RTL-SDR Blog V4 Datasheet

The RTL-SDR Blog V4 is an improved RTL-SDR dongle. RTL-SDR dongles were originally designed for DVB-T HDTV reception, but they were found by hardware hackers to be useful as a general purpose SDR. The standard dongles are okay for DVB-T reception but are just barely suitable for SDR users/experimenters. The RTL-SDR Blog V4 was redesigned with SDR user needs in mind, instead of DVB-T HDTV users who typically have more relaxed requirements.

Tuner Chip	R828D
ADC Chip	RTL2832U 8-bits
Frequency Range	500 kHz to 1.766 GHz
Bandwidth	2.56 MHz stable (up to 3.2 MHz with drops)
Typical Input Impedance	50 Ohms
Typical Current Draw	250 – 270 mA
HF Implementation	Upconverter with 28.8 MHz LO
Input Connector	1x SMA
USB Connector	USB-A Male
Local Oscillator Stability	1PPM TCXO
Bias Tee	4.5V, 180mA (software switchable)
Enclosure	Aluminum
Heat Dissipation	Thermal Pad to Aluminum Enclosure
Front End RF Design	Triplexor with switchable notch
Transmit Capability	None

Improvements on the V4 model

- **Improved HF Reception.** Now uses a built in upconverter instead of using a direct sampling circuit. This means no more Nyquist folding of signals around 14.4 MHz, improved sensitivity, and adjustable gain on HF. Like the V3, the lower tuning range remains at 500 kHz and very strong reception may still require front end attenuation/filtering.

- **Improved filtering.** The V4 makes use of the R828D tuner chip, which has three inputs. We triplex the SMA input into three bands, HF, VHF and UHF. This provides some isolation between the three bands, meaning out of band interference from strong broadcast stations is less likely to cause desensitization or imaging.

- **Improved Filtering x2.** In addition to the triplexing, we are also making use of the open drain pin on the R828D, which allows us to add simple notch filters for common interference bands such as broadcast AM, broadcast FM and the DAB bands. These only attenuate by a few dB, but may still help.

- **Improved phase noise on strong signals.** Due to an improved power supply design, phase noise from power supply noise has been significantly reduced.

- **Less heat.** Due to the improved power supply design the V4 uses slightly less current and generates slightly less heat compared to the V3.

Purchase at: www.rtl-sdr.com/store

Quickstart setup guide available at: www.rtl-sdr.com/qsg

Online Users Guide: https://www.rtl-sdr.com/v4

Drivers

The RTL-SDR Blog V4 requires up to date drivers in order to function.

Modern actively maintained software like SDR#, SDR++, SDR-Console V3 and GQRX already ships with up-to-date drivers.

In Windows some older and unmaintained/abandoned software may require you to manually update the drivers by replacing a .dll file.

In Linux, you will need to update the system drivers.

Please consult www.rtl-sdr.com/V4 for information about updating the drivers if necessary.

Bias Tee

RTL-SDR Blog V3 and V4 introduces a 4.5V bias tee that can be toggled entirely in software. The bias tee can continuously pull up to 180 mA of current.

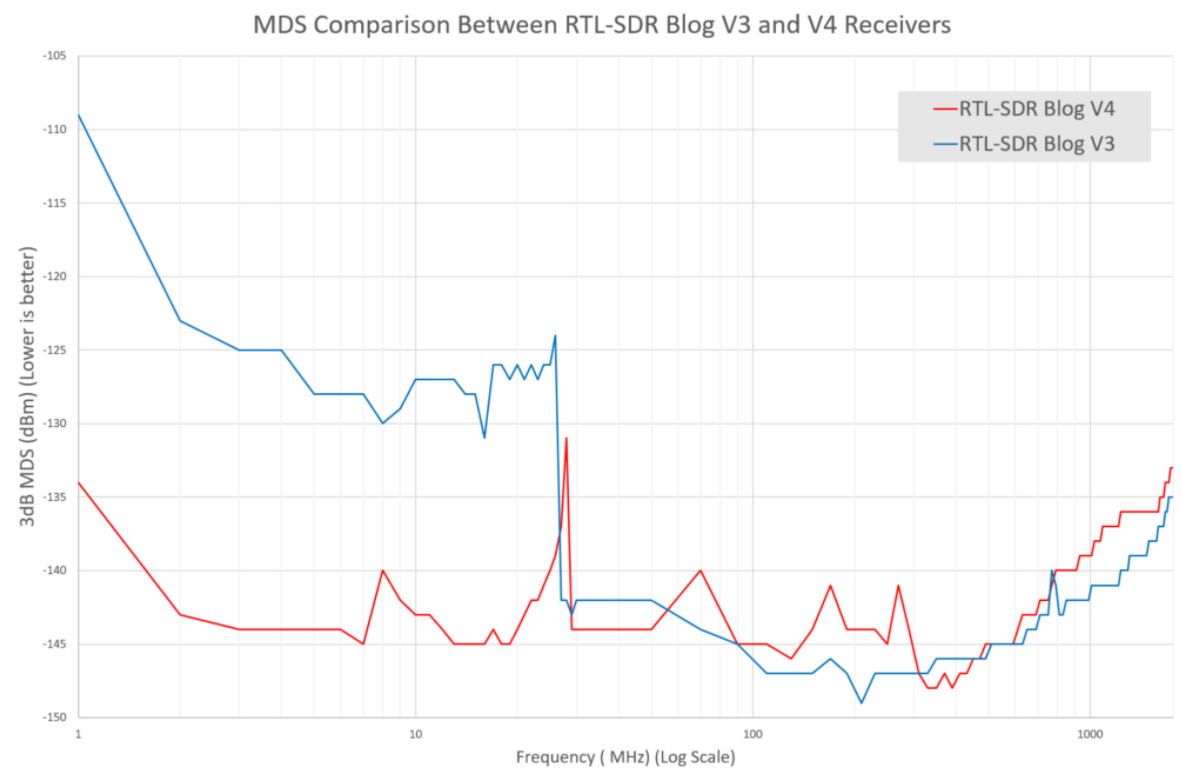
In software such as SDR# and SDR++ the bias tee can simply be activated by clicking on the "Bias Tee" checkbox.

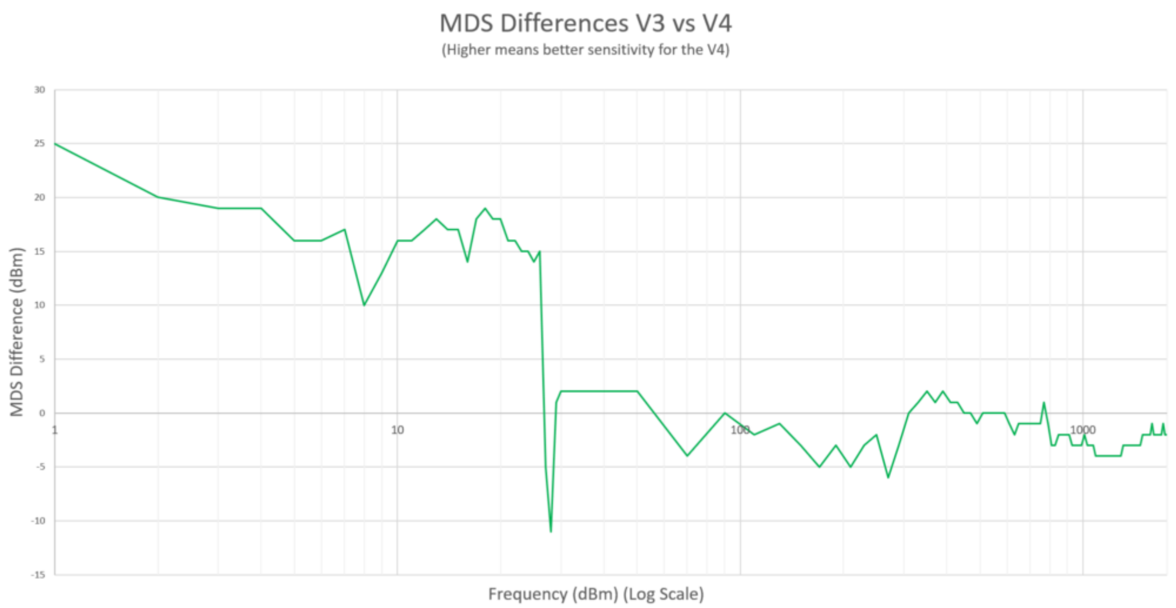
For other software without a bias tee activation option, please consult www.rtl-sdr.com/V4 for information on activating the bias tee.

Minimum Discernible Signal Measurements

The minimum discernable signal (MDS) is a test we can do to determine what is the minimum power level that a receiver can detect.

The results show that the MDS has significantly improved on the HF bands thanks to the upconverter design. However, there is some minor degradation in the VHF and UHF band when compared to the RTL-SDR Blog V3.





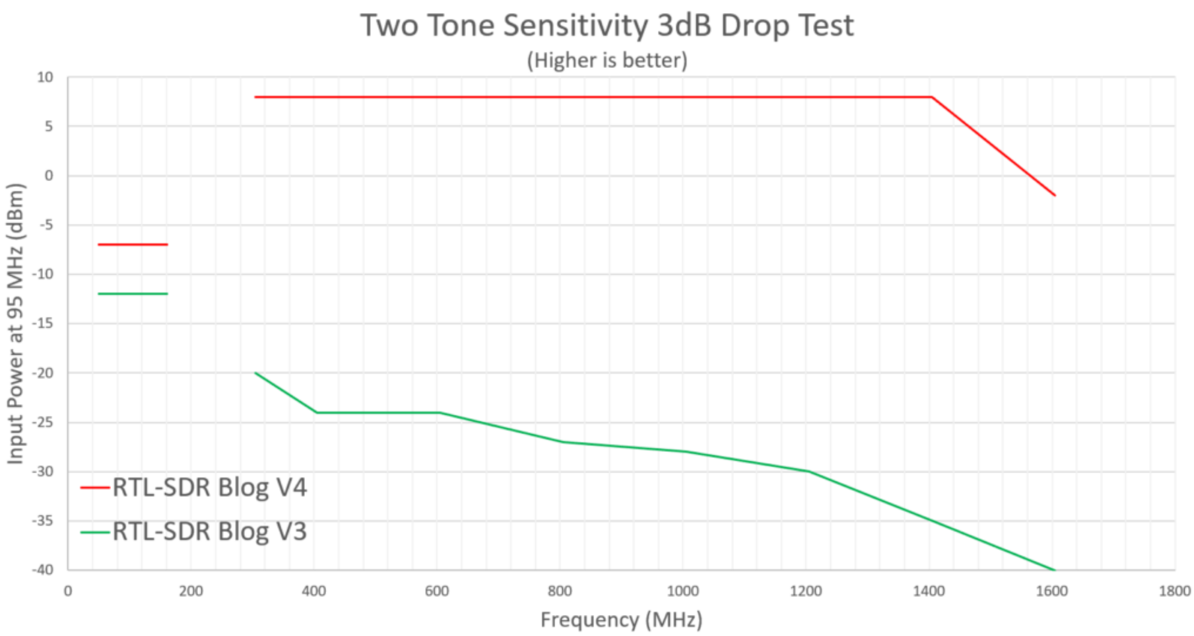
Two Tone Isolation & Desensitization Test

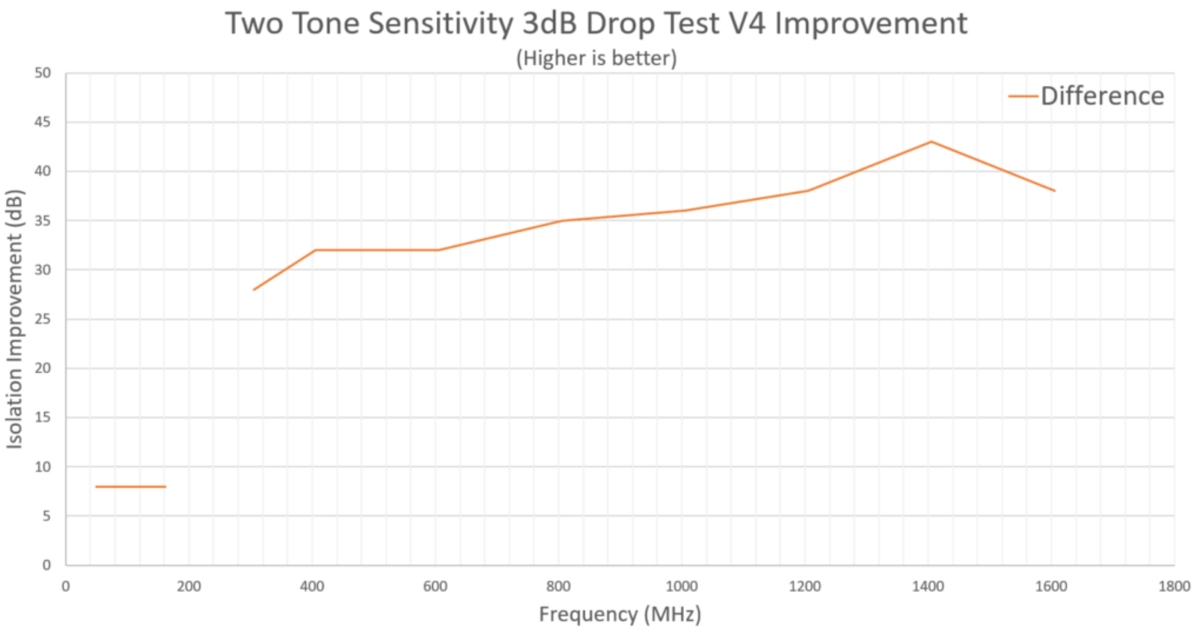
Strong out of band signals can cause an SDR to desensitize on other bands. For example, very strong broadcast FM (which is common), can cause signals being received on other frequencies to be received with a lower signal to noise ratio.

In this test we injected an "interference" tone (Tone A) at 95 MHz, and injected a second tone (Tone B) at another frequency. We then slowly increased the power on Tone A. When we noticed a 3 dB drop in the signal strength of Tone B we recorded the power level of Tone A that this occurred at.

From the difference graph we can see that isolation results within the same triplexer band are improved by about 8 dB thanks to the notch, and then out of band isolation is improved by 28 - 43 dB thanks to a combination of the triplexer filters and notch.

We note that between 305 - 1405 our measurements were limited by the max power out from our signal generator, and we believe the true results are roughly 5dB better than what was recorded at these frequencies.




Two Tone Sensitivity 3dB Drop Test V4 Improvement
(Higher is better)
Difference
Isolation Improvement (dB)
Frequency (MHz)
0
5
10
15
20
25
30
35
40
45
50
0
200
400
600
800
1000
1200
1400
1600
1800