HMC304MS8 / 304MS8E

v01.0705

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

Typical Applications

The HMC304MS8 / HMC304MS8E is ideal for:

- PCS & 3G
- 2.4 GHz ISM
- MMDS

Features

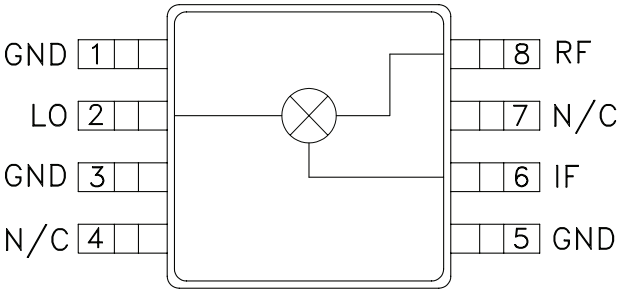
High Dynamic Range: +30 dBm IIP3

No External Components or Bias Required

LO/RF Isolation: 30 dB

Ultra Small MSOP8 Package: 14.8 mm^2

Functional Diagram



General Description

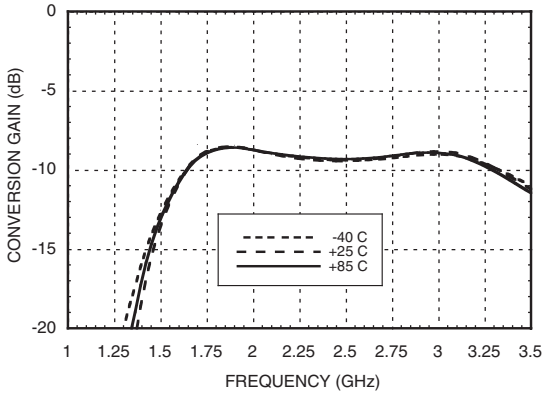
The HMC304MS8 & HMC304MS8E are passive high IP3 mixers in 8 lead plastic surface mount Mini Small Outline Packages (MSOP). This miniature single balanced MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip while not requiring any external components. The 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 make the HMC304MS8 & HMC304MS8E ideal for high dynamic range applications.

Electrical Specifications*, T_A = +25° C

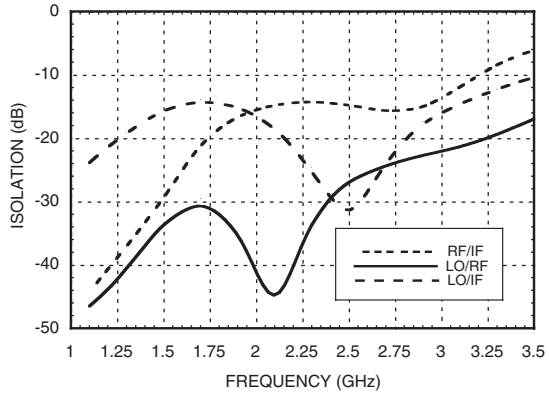
Parameter	LO = +17 dBm IF = 100 MHz			LO = +17 dBm IF = 100 MHz			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO		1.7 - 3.0			2.2 - 2.7		GHz
Frequency Range, IF		DC - 0.8			DC - 0.8		GHz
Conversion Loss		9	11		9	10.5	dB
Noise Figure (SSB)		9	11		9	10.5	dB
LO to RF Isolation	20	30		23	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.

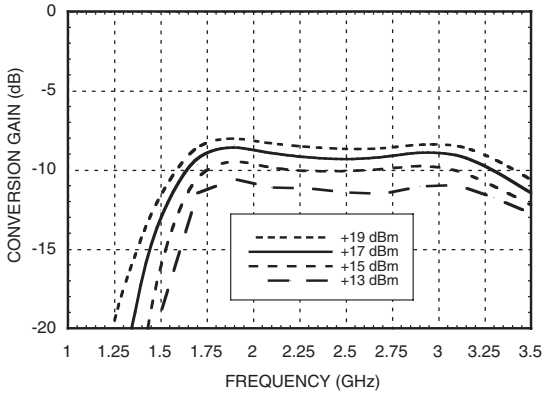
Conversion Gain vs. Temperature @ LO = +17 dBm



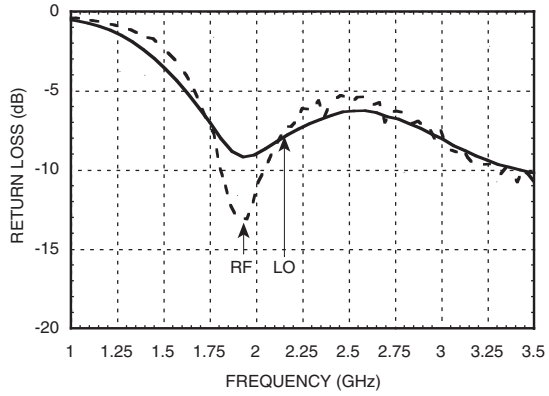
Isolation @ LO = +17 dBm



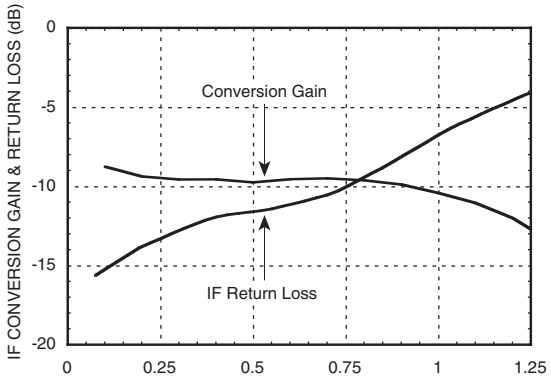
Conversion Gain vs. LO Drive



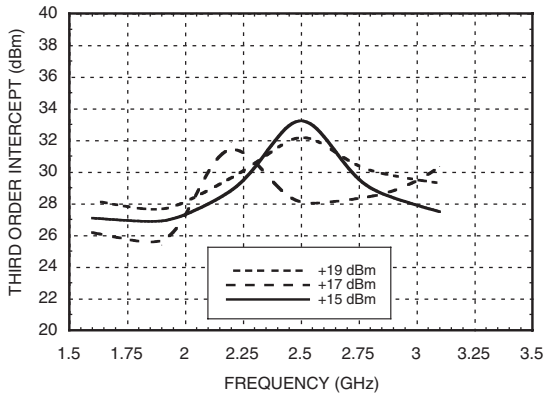
Return Loss @ LO = +17 dBm



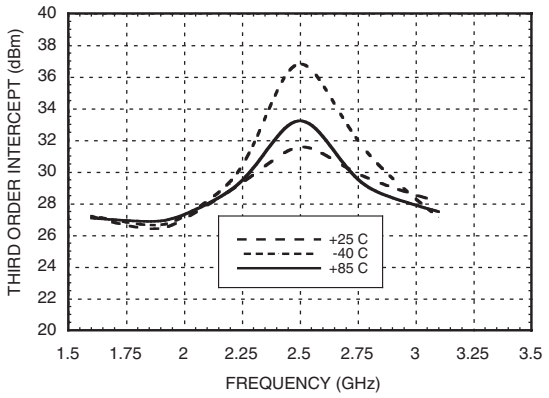
If Bandwidth @ LO = +17 dBm



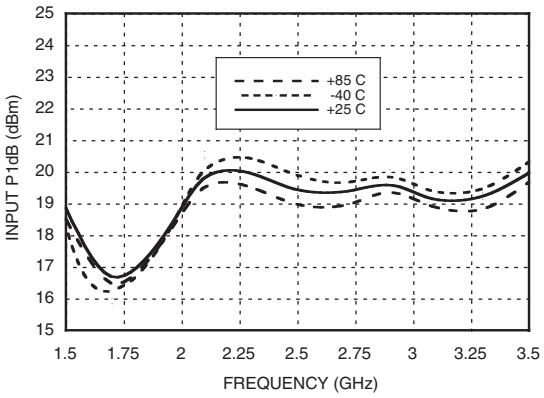
Input IP3 vs. LO Drive



Input IP3 vs. Temperature @ LO = +17dBm



P1dB vs. Temperature @ LO = +17 dBm



MxN Spurious Outputs

	nLO				
mRF	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

	nLO Spur at RF Port			
LO Frequency (GHz)	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.

HMC304MS8 / 304MS8E

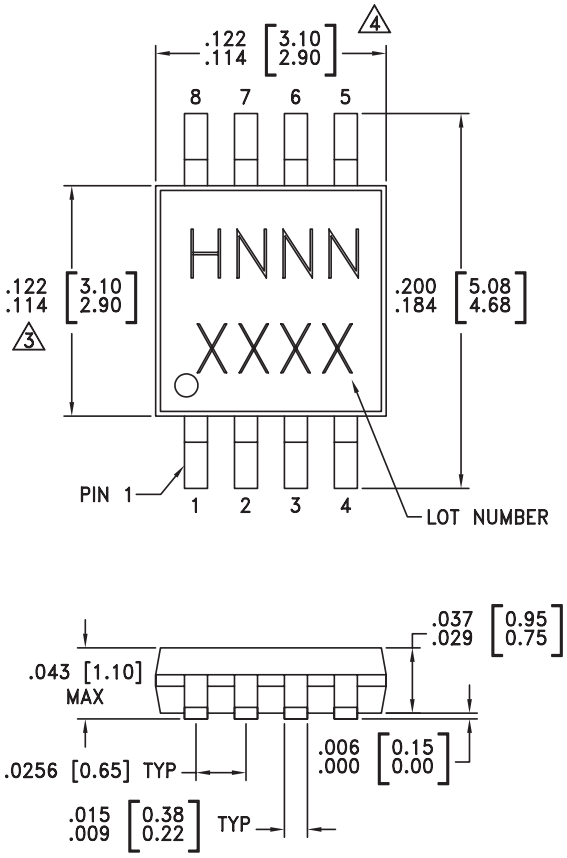
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Absolute Maximum Ratings

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

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

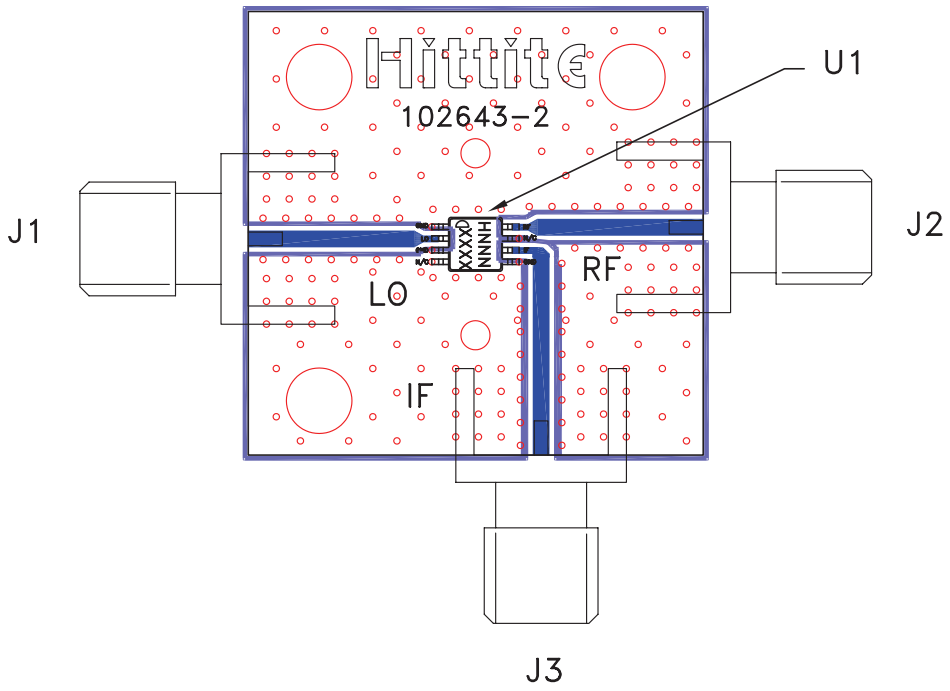
1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC304MS8	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	H304 XXXX
HMC304MS8E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H304 XXXX

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

Recommended PCB Layout



List of Materials for Evaluation PCB 102781 [1]

Item	Description
J1, J2, J3	PCB Mount SMA RF Connector
U1	HMC304MS8 / HMC304MS8E Mixer
PCB [2]	102643 Eval Board

[1] Reference this number when ordering complete evaluation PCB

[2] 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.

Notes: