R&S®MobileLocator

Advanced interference hunting and emitter location

ROHDE&SCHWARZ

Radiomonitoring & Radiolocation

Product Brochure | 01.00

R&S®MobileLocator
At a glance

R&S®MobileLocator makes it possible for the first time to detect and to automatically locate a transmitter from a moving DF vehicle. Within minutes, the compact DF system based on the R&S®DDF007 portable direction finder can turn a commercial vehicle into a DF platform for the frequency range from 20 MHz to 6 GHz. In combination with other Rohde&Schwarz direction finders, R&S®MobileLocator can also be used in dedicated DF vehicles and helicopters.

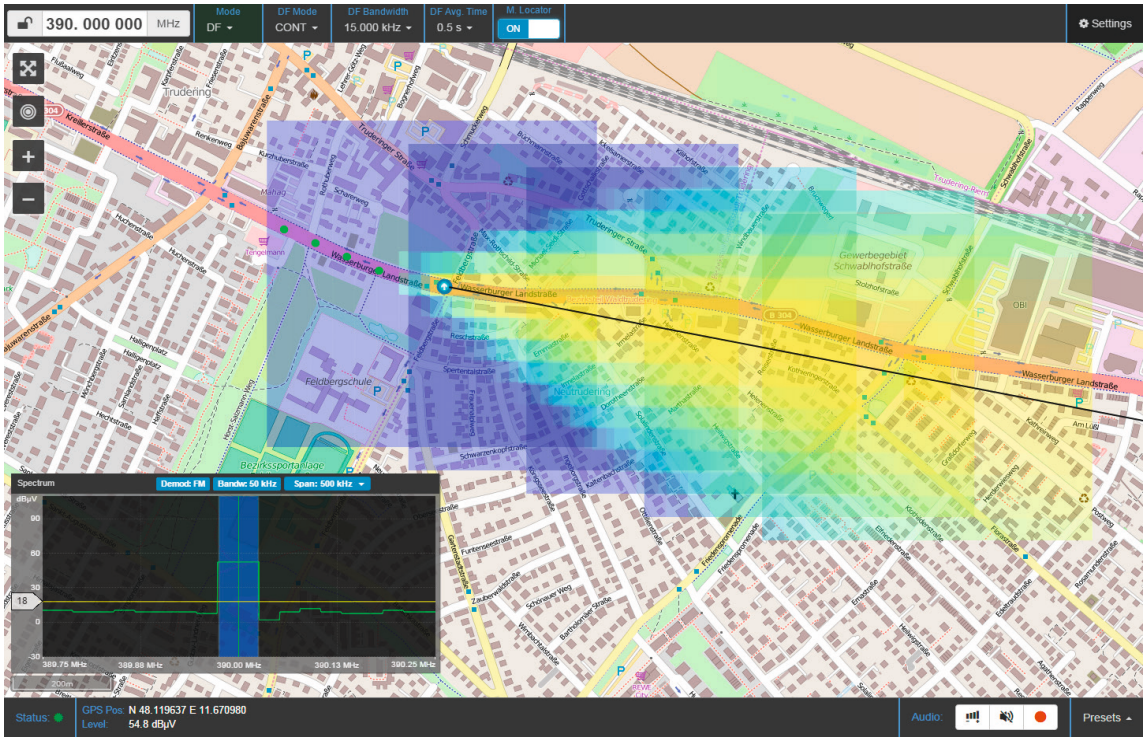
Faulty, poorly shielded or incorrectly configured electronic devices can unintentionally emit electromagnetic waves and interfere with or even disrupt existing radio services. Sources of such interference are frequently located in urban areas. This makes precise direction finding extremely difficult due to multipath propagation that results from radio waves being reflected and diffracted by surrounding buildings and other objects. Unless the operator has many years of experience in finding radio interference sources, having capabilities that quickly and automatically lead to the target is highly desirable.

Broad scope of application

R&S®MobileLocator was developed for automatic location of fixed frequency signals in urban areas. The signal does not have to be continuously active as long as a sufficient number of signal bearings are taken. R&S®MobileLocator is not designed to locate push-to-talk (PTT) networks or frequency agile signals.

Key facts

- Fast, easy installation in commercial vehicles
- Optimized for interference hunting in urban areas (multipath propagation)
- Automatic location of the transmitter's position
- Generation of an interference search report with all relevant information
- Straightforward and easy-to-use user interface



R&S®MobileLocator
Benefits and key features

Easy to transport, easy to set up
- Simple system configuration
- Support for laptops and tablets
- Fast setup in commercial vehicles

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Comprehensive, optimized system software
- Complete system software package
- Optimized web-based user interface for touchscreen operations
- Wide variety of expansion options

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Straightforward interference search and signal monitoring
- Panorama scan for quick overview of all signal activity
- Signal demodulation and audio recording
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Automated interference hunting
- Typical interference signals
- Automatic collection and evaluation of DF results
- Homing in on a transmitter
- Report generation with all relevant information

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Easy to transport, easy to set up

Simple system configuration

Automatic direction finding with R&S®MobileLocator requires a Rohde&Schwarz direction finder with DF antenna. For a small, mobile system, the R&S®DDF007 with the following options is recommended:

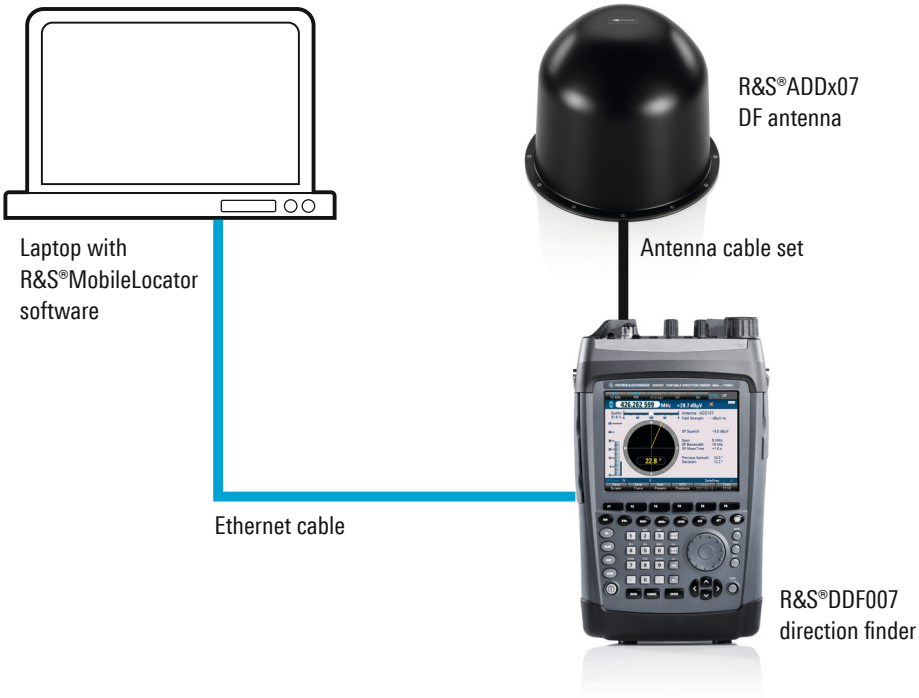
- R&S®DDF007-RC (remote control)
- R&S®DDF007-GPS (GPS position)
- R&S®DDF007-PS (panorama scan)

The R&S®ADD107 and the R&S®ADD207 are the DF antennas of choice for this direction finder. Necessary accessories include the R&S®ADD17XZ3 vehicle adapter with magnetic mount and the R&S®ADD17XZ5 cable set with converter.

R&S®Mobile Locator with R&S®MapView instead of the web-based GUI can also be used with other Rohde&Schwarz direction finders such as the R&S®DDF205, R&S®DDF255 or R&S®DDF550.

The R&S®MobileLocator software is installed on a laptop or powerful tablet and connected to the direction finder via a LAN cable.

R&S®DDF007 direction finder, R&S®ADDx07 antenna and laptop with installed R&S®MobileLocator software



Support for laptops and tablets

In a standard configuration, the R&S®MobileLocator control software, including the web-based GUI, is installed on a laptop. Additionally, tablets with an Internet browser can connect to the laptop via WLAN to enable remote control. The tablet is used for system control and result display via the web-based GUI.

Alternatively, a powerful Windows tablet can be connected directly to the direction finder. In this case, the complete control software is installed directly on the tablet, and no additional laptop is required.

Optional tablet for remote control.

Fast setup in commercial vehicles

Depending on the interference signal, either the R&S®ADD107 or the R&S®ADD207 compact DF antenna is mounted in the center of the vehicle roof using the magnetic mount adapter. Thanks to its large magnetic surface and ability to adapt to slightly curved vehicle roofs, the adapter has been approved for speeds of up to 130 km/h.

The DF antenna cable set is connected to the R&S®DDF007 in the vehicle. The direction finder and the laptop can be supplied with power from the cigarette lighter.

The laptop or tablet with the R&S®MobileLocator software is connected to the R&S®DDF007 via an Ethernet cable. Optionally, the tablet can be connected to the direction finder via WLAN using an additional access point router.

When a permanent Internet connection is available via LTE stick or laptop-integrated LTE support, the geographical maps are downloaded automatically as needed. If there is no Internet connection, the available offline maps, e.g. OpenStreetMap, for the target area must be stored on the laptop beforehand.

Commercial vehicle with installed R&S®MobileLocator ready for use. The operator controls the system via a laptop or tablet.

Comprehensive, optimized system software

Complete system software package

The R&S®MobileLocator software setup procedure automatically installs and configures the necessary R&S®RAMON software package on the laptop:

- R&S®RA-BASIC basic RAMON module
- R&S®DDF007-CTL control software
- R&S®RA-LOC radiolocation module
- R&S®RA-MLWEB MobileLocator web-based GUI
- R&S®OSM-Wizard download tool for geographical OpenStreetMap maps

Optimized web-based user interface for touchscreen operations

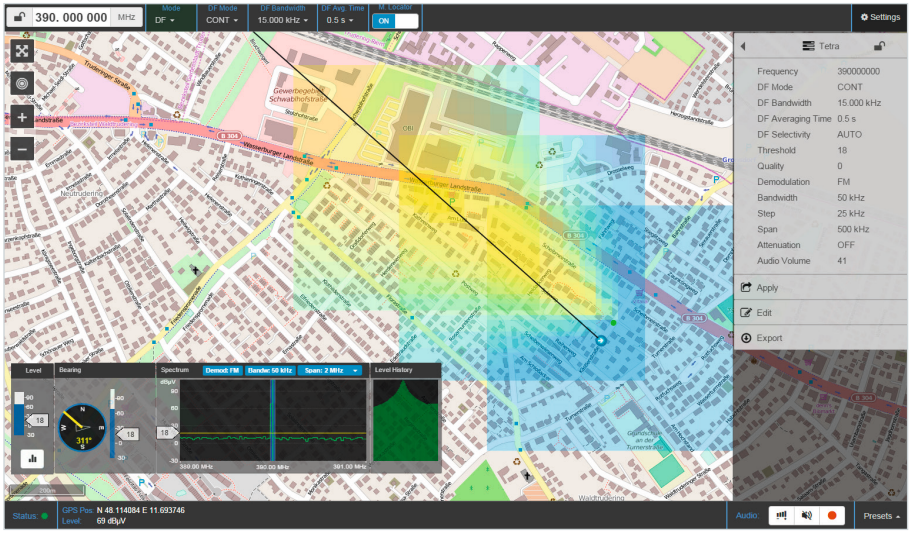
The R&S®MobileLocator system can be controlled via the standard R&S®RAMON or the web-based GUI. With the standard R&S®RAMON GUI, experienced users have access to additional configuration parameters.

The web-based GUI is optimized for interference search and provides direct access to all necessary parameters. On a touchscreen, all information and results are available with the tap of a finger. This means that the system can be operated easily even in challenging environments.

The result display can be adapted to user requirements. Additional widgets show the DF spectrum, signal level, track, signal level versus time and polar diagram. The covered route is indicated on the map by a color-coded signal level. Signal profiles support quick configuration when searching for typical types of interference. Rotating the map to reflect the vehicle's heading makes orientation easier.

Wide variety of expansion options

R&S®Mapview can be used alternatively instead of the web-based GUI. It supports additional features such as overlay of additional map information, measurement and recording tools, and display of individually selected bearing results for a manual triangulation of the emitter location. R&S®Replay can be used to replay and re-evaluate DF recordings.



R&S®MobileLocator control software on a laptop or tablet. Display of the current position with vehicle heading, DF spectrum and level versus time, together with the heat map for interference hunting.

Straightforward interference search and signal monitoring

Manual signal location in urban areas is very time-consuming and error-prone due to the strong multipath propagation of radio signals. R&S®MobileLocator is optimized for this situation and quickly guides the user to the location of the source of interference.

Panorama scan for quick overview of all signal activity

If the frequency of the interference signal is unknown, the panorama scan provides a quick overview of a large frequency range. This is especially helpful in detecting weak broadband interference signals.

Signal demodulation and audio recording

Interference signals can be demodulated to provide acoustic feedback of the signal activity during driving. For listening in, identification and recording of analog signals, the direction finder can be switched to receiver mode.

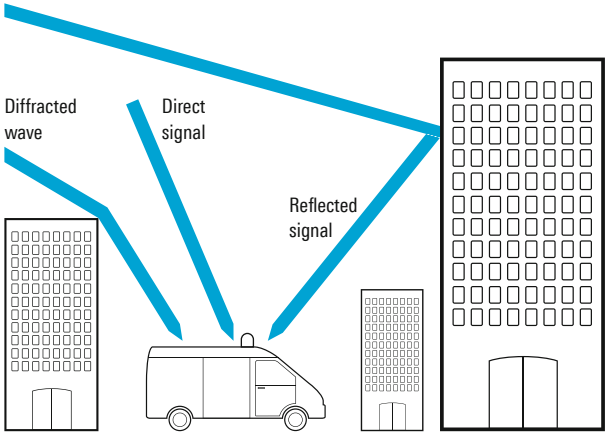
Spectrum display in realtime bandwidth for detailed signal monitoring

For more precise signal analysis, the fixed frequency mode (FFM) is used to determine the exact center frequency and signal bandwidth of the interference signal. Experienced users can identify possible interference sources directly from the frequency spectrum.

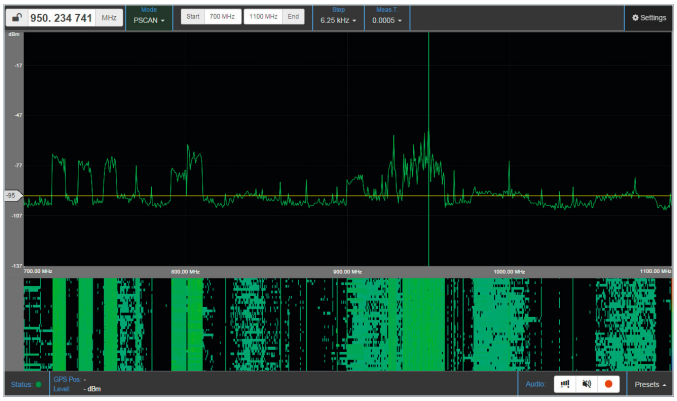
The system is then switched to the direction finding (DF) mode, and the DF parameters, such as DF bandwidth, DF mode and signal threshold, are set to complete the configuration of the direction finder. From this point, bearings for the target are output continuously. The DF bearings are visible in the map display.

Due to multipath propagation in urban areas, the vehicle receives the radio signal of interest from multiple directions.

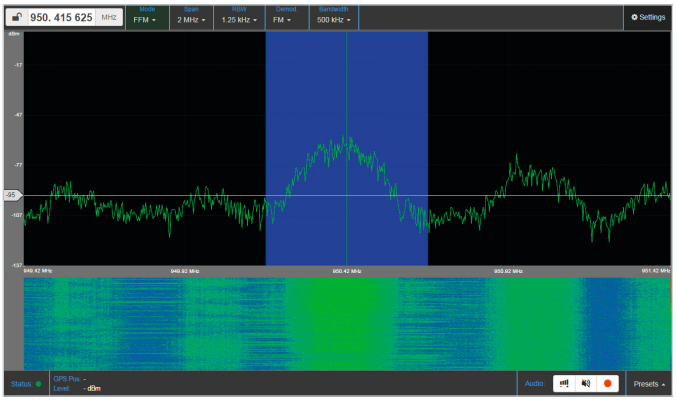
Multipath propagation



Panorama scan for quick overview of all signal activity in a wide frequency range.



Fixed frequency mode for precise interference signal analysis.



Automated interference hunting

Typical interference signals

Urban areas in particular have many possible sources of interference that can negatively impact radiocommunications or represent a safety concern. Some typical problems are:

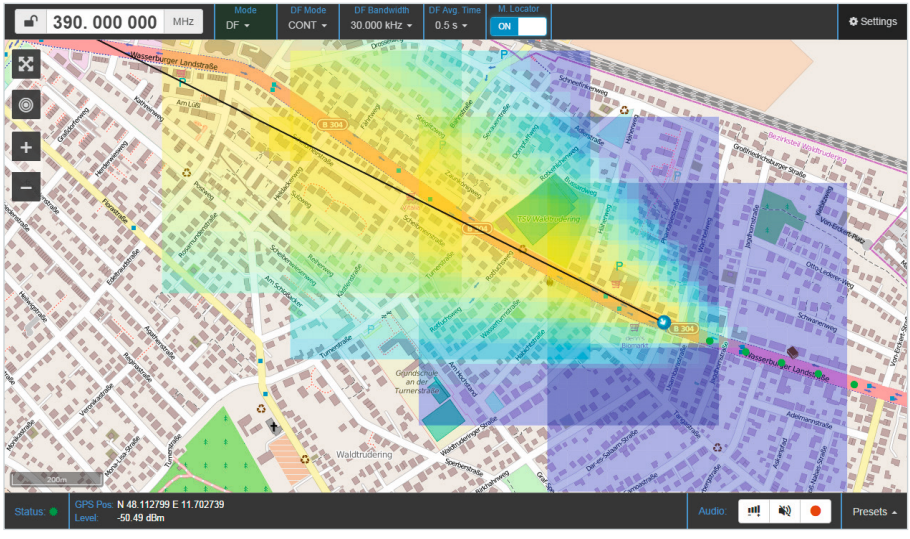
- Unapproved or defective DECT telephones
- Active antennas or SAT systems
- Repeaters
- Cellphone or GPS blocker
- Poorly shielded cable TV networks

Automatic collection and evaluation of DF results

As tall buildings can reflect or obscure signals, the vehicle must move at least at walking speed in order to obtain sufficient relevant bearings for R&S®MobileLocator. If the mobile direction finder comes to a standstill in an environment of this kind, or if the vehicle is parked, the bearings generally become unreliable. R&S®MobileLocator filters all available bearings, saves relevant DF results and uses statistical analysis to determine the most probable signal direction and position. The result is continually updated and displayed on the map as a heat map.

Homing in on a transmitter

It is initially difficult to determine a direction for the source of interference because the bearings are ambiguous. This is why it makes sense to start with large roads. For safety reasons, a passenger should monitor the DF results and inform the driver about the route to take. After a short time, R&S®MobileLocator will have sufficient bearings to display a heat map. The remaining route can then be planned based on the heat map. The screenshots show how the R&S®MobileLocator software uses the large number of bearings to calculate a radiolocation result step by step and displays this result on a map in the form of a heat map. For every position within a definable area, the software continuously calculates the probability of the transmitter being at that position and uses colors to indicate this probability.

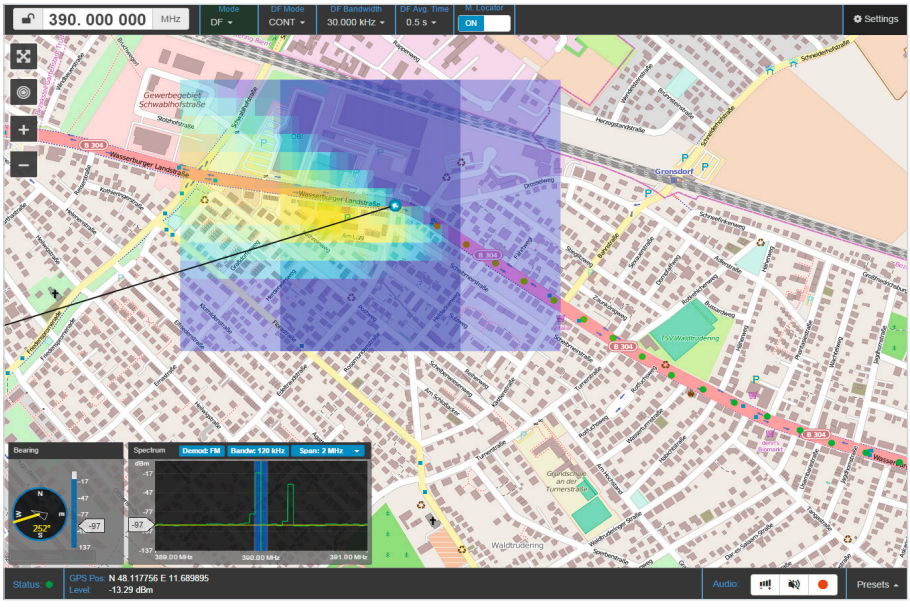


The heat map (yellow rectangle) in R&S®Mapview identifies the direction to the source of interference.

Once the vehicle is in the immediate vicinity of the target, the heat map will reduce to a single rectangle with a hotspot. If a sufficiently high number of good individual results is available, R&S®MobileLocator calculates the transmitter's position. In the example, the transmitter's position (red circle) is determined in just a few minutes to an accuracy of 20 m after driving past it just once. To identify individual rooms within a building, the portable R&S®HE300 active directional antenna is connected instead of the DF antenna, and the system is switched to manual DF mode.

Report generation with all relevant information

During the search for the source of interference, the web-based GUI can be used to start automatic recording of all relevant data. Additional screenshots can be manually added at any time. At the end of recording, a report is made available in PDF format.



If the DF vehicle is in the vicinity of the target, the heat map is reduced to a multicolor rectangle with a yellow hotspot.

The exact position of the source of interference is marked with a red circle.

Specifications in brief

Specifications in brief		
Direction finder		
R&S®DDF007 [1]	with R&S®DDF007-RC, R&S®DDF007-GPS options	20 MHz to 6 GHz (DF)
R&S®PR100; with R&S®PR100-DF option	with R&S®PR100-RC, R&S®PR100-GPS options	20 MHz to 6 GHz (DF)
DF mode		
Frequency range [2]	with R&S®ADD107	20 MHz to 1.3 GHz
	with R&S®ADD207	690 MHz to 6 GHz
DF method	20 MHz to 173 MHz	Watson-Watt
	173 MHz to 6 GHz	correlative interferometer
Bearing accuracy	with R&S®ADD107 (20 MHz to 1.3 GHz)	typ. 3° RMS
	with R&S®ADD107 (300 MHz to 1.3 GHz)	typ. 1° RMS
	with R&S®ADD207 (690 MHz to 6 GHz)	typ. 1° RMS
Receive mode		
Frequency range	with separate receiving antenna	9 kHz to 7.5 GHz
Scan speed	with R&S®DDF007-PS or R&S®PR100-PS option	up to 2 GHz/s
IF spectrum display range	selectable	up to 10 MHz
Demodulation bandwidth	selectable	up to 500 kHz
General data		
Operating time per lithium-ion battery pack	DF mode	up to 4 h
Weight	R&S®DDF007 with battery	approx. 3.5 kg
	R&S®ADD107, R&S®ADD207	approx. 6 kg
Operating temperature range		0 °C to +50 °C
Storage temperature range		–20 °C to +60 °C
Power supply	AC, with external power supply unit, DC	100 V to 240 V AC, 50/60 Hz, 1 A 20 V to 30 V DC, 4 A 24 V DC (nom.)

[1] In addition, R&S®Mobile Locator with R&S®Mapview instead of the web-based GUI, can be used with all Rohde&Schwarz direction finders such as the R&S®DDF205, R&S®DDF255 and R&S®DDF550.

[2] In addition, any other Rohde&Schwarz DF antenna, supported by the selected direction finder, can be used. If the DF antenna has no integrated GPS module, a separate GPS module is required.

Ordering information

Designation	Type	Order No.
Base unit		
R&S®MobileLocator system software [1] consists of: ▮ R&S®RA-BASIC basic RAMON module ▮ R&S®DDF007-CTL control software ▮ R&S®RA-LOC radiolocation module ▮ R&S®RA-MLWEB MobileLocator web-based GUI	R&S®RA-MOBLOC	3029.8815.02
Web GUI for R&S®MobileLocator Web-based user interface for easy control of R&S®MobileLocator as an extension to the existing R&S®RAMON software package	R&S®RA-MLWEB	3029.8821.02

[1] Hardware not included. Laptop or tablet, direction finder, DF antenna and accessories must be ordered separately.

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

Service that adds value

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

About Rohde&Schwarz

The Rohde&Schwarz electronics group is a leading supplier of solutions in the fields of test and measurement, broadcast and media, secure communications, cybersecurity, and radiomonitoring and radiolocation. Founded more than 80 years ago, this independent global company has an extensive sales network and is present in more than 70 countries. The company is headquartered in Munich, Germany.

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

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