

R&S® ESMW

ULTRA WIDEBAND MONITORING RECEIVER

Exceptional performance
for next generation radio monitoring



Product Brochure
Version 04.00

ROHDE & SCHWARZ

Make ideas real



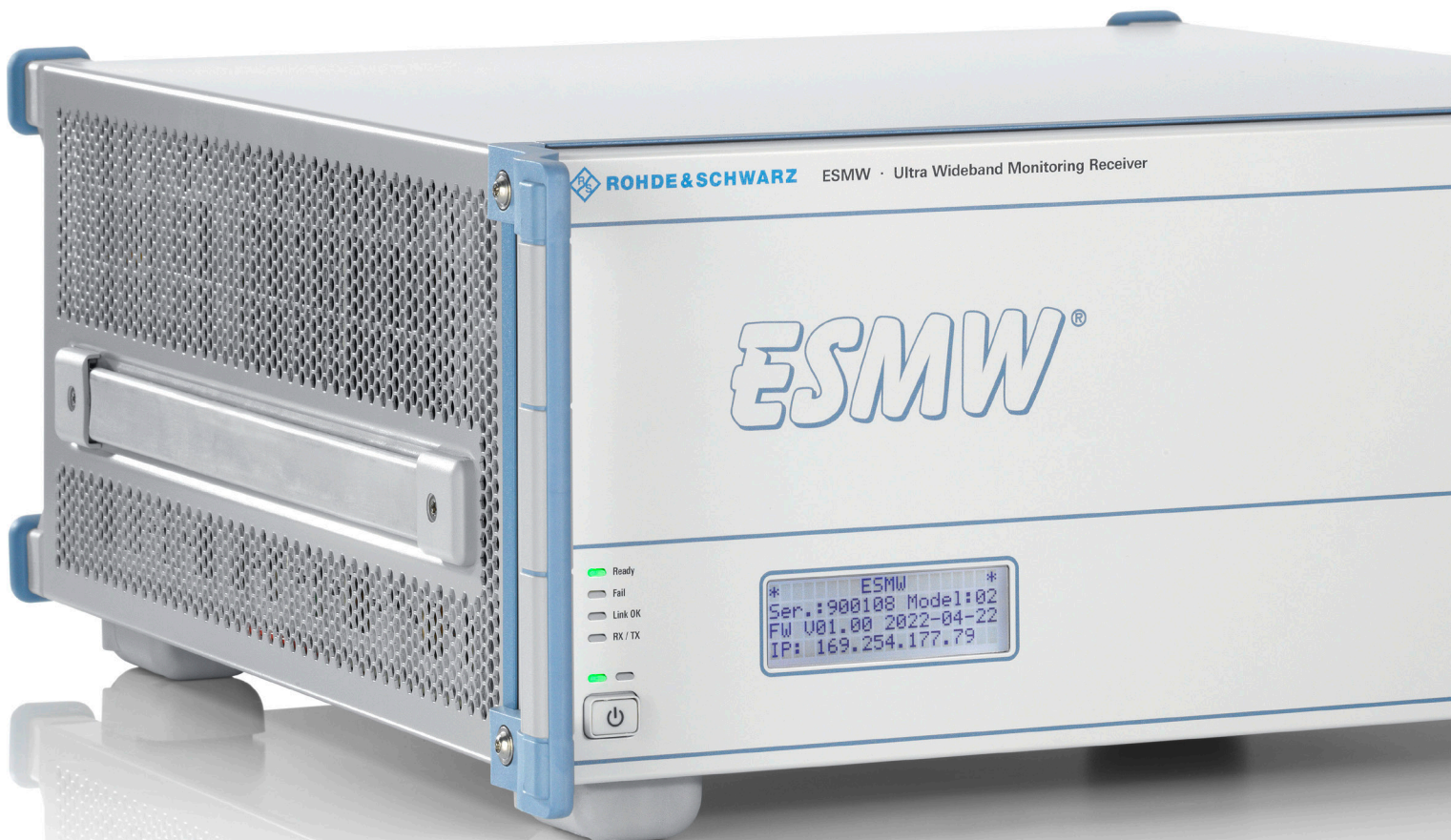
AT A GLANCE

The R&S®ESMW ultra wideband monitoring receiver is the perfect solution to address future trends and challenges in spectrum monitoring. It covers the wide frequency range of 8 kHz to 40 GHz with an outstanding real-time bandwidth of up to 2 GHz. In combination with Rohde & Schwarz single-channel direction finding (DF) antennas, it supports angle of arrival (AoA) direction finding from 300 kHz to 8.5 GHz. Thanks to its exceptional ITU-compliant RF performance, modular upgradeability and rich feature set, the R&S®ESMW provides the advanced capabilities needed to reliably measure the wideband signals of today and tomorrow in high-density spectrum environments.

The growing demand for wireless network connectivity calls for new and more complex transmission standards aimed at optimizing spectral efficiency and exploring higher frequency ranges with more available bandwidth. The spectrum is becoming increasingly denser, and channel bandwidths of 320 MHz (Wi-Fi 7), 400 MHz (5G FR2) and well beyond (6G) will soon be commonplace. This ongoing trend makes it increasingly difficult for regulatory authorities to verify proper spectrum usage in these wideband and highly dynamic spectrum environments.

The R&S®ESMW ultra wideband monitoring receiver with its cutting-edge, future-proof performance specifications is the ideal solution for next generation fixed and mobile radiomonitoring stations. It features a highly flexible modular option structure with multiple hardware and software extensions to meet current and future requirements.

The R&S®ESMW covers the 8 kHz to 40 GHz frequency range with outstanding ITU-compliant RF performance and extremely high dynamic range. Its incredibly large real-time bandwidth of up to 2 GHz enables wide instantaneous spectral overviews, reliable measurements of current and future wideband signals, extremely fast spectrum scan speeds of up to 2.6 THz/s and a minimum signal duration of only 75 ns for 100% probability of intercept (POI).



In addition to standard marker functions, the R&S®ESMW offers advanced measurement capabilities including polychrome spectrum, ITU-compliant signal parameter measurements and multiple digital downconverters (DDC). For recording and further analysis, the 100 Gigabit Ethernet (100GE) I/Q interface facilitates I/Q data streaming up to 2 GHz bandwidth while the 10GE I/Q interface provides I/Q data streaming up to 125 MHz bandwidth.

In combination with Rohde&Schwarz single-channel direction finding (DF) antennas, the R&S®ESMW can be upgraded to an angle of arrival (AoA) based direction finder that provides highly accurate bearing results from 300 kHz to 8.5 GHz. The built-in GNSS module also supports precise time difference of arrival (TDOA) radiolocation across the entire frequency range.

Besides standalone operation, the R&S®ESMW easily upgrades existing high-performance radiomonitoring systems running R&S®ARGUS or R&S®RAMON software thanks to its backward compatibility with the R&S®ESMD and R&S®ESME wideband monitoring receivers. Its versatile and well-documented data and control interfaces allow for easy third-party system integration.



KEY FACTS

- ▶ Frequency range for monitoring and TDOA from 8 kHz to 40 GHz
- ▶ Accurate ITU-compliant AoA direction finding from 300 kHz to 8.5 GHz; support of TDOA and hybrid radiolocation over the entire frequency range
- ▶ Up to 2 GHz real-time bandwidth for monitoring next generation wideband signals
- ▶ Modular upgradeability to meet current and future requirements
- ▶ Outstanding ITU-compliant RF performance and dynamic range for the most challenging spectrum environments
- ▶ Extremely fast panorama scan speeds of up to 2.6 THz/s
- ▶ Advanced signal measurement capabilities including polychrome spectrum, ITU-compliant signal measurements and multiple digital downconverters
- ▶ Wideband I/Q data streaming of up to 2 GHz via 100GE I/Q interface

TYPICAL APPLICATIONS

Future-proof ITU-compliant spectrum monitoring

Spectrum monitoring helps verify compliance with licenses, regulations and communications standards, and facilitates network management and planning. The R&S®ESMW ultra wideband monitoring receiver forms the basis for future-proof fixed and mobile spectrum monitoring stations. Thanks to its exceptional performance, various frequency range and bandwidth extensions, advanced measurement toolset and direction finding capabilities, the R&S®ESMW integrated into an R&S®ARGUS spectrum monitoring system¹⁾ is the ideal solution for all current and upcoming ITU-compliant monitoring tasks, including automated detection, identification and localization of interfering signals and unlicensed emissions.

¹⁾ See "R&S®ARGUS Spectrum Monitoring Software" product brochure (PD 3607.1013.12).

Communications intelligence (COMINT) and communications electronic support measures (CESM)

Intercepting radiocommunications signals to gather relevant information about their characteristics, origin and content is of highest importance to many security authorities. The R&S®ESMW offers the sensitivity, scan speed and feature set for any in-depth analysis to identify spectral activities of interest. In an R&S®RAMON radio monitoring system²⁾, the R&S®ESMW can be used for fast scanning as well as audio content analysis. Optional external R&S®CA100³⁾ and R&S®CA120 signal analysis software⁴⁾ allow for online analysis of digital signals, including automatic detection, classification and digital demodulation. For offline analysis, the R&S®ESMW features both wideband and narrowband I/Q data streaming and recording in combination with the R&S®DWR150 and R&S®DWR200 digital wideband recorders⁵⁾.

²⁾ See "R&S®RAMON Radiomonitoring Software" product brochure (PD 5214.3152.12).

³⁾ See "R&S®CA100 PC-Based Signal Analysis and Signal Processing Software" product brochure (PD 3606.9340.12).

⁴⁾ See "R&S®CA120 Multichannel Signal Analysis Software" product brochure (PD 3606.9327.12).

⁵⁾ See "R&S®DWR150 Digital Wideband Recorder" and "R&S®DWR200 Digital Wideband Recorder" product brochures (PD 3608.2420.12 and PD 5216.4056.12).



R&S®ESMW installed in a mobile monitoring station



R&S®ESMW installed in a COMINT shelter

FUTURE-PROOF SPECTRUM MONITORING SOLUTION

Modular structure with bandwidth extensions for future spectrum monitoring requirements

The R&S®ESMW features a modular option structure with multiple internal frequency range and bandwidth extensions. The base unit covers a frequency range of 20 MHz to 6 GHz. It is extendable down to 8 kHz with the R&S®HS1-HF option and up to 18 GHz with the R&S®HS1-MW18, which when combined with the R&S®HS1-MW40 option extends the frequency range to 40 GHz. The base unit offers 125 MHz real-time bandwidth, which can be extended to 500 MHz with the optional R&S®HS1-BW500 and to as much as 2 GHz when combined with the R&S®HS1-BW2000 option. This makes the R&S®ESMW a fully flexible solution that can be tailored to current monitoring tasks and easily upgraded to meet future requirements.

Outstanding RF performance in dense spectrum environments

Thanks to its extremely high dynamic range, the R&S®ESMW detects even the weakest signals in the presence of strong unwanted signals in a crowded spectrum. This optimal tradeoff between linearity and sensitivity is achieved using high-quality active components and sophisticated preselection filtering. Switched filter banks and tunable bandpass filters across the entire frequency range protect against harmonics and intermodulation from strong out-of-band signals. The R&S®ESMW provides outstanding RF performance for reliable measurements in the most challenging spectrum environments.

Two digital receive paths for individual tasks

The R&S®ESMW features two parallel digital receive paths. The real-time spectrum path with up to 2 GHz bandwidth enables fast detection and maximum scan speed, while the demodulation and measurement path with up to 125 MHz bandwidth allows for accurate and intuitive signal measurements. Thanks to this two-path digital signal processing architecture, many tasks such as spectral measurements and demodulation can be performed simultaneously.

Instantaneous measurements on future wideband signals

When upgraded to 500 MHz and 2 GHz real-time bandwidth, the R&S®ESMW can provide wide instantaneous spectral overviews and spectrum based measurements of wideband signals. Selectable resolution bandwidths offer the necessary sensitivity to focus on signals, even weak ones, while keeping the wideband overview. The R&S®ESMW is especially designed for measurements on current wideband signals, such as 5G, as well as on the emerging wideband signals that will be used in future transmission standards.

ITU-compliant hardware specifications

The performance parameters of the R&S®ESMW are in strict compliance with the requirements of Table 3.3-1 of the ITU Handbook on Spectrum Monitoring, Edition 2011. All R&S®ESMW specifications have been verified in line with the following ITU recommendations:

- ▶ ITU-R SM.1836 (IF filter edge steepness measurements)
- ▶ ITU-R SM.1837 (IP3 measurements)
- ▶ ITU-R SM.1838 (noise figure measurements)
- ▶ ITU-R SM.1840 (sensitivity measurements)



500 MHz real-time bandwidth with up to three configurable spectrum traces

FAST AND EFFICIENT DETECTION OF SPECTRAL ACTIVITIES

Well-designed user interface for easy operation

The R&S®ESMW is remote-controlled via the R&S®ESMW GUI running on a LAN-connected PC or laptop. The R&S®ESMW GUI's intuitive application-oriented user interface provides fast access to important measurement tools and settings. Multiple customizable measurement result displays and tab based switching between applications enable efficient and convenient operation.

Efficient and intuitive spectrum monitoring

The R&S®ESMW GUI provides a quick spectral overview with a well-organized spectrum and waterfall display. With up to three configurable spectrum traces and selectable resolution bandwidths, no signal goes unnoticed. Easily accessible marker sets and mathematical trace functions enable fast spectrum measurements and comparisons.

Detection and monitoring in real time

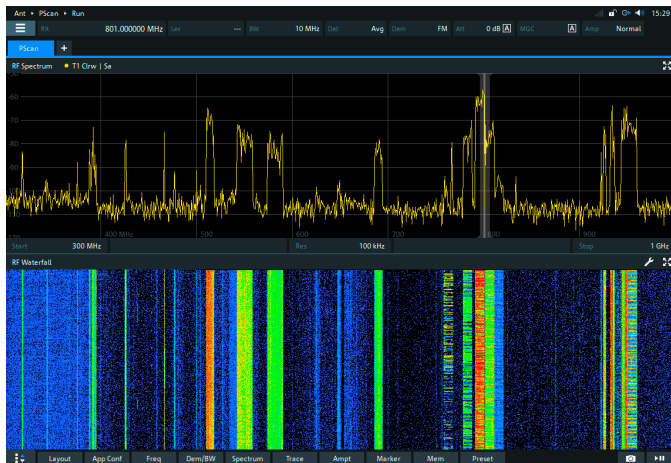
The R&S®ESMW calculates the real-time spectrum by applying fast Fourier transform (FFT) signal processing with at least 50% overlap. Signals as short as 75 ns can be reliably detected with 100% probability of intercept (POI) and full amplitude accuracy. Various FFT detectors and spectrum trace modes help set the focus on particular signal types. The waterfall display with its exceptionally fine time resolution of up to 1 μ s per line and its built-in history buffer enable analysis of short-time signals in the highest detail.

Extremely fast spectral scans with dedicated scan modes

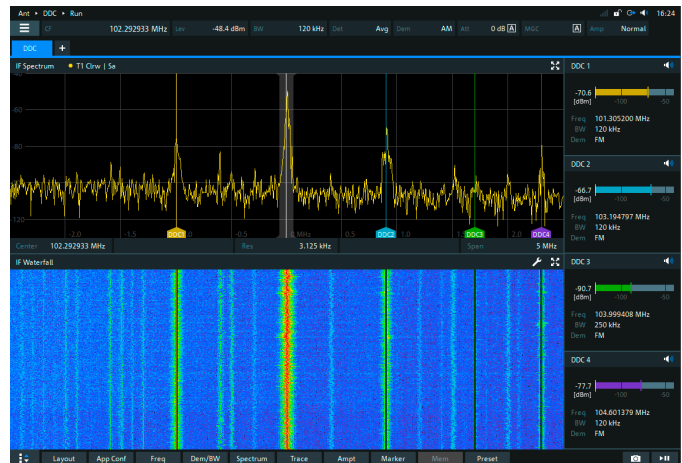
The R&S®ESMW offers a variety of dedicated scan modes for detecting unknown signals over wide frequency ranges and monitoring known communications channels. The R&S®HS1-PS panorama scan option provides incredibly fast spectral scans with speeds of up to 2.6 THz/s and adjustable frequency resolution. Thanks to the large real-time bandwidth of 2 GHz, panorama scans are perceived as almost real-time operation. For scanning equispaced or distinct communications channels, a frequency scan (FSCAN) and a memory scan (MSCAN) mode with speeds of up to 1700 channels/s are available. Configurable squelch levels and dwell times enable demodulation and listening in on active channels while scanning.

Additional digital downconverters

For measurement, demodulation or I/Q data streaming of detected signals, the demodulation and measurement path of the R&S®ESMW can be placed anywhere within the real-time bandwidth. The R&S®HS1-DDC digital downconverter option provides four additional independent narrowband channels within real-time bandwidth that all feature measurement, demodulation and streaming. The wideband overview via the real-time spectrum path is maintained to eliminate the possibility of emerging spectral events with higher priority being missed.



Fast spectral scan (panorama scan) with waterfall display across wide frequency ranges



Monitoring with up to 4+1 demodulation channels with different parameters in the real-time bandwidth

ADVANCED SIGNAL MEASUREMENTS

Level and field strength measurements

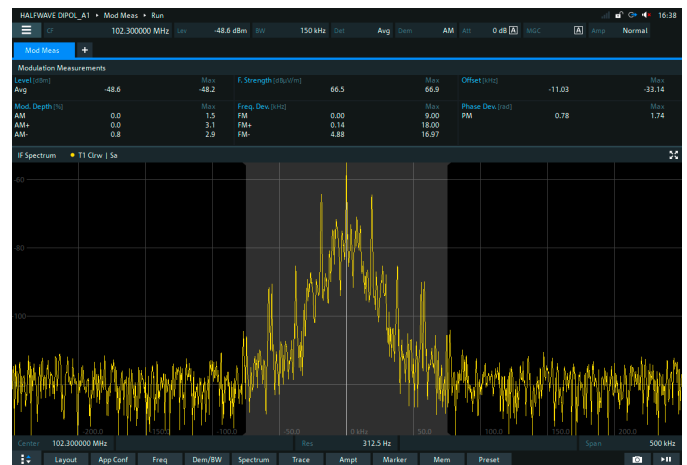
The R&S®ESMW allows for simultaneous level measurements with up to three detectors with peak indicators. A quasi-peak detector in line with CISPR 16-1-1 enables on-the-spot electromagnetic compatibility (EMC) measurements. Field strength measurements are performed in line with ITU-R SM.378-7. Once common Rohde&Schwarz monitoring antennas are configured, the antenna factors stored in the R&S®ESMW are applied to convert the received signal level to field strength.

Fully ITU-compliant measurements

The R&S®HS1-IM ITU measurement option enables analog modulation measurements as well as bandwidth and channel power measurements. The modulation parameters including modulation depth, frequency deviation and phase deviation of AM, FM and PM modulated signals can be concurrently measured in line with the ITU Handbook on Spectrum Monitoring. Digitally modulated signals can be analyzed, classified and demodulated with the PC based R&S®CA100 signal analysis software, which also enables manual parameter measurements in line with ITU-R SM.1600. The available bandwidth measurements include occupied bandwidth measurements based on the x dB and β % methods and bandwidth center offset measurements. All are in line with ITU-R SM.328-11, SM.443-4 and with Chapter 4.5 of the ITU Handbook on Spectrum Monitoring. Automatic channel power measurements determine the signal power within the real-time bandwidth.

Polychrome spectrum to distinguish superimposed signals

With the R&S®HS1-PC polychrome spectrum option, pulsed transmissions that are superimposed by stronger signals within the 2 GHz real-time bandwidth can be visually separated. To distinguish such transmissions in a dense signal scenario, the occurrence of the signal levels is color-coded in the spectrum. The signal can be further characterized by using the waterfall display to track variations over time.



ITU-compliant measurements of AM depth, FM deviation and PM deviation in a single view



The results of up to three level detectors along with their field strength measurements can be displayed simultaneously



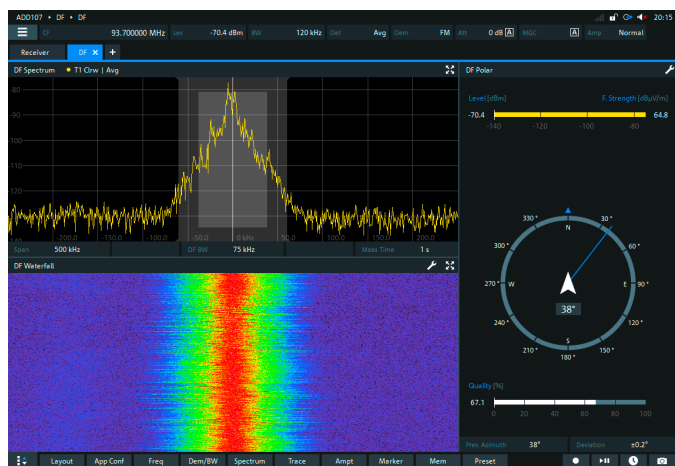
Polychrome spectrum uses color coding to indicate the relative level occupancy over time

PRECISE DIRECTION FINDING AND RADIOLOCATION

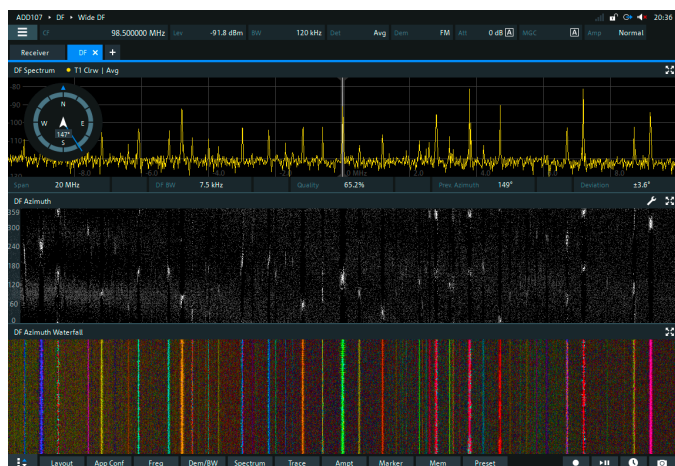
ITU-compliant AoA direction finding

With the R&S®HS1-DF direction finding option and connected to R&S®ADDx single-channel DF antennas¹⁾, the R&S®ESMW provides fast and highly accurate angle of arrival (AoA) direction finding from 300 kHz to 8.5 GHz. The bearing results for a selected signal within 125 MHz real-time bandwidth are conveniently displayed in a polar diagram. Depending on the DF antenna used, the precise correlative interferometer DF method enables typical system DF accuracy of 0.5° RMS. Once several DF results from various positions have been recorded, automatic triangulation via the R&S®HS1-MAP mapping and geotagging option determines the location of the interferer.

¹⁾ See "R&S®ADD597 Direction Finding and Monitoring Antenna" (PD 3609.9140.12) and "R&S®ADD119 Mobile HF DF Antenna" (PD 3683.9770.12) product brochures.



DF polar display for AoA direction finding of a single signal



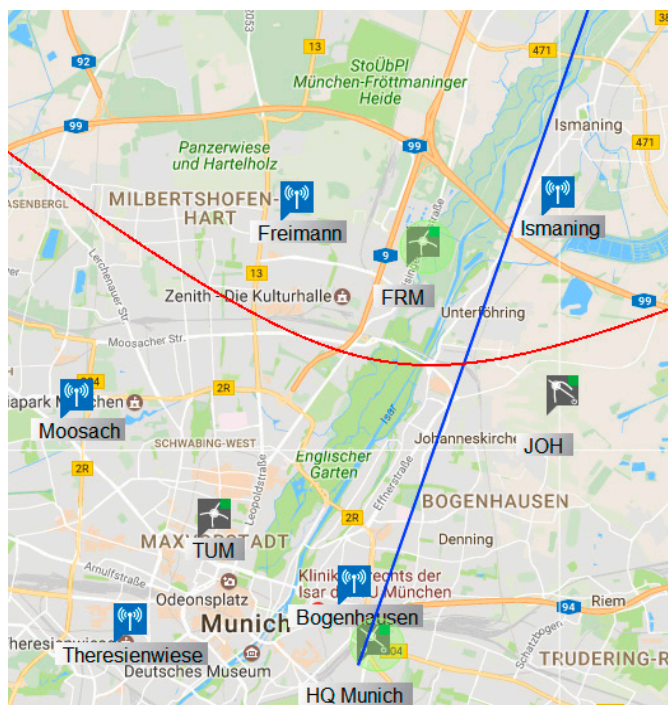
Simultaneous DF of all signals within real-time bandwidth

Wideband direction finding up to 125 MHz real-time bandwidth

The R&S®HS1-DF direction finding option also offers wideband direction finding with up to 125 MHz real-time bandwidth. The DF results for all signals within the real-time bandwidth can be simultaneously displayed in an azimuth versus frequency diagram. Brighter spots correspond to higher power signals. The color-coded DF waterfall display allows users to track changes to the azimuth of moving transmitters over time.

Precise radiolocation with multiple receivers

In a network of multiple R&S®ESMW receivers equipped with the R&S®HS1-DF option and controlled by R&S®ARGUS spectrum monitoring software, high-performance AoA radiolocation can be performed up to 8.5 GHz. Upgraded with the R&S®HS1-GNSS internal GNSS option, which provides exceptionally accurate I/Q data timestamps with a standard deviation of less than 30 ns, the network can also serve as a precise time difference of arrival (TDOA) system with emitter radiolocation across the entire frequency range. If both the R&S®HS1-DF and the R&S®HS1-GNSS are installed, even hybrid AoA and TDOA emitter radiolocation can be performed up to 8.5 GHz.



Hybrid TDOA/AOA location result in R&S®ARGUS. Combined with data from spectrum management, it shows that the measured location of the interferer does not coincide with a licensed transmitter.

RECORDING AND DOCUMENTATION

History mode and history buffer export

Unexpected spectral activities are often missed during standard operation. These signals can be reviewed in the spectrum by tuning back in time via the history mode, activated by a dedicated button in the R&S®ESMW GUI running on the PC. The history memory buffer can store minutes of recordings at 1 μ s time resolution per line in the waterfall display and can be exported to the local PC.

Trace recording and replay

The R&S®HS1-IR trace recording and replay option allows users to record spectrum traces including demodulated audio and geolocation data to the local PC. Recordings can be replayed via the R&S®ESMW GUI. The R&S®HS1-MAP mapping and geotagging option provides an additional map display. Trace recording and replay is particularly useful for long-term measurements during unattended or mobile monitoring missions.

Recording and documentation

For documentation and offline analysis, the R&S®ESMW provides narrowband I/Q data and audio recordings in WAV format to the local PC. The integrated audio player allows for direct audio replay. Screenshots can be taken on the spot via a dedicated screenshot button.

Positioning and map display

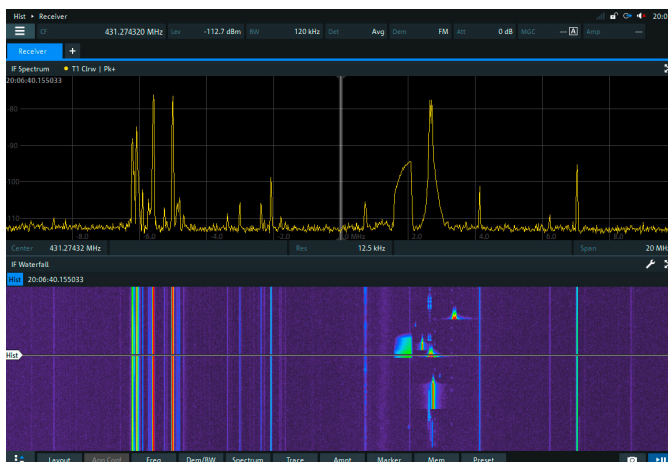
The R&S®HS1-GNSS internal GNSS option activates the built-in GNSS module, which provides accurate location information and precise frequency measurements in line with ITU-R SM.377-4. With the R&S®HS1-MAP mapping and geotagging option, the current position is displayed on an integrated map. OpenStreetMap (OSM) maps can either be downloaded live on the fly or offline via the OSM wizard and transferred to the receiver.

Coverage measurements

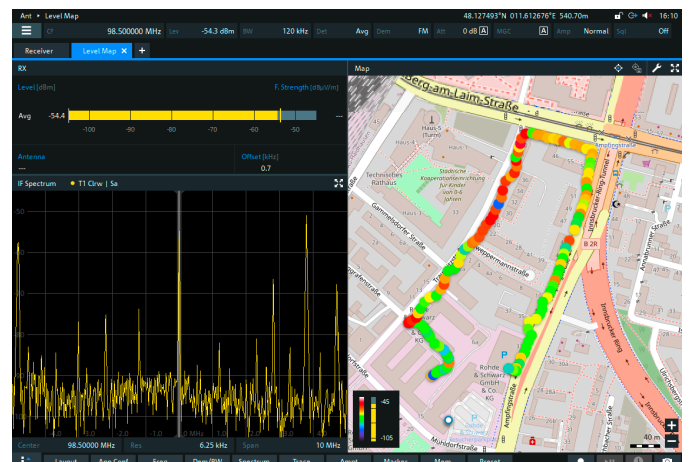
In addition to map display and triangulation, the R&S®HS1-MAP mapping and geotagging option enables level mapping, which is ideal for coverage measurements and interference hunting. During mobile operation, both the received signal level and the geolocation are saved. Measurements are either triggered manually or automatically over distance or time. The results are displayed on the map as a color-coded track, where different colors represent different signal levels.



LAN remote control using the R&S®ESMW GUI running on a Windows laptop



A missed signal event in receiver application is revisited using the history mode



Coverage measurements via level mapping while keeping the spectrum overview

EASY SYSTEM INTEGRATION

Upgrading made easy

In addition to standalone operation, the R&S®ESMW easily upgrades existing high-end Rohde&Schwarz monitoring systems with minimal installation and setup times due to its backward compatibility with the R&S®ESMD and R&S®ESME wideband monitoring receivers. Its open remote control interfaces and well-documented output data formats also enable simple integration into a multitude of third-party system solutions:

- ▶ Standard commands for programmable instruments (SCPI standard) for device control
- ▶ Easily structured trace data format for spectral and measurement data
- ▶ Baseband I/Q streaming from the spectrum path, the main demodulation path and the DDCs
- ▶ Several I/Q data formats available (e.g. AMMOS, VITA49.0)

Wideband I/Q data streaming

Equipped with the R&S®HS1-MIQ multi I/Q interface option, the R&S®ESMW provides wideband I/Q data streaming up to 2 GHz real-time bandwidth via a 100GE I/Q interface and up to 125 MHz real-time bandwidth via 10GE I/Q interface. Whether connected to the R&S®DWR150 and the R&S®DWR200 digital wideband recorders or a third-party system, the R&S®ESMW can be used as a powerful content producer for online and offline analysis of wideband signals.



For easy integration, the R&S®ESMW offers many hardware interfaces

SPECIFICATIONS IN BRIEF

| Specifications in brief | | |
|-------------------------|-------------------------------------|---|
| Frequency range | base unit | 20 MHz to 6 GHz |
| | optional | 8 kHz to 18 GHz or 20 MHz to 40 GHz |
| Real-time bandwidth | base unit | 125 MHz |
| | optional | 500 MHz and 2 GHz |
| DF frequency range | base unit | 20 MHz to 6 GHz |
| | optional | 300 kHz to 8.5 GHz |
| DF real-time bandwidth | | 125 MHz |
| Compatible DF antennas | | R&S®ADD107, R&S®ADD207, R&S®ADD207P, R&S®ADD307, R&S®ADD317, R&S®ADD119, R&S®ADD095, R&S®ADD196, R&S®ADD197, R&S®ADD295, R&S®ADD075, R&S®ADD597 |
| Demodulation bandwidth | | 125 MHz |
| Panorama scan speed | optional | 2.6 THz/s, at 2 MHz resolution bandwidth (RBW) 118 GHz/s, at 25 kHz resolution bandwidth (RBW) |
| I/Q data streaming | optional | |
| | via 100GE I/Q interface | up to 2 GHz |
| | via 10GE I/Q interface | up to 125 MHz |
| Dimensions | W × H × D, without feet and handles | 426 mm × 176 mm × 450 mm (16.8 in × 6.9 in × 17.7 in), 19", 4 HU |
| Weight | depends on options | 13.5 kg to 20 kg (30 lb to 44 lb) (depends on optional equipment installed) |

ORDERING INFORMATION

| Designation | Type | Order No. |
|--|----------------|-----------------------------|
| Base unit (including accessories supplied such as power cable, user manual) | | |
| Ultra wideband monitoring receiver | R&S®ESMW | 4103.4003.02 |
| Hardware options (built-in hardware) | | |
| 8 kHz HF frequency range extension ¹⁾ | R&S®HS1-HF | 4103.7260.02 |
| 18 GHz frequency range extension | R&S®HS1-MW18 | 4103.7302.02 |
| 40 GHz frequency range extension ²⁾ | R&S®HS1-MW40 | 4103.7348.02 |
| 500 MHz real-time bandwidth | R&S®HS1-BW500 | 4103.7483.02 |
| 100GE/10GE I/Q interface | R&S®HS1-MIQ | 4103.7783.02 |
| Software options (firmware) | | |
| 2 GHz real-time bandwidth ³⁾ | R&S®HS1-BW2000 | 4103.7225.02 |
| Panorama scan | R&S®HS1-PS | 4103.7025.02 |
| Polychrome spectrum | R&S®HS1-PC | 4103.7148.02 |
| ITU measurements | R&S®HS1-IM | 4103.7031.02 |
| Trace recording and replay | R&S®HS1-IR | 4103.7154.02 |
| Mapping and geotagging | R&S®HS1-MAP | 4103.7160.02 |
| Internal GNSS module | R&S®HS1-GNSS | 4103.7054.02 |
| Digital downconverters | R&S®HS1-DDC | 4103.7077.02 |
| Direction finding | R&S®HS1-DF | 4103.7060.02 |
| Documentation | | |
| Documentation of calibration values | R&S®HS1-DCV | 4103.7454.02 |
| Accessories | | |
| Cable sets for DF | | |
| DF cable set with L shape connector, length: 5 m For R&S®ADD107, R&S®ADD207, R&S®ADD207P | R&S®ADD17XZ4 | 4090.8730.02 |
| DF cable set, frequency range from 300 kHz to 1.3 GHz, length: 5/10/20/40/50/60 m For R&S®ADD107, R&S®ADD307, R&S®ADD317, R&S®ADD119, R&S®ADD095, R&S®ADD196, R&S®ADD197 | R&S®DDF1C-1 | 4077.6009.05/10/20/40/50/60 |
| DF cable set, frequency range from 300 kHz to 3 GHz, length: 5/10/20/30/40/50 m For R&S®ADD107, R&S®ADD307, R&S®ADD317, R&S®ADD119, R&S®ADD095, R&S®ADD196, R&S®ADD197, R&S®ADD295 | R&S®DDF1C-5 | 4077.7005.05/10/20/30/40/50 |
| DF cable set, frequency range from 300 kHz to 8.2 GHz, length: 5/10/20/30 m For R&S®ADD107, R&S®ADD207, R&S®ADD207P, R&S®ADD307, R&S®ADD317, R&S®ADD119, R&S®ADD095, R&S®ADD196, R&S®ADD197, R&S®ADD295, R&S®ADD075, R&S®ADD597 | R&S®DDF1C-7 | 4077.8001.95/91/92/93 |
| DF cable set, frequency range from 300 kHz to 8.5 GHz, length: 5/10/20/30 m For R&S®ADD597 | R&S®DDF1C-9 | 4117.4000.05/10/20/30 |
| Downconverter | | |
| Microwave converter 40 GHz ²⁾ | R&S®MC40 | 4098.6008.02 |
| Rack adapter | | |
| 19" rack adapter | R&S®ZZA-411 | 1096.3283.00 |
| Operator training courses | | |
| Standard operator training (duration: 1 day) | R&S®CT-ESMWST | 3717.2559.02 |
| Extended operator training (duration: 2 days) | R&S®CT-ESMWEX | 3717.2565.02 |

¹⁾ Not available in combination with the R&S®HS1-MW40 option. The R&S®HS1-HF and R&S®HS1-MW40 options are mutually exclusive.

²⁾ Requires R&S®HS1-MW18 option.

³⁾ Requires R&S®HS1-MW18 and R&S®HS1-BW500 options.

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

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 trail-blazers 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

Certified Environmental Management

ISO 14001

Rohde & Schwarz training

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