HMC218BMS8GE

v01.0616

GaAs MMIC DOUBLE-BALANCED MIXER 3.5 - 8 GHz

Typical Applications

The HMC218BMS8GE is ideal for:

- Base stations, Repeaters & Access Points
- WiMAX, WiBro & Fixed Wireless
- Portables & Subscribers
- PLMR, Public Safety & Telematics

Features

Passive Double-Balanced Topology

Input IP3: +17 dBm

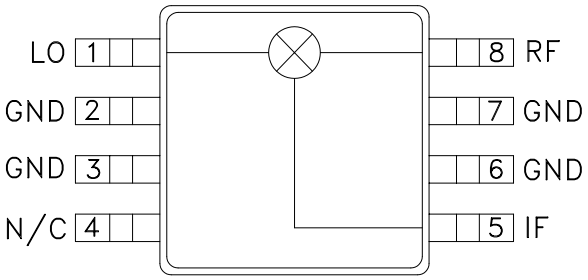
Low Conversion Loss: 7 dB

LO to RF Isolation: 38 dB

LO to IF Isolation: 32 dB

Up-converter & Down-converter Applications

Functional Diagram



General Description

The HMC218BMS8GE is an ultra miniature double-balanced mixers in an 8 lead plastic surface mount packages (MSOP). This passive MMIC mixer is constructed of GaAs Schottky diodes and novel planar transformer baluns on the chip. The device can be used as an up-converter, down-converter, bi-phase modulator / demodulator, or phase comparator. This mixer performs well when used as a down-converter from 3.5 to 8 GHz and as an up-converter from 4.5 to 8 GHz. The low conversion loss, high isolation and wide IF bandwidth make this mixer ideal for a variety of Rx and Tx frequency plans.

Electrical Specifications, T_A = +25 °C, IF = 100 MHz, LO = +13 dBm, LSB [1]

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range, RF		3.5 - 4.5			4.5 - 6			6 - 8		GHz
Frequency Range, LO		3.5 - 4.5			4.5 - 6			6- 8		GHz
Frequency Range, IF		DC - 1.6			DC- 1.6			DC - 1.6		GHz
Conversion Loss		9	12.5		7	8.5		7		dB
IP3 (Input)	10	13		12.5	17			17		dBm
IP2 (Input)		45			45			45		dBm
1 dB Gain Compression (Input)		10			10			11		dBm
LO to RF Isolation		42			38			36		dB
LO to IF Isolation	20	30		15	32			40		dB

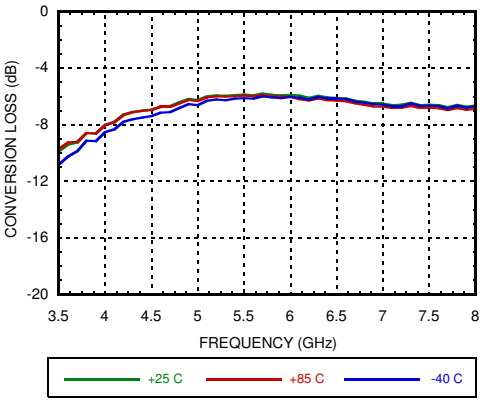
[1] Unless otherwise noted, all measurements performed as down-converter with high side LO, IF = 100 MHz, RFIN = -10 dBm

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

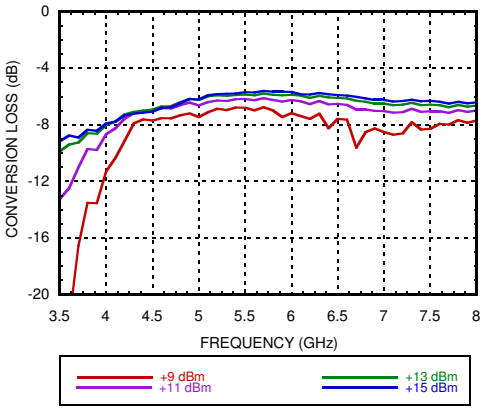
GaAs MMIC DOUBLE-BALANCED MIXER 3.5 - 8 GHz

High Side LO, Down-converter Performance, IF = 100 MHz

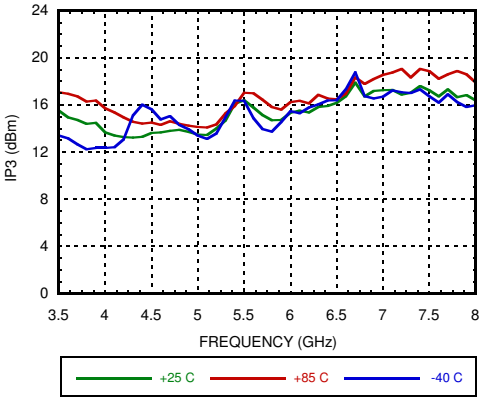
Conversion Loss vs. Temperature
LO = +13 dBm, RFIN = -10 dBm, LSB



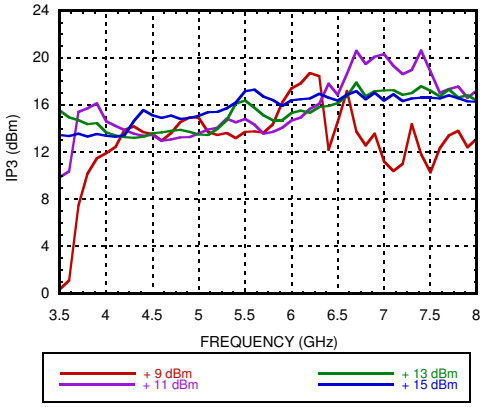
Conversion Loss vs. LO Drive
RFIN = -10 dBm, LSB



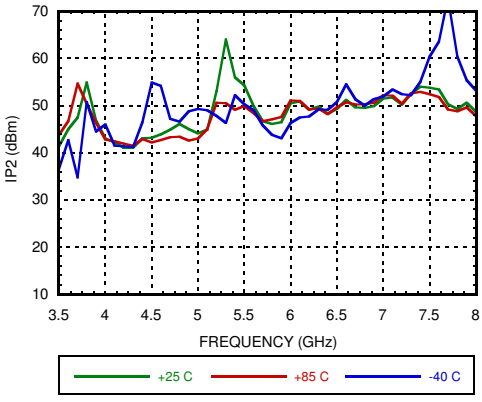
Input IP3 vs. Temperature
LO = +13 dBm, RFIN = -10 dBm, LSB



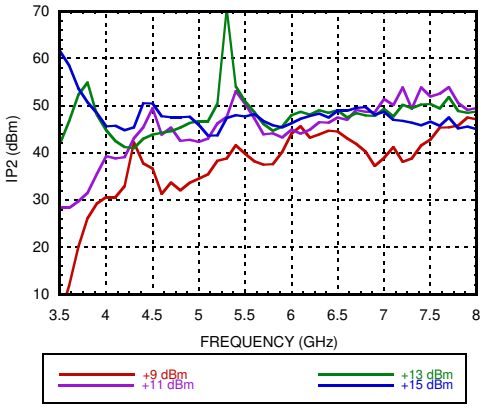
Input IP3 vs. LO Drive
RFIN = -10 dBm, LSB



Input IP2 vs. Temperature
LO = +13 dBm, RFIN = -10 dBm, LSB

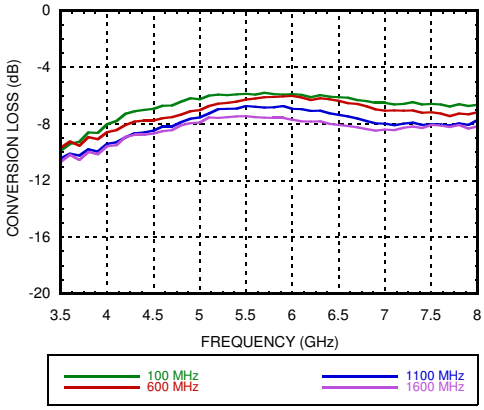


Input IP2 vs. LO Drive
RFIN = -10 dBm, LSB

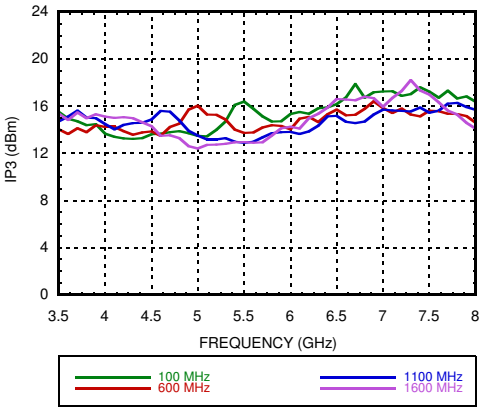


High Side LO, Down-converter Performance, IF = 100 MHz

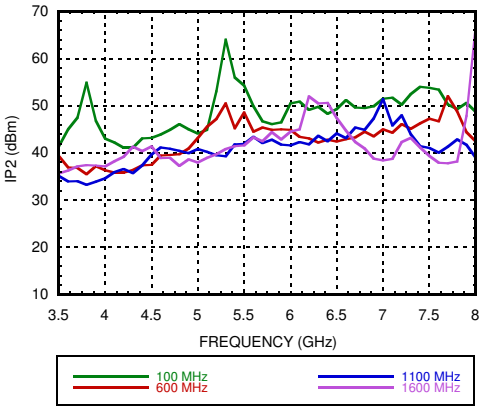
Conversion Loss vs. IF
LO = +13 dBm, RFIN = -10 dBm, LSB



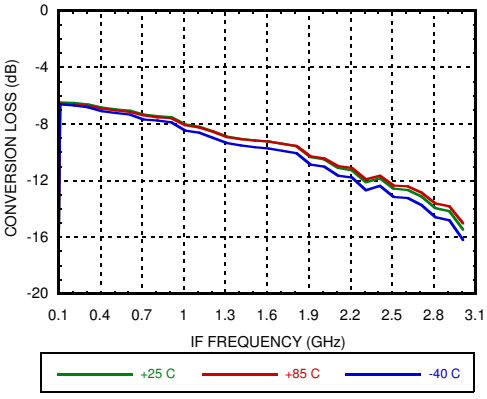
Input IP3 vs. IF
LO = +13 dBm, RFIN = -10 dBm, LSB



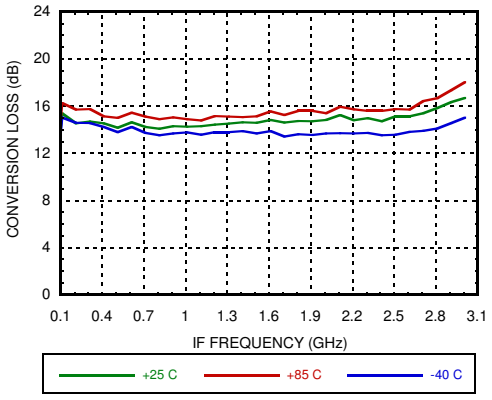
Input IP2 vs. IF
LO = +13 dBm, RFIN = -10 dBm, LSB



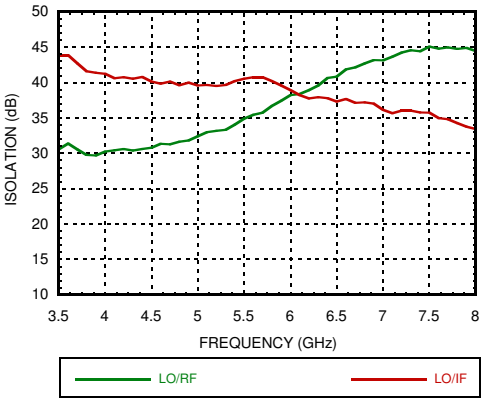
Conversion Loss over IF Bandwidth
@ LO = 6 GHz, LO Power = +13 dBm, LSB



Input IP3 over IF Bandwidth, LO = 6 GHz
LO Power = +13 dBm, LSB

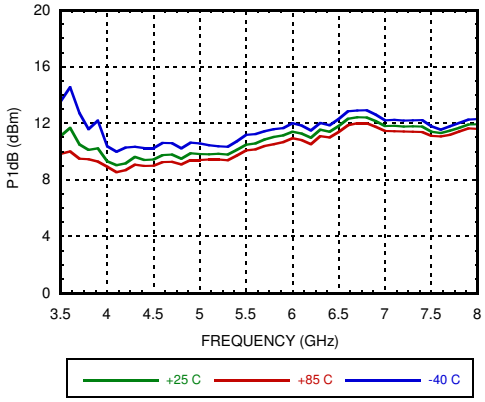


LO to RF and LO to IF Isolation
LO Power = +13 dBm

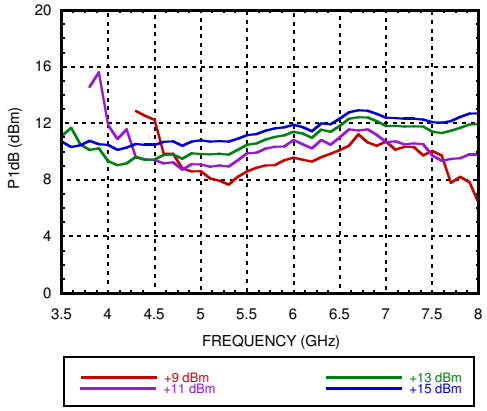


High Side LO, Down-converter Performance, IF = 100 MHz

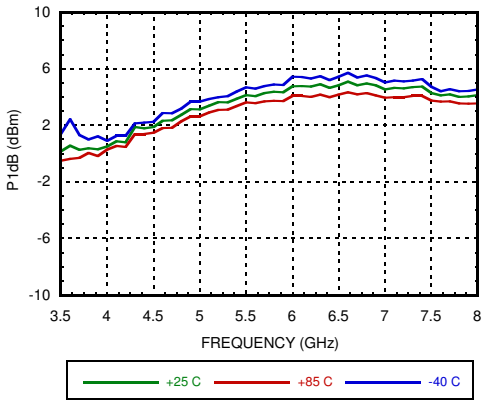
Input P1dB vs. Temperature
LO Power = +13 dBm, IF = 100 MHz



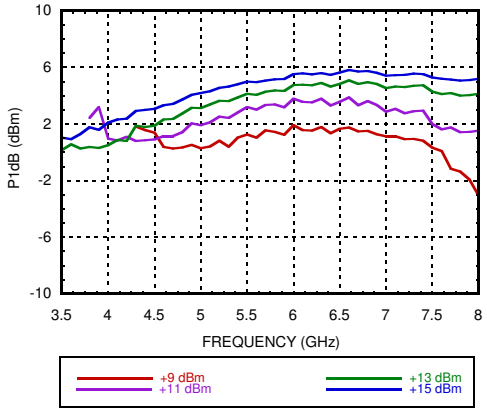
Input P1dB vs. LO Power
IF = 100 MHz,



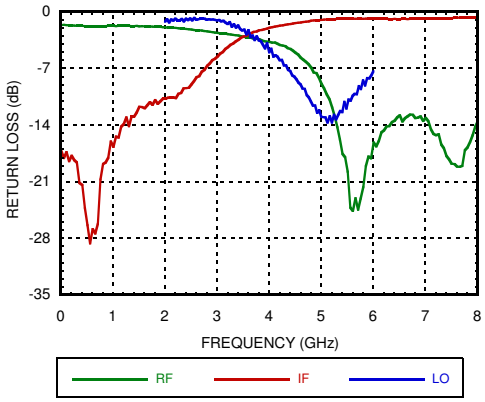
Output P1dB vs. Temperature
LO Power = +13 dBm, IF = 100 MHz



Output P1dB vs. LO Power
IF = 100 MHz



RF, LO, IF Return Loss @ LO = 4.6GHz
LO Power = +13 dBm



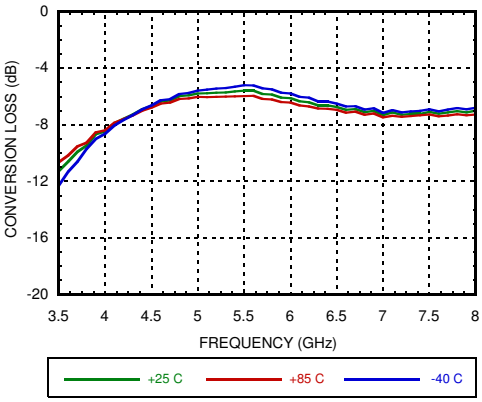
M x N Spurious Outputs, IF = 100 MHz

	nLO					
mRF	0	1	2	3	4	5
0		3.4	32.5	25.6	52.1	11.2
1	13.4		31.9	57.7	45.3	54.2
2	67.3	45.9	60.5	51.6	76.3	72.1
3	82.1	92.4	70.8	52	73.5	93.2
4	86.9	90.6	93.9	75.7	88.6	82.3
5	84	89.2	88.3	93.4	96	78.2

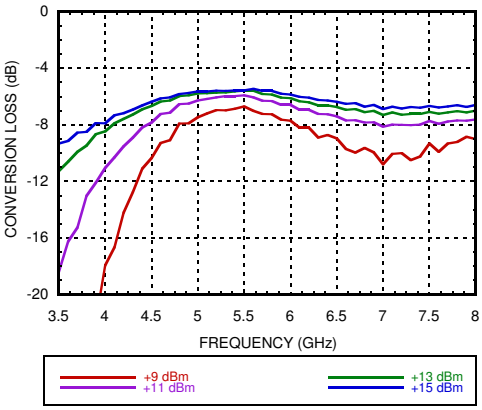
RF = 5.15 GHz @ -10 dBm
LO = 5.25 GHz @ +13 dBm
All values in dBc below IF power level (LO - RF) LSB
Spur values are (M x RF) - (N x LO)

Low Side LO, Up-converter Performance, IF = 100 MHz

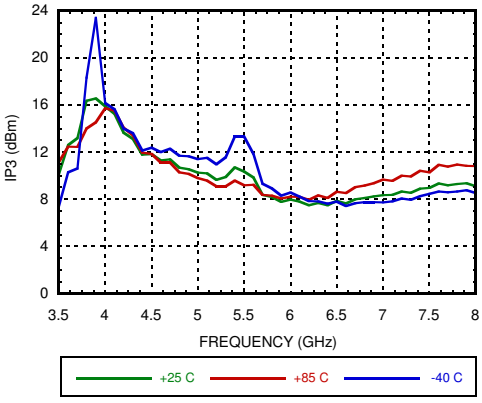
Conversion Loss vs. Temperature
LO = +13 dBm, RFIN = -10 dBm, USB



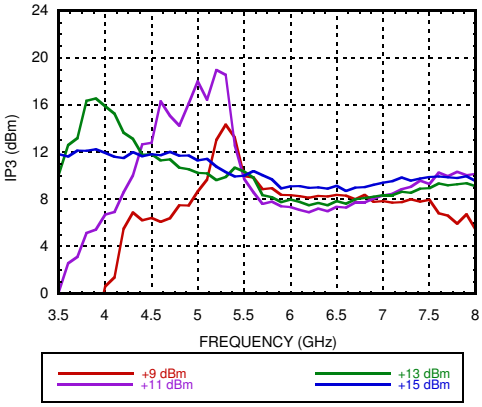
Conversion Loss vs. LO Drive
RFIN = -10 dBm, USB



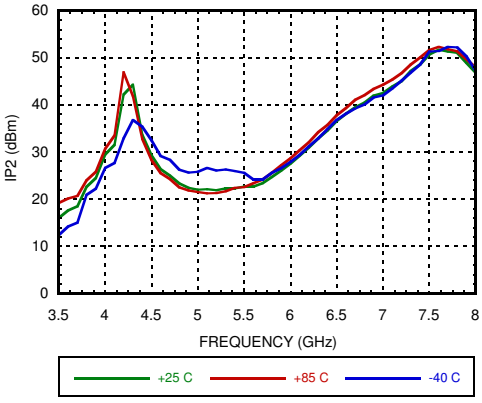
Input IP3 vs. Temperature
LO = +13 dBm, RFIN = -10 dBm, USB



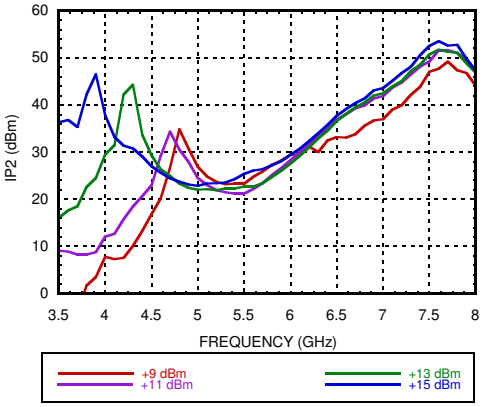
Input IP3 vs. LO Drive
RFIN = -10 dBm, USB



Input IP2 vs. Temperature
LO = +13 dBm, RFIN = -10 dBm, USB

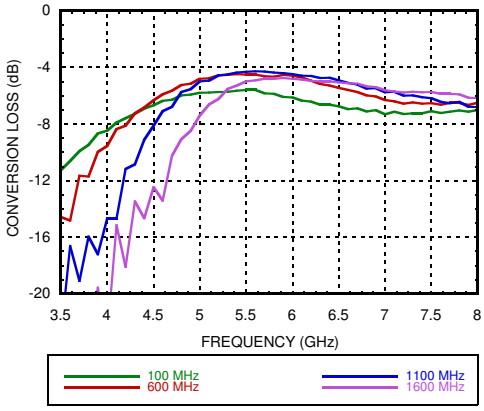


Input IP2 vs. LO Drive
RFIN = -10 dBm, USB

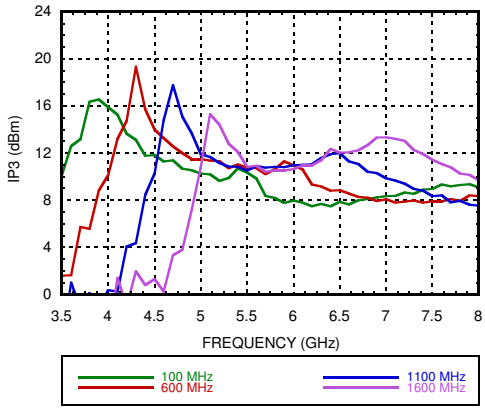


Low Side LO, Up-converter Performance

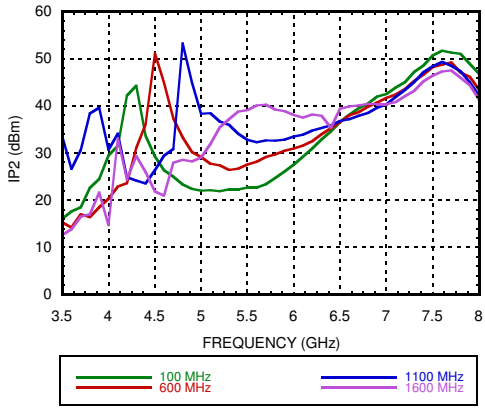
Conversion Loss vs. IF
LO = +13 dBm, RFIN = -10 dBm, USB



Input IP3 vs. IF
LO = +13 dBm, RFIN = -10 dBm, USB



Input IP2 vs. IF
LO = +13 dBm, RFIN = -10 dBm, USB



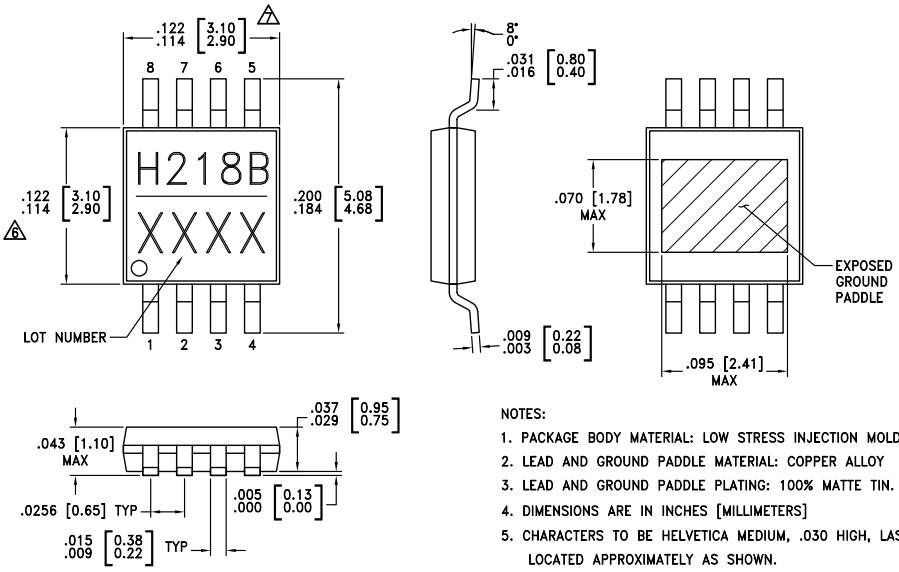
GaAs MMIC DOUBLE-BALANCED MIXER 3.5 - 8 GHz

Absolute Maximum Ratings

RF Power Input	+13 dBm
LO Power	+27 dBm
Channel Temperature	150 °C
Thermal Resistance (R_{TH}) (junction to ground paddle)	120 °C/W
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to 150°C
ESD Sensitivity (HBM)	750 V (Class 1B)
ESD Sensitivity (CDM)	1000 V (Class C5)

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

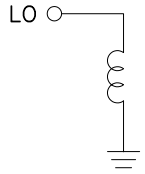
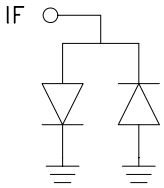
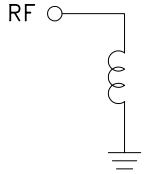
1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC. SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS]
5. CHARACTERS TO BE HELVETICA MEDIUM, .030 HIGH, LASER OR WHITE INK, LOCATED APPROXIMATELY AS SHOWN.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
7. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
8. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

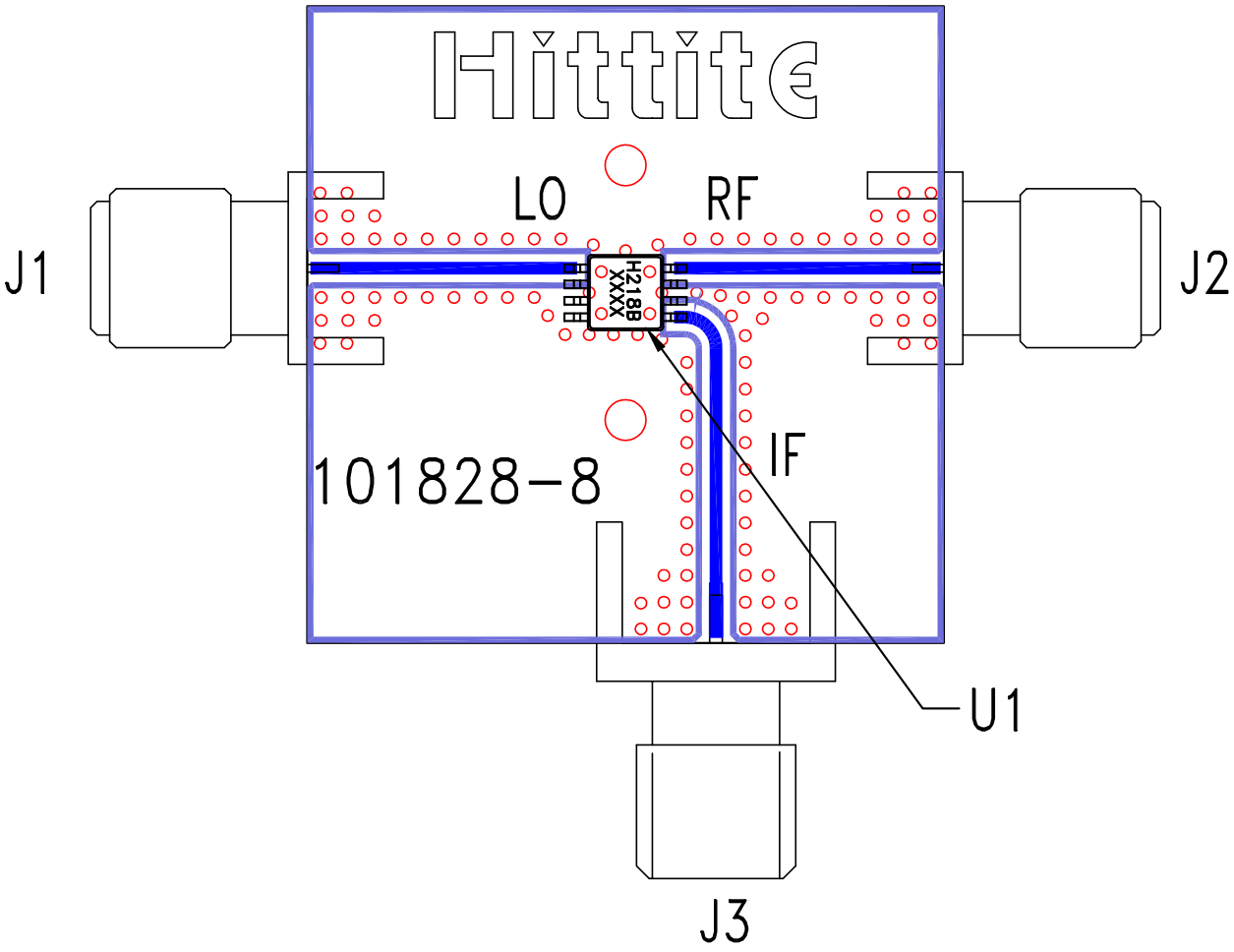
Part Number	Package Body Material	Lead Finish	MSL Rating [2]	Package Marking [1]
HMC218BMS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1	H218B XXXX

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

Pin Descriptions

Pin Number	Function	Description	Pin Schematic
1	LO	This pin is DC coupled and matched to 50 Ohms.	
2, 3, 6, 7	GND	These pins and package bottom must be connected to RF/DC ground.	
4	N/C	No connected required. Pins are not connected internally. However, all data shown herein was measured with theses pins connected to RF/DC ground 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 value has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source or sink more than 2 mA of current or part non-function and possible part failure will result.	
8	RF	This pin is DC coupled and matched to 50 Ohms.	

Evaluation PCB



List of Material for Evaluation PCB EV1HMC218BMS8G [1]

Item	Description
J1, J3	PCB Mount SMA RF Connector
U1	HMC218BMS8GE
PCB [2]	101828 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.

Notes: