

DATASHEET

CGY2220UH/C1

1-12 GHz Wide band Low Noise Amplifier

DESCRIPTION

The CGY2220UH/C1 is a high performance GaAs Wide Band Low Noise amplifier designed to operate from 1 to 12 GHz with an exceptionally low noise figure of 1.5 dB and very high gain of 36 dB.

The CGY2220UH/C1 is a 3 stages Low Noise Amplifier with low power consumption, the drain voltage is typically 1.5V and total current consumption 50 mA.

The CGY2220UH/C1 can be used in radio and radar systems, telecommunications and instrumentation.

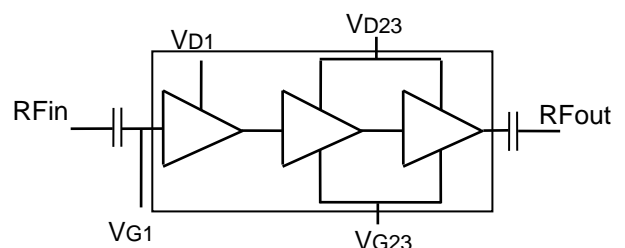
The die is manufactured using OMMIC's High Performance 70 nm gate length high Indium content MHEMT low noise technology. The MMIC uses gold bonding pads and backside metallization, the die is fully protected with Silicon Nitride passivation to obtain the highest level of reliability.

APPLICATIONS

- Radio systems
- Telecommunications
- Instrumentation

FEATURES

- Operating frequency range : 1 to 12 GHz
- Noise Figure 1.5 dB
- Gain : 36dB
- 50 Ohms input and output matched
- Input Return Loss : 12 dB at 10GHz
- Output Return Loss : 10 dB at 10GHz
- Power Supply : $I_{DD} = 50$ mA at $V_{DD} = 1.5$ V
- Delivered as 100 % on-wafer RF tested dies
- Samples and evaluation Boards Available
- Die size = 1.5 x 1 mm
- Device Availability Now
 - Tested, Inspected Known Good Die (KGD)
 - Samples available
 - Demonstration Boards



CGY2220UH/C1 Low Noise Amplifier Block Diagram



MAXIMUM VALUES

$T_{amb} = + 25 \text{ }^{\circ}\text{C}$, at Die backside; unless otherwise specified.

| Symbol | Parameter | Conditions | MIN. | MAX. | UNIT |
|----------------------|----------------------|-----------------------|-------|-------|--------------------|
| V_{G1}, V_{G23} | Gate voltage | Vg1 biased a RF input | - 1.5 | 0 | V |
| V_{D1}, V_{D23} | Drain voltage | | 0 | + 2 | V |
| I_{D1} | Drain current | | | 50 | mA |
| I_{D2} | | | | 50 | |
| I_{D3} | | | | 50 | |
| I_{GN} (all gates) | Gate Current | | - 2 | + 2 | mA |
| P_{IN} | RF Input power | | | + 3 | dBm |
| T_{amb} | Ambient temperature | | - 40 | + 85 | $^{\circ}\text{C}$ |
| T_j | Junction temperature | | | + 150 | $^{\circ}\text{C}$ |
| T_{stg} | Storage temperature | | - 55 | + 150 | $^{\circ}\text{C}$ |

Operation of this device outside the parameter ranges given above may cause permanent damage

THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | UNIT |
|-----------------|---|-------|----------------------|
| $R_{th(j-amb)}$ | Thermal resistance from junction to ambient (DC power at T_{amb} max) | TBD | $^{\circ}\text{C/W}$ |

ELECTRICAL CHARACTERISTICS

$T_{amb} = + 25 \text{ }^{\circ}\text{C}$, $I_{D3} = 18 \text{ mA}$, $I_{D2} = 18 \text{ mA}$, $I_{D1} = 18 \text{ mA}$,

| Symbol | Parameter | Conditions | MIN. | TYP. | MAX. | UNIT |
|--------------------|-------------------------------|------------------|------|-------|------|------|
| RFin | Input frequency | | 1 | | 12 | GHz |
| V_{D1}, V_{D23} | Drain Supply voltage | | | + 1.5 | | V |
| $I_{D1} + I_{D23}$ | Total supply current | | 40 | 55 | 65 | mA |
| G | Gain | | | 36 | | dB |
| NF | Noise Figure | | | 1.5 | | dB |
| P1dB | 1dB compression point | | | TBD | | dBm |
| Psat | Saturated power | | | TBD | | dBm |
| S_{11} | Input reflection coefficient | 50 Ohms – 10 Ghz | | -12 | | dB |
| S_{22} | Output reflection coefficient | 50 Ohms | | -10 | | dB |

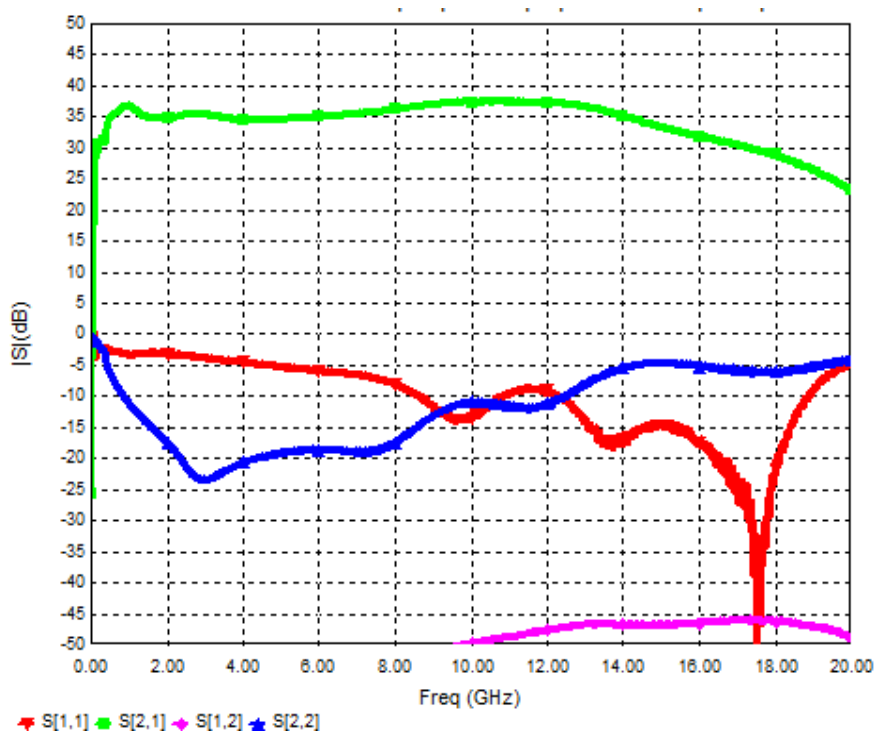
(*) Measurement reference planes are the INPUT and OUTPUT plans of the CGY2220UH/C1 MMIC.



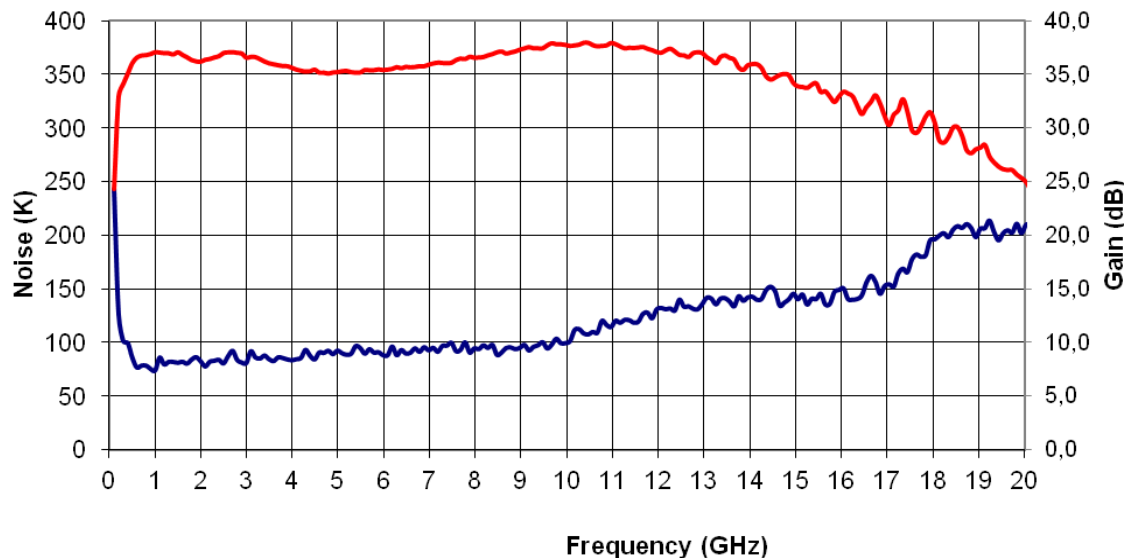
Caution : This device is a high performance RF component and can be damaged by inappropriate handling. Standard ESD precautions should be followed. OMMIC document "OM-CI-MV/ 001/ PG" contains more information on the precautions to take.

S-PARAMETER AND NOISE MEASUREMENTS

S-parameters Measurement performed on Carrier at 25°C
 VD1=VD23= +1.5V and ID total = 49mA



Noise measurements at 25°C



200K=2.27dB NF

150K=1.8dB NF

120K=1.5dB NF

100K=1.28dB NF



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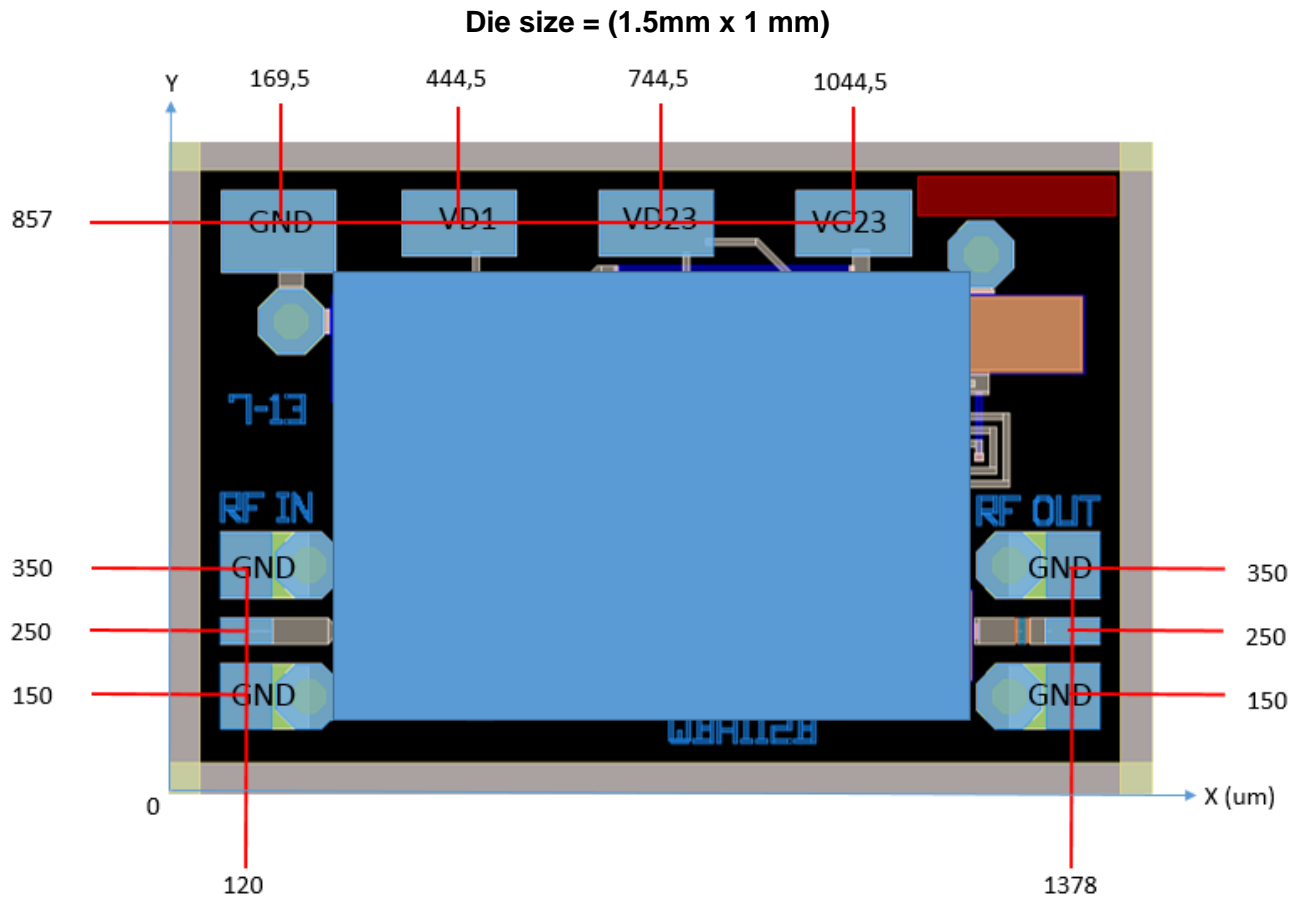
PAD LAYOUT


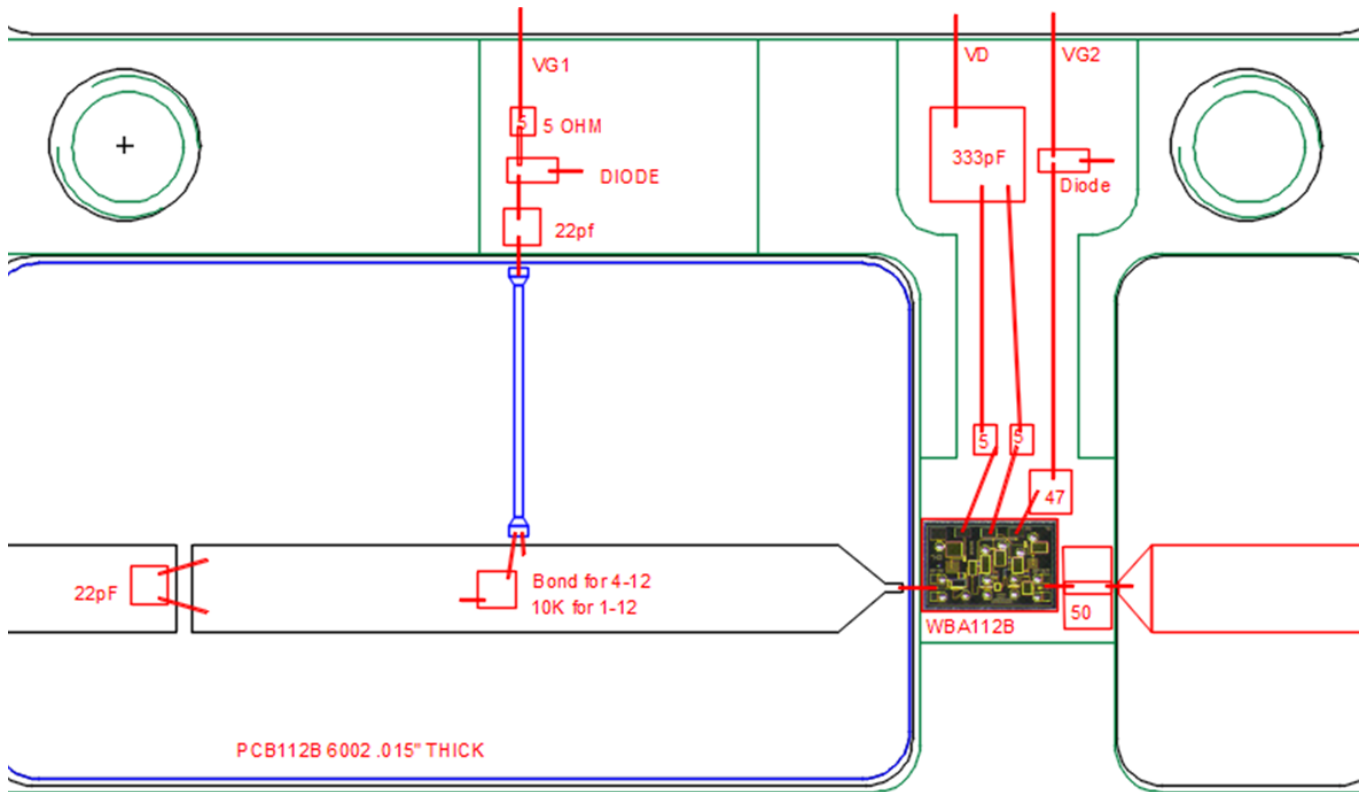
Figure1 : Layout view of CGY2220UH/C1

| Pad Name | X (um) | Y (um) |
|------------|--------|--------|
| GND | 120 | 150 |
| RFIN / VG1 | 120 | 250 |
| GND | 120 | 350 |
| GND | 169.5 | 857 |
| VD1 | 444.5 | 857 |
| VD23 | 744.5 | 857 |
| VG23 | 1044.5 | 857 |
| GND | 1378 | 350 |
| RFOUT | 1378 | 250 |
| GND | 1378 | 150 |



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ASSEMBLY



SOLDERING

To avoid permanent damages or impact on reliability during soldering process, die temperature should never exceed 330°C.

Temperature in excess of 300°C should not be applied to the die longer than 1mn

Toxic fumes will be generated at temperatures higher than 400°C

ORDERING INFORMATION

| Generic type | Package type | Version | Sort Type | Description |
|--------------|--------------|---------|-----------|---------------------|
| CGY2220 | UH | C1 | - | On-Wafer tested Die |



DEFINITIONS

Limiting values definition

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Applications that are described herein for any of these products are for illustrative purposes only. OMMIC makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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