

VWA-50014-AAAA
28 GHz – 17 dB – 21 dBm Medium Power MMIC

Description

The **VWA 50014 AA** MMIC is designed in 0.15µm low noise pHEMT process.

The device is capable of output voltage up to 8Vpp and has a saturation point above 21dBm. It covers frequency from DC to 28GHz, and is DC coupled. Design has been optimized to provide high efficiency, supply current is 200mA with Vb= +9V.

The MMICs integrate an output power monitoring function: a 24 dB tap coupler delivers the image of the output level on a dedicated pad, and a peak detector is available on the die. Connecting the input of the peak detector to the tap coupler output will generate a DC signal, at the output of the detector, monitoring the output signal. A reference diode is also available for temperature stabilization of the detector function.

S2P file can be provided for system design simulation.

GDSII file is also available for mechanical design.

Applications

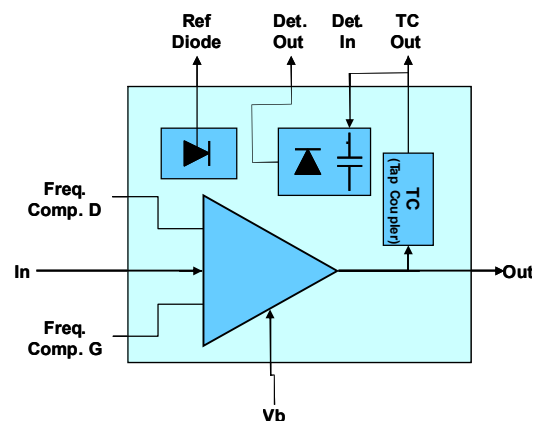
- Wide band Medium Power amplifier
- Radar / ECM / ECCM
- Test and measurement
- E2O driver up to 30 Gbps
- SONET/SDH
- Broadband communication
- Test and measurement

Features

- LN pHEMT GaAs MMIC
- Wideband: DC to 28GHz à 1dB
- Flat group delay up to 40Gb/s
- High output level up to 8 Vpp
- Psat > + 23 dBm
- 50Ω RF Single ended input and output
- DC coupled
- Low power consumption
- Positive voltage supply +9V, 200mA
- Integrated output power tap coupler
- Integrated output level detection
- Reference diode output
- 2,97 X 1,72 X 0,1 mm

Ordering information

Product code
VWA 50014 AA



Functional Block Diagram

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Typical Characteristics: $T_{amb} = 25^{\circ}\text{C}$, $V_{dd} = +9\text{V}$, $I_{dd} = 200\text{mA}$.

Parameter	Symbol	Min	Typ	Max	Unit
Frequency range	F		28		GHz
Gain	G		17		dB
Gain flatness with positive slope	ΔG		1		dB
Noise figure @ 10 GHz	NF		2,5		dB
Input adaptation	S11		12		dB
Output adaptation	S22		12		dB
Output power @ 1dB compression	P1dB		21		dBm
Saturated output power	PSat		23		dBm
Group delay variation up to 20GHz	$\Delta\Phi$		+/- 4		ps
Output tap coupler ratio	TC		24		dB
Drain supply voltage	Vdd		9		V
Supply current	Idd		200		mA

Environment Parameters	Symbols	Min	Max	Units
Storage temperature	Tst	-65	+150	$^{\circ}\text{C}$
Operating temperature	Top	-55	+85	$^{\circ}\text{C}$

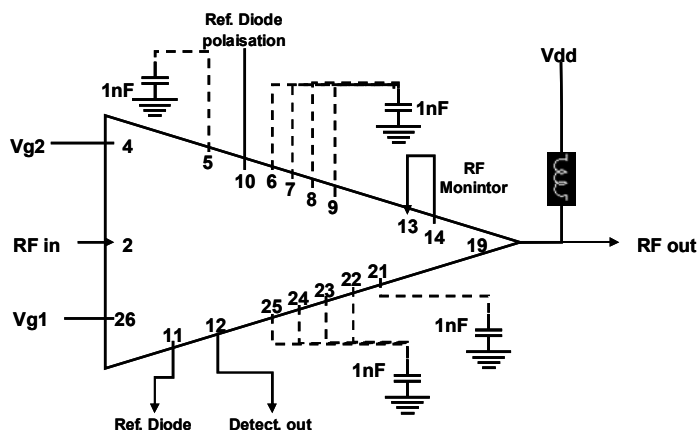
Absolute maximum ratings

Maximum ratings	Symbols	Min	Max	Units
Positive External DC bias voltage	Vdd		10	V
RF input power (In)	Pin max		+20	dBm
Temperature process max 20 secondes	T process		325	$^{\circ}\text{C}$
Continuous power dissipation (@ 85 $^{\circ}\text{C}$)	Pcw		1,8	W

Care should be taken to avoid supply transient and over voltage. Over voltage above the maximum specified in absolute maximum rating section may cause permanent damage to the device.

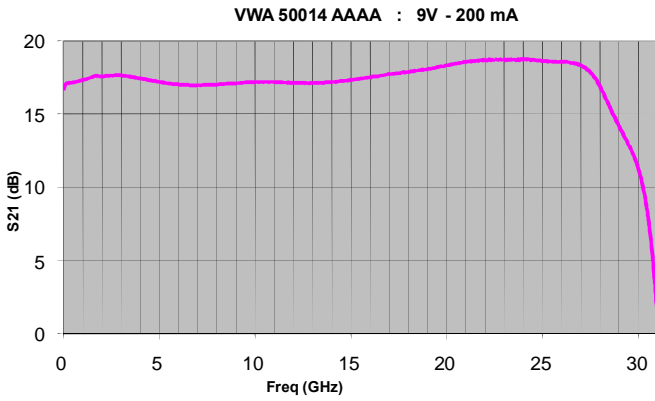
Application circuit

With internal detector

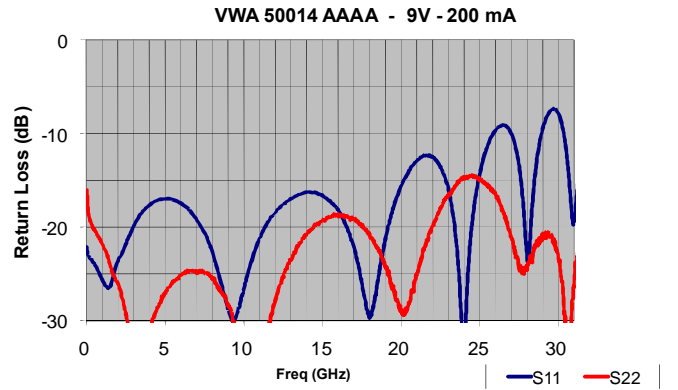


Probe measurement: Typical curves

Gain (dB) vs frequency (GHz)

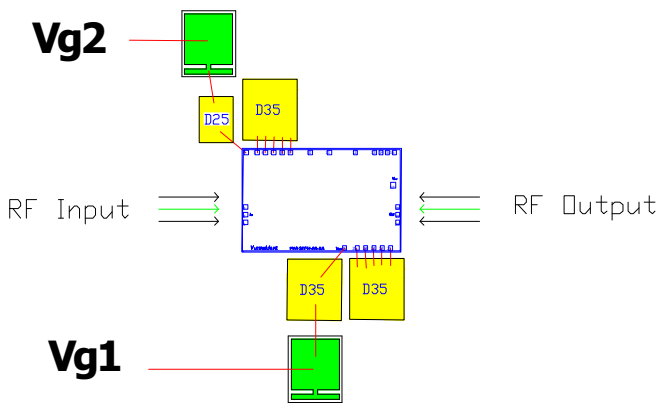


Return Loss (dB) vs frequency (GHz)

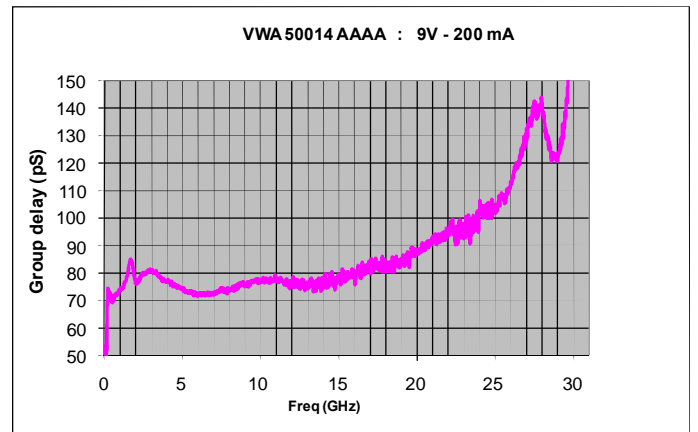


Probe Test configuration

(MIM capacitor D35=1nF D25=0.5nF->1nF)



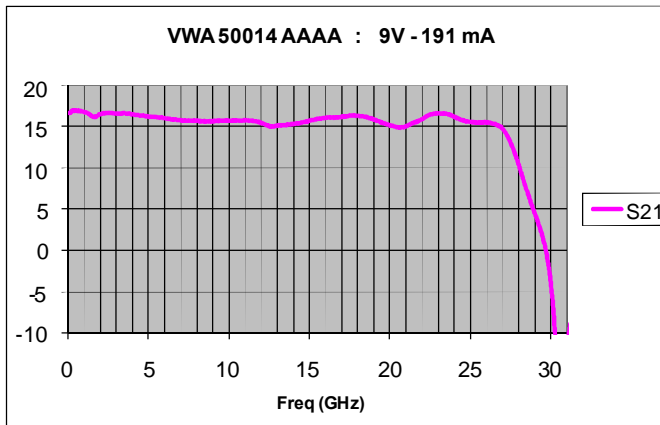
Group Delay (ps) vs frequency (GHz)



VWA 50014 AAAA Typical Performances in a "BNP1 Evaluation Housing"

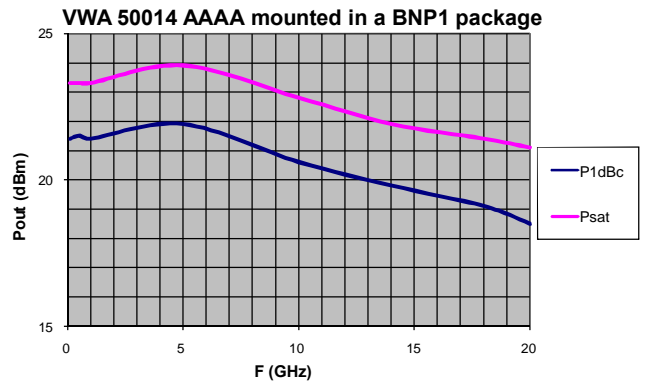
Gain (dB) vs frequency (GHz)

(Vg1=0V et Vg2=+2V)

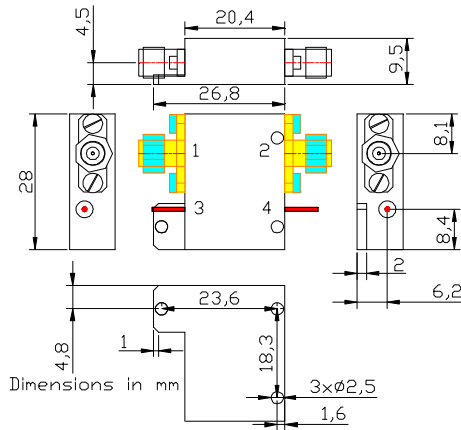


P1dB & PSat vs frequency (GHz)

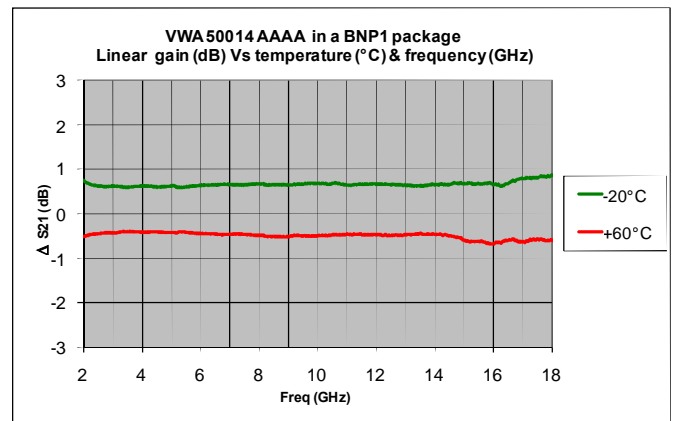
(Output IL in BNP1, estimated of 1,5 dB at 20GHz)

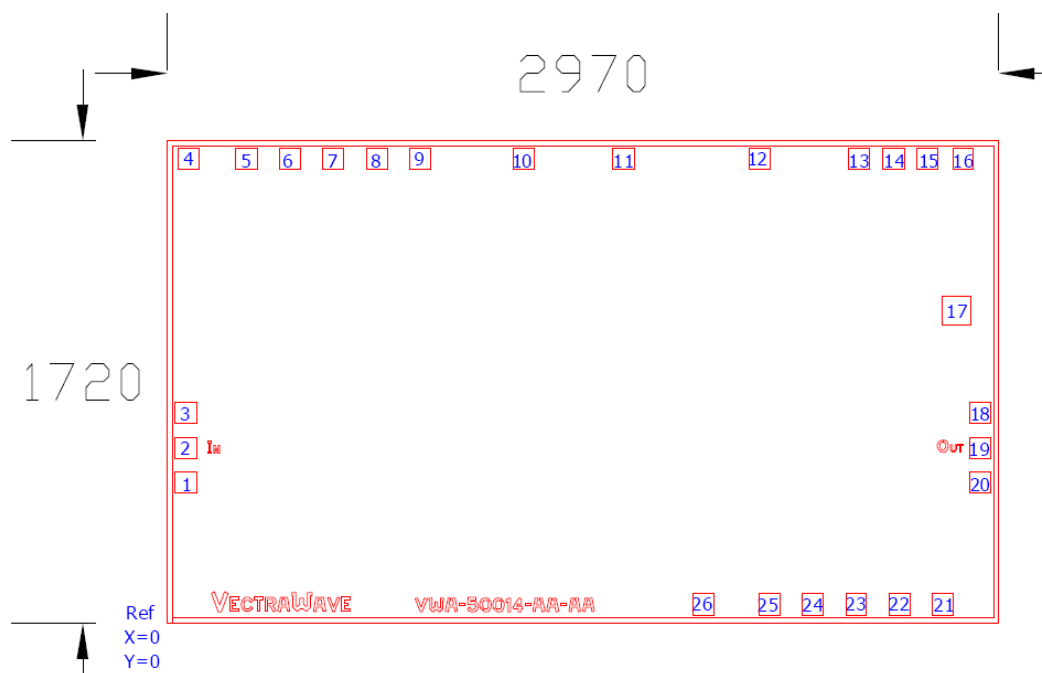


BNP1 Dimensions in mm



Gain (dB) Vs Temperature (°C)



Mechanical dimensions


Pad #	Name	Description	Position (x;y) μm	Pad #	Name	Description	Position (x;y) μm
1	GND	Ground – for probe test	68 - 499	14	TC Out	Output power tap coupler	2594 – 1653
2	In	RF Input - DC coupled- 50Ohm matched	68 - 624	15	RFL	50 Ohm adaptation of TC out when used externally	2716 – 1653
3	GND	Ground – for probe test	68 – 749	16	C0	Connect to 1nF to ground when RFL used	2843 – 1653
4	Vg2	Gate control 2 (positive voltage)	78 – 1653	17	Vb	Connected to positive supply voltage Vdd	2817 – 1113
5	D0	Connect to 1nF to ground	284 – 1653	18	GND	Ground – for probe test	2903 – 749
6	D1	Full band decoupling (same C as D0)	439 – 1653	19	Out	RF output - DC coupled- 50Ohm matched- connect to bias T	2903 – 624
7	D2	Full band decoupling (same C as D0)	594 – 1653	20	GND	Ground – for probe test	2903 – 499
8	D3	Full band decoupling (same C as D0)	749 – 1653	21	G0	Connect to 1nF to ground	2770 – 68
9	D4	Full band decoupling (same C as D0)	904– 1653	22	G1	Full band decoupling (same C as G0)	2615 – 68
10	VbDref	Polarization of reference diode –connect to Vdd	1273– 1653	23	G2	Full band decoupling (same C as G0)	2460 - 68
11	Dref	Reference diode ...	1630 – 1653	24	G3	Full band decoupling (same C as G0)	2305 – 68
12	Det Out	Output peak detector	2114 – 1653	25	G4	Full band decoupling (same C as G0)	2150 - 68
13	Det In	Input peak detector	2472 – 1653	26	Vg1	Gate control 1 (negative voltage)	1915 - 68

- All pads dimensions = 75 x 75 μm²; except pad 17 dimensions = 100 x 100 μm²
- Die thickness = 100μm
- Die bottom must be connected to ground (RF and DC)


Handling

These products are sensitive to electrostatic discharge and should not be handled except at a static free workstation. Take precautions to prevent ESD; use wrist straps, grounded work surfaces and recognized anti-static techniques when handling the MMIC.