R&S®FSUP
Signal Source Analyzer
Specifications

ROHDE&SCHWARZ

CONTENTS

Specifications

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

Operating modes		signal source analyzer
		spectrum analyzer
Signal source analyzer		phase noise measurement with spectrum analyzer method
		phase noise measurement with PLL method without cross-correlation
		internal reference
		external reference
		phase noise measurement with PLL method with cross-correlation
		residual phase noise measurement
		AM noise measurement [1]
		baseband noise measurement
		transient measurements
		VCO parameter characterization

All operating modes

(internal reference frequency)

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 +40 °C	8×10^{-8}
Total frequency error	per year	1.8×10^{-7}
Reference frequency, internal, nominal	R&S®FSU-B4 option	
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 +40 °C	1×10^{-9}
Total frequency error	per year	5×10^{-8}
External reference frequency		1 MHz to 20 MHz, 1 Hz steps [2]

Signal source analyzer mode

Phase noise measurement with PLL method

(internal reference oscillator, internal phase detector)

Frequency range	R&S®FSUP8	1 MHz to 8 GHz
	R&S®FSUP26	1 MHz to 26.5 GHz
	R&S®FSUP50	1 MHz to 50 GHz
Resolution		0.01 Hz
Offset frequency setting range		0.01 Hz to 30 MHz
RF level range	input frequency < 46 GHz	> –10 dBm to +30 dBm, –20 dBm to +30 dBm (typ.)
	input frequency ≥ 46 GHz	> 0 dBm to +30 dBm, –5 dBm to +30 dBm (typ.)
Loop bandwidth	PLL control of internal reference	1 Hz to 10 kHz [3]
	PLL control of DUT	1 Hz to 10 kHz [3]

[1] External AM noise detector required.

[2] With the R&S®FSUP-B60 option, only 10 MHz can be used as an external reference frequency.

[3] Limits may vary depending on DUT tuning slope and resulting loop stability.

Phase noise measurement, PLL method without cross-correlation

(internal reference oscillator, internal phase detector)

Spurious level, internal reference	offset > 1 kHz	
	f ≤ 8 GHz	–80 dBc
	8 GHz to 16 GHz	–74 dBc
	16 GHz to 26.5 GHz	–68 dBc
	26.5 GHz to 50 GHz	–62 dBc
Measurement uncertainty	signal harmonics < –30 dBc	
	100 Hz to 10 MHz offset	typ. < 1 dB
	1 Hz to 100 Hz or 10 MHz to 30 MHz offset	typ. < 3 dB
Spectral purity, SSB phase noise (1 Hz)	f = 640 MHz internal reference oscillator and phase detector, input level = +10 dBm, input signal harmonics and spurs < –30 dBc, +20 °C to +30 °C, LNA gain = 40 dB, loop bandwidth = 10 Hz, cross-correlation OFF	
	frequency offset	SSB phase noise
	1 Hz	< –60 dBc (1 Hz), nominal
	10 Hz	< –90 dBc (1 Hz), nominal
	100 Hz	< –105 dBc (1 Hz)
	1 kHz	< –128 dBc (1 Hz)
	10 kHz	< –135 dBc (1 Hz)
	100 kHz	< –144 dBc (1 Hz)
	1 MHz	< –159 dBc (1 Hz)
	10 MHz	< –165 dBc (1 Hz), nominal
	30 MHz	< –165 dBc (1 Hz), nominal
Measurement modes		internal reference, internal phase detector

Phase noise sensitivity with internal reference oscillator and internal phase detector
Input level > +5 dBm (with R&S®FSUP-B60 option > +10 dBm), input signal harmonics and spurs < –30 dBc,
operating mode "averaged", +20 °C to +30 °C,
LNA gain 40 dB, loop bandwidth ≤ 10 × frequency offset, max. 1 kHz

Frequency offset	input frequency, values in dBc (1 Hz)								
	R&S®FSUP8/26/50						R&S®FSUP26/50		R&S®FSUP50
	5 MHz	10 MHz	100 MHz	1 GHz	3 GHz	7 GHz	10 GHz	20 GHz	40 GHz
1 kHz	–150	–150	–145	–124	–114	–108	–102	–96	–90
10 kHz	–158	–155	–150	–129	–120	–113	–107	–101	–95
100 kHz	–160	–160	–160	–142	–131	–124	–117	–111	–105
1 MHz	–	–165	–165	–159	–145	–145	–138	–132	–126
10 MHz	–	–	–165	–160	–155	–154	–150	–148	–142
30 MHz	–	–	–	–160	–155	–155	–150	–148	–142

Phase noise sensitivity (typical values)

Frequency offset	input frequency, values in dBc (1 Hz)								
	R&S®FSUP8/26/50						R&S®FSUP26/50		R&S®FSUP50
	5 MHz	10 MHz	100 MHz	1 GHz	3 GHz	7 GHz	10 GHz	20 GHz	40 GHz
1 Hz	–113	–113	–90	–70	–61	–52	–50	–44	–38
10 Hz	–132	–131	–107	–90	–83	–67	–70	–66	–60
100 Hz	–141	–144	–129	–112	–101	–87	–90	–84	–78
1 kHz	–154	–154	–149	–127	–117	–111	–107	–101	–95
10 kHz	–162	–159	–154	–133	–123	–116	–112	–106	–100
100 kHz	–171	–164	–165	–145	–134	–127	–122	–116	–110
1 MHz	–	–170	–170	–162	–149	–148	–142	–136	–130
10 MHz	–	–	–170	–167	–159	–157	–155	–153	–147
30 MHz	–	–	–170	–167	–159	–160	–155	–153	–147
> 30 MHz [4]	–	–	–157	–157	–157	–143	–143	–140	–137

[4] For offsets > 30 MHz up to 10 GHz, the spectrum analyzer measurement method is used. The maximum achievable frequency offset is limited by ($f_{max} – f_{input}$) where f_{max} is the maximum frequency of the instrument model and f_{input} is the selected center frequency.

Phase noise measurement, PLL method with cross-correlation

R&S®FSUP-B60 low phase noise option installed, R&S®FSUP-B61 correlation extension option not installed

Frequency range	R&S®FSUP8	1 MHz to 8 GHz
	R&S®FSUP26	1 MHz to 26.5 GHz
	R&S®FSUP50	1 MHz to 50 GHz
Spurious level, internal reference	offset > 1 kHz	
	f ≤ 8 GHz	–80 dBc
	8 GHz to 16 GHz	–74 dBc
	16 GHz to 26.5 GHz	–68 dBc
	26.5 GHz to 50 GHz	–62 dBc
Measurement uncertainty	signal harmonics ≤ –30 dBc	
	100 Hz to 10 MHz offset	typ. < 1 dB
	1 Hz to 100 Hz or 10 MHz to 30 MHz offset	typ. < 3 dB

Phase noise sensitivity with internal reference oscillator and internal phase detector
Input level > +10 dBm, input signal harmonics and spurs < –30 dBc, operating mode "averaged", +20 °C to +30 °C, LNA gain 40 dB, loop bandwidth ≤ 10 × frequency offset, max. 1 kHz

Frequency offset	input frequency, values in dBc (1 Hz)								
	R&S®FSUP8/26/50						R&S®FSUP26/50		R&S®FSUP50
	5 MHz	10 MHz	100 MHz	1 GHz	3 GHz	7 GHz	10 GHz	20 GHz	40 GHz
1 kHz	–151	–151	–150	–130	–118	–113	–102	–96	–90
10 kHz	–159	–159	–158	–139	–125	–124	–107	–101	–95
100 kHz	–160	–166	–163	–150	–135	–134	–117	–111	–105
1 MHz	–	–168	–165	–160	–152	–150	–138	–132	–126
10 MHz	–	–	–170	–165	–165	–160	–150	–148	–142
30 MHz	–	–	–	–165	–165	–160	–150	–148	–142

Phase noise sensitivity (typical values)

Frequency offset	input frequency, values in dBc (1 Hz)								
	R&S®FSUP8/26/50						R&S®FSUP26/50		R&S®FSUP50
	5 MHz	10 MHz	100 MHz	1 GHz	3 GHz	7 GHz	10 GHz	20 GHz	40 GHz
1 Hz	–114	–116	–87	–75	–62	–55	–50	–44	–38
10 Hz	–136	–135	–110	–91	–87	–80	–70	–66	–60
100 Hz	–143	–146	–134	–115	–106	–97	–90	–84	–78
1 kHz	–157	–161	–160	–134	–123	–118	–107	–101	–95
10 kHz	–165	–168	–168	–143	–131	–129	–112	–106	–100
100 kHz	–171	–170	–176	–158	–139	–140	–122	–116	–110
1 MHz	–	–175	–177	–165	–160	–155	–142	–136	–130
10 MHz	–	–	–179	–172	–170	–170	–155	–153	–147
30 MHz	–	–	–179	–172	–170	–170	–155	–153	–147
> 30 MHz [5]	–	–	–157	–157	–157	–143	–143	–140	–137

[5] For offsets > 30 MHz up to 10 GHz, the spectrum analyzer measurement method is used. The maximum achievable frequency offset is limited by ($f_{max} – f_{input}$) where f_{max} is the maximum frequency of the instrument model and f_{input} is the selected center frequency.

R&S®FSUP-B60 low phase noise option and R&S®FSUP-B61 correlation extension option installed

Frequency range	R&S®FSUP26	1 MHz to 26.5 GHz
	R&S®FSUP50	1 MHz to 50 GHz
Spurious level, internal reference	offset > 1 kHz	
	f ≤ 8 GHz	–80 dBc
	8 GHz to 16 GHz	–74 dBc
	16 GHz to 26.5 GHz	–68 dBc
	26.5 GHz to 50 GHz	–62 dBc
Measurement uncertainty	signal harmonics < –30 dBc	
	100 Hz to 10 MHz offset	typ. < 1 dB
	1 Hz to 100 Hz or 10 MHz to 30 MHz offset	typ. < 3 dB

Phase noise sensitivity with internal reference oscillator and internal phase detector
Input level > +10 dBm, input signal harmonics and spurs < –30 dBc, operating mode "averaged", +20 °C to +30 °C, LNA gain 40 dB, loop bandwidth ≤ 10 × frequency offset, max. 1 kHz

Frequency offset	input frequency, values in dBc (1 Hz)								
	R&S®FSUP8/26/50						R&S®FSUP26/50		R&S®FSUP50
	5 MHz	10 MHz	100 MHz	1 GHz	3 GHz	7 GHz	10 GHz	20 GHz	40 GHz
1 kHz	–151	–151	–150	–130	–118	–113	–110	–106	–100
10 kHz	–159	–159	–158	–139	–125	–124	–120	–116	–110
100 kHz	–160	–166	–163	–150	–135	–134	–132	–126	–120
1 MHz	–	–168	–165	–160	–152	–150	–144	–138	–132
10 MHz	–	–	–170	–165	–165	–160	–160	–154	–148
30 MHz	–	–	–	–165	–165	–160	–160	–154	–148

Phase noise sensitivity (typical values)

Frequency offset	input frequency, values in dBc (1 Hz)								
	R&S®FSUP8/26/50						R&S®FSUP26/50		R&S®FSUP50
	5 MHz	10 MHz	100 MHz	1 GHz	3 GHz	7 GHz	10 GHz	20 GHz	40 GHz
1 Hz	–114	–116	–87	–75	–62	–55	–52	–48	–42
10 Hz	–136	–135	–110	–91	–87	–80	–77	–71	–65
100 Hz	–143	–146	–134	–115	–106	–97	–95	–89	–83
1 kHz	–157	–161	–160	–134	–123	–118	–116	–112	–106
10 kHz	–165	–168	–168	–143	–131	–129	–126	–120	–114
100 kHz	–171	–170	–176	–158	–139	–140	–138	–132	–126
1 MHz	–	–175	–177	–165	–160	–155	–150	–146	–140
10 MHz	–	–	–179	–172	–170	–170	–167	–161	–155
30 MHz	–	–	–179	–172	–170	–170	–170	–165	–159
> 30 MHz [6]	–	–	–157	–157	–157	–143	–143	–140	–137

[6] For offsets > 30 MHz up to 10 GHz, the spectrum analyzer measurement method is used. The maximum achievable frequency offset is limited by ($f_{max} – f_{input}$) where f_{max} is the maximum frequency of the instrument model and f_{input} is the selected center frequency.

Phase noise sensitivity improvement by correlation

Nominal phase noise sensitivity improvement by correlation measurements				
Number of correlations	10	100	1000	10000
Phase noise sensitivity improvement by up to	5 dB	10 dB	15 dB	20 dB

Predefined correlation modes	Mode "fast"		Mode "normal"		Mode "averaged"	
Offset frequency range	number of correlations	improvement by up to (nominal values, in dB)	number of correlations	improvement by up to (nominal values, in dB)	number of correlations	improvement by up to (nominal values, in dB)
1 Hz to 3 Hz	1	0	1	0	3	2
3 Hz to 10 Hz	1	0	3	2	10	5
10 Hz to 30 Hz	1	0	10	5	30	7
30 Hz to 100 Hz	1	0	30	7	100	10
100 Hz to 300 Hz	1	0	100	10	100	10
300 Hz to 1 kHz	3	2	100	10	300	12
1 kHz to 3 kHz	10	5	100	10	300	12
3 kHz to 10 kHz	30	7	100	10	1000	15
10 kHz to 30 kHz	100	10	100	10	1000	15
30 kHz to 100 kHz	100	10	100	10	1000	15
100 kHz to 300 kHz	100	10	300	12	1000	15
300 kHz to 1 MHz	100	10	300	12	1000	15
1 MHz to 3 MHz	100	10	300	12	1000	15
3 MHz to 10 MHz	100	10	300	12	1000	15
10 MHz to 30 MHz	100	10	1000	15	3000	17

Phase noise measurement, spectrum analyzer mode

Frequency range	R&S®FSUP8	1 MHz to 8 GHz
	R&S®FSUP26	1 MHz to 26.5 GHz
	R&S®FSUP50	1 MHz to 50 GHz
Displayed average noise level	specifications under "Displayed average noise level" in section "Spectrum analyzer mode" apply	
Phase noise sensitivity	specifications under "Spectral purity, SSB phase noise" in section "Spectrum analyzer mode" apply	

Amplitude noise measurement

Frequency range	R&S®FSUP8, R&S®FSUP26, R&S®FSUP50	frequency range depends on external AM noise detector range
Input voltage at *Input 2* connector		max. ±1 V RMS
Input impedance at *Input 2* connector		400 Ω || 50 pF (nominal)
Measurement uncertainty	offset range 1 kHz to 3 MHz	typ. < 3 dB

Amplitude noise sensitivity normalized to an external AM noise detector, conversion factor ≥ –4 dB [7] Input level > +15 dBm, input signal harmonics and spurs < –30 dBc, operating mode “averaged”, +20 °C to +30 °C, LNA gain 50 dB, Input 2 terminated with 50 Ω	
Frequency offset [8]	noise floor in dBc (1 Hz) (nominal)
1 kHz	–150
10 kHz	–160
100 kHz	–160
1 MHz	–160

[7] The noise floor may increase for an AM detector gain lower than –4 dB.

[8] The AM detector source impedance may define the maximum offset frequency of the measurement (lowpass).

Residual phase noise measurement with external phase detector (added phase noise measurement)

Frequency range	R&S®FSUP8, R&S®FSUP26, R&S®FSUP50	frequency range depends on external phase noise detector range
Input level at *Input 2* connector		max. ±1 V RMS
Input impedance at *Input 2* connector		400 Ω || 50 pF (nominal)
Measurement uncertainty	offset range 1 kHz to 1 MHz	typ. < 3 dB

Phase noise floor with external phase detector, phase detector slope ≥ 500 mV/rad [9] Phase detector input level > +10 dBm, input signal harmonics and spurs < –30 dBc, sweep mode “averaged”, +20 °C to +30 °C, LNA gain = 50 dB, input resistance = 400 Ω	
Frequency offset	noise floor values in dBc (1 Hz) (nominal)
1 kHz	–140
10 kHz	–150
100 kHz	–160
1 MHz	–160

Residual phase noise measurement with internal phase detector (added phase noise measurement)

Frequency range	R&S®FSUP8, R&S®FSUP26, R&S®FSUP50	100 MHz to 8 GHz
RF level input		+10 dBm (same level at both inputs)
Measurement uncertainty	offset range 1 kHz to 1 MHz	typ. < 3 dB

Phase noise floor with internal phase detector Input level [10] > +10 dBm, input signal harmonics and spurs < –30 dBc, sweep mode “averaged”, +20 °C to +30 °C, LNA gain 50 dB, signal	
Frequency offset	noise floor values in dBc (1 Hz) (nominal)
	1 GHz
1 kHz	–120
10 kHz	–130
100 kHz	–140
1 MHz	–150

Baseband noise measurement

Frequency range	R&S®FSUP8, R&S®FSUP26, R&S®FSUP50	1 Hz to 30 MHz
Input level at *Input 2* connector		max. 1 V RMS
Input impedance at *Input 2* connector		400 Ω || 50 pf (nominal)
Measurement uncertainty	offset range 1 kHz to 1 MHz	typ. < 3 dB

Noise floor Input 2 terminated with 50 Ω, AC-coupled, sweep mode “averaged”, +20 °C to +30 °C, LNA gain = 50 dB	
Range	noise floor
1 kHz to 1 MHz	–160 dBV (1 Hz) (nominal)

[9] The noise floor may increase for lower slopes. Signal harmonics may affect the noise display.

[10] Signal harmonics may affect the noise display.

Transient measurements

Measurement capabilities		frequency versus time
		phase versus time
		amplitude versus time
		carrier power versus time
Max. recording length		131200 sample
Bandwidth	sampling rate	max. recording time
100 Hz	122.0 Hz	1069 s
200 Hz	244.1 Hz	534 s
400 Hz	488.3 Hz	267 s
800 Hz	977.6 Hz	133 s
1.6 kHz	1.953 kHz	66.8 s
3.2 kHz	3.906 kHz	33.4 s
6.4 kHz	7.812 kHz	16.7 s
12.5 kHz	15.62 kHz	8.36 s
25 kHz	31.25 kHz	4.18 s
50 kHz	62.5 kHz	2.09 s
100 kHz	125 kHz	1.04 s
200 kHz	250 kHz	522 ms
400 kHz	500 kHz	261 ms
800 kHz	1 MHz	131 ms
1.6 MHz	2 MHz	65.3 ms
3 MHz	4 MHz	32.6 ms
5 MHz	8 MHz	16.3 ms
8 MHz	16 MHz	8.2 ms
10 MHz	32 MHz	4.1 ms
18 MHz	32 MHz	4.1 ms
30 MHz	64 MHz	2 ms
Trigger functions		free run, external, IF power
Transient carrier power measurement		
Display range		noise floor to +30 dBm
Max. dynamic range	demodulation bandwidth 200 kHz	typ. 75 dB
Display linearity	S/N > 16 dB	typ. 0.2 dB
Measurement uncertainty	S/N > 16 dB (RF = 50 kHz to 3 GHz)	typ. 1 dB
Transient frequency measurement		
Measurement range		0 Hz to 14 MHz
Frequency deviation uncertainty		< 3 % of measured value + residual FM
Residual FM	demodulation bandwidth ≤ 200 kHz, input level ≥ (reference level/dBm –10) dBm, input level ≥ (RF attenuation/dB – 30) dBm	RMS
	RF ≤ 1 GHz	15 Hz
	RF = 3 GHz	65 Hz
Distortion	deviation < 400 kHz	0.3 %
Transient phase measurement		
Measurement range		< 1000 rad

VCO parameter characterization

Measurement parameters		VCO tuning characteristic
		VCO tuning sensitivity
		RF power
		pushing ON/OFF
		measurement of harmonics
		VCO DC characteristic
		summary
Frequency range	R&S®FSUP8	10 MHz to 8 GHz
	R&S®FSUP26	10 MHz to 26.5 GHz
	R&S®FSUP50	10 MHz to 50 GHz
Power supplies		
Tuning ports		2 tuning ports
DC ports		2 DC ports
AUX ports		1 auxiliary port
VCO tuning characteristics		
Display		automatic scaling, numeric values of key parameters
Pushing		display of 3 traces for 3 different voltages in parallel
VCO tuning sensitivity		
Display		automatic scaling, numeric values of key parameters
Pushing		display of 3 traces for 3 different voltages in parallel
RF power		
Display		automatic scaling, numeric values of key parameters
		combined display of tuning and power characteristic
Pushing		display of 3 traces for 3 different voltages in parallel
Pulling [11]	R&S®FSP-B28 option TTL switching signals for user pulling unit (external) supported	display of 3 traces in parallel for 3 different external termination impedances
Measurement of harmonics		
Display		automatic scaling, numeric values of key parameters
	number of displayed harmonics	display of 3 traces for 3 harmonics
Order of harmonics	user-selectable	0 to 10
VCO DC characteristics		
Display		automatic scaling, numeric values of key parameters
Additional features		switching sequence for power and tuning ports

[11] The R&S®FSP-B28 option must be installed.

Parameters of DC ports 1 and 2		
Voltage	minimum value	0 V
	maximum value	12 V
	measurement accuracy (+20 °C to +30 °C)	±(0.4 % of reading + 5 mV)
	noise voltage (1 Hz) at 10 kHz offset	< 10 nV, nominal
Current	maximum current	500 mA [12]
	measurement accuracy (+20 °C to +30 °C)	±(2 % of reading + 5 mA)
Additional settings		minimum and maximum voltage limit setting
		maximum current limit
	pushing	settable pushing voltage
Parameters of AUX port		
Voltage	minimum voltage	–10 V
	maximum voltage	0 V
	measurement accuracy (+20 °C to +30 °C)	±(0.4 % of reading + 5 mV)
	noise voltage (1 Hz) at 10 kHz offset	<20 nV, nominal
Current	maximum current	–500 mA
	measurement accuracy (+20 °C to +30 °C)	±(2 % of reading + 5 mA), nominal
Parameters of tuning ports 1 and 2		
Voltage	minimum value	–10 V
	maximum value	28 V
Setting	setting accuracy (+20 °C to +30 °C)	±(0.2 % of set value + 5 mV) [13]
	noise voltage (1 Hz) at 10 kHz offset	1 nV, nominal
Current	maximum current (source impedance 1 kΩ)	20 mA [13]
	measurement accuracy (+20 °C to +30 °C)	±(2 % of reading + 2 mA)
Source impedance		500 Ω nominal

[12] If both DC ports are active, the maximum current of 500 mA is the sum current of both ports.

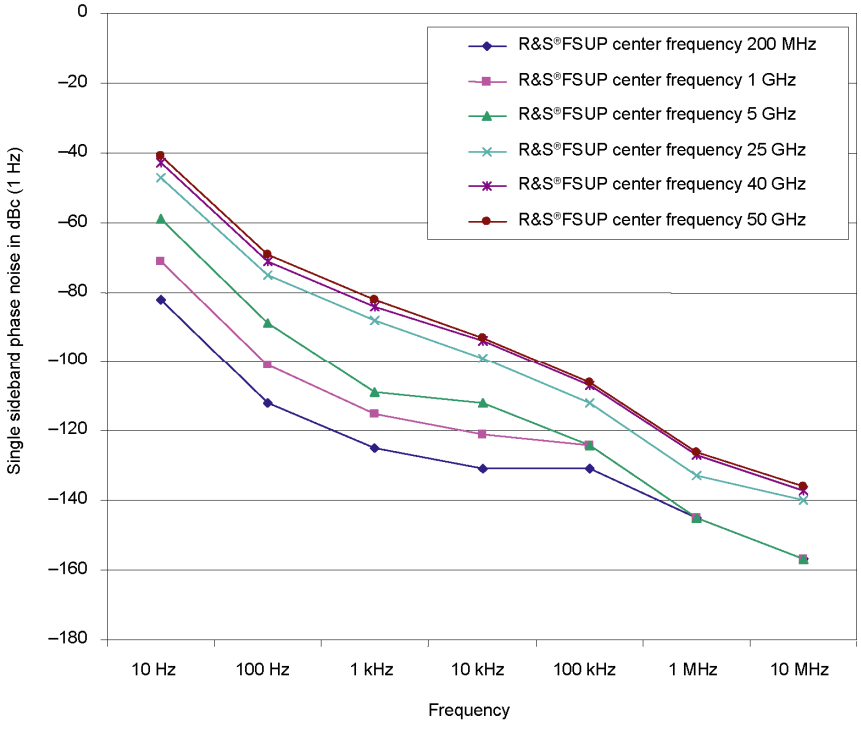
[13] If current is drawn from the tuning port, the tuning voltage may decrease due to a voltage drop over the source impedance.

Spectrum analyzer mode

Frequency

Frequency range	R&S®FSUP8	
	DC-coupled	20 Hz to 8 GHz
	AC-coupled	1 MHz to 8 GHz
	R&S®FSUP26	
	DC-coupled	20 Hz to 26.5 GHz
	AC-coupled	10 MHz to 26.5 GHz
	R&S®FSUP50	
	DC-coupled	20 Hz to 50 GHz
Resolution		0.01 Hz

Spectral purity, SSB phase noise (1 Hz)	f = 640 MHz, +20 °C to +30 °C	
Residual FM	RBW 10 kHz, RMS	< 1 Hz, nominal
Carrier offset	10 Hz	< –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	< –130 dBc, typ. –133 dBc
	1 MHz	< –140 dBc, typ. –146 dBc
	10 MHz	typ. –160 dBc



Sweep

Sweep time	time sweep, span = 0 Hz	1 µs to 16000 s in 5 % steps
	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)

Resolution bandwidths

Sweep filters		
3 dB bandwidths		10 Hz to 20 MHz in 1/2/3/5 sequence, 50 MHz
Bandwidth uncertainty	10 Hz to 100 kHz (digital)	< 3 %
	200 kHz to 5 MHz (analog)	< 10 %
	10 MHz	–30 % to +10 %
	20 MHz	–20 % to +20 %
	50 MHz, f ≤ 3.6 GHz	–20 % to +20 %
	50 MHz, f > 3.6 GHz	–30 % to +100 %
Shape factor 60 dB:3 dB	≤ 100 kHz	< 6
	200 kHz to 2 MHz	< 12
	3 MHz to 10 MHz	< 7
	20 MHz, 50 MHz	< 6, nominal

FFT filters		
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

EMI filters		
6 dB bandwidths		200 Hz, 9 kHz, 120 kHz
Bandwidth uncertainty		3 %, nominal
Shape factor 60 dB:3 dB		< 6, 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
Shape factor 60 dB:3 dB		< 2, nominal
Bandwidth uncertainty		2 %, nominal

Video bandwidths		1 Hz to 10 MHz in 1/2/3/5 sequence

Level

Display range		displayed noise floor to +30 dBm
Maximum input level		
DC voltage	RF input, AC-coupled	50 V
	RF input, DC-coupled	0 V
CW RF power	RF attenuation 0 dB	20 dBm (= 0.1 W)
	RF attenuation ≥ 10 dB	30 dBm (= 1 W)
Pulse spectral density		97 dBµV/MHz
Max. pulse voltage	RF attenuation ≥ 10 dB	150 V
Max. pulse energy	RF attenuation ≥ 10 dB, 10 µs	1 mWs

Intermodulation		
1 dB compression of input mixer	0 dB RF attenuation	
	≤ 3.6 GHz	+13 dBm, nominal
	> 3.6 GHz	
	R&S®FSUP8	+10 dBm, nominal
	R&S®FSUP26, R&S®FSUP50	+7 dBm, nominal
Third-order intercept point (TOI)	0 dB RF attenuation; level 2 × –10 dBm, ∆f > 5 × RBW or 10 kHz, whichever is larger	
	R&S®FSUP8	
	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®FSUP26	
	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®FSUP50	
	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
	26.5 GHz ≤ f_{in} < 28 GHz	> 8 dBm, typ. 11 dBm
	28 GHz ≤ f_{in} < 40 GHz	> 12 dBm, typ. 15 dBm
	f_{in} > 40 GHz	12 dBm, nominal
Second harmonic intercept (SHI)	0 dB RF attenuation	
	f_{in} < 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
	R&S®FSUP8, R&S®FSUP26, R&S®FSUP50	
	f_{in} > 1.8 GHz	> 80 dBm, nominal

Displayed average noise level	0 dB RF attenuation, termination 50 Ω, logarithmic scaling, normalized to 1 Hz RBW f < 10 kHz: 10 Hz FFT filter, trace average, sweep count = 20 f ≥ 10 kHz: RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker	
	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®FSUP8	
	20 MHz ≤ f < 2.0 GHz	< –154 dBm, typ. –157 dBm
	2.0 GHz ≤ f < 3.0 GHz	< –152 dBm, typ. –156 dBm
	3.0 GHz ≤ f < 3.6 GHz	< –150 dBm, typ. –152 dBm
	3.6 GHz ≤ f < 7 GHz	< –152 dBm, typ. –154 dBm
	7 GHz ≤ f ≤ 8 GHz	< –150 dBm, typ. –152 dBm
	R&S®FSUP26 without R&S®FSUP-B61 option	
	20 MHz ≤ f < 2 GHz	< –151 dBm, typ. –155 dBm
	2 GHz ≤ f < 3.6 GHz	< –148 dBm, typ. –152 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®FSUP26 with R&S®FSUP-B61 option installed	
	20 MHz ≤ f < 2 GHz	< –151 dBm, typ. –155 dBm
	2 GHz ≤ f < 3.6 GHz	< –148 dBm, typ. –152 dBm
	3.6 GHz ≤ f < 8 GHz	< –151 dBm, typ. –155 dBm
	8 GHz ≤ f < 13 GHz	< –149 dBm, typ. –153 dBm
	13 GHz ≤ f < 18 GHz	< –147 dBm, typ. –151 dBm
	18 GHz ≤ f < 22 GHz	< –145 dBm, typ. –148 dBm
	22 GHz ≤ f ≤ 26.5 GHz	< –143 dBm, typ. –146 dBm
	R&S®FSUP50 without R&S®FSUP-B61 option	
	20 MHz ≤ f < 2 GHz	< –151 dBm, typ. –155 dBm
	2 GHz ≤ f < 3.6 GHz	< –148 dBm, typ. –152 dBm
	3.6 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
	26.5 GHz ≤ f < 32 GHz	< –138 dBm, typ. –141 dBm
	32 GHz ≤ f < 46 GHz	< –133 dBm, typ. –136 dBm
	46 GHz ≤ f ≤ 50 GHz	< –128 dBm, typ. –131 dBm
	R&S®FSUP50 with R&S®FSUP-B61 option installed	
	20 MHz ≤ f < 2 GHz	< –151 dBm, typ. –155 dBm
	2 GHz ≤ f < 3.6 GHz	< –148 dBm, typ. –152 dBm
	3.6 GHz ≤ f < 13 GHz	< –148 dBm, typ. –151 dBm
	13 GHz ≤ f < 18 GHz	< –146 dBm, typ. –150 dBm
	18 GHz ≤ f < 22 GHz	< –145 dBm, typ. –148 dBm
	22 GHz ≤ f < 26.5 GHz	< –143 dBm, typ. –145 dBm
	26.5 GHz ≤ f < 32 GHz	< –135 dBm, typ. –138 dBm
	32 GHz ≤ f < 40 GHz	< –130 dBm, typ. –133 dBm
	40 GHz ≤ f < 46 GHz	< –128 dBm, typ. –131 dBm
	46 GHz ≤ f ≤ 50 GHz	< –125 dBm, typ. –128 dBm

Maximum dynamic range		
1 dB compression to DANL (1 Hz)		170 dB

Immunity to interference		
Image frequency	f ≤ 3.6 GHz	> 90 dB suppression, typ. > 110 dB
	3.6 GHz < f ≤ 40 GHz	> 70 dB suppression, typ. > 100 dB
	f > 40 GHz	70 dB suppression, nominal
	(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
	4.2 GHz < f ≤ 50 GHz	> 70 dB suppression, typ. > 90 dB
	(f = receive frequency)	
Spurious response	f > 1 MHz, without input signal, 0 dB RF attenuation, RBW ≤ 20 MHz	< –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 < 26.5 GHz	< –58 dBc
	26.5 GHz ≤ f < 40 GHz	< –52 dBc
	f ≥ 40 GHz	< –52 dBc, nominal
	(f = receive frequency)	

Level display		
Screen		625 × 500 pixel (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
Number of measurement points	default value	625
	range	155 to 10001 in steps of about a factor of 2
Trace functions		Clear/Write, MaxHold, MinHold, Average
Trace update rate	local measurement, display update rate, 625 points, zero span	90/s
	remote measurement, display OFF: zero span/sweep time 1 ms	100/s
	span = 10 MHz, sweep time 2.5 ms	70/s
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 measurement uncertainty		
Absolute level uncertainty at 128 MHz	RBW = 10 kHz, level –30 dBm, reference level –30 dBm, RF attenuation 10 dB	< 0.2 dB (σ = 0.07 dB)
Frequency response referenced to 128 MHz	DC coupling, RF attenuation ≥ 10 dB, +20 °C to +30 °C	
	10 MHz ≤ f < 3.6 GHz	< 0.3 dB (σ = 0.1 dB)
	3.6 GHz ≤ f < 8 GHz, span < 1 GHz	< 1.5 dB (σ = 0.5 dB)
	8 GHz ≤ f < 22 GHz, span < 1 GHz	< 2 dB (σ = 0.7 dB)
	22 GHz ≤ f < 40 GHz, span < 1 GHz	< 2.5 dB (σ = 0.8 dB)
	f ≥ 40 GHz, span < 1 GHz	< 3 dB (σ = 1.0 dB)
	RF attenuation > 40 dB or f ≥ 3.6 GHz, span ≥ 1 GHz	add 0.5 dB to above values
	40 GHz ≤ f ≤ 50 GHz	add 1 dB to above values
	DC coupling, RF attenuation ≥ 10 dB, +5 °C to +40 °C	
	10 MHz ≤ 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
Attenuator switching uncertainty	f = 128 MHz 0 dB to 70 dB, referenced to 10 dB attenuation	< 0.2 dB (σ = 0.07 dB)
Uncertainty of reference level setting	RF attenuation 10 dB, referenced to –10 dBm reference level setting	< 0.15 dB (σ = 0.05 dB)

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)
	RBW > 10 MHz, S/N > 16 dB	
	0 dB to –50 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 50 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	
	f < 3.6 GHz, RBW ≤ 100 kHz	0.3 dB
	f < 3.6 GHz, RBW > 100 kHz	0.5 dB
	3.6 GHz ≤ f < 8 GHz	1.2 dB
	8 GHz ≤ f < 22 GHz	1.5 dB
	22 GHz ≤ f < 40 GHz	1.8 dB
	40 GHz ≤ f < 50 GHz	2.2 dB

I/Q data

General		
Interface		GPIB or LAN interface
Sampling rate		programmable: 10 kHz to 81.6 MHz in 0.1 Hz steps
ADC resolution		14 bit
I/Q memory		16 Msample each for I and Q data
Max. equalized bandwidth		7 MHz
IF prefilter bandwidth		300 kHz to 10 MHz, 1/2/3/5 steps

Trigger functions

Trigger		
Trigger source		free run, video, external, IF level (mixer level 10 dBm to –50 dBm)
Trigger offset	span ≥ 10 Hz	125 ns to 100 s, resolution min. 125 ns (or 1 % of offset)
	span = 0 Hz	±(125 ns to 100 s), resolution min. 125 ns, depending on sweep time
Max. deviation of trigger offset		±(31.25 ns + (0.1 % × trigger offset))
Gated sweep		
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	R&S®FSUP8	N female
	R&S®FSUP26	test port adapter, APC 3.5 mm/N female
	R&S®FSUP50	test port adapter, 2.4 mm/N female
VSWR	RF attenuation ≥ 10 dB, DC-coupled	
	f < 3.6 GHz	< 1.5
	R&S®FSUP8	
	3.6 GHz ≤ f < 8 GHz	< 2
	R&S®FSUP26, R&S®FSUP50	
	3.6 GHz ≤ f < 18 GHz	< 1.8
	18 GHz ≤ f < 26.5 GHz	< 2.0
	26.5 GHz ≤ f < 40 GHz	< 2.5
	40 GHz ≤ f ≤ 50 GHz	< 3, nominal
	RF attenuation < 10 dB or AC-coupled	typ. 1.5
Setting range of attenuator		0 dB to 75 dB, in 5 dB steps

Input 2 (IN 2)		
Connector		N female
Input voltage at *Input 2* connector		max. ±1 V RMS

Generator output 1, 2 [14]		
Impedance		50 Ω, nominal
Connector		N female
Frequency range		10 MHz to 8 GHz
Level range		–15 to +3 dBm
Level uncertainty		1.5 dB
Level setting step size		0.5 dB

[14] Available only for “residual phase noise, external phase detector” mode.

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

DC ports 1 and 2		BNC connector
Supply voltages		0 V to 12 V, max. 500 mA, nominal [12]
Tuning ports 1 and 2		BNC connector
Supply voltages		–10 V to 28 V, max. 20 mA, nominal [13]

AUX port		BNC connector
Supply voltages		–10 V to 0 V, max. 500 mA, nominal

USB interface	upper connector	type A plug, version 2.0
	lower connector	type A plug, version 2.0

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

IF 404.4 MHz	active only if RBW > 10 MHz	BNC female
Impedance		50 Ω
Bandwidth	RBW > 10 MHz	equal to resolution bandwidth
Level	mixer level ≤ 0 dBm	typ. –10 dB

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		10 MHz
Level		> 0 dBm, nominal

Reference input		BNC female
Impedance		50 Ω
Input frequency range		1 MHz ≤ f_{in} ≤ 20 MHz, in 1 Hz steps
Required level		> 0 dBm into 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		1.4 V (TTL)
Input impedance		≥ 10 kΩ

IEC/IEEE bus control		interface in line with IEC 625-2 (IEEE 488.2)
Command set		SCPI 1997.0 or HP85XX 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 data

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

Mass memory		hard disk, USB flash disk (not supplied)
Data storage		> 500 instrument settings and traces

Environmental conditions		
Temperature	operating temperature range	+5 °C to +40 °C
	permissible temperature range	0 °C to +50 °C
Climatic loading		+40 °C at 85 % relative humidity (EN 600-2-30: 2000-02)

Mechanical resistance		
Vibration	sinusoidal	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, EN 61010-1, MIL-T-28800D, class 5
	random	10 Hz to 100 Hz, acceleration 1 g RMS
Shock		40 g shock spectrum, in line with MIL-STD-810D Method Nr.516.4, DIN EN 60068-2-27
	R&S®FSU-B20 option: random vibration	10 Hz to 300 Hz, acceleration 1.9 g RMS
Recommended calibration interval	operation with external reference	2 years
	operation with internal reference	1 year
RFI suppression		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, 3.1 A to 1.3 A, 50 Hz to 400 Hz, class of protection I in line with VDE 411
Power consumption	R&S®FSUP8	typ. 130 VA
	R&S®FSUP26, R&S®FSUP50	typ. 150 VA
Safety		in line with EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1, EN 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 (without options) [15], [16]	R&S®FSUP8	17.6 kg (38.8 lb)
	R&S®FSUP26	18.1 kg (39.9 lb)
	R&S®FSUP50	18.6 kg (41 lb)

[15] If the instrument is equipped with the R&S®FSUP-B60 option, 1.2 kg have to be added.

[16] If the instrument is equipped with the R&S®FSUP-B61 option, 1.5 kg have to be added.

R&S®FSUP-B21 LO/IF ports for external mixers (for R&S®FSUP26 and R&S®FSUP50 only)

LO signal		
Frequency range		7 GHz to 15.5 GHz
Level	+20 °C to +30 °C	+15.5 dBm ± 1 dB
	+5 °C to +40 °C	+15.5 dBm ± 3 dB

IF input		
IF frequency		404.4 MHz
Full scale level	2-port mixer (LO output/IF input, front panel)	–20 dBm
	3-port mixer (IF input, front panel)	–20 dBm
Level uncertainty	IF input level –30 dBm, RBW 30 kHz, 2-port mixer, LO output/IF input (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB
	3-port mixer, IF input (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB

Inputs and outputs (front panel)		
LO output/IF input		SMA female, 50 Ω
IF input		SMA female, 50 Ω

R&S®FSU-B23 RF preamplifier (for R&S®FSUP26 only, requires R&S®FSU-B25 option)

Level measurement uncertainty		
Frequency response	preamplifier = ON	
	3.6 GHz to 8 GHz	< 2.0 dB (σ = 0.7 dB)
	8 GHz to 22 GHz	< 2.5 dB (σ = 0.8 dB)
	22 GHz to 26.5 GHz	< 3.0 dB (σ = 1 dB)

Displayed average noise level	0 dB RF attenuation, termination 50 Ω, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, logarithmic scaling, trace average, sweep count = 20, mean marker, normalized to 1 Hz RBW	
	preamplifier = OFF	
	3.6 GHz to 8 GHz	R&S®FSUP26 specifications + 2 dB
	8 GHz to 26.5 GHz	R&S®FSUP26 specifications + 3 dB
	preamplifier = ON	
	3.6 GHz to 8 GHz	< –162 dBm, typ. –165 dBm
	8 GHz to 13 GHz	< –159 dBm, typ. –162 dBm
	13 GHz to 18 GHz	< –157 dBm, typ. –160 dBm
	18 GHz to 22 GHz	< –154 dBm, typ. –159 dBm
	22 GHz to 26.5 GHz	< –150 dBm, typ. –155 dBm

R&S®FSU-B25 electronic attenuator

Frequency		
Frequency range	R&S®FSUP8	100 kHz to 8 GHz
	R&S®FSUP26, R&S®FSUP50	100 kHz to 3.6 GHz

Setting range		
Electronic attenuator		0 dB to 30 dB, in 5 dB steps
Preamplifier		20 dB, switchable

Level measurement uncertainty		
Frequency response	with preamplifier or electronic attenuator	
	10 MHz to 50 MHz	< 1 dB (σ = 0.34 dB)
	50 MHz to 3.6 GHz	< 0.6 dB (σ = 0.2 dB)
	3.6 MHz to 8 GHz	< 2 dB (σ = 0.7 dB)
Reference error	at 128 MHz, RBW ≤ 100 kHz, reference level –30 dBm, RF attenuation 10 dB	
	electronic attenuator	< 0.3 dB (σ = 0.1 dB)
	preamplifier	< 0.3 dB (σ = 0.1 dB)

Displayed average noise level	0 dB RF attenuation, termination 50 Ω, logarithmic scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker	
	preamplifier = ON	
	R&S®FSUP8, R&S®FSUP26	
	10 MHz to 2.0 GHz	< –162 dBm
	2.0 GHz to 3.6 GHz	< –160 dBm
	R&S®FSUP8	
	3.6 GHz to 8 GHz	< –157 dBm
	R&S®FSUP50	
	10 MHz to 40 MHz	< –160 dBm
	40 MHz to 2 GHz	< –162 dBm
	2 GHz to 3.6 GHz	< –160 dBm
	If the R&S®FSU-B25 option is built in, the average noise level values displayed by the base units degrade by:	
	preamplifier = OFF, electronic attenuator = OFF	
	20 Hz to 3.6 GHz	1 dB
	R&S®FSUP8	
	3.6 GHz to 8 GHz	2 dB
	preamplifier = OFF, electronic attenuator 0 dB	
	20 Hz to 3.6 GHz	typ. 2.5 dB
	R&S®FSUP8	
	3.6 GHz to 8 GHz	typ. 3.5 dB

Intermodulation		
Third-order intercept point (TOI)	electronic attenuator = ON, Δf > 5 × RBW or 10 kHz	
	10 MHz to 300 MHz	> 17 dBm
	300 MHz to 3.6 GHz	> 20 dBm
	3.6 GHz to 8 GHz	> 18 dBm

R&S®FSUP-Z1 AM noise detector

Measurement range

Connectors	input	APC 3.5 mm male
	output	SMC [17]
Input impedance		50 Ω, nominal
Frequency range		10 MHz to 26.5 GHz (typ.)
Input level	10 MHz to 17 GHz	–10 dBm to +15 dBm
	17 GHz to 20 GHz	–10 dBm to +12 dBm
	20 GHz to 26.5 GHz	–10 dBm to +10 dBm

Effective system data

The specified effective system data are achieved after performing the appropriate system error calibration.
The data are valid between +20 °C and +30 °C, with a power of ≥ +10 dBm at the detector input and a termination resistance of 400 Ω at the detector output.

Input frequency range	input frequency	AM noise conversion gain
	10 MHz	typ. > –8 dB
	30 MHz	typ. > –7 dB
	100 MHz	typ. > –5 dB
	1 GHz	typ. > –5 dB
	10 GHz	typ. > –5 dB.
	20 GHz	typ. > –6 dB
	26 GHz	typ. > –7 dB
AM noise frequency offset range (3 dB)		1 Hz to 3 MHz, nominal
Input VSWR	10 MHz to 18.5 GHz	1.5:1, nominal
	18.5 GHz to 26.5 GHz	2:1, nominal

General data

The specified data are valid for the AM noise detector without the adapter cable.

Temperature loading	operating temperature range	+20 °C to +30 °C
	permissible temperature range	+5 °C to +40 °C
	storage temperature range	–40 °C to +70 °C
		in line with IEC 60068-2-1 and IEC 60068-2-2
Maximum rated input power		200 mW
Calibration interval		2 years
Dimensions	(L × ø)	43 mm × 10 mm (1.7 in × 0.38 in)
Weight		17 g (0.04 lb)
Shipping weight		1 kg (2.2 lb)

[17] An SMC to BNC adapter cable is supplied with the AM noise detector.

Ordering information

Designation	Type	Order No.
Signal Source Analyzer, 20 Hz to 8 GHz	R&S®FSUP8	1166.3505.09
Signal Source Analyzer, 20 Hz to 26.5 GHz	R&S®FSUP26	1166.3505.27
Signal Source Analyzer, 20 Hz to 50 GHz	R&S®FSUP50	1166.3505.51
Accessories supplied		
Power cable, printed quick start guide and CD-ROM with operating manual and service manual R&S®FSUP26: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connector R&S®FSUP50: test port adapter with 2.4 mm female (1088.1627.02) and N female (1036.4777.00) connector		

Designation	Type	Order No.	Retrofit	Remarks
Options				
Low-Aging OCXO	R&S®FSU-B4	1144.9000.02	yes	
External Generator Control	R&S®FSP-B10	1129.7246.03	yes	
Removable Hard Disk	R&S®FSUP-B18	1303.0400.05	no	
Second Hard Disk for R&S®FSP-B18	R&S®FSUP-B19	1303.0600.05	yes	requires R&S®FSUP-B18
LO/IF Ports for External Mixers	R&S®FSUP-B21	1157.1090.04	yes	for R&S®FSUP26 and R&S®FSUP50 only
20 dB Preamplifier, 3.6 GHz to 26.5 GHz	R&S®FSU-B23	1157.0907.02	no	for R&S®FSUP26 only, requires R&S®FSU-B25
Electronic Attenuator, 0 dB to 30 dB, and 20 dB Preamplifier (3.6 GHz)	R&S®FSU-B25	1144.9298.02	yes	
Trigger Port	R&S®FSP-B28	1162.9915.02	yes	
Low Phase Noise	R&S®FSUP-B60	1169.5544.03	yes	
Correlation Extension	R&S®FSUP-B61	1305.2500.26	no	for R&S®FSUP26 only, requires R&S®FSUP-B60
Correlation Extension (with 26.5 GHz preamplifier)	R&S®FSUP-B61	1305.2500.23	no	for R&S®FSUP26 only, requires R&S®FSUP-B60, R&S®FSU-B25, R&S®FSU-B23
Correlation Extension	R&S®FSUP-B61	1305.2500.50	no	for R&S®FSUP50 only, requires R&S®FSUP-B60
Firmware/software				
GSM/EDGE Application Firmware	R&S®FS-K5	1141.1496.02		
Bluetooth® Application Firmware	R&S®FS-K8	1157.2568.02		
Power Sensor Measurements	R&S®FS-K9	1157.3006.02		
Application Firmware for Noise Figure and Gain Measurements	R&S®FS-K30	1300.6508.02		preamplifier recommended (e.g. R&S®FSU-B25)
Vector Signal Analysis	R&S®FSQ-K70	1161.8038.02		
3GPP BTS/Node B FDD Application Firmware	R&S®FS-K72	1154.7000.02		
3GPP UE FDD Application Firmware (including HSUPA)	R&S®FS-K73	1154.7252.02		
3GPP HSDPA BTS Application Firmware	R&S®FS-K74	1300.7156.02		requires R&S®FS-K72
3GPP HSPA+ Base Station Test	R&S®FS-K74+	1309.9180.02		requires R&S®FS-K72 and R&S®FS-K74
3GPP TD-SCDMA BTS Application Firmware	R&S®FS-K76	1300.7291.02		
3GPP TD-SCDMA UE Application Firmware	R&S®FS-K77	1300.8100.02		
CDMA2000® IS-95 (cdmaOne)/1xEV-DV BTS Application Firmware	R&S®FS-K82	1157.2316.02		
CDMA2000® 1xEV-DV MS Application Firmware	R&S®FS-K83	1157.2416.02		
CDMA2000® 1xEV-DO BTS Application Firmware (including Rev A)	R&S®FS-K84	1157.2851.02		
CDMA2000® 1xEV-DO MS Application Firmware	R&S®FS-K85	1300.6689.02		
Generic OFDM Application Software	R&S®FSQ-K96	1308.9570.02		Windows-based software, external PC required

Designation	Type	Order No.
IEC/IEEE Bus Cable, length 1 m	R&S®PCK	0292.2013.10
IEC/IEEE Bus Cable, length 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 R&S®ZZA-411 adapter)	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		1065.9480.02
DC blocks		
DC Block, 10 kHz to 18 GHz (type N)	R&S®FSE-Z4	1084.7443.02
External harmonic mixers (for R&S®FSUP26, R&S®FSUP50 with R&S®FSUP-B21 option)		
Harmonic Mixer, 40 GHz to 60 GHz	R&S®FS-Z60	1089.0799.02
Harmonic Mixer, 50 GHz to 75 GHz	R&S®FS-Z75	1089.0847.02
Harmonic Mixer, 60 GHz to 90 GHz	R&S®FS-Z90	1089.0899.02
Harmonic Mixer, 90 GHz to 110 GHz	R&S®FS-Z110	1089.0947.04
AM noise detector		
AM Noise Detector	R&S®FSUP-Z1	1305.2700.02
For R&S®FSUP26 only		
Test port adapter, N male		1021.0541.00
Test port adapter, 3.5 mm male		1021.0529.00
Microwave Measurement Cable, with N male and 3.5 mm male test port adapter set	R&S®FSE-Z15	1046.2002.02
For R&S®FSUP50 only		
Test port adapter, N male		1036.4783.00
Test port adapter, K male		1036.4802.00
Test port adapter, K female		1036.4802.00

Service options		
Two-Year Calibration Service	R&S®CO2FSUP	Please contact your local Rohde & Schwarz sales office.
Three-Year Calibration Service	R&S®CO3FSUP	
Five-Year Calibration Service	R&S®CO5FSUP	
One-Year Repair Service following the warranty period	R&S®RO2FSUP	
Two-Year Repair Service following the warranty period	R&S®RO3FSUP	
Four-Year Repair Service following the warranty period	R&S®RO5FSUP	

For product brochure, see PD 5213.6729.12 and www.rohde-schwarz.com

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

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Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

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- Energy-efficient products
- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
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