

User Guide

Spectrum Recorder



RF Spectrum Data Logger for UHF Band Wireless Audio Devices

Note: This user guide applies to devices using Firmware 3.2 or later. Go to <https://www.rfvenue.com/spectrum-recorder-3.2-firmware-update> to get the latest firmware upgrade and directions.

Rear Panel Features

- 1 Ethernet / PoE RJ45 connection. Use for GUI access and/or network-based scan retrieval.
- 2 USB-A connection (for storage drive). Use a FAT32 format thumb drive to manually retrieve scans.
- 3 USB-C (for 5V, 1A supply); used for power if PoE is not available. A 5-volt DC power supply is included.
- 4 Indicator LEDs:

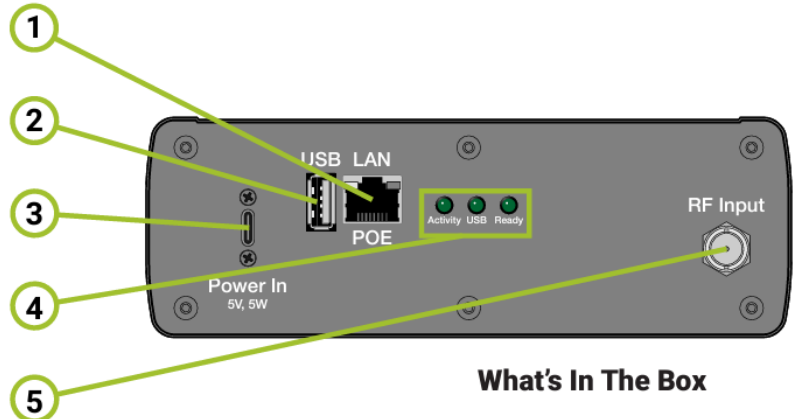
Activity — Blinks once per second while the Spectrum Recorder is operating.

USB — Indicates files are being copied to a storage drive plugged into the USB port.

Ready — Indicates that one or more new files are available to retrieve.

Note: A completed startup or reboot is indicated by the three LEDs lighting in sequence, 3x.

- 5 RF input from an antenna or antenna distribution system. Maximum input level is -20 dBm (10 μ W). A wideband whip antenna included for standalone operation.



What's In The Box

- Spectrum Recorder
- UHF wideband whip antenna
- 5V USB-C power supply with cable

Getting Started

- For standalone operation attach the included antenna or an output from an antenna distro to the RF input. Connect power with the included 5 VDC supply via the USB-C connection or PoE using the RJ45 connector.
- Insert a FAT32 formatted thumb drive to transfer scans in csv format to any other device. The activity light will blink 1x per second to indicate files are available to transfer.
- When connected directly to a computer via the RJ45, (without a network) the Spectrum Recorder will have a self-assigned IP address of 168.254.0.124. Enter this IP address in a browser to access the Spectrum Recorder via the GUI.
- If connected via a network the IP address will be provided by the router. The spectrum recorder GUI will be available by entering rfvenuespecrec.local on PC or rfvenuespecrec.lan on Mac in a browser (unless you have changed the host name in the GUI).

General Operation

The Spectrum Recorder is a dedicated device for continuous monitoring of the UHF frequency band primarily used for wireless audio transmission. Upon activation, it begins a new recording session and subsequently initiates a fresh session every 24 hours. The recorder is capable of scanning from 15 to 2700 MHz via the GUI in a web browser. The default scan settings are from 400 to 700 MHz spectrum in 25 kHz increments every 20 seconds. The Spectrum recorder also calculates and stores average values of the preceding 30 scans every 10 minutes as CSV files. Additionally, it generates daily reports

containing average, maximum, and dynamic frequency activity data. These reports aid in identifying frequency usage patterns and potential interference sources. The device can store up to 99 recording sessions, after which it overwrites the oldest data.

The Spectrum Recorder attempts to synchronize its internal clock with an online time server when connected to a network. If successful, CSV filenames generated every 10 minutes will include a timestamp in the format nn_xxx_yyyymmdd_hhmmss.csv. If a network connection is unavailable use the GUI to create a suitable timestamp. If there is no network access and no manual timestamp is added by the user, CSV files will be named in a simplified format: nn_xxx.csv.

In either case, the session number is **nn** and the file number is **xxx**. The date and time information is depicted in integers as **yyymmdd** and **hhmmss**. See *Descriptions of file types* on page 3 for more details.

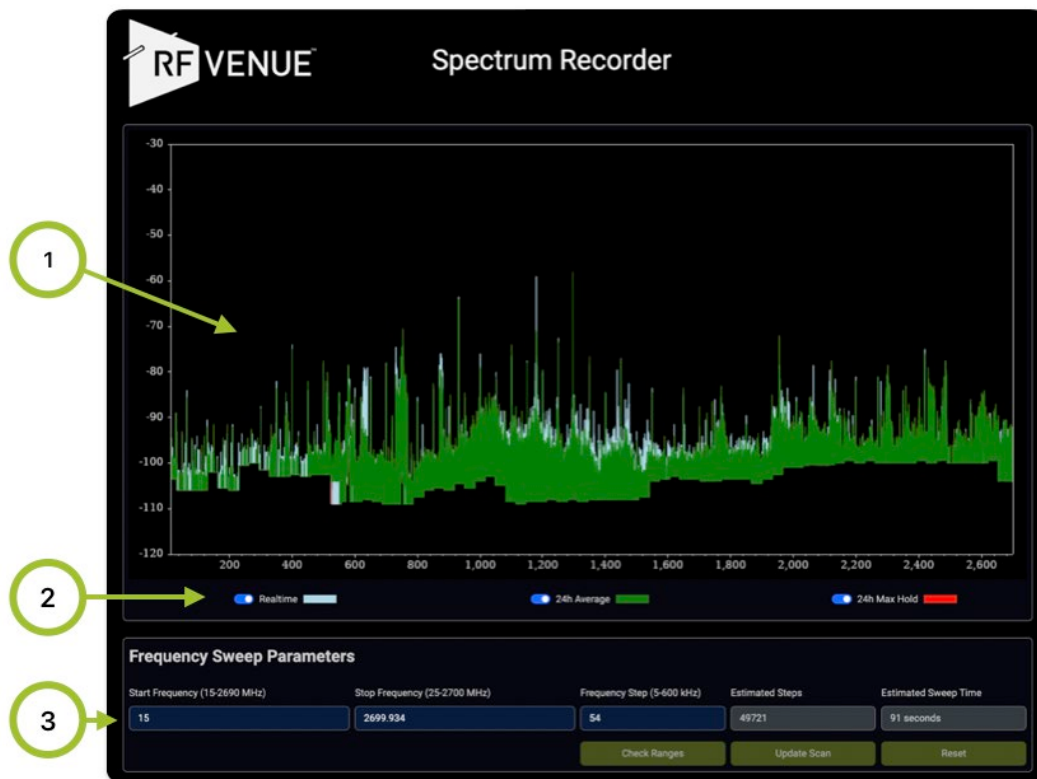
Each CSV file is approximately 165 kB in size and contains 12000 lines of data per the standard format used in wireless audio.

The first *column* is *ff.fff*: The frequency in MHz

The second *column* is *vv.v*: The amplitude in dBm.

Using the Graphical User Interface

(requires firmware 3.2 or later)



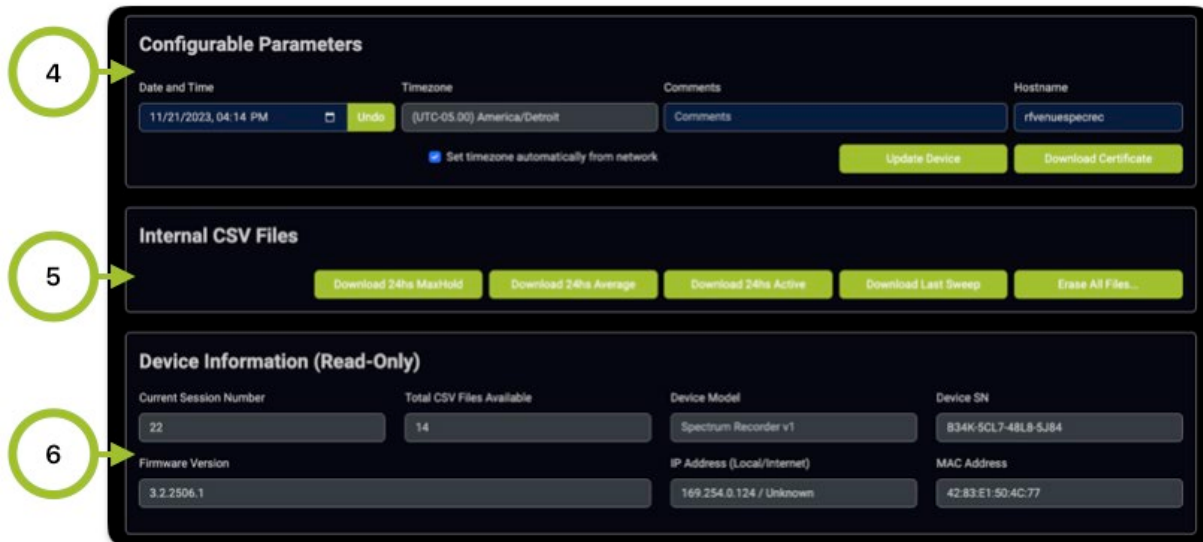
1. **Spectrum Display Scans** - toggle the switches on/off to display or hide scan types
 - a. Realtime - the most recent live scan
 - b. 24h Average - The average of all scans for the current scan setting from the last 24 hours
 - c. 24h Max Hold - The max value of all scans for the current scan setting from the last 24 hours

Note: 24h scans reset when the scan settings are changed

2. **Scan File Types to display** - allows the user to choose which scans to display

3. **Scan Settings:** (default is 400 - 700MHz)

- a. Select the desired start and stop frequency (MHz) plus the desired step size (kHz). The permissible values are indicated in parenthesis. Any changed values will turn red.
- b. Click on the **Check Ranges** button. The system will:
 - i. adjust any out of range parameters
 - ii. And estimate the time needed to complete the scan. Scan time is proportional to the number of steps needed to complete the scan.
- c. **Update Scan** will refresh the scan using the current settings
- d. **Reset** will return the scan settings to their default value.



4 → **Configurable Parameters**

Date and Time: 11/21/2023, 04:14 PM Timezone: (UTC-05:00) America/Detroit Comments: Comments Hostname: rfvenuespecrec

☒ Set timezone automatically from network

5 → **Internal CSV Files**

6 → **Device Information (Read-Only)**

Current Session Number	Total CSV Files Available	Device Model	Device SN
22	14	Spectrum Recorder v1	B34K-5CL7-48L8-SJ84
Firmware Version	IP Address (Local/Internet)	MAC Address	
3.2.2506.1	169.254.0.124 / Unknown	42:83:E1:50:4C:77	

4. Spectrum Recorder Configuration Settings

- a. **Date and Time:** indicates the current system time (if on a network) and allows the user to manually add a time stamp if offline (uncheck the **Set time zone automatically** box).
- b. **Comments:** provides a means for adding comments to a particular scan setup or scenario. Comments entered here appear only in the GUI for this device.
- c. **Hostname** - indicates the current network name for this Spectrum Recorder and allows the user to change the network name. This can be useful if there are multiple Spectrum Recorders on a network.
- d. **Update Device** - applies any changes made in the Configuration Parameters to Spectrum Recorder
- e. **Download Certificate** - will provide a security certificate if needed for a secure (https) connection.

5. Internal CSV Files

- a. The download buttons provide a means for downloading the selected scan type directly to your computer without a thumb drive. *Note: only the most recent live scan is available from here.*
- b. **Erase All Files** - erases all the internal files on the Spectrum Recorder. This creates a clean starting point for a remote or new facility scan.

6. **Device Information (Read-only)** - provides useful information about a particular Spectrum Recorder including: Session Number, Total CSV Files on the internal memory, device Model, device serial number, firmware version, IP Address and MAC address.

Retrieving Files

Using USB drive (simplest method)

- 1 To transfer data from the Spectrum Recorder, insert a USB drive formatted in FAT32 with a minimum capacity of 2 GB into the USB-A port. The USB indicator will illuminate while the device automatically copies all recorded data to the drive. Ten-minute scan files will be saved directly in the root directory of the USB drive, while the three daily session files will be organized within a folder named "24 Hour Spectrum Files."
- 2 When the transfer is done, the LED will turn off and you may remove the drive.
- 3 The Spectrum Recorder will also have created a folder called Configuration. In it will be a log file, log.txt, that lists all the files copied to the drive by the Spectrum Recorder. Another file, version.txt, will contain the Spectrum Recorder's vital information: firmware version, serial number, session number, number of files in the session, session span time, Media Access Control (MAC) address, Internet Protocol (IP) address, and the system time when the file dump occurred. The IP address and MAC address may be of use for other functions.

Via Network Drive Connection

The Spectrum Recorder can be mounted as a Network Drive using the Host Name (See the GUI) to provide full access to all files stored in the internal memory. The internal memory is sufficient for storing up to 99 days of continuous scans (based on the default settings).

Description of the File Types

Scan Files

The Spectrum Recorder completes a scan of 400 to 700 MHz every 20 seconds. Every 10 minutes, the system aggregates 30 scans conducted during this period and writes a CSV file. These three additional files are generated and updated from this data:

Average Capture File (Avg.csv):

- This file represents the average frequency spectrum capture over the last 24 hours or since the device was turned on. It is updated every 10 minutes.

Maximum Hold Detection File (MaxHold.csv):

- This file represents the highest values detected across all scans over the last 24 hours or since the device was turned on. It is updated every 10 minutes.

Active Frequencies File (Active.csv):

- This file highlights the dynamically active frequencies by showing the differences between the maximum hold and the average values for each frequency step over the last 24 hours or since the device was turned on. It is updated every 10 minutes.