

MEASURING EQUIPMENT OVERVIEW FOR EMI TESTING

www.rohde-schwarz.com

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.

The outstanding RF performance, internal preselection and state-of-the-art signal processing of the R&S®ESW and R&S®ESR compliance receivers meet the requirements of commercial and military standards, including 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 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®EPL1000	R&S®ESL
	High-end compliance testing with maximum measurement speed, top analysis capabilities and maximum sensitivity up to 44 GHz	Compliance testing for conducted and radiated disturbances up to 26.5 GHz at an attractive price	Precompliance testing with high reliability and sensitivity thanks to preselection filters and time domain scan	Compliance testing for conducted disturbances and magnetic fields up to 30 MHz	Compact, cost-effective measuring receiver for EMI precompliance measurements up to 6 GHz
Main characteristics					
Frequency range	1 Hz to 8 GHz/26.5 GHz/44 GHz	9 kHz to 3.6 GHz/7 GHz/26.5 GHz (10 Hz start frequency with -B29 option)	9 kHz to 3.6 GHz/7 GHz (10 Hz start frequency with -B29 option)	5 kHz to 30 MHz	9 kHz to 3 GHz/6 GHz
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	200 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	–
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 (9 kHz to 6 GHz, with -B22 option)
Maximum FFT bandwidth	60 MHz with base unit, 350 MHz with -B350/-B350R option, 970 MHz with -B1000/-B1000R option	30 MHz	30 MHz	30 MHz	no time domain scan
Real-time spectrum analysis for gapless interference investigation	80 MHz with base unit, up to 970 MHz with -B1000R option	40 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	–	about 9 hours
Preselection filters	21 (selectable notch filters at 2.4 GHz and 5.725 GHz)	16	16 (with -B2 option)	2 (in CISPR band A/B)	–
Displayed average noise level (DANL), 1 MHz < f ≤ 1 GHz (typical) ¹⁾	–169 dBm	–168 dBm	–162 dBm	–156 dBm (1 MHz < f ≤ 30 MHz)	–160 dBm
1 dB compression (nominal) ²⁾	+15 dBm	+10 dBm	+3 dBm	+10 dBm	+5 dBm
Absolute level uncertainty at 64 MHz ³⁾	< 0.2 dB	< 0.2 dB	< 0.2 dB	< 0.5 dB (at 16.667 MHz)	< 0.5 dB
General data					
Dimensions (W x H x D)	46.2 cm x 24.0 cm x 50.4 cm (18.15 in x 9.44 in x 19.81 in)	41.2 cm x 19.7 cm x 51.7 cm (16.22 in x 7.76 in x 20.35 in)	41.2 cm x 19.7 cm x 41.7 cm (16.22 in x 7.76 in x 16.42 in)	40.8 cm x 18.6 cm x 23.5 cm (16.06 in x 7.32 in x 9.25 in)	34.2 cm x 15.8 cm x 36.7 cm (13.48 in x 6.22 in x 14.45 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)	6.9 kg (15.2 lb)	7 kg (15.4 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 two-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 two-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 four-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 four-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 (CISPR 25 onboard receivers)
R&S®ESH2-Z3 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 30 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	Broadband antenna for commercial tests
R&S®HL050E log-periodic antenna	Directional antenna from 750 MHz to 6 GHz	Commercial/military testing above 1 GHz
R&S®HF907 horn antenna	Directional antenna from 800 MHz to 18 GHz	Commercial/military testing above 1 GHz
R&S®HZ-1 tripod	Tripod for R&S®HFH2-Z6E, R&S®HK116E, R&S®HL223 antennas	Wooden tripod for EMC antennas
Miscellaneous		
R&S®ESH3-Z2 external pulse limiter	Limits interference level from 0 Hz to 30 MHz	Conducted testing with high-energy interfering pulses

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 voltage probe

Conducted testing (disturbance current)



R&S®EZ-17 current probe

Radiated testing



R&S®HZ-15/HZ-17 probe set



R&S®HZ-16 preamplifier



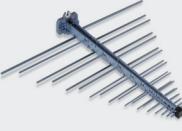
R&S®HFH2-Z2E active loop antenna



R&S®HFH2-Z6E rod antenna



R&S®HK116E biconical antenna



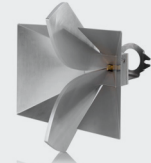
R&S®HL223 log-periodic antenna



R&S®HL562E ULTRALOG antenna



R&S®HL050E log-periodic antenna



R&S®HF907 horn antenna



R&S®HZ-1 tripod

Miscellaneous



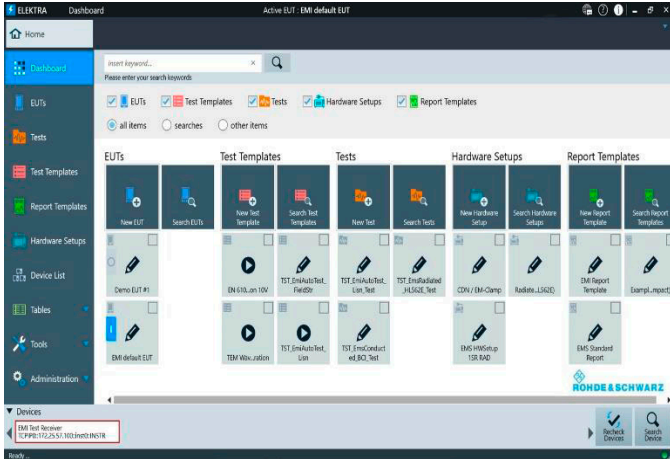
R&S®ESH3-Z2 external pulse limiter

R&S®ELEKTRA EMC TEST SOFTWARE

The R&S®ELEKTRA test software controls entire EMC systems and automates measurement of equipment under test (EUT) being certified for emissions (EMI) and immunity (EMS). The software simplifies configuration of test systems and test descriptions. The future-ready and revolutionary user interface is intuitive for new and existing users of EMC test software. 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 reports in advance, speeding up test execution. The software automatically collects, analyzes and evaluates measurement data and generates test reports as a PDF or DOCX file.



Key facts

Intuitive user interface

- ▶ Modern design optimized for touchscreens
- ▶ Dashboard for quick access to pinned elements
- ▶ All-in-one page design, meaning no window hopping

Get started quickly

- ▶ Predefined libraries for common EMC standards
- ▶ Automated instrument identification
- ▶ Automated field uniformity evaluation for EMS
- ▶ Wizard for migration from R&S®EMC32

Test plan editor

- ▶ Test plans with multiple tests
- ▶ Templates for various DUTs
- ▶ Configuration wizard for test setups

High test throughput

- ▶ Fully automated EMI and EMS tests
- ▶ Parallel preparation and execution of tests
- ▶ Optimization of receiver performance
- ▶ Automatic control of accessories

Report generation

- ▶ Automated evaluation of measurement data
- ▶ Customizable test reports can be saved as PDF and DOCX files

SWIFT AND RELIABLE MEASUREMENT OF ELECTROMAGNETIC EMISSIONS AND IMMUNITY



Rohde & Schwarz

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

www.rohde-schwarz.com

Service at Rohde & Schwarz You're in great hands

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

Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

Rohde & Schwarz customer support

www.rohde-schwarz.com/support

Rohde & Schwarz training

www.training.rohde-schwarz.com

Rohde & Schwarz customer support

www.rohde-schwarz.com/support

