



*Trusted RF Solutions™*

## NuPower Xtender™ 12B04A L- & S-Band Bidirectional Amplifier

10 Watt CW

2.5 Watts Linear, 5% EVM @ 34 dBm

1.0 GHz - 2.5 GHz

P/N: NW-BA-12B04A

(includes NW-BA-ACC-CB09MA)



**The NuPower Xtender™ 12B04A is a small, lightweight, and power-efficient bidirectional amplifier ideal for extending the communication range of half-duplex L- or S-band transceivers running constant-envelope or near-constant-envelope waveforms. The bidirectional amplifier generates 10 Watts of RF power from 1000 to 2500 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 35 dB of gain. The Xtender also features over-voltage and reverse-voltage protection and operates over a wide temperature range of -30 to +60 °C.

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

### Features

- 10 Watts RF Output Power
- 1.0 to 2.5 GHz
- Bidirectional Operation
- 35 dB of Transmit Gain
- 13 dB 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

# NuPower Xtender™ 12B04A 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	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C

Export Classification
ITAR Controlled

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	1000		2500	MHz	
Switching Speed	$T_{XON/OFF}$			1.5	$\mu$ S	10% to 90%
Operating Voltage	VDC	11	28	32	V	
Operating Current	$I_{DD}$		2.2	2.6	A	CW, Pin = +5 dBm
Module Efficiency			30		%	CW, Pin = +5 dBm

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

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	7	10		W	CW, Pin = +5 dBm
Transmit Gain	G		35		dB	CW, Pin = +5 dBm
Transmit Gain Flatness	$\Delta G$				dB	CW, Pin = +5 dBm
2nd Harmonic				-13	dBc	CW, Pin = +5 dBm
Spurious Emissions					dBc	CW, Pin = +5 dBm
Nominal Input Drive Level	$P_{IN}$		5		dBm	CW, Pin = +5 dBm
Transmit Current	$I_{TX}$		2.2	2.6	A	CW, Pin = +5 dBm
Transmit Output Mismatch VSWR						CW, Pin = +5 dBm
Transmit Input VSWR						CW, Pin = +5 dBm

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Receive P1dB	P1dB					
Receive Gain	G		13		dB	
Receive Gain Flatness	$\Delta G$				dB	
Receive Current	$I_{RX}$		100		mA	
Receive Noise Figure	NF		3.5			

# NuPower Xtender™ 12B04A BDA

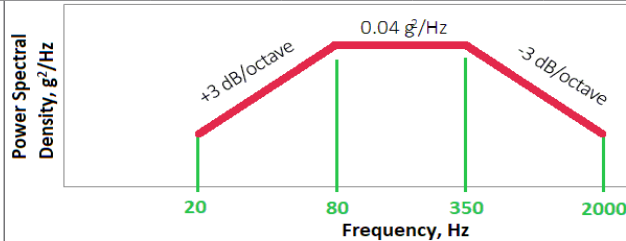
## Specifications (cont.)

### 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

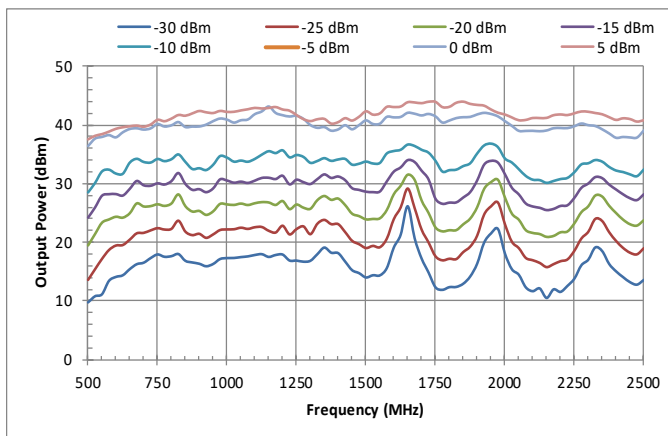
Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	$T_A$	-40		+60	°C
Operating Temperature (baseplate)	$T_C$	-40		+85	°C
Storage Temperature	$T_{STG}$	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration / Shock Profile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



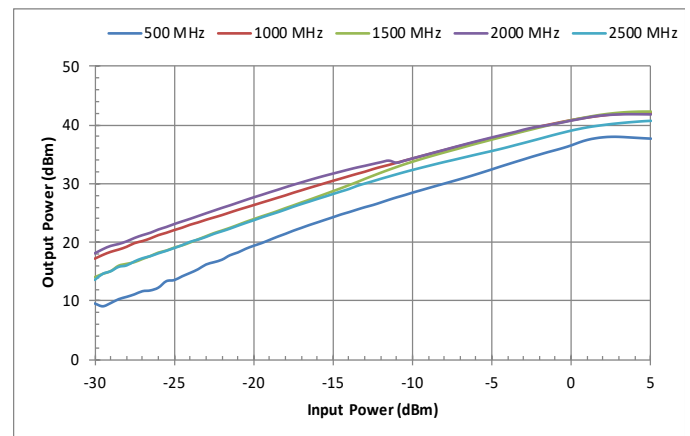
## Performance Plots

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

Output Power vs. Frequency



Output Power vs. Input Power

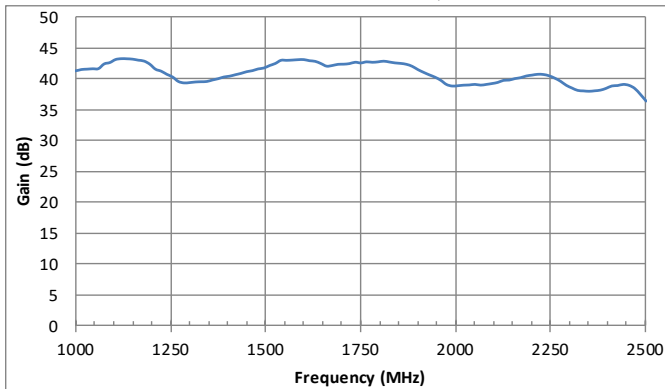


# NuPower Xtender™ 12B04A BDA

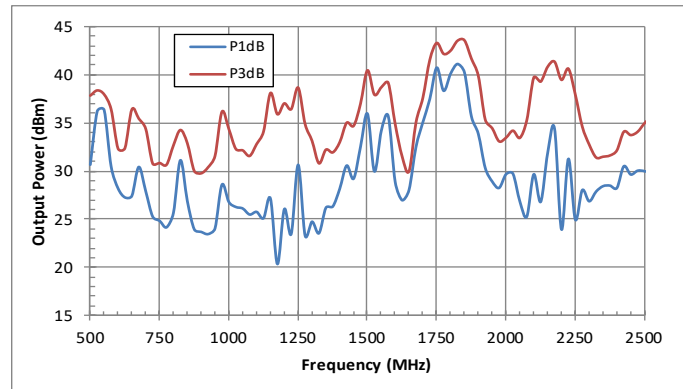
## Performance Plots (cont.)

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

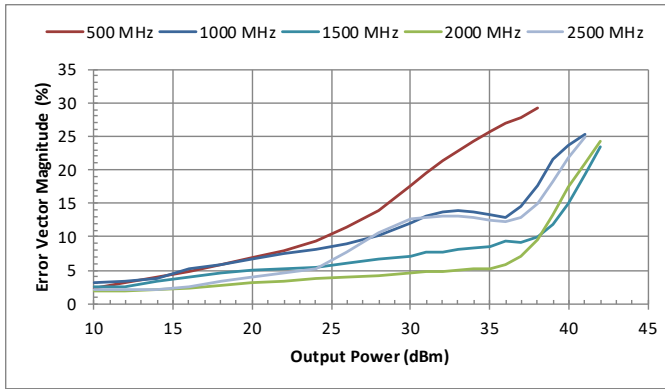
Gain vs. Frequency



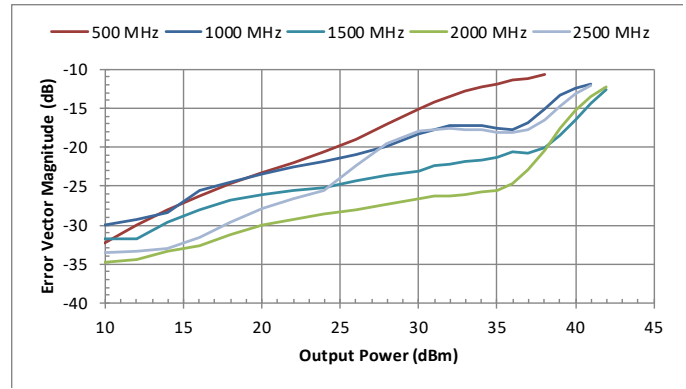
P1dB & P3dB



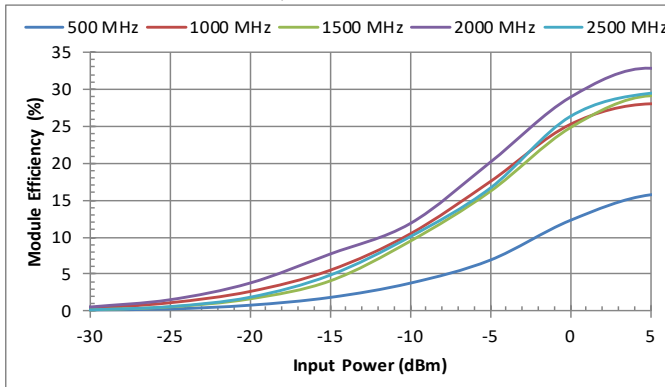
Error Vector Magnitude (%)  
[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



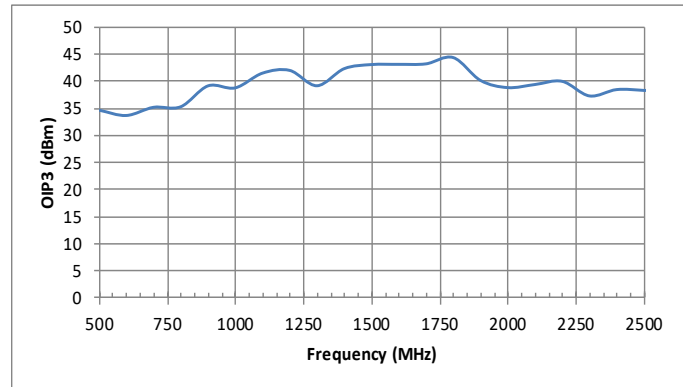
Error Vector Magnitude (dB)  
[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



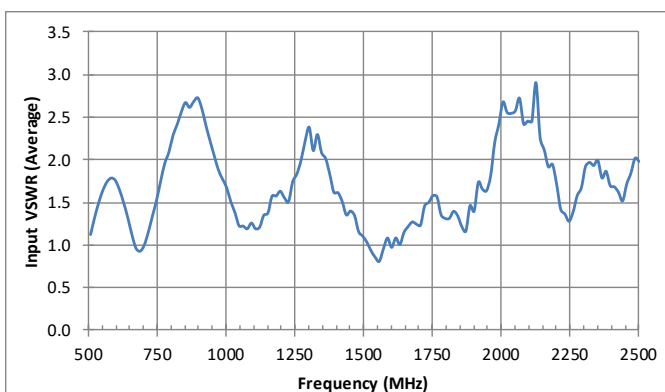
Efficiency vs. Output Power



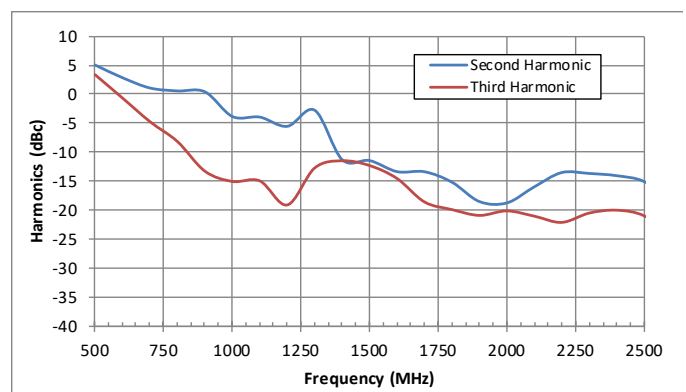
OIP3



VSWR

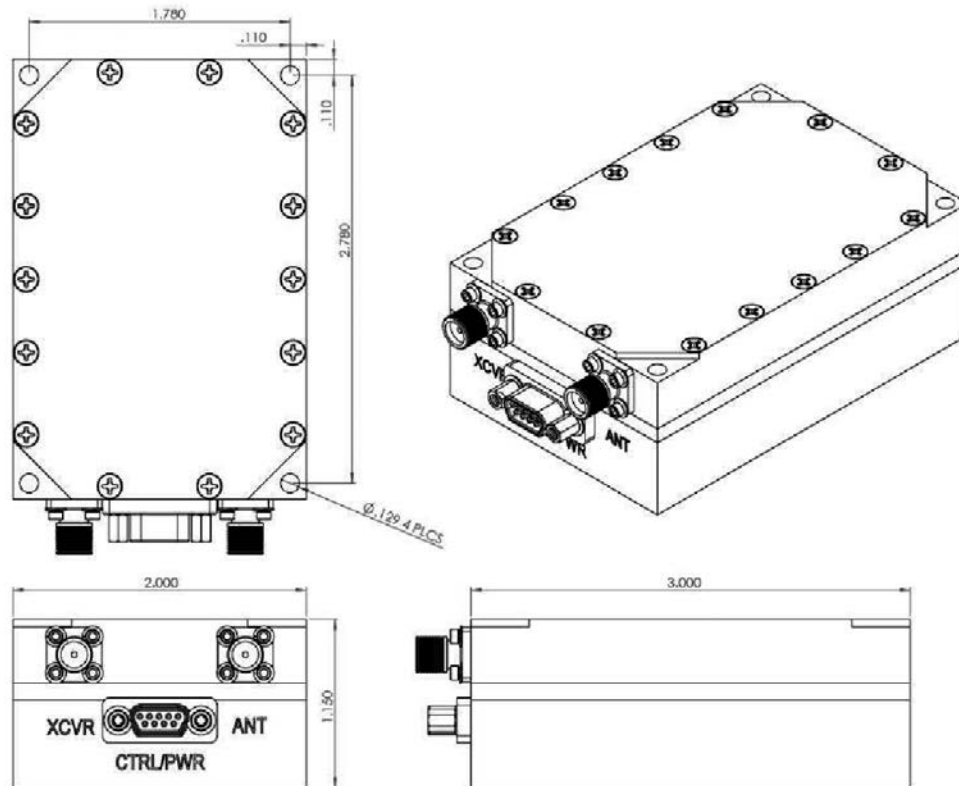


Harmonics (@ Psat)



# NuPower Xtender™ 12B04A 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



NuWaves Engineering  
132 Edison Drive  
Middletown, OH 45044

[www.nuwaves.com](http://www.nuwaves.com)  
[product.sales@nuwaves.com](mailto:product.sales@nuwaves.com)  
513.360.0800

**NuWaves**  
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