

# Spectrum Analyzer R&S® FS 300

9 kHz to 3 GHz



Smart instruments  
The new product family  
from  
Rohde & Schwarz

2<sup>nd</sup> Edition June 2003



**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 favourable price. Whether on the lab bench, in service or as a flexible measuring instrument in automatic production systems, the range of applications is almost unlimited.

- High-quality measurement characteristics**
- Resolution bandwidths from 200 Hz to 1 MHz**
- Frequency counter with 1 Hz resolution**
- Maximum input level 33 dBm**
- Ergonomic user interface**
- Remote control via USB interface**
- High picture refresh rate**



The *menu area* displays menus for setting parameters and functions

The *softkey area* displays different instrument functions as a function of the selected menu

*Rotary knob* for gradually varying instrument parameters

*Numerical keypad* for entering numerical parameters

*Arrows* for navigating in the menus

*Buttons* for confirming entered values

*System key* for calling system and service functions

## Condensed data

Frequency range	9 kHz to 3 GHz
Resolution bandwidths	200 Hz to 1 MHz (1, 2, 3, 5 sequences)
Video bandwidths	10 Hz to 1 MHz (1, 2, 3, 5 sequences)
Displayed average noise level	<-110 dBm, typ. -120 dBm (300 Hz)
Intermodulation-free range	<-70 dBc at -30 dBm input level
SSB phase noise, 10 kHz offset	<-90 dBc (1 Hz)
Markers	normal, delta, noise markers
Level uncertainty	<1.5 dB

## Ergonomic user interface

Operation is menu-guided so that even untrained users will quickly obtain correct results. Clear structures simplify navigation within the menus. Users familiar with spectrum analyzers from Rohde & Schwarz will quickly find the menu items they know from other Rohde & Schwarz instruments.

The bright TFT colour display with 320 x 240 pixel resolution allows traces to be read even at odd angles or when the incidence of light is unfavourable.

## Application ranges

The R&S FS300 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

Radiomonitoring remote-controlled via USB

## PC software

A powerful software option is available for remote control of the R&S FS300 from a PC. The software enhances the R&S FS300 functions and supports the generation of test reports on the PC.

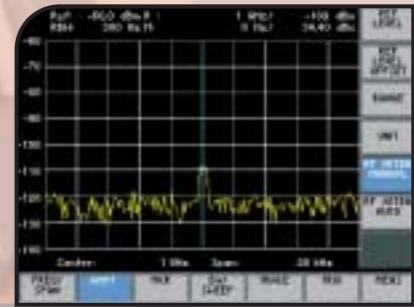
### Characteristics

- Windows 2000/XP-compatible
- PC linked to R&S FS300 via convenient USB interface
- Fast and simple transfer of measurements between R&S FS300 and PC
- Permanent sweep and transmission of ongoing sweeps to the PC with evaluation capabilities (marker, zoom, etc)
- Practically unlimited memory capacity for storing traces and measurement information (comparison of current and previous measurements)
- Extended range of functions (limit lines, log file)
- 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 are setting new standards in the lower price class. Since the displayed average noise level is typically  $-120$  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.



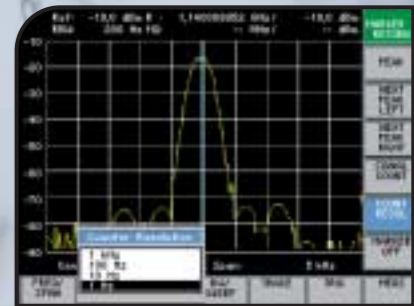
### Resolution bandwidths from 200 Hz to 1 MHz

With 16 different digitally implemented resolution bandwidths starting at 200 Hz, the R&S FS300 can be optimally adapted to different measurement tasks. Large bandwidths for overall measurements ensure short sweep times while small bandwidths provide high frequency resolution and low noise level. The R&S FS300 fulfills every requirement in between.



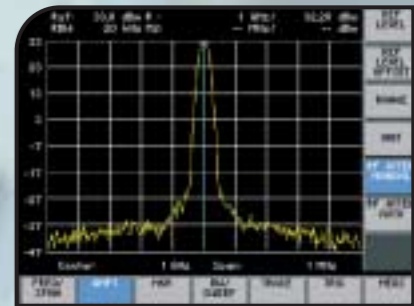
### Frequency counter with 1 Hz resolution

With the aid of the built-in frequency counter, the signal frequency can be measured with 1 Hz resolution. An additional frequency counter is in most cases not required, which saves space on the lab bench.



### Maximum input level up to 33 dBm

The maximum input level of the R&S FS300 permits signals to be measured far beyond the common limits. Mobile phones with a maximum output power of 2 W can be directly connected to the spectrum analyzer without external attenuators being required.



## Ready for the future – the new instrument family

The R&S FS300 is the first instrument of a new family of analyzers and generators for development, service and production. The platform on which this family is based provides optimum conditions for professional, favourably priced instruments. A few details are compact design, powerful processor system, fast internal bus and ergonomic user interface.

### Compact housing with flexible handle

The R&S FS300 is notable for its compact and robust design. Whether on the operator desk or in the rack, it takes up a minimum of space. Two series instruments can even be accommodated next to each other in a 19-inch rack.

The new, adjustable handle fulfills several functions. It serves for carrying the R&S FS300. It can be moved and locked in almost any desired position. With the aid of the handle, the instrument can be set up in a tilted position so that an optimum viewing angle can be obtained for the display. If the handle is in the way, it can easily be put away so that several R&S FS300 units can be stacked, for instance.

### Remote control via USB interface

A new feature in a measuring instrument is the USB remote-control interface of the R&S FS300. It allows the user to select external PC control even during instrument operation by means of "hot plug and play" simply by establishing a USB connection. This is the first time that lab test equipment can be remote-controlled via USB without any restrictions.

A Windows 2000/XP-compatible driver for different development environments comes with the R&S FS300.



# Specifications

**Important:** As a highly innovative company, we continuously refine our products. Please check our homepage [www.fs300.rohde-schwarz.com](http://www.fs300.rohde-schwarz.com) for new applications and features.

Frequency		
Frequency range	9 kHz to 3 GHz	
Reference frequency		
Aging	2 x 10 <sup>-6</sup> / year	
Temperature drift	1 x 10 <sup>-6</sup>	5° C to 30° C
Frequency counter		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Frequency span	1 kHz to 3 GHz, 0 Hz	
<b>Spectral purity</b>		
SSB phase noise	<-90 dBc (1 Hz)	10 kHz carrier offset
Residual FM	<100 Hz, typ. 60 Hz	1 kHz resolution bandwidth, 1 kHz video bandwidth
<b>Sweep time</b>		
Span ≥ 1 kHz	100 ms to 1000 s	
Span = 0 Hz	100 μs to 20 s	
<b>Bandwidths</b>		
Resolution bandwidths (-3 dB)	200 Hz to 1 MHz	in 1, 2, 3, 5 sequences
Video bandwidths	10 Hz to 1 MHz	in 1, 2, 3, 5 sequences

<sup>1</sup> 15 minutes warm-up within permissible temperature range

Amplitude		
Level measurement range	>137 dB	
Max. input level		
50 MHz to 3 GHz	+33 dBm	
10 MHz to 50 MHz	+26 dBm	
9 kHz to 10 MHz	+20 dBm	
Intermodulation-free range		
1 MHz to 100 MHz	≤ -60 dBc	two-tone signal with 2 x -30 dBm, 6 dB input attenuation
100 MHz to 3 GHz	≤ -70 dBc	-40 dBm, 0 dB input attenuation
Harmonics	≤ -60 dBc	terminated input, 0 dB input attenuation
Inherent spurious responses	≤ -85 dBm	10 MHz to 3 GHz, -30 dBm level at first mixer
Other spurious	≤ -60 dBc	300 Hz resolution bandwidth, 10 Hz video bandwidth, 0 dB input attenuation
Displayed average noise level	≤ -110 dBm, typ. -120 dBm	100 kHz to 3 GHz, 0 dB input attenuation
1 dB compression point of first mixer	-10 dBm	
Setting range of reference level	-110 dBm to +36 dBm	
RF input attenuation range	0 dB to 70 dB	in 2 dB steps, manual selection or automatic coupling to reference level
Display range	80 dB, 40 dB, 16 dB, 8 dB, linear	
Display units		
Logarithmic	dBm, dBμV, dBmV	
Linear	V, W	
Traces	1 active trace and 1 stored trace	
Level measurement uncertainty	≤1.5 dB	
<b>Markers</b>		
Marker	1 marker and 1 delta marker	
Marker functions	peak, next peak, marker to center, marker to reference	
Marker display	normal, delta, noise marker, frequency counter	
<b>Trigger</b>		
	free run, video, external, line	

Inputs		
<b>RF input</b>		
Connector	N female	
Input impedance	50 Ω	
VSWR	<1.5	10 MHz to 3 GHz, input attenuation ≥ 20 dB
Max. input level	+33 dBm	with 30 dB input attenuation
Max. DC voltage	30 V	
<b>External trigger input</b>		
Connector	BNC female	
Trigger voltage	TTL voltages	
<b>Reference frequency input</b>		
Connector	BNC female	
Reference frequency	10 MHz ± 50 Hz	
Input voltage	0.5 V to 2 V at 50 Ω	

Output		
<b>Reference frequency output</b>		
Connector	BNC female	
Reference frequency	10 MHz	
Output voltage	>0.5 V at 50 Ω	

Interfaces		
<b>USB-Host</b>		
Connector	A plug	
Protocol	Version 1.1	
Command set	device-specific, remote control via supplied Windows driver (Windows XP, 2000)	
<b>USB interface</b>		
Connector	B plug	
Protocol	Version 1.1	

Power supply		
Input voltage range	100 V to 240 V (AC), 50 Hz to 60 Hz, autoranging	
Power consumption	<35 VA	

General data		
<b>Display</b>		
Type	5.4" active TFT colour display	
Resolution	320 x 240 pixels	
<b>Memory locations</b>		
Traces	5	
Device setups	10	
<b>Ambient conditions</b>		
Permissible temperature range	+5° C to +45° C	meets DIN EN 60068-2-1/2
Storage temperature range	-20° C to +70° C	
Rel. humidity	95% at +40° C	meets DIN EN 60068-2-3 (non-condensing)
<b>Mechanical resistance</b>		
Sinusoidal vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz, 55 Hz to 150 Hz: 0.5 g constant	meets DIN EN 60068-2-6, DIN EN 61010-1 and MIL-T-28800D class 5
Random vibration	10 Hz to 500 Hz: 1.9 g	meets DIN EN 60068-2-64
Shock	shock spectrum	meets DIN EN 60068-2-27 and MIL-STD-810
<b>Electromagnetic compatibility</b>	meets EN 555011 class B and EN 61326 (EMC Directive 89/336/EEC)	
<b>EMI field strength</b>	10 V/m	
<b>Safety class</b>	DIN EN 61010-1 / IEC61010-1 UL3111-1; CSA22.2 No:1010.1	
<b>Dimensions (W x H x D)</b>	219 mm x 147 mm x 350 mm	
<b>Weight</b>	approx. 7.4 kg	

# Ordering information

Spectrum Analyzer R&S® FS 300		
Designation	Type	Order No.
Spectrum Analyzer	R&S FS 300	1147.0991.03
PC Software	R&S FS300-K1	1147.1017.02
Rack Adapter	R&S ZZA-300	1147.1281.00



**ROHDE & SCHWARZ**