

EMC Test & Measurement Products Catalog 2011/2012



R&S®ESU EMI Test Receiver

The R&S®ESU is a family of CISPR16-1-1-compliant EMI test receivers that meet all civil and military standards for electromagnetic disturbance measurements.

► For more details, see page 12.



R&S®HL046E

High Gain Log-Periodic Antenna



R&S®R-Line

Compact Test Chamber



R&S®TS-EMF Portable

EMF Measurement System

EMC Test and Measurement Products Catalog 2011/2012

Dear customer, this current catalog will give you an overview to all Rohde & Schwarz EMC products. For detailed information, please refer to our website www.rohde-schwarz.com and put in the respective type of the product as search term.

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For more than 75 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 numbers among the market leaders in all of its business fields, including wireless communications and RF test and measurement, terrestrial TV broadcasting and technologies relating to the interception and analysis of radio signals.

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



Our business fields

Test and measurement

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

Secure communications

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

Radiomonitoring and radiolocation

Spectrum monitoring systems and radiomonitoring equipment for public safety and national security

Broadcasting

Sound and TV broadcasting and measuring equipment

Test and measurement

Rohde&Schwarz is one of the world's largest manufacturers of electronic test and measurement equipment. Our products set standards in research, development, production, and service. As a key partner of industry and network operators for all T&M tasks in radiocommunications, we offer a broad product spectrum of market-leading solutions for all mobile radio and wireless technologies, especially for next-generation standards such as LTE and WiMAX™.

Through the continual expansion of its program for network and spectrum analysis, signal generation, and power measurement, Rohde&Schwarz once again demonstrated its expertise in RF and microwave T&M. By introducing first models of innovative, high-tech oscilloscopes and unique broadband power amplifiers, the company plans to address other high-volume market segments and continue to strengthen its position as a single-source provider and technology leader. The HAMEG products complete the new oscilloscope portfolio in the lower price segment.

Test and measurement.

Our test and measurement portfolio

- Test and measurement solutions for mobile radio and wireless technologies
 - Wireless device testers
 - Infrastructure testers
 - Protocol testers
 - Conformance/preconformance testers
 - Test systems and accessories
- Spectrum and signal analyzers
- Network analyzers
- Oscilloscopes
- Signal generators
- Coverage measurement systems
- EMC and field strength test solutions
- Power meters and voltmeters
- Audio analyzers
- Modular instruments
- Power supplies
- RF and microwave accessories
- System components
- Broadcasting and video T&M and monitoring solutions



Broadcasting

TV viewers and radio listeners in more than 80 countries receive their programs via transmitters from Rohde&Schwarz. Our unique product portfolio including both broadcasting and measuring equipment acts as a catalyst for the worldwide development of digital broadcasting. The company's market leadership in terrestrial TV transmitters, including for mobile TV, was further enhanced in the past year by the installation of Rohde&Schwarz equipment in all regions of the world. One of the primary success factors was the introduction of a new generation of transmitters featuring significantly lower power consumption.

At the bottom end of the transmission power scale, a new family of gap fillers and transposers for TV and DAB now provides cost-effective, seamless coverage even of areas with difficult topography.

To producers of consumer electronics, Rohde&Schwarz supplies all necessary test equipment for the development and production of satellite receivers, TV sets and other user equipment, including for the new high definition formats. The large variety of broadcast and video technologies is covered by the multistandard platforms from Rohde&Schwarz, which allow very flexible use at all stages of the value added chain.

Secure communications

Radiocommunications systems Security organizations and armed forces must be able to exchange information efficiently and securely. To ensure communications between civil and military forces across organizational boundaries and between various branches of armed forces or nationalities in multinational operations and in times of crisis, Rohde&Schwarz supplies armed forces with interoperable communications systems for use on the ground, at sea, and in the air. Our solutions use state-of-the-art encryption methods that satisfy the highest national and international security standards. To be able to serve the needs of future network-centric mission scenarios, Rohde&Schwarz is working intensively on the development of next-generation software defined radio (SDR) systems.

Professional mobile radio (PMR) TETRA radio networks have already been put into operation in more than 40 countries by the Rohde&Schwarz Professional Mobile Radio GmbH subsidiary – for example in a nationwide network in Malaysia, at the Panama Canal, at the Asian Games in Qatar, and along the highway network in Saxony (Germany).

Communications security For private industry, government agencies, and the military, Rohde&Schwarz SIT GmbH develops highly secure crypto products and systems for secure voice and data transmission via wireless and fixed links.

Our broadcasting portfolio

- Digital and analog TV transmitters for all power classes and all conventional standards worldwide, including mobile TV
- Digital and analog sound broadcast transmitters
- Broadcast and video test instruments and systems

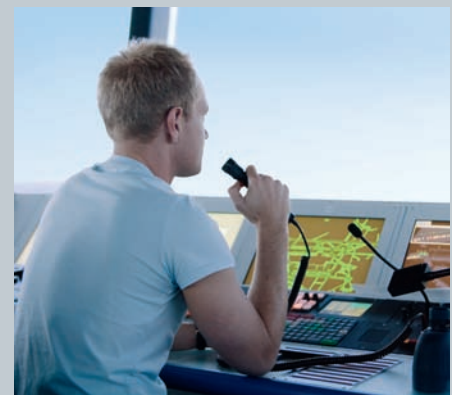
Our secure communications portfolio

- Integrated communications systems for the following
 - Civil and military air traffic control (ATC)
 - Army
 - Navy
 - Air force
- Encryption technology
- TETRA mobile radio systems

Broadcasting.



Secure communications.



Radiomonitoring and radiolocation

The need for mobile, wireless exchange of information is increasing drastically, but the usable frequency spectrum for radiocommunications is limited. Therefore, Rohde&Schwarz develops and produces stationary and mobile systems for detecting, locating and analyzing radiocommunications signals. These systems allow efficient monitoring and allocation of the limited radio frequencies.

The company's direction finders, signal analyzers, antennas and customized systems have made Rohde&Schwarz a reliable partner for its customers for many decades. Applications include public safety and national security, radio-monitoring by regulatory agencies and frequency management.

Services

Rohde&Schwarz operates a global service network in order to safeguard the investments of its customers.

The following on-site services are offered worldwide:

- Calibration
- Maintenance and repair
- Product updates and upgrades

By cooperating with the regional Rohde&Schwarz service centers as well as the factories and specialized subsidiaries, the company can provide a wide range of additional services:

- System integration
- System support
- Installation and commissioning
- Application support
- Development of customized modules, instruments and systems
- Software development
- Mechanical and electrical design
- Manufacturing to order
- Technical documentation
- Logistics concepts

Our radiomonitoring and radiolocation portfolio

- Radio intelligence systems
- Spectrum monitoring systems
- Signal analysis systems
- Receivers
- Direction finders
- Antennas
- Antenna calibration test site

Service you can rely on

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

Radiomonitoring and radiolocation.



Services.



Headquarters

At company headquarters in Munich, around 2000 employees work in research and development, central sales and service, marketing and administration.

Rohde & Schwarz GmbH & Co. KG

Mühldorfstraße 15
D-81671 München
Phone +49 89 41 29 0
Fax +49 89 41 29 121 64
info.rs@rohde-schwarz.com
www.rohde-schwarz.com

Contact

Sales

The addresses of the local sales companies can be found at: www.sales.rohde-schwarz.com

Customer Support

Our regional support centers will be glad to answer any questions regarding our products and service:

Europe, Africa, Middle East
Phone +49 89 4129 123 45
customersupport@rohde-schwarz.com

North America
Phone 1 888 837 87 72 (1 888 TEST RSA)
customer.support@rsa.rohde-schwarz.com

Latin America
Phone +1 410 910 79 88
customersupport.la@rohde-schwarz.com

Asia/Pacific
Phone +65 65 13 04 88
customersupport.asia@rohde-schwarz.com

Corporate Communications

Phone +49 89 4129 139 58
Fax +49 89 4129 135 63
pr@rohde-schwarz.com

Factories

Memmingen plant

Phone +49 8331 108 0
Fax +49 8331 108 11 24
info.rsmb@rohde-schwarz.com

Teisnach plant

Phone +49 9923 85 70
Fax +49 9923 85 71 174
info.rsdt@rohde-schwarz.com

Vimperk plant

Phone +420 388 45 21 09
Fax +420 388 45 21 13

Subsidiaries

Rohde & Schwarz Professional Mobile Radio GmbH

Phone +49 5042 998 0
Fax +49 5042 998 105
info.pmr@rohde-schwarz.com

Rohde & Schwarz SIT GmbH

Phone +49 30 658 84 223
Fax +49 30 658 84 183
info.sit@rohde-schwarz.com

HAMEG Instruments GmbH

Phone +49 6182 800 0
Fax +49 6182 800 100
info@hameg.com

GEDIS GmbH

Phone +49 431 600 51 0
Fax +49 431 600 51 11
sales@gedis-online.de

R&S Systems GmbH

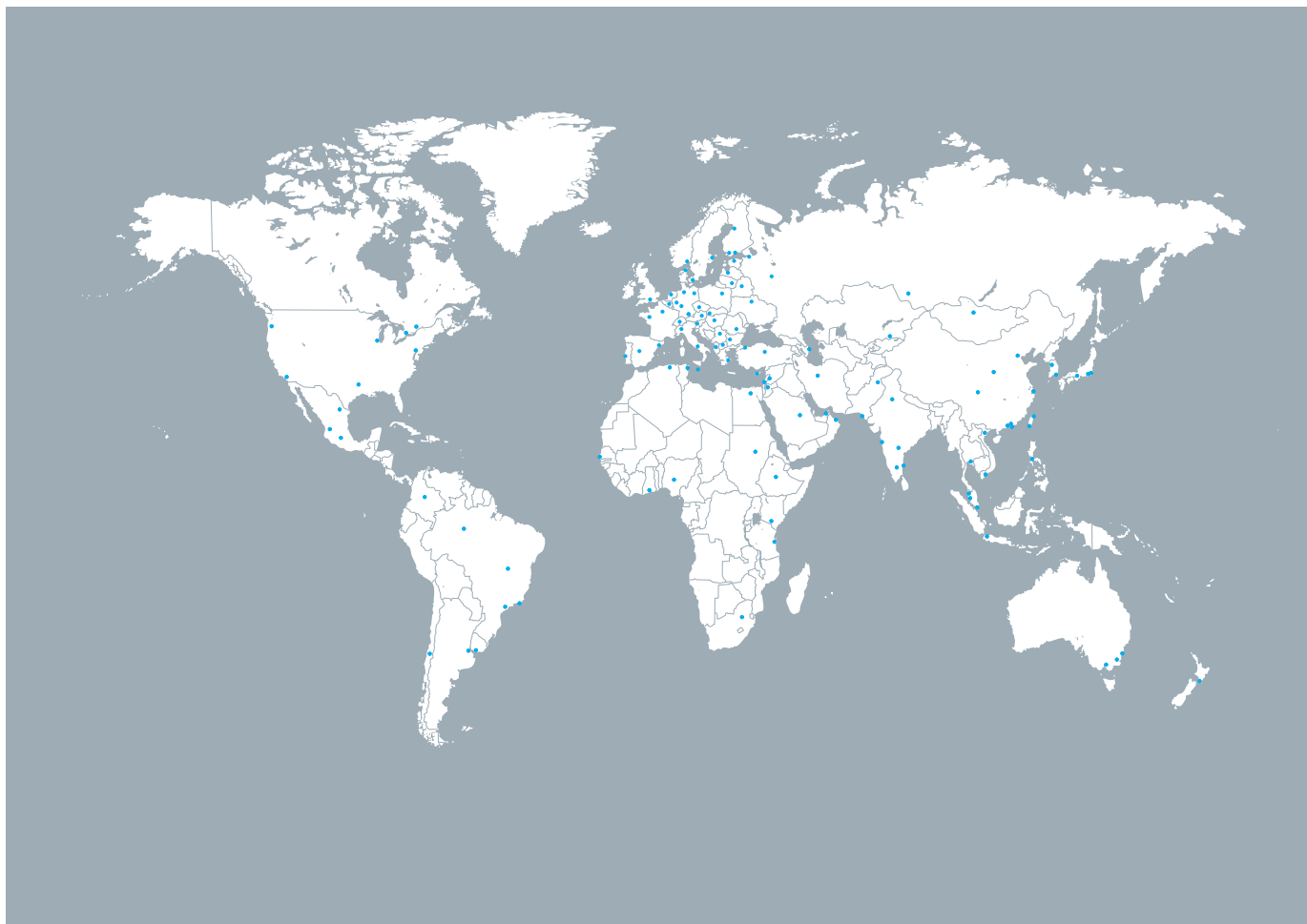
Phone +49 2203 495 23 25
Fax +49 2203 495 23 36
info.rssys@rohde-schwarz.com

Arpège S.A.S.

Phone +33 442 84 47 95
Fax +33 442 84 47 96
contact@arpege-sas.com

Rohde & Schwarz worldwide

Home



Introduction

EMC = EMI + EMS

Electromagnetic compatibility (EMC) is the capability of an electrical device or system to operate in its electromagnetic environment without disturbing or being disturbed by it. EMC is an important criterion of product quality. To ensure EMC of a product in the most economical way, appropriate measures should be taken early in the design phase. In line with the definition, EMC is subdivided into electromagnetic interference (EMI) and electromagnetic susceptibility (EMS). Legislation prescribes compliance with maximum values for EMI and minimum values for EMS. The relevant limits, the measurement methods and instruments to be employed are specified in the relevant standards.

Conformity mark

To show their conformity to the EMC requirements prescribed by law, all electrical devices have to be marked accordingly, e.g. by the CE conformity mark in the whole European economic area.

EMI measurements

For measuring the electromagnetic disturbance, the disturbance sink, which in the commercial sector is always the radio listener or TV viewer, is replaced by the measuring instrument. As a result, all test receivers for commercial EMI measurements should have man-like response built-in: they must have a quasi-peak-weighting detector to show the human perception of disturbance as a measured value. Disturbance measurements higher than 1 GHz use peak, CISPR-average and RMS-average weighting. In the military sector the disturbance sink is assumed to be a technical device which responds to the maximum disturbance level. Therefore, the peak level of disturbance is measured.

Disturbance is emitted by the equipment under test in various ways of coupling. Therefore, the EMC standards contain procedures for coupling the test receiver to the equipment under test, for the environment of the EUT and its operation.

EMS measurements

For measuring the electromagnetic susceptibility, the different disturbance sources occurring in practice are replaced by appropriate generators, the interfering signals of which are applied to the EUT via suitable coupling/decoupling networks.

For monitoring the proper functioning of the EUT, suitable monitoring equipment can be provided, which so far has not been defined in the relevant EMC standards. In many cases, highly shielded video cameras with a monitor are used for this purpose.

EMC measurement software

Reproducible EMC measurements are only possible upon compliance with a number of rules and standards for the measuring instruments used and for the measurement methods adopted.

For computer-controlled EMC measurements two different software tools are available: The R&S®ES-SCAN EMI diagnostics software is used to quickly and easily collect, evaluate, and document RFI voltage, power and field strength data. The R&S®EMC32 software platform includes various modules for electromagnetic interference (EMI) and electromagnetic susceptibility (EMS) measurements. Due to its flexible structure the software can be optimally adapted to the requirements of almost any commercial or military EMC application.

These tools relieve the user of routine settings and offer every convenience from automatic consideration of frequency-dependent transducer factors of the coupling/decoupling networks, automatic selection of the applicable limit lines, display of the results in graphical or tabular form through to the generation of test reports. Similar convenience is provided by the automatic EMI test routines implemented in the test receivers of the R&S®ESU, R&S®ESCI, R&S®ESPI and R&S®ESL series. They allow fully automatic time-saving measurements without an external controller, so that very compact test setups can be implemented.

EMC test systems

Planning and implementation of practice-oriented EMC test systems requires a great deal of specialized knowledge and experience. This is what Rohde&Schwarz specialists have. All their expertise goes into turnkey EMC test systems which provide the fastest way of yielding correct EMC measurements.

These systems are always tailored to the specific needs of the customer to provide the optimum solution to the tasks on hand. We can offer everything from small systems through to complete equipment of test houses with shielded anechoic chamber and the complete infrastructure required, covering all major standards in the commercial, automotive, wireless and military range.

EMC standards in the European Economic Area

The number of standards published in the Official Journals is steadily increasing. The different types of standards include “generic standards”, which can be applied in all cases which are not covered by specific product or product family standards. The product (family) standards are divided into standards limiting low-frequency and high-frequency emission (radio disturbance suppression) and standards defining the requirements of immunity to electromagnetic emission. Besides, there is a series of specific product standards defining EMC requirements.

Generic standards – emission

- **EN 61000-6-3:** Residential, commercial and light industry environment
- **EN 61000-6-4:** Industrial environment

Generic standards – immunity

- **EN 61000-6-1:** Residential, commercial and light industry environment
- **EN 61000-6-2:** Industrial environment

Product family standards and product standards for low-frequency emission

- **EN 61000-3-2:** EMC Part 3-2: Limits for harmonics up to 16 A
- **EN 61000-3-3:** EMC Part 3-3: Limits for voltage fluctuations and flicker up to 16 A
- **EN 61000-3-11, -12:** Limits for harmonic currents and voltage variations up to 75 A

Product family standards for high-frequency emission

- **EN 55011:** ISM equipment
- **EN 55012:** Automotive equipment – protection of off-board receivers
- **EN 55013:** Sound and TV broadcast receivers
- **EN 55014-1:** Household appliances and electric tools
- **EN 55015:** Lighting equipment
- **EN 55022:** Information technology equipment
- **EN 55025:** Automotive equipment – protection of off-board receivers
- **EN 55103-1:** Audio and video equipment

Product standards for immunity

- **EN 55014-2:** Household appliances, tools and similar apparatus
- **EN 61547:** Lighting equipment
- **EN 55020:** Sound and TV broadcast receivers
- **EN 55024:** Information technology equipment
- **EN 55103-2:** Audio and video equipment

Special standard for signal transmission in low voltage installations

- **EN 50065-1:** Signalling on low-voltage electrical installations, Part 1: General requirements, frequency bands and electromagnetic disturbances
- **EN 50065-2-x:** Immunity

Product standards containing EMC requirements

- **EN 50083-2:** Cabled networks for TV and sound signals
- **EN 50090-2-2:** Electronic systems for home and buildings
- **EN 50091-2:** Uninterruptible power systems
- **EN 50130-4:** Alarm systems
- **EN 50148:** Electronic taximeters
- **EN 50199, EN 60974-10:** Arc welding equipment
- **EN 50263:** Measuring relays
- **EN 50270:** Gas sensors
- **EN 50293:** Traffic signal systems
- **EN 50295, EN 60439-1, EN 60947-x-x:** Low voltage switchgear and control gear
- **EN 50370-1, -2:** Machine tools
- **EN 60034-1:** Rotating electrical machines
- **EN 60204-31:** Sewing machines
- **EN 60521, EN 60687, EN 61036...38, EN 61268, EN 62052-x, EN 62053-x, EN 62054-x:** Several AC watt-hour meters
- **EN 60601-1-2:** Medical electrical apparatus, General safety requirements – EMC requirements and tests
- **EN 50428, EN 60669-2-x, EN 61204-3:** Switches for household and similar
- **EN 60730-x-x:** Automatic electric controls for household and similar use
- **EN 60870-2-1:** Telecontrol equipment and systems
- **EN 60945:** Maritime navigational equipment
- **EN 61008-1, EN 61009-1, EN 61543:** Residual current circuit breakers
- **EN 61037:** Electronic ripple control receivers for tariff and load control
- **EN 61038:** Time switches for tariff and load control
- **EN 61131-2:** Programmable controllers
- **EN 61326:** Electrical equipment for measurement and test, control and laboratory use
- **EN 61800-3:** Adjustable speed electrical power drive systems
- **EN 61812-1:** Time relays for industrial applications
- **EN 617, 618, 619, 620:** Continuous handling equipment
- **EN 12015, EN 12016:** Elevators and escalators
- **EN 12895:** Industrial trucks
- **EN 13241:** Doors and gates
- **EN 13309:** Machines with electrical power supply
- **EN 14010:** Safety of machinery
- **EN ISO 14982:** Agricultural and forestry machines
- **EN 300386:** Telecommunications network equipment

Group of equipment																		
Standards																		
Frequency range	Test receivers	Accessories and extras																
From 20 Hz	R&S®ESIB R&S®ESU	R&S®EZ-17 Current Probe								●								
		R&S®HZ-10 H-Field Pickup Coil								●				●				
From 9 kHz	R&S®ESCI R&S®ESIB R&S®ESPI ¹⁾ R&S®ESU R&S®ESL ¹⁾	R&S®EZ-17 Current Probe	○	○	○	○	○	○	●	●		○	○					
		R&S®EZ-25 150 kHz Highpass	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○
		R&S®HZ-10 H-Field Pickup Coil								● ⁴⁾				●				
		R&S®HFU-Z Tripod	●							● ⁵⁾					●		●	
		R&S®HFH2-Z2 Loop Antenna	●							● ⁵⁾				●		●		
		R&S®HZ-1 Tripod								●								
		R&S®HFH2-Z6 Rod Antenna		●						●								
		R&S®ESH2-Z5 V-Network	●		●	●	●	●	●	● ⁶⁾	●	● ⁹⁾	●	●	●	●	●	●
		R&S®ESH3-Z6 V-Network		●						●								
		R&S®ENV216 V-Network	●		●	●	●	●	●	● ⁶⁾	●	● ⁹⁾	●	●	●	●	●	●
		R&S®ENV4200 V-Network	●		●	●	●	●	●		●	● ⁹⁾	●	●	●	●	●	●
		R&S®ENV21 Coupling Network							●									
		R&S®ENV41 Coupling Network							●									
		R&S®ENV81 Coupling Network							●									
		R&S®ESH2-Z2 Voltage Probe	●		●	●	●	●	●		●	●	●	●	●	●	●	●
		R&S®ESH2-Z3 Voltage Probe	●		●	●	●	●	●		●	●	●	●	●	●	●	●
		R&S®EZ-12 Antenna Imp. Converter		●														
		R&S®HZ-11 Probe Set	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		R&S®HZ-14 Probe Set	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		R&S®HM020 Triple-Loop Antenna	○					●									○	
		R&S®HZ-3/HZ-4 RF Cable	○		○	○	○	○	○	○								
		R&S®HZ-9 Power Supply	●	●						●					●		●	
From 30 MHz	R&S®ESCI R&S®ESIB R&S®ESPI ¹⁾ R&S®ESU R&S®ESL ¹⁾	R&S®EZ-17 Current Probe	○	○	○			○	○	●	●	○		○				
		R&S®ESV-Z1 Current Probe	○	○	○			○	○	●	○	○		○	○			
		R&S®MDS-21 Absorbing Clamp	●	●	○	●			○		●	●	●		●			
		R&S®HZ-11 Probe Set	○	○	○	○		○	○	○	○	○	○	○	○	○	○	○
		R&S®HZ-14 Probe Set	○	○	○	○		○	○	○	○	○	○	○	○	○	○	○
		R&S®HZ-15 Probe Set	○	○	○	○		○	○	○	○	○	○	○	○	○	○	○
		R&S®HK116 Biconical Antenna	●	●	●			●	●	●	●	●		●	●	●	●	●
		R&S®HL223 Log-Periodic Antenna	●	●	●			●	●	● ⁷⁾	●	●		●	●	●	●	●
		R&S®HL562 Ultralog Antenna	●	●	●				●		●			●	●	●	●	●
		R&S®HZ-1 Tripod								●								
From 1 GHz	R&S®ESCI R&S®ESIB R&S®ESPI ¹⁾ R&S®ESL ¹⁾ R&S®ESU	R&S®HL050, R&S®HF907 Antennas	●		●				●				●					
		Further antennas on request								●								
From 3 GHz	R&S®ESIB/ESCI7/ ESL6 ¹⁾ /ESPI7/ESU	R&S®HL050, R&S®HF907 Antennas	●		●				●				●					
		Further antennas on request								●								
From 6 GHz	R&S®ESIB R&S®ESU	R&S®HL050, R&S®HF907 Antennas	●		●				● ²⁾				●					
		Further antennas on request			●					●								
From 18 GHz to 40 GHz	R&S®ESIB40 R&S®ESU	Accessories							● ²⁾	● ¹⁰⁾			●					
		Further antennas on request																

	EN 300127	Telecom systems of large dimensions
	EN 300220, 330...440 EN 301489-3	Short range devices (SRD) 9 kHz to 40 GHz
	EN 301489-5 EN 301489-6	PMR equipment, DECT equipment
	EN 300339 EN 301489-1	Generic EMC standard for radio equipment
	ETS 300340	ERMES paging receivers
	EN 301489-7	GSM 900 MHz
		GSM 1800 MHz
	EN 300385 EN 301489-4	Fixed radio links
	ETS 300386-1 EN 300 386-2	Equipment for telecommunications networks
	EN 301489-9	Wireless microphones and similar equipment
	EN 301489-10	Second generation cordless telephones (CT2)
	EN 301489-11 EN 302018-2 ETS 300384/447	VHF FM broadcasting transmitters
	EN 301489-12	VSAT, SNG and TES equipment
	EN 301489-13	CB radio and ancillary equipment
	EN 300741 EN 301489-2	On-site and wide-area paging equipment
	EN 301489-15 EN 301783-2	Commercially available amateur radio equipment
	EN 301489-17	2.6 GHz wideband transmission and HiperLAN
	EN 301489-18	TETRA and ancillary equipment
	EN 301843-2	VHF maritime mobile radio telephone
	EN 301489-19	1.5 GHz receive-only MES for data communications
	EN 300831 EN301489-20	1.5/2/2.5 GHz MES for satellite GSM
	EN 300832 EN 301721	<1 GHz MES with LBRDC using LEDs
		Legend ● Necessary accessory. ○ Recommended extra. ^{a)} R&S®ESPI and R&S®ESL have limited compliance with CISPR 16-1-1. ^{a)} For FCC Part 15 only. ^{a)} VG up to 200 kHz. ^{a)} VG. ^{a)} VG, MIL, MIL-STD-461D, MIL-STD-461E. ^{a)} VG, DEF-STAN. ^{a)} MIL-STD-461C. ^{a)} See R&S®EZ-25. ^{a)} For MIL-STD-461 only.
		Current probe 5 Hz to 2 MHz/20 Hz to 100 MHz
		Shielded, calibrated field pickup coil 5 Hz to 10 MHz
	●	Current probe 20 Hz to 100 MHz
○	○	Passband 150 kHz to 30 MHz
		Shielded, calibrated field pickup coil 5 Hz to 10 MHz
	●	Tripod for R&S®HFH2-Z2 loop antenna
	●	Active loop antenna 9 kHz to 30 MHz
		Tripod for R&S®HFH2-Z6 rod antenna
		Active rod antenna 9 kHz to 30 MHz
	●	V-network up to 25 A, 4-line LISN
	●	V-network up to 150 A (500 A), single-phase LISN
	●	V-network up to 16 A, 2-line LISN
	●	V-network up to 200 A, 4-line LISN, from 150 kHz
		2-wire ISN from 150 kHz
		4-wire ISN from 150 kHz
		8-wire ISN from 150 kHz
	●	Active probe for RFI voltage measurement
	●	Passive probe for RFI voltage measurement
		Antenna impedance converter 9 kHz to 30 MHz
	○	Near-field probe set 100 kHz to 2 GHz
	○	Near-field probe set 9 kHz to 1 GHz
	○	Triple-loop antenna 9 kHz to 30 MHz
		Low-loss coaxial cables 3 m/10 m
	●	Power supply for R&S®HFH2-Z1/-Z2/-Z6 active antennas
		Current probe 20 Hz to 100 MHz
		Current probe 20 Hz to 600 MHz
		Absorbing clamp 30 Hz to 1000 MHz
	○	Near-field probe set 100 kHz to 2 GHz
	○	Near-field probe set 9 kHz to 1 GHz
	○	Near-field probe set 30 MHz to 3 GHz
●	●	Biconical antenna 30 MHz to 300 MHz
●	●	Log-periodic antenna 200 MHz to 1300 MHz
●	●	Biconical hybrid antenna 3 MHz to 3 GHz
		Tripod for R&S®HK116, R&S®HL223
●	●	RF connecting cable 12 m/7 m, common-mode suppression
	●	Directional antenna 1 GHz to 18 GHz, e.g. log-periodic antenna, or double-ridged waveguide horn antenna
	●	Directional antenna 1 GHz to 18 GHz, e.g. log-periodic antenna, or double-ridged waveguide horn antenna
	●	Directional antenna 1 GHz to 18 GHz, e.g. log-periodic antenna, or double-ridged waveguide horn antenna
	●	Double-ridged waveguide horn antenna

R&S®ESU EMI Test Receiver



Maximum-precision, standard-compliant EMI measurements at unparalleled measurement speed

The R&S®ESU is a family of CISPR16-1-1-compliant EMI test receivers that meet all civil and military standards for electromagnetic disturbance measurements. The R&S®ESU-K53 FFT-based time-domain scan option allows users to perform overview measurements up to 1000 times faster than on previous EMI test receivers. The R&S®ESU also features automatic and interactive measurement functions, parallel IF analysis and up to three detectors in parallel including the new average detector with meter time constant (CISPR-average) and RMS-average detector

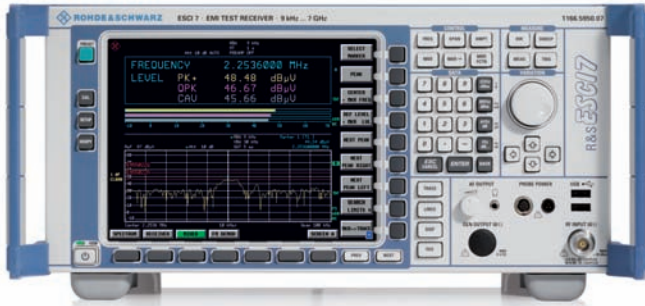
- Combination of standard-compliant EMI test receiver and high-end spectrum analyzer
- Excellent RF characteristics
- Very low measurement uncertainty
- Full compliance with CISPR 16-1-1 standard
- High speed time domain scan (FFT) option

- Receiver mode with parallel IF analysis
- All commercial and military standards met
- Internal preselection (can be switched off in analyzer mode)
- Integrated 20 dB preamplifier up to 3.6 GHz as standard
- Wide choice of detectors incl. CISPR-average and RMS-average
- CISPR- and MIL-STD-compliant measurement bandwidths
- User-programmable scan tables (max. 10 subranges)
- Frequency scan with max. three detectors in parallel (max. 2 million test points/trace)
- Second RF input (max. 1 GHz, pulse-protected)
- Time-domain analysis for evaluation of timing behaviour of disturbances (e.g. click-rate analysis)
- Fully and partially automatic measurements (preview measurement, data reduction, final measurement)
- Automatic consideration of coupling devices such as line impedance stabilization networks, probes, cables and antennas using transducer factors and sets
- Simultaneous measurement of multiple traces for parallel evaluation
- Continuous bargraph display and marker functions for precise measurements
- Automatic disturbance voltage measurements using remote-controllable line impedance stabilization networks (LISN) from Rohde & Schwarz
- Predefined transducer factors
- Library of limit lines for commercial standards
- Integrated report generator
- Optional low-noise preamplifiers up to 8/26.5/40 GHz (R&S®ESU-B24)

Specifications in brief

Frequency	R&S®ESU8	R&S®ESU26	R&S®ESU40
Frequency range, RF input 1	20 Hz to 8 GHz	20 Hz to 26.5 GHz	20 Hz to 40 GHz
Frequency range, RF input 2	20 Hz to 1 GHz	20 Hz to 1 GHz	20 Hz to 1 GHz
Reference frequency	aging 1 × 10 ⁻⁷ /year, optionally 2 × 10 ⁻⁸ /year (R&S®FSU-B4)		
Spectral purity	< –128 dBc (1 Hz), typ. –133 dBc (1 Hz) at 10 kHz		
Preselection	12 preselection filters in the range from 20 Hz to 3.6 GHz, can be switched off in analyzer mode		
Preamplifier (standard)	can be switched between preselection and 1st mixer, 20 dB gain, frequency range 1 kHz to 3.6 GHz		
Resolution bandwidths			
3 dB bandwidths	10 Hz to 10 MHz in steps of 1/2/3/5		
6 dB bandwidths (EMI)	10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz, 1 MHz		
FFT filters (–3 dB, analyzer mode)	1 Hz to 30 kHz in 1/3 sequences		
Channel filters	44 bandwidths, 100 Hz to 5 MHz		
Detectors (receiver mode)	max. peak, min. peak, RMS, average, quasi-peak, CISPR-average, RMS-average		
Display range	DANL up to +30 dBm		
Intermodulation			
Third-order intercept (TOI), without preselection/ preamplifier (< 3.6 GHz)	> +17 dBm	> +17 dBm	> +17 dBm
1 dB compression of input mixer (< 3.6 GHz)	+13 dBm nominal		

R&S®ESCI EMI Test Receiver



For compliance tests meeting all civil standards from 9 kHz to 3/7 GHz

The R&S®ESCI/ESCI7 EMI test receivers are standard-compliant measuring receivers for EMC certification measurements in line with commercial standards in the frequency range from 9 kHz to 3/7 GHz. The receivers conform to the latest version of the CISPR 16-1-1 basic standard. At the same time, they function as full-featured and powerful spectrum analyzers for lab applications.

- Combination of standard-compliant EMI test receiver and high-quality spectrum analyzer
- Integrated preselection with selectable 20 dB preamplifier
- Frequency range from 9 kHz to 3/7 GHz; usable for all commercial EMC standards
- Effective analysis of the disturbance spectrum through simultaneous graphical presentation of the disturbance level and emission spectrum around the receive frequency ("mixed-mode")
- Time-domain analysis for evaluation of timing behavior of disturbances (e.g. click-rate analysis)
- Automatic consideration of coupling devices such as line impedance stabilization networks, probes, cables and antennas using transducer factors and sets
- SCAN settings in tabular format (max. 10 subranges)
- Simultaneous measurement of multiple traces for parallel evaluation
- Fast, reliable measurements using automatic and interactive test routines
- Continuous bargraph display and marker functions for precise measurements
- Automatic disturbance voltage measurements using remote-controllable line impedance stabilization networks (LISN) from Rohde & Schwarz
- Predefined transducer factors
- Library of limit lines for commercial standards

Specifications in brief

Frequency

Frequency range	
R&S®ESCI	9 kHz to 3 GHz
R&S®ESCI7	9 kHz to 7 GHz
Frequency resolution	0.01 Hz
Frequency accuracy	
Standard	1×10^{-6}
With R&S®FSP-B4 (OCXO) option	1×10^{-7}
External reference frequency	10 MHz

Measurement time

Receiver mode/scan (per frequency step)	selectable from 33 μ s to 100 s
Analyzer mode/sweep time	selectable from 2.5 ms to 16000 s, zero span from 1 μ s to 16000 s

Resolution bandwidths

3 dB bandwidths	10 Hz to 3 MHz in steps of 1/3/10
6 dB bandwidths (EMI)	200 Hz, 9 kHz, 120 kHz (–6 dB), 1 MHz (impulse bandwidth)
Video bandwidth, analyzer mode	1 Hz to 10 MHz in steps of 1/3/10
Preselection	can be turned off in analyzer mode
R&S®ESCI	11 fixed/continuously tunable filters up to 3 GHz
R&S®ESCI7	12 fixed/continuously tunable filters up to 7 GHz

Level

Max. RF level (CW), input attenuation ≥ 10 dB	137 dB μ V (= 1 W)
Max. pulse energy, input attenuation ≥ 10 dB	
R&S®ESCI	10 mWs (20 μ s)
R&S®ESCI7	1 mWs (10 μ s)
Max. pulse voltage, input attenuation ≥ 10 dB, 10 μ s	150 V
Preamplifier	can be switched on/off, 20 dB gain
Third-order intercept (IP3)	
Without preselection/preamplifier,	
from 200 MHz to 3 GHz	> 7 dBm, typ. 10 dBm
from 3 GHz to 7 GHz	> 10 dBm, typ. 15 dBm (R&S®ESCI7)
With preselection/without preamplifier, from 200 MHz to 3 GHz	> 2 dBm, typ. 5 dBm
1 dB compression, $f > 200$ MHz, RF attenuation 0 dB, without preselection/preamplifier	> 5 dBm, nominal
Total measurement uncertainty, 95 % confidence level, < 3 GHz	
Without preselection/preamplifier	0.5 dB
With preselection/preamplifier	1.0 dB

Displayed average noise level (DANL),

receiver mode, nominal, input attenuation 0 dB, termination 50 Ω

Without preamplifier, 1 MHz, BW = 9 kHz	< –4 dB μ V
Without preamplifier, 30 MHz to 1 GHz, BW = 120 kHz	< 6 dB μ V
With preamplifier, 1 MHz, BW = 9 kHz	< –14 dB μ V
With preamplifier, 30 MHz to 1 GHz, BW = 120 kHz	< –4 dB μ V
Detectors, receiver mode	max./min. peak, quasi-peak, RMS, average, average with meter time, constant (CAV), RMS-average (CRMS)

Number of measurement points

Analyzer mode	125 to 8001 (default 501)
Receiver mode	
Frequency domain	max 1 million
Time domain	max 1.44 million

R&S®ESPI3/7 Test Receivers



The R&S®ESPI EMI test receivers are especially designed to meet all EMC testing demands during product development and for EMC precertification. Equipped with the R&S®ESPI-B2 preselector/preamplifier option, all R&S®ESPI models feature an excellent dynamic range and are therefore able to perform precise interference measurements for pulse repetition frequencies ≥ 10 Hz in line with CISPR 16-1-1.

The reference in the precompliance class

- Combination of precertification EMI test receiver and high-quality spectrum analyzer
- Frequency ranges
 - R&S®ESPI3: 9 kHz to 3 GHz
 - R&S®ESPI7: 9 kHz to 7 GHz
- Integrated preselection with selectable 20 dB preamplifier (R&S®ESPI-B2 option)
- Weighting detectors in line with the latest version of CISPR 16-1-1 incl. CISPR-average and RMS-average
- EMI analysis functions for fast, accurate results
- Evaluation of field strength profiles at very high measurement rates (R&S®ESPI-K50 option)

Performance features

- SCAN settings in tabular format
- Simultaneous measurement of multiple traces for parallel evaluation
- Fast, reliable measurements using automatic and interactive test routines
- Continuous bargraph display and marker functions for precise measurements
- Automatic disturbance voltage measurements using remote-controllable line impedance stabilization networks (LISN) from Rohde & Schwarz
- Predefined transducer factors
- Library of limit lines for commercial standards
- Measurement of the coverage field strength of communications or broadcast networks at very high measurement rates (R&S®ESPI-K50 option)
- Additional channel filters with various bandwidths between 5.6 MHz and 8 MHz matching terrestrial DVB networks inclusive DVB-T2 (R&S®ESPI-K50 option)

Specifications in brief

Frequency

Frequency range	
R&S®ESPI3	9 kHz to 3 GHz
R&S®ESPI7	9 kHz to 7 GHz
Frequency resolution	0.01 Hz
Frequency accuracy	
Standard	1×10^{-6}
With R&S®FSP-B4 (OCXO) option	1×10^{-7}
External reference frequency	10 MHz

Measurement time

Receiver mode/scan (per frequency step)	selectable from 100 μ s to 100 s
Analyzer mode/sweep time	selectable from 2.5 ms to 16000 s, zero span from 1 μ s to 16000 s

Resolution bandwidths

3 dB bandwidths	10 Hz to 10 MHz in steps of 1/3/10
6 dB bandwidths (EMI)	200 Hz, 9 kHz, 120 kHz (–6 dB), 1 MHz (impulse bandwidth)
Video bandwidth, analyzer mode	1 Hz to 10 MHz in steps of 1/3/10
Preselection (R&S®ESPI-B2 option)	can be turned off in analyzer mode, 11 fixed/continuously tunable filters up to 3 GHz

Level

Max. RF level (CW), input attenuation ≥ 10 dB	137 dB μ V (= 1 W)
Max. pulse energy, input attenuation ≥ 10 dB	1 mWs (10 μ s)
Max. pulse voltage, input attenuation ≥ 10 dB, 10 μ s	150 V
Preamplifier (R&S®ESPI-B2 option)	can be switched on/off, 20 dB gain up to 3 GHz

Third-order intercept (IP3)

Without preselection/preamplifier	
from 200 MHz to 3 GHz	> 7 dBm, typ. 10 dBm
from 3 GHz to 7 GHz	> 2 dBm, typ. 5 dBm (R&S®ESPI7)

With preselection/without preamplifier

from 200 MHz to 3 GHz	> 2 dBm, typ. 5 dBm
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1 dB compression, $f > 200$ MHz, RF attenuation 0 dB, without preselection/preamplifier

Total measurement uncertainty, 95% confidence level, < 3 GHz

Without preselection/preamplifier	0.5 dB
With preselection/preamplifier	1.5 dB

Displayed average noise level (DANL),

receiver mode, nominal, input attenuation 0 dB, termination 50 Ω

Without preamplifier, 1 MHz, BW = 9 kHz	< 17 dB μ V
Without preamplifier, 30 MHz to 1 GHz, BW = 120 kHz	< 6 dB μ V
With preamplifier, 1 MHz, BW = 9 kHz	< 7 dB μ V
With preamplifier, 30 MHz to 1 GHz, BW = 120 kHz	< –4 dB μ V

Detectors,

receiver mode

max/min, peak, quasi-peak, RMS, average, average with meter time, constant (CAV), RMS-average (CRMS)

Number of measurement points

Analyzer mode	125 to 8001 (default 501)
Receiver mode	max. 1 million (frequency domain)

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 accordance with the latest 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.

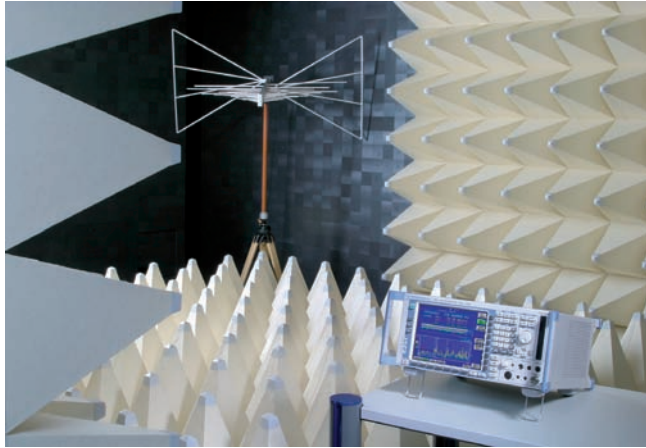
The combination of very good RF characteristics and all of the important functions needed for fast, precise measurement and evaluation of the EMC of a device under test in accordance with commercial standards is unmatched in this class of instrument. The diverse analysis capabilities, high measurement speed and time-saving automated test routines make the R&S®ESL the obvious choice for any development lab that needs to prepare for EMC certification tests.

- Frequency range from 9 kHz to 3 GHz or 9 kHz to 6 GHz covering almost all commercial EMC standards
- First-ever combination of an EMI test receiver and spectrum analyzer in the entry-level class
- All major functions of an advanced EMI test receiver, including fully automated test sequences
- Weighting detectors: max./min. peak, average, RMS, quasi-peak as well as average with meter time constant (CISPR-average) and RMS-average in line with the latest version of CISPR 16-1-1
- Compact, lightweight instrument, can be battery-powered for mobile applications

Specifications in brief

	R&S®ESL3	R&S®ESL3	R&S®ESL6	R&S®ESL6
Frequency range	9 kHz to 3 GHz	9 kHz to 3 GHz	9 kHz to 6 GHz	9 kHz to 6 GHz
Frequency accuracy (standard)	1 × 10 ⁻⁶			
With R&S®FSL-B4 (OCXO)	1 × 10 ⁻⁷			
Measurement time				
Receiver mode/scan (per frequency step)	selectable from 100 μs to 100 s			
Analyzer mode/sweep time	selectable from 2.5 ms to 16000 s, zero span 1 μs to 16000 s			
Resolution bandwidths				
3 dB bandwidths	10 Hz to 10 MHz in 1/3 sequence			
6 dB bandwidths (EMI)	200 Hz, 9 kHz, 120 kHz, 1 MHz (impulse)			
Video bandwidth, analyzer mode	1 Hz to 10 MHz in 1/3 sequence			
Level				
Max. RF level (input attenuation ≥ 10 dB)	+30 dBm (= 1 W)			
Max. pulse energy (pulse width 10 μs)	10 mWs			
Max. pulse voltage	150 V			
Third-order intercept (f ≥ 30 MHz)	typ. +18 dBm			
1 dB compression (0 dB RF attenuation, pre-amplifier = OFF, f > 200 MHz)	+ 5 dBm			
Displayed average noise level (0 dB RF attenuation, termination 50 Ω, RBW = 1 kHz, VBW = 1 Hz, sample detector, log scaling, normalized to 1 Hz, R&S®FSL-B22 preamplifier option ON)				
9 kHz < f < 3 MHz	typ. -130 dBm			
f = 500 MHz	typ. -162 dBm			
f = 3 GHz	typ. -158 dBm			
Detectors	pos./neg. peak, auto peak, quasi-peak, RMS, average, sample, average with meter time constant (CISPR-average), RMS-average			
Level measurement uncertainty (95% confidence level, +20 °C to +30 °C, S/N > 16 dB, 0 dB to -50 dB from reference level)	10 MHz < f ≤ 3 GHz: < 0.5 dB 3 GHz < f ≤ 6 GHz: < 0.8 dB			
Tracking generator	no	yes	no	yes
Frequency range	–	1 MHz to 3 GHz	–	1 MHz to 6 GHz
Output level	–	-20 dBm to 0 dBm	–	-20 dBm to 0 dBm

R&S®TS9975 EMI Test System



Tests in line with commercial, wireless, automotive and MIL standards

The R&S®TS9975 is the base system for conducted and radiated EMI measurements. Due to its modular design, it covers a wide range of applications and can be very easily adapted to the measurement task at hand. Any configuration is possible – from conducted measurements and the small precompliance system with a compact test cell to the accredited test system for complete motor vehicles. Nor do combinations of different applications or incremental expansion present a problem.

All test systems are controlled by R&S®EMC32 EMC test software.

The test receiver forms the core of the system. It evaluates and displays emissions in line with the relevant standards. From system design and implementation to installation and training, these turnkey systems and our EMC experts provide everything from a single source, enabling the customer to concentrate on testing. A design only for conducted or radiated measurements is possible.

Covered standards (examples)

This test system covers the main standards for EMI measurements for the different ranges of applications.

Commercial tests

- CISPR 11–22
- EN 55011–55022
- VDE 0872–0879
- ANSI-C 63.4
- CFR 47 FCC part 15, 18
- 3GPP TS 51.010
- ETSI EN 301908-1
- ETSI EN 300328-1

Wireless tests

- ETSI EN 301489 for all major technologies (e.g. CDMA, GSM, UMTS, LTE, WLAN, WiMAX etc.)

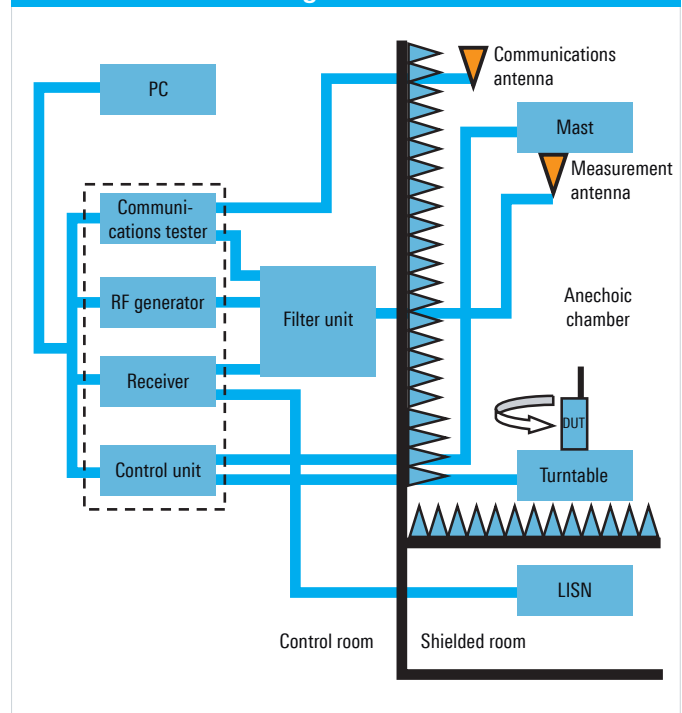
Automotive tests

- CISPR 12
- CISPR 25
- Customer-specific requirements

MIL tests

- VG 95370–95377
- DEF-STAN 49–41
- GAM-EG 13
- MIL-STD-461E/F
- Customer-specific requirements

R&S®TS9975 block diagram



R&S®TS9980 EMS Test System Audio and Video and TV-Monitoring



Measuring the electromagnetic susceptibility (EMS) of sound and TV broadcast receivers, satellite and DVB/DAB receivers

Automatic measurements in line with

- EN 55020:2001
- CISPR 20:2002, edition 5

The growth in communications via terrestrial and satellite links and the frequency crowding in cable networks may affect reception quality. Comprehensive EMS tests are used to verify the capability of receivers to operate satisfactorily even under adverse conditions. It covers the following measurements:

- Immunity to input interference (S1)
- Immunity to RFI voltages (S2a)
- Immunity to RFI currents (S2b)
- Immunity to radiated interference (S3)
- Shielding effectiveness (S4)
- Keyed Carrier (S5)
- Immunity against Radiated RFI for large EUT (S6)

Since these tests are highly complex and involve a large number of single measurements, they are carried out with automatic test systems. The R&S®TS9980 test system is available in three versions to cater for different products and applications:

■ R&S®TS9980 audio

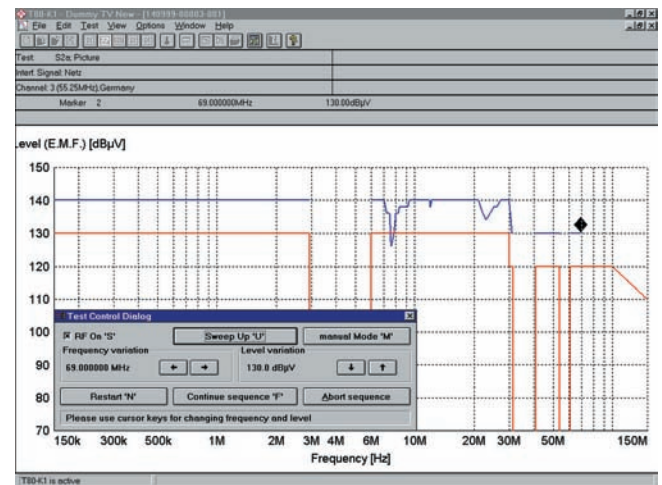
- FM: VHF (mono/stereo)
- AM: LF/MF/HF (mono)

■ R&S®TS9980 AV multistandard

- PAL: B/G, I, D/K
- SECAM: D/K, L/L'
- NTSC: M/N

■ R&S®TS9980 DVB multistandard

- DVB-C QAM (quadrature amplitude modulation) to ETS300429
- DVB-S QPSK (quadrature phase shift keying) to ETS300421
- DVB-T OFDM (orthogonal frequency division multiplex) to ETS300744
- ATSC 8VSB (vestigial sideband) to ATSC Doc. A/53
- DAB OFDM to ETS300401



R&S®T80-K1 system software

The powerful software package R&S®T80-K1 is the basis for automatic control and monitoring of the R&S®TS9980 test system as well as for data collection and analysis. Effective and hence economically efficient use of the R&S®TS9980 test system is only possible through automation.

Further benefits

- Improved reproducibility and higher accuracy of measurement results
- Automatic generation of comprehensive test reports
- Permanent system monitoring
- Improved data management through integrated database
- Automatic calibration and correction of frequency-dependent parameters

Software options

- R&S®T80-K5 (video upgrade)
- R&S®T80-K6 (audio upgrade)
- R&S®T80-K7 (DVB upgrade)
- R&S®T80-K8 (DAB upgrade)
- R&S®T80-K13 (option S4)
- R&S®T80-K14 (option S5)
- R&S®T80-K15 (option S6)

R&S®TS9982 EMS Test System



Radiated and conducted EMS measurements in line with commercial, wireless, automotive and MIL standards

The R&S®TS9982 is the base system for conducted and radiated EMS measurements. Due to its modular design, it covers a wide range of applications and can be very easily adapted to the measurement task at hand. Any configuration is possible – from conducted measurements and the small precompliance system with a compact test cell to the accredited test system for complete motor vehicles with 200 V/m. Nor do combinations of different applications or incremental expansion present a problem. All test systems are controlled by R&S®EMC32 EMC test software with its various capabilities like extensive EUT- and system monitoring. From system design and implementation to installation and training, these turnkey systems and our EMC experts provide everything from a single source, enabling the customer to concentrate on testing. A design only for conducted or radiated measurements is possible.

Covered standards (examples)

This test system covers all relevant standards for radiated and conducted commercial measurements for the different ranges of applications.

Commercial tests

- IEC/EN 61000-4-3 and -6
- IEC/EN 61000-4-20
- EN 61000-6-1
- EN 61000-6-2
- CISPR 24/EN 55024
- EN 60601-1-2

Wireless tests

- ETSI EN 301489 for all major technologies (e.g. CDMA, GSM, UMTS, LTE, WLAN, WiMAX etc.)

Automotive tests – components

- ISO 11452-2
- ISO 11452-3
- ISO 11452-4
- ISO 11452-5
- 2004/104/EC

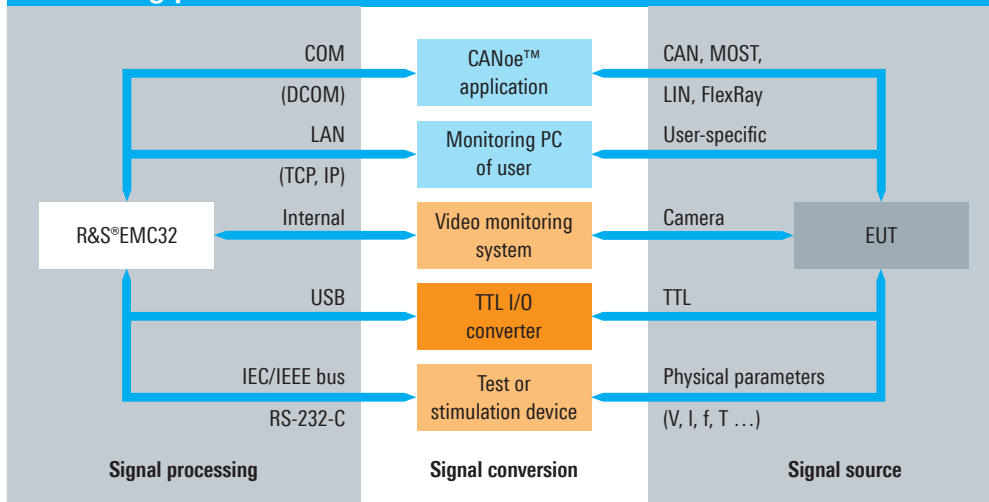
Automotive tests – vehicles

- ISO 11451
- 2004/104/EC
- Customer-specific requirements

MIL tests

- MIL-STD-461E/F
- Customer-specific requirements

Monitoring possibilities with R&S®EMC32 EMC measurement software



R&S®TS-EMF Portable EMF Measurement System



Simple, frequency-selective measurement of EMF emissions

In combination with Rohde&Schwarz spectrum analyzers, the R&S®TS-EMF measurement system detects high-frequency electromagnetic fields in the environment (EMF). The isotropic antenna, together with the software, which has been specifically designed for EMF measurements, allows simple and precise evaluation of total and individual emissions on-site.

- Automated EMF measurements
- Precise measurements of even complex scenarios and RF signals
- Wide frequency range from 9 kHz to 6 GHz using isotropic antennas
- Isotropic antenna detects fields independent of direction and polarization
- Combined use possible with various spectrum analyzers and test receivers from Rohde&Schwarz

Safety based on exact measurements for reproducible and reliable results

- Evaluation of total emissions, individual radio services or individual frequencies
- Measurements in line with all common EMF standards and measurement methods
- Correct evaluation even of complex scenarios or RF signals
- Excellent reproducibility using automated measurements

Efficient on-site measurements

- Fast, simple measurements owing to predefined test routines
- On-site interpretation of results using integrated report generation
- Easy adaptation to local conditions
- Versatile use due to the compact one-box solution with the R&S®FSL spectrum analyzer

Suitable for a wide range of applications

- Investigation of specific problems or radio signals by directly setting individual measurement parameters
- Additional manual measurements using a full-fledged spectrum analyzer
- Optional storage of raw measurement data for further in-depth result evaluation
- Precise extrapolation for WCDMA using CPICH demodulation

Future-oriented

- Coverage of the complete frequency range from 9 kHz to 6 GHz, extendable up to 40 GHz, using additional antennas
- Measurements of advanced radio services with wide bandwidths and high crest factors



R&S®EMF-M EMF-Monitor Station



Fully automatic EMF measurement station

Automated EMF long-term measurements expand snapshot measurements associated with risk communication

Conventional on-site measurements only cover the situation at the moment. Signal weighting is also difficult because some radio signals are only transmitted for a short time and because advanced technologies make use of adaptive power and radiation pattern control.

Such problems are solved by automatically and continuously monitoring typical or critical measurement points, which yield conclusive results. This approach involves standard-compliant monitoring over the entire frequency range, where the individual electromagnetic emissions are allocated to exact frequencies. This solution allows the evaluation of both short-term and long-term fluctuations, e.g. due to new technologies, and provides reliable data for risk communication and research.

- Automated EMF long-term measurements
- Frequency range 9 kHz to 3 GHz, optional 6 GHz
- Accurate and reliable detection of each emission
- Automatic wireless data transmission and remote configuration via GSM
- Ruggedized design for outdoor use
- Easily transportable

The main components of the R&S®EMF-M are

- Radome with measurement antennas, thermo hygro-sensor and GPRS antenna
- Protective cover (housing GPS antenna)
- R&S®ESPI test receiver
- System controller with measurement software and watchdog
- Temperature management with display
- Interface for external monitor for local configuration
- Foldable, detachable base

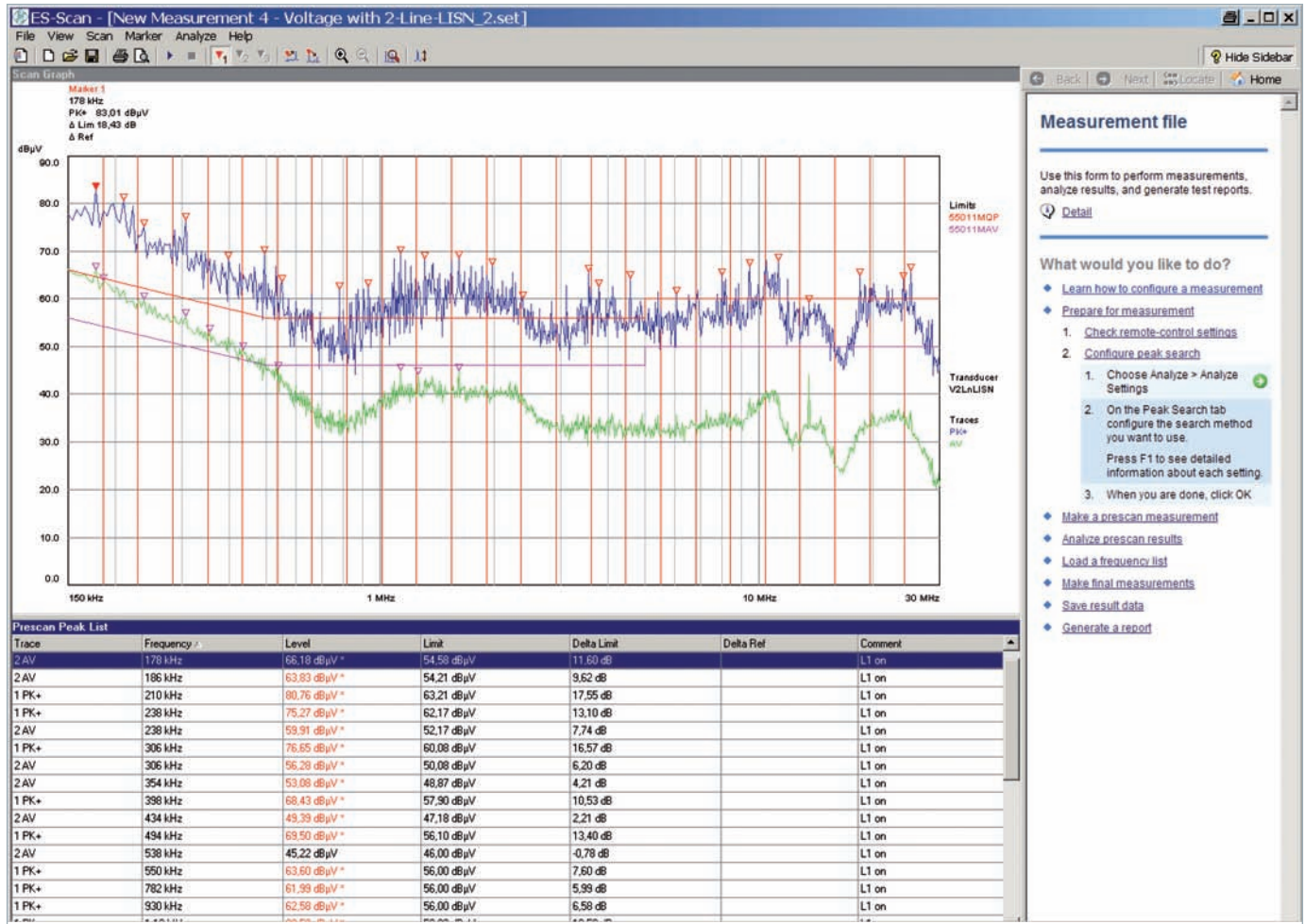
As an autonomous test station, the R&S®EMF-M precisely and seamlessly detects electromagnetic emissions in the frequency range from 9 kHz to 3 GHz or 6 GHz specified by many EMF standards.

The wide dynamic range covers both strong and weak signals. The frequency selective field strength measurement is not dependent on the angle of incidence and polarization, and covers everything from analog modulated signals up to digital, pulsed wideband or radar signals.

Measurement and signal analysis are controlled by the tried-and-tested R&S®RFEX EMF measurement software. This software allows the exact detection, allocation and evaluation of electromagnetic emissions. The measurement results are automatically transmitted to a server and – in Germany, for example – made available to the public via the Internet.



R&S®ES-SCAN EMI Software



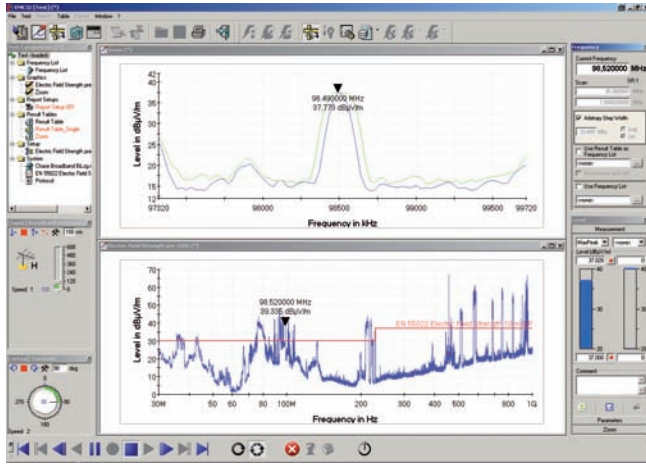
User-friendly software for EMI measurements

R&S®ES-SCAN is a cost-efficient and user-friendly 32-bit Windows software application that has been developed for Rohde&Schwarz test receivers and spectrum analyzers. The main requirements of EMI measurements in accordance 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 sub-ranges, final measurement with worst-case selection, report generation, and measurement data storage.

R&S®ES-SCAN offers all the advantages of a state-of-the-art software tool, including operation via keyboard and mouse, table editor, configurable report generation, and printout of reports on any Windows printer. An assistant supports the user of the R&S®ES-SCAN EMI software at any stage of operation. Online help texts explain all software functions; an operating manual is therefore not required.

- Menu-controlled configuration of test receiver and storage of settings on controller, including limit lines and transducer factors
- Reliable acquisition, evaluation, and documentation of measurement data
- Graphical display of scan data with automatic data reduction
- Marker function, including "Marker to Peak" and "Tune Receiver to Marker Frequency"
- Automatic peak search with selectable acceptance limit and selectable subranges
- Editable frequency list for automatic or semi-automatic final measurements
- "Fine Tuning" function for fast detection of local maxima
- Flexible configuration of report generation for different report layouts
- For use with the R&S®ESCI, R&S®ESPI and R&S®ESL EMI test receivers, the R&S®FSP and R&S®FSL spectrum analyzers, and the R&S®FSV signal and spectrum analyzer (in R&S®FSP compatibility mode)

R&S®EMC32 EMC Measurement Software Platform



R&S®EMC32 as virtual instrument: e.g. user interface for manual measurement of disturbance field strength.

For use in development, for compliance and batch testing

The R&S®EMC32 EMC measurement software can be used for all electromagnetic interference (EMI) and electromagnetic susceptibility (EMS) measurements. The software is a modern and powerful tool for controlling and monitoring Rohde&Schwarz devices as well as third party equipment. Thanks to its comprehensive and modular configuration capabilities and its open software structure, it ensures reliable collection, evaluation and documentation of measurement results.

- Cost efficient
- Flexible and scalable
- Future proof
- Modular concept allows flexible adaptation to customer needs
- Predefined hardware setups to support easy generation of test setups
- Support of measurements according to all major standards in the commercial, wireless, automotive and military range
- Manual and automatic EMI and EMS measurements
- Fully automatic and interactive sequences
- Customer or EUT specific data handling
- Extensive EUT monitoring capabilities and user specific actions
- Interface to Lab Management System

Options

R&S®EMC32-EB	Basic EMI measurement software
R&S®EMC32-S	Basic EMS measurement software
R&S®EMC32-K1	EMS measurements according to automotive standards and MIL-STD 461
R&S®EMC32-K2	EMC measurements according to wireless standards.
R&S®EMC32-K3	EMS measurements in reverberation chambers
R&S®EMC32-K4	Automatic EMS test sequences
R&S®EMC32-K6	EMS measurements in line with MIL-STD 461E, CS 103, 104, 105
R&S®EMC32-K7	Generic driver for generators, power meters and oscilloscopes
R&S®EMC32-K8	Database interface for Lab Management System
R&S®EMC32-K10	EMI auto test
R&S®EMC32-K11	Sequencer for EMC measurements
R&S®EMC32-K21	Application interface for customer specific RF measurements
R&S®EMC32-K22	Measurement of antenna characteristic (azimuth chart)
R&S®EMC32-K33	EMI measurements in mode tuned chambers (reverberation chambers)
R&S®EMC32-K51	EMI measurement reports in line with GMW 3091/3097
R&S®EMC32-K56	EMI measurements in line with MIL-STD 461E/F

Application overview (examples)

Application	Standards (examples) EMS	Standards (examples) EMI
Industrial and household products (commercial)	IEC/EN 61000-4-3, -6	CISPR 11/EN 55011 CISPR 14-1/EN 55014-1 ANSI-C63.4 FCC 15, 18
Information technology (commercial)	CISPR 24/EN 55024 IEC/EN 61000-4-3, -6	CISPR 22/EN 55022 ANSI-C63.4 FCC 15, 18
Medical devices (commercial)	EN 60601-1-2 EN 60601-2-x	EN 60601-1-2 CISPR 11/EN 55011
Wireless devices (commercial)	ETSI EN 301498-x ETSI EN 300826	ETSI EN 301498-x 3GPP TS 51.010 ETSI EN 301908-1 ETSI EN 300328-1 FCC part 15
Automotive	ISO 11451, ISO 11452, SAE J1113, SAE J551, 2004/104 EC Reverberation chamber (mode-tuned)	2004/104/EC CISPR 12, SAE J551/2 CISPR 25, SAE J1113/41 Reverberation chamber (mode-tuned)
Military/avionics	MIL-STD 461E/F, CS 114 and RS 103, MIL-STD 461E/F, CS 103, CS 104, CS 105 RTCA/DO-160 MIL-STD 464	MIL-STD 461E/F, CE 101, CE 102, CE 106, RE 101, RE 102, RE 103 RTCA/DO-160 VG 95370-95377 DEF-STAN 49-41 GAM-EG 13
Consumer products radio/TV receivers (commercial)		CISPR 13/EN 55013

R&S®BBA100 Broadband Amplifier



Family of modular, flexible and state-of-the-art broadband amplifiers.

The monitoring and control options allow the setup of very compact EMC systems. The R&S®BBA100 “grows” with the requirements. The instrument can be upgraded and therefore provides maximum investment protection and readiness for the future.

The R&S®BBA100 broadband amplifiers are suitable for a variety of applications in EMC environments, communications, research and physical engineering. They are optimally scalable and configurable.

Due to their modular design, the amplifiers can be tailored to meet specific requirements with regard to output power and frequency range.

Even in its basic version, the five HU 19" base unit includes a powerful system controller that controls the installed frequency bands (RF paths), switches the associated components (such as input switch, preamplifier and power amplifier) and monitors the system.

The user interface (both on the instrument and via web browser) allows efficient operation, and different remote-control interfaces make it possible to integrate the amplifier into automated environments and systems. Extension units accommodate additional amplifier units, allowing the R&S®BBA100 to be expanded into a system featuring higher power and/or additional frequency bands.

- Frequency ranges from 9 kHz to 1 GHz
- Output power up to 500 W
- Tolerant to 100% mismatch
- Suitable for amplitude, frequency, phase and pulse modulation, depending on the input signal
- Software-updatable system controller with versatile control and configuration options
- 19" housing of 5 HU, suitable for rack installation
- Wide-range AC power supplies (90 V to 264 V AC)
- Three-year warranty

Specifications in brief

RF specifications

Frequency ranges		9 kHz to 250 MHz instantaneously, 80 MHz to 400 MHz instantaneously, 250 MHz to 1 GHz instantaneously
Nominal power	9 kHz to 250 MHz	125/250/500 W
	80 MHz to 400 MHz	125/250/500 W
	250 MHz to 1 GHz	70/125 W
Nominal power gain without RF input switch module	9 kHz to 250 MHz	54.5/57.5/60.5 dB
	80 MHz to 400 MHz	54.5/57.5/60.5 dB
	250 MHz to 1 GHz	52.0/54.5 dB
Nominal power gain with RF input switch module	9 kHz to 250 MHz	51.0/54.0/57.0 dB
	80 MHz to 400 MHz	51.0/54.0/57.0 dB
	250 MHz to 1 GHz	48.5/51.0 dB
Gain flatness	at 1 dB compression and +25 °C	< 4.5 dB (or better, see data sheet)
	at 1 dB compression and temperature range 0 °C to +45 °C	< 5.5 dB (or better, see data sheet)
Gain adjustment range		> 20 dB
Spurious		typ. -80 dBc, max. -70 dBc
Modulation capability	no multi-carrier operation at VSWR > 2:1 and no operation with peak input power of more than 3 dB above nominal input power	AM, FM, ϕ M or PM
Input level for nominal output power	without RF input switch module	-3.5 dBm
	with RF input switch module	0 dBm
Output mismatch tolerance		100 %

R&S®OSP Open Switch and Control Platform



Open platform for fast and easy implementation of RF switch and control tasks

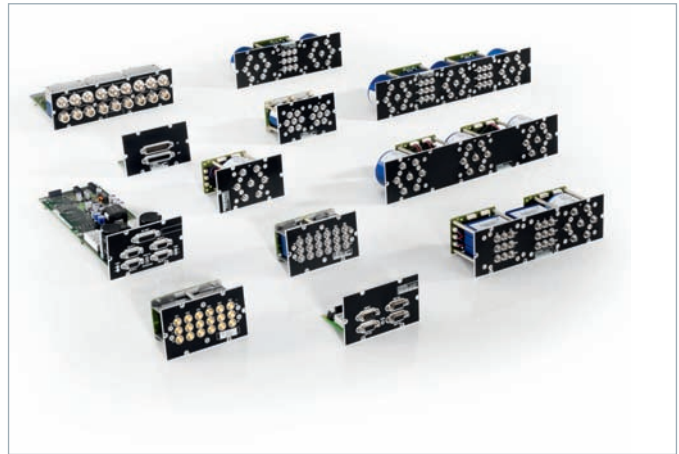
The R&S®OSP open switch and control platform is designed to handle RF switch and control tasks. A number of optional modules make the R&S®OSP ideally suited for a wide range of applications from simple RF switch functions to automatic path switchover in complex RF test systems such as EMC systems.



The modularity provided by the R&S®OSP family helps ensure the fast setup of test and measurement configurations for applications in production, test labs and development departments. The ability to implement complex wiring by means of a single switch and control platform is an essential prerequisite for reliable and reproducible measurements that can be automated to enable cost-efficient test sequences.

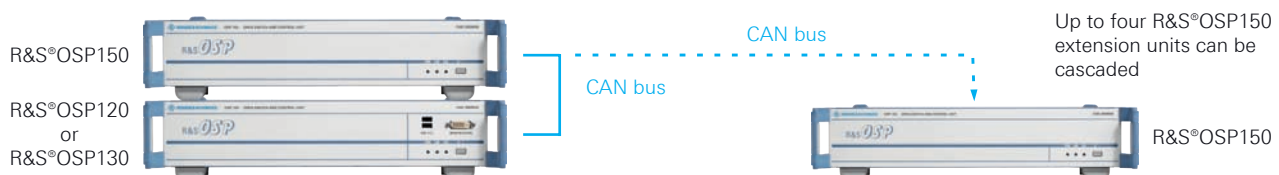
All base units of the platform can be controlled via the Ethernet interface. This interface makes it possible to connect the platform directly to a PC, integrate it into test systems or remotely operate it via a corporate network.

Compared to the R&S®OSP120, the R&S®OSP130 also has a control panel with a keyboard for direct manual operation of the R&S®OSP130 and any extension units that are connected. Manual operation of the R&S®OSP120 is possible by connecting an external keyboard and a monitor. The supplied operating software or a web GUI can be used to control the switch and control modules easily and directly without special software knowledge. Of course, it is also possible to control the platform from application programs such as LabVIEW, LabWindows/CVI, Agilent VEE, C++, C#, Visual Basic, Visual Basic .NET, etc.



- Compact size requiring little space
- Optimal configuration by selecting the appropriate switch and control modules
- Plug & play makes complex installation superfluous
- Path control allows easy, reliable and independent switching of different switching paths using only one command
- Easy generation of switching configurations owing to intuitive operating menu
- Flexible system integration via Ethernet interface
- Operation on the instrument ensures fast and direct access
- The R&S®OSP150 extension unit allows the range of functions to be expanded as necessary
- Special modules for EMC applications

Combinations of the R&S®OSP120 or R&S®OSP130 with the R&S®OSP150



R&S®R-Line Compact Test Chamber



Measurement accuracy as high as that of an anechoic chamber

The R&S®R-Line compact test chamber is used to eliminate emission problems and optimize the overall RF performance of wireless terminals already in the initial phases of product development. This helps to avoid costly and time-consuming modifications to a large number of prototypes at a later stage, thus optimizing time to market and return on investment.

The R&S®R-LINE compact RF chamber performs measurements in the critical frequency range from 800 MHz to 18 GHz with an accuracy as high as that of an anechoic chamber ten times larger. It easily fits into any R&D lab, which reduces investments for infrastructure and instrumentation.

The SVSWR validation requirements in line with CISPR 16-1-4:2007 are not only met but even considerably exceeded.

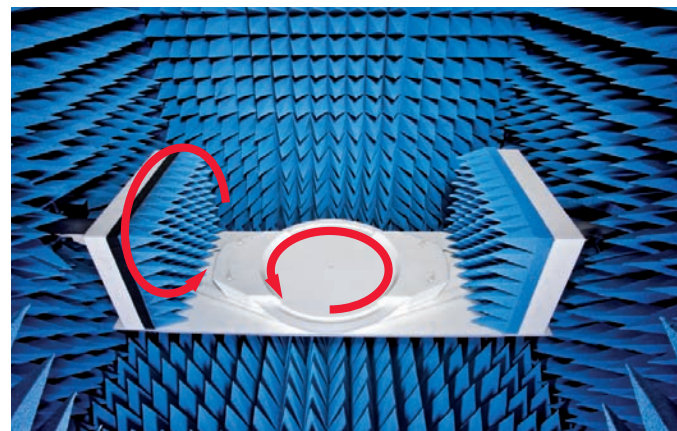
The high measurement accuracy is obtained through an optimized measurement geometry and absorber layout combined with a 3D positioner made of low-permittivity material throughout.

Optimum utilization of resources through comprehensive, automated test systems

Optimizing radiated spurious emissions and over-the-air (OTA) performance poses a permanent challenge. These two R&S®R-Line applications are automatically performed by the R&S®AMS32 or R&S®EMC32 test software together with Rohde&Schwarz turnkey test system solutions:

- R&S®TS8991 over-the-air (OTA) performance test system
- R&S®TS8996 radiated spurious emissions (RSE) test system

R&S®R-LINE identifies radiated harmonics and spurious emissions at an early stage – i.e. during development. This avoids complex and costly reengineering during the final conformance tests. As a result, time to market and related costs are thus reduced.



Internal 3D positioner.

Specifications in brief

RF specifications/measurement range

Frequency range	800 MHz to 18 GHz
Polarization	horizontal and vertical through R&S®HL024A1 cross-polarized antenna
Field uniformity site	VSWR, typ. 2 dB in line with CISPR 16-1-4:2007
Communications antenna	800 MHz to 6 GHz, circularly polarized
Shielding effectiveness	> 95 dB, 800 MHz to 6 GHz; > 70 dB, 6 GHz to 18 GHz

Mechanical data

Dimensions (W × H × D)	1700 mm × 2250 mm × 1640 mm (66.93 in × 88.58 in × 64.57 in)
Door size (W × H)	500 mm × 1000 mm (19.68 in × 39.37 in)
Size of EUT (Ø × H)	max. 330 mm × 240 mm (max. 12.99 in × 9.45 in)
Weight	562 kg (1239 lb)
Weight of EUT	max. 1 kg (max. 2.2 lb)
RF feedthroughs for calibration or connecting the EUT	2 × N (female), 2 × SMA (female)

R&S®DST200 RF Diagnostic Chamber



Ideal environment for RF analysis during development

The R&S®DST200 RF diagnostic chamber supports a wide range of radiated test applications for wireless devices. It fits on the workbench of every R&D lab and is therefore always available during the product design and optimization phase. The R&S®DST200 effectively assists in achieving high first-time pass rates at final type approval, which saves time and money.

Wireless devices of high quality have to pass special radiated test procedures such as desense and coexistence tests to ensure operation without self-interference. In addition, verifying the over-the-air (OTA) performance and measuring the radiated spurious emissions (RSE) are mandatory. The R&S®DST200 supports radiated test requirements at the R&D, quality assurance, production, and service levels. Compared with applications using large EMC anechoic chambers, the test setup including the R&S®DST200 is compact and easy to operate. Consistent and comparable result data is generated.

- Anechoic RF chamber with highly effective shielding > 110 dB for interference-free testing in unshielded environments
- Wide frequency range from 700 MHz to 6 GHz covering all important wireless standards
- High reproducibility due to excellent uniformity of field distribution at equipment under test (EUT) location
- Small size suitable for any lab environment
- Matchless mechanical design provides long-term stability and maintains the shielding effectiveness
- Easy opening and closing of door: no need for pneumatic components

Specifications in brief

RF specifications

Frequency range		700 MHz to 6 GHz (higher frequencies on request)
Antenna polarization		circular
Shielding effectiveness	700 MHz ≤ f ≤ 3 GHz, base unit with R&S®DST-B102 option	> 110 dB
	3 GHz < f ≤ 6 GHz, base unit with R&S®DST-B102 option	> 100 dB
Quiet zone	above EUT table, D × H (cylindrical)	200 mm × 30 mm (7.9 in × 1.2 in)
Field uniformity	max. field variation in quiet zone	< 3.2 dB (meas.)

RF connectors

RF feedthrough connectors	R&S®DST-B102 option	2 × N, female
Test antenna		1 × N, female

Feedthrough filters

Lowpass filter panel and fiber-optic interface	R&S®DST-B101 option	1 × 9-pin D-Sub, socket adapter, 2 × FSMA
USB lowpass filter panel	R&S®DST-B103 option	1 × USB 2.0 type A connector, female

General data

Weight		approx. 55 kg (approx. 121 lb)
Dimensions	W × H × D, with locking handle	770 mm × 760 mm × 695 mm (30.3 in × 29.9 in × 27.4 in)
Max. EUT weight	allowed on EUT table, supplied with R&S®DST200 base unit	3 kg (6.6 lb)
Max. EUT dimensions	W × H × D	400 mm × 330 mm × 400 mm (15.7 in × 13.0 in × 15.7 in)

R&S®TS712x Shielded RF Test Chambers



Reliable RF tests on devices with radio interface

The R&S®TS712x family of RF test chambers has been designed to meet the requirements of automatic production lines. These include long service life, rugged design and automatic opening and closing of the RF chamber. Featuring high shielding effectiveness over a wide frequency range, the RF test chambers perform tests on modules and devices with a radio interface in accordance with a wide variety of standards such as ISM, GSM/CDMA2000®/WCDMA, WLAN, Bluetooth®, Zigbee, WiMAX™ and LTE.

- Rugged design for long service life
- High shielding effectiveness up to 14 GHz
- Low reflection due to use of absorbent material
- Integrated RF connectors and filter feedthroughs
- Automatic and manual version
- Exchangeable connector plate for application specific modifications
- Variety of options to support application-specific configurations

R&S®TS7121A and R&S®TS7123M

The R&S®TS712x product family includes two base models that differ mainly in width. Plus, an automatic and a manual version of each model is available. The automatic R&S®TS712xA RF test chamber is mainly used in production. The R&S®TS712xM manual version is particularly suited for applications in service, quality assurance and development.

The automatic and manual versions R&S®TS712xA and R&S®TS712xM of the RF test chambers have the same basic design, ensuring the same test functionality for both versions in development, production and service. The exchangeable connector plate allows the user to add application-specific feedthroughs without having to modify the RF test chamber.

A number of options such as antenna couplers, absorber and USB filter feedthrough significantly simplify the configuration of the RF test chamber:

- Wideband antenna coupler (300 MHz to 6 GHz) for R&S®TS7123
- Antenna couplers, e.g. for GSM/CDMA2000®/WCDMA, WLAN, Bluetooth® and ISM
- Feedthrough filter for USB up to 2.0
- Elevated cover, e.g. for integrating CCD cameras and keyboard stimulators above the DUT

This allows the user to focus on the DUT and test specific modifications of the RF test chamber.



R&S®TS712x rear view.

EMC accessories for disturbance voltage/current/power and field strength measurements

EMC accessories for disturbance voltage measurements

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, low weight

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-461 D, E and F
- Calibrated in line with CISPR 16-1-2 and ANSI C63.4

R&S®ENV4200 200 A Four-Line V-Network



RFI voltage measurements at high currents

The R&S®ENV4200 V-network meets the requirements of CISPR 16-1-2, EN55016-1-2, and ANSIC63.4 for V-networks with the impedance in the frequency range 150 kHz to 30 MHz. The maximum attainable current of the V-network is limited by the voltage drop at the standardized inductances (CISPR 16-1-2 limits the voltage drop to 5% of the AC supply voltage) and by unavoidable heat losses.

Specifications in brief

- Frequency range 150 kHz to 30 MHz
- Impedance: $50 \mu\text{H} \parallel 50 \Omega$, magnitude and phase in line with CISPR16-1-2 Amd. 2:2006
- Artificial hand
- Continuous current up to $4 \times 200 \text{ A}$
- Air-core design
- Built-in pulse limiter (can be switched off)
- Remote control with TTL levels (compatible with Rohde&Schwarz EMI test receivers)

R&S®ESH2-Z5 25-A Four-Line V-Network



Interference measurements on DC- or AC-powered loads

The R&S®ESH2-Z5 four-line V-network is used to measure RFI voltages on supply connections of EUTs and is based on air-core inductances. It contains an artificial hand as well as a PE simulation network that can be bypassed.

Specifications in brief

- Frequency range 9 kHz to 30 MHz
- V-network in line with CISPR, EN, VDE, ANSI
- Impedance $(50 \mu\text{H} + 5 \Omega) \parallel 50 \Omega$, magnitude and phase in line with CISPR16-1-2:2006
- Continuous current up to $4 \times 25 \text{ A}$
- Short time current (max. 2 min.) up to $4 \times 50 \text{ A}$
- Artificial hand and PE simulation network
- Air-core design
- Remote control via TTL levels (compatible with the Rohde&Schwarz EMI test receivers)
- Calibrated to CISPR 16-1-2 and ANSI C63.4

R&S®ESH3-Z6 150-A Single-Line V-Network



For measurements of RFI voltage and immunity to RFI in low-impedance power supply networks

The R&S®ESH3-Z6 is a single-phase V-network with an equivalent circuit of $(5 \mu\text{H} + 1 \Omega) \parallel 50 \Omega$ for the frequency range 100 kHz to 200 MHz. The R&S®ESH3-Z6 is rated for a continuous current of up to 150 A and can handle surges of up to 500 A for a maximum time of 30 s. Its screw terminals ensure a low-impedance connection of the test device and the power supply.

Specifications in brief

- Frequency range 0.1 MHz to 200 MHz
- Continuous current up to 150 A
- Impedance $(5 \mu\text{H} + 1 \Omega) \parallel 50 \Omega$
- In line with
 - CISPR25 (onboard power supply systems)
 - CISPR 16-1-2 and EN55016-1-2 (low-impedance power supplies)
 - MIL-I-6181D, MIL-I-16910C, MIL-E-55301
 - DEF-STAN 59-411 and DO-160

EMC Accessories for disturbance voltage measurements

R&S®ENY21 2-Wire Coupling Network


Radio disturbance and immunity measurements on unshielded, symmetrical telecommunications ports

- Radio disturbance measurements in line with CISPR22:2005 and EN55022:2006 (150 kHz to 30 MHz)
- Immunity measurements in line with CISPR24 and EN55024 (150 kHz to 80 MHz)
- CISPR 16-1-2 complied with
- Adapter sets to meet standardized LCL requirements (55 dB and 65 dB) and to accommodate various telecommunications interfaces
- High transmission bandwidth for wanted signal (100 MHz)

Specifications in brief

- Frequency range
 - Radio disturbance: 150 kHz to 30 MHz
 - Immunity: 150 kHz to 80 MHz
- Asymmetrical impedance
 - Imped. (0.15 MHz to 30 MHz): $150 \Omega \pm 20 \Omega$
 - Phase angle (0.15 MHz to 30 MHz): $0^\circ \pm 20^\circ$
 - Imped. (> 30 MHz to 80 MHz): $150 \Omega \pm 40 \Omega$
- Voltage division factor in asymmetrical circuit
 - 150 kHz to 30 MHz: typ. 10 dB $\pm$ 1 dB
- Maximum permissible values
 - Max. RF input voltage: < 15 V
 - Max. DC voltage between line/ground: 100 V
 - Max. AC voltage between line/ground: 63 V
 - Max. DC current 400 mA (current on each individual wire of one pair or on different pairs)

R&S®ENY41 4-Wire Coupling Network


Radio disturbance and immunity measurements on unshielded, symmetrical telecommunications ports

- Radio disturbance measurements in line with CISPR22:2005 and EN55022:2006 (150 kHz to 30 MHz)
- Immunity measurements in line with CISPR24 and EN55024 (150 kHz to 80 MHz)
- CISPR 16-1-2 complied with
- Adapter sets to meet standardized LCL requirements (55 dB and 65 dB) and to accommodate various telecommunications interfaces
- High transmission bandwidth for wanted signal (100 MHz)

Specifications in brief

- Frequency range
 - Radio disturbance: 150 kHz to 30 MHz
 - Immunity: 150 kHz to 80 MHz
- Asymmetrical impedance
 - Imped. (0.15 MHz to 30 MHz): $150 \Omega \pm 20 \Omega$
 - Phase angle (0.15 MHz to 30 MHz): $0^\circ \pm 20^\circ$
 - Imped. (> 30 MHz to 80 MHz): $150 \Omega \pm 40 \Omega$
- Voltage division factor in asymmetrical circuit
 - 150 kHz to 30 MHz: typ. 10 dB $\pm$ 1 dB
- Maximum permissible values
 - Max. RF input voltage: < 15 V
 - Max. DC voltage between line/ground: 100 V
 - Max. AC voltage between line/ground: 63 V
 - Max. DC current 400 mA (current on each individual wire of one pair or on different pairs)

R&S®ENY81 8-Wire Coupling Network


Radio disturbance measurements on unshielded, symmetrical telecommunications ports

- Radio disturbance measurements in line with CISPR22:2005 and EN55022:2006 (150 kHz to 30 MHz)
- CISPR 16-1-2 complied with
- Adapter sets to meet standardized LCL requirements (55 dB and 65 dB) and to accommodate various telecommunications interfaces
- High transmission bandwidth for wanted signal (100 MHz)

Specifications in brief

- Frequency range: 150 kHz to 30 MHz
- Asymmetrical impedance
 - Imped. (0.15 MHz to 30 MHz): $150 \Omega \pm 20 \Omega$
 - Phase angle (0.15 MHz to 30 MHz): $0^\circ \pm 20^\circ$
- Voltage division factor in asymmetrical circuit
 - 150 kHz to 30 MHz: typ. 10 dB $\pm$ 1 dB
- Maximum permissible values
 - Max. RF input voltage: < 15 V
 - Max. DC voltage between line/ground: 100 V
 - Max. AC voltage between line/ground: 63 V
 - Max. DC current 400 mA (current on each individual wire of one pair or on different pairs)

R&S®ENY81-CA6 8-Wire Coupling Network for Cable Category CAT6


Radio disturbance measurements on unshielded, symmetrical telecommunications ports

- Radio disturbance measurements in line with CISPR22:2005 and EN55022:2006
- Immunity measurements in line with CISPR24 and EN55024 (150 kHz to 80 MHz)
- CISPR 16-1-2 complied with
- 75 dB longitudinal conversion loss (LCL)
- High transmission bandwidth for wanted signal (250 MHz)

Specifications in brief

- Frequency range
 - Radio disturbance: 150 kHz to 30 MHz
 - Immunity: 150 kHz to 80 MHz
- Asymmetrical impedance
 - Imped. (0.15 MHz to 30 MHz): $150 \Omega \pm 20 \Omega$
 - Phase angle (0.15 MHz to 30 MHz): $0^\circ \pm 20^\circ$
 - Imped. (> 30 MHz to 80 MHz): $150 \Omega \pm 40 \Omega$
- Voltage division factor in asymmetrical circuit
 - 150 kHz to 30 MHz: typ. 9.5 dB $\pm$ 1 dB
- Maximum permissible values
 - Max. RF input voltage: < 15 V
 - Max. DC voltage between line/ground: 100 V
 - Max. AC voltage between line/ground: 63 V
 - Max. DC current 400 mA (current on each individual wire of one pair or on different pairs)

EMC Accessories for disturbance voltage measurements

R&S®EZ-12 Antenna Impedance Converter

**Broadband matching unit for test receivers and spectrum analyzers with low-impedance inputs**

R&S®EZ-12 is used for high-impedance measurements of interference voltage at the feed-point of a vehicle-mounted antenna in the long-, medium-, shortwave and FM bands to VDE0879 Part 2 and CISPR25. For measurements in the VHF-FM range antenna signal can be switched to a separate 50-Ω input.

- Flat frequency response
- High sensitivity and overload capacity
- Calibration in line with CISPR25: 2008
- Remote-controlled FM range switch

Specifications in brief

- Frequency range: 150 kHz to 30 MHz (120 MHz)
- RF input: SO 10599-1
- Input impedance: > 100 kΩ, < 10 pF (at 1 MHz)
- Gain factor for direct input to antenna connector: +11.2 dB ±1 dB
- Correction factor (nom. gain to CISPR25 is 10 dB): 10 dB
- VSWR: ≤ 1.4
- Noise voltage at output (input terminated with antenna simulator; AVG, BW = 10 kHz)
 - f > 150 kHz: < -5 dBμV
 - f > 500 kHz: < -7 dBμV
- 1 dB compression point: > 107 dBμV

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 figure 2 of CISPR 16-1-1 (e.g. signalling equipment as defined in EN50065-1), a highpass filter may be added in front of the measuring receiver to improve the selectivity and so achieve the values stipulated in EN50065 Part 1 without impairing the passband of the measuring receiver.

- Conducted emission measurements to 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 the LISN
- High pulse energy capability (50 mWs)
- 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 the transition region:
 - 146 kHz: < 12 dB
 - 145 kHz: > 12 dB
 - 140 kHz: > 24 dB
 - 130 kHz: > 60 dB
- Max. input voltage (continuous): 137 dBμV
- Max. impulse energy (50 μs): 50 mWs
- Dimensions (L × W × H): 145 mm × 95 mm × 52 mm (5.7 in × 3.74 in × 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 RFI 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 RFI voltages (on AC supply lines) in line with CISPR 16-2-1 and EN55016-2-1.

R&S®ESH2-Z31 Attenuator

For checking the interference source impedance to EN55016-2-1 and CISPR 16-2-1

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

- Frequency range: 9 kHz to 30 MHz
- Measurement range (AVG, IF bandwidth 200 Hz with Rohde & Schwarz test receivers): -20 dBμV to +120 dBμV/+10 dBμV to +150 dBμV
- Attenuation, uncertainty of calibration: 10 dB, 0.5 dB/30 dB, 0.5 dB
- Input impedance: 118 kΩ ±5%||8 pF/1.5 kΩ ±5%||8 pF
- Max. input voltage
 - f < 63 Hz: 100 V/250 V
 - f < 500 Hz: 5 V/250 V
 - 9 kHz to 30 MHz: 3 V/30 V

R&S®ESH3-Z2 Pulse Limiter



High RF input levels and high-energy interfering pulses generated on artificial mains networks when the DUT is switched on and off can damage the RF input circuits of test receivers. The R&S®ESH3-Z2 pulse limiter limits and reduces the interference level.

Specifications in brief

- Frequency range: 0 Hz to 30 MHz
- Insertion loss: 10 dB ± 0.3 dB

- Frequency response: ≤ ±0.3 dB
- SWR with 50 Ω termination, input/output: ≤ 1.06/≤ 1.25
- Power-handling capacity in continuous mode: 1 W
- Pulse power-handling capacity: E = 0.1 Ws (6 ms)
- Dimensions (L × W × H or L × Ø): 94 mm × 25 mm × 25 mm (3.70 in × 0.98 in × 0.98 in)
- Weight: 120 g (0.26 lb)

EMC Accessories for disturbance current measurements

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 as well as for measuring shielding 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/model .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: 20 Hz to 1 MHz/2 MHz
- Source impedance: $\leq 0.8 \Omega / \leq 1 \Omega$
- Transfer impedance ZT 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 model 03 (EMS measurement)
 - Max. power at RF connector: 10 W (f > 1 MHz)

R&S®ESV-Z1 VHF Current Probe



R&S®ESV-Z1 current probe is used for selective or broadband measurement of very small as well as of very large RF currents in electric lines. They are shielded against electrostatic effects and comply with CISPR 16-1-2 and VDE0876.

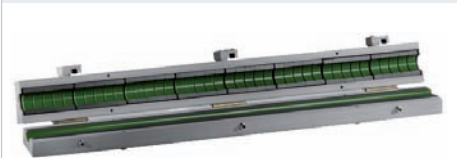
Specifications in brief

- Frequency range: 9 kHz to 600 MHz
- Measurement range (AVG, IF bandwidth 7.5 kHz): –33 dB μ A to +117 dB μ A

- Transfer admittance ($Y_t = I_{in}/V_{out}$): 0.1 S (20 MHz to 600 MHz)
- Transducer factor ($k = 20 \log(Y_t/s)$): –20 dB (20 MHz to 600 MHz)
- Max. current (superimposed on RF current or peak AC current): 50 A
- Max. diameter of conductor: 13.5 mm (0.53 in)
- Dimensions (dia./height): 55 mm/20 mm (2.17 in/0.79 in)
- Weight: 130 g (0.29 lb)

EMC Accessories for disturbance power measurements

R&S®EZ-24 Ferrite Clamp



The R&S®EZ-24 ferrite clamp is used to improve the reproducibility of disturbance field strength measurements and the measurements of disturbance power and screening effectiveness.

In a 50 Ω circuit, the clamp produces decoupling attenuation of more than 15 dB in the range from 30 MHz to 1 GHz. The ferrite clamp can be opened to insert the cable to be loaded.

Drafts on the measurement of radiated emission call for ferrite absorbers to load cables in order to improve the reproducibility of disturbance field strength measurements. Ferrite absorbers are also useful to improve the measurements of disturbance power and screening effectiveness.

Specifications in brief

- Frequency range: 1 MHz to 1 GHz
- High reproducibility of disturbance field strength measurements
- Calibrated in line with CISPR Publ.16-1-3
- Maximum diameter of cable: 22 mm

R&S®MDS-21 Absorbing Clamp



The R&S®MDS-21 absorbing clamp can be used in conjunction with EMI test receivers to measure the disturbance power on cables in line with CISPR 13 or EN 55013, in line with CISPR 14-1 or EN 55014-1, as well as in line with EN 50083-2 and in conjunction with two-port measurement devices to measure the shielding effectiveness of cables in line with DIN 47250 Part 6, IEC 96-1 and EN 50083-2.

It can also be used for measuring the efficiency of disturbance suppression devices for high-voltage ignition systems in line with CISPR 12 or EN 55012.

High-energy pulses are coupled out and taken to the measuring receiver. This means that measuring receiver inputs must be thoroughly protected.

The MDS clamps are also suitable for use as coupling clamps in order to test the immunity of electronic devices.

Specifications in brief

- Frequency range: 30 MHz to 1000 MHz
- Calibrated in line with CISPR Publ.16-1-3
- Ball bearing rollers for continuous use in automatic measurements
- Maximum diameter of cable: 20 mm

EMC Accessories for field strength measurements

R&S®HZ-10 Shielded, Calibrated Magnetic Field Pickup Coil (MIL)

**Measurement of magnetic field strengths to relevant standards**

The R&S®HZ-10 shielded and individually calibrated magnetic field pickup coil allows magnetic field strengths in the frequency range from 20 Hz to 200 kHz to be measured in line with commercial and military standards MIL-STD-461/462, DEF-STAN 59-61, GAM-EG 13, VG95377 Part 13 and EN55103-1. These standards specify limits for the magnetic flux density in the frequency range from 30 Hz to 50 kHz or 200 kHz and prescribe an electrostatically shielded coil with a defined number of turns for measuring the magnetic flux density. The coil comes with a calibration certificate for the range from 5 Hz to 10 MHz.

Specifications in brief

- Frequency range: 5 Hz to 10 MHz
- Antenna factor: calibration certificate supplied with coil
- Coil
 - Diameter: 133 mm (5.23 in)
 - Number of turns: 36
 - Type of wire: 7-41, litz wire
 - Resistance: 10 Ω
 - Inductance: 415 μ H
- Connector: Twinax female
- Dimensions (W x H x D): 142 mm x 178 mm x 29 mm (5.59 in x 7.01 in x 1.14 in)
- Weight: 260 g (0.57 lb)

R&S®HZ-11 E Near-Field Probe Set

**Diagnostic tools for solving EMC problems and RFID measurements**

The R&S®HZ-11 near-field probe set can be used in conjunction with test receivers, spectrum analyzers or oscilloscopes to determine electromagnetic emissions of any type. The main applications is in the diagnosis of emissions from printed circuit boards, cables and leakage spots in shielded enclosures. The passive probes can be used for a local susceptibility test. R&S®HZ-11 probe set is for a qualitative analysis. The probe set comes in a handy transit case.

Equipment supplied

- Three passive H-field probes
- Two passive E-field probes
- One probe extension
- One preamplifier
- One power supply

Specifications in brief

- Frequency range: 100 kHz to 2 GHz
- Probe type, measurement of E-/H-field rejection, 1st resonant frequency
 - Loop 6 cm, H-field, 41 dB, 790 MHz
 - Loop 3 cm, H-field, 29 dB, 1.5 GHz
 - Loop 1 cm, H-field, 11 dB, 2.3 GHz
 - Sphere 3.6 cm, E-field, 30 dB, > 1 GHz
 - Rod 6 mm, E-field, 30 dB, > 2 GHz
- Gain of broadband preamplifier

100 kHz	1 MHz	100 MHz	1 GHz	2 GHz	3 GHz
35 dB	38 dB	39 dB	33 dB	26 dB	14 dB
- Noise figure at 500 MHz: typ. 3.5 dB
- Saturated output level at 100 MHz: typ. 12 dBm
- 1 dB compression point at 100 MHz: typ. 8 dBm

R&S®HZ-12 Precision Halfwave Dipole Set

**Maximum precision for antenna calibration, field strength measurements and test site attenuation measurements**

Tunable halfwave dipoles are used for the calibration of VHF/UHF broadband antennas, which have their advantages in practical use but whose characteristics cannot be strictly calculated.

Halfwave dipoles are the only tool for checking reference sites used for antenna calibration in line with CISPR 16-1-5 and ANSI C63.5. They are also used for checking semi-anechoic chamber test sites.

Specifications in brief

- Frequency range: 30 MHz to 300 MHz
- Power attenuation of dipole pair (closely coupled):
 - 20 dB (calibration curve supplied with set)
- Antenna factor:
 - 7.5 dB to 27.6 dB (proportional to f)
- VSWR < 1.1

R&S®HZ-13 Precision Halfwave Dipole Set

**Maximum precision for antenna calibration, field strength measurements, and test site attenuation measurements**

Tunable halfwave dipoles are used for the calibration of VHF/UHF broadband antennas, which have their advantages in practical use but whose characteristics cannot be strictly calculated.

Halfwave dipoles are the only tool for checking reference sites used for antenna calibration in line with CISPR 16-1-5 and ANSI C63.5. They are also used for checking semi-anechoic chamber test sites.

Specifications in brief

- Frequency range: 300 MHz to 1000 MHz
- Power attenuation of dipole pair (closely coupled):
 - 20 dB (calibration curve supplied with set)
- Antenna factor:
 - 27.4 dB to 38 dB (proportional to f)
- VSWR:
 - < 1.2 (300 MHz to 800 MHz)
 - < 1.3 (800 MHz to 1 GHz)

EMC Accessories for field strength measurements

R&S®HZ-14 H Near-Field Probe Set

**Diagnostic tools for detecting EMC trouble spots**

The R&S®HZ-14 near-field probe set can be used in conjunction with test receivers, spectrum analyzers or oscilloscopes to determine electromagnetic emissions of any type. The main application is the diagnosis of emissions from printed boards, cables and leakage spots in shielded enclosures. The two passive H-field probes can be used for a local susceptibility test. The R&S®HZ-14 probe set is for quantitative analysis. It comes in a handy transit case.

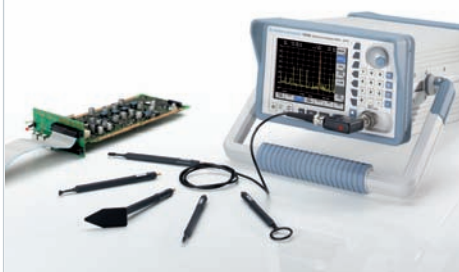
Equipment supplied

- Two passive H-field probes (9 kHz to 30 MHz and 30 MHz to 1 GHz)
- One active E-field probe (9 kHz to 1 GHz)
- One 30 dB preamplifier for the H-field probe (can be powered from all Rohde & Schwarz test receivers and spectrum analyzers)
- A test jig for functional testing of the H-field probes and simplified normalization of H-field measurements with the aid of a tracking generator and normalization functions provided in spectrum analyzers

Specifications in brief

- H-field probes
 - Max. input power: ≤ 30 MHz: 0.5 W, > 30 MHz: 0.25 W
 - VSWR ($f > 30$ MHz): < 2
- E-field probe
 - Frequency response: ± 3 dB
 - Sensitivity: 13 mV/V
- Connectors: SMA female
- Preamplifier
 - Frequency range: 9 kHz to 1 GHz
 - Gain: $30 \text{ dB} \pm 2 \text{ dB}$ (typ. $\pm 1 \text{ dB}$)
 - Noise figure: typ. $< 4 \text{ dB}$
 - 1 dB compression point: typ. 0 dBm
 - Input/output: BNC female/N male
 - Impedance: 50Ω
 - VSWR: < 2
 - DC powering: $10 \text{ V} \pm 0.1 \text{ V}$, $< 100 \text{ mA}$
 - DC connector: LEMO

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 for use in conjunction 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 diagnosis 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 $\times$ 4 mm), adapter for USA and Japan

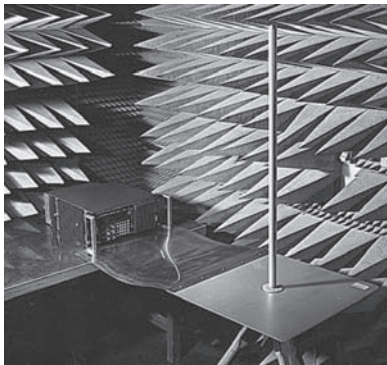
EMC Accessories for field strength measurements

R&S®HFH2-Z2 Loop Antenna

**Broadband active loop antenna for measuring the magnetic field-strength**

- Frequency range: 9 kHz to 30 MHz
- Antenna factor k, referred to 1/m: 20 dB (E-field)
- Accuracy: 1 dB
- Measurement range (IF bandwidth 200 Hz, AV ind.)
 - Lower limit, frequency-dependent, 9 kHz to 1 MHz: +40 dB(μV/m) to +10 dB(μV/m)
 - Lower limit, frequency-dependent, 1 MHz to 30 MHz: +10 dB(μV/m) to +5 dB(μV/m)
 - Upper limit: 140 dB(μV/m)
- Connectors
 - RF: BNC female, 50 Ω
 - Supply and coding (antenna factor): 12-contact Tuchel female
 - Length of connecting cables: 10 m (393.70 in)
- Current drain (±10 V): < 40 mA
- Dimensions (loop dia.): 590 mm (23.23 in)
- Weight in transit case, without cable: 12 kg (26.46 lb)

R&S®HFH2-Z6 Rod Antenna

**Broadband active rod antenna for measuring the electrical component of radiated EMI in test setups to MIL-STD-461/462 and similar MIL standards and CISPR25**

- Frequency range: 9 kHz to 30 MHz
- Antenna factor k, referred to 1/m: 10/20 dB, selectable
- Accuracy: 1 dB
- Measurement range (IF bandwidth 200 Hz, AV ind.)
 - Lower limit, frequency-dependent: +15 dB(μV/m) to -18 dB(μV/m)
 - Upper limit: 140 dB(μV/m), 130 dB(μV/m) with k = 10 dB
- Connectors
 - RF: BNC female, 50 Ω
 - Supply and coding (antenna factor): 12-contact Tuchel female
 - Length of connecting cables: 10 m (393.70 in)
- Current drain (±10 V): < 45 mA
- Dimensions
 - Counterpoise: 600 mm × 600 mm (23.62 in × 23.62 in)
 - Rod height: 1000 mm (39.37 in)
- Weight without cable: 5 kg (11.02 lb)

R&S®HZ-9 Power Supply

**Power supply for feeding the active R&S®HFH2-Z1/Z2/Z6 antennas, if these antennas cannot be powered from the test receiver**

- Output voltages: ±10 V ±0.5%
- Max. current load: 100 mA
- DC connector: 12-contact Tuchel female
- AC supply: 100 V to 240 V, -15/+10%
- Dimensions (W × H × D): 125 mm × 70 mm × 188 mm (4.92 in × 2.76 in × 7.40 in)
- Weight: 1.5 kg (3.31 lb)

EMC Accessories for field strength measurements

R&S®HL033 Log-Periodic Broadband Antenna

**Detection and measurement of RF signals**

- ▮ Extremely broadband
- ▮ Only one antenna required to cover a wide frequency range
- ▮ Low frequency-dependence of radiation patterns and input impedance
- ▮ Can be used as transmit antenna
- ▮ Metal parts electrically connected to mast flange for protection against electric charges and lightning
- ▮ Highly weatherproof
- ▮ Stable installation due to optional center bracket
- ▮ Individual calibration in line with ANSI C63.5

Specifications in brief

- ▮ Frequency range: 80 MHz to 2 GHz
- ▮ Polarization: linear
- ▮ Input impedance: 50 Ω
- ▮ VSWR: ≤ 2
- ▮ Max. input power (TA = +30°C)
 - 80 MHz: 460 W + 100% AM to
 - 2 GHz: 120 W + 100% AM
- ▮ Gain: typ. 6.5 dBi
- ▮ Max. wind speed (without ice deposit): 150 km/h
- ▮ Dimensions (L × W): approx. 1800 mm × 1960 mm (approx. 70.87 in × 77.17 in)
- ▮ Weight: approx. 5 kg (11.02 lb)

R&S®HL040 Log-Periodic Broadband Antenna

**For broadband transmission and reception under open-field and laboratory conditions**

- ▮ Wide bandwidth
- ▮ High symmetry and low frequency dependence of radiation patterns
- ▮ Coverage of various mobile radio frequency ranges
- ▮ Suitable for field-strength and EMC measurements due to high precision
- ▮ Individual calibration in line with ANSI C63.5/ DIN 45003
- ▮ Compact and sturdy design
- ▮ Can be used in the lab and for open-field applications
- ▮ Individual calibration certificate

Specifications in brief

- ▮ Frequency range: 400 MHz to 3 GHz
- ▮ Polarization: linear
- ▮ Input impedance: 50 Ω
- ▮ VSWR: < 2.5 , typ. < 2.0
- ▮ Max. input power: 150 W to 50 W CW
- ▮ Gain: 5 dBi to 7 dBi
- ▮ Front-to-back ratio
 - 400 MHz to 450 MHz: > 10 dB
 - 450 MHz to 3 GHz: > 15 dB
- ▮ Polarization isolation: > 20 dB
- ▮ Max. wind speed (without ice deposit): 200 km/h
- ▮ Dimensions (H × W × L): approx. 130 mm × 300 mm × 680 mm (5.1 in × 11.8 in × 26.8 in)
- ▮ Weight: approx. 2.8 kg (6.17 lb)

R&S®HL046 Log-Periodic Broadband Antenna

**Antenna for EMS measurements**

- ▮ Consists of two log-periodic antennas arranged in a V-shape and connected in parallel
- ▮ Almost rotation-symmetrical radiation patterns
- ▮ High antenna gain, i.e. low amplifier power required
- ▮ Wide frequency range
- ▮ High selectivity in the H plane
- ▮ Uniform object irradiation due to optimized radiation patterns
- ▮ Reduced influence of test chamber
- ▮ Wall mounting possible
- ▮ Small size, suitable for use in test chambers

Specifications in brief

- ▮ Frequency range: 80 MHz to 1.3 GHz
- ▮ Gain: typ. > 7 dBi
- ▮ Max. input power
 - 80 MHz: 1000 W + 100% AM to
 - 1 GHz: 300 W + 100% AM
- ▮ Front-to-back ratio: typ. > 20 dB
- ▮ Input impedance: 50 Ω
- ▮ VSWR: < 2
- ▮ Polarization: linear
- ▮ Trolley optionally
 - Height continuously adjustable between approx. 1 m and 1.75 m above ground
 - Pneumatic actuators optionally

R&S®HL046E High Gain Log-Periodic Antenna

**Antenna for EMS measurements**

- ▮ High antenna gain, i.e. low amplifier power is required
- ▮ No change of antennas needed over wide frequency range
- ▮ Uniform object irradiation due to optimized radiation patterns
- ▮ Small size, suitable for use in test chambers
- ▮ Reduced influence of test chamber
- ▮ Antenna gain approximately constant over the whole frequency range
- ▮ Wall mounting possible

Specifications in brief

- ▮ Frequency range: 80 MHz to 3 GHz
- ▮ Polarization: linear
- ▮ Input impedance: 50 Ω
- ▮ VSWR: < 2 (< 2.5 GHz), < 2.5 (≥ 2.5 GHz)
- ▮ Practical gain: typ. > 8 dBi
- ▮ Max. input power
 - 80 MHz: 1400 W + 100% AM to
 - 3 GHz: 250 W + 100% AM
- ▮ Trolley optionally
 - Height continuously adjustable between approx. 1 m and 1.75 m above ground
 - Pneumatic actuators optionally

EMC Accessories for field strength measurements

R&S®HL050 Log-Periodic Antenna

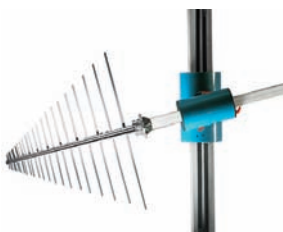
**Log-periodic directional antenna for linear polarization**

- Extremely wide frequency range
- Rotation-symmetrical radiation patterns
- High gain due to V-shaped configuration of antenna elements
- Can be used in the lab and for open-field applications
- Can be used as a separate antenna or as a feed for microwave directional antennas

Specifications in brief

- Frequency range: 850 MHz to 26.5 GHz
- Polarization: linear
- Input impedance: 50 Ω
- VSWR: ≤ 2.5
- Max. input power: 10 W to 2 W
- Gain: typ. 8.5 dBi
- Max. wind speed (without ice deposit): 180 km/h
- Dimensions (diameter $\times$ height, with radome): approx. 210 mm $\times$ 300 mm (8.27 in $\times$ 11.81 in)
- Weight: approx. 0.7 kg (1.54 lb)

R&S®HL223 Log-Periodic Antenna

**Measurement, monitoring and transmitting applications**

Owing to its broadband characteristics and the virtually frequency-independent radiation patterns, the R&S®HL223 covers a very wide frequency range. The sturdy construction makes the antenna suitable for stationary and mobile applications. Each antenna is supplied with an individual calibration certificate so that measurements can be performed in addition to monitoring and transmitting applications.

Specifications in brief

- Frequency range: 200 MHz to 1.3 GHz
- Polarization: linear
- Input impedance: 50 Ω
- VSWR: ≤ 2 (typ. 1.6)
- Max. input power: 1500 W to 600 W CW
- Gain: > 6 dBi
- Max. wind speed (without ice deposit): 200 km/h
- Dimensions (L $\times$ W): approx. 710 mm $\times$ 765 mm (27.95 in $\times$ 30.12 in)
- Weight: approx. 2 kg (4.41 lb)

R&S®HM020 Triple-Loop Antenna



R&S®HM020 is a large loop antenna system in line with CISPR 16-1-4, for electric lighting equipment with CISPR 15 and for induction sources with CISPR 11.

- Frequency range 9 kHz to 30 MHz
- Loops switchable between X, Y and Z planes
- Transducer factor of current probe: 0 dB, referred to 1 S
- RF connector: N female, 50 Ω

Dimensions (W $\times$ H $\times$ D); weight

- Loops setup, normal mode
2.49 m $\times$ 2.57 m $\times$ 2.07 m; 45 kg
(98.03 in $\times$ 101.18 in $\times$ 81.50 in; 99.21 lb)
- Loops setup, reduced height
2.49 m $\times$ 2.09 m $\times$ 2.07 m
(98.03 in $\times$ 82.28 in $\times$ 81.50 in)
- Transport crate: 2.68 m $\times$ 2.32 m $\times$ 0.57 m
(105.51 in $\times$ 91.34 in $\times$ 22.44 in)
- R&S®HM020Z1 basic pedestal
0.9 m $\times$ 1 m $\times$ 0.9 m; 40 kg
(35.43 in $\times$ 39.37 in $\times$ 35.43 in; 88.18 lb)
- R&S®HM020Z2 adapter pedestal
0.9 m $\times$ max. 0.5 m $\times$ 0.9 m; 30 kg
(35.43 in $\times$ max. 19.69 in $\times$ 35.43 in; 66.14 lb)

R&S®HK5000 EMS Broadband Dipole



High-power transmitting antenna specially designed for EMS operation in test chambers

- Generation of high field strength
- High power capability
- No tuning necessary
- Compact size
- Easy mounting and demounting

Specifications in brief

- Frequency range: 20 MHz to 100 MHz
- Polarization: linear
- Input impedance: 50 Ω
- VSWR: < 2 (under free space conditions)
- Gain: > 2 dBi (under free space conditions)
- Max. input power
 - With EIA 1 $\frac{5}{8}$ " connector: 10 kW CW
 - With 13-30 connector (in line with IEC 169-5): 5 kW CW
- Generated field strength: > 200 V/m_{RMS} at a distance of 1 m and 5 kW CW input power
- Dimensions (L $\times$ W $\times$ H)
 - Vertically polarized: approx. 1.8 m $\times$ 2.95 m $\times$ 2.2 m (approx. 70.9 in $\times$ 116.1 in $\times$ 86.6 in)
 - Horizontally polarized: approx. 2.9 m $\times$ 2.4 m $\times$ 2.2 m (approx. 114.2 in $\times$ 94.5 in $\times$ 86.6 in)
- Weight
 - Antenna: approx. 150 kg (330.7 lb)
 - Holder with motor: approx. 120 kg (264.6 lb)

EMC Accessories for field strength measurements

R&S®HK116 Biconical Antenna

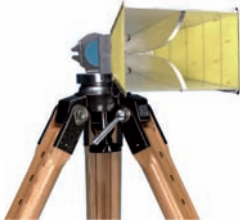
**For radiated emission measurements**

- Wide frequency range
- Radiation patterns virtually independent of frequency
- Individual calibration in line with ANSI C63.5 (free-space calibration) and ARP 958
- Low weight

Specifications in brief

- Frequency range: 20 MHz to 300 MHz
- Polarization: linear
- Input impedance: 50 Ω
- VSWR: typ. 2.5
- Permissible input power: 75 W CW
- Dimensions (L × W × H): approx. 1380 mm × 530 mm × 720 mm
- Weight: approx. 3 kg

R&S®HF907 Double-Ridged Waveguide Horn Antenna

**Broadband directional antenna, ideal for EMC measurements**

- Wide frequency range
- High gain and low VSWR for measurement of weak signals and generation of high field strengths without any significant return loss
- Radiation pattern contains only one main lobe over the entire frequency range
- Ideal for use in EMC laboratories
- Compact size, low weight
- Each antenna is calibrated individually in line with ANSI C63.5 and SAE ARP 958

Specifications in brief

- Frequency range: 800 MHz to 18 GHz
- Polarization: linear
- Polarization decoupling: > 25 dB (typ. > 30 dB)
- Input impedance: 50 Ω
- VSWR: ≤ 3.0 (f < 1.5 GHz), < 2.0 (f ≥ 1.5 GHz)
- Max. input power: 300 W CW/500 W PEP
- Gain: 5 dBi to 14 dBi (typ.)
- Dimensions (L × W × H): approx. 305 mm × 280 mm × 226 mm (approx. 12.0 in × 11.0 in × 8.9 in)
- Weight: approx. 1.9 kg (approx. 4.2 lb)

R&S®HL562 ULTRALOG

**EMI and EMS measurements in an extremely wide frequency range**

- Combines the characteristics of a biconical and a log-periodic antenna
- Only one antenna required to cover wide frequency range
- Selectable polarization plane
- V-shaped log-periodic part of the antenna for high system sensitivity
- Suitable for EMS measurements with high field strengths (10 V/m or higher)
- Gain increase at high frequencies
- Compact size
- Individual calibration (ANSI C63.5 and DIN 45003)

Specifications in brief

- Frequency range: 30 MHz to 3 GHz
- Polarization: linear
- Cross polar suppression: > 20 dB (in line with CISPR 16-1-4)
- Nominal impedance: 50 Ω
- VSWR: typ. < 2
- Max. input power (T_{AMB} = +40 °C)
 - 30 MHz: 150 W + 100% AM
 - 80 MHz: 300 W + 100% AM
 - 250 MHz: 500 W + 100% AM
 - 1000 MHz: 280 W + 100% AM
 - 3000 MHz: 180 W + 100% AM
- Gain: typ. 8 dBi from 200 MHz

R&S®HE202 Active Receiving Dipole

**Optimized for very small dimensions**

- Extremely small size
- High sensitivity
- Wide frequency range
- High immunity to nonlinear distortion, comparable to passive antennas in conjunction with high-grade preamplifier
- High immunity to nearby lightning strikes
- Shock- and vibration-resistant
- Linear polarization

- Frequency range: 200 MHz to 1 GHz
- VSWR: < 2.5
- Electronic gain: 5 dB to 9 dB
- Practical gain: 7 dB to 11 dB
- Directivity: 2 dB average
- Noise figure: 6 dB (200 MHz), 7 dB (1 GHz)
- 2nd order intercept point: > 55 dBm
- 3rd order intercept point: > 30 dBm
- Dimensions (L × H): 512 mm × 238 mm (20.16 in × 9.37 in)
- Weight: 2.1 kg (4.63 lb)

R&S®HE302 Active Receiving Dipole

**Optimized for very small dimensions**

- Extremely small size
- High sensitivity
- Wide frequency range
- High immunity to nonlinear distortion, comparable to passive antennas in conjunction with high-grade preamplifier
- High immunity to nearby lightning strikes
- Shock- and vibration-resistant
- Linear polarization

- Frequency range: 20 MHz to 500 MHz
- VSWR: < 2.5
- Electronic gain: -11 dB to +8 dB
- Practical gain: -9 dB to +10 dB
- Directivity: 2 dB average
- Noise figure: 28 dB (20 MHz), 9 dB (500 MHz)
- 2nd order intercept point: > 60 dBm
- 3rd order intercept point: > 30 dBm
- Dimensions (L × H): 1 m × 240 mm (39.37 in × 9.45 in)
- Weight: 2.5 kg (5.51 lb)

Service you can rely on

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

About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

Rohde & Schwarz GmbH & Co. KG

www.rohde-schwarz.com

Regional contact

Europe, Africa, Middle East

+49 89 4129 123 45

customersupport@rohde-schwarz.com

North America

1 888 TEST RSA (1 888 837 87 72)

customer.support@rsa.rohde-schwarz.com

Latin America

+1 410 910 79 88

customersupport.la@rohde-schwarz.com

Asia/Pacific

+65 65 13 04 88

customersupport.asia@rohde-schwarz.com

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