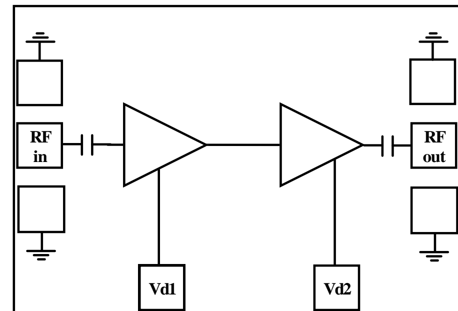
2.8 – 4.0 GHz Ultra Low Noise Amplifier

Features

- **Frequency Range: 2.8 - 4.0 GHz**
- **Noise Figure <1.0 dB @ 3.0GHz**
- **25 dB Nominal Gain**
- **11 dBm Nominal P1dB**
- **Single supply operation**
- **No external matching required**
- **DC decoupled Input and Output**
- **Nominal Bias 4V@ 62 mA**
- **0.15-um InGaAs pHEMT Technology**
- **Chip Dimensions: 2.9 x 1.7 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 ASL1010 is an Ultra Low Noise Amplifier operating in 2.8 - 4.0 GHz band. The LNA uses 2 stages of amplification to provide a typical gain of 25 dB. The LNA offers a noise figure < 1 dB till 3.1 GHz and has a mid-band noise figure of 1.4 dB. The LNA has nominal input return loss of 10 dB and output return loss of 12 dB. The LNA has a minimum P1dB of 11 dBm. The chip operates from a single positive supply of 4V. 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, low noise and excellent linearity are desired.

Absolute Maximum Ratings (1)

Parameter	Absolute Maximum	Units
Positive DC voltage	+6	V
RF input power	+15	dBm
Supply Current	100	mA
Operating Temperature	-55 to +85	°C
Storage Temperature	-65 to +150	°C

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

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

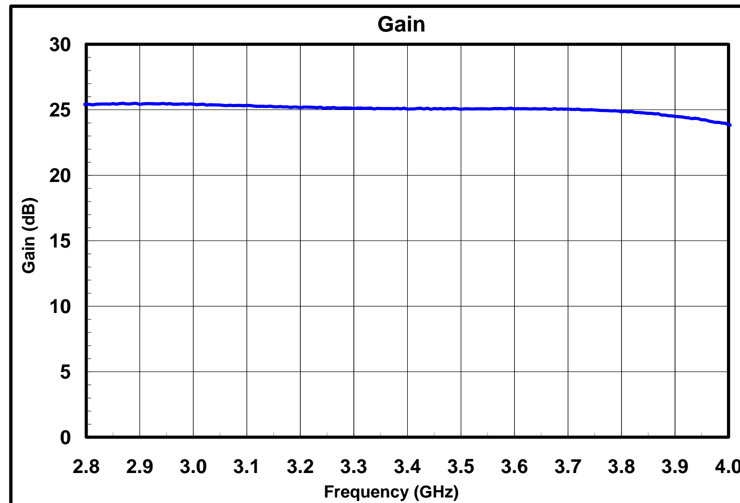
Parameter	Value	Value	Units
Frequency Range	2.8 – 3.2	3.2 – 4.0	GHz
Gain	25.2	24.5	dB
Gain Flatness	± 0.25	± 0.7	dB
Noise Figure (max.)	1.25	1.55	dB
Input Return Loss (min.)	7	10	dB
Output Return Loss(min.)	14	12	dB
Output Power (P1 dB)	11.5	13	dBm
Saturated output power (Psat)	13	15	dBm
Output Third Order Intercept (IP3)	22	24	dBm
Supply Current	62		mA

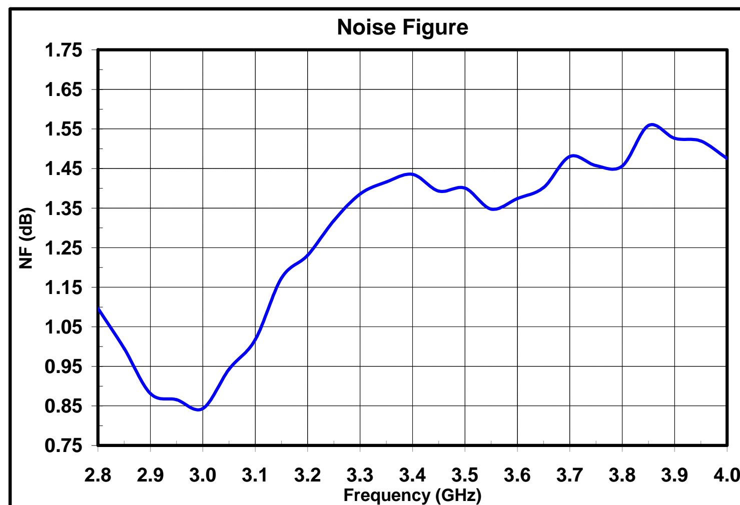
Note:

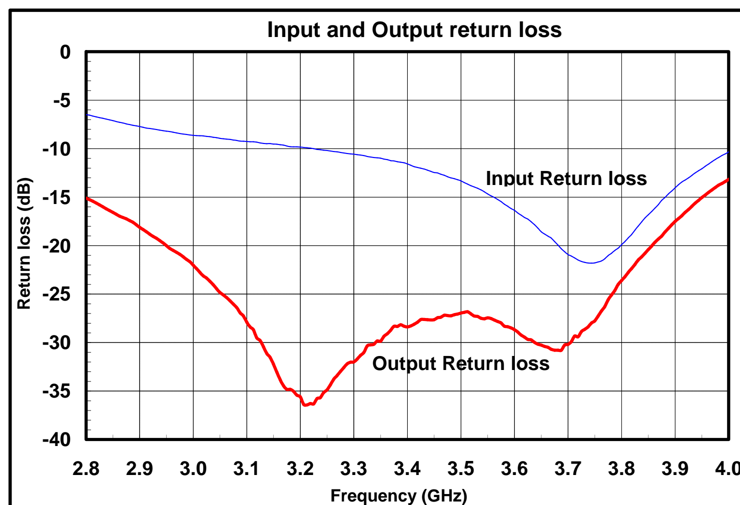
1. Electrical specifications as measured in a test fixture

Test fixture data

Vd1, Vd2, = 4V, Total Current = 62 mA, T_A = 25 °C

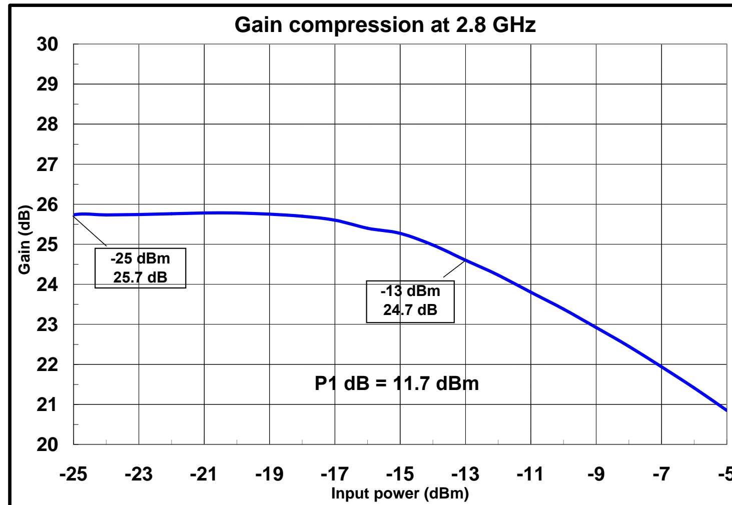


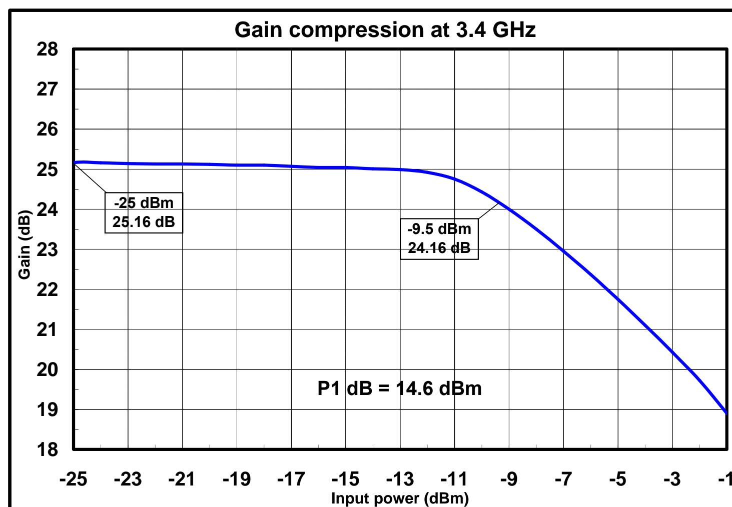


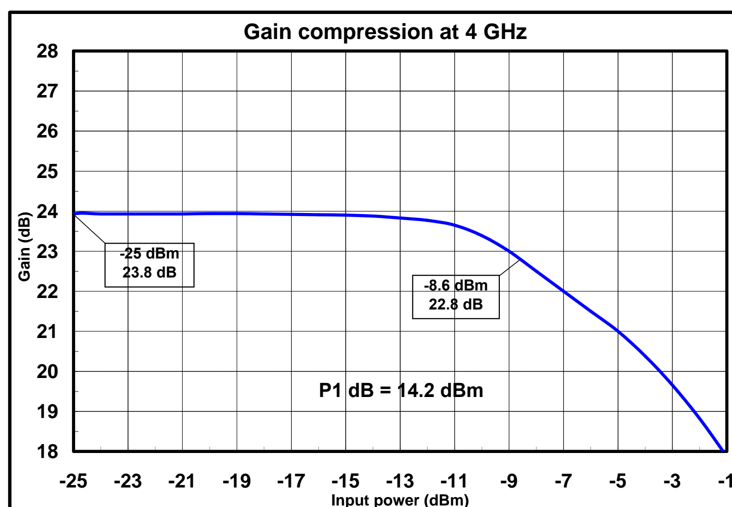


Test fixture data

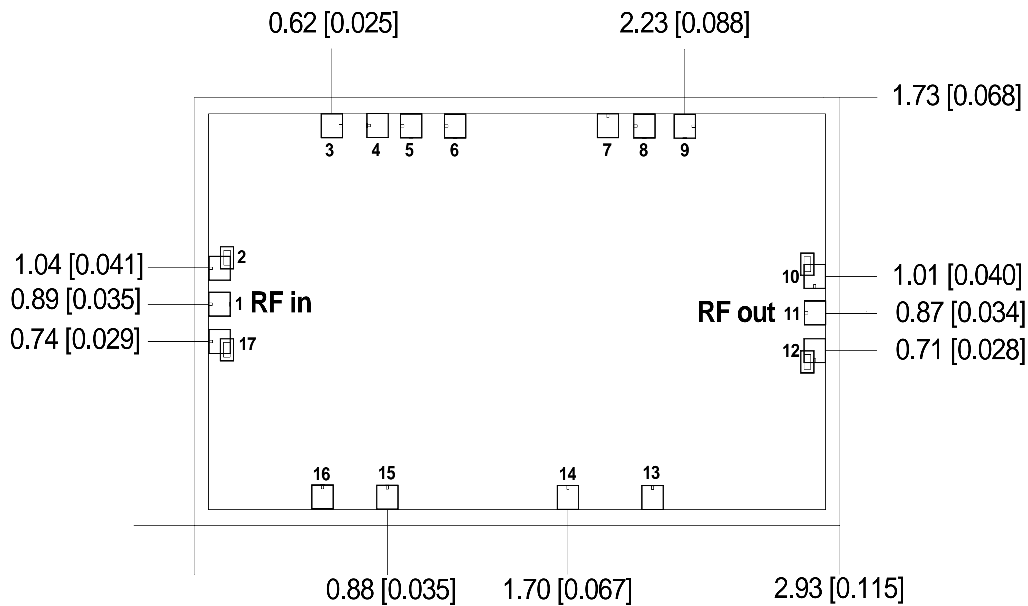
Vd1, Vd2, = 4V, Total Current = 62 mA, $T_A = 25\ ^oC$







Mechanical Characteristics



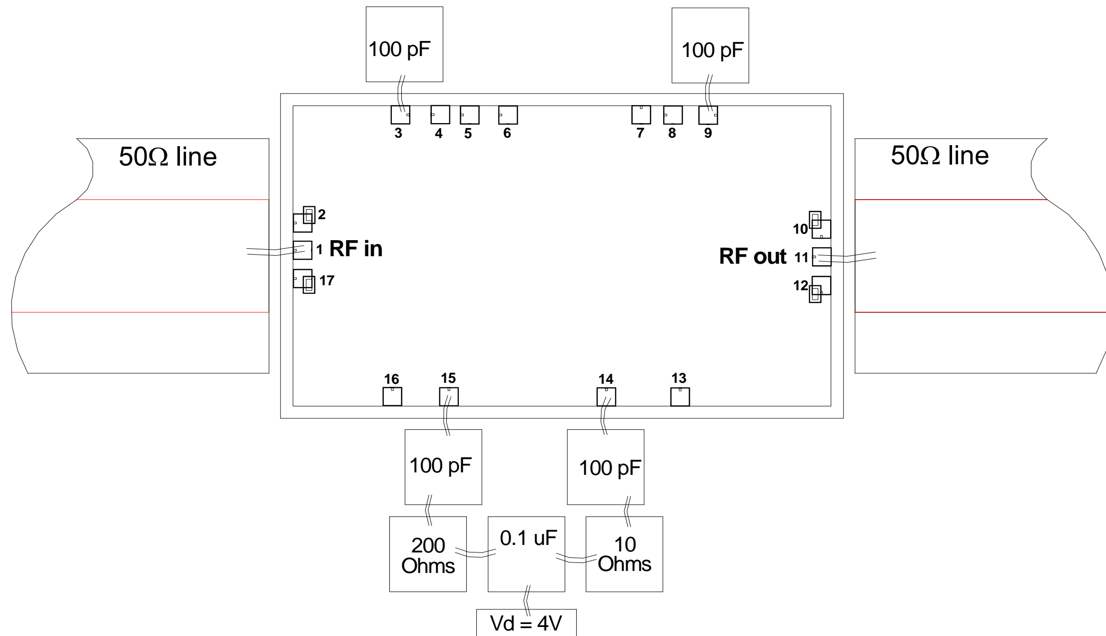
Units: millimeters (inches)

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

Note:

1. **Pad no. 1 : RF in**
2. **Pad no. 3 : Source bypass (100 pF)**
3. **Pad no. 9 : Source bypass (100 pF)**
4. **Pad no. 11 : RF out**
5. **Pad no. 14 : Vd1**
6. **Pad no. 15 : Vd2**
7. **For normal operation connections to above mentioned Bond pads are required.**

Recommended Assembly Diagram



Note:

1. Two 1 mil (0.0254 mm) bond wires of minimum length should be used for RF Input and output.
2. Drain bias bond wires of minimum length need to be used from chip bond pad to the 100 pF capacitors.
3. 0.1µF capacitors may be additionally used as a second level of bypass for reliable operation.

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

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