

# Dual Ultra Low Noise, High IP3 Amplifier

## 0.5 - 4.0 GHz



CGY2105XHV

Rev. V1

### Features

- Noise Figure:
  - 0.42 @ 1.9 GHz
  - 0.50 @ 2.5 GHz
- Gain:
  - 19.0 @ 1.9 GHz
  - 18.5 @ 2.5 GHz
- OIP3:
  - 35 @ 1.9 GHz
  - 33 @ 2.5 GHz
- P1dB:
  - 21 @ 1.9 GHz
  - 21 @ 2.5 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

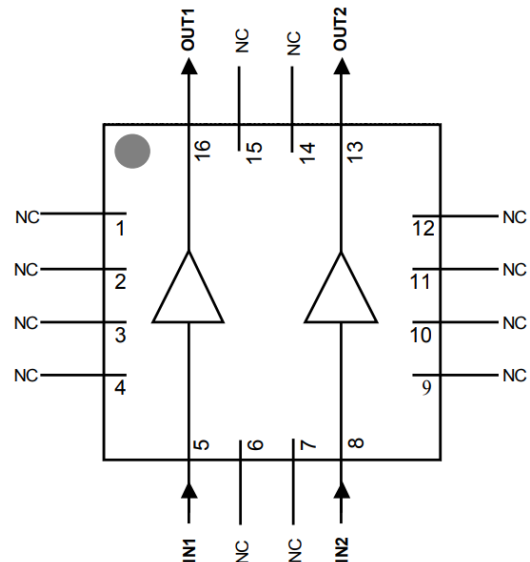
### Applications

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

### Description

The CGY2105XHV is an extremely low noise figure dual amplifier with state of the art noise figure and linearity suitable for applications from 500 to 4000 MHz. This device consists of two identical amplifiers on the same MMIC, and is ideal for use in a balanced configuration. Extremely low noise, high gain and high IP3 results have been achieved on several demonstrators. The minimum noise figure of itself is 0.23 dB at 1.9 GHz.

The MMIC is manufactured using a qualified 0.13  $\mu\text{m}$  pHEMT GaAs D01PH technology. The D01PH process is one of the European Space Agency (ESA) European preferred part list (EPPL) technologies. The device is available in a 4 mm QFN plastic package.



### Pin Configuration<sup>1</sup>

Pin #	Function
1 - 4, 6, 7, 9 - 12, 14, 15	No Connection
5	RF Input 1
8	RF Input 2
13	RF Output 2
16	RF Output 1
17 <sup>2</sup>	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
CGY2105XHV	

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### Electrical Specifications: Freq. = 0.5 - 4.0 GHz, T<sub>A</sub> = +23°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	@ Package Lead, 1.9 GHz @ Reference Board <sup>3,4</sup> , 1.9 GHz	dB	—	19.4 19.0	—
Noise Figure	@ Package Lead, 1.9 GHz @ Reference Board <sup>5,6</sup> , 1.9 GHz	dB	0.23 —	— 0.42	—
Bias Voltage	@ Package Lead, 1.9 GHz @ Reference Board <sup>3,4</sup> , 1.9 GHz	dB	—	3 5	—
Bias Current	@ Package Lead, 1.9 GHz, V <sub>EE</sub> = -0.45 V @ Reference Board <sup>3,4</sup> , 1.9 GHz V <sub>EE1</sub> = V <sub>EE2</sub> = -0.56 V	dB	—	50 50	—
Isolation	@ Package Lead, 1.9 GHz IN1/IN2	dB	—	35	—
Reverse Isolation	@ Reference Board <sup>3,4</sup> , 1.9 GHz OUT/IN	dB	—	23	—
OIP3	@ Reference Board <sup>3,4</sup> , 1.9 GHz	dBm	—	35	—
P1dB	@ Reference Board <sup>3,4</sup> , 1.9 GHz	dBm	—	21	—
Input Return Loss	@ Reference Board <sup>3,4</sup> , 1.9 GHz 50 Ω Source	dB	—	-22	-18
Output Return Loss	@ Reference Board <sup>3,4</sup> , 1.9 GHz 50 Ω Load	dB	—	-22	—

3. Balanced configuration with on-board bias resistors.

4. Measured reference plane are the input and output SMA connectors.

### Absolute Maximum Ratings<sup>5,6</sup>

Parameter	Absolute Maximum
Input Power	10 dBm
Gate Voltage	-3 to 0 V
Drain Voltage	0 to 6 V
Drain Current	200 mA
Junction Temperature	+150°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.

6. MACOM does not recommend sustained operation near these survivability limits.

### 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.

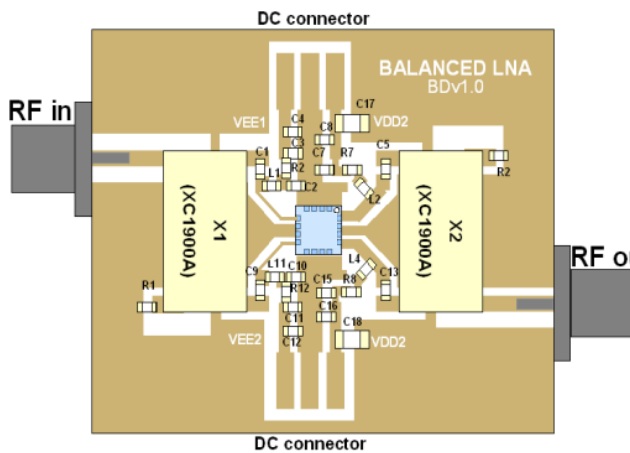
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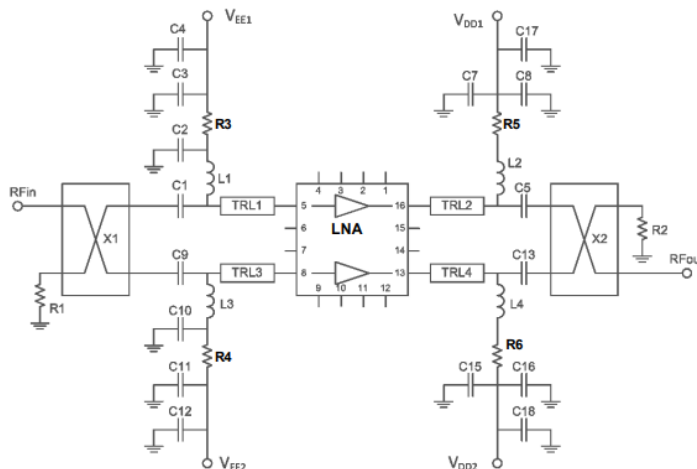
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## Balanced Reference Board, 1.9 GHz



## Circuit Diagram, 1.9 GHz

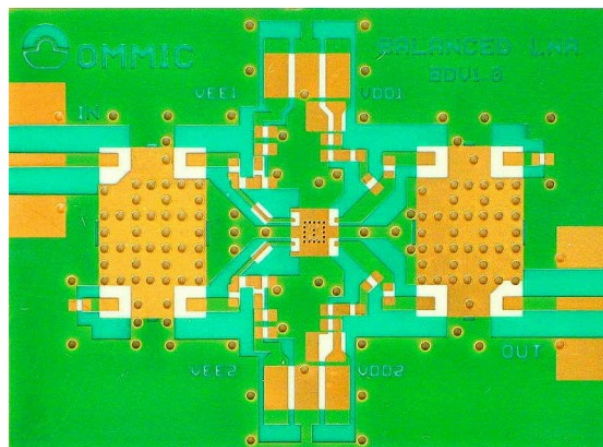


## Parts List

Part	Value	Case Style
C1, C9	33 pF	????
C2, C10	150 pF	0603
C3, C7, C11, C15	100 pF	0603
C4, C8, C12, C16	10 nF	0603
C5, C13	5 pF	0603
C17, C18	47 $\mu$ F	1210
L1, L3	30 nH	0603
L2, L4	51 nH	0603
R1, R2	50 $\Omega$	0603
R3, R4	470 $\Omega$	0603
R5, R6	39 $\Omega$	0603
TRL1, TRL3	94 $\Omega$	5200 x 300 $\mu$ m
TRL2, TRL4	43 $\Omega$	4300 x 1400 $\mu$ m
Board material is RO4350, height 508 $\mu$ m		

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



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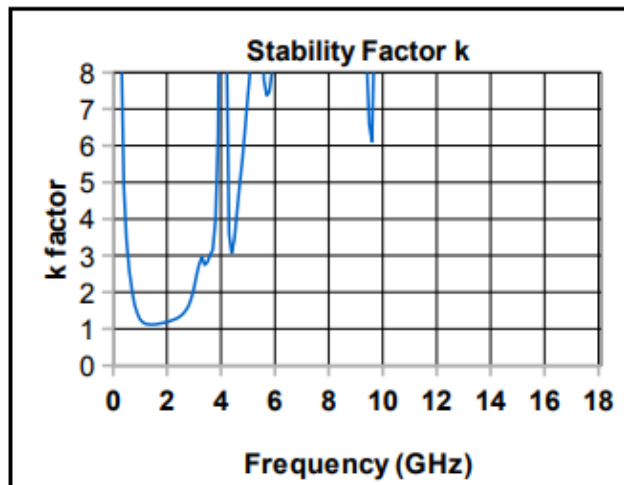
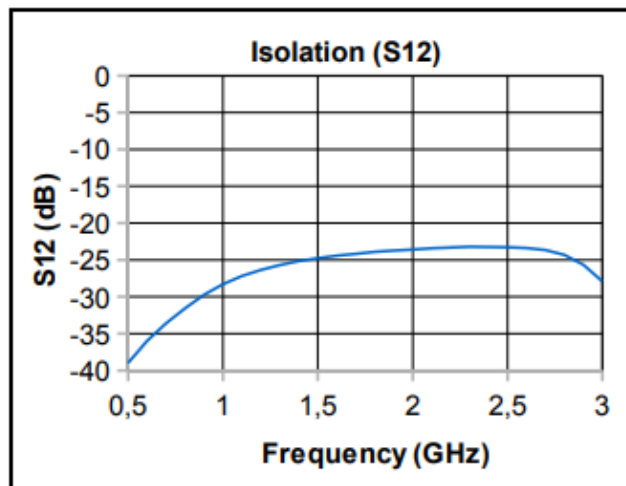
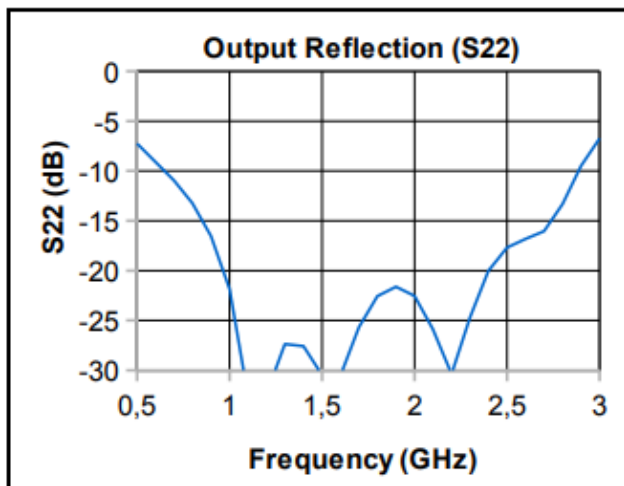
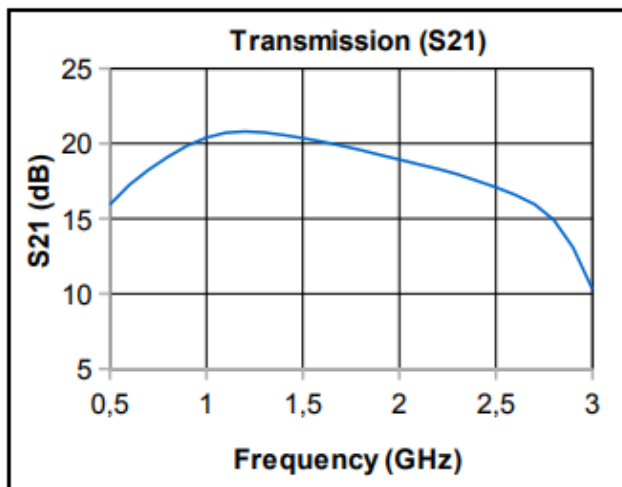
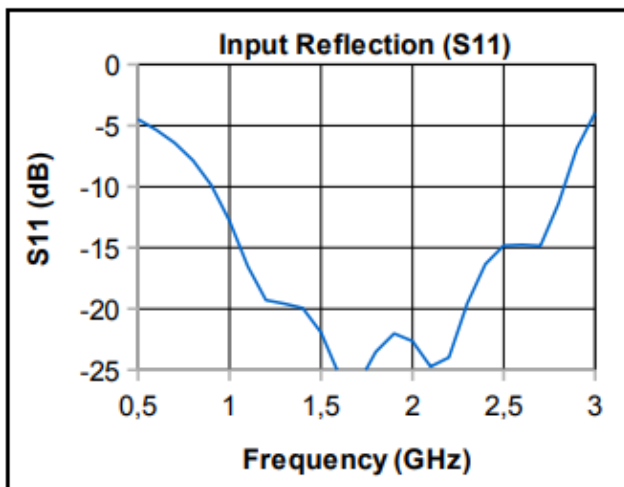


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### Typical Performance Curves:

Balanced Reference Board,  $V_{DD1} = V_{DD2} = 5\text{ V}$ ,  $I_{D1} + I_{D2} = 100\text{ mA}$ ,  $T_A = +23^\circ\text{C}$



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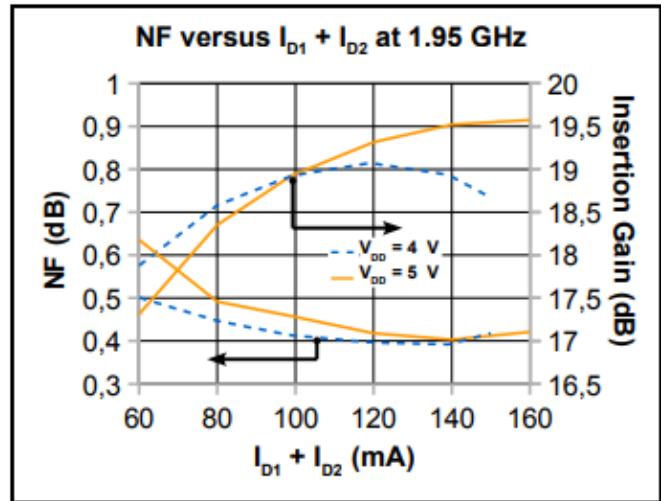
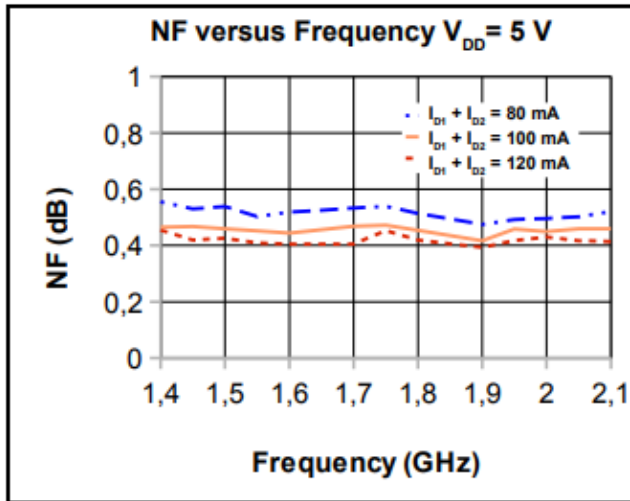


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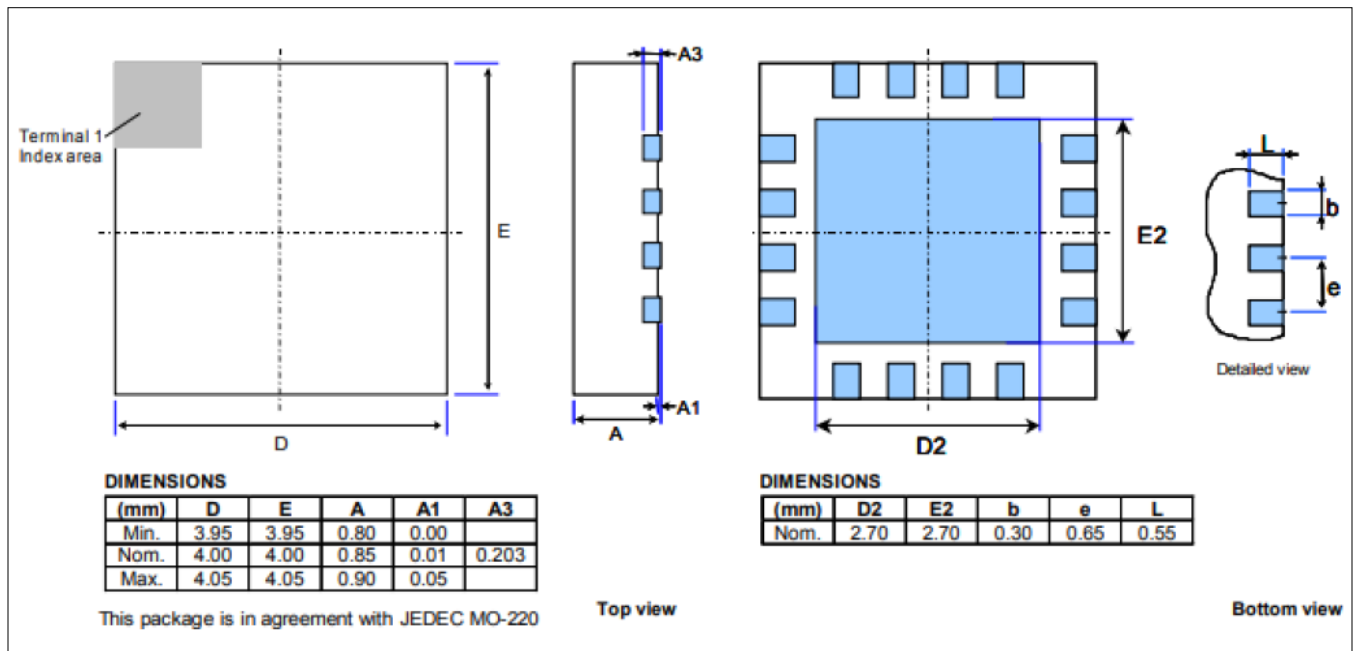
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## Lead-Free 4 mm 16-Lead PQFN



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