

Wideband 300W Solid State Power Amplifier 2GHz-6GHz



Product Description

The RFLUPA02G06GD is a wideband power amplifier with a frequency range of 2 to 6GHz.

The power output of this amplifier is 55 dBm typical. The typical small signal gain is 60 dB with a gain variance of ± 10 dB. This excellent performance is achieved through the use of GaN devices.

The power amplifier's input and output connector is N-Type. This product has a calibration feature which enables customer to obtain great performance through time and temperature changes.

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

Features

- Wideband Solid State Power Amplifier
- Small Signal Gain 60dB Typical
- Output Saturation Power 55dBm Typical
- Supply Voltage +48VDC
- 50 Ohm Matched Input/Output
- Overvoltage Protection
- Overcurrent Protection
- Auto Calibration

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°C)

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		2 – 4			4 – 6		GHz
Small Signal Gain		65			55		dB
Gain Variance		+/-10			+/-10		dB
Gain Variation Over Temperature (-40°C to +70°C)		+/-3			+/-3		dB
Input Return Loss		-10			-10		dB
Output 1dB Compression Point (P1dB)		50			50		dBm
Saturated Output Power (Psat)		54			55		dBm
IM3 (at 42dBm)		28.8			29.3		dBc
RF ON and OFF Speed. (Gate/Drain control through d-sub connector pin #2/ #3)		10			10		ms
Power Added Efficiency (PAE at 54dBm)		25			25		%
Current (+48VDC)		17			17		A
Weight				40			lbs.
Impedance				50			Ohms
Input / Output Connectors				N-Type Female			
Package				Please reference the mechanical drawing			

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+60VDC
*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

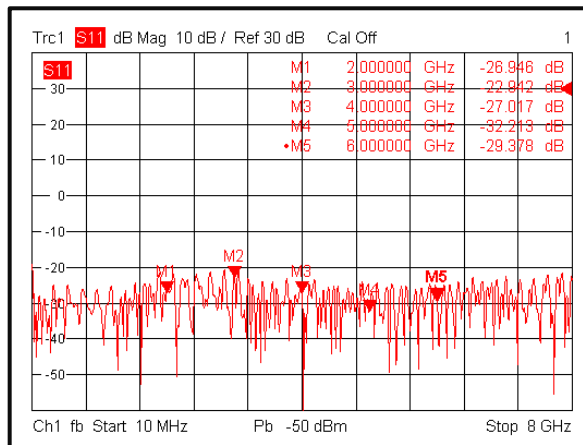
Parameter	Description
Operational Temperature	-40°C to +85°C (Case Temperature)
Storage Temperature	-55°C to +125°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for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

Notes:

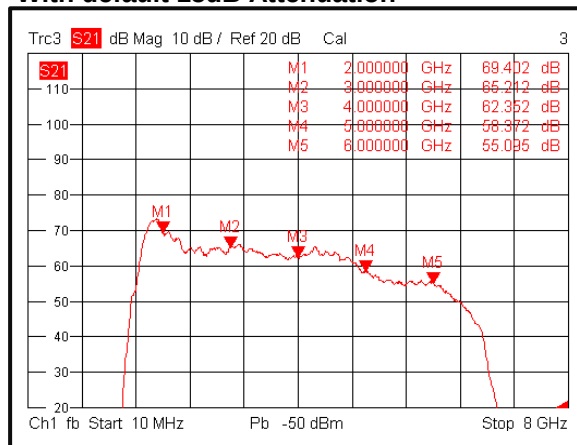
- Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.
- For vibration testing details please see additional information section

Typical Performance Plots

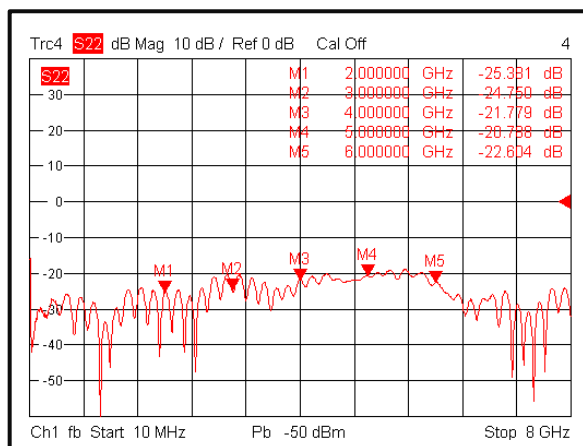
Input Return Loss @+25°C



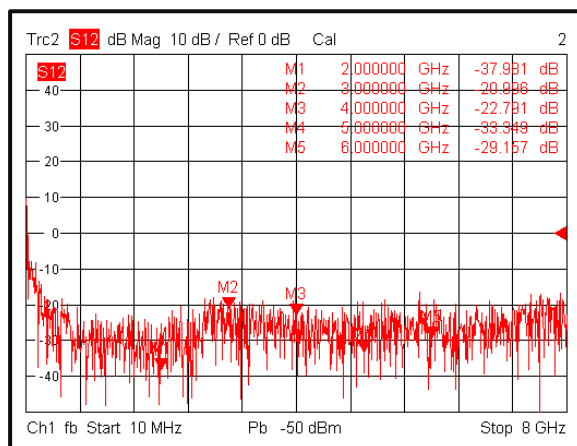
**Gain vs. Frequency @+25°C
With default 15dB Attenuation**



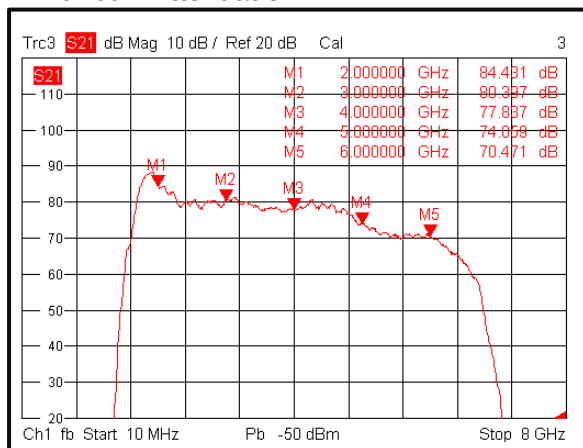
Output Return Loss vs. Frequency @+25°C



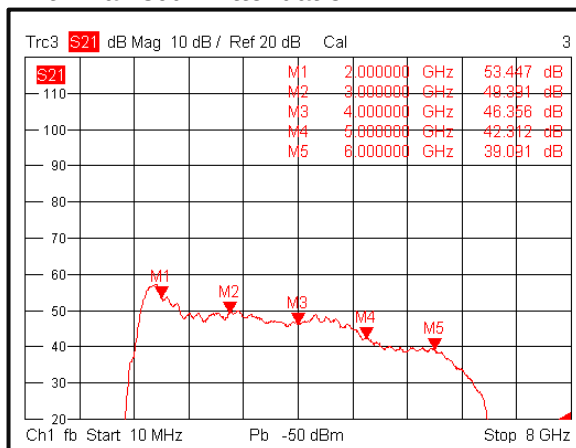
Isolation vs. Frequency @+25°C



**Gain vs. Frequency @+25°C
With 0dB Attenuation**



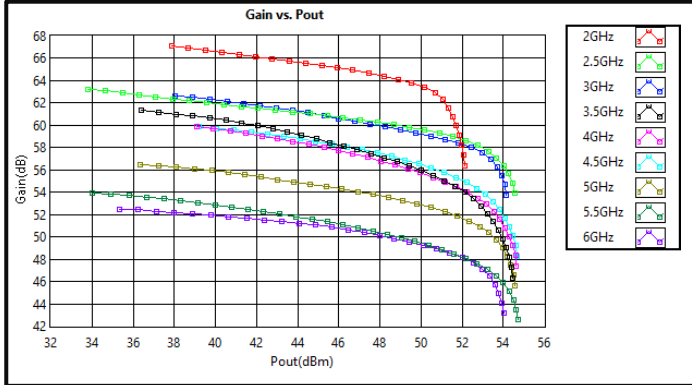
**Gain vs. Frequency @+25°C
With max 30dB Attenuation**



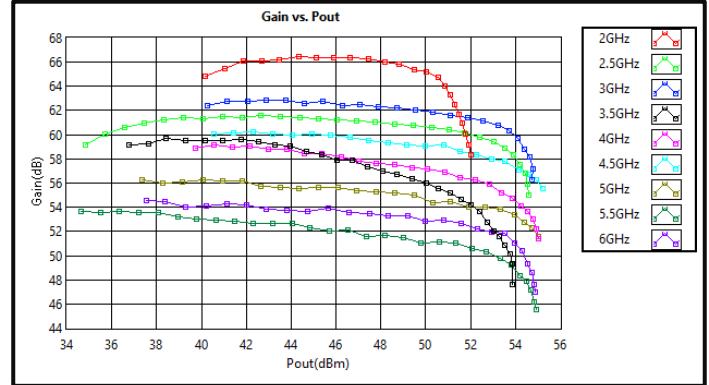
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

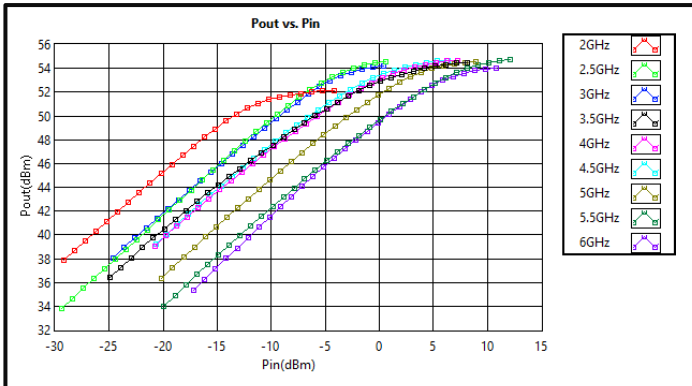
Gain vs Output Power CW
With default 15dB Attenuation



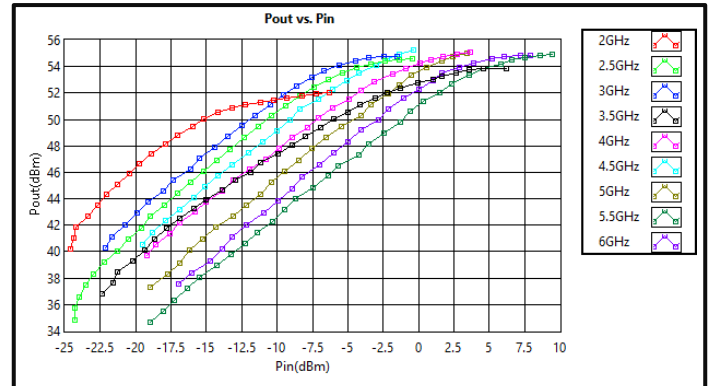
Gain vs Output Power *Pulse
With default 15dB Attenuation



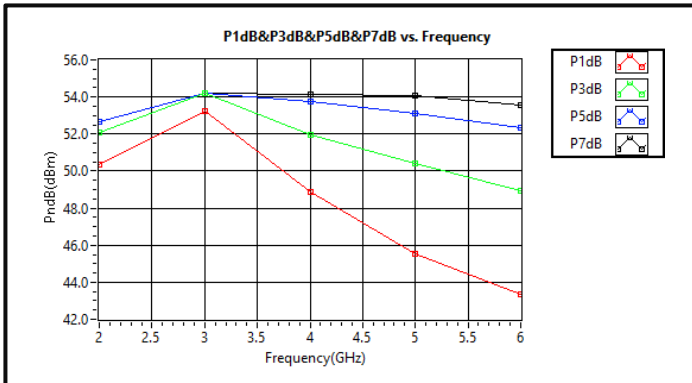
Output vs Input Power CW
With default 15dB Attenuation



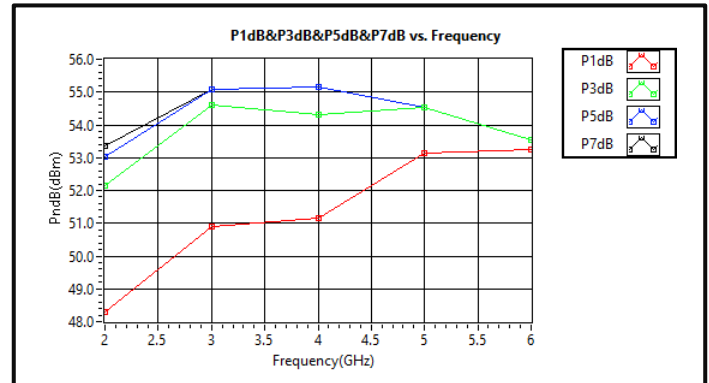
Output vs Input Power *Pulse
With default 15dB Attenuation



PxdB vs Frequency CW
With default 15dB Attenuation



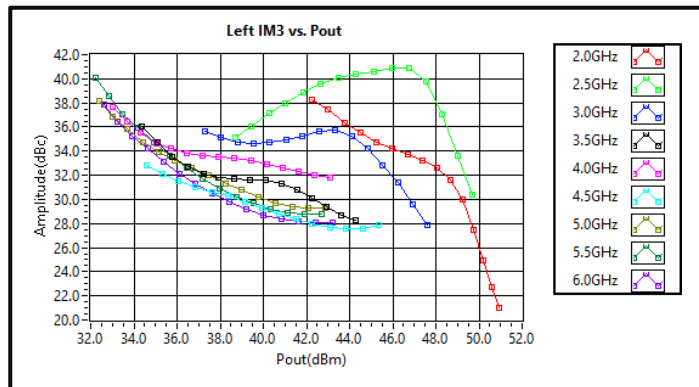
PxdB vs Frequency *Pulse
With default 15dB Attenuation



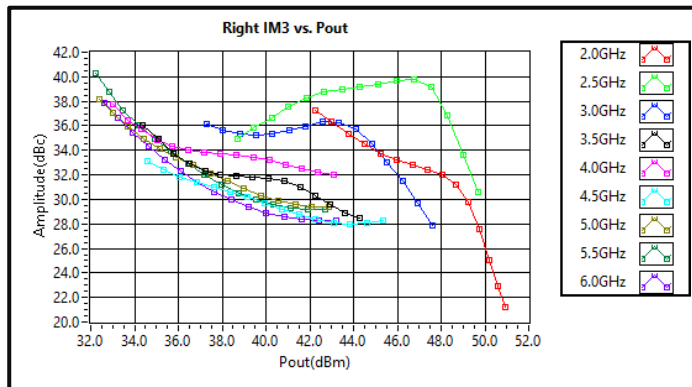
*Pulse Psat power test signal: 20μs pulse width with 10% duty cycle.

Typical Performance Plots

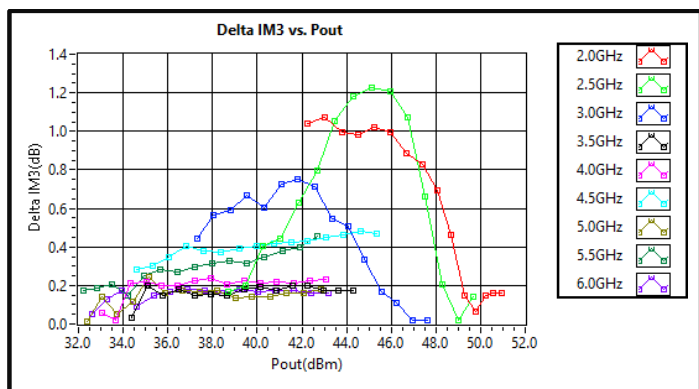
Left IM3 vs Output Power



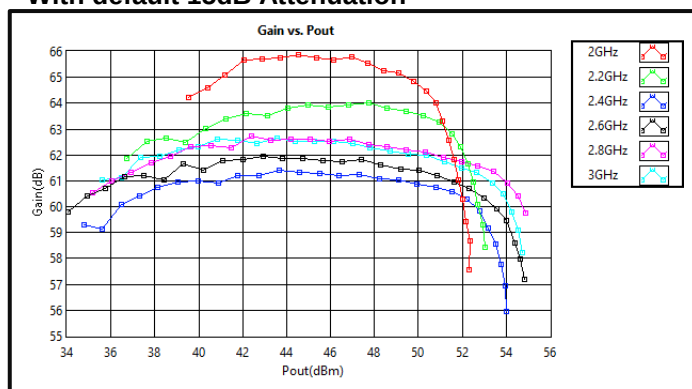
Right IM3 vs Output Power



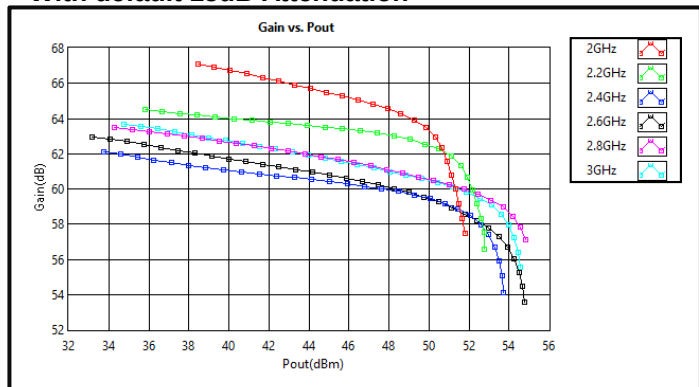
Delta IM3 vs Output Power



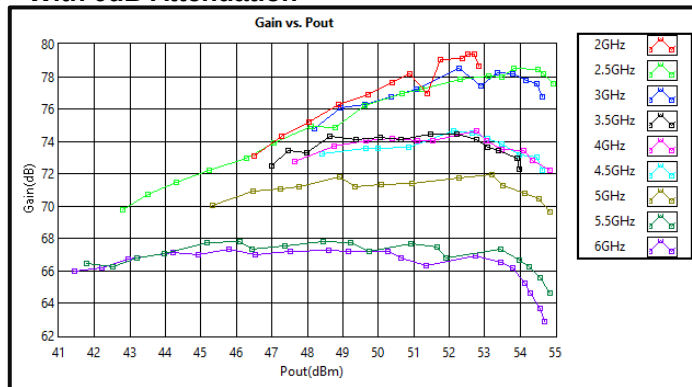
Gain vs Output Power *Pulse (2GHz-3GHz)
With default 15dB Attenuation



Gain vs Output Power CW *Pulse (2GHz-3GHz)
With default 15dB Attenuation



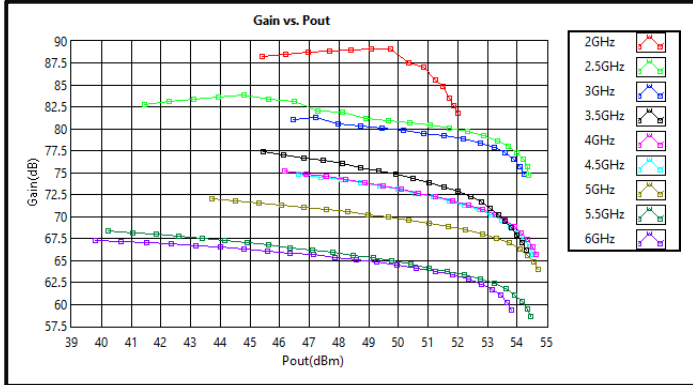
Gain vs Output Power *Pulse
With 0dB Attenuation



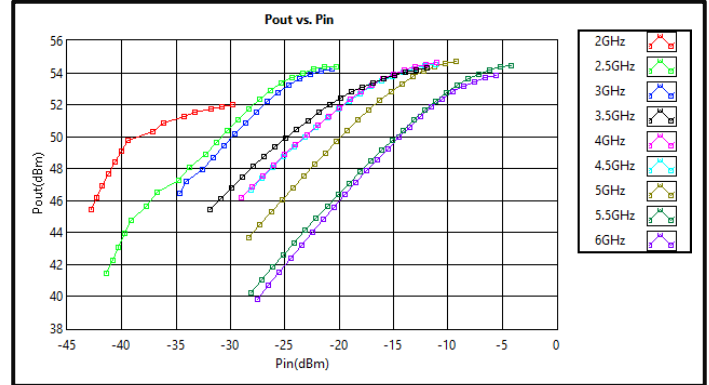
Note: IM3 test performed with 1MHz tone spacing

Typical Performance Plots

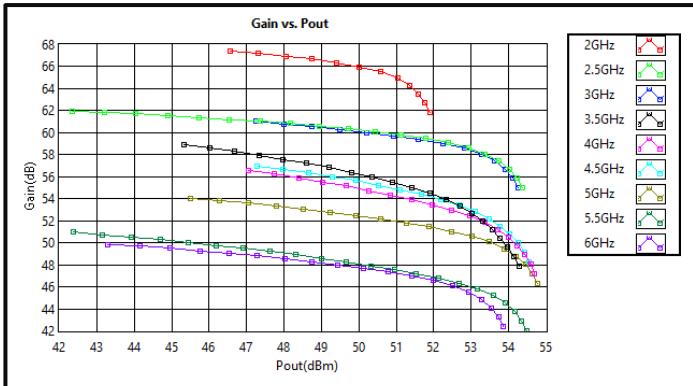
**Gain vs Output Power CW
With 0dB Attenuation**



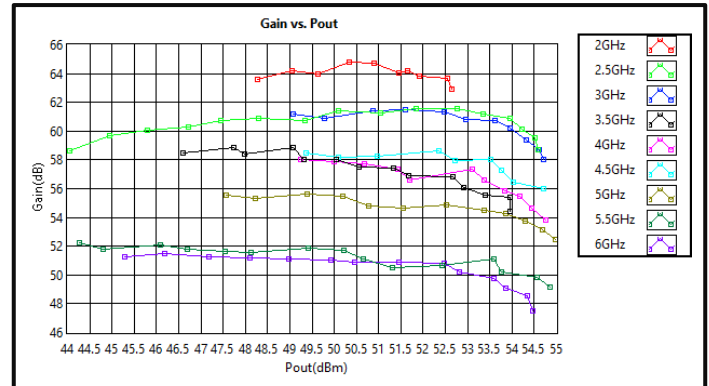
**Output vs Input Power CW
With 0dB Attenuation**



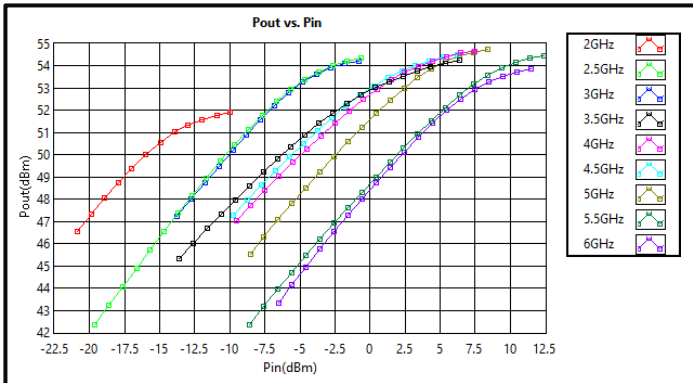
**Gain vs Output Power CW
With 30dB Attenuation**



**Gain vs Output Power *Pulse
With 30dB Attenuation**

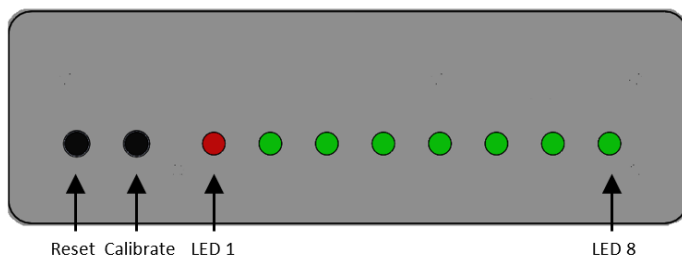


**Output vs Input Power CW
With 30dB Attenuation**



*Pulse Psat power test signal: 20μs pulse width with 10% duty cycle.

Alarm Status Panel

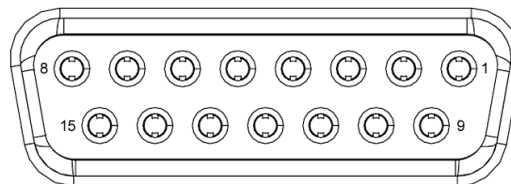


LED #	Name	Function	Initial State	Description	Applied
	Reset*	Control		Manual reset button to reset PA	Yes
	Calibration	Control		When pressed, button will start manual calibration	Yes
1	Power	Control	Red	LED will light to RED color when supply power is applied	Yes
2	Pout	Indicator	Red	LED will light to GREEN color when RF output power is ON	Yes
3	System Initialing	Indicator	Green	LED will blink while system is booting or calibrating	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
6	ID	Indicator	Green	PA will shut down and latch this LED to a RED color when an imbalance in the drain current of the combining branches occurs or if a drain current limit is reached *	Yes
7	TEMP	Indicator	Green	PA will shut down and latch this LED to a RED color when driven over temperature *	Yes
8	CAL	Indicator	Green	PA will shut down and latch this LED to a RED while in calibration mode	Yes

Note: 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 female part number: 172-E15-203R001



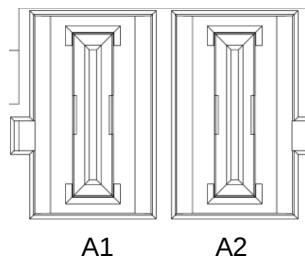
Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control		Resets PA when logic <u>LOW</u> is applied and released	Yes
2	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gate of amplifiers	Yes
3	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disables drian of amplifiers	Yes
4	RF IN Over	Indicator	HIGH	Pin will be latched to logic <u>HIGH</u> when input signal is over limit	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	Yes
8	PA Off Alarm	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when any of the protection limit is reached	No
9	Fan Alarm	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when Fan limit is reached	Yes
10	RF Switch OFF	Control	LOW	Applying logic <u>HIGH</u> turns RF switch to load path	Yes
11	VSWR	Indicator	HIGH	Pin will be latched to logic <u>HIGH</u> when output reflection is over limit	Yes
12	0dB Attenuation	Control	LOW	Applying logic <u>HIGH</u> enables 5dB attenuation	Yes
13	30dB Attenuation	Control	LOW	Applying logic <u>HIGH</u> enables 10dB attenuation	Yes
14	+5V	Power Supply	+5V	+5V DC is available for reference 400mA current ability	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 500uA.
- 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 250mA.
- Indicator output signals can source 5mA.

Power Supply Connector Table

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

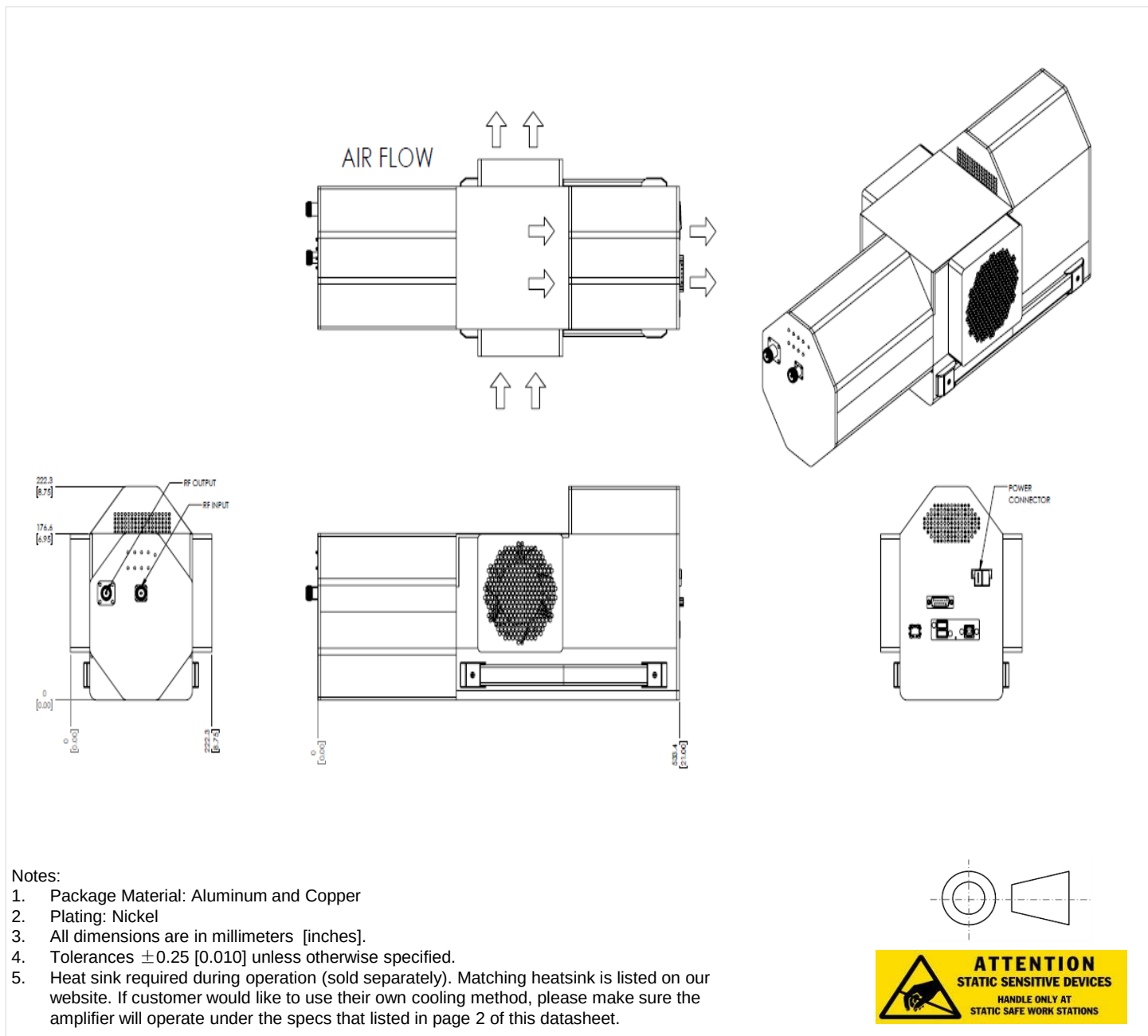


Pin #	Gender on the Housing	Function	Initial State	Description	Applied
A1	Male	GND	GND	Ground	Yes
A2	Male	VDC		Supply Voltage	Yes

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	Modification	Description
RFLUPA02G06GD	Input connector N-Type and Output connector N-Type	2GHz-6GHz DC Power Amplifier
REMC02G06GD	Input connector N-Type and Output connector N-Type	2GHz-6GHz EMC Benchtop Power Amplifier
REMC02G06GD-B	Input connector N-Type and Output connector N-Type optional RF blanking added.	2GHz-6GHz EMC Benchtop Power Amplifier with RF Blanking

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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