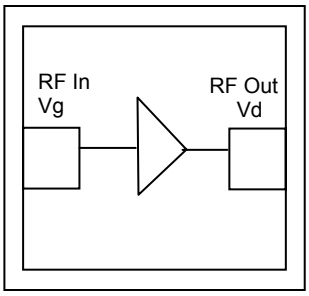
0.5 – 4.0 GHz Broadband Low Noise Amplifier

Features

- **Frequency Range: 0.5 - 4 GHz**
- **1.8 dB Mid-band Noise Figure**
- **12.5 dB Nominal Gain**
- **Very Low operating current (2V/15mA)**
- **Ideal Replacement for discrete devices**
- **10dBm Nominal P1dB**
- **Input Return Loss > 10 dB**
- **Output Return Loss > 12 dB**
- **0.15-um InGaAs pHEMT Technology**
- **Chip Size : 0.96 mm x 1.1 mm x 0.1 mm**

Functional Diagram



Typical Applications

- **Cellular system**
- **Base stations**
- **Narrow Band Applications**
- **Communication receivers and transmitters.**

Description

The AMT2122083 broadband MMIC LNA operates from 0.5 – 4 GHz. The MMIC employs a single stage amplifier design featuring 50 Ohm input/output impedance. The LNA features 12.5dB of nominal gain and has a typical mid-band noise figure of 1.8 dB. The LNA has Input return loss better than 10dB and an output return loss better than 12dB throughout the operating band. The LNA consumes a low current of 15 mA and delivers a nominal P1dB of 10dBm at 2V operation. In addition to being used as the first stage, the LNA's excellent linearity encourages its usage in the succeeding stages of a receiver chain. The die is fabricated using a reliable and standard Low noise 0.15um InGaAs pHEMT process. The circuit grounds are provided through vias to the

Absolute Maximum Ratings (1)

Parameter	Absolute Maximum	Units
Positive DC Supply	6	V
RF Input Power	20	dBm
Supply current	120	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 ^{o}C, V_{dd} = +2V, Z_o =50 Ω

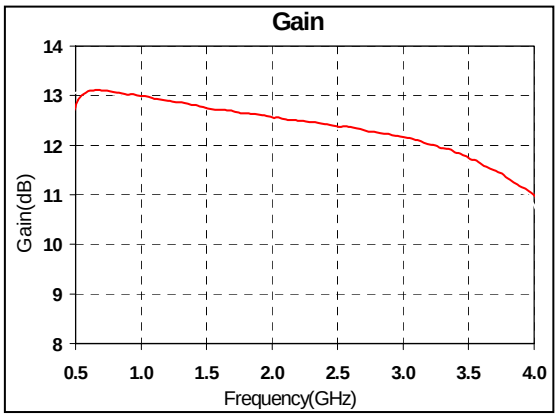
Parameter	Min.	Typ.	Max.	Units
Frequency	0.5	-	4.0	GHz
Gain	-	12.5	-	dB
Noise Figure (mid-band)	-	1.8	-	dB
Input Return Loss	-	10	-	dB
Output Return Loss	-	15	-	dB
Output Power (P1dB)	-	10	-	dBm
Output Third Order Intercept(IP3)	-	18	-	dBm
Supply Voltage		2		V
Supply Current	-	15	-	mA

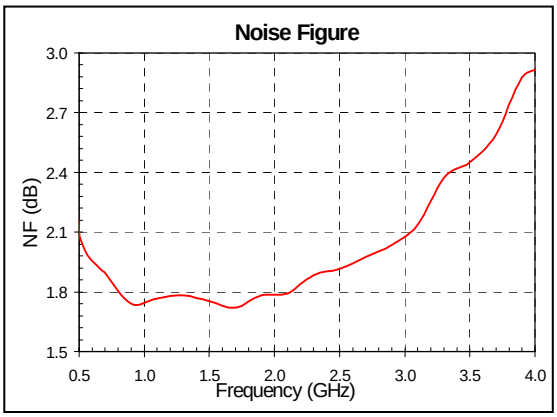
Note:

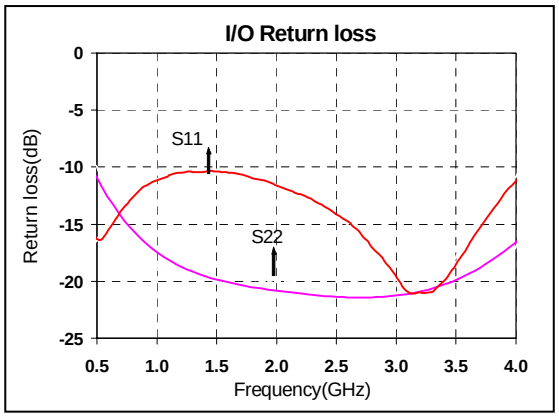
1. Electrical specifications as measured in test fixture.

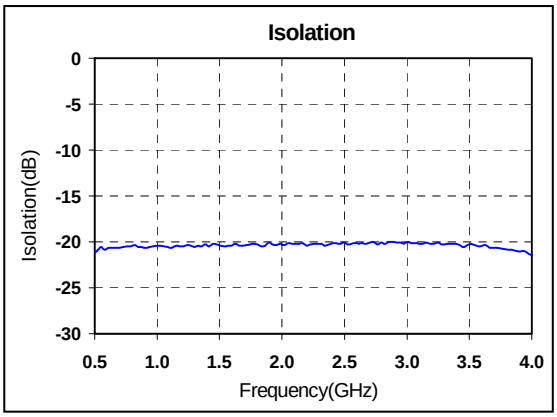
Test fixture data

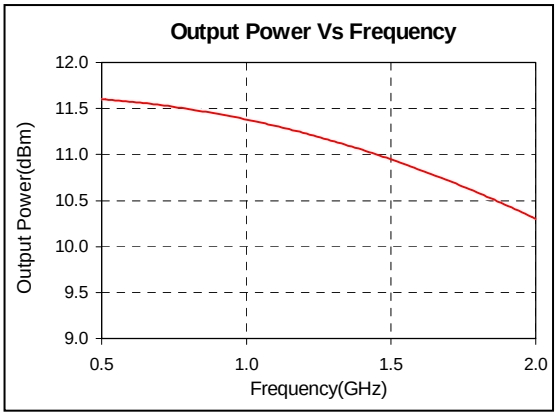
V_d = 2V, V_g = -0.5V, Total Current = 15mA, T_A = 25 °C



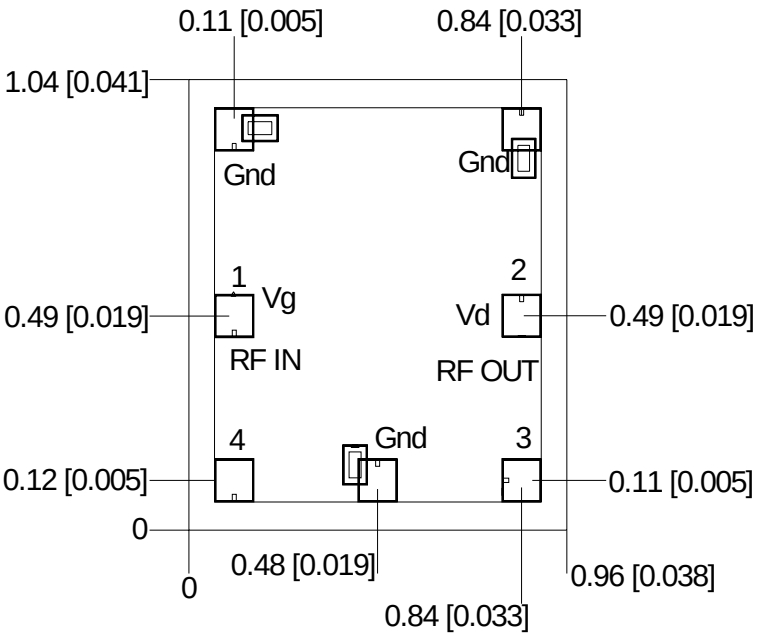








Mechanical Characteristics

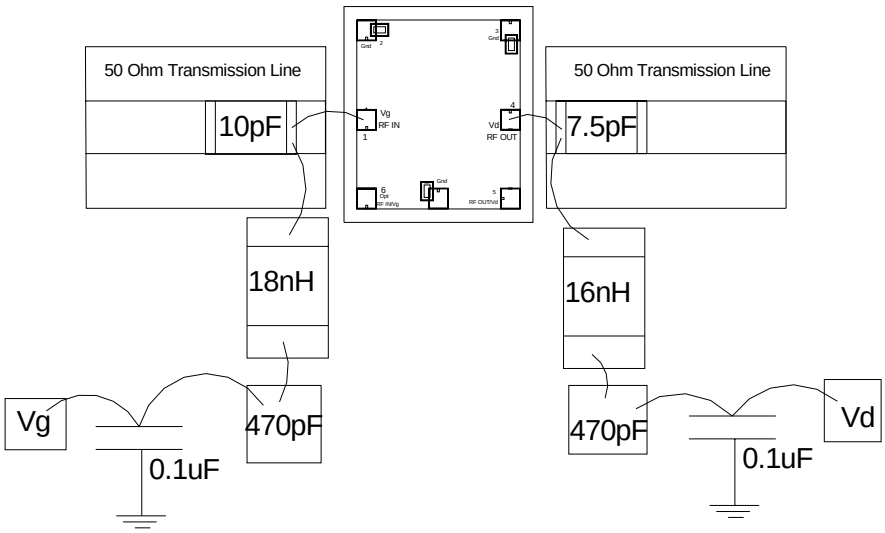


Units: millimeters (inches)

Note:

1. All RF and DC bond pads are 100µm x 100µm
2. Pad no. 1 : RF In & Vg
3. Pad no. 2 : RF Out & Vd
4. Pad no. 3: Optional Vd & RF Out
5. Pad no. 4: Optional Vg & RF In

Recommended Assembly Diagram



Note:

1. One 1 mil (0.0254mm) bond wire of minimum length should be used for RF input and Output.
2. 0.1uF capacitor may be additionally used as second level of bypass for reliable operation.
3. The inductors shown in the assembly are Coilcraft chip inductors. The preferred size is 0402. To enhance RF performance above 2 GHz, use of air-core inductors is advised.
4. The capacitors shown in the assembly diagram are Multilayer capacitors; the recommended size is 0402.

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