R&S®ESSENTIALS

CATALOG
TEST & MEASUREMENT





R&S®ESSENTIALS | CATALOG | TEST & MEASUREMENT | EDITION 11/2025 | VERSION 15.00

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THREE DIVISIONS

We have three divisions – **Test & Measurement**, **Technology Systems** and **Networks & Cybersecurity** – and they make us a reliable technology partner in a wide range of markets. Our cutting-edge products and solutions help industrial, business and regulatory customers reach and maintain digital and technological sovereignty.

TEST & MEASUREMENT

Wireless I Industry, Components & Research I Aerospace & Defense Testing I Automotive

TECHNOLOGY SYSTEMS

Secure Communications I SIGINT/Electronic Warfare | Monitoring & Analytics | Infrastructure & Networks

NETWORKS & CYBERSECURITY

Endpoint Security | Secure Networks | Certified & High Grade Crypto Solutions

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TEST EQUIPMENT FOR YOUR BENCH FROM R&S®ESSENTIALS

What make good test equipment great? Simplicity.

R&S®ESSENTIALS test instruments are designed for easy configuration, straightforward purchasing and intuitive operation.

Configuring and purchasing test instruments has never been easier. Our online configurator helps design the exact instrument you need for your test setup – including options and accessories.

Our global network of distributors make the R&S®ESSENTIALS portfolio easy to access around the world. Select your distributor of choice you submit a quote. Rohde&Schwarz will process your request to meet your budget and application needs.

Our authorized distribution partners also help with quick and easy online purchases. Benefit from 24 h delivery, flexible payment options and other services that make access to test equipment easy.

Want some practical expertise? Rohde&Schwarz also has resources for specific measurements along with guides to using our instruments in various application scenarios. We would be happy to help you find the right R&S®ESSENTIALS test instrument for you. Visit our website to get started.

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EXPLANATION OF ICONS

In this catalog, the instrument interfaces are represented by icons on the first page (bottom left) of each product description. These icons are explained below.

Icon	Explanation
Remote control	
	**USB** The instrument can be connected to a PC via universal serial bus (USB) using a USB cable with a standard B type plug.
	**Mini USB** The instrument can be connected to a PC via universal serial bus (USB) using a USB cable with a mini-B type plug.
	**Micro USB** The instrument can be connected to a PC via universal serial bus (micro USB) using a micro USB cable.
	**RS-232** The instrument is equipped with an RS-232 interface.
	**TCP/IP** The instrument is equipped with an Ethernet interface that can be connected to a local area network (LAN).
	**IEEE-488** The instrument is equipped with an IEEE-488 interface, also referred to as general purpose interface bus (GPIB). This bus is widely used for controlling instruments in laboratories.
	**WLAN** The instrument can be remote controlled via a wireless local area network (WLAN).
Storage	
	**USB flash drive** The instrument is equipped with a universal serial bus (USB) upstream interface that can be used to connect a USB flash drive or other USB mass storage devices with a standard A type plug.
	**Removable hard disk** The instrument comes with a removable hard disk, e.g. for saving measurement results.
	**SD card** An SD card can be inserted, e.g. for saving measurement results.
	**Micro SD card** A micro SD card can be inserted, e.g. for saving measurement results.
Compatibility	
	**LabVIEW** The instrument can be controlled using the LabVIEW software from National Instruments.
Display	
	**Screen** Settings, results, etc. are shown on the integrated display (3.5" to 12.1").
	**Touchscreen** The user can control the instrument by touching the screen with a special pen and/or one or more fingers.
Miscellaneous	
	**DVI output** An external monitor can be connected via a digital visual interface (DVI).
	**VGA output** The instrument can be connected to a PC via the video graphics array (VGA) interface.
	**Kensington** The instrument can be locked with the Kensington lock.
	**50 Ω/1 MΩ** The input impedance of the instrument can be switched between 50 Ω and 1 MΩ.

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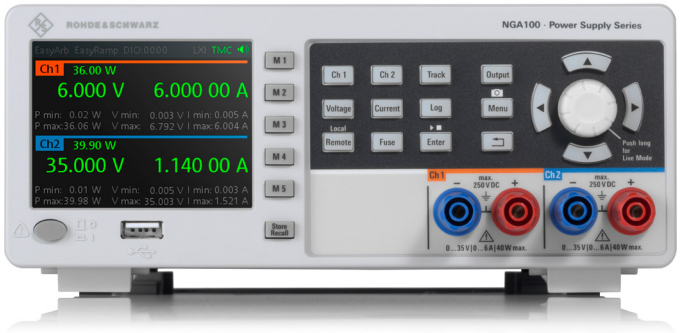
PRODUCT HIGHLIGHTS



MXO 3 series oscilloscope

The MXO 3 series oscilloscopes use cutting-edge technology for speed and precision. The oscilloscope combines enormous capabilities in a small package. Freedom and versatility are available without compromising results. Enjoy unmatched performance along with quick and easy understanding of your DUT.

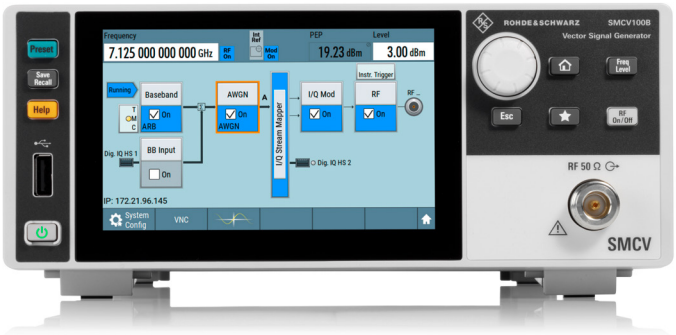
▶ page 22



R&S®NGA100 power supply series

R&S®NGA100 DC power supplies are linear, compact and easy-to-use. All models have excellent readback accuracy with a low-current range for demanding measurements. Data logging, arbitrary waveforms, built-in statistics and remote sensing features make the instruments ideal for various bench applications

▶ page 40



R&S®SMCV100B vector signal generator

The R&S®SMCV100B vector signal generator is the first multistandard platform for automotive, broadcast, navigation and wireless applications. This makes the R&S®SMCV100B unique for use in many applications, from the lab to production and wherever different technologies meet.

▶ page 58



FPL spectrum analyzer

The FPL is a single measuring instrument for a variety of measurement tasks. It supports spectrum analysis, highly accurate power measurement with power sensors and analysis of analog and digitally modulated signals. Models are available in frequencies from 5 kHz to 3/7.5/14/26.5 GHz and up to 40 MHz analysis bandwidth.

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Note: The photos do not show the real size of each instrument.

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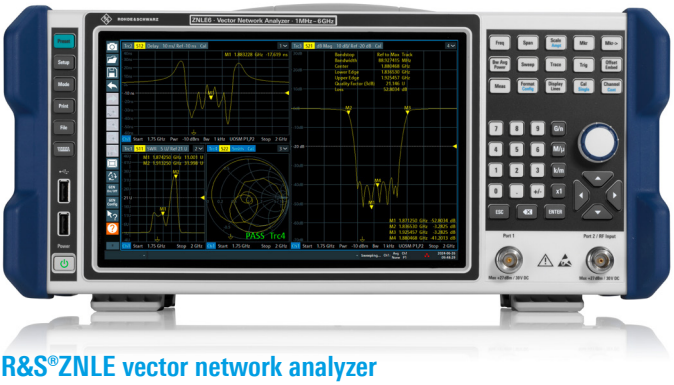

R&S®ZNLE vector network analyzer

The renowned high-quality design, innovative user interface and compact size of the R&S®ZNLE make it ideal for basic VNA applications. The R&S®ZNL-K2 time domain analysis option and R&S®ZNL-K3 distance-to-fault measurement option enhance the R&S®ZNLE with essential general purpose testing features. The base models support frequencies from 3/4.5/6/14/18 GHz.

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R&S®LCX LCR meter

The R&S®LCX LCR meters are versatile, extremely accurate and quick. The meters are ideal for challenging research, development and production applications. Two models and various options cover applications with a test signal frequency up to 10 MHz. Internal and external bias functions, comprehensive analysis options and versatile test fixtures expand the wide range of applications.

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LEARN THE FUNDAMENTALS OF TEST AND MEASUREMENT

Welcome to testing fundamentals at Rohde&Schwarz.

Getting started with electronic measurements can seem overwhelming. So, we have created this resource to help you master the essentials.

Our team of experts have put together a series of articles and videos that guide you through the basics of measurement – from understanding measurement principles to choosing the right instrument. Whether you are working with oscilloscopes, spectrum analyzers, vector network analyzers or power supplies, we have got you covered.

Check out the measurement basics for engineering and RF labs here:

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OSCILLOSCOPES

The R&S®ESSENTIALS oscilloscope portfolio offers options ranging from low-cost yet powerful 50 MHz oscilloscopes to full-featured 2 GHz oscilloscopes. Designed by the RF experts at Rohde&Schwarz, all oscilloscopes feature exceptional signal integrity, high value and excellent reliability.

Refer to the table on the next pages to see the differences between each family.

Bandwidth

Bandwidth is typically the most crucial parameter when choosing an oscilloscope. This is the frequency at which a sine wave is attenuated by 3 dB or is approximately 30% smaller. Since most signals are not monotone, you must account for the harmonic components that make up the signal, especially when most signals are closer to square waves. Capturing a 1 GHz square wave with a 1 GHz oscilloscope will cause the measured waveform to be distorted.

> Rule of thumb: Oscilloscope bandwidth = 3 to 5 × fundamental clock frequency of the test signal

The simplest way to determine how much bandwidth the oscilloscope needs is to take 3 to 5 times the clock frequency of the signal you want to measure. For example, a high-speed USB signal at 480 Mbit/s has a clock frequency of 240 MHz which would require a 720 MHz to 1.2 GHz oscilloscope. Another important consideration is the rise/fall time of the signal edges. Always make sure that the instrument can capture a faster rise/fall time than the measured waveform.

Sample rate and memory depth

Sample rate and memory depth are directly related. The sample rate defines how fast the oscilloscope samples and digitizes the waveform. Those samples have to be stored somewhere, which is why memory is important. A larger memory allows for a higher sample rate, which allows you to utilize the full bandwidth of the oscilloscope.

> Rule of thumb: For accurate signal reproduction, the sample rate should (typically) be five times the oscilloscope bandwidth. For example, for a 1 GHz oscilloscope, you need a sample rate of 5 Gsample/s.

As mentioned, memory depth is directly related to the sample rate. The deeper the memory, the longer you can capture at high sample rates.

> Rule of thumb: You probably want as much memory as you can get to maximize the amount of time captured at high sample rate.

Vertical resolution

The vertical resolution is the number of vertical levels an oscilloscope ADC can sample waveforms into bins. When the oscilloscope is sampling the waveform, it does not have an infinite number of levels to put the sample in. It has to choose a level to put that sample in. The more levels it has to choose from, the more precise it can be. An 8-bit oscilloscope has 256 quantization levels. A 10-bit oscilloscope has 1024. A 12-bit oscilloscope has 4096. A 16-bit oscilloscope has 65536 levels.

> Rule of thumb: In general, additional vertical resolution is most useful where you are trying to see a small signal riding on top of a much larger signal. Without the additional precision, the small signal would be lost in the larger signal.

Higher vertical resolution makes measurements more precise, but you should pay attention to the noise performance of the instrument frontend.

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Oscilloscope portfolio









	R&S®RTH1000	R&S®RTC1000	R&S®RTB 2	R&S®RTM3000
Vertical system				
Bandwidth [1]	60/100/200/350/500 MHz	50/70/100/200/300 MHz	70/100/200/300 MHz	100/200/350/500 MHz/1 GHz
Number of channels	2 plus DMM/4	2	2/4	2/4
Vertical resolution; system architecture	10 bit; 16 bit	8 bit; 16 bit	10 bit; 16 bit	10 bit; 16 bit
V/div, 1 MΩ	2 mV to 100 V	1 mV to 10 V	1 mV to 5 V	500 µV to 10 V
V/div, 50 Ω	–			500 µV to 1 V
Digital channels	8	8	16	16
Horizontal system				
Sampling rate per channel (in Gsample/s)	1.25 (4-channel model); 2.5 (2-channel model); 5 (all channels interleaved)	1; 2 (2 channels interleaved)	1.25; 2.5 (2 channels interleaved)	2.5; 5 (2 channels interleaved)
Maximum memory (per channel; 1 channel active)	125 kpoints (4-channel model); 250 kpoints (2-channel model); 500 kpoints	1 Mpoint; 2 Mpoints	10 Mpoints; 20 Mpoints	40 Mpoints; 80 Mpoints
Segmented memory	standard, 50 Mpoints	–	standard, 160 Mpoints	option, 400 Mpoints
Acquisition rate (in waveforms/s)	50 000	10 000	50 000 (300 000 in fast segmented memory mode)	64 000 (2 000 000 in fast segmented memory mode [2])
Trigger				
Types	digital	analog	analog	analog
Sensitivity	–	–	at 1 mV/div: > 2 div	at 1 mV/div: > 2 div
Analysis				
Mask test	tolerance mask	tolerance mask	tolerance mask	tolerance mask
Mathematics	elementary	elementary	basic (math on math)	basic (math on math)
Serial protocols triggering and decoding [1]	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, CAN FD, SENT	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429
Applications [1, 2]	high-resolution frequency counter, advanced spectrum analysis, harmonics analysis, user scripting	digital voltmeter (DVM), component tester, fast Fourier transform (FFT)	digital voltmeter (DVM), fast Fourier transform (FFT), frequency response analysis	power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis
Compliance testing [1, 2]	–	–	–	–
Display and operation				
Size and resolution	7" touchscreen, 800 × 480 pixel	6.5", 640 × 480 pixel	10.1" touchscreen, 1280 × 800 pixel	10.1" touchscreen, 1280 × 800 pixel
General data				
Dimensions in mm (W × H × D)	201 × 293 × 74	285 × 175 × 140	390 × 220 × 152	390 × 220 × 152
Weight in kg	2.4	1.7	2.5	3.3
Battery	lithium-ion, > 4 h	–	–	–

[1] Upgradeable.

[2] Requires an option.

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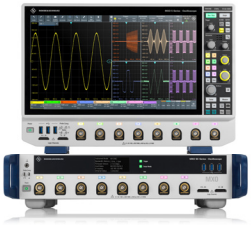

R&S®RTA4000	MXO 3	MXO 4	MXO 5/MXO 5C
200/350/500 MHz/1 GHz	100/200/350/500 MHz/1 GHz	200/350/500 MHz/1/1.5 GHz	100/200/350/500 MHz/1/2 GHz
4	4/8	4	4/8
10 bit	12 bit; 18 bit	12 bit; 18 bit	12 bit; 18 bit
500 µV to 10 V	1 mV to 10 V	500 µV to 10 V	500 µV to 10 V
500 µV to 1 V	1 mV to 1 V	500 µV to 1 V	500 µV to 1 V
16	16	16	16
2.5; 5 (2 channels interleaved)	2.5; 5 (2 channels interleaved)	2.5; 5 (2 channels interleaved)	5 on 4 channels; 2.5 on 8 channels (2 channels interleaved)
100 Msample; 200 Msample (1 Gsample in segmented memory mode)	standard: 125 Mpoints; max. upgrade: 500 Mpoints [2)]	standard: 400 Mpoints; max. upgrade: 800 Mpoints [2)]	standard: 500 Mpoints max. upgrade: 1 Gpoint [2)]
standard	standard: 10 000 segments; option: 1 000 000 segments	standard: 10 000 segments; option: 1 000 000 segments	standard: 10 000 segments; option: 1 000 000 segments
64 000 (2 000 000 in fast segmented memory mode [2)])	> 4 500 000 on 4 channels	> 4 500 000	> 4 500 000 on 4 channels
comprehensive (10 trigger types)	advanced (includes zone trigger), digital trigger (15 trigger types)	advanced (includes zone trigger), digital trigger (15 trigger types)	advanced (includes zone trigger), digital trigger (15 trigger types)
at 1 mV/div: > 2 div	0.0001 div, across full bandwidth, user controllable	0.0001 div, across full bandwidth, user controllable	0.0001 div, across full bandwidth, user controllable
elementary (tolerance mask around the signal)	user configurable, hardware based	user configurable, hardware based	user configurable, hardware based
basic (math on math)	advanced (formula editor)	advanced (formula editor)	advanced (formula editor)
I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, LIN, I²S, MIL-STD-1553, ARINC 429	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, QUAD-SPI, SENT, RFFE I³C, NRZ, SpaceWire, Manchester	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, QUAD-SPI, SENT, RFFE, I³C, NRZ, SpaceWire	I²C, SPI, UART/RS-232/RS-422/RS-485, CAN, CAN FD, CAN XL, LIN, ARINC 429, MIL-STD-1553, SPMI, 10BASE-T1S, 100BASE-T1, QUAD-SPI, SENT, RFFE, I³C, NRZ, SpaceWire
power, digital voltmeter (DVM), spectrum analysis and spectrogram, frequency response analysis	power, digital voltmeter (DVM), frequency response analysis	power, digital voltmeter (DVM), frequency response analysis, basic jitter analysis	power, digital voltmeter (DVM), frequency response analysis, basic jitter analysis
–	–	–	
10.1", color, 1280 × 800 pixel	11.6" touchscreen, 1920 × 1080 pixel (Full HD)	13.3" touchscreen, 1920 × 1080 pixel (Full HD)	for MXO 5 only: 15.6" touchscreen, 1920 × 1080 pixel (Full HD)
390 × 220 × 152	375 × 233 × 163	414 × 279 × 162	MXO 5: 445 × 314 × 154 MXO 5C: 445 × 105 × 405
3.3	4	6	MXO 5: 9 MXO 5C: 8.7
–	–	–	–

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R&S®Scope Rider RTH Handheld Oscilloscope



The perfect multipurpose tool for the lab or in the field.

- 60 MHz to 500 MHz at up to 5 Gsample/s
- High speed acquisition system with history mode
- 10-bit ADC
- Excellent sensitivity: 2 mV/div to 100 V/div
- Up to 200 V offset compensation range
- 37 automatic measurement functions
- Deep zoom with 500 ksample acquisition memory

Model overview

Model	Bandwidth	Channel (analog/digital)	Sample rate (analog/digital)	Memory depth	Update rate	Vertical resolution
R&S®RTH1002	60 MHz	2/8 (optional)	5 Gsample/s/1.25 Gsample/s	up to 500 kpoints, 50 Mpoints segmented memory	50 000 waveforms/s	up to 10 bit
R&S®RTH1012	100 MHz					
R&S®RTH1022	200 MHz					
R&S®RTH1032	350 MHz					
R&S®RTH1052	500 MHz					
R&S®RTH1004	60 MHz	4/8 (optional)				
R&S®RTH1014	100 MHz					
R&S®RTH1024	200 MHz					
R&S®RTH1034	350 MHz					
R&S®RTH1054	500 MHz					

Important facts

Specification	R&S®Scope Rider RTH	Why this is important
Update rate	50 000 waveforms/s	The faster the update rate, the faster users can find infrequent events.
Memory depth	up to 500 kpoints, 50 Mpoints segmented memory	Allows capture of the longest period of time at high sample rate.
Integration	DMM, MSO, protocol analyzer, data logger	Allows debugging of low speed serial devices and mixed signal designs.
ADC resolution	10 bit	Allows users to see more detail and smaller signals.
Display	7", 800 × 480, touchscreen	Makes it easier to operate and see information on the display.

Scope of delivery

- User manual
- Power cord
- USB cable
- Passive probes for each channel

Recommended options/accessories

Description	Type
Hardware options (plug-in)	
Mixed signal option, 250 MHz, 8 digital channels	R&S®RTH-B1
Software options	
I²C/SPI serial decoding	R&S®RTH-K1
UART/RS-232/RS-422/RS-485 serial decoding	R&S®RTH-K2
CAN/LIN serial triggering and decoding	R&S®RTH-K3

Recommended options/accessories

Description	Type
Spectrum analysis	R&S®RTH-K18
Advanced triggering	R&S®RTH-K19
Frequency counter	R&S®RTH-K33
Harmonics analysis	R&S®RTH-K34
User scripting	R&S®RTH-K38
Wireless LAN	R&S®RTH-K200/ R&S®RTH-K200US
Web interface remote control	R&S®RTH-K201
Probes	
Passive probe, 500 MHz, 10:1, isolated, 600 V CAT IV, 1000 V CAT III	R&S®RT-ZI10
Passive probe, 500 MHz, 100:1, isolated, 600 V CAT IV, 1000 V CAT III	R&S®RT-ZI11
Current probe, 100 kHz, 30 A, AC/DC	R&S®RT-ZC03



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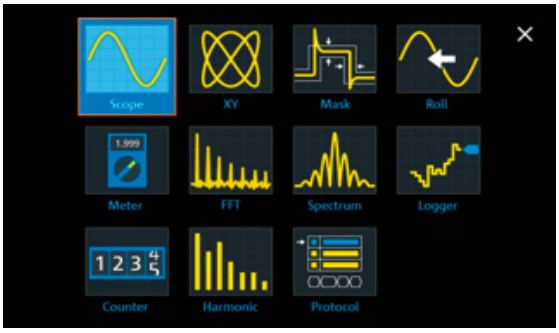
The perfect choice for:	
Electrical and electromechanical installation and maintenance	Education
Electronic field service and maintenance	Debugging and testing advanced power electronics

Your benefit	Features
Superior performance	► Deep memory (up to 50 Msample) and high resolution (5 Gsample/s) ► Fast acquisition rate: 50000 waveforms/s ► 10-bit ADC ► Excellent sensitivity: 2 mV/div to 100 V/div ► Up to 200 V offset range ► 37 automatic measurement functions
Outstanding protection and excellent connectivity	► Isolated channels: CAT IV 600 V/CAT III 1000 V ► IP51 housing that meets military requirements ► Wireless LAN and Ethernet for web based remote control and quick data access
8 instruments in one handheld package	► Lab performance oscilloscope ► Logic analyzer ► Protocol analyzer ► Data logger ► Digital multimeter [1] ► Spectrum analyzer ► Harmonics analyzer ► Frequency counter

[1] Additional multimeter channel in two-channel model.

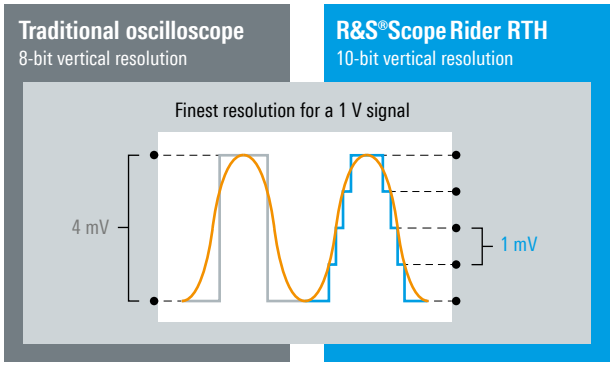


The high-speed acquisition system of the R&S®Scope Rider RTH captures up to 50 000 waveforms/s and uncovers rare and unexpected signal anomalies



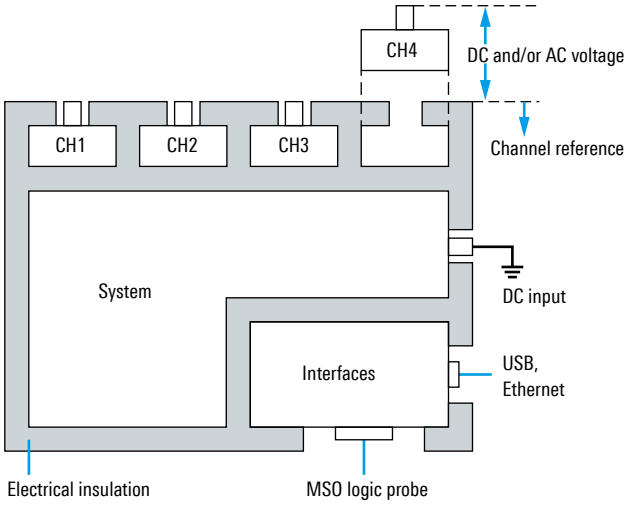
8 instruments in one: users can select the instrument they need at the push of a button

10-bit A/D converter: uncovers even small signal details



Double insulation for maximum safety

CH: Channel



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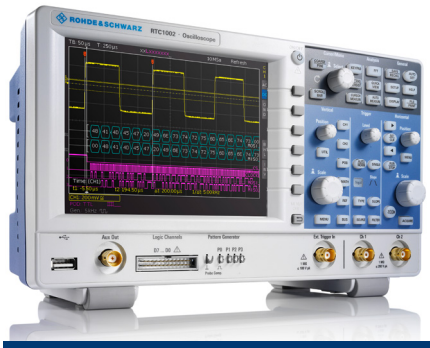
R&S®RTC1000 Oscilloscope



Get your results quicker

- Low-noise frontend for best results
- X-in-1 instrument that offers the functionality of an oscilloscope, logic analyzer, protocol analyzer, frequency analyzer, pattern generator, function generator, digital voltmeter and component tester

Model overview

Model	Bandwidth	Channel (analog/digital)	Consists of	Maximum sample rate	Maximum memory depth
R&S®RTC1002	50 MHz	2	R&S®RTC1000	2 Gsample/s	2 Msample
R&S®RTC1K-72	70 MHz		R&S®RTC1000 + R&S®RTC-B220		
R&S®RTC1K-102	100 MHz		R&S®RTC1000 + R&S®RTC-B221		
R&S®RTC1K-202	200 MHz		R&S®RTC1000 + R&S®RTC-B222		
R&S®RTC1K-302	300 MHz		R&S®RTC1000 + R&S®RTC-B223		
R&S®RTC1K-52M	50 MHz	2/8	R&S®RTC1000 + R&S®RTC-B1	2 Gsample/s	2 Msample
R&S®RTC1K-72M	70 MHz		R&S®RTC1000 + R&S®RTC-B220 + R&S®RTC-B1		
R&S®RTC1K-102M	100 MHz		R&S®RTC1000 + R&S®RTC-B221 + R&S®RTC-B1		
R&S®RTC1K-202M	200 MHz		R&S®RTC1000 + R&S®RTC-B222 + R&S®RTC-B1		
R&S®RTC1K-302M	300 MHz		R&S®RTC1000 + R&S®RTC-B223 + R&S®RTC-B1		

Important facts

Specification	R&S®RTC1000	Why this is important
Bandwidth	50/70/100/200/300 MHz (upgradeable, configurable)	Upgradeable bandwidth up to 300 MHz provides investment protection for future requirements.
Maximum memory depth	2 Msample	Allows capture of the longest period of time at high sample rate.
Mixed signal option (MSO)	8 channels, upgradeable, 0.5 Gsample/s, 0.5 Msample	Ideal for analysis of digital buses and correlation with analog signals.
Multifunctional	DVM, counter, waveform generator, pattern generator, component tester	Saves desk space and is a smart investment.

Scope of delivery

- User manual
- Power cord
- R&S®RT-ZP03S single-ended passive probes for each channel

Recommended options/accessories

Description	Type
Hardware options	
Mixed signal upgrade for non-MSO models, 300 MHz	R&S®RTC-B1
Arbitrary waveform generator	R&S®RTC-B6
Software options	
I²C/SPI serial triggering and decoding	R&S®RTC-K1
UART/RS-232/RS-422/RS-485 serial triggering and decoding	R&S®RTC-K2
CAN/LIN serial triggering and decoding	R&S®RTC-K3
Application bundle (R&S®RTC-K1, -K2, -K3, -B6)	R&S®RTC-PK1
Option bundle	
Soft carrying bag	R&S®RTC-Z3
Rackmount kit	R&S®ZZA-RTC1K

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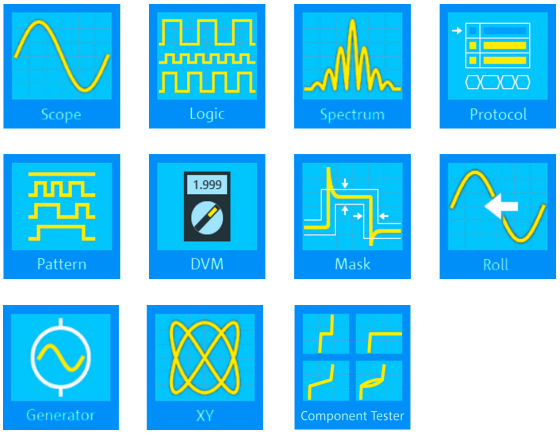
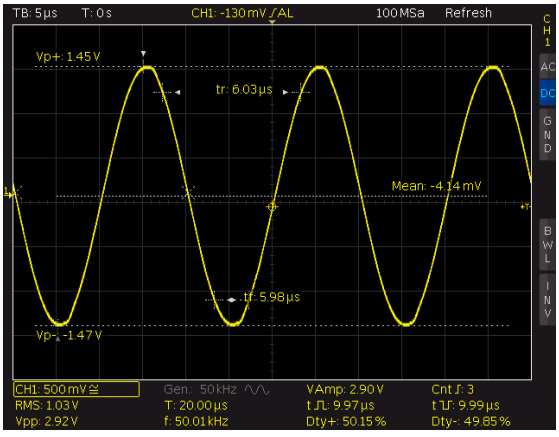
The perfect choice for:	
R&D troubleshooting	Education
Production tests and repair	Electronic hobbyists

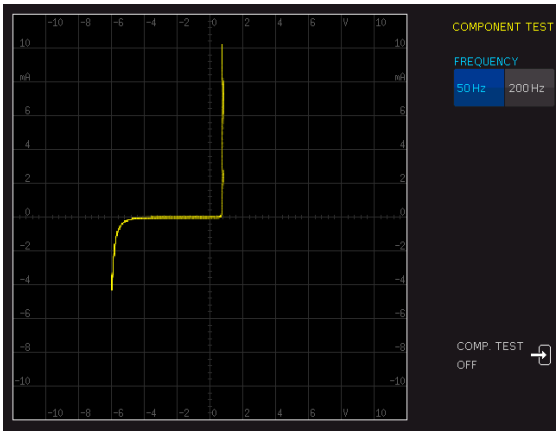
Your benefit	Features
Get your results quicker	Fast boot and auto measurement for concise and comprehensive results
Investment protection	Expandable to your needs through software licenses
Compactness saves desk space	Highest integration of instruments in a small form factor



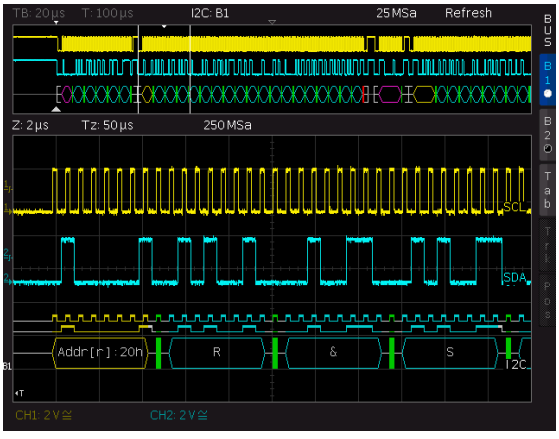
X-in-1 oscilloscope



QuickView: automatic measurement and graphical display at the push of a button



Quickly asses your components with the integrated tester



Gather insight into the digital communications on your circuitry

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R&S®RTB 2 Series Oscilloscope



Power of ten for every task, everyday

What sets these oscilloscopes apart from all the others?
New, advanced technology:

- 10-bit ADC: see small signal details in the presence of large signals
- 10 Msample acquisition memory depth on each channel (20 Msample interleaved, 260 Mpoints segmented)
- Large 10.1" high-resolution capacitive touchscreen with gesture support

Model overview

Model	Bandwidth	Channel (analog/digital)	Sample rate (analog/digital)	Memory depth	Update rate	Vertical resolution
R&S®RTB22	70 MHz	2/16 (optional)	2.5 Gsample/s/1.25 Gsample/s	up to 160 Msample	50000 waveforms/s	10 bit
R&S®RTB24	70 MHz	4/16 (optional)	2.5 Gsample/s/1.25 Gsample/s	up to 160 Msample	50000 waveforms/s	10 bit

Important facts

Specification	R&S®RTB 2	Why this is important
Bandwidth	70/100/200/300 MHz	Upgradeable bandwidth up to 300 MHz provides investment protection for future requirements.
ADC resolution	10 bit	Allows users to see more detail and smaller signals.
Maximum memory depth	20 Msample (160 Msample history)	Allows capture of the longest period of time at high sample rate.
Display	10.1" capacitive touchscreen (1280 × 800 pixel)	Makes it easier to operate and see information on the display.
Update rate	50000 waveforms/s	The faster the update rate, the faster users can find infrequent events.
Integration	DVM, counter, function generator, pattern generator, 16 channels MSO	Allows debugging of low speed serial devices and mixed signal designs.
Connectivity	LAN, USB host and device ports	Remote control makes updating and monitoring of the instrument easy.

Scope of delivery

- 300 MHz passive probe per channel
- Power cord
- Getting started manual
- Safety instructions
- 3 year warranty

Recommended options/accessories

Description	Type
Software options	
Application bundle	R&S®RTB2-PK1 (R&S®RTB-K1, R&S®RTB-K2, R&S®RTB-K3, R&S®RTB-K36)
Hardware options	
MSO, set of 2 logic probes, 300 MHz (+ 16 digital channels)	R&S®RTB2-B1
Accessories	
Front cover	R&S®RTB-Z1
Soft bag	R&S®RTB-Z3
Transit case	R&S®RTB-Z4
Rackmount kit	R&S®ZZA-RTB2K

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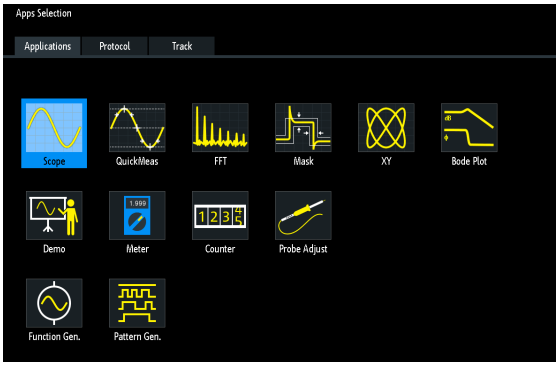
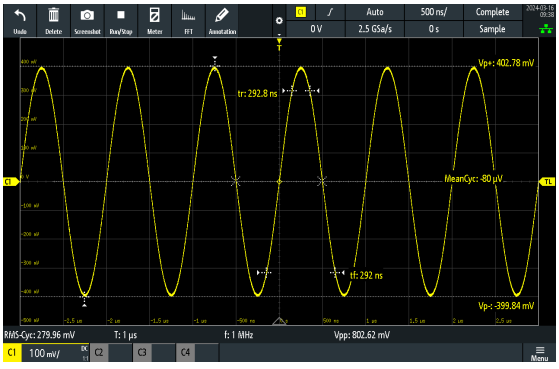
The perfect choice for:	
R&D troubleshooting	Education
Production tests and repair	Electronic hobbyists

Your benefit	Features
See small signal details in the presence of large signals	► 10-bit ADC ► 1280 × 800 pixel display resolution
Capture more time at full bandwidth	► 2.5 Gsample/s max. sample rate with up to 20 Msample memory ► 12 horizontal grid lines
Easier to see and collaborate. Faster operation and interpretation of results.	► 10.1" capacitive touchscreen with 1280 × 800 resolution ► Grid annotation ► Split dual window



10-in-1 oscilloscope

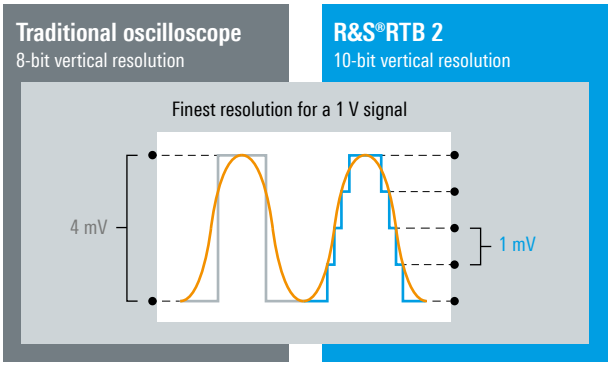


QuickMeas: automatic measurement and graphical display at the push of a button

More memory depth relative to that of the two largest oscilloscope manufacturers

	Tektronix 2 Series MSO	Keysight 2000 X-Series	R&S®RTB 2 series
Standard memory	10 Mpoints	1 Mpoint	10 Mpoints
Segmented memory	10 Mpoints	1 Mpoint	260 Mpoints

10-bit A/D converter: reveals even small signal details



R&S®RTM3000 Oscilloscope



See more of your signal with the power of 10

- Large 10.1" capacitive touchscreen
- 10-bit ADC at all sensitivity levels and with very little noise
- 40 Msample (all channels) and 80 Msample (interleaved) acquisition memory depth
- 10 s boot time

Model overview

Model	Bandwidth	Channel (analog/digital)	Consists of	Maximum sample rate (analog/digital)	Maximum memory depth
R&S®RTM3002	100 MHz	2	R&S®RTM3002	5 Gsample/s	40 Msample/channel, 80 Msample interleaved standard, 400 Msample (optional)
R&S®RTM3004	100 MHz	4	R&S®RTM3004		
R&S®RTM3K-22	200 MHz	2	R&S®RTM3002 + R&S®RTM-B222		
R&S®RTM3K-24	200 MHz	4	R&S®RTM3004 + R&S®RTM-B242		
R&S®RTM3K-32	350 MHz	2	R&S®RTM3002 + R&S®RTM-B223		
R&S®RTM3K-34	350 MHz	4	R&S®RTM3004 + R&S®RTM-B243		
R&S®RTM3K-52	500 MHz	2	R&S®RTM3002 + R&S®RTM-B225		
R&S®RTM3K-54	500 MHz	4	R&S®RTM3004 + R&S®RTM-B245		
R&S®RTM3K-102	1 GHz	2	R&S®RTM3002 + R&S®RTM-B2210		
R&S®RTM3K-104	1 GHz	4	R&S®RTM3004 + R&S®RTM-B2410		
R&S®RTM3K-02M	100 MHz	2/16	R&S®RTM3002 + R&S®RTM-B1	5 Gsample/s/ 5 Gsample/s	
R&S®RTM3K-04M	100 MHz	4/16	R&S®RTM3004 + R&S®RTM-B1		
R&S®RTM3K-22M	200 MHz	2/16	R&S®RTM3002 + R&S®RTM-B222 + R&S®RTM-B1		
R&S®RTM3K-24M	200 MHz	4/16	R&S®RTM3004 + R&S®RTM-B242 + R&S®RTM-B1		
R&S®RTM3K-32M	350 MHz	2/16	R&S®RTM3002 + R&S®RTM-B223 + R&S®RTM-B1		
R&S®RTM3K-34M	350 MHz	4/16	R&S®RTM3004 + R&S®RTM-B243 + R&S®RTM-B1		
R&S®RTM3K-52M	500 MHz	2/16	R&S®RTM3002 + R&S®RTM-B225 + R&S®RTM-B1		
R&S®RTM3K-54M	500 MHz	4/16	R&S®RTM3004 + R&S®RTM-B245 + R&S®RTM-B1		
R&S®RTM3K-102M	1 GHz	2/16	R&S®RTM3002 + R&S®RTM-B2210 + R&S®RTM-B1		
R&S®RTM3K-10M	1 GHz	4/16	R&S®RTM3004 + R&S®RTM-B2410 + R&S®RTM-B1		

Important facts

Specification	R&S®RTM3000	Why this is important
Bandwidth	100/200/350/500/1000 MHz (upgradeable)	Upgradeable bandwidth up to 1 GHz provides investment protection for future requirements.
ADC resolution	10 bit	Allows users to see more detail and smaller signals.
Maximum resolution	16 bit with high resolution or averaging	Allows users to see more detail and smaller signals.
Maximum memory depth	80 Msample	Allows capture of the longest period of time at high sample rate.
Segmented memory/history	optional, 400 Msample	Ideal for burst signals. Allows capture of the longest time periods at a high sample rate without wasting memory on idle periods.
Display	10.1", 1280 × 800, capacitive touchscreen	Makes it easier to operate and see information on the display.
Hardware dynamic range, full bandwidth	► 1 MΩ: 0.5 mV to 10 V ► 50 Ω: 0.5 mV to 1 V	Smallest settings allow users to zoom in on small signals with full bandwidth. Largest settings allow users to properly scale a large waveform.
Boot time	approx. 10 s	Remote control makes updating and monitoring of the instrument easy.

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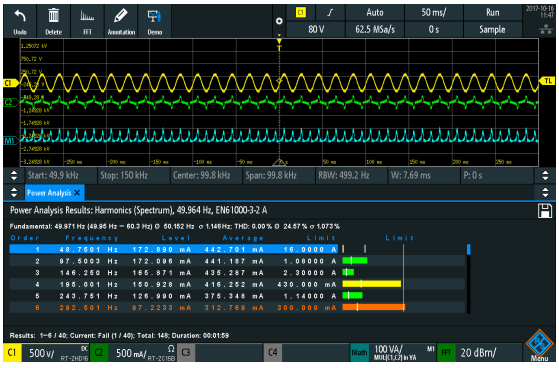
The perfect choice for:	
R&D debugging power	R&D debugging serial buses
Manufacturing test and repair	Education

Your benefit	Features
Easier to see and collaborate; faster to operate and interpret results	10.1" capacitive touchscreen with 1280 × 800 resolution, Grid annotation, split dual window, R&S®SmartGrid
Capture more time at full bandwidth	5 Gsample/s max. sample rate with up to 80 Msample memory, 12 horizontal divisions, 400 Msample history mode
See small signal details in the presence of large signals	10-bit ADC. 10.1", 1280 × 800 pixel display resolution
Start working sooner	10 s boot time
Troubleshoot and solve a wide range of problems with one instrument	8 instruments in one: oscilloscope, logic analyzer, spectrum analyzer, protocol analyzer, arbitrary waveform generator, pattern generator, counter, digital voltmeter

Power highlights

- Analysis of the input, output and transfer functions of switched-mode power supplies
- Measurement wizard for fast results
- Simple and fast documentation
- Analysis of the harmonic current in line with conventional EN, MIL and RTCA standards



Power analysis measurement

Scope of delivery

- User manual
- Power cord
- R&S®RT-ZP05S single-ended passive probes for each channel

Recommended options/accessories

Description	Type
Hardware options	
Mixed signal upgrade for non-MSO models, 16 channels, 5 Gsample/s, up to 80 Msample	R&S®RTM-B1
Arbitrary waveform generator	R&S®RTM-B6
Software options	
I²C/SPI triggering and decoding	R&S®RTM-K1
UART/RS-232/422/485 triggering and decoding	R&S®RTM-K2
History and segmented memory with 400 Msample	R&S®RTM-K15
Spectrum analysis and spectrogram	R&S®RTM-K37
Frequency response analysis (Bode plot)	R&S®RTM-K36
Application bundle [1], consists of the following options: (R&S®RTM-K1, -K2, -K3, -K5, -K6, -K7, -K15, -K31, -K36, -K37, -B6)	R&S®RTM-PK1US

[1] The R&S®RTM-PK1US option is only distributed in North America.

8 instruments in one

Oscilloscope	standard
Logic analyzer (16-channel MSO)	R&S®RTM-B1 MSO option, includes cabling, lead sets and grabbers
Protocol analyzer	options for different serial buses
Spectrum analyzer	R&S®RTM-K37 option with spectrogram
Integrated digital voltmeter	standard
Trigger counter	standard
Waveform generator (25 MHz)	R&S®RTM-B6 option
Pattern generator (4 bit)	R&S®RTM-B6 option

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R&S®RTA4000 Oscilloscope



See more of your signal with the power of 10

What sets these oscilloscopes apart from all others in their class? New, advanced technology.

- 10-bit ADC designed by Rohde&Schwarz
- 500 µV/div sensitivity with full bandwidth and low noise
- 1000 Msample total standard memory, optimal for serial protocol analysis

Model overview

Model	Bandwidth	Channel (analog/digital)	Consists of	Max. sample rate (analog/digital)	Max. memory depth
R&S®RTA4004	200 MHz	4	R&S®RTA4004	5 Gsample/s	100 Msample/channel, 200 Msample interleaved standard, 1 Gsample history
R&S®RTA4K-34	350 MHz	4	R&S®RTA4004 + R&S®RTA-B243		
R&S®RTA4K-54	500 MHz	4	R&S®RTA4004 + R&S®RTA-B245		
R&S®RTA4K-104	1 GHz	4	R&S®RTA4004 + R&S®RTA-B2410		
R&S®RTA4K-24M	200 MHz	4/16	R&S®RTA4004 + R&S®RTA-B1	5 Gsample/s/ 5 Gsample/s	
R&S®RTA4K-34M	350 MHz	4/16	R&S®RTA4004 + R&S®RTA-B243 + R&S®RTA-B1		
R&S®RTA4K-54M	500 MHz	4/16	R&S®RTA4004 + R&S®RTA-B245 + R&S®RTA-B1		
R&S®RTA4K-104M	1 GHz	4/16	R&S®RTA4004 + R&S®RTA-B2410 + R&S®RTA-B1		

Important facts

Specification	R&S®RTA4000	Why this is important
Bandwidth	200/350/500/1000 MHz (upgradeable)	Upgradeable bandwidth up to 1 GHz provides investment protection for future requirements.
ADC resolution	10 bit	Allows users to see more detail and smaller signals.
Max. resolution	16 bit with high resolution	Allows users to see more detail and smaller signals.
Noise 1 mV/div, 200 MHz, 50 Ω, % full scale	0.7%	Noise hides small signals and limits measurement accuracy.
Max. memory depth	200 Msample	Allows capture of the longest period of time at high sample rate.
Segmented memory/history	standard – 1000 Msample (1 Gsample)	Ideal for bursty signals. Allows capture of the longest period of time at high sample rate without wasting memory on idle periods.
Time base accuracy	±0.5 ppm	The better the time base accuracy, the more accurate deep memory measurements.
Hardware dynamic range, full bandwidth	▶ 1 MΩ: 0.5 mV to 10 V ▶ 50 Ω: 0.5 mV to 1 V	Smallest settings allow users to zoom in on small signals with full bandwidth. Largest settings allow users to properly scale a large waveform.

Scope of delivery

- R&S®RT-ZP10 single-ended passive probes for each channel
- Power cord
- 3 year warranty

Recommended options/accessories

Description	Type
Hardware options	
Mixed signal upgrade for non-MSO models, 16 channels, 5 Gsample/s, up to 200 Msample	R&S®RTA-B1
Arbitrary waveform generator	R&S®RTA-B6

Recommended options/accessories

Description	Type
Software options	
I²C/SPI serial triggering and decoding	R&S®RTA-K1
UART/RS-232/422/485 serial triggering and decoding	R&S®RTA-K2
Spectrum analysis and spectrogram	R&S®RTA-K37
Frequency response analysis (Bode plot)	R&S®RTA-K36
Application bundle[1], consists of the following options: (R&S®RTA-K1, -K2, -K3, -K5, -K6, -K7, -K31, -K36, -K37, -B6)	R&S®RTA-PK1US

[1] The R&S®RTA-PK1US option is only distributed in North America.



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The perfect choice for:	
R&D debugging power integrity	R&D debugging serial buses
Manufacturing test and repair	EMI debugging

Your benefit	Features
See small signal detail in the presence of large signals	10-bit ADC. Class-leading signal integrity
Easier to see and collaborate; faster to operate and interpret results	10.1" capacitive touchscreen with 1280 × 800 resolution. Grid annotation. Split window, R&S®SmartGrid
Capture more time, accurately, at full bandwidth	5 Gsample/s max. sample rate with up to 200 Msample memory. 12 horizontal divisions. 1 Gsample history mode. Class-leading time-base accuracy

Unrivaled signal integrity and deep memory

- Superb noise values allow you to see more of your signal
- 10-bit ADC designed by Rohde&Schwarz
- 500 µV/div sensitivity with full bandwidth and low noise
- Capture more time at full bandwidth
- Deep memory: standard 100 Msample per channel and 200 Msample interleaved
- Class-leading timebase accuracy ensures deep memory measurement accuracy
- Standard history function with over 1000 Msample of memory allows you to see back in time to potentially tens of thousands of trigger events



Power integrity measurement

8 instruments in one	
Oscilloscope	standard
Logic analyzer (16-channel MSO)	R&S®RTA-B1 MSO option, includes cabling, lead sets and grabbers
Protocol analyzer	options for different serial buses
Spectrum analyzer	R&S®RTA-K37 option with spectrogram
Integrated digital voltmeter	standard
Trigger counter	standard
Waveform generator (25 MHz)	R&S®RTA-B6 option
Pattern generator (4 bit)	R&S®RTA-B6 option

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MXO 3 Series Oscilloscope



New

Next generation oscilloscope: Fast. Precise. Compact.

- 100 MHz to 1 GHz bandwidth
- Up to 5 Gsample/s sample rate
- 125 Mpoints per channel standard memory
- 12-bit ADC at all sample rates
- 18-bit architecture with HD mode
- Precise digital trigger

Model overview

Model	Bandwidth
4-channel model	
R&S®MXO3-B242	200 MHz
R&S®MXO3-B243	350 MHz
R&S®MXO3-B245	500 MHz
R&S®MXO3-B2410	1 GHz
8-channel model	
R&S®MXO3-B282	200 MHz
R&S®MXO3-B283	350 MHz
R&S®MXO3-B285	500 MHz
R&S®MXO3-B2810	1 GHz

Key specifications

Bandwidth	▶ MXO 34: 100/200/350/500 MHz, 1 GHz ▶ MXO 38: 100/200/350/500 MHz, 1 GHz
Maximum sample rate	▶ MXO 34: 5 Gsample/s, 2.5 Gsample/s (> 2 channels) ▶ MXO 38: 5 Gsample/s, 2.5 Gsample/s (> 4 channels)
Channels	▶ MXO 34: 4 analog, 16 digital (with MSO) ▶ MXO 38: 8 analog, 16 digital (with MSO)
Maximum acquisition rate	4.5 million acquisitions/s per channel
ADC and maximum vertical resolution	12-bit at all sample rates (18 bit with HD mode)
Standard memory depth	125 Mpoints per channel (standard), 500 Mpoints per channel (option)
Display	11.6" Full HD display with capacitive touch
Operating system	Linux (closed)
VESA mount support	yes, 100 mm × 100 mm
Upgradeable	bandwidth, protocol trigger and decode, arbitrary waveform generator, analysis capabilities, MSO
Warranty	3 years

Important facts

Specification	MXO 3	Why this is important
Acquisition rate	4.5 million waveforms/s	Find rare events and see signal anomalies quickly
Vertical resolution and digital trigger	12 bit (18 bit in HD mode), digital trigger	See signals accurately and trigger on very small signals
Dimensions and weight	5 U and 4 kg	Portable instrument that fits anywhere

Recommended options/accessories

Description	Type
Bandwidth upgrade	
Upgrade of MXO 34 to 200 MHz bandwidth	R&S®MXO3-B242
Upgrade of MXO 34 to 350 MHz bandwidth	R&S®MXO3-B243
Upgrade of MXO 34 to 500 MHz bandwidth	R&S®MXO3-B245
Upgrade of MXO 34 to 1 GHz bandwidth	R&S®MXO3-B2410
Upgrade of MXO 38 to 200 MHz bandwidth	R&S®MXO3-B282
Upgrade of MXO 38 to 350 MHz bandwidth	R&S®MXO3-B283
Upgrade of MXO 38 to 500 MHz bandwidth	R&S®MXO3-B285
Upgrade of MXO 38 to 1 GHz bandwidth	R&S®MXO3-B2810

Scope of delivery

- 500 MHz passive probe (10:1) per channel
- Power cord
- Quick start guide
- Accessory bag
- 3 year warranty

Recommended options/accessories

Description	Type
Hardware options	
Mixed signal option, for MXO 3 series with 16 digital channels	R&S®MXO3-B1
Arbitrary waveform generator, 50 MHz, 1 analog channel	R&S®MXO3-B6
Memory upgrade to 500 Mpoints	R&S®MXO3-B105
Power analysis	R&S®MXO3-K31
Frequency response analysis	R&S®MXO3-K36
Low speed serial buses (I²C/QuadSPI/SPI/UART/RS-232/RS-422/RS-485/NRZ clocked/NRZ unclocked/custom Manchester)	R&S®MXO3-K510
Automotive protocols (CAN/CAN FD/CAN XL/LIN/SENT)	R&S®MXO3-K520
Aerospace protocols (ARINC 429/MIL-STD-1553/SpaceWire)	R&S®MXO3-K530
MIPI low speed protocols (SPMI/RFFE/I³C)	R&S®MXO3-K550
Automotive Ethernet protocols (10BASE-T1S)	R&S®MXO3-K560
Accessories	
Rackmount kit	R&S®ZZA-MXO3
Front cover	R&S®MXO3-Z1
Soft case	R&S®MXO3-Z3
Transit case	R&S®MXO3-Z4
VESA adapter	R&S®MXO5-Z7



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The perfect choice for:	
R&D troubleshooting	Education
Production tests and repair	Electronic hobbyists

Your benefit	Features
Fast	▶ Instantly see all signal activity to better understand your system ▶ Catch rare signal anomalies ▶ See all signal variation, including subtle changes ▶ Stays responsive to what you do, as you do it; the most information in the shortest amount of time
Precise	▶ Get a sharper and more accurate system overview ▶ See the smallest details even for larger signals ▶ Isolate even slightest spikes, bumps, dips and any other important changes ▶ Retain fast sample rates when capturing nanoseconds or milliseconds of time ▶ Replace speculation with certainty and persistent doubts with assurance
Compact	▶ Compact enough to work anywhere ▶ Unmatched four-channel and eight-channel performance up to 1 GHz in a surprisingly small package ▶ Integrated ARB, MSO, DMM and protocol analysis ▶ Rackmount with just 5 U

SUPERIOR USER INTERFACE

R&S®SmartGrid UI designed for high productivity

Customize your layout, fast

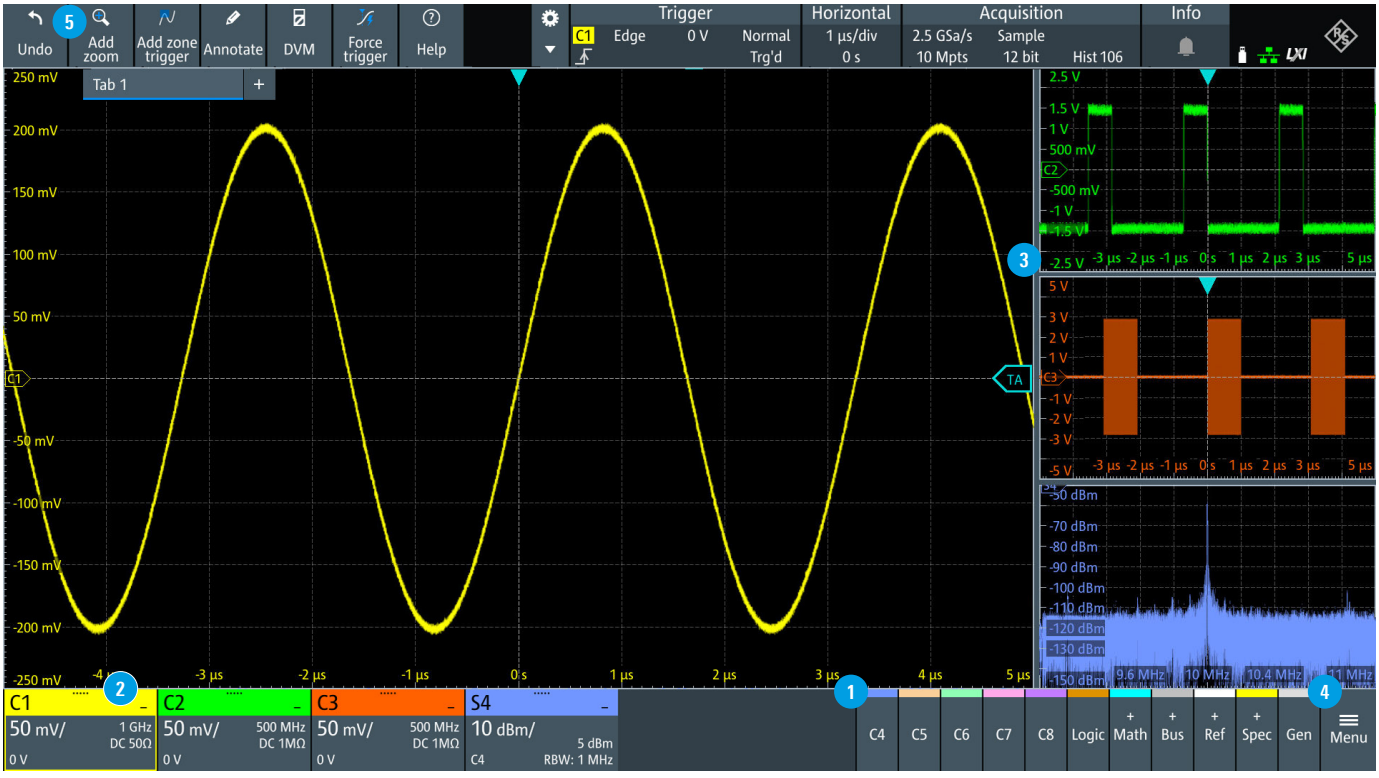
1. Tap to turn on sources and other functions
2. Quickly customize your display layout with drag&drop using R&S®SmartGrid
3. Adjust grid and result table boundaries using sliders

Quick access to settings and capabilities

4. Easily navigate to all settings using the main menu
5. Quickly access important tools with the customizable toolbar

Short learning curve

The MXO user interface is designed for minimal learning curve for users of other oscilloscopes. Anyone who needs a function description or who programs with the oscilloscope for programing just need to press the help button on the toolbar to see a description of the function and the associated SCPI command.



MXO 4 Series Oscilloscope



Next generation oscilloscope for accelerated insight

- 200 MHz to 1.5 GHz bandwidth
- 400 Mpoints per channel standard memory
- > 4.5 million waveforms/s with acquisition rate of up to 99%
- Precise digital trigger
- Up to 5 Gsample/s sample rate

Model overview

Model	Bandwidth	Channel	Sample rate	Maximum memory depth	Optional MSO
R&S®MX044-242	200 MHz	4	5 Gsample/s	400 Mpoints per channel (optional 800 Mpoints)	16 digital channels
R&S®MX044-243	350 MHz				
R&S®MX044-245	500 MHz				
R&S®MX044-2410	1 GHz				
R&S®MX044-2415	1.5 GHz				

Important facts

Specification	MXO 4	Why this is important
Acquisition rate	> 4.5 million waveforms/s	Find signal anomalies quickly.
ADC resolution	12 bit (18-bit architecture with HD mode)	See your signals accurately.
Memory depth	standard: 400 Mpoints per channel; option: 800 Mpoints interleaved	Capture more time.
Trigger	Industry's most sensitive trigger: 0.0001 vertical division	Isolate events with more precision.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Hardware options	
Mixed signal option (MSO) with 16 digital channels	R&S®MXO4-B1
Arbitrary waveform generator, 100 MHz, 2 channels	R&S®MXO4-B6
Memory upgrade to 800 Mpoints on 2 channels	R&S®MXO4-B108
Software options	
Power analysis	R&S®MXO4-K31
Frequency response analysis	R&S®MXO4-K36
Low speed serial triggering and decoding (I^2C/SPI/UART/RS-232/RS-422/RS-485)	R&S®MXO4-K510
Automotive serial triggering and decoding (CAN/CAN FD/CAN XL/LIN)	R&S®MXO4-K520
MIPI low speed protocols (SPMI)	R&S®MXO4-K550
Automotive Ethernet protocols (10BASE-T1S)	R&S®MXO4-K560
Accessories	
Front cover	R&S®MXO4-Z1
Soft case	R&S®MXO4-Z3
Transit case	R&S®MXO4-Z4
19" rackmount kit, 6 HU	R&S®ZZA-MXO4



L'IMPULSION Retrouvez nous sur www.limpulsion.fr

The perfect choice for:	
Hardware debugging; serial bus analysis	Power analysis
EMI debugging	Power integrity



Your go-to tool:

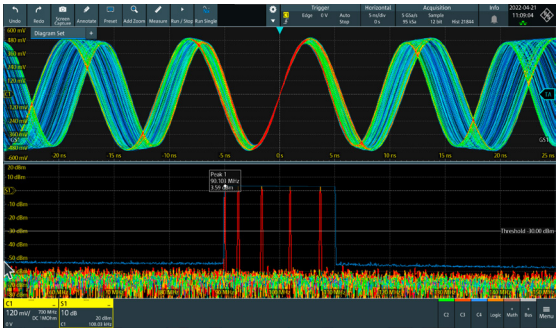
- Wide range of analysis functions accelerated by hardware for real-time performance, including math, measurements, etc.
- 16 digital channels activated with R&S®MXO4-B1 probes that can be used simultaneously with all analog channels
- R&S®MXO4-B6 adds 2 integrated 100 MHz arbitrary waveform generators with a wide range of available waveform shapes
- Frequency response and impedance analysis are available with R&S®MXO4-K36, making the oscilloscope more versatile for power analysis

Your benefit	Features
Find signal anomalies quickly	► World's fastest acquisition rate of up to > 4.5 million waveforms/s reveals infrequent anomalies instantly ► Industry's fastest trigger rearm time of 21 ns
See your signals accurately	► 12-bit ADC for high vertical resolution at all sample rates across the full bandwidth ► 18-bit architecture with HD mode ► Lowest noise of 104 µV at 1 GHz on 1 mV/div sensitivity ► Vertical sensitivity to 500 µV/div with ±5 V offset range
Capture more time	► Industry's deepest memory of 400 Mpoints per channel (optionally 800 Mpoints interleaved) ► History and segmentation memory to capture up to 1 million acquisitions
Isolate events with more precision	► Industry's most sensitive trigger: 0.0001 vertical division ► Best in class trigger jitter of just 1 ps ► Adjustable digital trigger filters



Serial bus analysis:

- Innovative dual-path protocol analysis for correct protocol packet decoding and triggering regardless of sample rate settings for waveform acquisitions
- Combined with deepest memory and segmentation, the MXO 4 captures longer durations of protocol events to help monitor and understand system behavior
- Search functionality helps finding events of interest in captured bus activity based on trigger or protocol content



Spectrum analysis:

- Hardware accelerated processing with an industry leading spectrum acquisition rate of 50 000 FFT/s, ideal for capturing spurious and random spectrum events
- RF and time domain views with independent control allows intuitive setup while remaining time-correlated
- Pristine RF spectrum performance with peak list and max./min. hold traces makes MXO 4 perfect for EMI debugging

Probe choices

Rohde&Schwarz offers a wide variety of probe choices for your applications including:

- Active single-ended and differential probes
- Modular broadband probes
- High voltage and current probes
- Power rail probes
- Logic probes
- Near-field probes

Visit our probe portfolio to find out more:

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MXO 5 Series Oscilloscope



Next generation oscilloscope: evolved for more challenges

- 100 MHz to 2 GHz bandwidth
- Up to 5 Gsample/s sample rate
- 500 Mpoints per channel standard memory
- 12-bit ADC at all sample rates
- 18-bit architecture with HD mode
- Precise digital trigger

Model overview

Model	Bandwidth
4-channel model	
R&S®MXO54-350	350 MHz
R&S®MXO54-500	500 MHz
R&S®MXO54-1000	1 GHz
R&S®MXO54-2000	2 GHz
8-channel model	
R&S®MXO58-100	100 MHz
R&S®MXO58-200	200 MHz
R&S®MXO58-350	350 MHz
R&S®MXO58-500	500 MHz
R&S®MXO58-1000	1 GHz
R&S®MXO58-2000	2 GHz

Key specifications

Maximum sample rate	interleaved: 5 Gsample/s; all channels: 2.5 Gsample/s
Channels	analog: 4 or 8; digital: 16 standard (dedicated connector)
Acquisition rate	per channel: 4.5 million acquisitions/s; on 4 channels: 18 million acquisitions/s
ADC resolution	12 bit (all sample rates)
Maximum vertical resolution	18 bit (HD mode)
Standard memory depth	standard: 500 Mpoints per channel; option: 1 Gpoint interleaved
Segmented memory	up to 1 million segments with 1 Mpoint capture
FFT speed	> 50000 FFT/s
FFT capabilities	log-log display, max./min. hold, peak lists
Vertical noise floor	130 µV (RMS) at 1 mV/div, 2 GHz bandwidth
Vertical offset range	5 V at 1 MΩ coupling
Arbitrary generator	2 channels, 100 MHz with 625 Msample/s
Digital trigger sensitivity	0.0001 div
Trigger hysteresis	user selectable
Trigger jitter	< 1 ps (RMS) (meas.)
Timebase accuracy	±0.2 ppm
Display	15.6" Full HD display with capacitive touch
VESA mount support	•, with R&S®MXO5-Z7 VESA adapter
Operating system	Linux
Upgradeable	bandwidth, protocol trigger and decode, arbitrary waveform generator, analysis capabilities

Scope of delivery

- 700 MHz passive probe (10:1) per channel
- Power cable
- Quick start guide
- Accessory bag
- 1 year warranty

Recommended options/accessories

Description	Type
Bandwidth upgrade	
Upgrade of MXO 54 to 500 MHz bandwidth	R&S®MXO5-B245
Upgrade of MXO 54 to 1 GHz bandwidth	R&S®MXO5-B2410
Upgrade of MXO 54 to 2 GHz bandwidth	R&S®MXO5-B2420
Upgrade of MXO 58 to 200 MHz bandwidth	R&S®MXO5-B282
Upgrade of MXO 58 to 350 MHz bandwidth	R&S®MXO5-B283
Upgrade of MXO 58 to 500 MHz bandwidth	R&S®MXO5-B285
Upgrade of MXO 58 to 1 GHz bandwidth	R&S®MXO5-B2810
Upgrade of MXO 58 to 2 GHz bandwidth	R&S®MXO5-B2820

Recommended options/accessories

Description	Type
Options	
Mixed signal option, for MXO 5 series with 16 digital channels	R&S®MXO5-B1
Arbitrary waveform generator, 100 MHz, 2 analog channels	R&S®MXO5-B6
Additional M.2 SSD	R&S®MXO5-B19
Memory option 1 Gpoint	R&S®MXO5-B110
Accessories	
Rackmount kit, for MXO 5 series with 8 HU	R&S®ZZA-MXO5
Front cover	R&S®MXO5-Z1
Soft case (W × H × D: 550 mm × 300 mm × 340 mm)	R&S®MXO5-Z3
Transit case (W × H × D: 613 mm × 478 mm × 337 mm)	R&S®MXO5-Z4
VESA adapter	R&S®MXO5-Z7



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The perfect choice for:	
Hardware debugging and serial bus analysis	Power analysis
EMI debugging	Power sequencing
Power integrity	Signal integrity

Important facts		
Specification	**MXO 5**	**Why this is important**
Acquisition rate	< 4.5 million waveforms/s	Find signal anomalies quickly.
ADC resolution	12 bit (18-bit architecture with HD mode)	See your signals accurately.
Memory depth	standard: 500 Mpoints per channel; option: 1 Gpoint interleaved	Capture more time.
Trigger	Industry's most sensitive trigger: 0.0001 vertical division	Isolate events with more precision.
Spectrum	> 50000 FFT/s	Multi-domain approach for signal insights. Fast FFT makes EMI debugging responsive to capture rare RF events.
Channels	4 or 8	See more signals at the same time with R&S®SmartGrid to intuitively arrange necessary waveforms.

Your go-to tool

Serial protocol trigger and decode

Fast spectrum support log-log scale

2 arbitrary generators (1 MHz to 100 MHz)

Power analysis quality and harmonics

Rohde&Schwarz will continue to rollout newer capabilities and functions in the future to meet ever changing requirements.

Digital voltmeter

Math functions

MSO logic analysis

Frequency response

Use cases (highlights)

Inverter and drive train analysis

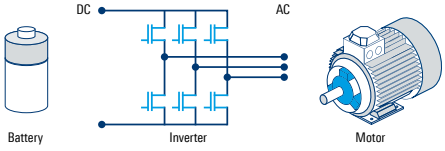
- More channels to observe voltage and current signals
- New WBG devices for faster switching
- Digital trigger with sensitivity to detect possible shoot-through events
- Longer record length for monitoring

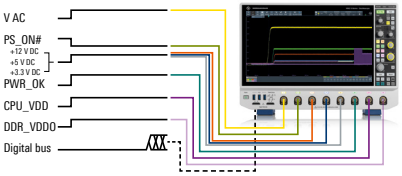
Power sequencing and integrity

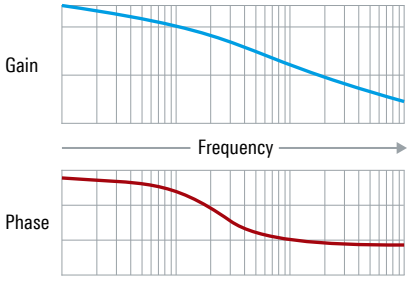
- Record more power rails longer
- 18-bit HD for high precision and sensitivity to power ripples
- Record all power up/down sequences
- Additional spectrum analysis helps identify spectral noise in debugging

Control loop response of power supply

- All-in-one tool to observe time and Bode plots
- Start from 0.01 Hz to 100 MHz
- Amplitude profile and delayed measurement for settling time







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MXO 5C Series Oscilloscope





Next generation oscilloscope in a compact form

The MXO 5C delivers breakthrough oscilloscope technology leveraged from MXO 5 series in a 2 HU form factor. Take advantage of the industry's highest channel density from 100 MHz to 2 GHz of bandwidth. Perfect for rackmount applications, it can also be used in bench applications with an external display or web interface with a virtual front panel. The four-channel and eight-channel models with bandwidths from 100 MHz to 2 GHz let you choose the one that is right for you.

Model overview

Model	Bandwidth
4-channel model	
R&S®MXO5C-43	350 MHz
R&S®MXO5C-45	500 MHz
R&S®MXO5C-410	1 GHz
R&S®MXO5C-420	2 GHz
8-channel model	
R&S®MXO5C-81	100 MHz
R&S®MXO5C-82	200 MHz
R&S®MXO5C-83	350 MHz
R&S®MXO5C-85	500 MHz
R&S®MXO5C-810	1 GHz
R&S®MXO5C-820	2 GHz

Key specifications

Integrated micro display	•, IP address, status, firmware, others
External display	HDMI, DisplayPort – virtual front panel
Maximum sample rate	interleaved: 5 Gsample/s; all channels: 2.5 Gsample/s
Channels	analog: 4 or 8; digital: 16 standard (dedicated connector)
Acquisition rate	per channel: 4.5 million acquisitions/s; on 4 channels: 18 million acquisitions/s
ADC resolution	12 bit (all sample rates)
Maximum vertical resolution	18 bit (HD mode)
Standard memory depth	standard: 500 Mpoints per channel; option: 1 Gpoint interleaved
Segmented memory	up to 1 million segments with 1 Mpoint capture
FFT speed	> 50 000 FFT/s
FFT capabilities	log-log display, max./min. hold, peak lists
Vertical noise floor	130 µV (RMS) at 1 mV/div, 2 GHz bandwidth
Vertical offset range	5 V at 1 MΩ coupling
Arbitrary generator	2 channels, 100 MHz with 625 Msample/s
Digital trigger sensitivity	0.0001 div
Trigger hysteresis	user selectable
Trigger jitter	< 1 ps (RMS) (meas.)
Timebase accuracy	±0.2 ppm
Operating system	Linux
Upgradeable	bandwidth, protocol trigger and decode, arbitrary waveform generator, analysis capabilities

Scope of delivery

- ▶ Power cable
- ▶ Quick start guide
- ▶ 1 year warranty

Recommended options/accessories

Description	Type
Bandwidth upgrade	
Upgrade of MXO 54C to 500 MHz bandwidth	R&S®MXO5C-B405
Upgrade of MXO 54C to 1 GHz bandwidth	R&S®MXO5C-B410
Upgrade of MXO 54C to 2 GHz bandwidth	R&S®MXO5C-B420
Upgrade of MXO 58C to 200 MHz bandwidth	R&S®MXO5C-B802
Upgrade of MXO 58C to 350 MHz bandwidth	R&S®MXO5C-B803
Upgrade of MXO 58C to 500 MHz bandwidth	R&S®MXO5C-B805
Upgrade of MXO 58C to 1 GHz bandwidth	R&S®MXO5C-B810
Upgrade of MXO 58C to 2 GHz bandwidth	R&S®MXO5C-B820

Recommended options/accessories

Description	Type
Options	
Mixed signal option, for MXO 5C series with 16 digital channels	R&S®MXO5C-B1
Arbitrary waveform generator, 100 MHz, 2 analog channels	R&S®MXO5C-B6
Additional M.2 SSD	R&S®MXO5C-B19
Memory option 1 Gpoint	R&S®MXO5C-B110
Power analysis	R&S®MXO5C-K31
Frequency response analysis	R&S®MXO5C-K36
Low speed serial triggering and decoding (I^2C/SPI/UART/RS-232/RS-422/RS-485)	R&S®MXO5C-K510
Automotive serial triggering and decoding (CAN/CAN FD/CAN XL/LIN)	R&S®MXO5C-K520
MIPI low speed protocols (SPMI)	R&S®MXO5C-K550
Automotive Ethernet protocols (10BASE-T1S, 100BASE-T1)	R&S®MXO5C-K560
Accessory	
Rackmount kit, for MXO 5C series	R&S®ZZA-KN2NS



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The perfect choice for:	
Rackmount	Bench
Oscilloscope or digitizer	General purpose, power electronics

Your benefit	Features
Best choice for your application and budget	Choose from a 4-channel or 8-channel version and a wider range of bandwidths (all user bandwidths upgradeable to 2 GHz)
More flexibility for rackmounts or benches	► An extremely useful integrated micro display provides quick access to critical information such as instrument IP, firmware version and more ► Use HDMI, DisplayPort or standard LAN web interfaces to visualize instrument controls ► Use in tighter spaces: Highest channel density in only 2 HU with $^1/_3$ the depth of competitors
Measurement confidence from superior hardware	► Includes 12-bit ADC that run at all sample rates ► Includes 500 Mpoints standard memory ► Captures up to 99% signal activity ► Rohde&Schwarz trigger re-arm time of 21 ns with max. acquisition rate of 4.5 million waveforms/s after preset (86% real-time signal capture) ► Trigger isolates small signal details at all bandwidths and vertical settings without any tradeoffs

Common applications

► Physics research
► Automated test
► Manufacturing test
► Power electronics
► Power management (PMIC)
► Use with MXO 5 series for up to 16 channels with common trigger

Important facts

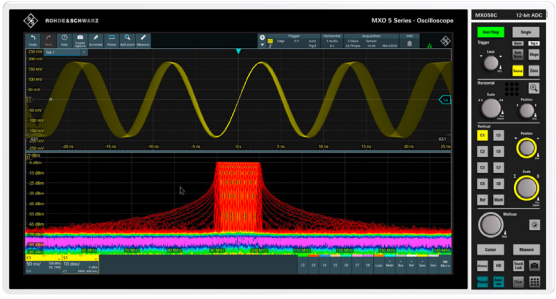
Specification	MXO 5C	Why this is important
Integrated micro display	low-power display IP address, firmware version and software options, available also when the instrument is turned off	Shows key information without needing a main screen.
Compact form factor	rackmount height: 2 HU	Compact for rackmount and bench applications where space is at a premium and high channel density is needed.
Removable M.2 SSD card	•	Enables data storage in a secure location.
External display	HDMI, DisplayPort – virtual front panel	Allows users to connect the oscilloscope to an external display or touchscreen and enjoy the same user-friendly user interface as MXO 5 series.



Integrated micro display provides critical info including IP address: Need to quickly find instrument IP address? Need to see if the oscilloscope is booted up and/or running? The world's first oscilloscope micro display gives you quick and easy access to critical information.



Do you need more than eight channels? Then combine a MXO 5 oscilloscope with a second one or with a MXO 5C for to 16 channels with a common trigger



Remote LAN web interface: Interact with Rohde&Schwarz oscilloscopes using the built-in web browser. The front panel has buttons and dials in addition to the setting dialog. Make and download screen images with just a mouse click.

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Probe portfolio

Probe type

- Passive
- Active single-ended
- Active differential
- Modular
- Power rail
- Multichannel
- High voltage
- Current
- Near-field
- Logic probes
- Accessories



Type (R&S®)	Description	Bandwidth	Dynamic range
RT-ZP03S/ZP05M/ZP05S/ ZP10/ZP11	general purpose model, 10:1, 10 MΩ	300 MHz to 700 MHz	up to 400 V (RMS)
RT-ZP1X	specialized model, 1:1, 1 MΩ	38 MHz	DC: 60 V, AC: 30 V (RMS)
RT-ZPMMCX	specialized MMCX tip, 25:1, 14.9 MΩ	700 MHz	DC: 60 V, AC: 30 V (RMS)
RT-ZZ80	broadband model, 10:1, 500 Ω	8 GHz	20 V (RMS)
RT-ZS10(E)/20/30/60	high bandwidth single ended, 10:1, 1 MΩ [1), 2)]	1 GHz to 6 GHz	±8 V
RT-ZD10/20/30/40	high bandwidth differential, 10:1, 1 MΩ [1), 2)]	1 GHz to 4.5 GHz	±5 V
RT-ZA15	attenuator for R&S®RT-ZD10/20/30, 10:1	depends on R&S®RT-ZD	±70 V DC, ±46 V AC (peak)
RT-ZM15/30/60/90/130/160	probe amplifier module, 10:1/2:1, 400 kΩ [1), 2)]	1.5 GHz to 16 GHz	depends on tip module used
RT-ZMA10/12/14/15	R&S®RT-ZM tip: solder-in/square-pin/flex solder-in/quick-connect	[3)]	±2.5 V (10:1), ±0.5 V (1:1)
RT-ZMA30/40/50	R&S®RT-ZM tip: browser/SMA/extreme temperature kit	[3)]	±2.5 V (10:1), ±0.5 V (1:1)
RT-ZPR20/40	high bandwidth power rail, 1:1, 50 kΩ (DC), 50 Ω (AC) [1), 2)]	2 GHz/4 GHz	±850 mV
RT-ZVC02/04	2/4 channels, small voltage and current, 10 MΩ	1 MHz	±1.8 V to ±15 V, ±4.5 µA to ±10 A
RT-ZI10(C)/11	isolated, 10:1/100:1, 10(10)/100 MΩ	500 MHz	600 V CAT IV (300 V CAT III)/600 V CAT IV
RT-ZH10/11	passive, single-ended, 100:1/1000:1, 50 MΩ	400 MHz	1 kV (RMS)
RT-ZHD07/15/16/60	differential, 25:1 to 100:1/250:1 to 1000:1 [1), 2)]	100 MHz to 200 MHz	±750 V to 6000 V (peak)
RT-ZISO	isolated, high bandwidth, high CMRR, 0.04:1 to 120:1 [1), 2)]	100 MHz to 1 GHz	depends on tip module used
ZISO-Z101/201/202/203	R&S®RT-ZISO tip: MMCX/MMCX/square pin, wide square pin	DC to 1 GHz	tip to reference input: 8/300/750/2500 V (RMS)
ZISO-Z301/302	R&S®RT-ZISO tip: isolated browser tip	DC to 500 MHz	tip to reference input: 300 V/3540 V (RMS)
RT-ZC02	high range, 0.01/0.001 V/A	20 kHz	1000 A (RMS)
RT-ZC03	basic AC/DC current probe	100 kHz	20 A (RMS), ±30 A (peak), 0.1 V/A
RT-ZC05B/10(B)	mid range 0.01 V/A [1)]	2 MHz/10 MHz	500 A/150 A (RMS), ±700 A/±300 A (peak)
RT-ZC15B/20(B)/30	high range 0.1/0.1/1 V/A [1)]	50/100/120 MHz	30/30/5 A (RMS), ±50/50/7.5 A (peak)
RT-ZC31	three range 0.1 V/A, 1 V/A, 10 V/A switchable	120 MHz	30 A (RMS), ±50 A (peak)
CWT/Mini/Ultra-Mini	PEMUK Rogowski wideband current probes	0.6 Hz to 50 MHz	30 A (peak) to 6000 A (peak)
HZ-15/17	passive E and H near-field probe set, compact	30 MHz to 3 GHz	N/A
RT-ZL03/04	logic probes, 8 channels	300 MHz/400 MHz	
RT-ZA9	N(m) adapter for R&S®RT-Zxx probes	depends on probe	
RT-ZA29	2D probe positioner		
RT-ZAP	3D probe positioner		
RT-ZA50	adapter, Rohde&Schwarz probe interface to 2.92 mm/3.5 mm/SMA		
RT-ZA51	adapter, 2.92 mm/3.5 mm/SMA to Rohde&Schwarz probe interface		
RT-Z2T	probe interface adapter, for selected Tektronix probes with TekProbe BNC level II interface		
For more information, see product brochure “Probes and accessories for Rohde&Schwarz oscilloscopes“ (PD 3606.8866.12)			

[1)] Includes Rohde&Schwarz probe interface.

[2)] Includes R&S®ProbeMeter and micro button for instrument control.

[3)] Depends on amplifier module.

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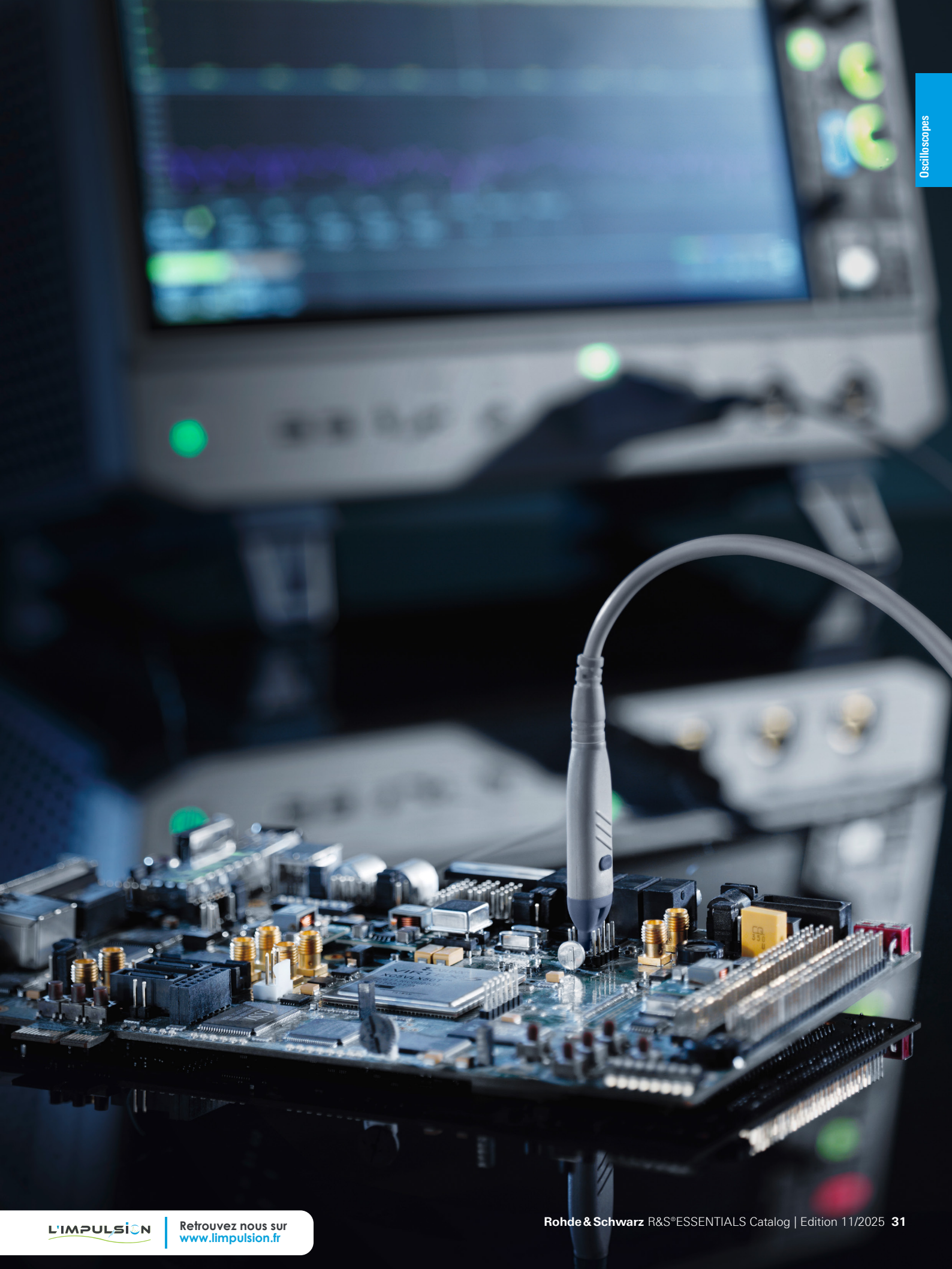

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POWER SUPPLIES

The R&S®ESSENTIALS DC power supply portfolio covers everything from basic low-cost power supplies to high-end instruments for cutting-edge R&D. We have a budget line for educational labs, a performance line for advanced applications and even a specialty line for battery simulation.

Number of channels

Our power supplies have up to four channels. The number depends the specific application and requirements.

In some cases, a single output will be sufficient. However, multi-output supplies can offer important advantages in applications that require +15 V and –15 V simultaneously. A multi-output supply with independently controllable outputs is usually more versatile and cost-efficient than a set of individual supplies.

Output power

Our power supplies have high power up to 800 W. All multichannel power supplies allow parallel and serial operation to achieve higher voltage/current output.

Readback measurements and sense lines

Modern power supplies include a multimeter that measures the voltage/current consumed by the device under test (DUT). The readback accuracy and resolution specifies the accuracy and resolution of these measurements.

The output cables that connect a power supply's output to its load have some resistance, and as current flow increases there will be a voltage drop across the cables. The sense lines connected from the supply to the load compensate for these unwanted voltage drops since the voltage can be measured directly at the DUT.

Most Rohde&Schwarz power supplies are equipped with sense lines.

Protection functions

Rohde&Schwarz power supplies come with a variety of protection functions to safeguard instruments and DUTs.

Depending on the model, users can separately set the maximum current (electronic fuse, overcurrent protection, OCP), maximum voltage (overvoltage protection, OVP) and maximum power (overpower protection, OPP) for each channel. The output channel will switch off when the limit is reached.

Overtemperature protection also prevents the instrument from overheating.

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R&S®NGP800 power supply series	44
R&S®NGL200 high precision power supply series	46
R&S®NGM200 high precision power supply series	48
R&S®NGU source measure units	50



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Power supply portfolio







	Basic units			Performance units	
	R&S®NGE102B/103B	R&S®NGC101(-G)/ NGC102(-G)/NGC103(-G)	R&S®NGA101/102/ 141/142	R&S®HMP2020/2030	R&S®HMP4030/4040
Electrical specifications					
Number of output channels	2/3	1/2/3	R&S®NGA101/141: 1 R&S®NGA102/142: 2	2/3	3/4
Maximum output power	66 W/100 W	100 W	40 W/80 W	188 W	384 W
Maximum output power per channel	33.6 W	100 W/50 W/33 W	40 W	80 W, except R&S®HMP2020, CH1: 160 W	160 W
Output voltage per channel	0 V to 32 V	0 V to 32 V	R&S®NGA101/102: 0 V to 35 V R&S®NGA141/142: 0 V to 100 V	0 V to 32 V	0 V to 32 V
Maximum output current per channel	3 A	10 A/5 A/3 A	R&S®NGA101/102: 6 A R&S®NGA141/142: 2 A	5 A, except R&S®HMP2020, CH1: 10 A	10 A
Voltage ripple and noise (RMS) (20 Hz to 20 MHz)	< 1.5 mV (typ.)	R&S®NGC101: < 1 mV R&S®NGC102/103: < 450 µV	R&S®NGA101/102: < 0.5 mV R&S®NGA141/142: < 1.5 mV	< 1.5 mV	< 1.5 mV
Current ripple and noise (RMS) (20 Hz to 20 MHz)	< 2 mA	R&S®NGC101: < 1.5 mA R&S®NGC102/103: < 1 mA	< 500 µA	< 1 mA	< 1 mA
Load recovery time [1]	< 200 µs	< 1 ms	R&S®NGA101/102: < 100 µs R&S®NGA141/142: < 50 µs	< 1 ms	< 1 ms
Programming/readback resolution					
Voltage	10 mV	1 mV	programming: R&S®NGA101/102: 1 mV R&S®NGA141/142: 10 mV readback: 1 mV	1 mV	1 mV
Current	1 mA	< 1 A: 0.1 mA (R&S®NGC101: 0.5 mA) ≥ 1 A: 1 mA	readback: 10 µA low-current measurement range: 1 µA	< 1 A: 0.1 mA (10 A CH: 0.2 mA); ≥ 1 A: 1 mA	< 1 A: 0.2 mA; ≥ 1 A: 1 mA
Readback accuracy (± (% of output + offset))					
Voltage	< 0.1% + 20 mV	< 0.05% + 2 mV	R&S®NGA101/102: 0.02% + 5 mV R&S®NGA141/142: 0.02% + 10 mV	< 0.05% + 5 mV	< 0.05% + 5 mV
Current	< 0.1% + 5 mA	R&S®NGC101: < 0.2% + 10 mA R&S®NGC102: < 0.1% + 5 mA R&S®NGC103: < 0.05% + 2 mA	< 0.05% + 500 µA low-current measurement range: < 0.15% + 40 µA	< 0.1% + 2 mA	< 0.1% + 2 mA
Display and interfaces					
Display	3.5" QVGA	3.5" QVGA	3.5" QVGA	240 × 64 pixel LCD	240 × 128 pixel LCD
Rear panel connections	–	16-pin connector block	8-pin connector block	4-pin connector block per channel	4-pin connector block per 2 channels
Remote control interfaces	standard: USB optional: LAN	standard: USB, LAN R&S®NGC10x-G models with IEEE-488 (GPIB)	standard: USB, LAN	optional: USB, LAN, IEEE-488 (GPIB), RS-232	optional: USB, LAN, IEEE-488 (GPIB), RS-232
General data					
Dimensions (W × H × D)	222 × 97 × 310 mm	222 × 97 × 291 mm	222 × 97 × 448 mm	285 × 95 × 405 mm	285 × 136 × 405 mm
Weight	4.9 kg/5.0 kg	2.6 kg (R&S®NGC10x-G models: 2.7 kg)	6.6 kg/7.0 kg/6.9 kg/7.3 kg	7.8 kg/8.0 kg	12.4 kg/12.8 kg
Rack adapter	R&S®HZC95 option	R&S®HZC95 option	R&S®HZN96 option	R&S®HZ42 option	R&S®HZP91 option

[1] 10% to 90% load change within a band of ±20 mV of set voltage.
[2] In the most sensitive measurement range.

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	High-precision power supplies		
R&S®NGP802/804/814/822/824	R&S®NGL201/202	R&S®NGM201/202	R&S®NGU201/401/411
R&S®NGP802/822: 2 R&S®NGP804/814/824: 4	1/2	1/2	R&S®NGU201: 2 R&S®NGU401/411: 4
R&S®NGP802/822: 400 W R&S®NGP804/814/824: 800 W	60 W/120 W	60 W/120 W	R&S®NGU201/401: 60 W R&S®NGU411: 20 W
200 W	60 W	60 W	60 W/20 W/60 W
R&S®NGP802/804/814 (CH1, CH2): 0 V to 32 V R&S®NGP822/824/814 (CH3, CH4): 0 V to 64 V	0 V to 20 V	0 V to 20 V	R&S®NGU201: 0 V to 20 V R&S®NGU401/411: –20 V to +20 V
R&S®NGP802/804/814 (CH1, CH2): 20 A R&S®NGP822/824/814 (CH3, CH4): 10 A	≤ 6 V output voltage: 6 A > 6 V output voltage: 3 A	≤ 6 V output voltage: 6 A > 6 V output voltage: 3 A	≤ 6 V output voltage: 8 A (R&S®NGU411: ≤ 10 V: 2 A) > 6 V output voltage: 3 A (R&S®NGU411: > 10 V: 1 A)
< 3 mV	< 500 µV	< 500 µV	< 500 µV
< 3.5 mA	< 1 mA	< 1 mA	< 1 mA
< 400 µs	< 30 µs	< 30 µs	< 30 µs
1 mV	1 mV/10 µV	10 µV[2)]	20 V range: 10 µV, 6 V range: 1 µV[2)]
0.5 mA	0.1 mA/10 µA	10 µA[2)]	10 A range: 10 µA (not for R&S®NGU411) 3 A range: 1 µA (R&S®NGU411: 2 A range) 100 mA range: 100 nA 10 mA range: 10 nA 1 mA range: 1 nA 10 µA range: 100 pA[2)]
R&S®NGP802/804/814 (CH1, CH2): < 0.05% + 5 mV R&S®NGP822/824/814 (CH3, CH4): < 0.05% + 10 mV	< 0.02% + 2 mV	< 0.02% + 2 mV[2)]	20 V range: < 0.02% + 2 mV 6 V range: < 0.02% + 500 µV[2)]
< 0.1% + 5 mA	< 0.05% + 250 µA	< 0.05% + 15 µA[2)]	10 A range: < 0.025% + 500 µA (not for R&S®NGU411) 3 A range: < 0.025% + 250 µA (R&S®NGU411: 2 A range) 100 mA range: < 0.025% + 15 µA 10 mA range: < 0.025% + 1.5 µA 1 mA range: < 0.025% + 150 nA 10 µA range: < 0.025% + 15 nA[2)]
TFT 5" 800 × 480 pixel WVGA touch	TFT 5" 800 × 480 pixel WVGA touch	TFT 5" 800 × 480 pixel WVGA touch	TFT 5" 800 × 480 pixel WVGA touch
8-pin connector block per 2 channels	8-pin connector block per channel	8-pin connector block per channel	8-pin connector block
standard: USB, LAN optional: IEEE-488 (GPIB)	standard: USB, LAN optional: IEEE-488 (GPIB)	standard: USB, LAN optional: IEEE-488 (GPIB)	standard: USB, LAN optional: IEEE-488 (GPIB)
362 × 100 × 451 mm	222 × 97 × 436 mm	222 × 97 × 436 mm	222 × 97 × 436 mm
R&S®NGP802/822: 7.5 kg R&S®NGP804/814/824: 8.0 kg	7.1 kg/7.3 kg	7.1 kg/7.3 kg	7.1 kg
R&S®ZZA-GE23 option	R&S®HZN96 option	R&S®HZN96 option	R&S®HZN96 option

All data is valid at +23°C (– 3°C/+ 7°C) after 30 minutes of warm-up time.
All values are measured values if not otherwise stated.
CH: channel; ● yes; – no; ○ optional

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R&S®NGE100B Power Supply Series



Meets your daily needs

- All channels are galvanically isolated and earth-free
- All channels are electrically equivalent with the same voltage, current and power
- Parallel and serial operation
- Protection functions to safeguard instrument and DUT
- Tracking and link functions
- Remote control via USB interface and optional LAN

Model overview

Model	Channel count	Maximum voltage	Maximum current	Maximum output power	Resolution
R&S®NGE102B	2	2 × 33 V	2 × 3 A	66 W	10 mV/1 mA
R&S®NGE103B	3	3 × 33 V	3 × 3 A	100 W	10 mV/1 mA

Important facts

Specification	R&S®NGE100	Why this is important
Interface options	USB, LAN (optional) Wi-Fi (optional)	Modern and common interface capabilities allow quick and ready access to control and program the instrument.
Dimensions	½ 19" 2 HU	A small footprint for the power supply allows placement in tight lab space conditions or university settings as well as high-density manufacturing and rack applications.
Arbitrary function generation	EasyArb	Easily programmable time/voltage or time/current curves.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Base unit	
Two-channel power supply	R&S®NGE102B
Three-channel power supply	R&S®NGE103B
Software options	
Ethernet remote control	R&S®NGE-K101
Digital I/O trigger	R&S®NGE-K103
System components	
19" rack adapter, 2 HU	R&S®HZC95



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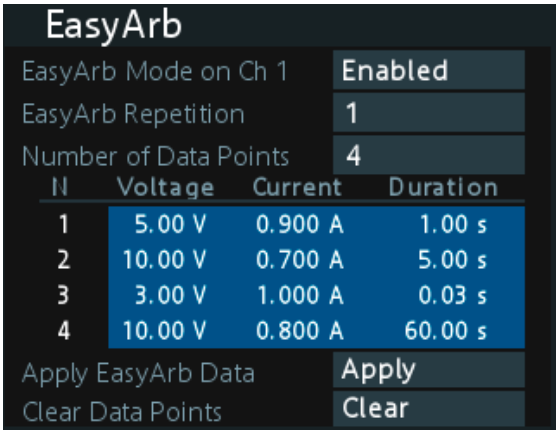
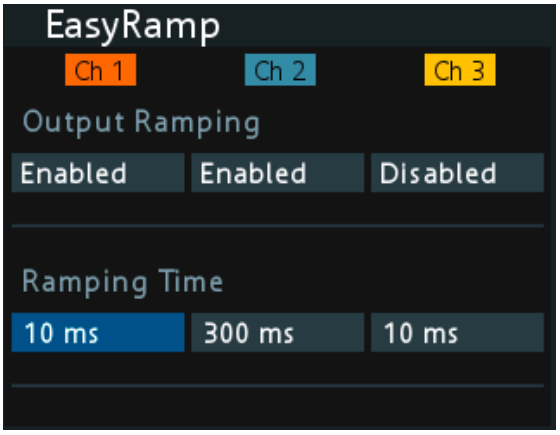
The perfect choice for:	
Education	R&D
Maintenance and repair	Manufacturing test

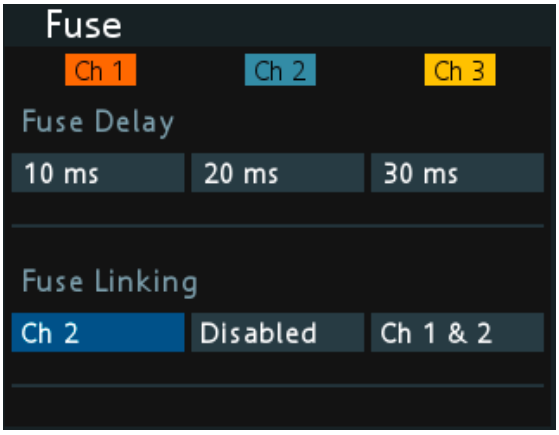
Your benefit	Features
Straightforward operation	All basic functions can be operated via direct keys on the front panel. The rotary knob can be used to adjust the desired voltage and current
The separate output channels can work like individual power supplies	All channels are electrically equivalent, galvanically isolated, earth-free and can be combined in serial or in parallel to achieve higher voltages or currents
Small, compact and quiet	Combination of primary transformer, secondary switching regulator and additional linear control reduces weight and size while maintaining robustness and low ripple



Comfort features for special applications: EasyArb allows the user to program time/voltage or time/current sequences



Comfort features for special applications: EasyRamp simulates operating conditions with controlled rise of supply voltage to prevent a sudden voltage surge

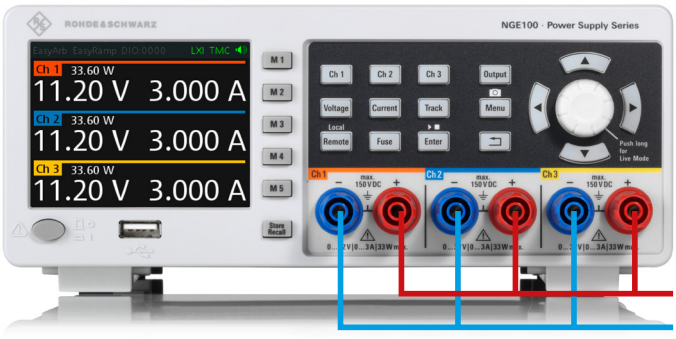


Users can set the power supply so that all channels are switched off if one channel hits the limit; or it can be set to leave one channel working

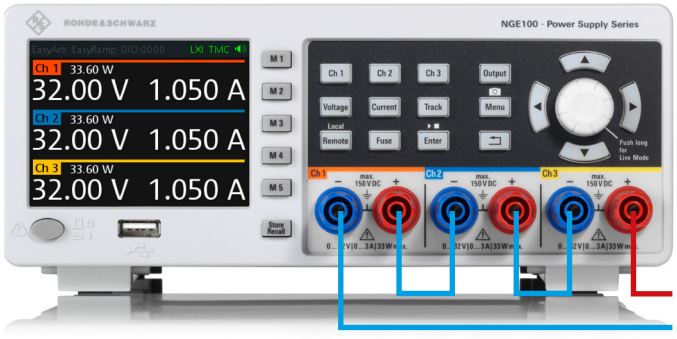
Parallel and serial operation

Running in parallel, higher currents can be achieved; serial connected channels yield higher voltages.

Parallel operation: max. 9 A



Serial operation: max. 96 V



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R&S®NGC100 Power Supply Series



Compact and easy to use

- One, two or three channels: the specifications and functions make it ideal for development labs and industrial environments
- High energy efficiency helps the power supplies remain cool and quiet, even at their maximum load
- Practical interfaces and connectors make work quick and convenient – even in 19" racks

Model overview

Model	Channels	Maximum output power per channel	Maximum output current per channel	Output voltage per channel	Maximum output power	Ripple and noise (20 Hz to 20 MHz)	Programming resolution	Readback resolution
R&S®NGC101	1	100 W	10 A	0 V to 32 V	100 W	< 1 mV (RMS) (meas.); < 5 mV (peak-to-peak) (meas.)	1 mV/< 1 A: 0.5 mA; 1 mV/≥ 1 A: 1 mA	1 mV/< 1 A: 0.5 mA; 1 mV/≥ 1 A: 1 mA
R&S®NGC102	2	50 W	5 A			< 450 µV (RMS), < 4 mV (peak-to-peak) (meas.)	1 mV/< 1 A: 0.1 mA; 1 mV/≥ 1 A: 1 mA	1 mV/< 1 A: 0.1 mA; 1 mV/≥ 1 A: 1 mA
R&S®NGC103	3	33 W	3 A					

Important facts

Specification	R&S®NGC100	Why this is important
Readback accuracy	▶ voltage ±(% of output + offset) < 0.05 % + 2 mV ▶ current ±(% of output + offset) – R&S®NGC101: < 0.15 % + 10 mA – R&S®NGC102: < 0.05 % + 4 mA – R&S®NGC103: < 0.05 % + 2 mA	The R&S®NGC100 can accurately measure and replicate actual device power consumption, even at low voltage and current levels. This simplifies the setup by reducing the need for external multimeters.
Ripple and noise (20 Hz to 20 MHz)	▶ voltage (RMS) – R&S®NGC101: < 1 mV – R&S®NGC102/103: < 450 µV ▶ current (RMS) – R&S®NGC101: < 1.5 mA – R&S®NGC102/103: < 1 mA	Allows the instrument to supply interference-free voltage to sensitive DUTs with advanced electronic circuitry which often reacts to supply line interference.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Single-channel power supply	R&S®NGC101
Single-channel power supply, GPIB	R&S®NGC101-G
Two-channel power supply	R&S®NGC102
Two-channel power supply, GPIB	R&S®NGC102-G
Three-channel power supply	R&S®NGC103
Three-channel power supply, GPIB	R&S®NGC103-G
19" rack adapter, 2 HU, for one or two R&S®NGC100 power supplies	R&S®HZC95



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The perfect choice for:	
Engineering labs	Production testing
Education	Maintenance and repair

Remote sensing

Improve voltage regulation and measurement accuracy with remote sensing that regulates the output voltage directly at the DUT input terminals instead of the power supply output terminals. The remote sensing function compensates for voltage drops over the supply leads – especially in applications with high current consumption. The R&S®NGC100 power supplies provide separate sense lines for each output channel.

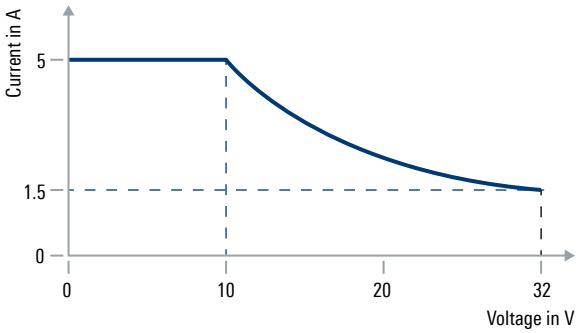
Data logging

Logging data is key to long-term monitoring, reviewing test setups and repeating test conditions when analyzing power behavior and optimizing power consumption. The R&S®NGC100 power supplies simultaneously log voltage and current measurements over time on all outputs with a maximum acquisition time of 1000 sample/s. Easily export the time-stamped data as a CSV file for analysis, reports and documentation.



Ideal for industrial environments: Power supply units in industrial production are often found in 19" racks. All R&S®NGC100 models can be integrated into 19" racks with the R&S®HZC95 rackmount adapters.

FlexPower: Get maximum power at various operating points



Your benefit	Features
All measured parameters clearly displayed	The brilliant color display shows voltage, current and power values in real time.
Flexible channel configurations for up to 96 V	All channels are galvanically isolated and can be combined to drive balanced circuitries or for higher voltages/currents.
Safe working environment	► FuseLink allows you to freely combine the electronic fuses in each channel ► A fuse delay can be set to prevent the power supply from switching off prematurely due to a short current spike ► Fan speed is automatically adjusted to the load condition, allowing you to work in a quiet environment
Emulate real-world scenarios	Arbitrary waveforms can be generated for voltage and current. This function can be configured and executed via the control panel or an external interface.
Control inrush currents	Increase the output voltage continuously within a timeframe of 10 ms to 10 s with the EasyRamp function.

Arbitrary functions

Emulate the normal behavior of your power subsystems early in the design process and simulate power problems for DUT design verification.

The EasyArb function lets you generate complex time-varying voltage and current sequences of output changes with dwell times down to 10 ms.

External trigger events

An external trigger signal (TTL) to the voltage interface on the back panel of the instrument can start an arbitrary function, activate and deactivate output delays and activate data logging.



WAGO cage clamp: To facilitate typical calibration setups, the rear panel connector was designed with a WAGO cage clamp.

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R&S®NGA100 Power Supply Series



Linear. Accurate. Affordable.

- The power supplies are linear, compact and easy to use
- Excellent readback accuracy with a low-current range for demanding measurements
- Ideal many bench applications thanks to the data logging, arbitrary waveforms, built-in statistics and remote sensing features
- Can be used in automated testing thanks to the various remote interfaces (USB and Ethernet)
- Advanced protective functions keep devices connected and power supplies safe

Model overview

Model	Channels	Maximum output power	Maximum output voltage per channel	Maximum output current per channel	Ripple and noise (RMS) (20 Hz to 20 MHz)	Readback accuracy
R&S®NGA101	1	40 W	35 V	6 A	< 0.5 mV, < 500 µA	< 0.02 % + 5 mV, < 0.03 % + 500 µA
R&S®NGA102	2	80 W	35 V (serial)	6 A (parallel)	< 0.5 mV, < 500 µA	< 0.02 % + 5 mV, < 0.03 % + 500 µA
R&S®NGA141	1	40 W	100 V	2 A	< 1.5 mV, < 500 µA	< 0.02 % + 10 mV, < 0.03 % + 500 µA
R&S®NGA142	2	80 W	100 V (serial)	2 A (parallel)	< 1.5 mV, < 500 µA	< 0.02 % + 10 mV, < 0.03 % + 500 µA

Important facts

Specification	R&S®NGA100	Why this is important
Readback accuracy	► voltage – R&S®NGA101, R&S®NGA102: < 0.02 % + 5 mV – R&S®NGA141, R&S®NGA142: < 0.02 % + 10 mV ► current: < 0.03 % + 500 µA	The R&S®NGA100 can accurately measure and replicate the actual power consumption for a device, even at low voltage and current levels. This simplifies the setup by reducing the need for external multimeters.
Ripple and noise (20 Hz to 20 MHz)	► voltage (RMS) – R&S®NGA101, R&S®NGA102: < 0.5 mV – R&S®NGA141, R&S®NGA142: < 1.5 mV ► current (RMS): < 500 µA	Allows the supply of interference-free voltage to sensitive DUTs with advanced electronic circuitry that is often sensitive to interference on supply lines.
Maximum output power	80 W	Increased output power enables the driving of DUTs with greater power consumption.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Software options	
Digital I/O trigger	R&S®NGA-K103
System components	
19" rack adapter, 2 HU	R&S®HZN96

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The perfect choice for:	
R&D	Manufacturing
IoT and low-power designs	General purpose and education

Your benefit	Features
Linear design	The linear design of the output stages allows R&S®NGA100 power supplies to operate with minimal residual ripple and noise for extremely stable output voltage and current.
FlexPower	The R&S®NGA100 power supplies operate with maximum power at various operating points and cover far more applications than single-range power supplies.
Channel fusion	Activate channel fusion in either serial or parallel mode and the device will act like a single-channel version of itself with double voltage or current capabilities.
Low-current measurement range	IoT devices can have multiple sleep modes with very low current consumption. To accurately determine these operating states, R&S®NGA100 power supplies have a low-current measurement range.

Features



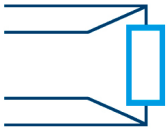
EasyRamp



Channel fusion



EasyArb



Remote sensing



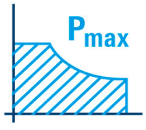
Built-in measurements



Data logging



Save/recall device settings



FlexPower



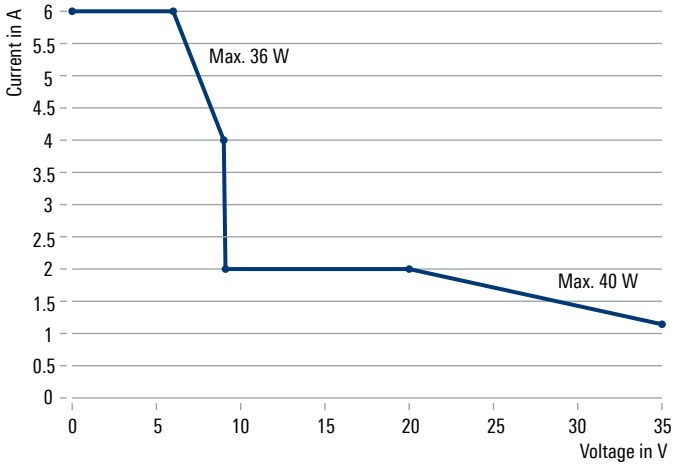
Digital I/O trigger



High accuracy

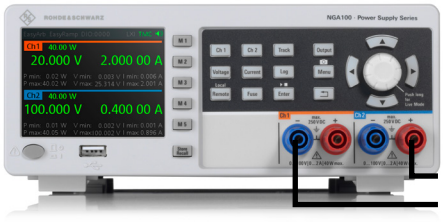
R&S®NGA101/R&S®NGA102 FlexPower curve per output

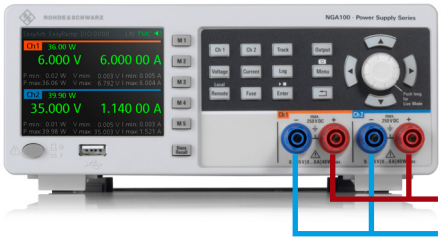
The R&S®NGA100 series operates with maximum power at various operating points and covers far more applications than single-range power supplies.



Channel fusion

Activate channel fusion in either serial or parallel mode and the device will act like a single-channel version of itself. In serial mode, the outputs are connected internally, while the parallel mode requires external wiring.





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R&S®HMP Power Supply Series



Up to four channels in a single instrument

- Primarily designed for industrial use (production environments and development labs)
- High efficiency with low residual ripple and many protection functions
- Four models: 2 or 3 channels with 188 W total output power, 3 or 4 channels with 384 W total output power
- Galvanically isolated, floating outputs with overload and short-circuit protection
- Remote sensing eliminates voltage drops on the load leads
- Comfortable programming features and 19" rack adapters ensure perfect integration into production environments

Model overview

Model	No. of channels	Output voltage per channel	Output current per channel	Maximum output power	Maximum output power per channel	Maximum voltage in serial operation	Maximum current in parallel operation
R&S®HMP2020	2	0 V to 32 V	CH1: 0 A to 10 A CH2: 0 A to 5 A	188 W	CH1: 160 W CH2: 80 W	64 V	15 A
R&S®HMP2030	3		0 A to 5 A	188 W	80 W	96 V	15 A
R&S®HMP4030	3		0 A to 10 A	384 W	160 W	96 V	30 A
R&S®HMP4040	4		0 A to 10 A	384 W	160 W	128 V	40 A

CH: Channel

Important facts

Specification	R&S®HMP2020/2030; R&S®HMP4030/4040	Why this is important
Number of output channels	2/3; 3/4	More channels in a compact package provide more flexibility for any specific application, especially with equal channels.
Maximum output power	max. 188 W; max. 384 W	With more output power, DUTs with more power consumption can be driven.
Maximum output power per channel	80 W (R&S®HMP2020: 160 W); 160 W	Same output power on all channels provides more flexible configuration in specific applications.
Maximum output voltage	32 V per channel	With the same output voltage on each channel, there are no limitations for using channels in different applications.
Maximum current per channel	5 A (R&S®HMP2020: 10 A); 10 A	With the same output current on each channel, there are no limitations for using channels in different applications.
Sense function	•, for each channel	Sense function provides more accurate voltage at the DUT especially when high current is needed.
Dimensions (W × H × D)	285 mm × 95 mm × 405 mm; 285 mm × 136 mm × 405 mm	The size of the instrument determines how much space is left on the work-bench for the measurement setup.
Weight	7.8 kg/8.0 kg; 12.4 kg/12.8 kg	If the instrument has to be used in different places, it is better to have a lighter instrument.

Scope of delivery

- Quick start guide
- Set of power cables
- 3 year warranty

Recommended options/accessories

Description	Type
Interfaces and system components	
Dual interfaces (RS-232/USB)	R&S®HO720, R&S®HO732
IEEE-488 (GPIB) interface	R&S®HO740
19" rack adapter, 2 HU, for R&S®HMP2020/HMP2030	R&S®HZ42
19" rack adapter, 4 HU, for R&S®HMP4030/HMP4040	R&S®HZP91



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The perfect choice for:	
Engineering lab	Production testing
Maintenance and repair	General purpose

Your benefit	Features
Up to 4 channels in a single compact box	Flexible configuration for any specific application, including sense lines for each channel to compensate voltage drops over the supply leads
Channels galvanically isolated and floating	Serial operation with up to 128 V or parallel operation with up to 40 A
Overcurrent protection (electronic fuse) and overvoltage protection	To safeguard the instrument and the DUT. The fuse link technology switches off all selected channels when one of them reaches its current limit
Easily programmable time/voltage or time/current curves	To vary voltage or current during a test sequence; can be programmed manually via the user interface or via the external interfaces



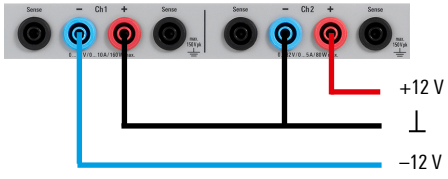
Connections for all channels – including sense lines – are also provided on the rear panel (shown here: R&S®HMP4040)

All channels galvanically isolated and floating

The R&S®HMP power supply family consists of instruments with two, three or four channels. The circuitry of each channel is completely isolated from the others; there is no connection to chassis ground. This makes it easy to combine the channels to drive balanced circuitries that might need +12 V/–12 V, for example, and avoids any ground problems in complex DUTs.

Supplying balanced circuits

Two channels can be connected together to supply balanced circuits with e.g. +12 V/–12 V.



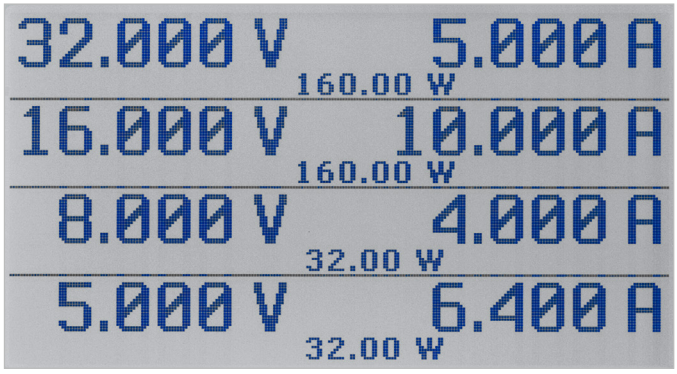
Intuitive to use

All basic R&S®HMP power supply functions can be operated directly via keys on the front panel. It is only necessary to use the menu level for special functions that are needed less frequently.

Color coding of operating states

All settings and operating conditions, including the output power and the status of the protection functions, are shown on the display and indicated by the colors of the illuminated channel keys. The colors of the illuminated keys indicate the different operating conditions:

- Active channel in constant voltage mode: green
- Active channel in constant current mode: red
- Channel in setting mode: blue





All settings and operating states are clearly visualized. Constant voltage mode is indicated by a green key, constant current mode is indicated by a red key. The key color changes to blue in setting mode.

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R&S®NGP800 Power Supply Series



Boost your efficiency with quad-core power

- Five models with 400 W or 800 W available, providing maximum power at a variety of operating points
- Two or four 200 W outputs can each supply up to 64 V or up to 20 A
- Electrically equivalent and galvanically isolated outputs can be wired in series or parallel for up to 250 V or 80 A
- Remote sense terminals, USB and a LAN interface included
- Can be used on a bench in automated test systems thanks to the user-installed GPIB interface, a digital I/O trigger, an analog input and a wireless LAN interface

Model overview

Model	Channel count	Maximum output power	Readback resolution	Output voltage per channel	Output current per channel	Output power per channel
R&S®NGP802	2	400 W	► voltage: 1 mV ► current: 0.5 mA	0 V to 32 V	20 A	200 W
R&S®NGP804	4	800 W		0 V to 32 V	20 A	200 W
R&S®NGP814	4	800 W		► CH1, CH2: 0 V to 32 V ► CH3, CH4: 0 V to 64 V	► CH1, CH2: 20 A ► CH3, CH4: 10 A	200 W
R&S®NGP822	2	400 W		0 V to 64 V	10 A	200 W
R&S®NGP824	4	800 W		0 V to 64 V	10 A	200 W

CH: Channel

Important facts

Specification	R&S®NGP800	Why this is important
Maximum output power	400 W/800 W	For power hungry devices.
Number of output channels	2/4	Powers up to 4 DUTs simultaneously.
Maximum output voltage per channel	32 V/64 V	Covers 48 V applications.
Maximum output current per channel	20 A/10 A	Meets high current consumption requirements.
Maximum output power per channel	200 W	Gets the full 200 W on each output (no shared total power among channels).
Programming resolution	1 mV/0.5 mA	Accurately sets your supply voltage and current.
Readback resolution	1 mV/0.5 mA	Replaces a DMM in many applications.
Acquisition rate	125 sample/s	Great for in-depth post analysis.
Display	5" 800 × 480 pixel touch	Enter values much faster with intuitive touch display.

Scope of delivery

- Power cable
- Terminal blocks
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Hardware option	
IEEE-488 (GPIB) interface	R&S®NG-B105
Software options	
Digital I/O trigger	R&S®NGP-K103
Analog input	R&S®NGP-K107
System components	
19" rack adapter, 2 HU	R&S®ZZA-GE23



L'IMPULSION | Retrouvez nous sur www.limpulsion.fr

The perfect choice for:	
R&D	Manufacturing
Automotive	General purpose

Your benefit	Features
Power four DUTs simultaneously	► Up to four independent, floating outputs ► All outputs galvanically isolated ► Space, cost and time efficient
Maximum power at various operating points	► FlexPower ► Up to 80 A when connected in parallel ► Up to 250 V when connected in series
All you need at a glance	► Large high-resolution touchscreen ► Built-in measurements ► Detailed statistics

More functions



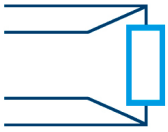
EasyRamp



Output delay



QuickArb



Remote sensing



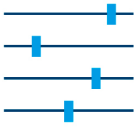
Built-in measurements



Data logging



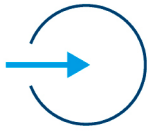
Save/recall device settings



User adjustment



Digital I/O trigger



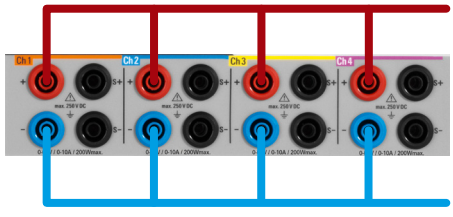
Analog input



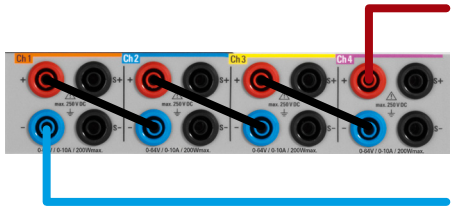
Large high-resolution touchscreen: The home screen gives you a clear overview of all your channels. Each channel can be selected for a more detailed view with a wide variety of additional information such as statistics and icons indicating the status of set protection levels or special functions.

Parallel and serial operation

In case your application requires more voltage or current, connect the outputs in series or parallel and get up to 250 V (R&S®NGP824) or 80 A (R&S®NGP804). Using the tracking function, voltage and current are adjusted on all selected channels simultaneously.



Parallel operation: max. 80 A



Serial operation: max. 250 V

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R&S®NGL200 High Precision Power Supply Series



What sets these power supplies apart from others?

- Fast regulation of output voltage with minimum overshoot and very fast load recovery time
- Minimum residual ripple and noise to supply interference-free voltage to sensitive DUTs
- Readings with up to 6½ digit resolution are perfect for characterizing devices that have low power consumption in standby mode and high current in full load operation
- Two quadrants: operates as source or sink

Model overview

Model	Number of channels	Maximum output power	Output power per channel	Output voltage per channel	Output current per channel	Load recovery time	Programming resolution
R&S®NGL201	1	60 W	max. 60 W	0 V to 20 V	► ≤ 6 V: 6 A ► > 6 V: 3 A	< 30 µs	1 mV/0.1 mA
R&S®NGL202	2	120 W					

Important facts

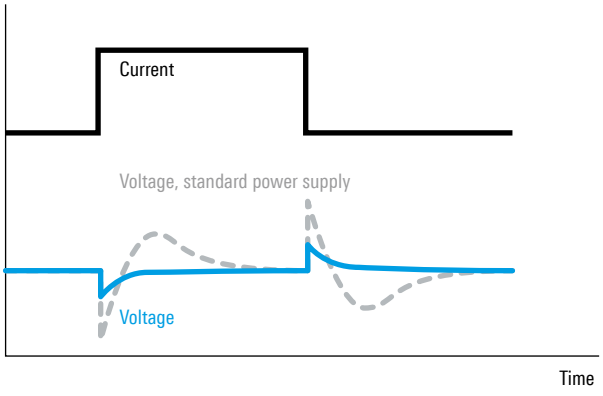
Specification	R&S®NGL200	Why this is important
Large high-resolution touchscreen	TFT 5" 800 × 480 pixels WVGA touch	Easy operation and display of a wide variety of additional information such as power values and statistics.
Sense function for lead resistance compensation	► R&S®NGL201: front and rear panels ► R&S®NGL202: rear panel	Regulate the voltage directly at the load, compensating for voltage drops over the supply leads.
QuickArb	► dwell time: 1 ms to 10 h ► maximum number of points: 4096	Simulate different battery charging conditions or program very short voltage drops to test the power-up behavior of a DUT.
Remote control via various interfaces	USB, Ethernet, IEEE-488 (optional)	Key for integration into test systems and automated operation via scripts.
Fast command processing time	< 6 ms (nom.)	Complex measurement sequences require ever faster setting, measuring and command processing times.

Scope of delivery

- Power cord
- Quick start guide
- 3 year warranty

Optimized load recovery time

Power supplies usually respond to abrupt load changes with overshoot and slow recovery times. Thanks to specially optimized control circuits, the R&S®NGL200 series achieves recovery times of < 30 µs with minimal overshoot, making them perfect for supplying sensitive components.





L'IMPULSION | Retrouvez nous sur www.limpulsion.fr

The perfect choice for:	
Battery tests	Power consumption tests
Simulation of voltage drops	Supplying sensitive designs

Your benefit	Features
Optimized load recovery time with minimal overshoot	Due to the optimized load recovery time of < 30 µs with minimal overshoot during challenging load conditions, the R&S®NGL200 is perfect when testing IoT and other battery-powered devices which require very little current in sleep mode and abruptly increase current when switching to transmit mode.
Low ripple and noise	To supply interference-free voltage to sensitive designs such as complex semiconductors and to support the development of power amplifiers and MMICs.
Sink and source operation	The linear two-quadrant output amplifier design of the R&S®NGL200 enables sink and source operation to simulate batteries and loads.
6½ digit resolution	With up to 6½ digit resolution when measuring voltage, current and power, the R&S®NGL200 is optimal for characterization of devices with low standby power consumption and high current in full load operation. It can replace an additional DMM in many applications.

Overvoltage protection (OVP), overpower protection (OPP)

If the voltage/power exceeds the configured maximum value, the channel is switched off and the corresponding symbol flashes on the display.

Overcurrent protection (electronic fuse, OCP)

The channels of R&S®NGL200 power supplies provide electronic fuses that can be set individually. If the channel current exceeds the set current, the channel is automatically switched off and a message is displayed.

QuickArb function

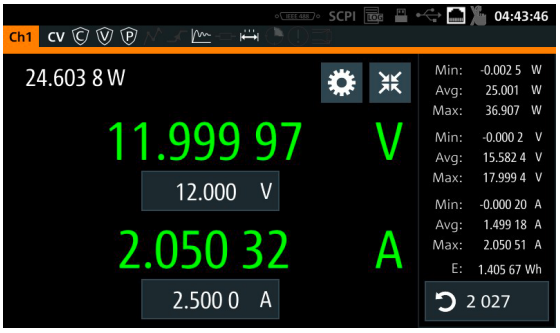
The Arb function lets you configure time/voltage or time/current sequences. With up to 4096 points and a dwell time resolution of up to 1 ms, the QuickArb function sets new standards.

Easy Ramp function

The output voltage can be increased continuously within a time frame of 10 ms to 10 s to avoid an abrupt rise of the supply voltage as is sometimes required by sensitive applications.



Easy operation: The high-resolution capacitive touchscreen is the central operating element for R&S®NGL200 power supplies. Icons clearly show the status of the set protection levels or special functions. Active channels in constant voltage mode light up green, while red is used for constant current mode. When the channels are switched on, the key lights up blue (active).



Readings with up to 6½ digit resolution: With a resolution of up to 6 ½ digits when measuring voltage, current and power, the R&S®NGL200 power supplies are perfect for measurements on devices that have low power consumption in standby mode and high current in full load operation. The large high-resolution display provides a lot of additional information such as power values and statistics.



Two-quadrant operation, minimum ripple and noise: The architecture of the R&S®NGL200 power supplies allows them to function both as a source and a sink. The power automatically switches from sink and source mode. In this example, CH2 is operating as a load. The linear design of the output stages reduces residual ripple and noise to a minimum and makes the R&S®NGL200 the perfect tool to support the development of power amplifiers and MMICs.

L'IMPULSION | Retrouvez nous sur www.limpulsion.fr

R&S®NGM200 High Precision Power Supply Series



High-speed accuracy

What sets these power supplies apart from others in their class?

- All channels are galvanically isolated and earth-free
- All channels are electrically equivalent with the same voltage, current and power
- Parallel and serial operation in source mode
- Protection functions to safeguard instrument and DUT
- Tracking and link functions
- Remote control via USB interface and LAN, unique in this class

Model overview

Model	Channel count	Maximum output power	Output power per channel	Output voltage per channel	Output current per channel	Load recovery time	Maximum readback resolution
R&S®NGM201	1	60 W	max. 60 W 3 × 3 A	0 V to 20 V	≤ 6 V: 6 A; > 6 V: 3 A	< 30 µs	1 µV/10 nA
R&S®NGM202	2	120 W					

Important facts

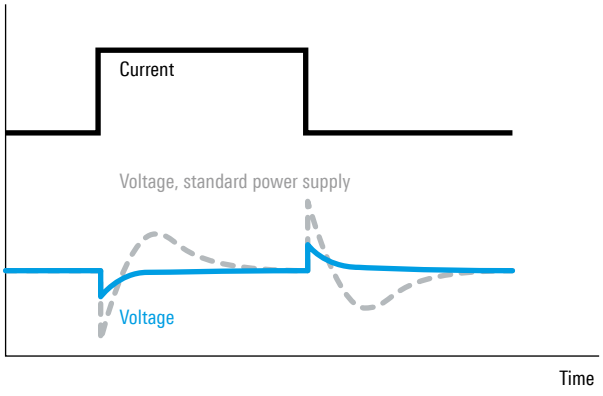
Specification	R&S®NGM200	Why this is important
Number of channels	1/2	More channels provide more flexibility for any specific application.
Maximum output power per channel	60 W	With more output power, DUTs with more power consumption can be driven.
Voltage ripple and noise (20 Hz to 20 MHz)	< 500 µV (RMS), < 2 mV (peak-to-peak)	Allows the instrument to supply interference-free voltage to sensitive DUTs with advanced electronic circuitry that is often sensitive to interference on the supply lines.
Load recovery time (20 mV)	< 30 µs	Important to supply DUTs when switching from low power consumption in standby mode to high current in full load operation without creating voltage drops or overshoots.
Maximum measurement speed	500 000 sample/s (2 µs)	High-speed acquisition, allows detection of spikes in the microsecond range that cannot be detected with slower instruments.
Protection functions	OCP/OVP/OPP/OTP	These functions safeguard the instrument and the device under test from damage.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Optimized load recovery time

Under challenging load conditions, most power supplies respond with slow recovery times and overshoots. Specially developed circuits in the R&S®NGM200 power supplies achieve a load recovery time of < 30 µs with minimal overshoot, making them perfect for supplying sensitive components.





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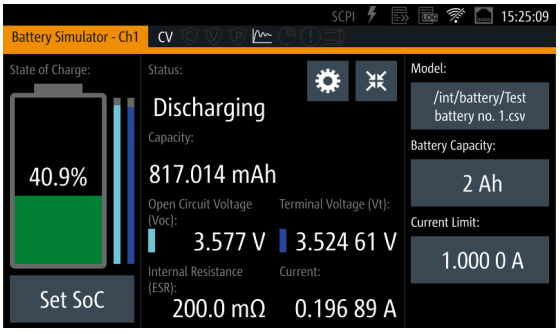
The perfect choice for:	
Battery tests	Power consumption tests
Simulation of voltage drops	Supplying sensitive designs

Your benefit	Features
Minimal overshoot from abrupt load changes	► Optimized load recovery time < 30 µs ► Handles abrupt load changes from a few µA to the ampere range without creating voltage drops or overshoots
Supply interference-free voltage to sensitive designs	Low ripple and noise values allow you to supply interference-free voltage to sensitive designs such as semiconductors and to support the development of power amplifiers and MMICs
Capture fast variations in voltage/current	► Acquisition rate: up to 500 ksample/s ► Voltage and current results available every 2 µs ► On the two-channel R&S®NGM202, data acquisition on both channels in parallel
Realistic battery simulation	► Simulate the actual battery output performance ► Testing can be based on a selected battery model ► Battery capacity, state of charge (SoC) and open circuit voltage (Voc) can be set to any state to test the device under specific circumstances



Readings with up to 6½ digit resolution: With a resolution of up to 6½ digits when measuring voltage, current and power, the R&S®NGM200 power supplies are perfect for characterizing devices that have low power consumption in standby mode and high current in full load operation. Two voltage measurement ranges and four current measurement ranges provide high accuracy and resolutions down to 1 µV/10 nA.
The high-resolution display provides additional information such as power values and statistics.



Battery simulation: When battery-operated devices have to be optimized for lifecycle, the discharging behavior of the battery type needs to be considered. The battery simulator function makes it possible to simulate the real battery output performance. Testing can be based on a selected battery model, and battery capacity, SoC and Voc can be set to any state to test the device under specific circumstances.
The discharging behavior of a battery can also be simulated, for example when designing battery chargers. In this application, the R&S®NGM200 is used in sink mode.



Two-quadrant operation, minimum ripple and noise: The architecture of the R&S®NGM200 power supplies allows them to function both as a source and a sink. The instruments automatically switch between sink and source operation. In this example, CH2 works as a load.
The linear design of the output stages reduces residual ripple and noise to a minimum and makes them perfect for the development of power amplifiers and MMICs.



Easy operation: The high-resolution capacitive touchscreen is the central operating element for the R&S®NGM200 power supplies. Icons clearly show the status of set protection levels or special functions. When the power supply is in constant voltage mode, the numbers and the keys light up green. Red is used for constant current mode. The Output button lights up blue to indicate that channels are switched on (active).

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R&S®NGU Source Measure Units



What sets this source measure unit apart?

- Two or four quadrants: source or sink operation with bipolar voltage
- Minimum residual ripple and noise for interference-free voltage to sensitive DUTs
- Fast regulation of output voltage with minimum overshoot and very fast load recovery time
- Acquisition rate of up to 500 ksample/s to capture extremely fast voltage or current variations
- Voltage priority and current priority modes
- High-capacitance mode
- Modulation input (R&S®NGU401/411)

Model overview

Model	Output voltage per channel	Maximum output power per channel	Maximum output current per channel	Load recovery time	Maximum acquisition rate	Ripple and noise
R&S®NGU201	0 V to 20 V	60 W	≤ 6 V output voltage: 8 A; > 6 V output voltage: 3 A	< 30 µs	500 ksample/s	< 500 µV (RMS); < 1 mA (RMS)
R&S®NGU401	–20 V to +20 V	20 W				
R&S®NGU411		60 W	≤ 10 V output voltage: 2 A; > 10 V output voltage:1 A			

Important facts

Specification	R&S®NGU	Why this is important
Quadrants	2/4	The source measure unit can function both as a source and a sink and simulate batteries or loads with two-quadrant architecture. Four-quadrant architecture units can source and sink in both polarities. This enables measuring the forward and reverse characteristics of semiconductor devices in a single test operation without changing the circuit.
Voltage ripple and noise (20 Hz to 20 MHz)	< 500 µV (RMS), < 2 mV (peak-to-peak)	The instrument can supply interference-free voltage to sensitive DUTs with advanced electronic circuitry which are often sensitive to interference on the supply lines.
Load recovery time (20 mV)	< 30 µs	Important for supplying DUTs when switching from low power consumption in standby to high current in full load operation without creating voltage drops or overshoots.
Maximum measurement speed	500 000 sample/s (2 µs)	High-speed acquisition allows detection of spikes in the microsecond range that cannot be detected with slower instruments.
Protection functions	OCP/OVP/OPP/OTP	These functions safeguard the instrument and the device under test.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Options	
Digital I/O trigger	R&S®NGU-K103
Digital voltmeter function	R&S®NGU-K104
IEEE-488 (GPIB) interface	R&S®NGU-B105
Battery simulation	R&S®NGU-K106
System components	
19" rack adapter, 2 HU	R&S®HZN96

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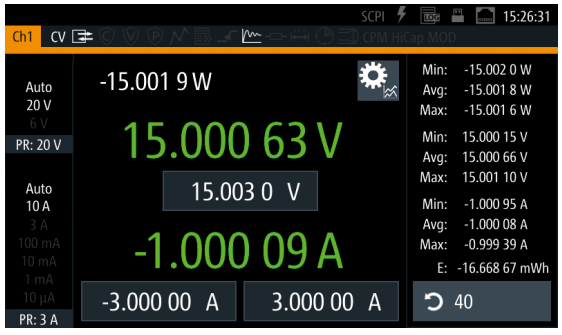
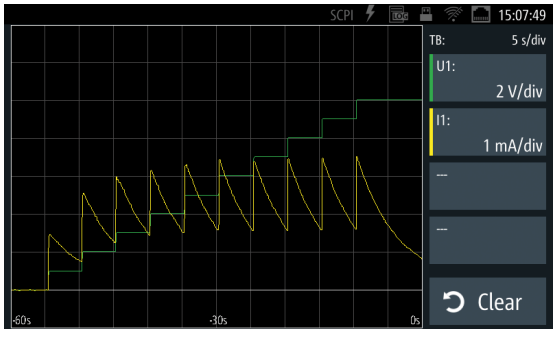
The perfect choice for:	
High-precision source and sink measurements	Semiconductor characterization
Supplying bipolar voltages	Simulation of voltage drops
Battery tests	Power consumption tests

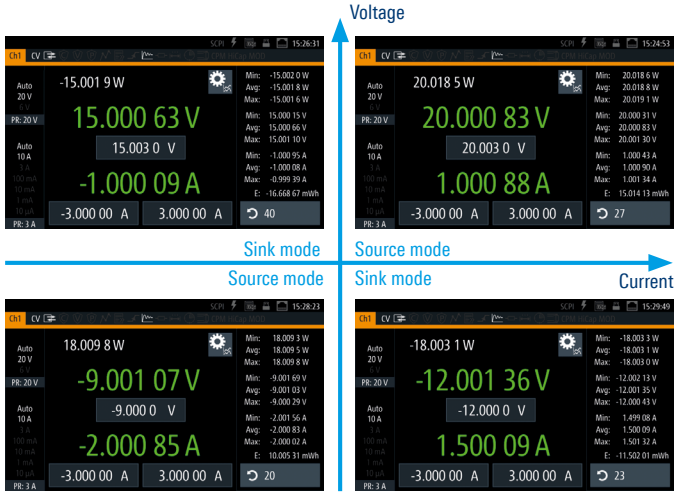
Your benefit	Features
Minimal overshoot from abrupt load changes	► Optimized load recovery time of < 30 µs ► Handles abrupt load changes from a few nA to the ampere range without creating voltage drops or overshoots
Analyze fast variations in voltage/current	► Acquisition rate of up to 500 ksample/s ► Voltage and current results available every 2 µs
Supply positive and negative voltages and currents	► Four-quadrant operation allows the R&S®NGU401/411 to act as a source or sink in both polarities ► Enables tasks such as measuring the forward and reverse characteristics of semiconductor devices in a single test operation without changes to the circuit
Can act as an AC source	► The R&S®NGU401/411 source measure unit provides a modulation input to connect an arbitrary generator. The output follows the modulation input signal, the instrument acts as an AC source and simulates glitches and unstable conditions



Two quadrants: operates as source and sink: The two-quadrant architecture of this source measure unit can function both as a source and a sink and simulate batteries and loads. The source measure unit automatically switches from source mode to sink mode. As soon as the externally applied voltage exceeds the set nominal voltage, current flows into the instrument, as indicated by a negative current reading. The linear design of the output stages reduces residual ripple and noise to a minimum.



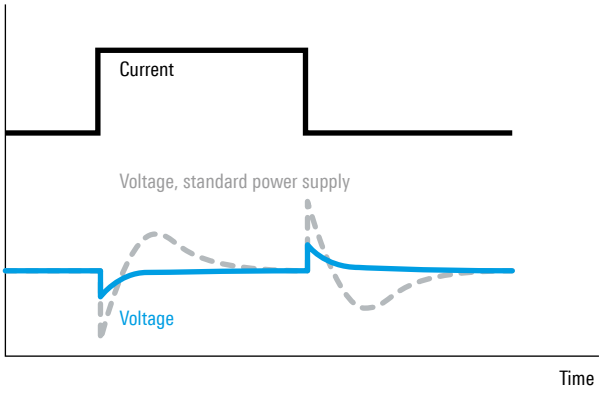
High-resolution graphical display of data: Here, the charging current of a capacitor is displayed while the voltage is increased stepwise. Up to four measurement functions can be selected and plotted against time, while minimum and maximum values can also be marked.



Four quadrants: source or sink operation with arbitrary polarity: The R&S®NGU401 can supply positive and negative voltages and currents with its four-quadrant architecture and can act as a source or sink in both polarities.

Optimized load recovery time

Under challenging load conditions, most power supplies respond with slow recovery times and overshoots. Specially developed circuits in the R&S®NGU source measure units achieve a load recovery time of < 30 µs with minimal overshoot, making them perfect for supplying sensitive components.



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SIGNAL GENERATORS

The Rohde&Schwarz signal generator portfolio has best-in-class characteristics (high bandwidth up to 2 GHz and a frequency range up to 67 GHz that can be extended to 170 GHz.) We also have a line of ultracompact and fast signal generators for automated production.

Frequency range

The frequency range is the most important specification when selecting a suitable signal generator. The generator's upper and lower frequency limits must cover application needs.

Output power

Output power is another key specification for selecting a signal generator. The higher the available power, the more likely you will be able to compensate for losses caused by cabling and components.

Instruments equipped with an electronic step attenuator provide very accurate low power levels and are not subject to the wear and tear of conventional mechanical attenuators.

Spectral purity

There are several measurements for assessing the spectral purity of a signal generator, including phase noise, spurious signals, harmonics and subharmonics. Phase noise measures the signal jitter. The better the spectral purity of a signal generator, the less it influences DUT measurements.

CW or modulated

Continuous wave (CW) generators provide only an unmodulated carrier frequency whereas analog signal generators can modulate the carrier frequency with e.g. AM, FM, φM and pulse modulation.

Products	Page
R&S®HMF25xx arbitrary function generator	54
R&S®SMB100B RF signal generator	56
R&S®SMCV100B vector signal generator	58

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Signal generator portfolio





	Analog signal generators R&S®SMB100B	Vector signal generator R&S®SMCV100B
Performance	● ●	●
Main features	▶ very low SSB phase noise ▶ very high output power	▶ good RF performance ▶ high output power ▶ RF DAC design
Frequency range	▶ RF model: 8 kHz to 1/3/6 GHz ▶ microwave model: 8 kHz to 12.75/20/31.8/40 GHz	4 kHz to 3/6/7.125 GHz
I/Q modulation bandwidth [1]	–	up to 240 MHz (internal)
Peak envelope power (PEP) (at 1 GHz/10 GHz) [1]	+26 dBm/+20 dBm	+20 dBm/n.a.
SSB phase noise (at 1 GHz [1], 1 Hz measurement bandwidth, 20 kHz carrier offset)	< –126 dBc	< –125 dBc
Harmonics (at 1 GHz) [1]	▶ 1 GHz to 6 GHz: –30 dBc (level ≤ +13 dBm) ▶ 12 GHz to 40 GHz: < –55 dBc (level = +10 dBm)	< –30 dBc (level ≤ +13 dBm)
Nonharmonics (at 1 GHz [1], > 10 kHz carrier offset)	< –82 dBc (level > +10 dBm)	< –52 dBc, –60 dBc (typ.) (level > +10 dBm)
Software compatibility	–	▶ R&S®WinIQSIM2 simulation software ▶ R&S®ARB Toolbox
Dimensions (W × H × D)	▶ RF model: 344 mm × 108 mm × 372 mm (13.6 in × 4.3 in × 14.7 in) ▶ microwave model: 460 mm × 107 mm × 503 mm (18.1 in × 4.21 in × 19.8 in)	222 mm × 97 mm × 366 mm (8.7 in × 3.8 in × 14.4 in)

[1] If not otherwise stated.

All values are specified.
● The higher the number of points, the better the performance.

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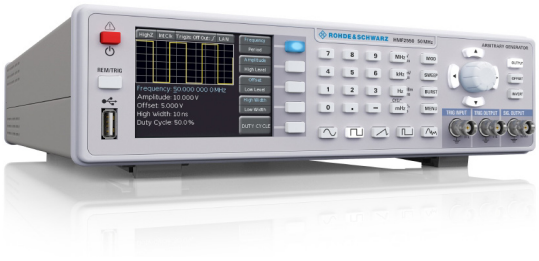
R&S®HMF25xx Arbitrary Function Generator



Accurate, versatile and affordable

- Two models: the R&S®HMF2525 with 25 MHz and the R&S®HMF2550 with 50 MHz maximum frequency
- 14-bit resolution and 8 ns rise time
- As well as standard waveforms such as sine, rectangle and triangle, the instruments provide powerful arbitrary signal functionality. In addition to predefined signal shapes such as sin(x)/x, white or pink noise, they can also output customer-specific, arbitrary shapes with a signal length of up to 256 ksample
- The burst, sweep, gating, internal and external triggering operating modes and the AM, FM, PM, PWM and FSK modulation functions (in each case internal and external) can be applied to all signals

Model overview

Model	Frequency range	Output voltage	Total harmonic distortion	Arbitrary waveform vertical resolution	Arbitrary waveform length	Interface
R&S®HMF2525	10 µHz to 25 MHz	5 mV to 10 V (peak-to-peak) (into 50 Ω) 10 mV to 20 V (peak-to-peak) (open circuit)	0.04 % (typ.) (f ≤ 100 kHz)	14 bit	up to 256 kpoints	dual-interface USB/RS-232, optional interfaces LAN/USB and IEEE-488 (GPIB)
R&S®HMF2550	10 µHz to 50 MHz					

Important facts

Specification	R&S®HMF2525/R&S®HMF2550	Why this is important
Waveform modes	R&S®HMF2525: ► sine: 10 µHz to 25 MHz ► square: 10 µHz to 25 MHz ► pulse: 100 µHz to 12.5 MHz ► ramp/triangle: 10 µHz to 5 MHz ► arbitrary: 100 µHz to 12.5 MHz R&S®HMF2550: ► sine: 10 µHz to 50 MHz ► square: 10 µHz to 50 MHz ► pulse: 100 µHz to 25 MHz ► ramp/triangle: 10 µHz to 10 MHz ► arbitrary: 100 µHz to 25 MHz	Allows utilization of the function generator for more applications and use cases.
Crisp color display	3.5" color TFT QVGA	See crisp representation of the waveform and all parameters.

Scope of delivery

- User manual
- Power cord
- 3 year warranty

Recommended options/accessories

Description	Type
Options and system components	
Dual interface (RS-232/USB)	R&S®HO720
Dual Ethernet/USB interface	R&S®HO732
IEEE-488 (GPIB) interface	R&S®HO740
Attenuators 50 Ω (3/6/10/20 dB)	R&S®HZ24
19" rackmount kit, 2 HU	R&S®HZ42
IEEE-488 (GPIB) cable, length: 2 m	R&S®HZ72

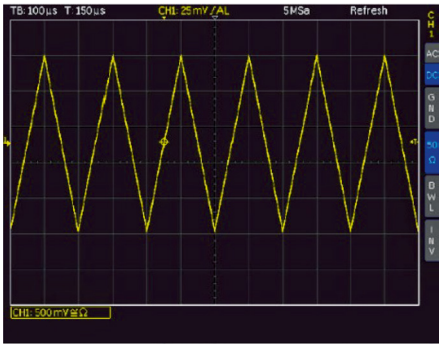


L'IMPULSION | Retrouvez nous sur www.limpulsion.fr

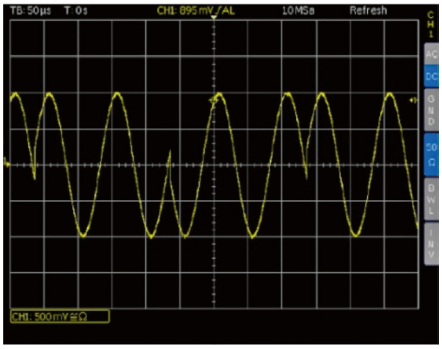
The perfect choice for:	
Engineering lab	Maintenance and repair
Education	General purpose

Your benefit	Features
Powerful pulse generator	Provides pulses with a recurrence rate of up to 12.5 MHz/25 MHz; the pulse width can be set from 15 ns to 999 s with a resolution of 5 ns. Rise/fall time can be selected from 8 ns to 500 ns – a very useful feature when characterizing input hysteresis of semiconductor devices
Easily create arbitrary waveforms	Arbitrary waveforms can be developed with PC software. Stored waveforms can be loaded via the front USB port or imported via the complementary HMExplorer software (available for download)

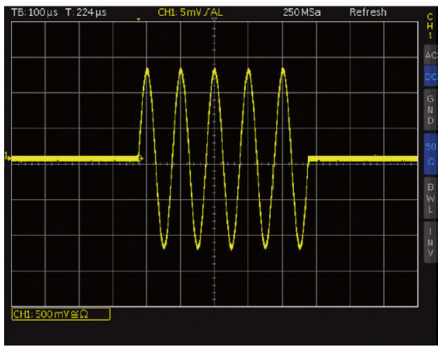
Signal examples



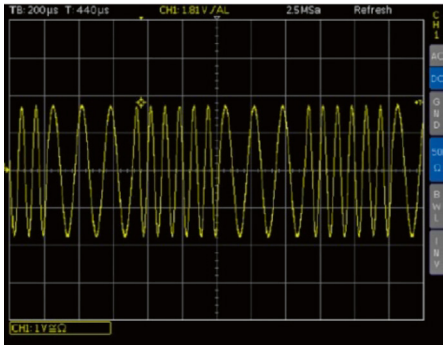
Triangle signal



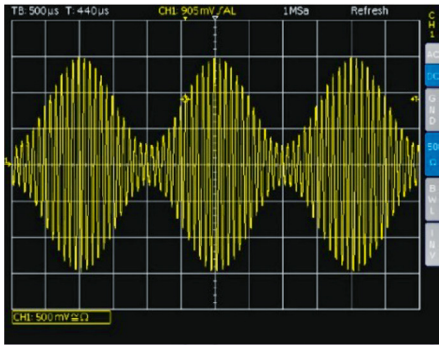
Phase modulation (PM)



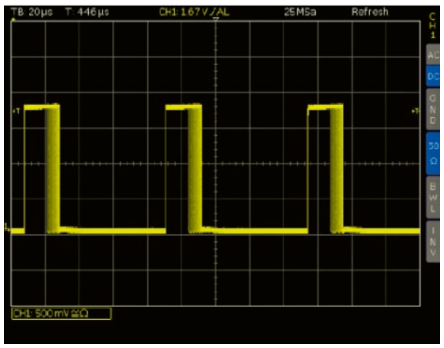
Burst example



Frequency shift keying (FSK)



Amplitude modulation (AM)



Pulse width modulation (PWM)

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R&S®SMB100B RF Signal Generator



Perfect for signal quality, perfect for output power, perfect for use

- All about performance and versatility in a small footprint
- Outstanding spectral purity
- Very high output power
- Comprehensive functionality and very simple operation

Model overview

Model (frequency range)	Configuration	Maximum output power (10 MHz < f ≤ 6 GHz)	Phase noise (1 GHz, at 20 kHz)	Optional analog modulation
1 GHz				
R&S®SMB100B	R&S®SMBB-B101	+18 dBm	< –126 dBc	AM, FM, phase, pulse
R&S®SMB100B (ultra high output power)	R&S®SMBB-B101, R&S®SMBB-K31, R&S®SMBB-B32	+26 dBm	< –126 dBc	AM, FM, phase, pulse
3 GHz				
R&S®SMB100B	R&S®SMBB-B103	+18 dBm	< –126 dBc	AM, FM, phase, pulse
R&S®SMB100B (ultra high output power)	R&S®SMBB-B103, R&S®SMBB-K31, R&S®SMBB-B32	+26 dBm	< –126 dBc	AM, FM, phase, pulse
6 GHz				
R&S®SMB100B	R&S®SMBB-B106	+18 dBm	< –126 dBc	AM, FM, phase, pulse
R&S®SMB100B (ultra high output power)	R&S®SMBB-B106, R&S®SMBB-K31, R&S®SMBB-B32	+26 dBm	< –126 dBc	AM, FM, phase, pulse

Important facts

Specification	R&S®SMB100B	Why this is important
Frequency range	8 kHz to 1/3/6 GHz	To cover the frequency range of the DUT.
Phase noise (f = 1 GHz, 20 kHz offset)	< –126 dBc	A generator with lower phase noise will add less unwanted noise to the DUT. This shows the true performance of the DUT. Test the device, not the generator.
Output power at 6 GHz	+26 dBm	A higher power level allows a wider range of testing. In addition, extra power enables the user to compensate for fixtures and cables between the generator and the test point, and removes the need for external amplifiers.
Dimensions (W × H × D)	with R&S®SMBB-B101/-B103/-B106 options: 344 mm × 108 mm × 372 mm	A smaller footprint takes up less space on a crowded workbench.
Weight	6.8 kg	

Scope of delivery

- Quick start guide
- Power cord
- 1 year warranty

Recommended options/accessories

Reference oscillator options	Type
OCXO reference oscillator [1]	R&S®SMBB-B1
OCXO reference oscillator, high performance [1]	R&S®SMBB-B1H
High performance pulse modulator	R&S®SMB-K22
Pulse generator	R&S®SMB-K23
Pulse train	R&S®SMB-K27

[1] Only the R&S®SMBB-B1 or the R&S®SMBB-B1H option can be installed.



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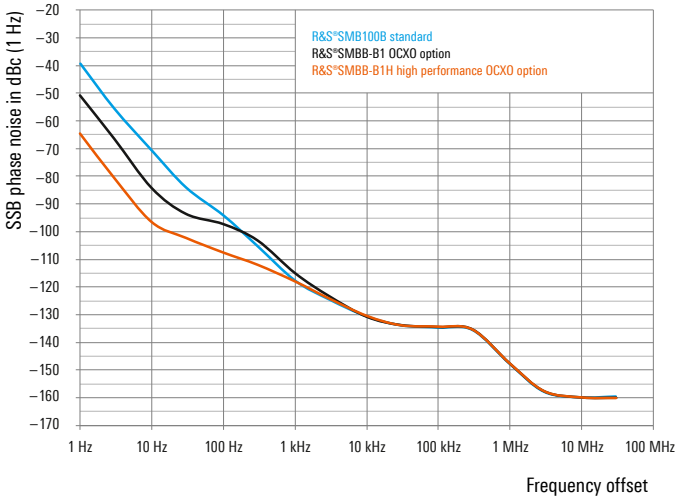
The perfect choice for:	
Local oscillator substitution for design and test engineers	Receiver sensitivity testing for design and test engineers
FM receiver testing	Pulsed signals in aerospace and defense applications to test radar systems

Your benefit	Features
No need for external amplifiers	Ultra high output power (34 dBm, 1 GHz, meas.)
User-configurable pulse scenarios	Pulse train option in combination with the pulse modulator and pulse generator option
Quickly and correctly create remote control programs	The instrument's built-in SCPI macro recorder with code generator can automatically record all manual settings and create an executable MATLAB script.
Compensation of external frequency responses	The R&S®SMB100B provides a user correction (UCOR) function for this purpose.
Replace your legacy signal generator	R&S®LegacyPro enables the R&S®SMB100B to reliably emulate a wide range of legacy generators from vendors such as Keysight, Agilent, HP, Anritsu and Rohde&Schwarz

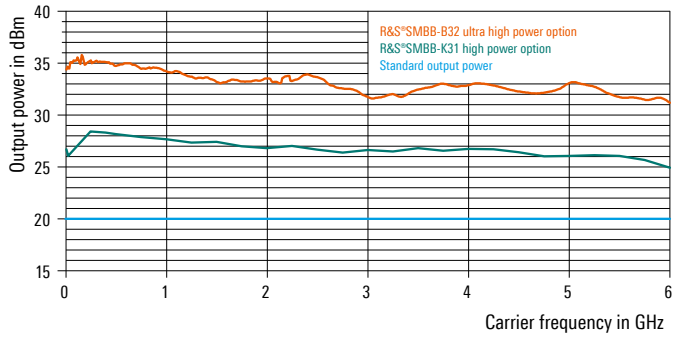
Perfect for signal quality

Single-sideband phase noise (1 GHz, 1 Hz bandwidth, measured): Thanks to its innovative synthesizer design, the R&S®SMB100B has very low SSB phase and wideband noise and excellent suppression of nonharmonic signal components.



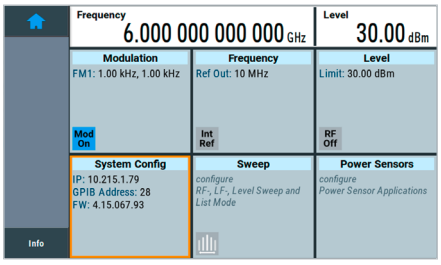
Perfect for output power

Measured maximum output power for the base unit, with the high power option (R&S®SMBB-K31) and with the additional ultra high power option (R&S®SMBB-B32). The R&S®SMB100B provides very high output power, no external amplifier is required downstream. This simplifies the test setup and results in high absolute level accuracy.

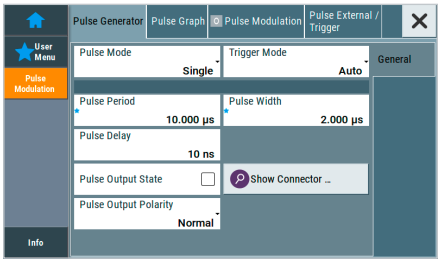


Perfect for use

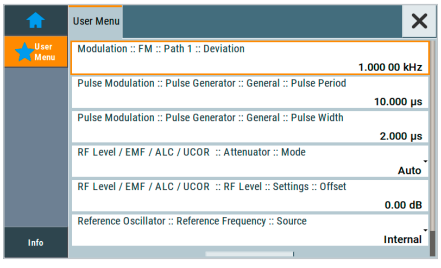
The R&S®SMB100B has a user-friendly high-resolution touchscreen interface which is fast and simple to operate.



Main screen with all important parameters and information



Individual menu items can be added to the user menu; added items are marked with a blue star



Example of a user menu; individually composed parameters can be directly set in this menu

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R&S®SMCV100B Vector Signal Generator



Maximum flexibility in applications and in production

- New direct RF DAC concept for RF signal generation
- I/Q modulation and upconversion in the digital domain (elimination of I and Q imbalance errors and LO leakage known from traditional analog I/Q modulators)
- Fully software defined option concept (no hardware options need to be selected for full functioning of the available instrument)
- RF frequency, memory, I/Q modulation bandwidth upgrades included
- Wide variety of applications.

Model overview

Model	Frequency	RF output power	Phase noise	Display
R&S®SMCV100B	4 kHz to 3/6/7.125 GHz	up to +20 dBm	< –125 dBc (f = 1 GHz, 20 kHz offset)	5" touch display (800 × 480 pixel)

Important facts

Specification	R&S®SMCV100B	Why this is important
Multistandard platform	multistandard platform for automotive, broadcast, navigation and wireless applications with numerous digital standards	Since only one instrument is needed for a wide variety of applications, it has the flexibility for deployment at any time for other tasks on a production line. This minimizes potential unused capacity and allows a massive reduction of downtime on production lines.
Frequency range	4 kHz up to 7.125 GHz	To cover the DUT frequency range.
Phase noise	< –125 dBc (f = 1 GHz, 20 kHz offset)	A generator with lower phase noise will add less unwanted noise to the DUT, revealing its true performance. Test the device, not the generator.
RF output power	up to +20 dBm	A higher power level allows a wider range of testing. Extra power enables the user to compensate for fixtures and cables between the generator and the test point, and removes the need for external amplifiers.

Scope of delivery

- Power cable
- Quick start guide
- 1 year warranty

Recommended options/accessories

Description	Type
Frequency options	
4 kHz to 3 GHz	R&S®SMCVB-B103
Frequency extension to 6 GHz	R&S®SMCVB-KB106
Frequency extension to 7.125 GHz	R&S®SMCVB-KB107
RF options	
High output power	R&S®SMCVB-K31
Low phase noise	R&S®SMCVB-K709

Recommended options/accessories

Digital standards with R&S®WinIQSIM2	
Broadcast standards	
DVB-H/DVB-T	R&S®SMCVB-K252
DAB/T-DMB	R&S®SMCVB-K253
DVB-S2/DVB-S2X	R&S®SMCVB-K416
Cellular standards	
5G NR Release 15	R&S®SMCVB-K444
5G NR Release 16	R&S®SMCVB-K448
5G NR Release 17	R&S®SMCVB-K471
5G NR Sidelink	R&S®SMCVB-K470
LTE Release 8	R&S®SMCVB-K255
LTE Release 9	R&S®SMCVB-K284
LTE Release 10	R&S®SMCVB-K285
LTE Release 11	R&S®SMCVB-K412
LTE Release 12	R&S®SMCVB-K413
LTE Release 13/14/15	R&S®SMCVB-K419
Cellular IoT Release 13	R&S®SMCVB-K415
Cellular IoT Release 14	R&S®SMCVB-K443
Cellular IoT Release 15	R&S®SMCVB-K446



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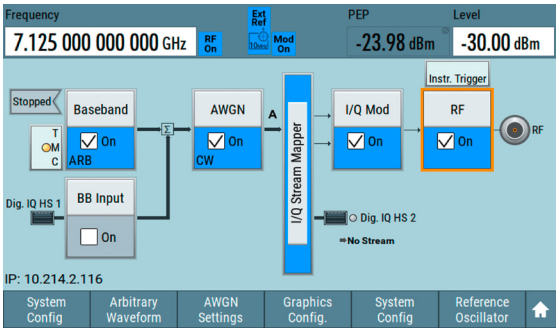
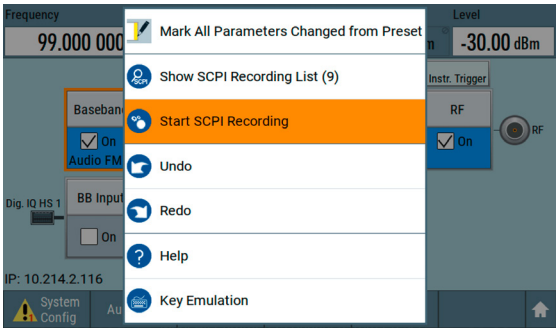
The perfect choice for:	
General purpose	Labs
EMC testing and validation	Manufacturing



Graphical user interface with block diagram: Instantly see the signal flow in the R&S®SMCV100B as well as the instrument input and output states. An integrated graphic function displays the generated signal in real time.



Built-in SCPI macro recorder: The integrated SCPI macro recorder with built-in code generator allows users to automatically record all manual settings and create a directly executable MATLAB script.

Your benefit	Features
First multistandard platform for automotive, broadcast, navigation and wireless applications	► Frequency range from 4 kHz to 7.125 GHz – Modern RF signal generation concept – Direct RF upconversion from 4 kHz to 2.5 GHz – Modulation bandwidth up to 240 MHz ► Powerful internal baseband generator – Real-time broadcast coder – Custom digital modulation – Internal baseband signal generation with ARB ► I/Q streaming capabilities – Playback of long I/Q sequences from solid state disk drive for EMC testing ► Support of R&S®WinIQSIM2 waveform generation – Wireless standards such as 5G NR, LTE, non-cellular IoT, Wi-Fi (IEEE 802.11) – Navigation standards for functional Go/NoGo tests and predefined position fix tests
Maximum flexibility in production	► From functional end-of-line testing (EOLT) to application-specific device software testing ► Fully software defined signal generation for easy upgrading at customer site ► Standardization of production lines with a single vector signal generator ► Minimizes downtime of production lines
User friendly in any detail	► Half a rack size, big performance, leading operation concept with block diagram ► 5" touch display (800 × 480 pixel) in a 2 HU instrument ► SCPI macro recorder

Recommended options/accessories	
3GPP FDD	R&S®SMCVB-K242
3GPP FDD HSPA/HSPA+, enhanced BS/MS tests	R&S®SMCVB-K283
GSM/EDGE	R&S®SMCVB-K240
EDGE Evolution	R&S®SMCVB-K241
Wireless connectivity standards	
IEEE 802.11a/b/g/n	R&S®SMCVB-K254
IEEE 802.11ac	R&S®SMCVB-K286
IEEE 802.11ax	R&S®SMCVB-K442
IEEE 802.11be	R&S®SMCVB-K447
Bluetooth® EDR/Low Energy	R&S®SMCVB-K260
Bluetooth® 5.x	R&S®SMCVB-K417
LoRa	R&S®SMCVB-K431

Recommended options/accessories	
Other standards and modulation systems	
OFDM signal generation	R&S®SMCVB-K414
Multicarrier CW signal generation	R&S®SMCVB-K261
Additive white Gaussian noise (AWGN)	R&S®SMCVB-K262
NFC A/B/F	R&S®SMCVB-K289

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HANDHELD ANALYZERS

Rohde&Schwarz handheld analyzers compress our advanced spectrum and vector network analyzer technologies into a compact form factor – ideal when working in the field.

Frequency range

Certain applications may require a wider frequency range to evaluate harmonics, spurs or alternate channels. In this case, it makes sense to consider a higher frequency model in order to capture all potential signals of interest.

Application example: Detecting the third-order harmonics of a 915 MHz signal requires a spectrum analyzer of more than 2.745 GHz maximum frequency.

Upgradeable

All handheld analyzers have various upgrade options. Some models even offer frequency upgrades without additional hardware or downtime. All upgrades are done via keycode, which eliminates the need to send the analyzer to a Rohde&Schwarz service center.

A simple upgrade can transform the range of capabilities for a basic analyzer. If only needed temporarily, a temporary license is also available.

Features and capabilities

Handheld analyzers provide a wide range of features and options to support different tasks in the field:

- Advanced spectrum measurements, e.g. channel power, occupied bandwidth and harmonic distortion
- Cable and antenna measurements, e.g. distance-to-fault, cable loss and VSWR
- Signal demodulation, e.g. AM/FM/PM demodulation and demodulation in line with specific wireless or mobile standards
- Vector signal analysis
- Spectrum monitoring and interference hunting

Some of these tasks require additional accessories, for example an antenna with the corresponding frequency range, a GPS receiver for position logging or a calibration kit for cable and antenna measurements.

Operating duration

All Rohde&Schwarz handheld analyzers are battery operated. Typically, a battery can last 3 hours to 4.5 hours, both the newest generation of Rohde&Schwarz handheld analyzers consume much less power. A full day's work in the field can now be done on a single charge.

For longer operating periods (for example when a handheld spectrum analyzer is installed at a remote location for a week to perform spectrum recording), simply take out the battery and use a power adapter. If there is a power outage, the analyzer will automatically power up when AC power returns. There is no need to send someone to the site to manually power up the analyzer.

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Products	Page
R&S®FSH handheld spectrum analyzer	64
R&S®Spectrum Rider FPH handheld spectrum analyzer	66
R&S®Cable Rider ZPH cable and antenna analyzer	68
R&S®ZVH cable and antenna analyzer	70
R&S®ZNH handheld vector network analyzer	72



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Handheld analyzer portfolio





	R&S®FSH	R&S®FPH
Description	handheld combination analyzer; with spectrum analyzer up to 20 GHz and two-port vector network analyzer up to 8 GHz	handheld spectrum analyzer; up to 44 GHz
Performance	●●	●
Frequency models	9 kHz to 20 GHz (3.6/8/13.6/20 GHz models available)	5 kHz to 44 GHz (2/3/4/6/8/13.6/20/26.5/31/44 GHz models available)
Analysis bandwidth	–	–
Phase noise	–105 dBc (1 Hz) (f = 500 MHz, 30 kHz offset)	–95 dBc (1 Hz) (f = 500 MHz, 30 kHz offset)
DANL, at 1 GHz, preamplifier OFF	–146 dBm	–146 dBm
DANL, at 1 GHz, preamplifier ON	–165 dBm	–163 dBm
TOI	+15 dBm	+10 dBm
Highlights	handheld combination analyzer: spectrum, full two-port vector network analyzer, power meter, cellular demodulation, interference hunting, EMI receiver mode, EMF measurement, vector voltmeter, pulse measurement	handheld spectrum analyzer: spectrum, power meter, interference hunting, EMI receiver mode, pulse measurement, field strength meter, modulation analyzer (AM/FM/ASK/FSK), up to 9 h operating time
Dimensions	194 mm × 300 mm × 144 mm (7.6 in × 11.8 in × 5.7 in)	202 mm × 294 mm × 76 mm (8.0 in × 11.6 in × 3 in)

- The higher the number of points, the higher the performance.

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	R&S®ZVH	R&S®ZPH	R&S®ZNH
	handheld cable and antenna analyzer; up to 8 GHz with optional vector network analyzer and spectrum analyzer	handheld cable and antenna analyzer; up to 4 GHz with optional spectrum analyzer	cable and antenna analyzer
	●●	●	
	100 kHz to 8 GHz (3.6 GHz/8 GHz models available)	5 kHz to 4 GHz (3 GHz/4 GHz models available)	30 kHz to 26.5 GHz (4/8/18/26.5 GHz models available)
	–	–	
	–105 dBc (1 Hz) (f = 500 MHz, 30 kHz offset)	–95 dBc (1 Hz) (f = 500 MHz, 30 kHz offset)	
	–146 dBm	–146 dBm	
	–165 dBm	–163 dBm	
	+10 dBm	+10 dBm	
	handheld combination analyzer: spectrum, cable and antenna, full two-port vector network analyzer, power meter, vector voltmeter	handheld combination analyzer: spectrum, cable and antenna, power meter, interference hunting, pulse analyzer, signal generator, modulation analyzer (AM/FM/ASK/FSK), built-in bias tee, extremely fast boot and measurement time	two-port handheld vector analyzer, cable and antenna measurement, full two-port S-parameter measurement, power sensor support, pulse measurement, vector voltmeter, power sensor versus frequency, time domain analysis
	194 mm × 300 mm × 144 mm (7.6 in × 11.8 in × 5.7 in)	202 mm × 294 mm × 76 mm (8.0 in × 11.6 in × 3 in)	202 mm × 294 mm × 76 mm (8 in × 11.6 in × 3 in)

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R&S®FSH Handheld Spectrum Analyzer



Expandable platform that eliminates the need for multiple instruments

Depending on the model and options installed, the R&S®FSH can be used as a:

- ▶ Spectrum analyzer
- ▶ Interference hunting analyzer
- ▶ Cable and antenna analyzer
- ▶ Two-port vector network analyzer
- ▶ Power meter

Model overview

Model (frequency range)	Tracking generator	Preamplifier included	Resolution bandwidth	Phase noise	Level measurement uncertainty	DANL	TOI
R&S®FSH4 (9 kHz to 3.6 GHz)		•	1 Hz to 3 MHz	–95 dBc (1 Hz), –105 dBc (1 Hz) (typ.)	up to 1 dB, 0.5 dB (typ.)	–161 dBm, –165 dBm (typ.)	> +10 dBm, +15 dBm (typ.)
R&S®FSH4 (9 kHz to 3.6 GHz)	•	•					
R&S®FSH4 (100 kHz to 3.6 GHz)	•	•					
R&S®FSH8 (9 kHz to 8 GHz)		•					> +3 dBm, +10 dBm (typ.)
R&S®FSH8 (9 kHz to 8 GHz)	•	•					
R&S®FSH8 (100 kHz to 8 GHz)	•	•					
R&S®FSH13 (9 kHz to 13.6 GHz)		•				–158 dBm, –162 dBm (typ.)	
R&S®FSH13 (9 kHz to 13.6 GHz)	•	•					
R&S®FSH20 (9 kHz to 20 GHz)		•					
R&S®FSH20 (9 kHz to 20 GHz)	•	•					

Important facts

Specification	R&S®FSH	Why this is important
Demodulation	GSM/GPRS/EDGE, WCDMA, TD-SCDMA, CDMA2000, 1xEV-DO, LTE TDD, LTE FDD	Allows modulation measurements on relevant wireless standards.
VNA support	full two-port	Allows for cable loss and antenna testing and characterization, as well as distance to fault measurements. Two-port capability increases accuracy of transmission measurements.
Wizard support for common measurement functions	•	Increases repeatable field test patterns and reduces user error.
Entry level model	3.6 GHz	Determines lowest cost entry point into the family.
Preamplifier	•	Increases sensitivity for low signal level measurements.

Scope of delivery

- ▶ Lithium-ion battery pack
- ▶ USB cable
- ▶ LAN cable
- ▶ AC power supply
- ▶ User manual
- ▶ 3 year warranty (one year for battery and accessories)

Recommended options/accessories

Description	Type
EMF measurement application	R&S®FSH-K105
Pulse measurements with power sensor [1), 2)]	R&S®FSH-K29
Spectrogram measurement application	R&S®FSH-K14
Interference analysis	R&S®FPH-K15
Geotagging measurement application [1)]	R&S®FSH-K16

1) Software license.
2) Requires R&S®FSH-Z129 for R&S®FSH4/8/13/20 with serial numbers < 121000.



Recommended options/accessories

Indoor mapping measurement application	R&S®FSH-K17
Receiver mode and channel scan measurement application	R&S®FSH-K43
LTE FDD downlink pilot channel and EVM measurement application [3)]	R&S®FSH-K50
LTE FDD downlink extended channel and modulation measurement application [3), 4)]	R&S®FSH-K50E
LTE TDD downlink pilot channel and EVM measurement application [3)]	R&S®FSH-K51
LTE TDD downlink extended channel and modulation measurement application [3), 5)]	R&S®FSH-K51E
Lithium-ion battery pack, 6.75 Ah	R&S®HA-Z206
Near-field probes	R&S®HZ-15
Yagi antenna, 824 MHz to 960 MHz	R&S®HA-Z900
Yagi antenna, 1710 MHz to 1990 MHz	R&S®HA-Z1900
Segmented sweep	R&S®FSH-K20

3) Only for R&S®FSH analyzers with serial numbers ≥ 105000.
4) R&S®FSH-K50 required.
5) R&S®FSH-K51 required.

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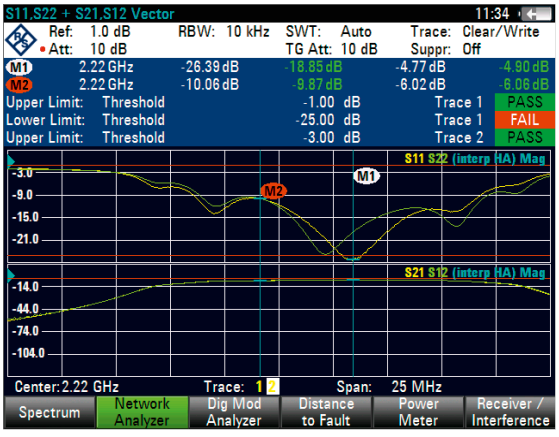
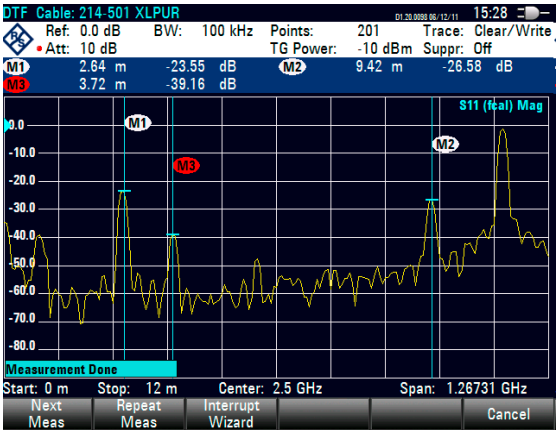
The perfect choice for:	
Installation and maintenance of transmitter stations	EMI debugging/ RF design validation
Interference hunting	Electromagnetic fields measurements

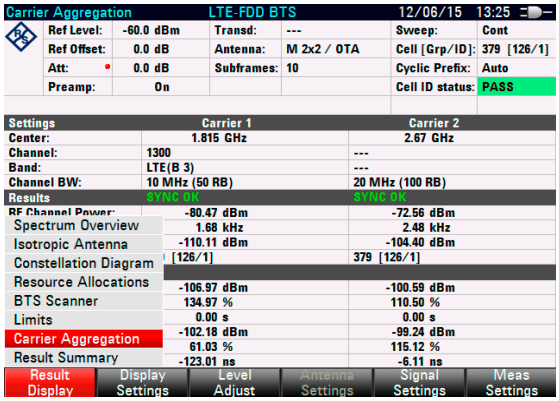
Your benefit	Features
An expandable platform for every RF handheld measurement application	Expanded modes of operation for field strength measurements, power measurements, network analysis, interference analysis, vector voltmeter, pulse measurements
Extensive support for numerous wireless technologies	Modulation analysis for cellular technologies, including over-the-air LTE-Advanced carrier aggregation signal analysis
Most efficient instrument in the field	▶ Sunlight readable display ▶ Generation of user-defined test sequences (R&S®FSH wizard) ▶ Wizard streamlines test development ▶ Remote control and data export with free R&S®Instrument View software ▶ Fast measurement mode switching ▶ SD card and USB port for data storage



Vector network analyzer mode: For cable loss and antenna testing and characterization as well as distance to fault measurements. Two-port capability for transmission measurements



Wizard function support for common measurements: User-definable test sequences that reduce operating errors in the field



Support of numerous wireless communications standards: Modulation measurements on GSM/GPRS/EDGE, WCDMA, TD-SCDMA CDMA2000, 1xEV-DO, LTE TDD, LTE FDD



The R&S®FSH with laptop

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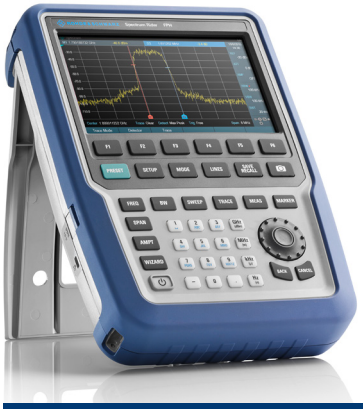
R&S®Spectrum Rider FPH Handheld Spectrum Analyzer



The three key Ps for lab and field environments

Performance: excellent DANL and phase noise

- ▶ Weak signals can be easily captured

Portability: weighs as little as 2.5 kg

- ▶ Carrying holster (R&S®HA-Z322) to free up hands
- ▶ Side strap included for easy transportation
- ▶ Selection of carrying cases available

Price: low starting price and optional software keycode upgrades

- ▶ Competitive and attractive price
- ▶ No downtime, no recalibration needed

Model overview

Model	Frequency range	Preamplifier	Resolution bandwidth	Phase noise (f = 500 MHz, 1 MHz offset)	Level measurement uncertainty	DANL	TOI
.02 + R&S®FPH-B3 + R&S®FPH-B4	5 kHz to 2 GHz up to 3 GHz up to 4 GHz	optional	1 Hz to 3 MHz	–125 dBc (1 Hz)	0.5 dB (typ.)	–163 dBm (typ.)	+10 dBm (typ.)
.06 + R&S®FPH-B8	5 kHz to 6 GHz up to 8 GHz					–162 dBm (typ.)	
.13/.23 + R&S®FPH-B20	5 kHz to 13.6 GHz up to 20 GHz			▶ model .13: –125 dBc (1 Hz) ▶ model .23: –125 dBc (1 Hz)			
.26/.36 R&S®FPH-B31	5 kHz to 26.5 GHz up to 31 GHz			▶ model .26: –125 dBc (1 Hz) ▶ model .36: –125 dBc (1 Hz)			
.44/.54	5 kHz to 44 GHz			–120 dBc (1 Hz)			

Important facts

Specification	R&S®Spectrum Rider FPH	Why this is important
Software upgradeable frequency ranges	•	Investment protection. Allows users to buy only what they need, when they need it.
Touchscreen (capacitive)	•	Allows faster measurement setup and configuration. Ability to pinch and zoom to set span.
Backlit keypad	•	Ability to use the equipment in all lighting conditions.
Fanless design	•	Quiet operation, sealed to protect against dust and water.

Scope of delivery

- ▶ Lithium-ion battery pack
- ▶ Side strap for your hand
- ▶ Power cord
- ▶ USB cable
- ▶ User manual
- ▶ 3 year warranty (one year for battery and accessories)

Recommended options/accessories

Description	Type
Spectrum analyzer 100 Hz frequency extension, from 5 kHz down to 100 Hz [1]	R&S®FPH-B29
Analog modulation analysis AM/FM	R&S®FPH-K7
Power sensor support	R&S®FPH-K9
Channel power meter	R&S®FPH-K19
Pulse measurements with power sensor	R&S®FPH-K29
Interference analysis	R&S®FPH-K15
Signal strength mapping	R&S®FPH-K16
Receiver mode	R&S®FPH-K43
EMF measurement application	R&S®FPH-K105

[1] For serial number ≥ 103100.
Not applicable to R&S®Spectrum Rider FPH model .02.



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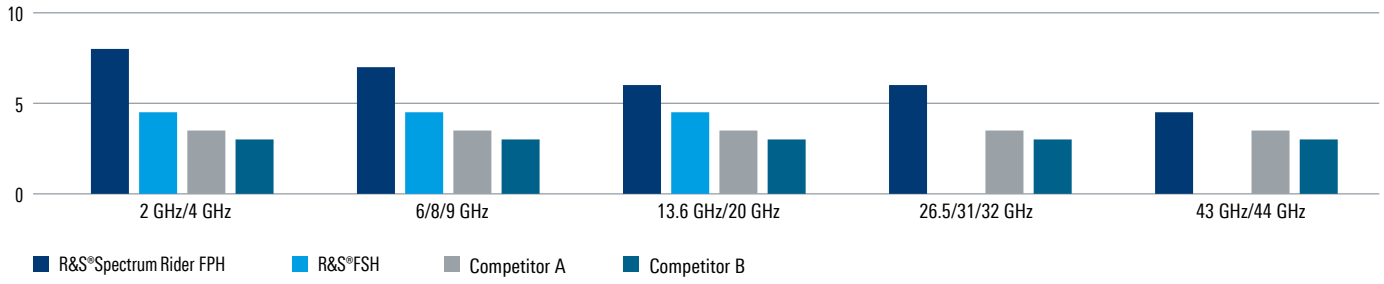
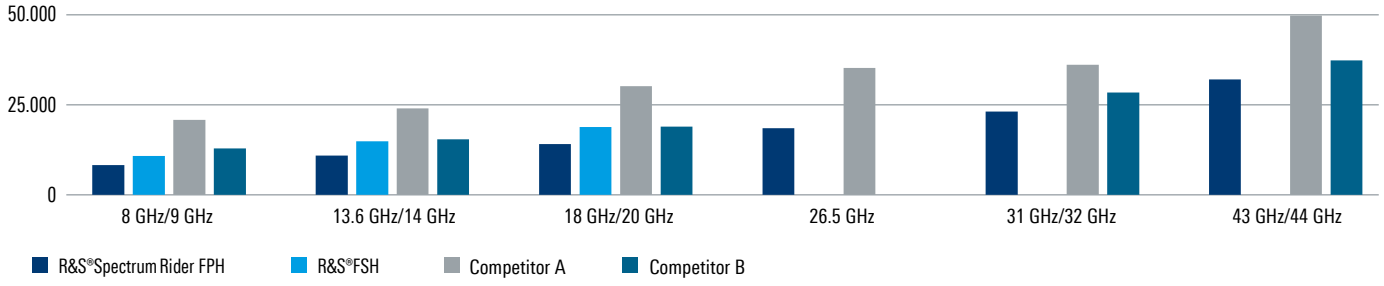
The perfect choice for:	
Spectrum clearance (5G ready)	Interference hunting
Pulse measurement	EMI debugging and RF design validation

Your benefit	Features
Battery life twice that of today's handheld spectrum analyzers	▶ models .02/.06/.13/.26: > 6 h battery life ▶ models .23/.36/.44/.54: 4.5 h battery life
Smartphone style capacitive touchscreen; also available with traditional interface	▶ 7" antiglare capacitive color touchscreen ▶ On-screen keyboard ▶ Smartphone-like gestures ▶ Adjustable display brightness ▶ Backlit large button keypad ▶ Multifunction rotary knob
Buy only what you need; upgrade later without returning analyzer for servicing	▶ Selection of 2/6/13.6/26.5 GHz base models ▶ Frequency upgrade keycode options available for each base model ▶ Channel power meter keycode option

Battery life comparison (in hours)

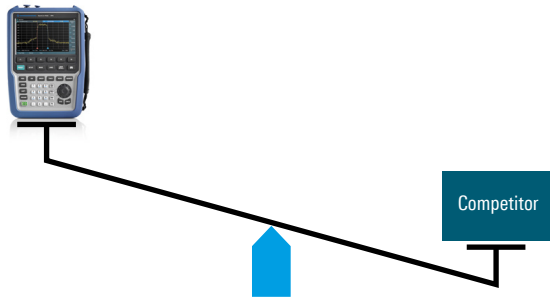


Price comparison (in EUR)



Lightweight design

Every additional gram adds to user fatigue in the field. Thanks to the state-of-the-art design, each unit weighs only 2.5 kg – regardless of the frequency range.



Performance and features

The R&S®Spectrum Rider FPH has exceptional phase noise and DANL to capture known and unknown signals. The R&S®Spectrum Rider FPH easily measures a wide range of parameters such as total harmonic distortion, occupied bandwidth, output power and channel power, making it the ideal tool for field work.

Other products to consider

- R&S®NRP power sensors supported up to 50 GHz
- R&S®FSH: when you need digital modulation analysis

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R&S®Cable Rider ZPH Cable and Antenna Analyzer



Save time in the field

The R&S®Cable Rider ZPH is a cable and antenna analyzer that is available in two models. The one-port model has all the essential basic measurement capabilities required for installing and maintaining antenna systems in the field. Its unique features ensure fast and efficient cable and antenna measurements. The two-port model offers more functionality and can perform spectrum analysis (R&S®ZPH-K1 option). It has an independent tracking source plus an integrated bias tee. All these add-ons make the R&S®Cable Rider ZPH the perfect field installation and maintenance tool.

Model overview

Model	Frequency range	Frequency extension	Measurement speed	Data points	Measurement mode (standard)	Measurement mode (optional)
R&S®ZPH one-port model (model .02)	2 MHz to 3 GHz	up to 4 GHz (R&S®ZPH-B4 option)	0.3 ms/point	101 to 2501	DTF, return loss, VSWR, one-port cable loss, Smith chart, phase	power meter, power measurement with power sensor, pulse measurement
R&S®ZPH two-port model (model .12)	► CAT mode: 2 MHz to 3 GHz ► spectrum mode: 5 kHz to 3 GHz				DTF, return loss, VSWR, one-port cable loss, Smith chart, phase, S_{21}	power meter, power measurement with power sensor, pulse measurement, spectrum analysis, interference analysis, AM/FM/ASK/FSK modulation analysis

Important facts

Specification	R&S®ZPH	Why this is important
Measurement speed	0.3 ms/point	Total overall test time is an important parameter impacted greatly by measurement speed. Faster measurement time per point increases overall throughput. This is especially important if hand-tuning of devices (antennas, resonators) is required.
Battery operation time	up to 6.5 h/9 h (mode dependent)	The advantages of having a long-lasting battery are obvious – no need to bring an extra battery with additional weight when climbing up a mast or tower, no dead batteries during measurement.
Automatic calibration unit	• [1]	With little or no VNA experience, users can make a valid calibration and accurate measurements. An auto-cal unit also eliminates the need to deal with individual open, short, match and through calibration standards. Auto-cal based calibrations can be performed in the field or the lab to ensure consistent and reliable results.
Capacitive touchscreen with gesture support	•	Intuitive (smartphone-like) operation. Allows faster measurement setup and configuration. Ability to pinch and zoom to set span.

[1] With R&S®ZN-Z103 calibration unit.

Scope of delivery

- ► Power cord
- ► Lithium-ion battery pack
- ► 3 year warranty (one year for battery and accessories)

Recommended options/accessories

Description	Type
Frequency upgrade (3 GHz to 4 GHz)	R&S®ZPH-B4
Spectrum analyzer preamplifier (requires R&S®ZPH-K1)	R&S®ZPH-B22
Calibration unit, one-port, 2 MHz to 4 GHz	R&S®ZN-Z103
Combined open/short/50 Ω load calibration standard, for calibrating VSWR and DTF measurements, DC to 3.6 GHz	R&S®FSH-Z29
Soft carrying bag	R&S®HA-Z220
Rainproof carrying holster	R&S®HA-Z322



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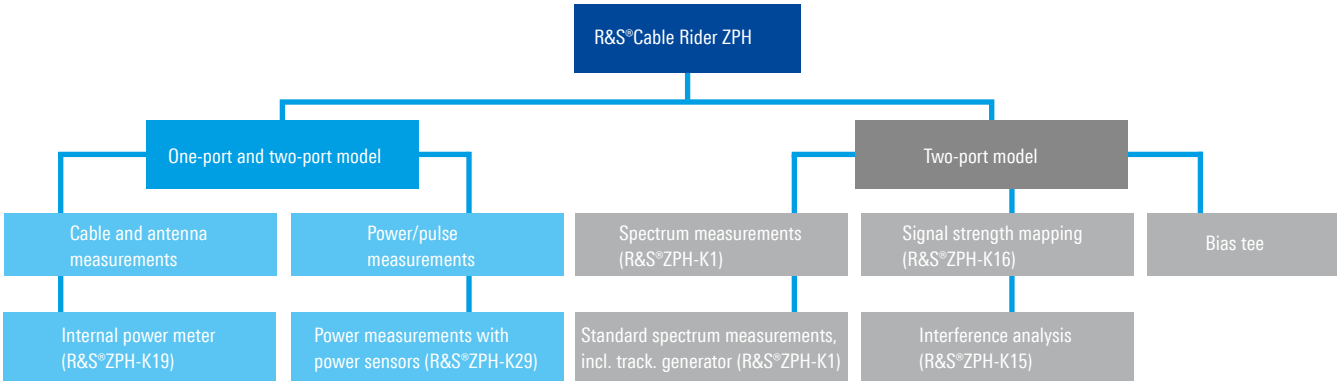
The perfect choice for:	
Installation and maintenance of AM/FM radio stations	Spectrum clearance/interference hunting [1]
RF cable testing	Antenna measurement

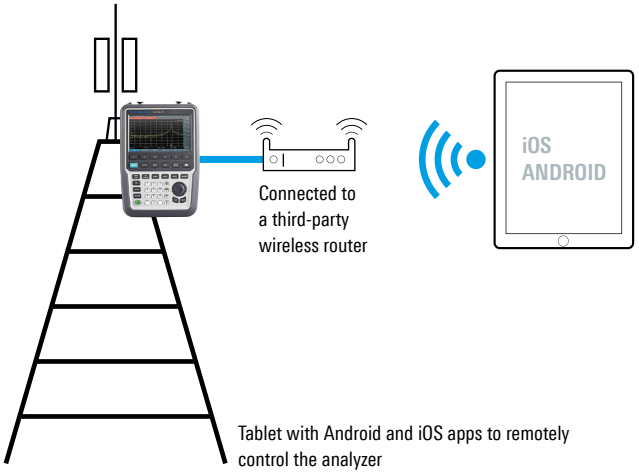
[1] Only with two-port model.

Your benefit	Features
Hybrid operation	Large keypads and sensitive capacitive touchscreen
Make the right measurement right away	Wizard function, settings preconfigured in advance
One-step calibration	No toggling between O/S/L standards with the R&S®ZN-Z103 automatic calibration unit
Shortest test time	Fastest measurement speed (0.3 ms/point), short boot and warm-up times
Work under bright or dim conditions	Non-reflective display with adjustable backlight, illuminated keypad
Buy what you need when you need it	Upgrade via keycode, no downtime, no recalibration required
Simple wireless remote operation	Free downloadable Android/iOS apps (third-party wireless router required)

More functions



Remote wireless control apps



Tablet with Android and iOS apps to remotely control the analyzer



One-step calibration with automatic calibration unit (R&S®ZN-Z103)



Combined OSL calibration kit (R&S®FSH-Z29)

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R&S®ZVH Cable and Antenna Analyzer



For more efficiency in the field

Depending on the options installed, the R&S®ZVH can be a cable and antenna analyzer, a two-port vector network analyzer, a power meter or a spectrum analyzer. Free software and apps are available to conveniently remote control the analyzer. The wizard function also allows users to preconfigure test sequences for repeatability and reduce measurement and troubleshooting time.

Model overview

Model (frequency range)	Number of ports	Dynamic range	Port output power	Data points	Measurement mode (standard)
R&S®ZVH4 (100 kHz to 3.6 GHz)	2	100 dB	0 dBm to –40 dBm	101 to 1201	reflection, DTF, one-port cable loss
R&S®ZVH8 (100 kHz to 8 GHz)	2	100 dB	0 dBm to –40 dBm	101 to 1201	reflection, DTF, one-port cable loss

Important facts

Specification	R&S®ZVH	Why this is important
Factory calibration available	•	Ensures accurate measurements even if the field technician forgets the calibration procedure.
Wizard support for common measurement functions	•	Increases repeatable field test patterns and reduces user errors.
Entry bandwidth	3.6 GHz	Determines lowest cost entry point into the family.
Preamplifier	included	Increases sensitivity for low signal level measurements.

Scope of delivery

- ▶ Lithium-ion battery pack
- ▶ LAN cable
- ▶ USB cable
- ▶ AC power supply
- ▶ CD-ROM with software and documentation
- ▶ Quick start guide
- ▶ 3 year warranty (one year for battery and accessories)

Recommended options/accessories

Description	Type
Options	
Remote control via LAN or USB	R&S®ZVH-K40
Transmission measurement	R&S®ZVH-K39
Vector network analysis	R&S®ZVH-K42
Vector voltmeter	R&S®ZVH-K45
Spectrum analysis	R&S®ZVH-K1
Spectrogram measurement application	R&S®ZVH-K14
Power meter	R&S®ZVH-K9
Popular accessories	
Combined open/short/50 Ω load calibration standard, DC to 8 GHz	R&S®FSH-Z28
Combined open/short/50 Ω load calibration standard, DC to 3.6 GHz	R&S®FSH-K29
Lithium-ion battery pack, 6.75 Ah	R&S®HA-Z206
Soft carrying bag	R&S®HA-Z220
Hard case	R&S®HA-Z321
GPS receiver	R&S®HA-Z240



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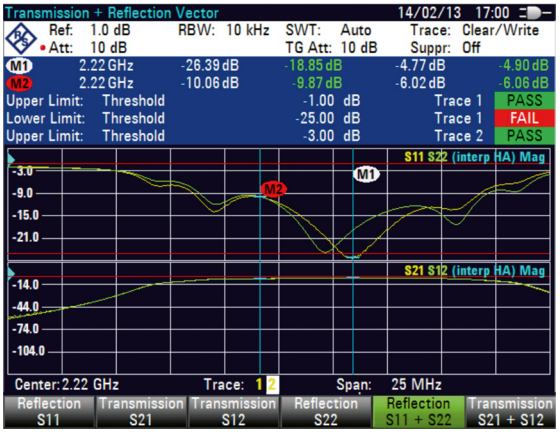
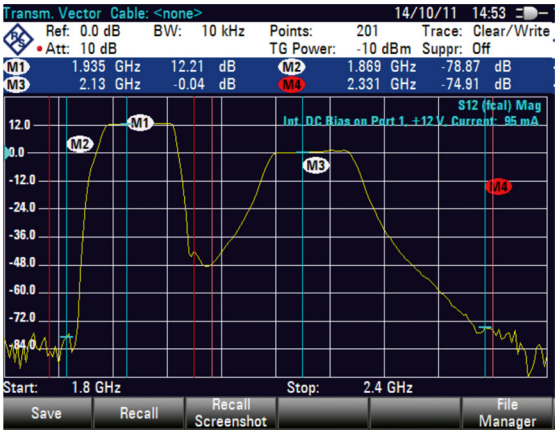
The perfect choice for:	
Installation and maintenance of AM/FM radio stations	RF cable measurement
Antenna measurement	General purpose spectrum measurement

Your benefit	Features
Make the right measurement right away	Wizard function, preconfiguration of settings in advance
An expandable platform for every RF handheld measurement application	Expanded modes of operation for field strength measurements, power measurements, network analysis, vector voltmeter, pulse measurements
Simple wireless remote operation	Free downloadable Android/iOS apps, R&S®MobileView (third-party wireless router required)
Most efficient instrument in the field	▶ Sunlight readable display ▶ Wizard streamlines test development ▶ Remote control and data export with free R&S®Instrument View software ▶ Fast switching of measurement modes ▶ SD card and USB port for data storage



Vector network analysis: Simultaneous display of four S-parameters (S_{11}, S_{21}, S_{12}, S_{22})



Two-port capability for transmission measurements

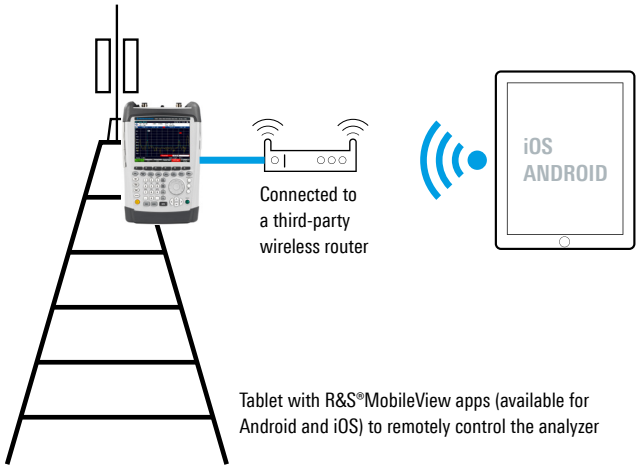


Remote control via LAN or USB: The R&S®ZVH can be remotely controlled via the USB or LAN interface and integrated into user-specific programs.

Wizard function: Fast and accurate measurements in three simple steps

1. Project manager/expert creates the test sequences
2. Operator uses the wizard to execute the test sequences
3. Operator shows the measurement result to the project manager/expert and documents it

Remote wireless control apps



Connected to a third-party wireless router

Tablet with R&S®MobileView apps (available for Android and iOS) to remotely control the analyzer

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R&S®ZNH Handheld Vector Network Analyzer



Lightweight design, heavyweight performance

R&S®ZNH is a full two-port handheld vector network analyzer that offers one-port cable and antenna measurement and full two-port S-parameter measurements. The touch based interface is simple to operate and a configuration overview menu makes measurement preparation more efficient. The R&S®ZNH may have a small form factor but it is complete in every detail and delivers high performance and all the key functions.

Model overview

Model, frequency range	Number of ports	Basic functions	Dynamic range	Maximum port output power	Trace noise	Measurement points
R&S®ZNH4, 30 kHz to 4 GHz R&S®ZNH8, 30 kHz to 8 GHz R&S®ZNH18, 30 kHz to 18 GHz R&S®ZNH26, 30 kHz to 26.5 GHz	2	DTF, one-port cable loss, VSWR, return loss, S_{11}, S_{21}, S_{12}, S_{22} (magnitude and phase)	up to 100 dB (typ.)	up to 0 dBm (meas.) (300 kHz ≤ f ≤ 24 GHz)	▶ magnitude (RMS): 0.0015 dB to 0.0040 dB (typ.) ▶ phase (RMS): 0.015° to 0.025° (typ.)	16001

Important facts

Specification	R&S®ZNH	Why this is important
Dynamic range	up to 100 dB (typ.)	This allows the instrument to accommodate large variations between the maximum and minimum power levels in a measurement.
Battery operating time	4 h	Long battery life means saves weight by eliminating the need for a spare battery in the field, while still having plenty of power for measurements.
Display	7" capacitive WVGA touchscreen with gesture support	Intuitive operation for faster measurement setup and configuration. Span is set with pinch and zoom.
Receiver architecture	The four-receiver architecture consists of two reference receivers and two test receivers at both port 1 and port 2.	The R&S®ZNH can support more advanced calibration types such as unknown through, open, short and match (UOSM) calibration. Such calibration is useful for DUTs with different input or output connector types at the test ports.

Scope of delivery

- ▶ Power cable
- ▶ Quick start guide
- ▶ 3 year warranty

Recommended options/accessories

Description	Type
Calibration kit, type N (m), 50 Ω, 0 Hz to 18 GHz	R&S®ZN-Z170
Calibration kit, type N (f), 50 Ω, 0 Hz to 18 GHz	R&S®ZN-Z170
Calibration kit, 3.5 mm (m), 50 Ω, 0 Hz to 26.5 GHz	R&S®ZN-Z135
Calibration kit, 3.5 mm (f), 50 Ω, 0 Hz to 26.5 GHz	R&S®ZN-Z135
Calibration kit, 50 Ω, 2 MHz to 4 GHz	R&S®ZN-Z103
Calibration kit, 50 Ω, 1 MHz to 6 GHz	R&S®ZN-Z103
Soft carrying bag	R&S®HA-Z220
Carrying holster	R&S®HA-Z322



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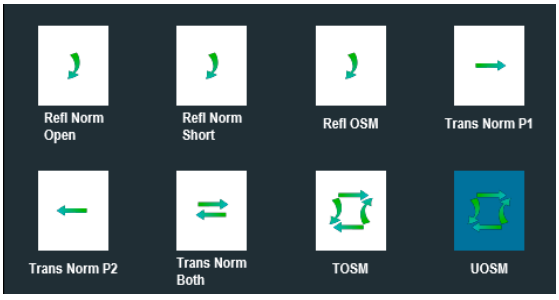
The perfect choice for:	
Field testing	R&D
Education	Manufacturing

Highlights

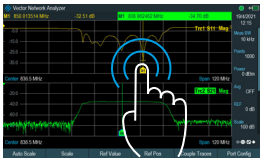
- Unknown through calibration (UOSM) is possible
- Various calibration kits are supported
- Calibration kit information can be entered manually with R&S®InstrumentView software



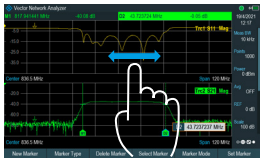
Your benefit	Features
Additional protection from overloading without external attenuator	Built-in receiver step attenuator with attenuation from 0 dB to 15 dB in 5 dB steps
Directly calibrate DUTs with different input/output connectors	Using UOSM calibration
Easy operation	▶ Intuitive touchscreen controls smartphone-like touch gestures ▶ Adjustable display brightness and backlit keypad for bright sunlight or dim environments ▶ Wizard function automates test sequences so that recurring measurements are quick, easy and mistake-free ▶ Battery life of four hours when fully charged
Easy configuration	▶ Configurable dashboard with overview menu for quick measurement setup and 70 % fewer taps ▶ Flexible calibration approach ▶ Numerous calibration standards and kits are supported. Calibration kit information can be easily entered manually with R&S®InstrumentView software
More functionality	▶ Many functions come standard, such as one-port cable and antenna analysis and full S-parameter measurement ▶ Buy only what you need – options can be ordered independently and without prerequisites ▶ Four-receiver architecture

Simple to operate

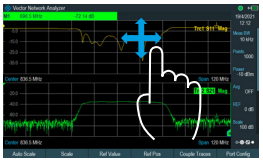
Intuitive operation using smartphone-like touch gestures



Add a marker with a double tap



Move a marker by dragging the marker label



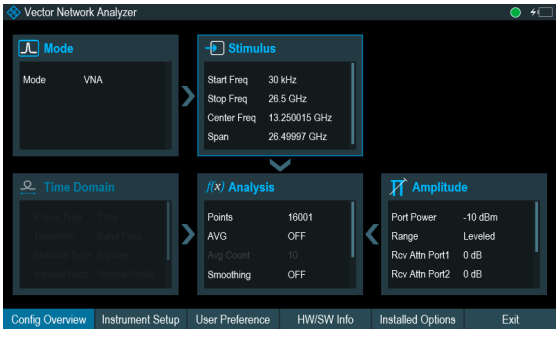
Delete a marker by crossing it out

Preconfigure in three simple steps

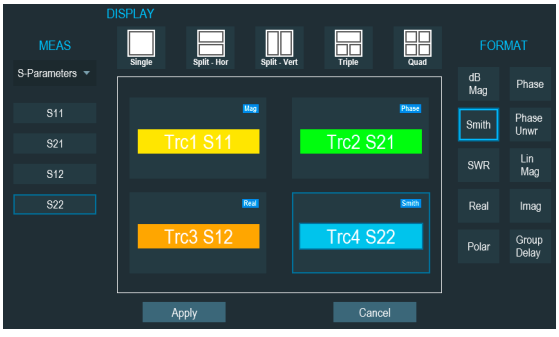
Eliminate measurement errors due to wrong inputs

1. Project manager/expert creates the test sequences
2. Operator uses the wizard to execute the test sequences
3. Operator shows the measurement result to the project manager/expert and documents it

Simple to configure



Configurable dashboard for fast parameter setting



Just a few taps to configure the measurement display and format

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SPECTRUM ANALYZERS

The Rohde&Schwarz spectrum analyzer portfolio offers options ranging from low-cost, yet powerful 1 GHz analyzers to full-featured 85 GHz spectrum analyzers. Designed by the RF experts at Rohde&Schwarz, our spectrum analyzers feature exceptional signal integrity, high value and excellent reliability.

Refer to the table on the next pages to see the differences between each family.

Frequency range

The frequency range specifies the range of frequencies over which the spectrum analyzer will operate. Certain applications require a wider frequency range to evaluate harmonics, spurs or alternate channels. In this case, a higher frequency model may be necessary in order to capture all potential signals of interest.

Application example: Detecting the third-order harmonics of a 915 MHz signal requires a spectrum analyzer with a maximum frequency greater than 2.745 GHz.

Dynamic range

The dynamic range is the analyzer's ability to detect weak signals in the presence of strong signals. The dynamic range is limited on the lower end by the analyzer's inherent noise and spurs. On the upper end, it is limited by nonlinearities.

The inherent noise is specified by the displayed average noise level (DANL), given in dBm and normalized to 1 Hz resolution bandwidth. The nonlinearities are given by the 1 dB compression point, second harmonic distortion and third-order intercept (TOI).

A preamplifier reduces the DANL and thus helps detect weak signals. However, it also increases other distortions and reduces the overall dynamic range. An input attenuator with a small step size helps use the maximum dynamic range.

Application example: Spurious emission measurements and EMI debugging: To detect a weak signal of –100 dBm with a resolution bandwidth of 10 kHz and a signal to noise ratio (SNR) of 10 dB, the DANL must be below –110 dBm/10 kHz, which is equivalent to –150 dBm (1 Hz).

Maximum input level

Level display range

1 dB compression of first mixer

Maximum dynamic range

Optimum mixer level

Maximum intermodulation-free range/maximum harmonic suppression

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Features and capabilities

Modern spectrum analyzers provide a wide range of options for enhanced signal analysis and usability. Possible firmware or software options include:

- Advanced spectrum measurements, e.g. spectrogram, channel power, occupied bandwidth, third-order intercept point
- I/Q analysis mode with a specific analysis bandwidth for capturing and analyzing signals, including phase information
- Software for signal demodulation, e.g. AM/FM/PM demodulation, vector signal analysis and signal demodulation in line with specific wireless standards
- Certain use cases and measurements require dedicated hardware. Possible hardware options include:
  - Battery operation or 12 V/24 V DC power for portable or vehicular operation
  - Tracking generator for scalar network analysis
  - 28 V DC output for noise figure measurements with a noise source
  - Remote control requires a IEEE-488 (GPIB), LAN or WLAN interface

Application example: Amplitude transmission measurements on an RF filter require a tracking generator.

Phase noise

The spectrum analyzer's inherent phase noise limits measurements very close to a carrier because spurs at e.g. 1 kHz offset may be hidden in the analyzer's phase noise. The inherent phase noise also limits the analyzers's ability to perform phase noise measurements on the signal source. It also impacts error vector magnitude (EVM) measurements on digitally modulated signals, especially narrowband signals.

Application example: To detect a spur at a certain frequency offset at 70 dB below the carrier with a 10 dB SNR and 10 Hz RBW, the SSB phase noise must be below –90 dBc (1 Hz).

Products	Page
R&S®FPC spectrum analyzer	78
R&S®FSC spectrum analyzer	80
FPL spectrum analyzer	82

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Economy spectrum analyzer portfolio





	R&S®FPC	R&S®FSC
Description	bench spectrum analyzer with vector network analyzer and signal generator up to 3 GHz	compact and cost-effective spectrum analyzer
Performance	•	•
Frequency models	5 kHz to 3 GHz (1/2/3 GHz models available)	9 kHz to 6 GHz (3 GHz/6 GHz models available)
Analysis bandwidth	–	–
Phase noise	–92 dBc (1 Hz) (f = 500 MHz, 30 kHz offset)	–95 dBc (1 Hz) (f = 500 MHz, 30 kHz offset)
DANL, at 1 GHz, preamplifier OFF	–150 dBm	–146 dBm
DANL, at 1 GHz, preamplifier ON	–165 dBm	–165 dBm
TOI	+10 dBm	+15 dBm
Highlights	economy spectrum analyzer by combining the value of three instruments: spectrum analyzer, vector network analyzer, signal generator, EMI receiver mode, modulation analyzer (AM/FM/ASK/FSK)	compact spectrum analyzer with great RF performance, small form factor
Dimensions	396 mm × 178 mm × 147 mm (15.6 in × 7.0 in × 5.8 in)	233 mm × 158.1 mm × 350 mm (9.2 in × 6.2 in × 13.8 in)

• The higher the number of points, the better the performance.

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	FPL
	general purpose spectrum analyzer
	●●●
	5 kHz to 3/7.5/14/26.5 GHz
	40 MHz
	< –105 dBc (1 Hz) (f = 1 GHz, 10 kHz offset)
	< –149 dBm
	< –163 dBm
	> 17 dBm
	battery, tracking generator; signal analysis applications: noise, analog demodulation, vector signal analyzer, NB-IoT (with R&S®VSE), EMI
	408 mm × 186 mm × 235 mm (16.06 in × 7.32 in × 9.25 in)

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R&S®FPC Spectrum Analyzer



The value of three instruments in one

Signal generator

The R&S®FPC not only features standard tracking generator measurements with frequency offset functionality, its signal source is independent to enable signal generator functionality. A CW signal can be set within the frequency range, or in a coupled mode to follow the center frequency setting of the spectrum analyzer mode.

Spectrum analyzer

The R&S®FPC base instrument has a frequency range from 5 kHz to 1 GHz. With keycode options, it can be unlocked up to 3 GHz and other features can be activated. The R&S®FPC provides the best dynamic range in its class. In combination with RBW settings down to 1 Hz, it resolves the finest details, which are displayed on the high-resolution 10.1" WXGA display. Wired or wireless remote control options are available for free.

Network analyzer

The R&S®FPC features an internal VSWR bridge that makes purchasing and mounting/dismounting an external bridge unnecessary. S_{11} reflection measurements are supported, including Smith chart and DTF features.

Model overview

Model (frequency range)	Preamplifier included	Independent signal generator	Tracking generator	Resolution bandwidth	Phase noise	DANL	TOI
R&S®FPC1000 (5 kHz to 1 GHz)	optional	–	–	1 Hz to 3 MHz	< –103 dBc (1 Hz) (f = 500 MHz, 100 kHz offset)	down to –165 dBm (typ.) (with preamplifier)	+7 dBm
R&S®FPC-B2 (5 kHz to 2 GHz, frequency upgrade)							
R&S®FPC-B3 (5 kHz to 3 GHz, frequency upgrade)							
R&S®FPC1500 (5 kHz to 1 GHz)		•	•				
R&S®FPC-B2 (5 kHz to 2 GHz, frequency upgrade)							
R&S®FPC-B3 (5 kHz to 3 GHz, frequency upgrade)							

Important facts

Specification	R&S®FPC1000	R&S®FPC1500	Why this is important
DANL (normalized to 1 Hz)	< –165 dBm (typ.) (power amplifier = on)		Most "economy" spectrum analyzers sacrifice premium components and superior RF design choices in favor of cost reduction. True RF performance in an economy instrument gives you the confidence of the most accurate measurements within your frequency needs.
TOI	+17 dBm (attenuation = 10 dB)		
Phase noise at 100 kHz offset	< –103 dBc (1 Hz) (typ.)		
Display	10.1" (1366 × 768 pixel)		Visualizing important signal details is not just a matter of the RF specifications; the high-resolution display of the R&S®FPC spectrum analyzers allows hardware signal details to be displayed on screen.
Modulation analysis	spectrum analysis and modulation analysis		A wider range of both modulation and spectrum analysis allow the spectrum analyzer to pair more suitably with a larger range of applications. Modulation analysis can allow demodulation of simple modulation formats such as ASK/FSK as well as AM/FM.
Tracking generator	–	tracking generator model with the unique value of three instruments in one	A spectrum analyzer with tracking generator is most useful for scalar transmission measurements, for example on filters. The R&S®FPC1500 comes with an extra: frequency conversion measurements (enabled by the independent type source of the instrument). This is great for RF mixer characterization.



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The perfect choice for:

R&D and service labs	Test automation
Professionals, hobbyists	Education and training

Your benefit	Features
Value of three	The R&S®FPC1500 combines the value of a spectrum analyzer, a vector network analyzer and a signal generator
More resolution for better measurements	Lowest noise floor in class down to –165 dBm (typ.) (with preamplifier), resolution bandwidth down to 1 Hz, 10.1" WXGA display
Investment protection	All upgrades available via keycode, no additional calibration required

Scope of delivery

- ► Power cable
- ► 3 year warranty (one year for accessories)

Recommended options/accessories

Description	Type
Spectrum analyzer frequency upgrade, 1 GHz to 2 GHz	R&S®FPC-B2
Spectrum analyzer frequency upgrade, 2 GHz to 3 GHz	R&S®FPC-B3
Spectrum analyzer preamplifier	R&S®FPC-B22
Wi-Fi connection support	R&S®FPC-B200
Wi-Fi USB nano flash drive	R&S®FPC-Z2

Recommended options/accessories

Description	Type
Modulation analysis	R&S®FPC-K7
Vector network analysis	R&S®FPC-K42
Receiver mode	R&S®FPC-K43
Advanced measurements	R&S®FPC-K55
19" rackmount kit	R&S®ZZA-FPC1
Near-field probes, 30 MHz to 3 GHz (set of 5 probes)	R&S®HZ-15
Amplifier, 100 kHz to 3 GHz	R&S®HZ-16
Near-field probes, 30 MHz to 3 GHz (set of 2 probes)	R&S®HZ-17
Carrying case	R&S®RTB-Z3

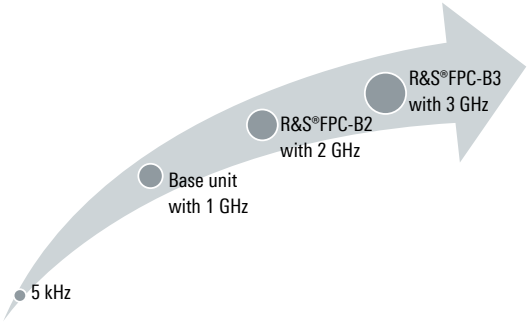
Highlights

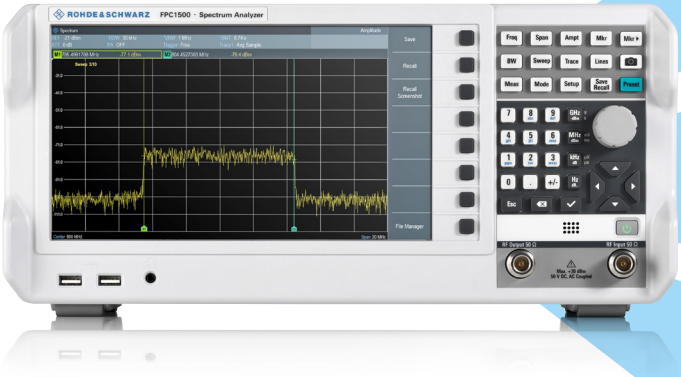
Class-leading spectrum analyzer

✓ Value of three	✓ 10.1" display
✓ Low noise floor	✓ Flexible upgrade concept
✓ High max. input power	✓ Easy to control

Frequency extension using keycodes

Buy what you need when you need it.





Spectrum analyzer

Investment protection	High resolution	Easy virtual control

Vector network analyzer

Internal VSWR bridge	One-port VNA (S_{11})	Smith chart

Signal generator

Tracking generator	Independent signal source	Coupled CW mode

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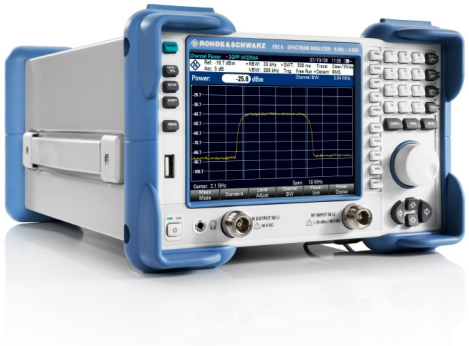
R&S®FSC Spectrum Analyzer



Compact and cost-effective spectrum analyzer

- Performance
  - The R&S®FSC features very good RF performance. Its DANL, TOI and phase noise make it ideal for many standard measurement applications
  - General purpose spectrum analysis presets for spectral characteristics, e.g. harmonics, AM modulation depth and ACLR are included as standard
- Compact form factor
  The R&S®FSC has the smallest footprint in its class at only 3 HU, ½ 19". It takes up very little space on a bench. Two R&S®FSC analyzers or one R&S®FSC and an R&S®SMC signal generator fit in just 3 HU of rack space
- Cost-effective
  Total cost of ownership is excellent due to affordable initial and calibration costs, plus very low operating cost with only 12 W power consumption

Model overview

Model	Frequency range	Preamplifier	Resolution bandwidth	Phase noise	Level measurement uncertainty	DANL	TOI
R&S®FSC3, model .03 (base)	9 kHz to 3 GHz	optional	10 Hz to 3 MHz	–95 dBc (1 Hz), –105 dBc (1 Hz) (typ.)	up to 1 dB, 0.5 dB (typ.)	–161 dBm, –165 dBm (typ.)	> +10 dBm, +15 dBm (typ.)
R&S®FSC3, model .13 (tracking gen.)	9 kHz to 3 GHz				up to 1.5 dB, 0.5 dB (typ.)	–161 dBm, –165 dBm (typ.)	> +10 dBm, +15 dBm (typ.)
R&S®FSC6, model .06 (base)	9 kHz to 6 GHz				up to 1.5 dB, 0.5 dB (typ.)	–155 dBm, –159 dBm (typ.)	> +3 dBm, +10 dBm (typ.)
R&S®FSC6, model .16 (tracking generator)	9 kHz to 6 GHz				up to 1.5 dB, 1 dB (typ.)	–155 dBm, –159 dBm (typ.)	> +3 dBm, +10 dBm (typ.)

Important facts

Specification	R&S®FSC	Why this is important
Tracking generator dynamic range	90 dB (typ.)	Provides higher dynamic range when performing filter measurements.
Phase noise		Lower phase noise enables greater signal detection accuracy close to the carrier.
30 kHz	up to –95 dBc (1 Hz)	
100 kHz	up to –100 dBc (1 Hz)	
1 MHz	up to –120 dBc (1 Hz)	

Recommended options/accessories

Description	Type
Preamplifier for spectrum analyzer	R&S®FSC-B22
19" rackmount kit for two R&S®FSC	R&S®ZZA-T33
19" rackmount kit for one R&S®FSC	R&S®ZZA-T34
Headphones	R&S®FSH-Z36
Near-field probes, 30 MHz to 3 GHz	R&S®HZ-15
Preamplifier for R&S®HZ-15, 100 kHz to 3 GHz	R&S®HZ-16



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The perfect choice for:	
R&D service labs	Test automation
Professionals, hobbyists	Education and training

Your benefit	Features
Easy to set up	Owing to its compact design, the R&S®FSC only takes up minimal bench space
Easy to operate	All important settings are available via proper hardkeys, supplemented by softkeys at the bottom of the display
Wide choice	4 base models to fit customer needs

Highlights

Class-leading spectrum analyzer

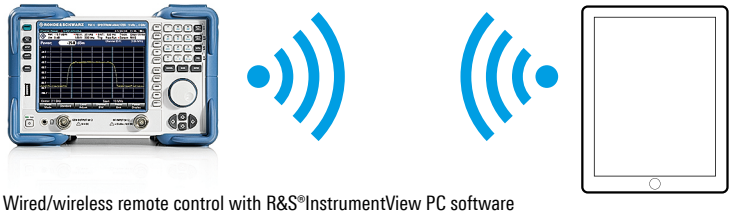
- ✓ High RF performance
- ✓ Low power consumption
- ✓ Low noise floor
- ✓ Compact form factor
- ✓ High max. input power
- ✓ Easy to control



Tracking generator for scalar transmission measurements

Easy virtual control [1]: control it your way, be it wired or wirelessly

Wireless remote control with R&S®MobileView app



Wired/wireless remote control with R&S®InstrumentView PC software



Flexible remote control on demand, anywhere, anytime.

[1] Via a wireless router connected to the instrument's LAN port.

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FPL Spectrum Analyzer



Benchtop performance from a portable analyzer

The FPL spectrum analyzer combines excellent RF performance with a small footprint. The light weight and optional battery/DC power make it the ideal instrument for the lab and in the field. Operating the multi-touch display instrument is intuitive and fun to use. The FPL supports multiple tasks in one instrument at an attractive price.

Model overview

Model	Frequency range	DANL at 1 GHz	Phase noise (f = 1 GHz, 10 kHz offset)	TOI at 1 GHz	Spurious response	Battery operation
R&S®FPL1003	5 kHz to 3 GHz	–166 dBm (typ.)	–108 dBc (1 Hz) (typ.)	+20 dBm (typ.)	< –70 dBc (typ.)	optional
R&S®FPL1007	5 kHz to 7.5 GHz					
R&S®FPL1014	5 kHz to 14 GHz					
R&S®FPL1026	5 kHz to 26.5 GHz					

Important facts

Specification	FPL	Why this is important
Analysis bandwidth	▶ 10 MHz standard ▶ 40 MHz optional	Digital demodulation possible within the analysis bandwidth.
Spurious	< –70 dBc	Unambiguous detection of small signals.
Phase noise (f = 1 GHz, 10 kHz offset)	< –105 dBc (1 Hz)	Analysis close to the carrier or of narrowband signals.
TOI at 1 GHz	> 17 dBm	Higher dynamic range to detect small signals in the presence of strong ones.
Dimensions (W × H × D)	408 mm × 186 mm × 235 mm	Smaller dimensions leave more space on the workbench and make it easier to integrate into a rack.
Weight	6 kg	Low weight for enhanced portability.
Battery operation	optional	Full portability.

Recommended options/accessories

Description	Type
OCXO frequency reference	R&S®FPL1-B4
Additional interfaces	R&S®FPL1-B5
Internal generator up to 3 GHz/7.5 GHz for R&S®FPL1003/R&S®FPL1007 (factory fitted)	R&S®FPL1-B9
IEEE-488 (GPIB) interface	R&S®FPL1-B10
YIG preselector bypass	R&S®FPL1-B11
Second hard disk (SSD)	R&S®FPL1-B19
RF preamplifier up to 7.5/14/26.5 GHz	R&S®FPL1-B22
1 dB steps for electronic attenuator	R&S®FPL1-B25
DC power supply, 12 V/24 V	R&S®FPL1-B30
Internal lithium-ion battery with charging unit	R&S®FPL1-B31
40 MHz analysis bandwidth	R&S®FPL1-B40

Recommended options/accessories

Description	Type
AM/FM/φM measurement demodulator	R&S®FPL1-K7
Power sensor measurement with R&S®NRP-Zxx power sensors	R&S®FPL1-K9
Noise figure measurement application	R&S®FPL1-K30
Phase noise measurement application	R&S®FPL1-K40
EMI measurement application	R&S®FPL1-K54
Vector signal analysis	R&S®FPL1-K70
Multi-modulation analysis [1]	R&S®FPL1-K70M
BER measurements with PRBS data [1]	R&S®FPL1-K70P

[1] Requires R&S®FPL1-K70.



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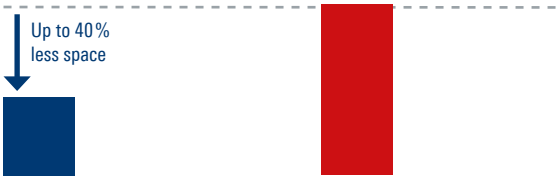
The perfect choice for:	
Research, education, service and maintenance	General purpose signal analysis and demodulation
Fast and easy integration into automated tests	Basic function test and EMI debugging in R&D

Your benefit	Features
One instrument for multiple tasks	► Spectrum analysis ► Power meter ► Analog and digital signal analysis
More space on your test bench	► Smallest footprint in its class (depth of only 23.5 cm)
Take it with you everywhere	► Top handle and low weight ► Optional battery pack, over 3 h operation ► Optional 12 V/24 V DC power supply

Up to 40 % more space and less weight on your desk

The FPL leaves up to 40 % more space on a typical 80 cm workbench than comparable analyzers. With 60 % less weight than comparable analyzers, it is the most portable benchtop analyzer.

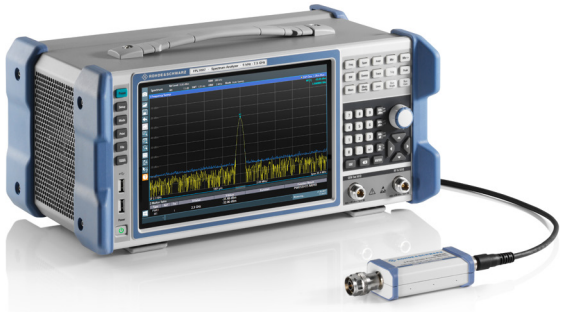


FPL

422 mm × 235 mm, 6 kg

Competitor

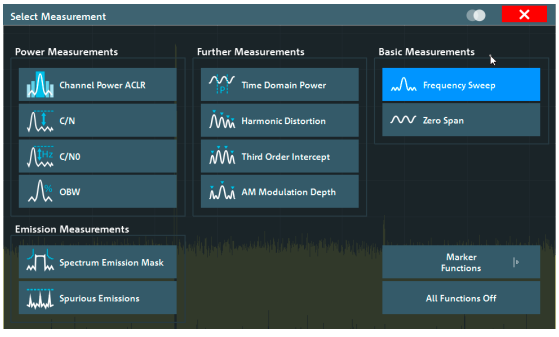
426 mm × 368 mm, 15 kg



Use as a power meter: Turn the FPL into a power meter with R&S®NRP power sensors and the R&S®FPL1-K9 option



Flexible user interface: Configure your result windows the way you want. Display different measurement channels at once. Sequential channel updating allows parallel measurement of e.g. spectrum, spectrogram, I/Q analysis and analog demodulation.



Many predefined measurements: Fast and easy access to a wealth of measurement and marker functions in the base model, including spectrogram measurements and I/Q analysis. Quick configuration through clear menus and touchscreen operation.

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VECTOR NETWORK ANALYZERS

The R&S®ESSENTIALS vector network analyzers have excellent RF characteristics and a wide range of analysis functions. They are ideal for analyzing passive and active components, such as filters, amplifiers, mixers and multiport modules.

S-parameters

A vector network analyzer (VNA) reveals the response of an electrical network. It includes at least one source to stimulate the device under test (DUT) in the forward and/or reverse direction, typically with frequency or continuous wave (CW) at a certain power or power sweep at a certain frequency. The VNA receivers measure the signals reflected by or transmitted through the DUT. S-parameters are the most commonly used VNA parameter. They are calculated as the ratio between response and stimulus signals and provide information about DUT characteristics, such as filter rejection and transmission, amplifier gain, cable attenuation and network matching.

Frequency range

The frequency range of a VNA is defined as its minimum and maximum available frequency values. This is important as the frequency range of the VNA must cover that of the DUT.

Sometimes a value for overrange is given, which allows a wider frequency range than officially specified. The measurement can be configured, but the operator must be aware that there is no performance data specified for the overrange and there might not be a matching calibration kit.

Rule of thumb: The frequency range of a VNA has to match the DUT's requirements.

Dynamic range

The higher the dynamic range, the faster it is possible to measure through the use of wider intermediate frequency bandwidth (IFBW). The dynamic range is defined as the difference between the maximum source power and the noise floor of the instrument. For the dynamic range specification, a noise floor at 10 Hz IFBW is typically used. By selecting a wider IFBW, an engineer can perform faster measurements by making a trade-off between speed and dynamic range. (A wider IFBW would increase noise floor and thus reduce the dynamic range.) If the IF bandwidth is increased by a factor of 10, the dynamic range is reduced by approximately 10 dB.

Rule of thumb: Especially for DUTs with very high frequency blocking characteristics, it is important to have a low noise floor so that even signals with higher attenuation can be discerned from the unwanted noise. For accurate measurements, the signal-to-noise ratio (SNR) should be at least 20 dB.

Measurement speed

The measurement speed tells you how fast a measurement can be performed. This is especially critical in production and manufacturing, but it can also be important in laboratory environments.

In general, the measurement speed is mainly determined by the number of measurement points, the IFBW, calibration type and the active/inactive status of calibration and/or offset. For example, with a low number of points, a high IFBW and inactive offset and calibration, the total sweep time can be in the range of milliseconds. On the contrary, if you have a measurement setup with many channels and traces, a high number of measurement points, a narrow IFBW and active calibration, the total test time can take several minutes.

Rule of thumb: A quick way to decrease the test time for one channel with one trace is to increase the IFBW or reduce the number of points.

Approx. test time ≈ *number of points/IFBW*

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Passive and active components

When measuring passive components (filters, cables and attenuators), the VNA only needs to perform standard S-parameter measurements and time-domain measurements to identify where a cable might be broken. For a simple filter with a high-blocking stopband, you might just need to measure its reflection (S_{11} and S_{22}) or its transmission (S_{21} and S_{12}) S-parameters. However, you would still need a high dynamic range to characterize it precisely in its stopband range.

If active components need to be measured, you need to analyze the required test parameters even more carefully to find the appropriate VNA. If you want to measure the compression point of an amplifier, for example, you must perform a power sweep and a power calibration, which are not standard features in all VNAs.

Products	Page
R&S®ZNL vector network analyzer	88
R&S®ZNLE vector network analyzer	90

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Vector network analyzer portfolio





	R&S®ZNL	R&S®ZNLE
Frequency range	5 kHz to 20 GHz	100 kHz to 20 GHz
Overrange	–	–
Ports	two N(f) 50 Ω or 3.5 mm (m) for R&S®ZNL20	two N(f) 50 Ω
Test set	bidirectional (S_{11}, S_{12}, S_{21}, S_{22})	bidirectional (S_{11}, S_{12}, S_{21}, S_{22})
Dynamic range	▶ up to 120 dB (spec.) ▶ up to 130 dB (typ.)	▶ up to 110 dB (spec.) ▶ up to 120 dB (typ.)
Number of points	1 to 100 001	1 to 5001
IF bandwidth	1 Hz to 500 kHz	1 Hz to 500 kHz
Trace noise	▶ 0.0035 dB (RMS) (spec.) ▶ 0.0005 dB (RMS) (typ.)	▶ 0.005 dB (RMS) (spec.) ▶ 0.001 dB (RMS) (typ.)
Measurement speed (201 points, 100 kHz IF bandwidth, 200 MHz span, two-port calibration)	9.6 ms	9.6 ms
Maximum power	▶ 0 dBm (spec.) ▶ +3 dBm (typ.)	0 dBm
Minimum power	▶ –10 dBm (base unit) ▶ –40 dBm (with R&S®ZNLx-B22)	–10 dBm
Power sweep range	–	–
Power sensor support	available in spectrum analyzer mode	–
Display	25.6 cm (10.1") diagonal WXGA color LCD with touchscreen, 1280 × 800 pixel	25.6 cm (10.1") diagonal WXGA color LCD with touchscreen, 1280 × 800 pixel
Dimensions (W × H × D)	408 mm × 186 mm × 235 mm	408 mm × 186 mm × 235 mm
Weight	6 kg to 8 kg	6 kg
Calibration unit support	●	●
User port	–	–
GPIB interface	○	○
Handler I/O interface	–	–
Time domain	●	●
Distance to fault	●	●
Spectrum analysis	○	–
Power range extension	○	–

● available/yes – not available/no ○ optional

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R&S®ZNL Vector Network Analyzer



One device for all your measurements

Measurement equipment for RF applications must fulfill high quality standards. Instruments should be easy to use and offer high versatility. Fast measurements and reliable performance are crucial.

With the R&S®ZNL, Rohde&Schwarz exceeds these expectations and offers even more: Vector network analysis, spectrum analysis and power meter measurements are unified in a single, compact instrument, making the R&S®ZNL a universal allrounder.

Model overview

Model	Frequency range	Dynamic range	Output power	IF bandwidth	Measurement speed
R&S®ZNL3	5 kHz to 3 GHz	120 dB (spec.), 130 dB (typ.)	–40 dBm to 0 dBm (spec.)	1 Hz to 500 kHz	16.7 ms for 401 points (100 kHz IFBW, TOSM, 200 MHz span)
R&S®ZNL4	5 kHz to 4.5 GHz				
R&S®ZNL6	5 kHz to 6 GHz				
R&S®ZNL14	5 kHz to 14 GHz				
R&S®ZNL20	5 kHz to 20 GHz				

Important facts

Specification	R&S®ZNL	Why this is important
Frequency	5 kHz to 20 GHz	The measuring instrument has to cover the working frequency range of the DUT.
Dynamic range	120 dB (spec.), 130 dB (typ.)	A high dynamic range is important for measuring e.g. high-rejection filters. It also makes it possible to use a larger IF filter for faster measurement speed.
Output power	–40 dBm to 0 dBm (spec.)	A high output power is needed if you need to measure high-rejection filters (requires more dynamic range) or very long cables.
Speed	16.7 ms for 401 points (100 kHz IFBW, TOSM, 200 MHz span)	Especially in production environments, it is important to measure fast. Because time is money.
Display	•	Having an integrated monitor reduces hassle when configuring measurements.
External PC	not required	The R&S®ZNL just needs to be switched on, and users can start measuring without having to configure an external PC.
Dimensions (W × H × D)	408 mm × 186 mm × 235 mm	The size of the VNA determines how much space is left on the workbench for the measurement setup. It is usually better to have more space.
Weight	6 kg to 8 kg	If the instrument needs to be moved around, it is better to have a lighter instrument.

Scope of delivery

- ► Printed operating manual
- ► CD with manual
- ► Power cable
- ► 3 year warranty (one year for battery and accessories)

Recommended options/accessories

Description	Type
Vector network analyzer, 5 kHz to 3 GHz	R&S®ZNL3
Vector network analyzer, 5 kHz to 4.5 GHz	R&S®ZNL4
Vector network analyzer, 5 kHz to 6 GHz	R&S®ZNL6
Vector network analyzer, 5 kHz to 14 GHz	R&S®ZNL14
Vector network analyzer, 5 kHz to 20 GHz	R&S®ZNL20

Recommended options/accessories

Description	Type
Spectrum analyzer function	R&S®ZNLx-B1
Time domain analysis	R&S®ZNL-K2
Distance-to-fault measurements	R&S®ZNL-K3
Independent CW source [1]	R&S®ZNL-K14
AM/FM/φM analog modulation analysis [1]	R&S®FPL1-K7
Measurements with R&S®NRP power sensors [1]	R&S®FPL1-K9
For more information about the R&S®VSE vector signal explorer software and selected options, contact your local Rohde&Schwarz sales office.	

[1] Requires R&S®ZNLx-B1 hardware option.



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The perfect choice for:	
General purpose RF lab measurements	Low-cost volume manufacturing
Education and training	IoT and wireless manufacturing and troubleshooting

Your benefit	Features
3 instruments in 1, plus an independent CW signal generator	A full two-port VNA that supports true spectrum analyzer hardware (R&S®ZNLx-B1) as well as power sensors, turning it into a power meter. The R&S®ZNL with the R&S®ZNLx-B1 option can also benefit from the R&S®ZNL-K14 option, which allows the stimulation of a DUT by an independent continuous wave generator for analysis in the frequency spectrum domain
Widest frequency range in the market	The R&S®ZNL has an unrivaled frequency operation range. The start frequency at 5 kHz is the lowest in the market for VNAs ranging up to 20 GHz
Fully portable	The R&S®ZNL is very lightweight (6 kg to 8 kg) and very compact (408 mm × 235 mm footprint) and has a top handle for easy transport. The battery pack allows it to be used on the go
Clearly structured user interface with multi-touch	Wide capacitive touchscreen for convenient configuration with multi-touch gesturing. Undo/redo softkeys and fully integrated context-sensitive help menu for user-friendly operation
Compatible with R&S®VSE	The R&S®ZNL is fully compatible with the R&S®VSE vector signal explorer software and selected options for in-depth analysis of the device under test

Highlights

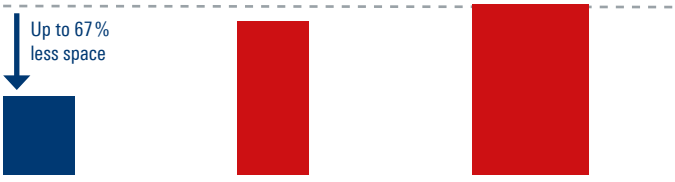
- Widest frequency range from 5 kHz to 20 GHz
- 3 instruments in 1: vector network analyzer, spectrum analyzer and power meter
- Optional independent CW signal generator for spectrum analysis
- Two-port vector network analyzer for bidirectional measurements
- MultiView operation
- Wide dynamic range of up to 130 dB (typ.)
- Output power: from –40 dBm to 3 dBm (typ.)
- Fast measurements, e.g. 16.7 ms at 100 kHz IFBW (401 points, 200 MHz span, two-port calibration)
- Compact size and low weight (6 kg to 8 kg)
- Optional battery pack



MultiView provides a convenient overview of all active R&S®ZNL modes. The figure shows a combination of spectrum analyzer and network analyzer. In this view, all modes can be updated sequentially.

Up to 67 % more space and 60 % less weight on your desk

The R&S®ZNL leaves up to 67 % more space on a typical 80 cm workbench than comparable analyzers.



R&S®ZNL
408 mm × 235 mm, 6 kg to 8 kg

Competitor 1
432 mm × 310 mm, 11.8 kg
Approx. 29 % more space needed

Competitor 2
484 mm × 590 mm, 11 kg
Approx. 67 % more space needed



Portable for use on the go: With batteries, the R&S®ZNL can be used outside the labs. Batteries are hot-swappable.



A padded soft carrying bag for safe transportation of the R&S®ZNL.

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R&S®ZNLE Vector Network Analyzer



Vector network analysis made easy

With the R&S®ZNLE, vector network analysis measurements are as easy as ABC: easy to use, easy to calibrate, easy to configure.

Fast measurement speeds, reliable RF performance and a clearly structured user interface make the R&S®ZNLE the perfect choice for vector network analysis measurements on passive components.

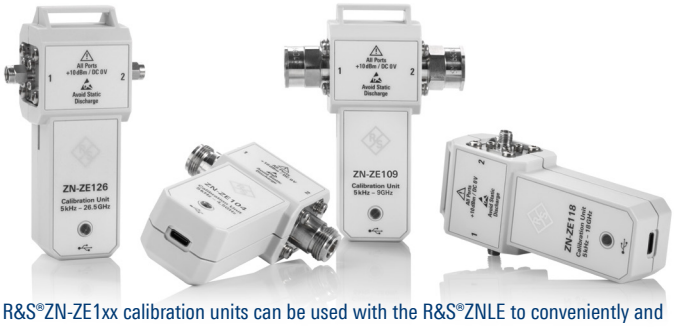
Model overview

Model	Frequency range	Dynamic range	Output power	IF bandwidth	Measurement speed
R&S®ZNLE3	100 kHz [1] to 3 GHz	110 dB (spec.), 120 dB (typ.)	0 dBm	1 Hz to 500 kHz	16.7 ms for 401 points (100 kHz IFBW, TOSM, 200 MHz span)
R&S®ZNLE4	100 kHz [1] to 4.5 GHz				
R&S®ZNLE6	100 kHz [1] to 6 GHz				
R&S®ZNLE14	100 kHz [1] to 14 GHz				
R&S®ZNLE18	100 kHz [1] to 18 GHz [2]				

[1] With R&S®ZNLE-B100 option.
[2] 20 GHz overrange.

Important facts

Specification	R&S®ZNLE	Why this is important
Frequency	100 kHz to 20 GHz	The measuring instrument has to cover the working frequency range of the DUT.
Dynamic range	110 dB (spec.), 120 dB (typ.)	A high dynamic range is important for measuring e.g. high-rejection filters. It also makes it possible to use a larger IF filter for faster measurements.
Output power	up to 0 dBm	High output power is required when measuring high-rejection filters (requires more dynamic range) or very long cables.
Speed	16.7 ms for 401 points (100 kHz IFBW, TOSM, 200 MHz span)	Especially in production environments, measurements need to be fast. Because time is money.
Display	•	An integrated monitor reduces hassle when configuring measurements.
External PC	not required	The R&S®ZNLE just needs to be switched on, and users can start measuring without having to configure an external PC.
Dimensions (W × H × D)	408 mm × 186 mm × 235 mm	VNA size determines how much space is left on the workbench for the measurement setup. It is usually better to have more space.
Weight	6 kg	If the instrument needs to be moved, a lighter instrument is better.



R&S®ZN-ZE1xx calibration units can be used with the R&S®ZNLE to conveniently and quickly perform system error correction.

Scope of delivery

- ▶ Power cable
- ▶ Operating manual
- ▶ CD with manual
- ▶ 3 year warranty

Recommended options/accessories

Description	Type
Vector network analyzer, 1 MHz to 3 GHz	R&S®ZNLE3
Vector network analyzer, 1 MHz to 4.5 GHz	R&S®ZNLE4
Vector network analyzer, 1 MHz to 6 GHz	R&S®ZNLE6
Vector network analyzer, 1 MHz to 14 GHz	R&S®ZNLE14
Vector network analyzer, 1 MHz to 18 GHz [2]	R&S®ZNLE18
Extended frequency range, lower end, 1 MHz to 100 kHz	R&S®ZNLE-B100
Time domain analysis	R&S®ZNL-K2
Distance-to-fault measurements	R&S®ZNL-K3
GPIB interface	R&S®FPL1-B10



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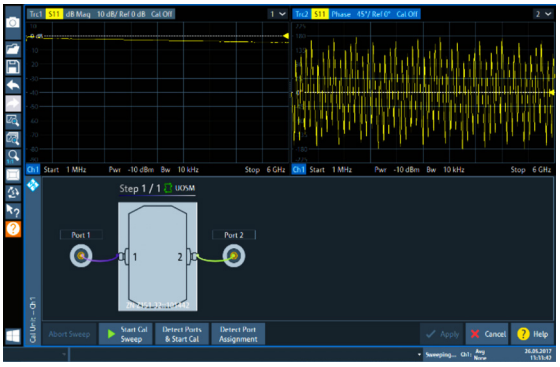
The perfect choice for:	
Passive RF components tests	Education and training
Automated testing	Production environment

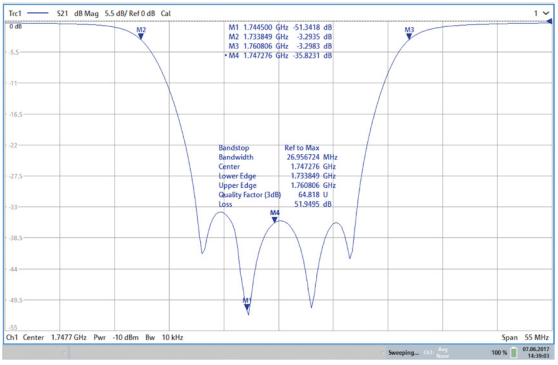
Your benefit	Features
Solid performance in an economic instrument	Standalone vector network analyzer with fast measurement speed and low trace noise
Clearly structured user interface with multi-touch display	Wide capacitive touchscreen for convenient configuration with multi-touch gesturing. Undo/redo softkeys and fully integrated context-sensitive help menu for user-friendly operation
Standard instrument for use in the lab	De/embedding, fixture compensation, support of automatic calibration units and remote control via LAN or IEEE-488 (GPIB)
Precise time-domain measurements	The broad frequency range from 100 kHz (with R&S®ZNLE-B100 option) to 20 GHz (overrange) makes the R&S®ZNLE ideal for measurements in the time domain, where spatial resolution is crucial

Highlights

- Broad frequency range: from 100 kHz to 20 GHz
- Time domain and distance-to-fault options for deeper analysis of filters and cables
- Compact standalone vector network analyzer with fully integrated PC
- Fast measurement speeds
- Innovative user interface and wide 10.1" multi-touch display
- Support of calibration units



Automatic calibration units supported for convenient automatic system error correction. To be even quicker, one-step autocalibration is available.

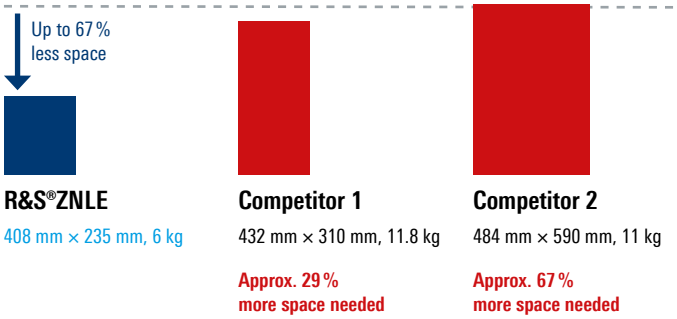


Vector network analysis: Automatic filter characterization with advanced marker functions – all important values in one step

Up to 67 % more space and 60 % less weight on your desk

The R&S®ZNLE leaves up to 67 % more space on a typical 80 cm workbench than comparable analyzers. Weighing 60 % less than comparable analyzers, it is the most portable benchtop analyzer. The R&S®ZNLE fits easily on any desk for convenient everyday measurements such as tuning a filter.





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EMI PRECOMPLIANCE

The Rohde&Schwarz electromagnetic interference (EMI) precompliance portfolio includes a comprehensive range of test equipment that streamlines EMI compliance test preparation. Rohde&Schwarz has reliable and efficient solutions tailored to meet diverse testing requirements, from versatile precompliance testers to advanced debugging tools. Engineered by EMC experts, all EMI precompliance instruments ensure high accuracy, exceptional reliability and seamless integration into your product development workflow.

Early EMC

Integrating electromagnetic compatibility (EMC) early in the design process is crucial for successful EMI compliance to minimize costly redesigns and delays during compliance testing.

Key practices:

- Early design reviews: Incorporate EMC assessments during initial design phases to identify and mitigate potential interference sources
- EMI debugging: Actively search for and address interference emissions at the PCB or component level to prevent issues during later testing stages

Precompliance test setups

Effective precompliance testing involves simplified test setups that mimic full compliance tests to ensure reliability and accuracy. Using scaled-down versions of full compliance tests lets you obtain preliminary results that correlate with certified laboratory measurements.

Rule of thumb: Precompliance should closely simulate full compliance environments to increase first-time pass rates.

Products	Page
R&S®ESL EMI test receiver	94
R&S®EPL1000 EMI test receiver	96

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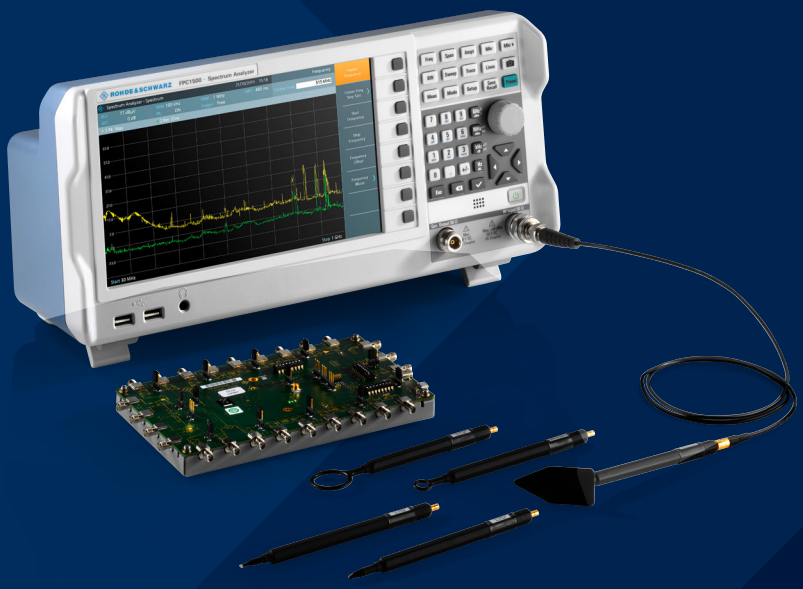
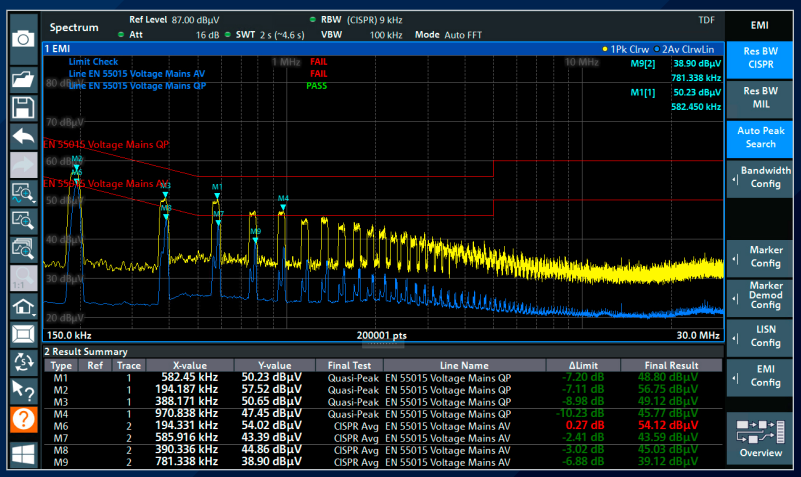
Solutions from Rohde&Schwarz



R&S®FPC-K43 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 to display 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.



R&S®FPL1-K54 EMI measurement application

The R&S®FPL1-K54 EMI measurement application adds EMI diagnostic functions to the FPL spectrum analyzer. The R&S®FPL1-K54 offers EMI bandwidths for commercial and military applications, detectors including quasi-peak, CISPR-average and RMS-average, limit lines and correction factors. Up to 200 001 user-defined sweep points enable higher frequency resolution regardless of large or small span and bandwidths settings.



R&S®ELEKTRA EMC test software

The R&S®ELEKTRA EMC test software controls complete EMC systems and automates measurements of equipment under test (EUT) being certified for emissions (EMI) and immunity (EMS). R&S®ELEKTRA simplifies configuration of test systems and test descriptions in accordance with common standards. It speeds up test execution and paves the way to quickly generating a comprehensive test report.

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R&S®ESL EMI Test Receiver



Compact, cost-effective measuring receiver

The R&S®ESL EMI test receiver combines two instruments in one: measuring EMC disturbances in line with commercial standards and also serving as a full-featured spectrum analyzer for diverse lab applications. The R&S®ESL is designed to meet the needs of cost-conscious users who want to perform diagnostic and precompliance EMI measurements up to 3 GHz or 6 GHz.

Model overview

Model (frequency range)	Measurement range	Amplitude accuracy	DANL with preamplifier	Resolution bandwidths	Tracking generator
R&S®ESL3 (9 kHz to 3 GHz)	–70 dBm to +23 dBm	0.5 dB	< –152 dBm (1 Hz)	10 Hz to 10 MHz (–3 dB), 200 Hz, 9 kHz, 120 kHz (–6 dB), 1 MHz (impulse)	not available
R&S®ESL3 (9 kHz to 3 GHz)					integrated
R&S®ESL6 (9 kHz to 6 GHz)					not available
R&S®ESL6 (9 kHz to 6 GHz)					integrated

Scope of delivery

- ▶ Power cable
- ▶ Quick start guide
- ▶ CD-ROM (with operating manual and service manual)
- ▶ 3 year warranty

Recommended options/accessories

Description	Type
OCXO reference frequency	R&S®FSL-B4
Additional interfaces (video out, IF out, noise source control, AUX port, R&S®NRP-Zxx power sensor)	R&S®FSL-B5
Gated sweep	R&S®FSL-B8
AM/FM/φM measurement demodulator	R&S®FSL-K7
Power sensor support (requires R&S®FSL-B5 or R&S®NRP-Z3/-Z4)	R&S®FSL-K9

USB | TCP/IP | Optional IEEE-488 | USB flash drive | VGA output

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The perfect choice for:	
EMI measurements and debugging of commercial products	EMC labs
Standard RF spectrum measurements	Development and mobile users

Your benefit	Features
EMI measurements	► Very good RF characteristics ► Frequency range covering the most important EMI measurements in commercial product standards ► All CISPR weighting detectors included ► All major functions of an advanced EMI test receiver, including fully automated EMI test sequences
Compact and mobile	► Rugged case as standard ► Compact size ► Lightweight ► Optional battery operation for installation, maintenance and on-site applications
Standard RF spectrum measurements	Complete functionality of an R&S®FSL3/ R&S®FSL6 spectrum analyzer included

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R&S®EPL1000 EMI Test Receiver



Quick, precise and compliant EMI measurements up to 30 MHz

The R&S®EPL1000 fully complies with CISPR16-1-1. The very fast time domain scan can check the complete CISPR bands A or B in a single shot. Built-in preselection ensures a high dynamic range and enables the acquisition of short pulses. The R&S®EPL1000 offers four-channel click rate analysis, a spectrogram function, IF analysis and further functions for detailed analysis. Automation simplifies measurements and ensures exact reproducibility of test sequences. These and many more functions make the R&S®EPL1000 ideal for conducted voltage and current measurements. Typical applications include precompliance measurements, precertification and certification in line with IEC, EN, CISPR and FCC.

Important facts

Specification	R&S®EPL1000	Why this is important
Fast time domain scan	RBW = 9 kHz, frequency segment 29.85 MHz, RBW = 120 kHz, frequency segment 24.6 MHz	It measures one CISPR band (band A or B) in one shot. This keeps overall measurement times small and enables fast identification of infrequent emissions.
Click rate analyzer	► CISPR 14-1 ► DENAN-law	The R&S®EPL1-K59 click rate analyzer has everything you need for CISPR 14-1 compliant discontinuous disturbance measurements (click measurements). These measurements can be easily configured and run for a defined period of time or until a specific number of clicks are detected. The measured values are automatically evaluated in line with CISPR 14-1 edition 6 or 7 and a PASS/FAIL information is given.

Scope of delivery

- ► Power cable
- ► Quick start guide
- ► 1 year warranty

Recommended options/accessories

Description	Type
EMI test receiver, 5 kHz to 30 MHz	R&S®EPL1000
Hardware options	
Internal generator, 5 kHz to 30 MHz	R&S®EPL1-B91
Replacement SSD, including controller unit	R&S®EPL1-B19
OCXO, precision frequency reference	R&S®FPL1-B4
GPIB interface	R&S®FPL1-B10
DC power supply for 12 V/24 V supply voltage	R&S®FPL1-B30
Lithium-ion battery pack, with controller unit for internal battery slot	R&S®FPL1-B31

Recommended options/accessories

Keycode options	
Click rate analyzer	R&S®EPL1-K59
IF analysis	R&S®EPL1-K56
AM/FM/PM measurement demodulator	R&S®FPL1-K7
Protective hard cover	R&S®EPL1-Z1
Soft carrying bag, for transport and outdoor operation	R&S®EPL1-Z2
H-style shoulder harness (requires R&S®FPL1-Z2 option)	R&S®EPL1-Z3
Spare lithium-ion battery pack	R&S®FPL1-Z4
Antiglare display film, for outdoor operation	R&S®FPL1-Z5
19" rackmount kit	R&S®EPL1-Z6
Lithium-ion battery charger, for charging spare batteries	R&S®FSV-B34
Accredited calibration	R&S®ACAEPL1000
Documentation of calibration values	R&S®DCV-2



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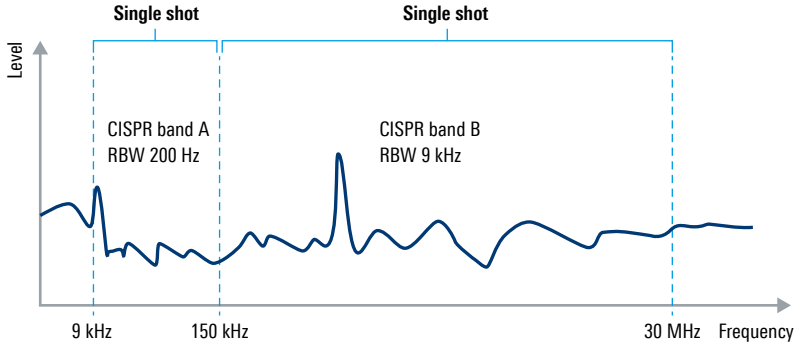
The perfect choice for:	
Product certification and precertification	Basic function test and EMI debugging in R&D
Research, education and government	Testing for commercial products against IEC, EN, CISPR and FCC

Your benefit	Features
Precise and standard-compliant EMI identification	R&S®EPL1000 meets CISPR 16-1-1, MIL-STD-461 and DO-160 requirements and can be used to develop and certify a wide range of electrical products for both commercial and military.
Fast measurements thanks to time domain scan	With a single scan, it can measure an entire CISPR band (A or B). This enables fast and reliable detection of sporadic emissions
Automation of measurements	Automatic measurement of: ▶ Multiple frequency segments with individual settings ▶ Multiple lines connected to a LISN
Comprehensive EMI analysis functions	Includes click rate analyzer, bargraph, spectrogram, zero span, IF analysis, AM/FM output and spectrum analysis functions
Simple integration into EMI test systems	R&S®EPL1000 can be integrated into TCP/IP network via its Ethernet interface. This allows remote control using SCPI commands to EMC test software like R&S®ELEKTRA.

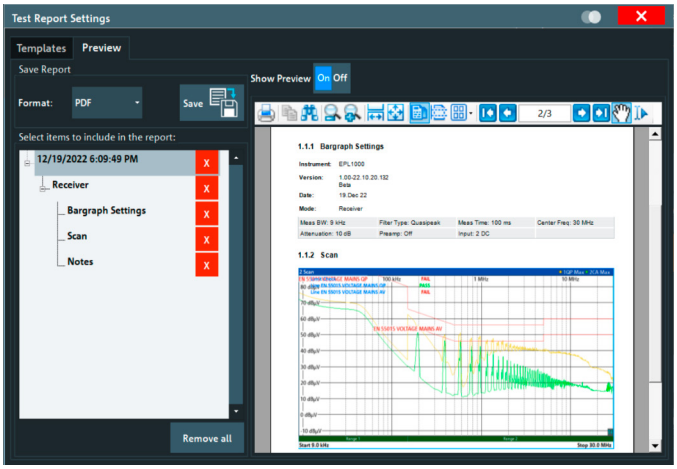
Fast measurement with time domain scan

The R&S®EPL1000 can measure an entire CISPR band (A or B) in a single shot, for much shorter total measurement times. Highly parallelized measurements enable longer gap-less checks of relatively large frequency segments and reliable and fast detection of sporadic emissions.



Precise and standard-compliant EMI identification

The R&S®EPL1000 meets CISPR 16-1-1 requirements and also supports the decadic 6 dB bandwidths require by MIL-STD-461 and DO-160. The R&S®EPL1000 can be used to develop and certify a wide range of electrical products.



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METERS AND ANALYZERS

At Rohde & Schwarz, we understand the importance of good basics and we are committed to delivering high-quality, general-purpose tools to meet evolving industry needs. The R&S®ESSENTIALS meters and analyzers portfolio is the backbone of electronic measurements and supports engineers in a wide range of applications.

LCR bridge/meter?

An LCR bridge/meter measures impedance parameters such as inductance (L), capacitance (C) and resistance (R) of an electronic component. Benchtop LCR meters typically have selectable test frequencies of more than 100 kHz to create data points at multiple spot frequencies. They often include options to superimpose a DC voltage or current on the AC measuring signal. In addition, benchtop meters allow you to use special fixtures when measuring surface mount device (SMD) components, air core coils and transformers. Often used in a general capacity, LCR bridges/meters can be used to validate and test development components during incoming inspection and to determine variations between parts. LCR bridges/meters are also ideal for production facilities, as they enable fast measurements and come with binning interfaces to control a handler/sorter.

Arbitrary waveform generator

An arbitrary waveform generator (AWG) generates electrical waveforms. It is used to test all aspects of a receive (RX) device to determine performance limits and unexpected behavior. AWGs can generate signals that closely approximate real-world signals, both wanted signals and interferers. The generated signals can be modified in precise ways to operate the receivers under usual conditions or at performance limits.

Unlike function generators, AWGs can generate any arbitrarily defined waveform at their output. Some AWGs also operate as conventional function generators to produce standard waveforms such as sine, square, ramp, triangle, noise and pulse. Some units include additional built-in waveforms such as exponential rise and fall times, sinx/x and ECG. There are also AWGs that allow users to retrieve waveforms from a number of digital and mixed-signal oscilloscopes.

Power analyzer

The power analyzer measures and characterizes both AC and DC power. Basic power analyzers provide fundamental numerical measurements, while advanced power analyzers support a wider range of both numerical and graphical measurements, including advanced analysis functions such as inrush current characterization and harmonic analysis. In addition to these measurements, some analyzers facilitate automated conformance tests for standby and harmonic measurements.

Digital multimeter

Digital multimeters form the backbone of electronic measurements, supporting engineers in a wide range of applications. They are invaluable for circuit troubleshooting, component testing and system validation. These devices measure voltage, current and resistance, combining the features of a voltmeter, ammeter and ohmmeter in a single device. Accuracy and speed are the most important parameters of digital multimeters, with usability coming in at a close third.

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Products	Page
R&S®LCX LCR meter	100
R&S®NPA power analyzers	102
R&S®UDS digital multimeter	102

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R&S®LCX LCR Meter



What sets this LCR meter apart?

- Fast, accurate and versatile
- Upgradeable frequency range
- Test signals for all requirements
- DC bias
- Data logging function
- High-resolution touchscreen
- Versatile test fixtures

Model overview

Model	Measurement functions	Frequency range	Test signal voltage (at 100 Ω)	Test signal current (at 100 Ω)	Internal bias voltage
R&S®LCX100	Cp, Cs, Lp, Ls, D, Q, G, Rp, Rs, Rdc, R, X, Z, Y, Θd, Θr, B, M, N	DC, 4 Hz to 300 kHz	≤ 1 MHz: 10 mV to 10 V, ≤ 5 MHz: 50 mV to 2 V, > 5 MHz: 100 mV to 1 V	≤ 1 MHz: 0.1 mA to 100 mA, ≤ 5 MHz: 0.5 mA to 20 mA, > 5 MHz: 1 mA to 10 mA	0 V to 10 V
R&S®LCX200		DC, 4 Hz to 500 kHz (1 MHz or 10 MHz optional)			

Important facts

Specification	R&S®LCX100, R&S®LCX200	Why this is important
Test fixtures	R&S®LCX-Z1, R&S®LCX-Z2, R&S®LCX-Z3, R&S®LCX-Z4, R&S®LCX-Z5, R&S®LCX-Z11	Versatile fixtures for lead-type devices, SMD components and transformers to perform measurements quickly.
Triggering	continuous, manual (hardkey on front), external via remote control, external via digital I/O interface	Accommodates more complex manufacturing setups.
Data logging	data rate up to 10 sample/s	Records measured values every 100 ms.
Interfaces	standard: USB-TMC, USB-CDC (virtual COM), LAN; optional: IEEE-488 (GPIB)	Most operations for an LCR meter are programmed. Having a modern and easy to use interface helps minimize input errors.

Scope of delivery

3 year warranty

Recommended options/accessories

Description	Type
LCR meter, 300 kHz, base unit	R&S®LCX100
LCR meter, 500 kHz, base unit	R&S®LCX200
Advanced analysis functions	R&S®LCX-K106
Digital I/O ports and binning function	R&S®LCX-K107
Extended bias functions	R&S®LCX-K108
Frequency upgrade to 1 MHz, for R&S®LCX200	R&S®LCX-K201
Frequency upgrade to 10 MHz, for R&S®LCX200	R&S®LCX-K210
IEEE-488 (GPIB) interface, for R&S®NGP/LCX	R&S®NG-B105
Test fixture for axial/radial lead type devices	R&S®LCX-Z1
Kelvin clip lead	R&S®LCX-Z2
Test fixture for SMD components	R&S®LCX-Z3
Test tweezers for SMD components	R&S®LCX-Z4
Transformer test cables	R&S®LCX-Z5
BNC extension, length: 1 m	R&S®LCX-Z11
19" rack adapter, 2 HU	R&S®ZZA-GE23



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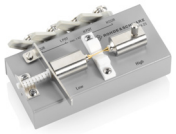
The perfect choice for:	
Component R&D	Component production
Service and testing	Education

Your benefit	Features
Versatile functionality, all frequently used measurements supported	▶ Performs the full range of measurements required to characterize resistors, capacitors and inductors
DC measurements and test signal frequencies of up to 10 MHz	▶ Frequency range from 4 Hz to 300 kHz ▶ Upper frequency limit of 500 kHz; extendable to 1 MHz or 10 MHz using software options
Easy to use	▶ Modern and intuitive operation thanks to a large capacitive touchscreen ▶ Frequently used functions directly accessible via the front panel keys

R&S®LCX-Z1



R&S®LCX-Z3



R&S®LCX-Z4



R&S®LCX-Z2



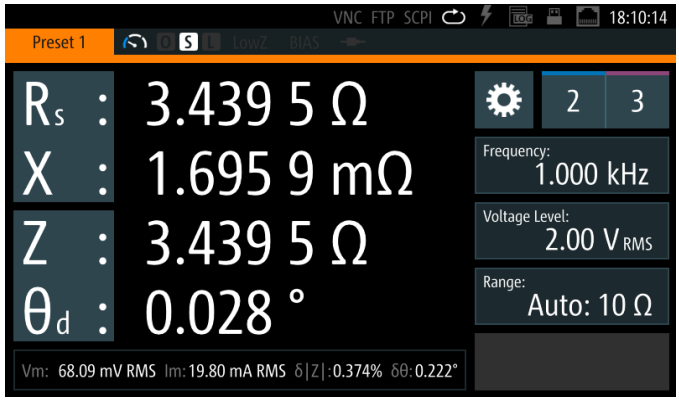
R&S®LCX-Z11



R&S®LCX-Z5



Test fixtures for a wide range of applications: LCR meters from Rohde&Schwarz can perform measurements on a wide range of components. Test fixtures are available that match the shape of the component.



Display and usability: Up to four measurement parameters can be shown on the display at the same time with additional information

List of measurement functions	
Cp	Capacitance value measured with parallel-equivalent circuit model
Cs	Capacitance value measured with series-equivalent circuit model
Lp	Inductance value measured with parallel-equivalent circuit model
Ls	Inductance value measured with series-equivalent circuit model
D	Dissipation factor
Q	Quality factor (inverse of D)
G	Equivalent parallel conductance measured with parallel-equivalent circuit model
Rp	Equivalent parallel resistance measured with parallel-equivalent circuit model
Rs	Equivalent series resistance measured with series-equivalent circuit model
Rdc	Direct current resistance
R	Resistance
X	Reactance
Z	Impedance
Y	Admittance
Θd	Phase angle of impedance/admittance (degree)
Θr	Phase angle of impedance/admittance (radian)
B	Susceptance
M	Mutual inductance
N	Turns ratio

Options for advanced applications

- **R&S®LCX-K106 advanced analysis functions**
  For dynamic impedance measurements that sweep the frequency, voltage or current of the test signal or bias signal
- **R&S®LCX-K107 digital I/O ports and binning function**
  Includes trigger input and eight data lines for binning
- **R&S®LCX-K108 extended bias functions**
  External DC bias voltage of up to 40 V and internal bias source in current regulation mode of up to 200 mA (DC)
- **R&S®LCX-K201/-K210 frequency upgrade**
  Upgrade to 1 MHz/10 MHz for the R&S®LCX200

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R&S®NPA Power Analyzers



All-in-one: the compact class that has it all

- First compact AC/DC load and standby current characterization tester for measurement without additional tools such as computers or remote infrastructure
- Performance and compliance protocols in line with IEC 62301, EN 50564 and EN 61000-3-2
- Numerical and graphical display with 26 key parameters

Model overview

Model	IEEE-488 (GPIB)	Bandwidth	Sampling rate	Power measurement range	Voltage input	Current input	Basic accuracy	Frequency accuracy	Input impedance
R&S®NPA101 power meter	–	DC to 100 kHz	500 ksample/s	simultaneous display of current and voltage, each with 16 bit	up to 600 V (RMS)	up to 20 A (RMS)	0.05 % of reading	0.1 % of reading	2 MΩ
R&S®NPA501 power analyzer	–								
R&S®NPA501-G power analyzer	•								
R&S®NPA701 compliance tester	–								
R&S®NPA701-G compliance tester	•								

Important facts

Specification	R&S®NPA	Why this is important
Configurable user interface and display	fully configurable 3.5" QVGA color TFT display	Allows users to see the measurements. Also convenient for documentation and screenshot capture.
On-instrument policy testing	on-instrument IEC 62301, EN 50564, EN 61000-3-2	Allows users to verify policies on the spot, without a PC and avoiding all of the associated IT and antivirus issues
Broad set of advanced analysis	waveform mode, trend chart, inrush mode, harmonics view	Gain insight into user problems quickly and easily with integrated analysis tools that are quick and easy to use.

Scope of delivery

- Power cable
- Quick start guide
- 3 year warranty

Recommended options/accessories

Description	Type
Power meter, DC to 100 kHz	R&S®NPA101
Power analyzer, DC to 100 kHz	R&S®NPA501
Power analyzer, DC to 100 kHz, incl. IEEE-488 (GPIB) interface	R&S®NPA501-G
Compliance tester, DC to 100 kHz	R&S®NPA701
Compliance tester, DC to 100 kHz, incl. IEEE-488 (GPIB) interface	R&S®NPA701-G
Accessories	
Mains adapter, EU version	R&S®NPA-Z1
Mains adapter, UK version	R&S®NPA-Z2
Mains adapter, US version	R&S®NPA-Z3
Mains adapter, CHN/AUS version	R&S®NPA-Z4
AC/DC current probe, 30 A, 4 mm connectors	R&S®HZC50
AC/DC current probe, 1000 A, 4 mm connectors	R&S®HZC51
19" rack adapter, 2 HU, for one or two R&S®NPA power supplies	R&S®HZC95

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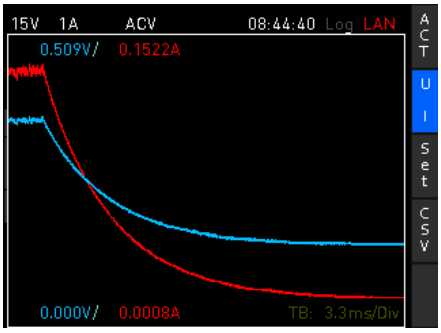
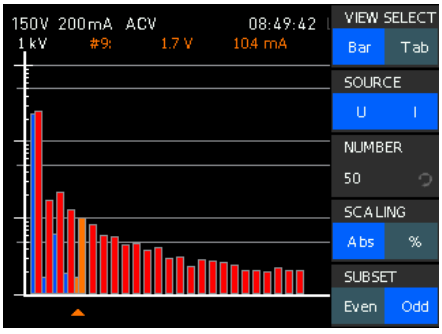
The perfect choice for:	
Engineering labs	Production testing
Education	General purpose

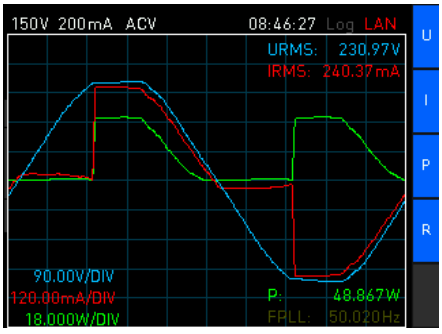
Graphical views



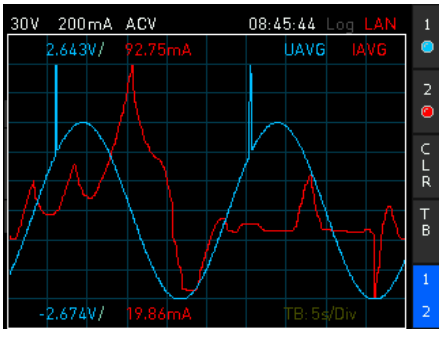
Inrush function



Harmonic analysis bargraph



Waveform function: load with phase-angle control



Trend chart function

Your benefit	Features
Clear display of all measured parameters	► Simultaneous display of up to 10 numerical measurement functions ► User configurable measurement display ► Graphical display modes for inrush, harmonic analysis, waveform and trend chart
High measurement accuracy	► Basic accuracy: 0.05 % ► Signal acquisition from DC to 100 kHz at a sampling rate of 500 ksample/s ► Simultaneous display of current and voltage, each with 16 bit resolution
Everyday measurement functions	► 26 different measurement and mathematical functions ► Limit testing with pass/fail indication for up to six selectable limits

List of measurement functions

Basic (all R&S®NPA models)	
P	Active power (W)
S	Apparent power (VA)
Q	Reactive power (VAR)
PF	Lambda power factor (λ)
PHI	Phase shift (φ)
FU	Voltage frequency value (Hz)
FI	Current frequency value (Hz)
FPLL	Acquisition frequency (Hz)
URMS	RMS voltage (U RMS)
UAVG	Average voltage (U AVG)
IRMS	RMS current (I RMS)
IAVG	Average current (I AVG)
UTHD	Total harmonic distortion U
ITHD	Total harmonic distortion I
WHM, WHP, WH, AHM, AHP, AH	Energy counter (integrator values)
Logging	Measured value logging (CSV)
Advanced and graphical (R&S®NPA501, R&S®NPA501-G, R&S®NPA701, R&S®NPA701-G)	
UPPeak	Maximum voltage (U PEAK)
UMPeak	Minimum voltage (U PEAK)
IPPeak	Maximum current (I PEAK)
IMPeak	Minimum current (I PEAK)
PPPeak	Maximum power (P PEAK)
PMPeak	Minimum power (P PEAK)
Harmonics	Bargraph of up to 50 harmonics
Waveform	Waveform display (displays one period of voltage, current or power)
Trend chart	Current and voltage displayed as a waveform
Inrush	Triggered display of waveform (single shot)
Limit / PASS/FAIL	Limit display
Sensor input	Input for current probe/external shunt
DIN/AIN	Digital/analog inputs and outputs (BNC)
Compliance evaluation (R&S®NPA701, R&S®NPA701-G)	
IEC 62301	Standby standard
EN 50564	Extended standby
EN 61000-3-2	Harmonic current for EMC, CE approval

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R&S®UDS Digital Multimeters



Built for accuracy, designed for ease

The R&S®UDS family of compact digital multimeters is engineered for both general purpose and production line environments. Renowned for versatility and precision, the multimeters can simultaneously display three measurement functions, streamlining test workflows. Beyond the standard 12 measurement functions, the multimeters have built-in statistical and mathematical functions and an intuitive user interface for smooth and efficient testing.

Model overview

Model	IEEE-488 (GPIB)	Measurement range	Basic DC accuracy	Number of digits
	–	DC to 100 kHz	0.015 % of reading	5½
R&S®UDS500-G, with GPIB interface	•			
R&S®UDS600	–		0.0075 % of reading	6½
R&S®UDS600-G, with GPIB interface	•			

Important facts

Specification	R&S®UDS	Why this is important
Measurement range	DC to 100 kHz	Enables testing across frequencies up to 100 kHz; broadens applications.
Digit resolution	up to 6½ digits	A higher number of digits indicates greater resolution.
Basic DC accuracy	0.0075 %	Minimizes errors in critical applications.
Resolution	100 nV, 10 nA, 0.1 mΩ, 0.1 pF, 1 Hz, 0.1 °C	Detects very small signals and variations
Reading rate	up to 200 readings/s	Captures transients and fast-changing signals.
Measurement counts	up to 2 000 000 counts	Capture long tests or many samples without losing resolution.

Scope of delivery

- Silicone test leads, with safety connector and length: 1 m (blue, red or black)test probe
- Quick start guide
- Set of power cables
- 3 year warranty

Recommended options/accessories

Description	Type
Accessories	
Silicon test lead, banana to banana, length: 1 m (set of 5, color: blue)	R&S®HZ10B
Silicon test lead, banana to banana, length: 1 m (set of 5, color: red)	R&S®HZ10R
Silicon test lead, banana to banana, length: 1 m (set of 5, color: black)	R&S®HZ10S
System components	
19" rack adapter, 2 U, for R&S®NGE100B/ NGC100/NPA/UDS and R&S®HMC series	R&S®HZC95

USB TCP/IP Optional IEEE-488 USB flash drive

L'IMPULSION Retrouvez nous sur www.limpulsion.fr

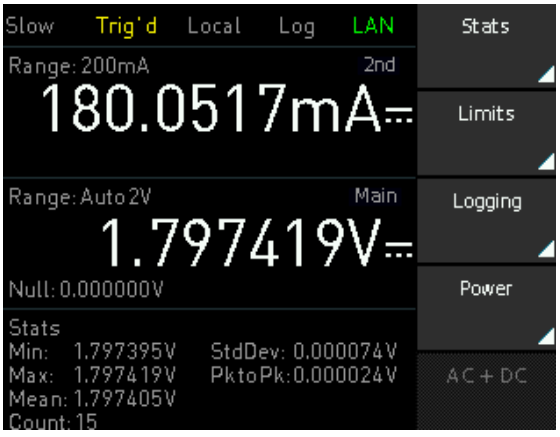
The perfect choice for:	
Engineering lab	General purpose
Production testing	Education

Your benefit	Features
See more at a glance	► Simultaneous display of three measurements (DC, AC and statistics) ► QVGA color display for excellent readability ► Limit testing directly on the display for easy minimum/maximum analysis
Versatile functions	► Mathematical functions ► Built-in statistics ► Two-wire and four-wire measurements ► Limit testing
Remote controllability	► Remote control with SCPI based commands ► Ethernet interface (LAN) with integrated web server ► Driver packages

Application	How the R&S®UDS meets your needs
General purpose	► Simultaneous display of three measurements, e.g. DC + AC + statistics ► QVGA color display for excellent readability ► Limit testing directly on the display for easy minimum/maximum analysis
Engineering lab	► Mathematical functions ► Built-in statistics ► Two- and four-wire measurements ► Limit testing
Production environment	► Remote control via SCPI based commands ► Ethernet interface (LAN) with integrated web server ► Driver packages

Simultaneous measurement display

Simultaneous display of three measurements, including DCI and ACI at the same time



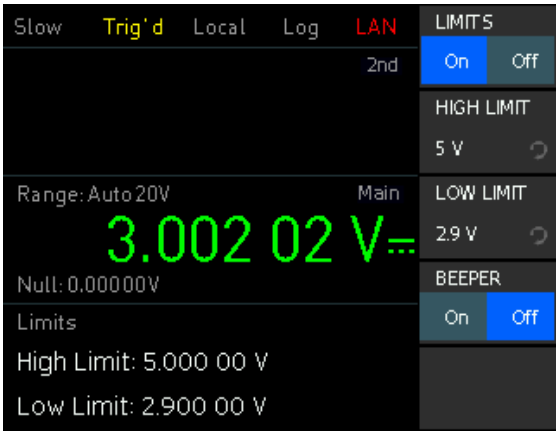
Ideal for industrial environments

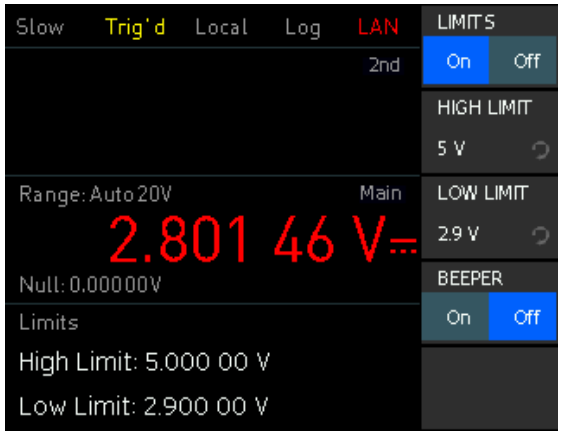
Easily fits into the R&S®HZC95 19" rackmount kit for production environments



Limit testing

Programmable test functions ideal for minimum and maximum analyses





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POWER SENSORS

The Rohde&Schwarz power sensor portfolio offers industry-leading performance, with the lowest noise floor, lowest measurement uncertainty and fastest measurement speed. The sensors are also easy to use with touchscreen base units, LAN interfaces, built-in triggering and emulation of legacy power meters.

Frequency range

The sensor should fully encompass the operational frequencies of the DUT.

The standard range of a power sensor typically covers a broad spectrum suitable for most high-frequency applications, including telecommunications and radar systems. Some sensor models also offer overrange capabilities, allowing measurements beyond standard frequency limits. Note that overrange performance may lack ensured accuracy and compatible calibration kits.

> Rule of thumb: Make sure the power sensor frequency range aligns with or exceeds the DUT range for comprehensive and reliable measurements.

Dynamic range

A high dynamic range is essential for applications with large power level variations to enable precise measurements even with significant signal attenuation. A lower noise floor enhances the signal-to-noise ratio (SNR) and allows weaker signals to be detected without interference.

> Rule of thumb: To accurately measure highly attenuated signals, prioritize sensors with a low noise floor and a high dynamic range to maintain a minimum SNR of 20 dB.

Measurement speed

Measurement speed determines how quickly a power sensor can perform a measurement, critical in production environments and laboratory settings.

Increase measurement speed by reducing the number of measurement points and increasing the IFBW. However, this can raise the noise floor and reduce dynamic range. Balancing speed with measurement accuracy is essential.

> Rule of thumb: To decrease test time for single-channel measurements, increase the IFBW or reduce the number of measurement points, while keeping in mind the impact on dynamic range and measurement accuracy.

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R&S®NRX Power Meter



The new power meter generation with a modern and intuitive user interface

- Support up to four Rohde&Schwarz power sensors simultaneously
- Clear result display on the flexible configurable screen
- Touchscreen based user interface operating concept
- Function keys on the front panel for quick access to the most important functions

Model overview

Model	Frequency range	Measurement channels	Power measurement range	Display	Compatible sensors	Weight
R&S®NRX	DC to 170 GHz (sensor-dependent)	1 to 4	0.1 fW to 30 W (average) (sensor-dependent)	5"/12.7 cm (touch) with 800 × 480 pixel resolution (WVGA)	▶ R&S®NRPxxS(N)/T(N)/A(N)/P/E series ▶ R&S®NRQ6 frequency selective power sensor ▶ R&S®NRT-Zxx directional power sensors	2.35 kg/2.58 kg (option-dependent)

Important facts

Specification	R&S®NRX	Why this is important
Large high-resolution touchscreen	TFT 5" 800 × 480 pixel, WVGA	Intuitive and fast operation.
Number of measurement channels	1 to 4	Flexibility to meet current and future requirements.
Sensor compatibility	R&S®NRPxxS(N), R&S®NRPxxA(N), R&S®NRPxxT(N), R&S®NRPxxTWG(N), R&S®NRPxxE and R&S®NRQ6	One base unit for all current Rohde&Schwarz power sensors and selected discontinued sensors.
Automatic pulse analysis	with R&S®NRPxP sensors	Time-saving, no need for manual calculation.
Sensor check source	50 MHz (nom.) or 1 GHz (nom.) selectable, CW and pulse mode	High-precision sensor verification in a module.
Power reflection measurements	R&S®NRX-B9 option	First base unit compatible with termination and directional power sensors in a single device.

Scope of delivery

- Quick start guide
- Power cord
- 3 year warranty

Recommended options/accessories

Description	Type
Base unit	
Power meter	R&S®NRX
Hardware options	
Sensor check source	R&S®NRX-B1
Third (C) and fourth (D) sensor connector, for R&S®NRP	R&S®NRX-B4
IEEE-488 (GPIB) interface	R&S®NRX-B8
Sensor interface, for R&S®NRT	R&S®NRX-B9

Recommended options/accessories

Description	Type
Software options	
Second measurement channel	R&S®NRX-K2
Third and fourth measurement channel	R&S®NRX-K4
Keysight emulation mode (N1911A/N1912A/N432A/E4418A/E4419A)	R&S®NRX-K301
Recommended extras for R&S®NRPxxS(N)/T(N)/A(N) power sensors A minimum of one interface cable is required for power sensor operation.	
8-pole interface cable, length: 1.50 m	R&S®NRP-ZK8
8-pole interface cable, length: 3.00 m	R&S®NRP-ZK8
8-pole interface cable, length: 5.00 m	R&S®NRP-ZK8
Recommended extras for R&S®NRX	
19" rack adapter (for one R&S®NRX power meter and one empty casing)	R&S®ZZA-KNA22
19" rack adapter (for two R&S®NRX power meters)	R&S®ZZA-KNA24



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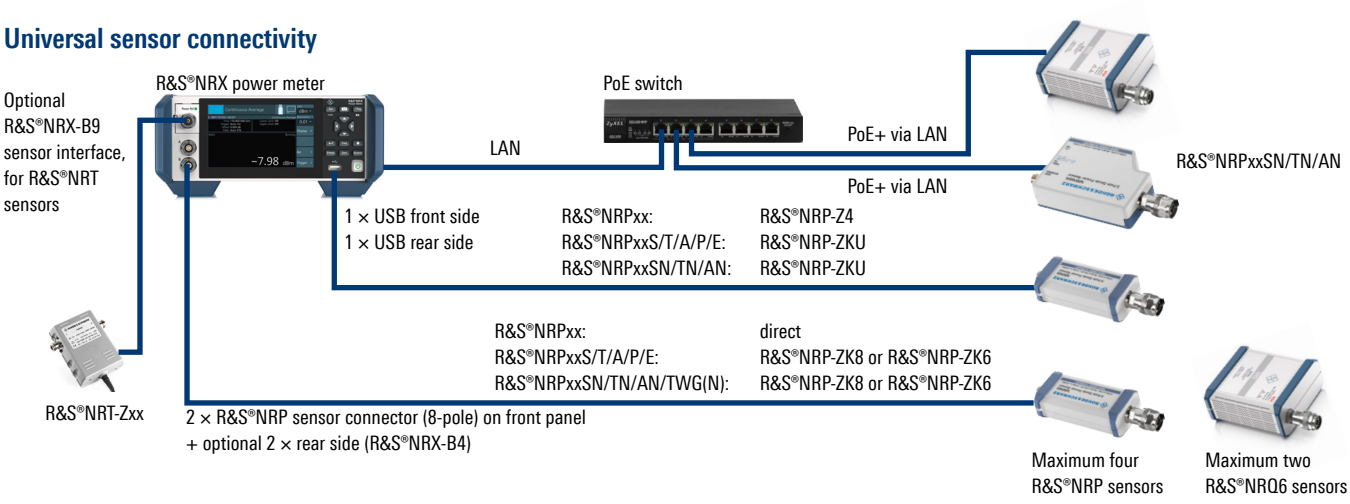
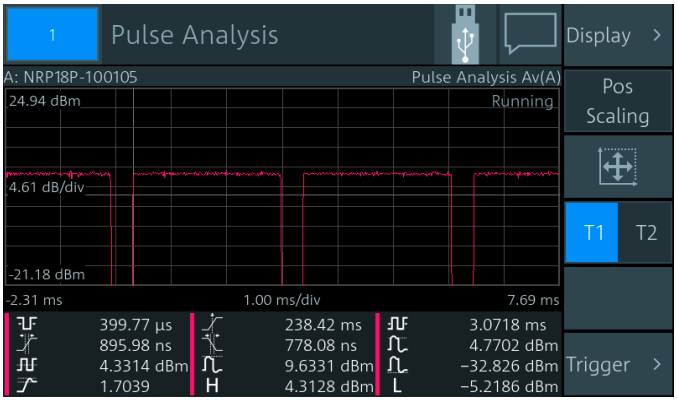
The perfect choice for:	
Easy RF power measurements	Multichannel measurements
RF pulse analysis	System integration

Your benefit	Features
Easy to use	► Clear color touchscreen supports the intuitive, window-based operating concept ► Color-coded key parameters and functions can be seen at a glance ► Results are presented in numerical and graphical display windows that can be easily configured
Sensor check source	► Superior pulse reference generator ► Test source for sensor and DUT ► Variable mode (CW/pulse), frequency (50 MHz/1 GHz) and discrete power steps
All-in-one base unit	► Supports multipath, thermal, wideband and averaging sensors ► Supports frequency selective power sensors ► Supports directional power sensors

Universal sensor connectivity





Automatic pulse analysis: All R&S®NRPxP wideband power sensors allow automatic pulse analysis. Up to 12 of 18 user-selected pulse parameters can be displayed in addition to the measurement trace.



Flexible device interfacing: The R&S®NRX provides three different remote interfaces for integration in automated test setups: Ethernet, USB and optionally IEEE-488 (GPIB) (R&S®NRX-B8).

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R&S®NRPxE RF Power Sensors



Reliable. Accurate. Affordable.

R&S®NRPxE diode power sensors blend precision and durability. The rugged housing can withstand tough engineering environments while remaining highly accurate. USB TMC digital connectivity simplifies integration with existing equipment. A focus on user safety and simplicity helps the R&S®NRPxE ensure easy and secure operation. Enhance measurement capabilities and reliability like never before with our cutting-edge power sensor technology at a fantastic price.

- Frequency range: 10 MHz to 8 GHz/18 GHz
- Dynamic range: 80 dB
- Measurement speed: up to 1000/s
- Video bandwidth: 100 kHz
- Digital connectivity: USB TMC
- VSWR: starting from < 1.13

Model overview

Model	Frequency range	Measurement range	Connectivity
R&S®NRP8E	10 MHz to 8 GHz	–60 dBm to +20 dBm	USB TMC
R&S®NRP18E	10 MHz to 18 GHz	–60 dBm to +20 dBm	USB TMC

Scope of delivery

3 year warranty

Recommended options/accessories

Diode power sensors, 1 nW to 100 mW, 10 MHz to 8 GHz	R&S®NRP8E
Diode power sensors, 1 nW to 100 mW, 10 MHz to 18 GHz	R&S®NRP18E
Sensor cable, USB-A	R&S®NRP-ZKU
Sensor cable, USB-C	R&S®NRP-ZKC
6-pole interface cable, for Rohde&Schwarz T&M devices	R&S®NRP-ZK6
8-pole interface cable, for R&S®NRX power meter	R&S®NRP-ZK8
Power meter	R&S®NRX

USB

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The perfect choice for:	
R&D service labs	Electronics test and repair centers
Hobbyists and HAM radio	Education and training

Your benefit	Features of the R&S®NRPxE
Reliable power measurements	▶ Precision N connector for accurate, repeatable measurements ▶ Diode type detector for fast and precise readings ▶ Manufactured to strict RF specifications ▶ Calibrated over a wide temperature range ▶ Proven multipath diode technology
Safe and easy to use	▶ Get started without consulting a manual ▶ Clear and visible labeling on the sensor: – RF connector type with IEEE color coding – Maximum input power – Maximum DC voltage – RF connector torque
Great user experience	▶ On a PC computer with free professional R&S®PowerViewer Software ▶ On the R&S®NRX dedicated power meter base unit ▶ On a mobile phone using the free R&S®Power Viewer Software mobile application from Google Play store

Compact, rugged housing

R&S®NRP power sensors are built to last. The durable mechanical build is housed in an industry grade compound with dark blue rubber ruggedizing.



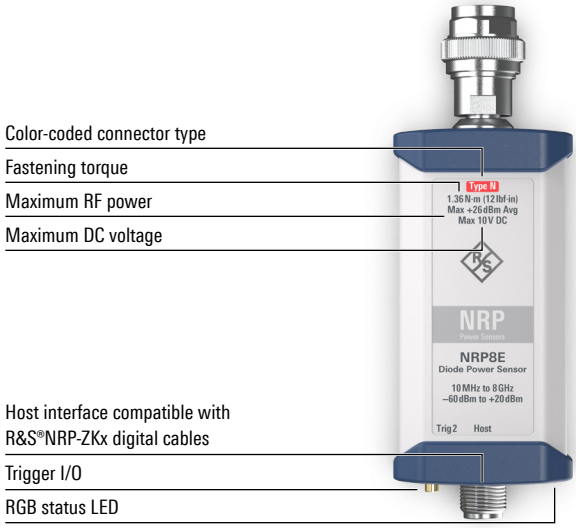
Mobile connectivity

Taking reliable RF power measurements is as simple as taking a photo. The free mobile app is available on the Google Play store.



Easy to use

Get started without even having to read a manual: The most important RF relevant data is clearly stated on the sensor product label.



Base unit compatibility

The R&S®NRP8E and R&S®NRP18E can be operated with the R&S®NRX power meter, but also with other Rohde&Schwarz T&M instruments, PCs or mobile phones.



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R&S®NRP Power Sensors



Intelligent, LAN enabled power measurements

- Long been recognized for delivering supreme precision and speed
- R&S®NRPxxS(N), R&S®NRPxxT(N), R&S®NRPxxE and R&S®NRPxxA(N) power sensors offer USB capability and can be controlled via LAN
- Unique R&S®NRP power meter portfolio

Model overview

Model	Frequency range	Sensor type	Connectivity	Description
R&S®NRPxxS, R&S®NRPxxSN-V [1]	10 MHz to 90 GHz	three-path diode	USB, LAN	Leading performance sensors deliver accurate results quickly.
R&S®NRPxxT, R&S®NRPxxTN/ TWG/TWGN	DC to 170 GHz	thermal	USB, LAN	Most accurate results.
R&S®NRPxxA, R&S®NRPxxAN	8 kHz to 18 GHz	average	USB, LAN	Ideal for EMC applications.
R&S®NRPxP	50 MHz to 50 GHz	pulse	USB	Ideal for characterizing pulses.
R&S®NRPxxE	10 MHz to 18 GHz	diode	USB	Cost-effective power measurement solution for production.

[1] No cable supplied as standard. To operate the R&S®NRPxxSN sensors over the LAN interface, a power over Ethernet adapter is required. The sensor can also be operated with the R&S®NRP-ZKU or R&S®NRP-ZK6 + R&S®NRP-ZK8 cables.

Key facts

- Maximum dynamic range: –70 dBm to +45 dBm
- Frequency range: DC to 170 GHz
- More than 50 000 readings/s [1]
- Flexible operation with R&S®NRX base unit, laptop/PC and many Rohde&Schwarz instruments
- Control and monitoring via LAN and USB
- Easy LAN operation from a web browser
- R&S®NRPxxS(N) for fast, accurate and packed with features to measure CW and modulated signals
- R&S®NRPxxSN-V for use in thermal vacuum (TVAC) chambers
- R&S®NRPxxT(N)/TWG(N) for most accurate power measurement for reference applications and use in calibration labs
- R&S®NRPxxA(N) for accurate average power measurement
- R&S®NRPxxP for time domain analysis and automatic pulse analysis for radar applications and universal use
- R&S®NRP8E/18E for cost-effective power measurement solution for production
- R&S®NRP-Z27/-Z37/-Z47 for level calibration of signal sources in conjunction with Rohde&Schwarz measuring receivers

[1] For R&S®NRPxxS(N).

USB TCP/IP

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The perfect choice for:	
Base stations and mobile equipment	Calibration

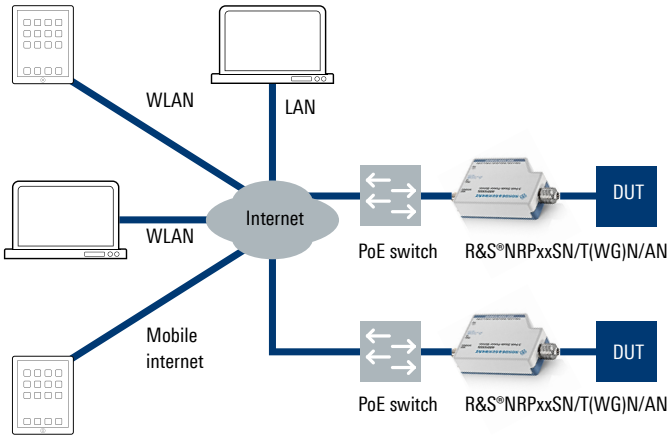
Scope of delivery

- Quick start guide
- 3 year warranty

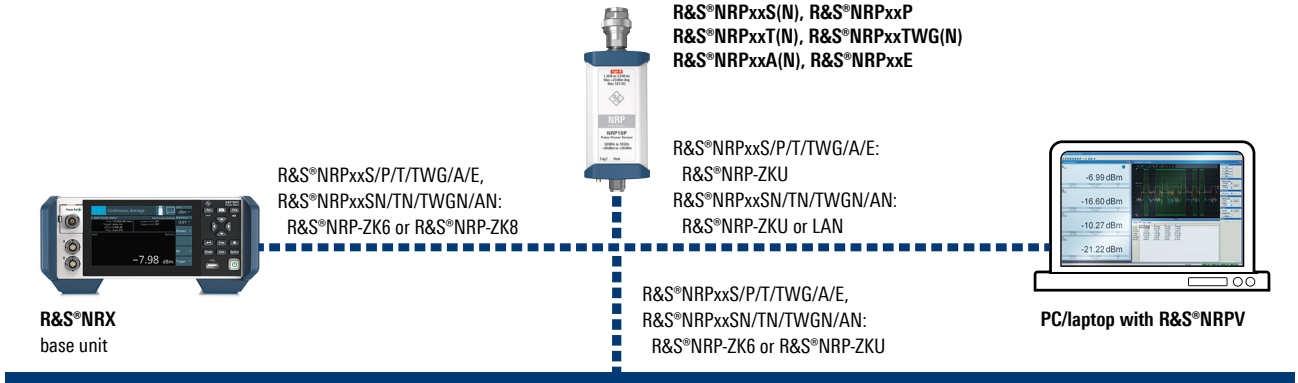
Your benefit	Features
Make a measurement anywhere with LAN based sensors	Complete range of LAN sensors (multipath, thermal and average), from DC to 90 GHz
High measurement speed	> 50 000 readings/s [1]
Fastest time to accurate measurements	► Widest measurement range ► Lowest noise floor ► Fastest measurements

[1] For R&S®NRPxxS(N).

Simultaneous, location-independent remote monitoring of multiple R&S®NRPxxSN/T(WG)N/AN power sensors using a web browser



Multiple ways to operate the R&S®NRP power sensors



Supported Rohde&Schwarz instruments



Signal generators
e.g. R&S®SMW200A



Signal and spectrum analyzers
e.g. FSW



Network analyzers
e.g. R&S®ZNA

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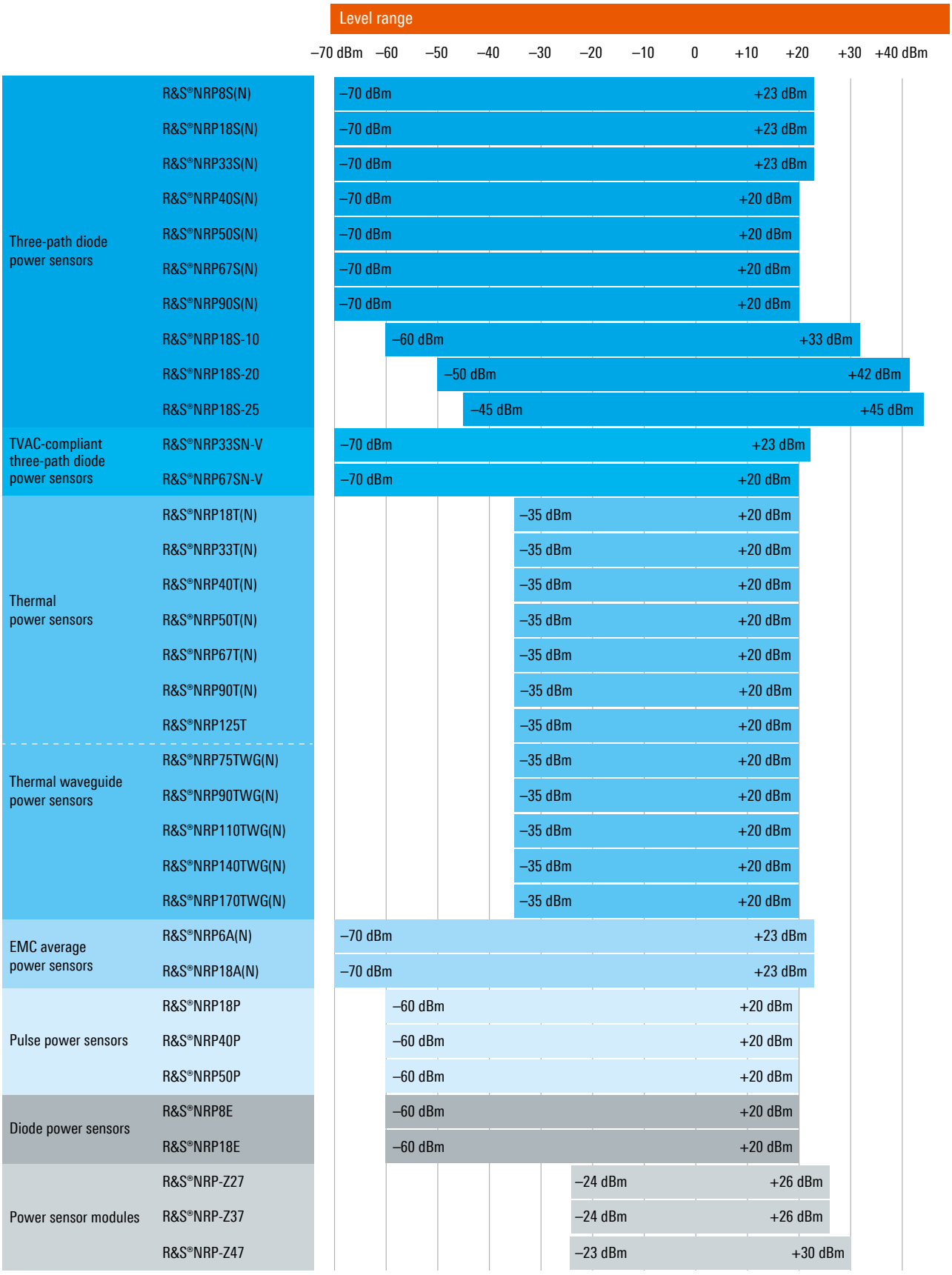
Power sensor overview



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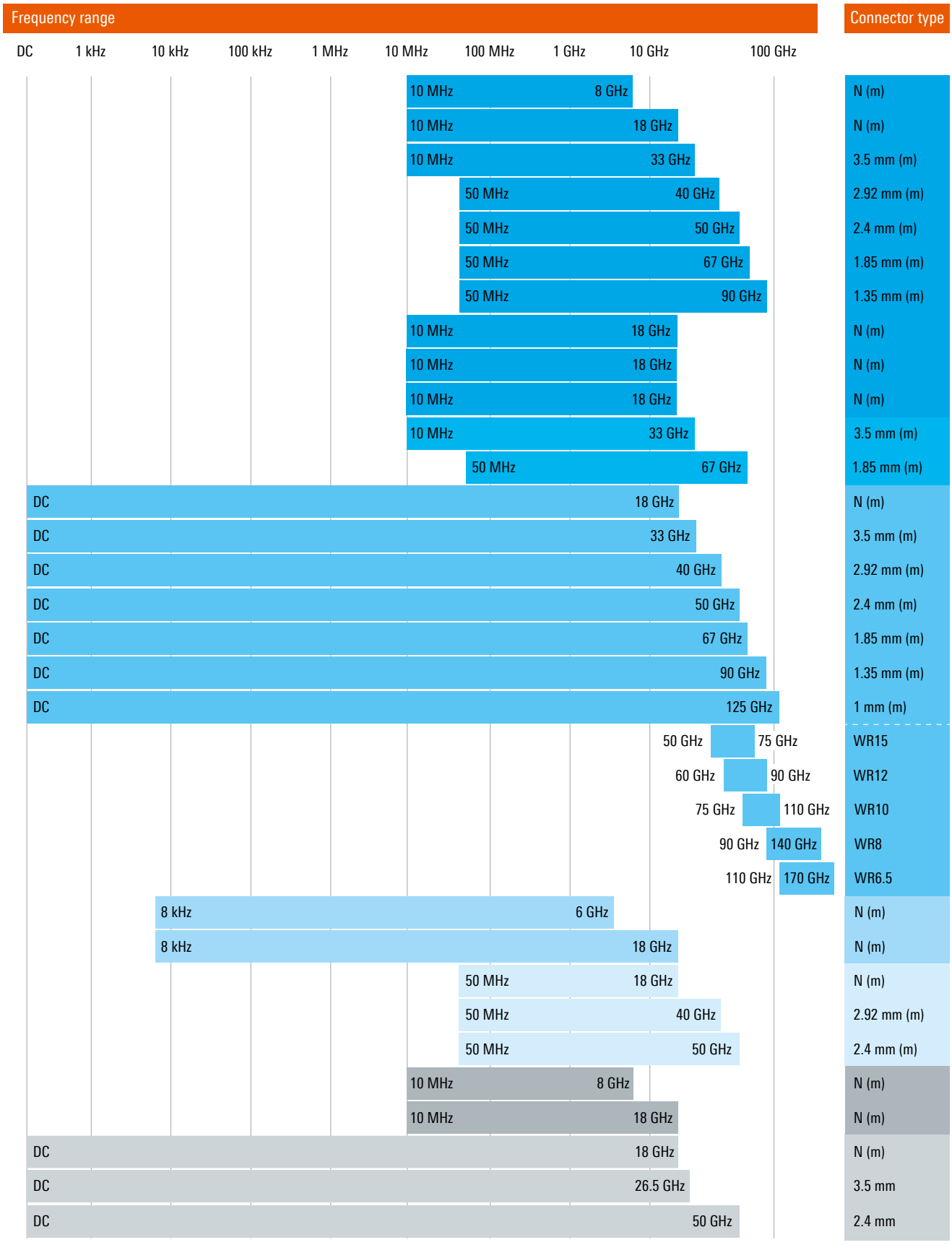

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Customer proximity – with over 70 service and sales subsidiaries, we're close to you no matter where you are in the world.



Our service specialists are always on your wavelength – whether personal or remote.



Calibration solutions from a single source. One trusted partner.



When compliance counts, we're at your side – in accordance with national and international standards.

Precision has a name: Rohde&Schwarz. The products and systems from Rohde&Schwarz are cutting-edge technology, just like our services. We offer a range of innovative and advanced services to best protect you and your high-end solutions. As a reliable partner, we support you through all product lifecycle phases.

We are at your side with an extensive and growing service portfolio tailored to your specific needs. Our services range from detailed consultation before, during and after purchase to application support, calibration services, updates, seminars and customized training courses.

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Service at Rohde & Schwarz

YOU'RE IN GREAT HANDS

	SERVICE PLANS	ON DEMAND
Calibration	Up to five years [1]	Pay per calibration
Warranty and repair	Up to five years [1]	Standard price repair

[1] For extended periods, contact your Rohde & Schwarz sales office.

Instrument management made easy

The R&S®InstrumentManager makes it easy to register and manage your instruments. It lets you schedule calibration dates and book services.

Find out more about our service portfolio under:

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FROM PRESALES TO SERVICE. AT YOUR DOORSTEP.

The Rohde&Schwarz network in over 70 countries ensures optimum on-site support by highly qualified experts.

User risks are reduced to a minimum at all project stages:

- Solution finding/purchase
- Technical startup/application development/integration
- Training
- Operation/calibration/repair



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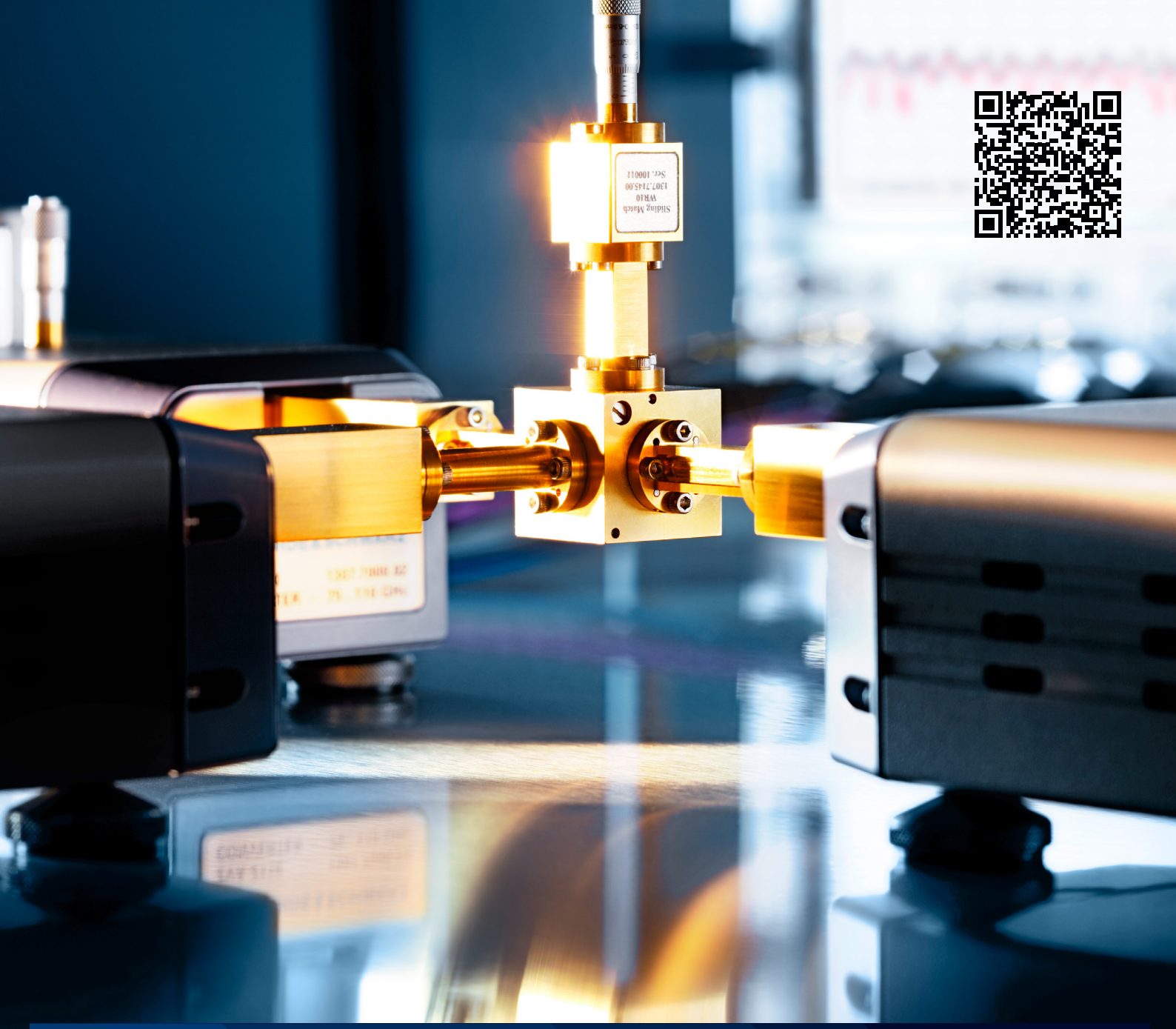

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