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DATASHEET CGY2272UH

V – BAND LOW NOISE AMPLIFIER

PRODUCT IN DEVELOPMENT – Engineering Sample Release (ESR)

DESCRIPTION

This V-Band LNA is a high-performance GaAs Low Noise Amplifier MMIC designed to operate in the V-band.

The V-Band LNA is 4 stages Single Supply LNA. It has an exceptionally low noise figure of 2 dB with 25 dB of gain. 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

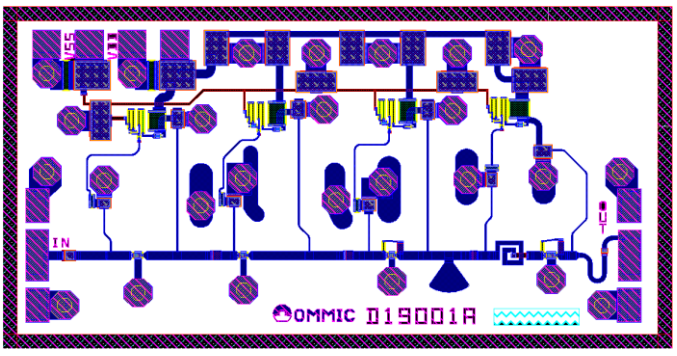
- Radar
- Telecommunications
- Instrumentation
- Spatial

FEATURES

- **OPERATING RANGE -** 44 – 69 GHz
- **GAIN** 25 dB
- **NOISE FIGURE**< 2 dB
- **Pin max** 15 dBm (CW)
- **POWER CONSUMPTION**

  Single positive & negative Supply auto bias / temp controlled

  - VD = 1.5 V
  - VS = 1.5 V
  - I_{Qtot} = 46 mA
- **CHIP SIZE** 2.35 x 1.2 mm²
- **50 Ohms INPUT AND OUTPUT MATCHED**



V – BAND LNA DIE VIEW

RoHS Compliant

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ABSOLUTE MAXIMUM RATING

T_{amb} = + 25 °C

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
VS	Gate voltage	VD Open circuit	- 3	0	V
VD	Drain voltage	VD Open circuit	0	+ 3	V
Is / ID	Current			5/90	mA
PIN	RF input power	CW		+ 15	dBm
T_{amb}	Ambient temperature		- 40	+ 85	° C
T_j	Junction temperature			+ 150	° C
T_{stg}	Storage temperature		- 55	+ 150	° C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
Rth_{amb}	Thermal resistance at ambient temperature (+ 20°C)	35.26	° C/W
$Rth_{60°c}$	Thermal resistance at 85°C	46.54	° C/W

ELECTRICAL CHARACTERISTICS

T_{amb} = + 25 °C, V_d = 1.5 V, Vs = - 1.5 V with 0.15 nH equivalent bondings on both Rfin RFout

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
RFin	Input frequency		44		69	GHz
Performances on Reference Board with 0.25 nH bonding parasitic inductor at input and ouput						
VD	Drain Supply Voltage		+ 1.3	+ 1.5	+ 1.7	V
Is + ID	Drain Supply Current	@ Vd = 1.5		46		mA
G	Gain		23	25	26.5	dB
NF	Noise Figure				2	dB
OP1dB	1dB compression point			1.8		dBm
ISO_{rev}	Reverse Isolation	RF_{OUT}/RF_{IN}	-50		- 32	dB
S_{11}	Input reflection coefficient	50 Ohms			- 10	dB
S_{22}	Output reflection coefficient	50 Ohms			- 10	dB

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NOISE FIGURE

Conditions : T_{amb} = + 25°C / V_DD = 1.5 V / V_SS = -1.5 V /I_DD = 46 mA

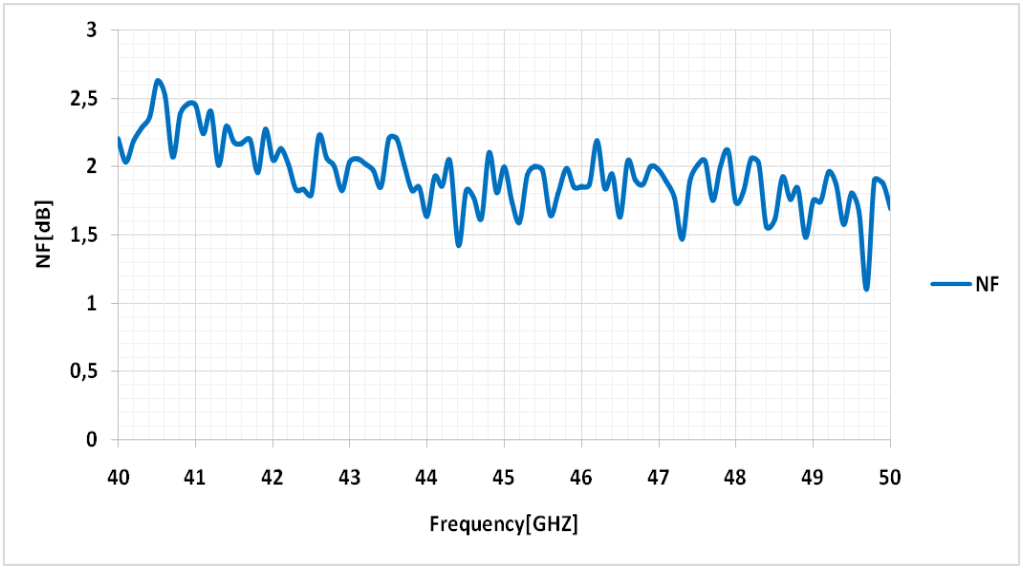

Figure 1: NF vs frequency

ON WAFER

S-PARAMETERS

Conditions : T_{amb} = + 25°C / V_DD = 1.5 V / V_SS=-1.5 V / I_DD = 46 mA

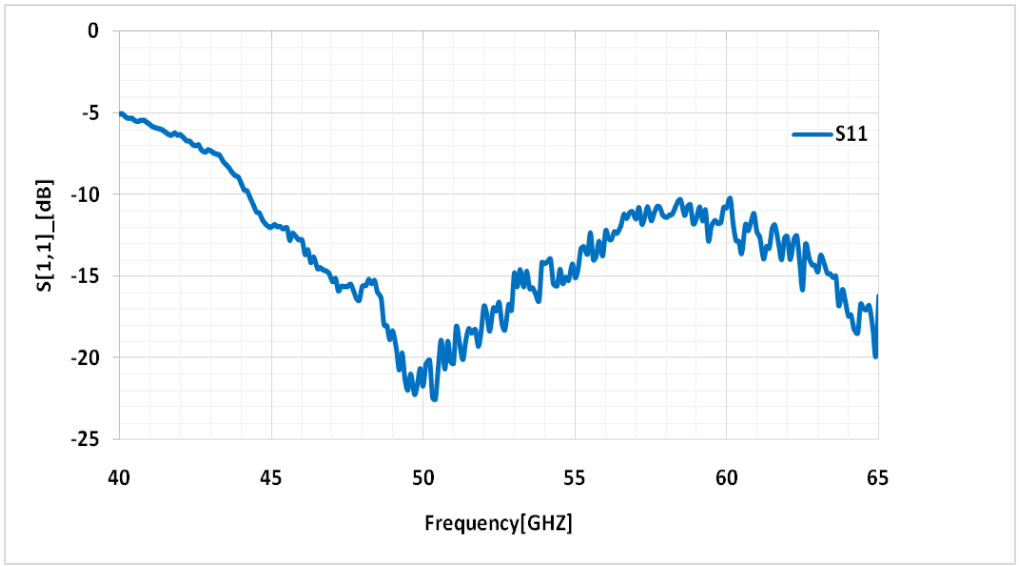

Figure 2: Return loss vs frequency

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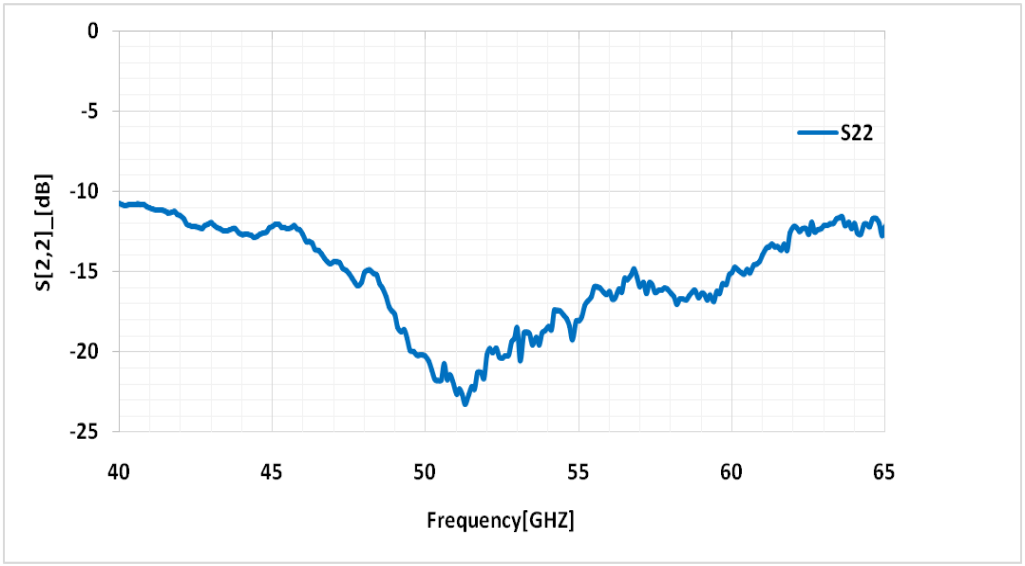

Figure 3: Return loss vs frequency

ON WAFER

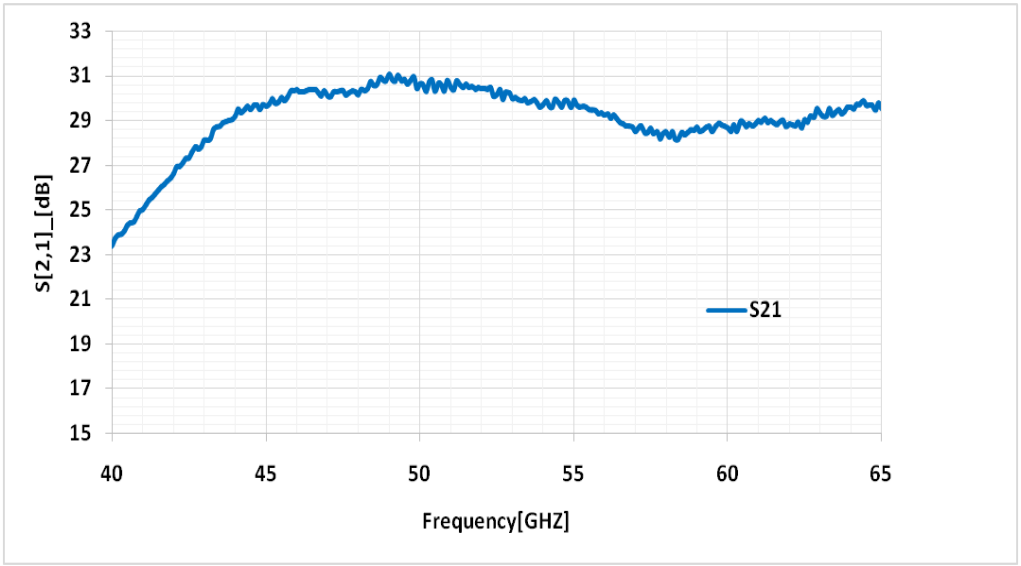

Figure 4: Gain vs frequency

P1DB_IN-OUT

ON WAFER

Conditions : T_{amb} = + 25°C / V_DD = 1.5 V / V_SS=-1.5 V / I_DD = 46 mA

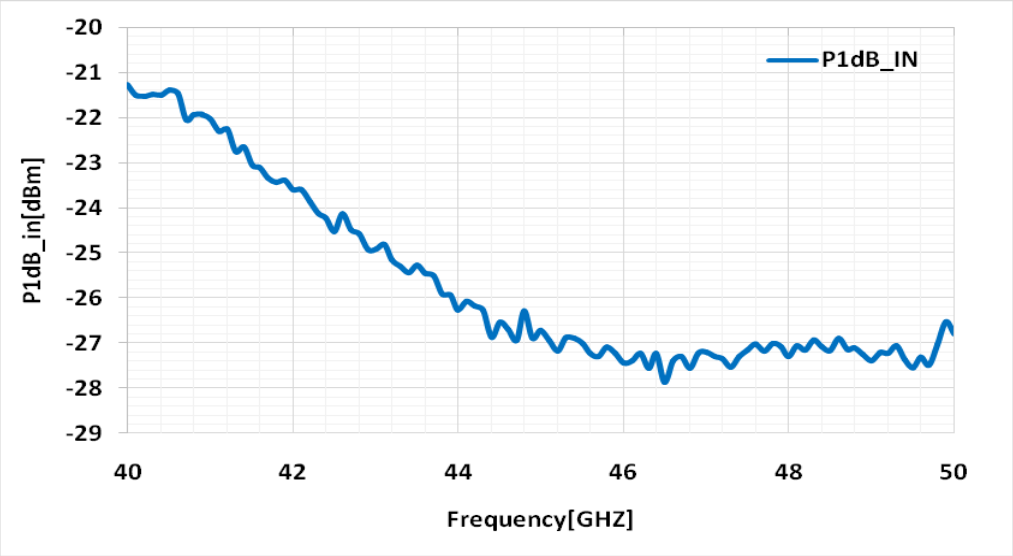

Figure 5: P1dB_IN vs frequency

ON WAFER

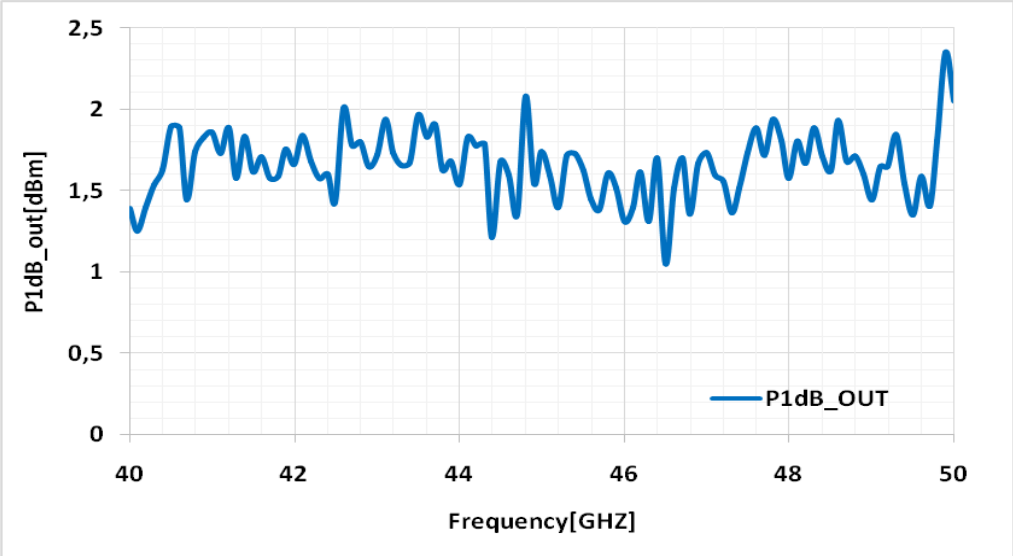

Figure 6: P1dB_OUT vs frequency

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APPLICATION SCHEMATIC

Decoupling scheme depends on customer implementation, in order to prevent unstability it is hightly recommended to place a 100pF RF decoupling chip capacitor at each DC terminal with the shortest possible bonding wires. Additionnaly, a 1nF SMD capacitor can be added on the DC Pad.

The decoupling network depends on supply, on grounding environement, on form factor, on all parasitics added by the customer environement. According to this, the appropriate network sometimes need to be fine-tuned in accordance with rules applyable in the high frequency domain.

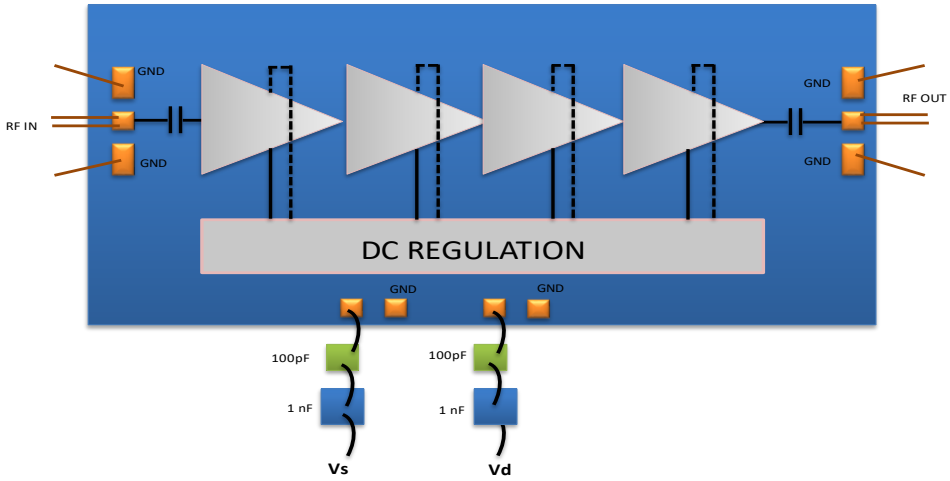

Figure 7: V-Band LNA Application Schematic

PAD DESCRIPTION

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.

PAD LAYOUT

VDD, VSS are DC signals applied on the north side. Many ground accesses are complementing the pad layout. The backside is the ground reference plan.

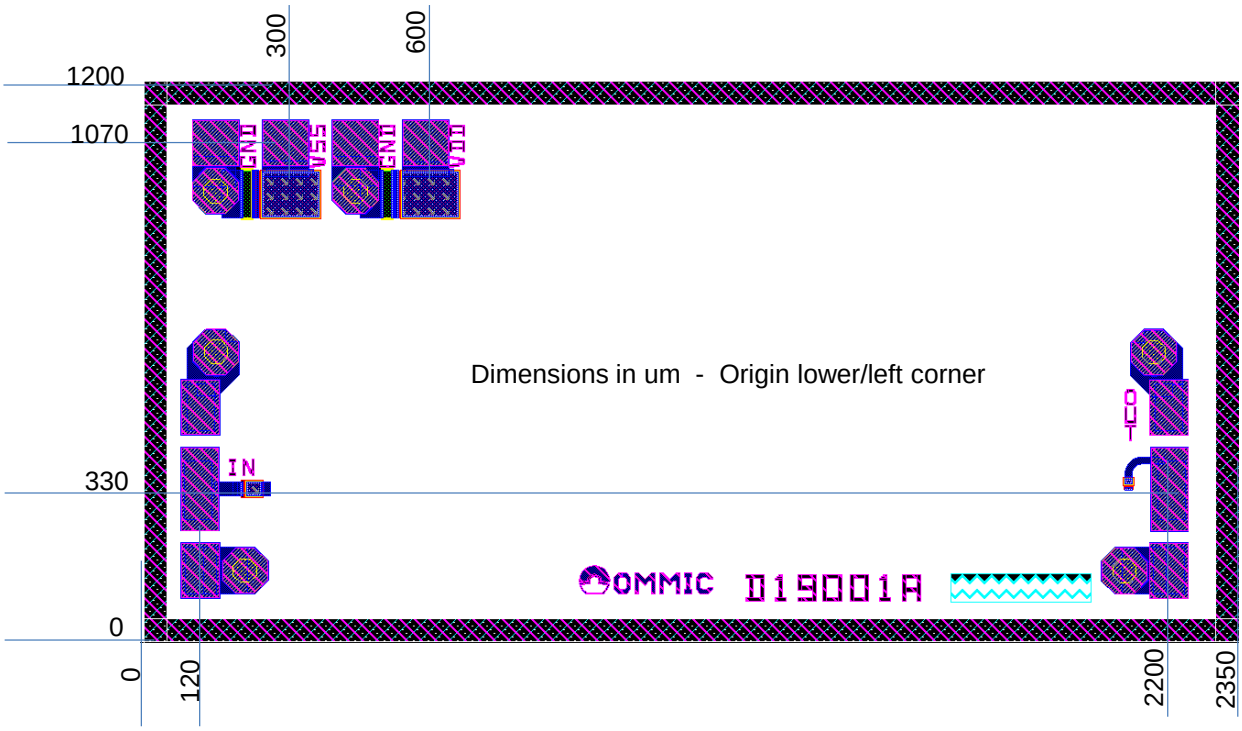

Figure 8: V-Band LNA PAD Layout

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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

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