

# ADALM-PLUTO

## SDR Active Learning Module



### Product Overview

The easy to use ADALM-PLUTO active learning module (PlutoSDR) helps introduce electrical engineering students to the fundamentals of software-defined radio (SDR), radio frequency (RF), and wireless communications. Designed for students at all levels and from all backgrounds, the module can be used for both instructor-led and self-directed learning to help students develop a foundation in real-world RF and communications that they can build on as they pursue science, technology, or engineering degrees.

### Connecting RF Theory with RF Practice

The PlutoSDR works as a portable lab that, when used with a host, can augment classroom learning. MATLAB® and Simulink® are two of the many software packages supported by PlutoSDR, and it provides an intuitive graphical user interface (GUI) so students can learn faster, work smarter, and explore more.

### Made for Teachers, Students, and Self-Learners

The PlutoSDR features independent receive and transmit channels that can be operated in full duplex. The active learning module can generate or acquire RF analog signals from 325 MHz to 3800 MHz at up to 61.44 megasamples per second (MSPS). Small enough to fit in a shirt pocket, the PlutoSDR is completely self-contained and entirely USB powered with the default firmware. Because PlutoSDR is enabled by libiio drivers, it supports OS X®, Windows®, and Linux®, which allows students to learn and explore on a variety of devices.

With dozens of available online tutorials for SDR-based projects, PlutoSDR boasts labs and teaching material covering topics such as ADS-B aircraft position, receiving NOAA and Meteor-M2 weather satellite imagery, GSM analysis, listening to TETRA signals, pager decoding, and many more!

### Features

- ▶ Portable self-contained RF learning module
- ▶ Cost-effective experimentation platform
- ▶ RF coverage from 325 MHz to 3.8 GHz
- ▶ Flexible rate, 12-bit ADC and DAC
- ▶ One transmitter and one receiver (female SMA, 50 Ω)
- ▶ Half or full duplex
- ▶ MATLAB, Simulink support
- ▶ GNU Radio sink and source blocks
- ▶ Libiio, a C, C++, C#, and Python API
- ▶ USB 2.0 interface
- ▶ Plastic enclosure
- ▶ USB powered
- ▶ Up to 20 MHz of instantaneous bandwidth (complex I/Q)

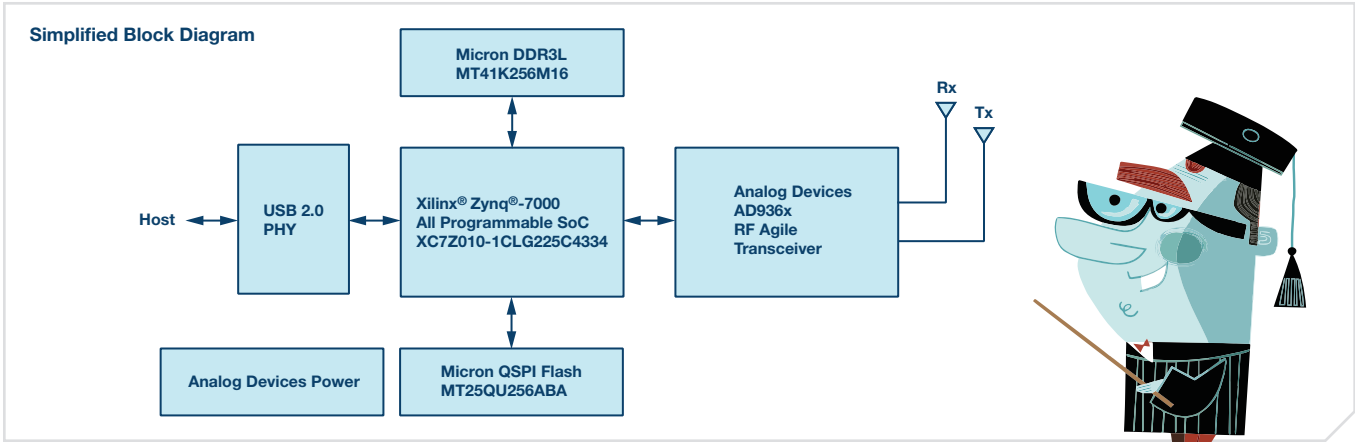


### Kit Includes

- ▶ Analog Devices PlutoSDR active learning module
- ▶ Two antennas (824 MHz to ~894 MHz/1710 MHz to ~2170 MHz)
- ▶ One 15 cm SMA cable
- ▶ One USB cable

To purchase this active learning module, visit [analog.com/plutosdr](http://analog.com/plutosdr).





## PlutoSDR Host Interface

The PlutoSDR supports the following USB device classes:

- ▶ Mass storage (for easy firmware updates)
- ▶ Serial (for interacting with the Linux kernel/userspace on PlutoSDR)
- ▶ Networking/RNDIS (for loading and controlling custom ARM® applications)
- ▶ Libio (bulk USB for SDR data transfer and control)
- ▶ Device firmware upgrade (for backup firmware upgrades)

## Open Source

The PlutoSDR open source firmware is built from Das U-Boot, the Linux kernel, and Buildroot. As part of the class materials, the firmware is able to be run, copied, distributed, studied, changed, and improved with Vivado® HL WebPACK™ Edition (license free). Supporting USB 2.0 On-the-Go, the PlutoSDR can attach to a variety of USB peripherals (wired networking, Wi-Fi dongles, audio, etc.), which extends functionality. All documentation is open and available at [wiki.analog.com/plutosdr](http://wiki.analog.com/plutosdr).

## University and Active Learning Program

ADI's many learning activities provide faculty and students with the opportunity to further develop the theory, understanding, and practice to interpret the world around them by intelligently bridging the physical and digital realms with unmatched ADI technologies that sense, measure, and connect. From select sponsored faculty research to samples program, ADI provides faculty and student access to ADI products, information, teaching materials, and mentoring for use in research, thesis, and undergraduate projects. ADI offers co-ops and internships, and hires many new college graduates worldwide. More information can be found at [analog.com/university](http://analog.com/university).

Specifications	Typical
<i>Power</i>	
DC Input (USB)	4.5 V to 5.5 V
<i>Conversion Performance and Clocks</i>	
ADC and DAC Sample Rate	65.2 kSPS to 61.44 MSPS
ADC and DAC Resolution	12 bits
Frequency Accuracy	±25 ppm
<i>RF Performance</i>	
Tuning Range	325 MHz to 3800 MHz
Tx Power Output	7 dBm
Rx Noise Figure	<3.5 dB
Rx and Tx Modulation Accuracy (EVM)	-34 dB (2%)
RF Shielding	None
<i>Digital</i>	
USB	2.0 On-the-Go
Core	Single ARM Cortex®-A9 @ 667 MHz
FPGA Logic Cells	28k
DSP Slices	80
DDR3L	4 Gb (512 MB)
QSPI Flash	256 Mb (32 MB)
<i>Physical</i>	
Dimensions	117 mm × 79 mm × 24 mm 4.62" × 3.11" × 0.95"
Weight	114 g
Temperature	10°C to 40°C

## EngineerZone® Online Support Community

Engage with the PlutoSDR developers in the virtual classroom, as well as ADI's technology experts in our online support community.

Visit [ez.analog.com/community/university-program](http://ez.analog.com/community/university-program)



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