NuWaves RF Solutions

NuPower Xtender™ LS10S01
L- & S-Band Bidirectional Amplifier

20 Watt CW
10 Watts Linear, 5% EVM [QPSK]
1.0 GHz - 2.5 GHz

P/N: NW-BA-LS-10-S01

Contact sales@nuwaves.com for custom options

The NuPower Xtender™ LS10S01 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 20 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 38% 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 typically provides 38 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

- 20 Watts (typ) RF Output Power
- 1.0 to 2.5 GHz
- Bidirectional Operation
- 38 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
- Air Launch Effect (ALE)
- Common Launch Tube (CLT)
- Counter UAS Detection and Mitigation
- MIMO/MANET Radio Range Extension
- SISO Radio Range Extension

132 Edison Drive, Middletown, OH 45044 | 513.360.0800 | sales@nuwaves.com | www.nuwaves.com

NuPower Xtender™ LS10S01 BDA

Specifications

Absolute Maximums

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: +10	dBm
	ANT Port[1]:+30	
Max Operating Temperature (ambient)	60	℃
Max Operating Temperature (baseplate)	85	℃
Max Storage Temperature	85	℃

Export Classification
ECCN 5A991G

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

Electrical Specifications - Operational

@ 28 VDC, 25 °C, Z_S=Z_L=50 Ω, CW, Pin = + 5 dBm (unless otherwise specified)

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	CW
Module Efficiency (Transmit)			38		%	CW

Electrical Specifications - Transmit

@ 28 VDC, 25 °C, Z_S=Z_L=50 Ω, CW, Pin = +5 dBm (unless otherwise specified)

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	20		W	
Transmit Gain	G		38		dB	
Power Gain Flatness	ΔG		±1.5		dB	1-2.5 GHz
Small Signal Gain Flatness	ΔG		±4		dB	Pin=-30dBm, 1-2.5 GHz
Harmonics	2nd		-18		dBc	
	3rd		-22			
Nominal Input Drive Level	P_{IN}		5		dBm	
Quiescent Current	I_{DQ}		115		mA	T/R Enable Off (Receive Current)
Transmit Current	I_{TX}		2.3	3.5	A	
Transmit Input VSWR (XCVR Port)	VSWR		1.4:1			
Transmit Output Mismatch VSWR	VSWR			10:1	Ψ	No damage at all phase angles

Electrical Specifications - Receive

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Receive Gain	G	12	14		dB	
Receive P1dB	P1dB		16.2		dBm	
Receive Gain Flatness	ΔG		±1		dB	1-2.5 GHz

Specifications (cont.)

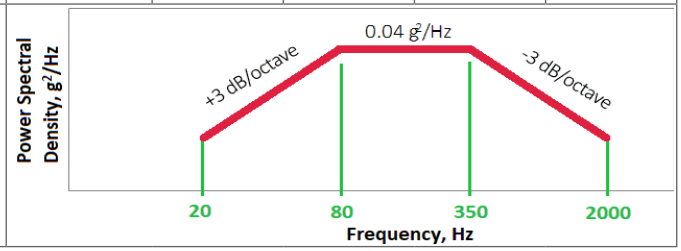
Electrical Specifications - Receive (cont.) @ 28 VDC, 25 °C, Z_S=Z_L=50 Ω, CW, -30 dBm Input Power (unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Receive Current	I_{RX}		115		mA	
Receive Noise Figure	NF		2		dB	
Receive Input VSWR (ANT Port)	VSWR		1.6:1			

Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	3.0 x 2.0 x 0.65	in	Max
Weight	4	oz	Max
RF Connectors, Input/Output	SMA Female		
Interface Connector	Micro-D, 9-pin Socket		
Cooling	Adequate Heatsink Required		

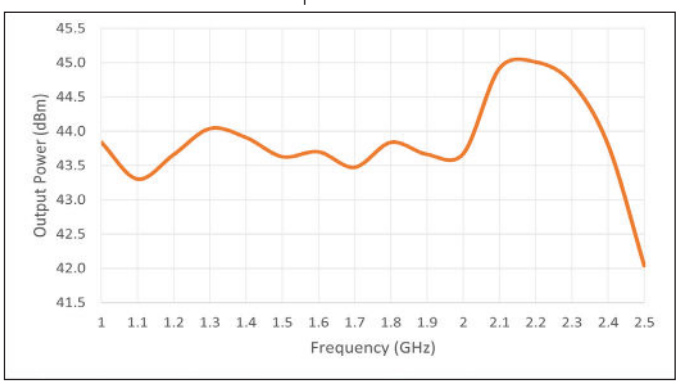
Environmental Specifications

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)					

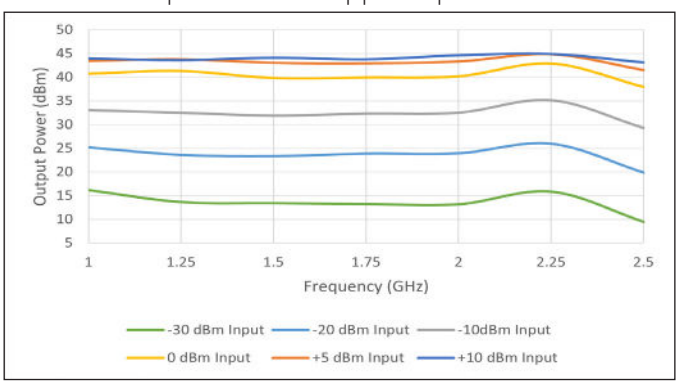
Transmit Performance Plots

Test Conditions: +28 VDC, +25 °C, Z_S=Z_L=50 Ω, CW, +5dBm Input Power (unless otherwise specified)

Output Power



Output Power - Stepped Input Power

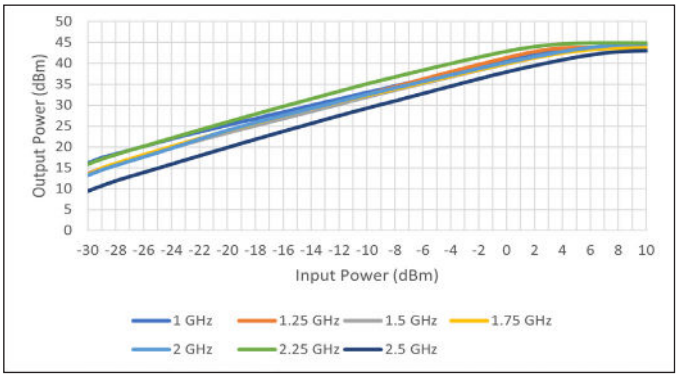


NuPower Xtender™ LS10S01 BDA

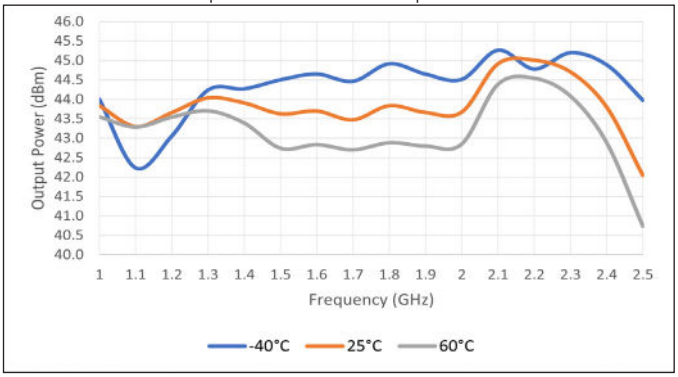
Transmit Performance Plots (cont.)

Test Conditions: +28 VDC, +25 °C, Z_S=Z_L=50 Ω, CW, +5dBm Input Power (unless otherwise specified)

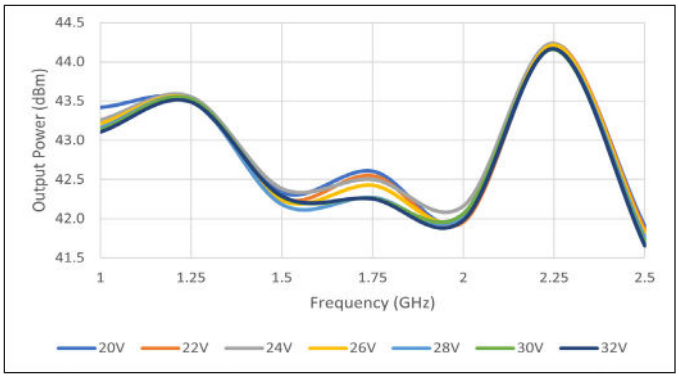
Output Power vs. Input Power



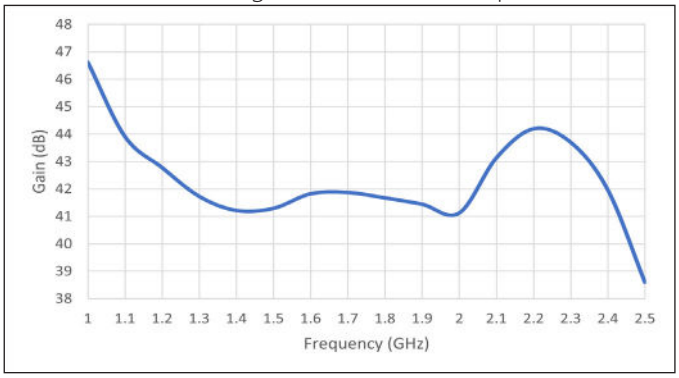
Output Power vs Temperature



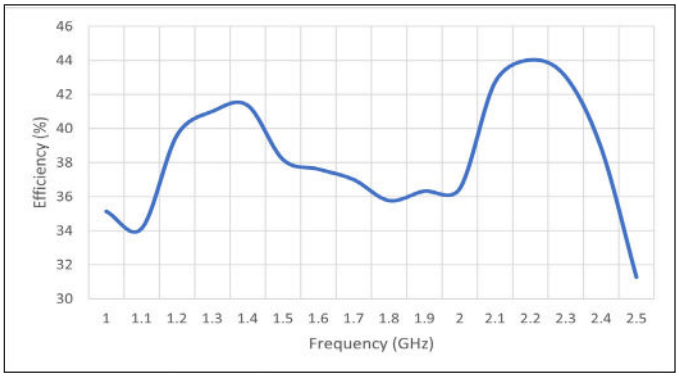
Output Power vs. Input Voltage



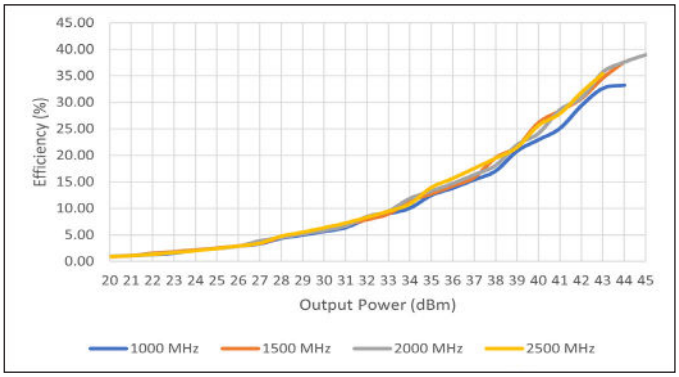
Transmit Small Signal Gain [-30dBm Input Power]



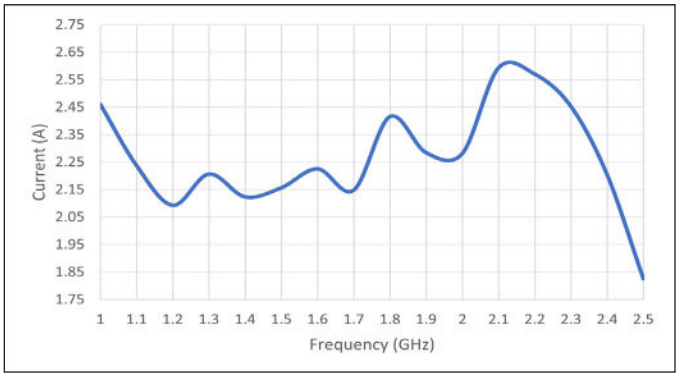
Efficiency



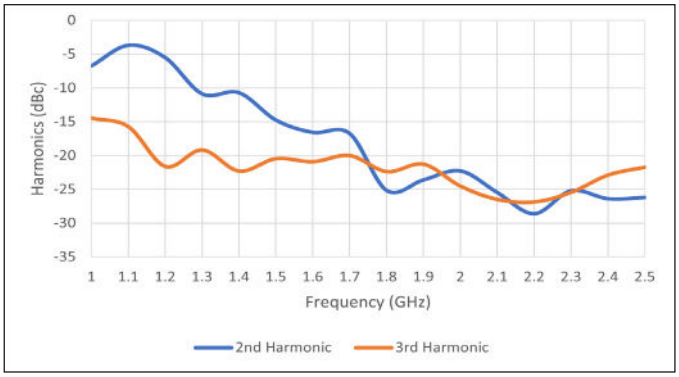
Efficiency vs. Output Power



Current Consumption



Harmonics



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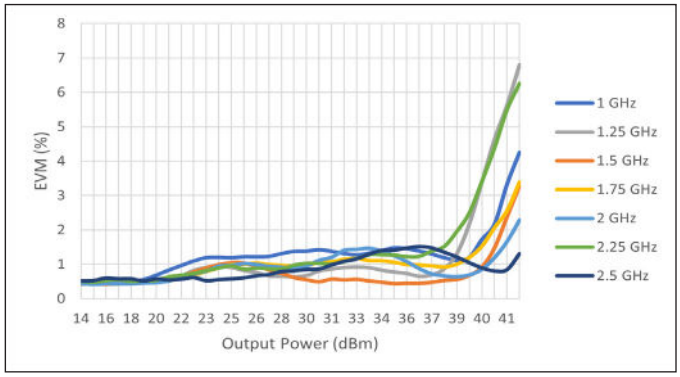
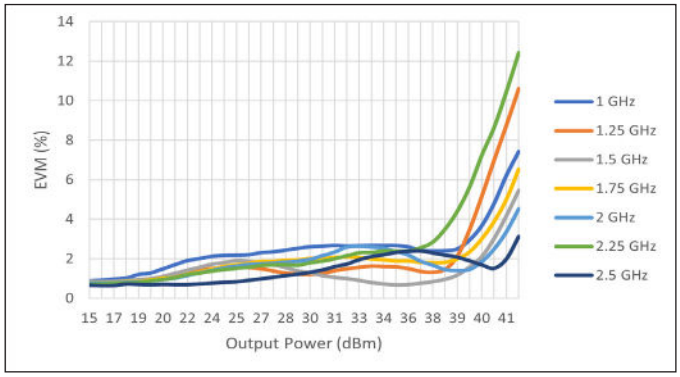
Transmit Performance Plots (cont.)

Test Conditions: +28 VDC, +25 °C, Z_S=Z_L=50 Ω, CW, +5dBm Input Power (unless otherwise specified)

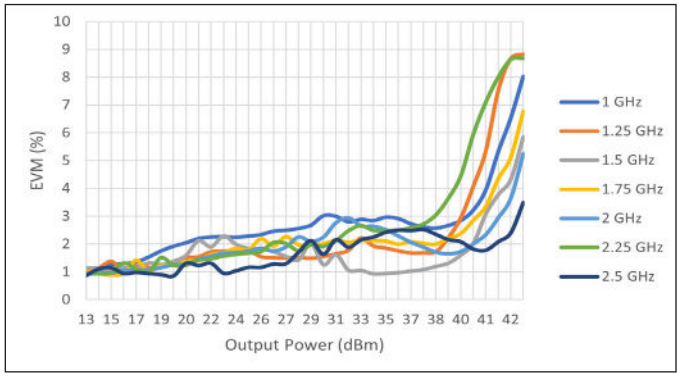
EVM vs. Output Power [QPSK, 1 Msps, 35% Filter]



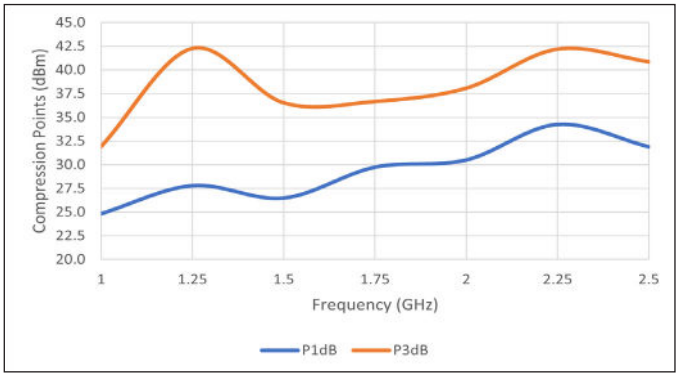
EVM vs. Output Power [16 QAM, 2 Msps, 35% Filter]



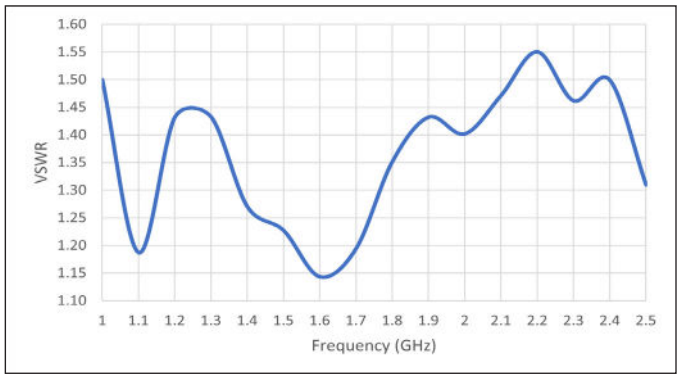
EVM vs. Output Power [64 QAM, 5 Msps, 10% Filter]



Transmit P1dB & P3dB



Transmit Input VSWR



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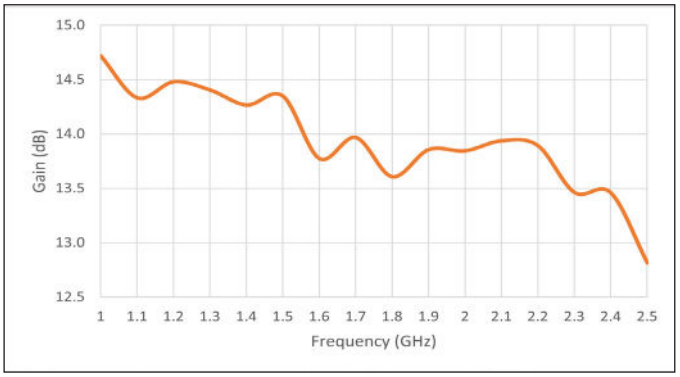
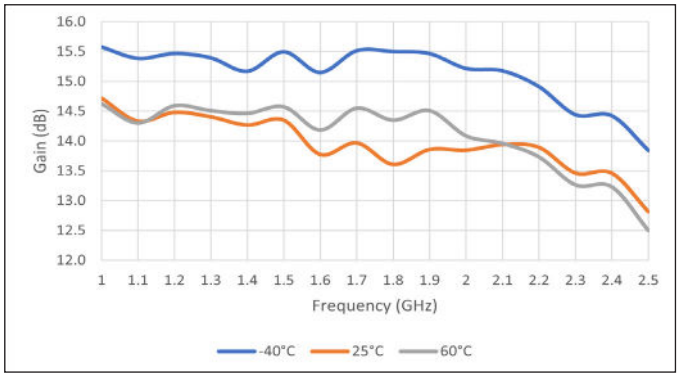
Receive Performance Plots

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

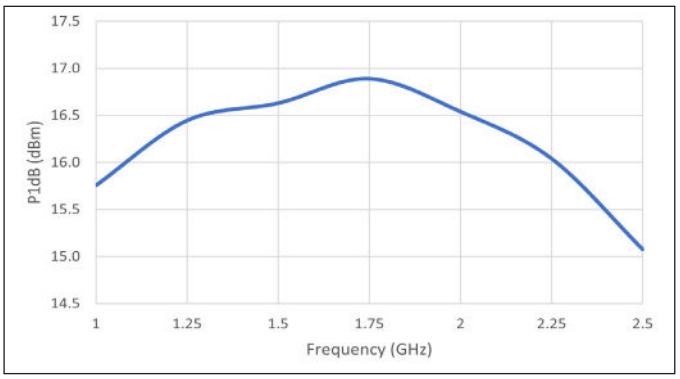
Receive Gain



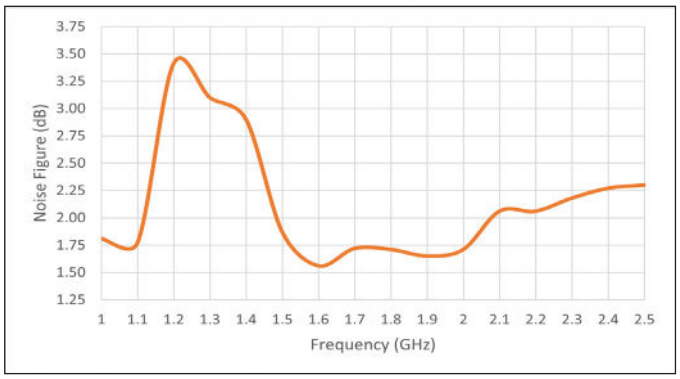
Receive Gain vs Temperature



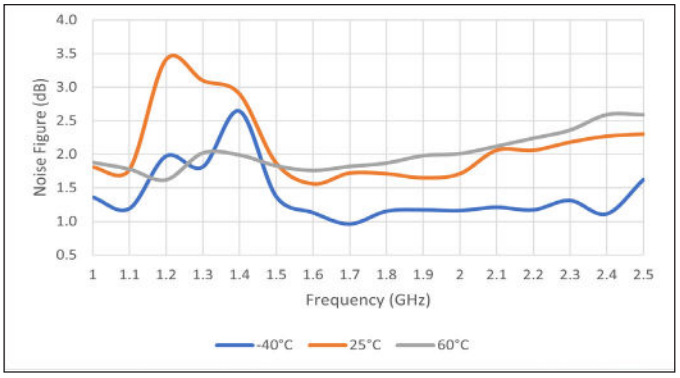
Receive P1dB



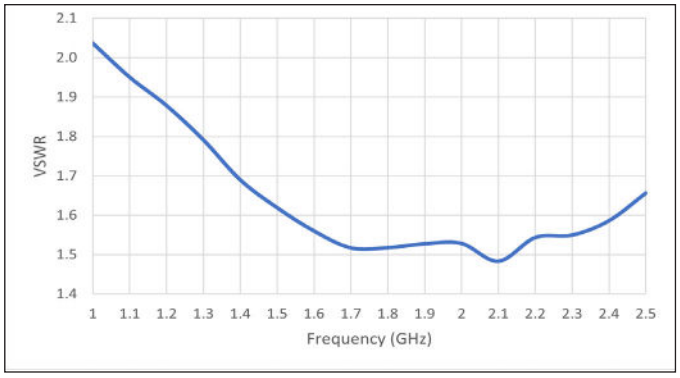
Receive Noise Figure



Receive Noise Figure vs Temperature



Receive Input VSWR



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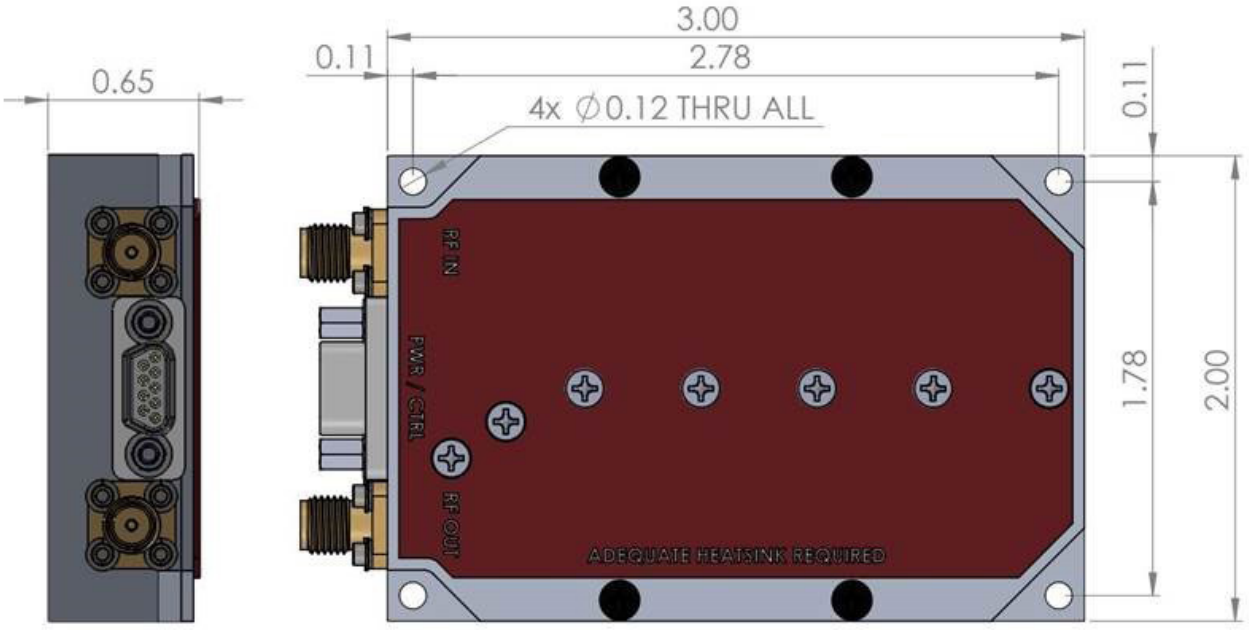
Mechanical Outline



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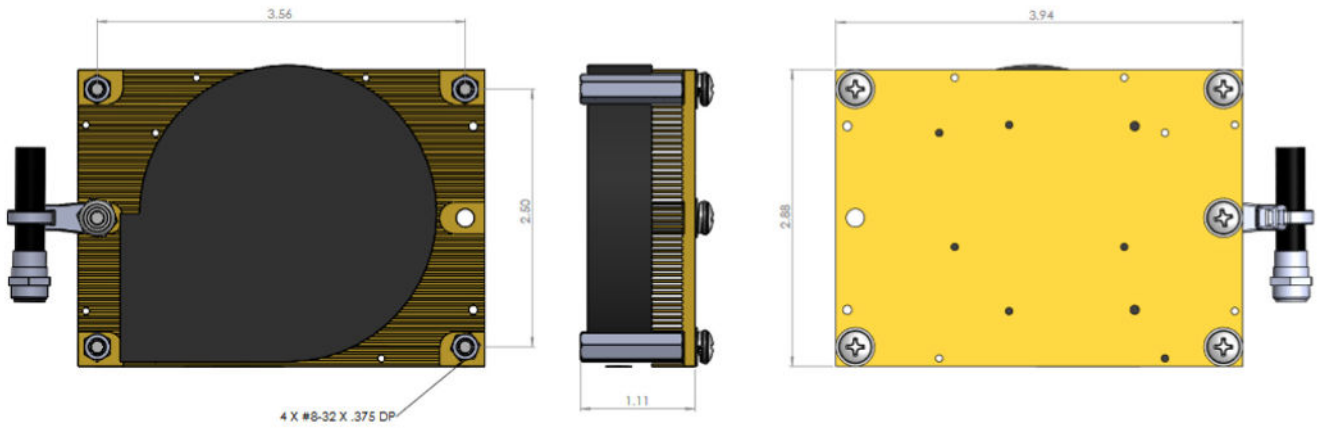
Optional Heatsink Drawing

Heatsink and Integrated Fan: HTSK-01



Accessory Part Numbers - Sold Separately

Part Number	Description
NW-FL-05LPLE-2500-SFSF-M01	Harmonic Filter Module
NW-BA-ACC-CB09MA	Standard Interface Cable Assembly - Flying Leads
NW-BA-ACC-CT09MA	Upgraded Interface Cable Assembly - Banana Plug Termination
HTSK-01	Heatsink with Integrated Fan

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	Logic Voltage
DC Power (Primary Power, +11 to +32 Volts)	I	1, 2, 9	-
Ground (DC Return)	I	3, 4, 5	-
RS-485 Data Transmit	O	6	-
RS-485 Data Receive	I	7	-
T/R Enable	I/O	8	3.3V Logic[2] High: 2.31 - 3.8 VDC Low: -0.5 - 0.99 VDC
T/R Mode: Source (Autosense)[1] T/R Mode: Sink (Manual T/R) [High TX / Low RX]			5V Logic[2] High: 3.5 - 5.5 VDC Low: -0.5 - 1.5 VDC

[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.

Contact NuWaves

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132 Edison Drive
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www.nuwaves.com
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513.360.0800

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