DATA SPECIFICATION FOR THE HIGH PERFORMANCE WIDEBAND RF TUNER (HIPERTUNER™)

MODEL NUMBER:

RF200-2500TUNV1

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Superior Engineering Design Services

NuWaves' **High Performance Wideband RF Tuner (HiPerTUNER™)** provides excellent performance where selective filtering is needed, such as a receiver preselector or exciter postselector, over the frequency range of 200 MHz to 2.5 GHz. The HiPerTUNER™ is digitally controlled via a simple terminal program which provides functionality to select frequency and attenuation levels.

1. PRODUCT OVERVIEW

1.1 Introduction

The HiPerTUNER™ is a state-of-the-art miniature RF Tuner utilized for RF signals in the band of 200 MHz to 2.5 GHz. The HiPerTUNER™ meets the demanding need for high performance receiver pre-selector for applications involving RF communications and signal exploitation, inclusive of SIGINT, COMINT, and ELINT. The HiPerTUNER™ integrates with a host controller or terminal program, and utilizes a straight-forward RS-232 command/control serial interface for ease of integration.

The HiPerTUNER™ provides high dynamic range performance over the 200 MHz – 2500 MHz frequency range with low noise figure.

The tuner boasts superb multiple cascaded varactor tuned filtering to remove high energy out-of-band interferers.

As an added benefit, the RF tuner incorporates robust defenses from interface sources by providing over-current and reverse voltage protection.

1.2 Product Highlights

- Exceptionally Wide Frequency Range: The HiPerTUNER™ supports operational frequencies from 200 MHz to 2500 MHz.
- User Definable Frequency Selection: The HiPerTUNER™ is designed to allow end users the ability to select an operational frequency in 1 MHz increments.
- Enclosure: The Multi-Octave RF Upconverter is housed in a rugged aluminum enclosure with SMA connectors.
- User Friendly: The optional Graphical User Interface (GUI) provides the end user a simple method of controlling the output frequency and attenuation.
- High Reliability: NuWaves' selection of conservatively de-rated components provides high reliability and excellent MTBF results. Each HiPerTUNER™ is quality inspected to IPC-A-610 Class III standards.
- RF Attenuation Control: The user has 45 dB of RF level control in 1 dB increments.
- Simple Interface Control: The upconverter uses a straight forward RS-232 command interface.

1.3 Functional Description

The HiPerTUNER™ accepts RS-232 command/control data from a host controller with full duplex capability. The primary host functions are:

- Tune Filters
- Configure Manual Gain Control (MGC) level
- Command the RF tuner into sleep mode

The physical interface to the tuner is a micro-miniature 9-Pin panel mounted male connector which enables the tuner to be mated with a host controller or a terminal program[1] via a cabling harness. RF input and output connections are made through two SMA female connectors.

The HiPerTUNER™'s simple interface consists of a single supply voltage and basic command/control and status lines. [See Figure 1.]

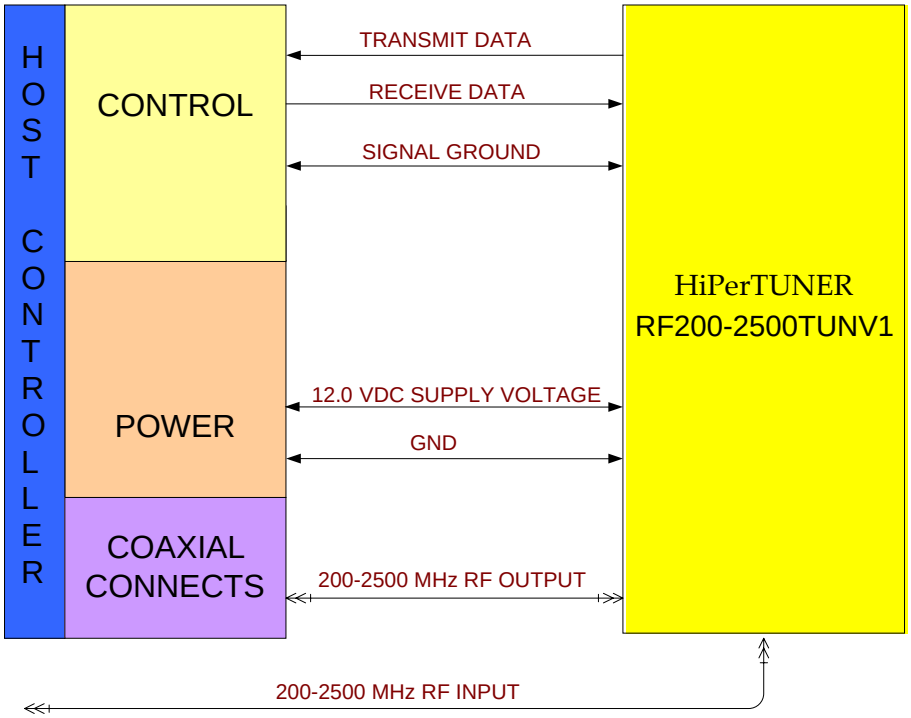

Figure 1: HiPerTUNER™ Interface Signals

[1] NuWaves recommends the Bray software for Terminal Emulation.

The HiPerTUNER™ accepts RF signals, providing continuous frequency coverage from 200 MHz to 2500 MHz. The signal of interest is filtered, amplified, and passed onto a host receiver or transmitter. A top-level block diagram of the tuner is depicted in Figure 2.

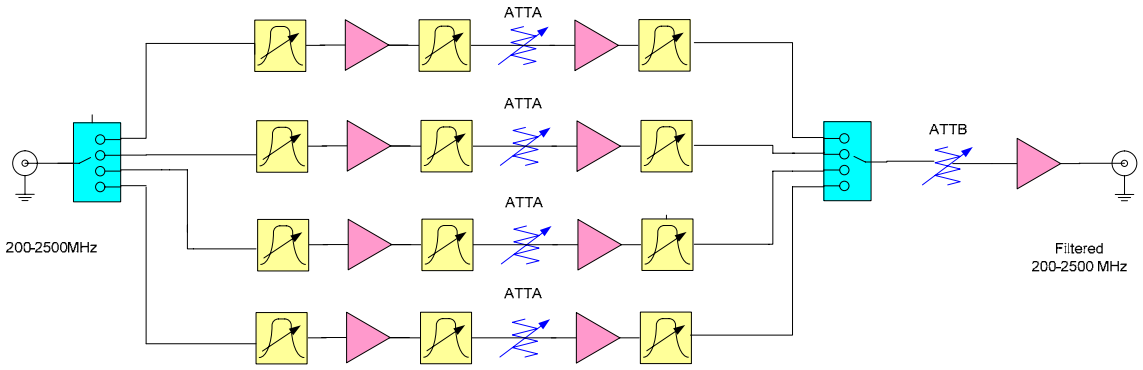

Figure 2: HiPerTUNER™ Basic Block Diagram

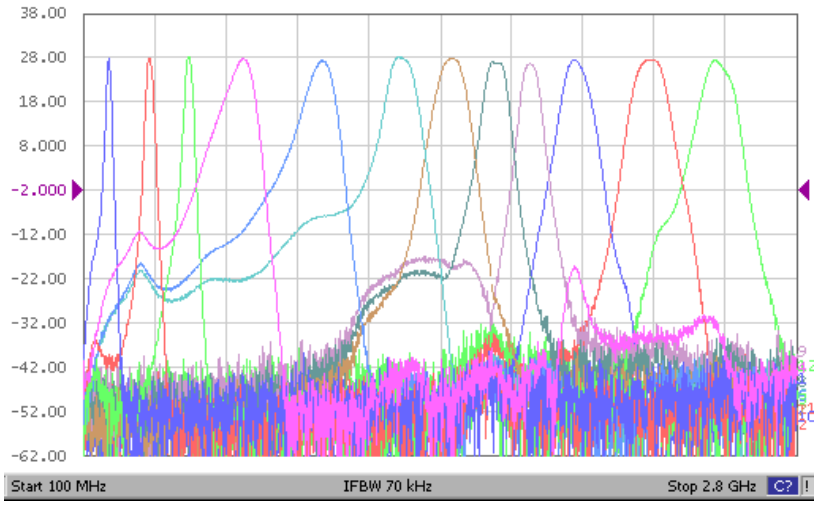

Figure 3: HiPerTUNER™ Frequency Response

1.4 Part Number Ordering Information:

Part Number	Description
RF200-2500TUNV1	**HiPerTUNER™ Module**
RF200-2500TUNV1-KIT	**Development Kit – HiPerTUNER™ Module, Software, Power/Data Interface Cable**

2. HiPerTUNER™ SPECIFICATIONS

System Parameter	Specification
Frequency Range	200 - 2500 MHz
Tuning Resolution	1 MHz
Noise Figure: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 ≤ 8 dB (5 dB typical) ≤ 9 dB (6 dB typical) ≤ 12 dB (6 dB typical) ≤ 10 dB (7 dB typical)
Gain Control	Manual Gain Control (MGC)
Gain Control Range	45 dB in 1 dB Steps
Gain: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 ≥ 28 dB (32 dB typical) ≥ 22 dB (28 dB typical) ≥ 18 dB (22 dB typical) ≥ 21 dB (26 dB typical) Units can be gain leveled to +/- 2dB across entire frequency range – consult Factory
P1dB: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 ≤ 6 dBm (8 dBm typical) ≤ 7 dBm (9 dBm typical) ≤ 8 dBm (10 dBm typical) ≤ 9 dBm (11 dBm typical)
RF Input Level – No Damage	+20 dBm
OIP3: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 ≤ 7 dBm (15 dB typical) ≤ 16 dBm (18 dB typical) ≤ 12 dBm (16 dB typical) ≤ 15 dBm (17 dB typical
IIP2	-15 dBm
3 dB Bandwidth: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 5% BW typical 8% BW typical 4% BW typical 3% BW typical

System Parameter	Specification
10 dB Bandwidth: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 9% BW typical 15% BW typical 7% BW typical 6% BW typical
20 dB Bandwidth: 200 – 500 MHz 500 – 1300 MHz 1300 – 1800 MHz 1800 – 2500 MHz	 13% BW typical 23% BW typical 11% BW typical 9% BW typical
Tuning Speed	50 mS (For faster tuning consult factory)
Input VSWR	≤ 2.5:1
Output VSWR	≤ 2.5:1
Reverse Voltage Protection	40 VDC
Dimensions (Nominal)	6.5” x 4.0” x 0.75” (L x W x H)
Power Supply	12 VDC typical (9 – 16 VDC)
Tuner Current (@ 12VDC): Normal Mode Sleep Mode	 150 mA typical 15 mA typical
Operating Temperature	-20° C to +50° C
Storage Temperature	-40° C to +85° C
Digital Interface	RS-232
Multi-Drop RS-232 (Contact Factory)	Up to Eight Units (address configured by hardware)
Digital Interface Data Rate	9600 bps (8N1)
Control Interface Connector	9 pin micro-miniature D-sub connector (M)
RF Input Connector	SMA (F)
RF Connector Impedance	50 Ω
RF Output Connector	SMA (F)
RF Output Impedance	50 Ω
Mode	Standard or Multi-Drop (configured at factory) Default is standard mode Bus Address preset prior to shipping

3. INSTALLATION, CONNECTING, AND USING THE HiPerTUNER™

The **RF200-2500TUNV1** module has been designed to be highly reliable under the specified operating conditions. The following installation and hook-up guidelines should be followed to prevent damage to the module. The input voltage of the module is designed to operate at 12VDC; damage can occur if you exceed 16 VDC.

The interface pin-out definitions and the command strings for programming the HiPerTUNER™ are detailed in NuWaves' document number 6008-1000-1201 entitled "Specification and Interface Control Document (ICD) for the High Performance Wideband RF Tuner (HiPerTUNER™)". Consult the factory to request subject document.

The HiPerTUNER™ contains components that are sensitive to Electro-Static Discharge (ESD). The use of wrist strap, mats, and ground straps should be adhered to during the installation process.

The enclosure is NOT watertight, so the electronics of the unit must be kept away from moisture to prevent damage.

4. MECHANICAL

The following figure provides a dimensional view of the RF200-2500TUNV1 tuner outline drawing and mounting.

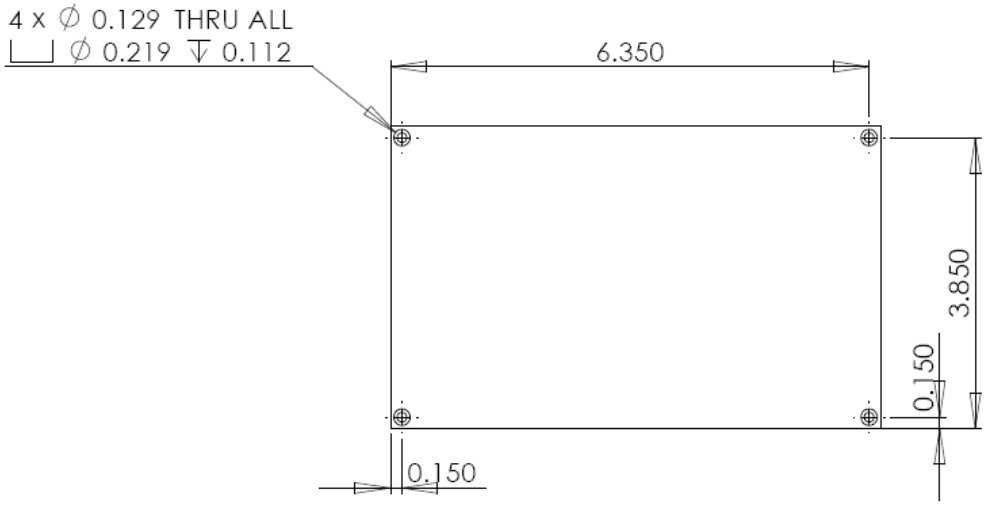

Figure 4: HiPerTUNER™ Outline Drawing

Outline Dimensions	
Length	6.50 in
Width	4.00 in
Height	0.75 in
Weight	TBD oz. (typ)

5. GETTING ASSISTANCE – APPLICATIONS ENGINEERING

NuWaves is proud of its products, and getting assistance on the HiPerTUNER™ module is easy.

Sales and Technical Solutions Engineering:

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Email: kharrison@nuwaves-ltd.com

NuWaves Home Page: www.nuwaves-ltd.com

Standard Product Warranty: http://nuwaves-ltd.com/pdf/Standard_Warranty.pdf

6. GENERAL INFORMATION