

MEASURING EQUIPMENT OVERVIEW FOR EMI TESTING

ROHDE & SCHWARZ

Make ideas real



APPLICATIONS

Compliance testing

Rohde&Schwarz is your reliable partner for compliance testing – from antennas to software. In every test setup, the EMI test receiver is key. It needs to fulfill the highest demands for detecting, measuring and weighting all disturbance signals.

With their outstanding RF performance, internal preselection and state-of-the-art signal processing, the R&S®ESW, R&S®ESR and R&S®EPL1000 EMI test receivers meet the requirements of commercial and military standards such as IEC, CISPR, EN, ETSI, ANSI, FCC, VCCI, MIL-STD-461 and DO-160.



The powerful R&S®ESW forms the core of an EMI compliance test system.

Precompliance testing

Precompliance tests and general EMI analysis testing reduces the risk of a product failing the final compliance test, which is required for market certification. Failing this test significantly increases costs and delays the product's market launch.

Precompliance EMI test receivers provide a level of accuracy close to that of a compliance receiver. This helps to detect potential EMI problems early on in development. Spectrum analyzers and oscilloscopes with specific functionalities can also be used for EMI debugging and precompliance measurements.



The R&S®ESRP gives accurate insights into EMI problems before the certification test.

EMI TEST RECEIVER PORTFOLIO

From EMI debugging and precompliance measurements to high-performance compliance testing, Rohde & Schwarz offers test receivers for every aspect of EMI testing.



	R&S®ESW	R&S®ESR	R&S®ESRP	R&S®EPL1001/R&S®EPL1007	R&S®EPL1000
	High-end compliance testing up to 44 GHz with the highest speed, widest bandwidth, best analysis capabilities and greatest sensitivity	Mid-range compliance testing up to 26.5 GHz with low sensitivity and high testing speed at an attractive price	Precompliance testing with high reliability and sensitivity thanks to preselection filters and time domain scan	Entry-level precompliance and optional compliance testing up to 7.125 GHz	Compliance testing up to 30 MHz for conducted disturbances and magnetic fields
Main characteristics					
Frequency range	1 Hz to 8/26.5/44 GHz	9 kHz to 3.6/7/26.5 GHz (10 Hz start frequency with -B29 option)	9 kHz to 3.6/7 GHz (10 Hz start frequency with -B29 option)	5 kHz to 1/7.125 GHz (upgradeable from 1 GHz to 7.125 GHz)	5 kHz to 30 MHz
Resolution bandwidth (-6 dB)	1 Hz to 80 MHz (with -B8 option)	10 Hz to 1 MHz (decadic bandwidths with -B29 option)	10 Hz to 1 MHz (decadic bandwidths with -B29 option)	10 Hz to 1 MHz	10 Hz to 1 MHz
Compliance	CISPR 16-1-1, ANSI-C63 and MIL-STD-461	CISPR 16-1-1, ANSI-C63 and MIL-STD-461	-	CISPR 16-1-1, ANSI-C63 and MIL-STD-461 (with R&S®EPL1-B2 and R&S®EPL1-B1611 options)	CISPR 16-1-1, ANSI-C63 and MIL-STD-461
Preamplifier gain	20 dB (1 kHz to 8 GHz), 30 dB (150 kHz to 8/26.5/44 GHz with -B24 option)	20 dB (1 kHz to 7 GHz with -B22 option for R&S®ESR3 and R&S®ESR7), 30 dB (7 GHz to 26.5 GHz)	20 dB (1 kHz to 7 GHz with -B2 option)	20 dB	20 dB
Maximum FFT bandwidth, for frequency < 30 MHz	29.85 MHz	29.85 MHz	29.85 MHz	29.85 MHz	29.85 MHz
Maximum FFT bandwidth, for frequency > 30 MHz	60 MHz with base unit, 350 MHz with -B350/-B350R option, 970 MHz with -B1000/-B1000R option	25.6 MHz	25.6 MHz	20 MHz	-
Real-time analysis for gapless interference investigation	80 MHz with base unit, up to 970 MHz with -B1000R option	40 MHz	-	20 MHz	-
RF performance					
Measurement speed, 30 MHz to 1 GHz, 120 kHz RBW, 1 s measurement time, quasi-peak detector	50 s with base unit, 18.5 s with -B1000/-B1000R option (full compliance), 1.8 s with -B1000/-B1000R option (pretesting)	80 s	989 s	100 s	-
Preselection filters	21 (selectable notch filters at 2.4 GHz and 5.725 GHz)	16	16 (with -B2 option)	9	2 (in CISPR band A/B)
Displayed average noise level (DANL), 1 MHz < f ≤ 1 GHz (typical) ¹⁾	-169 dBm	-168 dBm	-162 dBm	-160 dBm	-156 dBm (1 MHz < f ≤ 30 MHz)
1 dB compression (nominal) ²⁾	+15 dBm	+10 dBm	+3 dBm	+7 dBm	+10 dBm
Absolute level uncertainty at 64 MHz ³⁾	< 0.2 dB	< 0.2 dB	< 0.2 dB	< 0.3 dB (at 16.667 MHz)	< 0.3 dB (at 16.667 MHz)
General data					
Dimensions (W × H × D)	46.2 cm × 24.0 cm × 50.4 cm (18.15 in × 9.44 in × 19.81 in)	41.2 cm × 19.7 cm × 51.7 cm (16.22 in × 7.76 in × 20.35 in)	41.2 cm × 19.7 cm × 41.7 cm (16.22 in × 7.76 in × 16.42 in)	40.8 cm × 18.9 cm × 30.5 cm (16.06 in × 7.44 in × 12.0 in)	40.8 cm × 18.9 cm × 23.5 cm (16.06 in × 7.44 in × 9.25 in)
Weight (without options)	from 20.6 kg to 25.2 kg (from 45.4 lb to 55.6 lb)	from 12.8 kg to 14.6 kg (from 28.2 lb to 32.2 lb)	9.5 kg (20.9 lb)	8.4 kg (18.1 lb)	6.9 kg (15.2 lb)

Key features					
High-end receiver with outstanding dynamic range and pulse resolution	•				
Multi CISPR APD measurement application	•				
FFT time domain scan for ultrafast measurements	•	•	•	•	•
Receiver and spectrum analyzer in one instrument	•	•	•	•	•
(Additional) pulse protected input for conducted testing	•	•		•	•
Optional tracking generator		•	•	•	•
Mobile use with DC power and internal batteries		•	•	•	•

¹⁾ RF attenuation = 0 dB, termination = 50 Ω, RBW = 1 kHz, VBW = 1 Hz, sample detector, log scaling, normalized to 1 Hz. ²⁾ RF attenuation = 0 dB, preselection and preamplifier off. ³⁾ RBW = 10 kHz, level = -10 dBm, reference level = -10 dBm, RF attenuation = 10 dB.

ACCESSORY PORTFOLIO

From software to complete systems, Rohde & Schwarz offers the right equipment for all EMI testing requirements. For conducted testing, line impedance stabilization networks (LISN) and current or voltage probes decouple interference from the device under test (DUT) and apply it to the test receiver, providing a defined connection between the DUT and the test receiver. In a radiated test setup, antennas accurately capture electromagnetic emissions in every required frequency range.

Accessory	Type	Applicable for
Software		
R&S®ELEKTRA EMC test software	Software for interactive and automatic EMC measurements with result analysis and reporting	Automated EMI and EMS testing in line with all major standards
Conducted testing (disturbance voltage)		
R&S®ENV216	Two-line V-network up to 16 A (CISPR 16-1-2)	Compliance testing on single-phase AC lines up to 240 V AC and 50 V DC
R&S®AMN6500	Two-line V-network up to 16 A (precompliance)	Precompliance testing on single-phase AC lines up to 240 V AC and 28 V DC
R&S®ENV432	V-network up to 32 A, four-line LISN (CISPR 16-1-2)	Compliance testing on three-phase AC and DC lines up to 32 A
R&S®ENV4200	V-network up to 200 A, four-line LISN, from 150 kHz (CISPR 16-1-2)	Compliance testing on three-phase AC and DC lines up to 200 A
R&S®ESH3-Z6	V-network up to 100 A (500 A), single-phase LISN	AC and DC conducted testing in automotive networks (CISPR25 onboard receivers)
R&S®ESH2-Z3 passive voltage probe	Passive probe from 9 kHz to 30 MHz (CISPR 16-1-2)	RFI voltage measurement on AC lines
Conducted testing (disturbance current)		
R&S®EZ-17 current probe	Current probe from 20 Hz to 100 MHz (245 MHz) (CISPR 16-1-2)	AC and DC line testing of military and airborne equipment
Radiated testing		
R&S®HZ-15 probe set	Magnetic and electric near field probe set from 30 MHz to 3 GHz	Localizing magnetic and electric fields with a set of five probes
R&S®HZ-16 preamplifier	Preamplifier 20 dB, 100 kHz to 3 GHz, with 12 V DC power supply	Preamplifier for near field probes to measure low field strengths
R&S®HZ-17 probe set	Magnetic near field probe set from 30 MHz to 3 GHz	Localizing magnetic fields with two probes
R&S®HFH2-Z2E active loop antenna	Active loop antenna from 8.3 kHz to 30 MHz	Measuring magnetic fields
R&S®HFH2-Z6E active rod antenna	Active rod antenna from 8.3 kHz to 30 MHz	Measuring electric fields
R&S®HK116E biconical antenna	Biconical antenna from 20 MHz to 300 MHz	Antenna for commercial and military tests
R&S®HL223 log-periodic antenna	Log-periodic antenna from 200 MHz to 1.3 GHz	Antenna for commercial and military tests
R&S®HL562E ULTRALOG antenna	Biconical hybrid antenna from 30 MHz to 6 GHz	Ultrabroadband antenna for susceptibility and emission measurements
R&S®HL040E log-periodic broadband antenna	Broadband antenna from 400 MHz to 6 GHz with stable radiation pattern over its entire frequency range	Susceptibility and emission measurements in reverberation chambers
R&S®HL047 high-gain log-periodic antenna	High gain antenna from 80 MHz to 6 GHz	Susceptibility measurements with high antenna gain for low power requirements
R&S®HL050 log-periodic antenna	Directional antenna from 850 MHz to 26.5 GHz	Commercial/military testing above 1 GHz
R&S®HF907 double-ridged waveguide horn antenna	Directional antenna from 800 MHz to 18 GHz	Commercial testing above 1 GHz
R&S®HF1444G14 high-gain EMI microwave antenna	High-gain EMI microwave antenna from 14.9 GHz to 44 GHz combines high antenna gain with wide half-power beamwidth	Microwave emission testing
Miscellaneous		
R&S®HZ-1 tripod	Tripod for R&S®HFH2-Z6E, R&S®HK116E, R&S®HL223 antennas	Wooden tripod for EMC antennas
R&S®ESH3-Z2 external pulse limiter	Limits interference level from 0 Hz to 30 MHz	Conducted testing with high-energy interfering pulses
R&S®HL562E-ATT attenuator	4 dB/6 dB hybrid antenna impedance matching pad	Attenuator with/without accredited calibration

Conducted testing (disturbance voltage)



R&S®ENV216 V-network



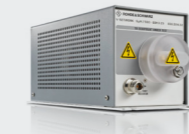
R&S®AMN6500 V-network



R&S®ENV432 V-network



R&S®ENV4200 V-network



R&S®ESH3-Z6 V-network



R&S®ESH2-Z3 passive voltage probe

Conducted testing (disturbance current)



R&S®EZ-17 current probe

Radiated testing



R&S®HZ-15/R&S®HZ-17 probe set



R&S®HZ-16 preamplifier



R&S®HFH2-Z2E active loop antenna



R&S®HFH2-Z6E active rod antenna



R&S®HK116E biconical antenna



R&S®HL223 log-periodic antenna



R&S®HL562E ULTRALOG antenna



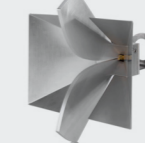
R&S®HL047 high-gain log-periodic antenna



R&S®HL040E log-periodic broadband antenna



R&S®HL050 log-periodic antenna



R&S®HF907 double-ridged waveguide horn antenna



R&S®HF1444G14 high-gain EMI microwave antenna

Miscellaneous



R&S®HZ-1 tripod

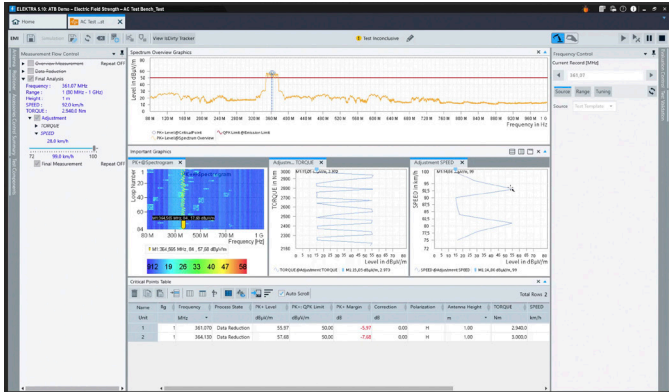


R&S®ESH3-Z2 external pulse limiter

R&S®ELEKTRA EMC TEST SOFTWARE

The R&S®ELEKTRA EMC test software controls entire EMC systems and automates measurement of equipment under test (EUT) being certified for emissions (EMI). The software simplifies configuration of test setups and test procedures as well as reporting of test results. The future-ready, revolutionary user interface is intuitive for new and existing EMC test software users. The software is ideal both for compliance and precompliance testing.

R&S®ELEKTRA features predefined libraries for common EMC standards, EUT centric test plans as well as automatic identification of connected instruments. The ability to create EUT test plans allows users to set up and define tests and result reports in advance, speeding up test execution. The software automatically collects, analyzes and evaluates measurement data and generates test reports.



Key facts	
Intuitive user interface	<ul style="list-style-type: none"> ▶ Modern and user-friendly design ▶ Dashboard for quick access to frequently used elements ▶ All-in-one page design with instant access to all relevant information
Get started quickly	<ul style="list-style-type: none"> ▶ Predefined libraries for common EMC standards ▶ Automated instrument identification ▶ Test system component characterization procedures
Test plan editor	<ul style="list-style-type: none"> ▶ Test plans with multiple tests per DUT ▶ Automated execution of test campaigns
High test throughput	<ul style="list-style-type: none"> ▶ Fully automated EMI tests using performance of modern PCs ▶ Parallel operation, such as preparation and execution of tests ▶ Optimized receiver communication interface for high speed data transfer
Report generation	<ul style="list-style-type: none"> ▶ Automated evaluation of measurement data ▶ Customizable test reports can be saved as PDF and DOCX files ▶ Standardized data exchange interface to third-party databases

SWIFT AND RELIABLE MEASUREMENT OF ELECTROMAGNETIC EMISSIONS



Rohde & Schwarz

The Rohde & Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks & cybersecurity. Founded 90 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

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Service at Rohde & Schwarz You're in great hands

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ISO 14001

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