

# USRP N200 Series

## Ethernet Software Radio Systems

The Ettus Research™ USRP™ enables engineers to rapidly design and implement powerful, flexible software radio systems. Paired with the appropriate RF daughterboard, the USRP systems can address software radio applications from DC to 6 GHz. The USRP N200 series builds on the success of the USRP2, offering higher performance and increased flexibility. The series comprises the USRP N210 for demanding applications and the USRP N200 for low cost solutions.

High-speed and high precision ADCs and DACs allow for wide band signals with a high dynamic range. A Gigabit Ethernet interface enables simultaneously sending up to 50 MHz of RF bandwidth in and out of the USRP software radio. The USRP N200 series features Xilinx® Spartan® 3A-DSP FPGAs which are optimized for DSP applications and allow processing complex waveforms at high sample rates. The USRP N210 is powered by an FPGA that offers 50% more resources than the USRP N200 enabling more complex code on the FPGA to match the needs of demanding applications.

On both models high sample rate processing, like digital up-and down conversion, takes place in the FPGA. Lower sample rate operations can be performed on the host computer, or in the FPGA, which contains a 32-bit RISC microprocessor. The USRP's configuration and firmware are stored in onboard Flash to allow for easy programming over the network.

The two onboard digital downconverters (DDCs) mix, filter, and decimate (from 100 MS/s) incoming signals in the FPGA. Two digital upconverters (DUCs) interpolate baseband signals to 100 MS/s before translating them to the selected output frequency. The DDCs and DUCs combined with the high sample rates also greatly simplify analog filtering requirements.

Multiple USRP systems can be connected together to form fully coherent multiple antenna systems for MIMO operation. The master oscillator can be locked to an external reference, and there is a 1 pulse per second (1PPS) input for precise timing applications. An optional internal GPSDO is also available.

Daughterboards mounted on the USRP provide flexible, fully integrated RF front-ends. A wide variety of daughterboards allows you to use different frequencies from DC to 6 GHz for a broad range of applications. Please refer to [ettus.com](http://ettus.com) for a complete list of compatible daughterboards.



## FEATURES

- Two 100 MS/s 14-bit analog to digital converters
- Two 400 MS/s 16-bit digital to analog converters
- Digital downconverters with programmable decimation rates
- Digital upconverters with programmable interpolation rates
- Gigabit Ethernet Interface
- 2 Gbps high-speed serial interface for expansion
- Capable of processing signals up to 100 MHz wide
- Capable of streaming signals up to 50 MHz wide
- Modular architecture supports a wide variety of RF daughterboards
- Auxiliary analog and digital I/O support complex radio controls such as RSSI and AGC
- Fully coherent multi-channel systems (MIMO capable)
- 1 MB of on-board high-speed SRAM
- TCXO Frequency Reference
- Optional internal GPS locked reference oscillator

## OPEN SOURCE

The USRP N200 series firmware, drivers, and FPGA design are open source. When combined with the open source GNU Radio software, you get an open software radio system enabling host-based signal processing on commodity platforms. No software or licenses need to be purchased. It provides a complete development environment to create your own radios.

The Universal Hardware Driver (UHD) provides support for the USRP hardware under Linux, Mac OS X and Windows sharing the same architecture to enable cross platform development. The UHD enables support for National Instruments LabVIEW™.

## ORDERING INFORMATION

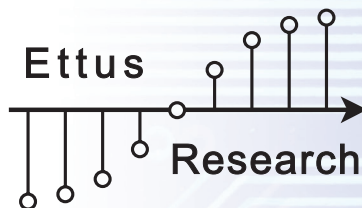
Model	Part Number
USRP N200.....	UN200-KIT
USRP N210.....	UN210-KIT

**For a complete list of available models and accessories, please refer to [ettus.com/order](http://ettus.com/order)**

## ABOUT ETTUS RESEARCH

Ettus Research specializes in low cost, high quality software defined radio (SDR) systems. USRP systems all over the world enable users to address a broad range of research, academic, industrial, and defense applications. The USRP platform is designed to address applications that require RF modulations in frequencies up to 6GHz with wide bandwidths and MIMO setups. A few example application areas include white spaces, mobile phones, public safety radio, land mobiles, broadcast TV, FM radio, satellite navigation, and amateur radio bands. The company was founded in 2004 and is based in Mountain View, California. As of February 5, 2010, Ettus Research LLC operates as a wholly owned subsidiary of National Instruments Corporation (NASDAQ:NATI).

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## SPECIFICATIONS

### Input

2 Input Channels or 1 I-Q Pair  
Sample Rate: 100 Ms/s  
Resolution: 14 bits  
SFDR: 88 dB

### Output

2 Output Channels or 1 I-Q Pair  
Sample Rate: 100 Ms/s  
Resolution: 16 bits  
SFDR: 80+ dB

### Timing & Synchronization

PPS Input: 3-5 V dc  
Reference Clock: 5 or 10 MHz  
Connector Type: SMA  
MIMO Expansion port

### Auxiliary I/O

High-Speed Digital I/O: 32 bits  
Analog Input: 4 channels  
Analog Output: 4 channels

### FPGA

USRP N200: Xilinx® Spartan®3A-DSP1800  
USRP N210: Xilinx® Spartan® 3A-DSP3400

### Bandwidth

50 MHz Instantaneous bandwidth (8 bit mode)  
25 MHz Instantaneous bandwidth (16 bit mode)  
Full Duplex

### Power Requirements

6VDC, 3A  
(includes daughterboard requirements)

### Supported Operating Systems

- Linux
- Mac OS X
- Windows