

**VWA-50015-AAAA**  
**VWA-50015-ACAA**

**35 GHz – 10 dB – 15 dBm**  
**Low Noise MMIC**

**Description**

The **VWA-50015-AAAA** is an analog Low Noise/medium power MMIC amplifier for ultra wide band applications up to 40GHz, with flat group delay.

The **VWA-50015-ACAA** is the Mirror of the VWA-50015-AAAA, with similar performance.

Both devices are designed in 0.15µm low noise pHEMT process, and are ideal for differential driver application.

Both devices are capable of more than +15 dBm output power at 1dB compression point, and provide more than 10dB of gain from DC to 30 GHz with less than 1 dB of Gain variation with an excellent group delay up to 50GHz (less than +/- 3ps). The Design has been optimized to provide high efficiency, supply current is as low as 90mA with Vb=+6V to +8V.

The MMIC integrates 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.

**Features**

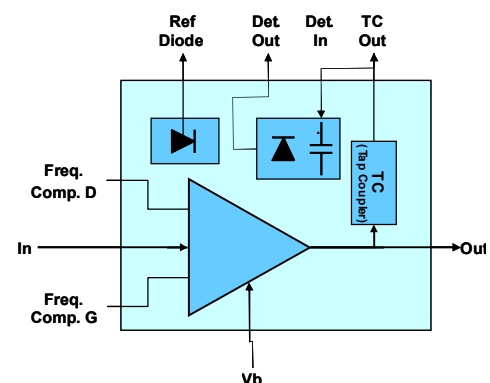
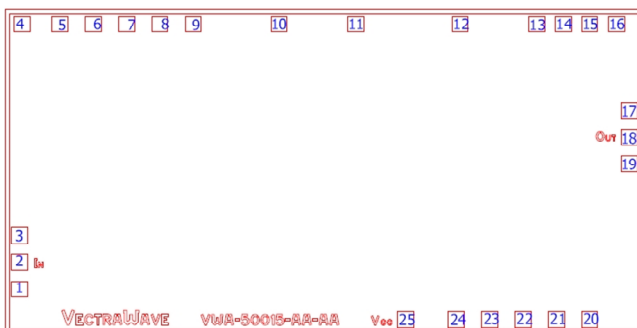
- LN pHEMT GaAs MMIC
- Wide band : DC – 35 GHz @ 1dB
- Flat group delay
- 50Ω RF Single ended input and output
- DC coupled
- Low power consumption<0,6W
- Positive voltage supply +6V to +8V
- Integrated output power tap coupler
- Integrated output level detection
- Reference diode output
- 2.97 x 1.52 x 0.10 mm

**Applications**

- Fiber transmission: 10 to 50 Gbps
- Differential Driver amplifiers
- Broadband communication
- Wide band Low Noise amplifier
- Radar / ECM / ECCM
- Test and Measurement

**Ordering information**

Product code
VWA 50015 AA
VWA 50015 AC



**Pin out and dimensions**  
**(2.97 X 1.52 X 0.10 mm)**

**Functional Block Diagram**

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VWA 50015 AA & AC DS Rev1.0 VectraWave Proprietary information subject to change



**光貿易株式会社**

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**Typical Characteristics:** Tamb = 25°C, Vdd = +8V, Idd = 80mA.

Parameter	Symbol	Min	Typ	Max	Unit
Frequency range	F		35		GHz
Gain	G		10		dB
Gain flatness	$\Delta G$		1		dB
Noise figure @ 10 GHz	NF		2		dB
Input adaptation	S11		12		dB
Output adaptation	S22		12		dB
Output power @ 1dB compression	P1dB		15		dBm
Saturated output power	PSat		16		dBm
Group delay variation	$\Delta\Phi$		+/- 3		ps
Output tap coupler ratio	TC		24		dB
Drain supply voltage	Vdd		8		V
Supply current	Idd		100		mA

Environment Parameters	Symbols	Min	Max	Units
Storage temperature	Tst	-65	+150	°C
Operating temperature	Top	-55	+85	°C

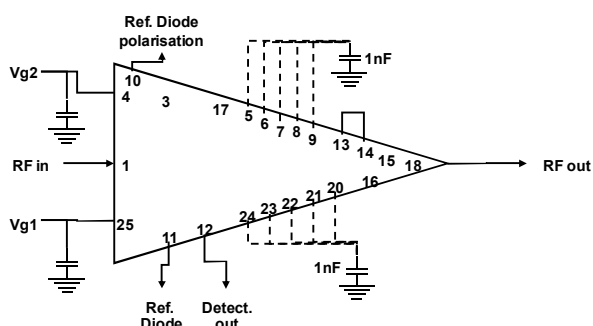
### Absolute maximum ratings

Maximum ratings	Symbols	Min	Max	Units
Positive External DC bias voltage	Vdd		9	V
RF input power (In)	Pin max		+20	dBm
Temperature process max 20 secondes	T process		325	°C
Continuous power dissipation (@ 85°C)	Pcw		0,6	W

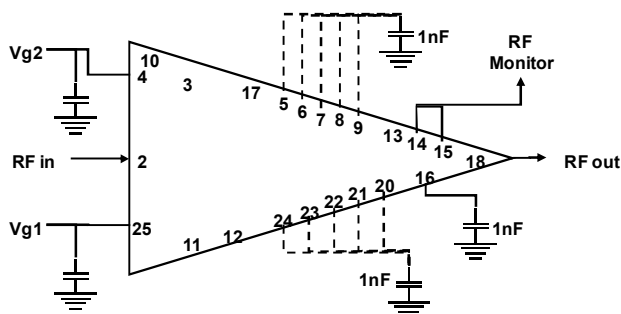
Care should be taken to avoid supply transient and over voltage. Over voltage above the maximum specified in absolute maximum rating section may cause permanent damage to the device.

### Application circuit

with internal detector



with external detector



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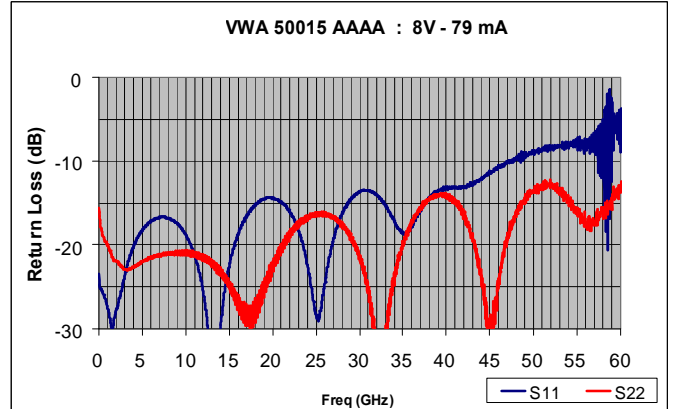
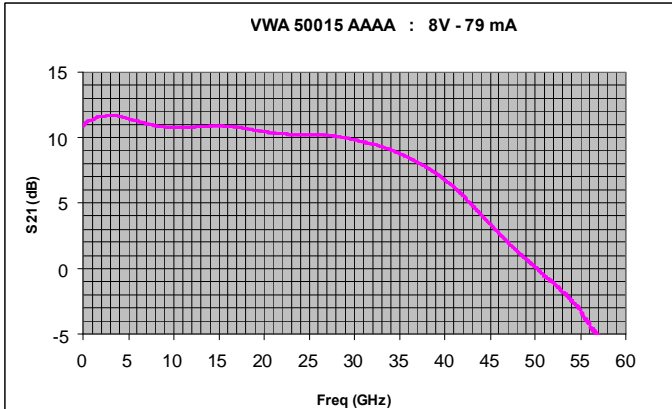
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**VWA 50015 AAAA: Probe measurement (Typical curves)**

**Gain (dB) vs frequency (GHz)**

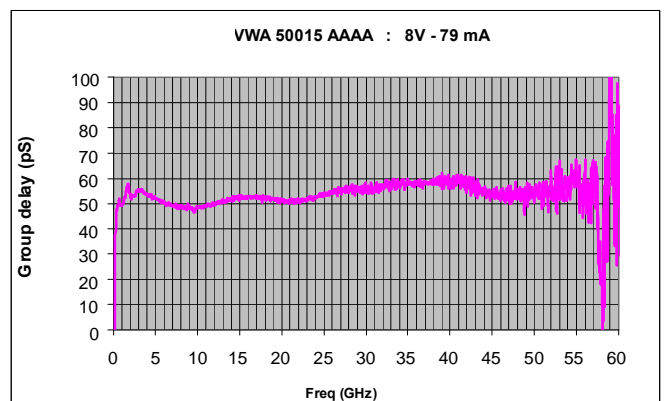
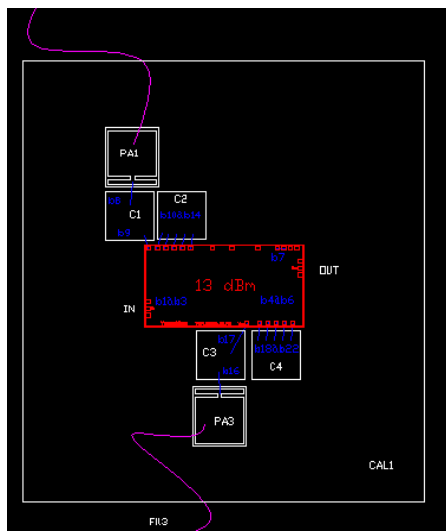
**Return Loss (dB) vs frequency (GHz)**



**Probe Test configuration**

**Group Delay (ps) vs frequency (GHz)**

C1, C2, C3, C4: 1000 pF capacitor



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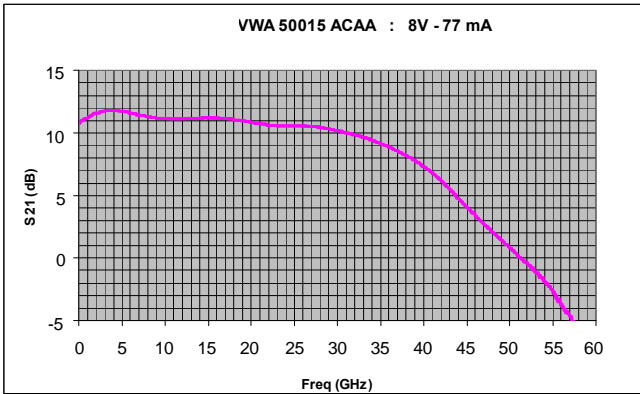


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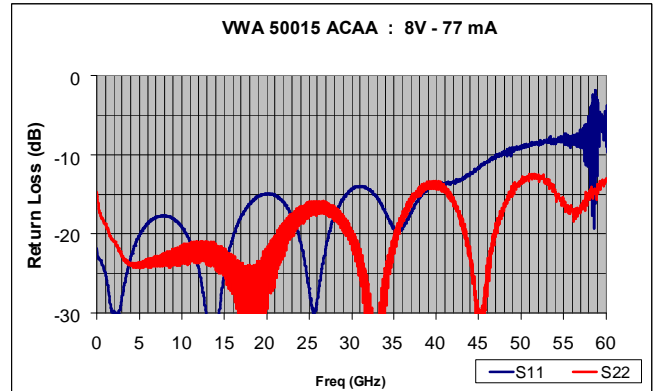
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**VWA 50015 ACAA (Die Mirror): Probe measurement (Typical curves)**

**Gain (dB) vs frequency (GHz)**

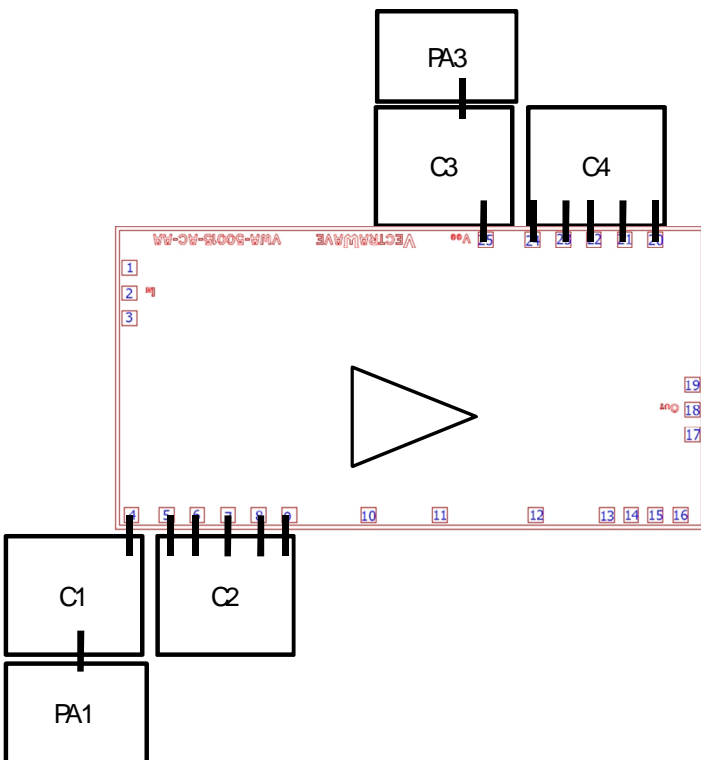


**Return Loss (dB) vs frequency (GHz)**

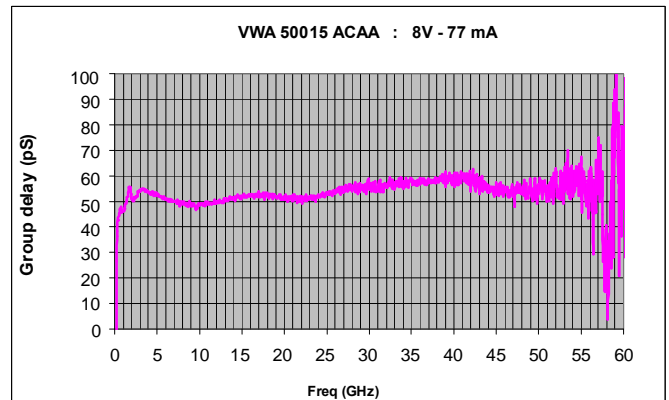


**Probe Test configuration**

C1, C2, C3, C4: 1000 pF capacitor



**Group Delay (ps) vs frequency (GHz)**



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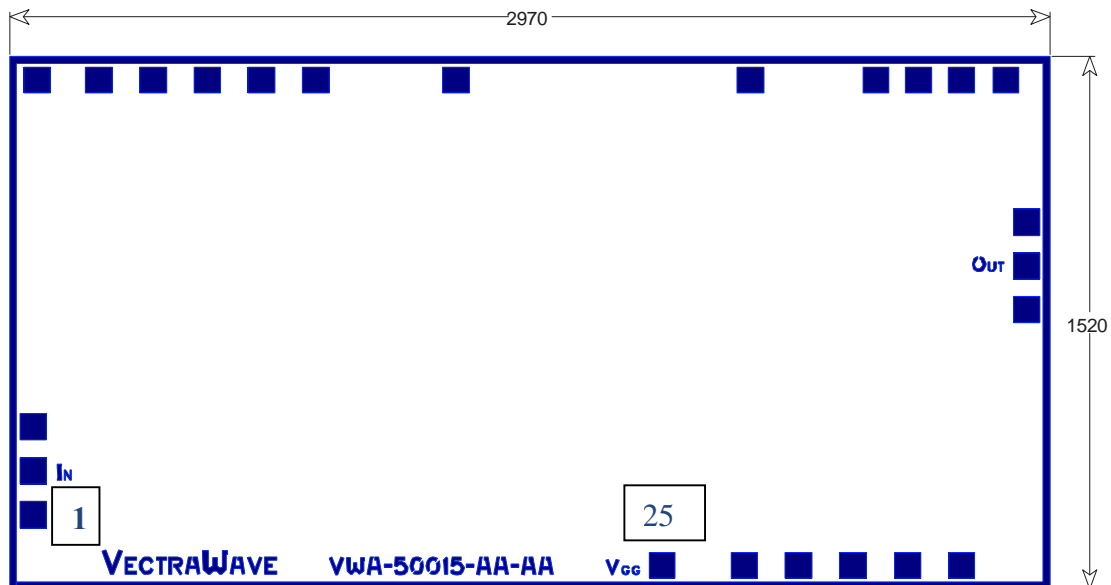
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**VWA-50015-AAAA Pin out and pad description**


Pad #	Name	Description	Pad #	Name	Description
1	GND	Ground – for probe test	14	TC Out	Output power tap coupler
2	In	RF Input - DC coupled- 50Ohm matched	15	RFL	50 Ohm adaptation of TC out when used externally
3	GND	Ground – for probe test	16	C0	Connect to 1nF to ground when RFL is used
4	Vg2	Gate control 2 (positive volatge)	17	GND	Ground – for probe test
5	D0	Connect to 1nF to ground	18	Out	RF output - DC coupled- 50Ohm matched- Conect to Bias T
6	D1	Full band decoupling (same C as D0)	19	GND	Ground – for probe test
7	D2	Full band decoupling (same C as D0)	20	G0	Connect to 1nF to ground
8	D3	Full band decoupling (same C as D0)	21	G1	Full band decoupling (same C as G0)
9	D4	Full band decoupling (same C as D0)	22	G2	Full band decoupling (same C as G0)
10	VbDref	Polarization of reference diode –connect to	23	G3	Full band decoupling (same C as G0)
11	Dref	Reference diode ...	24	G4	Full band decoupling (same C as G0)
12	Det Out	Output peak detector	25	Vg1	Gate control 1...(negative voltage)
13	Det In	Input peak detector			

- All pads dimensions = 75 x 75  $\mu\text{m}^2$ ; except pad 9 dimensions = 100 x 100  $\mu\text{m}^2$
- Die thickness = 100 $\mu\text{m}$
- Die bottom must be connected to ground (RF and DC)

**Handling**

This product is 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 **VWA-50015-AA-AA** MMIC.



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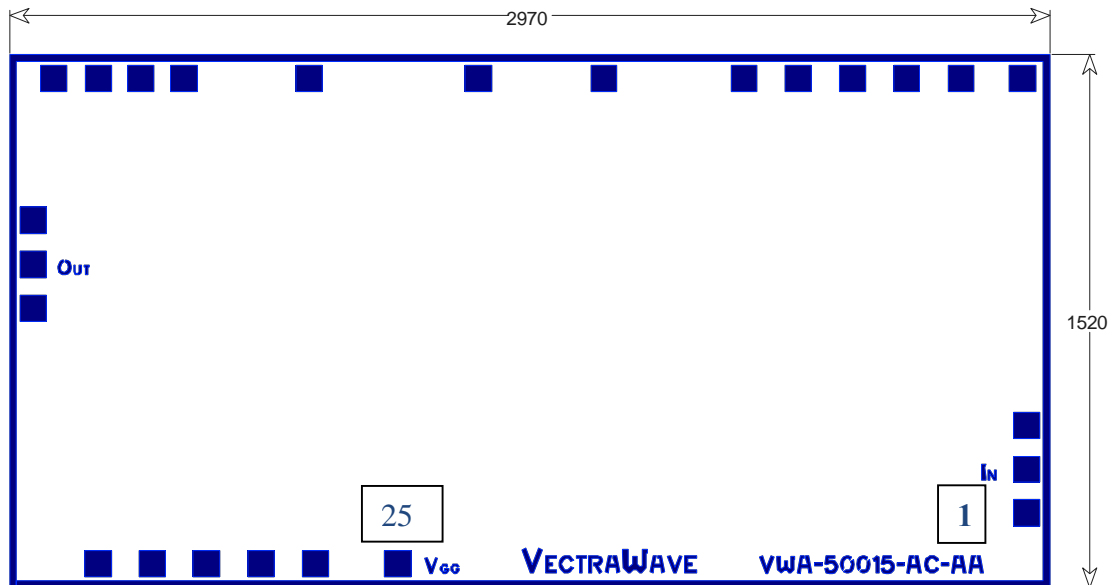
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**VWA-50015-ACAA (Die Mirror) Pin out and pad description**


Pad #	Name	Description	Pad #	Name	Description
1	GND	Ground – for probe test	14	TC Out	Output power tap coupler
2	In	RF Input - DC coupled- 50Ohm matched	15	RFL	50 Ohm adaptation of TC out when used externally
3	GND	Ground – for probe test	16	C0	Connect to 1nF to ground when RFL is used
4	Vg2	Gate control 2 (positive volatge)	17	GND	Ground – for probe test
5	D0	Connect to 1nF to ground	18	Out	RF output - DC coupled- 50Ohm matched- Conect to Bias T
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