HMC214MS8 / 214MS8E

v01.1109

HIGH IP3 GaAs MMIC MIXER, 2.4 - 4.0 GHz

Designer's Kit Available

Typical Applications

The HMC214MS8 / HMC214MS8E is ideal for:

- WiMAX, 802.16
- Fixed Wireless Access
- Wireless Local Loop

Features

Input IP3: +34 dBm

LO to RF Isolation: 28 dB

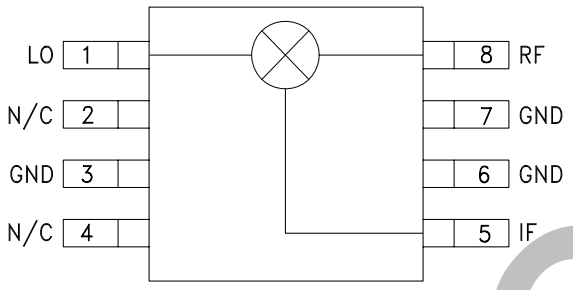
+22 dBm Input P1dB

No External Components

Ultra Small MSOP Package: 14.8mm²

Included in the HMC-DK003 Designer's Kit

Functional Diagram



General Description

The HMC214MS8(E) is a general purpose high dynamic range passive MMIC mixer in plastic surface mount 8 lead Mini Small Outline Package (MSOP) covering 2.4 to 4 GHz. Excellent input IP3 performance of +34 dBm for downcon-version and +31 dBm for upconversion is provided for WiMax and other 3.5 GHz applications at an LO drive of +17 dBm. With a 1dB compression of +22 dBm, the RF port will accept a wide range of input signal levels. Conversion loss is 10 dB typical and LO isolations are maintained at 25 to 30 dB. This miniature single-ended monolithic GaAs FET mixer does not require any external components or bias. The DC to 1 GHz IF frequency response will satisfy many transmit and receive frequency plans configured for low side LO. The HMC214MS8 & HMC214MS8E input IP3 performance coupled with its high P1dB rivals traditional active FET mixers while offering a much smaller 14.8mm² standard IC footprint and no DC bias.

Electrical Specifications, T_A = +25°C, LO = +17dBm, IF = 200 MHz*

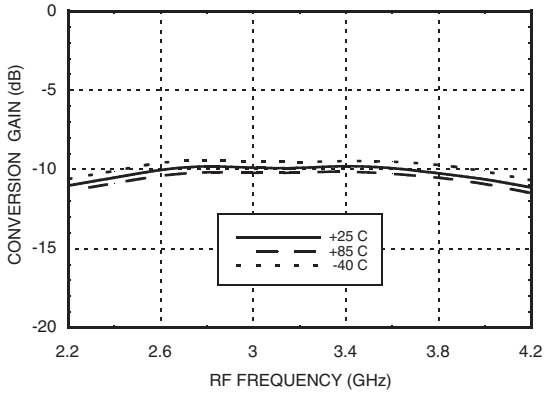
Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range, RF		2.4 - 4.0			3.4 - 3.8		GHz
Frequency Range, LO		2.4 - 4.0			3.4 - 3.8		GHz
Frequency Range, IF		DC - 1			DC - 1		GHz
Conversion Loss		10	12		10	11.5	dB
Noise Figure (SSB)		10	12		10	11.5	dB
LO to RF Isolation	18	30		20	28		dB
LO to IF Isolation	12	25		22	30		dB
IP3 (Input)	26	30		31	34		dBm
1 dB Gain Compression (Input)	18	21		20	22		dBm
LO Input Drive Level (Typical)		+15 to +19			+15 to +19		dBm

*Unless otherwise noted, all measurements performed as a downconverter, with low side LO & IF = 200 MHz.

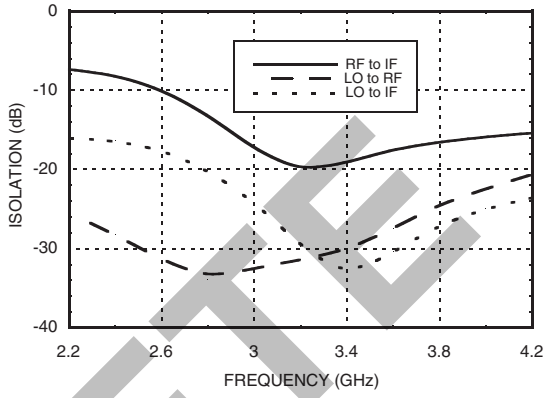
For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

RoHS✓ EARTH FRIENDLY

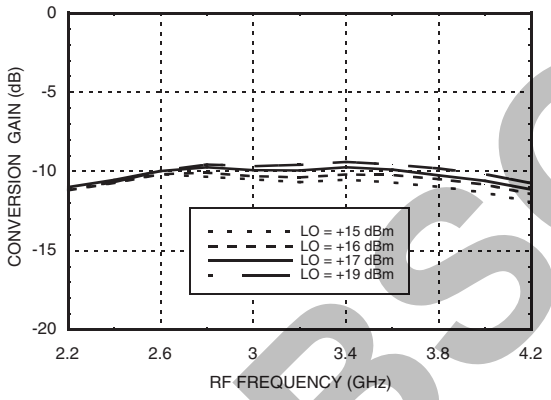
Conversion Gain vs. Temperature @ LO = +17 dBm



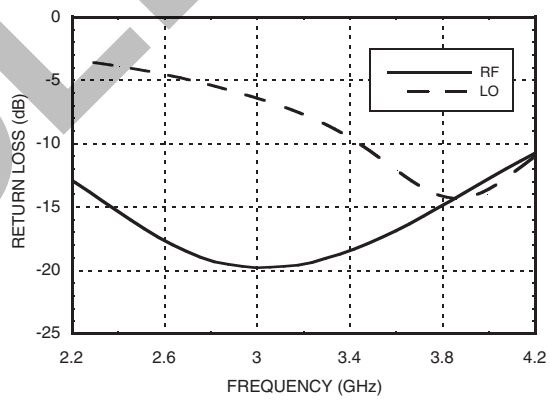
Isolation @ LO = +17 dBm



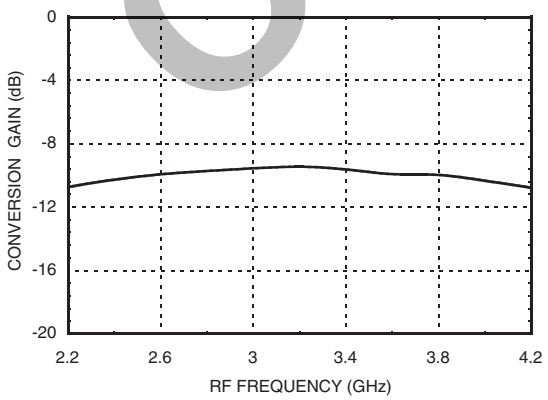
Conversion Gain vs. LO Drive



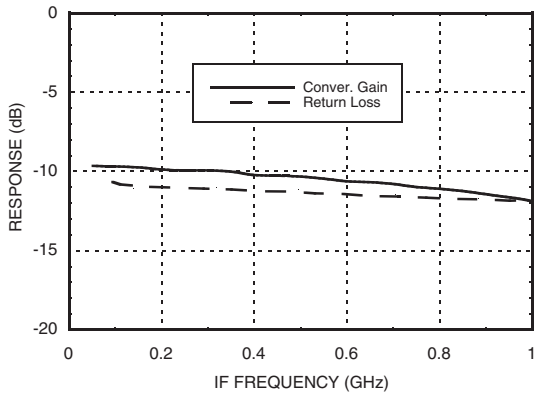
Return Loss @ LO = +17 dBm



Upconverter Performance Conversion Gain @ LO = +17 dBm



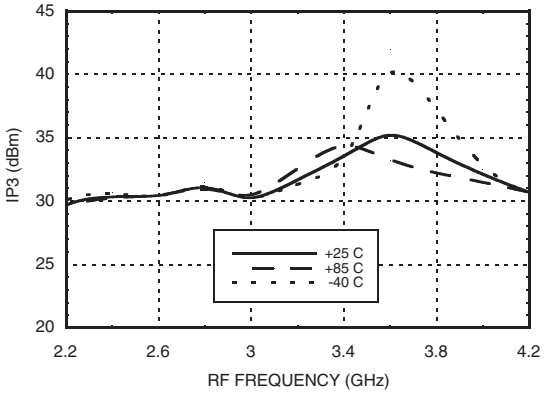
IF Bandwidth @ LO = +17 dBm



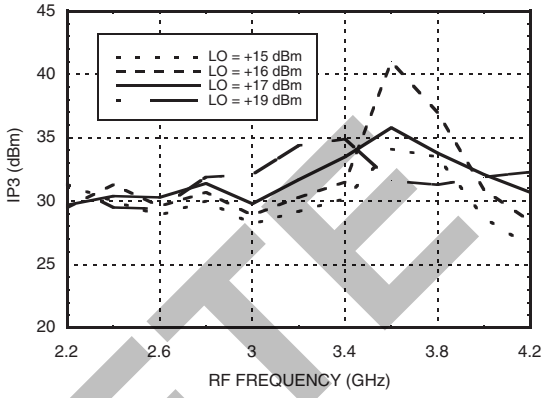
Unless otherwise noted, all measurements performed as a downconverter, with low side LO & IF = 200 MHz.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

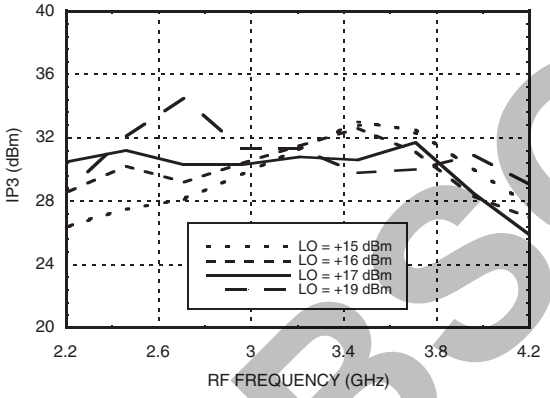
Input IP3 vs. Temperature, LO = +17 dBm



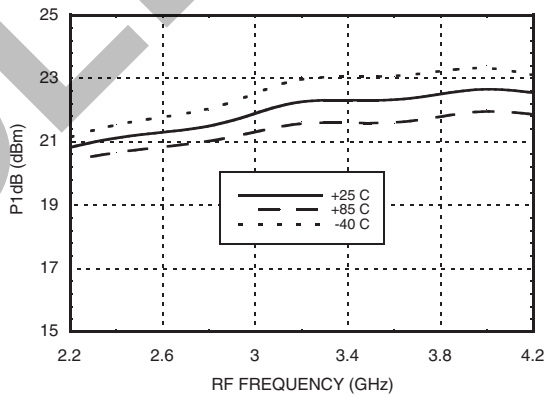
Input IP3 vs. LO Drive



Upconverter IP3 vs. LO Drive, IF = 200 MHz



Input P1dB vs. Temperature @ LO = +17 dBm



Harmonics of LO

	nLO Spur @ RF Port			
LO Freq (GHz)	1	2	3	4
2.6	35	26	42	39
2.8	30	26	47	40
3.0	29	26	46	42
3.2	28	29	42	xx
3.4	25	28	40	xx
3.6	24	31	39	xx

LO = +17 dBm
All values are in dBc below input LO level @ RF port.

MxN Spurious Outputs

	nLO				
mRF	0	1	2	3	4
0	xx	-4	-2	9	xx
1	9	0	37	39	35
2	73	66	49	65	77
3	97	98	104	85	91
4	xx	100	99	104	106

RF Freq = 3.5 GHz @ -10 dBm
LO Freq = 3.3 GHz @ +17 dBm
All values in dBc relative to the IF output power.

Unless otherwise noted, all measurements performed as a downconverter, with low side LO & IF = 200 MHz.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

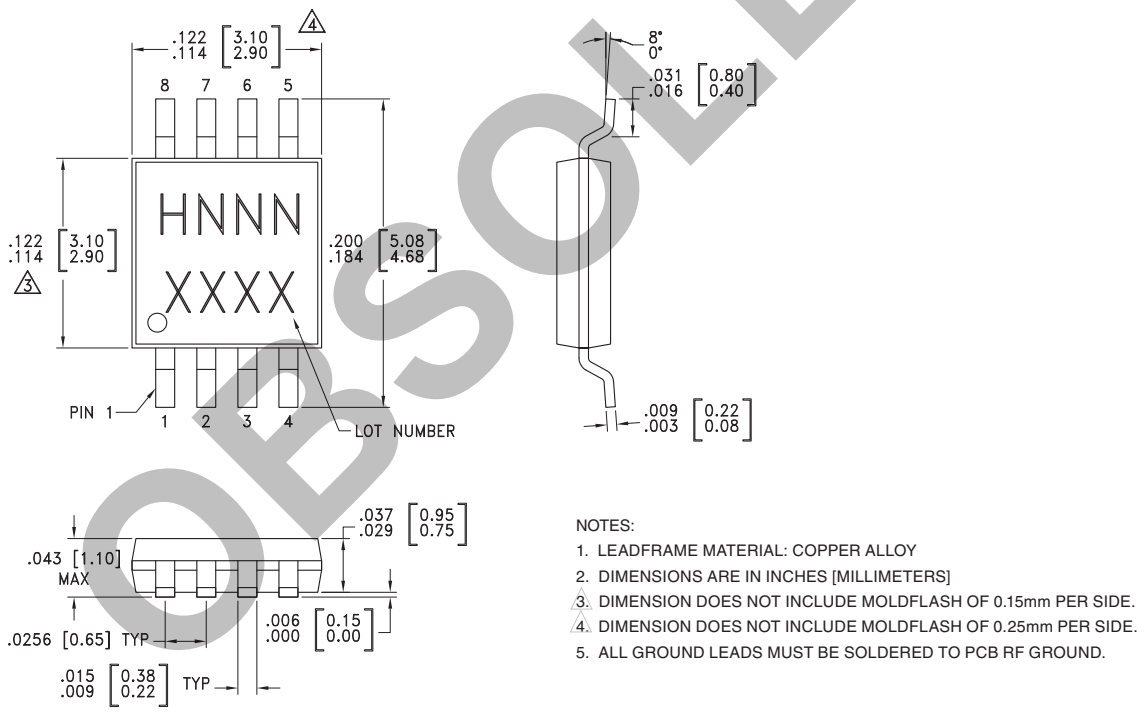
RoHS✓ EARTH FRIENDLY

Absolute Maximum Ratings

RF/IF Input	+27 dBm
LO Drive	+27 dBm
IF DC Current	±40 mA
Channel Temperature	150 °C
Continuous Pdiss (T=85 °C) (derate 3.69 mW/°C above 85 °C)	240 mW
Thermal Resistance (R_{TH}) (junction to lead)	270 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A

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

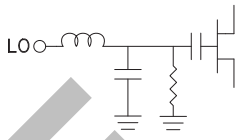
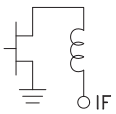
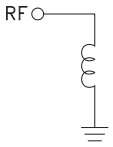
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC214MS8	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	H214 XXXX
HMC214MS8E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H214 XXXX

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

Unless otherwise noted, all measurements performed as a downconverter, with low side LO & IF = 200 MHz.

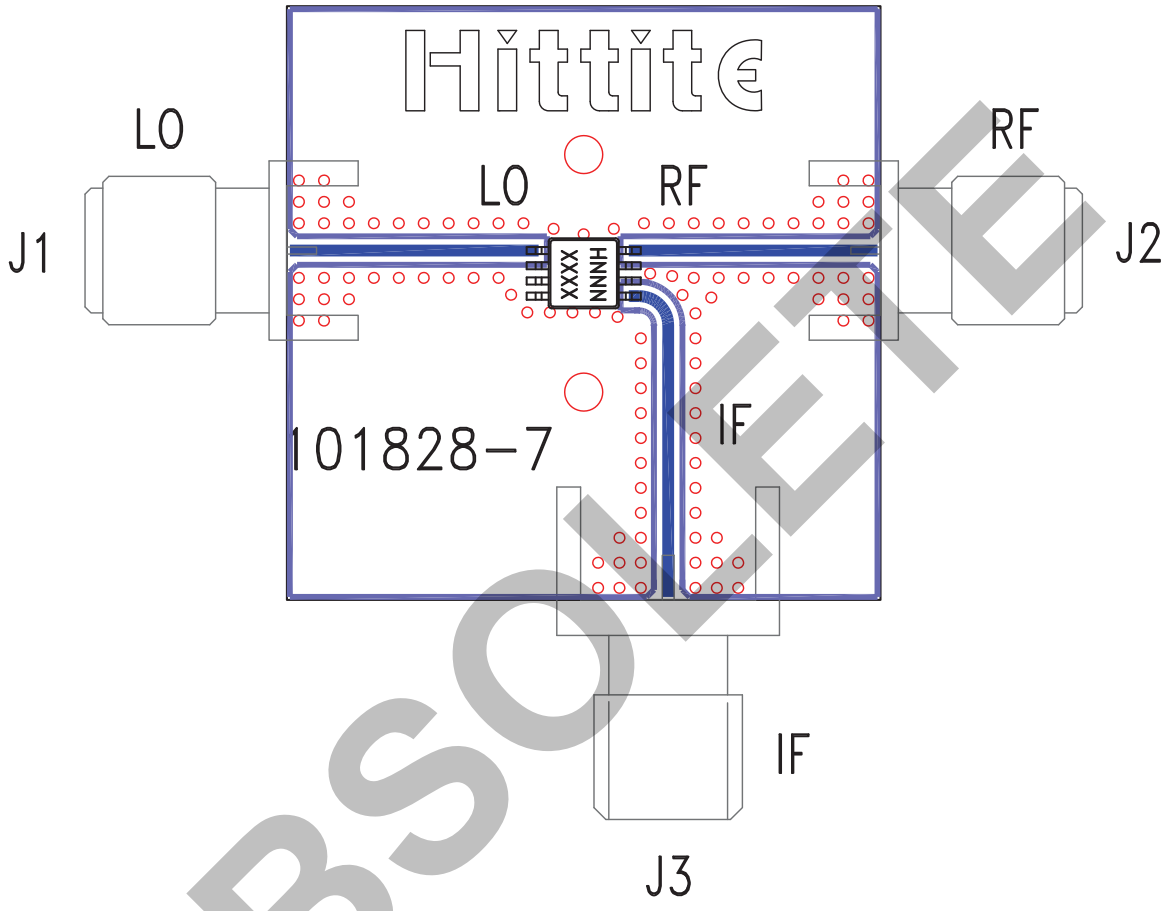
For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	LO	This pin is DC coupled & matched to 50 Ohms. Blocking capacitors are required if line potential is not equal to 0V.	
2, 4	N/C	The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	
3, 6, 7	GND	This pin must be connected to RF ground.	
5	IF	This pin is DC coupled. For applications not requiring operation to DC this port should be DC blocked externally using a series capacitor. Choose value of capacitor to pass IF frequency desired. For operation to DC, this pin must not sink/source more than 40 mA of current or failure may result.	
8	RF	This pin is DC coupled and matched to 50 Ohms.	

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

Evaluation PCB



List of Materials for Evaluation PCB 101830 [1]

Item	Description
J1 - J3	PCB Mount SMA RF Connector
U1	HMC214MS8 / HMC214MS8E Mixer
PCB [2]	101828 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 and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D