

Wide Band Solid State Power Amplifier 2GHz-6GHz



Product Description

RFLUPA02G06GC-B is a wideband solid state power amplifier with a frequency range of 2 to 6GHz.

The power output of this amplifier is 50 dBm typical. The typical small signal gain is 55dB with a flatness of ± 5 dB.

The power amplifier's input connector is SMA Female and output connector is an N-Type Female.

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

Features

- Wideband Solid State Power Amplifier
- Small Signal Gain 55dB Typical
- Output Saturation Power 50dBm Typical
- Supply Voltage +48VDC
- 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	Units
Frequency Range		2 – 6		GHz
Small Signal Gain		55		dB
Gain Flatness		+/-5		dB
Gain Variation Over Temperature (-40°C to +70°C)		+/-3		dB
Input Return Loss		-7		dB
*Output 1dB Compression Point (P1dB)		45		dBm
*Saturated Output Power (Psat)		50		dBm
Supply Current (Vcc = +48VDC)		2	10	A
RF Off Speed		500		ns
RF On Speed		20		us
Power Added Efficiency (PAE)		20		%
Weight		6.6		lbs.
Impedance		50		Ohms
Input / Output Connectors		SMA Female, N-Type 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 3dBm back off from Psat is required.

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+45VDC to +49.5VDC
*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

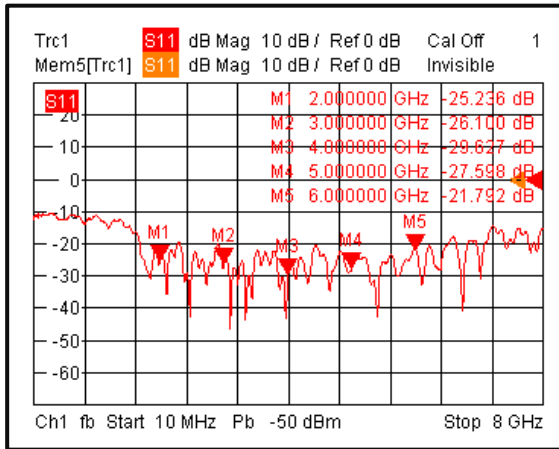
Parameter	Description
Operational Temperature	-40°C to +85°C (Case Temperature)
Storage Temperature	-55°C to +125°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for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

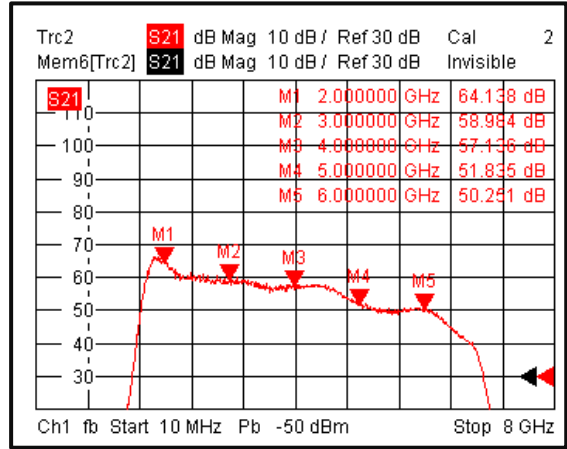
**For vibration testing details please see additional information section.

Typical Performance Plots

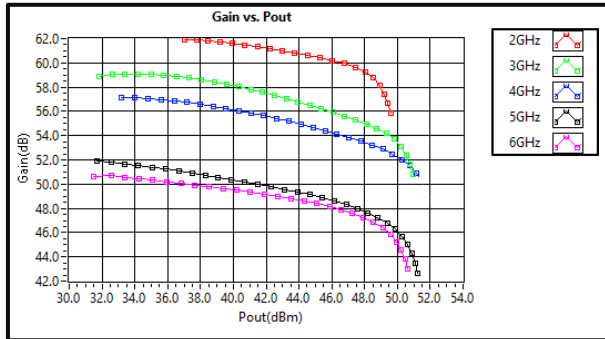
Input Return Loss @+25°C



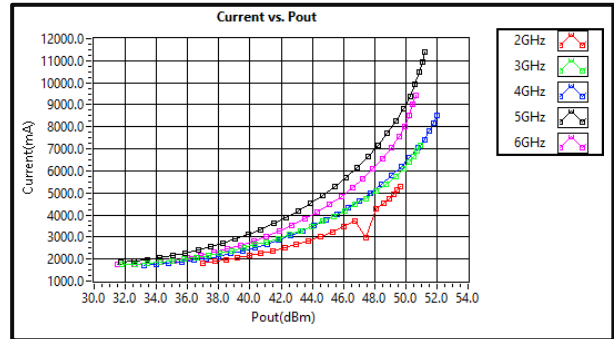
Gain vs. Frequency @+25°C



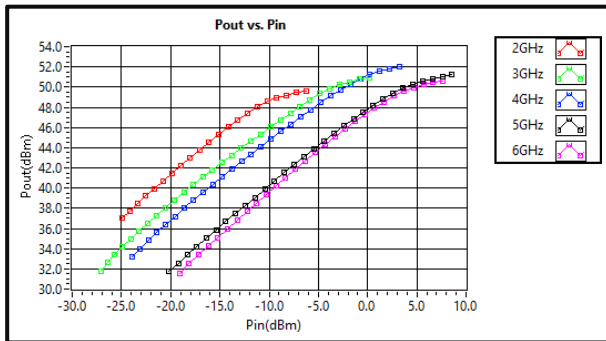
Gain vs Output Power @+25°C



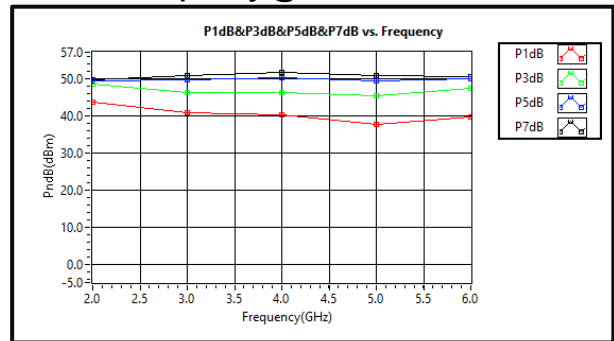
Current vs Output Power @+25°C



Output Power vs Input Power @+25°C

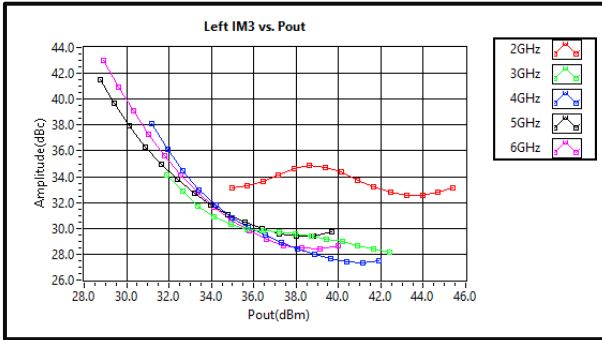


PXdB vs Frequency @+25°C

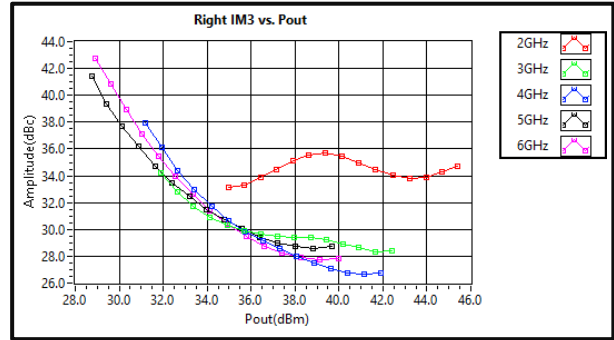


Typical Performance Plots

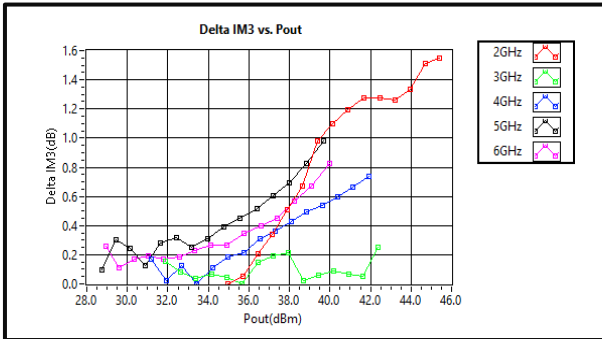
Left IM3 vs Output Power @+25 °C



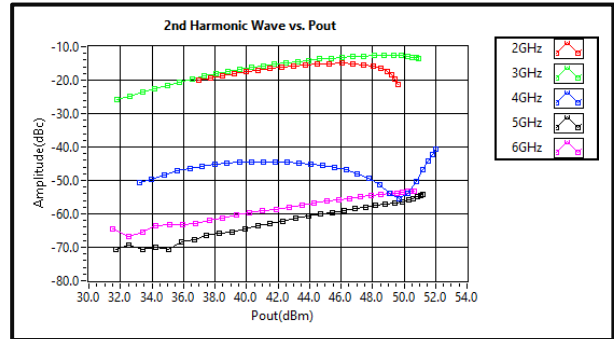
Right IM3 vs Output Power @+25°C



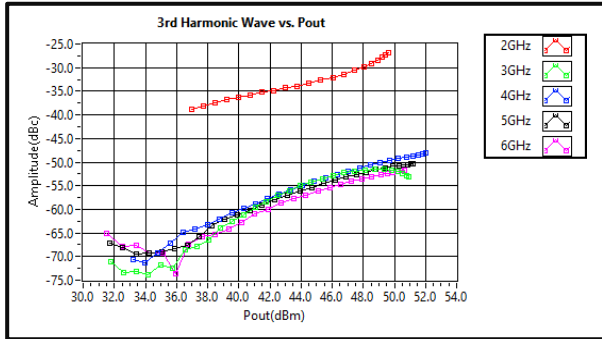
Delta IM3 vs Output Power @+25°C



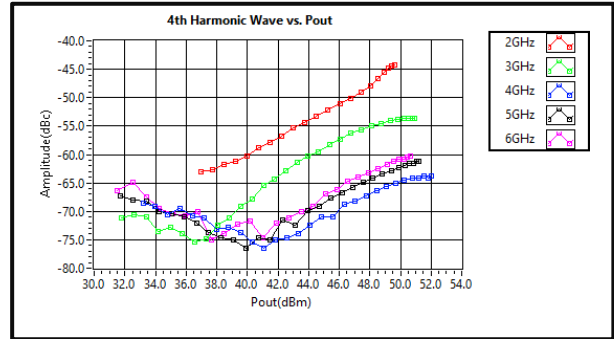
2nd Harmonic Wave vs Output Power @+25 °C



3rd Harmonic Wave vs Output Power @+25°C

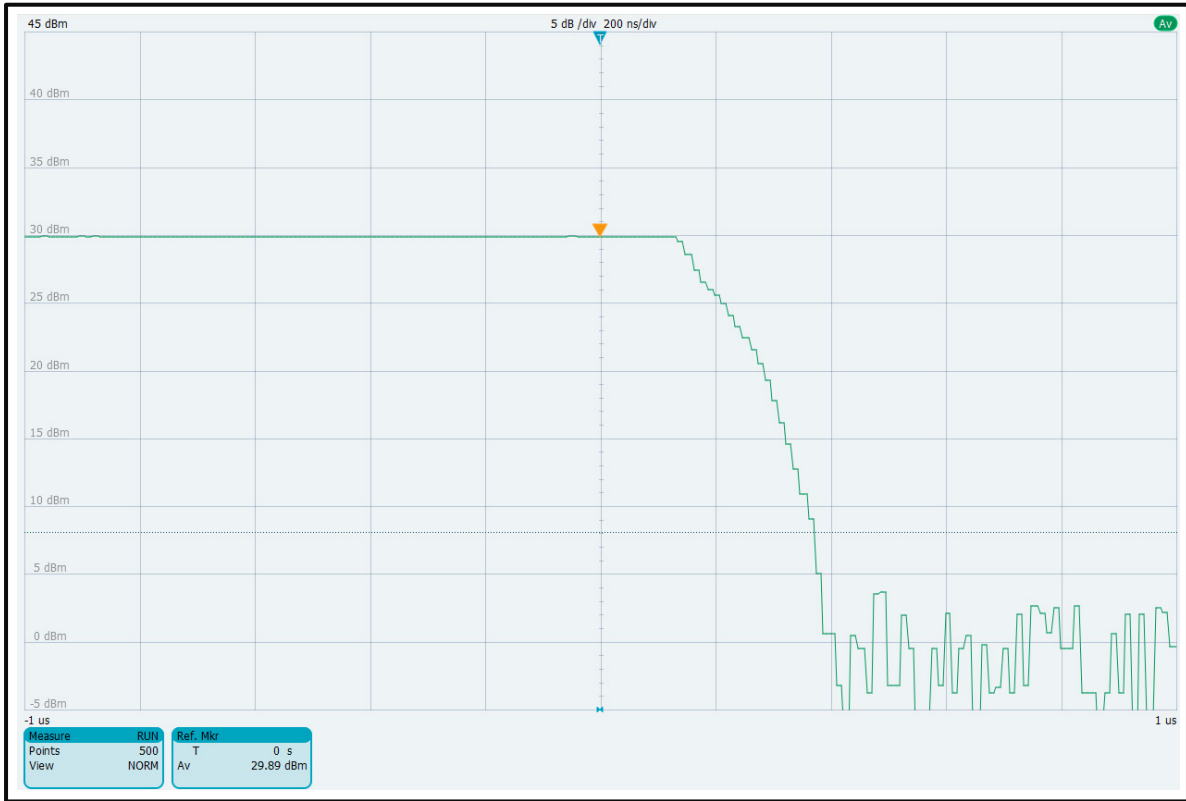


4th Harmonic Wave vs Output Power @+25°C

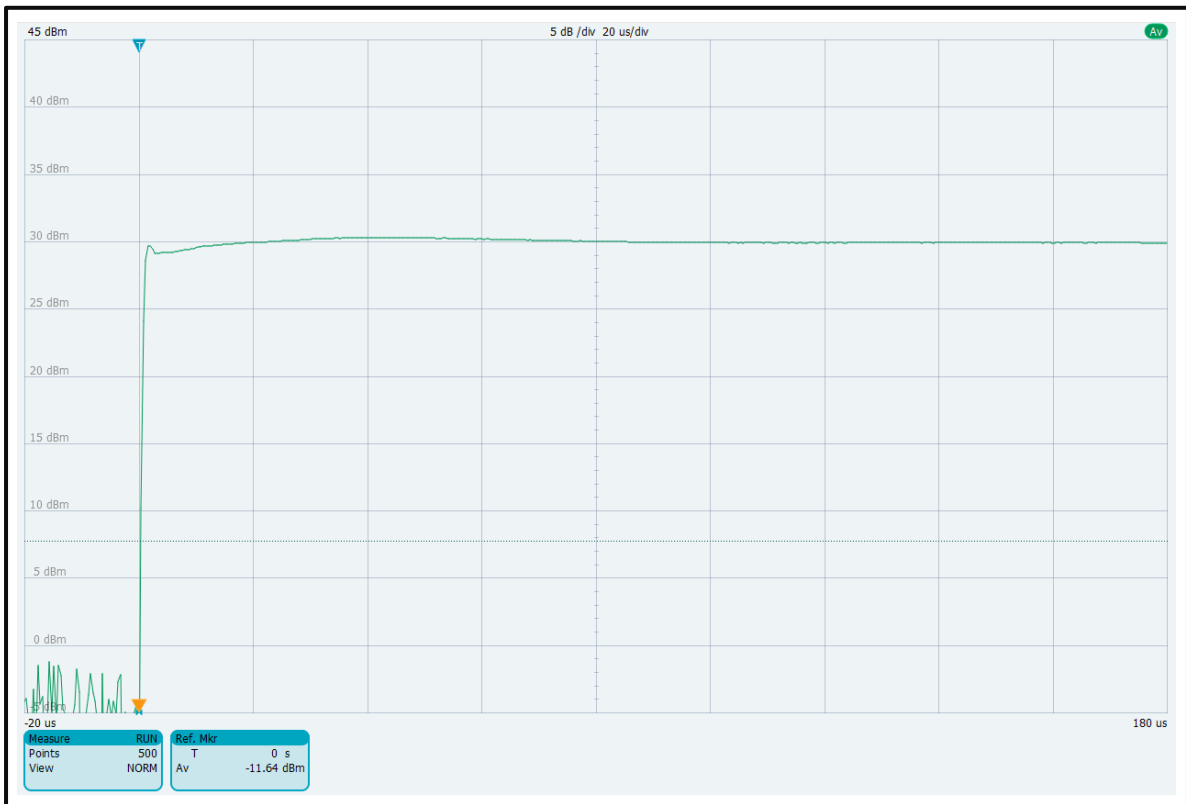


Note: Input/Output return loss measurements include attenuators to protect equipment

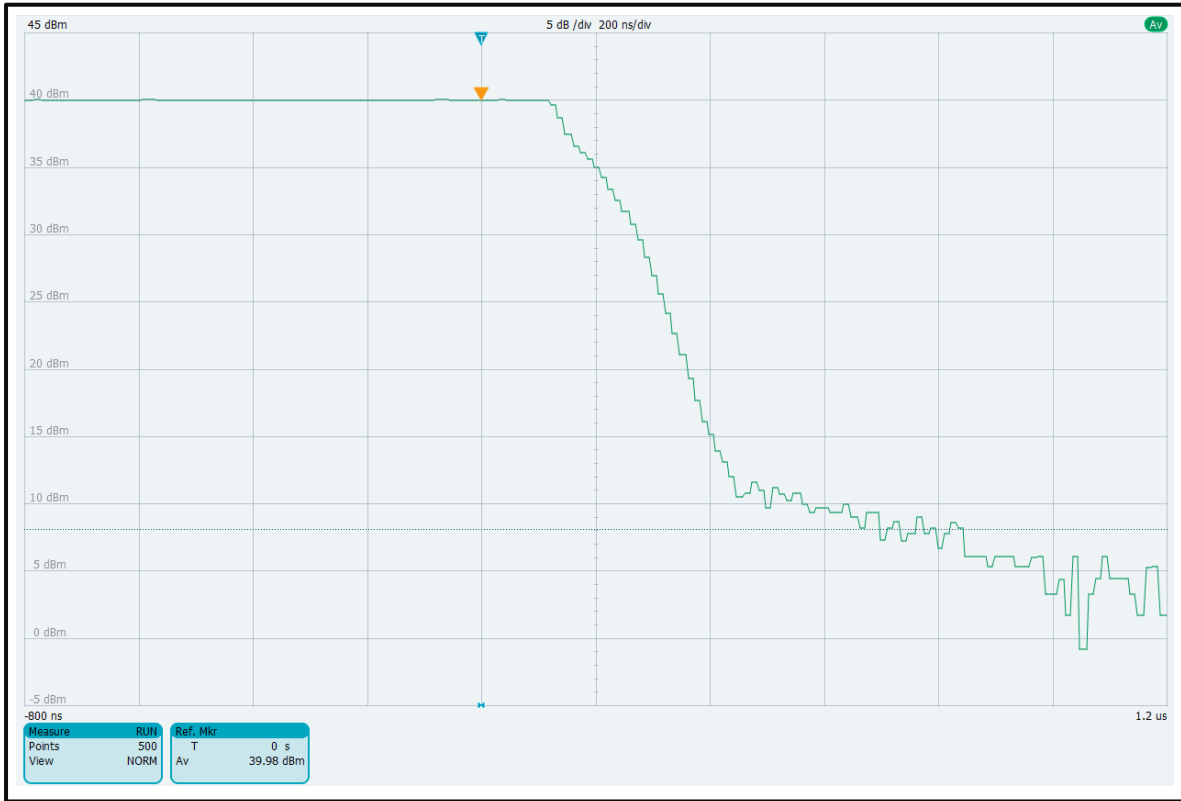
Blanking RF off timing: 30dBm Output Power (200 ns/div)



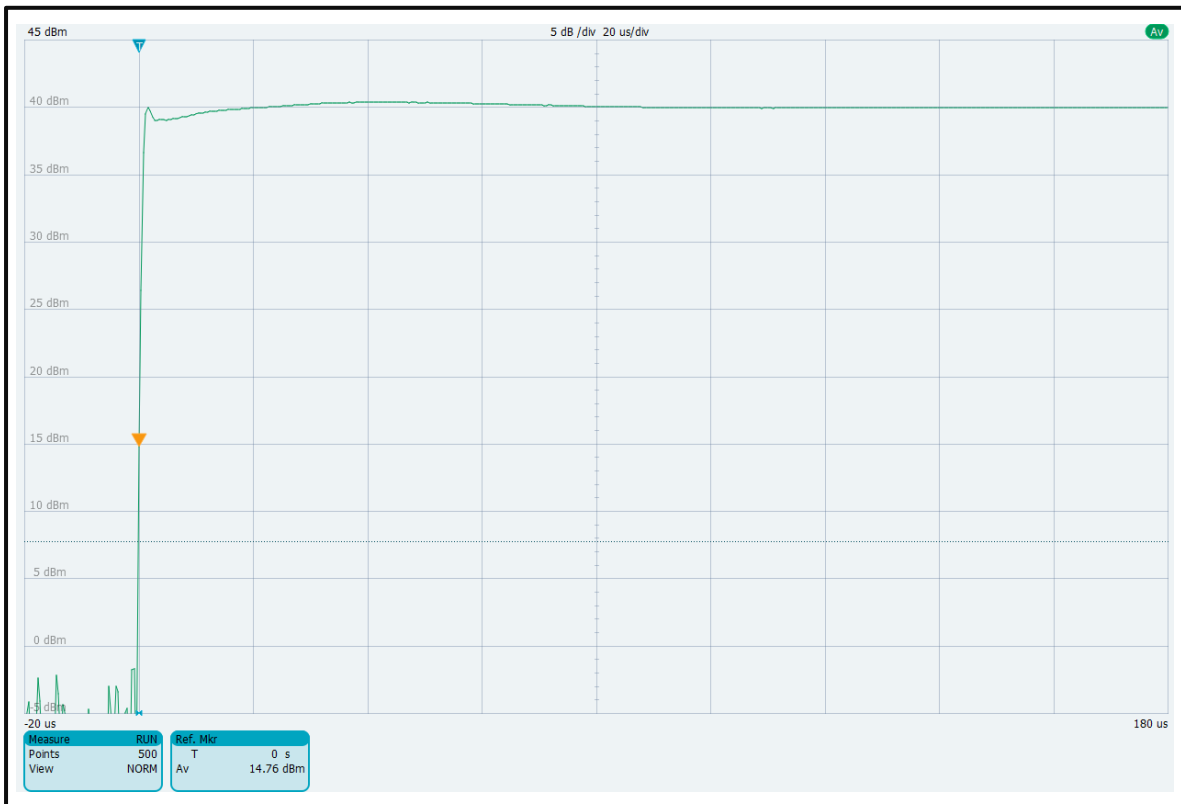
Blanking RF on timing: 30dBm Output Power (20 us/div)



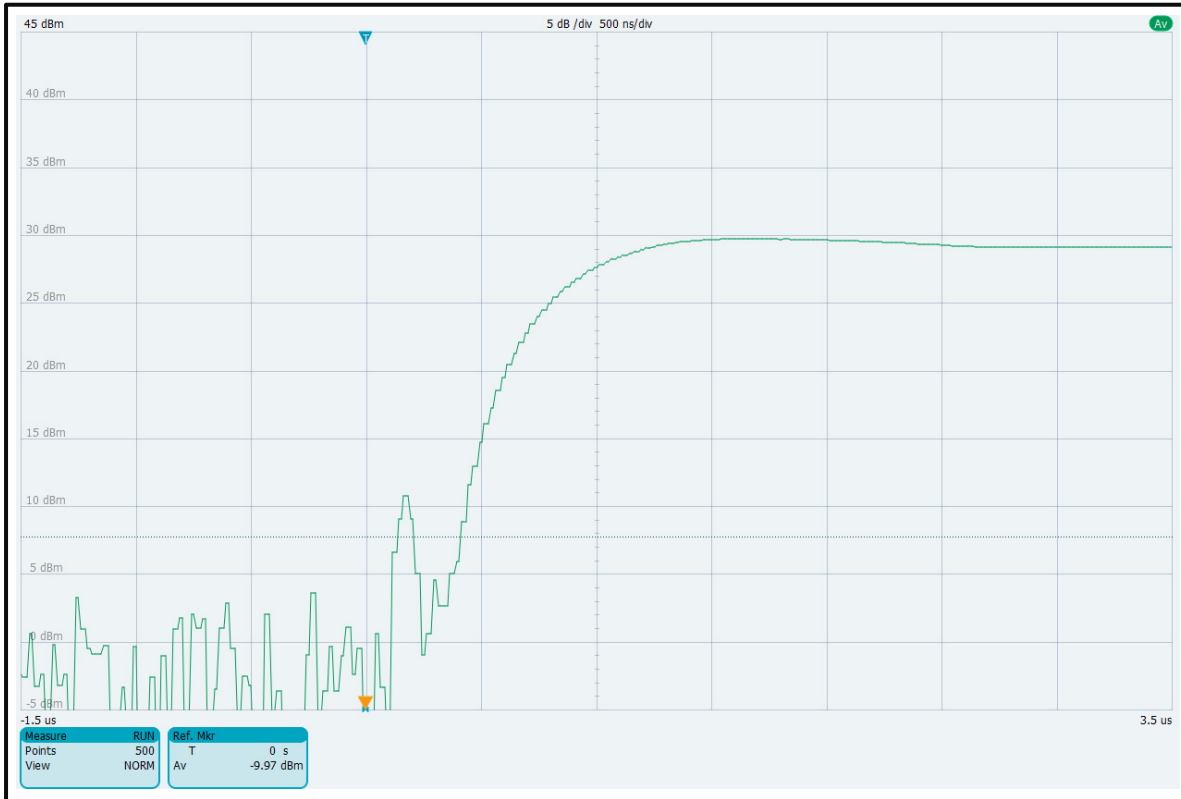
Blanking RF off timing: 40dBm Output Power (200 ns/div)



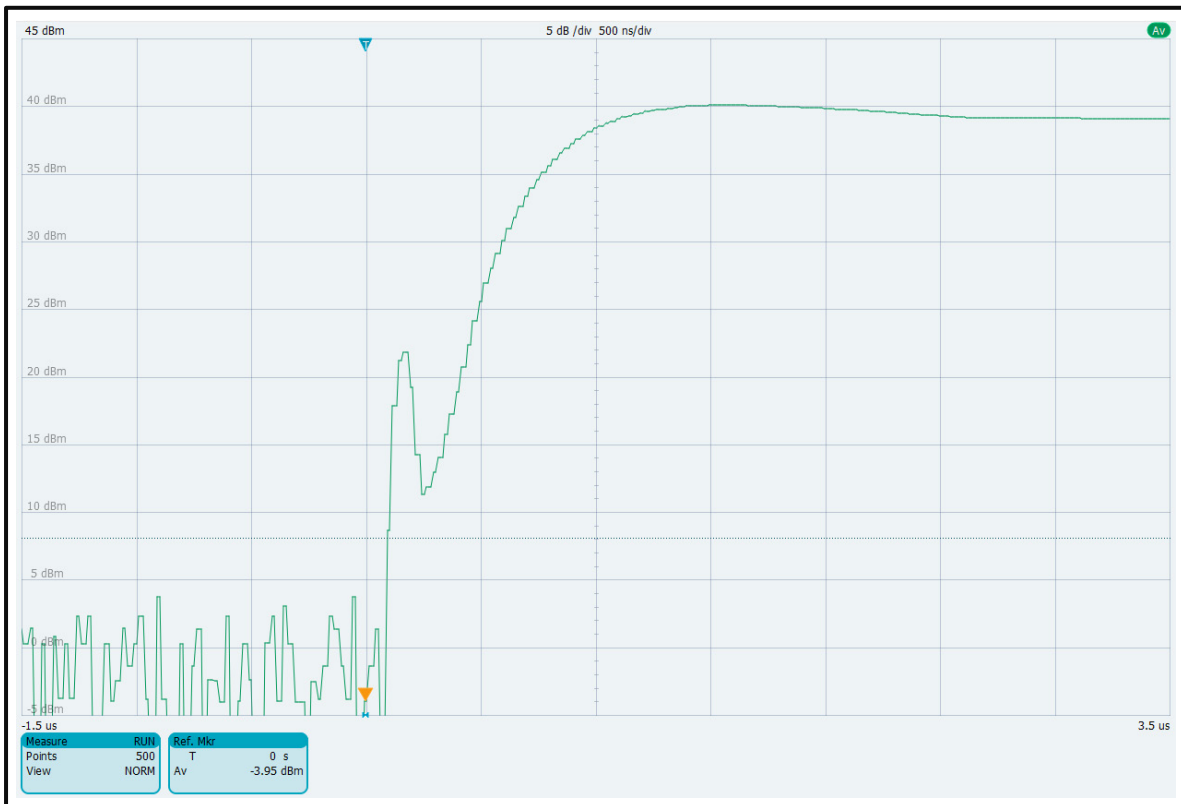
Blanking RF on timing: 40dBm Output Power (20 us/div)



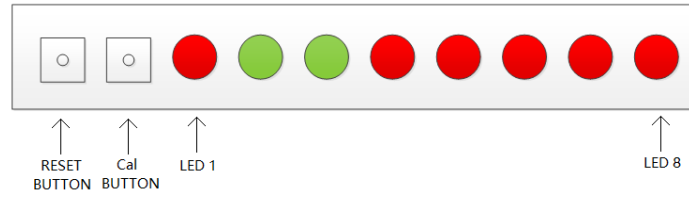
Blanking RF on timing: 30dBm Output Power (500 ns/div)



Blanking RF on timing: 40dBm Output Power (500 ns/div)



Alarm Status Panel

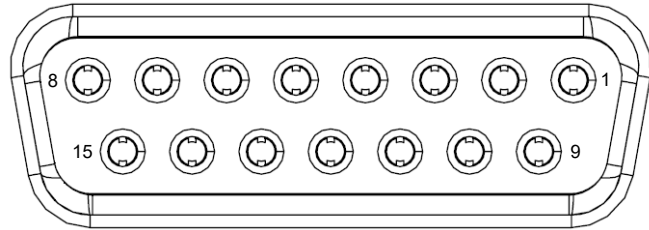


LED #	Name	Function	Initial State	Description	Applied
	Reset*	Control		Manual reset button to reset PA	Yes
	Calibration	Control		Manual calibration button to start calibrating the PA when CAL alarm LED is RED	Yes
1	Power	Control	Red	LED will light to RED color when supply power is applied	Yes
2	Pout	Indicator	Red	LED will light to GREEN color when RF output power is ON	Yes
3	System Initialing	Indicator	Green	LED will blink while boosting the system	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	Ground	Green	PA will shut down and latch this LED to a RED color if calibration needed while boosting the system *	Yes

*LED 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



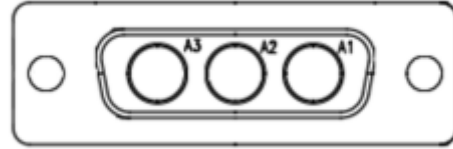
Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control	HIGH	Resets PA when logic <u>LOW</u> is applied and released.	Yes
2	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gates of driver amplifiers.	Yes
3	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disables drains of ALL amplifiers.	Yes
4	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
5	Temperature Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when temperature limit is reached.	Yes
6	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
7	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
8	Amplifier Off	Indicator	LOW	If amplifier protection trips and turns off, logic goes <u>HIGH</u> , indicating drains and gates of amplifiers are disabled.	Yes
9	Fan Failure	Indicator	LOW	Logic will latch <u>HIGH</u> and amplifier turned off when a fan failure is detected.	No
10	Temperature Signal	Signal	ANALOG	Analog voltage between zero- and five-volts representing temperature of RF section.	No
11	VSWR	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> and amplifier turned off when output reverse RF signal maximum limit is reached.	Yes
12	Input Power Monitor	Signal	ANALOG	Analog voltage between zero- and five-volts representing input signal power level.	No
13	+5V	Power Supply	+5V	+5V DC is supplied for reference.	Yes
14	Ground	Ground	GND	Ground	Yes
15	Drain Blanking	Control	LOW	Applying logic <u>HIGH</u> disables fast, drains of last stage of amplifier.	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 100mA.
- Indicator output signals can source 24mA.

Power Supply Connector Table

Female D-Sub is on the housing
Mating male part number: 09692100033

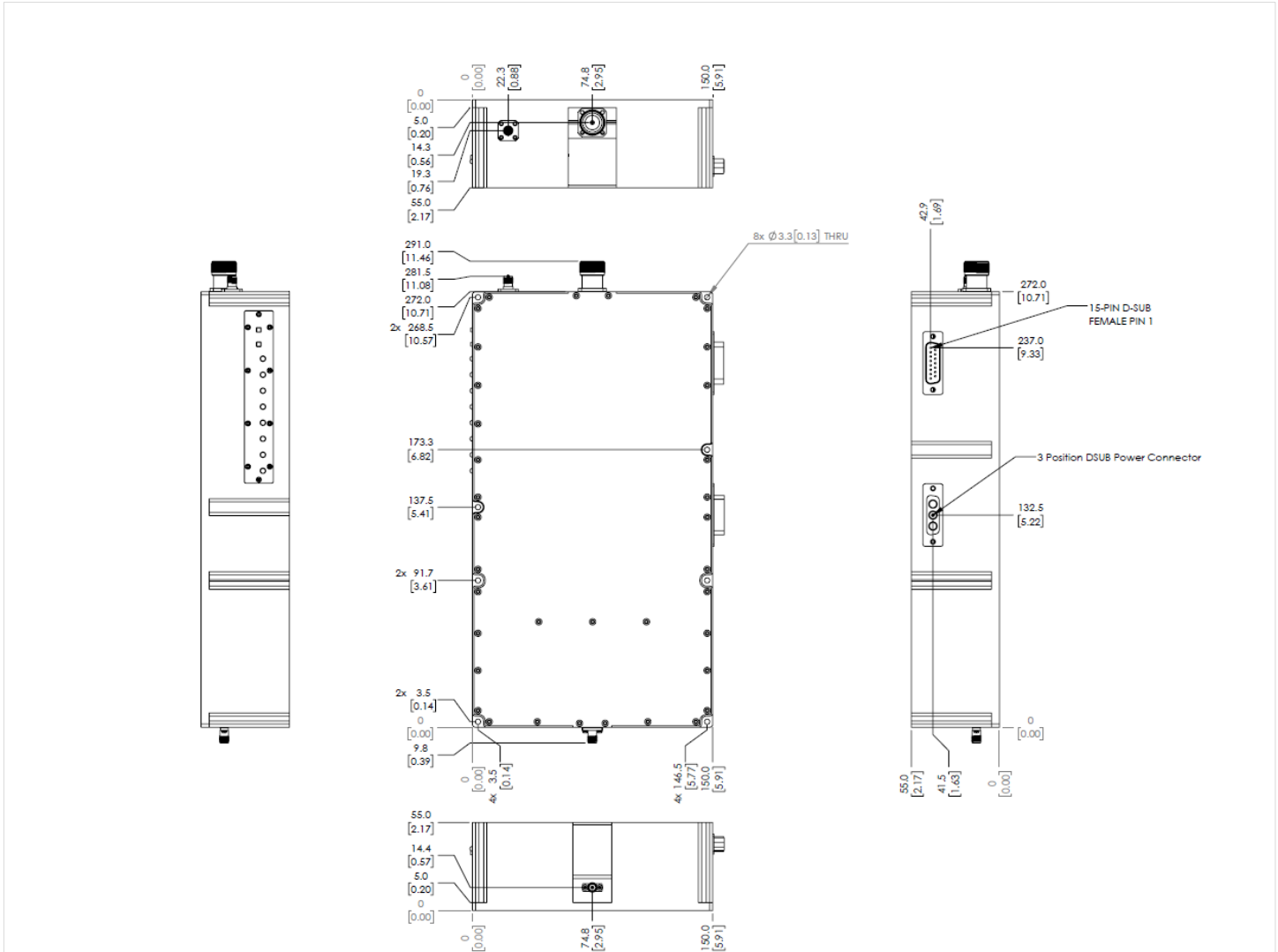


Pin #	Gender on the Housing	Function	Description	Applied
A1	Female	Ground	Ground	Yes
A2	Female	VDC	Supply Voltage	Yes
A3	Female	VDC	Supply Voltage	Yes

Notes:

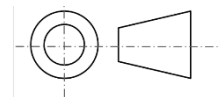
- Matching connector and cable will be shipped with the product.
- If customer would like to use their own wires, 12 AWG wire is required for high current applications.
- Connector image seen as if looking at amplifier.

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
RFLUPA02G06GC-B	Input connector SMA female and Output connector N-Type female	2GHz-6GHz 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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