

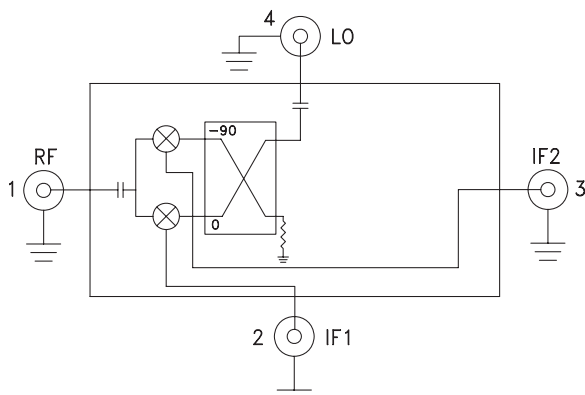


### Typical Applications

The HMC-C041 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: 35 dB
- LO to RF Isolation: 45 dB
- High Input IP3: +25 dBm
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85 °C Operating Temperature

### General Description

The HMC-C041 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.

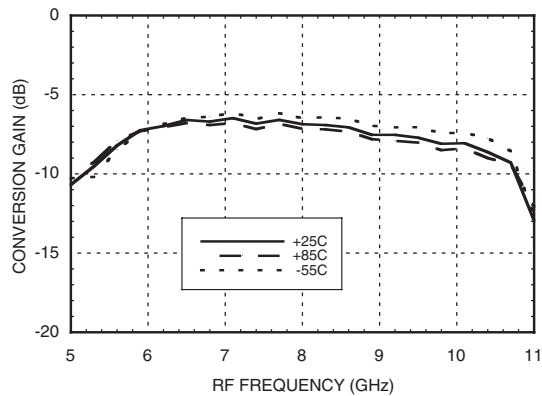
### Electrical Specifications, $T_A = +25^\circ \text{C}$ , $IF = 100 \text{ MHz}$ , $LO = +19 \text{ dBm}^*$

| Parameter                | Min. | Typ.     | Max. | Units |
|--------------------------|------|----------|------|-------|
| Frequency Range, RF/LO   |      | 6 - 10   |      | GHz   |
| Frequency Range, IF      |      | DC - 3.5 |      | GHz   |
| Conversion Loss (As IRM) |      | 7.5      | 10   | dB    |
| Image Rejection          | 20   | 35       |      | dB    |
| 1 dB Compression (Input) |      | +17      |      | dBm   |
| LO to RF Isolation       | 35   | 45       |      | dB    |
| LO to IF Isolation       | 20   | 25       |      | dB    |
| IP3 (Input)              |      | +25      |      | dBm   |
| Amplitude Balance        |      | 0.5      |      | dB    |
| Phase Balance            |      | 5        |      | Deg   |

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

Data taken As IRM With External IF Hybrid

### Conversion Gain vs. Temperature

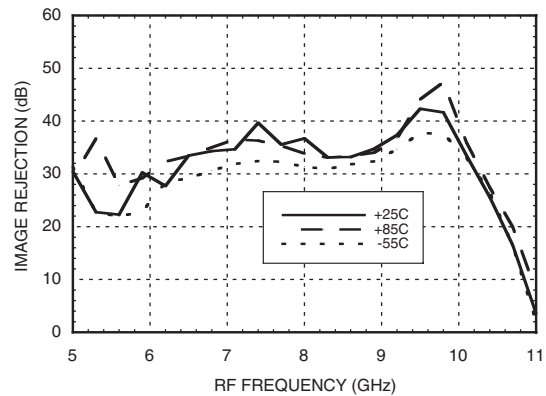


## HMC-C041

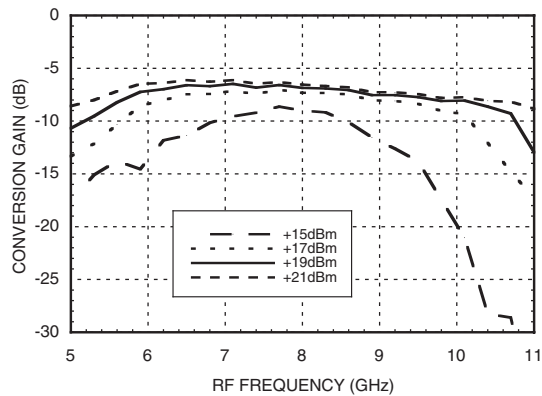
### GaAs MMIC I/Q MIXER MODULE

### 6 - 10 GHz

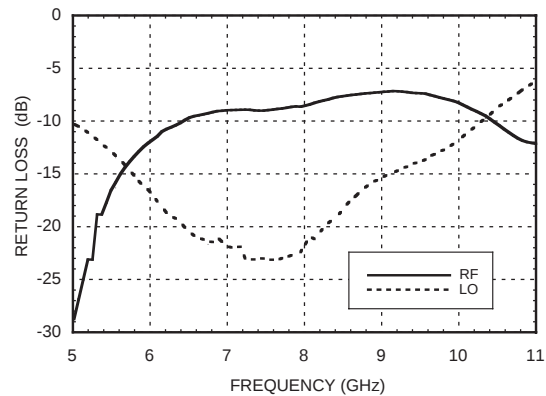
### Image Rejection vs. Temperature



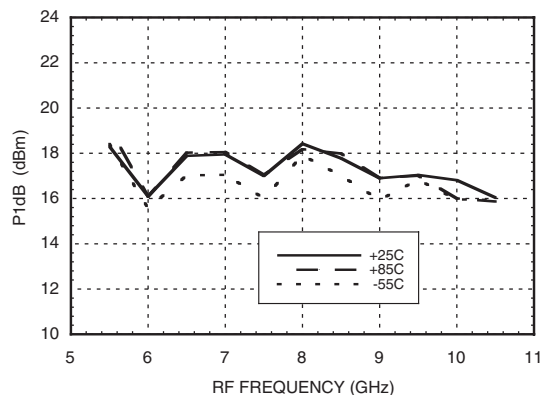
### Conversion Gain vs. LO Drive



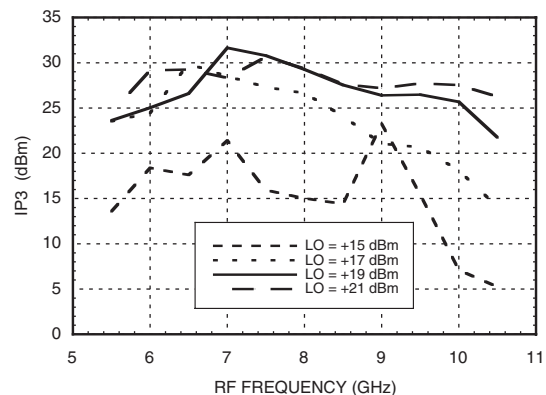
### Return Loss



### Input P1dB vs. Temperature

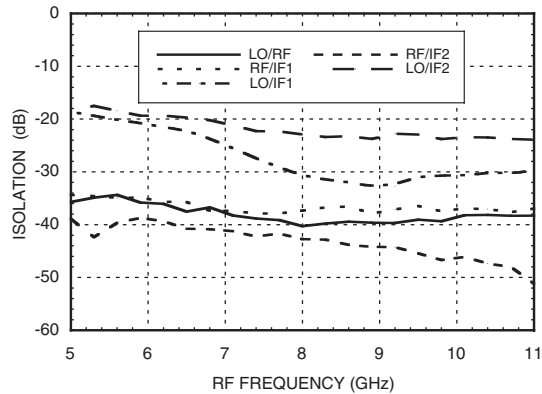


### Input IP3 vs. LO Drive

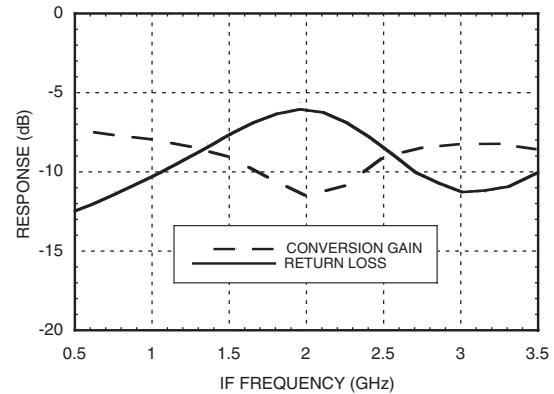


#### Quadrature Channel Data Taken Without IF Hybrid

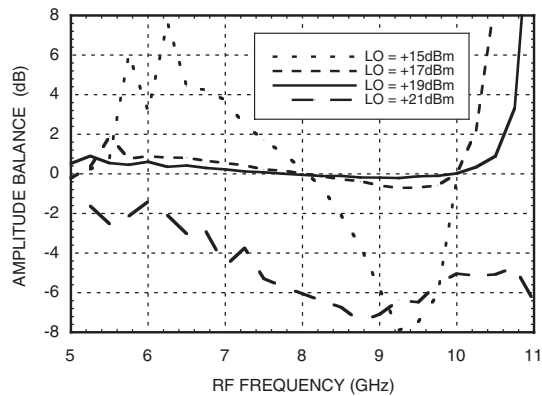
##### Isolations



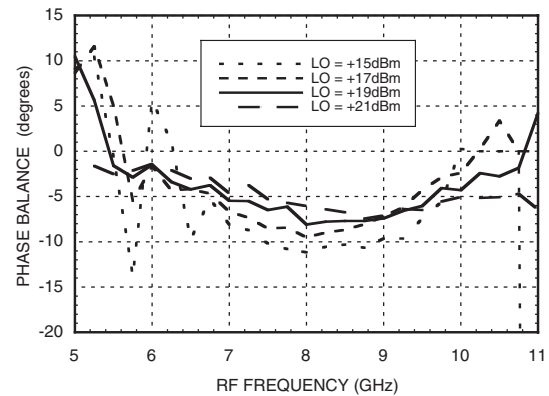
##### IF Bandwidth\*



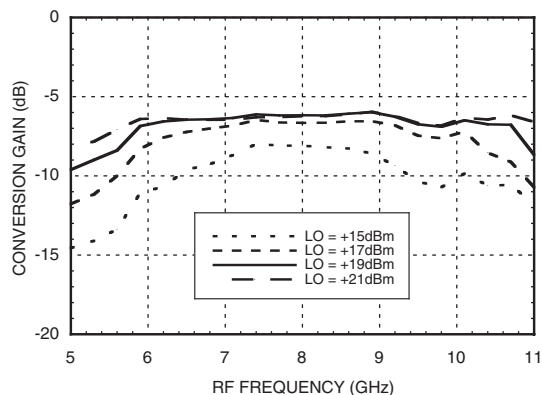
##### Amplitude Balance vs. LO Drive



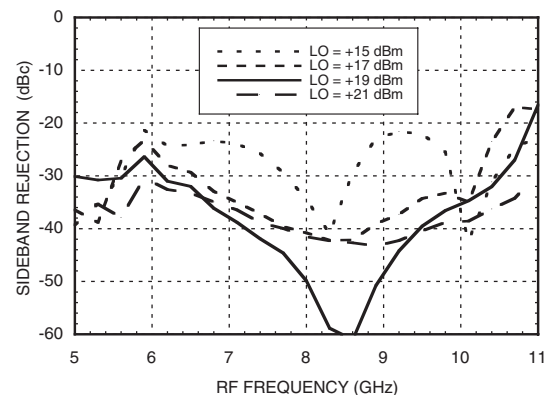
##### Phase Balance vs. LO Drive



##### 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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## GaAs MMIC I/Q MIXER MODULE 6 - 10 GHz

### Harmonics of LO

| LO Freq. (GHz) | nLO Spur at RF Port |    |    |    |
|----------------|---------------------|----|----|----|
|                | 1                   | 2  | 3  | 4  |
| 3.5            | 39                  | 40 | 52 | 51 |
| 6.5            | 43                  | 49 | 51 | 70 |
| 7.5            | 51                  | 65 | 53 | 62 |
| 8.5            | 56                  | 61 | 56 | 50 |
| 9.5            | 47                  | 57 | 65 | 63 |
| 10.5           | 45                  | 55 | 59 | 46 |

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  | 10  | 29  | 18  | 51  |
| 1   | 33  | 0   | 46  | 77  | 68  |
| 2   | 99  | 71  | 75  | 70  | 99  |
| 3   | 97  | 101 | 100 | 86  | 101 |
| 4   | 99  | 98  | 98  | 102 | 107 |

RF = 7.6 GHz @ -10 dBm  
LO = 7.5 GHz @ +19 dBm  
Data taken without IF hybrid  
All values in dBc below IF power level

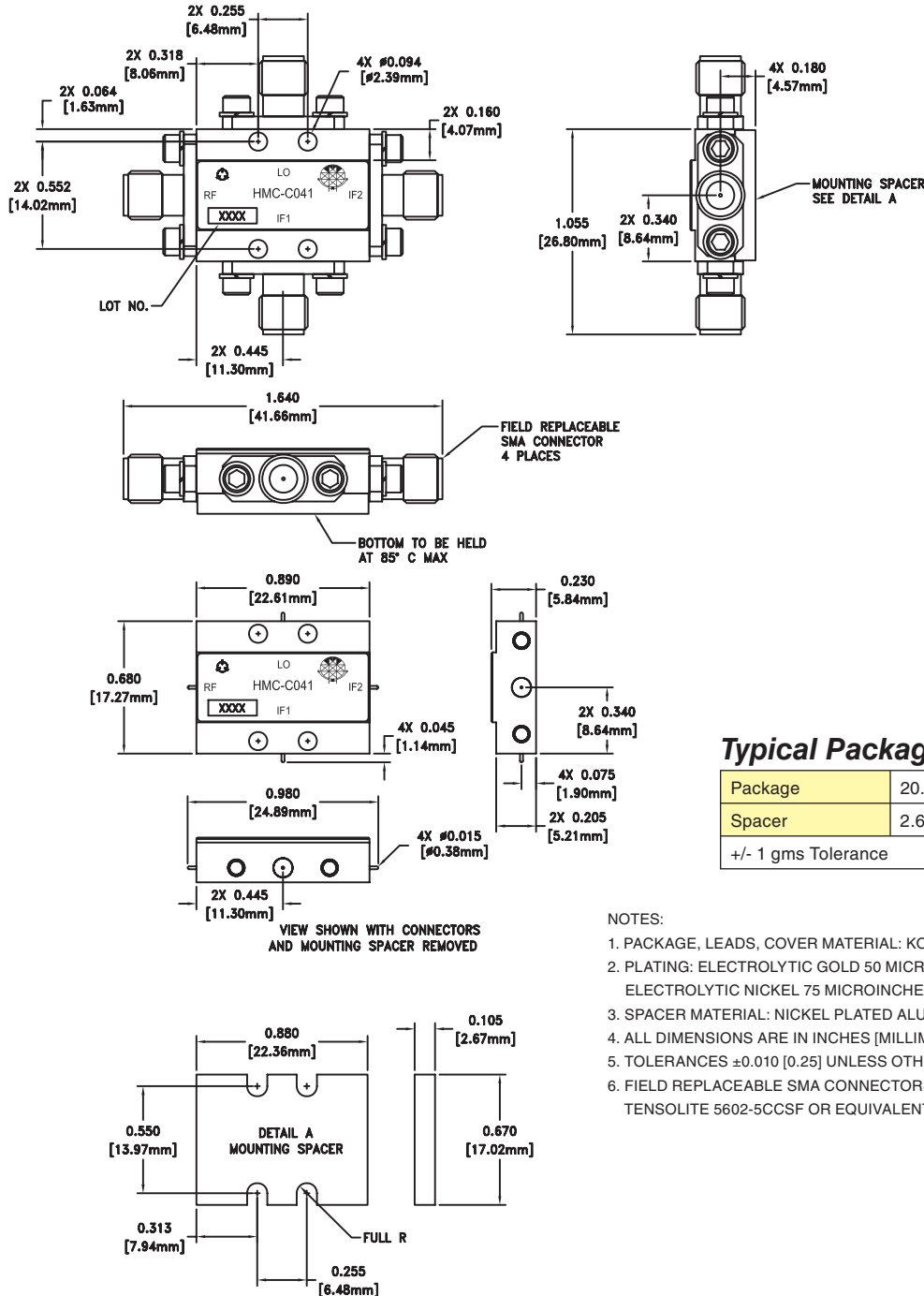
### Absolute Maximum Ratings

|                                                                        |                |
|------------------------------------------------------------------------|----------------|
| RF / IF Input                                                          | +20 dBm        |
| LO Drive                                                               | +27 dBm        |
| Channel Temperature                                                    | 150°C          |
| Continuous P <sub>diss</sub> (T=85°C)<br>(derate 7.8 mW/°C above 85°C) | 507 mW         |
| Thermal Resistance (R <sub>TH</sub> )<br>(junction to die bottom)      | 128 °C/W       |
| Storage Temperature                                                    | -65 to +150 °C |
| Operating Temperature                                                  | -55 to +85 °C  |



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### Outline Drawing



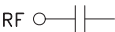
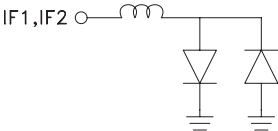
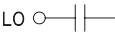
### Typical Package Weight

|                     |          |
|---------------------|----------|
| Package             | 20.0 gms |
| Spacer              | 2.6 gms  |
| +/- 1 gms Tolerance |          |

### NOTES:

1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
3. SPACER MATERIAL: NICKEL PLATED ALUMINUM
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES ±0.010 [0.25] UNLESS OTHERWISE SPECIFIED.
6. FIELD REPLACEABLE SMA CONNECTORS. TENSOLITE 5602-5CCSF OR EQUIVALENT.

### Pin Descriptions

| Pin Number | Function | Description                                                                                                                                                                                                                                                                                                                                              | Interface Schematic                                                                          |
|------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 1          | RF       | This pin is AC coupled and matched to 50 Ohms from 6 to 10 GHz.                                                                                                                                                                                                                                                                                          | 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 from 6 to 10 GHz.                                                                                                                                                                                                                                                                                          | LO        |