

USER GUIDE

RTL-SDR Blog V4L (Lite)

USB SDR Receiver 500 kHz to 1.766 GHz · R828S + RTL2832U

Important Notes

The V4L requires up-to-date drivers compatible with the R828S tuner. With an outdated driver, the dongle may be detected but will not receive any signals. HF reception is handled by a built-in upconverter: do not enable “direct sampling” mode.



The V4L Lite is available in Europe from Passion Radio:

<https://www.passion-radio.com/rtl-sdr-stick/r828s-v4l-3214.html>

1. Overview

The RTL-SDR Blog V4L (Lite) is a USB software-defined radio (SDR) receiver designed for listening to and experimenting with radio across a very wide frequency range. It uses the same architecture as the V4 with an integrated RF converter, but employs the Rafael Micro R828S tuner and a diplexed RF/VHF-UHF input filter instead of the V4's triplexing.

Practical implication: The V4L offers slightly better sensitivity due to lower filtering losses, but it is less protected than the V4 against desensitization caused by very strong out-of-band signals. In busy RF environments, an external filter or attenuator may therefore be useful.

2. Technical Specifications

Specifications	Value
Tuner	Rafael Micro R828S
A/D Converter	RTL2832U, 8-bit
Frequency Range	500 kHz to 1.766 GHz
Stable bandwidth	2.56 MHz stable; up to 3.2 MHz with risk of sample loss
Typical RF impedance	50 Ω
Typical power consumption	250 to 270 mA
HF reception	Integrated upconverter, LO 28.8 MHz
Antenna connector	SMA female, 50 Ω
USB connector	USB-A male
Oscillator stability	TCXO 1 ppm
Bias-T	4.5 V, up to 180 mA, software-enabled
Housing	Aluminum
Heat Dissipation	Thermal pad to aluminum housing
Input RF architecture	HF / VHF-UHF Diplexer
Transmission	None: reception only

Key difference from the RTL-SDR Blog V4

The V4 uses an R828D tuner with three inputs and RF input triplexing. The V4L uses an R828S with two inputs and HF / VHF-UHF diplexing. The V4L retains the built-in HF converter, the 1 ppm TCXO, the 4.5 V Bias-T, the Bias-T LED, the improved power supply, and the aluminum case.

3. Before First Use

- Use an antenna suitable for the frequency band you are listening to. An outdoor antenna, placed high up and in an unobstructed location, greatly improves reception.
- Preferably connect the dongle directly to a reliable USB port. Long USB extension cables and certain unpowered hubs can cause voltage drops or disconnections.
- Install a recent V4L driver before concluding that the device is malfunctioning. Older drivers may recognize the USB interface but fail to properly control the R828S tuner.
- The RTL-SDR V4L is a receiver only: it cannot transmit.

4. Installation on Windows with SDR#

The procedure below follows the guidelines in the official RTL-SDR Blog quick start guide. Recent versions of SDR# include the download of the RTL-SDR Blog driver branch via the installation script.

1. Download the latest version of SDR# and fully extract the archive to a local folder. Avoid the “Program Files” folder to minimize write permission issues.
2. Run the “install-rtlsdr.bat” file located in the SDR# folder. The script downloads the rtlsdr.dll library and the Zadig tool, among other things.
3. Plug the RTL-SDR V4L into a USB port and wait a few seconds for Windows to finish detecting the device.
4. Launch Zadig as an administrator, then open “Options > List All Devices.”
5. Select “Bulk-In, Interface (Interface 0)” or, depending on your system, the RTL2832U / RTL2832UHIDIR / Blog V4L entry corresponding to the USB identifier 0BDA:2838. Do not select “Interface 1” or any other USB device.
6. Select the WinUSB driver, then click “Replace Driver” or “Install Driver.”
7. Open SDR#, select the “RTL-SDR USB” source, then start reception.
8. Adjust the RF gain: a gain setting of 0 may only allow very strong stations to appear. Gradually increase the gain until you achieve the best signal-to-noise ratio without saturation.

Important - Zadig

Zadig replaces the driver for the selected device. Carefully verify that you have selected the RTL-SDR interface (Interface 0 / USB ID 0BDA:2838). Selecting a keyboard, mouse, or other device by mistake may replace its driver.

5. Updating V4L Drivers on Windows

For software that does not yet natively support V4L, the official documentation recommends replacing the RTL-SDR library with the latest version from the RTL-SDR Blog.

1. Download the archive of the latest version (“Releases.zip”) from the official rtlsdrblog/rtl-sdr-blog repository.
2. Copy the “rtlsdr.dll” file appropriate for your software’s architecture into the application folder, replacing the old version.
3. Most 64-bit software uses the DLL from the x64 folder. Some 32-bit programs, including certain versions of SDR#, welle.io, or RTL1090, use the x86 DLL.
4. If necessary, also copy the msvcrt100.dll and pthreadVC2.dll libraries provided with the driver version.

6. Software and Special Cases

SDR++, SDR-Console, GQRX, and maintained software

Actively maintained SDR software increasingly includes the latest drivers. If the V4L is recognized but does not receive any signal, check to make sure that the embedded version of the driver explicitly supports the R828S / Blog V4L.

HDSDR and SDRUno

Use the RTL-SDR Blog-compatible ExtIO. In these programs, disable “IF AGC,” which does not work correctly with the V4/V4L architecture according to the official documentation.

Spektrum

The official guide recommends replacing the librtlsdr.dll library in the spektrum\lib folder with the latest version of rtl_sdr.dll—renamed to librtlsdr.dll—along with the necessary accompanying DLLs.

7. HF Reception: Direct Sampling Not Enabled

The V4L receives HF directly starting at 500 kHz thanks to its built-in upconverter. Therefore, simply set the software to the desired HF frequency. Unlike the RTL-SDR Blog V3, you must not enable “direct sampling”: on the V4L, this mode does not produce a usable reception.

- Usable HF range starting at 500 kHz.
- Adjustable HF gain via the tuner after conversion.
- No Nyquist foldback around 14.4 MHz, unlike the previous direct-sampling HF reception.
- If very powerful stations are present, use a bandpass filter, a band-stop filter, or an external attenuator as needed.

8. 4.5 V Bias-T: Powering an LNA or an active antenna

The RTL-SDR Blog V4L includes a software-switchable Bias-T on the SMA connector. It provides approximately 4.5 V and can deliver up to 180 mA continuously to power an LNA, an active antenna, or a compatible converter via the coaxial cable.

Bias-T Warning

Do not enable the Bias-T on an antenna that has a direct DC short circuit at its input, unless a powered device designed for this purpose (such as an LNA) is inserted between the antenna and the dongle. The circuit includes protective measures, but a prolonged short circuit may damage the regulator or the resettable fuse.

Enabling in Software

- SDR# / SDR++: When the software directly offers a “Bias Tee” checkbox, use this option.
- With the RTL-SDR Blog drivers, some interfaces use the “Offset Tuning” option to control the Bias-T.
- At the command line: “rtl_biast -b 1” enables the Bias-T, and “rtl_biast -b 0” disables it. Close any other software using the dongle before running rtl_biast.
- The red LED near the SMA connector lights up when the Bias-T is active.

Force Bias-T at startup

The RTL-SDR Blog driver allows you to write a flag to the EEPROM that forces the Bias-T to be active using the command “rtl_eeprom -b 1.” Unplug and then plug the dongle back in after writing the flag. This feature only works if the system is using a compatible RTL-SDR Blog driver.

9. Linux

On Linux, the official documentation recommends removing the old RTL-SDR libraries and then installing the latest RTL-SDR Blog branch. The procedure is as follows:

```
sudo apt purge ^librtlsdr
sudo apt-get install libusb-1.0-0-dev git cmake pkg-config build-essential
git clone https://github.com/rtlsdrblog/rtl-sdr-blog
cd rtl-sdr-blog && mkdir build && cd build
cmake ../ -DINSTALL_UDEV_RULES=ON
make
sudo make install
sudo cp ../rtl-sdr.rules /etc/udev/rules.d/
sudo ldconfig
```

You must then disable the kernel’s DVB-T driver if it takes control of the dongle, then reboot the system. Specialized distributions and images (FlightRadar24, FlightAware, ADSBExchange, OpenWebRX+) may require rebuilding or reinstalling their librtlsdr packages so that they use the new library.

10. macOS and Android

macOS

Support depends heavily on the software, as many applications include their own RTL-SDR library. When software can use rtl_tcp, compiling a compatible version locally may be a solution. Always check the documentation for the software you’re using before purchasing if macOS is your primary platform.

Android

The official V4L page states that, at the time of publication, SDR Touch / RTL-SDR TCP Driver, SDR++, and SDRangel on Android did not yet officially support V4L. This may change: use a recent version and explicitly check for V4L/R828S compatibility.

11. Reception Tips and Handling Strong Signals

- Adjust the gain manually rather than automatically seeking the maximum gain: too much gain can saturate the converter and degrade reception.
- In urban environments near powerful FM, DAB, or AM transmitters, use a suitable external filter if necessary.
- The V4L is slightly more sensitive than the V4 due to lower input filtering losses, but its behavior when faced with very strong out-of-band signals is closer to that of the V3.
- For weak signals, first optimize the antenna, height, line-of-sight, and coaxial cable losses before adding an LNA.

12. EEPROM: Do not modify the product identifiers

The drivers use EEPROM strings to correctly identify the model. Do not modify the manufacturer and product fields.

Field	Value
Manufacturer	RTLSDRBlog
Product	V4L Blog

13. Quick Troubleshooting

Symptom	Checks / Solution
The dongle is detected but no signal appears	Update the driver / rtl_sdr.dll to a V4L-compatible version. Also check the RF gain and make sure the correct RTL-SDR USB source is selected.
Signals at an inconsistent frequency or abnormal behavior	First, check the driver version and ensure that the product's EEPROM strings have not been modified.
"No Device Selected" in SDR#	Run install-rtl_sdr.bat again, verify that rtl_sdr.dll is present, and reinstall WinUSB on Interface 0 using Zadig.
USB Disconnections	Try a different port, preferably USB 2.0; remove long extension cables or unpowered hubs.
Very Weak Reception	Gradually increase the RF gain, test with a better-positioned antenna, and check the cables and connectors.
The Bias-T does not activate	Make sure the latest RTL-SDR Blog driver is loaded and that no other software is locking the dongle while using rtl_biast.
No HF reception	Do not enable direct sampling; set the HF frequency directly using a V4L-compatible driver.
Spectrum Interference Near Powerful Transmitters	Reduce the gain and add a filter or an external attenuator suitable for the band to be received.

14. Official Sources and Resources

- [RTL-SDR User Guide V4L Blog](#)
- [RTL-SDR Quick Start Guide](#)
- [RTL-SDR Blog Drivers](#)
- [Passion Radio - RTL-SDR receivers and dongles](#)

The V4L Lite is available in Europe at Passion Radio:

<https://www.passion-radio.com/rtl-sdr-stick/r828d-v4-2402.html>