



Rev 1.1 / Beta
13.10.2015

USB Real-Time Spectrum Analyzer & Recorder SPECTRAN V5 X

1Hz to 20GHz (40GHz) - Ultra fast sweep mode – Unlimited recording time

- ◆ Up to 160MHz Real-Time bandwidth
- ◆ POI below 1 μ S
- ◆ Real-time I/Q streaming via USB
- ◆ Very fast sweep mode, scans 20GHz in less than 20mS
- ◆ Patented polyphase filter technology
- ◆ Patented spectrum analysis (modulated LO)
- ◆ First analyzer with ultra fast LO sweeps (μ S DDS sweep)
- ◆ Compact and lightweight
- ◆ Optional I/Q Generator (6GHz) and Power Meter (40GHz)
- ◆ Includes World's first 3D Real-Time Spectrum monitoring and recording Software „RTSA Suite“ (gapless streaming and playback)

AaroniaUSA

Fast, compact and powerful

Aaronia presents the SPECTRAN V5 X, a USB Real-Time Spectrum Analyzer designed to capture even shortest signal transmissions. It's scanning speed and recording time is without competition, the Analyzer scans 20GHz in less than 20mS making it World's fastest USB Spectrum Analyzer.

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

The included PC analysis software RTSA Suite transforms the V5 X into a fully-featured Benchtop Spectrum Analyzer (see page 3). Available in 4 different versions (see page 7) the V5 X offers a solution for almost every application.

- ◆ Ultra wide measurement range from 1Hz to 20GHz

- ◆ Optional Internal Battery (2-3 hours run-time)

- ◆ High quality aluminum alloy

- ◆ Including watertight transport case

- ◆ Included PC Software



- ◆ Size: 255 x 137 x 41mm

- ◆ 6GHz I/Q Generator (optional)

- ◆ Weight: 2,1kg

- ◆ 50 Ohm RF input (SMA)

- ◆ Optional External Battery (5-6 hours run-time, Hotswap)

- ◆ 40GHz Power Meter (optional)

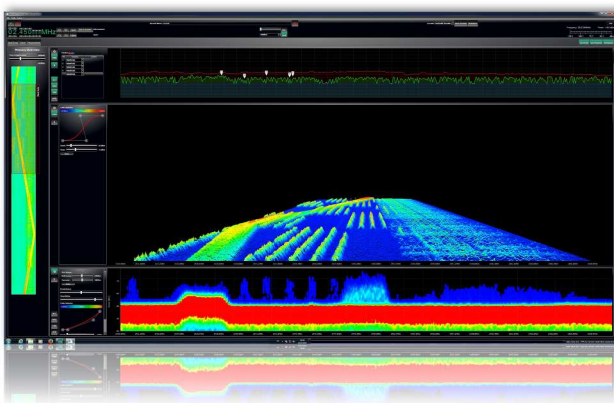
RTSA Suite

World's fastest Real-Time Analyzer Software included

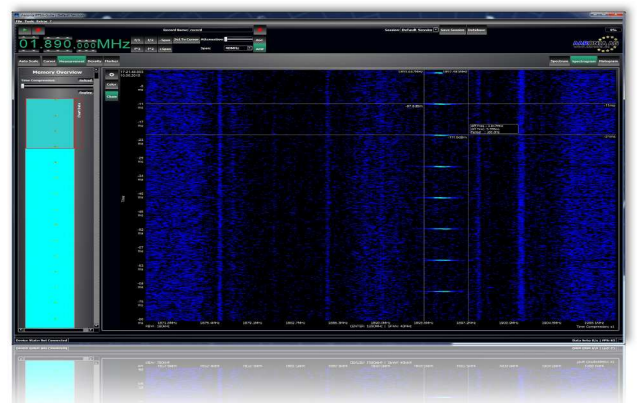
Aaronia's real-time Software „RTSA Suite“ offers powerful analysis features. An intuitive layout combined with useful display options helps to identify, capture, demodulate and track signals up to 20GHz. Simply connect the V5 X via USB to a suitable PC/Laptop and enjoy the advantages of the RTSA Suite.



- ◆ High-resolution persistence spectrum display of the current sweep, Average, Min / Max, peak, RMS, etc.
- ◆ Marker function with unlimited number of different markers (min, max, delta, AVG, OBW..)
- ◆ Intuitive drag and drop zoom, shortcuts etc.



- ◆ The RTSA Software displays several views at once (Spectrum, 3D Waterfall, Histogram, etc.)
- ◆ The window size can be adjusted freely, therefore a full utilization of e.g. FULL HD or 4K displays is possible



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

Highlights

The Aaronia SPECTRAN V5 X 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:

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

µS ultra fast DDS sweep

The SPECTRAN V5 X also offers a “classical” spectrum analyser mode by means of µS ultra fast DDS sweep:

In addition to LO-modulation the V5 X 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 X with its accelerated sweep rate is much faster than currently available sweep spectrum analysers.

Polyphase filter

The Aaronia SPECTRAN V5 X is setting new standards in filtering process technology. Where typical Real-Time Analysers are based on Fourier analysis, the V5 X 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 X break-through technology will not miss even the smallest signal detail in the investigated frequency band.

Expandable frequency range down to 1Hz

The SPECTRAN V5 X can optional be fitted with a frequency extension down to 1Hz. The input signal is internally diverted to a second RF- path, which is optimised for low frequency processing.

The low frequency path offers a frequency range from 1Hz up to 40MHz. In the path is a high-performance 16Bit AD converter with 105MSPS is used. The resolution enhancement from 14Bit to 16Bit improves the dynamic range from 80dB (14Bit) to 100dB (16Bit), which leaves nothing to be desired. This path is a fully capable Real-Time function controllable by µS DDS sweep. The low frequency path (1Hz-40MHz/16Bit) and the radio frequency path (9kHz-20GHz/14Bit) are seamless to the User, except for the particularly noteworthy improvement in the dynamic range.



◆ Scope of delivery

Technology

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 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. An optional 16Bit A/D converter with 100dB dynamic range (1Hz-40MHz) can be added.

The SPECTRAN V5 X is controlled in Real-Time via USB. An optional tracking generator up to 6GHz allows, amongst others, network-, cable- and antenna measurements.

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).



Real-Time Streaming

The Real-Time Streaming function is another special feature of the SPECTRAN V5 X. Contrary to existing Real-Time Spectrum Analysers, which do not allow uninterrupted data logging, the V5 X 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.

Scope of Delivery

The V5 X comes including an extensive scope of delivery, depending on the necessity of the user the delivery can be extended to various additional products (see "Accessories" on Page 9).

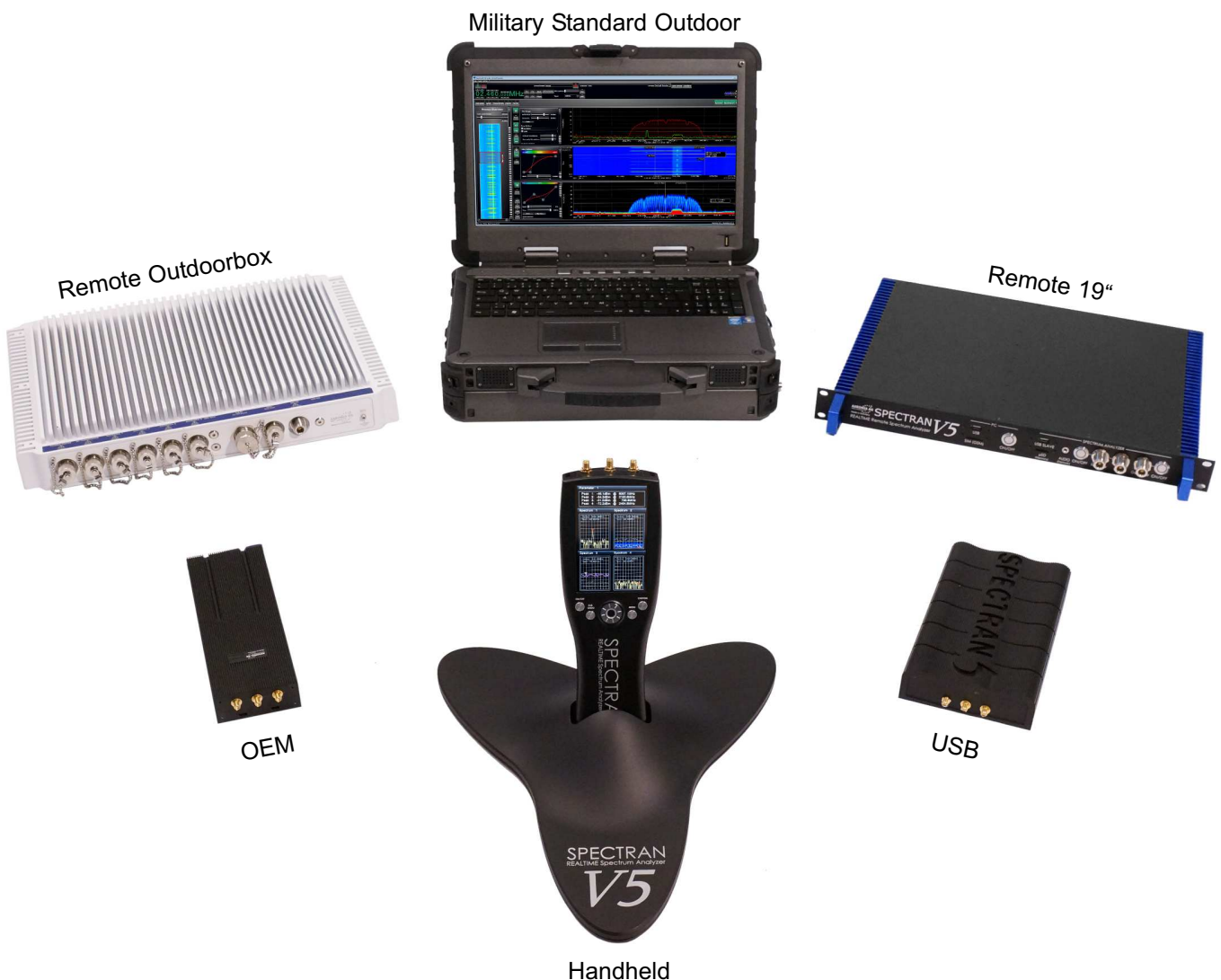
- ◆ SPECTRAN V5 X incl. Option 020 (internal 20dB preamp)
- ◆ OmniLOG 70600 omnidirectional antenna (700MHz to 6GHz)
- ◆ Watertight & shock-proof transport case
- ◆ Spectrum Analysis Software RTSA Suite and MCS (on CD)
- ◆ International Power Supply with adapters
- ◆ English manual (on CD)

Interfaces

- ◆ 50 Ohm RF input
- ◆ I/Q Tracking generator (6GHz) output
- ◆ Sync In/Output
- ◆ Audio Output
- ◆ USB Slave
- ◆ USB Master
- ◆ Micro SD
- ◆ Power

SPECTRAN V5 - Solutions for every application

The SPECTRAN V5 series is available in different versions, each specially equipped for it's specific application. Besides the Handheld version Aaronia offers the USB (X & OEM) series, remote-control Analyzers (19" RSA and outdoor box) and military grade Countersurveillance Receivers (XFR V5 PRO).



Specifications

| | 8060 V5 X | 80120 V5 X | 80160 V5 X | 80200 V5 X |
|---|--|------------------------|------------------------|------------------------|
| Comparison Features | | | | |
| Frequency Range (min) | 9kHz (optional 1Hz with Option 003) | | | |
| Frequency Range (max) | 6GHz | 12GHz | 16GHz | 20GHz |
| Real-Time Bandwidth | 40MHz (opt. 80MHz) | 80MHz (opt. 160MHz) | 80MHz (opt. 160MHz) | 80MHz (opt. 160MHz) |
| Minimum Event Duration for 100% POI | <1µS | | | |
| Max. Power at RF input (50 Ohm) | +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. +/- 1dB | | | |
| RF input | 50 Ohm (SMA-connector) | | | |
| Frequency reference accuracy | 0,5ppm (optional 5ppb with Option 002) | | | |
| RBW (resolution bandwidth) | 1Hz to 40MHz (in preparation) | | | |
| VBW (video bandwidth) | 1Hz to 40MHz (in preparation) | | | |
| Demodulator | AM, FM | | | |
| Measurement Units | dBm, dBµV, V/m, A/m, W/m², dBµV/m, W/cm² | | | |
| Detector | Min, Max, AVG, Peak, QPeak (in preparation) | | | |
| Attenuator range | 45dB (0,5dB steps, incl. pre-amp) | | | |
| Traces | ACT, AVG, MAX, MIN | | | |
| Reference range | -200dBm to 100dBm | | | |
| Measurement modes | I/Q (in preparation), Power/Frequency Data | | | |
| Views | Spectrum, Persistence Spectrum, Spectrogram / Waterfall, Histogram | | | |
| Video RAM | 32 MB | 64 MB | 64 MB | 64 MB |
| SDRAM | 128 MB | 256 MB | 256 MB | 256 MB |
| ADC | 250MSPS 14Bit | 500MSPS 14Bit | 500MSPS 14Bit | 500MSPS 14Bit |
| GPS | Support via external Aaronia GPS Logger | | | |
| FPGA | 72K ECP3 | 240K ECP3 | 240K ECP3 | 240K ECP3 |
| DSP (Dual Core Blackfin) | 400 MHz | 600 MHz | 600 MHz | 600 MHz |
| Temperature Range (Operation) | 0 °C to +50 °C | | | |
| Temperature Range (Storage) | -20 °C to +60 °C | | | |
| Dimensions | 255 x 137 x 41mm | | | |
| Weight | 2,1kg | | | |
| Power Supply | AC Input: 100-240V, 50-60Hz - DC Output: 5,6V, 5A max. | | | |
| Power Consumption | <30W | | | |
| Country of Origin | Germany | | | |
| Recommended Calibration Interval | 2 years | | | |

* optionally available +33dBm, decreases sensitivity by 20dB, Article number 775

Options

Included in delivery

Option 020: Internal 20dB Low-Noise Pre-Amplifier

This option provides an internal, super low-noise 20dB Pre-Amplifier, enabling maximum performance particularly when measuring extremely weak signals. It is switched via a true RF switch.

Order/Art.-No.: 120

Available options (extra charge)

Option 220 / 240: 20 / 40GHz Power Meter (in preparation)

High accuracy internal Power Meter up to 40GHz.

Order/Art.-No.: 127 (20GHz Power Meter) - Order/Art.-No.: 128 (40GHz Power Meter)

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.

Order/Art.-No.: 126

Option 003: Low Frequency Extension (starting at 1Hz, in preparation)

Extension of the low frequency range to 1Hz. The input signal is internally diverted to a second RF- path, which is optimised for low frequency processing. The low frequency path offers a frequency range from 1Hz up to 40MHz. This path uses a high-performance 16Bit AD converter with 105MSPS. This resolution enhancement from 14Bit to 16Bit improves the dynamic range from 80dB (14Bit) to 100dB (16Bit), which leaves nothing to be desired. This path is a fully capable Real-Time function controllable by μ S DDS sweep. The low frequency path (1Hz-40MHz/16Bit) and the radio frequency path (9kHz-20GHz/14Bit) are seamless to the User, except for the particularly noteworthy improvement in the dynamic range.

Order/Art.-No.: 124

Option 004: Ultra Low Phase Noise

Order/Art.-No.: 123

Option 007: 6GHz Tracking / IQ DDS Generator (in preparation)

Order/Art.-No.: 125

Option 160: 160MHz Real-Time Bandwidth (in preparation)

Extends the Real-time Bandwidth from 80MHz to 160MHz. Available for SPECTRAN HF-80120 V5 X, HF-80160 V5 X and HF-80200 V5 X.

Order/Art.-No.: 119

Accessories

Near Field Probe Set (DC to 9GHz)

Passive or active Near-Field Probeset PBS1 or PBS2. Consisting of 5 Probes (4xH-Field, 1xE-Field), 40dB Preamplifier (only PBS2). Perfect for EMC near field tests.

Order/Art.-No.: 720 / 721



External low noise Pre-Amplifier

External Battery-Powered Preamplifier with full range of DC to 35GHz & up to 40dB gain. Perfect to reach extremely high sensitivity up to -170dBm/Hz.



Biconical Antennas (20MHz - 3GHz)

Broadband Biconical Antennas for EMC Pre-compliance Tests. Perfect for in-house compliance testing of various EMC standards up to 3GHz. High bandwidth and gain up to 41dBi.



Directional Antennas (380MHz - 35GHz)

Directional, Ultra Broadband Antennas with extremely wide frequency range from 380MHz to 35GHz. High and constant gain of typ. 5dBi (45dBi optional/active), with optional Laser, GPS, Compass and Pre-Amplifier.



OmniLOG 30800 (300MHz - 8GHz)

Omnidirectional Broadband Antenna with extremely wide frequency range from 300MHz to 8GHz. Small and lightweight.

Order/Art.-No. : 734



Low Frequency Antennas

Magnetic Tracking Antennas for the low frequency range of the Analyzer. Covering max. 1Hz to 400MHz. Active and Passive Antennas with high sensitivity.



Active Differential Probe (DC - 40MHz)

Differential Probe for conducted emission testing. Offers a potential free measurement and expands the measurement range up to 240V.

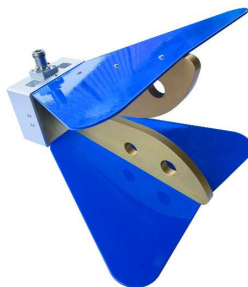
Order/Art.-No. : 730



PowerLOG 70180 (700MHz - 18GHz)

Directional, High-Power Horn Antenna. Perfect for EMC Immunity Tests. Up to 500W input power (peak).

Order/Art.-No. : 726



1m / 5m / 10m SMA-Cable

High quality special SMA cable for connecting any HyperLOG or MDFAntenna with the Analyzer. Available as 1m, 5m and 10m Cable. All versions: SMA plug (male) / SMA plug (male).



DC-Blocker

It prevents the RF-input of the SPECTRAN to be destroyed by the DC-voltages of e.g. DSL/ISDN lines.

Order/Art.-No.: 778



20dB Attenuator (DC -18GHz)

Expands the measurement range to +40dBm.

Order/Art.-No.: 775

