

Wideband Power Amplifier 16GHz-21GHz



Product Description

RFLUPA16G21G01BBK is a wideband power amplifier with a frequency range of 16 to 21GHz.

The power output of this amplifier is 40.5dBm typical. The typical small signal gain is 43 dB with a variance of ± 3 dB. This performance is achieved through the use of GaN devices.

The power amplifier's input and output connectors are 2.92mm. The operating temperature of this product is within -40 to +85°C.

Features

- Wideband Solid State Power Amplifier
- Small Signal Gain 43dB Typical
- Output Saturation Power 40.5dBm Typical
- Supply Voltage +36VDC
- 50 Ohm Matched Input/Output
- Drain Overvoltage Protection
- Drain 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		16 – 21		GHz
Small Signal Gain		43		dB
Gain Variance		+/-3		dB
Gain Variation Over Temperature (-40°C to +70°C)		+/-3		dB
Input Return Loss		-10		dB
*Saturated Output Power (Psat)		40.5		dBm
Supply Current ($V_{CC} = +36\text{VDC}$)		0.4	1.7	A
IM3		-28		dBc
Weight		1		lbs.
Impedance		50		Ohms
Input / Output Connectors	2.92mm – Female (Input) / 2.92mm – Female (Output)			
Package	Screw Sealed (Standard)			
	Hermetically Sealed (Optional)			

Note: Special screening is available with extra cost. Please inquire with sales.

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 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

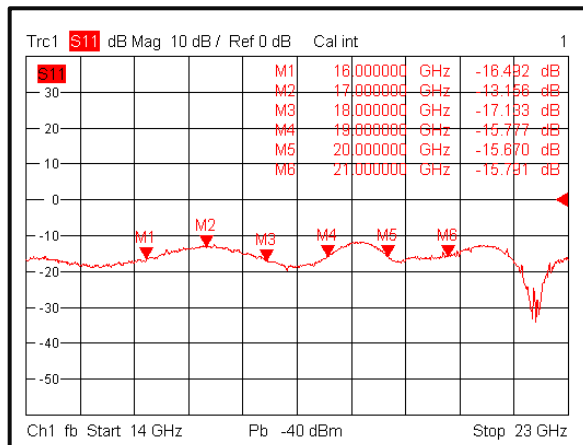
Parameter	Description
Operational Temperature	-40°C to +75°C (Case Temperature)
Storage Temperature	-55°C to +125°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for 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)

Notes:

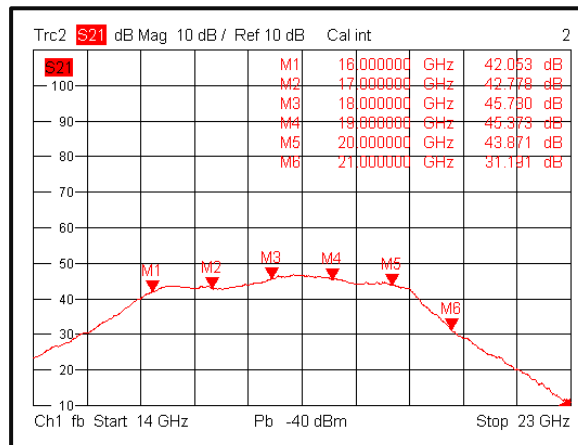
- Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.
- For vibration testing details please see additional information section

Typical Performance Plots

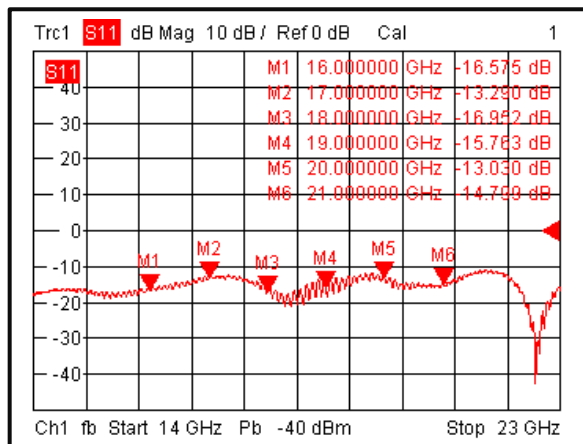
Input Return Loss @+25°C



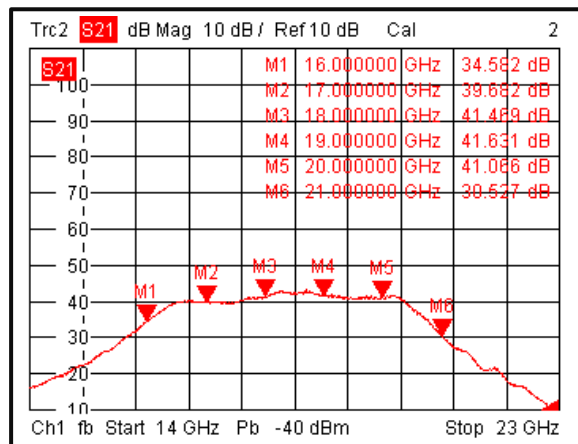
Gain vs. Frequency @+25°C



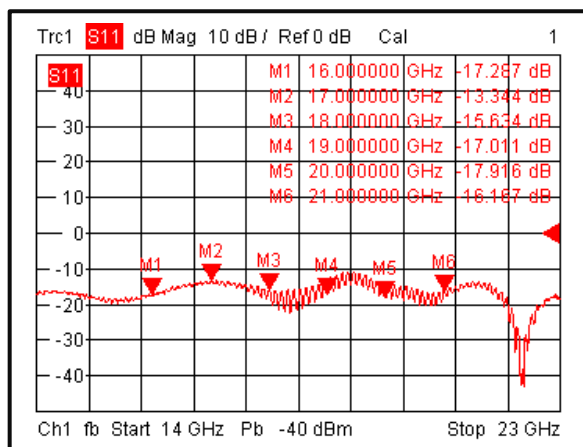
Input Return Loss @-40°C



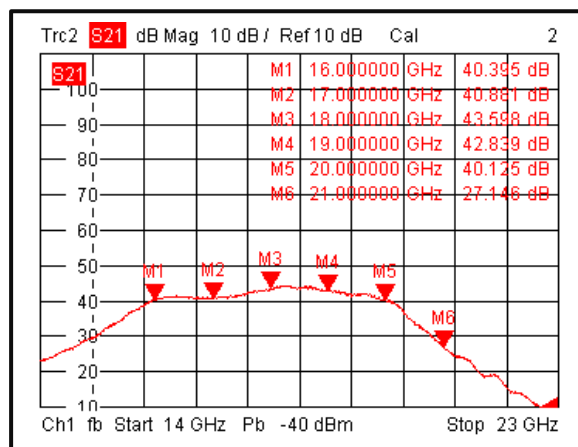
Gain vs. Frequency @-40°C



Input Return Loss @+85°C



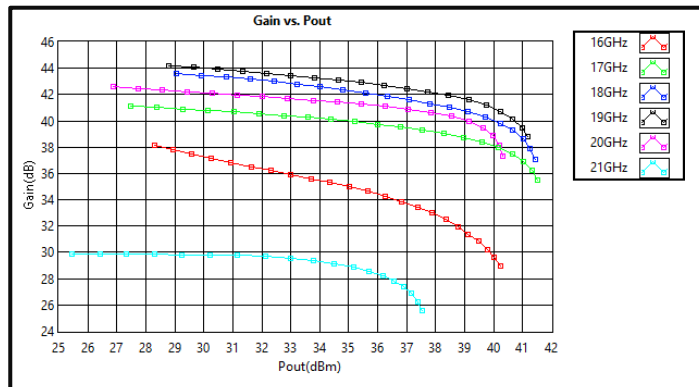
Gain vs. Frequency @+85°C



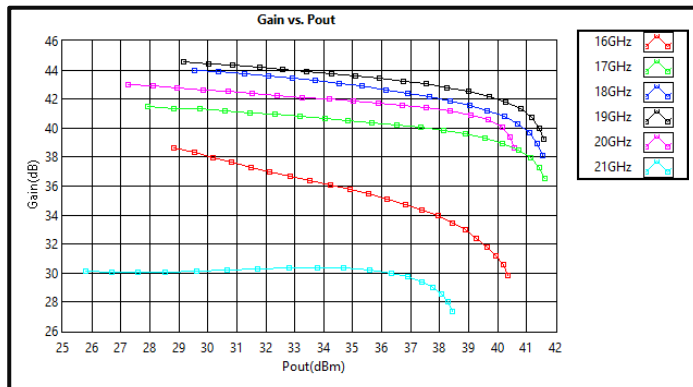
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

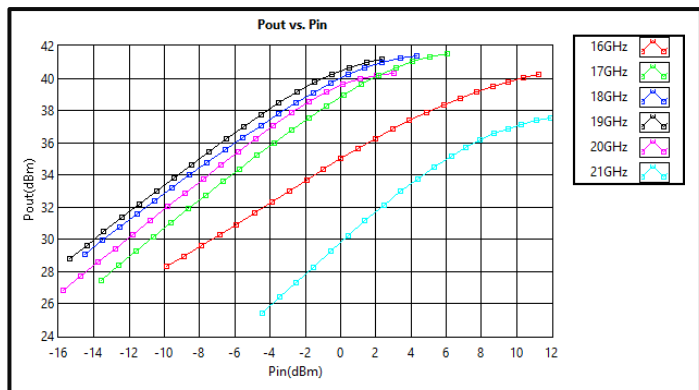
Gain vs Output Power CW



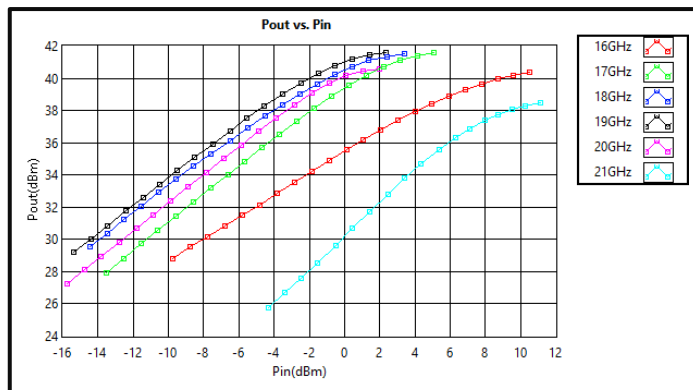
Gain vs Output Power *Pulse



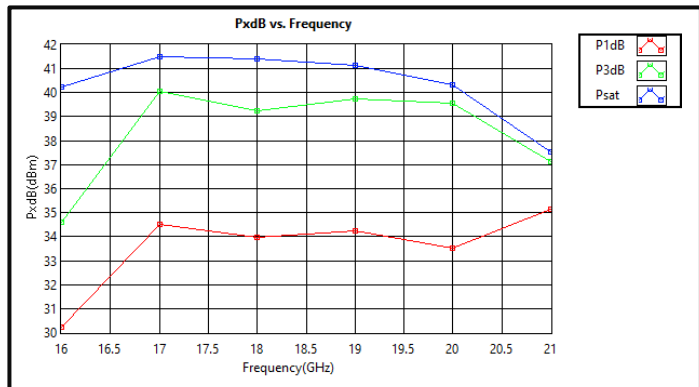
Output vs Input Power CW



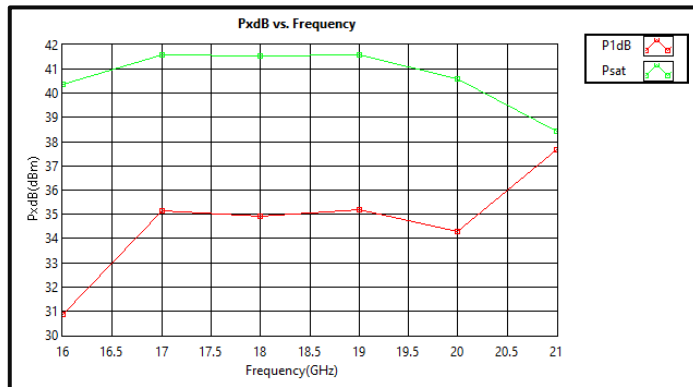
Output vs Input Power *Pulse



PxdB vs Frequency CW



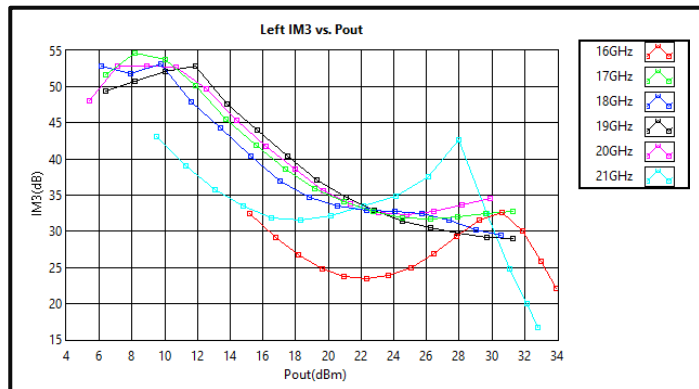
PxdB vs Frequency *Pulse



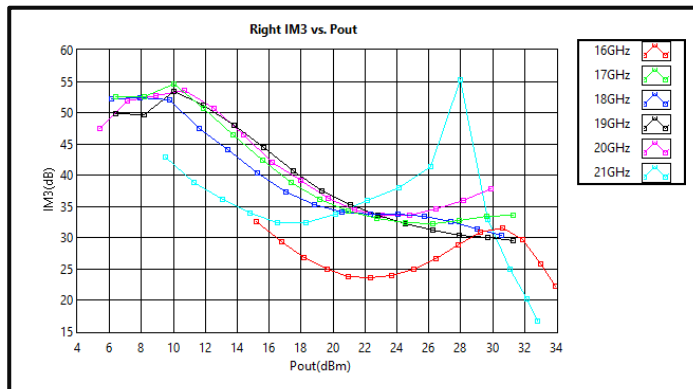
*Pulse Psat power test signal: 200μs pulse width with 10% duty cycle.

Typical Performance Plots

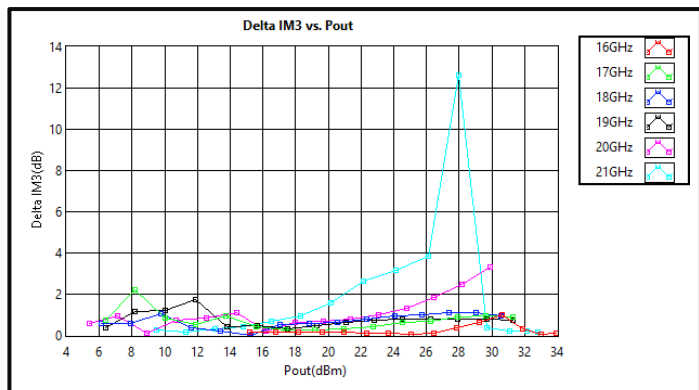
Left IM3 vs Output Power



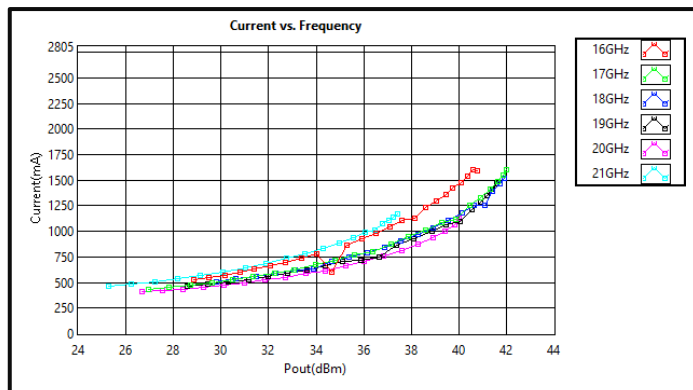
Right IM3 vs Output Power



Delta IM3 vs Output Power

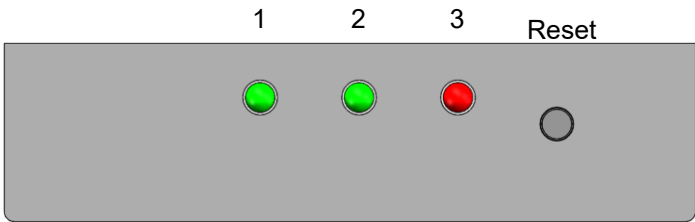


Current vs Output Power (+36VDC)



Note: IM3 test performed with 1MHz tone spacing

Alarm Status Panel

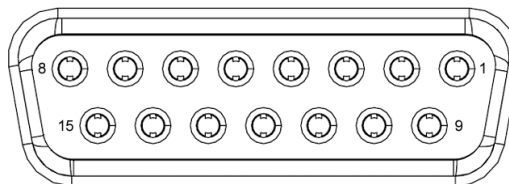


LED #	Name	Function	Initial State	Description	Applied
1	Temp	Indicator	Green	PA will shut down and latch this LED to a RED color when recommended case temperature is exceeded	Yes
2	ID	Indicator	Green	PA will shut down and latch this LED to a RED color when a drain current limit is exceeded	Yes
3	Power	Indicator	Red	LED will light to RED color when supply power is applied	Yes
	Reset*	Control		Manual reset button to reset PA	Yes

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

Protection Connector Table

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

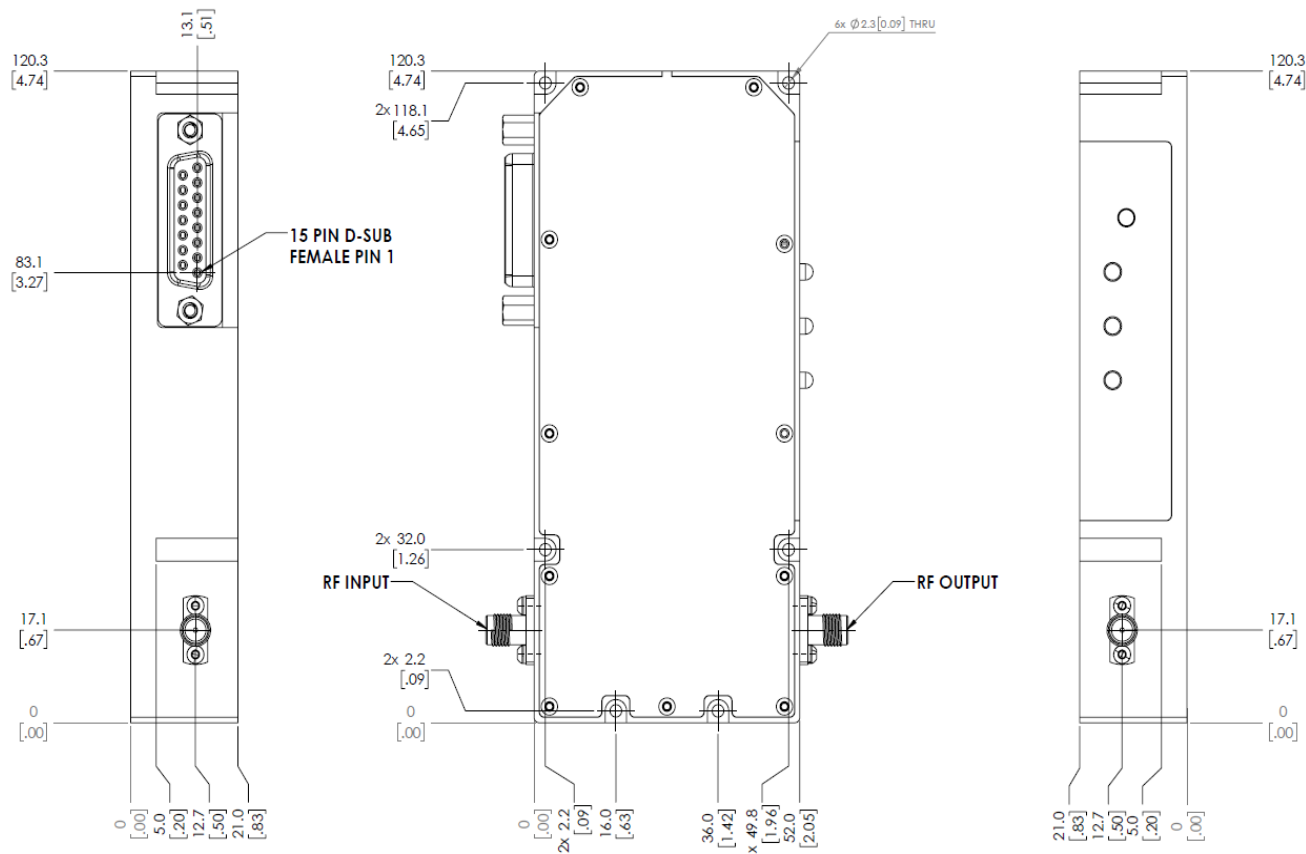


Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control	HIGH	Resets PA when logic <u>LOW</u> is applied and released	Yes
2	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disables drains of amplifiers	Yes
3	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gates of amplifiers	Yes
4	NC	NC	NA	NA	NA
5	Temp Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when amplifier is driven over temperature	Yes
6	Current Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when drain current limit is reached	Yes
7	NC	NC	NA	NA	NA
8	GND	Ground	NA	GND	Yes
9	VDC	VDC	NA	DC power supply pin for amplifier	Yes
10	VDC	VDC	NA	DC power supply pin for amplifier	Yes
11	ID Signal	Indicator	NA	Current provided to the drain of the last stage of the amplifier is represented by voltage	Yes
12	Temp Signal	Indicator	NA	PA carrier case temperature is represented by voltage	Yes
13	+5V User	Power Supply	+5V	+5V DC is supplied for reference	Yes
14	GND	Ground	GND	Ground	Yes
15	GND	Ground	GND	Ground	Yes

Notes:

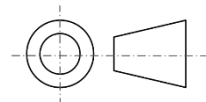
- HIGH/LOW voltages are standard TTL signals 0.0V-0.8V = LOW. 2V-5V = HIGH. Input current is 10uA.
- Matching connector and cable will be shipped with the product.
- Applied=Yes means the feature is included. Applied=No means the feature is not included with this model.
- 5V reference supply can source 700mA.
- Indicator output signals can source 24mA.

Outline Drawing



Notes:

1. Package Material: Aluminum and Copper
2. Plating: Nickel
3. All dimensions are in millimeters [inches].
4. Tolerances ± 0.25 [0.010] unless otherwise specified.
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.



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
RFLUPA16G21G01BBK	Input connector 2.92mm and Output connector 2.92mm	16GHz-21GHz 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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