

Reconfigurable Dual-Band GaN Power Amplifier

S-Band: 3.1 - 3.5GHz

X-Band: 9 - 11GHz



Product Description

The RFLUPA0311GAD is reconfigurable dual-band (S- and X-Band) GaN power amplifiers (PAs), covering frequency band 2.7 - 3.9GHz and 9 - 11GHz. High Power Added Efficiency (PAE) 47% for S-Band, and 32% for X-Band.

The power output of this amplifier is 43 dBm typical for both frequency bands. The typical small signal gain is 49dB with a flatness of ± 3 dB. This performance is achieved through the use of GaN devices. This power amplifier works with a +36 VDC power supply.

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

Features

- Wideband EMC Solid State Power Amplifier
- Small Signal Gain 49dB Typical
- Output Saturation Power 43dBm Typical
- Supply Voltage 36 VDC
- 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 ($T_A = +25^\circ\text{C}$)

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		3 - 3.5			9 - 11		GHz
Small Signal Gain		49.7			45.7		dB
Gain Flatness		+/-3			+/-3		dB
Gain Variation Over Temperature (-40°C to +70°C)		+/-3			+/-3		dB
Input Return Loss		-12			-20		dB
*Output 1dB Compression Point (P1dB)		39			39		dBm
*Saturated Output Power (Psat)		43.6			43.5		dBm
Supply Current (Vcc = +36VDC)		0.9	5.3		0.9	5.3	A
IM3 @ P1dB		-35			-60		dBc
RF ON and OFF Speed		80			80		us
Power Added Efficiency (PAE)		47			32		%
Weight			2.9				lbs.
Impedance			50				Ohms
Input / Output Connectors					SMA Female		
Package					Screw Sealed (Standard)		
					Hermetically Sealed (Optional)		

* P1dB, P3dB and Psat power test signal: 200 μ s pulse width with 10% duty cycle.

* For average CW power testing or increased duty cycle, a 5dB back off from Psat is required.

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+34VDC to +40VDC
*RF Input Power (RFIN)	Psat – Large Signal Gain

Bias Up Procedure

1. Connect ground
2. Connect input and output with 50 Ohm source/load.
(In band VSWR < 1.9:1 or >10dB return loss.)
3. Connect VDC and make sure power supply can handle max current.

Bias Down Procedure

1. Turn off VDC
2. Remove VDC Connection
3. Remove RF Connection
4. Remove ground

Environmental Specifications and Test Standards

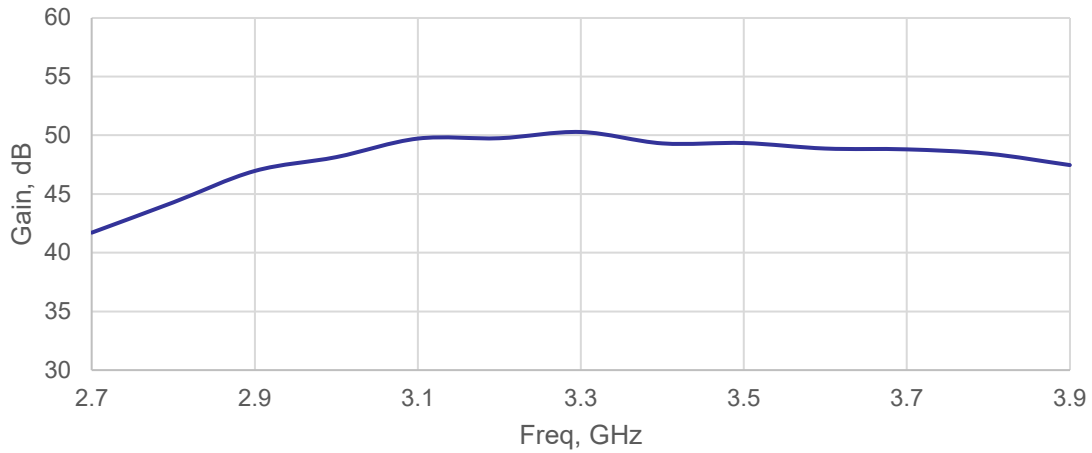
Parameter	Description
Operational Temperature	-40°C to +85°C (Case Temperature)
Storage Temperature	-55°C to +125°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for 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.

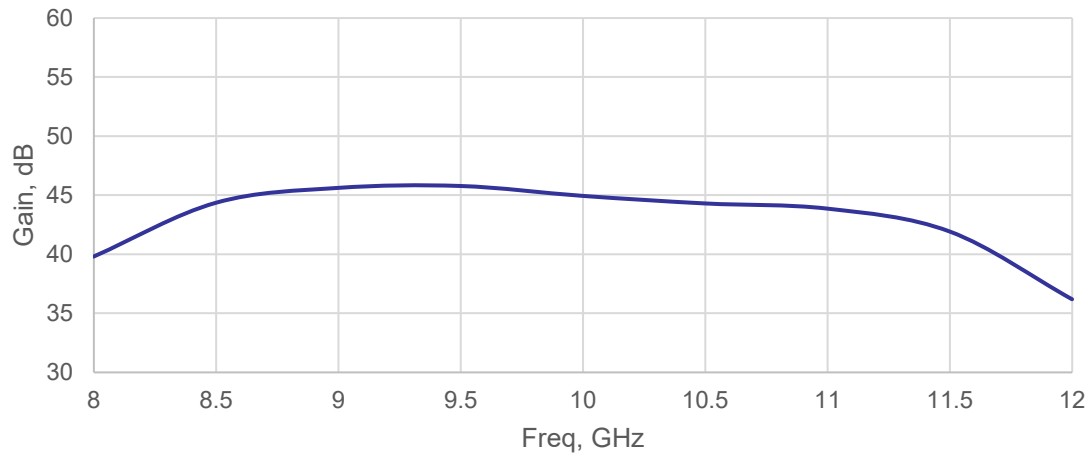
**For vibration testing details please see additional information section.

Typical Performance Plots

Gain 2.7GHz to 3.9GHz

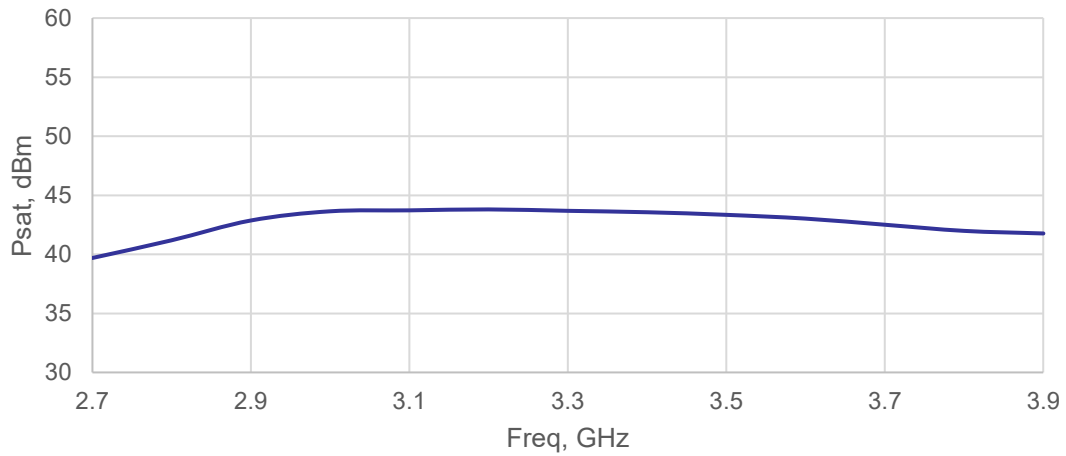


Gain 8GHz to 12GHz

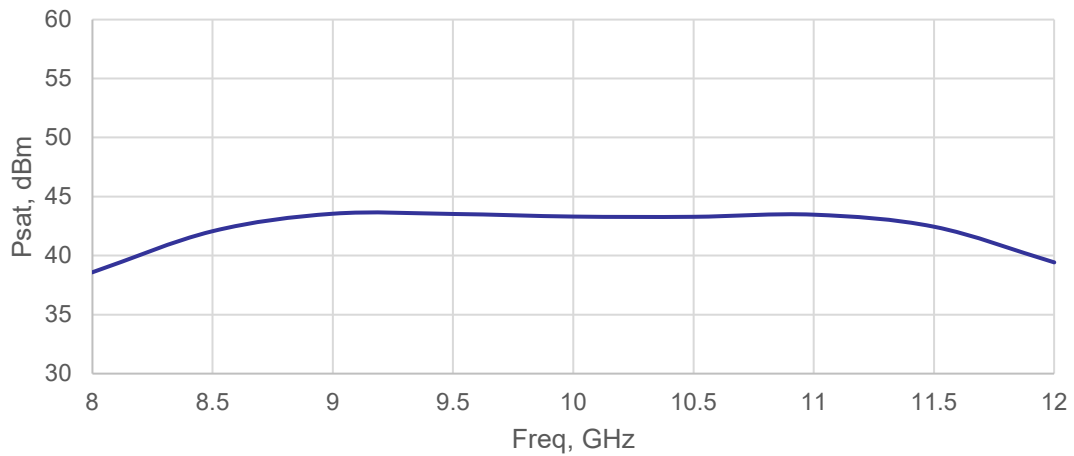


Typical Performance Plots

Psat 2.7GHz to 3.9GHz



Psat 8GHz to 12GHz



Protection Connector Table

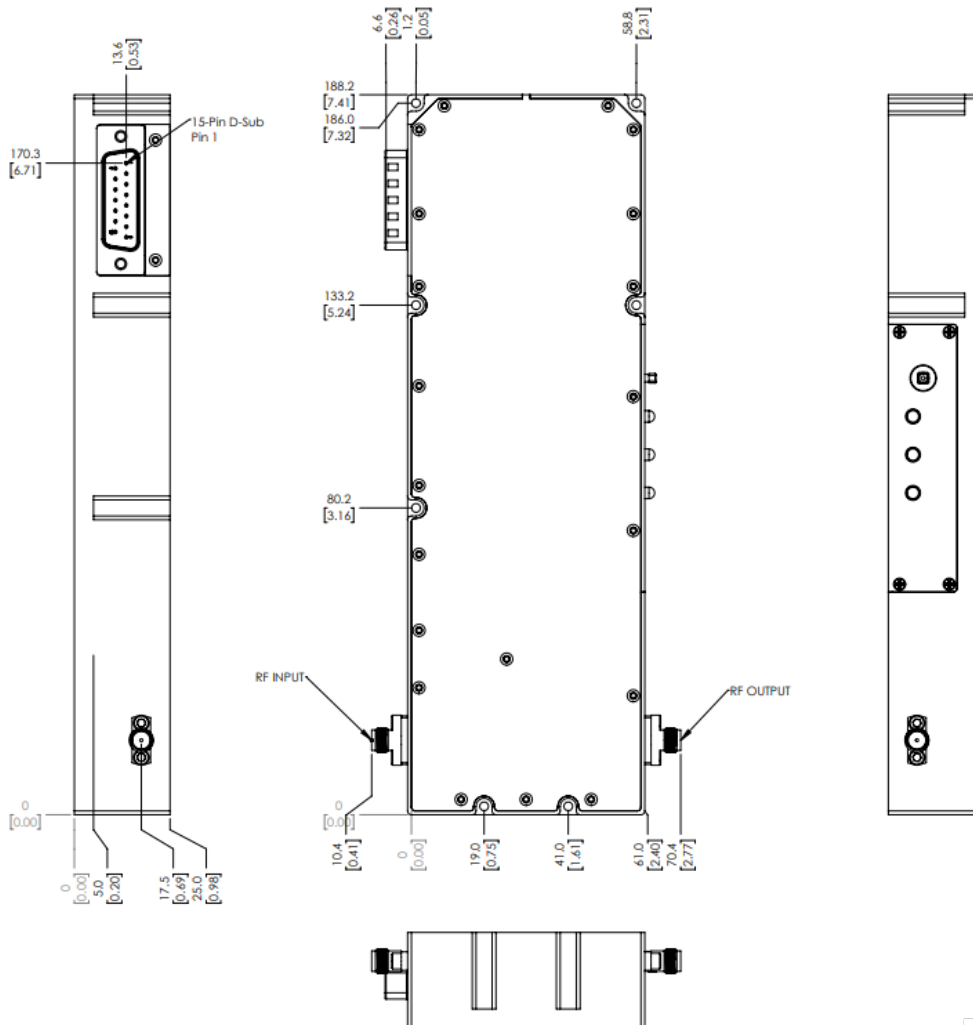
Female D-Sub on the housing
Part Number: 173-E15-213R001

Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control		Resets PA when logic <u>LOW</u> is applied and released	Yes
2	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disables drains of amplifiers	Yes
3	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gates of amplifiers	Yes
4	Frequency Selection	Control	LOW	Applying logic <u>HIGH</u> to select X-Band Operation Applying logic <u>LOW</u> to select S-Band Operation	Yes
5	Temp Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when amplifier is driven over temperature	Yes
6	Current Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when drain current limit is reached	Yes
7	ID Imbalance	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> 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:

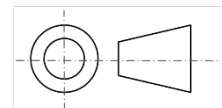
- HIGH/LOW voltages are standard TTL signals 0.0V-0.8V = LOW. 2V-5V = HIGH. Input current is 10uA.
- Matching connector and cable will be shipped with the product.
- Applied=Yes means the feature is included. Applied=No means the feature is not included with this model.
- 5V reference supply can source 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
RFLUPA0311GAD	Input connector SMA and Output connector SMA	Dual-Band GaN 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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