



GaAs PHEMT MMIC LOW NOISE AMPLIFIER, 700 - 1000 MHz

Typical Applications

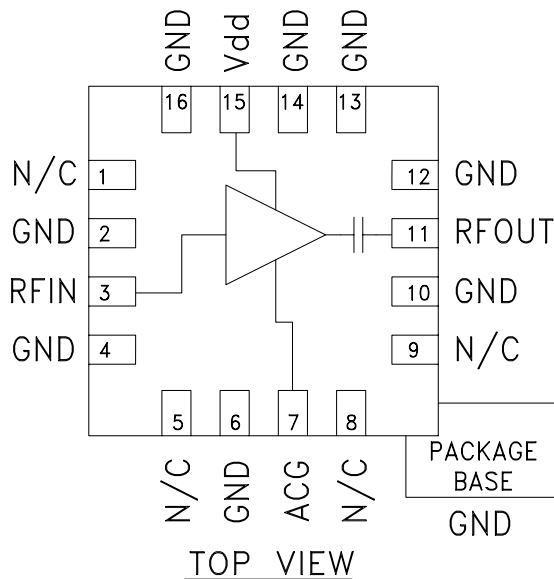
The HMC372LP3 / HMC372LP3E is ideal for basestation receivers:

- GSM, GPRS & EDGE
- CDMA & W-CDMA
- Private Land Mobile Radio

Features

- Noise Figure: < 1 dB
- Output IP3: +34 dBm
- Gain: 15 dB
- Very Stable Gain vs. Supply & Temperature
- Single Supply: +5V @ 100 mA
- 50 Ohm Matched Output

Functional Diagram



General Description

The HMC372LP3 & HMC372LP3E are GaAs pHEMT MMIC Low Noise Amplifiers that are ideal for GSM & CDMA cellular basestation front-end receivers operating between 700 and 1000 MHz. The amplifier has been optimized to provide 1 dB noise figure, 15 dB gain and +34 dBm output IP3 from a single supply of +5V @ 100 mA. Input and output return losses are 25 and 14 dB respectively with the LNA requiring only four external components to optimize the RF Input match, RF ground and DC bias. For applications which require improved noise figure, please see the HMC617LP3(E).

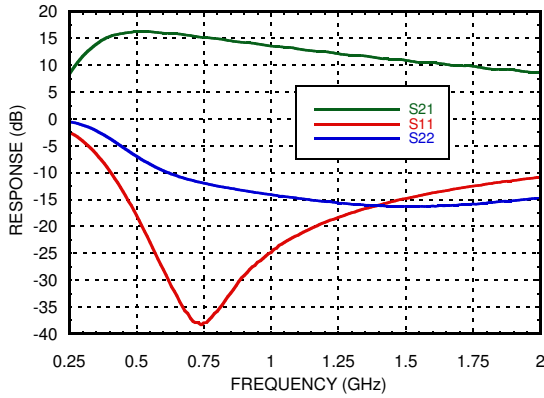
Electrical Specifications, $T_A = +25^\circ\text{C}$, $V_S = +5\text{V}$

| Parameter | Min. | Typ. | Max. | Min. | Typ. | Max. | Units |
|--|-----------|-------|------------|------|-------|-------|---------|
| Frequency Range | 810 - 960 | | 700 - 1000 | | | | MHz |
| Gain | 12.5 | 14.5 | | 11.5 | 14.5 | | dB |
| Gain Variation Over Temperature | | 0.008 | 0.015 | | 0.008 | 0.015 | dB / °C |
| Noise Figure | | 1.0 | 1.3 | | 1.0 | 1.3 | dB |
| Input Return Loss | | 25 | | | 25 | | dB |
| Output Return Loss | | 14 | | | 12 | | dB |
| Reverse Isolation | | 20 | | | 22 | | dB |
| Output Power for 1dB Compression (P1dB) | 18 | 21 | | 17 | 20 | | dBm |
| Saturated Output Power (Psat) | | 23.5 | | | 22.5 | | dBm |
| Output Third Order Intercept (IP3) (-20 dBm Input Power per tone, 1 MHz tone spacing) | | 34 | | 30 | 33 | | dBm |
| Supply Current (I _{dd}) | | 100 | | | 100 | | mA |

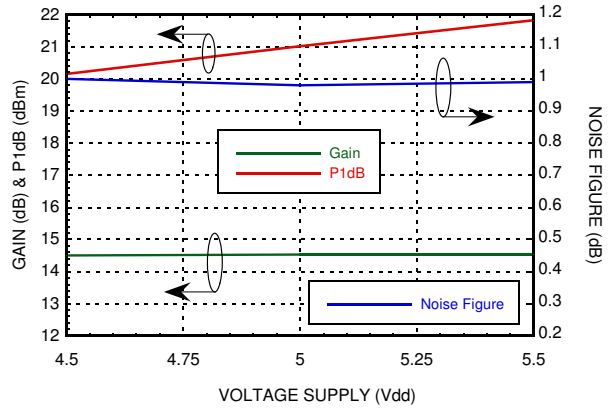


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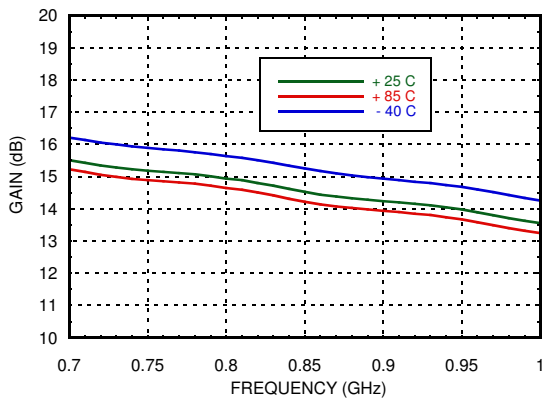
Broadband Gain & Return Loss



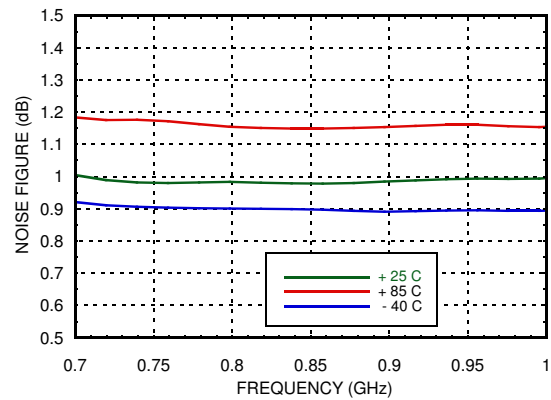
Gain, Noise Figure & Power vs. Supply Voltage @ 850MHz



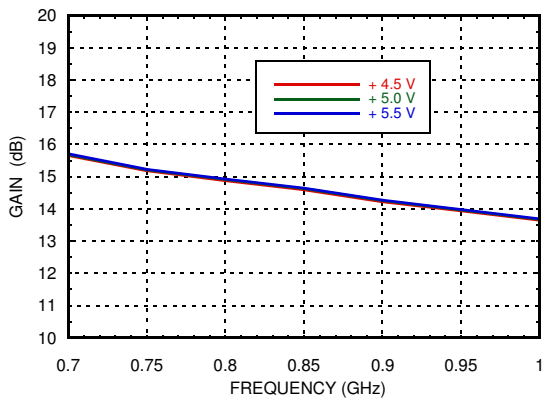
Gain vs. Temperature



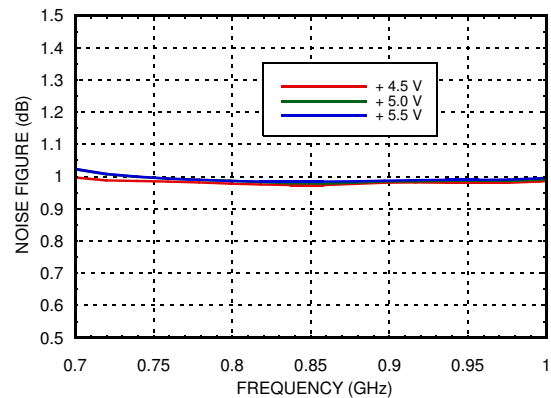
Noise Figure vs. Temperature



Gain vs. Vdd



Noise Figure vs. Vdd

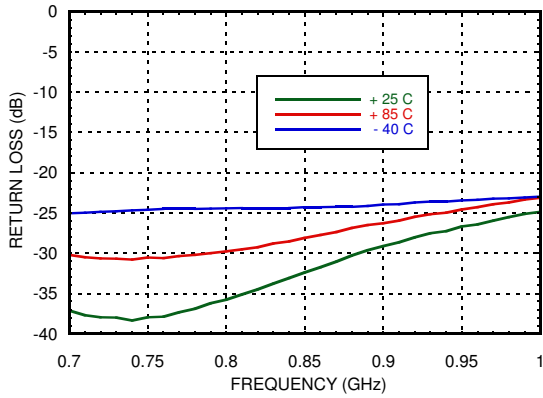




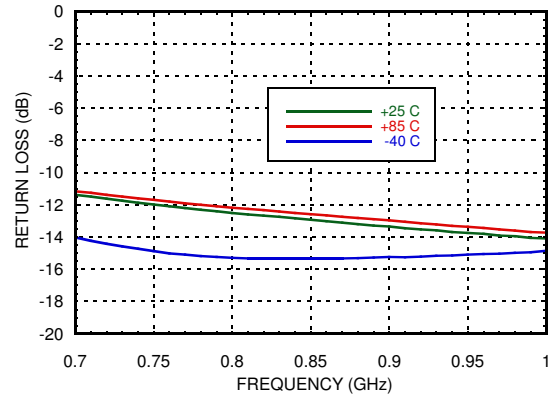
GaAs PHEMT MMIC LOW NOISE AMPLIFIER, 700 - 1000 MHz

AMPLIFIERS - LOW NOISE - SMT

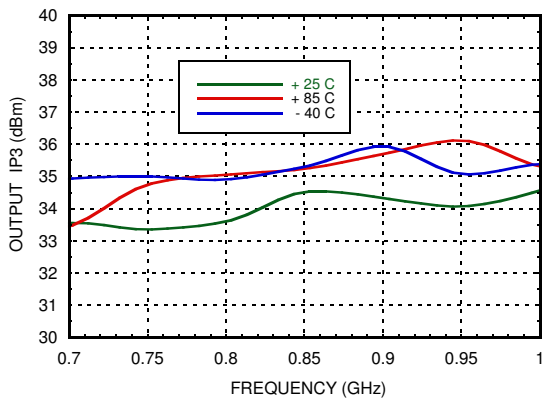
Input Return Loss vs. Temperature



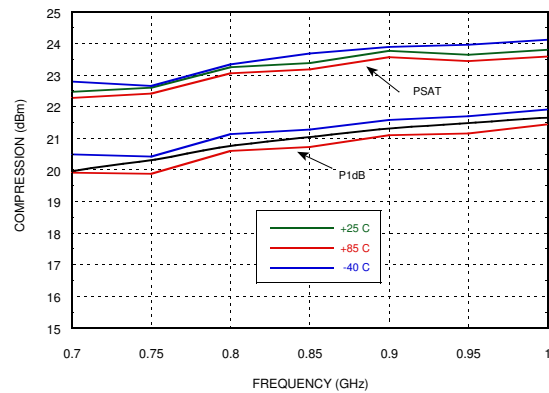
Output Return Loss vs. Temperature



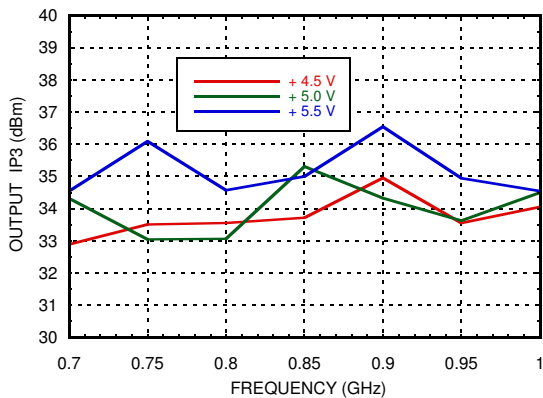
Output IP3 vs. Temperature



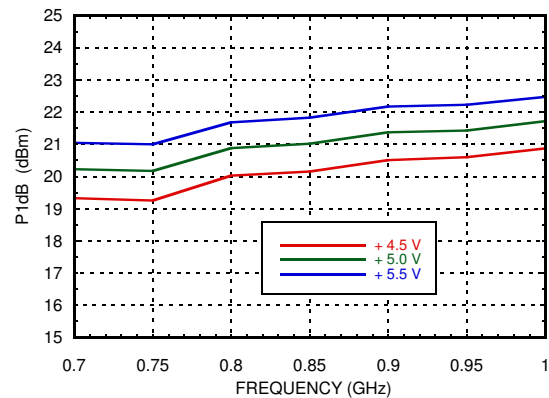
P1dB & Psat vs. Temperature



Output IP3 vs. Vdd



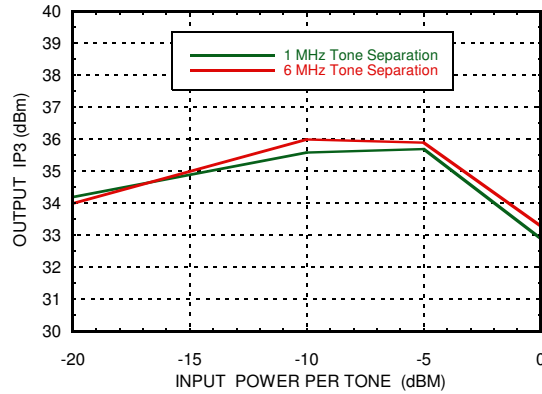
P1dB vs. Vdd



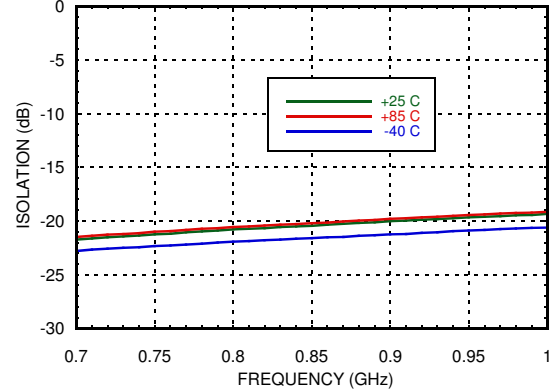


GaAs PHEMT MMIC LOW NOISE AMPLIFIER, 700 - 1000 MHz

Output IP3 vs. Input Power @ 950 MHz



Reverse Isolation vs. Temperature



Absolute Maximum Ratings

| | |
|---|----------------|
| Drain Bias Voltage (Vdd) | +8.0 Vdc |
| RF Input Power (RFIN)(Vs = +5.0 Vdc) | +15 dBm |
| Channel Temperature | 150 °C |
| Continuous P _{diss} (T = 85 °C) (derate 15.6 mW/°C above 85 °C) | 1.015 W |
| Thermal Resistance (channel to ground paddle) | 64.1 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |

Typical Supply Current vs. Vdd

| Vdd (Vdc) | I _{dd} (mA) |
|-----------|----------------------|
| +4.5 | 98 |
| +5.0 | 100 |
| +5.5 | 102 |

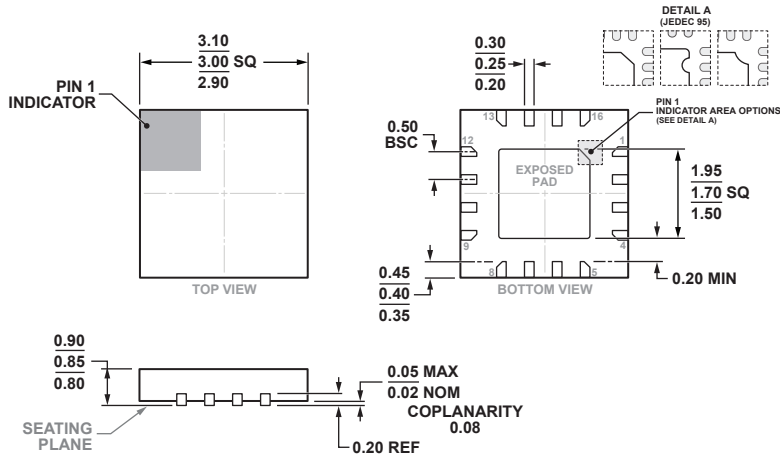


**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**



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AMPLIFIER, 700 - 1000 MHz**

Outline Drawing



COMPLIANT WITH JEDEC STANDARDS MO-220-VEED-4.

16-Lead Lead Frame Chip Scale Package [LFCSP]
3 mm x 3 mm and 0.85 mm Package Height
(HCP-16-1)
Dimensions shown in millimeters

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating ^[1] | Package Marking ^[2] |
|--------------|--|---------------|---------------------------|--------------------------------|
| HMC372LP3E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL3 ^[2] | H372 XXXX |
| HMC372LP3ETR | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL3 ^[2] | H372 XXXX |

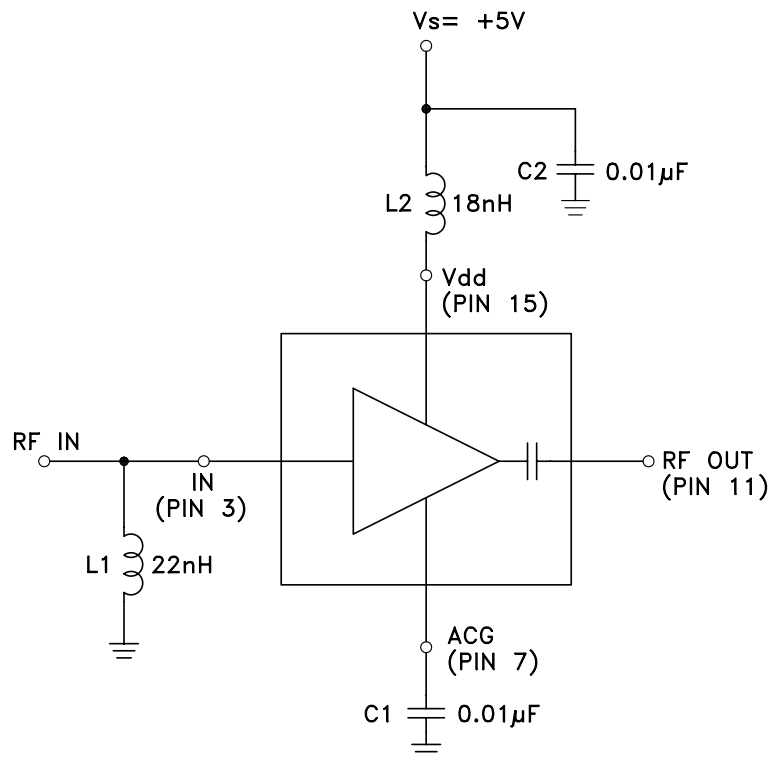
[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

Pin Descriptions

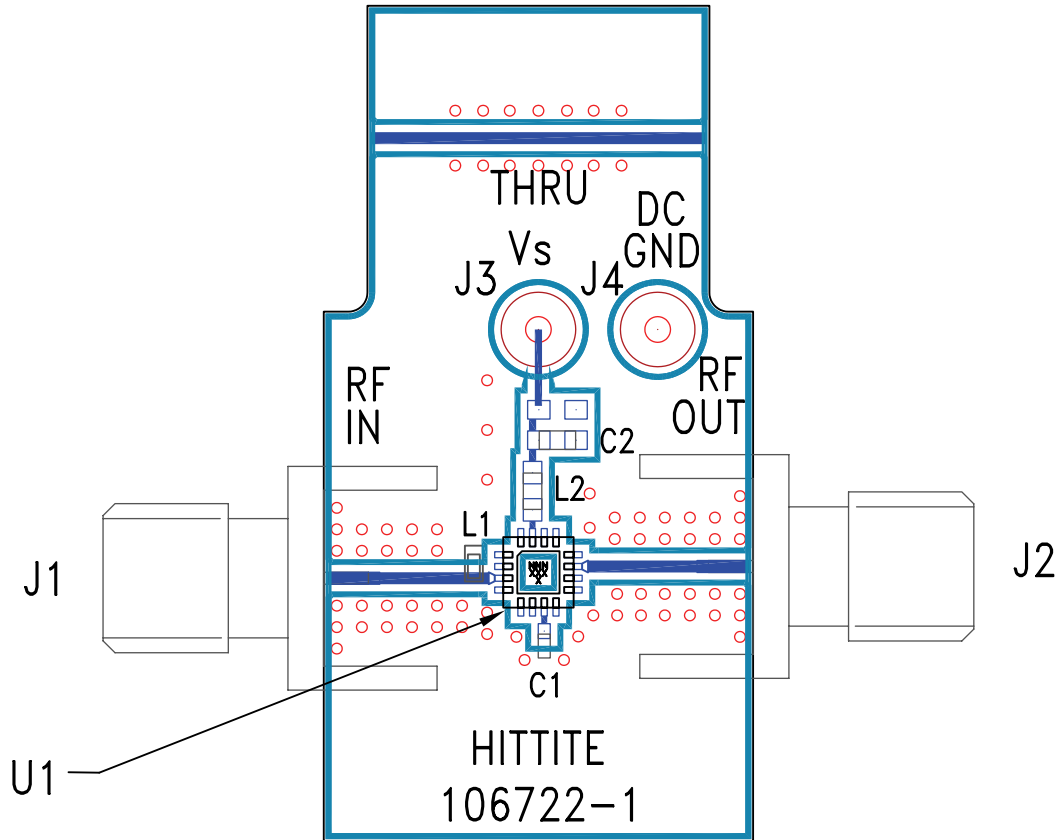
| Pin Number | Function | Description | Interface Schematic |
|-----------------------------|----------|---|---------------------|
| 1, 5, 8, 9 | N/C | No connection necessary. These pins may be connected to RF/DC ground. | |
| 2, 4, 6, 10, 12, 13, 14, 16 | GND | These pins must be connected to RF/DC ground. | |
| 3 | RF IN | This pin is matched to 50 Ohms with a 22 nH inductor to ground. See Application Circuit. | |
| 7, 15 | ACG | AC Ground - An external capacitor of 0.01μF to ground is required for low frequency bypassing. See Application Circuit for further details. | |
| | Vdd | Power supply voltage. Choke inductor and bypass capacitor are required. See application circuit. | |
| 11 | RF OUT | This pin is AC coupled and matched to 50 Ohms. | |

Application Circuit



Note 1: Choose value of capacitor C1 for low frequency bypassing. A 0.01 μF ±10% capacitor is recommended.
 Note 2: L1, L2 and C1 should be located as close to the pins as possible.

Evaluation PCB



List of Materials for Evaluation PCB 106821 [1]

| Item | Description |
|---------|----------------------------------|
| J1 - J2 | PCB Mount SMA RF Connector |
| J3 - J4 | DC Pin |
| C1 | 10000 pF Capacitor, 0402 Pkg. |
| C2 | 10000 pF Capacitor, 0060 Pkg. |
| L1 | 22nH Inductor, 0402 Pkg. |
| L2 | 18nH Inductor, 0603 Pkg. |
| U1 | HMC372LP3 / HMC372LP3E Amplifier |
| PCB [2] | 106722 Evaluation PCB |

[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 Analog Devices upon request.



HMC372LP3 / 372LP3E

v04.0920

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Notes:

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