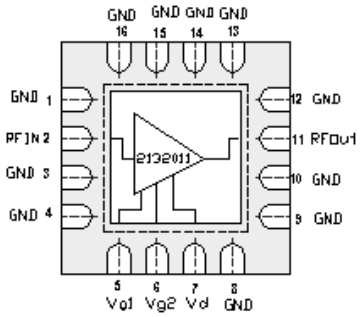
4.5 – 6 GHz Ultra Low Noise Amplifier

Features

- **Frequency Range: 4.5- 6 GHz**
- **1.1 dB mid band Noise Figure**
- **17 dB Gain**
- **10dBm Nominal P1dB @ 5.5GHz**
- **On-chip DC Blocks**
- **Bias current : 50mA (Tunable)**
- **0.15-um InGaAs pHEMT Technology**
- **16-Pin QFN Plastic Package : 3mmx3mmx1mm**

Functional Diagram



Typical Applications

- **Receiver Front End**
- **Military & Space**
- **RADAR**

Description

AMT 2132011P is an Ultra Low Noise single stage Amplifier MMIC combining high gain and state of the art noise figure for Receiver Front End applications. It features 1.1dB(max) Noise Figure in 4.5 -6.0 GHz band with good I/O return Losses and 17dB gain. Input/Output matching networks, DC Blocks and bypass capacitors are provided on-chip for simplification of assembly operation. The amplifier operates on 50mA, Drain Bias of +3to+5V and Gate biases of +2.5V & -0.4 V supply. The die is fabricated using reliable Low noise 0.15um InGaAs pHEMT process. This chip is available in low cost 16 pin QFN plastic package.

Absolute Maximum Ratings[1]

Parameter	Absolute Maximum	Units
Positive DC Supply	10	V
RF Input Power	20	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 @ T_A = 25 °C, Z_o =50 Ω

V_{dd} = +4V, Vg1= -0.32V, Vg2=+2.5V , Total Current =50mA

Parameter	Frequency			Units
	4.5 – 6	5.4 - 5.9	5.75 - 5.85	GHz
Gain	17.5	17.5	17.5	dB
Gain Flatness	± 0.25	± 0.2	± 0.05	dB
Noise Figure	1.1/1.4(1)	1.1/1.4(1)	1.1/1.4(1)	dB
Input Return Loss	-9	-12	-12	dB
Output Return Loss	-12	-12	-12	dB
Reverse Isolation	-27	-27	-27	dB
P1dB	8/12(2)	8/12(2)	8/12(2)	dBm
Output Third Order Intercept (3)	25	25	25	dBm
Supply Current(4)	50			mA
Bias Voltage (VD, VG1, VG2)	+4, -0.32, +2.5			V

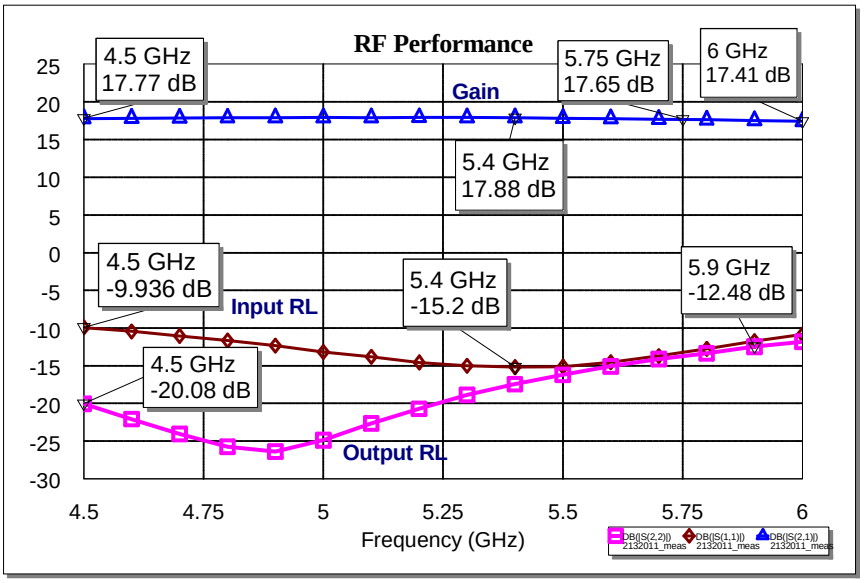
Note:

1. 1.4dB NF @ Vd= 5V, 50mA operation
2. 12dBm P1dB @ Vd=5V
3. Estimated performance
4. VG1 can be tuned between -0.3V to -0.5V to operate the device at 50mA.
5. This is a High Performance Device. Damage can be caused due to inappropriate handling.

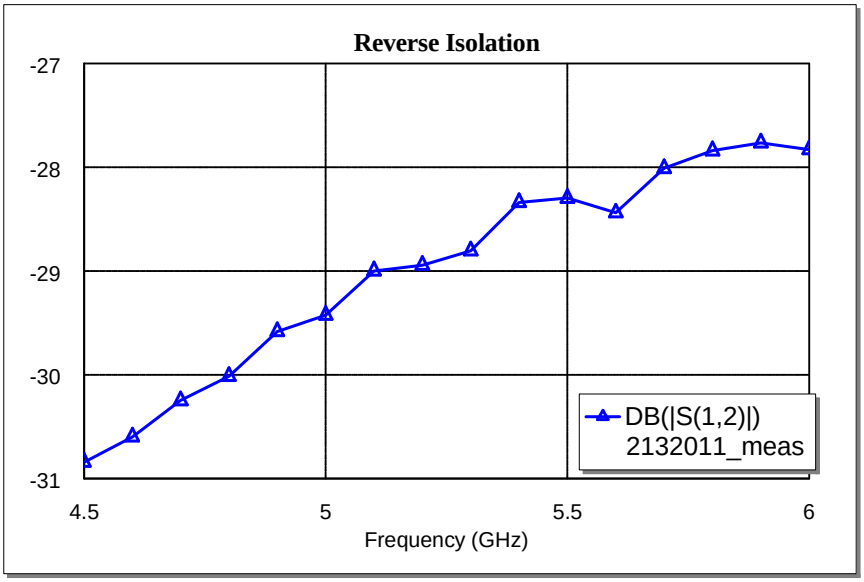
Test Fixture data @ T_A = 25 °C, Z_o =50 Ω

V_{dd} = +4V, Vg1= -0.32V, Vg2=+2.5V , Total Current =50mA

RF Performance @ 4V

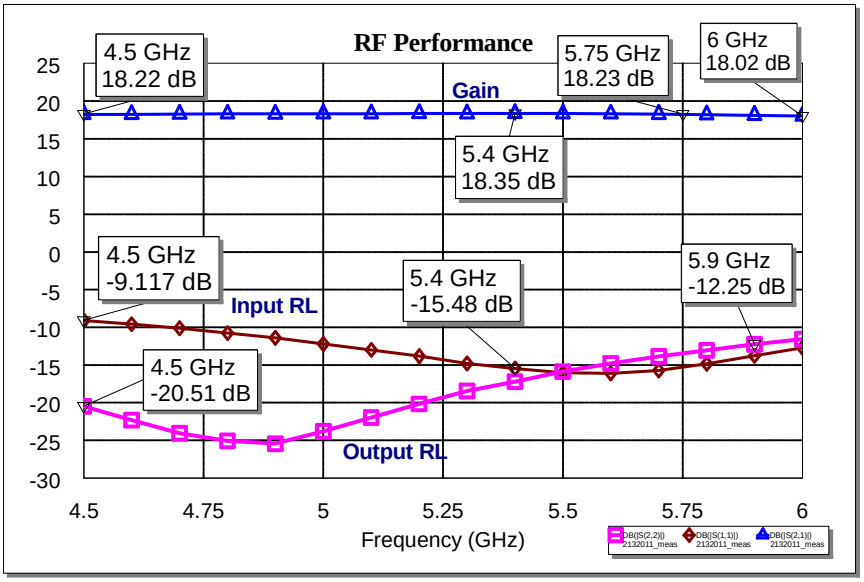


Reverse Isolation



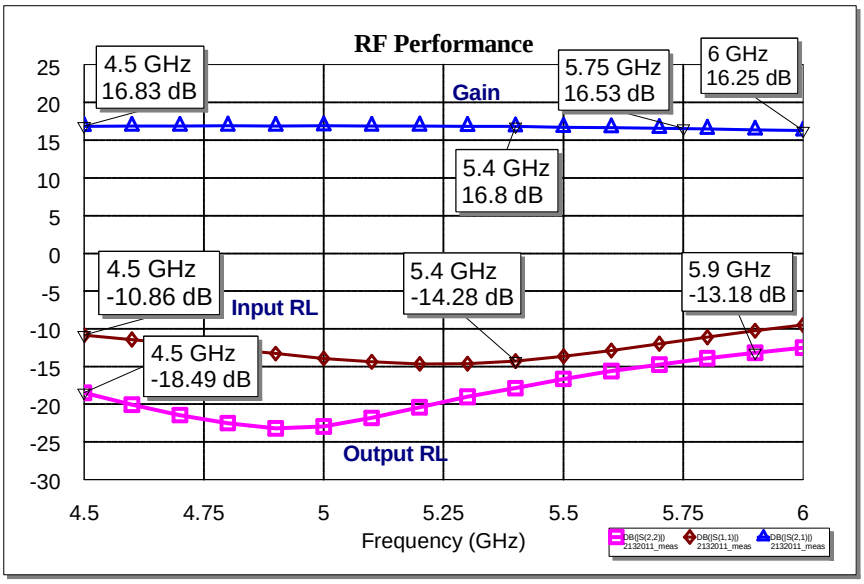
Test Fixture data @ T_A = 25 °C, Z_o =50 Ω

RF Performance @ 3V



V_{dd} = +3V, Vg1= -0.27V, Vg2 derived from V_{dd}, Total Current =50mA

RF Performance @ 5V

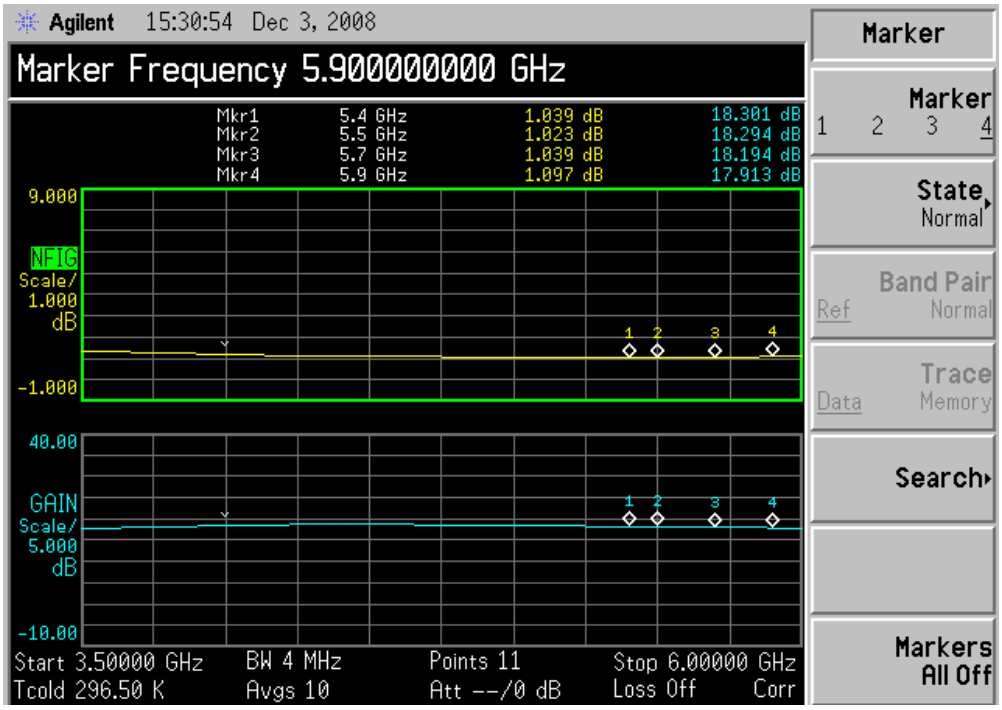


V_{dd} = +5V, Vg1= -0.4V, Vg2 derived from V_{dd} ,Total Current =50mA

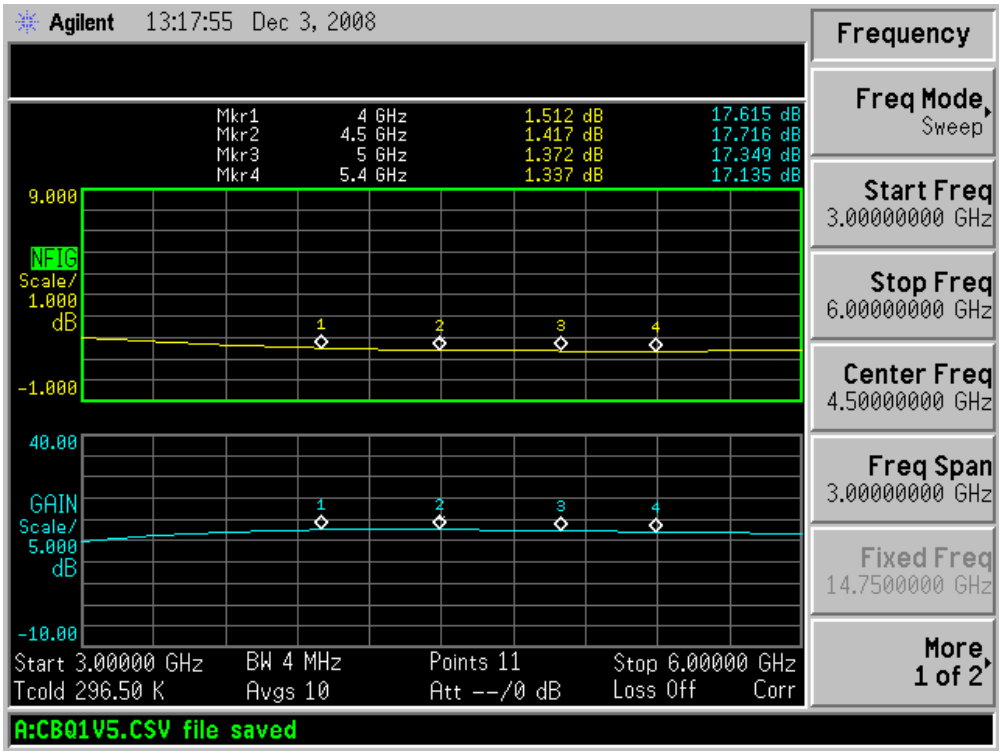
Test Fixture data @ T_A = 25 °C, Z_o =50 Ω

Total Current =50mA

Noise Figure @ VD=3V, Id=50mA



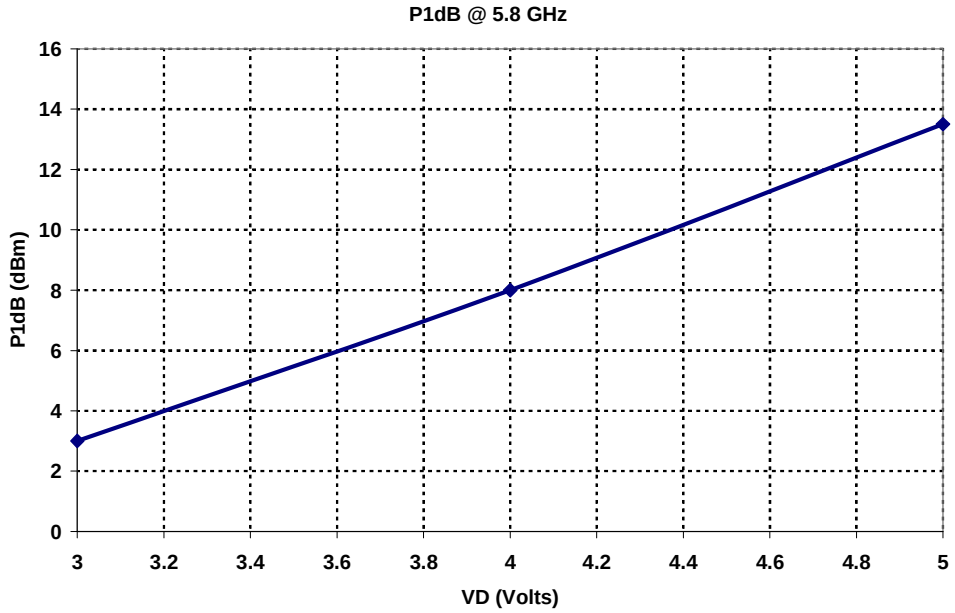
Noise Figure @ VD=5V, Id=50mA



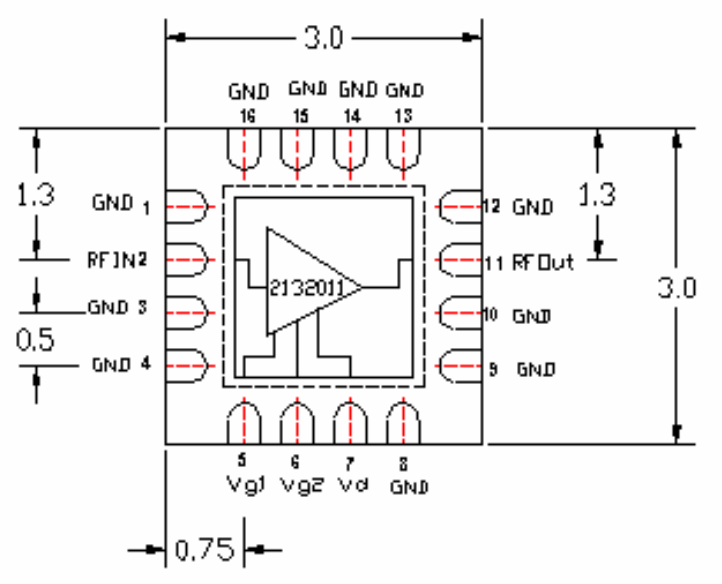
Test Fixture data @ T_A = 25 °C, Z_o =50 Ω

Total Current =50mA

P1dB @ 5.8GHz Vs Drain Voltage



Mechanical Characteristics
(16 Pin 3mmx 3mm x 1mm QFN Package)

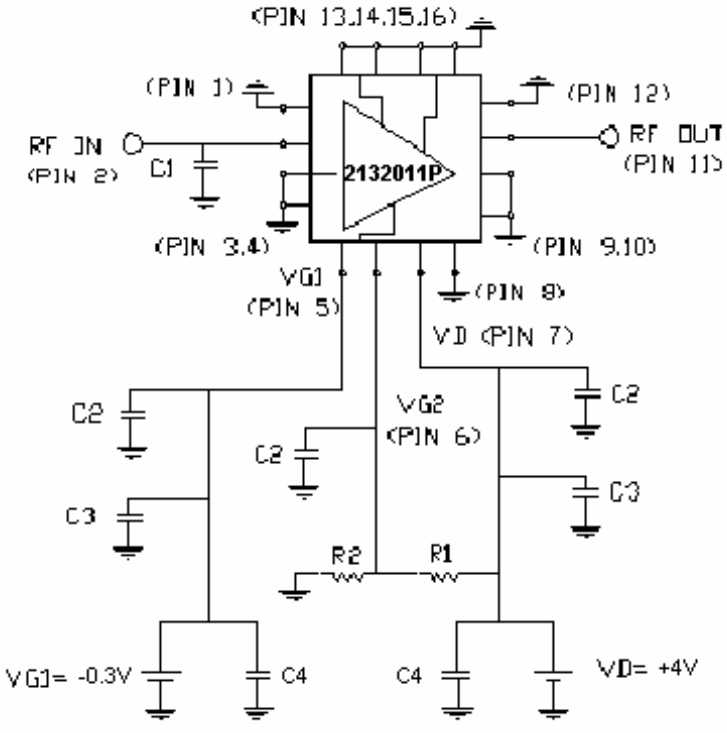


Units: millimeters

Pin Description:

Pin 2	: RF in
Pin 5	: Gate Bias 1
Pin 6	: Gate Bias2
Pin 7	: Drain Bias
Pin11	: RF out
Pin 1,3,4,8,9,10, 12, 13,14,15,16	: Ground

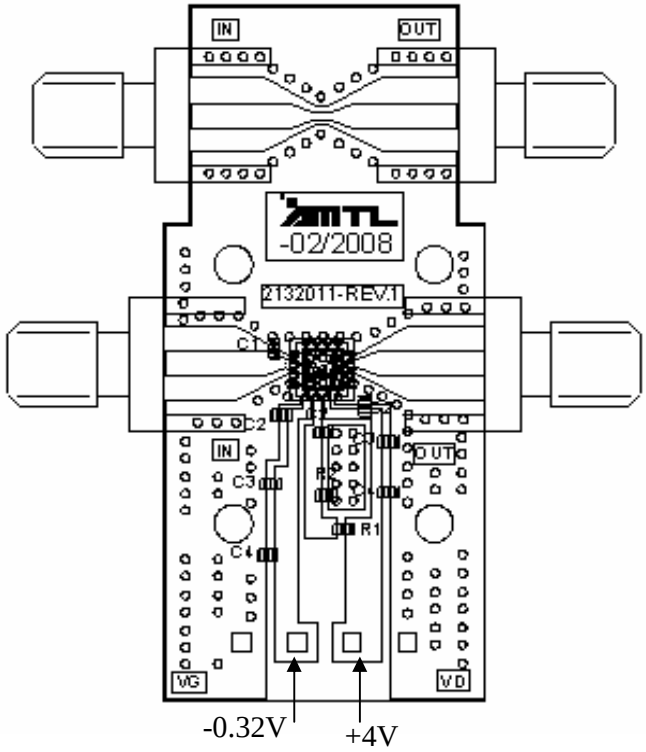
Application Circuit



Note :

1. C1 is used to improve I/P match
2. C2=470pF
3. C3=0.1uF
4. C4=1uF
5. R1=4.7K, R2=8.2K

Evaluation PCB (15mm x 33mm)



List of Components

Component ID	Value	Description / Part No.
C1	0.2pF	I/P match (0603/0805 Pkg or single layer capacitor)
C2	470 pF	1st Bypass capacitor (0402Pkg)
C3	0.1 uF	2nd Bypass Capacitor (0402 Pkg.)
C4	1uF	2nd Bypass Capacitor (0402 Pkg.)
R1	4.7K Ohm	Resistor in VG2 Bias network (0402 Pkg.)
R2	8.2K Ohm	Resistor in VG2 Bias network (0402 Pkg.)
Board Material : RT/Duroid 5880, 10mil		

***N*ote:**

1. Input and Output Lines should be of 50Ω I mpedance.
2. Sufficient numbers of via holes should be provided for good grounding.
3. Vg2 can be applied independently without using R1 & R2 and tuned.
4. All capacitors shown in the assembly diagram are multi-layer capacitors.
5. Evaluation PCB is available from AMTL upon request.

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