Wideband Power Amplifier
2GHz-20GHz

Product Description

RAMP01G22GB is an AC power amplifier with a frequency range of 2 to 20GHz.

The power output of this amplifier is 40 dBm typical. The typical small signal gain is 43dB with a flatness of ±3 dB. This performance is achieved through the use of GaN devices.

This power amplifier works with typically 110 VAC power supply.

The power amplifier's input and output connectors are SMA.

The operating temperature of this product is within -40 to +85ºC.

Features

- Wideband EMC Solid State Power Amplifier
- Small Signal Gain 43dB Typical
- Output Saturation Power 40dBm Typical
- Supply Voltage 110 VAC
- 50 Ohm Matched Input/Output
- Overcurrent Protection

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=+25ºC)

Parameter	Min	Typ	Max	Units
Frequency Range		2 – 20		GHz
Small Signal Gain		43		dB
Gain Flatness		+/-3		dB
Gain Variation Over Temperature (-40ºC to +70ºC)		+/-3		dB
Input Return Loss		-12		dB
*Output 1dB Compression Point (P1dB)		35		dBm
*Saturated Output Power (Psat)		40		dBm
IM3 @ P1dB		22		dBc
RF ON and OFF Speed		80		us
Power Added Efficiency (PAE)		20		%
Weight		≈ 10		lbs.
Impedance		50		Ohms
Input / Output Connectors		SMA Female		
Package		Screw Sealed (Standard)		
		Hermetically Sealed (Optional)		

* P1dB, P3dB and Psat power test signal: 200μs pulse width with 10% duty cycle.
* For average CW power testing or increased duty cycle, a 5dB back off from Psat is required.

RF-LAMBDA USA LLC: www.rflambda.com
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Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	110VAC to 220VAC
*RF Input Power (RFIN)	Psat – Large Signal Gain

Bias Up Procedure

1. Connect input and output with 50 Ohm source/load. (In band VSWR < 1.9:1 or >10dB return loss.)
2. Connect Power Cable
3. Turn on the Back Panel AC Power Supply Switch
4. Press the Power Switch on Front Panel

Bias Down Procedure

1. Press the Power Switch on Front Panel
2. Turn off the Back Panel AC Power Supply Switch
3.Remove Power Cable
4. Remove RF Connection

Environmental Specifications and Test Standards

Parameter	Description
Operational Temperature	-40ºC to +85ºC (Case Temperature)
Storage Temperature	-55ºC to +125ºC
Thermal Shock	-40ºC → +85ºC (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 +85ºC 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.

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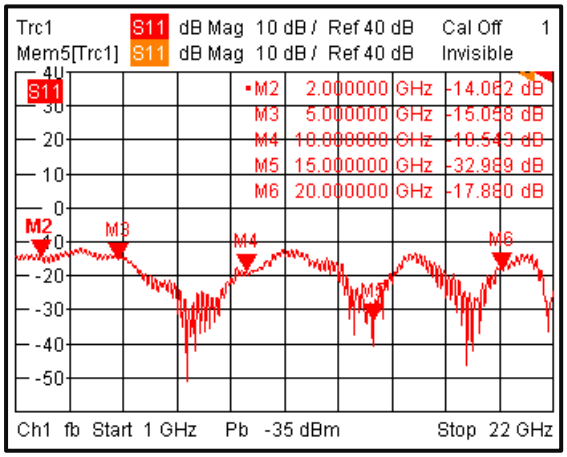
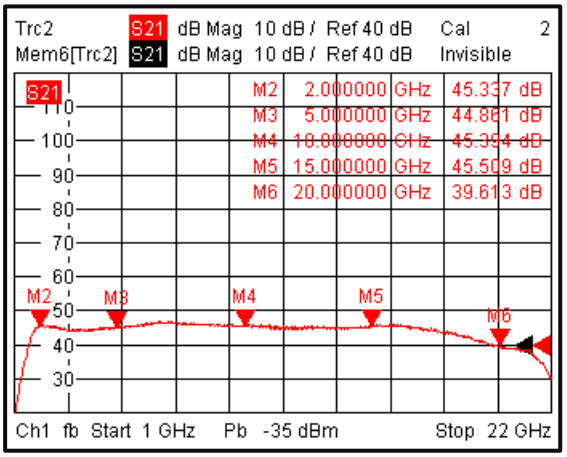
Typical Performance Plots

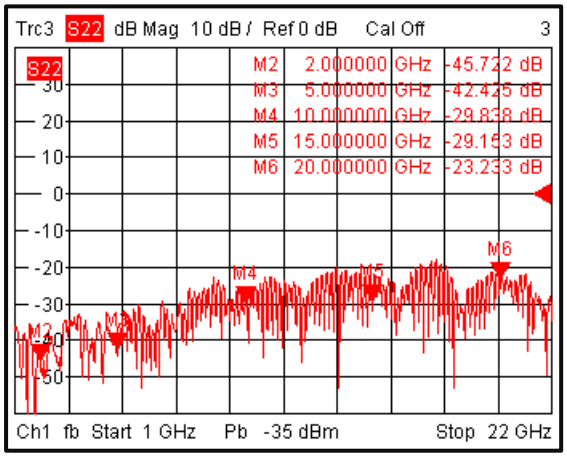
Input Return Loss @+25ºC



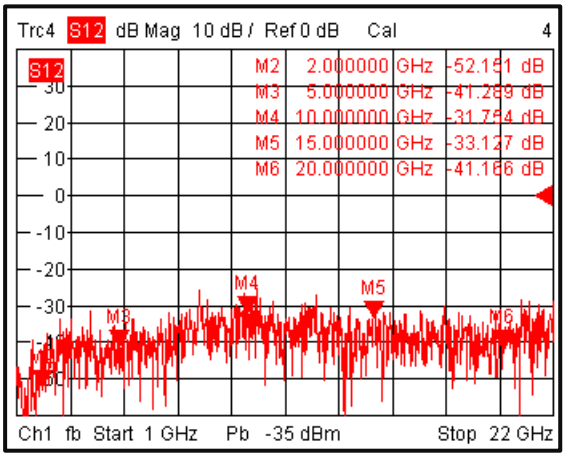
Gain vs. Frequency @+25ºC



Output Return Loss @+25ºC

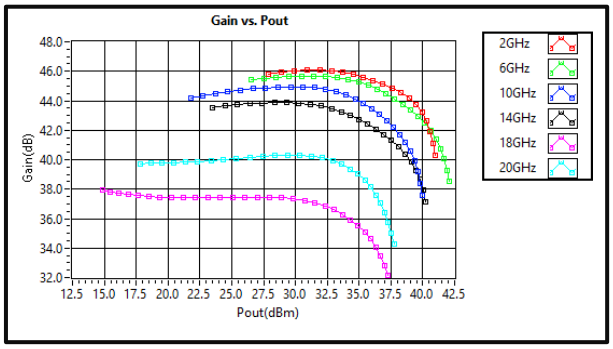


Isolation @+25ºC

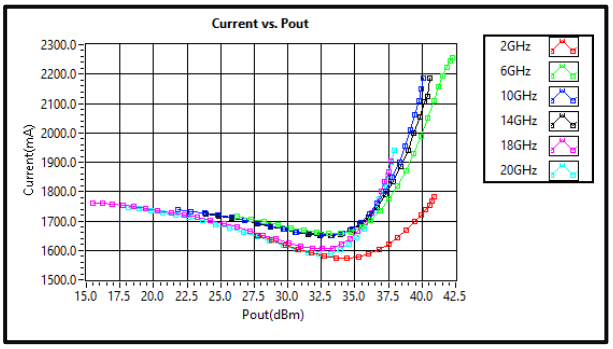


Typical Performance Plots

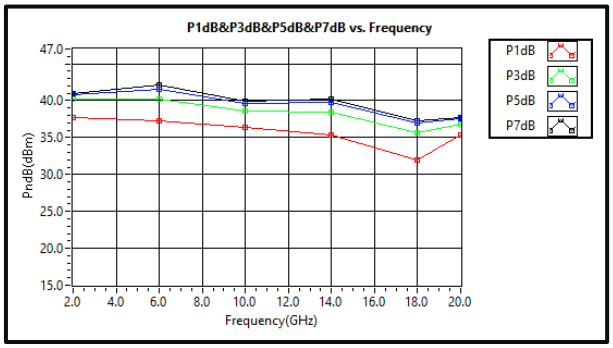
Gain vs. Output power @+25 ºC



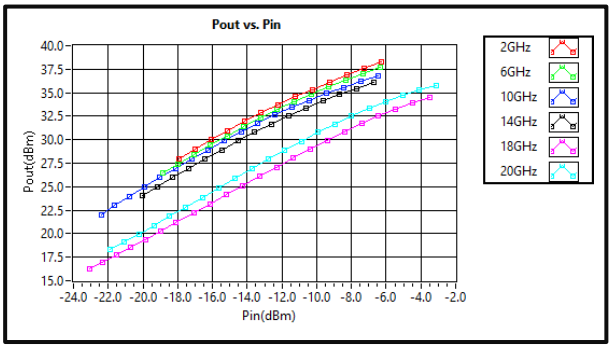
Current vs. Output Power @+25ºC



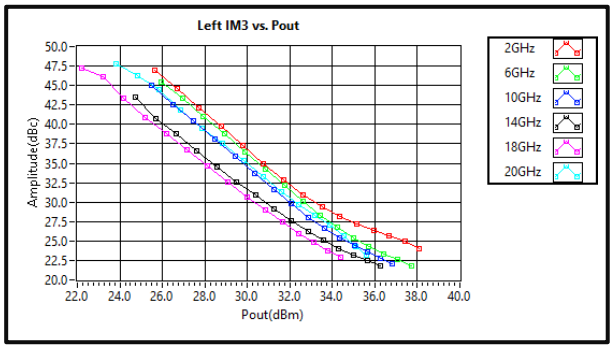
PndB vs. Frequency @+25ºC



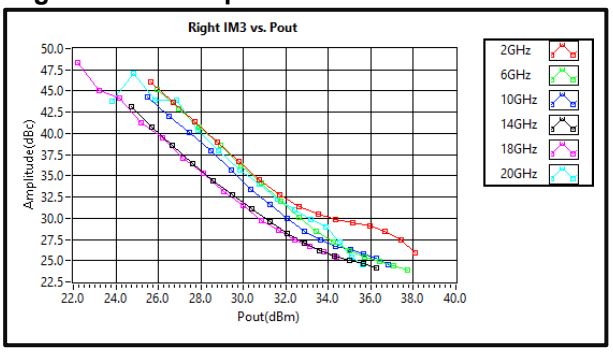
Input vs. Output Power @+25 ºC



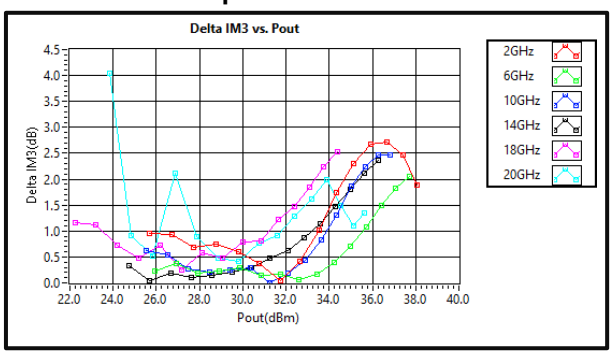
Left IM3 vs. Output Power



Right IM3 vs. Output Power

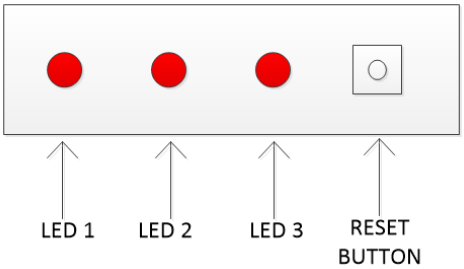


Delta IM3 vs. Output Power



Note: Input/Output return loss measurements include attenuators to protect equipment

Alarm Status Panel

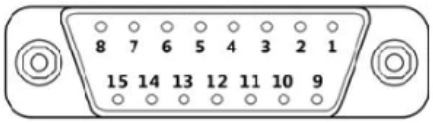


LED #	Name	Function	Initial State	Description	Applied
	Reset*	Control		Manual reset button to reset PA	Yes
1	Power	Control	Red	LED will light to RED color when supply power is applied	Yes
2	ID	Indicator	Green	PA will shut down and latch this LED to a RED color if a drain current limit is reached *	Yes
3	TEMP	Indicator	Green	PA will shut down and latch this LED to a RED color when driven over temperature *	Yes

*If a protection LED is latched, the LED needs to be manually reset to initial state by pressing RESET button

Protection Connector Table

Female D-Sub is on the housing
The mating male part number: 172-E15-203R001

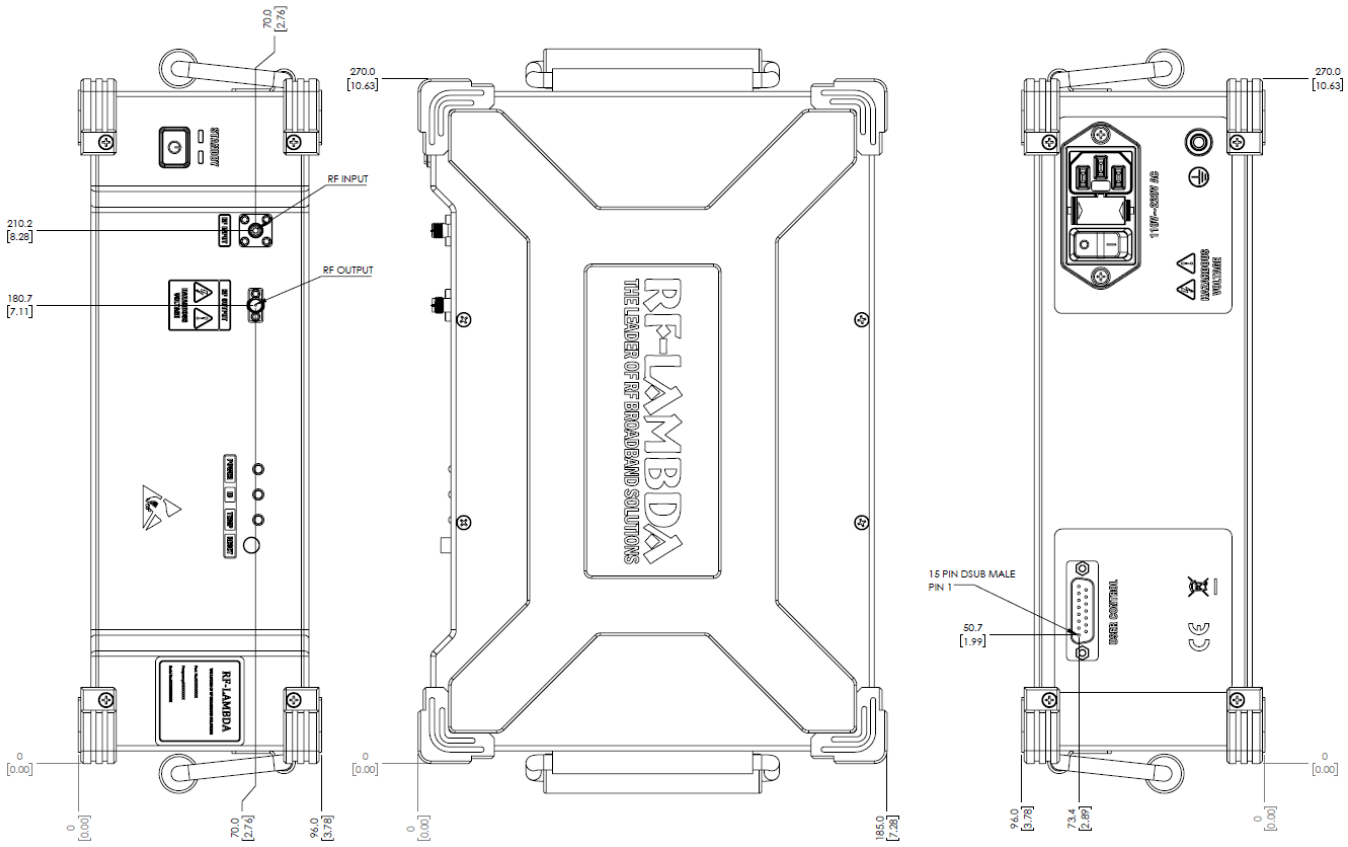


DB15 Female

Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control		Resets PA when logic LOW is applied and released	Yes
2	Drain Disable	Control	LOW	Appling logic HIGH disables drains of amplifiers	Yes
3	Gate Disable	Control	LOW	Applying logic HIGH disables gates of amplifiers	Yes
4	RF IN Over	Indicator	LOW	Pin will be latched to logic HIGH when input signal is over limit	No
5	Temp Over	Indicator	LOW	Pin will be latched to logic HIGH when amplifier is driven over temperature	Yes
6	Current Over	Indicator	LOW	Pin will be latched to logic HIGH when drain current limit is reached	Yes
7	ID Imbalance	Indicator	LOW	Pin will be latched to logic HIGH when an imbalance in the drain current of the combining branches occurs	No
8	GND	Ground	GND	Ground	Yes
9	VDC	VDC	NA	Power Supply for Amplifier	Yes
10	VDC	VDC	NA	Power Supply for Amplifier	Yes
11	VDC	VDC	NA	Power Supply for Amplifier	Yes
12	Temp Signal	Indicator	NA	PA carrier case temperature is represented by voltage	Yes
13	+5V	Power Supply	+5V	+5V DC is supplied for reference	Yes
14	GND	Ground	GND	Ground	Yes
15	GND	Ground	GND	Ground	Yes

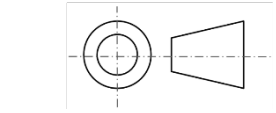
Notes:
- HIGH/LOW voltages are standard TTL signals 0.0V-0.8V = LOW. 2V-5V = HIGH. Input current is 10uA.
- Matching connector and cable will be shipped with the product.
- Applied=Yes means the feature is included. Applied=No means the feature is not included with this model.
- 5V reference supply can source 700mA.
- Indicator output signals can source 24mA.

Outline Drawing



Notes:

1. Package Material: Aluminum and Copper
2. Plating: Nickel
3. All dimensions are in millimeters [inches].
4. Tolerances ±0.25 [0.010] unless otherwise specified.
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.



Additional Information

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

Ordering Information

Part Number	Modification	Description
RAMP01G22GB	Input connector SMA and Output connector SMA	2GHz-20GHz Power 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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