Low Noise Amplifier

8 to 12GHz - 19dB - 1.0dB NF QFN Single Bias

DATA SHEET **VWA 0001148 AA**

General Description

The **VWA 0001148 AA** is a low noise amplifier MMIC operating in the frequency range 8 to 12GHz. The device is packaged in a 3x3 mm 16 lead Plastic Surface Mount Package (ROHS). This component uses VWA 5001134 AA VectraWave die.

The device has a linear gain of 19 dB and a typical noise figure of 1.0 dB. Typical operating supply current is only 30 mA with a supply voltage at +3 V. It is manufactured on a PHEMT Technology and is especially suited for radar and for telecommunication applications.

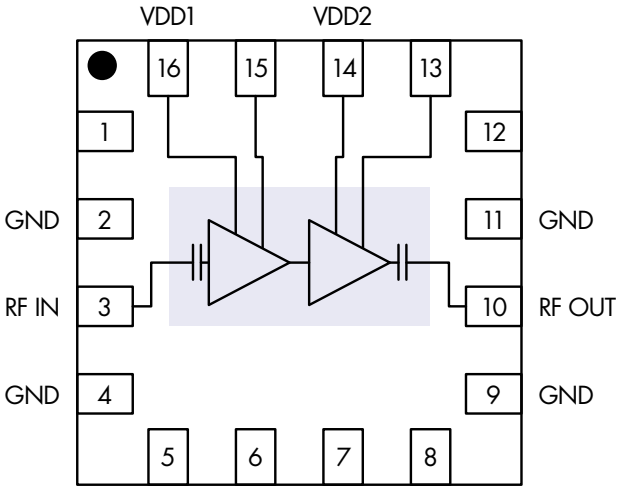
Features

- Operating frequency range: 8 to 12GHz
- Gain: 19dB
- Noise figure: 1.0dB
- Gain Flatness: +/- 0.5dB
- Input Return Loss: -10dB typ.
- Output Return Loss: -12dB typ.
- Power supply: 30mA @ +3V
- Package: QFN 3 x 3mm 16 Lead

Applications

- **Radar**
- **Test and measurement**
- **Telecommunications**

Functional Block Diagram & Pins Assignment



Pin	Name
1	NC
2	GND
3	RF in
4	GND
5	NC
6	NC
7	NC
8	NC

Pin	Name
9	GND
10	RF out
11	GND
12	NC
13	NC
14	VDD2
15	NC
16	VDD1

Electrical Specifications

Test conditions unless otherwise noted: • T_{amb} = +25°C

• ID = 30mA • VDD = VDD1 = VDD2 = +3V • Measurement reference plane: QFN accesses

Symbol	Parameter	Min	Typ	Max	Unit
F	Frequency range	8		12	GHz
G	Linear gain		19		dB
ΔG	Small signal gain flatness		+/-0.5		dB
NF	Noise Figure		1.0		dB
OP1dB	Output power at 1dB compression		7		dBm
Psat	Saturated Output Power		9		dBm
S11	Input Return loss		-10		dB
S22	Output Return loss		-12		dB
VDD1_2	Operating supply voltage		+3		V
IDD	Supply current		30		mA

Absolute Maximum Ratings

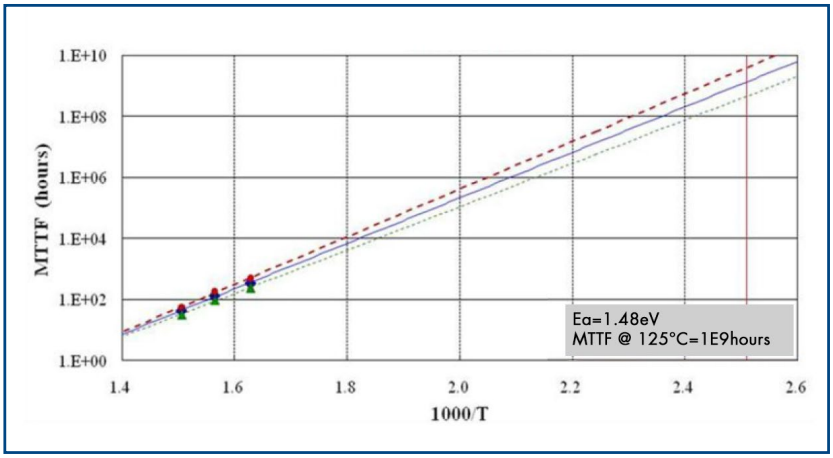
Symbol	Maximum Ratings	Min	Max	Unit
VDD1_2	Drain voltage		+4	V
Pin	CW Input Power		+10	dBm
Tst	Storage temperature	-55	+125	°C
Top	Operating temperature	-40	+85	°C
Tch	Channel temperature		+150	°C

Operation of this device above any of these parameters may cause permanent damage.

MTTF (Provided by Foundry)

The values shown here are calculated, only to be used as a guideline and represent reliability information under Vds=+5V and drain current of 267mA/mm.

0.15μm Low noise pHEMT
(PL15-10) / MTTF Test Arrhenius Plot



10% failure line : MTTF @ 125C=4.7E8
50% failure line : MTTF @ 125C=1E9
90% failure line : MTTF @ 125C=4.1E9

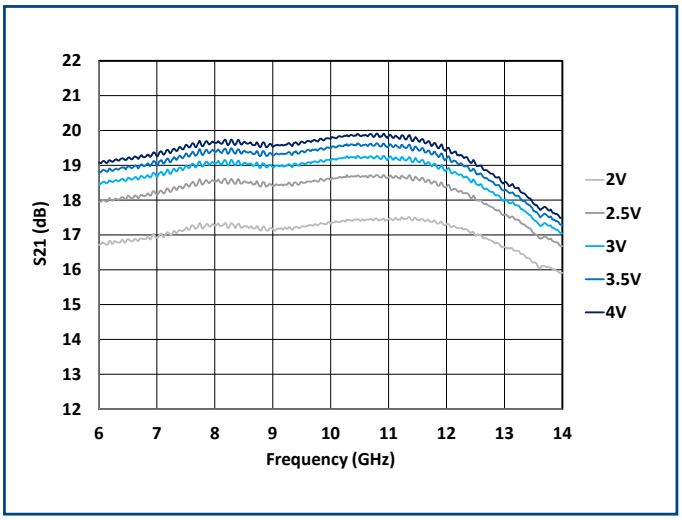
Typical performances (Board measurements)

Measurement conditions otherwise noted:

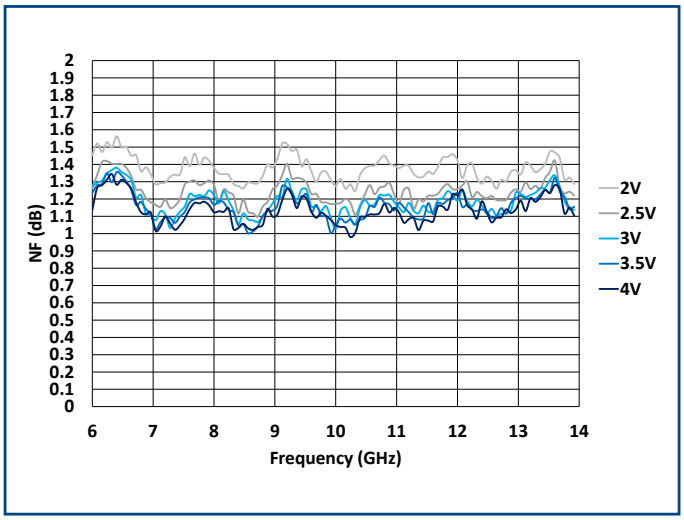
Measurement results reference plane at the QFN accesses.

- Tamb = +25°C
- VDD = VDD1 = VDD2 = +3V
- Typically, IDD = IDD1 + IDD2 = 30mA

Small signal Gain (dB)

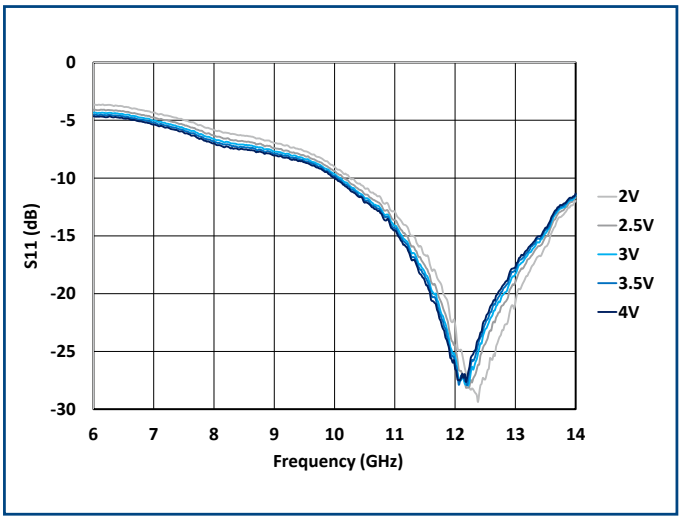


Noise Figure (dB)*

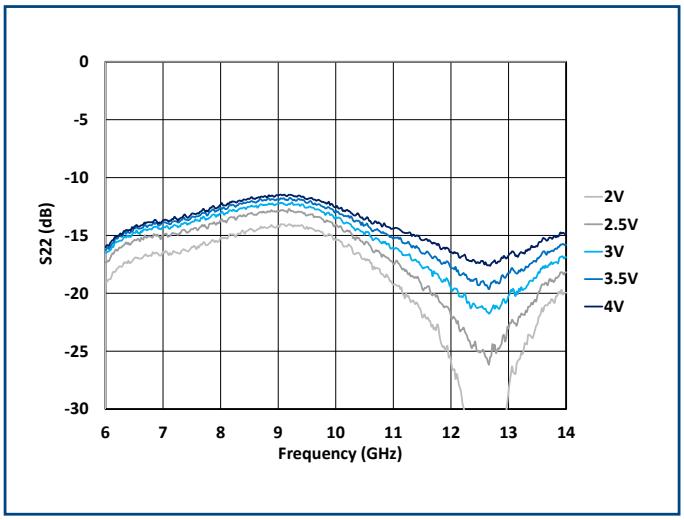


**Setup measurement is given with accuracy of 0.2 dB.*

Input Return Loss (dB)

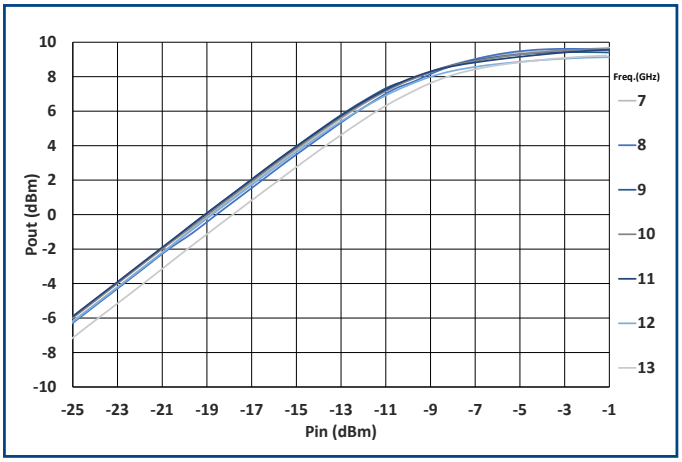


Output Return Loss (dB)

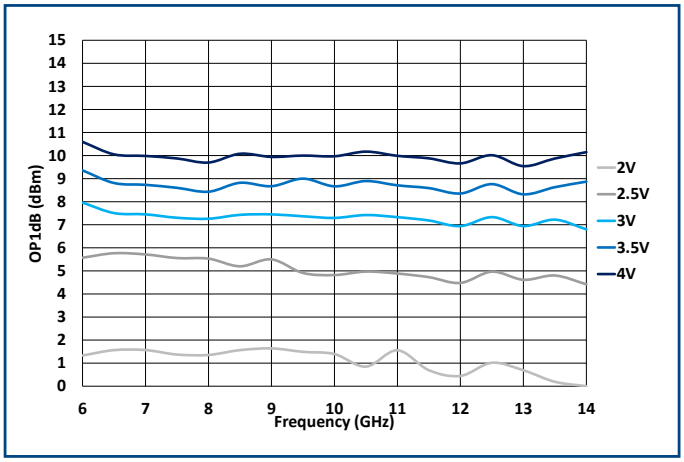


Typical performances (Board measurements)

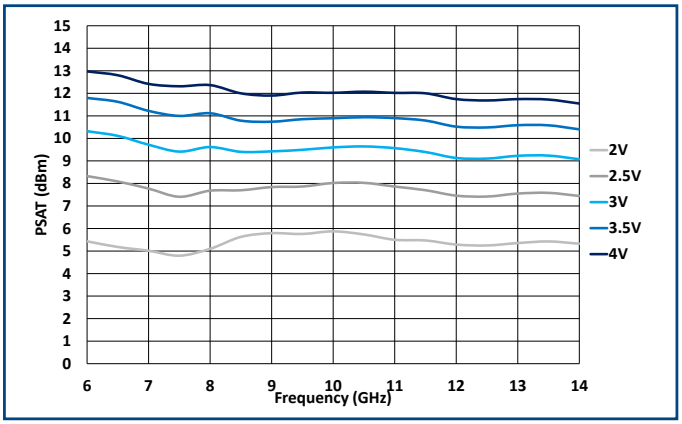
Output power VS Input Power @ VDD=3V



P1dB vs Frequency



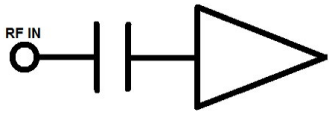
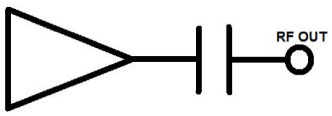
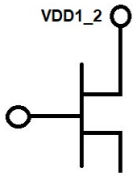
Psat vs Frequency



IDD vs VDD

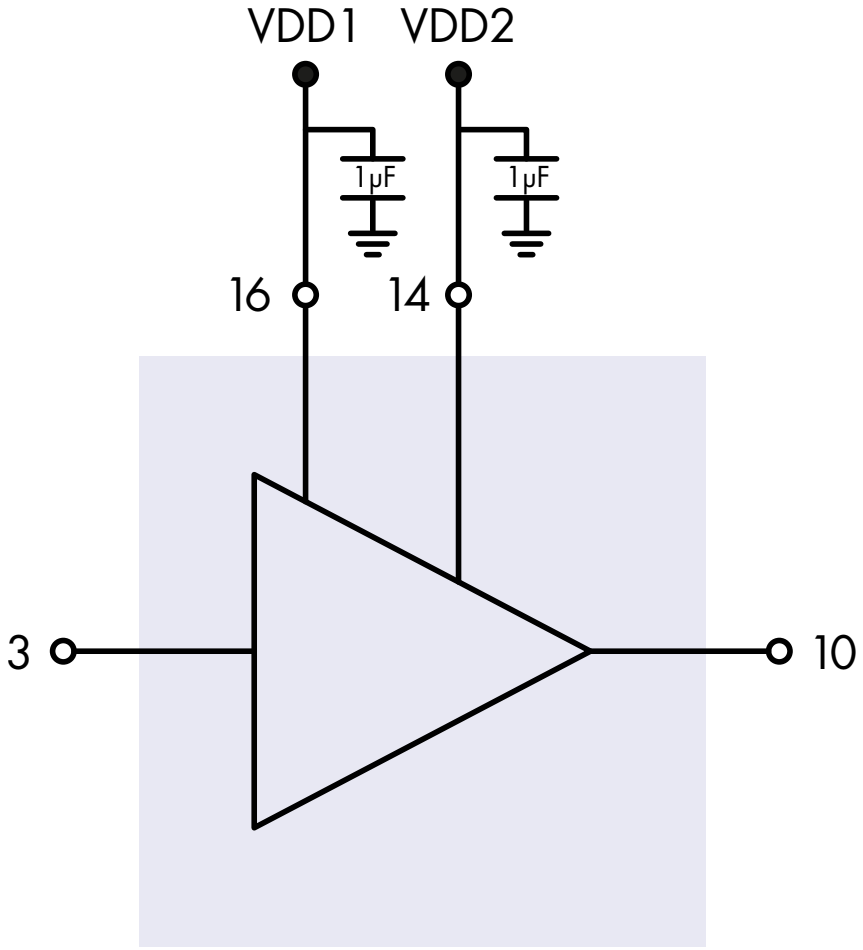
VDD (V)	IDD (mA)
2 V	23.5 mA
2.5 V	27 mA
3 V	30 mA
3.5 V	34 mA
4 V	38 mA

Pin description

Pin number	Name	Description	Electrical interface
3	RFin	AC coupled, amplifier input access. Internally matched 50 Ohms.	
10	RFout	AC coupled amplifier output access. Internally matched 50 Ohms.	
16, 14	VDD1, VDD2	1st stage and 2nd stage drain biasing access	
Exposed Pad	GND	Ground Pad must be connected to RF and DC Ground	

Application circuit

- 1 µF SMD Capacitors as close as possible to the QFN



Biasing procedure

Switch on

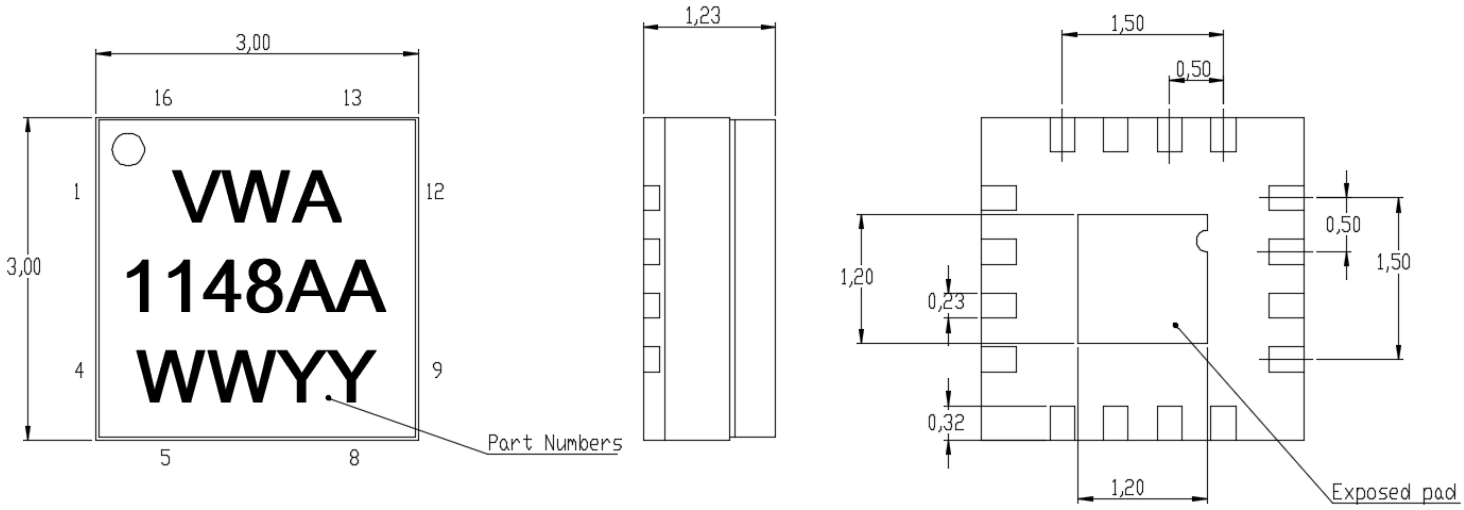
1. Set VDD1, VDD2 to +3V
2. Turn RFin ON

Switch off

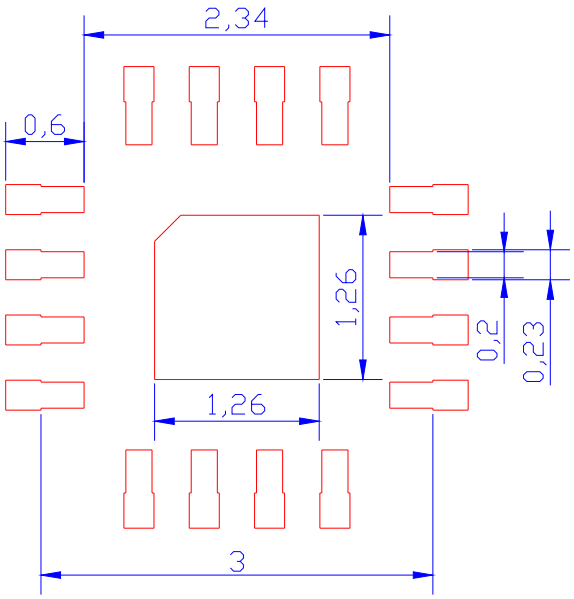
1. Turn RFin OFF
2. Decrease VDD1, VDD2 to 0V

Mechanical Drawing

- QFN exposed PAD must be connected to ground (RF and DC)

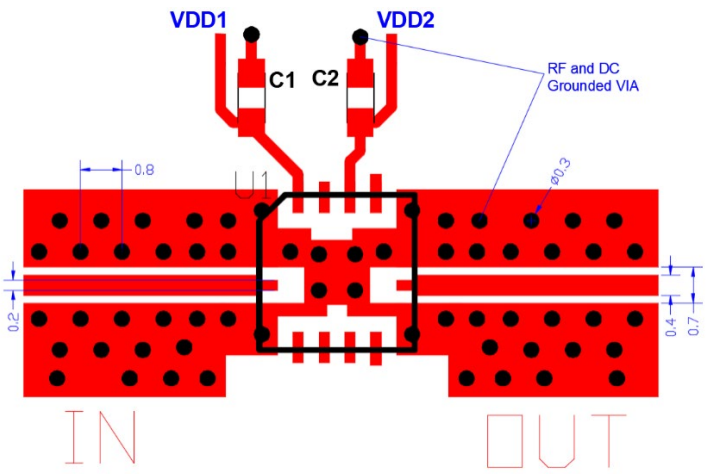


Recommended Land pattern



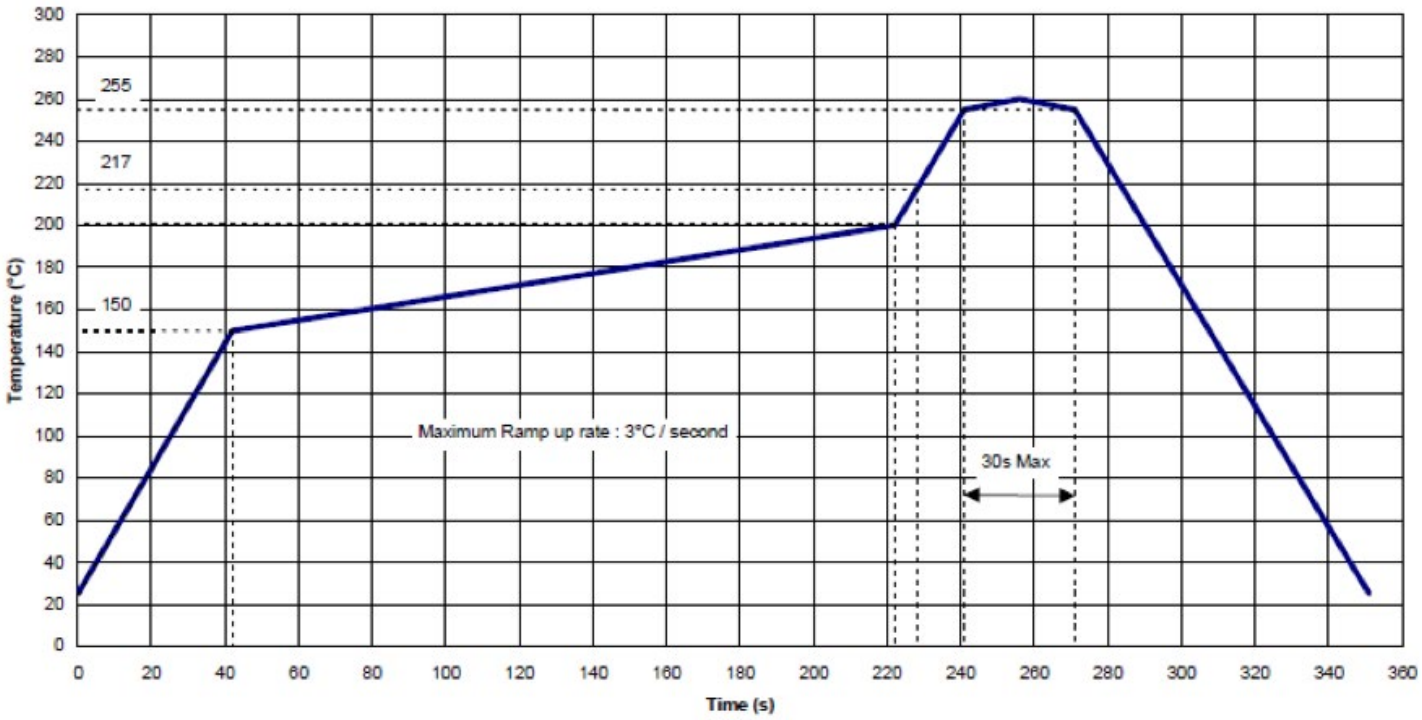
Suggested Board Layout

- C1, C2: 0402 1 µF/16V capacitor
- Substrate: RO4350B, thickness 0.254mm



Soldering Recommandations

- Solder Stencil thickness : 127µm
- Solder : SAC 305 (ROHS)
- Temperature profile example : maximum recommended reflow profile (leadfree)



Ordering Information

Product Code	Definition
VWA 0001148 AA	8 to 12GHz – 19dB – 1.0dB NF Low noise Amplifier

Associated Material

Product Code	Definition
Packaged die Evaluation Board (packaged die EVB)	Contact factory
Mechanical files (DXF)	Contact factory
Measurents files (S2P)	Contact factory

Product Compliance Information

Sensitivy Rating :

Test : Human Body Model (HBM)
Standard : JEDEC Standard JESD22-A114

CAUTION ! ESD-Sensitive device

RoHS-Compliance :

This part is compliant with EU 2011/65/ EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).
This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C15H12Br402) Free
- PFOS Free
- SVHC Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about Vectrawave:

Vectrawave SA
5, rue Louis de Broglie
22 300 Lannion - FRANCE

www.vectrawave.com
Email sales: contact_sales@vectrawave.com
Tel sales:+33 (0)2 57 63 00 20

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