p*RF*-10000915CXC01

RF Power Amplifier

Rev. 1 – 06 09 2019

1. General description

The p*RF*-10000915CXC01 is a robust and easy to use microwave RF Energy amplifier with 1000W output power and typical 45 dB of gain in the 902 - 928 MHz ISM band. With such high gain the input drive level requirement is low and can be directly retrieved from a small signal generator module such as pinkRF's pRF-SG4A_2450_SMA_DV.

Specifications (typical values)		
	Saturated RF output power (W / dBm)	≥ 1000 / 60
	Frequency band (MHz)	902 - 928
	Typical gain @ saturated power (dB)	45
	DC Voltage (V)	50
	Maximum current (A)	35.5
	ROHS compliant	Yes
	Maximum PAE (%) at saturated power	≥ 61
	Maximum VSWR at output for less than 100 ms	20:1
	Maximum VSWR at output continuous wave	4:1
	Input return loss (dB)	10
	Circulator / isolator	Built-in
	Built-in coupler directivity (dB)	18
	Harmonics (dBc)	< -20

2. Features and benefits

- High ruggedness
- High gain
- High efficiency
- Hardware enabled excessive temperature and reflected power shutdown
- Built-in coupler and detectors for forward and reflected RF power levels
- Analog and digital interfaces for forward and reflected power readings
- Power supply (5.7V, 1A) for auxiliary circuitry e.g. pinkRF small signal generator module
- Integrated water-cooled heatsink
- Temperature compensated bias

3. Applications

The pinkRF amplifier module p*RF*-10000915CXC01 can be used as an adjustment-free building block in any single or multi-channel system suitable for high power RF Energy applications like:

- Industrial Heating and drying
- Industrial Food processing
- Industrial Plasma processes

Application support

Driven by a signal generator module (e.g. pRF-SG4A_2450_SMA_DV), connected to a DC power supply, and supplied with cooling water flow, the module is ready to deliver RF power into an applicator (i.e. a "device" to contain and/or apply the RF energy).

The usage of the latest generation LDMOS solid state devices guarantees high efficiency, long lifetime, fully controllable and stable output power over temperature and a compact module outline. The build-in circulator protects the amplifier under high reflection conditions: it can withstand VSWR up to 4:1 continuously and up to 20:1 for short less than 100ms. The amplifier module will automatically shut down at excessive temperature and adverse power conditions.

Based on the analog sensing signals ($P_{forward}$, $P_{reflected}$) or digitally via I^2C, ($P_{forward}$, $P_{reflected}$, T_{final} and $T_{ambient}$), the external control logic (like that provided in pinkRF's small signal generators) can optimize the RF vector (frequency, power, phase, time) depending on the application needs in real time.

Functionality and Control
RF enable PA biasing enable (via GPIO pin and/or I^2C)
Temperature of final transistor (via I^2C)
Temperature of amplifier ambient (via I^2C)
Forward power (both analog output and via I^2C)
Reverse power (both analog output and via I^2C)

Absolute maximum ratings[1]	
Operating temperature final transistor	25 to 75 °C
Storage temperature (emptied water-cooling circuit)	-20 to 120 °C
Cooling water temperature	25 to 35 °C
Cooling water flow	≥ 4l per minute
RF input power (CW)	30 dBm
DC supply voltage	52V
GPIO and I^2C pin voltages	0 to 3.5V

Note (1): Permanent damage may occur is any of this limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.

4. Typical RF performance[2]

Note [(2)]: Test conditions CW RF Signals; 23°C water cooled heatsink; 32V supply

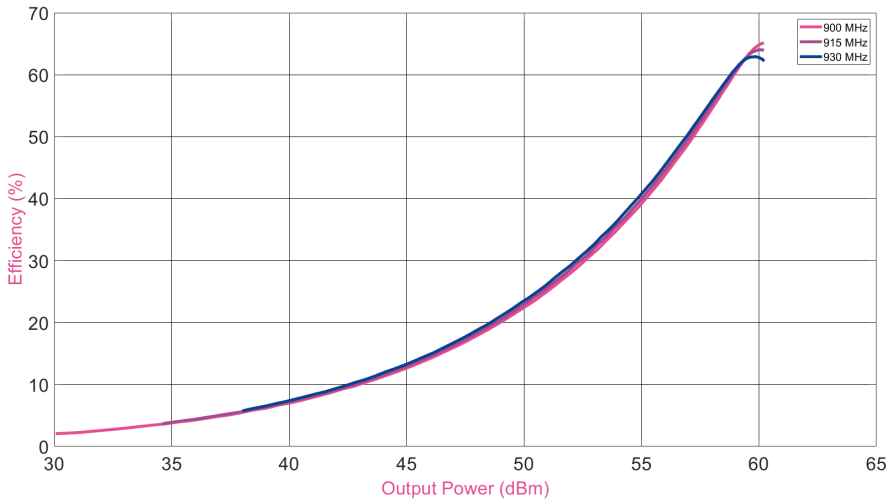


Figure 1: Test information (Efficiency vs Output Power)

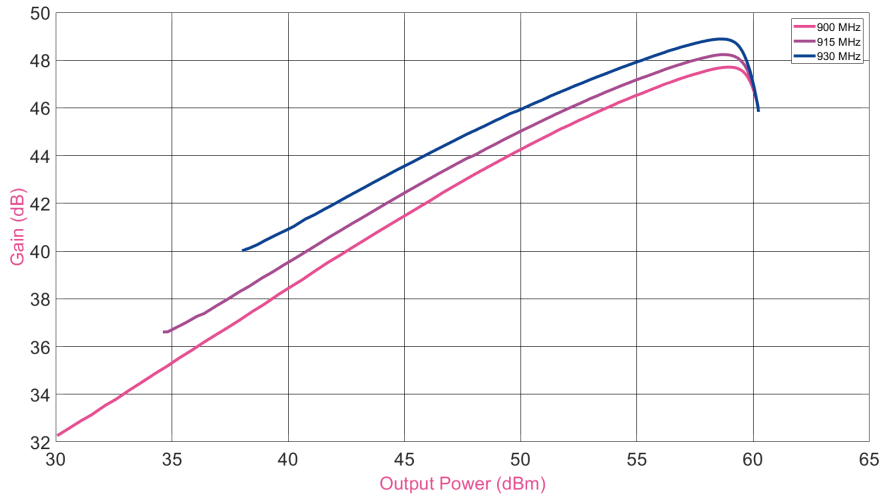


Figure 2: Test information (Gain vs Output Power)

5. Mechanical dimensions

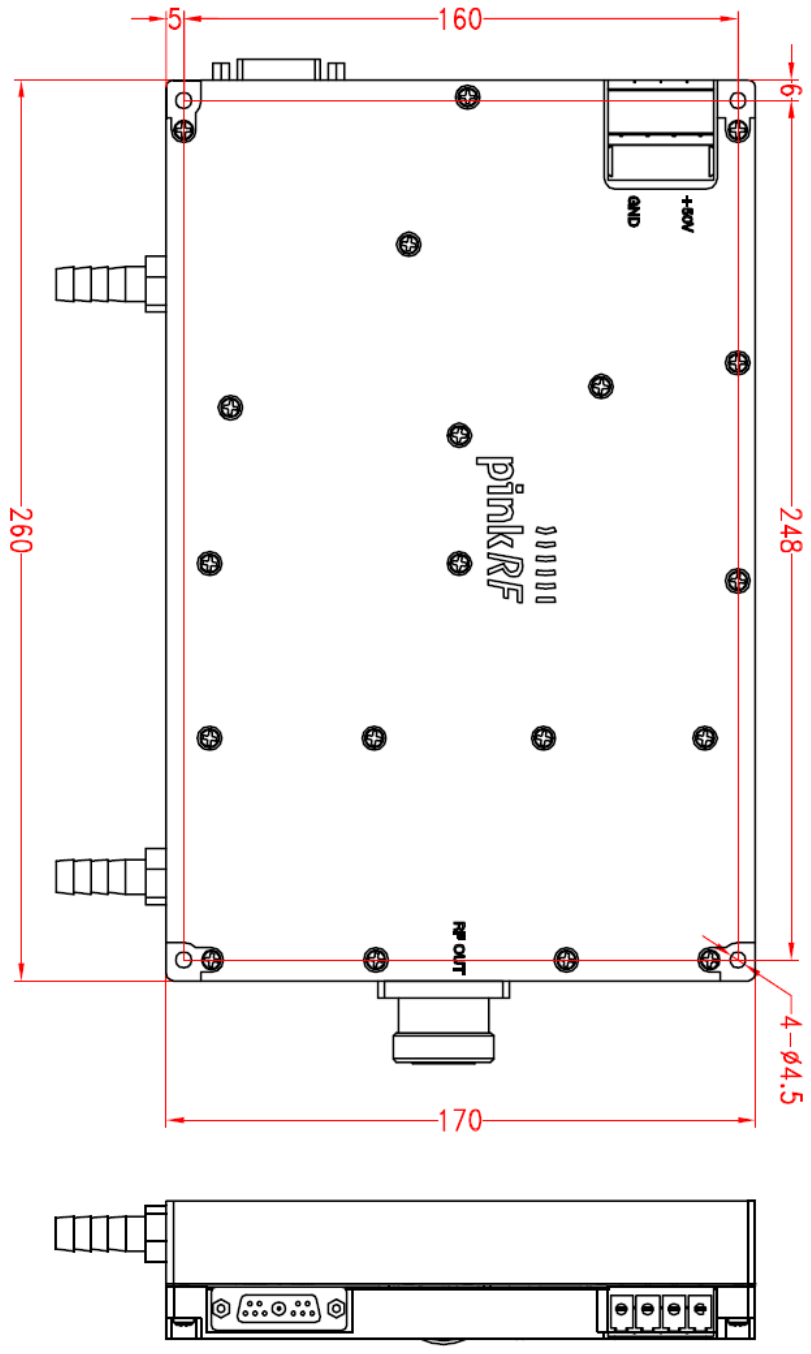
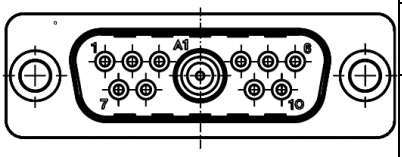
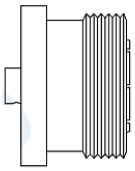


Figure 3: Mechanical dimensions p*RF*-10000915CXC01

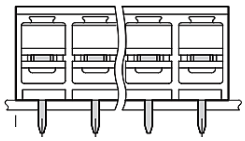
6. Interfaces



11W1 D-sub connector	
Pin A1 Coaxial female small signal RF input	Pin 5 I^2C SCL (no pullup provided)
Pin 1 $P_{forward}$ analog output (0.1 – 0.9V)	Pin 6 +5.7V DC supply output (1A max)
Pin 2 PA enable/disable GPIO input high: disable 3.3V, low: enable 0V, open: disable	Pin 7 $P_{reflected}$ power monitor output (0.1 – 1.0V)
Pins 3,8 Not Connected	Pin 9 I^2C SDA (no pullup provided)
Pins 4,10 Ground	



Output connector 7/16 DIN female



DC Input power connector	
1 V_{cc} +50 V_{dc} supply input	3 Ground
2 V_{cc} +50 V_{dc} supply input	4 Ground

Module pRF-10000915CXC01	
Dimensions (excluding connectors, mm)	260 x 170 x 40
Dimensions (including connectors, mm)	290 x 203 x 40
Weight (kg)	3.7 (including water)
Baseplate with 4 mounting holes (M4 screws)	
Watercooler in and out	10 mm tube connection
Shielded Aluminium casing	
ROHS compliant	

7. Disclaimer

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Contact Information

pink*RF* B.V.
Transistorweg 7D
6534 AT Nijmegen
The Netherlands

Contact us via
+31 85 040 9062
sales@pinkrf.com
www.pinkrf.com