

Version
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EMI Test Receiver R&S® ESU

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

Performance features

- ◆ Frequency ranges from 20 Hz to 8/26.5/40 GHz
- ◆ Excellent RF characteristics
- ◆ Very low measurement uncertainty
- ◆ Full compliance with CISPR 16-1-1 standard
- ◆ All commercial and military standards met

Measurement speed

- ◆ Extremely short total measurement times with time-domain scan (FFT) option
- ◆ Fast overview measurements in analyzer mode (sweep time min. 2.5 ms)
- ◆ Receiver mode with parallel realtime IF analysis
- ◆ Fast time-domain analysis (resolution starting at 10 μ s, monitoring time >2 h)
- ◆ Remote control via GPIB and LAN (Ethernet)

Innovative engineering

- ◆ All EMC detectors incl. CISPR-AV and CISPR-RMS
- ◆ Fully automatic measurements (preview/final measurement)
- ◆ Integrated report generator (PDF, HTML, RTF file format)
- ◆ Windows XP, USB interfaces e.g. for memory stick
- ◆ Removable hard disk (flash card) optional


ROHDE & SCHWARZ

Leading in performance

The R&S® ESU is a high-end EMI test receiver for standard-compliant measurements in accordance with CISPR 16-1-1 and meets all civil and military standards for EMI measurements.

The test receiver is available in three frequency ranges: from 20 Hz to 8 GHz, 26.5 GHz or 40 GHz.

The wide dynamic range combined with low inherent noise and low measurement uncertainty ensure high-quality test results. Comprehensive functions such as configurable RF scan, realtime IF analysis and fast Fourier transform (FFT) analysis for overview measurements provide accurate, quick and reliable solutions to any measurement problem. All detectors used today in EMI test and measurement (peak, AV, RMS, CISPR-AV and quasi-peak) as well as the CISPR-RMS detector, which will be im-

portant for evaluating interference in the future, are of digital design and ensure high stability and reproducibility of measurements.

The R&S® ESU family is based on the tried-and-tested concept of combining a test receiver and a spectrum analyzer in one box, which provides a full-compliance test receiver and a full-fledged, top-class spectrum analyzer.

High measurement speed

Measuring the EMI of a product is very complex and requires not only significant technical effort but also considerable time. In particular recording and evaluating RFI field strength is one of the most time-consuming tasks in EMI test and measurement.

The time-domain scan, which the R&S® ESU family offers as a commercial solution for the first time, is a new method for overview measurements

and is based on FFT. The test receivers perform extremely fast measurements in the time domain in consecutive frequency intervals, which considerably reduces the amount of time needed for a measurement. A frequency scan from 30 MHz to 1 GHz with an IF bandwidth of 9 kHz is more than 50 times faster than the frequency-domain scan, plus it yields much higher throughput and reduces the costs per measurement. The time-domain scan is available as the R&S® ESU-K53 option.

Simple, well-designed documentation

Easy-to-compile, conclusive and complete documentation of test results is highly important, especially in EMC test and measurement. The convenient report generator of the R&S® ESU family and editable templates make it easy to compile test reports. After the report has been finished, you can check it using the preview function and then print it for your own documentation or save it as a file in PDF, HTML or RTF format on a



data carrier (internal hard disk, optional flash card or USB stick). In addition, the screen content can be stored as a hard copy in BMF, WMF or EMF format and subsequently processed using a word processing program.

Detailed EMI tests made easy

Manual measurement is still the most effective means of identifying, locating and eliminating sources of electromagnetic interference. This is supported by the R&S® ESU's large-sized, high-resolution and easy-to-read color display, which presents all the necessary information at a glance. Besides displaying numeric data for the different detectors, the EMI test receiver displays this data in parallel by means of an analog bargraph. You can thus immediately see the effect of manipulations on the device under test. In the lower part of the screen, the instrument shows either the complete RFI spectrum with limit lines or the spectrum about the set receive frequency (with realtime IF analysis). The IF analysis in particular helps you to evaluate EMI and gives you an impression of the condition near the set measurement frequency.

Summary of highlights

EMI test receiver

- ◆ Full compliance with CISPR 16-1-1 standard
- ◆ Complex, internal preselection (can be switched off in analyzer mode)
- ◆ Integrated 20 dB preamplifier up to 3.6 GHz
- ◆ Wide choice of detectors incl. CISPR-AVG and CISPR-RMS
- ◆ 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 measurements (max. 2 million test points, measurement time $\geq 10 \mu\text{s}/\text{point}$)
- ◆ Fully and partially automatic measurements (preview measurement, data reduction, final measurement)

Spectrum analyzer

- ◆ Maximum dynamic range and minimum phase noise
- ◆ Sweep time
 - for span $> 10 \text{ Hz}$: 2.5 ms to 16 000 s
 - for zero span: 1 μs to 16 000 s
- ◆ Resolution bandwidths 10 Hz to 10 MHz in steps of 1/2/3/5
- ◆ FFT, RRC and channel filters
- ◆ Versatile and comprehensive evaluation facilities for lab applications (time-domain power, IP3 marker, noise/phase-noise marker, channel/adjacent-channel measurements)

Wide-ranging functionality

- ◆ Correction values (cable loss, antenna transducers) automatically taken into account, user-programmable transducer sets
- ◆ Saving of settings and test results on internal hard disk or via LAN or USB interface (on front and rear panels)
- ◆ Modern processor technology (Celeron M, Windows XP Embedded) and networking (GPIB, LAN, USB), Remote Desktop function
- ◆ Remote control via GPIB or LAN
- ◆ Drivers for LabView, LabWindows/CVI, VXI Plug & Play Instrument
- ◆ Compact design (weight approx. 16 kg)



Receiver mode (frequency/level display, bargraph display and continuous realtime IF analysis for set center frequency)



Receiver mode (spectrum display (scan) of preview measurement (PK+AV), limit lines and final measurement results with QP and AV evaluation)



Fast time-domain scan (FFT) with scan table editor



Template editor of report generator

Condensed data of the R&S®ESU

	R&S®ESU 8	R&S®ESU 26	R&S®ESU 40
Frequency range			
RF input 1	20 Hz to 8 GHz	20 Hz to 26.5 GHz	20 Hz to 40 GHz
RF input 2	20 Hz to 1 GHz		
Reference frequency	aging 1×10^{-7} /year, optionally 2×10^{-8} /year		
Spectral purity	<-120 dBc (1 Hz), typ. -123 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	can be switched between preselection and 1st mixer, 20 dB gain, frequency range 1 kHz to 3.6 GHz		
IF filter			
3 dB bandwidths	10 Hz to 10 MHz in steps of 1/2/3/5		
6 dB bandwidths	10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz, 1 MHz		
Detectors (receiver mode)	max. peak, min. peak, RMS, average, CISPR-AV, CISPR-RMS, quasi-peak		
Display range	displayed average noise level up to +30 dBm		

	R&S® ESU 8	R&S® ESU 26	R&S® ESU 40
Intermodulation			
Third-order intercept (IP3) (without preselection)	>+17 dBm		
1 dB compression of input mixer (<3.6 GHz)	+13 dBm nominal		
Displayed average noise level	analyzer mode, 0 dB RF attenuation, RBW = 10 Hz, VBW = 1 Hz, zero span		
Without preselector			
1 MHz	<-130 dBm		
10 MHz	<-143 dBm		
1 GHz	<-143 dBm	<-140 dBm	
8 GHz	<-140 dBm	<-142 dBm	<-140 dBm
13 GHz	-	<-140 dBm	
26 GHz	-	<-135 dBm	
40 GHz	-	-	<-128 dBm
With preselector, without preamplifier			
1 MHz	<-130 dBm		
10 MHz	<-143 dBm		
1 GHz	<-143 dBm		
3 GHz	<-135 dBm		
With preselector, with preamplifier			
1 MHz	<-145 dBm		
10 MHz	<-151 dBm		
1 GHz	<-150 dBm		
3 GHz	<-147 dBm		
Total measurement uncertainty			
f < 3.6 GHz	0.6 dB		
3.6 GHz ≤ f < 8 GHz	2.0 dB		
8 GHz ≤ f < 18 GHz	-	2.5 dB	
18 GHz ≤ f < 26.5 GHz	-	3.0 dB	
26.5 GHz ≤ f < 40 GHz	-	-	3.0 dB
Level display			
Display	625 × 500 pixels (one diagram), max. two diagrams with different settings		
Number of test points			
Analyzer mode	625 (standard value) 155 to 10 001 in steps of approx. factor 2		
Receiver mode	max. 2 000 000/trace		
General data			
Display	21 cm LC TFT color display (8.4")		
Power consumption	130 VA	150 VA	
Dimensions (W × H × D)	435 mm × 192 mm × 460 mm		
Weight	15.6 kg	16.7 kg	17.0 kg

Ordering information

Designation	Type	Order No.
EMI Test Receiver 20 Hz to 8 GHz	R&S® ESU 8	1302.6005.08
EMI Test Receiver 20 Hz to 26.5 GHz	R&S® ESU 26	1302.6005.26
EMI Test Receiver 20 Hz to 40 GHz	R&S® ESU 40	1302.6005.40
Options		
Removable Hard Disk (Flash Card) for R&S® ESU	R&S® ESU-B18	1303.0400.06
Second Hard Disk (Flash Card) for R&S® ESU-B18	R&S® ESU-B19	1303.0600.06
Time-Domain Scan (FFT)	R&S® ESU-K53	1305.8509.02
Low-Aging OXCO	R&S® FSU-B4	1144.9000.02
Tracking Generator 100 kHz to 3.6 GHz	R&S® FSU-B9	1142.8994.02
Attenuator for Tracking Generator R&S® FSU-B9	R&S® FSU-B12	1142.9349.02
External Generator Control	R&S® FSP-B10	1129.7246.03



More information at
www.rohde-schwarz.com
 (search term: ESU)



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