R&S®EVSD1000
VHF/UHF NAV/DRONE ANALYZER

Efficient drone inspection of terrestrial navigation and communications systems

Product Brochure
Version 03.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

The R&S®EVSD1000 VHF/UHF nav/drone analyzer is a signal level and modulation analyzer for medium-sized drones. It can carry out measurements of ILS, GBAS and VOR ground stations as well as air traffic control communications (ATC COM) signals during startup, maintenance and servicing. The mechanical and electrical design is optimized for drone based measurements of terrestrial navigation systems.

As the most important component of drone based measurement systems for terrestrial navigation aids, the R&S®EVSD1000 allows precise, high-sensitivity analysis in the frequency range from 70 MHz to 410 MHz. The analyzer measures ILS, GBAS and VOR ground systems in line with ICAO standards and investigates ATC COM signals. When used as a measurement drone payload, it supports much more efficient testing and analysis relative to conventional ground based measurement methods.

The R&S®EVSD1000 largely has the same receiver hardware and software as the R&S®EVSG1000 VHF/UHF air-nav/com analyzer that performs the same measurements from the ground. It has the same level of performance as the R&S®EVSF1000 VHF/UHF nav/flight analyzer, ensuring that in-flight results for drone measurement campaigns are comparable to ground based results as stipulated by the ICAO standards.

The R&S®EVSD1000 base configuration includes all essential drone inspection functions and can precisely determine characteristic system parameters at a rate of 100 data records per second for modulation depth, DDM and SDM. All data delivered by the R&S®EVSD1000 is acquired, visualized and stored internally and shared via the data connection to the ground operator for a seamless data stream.

The R&S®EVSD1000 is very compact with a robust mechanical design and excellent signal processing sensitivity, making it ideal for use in measurement drones. Spectrum and signal analysis options as well as a time domain analysis option are also available. At 1.5 kg, the R&S®EVSD1000 can be used on a medium-sized drone for measurements of ILS/VOR systems in line with the ICAO standards.

Side view of the R&S®EVSD1000 with connectors for LAN, power supply and one of the data link antennas.

KEY FACTS

- Precise, reproducible analyses of ILS, GBAS and VOR ground systems (in line with ICAO Doc 8071 and ICAO Annex 10)
- Extremely compact with integrated battery and data link module (Wi-Fi®)
- High measurement rate for dynamic measurements of 100 data records per second
- Simultaneous analysis of course and clearance signals in dual-frequency (2F) ILS systems
- Detailed analysis options in the frequency and time domain

BENEFITS

Excellent drone inspection system performance
► page 4

Highly customizable for specific tasks
► page 5

Tailored to drone inspection applications
► page 6

The R&S®EVSD1000 without cover – easy access to the battery and data link module (Wi-Fi®).

EXCELLENT DRONE INSPECTION SYSTEM PERFORMANCE

High accurancy level measurements

The R&S®EVSD1000 has an extremely wide dynamic range thanks to switchable preamplifiers and selectable attenuators in combination with a high-level mixer. An integrated calibration generator with long-term stability ensures accurate level measurements.

Outstanding input sensitivity, efficient preselector

Th high sensitivity, low noise figure and narrowband filters of the R&S®EVSD1000 deliver very precise results even at low signal levels. The R&S®EVSD1000 also has a wide input level range and steep-edged preselection filters for optimized interference rejection in ILS, GBAS, VOR and COM measurements. As a result, the R&S®EVSD1000 can supress intermodulation and is immune to interference for reliable measurements, even when it is close to FM transmitters.

Precision modulation analysis in real time

The R&S®EVSD1000 uses digital signal processing for outstanding accuracy when analyzing modulation. The input signal is sampled at the IF with a high-precision analog-to-digital converter. The FPGA technology processes results in real time with the highest possible reproducibility.

Enhanced ground inspection

Air navigation service providers regularly check ground installations with diverse measurements such as:

- ILS localizer course structure
- ILS localizer coverage or linearity
- ILS glide path coverage or structure
- VOR or GBAS installation tests

The R&S®EVSD1000 is ideal for all ground measurements. All measurement values include accurate location and time stamps with a GNSS module. The GNSS RTK device (R&S®EVSD1-Z6) plus the GNSS antenna (R&S®EVSD1-Z7) also provide accurate positioning data in the centimeter range.

Reliable measurement of identifier parameters

The R&S®EVSD1000 automatically measures and decodes the identifier for a station under test and returns the ID pulse repetition rate, the ID code and the dash, dot and gap lengths.

Front view of the R&S®EVSD1000 with power switch and status LEDs switched on.

HIGHLY CUSTOMIZABLE FOR SPECIFIC TASKS

Simultaneous analysis of course and clearance signals (R&S®EVSG-K1)

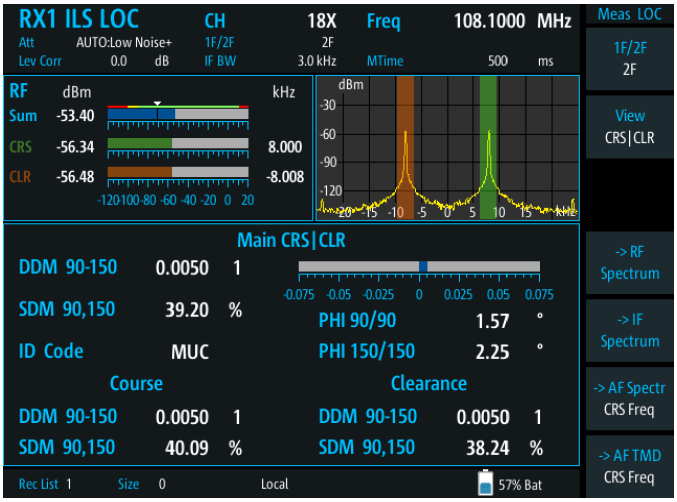
The R&S®EVSG-K1 option makes it possible to independently and simultaneously measure both carriers of a dual-frequency (2F) ILS system. The level and modulation values for each carrier (course and clearance) are measured and analyzed at the same time. Each carrier can be measured without switching off the other to determine the phase relationship between the 90 Hz and 150 Hz AF tones for the individual carriers.

Detailed analysis of VOR (R&S®EVSG-K2)

In combination with the R&S®EVSG-K2 option, the R&S®EVSD1000 can analyze characteristic parameters such as the bearing and modulation in VOR systems for orbital and radial inspection flights. The R&S®EVSD1000 can also determine the AM distortion values required for Doppler VOR (DVOR) systems.

Testing ground based augmentation systems (GBAS) for satellite navigation (R&S®EVSG-K4)

The R&S®EVSG-K4 software option can be used to test VHF data broadcast (VDB) for GBAS ground based satellite navigation systems. GBAS content is analyzed and synchronized with a PPS signal. The instrument analyzes the GBAS parameters for each time slot. Message types (MT) are defined with XML description files. Standard files for MT1, MT2, MT4 and MT11 are included. Files for existing MTs can be modified or new MT description files created. All measured values and data content can be streamed via the R&S®EVSD1-Z5 data link module (Wi-Fi®), recorded, saved or exported via a USB flash drive.



Simultaneous analysis of course and clearance signals using the R&S®EVSG-K1 option.

ATC COM signal analysis (R&S®EVSG-K6)

The R&S®EVSG-K6 option analyzes the level, frequency and modulation (AM and FM) of ATC COM signals in the VHF and UHF bands.

High measurement rate and integrated data recording

The R&S®EVSD1000 can process up to 100 data records per second and analyze effects such as scallops and bends. An external GNSS module can be used to automatically link each data record to the correct GPS time and location stamps. The R&S®EVSD1000 has a large internal memory to store all data records even if acquired at very high rates. After the drone inspection, recorded data can be transferred to a PC or laptop via a USB flash drive or LAN cable.

RF spectrum analysis (R&S®EVSG-K10) and AF spectrum analysis (R&S®EVSG-K11)

The R&S®EVSG-K10 option lets the R&S®EVSD1000 display the RF spectrum in the 70 MHz to 410 MHz range for the input signal on an external PC. Clear/write, average and peak hold trace modes as well as markers and delta markers can be selected. The wide dynamic range and low noise figure support interference analysis in the ILS/VOR and COM bands. The R&S®EVSD1000 has an integrated VNC server to access measurement results and change settings without any special software. Just a PC with a standard VNC client and Wi-Fi® access to the R&S®EVSD1000 via the R&S®EVSD1-Z5 are needed. The R&S®EVSD1000 can also be used with the R&S®EVSG-K11 option for baseband analysis to identify harmonics and intermodulation products.

Time domain analysis (R&S®EVSG-K12)

The R&S®EVSG-K12 option can be used to analyze signals in the time domain. Cursor functions ensure reliable detection of phase and level errors. Even very small signal distortions can be identified thanks to the fine graphical resolution and high vertical A/D converter resolution.

I/Q data streaming (R&S®EVSG1-K25)

The R&S®EVSD1000 can stream and internally store I/Q data for the analyzed signal. This I/Q data can be used in an arbitrary waveform generator to replay the recorded signal when comparing various NavAid receivers.

TAILORED TO DRONE INSPECTION APPLICATIONS

Integration into drone measurement systems

Mounting a payload on a drone requires mechanical and electrical adaptations. The R&S®EVSD1-Z20 option offers a mechanical adapter and additional cables (power, GNSS, data link, etc.) for fast and easy integration of the R&S®EVSD1000 onto a DJI Matrice 300 RTK drone. Adapters for other drone types can be constructed on request.

Antenna (R&S®EVSD1-Z3)

The small size and low weight of the R&S®EVSD1-Z3 ILS/VOR antenna make it a perfect fit for the base unit in medium-sized drones and ideal for drone measurements. The antenna covers the frequency range for ILS (localizer and glidepath), VOR and GBAS and can be mechanically mounted via a quick release with a small mast below the R&S®EVSD1000 or on top of the drone.

Optional battery (R&S®EVSD1-Z1) for independent power supply

The R&S®EVSD1000 can either be powered by the drone or by the R&S®EVSD1-Z1 option when an independent power supply is needed. The small battery fits into an R&S®EVSD1000 compartment and can be charged with the R&S®EVSD1-Z2 external battery charger.

Compact, robust, lightweight

The compact size and light weight makes the R&S®EVSD1000 ideal for drone inspection systems. The mechanical design of the R&S®EVSD1000 is in line with EN 60068-2-6 and EN 60068-2-64 (sinusoidal and random vibration) and MIL-STD-810G method no. 516.6, procedure I (shock). The quick release enables fast and easy assembly and dismantling of the system and convenient transportation.

Detailed analyses in line with ICAO requirements

ICAO Doc 8071 and ICAO Annex 10 specify the service and maintenance of ILS, GBAS and VOR systems. The R&S®EVSD1000 is especially designed to meet all ICAO requirements. The required high speed and flexibility of the R&S®EVSD1000 means that all necessary measurements can be performed accurately and with temporal resolution. Measurements include standard modulation parameters along with distortion and residual modulation (residual FM, unwanted AM).

Simple remote control (R&S®EVSD1-Z5)

The R&S®EVSD1000 is usually remotely controlled via an R&S®EVSD1-Z5 data link module (Wi-Fi®). Measurement data can be streamed to the operator on the ground for further processing.

High position accuracy (R&S®EVSD1-Z6 and R&S®EVSD1-Z7)

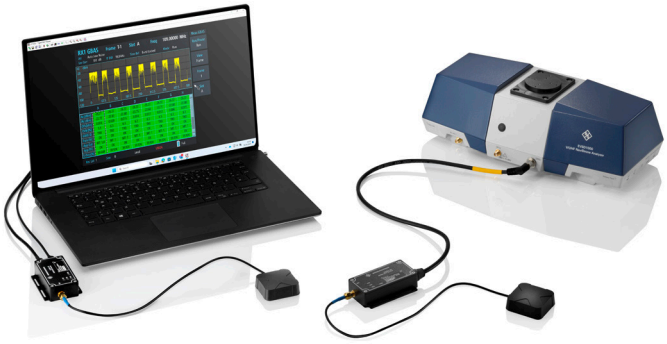
An R&S®EVSD1-Z6 GNSS RTK device (rover) and an R&S®EVSD1-Z7 GNSS antenna provide accurate location and time stamps for each R&S®EVSD1000 measurement.

An additional GNSS RTK set on the ground (base plus antenna) connected to a PC can improve the location stamp accuracy into the centimeter range. A Wi-Fi® connection between the PC and R&S®EVSD1000 (via R&S®EVSD1-Z5) is needed for the GNSS correction data exchange.

Maintenance, repair and service

The modular design and mechanical ruggedness make the R&S®EVSD1000 very serviceable. In the event of faults or if other servicing become necessary, the instrument can be quickly inspected in a lab using the external R&S®EVSG1-Z8 power supply and be returned to operation by simply replacing the modules and calibrating it in line with the service manual instructions.

R&S®EVSG1-Z11 verification test software lets users independently perform verifications. The software is run on an external PC and performs all the necessary and time-consuming measurements and automatically generates test reports.



R&S®EVSD1000 with R&S®EVSD1-Z6 GNSS RTK device and R&S®EVSD1-Z7 GNSS antenna

ORDERING INFORMATION

Designation	Type	Order No.
Base unit (including accessories supplied such as power cable and manual)		
VHF/UHF nav/drone analyzer	R&S®EVSD1000	1330.0350.02
Accessories supplied: DC power cable (length: 0.5 m), LAN cable (length: 1 m), getting started guide (English)		
Software options		
ILS CRS/CLR analysis	R&S®EVSG-K1	1329.9005.02
VOR analysis	R&S®EVSG-K2	1329.9011.02
Marker beacon analysis	R&S®EVSG-K3	1329.9028.02
GBAS analysis	R&S®EVSG-K4	1329.9034.02
COM analysis	R&S®EVSG-K6	1329.9057.02
RF spectrum analysis	R&S®EVSG-K10	1329.9063.02
AF spectrum analysis	R&S®EVSG-K11	1329.9070.02
Time domain analysis	R&S®EVSG-K12	1329.9086.02
I/Q data streaming	R&S®EVSG1-K25	1329.9157.02
Recommended extras		
Documentation of calibration values	R&S®DCV-2	0240.2193.10
Battery pack	R&S®EVSD1-Z1	1330.0366.02
Battery charger	R&S®EVSD1-Z2	1330.0372.02
VHF/UHF antenna	R&S®EVSD1-Z3	1330.0395.02
Data link module (Wi-Fi®)	R&S®EVSD1-Z5	1330.0520.02
GNSS RTK device (rover)	R&S®EVSD1-Z6	1330.0472.02
GNSS RTK device (base)	R&S®EVSD1-Z6	1330.0472.03
GNSS antenna	R&S®EVSD1-Z7	1330.0437.02
Transport case	R&S®EVSD1-Z9	1330.0508.02
Drone adapter, for DJI Matrice 300 RTK	R&S®EVSD1-Z20	1330.0443.02
Power supply	R&S®EVSG1-Z8	1330.0289.02
Verification test software	R&S®EVSG1-Z11	1329.8921.02

Service options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde&Schwarz sales office for more information.
Extended warranty, two years	R&S®WE2	
Extended warranty, three years	R&S®WE3	
Extended warranty, four years	R&S®WE4	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with calibration coverage, three years	R&S®CW3	
Extended warranty with calibration coverage, four years	R&S®CW4	

Your local Rohde & Schwarz expert will help find the best solution for you.
To find your nearest Rohde & Schwarz representative, visit www.sales.rohde-schwarz.com

Service at Rohde&Schwarz
You're in great hands

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

Rohde&Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Rohde&Schwarz training
www.training.rohde-schwarz.com

Rohde&Schwarz customer support
www.rohde-schwarz.com/support

PD 3683.4626.12 | Version 03.00 | June 2024 (ja)
R&S®EVSD1000 VHF/UHF Nav/Drone Analyzer
Data without tolerance limits is not binding | Subject to change

3683462612