NuWaves
RF Solutions

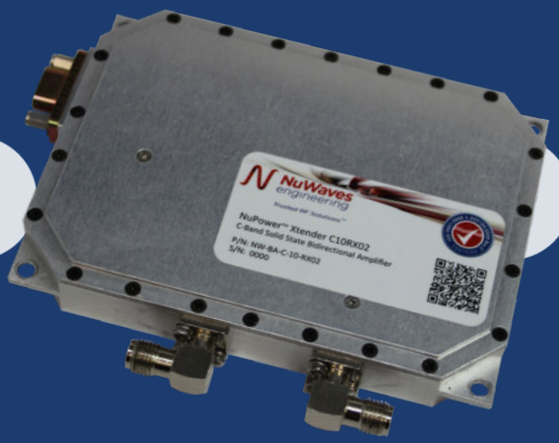
# RF Power Amplifiers (PA) & Bidirectional Amplifiers (BDA) for Counter UAS

Custom Solutions for Detection, Identification, and Mitigation

COUNTER UAS
DETECT
IDENTIFY
MITIGATE

# At a Glance

- Increase UAV Detection Range
- Extend C-UAS RF Mitigation Range
- Cover Frequencies from UHF to C-Band
- Custom Developed Solutions to Fit Your Current Needs
- Signal Jamming
- In-house Contract Manufacturing
- AS9100 Certified Quality Management System
- Counter UAS R&D and Testing




NuWaves RF Solutions is committed to amplifying RF Mitigation and RF Detection Counter UAS technologies because we are dedicated to supporting the warfighters and officers in harm's way.

New enemies and threats are constantly evolving to meet the warfighter on the battlefield and the Customs and Border Protection (CBP) officer on the perimeter. NuWaves is committed to enhancing the protection of these individuals in the ever-evolving Counter UAS sector by assisting OEMs and the DoD/DHS to extend RF mitigation and detection ranges.

The modern battlefield and homeland security atmosphere have changed significantly with the availability of commercial drones. Enemy organizations are using drones to give them an edge against the U.S. Warfighters and U.S. law enforcement. Drones are now used for a wide range of applications including battlefield reconnaissance, identification of smuggling routes, prison contraband, and these uses continue to evolve. Recently, they have even turned into flying IED's. The need for increasing innovative technology to combat the enemy has been met by NuWaves power amplifiers and bidirectional amplifiers. With NuWaves' technology, UAS companies are able to operate and attack threats at further distances than ever before.

Border Patrol

Battlefield Reconnaisannce

Enemy Drone Swarms

**Our technologies are actively helping to protect, mitigate, and detect against:**

- Battlefield Reconnaissance
- FOB Defense
- UAVIED'S (Unmanned Aerial Vehicle Improvised Explosive Devices)
- Enemy Drone Swarms
- Critical Infrastructure
  Oil Rigs, Nuclear Power Plants, Oil Rigs, Communications Systems, etc.
- Enhanced Detection Range of Drug Smuggling UAV's at the Border
- Prison Contraband
- Human Trafficking
- Airport and Venue Security
- Border Security
- Vehicle Mounted Systems

# Enhance your system's capabilities and stop UAV bad actors in their tracks.

**Top 3 Use Cases for NuWaves' Innovative GaN Technology:**

- RF mitigation through increased RF signal range extension
- UAV detection range extenstion
- Signal jamming

***Bidirectional Amplifiers (BDA) offer all in one solution for Counter UAS. Transmit enables C-UAS Mitigation, while Receive can assist in identification and detection. NuWaves' BDAs are available in both half and full duplex.***

## NuPower™ 11B02A-TAC RF Power Amplifier

**Frequency:** 200 MHz to 2.6 GHz

**Size:** 2.34" X 1.96" x 0.62"

**TX Gain:** 40 dB

**TX Output:** 10 W (Psat)

## NuPower™ 13G05A RF Power Amplifier

**Frequency:** 800 MHz to 2.0 GHz

**Size:** 4.50" x 3.50" x 0.61"

**TX Gain:** 47 dB

**TX Output:** 50 W (Psat)

## NuPower Xtender™ ULSC-20-C01-S01 RF Bidirectional Amplifier

**Frequency:** 500 MHz to 6.0 GHz

**Size:** 3.00" x 2.00" x 1.16"

**TX Gain:** 13 dB

**TX Output:** 20 W (Psat)

## NuPower™ S100A01 RF Power Amplifier

**Frequency:** 2.0 GHz to 2.5 GHz

**Size:** 3.57" x 2.57" x 0.50"

**TX Gain:** 21 dB

**TX Output:** 125 W (Psat)

## NuPower Xtender™ C10RX03 RF Bidirectional Amplifier

**Frequency:** 4.4 GHz to 5.5 GHz

**Size:** 3.57" x 2.57" x 0.50"

**TX Gain:** 10 dB

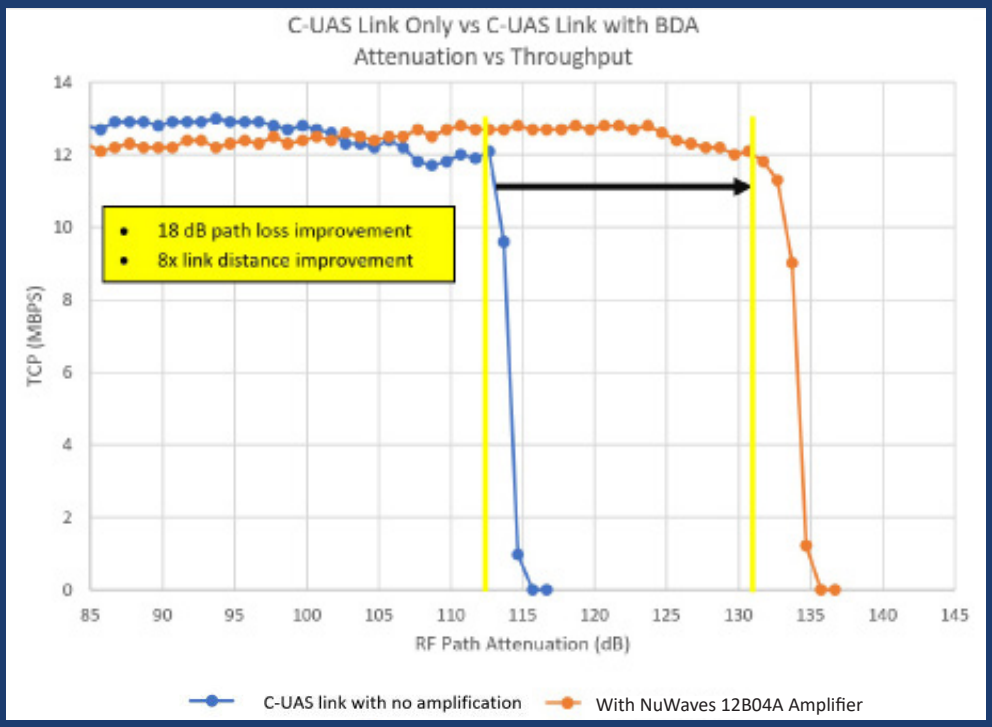
**TX Output:** 10 W (Psat)

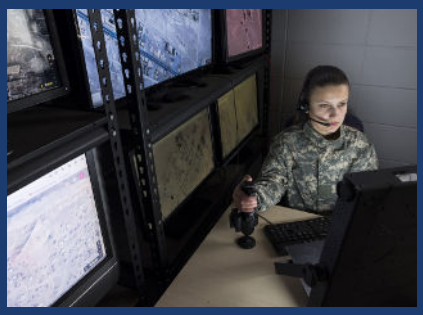
## Custom Power Amplifier Design

- Provide your concept (parameters, specs, etc.)
- Let our engineers create a custom design
- In-house MIL-STD testing, including environmental testing
- Quick-turn, in-house manufacturing and production

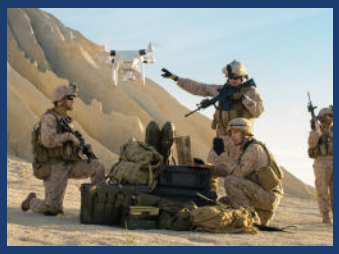
Performance measurements are provided in the following graphs to summarize the link margin improvements using the NuWaves NW-BA-12B04A-D27 BDAs. The RF path attenuator value as indicated on the horizontal axis of the graphs represents path loss and can be used to determine link distance. NuWaves chose to represent the link distance in terms of path loss since the overall link distance will vary on other system parameters such as antenna gain, fade margin, etc and these parameters will vary from system to system.

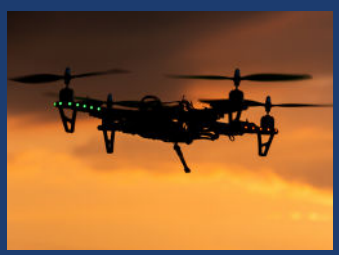
**Counter UAS Link with no Amplification Settings: 10 MHz BW**



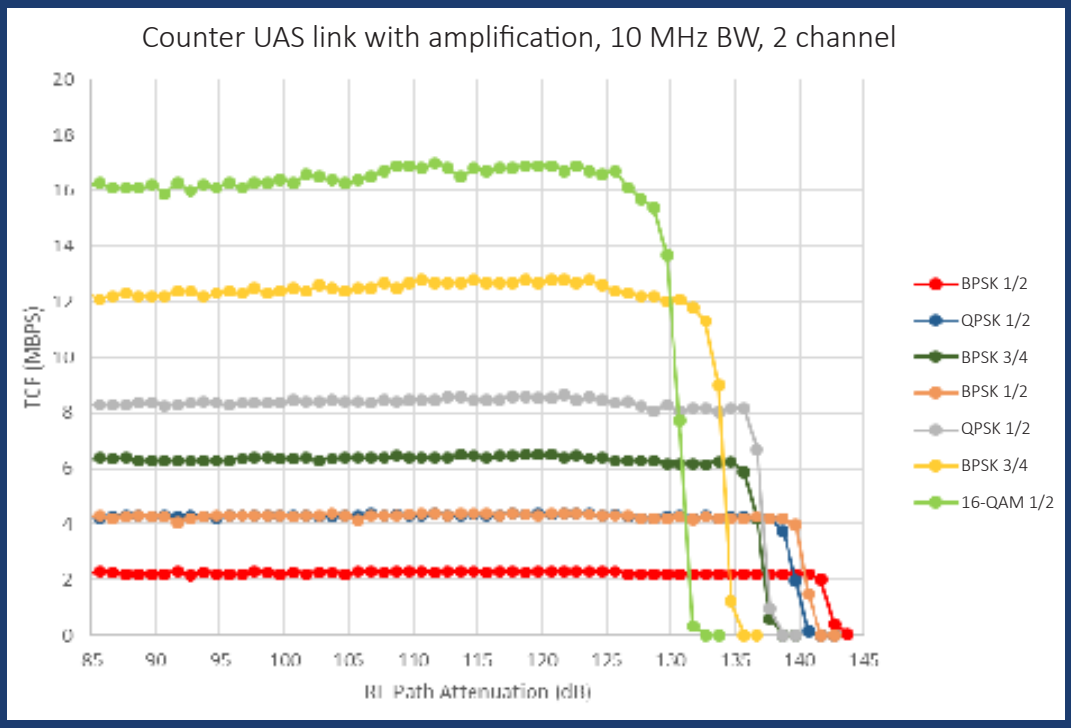



**NuWaves helps clients achieve range extension by improving the link distance by up to 8-10X.**





**Counter UAS link with amplification: 10 MHz BW, Modulation comparison**

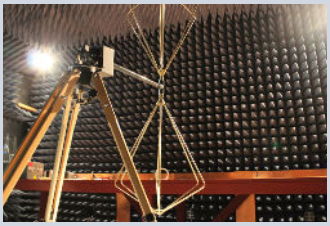


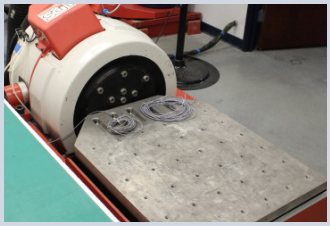
# Commitment to Our Military and Our Customers

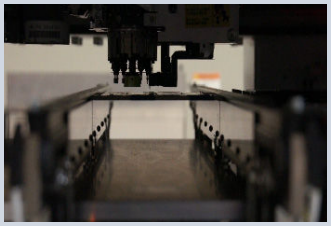
NuWaves RF Solutions endeavors to provide one of-a-kind technical solutions for the U.S. Military—including high-technology products and engineering services—and to achieve unsurpassed EXCELLENCE in client satisfaction.

*NUWAVES IS KNOWN THROUGHOUT THE INDUSTRY FOR **HIGH-PERFORMANCE MINIATURE DESIGNS, QUICK-TEMPO** AND **COST-EFFECTIVE SOLUTIONS**, MEETING THE MOST DEMANDING CUSTOMER REQUIREMENTS.*

A veteran-owned small business (VOSB) founded in 2000, NuWaves RF Solutions is a premier supplier of Radio Frequency (RF) and Microwave solutions for military, government, industrial, and commercial customers. NuWaves provides quick-tempo design and engineering services that address the most demanding customer requirements, especially with regard to hardware size, weight and power (SWaP) optimization, cost and – oftentimes equally important – schedule. NuWaves also offers a broad catalog of high-performance commercial off-the-shelf (COTS) RF products, many of which have been derived from custom developments.







Through our concept to production capability, NuWaves is uniquely positioned to provide a quick-turn solution to your system's needs. Our skilled engineering team provides insight during the stages of design and development. In addition, NuWaves has an in-house anechoic chamber, vibration/shock table, and temperature and humidity chambers to test a wide range of EMI/EMC and environmental conditions for military applications.

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