

Wideband Power Amplifier 39GHz-48GHz



Product Description

RFLUPA39G48GD is a wideband power amplifier with a frequency range of 39 to 48GHz.

The power output of this amplifier is 43 dBm typical. The typical small signal gain is 40 dB with flatness of ± 9 dB.

The power amplifier's input connector is 2.4mm and output connector is WR-22 waveguide.

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

Features

- Small Signal Gain 40dB Typical
- Supply Voltage +48VDC
- 50 Ohm Matched Input/Output
- Overvoltage Protection
- Overcurrent Protection
- Output Saturation Power 44dBm Typical
- Wideband EMC Solid State Power Amplifier

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
- Satellite Communications

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

Parameter	Min	Typ	Max	Units
Frequency Range		39 – 48		GHz
Small Signal Gain		40		dB
Gain Flatness		+/-9		dB
Gain Variation Over Temperature (-40°C to +70°C)		+/-5		dB
Input Return Loss		-13		dB
*Output 1dB Compression Point (P1dB)		40		dBm
*Saturated Output Power (Psat)		44		dBm
Supply Current ($V_{CC} = +48\text{VDC}$)		6.3	12	A
IM3		-28		dBc
RF ON and OFF Speed		80		us
Power Added Efficiency (PAE)		1		%
Time Division Duplexing (TDD) Blanking	ON	20		us
	OFF	200		us
Weight		10.2		lbs.
Impedance		50		Ohms
Input / Output Connectors		2.4mm / WR-22 Waveguide		
Package		Copper (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 3dB back off from Psat is required.

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+50VDC
*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

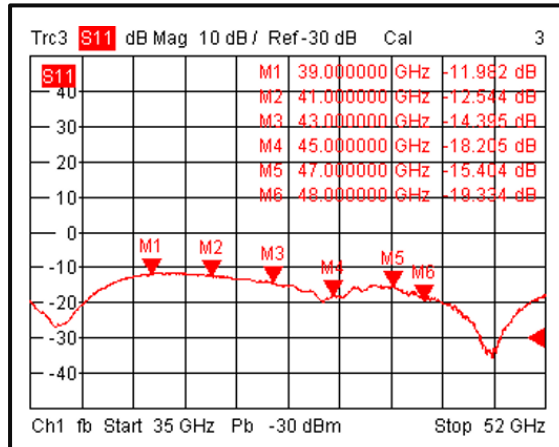
Parameter	Description
Operational Temperature	-40°C to +85°C (Case Temperature)
Storage Temperature	-55°C to +125°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for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

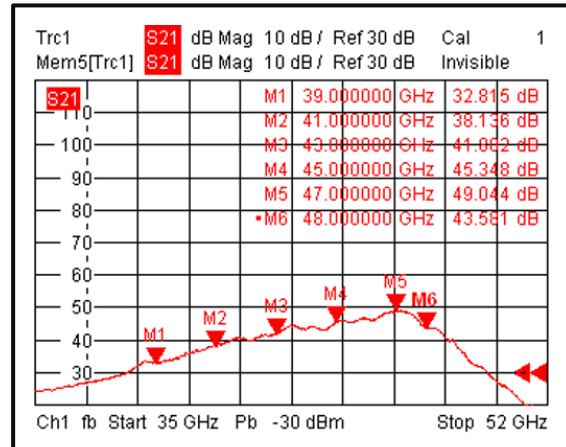
**For vibration testing details please see additional information section.

Typical Performance Plots

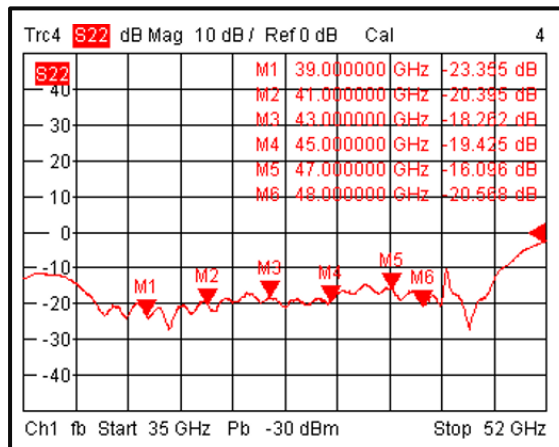
Input Return Loss @+25°C



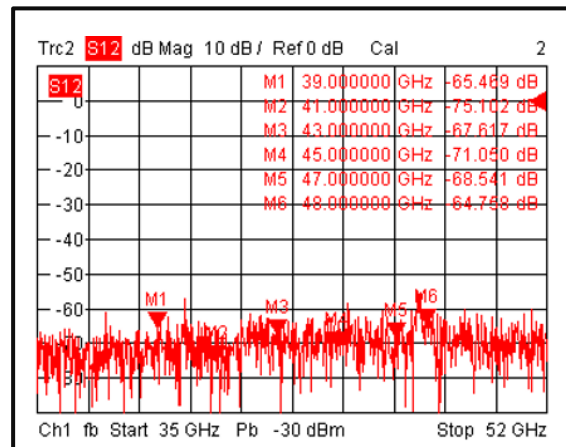
Gain vs. Frequency @+25°C



Output Return Loss @+25°C



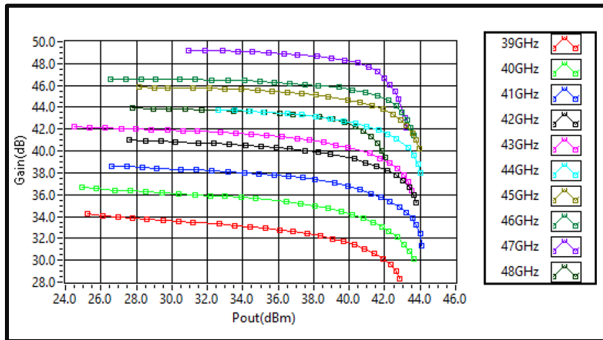
Isolation @+25°C



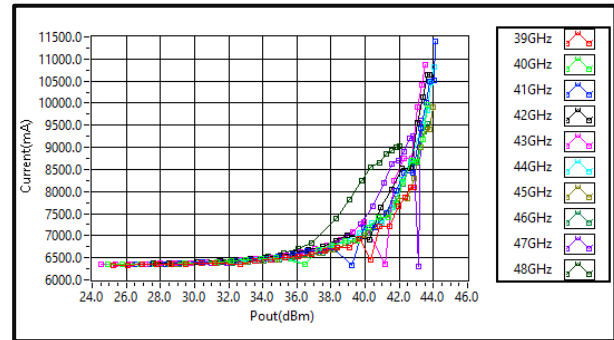
Note: Small signal VNA measurements include attenuators to protect equipment. Output return loss measurements include attenuators to protect equipment

Typical Performance Plots

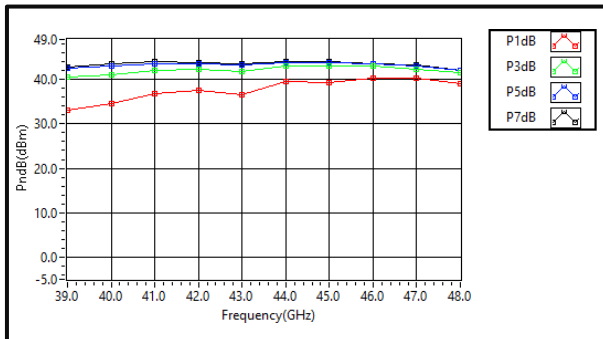
Gain vs. Output power @+25 °C



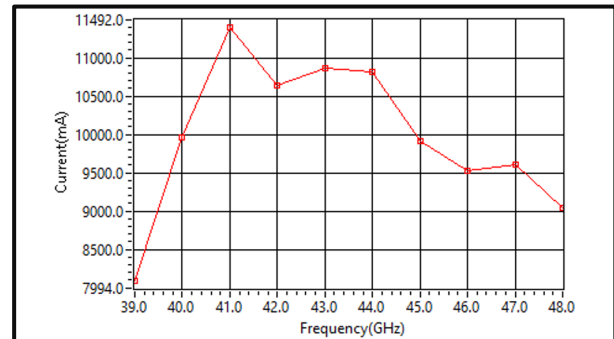
Current vs. Output Power @+25°C



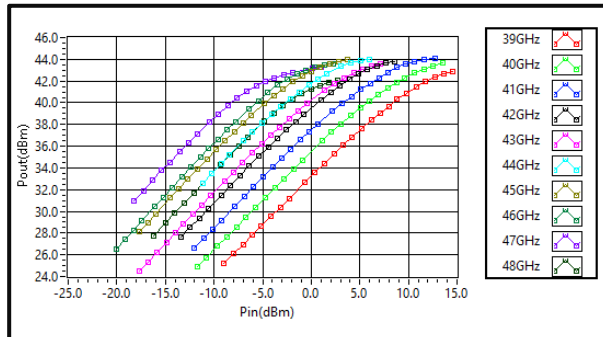
PndB vs. Frequency @+25°C



Max Current vs. Frequency @+25 °C

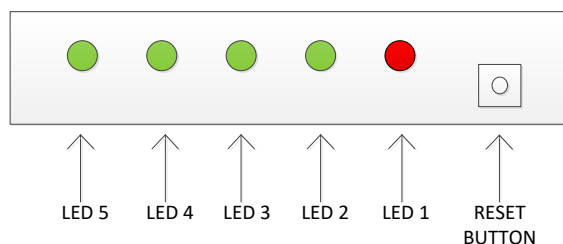


Input Power vs. Output Power @+25°C



Note: Power test with a CW signal.

Alarm Status Panel

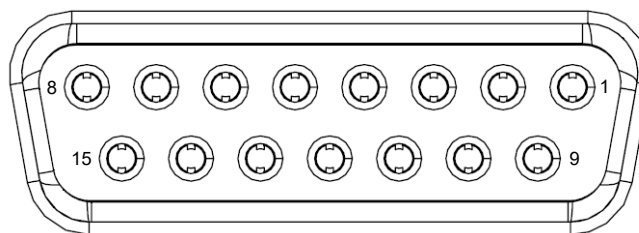


LED #	Name	Function	Initial State	Description	Applied
	Reset*	Control		Manual reset button to reset PA	Yes
1	Power	Control	Red	LED will light to RED color when supply power is applied	Yes
2	VSWR / RFIN	Indicator	Green	PA will shut down and latch this LED to a RED color when RF out reverses power is above threshold or input power is above threshold.	No
3	Imbalance	Indicator	Green	PA will shut down and latch this LED to a RED color when RF out reverses power is above threshold.	Yes
4	RF IN	Indicator	Green	PA will shut down and latch this LED to a RED color when input signal is over limit *	Yes
5	VSWR	Indicator	Green	PA will shut down and latch this LED to a RED color when output reflection is over limit *	Yes

*If protection trips and LED goes red amplifier needs to be manually reset to initial state by pressing RESET button

Protection Connector Table

Female D-Sub is on housing.
 A mating male part number is 172-E15-103R001



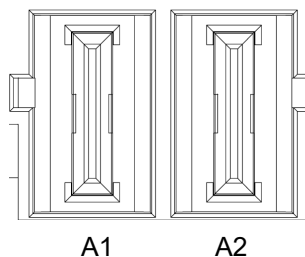
Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control		Resets PA when logic <u>LOW</u> is applied and released.	Yes
2	RF Disable	Control	LOW	Applying logic <u>HIGH</u> disables drains and gates of amplifiers.	Yes
3	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gates of amplifiers.	Yes
4	Drain Disable	Indicator	LOW	Applying logic <u>HIGH</u> disables drains and gates of amplifiers.	No
5	Drain Blanking	Indicator	LOW	Applying logic <u>HIGH</u> (2μs minimum pulse) disables drains of amplifiers.	No
6	Temperature Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when temperature limit is reached.	Yes
7	Current Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when current limit is reached by any RF components.	Yes
8	ID Imbalance	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when current imbalance between combined RF amplifiers happens.	Yes
9	Input Power Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when input RF signal maximum limit is reached.	No
10	VSWR	Indicator	GND	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when output reverse RF signal maximum limit is reached.	No
11	Temperature Signal	Signal	ANALOG	Analog voltage between zero- and five-volts representing temperature of RF section.	Yes
12	Input Power Monitor	Signal	ANALOG	Analog voltage between zero- and five-volts representing input signal power level.	Yes
13	Output Power Monitor	Signal	ANALOG	Analog voltage between zero- and five-volts representing output signal power level.	Yes
14	+5V	Power Supply	+5V	+5V DC is supplied for reference.	Yes
15	GND	Ground	GND	Ground	No

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 1A.
- Indicator output signals can source 24mA.

Power Supply Connector Table

Male Molex Connector on housing
The mating female part number: 1510340012

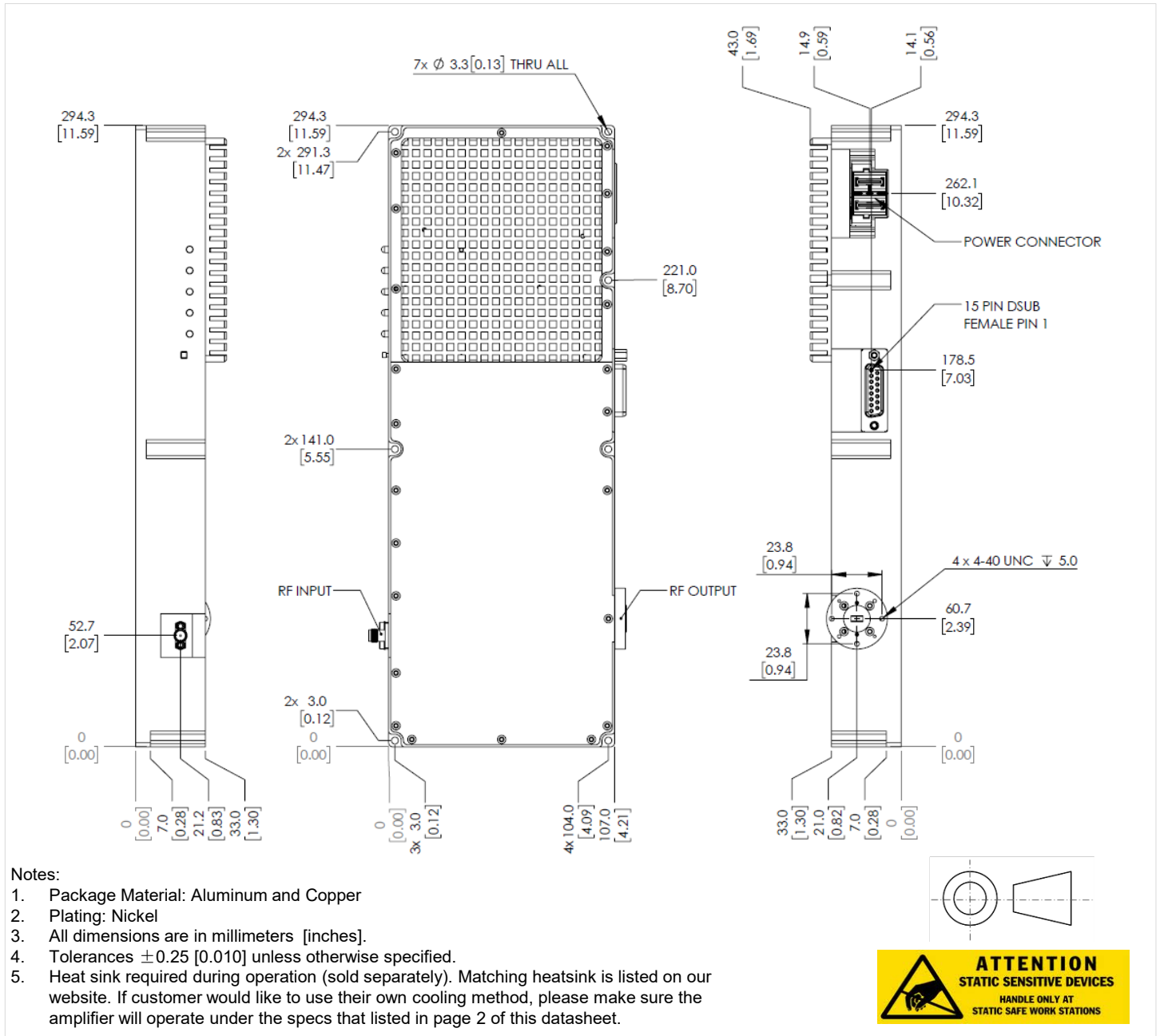


Pin #	Gender on the Housing	Function	Initial State	Description	Applied
A1	Male	VDC		Supply Voltage	Yes
A2	Male	GND	GND	Ground	Yes

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



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	Connectors	Description
RFLUPA39G48GD	Input connector 2.4mm and Output connector WR22	39GHz-48GHz 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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