NuWaves
RF Solutions

# NuPower Xtender™ U-20-C01
# 900 MHz ISM Bidirectional Amplifier

20 Watt CW
800 MHz to 1000 MHz

P/N: NW-BA-U-20-C01-S01

(includes NW-BA-ACC-CB09MA Standard Interface Cable Assembly)

**The NuPower Xtender™ U-20-C01 is a small, lightweight, and power-efficient bidirectional amplifier ideal for extending the communication range of half-duplex UHF transceivers running constant-envelope or near-constant-envelope waveforms. The bidirectional amplifier generates 20 Watts of RF power from 800 to 1000 MHz in transmit mode and the integrated low-noise amplifier provides a minimum of 13 dB of gain in receive mode.**

Based on the latest gallium nitride (GaN) technology, the Xtender offers greater than 30% power efficiency at most frequencies and its compact size makes it ideal for integration into space-constrained platforms. Adjacent radio frequency bands, such as the popular 900 MHz Industrial, Scientific and Medical (ISM) band, are also supported by the bidirectional PA, at lower peak power levels.

Accepting a +5 dBm RF input, the Xtender provides 38 dB of transmit gain. The Xtender also features over-voltage and reverse-voltage protection and operates over a wide temperature range of -40 to +60 °C.

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

## Features

- 20 Watts RF Output Power
- 800 to 1000 MHz
- Bidirectional Operation
- 38 dB (typ) of Transmit Gain
- 18 dB (typ) Receive Gain LNA
- Fast T/R Mode Switching with Auto-Sensing or Manual T/R Line
- Small Form Factor
- High Efficiency GaN Technology
- Over-Voltage & Reverse-Voltage Protection

## Applications

- Unmanned Aircraft Systems (UAS) - Group 2 and Group 3
- Unmanned Ground Vehicles (UGV)
- RF Communication Systems
- Software Defined Radios

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# NuPower Xtender™ U-20-C01-S01 BDA

## Specifications

### Absolute Maximums

| Parameter | Rating | Unit |
|---|---|---|
| Max Device Voltage | 32 | V |
| Max Device Current | 3.5 | A |
| Max RF Input Power, $Z_L = 50\ \Omega$ | 10 | dBm |
| Max Operating Temperature (ambient) | 60 | ℃ |
| Max Operating Temperature (baseplate) | 85 | ℃ |
| Max Storage Temperature | 85 | ℃ |

| Export Classification |
|---|
| EAR99 |

### Electrical Specifications - Operational @ 28 VDC, 25 °C, $Z_S$=$Z_L$=50 Ω

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| Operating Frequency | BW | 800 | | 1000 | MHz | |
| Switching Speed | $TX_{ON/OFF}$ | | 1.5 | | µS | 10% to 90% |
| Operating Voltage | VDC | 11 | 28 | 32 | V | |
| Operating Current | $I_{DD}$ | | 2.4 | 2.7 | A | CW, Pin = +5 dBm |
| Module Efficiency | | | 30 | | % | CW, Pin = +5 dBm |

### Electrical Specifications - Transmit @ 28 VDC, 25 °C, $Z_S$=$Z_L$=50 Ω, Conditions at CW, Pin = +5 dBm (unless specified otherwise)

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| RF Output Power, Linear | $P_L$ | | 2.5 | | W | 802.11g, 10 MHz BW, 16 QAM |
| RF Output Power, Psat | Psat | | 20 | | W | |
| Transmit Gain | G | | 38 | | dB | |
| Transmit Gain Flatness | ΔG | | 2 | | dB | CW, Pin=-30dBm |
| 2nd Harmonic | | | -13 | | dBc | |
| Nominal Input Drive Level | $P_{IN}$ | | 5 | | dBm | |
| Transmit Current | $I_{TX}$ | | 2.4 | 2.8 | A | |
| Transmit Output Mismatch VSWR | | | | 10:1 | Ψ | no damage at all phase angles |
| Transmit Input VSWR | | | 3:1 | | | |

### Electrical Specifications - Receive @ 28 VDC, 25 °C, $Z_S$=$Z_L$=50 Ω

| Parameter | Symbol | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|---|
| Receive P1dB | P1dB | | 14 | | dBm | |
| Receive Gain | G | 17.5 | 18 | | dB | Pin = -30 dBm |
| Receive Gain Flatness | ΔG | | 1 | | dB | |
| Receive Current | $I_{RX}$ | | 100 | | mA | |
| Receive Noise Figure | NF | | 1.1 | | dB | |

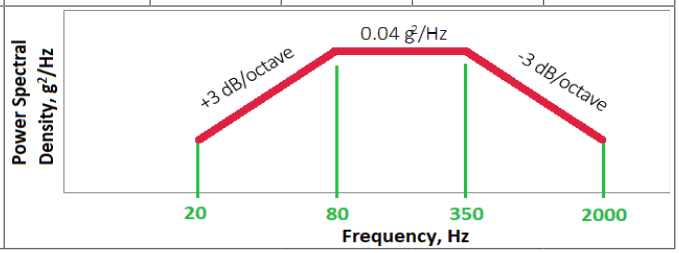
# NuPower Xtender™ U-20-C01-S01 BDA

## Specifications (cont.)

### Mechanical Specifications

| Parameter | Value | Unit | Limits |
|---|---|---|---|
| Dimensions | 3.0 x 2.0 x 1.16 | in | Max |
| Weight | 5.8 | oz | Max |
| RF Connectors, Input/Output | SMA Female | | |
| Interface Connector | Micro-D, 9-pin Socket | | |
| Cooling | Adequate Heatsink Required | | |

### Environmental Specifications

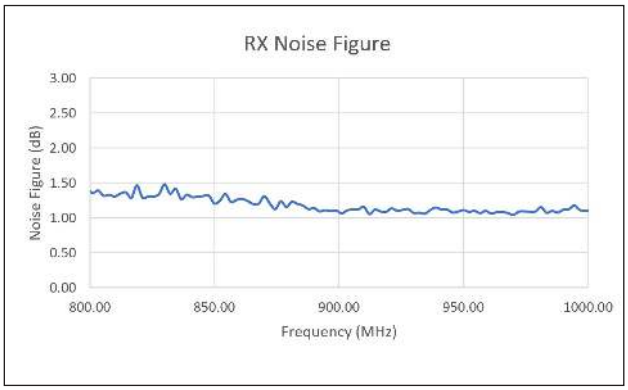
| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature (ambient) | $T_A$ | -40 | | +60 | ℃ |
| Operating Temperature (baseplate) | $T_C$ | -40 | | +85 | ℃ |
| Storage Temperature | $T_{STG}$ | -55 | | +85 | ℃ |
| Relative Humidity (non-condensing) | RH | | | 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) |  | | | | |

# NuPower Xtender™ U-20-C01-S01 BDA

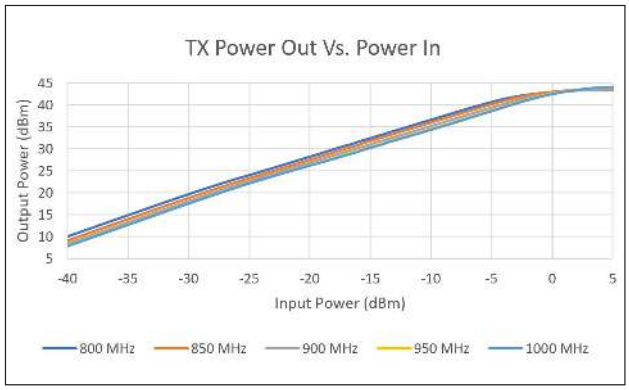
## Performance Plots (cont.)

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

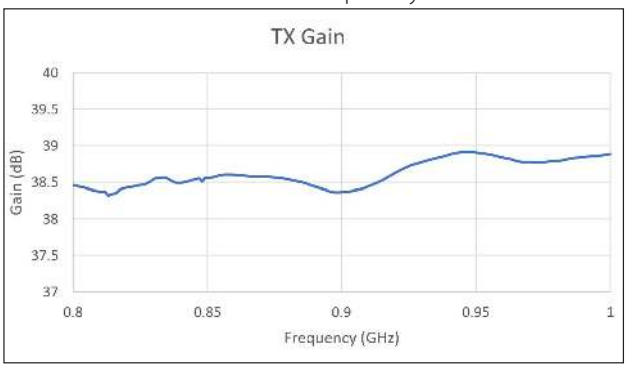
Noise Figure vs. Frequency



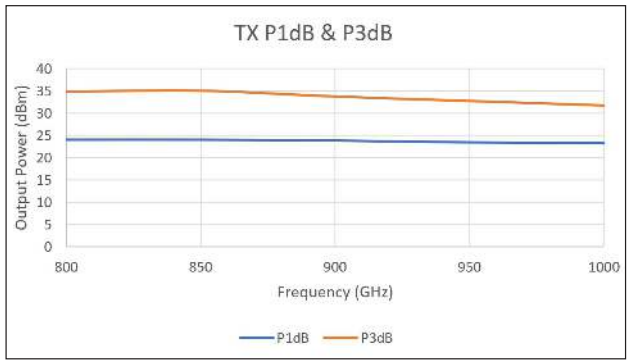

Output Power vs. Input Power



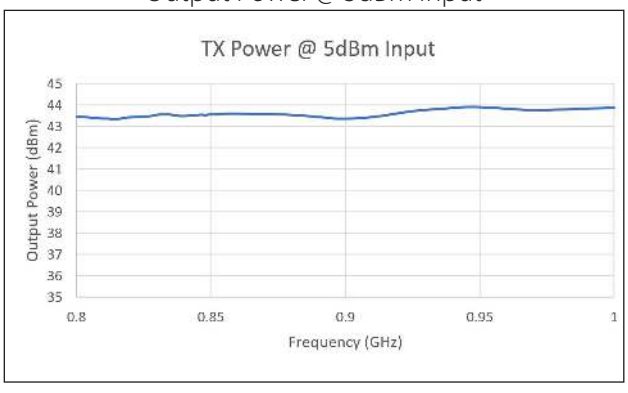

Gain vs. Frequency



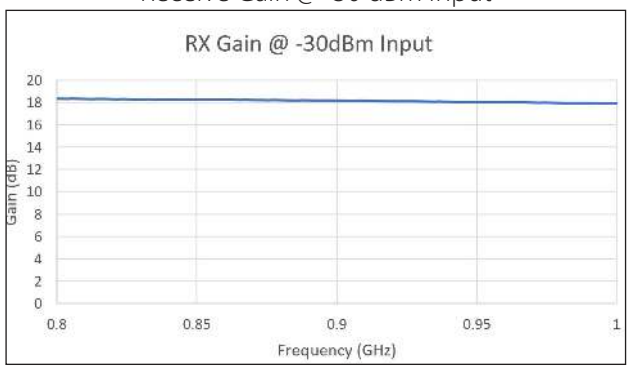

P1dB & P3dB



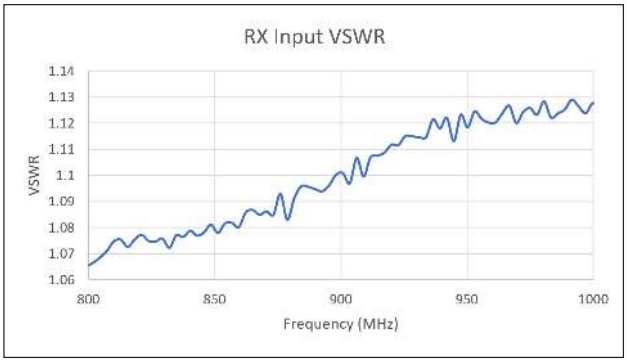

Output Power @ 5dBm Input



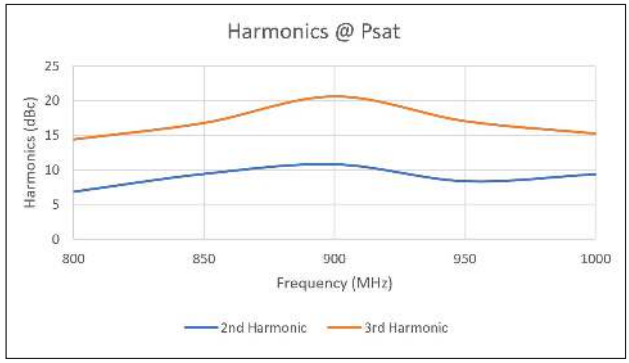

Receive Gain @ -30 dBm Input




VSWR



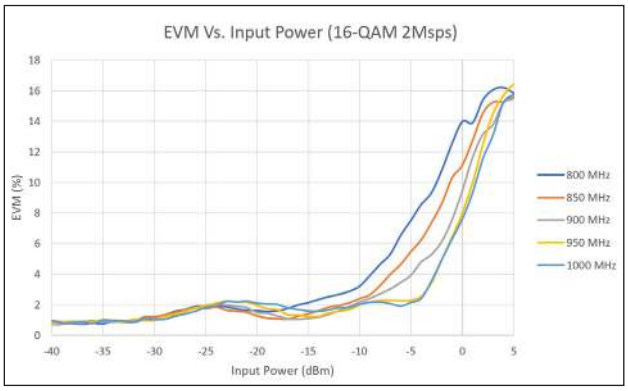

Harmonics (@ Psat)



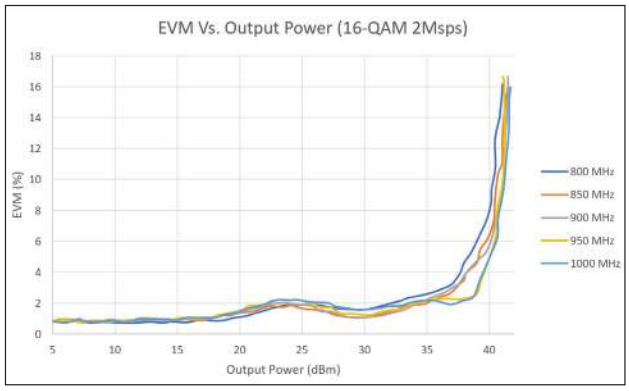
## Performance Plots (cont.)

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

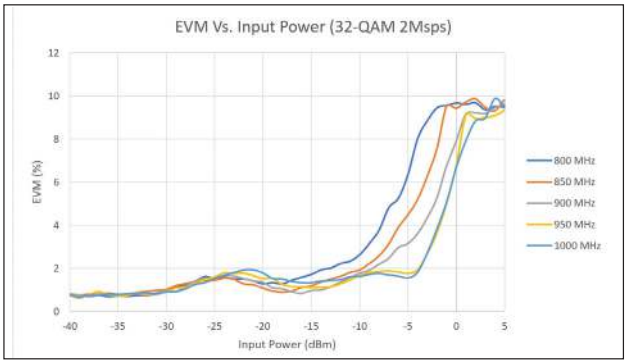
EVM Vs. Input Power (16-QAM 2Msps)



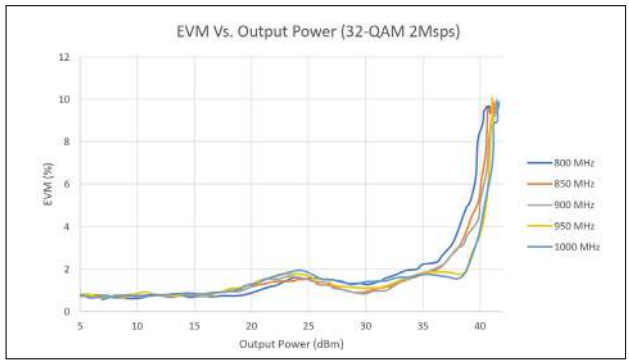

EVM Vs. Output Power (16-QAM 2Msps)



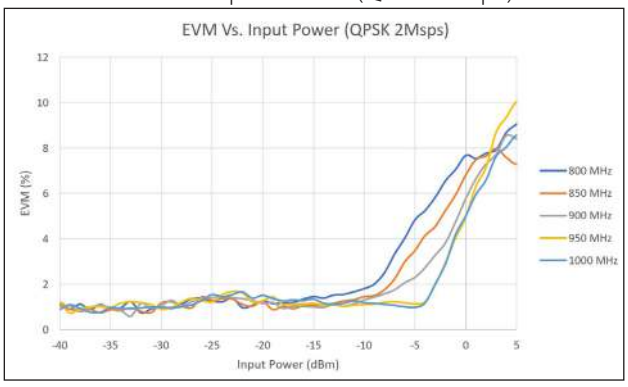

EVM Vs. Input Power (32-QAM 2Msps)



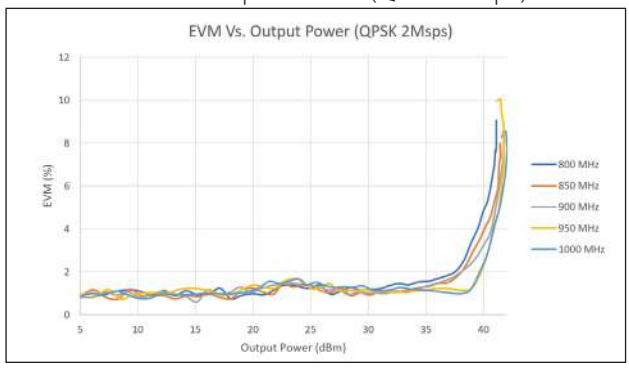

EVM Vs. Output Power (32-QAM 2Msps)




EVM Vs. Input Power (QPSK 2Msps)

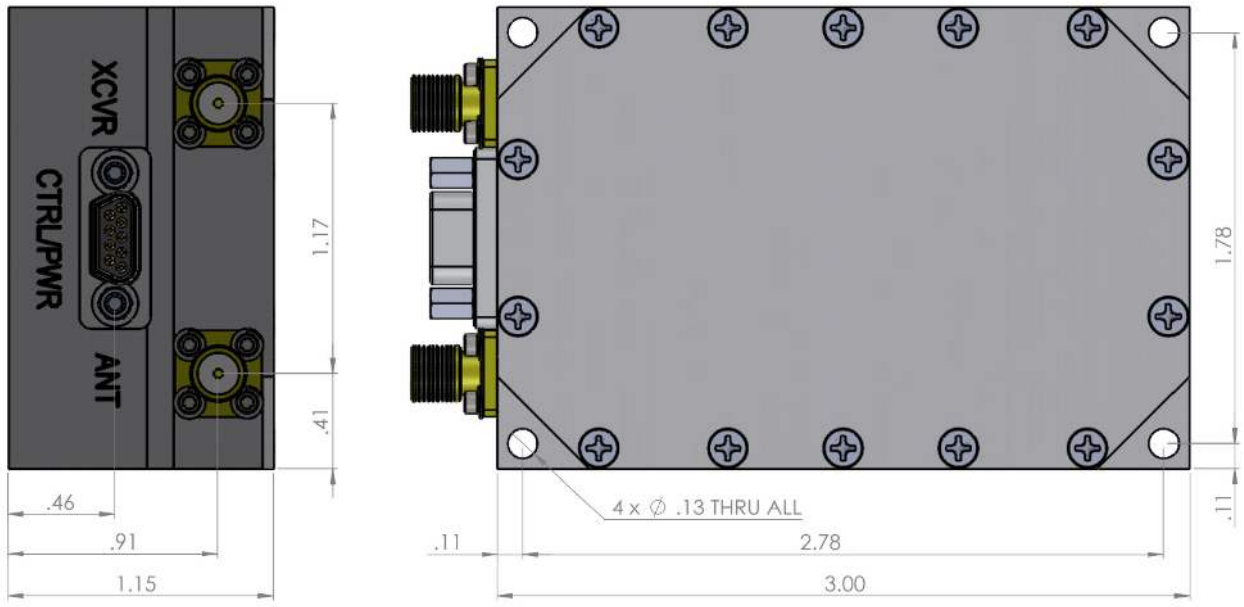



EVM Vs. Output Power (QPSK 2Msps)



# NuPower Xtender™ U-20-C01-S01 BDA

## Mechanical Outline




## Accessory Part Numbers

| Part Number | Description |
|---|---|
| NW-FL-05LPLE-2500-SFSF-M01 | Harmonic Filter Module |
| NW-BA-ACC-CB09MA | Standard Interface Cable Assembly - Flying Leads (included with module) |
| NW-BA-ACC-CT09MA | Upgraded Interface Cable Assembly - Banana Plug Termination |
| NW-BA-ACC-KT01 | Accessory Kit, which includes Fan-Cooled Heatsink and Upgraded Interface Cable |
| NW-BA-ACC-HS02 | Heatsink with Integrated Fan |

## Pinout

| Function | I/O | Pin |
|---|---|---|
| DC Power (+11 to +32 Volts) | I | 1, 2, 9 |
| Ground | I | 3, 4, 5 |
| RS-485 Data Transmit | O | 6 |
| RS-485 Data Receive | I | 7 |
| Transmit/Receive Source or Sink | I/O | 8 |

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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