



GaAs MMIC FUNDAMENTAL MIXER MODULE, 11 - 20 GHz

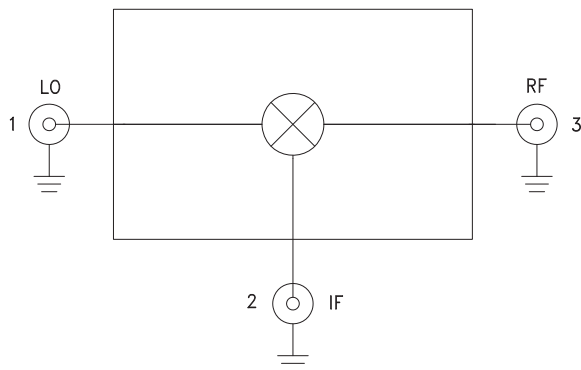


Typical Applications

The HMC-C051 is ideal for:

- Point-to-Point Radios
- Point-to-Multi-Point Radios & VSAT
- Test Equipment & Sensors
- Military End-Use

Functional Diagram



Features

- High LO/RF Isolation: 43 dB
- Passive Double Balanced Topology
- Low Conversion Loss: 7 dB
- Wide IF Bandwidth: DC - 6 GHz
- Robust 1,000V ESD, Class 1C
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85 °C Operating Temperature

General Description

The HMC-C051 is a general purpose double balanced mixer housed in a miniature hermetic module that can be used as an upconverter or downconverter between 11 and 20 GHz. This mixer is fabricated in a GaAs MESFET process, and requires no external components or matching circuitry. The HMC-C051 provides excellent LO to RF and LO to IF isolation due to optimized balun structures. 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, $T_A = +25^\circ \text{C}$, $IF = 100 \text{ MHz}$, $LO = +13 \text{ dBm}^*$

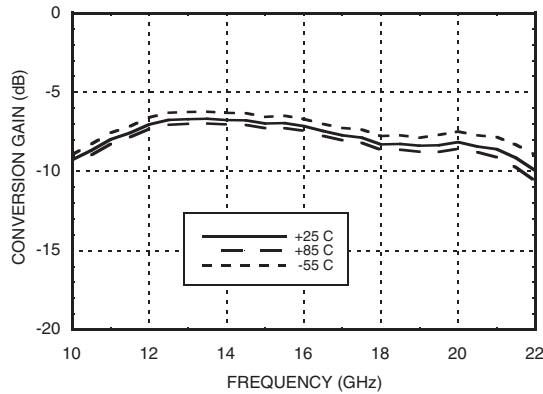
| Parameter | Min. | Typ. | Max. | Min. | Typ. | Max. | Units |
|-------------------------------|------|---------|------|---------|------|------|-------|
| Frequency Range, RF & LO | | 12 - 16 | | 11 - 20 | | | GHz |
| Frequency Range, IF | | DC - 6 | | DC - 6 | | | GHz |
| Conversion Loss | | 7 | 9 | | 8 | 11 | dB |
| Noise Figure (SSB) | | 6 | | | 7.5 | | dB |
| LO to RF Isolation | 38 | 44 | | 32 | 43 | | dB |
| LO to IF Isolation | 36 | 40 | | 36 | 41 | | dB |
| RF to IF Isolation | 19 | 28 | | 19 | 29 | | dB |
| IP3 (Input) | | 17 | | | 18 | | dBm |
| IP2 (Input) | | 44 | | | 41 | | dBm |
| 1 dB Gain Compression (Input) | | 10 | | | 11 | | dBm |

*Unless otherwise noted, all measurements performed as downconverter, $IF = 100 \text{ MHz}$.

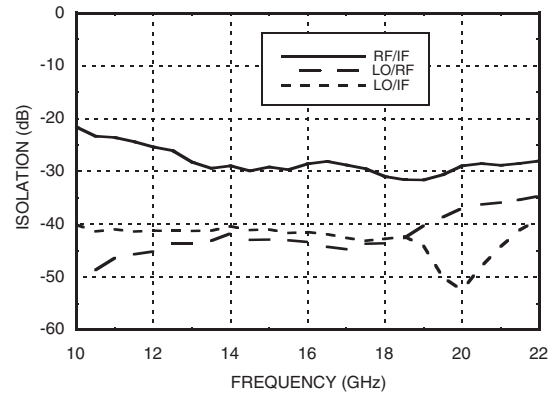


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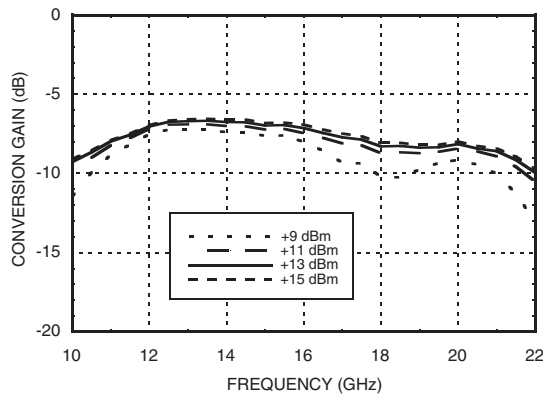
Conversion Gain vs. Temperature @ LO = +13 dBm



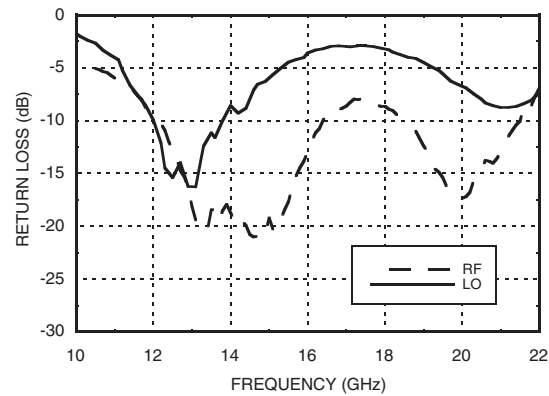
Isolation @ LO = +13 dBm



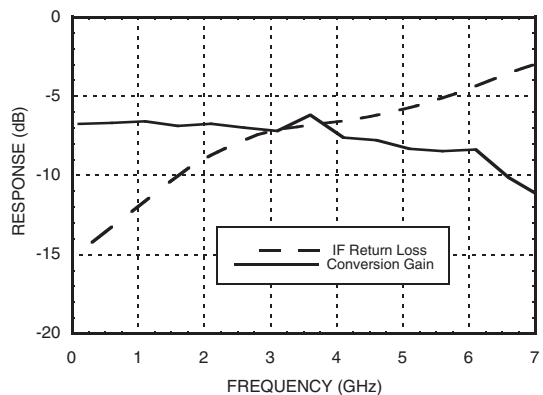
Conversion Gain vs. LO Drive



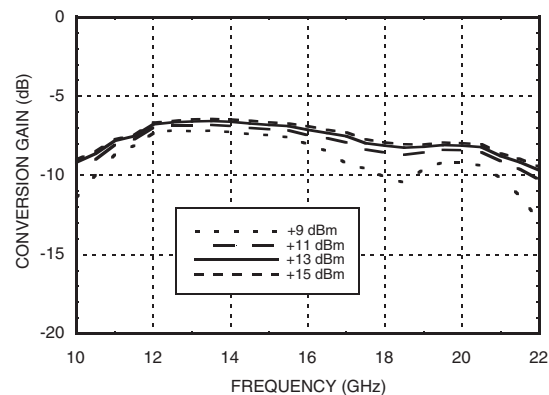
Return Loss @ LO = +13 dBm



IF Bandwidth @ LO = +13 dBm



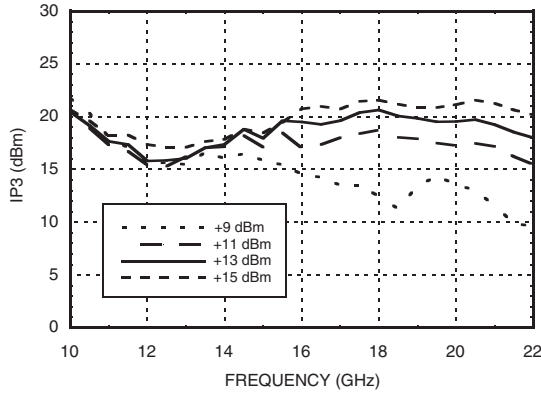
Upconverter Performance Conversion Gain vs. LO Drive



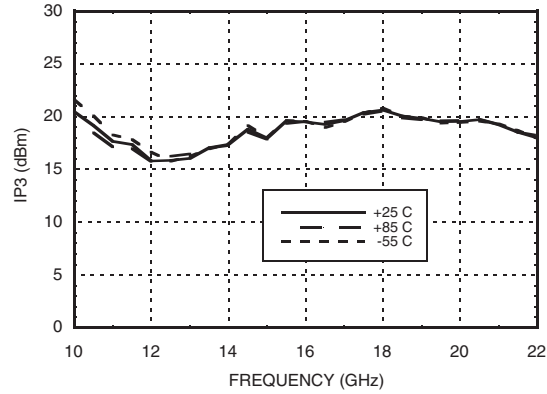


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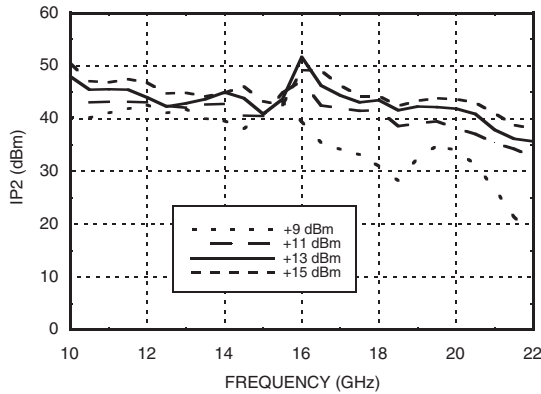
Input IP3 vs. LO Drive *



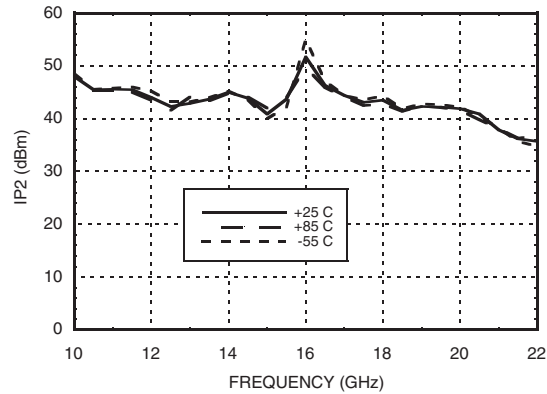
Input IP3 vs. Temperature @ LO = +13 dBm*



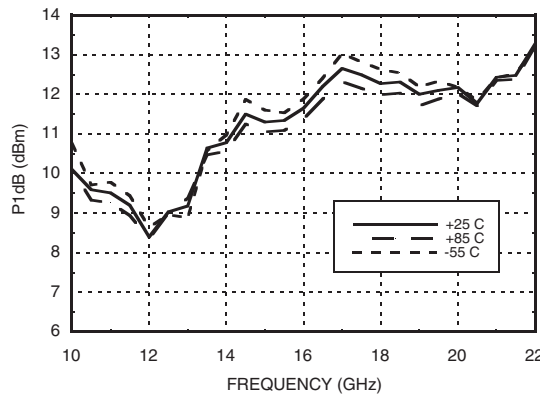
Input IP2 vs. LO Drive *



Input IP2 vs. Temperature @ LO = +13 dBm*



Input P1dB vs. Temperature @ LO = +13 dBm



* Two-tone input power = -10 dBm each tone, 1 MHz spacing.



Absolute Maximum Ratings

| | |
|-----------------------|----------------|
| RF / IF Input | +25 dBm |
| LO Drive | +25 dBm |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -55 to +85 °C |
| ESD Sensitivity (HBM) | Class 1C |



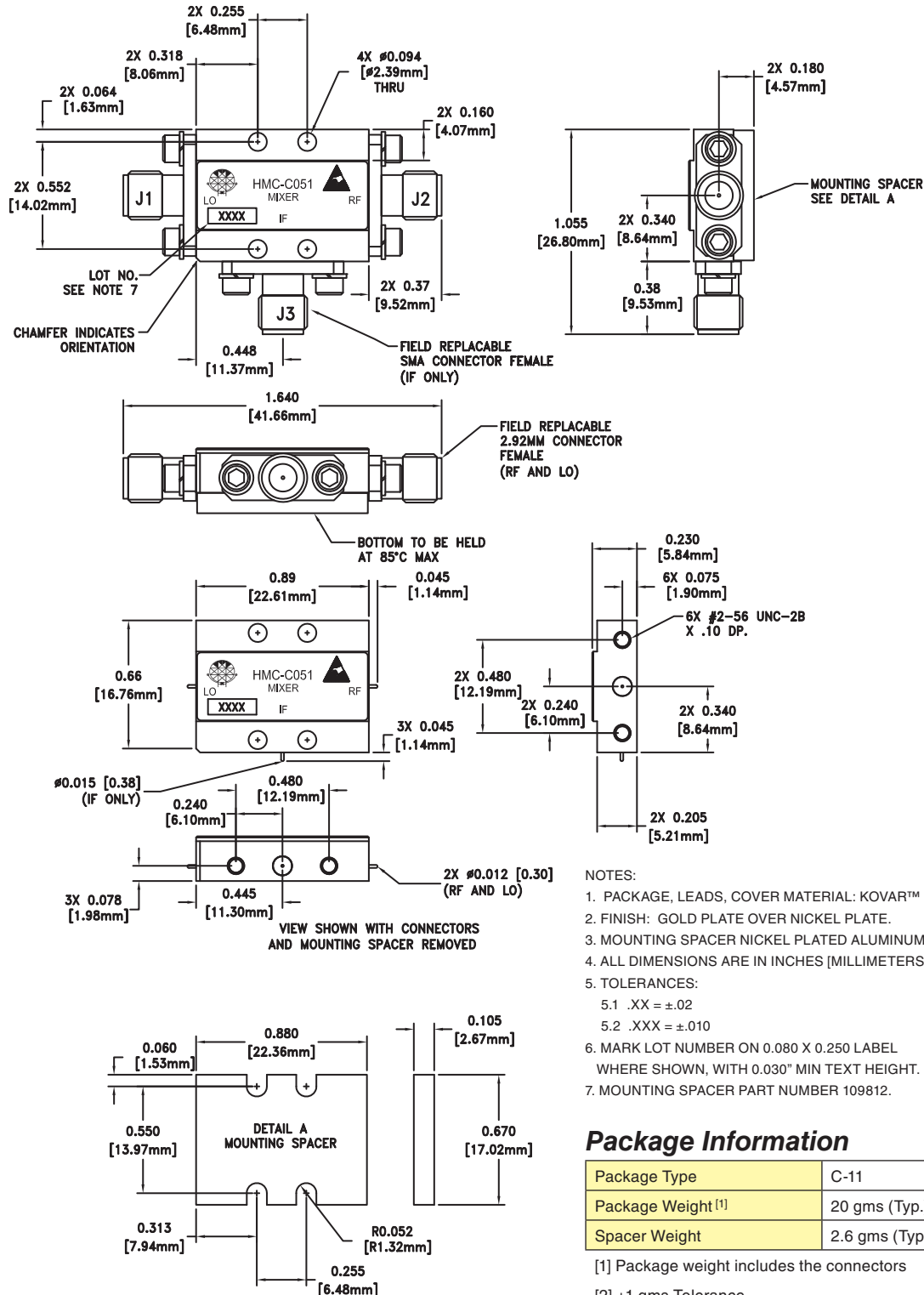
ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

MxN Spurious Outputs

| mRF | nLO | | | | |
|-----|-----|-----|-----|-----|-----|
| | 0 | 1 | 2 | 3 | 4 |
| 0 | xx | 15 | 34 | 32 | xx |
| 1 | 26 | 0 | 43 | 47 | 61 |
| 2 | 77 | 74 | 60 | 72 | 99 |
| 3 | 95 | 94 | 98 | 72 | 92 |
| 4 | xx | 108 | 108 | 103 | 106 |

RF Frequency= 15 GHz @ -10 dBm
 LO Frequency= 14.9 GHz @ +13 dBm
 All values in dBc below IF power level (1RF - 1LO).

Outline Drawing



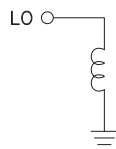
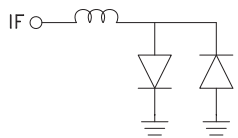
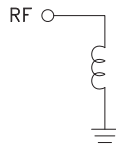
- NOTES:
- PACKAGE, LEADS, COVER MATERIAL: KOVAR™
 - FINISH: GOLD PLATE OVER NICKEL PLATE.
 - MOUNTING SPACER NICKEL PLATED ALUMINUM.
 - ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
 - TOLERANCES:
 - 5.1 .XX = ±.02
 - 5.2 .XXX = ±.010
 - MARK LOT NUMBER ON 0.080 X 0.250 LABEL WHERE SHOWN, WITH 0.030" MIN TEXT HEIGHT.
 - MOUNTING SPACER PART NUMBER 109812.

Package Information

| | |
|--------------------|----------------|
| Package Type | C-11 |
| Package Weight [1] | 20 gms (Typ.) |
| Spacer Weight | 2.6 gms (Typ.) |

[1] Package weight includes the connectors
[2] ±1 gms Tolerance


Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|------------|----------|--|---|
| 1 | LO | This pin is DC coupled and matched to 50 Ohms. |  |
| 2 | IF | 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 or sink more than 2 mA of current or part non-function and possible part failure will result. |  |
| 3 | RF | This pin is DC coupled and matched to 50 Ohms. |  |