



Trusted RF Solutions™

NuPower™ C20R01 C-Band Solid State Power Amplifier

20 Watts CW, 4.4 GHz - 4.9 GHz
2 Watts Linear, 4% EVM @ 33 dBm

P/N: NW-PA-C-20-R01

(Includes NW-PA-ACC-CB09MC interface cable)



The NuPower™ C20R01 is a small, highly efficient, solid state power amplifier that provides 20 watts of RF power to boost performance of data links and transmitters.

The NuPower C20R01 accepts a nominal 0 dBm (1 mW) RF input and provides 43 dB of gain from 4400 MHz to 4900 MHz for continuous wave (CW) and near-constant envelope waveforms.

Based on the latest gallium nitride (GaN) technology, the NuPower C20R01's 15% - 30% power efficiency and <math><10\text{ in}^3</math> form factor make it ideal for size, weight, and power-constrained broadband RF telemetry, tactical communication systems, and electronic warfare systems.

NuPower PAs feature over-voltage and reverse-voltage protection and can operate over a wide temperature range of -40 °C to +60 °C (baseplate).

Extend your operational communication range with NuPower™ amplifiers from NuWaves Engineering.

Features

- 20 Watts RF Output Power
- 4.4 GHz to 4.9 GHz
- Small Form Factor (4.50" x 3.50" x 0.61")
- High-Efficiency GaN Technology
- 0 dBm Nominal RF Input
- Over-Voltage Protection
- Reverse-Voltage Protection
- Logic On/Off Control

Benefits

- Extended Range
- Improved Link Margin
- Reduced load on DC power budget due to high efficiency operation
- Requires less volume on space-constrained platforms

Applications

- Unmanned Aircraft Systems (UAS), Group 2 & 3
- Unmanned Ground Vehicles (UGV)
- Broadband RF Telemetry
- RF Communication Systems
- Electronic Warfare - Airborne Electronic Attack
- Software Defined Radios

NuPower™ C20R01 Power Amplifier

Preliminary Specifications

Absolute Maximums

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	6	A
Max RF Input Power, $Z_L = 50 \Omega$	15	dBm
Max Operating Temperature (ambient)	55	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C

Export Classification

ECCN 5A991.G

Electrical Specifications @ 28VDC, 25 °C, $Z_S=Z_L=50 \Omega$

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	4.4		4.9	GHz	
RF Output Power	P_{SAT}	20			W	4.4 GHz - 4.9 GHz, 0 dBm input
Output Power @ 1dB Compression	P_{1dB}		33		dBm	4.4 GHz
			32			4.65 GHz
			30			4.9 GHz
Small Signal Gain	G		48		dB	4.4 GHz, @ -30 dBm input
			48			4.65 GHz, @ -30 dBm input
			45			4.9 GHz, @ -30 dBm input
Small Signal Gain Flatness	ΔG		5		dB	$P_{in} = -30$ dBm
Input VSWR	VSWR		2:1			
Nominal Input Drive Level	P_{IN}		0		dBm	
Operating Voltage	VDC	27	28	32	V	
Quiescent Current (RF Enable Off)	I_{DQ}		10		mA	
Quiescent Current (RF Enable On)	I_{DQ}		0.85		A	
Operating Current	I_{DD}		3.6		A	$P_{in} = 0$ dBm
Module Efficiency			25		%	
Switching Speed	$TX_{ON/OFF}$			2	μS	10% to 90%
Third Order Intercept Point (Two tone test at 1 MHz spacing, $P_{out} = 20$ dBm / tone)	OIP3		44		dBm	
Harmonics	2nd			-25	dBc	
	3rd			-25		
Output Mismatch (No Damage)				10:1		

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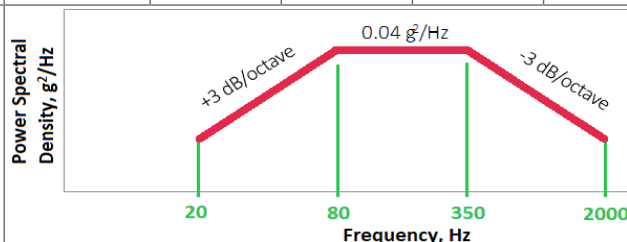
Preliminary Specifications (cont.)

Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	4.5 x 3.5 x 0.61	in	Max
Weight	9	oz	Max
RF Connectors, Input/Output	SMA Female		
Interface Connector	Micro-D, 9-pin Socket		
Cooling	Adequate Heatsink Required		

Environmental Specifications

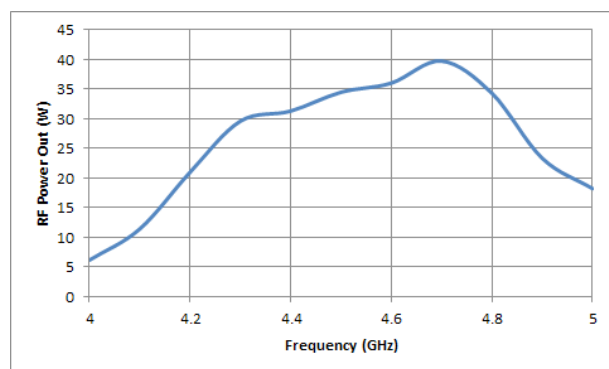
Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	T_A	-40		+55	°C
Operating Temperature (baseplate)	T_C	-40		+60	°C
Storage Temperature	T_{STG}	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration / Shock Profile (Random profile in x,y, z axis, as per Figure for 15 minute duration in each axis)					



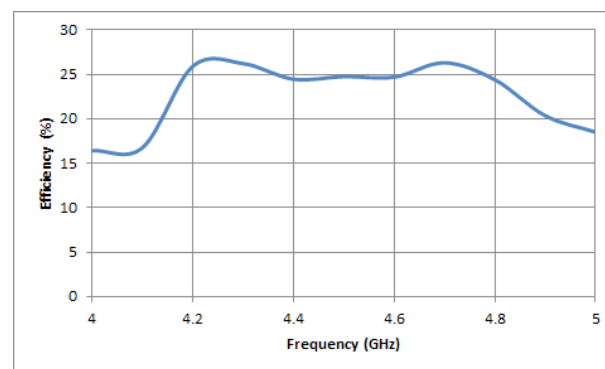
Performance Plots

Test Conditions: +28 VDC, +25 °C, $Z_s=Z_L=50 \Omega$, Pin=0 dBm

RF Power Out



Efficiency



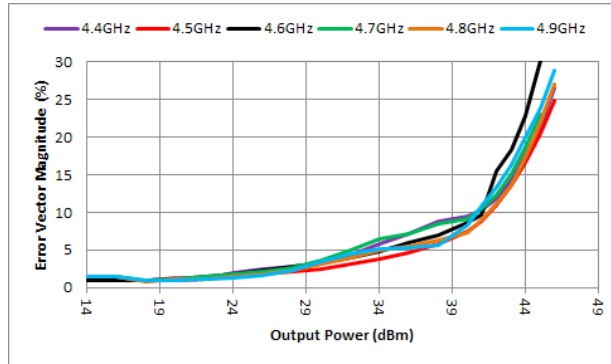
NuPower™ C20R01 Power Amplifier

Performance Plots (cont.)

Test Conditions: +28 VDC, +25 °C, $Z_S=Z_L=50 \Omega$

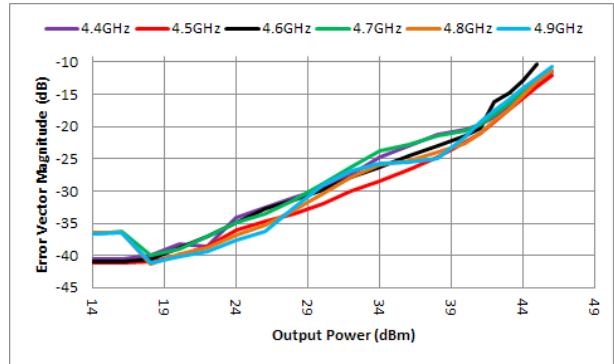
Error Vector Magnitude (%)

[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



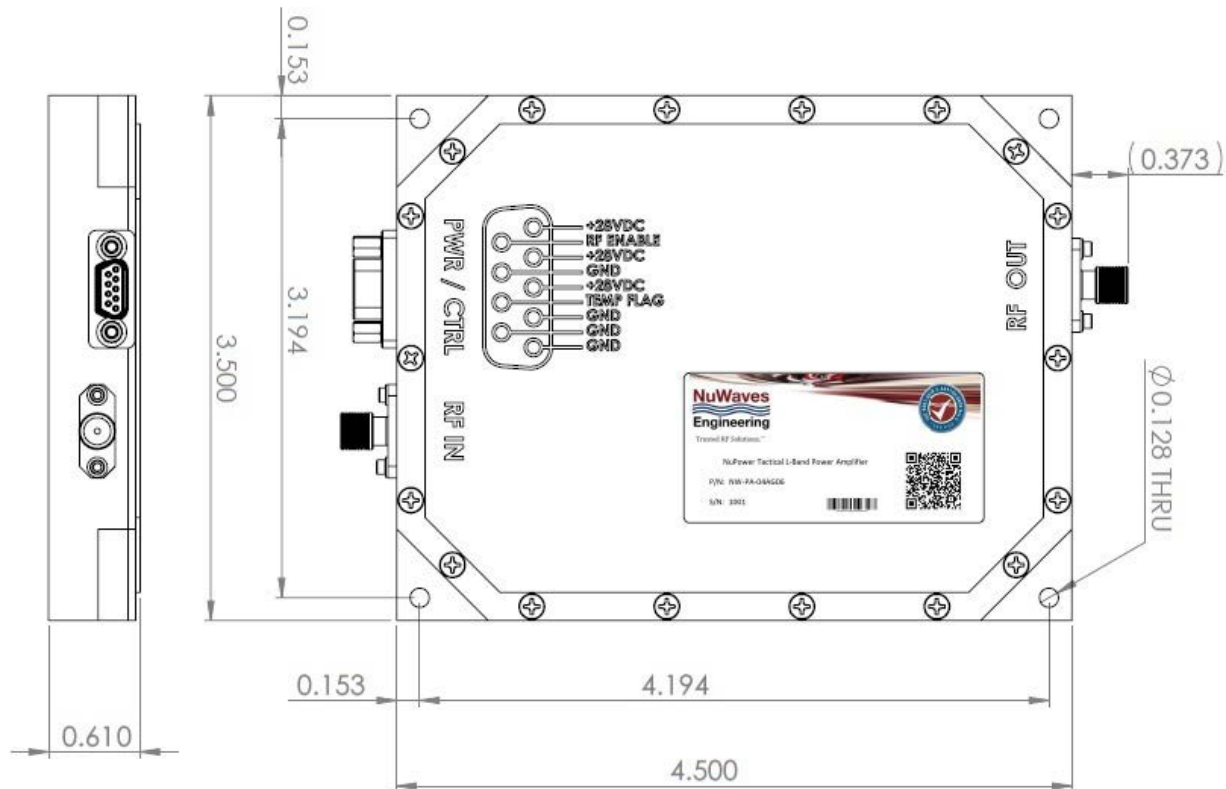
Error Vector Magnitude (dB)

[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



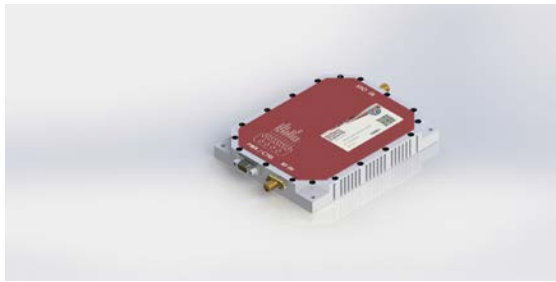
Mechanical Outline

PA Module

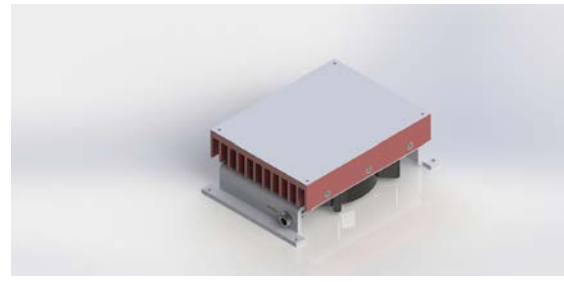


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PA Module and Accessory Images



PA Module



Optional Fan-Cooled Heatsink



PA Module w/ Fan-Cooled Heatsink

Accessory Part Numbers

Part Number	Description
NW-PA-ACC-CB09MC	Standard Interface Cable Assembly - Flying Leads (included with module)
NW-PA-ACC-CT09MC	Upgraded Interface Cable Assembly - Banana Plug Termination
NW-PA-ACC-KT03	Accessory Kit, which includes Fan-Cooled Heatsink and Upgraded Interface Cable
NW-PA-ACC-HS05	Heatsink with Integrated Fan

Pinout

Function	I/O	Pin
DC Power (+28 Volts)	I	3, 4, 5
Ground	I	1, 2, 6, 8
Over Temperature Flag 0V = temperature fault +5V = no fault	O	7
RF Enable 0V or GND = RF ON +5V or NC = RF OFF	I	9

For information on product disposal (end-of-life), please refer to this document:
<https://nuwaves.com/wp-content/uploads/Product-Disposal-End-of-Life.pdf>

Contact NuWaves



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