

# NuWaves

## RF Solutions

## NuPower™ C10R01 C-Band Solid State Power Amplifier

18 Watts CW  
5100 MHz - 5900 MHz

P/N: NW-PA-C-10-R01 (Standard/3.3V Logic)  
P/N: NW-PA-C-10-R01-5V (5V Logic)



**The NuPower™ C10R01 is a small, highly efficient, solid state power amplifier (SSPA) that typically provides 18 watts of RF power across the 5100 to 5900 MHz frequency range, boosting performance of data links and transmitters.**

The NuPower C10R01 accepts a nominal 0 dBm RF input and typically provides 42 dB of gain from 5100 to 5900 MHz for continuous wave (CW) and near-constant envelope waveforms.

Based on the latest gallium nitride (GaN) technology, the NuPower C10R01's power efficiency and 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 protection and can operate over a wide temperature range of -40 °C to +85 °C (baseplate).

**Extend your operational communication range with NuPower™ amplifiers from NuWaves RF Solutions.**

### Features

- 18 Watts RF Output Power (typ)
- 5100 to 5900 MHz
- Small Form Factor (3.57" x 2.57" x 0.50")
- High Efficiency GaN Technology
- 0 dBm Nominal RF Input
- 42 dB of Transmit Gain (typ)
- Over-Voltage Protection
- 3.3 V Logic Control (C10R01)
- 5V Logic Control (C10R01-5V)

### Benefits

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

### Applications

- Unmanned Aircraft Systems (UAS), Group 2 through Group 5
- Unmanned Ground Vehicles (UGV)
- RF Telemetry & Communications Systems
- Air Launch Effect (ALE)
- Common Launch Tube (CLT)
- Counter UAS Detection & Mitigation
- MIMO/SISO/MANET Radio Range Extension

# NuPower™ C10R01 Power Amplifier

## Specifications

### Absolute Maximums

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current @ 28 VDC	3	A
Max RF Input Power, CW, $Z_L = 50 \Omega$	+12	dBm
Max Operating Temperature (ambient)	60	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	100	°C

Export Classification
EAR99

### Electrical Specifications @ 28 VDC, 25 °C, $Z_S=Z_L=50 \Omega$ , CW, 0 dBm Input Power (unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	5100		5900	MHz	
RF Output Power	$P_{SAT}$	8	18		W	
Output Power @ 1 dB/3dB Compression	$P_{1dB/P3dB}$		25/35		dBm	5100 MHz
			30/40			5500 MHz
			25/37			5900MHz
Small Signal Gain	G		48		dB	5100 MHz, @ -30 dBm input
			50			5500 MHz, @ -30 dBm input
			51			5900 MHz, @ -30 dBm input
Small Signal Gain Flatness	$\Delta G$		$\pm 1.7$		dB	5.1-5.9 GHz; $P_{in} = -30$ dBm
Power Gain Flatness	$\Delta G$		$\pm 1.1$			5.1-5.9 GHz
Input VSWR	VSWR		1:9:1			
Nominal Input Drive Level	$P_{IN}$		0		dBm	
Operating Voltage	VDC	27	28	32	V	
Quiescent Current (RF Enable Off)	$I_{DQ}$		60		mA	
Quiescent Current (RF Enable On)	$I_{DQ}$		360		mA	
Operating Current	$I_{DD}$		2.1		A	
Module Efficiency			32		%	
Switching Speed	$TX_{ON/OFF}$		0.4	2	$\mu S$	10% to 90%
Third Order Order Intercept Point (Two tone test at 1 MHz spacing, $P_{out} = 20$ dBm / tone)	OIP3		38		dBm	5100 MHz
			38			5500 MHz
			39			5900 MHz
Harmonics	2nd		-43		dBc	
	3rd		-46		dBc	
Output Mismatch (No Damage)	VSWR			10:1	$\Psi$	No damage at all phase angles

# NuPower™ C10R01 Power Amplifier

## Specifications (cont.)

### Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	3.57 x 2.57 x 0.50	in	Max
Weight	4.0	oz	
RF Connectors, Input/Output	SMA Female, right angle		
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		+60	°C
Operating Temperature (baseplate)	$T_C$	-40		+85	°C
Storage Temperature	$T_{STG}$	-60		+100	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft

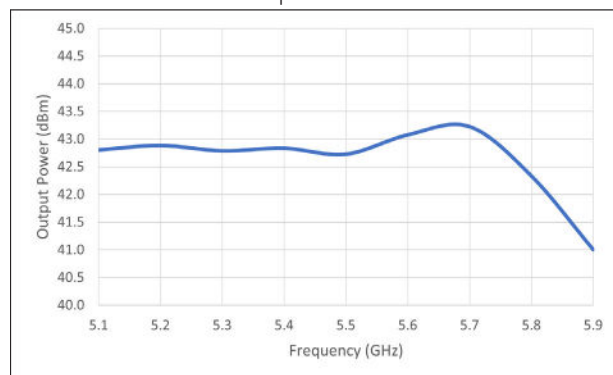
  

<p>Vibration Profile (Random profile in x,y, z axis, as per Figure for 15 minute duration in each axis)</p>	<p>Power Spectral Density, <math>g^2/Hz</math></p> <p>Frequency, Hz</p> <p>0.04 <math>g^2/Hz</math></p> <p>+3 dB/octave</p> <p>-3 dB/octave</p> <p>20 80 350 2000</p>
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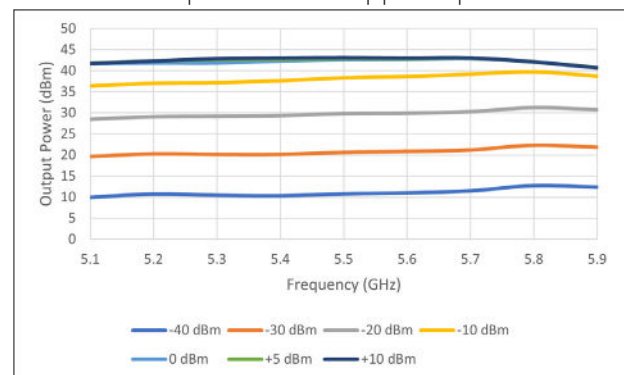
## Performance Plots

Test Conditions: +28 VDC, +25 °C,  $Z_S=Z_L=50 \Omega$ , CW, 0 dBm Input Power (unless otherwise stated)

Output Power



Output Power - Stepped Input

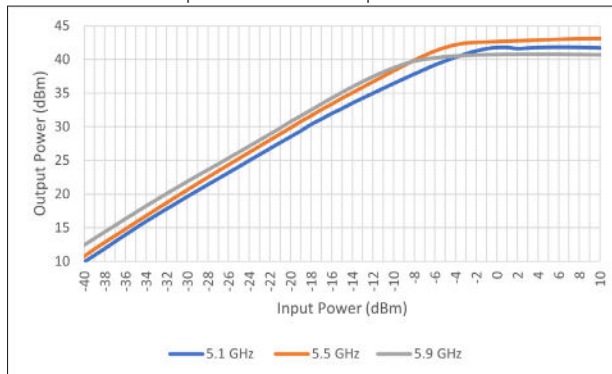


# NuPower™ C10R01 Power Amplifier

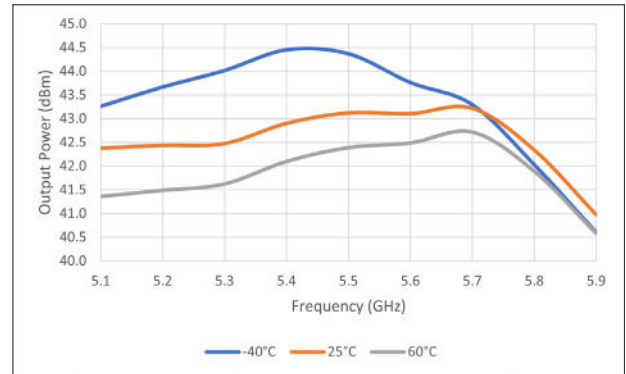
## Performance Plots (cont.)

Test Conditions: +28 VDC, +25 °C,  $Z_S=Z_L=50\ \Omega$ , CW, 0 dBm Input Power (unless otherwise stated)

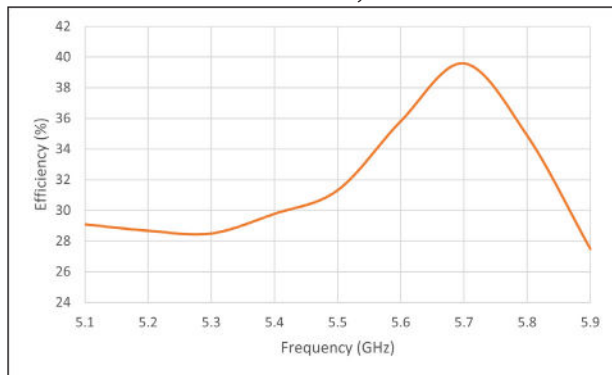
Output Power vs Input Power



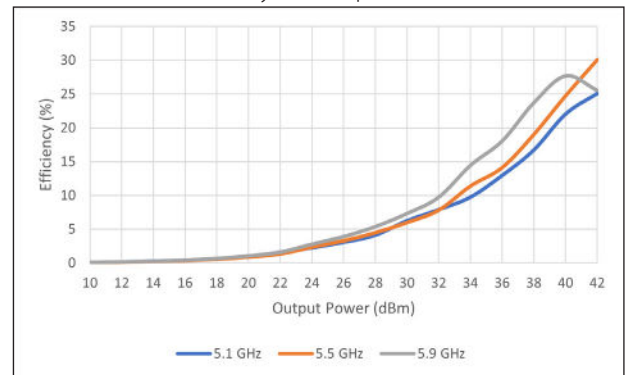
Output Power vs Temperature



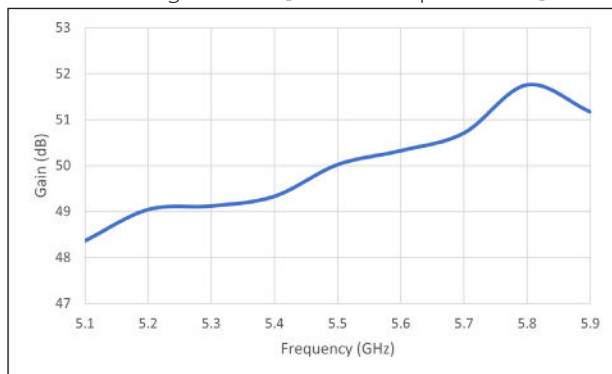
Efficiency



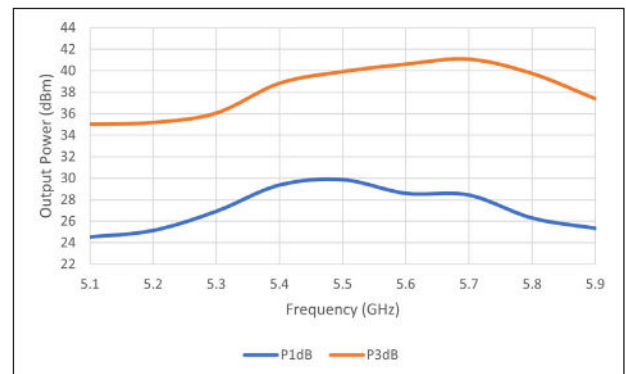
Efficiency vs Output Power



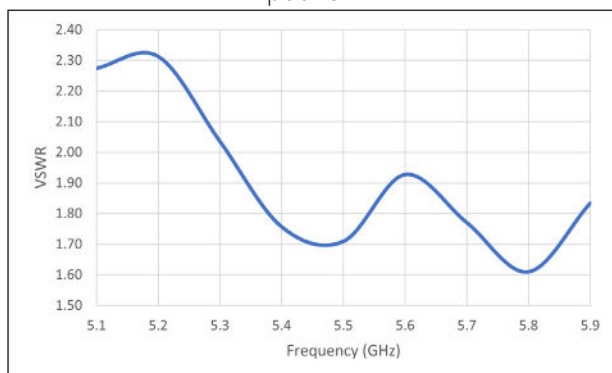
Small Signal Gain [-30 dBm Input Power]



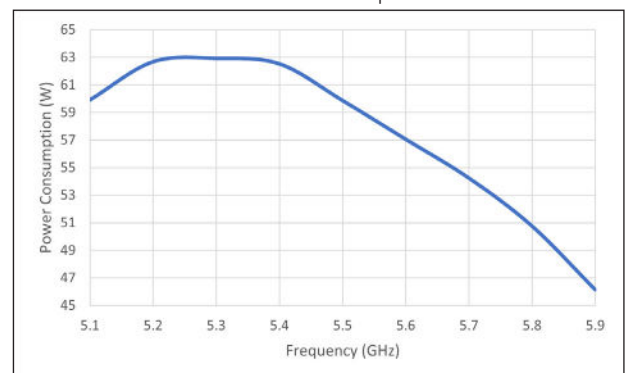
P1dB / P3dB



Input VSWR

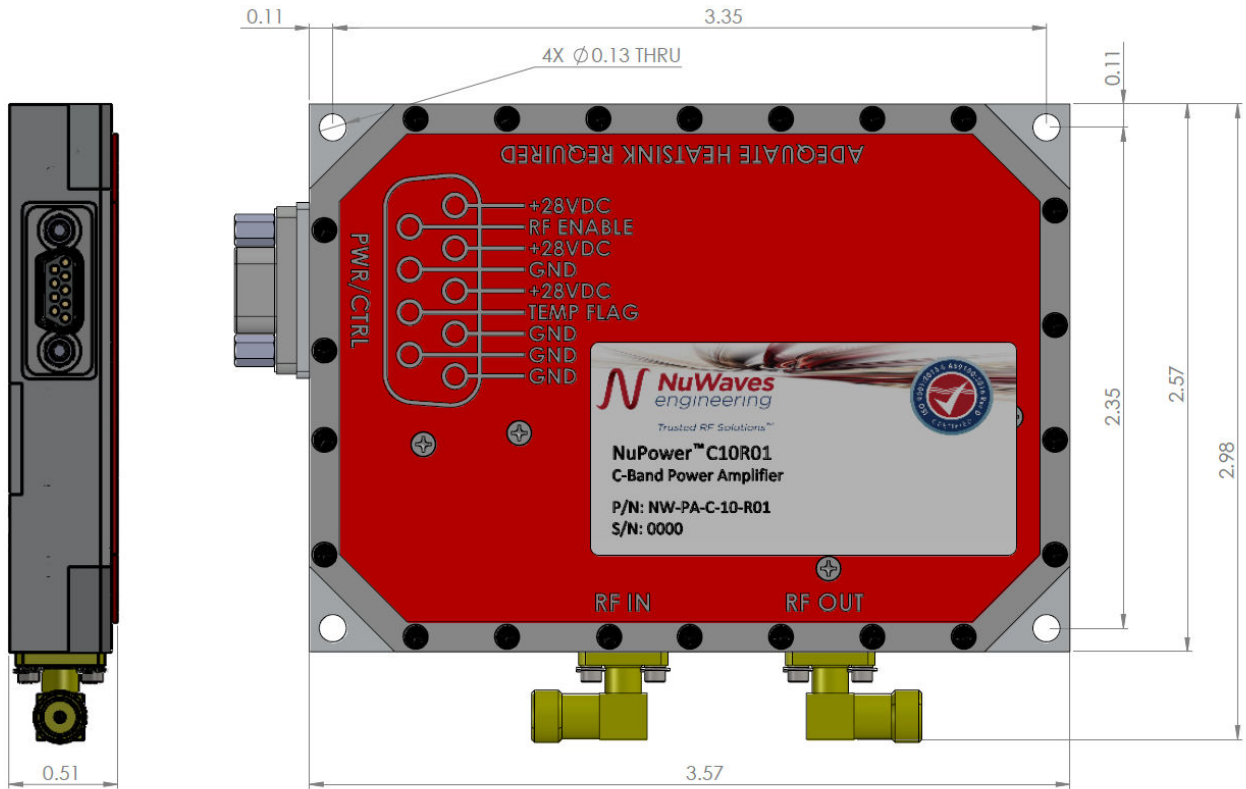


Power Consumption



# NuPower™ C10R01 Power Amplifier

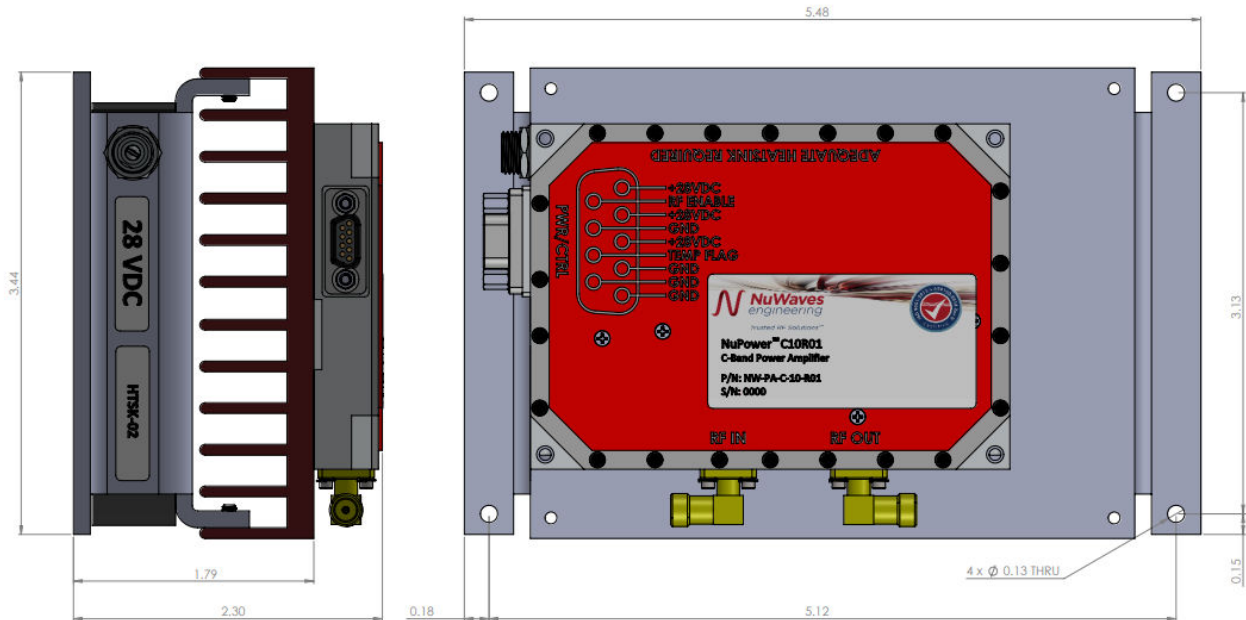
## Mechanical Outline



# NuPower™ C10R01 Power Amplifier

## Optional Heatsink

Heatsink & Integrated Fan: HTSK-02



## Accessory Part Numbers - Sold Separately

Part Number	Description
NW-PA-ACC-CB09MC	Standard Interface Cable Assembly - Flying Leads
NW-PA-ACC-CT09MC	Upgraded Interface Cable Assembly - Banana Plug Termination
HTSK-02	Fan-Cooled Heatsink with Integrated Fan

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>

## Pinout

Function	I/O	Pin	Logic Voltage
DC Power (+28 Volts)	I	3, 4, 5	-
Ground	I	1, 2, 6, 8	-
Over Temperature Flag 0 Volts = Temperature Fault +3.3 <sup>1</sup> Volts = No Fault	O	7	3.3V Logic (C10R01 Only): -0.5V to +0.99V = Logic Low +2.31V to +3.8V = Logic High  5V Logic (C10R01-5V Only): -0.5V to +1.5V = Logic Low +3.5V to +5.5V = Logic High
RF Enable <sup>1,2</sup> 0V or GND = RF On NC = RF Off	I	9	3.3V Logic (C10R01 Only): 0V to +0.8V = Logic Low +2V to +3.3V = Logic High <sup>3</sup>  5V Logic (C10R01-5V Only): 0V to +1.5V = Logic Low 3.5V to +5V = Logic High <sup>3</sup>

<sup>1</sup> Default configuration for Pin 7 and Pin 9 = 3.3V logic

For 5V logic, please order P/N NW-PA-C-10-R01-5V

<sup>2</sup> For Inverted / Active High Logic, please order p/n NW-PA-C-10-R01-AH

[0V or GND = RF Off, NC = RF On]

<sup>3</sup> RF Enable is pulled high internally and does not require user to apply voltage to this line

## Contact NuWaves



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