature @ LO = +17 dBm**



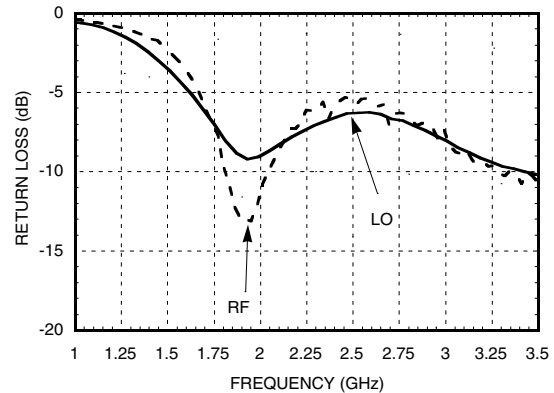
**Isolation @ LO = +17 dBm**



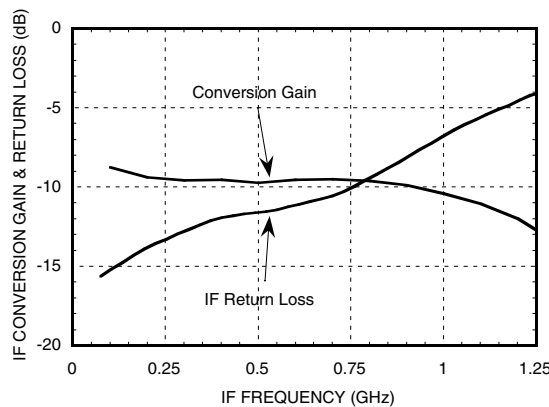
**Conversion Gain vs. LO Drive**



**Return Loss @ LO = +17 dBm**

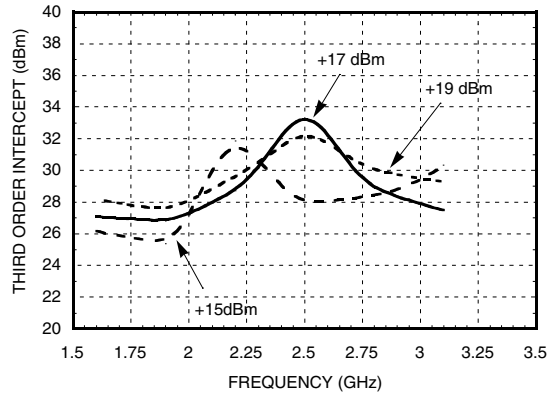


**If Bandwidth @ LO = +17 dBm**

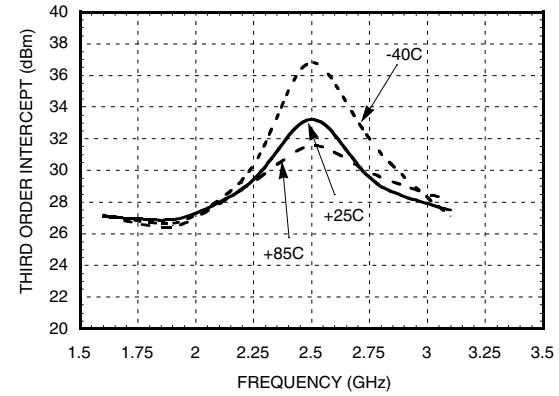


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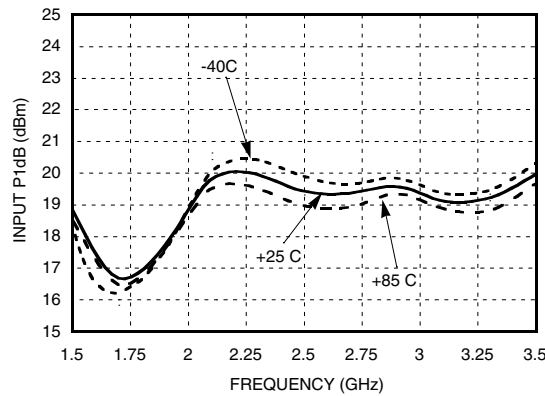
**Input IP3 vs. LO Drive**



**Input IP3 vs. Temperature @ LO = +17dBm**



**P1dB vs. Temperature @ LO = +17 dBm**



**MxN Spurious Outputs**

mRF	nLO				
	0	1	2	3	4
0	xx	-20	-11	2	7
1	10	0	32	29	31
2	50	61	62	52	59
3	89	90	93	85	81
4	>107	>107	>107	>107	>107

RF = 2 GHz @ -10 dBm  
LO = 1.9 GHz @ +17 dBm  
All values in dBc relative to the IF power level.

**Harmonics of LO**

LO Frequency (GHz)	nLO Spur at RF Port			
	1	2	3	4
1.5	34	18	32	49
1.9	34	18	32	48
2.3	32	22	36	58
2.7	25	26	39	73
3.1	23	29	35	64
3.6	17	31	36	57

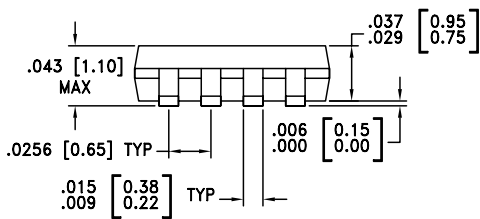
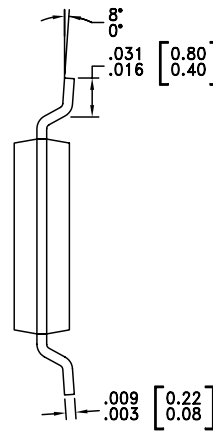
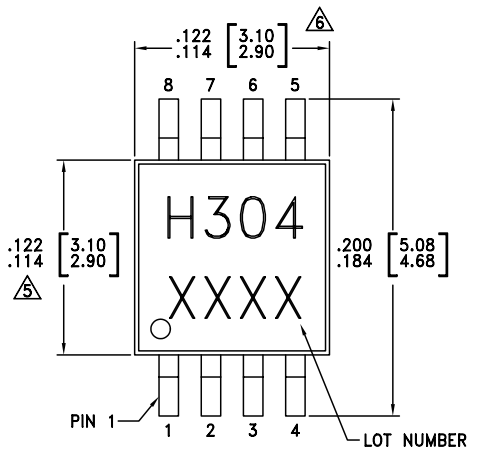
LO = +17 dBm  
Values in dBc below input LO level measured at the RF port.

## GaAs MMIC HIGH IP3 SINGLE-BALANCED SMT MIXER, 1.7 - 3 GHz

### Absolute Maximum Ratings

RF / IF Input	+27 dBm
LO Drive	+27 dBm
DC Current into IF Port	±9 mA
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

### Outline Drawing

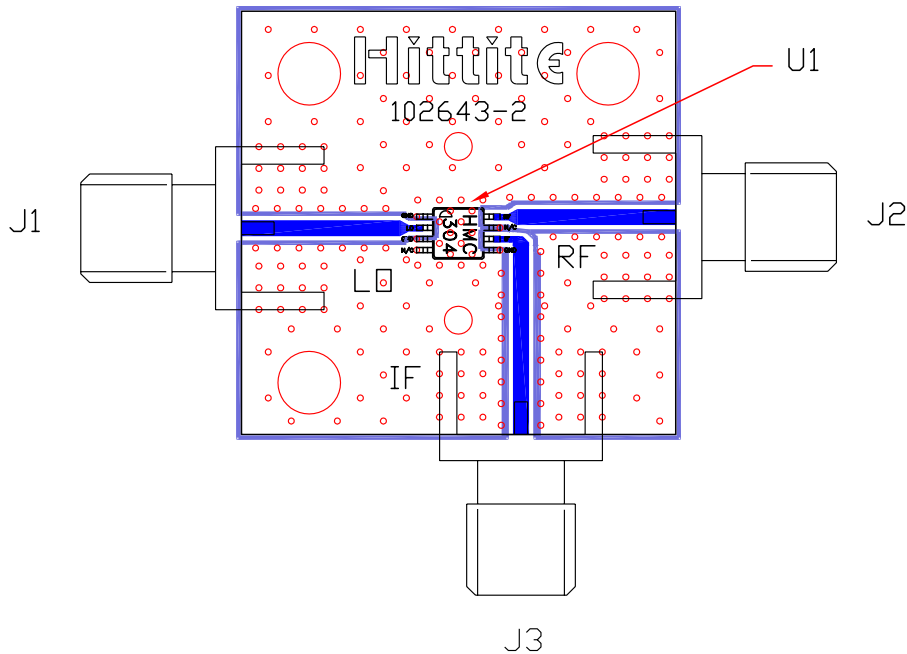


NOTES:

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 HIGH IP3 SINGLE-BALANCED SMT MIXER, 1.7 - 3 GHz

### Recommended PCB Layout



### List of Materials

Item	Description
J1, J2, J3	PC Mount SMA RF Connector
U1	HMC304MS8 Mixer
PCB*	102643 Eval Board
* Circuit Board Material: Rogers 4350	

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

## ***GaAs MMIC HIGH IP3 SINGLE- BALANCED SMT MIXER, 1.7 - 3 GHz***

**Notes:**