Dual Ultra Low Noise, High IP3 Amplifier
0.5 - 6.0 GHz

CGY2107HV
Rev. V1

Features

- Noise Figure:
  - 0.63 @ 1.9 GHz
  - 0.70 @ 2.5 GHz
  - 0.85 @ 3.5 GHz
- Gain:
  - 23.5 @ 1.9 GHz
  - 21.0 @ 2.5 GHz
  - 19.5 @ 3.5 GHz
- OIP3:
  - 34 @ 1.9 GHz
  - 33 @ 2.5 GHz
  - 37 @ 3.5 GHz
- Dual MMIC LNA with Excellent Tracking
- Highly Reliable pHEMT MMIC Process
- 100% RF Tested
- Samples & Demonstration Boards Available
- Space & MIL-STD Available
- Lead-Free 4 mm 16-Lead QFN
- RoHS* Compliant

Applications

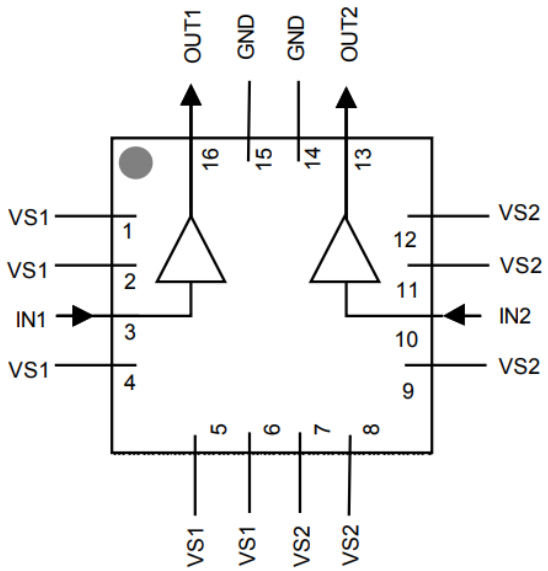
- Base Station (LTE, GSM, CDMA, WCDMA, TDS-CDMA, CDMA2000, WiMAX, etc.)
- Tower Mounted Amplifiers
- Repeaters

Description

The CGY2170HV is an extremely low noise figure cascade amplifier with state of the art noise figure and linearity suitable for applications from 0.5 to 6 GHz.

This device consists of two identical amplifiers on the same MMIC, and is ideal for use in a balanced configuration or as two single ended amplifiers. Used as a balanced amplifier with 3 dB couplers, a 0.63 dB noise figure, 34 dBm output IP3 and 23.5 dB gain is obtained at 1.9 GHz. At 3.5 GHz a balanced demonstrator exhibits 0.85 dB noise figure, 19.5 dB gain and OIP3 of 37 dBm. These are measured values and include the noise contribution of the couplers, connectors and biasing circuitry. Extremely low noise, high gain and high IP3 results have been achieved on several demonstrators. The minimum noise figure of itself is 0.32 dB at 1.9 GHz.

The MMIC is manufactured using a qualified 0.25 µm pHEMT GaAs MMIC technology. The device is available in a 4 mm QFN plastic package.



Pin Configuration[1]

Pin #	Function
1, 2, 4, 5, 6	VS1 Source
3	RF Input 1 Gate
7, 8, 9, 11, 12	VS2 Source
10	RF Input 2 Gate
13	RF Output 2 Drain
14, 15	GND
16	RF Output 1 Drain
17[2]	Paddle

1. MACOM recommends connecting No Connection (N/C) pins to ground.
2. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

Ordering Information

Part Number	Package
CGY2107HV	

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications: Freq. = 0.5 - 6.0 GHz, T_A = +23°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	@ Package Lead, 1.90 GHz @ Reference Board[5], 1.95 GHz @ Demonstration Board[6], 1.90 GHz	dB	— 23.0 —	22.0 24.0 23.4	—
Noise Figure	@ Package Lead, 1.90 GHz @ Reference Board[5], 1.95 GHz @ Demonstration Board[6], 1.90 GHz	dB	0.32 — —	— 0.50 0.63	—
Bias Voltage	@ Package Lead, 1.90 GHz @ Reference Board[5], 1.95 GHz @ Demonstration Board[6], 1.90 GHz	V	—	4 5 5	—
Bias Current	@ Package Lead, 1.90 GHz, V_{EE} = -0.55 V @ Reference Board[5], 1.95 GHz $V_{EE1} = V_{EE2}$ = -0.55 V @ Demonstration Board[6], 1.90 GHz $V_{EE1} = V_{EE2}$ = -0.66 V	mA	—	50 50 50	—
Isolation	@ Reference Board[5], 1.95 GHz IN1/IN2	dB	30	—	—
Reverse Isolation	@ Reference Board[5], 1.95 GHz OUT/IN	dB	—	32	—
IIP3	@ Reference Board[5], 1.95 GHz, 70 mA @ Demonstration Board[6], 1.90 GHz	dBm	3.5 —	7.0 11	—
P1dB	@ Demonstration Board[6], 1.90 GHz	dBm	—	19	—
Input Return Loss	@ Reference Board[5], 1.95 GHz @ Demonstration Board[6], 1.90 GHz 50 Ω Source	dB	—	-4.5 -25.6	—
Output Return Loss	@ Reference Board[5], 1.95 GHz @ Demonstration Board[6], 1.90 GHz 50 Ω Load	dB	—	-10.0 -23.9	—

3. Single ended configuration with on-board bias resistors.
4. Balanced configuration with on-board bias resistors.
5. Measured reference plane are the input and output SMA connectors.

Absolute Maximum Ratings[6,7]

Parameter	Absolute Maximum
Input Power	10 dBm
Gate Voltage	-3 to 1 V
Drain Voltage	1 to 10 V
Drain Current	100 mA
Junction Temperature	+150°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.

Thermal Characteristics

Parameter	Absolute Maximum
Thermal Resistance	70°C/W

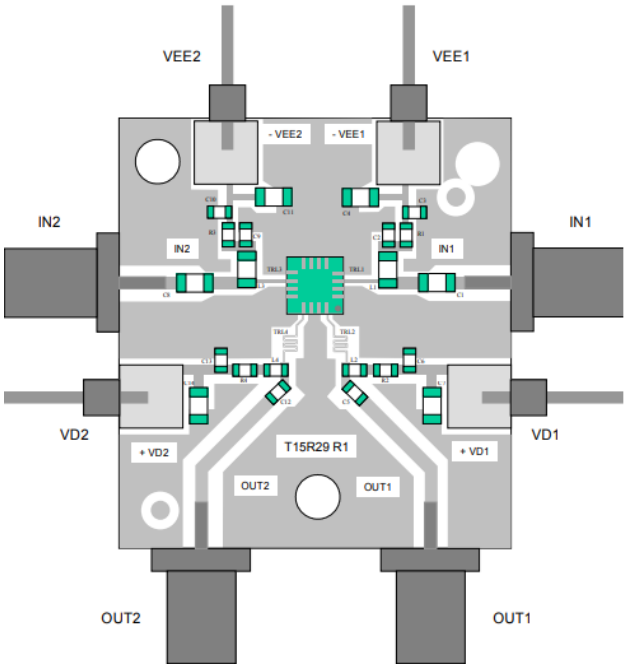
Handling Procedures

Please observe the following precautions to avoid damage:

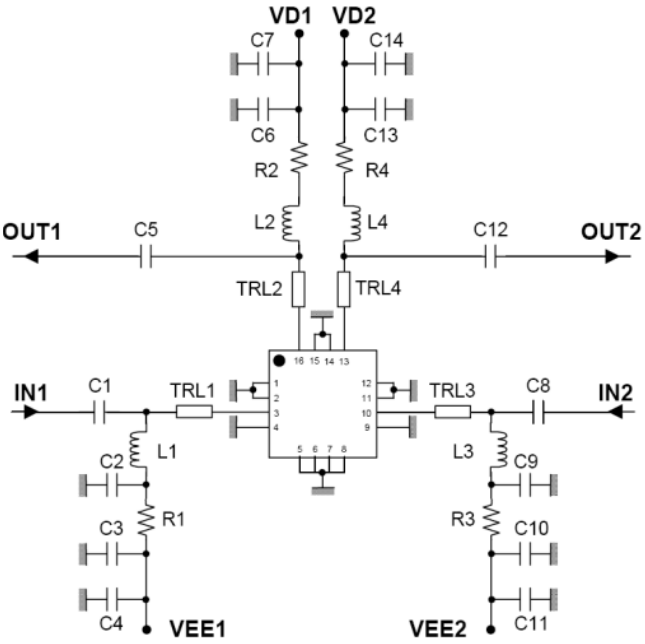
Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Single Ended Reference Board, 1.9 GHz



Circuit Diagram, 1.9 GHz

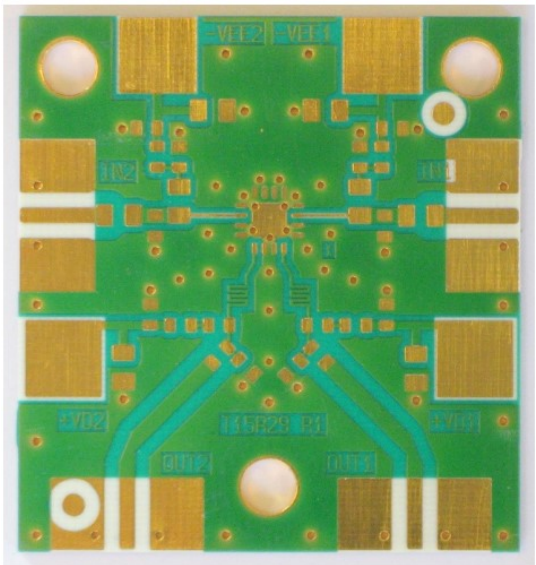


Parts List

Part	Value	Case Style
C1, C8	47 pF	0603
C2, C9	10 pF	0603
C3, C10	15 pF	0603
C4, C7, C11, C14	10 nF	0805
C5, C6, C12, C13	3 pF	0603
C15, C16	47 µF	1210
L1, L3	22 nH	0805
L2, L4	22 nH	0603
R1, R3	470 Ω	0603
R2, R4	22 Ω	0603
TRL1, TRL3	150 Ω, 300 µm	
TRL2, TRL4	150 Ω, 10000 µm	
Board material is RO4350, height 508 µm		

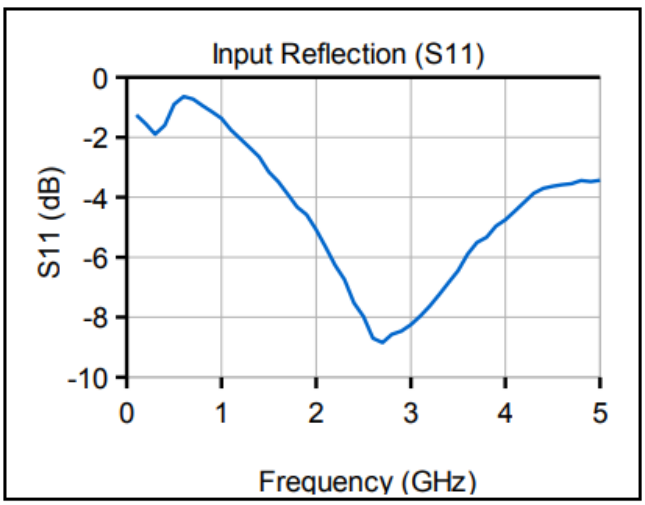
7. Capacitor C17 and C18 prevent low frequency oscillations when the board is biased from laboratory power supplies. They are not required when on-board voltage regulators are used.

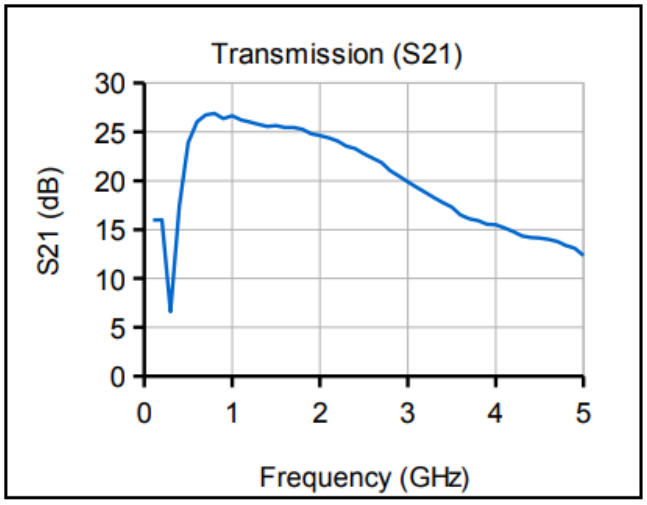
Reference Circuit Board, 1.9 GHz

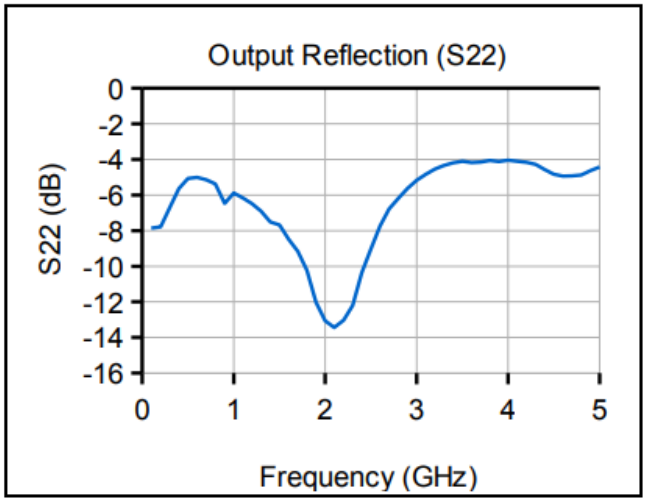


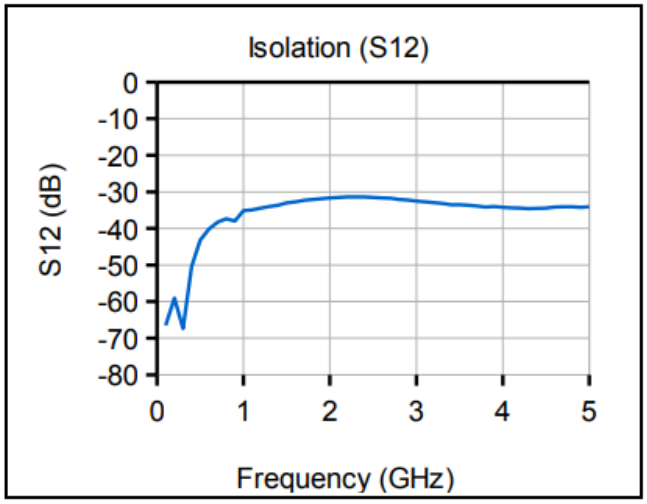
Typical Performance Curves:

Single Ended Reference Board, $V_{DD1} = V_{DD2} = 5$ V, $I_{D1} + I_{D2} = 100$ mA, $T_A = +23°C$



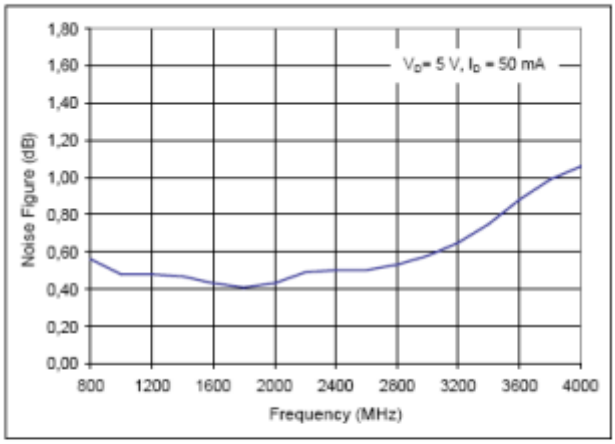




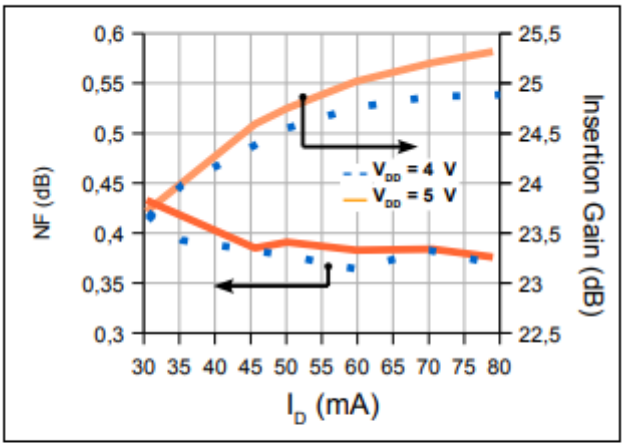


Typical Performance Curves:
Single Ended Reference Board, $V_{DD1} = V_{DD2} = 5$ V, $I_{D1} + I_{D2} = 100$ mA, $T_A = +23°C$

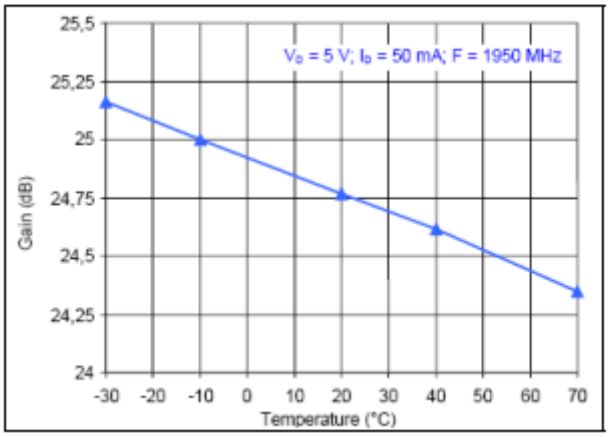
NF versus Frequency



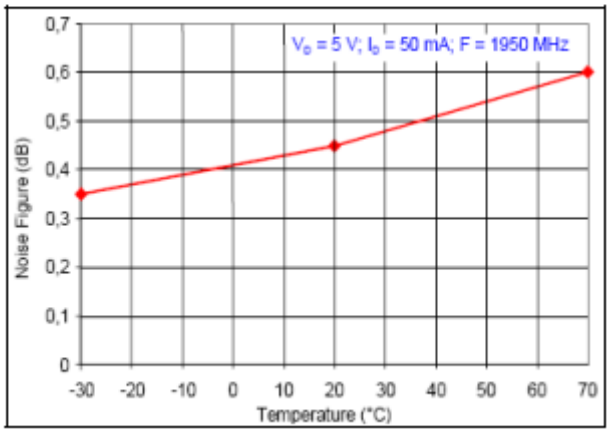
NF versus I_D current at 1900MHz



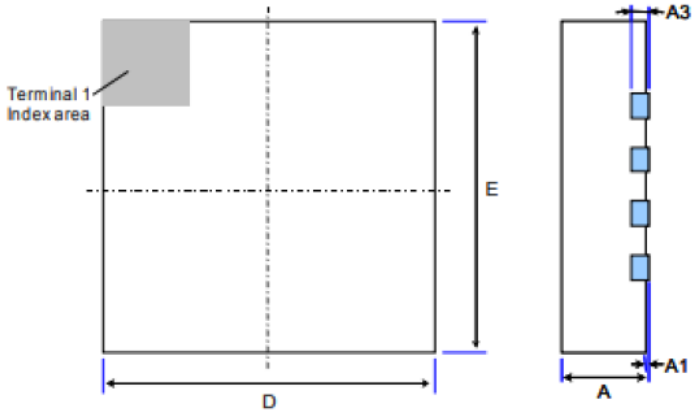
Gain versus Temperature



NF versus Temperature



Lead-Free 4 mm 16-Lead PQFN



DIMENSIONS

(mm)	D	E	A	A1	A3
Min.	3.95	3.95	0.80	0.00	
Nom.	4.00	4.00	0.85	0.01	0.203
Max.	4.05	4.05	0.90	0.05	

This package is in agreement with JEDEC MO-220

Top view

DIMENSIONS

(mm)	D2	E2	b	e	L
Nom.	2.70	2.70	0.30	0.65	0.55

Bottom view