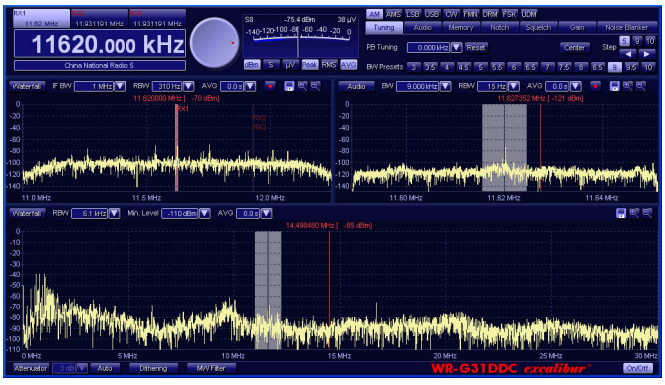
WR-G31DDC *'Excalibur'*

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 conversion
- 50 MHz-wide, real-time spectrum analyzer
- 2 MHz recording and processing bandwidth
- Three parallel demodulator channels
- Waterfall display functions
- Audio spectrum analyzer
- Audio and IF recording and playback
- Recording with pre-buffering
- Very high IP3 (+31 dBm)
- Excellent sensitivity (0.35 µV SSB, 0.16 µV CW)
- Excellent dynamic range (107 dB)
- Selectable medium-wave filter

The WiNRADiO WR-G31DDC *'Excalibur'* 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 2 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-converter 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 tuning accuracy. These key features create a receiver in a class of its own, with wide application potential, at a very affordable price.

The receiver's robust front-end is equipped with an ultra-high-linearity amplifier which results in exceptional strong-signal performance. 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.

The entire 2 MHz DDC (digitally down-converted) bandwidth is available for recording and demodulation. Three demodulators allow the simultaneous reception of three signal frequencies within the 2 MHz bandwidth.

The digital down-converter provides 21 selectable output bandwidths ranging from 20 kHz to 2 MHz. Any bandwidth can be fine-tuned 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 receiver is lightweight and portable, an ideal accessory for laptop and notebook computers. Every modern portable computer can be quickly and easily converted into a powerful HF monitoring station with minimum fuss.

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Hardware

The WiNRADiO G31DDC 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-G31DDC 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 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 2 MHz spectrum band can be recorded for later demodulation. Pre-buffering prevents signal loss at the start of a transmission.

A flexible scheduler function allows unattended recording of each channel at specified dates and times.

The software-defined architecture allows easy software upgrades for demodulation and decoding requirements.

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, CW, FMN, FSK UDM (user-defined mode) DRM mode optional	
Image rejection	90 dB typ.	
IP3	+31 dBm min.	
Attenuator	0 - 21 dB, adjustable in 3 dB steps	
SFDR	107 dB min.	
Noise figure	14 dB	
MDS	-130 dBm @ 10 MHz, 500 Hz BW	
Phase noise	-145 dBc/Hz @ 10 kHz	
RSSI accuracy	2 dB typ.	
RSSI sensitivity	-140 dBm	
DDC bandwidth (processing and recording)	20 kHz - 2 MHz (selectable in 21 steps)	
Selectivity (demodulation bandwidth)	10 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 2 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)	AM	-101 dBm (2.00 µV) @ 10 dB S+N/N, 30% modulation, 5 kHz BW
	SSB	-116 dBm (0.35 µV) @ 10 dB S+N/N, 2.1 kHz BW
	CW	-123 dBm (0.16 µV) @ 10 dB S+N/N, 500 Hz BW
	FM	-112 dBm (0.56 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	2.5 ppm (0 to 50 °C)	
MW filter	Cut-off frequency 1.8 MHz @ -3 dB Attenuation 60 dB min @ 0.5 MHz	
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 @ 500 mA (adapter included)	
Operating temp.	0 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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