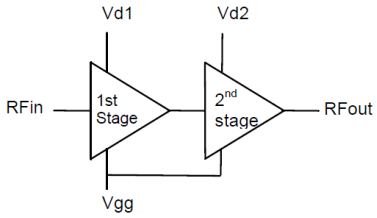
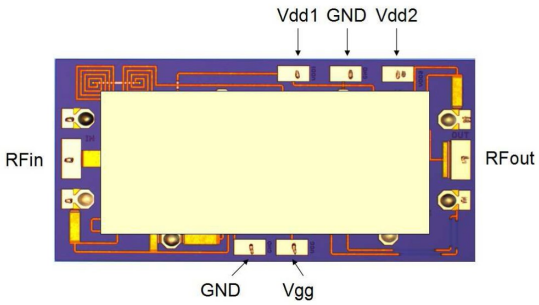
Low Noise Amplifier
13 - 15 GHz

CGY2125AUH/C1
Rev. V1

Features

- Noise Figure: 1.5 dB @ 14 GHz
- Gain: 25 dB @ 14 GHz
- P1dB: 8 dBm
- Input Return Loss: >11 dB @ 14 GHz
- Output Return Loss: >20 dB @ 14 GHz
- Power Supply: 20 mA @ 3.3 V
- Chip Size: 2.1 x 1.1 mm
- 100% RF Tested, Known Good Die
- Demonstration Boards Available
- Space & MIL-STD Available
- RoHS* Compliant





Applications

- Radar
- Telecommunication
- Instrumentation

Description

The CGY2125AUH/C1 is a high performance GaAs low noise amplifier MMIC designed to operate in the Ku band.

This device has a low noise figure of 1.7 dB with 25 dB of gain for a power consumption of only 65 mW. On chip matching provides 11 dB of input return loss and 20 dB output return loss at 14 GHz. It can be used in Radar, Telecommunication and Instrumentation applications.

The die is manufactured using a 0.13 µm gate length pHEMT technology. The MMIC uses gold bond 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.

Pad Configuration

Pad	Function
RFOUT	RF Output
RFIN	RF Input
VD1	1st Stage Drain
VD2	2nd Stage Drain
VG1	1st Stage Gate
GND[1]	Ground

1. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

Ordering Information

Part Number	Package
CGY2125AUH/C1	Die

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

Electrical Specifications[2]: Freq. = 14 GHz, T_A = +25°C, V_{D1}, V_{D2} = 3.3 V, I_D1, I_D2 = 20 mA

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	—	dB	—	25	—
Noise Figure	—	dB	—	1.5	—
Drain Supply Voltage	—	dB	—	3.3	—
Drain Supply Current	V_{GG} = 0 V	dB	—	20	—
Reverse Isolation	RF_{OUT} / RF_{IN}	dB	—	-47	—
P1dB	—	dBm	—	8	—
PSAT	—	dBm	—	9	—
Output IP3	—	dBm	—	TBD	—
IMD3	—	dBc	—	TBD	—
Input Return Loss	50 Ω	dB	—	-11	—
Output Return Loss	50 Ω	dB	—	-20	—

2. Measured reference plane are the input and output planes of the MMIC.

Absolute Maximum Ratings[3,4]

Parameter	Absolute Maximum
RF Input Power	10 dBm
Gate Voltage	-4 to +1 V
Drain Voltage	-4 to +5 V
Drain Current	100 mA
Junction Temperature	+150°C
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +150°C

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

Thermal Characteristics

Parameter	Absolute Maximum
Thermal Resistance	TBD°C/W

Handling Procedures

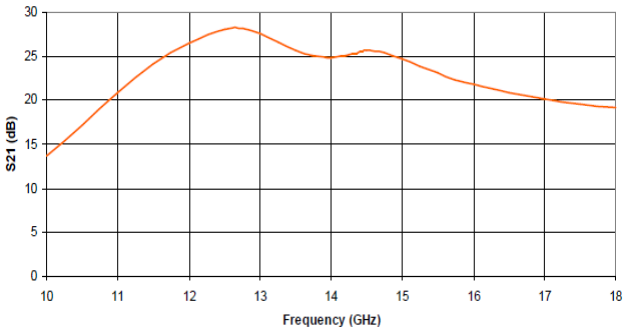
Please observe the following precautions to avoid damage:

Static Sensitivity

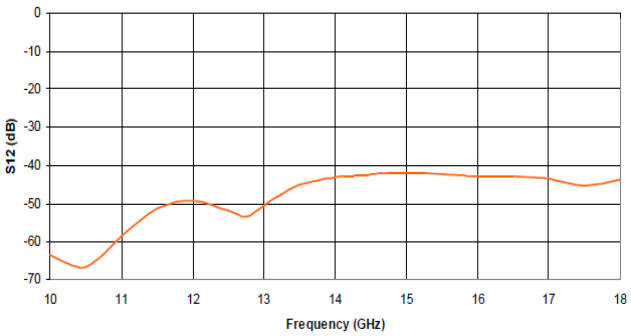
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves: V_D = 1.1 V, I_D = 7.5 mA, T_A = +25°C

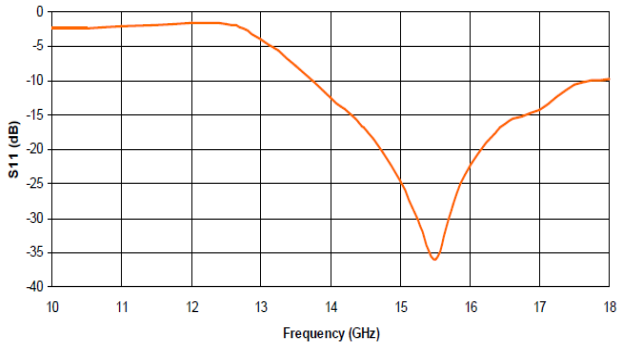
Gain vs. Frequency



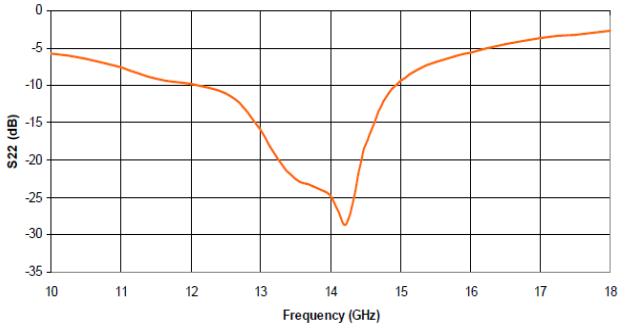
Reverse Isolation vs. Frequency



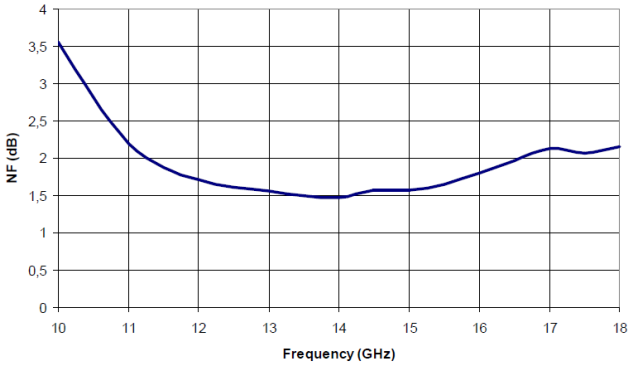
Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



Noise Figure vs. Frequency



Application Schematic

To prevent instability of the customer design it is highly recommended to place small chip capacitors as near as possible to the CGY2125AUH/C1 die and to connect them with wire bonds as short as possible.

An additional 10 µF can also added on drain supplies in order to improve stability at low frequencies.

Additionally, a 10 nF capacitor can be added on a drain connection. In the gate circuitry, a 500 Ω resistor may be added in series to improve gate isolation and prevent unwanted oscillations. The resistors are introducing some low pass filtering in case of fast power switching using gate control architecture.

Depending on 50 Ω connected lines and associated tapers, many connections schemes can be studied/ used regarding RFin and RFout connections.

RFin and RFout bondings can be doubled using two 25 µm wire bonding or one 50 µm ribbon.

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.