Wideband Solid State Power Amplifier
30GHz-60GHz

Product Description

RFLUPA30G65GC is a wideband solid state power amplifier with a frequency range of 30 to 60GHz.

The power output of this amplifier is 27dBm typical. The typical small signal gain is 50dB with a gain flatness of ±5dB. 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 connectors are 1.85mm-female.

The operating temperature of this product is -20 to +60ºC.

Features

- Ultra Wide Band Power Amplifier
- Small Signal Gain 50dB Typical
- Output Saturation Power 27dBm Typical
- Supply Voltage +28VDC
- 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=+25ºC)

Parameter		Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		30		45	45		60	GHz
Small Signal Gain		45	50		50	55		dB
Gain Flatness			±3.0			±5.0		dB
Gain Variation Over Temperature (-20ºC to +60ºC)			±4			±4		dB
Input VSWR			2.5	3		2.5	3	:1
*Output 1dB Compression Point (P1dB)			22			20		dBm
*Saturated Output Power (Psat)		23	27		21	23		dBm
Supply Current (Vcc = +28VDC)			1	2.5		1	2.5	A
IM3			35			35		dBc
RF ON and OFF Speed				3/70Typ.				us
Power Added Efficiency (PAE)			5%			5%		%
Time Division Duplexing (TDD) Blanking	ON			50Typ.				us
	OFF			25Typ.				us
Weight	Net			2.2Max.				lbs.
	Including Heat sink			5.2Max				
Impedance				50				Ohms
Input / Output Connectors				1.85mm-Female				
Package				Epoxy Sealed (Standard)				
				Hermetically Sealed (Optional)				

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Sales: sales@rflambda.com Technical: support@rflambda.com

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

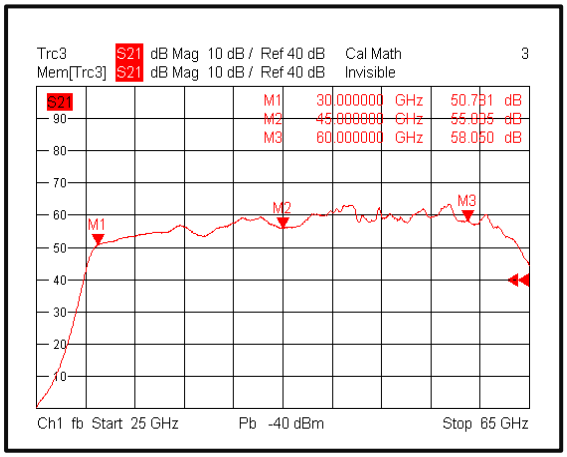
Environmental Specifications and Test Standards

Parameter	Description
Operational Temperature	-20ºC 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)

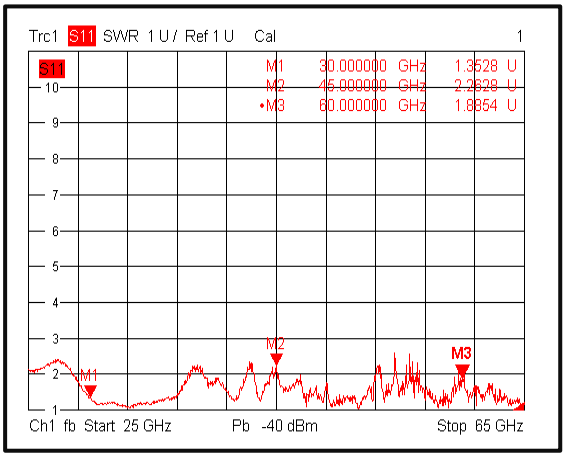
*Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.
**For vibration testing details please see additional information section.

Typical Performance Plots

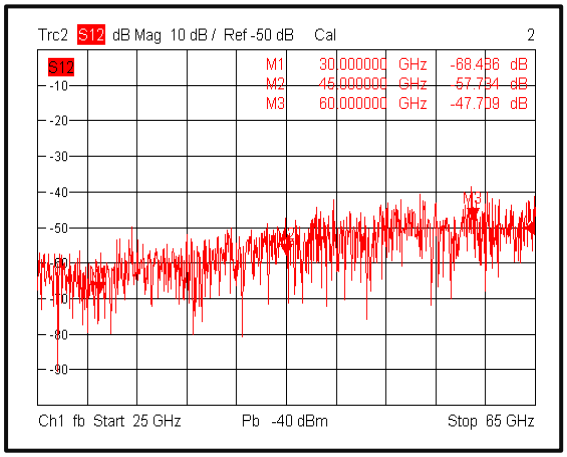
Gain@+25℃



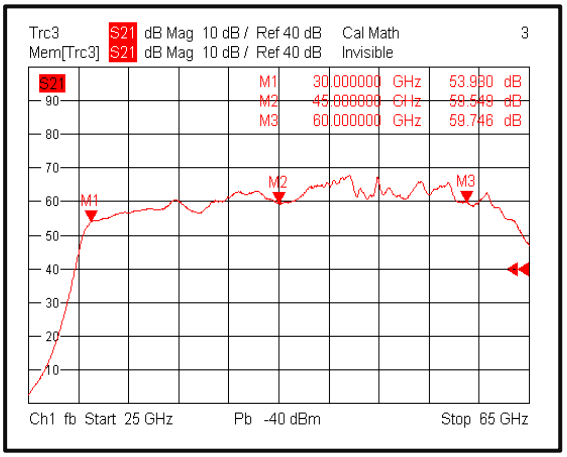
Input VSWR @+25℃



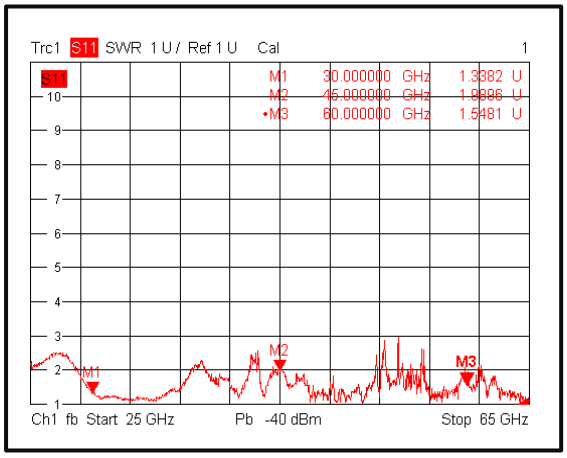
Isolation@+25℃



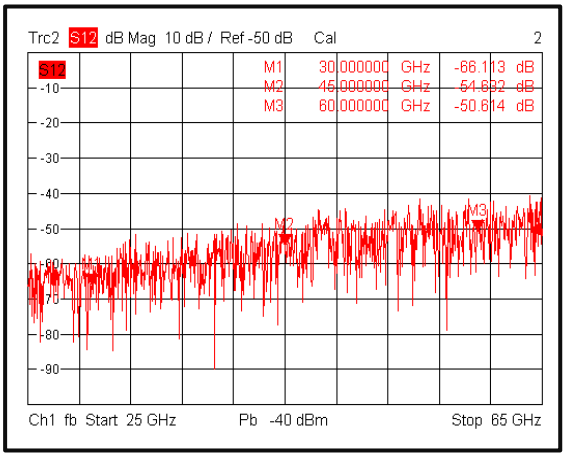
Gain@-20℃



Input VSWR @-20℃



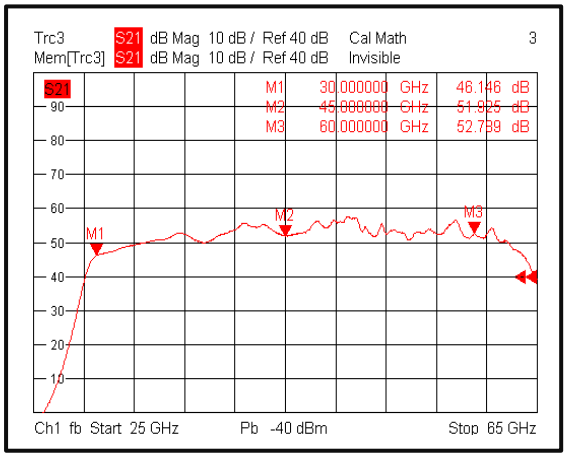
Isolation@-20℃



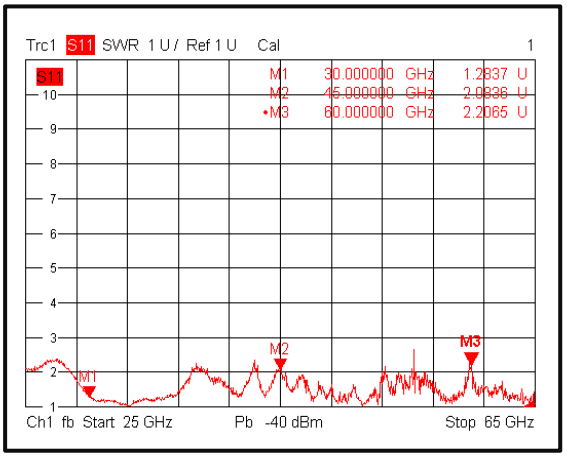
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

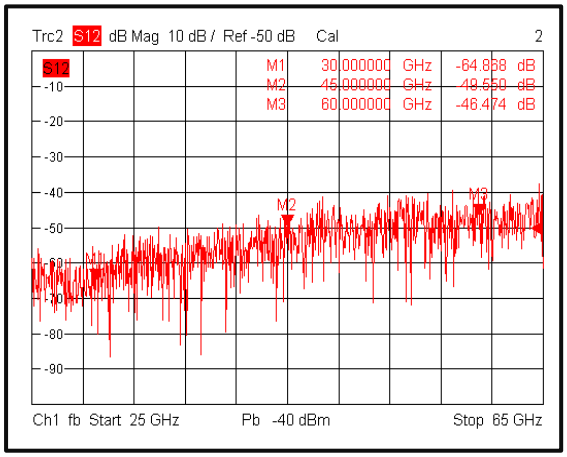
Gain@+60℃



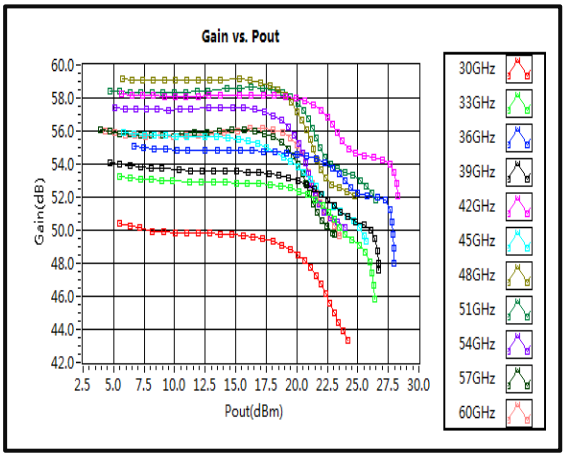
Input VSWR @+60℃



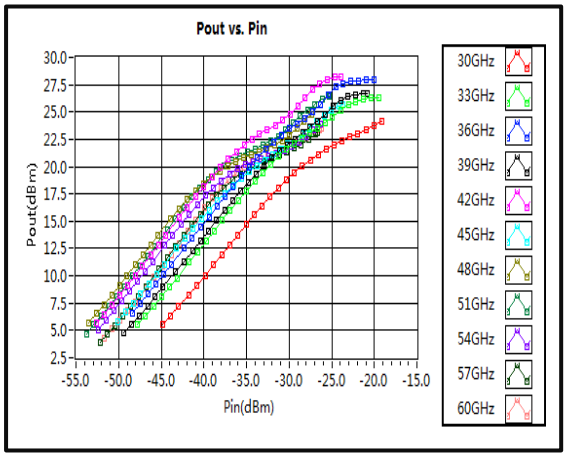
Isolation@+60℃



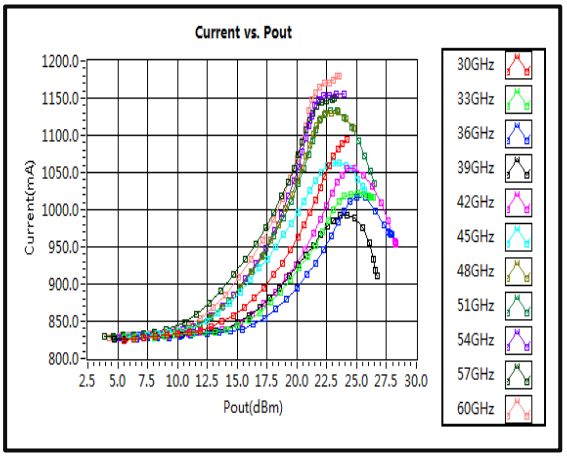
Gain vs. Output Power



Pout vs. Pin

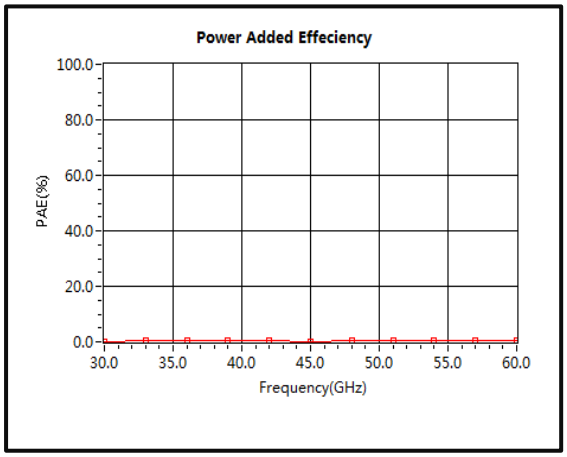


Current vs. Pout

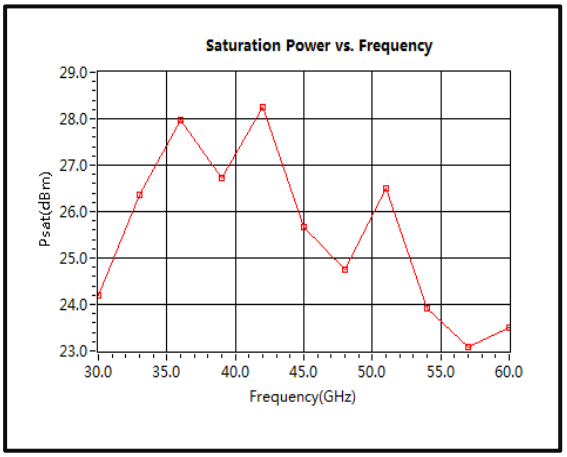


Typical Performance Plots

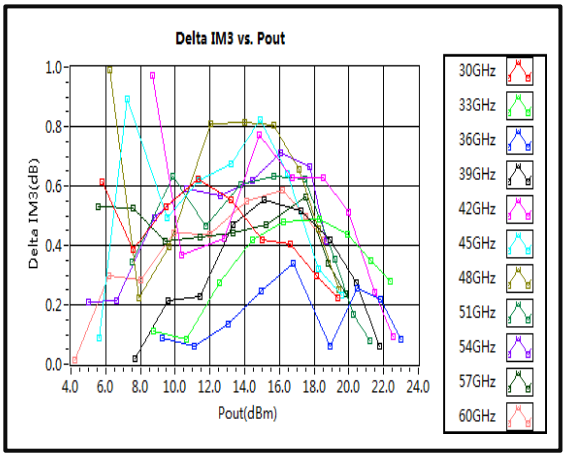
Power Added Efficiency



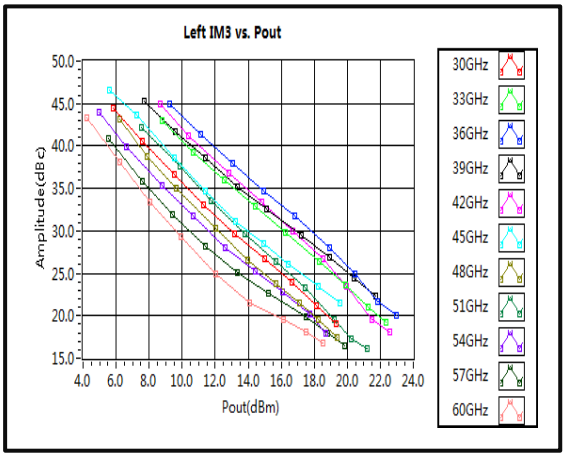
Saturation Power vs. Frequency



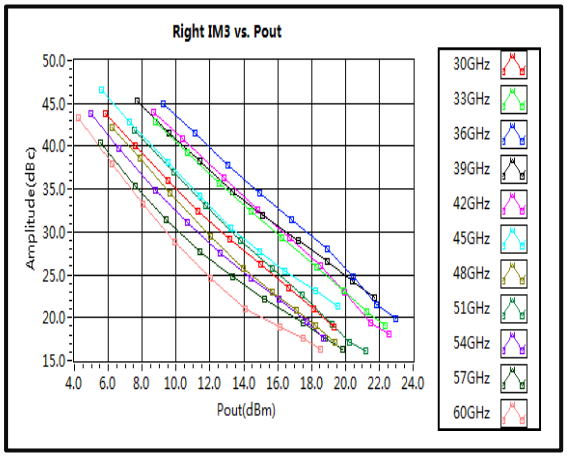
Delta IM3 vs. Pout



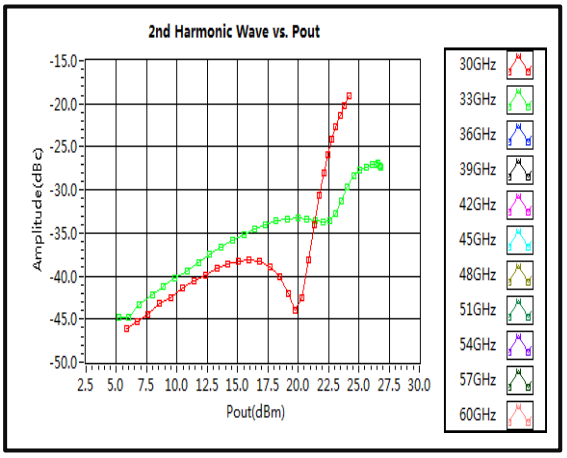
Left IM3 vs. Pout



Right IM3 vs. Pout



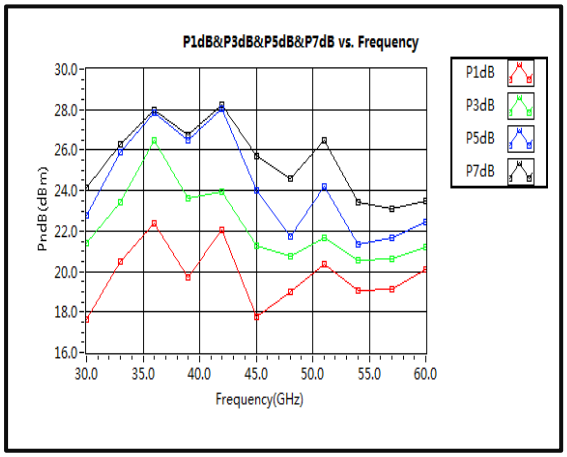
2nd Harmonic Wave Output Power



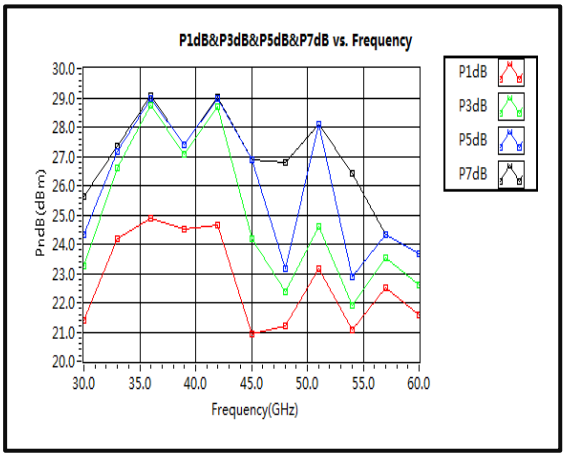
Note: Small signal VNA measurements include attenuators to protect equipment

Typical Performance Plots

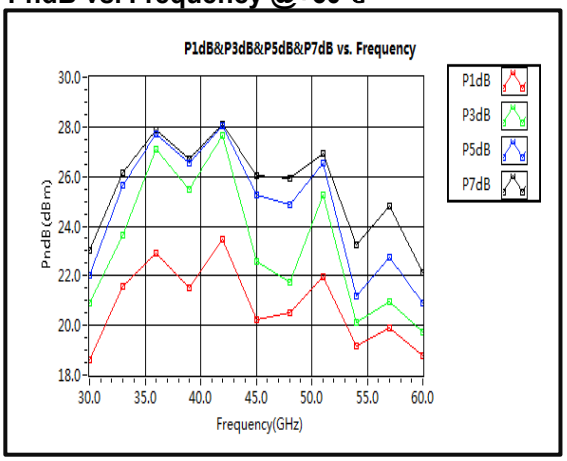
PndB vs. Frequency @+25℃



PndB vs. Frequency @-20℃

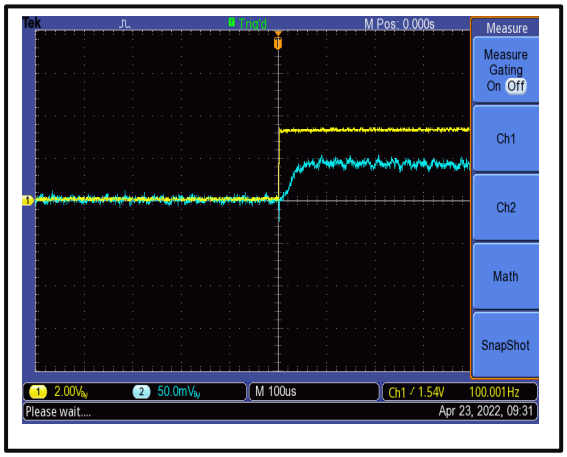


PndB vs. Frequency @+60℃

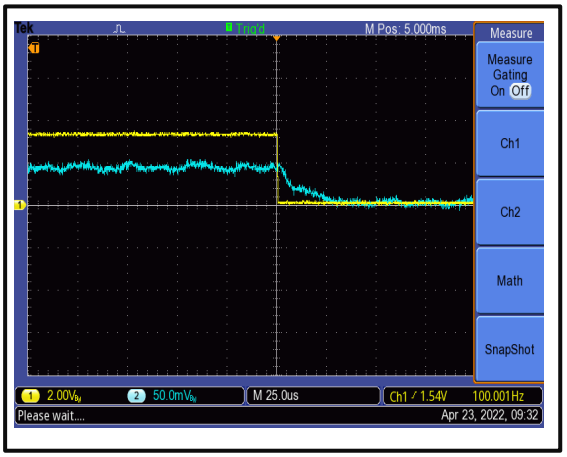


Typical Performance Plots

The TDD Rise Time is 50us @+25℃

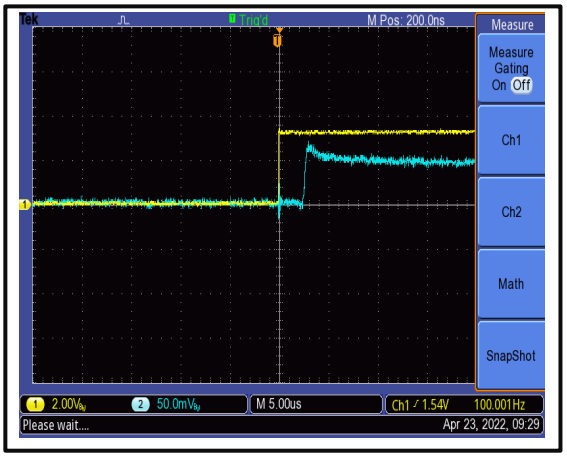


The TDD Fall Time is 25us @+25℃



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

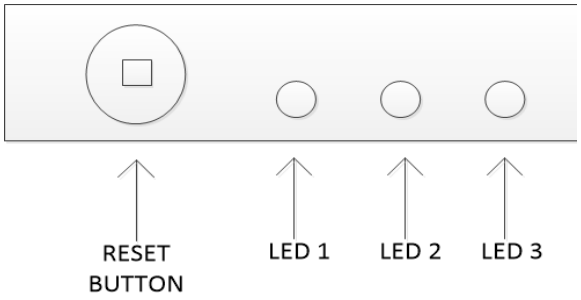
The Drain-Enable Rise Time is 3 us @+25℃



The Drain-Disable Fall Time is 70 us @+25℃

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

Protection Connector Table

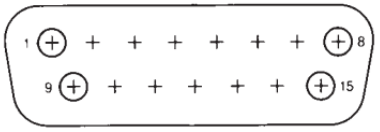


	Name	Function	Initial State	Description	Applied
Button	RESET	Control		Manual reset button to reset PA	Yes
LED3	POWER	Indicator	RED Color	LED will light to RED color when supply power is applied	Yes
LED 2	ID	Indicator	GREEN Color	PA will shut down and latch this LED to a RED color when Current Limit is reached*	Yes
LED 1	TEMP	Indicator	GREEN Color	PA will shut down and latch this LED to a RED color when driven over temperature *	Yes

HIGH / LOW voltages are standard TTL signals:
0.0V-0.8V = LOW
2.8V-5V = HIGH

Protection Connector Table

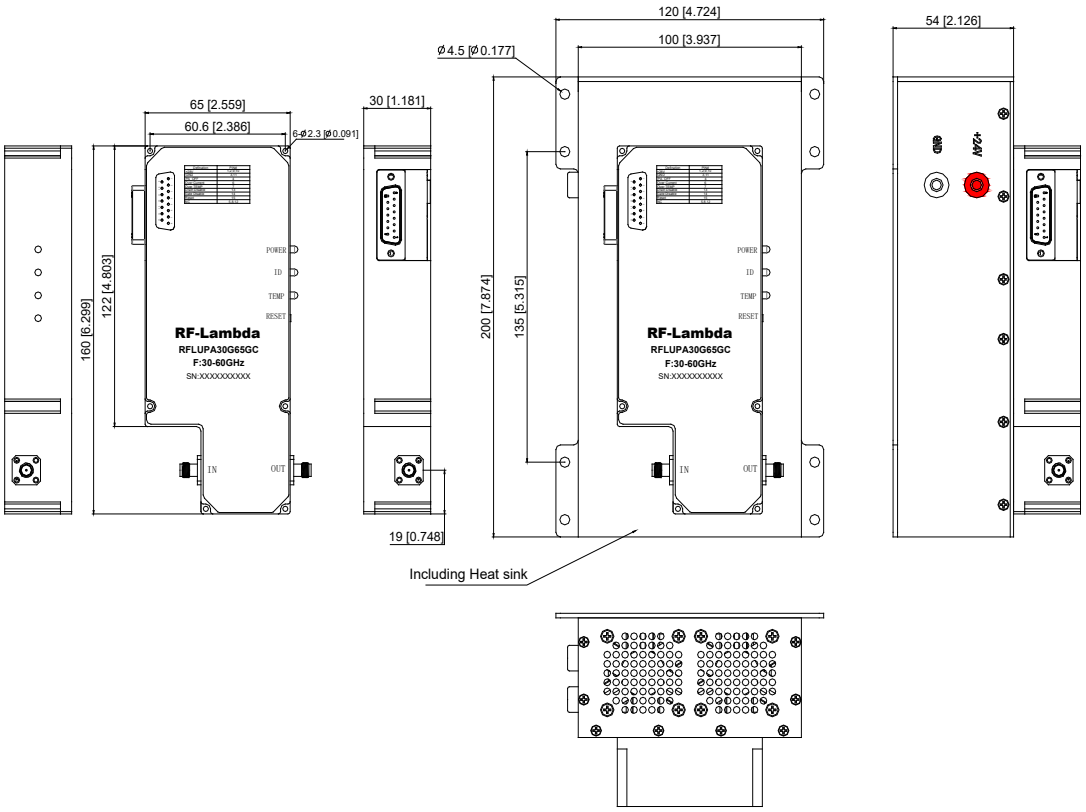
Male D-Sub is on the housing
The mating female part number: 172-E15-203R001



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	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	Over Current	Indicator	LOW	Pin will be latched to logic HIGH when Current Limit is reached	Yes
7	Over Temp	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 HIGH 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

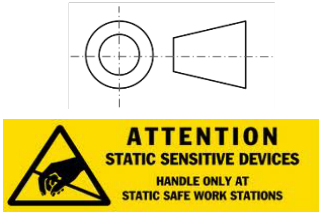
Notes:
- HIGH/LOW voltages are standard TTL signals 0.0V-0.8V = LOW. 2.8V-5V = HIGH. Input current is 10uA.
- Matching connector and cable will be shipped with the product.
- Applied=Yes means the feature is included. Applied=No means the feature is not included with this model.
- 5V reference supply can source 700mA.
- Indicator output signals can source 24mA.

Outline Drawing



Notes:

1. Package Material: 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
RFLUPA30G65GC	connectors 1.85mm-Female	30GHz-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

The information contained herein is believed to be reliable. RF-Lambda makes no warranties regarding the information contained herein. RF-Lambda assumes no responsibility or liability whatsoever for any of the information contained herein. RF-Lambda assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for RF-Lambda products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.
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