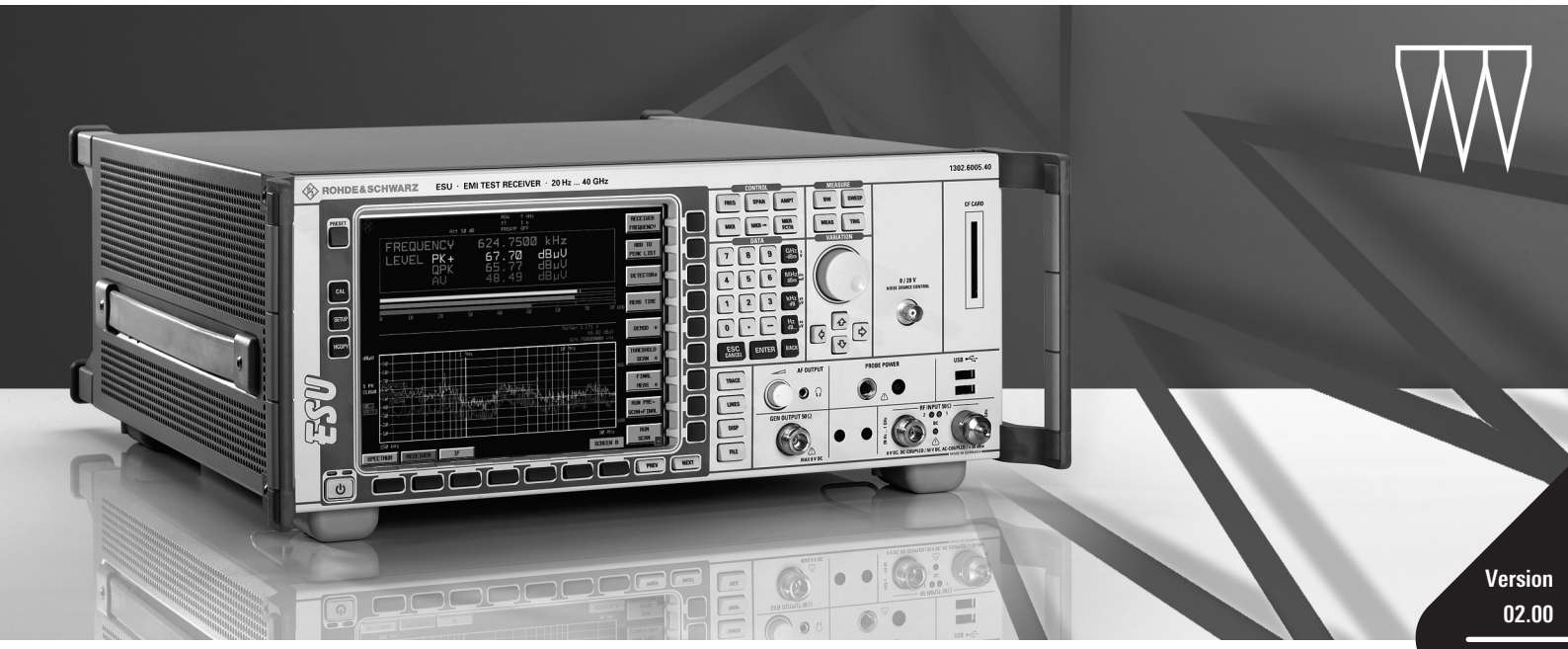

Version 02.00

October 2007

R&S®ESU EMI Test Receiver

Data sheet

ROHDE&SCHWARZ

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Specifications apply under the following conditions: 30 minutes warm-up time at ambient temperature, specified environmenttal conditions met, calibration cycle adhered to, and total calibration performed. Data without tolerances: typical values only. Data designated 'nominal' applies to design parameters and is not tested.

Base Unit

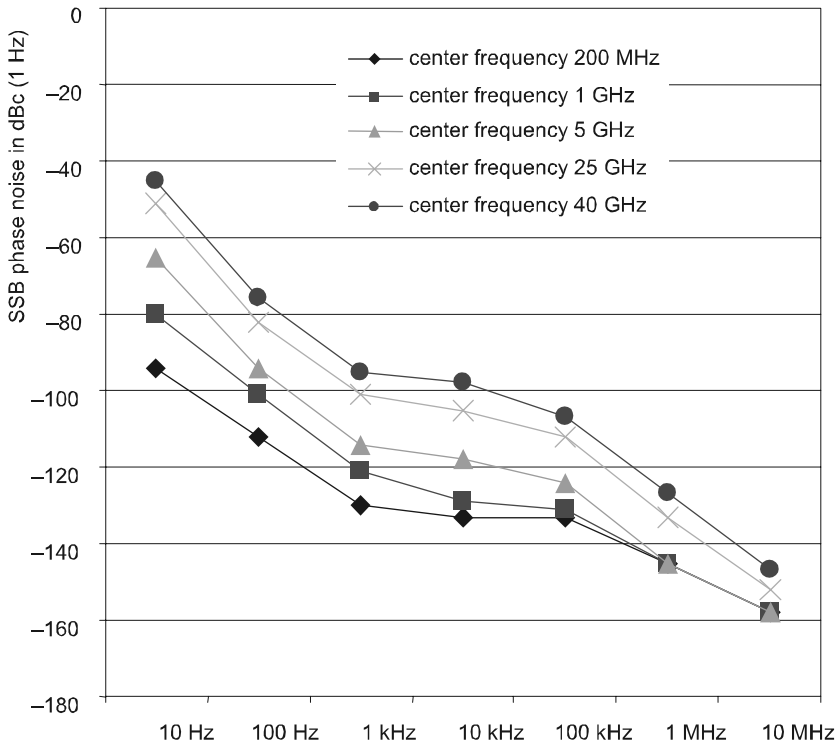
Frequency

Frequency range	R&S®ESU8	
	DC coupled	20 Hz to 8 GHz
	AC coupled	1 MHz to 8 GHz
	R&S®ESU26	
	DC coupled	20 Hz to 26.5 GHz
	AC coupled	10 MHz to 26.5 GHz
	R&S®ESU40	
	DC coupled	20 Hz to 40 GHz
	AC coupled	10 MHz to 40 GHz
	all models	
	DC coupled, input 2	20 Hz to 1 GHz
	AC coupled, input 2	9 kHz to 1 GHz
Frequency resolution		0.01 Hz

Reference frequency, internal, nominal	standard OCXO	
Aging per day	after 30 days of continuous operation	1×10^{-9}
Aging per year	after 30 days of continuous operation	1×10^{-7}
Temperature drift	+5° C to +45° C	8×10^{-8}
Total error	per year	1.8×10^{-7}
Reference frequency, internal, nominal	**option R&S®FSU-B4**	
Aging per day	after 30 days of continuous operation	2×10^{-10}
Aging per year	after 30 days of continuous operation	3×10^{-8}
Temperature drift	+5° C to +45° C	1×10^{-9}
Total error	per year	5×10^{-8}
External reference frequency		1 MHz to 20 MHz, 1 Hz steps

Frequency display		with marker or frequency counter
Marker resolution		span/624
Maximum deviation	sweep time >3 × auto sweep time	±(marker frequency × reference error + 0.5 % × span +10 % × resolution bandwidth + ½ (last digit))
Frequency counter resolution	selectable	0.1 Hz to 10 kHz
Count accuracy	S/N >25 dB	±(frequency × reference error + ½ (last digit))
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Max. span deviation		1 %

Spectral purity, SSB phase noise (1 Hz)	f = 640 MHz	
Residual FM	RBW 10 kHz, RMS	<1 Hz nominal
Carrier offset	10 Hz	<–73 dBc, nominal
	10 Hz with option R&S®FSU-B4 fitted	<–86 dBc, nominal
	100 Hz	<–98 dBc, typ. –104 dBc
	1 kHz	<–116 dBc, typ. –124 dBc
	10 kHz	<–128 dBc, typ. –133 dBc
	100 kHz	<–128 dBc, typ. –133 dBc
	1 MHz	<–140 dBc, typ. –146 dBc
	10 MHz	typ. –160 dBc



Receiver scan

Scan		scan with max. 10 subranges with different settings
Measurement time per frequency	selectable	10 µs to 100 s

Sweep

Sweep time	time sweep, span = 0 Hz	1 µs to 16000 s in steps of 5 %
	frequency sweep, span ≥10 Hz	2.5 ms to 16000 s in steps of ≤10 %
Max. deviation of sweep time		3 %
Measurement in time domain		with marker and cursor lines (resolution 31.25 ns)

Preselection

Preselection	can be switched off in analyzer mode	13 preselection filters
Bandwidth (–6 dB), nominal	20 Hz to 150 kHz	230 kHz, fixed lowpass filter
	150 kHz to 2 MHz	2.6 MHz, fixed bandpass filter
	2 MHz to 8 MHz	2 MHz, tracking bandpass filter
	8 MHz to 30 MHz	6 MHz, tracking bandpass filter
	30 MHz to 70 MHz	15 MHz, tracking bandpass filter
	70 MHz to 150 MHz	30 MHz, tracking bandpass filter
	150 MHz to 300 MHz	60 MHz, tracking bandpass filter
	300 MHz to 600 MHz	80 MHz, tracking bandpass filter
	600 MHz to 1 GHz	100 MHz, tracking bandpass filter
	1 GHz to 2 GHz	tracking highpass filter
	2 GHz to 3 GHz	fixed highpass filter
	3 GHz to 3.6 GHz	fixed highpass filter
	3.6 GHz to 8/26.5/40 GHz	60 MHz + f/500, YIG filter
Preamplifier	switchable between preselection and 1st mixer	
Range		1 kHz to 3.6 GHz
Gain		20 dB, nominal

IF and resolution bandwidths

3 dB bandwidths		10 Hz to 10 MHz in 1/2/3/5 sequence
Bandwidth uncertainty	10 Hz to 100 kHz (digital)	<3 %
	200 kHz to 5 MHz (analog)	<10 %
	10 MHz	–30 % to +10 %
Shape factor 60 dB:3 dB	≤100 kHz	<6
	200 kHz to 2 MHz	<12
	3 MHz to 10 MHz	<7

6 dB bandwidths		10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz, 1 MHz
Bandwidth uncertainty		3 %
Shape factor 60 dB:6 dB		<5

FFT filters (analyzer mode only)		
3 dB bandwidths		1 Hz to 30 kHz in 1/2/3/5 sequence
Bandwidth uncertainty		<5 %, nominal
Shape factor 60 dB:3 dB		<3, nominal

Channel filters		
Bandwidths		100, 200, 300, 500 Hz, 1, 1.5, 2, 2.4, 2.7, 3, 3.4, 4, 4.5, 5, 6, 8.5, 9, 10, 12.5, 14, 15, 16, 18 (RRC), 20, 21, 24.3 (RRC), 25, 30, 50, 100, 150, 192, 200, 300, 500 kHz, 1, 1.2288, 1.28 (RRC), 1.5, 2, 3, 3.84 (RRC), 4.096 (RRC), 5 MHz
	with option R&S®ESPI-K50:	5.6 MHz (ISDB-T, Japan), 6.0 MHz (DVB-T, USA), 6.4 MHz
Shape factor 60 dB:3 dB		<2, nominal
Bandwidth uncertainty		<2 %, nominal

Video bandwidths (analyzer mode only)		1 Hz to 10 MHz in 1/2/3/5 sequence

Level

Display range		displayed noise floor to 137 dBµV

Maximum input level		
DC voltage	RF input, AC coupled	50 V
	RF input, DC coupled	0 V
CW RF power	RF attenuation 0 dB	127 dBµV (= 0.1 W)
	RF attenuation ≥10 dB	137 dBµV (= 1.0 W)
Pulse spectral density		97 dBµV/MHz
Max. pulse voltage	RF attenuation ≥10 dB	
	input 1	150 V
	input 2	450 V
Max. pulse energy	RF attenuation ≥10 dB, 10 µs, input 1	1 mWs
	RF attenuation ≥10 dB, 10 µs, input 2	20 mWs

Intermodulation		
1 dB compression of input mixer	0 dB RF attenuation, preselection/preamplifier = OFF[1]	
	≤3.6 GHz	+13 dBm, nominal
	>3.6 GHz	
	R&S®ESU8	+10 dBm, nominal
	R&S®ESU26/40	+7 dBm, nominal
Third-order intercept point (TOI)	level 2 × –10 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger	
	preselection/preamplifier = OFF[1]	
	R&S®ESU8	
	10 MHz ≤ f_{in} < 300 MHz	>17 dBm, typ. 20 dBm
	300 MHz ≤ f_{in} < 3.6 GHz	>20 dBm, typ. 25 dBm
	3.6 GHz ≤ f_{in} ≤ 8 GHz	>18 dBm, typ. 23 dBm
	R&S®ESU26, R&S®ESU40	
	10 MHz ≤ f_{in} < 300 MHz	>17 dBm, typ. 20 dBm
	300 MHz ≤ f_{in} < 3.6 GHz	>22 dBm, typ. 27 dBm
	3.6 GHz ≤ f_{in} ≤ 26.5 GHz	>12 dBm, typ. 15 dBm
	R&S®ESU40	
	26.5 GHz < f_{in} ≤ 40 GHz	>12 dBm, typ. 15 dBm
	preselection = ON, preamplifier = OFF	
	10 MHz ≤ f_{in} < 300 MHz	>9 dBm, typ. 12 dBm
	300 MHz ≤ f_{in} ≤ 3.6 GHz	>12 dBm, typ. 15 dBm
	preselection = ON, preamplifier = ON	
	10 MHz ≤ f_{in} ≤ 3.6 GHz	>–10 dBm, typ. –7 dBm
Second harmonic intercept (SHI)	preselection/preamplifier = OFF[1]	
	f < 100 MHz	>35 dBm
	100 MHz < f_{in} ≤ 400 MHz	>45 dBm, typ. 55 dBm
	400 MHz < f_{in} ≤ 500 MHz	>52 dBm, typ. 60 dBm
	500 MHz < f_{in} ≤ 1 GHz	>45 dBm, typ. 55 dBm
	1 GHz < f_{in} ≤ 1.8 GHz	>35 dBm
	f_{in} > 1.8 GHz	>80 dBm, nominal
	preselection = ON, preamplifier = OFF	
	f_{in} < 100 MHz	>40 dBm
	100 MHz < f_{in} ≤ 1.8 GHz	>55 dBm, typ. 65 dBm
	preselection = ON, preamplifier = ON	
	f_{in} < 100 MHz	>35 dBm
	100 MHz < f_{in} ≤ 1.8 GHz	>45 dBm, typ. 55 dBm

Displayed average noise level (analyzer mode)		
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, preselection = OFF, preamplifier = OFF f < 10 kHz: 10 Hz FFT Filter, trace average, sweep count = 20 f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, span = 0 Hz, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	all models	
	20 Hz	<–90 dBm
	100 Hz	<–110 dBm
	1 kHz	<–120 dBm
	10 kHz	<–130 dBm
	100 kHz	<–130 dBm
	1 MHz	<–140 dBm
	10 MHz	<–153 dBm
	R&S®ESU8	
	20 MHz ≤ f < 1 GHz	<–154 dBm, typ. –158 dBm
	1 GHz ≤ f < 2 GHz	<–152 dBm, typ. –155 dBm
	2 GHz ≤ f < 3.6 GHz	<–148 dBm, typ. –151 dBm
	3.6 GHz ≤ f < 7 GHz	<–152 dBm, typ. –154 dBm
	7 GHz ≤ f ≤ 8 GHz	<–150 dBm, typ. –152 dBm

[1] Only available in analyzer mode.

	R&S®ESU26	
	20 MHz ≤ f < 1 GHz	<–152 dBm, typ. –156 dBm
	1 GHz ≤ f < 2 GHz	<–150 dBm, typ. –154 dBm
	2 GHz ≤ f < 3.6 GHz	<–147 dBm, typ. –150 dBm
	3.6 GHz ≤ f < 8 GHz	<–152 dBm, typ. –156 dBm
	8 GHz ≤ f < 13 GHz	<–150 dBm, typ. –153 dBm
	13 GHz ≤ f < 18 GHz	<–148 dBm, typ. –151 dBm
	18 GHz ≤ f < 22 GHz	<–147 dBm, typ. –150 dBm
	22 GHz ≤ f ≤ 26.5 GHz	<–145 dBm, typ. –148 dBm
	R&S®ESU40	
	20 MHz ≤ f < 1 GHz	<–152 dBm, typ. –156 dBm
	1 GHz ≤ f < 2 GHz	<–150 dBm, typ. –154 dBm
	2 GHz ≤ f < 3.6 GHz	<–147 dBm, typ. –150 dBm
	3.6 GHz ≤ f < 8 GHz	<–150 dBm, typ. –153 dBm
	8 GHz ≤ f < 13 GHz	<–148 dBm, typ. –151 dBm
	13 GHz ≤ f < 18 GHz	<–146 dBm, typ. –149 dBm
	18 GHz ≤ f < 22 GHz	<–145 dBm, typ. –147 dBm
	22 GHz ≤ f < 26.5 GHz	<–143 dBm, typ. –145 dBm
	26.5 GHz ≤ f < 33 GHz	<–141 dBm, typ. –144 dBm
	33 GHz ≤ f ≤ 40 GHz	<–138 dBm, typ. –141 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, preselection = ON, preamplifier = OFF f < 10 kHz: RBW = 10 Hz, VBW = 30 Hz, trace average, sample detector, sweep count = 20, mean marker f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, span = 0 Hz, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	all models	
	20 Hz	typ. <–90 dBm
	100 Hz	<–110 dBm
	1 kHz	<–120 dBm
	10 kHz	<–130 dBm
	100 kHz	<–130 dBm
	1 MHz	<–140 dBm
	10 MHz	<–153 dBm
	R&S®ESU8	
	20 MHz ≤ f < 2 GHz	<–155 dBm, typ. –158 dBm
	2 GHz ≤ f < 2.5 GHz	<–153 dBm, typ. –156 dBm
	2.5 GHz ≤ f < 3 GHz	<–150 dBm, typ. –153 dBm
	3 GHz ≤ f ≤ 3.6 GHz	<–145 dBm, typ. –148 dBm
	R&S®ESU26/40	
	20 MHz ≤ f < 1 GHz	<–155 dBm, typ. –158 dBm
	1 GHz ≤ f < 2 GHz	<–153 dBm, typ. –156 dBm
	2 GHz ≤ f < 2.5 GHz	<–151 dBm, typ. –154 dBm
	2.5 GHz ≤ f < 3 GHz	<–147 dBm, typ. –151 dBm
	3 GHz ≤ f ≤ 3.6 GHz	<–142 dBm, typ. –146 dBm
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, preselection = ON, preamplifier = ON f < 10 kHz: RBW = 10 Hz, VBW = 30 Hz, trace average, sample detector, sweep count = 20, mean marker f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, span = 0 Hz, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	all models	
	1 kHz	<–130 dBm
	10 kHz	<–140 dBm
	100 kHz	<–140 dBm
	1 MHz	<–150 dBm
	10 MHz	<–165 dBm
	R&S®ESU8	
	20 MHz ≤ f < 500 MHz	<–165 dBm, typ. –168 dBm
	500 MHz ≤ f < 2 GHz	<–163 dBm, typ. –166 dBm
	2 GHz ≤ f < 3 GHz	<–161 dBm, typ. –164 dBm
	3 GHz ≤ f ≤ 3.6 GHz	<–157 dBm, typ. –160 dBm
	R&S®ESU26/40	
	20 MHz ≤ f < 500 MHz	<–163 dBm, typ. –166 dBm
	500 MHz ≤ f < 2 GHz	<–161 dBm, typ. –164 dBm
	2 GHz ≤ f < 3 GHz	<–160 dBm, typ. –163 dBm
	3 GHz ≤ f ≤ 3.6 GHz	<–155 dBm, typ. –158 dBm

Noise indication (receiver mode)		
Nominal, calculated from DANL data		
	RF attenuation = 0 dB, termination = 50 Ω, average (AV) detector, preamplifier = OFF	
	all models	
	20 Hz, BW = 10 Hz	<27 dBµV
	100 Hz, BW = 10 Hz	<7 dBµV
	1 kHz, BW = 100 Hz	<7 dBµV
	10 kHz, BW = 200 Hz	<0 dBµV
	100 kHz, BW = 200 Hz	<0 dBµV
	1 MHz, BW = 9 kHz	<7 dBµV
	10 MHz, BW = 9 kHz	<–6 dBµV
	R&S®ESU8	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–8 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<3 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<12 dBµV
	2 GHz ≤ f < 2.5 GHz, BW = 1 MHz	<14 dBµV
	2.5 GHz ≤ f < 3 GHz, BW = 1 MHz	<17 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<22 dBµV
	3.6 GHz ≤ f < 7 GHz, BW = 1 MHz	<15 dBµV
	7 GHz ≤ f ≤ 8 GHz, BW = 1 MHz	<17 dBµV
	R&S®ESU26	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–8 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<3 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<12 dBµV
	2 GHz ≤ f < 2.5 GHz, BW = 1 MHz	<16 dBµV
	2.5 GHz ≤ f < 3 GHz, BW = 1 MHz	<20 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<25 dBµV
	3.6 GHz ≤ f < 8 GHz, BW = 1 MHz	<15 dBµV
	8 GHz ≤ f < 13 GHz, BW = 1 MHz	<17 dBµV
	13 GHz ≤ f < 18 GHz, BW = 1 MHz	<19 dBµV
	18 GHz ≤ f < 22 GHz, BW = 1 MHz	<20 dBµV
	22 GHz ≤ f ≤ 26.5 GHz, BW = 1 MHz	<22 dBµV
	R&S®ESU40	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–8 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<3 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<12 dBµV
	2 GHz ≤ f < 2.5 GHz, BW = 1 MHz	<16 dBµV
	2.5 GHz ≤ f < 3 GHz, BW = 1 MHz	<20 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<25 dBµV
	3.6 GHz ≤ f < 8 GHz, BW = 1 MHz	<17 dBµV
	8 GHz ≤ f < 13 GHz, BW = 1 MHz	<19 dBµV
	13 GHz ≤ f < 18 GHz, BW = 1 MHz	<21 dBµV
	18 GHz ≤ f < 22 GHz, BW = 1 MHz	<22 dBµV
	22 GHz ≤ f < 26.5 GHz, BW = 1 MHz	<24 dBµV
	26.5 GHz ≤ f < 33 GHz, BW = 1 MHz	<26 dBµV
	33 GHz ≤ f ≤ 40 GHz, BW = 1 MHz	<29 dBµV
	RF attenuation = 0 dB, termination = 50 Ω, average (AV) detector, preamplifier = ON	
	all models	
	1 kHz, BW = 100 Hz	<–3 dBµV
	10 kHz, BW = 200 Hz	<–10 dBµV
	100 kHz, BW = 200 Hz	<–10 dBµV
	1 MHz, BW = 9 kHz	<–3 dBµV
	10 MHz, BW = 9 kHz	<–18 dBµV
	R&S®ESU8	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–18 dBµV
	30 MHz ≤ f < 500 MHz, BW = 120 kHz	<–7 dBµV
	500 MHz ≤ f < 1 GHz, BW = 120 kHz	<–5 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<4 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<6 dBµV
	3 GHz ≤ f ≤ 3.6 GHz, BW = 1 MHz	<10 dBµV

	R&S®ESU26/40	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–16 dBµV
	30 MHz ≤ f < 500 MHz, BW = 120 kHz	<–5 dBµV
	500 MHz ≤ f < 1 GHz, BW = 120 kHz	<–3 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<6 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<7 dBµV
	3 GHz ≤ f ≤ 3.6 GHz, BW = 1 MHz	<11 dBµV
Increase of DANL relative to AV display	max peak	typ. +11 dB
	RMS	typ. +1 dB
	quasi peak	
	band A	typ. +3 dB
	band B	typ. +4 dB
	bands C and D	typ. +6 dB

Immunity to interference		
Image frequency	f ≤ 3.6 GHz	>90 dB suppression, typ. >110 dB
	f > 3.6 GHz	>70 dB suppression, typ. >100 dB
	f = receive frequency	
Intermediate frequency	f ≤ 3.6 GHz	>90 dB suppression, typ. >110 dB
	3.6 GHz < f ≤ 4.2 GHz	typ. 70 dB suppression
	f > 4.2 GHz	>70 dB suppression, typ. >90 dB
	f = receive frequency	
Spurious response	f > 1 MHz, without input signal, RF attenuation = 0 dB, termination = 50 Ω	<–103 dBm
Other interfering signals	Δf > 100 kHz	
	mixer level <–10 dBm, f_{in} ≤ 2.3 GHz	<–80 dBc
	mixer level <–35 dBm, 2.3 GHz <f_{in}<4 GHz	<–70 dBc
	mixer level <–10 dBm	
	4 GHz ≤ f < 8 GHz	<–70 dBc
	8 GHz ≤ f < 16 GHz	<–64 dBc
	16 GHz ≤ f < 26 GHz	<–58 dBc
	26.5 GHz ≤ f < 40 GHz	<–52 dBc
	f = receive frequency	

Level display (analyzer mode)		
Screen		625 × 500 pixels (one diagram), max. 2 diagrams with independent settings
Logarithmic level axis		1 dB to 200 dB, in steps of 1/2/5
Linear level axis		10 % of reference level per level division, 10 divisions or logarithmic scaling
Number of traces	1 measurement diagram	3
	2 measurement diagrams	6
Trace detector		max peak, min peak, auto peak (normal), sample, RMS, average, quasi peak, CISPR-AV, CISPR-RMS
Number of measurement points	default value	625
	range	155 to 30001 in steps of about a factor of 2
Trace functions		clear/write, max hold, min hold, average
Trace update rate	local measurement, display update rate, 625 points, zero span	80 per second
	remote measurement, display off:	
	zero span/sweep time 1 ms	70 per second
	span = 10 MHz, sweep time 2.5 ms	50 per second
Setting range of reference level	logarithmic level display	–130 dBm to (+5 dBm + RF attenuation), max. 30 dBm, in steps of 0.1 dB
	linear level display	7.0 nV to 7.07 V in steps of 1 %
Units of level axis	logarithmic level display	dBm, dBµV, dBmV, dBµA, dBpW
	linear level display	µV, mV, µA, mA, pW, nW

Level display (receiver mode)		
Screen		625 x 500 pixels, max. 2 diagrams
Level display	analog	numeric; 0.01 dB resolution
	digital	bargraph display, separately for each detector
Detectors	max. 3 selectable	max peak, min peak, RMS, average, CISPR-AV, CISPR-RMS, quasi peak
Measurement time	selectable	5 µs to 100 s
Units of level axis	logarithmic level display	dBm, dBµV, dBmV, dBµA, dBpW, dBpT
RF spectrum		
Logarithmic level axis		10 dB to 200 dB, in steps of 10
Frequency axis	selectable	linear or logarithmic
Number of traces		3
IF spectrum		
Span	selectable	1 kHz to 10 MHz, depending on RBW
Resolution bandwidth	selectable	10 Hz to 100 kHz
Detector		sample
Logarithmic level axis		80 dB to 120 dB, depending on RBW, selectable 10 dB to 200 dB
Frequency axis		linear
Number of traces		3

Level measurement uncertainty		
Absolute level uncertainty at 128 MHz	RBW = 10 kHz, level –30 dBm, reference level –30 dBm, RF attenuation 10 dB	
	preselection = OFF, preamplifier = OFF[2]	<0.2 dB (σ = 0.07 dB)
	preselection/preamplifier = ON	<0.3 dB (σ = 0.1 dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥10 dB, preselection= OFF, preamplifier = OFF[2]	
	+20 °C to +30 °C	
	20 Hz to 10 MHz	<0.5 dB (σ = 0.16 dB)
	10 MHz ≤ f < 2 GHz	<0.3 dB (σ = 0.1 dB)
	2 GHz ≤ f < 3.6 GHz	<0.5 dB (σ = 0.16 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	<1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f ≤ 40 GHz, span < 1 GHz	<2 dB (σ = 0.7 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	+5 °C to +45 °C	
	20 Hz ≤ f < 3.6 GHz	<0.6 dB (σ = 0.2 dB)
	3.6 GHz ≤ f < 26.5 GHz	add 0.5 dB to above values
	f ≥ 26.5 GHz	add 1.0 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥10 dB, preselection/preamplifier = ON	
	+20 °C to +30 °C	
	20 Hz to 10 MHz	<0.8 dB (σ = 0.26 dB)
	10 MHz ≤ f < 2 GHz	<0.6 dB (σ = 0.2 dB)
	2 GHz ≤ f ≤ 3.6 GHz	<0.8 dB (σ = 0.26 dB)
	+5 °C to ≤ +45 °C	
	20 Hz ≤ f ≤ 3.6 GHz	<0.9 dB (σ = 0.26 dB)
Attenuator switching uncertainty	f = 128 MHz	<0.2 dB (σ = 0.07 dB)
	0 dB to 70 dB, referenced to 10 dB attenuation	
Uncertainty of reference level setting	RF attenuation 10 dB, referenced to –10 dBm reference level setting	<0.15 dB (σ = 0.05 dB)
Quasi-peak display		in line with CISPR 16-1

[2] Only available in analyzer mode.

Display nonlinearity	+20 °C to +30 °C, mixer level ≤–10 dBm	
Logarithmic level display	RBW ≤100 kHz or channel filters, S/N >20 dB	
	0 dB to –70 dB	<0.1 dB (σ = 0.03 dB)
	–70 dB to –90 dB	<0.3 dB (σ =0.1 dB)
	200 kHz ≤ RBW ≤10 MHz, S/N >16 dB	
	0 dB to –50 dB	<0.2 dB (σ = 0.07 dB)
	–50 dB to –70 dB	<0.5 dB (σ = 0.17 dB)
Linear level display		5 % of reference level
Bandwidth switching error	referenced to RBW = 10 kHz	
	1 Hz to 100 kHz	<0.1 dB (σ = 0.03 dB)
	200 kHz to 3 MHz	<0.2 dB (σ = 0.07 dB)
	5 MHz to 10 MHz	<0.5 dB (σ = 0.15 dB)
	FFT filter 1 Hz to 3 kHz	<0.2 dB (σ = 0.07 dB)

Total measurement uncertainty	signal level 0 dB to –70 dB below reference level, S/N >20 dB, 10 dB ≤ RF attenuation ≤ 40 dB, span/RBW <100, 95 % confidence level, +20 °C to +30 °C, mixer level ≤–10 dBm, preselection = OFF, preamplifier = OFF[3]	
	10 MHz ≤ f < 2 GHz, RBW ≤100 kHz	0.3 dB
	2 GHz ≤ f < 3.6 GHz, RBW ≤100 kHz	0.5 dB
	10 MHz ≤ f < 3.6 GHz, RBW >100 kHz	0.5 dB
	3.6 GHz ≤ f < 8 GHz	1.2 dB
	8 GHz ≤ f ≤ 40 GHz	1.5 dB
	signal level 0 dB to –70 dB below reference level, S/N >20 dB, 10 dB ≤ RF attenuation ≤ 40 dB, span/RBW <100, 95 % confidence level, +20 °C to +30 °C, mixer level ≤–10 dBm, preselection/preamplifier = ON	
	10 MHz ≤ f < 2 GHz, RBW ≤100 kHz	0.5 dB
	2 GHz ≤ f ≤ 3.6 GHz, RBW ≤100 kHz	0.8 dB
	10 MHz ≤ f ≤ 3.6 GHz, RBW >100 kHz	0.8 dB

I/Q data

General		
Interface		GPIB or LAN interface
Sampling rate		programmable: 10 kHz to 81.6 MHz in steps of 0.1 Hz
ADC resolution		14 bit
I/Q memory		16 Msamples each for I and Q data

RF path		
Max. information bandwidth		7 MHz
Harmonic distortion	full-scale input signal	typ. <–70 dBc
Third order distortion	two input tones 6 dB below full scale	typ. <–80 dBc
LO feedthrough	$f_{I/Q}$ = 81.6 MHz – f_{center}, mixer level = –10 dBm	typ. <–65 dBfs
Aliased DC offset	$f_{I/Q}$ = 20.4 MHz; within ±10 K temperature change after I/Q or total calibration	typ. <–65 dBfs

Frequency response	within 2/3 RBW; RBW = 3/5/10 MHz	
	f ≤ 3.6 GHz	typ. 0.3 dB
Deviation from linear phase	within 2/3 RBW; RBW = 3/5/10 MHz	
	f ≤ 3.6 GHz	typ. 1°

Audio demodulation

AF demodulation types		AM and FM
Audio output		loudspeaker and phone jack
Marker stop time in spectrum mode		100 ms to 60 s

[3] Only available in analyzer mode.

Trigger functions

Trigger		
Trigger source	analyzer mode	free run, video, external, IF level (mixer level 10 dBm to –50 dBm)
	receiver mode	free run, video, external
Trigger offset	analyzer mode, span ≥10 Hz	125 ns to 100 s, resolution min. 125 ns (or 1 % of offset)
	analyzer mode, span = 0 Hz	± (125 ns to 100 s), resolution min. 125 ns, depending on sweep time
Max. deviation of trigger offset	analyzer mode	± (31.25 ns + (0.1 % × trigger offset))
Gated sweep (analyzer mode)		
Gate source		external, IF level, video
Gate delay		1 µs to 100 s
Gate length		125 ns to 100 s, resolution min. 125 ns or 1 % of gate length
Max. deviation of gate length		± (31.25 ns + (0.05 % × gate length))

Inputs and outputs (front panel)

RF input		
Impedance		50 Ω
Connector	input 1	
	R&S®ESU8	N female
	R&S®ESU26	test port adapter APC 3.5 mm/N female
	R&S®ESU40	test port adapter 2.92 mm (K)/N female
	input 2	N female
VSWR	RF attenuation ≥10 dB, DC coupled	
	f ≤ 1 GHz	<1.2
	1 GHz < f < 3.6 GHz	<1.5
	R&S®ESU8	
	3.6 GHz ≤ f ≤ 8 GHz	<2
	R&S®ESU26/40	
	3.6 GHz ≤ f < 18 GHz	<1.8
	18 GHz ≤ f < 26.5 GHz	<2.0
	26.5 GHz ≤ f ≤ 40 GHz	<2.5
	RF attenuation <10 dB, DC coupled, +5 °C to +30 °C	
	f ≤ 1 GHz	<2.0
	f > 1 GHz	<3.0
	RF attenuation ≥10 dB, AC coupled	
	input 1	
	20 MHz ≤ f ≤ 1 GHz	<1.2
	1 GHz < f < 18 GHz	typ. 1.8
	18 GHz ≤ f < 26.5 GHz	typ. 2.0
	26.5 GHz ≤ f ≤ 40 GHz	typ. 2.5
	input 2	
	100 kHz ≤ f ≤ 1 GHz	<1.2
Setting range of attenuator		0 dB to 75 dB, in steps of 5 dB

Probe power supply		
Supply voltages		+15 V DC, –12.6 V DC and ground, max. 150 mA, nominal

Power supply for antennas etc		5-pin connector
Supply voltages		±10 V and ground, max. 100 mA, nominal

USB interface		type A plug, version 2.0
AF output		3.5 mm mini jack
Output impedance		10 Ω
Open-circuit voltage		up to 1.5 V, adjustable
Power supply for noise source		BNC female
Output voltage		0 V and 28 V, switchable, nominal

Inputs and outputs (rear panel)

IF 20.4 MHz		BNC female
Impedance		50 Ω
Bandwidth	RBW ≤30 kHz	1.67 × resolution bandwidth, min. 2.6 kHz
	RBW = 50 kHz, 100 kHz	400 kHz
	200 kHz ≤ RBW ≤10 MHz	equal to resolution bandwidth
Level	RBW ≤100 kHz, FFT filter, mixer level > –70 dBm	–20 dBm at reference level
	RBW = 200 kHz to 10 MHz, mixer level > –50 dBm	0 dBm at reference level

Video output		BNC female
Impedance		50 Ω
Output voltage	RBW ≥200 kHz, logarithmic scaling, full scale	0 V to 1 V (EMF)

Reference output		BNC female
Impedance		50 Ω
Output frequency	internal reference	10 MHz
	external reference	same as reference input signal
Level		>0 dBm, nominal

Reference input		BNC female
Impedance		50 Ω
Input frequency range		1 MHz ≤ f_{in} ≤ 20 MHz, in steps of 1 Hz
Required level		>0 dBm from 50 Ω

Sweep output		BNC female
Output voltage		0 V to 5 V, proportional to displayed frequency

External trigger/gate input		BNC female
Trigger voltage		0.5 V to 3.5 V
Input impedance		≥10 kΩ

IEC/IEEE bus control		interface in line with IEC 625-2 (IEEE 488.2)
Command set		SCPI 1997.0 or HP8566 compatible
Connector		24-pin Amphenol female
Interface functions		SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0

LAN interface		10/100BaseT, RJ-45
USB interface	upper connector	type A plug, version 1.1
	lower connector	type A plug, version 2.0
Serial interface		RS-232-C (COM), 9-pin female connectors
Printer interface		parallel (Centronics compatible)
Mouse interface		PS/2 compatible
Connector for external monitor (VGA)		15-pin D-Sub

General specifications

Display		21 cm LC TFT color display (8.4")
Resolution		800 × 600 pixels (SVGA resolution)
Pixel failure rate		$<1 \times 10^{-5}$

Mass memory		
Mass memory		hard disk
	option R&S®ESU-B18	hard disk replaced by a flash disk
Data storage		>500 instrument settings and traces

Temperature	operating temperature range	+5° C to +40 °C
	permissible temperature range	+0° C to +50 °C
	storage temperature range	–40°C to +70 °C
Climatic loading		+40 °C at 95 % relative humidity (in line with EN 60068-2-30: 2000-02)

Mechanical resistance	sinusoidal vibration	5 Hz to 150 Hz, max. 2 g at 55 Hz; 0.5 g from 55 Hz to 150 Hz; in line with EN 60068-2-6: 1996-05, EN 60068-2-30: 2000-02, EN 61010-1, MIL-T-28800D, class 5
	random vibration	10 Hz to 100 Hz, acceleration 1 g (RMS)
	shock	40 g shock spectrum, in line with MIL-STD-810C and MIL-T-28800D, classes 3 and 5
Recommended calibration interval	operation with external reference	2 years
	operation with internal reference	1 year
RFI suppression		Complies with European EMC Directive 89/336/EEC and new EMC Directive 2004/108/EC including: IEC/EN 61326 Class B (Emission) CISPR 11/EN 55011/Group 1 Class B (Emission) IEC/EN 61326 Table A.1 (Immunity, Industrial)

Power supply		
AC supply		100 V to 240 V, 50 Hz to 400 Hz
Rated power consumption		3.1 A to 1.3 A or 500 VA
Power consumption	R&S®ESU8	typ. 130 VA
	R&S®ESU26/40	typ. 150 VA
Safety		in line with EN 61010-1, UL 61010B-1, CSA C22.2 No. 1010-1, IEC 61010-1
Test mark		VDE, GS, CSA, CSA-NRTL
Dimensions	W × H × D	435 mm × 192 mm × 460 mm (17,13 in × 7,56 in × 18,11 in)
Weight net, w/o options, nominal	R&S®ESU8	15.6 kg (34.4 lb)
	R&S®ESU26	16.7 kg (36.8 lb)
	R&S®ESU40	17.0 kg (37.5 lb)

R&S®FSU-B9 Tracking Generator, R&S®FSU-B12 Attenuator for Tracking Generator

Unless specified otherwise, specifications not valid for frequency range from –3 × RBW to +3 × RBW, however at least not valid from –100 kHz to +100 kHz. Maximum output level +5 dBm (peak modulation in the case of amplitude-modulated signals).

Frequency		
Frequency range		100 kHz to 3.6 GHz
Resolution		1 Hz
Frequency offset		
Setting range		±200 MHz
Resolution		1 Hz

Spectral purity		
SSB phase noise	f = 500 MHz, carrier offset 10 kHz	
	normal mode	typ. –120 dBc (1 Hz)
	with frequency offset	typ. –110 dBc (1 Hz)
	with FM modulation on	typ. –110 dBc (1 Hz)

Level		
Level setting range		–30 dBm to +5 dBm in steps of 0.1 dB
	with option R&S®FSU-B12	–100 dBm to +5 dBm in steps of 0.1 dB

Max. deviation of output level		
Absolute	f = 128 MHz, output level –20 dBm to 0 dBm	<1 dB (σ = 0.34 dB)
Frequency response	referenced to level at 128 MHz, sweep time >100 ms, +5 °C to +45 °C	
	output level –20 dBm to 0 dBm, 100 kHz to 3.6 GHz	<3 dB, typ. 1.9 dB
	output level –30 dBm to –20 dBm, f = 100 kHz to 3.6 GHz	3 dB
	additional deviation with R&S®FSU-B12, 100 kHz to 3.6 GHz	<1 dB

Dynamic range		
Attenuation measurement range	RBW = 1 kHz, f > 10 MHz	100 dB
Harmonics	output level –10 dBm	typ. –30 dBc
Spurious, nonharmonics	output level 0 dBm	typ. –30 dBc

Modulation		
Modulation format	external	I/Q, AM, FM
Input voltage	full scale	
	AM, FM, V pp	1 V
	I/Q	$\sqrt{U_i^2 + U_q^2}$ = 0.5 V
AM	$f_{center} > f_{mod}$, span = 0 Hz	
Modulation depth		0 % to 99 %
Modulation frequency response	0 Hz to 5 MHz	1 dB
	0 Hz to 30 MHz	3 dB
FM	$f_{center} > f_{mod}$, span = 0 Hz	
Frequency deviation		full range: 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz
Modulation frequency range	deviation ≤10 MHz	0 Hz to 1 kHz
	deviation ≤1 MHz	0 Hz to 100 kHz
Modulation frequency response	0 kHz to 100 kHz	1 dB
I/Q modulation	$f_{center} > f_{mod}$, span = 0 Hz	
Modulation frequency response	0 Hz to 5 MHz	1 dB
	0 Hz to 30 MHz	3 dB
Modulation deviation of tracking generator	I/Q modulation, typical values, baseband signals generated by the R&S®AMIQ	
EVM	NADC/TETRA/PDC	
	RMS	2 %
	peak	4 %
	PHS	
	RMS	2 %
	peak	5 %
Phase error	GSM/DCS1800/PCS1900	
	RMS	1.5°
	peak	5°
Rho factor	IS-95 CDMA	0.997

Inputs and outputs (front panel)		
RF output		N female, 50 Ω
VSWR	100 kHz ≤ f < 2 GHz	1.2
	2 GHz ≤ f ≤ 3.6 GHz	1.5

Inputs and outputs (rear panel)		
TG I/AM IN		BNC female
Impedance		50 Ω
Input voltage	V_{pp}	1 V
TG Q/FM IN		BNC female
Impedance		50 Ω
Input voltage	V_{pp}	1 V

R&S®ESU-B24 Low-Noise Preamplifier

Frequency range	R&S®ESU8	100 kHz to 8 GHz
	R&S®ESU26	100 kHz to 26.5 GHz
	R&S®ESU40	100 kHz to 40 GHz
Nominal gain		30 dB
Displayed average noise level (DANL) (analyzer mode)		
	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW, preselection = OFF, preamplifier = OFF, low-noise preamplifier = OFF f < 10 kHz: 10 Hz FFT Filter, trace average, sweep count = 20, f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, span = 0 Hz, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	all models	
	20 Hz	<–90 dBm
	100 Hz	<–110 dBm
	1 kHz	<–120 dBm
	10 kHz	<–130 dBm
	100 kHz	<–130 dBm
	1 MHz	<–140 dBm
	10 MHz	<–153 dBm
	R&S®ESU8:	
	20 MHz ≤ f < 1 GHz	<–154 dBm, typ. –158 dBm
	1 GHz ≤ f < 2 GHz	<–151 dBm, typ. –155 dBm
	2 GHz ≤ f < 3 GHz	<–146 dBm, typ. –149 dBm
	3 GHz ≤ f < 3.6 GHz	<–145 dBm, typ. –148 dBm
	3.6 GHz ≤ f < 5 GHz	<–148 dBm, typ. –151 dBm
	5 GHz ≤ f < 6 GHz	<–147 dBm, typ. –150 dBm
	6 GHz ≤ f ≤ 8 GHz	<–144 dBm, typ. –147 dBm
	R&S®ESU26:	
	20 MHz ≤ f < 1 GHz	<–152 dBm, typ. –156 dBm
	1 GHz ≤ f < 2 GHz	<–150 dBm, typ. –154 dBm
	2 GHz ≤ f < 3.6 GHz	<–145 dBm, typ. –148 dBm
	3.6 GHz ≤ f < 10 GHz	<–147 dBm, typ. –150 dBm
	10 GHz ≤ f < 18 GHz	<–145 dBm, typ. –149 dBm
	18 GHz ≤ f < 22 GHz	<–142 dBm, typ. –145 dBm
	22 GHz ≤ f ≤ 26.5 GHz	<–140 dBm, typ. –143 dBm
	R&S®ESU40:	
	20 MHz ≤ f < 1 GHz	<–152 dBm, typ. –156 dBm
	1 GHz ≤ f < 2 GHz	<–150 dBm, typ. –154 dBm
	2 GHz ≤ f < 3.6 GHz	<–145 dBm, typ. –148 dBm
	3.6 GHz ≤ f < 10 GHz	<–147 dBm, typ. –150 dBm
	10 GHz ≤ f < 18 GHz	<–145 dBm, typ. –149 dBm
	18 GHz ≤ f < 22 GHz	<–142 dBm, typ. –145 dBm
	22 GHz ≤ f < 26.5 GHz	<–140 dBm, typ. –143 dBm
	26.5 GHz ≤ f < 32 GHz	<–135 dBm, typ. –138 dBm
	32 GHz ≤ f ≤ 40 GHz	<–133 dBm, typ. –135 dBm

	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW preselection = ON, preamplifier = OFF f < 10 kHz: RBW = 10 Hz, VBW = 30 Hz, trace average, sample detector, sweep count = 20, mean marker f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, span = 0 Hz, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	all models	
	20 Hz	typ. <–90 dBm
	100 Hz	<–110 dBm
	1 kHz	<–120 dBm
	10 kHz	<–130 dBm
	100 kHz	<–130 dBm
	1 MHz	<–140 dBm
	10 MHz	<–153 dBm
	R&S®ESU8:	
	20 MHz ≤ f < 2 GHz	<–155 dBm, typ. –158 dBm
	2 GHz ≤ f < 2.5 GHz	<–151 dBm, typ. –154 dBm
	2.5 GHz ≤ f < 3 GHz	<–148 dBm, typ. –151 dBm
	3 GHz ≤ f < 3.6 GHz	<–142 dBm, typ. –145 dBm
	3.6 GHz ≤ f < 5 GHz	<–148 dBm, typ. –151 dBm
	5 GHz ≤ f < 6 GHz	<–147 dBm, typ. –150 dBm
	6 GHz ≤ f ≤ 8 GHz	<–144 dBm, typ. –147 dBm
	R&S®ESU26:	
	20 MHz ≤ f < 2 GHz	<–152 dBm, typ. –156 dBm
	2 GHz ≤ f < 3 GHz	<–147 dBm, typ. –151 dBm
	3 GHz ≤ f < 3.6 GHz	<–142 dBm, typ. –145 dBm
	3.6 GHz ≤ f < 10 GHz	<–147 dBm, typ. –150 dBm
	10 GHz ≤ f < 18 GHz	<–145 dBm, typ. –149 dBm
	18 GHz ≤ f < 22 GHz	<–142 dBm, typ. –145 dBm
	22 GHz ≤ f ≤ 26.5 GHz	<–140 dBm, typ. –143 dBm
	R&S®ESU40:	
	20 MHz ≤ f < 2 GHz	<–152 dBm, typ. –156 dBm
	2 GHz ≤ f < 3 GHz	<–147 dBm, typ. –151 dBm
	3 GHz ≤ f < 3.6 GHz	<–142 dBm, typ. –145 dBm
	3.6 GHz ≤ f < 10 GHz	<–147 dBm, typ. –150 dBm
	10 GHz ≤ f < 18 GHz	<–145 dBm, typ. –149 dBm
	18 GHz ≤ f < 22 GHz	<–142 dBm, typ. –145 dBm
	22 GHz ≤ f < 26.5 GHz	<–140 dBm, typ. –143 dBm
	26.5 GHz ≤ f < 32 GHz	<–135 dBm, typ. –138 dBm
	32 GHz ≤ f ≤ 40 GHz	<–133 dBm, typ. –135 dBm

	RF attenuation = 0 dB, termination = 50 Ω, log. scaling, normalized to 1 Hz RBW preselection = ON, preamplifier = ON[4] f < 10 kHz: RBW = 10 Hz, VBW = 30 Hz, trace average, sample detector, sweep count = 20, mean marker f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, span = 0 Hz, sweep time = 50 ms, trace average, sample detector, sweep count = 20, mean marker	
	all models	
	1 kHz	<–130 dBm
	10 kHz	<–140 dBm
	100 kHz	<–140 dBm
	1 MHz	<–150 dBm
	10 MHz	<–165 dBm
	R&S®ESU8:	
	20 MHz ≤ f < 500 MHz	<–165 dBm, typ. –168 dBm
	500 MHz ≤ f < 2 GHz	<–162 dBm, typ. –165 dBm
	2 GHz ≤ f < 3 GHz	<–159 dBm, typ. –162 dBm
	3 GHz ≤ f < 3.6 GHz	<–154 dBm, typ. –157 dBm
	3.6 GHz ≤ f < 6 GHz	<–162 dBm, typ. –165 dBm
	6 GHz ≤ f ≤ 8 GHz	<–160 dBm, typ. –163 dBm
	R&S®ESU26:	
	20 MHz ≤ f < 2 GHz	<–162 dBm, typ. –165 dBm
	2 GHz ≤ f < 3 GHz	<–158 dBm, typ. –161 dBm
	3 GHz ≤ f < 3.6 GHz	<–155 dBm, typ. –158 dBm
	3.6 GHz ≤ f < 13 GHz	<–165 dBm, typ. –168 dBm
	13 GHz ≤ f < 22 GHz	<–163 dBm, typ. –165 dBm
	22 GHz ≤ f ≤ 26.5 GHz	<–160 dBm, typ. –163 dBm
	R&S®ESU40:	
	20 MHz ≤ f < 2 GHz	<–162 dBm, typ. –165 dBm
	2 GHz ≤ f < 3 GHz	<–158 dBm, typ. –161 dBm
	3 GHz ≤ f < 3.6 GHz	<–155 dBm, typ. –158 dBm
	3.6 GHz ≤ f < 13 GHz	<–165 dBm, typ. –168 dBm
	13 GHz ≤ f < 22 GHz	<–163 dBm, typ. –165 dBm
	22 GHz ≤ f < 32 GHz	<–160 dBm, typ. –163 dBm
	32 GHz ≤ f ≤ 40 GHz	<–155 dBm, typ. –158 dBm
	0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, preselection = OFF, preamplifier = OFF, low-noise preamplifier = ON RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, trace average, sweep count = 20, mean marker	
	all models	
	100 kHz	<–140 dBm
	1 MHz	<–150 dBm
	10 MHz	<-163 dBm
	R&S®ESU8	
	20 MHz ≤ f < 2 GHz	<–165 dBm, typ. –168 dBm
	2 GHz ≤ f < 3.6 GHz	<–163 dBm, typ. –166 dBm
	3.6 GHz ≤ f < 6 GHz	<–162 dBm, typ. –165 dBm
	6 GHz ≤ f ≤ 8 GHz	<–160 dBm, typ. –163 dBm
	R&S®ESU26:	
	20 MHz ≤ f < 2 GHz	<–164 dBm, typ. –167 dBm
	2 GHz ≤ f < 3 < 3.6 GHz	<–163 dBm, typ. –166 dBm
	3.6 GHz ≤ f < 13 GHz	<–165 dBm, typ. –168 dBm
	13 GHz ≤ f < 22 GHz	<–163 dBm, typ. –166 dBm
	22 GHz ≤ f ≤ 26.5 GHz	<–160 dBm, typ. –163 dBm
	R&S®ESU40:	
	20 MHz ≤ f < 2 GHz	<–164 dBm, typ. –167 dBm
	2 GHz ≤ f < 3 < 3.6 GHz	<–163 dBm, typ. –166 dBm
	3.6 GHz ≤ f < 13 GHz	<–165 dBm, typ. –168 dBm
	13 GHz ≤ f < 22 GHz	<–163 dBm, typ. –166 dBm
	22 GHz ≤ f < 32 GHz	<–160 dBm, typ. –163 dBm
	32 GHz ≤ f ≤ 40 GHz	<–155 dBm, typ. –158 dBm

[4] With option R&S®ESU-B24 the frequency range of the preamplifier is extended to the upper frequency limit of the instrument.

Noise indication (receiver mode)		
Nominal, calculated from DANL data		
	RF attenuation = 0 dB, termination = 50 Ω, average (AV) detector, preamplifier = OFF	
	all models	
	20 Hz, BW = 10 Hz	<27 dBµV
	100 Hz, BW = 10 Hz	<7 dBµV
	1 kHz, BW = 100 Hz	<7 dBµV
	10 kHz, BW = 200 Hz	<0 dBµV
	100 kHz, BW = 200 Hz	<0 dBµV
	1 MHz, BW = 9 kHz	<7 dBµV
	10 MHz, BW = 9 kHz	<–6 dBµV
	R&S®ESU8:	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–8 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<3 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<12 dBµV
	2 GHz ≤ f < 2.5 GHz, BW = 1 MHz	<16 dBµV
	2.5 GHz ≤ f < 3 GHz, BW = 1 MHz	<19 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<25 dBµV
	3.6 GHz ≤ f < 5 GHz, BW = 1 MHz	<19 dBµV
	5 GHz ≤ f < 6 GHz, BW = 1 MHz	<20 dBµV
	6 GHz ≤ f ≤ 8 GHz, BW = 1 MHz	<23 dBµV
	R&S®ESU26:	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–5 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<6 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<15 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<20 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<25 dBµV
	3.6 GHz ≤ f < 10 GHz, BW = 1 MHz	<20 dBµV
	10 GHz ≤ f < 18 GHz, BW = 1 MHz	<22 dBµV
	18 GHz ≤ f < 22 GHz, BW = 1 MHz	<25 dBµV
	22 GHz ≤ f ≤ 26.5 GHz, BW = 1 MHz	<27 dBµV
	R&S®ESU40:	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–5 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<6 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<15 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<20 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<25 dBµV
	3.6 GHz ≤ f < 10 GHz, BW = 1 MHz	<20 dBµV
	10 GHz ≤ f < 18 GHz, BW = 1 MHz	<22 dBµV
	18 GHz ≤ f < 22 GHz, BW = 1 MHz	<25 dBµV
	22 GHz ≤ f < 26.5 GHz, BW = 1 MHz	<27 dBµV
	22 GHz ≤ f < 32 GHz, BW = 1 MHz	<32 dBµV
	32 GHz ≤ f ≤ 40 GHz, BW = 1 MHz	<34 dBµV

	RF attenuation = 0 dB, termination = 50 Ω, average (AV) detector, preamplifier = ON[5]	
	all models	
	1 kHz, BW = 100 Hz	<–3 dBµV
	10 kHz, BW = 200 Hz	<–10 dBµV
	100 kHz, BW = 200 Hz	<–10 dBµV
	1 MHz, BW = 9 kHz	<–3 dBµV
	10 MHz, BW = 9 kHz	<–18 dBµV
	R&S®ESU8:	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–18 dBµV
	30 MHz ≤ f < 500 MHz, BW = 120 kHz	<–7 dBµV
	500 MHz ≤ f < 1 GHz, BW = 120 kHz	<–4 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<5 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<8 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<13 dBµV
	3.6 GHz ≤ f < 6 GHz, BW = 1 MHz	<5 dBµV
	6 GHz ≤ f ≤ 8 GHz, BW = 1 MHz	<7 dBµV

[5] With option R&S®ESU-B24 the frequency range of the preamplifier is extended to the upper frequency limit of the instrument.

	R&S®ESU26:	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–15 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<–4 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<5 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<9 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<12 dBµV
	3.6 GHz ≤ f < 13 GHz, BW = 1 MHz	<2 dBµV
	13 GHz ≤ f < 22 GHz, BW = 1 MHz	<4 dBµV
	22 GHz ≤ f ≤ 26.5 GHz, BW = 1 MHz	<7 dBµV
	R&S®ESU40:	
	20 MHz ≤ f < 30 MHz, BW = 9 kHz	<–15 dBµV
	30 MHz ≤ f < 1 GHz, BW = 120 kHz	<–4 dBµV
	1 GHz ≤ f < 2 GHz, BW = 1 MHz	<5 dBµV
	2 GHz ≤ f < 3 GHz, BW = 1 MHz	<9 dBµV
	3 GHz ≤ f < 3.6 GHz, BW = 1 MHz	<12 dBµV
	3.6 GHz ≤ f < 13 GHz, BW = 1 MHz	<2 dBµV
	13 GHz ≤ f < 22 GHz, BW = 1 MHz	<4 dBµV
	22 GHz ≤ f < 32 GHz, BW = 1 MHz	<7 dBµV
	32 GHz ≤ f ≤ 40 GHz, BW = 1 MHz	<12 dBµV

Level measurement uncertainty		
Absolute level uncertainty at 128 MHz	RBW = 10 kHz, level –30 dBm, reference level –30 dBm, RF attenuation 10 dB	
	preselection = OFF, preamplifier = OFF, low-noise preamplifier = OFF[6]	<0.2 dB (σ = 0.07 dB)
	low-noise preamplifier = ON[6]	<0.3 dB (σ = 0.1 dB)
	preselection/preamplifier = ON[7]	<0.3 dB (σ = 0.1 dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥10 dB, preselection = OFF, preamplifier = OFF, low-noise preamplifier = OFF[6]	
	+20 °C to +30 °C	
	20 Hz ≤ f < 10 MHz	<0.5 dB (σ = 0.16 dB)
	10 MHz ≤ f < 2 GHz	<0.3 dB (σ = 0.1 dB)
	2 GHz ≤ f < 3.6 GHz	<0.5 dB (σ = 0.16 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	<1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f ≤ 40 GHz, span < 1 GHz	<2.0 dB (σ = 0.7 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	+5 °C to +45 °C	
	20 Hz ≤ f < 3.6 GHz	<0.6 dB (σ = 0.2 dB)
	3.6 GHz ≤ f < 8 GHz	add 0.5 dB to above values
	8 GHz ≤ f < 26.5 GHz	add 1.0 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 1.5 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	DC coupling, RF attenuation ≥10 dB, preselection = OFF, preamplifier = OFF, low-noise preamplifier = ON[6]	
	+20 °C to +30 °C	
	100 kHz ≤ f < 10 MHz	<0.8 dB (σ = 0.26 dB)
	10 MHz ≤ f < 3.6 GHz	<0.6 dB (σ = 0.2 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	<1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f ≤ 40 GHz, span < 1 GHz	<2.0 dB (σ = 0.7 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	+5 °C to +45 °C	
	100 kHz ≤ f < 10 MHz	<1.0 dB (σ = 0.33 dB)
	10 MHz ≤ f < 3.6 GHz	<0.8 dB (σ = 0.26 dB)
	3.6 GHz ≤ f < 22 GHz	add 0.5 dB to above values
	22 GHz ≤ f < 26.5 GHz	add 1.0 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 2.0 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values

[6] Only available in analyzer mode.

[7] With option R&S®ESU-B24 the frequency range of the preamplifier is extended to the upper frequency limit of the instrument.

	DC coupling, RF attenuation ≥10 dB, preselection = ON, preamplifier = ON[8]	
	+20 °C to +30 °C	
	1 kHz ≤ f < 10 MHz	<0.8 dB (σ = 0.26 dB)
	10 MHz ≤ f < 2 GHz	<0.6 dB (σ = 0.2 dB)
	2 GHz ≤ f < 3.6 GHz	<0.8 dB (σ = 0.26 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	<1,5 dB (σ = 0.7 dB)
	8 GHz ≤ f ≤ 40 GHz, span < 1 GHz	<2.0 dB (σ = 0.7 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	+5 °C to +45 °C	
	1 kHz ≤ f < 3.6 GHz	<0.9 dB (σ = 0.3 dB)
	3.6 GHz ≤ f < 22 GHz	add 0.5 dB to above values
	22 GHz ≤ f < 26.5 GHz	add 1.0 dB to above values
	26.5 GHz ≤ f ≤ 40 GHz	add 2.0 dB to above values
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values

Second harmonic intercept (SHI)	R&S®ESU26, R&S®FSU40:	
	f_{in} > 1.8 GHz	>65 dBm, nominal

VSWR	RF attenuation <10 dB, DC coupled,	
	+5 °C to +30 °C	
	f ≤ 1 GHz	<2.0
	1 GHz ≤ f < 2.5 GHz	<3.0
	2.5 GHz < f ≤ 3.6 GHz	<4.0
	f ≥ 3.6 GHz	<3.0

Ordering information

Designation	Type	Order No.
EMI Test Receiver 20 Hz to 8 GHz	R&S®ESU8	1302.6005.08
EMI Test Receiver 20 Hz to 26.5 GHz	R&S®ESU26	1302.6005.26
EMI Test Receiver 20 Hz to 40 GHz	R&S®ESU40	1302.6005.40
Accessories supplied		
Power cable, probe power cable, printed quick start guide and CD-ROM (with operating manual and service manual) R&S®ESU26: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connector R&S®ESU40: test port adapter with K female (1036.4790.00) and N female (1036.4777.00) connector		

Options

Designation	Type	Order No.	Retrofittable	Remarks
Options				
OCXO, low aging/ improved phase noise at 10 Hz carrier offset	R&S®FSU-B4	1144.9000.02	yes	
Tracking Generator, 100 kHz to 3.6 GHz	R&S®FSU-B9	1142.8994.02	yes	
External Generator Control	R&S®FSP-B10	1129.7246.03	yes	
Output Attenuator, 0 dB to 70 dB, for R&S®FSU-B9	R&S®FSU-B12	1142.9349.02	yes	requires R&S®FSU-B9
Removable Hard Disk	R&S®ESU-B18	1303.0400.06	no	
Second Hard Disk for R&S®ESU-B18	R&S®ESU-B19	1303.0500.06	–	requires R&S®ESU-B18
Low-Noise Preamplifier (100 kHz to 8 GHz)	R&S®ESU-B24	1157.2100.08	yes	for R&S®ESU8 only
Low-Noise Preamplifier (100 kHz to 26.5 GHz)	R&S®ESU-B24	1157.2100.26	yes	for R&S®ESU26 only
Low-Noise Preamplifier (100 kHz to 40 GHz)	R&S®ESU-B24	1157.2100.40	yes	for R&S®ESU40 only
Firmware/software				
Time Domain Scan	R&S®ESU-K53	1305.8509.02	yes	key code
Triggered Scan for Coverage Meas.	R&S®ESPIK50	1106.4386.02	yes	key code

[8] With option R&S®ESU-B24 the frequency range of the preamplifier is extended to the upper frequency limit of the instrument.

Recommended extras

Designation	Type	Order No.
Headphones		0708.9010.00
Printed manuals (includes operating and service manuals)		1302.6170.32
IEC/IEEE Bus Cable, 1 m	R&S®PCK	0292.2013.10
IEC/IEEE Bus Cable, 2 m	R&S®PCK	0292.2013.20
19” Rack Adapter	R&S®ZZA-411	1096.3283.00
Adapter for mounting on telescopic rails (only with 19” Adapter R&S®ZZA-411)	R&S®ZZA-T45	1109.3774.00
Matching pads, 50/75 Ω		
L Section, matching at both ends	R&S®RAM	0358.5414.02
Series Resistor, 25 Ω, matching at one end (taken into account in instrument function RF INPUT 75 Ω)	R&S®RAZ	0358.5714.02
SWR bridges, 50 Ω		
SWR Bridge, 5 MHz to 3 GHz	R&S®ZRB2	0373.9017.5X (X = 2/3/5/6)
SWR Bridge, 40 kHz to 4 GHz	R&S®ZRC	1039.9492.5X (X = 2/5)
High power attenuators		
100 W, 3/6/10/20/30 dB, 1 GHz	R&S®RBU100	1073.8495.XX (XX = 03/06/10/20/30)
50 W, 3/6/10/20/30 dB, 2 GHz	R&S®RBU50	1073.8695.XX (XX = 03/06/10/20/30)
50 W, 20 dB, 6 GHz	R&S®RDL50	1035.1700.52
Connectors and cables		
Probe power connector, 3 pin		1065.9480.00
For R&S®ESU26 only		
Test port adapter, N male		1021.0541.00
Test port adapter, 3.5 mm male		1021.0529.00
Microwave Measurement Cable with test port adapter set N male and 3.5 mm male	R&S®FSE-Z15	1046.2002.02
For R&S®ESU40 only		
Test port adapter, N male		1036.4783.00
Test port adapter, K male		1036.4802.00
Test Port Adapter, 2.4 mm female	R&S®FSE-Z5	1088.1627.02

Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

For product brochure, see PD 5213.6693.12
and www.rohde-schwarz.com
(search term: ESU)

ROHDE&SCHWARZ

www.rohde-schwarz.com
Europe: +49 1805 12 4242, customersupport@rohde-schwarz.com
USA and Canada: +1-888-837-8772, customer.support@rsa.rohde-schwarz.com
Asia: +65 65 130 488, customersupport.asia@rohde-schwarz.com