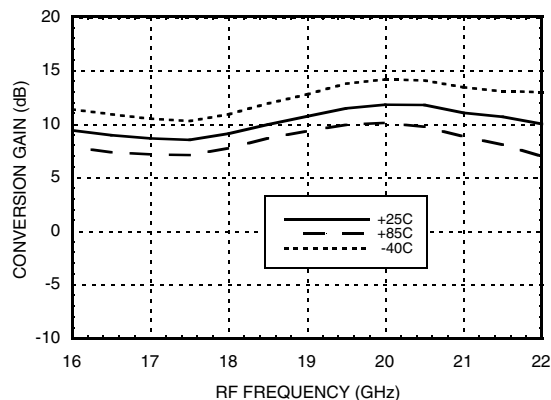




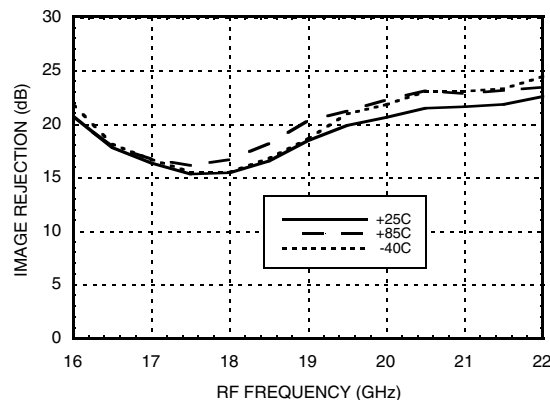
**GaAs MMIC I/Q DOWNCONVERTER  
17 - 21 GHz**

*Data Taken As IRM With External IF Hybrid*

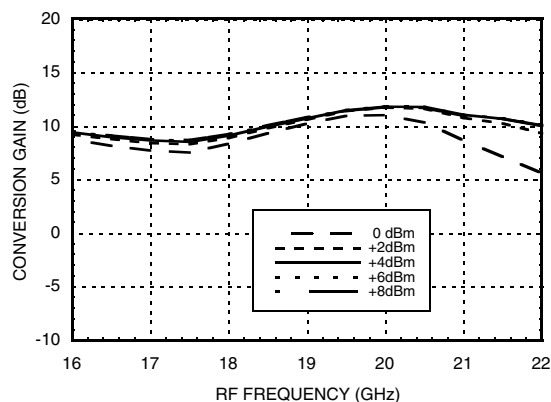
**Conversion Gain vs. Temperature**



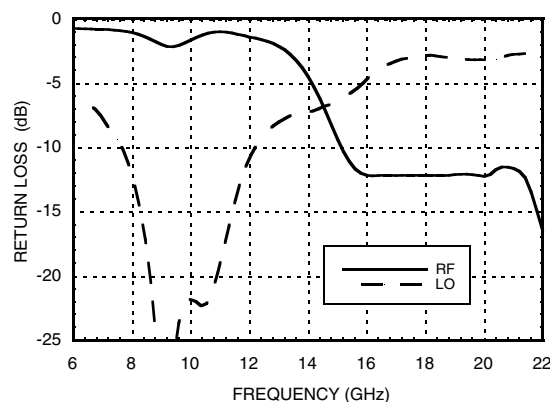
**Image Rejection vs. Temperature**



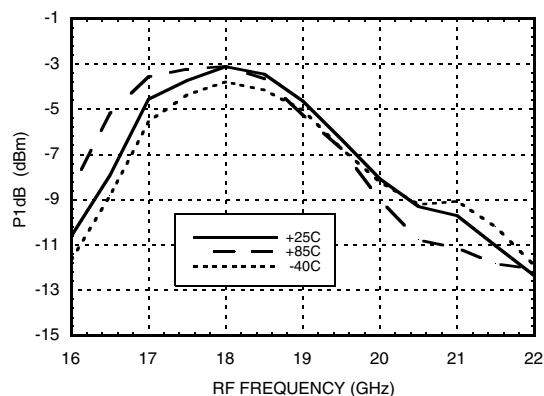
**Conversion Gain vs. LO Drive**



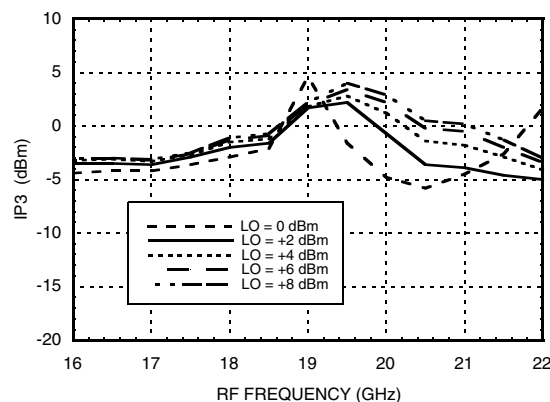
**Return Loss**

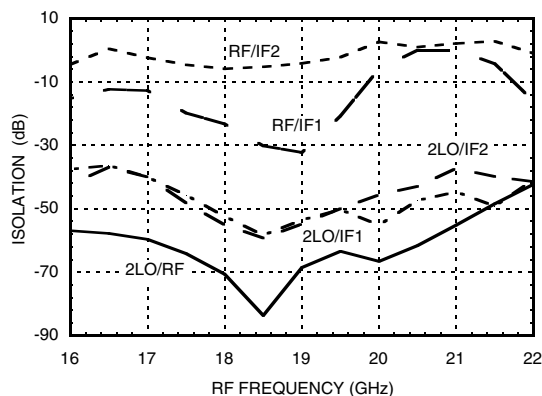
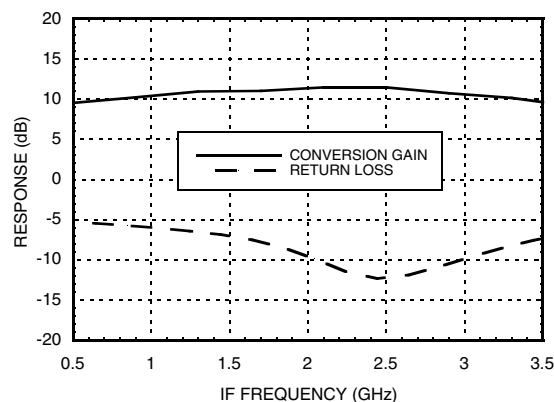
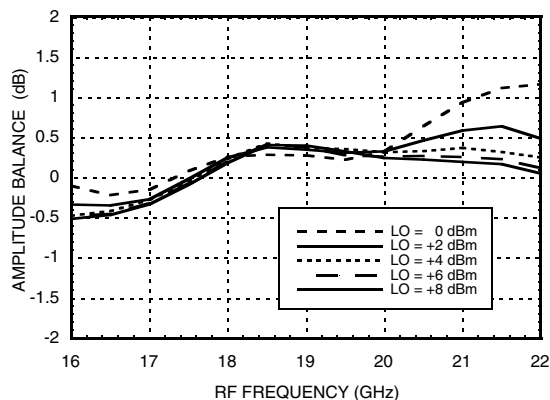
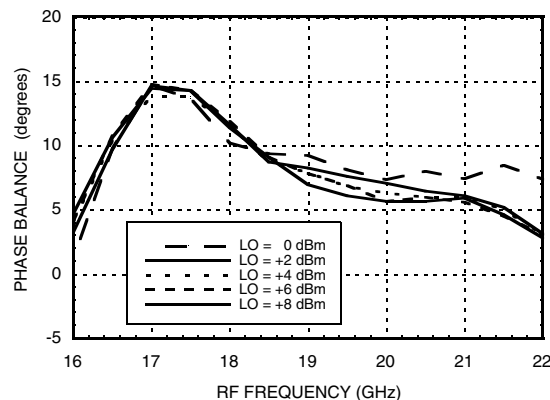
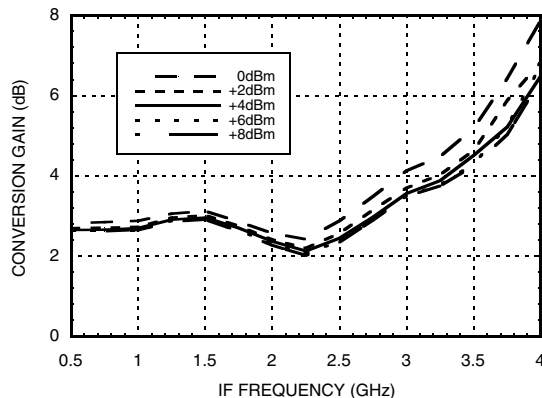
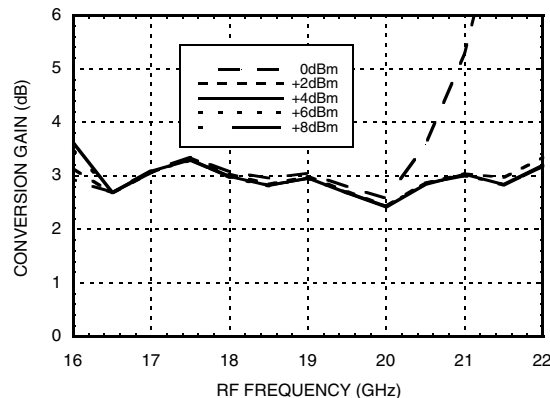


**Input P1dB vs. Temperature**



**Input IP3 vs. LO Drive**




**GaAs MMIC I/Q DOWNCONVERTER**  
**17 - 21 GHz**
**Quadrature Channel Data Taken Without IF Hybrid**
**Isolations**

**IF Bandwidth\***

**Amplitude Balance vs. LO Drive**

**Phase Balance vs. LO Drive**

**Noise Figure vs. LO Drive,  
LO Frequency = 8.6 GHz**

**Noise Figure vs. LO Drive,  
IF Frequency = 100 MHz**


\* Conversion gain data taken with external IF hybrid, LO frequency fixed at 8.6 GHz and RF varied

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**GaAs MMIC I/Q DOWNCONVERTER**  
**17 - 21 GHz**
**MxN Spurious Outputs**

|     | nLO |    |    |    |    |
|-----|-----|----|----|----|----|
| mRF | 0   | 1  | 2  | 3  | 4  |
| 0   | xx  | 21 | 25 | 32 | 35 |
| 1   | 32  | 26 | 0  | 25 | 41 |
| 2   | 54  | 81 | 69 | 61 | 46 |
| 3   | xx  | xx | xx | 79 | 79 |
| 4   | xx  | xx | xx | xx | xx |

RF = 18 GHz @ -20 dBm  
LO = 8.5 GHz @ +4 dBm  
Data taken without IF hybrid  
All values in dBc below IF power level (1RF -2LO = 1 GHz)

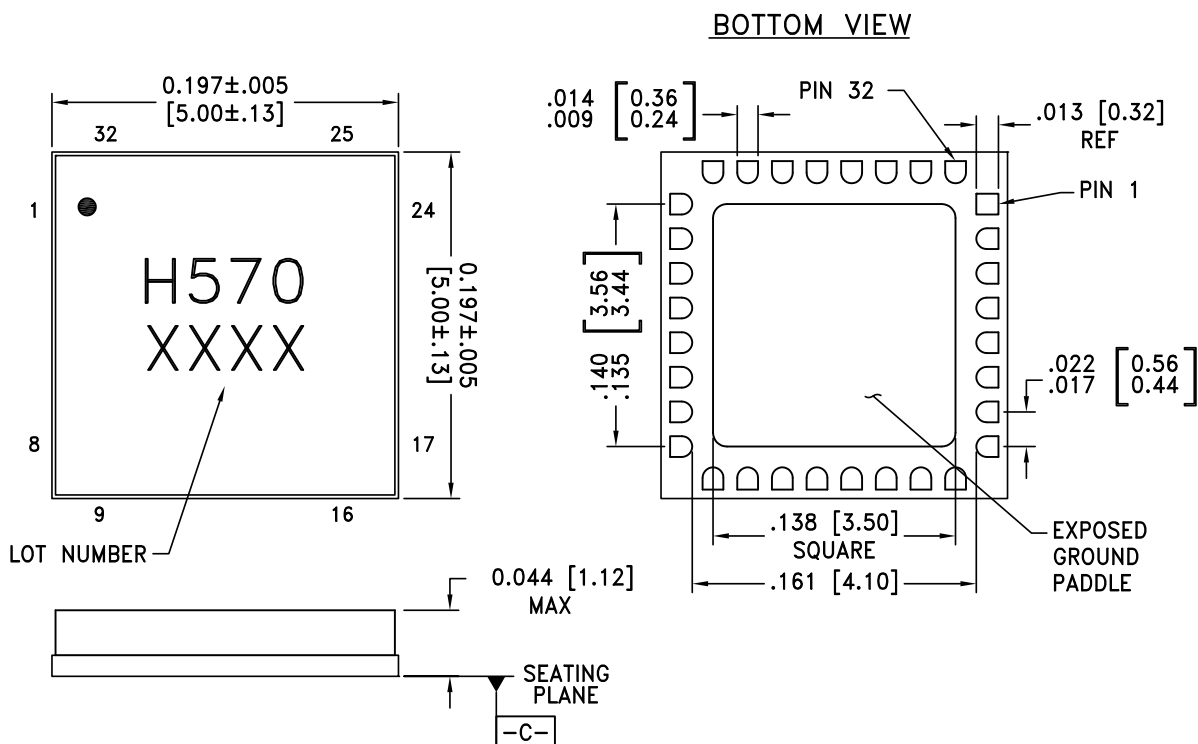
**Absolute Maximum Ratings**

|   |                |
|---|----------------|
| RF  | 2 dBm          |
| LO Drive  | 13 dBm         |
| Vdd   | 5.5V           |
| Channel Temperature   | 175°C          |
| Continuous P <sub>diss</sub> (T=85°C)<br>(derate 9.56 mW/°C above 85°C) | 860 mW         |
| Thermal Resistance (R <sub>TH</sub> )<br>(channel to package bottom)    | 104.6 °C/W     |
| Storage Temperature   | -65 to +150 °C |
| Operating Temperature   | -55 to +85 °C  |
| ESD Sensitivity (HBM)   | Class 1B       |



**ELECTROSTATIC SENSITIVE DEVICE**  
**OBSERVE HANDLING PRECAUTIONS**

## Outline Drawing



### NOTES:

1. PACKAGE BODY MATERIAL: ALUMINA
2. LEAD AND GROUND PADDLE PLATING: 30 - 80 MICROINCHES GOLD OVER 50 MICROINCHES MINIMUM NICKLE
3. DIMENSIONS ARE IN INCHES [MILLIMETERS]
4. LEAD SPACING TOLERANCE IS NON-CUMULATIVE
5. PACKAGE WARP SHALL NOT EXCEED 0.05mm DATUM
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND

## Package Information

| Part Number | Package Body Material | Lead Finish      | MSL Rating          | Package Marking <sup>[2]</sup> |
|-------------|-----------------------|------------------|---------------------|--------------------------------|
| HMC570LC5   | Alumina, White        | Gold over Nickel | MSL3 <sup>[1]</sup> | H570<br>XXXX                   |





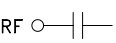
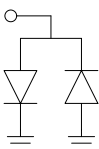
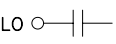
[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

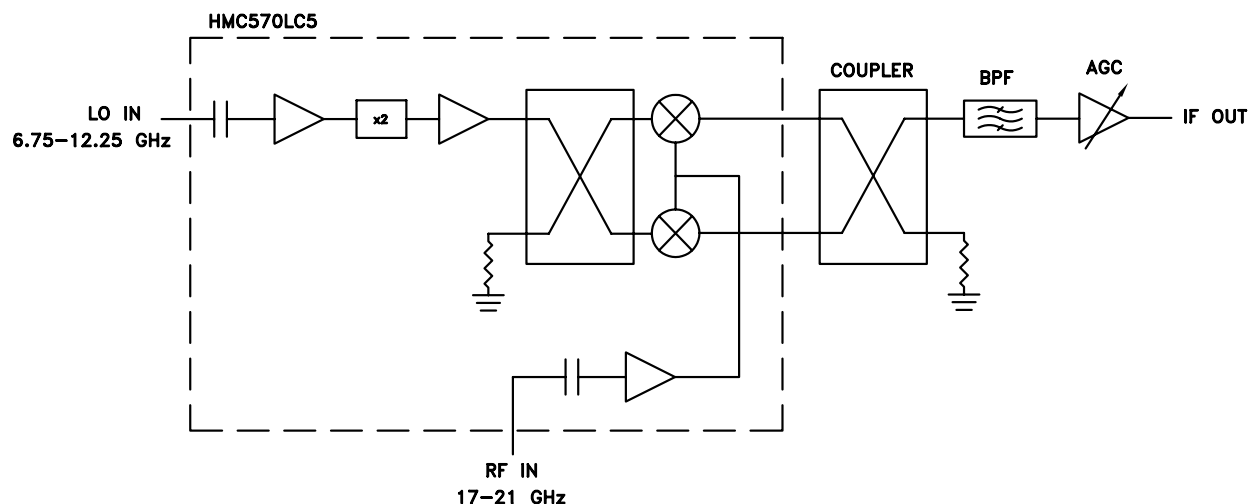


## GaAs MMIC I/Q DOWNCONVERTER 17 - 21 GHz

### Pin Descriptions

| Pin Number   | Function | Description  | Interface Schematic   |
|--|----------|--|---|
| 1  | VddLO    | Power supply for first stage of LO amplifier.  | VddLO      |
| 2, 4 - 6, 8, 9,<br>12 - 18, 21, 22,<br>25 - 28, 31, 32 | N/C      | No connection required. These pins may be connected to RF/DC ground without affecting performance.   |   |
| 3  | VddLO2   | Power supply for second stage of LO amplifier.   | VddLO2     |
| 7  | VddRF    | Power supply for RF LNA.   | VddRF      |
| 10, 19, 24, 29   | GND      | These pins and ground paddle must be connected to RF/DC ground.  | GND        |
| 11   | RF       | This pin is AC coupled and matched to 50 Ohms  | RF         |
| 20   | 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 frequency range. For operation to DC, this pin must not sink / source more than 3 mA of current or part non-function and possible failure will result. | IF1, IF2  |
| 23   | IF1      |  |   |
| 30   | LO       | This pin is AC coupled and matched to 50 Ohms.   | LO       |

### Typical Application



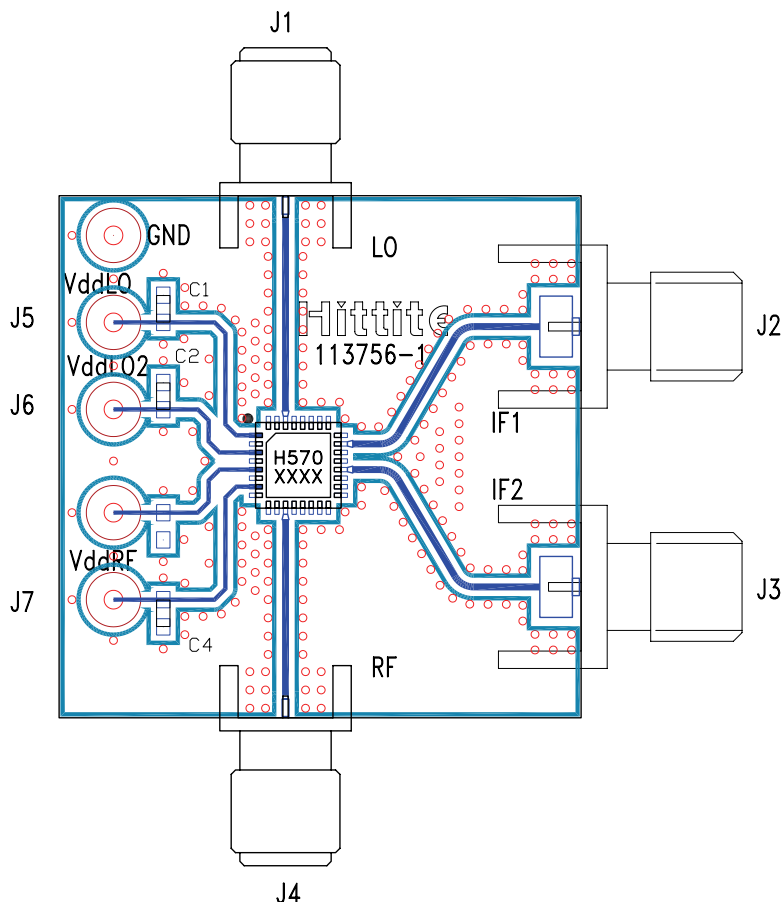
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**GaAs MMIC I/Q DOWNCONVERTER  
17 - 21 GHz**

**Evaluation PCB**



**List of Materials for Evaluation PCB 113758 <sup>[1]</sup>**

| Item    | Description                      |
|---------|----------------------------------|
| C1 - C4 | Capacitor 0603, 0.01 $\mu$ F     |
| J1, J4  | PCB Mount SMA RF Connector, SRI  |
| J2, J3  | PCB Mount SMA Connector, Johnson |
| J5 - J7 | DC Pin                           |
| U1      | HMC570LC5                        |
| PCB [2] | 113756 Evaluation Board          |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request.

**GaAs MMIC I/Q DOWNCONVERTER**  
**17 - 21 GHz**