



## GaAs MMIC I/Q MIXER MODULE 8.5 - 13.5 GHz

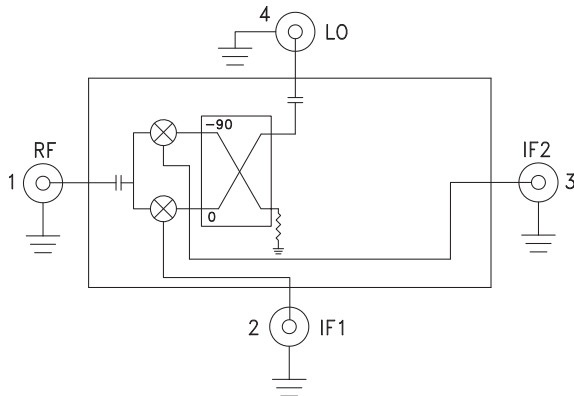


### Typical Applications

The HMC-C042 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 - 2 GHz
- Image Rejection: 28 dB
- LO to RF Isolation: 38 dB
- High Input IP3: +25 dBm
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85 °C Operating Temperature

### General Description

The HMC-C042 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, $T_A = +25^\circ \text{C}$ , $IF = 100 \text{ MHz}$ , $LO = +19 \text{ dBm}^*$

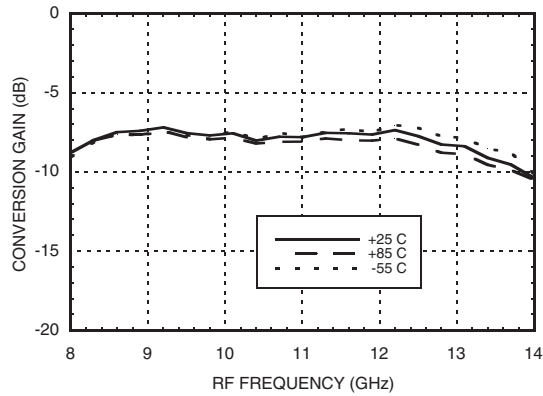
Parameter	Min.	Typ.	Max.	Units
Frequency Range, RF/LO	8.5 - 13.5			GHz
Frequency Range, IF	DC - 2			GHz
Conversion Loss (As IRM)		8	10	dB
Image Rejection	17	28		dB
1 dB Compression (Input)		+17		dBm
LO to RF Isolation	35	38		dB
LO to IF Isolation	20	25		dB
IP3 (Input)		+25		dBm
Amplitude Balance		0.6		dB
Phase Balance		6		Deg

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

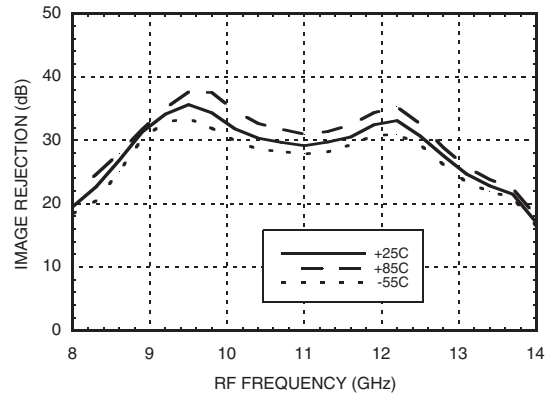
**GaAs MMIC I/Q MIXER MODULE  
8.5 - 13.5 GHz**



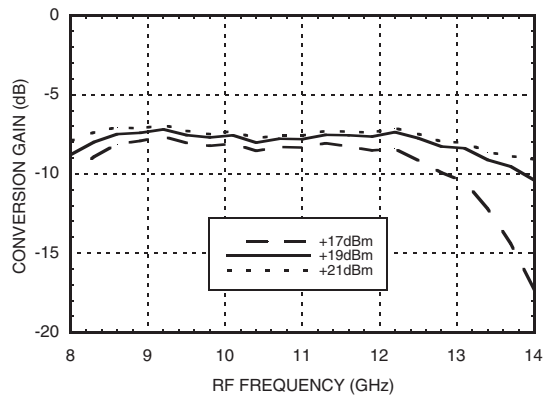
**Data taken As IRM With External IF Hybrid**  
**Conversion Gain vs. Temperature**



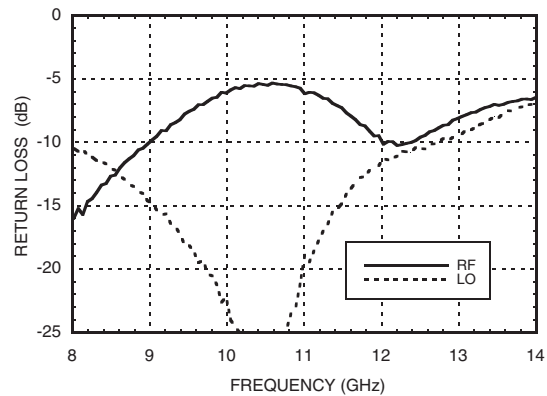
**Image Rejection vs. Temperature**



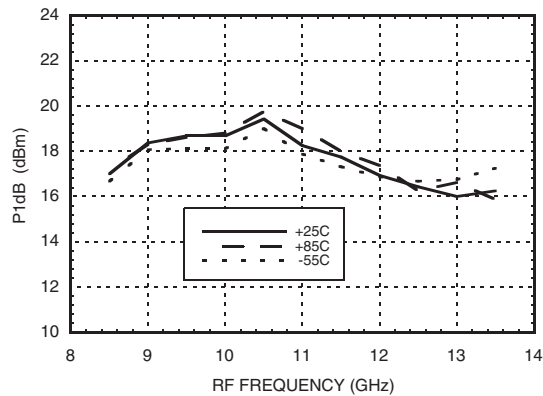
**Conversion Gain vs. LO Drive**



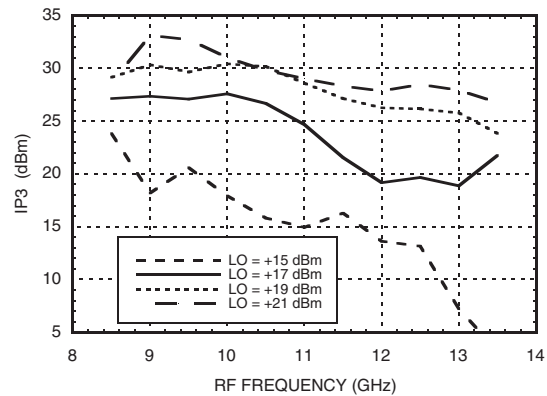
**Return Loss**



**Input P1dB vs. Temperature**



**Input IP3 vs. LO Drive**



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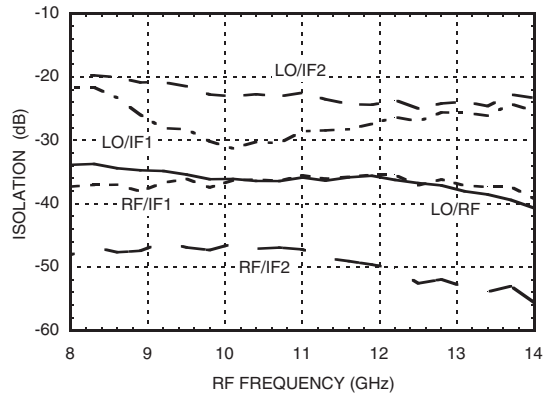
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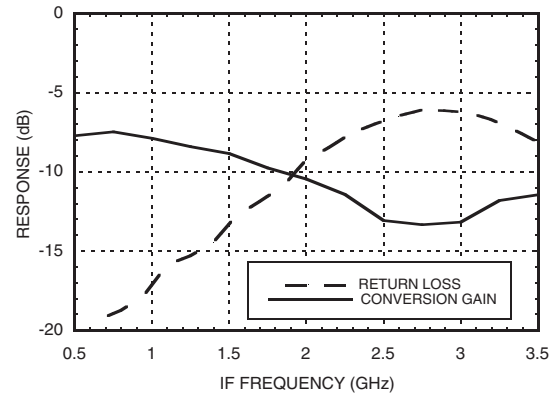


**Quadrature Channel Data Taken Without IF Hybrid**

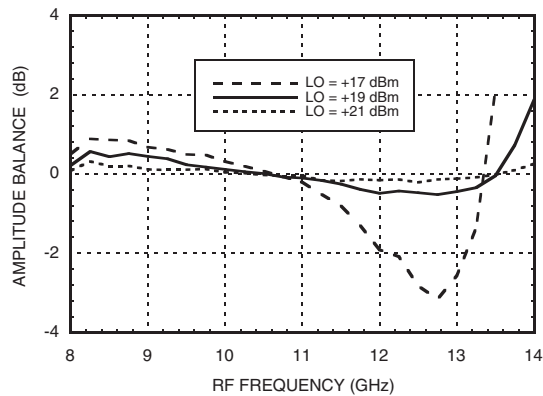
**Isolations**



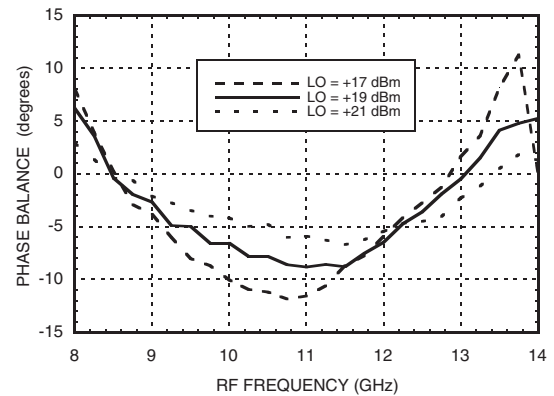
**IF Bandwidth\***



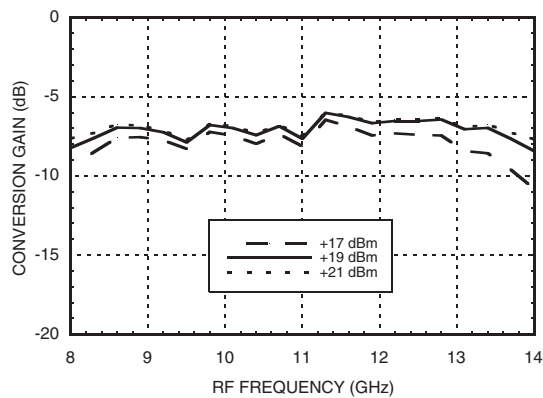
**Amplitude Balance vs. LO Drive**



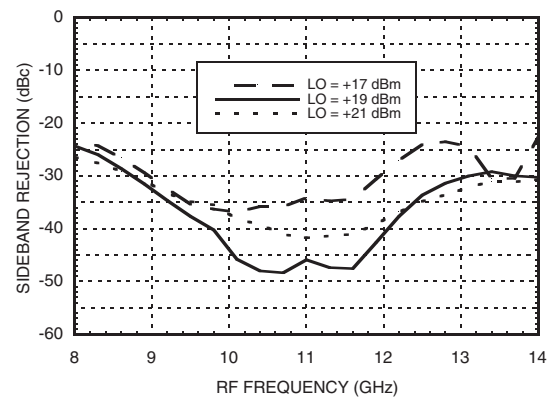
**Phase Balance vs. LO Drive**



**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
8.5	34	48	50	77
9.5	35	47	57	64
10.5	36	51	62	53
11.5	35	57	67	45
12.5	36	52	67	47
13.5	38	51	64	xx

LO = +19 dBm  
Values in dBc below input LO level measured at RF Port.

### MxN Spurious Outputs

mRF	nLO				
	0	1	2	3	4
0	xx	-11	16	22	38
1	33	0	53	62	95
2	86	77	76	78	94
3	96	95	101	91	102
4	89	94	96	101	107

RF = 10.6 GHz @ -10 dBm  
LO = 10.5 GHz @ +19 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 <sub>diss</sub> (T=85°C) (derate 7.1 mW/°C above 85°C)	460 mW
Thermal Resistance (R <sub>TH</sub> ) (junction to die bottom)	140 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

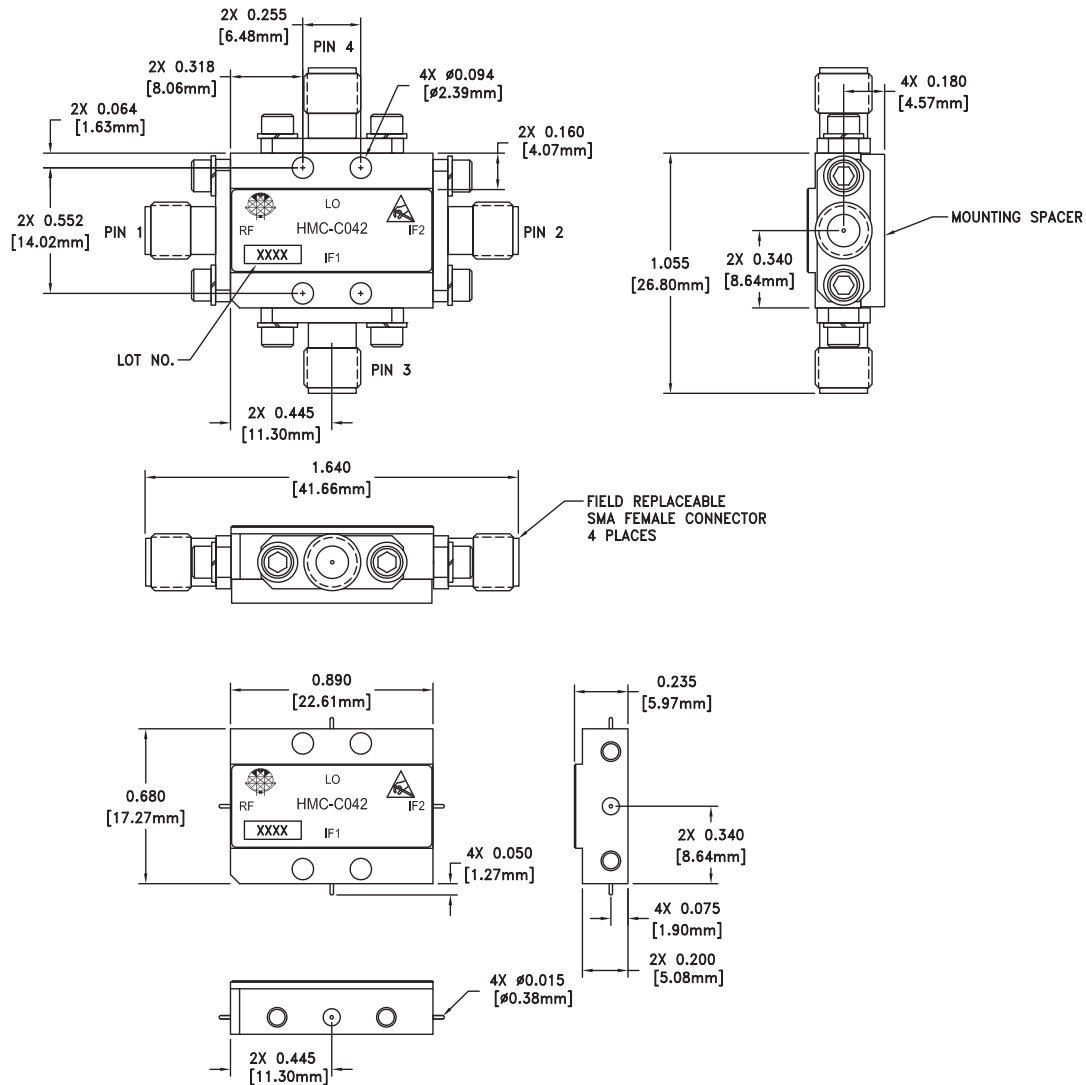


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

## GaAs MMIC I/Q MIXER MODULE 8.5 - 13.5 GHz



### Outline Drawing



VIEW SHOWN WITH CONNECTORS REMOVED

#### 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

#### Package Information


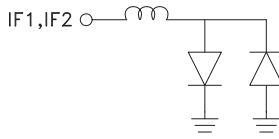
Package Type	C-4
Package Weight <sup>[1]</sup>	20 gms <sup>[2]</sup>
Spacer Weight	2.6 gms <sup>[2]</sup>

[1] Includes the connectors

[2] ±1 gms Tolerance



### 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.	IF1, IF2 
3	IF2		
4	LO	This pin is AC coupled and matched to 50 Ohms.	LO 