X-Band Low Noise Amplifier
8 - 12 GHz

CGY2124UH/C1
Rev. V1

Features

- Single Supply Architecture
- Noise Figure: 1.1 dB
- Gain: 32 dB
- Gain Flatness: ±0.8 dB
- OIP3: 20 dBm
- P1dB: 10 dBm
- Return Loss: 12 dB
- Power Supply: 55 mA @ 5 V
- Chip Size: 2.4 x 1.56 mm
- 100% RF Tested, Known Good Die
- Demonstration Boards Available
- Space & MIL-STD Available
- RoHS* Compliant

Applications

- Radar
- Telecommunication
- Instrumentation

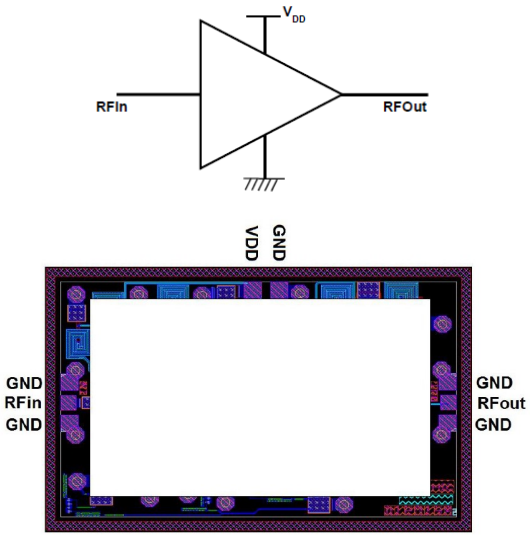
Description

The CGY2124UH/C1 is a high performance GaAs single supply low noise amplifier MMIC designed to operate in the X band.

This device has an ultra-low noise figure of 1.1 dB with minimum 32 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 a 0.13 µm 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.



Pad Configuration

Pad	Function
RFOUT	RF Output
RFIN	RF Input
VDD	Single Supply Pad
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
CGY2124UH/C1	Die

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

Electrical Specifications[2]: Freq. = 8 - 12 GHz, T_A = +25°C, V_{DD} = 5 V

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	—	dB	32	33	34
Noise Figure	—	dB	—	1.1	1.3
Drain Supply Voltage	—	dB	—	5	—
Drain Supply Current	—	dB	45	55	—
Reverse Isolation	RF_{OUT} / RF_{IN}	dB	-50	-55	—
P1dB	—	dBm	—	10	—
Output IP3	—	dBm	19.0	20.0	21.2
Input Return Loss	50 Ω	dB	—	-12	—
Output Return Loss	50 Ω	dB	—	-12	—

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
Drain Voltage	0 to 6 V
Drain Current	100 mA
Junction Temperature	+150°C
Operating Temperature	-55°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

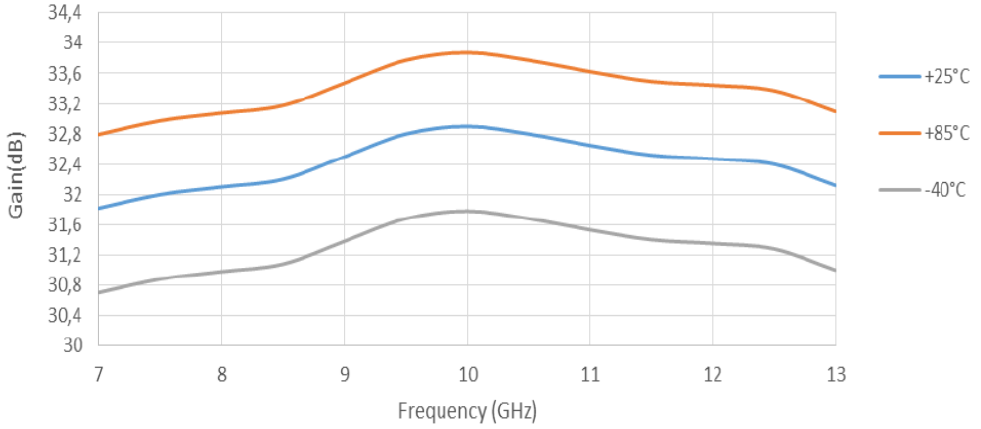
Please observe the following precautions to avoid damage:

Static Sensitivity

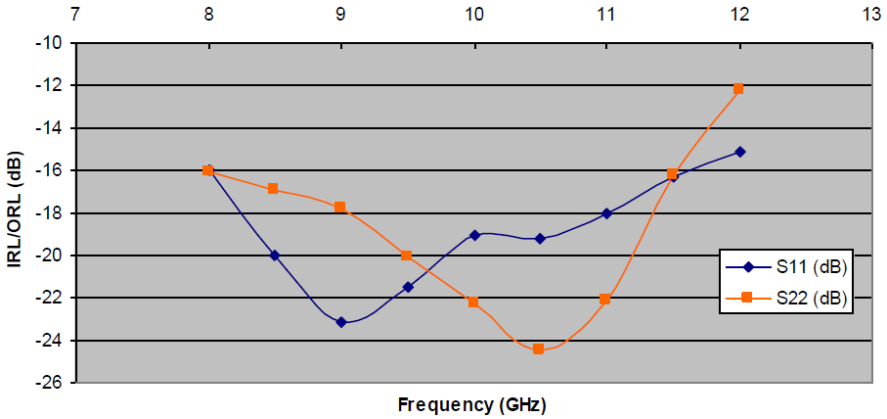
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves: V_{DD} = 5 V, I_D = 55 mA, T_A = +25°C

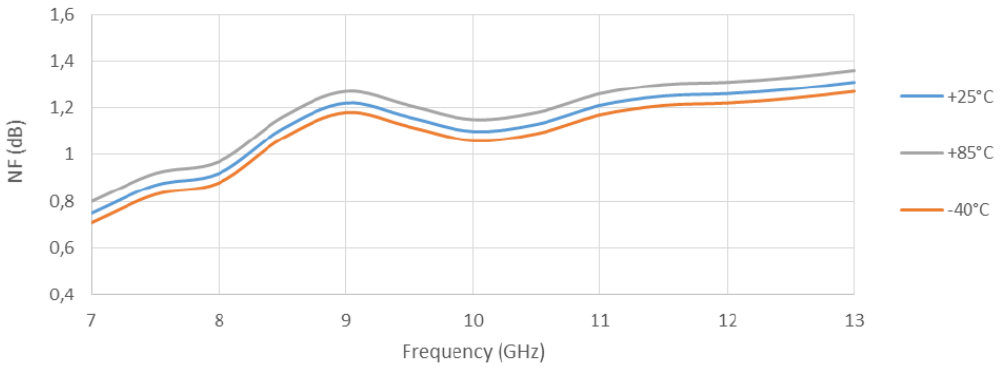
Gain vs. Frequency



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 die and to connect them with bonding as short as possible.

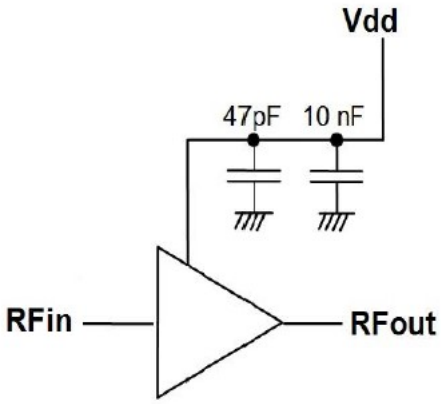
Additionally, a 10 nF capacitor can be added on a drain connection to insure low frequency decoupling, the power supply decoupling could be complemented with 1 µF capacitors.

Soldering

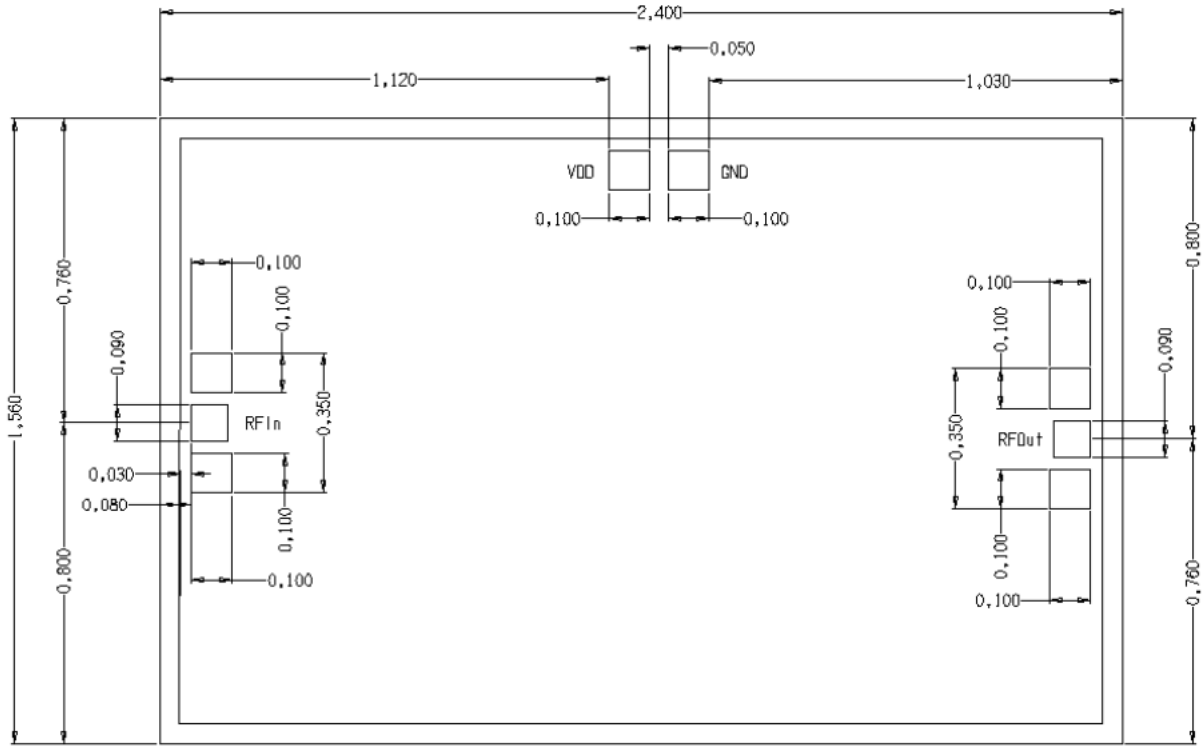
To avoid permanent damages or impact on reliability during soldering process, die temperature should never exceed 300°C.

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.



Mechanical Information



Pad Position[9,10]

Pad Name	Pad Coordinate		Pad Size	Description
	X	Y		
VDD	1170	1430	100 x 100	
GND	1320	1430	100 x 100	
RFIN GND N	130	925	100 x 100	RF in Ground North
RFIN	125	800	90 x 90	RF in Signal - spacing to GND pad 30
RFIN GND S	130	675	100 x 100	RF in Ground South
RFOUT GND N	2270	635	100 x 100	RF out Ground North
RFOUT	2275	760	90 x 90	RF out Signal - spacing to GND pad 30
RFOUT GND S	2270	885	100 x 100	RF out Ground South