

## GaAs MMIC I/Q MIXER MODULE 4.0 - 8.5 GHz

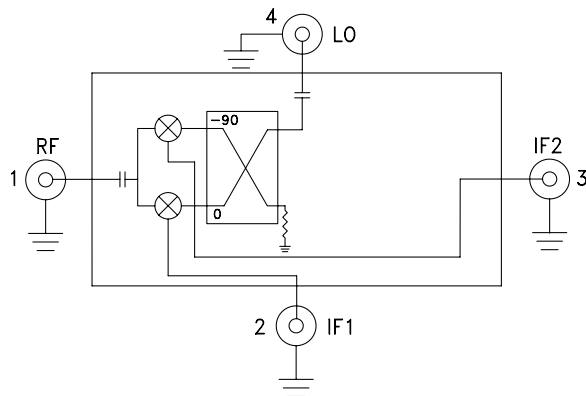


### Typical Applications

The HMC-C009 is ideal for:

- Telecommunications Equipment
- Test Equipment
- Military Radios, Radar & ECM
- Space Systems

### Functional Diagram



### Features

- Wide IF Bandwidth: DC - 3.5 GHz
- Image Rejection: 35 dB
- LO to RF Isolation: 40 dB
- High Input IP3: +23 dBm
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 °C to +85 °C Operating Temperature

### General Description

The HMC-C009 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. 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 modules I/O pins to a microstrip or coplanar circuit.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , $IF = 100\text{ MHz}$ , $LO = +15\text{ dBm}^*$

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range, RF/LO		4.0 - 8.5			5.5 - 7.5		GHz
Frequency Range, IF		DC - 3.5			DC - 3.5		GHz
Conversion Loss (As IRM)		7.5	10.5		7.5	9.5	dB
Image Rejection	22	35		28	34		dB
1 dB Compression (Input)		+14			+15		dBm
LO to RF Isolation	32	40		35	40		dB
LO to IF Isolation	14	20		15	20		dB
IP3 (Input)		+23			+23		dBm
Amplitude Balance		0.3			0.2		dB
Phase Balance		8			6		Deg

\* Unless otherwise noted, all measurements performed as downconverter.

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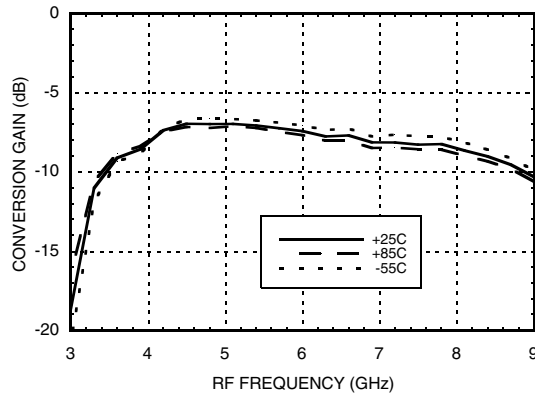
For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106  
Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com)  
Application Support: Phone: 1-800-ANALOG-D

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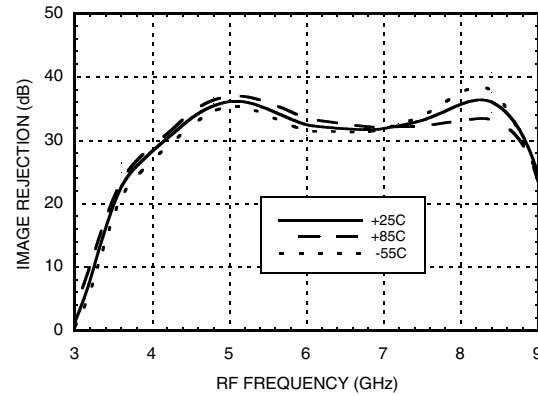


Data taken As IRM With External IF Hybrid

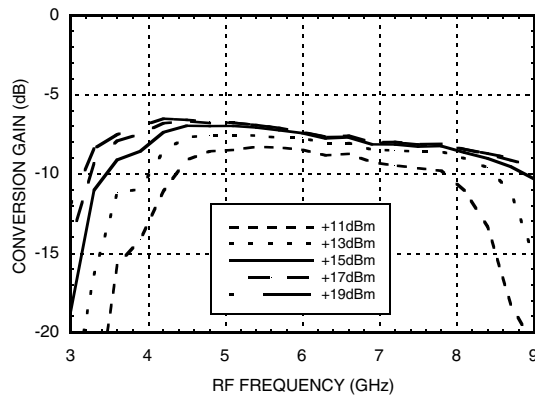
**Conversion Gain vs. Temperature**



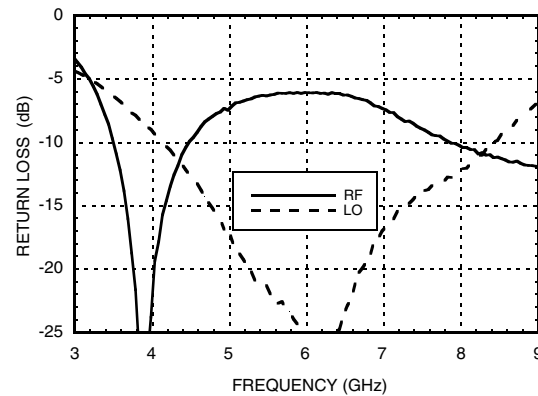
**Image Rejection vs. Temperature**



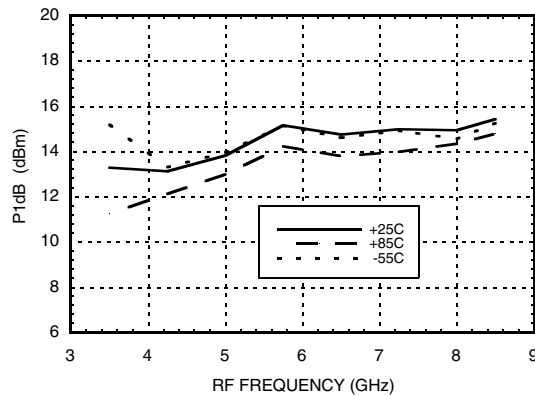
**Conversion Gain vs. LO Drive**



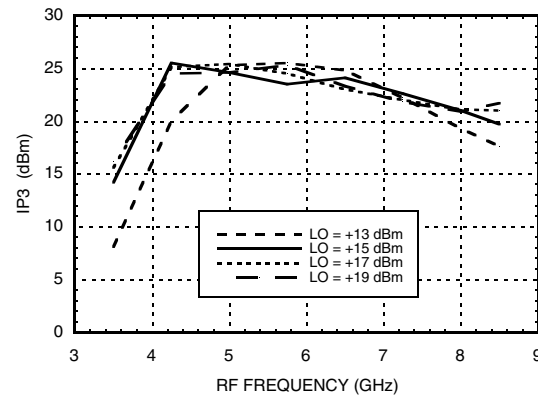
**Return Loss**



**Input P1dB vs. Temperature**



**Input IP3 vs. LO Drive**



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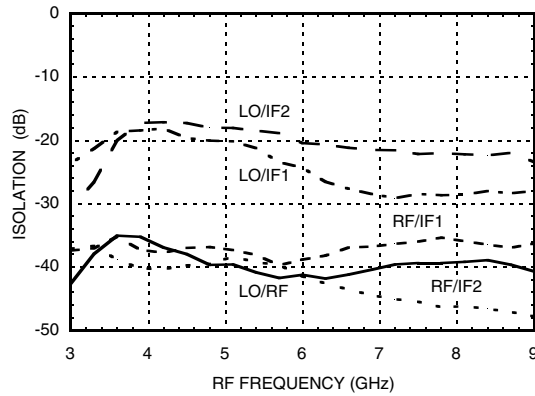
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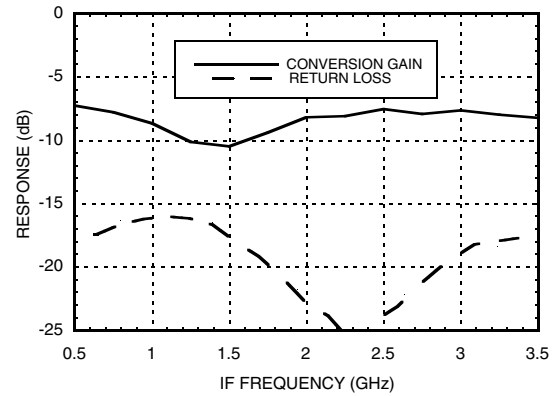


**Quadrature Channel Data Taken Without IF Hybrid**

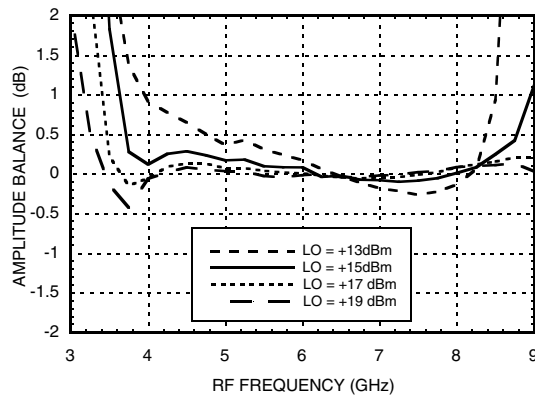
**Isolations**



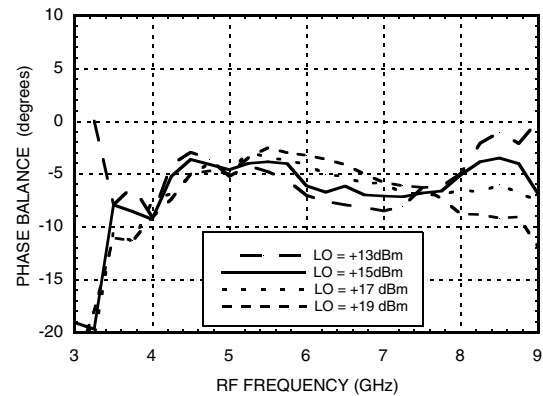
**IF Bandwidth\***



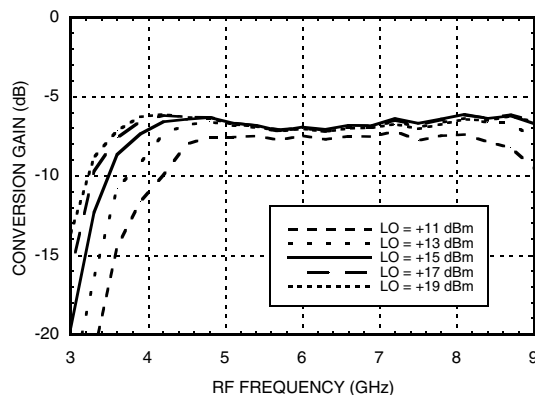
**Amplitude Balance vs. LO Drive**



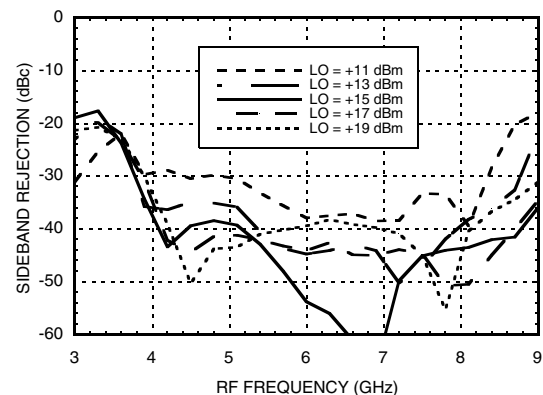
**Phase Balance vs. LO Drive**



**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	3	4
3.5	41	54	59	57
4.5	43	43	59	58
5.5	46	57	52	71
6.5	44	60	71	60
7.5	43	66	69	62
8.5	44	65	69	70

LO = +15 dBm  
Values in dBc below input LO level measured at RF Port.  
Data taken with IF ports terminated in 50 Ohms.

### MxN Spurious Outputs

mRF	nLO				
	0	1	2	3	4
0	xx	-10	35	25	51
1	35	0	45	54	74
2	94	64	72	67	95
3	95	97	99	84	97
4	90	93	95	97	106

RF = 5.6 GHz @ -10 dBm  
LO = 5.5 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
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

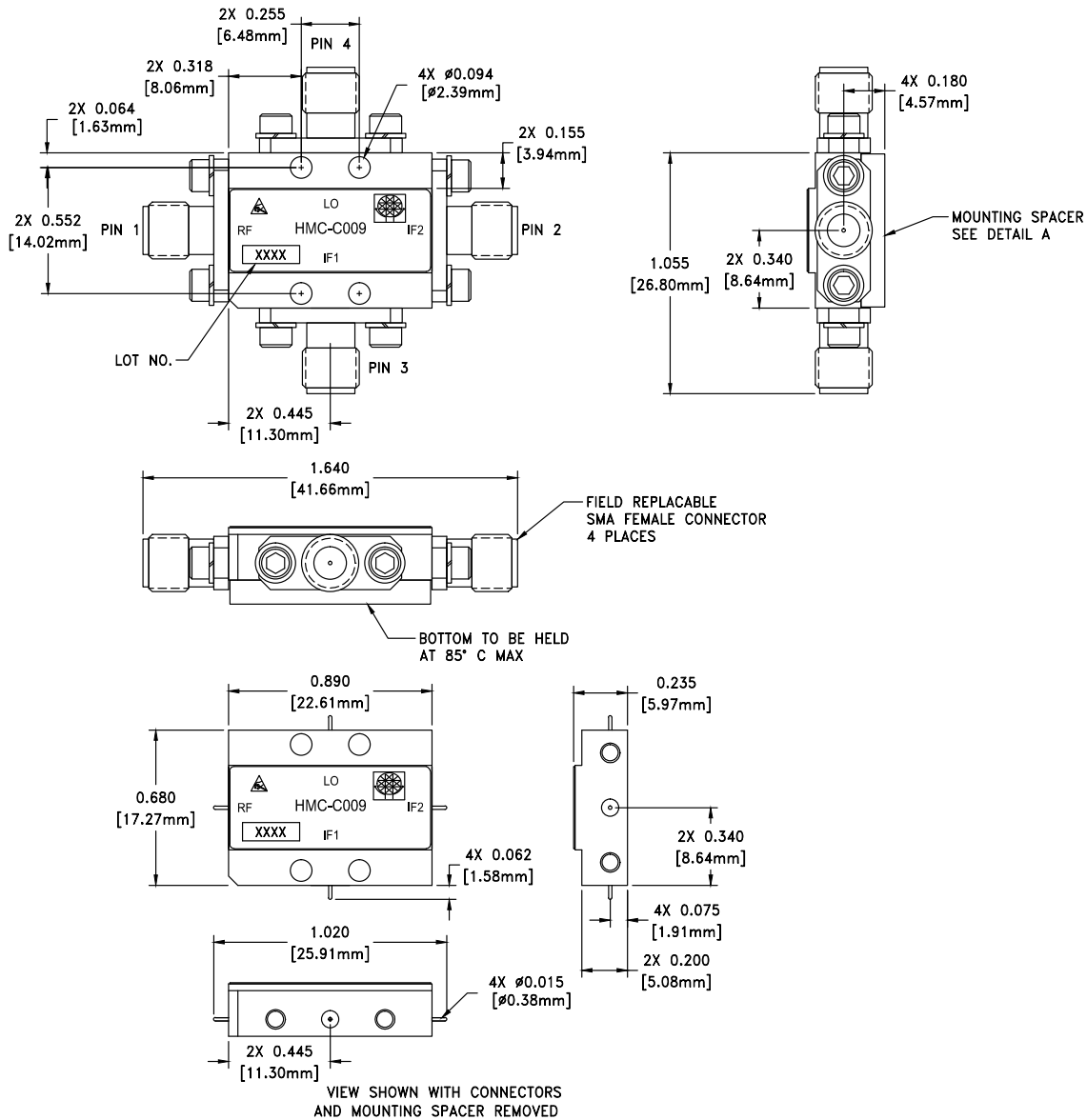


ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

**GaAs MMIC I/Q MIXER MODULE  
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**Outline Drawing**



**Package Information**

Package Type	C-4
Package Weight <sup>[1]</sup>	20 gms <sup>[2]</sup>
Spacer Weight	2.6 gms <sup>[2]</sup>

[1] Includes the connectors

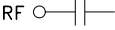
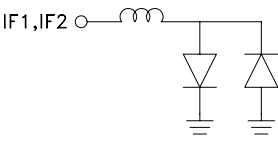
[2] ±1 gms Tolerance

**NOTES:**

1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. FINISH: GOLD PLATE OVER NICKEL PLATE
3. MOUNTING SPACER: NICKEL PLATED ALUMINUM
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
5. TOLERANCES:
  - 5.1 .XX = ±0.02
  - 5.2 .XXX = ±0.010
6. FIELD REPLACEABLE SMA CONNECTORS  
TENSOLITE 5602 - 5CCSF OR EQUIVALENT
7. TO MOUNT MODULE TO SYSTEM PLATFORM REPLACE 0 -80  
HARDWARE WITH DESIRED MOUNTING SCREWS



### 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 3mA of current or part non-function and possible part failure will result.	IF1,IF2 
3	IF2		
4	LO	This pin is AC coupled and matched to 50 Ohms.	LO 