



**NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED**



**THIS PAGE INTENTIONALLY LEFT BLANK**



MICROWAVE CORPORATION v05.1107



# HMC308 / 308E

## GENERAL PURPOSE 100 mW GaAs MMIC AMPLIFIER, 0.8 - 3.8 GHz

### Typical Applications

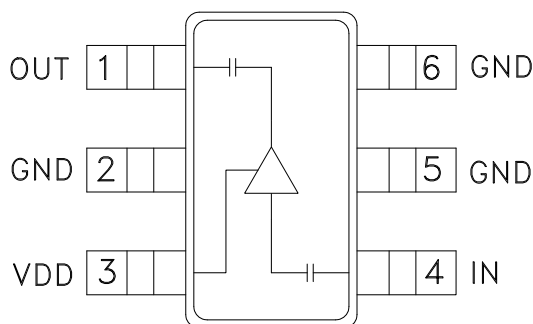
Broadband or Narrow Band Applications:

- Cellular/PCS/3G
- Fixed Wireless & Telematics
- Cable Modem Termination Systems
- WLAN, Bluetooth & RFID

### Features

Gain: 18 dB  
P1dB Output Power: +17 dBm@ +5V  
Single Supply: +3V or +5V  
No External Components  
Integrated DC Blocks  
Ultra Small Package: SOT26

### Functional Diagram



### General Description

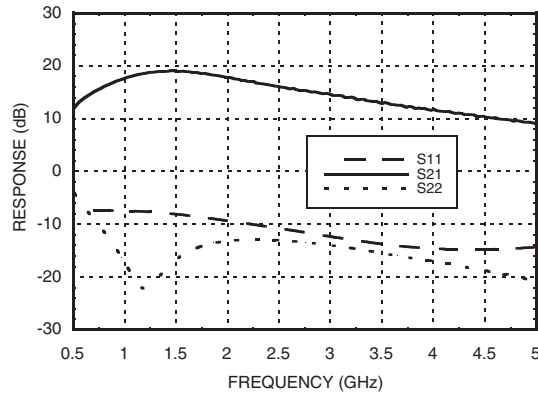
The HMC308 & HMC308E are low cost MESFET MMIC amplifiers that operate from a single +3 to +5V supply from 0.8 to 3.8 GHz. The surface mount SOT26 amplifier can be used as a broadband amplifier stage or used with external matching for optimized narrow band applications. With Vdd biased at +5V, the HMC308 & HMC308E offers 18 dB of gain and +20 dBm of saturated output power while requiring only 53 mA of current. This amplifier is ideal as a driver amplifier for transmitters or for use as a local oscillator (LO) amplifier to increase drive levels for passive mixers. The amplifier occupies 0.014 in<sup>2</sup> (9 mm<sup>2</sup>), making it ideal for compact radio designs.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , as a function of Vdd

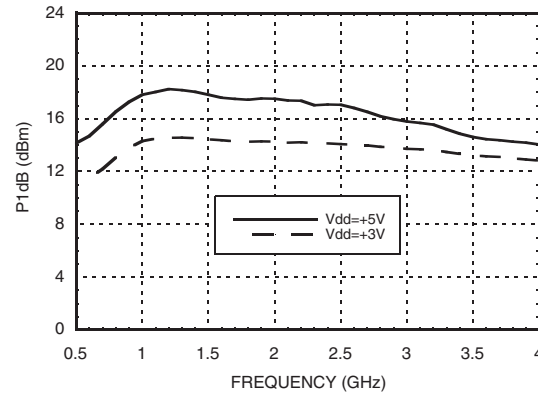
| Parameter                                | Vdd = +3V |       |       | Vdd = +5V |       |       | Vdd = +5V |       |       | Vdd = +5V |       |       | Units |
|------------------------------------------|-----------|-------|-------|-----------|-------|-------|-----------|-------|-------|-----------|-------|-------|-------|
|                                          | Min.      | Typ.  | Max.  | Min.      | Typ.  | Max.  | Min.      | Typ.  | Max.  | Min.      | Typ.  | Max.  |       |
| Frequency Range                          | 2.3 - 2.7 |       |       | 0.8 - 2.3 |       |       | 2.3 - 2.7 |       |       | 2.7 - 3.8 |       |       | GHz   |
| Gain                                     | 13        | 15.5  |       | 14        | 18    |       | 13        | 16    |       | 10        | 13    |       | dB    |
| Gain Variation over Temperature          |           | 0.025 | 0.035 |           | 0.025 | 0.035 |           | 0.025 | 0.035 |           | 0.025 | 0.035 | dB/°C |
| Input Return Loss                        |           | 11    |       |           | 8     |       |           | 11    |       |           | 13    |       | dB    |
| Output Return Loss                       |           | 17    |       |           | 13    |       |           | 12    |       |           | 13    |       | dB    |
| Output Power for 1 dB Compression (P1dB) | 12        | 14    |       | 14        | 17    |       | 13.5      | 16.5  |       | 12        | 15    |       | dBm   |
| Saturated Output Power (Psat)            |           | 17    |       |           | 20    |       |           | 19.5  |       |           | 17    |       | dBm   |
| Output Third Order Intercept (IP3)       | 23        | 26    |       | 27        | 30    |       | 26        | 29    |       | 24        | 27    |       | dBm   |
| Noise Figure                             |           | 7     |       |           | 7.5   |       |           | 7     |       |           | 7     |       | dB    |
| Supply Current (Idd)                     |           | 50    |       |           | 53    |       |           | 53    |       |           | 53    |       | mA    |

## GENERAL PURPOSE 100 mW GaAs MMIC AMPLIFIER, 0.8 - 3.8 GHz

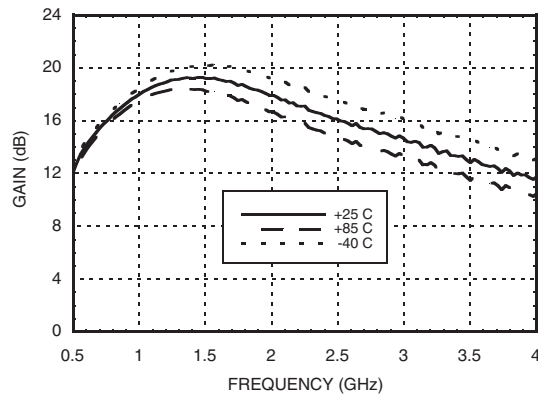
### Broadband Gain & Return Loss @ $V_{dd} = +5V$



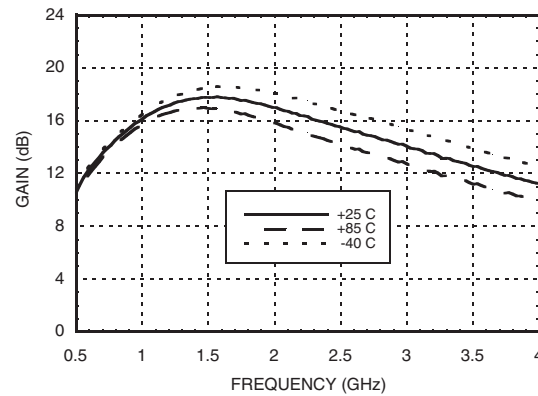
### P1dB vs. $V_{dd}$ Bias



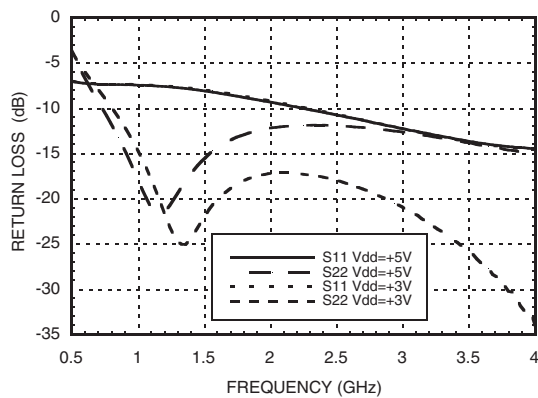
### Gain vs. Temperature @ $V_{dd} = +5V$



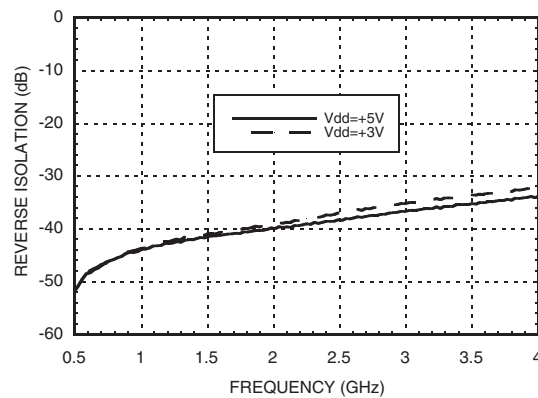
### Gain vs. Temperature @ $V_{dd} = +3V$



### Input & Output Return Loss vs. $V_{dd}$ Bias

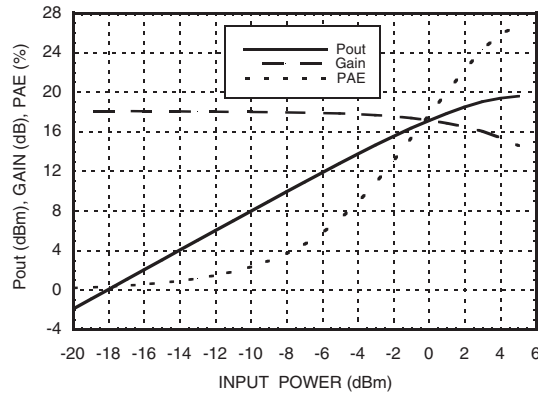


### Reverse Isolation vs. $V_{dd}$ Bias

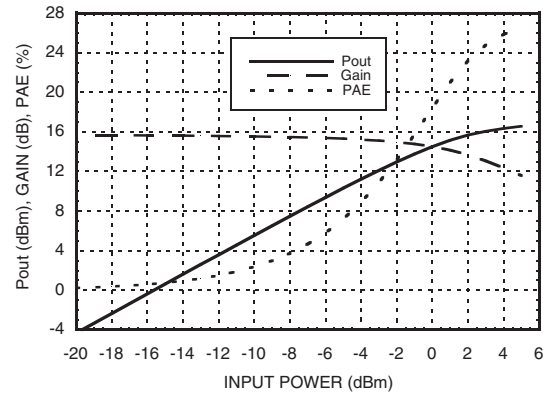


## GENERAL PURPOSE 100 mW GaAs MMIC AMPLIFIER, 0.8 - 3.8 GHz

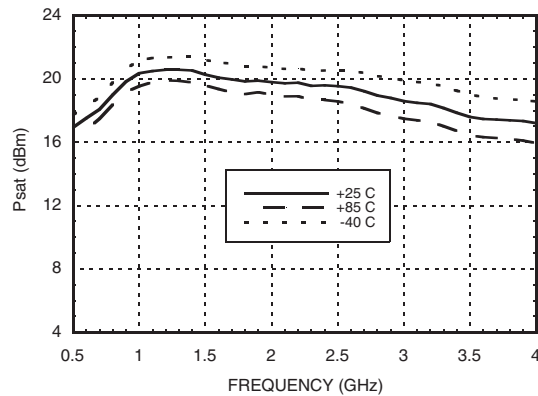
**Power Compression  
@ 2.0 GHz, Vdd = +5V**



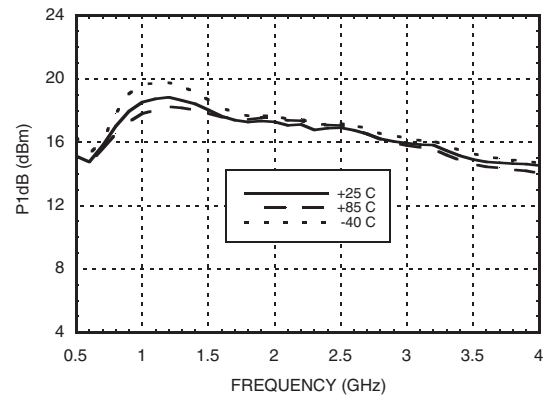
**Power Compression  
@ 2.5 GHz, Vdd = +5V**



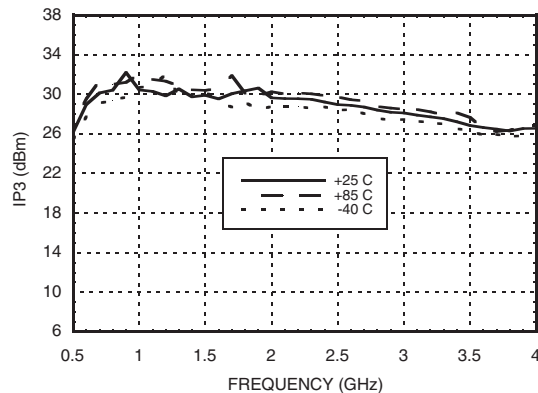
**Psat vs. Temperature @ Vdd = +5V**



**Output P1dB vs.  
Temperature @ Vdd = +5V**



**Output IP3  
vs. Temperature @ Vdd = +5V**

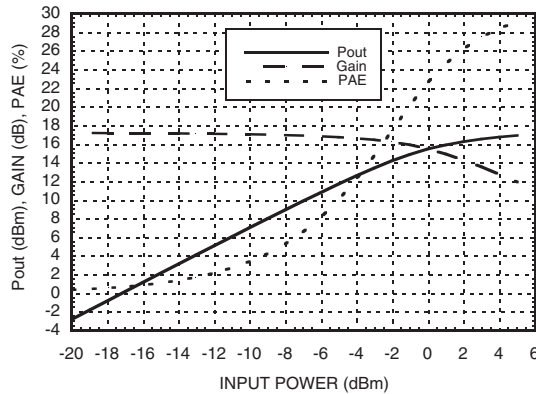


**Typical Supply Current vs. Vdd**

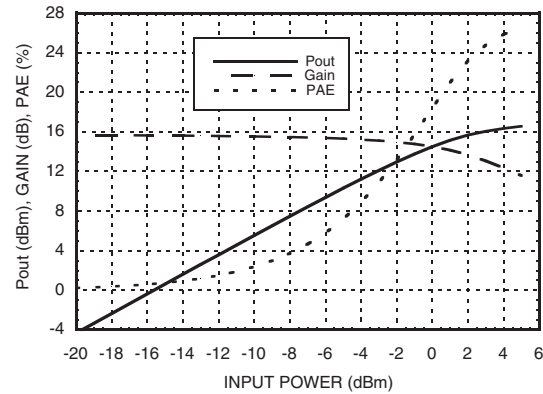
| Vdd (Vdc) | Idd (mA) |
|-----------|----------|
| +2.5      | 49       |
| +3.0      | 50       |
| +3.5      | 51       |
| +4.5      | 50       |
| +5.0      | 53       |
| +5.5      | 54       |

## GENERAL PURPOSE 100 mW GaAs MMIC AMPLIFIER, 0.8 - 3.8 GHz

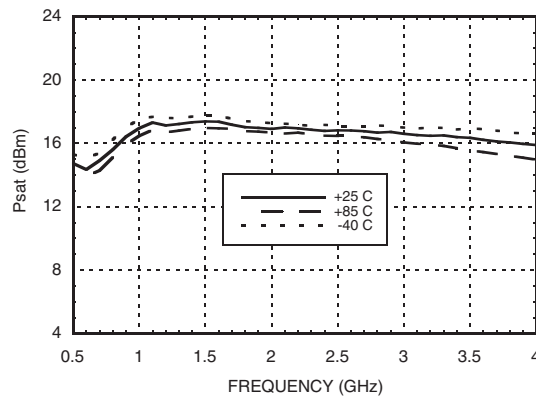
### Power Compression @ 2.0 GHz, Vdd = +3V



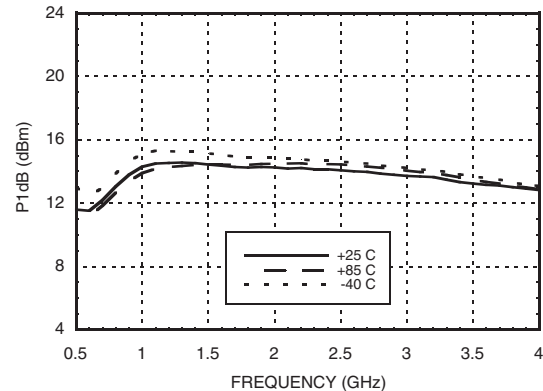
### Power Compression @ 2.5 GHz, Vdd = +3V



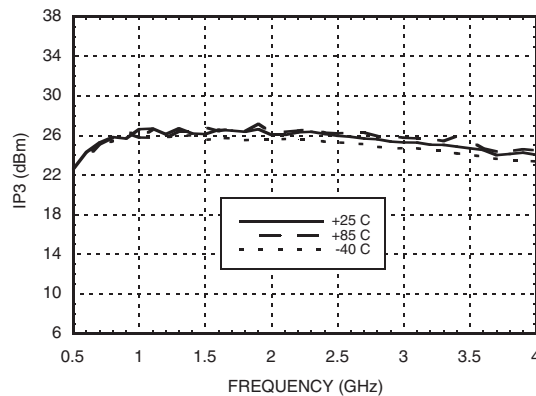
### Psat vs. Temperature @ Vdd = +3V



### Output P1dB vs. Temperature @ Vdd = +3V



### Output IP3 vs. Temperature @ Vdd = +3V

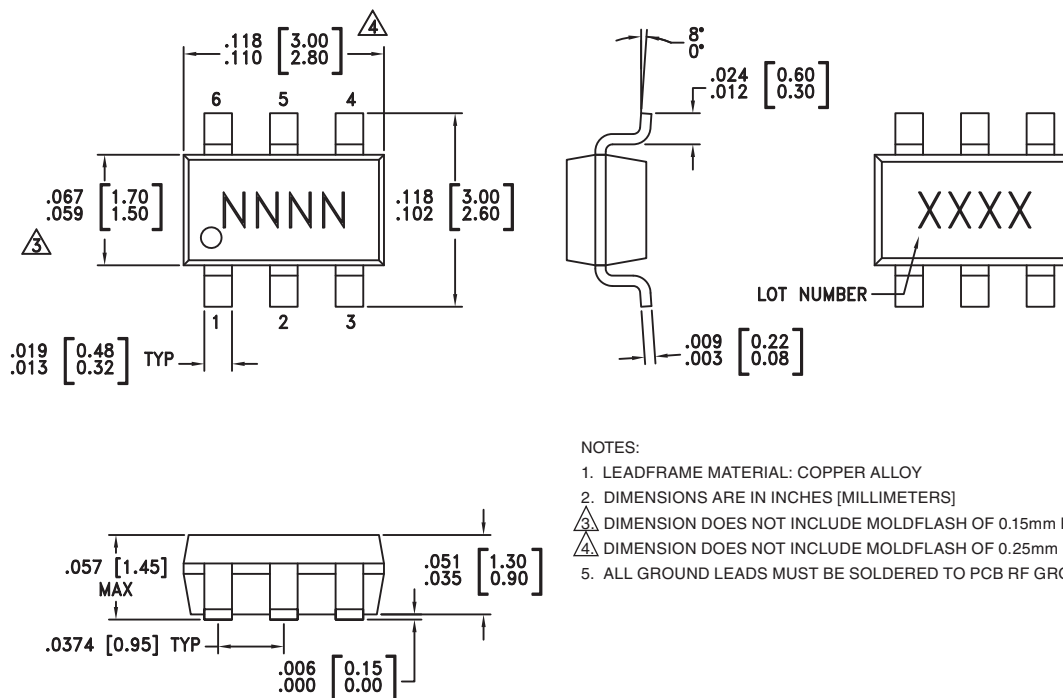


### Absolute Maximum Ratings

|                                                                             |                |
|-----------------------------------------------------------------------------|----------------|
| Drain Bias Voltage (Vdd)                                                    | +7.0 Vdc       |
| RF Input Power (RFIN)(Vdd = +5Vdc)                                          | +10 dBm        |
| Channel Temperature                                                         | 150 °C         |
| Continuous P <sub>diss</sub> (T = 85 °C)<br>(derate 6.25 mW/°C above 85 °C) | 0.406 W        |
| Thermal Resistance<br>(channel to lead)                                     | 160 °C/W       |
| Storage Temperature                                                         | -65 to +150 °C |
| Operating Temperature                                                       | -40 to +85 °C  |
| ESD Sensitivity (HBM)                                                       | Class 1A       |



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

**GENERAL PURPOSE 100 mW GaAs  
MMIC AMPLIFIER, 0.8 - 3.8 GHz**
**Outline Drawing****NOTES:**

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND

**Package Information**

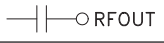
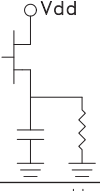
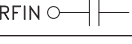
| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|----------------------------------------------------|---------------|---------------------|--------------------------------|
| HMC308      | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | H308<br>XXXX                   |
| HMC308E     | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | 308E<br>XXXX                   |

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

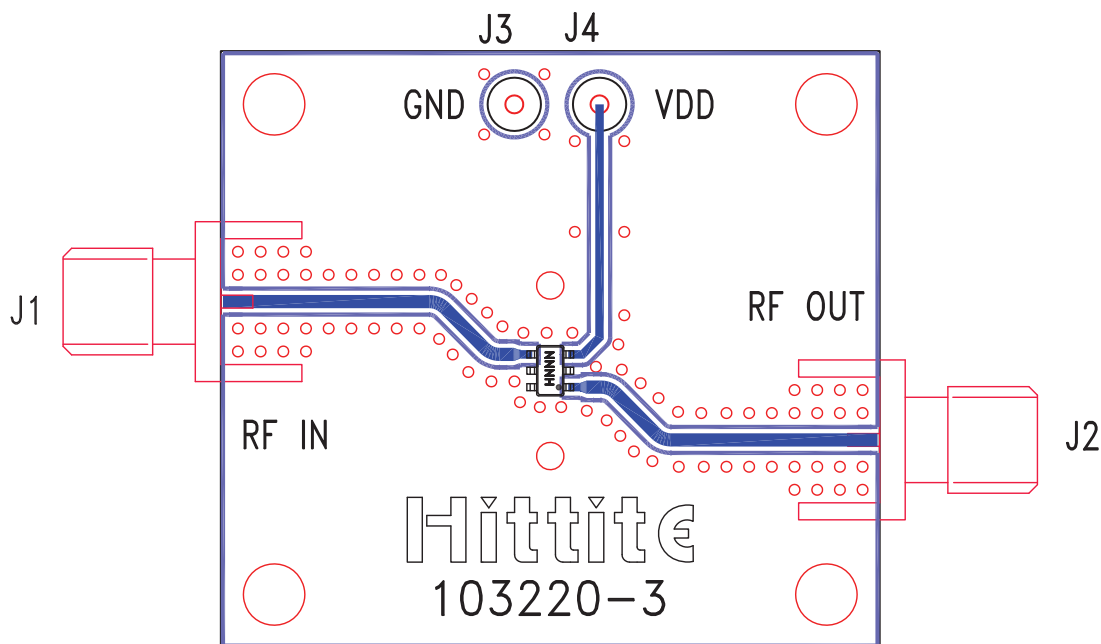
[3] 4-Digit lot number XXXX

**Pin Descriptions**

| Pin Number | Function | Description                                    | Interface Schematic                                                                   |
|------------|----------|------------------------------------------------|---------------------------------------------------------------------------------------|
| 1          | RFOUT    | This pin is AC coupled and matched to 50 Ohms. |  |
| 2, 5, 6    | GND      | These pins must be connected to RF/DC ground.  |  |
| 3          | Vdd      | Power supply voltage.                          |  |
| 4          | RFIN     | This pin is AC coupled and matched to 50 Ohms. |  |

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:  
 20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373  
 Order On-line at [www.hittite.com](http://www.hittite.com)

### Evaluation PCB



### List of Materials for Evaluation PCB 103802 <sup>[1]</sup>

| Item    | Description                |
|---------|----------------------------|
| J1, J2  | PCB Mount SMA Connector    |
| J3, J4  | DC Pins                    |
| U1      | HMC308 / HMC308E Amplifier |
| PCB [2] | 103220 Evaluation Board    |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Roger 4350

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads 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.