

Wideband Solid State Power Amplifier 30GHz-65GHz



Product Description

RFLUPA30G65GD is a wideband solid state power amplifier with a frequency range of 30 to 65GHz.

The power output of this amplifier is 28dBm typical. The typical small signal gain is 50dB with a gain flatness of ± 8 dB. This performance is achieved through the use of GaAs devices. This power amplifier works with a +28 VDC power supply.

The power amplifier's input and output connector are 1.85mm-female.

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

Features

- Ultra Wide band Power Amplifier
- Small Signal Gain 50dB Typical
- Output Saturation Power 28dBm Typical
- Supply Voltage +28 VDC
- 50 Ohm Matched Input/Output
- Overcurrent Protection

Typical Applications

- Wireless Infrastructure
- Military and Aerospace Applications
- Test Instrumentation
- Radar Systems
- Microwave Radio Systems
- TR Modules
- Research and Development

Electrical Specifications ($T_A = +25^\circ\text{C}$)

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	30		60	60		65	GHz
Small Signal Gain		50			40		dB
Gain Flatness		± 8.0			± 6.0		dB
Gain Variation Over Temperature (-40°C to +60°C)		± 4			± 4		dB
Input VSWR		2.5	3		2.5	3	:1
Output 1dB Compression Point (P1dB)		25			23		dBm
*Saturated Output Power (Psat)	26	29		22	25		dBm
Supply Current (Vcc = +28VDC)		1.2	2.4		1.2	2.4	A
IM3		35			35		dBc
Power Added Efficiency (PAE)		2			2		%
Turn On/Off Speed (Drain Disable)	ON	10			10		us
	OFF	80			80		us
Turn On/Off Speed (Gate Disable)	ON	10			10		us
	OFF	80			80		us
Weight	Net		3.55 Max.				lbs.
	Including Heat sink		9.71 Max.				
Impedance			50				Ohms
Input / Output Connectors			1.85mm-Female				
Package			Epoxy Sealed (Standard)				
			Hermetically Sealed (Optional)				

* Peak-power test signal: 200 μ s pulse width with 10% duty cycle.

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage Range	+30VDC
*RF Input Power (RFIN)	-12dBm

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 +28VDC and make sure power supply can handle max current.

Bias Down Procedure

1. Turn off +28VDC
2. Remove +28VDC Connection
3. Remove RF Connection
4. Remove ground

Environmental Specifications and Test Standards

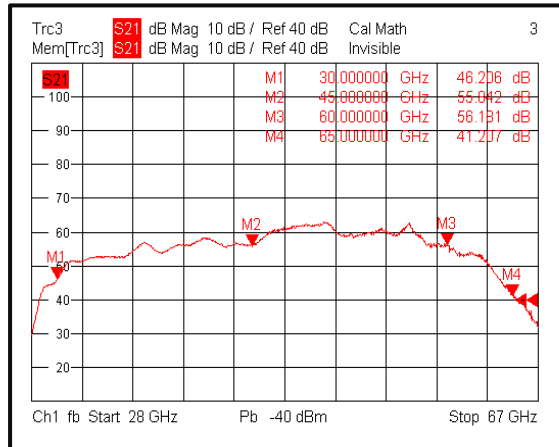
Parameter	Description
Operational Temperature	-40°C to +60°C (Case Temperature)
Storage Temperature	-55°C to +105°C
Thermal Shock	-40°C → +85°C (5 Cycles / 10 hours)
**Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +60°C for 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.

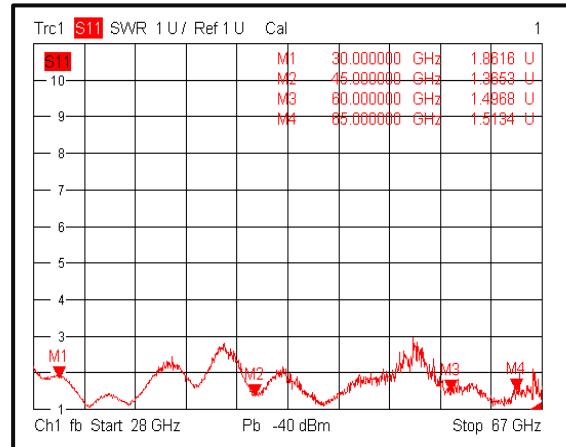
**For vibration testing details please see additional information section.

Typical Performance Plots

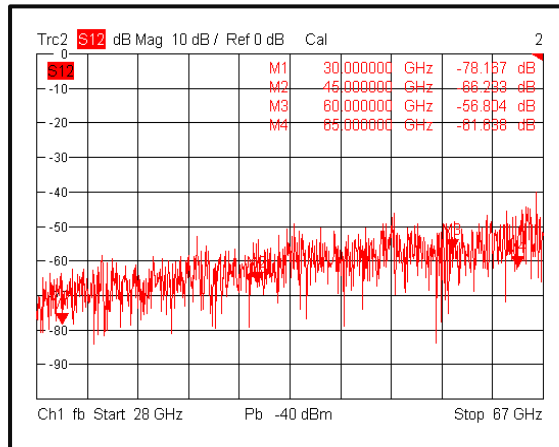
Gain@+25°C



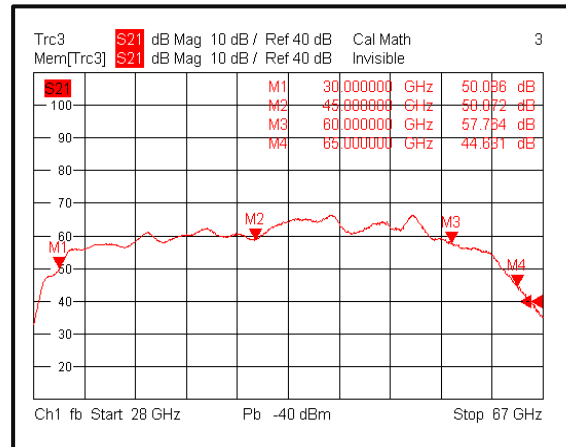
Input VSWR @+25°C



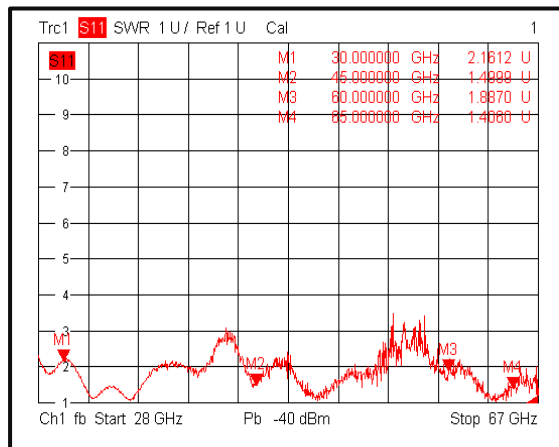
Isolation@+25°C



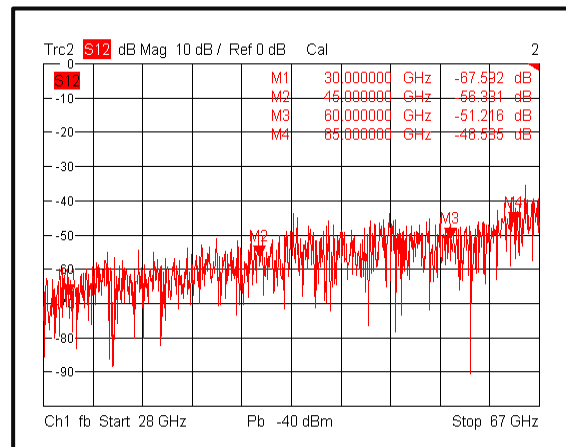
Gain@-40°C



Input VSWR @-40°C



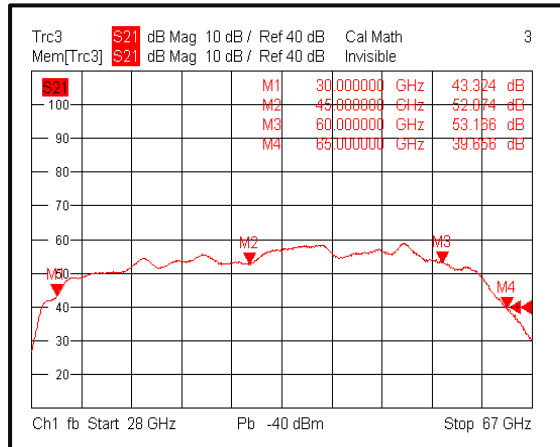
Isolation@-40°C



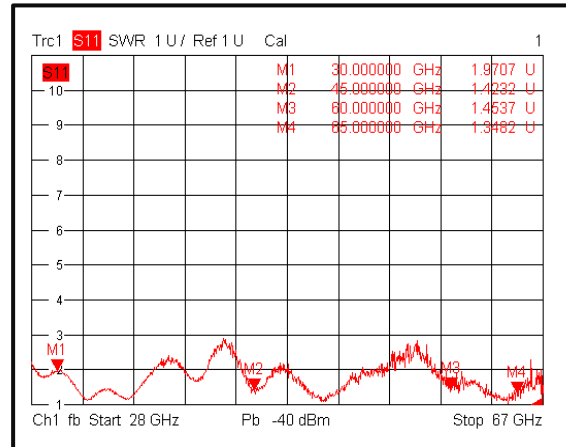
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

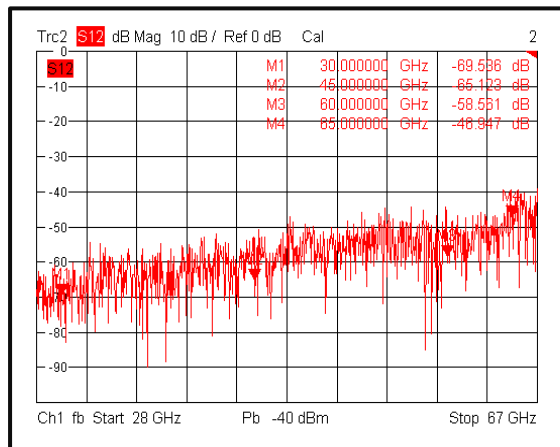
Gain@+60°C



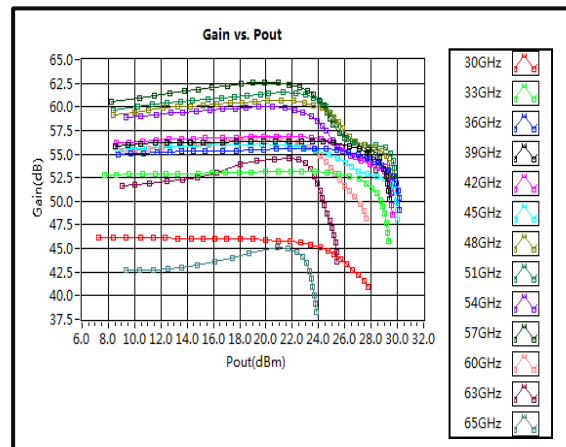
Input VSWR @+60°C



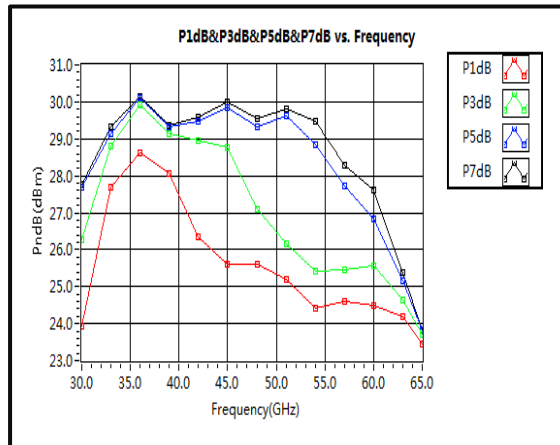
Isolation@+60°C



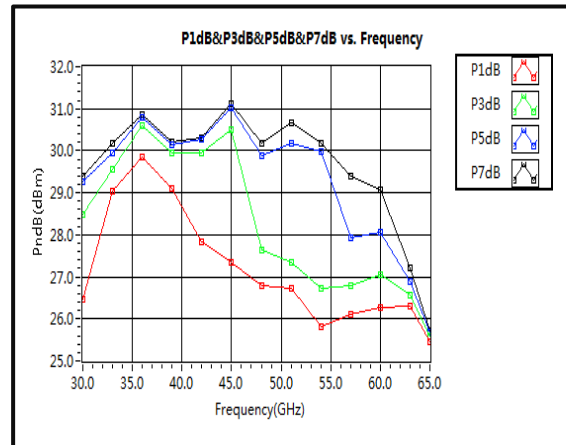
Gain vs. Output Power (CW Power)



PndB vs. Frequency (CW Power) @+25°C

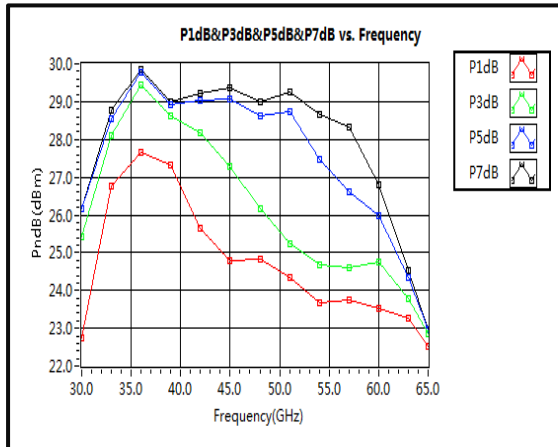


P1dB&P5dB vs. Frequency (CW Power) @-40°C

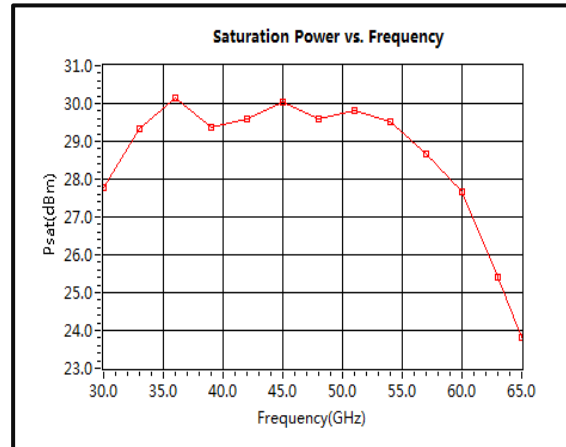


Typical Performance Plots

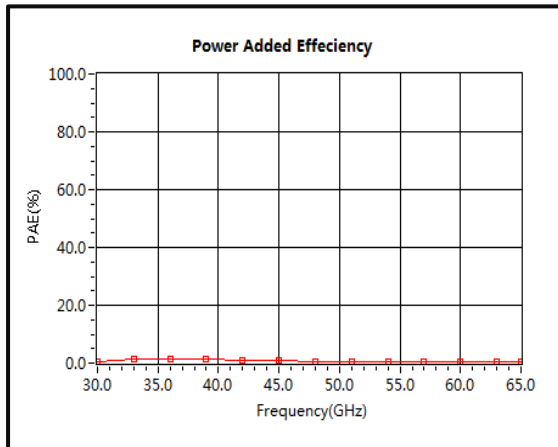
P1dB & P5dB vs. Frequency (CW Power) @+60°C



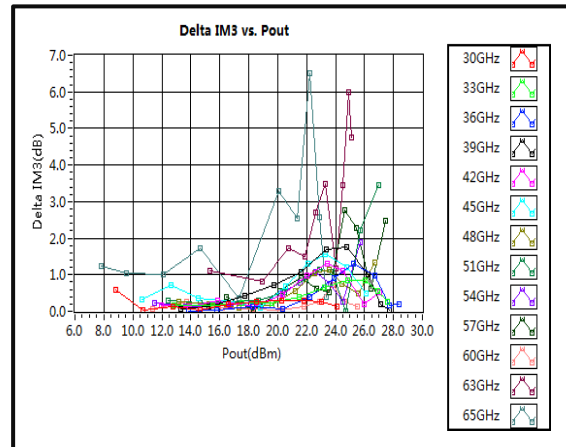
Saturation Power vs. Frequency (CW Power)



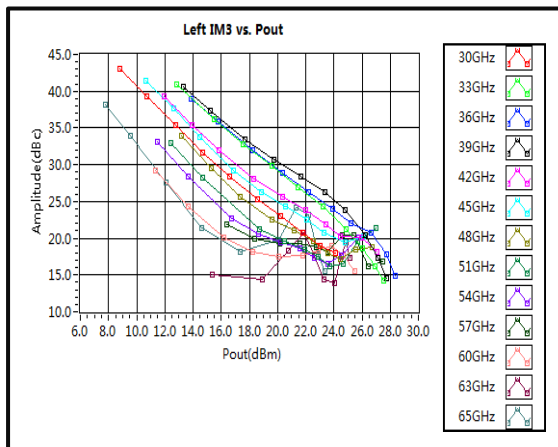
Power Added Efficiency (CW Power)



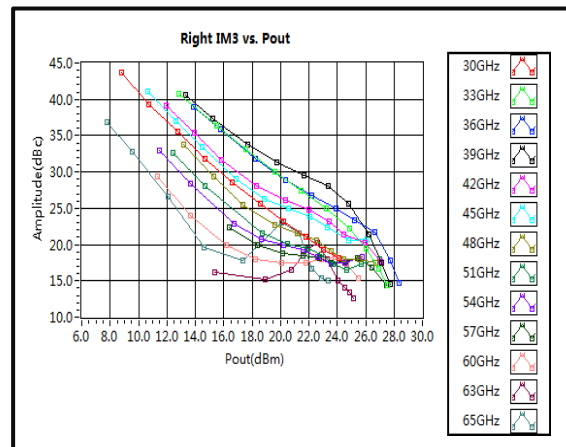
Delta IM3 vs. Pout



Left IM3 vs. Pout

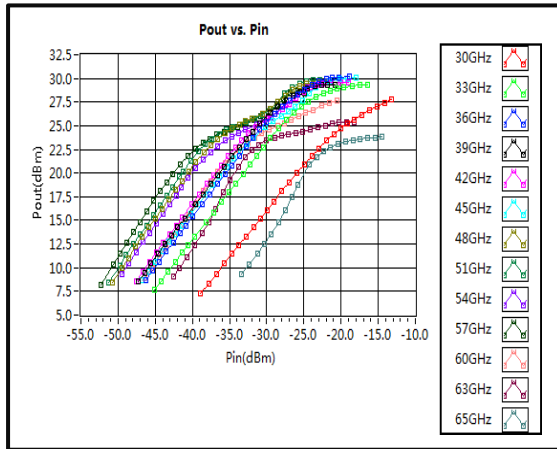


Right IM3 vs. Pout

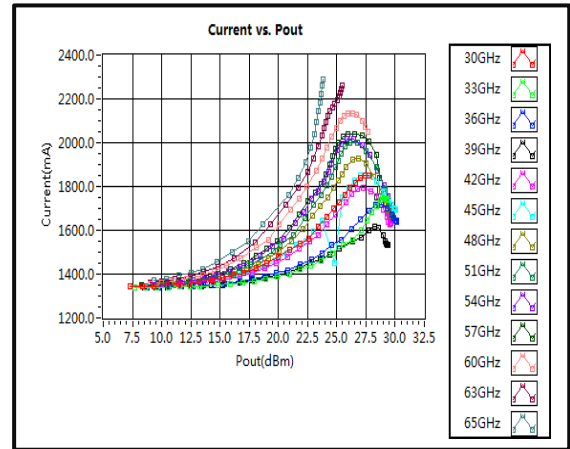


Typical Performance Plots

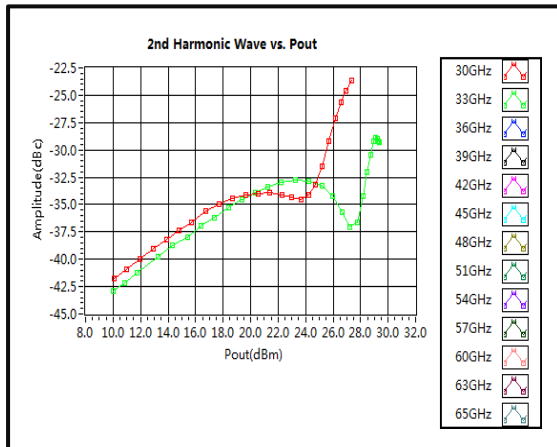
Pout vs. Pin (CW Power)



Current vs. Pout (CW Power)

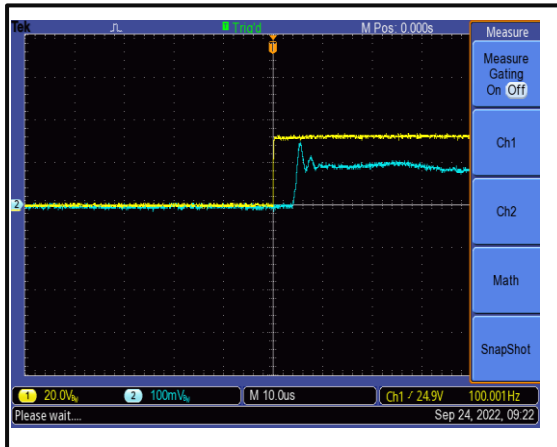


2nd Harmonic Wave Output Power

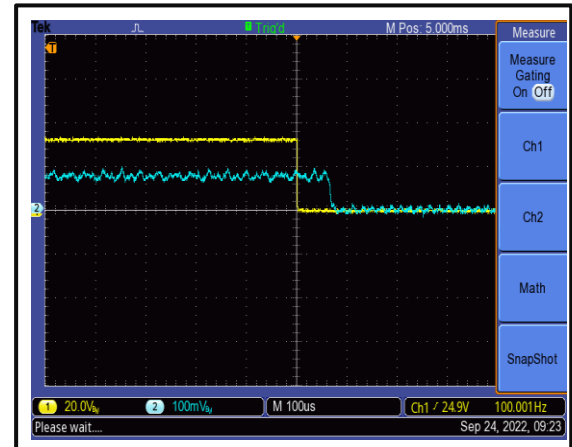


Typical Performance Plots

The Drain-Enable Rise Time is 10 us @+25°C

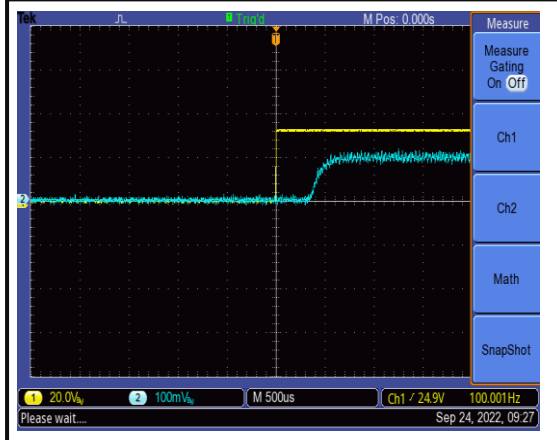


The Drain-Disable Fall Time is 100 us @+25°C

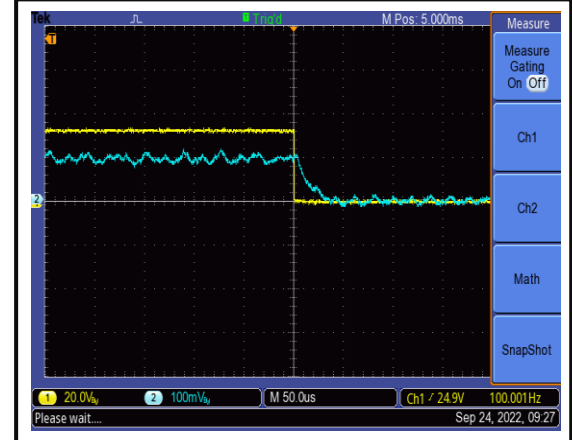


The drain control port: D-sub 15 PIN #13 (Drain_OFF).
The yellow curve is the drain control signal, the blue curve is RF output envelope.

The Gate-Enable Rise Time is 500 us @+25°C



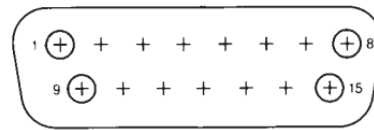
The Gate-Enable Fall Time is 50 us @+25°C



The gate control port: D-sub 15 PIN #14 (GATE_OFF).
The yellow curve is the gate control signal, the blue curve is RF output envelope.

Protection Connector Table

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

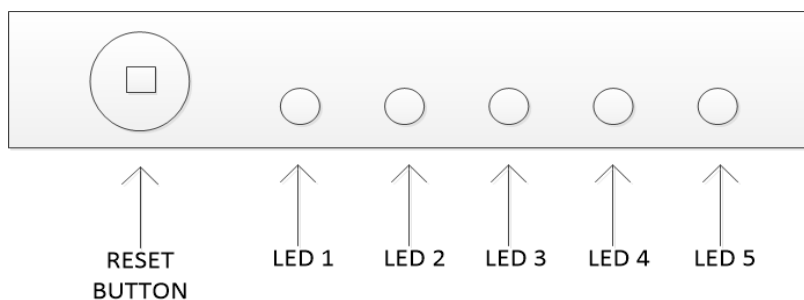


Pin #	Name	Function	Initial State	Description	Applied
1,2,9,10	VDD	Power Supply	+28V	+28V DC is supply Voltage	Yes
3,11	GND	Ground	GND	Ground	Yes
4	PA_OFF	Indicator	LOW	Amplifier working state, high level is off	Yes
5	RF Input Over Drive	Indicator	LOW	Pin will be latched to logic HIGH when input signal is over limit	NO
6	Current Over	Indicator	LOW	Pin will be latched to logic HIGH when Current Limit is reached	Yes
7	Temp Over	Indicator	LOW	Pin will be latched to logic HIGH when drive over Temperature	Yes
8	ID Balance	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when an imbalance in the drain current of the combining branches occurs	Yes
12	Switch Disable	Control	HIGH	Applying logic LOW disconnect RF signal of amplifiers	NO
13	Drain Disable	Control	HIGH	Applying logic LOW disables Positive Supply Voltage of amplifiers	Yes
14	Gate Disable	Control	HIGH	Applying logic LOW disables gates of amplifiers	Yes
15	RESET	Control	HIGH	Resets PA when logic LOW is applied and released (Internally Pulled-High +3.3V)	Yes

Notes:

- HIGH/LOW voltages are standard TTL signals 0.0V-0.8V = LOW. 2.8V-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.

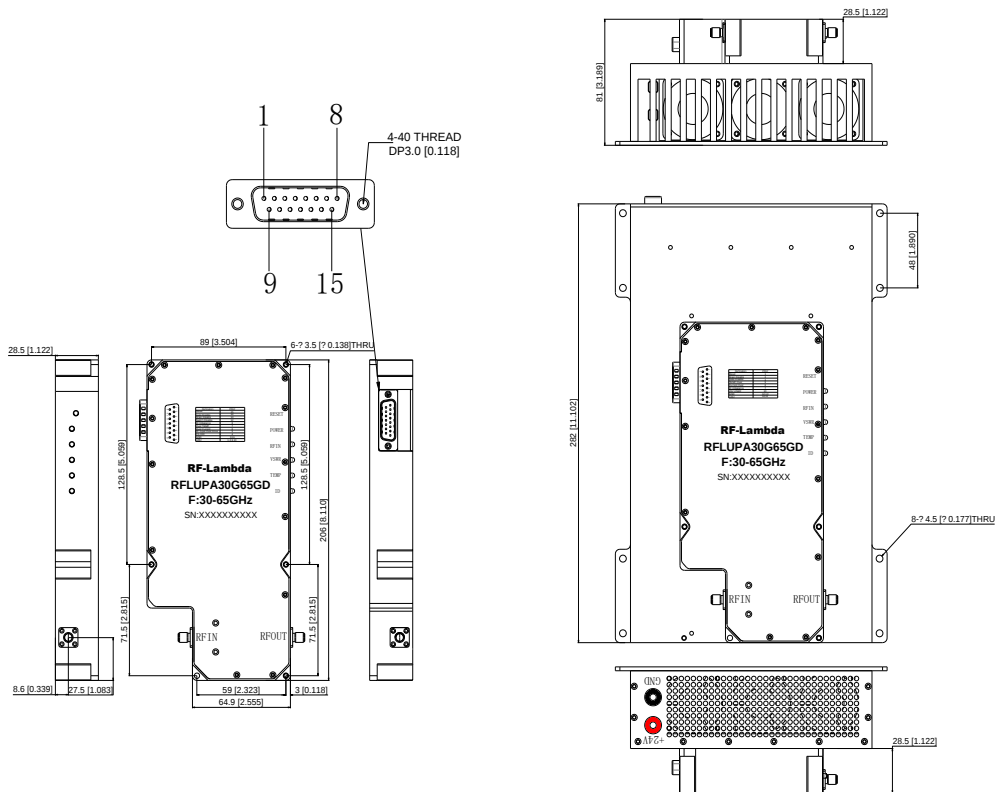
Alarm Status Panel



	Name	Function	Initial State	Description	Applied
	RESET	Control		Manual reset button to reset PA	Yes
LED 1	POWER	Indicator	RED Color	LED will light to <u>RED</u> color when supply power is applied	Yes
LED 2	RF IN	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when input signal is over limit *	No
LED 3	VSWR	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when output reflection is over limit *	No
LED 4	TEMP	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when driven over temperature *	Yes
LED 5	ID	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when an imbalance in the drain current of the combining branches occurs OR if a drain current limit is reached *	Yes

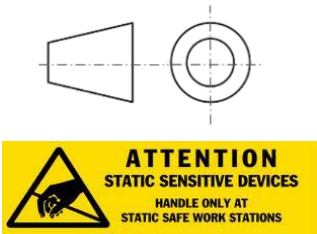
*LED needs to be manually reset to initial state by pressing RESET button

Outline Drawing



Notes:

1. Package Material: Aluminum
2. Finish: Nickel Plated
3. All dimensions are in millimeters [inches].
4. Tolerances ± 0.25 [0.01] 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.
6. Standard torque wrench must be used to secure RF connectors



Packing List

ID	Description	QTY
1	Fig a. Fan adapter	1
2	Fig b. DB15 cable (RFCBLADB15)	1



Fig a.



Fig b.

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
RFLUPA30G65GD	connectors 1.85mm-Female	30GHz-65GHz 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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