

Value Instruments Catalog 2014 Test & Measurement



Value Instruments Catalog 2014

from Rohde & Schwarz

T&M instruments that meet your needs

Whether you work in a major electronics R&D facility or a small service lab, you are not always performing complex measurements and do not always need the ultimate in high-end T&M equipment. What you need are precise, reliable, universal measuring instruments. That is exactly what you get with value instruments from Rohde & Schwarz: instruments that combine practical features with excellent measurement characteristics, instruments that are easy to use and easy on the budget.

Service that puts you first

As an electronics company with a successful history spanning more than 80 years, we have built a strong global presence that includes a worldwide service and sales network, 24-hour support and R&D centers at technology locations around the globe. No matter how you buy our products – through direct sales channels, from a distributor or from our R&S®Surf-In webstore that is available in numerous countries¹⁾ – there is always a personal contact partner ready to help you. Worldwide at all times.



¹⁾ Product portfolio may differ from country to country; please visit your local R&S®Surf-In or contact your local Rohde & Schwarz partner for more information.

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About Rohde & Schwarz

For 80 years, Rohde & Schwarz has stood for quality, precision and innovation in all fields of wireless communications. The privately owned company group has a global presence. It develops, produces and markets a wide range of electronic capital goods for industry, infrastructure operators and government agencies.

Rohde & Schwarz is among the market leaders in all of its business fields, including wireless communications and RF test and measurement, terrestrial TV broadcasting and technologies related to the interception and analysis of radio signals.

Numerous subsidiaries and representatives not only ensure quick, competent on-site support anywhere in the world, but also safeguard customer investments with comprehensive service and support offerings.

More information: www.rohde-schwarz.com



Our business fields

Test & measurement

T&M instruments and systems for wireless communications, electronics and microwave applications

Secure communications

(Radio) systems providing encrypted communications for armed forces, government agencies and industry

Radiomonitoring and radiolocation

Spectrum monitoring systems and radiomonitoring equipment for homeland and external security

Broadcasting

Sound and TV broadcasting and measuring equipment

Committed to sustainability

As an independent, privately owned company, Rohde&Schwarz can plan in the long run without having to think in terms of quarters. The resulting entrepreneurial freedom allows us to orient all our business processes toward sustainability, from product planning and employee loyalty to a trusting partnership with our customers.

Continuity and innovative creativity are not in conflict, but are inspiring key elements of the Rohde&Schwarz culture, whose stimulating mix drives our employees to achieve the exceptional. We not only encourage new approaches and ways of thinking, we also give our developers the freedom to reach for the previously unthinkable solutions that revolutionize the market and bring our customers sustained benefit. Respect for each individual employee, self-responsibility and open, flat organizational structures shape our corporate culture and ensure fast, unbureaucratic decision-making – advantages that benefit our customers to the full. For many years, top rankings in leading surveys have proven the company's attractiveness as an employer, helping us recruit top industry talent.

Rohde&Schwarz has always placed great emphasis on environmental awareness and protection. Our manufacturing processes and materials meet the highest requirements for energy efficiency and environmental performance.

Creative space – the campus-like setting of our Munich headquarters helps ideas develop into products that set new standards around the world.



Three questions regarding R&S®Surf-In



What features does the webstore offer? Is Rohde & Schwarz using it to replace its first-class sales network? Such questions are inevitable when a company launches an online sales channel on the Internet. That's why we are confronting these very questions – and answering them for you.

Question 1

What features does R&S®Surf-In offer?

R&S®Surf-In offers all the classic features of a webstore, including:

- User profile
Enter your data in the customer profile so that you can simply refer to it for future orders
- Customization
R&S®Surf-In automatically shows all the accessories available for a given product. You can select and order the options you need right away
- Certified pre-owned equipment
An overview of our used instruments lets you purchase high-performance, high-quality Rohde & Schwarz products you are accustomed to, but at low prices
- Special promotions and PPA
You can see instantly whether a given product group is on special promotion, and take direct advantage of these opportunities
- Localization
Our webstore supports multiple languages and currencies, and conforms to the business processes customary in your country

- Cart
Choose now, order later – no problem. And naturally you can change items in the cart
- Request a demo
R&S®Surf-In is basically an anonymous online sales channel. But if you are not sure what you need, or if you want personal advice, get our local sales engineers involved and request a product demo
- Order overview
A list of all your online orders is available under the order overview

Question 2

How does R&S®Surf-In benefit me?

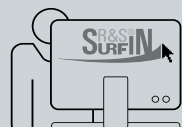
- R&S®Surf-In is primarily intended as a convenient way to order our lower-priced products. If you know exactly what you need, and want to place the order quickly and economically online, this is the way to do it
- If you first just want to get information on our products, R&S®Surf-In is an ideal place to get an overview, whenever and wherever you want

Question 3

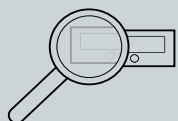
Can I still get expert support?

- Every customer is important to us. With R&S®Surf-In, we are where you are – online. Here as well, we want to satisfy your requirements and meet your expectations. This online sales tool lets us offer you support in even more ways
- But whenever you need it, our international sales team is available to advise on requirements and applications

It's easy ...



Just go to
www.rohde-schwarz.com/surf-in, select your country and ...



... check out the specifications and functions of products you're interested in ...



... check prices and your budget ...







... get advice from local sales engineers if needed ...



... and place the order quickly and easily.

Spectrum analyzers

Type/designation	Frequency range	DANL (sensitivity)	TOI	RBW	Portability
HMS-X spectrum analyzer 	100 kHz to 1/3 GHz (depending on options)	<ul style="list-style-type: none"> ▪ -104 dBm (typ.) ▪ With EMC option: -135 dBm (typ.) 	+10 dBm (typ.)	<ul style="list-style-type: none"> ▪ 10 kHz to 1 MHz, 200 kHz (-3 dB) ▪ With EMC option: 100 Hz to 1 MHz, 200 kHz (-3 dB) 	Benchtop
R&S®FSC spectrum analyzer 	9 kHz to 3/6 GHz (depending on model)	<ul style="list-style-type: none"> ▪ < -141 dBm (1 Hz), -146 dBm (1 Hz) (typ.) ▪ < -161 dBm (1 Hz), -165 dBm (1 Hz) (typ.) with R&S®FSC-B22 preamplifier option 	> 10 dBm, 15 dBm (typ.) (frequency = 1 GHz)	10 Hz to 3 MHz	<ul style="list-style-type: none"> ▪ Compact dimensions ▪ Benchtop
R&S®FSH handheld spectrum analyzer 	9/100 kHz to 3.6/8 GHz (depending on model)	<ul style="list-style-type: none"> ▪ < -141 dBm (1 Hz), -146 dBm (1 Hz) (typ.) ▪ < -161 dBm (1 Hz), -165 dBm (1 Hz) (typ.) with preamplifier 	<ul style="list-style-type: none"> ▪ > +10 dBm, +15 dBm (typ.) (300 MHz to 3.6 GHz) ▪ > +3 dBm, +10 dBm (typ.) (3.6 GHz to 8 GHz) 	1 Hz to 3 MHz	<ul style="list-style-type: none"> ▪ Handheld ▪ Ruggedized ▪ Low weight (3 kg (6.6 lb) with battery) ▪ Up to 4.5 h battery-powered operation ▪ Ideal for field applications
R&S®FSL spectrum analyzer 	9 kHz to 3/6 GHz (depending on model)	<ul style="list-style-type: none"> ▪ < -140 dBm (1 Hz) ▪ < -152 dBm (1 Hz), -162 dBm (1 Hz) (typ.) with preamplifier 	+18 dBm (typ.)	<ul style="list-style-type: none"> ▪ 300 Hz to 10 MHz (standard) ▪ 10 Hz to 10 MHz (with R&S®FSL-B7) 	<ul style="list-style-type: none"> ▪ Ruggedized housing ▪ Optional battery pack and DC power supply

HMS-X Spectrum Analyzer



The spectrum analyzer platform from HAMEG

- Frequency range: 100 kHz to 1.6 GHz/3 GHz¹⁾
- Spectral purity: > -100 dBc (1 Hz) (at 100 kHz)
- Sweep: 20 ms to 1000 s
- Detectors: auto/min./max. peak, sample, RMS, average, quasi-peak²⁾
- Various markers/delta markers and peak functions
- Tracking generator³⁾
 - Frequency range: 5 MHz to 1.6 GHz/3 GHz¹⁾
 - Output level: -20 dBm to 0 dBm
- Direct export of data to USB flash drive, RS-232/USB dual interface for remote control
- Fanless design and fast boot time

¹⁾ With HMS-3G (HV212) option.

²⁾ With HMS-EMC (HV213) option.

³⁾ With HMS-TG (HV211) option.

Description	HMS-X option ⁴⁾	Voucher code ⁵⁾
Activation of built-in tracking generator	HMS-TG	HV211
Bandwidth upgrade to 3 GHz	HMS-3G	HV212
EMC option with preamplifier	HMS-EMC	HV213

⁴⁾ Available only with purchase of HMS-X base unit.

⁵⁾ For activation of HMS-X options at any time after purchase.

Application	How the HAMEG HMS-X meets your needs
EMI precompliance measurements	<ul style="list-style-type: none"> ■ Free EMI software ■ Easy-to-use optional near-field probe sets
RF measurements	<ul style="list-style-type: none"> ■ High accuracy ■ High sensitivity
Filter characteristics, antennas	<ul style="list-style-type: none"> ■ Built-in tracking generator (with HMS-TG/HV211 option) ■ Optional VSWR bridge
Education and service	<ul style="list-style-type: none"> ■ Fast boot time ■ Easy to use ■ Lightweight ■ DVI output as standard for connection to data projector or external monitor

R&S®FSC Spectrum Analyzer



Professional spectrum analysis – compact and cost-efficient

The R&S®FSC is a compact, cost-efficient solution that offers all essential features of a professional spectrum analyzer with Rohde&Schwarz quality.

Key facts

- ▮ Frequency range from 9 kHz to 3 GHz or 6 GHz
- ▮ Resolution bandwidths from 10 Hz to 3 MHz
- ▮ High sensitivity (< -141 dBm (1 Hz), with optional preamplifier < -161 dBm (1 Hz))
- ▮ High third-order intercept (> 10 dBm, 15 dBm (typ.))
- ▮ Low measurement uncertainty (< 1 dB)
- ▮ Internal tracking generator (models .13/.16)
- ▮ Power meter and preamplifier option
- ▮ Storage of measurement results on USB flash drive
- ▮ LAN and USB interfaces for remote control and transfer of measurement data
- ▮ R&S®FSCView software for simple documentation of measurement results
- ▮ Compact dimensions
- ▮ Low power consumption (12 W)

Models

Designation	Type
Spectrum Analyzer, 9 kHz to 3 GHz	R&S®FSC3
Spectrum Analyzer, 9 kHz to 3 GHz, with tracking generator	R&S®FSC3
Spectrum Analyzer, 9 kHz to 6 GHz	R&S®FSC6
Spectrum Analyzer, 9 kHz to 6 GHz, with tracking generator	R&S®FSC6

Application	How the R&S®FSC meets your needs
General-purpose spectrum analysis	<ul style="list-style-type: none"> ▮ Quick check of spectral characteristics (harmonics, AM modulation depth, ACLR, etc.) or for diagnostic applications ▮ Service and repair centers, training centers, universities or schools ▮ High measurement accuracy ▮ High sensitivity ▮ LAN and USB interfaces
Use in compact test systems	<ul style="list-style-type: none"> ▮ Compact size allows installation of two R&S®FSC or one R&S®FSC and one R&S®SMC100A signal generator in a single 19" rack ▮ Remote control via USB/LAN ▮ Support of R&S®NRP-Zxx power sensors ▮ Only 12 W power consumption ▮ Passive cooling, i.e. no built-in fan
Power measurements	<ul style="list-style-type: none"> ▮ Precision RF power meter with R&S®NRP-Zxx power sensors
Satellite monitoring	<ul style="list-style-type: none"> ▮ Satellite dish positioning ▮ Link management
Universal instrument	<ul style="list-style-type: none"> ▮ Determination of transmission characteristics of cables, filters and amplifiers, up to 90 dB dynamic range (model .13 or .16 required) ▮ Location of EMC problems with near-field probes

R&S®FSH Handheld Spectrum Analyzer



Where mobility counts

The R&S®FSH spectrum analyzer is rugged, handy and designed for use in the field.

Key facts

- ▀ Spectrum analyzer, cable and antenna tester, full two-port vector network analyzer, modulation analyzer and power meter in a single device
- ▀ Frequency range from 9 kHz to 3.6 GHz or 8 GHz
- ▀ Low measurement uncertainty (< 1 dB)
- ▀ Easy operation with user-configurable test sequences (wizard)
- ▀ 20 MHz demodulation bandwidth for analyzing LTE signals
- ▀ Support of LTE FDD, TD-LTE, 3GPP WCDMA, GSM and CDMA2000® 1xEV-DO downlink analysis
- ▀ Support of all LTE signal bandwidths up to 20 MHz
- ▀ Easy-to-replace lithium-ion battery for up to 4.5 h of operation
- ▀ Rugged, splashproof housing for rough work in the field
- ▀ Easy handling due to low weight (3 kg (6.6 lb) with battery) and easy-to-reach function keys

Models

Designation	Type
Handheld Spectrum Analyzer, 9 kHz to 3.6 GHz, with preamplifier	R&S®FSH4
Handheld Spectrum Analyzer, 9 kHz to 3.6 GHz, with preamplifier and tracking generator	R&S®FSH4
Handheld Spectrum Analyzer, 100 kHz to 3.6 GHz, with preamplifier, tracking generator and internal VSWR bridge	R&S®FSH4
Handheld Spectrum Analyzer, 9 kHz to 8 GHz, with preamplifier	R&S®FSH8
Handheld Spectrum Analyzer, 9 kHz to 8 GHz, with preamplifier and tracking generator	R&S®FSH8
Handheld Spectrum Analyzer, 100 kHz to 8 GHz, with preamplifier, tracking generator and internal VSWR bridge	R&S®FSH8

For higher frequencies, please contact your local Rohde & Schwarz partner.

Application	How the R&S®FSH meets your needs
RF spectrum measurement	<ul style="list-style-type: none"> ▀ Various measurement functions (channel power, OBW, ACLR, SEM, etc.) ▀ High measurement accuracy and high sensitivity ▀ Geotagging and interference hunting
Service and maintenance of transmitter stations	<ul style="list-style-type: none"> ▀ Interference hunting ▀ Cable and antenna testing ▀ Power measurements with external directional or terminating power sensors ▀ LTE FDD, TD-LTE, 3GPP WCDMA, GSM and CDMA2000® 1xEV-DO downlink analysis ▀ Internal SWR bridge with bias tee ▀ R&S®FSH4View software for easy documentation
Measurements of electromagnetic fields	<ul style="list-style-type: none"> ▀ Wide frequency range ▀ Support of isotropic antenna and directional antennas ▀ Results in dBμV/m and W/m² ▀ Channel power measurement function
Field use	<ul style="list-style-type: none"> ▀ Rugged housing, low weight and compact size ▀ Battery-operated with long battery operating time and easy-to-replace battery ▀ Easy to use ▀ SD memory card for storing thousands of measurement results ▀ Excellent handling in the field due to portrait form factor
Diagnostic applications in the lab or in service	<ul style="list-style-type: none"> ▀ Universal instrument for spectrum measurements, vector network analysis and precise power measurements ▀ Location of EMC problems with near-field probes ▀ High measurement accuracy and high sensitivity ▀ LAN/USB interface

R&S®FSL Spectrum Analyzer



High-end functions in an extremely lightweight, compact package

The R&S®FSL is an extremely lightweight, compact spectrum analyzer that is ideal for a large number of applications in development, service and production.

Key facts

- ▀ Cost-efficient spectrum analyzer with high-quality features
- ▀ Frequency range from 9 kHz to 3/6 GHz
- ▀ All models with and without tracking generator
- ▀ Best RF characteristics in its class
- ▀ Wide I/Q demodulation bandwidth – up to 28 MHz
- ▀ Support for WLAN and WiMAX™ testing
- ▀ High measurement accuracy
- ▀ Portable for field applications
- ▀ Compact and lightweight (< 8 kg (18 lb))
- ▀ Optional battery operation
- ▀ Easy on-site upgradeability

Models





Designation	Type
Spectrum Analyzer, 9 kHz to 3 GHz	R&S®FSL3
Spectrum Analyzer, 9 kHz to 3 GHz, with tracking generator	R&S®FSL3
Spectrum Analyzer, 9 kHz to 6 GHz	R&S®FSL6
Spectrum Analyzer, 9 kHz to 6 GHz, with tracking generator	R&S®FSL6
For higher frequencies, please contact your local Rohde & Schwarz partner.	

Application	How the R&S®FSL meets your needs
Evaluation of broadband signals	Its widest-in-class I/Q demodulation bandwidth of 20/28 MHz allows engineers to measure broadband wireless signals using I/Q data
Insertion loss measurements	The tracking generator models of the R&S®FSL enable the analysis of insertion loss and bandwidth filter measurements
Power measurement option	The R&S®FSL-K9 option expands the spectrum analyzer to a high-precision RF power meter when used with the R&S®NRP-Zxx power sensors
Interference analysis	The spectrogram functionality of the R&S®FSL-K14 option enables unattended signal monitoring, providing versatile interference analysis
WiMAX™ design and production	The R&S®FSL provides demodulation capabilities for WiMAX™ signals in a design and production platform
WLAN production testing	The WLAN option creates the basis of a WLAN TX production tester at a very competitive price

R&S®FSL spectrum analyzer options

Designation	Type	Comments
OCXO Reference Frequency, aging 1×10^{-7} /year	R&S®FSL-B4	standard with the R&S®FSL18
Additional Interfaces	R&S®FSL-B5	video out, IF out, noise source control, AUX port, connector for R&S®NRP-Zxx power sensors
TV Trigger	R&S®FSL-B6	
Narrow Resolution Filters	R&S®FSL-B7	
Gated Sweep	R&S®FSL-B8	
GPIB Interface	R&S®FSL-B10	
RF Preamp (3/6 GHz)	R&S®FSL-B22	
DC Power Supply, 12 V to 28 V	R&S®FSL-B30	
NiMH Battery Pack	R&S®FSL-B31	requires R&S®FSL-B30
AM/FM/φM Measurement Demodulator	R&S®FSL-K7	
Transmitter Measurements for Bluetooth® V2.0 and EDR	R&S®FSL-K8	
Power Sensor Support	R&S®FSL-K9	requires R&S®FSL-B5 or R&S®NRP-Z3/-Z4 and R&S®NRP-Zxx power sensor
Spectrogram Measurements	R&S®FSL-K14	
Analog and Digital Cable TV Measurements	R&S®FSL-K20	
Application Firmware for Noise Figure and Gain Measurements	R&S®FSL-K30	requires R&S®FSL-B5 and preamplifier
3GPP FDD BTS Application Firmware	R&S®FSL-K72	
CDMA2000® Base Station Analysis	R&S®FSL-K82	
1xEV-DO Base Station Analysis	R&S®FSL-K84	
WLAN Transmitter Measurements for IEEE 802.11a, b, g, j	R&S®FSL-K91	
Upgrade of R&S®FSL-K91 to IEEE 802.11n	R&S®FSL-K91n	
WiMAX™ IEEE 802.16-2004 OFDM Application Firmware	R&S®FSL-K92	
WiMAX™ IEEE 802.16-2009 OFDM/OFDMA Application Firmware	R&S®FSL-K93	
Upgrade from R&S®FSL-K92 to R&S®FSL-K93	R&S®FSL-K92U	
EMI Software	R&S®ES-SCAN	

Signal generators

Type/designation	Frequency range	Max. output power/voltage	SSB phase noise	Nonharmonics	Modulation
HMF arbitrary function generator 	10 μ Hz to 25/50 MHz	10 V (V_{pp}) (50 Ω)	< -115 dBc (1 Hz) (typ.)	<ul style="list-style-type: none"> ▪ -70 dBc ($f < 1$ MHz) ▪ -70 dBc + 6 dB/octave ($1 \text{ MHz} < f < 50 \text{ MHz}$) 	AM, FM, pulse, PWM, FSK
HM8134-3/HM8135 RF synthesizer 	1 Hz to 1.2/3 GHz	+13 dBm	\leq -95 dBc (1 Hz) ($f = 1$ GHz)	\leq -50 dBc (> 15 kHz from carrier)	AM, FM, ϕ M, pulse, FSK, PSK
R&S®SMC100A signal generator 	9 kHz to 1.1/3.2 GHz (depending on RF path option)	+13 dBm ($f = 200$ kHz to 3.2 GHz)	< -105 dBc (-111 dBc (typ.)) ($f = 1$ GHz, carrier offset = 20 kHz, 1 Hz measurement bandwidth)	< -60 dBc (-72 dBc (typ.)) (carrier offset > 10 kHz, $f \leq 1600$ MHz)	AM, FM, ϕ M, pulse
R&S®SMB100A RF and microwave signal generator 	9 kHz to 1.1/2.2/3.2/6 GHz (depending on RF path option)	+18 dBm ($1 \text{ MHz} \leq f < 12.75$ GHz)	< -122 dBc (-128 dBc (typ.)) ($f = 1$ GHz, carrier offset = 20 kHz, 1 Hz measurement bandwidth)	< -70 dBc (< -84 dBc (typ.)) (carrier offset > 10 kHz, $23.4375 \text{ MHz} < f \leq 1500$ MHz)	AM, FM, ϕ M, pulse

HMF Arbitrary Function Generator



The latest generation of HAMEG arbitrary function generators

- ▮ Frequency range: 10 μ Hz to 25/50 MHz
- ▮ Triangle waveforms up to 10 MHz
- ▮ Output voltage: 5 mV to 10 V (V_{pp}) (into 50 Ω)
- ▮ Total harmonic distortion of 0.04% ($f < 100$ kHz)
- ▮ Waveforms: sine, square, triangle/ramp, pulse, arbitrary (incl. predefined waveforms such as white/pink noise, cardinal sine, exponential rise/fall)
- ▮ Modulation modes: AM, FM, pulse, PWM, FSK (internal and external)
- ▮ External connectors: TRIGGER (I/O), SWEEP (O), MODULATION (I)
- ▮ External reference input/output (10 MHz) via BNC connector
- ▮ Arbitrary waveform generator: 250 Msample/s, 14 bit, 256 kpoint
- ▮ PC software (free of charge) to easily create user-defined waveforms
- ▮ Oscillographic signal display in realtime
- ▮ Front USB connector to easily save and recall waveforms and settings
- ▮ USB/RS-232 dual interface for remote control
- ▮ Fanless design

Models/options

Designation	Type
25 MHz Arbitrary Function Generator	HMF2525
50 MHz Arbitrary Function Generator	HMF2550
Dual Ethernet/USB Interface	HO730
IEEE488 (GPIB) Interface, galvanically isolated	HO740

Application	How the HAMEG HMF meets your needs
Analog circuit design	<ul style="list-style-type: none"> ▮ Low-noise amplifier ▮ Many predefined curves including white and pink noise ▮ Up to 10 V (V_{pp}) into 50 Ω load
Mixed signal design and debugging	<ul style="list-style-type: none"> ▮ Pulse mode with adjustable rise time ▮ Sweep, burst mode ▮ AM, FM, pulse, PWM, FSK modulation modes
Education and service	<ul style="list-style-type: none"> ▮ Fast boot time ▮ Easy to use ▮ Fanless design

HM8134-3/HM8135 RF Synthesizer



RF synthesizers from the 8100 programmable measuring instruments series

- Frequency range: 1 Hz to 1.2/3 GHz
- Output power: -127 dBm/-135 dBm to +13 dBm
- Frequency resolution: 1 Hz
- High spectral purity, excellent sweep mode
- Modulation modes: AM, FM, pulse, phase, FSK, PSK
- Internal modulation (10 Hz to 150 kHz): sine, square, triangle, ramp
- External reference input/output (10 MHz) via BNC connector
- HM8134-3/HM8135: TCXO
(temperature stability: $\pm 0.5 \times 10^{-6}$);
HM8134-3X/HM8135-X: OCXO
(temperature stability: $\pm 1.0 \times 10^{-8}$)
- RS-232/USB dual interface, IEEE-488 (GPIB) optional

Models/options

Designation	Type
1.2 GHz RF Synthesizer	HM8134-3
1.2 GHz RF Synthesizer, with OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)	HM8134-3X
3 GHz RF Synthesizer	HM8135
3 GHz RF Synthesizer, with OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)	HM8135-X
IEEE 488 (GPIB) Interface, galvanically isolated	HO880

Application	How the HAMEG HM8134-3/HM8135 meets your needs
Analog RF circuit design	<ul style="list-style-type: none"> ■ Low-noise amplifier, high dynamic range, up to +13 dBm output power ■ Clean sine wave due to high spectral purity
RF system design	<ul style="list-style-type: none"> ■ Sweep mode ■ Several internal modulation types: sine wave, square wave, triangle, ramp up to 150 kHz ■ Internal offset correction
Education and service	<ul style="list-style-type: none"> ■ Fast boot time ■ Easy to use

R&S®SMC100A Signal Generator



Smallest size and best price/performance ratio in its class

The analog R&S®SMC100A sets new standards for attractively priced signal generators. It has the smallest size and the best price/performance ratio in its class.

Key facts

- ▀ Frequency range from 9 kHz to 1.1 GHz or 3.2 GHz
- ▀ Maximum output level of > +17 dBm (typ.)
- ▀ Low SSB phase noise of -111 dBc (typ.) (f = 1 GHz, 20 kHz carrier offset, 1 Hz measurement bandwidth)
- ▀ Wear-free electronic attenuator with integrated overvoltage protection
- ▀ AM/FM/φM/pulse modulation provided as standard
- ▀ Signal generator with the best price/performance ratio in its class
- ▀ Signal generator with the smallest size in its class (½ 19", 2 height units)
- ▀ Low total cost of ownership

Models/options

Designation	Type
Signal Generator	R&S®SMC100A
RF Path, 9 kHz to 1.1 GHz	R&S®SMC-B101
RF Path, 9 kHz to 3.2 GHz	R&S®SMC-B103
OCXO Reference Oscillator	R&S®SMC-B1
GPIB/IEEE 488 Interface	R&S®SMC-K4

Application	How the R&S®SMC100A meets your needs
Service and maintenance of RF components and modules	<ul style="list-style-type: none"> ▀ Good SSB phase noise and wideband noise ▀ Analog modulation modes included in instrument ▀ Perfect for simple measurements such as gain, intermodulation and distortion measurements
RF tests in education	<ul style="list-style-type: none"> ▀ Cost-efficient instrument ▀ Easy to operate ▀ Good performance for RF experiments
Field use	<ul style="list-style-type: none"> ▀ Small size and low weight ▀ R&S®NRP-Zxx power sensors can be connected (no need for an additional power meter)
A&D development/service/maintenance	<ul style="list-style-type: none"> ▀ Sanitizing procedure for internal memory ▀ Support for self-maintainers
Simple production applications	<ul style="list-style-type: none"> ▀ Short frequency and level setting times ▀ Low total cost of ownership (TCO)

R&S®SMB100A Signal Generator



Versatile, compact solution for signal generation

The analog R&S®SMB100A signal generator delivers excellent signal characteristics and high flexibility at low cost of ownership – the key criteria for a signal source.

Key facts

- ▀ Wide frequency range from 9 kHz to 6 GHz
- ▀ Excellent signal characteristics with low SSB phase noise of -128 dBc (typ.) (at 1 GHz, 20 kHz offset)
- ▀ High output power of up to $+27$ dBm
- ▀ Wear-free electronic attenuator up to 6 GHz
- ▀ Short setting times for frequency (< 3 ms) and level (< 2.5 ms) via remote control and < 1 ms in list mode
- ▀ All important analog modulation modes with AM, FM/φM and pulse modulation supported
- ▀ Optional pulse modulator with > 90 dB (typ.) on/off ratio (up to 11 GHz) and rise/fall time of < 5 ns (typ.); pulse generator with minimum pulse width of 10 ns
- ▀ Compact size with only two height units and low weight

Models/options





Designation	Type
Signal Generator	R&S®SMB100A
RF Path, 9 kHz to 1.1 GHz	R&S®SMB-B101
RF Path, 9 kHz to 2.2 GHz	R&S®SMB-B102
RF Path, 9 kHz to 3.2 GHz	R&S®SMB-B103
RF Path, 9 kHz to 6 GHz	R&S®SMB-B106
OEXO Reference Oscillator	R&S®SMB-B1
OEXO High-Performance Reference Oscillator	R&S®SMB-B1H
For higher frequencies, please contact your local Rohde & Schwarz partner.	

Application	How the R&S®SMB100A meets your needs
Blocking/receiver tests	Can serve as a high-quality generator of transmitter or interference signals up to 6 GHz (as specified in 3GPP TS25.141, for example)
Production testing	Compared with mechanical attenuators, the electronic attenuator eliminates wear caused by continuous switching; the modular design enables on-site instrument servicing and ensures fast level switching
Development of RF ICs	85 dB (typ.) suppression of unwanted and nonpredictable spurs and low wideband noise of -148 dBc (typ.) meet most development needs
Car radio tests	Optional FM stereo coder with RDS signal generation capabilities (available for R&S®SMB-B101/-B102/-B103/-B106), can be used together with the R&S®UPV or R&S®UPP audio analyzer
EMC applications	Wide frequency range from 9 kHz to 6 GHz for wide coverage with only one source, for simplified EMC test setups
Test system integration	Multiple choices for remote interfaces: LAN, USB and GPIB
LO	LO substitution in various applications
General purpose	Test of components, R&D, laboratory equipment

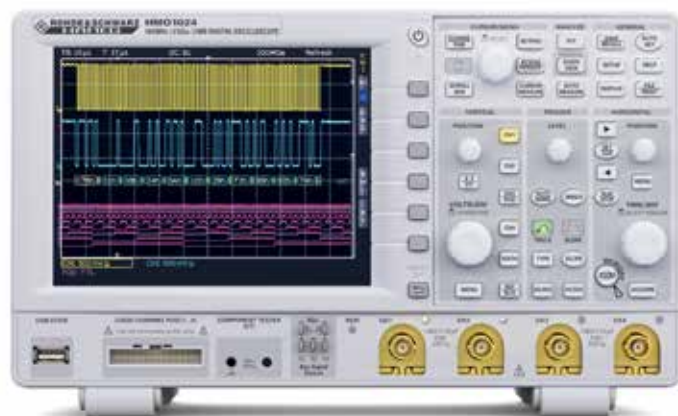
R&S®SMB100A signal generator and options

Designation	Type	Comments
Signal Generator Including power cable, quick start guide and CD-ROM (with operating and service manual)	R&S®SMB100A	base unit must be ordered together with an R&S®SMB-B101/-B102/-B103/-B106 frequency option
Frequency Range, 9 kHz to 1.1 GHz	R&S®SMB-B101	
Frequency Range, 9 kHz to 2.2 GHz	R&S®SMB-B102	
Frequency Range, 9 kHz to 3.2 GHz	R&S®SMB-B103	
Frequency Range, 9 kHz to 6 GHz	R&S®SMB-B106	
OCXO Reference Oscillator	R&S®SMB-B1	only one of these options (R&S®SMB-B1 or R&S®SMB-B1H) can be installed
OCXO Reference Oscillator, high performance	R&S®SMB-B1H	
Stereo/RDS Coder	R&S®SMB-B5	only available with an R&S®SMB-B101, R&S®SMB-B102, R&S®SMB-B103 or R&S®SMB-B106 frequency option
Pulse Modulator for R&S®SMB-B101/-B102/-B103/-B106	R&S®SMB-K22	
Pulse Generator	R&S®SMB-K23	
Pulse Train	R&S®SMB-K27	requires the R&S®SMB-K23 option; only available for instruments with serial number > 102400

Oscilloscopes

Type/designation	Bandwidth (-3 dB)	Number of channels	Max. sampling rate (realtime)	Memory depth	Input sensitivity
HMO compact digital oscilloscope 	<ul style="list-style-type: none"> ▮ 70 MHz ▮ 100 MHz ▮ 150 MHz ▮ 200 MHz 	<ul style="list-style-type: none"> ▮ 2 channels ▮ 4 channels 	<ul style="list-style-type: none"> ▮ 1 Gsample/s per channel ▮ 2 Gsample/s interleaved 	<ul style="list-style-type: none"> ▮ 1 Msample per channel ▮ 2 Msample interleaved 	<ul style="list-style-type: none"> ▮ 50 Ω: 1 mV/div to 10 V/div ▮ 1 MΩ: 1 mV/div to 10 V/div
	with MSO probe option: 350 MHz	8 digital channels	1 Gsample/s	1 Msample	
HMO3000 digital oscilloscope 	<ul style="list-style-type: none"> ▮ 300 MHz ▮ 400 MHz ▮ 500 MHz 	<ul style="list-style-type: none"> ▮ 2 channels ▮ 4 channels 	<ul style="list-style-type: none"> ▮ 2 Gsample/s per channel ▮ 4 Gsample/s interleaved ▮ 1 Gsample/s (logic channels) 	<ul style="list-style-type: none"> ▮ 4 Msample per channel ▮ 8 Msample interleaved 	<ul style="list-style-type: none"> ▮ 50 Ω: 1 mV/div to 5 V/div ▮ 1 MΩ: 1 mV/div to 5 V/div
	with MSO probe option: 350 MHz	8/16 digital channels	1 Gsample/s	4 Msample	
R&S®RTM2000 digital oscilloscope 	<ul style="list-style-type: none"> ▮ 350 MHz ▮ 500 MHz 	<ul style="list-style-type: none"> ▮ 2 channels ▮ 4 channels 	<ul style="list-style-type: none"> ▮ 2.5 Gsample/s per channel ▮ 5 Gsample/s interleaved 	<ul style="list-style-type: none"> ▮ 10 Msample per channel ▮ 20 Msample interleaved 	<ul style="list-style-type: none"> ▮ 50 Ω: 1 mV/div to 1 V/div ▮ 1 MΩ: 1 mV/div to 10 V/div
	with MSO option: 400 MHz	16 digital channels	up to 5 Gsample/s	up to 20 Msample	
R&S®RTO digital oscilloscope 	600 MHz	<ul style="list-style-type: none"> ▮ 2 channels ▮ 4 channels 	<ul style="list-style-type: none"> ▮ 10 Gsample/s per channel ▮ 5 Gsample/s 	<ul style="list-style-type: none"> ▮ 20 Msample per channel ▮ Optionally up to 100 Msample per channel 	<ul style="list-style-type: none"> ▮ 50 Ω: 1 mV/div to 1 V/div ▮ 1 MΩ: 1 mV/div to 10 V/div
	with MSO option: 400 MHz	16 digital channels	5 Gsample/s	200 Msample	
Oscilloscope probes	see page 24				

HMO Compact Digital Oscilloscope



Digital mixed signal oscilloscope

- 2 Gsample/s realtime sampling rate, low-noise flash A/D converter
- 2 Mpoint memory, zoom up to 50 000:1
- MSO functionality included as standard (HO3508 logic probe with eight channels required)
- Component tester for capacitors, inductors and semiconductors
- Vertical sensitivity down to 1 mV/div
- Trigger modes: slope (A/B), pulse width, video, logic, serial buses (optional)

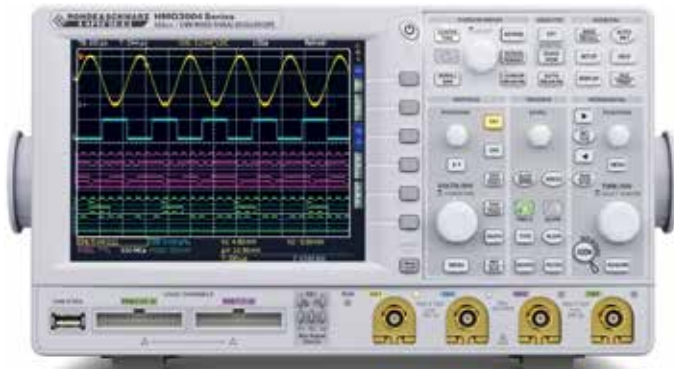
- Serial bus trigger and hardware-accelerated decode including list view options: I²C + SPI + UART/RS-232 (HOO10/HOO11), CAN + LIN (HOO12)
- 28 automeasurement parameters plus statistics, formula editor, ratio cursor
- Six-digit hardware counter
- FFT up to 64 kpoints (dBm, dBV, V (RMS))
- Pass/fail tests based on masks
- Automatic search for user-defined events
- Display: 12-div x-axis, 20-div y-axis (VirtualScreen)
- 2 × USB for mass storage, RS-232/USB dual interface for remote control

Models/options

Designation	Type
70 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO722/HMO724
100 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO1022/ HMO1024
150 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO1522/ HMO1524
200 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO2022/ HMO2024
Analysis of I ² C, SPI and UART/RS-232 Signals on analog and logic channels (two buses can be analyzed at the same time)	HOO10
Analysis of I ² C, SPI and UART/RS-232 Signals on all analog channels (only one bus available for analysis)	HOO11
Analysis of CAN and LIN Signals on analog and logic channels for two buses	HOO12
Dual Ethernet/USB Interface	HO730
IEEE 488 (GPIB) Interface, galvanically isolated	HO740

Application	How the HAMEG HMO compact series meets your needs
Engineering lab	<ul style="list-style-type: none"> Advanced math functions available as standard, math on math possible Automeasurement for 28 user-defined parameters Memory zoom function up to 50 000:1
Analog circuit design	<ul style="list-style-type: none"> Low-noise amplifier and A/D converter 1 mV/div sensitivity 50 Ω/1 MΩ input impedance, switchable (HMO152x, HMO202x) Component tester
Embedded debugging	<ul style="list-style-type: none"> Mixed signal option (MSO) with 8 logic channels Optional serial bus trigger and hardware-accelerated decode 6-digit hardware counter FFT with 64 kpoints
Production environment	<ul style="list-style-type: none"> Remote control for automated data acquisition Pass/fail tests based on user-defined masks with error signal output Automatic signal measurement at the push of a button USB/RS-232, Ethernet or GPIB (IEEE 488) interfaces
General purpose and education	<ul style="list-style-type: none"> Fast boot time; slim and lightweight design Low-noise, intelligent temperature management Extended display size through VirtualScreen technology

HMO3000 Digital Oscilloscope



Digital mixed signal oscilloscope

- ▮ 4 Gsample/s realtime sampling rate, low-noise flash A/D converter
- ▮ 8 Mpoint memory, zoom up to 200 000:1
- ▮ Automatically or manually adjustable memory depth
- ▮ Segmented memory option (HOO14)
- ▮ MSO functionality included as standard (HO3508/HO3516 logic probe with 8/16 logic channels required)
- ▮ Vertical sensitivity down to 1 mV/div
- ▮ Trigger modes: slope (A/B), pulse width, video, logic, serial buses (optional), hold-off

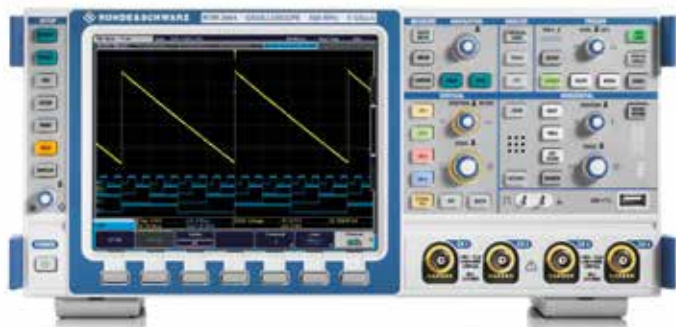
- ▮ Serial bus trigger and hardware-accelerated decode including list view options: I²C + SPI + UART/RS-232 (HOO10/HOO11), CAN + LIN (HOO12)
- ▮ 28 automeasurement parameters plus statistics, formula editor, ratio cursor
- ▮ Six-digit hardware counter
- ▮ FFT up to 64 kpoints (dBm, dBV, V (RMS))
- ▮ Pass/fail tests based on masks
- ▮ Automatic search for user-defined events
- ▮ Display: 12-div x-axis, 20-div y-axis (VirtualScreen)
- ▮ 2 × USB for mass storage, Ethernet/USB dual interface for remote control

Models/options

Designation	Type
300 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO3032/ HMO3034
400 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO3042/ HMO3044
500 MHz Two/Four-Channel Mixed Signal Oscilloscope	HMO3052/ HMO3054
Analysis of I ² C, SPI and UART/RS-232 Signals on analog and logic channels (two buses can be analyzed at the same time)	HOO10
Analysis of I ² C, SPI and UART/RS-232 Signals on all analog channels (only one bus available for analysis)	HOO11
Analysis of CAN and LIN Signals on analog and logic channels for two buses	HOO12
Segmented Memory Option	HOO14
Bandwidth Upgrade from 300 MHz to 500 MHz for two/four-channel models	HOO352/HOO354
Bandwidth Upgrade from 400 MHz to 500 MHz for two/four-channel models	HOO452/HOO454

Application	How the HAMEG HMO3000 meets your needs
Engineering lab	<ul style="list-style-type: none"> ▮ Adjustable memory depth ▮ Advanced math functions available as standard, math on math possible ▮ Automeasurement for 28 user-defined parameters ▮ Segmented memory option
Analog circuit design	<ul style="list-style-type: none"> ▮ Low-noise amplifier and A/D converter ▮ 1 mV/div sensitivity ▮ 50 Ω/1 MΩ input impedance, switchable ▮ Bandwidth upgrades via software options
Embedded debugging	<ul style="list-style-type: none"> ▮ Mixed signal option (MSO) with 16 logic channels ▮ Optional serial bus trigger and hardware-accelerated decode ▮ 6-digit hardware counter ▮ FFT with 64 kpoints
Production environment	<ul style="list-style-type: none"> ▮ Remote control for automated data acquisition ▮ Pass/fail tests based on user-defined masks with error signal output ▮ Automatic signal measurement at the push of a button ▮ USB/RS-232, Ethernet or GPIB (IEEE488) interfaces
General purpose and education	<ul style="list-style-type: none"> ▮ Fast boot time ▮ Low-noise, intelligent temperature management ▮ Extended display size through VirtualScreen technology ▮ DVI-D output for external display

R&S®RTM2000 Digital Oscilloscope



Scope of the art: compact, precise, versatile

Ease of use, combined with fast and reliable results, is precisely what users expect from a bench oscilloscope. Rohde & Schwarz has the solution: the R&S®RTM2000. Users can now work with two screens in one, quickly access important functions, evaluate results while other oscilloscopes are still booting up and see signals otherwise lost in the noise.

Key facts

- 350 MHz or 500 MHz bandwidth, up to 5 Gsample/s sampling rate, up to 20 Msample memory depth
- Two-channel and four-channel models
- Excellent measurement accuracy due to low-noise frontends

- Input sensitivity down to 1 mV/div at full bandwidth
- Fast time to results: switch on, measure and done
- High-resolution XGA display
- QuickMeas: key results at the push of a button
- Extensive cursor-based measurement functions
- Two displays instead of one: VirtualScreen
- Multilingual: choice of nine languages
- Triggering and decoding of serial protocols: I²C, SPI, UART/RS-232, I²S and CAN/LIN
- Automated power measurement option
- 16 digital channels with the R&S®RTM-B1 MSO option
- High-performance probes with extensive accessories

Models/options

Designation	Type
Digital Oscilloscope, 350 MHz, 2 channels	R&S®RTM2032
Digital Oscilloscope, 350 MHz, 4 channels	R&S®RTM2034
Digital Oscilloscope, 500 MHz, 2 channels	R&S®RTM2052
Digital Oscilloscope, 500 MHz, 4 channels	R&S®RTM2054
Options	
Mixed Signal Option, 400 MHz	R&S®RTM-B1
GPIB Interface	R&S®RTM-B10
Bandwidth Upgrade from 350 MHz to 500 MHz	R&S®RTM-B200
I ² C/SPI Serial Triggering and Decoding	R&S®RTM-K1
UART/RS-232 Serial Triggering and Decoding	R&S®RTM-K2
CAN/LIN Serial Triggering and Decoding	R&S®RTM-K3
I ² S/LJ/RJ/TDM Serial Triggering and Decoding	R&S®RTM-K5
Power Analysis	R&S®RTM-K31

Application	How the R&S®RTM2000 meets your needs
General debugging and analysis	<ul style="list-style-type: none"> ■ QuickMeas: key results at the push of a button ■ Logic analysis: 20 Msample with 5 Gsample/s for detailed analysis of digital signals ■ Extensive cursor-based measurements ■ Versatile selection of signal acquisition modes ■ "Smooth" mode for smoothing nonperiodic signals ■ Extensive triggering options for keeping track of important signal events ■ Intuitive user interface for highest efficiency ■ Two displays instead of one: VirtualScreen ■ Active probes with innovative features, e.g. micro button and R&S®ProbeMeter ■ Low weight/compact lab instrument
Signal validation	<ul style="list-style-type: none"> ■ Lowest noise floor in its class: excellent measurement accuracy ■ Full bandwidth even at an amplitude range of 1 mV/div enables true representation of weak signals ■ No crosstalk due to good channel-to-channel isolation ■ Active probes with premium specifications
Production testing	<ul style="list-style-type: none"> ■ Comprehensive set of automated measurement functions ■ Remote interface covering complete function set of instrument ■ Installation in standard 19" racks possible
Service, maintenance and education	<ul style="list-style-type: none"> ■ Ideal for general-purpose measurements ■ Simple operation ■ Lightweight and portable ■ Short start-up time
Embedded design	<ul style="list-style-type: none"> ■ Advanced trigger and decode (I²C, SPI, RS-232, UART, audio) options ■ Logic analysis: 20 Msample with 5 Gsample/s for detailed analysis of digital signals

R&S®RTO Digital Oscilloscope



Scope of the art: created to be unique

The R&S®RTO oscilloscopes combine excellent signal fidelity, high acquisition rate and the world's first realtime digital trigger system with a compact device format in the 600 MHz to 4 GHz class.

Key facts


- ▮ 600 MHz bandwidth, up to 10 Gsample/s sampling rate, up to 80 Msample standard memory depth
- ▮ Two-channel and four-channel models
- ▮ Low-noise frontend – best in its class
- ▮ Full bandwidth even at 1 mV/div
- ▮ Single-core ADC delivers industry best ENOB of > 7 bit
- ▮ 1 million waveforms/s even when performing measurements and analysis
- ▮ Hardware-accelerated measurements
- ▮ Industry best trigger jitter < 1 ps (RMS)
- ▮ Triggering and decoding of serial protocols: I²C, SPI, RS-232, UART, CAN, LIN, FlexRay™ and audio
- ▮ Mixed signal analysis with MSO option
- ▮ Software interface for acquisition and downconversion of I/Q data

Models

Designation	Type
Digital Oscilloscope, 600 MHz, 2 channels	R&S®RTO1002
Digital Oscilloscope, 600 MHz, 4 channels	R&S®RTO1004
Bandwidth upgradeable up to 4 GHz	

Application	How the R&S®RTO meets your needs
Embedded design and debugging	<ul style="list-style-type: none"> ▮ High acquisition rate to identify rare signal faults fast ▮ Innovative trigger system for high accuracy and trigger flexibility ▮ Hardware-accelerated measurement and analysis functions (e.g. histogram, mask testing) ▮ Full vertical resolution of ADC for multiple waveforms thanks to multigrid display ▮ Advanced triggering and decoding (I²C, SPI, RS-232, UART, audio) option ▮ Mixed signal analysis ▮ Powerful and user-friendly FFT-based spectrum analysis: ideal for time-frequency correlated measurements and EMI debugging ▮ Advanced power measurements for SMPS and DC/DC converters with power analysis software ▮ History view function ▮ Intuitive user interface for most efficient work ▮ Active probes with innovative features such as micro button and R&S®ProbeMeter ▮ Low weight; lowest acoustic noise; compact lab instrument
Signal validation	<ul style="list-style-type: none"> ▮ High signal fidelity provides additional measurement margin ▮ Digital trigger for lowest trigger jitter in realtime ▮ Lowest noise floor in its class ▮ Active probe with premium specifications ▮ Full bandwidth also for amplitude ranges ≤ 10 mV/div enables true representation of weak signals
Automotive electronics	<ul style="list-style-type: none"> ▮ High signal fidelity for trustable measurement results ▮ Advanced trigger and decode option for CAN/LIN/FlexRay™ interfaces ▮ High acquisition rate to identify rare signal faults fast
Manufacturing test	<ul style="list-style-type: none"> ▮ Comprehensive set of automated measurement functions ▮ Fast remote interface covers complete function set of instrument ▮ Installation in standard 19" racks possible ▮ LXI class C support

R&S®RTO digital oscilloscope options

Designation	Type
MSO Option, 400 MHz, scope of the art 	R&S®RTO-B1
OCXO 10 MHz	R&S®RTO-B4
GPIB Interface	R&S®RTO-B10
Solid State Disk (SSD)	R&S®RTO-B18
Replacement Hard Disk incl. firmware	R&S®RTO-B19
Memory Upgrade, 50 Msample per channel	R&S®RTO-B101
Memory Upgrade, 100 Msample per channel	R&S®RTO-B102
I ² C/SPI Triggering and Decoding	R&S®RTO-K1
RS-232/UART Serial Decoding	R&S®RTO-K2
CAN/LIN Triggering and Decoding	R&S®RTO-K3
FlexRay™ Triggering and Decoding	R&S®RTO-K4
I ² S/LJ/RJ/TDM Serial Triggering and Decoding	R&S®RTO-K5
I/Q Software Interface	R&S®RTO-K11
Jitter Analysis	R&S®RTO-K12
Clock Data Recovery	R&S®RTO-K13
USB 2.0 Compliance Test Software	R&S®RTO-K21
Ethernet Compliance Test	R&S®RTO-K22
Power Analysis	R&S®RTO-K31
Upgrade R&S®RTO to Windows 7	R&S®RTO-U1
Front Cover	R&S®RTO-Z1
Probe Pouch	R&S®RTO-Z5

Oscilloscope probes

	Scope series	HMO							R&S®RTM		R&S®RTO
		Model	722/4	1022/4	1522/4	2022/4	3032/4	3042/4	3052/4	2032/4	2052/4
	Bandwidth	70 MHz	100 MHz	150 MHz	200 MHz	300 MHz	400 MHz	500 MHz	350 MHz	500 MHz	600 MHz
Passive probes											
HZ154	10/100 MHz	■	■	○	○	○	○	○	○	○	○
HZ51	150 MHz	○	○	○	○	○	○	○	○	○	○
HZ52	250 MHz	○	○	○	○	○	○	○	○	○	○
HZO10	250 MHz	○	○	■	■	○	○	○	○	○	○
HZ350	350 MHz	○	○	○	○	■	■	○	○	○	○
HZ355	500 MHz	○	○	○	○	●	●	■	○	○	○
R&S®RTM-ZP10	500 MHz	○	○	○	○	○	○	○	■	■	○
R&S®RT-ZP10	500 MHz	○	○	○	○	○	○	○	○	○	■
Transmission line probes											
R&S®RT-ZZ80	8 GHz								○	○	●
Active probes											
HZO30	1 GHz	●	●	●	●	●	●	●			
R&S®RT-ZS10E	1 GHz								●	●	●
R&S®RT-ZS10	1 GHz								●	●	●
R&S®RT-ZS20	1.5 GHz								○	○	○
R&S®RT-ZS30	3 GHz								○	○	○
R&S®RT-ZS60	6 GHz								○	○	○
Differential probes											
HZ109	30/40 MHz	●	○	○	○	○	○	○	○	○	○
HZO40	200 MHz	○	●	○	○	○	○	○	○	○	○
HZO41	800 MHz	○	○	●	●	●	●	●	○	○	○
R&S®RT-ZD10	1 GHz								●	●	●
R&S®RT-ZD20	1.5 GHz								○	○	○
R&S®RT-ZD30	3 GHz								○	○	○
R&S®RT-ZD40	4.5 GHz								○	○	○
High-voltage probes											
HZ53	100:1	●	●	●	●	●	●	●	○	○	○
HZO20	1000:1	●	●	●	●	●	●	●	○	○	○
R&S®RT-ZH10	100:1	○	○	○	○	○	○	○	●	●	●
R&S®RT-ZH11	1000:1	○	○	○	○	○	○	○	●	●	●
High-voltage differential probes											
HZ100	700 V (V_{diff})	●	●	●	●	●	●	●	○	○	○
HZ115	1000 V (V_{diff})	●	●	●	●	●	●	●	○	○	○
R&S®RT-ZD01	1000 V	○	○	○	○	○	○	○	●	●	●
Current probes											
HZO50	±20 A (RMS)	●	●	●	●	●	●	●	○	○	○
HZO51	±100 A (RMS)	●	●	●	●	●	●	●	○	○	○
R&S®RT-ZC20 ¹⁾	±30 A (RMS)	○	○	○	○	○	○	○	●	●	●
R&S®RT-ZC10 ¹⁾	±150 A (RMS)	○	○	○	○	○	○	○	●	●	●
EMI probe sets											
R&S®HZ-15	30 MHz to 3 GHz										●

- Standard delivery. One probe per oscilloscope channel.
- Recommended. Available as an option.
- Compatible. System bandwidth may be limited on probe or base unit. Manual configuration on oscilloscope may be necessary for compensation.

¹⁾ R&S®RT-ZA13 power supply necessary.



Passive probes: the allrounders for every oscilloscope.

HZ355 500 MHz passive probe 10:1 with automatic identification.



Extensive R&S®RT-ZA1 accessory set for optimal contacting.



HZO20 high-voltage probe 1000:1 (400 MHz, 1 kV (RMS)).



R&S®RT-ZA4 mini clips and R&S®RT-ZA5 micro clips for reliable contacting, especially when using multiple probes.



HZ115 active differential high-voltage probe.



R&S®RT-ZD01 high-voltage differential probe (100 MHz, 1 kV (RMS)).



HZO51 AC/DC current probe (100/1000 A, DC to 20 kHz).



HZO30 1 GHz active probe (0.9 pF, 1 MΩ, including accessories).





R&S®RT-ZS10/20/30.





R&S®RT-ZD10/20/30.

Rohde & Schwarz active probes (1.0 GHz to 6.0 GHz).

Probe accessories

Designation	Type
Accessory Set for R&S®RT-ZP10/R&S®RTM-ZP10	R&S®RT-ZA1
Spare Accessory Set for R&S®RT-ZS10/10E/20/30	R&S®RT-ZA2
Pin Set for R&S®RT-ZS10/10E/20/30	R&S®RT-ZA3
Mini Clips	R&S®RT-ZA4
Micro Clips	R&S®RT-ZA5
Lead Set	R&S®RT-ZA6
Pin Set for R&S®RT-ZD20/30	R&S®RT-ZA7
N-Type Adapter for R&S®RT-Zxx probes	R&S®RT-ZA9
SMA Adapter	R&S®RT-ZA10
Probe Power Supply	R&S®RT-ZA13
External Attenuator 10:1, 2.0 GHz, 1 MΩ 1.3 pF, 70 V DC, 46 V AC (peak) for R&S®RT-ZD20/30	R&S®RT-ZA15
Power Deskew Fixture	R&S®RT-ZF20
20 dB Preamp for R&S®HZ-15	R&S®HZ-16

Power meters

Type/designation	Frequency range	Power range	Accuracy
R&S®NRP2 power meter 	DC to 110 GHz (depending on sensor)	-67 dBm to +45 dBm (depending on sensor)	Depending on sensor
Two-path diode power sensors 			
R&S®NRP-Z211	10 MHz to 8 GHz	1 nW to 100 mW (-60 dBm to +20 dBm)	0.054 dB to 0.110 dB
R&S®NRP-Z221	10 MHz to 18 GHz	1 nW to 100 mW (-60 dBm to +20 dBm)	0.054 dB to 0.143 dB

R&S®NRP Power Meter Family

The most important features for accurate and uncomplicated power measurements are top measurement accuracy and speed as well as simple operation on a base unit or a laptop/PC. The R&S®NRP power meter family combines all these characteristics in the R&S®NRP2 base unit, R&S®NRPV virtual power meter PC software and a comprehensive portfolio of USB-capable power sensors. The R&S®NRP family is ideal for use in production, R&D and calibration labs as well as for installation and maintenance tasks.

All R&S®NRP-Zxx power sensors are independent measuring instruments. Using an USB adapter, they can be directly connected to a laptop/PC and operated via the R&S®NRPV software.

Key facts

- Cost-effective and compact: sensor operation on a laptop/PC via USB
- Comprehensive portfolio for power measurements from DC to 110 GHz, from -67 dBm to +45 dBm
- 90 dB dynamic range with three-path diode power sensors
- Precise analysis of the envelope power with wideband power sensors
- Top accuracy with thermal power sensors
- Up to four R&S®NRP-Zxx power sensors can be simultaneously connected to the R&S®NRP2 base unit

R&S®NRP2 Power Meter



Versatile and user-friendly

The R&S®NRP2 base unit was designed to be as versatile and easy to operate as possible.

Key facts

- The right sensor for all applications
- Versatile measurement functions
- Simply plug in and measure
- Minimize measurement uncertainty
- Enhanced auto averaging filter
- Easy system integration
- Multiple ways to operate R&S®NRP-Zxx power sensors

Models/options

Designation	Type
Power Meter	R&S®NRP2
Sensor Check Source	R&S®NRP-B1
Second Sensor Input (B)	R&S®NRP-B2
3rd and 4th Sensor Inputs (C, D)	R&S®NRP-B5
Rear Panel Sensor Inputs A and B	R&S®NRP-B6

Applications	How the R&S®NRP-Zxx meet your needs
<ul style="list-style-type: none"> ■ Power measurements on base stations and mobile equipment ■ Design and production of components (e.g. power amplifiers) ■ Antenna measurements ■ Calibration of test and measurement equipment 	<ul style="list-style-type: none"> ■ Rohde & Schwarz is the world's most experienced supplier of USB power sensors – this means reliable, mature products that also meet future needs, and less investment risk ■ USB sensors without compromises – the R&S®NRP-Zxx power sensors are USB sensors that can be used standalone and have no downside in terms of versatility, accuracy and functionality ■ R&S®Smart Sensor Technology makes it possible to achieve higher accuracy compared to classic designs for sensor and base unit ■ Wide variety of sensors – the right sensor for every application ■ Measurements that are both fast and accurate – high throughput paired with measurement results that can be trusted

R&S®NRP-Z211/-Z221 Two-Path Diode Power Sensor



Cost-effective solution for production applications

The R&S®NRP-Z211/-Z221 two-path diode power sensors combine all key characteristics relevant for their use in production. They are cost-effective, fast, precise and USB-capable, offering the best price/performance ratio in their class.



Key facts

- Innovative two-path diode power sensor with enhanced interranger performance
- 80 dB dynamic range for CW and modulated signals
- Continuous average, burst average, timeslot average, time gating and trace mode supported (20 kHz video bandwidth)
- Automatic burst detection and acquisition
- Up to 1500 measurements/s (buffered mode)
- Low sensitivity to harmonics

Models/options

Designation	Type
1 nW to 100 mW, 10 MHz to 8 GHz	R&S®NRP-Z211
1 nW to 100 mW, 10 MHz to 18 GHz	R&S®NRP-Z221
USB Adapter Cable (active)	R&S®NRP-Z3
USB Adapter Cable (passive)	R&S®NRP-Z4
Sensor Hub	R&S®NRP-Z5

Network analyzers

Type/designation	Frequency range	Dynamic range	SPA functionality	Portability
R&S®ZVH cable and antenna analyzer 	100 kHz to 3.6/8 GHz (depending on model)	<ul style="list-style-type: none"> ▪ < -141 dBm (1 Hz), -146 dBm (1 Hz) (typ.) ▪ < -161 dBm (1 Hz), -165 dBm (1 Hz) (typ.) with preamplifier 	<ul style="list-style-type: none"> ▪ > +7 dBm (f < 300 MHz) ▪ > +10 dBm (300 MHz to 3.6 GHz) ▪ > +3 dBm (3.6 GHz to 8 GHz) 	<ul style="list-style-type: none"> ▪ Handheld ▪ Ruggedized ▪ Low weight (3 kg (6.6 lb) with battery) ▪ Up to 4.5 h battery-powered operation ▪ Ideal for field applications
R&S®ZVL vector network analyzer 	9 kHz to 3/6 GHz (specified, depending on model)	<ul style="list-style-type: none"> ▪ Dynamic range > 115 dB, 123 dB (typ.)¹⁾ ▪ Receiver step attenuators 0 dB to 30 dB (5 dB steps) 	<ul style="list-style-type: none"> ▪ AM/FM/φM demodulation ▪ Noise measurements ▪ Spectrogram ▪ Cable TV ▪ 3GPP, WLAN, WiMAX™ 	<ul style="list-style-type: none"> ▪ Portable ▪ Battery pack ▪ 12 V to 28 V power supply ▪ Low weight (< 7 kg (15.4 lb)) ▪ Small and compact (37 cm (14.6 in) depth) ▪ Optional internal battery or 12 V car supply system ▪ Shock-resistant housing and ergonomic carrying handle

¹⁾ In selected frequency subrange, depending on model.

R&S®ZVH Cable and Antenna Analyzer



The new benchmark for efficiency in the field

The R&S®ZVH cable and antenna analyzer is rugged, handy and designed for use in the field. Its low weight and simple operation make it indispensable for anyone who needs an efficient measuring instrument outdoors for the installation and maintenance of antenna systems.

Key facts

- ▮ Perfect tool for cable and antenna installation
- ▮ Frequency range from 100 kHz to 3.6 GHz or 8 GHz
- ▮ Easy operation with user-configurable test sequences (wizard)
- ▮ 100 dB (typ.) dynamic range for filter and antenna isolation measurements
- ▮ Built-in DC voltage supply (bias) for active components such as amplifiers
- ▮ Distance-to-fault, reflection and cable loss measurements
- ▮ Vector network analyzer, vector voltmeter, transmission measurement, spectrum analyzer and power meter option
- ▮ Saving of measurement results on SD memory card or USB flash drive
- ▮ Easy-to-replace lithium-ion battery for up to 4.5 h of operation
- ▮ Rugged, splashproof housing for rough work in the field
- ▮ Easy handling due to low weight (3 kg (6.6 lb) with battery) and easy-to-reach function keys

5

Models	
Designation	Type
Cable and Antenna Analyzer, 100 kHz to 3.6 GHz	R&S®ZVH4
Cable and Antenna Analyzer, 100 kHz to 8 GHz	R&S®ZVH8

Application	How the R&S®ZVH meets your needs
Installation of transmit systems (for mobile radio, broadcasting or radiocommunications)	<ul style="list-style-type: none"> ▮ Cable and antenna testing ▮ Wizard and reporting tool for optimized workflow ▮ Return loss and distance-to-fault measurements ▮ Two-port transmission test capability (S_{21}) for testing cables, filters and amplifiers ▮ Built-in DC voltage supply for measuring active components such as tower mounted amplifiers (TMA) ▮ Position finding using GPS receiver
Maintenance of transmit systems	<ul style="list-style-type: none"> ▮ Cable and antenna testing ▮ Full two-port network analysis ▮ Interference hunting with spectrogram ▮ Power measurements with R&S®NRP-Zxx power sensors ▮ Support of directional power sensors to measure transmitter output power and antenna matching simultaneously ▮ RF spectrum measurements (channel power, OBW, harmonics, AM modulation depth, ACLR, etc.) ▮ Position finding using GPS receiver ▮ R&S®ZVHView software for easy documentation
Field use	<ul style="list-style-type: none"> ▮ Rugged housing, compact size and low weight ▮ Easy to use ▮ SD memory card or USB flash drive for storing thousands of measurement results ▮ Excellent handling in the field due to portrait form factor ▮ Battery-operated with long battery operating time and easy-to-replace battery

R&S®ZVL Vector Network Analyzer



The cost-efficient compact class in network analysis

The R&S®ZVL is a compact, powerful network analyzer that also meets future needs and is therefore ideal for use in development, production and service.

Key facts



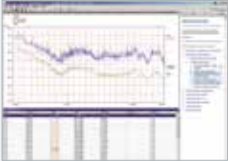
- ▀ Network analyzer, spectrum analyzer and power meter in a single box
- ▀ Digital communications standards
- ▀ Bidirectional test set for displaying all four S-parameters
- ▀ R&S®ZVL3-75: 75 Ω vector network analyzer for TV and CATV measurements
- ▀ Multitrace display for displaying all relevant parameters
- ▀ Distance-to-fault measurement for detecting cable faults
- ▀ Time domain analysis
- ▀ Operation with mouse or hardkeys/softkeys; convenient user interface with wizards and context menus
- ▀ Undo/Redo softkey for reversing up to six preceding operating steps
- ▀ USB connector for R&S®NRP-Zxx power sensors for precise power measurements
- ▀ DVI-D connector for external monitor

Models/options

Designation	Type
Vector Network Analyzer	
3 GHz, 2 ports, 50 Ω	R&S®ZVL3
6 GHz, 2 ports, 50 Ω	R&S®ZVL6
For higher frequencies, please contact your local Rohde & Schwarz partner.	
OXC0 Reference Frequency	R&S®FSL-B4
Additional Interfaces	R&S®FSL-B5
GPIB Interface	R&S®FSL-B10
Spectrum Analysis	R&S®ZVL-K1
Power Sensor Support	R&S®FSL-K9

Application	How the R&S®ZVL meets your needs
Measurements on filters, cables and amplifiers	<ul style="list-style-type: none"> ▀ Full two-port bidirectional test set to display all four S-parameters of a two-port DUT for complete device characterization ▀ Power range (typ.) from -60 dBm to +10 dBm ▀ Noise figure measurement option ▀ Time domain and distance-to-fault option ▀ Spectrum analysis function to measure output spectrum, TOI and ACP
EMC, wireless communications and satellite applications	<ul style="list-style-type: none"> ▀ With its frequency range from 9 kHz to 6 GHz (5 kHz to 6 GHz (typ.)), the R&S®ZVL covers the frequency range for EMC, wireless communications and satellite applications
Power measurement	<ul style="list-style-type: none"> ▀ The R&S®FSL-K9 option expands the R&S®ZVL to a high-precision RF power meter when used with R&S®NRP-Zxx power sensors
Full spectrum analysis	<ul style="list-style-type: none"> ▀ Spectrum analyzer option with a wide scope of functions
Field use	<ul style="list-style-type: none"> ▀ Operation independent of AC supply due to optional internal battery or 12 V car supply system ▀ Shock-resistant housing and ergonomic carrying handle ▀ Compact size, low weight

EMC precompliance

Type/designation	Frequency range	Frequency accuracy	Measurement time	RBW	DANL (sensitivity)
EMC-SET EMC precompliance sets 	100 kHz to 1/3 GHz (depending on model)	n.a.	20 ms to 1000 s	<ul style="list-style-type: none"> ▀ 1 kHz (100 Hz) to 1 MHz in 1/3 steps ▀ 200 Hz (-3 dB), 9 kHz, 120 kHz, 1 MHz (-6 dB) 	-115 dBm, -124 dBm (typ.); -135 dBm
R&S®ESL EMI test receiver 	9 kHz to 3/6 GHz (depending on model)	<ul style="list-style-type: none"> ▀ 1×10^{-6} (standard) ▀ 1×10^{-7} (with R&S®FSL-B4 OCXO option) 	<ul style="list-style-type: none"> ▀ Selectable from 100 μs to 100 s (receiver mode/scan, per frequency step) ▀ Selectable from 2.5 ms to 16000 s, zero span 1 μs to 16000 s (analyzer mode/sweep time) 	<ul style="list-style-type: none"> ▀ 10 Hz to 10 MHz in 1/3 sequence (-3 dB) ▀ 200 Hz, 9 kHz, 120 kHz (-6 dB), 1 MHz (impulse) 	Preamplifier on (R&S®FSL-B22 option), normalized to 1 Hz <ul style="list-style-type: none"> ▀ < -130 dBm (9 kHz to 1 MHz) ▀ < -135 dBm (1 MHz to 10 MHz) ▀ < -145 dBm (10 MHz to 50 MHz) ▀ < -152 dBm (50 MHz to 3 GHz)
R&S®ES-SCAN EMI software 	User-friendly, cost-effective Windows application for EMI testing in line with commercial standards				
EMC accessories	see page 37				

EMC-SET EMC Precompliance Sets



All-round, cost-efficient EMI measuring set

The HAMEG EMC-SET1 and EMC-SET2 sets provide all necessary devices and software to conduct reliable EMC precompliance measurements. These sets meet the needs of cost-conscious customers and engineers who want to perform diagnostic troubleshooting during the design phase or measure typical EMI problems.

Key facts

The EMC precompliance sets include the following:

- HMS-X with HMS-EMC EMC and preamplifier option (EMC-SET2: HMS-3G option included)
 - Frequency range from 100 kHz to 1.6/3 GHz
 - Fast sweep mode
 - Receiver mode with quasi-peak detector
 - Various detectors: auto peak, min./max. peak, sample, RMS
- HM6050-2 (LISN)
 - Frequency range from 9 kHz to 30 MHz
 - Built-in transient limiter
 - Artificial hand connector
- HZ530 (EMC-SET1) (HZ540 (EMC-SET2))
 - Frequency range from 100 kHz to 1/3 GHz
 - Probes included (1 × E-field probe, 1 × H-field probe, 1 × high-impedance probe)
- EMC PreCom 2.00
 - EMI module part of the HMEexplorer software for conducting precompliance measurements (only with HO720 USB/RS-232 interface card and Windows 32-bit version)

Models/options

Designation	Type
EMC Precompliance Set, including HMS-X, HMS-EMC, HM6050-2, HZ530, EMC PreCom	EMC-SET1
EMC Precompliance Set, including HMS-X, HMS-EMC, HMS-3G, HM6050-2, HZ540, EMC PreCom	EMC-SET2

Application	How the HAMEG EMC-SET meets your needs
EMI precompliance measurements in engineering labs for EMC problem detection and troubleshooting during design phase	<ul style="list-style-type: none"> ■ Set with all necessary devices for measuring typical EMC disturbances in line with commercial standards ■ Reliable measurement of line-conducted interferences ■ Wide variety of active broadband probes for EMI diagnosis
Remotely controlled EMI measurements in line with commercial standards for EMC diagnosis and precompliance	<ul style="list-style-type: none"> ■ Free PC software for automated EMI measurements ■ Full remote control via SCPI-based commands ■ USB/RS-232, LAN or GPIB interfaces ■ Fanless design

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.

Key facts

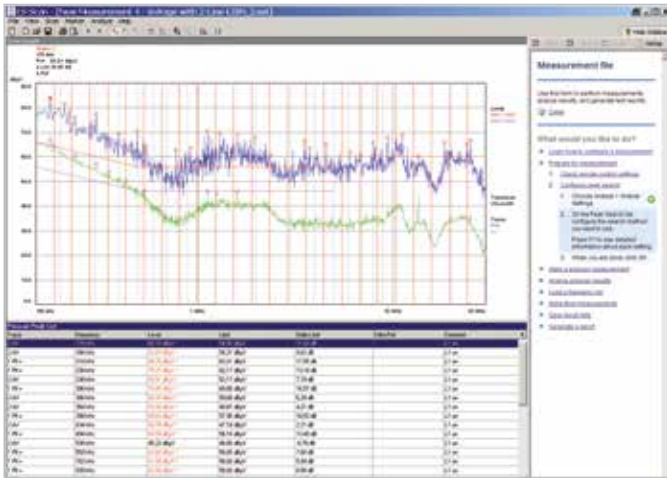
- ▀ Frequency range from 9 kHz to 3/6 GHz covering almost all commercial EMC standards
- ▀ All major functions of an advanced EMI test receiver, including fully automated test sequences
- ▀ Weighting detectors: min. peak, max. peak, average, RMS, quasi-peak, average with meter time constant (CISPR-average) and RMS-average
- ▀ Compact, lightweight instrument, can be battery-powered for mobile applications

Models/options

Designation	Type
EMI Test Receiver, 9 kHz to 3 GHz	R&S®ESL3
EMI Test Receiver, 9 kHz to 3 GHz, with tracking generator	R&S®ESL3
EMI Test Receiver, 9 kHz to 6 GHz	R&S®ESL6
EMI Test Receiver, 9 kHz to 6 GHz, with tracking generator	R&S®ESL6
OXC0 Reference Frequency, aging 1×10^{-7} /year	R&S®FSL-B4
Additional Interfaces	R&S®FSL-B5
GPIB Interface	R&S®FSL-B10
RF Preamplifier (3/6 GHz)	R&S®FSL-B22
AM/FM/φM Measurement Demodulator	R&S®FSL-K7
Power Sensor Support	R&S®FSL-K9
Noise Figure and Gain Measurements	R&S®FSL-K30

Application	How the R&S®ESL meets your needs
EMI measurements of commercial products in engineering and EMC labs for EMC problem detection and EMC troubleshooting during the design phase and for preparation of final certification (precertification)	<ul style="list-style-type: none"> ▀ Very good RF characteristics ▀ Frequency range covering the most important EMI measurements in commercial product standards ▀ All IF bandwidths in line with the latest CISPR 16 basic standard ▀ All CISPR weighting detectors included ▀ All major functions of an advanced EMI test receiver, including fully automated EMI test sequences ▀ Low investment costs ▀ Cost-saving plug & play options
Mobile use	<ul style="list-style-type: none"> ▀ Rugged case as standard ▀ Compact size ▀ Lightweight ▀ Optional battery operation for installation, maintenance and on-site applications
Standard RF spectrum measurements	<ul style="list-style-type: none"> ▀ Complete functionality of an R&S®FSL3/R&S®FSL6 spectrum analyzer included

R&S®ES-SCAN EMI Software



User-friendly software for EMI measurements

R&S®ES-SCAN is a cost-efficient and user-friendly Windows software application that has been developed for Rohde&Schwarz EMI test receivers as well as signal and spectrum analyzers. The main requirements of EMI measurements in line with commercial standards have been combined in an easy-to-use application: measurement settings and storage, scan data acquisition and display with automatic data reduction, peak search with acceptance limit and selection of subranges, final measurement with worst-case selection, report generation and measurement data storage.

Key facts

- Menu-controlled configuration of test receiver/spectrum analyzer and storage of settings on controller, including limit lines and transducer factors
- Reliable acquisition, evaluation and documentation of measurement data
- Marker function, including marker to peak and tune to marker frequency
- Automatic peak search with selectable acceptance limit and selectable subranges
- Editable frequency list for semi-automatic and manual final measurements
- Fine tuning function for reliable detection of local maxima
- Flexible configuration of test report layouts (RTF format)
- For use with the R&S®ESR, R&S®ESRP, R&S®ESCI, R&S®ESPI and R&S®ESL EMI test receivers, the R&S®FSP and R&S®FSL spectrum analyzers, the R&S®FSW and R&S®FSV signal and spectrum analyzers and the R&S®FSVR real-time spectrum analyzer

Application	How R&S®ES-SCAN meets your needs
Remotely controlled EMI measurements in line with commercial standards for EMC diagnosis and precompliance	<ul style="list-style-type: none"> ■ Works with the R&S®ESR, R&S®ESRP, R&S®ESCI, R&S®ESPI, R&S®ESL, R&S®FSL, R&S®FSP, R&S®FSW, R&S®FSV and R&S®FSVR ■ Remote control via GPIB and LAN ■ Full on-screen configuration of Rohde&Schwarz EMI receivers/signal and spectrum analyzers and setup storage on PC ■ Predefined standard limit lines, transducers and measurement setups ■ Flexible generation of meaningful test reports with different layouts ■ Help sidebar provides operational assistance for less experienced and occasional users
Small system solutions without remote control of antenna mast, turntable and slideway and without fully automated test routines	<ul style="list-style-type: none"> ■ Cost-effective tool for EMI diagnostics and development testing in line with commercial standards ■ Combines the basic requirements of EMI measurements in an easy-to-use application
Remotely controlled conducted emission measurements in line with commercial standards for EMC certification	<ul style="list-style-type: none"> ■ Support of the R&S®ESR and R&S®ESCI EMI test receivers for full compliance testing ■ Remote control of Rohde&Schwarz line impedance stabilization networks (LISN) (via test receiver user port) ■ Semi-automated measurement routines ■ Flexible generation of meaningful test reports with different layouts

EMC accessories

EMC accessories

R&S®ENV216 Two-Line V-Network

**Disturbance voltage measurements on single-phase EUTs**

- ▮ Several models for Germany, United Kingdom, France, China/Australia, USA
- ▮ Air-core design and artificial hand
- ▮ Switch-selectable highpass filter of 150 kHz
- ▮ Built-in 10 dB attenuator pad
- ▮ Built-in pulse limiter (can be switched off)
- ▮ Remote control with TTL levels (compatible with Rohde&Schwarz EMI test receivers)
- ▮ Compact, lightweight

Specifications in brief

- ▮ Frequency range: 9 kHz to 30 MHz
- ▮ Continuous current up to 16 A (depending on model)
- ▮ Simulated impedance: $(50 \mu\text{H} + 5 \Omega) \parallel 50 \Omega$ in line with CISPR 16-1-2 Amd. 2:2006
- ▮ V-network in line with CISPR, EN, VDE, ANSI, FCC Part 15 and MIL-STD-461D, E and F
- ▮ Calibrated in line with CISPR 16-1-2 and ANSI C63.4

R&S®EZ-25 150 kHz Highpass

**Conducted emission measurements in the presence of longwave mains disturbance signals**

For the measurement of equipment that requires higher selectivity at the transition between 130 kHz and 150 kHz as shown in Fig. 2 of CISPR 16-1-1 (e.g. signaling equipment as defined in EN50065-1), a highpass filter may be added in front of the measuring receiver to improve the selectivity and achieve the values stipulated in EN50065 Part 1 without impairing the passband of the measuring receiver.

- ▮ Conducted emission measurements in line with EN50065 Part 1
- ▮ Very steep slope in line with CISPR 16-1-1
- ▮ Suitable for any CISPR measuring receiver
- ▮ Relative attenuation > 50 dB below 130 kHz
- ▮ Built-in 10 dB attenuation pad for exact 50 Ω termination of LISN
- ▮ High pulse energy capability (50 mW)
- ▮ Calibrated response

Specifications in brief

- ▮ Passband: 150 kHz to 30 MHz
- ▮ Insertion loss in passband: 9.5 dB to 11.5 dB
- ▮ VSWR in passband: < 1.2
- ▮ Stopband: below 130 kHz
- ▮ Minimum attenuation in stopband: 60 dB
- ▮ Attenuation in transition region
 - 146 kHz: < 12 dB
 - 145 kHz: > 12 dB
 - 140 kHz: > 24 dB
 - 130 kHz: > 60 dB
- ▮ Max. input voltage (continuous): 137 dB μ V
- ▮ Max. impulse energy (50 μ s): 50 mW
- ▮ Dimensions (L x W x H): 145 mm x 95 mm x 52 mm (5.7 in x 3.74 in x 2.05 in)
- ▮ Weight: 500 g (1.1 lb)

R&S®ESH2-Z2/-Z3 Voltage Probes, R&S®ESH2-Z31 Attenuator

**R&S®ESH2-Z2 active voltage probe**

The active voltage probe is used for measuring disturbance voltages on lines that do not carry AC supply voltage.

R&S®ESH2-Z3 passive voltage probe

The passive voltage probe is suitable for measuring disturbance voltages (on AC supply lines) in line with CISPR 16-2-1 and EN 55016-2-1.

R&S®ESH2-Z31 attenuator

For checking the disturbance source impedance in line with EN 55016-2-1 and CISPR 16-2-1

Specifications in brief (R&S®ESH2-Z2/Z3)

- ▮ Frequency range: 9 kHz to 30 MHz
- ▮ Measurement range (AVG, 200 Hz IF bandwidth with Rohde&Schwarz test receivers): -20 dB μ V to +120 dB μ V/+10 dB μ V to +150 dB μ V
- ▮ Attenuation, uncertainty of calibration: 10 dB, 0.5 dB/30 dB, 0.5 dB
- ▮ Input impedance: $118 \text{ k}\Omega \pm 5\% \parallel 8 \text{ pF} / 1.5 \text{ k}\Omega \pm 5\% \parallel 8 \text{ pF}$
- ▮ Max. input voltage
 - $f < 63 \text{ Hz}$: 100 V/250 V
 - $f < 500 \text{ Hz}$: 5 V/250 V
 - 9 kHz to 30 MHz: 3 V/30 V

EMC accessories

R&S®EZ-17 Current Probe

**Emission and susceptibility measurements**

The R&S®EZ-17 model .02 with its extremely flat frequency response is optimal for current measurements and for measuring screening effectiveness.

Due to its high load capacity, model .03 is recommended for EMS measurements (bulk current injection).

- Model .02 for emission measurements
- Model .03 for emission and susceptibility measurements
- High sensitivity and overload capability
- Wide frequency range
- High load capacity for DC and AC current
- Small dimensions in spite of large inner diameter (30 mm)
- Simple clamping thanks to spring-loaded mechanism

Specifications in brief (model .02/.03)

- Frequency range: 20 Hz to 100 MHz
- Range with constant transducer factor (-3 dB): 1 MHz/2 MHz to 100 MHz
- Transducer factor reduced by 20 dB/decade in range from 20 Hz to 1 MHz/2 MHz
- Source impedance: $\leq 0.8 \Omega / \leq 1 \Omega$
- Transfer impedance Z_T in range with constant transducer factor: $3.16 \Omega / 7.1 \Omega$
- Transducer factor k in range with flat frequency response: -10 dB/-17 dB
- Load capacity (RF current measurement)
 - Max. DC current or peak, AC current: 300 A ($f < 1$ kHz)
 - Max. RF current (RMS): 2 A ($f > 1$ MHz)/1 A ($f > 1$ MHz)
- Load capacity of model .03 (EMS measurement)
 - Max. power at RF connector: 10 W ($f > 1$ MHz)

R&S®HZ-15 Probe Set for E and H Near-Field Emission Measurements






The R&S®HZ-15 probe set contains special probes from 30 MHz to 3 GHz for near-field emission measurements on electronic modules and can be used together with test receivers and spectrum analyzers. Inserting the R&S®HZ-16 preamplifier between the near-field probe and the spectrum analyzer makes it easier to measure very weak high-frequency fields of up to 3 GHz.

- Five probes for easy diagnostic measurements
- Special, electrically shielded magnetic field probes
- Probe tips adapted to near-field measurement
- High-resolution measurements
- Easy-to-determine magnetic field orientation
- Easy operation and handling


Specifications in brief (R&S®HZ-16)

- Frequency range: 100 kHz to 3 GHz
- Gain: 20 dB (from 1.5 GHz decreasing to 17 dB)
- Noise figure: 4.5 dB
- Max. input power: +13 dBm
- Operating voltage: 12 V
- Plug-in power supply: 100 V to 240 V, 50 Hz/60 Hz, Euro connector (2 mm × 4 mm), adapter for USA and Japan

Audio and multimedia testers

Type/designation	Broadcasting standards	Transport stream formats	Video/audio formats	Instrument functions	Frequency range	Power range
R&S®SFC-U compact USB modulator 	<ul style="list-style-type: none"> Terrestrial: DVB-T2, DVB-T, DVB-H, DTMB, CMMB, T-DMB, ISDB-T, ISDB-T_{SB}, ATSC/8VSB, ATSC-M/H Cable: DVB-C2, DVB-C, J.83/B, ISDB-C, analog TV Satellite: DVB-S2, DVB-S, DIRECTV Audio: DAB, DAB+, ISDB-T_{SB}, FM radio 	MPEG-2 TS, ETI NA, ETI NI, MFS/PMS, DIRECTV	n.a.	<ul style="list-style-type: none"> Modulator with realtime coder Transport stream player Analog A/V generator AWGN generator 	30 MHz to 3000 MHz	-110 dBm to 0 dBm
R&S®SFC compact modulator 	<ul style="list-style-type: none"> Terrestrial: DVB-T2, DVB-T, DVB-H, DTMB, CMMB, T-DMB, ISDB-T, ISDB-T_{SB}, ATSC/8VSB, ATSC-M/H Cable: DVB-C2, DVB-C, J.83/B, ISDB-C, analog TV Satellite: DVB-S2, DVB-S, DIRECTV Audio: DAB, DAB+, ISDB-T_{SB}, FM radio 	MPEG-2 TS, ETI NA, ETI NI, MFS/PMS, DIRECTV	n.a.	<ul style="list-style-type: none"> Modulator with realtime coder Transport stream player Analog A/V generator AWGN generator 	30 MHz to 3000 MHz	-110 dBm to 0 dBm
R&S®EFL240/340 portable TV test receiver 	<ul style="list-style-type: none"> Terrestrial: DVB-T2¹⁾, DVB-T, DVB-H Cable: DVB-C, analog TV Satellite: DVB-S2, DVB-S Audio: FM radio 	n.a.	<ul style="list-style-type: none"> MPEG-2, MPEG-4, SD, HD (1080p) MPEG-1 L2, Dolby®, AC3, AAC, DD+ PAL, SECAM, NTSC 	<ul style="list-style-type: none"> TV test receiver Spectrum analyzer MPEG decoder Video/audio decoder 	5 MHz to 2500 MHz	15 dBμV to 130 dBμV

¹⁾ R&S®EFL340 only.

Type/designation	Audio interfaces	Number of channels	Analyzer bandwidth	Analyzer voltage range
R&S®UPP audio analyzer 	<ul style="list-style-type: none"> Analog balanced Analog unbalanced with XLR/BNC adapter Digital professional and consumer format in line with AES3 or IEC 60958 I²S HDMI™ 	<ul style="list-style-type: none"> Analog: 2/4/8 channels Digital: 1 to 8 channels (depends on interface) 	<ul style="list-style-type: none"> Analog: DC/20 Hz to 80 kHz Digital: max. clock rate 200 kHz 	1 μV to 50 V (RMS, sine)

R&S®SFC-U Compact USB Modulator



Test signals for TV and audio broadcasting – handy and economical

The R&S®SFC-U compact USB modulator is an economical multistandard signal source. It supports realtime coding for all conventional digital and analog TV and audio broadcasting standards. The R&S®SFC-U is a USB device designed for use with a PC, enabling plug&play test signal generation.

Key facts

- High precision modulator with MER > 40 dB
- VHF and UHF frequency range, optionally up to 3 GHz
- Level range from 0 dBm to -31.5 dBm, optionally to -110 dBm
- Terrestrial TV standards: DVB-T2, DVB-T, DVB-H, DTMB, CMMB, T-DMB, ISDB-T, ISDB-T_B, ATSC/8VSB, ATSC-M/H
- Cable TV standards: DVB-C2, DVB-C, J.83/B, ISDB-C
- Satellite TV standards: DVB-S2, DVB-S, DIRECTV
- Analog TV standards: B/G, D/K, I, M/N, L

- Audio broadcasting standards: DAB, DAB+, ISDB-T_{SB}, AM/FM/RDS
- Transport stream player and analog audio/video generator integrated in PC software
- Optional transport stream libraries and test pattern libraries supported
- Integrated AWGN generator
- ASI transport stream input

Models/options

Designation	Type
Compact USB Modulator	R&S®SFC-U
Terrestrial TV Option Package (includes DVB-T, DVB-H, ISDB-T, ISDB-T _B , ISDB-T _{SB} , DTMB, CMMB, ATSC/8VSB, ATSC-M/H)	R&S®SFC-U-PK1
Cable TV Option Package (includes DVB-C, J.83/B, ISDB-C)	R&S®SFC-U-PK2
Satellite TV Option Package (includes DVB-S2, DVB-S, DIRECTV, R&S®SFC-U-K83)	R&S®SFC-U-PK3
T2/C2 Option Package (includes DVB-T2, DVB-C2)	R&S®SFC-U-PK4
Audio Broadcasting Option Package (includes DAB, DAB+, T-DMB, AM/FM/RDS) ¹⁾	R&S®SFC-U-PK5
Analog TV Option Package (includes standards B/G, D/K, I, M/N, L)	R&S®SFC-U-PK6
Frequency Extension, 30 MHz to 3 GHz	R&S®SFC-U-K83
Electronic Attenuator, 0 dB to +110 dB	R&S®SFC-U-K84
AWGN Noise Generator	R&S®SFC-U-K40
Digital I/Q Input	R&S®SFC-U-K80

¹⁾ DAB, DAB+ and T-DMB might require the R&S®SFC-U-K83 frequency extension.

Application	How the R&S®SFC-U meets your needs
Software development for TV receivers	<ul style="list-style-type: none"> Easy and convenient operation from PC Generates test signals for various TV standards Test signals can include EPG and data services Libraries with various test sequences available as options Playout of transport streams with encrypted content Endless and seamless transport stream playout
Product presentation and demonstration	<ul style="list-style-type: none"> Small, easy-to-use signal source Generates test signals for various TV standards
Set-top box service: test, repair and firmware update	<ul style="list-style-type: none"> Generates standard-compliant test signal for simple Go/NoGo test Playout of special transport streams for firmware update of set-top boxes Easy-to-use signal source for operation by inexperienced users
Testing multiplex configurations for broadcasting networks	<ul style="list-style-type: none"> Playout of transport streams with any multiplex configuration to be verified Generates standard-compliant test signal to verify multiplex settings with TV receivers
Routine functional check of TV test equipment	<ul style="list-style-type: none"> High accuracy of signal level and frequency Generates test signals for cable, satellite and terrestrial TV standards

R&S®SFC Compact Modulator



Test signals for TV and audio broadcasting – handy and economical

The R&S®SFC compact modulator is an economical multi-standard signal source. It supports realtime coding for all conventional digital and analog TV and audio broadcasting standards. The R&S®SFC is equipped with a built-in computer, making it ideal for standalone operation and for integration into a signal generation system with multiple generators.

Key facts

- High precision modulator with MER > 40 dB
- VHF and UHF frequency range, optionally up to 3 GHz
- Level range from 0 dBm to –31.5 dBm, optionally to –110 dBm
- Terrestrial TV standards: DVB-T2, DVB-T, DVB-H, DTMB, CMMB, T-DMB, ISDB-T, ISDB-T_B, ATSC/8VSB, ATSC-M/H
- Cable TV standards: DVB-C2, DVB-C, J.83/B, ISDB-C
- Satellite TV standards: DVB-S2, DVB-S, DIRECTV
- Analog TV standards: B/G, D/K, I, M/N, L
- Audio broadcasting standards: DAB, DAB+, ISDB-T_{SB}, AM/FM/RDS
- Integrated transport stream player and analog audio/video generator
- Transport stream libraries and test pattern libraries supported
- Integrated AWGN generator
- ASI transport stream input
- Digital I/Q input to connect to other Rohde&Schwarz broadcast signal generators

Models/options

Designation	Type
Compact Modulator	R&S®SFC
Frequency Extension, 30 MHz to 3 GHz	R&S®SFC-K83
Electronic Attenuator, 0 dB to +110 dB	R&S®SFC-K84
AWGN Noise Generator	R&S®SFC-K40
Digital I/Q Input	R&S®SFC-K80
Coder Extension Board	R&S®SFC-B15
Realtime coders for the broadcasting standards and transport stream libraries are available as individual software options.	
Please visit our website for a complete list of options and order numbers.	

Application	How the R&S®SFC meets your needs
Use in central signal generation systems (transmitter room systems)	<ul style="list-style-type: none"> ■ Generates test signals for various TV standards ■ Integrated computer enables standalone operation ■ Automatic booting and start-up after power-on ■ Full remote control via LAN ■ R&S®Central TX System Control software controls and monitors many R&S®SFC
General-purpose broadcast signal generator	<ul style="list-style-type: none"> ■ High accuracy of signal level and frequency ■ Small, easy-to-use signal source ■ Generates test signals for various TV standards
2nd RF output for R&S®SFU broadcast test system	<ul style="list-style-type: none"> ■ Digital I/Q input to connect to other Rohde&Schwarz broadcast signal generators ■ Extends the R&S®SFU broadcast test system to a two-channel generator ■ Enables MISO and diversity reception scenarios

R&S®EFL240/340 Portable TV Test Receiver



Professional installation of cable and satellite TV systems and antennas

The R&S®EFL240 and R&S®EFL340 are compact, portable TV test receivers for satellite, cable and terrestrial television. The R&S®EFL340 includes DVB-T2. Their versatile measurement functions and their operating convenience are ideal for the installation of cable TV systems, satellite receiver systems, in-building distribution systems and antennas. The favorable price makes the R&S®EFL240 and R&S®EFL340 extremely attractive for these applications.

Key facts

- ▀ Multistandard TV test receiver
- ▀ Frequency range from 5 MHz to 2500 MHz
- ▀ Ergonomic design and easy operation
- ▀ More than 4 hours of battery operation
- ▀ Analysis of DVB-T¹⁾, DVB-T, DVB-H, DVB-C, DVB-S and DVB-S2
- ▀ Measurement of constellation, MER(f) and echoes
- ▀ MPEG-2 and MPEG-4 decoding, SD and HD video display
- ▀ ASI input/output interface¹⁾
- ▀ Common interface for encrypted programs
- ▀ PAL, SECAM, NTSC and FM radio reception
- ▀ Combo mode for simultaneous display of video, spectrum and measurement results
- ▀ Automated measurements simplify routine work
- ▀ Ethernet/LAN interface for remote measurement and data logging¹⁾
- ▀ R&S®EFL-Suite software for transferring measurement results to a PC
- ▀ Accessories included: soft bag, carrying straps, RF adapter set, power supply, car adapter, SD card, cables, CD ROM with manuals and R&S®EFL-Suite software

¹⁾ R&S®EFL340 only.

Models/options	
Designation	Type
Portable TV Test Receiver	R&S®EFL240
Portable TV Test Receiver	R&S®EFL340
Rain Cover	R&S®EFL-Z1

Application	How the R&S®EFL240/340 meets your needs
Analysis of reception problems in terrestrial TV networks	<ul style="list-style-type: none"> ▀ Echo measurement without receiver lock to analyze multipath propagation under poor reception conditions ▀ Pre-echo and post-echo measurement to analyze SFN configuration ▀ MER(f) measurement to detect narrowband interference effects and co-channel interference ▀ Ethernet/LAN interface enables remote measurement and long-time data logging via Internet
Installation of cable TV systems	<ul style="list-style-type: none"> ▀ Measurement of digital and analog cable TV signals ▀ Automatic scan&log function simplifies measurements in a fully loaded cable TV network ▀ Spectrum analyzer with zoom function
Installation of satellite TV receivers	<ul style="list-style-type: none"> ▀ Antenna positioning function simplifies dish alignment ▀ Satellite identifier function ▀ Transponder lists of many satellites pre-installed ▀ Realtime FFT spectrum display in combo mode
Field use	<ul style="list-style-type: none"> ▀ Handy, lightweight portable instrument ▀ Exceptionally long battery operation of more than four hours ▀ Soft bag with all necessary accessories
On-site support for TV tuners	<ul style="list-style-type: none"> ▀ Reference receiver for troubleshooting of TV tuners ▀ Combo mode provides a quick overview of signal quality ▀ Support of all relevant TV standards

R&S®UPP Audio Analyzer



Multichannel and cost-efficient, for use in the lab and in production

The compact cost-efficient R&S®UPP audio analyzer is designed for system applications. It features low height and comes without front panel control elements or integrated display.

Key facts

- ▮ Suitable for all interfaces: analog, digital and combined
- ▮ HDMI™ device testing
- ▮ Parallel measurements on up to eight channels
- ▮ Up to 80 kHz bandwidth and 200 kHz sampling rate
- ▮ User-programmable filters for analyzer and generator
- ▮ Compact instrument with integrated PC and low height

Models/options	
Designation	Type
Audio Analyzer, Two Channels	R&S®UPP200
Audio Analyzer, Four Channels	R&S®UPP400
Audio Analyzer, Eight Channels	R&S®UPP800
Hardware options	
Digital Audio I/O	R&S®UPP-B2
HDMI™ and Digital Audio Interfaces	R&S®UPP-B4
Software options	
Digital Audio Protocol for R&S®UPP-B2	R&S®UPP-K21
Dolby® Datastream Decoding for R&S®UPP-B4	R&S®UPP-K41
Extended Audio/Video Measurements for R&S®UPP-B4	R&S®UPP-K45
1/n Octave Analysis for R&S®UPP	R&S®UPP-K601
Cascading Software for R&S®UPP800	R&S®UPP-K800
System components	
XLR/BNC Adapter Set, male	R&S®UP-Z1M
XLR/BNC Adapter Set, male/female	R&S®UP-Z1MF
AES/EBU Cable for R&S®UPP-B2	R&S®UP-Z2
I²S Cable for R&S®UPP-B2/R&S®UPV-B41	R&S®UP-Z3
Eight-Channel I²S Cable for R&S®UPP-B4	R&S®UP-Z4

Application	How the R&S®UPP meets your needs
General-purpose audio analysis	<ul style="list-style-type: none"> ▮ Generation of a wide variety of analog and – optionally – digital test signals ▮ Broad scope of measurements on both analog and – optionally – digital interfaces ▮ Powerful and even multichannel FFT analysis ▮ User-programmable filters that can be adapted in seconds to the individual measurement task ▮ Integrated control PC; manual operation requires only an external monitor and a mouse and keyboard
Use in production	<ul style="list-style-type: none"> ▮ Parallel measurements for high throughput ▮ High measurement speed throughout the system ▮ Easy, efficient creation of remote control routines using the SCPI recording function
Measurements on multichannel devices	<ul style="list-style-type: none"> ▮ Three models: R&S®UPP200/R&S®UPP400/R&S®UPP800 with 2/4/8 analog analyzer channels ▮ Instruments can be cascaded to up to 48 measurement channels ▮ Parallel measurements on all channels save time
HDMI™ applications	<ul style="list-style-type: none"> ▮ Full-fledged audio analyzer with HDMI™ function ▮ Generation and analysis of audio, video and data signals ▮ Display of audio and video InfoFrames ▮ Support of HDMI™ standard 1.4b, including audio return channel and HDMI™ Ethernet
Measurements on mixed interfaces	<ul style="list-style-type: none"> ▮ 2/4/8 analog analyzer channels in one box ▮ AES/EBU and D/P DIF interfaces for measuring digital audio components ▮ Digital protocol analysis and generation ▮ I²S interfaces for testing audio ICs ▮ HDMI™ device testing ▮ Interfaces for the generator and analyzer can be set independently of one another and used together in any combination

Radio testers

R&S® CTH Portable Radio Test Set



Always on duty

The R&S® CTH allows dependable testing of analog FM radio systems, even under challenging environmental conditions. In addition, it can also be used for distance-to-fault measurements and over-the-air verification. The radio test set was designed especially for outdoor use.

Key facts




- Extensive measurement capabilities
 - Receiver test with flexible frequency setting
 - Frequency measurement
 - Power measurement
 - VSWR
 - Over-the-air measurement
 - Distance-to-fault measurement
 - Voice reporting
- Rugged and all-weatherproof
 - Robust and shockproof
 - Splashproof
 - Wide temperature range

Models/options

Designation	Type
Portable Radio Test Set	R&S® CTH200A
Transit Case	R&S® CTH-Z20
50 Ω Load, BNC Adapter and Cables	R&S® CTH-Z30

Application	How the R&S® CTH meets your needs
Verification of FM radios	<ul style="list-style-type: none"> ■ Quick check of FM radios before use or on a regular basis ■ TX test to verify power and frequency ■ RX test to check receiver sensitivity with 150 Hz subaudio and 900 Hz audio tone
Over-the-air measurements	<ul style="list-style-type: none"> ■ On-the-go check basic operation and frequency setting ■ Verification of transmission and correct frequency setting before going into the field
Cable fault measurements	<ul style="list-style-type: none"> ■ Verification of fault-free cabling in the field such as remote antennas ■ Displays the distance to a cable fault and helps identify the problem

Power supplies

Type/designation	V _{max}	I _{max}	P _{max}	Overvoltage protection	Resolution	Remote control
HM8143 three-channel arbitrary power supply 	<ul style="list-style-type: none"> ▮ 2 × 30 V ▮ 1 × 5 V 	3 × 2 A	130 W	n.a.	<ul style="list-style-type: none"> ▮ 10 mV ▮ 1 mA 	<ul style="list-style-type: none"> ▮ USB/RS-232 ▮ optional: IEEE488 (GPIB)
HMP2020/HMP2030 programmable two/three-channel power supply 	<ul style="list-style-type: none"> ▮ 2 × 32 V (HMP2020) ▮ 3 × 32 V (HMP2030) 	<ul style="list-style-type: none"> ▮ 1 × 10 A/1 × 5 A (HMP2020) ▮ 3 × 5 A (HMP2030) 	188 W	adjustable for each channel	<ul style="list-style-type: none"> ▮ 1 mV ▮ 0.2 mA (I < 1 A), 1 mA (I ≥ 1 A) (HMP2020) ▮ 0.1 mA (I < 1 A), 1 mA (I ≥ 1 A) (HMP2030) 	<ul style="list-style-type: none"> ▮ USB/RS-232 ▮ optional: Ethernet/USB, IEEE488 (GPIB)
HMP4030/HMP4040 programmable three/four-channel power supply 	<ul style="list-style-type: none"> ▮ 3 × 32 V (HMP4030) ▮ 4 × 32 V (HMP4040) 	<ul style="list-style-type: none"> ▮ 3 × 10 A (HMP4030) ▮ 4 × 10 A (HMP4040) 	384 W	adjustable for each channel	<ul style="list-style-type: none"> ▮ 1 mV ▮ 0.2 mA (I < 1 A), 1 mA (I ≥ 1 A) 	<ul style="list-style-type: none"> ▮ USB/RS-232 ▮ optional: Ethernet/USB, IEEE488 (GPIB)

HM8143 Three-Channel Arbitrary Power Supply



The most versatile power supply

- 2 × 0 V to 30 V/1 × 5 V, 3 × 2 A (130 W)
- Realtime voltage and current values
- Linear regulated, two-quadrant power supply (current source and sink)
- Setting and readback resolution: 10 mV, 1 mA
- Electronic fuse and tracking
- Advanced parallel (up to 6 A) and serial (up to 65 V) operation
- Front connectors: 4 mm (0.16 in) safety sockets
- Sense connectors for line loss compensation (30 V channels)
- External modulation of output voltages up to 50 kHz
- Arbitrary module: 4096 points, 12 bit
- RS-232/USB dual interface, optionally IEEE-488 (GPIB)

Models/options

Designation	Type
Three-Channel Arbitrary Power Supply	HM8143
IEEE 488 (GPIB) Interface Card	HO880

Application	How the R&S®HM8143 meets your needs
Engineering labs	<ul style="list-style-type: none"> ■ Up to 30 V, 2 A per regulated channel ■ Linear regulated power unit ■ Sense inputs for compensation of lead resistances ■ External modulation up to 50 kHz
Production environment	<ul style="list-style-type: none"> ■ Trigger and modulation connectors (BNC) ■ Full remote control, several interfaces available, LabVIEW
Simulation of charging processes of batteries	<ul style="list-style-type: none"> ■ Free PC software to program arbitrary waveforms ■ Usable as sink and source

HMP2020/HMP2030 Programmable Two/Three-Channel Power Supply



Key facts

- HMP2020: 1 × 0 V to 32 V/0 A to 10 A; 1 × 0 V to 32 V/0 A to 5 A (188 W)
- HMP2030: 3 × 0 V to 32 V/0 A to 5 A (188 W)
- Low residual ripple due to linear postregulators
- Realtime voltage, current and power values
- High setting and readback resolution: 1 mV and 0.1/0.2/1.0 A (depending on current and model)
- FuseLink (electronic fuse) freely combinable for all channels
- FuseDelay tunable up to 250 ms
- EasyArb function directly programmable on device
- PC software (free of charge) for easy generation of user-defined waveforms
- Independently adjustable overvoltage protection (OVP) for each channel
- Advanced parallel and serial operation via V/I tracking
- Front connectors: 4 mm (0.16 in) safety sockets
- Rear connectors for all channels, including sense
- USB/RS-232 dual interface, remote control via SCPI-based commands

Models/options

Designation	Type
Programmable Two-Channel Power Supply	HMP2020
Programmable Three-Channel Power Supply	HMP2030
Dual Ethernet/USB Interface	HO730
IEEE 488 (GPIB) Interface, galvanically isolated	HO740

Application	How the HAMEG HMP2020/HMP2030 meets your needs
Engineering labs	<ul style="list-style-type: none"> ■ Up to 32 V and up to 10 A per channel ■ Sense inputs ■ Overcurrent protection freely combinable with other channels (FuseLink)
Production environment	<ul style="list-style-type: none"> ■ All outputs and sense inputs available on rear of device ■ Remote control using USB/RS-232 interface as standard, Ethernet or GPIB as an option
Simulation of charging processes of batteries	<ul style="list-style-type: none"> ■ Easy-to-program arbitrary V/I curves

HMP4030/HMP4040 Programmable Three/Four-Channel Power Supply



Key facts

- HMP4030: 3 × 0 V to 32 V/0 A to 10 A (384 W)
- HMP4040: 4 × 0 V to 32 V/0 A to 10 A (384 W)
- Low residual ripple due to linear postregulators
- Realtime voltage, current and power values
- High setting and readback resolution: 1 mV and 0.1/0.2/1.0 A (depending on current and model)
- FuseLink (electronic fuse) freely combinable for all channels
- FuseDelay tunable up to 250 ms
- EasyArb function directly programmable on device
- PC software (free of charge) for easy generation of user-defined waveforms
- Independently adjustable overvoltage protection (OVP) for each channel
- Advanced parallel and serial operation via V/I tracking
- Front connectors: 4 mm (0.16 in) safety sockets
- Rear connectors for all channels, including sense
- USB/RS-232 dual interface, remote control via SCPI-based commands

Models/options

Designation	Type
Programmable Three-Channel Power Supply	HMP4030
Programmable Four-Channel Power Supply	HMP4040
Dual Ethernet/USB Interface	HO730
IEEE 488 (GPIB) Interface, galvanically isolated	HO740

Application	How the HAMEG HMP4030/HMP4040 meets your needs
Engineering labs	<ul style="list-style-type: none"> ■ Up to 32 V and up to 10 A per channel ■ Sense inputs ■ Overcurrent protection freely combinable with other channels (FuseLink)
Production environment	<ul style="list-style-type: none"> ■ All outputs and sense inputs available on rear of device ■ Remote control using USB/RS-232 interface as standard, Ethernet or GPIB as an option
Simulation of charging processes of batteries	<ul style="list-style-type: none"> ■ Easy-to-program arbitrary V/I curves

LCR bridges/meters

HM8118 200 kHz LCR Bridge/Meter



Key facts

- Measurement range: 20 Hz to 200 kHz (69 steps)
- Basic accuracy: 0.05%
- Measurement rate: up to 12 values/s
- Automatic or manual selection of circuit type (serial, parallel)
- Measurement functions: L, C, R, |Z|, X, |Y|, G, B, D, Q, ϕ , Δ , M, N
- Transformer measurement: mutual inductance and ratio
 - Internal: 0 V to 5 V/0 mA to 200 mA (resolution: 10 mV/1 mA)
 - External: 0 V to 40 V (bias voltage only)
- RS-232/USB dual interface for remote control
- Fanless design

Models/options

Designation	Type
200 kHz LCR Bridge/Meter	HM8118
Binning Interface, for automatic sorting of components	HO118
IEEE 488 (GPIB) Interface, galvanically isolated	HO880

Application	How the HAMEG HM8118 meets your needs
Component incoming inspection	<ul style="list-style-type: none"> ■ High accuracy and automatic modes ensure reliable, reproducible results
Component validation (variation/quality)	<ul style="list-style-type: none"> ■ Easy-to-use one-button user interface ■ Fast measurements shorten test time ■ Optional accessories make transformer measurements possible
Test of SMD components	<ul style="list-style-type: none"> ■ Standard test fixture for SMD components allows out-of-the-box measurements
Easy integration into factory lines using optional HO118 binning interface	<ul style="list-style-type: none"> ■ Binning interface can control handler/sorter in factory line ■ Fast measurement mode and remote control using USB/RS-232 or optional GPIB interface

Frequency counters

HM8123 Universal Counter



3 GHz counter

- Measurement range: DC to 3 GHz
 - Input A/B (BNC): DC to 200 MHz
 - Input C (SMA): 100 MHz to 3 GHz
- Input impedance A/B: 50 Ω or 1 MΩ (switchable), sensitivity 25 mV
- Input impedance C: 50 Ω, sensitivity 30 mV
- 10-digit resolution (at 10 s gate time)
- Nine measurement functions, external GATE and ARMING connectors (BNC)
- External reference input/output (10 MHz) via BNC connector
- HM8123: TCXO (temperature stability: $\pm 0.5 \times 10^{-6}$), HM8123-X: OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)
- RS-232/USB dual interface, optionally IEEE-488 (GPIB)
- Fanless design

Models/options

Designation	Type
3 GHz Universal Counter	HM8123
3 GHz Universal Counter, OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)	HM8123-X
Test Cable BNC/BNC	HZ33, HZ34
19" Rackmount Kit, 2 HU	HZ42
Adapter, BNC to 4 mm banana	HZ20
IEEE 488 (GPIB) Interface, galvanically isolated	HO880

Application	How the HAMEG HM8123 meets your needs
Analog RF circuit design	<ul style="list-style-type: none"> ■ High sensitivity and frequency range up to 3 GHz ■ 10-digit resolution for precise measurement results ■ Optional OCXO for even higher accuracy
Development of clock and clock distribution systems	<ul style="list-style-type: none"> ■ Interchannel measurements: frequency/period/time interval/phase A:B ■ Burst measurements
Education and service	<ul style="list-style-type: none"> ■ Fast boot time ■ Easy to use due to one-pushbutton operation

Multimeters

HM8112-3 Digital Multimeter



Cost-efficient solution

The HM8112-3 offers all essential features for accurate measurement and data acquisition in laboratory and production environments.

Key facts

- Measurement range: DC to 300 kHz
- Resolution: 100 nV, 100 pA, 100 $\mu\Omega$, 1 pF, 0.01 °C/F
- High accuracy: 0.003% (DC), 0.08% (AC)
- True RMS measurement, AC and AC+DC
- 6½-digit display (1 200 000 counts)
- Measurement functions: voltage, current, resistance and temperature (PT100/PT1000 and Ni sensors) measurements, frequency and diode tests (two and four-wire)
- Measurement intervals: 0.1 s to 60 s
- Mathematic functions: limit testing, min./max., average, offset
- Internal data logger for long-term acquisition
- RS-232/USB dual interface, optionally IEEE-488 (GPIB)
- HM8112-3S: HM8112-3 with scanner card

Models

Designation	Type
Digital Multimeter	HM8112-3
Digital Multimeter, with Scanner Card (8 + 1 channels, each two and four-wire)	HM8112-3S

Application	How the HAMEG HM8112-3 meets your needs
General purpose	<ul style="list-style-type: none"> ■ Clear 6½-digit display ■ Quick and easy measurement ■ Highly valuable for service and repair centers, training centers, universities or schools ■ Remote control for automated long-term data logging
Engineering lab	<ul style="list-style-type: none"> ■ High resolution and accuracy ■ Wide frequency range from DC to 300 kHz ■ Accurate four-wire measurement ■ Fanless design
Production environment	<ul style="list-style-type: none"> ■ Optional scanner card (8 + 1 channels) ■ RS-232, USB or GPIB interfaces, galvanically isolated ■ LabVIEW drivers available

HMC8012 Digital Multimeter



Key facts

- ▮ Measurement range: DC to 100 kHz
- ▮ Resolution: 1 μ V, 100 nA, 1 m Ω , 1 pF, 1 Hz, 0.1 $^{\circ}$ C/F
- ▮ Basic accuracy: 0.015% (DC)
- ▮ True RMS measurement, AC and AC+DC
- ▮ 5 $\frac{3}{4}$ -digit display (480 000 counts)
- ▮ Simultaneous display of three measurement functions, e.g. DC + AC + statistics
- ▮ Measurement rate: up to 200 values/s
- ▮ Measurement functions: V (DC), I (DC), RMS, V (AC), I (AC), frequency, DC power, resistance (two and four-wire), temperature (PT100/PT500/PT1000), capacitance, diode and continuity test
- ▮ Mathematic functions: limit testing, min./max., average, offset, DC power, dB, dBm
- ▮ Data logging to internal memory or USB flash drive in CSV format
- ▮ Interfaces: USB-TMC/-VCP, Ethernet, LXI, IEEE-488 (GPIB)
- ▮ SCPI commands largely compatible with Agilent 34410A (HMC8012-G): HMC8012 incl. IEEE-488 (GPIB) interface

Models/options

Designation	Type
5 $\frac{3}{4}$ -Digit Multimeter	HMC8012
5 $\frac{3}{4}$ -Digit Multimeter, incl. IEEE-488 (GPIB)	HMC8012-G
IEEE-488 (GPIB) Interface for HMC series	HOC740

Application	How the HAMEG HMC8012 meets your needs
General purpose	<ul style="list-style-type: none"> ▮ Clear 5$\frac{3}{4}$-digit display ▮ Quick and easy measurement ▮ High resolution and accuracy ▮ Highly valuable for service and repair centers, training centers, universities or schools
Engineering lab	<ul style="list-style-type: none"> ▮ Wide frequency range from DC to 300 kHz ▮ Accurate four-wire measurement ▮ Long-term data logging capability ▮ Fanless design
Production environment	<ul style="list-style-type: none"> ▮ LXI compliant Ethernet interface ▮ USB and Ethernet interface, GPIB (HMC8012-G only) ▮ SCPI remote control functionality ▮ LabVIEW drivers available

Power consumption meters

HM8115-2 8 kW Power Meter



Key facts

- ▮ Measurement range: 1 mW to 8 kW
- ▮ Voltages from 100 mV to 500 V, currents from 1 mA to 16 A
- ▮ Frequency range: DC to 1 kHz
- ▮ Simultaneous display of voltage, current and power (W, var, VA and power factor) values
- ▮ Autoranging for easy measurement
- ▮ Suitable for measurements on frequency converters
- ▮ Monitor output (BNC) shows instantaneous power value
- ▮ RS-232/USB dual interface, optionally IEEE-488 (GPIB)
- ▮ PC software for automated long-term data acquisition included

Model

Designation	Type
8 kW Power Meter	HM8115-2

Application	How the HAMEG HM8115-2 meets your needs
General purpose	<ul style="list-style-type: none"> ▮ Quick and easy measurements through autoranging and setup ▮ Synchronous display of voltage, current and active power ▮ Suitable for service and training centers, universities and schools ▮ RS-232, USB or GPIB interfaces
Engineering lab	<ul style="list-style-type: none"> ▮ Wide frequency range from DC to 1 kHz ▮ Convenient power functions: W, var, VA and power factor ▮ Monitor output shows power level (BNC, analog) ▮ Fanless design
Production environment	<ul style="list-style-type: none"> ▮ Remote control for automated long-term data logging ▮ Galvanically isolated interfaces ▮ LabVIEW drivers available

Appendix

Service and support



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Rohde & Schwarz

worldwide

Headquarters

At company headquarters in Munich, around 2500 employees work in research and development, central sales and service, marketing and administration.

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Sales

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Customer support – worldwide live support

Whatever problem you have, our support center is there to help you. Your question will be dealt with fast and in detail. There are three support centers in three different time zones: Munich, Washington and Singapore. Support is available 24 hours a day, Monday through Friday excluding public holidays. The staff of our support center is optimally trained to assist you in solving your problems. Our regional support centers will be glad to answer any questions regarding our products and service:

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Rohde & Schwarz

Service with added value

Contractually assured services

Rohde & Schwarz offers full-range service at your command. You can mix and match our services according to your technical and budgetary requirements.

Service contracts

As the original equipment manufacturer (OEM), we provide the most qualified, responsive and thorough service available. Customer care is especially important to us. We support you with services tailored to your needs:

- ▮ Short and reliable turnaround times
- ▮ Efficient logistics for pickup and return of your equipment
- ▮ High spare-part availability
- ▮ Flexible adjustment of terms during the contract period
- ▮ Services tailored to your needs

Service options

Service options are powerful service contracts that are offered exclusively when you purchase a new product. Taking advantage of a service option ensures optimum performance and availability of your Rohde & Schwarz product at low, predictable operating costs.

Online management

Online management of instrument data and service transactions provides an ideal overview and saves time. That's why Rohde & Schwarz offers its customers numerous state-of-the-art instrument and service management functions in the service portal. Since we always go a step further, we provide additional features that make your work even easier.

Register at <http://my.rohde-schwarz.com/serviceportal>



Calibration Repair			
Factory standard calibration <ul style="list-style-type: none"> Full calibration (ISO 17025 conformant), returning the instrument to the same state as when it originally left the factory Traceability to national/ international standards Certificate and test report Software updates and hardware modifications included Instrument adjustment 	Accredited calibration <ul style="list-style-type: none"> Same features as factory standard calibration Directly traceable calibration in accordance with ISO 17025 Controlled by national accreditation authority (NIST, DKD/DAkkS) Certificate and test report Software updates and hardware modifications Instrument adjustment 	Performance calibration (only available under service contract) <ul style="list-style-type: none"> Competitive price Complete measurement of all specifications as with factory standard calibration Certificate and test report Quality-related software updates and hardware modifications No instrument adjustments 	Adjustment <ul style="list-style-type: none"> Includes adjustment and incoming equipment test report Can only be ordered in connection with performance calibration
Standard price repair <ul style="list-style-type: none"> Fixed repair price which covers the cost of materials and work performed Twelve-month service warranty on the entire equipment (does not apply in case of improper handling or alteration of the equipment) Calibration in line with ISO 9001 including documentation of test results Latest hardware and software updates 	<ul style="list-style-type: none"> Pickup and return of the equipment (only for shipping by a Rohde&Schwarz logistics partner in the country of the Rohde&Schwarz service organization) If it turns out that only little work and material are needed to eliminate the fault, you pay merely a small lump sum instead of the standard price 	Time and material repair <ul style="list-style-type: none"> Repair based on the amount of material and work required to repair the equipment Twelve-month service warranty on the work performed 	

Rohde & Schwarz service offers you further advantages

Service request

Service from the start – higher efficiency, smooth handling and greater visibility through on-line tracking. Just call or visit our website at <http://rohde-schwarz.com/RMA> to register your instrument. You will immediately receive shipping instructions, the service reference number, preliminary service pricing options and the estimated turnaround time via e-mail.

Service for third-party maintenance (TPM) products

Rohde & Schwarz also offers the services mentioned here for TPM products.

On-site calibration

You can opt for on-site calibration of your Rohde & Schwarz equipment and TPM products. On-site calibration is convenient and reduces downtime to the absolute minimum. Various calibrations and minor repairs can be performed at your company; minimum quantities apply.

Pickup service

On request we pick up your equipment at your company. We can also arrange for the packaging.

Loan equipment

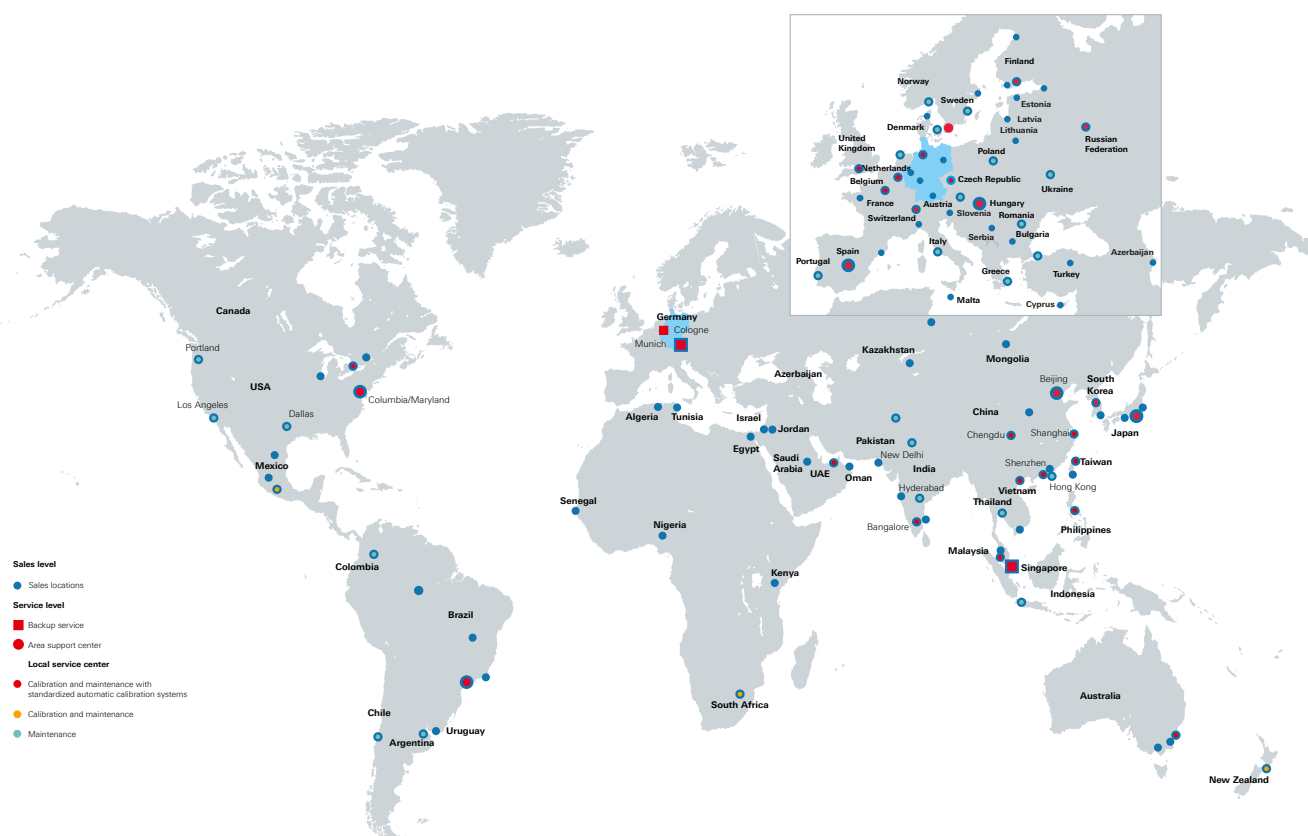
Your local service center can offer a loaner to bridge the repair time – subject to availability.

Service order tracking

The www.servicestatus.rohde-schwarz.com portal allows you to verify the repair or calibration status of your instrument. Service order tracking provides effective transparency. You only need the service reference number and the serial number of your equipment to track its status.



Global sales and service locations




















Trademarks

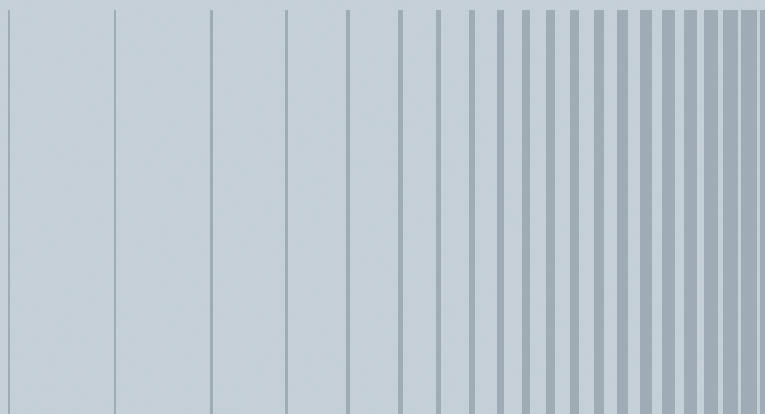
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- CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA)
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Explanation of icons

In this catalog, the instrument interfaces are represented by icons underneath the picture of the respective instrument. These icons are explained below.

Icon	Explanation
	HDMI The instrument can be connected to a computer via the high-definition multimedia interface (HDMI™).
	DVI output An external monitor can be connected via a digital visual interface (DVI).
	USB The instrument can be connected to a computer via universal serial bus (USB) using a USB cable with a standard-B type plug.
	Optional USB An option is available that upgrades the instrument with a USB interface so that it can be connected to a computer via universal serial bus (USB) using a USB cable with a standard-B type plug.
	Mini USB The instrument can be connected to a computer via universal serial bus (USB) using a USB cable with a mini-B type plug.
	RS-232 The instrument is equipped with an RS-232 interface.
	USB stick 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.
	SD card An SD memory card can be inserted, e.g. for saving measurement results.
	TCP/IP The instrument is equipped with an Ethernet interface that can be connected to a local area network (LAN).
	Optional TCP/IP An option is available that upgrades the instrument with an Ethernet interface so that it can be connected to a local area network (LAN).
	Optional Optical TCP/IP An option is available that upgrades the instrument with an optical Ethernet interface so that it can be connected to a local area network (LAN) with a FDDI PMD, 100 Mbit/s, duplex SC connector.
	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.
	Optional IEEE-488 An option is available that upgrades the instrument with an IEEE-488 interface, also referred to as general-purpose interface bus (GPIB). This bus is widely used for controlling instruments in laboratories.
	Software inclusive The instrument is shipped with a CD or DVD that contains PC software for controlling the instrument or processing measurement results.
	LabVIEW The instrument can be controlled using the LabVIEW software from National Instruments.
	VGA screen Settings, results, etc. are shown on the integrated 16.5 cm (6.5") display with VGA resolution (640 × 480 pixel).
	50 Ω/1 MΩ The input impedance of the instrument can be switched between 50 Ω and 1 MΩ.



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Printed in Germany (sk)
PD 3606.6463.42 | Version 04.00 | January 2014
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Rohde & Schwarz GmbH & Co. KG
81671 München, Germany



3606646342