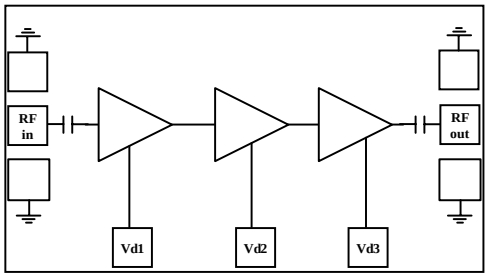
3.0 – 4.0 GHz Ultra Low Noise Amplifier

Features

- **Frequency Range : 3.0 – 4.0GHz**
- **Ultra low noise figure < 1.25 dB**
- **High Gain ~ 35 dB**
- **18 dBm Nominal P1 dB**
- **Input Return Loss > 12 dB**
- **Output Return Loss > 18 dB**
- **Single supply operation**
- **No external matching required**
- **DC decoupled input and output**
- **0.15 µm InGaAs pHEMT Technology**
- **Chip dimension: 3.9 x 2.1 x 0.1 mm**

Functional diagram



Typical Applications

- **Radar**
- **Military**
- **Test Equipment and Sensors**
- **Point-to-Point Radios, Point-to-Multi-Point Radios & VSATS**

Description

The AMT2122041 is an Ultra Low Noise Amplifier operating in 3.0 -4.0 GHz frequency range. The LNA uses 3 stages of amplification and provides a high gain of 35 dB with a noise figure of 1.25 dB. The typical input and output return loss are better than 13 dB and 18 dB respectively. The LNA delivers a minimum P1 dB of 17 dBm over the entire operating band. The chip operates from a single positive supply. The RF ports are DC decoupled on chip. The Circuit grounds are provided through vias to the backside metallization. The die is fabricated using a reliable 0.15µm InGaAs pHEMT technology. The die is suitable in applications where high gain, very low noise and excellent linearity are desired.

Absolute Maximum Ratings(1)

Parameter	Absolute Maximum	Units
Positive DC voltage	+7	V
RF input power	+15	dBm
Supply Current	220	mA
Operating Temperature	-55 to +85	^{o}C
Storage Temperature	-65 to +150	^{o}C

1. Operation beyond these limits may cause permanent damage to the component

Electrical Specifications[1] @ T_A = 25 °C, Zo =50Ω; Vd1 = 1V, Vd2 = Vd3 = 4V

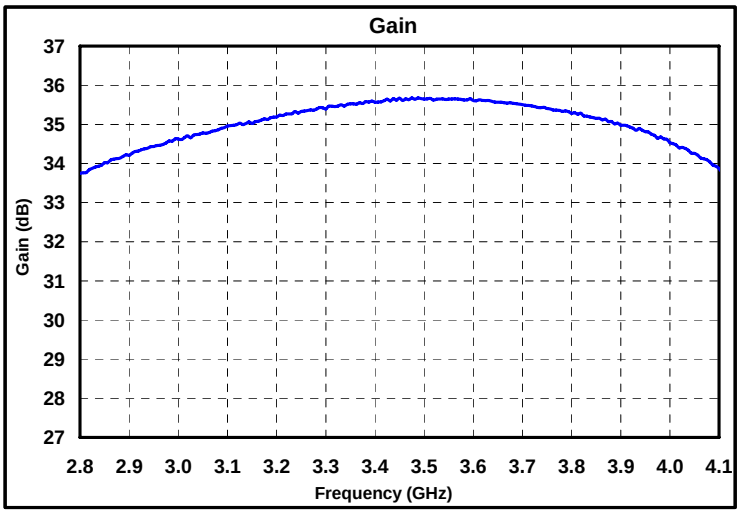
Parameter	Min.	Typ.	Max.	Units
Frequency Range	3.0	–	4.0	GHz
Gain	32	35	37	dB
Gain Flatness	–	± 0.5	–	dB
Noise Figure	–	1.25	1.5	dB
Input Return Loss	10	13	–	dB
Output Return Loss	15	18	–	dB
Output Power (P1 dB)	16	18	–	dBm
Saturated output power (Psat)	–	20	–	dBm
Output Third Order Intercept (IP3)	–	28	–	dBm
Supply Current	110	140	170	mA

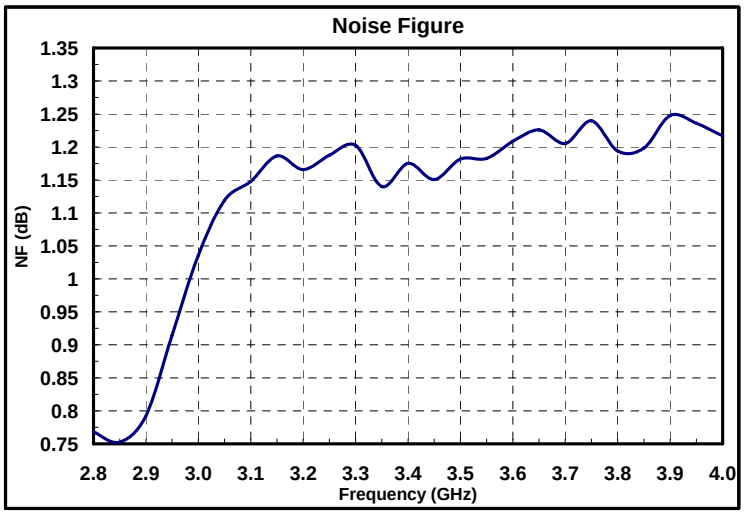
Note:

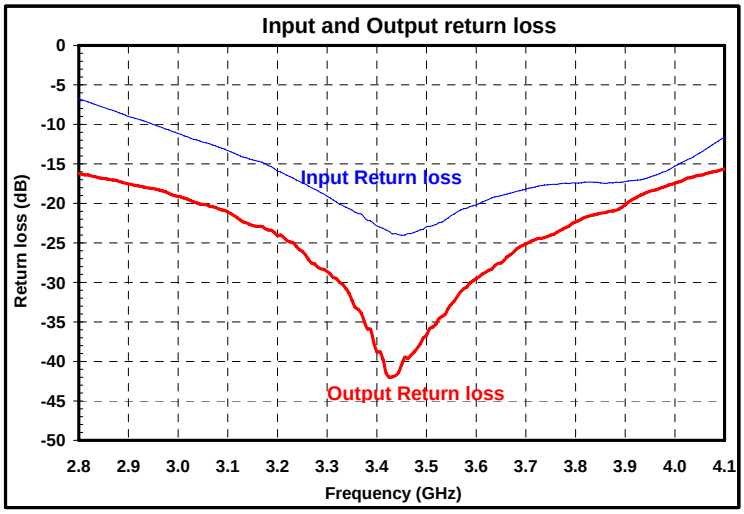
1. Electrical specifications as measured in a test fixture.

Test fixture data

Vd1= 1V, Vd2 = Vd3 = 4V, Total Current = 140 mA, T_A = 25 °C







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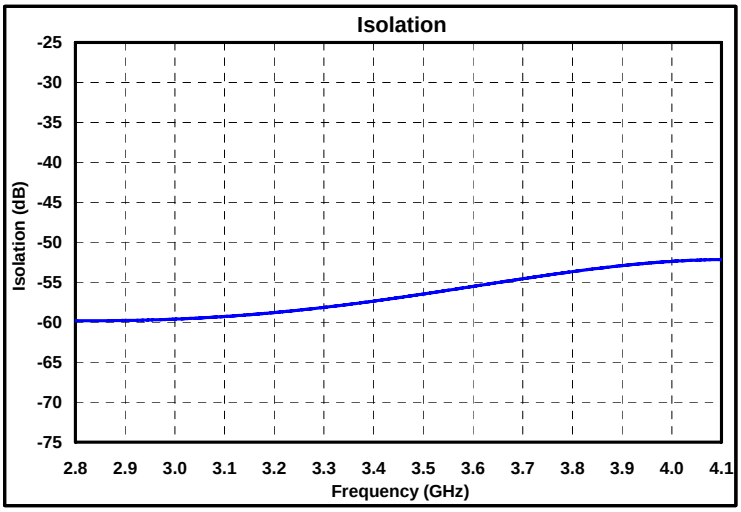
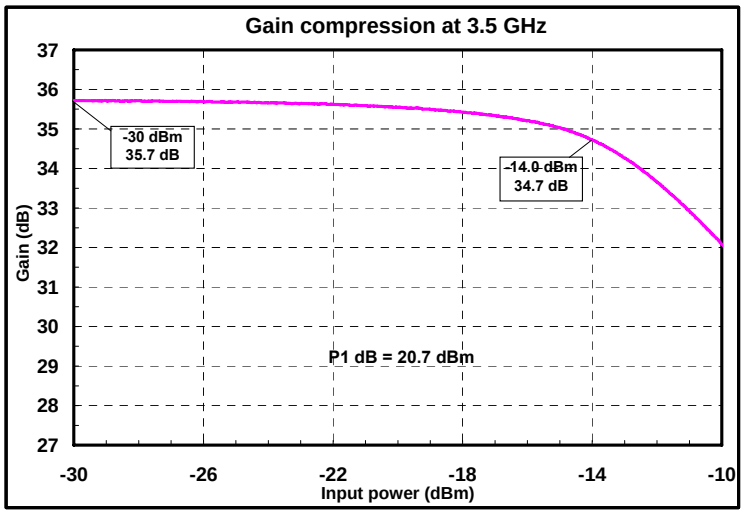
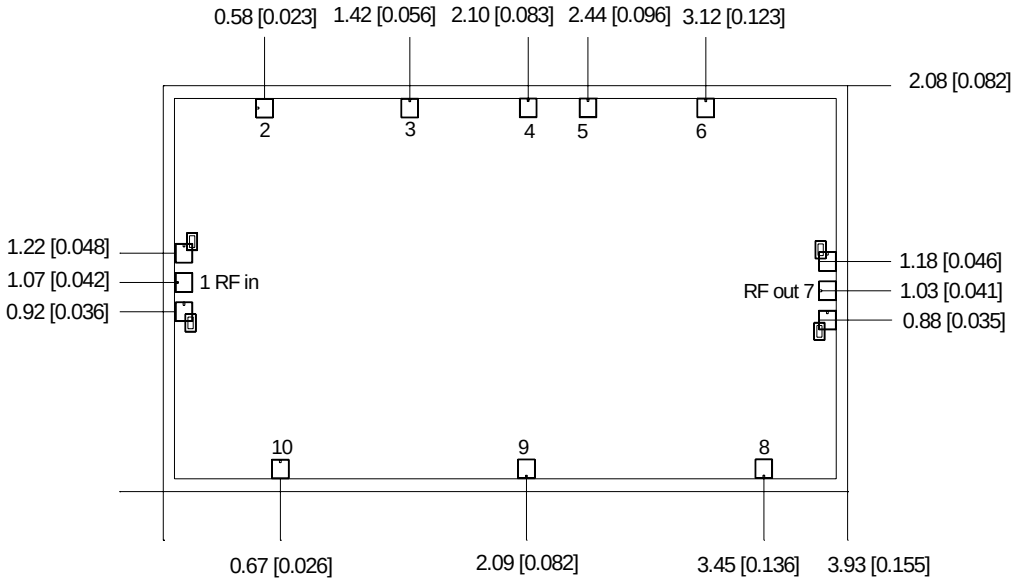




Mechanical Characteristics



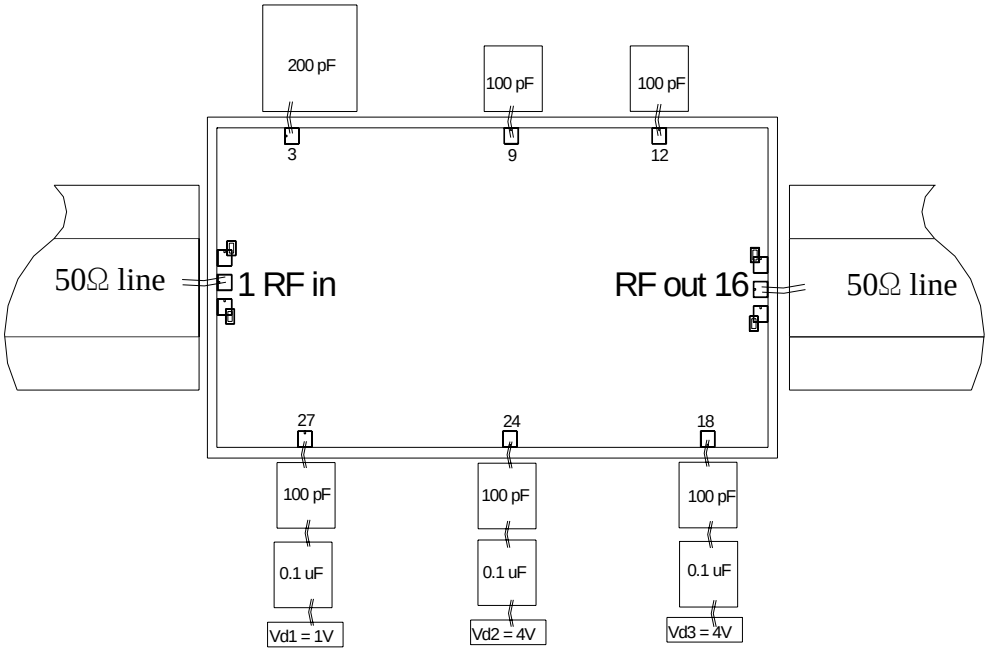
Units: millimeters (inches)

All RF and DC bond pads are 100µm x 100µm

Note:

1. **Pad no. 1: RF in**
2. **Pad no. 2: Source bypass (200 pF)**
3. **Pad no. 3: Optional Vg1**
4. **Pad no. 4: Source bypass (100 pF)**
5. **Pad no. 5: Optional Vg2**
6. **Pad no. 6: Source bypass (100 pF)**
7. **Pad no. 7: RF out**
8. **Pad no. 8: Vd3**
9. **Pad no. 9: Vd2**
10. **Pad no. 10: Vd1**

Recommended Assembly Diagram



Note :

1. Two 1 mil (0.0254mm) bond wires of minimum length should be used for RF input and output.
2. Two 1 mil (0.0254mm) bond wires of minimum length should be used from chip bond pad to 100pF capacitor.
3. Input and output 50 ohm lines are on 5 mil RT Duroid substrate
4. 0.1 µF capacitors may be additionally used as a second level of bypass for reliable operation
5. The bond numbers shown in assembly diagram are as per bond pad numbers printed on the die.
6. The RF input & output ports are DC decoupled on-chip.

Die attach: For Epoxy attachment, use of a two-component conductive epoxy is recommended. An epoxy fillet should be visible around the total die periphery. If Eutectic attachment is preferred, use of fluxless AuSn (80/20) 1-2 mil thick preform solder is recommended. Use of AuGe preform should be strictly avoided.

Wire bonding: For DC pad connections use either ball or wedge bonds. For best RF performance, use of 150 - 200µm length of wedge bonds is advised. Single Ball bonds of 250-300µm though acceptable, may cause a deviation in RF performance.

GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing

All information and Specifications are subject to change without prior notice