

## 100W Broadband High Power Amplifier Module 20MHz -1000MHz



### Product Description

RFLUPA0001GK2-R is a broadband high power amplifier module with a frequency range of 20 to 1000MHz.

The power output of this amplifier is 50dBm typical. The typical small signal gain is 50dB with a gain flatness of  $\pm 1.0$ dB. This power amplifier works with a +28VDC power supply.

The working temperature of this product is between -40°C and 70°C.

### Features

- High Power Amplifier
- Small Signal Gain 50dB Typical
- Output Saturation Power 50dBm Typical
- Supply Voltage +28VDC
- 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 ( $T_A=+25^\circ\text{C}$ , $V_{CC}=+28\text{VDC}$ )

| Parameter                                         | Min                            | Typ  | Max      | Min | Typ  | Max  | Units |
|---------------------------------------------------|--------------------------------|------|----------|-----|------|------|-------|
| Frequency Range                                   | 20                             |      | 100      | 100 |      | 1000 | MHz   |
| Gain                                              | 49                             | 50   | 53       | 49  | 50   | 54   | dB    |
| Gain Flatness                                     |                                | ±1.0 |          |     | ±1.5 |      | dB    |
| Gain Variation Over Temperature<br>(-40°C~+70°C ) |                                | ±2.0 |          |     | ±2.0 |      | dB    |
| Input VSWR                                        |                                | 1.5  | 2.0      |     | 1.5  | 2.0  | : 1   |
| Output Power for 1 dB Compression (P1dB)          |                                | 50   |          |     | 50   |      | dBm   |
| Saturated Output Power (Psat)                     | 48.5                           | 51   |          | 48  | 50.5 |      | dBm   |
| IM3                                               |                                | 25   |          |     | 25   |      | dBc   |
| Isolation S12                                     |                                | -55  |          |     | -55  |      | dB    |
| Supply Current (Vcc=+28V)                         |                                | 2.1  | 13.5     |     | 2.1  | 13.5 | A     |
| Efficiency @ P1dB                                 |                                | 45   |          |     | 40   |      | %     |
| Weight                                            | Net                            |      | 1.8 Max. |     |      |      | lbs.  |
|                                                   | Including Heat Sink            |      | 8.5 Max. |     |      |      |       |
| Impedance                                         | 50                             |      |          |     |      |      | Ohms  |
| Input / Output Connectors                         | SMA- Female                    |      |          |     |      |      |       |
| DC Interface Connector                            | D-Sub9-Pin ( Male)             |      |          |     |      |      |       |
| Package                                           | Epoxy Sealed (Standard)        |      |          |     |      |      |       |
|                                                   | Hermetically Sealed (Optional) |      |          |     |      |      |       |

### Absolute Maximum Ratings

| Parameter              | Rating |
|------------------------|--------|
| Operating Voltage      | +32V   |
| *RF Input Power (RFIN) | +5dBm  |

### Bias Up Procedure

- 1.Connect Ground Pin
- 2.Connect input and output
- 3.Connect +28V biasing

### Bias Down Procedure

- 1.Turn off +28V biasing
- 2.Remove RF connection
- 3.Remove Ground.

### Environmental Specifications and Test Standards

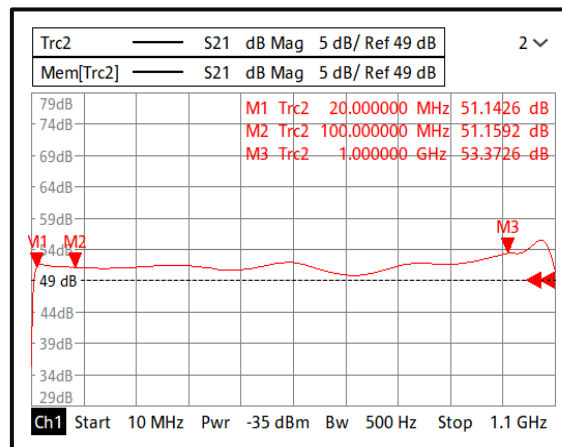
| Parameter                         | Description                                                                                                                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operational Temperature           | -40°C to +70°C<br>(Case Temperature)                                                                                                                                                                            |
| Storage Temperature               | -50°C to +105°C                                                                                                                                                                                                 |
| Thermal Shock                     | -40°C → +85°C<br>(5 Cycles / 10 hours)                                                                                                                                                                          |
| **Random Vibration                | MIL-STD-202G<br>Table 214-I, Test Condition Letter C<br>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<br>2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s<br>3. Total 18 times (6 directions, 3 repetitions per direction). |
| Altitude                          | Standard: 30,000 Ft (Epoxy Sealed Controlled Environment)<br>Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)                                                                                             |
| Hermetically Sealed<br>(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.

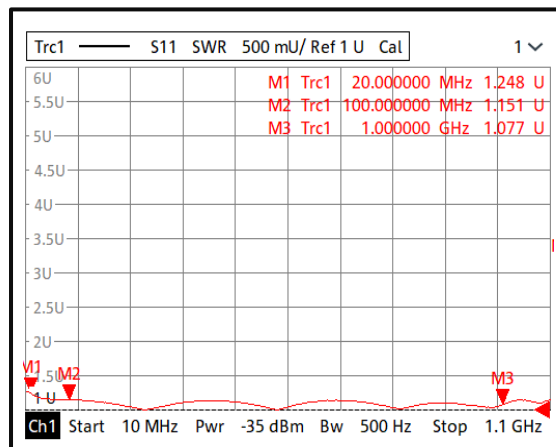
\*\*For vibration testing details please see additional information section.

Typical Performance Plots

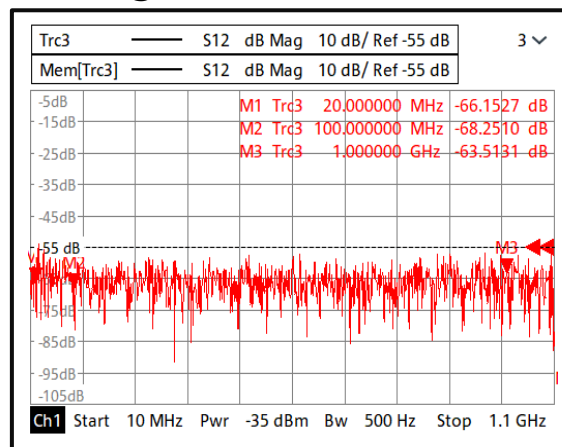
Gain@+25°C



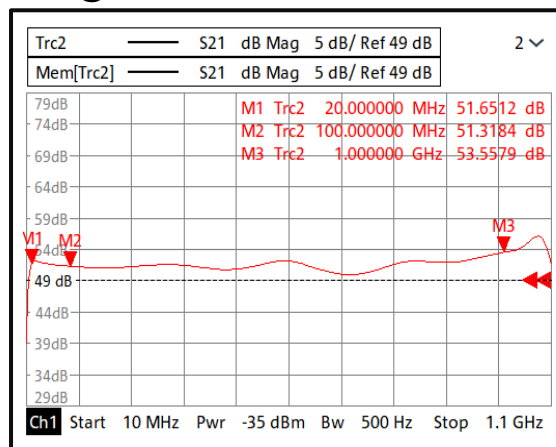
Input VSWR @+25°C



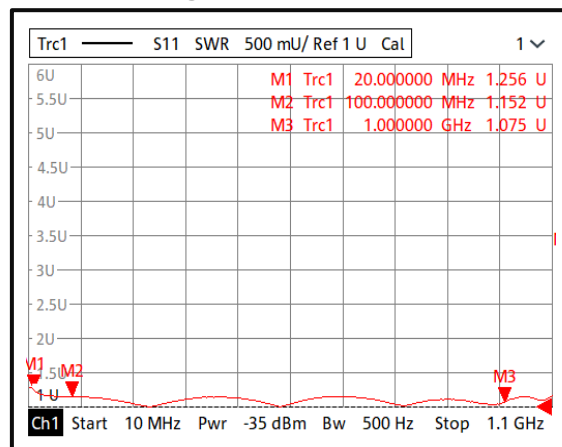
Isolation@+25°C



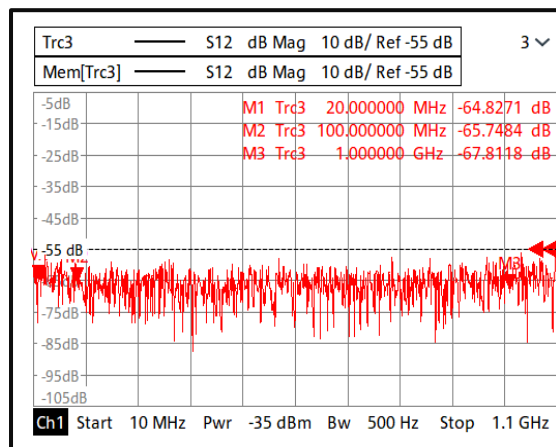
Gain@-40°C



Input VSWR @-40°C



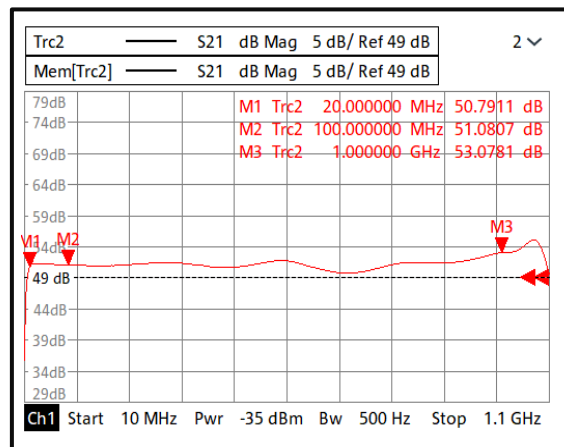
Isolation@-40°C



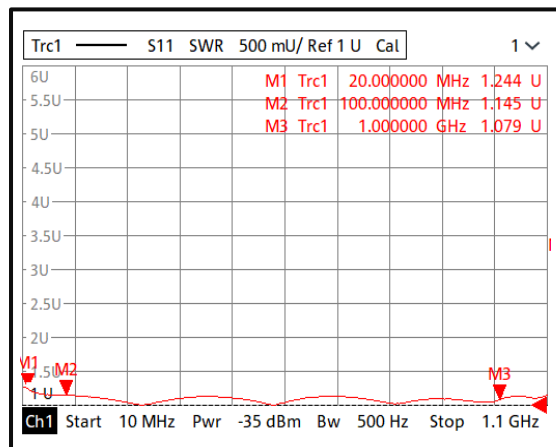
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

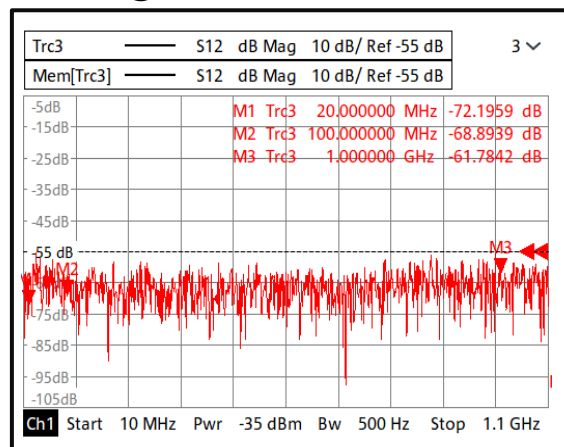
Gain@+70°C



Input VSWR @+70°C



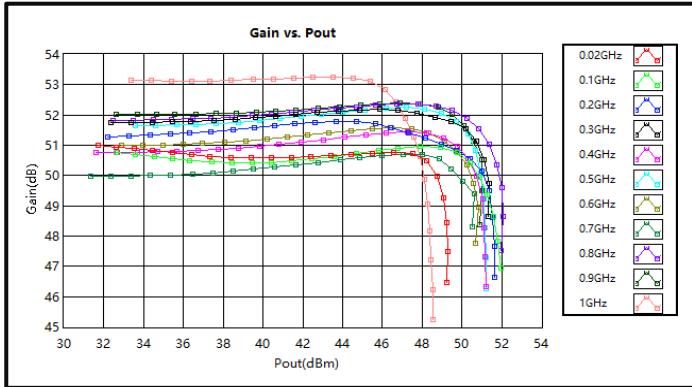
Isolation@+70°C



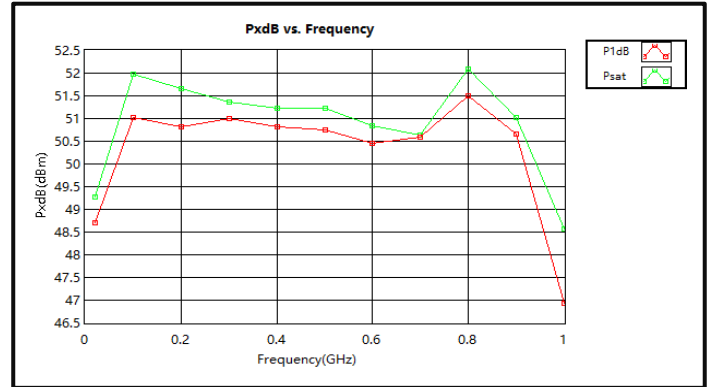
Note: Small signal VNA measurements include attenuators to protect equipment

**Typical Performance Plots**

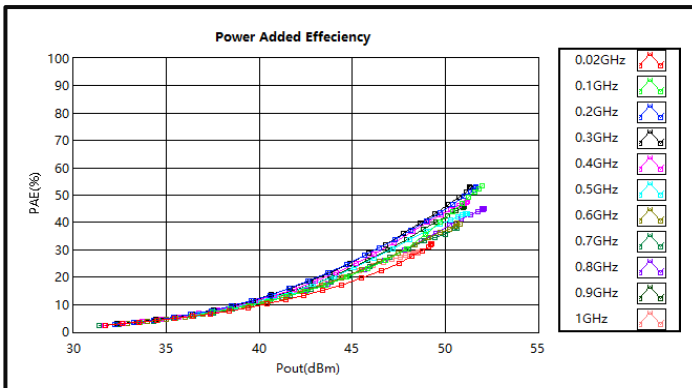
**Gain vs. Output Power CW**



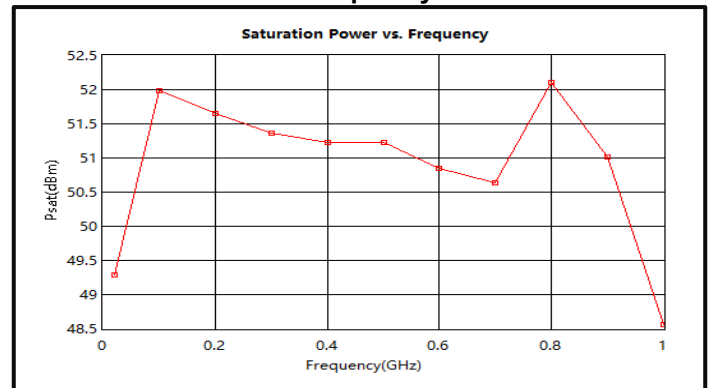
**PndB vs. Frequency CW**



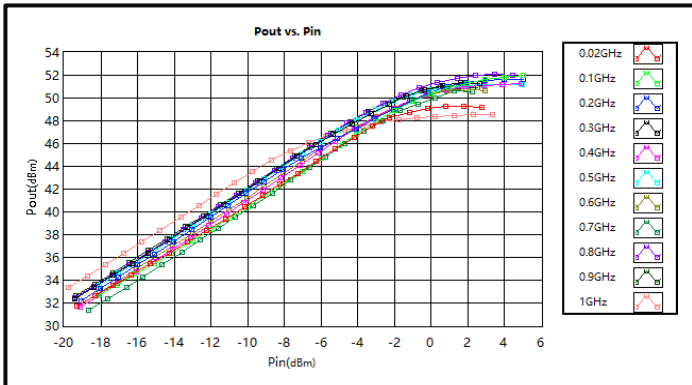
**Power Added Efficiency CW**



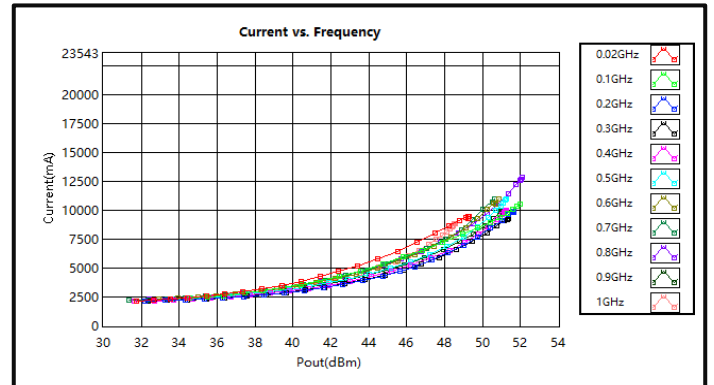
**Saturation Power vs. Frequency CW**



**Pout vs. Pin CW**

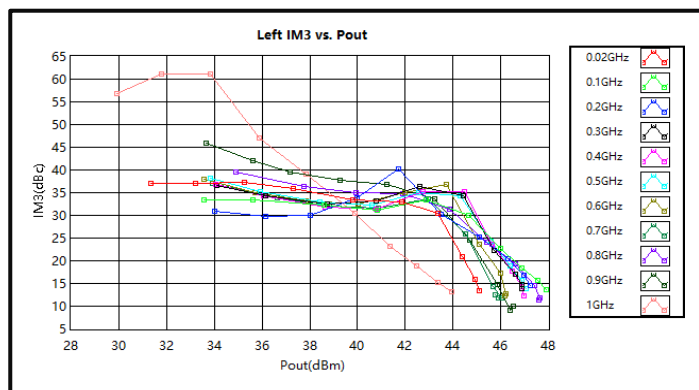


**Current vs. Pout CW**

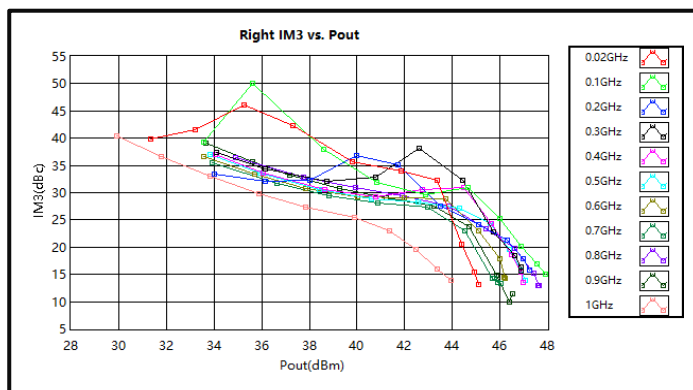


## Typical Performance Plots

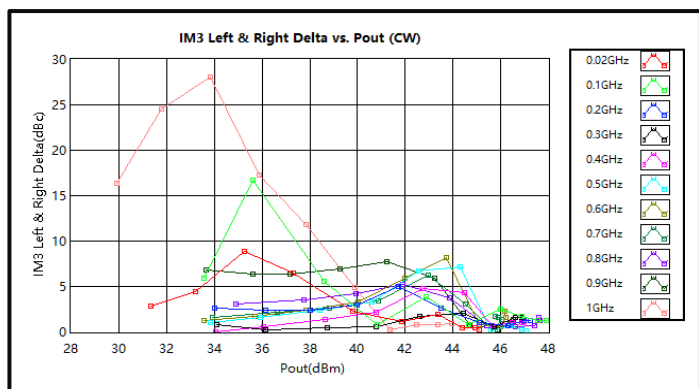
**Left IM3 vs. Pout CW**



**Right IM3 vs. Pout CW**

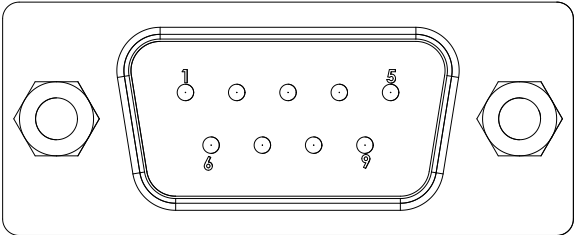


**Delta IM3 vs. Pout CW**



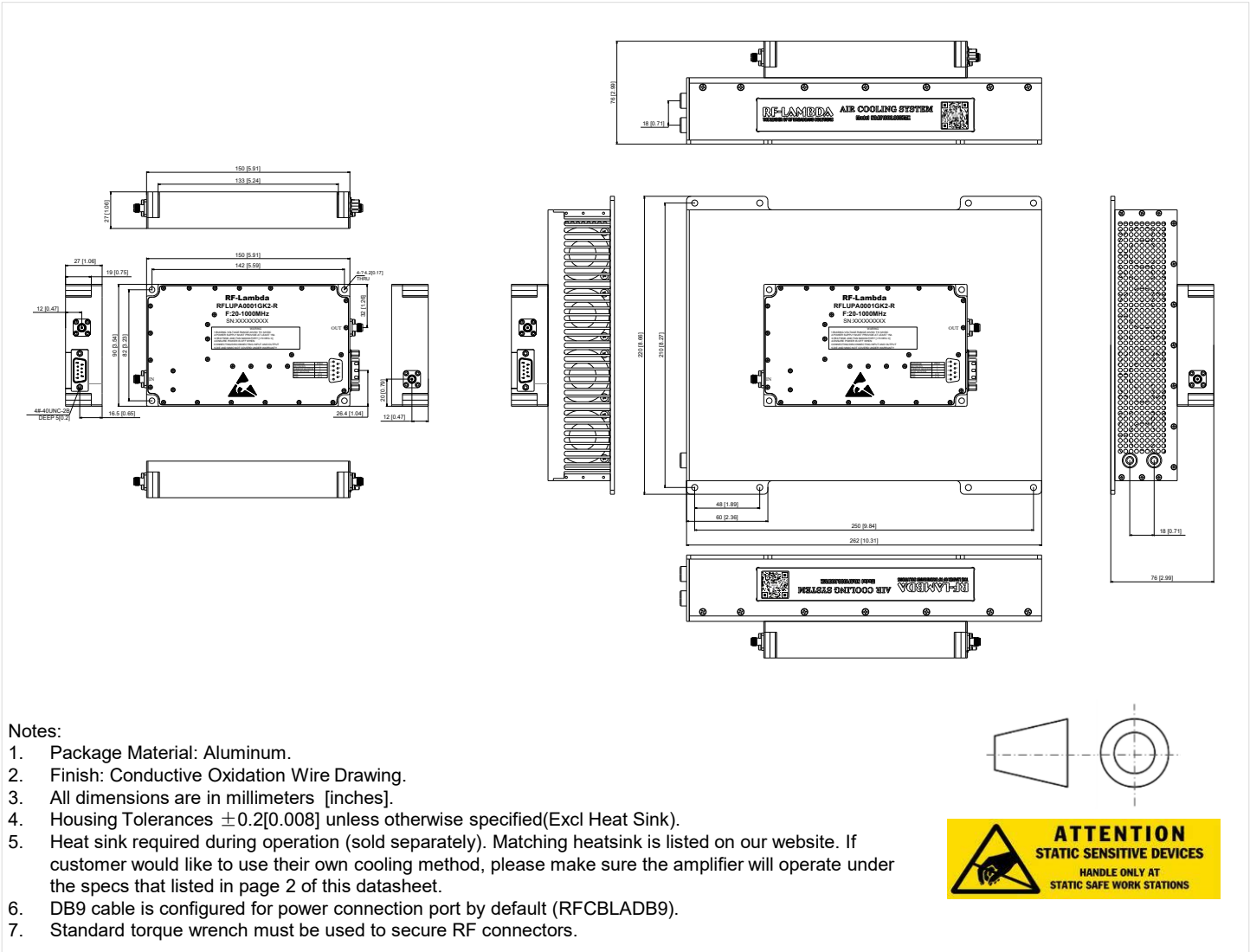
Note: IM3 test performed with 1MHz tone spacing

DC Interface Connector



| Pin # | Description     | Specifications                                                                                             |
|-------|-----------------|------------------------------------------------------------------------------------------------------------|
| 4,5,9 | VDD             | +28VDC                                                                                                     |
| 6,7,8 | GND             | Ground                                                                                                     |
| 1     | SHUTDOWN        | Amplifier Disable: TTL Logic Low (Default state is low , external pull-up to 3.3V to enable the amplifier) |
| 2     | CURRENT MONITOR | Analog voltage relative to IDD @ 100mV per Ampere                                                          |
| 3     | TEMP MONITOR    | Analog voltage relative to Module's Temperature (500mV+10 mV/°C)                                           |

**Outline Drawing**



**Packing List**

| ID | Description                  | QTY |
|----|------------------------------|-----|
| 1  | Fig a. DB9 cable (RFCBLADB9) | 1   |
| 2  | Fig b. Screws (#4-40*5+6)    | 2   |



**Fig a.**



**Fig b.**



## Ordering Information

| Part Number     | Modification | Description                   |
|-----------------|--------------|-------------------------------|
| RFLUPA0001GK2-R | Standard     | 20MHz-1000MHz 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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