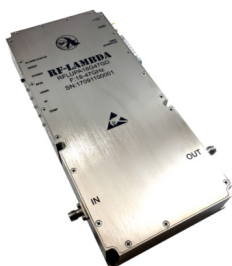


Ultra Wide Band Power Amplifier 20GHz - 54GHz



Note: The photo is for illustration purposes only.
Please refer to outline drawing

Product Description

RFLUPA20G54GD is an ultra wideband power amplifier with a frequency range of 20 to 54GHz.

The power output of this amplifier is 37 dBm typical. The typical small signal gain is 50dB with a gain flatness of ± 3 dB.

The power amplifier's input connector is 2.4mm and output connector is 2.4mm.

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

Features

- Ultra Wide Band Power Amplifier
- Small Signal Gain 50dB Typical
- Output Saturation Power 37dBm Typical
- Supply Voltage +36VDC
- 50 Ohm Matched Input/Output

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		20-40			40-54		GHz
Small Signal Gain		50			43		dB
Gain Variation Over Temperature		±3			±3		dB
Noise Figure		7			7		dB
Input Return Loss		15			15		: 1
Output 1dB Compression Point (P1dB)		36			31		dBm
Saturated Output Power (Psat)		37.4			33.4		dBm
Output Third Order Intercept (IP3)		47			46		dBm
Supply Current (Vcc = +36V)		2300	3500		2300	3500	mA
DC Voltage		36			36		V
Isolation S12		60			60		dB
Maximum Input Power		Psat - Gain			Psat - Gain		dBm
Weight				3.3			lbs.
Impedance				50			Ohms
Input / Output Connectors		2.4mm – Female(Input)--2.4mm – Female(Output)					
Environmental Sealing	Epoxy 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 3dBm back off from Psat is required.

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+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 positive supply and make sure power supply can handle max current.

Bias Down Procedure

1. Turn off power supply
2. Remove positive supply Connection
3. Remove RF Connection
4. Remove ground

Environmental Specifications and Test Standards

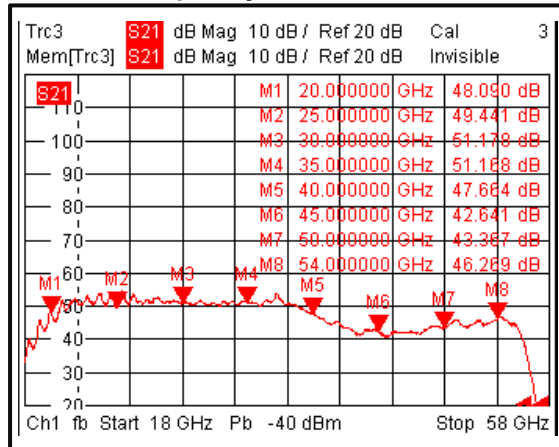
Parameter	Description
Operational Temperature	-40°C to +85°C (Case Temperature)
Storage Temperature	-55°C to +125°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for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

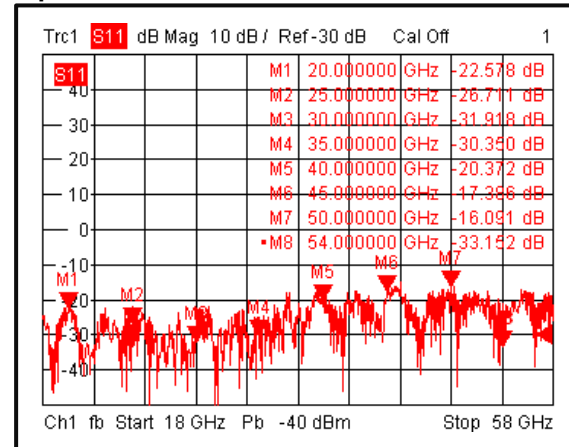
**For vibration testing details please see additional information section.

Typical Performance Plots

Gain vs. Frequency



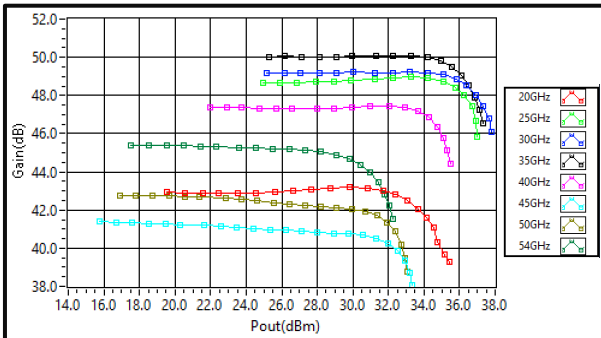
Input Return Loss



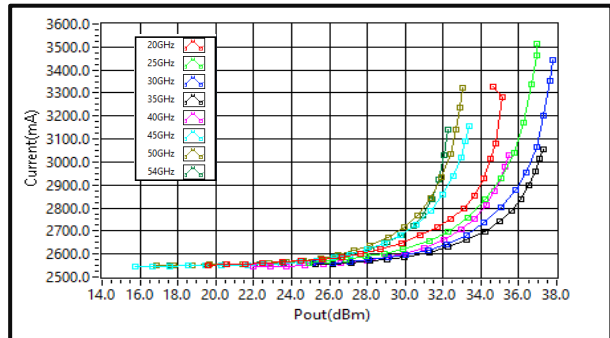
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

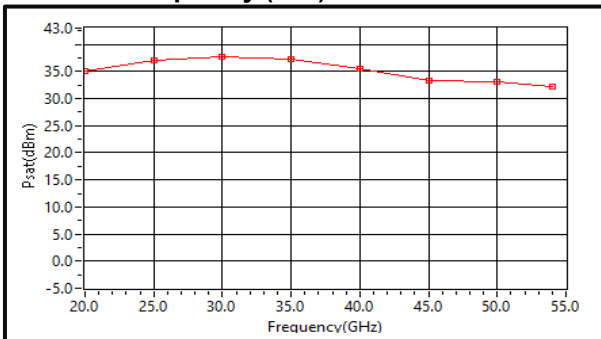
Gain vs. Output Power (CW)



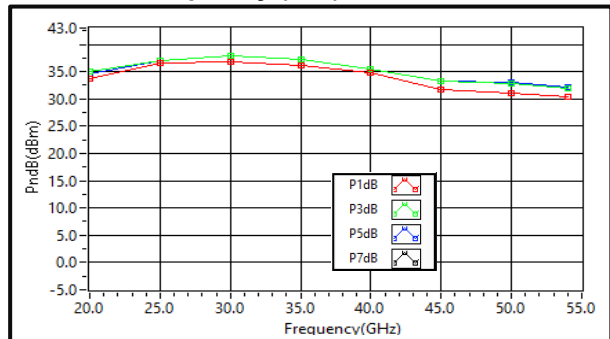
Current vs. Pout



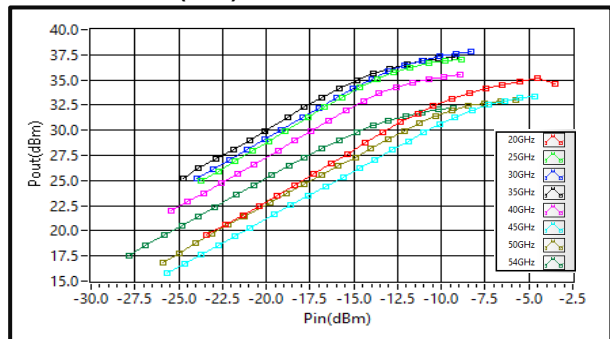
PSat vs. Frequency (CW)



PxdB vs. Frequency (CW)



Pout vs. Pin (CW)



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

Protection Connector Table

Female D-Sub is on the housing
The mating male part number: 172-E15-113R001

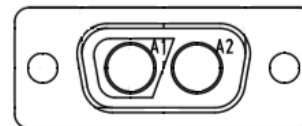
Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control		Resets PA when logic <u>LOW</u> is applied and released	Yes
2	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disables drains of amplifiers	Yes
3	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gates of amplifiers	Yes
4	RF IN Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when input signal is over limit	No
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	VDC	Power Supply	VDC	Supply Voltage (max 5A current ability for this pin. For high current applications please use the power connector, refer to page 6 of this datasheet)	Yes
8	VDC	Power Supply	VDC	Supply Voltage (max 5A current ability for this pin. For high current applications please use the power connector, refer to page 6 of this datasheet)	Yes
9	VSWR	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when output reflection is over limit	No
10	+5V	Power Supply	+5V	+5V DC is supplied for reference	Yes
11	GND	Ground	GND	Ground	Yes
12	GND	Ground	GND	Ground	Yes
13	GND	Ground	GND	Ground	Yes
14	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	Yes
15	Temp Signal	Indicator	LOW	PA carrier case temperature is represented by voltage	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.

Power Supply Connector Table

Male D-Sub is on the housing, part number:09691100022
The mating female part number: 09691000022

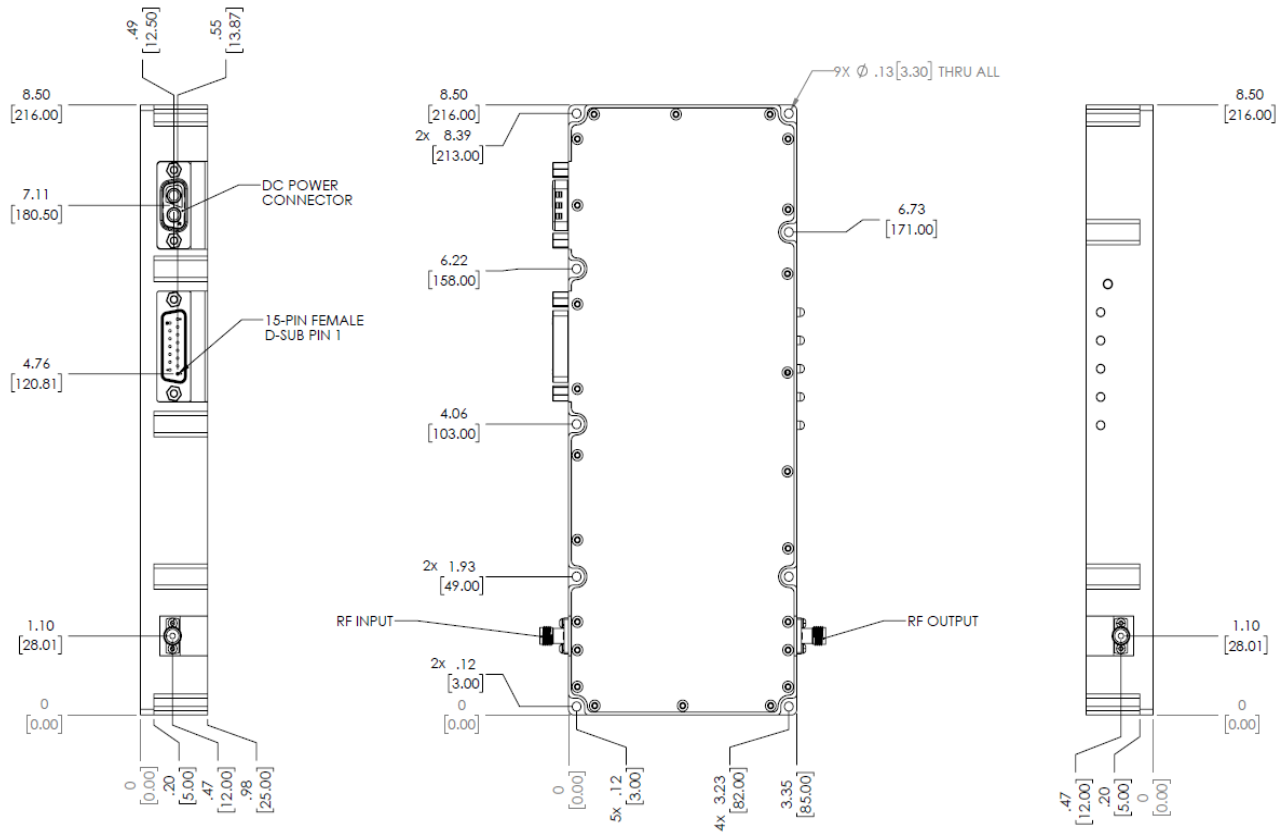


Pin #	Gender on the Housing	Function	Initial State	Description	Applied
A1	Female	VDC	VDC	Supply Voltage (this pin is up to 20A)	Yes
A2	Male	GND	GND	GND (this pin is up to 20A)	Yes

Notes:

- Matching connector and cable will be shipped with the product.
- If customer would like to use their own wires, 12 AWG wire is required for high current applications.

Outline Drawing:-NP



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	Connector	Description
RFLUPA20G54GD	Input connector 2.4mm and Output connector 2.4mm	20GHz-54GHz Ultra Wide Band DC Power Amplifier
RAMP20G54GD	Input connector 2.4mm and Output connector 2.4mm	20GHz-54GHz Ultra Wide Band AC 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

The information contained herein is believed to be reliable. RF-Lambda makes no warranties regarding the information contained herein. RF-Lambda assumes no responsibility or liability whatsoever for any of the information contained herein. RF-Lambda assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for RF-Lambda products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

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