

# NuWaves

## RF Solutions

## NuPower Xtender™ SCISR-20 Tri-Band, Multi-Channel Bidirectional Amplifier

L-Band: 1000 MHz - 2000 MHz  
S-Band: 2000 MHz - 2500 MHz  
C-Band: 4400 MHz - 5100 MHz

P/N: NW-BA-SCISR-20-M02



(Custom options available: contact us at [sales@nuwaves.com](mailto:sales@nuwaves.com) for more information)

**The NuPower Xtender™ SCISR-20 is a multi-channel, tri-band, solid-state bidirectional amplifier (BDA) that provides 20 watts of highly efficient RF power and 15 dB of receive gain†. This BDA is ideal for extending the communication range of multi-channel half-duplex (in-band) or full-duplex (cross-band) transceivers running constant envelope waveforms such as FM, BPSK, and GMSK, as well as high peak-to-average waveforms such as OFDM.**

The efficiency and compact form factor of the NuPower Xtender™ SCISR-20 BDA makes it ideal for size, weight, and power-constrained RF telemetry and tactical communication systems. This solid state BDA features a compact form-factor, allowing the system integrator to easily incorporate the unit into the communications payload of small unmanned aircraft systems (UAS) or other small platforms.

### Features

- Independently-controlled RF channels for half-duplex (in-band) and full-duplex (cross-band) operation
- Auto-sense or manual T/R control
- Optimized size, weight, and power (SWaP)
- High-efficiency GaN technology
- Single or multiple power supply
- Non-proprietary interfaces
- Over-voltage protection
- 3.3 V or 5 V logic control

### Applications

- Unmanned Aircraft Systems (UAS)  
-Group 2 - 5
- 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
- Airborne datalinks allowing ISR and command and control C2 data transmission

### Supports

- Collins Aerospace RT-2071 (C) Secure CDL ISR (SCISR) Radio\*
- Cubic Nano Multiband Transceiver (nMT)/SCISR
- Kratos SCISR/TBS Radio\*
- L3 BANDIT™ 2/SCISR Transceiver

† Band-dependent

\* Verified compatibility with radio OEM

# NuPower Xtender™ SCISR-20

## Specifications

### Absolute Maximums

Parameter		Rating	Unit
Max Device Voltage		32	V
Max Device Current [L- & S-Band]	@ 11 VDC	7.25	A
	@ 28 VDC	3.25	A
	@ 32 VDC	2.75	A
Max Device Current [C-Band]	@ 27 VDC	2.0	A
	@ 28 VDC	2.14	A
	@ 32 VDC	2.25	A
Max RF Input Power @ XCVR Port, $Z_L = 50 \Omega$ , CW [All Bands]		+33	dBm
Max RF Input Power @ ANT Port, $Z_L = 50 \Omega$ , CW [L- & S-Band]		-13.5 (Autosense)	dBm
		+30 (Manual T/R)	
Max RF Input Power @ ANT Port, $Z_L = 50 \Omega$ , CW [C-Band]		+30	dBm
Max Operating Temperature (baseplate)		85	°C
Max Storage Temperature		85	°C

Export Classification
ECCN 5A991.B & 5A991.G

### Electrical Specifications - Operational @ 28 VDC, 25 °C, $Z_S=Z_L=50 \Omega$ , CW, +30 dBm Input Drive (unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	1000		2500	MHz	L- & S-Band
		4400		5100		C-Band
Switching Speed	$T_{XON/OFF}$			2	$\mu$ S	10% to 90%
Operating Voltage	VDC	11	28	32	V	L- & S-Band
		27	28	32		C-Band
Operating Current - Transmit	$I_{DD}$		2.1		A	L- & S-Band
			1.6			C-Band
Operating Current - Receive	$I_{DD}$		90		mA	L- & S-Band
			50			C-Band
Quiescent Current	$I_{DQ}$		90		mA	L- & S-Band
			50			C-Band
Module Efficiency			35		%	L- & S-Band
			22			C-Band

### In-Band and Cross-Band Operation

Each channel operates independent of one another. Here are a few examples of how the SCISR-20 could be operated:

- Receiving on S-band while transmitting on S-band (half-duplex)
- Receiving on S-band while transmitting on C-band (full-duplex)
- Receiving on S-band while transmitting on L- and C-band (full-duplex)
- Receiving on L-, S-, and C-band simultaneously
- Transmitting on L-, S-, and C-band simultaneously

# NuPower Xtender™ SCISR-20

## Specifications (cont.)

Electrical Specifications - Transmit (L- & S-Band) @ 28 VDC, 25 °C,  $Z_s=Z_L=50 \Omega$ , CW, +30 dBm Input Drive (unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
RF Output Power, P <sub>sat</sub>	P <sub>sat</sub>		20		W	
Power Gain	G		13		dB	
Power Gain Flatness	$\Delta G$		1.5		dB	1.0 - 2.5 GHz
Small Signal Gain	G		19		dB	Pin = -5 dBm
Small Signal Gain Flatness	$\Delta G$		$\pm 2.5$		dB	Pin = -5 dBm; 1 - 2.5 GHz
Input VSWR	VSWR		1.9:1			
Output Mismatch VSWR	VSWR			10:1	$\psi$	No damage at all phase angles
Nominal Input Drive Level	P <sub>IN</sub>		+30		dBm	
2nd Harmonic			17		dBc	

Electrical Specifications - Transmit (C-Band) @ 28 VDC, 25 °C,  $Z_s=Z_L=50 \Omega$ , CW, + 30 dBm Input Drive (unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
RF Output Power, P <sub>sat</sub>	P <sub>sat</sub>		10		W	
Power Gain	G		10		dB	
Power Gain Flatness	$\Delta G$		0.4		dB	4.4 - 5.1 GHz
Small Signal Gain	G		18		dB	Pin = -5 dBm
Small Signal Gain Flatness	$\Delta G$		$\pm 2.4$		dB	Pin = -5 dBm; 4.4 - 5.1 GHz
Input VSWR	VSWR		2.8:1			
Output Mismatch VSWR	VSWR			10:1	$\psi$	No damage at all phase angles
Nominal Input Drive Level	P <sub>IN</sub>		+30		dBm	
2nd Harmonic			42		dBc	

Electrical Specifications - Receive (L- & S-Band) @ 28 VDC, 25 °C,  $Z_s=Z_L=50 \Omega$ , -5 dBm Input Drive (unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Receive Gain	G		16		dB	
Receive Gain Flatness	$\Delta G$		$\pm 2$		dB	1 - 2.5 GHz
Receive Noise Figure	NF		1.7			-40 °C
			2			+25 °C
			2.35			+60 °C

Electrical Specifications - Receive (C-Band) @ 28 VDC, 25 °C,  $Z_s=Z_L=50 \Omega$ , -5 dBm Input Drive (unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Receive Gain	G		12.8		dB	
Receive Gain Flatness	$\Delta G$		$\pm 1$		dB	4.4 - 5.1 GHz
Receive Noise Figure	NF		2.2			-40 °C
			2.8			+25 °C
			3.45			+60 °C

# NuPower Xtender™ SCISR-20

## Specifications (cont.)

### Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	7.25 x 4.50 x 1.375	in	Max
Weight	34	oz	
RF Connectors, Input/Output	SMA Female (6x) (2/ea per L-, S-, and C-band)		
Interface Connector	Micro-D, 25-pin Socket		
Cooling	Adequate Heatsink Required		

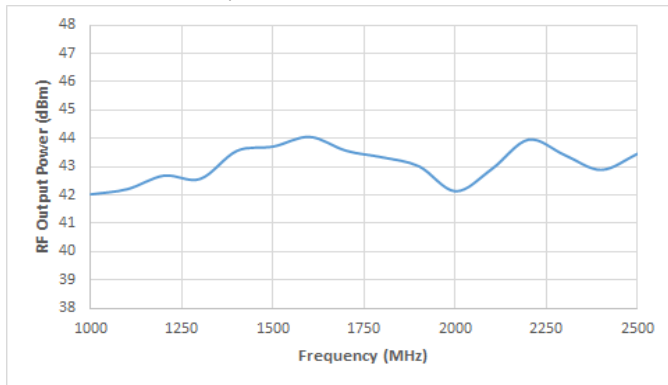
### Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	T <sub>A</sub>	-40		+60	°C
Operating Temperature (baseplate)	T <sub>C</sub>	-40		+85	°C
Storage Temperature	T <sub>STG</sub>	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration Profile (Random profile in x,y, z axis, as per Figure for 15 minute duration in each axis)	<p>The graph shows a trapezoidal vibration profile. The y-axis is Power Spectral Density in g<sup>2</sup>/Hz, and the x-axis is Frequency in Hz. The profile starts at 20 Hz, rises with a slope of +3 dB/octave to 80 Hz, remains flat until 350 Hz, and then falls with a slope of -3 dB/octave to 2000 Hz. Vertical green lines mark the corner frequencies at 20, 80, 350, and 2000 Hz.</p>				

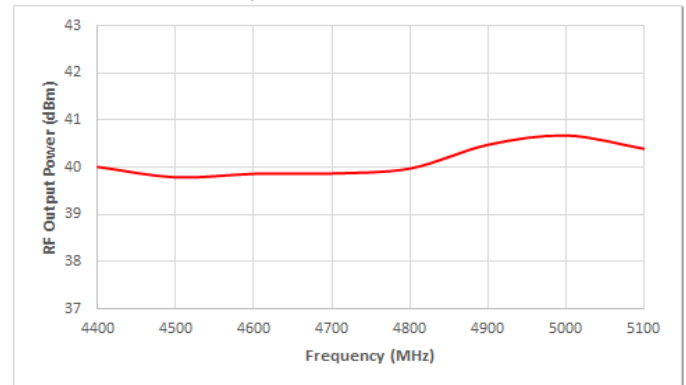
# NuPower Xtender™ SCISR-20

Performance Plots - Transmit @ 28 VDC, 25 °C,  $Z_S=Z_L=50 \Omega$ ,  $P_{in} = +30 \text{ dBm}$

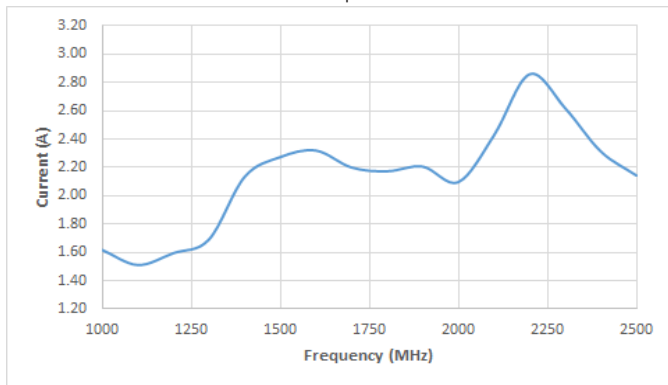
### Output Power - L/S-Band



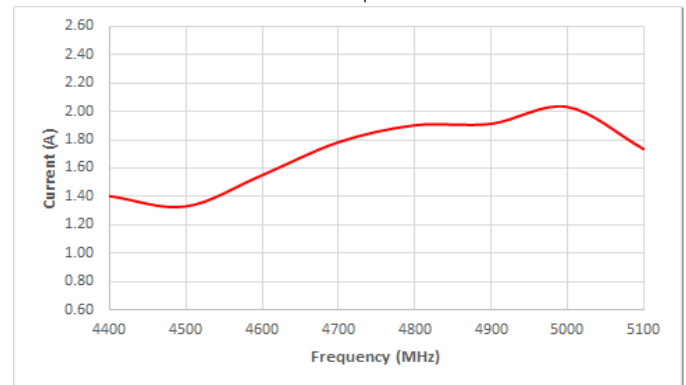
### Output Power - C-Band



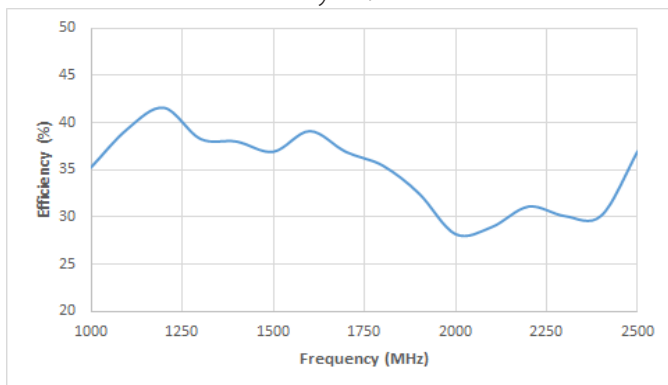
### Current Consumption - L/S-Band



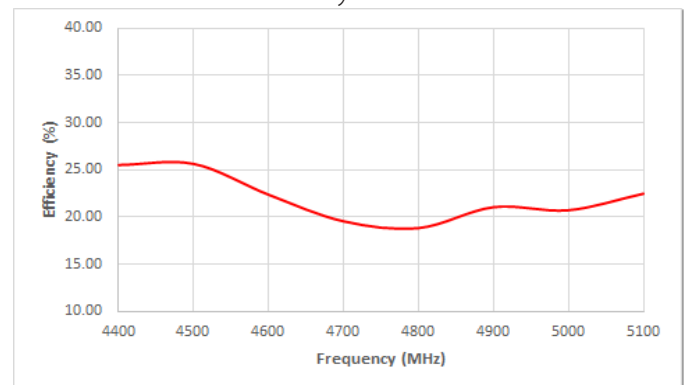
### Current Consumption - C-Band



### Efficiency - L/S-Band



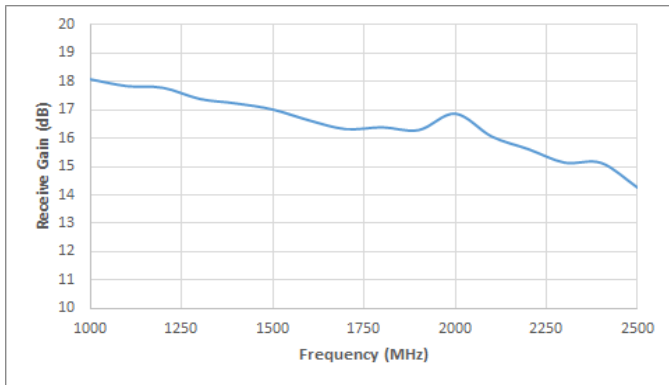
### Efficiency - C-Band



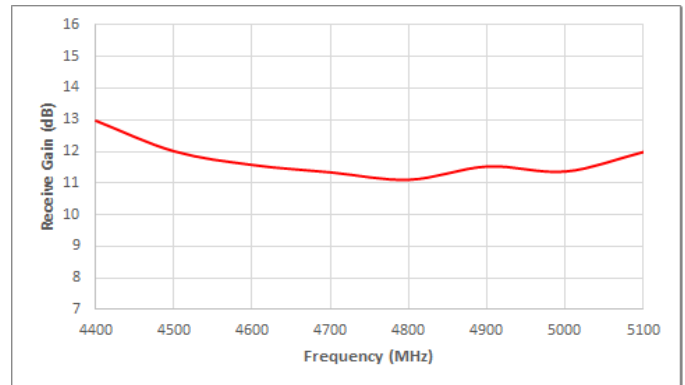
# NuPowerXtender™ SCISR-20

Performance Plots - Receive @ 28 VDC, 25 °C,  $Z_S=Z_L=50 \Omega$ , Pin = -30 dBm

Receive Gain - L/S-Band

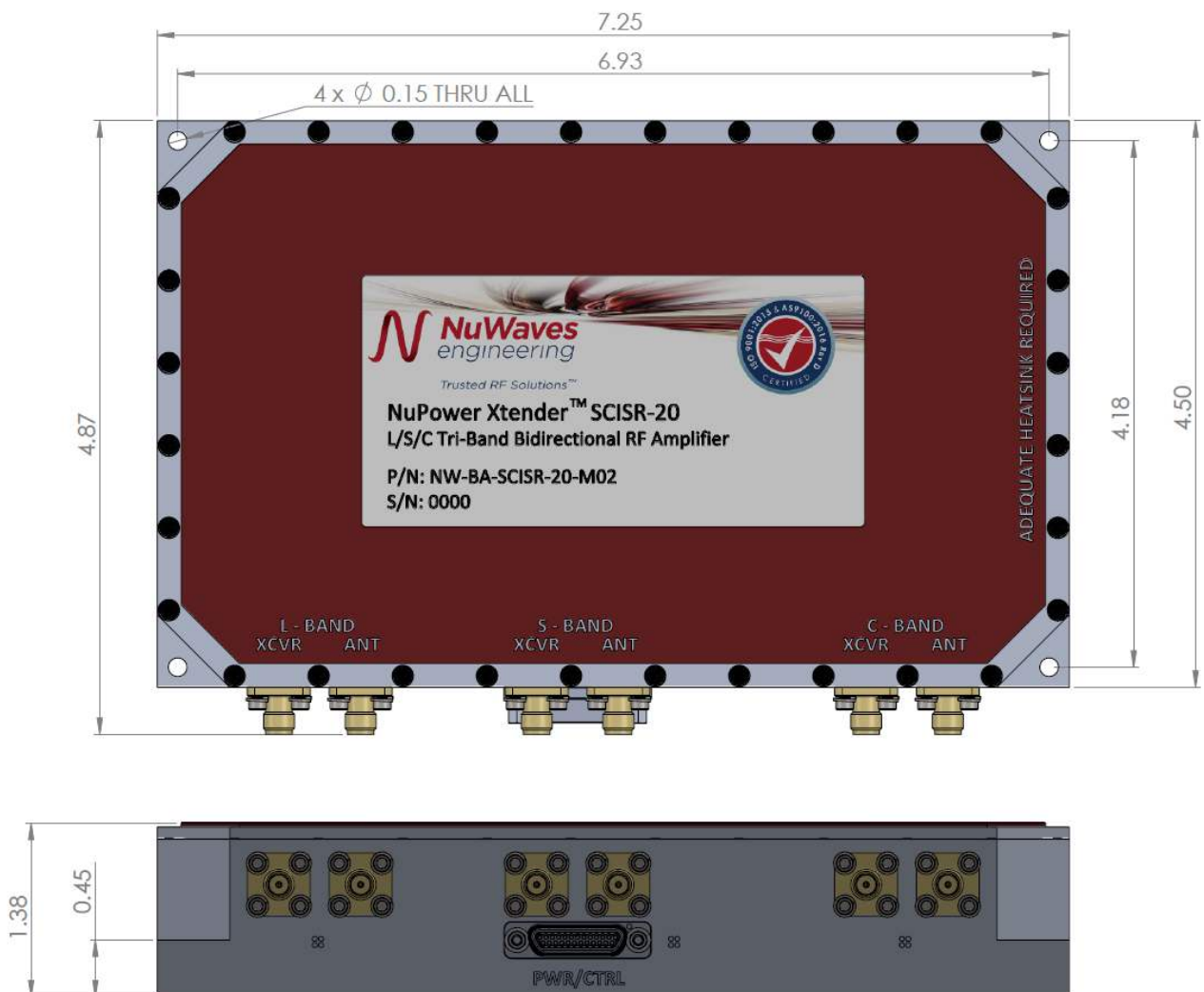


Receive Gain - C-Band



## Mechanical Outline

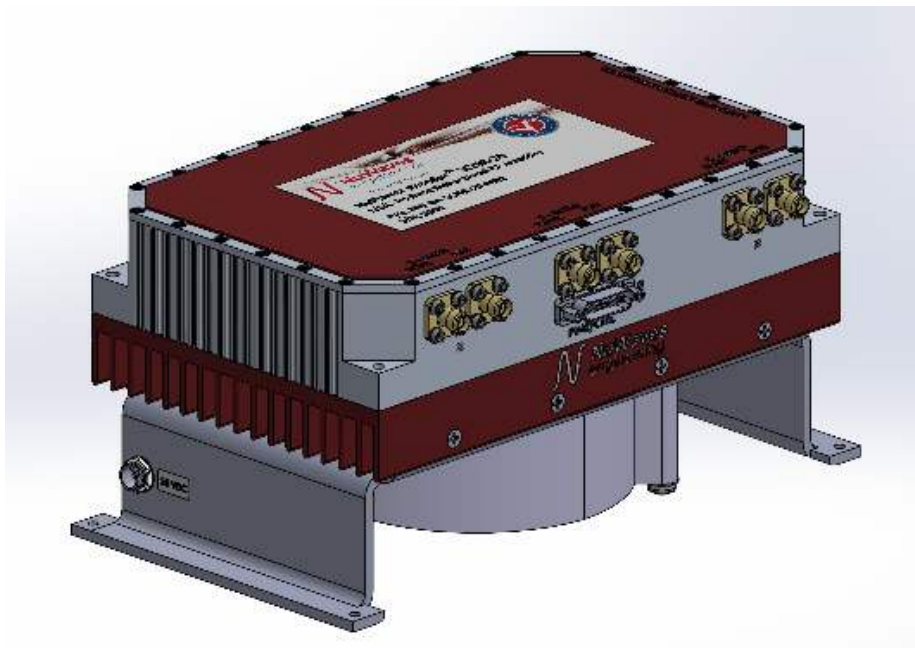
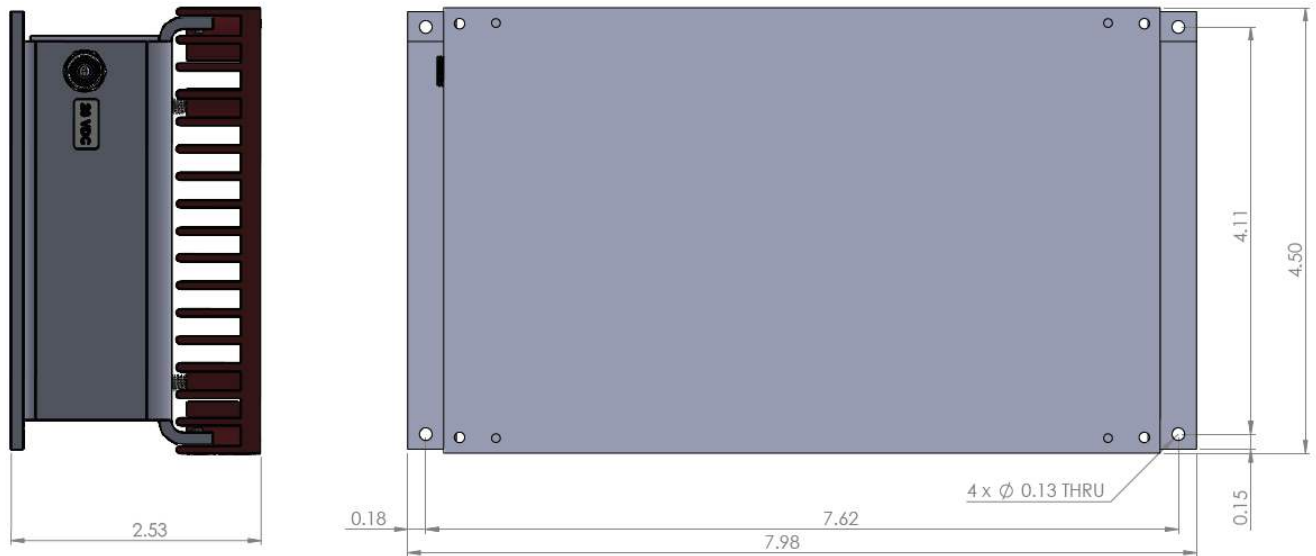
### Module



# NuPowerXtender™ SCISR-20

## Mechanical Outline (cont.)

### Optional Heatsink



# NuPowerXtender™ SCISR-20

## Accessory Part Numbers

Part Number	Description
BDA-CBL-03-F	Standard Interface Cable Assembly - Flying Leads (included with module)
BDA-CBL-03-B	Upgraded Interface Cable Assembly - Banana Plug Termination
HTSK-07	Heatsink with Integrated Fan

## Pinout

Function	I/O	Pin
DC Power, L-Band (+11 to +32 Volts)	I	12, 13, 22
DC Power, S-Band (+11 to +32 Volts)	I	5, 20, 21
DC Power, C-Band (+28 Volts)	I	1, 2
DC Ground, L-Band	I	10, 11
DC Ground, S-Band	I	18, 19
DC Ground, C-Band	I	3, 4
T/R Control, L-Band	O	23
T/R Control, S-Band	O	6
T/R Control, C-Band	O	14
RS-485 Data +, L-Band	I	24
RS-485 Data -, L-Band	I	25
Digital Ground, L-Band	I	9
RS-485 Data +, S-Band	I	7
RS-485 Data -, S-Band	I	8
Digital Ground, S-Band	I	17
Over Temperature Flag, C-Band 0V = Temperature Fault +5V = No Fault	O	15

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 RF Solutions  
132 Edison Drive  
Middletown, OH 45044

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

