

# R&S® FSH

## Handheld Spectrum Analyzer

### Where mobility counts



**75** Years of  
Driving  
Innovation



**ROHDE & SCHWARZ**

# R&S®FSH Handheld Spectrum Analyzer At a glance

The R&S®FSH spectrum analyzer is rugged, handy and designed for use in the field. Its low weight, its simple, well-conceived operation and the large number of measurement functions make it an indispensable tool for anyone who needs an efficient measuring instrument for outdoor work.

The R&S®FSH is a spectrum analyzer and, depending on the model and the options installed, a power meter, a cable and antenna tester and a two-port vector network analyzer. It provides the three most important RF analysis functions that an RF service technician or an installation and maintenance team needs to solve daily routine measurement tasks. For example, it can be used for maintaining or installing transmitter systems, checking cables and antennas, assessing signal quality in broadcasting, radiocommunications and service, measuring electric field strength or in simple lab applications. The R&S®FSH can perform any of these tasks quickly, reliably and with high measurement accuracy.

Weighing only 3 kg, the R&S®FSH is a handy instrument. All frequently used functions have their own function keys and are within reach of your fingertips. The brilliant color display is easy to read even under poor lighting conditions and has a monochrome mode for extreme conditions.

The capacity of the R&S®FSH battery enables you to work without interruptions for up to 4.5 hours. The battery is changed within seconds. And if it rains? No problem – all connectors are splash-proof.

## Key facts

- Frequency range from 9 kHz to 3.6 GHz or 8 GHz
- High sensitivity ( $<-141$  dBm (1 Hz), with preamplifier  $<-161$  dBm (1 Hz))
- Low measurement uncertainty ( $<1$  dB)
- Measurement functions for all important measurement tasks related to the startup and maintenance of transmitter systems
- Internal tracking generator and VSWR bridge with built-in DC voltage supply (bias)
- Two-port network analyzer
- Easy-to-replace Li-ion battery for up to 4.5 h of operation
- Rugged, splash-proof housing for rough work in the field
- Easy handling due to low weight (3 kg with battery) and easy-to-reach function keys
- Saving of measurement results on SD card
- LAN and USB interface for remote control and transfer of measurement data
- R&S®FSH4View software for simple documentation of measurement results

Easy-to-replace battery



# R&S®FSH

## Handheld Spectrum Analyzer

### Benefits and key features

#### Installation and maintenance of transmitter stations

- Power measurements on pulsed signals
- Channel power measurements
- Distance-to-fault measurements
- Two-port vector network analysis
- Scalar network analysis
- One-port cable loss measurements
- Power measurements up to 18 GHz
- Directional power measurements up to 4 GHz

▷ [page 4](#)

#### Measurements of electromagnetic fields

- Field strength measurements with directional antenna
- Field strength measurements with isotropic antenna

▷ [page 7](#)

#### Diagnostic applications in the lab or in service

- General spectrum analysis
- Location of EMC problems

▷ [page 8](#)

#### Documentation and remote control

- R&S®FSH4View software for documenting measurement results
- Remote control via LAN or USB

▷ [page 9](#)

#### Easy operation

- Quick function selection via keypad and rotary knob
- Optimal reading of measurement results in any situation
- Setting of frequency via channel tables
- Easy-to-access, well-protected connectors

▷ [page 10](#)

R&S®FSH with fold-out stand for desktop use



# Installation and maintenance of transmitter stations

The R&S®FSH is designed for the installation and maintenance of transmitter systems. For this purpose, it provides the following measurement functions:

- Checking of signal quality in the spectral and time domain with channel power measurements and measurements on pulsed signals
- Distance-to-fault measurements on cables and one-port cable loss measurements
- Measuring of antenna match and testing of power amplifiers with vector network analysis
- Determination of transmission power with power sensors

## Power measurements on pulsed signals

By means of the TDMA POWER function, the R&S®FSH performs time-domain power measurements within a time division multiple access (TDMA) timeslot. To make work easier for the user, all required instrument settings are already predefined for the GSM and EDGE standards.

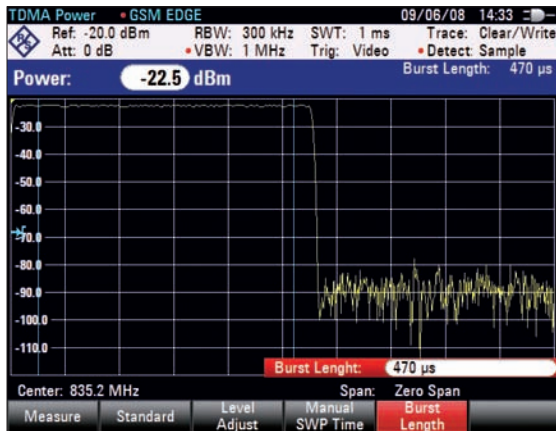
## Channel power measurements

The R&S®FSH determines the power of a definable transmission channel by means of the channel power measurement function. A channel power measurement for the 3GPP WCDMA, cdmaOne and CDMA2000®<sup>1)</sup> 1x digital mobile radio standards is performed at a keystroke.

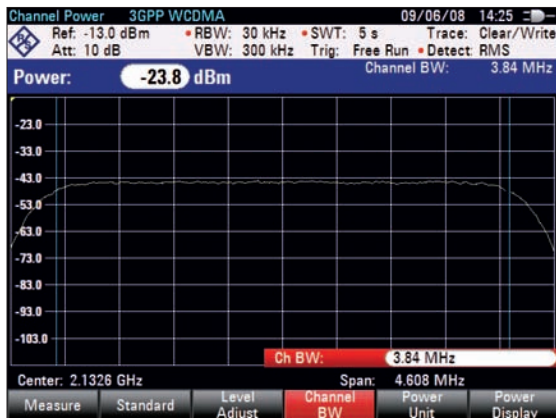
## Distance-to-fault measurements

The distance-to-fault, caused by a pinched cable or by loose or corroded cable connections, is determined quickly and precisely. The built-in threshold function ensures that only true cable faults, i.e. faults that exceed a tolerance limit, are displayed in a list. This considerably simplifies the evaluation of the measurement.

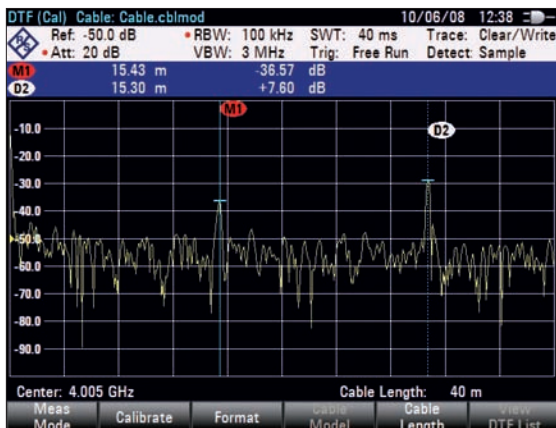
<sup>1)</sup> CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA - USA).



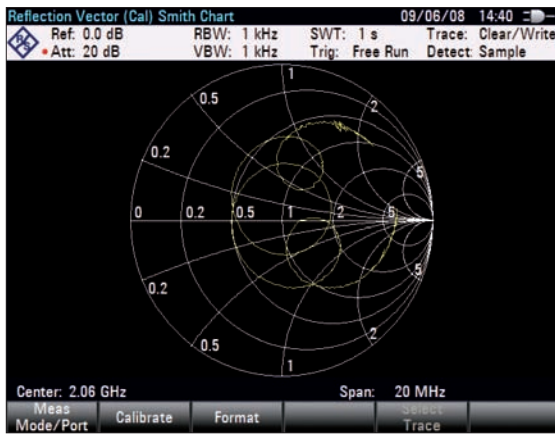
TDMA power measurement



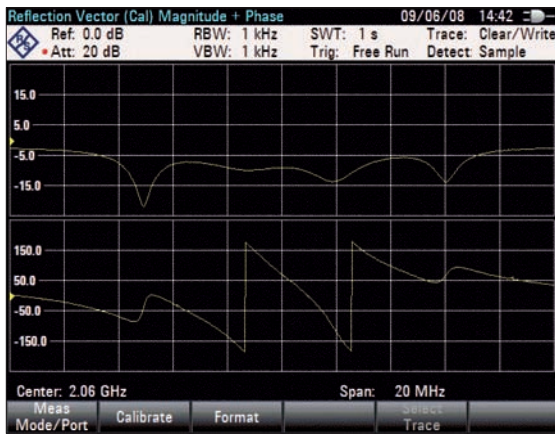
Channel power measurement



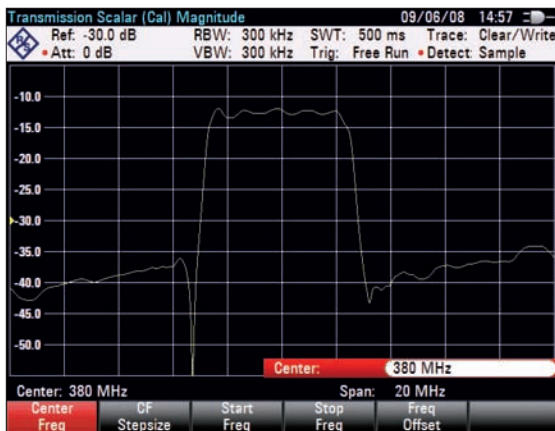
Distance-to-fault (DTF) measurement



Vector network analysis: measurement with Smith chart



Vector network analysis: display of magnitude and phase



Scalar transmission measurement

## Two-port vector network analysis

The "vector measurements" option transforms the R&S®FSH models with built-in tracking generator and internal VSWR bridge into a two-port vector network analyzer. Matching and transmission characteristics of filters, amplifiers, etc., can be determined quickly and with high accuracy in the forward and reverse direction with only one test setup. The built-in DC bias supplies power to active DUTs such as amplifiers via the RF cable. This function is especially useful for mast-mounted amplifiers of a mobile radio base station.

- Increased measurement accuracy due to vector system error correction
- Measurement of magnitude and phase of S-parameters  $S_{11}$ ,  $S_{21}$ ,  $S_{12}$  and  $S_{22}$
- Simultaneous display of magnitude and phase in split-screen mode
- Smith chart with zoom function
- Support of all conventional marker formats
- Input of a reference impedance for DUTs with an impedance that is not 50  $\Omega$

## Scalar network analysis

If you are not reliant on the advantages of vector network analysis for reflection and transmission measurements, the R&S®FSH models featuring a built-in tracking generator are a more cost-effective solution for determining the transmission characteristics of cables, filters and amplifiers. The R&S®FSH models with a built-in VSWR bridge (models .24 and .28) can, in addition, measure the matching (return loss, reflection coefficient or VSWR), e.g. of an antenna.

## One-port cable loss measurements

The R&S®FSH can determine the cable loss of installed cables without much effort. It is sufficient to connect one end of the cable to the R&S®FSH measurement port. The other end of the cable is terminated with a short circuit or left open.



R&S®FSH and R&S®FSH-Z1 terminating power sensor

### Power measurements up to 18 GHz

Equipped with the R&S®FSH-Z1 and R&S®FSH-Z18 power sensors, the R&S®FSH becomes a highly accurate RF power meter up to 8 GHz or 18 GHz with a measurement range from  $-67$  dBm to  $+23$  dBm.

### Directional power measurements up to 4 GHz under operating conditions

The R&S®FSH-Z14 and R&S®FSH-Z44 directional power sensors transform the R&S®FSH into a full-featured directional power meter for the frequency ranges from 25 MHz to 1 GHz and from 200 MHz to 4 GHz. The R&S®FSH can then simultaneously measure the output power and the matching of transmitter system antennas under operating conditions. The power sensors measure average power up to 120 W and normally eliminate the need for any extra attenuators. They are compatible with the common GSM/EDGE, 3GPP WCDMA, cdmaOne, CDMA2000® 1x, DVB-T, DAB standards. In addition, the peak envelope power (PEP) up to max. 300 W can be determined.



R&S®FSH and R&S®FSH-Z44 directional power sensor

# Measurements of electromagnetic fields

The effects of electromagnetic fields (EMF) caused by transmitter systems can be reliably determined by the R&S®FSH. Due to its large frequency range of up to 8 GHz, the R&S®FSH covers all common wireless communications services, including mobile radio (GSM, CDMA, UMTS, DECT), Bluetooth®<sup>2)</sup>, WLAN (IEEE 802.11a, b, g, n), WiMAX™, broadcasting and television.

<sup>2)</sup> The Bluetooth® word mark and logos are owned by the Bluetooth SIG, Inc., and any use of such marks by Rohde&Schwarz is under license.

- Determination of maximum field strength using directional antennas
- Direction-independent field strength measurements using an isotropic antenna
- Determination of electric field strength in a transmission channel with defined bandwidth (channel power measurement)

## Field strength measurements with directional antenna

When measuring electric field strength, the R&S®FSH takes into account the specific antenna factors of the connected antenna. The field strength is displayed directly in dBμV/m. If W/m<sup>2</sup> is selected, the power flux density is calculated and displayed. In addition, frequency-dependent loss or gain, e.g. of a cable or amplifier, can be corrected.

For simple result analysis, the R&S®FSH provides two user-definable limit lines with automatic limit monitoring.

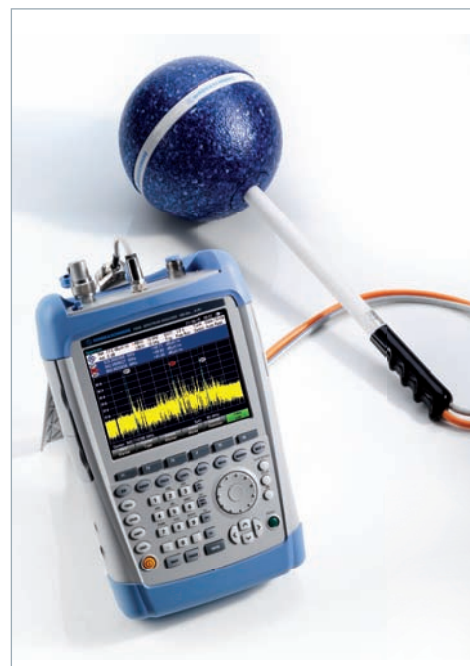
## Field strength measurements with isotropic antenna

Equipped with the R&S®TS-EMF isotropic antenna, the R&S®FSH can determine the direction-independent resultant field strength in the frequency range from 30 MHz to 3 GHz. The antenna includes three orthogonally arranged antenna elements for measuring the resultant field strength. The R&S®FSH sequentially activates the three antenna elements and calculates the resultant field strength, taking into account the antenna factors for each individual antenna element as well as the cable loss of the connection cable.

R&S®FSH with R&S®HE300 antenna



R&S®FSH with R&S®TS-EMF isotropic antenna



# Diagnostic applications in the lab or in service

The fold-out stand turns the R&S®FSH into a desktop analyzer for work in the lab or in service.

The R&S®FSH is suitable, for example, for the following applications:

- Frequency and level measurements
- Power measurements up to 18 GHz with the accuracy of a power meter
- Measurements on amplifiers, filters, etc., using vector network analysis
- Automated creation of test sequences by remote control via LAN or USB

## Location of EMC problems

The R&S®HZ-15 near-field probes are used as diagnostic tools for locating EMC problems, e.g. on circuit boards, integrated circuits, cables and shieldings. The R&S®HZ-15 near-field probe set is adequate for emission measurements from 30 MHz to 3 GHz. The R&S®HZ-16 preamplifier improves measurement sensitivity up to 3 GHz, with approx. 20 dB gain and a noise figure of 4.5 dB. In combination with the R&S®FSH, the preamplifier and near-field probe set are a cost-effective means of analyzing and locating disturbance sources during development.

R&S®FSH with near-field probes and DUT



R&S®FSH with laptop



# Documentation and remote control

The supplied software is very easy to operate. It allows you to document measurement results and helps you administer instrument settings.

## R&S®FSH4View software for documenting measurement results

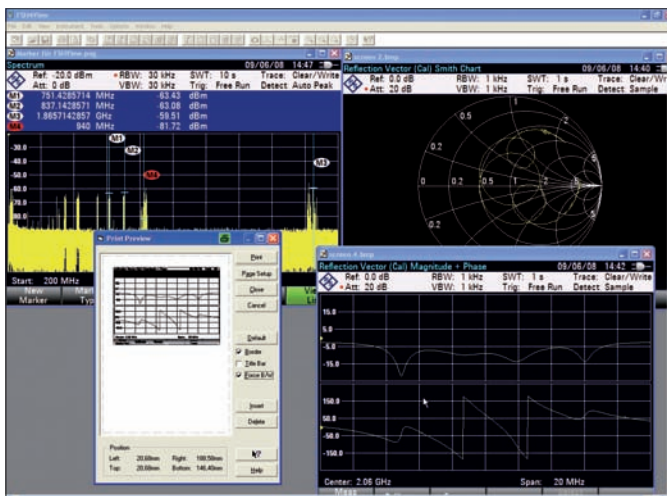
- Fast data exchange via a USB or LAN connection between the R&S®FSH and a PC
- Easy further processing of measurement results by means of data export in ASCII or MS Excel format
- Storage of graphics data in .bmp, .pcx, .png and .wmf format
- Printout of all relevant data via Windows PC
- Remote signal monitoring via LAN by means of permanent and continuous transfer of sweeps
- Simple comparison of measurement results
- Automatic storage of measurement results at selectable intervals
- Subsequent analysis of measurement results by displaying/hiding and shifting markers
- Subsequent display of limit lines
- Generation of cable data using an integrated cable editor and downloading to the R&S®FSH for the distance-to-fault measurement
- Editor for generating limit lines, antenna factors and transducer factors for external attenuators or amplifiers as well as channel lists

## Remote control via LAN or USB

The R&S®FSH can be remote-controlled via the USB or LAN interface and integrated into user-specific programs.

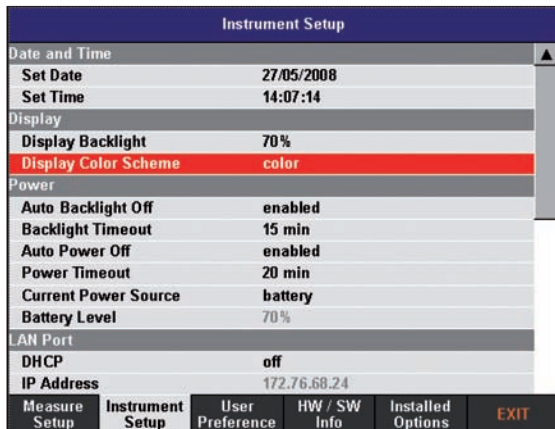
The SCPI-compatible remote-control commands are activated by the R&S®FSH-K40 option.

R&S®FSH4View software

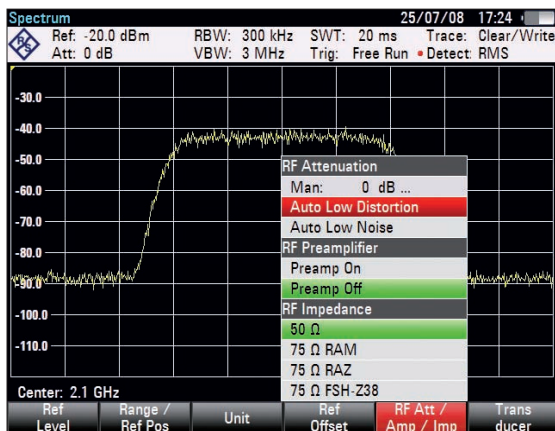


# Easy operation

All frequently used functions such as reference level, bandwidths, frequency, etc., can be set directly via keys.



Easy configuration of instrument setup



Straightforward menus for easy selection of functions



Selecting the channel table

## Quick function selection via keypad and rotary knob

The R&S®FSH is operated via the keypad and rotary knob. The selected function can be activated directly using the Enter button that is integrated in the rotary knob. Due to the vertical design, you can easily reach all operating elements with your fingers. You can switch between different operating modes (e.g. "spectrum analyzer", "vector network analyzer", "power meter") using the MODE key.

All basic settings can be conveniently set in a straightforward list. Measurement results including instrument settings are saved to the internal memory or the replaceable SD memory card. Predefined instrument settings can be locked to prevent them from being changed unintentionally. This reduces the danger of incorrect measurements.

For documentation purposes, you can take a screenshot of any contents you like and then save it as a graphics file.

## Optimal reading of measurement results in any situation

The measurement results on the bright, 6.5" VGA color display are very easy to read. The backlighting of the display can be adjusted to the ambient lighting conditions. For use in extremely strong sunlight, a special monochrome mode provides optimal contrast.

## Setting of frequency via channel tables

As an alternative to entering a frequency, you can tune the R&S®FSH by means of channel numbers. The channel number is displayed instead of the center frequency. Users who are familiar with channel assignments from common TV or mobile radio applications can operate the R&S®FSH even more easily. TV channel tables for a large number of countries are supplied with the R&S®FSH.



### Easy-to-access, well-protected connectors

Additional inputs/outputs such as the DC voltage supply (bias), interfaces and the SD card are easily accessible under dust-proof caps on the side of the instrument.

Additional connectors (e.g. for LAN and USB) are protected by caps

### Front view



# System configuration

## R&S®FSH options and applications

Altogether six R&S®FSH models for different applications and frequency ranges are available. The R&S®FSH4 and R&S®FSH8 can perform measurements up to an upper frequency limit of 3.6 GHz and 8 GHz, respectively. Models featuring a built-in tracking generator can also be used to determine the transmission characteristics of cables, filters, amplifiers, etc.

Additional models with built-in tracking generator and internal VSWR bridge are available for distance-to-fault (DTF) measurements, matching measurements and vector network analysis. All models have an adjustable preamplifier, making them suitable for measuring very small signals. Two power sensors are available as accessories – for precise terminating power measurements up to 18 GHz and for directional power measurements up to 4 GHz. The following tables show possible configurations for different standard functions and applications as well as an overview of available models.

| Standard functions           |                            |                               |                                                                              |                                       |                                            |                                        |                                      |
|------------------------------|----------------------------|-------------------------------|------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------|----------------------------------------|--------------------------------------|
| Application/<br>product      | TDMA power<br>measurements | Channel power<br>measurements | Field strength<br>measurements/<br>measurements<br>with isotropic<br>antenna | Occupied<br>bandwidth<br>measurements | Frequency<br>settings via<br>channel table | Scalar<br>transmission<br>measurements | Scalar<br>reflection<br>measurements |
| R&S®FSH4/8,<br>model .04/.08 | ✓                          | ✓                             | ✓                                                                            | ✓                                     | ✓                                          | –                                      | –                                    |
| R&S®FSH4/8,<br>model .14/.18 | ✓                          | ✓                             | ✓                                                                            | ✓                                     | ✓                                          | ✓                                      | –                                    |
| R&S®FSH4/8,<br>model .24/.28 | ✓                          | ✓                             | ✓                                                                            | ✓                                     | ✓                                          | ✓                                      | ✓                                    |

| Options                      |                                              |                                                       |                                        |                                               |                                                        |                                  |
|------------------------------|----------------------------------------------|-------------------------------------------------------|----------------------------------------|-----------------------------------------------|--------------------------------------------------------|----------------------------------|
| Application/<br>product      | Distance-to-fault<br>(DTF) measure-<br>ments | Vector reflection<br>and transmission<br>measurements | One-port<br>cable loss<br>measurements | Power measure-<br>ments up to<br>8 GHz/18 GHz | Directional power<br>measurements up<br>to 1 GHz/4 GHz | Remote control<br>via LAN or USB |
| R&S®FSH4/8,<br>model .04/.08 | –                                            | –                                                     | –                                      | R&S®FSH-Z1/-Z18                               | R&S®FSH-Z14/-Z44                                       | R&S®FSH-K40                      |
| R&S®FSH4/8,<br>model .14/.18 | –                                            | –                                                     | –                                      | R&S®FSH-Z1/-Z18                               | R&S®FSH-Z14/-Z44                                       | R&S®FSH-K40                      |
| R&S®FSH4/8,<br>model .24/.28 | R&S®FSH-K41                                  | R&S®FSH-K42                                           | R&S®FSH-K42                            | R&S®FSH-Z1/-Z18                               | R&S®FSH-Z14/-Z44                                       | R&S®FSH-K40                      |

| Models              |                    |              |                    |                      |
|---------------------|--------------------|--------------|--------------------|----------------------|
| R&S®FSH model       | Frequency range    | Preamplifier | Tracking generator | Built-in VSWR bridge |
| R&S®FSH4, model .04 | 9 kHz to 3.6 GHz   | ✓            | –                  | –                    |
| R&S®FSH4, model .14 | 9 kHz to 3.6 GHz   | ✓            | ✓                  | –                    |
| R&S®FSH4, model .24 | 100 kHz to 3.6 GHz | ✓            | ✓                  | ✓                    |
| R&S®FSH8, model .08 | 9 kHz to 8 GHz     | ✓            | –                  | –                    |
| R&S®FSH8, model .18 | 9 kHz to 8 GHz     | ✓            | ✓                  | –                    |
| R&S®FSH8, model .28 | 100 kHz to 8 GHz   | ✓            | ✓                  | ✓                    |

# Specifications in brief

| Spectrum analysis                                      |                                                   |                                                                                                      |                          |
|--------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------|
|                                                        |                                                   | R&S®FSH4                                                                                             | R&S®FSH8                 |
| Frequency range                                        | model .04/.14 or model .08/.18                    | 9 kHz to 3.6 GHz                                                                                     | 9 kHz to 8 GHz           |
|                                                        | model .24/.28                                     | 100 kHz to 3.6 GHz                                                                                   | 100 kHz to 8 GHz         |
| Resolution bandwidths                                  |                                                   | 100 Hz to 3 MHz                                                                                      |                          |
| Displayed average noise level                          | without preamplifier, RBW = 1 Hz (normalized)     |                                                                                                      |                          |
|                                                        | 9 kHz to 100 kHz<br>(models .04/.14/.08/.18 only) | <−108 dBm, typ. −118 dBm                                                                             | <−108 dBm, typ. −118 dBm |
|                                                        | 100 kHz to 1 MHz                                  | <−115 dBm, typ. −125 dBm                                                                             | <−115 dBm, typ. −125 dBm |
|                                                        | 1 MHz to 10 MHz                                   | <−136 dBm, typ. −144 dBm                                                                             | <−136 dBm, typ. −144 dBm |
|                                                        | 10 MHz to 2 GHz                                   | <−141 dBm, typ. −146 dBm                                                                             | <−141 dBm, typ. −146 dBm |
|                                                        | 2 GHz to 3.6 GHz                                  | <−138 dBm, typ. −143 dBm                                                                             | <−138 dBm, typ. −143 dBm |
|                                                        | 3.6 GHz to 5 GHz                                  | –                                                                                                    | <−142 dBm, typ. −146 dBm |
|                                                        | 5 GHz to 6.5 GHz                                  | –                                                                                                    | <−140 dBm, typ. −144 dBm |
|                                                        | 6.5 GHz to 8 GHz                                  | –                                                                                                    | <−136 dBm, typ. −141 dBm |
| Displayed average noise level                          | with preamplifier, RBW = 1 Hz (normalized)        |                                                                                                      |                          |
|                                                        | 100 kHz to 1 MHz                                  | <−133 dBm, typ. −143 dBm                                                                             | <−133 dBm, typ. −143 dBm |
|                                                        | 1 MHz to 10 MHz                                   | <−157 dBm, typ. −161 dBm                                                                             | <−157 dBm, typ. −161 dBm |
|                                                        | 10 MHz to 2 GHz                                   | <−161 dBm, typ. −165 dBm                                                                             | <−161 dBm, typ. −165 dBm |
|                                                        | 2 GHz to 3.6 GHz                                  | <−159 dBm, typ. −163 dBm                                                                             | <−159 dBm, typ. −163 dBm |
|                                                        | 3.6 GHz to 5 GHz                                  | –                                                                                                    | <−155 dBm, typ. −159 dBm |
|                                                        | 5 GHz to 6.5 GHz                                  | –                                                                                                    | <−151 dBm, typ. −155 dBm |
|                                                        | 6.5 GHz to 8 GHz                                  | –                                                                                                    | <−147 dBm, typ. −150 dBm |
| Third-order intercept                                  | 300 MHz to 3.6 GHz                                | >10 dBm, typ. +15 dBm                                                                                | >10 dBm, typ. +15 dBm    |
|                                                        | 3.6 GHz to 8 GHz                                  | –                                                                                                    | >3 dBm, typ. +10 dBm     |
| Phase noise                                            | frequency 500 MHz                                 |                                                                                                      |                          |
|                                                        | 30 kHz carrier offset                             | <−95 dBc (1 Hz), typ. −105 dBc (1 Hz)                                                                |                          |
|                                                        | 100 kHz carrier offset                            | <−100 dBc (1 Hz), typ. −110 dBc (1 Hz)                                                               |                          |
|                                                        | 1 MHz carrier offset                              | <−120 dBc (1 Hz), typ. −127 dBc (1 Hz)                                                               |                          |
| Detectors                                              |                                                   | sample, max/min peak, auto peak, RMS                                                                 |                          |
| Level measurement uncertainty                          | 10 MHz < f ≤ 3.6 GHz                              | <1 dB, typ. 0.5 dB                                                                                   | <1 dB, typ. 0.5 dB       |
|                                                        | 3.6 MHz < f ≤ 8 GHz                               | –                                                                                                    | <1.5 dB, typ. 1 dB       |
| Display                                                |                                                   | 6.5" color LCD with VGA resolution                                                                   |                          |
| Battery operating time<br>(without tracking generator) | R&S®HA-Z204, 4 Ah                                 | up to 3 h                                                                                            |                          |
|                                                        | R&S®HA-Z206, 6 Ah                                 | up to 4.5 h                                                                                          |                          |
| Dimensions (W × H × D)                                 |                                                   | 194 mm × 300 mm × 69 mm (144 mm <sup>1)</sup> )<br>7.6 in × 11.8 in × 2.7 in (5.7 in <sup>1)</sup> ) |                          |
| Weight                                                 |                                                   | 3 kg (6.6 lb)                                                                                        |                          |

<sup>1)</sup> With carrying handle.

# Vector network analysis (model .24/.28 with R&S®FSH-K42 only)

|                                                |                        | R&S®FSH4                                                                                               | R&S®FSH8            |
|------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------|---------------------|
| Frequency range                                | model .24 or model .28 | 300 kHz to 3.6 GHz                                                                                     | 300 kHz to 8 GHz    |
| Output power (port 1, port 2)                  |                        | 0 dBm to –50 dBm                                                                                       |                     |
| Reflection measurement ( $S_{11}$ , $S_{22}$ ) |                        |                                                                                                        |                     |
| Directivity                                    | 300 kHz to 3 GHz       | nominal >43 dB                                                                                         | nominal >43 dB      |
|                                                | 3 GHz to 3.6 GHz       | nominal >37 dB                                                                                         | nominal >37 dB      |
|                                                | 3.6 GHz to 6 GHz       | –                                                                                                      | nominal >37 dB      |
|                                                | 6 GHz to 8 GHz         | –                                                                                                      | nominal >31 dB      |
| Display modes                                  |                        | magnitude, phase, magnitude + phase, Smith chart, VSWR, return loss (dB), reflection coefficient, mRho |                     |
| Transmission measurements                      |                        |                                                                                                        |                     |
| Dynamic range ( $S_{21}$ )                     | 100 kHz to 300 kHz     | typ. 70 dB                                                                                             | typ. 70 dB          |
|                                                | 300 kHz to 3.6 GHz     | >70 dB, typ. 90 dB                                                                                     | >70 dB, typ. 90 dB  |
|                                                | 3.6 GHz to 6 GHz       | –                                                                                                      | >70 dB, typ. 90 dB  |
|                                                | 6 GHz to 8 GHz         | –                                                                                                      | typ. 50 dB          |
| Dynamic range ( $S_{12}$ )                     | 100 kHz to 300 kHz     | typ. 80 dB                                                                                             | typ. 80 dB          |
|                                                | 300 kHz to 3.6 GHz     | >80 dB, typ. 100 dB                                                                                    | >80 dB, typ. 100 dB |
|                                                | 3.6 GHz to 6 GHz       | typ. 60 dB                                                                                             | >80 dB, typ. 100 dB |
|                                                | 6 GHz to 8 GHz         | –                                                                                                      | typ. 60 dB          |
| Display modes                                  |                        | magnitude (loss, gain), phase, magnitude + phase                                                       |                     |

# Ordering information

| Designation                                                                                                                               | Type         | Order No.    |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|
| <b>Base unit</b>                                                                                                                          |              |              |
| Handheld Spectrum Analyzer, 9 kHz to 3.6 GHz, with preamplifier                                                                           | R&S®FSH4     | 1309.6000.04 |
| Handheld Spectrum Analyzer, 9 kHz to 3.6 GHz, with preamplifier and tracking generator                                                    | R&S®FSH4     | 1309.6000.14 |
| Handheld Spectrum Analyzer, 100 kHz to 3.6 GHz, with preamplifier, tracking generator and internal VSWR bridge                            | R&S®FSH4     | 1309.6000.24 |
| Handheld Spectrum Analyzer, 9 kHz to 8 GHz, with preamplifier                                                                             | R&S®FSH8     | 1309.6000.08 |
| Handheld Spectrum Analyzer, 9 kHz to 8 GHz, with preamplifier and tracking generator                                                      | R&S®FSH8     | 1309.6000.18 |
| Handheld Spectrum Analyzer, 100 kHz to 8 GHz, with preamplifier, tracking generator and internal VSWR bridge                              | R&S®FSH8     | 1309.6000.28 |
| <b>Accessories supplied</b>                                                                                                               |              |              |
| Li-ion battery pack (4 Ah), USB cable, LAN cable, AC power supply, CD-ROM with R&S®FSH4View software and documentation, quick start guide |              |              |
| <b>Software options (usually firmware)</b>                                                                                                |              |              |
| Remote Control via LAN or USB                                                                                                             | R&S®FSH-K40  | 1304.5606.02 |
| Distance-to-Fault Measurement (for models .24 and .28 only, requires R&S®FSH-Z320 or R&S®FSH-Z321 and R&S®FSH-Z28 or R&S®FSH-Z29)         | R&S®FSH-K41  | 1304.5612.02 |
| Vector Reflection and Transmission Measurements (for models .24 and .28 only, requires R&S®FSH-Z28 or R&S®FSH-Z29)                        | R&S®FSH-K42  | 1304.5629.02 |
| <b>Accessories</b>                                                                                                                        |              |              |
| Power Sensor, 10 MHz to 8 GHz                                                                                                             | R&S®FSH-Z1   | 1155.4505.02 |
| Power Sensor, 10 MHz to 18 GHz                                                                                                            | R&S®FSH-Z18  | 1165.1909.02 |
| Directional Power Sensor, 25 MHz to 1 GHz                                                                                                 | R&S®FSH-Z14  | 1120.6001.02 |
| Directional Power Sensor, 200 MHz to 4 GHz                                                                                                | R&S®FSH-Z44  | 1165.2305.02 |
| RF Cable (1 m), N male/N female connectors for R&S®FSH-K41 option, DC to 8 GHz                                                            | R&S®FSH-Z320 | 1309.6600.00 |
| RF Cable (3 m), N male/N female connectors for R&S®FSH-K41 option, DC to 8 GHz                                                            | R&S®FSH-Z321 | 1309.6617.00 |
| Combined Open/Short/50 Ω Load Calibration Standard, for calibrating the VSWR and DTF measurement, DC to 3.6 GHz                           | R&S®FSH-Z29  | 1300.7510.03 |
| Combined Open/Short/50 Ω Load Calibration Standard, for calibrating the VSWR and DTF measurement, DC to 8 GHz                             | R&S®FSH-Z28  | 1300.7810.03 |
| Matching Pad, 50 Ω/75 Ω, bidirectional, 0 Hz to 2.7 GHz, N female/N male connectors, load capacity 2 W                                    | R&S®RAZ      | 0358.5714.02 |
| Matching Pad, 50 Ω/75 Ω, bidirectional, 0 Hz to 2.7 GHz, N female/N male connectors, load capacity 2 W                                    | R&S®RAM      | 0358.5414.02 |
| Matching Pad, 50 Ω/75 Ω, bidirectional, 0 Hz to 1 GHz, BNC female/N male connectors, load capacity 1 W                                    | R&S®FSH-Z38  | 1300.7740.02 |
| Li-Ion Battery Pack, 6 Ah                                                                                                                 | R&S®HA-Z206  | 1309.6146.00 |
| Battery Charger for Li-ion battery pack, 4 Ah/6 Ah                                                                                        | R&S®HA-Z203  | 1309.6123.00 |
| 12 V Car Adapter                                                                                                                          | R&S®HA-Z202  | 1309.6117.00 |
| Soft Carrying Bag<br>W × H × D: 260 mm × 360 mm × 280 mm (10.2 in × 14.2 in × 11.0 in)                                                    | R&S®HA-Z220  | 1309.6175.00 |
| SD Memory Card, 1 Gbyte                                                                                                                   | R&S®HA-Z231  | 1309.6217.00 |
| Headphones                                                                                                                                | R&S®FSH-Z36  | 1145.5838.02 |
| Active Directional Antenna, 20 MHz to 7.5 GHz                                                                                             | R&S®HE300    | 4067.5900.02 |
| Loop Antenna for R&S®HE300, 9 kHz to 20 MHz                                                                                               | R&S®HE300-HF | 4067.6806.02 |
| Isotropic Antenna, 30 MHz to 3 GHz                                                                                                        | R&S®TS-EMF   | 1158.9295.13 |
| Near-Field Probe Set                                                                                                                      | R&S®HZ-15    | 1147.2736.02 |
| Preamplifier for R&S®HZ-15                                                                                                                | R&S®HZ-16    | 1147.2720.02 |
| Spare USB Cable                                                                                                                           | R&S®HA-Z211  | 1309.6169.00 |
| Spare LAN Cable                                                                                                                           | R&S®HA-Z210  | 1309.6152.00 |
| Spare AC Power Supply                                                                                                                     | R&S®HA-Z201  | 1309.6100.00 |

## Service you can rely on

- In 70 countries
- Person-to-person
- Customized and flexible
- Quality with a warranty
- No hidden terms

## About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

## Regional contact

Europe, Africa, Middle East

+49 1805 12 42 42\* or +49 89 4129 137 74

customersupport@rohde-schwarz.com

North America

1-888-TEST-RSA (1-888-837-8772)

customer.support@rsa.rohde-schwarz.com

Latin America

+1-410-910-7988

customersupport.la@rohde-schwarz.com

Asia/Pacific

+65 65 13 04 88

customersupport.asia@rohde-schwarz.com

Certified Quality System  
**ISO 9001**  
DQS REG. NO 1954 QM

Certified Environmental System  
**ISO 14001**  
DQS REG. NO 1954 UM

For data sheet, see  
PD 5214.0482.22  
and [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

## Rohde & Schwarz GmbH & Co. KG

Mühlendorfstraße 15 | 81671 München

Phone +49 89 41 290 | Fax +49 89 41 29 121 64

[www.rohde-schwarz.com](http://www.rohde-schwarz.com)

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG  
Trade names are trademarks of the owners | Printed in Germany (ch)  
PD 5214.0482.12 | Version 01.00 | September 2008 | R&S®FSH  
Data without tolerance limits is not binding | Subject to change

\*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.