ANALOG DEVICES

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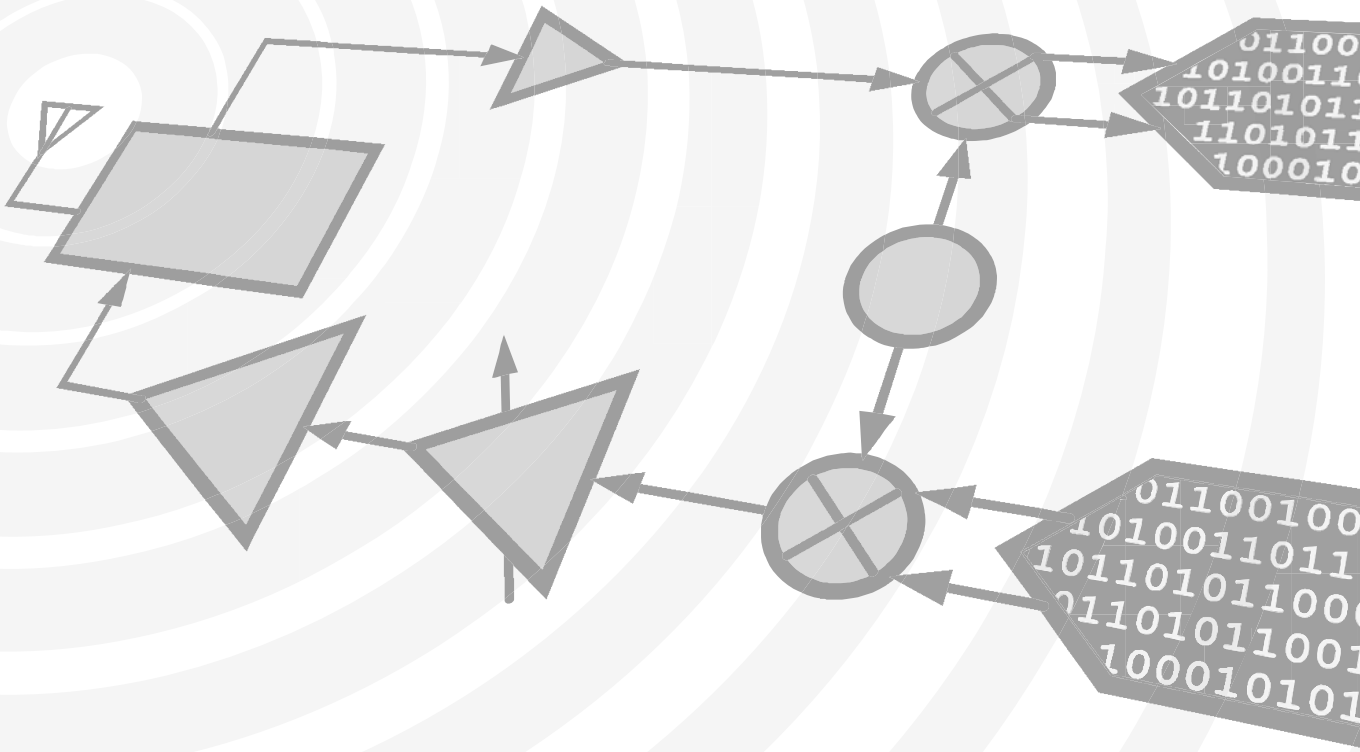
NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED



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HMC411MS8G / 411MS8GE

GaAs MMIC SINGLE-BALANCED MIXER, 10 - 15 GHz

Typical Applications

The HMC411MS8G / HMC411MS8GE is ideal for:

- Long Haul Radio Platforms
- Microwave Radio
- VSAT

Features

Conversion Loss: 9 dB

LO/RF Isolation: 27 dB

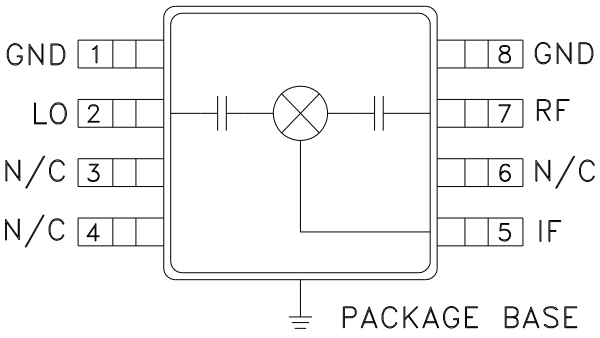
LO/IF Isolation: 30 dB

Input IP3: +16 dBm

No External Components

MSOP8G SMT Package

Functional Diagram



General Description

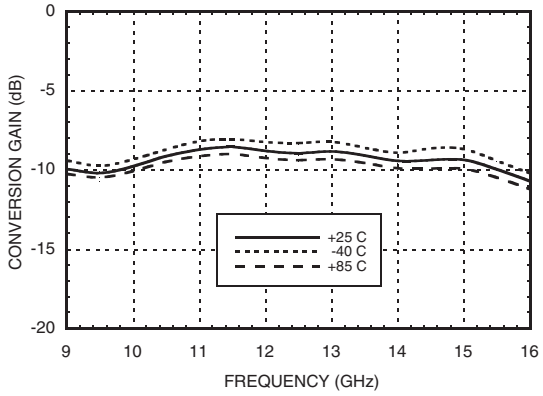
The HMC411MS8G & HMC411MS8GE are passive single balanced mixers that operates between 10 GHz and 15 GHz. The HMC411MS8G(E) operate with LO drive levels between +9 dBm and +15 dBm, and provide 9 dB conversion loss across the entire specified frequency band. These mixers require no external components or bias.

Electrical Specifications, T_A = +25° C

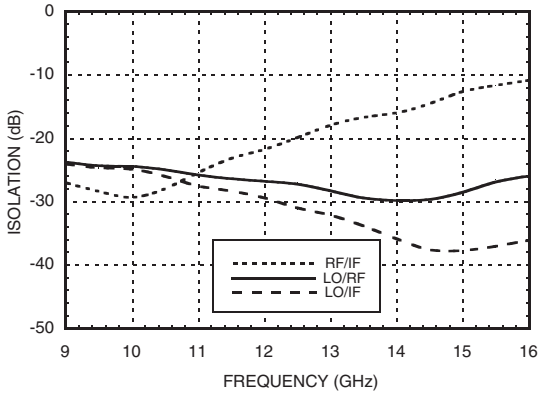
Parameter	IF = 1.45 GHz LO = +13 dBm			Units
	Min.	Typ.	Max.	
Frequency Range, RF & LO		10.0 - 15.0		GHz
Frequency Range, IF		DC - 3		GHz
Conversion Loss		9	12	dB
Noise Figure (SSB)		9	12	dB
LO to RF Isolation	20	27		dB
LO to IF Isolation	20	30		dB
RF to IF Isolation	8	15 - 20		dB
IP3 (Input)	11	16		dBm
1 dB Compression (Input)	5	9		dBm

** Unless otherwise noted, all measurements performed as downconverter, IF= 1.45 GHz.*

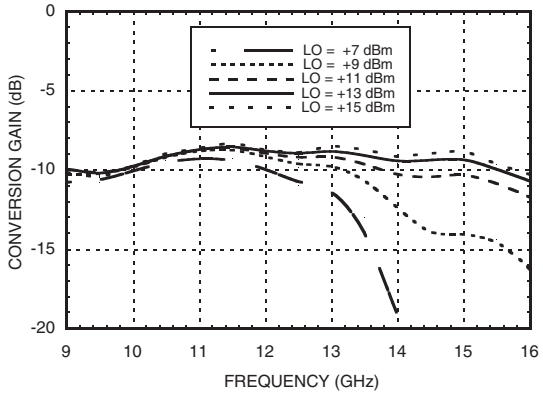
Conversion Gain vs. Temperature @ LO = +13 dBm



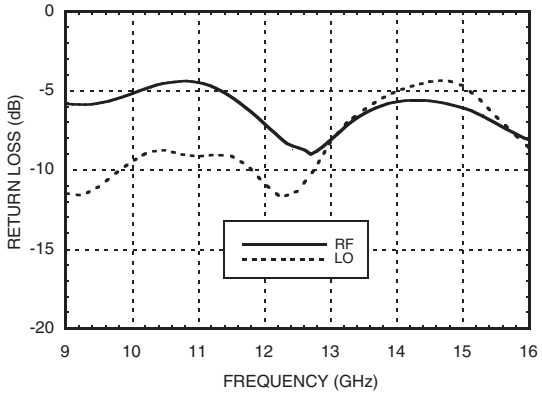
Isolation @ LO = +13 dBm



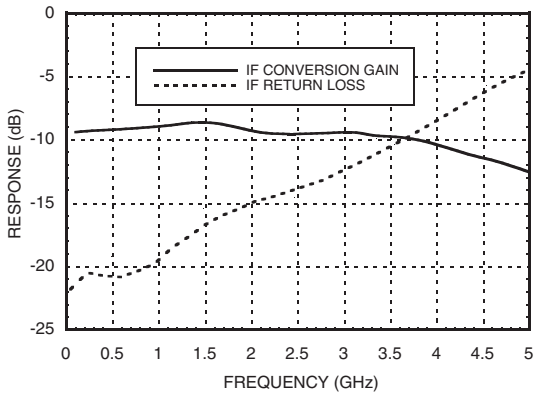
Conversion Gain vs. LO Drive



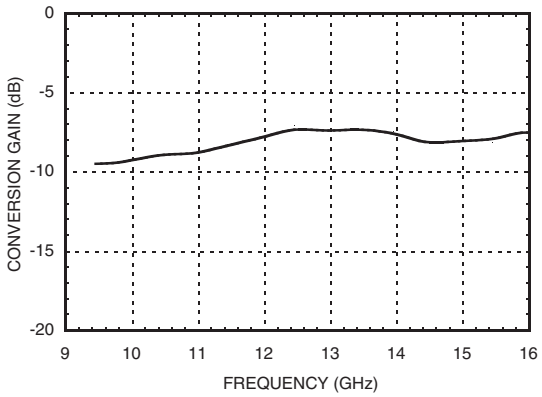
Return Loss @ LO = +13 dBm



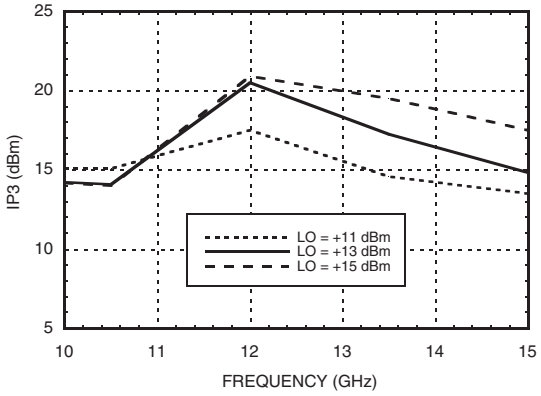
IF Bandwidth @ LO = +13 dBm



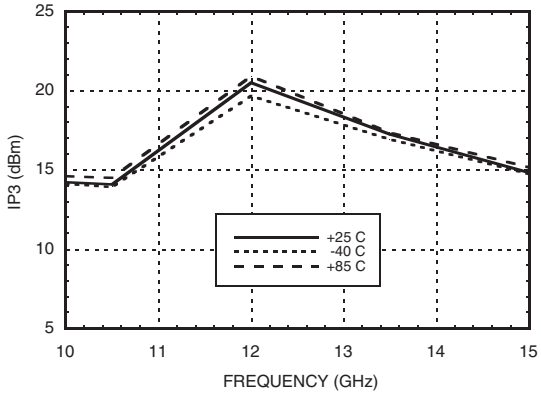
Upconverter Performance Conversion Gain @ LO = +13 dBm



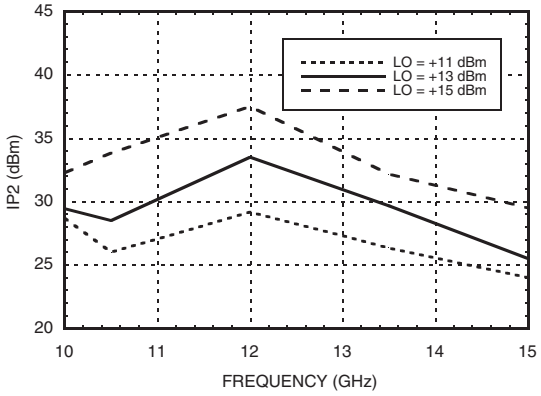
Input IP3 vs. LO Drive*



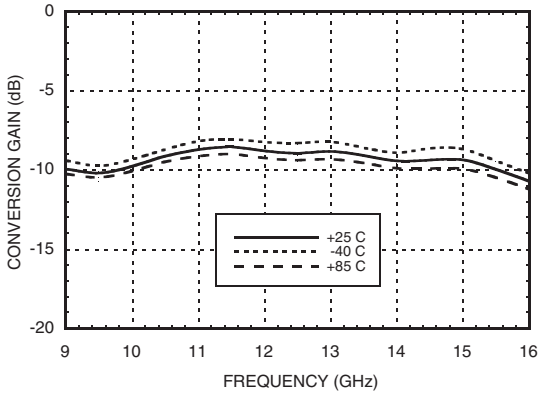
Input IP3 vs. Temperature @ LO = +13 dBm*



Input IP2 vs. LO Drive *



Input P1dB vs. Temperature @ LO = +13 dBm



MxN Spurious @ IF Port

	nLO				
mRF	0	1	2	3	4
0	XX	0	5	37	N/A
1	7	0	49	42	54
2	47	66	44	56	57
3	>95	>95	>95	58	77
4	N/A	>95	>95	>95	>95

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

Harmonics of LO

	nLO Spur @ RF Port			
LO Freq. (GHz)	1	2	3	4
9	25	18	46	53
10.5	25	20	52	66
12	27	24	47	63
13.5	27	33	61	N/A
15	27	47	67	N/A
16.5	24	52	63	N/A

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

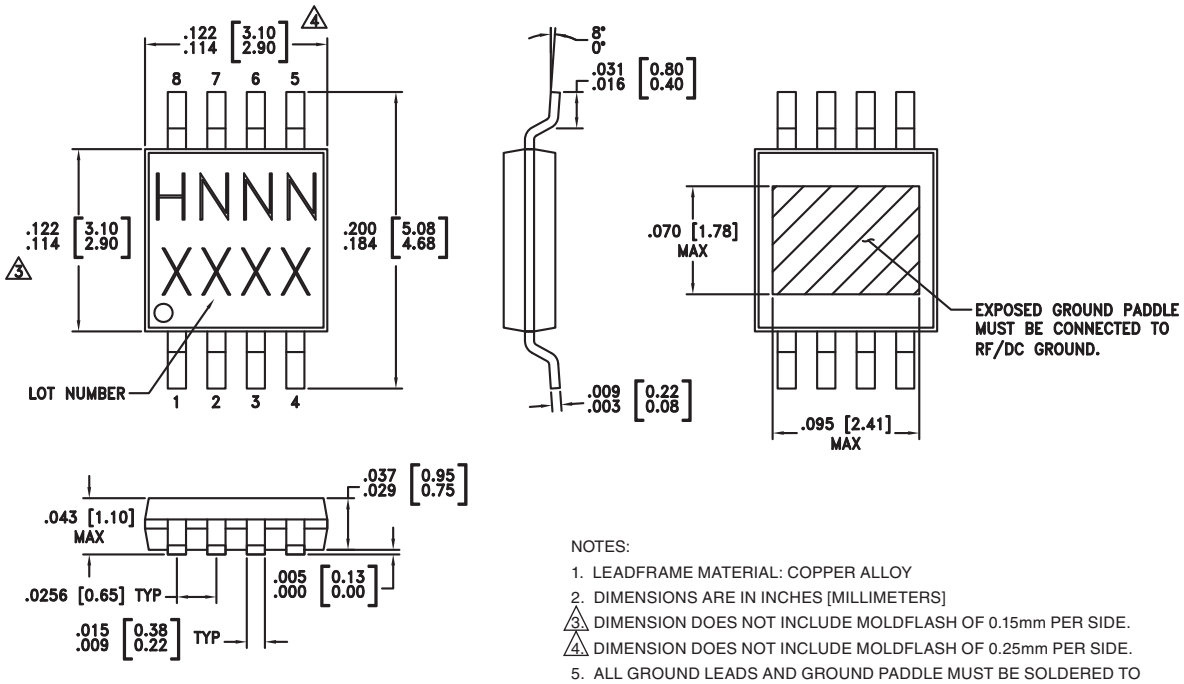
** Two-tone input power = 0 dBm each tone, 1 MHz spacing.*

Absolute Maximum Ratings

RF / IF Input	+15 dBm
LO Drive	+27 dBm
IF DC Current	±2 mA
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:

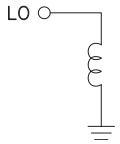
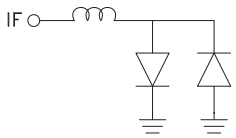
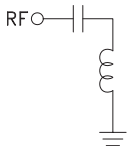
1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

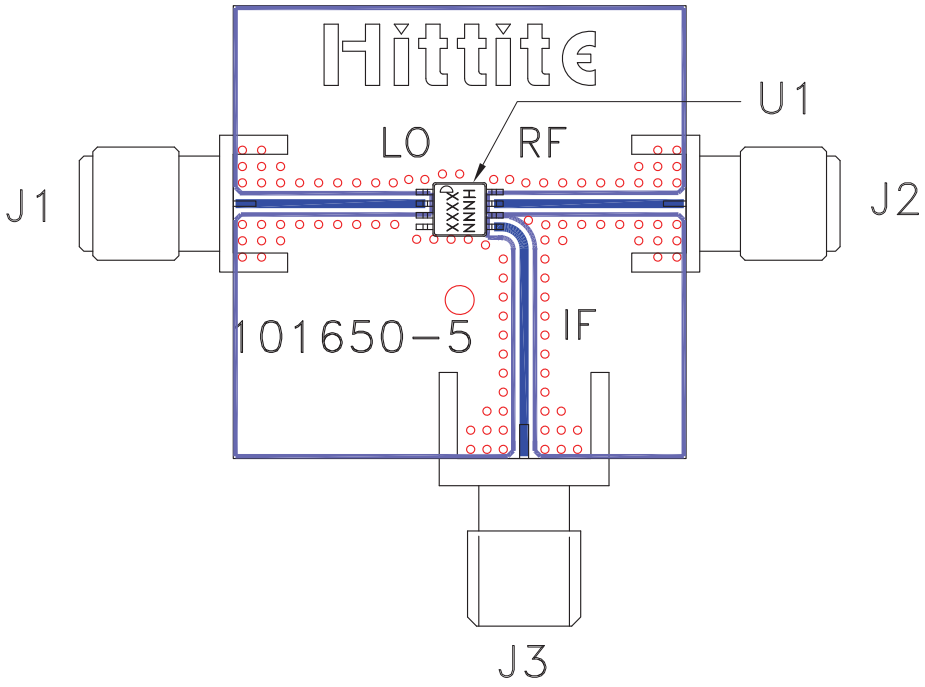
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC411MS8G	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	H411 XXXX
HMC411MS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H411 XXXX

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

Pin Descriptions

Pin Number	Funciton	Description	Interface Schematic
1, 8	GND	Pins and exposed ground slug must connect to RF ground.	
2	LO	This pin is AC coupled and matched to 50 Ohms.	
3, 4, 6	N/C	Not Connected	
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 value has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source/sink more than 2 mA of current or die non-function and possible die failure will result.	
7	RF	This pin is AC coupled and matched to 50 Ohms.	

Evaluation PCB



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	HMC411MS8G / HMC411MS8GE
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 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.