

Communications Electronics

Introduction to the RTL-SDR Software Defined Receiver And Simulink[®]

What is A Software Defined Radio (SDR)?

- Traditionally many functions in radio receivers and transmitters have been implemented in analog hardware
 - Filters, Down-conversion, Modulators, Demodulators for example
- In an SDR radio signals are converted to digital samples and these functions are performed in software
- This creates a radio that is extremely flexible, and its capabilities can be modified by changing software

What is the RTL-SDR?

- The RTL-SDR is an inexpensive Software Defined Radio (SDR) Receiver in the form of a USB dongle



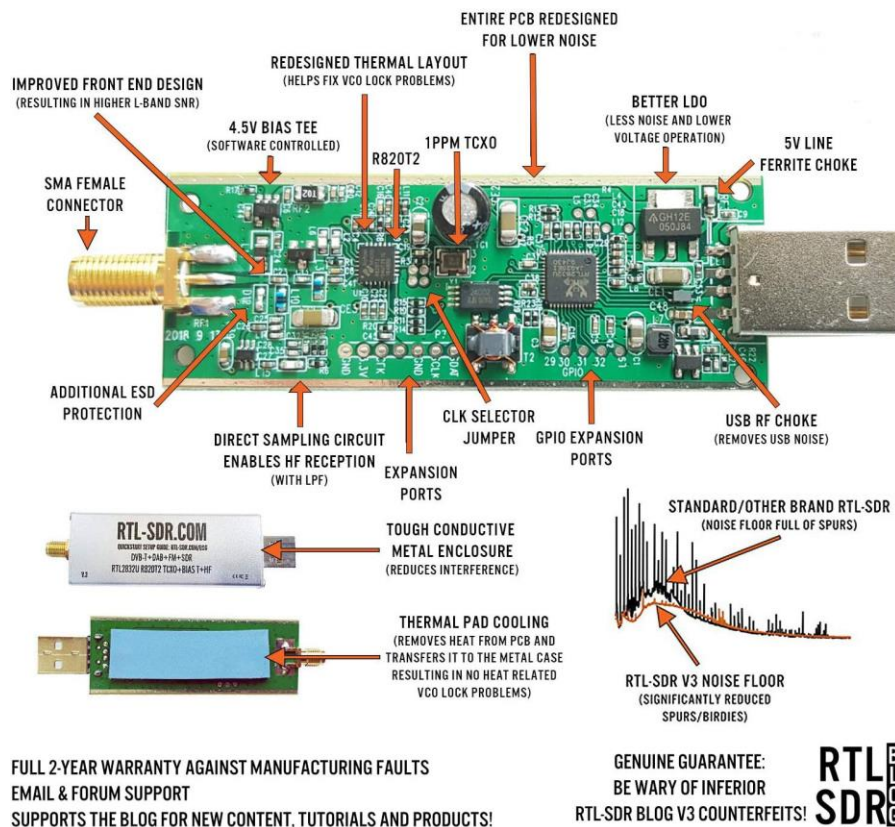
What is the RTL-SDR?

- The RTL-SDR is based on mass produced DVB-T tuner based on the RTL2832U chipset
- Software was developed to allow access to the raw samples from the device
- It is now very popular among hobbyists because it is inexpensive and highly capable

<https://www.rtl-sdr.com/about-rtl-sdr/>

Internal View of the RTL-SDR

CHOOSE A GENUINE RTL-SDR BLOG V3



RTL-SDR Kit

- The RTL-SDR kit comes with the RTL-SDR and a set of telescoping antennas and mounts



What Can the Receiver Do?

- The RTL-SDR is a receiver only
 - Other SDR devices have transmit capability
- Receives from 500 kHz to 1.7 GHz
- Supports up to 2.4 MHz of bandwidth
- Stable reference oscillator (1PPM)

What Can the Receiver Do?

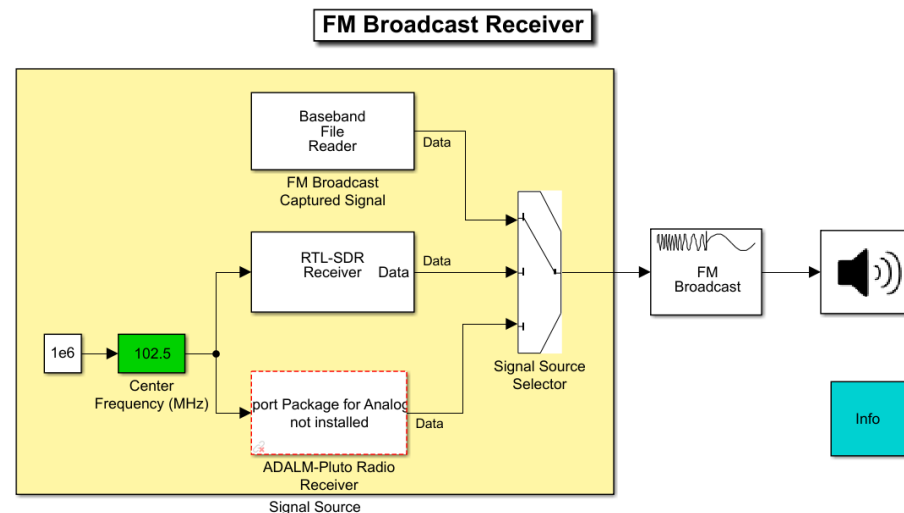
- The RTL-SDR can be configured as a receiver for
 - General radio scanning
 - Air traffic Control
 - Public Safety Radio
 - ADSB, ACARS, APRS
 - NOAA APT weather satellite
 - And much more

How Will we use the RTL-SDR?

- We will be interfacing to the RTL-SDR using MATLAB[®] and SIMULINK[®]
- This will allow us to work with receiver samples and explore the spectrum and demodulating different signal types
- We will also use the device as a spectrum analyzer

What is SIMULINK®?

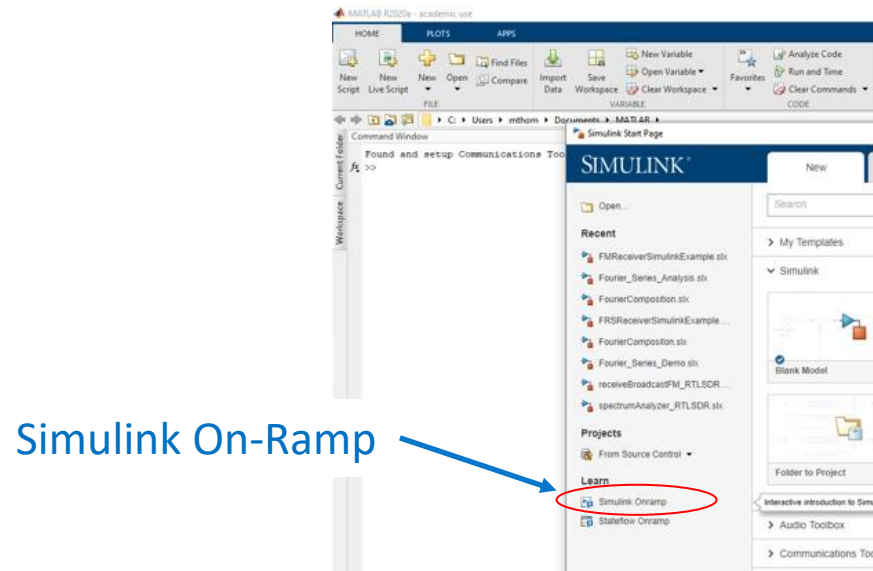
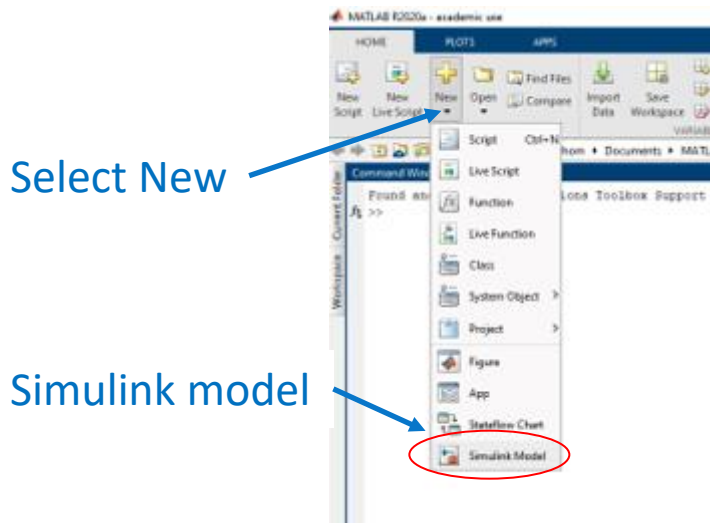
- SIMULINK® is a block diagram based tool that can be used to simulate continuous and discrete time systems
- Integrated with MATLAB®
- Example Simulink® model using the RTL-SDR block to create and FM Broadcast receiver



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Learning SIMULINK®

- A Simulink On-Ramp self guided tutorial is provided by MathWorks®
 - About 3 hours in duration
- Access it through MATLAB



How to install Simulink and the RTL-SDR Support toolbox

- Instructions detailing how to install MATLAB® and Simulink® is in myCourses
- MATLAB also requires an additional hardware support package to be installed
- Instructions detailing how to install the RTL-SDR support package for MATLAB® and Simulink® is also in myCourses