R&S®FSH4/8

A Mobile and Rugged Handheld Spectrum Analyzer for Use in the Field

The new R&S®FSH4/8 builds upon successes of FSH3/6/18 with network operators, TV broadcast operators, and military to offer an indispensable tool for field users who need an efficient measuring instrument. The new FSH4/8 improved upon RF performance, CPU speed, display size, interfaces for memory expansion slot to further support a very wide range of applications, and truly make it a mobile precise measurement instrument. Depending upon model and installed options, it serves as a power meter, cable and antenna tester, or a two-part vector network analyzer. With the new and improved GUI and dedicated function keys, it provides better operation to field users.

Field users can efficiently use and effectively address the following applications using the new R&S®FSH4/8:

- Service & Maintenance on transmitter stations
- Cable & Antenna tests
- EMF measurements
- EMI precompliance
- Signal monitoring
- Interference hunting
- Precise power measurements

Key facts

- Frequency range from 9 kHz to 3.6 GHz or 8 GHz
- High sensitivity (<–141dBm(1Hz), with preamplifier<–161 dBm (1 Hz))
- Low measurement uncertainty (<1 dB)
- Internal tracking generator and VSWR bridge with built-in DC voltage supply (bias)
- Two-port network analyzer
- Directional power measurements up to 4 GHz under operating conditions
- 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

Key Features

- Ease of use
- Ruggedized, yet mobile form factor
- Accessories for field users
- Improved RF performances
- Easy to replace Li-Ion battery pack with an external charger
- Internal VSWR bridge to reduce overall size and weight, making it easy to handle
- SD memory expansion slot to store measurements, results and installation settings
- USB and LAN interfaces supporting remote control functions and ease of firmware updates
- Faster CPU to provide quicker display updates
- Larger 6.5” VGA display allowing split screen mode

New Features

- Improved RF Performance
  - up to 16 dB more sensitivity, 20 dB better phase noise @10 kHz offset
  - up to 0.5 dB better measurement accuracy

- Internal VSWR Bridge with two Bias-Tees
  - avoids repeatedly mounting and dismounting the VSWR bridge
  - reduced total size, comfortable handling for the field use
  - power supply of active components like tower mounted amplifiers (TMA)

- 2-Port Vector Network Analyzer
  - Magnitude and phase measurement in forward and reverse direction
  - Measurement of all four S-parameters S11, S21, S12 S22

- Easy exchangeable Li-Ion battery
  - extension of the battery operating time
  - state-of-the-art battery technology
  - (high capacity at a low weight)
  - battery operating time up to 3 h (4 Ah)/ 4.5h (6 Ah)

- External battery charger available

- SD-memory card slot
  - easy memory extension via ordinary SD-card
  - storing of thousands measurement results and instrument settings
  - easy handling of test results in security areas

- USB/LAN interfaces
  - remote control via USB/LAN
  - easy firmware update via LAN or USB

- Large 6.5 “ color display with 640 x 480 VGA resolution
  - improved resolution for distance to fault
  - allows split screen mode

- Faster CPU
  - automatic scrambling code detection approx. 5 times faster than FSH3
  - faster display update rate -> 15/s (FSH: 8/s)

- Display of two traces
  - measurement with different detectors

- Improved operating concept
  - additional hard and soft keys leads to a more clear menu structure
  - improved multi-marker operation

- GPS Receiver Option (planned)
  - Support of external GPS-Receiver
  - For documentation of the current location
  - Improvement of the internal reverence frequency

- Built-in loudspeaker
  - AM/FM AF- demodulation without headphone

- All in- and output connectors with covers
  - Protection against dirt, dust and water

Potential Customers

- Telecom Industry
- Network Operators (mobile communications and broadcast)
- Military
- Automotive / Electronic manufacturers
- Aerospace
- Medicine Technology
- Public Safety (police, fire safety)
- Consumer Electronics
- Service and Maintenance
- Education (universities, training centers, etc.)

Standard functions							
Applioation/ produot	TDMA power measurements	Channel power measurements	Field strength measurements/ measurements with isotropio antenna	Oooupied bandwidth measurements	Frequenoy settings via ohannel table	Soalar transmission measurements	Soalar refleotion measurements
R&S®FSH4/8, model .04/.08	√	√	√	√	√	–	–
R&S®FSH4/8, model .14/.18	√	√	√	√	√	√	–
R&S®FSH4/8, model .24/.28	√	√	√	√	√	√	√

Models				
R&S®FSH model	Frequenoy range	Preamplifier	Traoking 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	√	√	√

Options						
Applioation/ produot	Distanoe-to-fault (DTF) measure-ments	Veotor refleotion and transmission measurements	One-port oable loss measurements	Power measure-ments up to 8 GHz/18 GHz	Direotional power measurements up to 1 GHz/4 GHz	Remote oontrol via LAN or USB
R&S®FSH4/8, model .04/.08	–	–	–	R&S®FSH-Z1/-Z18	R&S®FSH-Z14/-Z44	R&S®FSH-K40
R&S®FSH4/8, model .14/.18	–	–	–	R&S®FSH-Z1/-Z18	R&S®FSH-Z14/-Z44	R&S®FSH-K40
R&S®FSH4/8, 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

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 (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 (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 [1]) 7.6 in × 11.8 in × 2.7 in (5.7 in [1])	
Weight		3 kg (6.6 lb)	

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

Products

Item	Part Number	Description	*RSA List*
FSH4 (Model .04)	1309.6000.04	Handheld Spectrum Analyzer 9 kHz to 3.6 GHz with Preamplifier	$8,950.00
FSH4 (Model .14)	1309.6000.14	Handheld Spectrum Analyzer 9 kHz to 3.6 GHz with Preamplifier and Tracking Generator	$11,170.00
FSH4 (Model .24)	1309.6000.24	Handheld Spectrum Analyzer 300 kHz to 3.6 GHz with Preamplifier, Tracking Generator, VSWR bridge	$15,360.00
FSH8 (Model .08)	1309.6000.08	Handheld Spectrum Analyzer 9 kHz to 8 GHz with Preamplifier	$13,150.00
FSH8 (Model .18)	1309.6000.18	Handheld Spectrum Analyzer 9 kHz to 8 GHz with Preamplifier and Tracking Generator	$15,230.00
FSH8 (Model .28)	1309.6000.28	Handheld Spectrum Analyzer 300 kHz to 8 GHz with Preamplifier, Tracking Generator and VSWR bridge	$20,980.00

Options

Item	Part Number	Description	*RSA List*
HA-Z220	1309.6175.00	Soft carrying bag for FSH4/8	$250.00
HA-Z231	1309.6217.00	SD Memory Card, 1 GB	$100.00
FSH-Z320	1309.6600.00	RF Cable (1m) DC to 8 GHz. armored, N male to N female connectors	$320.00
FSH-Z321	1309.6617.00	RF Cable (3m) DC to 8 GHz. armored, N male to N female connectors	$430.00
HA-Z201	1309.6100.00	Spare Power Supply	$215.00
HA-Z202	1309.6117.00	12V Car Adapter for Cigarette Lighter	$190.00
HA-Z203	1309.6123.00	Battery Charger for Li-Ion Battery Pack 4 Ah/6 Ah	$510.00
HA-Z206	1309.6146.00	Li-Ion Battery Pack 6 Ah	$530.00
HA-Z210	1309.6152.00	Spare Ethernet Cable 1.5m	$35.00
HA-Z211	1309.6169.00	Spare USB Cable 1.5 m, type A / mini B connector	$40.00
FSH-K40	1304.5606.02	Remote Control via LAN/USB for FSH4/8	$395.00
FSH-K41	1304.5612.02	Distance-to-Fault Measurement for R&S FSH4/8 (only for models .24 / .28)	$1,165.00 $
FSH-K42	1304.5629.02	Vector Transmission and Reflection Measurements for R&S FSH 4/8	$970.00