Spectrum Analyzer
R&S®FS300/FS315

9 kHz to 3 GHz

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ROHDE&SCHWARZ

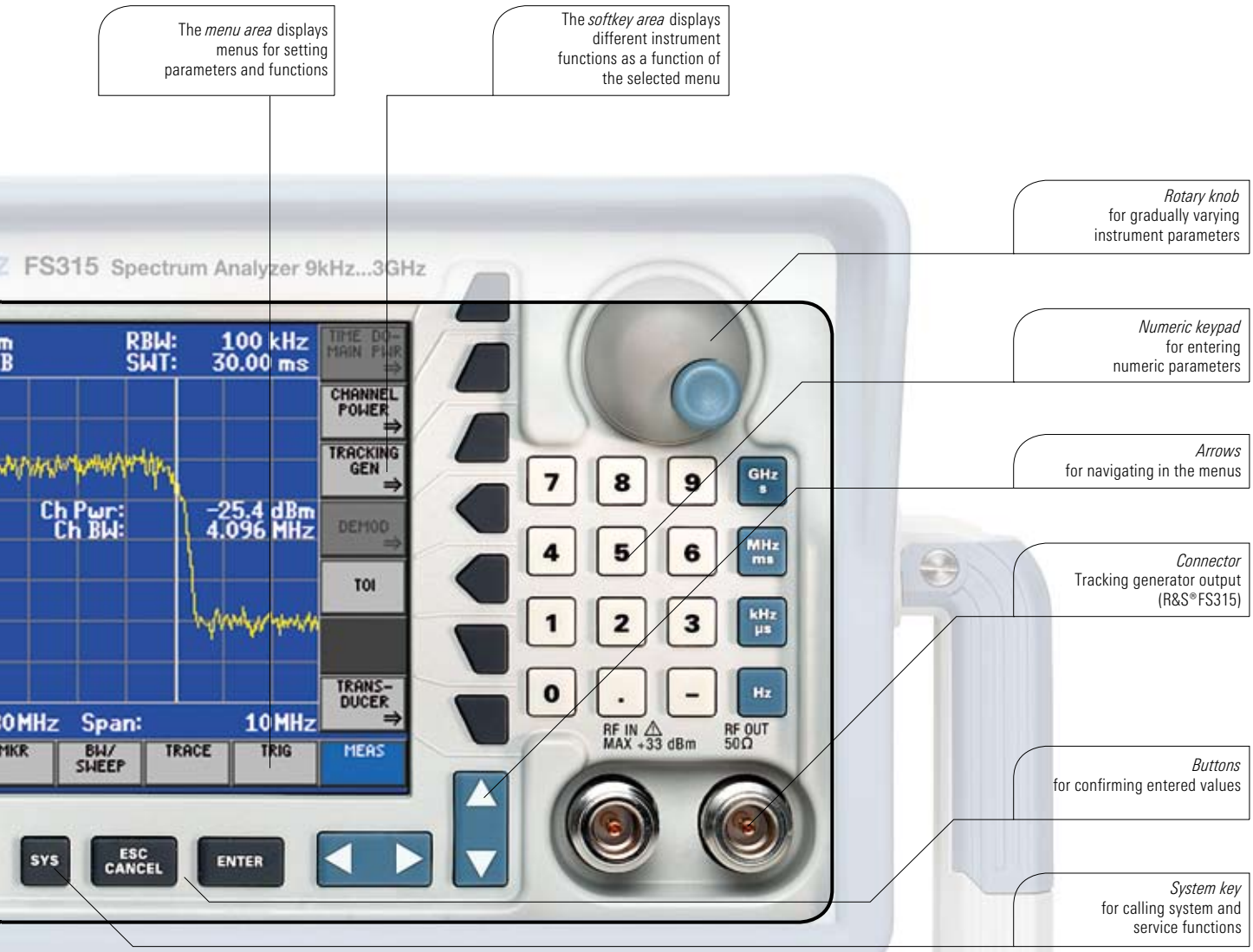
Professional test equipment for laboratory, service and production

The R&S®FS300 is a highly accurate spectrum analyzer with a frequency range of 9 kHz to 3 GHz. Owing to its modern, digital frequency processing technique, it offers high measurement quality at a favorable price. The R&S®FS315 is additionally equipped with a built-in tracking generator from 9 kHz to 3 GHz for scalar network analysis; the tracking generator is also suitable for generating fixed-frequency signals. Plus, the R&S®FS315 includes various detectors for evaluating measurement results and allows electric field strength measurements taking into account the antenna factors.

- **High-quality measurement characteristics**
- **Resolution bandwidths from 200 Hz to 20 MHz (R&S®FS315)**
- **Frequency counter with 1 Hz resolution**
- **Maximum input level 33 dBm**
- **Ergonomic user interface**
- **Remote control via USB interface**
- **AM/FM audio frequency demodulator output (R&S®FS315)**

Condensed data

	R&S®FS300	R&S®FS315
Frequency range	9 kHz to 3 GHz	
Resolution bandwidths (–3 dB)	200 Hz to 1 MHz	200 Hz to 20 MHz
Video bandwidths	10 Hz to 1 MHz	10 Hz to 20 MHz
Displayed average noise level	< –110 dBm, typ. –115 dBm (300 Hz)	
Intermodulation-free range	< –70 dBc at –36 dBm input level	
SSB phase noise, 10 kHz offset	< –90 dBc (1 Hz)	
Level uncertainty	< 1.5 dB, typ. 0.7 dB	
Detector	peak	max/min peak, sample, average, RMS
Measurement functions	TOI, TDMA power, frequency counter, noise marker	TOI, TDMA power, frequency counter, noise marker, occupied bandwidth (OBW), return loss, transmission, channel power
Tracking generator	–	9 kHz to 3 GHz
Audio frequency demodulator	–	AM /FM
Measurement with antenna factors	–	yes



Ergonomic user interface

Operation is menu-guided enabling even untrained users to quickly obtain correct results. Clear structures simplify navigation within the menus.
The bright TFT color display allows traces to be read even at odd angles or when the incidence of light is unfavorable.

Application ranges

The R&S®FS300/FS315 is a versatile spectrum analyzer for comprehensive measurements in laboratory, service and production.

- **Measurement of RF spectrum (level and frequency)**
- **Measurement of radiated interference (EMC)**
- **Time domain measurements**
- **Radiomonitoring remote-controlled via USB**
- **Scalar network analysis (only R&S®FS315)**

PC software

A powerful software package for remote control from a PC is supplied with the R&S®FS300/FS315. The software enhances the R&S®FS300/FS315 functions and supports the generation of test reports on the PC.

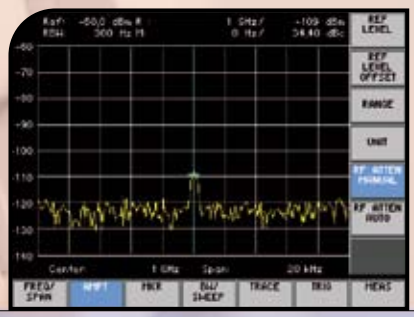
Characteristics

- Windows 2000/XP-compatible
- PC linked to R&S®FS300/FS315 via USB interface
- Fast and simple transfer of measurements between R&S®FS300/FS315 and PC
- Permanent sweep and transmission of ongoing sweeps to the PC with evaluation capabilities (marker, zoom, etc)
- Extended range of functions (limit lines, log file)
- Practically unlimited memory capacity for storing traces and measurement information (comparison of current and previous measurements)
- Export of trace values (900 points) in txt format for import into MS Excel
- Export of displayed data (screenshots) in JPEG format
- Output of results to standard printer

High-quality measurement characteristics

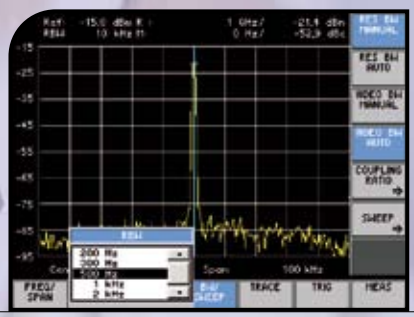
The RF characteristics of the R&S®FS300/FS315 are setting new standards in the lower price class. Since the displayed average noise level is typically –115 dBm (300 Hz), even weak signals can be reliably detected. Owing to the wide dynamic range, this is also possible when strong carrier signals are present.

The points in the traces are displayed with an accuracy unrivalled in this price class. This is an essential prerequisite for any measurement task.



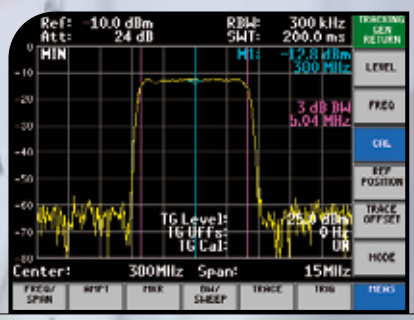
Resolution bandwidths from 200 Hz to 1 MHz

With 16 digitally implemented resolution bandwidths from 200 Hz to 1 MHz, the R&S®FS300 can be optimally adapted to the measurement task at hand. The R&S®FS315 additionally covers the range up to 20 MHz. Wide resolution bandwidths for overall measurements ensure short sweep times, whereas narrow bandwidths are ideal for high frequency resolution and a low noise level. The R&S®FS300 and R&S®FS315 fulfill every requirement in between.



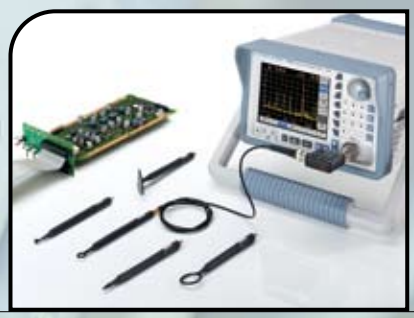
Scalar network analysis

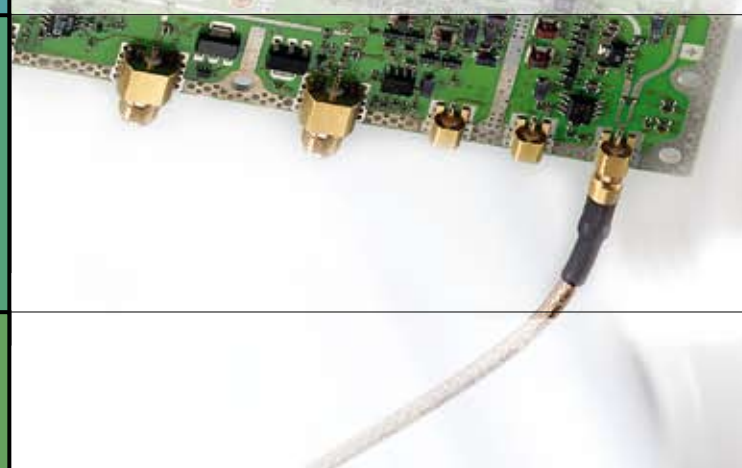
The R&S®FS315 with built-in tracking generator is the perfect solution for cost-efficient testing of the transmission behavior of filters, cables, amplifiers and so forth. Equipped with an additional VSWR bridge, reflection measurements can also be performed. Entering any frequency offset between 0 Hz and 3 GHz allows measurements on frequency-converting DUTs. With simple applications, the tracking generator can be used as a signal generator with a permanently set frequency.



Locating EMC weak spots

The R&S®HZ-15 near-field probes are diagnostic tools used for locating EMC weak spots on printed boards, integrated circuits, cables, shieldings and other trouble spots. The Near-Field Probe Set R&S®HZ-15 is adequate for emission measurements from 30 MHz to 3 GHz. The Preamplifier R&S®HZ-16 up to 3 GHz, with approximately 20 dB gain and a noise figure of 4.5 dB, increases sensitivity for measurements. In combination with the R&S®FS300/FS315, the preamplifier and near-field probe set are a cost-effective means of analyzing and locating sources of interference during development.






ROHDE & SCHWARZ FS300 Spectrum Analyzer 9kHz...3GHz
R&S Smart instruments
ON
STBY
SYS
ESC CANCEL
ENTER
RF IN MAX +33 dBm

Ready for the future – the new instrument family

The R&S®FS300 and the R&S®FS315 are part of a new family of analyzers and generators for development, service and production applications. The platform on which this family is based – with its compact design, powerful processor system, fast internal bus and ergonomic user interface – provides optimum conditions for professional, favorably priced instruments.

Compact housing with adjustable handle

The R&S®FS300 and the R&S®FS315 are notable for their compact and robust design. They require only a minimum of space on your desktop or in the rack. Even two instruments of this family can easily be accommodated next to each other in a 19-inch rack. The handle, which can be turned and shifted, can be used to carry the instrument during transport and as a fold-out support to ensure an ideal angle. The handle can be conveniently tilted to the side if it interferes with smooth operation.

Remote control via USB interface

The R&S®FS300 and the R&S®FS315 can easily be operated from a PC via the USB remote-control interface. Simply connect the PC via hot plug & play, start the supplied software and that's it. The supplied drivers for Windows 2000/XP make system software integration mere child's play.

Specifications

Our products are continuously enhanced and upgraded. For the latest on the R&S®FS300 and the R&S®FS315, check out the Internet at **www.fs300.rohde-schwarz.com**

Frequenz

		R&S®FS300	R&S®FS315
Frequency range		9 kHz to 3 GHz	
Frequency resolution		0.1 Hz	
Reference frequency		10 MHz, nominal	
Aging		2×10^{-6}/year	
Temperature drift	5 °C to 30 °C	1×10^{-6}	
External reference		10 MHz	
Frequency counter			
Resolution		1 Hz, 10 Hz	
Count accuracy	S/N >25 dB	±(marker frequency × reference error + ½ (last digit))	
Frequency span		1 kHz to 3 GHz, 0 Hz	
Span accuracy		<1 %	
Spectral purity			
SSB phase noise	9 kHz ≤ f ≤ 3 GHz		
	10 kHz carrier offset	<–90 dBc (1 Hz), typ. 95 dBc (1 Hz)	
	100 kHz carrier offset	typ. –100 dBc (1 Hz)	
	1 MHz carrier offset	typ. –110 dBc (1 Hz)	
Residual FM	1 kHz resolution bandwidth, 1 kHz video bandwidth 9 kHz ≤ f ≤ 3 GHz, weighting in line with CCITT	<100 Hz	
Sweep time			
Span >1 kHz		100 ms to 1000 s (steps depending on RBW and span)	30 ms to 1000 s
Max. deviation		5 %	1 %
Span = 0 Hz		100 µs to 20 s	5 µs to 10 s
Resolution		150 ns	20 ns

Frequency

		R&S®FS300	R&S®FS315
Bandwidths			
Resolution bandwidths (–3 dB)	in 1/2/3/5 sequence	200 Hz to 1 MHz	200 Hz to 20 MHz
Bandwidth accuracy	RBW ≤ 1 MHz	5 %	<1 %
	2 MHz ≤ RBW ≤ 10 MHz	–	<5 %
	RBW 10 MHz, 20 MHz	–	<10 %
Shape factor 60 db/3 dB	RBW ≤ 1 MHz	<4.6:1	
Video bandwidths	in 1/2/3/5 sequence	10 Hz to 1 MHz	10 Hz to 20 MHz

Amplitude

		R&S®FS300	R&S®FS315
Display range		displayed average noise level to + 33 dBm	
Display scaling		80 dB, 40 dB, 16 dB, 8 dB, linear	
Display units			
Logarithmic		dBm, dBµV, dBmV	
Linear		V, W	
Maximum input level			
DC voltage		30 V	
	step from –30 V to +30 V	1200 V/µs	
CW RF power	RF attenuation <20 dB	+13 dBm	
	RF attenuation ≥20 dB		
	50 MHz to 3 GHz	+33 dBm	
	20 MHz to 50 MHz	+26 dBm	
	9 kHz to 20 MHz	+20 dBm	
1 dB compression point of 1st mixer			
	f >100 kHz, RF attenuation 0 dB	–10 dBm nominal	
Linearity			
Harmonics	input level –40 dBm, RF attenuation 0 dB	<–60 dBc	
Intermodulation-free dynamic range for third-order intermodulation	two-tone signal with level 2 × –30 dBm, RF attenuation 6 dB	<–70 dBc	
Displayed average noise level			
	9 kHz to 3 GHz, RF attenuation 0 dB, 300 Hz RBW, 10 Hz video bandwidth	<–110 dBm, typ. –115 dBm	

Amplitude

		R&S®FS300	R&S®FS315
Spurious			
Inherent spurious	RF attenuation 0 dB, input terminated	<–85 dBm	
Other spurious	10 MHz to 3 GHz, level at 1st mixer –35 dBm	<–60 dBc	
Level settings			
Setting range of reference level		–110 dBm to +36 dBm	
Resolution		0.1 dB	
RF attenuation range	manual selection or automatically coupled to reference level	0 dB to 70 dB	
Resolution		2 dB	
Traces			1 active trace and 1 stored trace
Trace detectors		max peak	max peak, min peak, sample, average, RMS,
Trace functions		clear/write, max hold, min hold, average	
Max. uncertainty of level measurement			
Frequency response	9 kHz to 3 GHz, RF attenuation 0 dB to 70 dB	–	<1.0 dB
Reference level uncertainty		–	<0.3 dB
Display nonlinearity	0 dB to –60 dB	–	<0.3 dB
	–60 dB to –70 dB	–	<1 dB
Bandwidth switching uncertainty		<0.2 dB	<0.3 dB
Total measurement uncertainty	0 dB to –60 dB below ref. level, RBW ≤5 MHz	<1.5 dB	1.5 dB, typ. 0.7 dB
Markers			
Number of markers and delta markers		1 marker and 1 delta marker	
Marker functions		peak, next peak left, next peak right, center frequency = marker frequency, reference level = marker level	
Marker displays		normal (level), noise marker, frequency counter, n dB down (bandwidth)	
Audio demodulation	zero span only, RBW ≤1 MHz	–	AM and FM

Trigger

		R&S®FS300	R&S®FS315
Span ≥ 1 kHz			
Trigger source		free run, external	
Trigger offset	sweep time > 100 ms	0 ≤ trigger offset ≤ 100 ms, resolution 25 ns	
Span = 0 Hz			
Trigger source			free run, external, video
Trigger offset	negative offset limited by sweep time	–100 ms ≤ trigger offset ≤ 100 ms	–100 ms ≤ trigger offset ≤ 10 s

Tracking generator

			only R&S®FS315
Frequency			
Frequency range			9 kHz to 3 GHz
Frequency offset			
Setting range			0 Hz to 3 GHz
Resolution			0.1 Hz
Spectral purity			
SSB phase noise	10 kHz carrier offset 9 kHz ≤ f ≤ 3 GHz		<–90 dBc (1 Hz)
Level			
Level setting range			0 dBm to –50 dBm
Resolution			0.1 dB
Max. deviation of output level	9 kHz to 3 GHz, 20 °C to 30 °C 50 kHz ≤ RBW ≤ 1 MHz		<1 dB
Spurious			
Harmonics	output level –10 dBm		<–20 dBc
Nonharmonics	output level 0 dBm		<–30 dBm

Interfaces

		R&S®FS300	R&S®FS315
USB host	device-specific command set, remote control via supplied Windows driver (Windows XP/2000)	A plug, protocol version 1.1	
USB device		B plug, protocol version 1.1	
Connector for external monitor (VGA)		15-pin D-Sub female	
Keyboard connector		PS/2 female	

Inputs

		R&S®FS300	R&S®FS315
RF input			
Connector		N female (front panel)	
Impedance		50 Ω	
VSWR	RF attenuation 20 dB	<1.5	
External trigger input			
Connector		BNC female (rear panel)	
Trigger voltage		TTL	
Reference frequency input			
Connector		BNC female (rear panel)	
Reference frequency		10 MHz ± 50 Hz	
Impedance		50 Ω	
Input level		0 dBm to 20 dBm	

Outputs

		R&S®FS300	R&S®FS315
RF output (tracking generator)			
Connector		–	N female (front panel)
Impedance		–	50 Ω
VSWR		–	<1.6
Reference frequency output			
Connector		BNC female (rear panel)	
Reference frequency		10 MHz	
Impedance		50 Ω	
Output level		7 dBm nominal	
AF output			
Connector		–	3.5 mm mini jack for headphones (rear panel)
Impedance		–	15 Ω nominal

General data

		R&S®FS300	R&S®FS315
Display			
Type		5.4" active TFT color display	
Resolution		320 × 240 pixel	
Max. refresh rate		10 pictures/s, nominal	
Power supply			
Input voltage range	autoranging	100 V to 240 V (AC), 50 Hz to 60 Hz	
Power consumption		<45 W	<60 W
Ambient conditions			
Operating temperature range	meets EN 60068-2-1/2	+5°C to +45°C	
Storage temperature range		–20°C to +70°C	
Relative humidity	meets EN 60068-2-78	95 % at +40 °C	
Mechanical resistance			
Sinusoidal vibration	meets EN 60068-2-6, EN 61010-1 and MIL-T-28800D class 5	5 Hz to 150 Hz, max. 2 g at 55 Hz, 55 Hz to 150 Hz: 0.5 g constant	
Random vibration	meets EN 60068-2-64	10 Hz to 500 Hz: 1.9 g	
Shock	meets EN 60068-2-27 and MIL-STD-810	shock-spectrum	
Electromagnetic compatibility		meets EN 55011 class B and EN 61326 (EMC Directive of EU (89/336/EEC))	
EMI field strength		10 V/m	
Safety		EN 61010-1/IEC61010-1, UL3111-1, CSA C22.2 No. 1010.1	
Dimensions (W × H × D)		219 mm × 147 mm × 350 mm	
Weight		8.5 kg	9 kg

Spectrum Analyzer R&S®FS300/FS315

Designation	Type	Order No.
Spectrum Analyzer	R&S®FS300	1147.0991.03
Spectrum Analyzer with Tracking Generator	R&S®FS315	1147.1000.03
Rack Adapter	R&S®ZZA-300	1147.1281.00
Transit Case	R&S®ZZK-300	1147.2542.02
Accessories supplied for the R&S®FS300/FS315:		
User manual (German/English), CD-ROM with PC software and documentation, USB cable for PC connection, power cable		
Recommended extras for the R&S®FS300/FS315:		
Near-Field Probe Set	R&S®HZ-15	1147.2736.02
Preamplifier for R&S®HZ-15	R&S®HZ-16	1147.2720.02
SWR Bridge 5 MHz to 3 GHz	R&S®ZRB2	0373.9017.52
SWR Bridge 5 MHz to 2.5 GHz	R&S®ZRB2	0373.9017.53
Spare Short/Open Calibration Standard for VSWR Calibration	R&S®FSH-Z30	1145.5773.02

Certified Quality System ISO 9001 DQS REG. NO 1954 QM

Certified Environmental System ISO 14001 DQS REG. NO 1954 UM

More information at
www.rohde-schwarz.com
(search term: Smart Instruments, FS300, FS315)

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