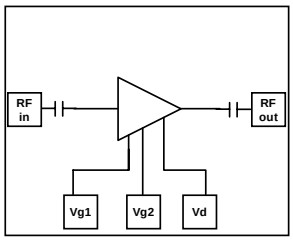
1.0 – 6 GHz Ultra Low Noise Amplifier

Features

- **Frequency Range: 1.0- 6 GHz**
- **0.7 dB mid-band Noise Figure**
- **18 dB mid band Gain**
- **14dBm Nominal P1dB**
- **Bias current : 50mA**
- **0.15-um InGaAs pHEMT Technology**
- **Chip Size : 1.5 mm x 1.1 mm x 0.1 mm**

Functional Diagram



Typical Applications

- **Cellular system**
- **Base stations**
- **Applications from 1 to 6GHz in Balanced configuration**
- **Communication receivers and transmitters.**

Description

AMT 2122092 is an Ultra Low Noise single stage Amplifier MMIC combining high gain and state of the art noise figure. No-off-chip components are needed, except for additional bypass capacitors in DC bias path for reliable operation. Matching network, DC Blocks and bypass capacitors are provided on-chip for simplification of assembly operation. The amplifier operates on Drain Bias of +5V and Gate biases of +2V & -0.4 V supply. The bias current can be tuned from 30 to 70 mA as per requirement with minor variation in performance. The LNA features 18dB mid-band gain and 0.7 dB mid-band noise figure (typical). The die is fabricated using reliable Low noise 0.15um InGaAs pHEMT process.

Absolute Maximum Ratings (1)

Parameter	Absolute Maximum	Units
Positive DC Supply	12	V
RF Input Power	23	dBm
Supply current	100	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, Z_o =50 Ω

Vdd = +5V, Vg1= -0.4V, Vg2= +2V

Parameter	Min.	Typ.	Max.	Units
Frequency	1.0	-	6	GHz
RF Performance between 2.5-4 GHz unless otherwise stated:				
Gain	17	18	20	dB
Gain Flatness	-	± 0.5	± 0.7	dB
Noise Figure	0.6	0.7	.8	dB
Input Return Loss	-6	-8	-	dB
Output Return Loss	-10	-15	-	dB
Reverse Isolation	-	-31	-	dB
Output Power (P1dB) @ 3.3 GHz	-	+14	-	dBm
Output Third Order Intercept(IP3) [2]	-	30	-	dBm
Supply Current[3]	30	50	70	mA

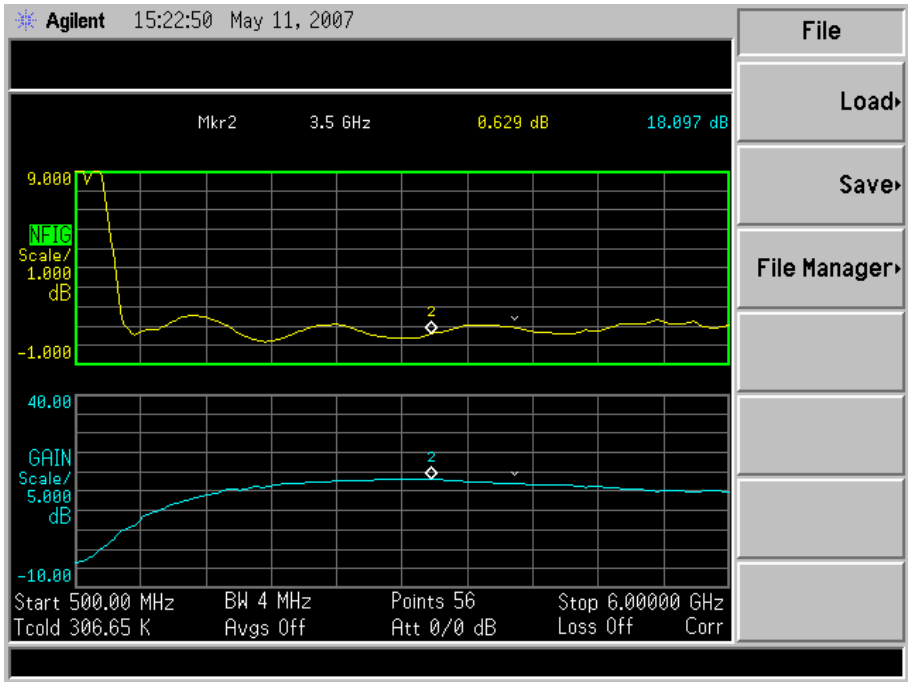
Note:

1. Electrical specifications as measured in test fixture.
2. Estimated value
3. Supply current tunable with gate bias (Vg1) with minor variation in performance.

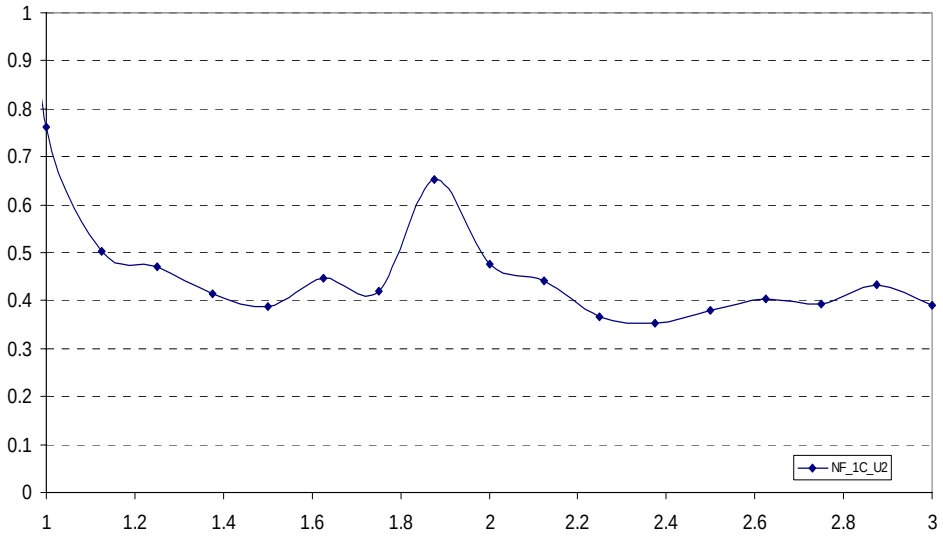
Test fixture data

Vdd =+5V ,Vg1= -0.4V, Vg2= +2V, Total Current = 50mA , T_A = 25 °C

Noise Figure & Gain performance in 0.5- 6GHz



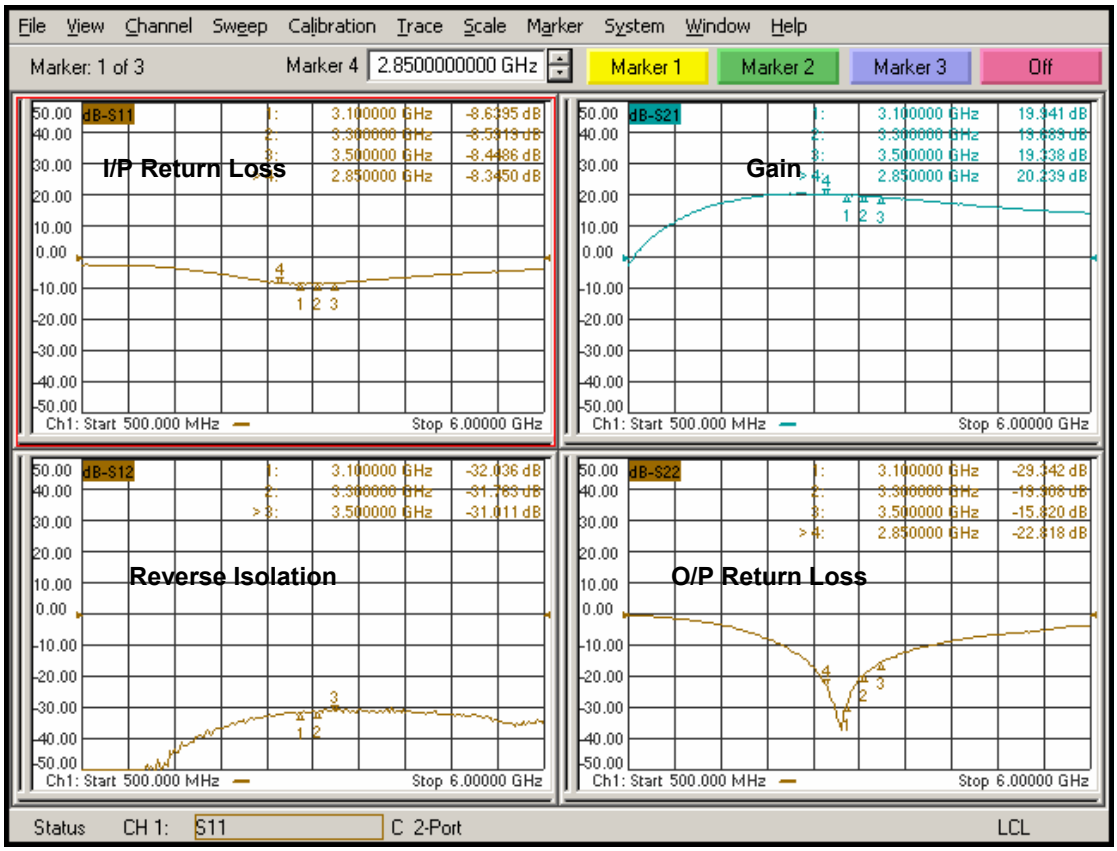
Noise Figure performance in 1 - 3 GHz



Test fixture data

Vdd =+5V ,Vg1= -0.4V, Vg2= +2V, Total Current = 50mA , T_A = 25 °C

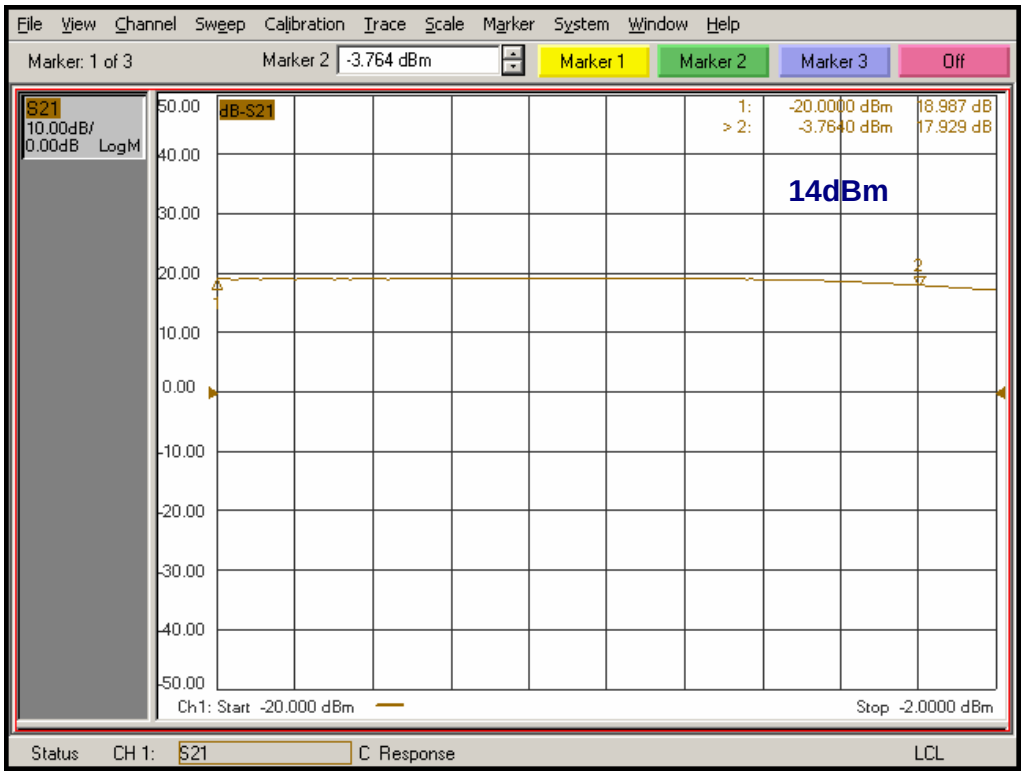
RF Performance



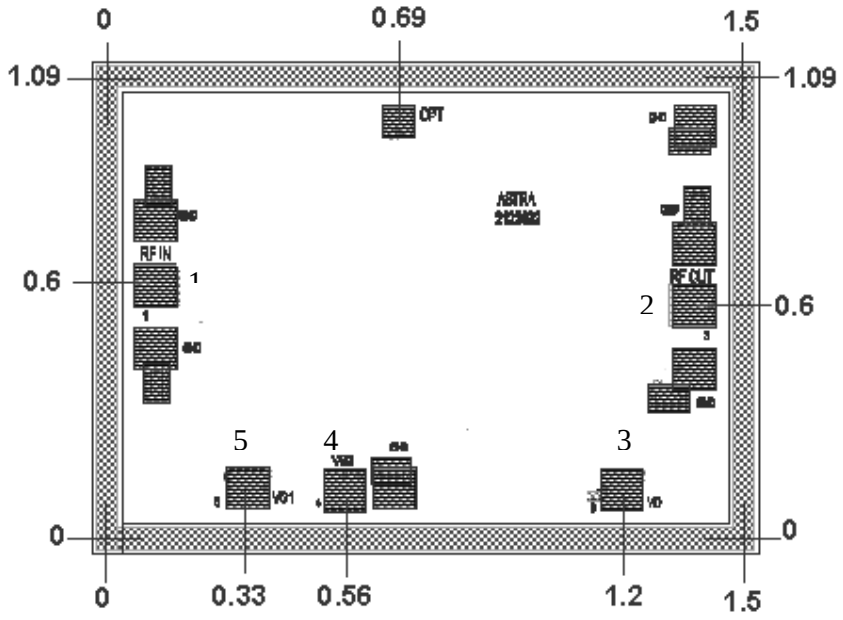
Test fixture data

Vdd =+5V ,Vg1= -0.4V, Vg2= +2V, Total Current = 50mA , T_A = 25 °C

Gain compression at 3.3 GHz



Mechanical Characteristics

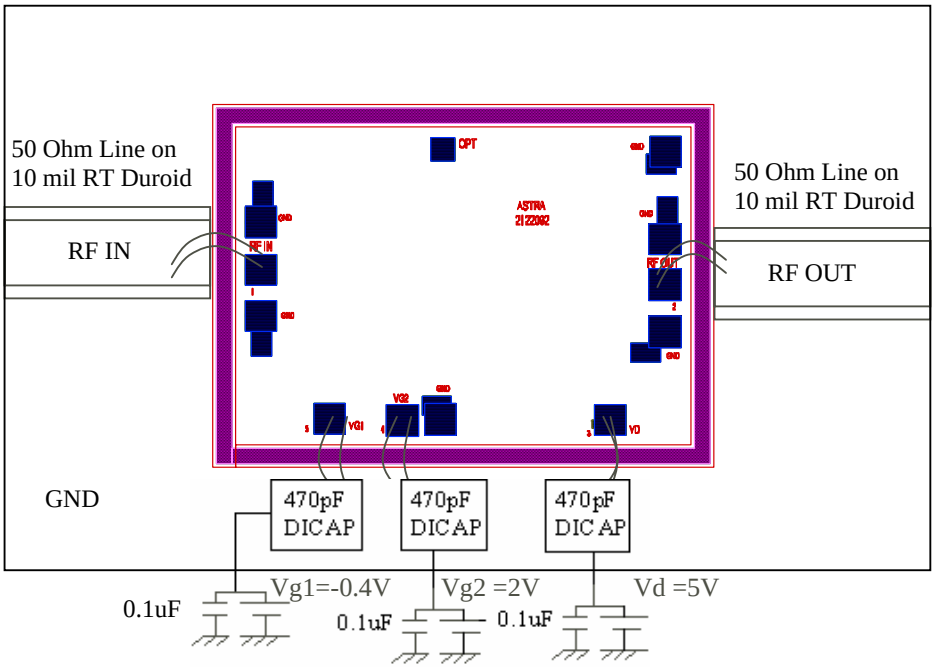


Units: millimeters

Note:

1. All RF and DC bond pads are 100µm x 100µm
2. Pad no. 1 : RF In
3. Pad no. 2 : RF Out
4. Pad no. 3 : Vdd (470 pF)
5. Pad no. 4 : Vg2 (470pF)
6. Pad no. 5 : Vg1 (470pF)

Recommended Assembly Diagram



Note:

1. Two one mil (0.0254mm) bond wires of minimum length should be used for RF input and Output.
2. Two one mil (0.0254mm) bond wires of minimum length should be used from chip bond pad to 470pF bypass capacitors.
3. 0.1uF capacitor should be additionally used as second level of bypass for reliable operation.
4. All capacitors shown in the assembly diagram (except 0.1µF) are single layer capacitors.

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 250µm 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