# HMC374SC70E

v01.0814

## GaAs pHEMT LOW NOISE AMPLIFIER 0.3 - 3.0 GHz

### Typical Applications

The HMC374SC70E is ideal for:

- Cellular/PCS/3G
- WCS, MMDS & ISM
- Fixed Wireless & WLAN
- Private Land Mobile Radio

### Features

Single Supply: Vdd = +3.0 to +3.6V

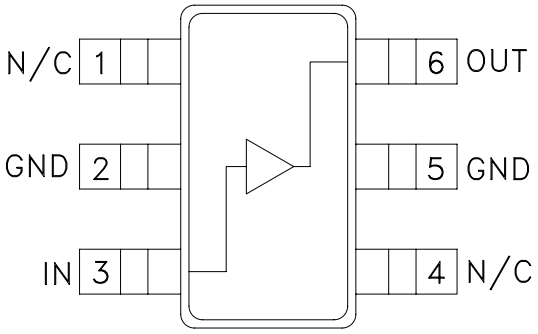
Broadband Performance

Low Noise Figure: 1.6 dB

High Output IP3: +35 dBm

High Gain: 15 dB @ 0.6 GHz

### Functional Diagram




### General Description

The HMC374SC70E is a general purpose broadband Low Noise Amplifier (LNA) for use in the 0.3 - 3 GHz frequency range. The LNA provides 15 dB of gain and a 1.6 dB noise figure from a single positive supply of +3.0 to +3.6V. The low noise figure coupled with a high P1dB (17 dBm) and high OIP3 (35 dBm) make this part ideal for cellular applications. The compact LNA is designed for repeatable gain and noise figure performance. To minimize board area the design is offered in a low cost SC70E package that occupies only 0.089" x 0.053".

### Electrical Specifications, Vdd= +3.3V

| Parameter | Min. [2] | Typ.[1] | Max. [2] | Min. [2] | Typ. [1] | Max. [2] | Min. [2] | Typ. [1] | Max. [2] | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | | 0.6 | | | 1.0 | | | 3.0 | | GHz |
| Gain | 14 | 15 | | 13 | 14.5 | | 6 | 8.5 | | dB |
| Gain Variation Over Temperature (-40°C to +25°C) | | 0.005 | | | 0.008 | | | 0.012 | | dB/°C |
| Gain Variation Over Temperature (+25 °C to +85 °C) | | 0.004 | | | 0.005 | | | 0.008 | | |
| Noise Figure | | 2 | 2.6 | | 1.6 | 2.3 | | 1.8 | 2.2 | dB |
| Input Return Loss | 4.5 | 5.5 | | 6 | 7.5 | | 8 | 9 | | |
| Output Return Loss | 5.5 | 7.5 | | 8 | 10 | | 13 | 15 | | |
| Output 1 dB Compression (P1dB) | 15.5 | 16.5 | | 16 | 17 | | 16.5 | 18 | | dBm |
| Saturated Output Power (Psat) | 17.5 | 18.5 | | 17.5 | 18.5 | | 18 | 19 | | |
| Output Third Order Intercept (OIP3) | | 34 | | | 33.5 | | | 36 | | |
| Supply Current (Idd) (Vdd = +3.3V) | | 75 | | | 75 | | | 75 | | mA |
| Supply Voltage (Vdd) | 3.0 | 3.3 | 3.6 | 3.0 | 3.3 | 3.6 | 3.0 | 3.3 | 3.6 | V |

[1] Typical values are determined at $T_A$=+25°C

[2] Minimum and maximum values are determined from $T_A$=-40°C to $T_A$=+85°C



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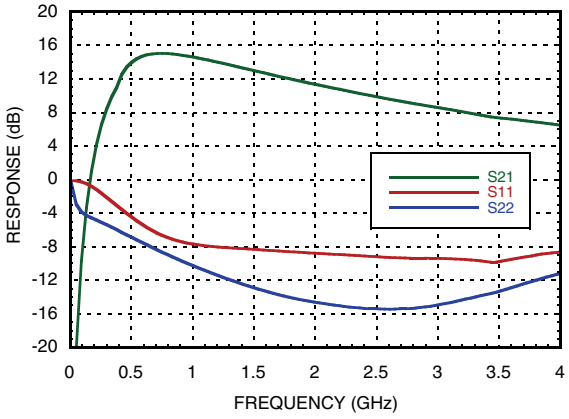
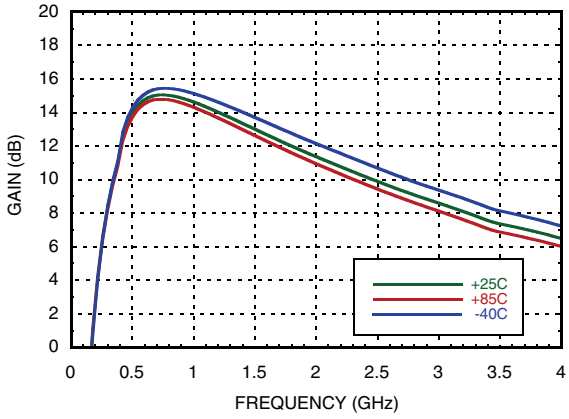
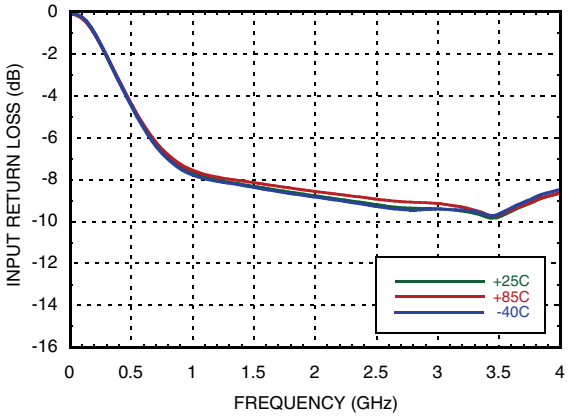
### Broadband Gain & Return Loss



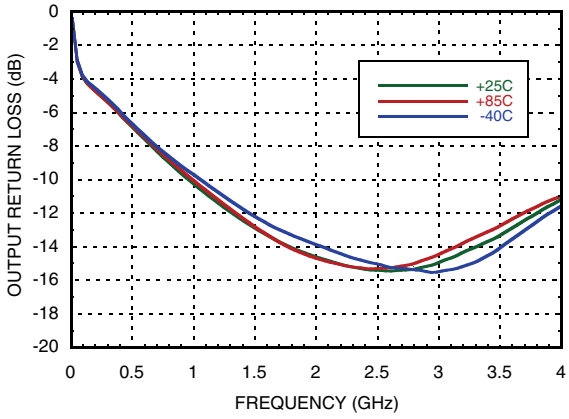

### Gain vs. Temperature



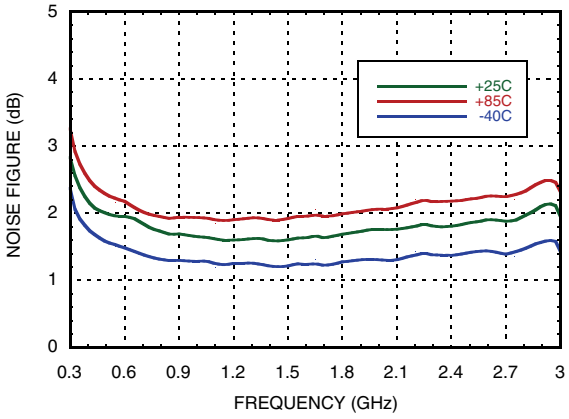

### Input Return Loss vs. Temperature



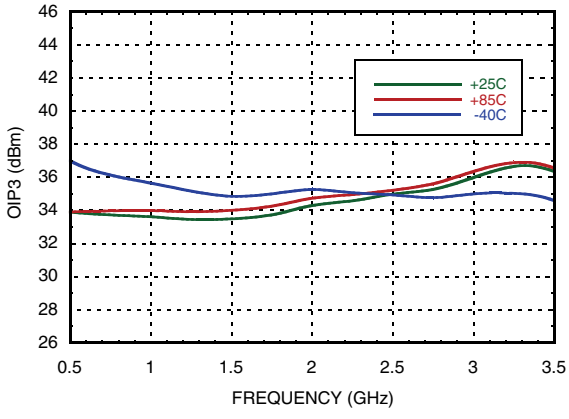

### Output Return Loss vs. Temperature




### Noise Figure vs. Temperature




### Output IP3 vs. Temperature [1]




[1] OIP3 measurements were taken for Pout = 0 dBm



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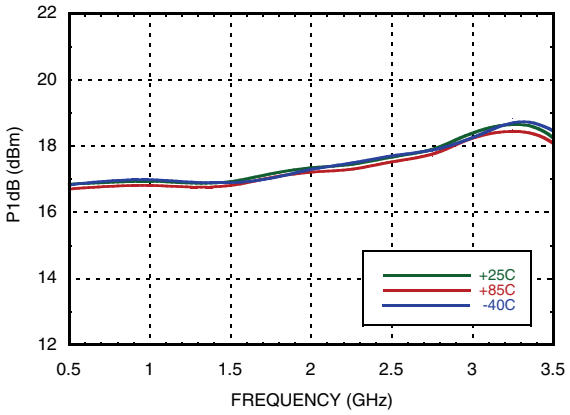
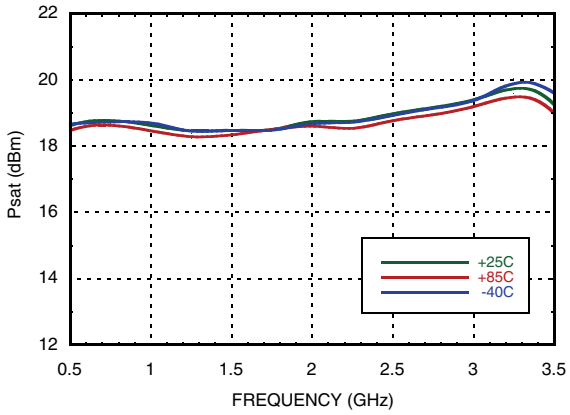
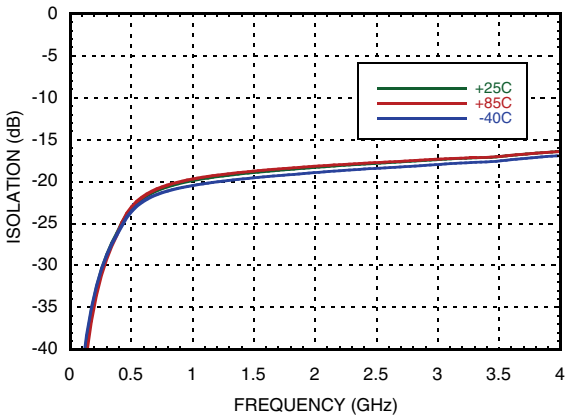
### Output P1dB vs. Temperature



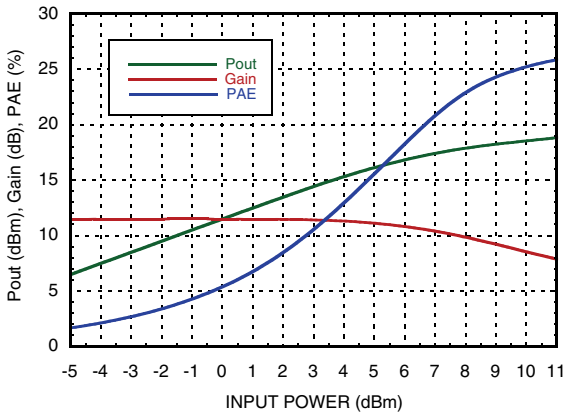

### Output Psat vs. Temperature



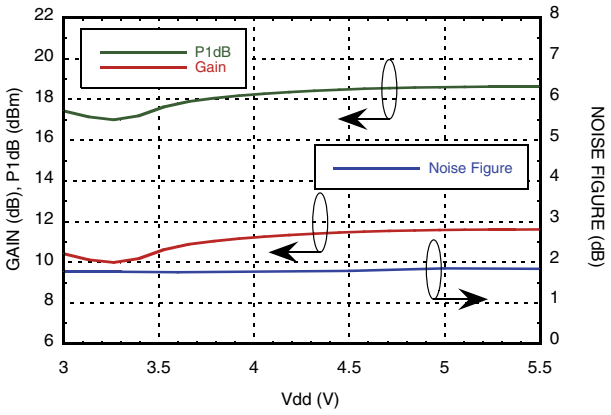

### Reverse Isolation vs. Temperature



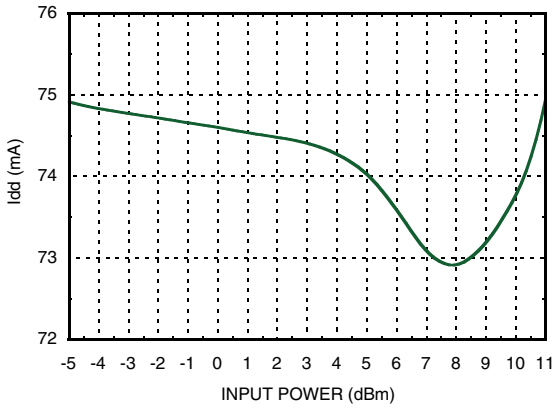

### Pout, Gain & PAE @ 2 GHz




### Gain, Noise Figure & P1dB vs. Supply Voltage @ 2 GHz




### Supply Current vs. Input Power @ 2 GHz



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## Absolute Maximum Ratings

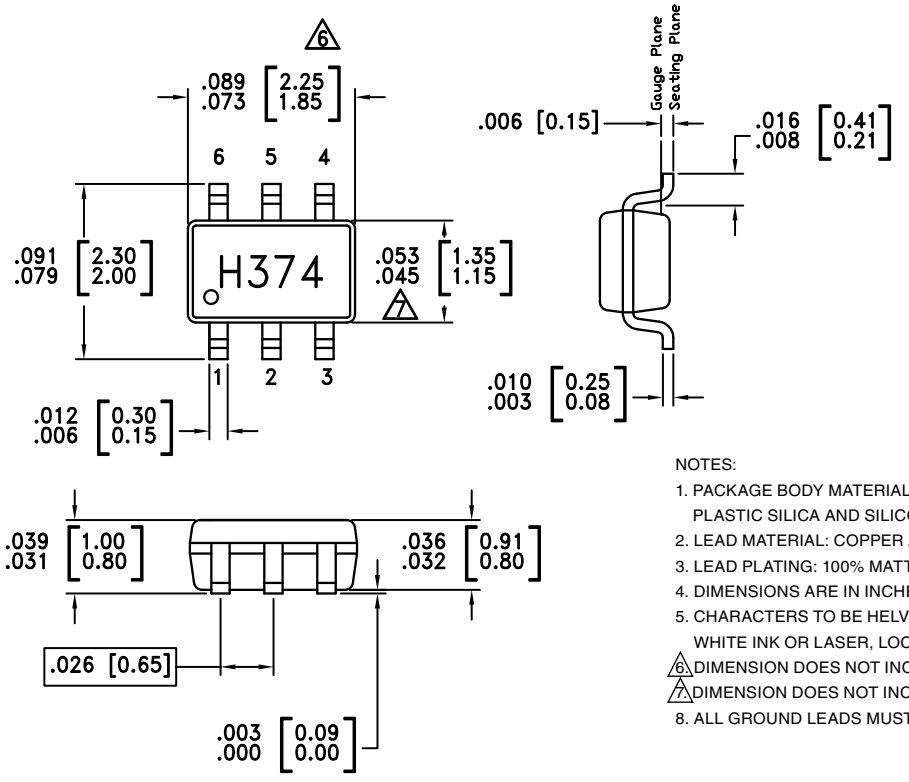
| | |
|---|---|
| Drain Bias Voltage (Vdd) | +7.0 Vdc |
| RF Input Power (RFIN)(Vdd = +5.0 Vdc) | 15 dBm |
| Channel Temperature | 150 °C |
| Continuous Pdiss (T = 85 °C) (derate 4.88 mW/°C above 85 °C) | 0.32 W |
| Thermal Resistance (channel to lead) | 205 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 0 |

## Typical Supply Current vs. Vdd

| Vdd (V) | Idd (mA) |
|---|---|
| 3 | 75 |
| 3.3 | 75 |
| 3.6 | 75 |

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

## Outline Drawing




NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD MATERIAL: COPPER ALLOY
3. LEAD PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS]
5. CHARACTERS TO BE HELVETICA MEDIUM, .015 HIGH, WHITE INK OR LASER, LOCATED APPROXIMATELY AS SHOWN.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
7. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
8. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

## Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking [3] |
|---|---|---|---|---|
| HMC374SC70E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 [2] | H374E<br>XXXX |

[1] Max peak reflow temperature of 235 °C
[2] Max peak reflow temperature of 260 °C
[3] 4-Digit lot number XXXX



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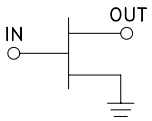
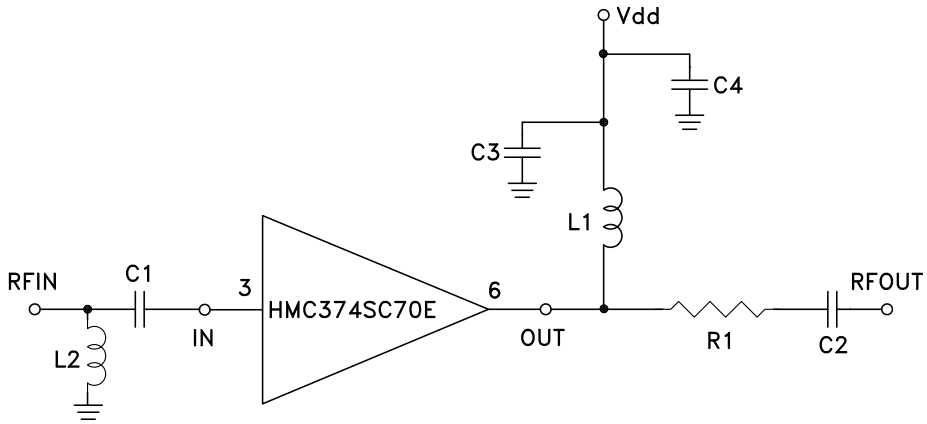
## Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|---|---|---|---|
| 1,4 | N/C | These pins may be connected to RF/DC ground. Performance will not be affected. | |
| 2, 5 | GND | These pins must be connected to RF/DC ground. |   |
| 3 | IN | RF input pin is DC coupled. An off-chip DC blocking capacitor is required. |   |
| 6 | OUT | RF output and DC Bias for the output stage. See application circuit for off-chip components. | |

## Application Circuit



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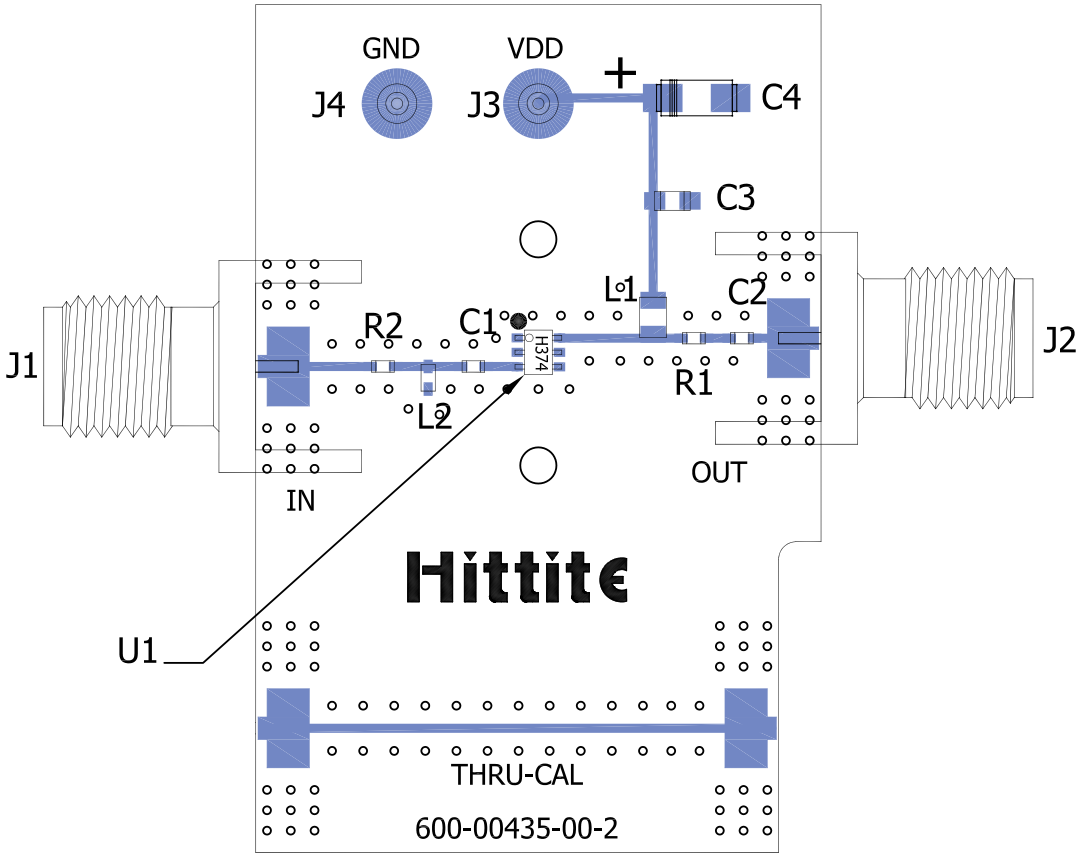
## Evaluation PCB




## List of Materials for EVAL01-HMC374SC70E [1]

| Item | Description |
|---|---|
| J1, J2 | PCB Mount SMA Connector |
| J3, J4 | DC Pin |
| C1 | 27 pF Capacitor, 0402 Pkg. |
| C2 | 150 pF Capacitor, 0402 Pkg. |
| C3 | 10 nF Capacitor, 0603 Pkg. |
| C4 | 4.7 Capacitor, Tantalum |
| L1 | 27 nH Inductor, 0603 Pkg. |
| L2 | 22 nH Inductor, 0402 Pkg. |
| R1 | 10 Ohms Resistor, 0402 Pkg. |
| R2 | 0 Ohm Resistor, 0402 Pkg. |
| U1 | HMC374SC70E Amplifier |
| PCB [2] | 600-00435-00 Evaluation PCB |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Roger 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 should be connected directly to the ground plane similar to that shown above. 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.



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