



Advanced Test Equipment Corp.  
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SPECTRAN

# V5 Handheld (9kHz to 20GHz)

Handheld real-time spectrum analyzer, with unlimited recording and super fast sweep



Simultaneous Measurement of 4 Bands

Real-time bandwidth of up to 175MHz

Compact, Lightweight Handheld Analyzer

# Highlights

- ✓ World's first and only handheld real-time spectrum analyzer
- ✓ Scans 20GHz in less than 20mS (1000GHz / sec.)
- ✓ Real-time capture bandwidth up to 175MHz
- ✓ POI below 1QS
- ✓ Unlimited recording time
- ✓ Wide measuring range up to 20GHz
- ✓ Sample rate / second: > 5 million
- ✓ 500 MSPS (14 Bit Dual 256MSPS I/Q)
- ✓ Real-time I/Q streaming via USB
- ✓ High resolution touch screen
- ✓ Extremely compact and lightweight
- ✓ Memory expansion via MicroSD Slot
- ✓ Including the "RTSA Suite Pro" spectrum analysis software
- ✓ Made in Germany



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MADE IN GERMANY

# Introduction

## Fast, compact and powerful

Aaronia presents the SPECTRAN V5, a Handheld Real-Time Spectrum Analyzer designed to capture even shortest signal transmissions. Its scanning speed and recording time are without competition. The Analyzer scans 20GHz in less than 20mS making it world's fastest handheld spectrum analyzer.

## Perfect for any RF-Problem

With this spectrum analyzer you can master any challenge. Whether it is for spectrum monitoring, RF and microwave measurements, Interference hunting, EMC testing or Wi-Fi and wireless network measurements, the SPECTRAN V5 is the ideal Spectrum Analyzer for making reliable and fast measurements.

## Compact and Lightweight

A weight of just 850g predestines the V5 for measurements in the field yet it can also be used in the lab. The included PC analysis software RTSA Suite transforms the V5 into a fully-featured benchtop spectrum analyzer (see page 4). The V5 offers a solution for almost every application.

## Made in Germany

Like all devices of the SPECTRAN series, the SPECTRAN V5 Handheld spectrum analyzer is developed and assembled in Germany, guaranteeing the highest quality standard.

- ◆ TFT Touchscreen with 800x480 resolution
- ◆ Ultrawide frequency range from 9kHz up to 20GHz
- ◆ Compact Size: 255 x 85 x 32mm
- ◆ Weighs only 850g

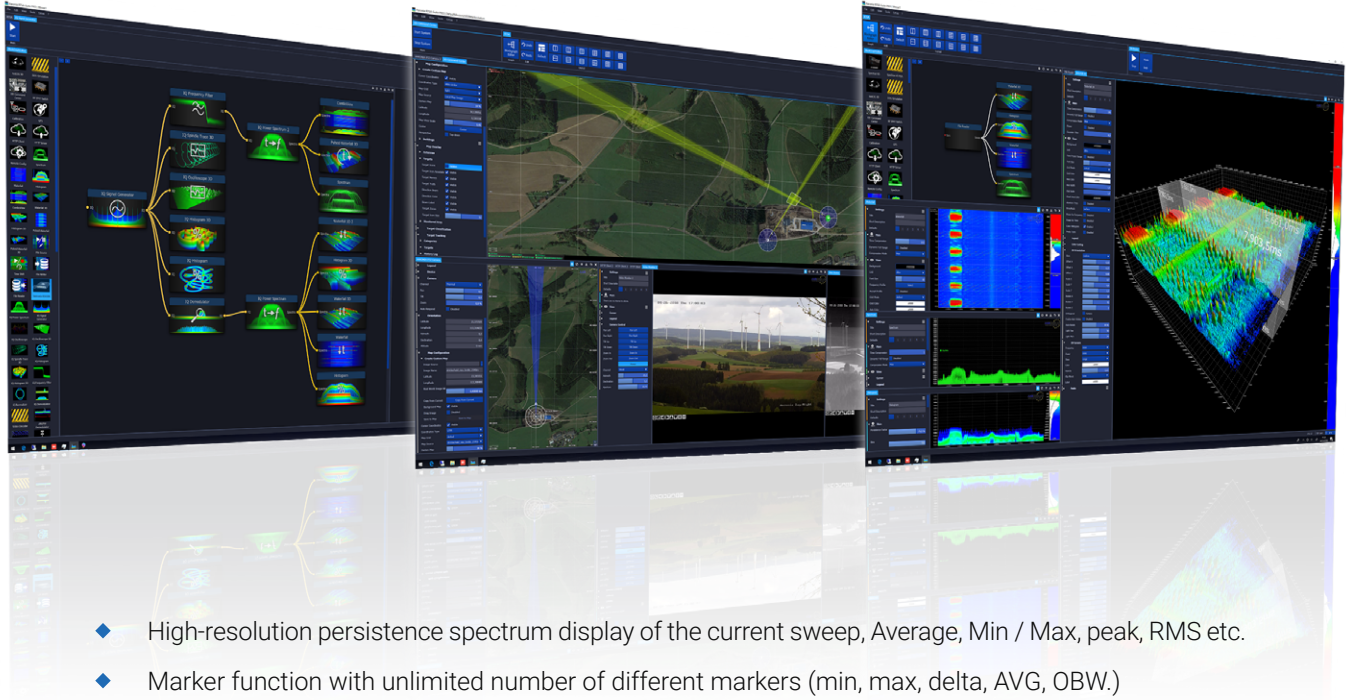


- ◆ Included PC Software
- ◆ Tough, high quality aluminum alloy
- ◆ 50 Ohm RF input (SMA)
- ◆ 8000mAh LiPo Power Battery (2 hours runtime)

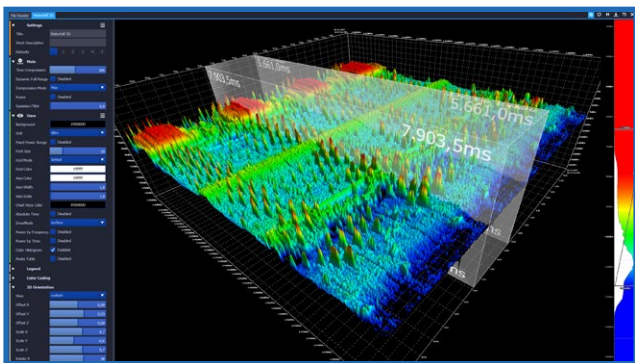
# RTSA Suite Pro

The world's fastest real-time analyzer software.

Aaronia's "RTSA Suite Pro" is an extremely powerful and flexible software, with an intuitive and highly customizable user interface. The node-based software allows the user to identify, capture, demodulate and track any signal, and offers a multitude of ways to graphically display the signal detection.

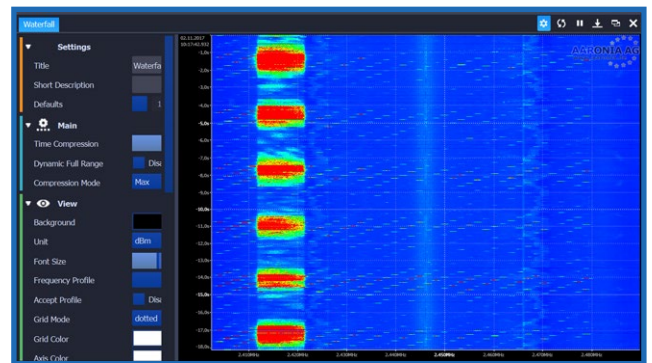


## 3D View and Histogram View



- ◆ The V5 Handheld offers several views (Spectrum, 3D Waterfall, Histogram and more)
- ◆ The different views are fully customizable and can be easily arranged with the drag-and-drop system

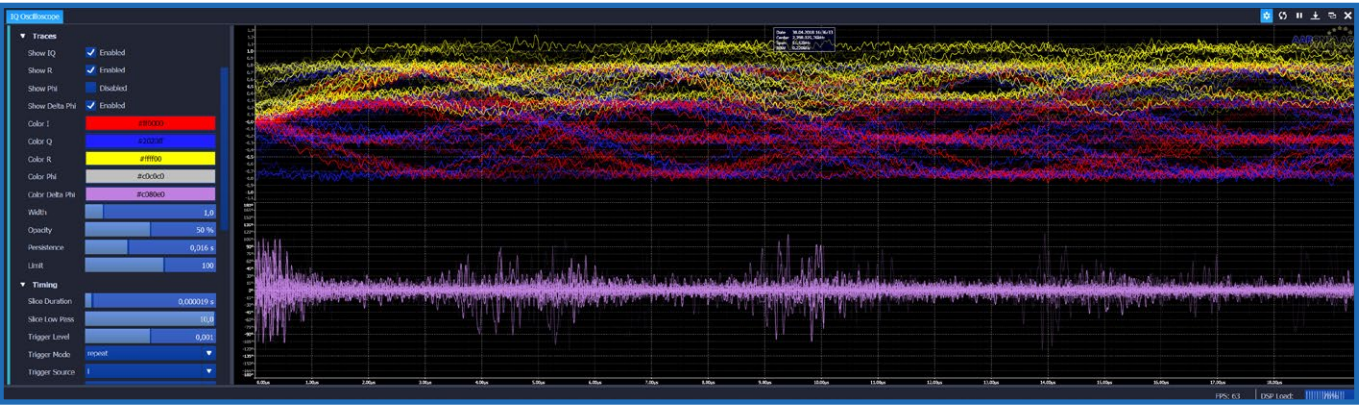
## Waterfall View



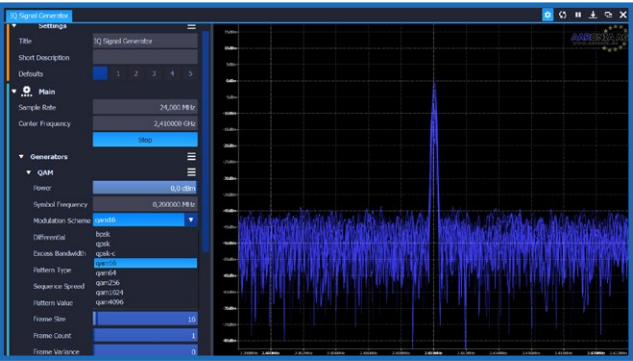
- ◆ Spectrogram / Waterfall View for the identification of frequency hops, measurements of pulse rate, analysis of time variant spectra and the tuning of a VCO

# RTSA Suite Pro

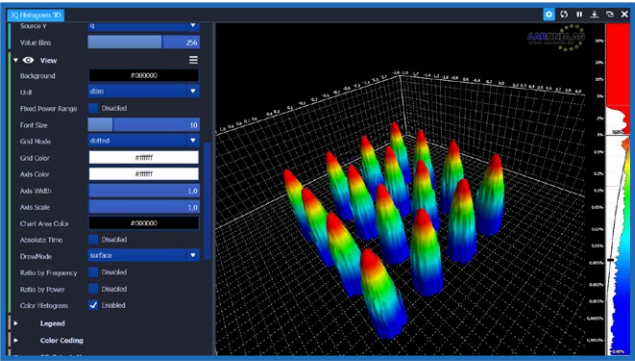
## IQ Oscilloscope



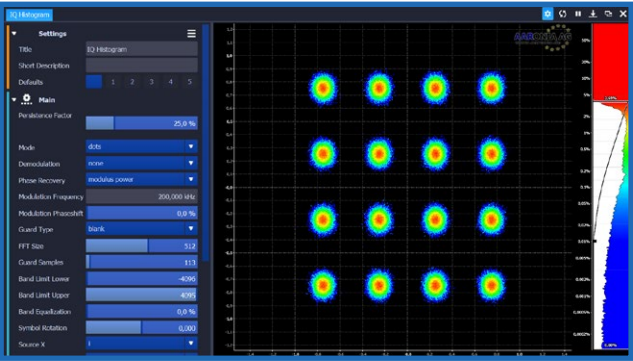
## IQ Signal Generator



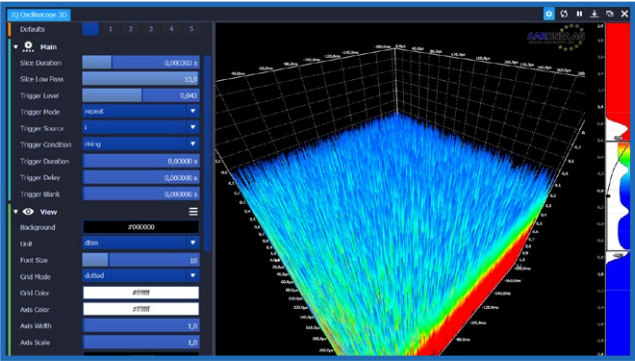
## IQ Histogram 3D



## IQ Histogram



## IQ Oscilloscope 3D



# SPECTRAN V5 Handheld

The Aaronia SPECTRAN V5 impresses with the combination of Real-Time spectrum analysis by means of a shifted poly-phase-filter used together with a patented measurement process with modulated local oscillator.

Benefits include:

- ◆ Small and compact design and construction (significantly fewer and much smaller components are required)
- ◆ Implementation of cost-effective hardware for a reasonable price (only "standardized" RF-components are needed)
- ◆ Extremely low noise signal processing up to -170dBm/Hz (achieved by eliminating noisy components in the RF path)
- ◆ Analysis of even highest frequencies up to 20GHz (achieved by the elimination of upper lying LO)

## µS ultra fast DDS sweep

The SPECTRAN V5 also offers a "classical" spectrum analyzer mode by means of µS ultra fast DDS sweep:

In addition to LO-modulation the V5 has a DDS-synthesizer available with up to 800 MSPS I/Q for extremely fast frequency hops of the local oscillator. This technology allows sophisticated measuring programmes over the full frequency range up to 20GHz.

The SPECTRAN V5 with its accelerated sweep rate is much faster than currently available sweep spectrum analysers.

## Polyphase filter

The Aaronia SPECTRAN V5 is setting new standards in filtering process technology. Where typical Real-Time Analysers are based on Fourier analysis, the V5 uses a patented receiving method with two staggered combs which are produced by a polyphase filter.

In contrast to the ordinary Fourier analysis, the polyphase filter covers more than one interval of sampling points, based on the number of frequency points. Thereby any filter curve (e.g. real Gauss-filter) can be realised without limitation of the slope due to the predetermined interval. To avoid gaps in the frequency-time-diagram, two spatially and temporary staggered filter combs are used for analysis. This SPECTRAN V5 break-through technology will not miss even the smallest signal detail in the investigated frequency band.



# Technology

## Analyzer Hardware

The signal processing is realised by FPGA, which also includes a vector processor for statistic analysis and demodulation. Together with the powerful Dual Core Blackfin DSP-CPU and the 800x480 pixel high-resolution colour display and touch screen, the possibilities for analysing even the most complex signals are limitless.

Within the analogue process, the signal is sampled by a real 14Bit A/D converter with up to 500MSPS (250 MSPS I/Q) data rate. This process always ensures a big dynamic range of 80dB and a high quality of analysis.



## Real-Time Streaming

The Real-Time Streaming function is another special feature of the SPECTRAN V5. Contrary to existing Real-Time Spectrum Analysers, which do not allow uninterrupted data logging, the V5 can stream data continuously and save them gap-free and without any time limit on PC e.g. via high-speed USB-interface.

The real-time streaming offers a variety of new applications that were previously inconceivable, like recording and repeated playing of any signal or a subsequent, complete decoding of complete recorded digital signals like GSM, TETRA, etc.

## Multiple Ways to Control

The SPECTRAN V5 can be controlled either by the unit's touch screen, by a multifunctional jog-dial, via custom-hotkeys or real-time remote control via USB.

Optionally available is a GPS-Logger, which stores the exact location of the measurement and allows complex measurement runs as well. The GPS-Logger, together with the integrated data logger, enable a complete gap-free recording of field measurements including an automatic heatmap-generation (e.g. on Google-Maps). Thus, the user's documentation of EMC measurements or the visualisation of network coverage of GSM, WLAN etc. will be remarkably easy to generate.

## Large Battery Capacity

The SPECTRAN V5 has an integrated 8,000mAh lithium polymer battery (LiPo) for 2 hours of runtime, plus there is a 20,000mAh external power pack available to provide 4 hours of runtime.

A variety of more advanced software-evaluation and analysis-options are currently under development and these will be available for retrofit when requested (e.g. GSM decoder).

# Technology

## Scope of delivery

The SPECTRAN V5 Handheld comes with an extensive scope of delivery, depending on the special needs of users, the delivery can be extended to various additional products (see "Accessories" on Page 9).

- SPECTRAN V5 Handheld incl. Option 020 (internal 20dB preamp)
- OmniLOG 70600 antenna (700MHz to 6GHz)
- Water- & shock-proof transport case
- Spectrum Analysis Software "RTSA Suite Pro" and "MCS" (on USB stick)
- Rechargeable 8000mAh battery (installed, external power pack available as option)
- Battery charger / power supply
- English manual (on CD)

## Solutions for every application

The SPECTRAN V5 series is available in different versions, each specially equipped for a specific application. Besides the handheld version, Aaronia offers the USB (X & OEM) series, remote-controlled analyzers (19" RSA and Outdoor-Box) and military grade Countersurveillance Receivers (XFR V5 PRO).

## Interfaces

- 50 Ohm RF input
- Audio Output
- USB Slave
- USB Master
- Micro SD
- Power

## Options

Optional modifications to the V5 Handheld:

**Option 002:** 5ppb (0,005ppm) OCXO Timebase  
This highly precise OCXO timebase, which has been especially developed for the SPECTRAN®, offers significantly reduced phase noise (jitter). This will allow the use of far narrower filters, which will in turn vastly enhance sensitivity. To fully exploit the maximum sensitivity this option is indispensable! Furthermore, the OCXO timebase allows far more accurate frequency measurement and display.

**Option 160:** Expands the real-time Bandwidth from 88MHz to 160 or 175MHz.



# Analyzer Specifications

Specifications	V5 80200
Frequency Range	9kHz to 20GHz
Real-Time Bandwidth	88MHz (Optional: 160/175MHz)
Min. Event Duration	<1µS
Max. Power at RF input	+20dBm (+33dBm*)
Displayed Average Noise Level (internal pre-amp on)	typ. -150dBm/Hz
Displayed Average Noise Level (with external pre-amp)	max. -170dBm/Hz
Amplitude accuracy (typ.)	typ. +/- 1,5dB
RF Input	50 Ohm (SMA-connector)
Frequency reference accuracy	0,5ppm (optional 5ppb with Option 002)
RBW (resolution bandwidth)	1Hz to 3MHz
VBW (video bandwidth)	1Hz to 3MHz
Demodulator	AM, FM
Measurement Units	dBm, dBµV, V/m, A/m, W/m², dBµV/m, W/cm²
Detector	45dB (0,5dB steps)
Traces	ACT, AVG, MAX, MIN
Reference range	-200dBm to 100dBm
Measurement modes	I/Q, Power/Frequency Data
ADC	500MSPS 14Bit
GPS	Support via external GPS Logger
FPGA	240K ECP3
DSP	600MHz
Temperature Range (Operation)	0 °C to +40 °C
Temperature Range (Storage)	-20 °C to +60 °C
Dimensions	255 x 85 x 29mm
Weight	850g
Power Supply	AC Input: 100-240V, 50-60Hz - DC Output: 5,6V, 5A max.
Power Consumption	<35W
Country of Origin	Germany
Recommended Calibration Interval	2 years