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HMC412AMS8G / 412AMS8GE

v02.0614

DOUBLE-BALANCED MIXER, 9 - 15 GHz

Typical Applications

The HMC412AMS8G / HMC412AMS8GE is ideal for:

- Long Haul Radio Platforms
- Microwave Radio
- VSAT

Features

Conversion Loss: 8 dB

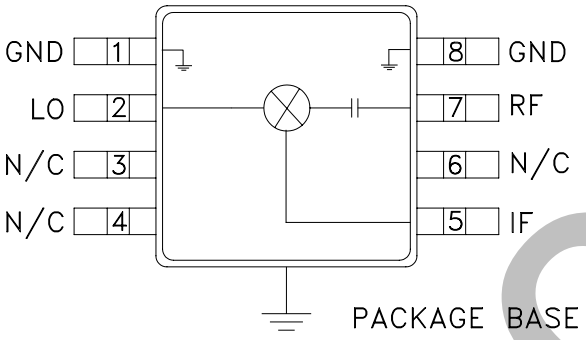
Noise Figure: 8 dB

Input IP3: 19 dBm

No External Components

MSOP8G SMT Package

Functional Diagram



General Description

The HMC412AMS8G & HMC412AMS8GE are passive double balanced mixers that operate between 9.0 GHz and 15 GHz. The HMC412AMS8G(E) operate with LO drive levels between +9 dBm and +13 dBm, and provides 8 dB conversion loss across the entire specified frequency band. This mixer requires no external components or bias.

OBSOLETE

Electrical Specifications, T_A = +25° C, IF = 1.45 GHz, LO = +13 dBm [1]

Parameter	Min.	Typ.	Max.	Units
Frequency Range, RF & LO		9.0 - 15.0		GHz
Frequency Range, IF		DC - 2.5		GHz
Conversion Loss		8	11	dB
Noise Figure (SSB)		8		dB
LO to RF Isolation		44		dB
LO to IF Isolation	33	42		dB
RF to IF Isolation		30		dB
IP3 (Input)		19		dBm
1 dB Compression (Input)		11.5		dBm

[1] Unless otherwise noted, all measurements performed as downconverter, IF= 1.45 GHz.

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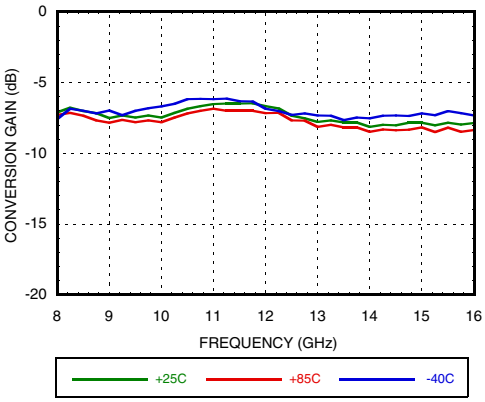
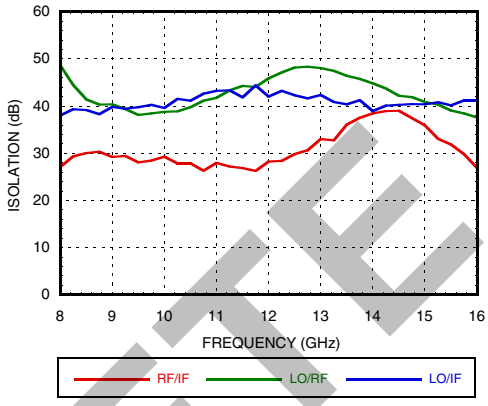
DOUBLE-BALANCED MIXER, 9 - 15 GHz

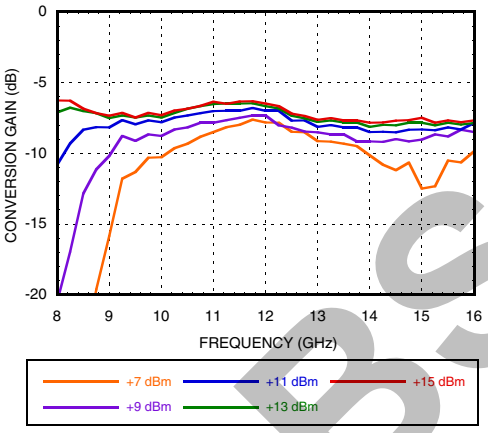
Conversion Gain vs. Temperature @ LO = +13 dBm



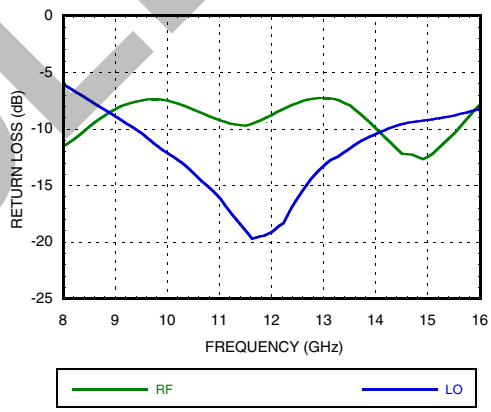
Isolation @ LO = +13 dBm



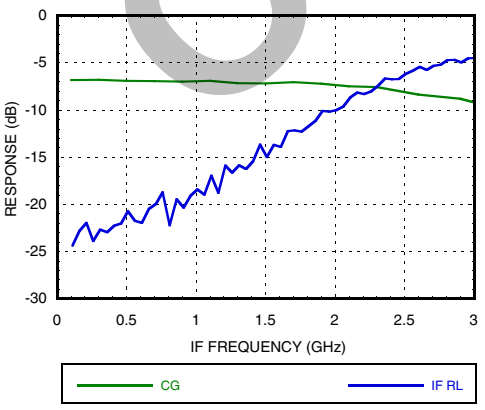
Conversion Gain vs. LO Drive



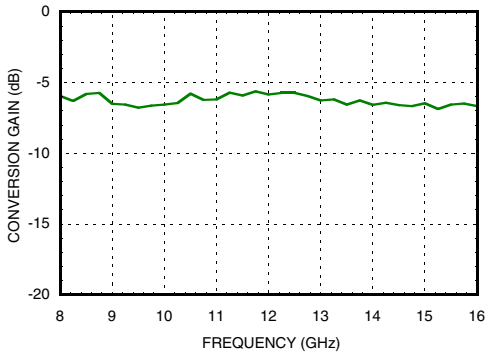
Return Loss @ LO = +13 dBm



IF Bandwidth @ LO = +13 dBm



Upconverter Performance Conversion Gain @ LO = +13 dBm



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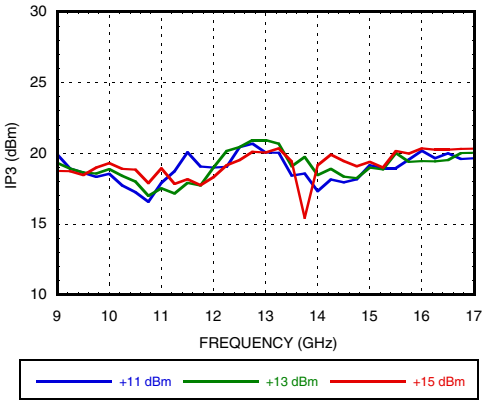
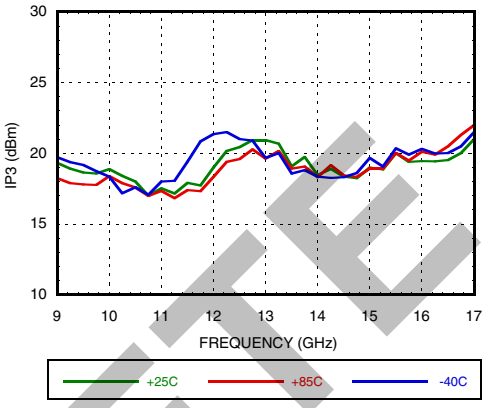
DOUBLE-BALANCED MIXER, 9 - 15 GHz

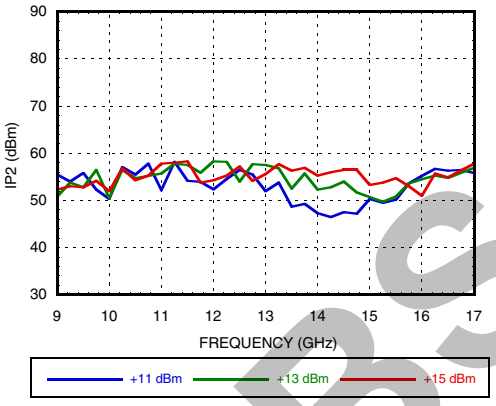
Input IP3 vs. LO Drive [1]



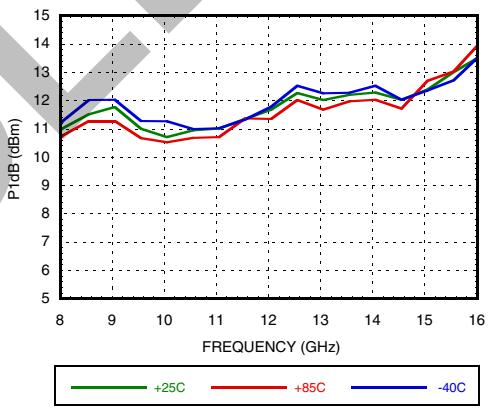
Input IP3 vs. Temperature @ LO = +13 dBm [1]



Input IP2 vs. LO Drive [1]



Input P1dB vs. Temperature @ LO = +13 dBm



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MxN Spurious @ IF Port

	nLO				
mRF	0	1	2	3	4
0	xx	9	28	41	N/A
1	34	0	38	37	41
2	>85	>85	71	>85	>85
3	>85	>85	>85	>85	>85
4	N/A	>85	>85	>85	>85

RF = 14.45 GHz @ -10 dBm
LO = 13 GHz @ +13 dBm
All values in dBc relative to the IF. Measured as downconverter.

Harmonics of LO

	nLO Spur @ RF Port			
LO Freq. (GHz)	1	2	3	4
9	41	33	56	55
10.5	44	45	57	71
12	47	52	52	N/A
13.5	43	60	60	N/A
15	37	63	55	N/A
16.5	32	67	50	N/A

LO = +13 dBm
All values in dBc below input LO level @ RF port.

[1] Two-tone input power= -10 dBm each tone, 1 MHz spacing.

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Absolute Maximum Ratings

RF/IF Input	+24 dBm
LO Drive	+24 dBm
Channel Temperature	150 °C
IF DC current	± 4mA
Continuous Pdiss (T = 85°C) (derate 4.3mW / ° C above 85 °C	280 mW
Thermal Resistance (channel to ground paddle)	230.5 °C/W
Storage Temperature	-65 to + 150 °C
Operating Temperature	-55 to + 85 °C
ESD Sensitivity (HBM)	Class 1A

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

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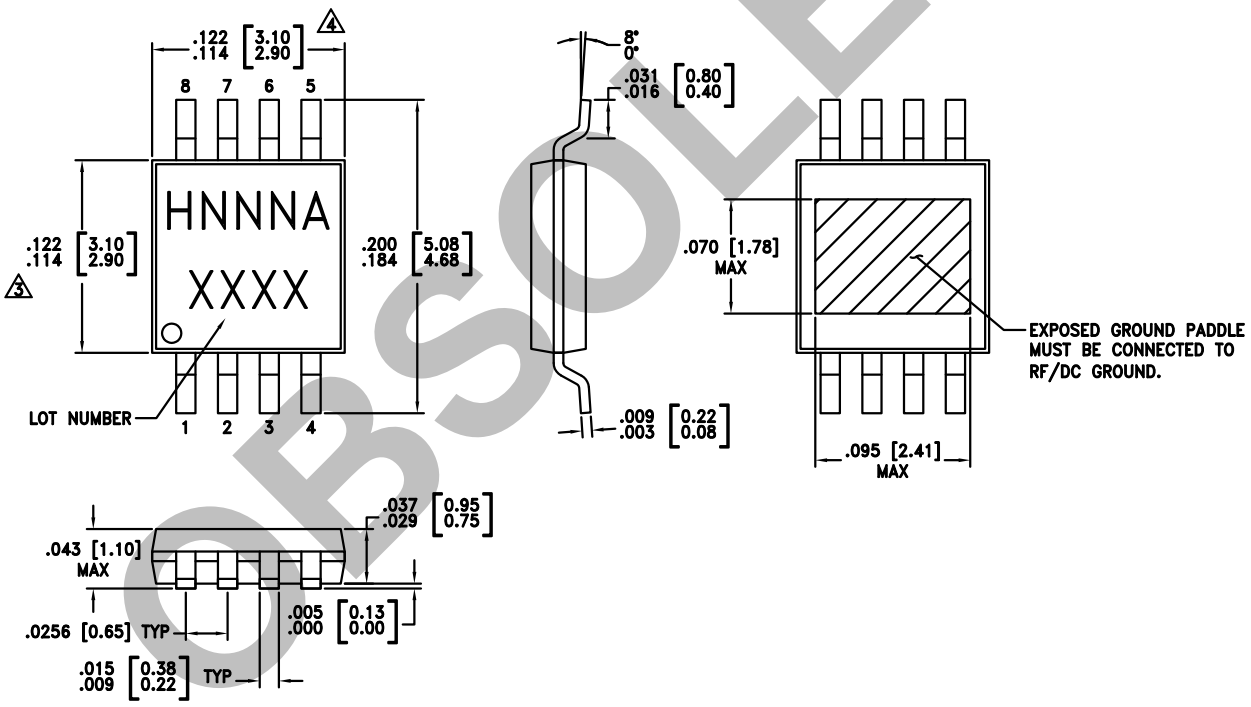
Outline Drawing



Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC412AMS8G	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	H412A XXXX
HMC412AMS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H412A XXXX

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

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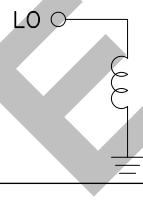
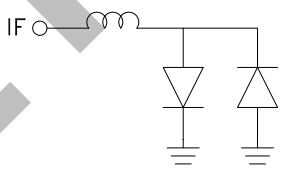
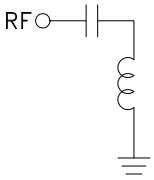
Pin Descriptions

Pin Number	Function	Description	Pin Schematic
1, 8	GND	These pins and the exposed ground paddle must be connected to RF ground.	
2	LO	This pin is DC coupled and matched to 50 Ohms.	
3, 4, 6	N/C	These pins are not connected internally.	
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 whose values has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source/sink more than 4mA of current or die non-function and possible die failure will result.	
7	RF	This pin is AC coupled and matched to 50 Ohms.	

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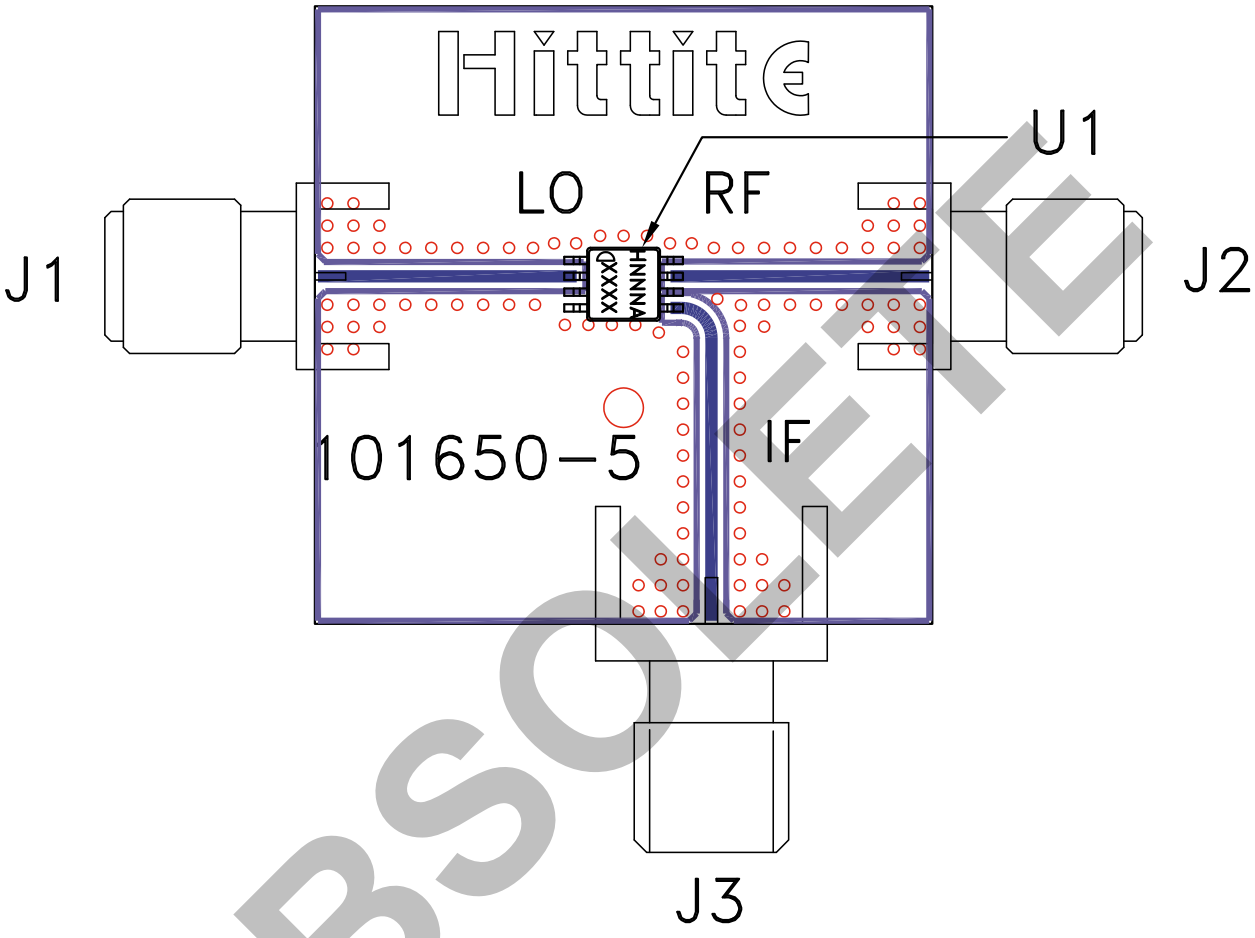
Evaluation PCB



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List of Materials for Evaluation PCB 103350 [1]

Item	Description
J1 - J2	PCB Mount SMA RF Connector, SRI
J3	PCB Mount SMA Connector, Johnson
U1	HMC412AMS8G / HMC412AMS8GE Mixer
PCB [2]	101650 Evaluation Board

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the 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.

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