

2W Ultra Wide Band Power Amplifier 40GHz-60GHz



Product Description

RFLUPA40G60GF is a wide band power amplifier with a frequency range of 40 to 60GHz.

The power output of this amplifier is 33dBm typical. The typical small signal gain is 45dB with a gain flatness of ± 3 dB. This performance is achieved through the use of GaN devices.

This power amplifier works with a +28V DC power supply.

The power amplifier input connector is 1.85mm-female and output connector is WR19.

The operating temperature of this product is -40 to +70°C.

Features

- Solid State Power Amplifier
- Small Signal Gain 45dB Typical
- Output Saturation Power 33dBm Typical
- Supply Voltage +28 VDC
- 50 Ohm Matched Input/Output
- Overvoltage Protection
- 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	40		60	GHz
Small Signal Gain	39	45		dB
Gain Flatness		± 3.0		dB
Gain Variation Over Temperature (-40°C to +70°C)		± 3.0		dB
Input VSWR		2		:1
Output 1dB Compression Point (P1dB)	27	29		dBm
Saturated Output Power (Psat)	31.5	33		dBm
Isolation S12		-55		dB
Supply Current ($V_{CC} = +28\text{V}$)		1.3	2	A
Power Added Efficiency (PAE)		5		%
Turn On/Off Speed (Gate Disable)	ON	100		us
	OFF	1000		us
Turn On/Off Speed (Drain Disable)	ON	100		us
	OFF	100		us
Weight	Net	6.0 Max.		lbs.
	Including Heat Sink	7.2 Max.		
Impedance		50		Ohms
Input / Output Connectors		1.85mm-Female (Input) – WR19 (Output)		
Package		Epoxy Sealed (Standard)		
		Hermetically Sealed (Optional)		

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+30VDC
*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

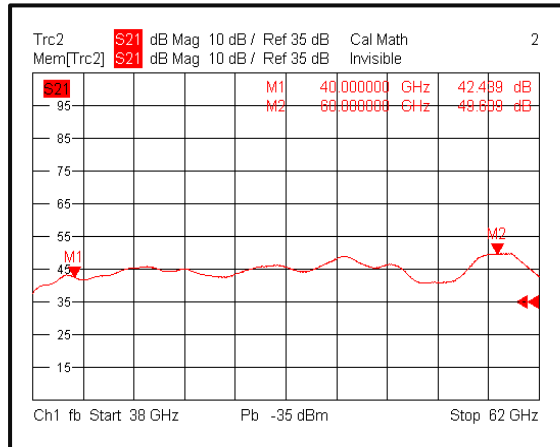
Parameter	Description
Operational Temperature	-40°C to +70°C (Case Temperature)
Storage Temperature	-50°C to +105°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +70°C for 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.

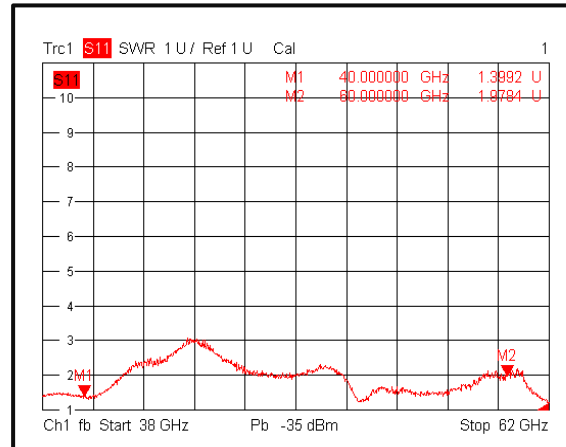
**For vibration testing details please see additional information section.

Typical Performance Plots

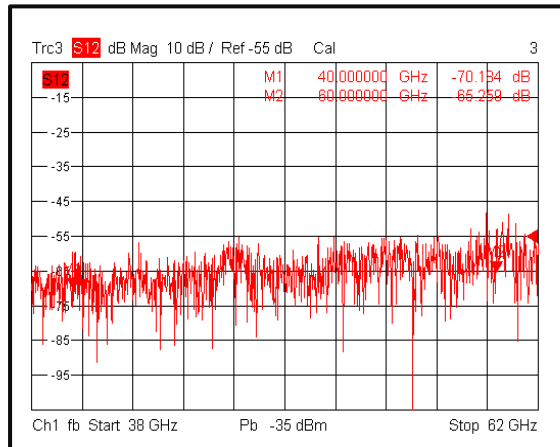
Gain@+25°C



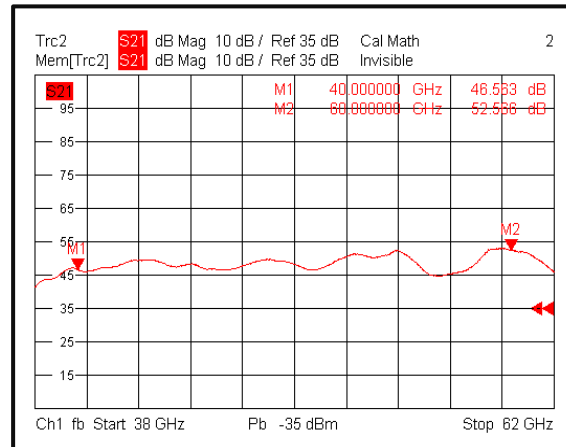
Input VSWR @+25°C



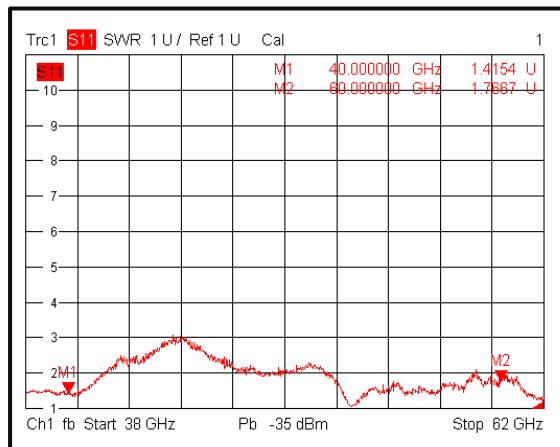
Isolation@+25°C



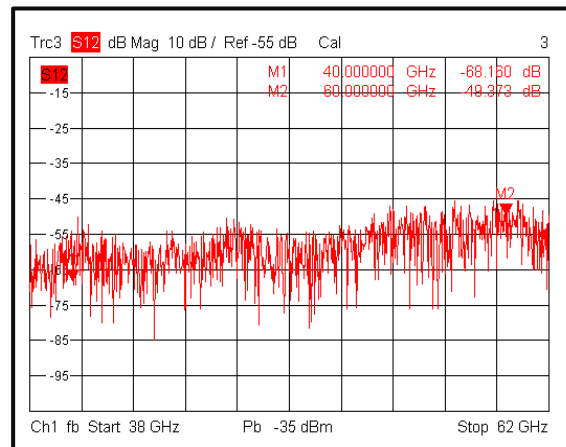
Gain@-40°C



Input VSWR @-40°C



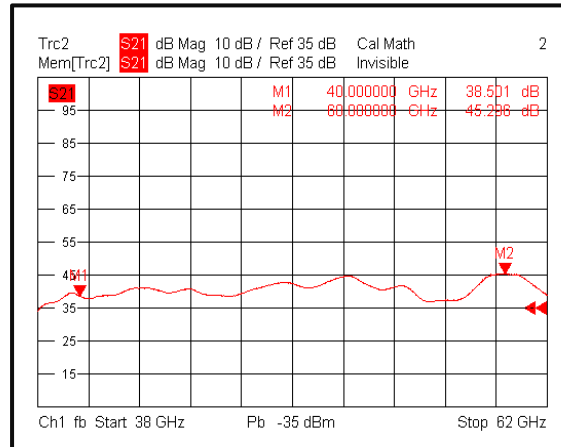
Isolation@-40°C



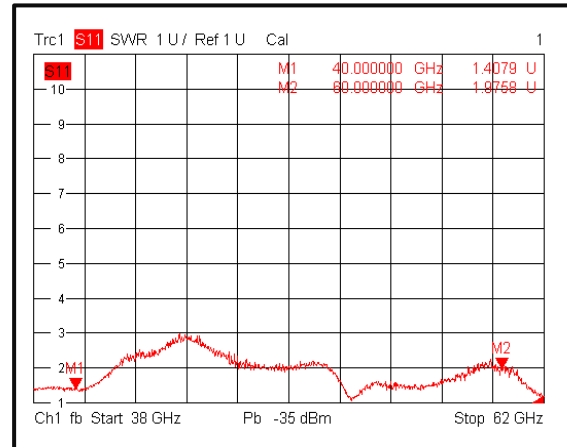
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

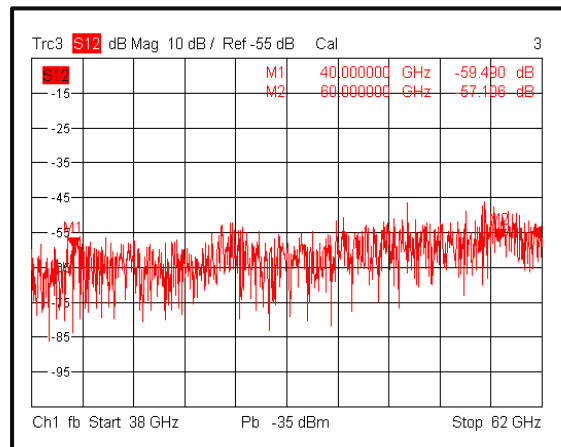
Gain@+70°C



Input VSWR @+70°C



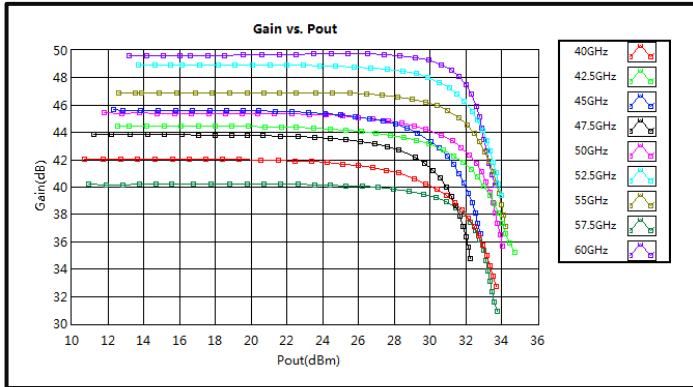
Isolation@+70°C



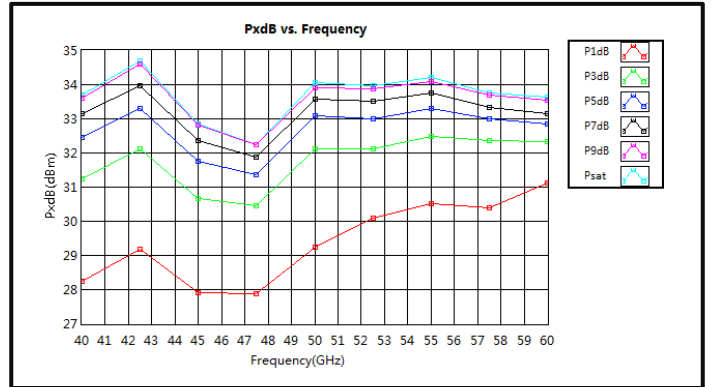
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

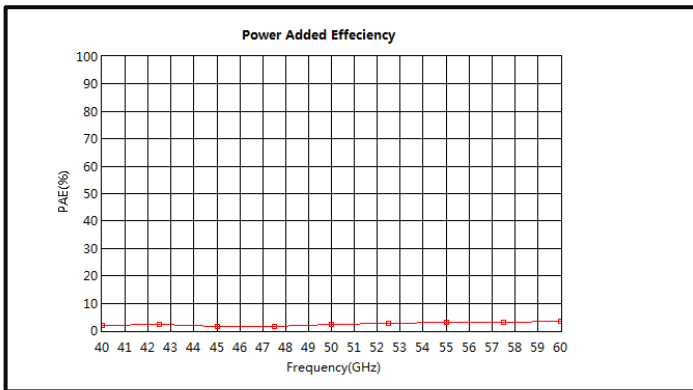
Gain vs. Output Power CW



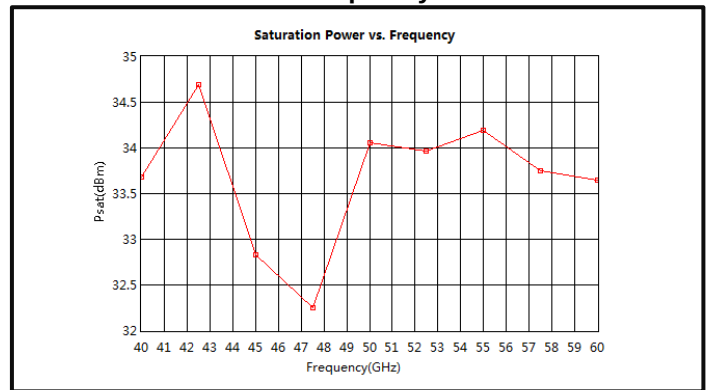
PndB vs. Frequency CW



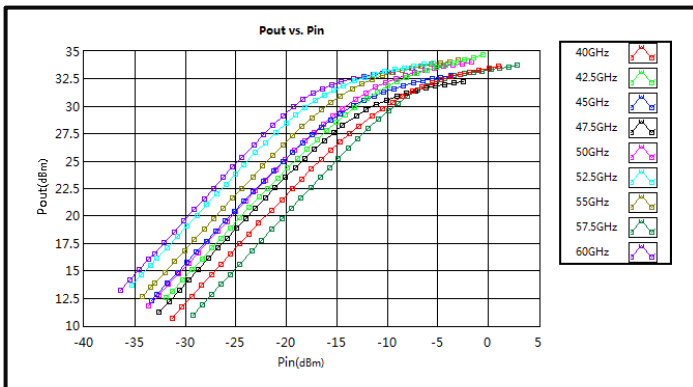
Power Added Efficiency CW



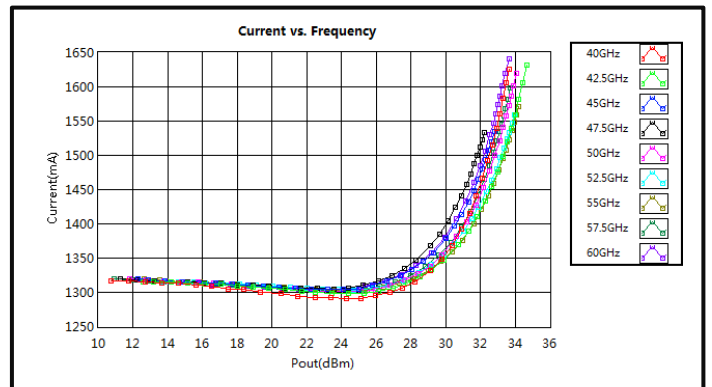
Saturation Power vs. Frequency CW



Pout vs. Pin

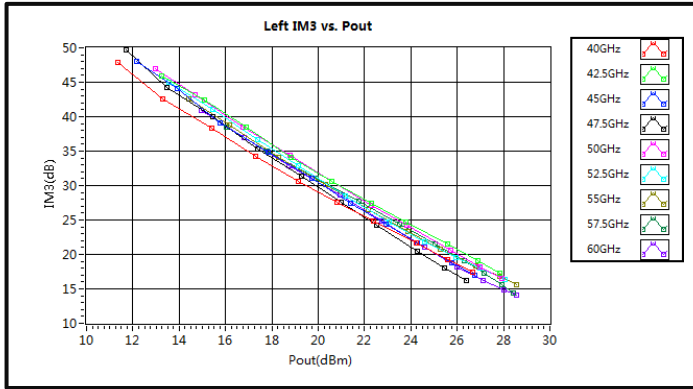


Current vs. Pout

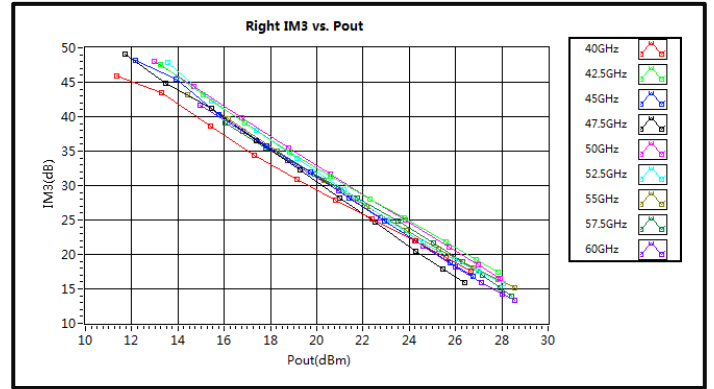


Typical Performance Plots

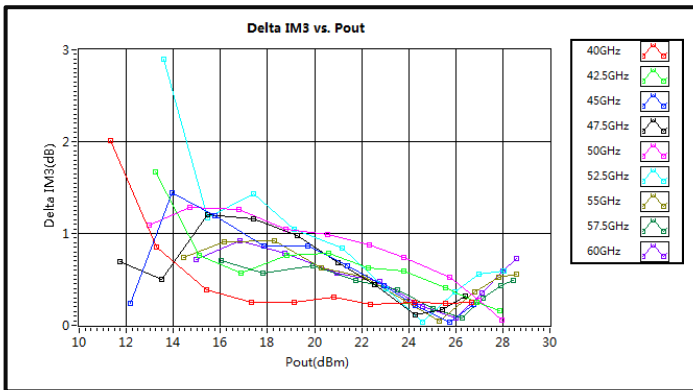
Left IM3 vs. Pout



Right IM3 vs. Pout



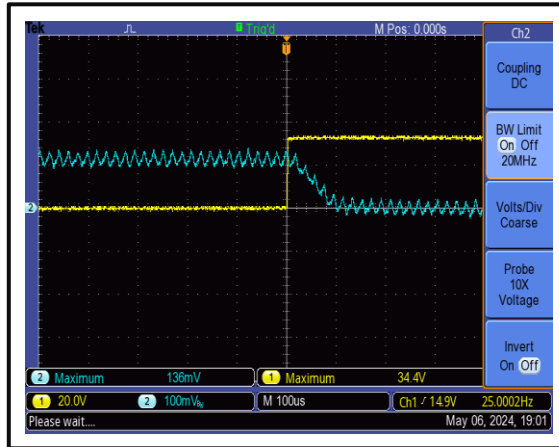
Delta IM3 vs. Pout



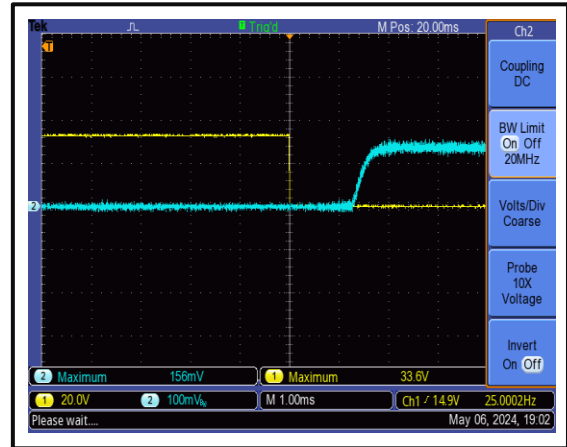
Note: IM3 test performed with 1MHz tone spacing

Typical Performance Plots

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

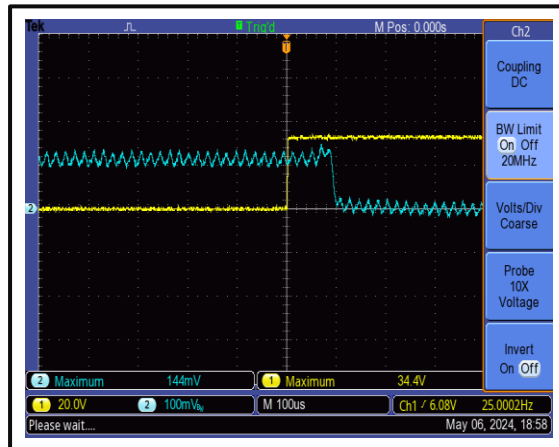


The Gate-Enable Fall Time is 1000 us @+25°C

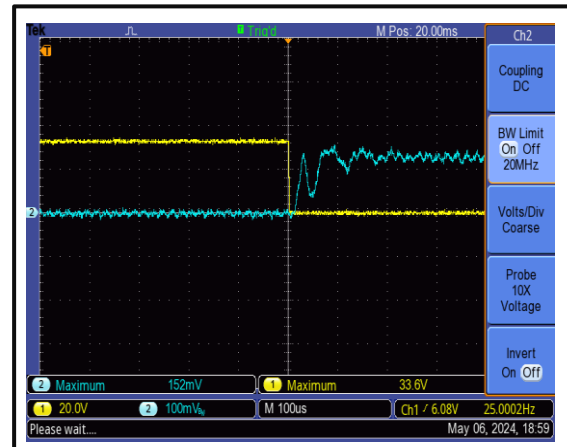


The gate control port: D-sub 15 PIN #6 (Gate Disable).
The yellow curve is the gate control signal, the blue curve is RF output envelope.

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



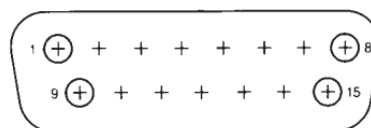
The AMP-Disable Fall Time is 100 us @+25°C



The AMP control port: D-sub 15 PIN #7 (AMP Disable).
The yellow curve is the drain control signal, the blue curve is RF output envelope.

Protection Connector Table

Male D-Sub is on the housing
The mating Female part number: 172-E15-203R001

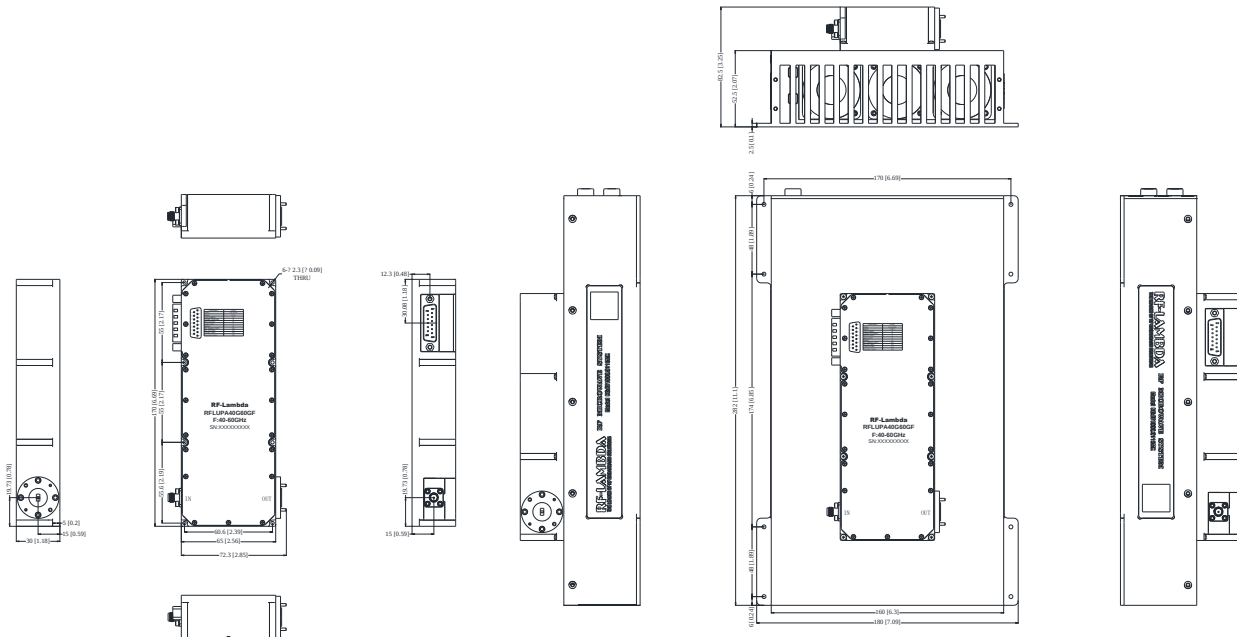


Pin #	Name	Function	Initial State	Description	Applied
1,2,9,10	VDD	Power Supply	+28V	+28V DC is supply Voltage	Yes
3,11	GND	Ground	GND	Ground	Yes
4	+5V_USER	Power Supply	+5V	+5V DC is supplied for reference(200mA)	Yes
5	TEMP_SIGNAL	Indicator	Voltage	Display temperature signal	Yes
6	GATE_OFF	Control	LOW	Applying logic HIGH disables gates of amplifiers	Yes
7	AMP_OFF	Control	LOW	Applying logic HIGH disables Positive Supply Voltage of amplifiers	Yes
8	RESET	Control	HIGH	Resets PA when logic LOW is applied and released (Internally Pulled-High +5V)	Yes
12	RF_Switch_OFF	Control	HIGH	Applying logic LOW disconnect RF signal of amplifiers	NO
13	RF IN Over	Indicator	LOW	Pin will be latched to logic HIGH when input signal is over limit	NO
14	Temp Over	Indicator	LOW	Pin will be latched to logic HIGH when drive over Temperature	Yes
15	Current Over	Indicator	LOW	Pin will be latched to logic HIGH when Current Limit is reached	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 200mA.
- Indicator output signals can source 24mA.

Outline Drawing



Ordering Information

Part Number	Modification	Description
RFLUPA40G60GF	Input Connector 1.85mm-Female and Output Connector WR19	40GHz-60GHz 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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