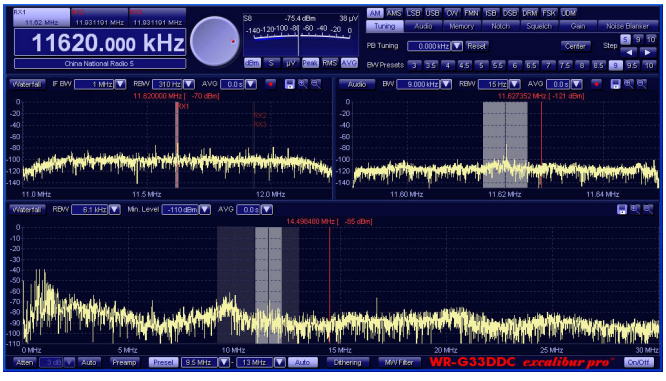
WR-G33DDC *'Excalibur Pro'*

Professional Direct-Sampling Software-Defined HF Receiver

- 9 kHz to 50 MHz continuous frequency range
- Direct sampling with digital down-conversion
- 16-bit 100 MSPS A/D converter
- 50 MHz-wide, real-time spectrum analyzer
- 4 MHz recording and processing bandwidth
- Continuously adjustable filter bandwidth down to 1 Hz
- Three parallel demodulator channels
- Waterfall display functions
- Audio spectrum analyzer
- Audio and IF recording with pre-buffering
- Very high IP3 (+31 dBm)
- Excellent sensitivity (0.20 µV SSB, 0.10 µV CW)
- Excellent dynamic range (107 dB)
- Excellent frequency stability (0.5 ppm)
- Selectable medium wave filter
- User-configurable preselector
- Selectable low-noise preamplifier
- Test and measurement functions

The WiNRADiO WR-G33DDC *'Excalibur Pro'* is a high-performance, low-cost, direct-sampling, software-defined, shortwave receiver with a frequency range from 9 kHz to 50 MHz. It includes a real-time 50 MHz-wide spectrum analyzer and 4 MHz-wide instantaneous bandwidth available for recording, demodulation and further digital processing.



The receiver's superior performance results from its innovative, direct-sampling, digital down-conversion architecture along with the use of leading-edge components and design concepts. These all result in a very high IP3, wide dynamic range, high sensitivity, and accurate tuning. These key features create a receiver in a class of its own, with wide application potential, at a very affordable price.

The entire 4 MHz DDC (digitally down-converted) bandwidth is available for recording and demodulation. Three demodulators allow the simultaneous reception of three signal frequencies within the 4 MHz.

The receiver's robust front-end is equipped with an ultra-high-linearity amplifier which results in exceptional strong-signal performance. This already robust front-end is further enhanced with a user-selectable preselector that can operate either in a fully automatic or user-configurable mode. As many as 119 different filter combinations can be constructed by the user (91 bandpass, 14 low-pass and 14 high-pass). The front-end employs 34 subminiature electromechanical relays (rather than often used but distortion-prone semiconductor switches) to ensure high dynamic range.

A user-selectable low-noise preamplifier provides additional sensitivity for the receiver to be able to extract even the weakest signals from noise.

An advanced dithering technique eliminates spurious signals without significantly increasing the receiver's noise floor. The superior 16-bit 100 MSPS analog-to-digital converter provides exceptional performance over an extremely wide range of signals.

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Hardware

The WiNRADiO G33DDC receiver breaks new ground with its state-of-the-art components, such as a high-performance 16-bit 100 MSPS analog-to-digital converter. It connects to a computer via the USB interface which facilitates receiver control as well as transfer of the 24-bit digitally down-converted I&Q signal. The receiver is very well shielded against interference, making it possible to operate in a noisy computer environment.

The receiver is supplied with an external AC/DC power adapter, working in linear mode to avoid even the slightest possibility of interference emanating from the power supply.

Software

The WR-G33DDC software provides an elegant and logical user interface. There are several spectrum analyzer configurations including the 50 MHz full span with 1.5 kHz resolution. The fully-zoomable display can be viewed in either the standard or waterfall mode.

The down-converted portion is highlighted and can be selected either via keyboard or by the mouse cursor and then displayed in another window, within which three independent receiver channels can exist. For any channel, the receiver's selectivity, IF shift, passband tuning, notch, and other functions can be adjusted, and the audio spectrum of the demodulated signal can be observed.

The digital down-converter provides 24 selectable output bandwidths ranging from 20 kHz to 4 MHz. The receiver's selectivity can be adjusted with 1 Hz resolution. The bandpass audio filter's low and high cut-off frequencies are graphically adjustable, as is the notch filter and noise blanker.

The parameters of all three independent channels can be set separately, allowing each to be recorded simultaneously and independently. Recording and playback are also provided at the output of the digital down-converter, where an entire 4 MHz spectrum band can be recorded for later demodulation. Pre-buffering prevents signal loss at the start of a transmission.

In spite of the receiver's ground-breaking architecture, the software still remains simple and intuitive to use, containing all the features generally expected in modern receivers such as noise blanking, memories, scheduler, squelch (level, voice or noise activated), numerous tuning options, and a wide choice of demodulation modes, including user-defined and optional DRM modes.

Specifications

Receiver type	Direct-sampling, digitally down-converting software-defined receiver	
Frequency range	9 kHz to 50 MHz	
Tuning resolution	1 Hz	
Mode	AM, AMS, LSB, USB, DSB, ISB, CW, FMN,FSK, UDM (user-defined mode) DRM mode optional	
Image rejection	100 dB typ.	
IP3	+31 dBm (preamp off) +21 dBm (preamp on)	
Attentuator	0 - 21 dB, adjustable in 3 dB steps	
SFDR	107 dB (preamp off) 103 dB (preamp on)	
Noise figure	14 dB (preamp off) 10 dB (preamp on)	
MDS	-130 dBm @ 10 MHz, 500 Hz BW (preamp off) -134 dBm @ 10 MHz, 500 Hz BW (preamp on)	
Phase noise	-145 dBc/Hz @ 10 kHz	
RSSI accuracy	2 dB typ.	
RSSI sensitivity	-140 dBm	
DDC bandwidth (processing and recording)	20 kHz - 4 MHz (selectable in 24 steps)	
Selectivity (demodulation bandwidth)	1 Hz - 62.5 kHz (continuously variable in 1 Hz steps)	
Spectrum analyzers	Input spectrum/waterfall, 30 or 50 MHz wide, 1.5 kHz resolution bandwidth	
	DDC spectrum/waterfall, max 4 MHz wide, 1 Hz resolution bandwidth	
	Channel spectrum, max 62.5 kHz wide, 1 Hz resolution bandwidth	
	Demodulated audio, 16 kHz wide, 1 Hz resolution bandwidth	
ADC	16 bit, 100 MSPS	
Sensitivity (@ 10 MHz) **(preamp on)**	AM	-106 dBm (1.12 µV) @ 10 dB S+N/N, 30% modulation, 5 kHz BW
	SSB	-121 dBm (0.20 µV) @ 10 dB S+N/N, 2.1 kHz BW
	CW	-127 dBm (0.10 µV) @ 10 dB S+N/N, 500 Hz BW
	FM	-117 dBm (0.32 µV) @ 12 dB SINAD, 3 kHz deviation, 12 kHz BW, audio filter 300 - 3000 Hz, deemphasis -6 dB/oct
Tuning accuracy	0.5 ppm @ 25 °C	
Tuning stability	0.5 ppm (0 to 50 °C)	
MW filter	Cut-off frequency 1.8 MHz @ -3 dB Attenuation 60 dB min @ 0.5 MHz	
Preselection filters	119 filters available in automatic or manual mode, (14 high pass, 14 low pass, 91 bandpass and bypass)	
Antenna input	50 Ω (SMA connector)	
Output	24-bit digitized I&Q signal over USB interface	
Interface	USB 2.0 High speed	
Power supply	12 V DC @ 510 mA (preamp off) 12 V DC @ 620 mA (preamp on) (adapter included)	
Operating temp.	0 °C to 50 °C	
Dimensions	Length: 166 mm (6.5") Width: 97 mm (3.8") Height: 41 mm (1.6")	
Weight	430 g (15.1 oz)	

Specifications are subject to change without prior notice due to continuous product development.

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