

Ultra Wide Band Power Amplifier 0.03GHz-1GHz



Product Description

RFLUPA0010G200B is an ultra wide band power amplifier with a frequency range of 0.03 to 1GHz.

The power output of this amplifier is 53dBm typical. The typical small signal gain is 55dB with a gain flatness of ± 3.0 dB.

This power amplifier works with a +48VDC power supply.

The working temperature of this product is between - 40°C and + 60°C.

Features

- Ultra Wide band Power Amplifier
- Small Signal Gain 55dB Typical
- Output Saturation Power 53dBm Typical
- High P1dB +50dBm Typical
- Supply Voltage +48VDC
- 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 | 0.03 | | 0.8 | 0.8 | | 1 | GHz |
| Small Signal Gain | | 55 | | | 55 | | dB |
| Gain Flatness | | ± 2.5 | | | ± 2.5 | | dB |
| Gain Variation Over Temperature (-40°C~+60°C) | | ± 2.0 | | | ± 2.0 | | dB |
| Input VSWR | | 1.5 | | | 1.5 | | : 1 |
| Output 1dB Compression Point (P1dB) | | 51.5 | | | 50 | | dBm |
| Saturated Output Power (Psat) | | 53 | | | 51.5 | | dBm |
| Supply Current (Vcc=+48V) | | 0.75 | 20 | | 0.75 | 20 | A |
| Isolation S12 | | -60 | | | -60 | | dB |
| Turn On/Off Speed (Switch Disable) | ON | | | | 12 | | us |
| | OFF | | | | 8 | | us |
| Turn On/Off Speed (Drain Disable) | ON | | | | 25 | | ms |
| | OFF | | | | 20 | | ms |
| Turn On/Off Speed (Gate Disable) | ON | | | | 50 | | us |
| | OFF | | | | 30 | | ms |
| Weight | Net | | 5.85 Max. | | | | lbs. |
| | Including Heat sink | | 23.38 Max. | | | | |
| Impedance | | | 50 | | | | Ohms |
| Input / Output Connectors | | | SMA- Female(Input) – N- Female(Output) | | | | |
| Package Sealing | | | Epoxy Sealed (Standard) | | | | |
| | | | Hermetically Sealed (Optional) | | | | |

Absolute Maximum Ratings

| Parameter | Rating |
|------------------------|--------------------------|
| Operating Voltage | +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

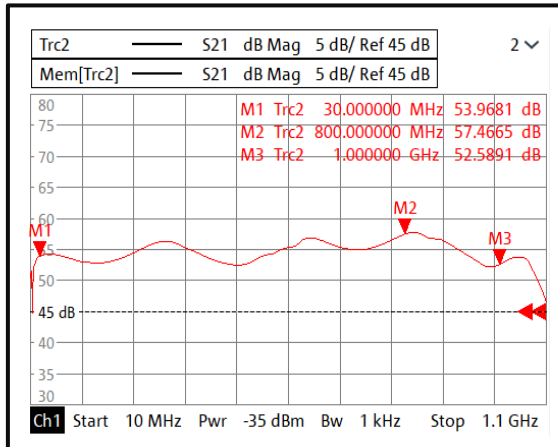
| Parameter | Description |
|--------------------------------|---|
| Operational Temperature | -40°C to +60°C (Case Temperature) |
| Storage Temperature | -50°C to +105°C |
| Thermal Shock | -40°C → +85°C (5 Cycles / 10 hours) |
| **Random Vibration | MIL-STD-202G Table 214-I, Test Condition Letter C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

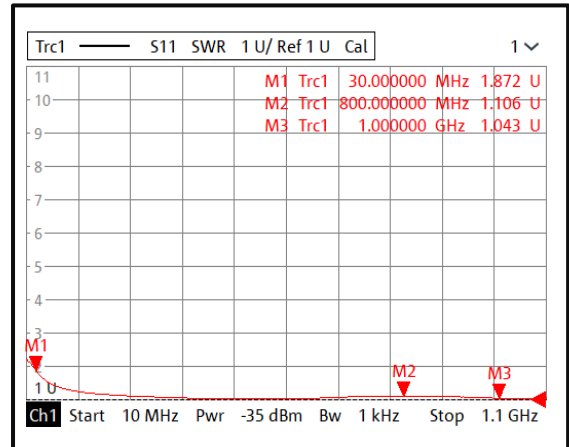
**For vibration testing details please see additional information section.

Typical Performance Plots

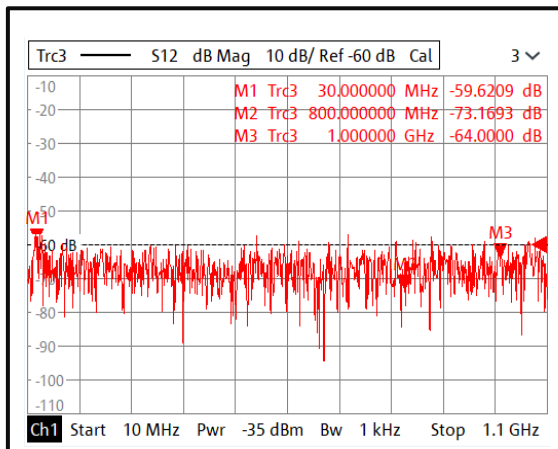
Gain @ +25°C



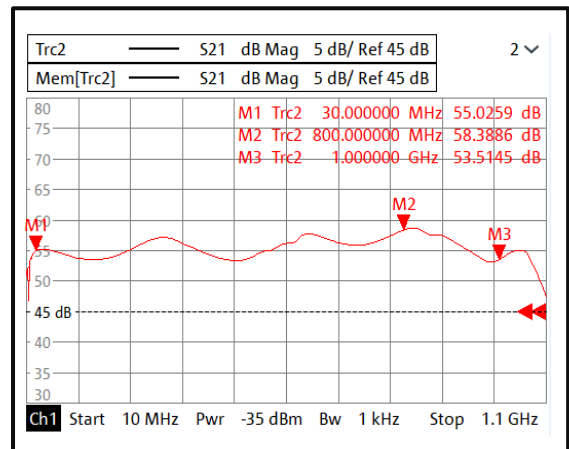
Input VSWR @ +25°C



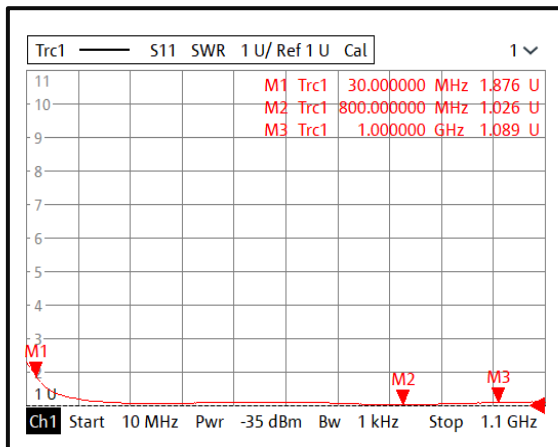
Isolation @ +25°C



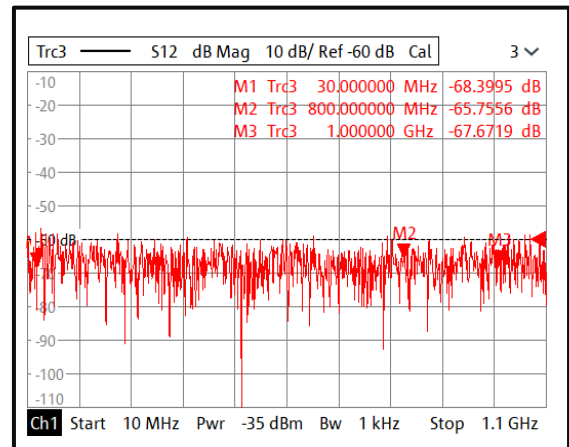
Gain @ -40°C



Input VSWR @ -40°C



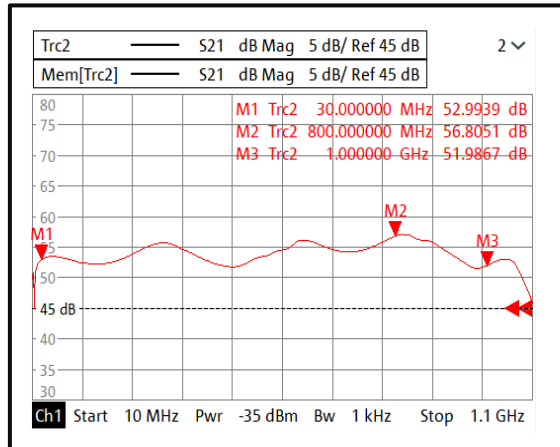
Isolation @ -40°C



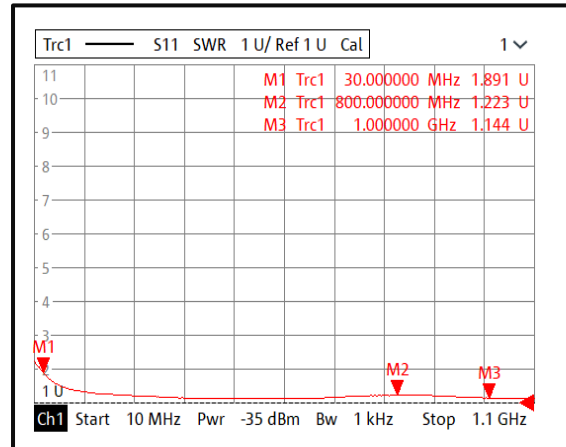
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

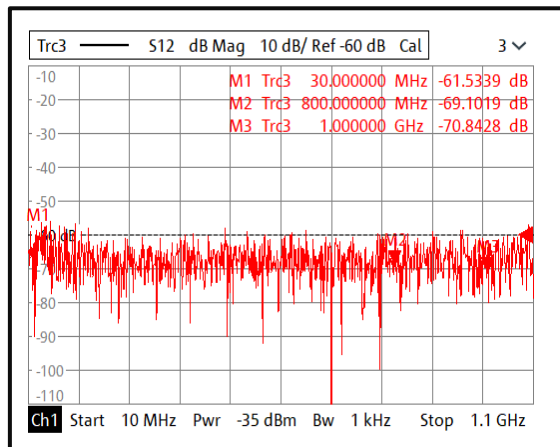
Gain @ +60°C



Input VSWR @ +60°C



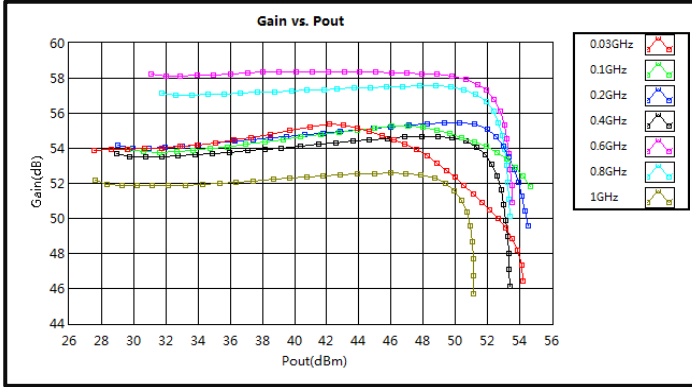
Isolation @ +60°C



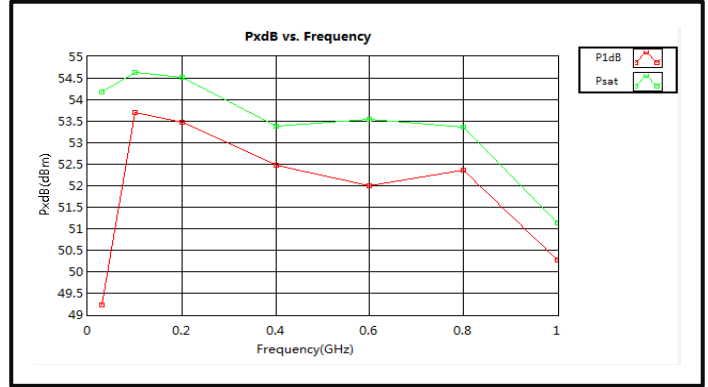
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

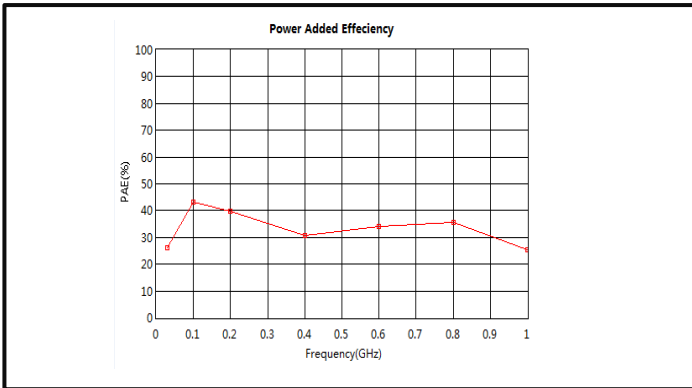
Gain vs. Output Power CW



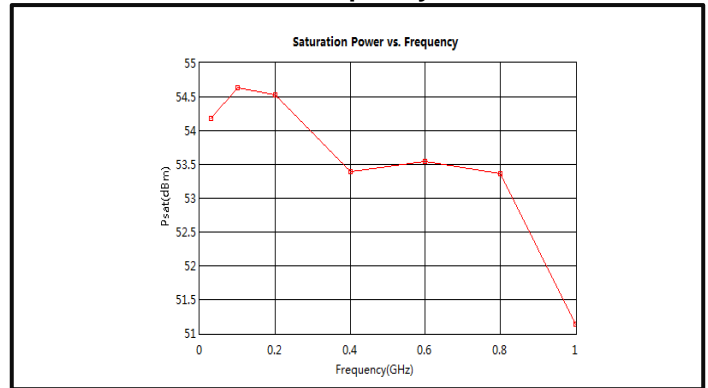
PndB vs. Frequency CW



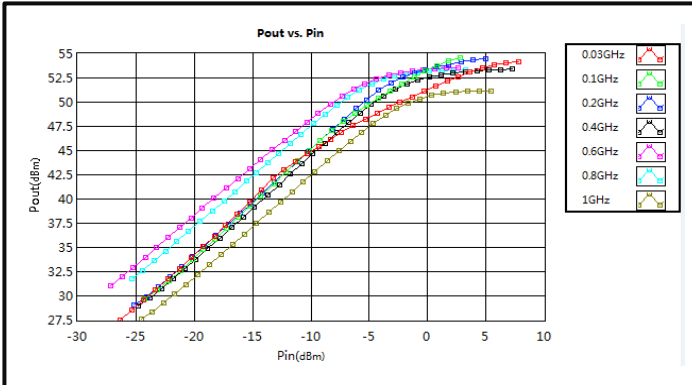
Power Added Efficiency CW



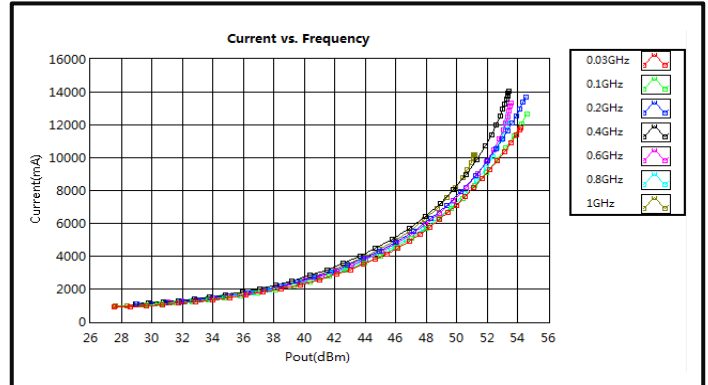
Saturation Power vs. Frequency CW



Pout vs. Pin

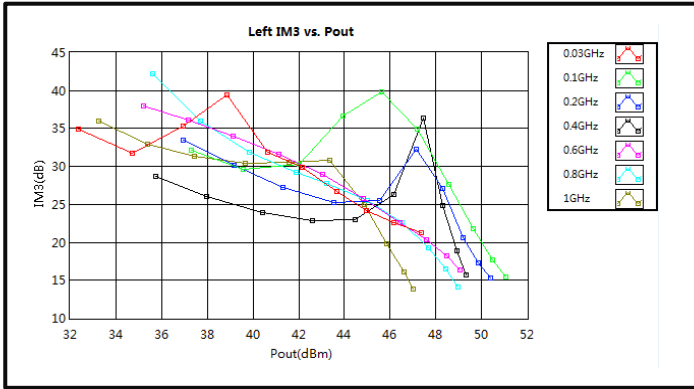


Current vs. Pout

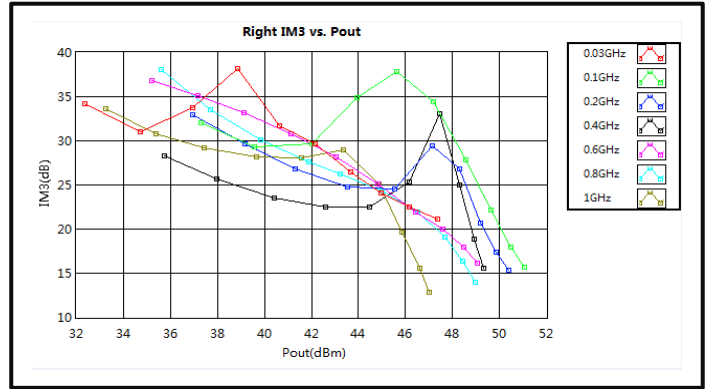


Typical Performance Plots

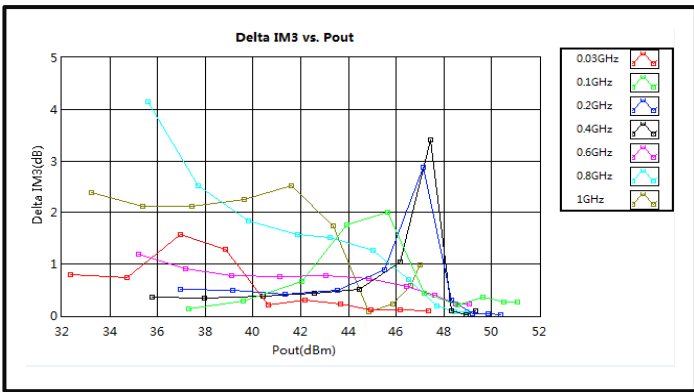
Left IM3 vs. Pout



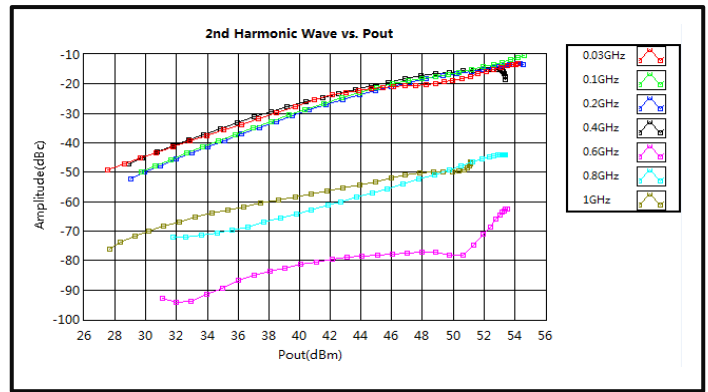
Right IM3 vs. Pout



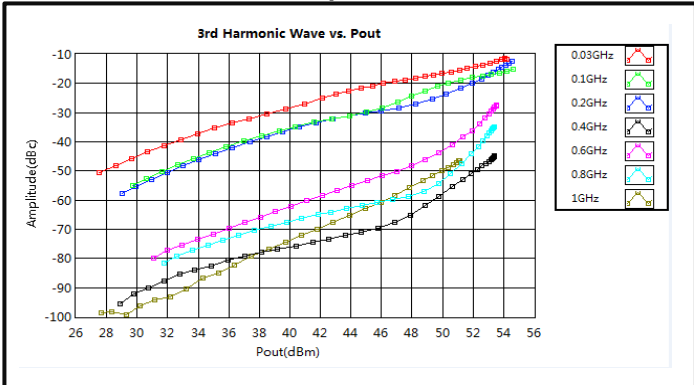
Delta IM3 vs. Pout



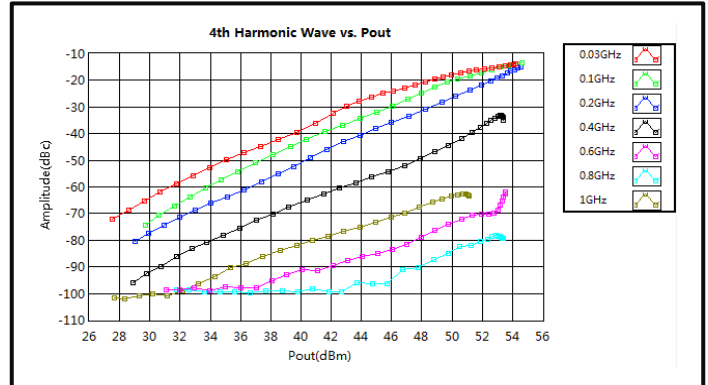
2nd Harmonic Wave Output Power



3rd Harmonic Wave Output Power



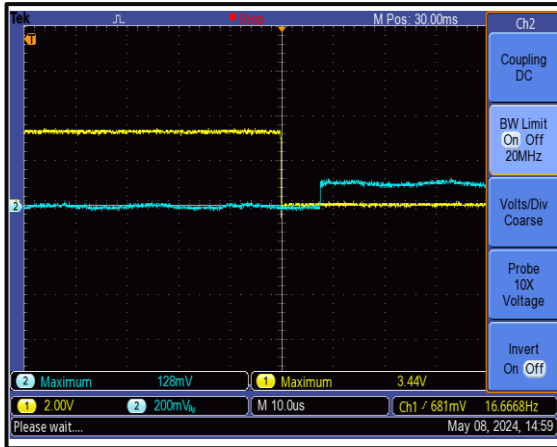
4th Harmonic Wave Output Power



Note: IM3 test performed with 1MHz tone spacing

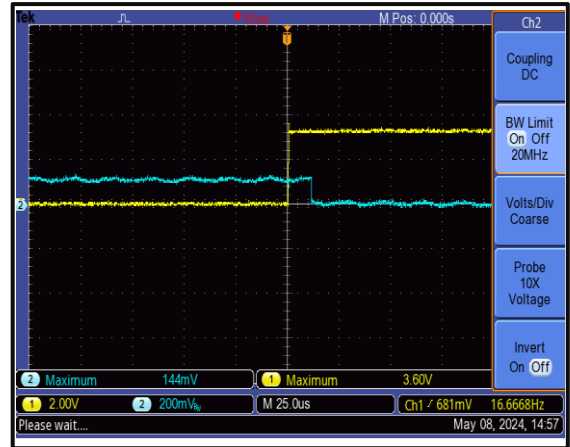
Typical Performance Plots

The RF Switch Off Time is 8 us @+25°C

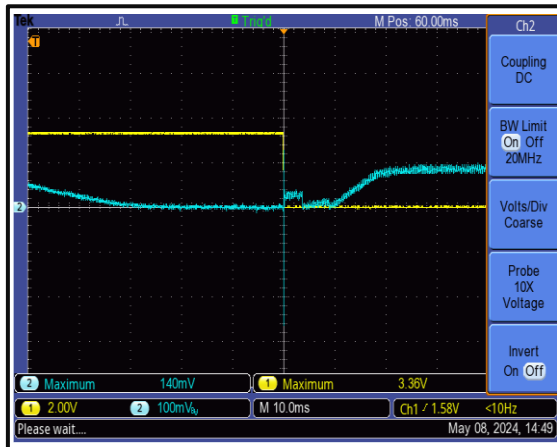


Switch control port: D-sub 17 PIN #4 (RF Input Switch) .
The yellow curve is the switch control signal, the blue curve is RF output envelope.

The RF Switch On Time is 12 us @+25°C



The Drains Closure Time is 20 ms @+25°C

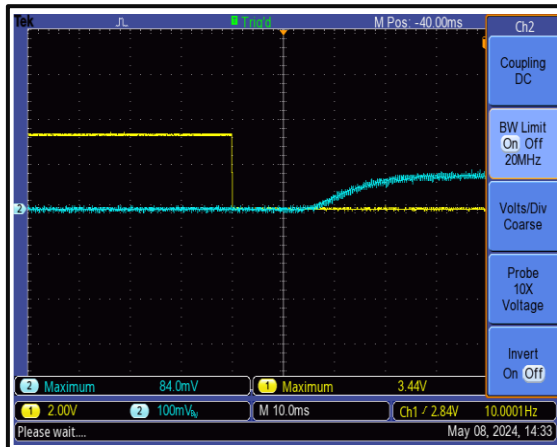


The drain control port: D-sub 17 PIN #3 (Drain Disable).
The yellow curve is the drain control signal, the blue curve is RF output envelope.

The Drains Open Time is 25 ms @+25°C

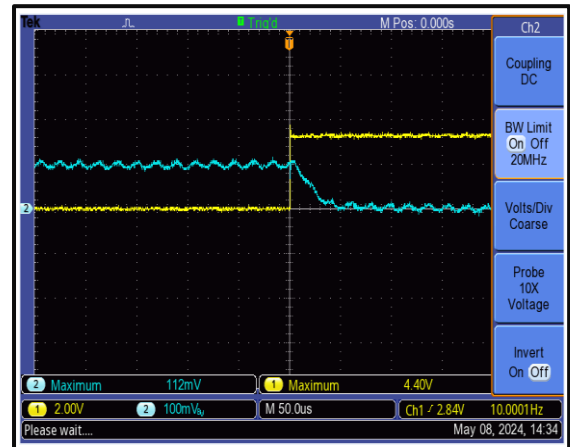


The Gates Closure Time is 30 ms @+25°C



The gate control port: D-sub 17 PIN #2 (Gate Disable) .
The yellow curve is the gate control signal, the blue curve is RF output envelope.

The Gates Open Time is 50 us @+25°C



Interface Connector

Male D-Sub is on the housing
The mating female part number: RFCBLADB17

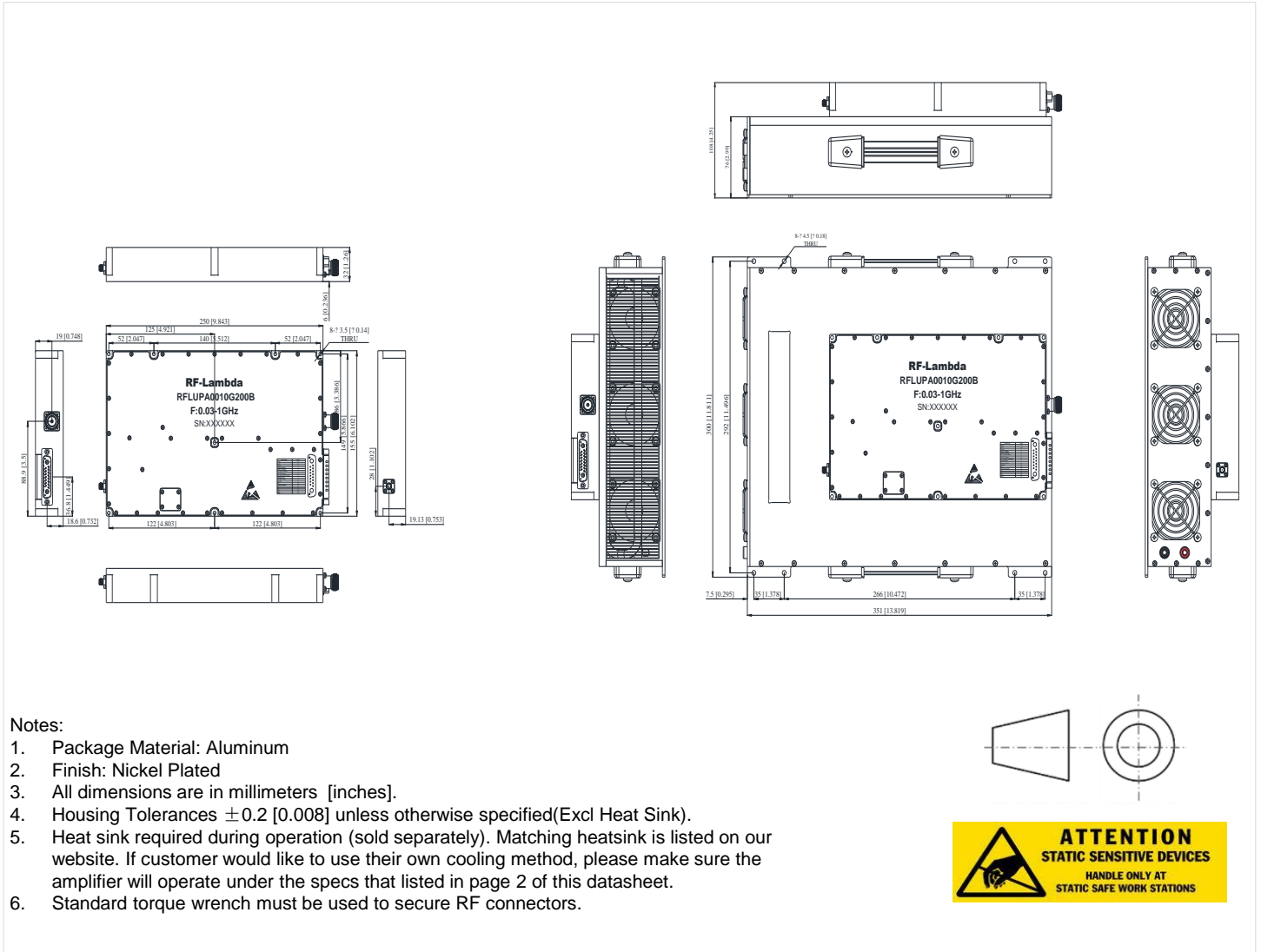


| Pin # | Name | Function | Initial State | Description | Applied |
|-------|---------------------|--------------|---------------|---|---------|
| A1 | VDD | Power Supply | +48V | +48V DC is supply Voltage | Yes |
| A2 | GND | Ground | GND | Ground | Yes |
| 1 | Reset | Control | HIGH | Resets PA when logic LOW is applied for five more seconds and released | Yes |
| 2 | Gate Disable | Control | LOW | Applying logic HIGH disables gate of amplifiers | Yes |
| 3 | Drian Disable | Control | LOW | Applying logic HIGH disables drain of amplifiers | Yes |
| 4 | RF Input Switch | Control | LOW | Applying logic HIGH turns OFF RF front-end switch to terminator | Yes |
| 5 | PA Off Alarm | Indicator | LOW | Pin will be latched to logic HIGH when any of the protection limit is reached | Yes |
| 6 | RF Input Over Drive | Indicator | LOW | Pin will be latched to logic HIGH when input signal is over limit | Yes |
| 7 | Temp Over | Indicator | LOW | Pin will be latched to logic HIGH when amplifier is driven over temperature | Yes |
| 8 | Current Over | Indicator | LOW | Pin will be latched to logic HIGH when drain current limit is reached | Yes |
| 9 | VSWR | Indicator | LOW | Pin will be latched to logic HIGH when output reflection is over limit | Yes |
| 10 | ID Imbalance | Indicator | LOW | Pin will be latched to logic HIGH when an imbalance in the drain current of the combining branches occurs | No |
| 11 | Temp monitor | Indicator | Voltage | Analog voltage relative to module's temperature | Yes |
| 12 | Current monitor | Indicator | Voltage | Analog voltage relative to module's current | No |
| 13 | NC | NC | NC | NC | No |
| 14 | +5V | Power Supply | +5V | +5V DC is provided for reference * | Yes |
| 15 | GND | GND | GND | GND | 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.

Outline Drawing



Packing List

| ID | Description | QTY |
|----|--------------------------------|-----|
| 2 | Fig a. DB17 cable (RFCBLADB17) | 1 |



Fig a.

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 |
|-----------------|--------------|------------------------------|
| RFLUPA0010G200B | Standard | 0.03GHz-1GHz 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.

RF-Lambda products are not warranted or authorized for use as critical components in medical, life-saving, or life sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.