

# WR-G315i

## High Performance Software-Defined Wideband Receiver

- 9 kHz - 1800 MHz frequency range
- Software-defined DSP demodulation
- Excellent sensitivity
- High dynamic range
- Continuously adjustable IF bandwidth
- Excellent suppression of internal spurs
- Real-time spectrum analyzer
- Graphical IF shift, audio and notch filters
- Noise blanker
- Audio and IF recording and playback
- Test and measurement facilities



The WINRADIO WR-G315i receiver is a software-defined high-performance wideband receiver (9 kHz - 1800 MHz) on a PCI card. The front-end is a DDS-based double-conversion superhet, the last IF stage is implemented in software resident in the on-board DSP.

This receiver is intended for government, military, security, industrial, surveillance, broadcast monitoring, and demanding consumer applications.



The receiver is extremely sensitive, making it possible to comfortably read CW signals well under -130 dBm input levels, yet featuring a respectable dynamic range making the receiver resistant to strong signal overload.

The high sensitivity is also matched by that of the S-meter: The calibrated S-meter shows the received signal levels in dBm,  $\mu$ V or S-units, down to the receiver noise floor. The IF bandwidth of the receiver is continuously adjustable from 1Hz to 15kHz, in 1 Hz steps.

Several WR-G315i receivers can reside in a single PC (as many as there are free PCI slots), which provides an ideal solution for high-performance multi-channel surveillance and monitoring systems.

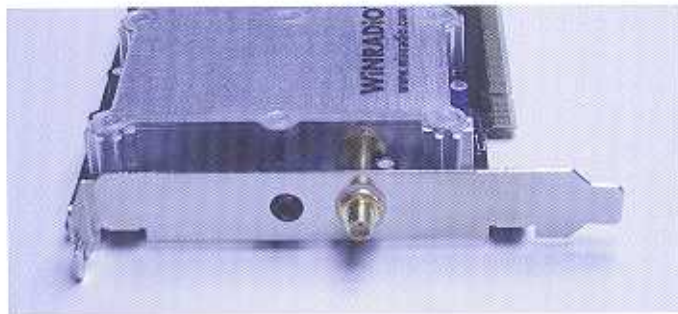
As the last IF and demodulation processing are entirely software-defined, this means that additional demodulation or decoding modes can be easily added by a mere software change.

In addition to audio recording, the receiver can also record a 20 kHz wide spectrum at the IF level, making it possible to thoroughly analyze a signal, and experiment with extracting a weak signal with different filter settings for the best reception.

Apart from the antenna and audio leads, there are no other interface or power supplies cables - no clutter on your desk. Every modern desktop computer can be converted into a powerful RF monitoring station with minimum fuss.

## Hardware

The PCI card plugs into an available slot of an IBM-compatible PC. There is a single SMA antenna connector and an output line level audio jack which can be used to connect the receiver output directly to a sound card line-input or an amplified speaker.



The receiver has its own on-board DSP, which performs the final stage IF filtering and demodulation. Additional demodulation or decoding modes can be easily added by a software change.

## Software

The WR-G315i software contains numerous advanced features, many tuning and scanning options, virtually unlimited memories and a rich on-line help facility.

There are numerous modulation modes, variable IF bandwidth 1 Hz to 15 kHz, two spectrum analyzers with 16 Hz resolution, graphically controlled IF shift, notch and audio filter, and noise blanker. The built-in recorder can record and play back demodulated audio as well as the IF signal, which means that it is possible to "re-receive" the same signal again and again with different IF filter bandwidths, notch and audio filter, noise blanking or demodulator settings, to arrive at the best possible reception of a weak or interference-prone signal.



One of the many integrated spectrum analysis functions

The signal test facility can perform various measurements on the received signal including frequency accuracy, amplitude modulation depth, frequency deviation, THD (total harmonic distortion) and SINAD.

There is also a unique research and education function making it possible to explore interactive block diagrams of the software-defined demodulator, for each demodulation mode, and observe demodulation taking place on real-time signals using two integrated spectrum analyzers and a vector voltmeter.

## Options

### External Reference Oscillator Option (G315/XR)

The G315/XR option adds an external SMA connector to the receiver board, which can be used to connect an external reference oscillator for the highest possible frequency accuracy. This external oscillator can be any frequency from 8 to 20 MHz (the user specifies this frequency via software).

### Reference Oscillator Output Option (G315/RO)

The G315/RO option adds an external SMA connector to the receiver board, which can be used to output the internal reference frequency. This is useful for situations when the receiver's own internal oscillator is to be used as a reference for other equipment, or, if an external reference is used, to provide this external reference to other receivers in a daisy-chain arrangement. If the receiver relies on its internal reference oscillator, this option will provide 16.384 MHz reference output. If an external oscillator is used, then the external oscillator frequency will be provided at this output.

### Intermediate Frequency Output Option 10.7 MHz (G315/IF1)

The G315/IF1 option provides a wideband IF output, involving an additional conversion from the first 109.65 MHz IF down to 10.7 MHz.

### Wide FM Option (G315/WFM)

The G315/WFM option provides the facility to receive wide FM modulation of broadcast radio and TV stations. The IF signal is processed and demodulated in hardware, and digitized at the demodulated audio level.



Ext. Ref. In (OptionXR) Audio Out Antenna Ref. Out (OptionRO) IF Out (OptionIF1)

To order a receiver with an option from above, add the option code(s) to the receiver model number. Options can be mixed together, for example G315iXR/RO. A range of software options is also available. Please visit our Web site [www.winradio.com](http://www.winradio.com) for up-to-date information about available software options.

## Specifications

|                                    |  |  |  |
|------------------------------------|--|--|--|
| <b>Receiver type</b>               | DSP-based SDR with DDS-based dual-conversion superheterodyne front-end |  |  |
| <b>Frequency range</b>             | 9 kHz - 1800 MHz   |  |  |
| <b>Tuning resolution</b>           | 1 Hz   |  |  |
| <b>Mode</b>                        | AM, AMS, LSB, USB, DSB, ISB, CW, NFM (WFM optional)                    |  |  |
| <b>Image rejection</b>             | 1.8-150 MHz: 60 dB typ.<br>150-1800 MHz: 50 dB typ.                    |  |  |
| <b>Spurious-free dynamic range</b> | 90 dB  |  |  |
| <b>IP3</b>                         | preamp off: +14.5 dBm @ 50 kHz<br>preamp on: +4 dBm @ 50 kHz           |  |  |
| <b>Phase noise</b>                 | -148 dBc/Hz @ 100 kHz  |  |  |
| <b>Internal spurious</b>           | Less than equivalent antenna input of -115 dBm                         |  |  |
| <b>RSSI accuracy</b>               | 2 dB   |  |  |
| <b>RSSI sensitivity</b>            | -137 dBm   |  |  |
| <b>Bandwidth</b>                   | 1 - 15000 Hz (adjustable in 1 Hz steps)                                |  |  |
| <b>Scanning speed</b>              | 500 steps/s @ 1 kHz steps  |  |  |

| Sensitivity              | Mode                        | 0.15-500 MHz          | 500-1800 MHz          |
|--------------------------|-----------------------------|-----------------------|-----------------------|
| (AM/SSB/CW<br>10 dB SIN) | AM, AMS<br>(30% modulation) | -108 dBm<br>(0.60 µV) | -104 dBm<br>(1.4 µV)  |
|                          | AM, AMS<br>(80% modulation) | -116 dBm<br>(0.35 µV) | -112 dBm<br>(0.56 µV) |
|                          | LSB, USB,<br>ISB, DSB       | -119 dBm<br>(0.25 µV) | -115 dBm<br>(0.45 µV) |
|                          | CW                          | -126 dBm<br>(0.11 µV) | -122 dBm<br>(0.18 µV) |
| (NFM 12dB<br>SINAD)      | NFM                         | -113 dBm<br>(0.50 µV) | -109 dBm<br>(0.80 µV) |

Note: Below 150 kHz, the sensitivity gradually drops. Typical figures (CW) are: 100 kHz: -124 dBm; 50 kHz: -118 dBm; 25 kHz: -116 dBm; 10 kHz: -110 dBm

|                                 |   |
|---------------------------------|---|
| <b>Intermediate frequencies</b> | IF1: 109.65 MHz<br>IF2: 12 kHz  |
| <b>Tuning accuracy</b>          | 1 ppm (25°C ± 2°C)  |
| <b>Frequency stability</b>      | 0.5 ppm (0 to 60°C)   |
| <b>Antenna input</b>            | 50 ohm (SMA connector)  |
| <b>Interface</b>                | PCI 2.2 compliant   |
| <b>Dimensions</b>               | Length: 195 mm (7.68") (excluding mounting bracket)<br>Height: 99 mm (3.90") (excluding edge connector)<br>Thickness: 19 mm (0.75") (incl. components on either side) |
| <b>Weight</b>                   | 330 g (11.6 oz)   |
| <b>System requirements</b>      | IBM PC compatible (CPU 500 MHz or higher), PCI slot<br>Windows 98/ME/2000/XP  |

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