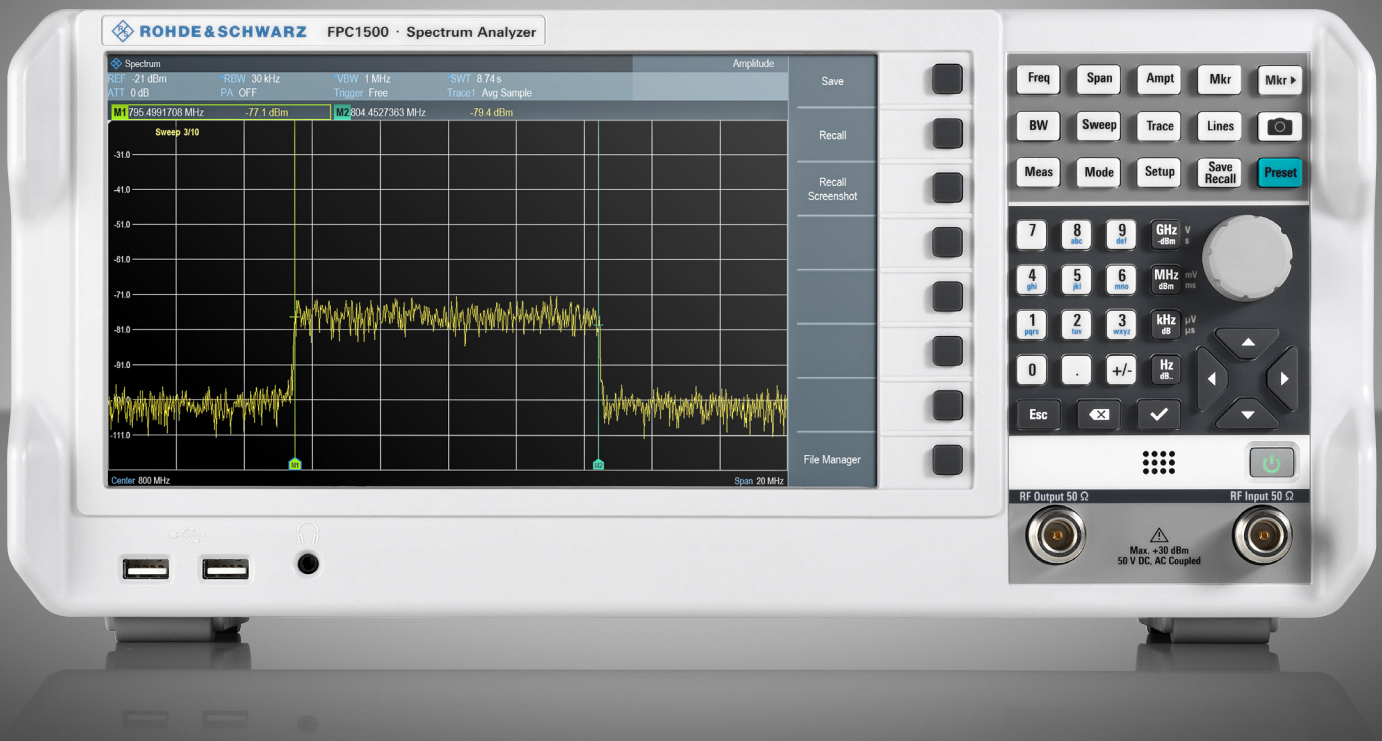
R&S®ESSENTIALS

R&S®FPC SPECTRUM ANALYZER

Unexpected performance in entry class



3 year warranty

Product Brochure
Version 06.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

Outstanding quality and innovation does not have to come with a high price tag. The R&S®FPC spectrum analyzer provides unexpected performance at a budget-friendly price. It is engineered in Germany and designed to the same quality standards as high-end instruments.

Investment protection, high resolution and easy control – these traits make the R&S®FPC spectrum analyzer a perfect tool for university laboratories, research institutions as well as production and service facilities.

The R&S®FPC has the value of three. It is the only spectrum analyzer on the market that provides the value of three instruments. Incidentally, these are the three most commonly used instruments on an RF engineer's workbench, for instance in IoT device development.

1. Spectrum analyzer

The R&S®FPC is a spectrum analyzer that provides investment protection through software frequency upgrade capability. It features class-leading RF performance engineered in Germany. In addition, PC and mobile remote control options are available.

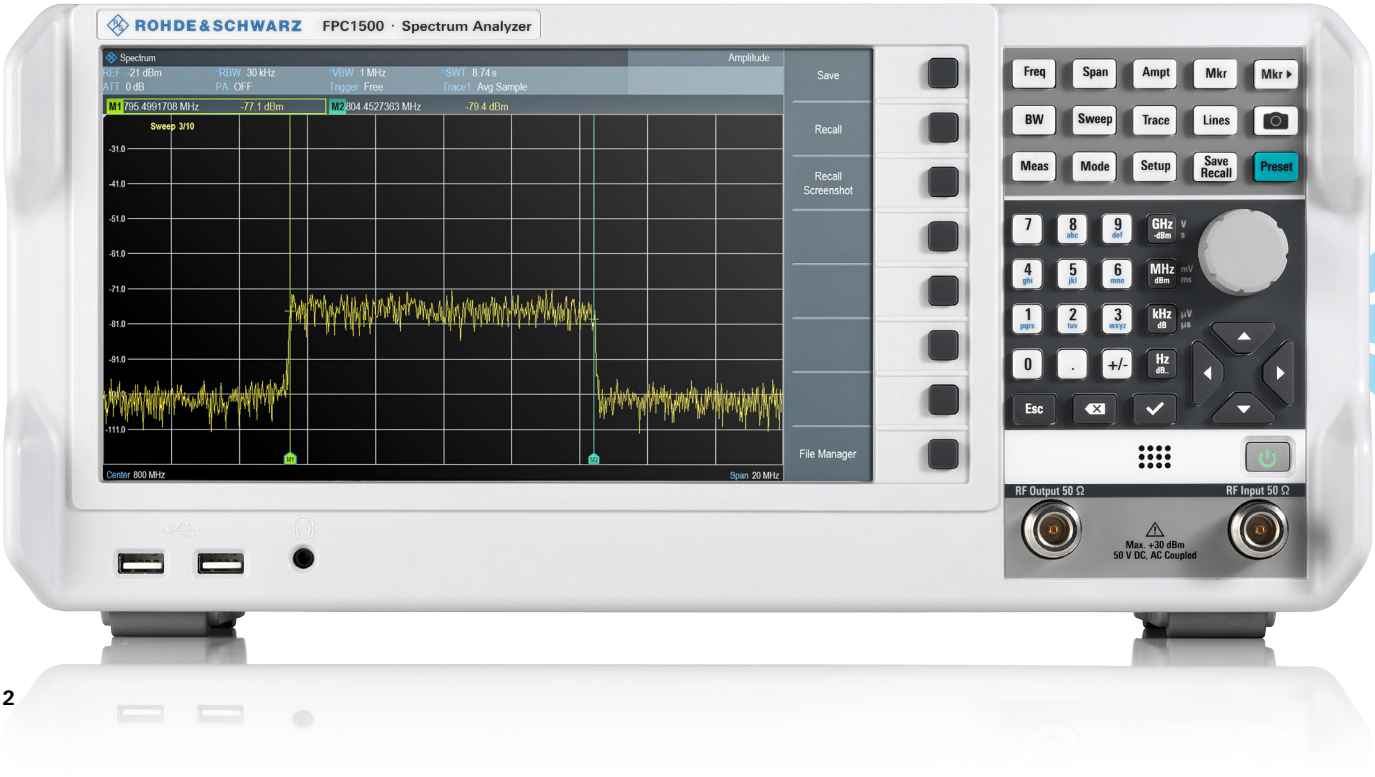
2. Vector network analyzer

The R&S®FPC is a vector network analyzer that utilizes an integrated VSWR bridge to achieve one-port vector network analysis, with a Smith chart display available. Having an integrated VSWR bridge means there is no need to mount/dismount an external bridge during test operation.

3. Signal generator

The R&S®FPC is a signal generator due to the unique independent source principle. Not only does it provide standard tracking generator functionality, it can also be used in free or coupled CW modes.

By combining the value of three instruments, the R&S®FPC is truly unique. The advantages of this three-in-one concept reach further than having only one bench space occupied. A single instrument also means that to obtain the specified measurement performance, only a single investment and a single calibration are required.



BENEFITS AND KEY FEATURES

Key facts

- RF performance engineered in Germany
- 10.1" WXGA (1366 × 768 pixel) display – largest and highest resolution in its class
- Frequency range from 5 kHz to 1 GHz, keycode upgradable to 2 GHz/3 GHz
- Resolution bandwidth settings down to 1 Hz
- Tracking generator and independent CW signal generator
- Built-in VSWR bridge
- One-port vector network analyzer with Smith chart display
- Wi-Fi enabled, supported by included remote control software
- 3 year standard warranty

Spectrum analyzer

- Investment protection
- High resolution
- Easy virtual control
- page 4

Network analyzer

- Internal VSWR bridge
- One-port vector network analyzer (S_{11})
- Smith chart
- page 6

Signal generator

- Tracking generator
- Independent signal source
- Coupled CW mode
- page 8

Value of three

More than a spectrum analyzer

Spectrum analyzer

Investment protection	High resolution	Easy virtual control

Vector network analyzer

Internal VSWR bridge	One-port vector network analyzer	Smith chart

Signal generator

Tracking generator	Independent signal source	Coupled CW mode

Model selection guide

Feature	R&S®FPC1000	R&S®FPC1500
Spectrum analyzer	•	•
One-port vector network analyzer		•
Signal generator		•
Internal VSWR bridge		•
Independent signal source		•
Silent operation	•	•
Small footprint	•	•
Low power consumption	•	•
Remote control software (free of charge)	•	•

SPECTRUM ANALYZER

Investment protection

The R&S®FPC is future-proof thanks to the unique Rohde&Schwarz upgrade path. The base unit covers a frequency range from 5 kHz to 1 GHz, with keycode-activated upgrades available.

The R&S®FPC can be upgraded by simply entering a software keycode. All options are in place and can be enabled by the user. The unique Rohde&Schwarz upgrade path eliminates the need for additional upgrade calibration.

High resolution

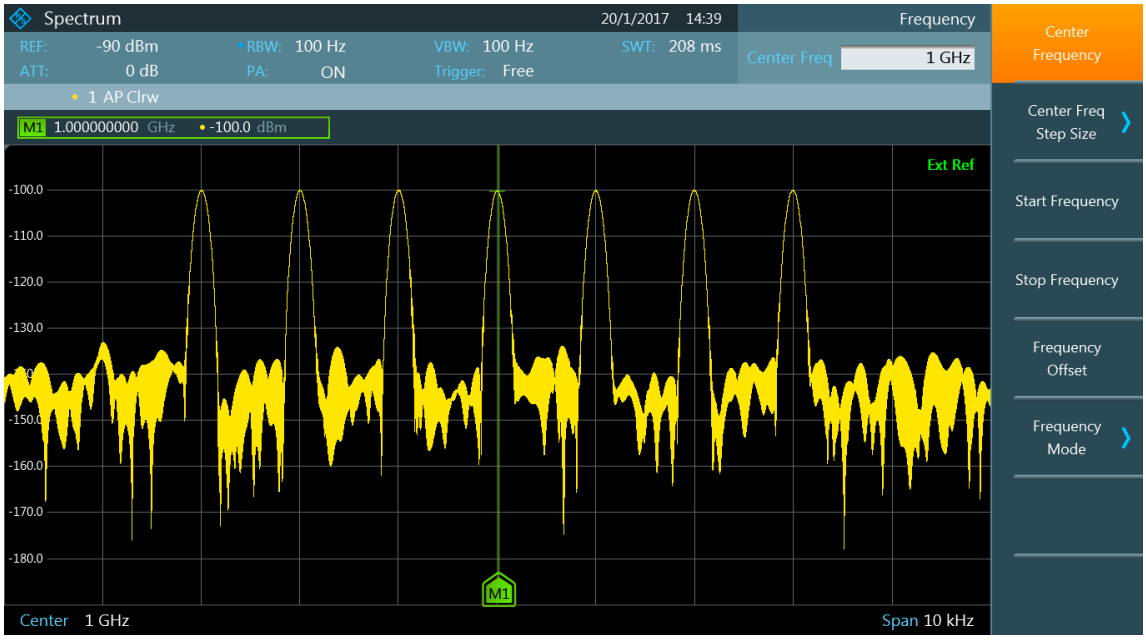
The R&S®FPC has the largest, highest-resolution display of any entry level spectrum analyzer. More horizontal plus more vertical display size and resolution means more signal details in unprecedented clarity. This class-leading display of the R&S®FPC visualizes the outstanding quality of the signal measurements.

The quality of RF measurements strongly depends on suitable resolution bandwidth settings. Finer resolution bandwidth means more resolved spectral detail. High sensitivity is critical in many applications, e.g. when measuring extremely weak signals. The R&S®FPC provides an extraordinarily low noise floor of typical –150 dBm with 1 Hz resolution bandwidth setting.

The optional R&S®FPC-B22 preamplifier increases sensitivity even further, to typical –165 dBm. While most entry level spectrum analyzers can measure up to +20 dBm (100 mW), the R&S®FPC is able to measure high-power signals of up to +30 dBm (1 W).

The combination of low noise floor and high maximum input power provides an exceptionally wide measurement dynamic range in the R&S®FPC.

The high measurement resolution of the R&S®FPC fully utilizes the 10.1" WXGA display



Easy virtual control

Integrated wireless technology eliminates the need for network cables. The R&S®FPC is Wi-Fi enabled [1] and wirelessly connects to Wi-Fi access points. This renders Ethernet cables, plugs, hubs and installation superfluous.

Simple and intuitive controls are game-changing trends in industry. The R&S®FPC connects to R&S®InstrumentView as well as to R&S®MobileView remote control platforms via USB [2], Ethernet or Wi-Fi.

R&S®InstrumentView (PC software) and R&S®MobileView (iOS/Android app) are powerful all-in-one remote control applications that come bundled with the R&S®FPC [3].

[1] Wi-Fi feature not available in some countries due to local certification requirements.
[2] R&S®InstrumentView only.
[3] Incorporates R&S®FPH, R&S®ZPH, R&S®FSH, R&S®ZVH and R&S®FSC interfaces.

Powerful all-in-one remote control applications

	R&S®InstrumentView	R&S®MobileView
Easy and fast exchange of screenshots or configurations between the instrument and a remote control device	•	
Remote control of the instrument from any network location	•	•
Easy creation of test reports in PDF, HTML and RTF format	•	
Easy processing of measurement results, editing of measurement results by displaying/hiding and shifting markers or limit lines, etc.	•	
PC (Windows) compatible	•	
iOS/Android compatible		•
Bundled with the R&S®FPC at no extra charge	•	•

The R&S®FPC1000: perfect in university education

NETWORK ANALYZER

Internal VSWR bridge

Due to its unique design utilizing an internal VSWR bridge, the R&S®FPC1500 can perform one-port vector reflection measurements. This feature makes it possible to take impedance measurements on RF antennas or RF circuits with the Smith chart display or distance-to-fault measurements to detect faulty locations over a long RF cable.

Thanks to the built-in internal VSWR bridge, it is no longer necessary to mount/dismount an external VSWR bridge when switching between the measurement modes, e.g. from the spectrum analyzer mode to the vector network analyzer mode or vice versa.

One-port vector network analyzer (S_{11})

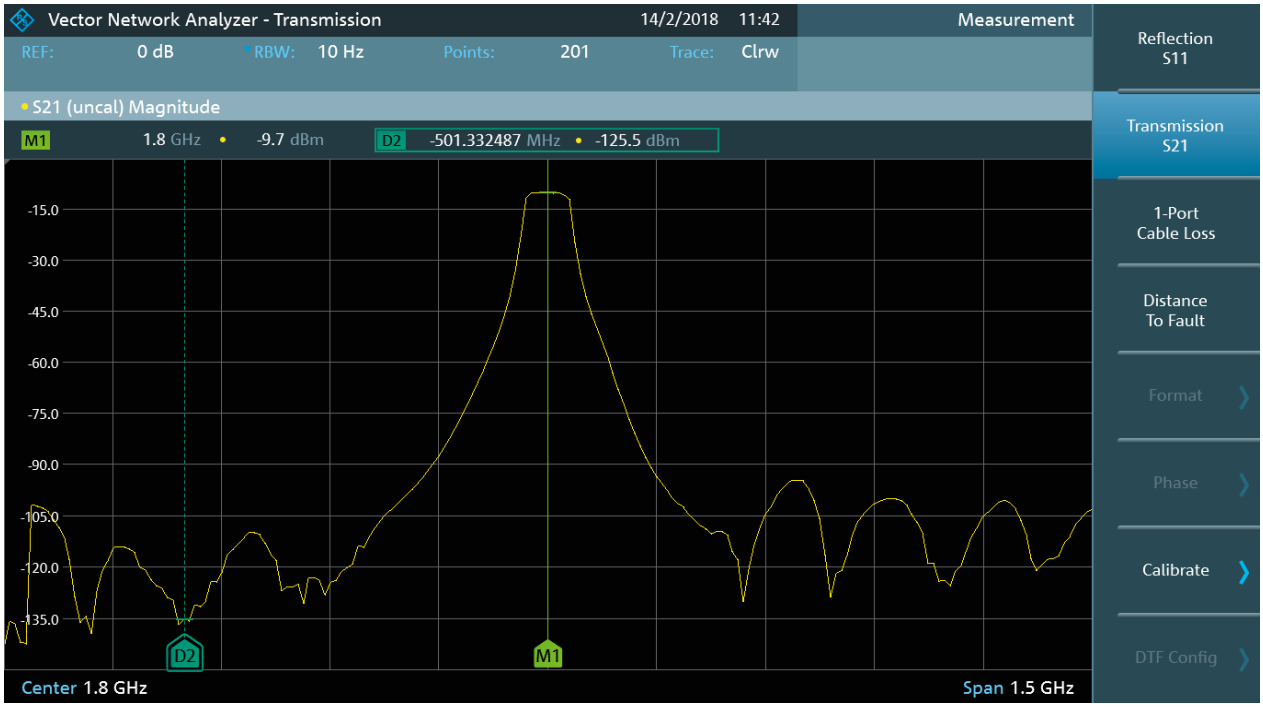
One-port vector network analysis is used for impedance matching on components or networks, such as antennas or filters.

Impedance matching is an integral part of RF engineering, used to adjust transmission bandwidth and balance power transmission. With its integrated VSWR bridge, the R&S®FPC1500 becomes a one-port vector network analyzer that can perform all of these S_{11} measurements.

Another application of S_{11} measurements is distance-to-fault (DTF) measurement. It displays RF return loss or VSWR data versus distance. It reveals poor connections, damaged cables or faulty antennas quickly and provides information on physical distance from the calibration point to the faulty location.

Should calibration be needed to eliminate the effects of additional cables or adapters used to connect the analyzer to the device under test (DUT), the R&S®ZN-Z103 automatic calibration unit performs the calibration in a single step.

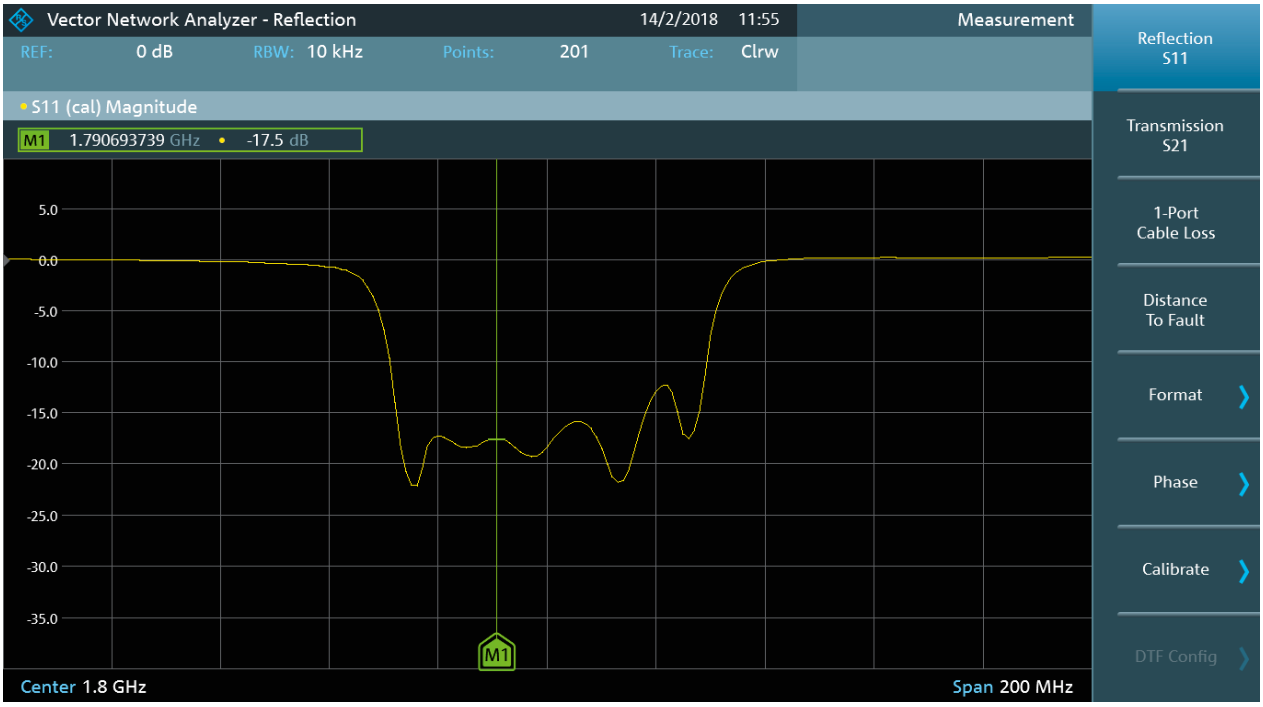
R&S®FPC1500 S_{21} scalar transmission measurement with the R&S®FPC-K42 option



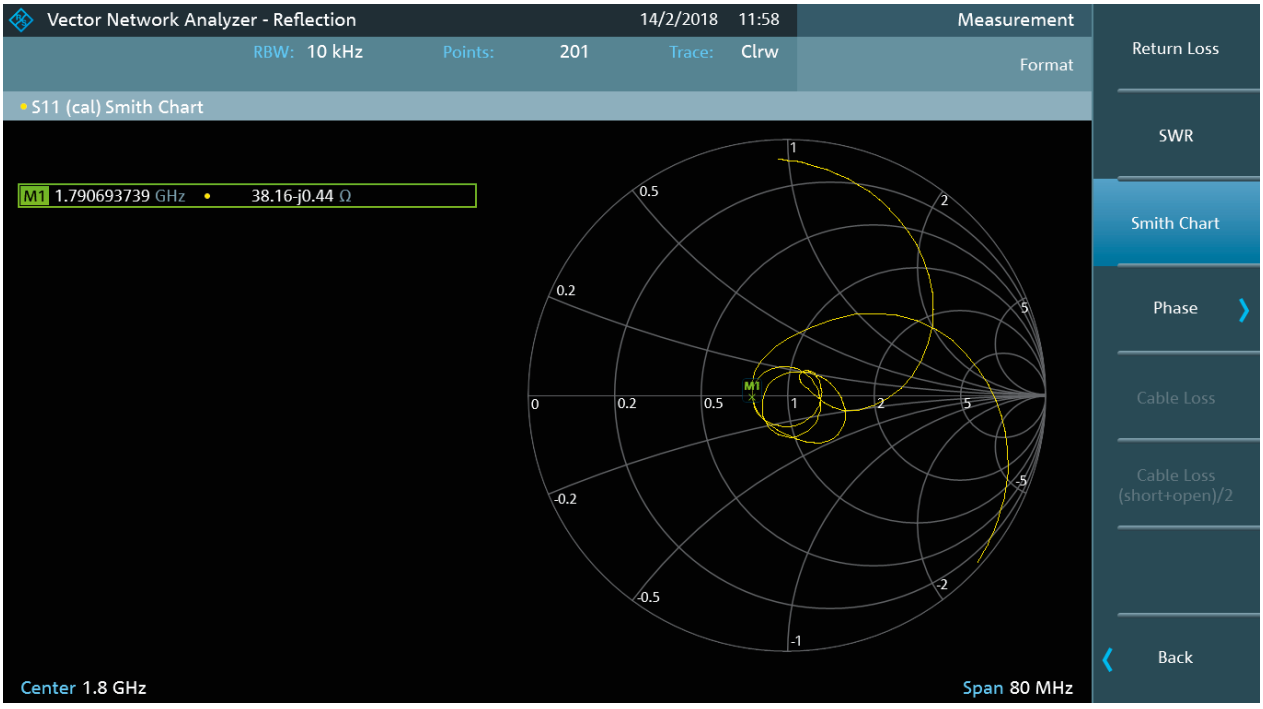
Smith chart

The Smith chart visualizes the complex S_{11} reflection. In other words, it shows how resistive, capacitive or inductive a load is across the frequency range. With this information, it is easy to tune network components to optimize impedance matching.

R&S®FPC1500 S_{11} magnitude measurement with the R&S®FPC-K42 option



R&S®FPC1500 Smith chart with the R&S®FPC-K42 option



SIGNAL GENERATOR

Tracking generator

RF engineering often requires testing of passive or active RF circuits that do not produce any RF signal on their own, such as amplifiers, filters or even RF cables. A standalone spectrum analyzer is not sufficient here, a signal generator is required. The R&S®FPC1500 features tracking generator functionality, which makes scalar transmission measurements possible, for example frequency response measurements of RF filters.

The tracking generator can be used in an independent mode as well. By applying a positive or negative frequency offset to the tracking signal, frequency conversion measurements are possible, e.g. for measuring mixers.

Independent signal source

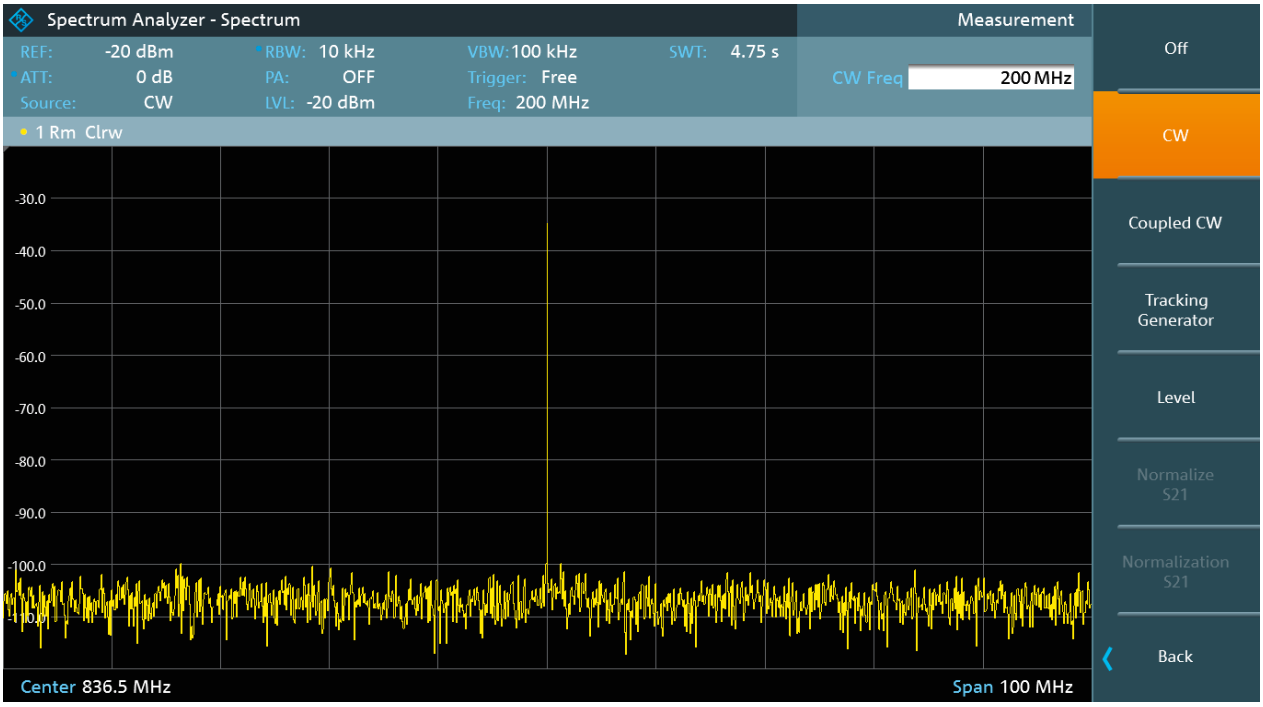
The R&S®FPC1500 can do even more, using its integrated signal source in an independent mode. This unique capability enables the R&S®FPC1500 to act as a continuous wave (CW) signal generator. The source can be used e.g. as a LO signal for mixer measurements or as an input signal for amplifier gain measurements.

Typical university lab setup with the R&S®FPC1500, oscilloscope and power supply

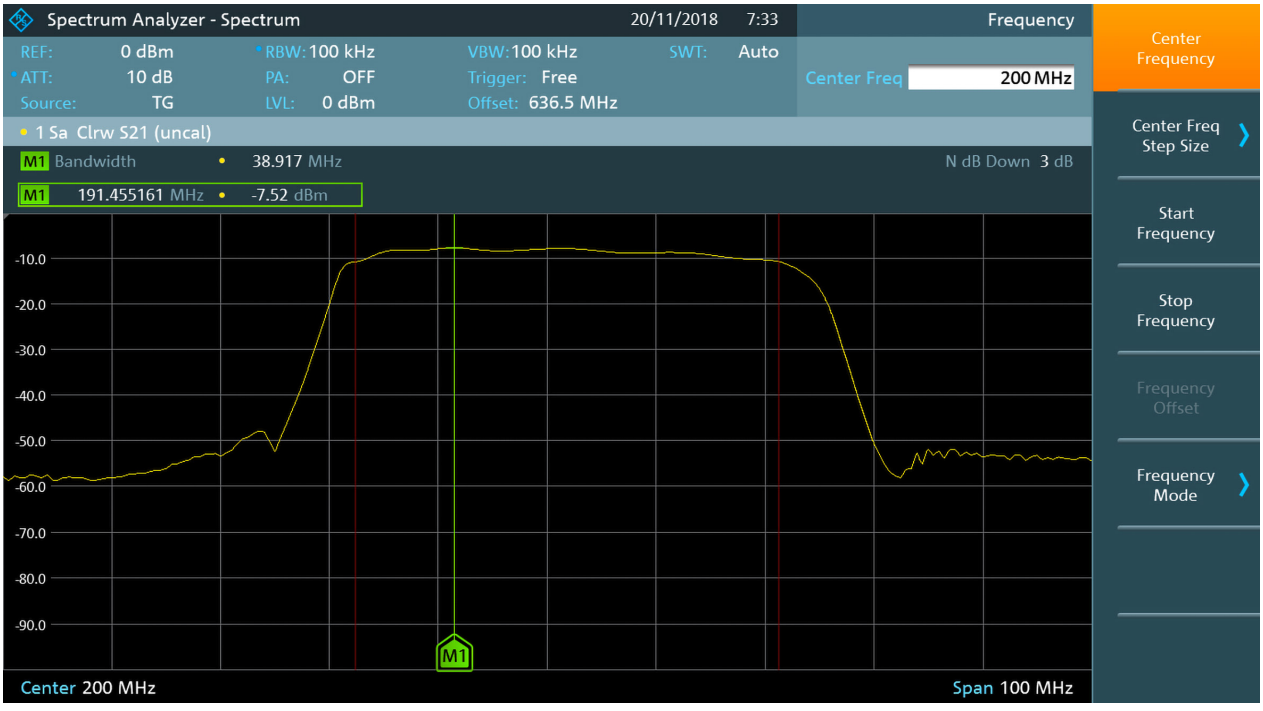
Coupled CW mode

Coupled CW is a special mode that couples the generated CW signal to the displayed center frequency of the R&S®FPC1500. Whenever a measurement requires a CW signal to follow the R&S®FPC1500 center frequency, these adjustments now can be conveniently set in one step.

R&S®FPC1500 signal generator signal measured in the spectrum analyzer mode



R&S®FPC1500 tracking generator measuring signal chain containing mixers, filters and amplifiers



OPERATING ELEMENTS

10.1" high-resolution display
1366 × 768 pixel resolution

Six markers
Shown vividly in different colors

Two USB 2.0 ports
- For storage media
- For connecting accessories

Headphone jack

Soft menu selection
Quick access to key tools

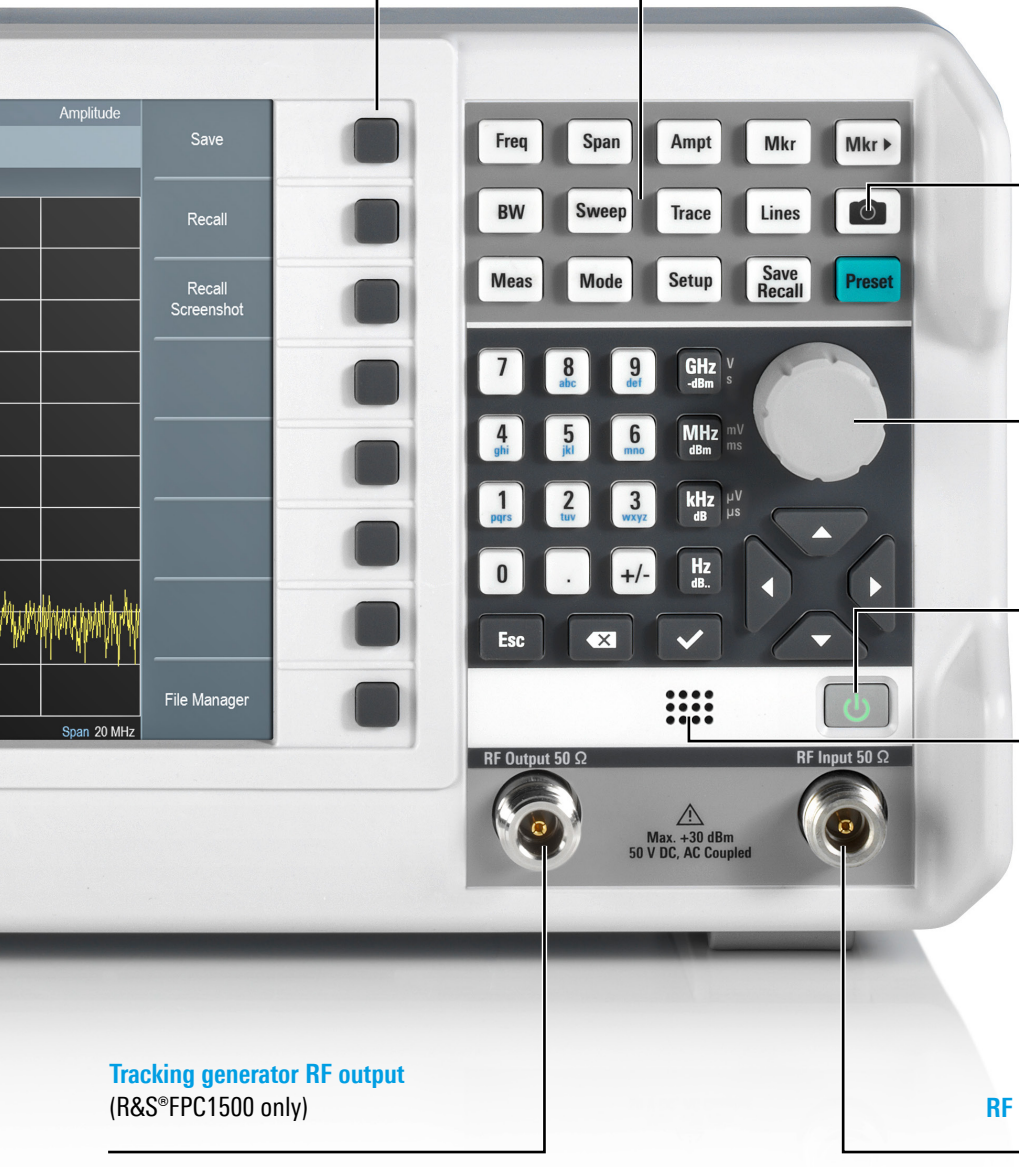
Measurement setup buttons

Documentation of results
Documentation as a screenshot or of instrument settings

Control knob

Power key
Approx. 15 s boot time

Audio speaker



Tracking generator RF output
(R&S®FPC1500 only)

RF input

OPTIONAL SOFTWARE APPLICATIONS

Receiver mode

The R&S®FPC offers the optional R&S®FPC-K43 receiver mode for EMI debugging on circuit boards, integrated circuits or cable shielding. It includes the ability to record two traces as well as displaying a logarithmic scale of the frequency axis. The R&S®FPC-B22 preamplifier compensates for coupling loss of probes and increases sensitivity to detect small interfering signals.

Cost effective yet powerful, the R&S®FPC can be used to analyze and locate disturbance sources during development.

Modulation analysis

The R&S®FPC-K7 software option converts the R&S®FPC into a modulation analyzer for measuring the modulation quality of amplitude or frequency-modulated signals.

The analog demodulation display shows the waveform as well as a summary of measurement parameters such as carrier power, carrier offset, modulation index (depth) for AM signals, frequency deviation for FM signals, SINAD and THD. The modulation summary display provides user-definable limits for each measurement. Demodulated audio is supported via the built-in speaker or the headphone jack.

Basic digital modulation formats are used with many applications, e.g. near field communications. The R&S®FPC supports both ASK and FSK analysis. The digital modulation displays include trace, eye diagram, modulation error and symbol analysis. Specialized configuration presets for Bluetooth® Low Energy (Bluetooth® LE) and tire pressure monitoring systems (TPMS) are available, too.

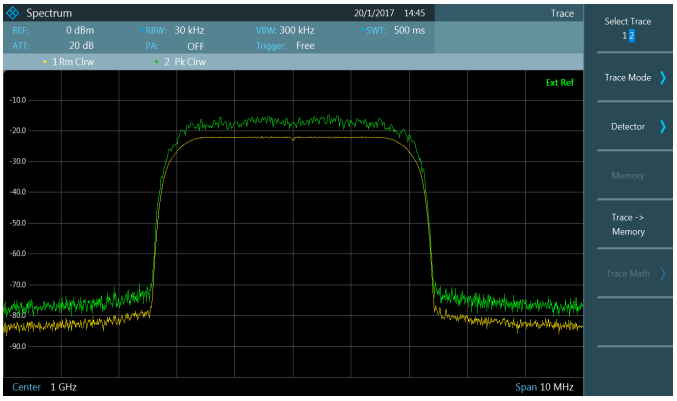
The R&S®FPC-K7 option lets users easily verify the quality of the basic modulated signals.

R&S®FPC1000 spectrum analyzer with the R&S®HZ-15 probe set and DUT

Advanced measurements

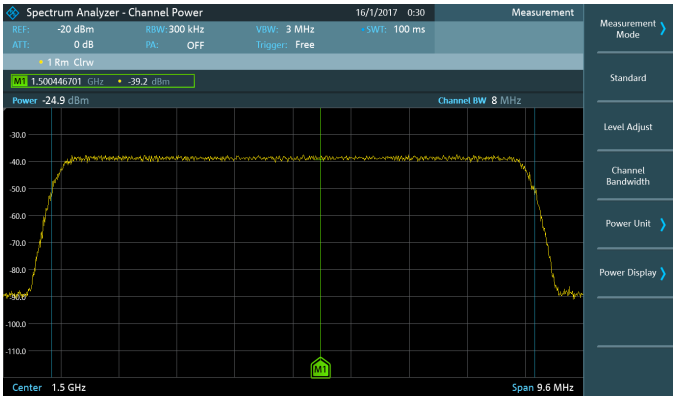
The R&S®FPC-K55 option adds functions for measuring channel power, occupied bandwidth, harmonic distortion, time domain power within a time division multiple access (TDMA) timeslot, AM modulation depth and third order intercept (TOI). It even provides a spectrogram display to gain easy insight into spectrum occupancy or time varying signals.

Standard feature: two traces available

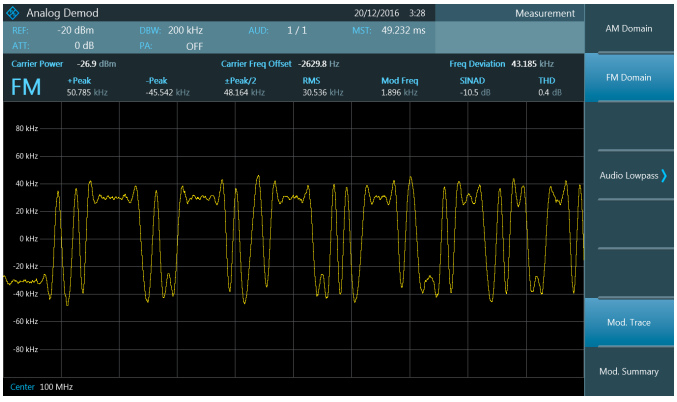


R&S®FPC-B22 high sensitivity with internal preamplifier

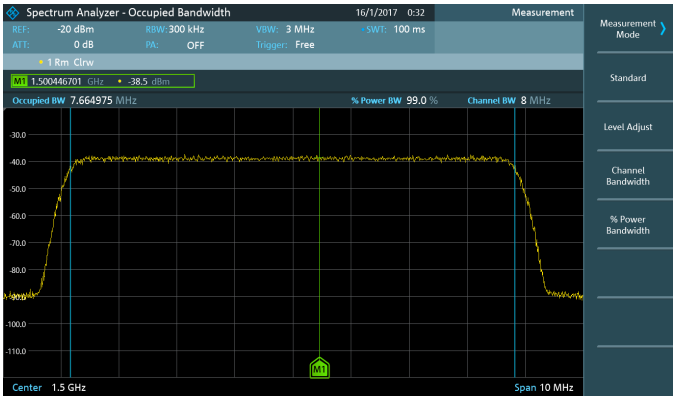
R&S®FPC-K55 channel power measurement



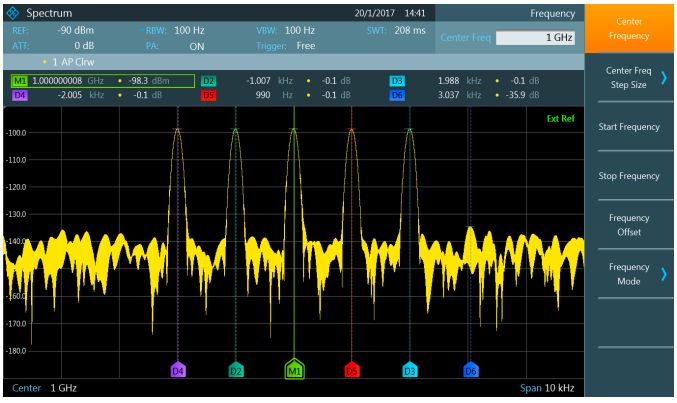
R&S®FPC-K7 FM modulation analysis



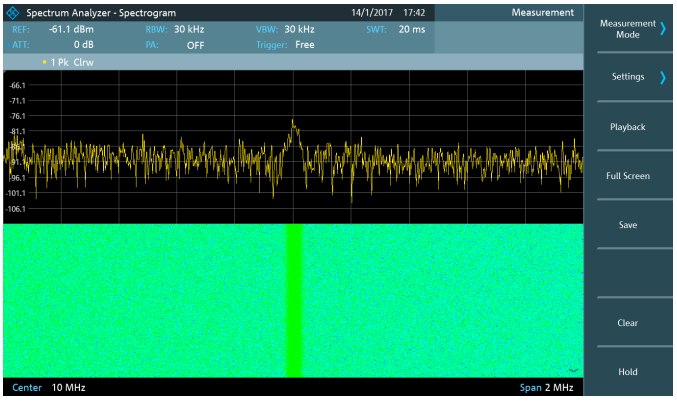
R&S®FPC-K55 occupied bandwidth measurement



Standard feature up to six markers



R&S®FPC-K55 spectrogram



SPECIFICATIONS IN BRIEF

Specifications in brief		
Frequency range	R&S®FPC1000/R&S®FPC1500 base unit	5 kHz to 1 GHz
	with R&S®FPC-B2 option	5 kHz to 2 GHz
	with R&S®FPC-B2 and R&S®FPC-B3 options	5 kHz to 3 GHz
Frequency resolution		1 Hz
Resolution bandwidth		1 Hz to 3 MHz in 1/3 sequence
Spectral purity, SSB phase noise		f = 500 MHz
	30 kHz	< –88 dBc (1 Hz), typ. –92 dBc (1 Hz)
	100 kHz	< –98 dBc (1 Hz), typ. –103 dBc (1 Hz)
	1 MHz	< –120 dBc (1 Hz), typ. –125 dBc (1 Hz)
Displayed average noise level	0 dB RF attenuation, termination 50 Ω, RBW = 100 Hz, VBW = 10 Hz, sample detector, log scaling, normalized to 1 Hz	
	preamplifier = off	
	1 MHz to 10 MHz	< –127 dBm, typ. –135 dBm
	10 MHz to 2 GHz	< –142 dBm, typ. –150 dBm
	2 GHz to 3 GHz	< –138 dBm, typ. –147 dBm
	preamplifier = on (requires R&S®FPC-B22 option)	
	1 MHz to 10 MHz	< –147 dBm, typ. –157 dBm
	10 MHz to 2 GHz	< –158 dBm, typ. –165 dBm
	2 GHz to 3 GHz	< –155 dBm, typ. –163 dBm
Third order intercept (TOI)	intermodulation-free dynamic range, signal level 2 × –20 dBm, RF attenuation = 0 dB, RF preamplifier = off	
	f_{in} = 1 GHz	+7 dBm (meas.)
	f_{in} = 2.4 GHz	+10 dBm (meas.)
One-port vector network analyzer	frequency range	2 MHz to 1/2/3 GHz
	output power	–10 dBm
Tracking generator	frequency range	5 kHz to 1/2/3 GHz
	output power	–30 dBm to 0 dBm
Independent source	frequency range	5 kHz to 1/2/3 GHz
	output power	–30 dBm to 0 dBm

ORDERING INFORMATION

Designation	Type	Order No.
Spectrum analyzer, 5 kHz to 1 GHz	R&S®FPC1000	1328.6660.02
Spectrum analyzer, with tracking generator, 5 kHz to 1 GHz	R&S®FPC1500	1328.6660.03
Spectrum analyzer frequency upgrade, 1 GHz to 2 GHz	R&S®FPC-B2	1328.6677.02
Spectrum analyzer frequency upgrade, 2 GHz to 3 GHz (requires R&S®FPC-B2)	R&S®FPC-B3	1328.6683.02
Spectrum analyzer preamplifier	R&S®FPC-B22	1328.6690.02
Wi-Fi connection support (requires R&S®FPC-Z2)	R&S®FPC-B200	1328.6990.02
Modulation analysis	R&S®FPC-K7	1328.6748.02
Vector network analysis (R&S®FPC1500 only)	R&S®FPC-K42	1328.7396.02
Receiver mode	R&S®FPC-K43	1328.6754.02
Advanced measurements	R&S®FPC-K55	1328.6760.02
Accessories		
RF teaching kit, various functionalities and SMA calibration kit	R&S®FPC-Z10	1328.7338.02
Calibration unit, one port, 2 MHz to 4 GHz	R&S®ZN-Z103	1321.1828.02
19" rackmount kit	R&S®ZZA-FPC1	1328.7080.02
Near field probe set, 30 MHz to 3 GHz (set of five probes)	R&S®HZ-15	1147.2736.02
Amplifier, 100 kHz to 3 GHz	R&S®HZ-16	1147.2720.02
Near field probe set, 30 MHz to 3 GHz (set of two probes)	R&S®HZ-17	1339.4141.02
Carrying case	R&S®RTB-Z3	1333.1734.02
Wi-Fi USB nano flash drive	R&S®FPC-Z2	1328.6260.02

Warranty		
Base unit		3 years
All other items [1]		1 year
Service options		Please contact your local Rohde&Schwarz sales office.
Extended warranty, one year	R&S®WE1	
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	

[1] For options installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

Service that adds value

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

Rohde&Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

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

Rohde&Schwarz training

www.training.rohde-schwarz.com

Rohde&Schwarz customer support

www.rohde-schwarz.com/support

PD 5214.7112.12 | Version 06.00 | July 2022 (st)
R&S®FPC Spectrum Analyzer

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