

GaAs InGaP HBT MMIC BROADBAND AMPLIFIER GAIN BLOCK, DC - 6.0 GHz

Typical Applications

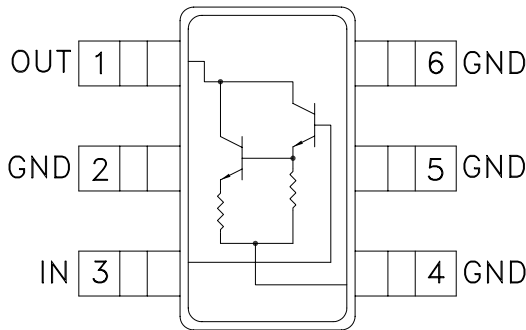
Ideal as a Driver & Amplifier for:

- 2.2 - 2.7 GHz MMDS
- 3.5 GHz Wireless Local Loop
- 5.0 - 6.0 GHz UNII & HiperLAN

Features

- P1dB Output Power: +14 dBm
- Output IP3: +27 dBm
- Gain: 17 dB
- Single Supply: +5V
- High Reliability GaAs HBT Process
- Ultra Small Package: SOT26

Functional Diagram



General Description

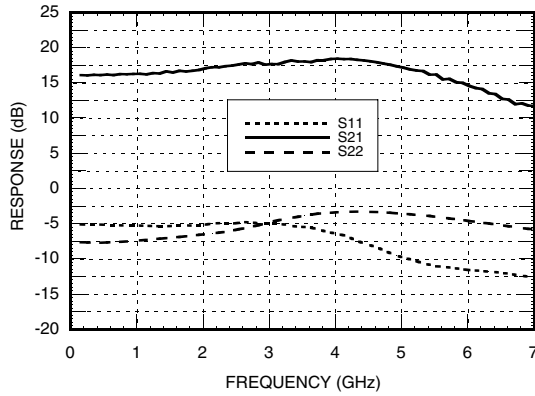
The HMC313 is a GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC amplifier that operates from a single Vcc supply. The surface mount SOT26 amplifier can be used as a broadband gain stage or used with external matching for optimized narrow band applications. With Vcc biased at +5V, the HMC313 offers 17 dB of gain and +15 dBm of saturated power while only requiring 50 mA of current. The “HMC313 Biasing and Impedance Matching Techniques” application note available within the “Application Notes” section offers recommendations for narrow band operation.

Electrical Specifications, $T_A = +25^\circ\text{C}$

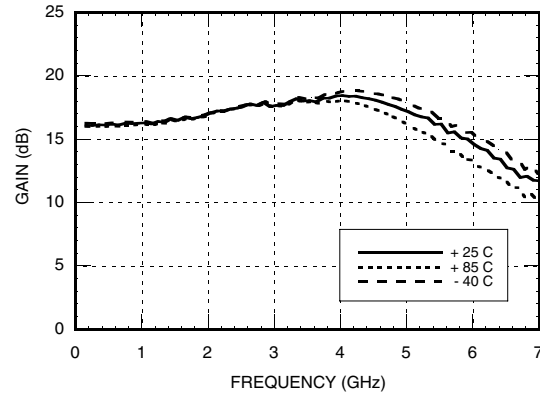
| Parameter | Vcc = +5V | | | Units |
|--|-----------|------|------|-------|
| | Min. | Typ. | Max. | |
| Frequency Range | DC - 6 | | | GHz |
| Gain | 14 | 17 | 20 | dB |
| Gain Variation Over Temperature | | 0.02 | 0.03 | dB/°C |
| Input Return Loss | | 7 | | dB |
| Output Return Loss | | 6 | | dB |
| Reverse Isolation | | 30 | | dB |
| Output Power for 1 dB Compression (P1dB) @ 1.0 GHz | 11 | 14 | | dBm |
| Saturated Output Power (Psat) @ 1.0 GHz | | 15 | | dBm |
| Output Third Order Intercept (IP3) @ 1.0 GHz | 24 | 27 | | dBm |
| Noise Figure | | 6.5 | | dB |
| Supply Current (Icc) | | 50 | | mA |

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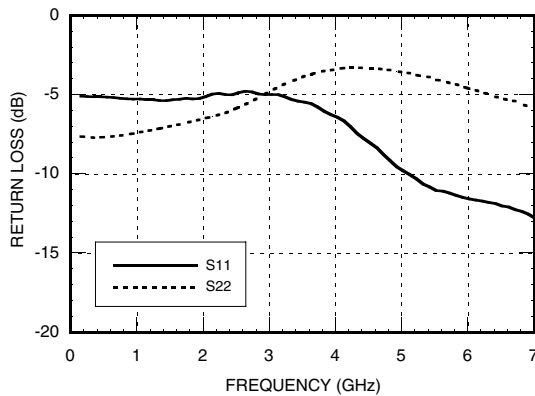
Gain & Return Loss



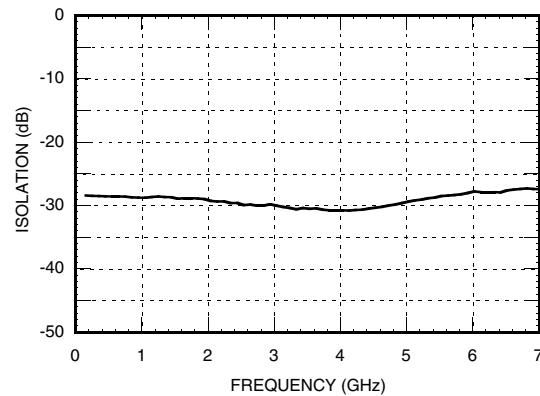
Gain vs. Temperature



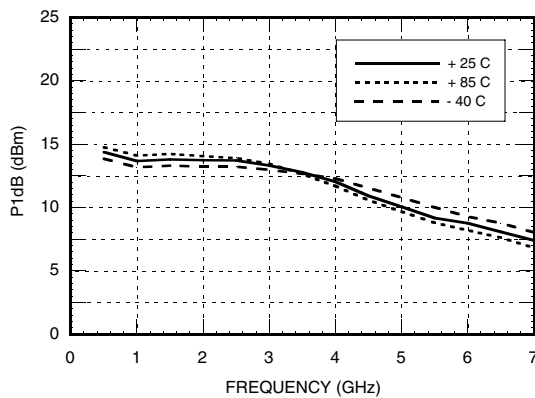
Input & Output Return Loss



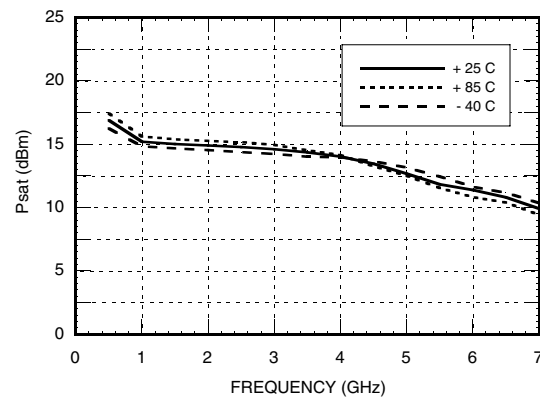
Reverse Isolation



P1dB vs. Temperature



Psat vs. Temperature

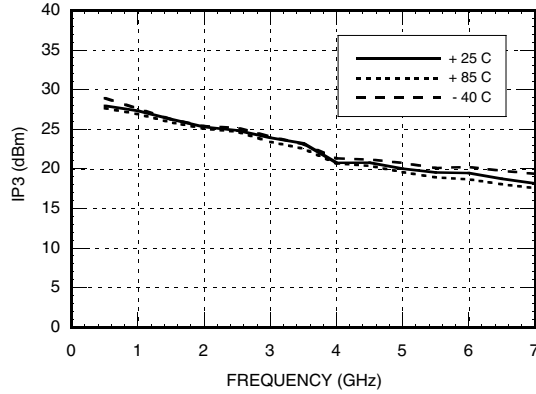


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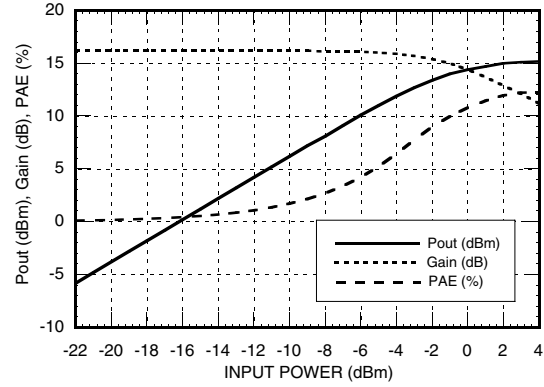
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AMPLIFIERS - SMT

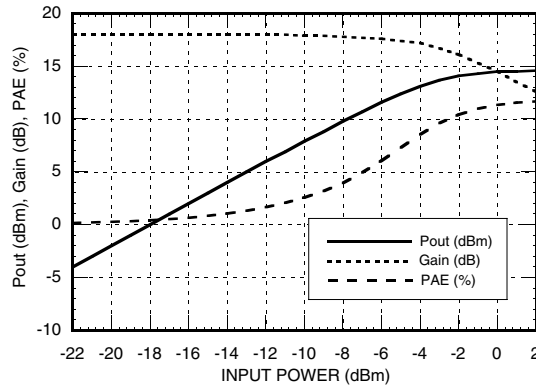
Output IP3 vs. Temperature



Power Compression @ 1.0 GHz



Power Compression @ 3.0 GHz

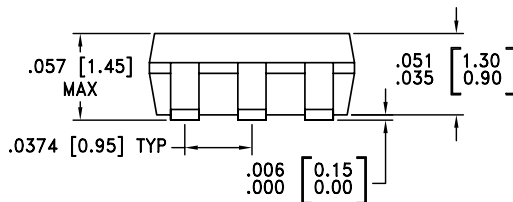
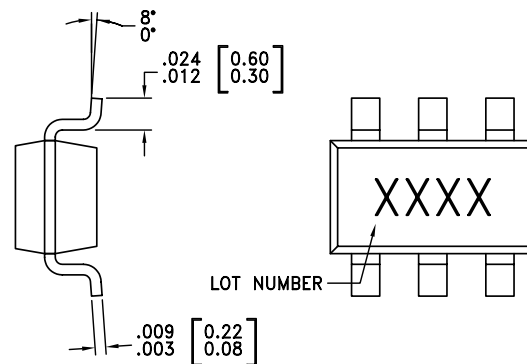
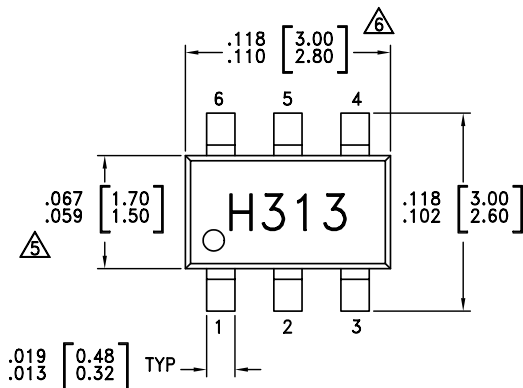


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Absolute Maximum Ratings

| | |
|---|----------------|
| Collector Bias Voltage (Vcc) | +5.5 Vdc |
| RF Input Power (RFin)(Vcc = +5.0 Vdc) | +20 dBm |
| Junction Temperature | 150 °C |
| Continuous P _{diss} (T = 85 °C) (derate 3.99 mW/°C above 85 °C) | 0.259 W |
| Thermal Resistance (junction to lead) | 251 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |

Absolute Maximum Ratings

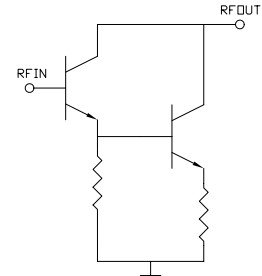



NOTES:

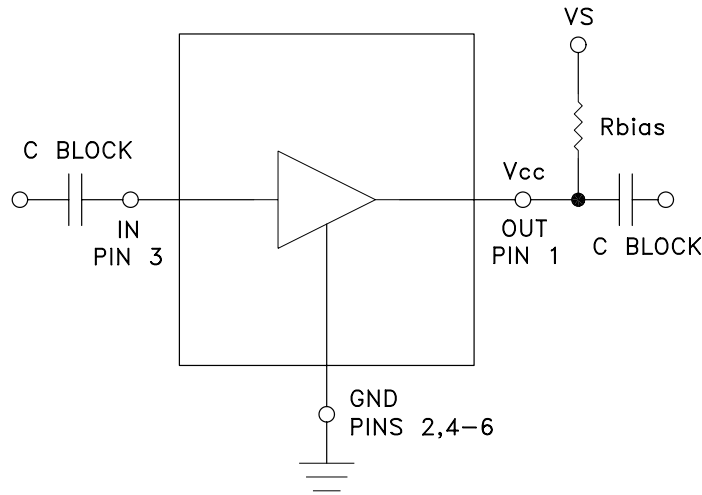
1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

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Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|------------|----------|--|---|
| 1 | RFOUT | This pin is DC coupled. An off chip DC blocking capacitor is required. |  |
| 3 | RFIN | This pin is DC coupled. An off chip DC blocking capacitor is required. | |
| 2, 4-6 | GND | These pins must be connected to RF/DC ground. |  |

Application Circuit

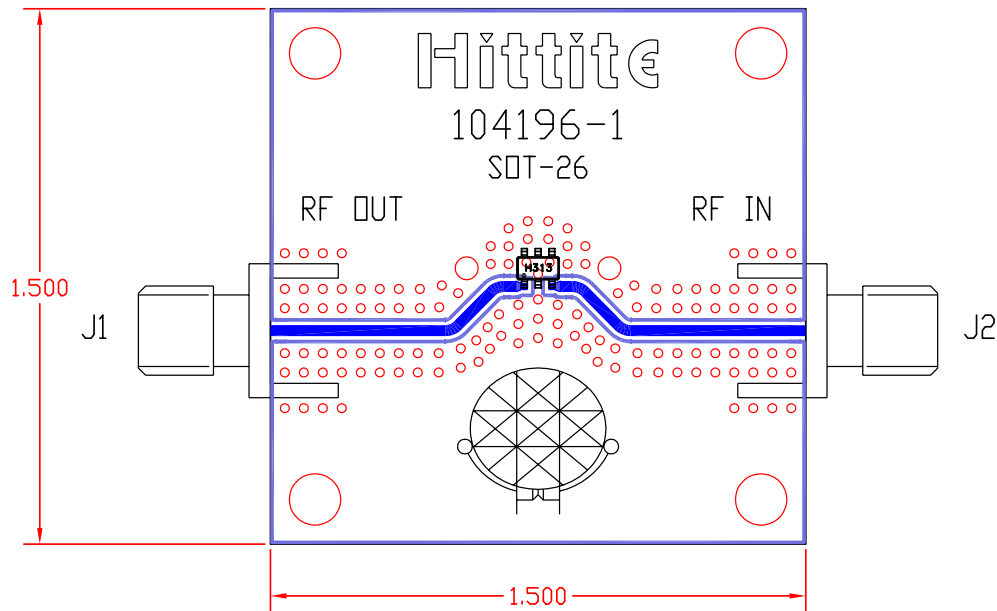


Note:

1. Select R_{bias} to achieve desired V_{cc} voltage on Pin 1.
2. External Blocking Capacitors are required on Pins 1 & 3.
3. See "Application Notes" section for HMC313 Application Circuit.

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Evaluation PCB



List of Material

| Item | Description |
|-------------------------------------|----------------------------|
| J1 - J2 | PC Mount SMA Connector |
| U1 | HMC313 |
| PCB* | Evaluation PCB 1.5" x 1.5" |
| *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.

The "HMC313 Biasing and Impedance Matching Techniques" application note is located in the "Application Notes" section of this Designers' Guide.