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[Analog Devices Inc.](#)
[HMC-C044](#)

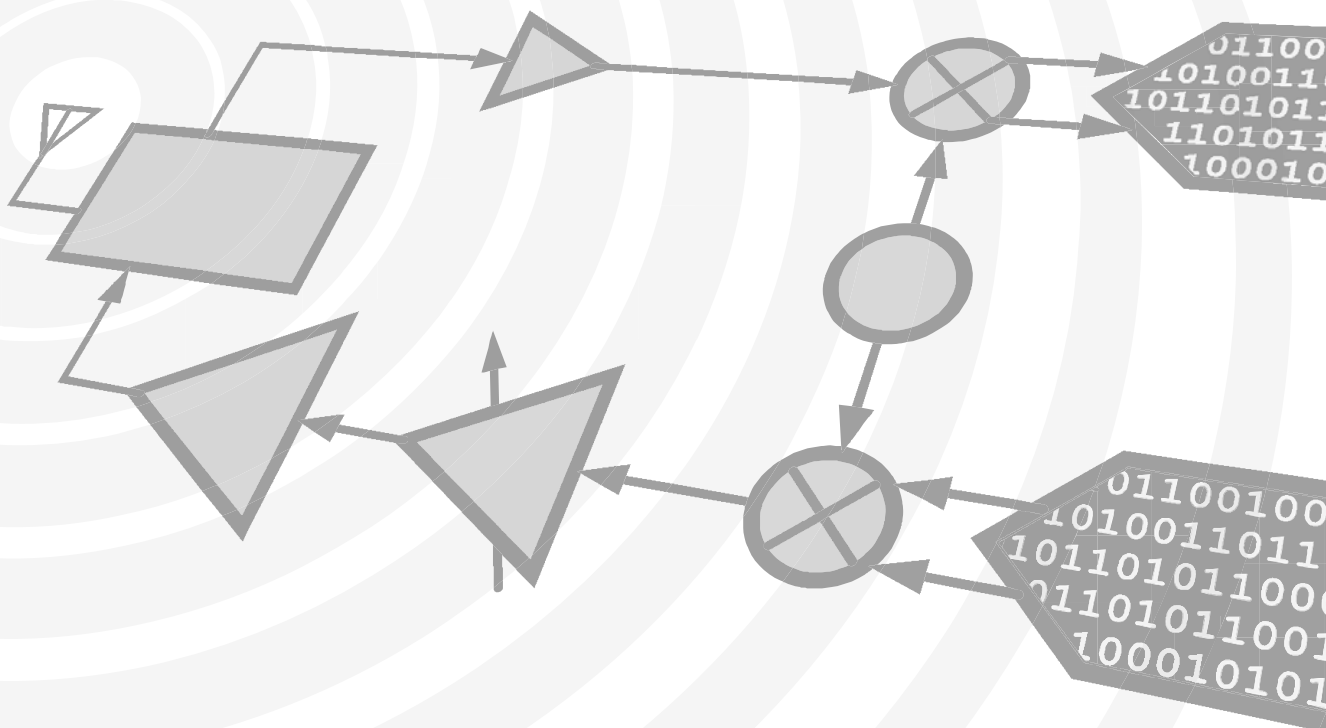
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Analog Devices Welcomes Hittite Microwave Corporation

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v02.0310



HMC-C044

GaAs MMIC I/Q MIXER MODULE 15 - 23 GHz

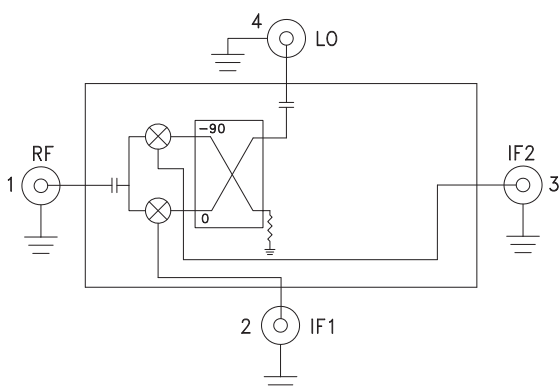


Typical Applications

The HMC-C044 is ideal for:

- Point-to-Point Radios
- Point-to-Multi-Point Radios & VSAT
- Test Equipment & Sensors
- Military End-Use

Functional Diagram



Features

- Wide IF Bandwidth: DC - 3.5 GHz
- Image Rejection: 30 dB
- LO to RF Isolation: 35 dB
- High Input IP3: +25 dBm
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85 °C Operating Temperature

General Description

The HMC-C044 is a passive I/Q MMIC mixer housed in a miniature hermetic module which can be used as either an Image Reject Mixer or a Single Sideband Upconverter. The module utilizes two standard Hittite double balanced mixer cells and a 90 degree hybrid fabricated on a GaAs MESFET process. A low frequency quadrature hybrid was used to produce a 100 MHz USB IF output. This MMIC based module is a more reliable and consistent alternative to hybrid style I/Q Mixers and Single Sideband Converter assemblies. The module features removable SMA connectors which can be detached to allow direct connection of the I/O pins to a microstrip or coplanar circuit.

Electrical Specifications, $T_A = +25^\circ \text{C}$, $IF = 100 \text{ MHz}$, $LO = +17 \text{ dBm}^*$

Parameter	Min.	Typ.	Max.	Units
Frequency Range, RF/LO		15 - 23		GHz
Frequency Range, IF		DC - 3.5		GHz
Conversion Loss (As IRM)		8	10	dB
Image Rejection	20	30		dB
1 dB Compression (Input)		+15		dBm
LO to RF Isolation	30	35		dB
LO to IF Isolation	17	22		dB
IP3 (Input)		+25		dBm
Amplitude Balance		0.3		dB
Phase Balance		4		Deg

* Unless otherwise noted, all measurements performed as downconverter.

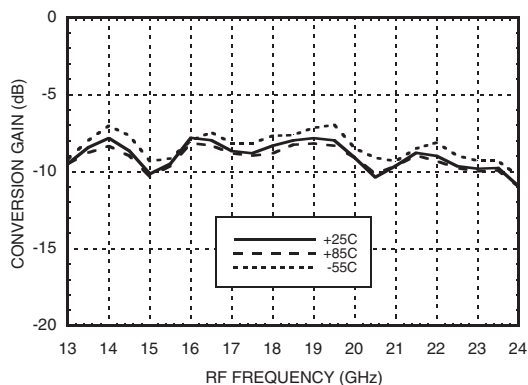
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Data taken As IRM With External IF Hybrid
Conversion Gain vs. Temperature

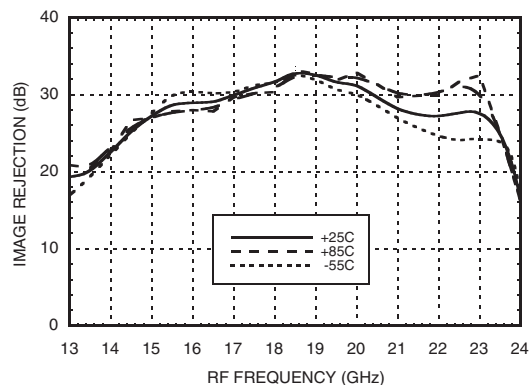


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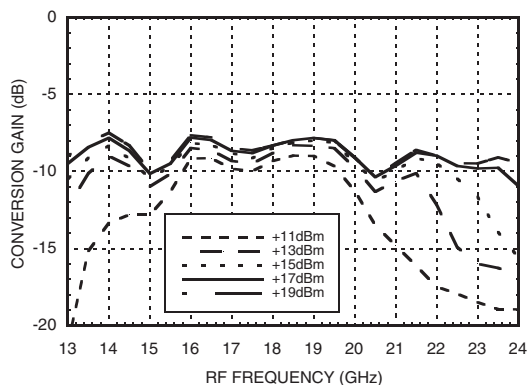
GaAs MMIC I/Q MIXER MODULE

15 - 23 GHz

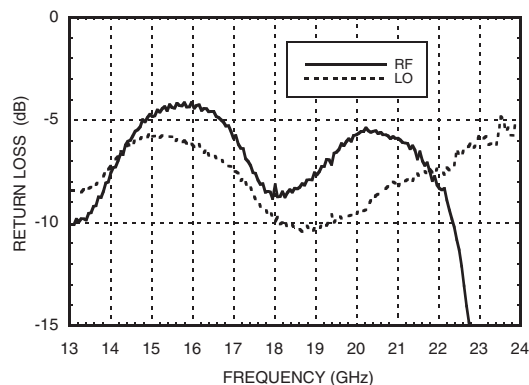
Image Rejection vs. Temperature



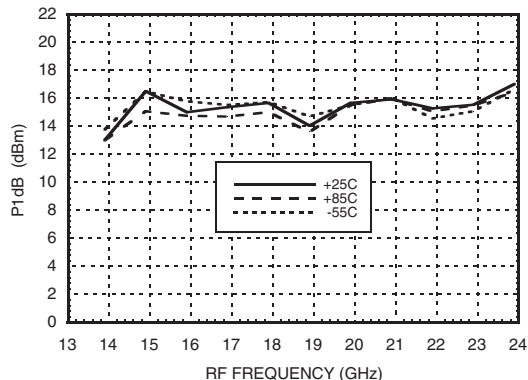
Conversion Gain vs. LO Drive



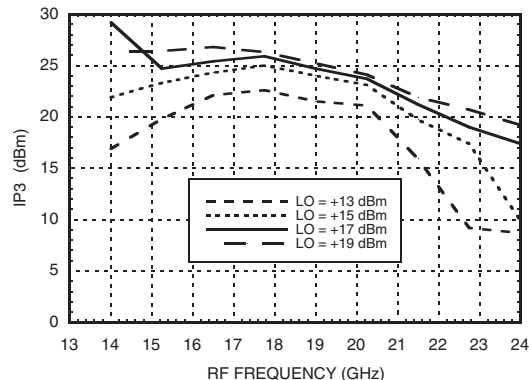
Return Loss



Input P1dB vs. Temperature



Input IP3 vs. LO Drive





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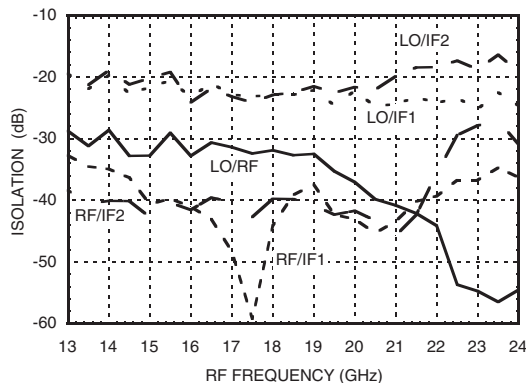


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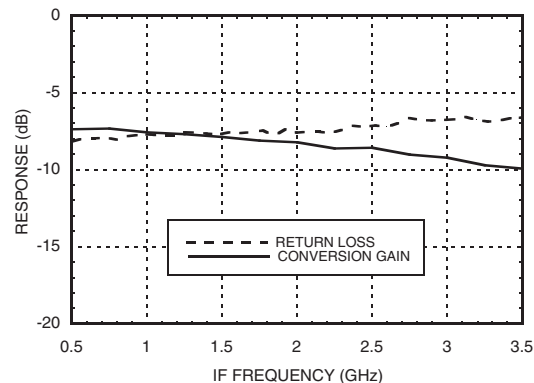
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Quadrature Channel Data Taken Without IF Hybrid

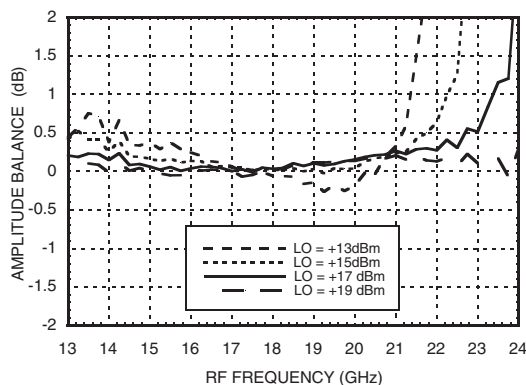
Isolations



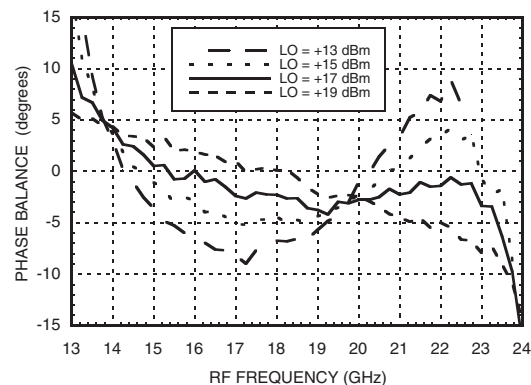
IF Bandwidth*



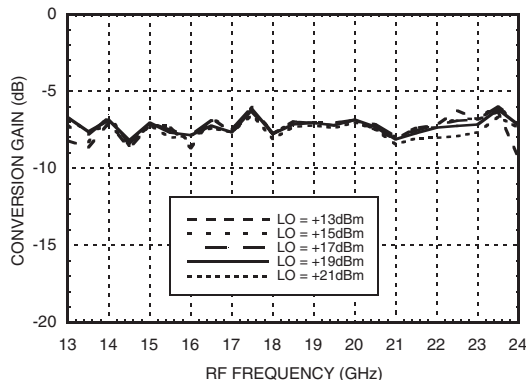
Amplitude Balance vs. LO Drive



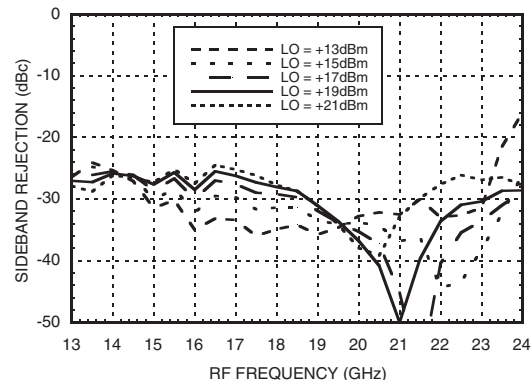
Phase Balance vs. LO Drive



Upconverter Performance Conversion Gain vs. LO Drive*



Upconverter Performance Sideband Rejection vs. LO Drive*



* Conversion gain data taken with external IF hybrid

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Harmonics of LO

LO Freq. (GHz)	nLO Spur at RF Port	
	1	2
15.5	31	51
17	31	56
18.5	32	63
20	37	73
21.5	42	72
23	55	71

LO = + 15 dBm
Values in dBc below input LO level measured at RF Port.

MxN Spurious Outputs

mRF	nLO				
	0	1	2	3	4
0	xx	-9	29	xx	xx
1	34	0	46	61	xx
2	87	65	82	62	87
3	xx	87	92	86	90
4	xx	xx	84	92	92

RF = 17.6 GHz @ -10 dBm
LO = 17.5 GHz @ +15 dBm
Data taken without IF hybrid
All values in dBc below IF power level

Absolute Maximum Ratings

RF / IF Input	+20 dBm
LO Drive	+ 27 dBm
Channel Temperature	150°C
Continuous P _{diss} (T=85°C) (derate 5.22 mW/°C above 85°C)	340 mW
Thermal Resistance (R _{TH}) (junction to package bottom)	191.5 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS



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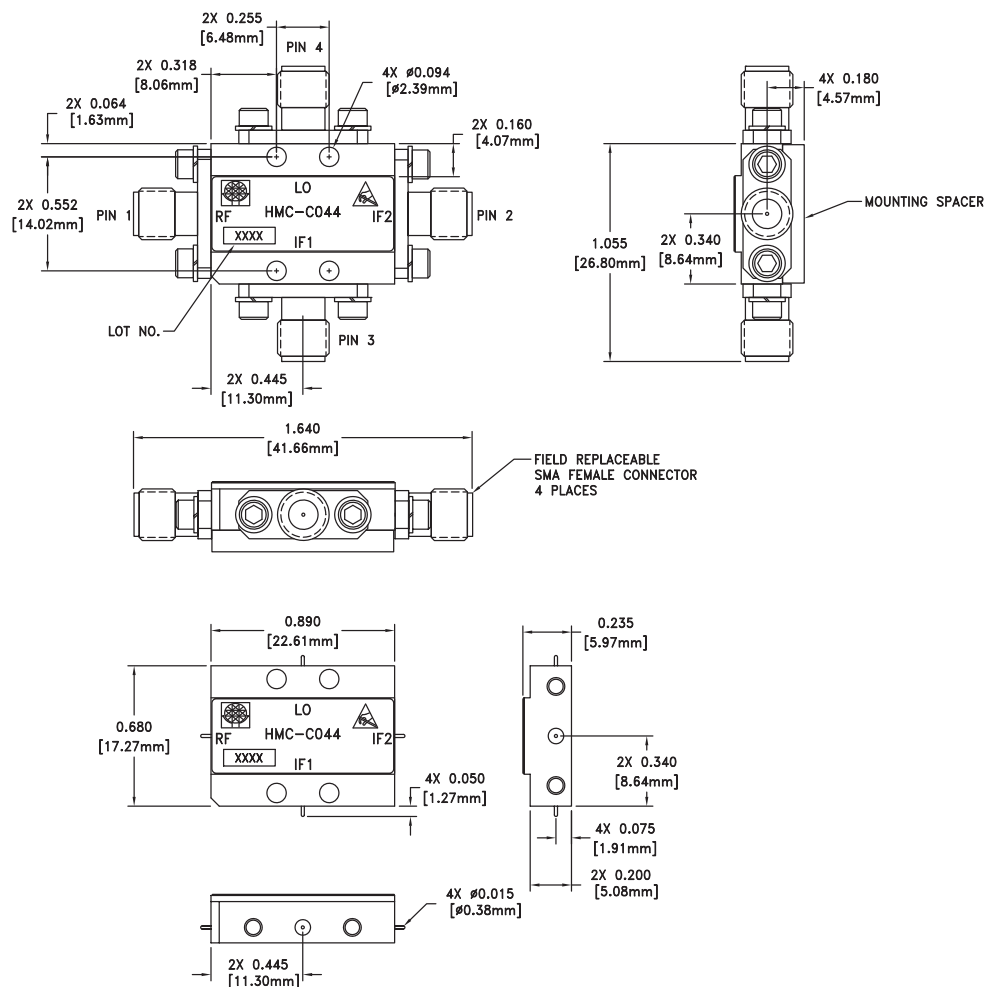
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Outline Drawing



VIEW SHOWN WITH CONNECTORS REMOVED

Package Information

Package Type	C-4
Package Weight [1]	20 gms [2]
Spacer Weight	2.6 gms [2]

[1] Includes the connectors

[2] ±1 gms Tolerance

NOTES:

- 1.0 PACKAGE, LEADS, COVER MATERIAL: KOVART™
- 2.0 FINISH: GOLD PLATE OVER NICKEL PLATE
- 3.0 MOUNTING SPACER: NICKEL PLATED ALUMINUM.
- 4.0 ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
- 5.0 TOLERANCES:
- 5.1 .XX = ±.02
- 5.2 .XXX = ±.010
- 6.0 FIELD REPLACEABLE SMA CONNECTORS.
TENSOLITE 5602-5CCSF OR EQUIVALENT.
- 7.0 TO MOUNT MODULE TO SYSTEM PLATFORM REPLACE 0-80
HARDWARE WITH DESIRED MOUNTING SCREWS.

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Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	RF	This pin is AC coupled and matched to 50 Ohms.	RF
2	IF1	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 3 mA of current or part non-function and possible part failure will result.	
3	IF2		
4	LO	This pin is AC coupled and matched to 50 Ohms.	LO