NuWaves
RF Solutions

NuPower Xtender™
DUAL LS-20-S01-D30
2X2 L-&S-Band Bidirectional Amplifier

25 Watt CW
1.0 GHz - 2.5 GHz

P/N: NW-BA-DUAL-LS-20-S01-D30

Contact sales@nuwaves.com for custom options, including 3x3 or 4x4 options in a single housing

The NuPower Xtender™ DUAL LS-20-S01-D30 is a 2x2 dual channel bi-directional amplifier ideal for extending the range of communications and datalinks for ISR applications. This amplifier supports NxN MIMO radios, where 2x2 or 4x4 configurations are used for high data rate applications. The bidirectional amplifier typically generates 25 Watts of RF power from 1000 to 2500 MHz in transmit mode and the integrated low-noise amplifier typically provides 14 dB of gain in receive mode.

Based on the latest gallium nitride (GaN) technology, the Xtender typically offers 39% 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 nominal +30 dBm RF input, the Xtender typically provides 14 dB of gain. The Xtender also features over-voltage and reverse-voltage protection and operates over a wide temperature range of -40 to +85 °C baseplate.

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

Features

- 25 Watts (typ) RF Output Power
- 1.0 to 2.5 GHz
- Bidirectional Operation
- 14 dB (typ) of Transmit Gain
- 14 dB (typ) Receive Gain
- 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)
- Software Defined Radios
- Counter UAS Detection and Mitigation
- MIMO/MANET Radio Range Extension
- SISO Radio Range Extension

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NuPower Xtender™ DUAL LS-20-S01-D30 BDA

Specifications

Absolute Maximums

Per Channel		
Parameter	**Rating**	**Unit**
Max Device Voltage	32	V
Max Device Current	3.5	A
Max RF Input Power, CW, $Z_L = 50\ \Omega$	XCVR Port: +33	dBm
	ANT Port[1]:+30	
Max Operating Temperature (ambient)	60	℃
Max Operating Temperature (baseplate)	85	℃
Max Storage Temperature	85	℃

[1]Max operational receive input power = -20 dBm

Export Classification
EAR 99

Electrical Specifications - Operational

@ 28 VDC, 25 °C, Z_S=Z_L=50 Ω, CW, Pin = + 30 dBm (unless otherwise specified)

Per Channel						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Condition**
Operating Frequency	BW	1000		2500	MHz	
Switching Speed	$TX_{ON/OFF}$		0.95	1.5	µS	Rx - Tx (Manual T/R)
			1.3	1.5		Tx - Rx (Manual T/R)
			1.3	1.5		Rx - Tx (Autosense)
			1.6	2.0		Tx - Rx (Autosense)
Operating Voltage	VDC	11	28	32	V	
Operating Current (Transmit)	I_{DD}		2.3	3.5	A	
Module Efficiency (Transmit)			39		%	

Electrical Specifications - Transmit

@ 28 VDC, 25 °C, Z_S=Z_L=50 Ω, CW, Pin = +30 dBm (unless otherwise specified)

Per Channel						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Condition**
RF Output Power, Linear	P_L		10		W	QPSK, 1 Msps, 35% Filter
RF Output Power, Psat	Psat	10	25		W	
Transmit Gain	G		14		dB	
Power Gain Flatness	ΔG		±1.1		dB	1-2.5 GHz
Small Signal Gain Flatness	ΔG		±2.5		dB	Pin= 0 dBm, 1-2.5 GHz
Harmonics	2nd		-18		dBc	
	3rd		-22			
Nominal Input Drive Level	P_{IN}		30	33	dBm	
Quiescent Current	I_{DQ}		75		mA	T/R Enable Off (Receive Current)
Transmit Current	I_{TX}		2.5	3.5	A	
Transmit Input VSWR (XCVR Port)	VSWR		2:1			
Transmit Output Mismatch VSWR	VSWR			10:1	Ψ	No damage at all phase angles

NuPower Xtender™ DUAL LS-20-S01-D30 BDA

Specifications (cont.)

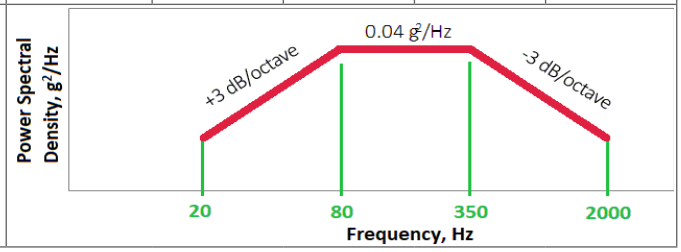
Electrical Specifications - Receive @ 28 VDC, 25 °C, Z_S=Z_L=50 Ω, CW, -30 dBm Input Power (unless otherwise specified)

Per Channel						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Condition**
Receive Gain	G	12	14		dB	
Receive P1dB	P1dB		16		dBm	Pin=+3 dBm (typ)
Receive Gain Flatness	ΔG		±1		dB	1-2.5 GHz
Receive Current	I_{RX}		75		mA	
Receive Noise Figure	NF		2.1		dB	
Receive Input VSWR (ANT Port)	VSWR		1.6:1			

Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	3.0 x 5.0 x 0.6	in	Max
Weight	TBD	oz	Max
RF Connectors, Input/Output	SMA Female		
Interface Connector	Micro-D, 21-pin Socket		
Cooling	Adequate Heatsink Required		

Environmental Specifications

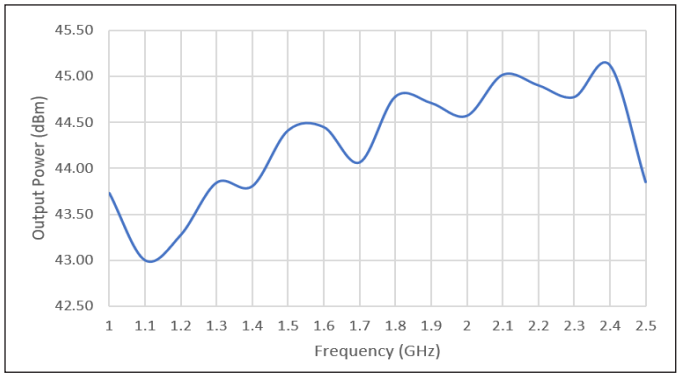
Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	T_A	-40		+60	°C
Operating Temperature (baseplate)	T_C	-40		+85	°C
Storage Temperature	T_{STG}	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration / Shock Profile (Random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

NuPower Xtender™ DUAL LS-20-S01-D30 BDA

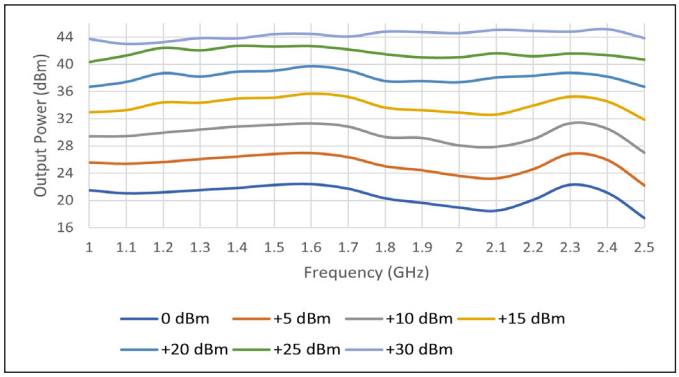
Transmit Performance Plots

Test Conditions: +28 VDC, +25 °C, Z_S=Z_L=50 Ω, CW, +30 dBm Input Power (unless otherwise specified)

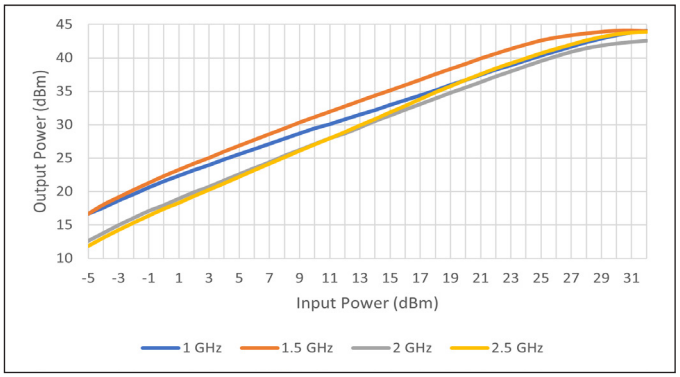
Output Power



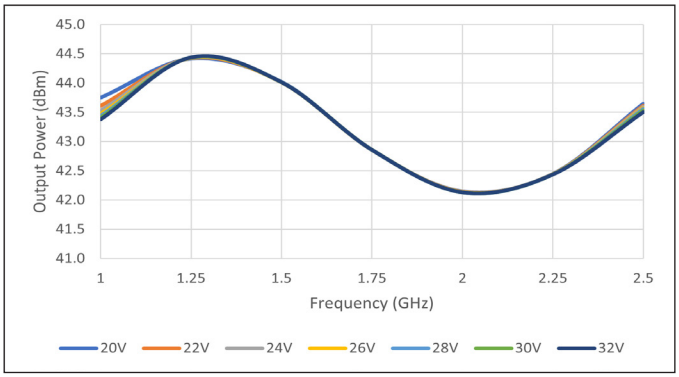
Output Power - Stepped Input Power



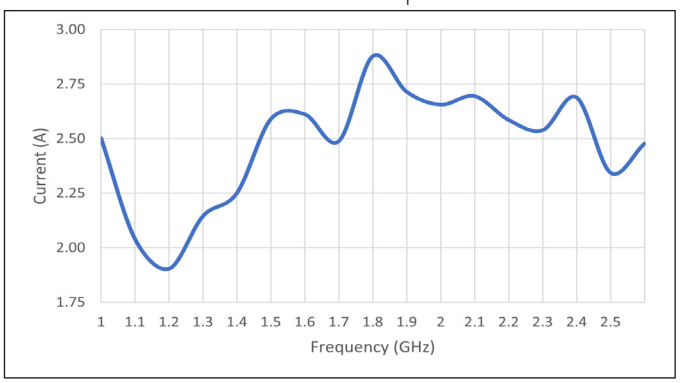
Output Power vs. Input Power



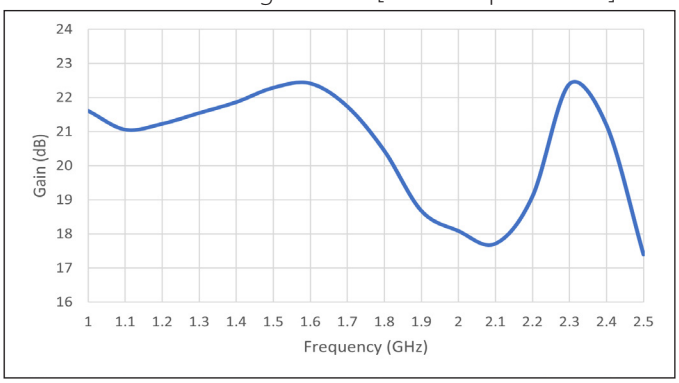
Output Power vs. Input Voltage



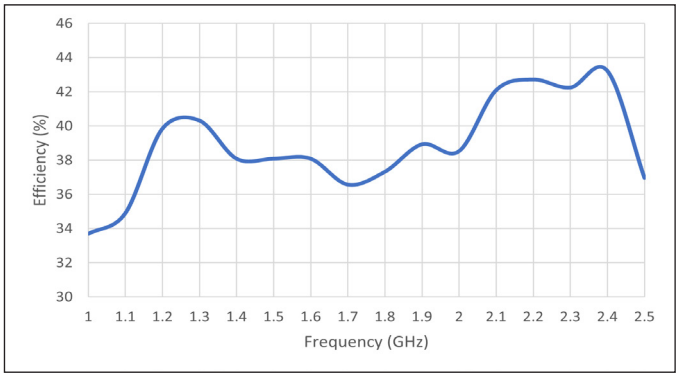
Current Consumption



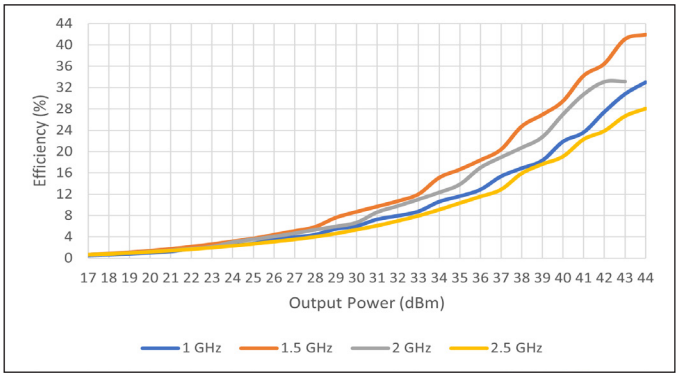
Transmit Small Signal Gain [0 dBm Input Power]



Efficiency



Efficiency vs. Output Power

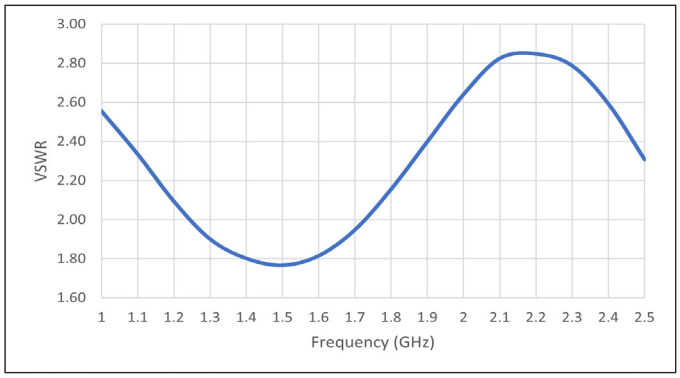


NuPower Xtender™ DUAL LS-20-S01-D30 BDA

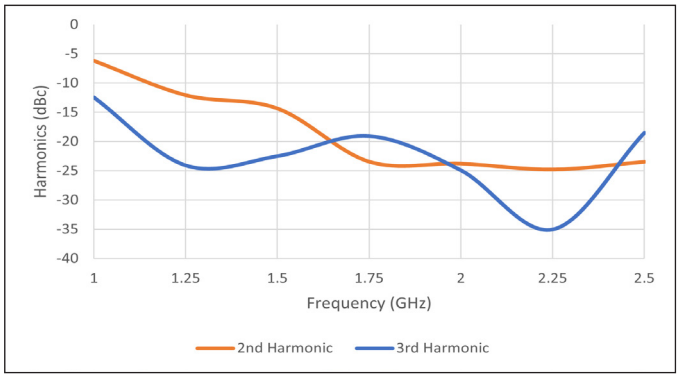
Transmit Performance Plots (cont.)

Test Conditions: +28 VDC, +25 °C, Z_S=Z_L=50 Ω, CW, +30 dBm Input Power (unless otherwise specified)

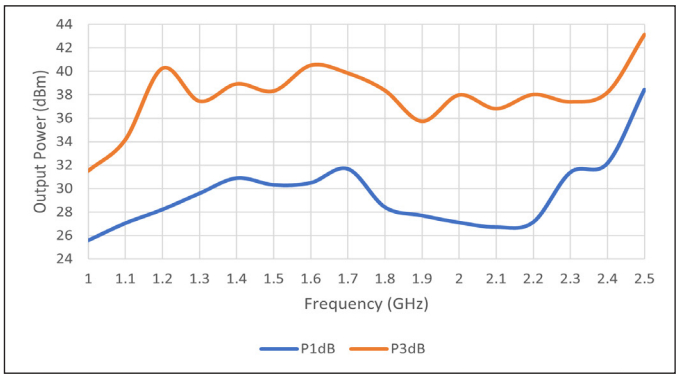
Transmit Input VSWR



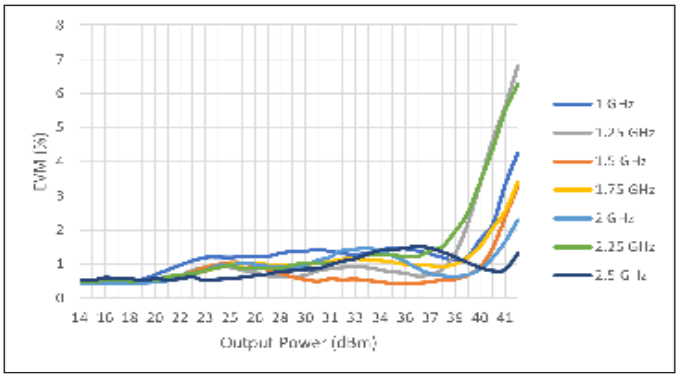
Harmonics



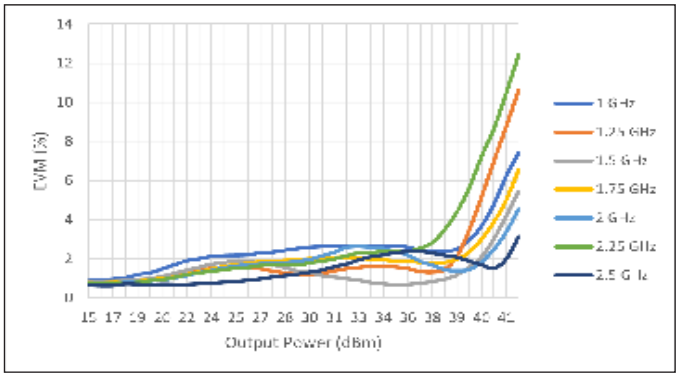
Transmit P1dB & P3dB



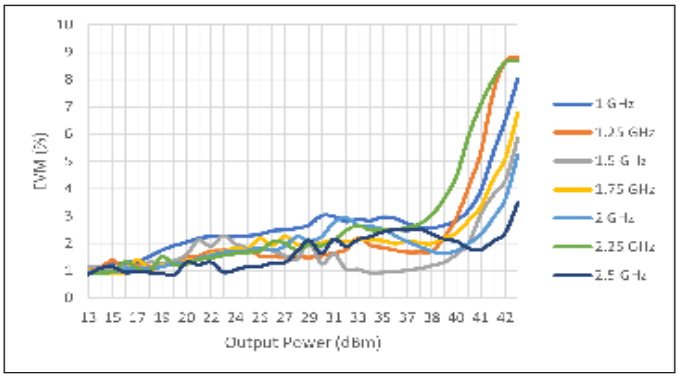
EVM vs. Output Power [QPSK, 1 Msps, 35% Filter]



EVM vs. Output Power [16 QAM, 2 Msps, 35% Filter]



EVM vs. Output Power [64 QAM, 5 Msps, 10% Filter]

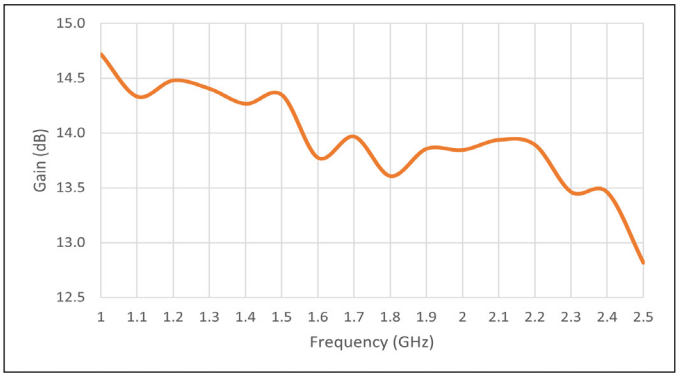


NuPower Xtender™ DUAL LS-20-S01-D30 BDA

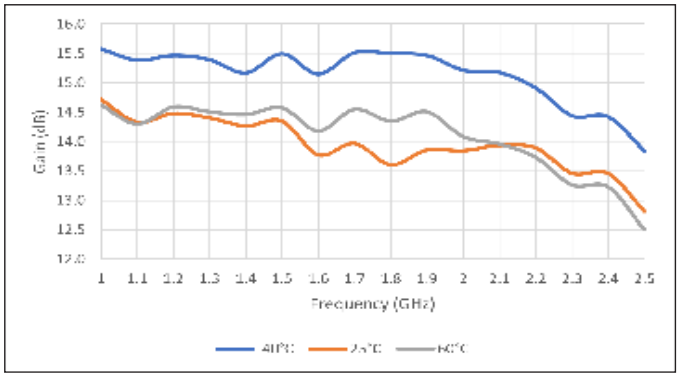
Receive Performance Plots

Test Conditions: +28 VDC, +25 °C, Z_S=Z_L=50 Ω, CW, -30 dBm Input Power (unless otherwise specified)

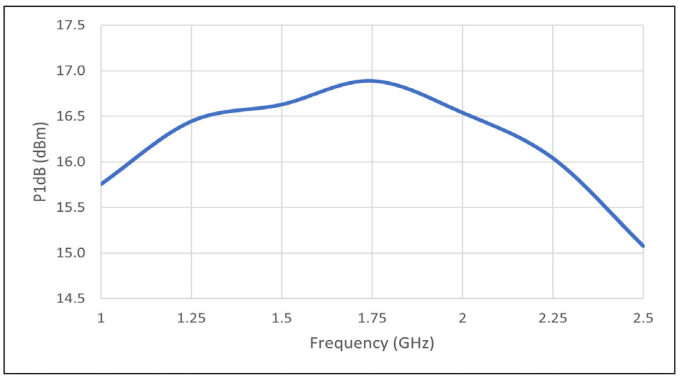
Receive Gain



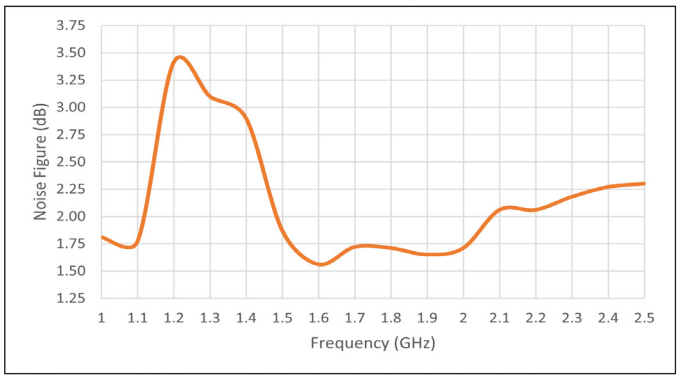
Receive Gain vs Temperature



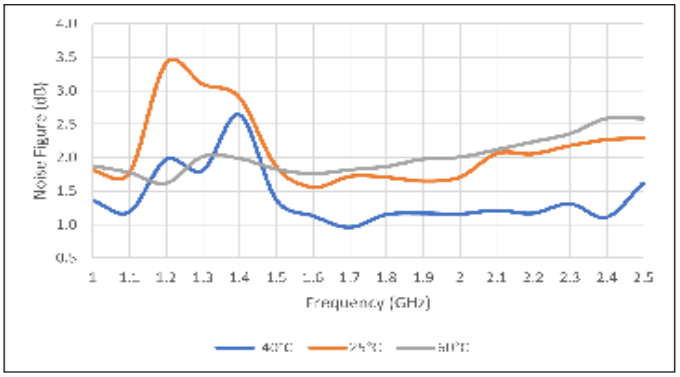
Receive P1dB



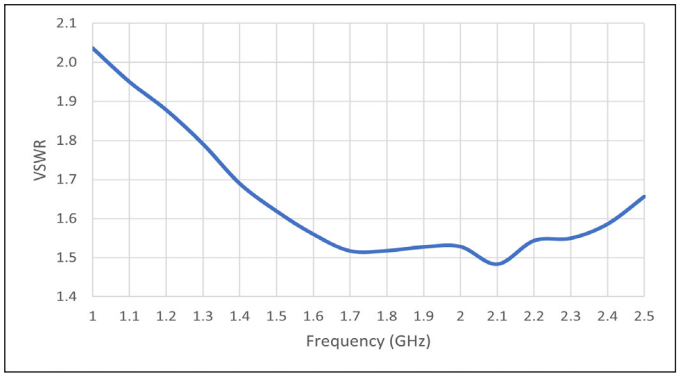
Receive Noise Figure



Receive Noise Figure vs Temperature



Receive Input VSWR



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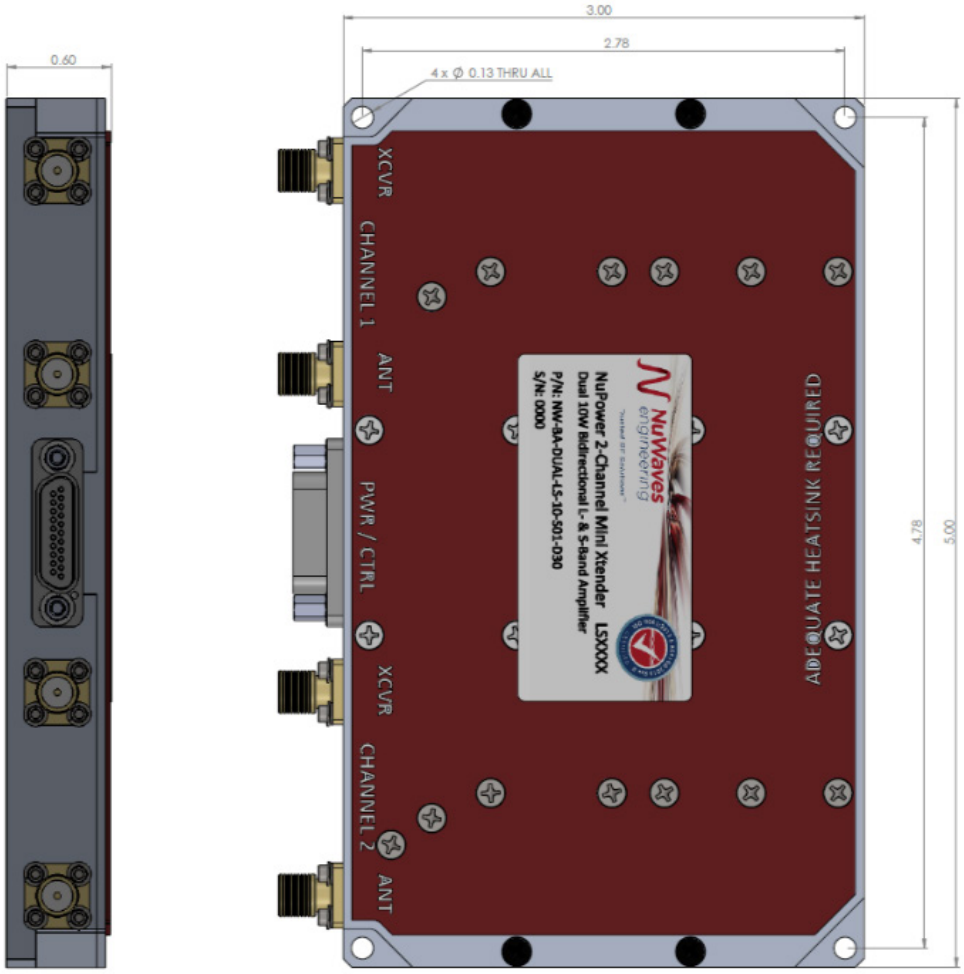
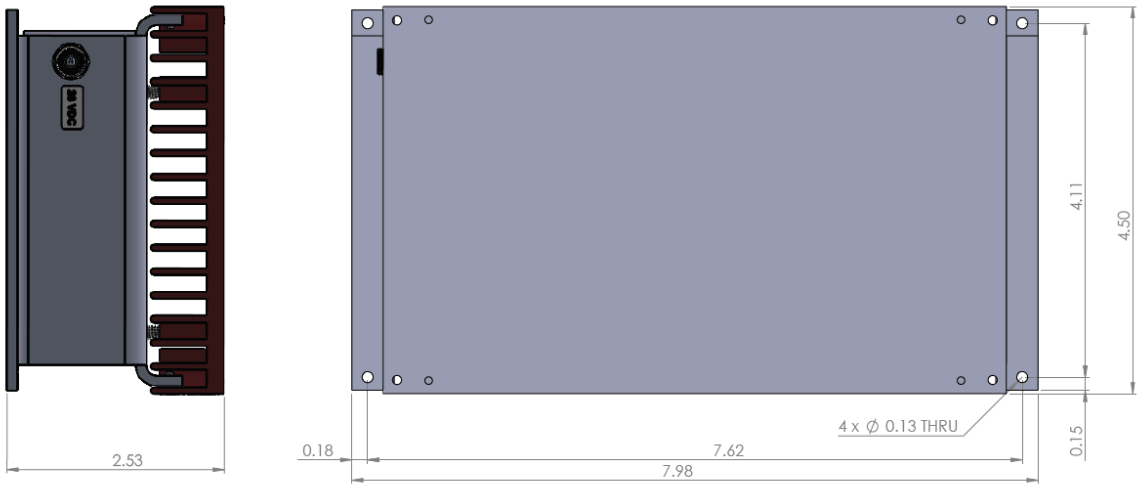
Mechanical Outline



NuPower Xtender™ DUAL LS-20-S01-D30 BDA

Optional Heatsink Drawing

Heatsink and Integrated Fan: HTSK-07



Accessory Part Numbers

Part Number	Description
NW-FL-05LPLE-2500-SFSF-M01	Harmonic Filter Module (sold separately)
BDA-CBL-10-F	Standard Interface Cable Assembly - Flying Leads (sold separately)
BDA-CBL-10-B	Upgraded Interface Cable Assembly - Banana Plug Terminations (sold separately)
HTSK-07	Heatsink with Integrated Fan (sold separately)

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
DC Power (Primary Power, +11 to +32 Volts)	I	Channel 1: 10, 11, 20, 21
		Channel 2: 1, 2, 12, 13
Ground (DC Return)	I	Channel 1: 8, 9, 18, 19
		Channel 2: 3, 4, 14, 15
RS-485 Data Transmit	O	Channel 1: 7
		Channel 2: 5
RS-485 Data Receive	I	Channel 1: 17
		Channel 2: 16
T/R Enable T/R Mode: Source (Autosense)[1] T/R Mode: Sink (Manual T/R) [High TX / Low RX] (See notes 2 & 3 below for logic information)	I/O	6

[1]Autosense automatically switches to transmit and receive based on input signal strength. Typical threshold is 0 dBm; see user manual for complete information.
[2]Logic level configurable by user or factory. Default logic level is 3.3V.
[3]3.3V (default) High: 2.31-3.8VDC, Low: -0.5-0.99VDC; 5V High: 3.5-5.5VDC, Low: -0.5-1.5VDC

Contact NuWaves

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