

## Wide Band AC Low Noise Amplifier 16GHz-24GHz



### Product Description

RAMP16G24GA is a wideband AC low noise amplifier with a frequency range of 16 to 24GHz.

The power output of this amplifier is 18dBm typical. The typical gain is 23dB with a flatness of  $\pm 0.5$ dB.

The AC amplifier uses a standard convenient 110V/220 VAC power supply.

### Features

- Wide Band AC Low Noise Amplifier
- Small Signal Gain 23dB Typical
- Output Saturation Power 20dBm Typical
- Supply Voltage 110/220 VAC
- 50 Ohm Matched

### Typical Applications

- Wireless Infrastructure
- Military and Aerospace Applications
- Test Instrumentation
- Radar Systems
- 5G Wireless Communications
- Microwave Radio Systems
- TR Modules
- Research and Development
- Cellular Base Stations

### Electrical Specifications ( $T_A = +25^\circ\text{C}$ )

Parameter	Min	Typ	Max	Units
Frequency Range	16		24	GHz
Small Signal Gain	20	23	27	dB
Gain Flatness		$\pm 0.5$		dB
Gain Variation Over Temperature ( $-40^\circ\text{C} \sim +85^\circ\text{C}$ )		$\pm 1.0$		dB
Noise Figure		1.8	2.3	dB
Input VSWR		2.0		: 1
Output VSWR		1.8		: 1
Output 1dB Compression Point (P1dB)	13	18		dBm
Saturated Output Power (Psat)		20		dBm
Output Third Order Intercept (OIP3)		25		dBm
Supply Current (AC 110~220V)		100	200	mA
Isolation S12		-55		dB
Weight		-		lbs.
Impedance		50		Ohms
Input / Output Connectors	SMA-Female			
Package	Epoxy Sealed (Standard)			
	Hermetically Sealed (Optional)			

**Absolute Maximum Ratings**

Parameter	Rating
Supply Voltage Range	110~240 VAC
*RF Input Power (RFIN)	+20dBm

**Bias Up Procedure**

1. Connect input and output with 50 Ohm source and load with in band return loss better than 10dB.
2. Connect AC Plug
3. Flip switch to "ON" position

**Bias Down Procedure**

1. Flip switch to "OFF" position
2. Remove AC Plug
3. Remove RF Connection

**Environmental Specifications and Test Standards**

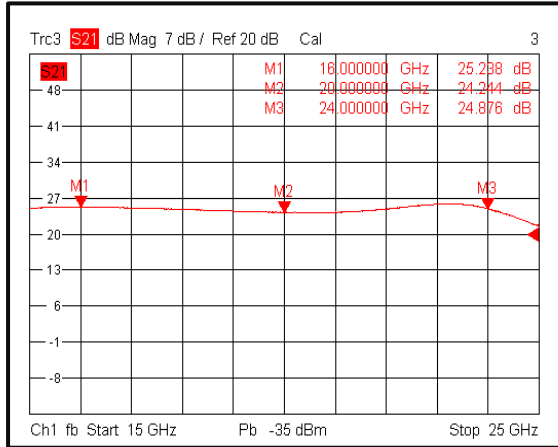
Parameter	Description
Operational Temperature	-40°C to +85°C (Case Temperature)
Storage Temperature	-50°C to +105°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for 72 Hours
Shock	1. Weight >20g, 50g half sine wave for 11ms, Speed variation 3.44m/s 2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s 3. Total 18 times (6 directions, 3 repetitions per direction).
Altitude	Standard: 30,000 Ft (Epoxy Sealed Controlled Environment) Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)
Hermetically Sealed (Optional)	MIL-STD-883 (For Hermetically Sealed Units)

\*Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.

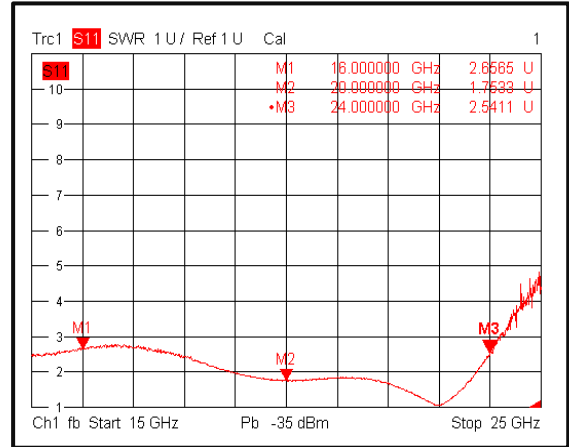
\*\*For vibration testing details please see additional information section.

Typical Performance Plots

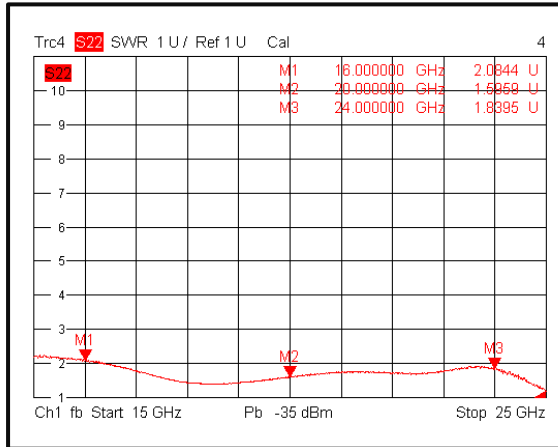
Gain@+25°C



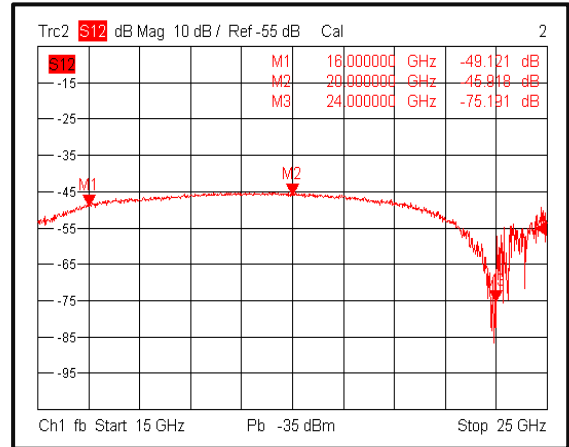
Input VSWR@+25°C



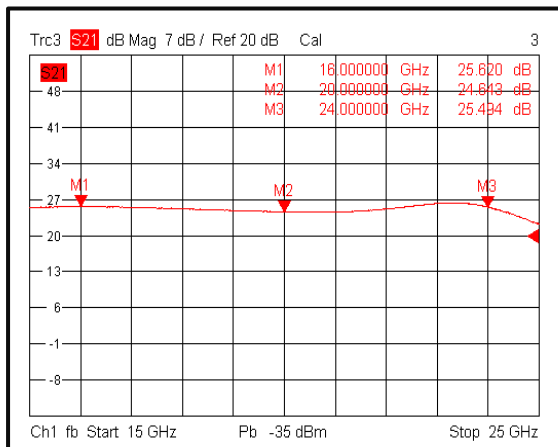
Output VSWR@+25°C



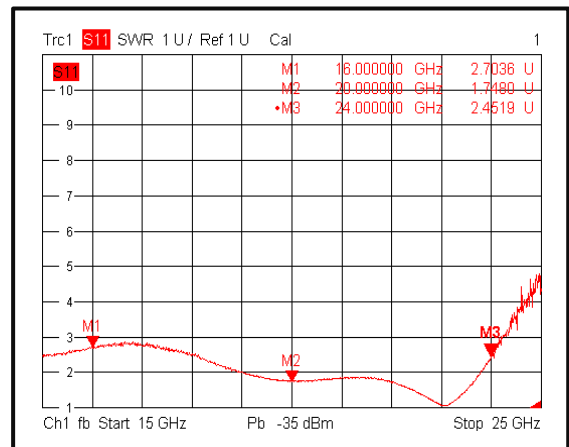
Isolation@+25°C



Gain@-40°C

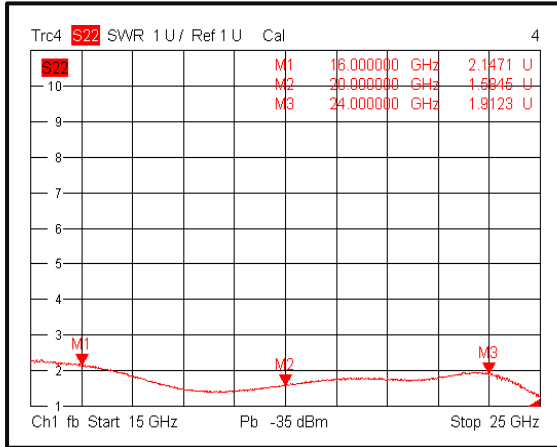


Input VSWR@-40°C

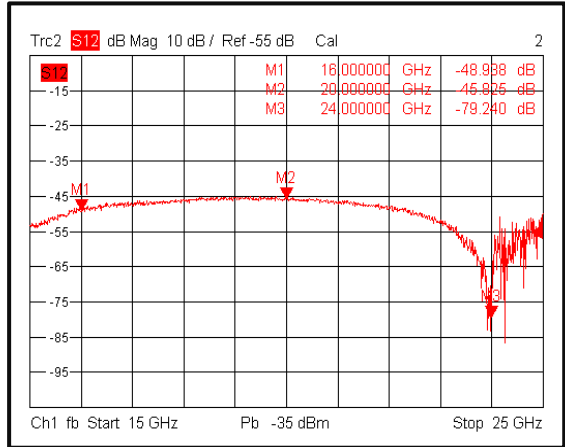


Typical Performance Plots

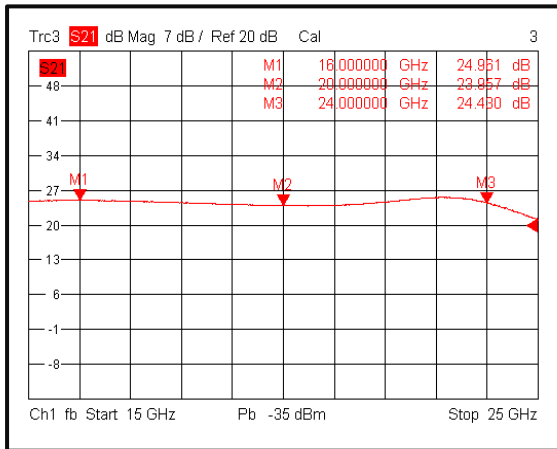
Output VSWR@-40°C



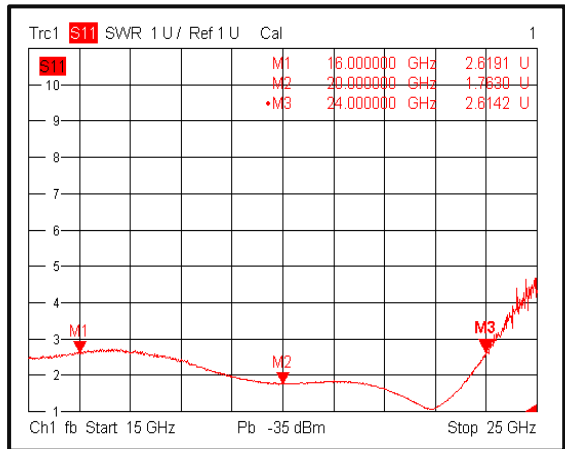
Isolation@-40°C



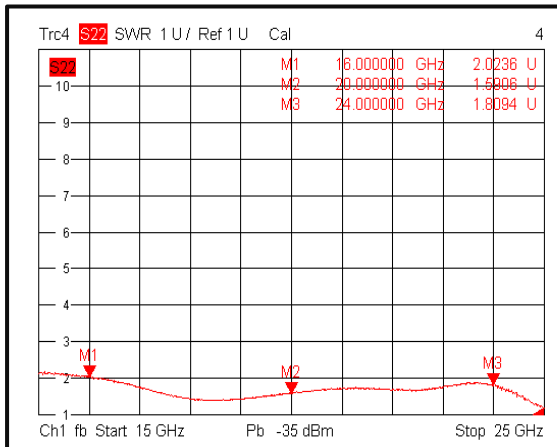
Gain@+85°C



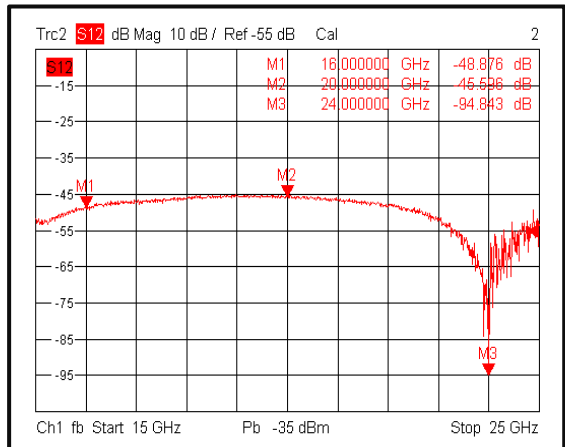
Input VSWR@+85°C



Output VSWR@+85°C

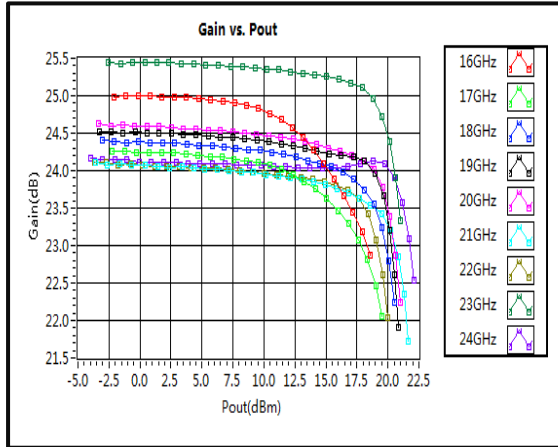


Isolation@+85°C

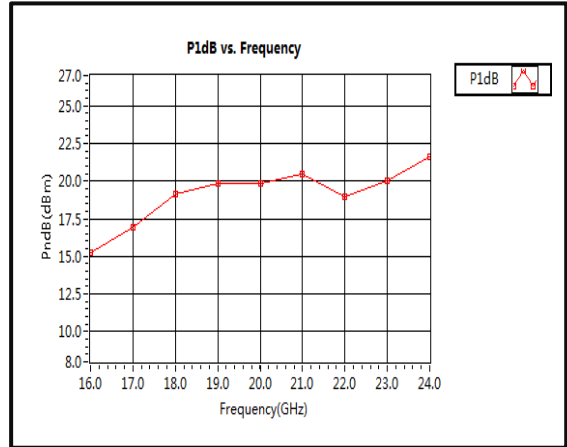


Typical Performance Plots

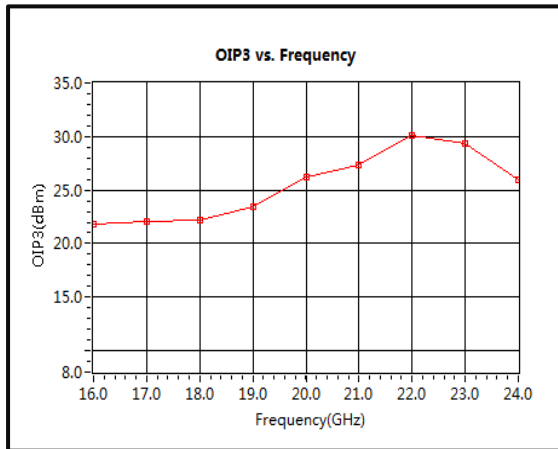
Gain vs. Output Power



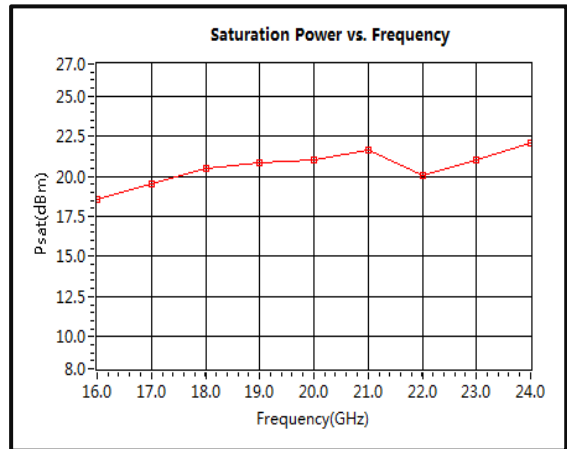
P1dB vs. Frequency



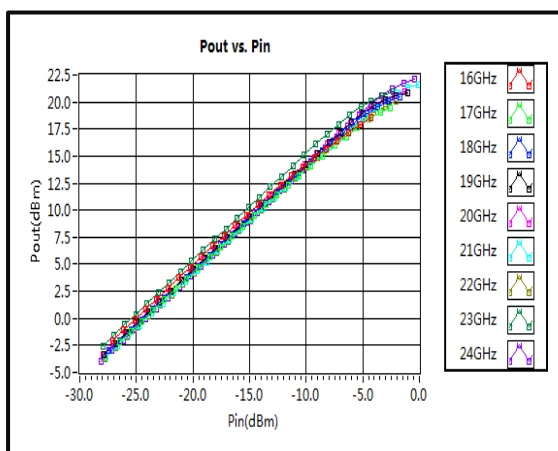
Output Third Order Intercept (OIP3)



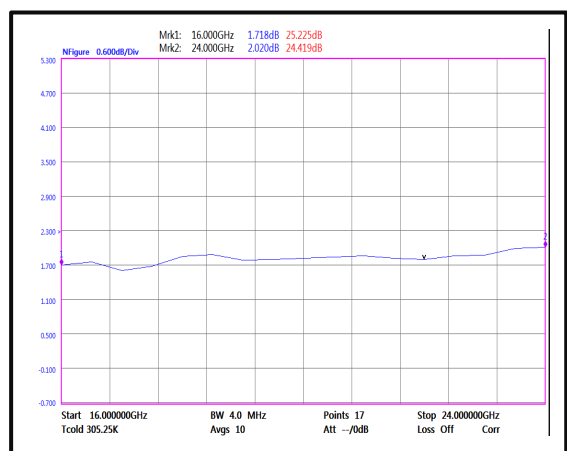
Saturation Power vs. Frequency



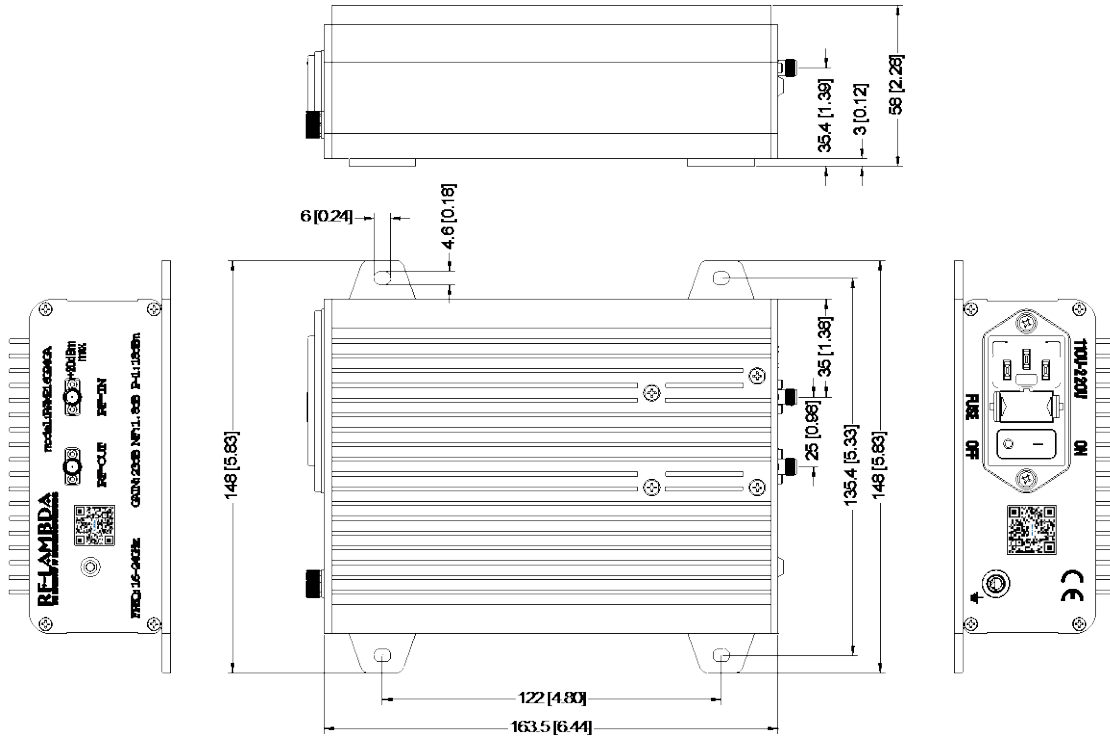
Pout vs. Pin



Noise Figure (4GHz-12GHz)

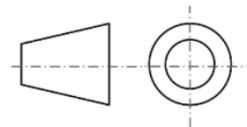


**Outline Drawing**



Notes:

1. Package Material: Aluminum
2. Plating: Black Paint
3. All dimensions are in millimeters [inches].
4. Housing Tolerances  $\pm 0.15$  [0.006] unless otherwise specified (Excl Heat Sink).
5. Heat sink required during operation (sold separately). Matching heatsink is listed on our website. If customer would like to use their own cooling method, please make sure the amplifier will operate under the specs that listed in page 2 of this datasheet.
6. Standard torque wrench must be used to secure RF connectors.



Additional Information

Documentation	Webpage
ESD Policy	<a href="https://rflambda.com/pdf/rflambda_esd_control.pdf">https://rflambda.com/pdf/rflambda_esd_control.pdf</a>
Heatsink Lookup Specifications	<a href="https://rflambda.com/search_heatsink.jsp">https://rflambda.com/search_heatsink.jsp</a>
Connector Torque Specifications	<a href="https://www.rflambda.com/pdf/Torque_Specifications.pdf">https://www.rflambda.com/pdf/Torque_Specifications.pdf</a>
Random Vibration Test Standard	<a href="https://www.rflambda.com/pdf/rflambda_random_vibration_MIL-STD-202G.pdf">https://www.rflambda.com/pdf/rflambda_random_vibration_MIL-STD-202G.pdf</a>

**Ordering Information**

Part Number	Modification	Description
RAMP16G24GA	2.92mm-Female	16GHz-24GHz AC Low Noise Amplifier

**Amplifier Use**

Ensure that the amplifier input and output ports are safely terminated into a proper 50 ohm load before turning on the power. Never operate the amplifier without a load. A proper 50 ohm load is defined as a load with impedance less than 1.9:1 or return loss larger than 10dB relative to 50 Ohm within the specified operating band width.

Power Supply Requirements

Power supply must be able to provide adequate current for the amplifier. Power supply should be able to provide 1.5 times the typical current or 1.2 times the maximum current (whichever is greater).

In most cases, RF - Lambda amplifiers will withstand severe mismatches without damage. However, operation with poor loads is discouraged. If prolonged operation with poor or unknown loads is expected, an external device such as an isolator or circulator should be used to protect the amplifier.

Ensure that the power is off when connecting or disconnecting the input or output of the amp.

Prevent overdriving the amplifier. Do not exceed the recommended input power level.

Adequate heat-sinking required for RF amplifier modules. Please inquire.

Amplifiers do not contain Thermal protection, Reverse DC polarity or Over voltage protection with the exception of a few models. Please inquire.

Proper electrostatic discharge (ESD) precautions are recommended to avoid performance degradation or loss of functionality.

**What is not covered with warranty?**

Each RF - Lambda amplifier will go through power and temperature stress testing. Since the die, ICs or MMICs are fragile, these are not covered by warranty. Any damage to these will NOT be free to repair.

**Important Notice**

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RF-Lambda products are not warranted or authorized for use as critical components in medical, life-saving, or life sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.