

200W Wide Band Solid State Power Amplifier 8GHz-12GHz



Product Description

RFLUPA08G12GC is a wide band power amplifier with a frequency range of 8 to 12GHz.

The power output of this amplifier is 53dBm typical. The typical small signal gain is 63dB with a gain flatness of ± 2.0 dB. This power amplifier works with a +36VDC power supply.

The power amplifier input connector is SMA-female and output connector is WR90.

The operating temperature of this product is -40 to +60°C.

Features

- Solid State Power Amplifier
- Small Signal Gain 63dB Typical
- Output Saturation Power 53dBm Typical
- Supply Voltage +36 VDC
- 50 Ohm Matched

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	8		12	GHz
Small Signal Gain	58	63		dB
Gain Flatness		± 2.0		dB
Gain Variation Over Temperature (-40°C to +60°C)		± 2.0		dB
Input VSWR		1.5	2.0	: 1
Output 1dB Compression Point (P1dB)		47		dBm
Saturated Output Power (Psat)	52	53		dBm
Supply Current ($V_{CC} = +36\text{V}$)		10	25	A
Power Added Efficiency (PAE)		15		%
Turn On/Off Speed (Switch Disable)	ON	100		ns
	OFF	100		ns
Turn On/Off Speed (Drain Disable)	ON	25		us
	OFF	300		us
Turn On/Off Speed (Gate Disable)	ON	350		us
	OFF	100		us
Weight	Net	15.6 Max.		lbs.
	Including Heat Sink	37.5 Max.		
Impedance		50		Ohms
Input / Output Connectors	SMA-Female(Input) – WR90(Output) (H-Plane available with adapter)			
Package	Epoxy Sealed (Standard)			
	Hermetically Sealed (Optional)			

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 VSWR.)
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

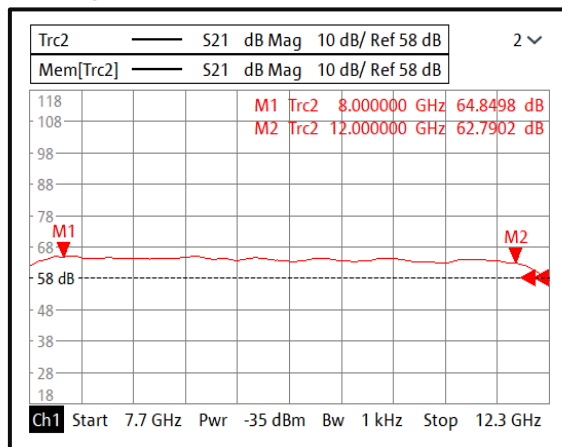
Parameter	Description
Operational Temperature	-40°C to +60°C (Case Temperature)
Storage Temperature	-50°C to +105°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +60°C for 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.

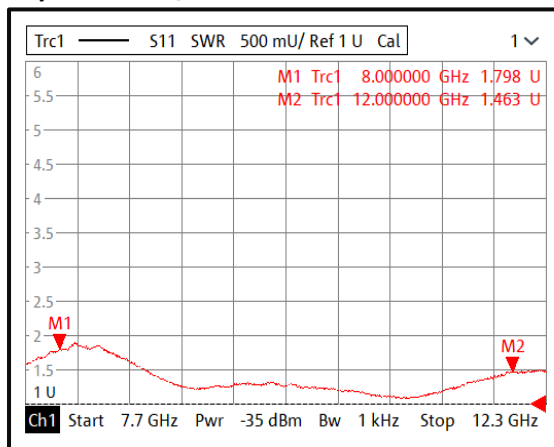
**For vibration testing details please see additional information section.

Typical Performance Plots

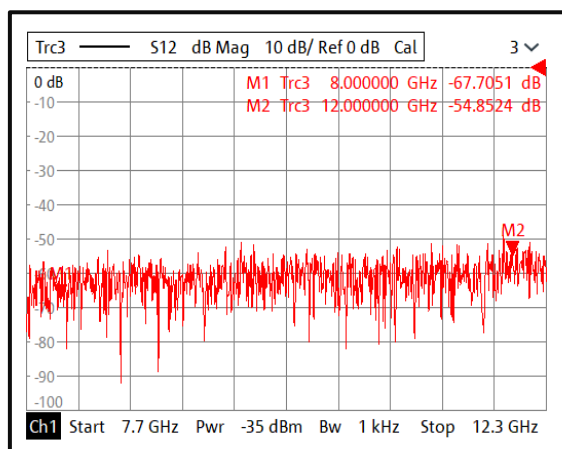
Gain @ +25°C



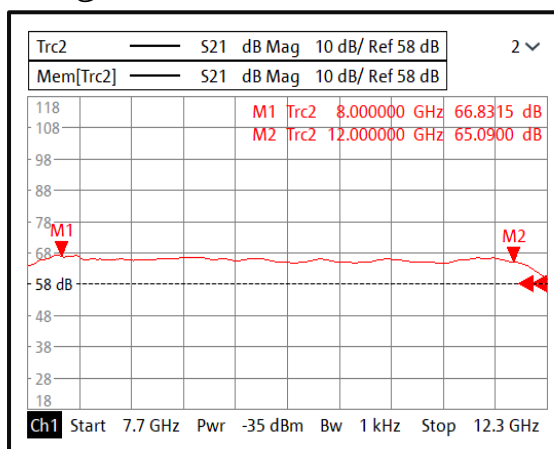
Input VSWR@+25°C



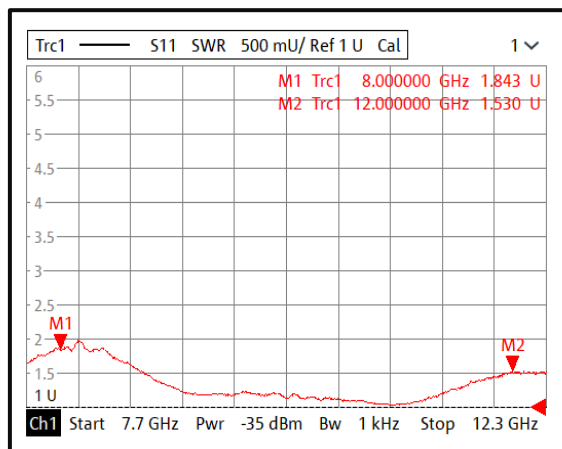
Isolation @ +25°C



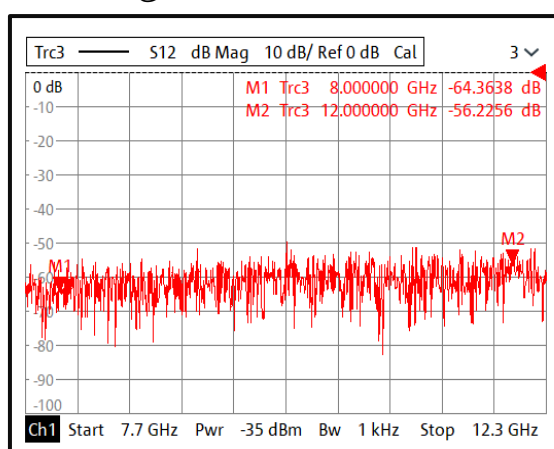
Gain @ -40°C



Input VSWR@ -40°C



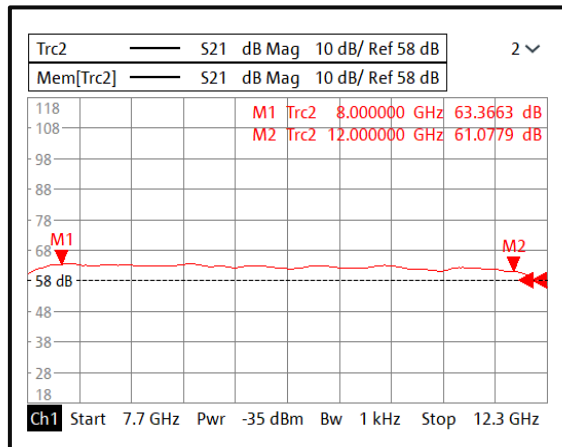
Isolation @ -40°C



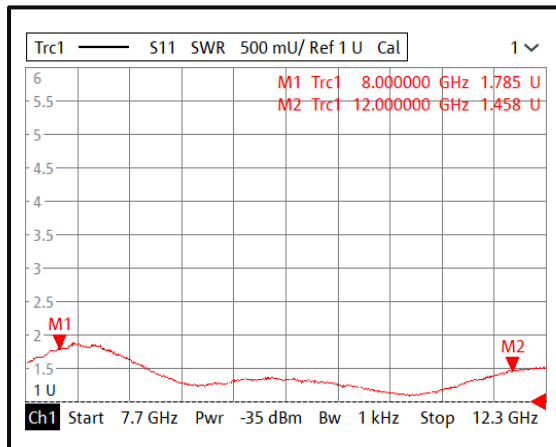
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

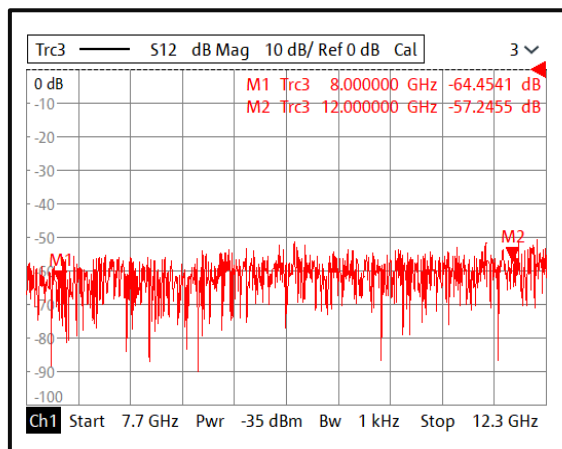
Gain @ +60°C



Input VSWR @ +60°C



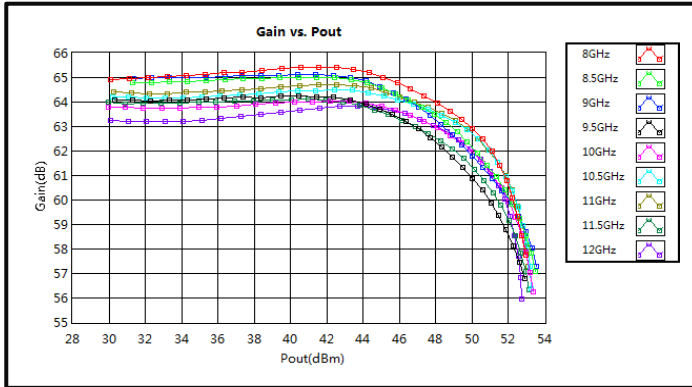
Isolation @ +60°C



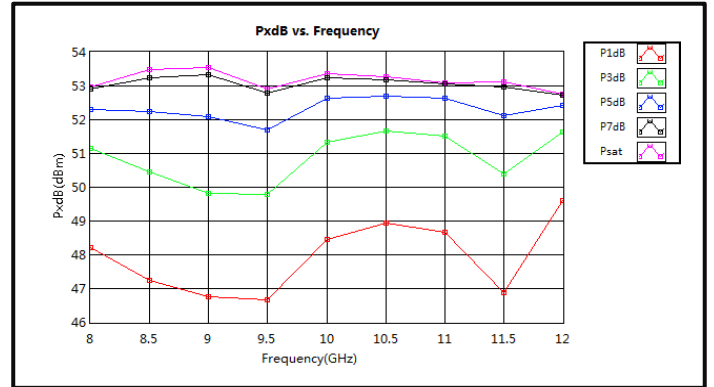
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

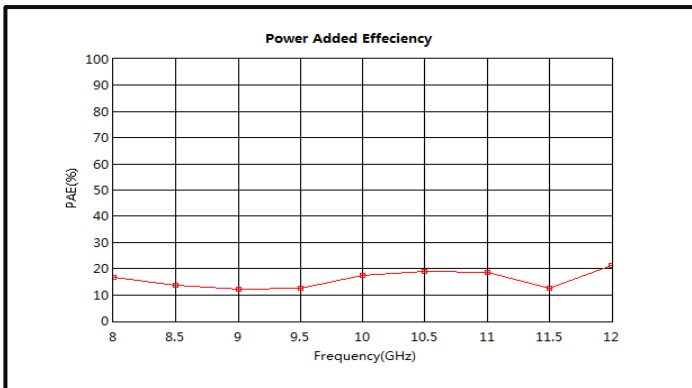
Gain vs. Output Power CW



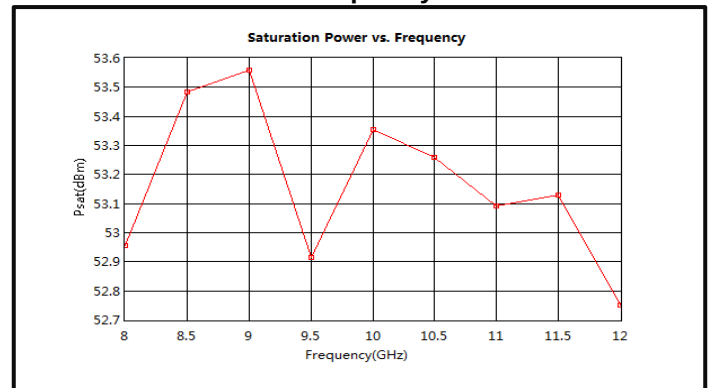
PndB vs. Frequency CW



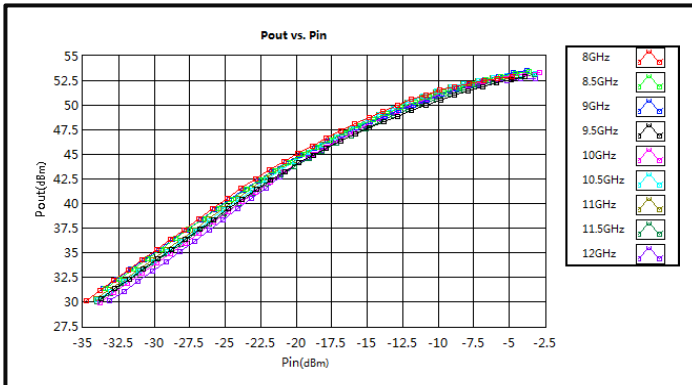
Power Added Efficiency CW



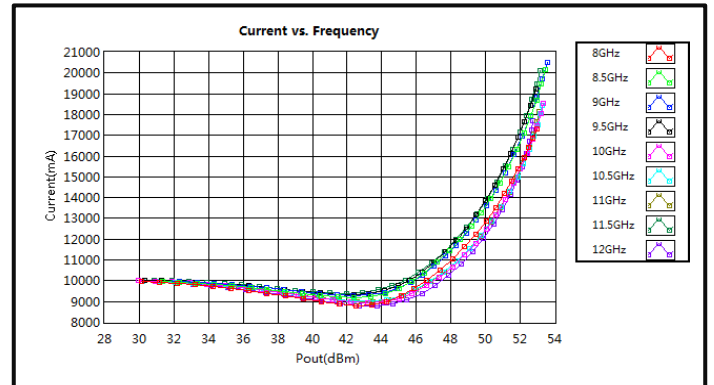
Saturation Power vs. Frequency CW



Pout vs. Pin

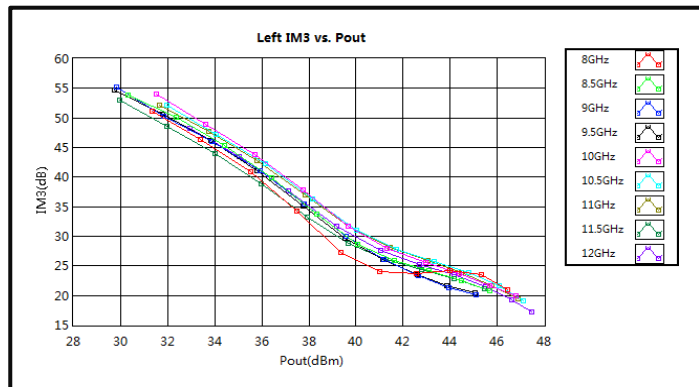


Current vs. Pout

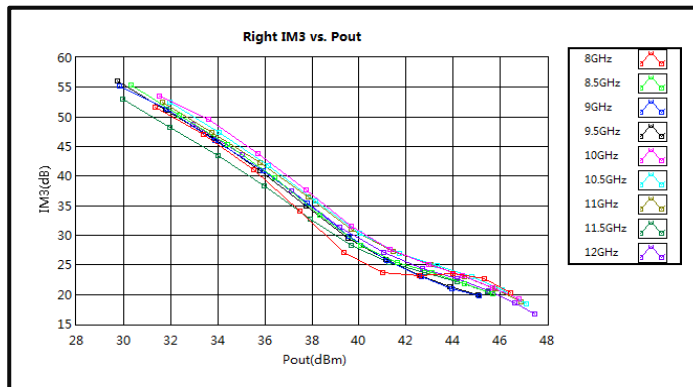


Typical Performance Plots

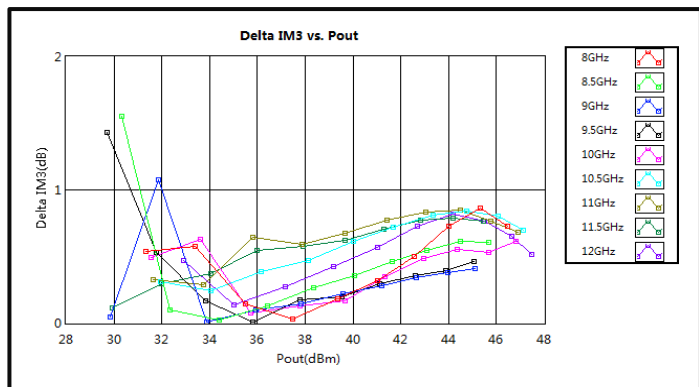
Left IM3 vs. Pout



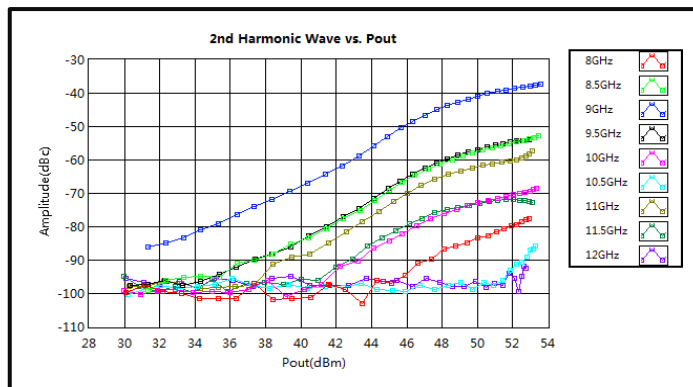
Right IM3 vs. Pout



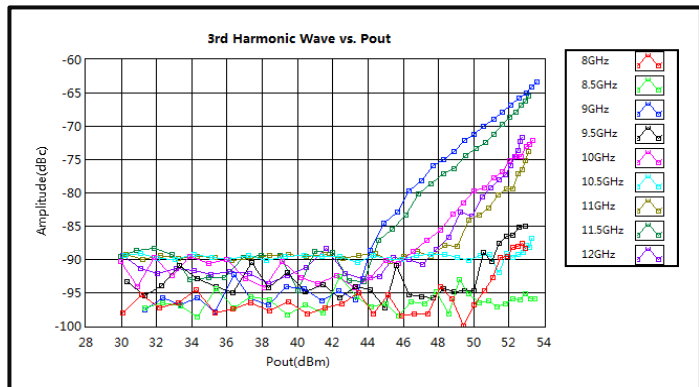
Delta IM3 vs. Pout



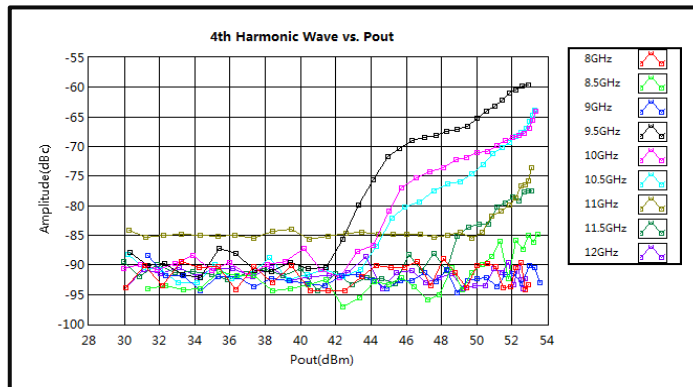
2nd Harmonic Wave Output Power



3rd Harmonic Wave Output Power



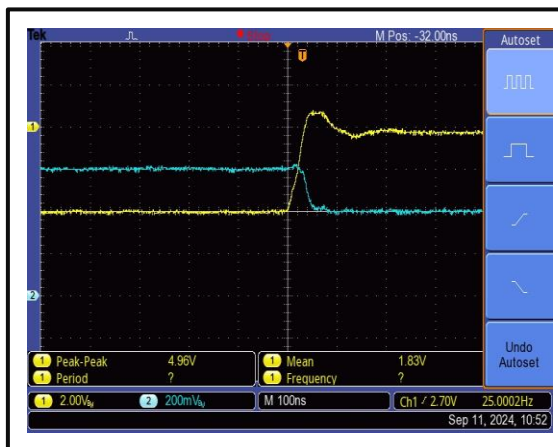
4th Harmonic Wave Output Power



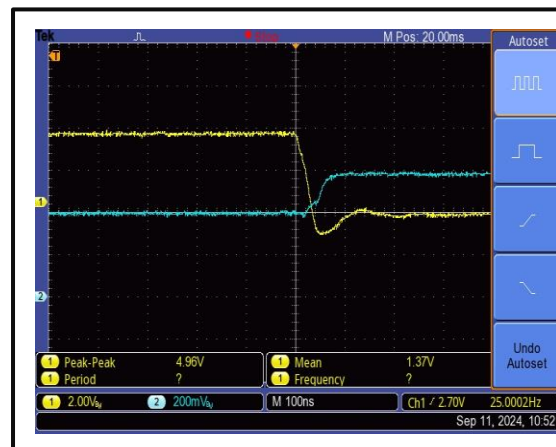
Note: IM3 test performed with 1MHz tone spacing

Typical Performance Plots

The Switching Rise Time is 100 ns @+25°C

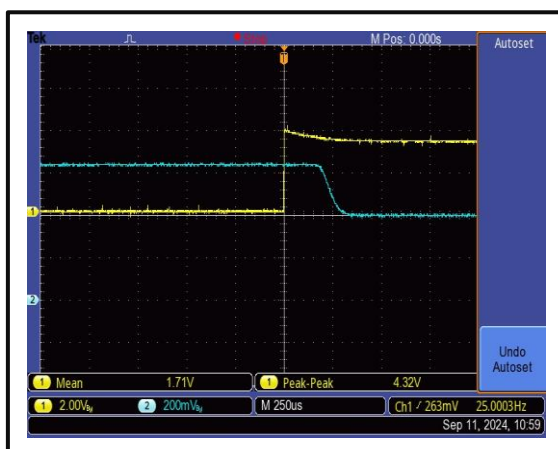


The Switching Fall Time is 100 ns @+25°C

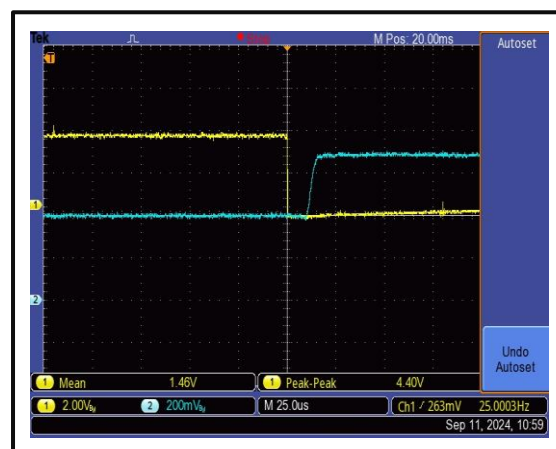


Switch control port: D-sub 15 PIN #10(RF Input Switch) .
The yellow curve is the switch control signal, the blue curve is RF output envelope.

The Drain-Enable Rise Time is 300 us @+25°C

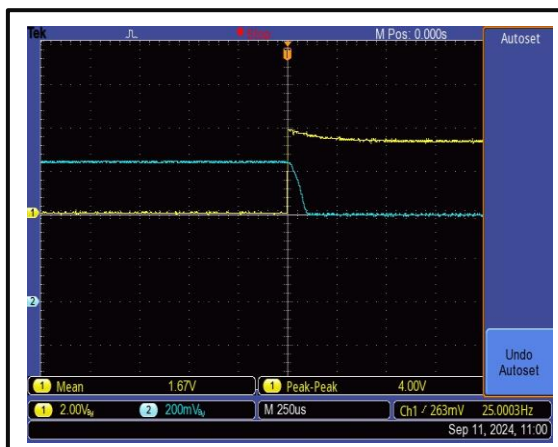


The Drain-Disable Fall Time is 25 us @+25°C

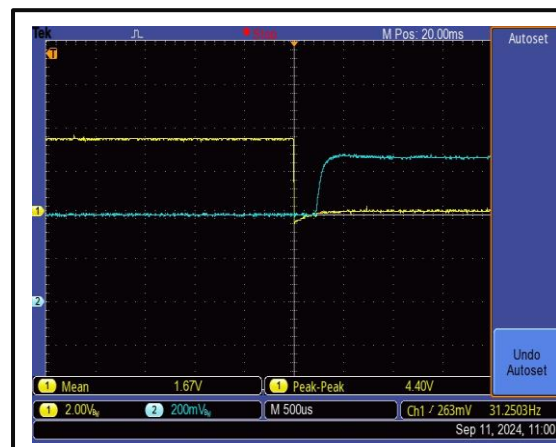


The drain control port: D-sub 15 PIN #3 (Drain Disable).
The yellow curve is the drain control signal, the blue curve is RF output envelope.

The Gate-Enable Rise Time is 100 us @+25°C



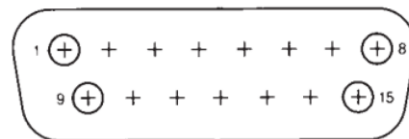
The Gate-Enable Fall Time is 350 us @+25°C



The gate control port: D-sub 15 PIN #2 (Gate Disable).
The yellow curve is the gate control signal, the blue curve is RF output envelope.

Protection Connector Table

Female D-Sub is on the housing
The mating Male part number: 172-E15-103R001



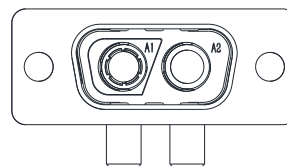
Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control	HIGH	Resets PA when logic <u>LOW</u> is applied for five more seconds and released	Yes
2	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disable gates of amplifiers	Yes
3	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disable drains of amplifiers	Yes
4	RF Input Over Drive	Indicator	LOW	Pin will be latched to logic HIGH when input signal is over limit	Yes
5	Temp Over	Indicator	LOW	Pin will be latched to logic HIGH when amplifier is driven over temperature	Yes
6	Current Over	Indicator	LOW	Pin will be latched to logic HIGH when drain current limit is reached	Yes
7	ID Imbalance	Indicator	LOW	Pin will be latched to logic HIGH 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 HIGH when any of the protection limit is reached	Yes
9	Fan Alarm	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when Fan limit is reached	No
10	RF Input Switch	Control	LOW	Applying logic HIGH turns OFF RF front-end switch to terminator	Yes
11	VSWR	Indicator	LOW	Pin will be latched to logic HIGH when output reflection is over limit	Yes
12	Fixed Attenuation 10dB	Control	LOW	Applying and holding logic HIGH to enable 10dB fixed attenuation	Yes
13	Fixed Attenuation 20dB	Control	LOW	Applying and holding logic HIGH to enable 20dB fixed attenuation	Yes
14	+5V	Power Supply	+5V	+5V DC is supplied for reference (200mA)	Yes
15	GND	Ground	GND	Ground	Yes

Notes:

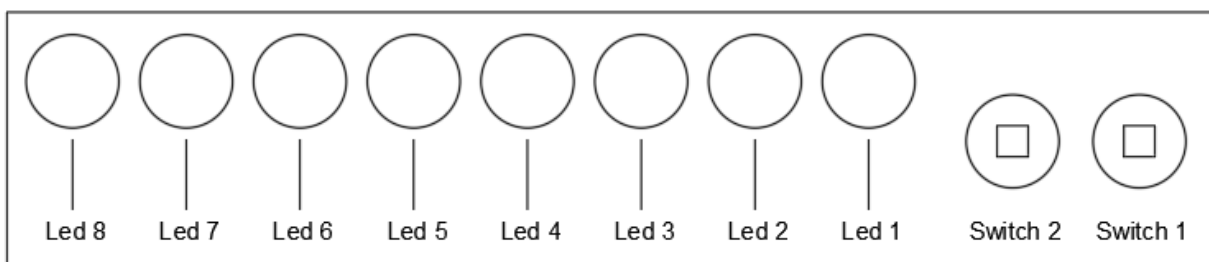
- HIGH/LOW voltages are standard TTL signals 0V to 0.8V = LOW. 2.8V to 5V = HIGH. Input current is 10uA.
- Matching connector and cable will be shipped with the product.
- Applied=Yes means the feature is included. Applied=No means the feature is not included with this model.
- 5V reference supply can source 500mA.
- Indicator output signals can source 24mA.

Protection Connector Table

Female D-Sub is on the housing
The mating Male part number: 09691100022



Pin #	Name	Function	Initial State	Description	Applied
A1	+36 VDC	Power Supply	+36 VDC	Power Supply	Yes
A2	GND	Ground	GND	Ground	Yes



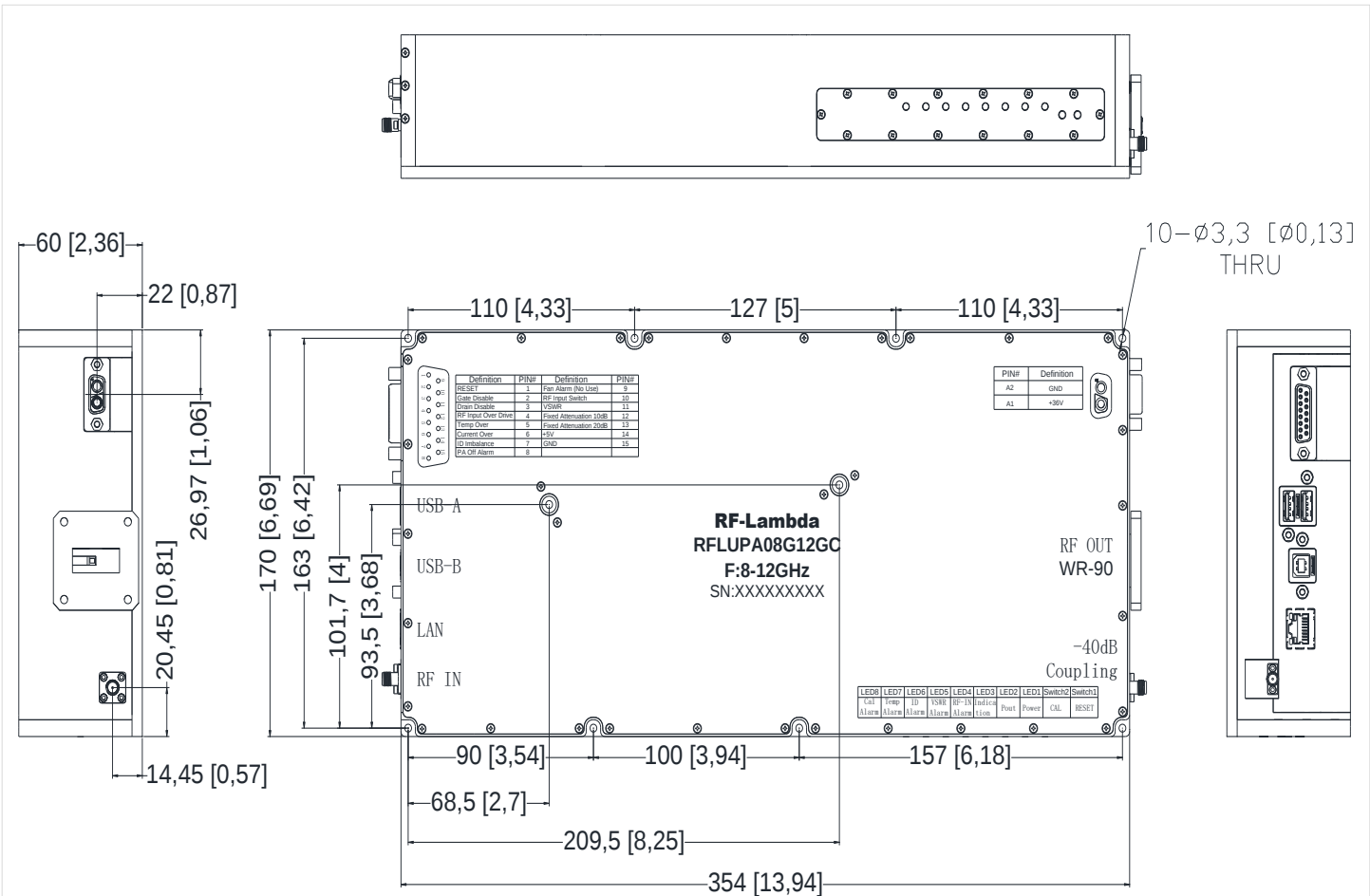
	Name	Function	Initial State	Description	Applied
Switch 1	Reset	Control		Manual reset switch to reset PA	Yes
Switch 2	Calibration	Control		Manual calibration switch to correct PA	Yes
Led 1	Power	Indicator	GREEN Color	Power supply normal indicator *	Yes
Led 2	RF ON/OFF	Indicator	GREEN Color	RF output status indicator. PA will shut down and latch this LED to a RED color when any protection is triggered *	Yes
Led 3	System Initial	Indicator	GREEN Color	The indicator will flash during calibration *	Yes
Led 4	RF Input Over Drive	Indicator	GREEN Color	PA will shut down and latch this LED to a RED color when input signal is over limit *	Yes
Led 5	Over VSWR	Indicator	GREEN Color	PA will shut down and latch this LED to a RED color when output reflection is over limit *	Yes
Led 6	Over Current	Indicator	GREEN Color	PA will shut down and latch this LED to a RED color when current limit is reached or an imbalance in the drain current of the combining branches occurs *	Yes
Led 7	Over Temp	Indicator	GREEN Color	PA will shut down and latch this LED to a RED color when driven over temperature *	Yes
Led 8	Calibration State	Indicator	GREEN Color	Calibration status indicator. The red light indicates that calibration is required *	Yes

*LED needs to be manually reset to initial state by pressing RESET button

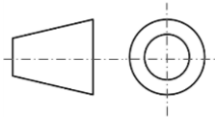
Equipment Specifications

Name	Description
-40dB Coupling	Coupling output interface of amplifier output terminal
USB-B	USB-B Port(remote control)
LAN	LAN Port (remote control)
USB-A	USB-A Port (work log)
	USB-A Port (N/A)

Outline Drawing

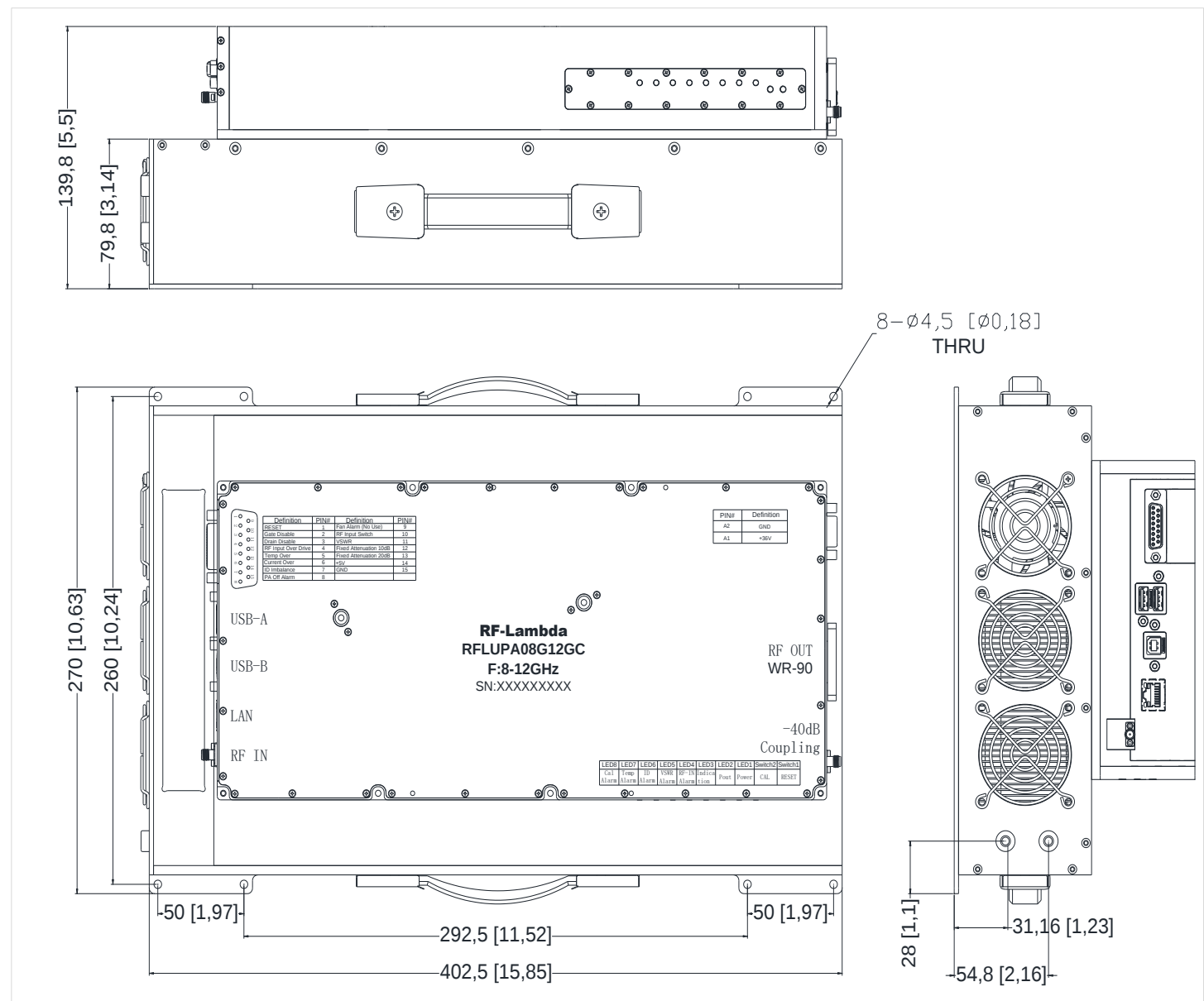


- Notes:
- Package Material: Copper.
 - Finish: Nickel Plated.
 - All dimensions are in millimeters [inches].
 - Housing Tolerances ± 0.2 [0.008] unless otherwise specified (Excl Heat Sink).
 - Heat sink required during operation (sold separately). Matching heatsink is listed on our website. If customer 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.
 - DB15 cable is configured for power connection port by default (RFCBLADB15).
 - Heat Sink required during operation (Sold Separately).
 - Standard torque wrench must be used to secure RF connectors.



ATTENTION
STATIC SENSITIVE DEVICES
HANDLE ONLY AT
STATIC SAFE WORK STATIONS

Outline Drawing



Packing List

ID	Description	QTY
1	Fig a. DB15 cable (RFCBLADB15)	1
2	Fig b. DB2 cable (RFCBLADB2M)	1



Fig a.



Fig b.

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
RFLUPA08G12GC	Input Connector SMA-Female and Output Connector WR-90	8GHz-12GHz 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 VSWR 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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