

PRELIMINARY DATASHEET

CGY2260UH/C1 25-43GHz Ultra Low Noise Amplifier

DESCRIPTION

The CGY2260UH/C1 is a high performance GaAs Low Noise Amplifier MMIC designed to operate in the K band.

The CGY2260UH/C1 is 3 stages Single Supply LNA. It has an exceptionally low noise figure of 1.5dB with a very flat 25 dB of gain (+/-0.4dB). The on chip matching provides 15 dB of Input Return Loss and Output Return Loss. Thanks to the DC regulation the gain and noise are very stable wrt temperature change. It can be used in Radar, SATCOM, Telecommunication and Instrumentation applications.

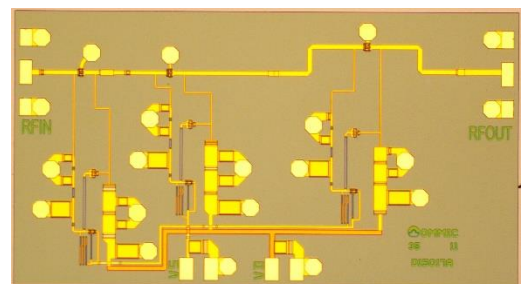
The die is manufactured using OMMIC's Advanced 70 nm gate length high Indium content MHEMT Technology. The MMIC uses gold bonding pads and backside metallization and is fully protected with Silicon Nitride passivation to obtain the highest level of reliability.

APPLICATIONS

- Radar
- SATCOM
- Telecommunications
- Instrumentation

FEATURES

- ▶ Operating frequency range : 25 to 43 GHz
- ▶ Single Supply auto bias / temp controlled
- ▶ Flat Gain: 25dB (+/-0.4dB) overall bandwidth
- ▶ Noise Figure: < 1.8 dB on overall bandwidth (1.2dB at 30GHz)
- ▶ Single positive and negative supply (+ and -1.5V)
- ▶ Low consumption : 52mA (78mW)
- ▶ OP1dB : > 6dBm (8dBm@28-36GHz)
- ▶ Robust : Max +15dBm CW Input power
- ▶ 50 Ohms input and output matched
- ▶ Input Return Loss: > 11 dB
- ▶ Output Return Loss: > 15 dB
- ▶ Die size = 1.68 x 3.0 mm
- ▶ Available
 - Production Tested, Inspected Known Good Die (KGD)
 - Samples



CGY2260UH/C1

MAXIMUM VALUES

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

Symbol	Parameter	Conditions	MIN.	MAX.	UNIT
V_s	Gate voltage	V_D Open circuit	- 3.0	0	V
V_D	Drain voltage	V_D Open circuit	0	+ 3	V
I_s / I_D	Current			5/90	mA
P_{IN}	RF Input power	CW		+ 15	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

$T_{amb} = + 25\text{ }^{\circ}\text{C}$, $V_d = 1.5\text{V}$, $V_s = -1.5\text{V}$ with 0.15nH equivalent bondings on both RFin RFout

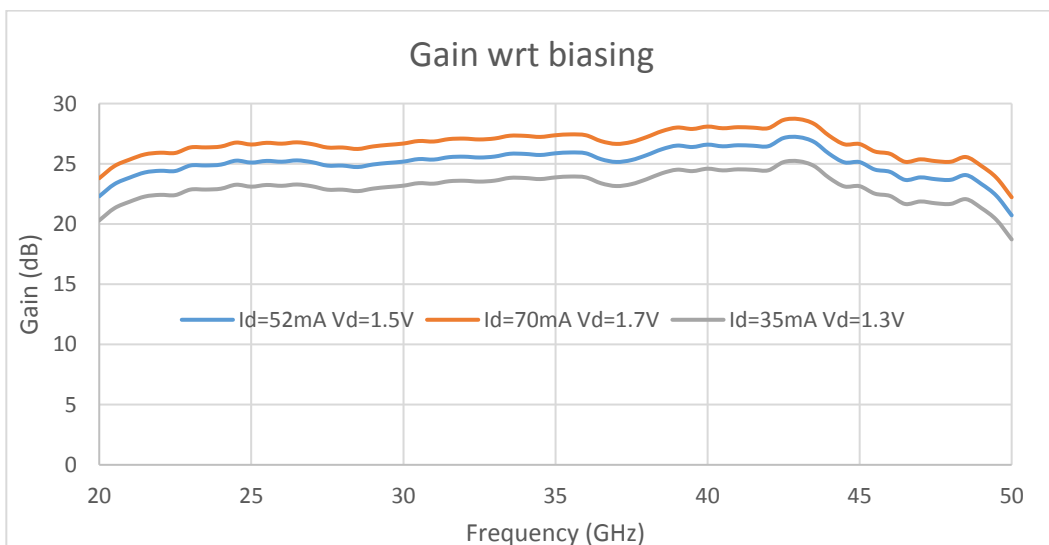
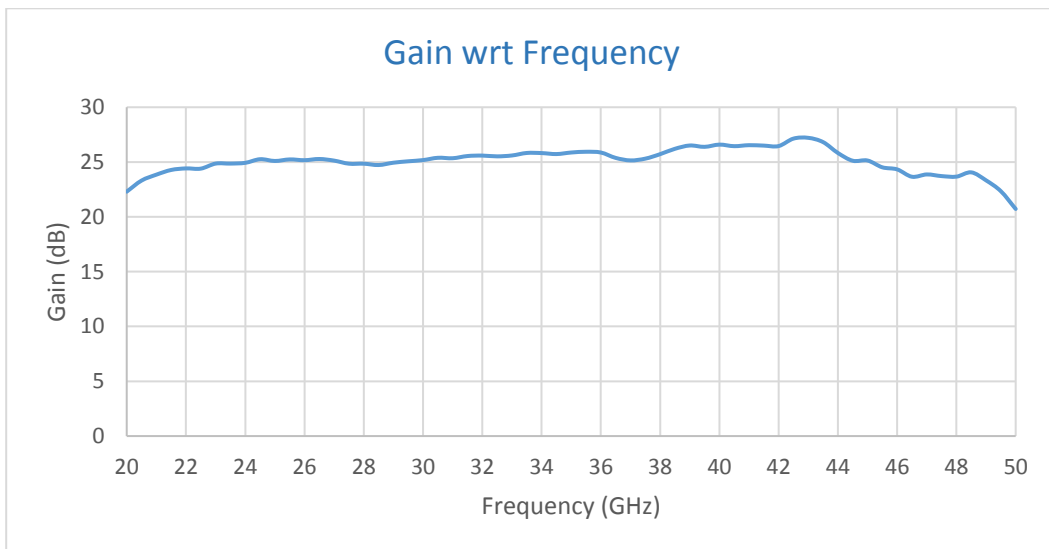
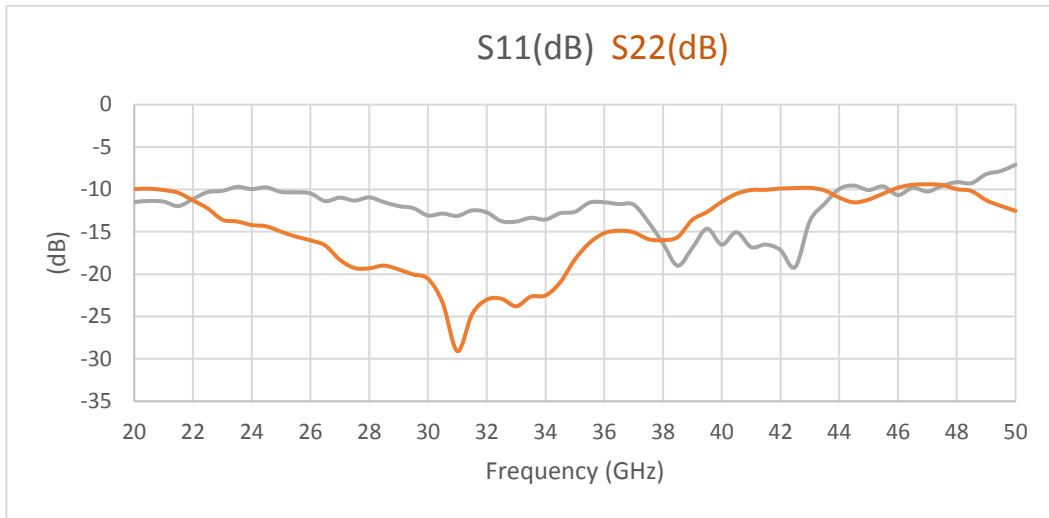
Symbol	Parameter	Conditions	MIN.	TYP.	MAX.	UNIT
RFin	Input frequency		25		43	GHz
<i>Performances on Reference Board with 0.25nH bonding parasitic inductor at input and output</i>						
V_D	Drain Supply voltage		+1.3	+ 1.5	+1.7	V
$I_s + I_D$	Drain Supply current	@ $V_d=1.3 / 1.5 / 1.7\text{V}$	35	52	69	mA
G	Gain	@ $V_d=1.3 / 1.5 / 1.7\text{V}$	23	25	26.5	dB
NF_{MIN}	Noise Figure			1.6		dB
OP_{1dB}	1dB compression point	@ 25/30/43GHz		8/7.5/5.5		dBm
ISO_{rev}	Reverse Isolation	RFOUT/RFIN	-50		-32	dB
S_{11}	Input reflection coefficient	50 Ohms	-18	-11	-10	dB
S_{22}	Output reflection coefficient	50 Ohms	-25	-15	-10	dB



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.

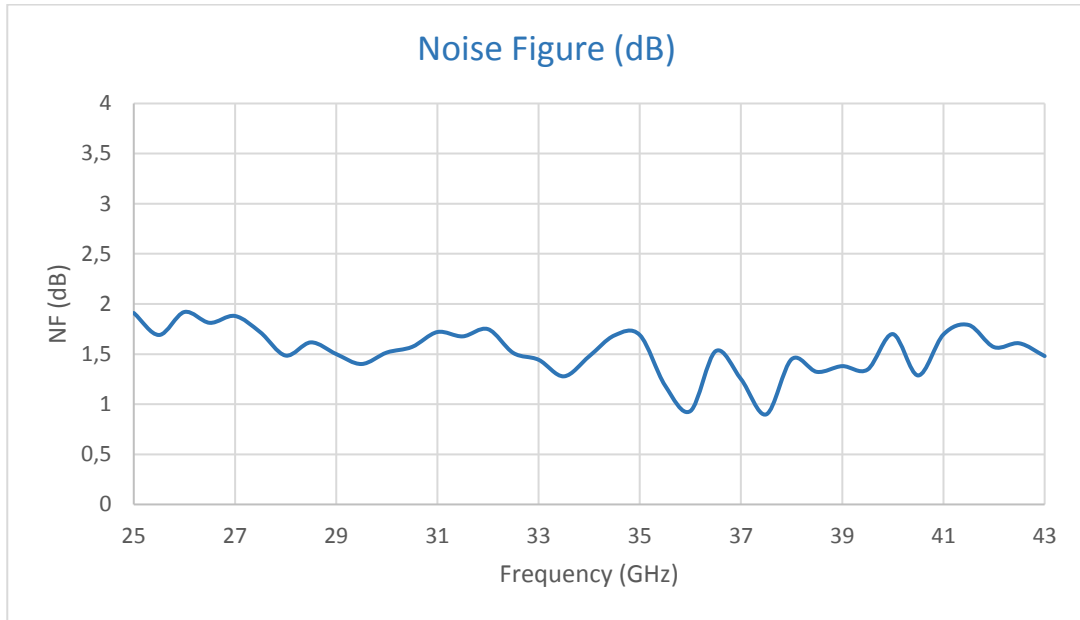
S-PARAMETERS

Conditions: $V_d = 1.5V$, $V_s = -1.5V$, $T_{amb} = +25^\circ C$ (On carrier measurements \rightarrow 0.15nH bonding)



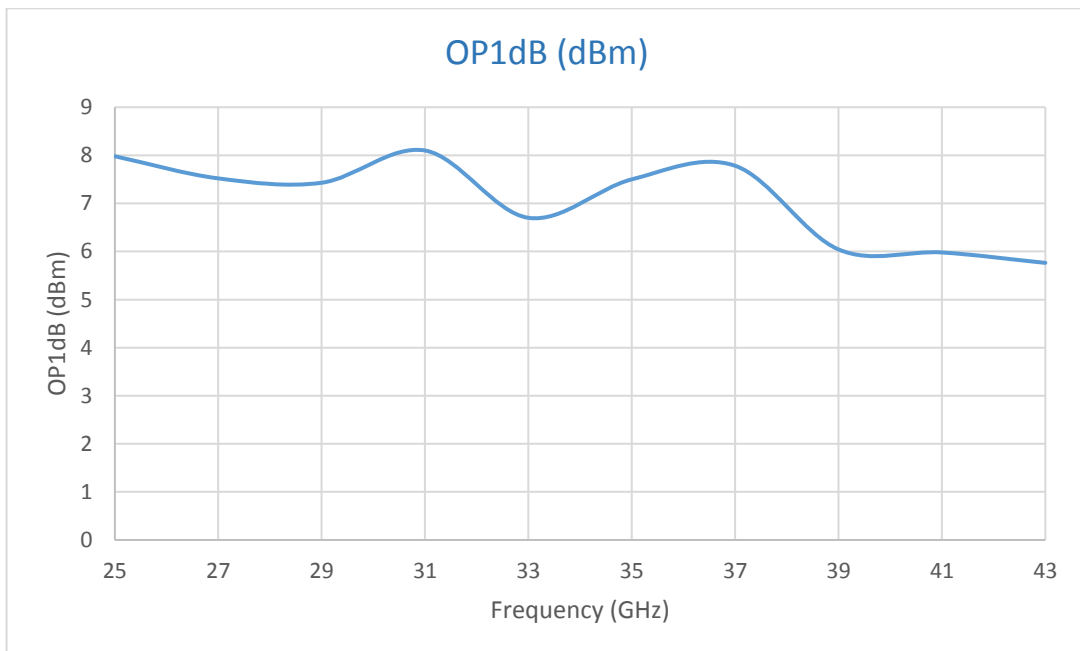
NOISE FIGURE

Conditions : $V_d = 1.5V$, $V_s = -1.5V$, $T_{amb} = + 25^{\circ}C$ (On carrier measurements \rightarrow 0.15nH bonding)



OP1dB

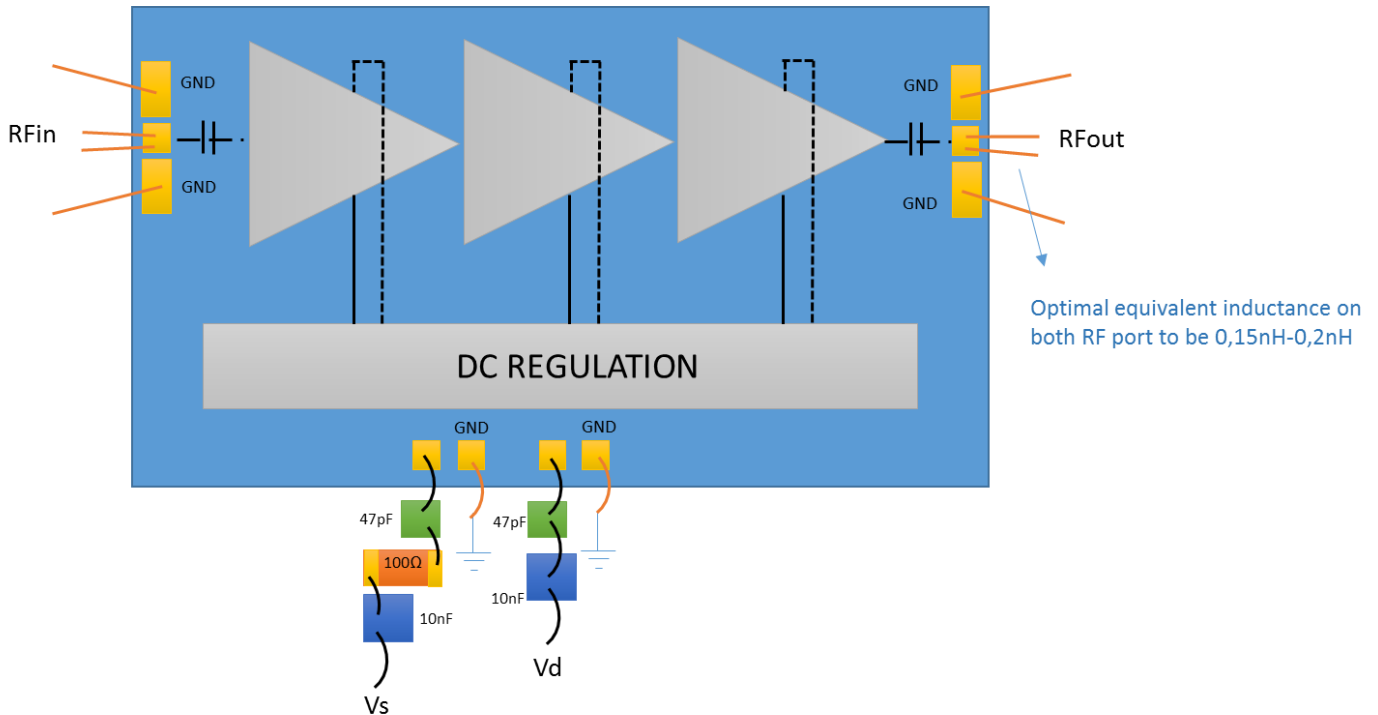
Conditions: $V_d = 1.5V$, $V_s = -1.5V$, $T_{amb} = + 25^{\circ}C$ (On carrier measurements \rightarrow 0.15nH bonding)



APPLICATION SCHEMATIC

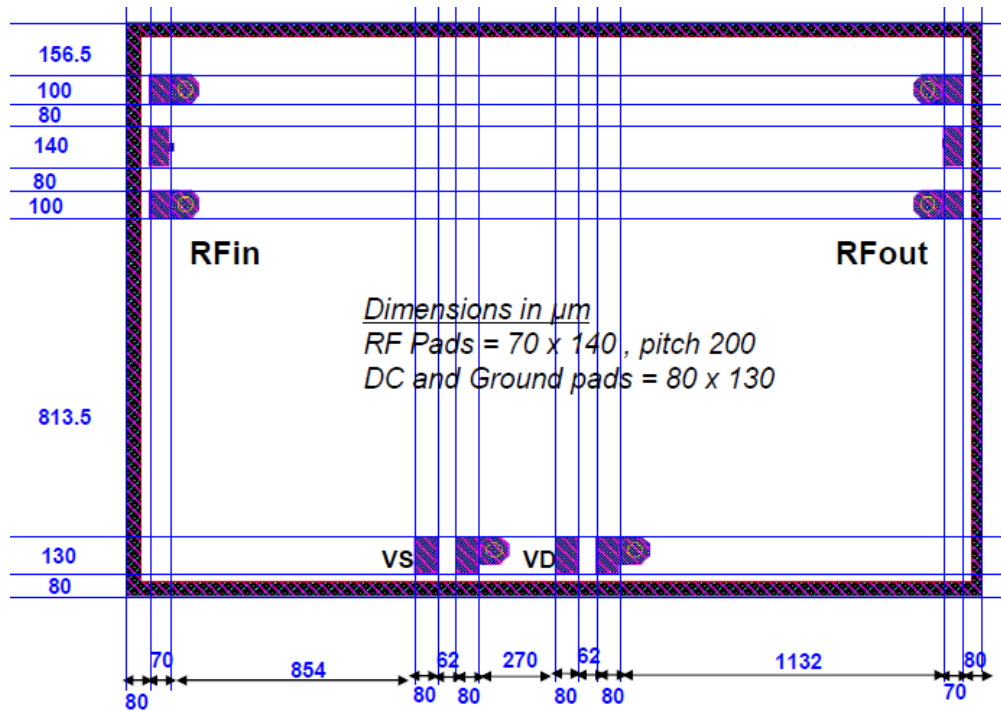
To prevent instability of the customer design it is highly recommended to place small chip capacitors as near as possible to the CGY226oUH/C1 die and to connect them with bondings as short as possible.

Additionally, a 10nF capacitor can be added on a drain connection. In the gate circuitry, a 100 Ω resistor may be added in serie 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.



Component NAME	Value	Type	Comment
All 47pF capacitors	47pF	Chip Capacitor	Chip capacitor PRESIDIO COMPONENTS P/N SA151BX470M2HX5#013B soldered close to the die with bonding as short as possible
All 100 Ω resistors	100 Ω	Serial Chip Resistor	Chip resistor US MICROWAVES RG1421-100-1% soldered close to the 47pF chip capacitor with bonding as short as possible
All 10nF capacitors	10nF	Chip Capacitor	MURATA GMA085R71C103MD01T GM260 X7R 103M 16M100 PM520

DIE LAYOUT AND PIN CONFIGURATION



PINOUT

Symbol	Pad	Description
RFout	OUT	RF output
RFIN	IN	RF input
Vd	VD	Positive supply voltage
Vs	Vs	Negative supply voltage
GND	BACKSIDE	Ground

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.

BONDINGS PAD COORDINATES

Origin point of coordinates (0,0) is on the left bottom side.
All dimension in um.

Symbol	Pad X coordinate	Pad Y coordinate
GND	115	1473
RFIN	115	1273
GND	115	1073
VS	1044	115
GND	1186	115
VD	1536	115
GND	1678	115
GND	2885	1073
RFOUT	2885	1273
GND	2885	1473

Figure 1 : pad coordinates (in um)

DELIVERY

Type	Description	Terminals	Pitch (mm)	Package size (mm)
DIE	100% RF and DC on-wafer tested	10	-	1.68 x 3 x 0.1

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
CGY226o	UH	C1	-	On-Wafer measured KGD



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.

DISCLAIMERS

Life support applications

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. OMMIC's customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify OMMIC for any damages resulting from such application.

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