RF FUNDAMENTALS IN COMMERCIAL EMI TESTING

R&S supplies both precompliance and fully compliant EMI test receivers, meeting all CISPR and FCC requirements for certification testing.

Precompliance receivers offer an ideal cost/benefit solution during development. They implement the required measurement bandwidths, limit lines, and detectors, but the receiver is not certified as a compliant measurement instrument per CISPR 16-1-1, making it more cost effective and versatile for measurements during the development.

R&S EMI compliance test equipment enables fast, reliable testing based on international standards and regulations, significantly reducing the risk of failures during final certification.

Learn more about EMI testing here:
www.rohde-schwarz.com/emc-compliance-testing

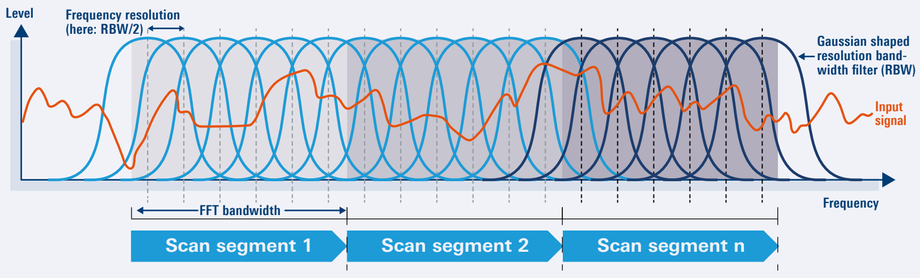
Conducted emission measurements

STANDARD	DESCRIPTION*	FREQUENCY RANGES
CISPR 11 ISM equipment	Voltage measurement with LISN or AAN (QP and CAV)	150 kHz to 30 MHz
CISPR 14-1 Household equipment and electric tools	Voltage measurement with LISN/AAN (QP and CAV)	9/150 kHz to 30 MHz
	Current measurement with current clamp (QP and CAV)	150 kHz to 30 MHz
	Power measurement with absorbing clamp (QP and CAV)	30 MHz to 300 MHz
CISPR 15 Lighting equipment	Voltage measurement with LISN/AAN (QP and CAV)	9/150 kHz to 30 MHz
	Current measurement with current clamp (QP and CAV)	150 kHz to 30 MHz
	Voltage measurement with CDNE (QP)	30 MHz to 300 MHz
CISPR 32 Multimedia equipment	Voltage measurement with LISN/AAN/CVP (QP and CAV)	150 kHz to 30 MHz
	Current measurement with current clamp (QP and CAV)	150 kHz to 30 MHz
FCC PART 15 Radio frequency devices	Voltage measurement with LISN (QP and CAV)	150 kHz to 30 MHz

Radiated emission measurements

STANDARD	DESCRIPTION*	FREQUENCY RANGES
CISPR 11 ISM equipment	Magnetic field measurement (QP)	150 kHz to 30 MHz
	Electric field measurement (QP/Peak and CAV)	30 MHz to 1/18 GHz
CISPR 14-1 Household equipment and electric tools	Magnetic field measurement (QP)	9 kHz to 30 MHz
	Electric field measurement (QP/Peak and CAV)	30 MHz to 1/6 GHz
CISPR 15 Lighting equipment	Magnetic field measurement (QP)	9 kHz to 30 MHz
	Electric field measurement (QP/Peak and CAV)	30 MHz to 1/6 GHz
CISPR 32 Multimedia equipment	Electric field measurement (QP/Peak and CAV)	30 MHz to 1/6 GHz
FCC PART 15 Radio frequency devices	Electric field measurement (QP/Peak and CAV)	30 MHz to 1/40 GHz

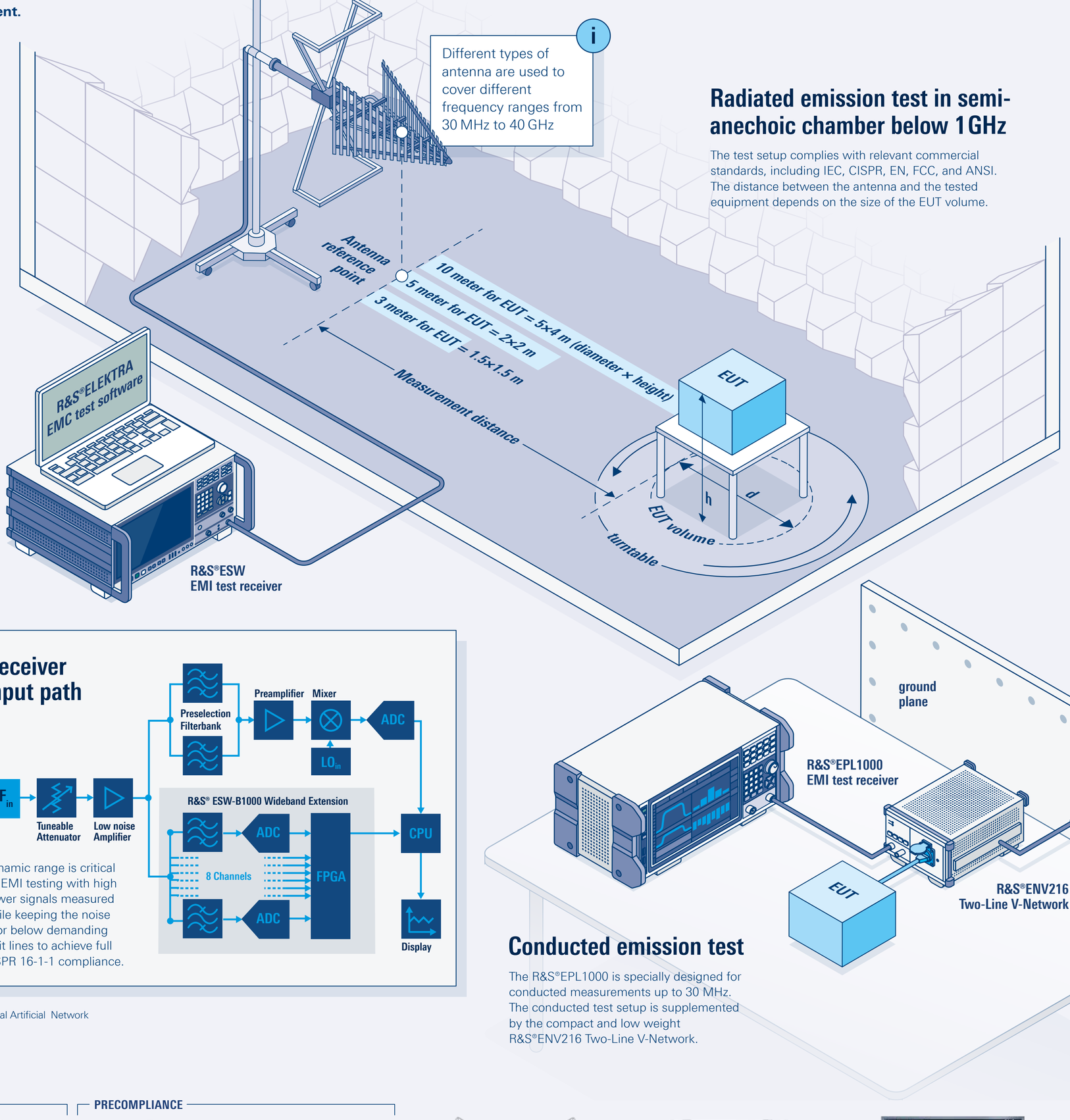
*PK = peak, QP = quasi-peak, CAV = CISPR-average, CVP = Capacitive Voltage Probe, AAN = Asymmetrical Artificial Network



Time Domain Scan

The traditional stepped scan measures one frequency point at a time of the voltage captured by the resolution bandwidth (RBW) before stepping to the next point. An RBW/2 step size creates so many points that the test slows dramatically. The Time Domain Scan uses the FFT (Fast Fourier Transform) to calculate the spectrum of many RBW's in parallel within one FFT bandwidth, allowing much faster measurement speeds. With up to 970 MHz, the wideband TDS allows fastest speed and highest detection rate for intermittent signals by minimizing the number of scan segments and allowing longer measurement times.

FREQUENCY RANGE	DETECTOR*	BANDWIDTH	MEASUREMENT TIME	STEPPED SCAN	TIME DOMAIN SCAN	R&S®ESW-B1000 970 MHZ WIDEBAND EXT.
150 kHz to 30 MHz	PK, QP, CAV	9 kHz	1 s	3:40 h	2 s	2 s
30 MHz to 1 GHz	PK, QP	120 kHz	1 s	9 h	~ 80 s	1.8 s
1 GHz to 6 GHz	PK, CAV	1 MHz	1 s	5:30 h	~ 300 s	23 s
1 GHz to 18 GHz	PK	1 MHz	15 ms	11:20 h	~ 20 s	14 s



Radiated emission test in semi-anechoic chamber below 1 GHz

The test setup complies with relevant commercial standards, including IEC, CISPR, EN, FCC, and ANSI. The distance between the antenna and the tested equipment depends on the size of the EUT volume.

Receiver input path

Dynamic range is critical for EMI testing with high power signals measured while keeping the noise floor below demanding limit lines to achieve full CISPR 16-1-1 compliance.

Conducted emission test

The R&S®EPL1000 is specially designed for conducted measurements up to 30 MHz. The conducted test setup is supplemented by the compact and low weight R&S®ENV216 Two-Line V-Network.

EMI testing solutions from Rohde & Schwarz

COMPLIANCE

R&S®ESW EMI TEST RECEIVER

High-end compliance testing up to 44 GHz with the highest speed, widest bandwidth, best analysis capabilities and lowest noise floor

- Frequency ranges from 1 Hz to 8 GHz, 26.5 GHz or 44 GHz
- Highest dynamic range and accuracy
- Ultrafast measurements with FFT-based time domain scan

R&S®ESR EMI TEST RECEIVER

Mid-range compliance testing up to 26.5 GHz with low noise floor and high testing speed at an attractive price

- Frequency range from 10 Hz to 3.6 GHz, 7 GHz or 26.5 GHz
- High dynamic range and accuracy

PRECOMPLIANCE

R&S®EPL EMI TEST RECEIVER

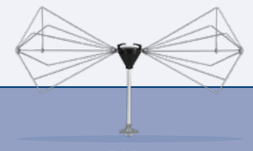
Compliance testing up to 30 MHz for conducted disturbances and magnetic fields; entry-level precompliance and optional compliance testing up to 7.125 GHz

- Testing from 5 kHz up to 30 MHz, 1 GHz or 7.125 GHz
- Precompliance and compliance testing
- Flexible option concept – buy what you need, upgrade at any time
- Fast time domain scan
- Four-channel click rate analyzer compliant to CISPR 14-1
- Battery operation for mains independent use
- Compact and highly mobile instrument

R&S®ESRP EMI TEST RECEIVER

Precompliance testing with high reliability and low noise floor thanks to preselection filters and time domain scan

- Frequency range from 10 Hz to 3.6 GHz or 7 GHz
- EMI measurement bandwidths and detectors in line with CISPR



R&S ANTENNAS

Wide range of antennas for radiated emission and susceptibility RF measurements


R&S®HL223: 200 MHz to 1.3 GHz


R&S®HK116E: 30 MHz to 300 MHz


R&S®HL562E: 30 MHz to 8 GHz


R&S®HF907: 800 MHz to 18 GHz


R&S®HF1444G14: 14.9 GHz to 44 GHz

R&S LISN

Line Impedance Stabilization Network (LISN) for conducted testing: Two- or four-line V-network for disturbance voltage measurements on single-phase or three-phase EUTs.


R&S®ENV216 2-line (16 A)


R&S®ENV432 4-line (32 A)


R&S®ENV4200 4-line (200 A)

SOFTWARE & ACCESSORIES


R&S®ELEKTRA Test Software


R&S®ESH3-Z2 Pulse limiter


R&S®ESCU08/R&S®ESCU18/ R&S®HZ-16 Pre-amplifiers


R&S®ESH2-Z3 Voltage Probe

R&S®EZ-17 Current Probe


R&S®HZ-15/R&S®HZ-17 Near Field Probe sets


R&S®HZ-1/R&S®LAS/ R&S®UAS/R&S®RAS Antenna Stands

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