NuWaves engineering

*Trusted RF Solutions™*

# NuPower™ C30R01

## C-Band Solid State Power Amplifier

30 Watts CW, 5.03 GHz - 5.09 GHz
5% EVM @ 45 dBm

P/N: NW-PA-C-30-R01

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

**The NuPower™ C30R01 is a small, highly efficient, solid state power amplifier that provides 30 watts of RF power to boost performance of data links and transmitters.**

The NuPower C30R01 accepts a nominal 0 dBm (1 mW) RF input and provides 45 dB of gain from 5.03 GHz - 5.09 GHz for continuous wave (CW) and near-constant envelope waveforms.

Based on the latest gallium nitride (GaN) technology, the NuPower C30R01's 30% power efficiency and <10 $in^3$ 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 +85 °C (baseplate).

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

## Features

- 30 Watts RF Output Power
- 5.03 GHz - 5.09 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

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# NuPower™ C30R01 Power Amplifier

## Preliminary Specifications

### Absolute Maximums

| Parameter | Rating | Unit |
|---|---|---|
| Max Device Voltage | 32 | V |
| Max Device Current | 5 | A |
| Max RF Input Power, $Z_L = 50\ \Omega$ | 15 | dBm |
| Max Operating Temperature (ambient) | 55 | ℃ |
| Max Operating Temperature (baseplate) | 85 | ℃ |
| Max Storage Temperature | 85 | ℃ |

| Export Classification |
|---|
| ECCN 5A991.G |

### Electrical Specifications @ 28 VDC, 25 ℃, $Z_S$=$Z_L$=50 Ω

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| Operating Frequency | BW | 5.03 | | 5.09 | GHz | |
| RF Output Power | $P_{SAT}$ | 30 | 35 | | W | 5.03 GHz - 5.09 GHz, 0 dBm input |
| Output Power @ P3dB Compression | P3dB | | 40 | | dBm | 5.03 GHz |
| | | | 41 | | | 5.06 GHz |
| | | | 42 | | | 5.09 GHz |
| Small Signal Gain | G | | 54 | | dB | 5.03 GHz, @ -30 dBm input |
| | | | 53 | | | 5.06 GHz, @ -30 dBm input |
| | | | 52 | | | 5.09 GHz, @ -30 dBm input |
| Small Signal Gain Flatness | ΔG | | 2 | | dB | Pin = -30 dBm |
| Input VSWR | VSWR | | 2.3:1 | | | |
| 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 | $I_{DD}$ | | 4.1 | | A | Pin = 0 dBm |
| Module Efficiency | | | 30 | | % | |
| Switching Speed | $TX_{ON/OFF}$ | | | 2 | µS | 10% to 90% |
| Third Order Order Intercept Point (Two tone test at 1 MHz spacing, Pout = 20 dBm / tone) | OIP3 | | 40 | | dBm | |
| Harmonics | 2nd | | -70 | | dBc | |
| | 3rd | | -70 | | | |
| Output Mismatch (No Damage) | | | | 10:1 | Ψ | No damage at all angles |

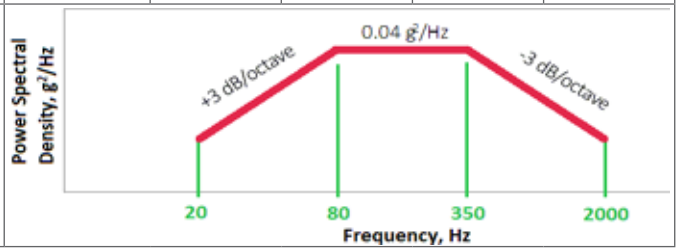
# NuPower™ C30R01 Power Amplifier

## 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 | | |

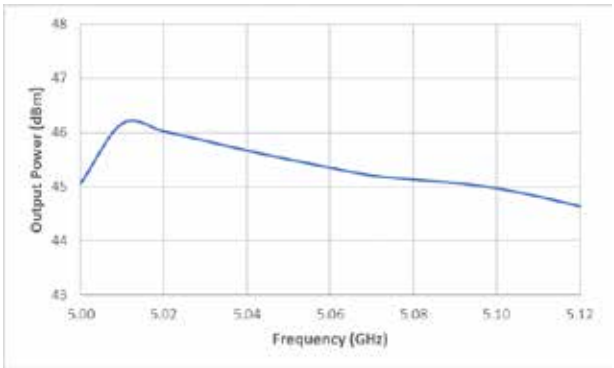
### Environmental Specifications

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

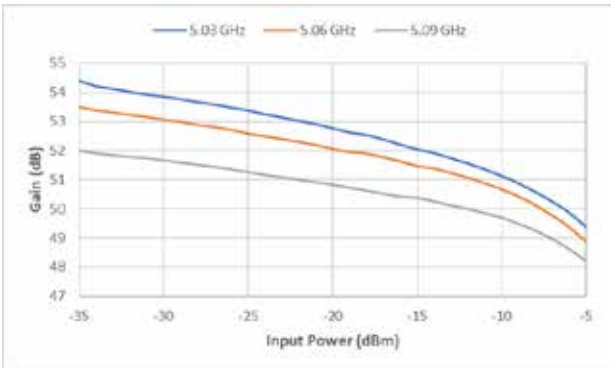
## Performance Plots

Test Conditions: +28 VDC, +25 ℃, $Z_S$=$Z_L$=50 Ω, Pin=0 dBm

Output Power vs. Frequency



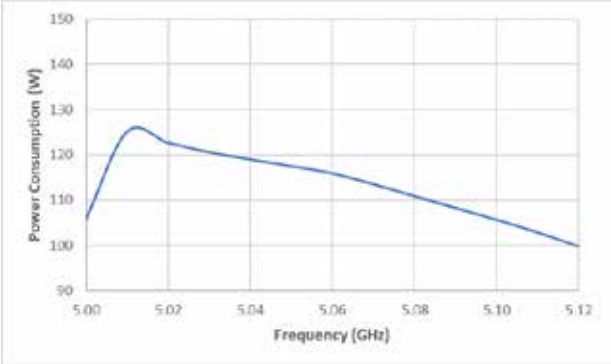

Gain vs. Input Power



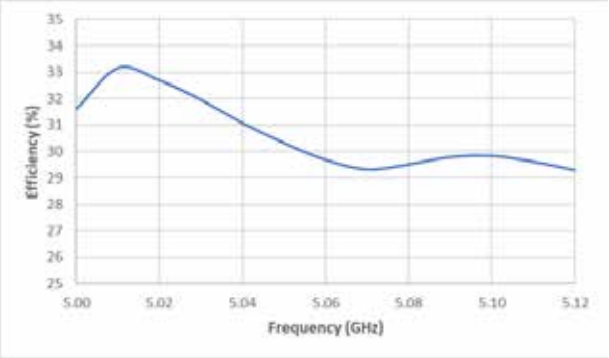
## Performance Plots (cont.)

Test Conditions: +28 VDC, +25 °C, $Z_S$=$Z_L$=50 Ω, Pin=0 dBm

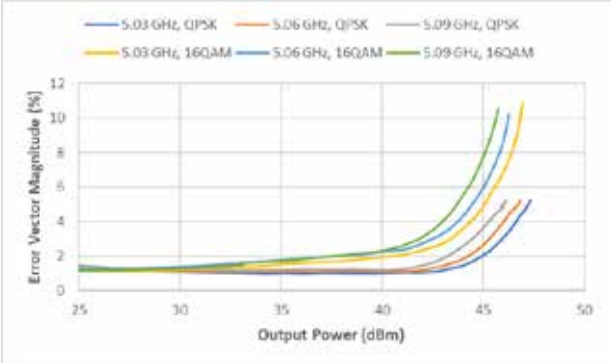
Power Consumption vs. Frequency



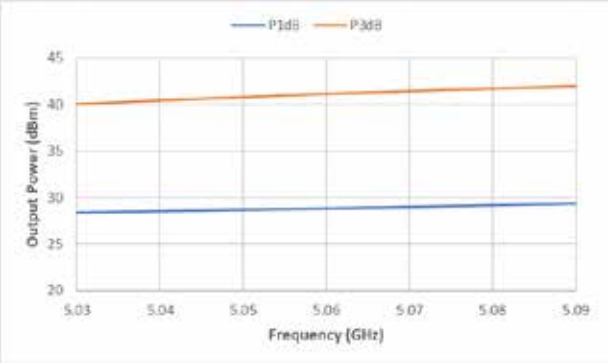

Efficiency vs. Frequency



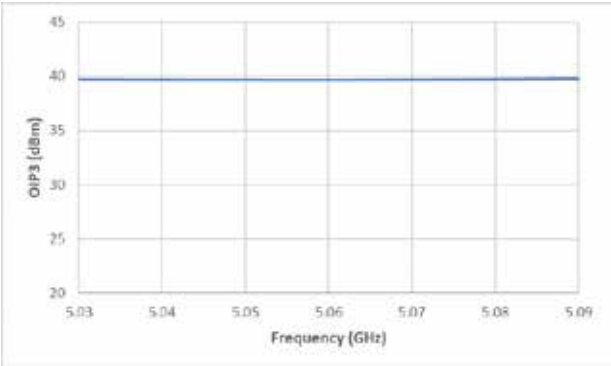

EVM (%) vs. Output Power



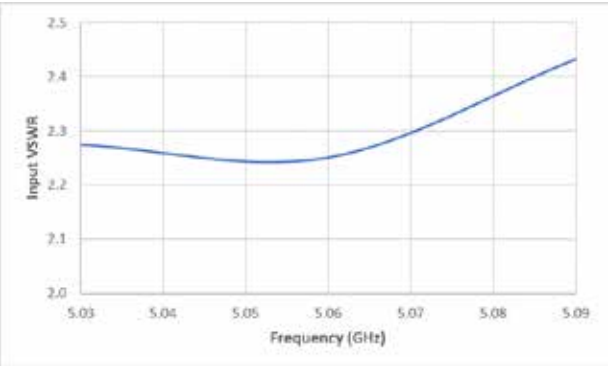

P1dB & P3dB vs. Frequency




OIP3 vs. Frequency



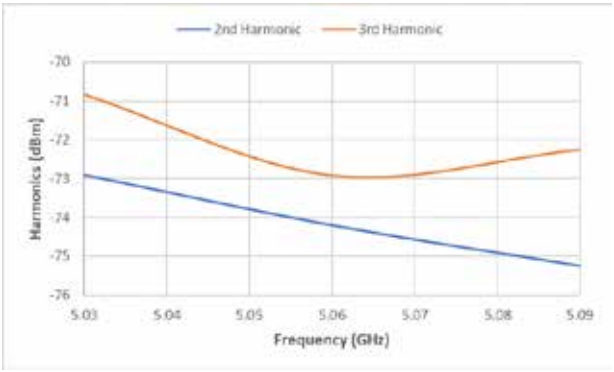

Input VSWR vs. Frequency



## Performance Plots (cont.)

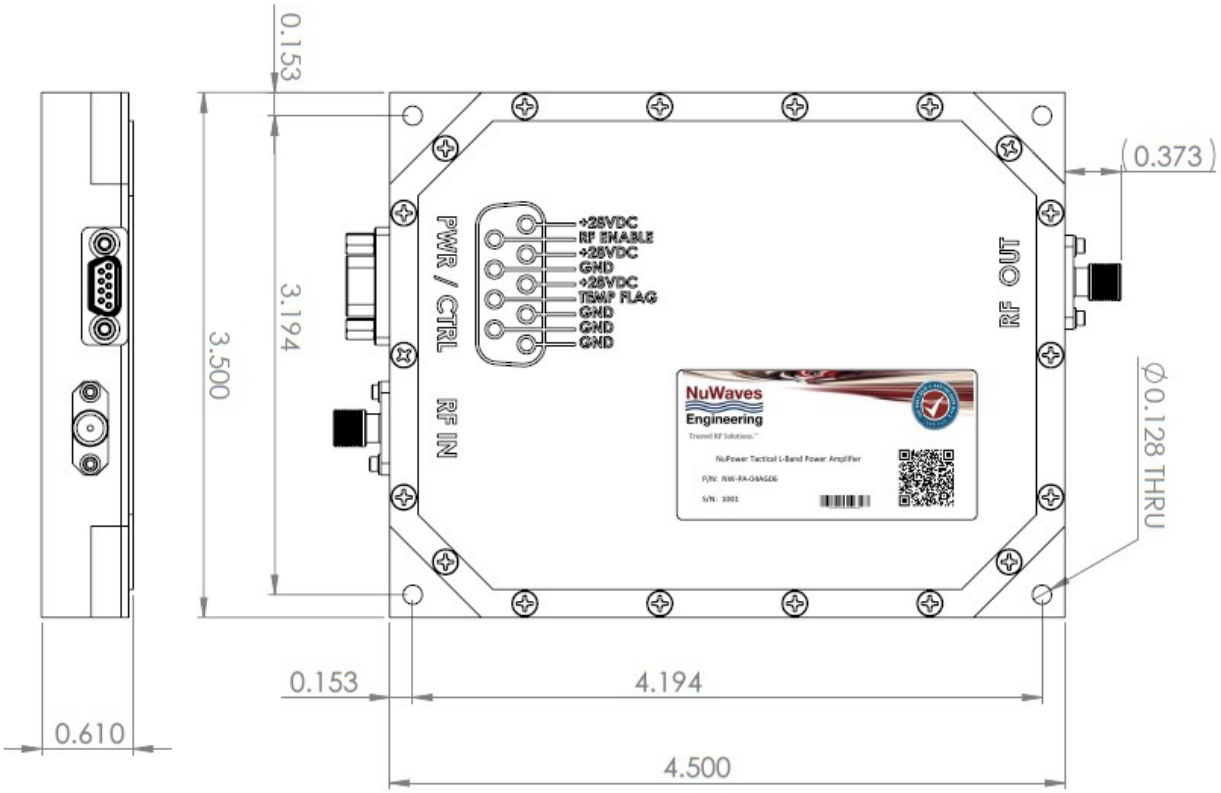
Test Conditions: +28 VDC, +25 °C, $Z_S$=$Z_L$=50 Ω, Pin=0 dBm

2nd & 3rd Harmonic vs. Frequency



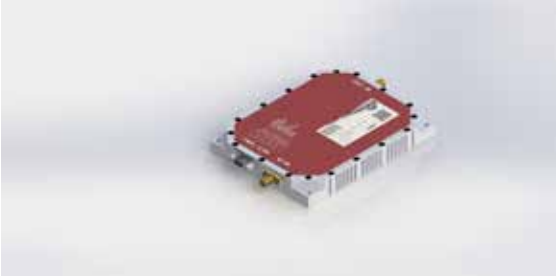

## Mechanical Outline

PA Module

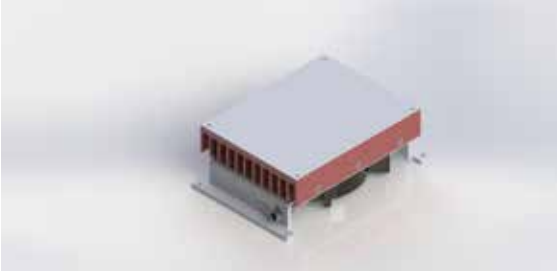


# NuPower™ C30R01 Power Amplifier

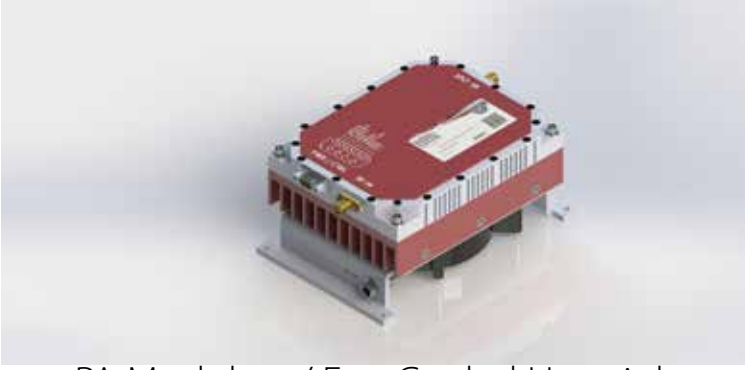
## PA Module and Accessory Images



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<br>0V = temperature fault<br>+5V = no fault | O | 7 |
| RF Enable<br>0 V or GND = RF ON<br>+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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