

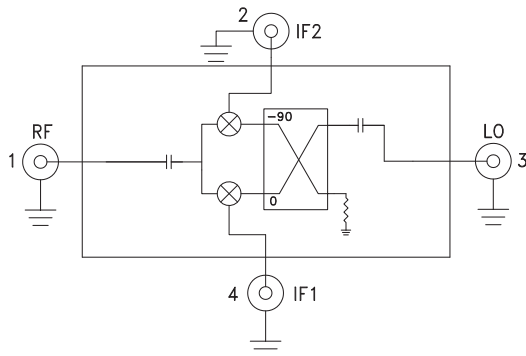


### Typical Applications

The HMC-C047 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: 15 dB
- LO to RF Isolation: 35 dB
- High Input IP3: 19 dBm
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85 °C Operating Temperature

### General Description

The HMC-C047 is a passive I/Q MMIC mixer housed in a miniature hermetic module which can be used as either an Image Reject Mixer (IRM) 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 Upper Side Band (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, $T_A = +25^\circ \text{C}$ , $IF = 100 \text{ MHz}$ , $LO = +17 \text{ dBm}^*$

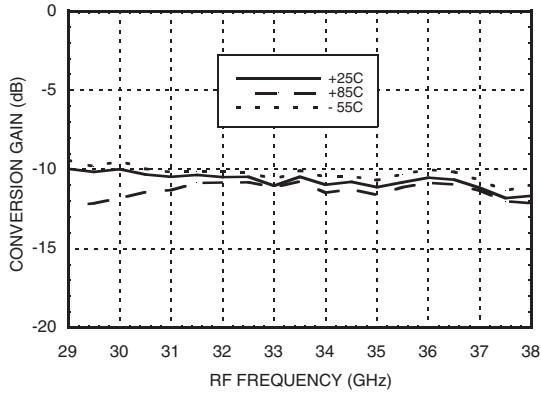
| Parameter                | Min.     | Typ. | Max.     | Min. | Typ. | Max. | Units |
|--------------------------|----------|------|----------|------|------|------|-------|
| Frequency Range, RF/LO   | 30 - 34  |      | 34 - 38  |      |      |      | GHz   |
| Frequency Range, IF      | DC - 3.5 |      | DC - 3.5 |      |      |      | GHz   |
| Conversion Loss (As IRM) |          | 10.5 | 13.5     |      | 11   | 14   | dB    |
| Image Rejection          | 11       | 15   |          | 11   | 15   |      | dB    |
| 1 dB Compression (Input) |          | 17   |          |      | 17   |      | dBm   |
| LO to RF Isolation       | 30       | 35   |          | 23   | 34   |      | dB    |
| LO to IF Isolation       | 18       | 25   |          | 14   | 23   |      | dB    |
| IP3 (Input)              |          | 19   |          |      | 19   |      | dBm   |
| Amplitude Balance        |          | 0.5  |          |      | 1    |      | dB    |
| Phase Balance            |          | 13   |          |      | 12   |      | Deg   |

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



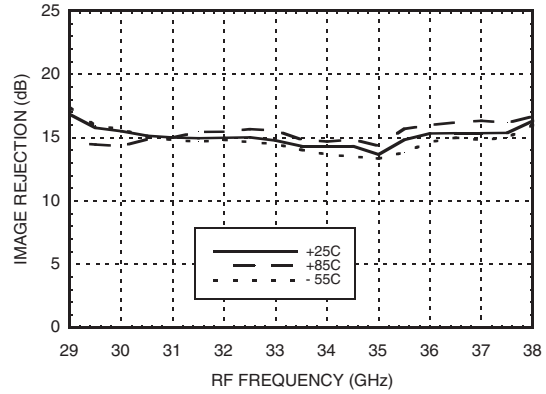
Data taken As IRM With External IF 90° Hybrid

Conversion Gain vs. Temperature

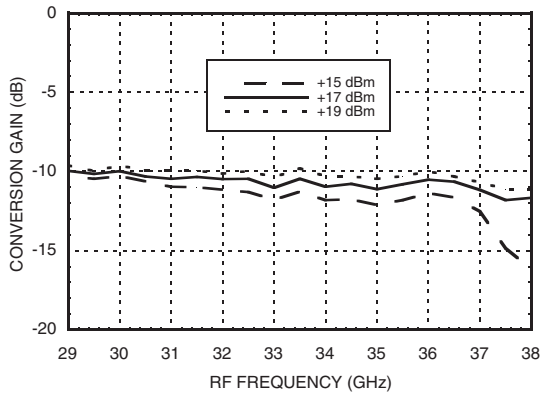


HMC-C047  
GaAs MMIC I/Q MIXER MODULE  
30 - 38 GHz

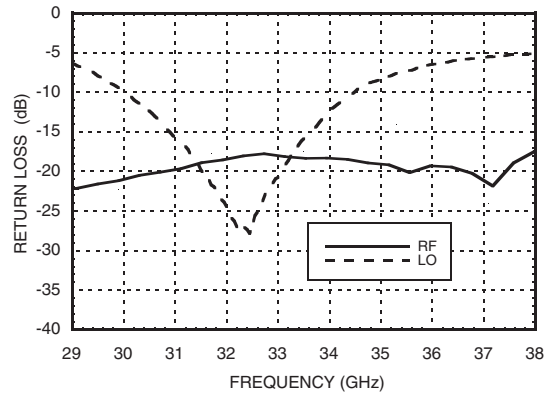
Image Rejection vs. Temperature



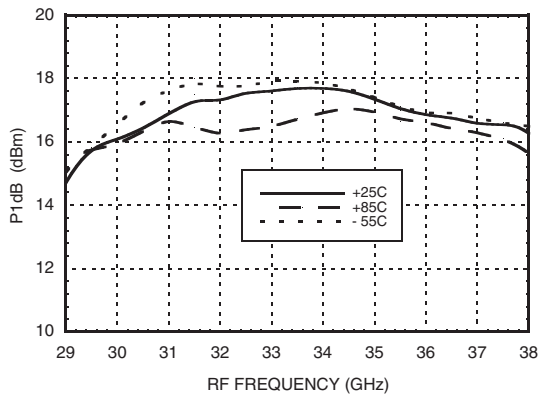
Conversion Gain vs. LO Drive



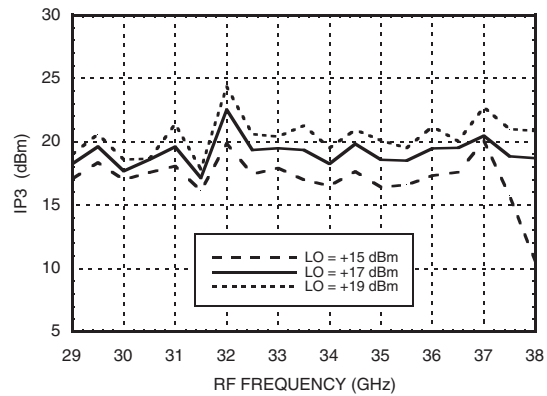
Return Loss



Input P1dB vs. Temperature



Input IP3 vs. LO Drive

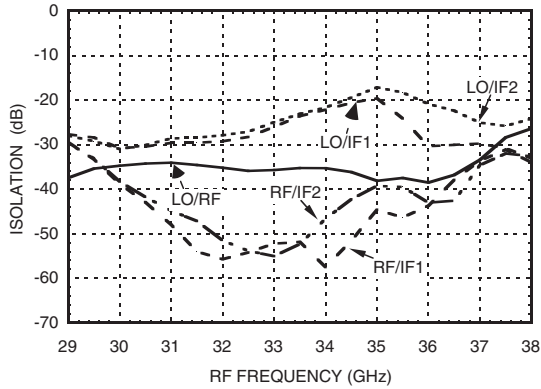




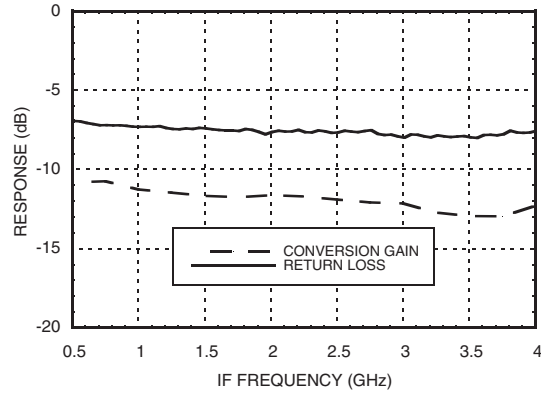
## GaAs MMIC I/Q MIXER MODULE 30 - 38 GHz

### IF1 & IF2 Port Characteristics

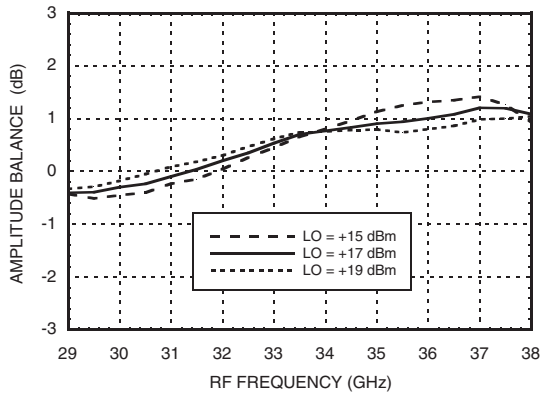
Isolations, LO = +19 dBm



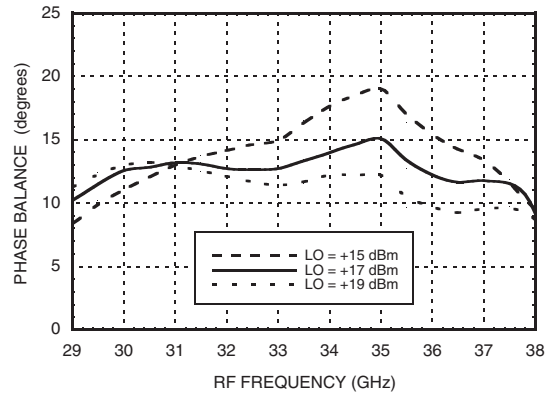
### IF Bandwidth\*



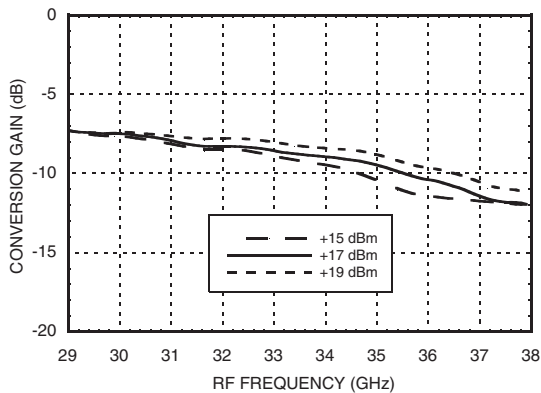
### Amplitude Balance vs. LO Drive



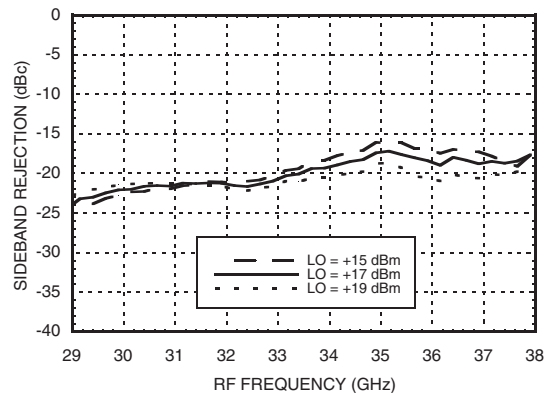
### Phase Balance vs. LO Drive



### Upconverter Performance Conversion Gain vs. LO Drive\*



### Upconverter Performance Sideband Rejection vs. LO Drive\*



\* Conversion gain data taken with external IF hybrid


**Absolute Maximum Ratings**

|                       |                |
|-----------------------|----------------|
| RF Input              | +19 dBm        |
| IF1 / IF2 Input       | +24 dBm        |
| LO Drive              | +27 dBm        |
| Storage Temperature   | -65 to +150 °C |
| Operating Temperature | -55 to +85°C   |

**MxN Spurious Outputs**

| mRF | nLO |     |     |    |     |
|-----|-----|-----|-----|----|-----|
|     | 0   | 1   | 2   | 3  | 4   |
| 0   | xx  | -12 | xx  | xx | xx  |
| 1   | 47  | 0   | 53  | xx | xx  |
| 2   | xx  | 62  | 68  | 59 | xx  |
| 3   | xx  | xx  | 101 | 70 | 90  |
| 4   | xx  | xx  | xx  | 90 | 104 |

RF = 35.1 GHz @ -10 dBm

LO = 35 GHz @ +17 dBm

Data taken without IF 90° hybrid

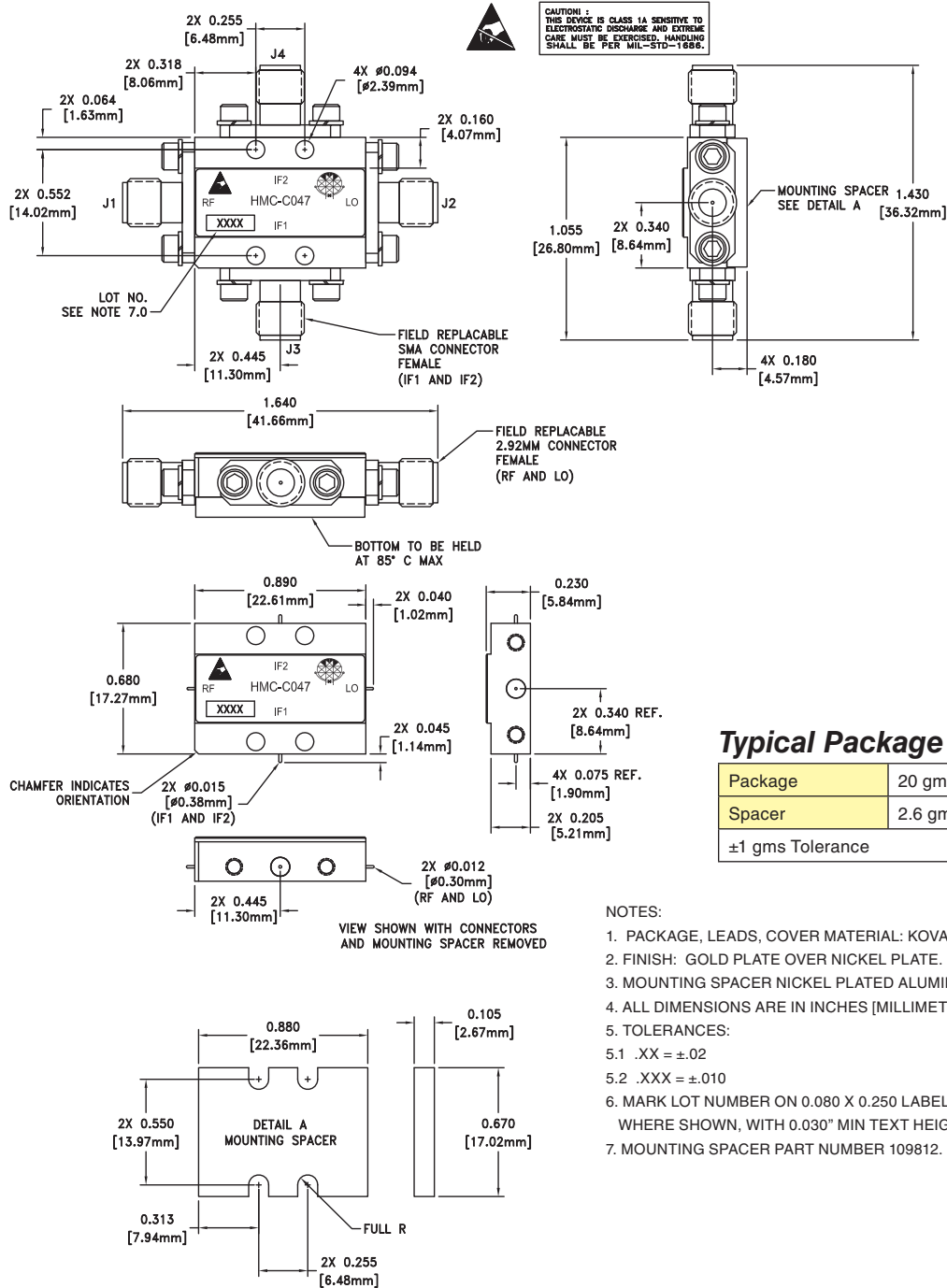
All values in dBc with reference to output power at IF= 100 MHz


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**



## GaAs MMIC I/Q MIXER MODULE 30 - 38 GHz

### Outline Drawing



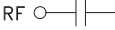
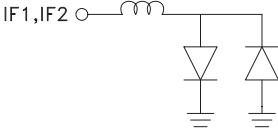
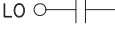
### Typical Package Weight

|                  |         |
|------------------|---------|
| Package          | 20 gms  |
| Spacer           | 2.6 gms |
| ±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 = ±.02
  - 5.2 .XXX = ±.010
6. MARK LOT NUMBER ON 0.080 X 0.250 LABEL WHERE SHOWN, WITH 0.030" MIN TEXT HEIGHT.
7. MOUNTING SPACER PART NUMBER 109812.


**Pin Descriptions**

| Pin Number | Function | Description  | Interface Schematic   |
|------------|----------|--|---|
| 1          | RF       | This pin is AC coupled and matched to 50 Ohms.   |  |
| 2          | IF2      | 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. |  |
| 4          | IF1      |  |   |
| 3          | LO       | This pin is AC coupled and matched to 50 Ohms.   |  |