

# PRELIMINARY DATASHEET

## CGY2221UH/C1

### X-Band 8-12 GHz Low Noise Amplifier

#### DESCRIPTION

The CGY2221UH/C1 is a high performance GaAs single supply Low Noise Amplifier MMIC designed to operate in the X band with an extremely high maximum input RF power.

The CGY2221UH/C1 has an a low noise figure of 1.6 dB with minimum 16 dB of Gain. The on chip matching provides better than 12 dB of Input and Output Return Loss. It can be used in Radar, Telecommunication and Instrumentation applications.

The die is manufactured using OMMIC's 0.13  $\mu\text{m}$  gate length PHEMT Technology. The MMIC uses gold bonding pads and backside metallization and is fully protected with Silicon Nitride passivation to obtain the highest level of reliability.

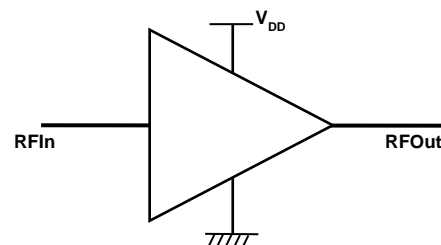
This technology has been evaluated for Space applications and is on the European Preferred Parts List of the European Space Agency.

#### APPLICATIONS

- Radar
- Telecommunications
- Instrumentation

#### FEATURES

- ▶ Operating Range : 8 GHz to 12 GHz
- ▶ Single supply architecture
- ▶ Noise Figure : 1.6 dB
- ▶ Gain > 16 dB
- ▶ Maximum input power: +31dBm
- ▶ Gain Flatness : +/- 0.8dB
- ▶ Output  $P_{1dB}$ : 17 dBm
- ▶ TOI: 29dBm
- ▶ Input Return Loss : 12 dB
- ▶ Output Return Loss : 15 dB
- ▶ Power supply : 82 mA @ 5 V
- ▶ Die Size : 2mm x 1 mm
- ▶ Device Availability (Q1 2015) :
  - Space and MIL-STD MMICs



CGY2221UH/C1 block diagram

## MAXIMUM VALUES

 $T_{amb} = + 25 \text{ }^{\circ}\text{C}$ 

Symbol	Parameter	Conditions	MIN.	MAX.	UNIT
$V_{dd}$	Drain voltage		0	+ 6	V
$I_{dd}$	Drain current			100	mA
$P_{IN}$	RF Input power	CW / 10us pulse 10% Duty cycle		+21 / +31	dBm
$T_{amb}$	Ambient temperature		- 55	+ 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

 $T_{amb} = + 25 \text{ }^{\circ}\text{C}$ ,  $V_{dd} = 5\text{V}$ 

Symbol	Parameter	Conditions	MIN.	TYP.	MAX.	UNIT
$R_{Fin}$	Input frequency		8		12	GHz
<i>Performances of the die</i>						
$V_{DD}$	Drain Supply Voltage			+ 5		V
$I_{DD}$	Drain Supply Current		72	82	92	mA
$G$	Gain		16	17		dB
$NF$	Noise Figure		1.5	1.6	1.8	dB
$P_{1dB^*}$	1dB compression point		16	17		dBm
$TOI$	3 <sup>rd</sup> Order intercept ( $F=10\text{GHz}$ , $P_{out}=0\text{dBm}$ )			29		dBm
$ISO_{rev}$	Reverse Isolation	$R_{FOUT}/R_{FIN}$		-35	-30	dB
$S_{11}$	Input reflection coefficient	50 Ohms		-12		dB
$S_{22}$	Output reflection coefficient	50 Ohms		-12		dB

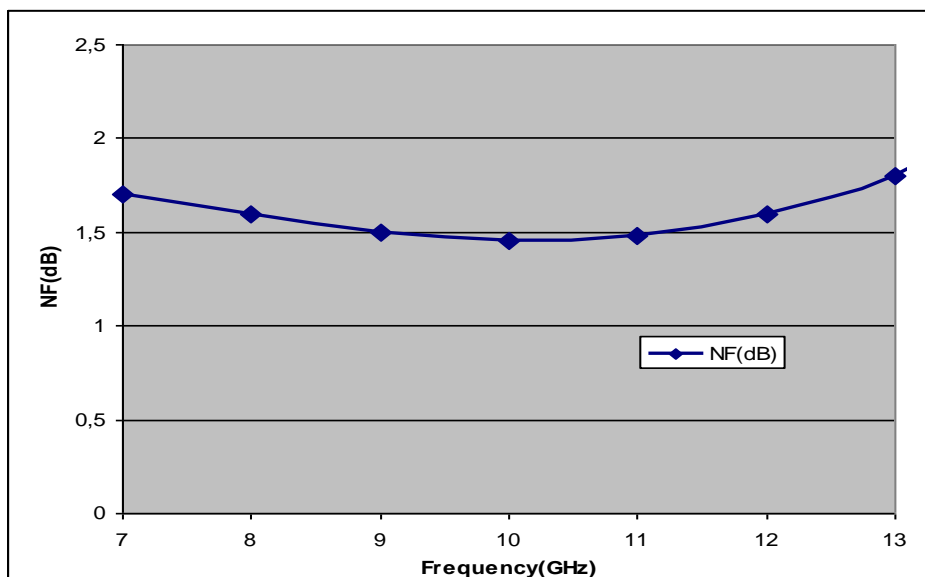
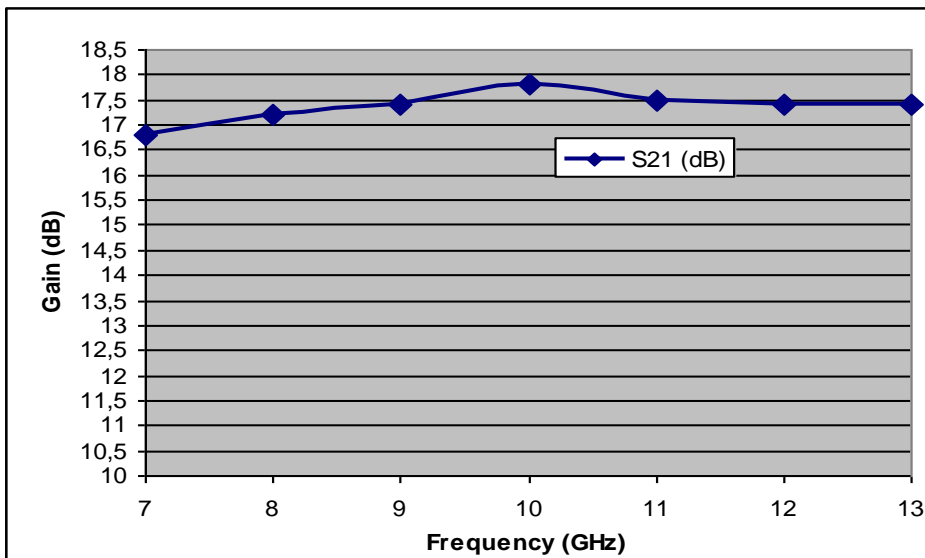
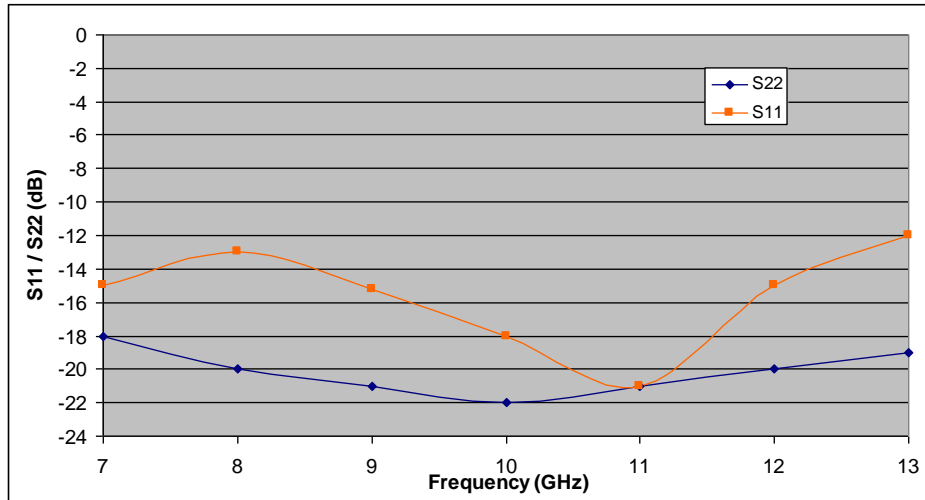
(\*) Measurement reference planes are the INPUT and OUTPUT plans of the CGY2221UH/C1



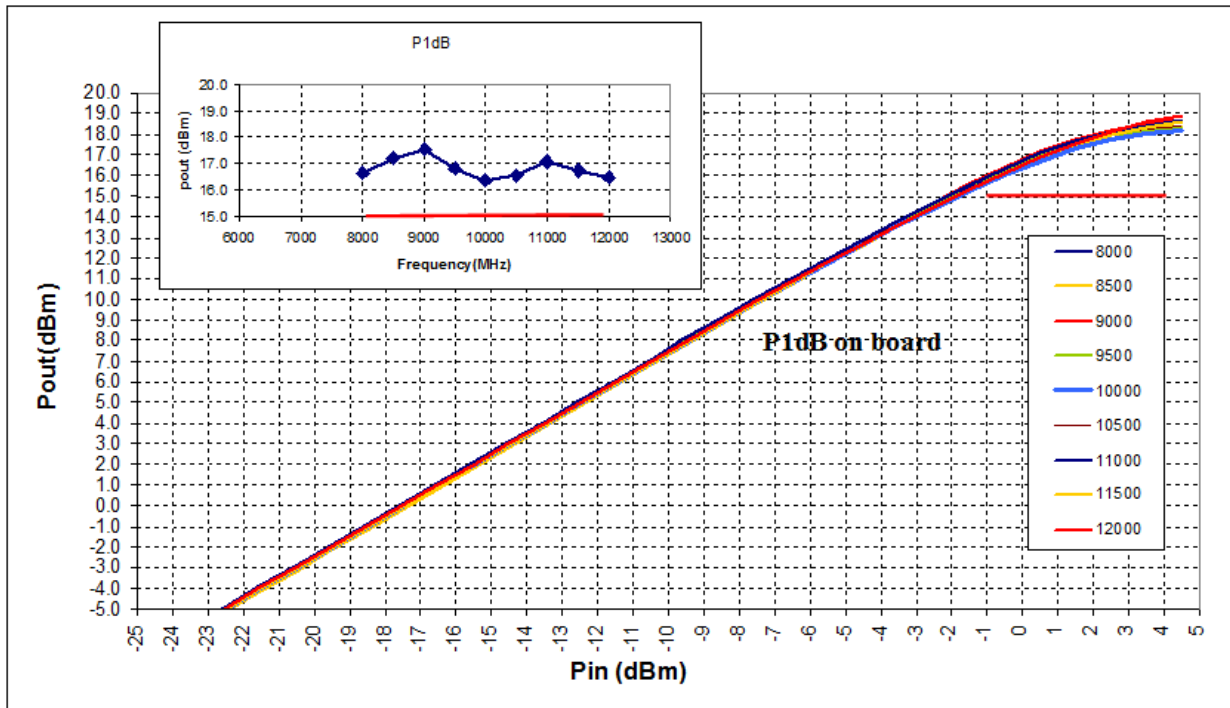
**Caution** : This device is a high performance RF component and can be damaged by inappropriate handling. Standard ESD precautions should be followed. OMMIC document "OM-CI-MV/ 001/ PG" contains more information on the precautions to take.

**S-PARAMETERS, NF, K :**

Measured at 25°C, VDD = 5V ID = 82mA , Input bonding Inductance = 0.4nH, Out Bonding = 0.2nH

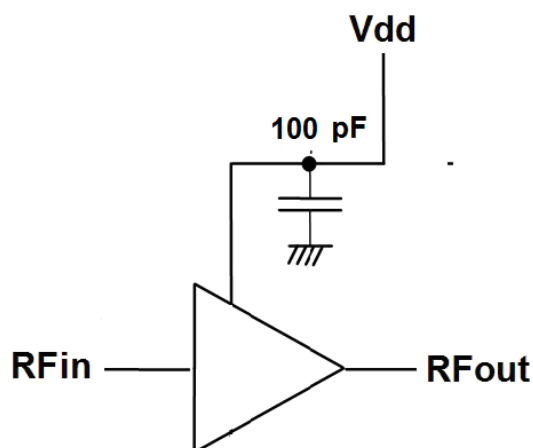


**Output Power:** Measured on Board with Wire inductances  $L_{in} = 0.4nH$  and  $L_{out} = 0.2nH$



## APPLICATION SCHEMATIC

To prevent instability of the customer design it is highly recommended to place small chip capacitors as near as possible to the CGY2221UH/C1, here 100pF recommended. Additionally, a 10nF capacitor can be added on a drain connection to insure low frequency decoupling, the power supply decoupling could be complemented with 1 uF capacitors.



**Figure 1 : Application schematics**

**PIN CONFIGURATION:**

**PINOUT**

Symbol	Description
RFIN	RF input
RFOUT	RF output
GND	Ground
VDD	Single Supply Voltage

**Note :**

*In order to ensure good RF performances and stability It is key to connected to the ground the pad available on the backside of the die. Input bonding wire inductance should be between 0.2nH and 0.6nH and output bonding inductance between 0.15 and 0.5nH. We recommend 25um gold wire bondings. Pad opening enables to connect two wires (wedge) on each RF pads.*

**SOLDERING**

To avoid permanent damages or impact on reliability during soldering process, die temperature should never exceed 300°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
CGY2221UH/C1	die	C1	-	



## 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

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