Wide Band Solid State Power Amplifier
0.02GHz-3GHz

Product Description

RFLUPA02M20MH is a wideband solid state power amplifier with a frequency range of 0.02 to 3GHz.

The power output of this amplifier is 47dBm typical. The typical small signal gain is 52dB with a flatness of ±2.5dB. This power amplifier works with a +48 VDC power supply.

The power amplifier input and output connectors are SMA-Female.

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

Features

- Wideband Solid State Power Amplifier
- Gain: 52dB typical
- Output power +47dBm typical
- Supply Voltage: +48V
- 50 Ohm Matched Input/Output
- Over Temperature Protection
- Over Current 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, TA = +25ºC, Vcc = +48V

Parameter		Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range		0.02		2	2		3	GHz
Small Signal Gain		47	52		47	52		dB
Gain Flatness			±2.5	±3.5		±2.5		dB
Gain Variation Over Temperature (-40℃~+60℃)			±2.0			±2.0		dB
Input VSWR			1.5	2.0		1.5	2.0	: 1
Output 1dB Compression Point (P1dB)			45.5			45.5		dBm
Saturated Output Power (Psat)		45	47		46	47		dBm
Supply Current (Vcc=+48V)			1	6		1	6	A
Power Added Efficiency (PAE)			30			30		%
Turn On/Off Speed (Switch Disable)	ON			600				ns
	OFF			200				
Turn On/Off Speed (Drain Disable)	ON			100				us
	OFF			3000				
Turn On/Off Speed (Gate Disable)	ON			1000				us
	OFF			25				
Weight	Net			3.49 Max.				lbs.
	Including Heat sink			9.26 Max.				
Impedance				50				Ohms
Input / Output Connectors				SMA-Female				
Package Sealing				Epoxy Sealed (Standard)				
				Hermetically Sealed (Optional)				

RF-LAMBDA USA LLC: www.rflambda.com
Sales: sales@rflambda.com Technical: support@rflambda.com

Absolute Maximum Ratings

Parameter	Rating
Operating Voltage	+50V
*RF Input Power	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

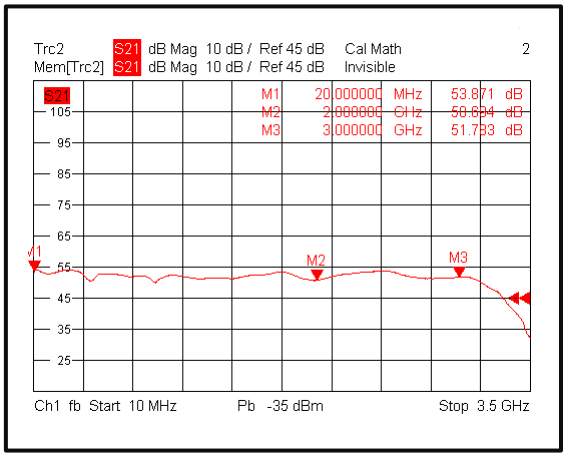
Environmental Specifications and Test Standards

Parameter	Description
Operational Temperature	-40ºC to +60ºC (Case Temperature)
Storage Temperature	-50ºC to +105ºC
Thermal Shock	-40ºC → +85ºC (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 +60ºC 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)

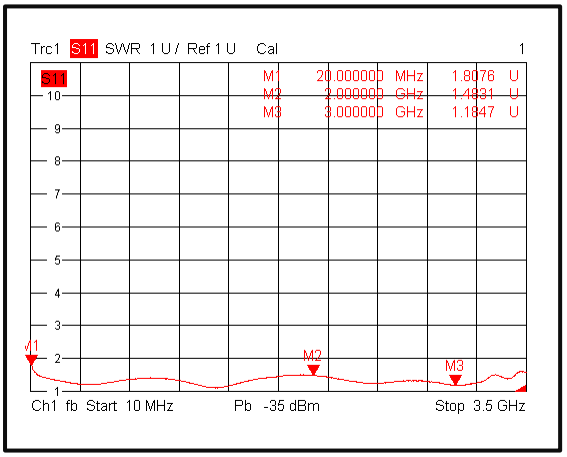
*Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.
**For vibration testing details please see additional information section.

Typical Performance Plots

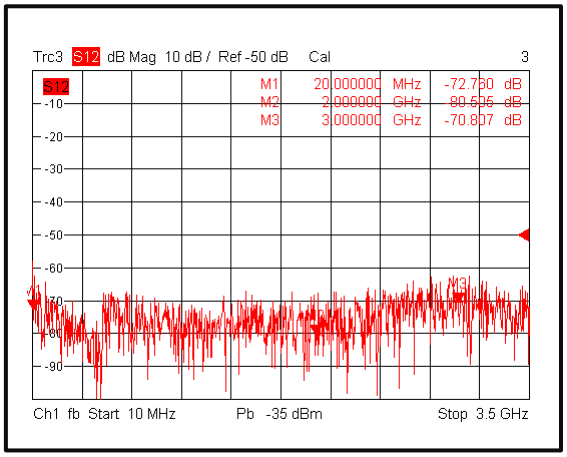
Gain @ +25℃



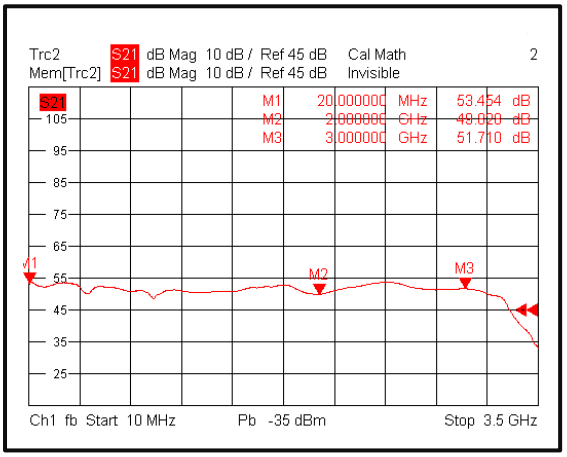
Input VSWR@+25℃



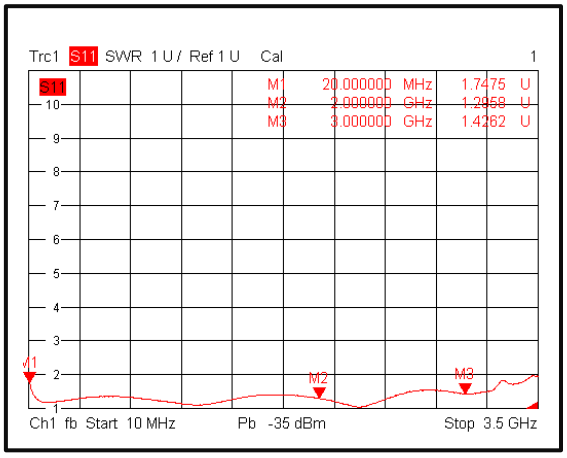
Isolation @ +25℃



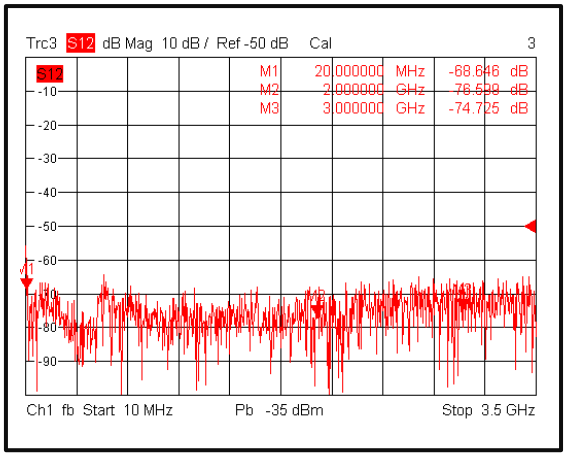
Gain @ -40℃



Input VSWR@ -40℃



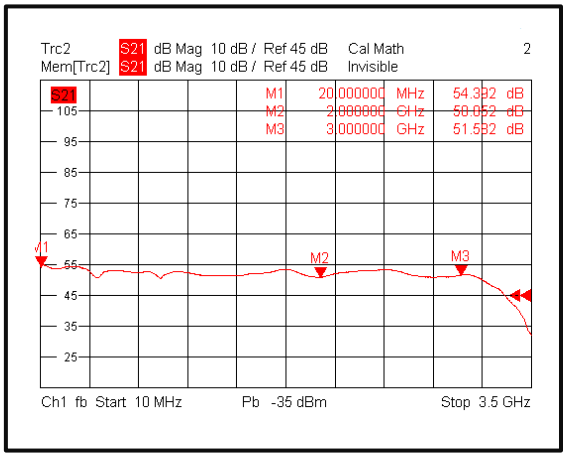
Isolation @ -40℃



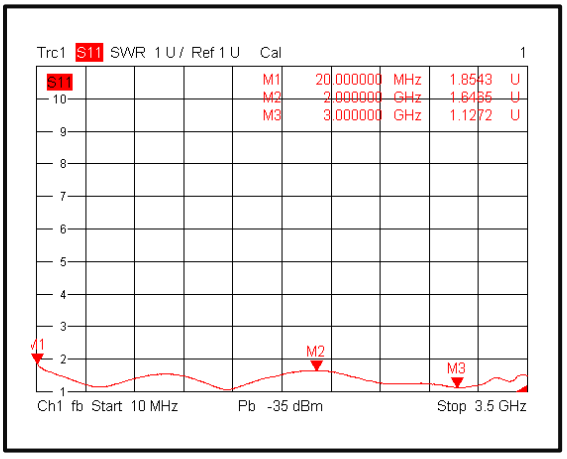
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

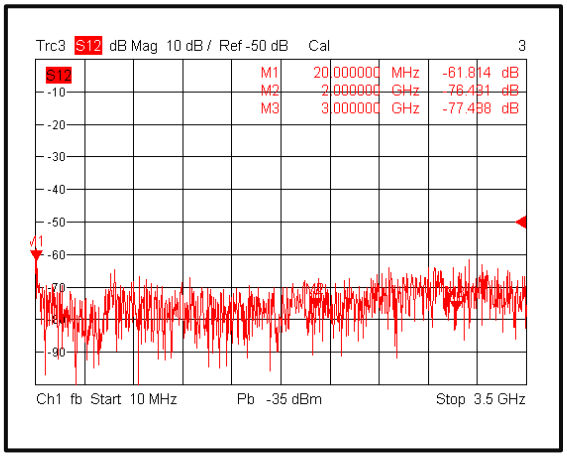
Gain @ +60℃



Input VSWR@ +60℃



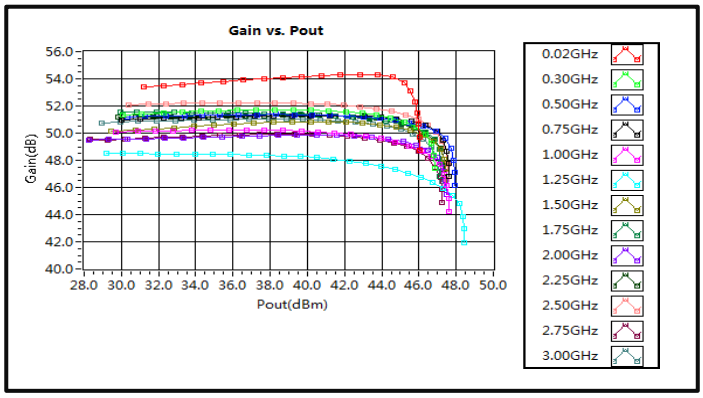
Isolation @ +60℃



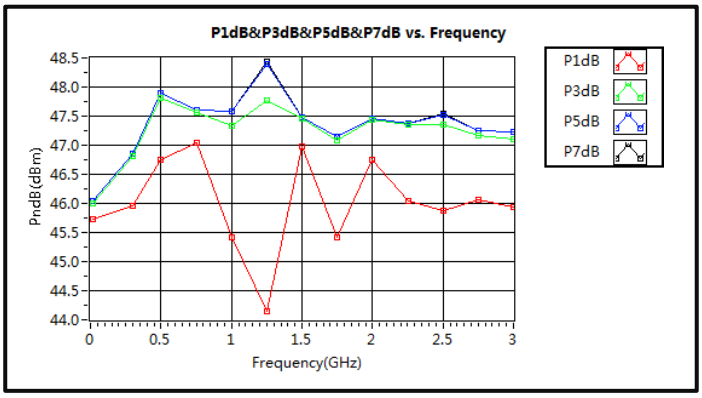
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

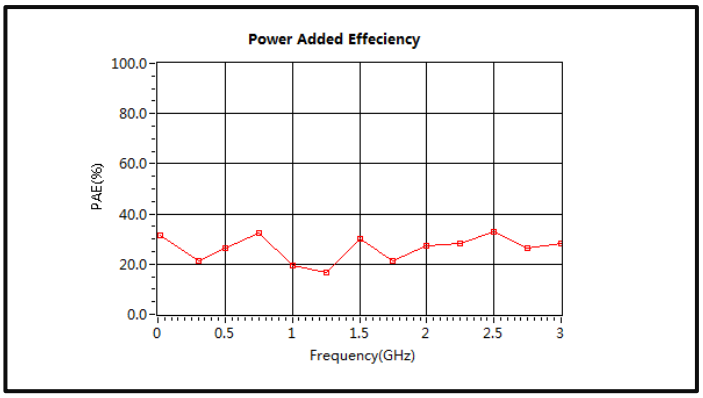
Gain vs. Output Power CW



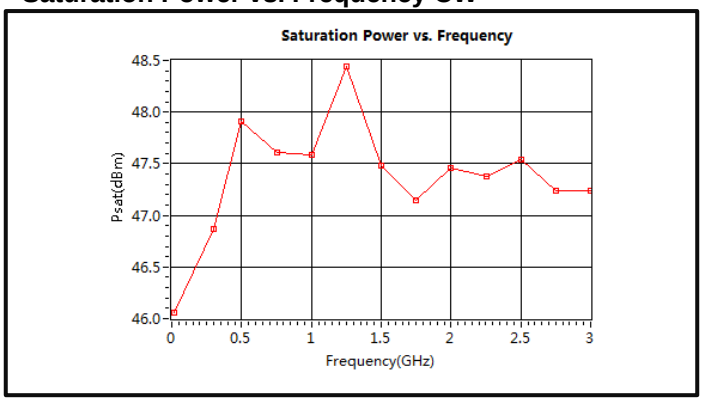
PndB vs. Frequency CW



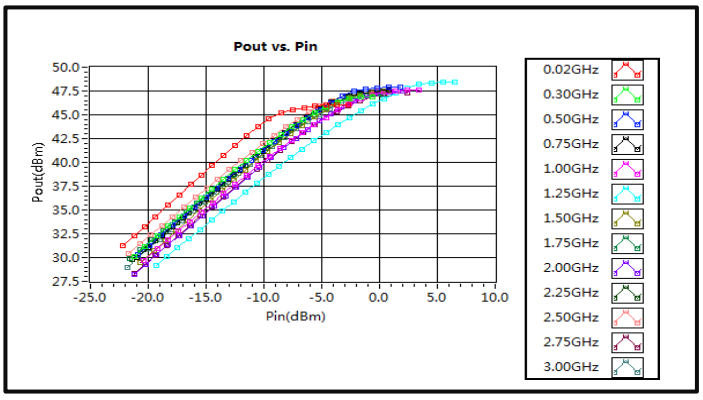
Power Added Efficiency CW



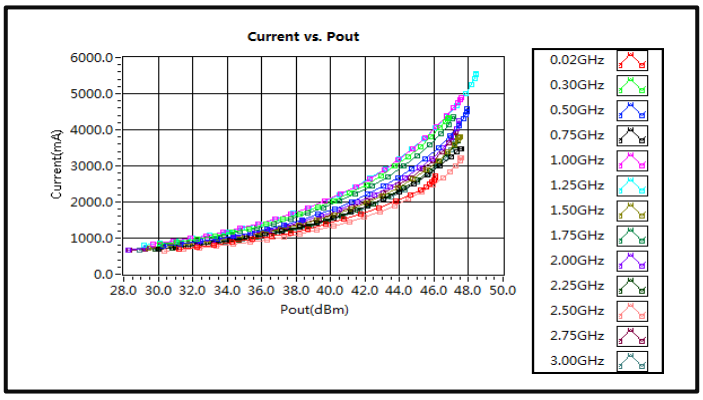
Saturation Power vs. Frequency CW



Pout vs. Pin

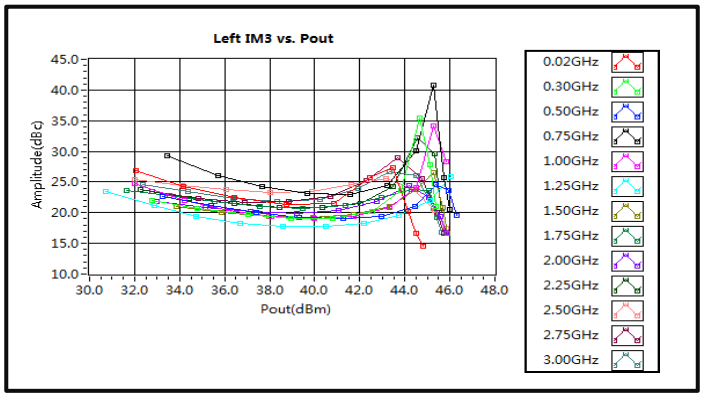


Current vs. Pout

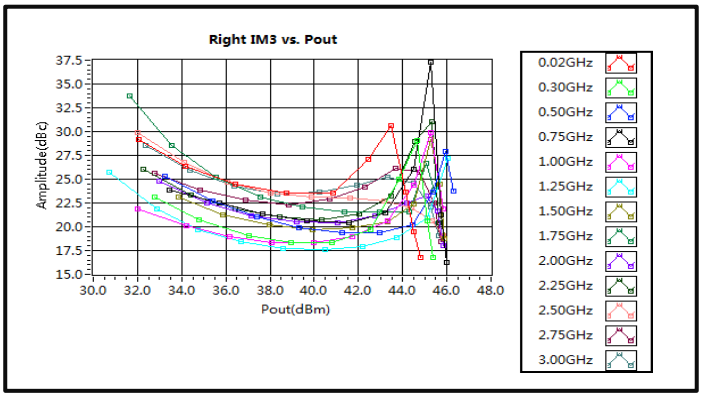


Typical Performance Plots

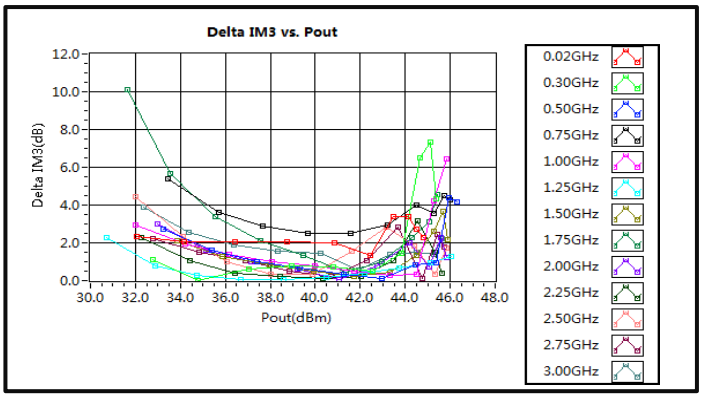
Left IM3 vs. Pout



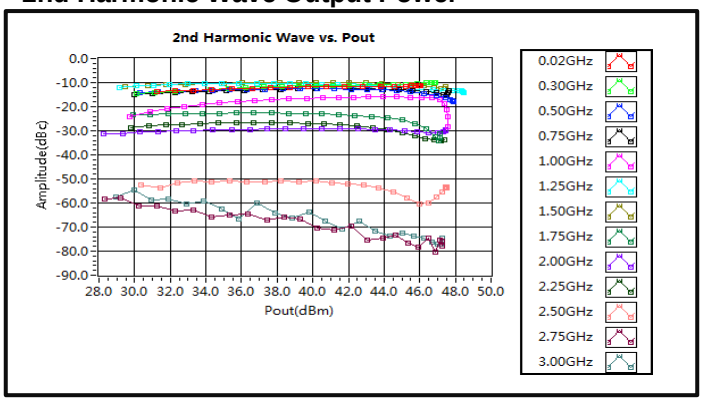
Right IM3 vs. Pout



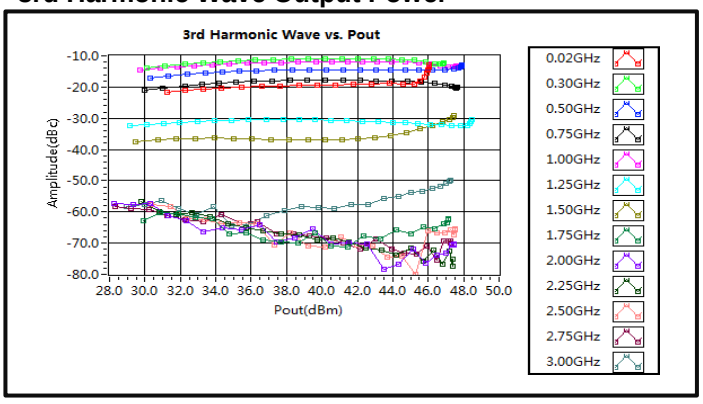
Delta IM3 vs. Pout



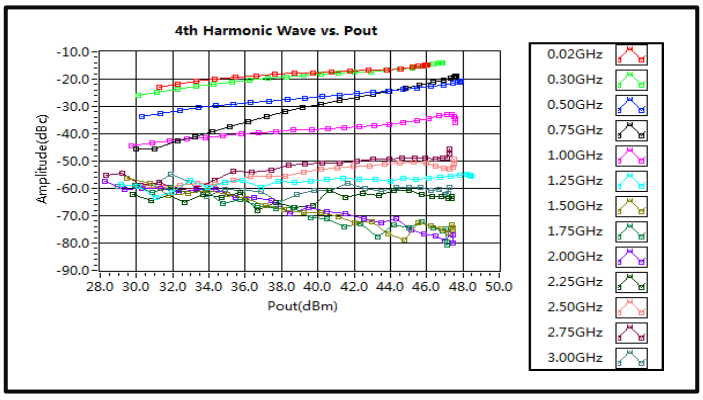
2nd Harmonic Wave Output Power



3rd Harmonic Wave Output Power



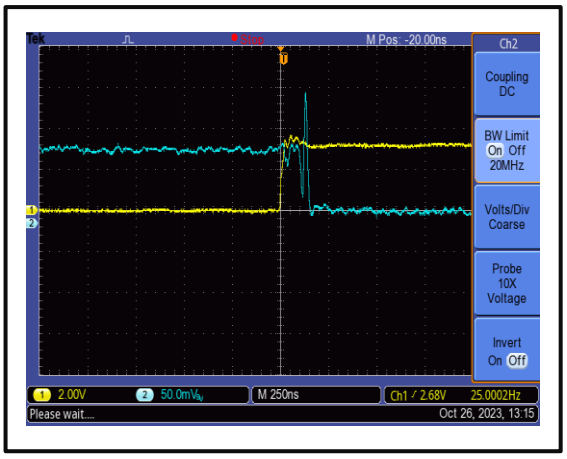
4th Harmonic Wave Output Power



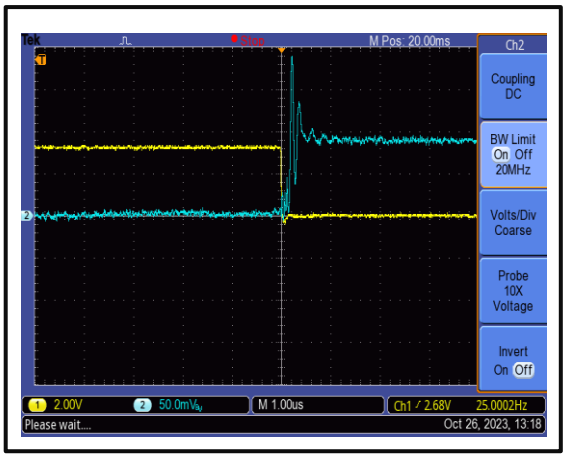
Note: IM3 test performed with 1MHz tone spacing

Typical Performance Plots

The RF Switch Off Time is 200 ns @+25℃

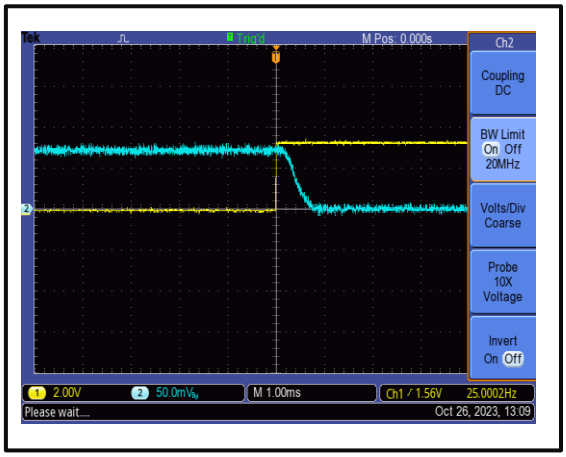


The RF Switch On Time is 600 ns @+25℃

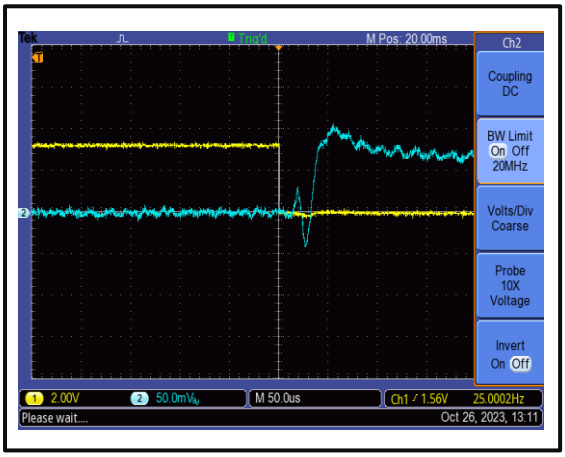


Switch control port: D-sub 17 PIN #4 (RF Input Switch) .
The yellow curve is the switch control signal, the blue curve is RF output envelope.

The Drains Closure Time is 1000 us @+25℃

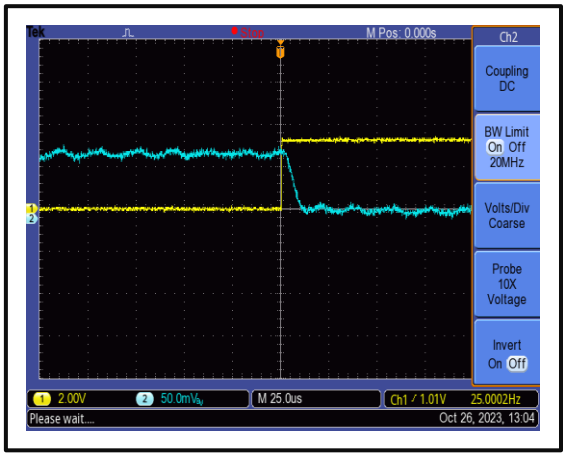


The Drains Open Time is 100 us @+25℃

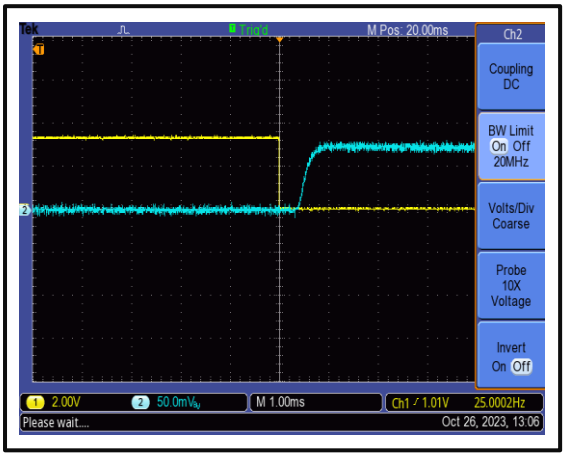


The drain control port：D-sub 17 PIN #3 (Drain Disable).
The yellow curve is the drain control signal, the blue curve is RF output envelope.

The Gates Closure Time is 25 us @+25℃



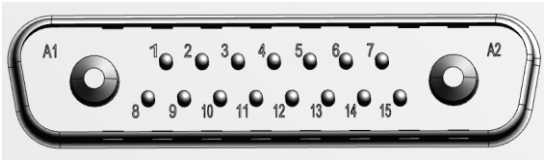
The Gates Open Time is 1000 us @+25℃



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.

Interface Connector

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

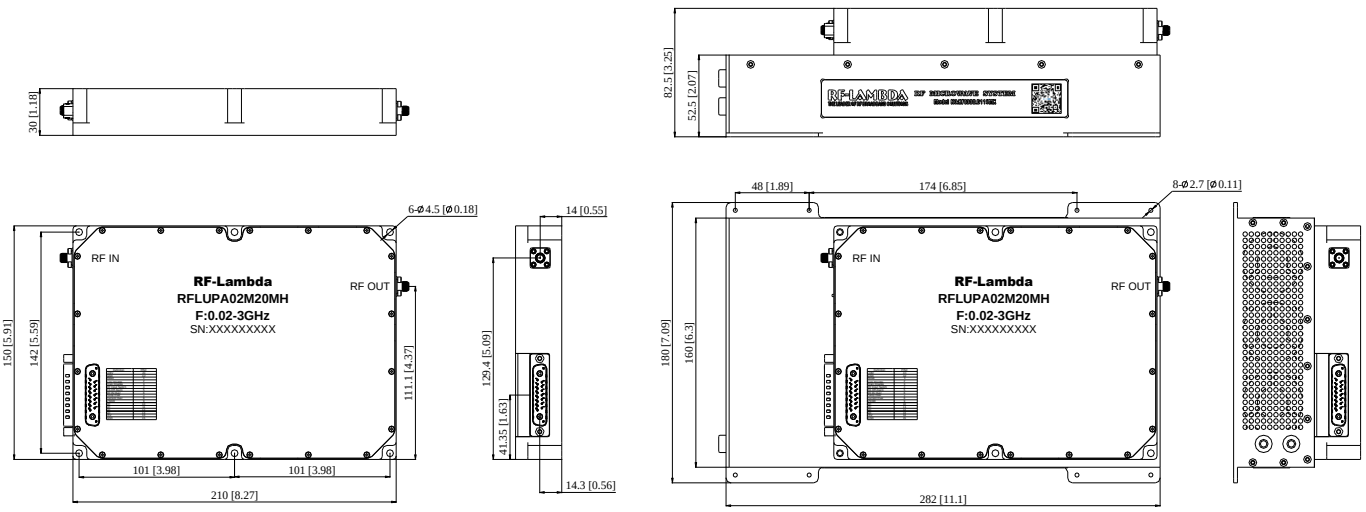


Pin #	Name	Function	Initial State	Description	Applied
A1	VDD	Power Supply	+48V	+48V DC is supply Voltage	Yes
A2	GND	Ground	GND	Ground	Yes
1	Reset	Control	HIGH	Resets PA when logic LOW is applied for five more seconds and released	Yes
2	Gate Disable	Control	LOW	Appling logic HIGH disables gate of amplifiers	Yes
3	Drain 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	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	NC	NC	NC	NC	No
11	NC	NC	NC	NC	No
12	NC	NC	NC	NC	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.

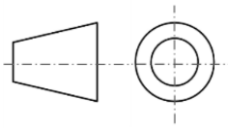
RF-LAMBDA USA LLC: www.rflambda.com
Sales: sales@rflambda.com Technical: support@rflambda.com

Outline Drawing



Notes:

1. Package Material: Aluminum
2. Finish : Nickel Plated
3. All dimensions are in millimeters [inches].
4. Housing Tolerances ±0.2 [0.008] unless otherwise specified (Excl Heat Sink).
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.
6. DB17 cable is configured for power connection port by default (RFCBLADB17)
7. Standard torque wrench must be used to secure RF connectors



Packing List

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

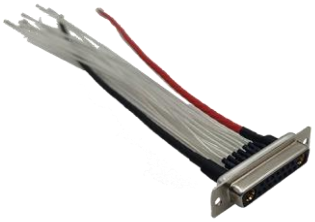


Fig a.

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
RFLUPA02M20MH	Input and Output connectors are SMA-Female	0.02GHz – 3GHz 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

RF-LAMBDA USA LLC: www.rflambda.com
Sales: sales@rflambda.com Technical: support@rflambda.com