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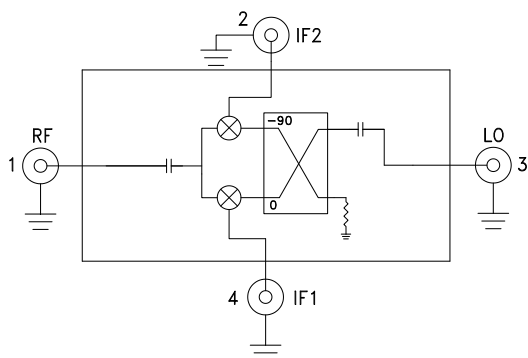


## Typical Applications

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

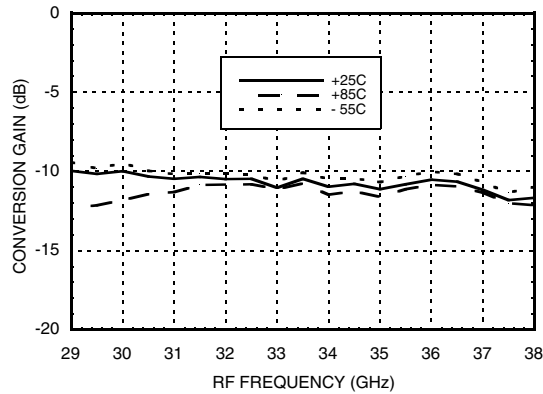
The HMC-C047 is a passive I/Q MMIC mixer housed in a miniature hermetic module which can be used as either an Image Reject Mixer (IRM) or a Single Sideband Upconverter. The module utilizes two standard Hittite double balanced mixer cells and a 90 degree hybrid fabricated on a GaAs MESFET process. A low 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, $T_A = +25^\circ \text{C}$ , $IF = 100 \text{ MHz}$ , $LO = +17 \text{ dBm}^*$

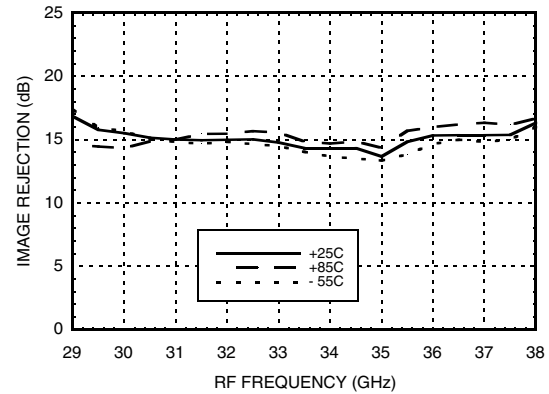
| Parameter                | Min.     | Typ. | Max. | Min.     | Typ. | Max. | Units |
|--------------------------|----------|------|------|----------|------|------|-------|
| Frequency Range, RF/LO   | 30 - 34  |      |      | 34 - 38  |      |      | GHz   |
| Frequency Range, IF      | DC - 3.5 |      |      | 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.

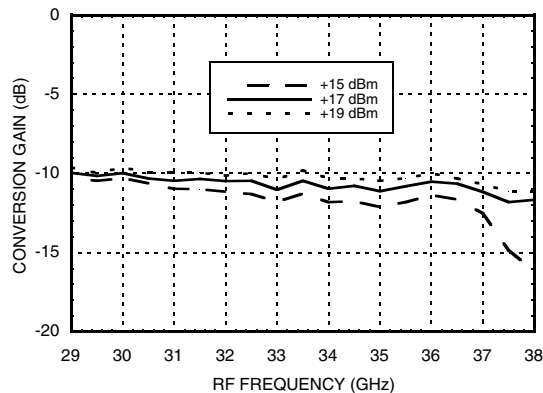
**Data taken As IRM With External IF 90° Hybrid**  
**Conversion Gain vs. Temperature**



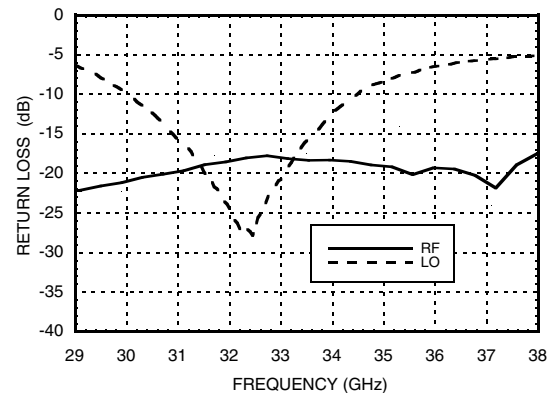
**Image Rejection vs. Temperature**



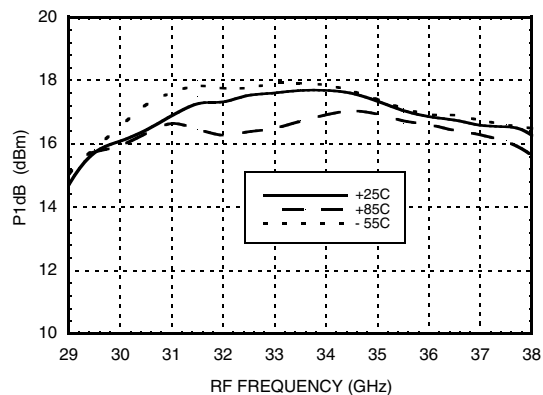
**Conversion Gain vs. LO Drive**



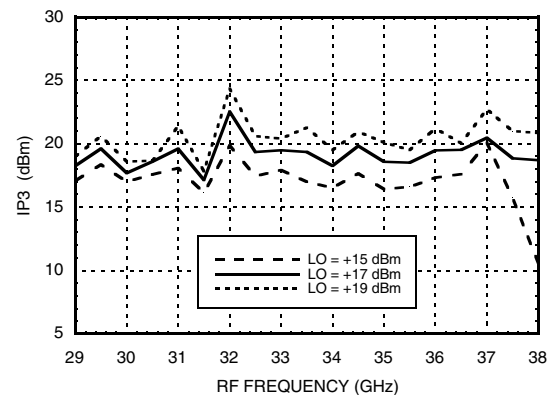
**Return Loss**



**Input P1dB vs. Temperature**

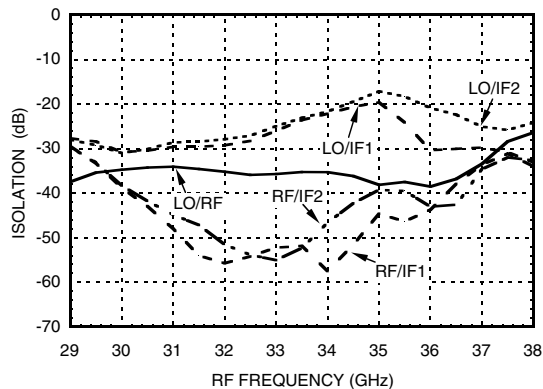


**Input IP3 vs. LO Drive**

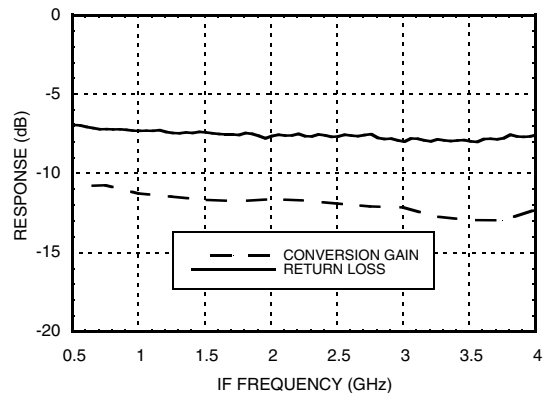


## IF1 & IF2 Port Characteristics

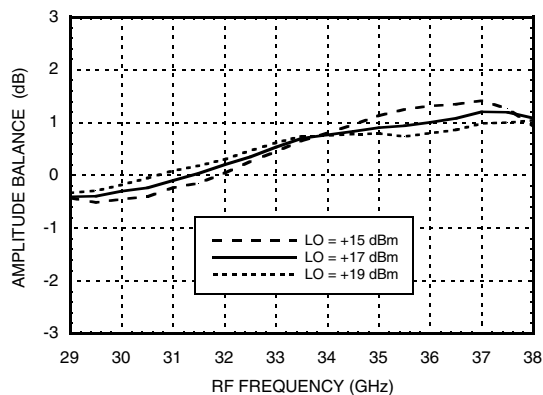
Isolations, LO = +19 dBm



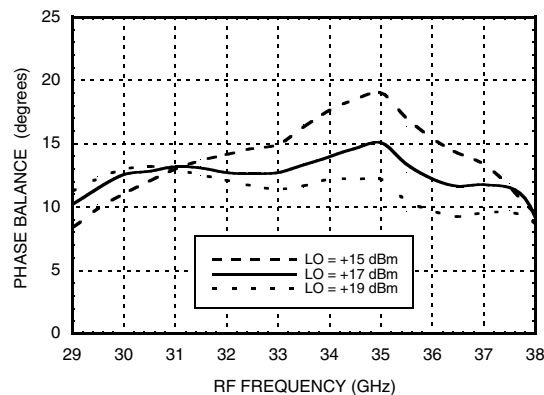
## IF Bandwidth\*



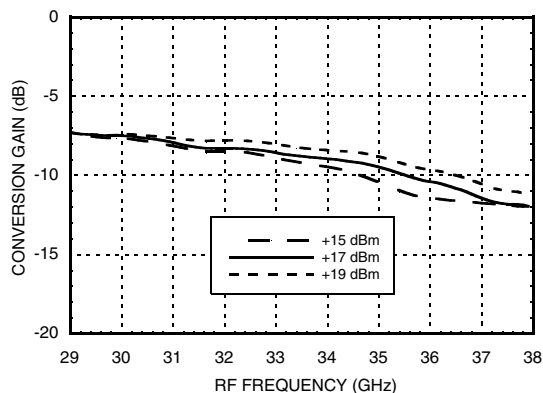
## Amplitude Balance vs. LO Drive



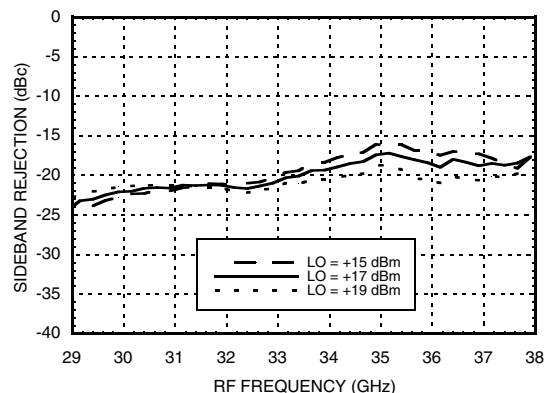
## Phase Balance vs. LO Drive



## Upconverter Performance Conversion Gain vs. LO Drive



## Upconverter Performance Sideband Rejection vs. LO Drive



\* Conversion gain data taken with external IF 90° hybrid



MICROWAVE CORPORATION v01.0711



## HMC-C047

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

#### 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

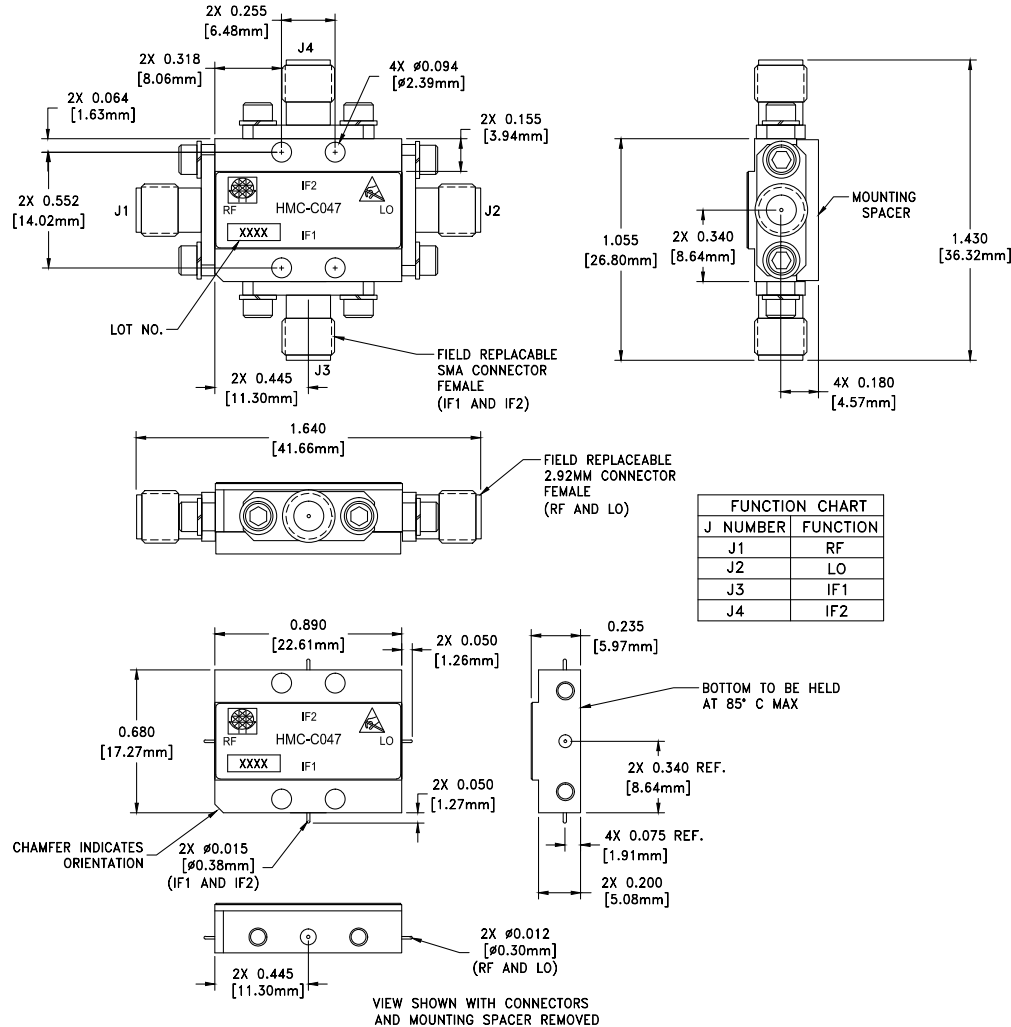


ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

5

MIXERS

### Outline Drawing



### Package Information

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

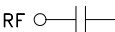
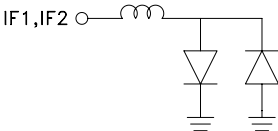
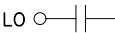
[1] Includes the connectors

[2] ±1 gms Tolerance

#### NOTES:

- 1.0 PACKAGE, LEADS, COVER MATERIAL: KOVAR™
- 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.

### Pin Descriptions

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

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