gANZ0012
E-band MPA MMIC
71-86 (65-90) GHz

Features

- 14/16 dBm P1dB/PSAT
- Full E-band coverage
- 22 dBm OIP3
- 15 dB gain

Typical Applications

- Point-to-point communication
- Instrumentation
- Fiber over radio
- 77 GHz radar

Description

gANZ0012 is a Medium Power Amplifier (MPA) in the E-band suitable for point-to-point communication. The MPA features 16 dB P1dB and very flat frequency response. Furthermore, the MPA has high gain, high linearity and low input/output return loss.

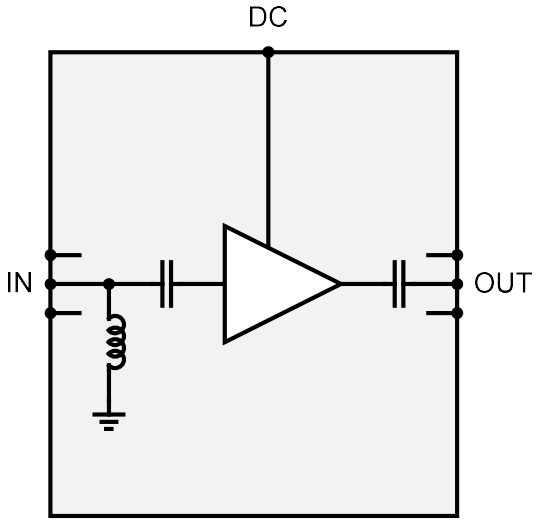

Figure 1. Block diagram of the MPA.

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ELECTRICAL PERFORMANCE

Table 1. Electrical performance T_A=25°C

Parameter	Min	Typ	Max	Unit
Frequency	71(65)		86 (90)	GHz
Gain		13		dB
NF		6		dB
P1dB		14		dBm
PSAT		16		dBm
OIP3		22		dBm
PAE		TBD		%
Input return loss		4		dB
Output return loss		10		dB
Power consumption		200		mW

MEASURED PERFORMANCE

The chip has been measured on-wafer using CW and 2-tone input test signals. The MPA uses typical bias settings if not specified differently.

Table 2. Test conditions

Parameter	Setting
RF input power	-25 dBm/tone
RF input frequency	81 GHz
Frequency separation	10 MHz
Temperature	25°C

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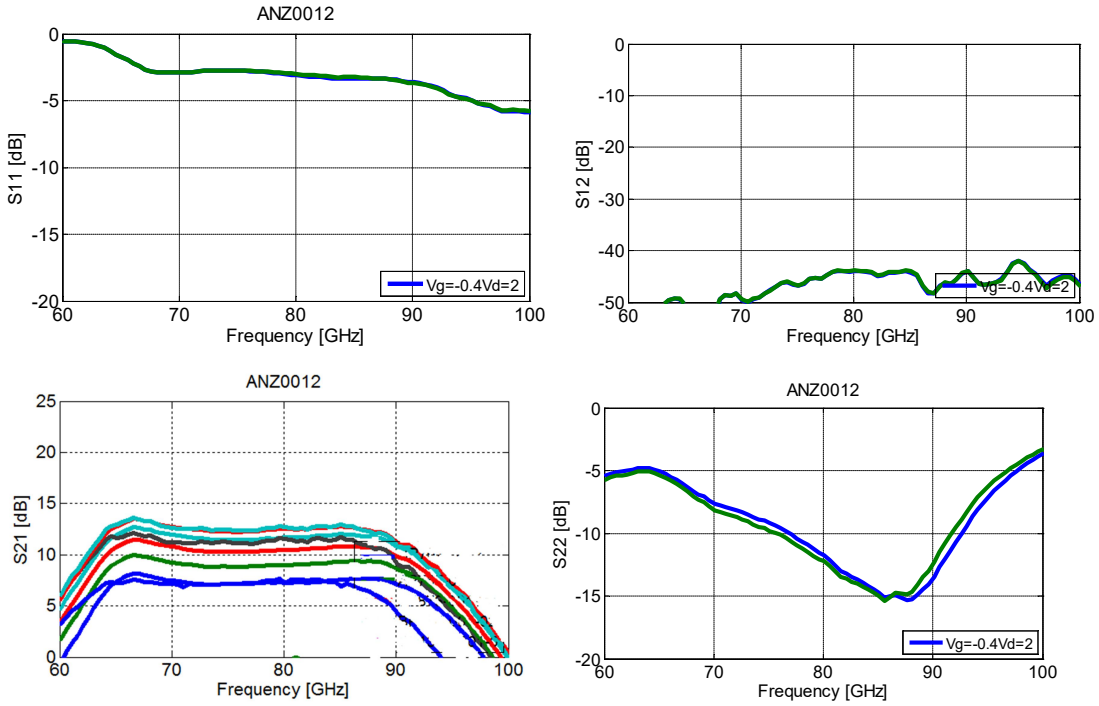

Figure 2. Small signal response from 60-100 GHz at nominal bias. (Upper left): Input matching. (Upper right): Reverse isolation. (Lower left): Small-signal gain. (Lower right): Output matching.

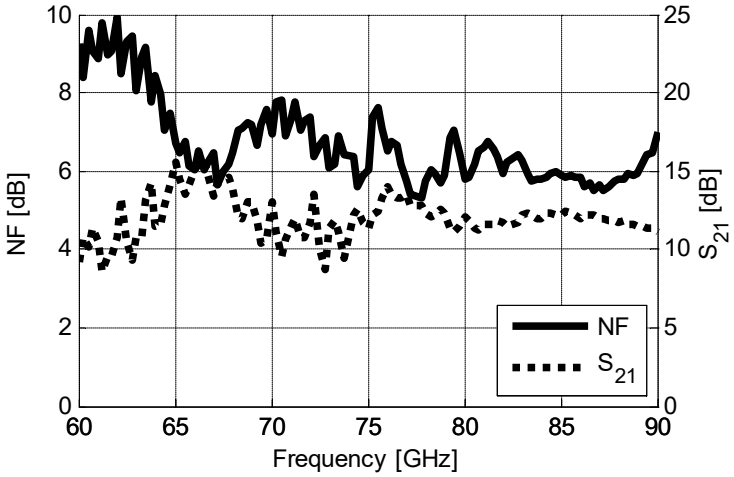

Figure 3. (Left): NF vs freq

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Recommended Operating Conditions

Bias should first be applied to the gates (VG…) followed by the drains (VD…). The gate voltages must be adjusted within the min/max range indicated in Table 3-Table 5 to obtain the specified drain currents. The drain currents are stated with no input signal.

Table 3. Electrical settings on connector P1

Connector P1	Pad No.	Bias settings (V/mA)			I/O
		Min	Typ	Max	
VD	1	2	3 / 75	3.3	Input
NC	2				NC
GND	3				Ground
VG2	4	-0.6	-0.4	-0.2	Input
VG2	5	-0.6	-0.4	-0.2	Input

Table 4. Electrical settings on connector P2

Connector P2	Pad No.	Interface	I/O
GND	1		Ground
RF_OUT	2	Z_0 = 50 Ohm, AC coupled	Output
GND	3		Ground

Table 5. Electrical settings on connector P3

Connector P3	Pad No.	Interface	I/O
GND	1		Ground
RF_IN	2	Z_0 = 50 Ohm, AC coupled	Input
GND	3		Ground

Absolute Maximum Ratings

Table 6. Absolute maximum ratings

Gate-source voltage	-2 to +0.7 V
Drain-source voltage	4.5 V
Gate-drain breakdown voltage	8 V
ID	100 mA
RF input power	+15 dBm
Operating temperature	-40 to + 85°C

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Storage temperature	-65 to +150°C

OUTLINE DRAWING

Mechanical drawing with pad locations is also available in dxf-file format on the web. The substrate thickness is 50 µm (GaAs).

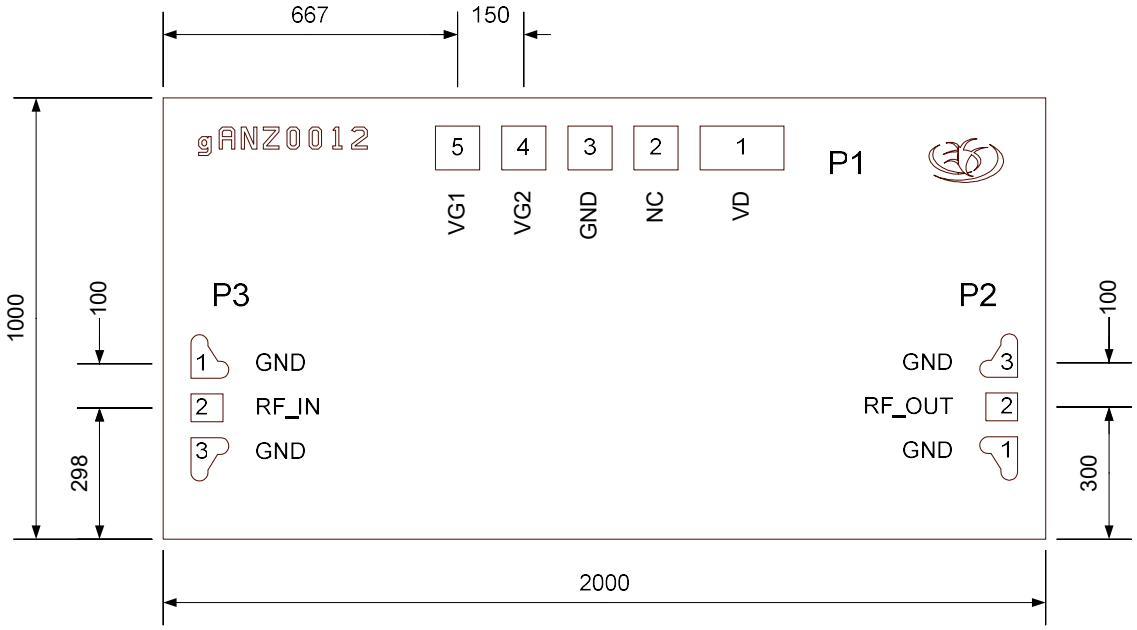

Figure 4. Outline drawing of the MMIC. Dimensions are in um.

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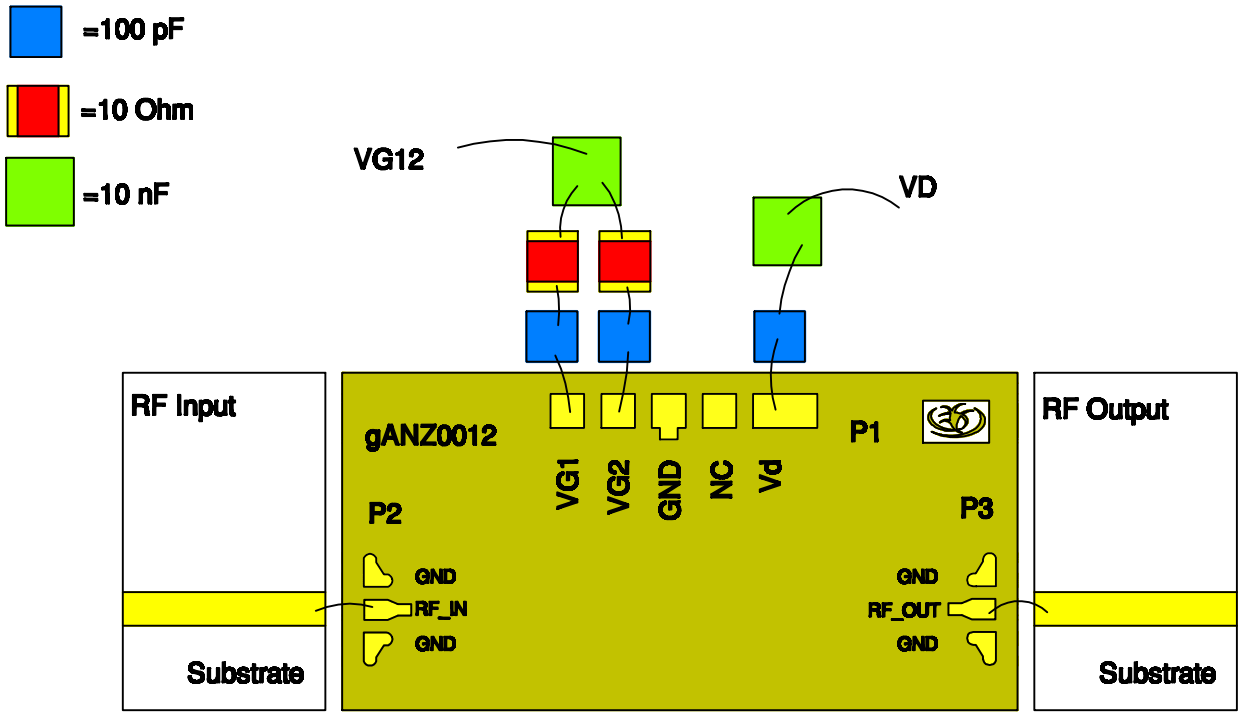
Recommended Assembly Diagram



Biasing Procedure

Turn on
1) Vg = - 2 V
2) Vd = +3 V
3) Adjust Vg to obtain Id = 75 mA

Turn off
1) Vd = 0V
2) Vg = 0V

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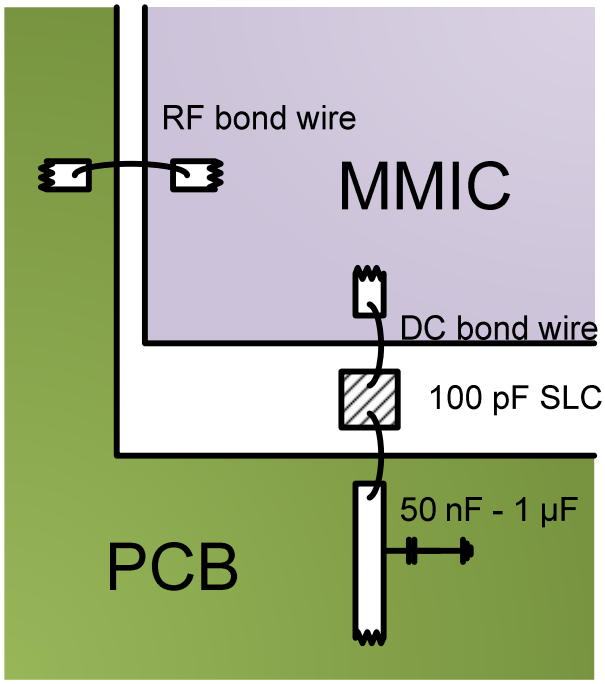
DIE ATTACH

The die mounting surface must be clean and flat. Our MMICs are all back metalized which also serves as ground. The back side must be both electrically and thermally connected using soldering or epoxy with high thermal and electrical conductivity. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030HK-PT/H579. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. The thickness of our MMICs is 50 µm (2 mil). For the best RF performance, the circuit board line should be at the same height. It is recommended to use antistatic die pick up tools only.

WIRE BONDING

Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the square gold bond pads. Bond force, time, ultrasonic power and temperature are all critical parameters for good attachment.



We recommend using 25 µm (1 mil) diameter bond wires or 75 µm × 12.5 µm (3 × 0.5 mil) ribbons. The width of the RF pads on the MMIC is 72 µm and DC is 90 µm. All RF bondwires should be kept as short as possible and not exceeding 300 µm. Long bond wires will result in an undesirable series inductance that is difficult to compensate for over large bandwidths. Bondwires to DC pads should preferably also be kept as short as possible.

Figure 1. Assembly diagram

To the DC pads, we recommended first bonding to a 100 pF SLC capacitor and then to a 50 nF-1 µF capacitor onto the circuit board.

Table 1. Typical wire dimensions for wedge bonding

Parameter	Min	Typ	Max	Unit
RF bond wire diameter	17	25	25	um
RF bond wire length	0	150	300	um
DC bond wire diameter	17	25	75	um
DC bond wire length	0	300	2000	um