

up to 40 GHz

up to 40 GHz

Version
06.00

May
2008

R&S® FSP Spectrum Analyzer

Data Sheet



ROHDE & SCHWARZ

Specifications

Specifications are valid under the following conditions:

15 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.

Data designated "nominal" applies to design parameters and is not tested.

Data designated " $\sigma = xx$ dB" is shown as standard deviation.

| | R&S® FSP3 | R&S® FSP7 | R&S® FSP13 | R&S® FSP30 | R&S® FSP40 |
|---|---|-------------------------|----------------------------|--------------------------|--------------------------|
| Frequency | | | | | |
| Frequency range | 9 kHz to 3 GHz | 9 kHz to 7 GHz | 9 kHz to 13.6 GHz | 9 kHz to 30 GHz | 9 kHz to 40 GHz |
| Frequency resolution | 0.01 Hz | | | | |
| Internal reference frequency (nominal) | | | | | |
| Aging per year ¹⁾ | 1×10^{-6} | | | | |
| Temperature drift | 1×10^{-6} | | | | |
| With option R&S® FSP-B4 (OCXO) | | | | | |
| Aging per year ¹⁾ | 1×10^{-7} | | | | |
| Temperature drift | 1×10^{-8} | | | | |
| External reference frequency | | | | | |
| | 10 MHz | | | | |
| Frequency display | | | | | |
| | with marker or frequency counter | | | | |
| Marker resolution | span/500 | | | | |
| Max. deviation (sweep time >3 × auto sweep time) | $\pm(\text{frequency} \times \text{reference frequency} + 0.5\% \times \text{span} + 10\% \times \text{resolution bandwidth} + \frac{1}{2} \text{ (last digit)})$ | | | | |
| Frequency counter resolution | 0.1 Hz to 10 kHz (selectable) | | | | |
| Count accuracy (S/N >25 dB) | $\pm(\text{frequency} \times \text{reference frequency} + \frac{1}{2} \text{ (last digit)})$ | | | | |
| Frequency span | 0 Hz, 10 Hz to 3 GHz | 0 Hz, 10 Hz to 7 GHz | 0 Hz, 10 Hz to 13.6 GHz | 0 Hz, 10 Hz to 30 GHz | 0 Hz, 10 Hz to 40 GHz |
| Max. span deviation | 0.1% | | | | |
| Spectral purity (dBc (1 Hz)) SSB phase noise, f = 500 MHz, for f > 500 MHz see diagrams below | | | | | |
| Carrier offset | | | | | |
| 100 Hz | <-84, typ.-90 | | | | |
| 1 kHz | <-100, typ.-108 | | | | |
| 10 kHz | <-106, typ.-113 | | | | |
| 100 kHz ²⁾ | <-110, typ.-113 | | | | |
| 1 MHz ²⁾ | <-120, typ.-125 | | | | |
| 10 MHz | typ.-145 | | | | |
| Residual FM | | | | | |
| f = 500 MHz, RBW 1 kHz, sweep time 100 ms | typ. 3 Hz | | | | |

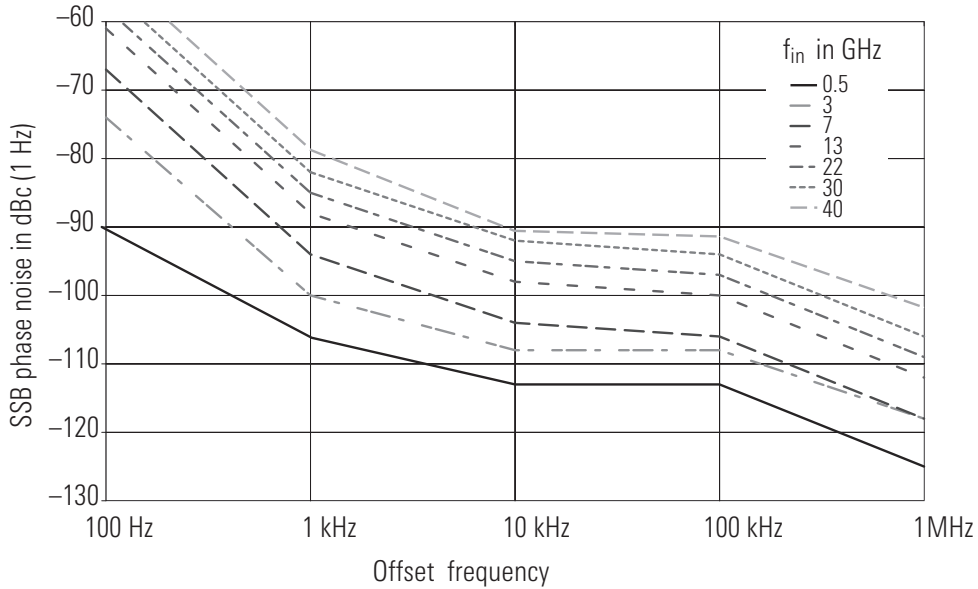
¹⁾ After 30 days of operation.

²⁾ Valid for span >100 kHz.

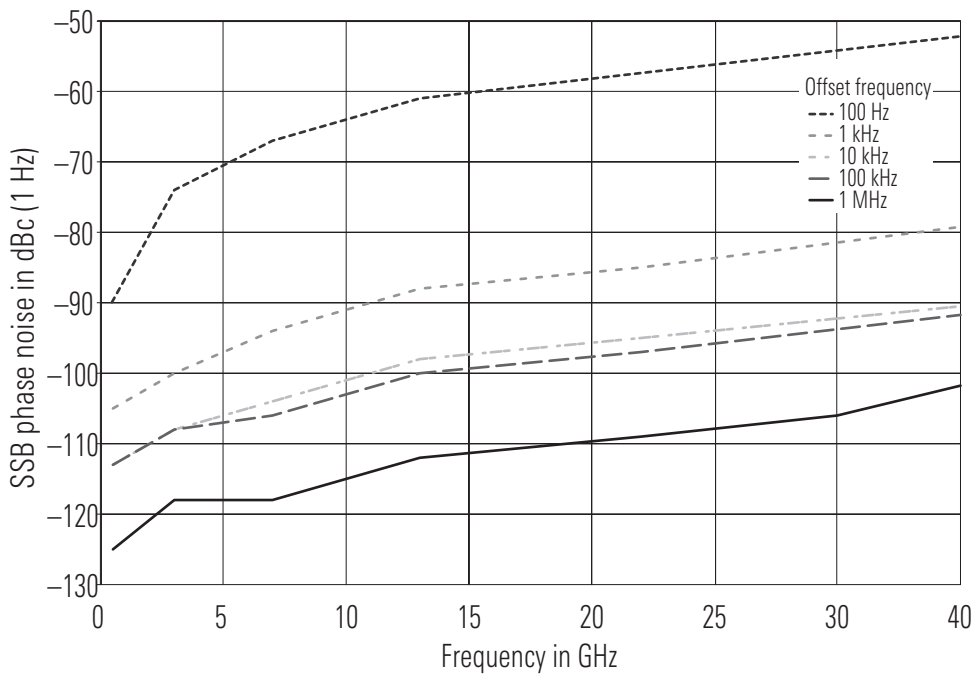
Typical values for SSB phase noise (reference to 1 Hz bandwidth):

| Offset | $f_{in} = 3 \text{ GHz}$ | $f_{in} = 7 \text{ GHz}$ | $f_{in} = 13 \text{ GHz}$ | $f_{in} = 22 \text{ GHz}$ | $f_{in} = 26 \text{ GHz}$ | $f_{in} = 40 \text{ GHz}$ |
|---------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 100 Hz | -74 dBc | -67 dBc | -61 dBc | -57 dBc | -55 dBc | -52 dBc |
| 1 kHz | -100 dBc | -94 dBc | -88 dBc | -84 dBc | -82 dBc | -79 dBc |
| 10 kHz | -108 dBc | -104 dBc | -98 dBc | -94 dBc | -92 dBc | -91 dBc |
| 100 kHz | -108 dBc | -106 dBc | -100 dBc | -96 dBc | -94 dBc | -92 dBc |
| 1 MHz | -118 dBc | -118 dBc | -112 dBc | -108 dBc | -106 dBc | -102 dBc |

Typ. SSB phase noise vs offset



Typ. SSB phase noise vs frequency



| | R&S® FSP3 | R&S® FSP7 | R&S® FSP13 | R&S® FSP30 | R&S® FSP40 |
|--|--|------------------------------------|----------------------|---------------------|----------------------|
| Sweep time | | | | | |
| Span ≥10 Hz | 2.5 ms to 16000 s | | | | |
| Max. deviation | 1% | | | | |
| Span 0 Hz | 1 μs to 16000 s | | | | |
| Resolution | 125 ns | | | | |
| Resolution bandwidths | | | | | |
| Bandwidths | 10 Hz to 10 MHz (–3 dB) in 1, 3 sequence | | | | |
| EMI bandwidths | 200 Hz, 9 kHz, 120 kHz (–6 dB) | | | | |
| Bandwidth accuracy | | | | | |
| ≤100 kHz | <3% | | | | |
| 300 kHz to 3 MHz | <10% | | | | |
| 10 MHz | +10%, –30% | | | | |
| Shape factor –60 dB: –3 dB | | | | | |
| ≤100 kHz | <5:1 (Gaussian filters) | | | | |
| 300 kHz to 3 MHz | <15:1 (4-pole synchronously tuned filters) | | | | |
| 10 MHz | <7:1 | | | | |
| Shape factor –60 dB: –6 dB | | | | | |
| EMI bandwidths | <5:1 | | | | |
| Video bandwidths | 1 Hz to 10 MHz in 1, 3 sequence | | | | |
| FFT filter | | | | | |
| Bandwidths | 1 Hz to 30 kHz (–3 dB) in 1, 3 sequence | | | | |
| Bandwidth accuracy | 5%, nominal | | | | |
| Shape factor –60 dB: –3 dB | 2.5:1 nominal | | | | |
| Channel filter | | | | | |
| 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; 1.228; 1.5; 2; 3; 5 MHz 1.28 (RRC), 3.84 (RRC), 4.096 (RRC) | | | | |
| Level | | | | | |
| Display range | displayed average noise level to 30 dBm | | | | |
| Maximum input level | | | | | |
| DC voltage | 50 V | | 0 V | | |
| DC voltage with R&S® FSP-B29 | 0V | | | | |
| RF attenuation 0 dB | | | | | |
| CW RF power | 20 dBm | | | | |
| Pulse spectral density | 97 dBμV (1 MHz) | | | | |
| RF attenuation ≥10 dB | | | | | |
| CW RF power | 30 dBm | | | | |
| Max. pulse voltage | 150 V | | 50 V | | |
| Max. pulse energy (10 μs) | 1 mWs | | 0.5 mWs | | |
| 1 dB compression of input mixer | | | | | |
| 0 dB RF attenuation, f > 200 MHz | 0 dBm nominal | | | | |
| Intermodulation | | | | | |
| 3rd-order intermodulation | | | | | |
| Intermodulation-free dynamic range, level 2 × –30 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger | | | | | |
| 20 MHz to 200 MHz | >70 dBc, TOI >5 dBm | | | | |
| 200 MHz to 3 GHz | >74 dBc, TOI >7 dBm (typ. 10 dBm) | | | | |
| 3 GHz to 7 GHz | – | >80 dBc, TOI >10 dBm (typ. 15 dBm) | | | |
| 7 GHz to 13.6 GHz | – | – | >80 dBc, TOI >10 dBm | | |
| 13.6 GHz to 30 GHz | – | – | – | >76 dBc, TOI >8 dBm | >80 dBc, TOI >10 dBm |
| 30 GHz to 40 GHz | – | – | – | – | >80 dBc, TOI >10 dBm |
| With optional Electronic Attenuator R&S® FSP-B25 switched on | | | | | |
| 20 MHz to 200 MHz | >74 dBc, TOI > 7 dBm | | – | | |
| 200 MHz to 3 GHz | >80 dBc, TOI > 10 dBm | | – | | |
| 3 GHz to 7 GHz | >84 dBc, TOI > 12 dBm | | – | | |

| | R&S® FSP3 | R&S® FSP7 | R&S® FSP13 | R&S® FSP30 | R&S® FSP40 |
|---|--|-----------------------------|--|-----------------------------|-----------------------------|
| Second harmonic intercept point (SHI) | | | | | |
| <100 MHz | | | typ. 25 dBm | | |
| 100 MHz to 1.5 GHz | | | typ. 35 dBm | | |
| 1.5 GHz to 7 GHz | – | | typ. 80 dBm | | |
| 7 GHz to 13.6 GHz | – | – | typ. 80 dBm | | |
| 13.6 GHz to 30 GHz | – | – | – | typ. 80 dBm | |
| 30 GHz to 40 GHz | – | – | – | – | typ. 80 dBm |
| Displayed average noise level | | | | | |
| (0 dB RF attenuation, RBW 10 Hz, VBW 1 Hz, 20 averages, trace average, span 0 Hz, termination 50 Ω) | | | | | |
| Frequency | | | | | |
| 9 kHz | | | <–95 dBm | | |
| 100 kHz | | | <–100 dBm | | |
| 1 MHz | | | <–120 dBm, typ. –125 dBm | | |
| 10 MHz to 1 GHz | <–142 dBm, typ. –145 dBm | | <–140 dBm, typ. –145 dBm | | |
| 1 GHz to 3 GHz | <–140 dBm, typ. –145 dBm | | <–138 dBm, typ. –143 dBm | | |
| 3 GHz to 7 GHz | – | <–138 dBm, typ. –143 dBm | <–135 dBm, typ. –140 dBm | | |
| 7 GHz to 13.6 GHz | – | – | <–132 dBm, typ. –138 dBm | | |
| 13.6 GHz to 22 GHz | – | – | – | <–120 dBm, typ. –128 dBm | – |
| 22 GHz to 30 GHz | – | – | – | <–115 dBm, typ. –123 dBm | – |
| 13.6 GHz to 20 GHz | – | – | – | – | <–120 dBm, typ. –128 dBm |
| 20 GHz to 30 GHz | – | – | – | – | <–120 dBm, typ. –128 dBm |
| 30 GHz to 40 GHz | – | – | – | – | <–112 dBm, typ. –120 dBm |
| Displayed average noise level with preamplifier on (option R&S® FSP-B25) | | | | | |
| 10 MHz to 2 GHz | | <–152 dBm | | – | |
| 2 GHz to 7 GHz | | <–150 dBm | | – | |
| Immunity to interference | | | | | |
| Image frequency | | | >70 dB | | |
| Intermediate frequency (f <3 GHz) | | | >70 dB | | |
| Spurious responses (f >1 MHz, without input signal, 0 dB attenuation) | | | <–103 dBm | | |
| Other spurious (with input signal, mixer level <–10 dBm, Δf >100 kHz) | | | f <7 GHz: <–70 dBc f <13.6 GHz: <–64 dBc f <30 GHz: <–56 dBc | | |
| Level display | | | | | |
| Screen | 501 × 400 pixels (one diagram), max. two diagrams with independent settings | | | | |
| Logarithmic level scale | 10 dB to 200 dB, in steps of 10 dB | | | | |
| Linear level scale | 10% of reference level per level division (10 divisions) | | | | |
| Traces | max. 3, with two diagrams on screen max. 3 per diagram | | | | |
| Trace detector | max peak, min peak, auto peak, sample, quasi-peak, average, RMS | | | | |
| Trace functions | clear/write, max. hold, min hold, average | | | | |
| Number of test points | 501, selectable in steps of approx. factor 2, 125 to 8001 | | | | |
| Setting range of reference level | | | | | |
| Logarithmic level display | –130 dBm to 30 dBm, in steps of 0.1 dB | | | | |
| Linear level display | 70.71 nV to 7.07 V in steps of 1% | | | | |
| Units of level scale | dBm, dBmV, dBμV, dBμA, dBpW (log level display), mV, μV, mA, μA, pW, nW (linear level display) | | | | |
| Max. uncertainty of level measurement | | | | | |
| At 128 MHz, –30 dBm (RF attenuation 10 dB, RBW 10 kHz, ref. level –20 dBm) | <0.2 dB (σ = 0.07 dB) | | | | |

| | R&S® FSP3 | R&S® FSP7 | R&S® FSP13 | R&S® FSP30 | R&S® FSP40 |
|--|--|-----------|--|---|------------|
| Frequency response | | | | | |
| <50 kHz | <+0.5/- 1.0 dB | | | | |
| 50 kHz to 3 GHz | <0.5 dB ($\sigma = 0.17$ dB) | | | | |
| 3 GHz to 7 GHz | <2 dB ($\sigma = 0.7$ dB) | | | | |
| 7 GHz to 13.6 GHz | <2.5 dB ¹⁾ | | | | |
| 13.6 GHz to 30 GHz | <3 dB ¹⁾ | | | | |
| 30 GHz to 40 GHz | <4 dB ¹⁾ | | | | |
| Frequency response with option R&S® FSP-B25 switched on (preamplifier, electronic attenuator) | | | | | |
| 10 MHz to 3 GHz | <1 dB ($\sigma = 0.33$ dB) | | | | |
| 3 GHz to 7 GHz | <2 dB ($\sigma = 0.7$ dB) | | | | |
| Attenuator | <0.2 dB ($\sigma = 0.07$ dB) | | | | |
| Reference level switching | <0.2 dB ($\sigma = 0.07$ dB) | | | | |
| Display nonlinearity LOG/LIN (S/N >16 dB) | | | | | |
| RBW \leq 100 kHz | | | | | |
| 0 dB to -70 dB | <0.2 dB ($\sigma = 0.07$ dB) | | | | |
| -70 dB to -90 dB | <0.5 dB ($\sigma = 0.17$ dB) | | | | |
| RBW \geq 300 kHz | | | | | |
| 0 dB to -50 dB | <0.2 dB ($\sigma = 0.07$ dB) | | | | |
| -50 dB to -70 dB | <0.5 dB ($\sigma = 0.17$ dB) | | | | |
| Bandwidth switching uncertainty (ref. to RBW = 10 kHz) | | | | | |
| 10 Hz to 100 kHz | <0.1 dB ($\sigma = 0.03$ dB) | | | | |
| 300 kHz to 10 MHz | <0.2 dB ($\sigma = 0.07$ dB) | | | | |
| 1 Hz to 3 kHz, FFT | <0.2 dB ($\sigma = 0.03$ dB) | | | | |
| Total measurement uncertainty | | | | | |
| 50 kHz to 3 GHz, signal level 0 dB to 70 dB below reference level, S/N >16 dB, RBW \leq 100 kHz, 95 % confidence level | 0.5 dB | | | | |
| Trigger functions | | | | | |
| Trigger | | | | | |
| Span \geq10 Hz | | | | | |
| Trigger source | free run, video, external, IF level | | | | |
| Trigger offset | 125 ns to 100 s, resolution 125 ns min. (or 1% of offset) | | | | |
| Span = 0 Hz | | | | | |
| Trigger source | free run, video, external, IF level | | | | |
| Trigger offset | \pm 125 ns to 100 s, min. resolution 125 ns, dependent on sweep time | | | | |
| Max. deviation of trigger offset | $\pm(125 \text{ ns} + (0.1\% \times \text{delay time}))$ | | | | |
| Gated sweep | | | | | |
| Trigger source | external, IF level, video | | | | |
| Gate delay | 1 μ s to 100 s | | | | |
| Gate length | 125 ns to 100 s, min. resolution 125 ns or 1% of gate length | | | | |
| Max. deviation of gate length | $\pm(125 \text{ ns} + (0.05\% \times \text{gate length}))$ | | | | |
| Inputs and outputs (front panel) | | | | | |
| RF input | N female, 50 Ω | | test port system 50 Ω , N female, 3.5 mm female ²⁾ | test port system 50 Ω , N female, K female ²⁾ | |
| VSWR (RF attenuation >0 dB) | | | | | |
| f <3 GHz | 1.5:1 | | | | |
| f <7 GHz | 2.0:1 | | | | |
| f <13 GHz | 2.5:1 | | | | |
| f <30 GHz | 3.0:1 | | | | |
| f <40 GHz | 3.0:1 | | | | |
| Input attenuator | 0 dB to 70 dB in 10 dB steps | | | | |
| With option R&S® FSP-B25 | 0 dB to 75 dB in 5 dB steps | | not available | | |
| Probe power supply | +15 V DC, -12.6 V DC and ground, max. 150 mA | | | | |
| Keyboard connector | PS/2 female for MF2 keyboard | | | | |
| AF output (only with option R&S® FSP-B3) | 3.5 mm mini-jack | | | | |

| | R&S® FSP3 | R&S® FSP7 | R&S® FSP13 | R&S® FSP30 | R&S® FSP40 |
|--|--|-----------|------------|------------|------------|
| Output impedance | 10 Ω | | | | |
| Open-circuit voltage | up to 1.5 V, adjustable | | | | |
| Inputs and outputs (rear panel) | | | | | |
| IF 20.4 MHz | $Z_{out} = 50 \Omega$, BNC female | | | | |
| Level | | | | | |
| RBW ≤30 kHz, FFT | -10 dBm at reference level, mixer level >-60 dBm | | | | |
| RBW ≥100 kHz | 0 dBm at reference level, mixer level >-60 dBm | | | | |
| Reference frequency | | | | | |
| Output | BNC female | | | | |
| Output frequency | 10 MHz | | | | |
| Level | 0 dBm, nominal | | | | |
| Input | 10 MHz | | | | |
| Required level | 0 dBm into 50 Ω | | | | |
| Others | | | | | |
| Power supply for noise source | BNC female, 0 V and 28 V, switchable, max. 100 mA | | | | |
| External trigger/gate input | BNC female, >10 kΩ | | | | |
| Trigger voltage | 1.4 V (TTL) | | | | |
| IEC/IEEE bus remote control interface to IEC 625-2 (IEEE 488.2) | | | | | |
| Command set | SCPI 1997.0 | | | | |
| Connector | 24-pin Amphenol female | | | | |
| Interface functions | SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0 | | | | |
| Serial interface | RS-232-C (COM), 9-pin sub-D connector | | | | |
| Printer interface | parallel (Centronics-compatible) | | | | |
| Mouse connector | PS/2 female | | | | |
| Connector for ext. monitor (VGA) | 15-pin sub-D connector | | | | |
| General data | | | | | |
| Display | 21 cm TFT colour display (8.4") | | | | |
| Resolution | 640 × 480 pixels (VGA resolution) | | | | |
| Pixel failure rate | $<2 \times 10^{-5}$ | | | | |
| Mass memory | 1.44 MByte 3½" disk drive (built-in), hard disk | | | | |
| Data storage | >500 instrument settings and traces | | | | |
| Temperatures | | | | | |
| Operating temperature range | +5°C to +40°C | | | | |
| Permissible temperature range | +5°C to +45°C | | | | |
| Storage temperature range | -40°C to +70°C | | | | |
| Damp heat | +40°C at 95% relative humidity (EN 60068-2-30) | | | | |
| Mechanical resistance | | | | | |
| Vibration, sinusoidal | 5 Hz to 150 Hz, max. 2 g at 55 Hz; 0.5 g from 55 Hz to 150 Hz; meets EN60068-2-6, EN60068-2-30, EN61010-1, MIL-T-28800D, class 5 | | | | |
| Vibration, random | 10 Hz to 100 Hz, acceleration 1 g (rms) | | | | |
| Shock test | 40 g shock spectrum, meets MIL-STD-810C and MIL-T-28800D, classes 3 and 5 | | | | |
| Recommended calibration interval | 2 years for operation with external reference, 1 year with internal reference | | | | |
| Power supply | | | | | |
| AC supply | 100 V AC to 240 V AC, 50 Hz to 400 Hz, 3.1 A to 1.3 A, class of protection I to VDE411 | | | | |
| Typical power consumption | 70 VA | 120 VA | 150 VA | | |
| Safety | meets EN61010-1, UL3111-1, CSAC22.2 No. 1010-1, | | | | |
| RFI suppression | meets EMC Directive of EU (89/336/EEC) and German EMC law | | | | |
| Test mark | VDE, GS, CSA, CSA-NRTL/C | | | | |
| Dimensions in mm (W × H × D) | 412 × 197 × 417 | | | | |
| Weight | 10.5 kg | 11.3 kg | 12 kg | | |

¹⁾ RF attenuation 10 dB, sweep time >1s/1 GHz.

²⁾ See recommended extras for alternate connectors.

Specifications of options

Tracking Generator R&S®FSP-B9

Unless specified otherwise, specifications not valid for frequency range from $-3 \times \text{RBW}$ to $+3 \times \text{RBW}$; however, at least not valid from -9 kHz to $+9 \text{ kHz}$. The specified level accuracy of the tracking generator is valid under the following conditions: RF attenuation $\geq 20 \text{ dB}$ and sweep time $\geq 2000 \text{ ms}$.

| Frequency | |
|--|--|
| Frequency range | 9 kHz to 3 GHz |
| Frequency offset | |
| Setting range | $\pm 150 \text{ MHz}$ |
| Resolution | 1 Hz |
| Spectral purity (dBc (1 Hz)) SSB phase noise, $f = 500 \text{ MHz}$, carrier offset 100 kHz | |
| Normal mode | typ. -90 |
| With FM modulation on | typ. -70 |
| Level | |
| Level setting range | -30 dBm to 0 dBm in steps of 0.1 dB |
| Level setting range with AM | -30 dBm to -6 dBm in steps of 0.1 dB |
| Max. deviation of output level, 128 MHz, 0 dBm | $< 1 \text{ dB}$ |
| Frequency response | |
| Output level 0 dBm, 100 kHz to 2 GHz | $< 1 \text{ dB}$ |
| Output level 0 dBm to -25 dBm , 9 kHz to 3 GHz | $< 3 \text{ dB}$ |
| Dynamic range | |
| Attenuation, RBW = 1 kHz, $f > 10 \text{ MHz}$ | typ. 110 dB |
| Spurious | |
| Harmonics, output level -10 dBm | typ. -30 dBc |
| Nonharmonics, output level 0 dBm | typ. -30 dBc |
| Modulation | |
| Modulation format (external) | I/Q, AM, FM, FM-DC, PM, ASK, FSK |
| AM, $f > 10 \text{ MHz}$ | |
| Modulation depth | 0% to 99% |
| Modulation frequency range | 0 Hz to 1 MHz |
| FM, $f > 10 \text{ MHz}$ | |
| Frequency deviation | 0 Hz to 20 MHz |
| Modulation frequency range | 0 Hz to 100 kHz |
| I/Q modulation, $f > 10 \text{ MHz}$ | |
| 0 Hz to 30 MHz | typ. 1 dB |
| Inputs and outputs (front panel) | |
| RF output | N female, 50 Ω |
| VSWR | typ. 2:1 |
| Inputs and outputs (rear panel) | |
| TG/AM IN | $V_{\text{max(pp)}} = 1 \text{ V}$; $Z_{\text{in}} = 50 \Omega$, BNC female |
| TG Q/FM IN | $V_{\text{max(pp)}} = 1 \text{ V}$; $Z_{\text{in}} = 50 \Omega$, BNC female |
| External Generator Control R&S®FSP-B10 | |
| Supported signal generators | R&S®SME02/03/06, R&S®SMG, R&S®SMGL, R&S®SMGU, R&S®SMH, R&S®SMHU, R&S®SMIQ02B/02E/03B/03E/04B/06B R&S®SML, R&S®SMR20/27/30/40/60 R&S®SMP02/22/03/04, R&S®SMX, R&S®SMY R&S®SMT02/03/06 |
| LAN Interface R&S®FSP-B16 | |
| Connector (rear panel) | RJ-45 |
| Supported protocols | 10Base-T (IEEE standard 10 Mbit/s 802.3) 100Base-TX (IEEE standard 100 Mbit/s 802.3u) |
| Extended Environmental Specification R&S®FSP-B20 | |
| Temperature range (noncondensing) | |
| Operating temperature range | 0°C to $+50^\circ\text{C}$ |
| Permissible temperature range | 0°C to $+55^\circ\text{C}$ |
| Mechanical resistance | |
| Vibration, random | 10 Hz to 300 Hz, acceleration 1.9 g (rms) |

LO/IF ports for external Mixers R&S®FSP-B21 (R&S®FSP40 only)

| LO level | |
|-----------------|-------------------|
| Frequency range | 7 GHz to 13.2 GHz |
| Level | +15.5 dBm ±3 dB |

| IF input | |
|---|-----------|
| IF frequency | 404.4 MHz |
| Full scale level | |
| 2 port mixer, LO output/IF input (front) | -20 dBm |
| Level deviation | |
| IF level -30 dBm, reference level -20 dBm, RBW 30 kHz, LO output/IF input (front) | <1dB |
| Full scale level | |
| 3 port mixer, IF input (front) | -20 dBm |
| Level deviation | |
| IF level -30 dBm, reference level -20 dBm, RBW 30 kHz, IF input (front) | <1dB |

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

Electronic Attenuator R&S®FSP-B25 (only for R&S®FSP3 and R&S®FSP7)

| Frequency | |
|-------------------------------------|-----------------------------|
| Frequency range | 10 MHz to 7 GHz |
| Input attenuator range (mechanical) | 0 dB to 75 dB in 5 dB steps |
| Electronic attenuation range | 0 dB to 30 dB in 5 dB steps |
| Preamplifier | 20 dB, switchable |

| Displayed average noise level with preamplifier on (0 dB RF attenuation, RBW 10 Hz, VBW 1 Hz, 20 averages, trace average, span 0 Hz, termination 50 Ω) | |
|---|-----------|
| 10 MHz to 2 GHz | <-152 dBm |
| 2 GHz to 7 GHz | <-150 dBm |

| Intermodulation with electronic attenuator on | |
|---|----------------------|
| 3rd-order intermodulation, intermodulation-free dynamic range, level 2×-30 dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger | |
| 20 MHz to 200 MHz | >74 dBc, TOI >7 dBm |
| 200 MHz to 3 GHz | >80 dBc, TOI >10 dBm |
| 3 GHz to 7 GHz | >84 dBc, TOI >12 dBm |

| Max. deviation of level measurement | |
|--|-------------------------------|
| 128 MHz, -30 dBm (RF attenuation 10 dB, RBW 10 kHz, ref. level -20 dBm), preamplifier on | <0.2 dB ($\sigma = 0.07$ dB) |
| Electronic attenuator | <0.2 dB ($\sigma = 0.07$ dB) |

| Frequency response with preamplifier, electronic attenuator | |
|--|-------------------------------|
| 10 MHz to 3 GHz | <1.0 dB ($\sigma = 0.33$ dB) |
| 3 GHz to 7 GHz | <2 dB ($\sigma = 0.7$ dB) |

| Trigger Port R&S®FSP-B28 | |
|-------------------------------------|---------------------------------------|
| Output voltage | high ≤ 1.4 V low ≥ 0.7 V |
| Trigger port connector | 25-pin sub-D female |

| Frequency range extension 20 Hz R&S®FSP-B29 | |
|--|--------------------|
| Frequency range | 20 Hz to f_{max} |
| Frequency response <9 kHz | <1 dB |

| Displayed average noise level | |
|---|----------|
| 0 dB RF attenuation, RBW 10 Hz, VBW 1 Hz, 20 averages, trace average, span 0 Hz, termination 50 Ω | |
| 20 Hz | <-58 dBm |
| 100 Hz | <-75 dBm |
| 1 kHz | <-85 dBm |

| DC Power Supply R&S®FSP-B30 | |
|--|-----------------------------------|
| Input voltage range | 10 V to 28 V DC 25 A to 12.5 A |
| Output voltage | 120 V to 360 V DC/300 W |

| Current consumption ($V_{DC} = 12$ V, R&S®FSP without options, default settings) | |
|--|----------------|
| R&S®FSP3 | typ. 6 A |
| R&S®FSP30 | typ. 8 A |
| Operating temperature range | 0°C to +50°C |
| Storage temperature range | -40°C to +70°C |
| Dimensions in mm (W × H × D) | 145 × 154 × 65 |
| Weight | 0.6 kg |

Battery Pack R&S®FSP-B31/-B32

| | |
|--|-------------------------|
| NiMH battery pack with built-in load control for all R&S®FSP and R&S®ESPI models with options R&S®FSP-B1 and R&S®FSP-B30 | |
| Input voltage of battery pack | 10 V to 28 V DC |
| Input voltage power supply (battery charge) | 24 V DC/max. 3 A |
| Output voltage | |
| Battery operation | 13.2 V DC/200 Wh |
| Bypass operation | 10 V to 28 V DC/10 A |
| Typical operating times (R&S®FSP without options) | |
| R&S®FSP3 | 2 h |
| R&S®FSP30 | 1.5 h |
| Charging time | 5 h at +25 °C |
| Operating temperature range (discharging) | 0 °C to +50 °C |
| Operating temperature range (charging) | +10 °C to +40 °C |
| Storage temperature range (<1 year) | -20 °C to +35 °C |
| Storage temperature range (<1 month) | -20 °C to +55 °C |
| Dimensions (W × H × D) | 400 mm × 134 mm × 42 mm |
| Weight | 3.7 kg |
| AC adapter (R&S®FSP-B31 only) | |
| Input voltage range | 100 V to 240 V AC ±10% |
| Input frequency range | 50 Hz to 60 Hz ±5% |
| Input power | 140 VA |
| Output voltage | 24 V |
| Output current | 3 A |
| Operating temperature range | 0 °C to +50 °C |
| Storage temperature range | -20 °C to +70 °C |
| Dimensions (W × H × D) | 132 mm × 58 mm × 30 mm |
| Weight | 0.3 kg |

Ordering information

| Order designation | Type | Order No. |
|--------------------------------------|-----------|--------------|
| Spectrum Analyzer, 9 kHz to 3 GHz | R&S®FSP3 | 1164.4391.03 |
| Spectrum Analyzer, 9 kHz to 7 GHz | R&S®FSP7 | 1164.4391.07 |
| Spectrum Analyzer, 9 kHz to 13.6 GHz | R&S®FSP13 | 1164.4391.13 |
| Spectrum Analyzer, 9 kHz to 30 GHz | R&S®FSP30 | 1164.4391.30 |
| Spectrum Analyzer, 9 kHz to 40 GHz | R&S®FSP40 | 1164.4391.40 |

Accessories supplied

Power cable, compact manual, CD-ROM with operating manual and service manual.
R&S®FSP30: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connector.
R&S®FSP40: test port adapter with K female (1036.4790.00) and N female (1036.4777.00) connector.

Options

| Order designation | Type | Order No. | Retrofittable | Remarks |
|---|-------------|---------------|---------------|--|
| Options | | | | |
| Delete Manuals | R&S®FSP-B0 | 1129.8394.02 | | |
| Rugged Case, carrying handle (factory-fitted) | R&S®FSP-B1 | 1129.7998.02 | no | |
| AM/FM Audio Demodulator | R&S®FSP-B3 | 1129.6491.02 | yes | not with R&S®FSP-B15. |
| OCXO Reference Frequency | R&S®FSP-B4 | 1129.6740.02 | yes | |
| TV Trigger/RF Power Trigger | R&S®FSP-B6 | 1129.859.4.02 | yes | not with R&S®FSP-B21. |
| Internal Tracking Generator 9 kHz to 3 GHz, I/Q modulator, for all R&S®FSP models | R&S®FSP-B9 | 1129.6991.02 | yes | |
| External Generator Control for all R&S®FSP models | R&S®FSP-B10 | 1129.7246.03 | yes | |
| Pulse Calibrator for R&S®FSP | R&S®FSP-B15 | 1155.1006.02 | yes | not with R&S®FSP-B3; required for R&S®FS-K72/-K73 |
| LAN Interface 100BT for all R&S®FSP models with Windows XP (1164.4391.xx) | R&S®FSP-B16 | 1129.8042.03 | yes | |

| Order designation | Type | Order No. | Retrofittable | Remarks |
|---|-------------|--------------|---------------|--|
| Removable Flash Disk | R&S®FSP-B18 | 1163.0892.03 | no | |
| Second Flash Disk for R&S®FSP-B18 | R&S®FSP-B19 | 1163.1124.03 | | R&S®FSP-B18 required |
| Extended Environmental Specification | R&S®FSP-B20 | 1155.1606.06 | no | |
| LO/IF Ports for External Mixers | R&S®FSP-B21 | 1155.1758.03 | yes | not with R&S®FSP-B6; only for R&S®FSP40 |
| Electronic Attenuator, 0 dB to 30 dB, 5 dB steps, integrated preamplifier for R&S®FSP3 and R&S®FSP7 | R&S®FSP-B25 | 1129.7746.03 | yes | |
| Trigger Port for R&S®FSP for indication of trigger conditions | R&S®FSP-B28 | 1162.9915.02 | yes | |
| Frequency Range Extension 20 Hz for R&S®FSP3/7 | R&S®FSP-B29 | 1163.0663.07 | no | |
| Frequency Range Extension 20 Hz for R&S®FSP13/30 | R&S®FSP-B29 | 1163.0663.30 | no | |
| Frequency Range Extension 20 Hz for R&S®FSP40 | R&S®FSP-B29 | 1163.0663.40 | no | |
| DC Power Supply for Spectrum Analyzers R&S®FSP | R&S®FSP-B30 | 1155.1158.02 | yes | |
| Battery Pack for Spectrum Analyzers R&S®FSP | R&S®FSP-B31 | 1155.1258.02 | yes | R&S®FSP-B1 and R&S®FSP-B30 required |
| Spare Battery Pack for Spectrum Analyzers R&S®FSP | R&S®FSP-B32 | 1155.1506.02 | yes | R&S®FSP-B31 required |
| Demodulation Hardware and Memory Extension | R&S®FSP-B70 | 1157.0559.02 | yes | required for R&S®FS-K72/ -K73; R&S®FSP-B15 required |

Software

| | | | | |
|---|-------------|--------------|--|---|
| GSM/EDGE Application Firmware, Mobile | R&S®FS-K5 | 1141.1496.02 | | |
| AM/FM/ϕM Measurement Demodulator | R&S®FS-K7 | 1141.1796.02 | | |
| Application Firmware for Bluetooth® Measurements | R&S®FS-K8 | 1157.2568.02 | | |
| Power Sensor Measurements | R&S®FS-K9 | 1157.3006.02 | | supports R&S®NRP-Z11/-Z21 with R&S®NRP-Z4 USB con- nector |
| Application Firmware for Noise Figure and Gain Measurements | R&S®FS-K30 | 1300.6508.02 | | Preamplifier R&S®FSP-B25 recommended |
| Application Firmware for Phase Noise Measurements | R&S®FS-K40 | 1161.8138.02 | | |
| 3GPP BTS/Node B FDD Application Firmware | R&S®FS-K72 | 1154.7000.02 | | R&S®FSP-B15 and -B70 required |
| 3GPP UE FDD Application Firmware | R&S®FS-K73 | 1154.7252.02 | | R&S®FSP-B15 required, R&S®FSP-B70 recommended |
| 3GPP HSDPA BTS Application Firmware | R&S®FS-K74 | 1300.7156.02 | | R&S®FS-K72 required |
| 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) 1xEV-DV BTS FDD 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 | R&S®FS-K84 | 1157.2851.02 | | |
| CDMA2000®-1xEV-DO MS Application Firmware | R&S®FS-K85 | 1300.6689.02 | | |
| WLAN 802.11a TX Measurements Application Firmware | R&S®FSP-K90 | 1300.6650.02 | | |
| WiBro IEEE 802.16 OFDMA Measurements Application Firmware | R&S®FSP-K93 | 1308.5500.02 | | |

The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Rohde & Schwarz is under license.
CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA -USA).

Recommended extras

| Designation | Type | Order No. |
|---|------------|-------------------------------------|
| Headphones | | 0708.9010.00 |
| DC Block, 10 kHz to 18 GHz (type N) | R&S®FSE-Z4 | 1084.7443.02 |
| 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 (not for R&S®FSP-B1) | R&S®ZZA478 | 1096.3248.00 |
| Soft Carrying Case, grey | R&S®ZZT473 | 1109.5048.00 |
| Printed operating manual (German) | – | 1093.4820.11 |
| Printed operating manual (English) | – | 1093.4820.12 |
| Printed service manual (German) | – | 1093.4820.81 |
| Printed service manual (English) | – | 1093.4820.82 |
| Matching Pads, 75 Ω | | |
| L Section | R&S®RAM | 0358.5414.02 |
| Series Resistor, 25 Ω ¹⁾ | R&S®RAZ | 0358.5714.02 |
| SWR Bridge, 5 MHz to 3 GHz | R&S®ZRB2 | 0373.9017.52 |
| SWR Bridge, 40 kHz to 4 GHz | R&S®ZRC | 1039.9492.52 |
| High-Power Attenuators, 100 W | | |
| 3/6/10/20/30 dB | R&S®RBU100 | 1073.8495.XX (XX=03/06/10/20/30) |
| High-Power Attenuators, 50 W | | |
| 3/6/10/20/30 dB | R&S®RBU50 | 1073.8695.XX (XX=03/06/10/20/30) |
| For R&S®FSP30 | | |
| Test Port Adapter, 3.5 mm male | – | 1021.0529.00 |
| Test Port Adapter, N male | – | 1021.0541.00 |
| Microwave Measurement Cable and Adapter Set | R&S®FS-Z15 | 1046.2002.02 |
| For R&S®FSP40 | | |
| Test Port Adapter K male | – | 1036.4802.00 |
| Test Port Adapter N male | – | 1036.4783.00 |
| Test Port Adapter 2.4 mm female | R&S®FSE-Z5 | 1088.1627.02 |
| Connectors | | |
| Probe power connector, 3-pin | | 1065.9480.00 |

¹⁾ Taken into account in device function RF INPUT 75 Ω.

Related data sheets

| Title | Order No. |
|---|-----------------|
| TV Trigger/RF Power Trigger R&S®FSP-B6 | PD 0757.6433 |
| GSM/EDGE Application Firmware R&S®FS-K5 | PD 0757.6185 |
| AM/FM/φM Measurement Demodulator R&S®FS-K7 | PD 0757.6685 |
| Bluetooth Application Firmware R&S®FS-K8 | PD 0757.7730 |
| Application Firmware for Noise Figure and Amplifier Measurements R&S®FS-K30 | PD 0758.0839.32 |
| Application Firmware for Phase Noise Measurements R&S®FS-K40 | PD 0758.2631.32 |
| WCDMA 3GPP Application Firmware R&S®FS-K72/-K73/-K74 | PD 0757.7246 |
| TD-SCDMA Test Application Firmware R&S®FS-K76/-K77 | PD 0758.0880.32 |
| CDMA2000® Base Station Test Application Firmware | PD 0758.1712.32 |
| 1xEV-DO Base Station Test Application Firmware R&S®FS-K82/-K84 | |
| Mobile Station Test Application Firmware R&S®FS-K83/R&S®FS-K85 | PD 0758.1729.32 |
| WLAN Application Firmware R&S®FSQ-K91/R&S®FSP-K90 | PD 0758.1435.12 |
| R&S®FSx-K92/-K93 WiMAX Application Firmware | PD 5213.8550.32 |

Product brochure see PD 0758.1206.12
and at www.rohde-schwarz.com
(search term: FSP)



ROHDE & SCHWARZ

www.rohde-schwarz.com

Europe, Africa, Middle East +491805124242* or +4989412913774 customersupport@rohde-schwarz.com

North America 1-888-TEST-RSA (1-888-837-8772) customer.support@rsa.rohde-schwarz.com

Latin America +1-410-910-7988 customersupport.la@rohde-schwarz.com

Asia/Pacific +6565130488 customersupport.asia@rohde-schwarz.com