



up to 46 GHz

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Version
07.00

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Spectrum Analyzer R&S® FSU

Specifications



ROHDE & SCHWARZ

Specifications

Specifications are valid 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. Data designated 'nominal' applies to design parameters and is not tested.

Frequency

| | | |
|-----------------------------|-----------------------|--------------------|
| Frequency range | R&S FSU3: DC coupled | 20 Hz to 3.6 GHz |
| | AC coupled | 10 MHz to 3.6 GHz |
| | R&S FSU8: DC coupled | 20 Hz to 8 GHz |
| | AC coupled | 10 MHz to 8 GHz |
| | R&S FSU26: DC coupled | 20 Hz to 26.5 GHz |
| | AC coupled | 10 MHz to 26.5 GHz |
| | R&S FSU46: DC coupled | 20 Hz to 46 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 | dependent on span | 0.1 Hz to 10 kHz |
| Maximum deviation | sweep time >3 x auto sweep time | $\pm(\text{marker frequency} \times \text{reference error} + 0.5\% \times \text{span} + 10\% \times \text{resolution bandwidth} + \frac{1}{2} \text{ (last digit)})$ |
| Frequency counter resolution | selectable | 0.1 Hz to 10 kHz |
| Count accuracy | S/N >25 dB | $\pm(\text{frequency} \times \text{reference error} + \frac{1}{2} \text{ (last digit)})$ |
| Display range for frequency axis | | 0 Hz, 10 Hz to max. frequency |
| Resolution | | 0.1 Hz |
| Max. span deviation | | 1.00% |

| | | |
|---|-------------------------------------|--|
| Spectral purity, SSB phase noise | f = 640 MHz | |
| Residual FM | nominal | <1 Hz |
| Carrier offset | 10 Hz | -73 dBc (1 Hz), nominal |
| | 10 Hz with option R&S FSU-B4 fitted | -86 dBc (1 Hz), nominal |
| | 100 Hz | <-94 dBc (1 Hz), typ. -100 dBc (1 Hz) |
| | 1 kHz | <-112 dBc (1 Hz), typ. -116 dBc (1 Hz) |
| | 10 kHz | <-120 dBc (1 Hz), typ. -123 dBc (1 Hz) |
| | 100 kHz | <-120 dBc (1 Hz), typ. -123 dBc (1 Hz) |
| | 1 MHz | <-138 dBc (1 Hz), typ. -144 dBc (1 Hz) |
| | 10 MHz | <-155 dBc (1 Hz), typ. -160 dBc (1 Hz) |

Sweep

| | | |
|------------------------------|------------------------------------|--|
| Sweep time | time sweep, span = 0 Hz | 1 μ s to 16000 s in 5% steps |
| | frequency sweep, span \geq 10 Hz | 2.5 ms to 16000 s in steps \leq 10% |
| Max. deviation of sweep time | | 3% |
| Sampling rate | | 31.25 ns (32 MHz A/D converter) |
| Measurement in time domain | | with marker and cursor lines (resolution 31.25 ns) |

Resolution bandwidths

| Analog 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 Gaussian) | <3% |
| | 200 kHz to 5 MHz (analog Gaussian) | <10% |
| | 10 MHz | -30% to +10% |
| | 20 MHz | -20% to +20% |
| | 50 MHz, f \leq 3.6 GHz | -20% to +20% |
| | 50 MHz, f >3.6 GHz | -30% to +100% |
| Shape factor 60 dB:3 dB | | |
| | \leq 100 kHz | <6 |
| | 200 kHz to 2 MHz | <12 |
| | 3 MHz to 10 MHz | <7 |
| | 20 MHz, 50 MHz | <6, nominal |

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

| 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, 1.5, 2, 3, 3.84 (RRC), 4.096 (RRC) 5 MHz |
| Shape factor 60 dB:3 dB | | <2, nominal |
| Bandwidth uncertainty | | 2%, nominal |

Level

| | | |
|------------------------|--|------------------------------------|
| Display range | | displayed noise floor to +30 dBm |
| Maximum input level | | |
| DC voltage | RF input AC coupled RF input DC coupled | 50 V 0 V |
| CW RF power | RF attenuation 0 dB RF attenuation \geq 10 dB | 20 dBm (= 0.3 W) 30 dBm (= 1 W) |
| Pulse spectral density | | 97 dB μ V/MHz |
| Max. pulse voltage | RF attenuation \geq 10 dB | 150 V |
| Max. pulse energy | RF attenuation \geq 10 dB, 10 μ s | 1 mWs |

| Intermodulation | | |
|-----------------------------------|--|---|
| 1 dB compression of input mixer | 0 dB RF attenuation ≤3.6 GHz >3.6 GHz R&S FSU8 R&S FSU26, R&S FSU46 | +13 dBm, nominal +10 dBm, nominal +7 dBm, nominal |
| Third-order intercept point (TOI) | level 2×-10 dBm, $\Delta f > 5 \times$ RBW or 10 kHz, whichever is larger R&S FSU3: 10 MHz ≤ f < 300 MHz 300 MHz ≤ f ≤ 3.6 GHz R&S FSU8: 10 MHz ≤ f < 300 MHz 300 MHz ≤ f ≤ 3.6 GHz 3.6 GHz ≤ f ≤ 8 GHz R&S FSU26, R&S FSU46: 10 MHz ≤ f < 300 MHz 300 MHz ≤ f < 3.6 GHz 3.6 GHz ≤ f < 26.5 GHz R&S FSU46: 26.5 GHz ≤ f ≤ 40 GHz f > 40 GHz | >17 dBm, typ. 20 dBm >19 dBm, typ. 25 dBm >17 dBm, typ. 20 dBm >20 dBm, typ. 25 dBm >18 dBm, typ. 23 dBm >17 dBm, typ. 20 dBm >22 dBm, typ. 27 dBm >12 dBm, typ. 15 dBm >12 dBm, typ. 15 dBm 12 dBm, nominal |
| Second harmonic intercept (SHI) | f < 100 MHz 100 MHz < f ≤ 400 MHz 400 MHz < f ≤ 500 MHz 500 MHz < f ≤ 1 GHz 1 GHz < f ≤ 1.8 GHz > 1.8 GHz | >35 dBm >45 dBm, typ. 55 dBm >52 dBm, typ. 60 dBm >45 dBm, typ. 55 dBm >35 dBm 80 dBm, nominal |

| Displayed average noise level | | |
|---|---|--|
| 0 dB RF attenuation, RBW = 10 Hz, VBW = 30 Hz, trace average, sweep count = 20, span = 0 Hz, termination 50 Ω | | |
| | 20 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz | <-80 dBm <-100 dBm <-110 dBm <-120 dBm <-120 dBm <-130 dBm |
| | R&S FSU3 | |
| | 10 MHz ≤ f < 2.0 GHz 2.0 GHz ≤ f ≤ 3.0 GHz 3.0 GHz ≤ f ≤ 3.6 GHz | <-145 dBm, typ. -148 dBm <-143 dBm, typ. -147 dBm <-142 dBm, typ. -146 dBm |
| | R&S FSU8 | |
| | 10 MHz ≤ f < 2.0 GHz 2.0 GHz ≤ f < 3.0 GHz 3.0 GHz ≤ f < 7 GHz 7 GHz ≤ f < 8 GHz | <-145 dBm, typ. -148 dBm <-143 dBm, typ. -145 dBm <-142 dBm, typ. -144 dBm <-140 dBm |
| | R&S FSU26 | |
| | 10 MHz ≤ f < 2 GHz 2 GHz ≤ f < 3.6 GHz 3.6 GHz ≤ f < 8 GHz 8 GHz ≤ f < 13 GHz 13 GHz ≤ f < 18 GHz 18 GHz ≤ f < 22 GHz 22 GHz ≤ f < 26.5 GHz | <-142 dBm, typ. -146 dBm <-140 dBm, typ. -143 dBm <-142 dBm, typ. -146 dBm <-140 dBm, typ. -143 dBm <-138 dBm, typ. -141 dBm <-137 dBm, typ. -140 dBm <-135 dBm, typ. -138 dBm |
| | R&S FSU46 | |
| | 10 MHz ≤ f < 2 GHz 2 GHz ≤ f < 13 GHz 13 GHz ≤ f < 18 GHz 18 GHz ≤ f < 22 GHz 22 GHz ≤ f < 26.5 GHz 26.5 GHz ≤ f < 40 GHz 40 GHz ≤ f < 46 GHz | <-142 dBm, typ. -146 dBm <-140 dBm, typ. -143 dBm <-138 dBm, typ. -141 dBm <-137 dBm, typ. -140 dBm <-135 dBm, typ. -138 dBm <-130 dBm, typ. -133 dBm <-125 dBm, typ. -130 dBm |

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

| Immunity to interference | | |
|---------------------------------|--|--|
| Image frequency | f ≤ 3.6 GHz f > 3.6 GHz | >90 dB, typ. >110 dB >70 dB, typ. >100 dB |
| Intermediate frequency | f ≤ 3.6 GHz 3.6 GHz < f ≤ 4.2 GHz f > 4.2 GHz | >90 dB, typ. >110 dB typ. 70 dB >70 dB, typ. >90 dB |
| Spurious response | f > 1 MHz, without input signal, 0 dB RF attenuation | < -103 dBm |
| Other interfering signals | Δf > 100 kHz mixer level < -10 dBm, f ≤ 2.3 GHz mixer level < -35 dBm, 2.3 GHz < f < 4 GHz mixer level < -10 dBm 4 GHz ≤ f < 8 GHz 8 GHz ≤ f < 16 GHz 16 GHz ≤ f < 26 GHz 26.5 GHz ≤ f < 40 GHz f ≥ 40 GHz | < -80 dBc < -70 dBc < -70 dBc < -64 dBc < -58 dBc < -52 dBc < -52 dBc, nominal |

| Level display | | |
|----------------------------------|---|---|
| Screen | | 625 x 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 2 measurement diagrams | 3 6 |
| Trace detector | | Max Peak, Min Peak, Auto Peak (Normal), Sample, RMS, Average, Quasi Peak |
| Number of measurement points | default value range | 625 155 to 10001 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 remote measurement, display off: zero span / sweep time 1 ms span = 10 MHz, sweep time 2.5 ms | 80 per second 70 per second 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 linear level display | dBm, dBμV, dBmV, dBμA, dBpW μV, mV, μA, mA, pW, nW |

| Level measurement uncertainty | | |
|--|--|---|
| Reference error at 128 MHz | RBW = 100 kHz, level -30 dBm, reference level -30 dBm, RF attenuation 10 dB | < 0.2 dB (σ = 0.07 dB) |
| Frequency response | DC coupling, RF attenuation ≥ 10 dB, +20 °C to +30 °C 10 MHz ≤ f < 3.6 GHz 3.6 GHz ≤ f < 8 GHz, span < 1 GHz 8 GHz ≤ f < 22 GHz, span < 1 GHz 22 GHz ≤ f < 26.5 GHz, span < 1 GHz 26.5 GHz ≤ f < 40 GHz, span < 1 GHz 40 GHz ≤ f < 46 GHz, span < 1 GHz, RF attenuation ≤ 40 dB +5 °C to +45 °C and 10 MHz ≤ f < 3.6 GHz +5 °C to +45 °C, or span ≥ 1 GHz | < 0.3 dB (σ = 0.1 dB) < 1.5 dB (σ = 0.5 dB) < 2 dB (σ = 0.7 dB) < 2.5 dB (σ = 0.8 dB) < 2.5 dB (σ = 0.8 dB) < 3 dB (σ = 1.0 dB) < 0.3 dB (σ = 0.1 dB) add 0.5 dB to above values |
| Attenuator switching uncertainty | | < 0.2 dB (σ = 0.07 dB) |
| Uncertainty of reference level setting | | < 0.15 dB (σ = 0.05 dB) |

| | | |
|------------------------------|--|--|
| Display non linearity | +20 °C to +30 °C, mixer level ≤-10 dBm) | |
| Logarithmic level display | RBW ≤ 100 kHz, S/N >20 dB 0 dB to -70 dB -70 dB to -90 dB | <0.1 dB (σ = 0.03 dB) <0.3 dB (σ =0.1 dB) |
| | 200 kHz ≤ RBW ≤10 MHz, S/N >16 dB 0 dB to -50 dB -50 dB to -70 dB | <0.2 dB (σ =0.07 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 200 kHz to 3 MHz 5 MHz to 50 MHz FFT filter 1 Hz to 3 kHz | <0.1 dB (σ =0.03 dB) <0.2 dB (σ =0.07 dB) <0.5 dB (σ =0.15 dB) <0.2 dB (σ =0.07 dB) |

| | | |
|--------------------------------------|--|--|
| Total measurement uncertainty | | |
| | 0 dB to -70 dB, S/N >20 dB, span/RBW <100, 95% confidence level, 20 °C to 30 °C, mixer level ≤-10 dBm f <3.6 GHz, RBW ≤100 kHz f <3.6 GHz, RBW >100 kHz 3.6 GHz ≤ f <8 GHz 8 GHz ≤ f <18 GHz 18 GHz ≤ f <26.5 GHz 26.5 GHz ≤ f <40 GHz 40 GHz ≤ f <46 GHz | 0.3 dB 0.5 dB 2.0 dB 2.5 dB 3.0 dB 3.0 dB 3.5 dB |

I/Q data

| | | |
|-------------------------|--|---|
| Interface | | GPIB or LAN interface |
| Memory length | | max. 512 k samples I and Q |
| Sample length | | 24 bit, each I and Q |
| Sample rate | settable in steps of 0.5 (32 MHz x 2 ⁻ⁿ , n = 0 to 11) | 15.625 kHz to 32 MHz |
| Max. signal bandwidth | Sample rate ≤2 MHz 4 MHz 8 MHz 16 MHz 32 MHz | 0.8 x sample rate 2.8 MHz 4.8 MHz 7 MHz 9 MHz |
| IF pre-filter bandwidth | | 300 kHz to 10 MHz, 1/2/3/5 steps |

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 |

Trigger functions

| | | |
|----------------------------------|-------------------|--|
| Trigger | | |
| Trigger source | | free run, video, external, IF level (mixer level >10 dBm to -50 dBm) |
| Trigger offset | span \geq 10 Hz | 125 ns to 100 s, resolution 125 ns min. (or 1% of offset) |
| | span = 0 Hz | \pm 125 ns to 100 s, resolution 125 ns min., dependent on sweep time |
| Max. deviation of trigger offset | | \pm (31.25 ns + (0.1% x trigger offset)) |
| Gated sweep | | |
| Gate source | | external, IF level, video |
| Gate delay | | 1 μ s to 100 s |
| Gate length | | 125 ns to 100 s, resolution min. 125 ns or 1% of gate length |
| Max. deviation of gate length | | \pm (31.25 ns + (0.05% x gate length)) |

Inputs and outputs (front panel)

| | | |
|-----------------------------|--|--|
| RF input | | |
| Impedance | | 50 Ω |
| Connector | R&S FSU3, R&S FSU8 R&S FSU26, R&S FSU46 | N female, testport adapter APC 3.5 mm / N female, testport adapter 2.92 mm (K) / N female, |
| VSWR | RF attenuation \geq 10 dB, DC coupled f < 3.6 GHz R&S FSU8: 3.6 GHz \leq f < 8 GHz R&S FSU26, R&S FSU46: 3.6 GHz \leq f < 18 GHz 18 GHz \leq f < 26.5 GHz 26.5 GHz \leq f < 40 GHz 40 GHz \leq f \leq 46 GHz | <1.5 <2 <1.8 <2.0 <2.5 <3, nominal |
| | RF attenuation <10 dB or AC coupling | 1.5, typical |
| Setting range of attenuator | | 0 dB to 75 dB, in 5 dB steps |

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

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

| | | |
|-------------------------------|--|-----------------------------------|
| Keyboard connector | | PS/2 female |
| AF output | | |
| Connector | | 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 \leq 30 kHz | 1.67 x resolution bandwidth, min. 2.6 kHz |
| | RBW = 50 kHz, 100 kHz | 400 kHz |
| | 200 kHz \leq RBW \leq 10 MHz | equal to resolution bandwidth |
| Level | RBW \leq 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 \leq 0 dBm | mixer level typ.-10 dB |

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

| | | |
|-------------------------|---------|-------------------|
| Reference output | | BNC female |
| Impedance | | 50 Ω |
| Output frequency | | 10 MHz |
| Level | nominal | $>$ 0 dBm |

| | | |
|------------------------|--|--|
| Reference Input | | BNC female |
| Impedance | | 50 Ω |
| Input frequency range | | 1 MHz \leq f_{in} \leq 20 MHz, in 1 Hz steps |
| 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 | | 1.4 V (TTL) |
| Input impedance | | \geq 10 k Ω |

| | | |
|--------------------------------------|--|--|
| IEC/IEEE bus control | | interface to 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 | | 10/100 BaseT, RJ45 |
| USB interface | | type A plug, version 1.1 |
| 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 sub-D |

General specifications

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

| | | |
|--------------------|--------------------|---|
| Mass memory | | |
| Mass memory | | 1.44 Mbyte 3 1/2" disk drive, hard disk |
| Data storage | | >500 instrument settings and traces |
| Mass memory | option R&S FSU-B20 | hard disk replaced by a flash disk |

| | | |
|--------------------|--|---|
| Temperature | | |
| Temperature | operating temperature range permissible temperature range storage temperature range option R&S FSU-B20: operating temperature range permissible temperature range | +5° C to +40 °C +0° C to +50 °C -40°C to +70 °C 0 °C to +50 °C 0 °C to +55 °C |
| Climatic loading | | +40 °C at 95% relative humidity (DIN 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; meets DIN EN 60068-2-6: 1996-05, DIN EN 60068-2-30: 2000-02, DIN EN 61010-1, MIL-T-28800D, class 5 |
| | random vibration | 10 Hz to 100 Hz, acceleration 1 g (rms) |
| | shock | 40 g shock spectrum, meets MIL-STD-810C and MIL-T-28800D, classes 3 and 5 |
| | option R&S FSU-B20: random vibration | 10 Hz to 300 Hz, acceleration 1.9 g (rms) |
| Recommended calibration interval | operation with external reference operation with internal reference | 2 years 1 year |
| RFI suppression | | meets EMC directive of EU (89/336/EEC) and German EMC legislation |

| | | |
|---------------------|--|--|
| 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 to VDE 411 |
| Power consumption | R&S FSU3, R&S FSU8 | typ. 130 VA |
| | R&S FSU26, R&S FSU46 | typ. 150 VA |
| Safety | | meets EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1, IEC 1010-1 |
| Test mark | | VDE, GS, CSA, CSA-NRTL |
| Dimensions | W x H x D in mm | 435 x 192 x 460 |
| Weight | R&S FSU3 R&S FSU8 R&S FSU26 R&S FSU46 | 14.6 kg 15.4 kg 16.5 kg 16.8 kg |

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

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 -100 kHz to $+100 \text{ kHz}$. Maximum output level $+5 \text{ dBm}$ (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 | | $\pm 200 \text{ MHz}$ |
| Resolution | | 1 Hz |

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

| Level | | |
|---------------------|-------------------------|---|
| Level setting range | with option R&S FSU-B12 | -30 dBm to $+5 \text{ dBm}$ in steps of 0.1 dB -100 dBm to $+5 \text{ dBm}$ in steps of 0.1 dB |

| Max. deviation of output level | | |
|--------------------------------|---|--|
| Absolute | f = 128 MHz, output level -20 dBm to 0 dBm | $<1 \text{ dB}$ ($\sigma = 0.34 \text{ dB}$) |
| Frequency response | referenced to level at 128 MHz, sweep time $>100 \text{ ms}$, $+5 \text{ }^\circ\text{C}$ to $+45 \text{ }^\circ\text{C}$ | |
| | output level -20 dBm to 0 dBm , 100 kHz to 3.6 GHz output level -30 dBm to -20 dBm , f= 100 kHz to 3.6 GHz additional deviation with R&S FSU-B12, 100 kHz to 3.6 GHz | $<3 \text{ dB}$, typ. 1.9 dB 3 dB $<1 \text{ dB}$ |

| Dynamic range | | |
|-------------------------------|----------------------------------|------------------------|
| Attenuation measurement range | RBW = 1 kHz, f $>10 \text{ MHz}$ | 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 |
| AM | $f_{\text{Center}} > f_{\text{Mod}}$, span = 0 Hz | |
| Modulation depth | | 0% to 99% |
| Modulation frequency response | 0 Hz to 5 MHz 0 Hz to 30 MHz | 1 dB 3 dB |
| FM | $f_{\text{Center}} > f_{\text{Mod}}$, span = 0 Hz | |
| Frequency deviation | | 0 Hz to 10 MHz |
| Modulation frequency range | deviation <10 MHz deviation <1 MHz | 0 Hz to 1 kHz 0 Hz to 100 kHz |
| Modulation frequency response | 0 kHz to 100 kHz | 1 dB |
| I/Q modulation | $f_{\text{Center}} > f_{\text{Mod}}$, span = 0 Hz | |
| Modulation frequency response | 0 Hz to 5 MHz 0 Hz to 30 MHz | 1 dB 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 $\leq f \leq$ 2 GHz | 1.2 |
| | 2 GHz $\leq f \leq$ 3.6 GHz | 1.5 |

| Inputs and outputs (rear panel) | | |
|--|--|--|
| TG I/AM IN Level | | $Z_{\text{in}} = 50 \Omega$, BNC female $V_{\text{max(pp)}} = 0.5 \text{ V}$ |
| TG Q/FM IN Level | | $Z_{\text{in}} = 50 \Omega$, BNC female $V_{\text{max(pp)}} = 0.5 \text{ V}$ |

LO/IF Ports for External Mixers R&S FSU-B21 (for R&S FSU26 and R&S FSU46 only)

| LO signal | | |
|-----------------|-------------------------------------|------------------------------------|
| Frequency range | | 7.0 GHz to 15.5 GHz |
| Level | +20 °C to +30 °C +5 °C to +45 °C | +15.0 dBm ±1 dB +15.0 dBm ±3 dB |

| IF input | | |
|-------------------|---|--|
| IF frequency | | 404.4 MHz |
| Full scale level | 2-port mixer (LO output / IF input, front panel) 3-port mixer (IF input, front panel) | -20 dBm + conversion loss of external mixer -20 dBm + conversion loss of external mixer |
| Level uncertainty | IF level -30 dBm, reference level -20 dBm + conversion loss of external mixer, RBW 30 kHz, 2-port mixer, LO output / IF input (front panel) +20 °C to +30 °C +5 °C to +45 °C 3-port mixer, IF input (front panel) +20 °C to +30 °C +5 °C to +45 °C | <1 dB <3 dB <1 dB <3 dB |

Inputs and outputs (front panel)

| Option R&S FSU-B21 | | |
|----------------------|--|------------------|
| LO output / IF input | | SMA-female, 50 Ω |
| IF input | | SMA-female, 50 Ω |

RF Preamplicator R&S FSU-B23 (for R&S FSU26 only, requires option R&S FSU-B25)

| Level measurement uncertainty | | |
|-------------------------------|--|--|
| Frequency response | preamplifier = on 3.6 GHz to 8 GHz 8 GHz to 22 GHz 22 GHz to 26.5 GHz | <2.0 dB ($\sigma = 0.7$ dB) <2.5 dB ($\sigma = 0.8$ dB) <3.0 dB ($\sigma = 1$ dB) |

| Displayed average noise level | | |
|-------------------------------|---|--|
| | RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, trace average, sweep count = 20, mean marker, normalized to 10 Hz RBW | |
| | preamplifier = off 3.6 GHz to 8 GHz 8 GHz to 26.5 GHz | R&S FSU26 specifications + 2 dB R&S FSU26 specifications + 3 dB |
| | preamplifier = on 3.6 GHz to 8 GHz | <-152 dBm, typ. -155 dBm |
| | 8 GHz to 13 GHz | <-149 dBm, typ. -152 dBm |
| | 13 GHz to 18 GHz | <-147 dBm, typ. -150 dBm |
| | 18 GHz to 22 GHz | <-144 dBm, typ. -149 dBm |
| | 22 GHz to 26.5 GHz | <-140 dBm, typ. -145 dBm |

Electronic Attenuator R&S FSU-B25

| Frequency | | |
|-----------------|-----------|-------------------|
| Frequency range | R&S FSU3 | 10 MHz to 3.6 GHz |
| | R&S FSU8 | 10 MHz to 8 GHz |
| | R&S FSU26 | 10 MHz to 3.6 GHz |
| | R&S FSU46 | 10 MHz to 3.6 GHz |

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

| Maximum level measurement error | | |
|---------------------------------|---|------------------------------|
| Frequency response | with preamplifier or electronic attenuator | |
| | 10 MHz to 50 MHz | <1 dB ($\sigma = 0.34$ dB) |
| | 50 MHz to 3.6 GHz | <0.6 dB ($\sigma = 0.2$ dB) |
| | 3.6 MHz to 8 GHz | <2.0 dB ($\sigma = 0.7$ dB) |
| Reference error | at 128 MHz, RBW \leq 100 kHz, reference level -30 dBm, RF attenuation 10 dB | |
| | electronic attenuator | <0.3 dB ($\sigma = 0.1$ dB) |
| | preamplifier | <0.3 dB ($\sigma = 0.1$ dB) |

| Displayed average noise level | | |
|-------------------------------|--|-------------|
| | RBW = 1 KHz, VBW = 3 KHz, zero span, sweep time 50 ms, trace average, sweep count = 20, mean marker, normalized to 10 Hz RBW | |
| | preamplifier on | |
| | 10 MHz to 2.0 GHz | <-152 dBm |
| | 2.0 GHz to 3.6 GHz | <-150 dBm |
| | 3.6 MHz to 8 GHz | <-147 dBm |
| | with the R&S FSU-B25 built in, the average noise level values displayed by the base units degrade by (R&S FSU-B25 off): | |
| | 20 Hz to 3.6 GHz | 1 dB |
| | R&S FSU8, 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 FSU8, 3.6 GHz to 8 GHz | typ. 3.5 dB |

| Intermodulation | | |
|--|---|---------|
| Third-order intermodulation, third-order intercept (TOI) | electronic attenuator on, $\Delta f > 5 \times$ 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 |

Ordering information

| Order designation | Type | Order No. |
|--|-----------|--------------|
| Spectrum Analyzer 20 Hz to 3.6 GHz | R&S FSU3 | 1166.1660.03 |
| Spectrum Analyzer 20 Hz to 8 GHz | R&S FSU8 | 1166.1660.08 |
| Spectrum Analyzer 20 Hz to 26.5 GHz | R&S FSU26 | 1166.1660.26 |
| Spectrum Analyzer 20 Hz to 46 GHz | R&S FSU46 | 1166.1660.46 |
| Accessories supplied | | |
| Power cable, operating manual, service manual, R&S FSU26: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connector R&S FSU46: test port adapter with K female (10366.4790.00) and N female (1036.4777.00) connector | | |

Options

| Order 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, 9 kHz to 3.6 GHz | R&S FSU-B9 | 1142.8994.02 | yes | |
| External Generator Control | R&S FSP-B10 | 1129.7246.02 | 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 FSU-B18 | 1145.0242.0x | no | excludes R&S FSU-B20 |
| Second Hard Disk for R&S FSU-B18 | R&S FSU-B19 | 1145.0394.0x | | requires R&S FSU-B18 |
| Extended Environmental Specifications | R&S FSU-B20 | 1155.1606.08 | no | |
| LO/IF ports for external mixers | R&S FSU-B21 | 1157.1090.02 | yes | only for R&S FSU26 and R&S FSU46 |
| 20 dB Preamplifier, 3.6 GHz to 26.5 GHz, for R&S FSU26 | R&S FSU-B23 | 1157.0907.02 | no | only for R&S FSU26, requires R&S FSU-B25 |
| Electronic Attenuator, 0 dB to 30 dB, and 20 dB Preamplifier (3.6 GHz) | R&S FSU-B25 | 1044.9298.02 | yes | |
| Firmware / Software | | | | |
| Noise Measurement Software | R&S FS-K3 | 1057.3028.02 | | preamplifier (e.g. R&S FSU-B25) recommended |
| Phase Noise Measurement Software | R&S FS-K4 | 1108.0088.02 | | |
| GSM/EDGE Application Firmware | R&S FS-K5 | 1141.1496.02 | | |
| FM Measurement Demodulator | R&S FS-K7 | 1141.1796.02 | | |
| 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 | | |
| 3GPP BTS/Node B FDD Application Firmware | R&S FS-K72 | 1154.7000.02 | | |
| 3GPP UE FDD Application Firmware | R&S FS-K73 | 1154.7252.02 | | |
| 3GPP HSDPA BTS Application Firmware | R&S FS-K74 | 1300.7156.02 | | |
| 3GPP TD-SCDMA Application Firmware | R&S FS-K76 | 1300.7291.02 | | |
| CDMA2000 BTS Application Firmware | R&S FS-K82 | 1157.2316.02 | | |
| CDMA2000 MS Application Firmware | R&S FS-K83 | 1157.2416.02 | | |
| CDMA2000 1xEV-DO BTS Application Firmware | R&S FS-K84 | 1157.2851.02 | | |

Recommended extras

| Order designation | Type | Order No. |
|--|-------------|------------------------------------|
| Headphones | | 0708.9010.00 |
| US Keyboard with trackball | R&S PSP-Z2 | 1091.4100.02 |
| 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 | 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 |
| SWR Bridge, 40 kHz to 4 GHz | R&S ZRC | 1039.9492.5X |
| 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 |
| DC blocks | | |
| DC Block, 5 MHz to 7 GHz (Type N) | R&S FSE-Z3 | 4010.3895.00 |
| DC Block, 10 kHz to 18 GHz (Type N) | R&S FSE-Z4 | 1084.7443.02 |
| External harmonic mixers (for R&S FSU26, R&S FSU46 with option R&S FSU-B21) | | |
| 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 | 1089.0976.02 |
| For R&S FSU26 only: | | |
| Test port adapter N male for R&S FSU26 | | 1021.0541.00 |
| Test port adapter 3.5 mm male for R&S FSU26 | | 1021.0529.00 |
| Microwave Measurement Cable with test port adapter set N male and 3.5 mm male for R&S FSU26 | R&S FSE-Z15 | 1046.2002.02 |
| For R&S FSU46 only: | | |
| Test port adapter N male for R&S FSU46 | | 1036.4783.00 |
| Test port adapter K male for R&S FSU46 | | 1036.4802.00 |
| Test port adapter 2.4 mm male for R&S FSU46 | R&S FSE-Z5 | 1088.1627.02 |



Product brochure see PD 0758.0016.12
and at www.rohde-schwarz.com
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