

NOISE FIGURE MEASUREMENT APPLICATION

Specifications

R&S®FPL1-K30 Noise Figure Measurement Application
R&S®FPS-K30 Noise Figure Measurement Application
R&S®FSV-K30 Noise Figure Measurement Application
R&S®FSV3-K30 Noise Figure Measurement Application
R&S®FSW-K30 Noise Figure Measurement Application
R&S®FSWP-K30 Noise Figure Measurement Application



Data Sheet
Version 07.00

ROHDE & SCHWARZ
Make ideas real



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Definitions

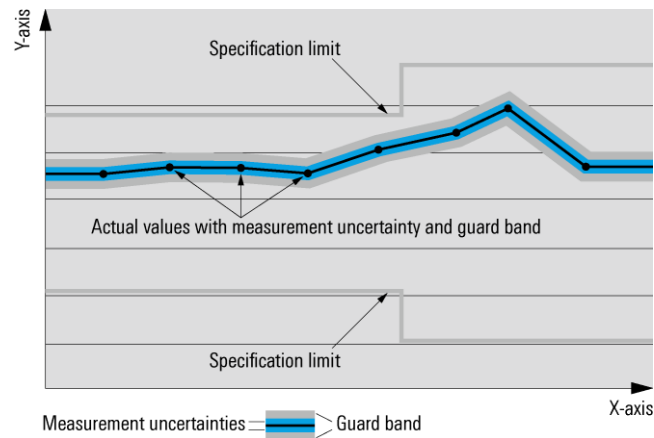
General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as $<$, \leq , $>$, \geq , \pm , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with $<$, $>$ or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

Specifications

The specifications of the R&S®Fxx-K30 noise figure measurement application are based on the data sheet specifications of

- R&S®FSW signal and spectrum analyzer
- R&S®FSWP phase noise analyzer
- R&S®FSVA3000 signal and spectrum analyzer (R&S®FSV3-K30)
- R&S®FSV3000 signal and spectrum analyzer (R&S®FSV3-K30)
- R&S®FPS signal and spectrum analyzer
- R&S®FSVA signal and spectrum analyzer (R&S®FSV-K30)
- R&S®FSV signal and spectrum analyzer (R&S®FSV-K30)
- R&S®FPL1000 signal and spectrum analyzer
- R&S®ZNL network analyzer

They have not been checked separately and are not verified during instrument calibration. Measurement uncertainties are given as 95 % confidence intervals. The specified errors, accuracies and uncertainties do not take into account systematic errors due to reduced signal-to-noise (S/N) ratio, uncertainties due to imperfect impedance matching, uncertainties of external measurement amplifiers and mixers, and uncertainties due to a reduced measurement interval and uncertainties of the noise source. The specified errors, accuracies and uncertainties apply at calibrated measurement frequency points.

Frequency

| Frequency range | RF input | |
|--------------------------------------|--|------------------------------|
| | R&S®FSW-K30 | same as R&S®FSW ¹ |
| R&S®FSWP-K30 | same as R&S®FSWP ^{1, 2} | |
| R&S®FSV3-K30 | same as R&S®FSVA3000/R&S®FSV3000 | |
| R&S®FPS-K30 | same as R&S®FPS | |
| R&S®FSV-K30 | same as R&S®FSV/R&S®FSVA | |
| R&S®FPL1-K30 | same as R&S®FPL1000/R&S®ZNL | |
| external mixer IF input ³ | | |
| R&S®FSW-K30 | same as frequency range of used external mixer | |
| R&S®FSWP-K30 | same as frequency range of used external mixer | |
| R&S®FSV-K30 | same as frequency range of used external mixer | |

Configuration

| DUT configuration | | mode | base instrument | with -B10 ⁴ option | with -B21 ³ option | with -B21 and -B10 ⁵ options | |
|-------------------|-----------------------------------|-------------------------|-----------------|-------------------------------|-------------------------------|---|---|
| RF input | direct | | • | • | • | • | |
| | fixed LO, upconverter | | • | • | • | • | |
| | fixed LO, downconverter | | • | • | • | • | |
| | fixed IF, upconverter | | | • | | • | |
| | fixed IF, downconverter | | | • | | • | |
| | external mixer input ³ | direct | | | | • | • |
| | | fixed LO, upconverter | | | | • | • |
| | | fixed LO, downconverter | | | | • | • |
| | | fixed IF, upconverter | | | | | • |
| | | fixed IF, downconverter | | | | | • |

¹ Restricted IF overload, IF power trigger and auto level functionality depending on carrier frequency and bandwidth at carrier frequencies < 50 MHz.

² The R&S®FSWP-B1 option is a prerequisite for using the R&S®FSWP-K30 option with the R&S®FSWP phase noise analyzer.

³ R&S®FSW26/FSW43/FSW50/FSW67/FSW85 with the R&S®FSW-B21 option and external mixer, R&S®FSWP26/FSWP50 with the R&S®FSWP-B1 and R&S®FSWP-B21 options and external mixer or R&S®FSV30/FSV40/R&S®FSVA30/FSVA40 with the R&S®FSV-B21 option and external mixer are required. Not available for R&S®FSVA3000, R&S®FSV3000, R&S®FPS, R&S®FPL1000 and R&S®ZNL.

⁴ R&S®FSW with the R&S®FSW-B10 option, R&S®FSWP with the R&S®FSWP-B1 and R&S®FSWP-B10 options, R&S®FSVA3000 with the R&S®FSV3-B10 option, R&S®FSV3000 with the R&S®FSV3-B10 option, R&S®FPS with the R&S®FPS-B10 option or R&S®FSV with the R&S®FSV-B10 option are required. Not available for R&S®FPL1000 and R&S®ZNL.

⁵ R&S®FSW26/FSW43/FSW50/FSW67/FSW85 with the R&S®FSW-B10 and R&S®FSW-B21 options and external mixer, R&S®FSWP26/FSWP50 with the R&S®FSW-B1, R&S®FSW-B10 and R&S®FSWP-B21 options and external mixer or R&S®FSV30/FSV40/R&S®FSVA30/FSVA40 with the R&S®FSV-B10 and R&S®FSV-B21 options and external mixer are required. Not available for R&S®FSVA3000, R&S®FSV3000, R&S®FPS, R&S®FPL1000 and R&S®ZNL.

| | | |
|--|--------------------------|--|
| Measurement configuration | sweep mode | frequency sweep |
| | | frequency table (user-defined) |
| | noise source type | noise diode, resistor, smart noise source ⁶ |
| | | ENR |
| | input loss | constant, user-defined table |
| | output loss | constant, user-defined table |
| | calibration loss | constant, user-defined table |
| | frequency settings | start frequency, stop frequency, number of frequency points |
| | | center frequency, span, step size |
| | measurement settings | RBW |
| | | sweep time |
| | | settling time |
| | | average |
| | level and range settings | reference level (auto, manual) |
| auto reference level range | | |
| RF attenuator (manual) | | |
| second stage correction (calibration) | on/off | |

| | | | | |
|--|---|---------------------------------|----------------|---|
| Remote control | control via SCPI command set and application-specific extensions | R&S®FSW and R&S®FSWP | • | • |
| | | R&S®FSVA3000 and R&S®FSV3000 | • ⁸ | • |
| | | R&S®FPS | • | • |
| | | R&S®FSV and R&S®FSVA | • | • |
| | | R&S®FPL1000 and R&S®ZNL | • ⁹ | • |
| Uncertainty calculator and result uncertainty calculation | R&S®FSW-K30 | on/off | | |
| | R&S®FSWP-K30 | on/off | | |
| | R&S®FSV3-K30 | on/off | | |
| | R&S®FPS-K30 | on/off | | |
| | R&S®FSV-K30 | on/off | | |
| | R&S®FPL1-K30 | not available | | |
| Preamplifier ¹⁰ | R&S®FSW-K30 | 30 dB/off | | |
| | R&S®FSWP-K30 | 30 dB/off | | |
| | R&S®FSV3-K30 | 30 dB/off | | |
| | R&S®FPS-K30 | on/off | | |
| | R&S®FSV-K30 | on/off | | |
| | R&S®FPL1-K30 | on/off | | |

⁶ Smart noise source support not available for R&S®FSV and R&S®FSVA.

⁷ Smart noise source table support not available for R&S®FSV and R&S®FSVA.

⁸ R&S®FSVA3000 with the R&S®FSV3-B5 option or R&S®FSV3000 with the R&S®FSV3-B5 option are required.

⁹ R&S®FPL1000 with the R&S®FPL1-B10 option or R&S®ZNL with the R&S®FPL1-B10 option are required.

¹⁰ R&S®FSW8/FSW13/FSW26/FSW43/FSW50/FSW67 with the R&S®FSW-B24 option, R&S®FSWP8/FSWP26/FSWP50 with the R&S®FSWP-B24 option, R&S®FSVA3004/FSVA3007/FSVA3013/FSVA3030/FSVA3044 with the R&S®FSV3-B24 option, R&S®FSV3004/FSV3007/FSV3013/FSV3030/FSV3044 with the R&S®FSV3-B24 option, R&S®FPS4/FPS7 with the R&S®FPS-B22 option, R&S®FPS13/FPS30/FPS40 with the R&S®FPS-B24 option, R&S®FSV4/FSV7 with the R&S®FSV-B22 option, R&S®FSV13/FSV30/FSV40 with the R&S®FSV-B24 option, R&S®FSVA4/FSVA7 with the R&S®FSV-B22 option, R&S®FSVA13/FSVA30/FSVA40 with the R&S®FSV-B24 option or R&S®FPL1000 with the R&S®FPL1-B22 option are required. Not available for R&S®ZNL.

Results

| R&S®FSW-K30, R&S®FSWP-K30, R&S®FSV3-K30 for R&S®FSVA3000/FSV3000, R&S®FPS-K30, R&S®FPL1-K30 | | |
|--|--|--|
| Result display | result table | frequency |
| | | selectable: noise figure, noise temperature, gain, power (hot), power (cold), Y factor |
| | marker table | marker reference, frequency |
| | | selectable: noise figure, noise temperature, gain, power (hot), power (cold), Y factor |
| graph results | noise figure, noise temperature, gain, power (hot), power (cold), Y factor | |
| | x-axis according to frequency settings | |
| | y-axis scaling automatic or user-defined | |
| Trace | trace configuration | up to 4 traces |
| | | clear/write, view, blank |
| | | copy trace |
| | markers | up to 4 markers (normal/delta) |
| | limit lines | noise figure, gain |

| R&S®FSV-K30 for R&S®FSVA/FSV | | |
|---|---------------------|--|
| Result display | result table | frequency, noise figure, noise temperature, gain |
| | graph results | noise figure, gain |
| | | x-axis according to frequency settings y-axis scaling automatic or user-defined |
| Trace | trace configuration | measurement traces, up to 3 memory traces |
| | | copy trace |
| | markers | up to 4 markers |
| | limit lines | noise figure, gain |

Measurement uncertainty (nominal)

| | | |
|-------------------------------------|--|------------------------|
| Noise figure measurement range | noise source ENR | measurement range |
| | 4 dB to 7 dB | 0 dB to 20 dB |
| | 12 dB to 17 dB | 0 dB to 30 dB |
| | 20 dB to 22 dB | 0 dB to 35 dB |
| Resolution | | 0.01 dB |
| Instrument noise figure uncertainty | R&S®FSW-K30, R&S®FSWP-K30 | |
| | 10 MHz to 50 GHz ¹¹ | ±0.05 dB ¹² |
| | R&S®FSV3-K30 | |
| | 10 MHz to 44 GHz ¹¹ | ±0.05 dB ¹³ |
| | R&S®FPS-K30 | |
| | 10 MHz to 7 GHz ¹¹ | ±0.05 dB ¹⁴ |
| | > 7 GHz ¹¹ | ±0.05 dB ¹⁵ |
| | R&S®FPL1-K30 | |
| | R&S®FPL1000: 10 MHz to 7 GHz ¹¹ | ±0.05 dB ¹⁶ |
| | R&S®ZNL: 10 MHz to 3 GHz | ±0.05 dB ¹⁷ |
| | R&S®FSV-K30 | |
| | 10 MHz to 7 GHz ¹¹ | ±0.05 dB ¹⁸ |
| > 7 GHz ¹¹ | ±0.05 dB ¹⁹ | |
| Gain measurement range | | -20 dB to +60 dB |
| Resolution | | 0.01 dB |
| Accuracy | R&S®FSW-K30, R&S®FSWP-K30 | |
| | 10 MHz to 50 GHz ¹¹ | ±0.15 dB ¹² |
| | R&S®FSV3-K30 | |
| | 10 MHz to 44 GHz ¹¹ | ±0.15 dB ¹³ |
| | R&S®FPS-K30 | |
| | 10 MHz to 7 GHz ¹¹ | ±0.15 dB ¹⁴ |
| | > 7 GHz ¹⁰ | ±0.15 dB ¹⁵ |
| | R&S®FPL1-K30 | |
| | R&S®FPL1000: 10 MHz to 7 GHz ¹¹ | ±0.15 dB ¹⁶ |
| | R&S®ZNL: 10 MHz to 3 GHz | ±0.15 dB ¹⁷ |
| | R&S®FSV-K30 | |
| | 10 MHz to 7 GHz ¹¹ | ±0.15 dB ¹⁸ |
| > 7 GHz ¹¹ | ±0.15 dB ¹⁹ | |

¹¹ The upper frequency limit depends on the instrument model.

¹² With internal preamplifier (R&S®FSW-B24/FSWP-B24 option), gain 30 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

¹³ With internal preamplifier (R&S®FSV3-B24), gain 30 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

¹⁴ With internal preamplifier (R&S®FPS-B22 option) = on, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

¹⁵ With external gain 30 dB, noise figure < 5 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

¹⁶ With internal preamplifier (R&S®FPL1-B22 option) = on, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

¹⁷ With external gain 30 dB, noise figure < 5 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

¹⁸ With internal preamplifier (R&S®FSV-B22 option) = on, sweep time > 300 ms, input attenuator = 0 dB.

¹⁹ With external gain 30 dB, noise figure < 5 dB, sweep time > 300 ms, input attenuator = 0 dB.

Recommended hardware

| Designation | Type | Order No. |
|--|----------------|--------------|
| Smart noise source, 10 MHz to 26.5 GHz | R&S®FS-SNS26 | 1338.8008.26 |
| Smart noise source, 100 MHz to 40 GHz | R&S®FS-SNS40 | 1338.8008.40 |
| Smart noise source, 100 MHz to 55 GHz | R&S®FS-SNS55 | 1338.8008.55 |
| Accessories supplied with each R&S®FS-SNS | | |
| Interface cable | R&S®SNSCABLE | 1338.8020.00 |
| Manual, carrying case | | |
| Optional accessories | | |
| Y adapter cable for legacy instruments | R&S®SNSCABLE-Y | 1338.8066.00 |

| Noise source ²⁰ | RF connector | Frequency range | ENR |
|----------------------------|--------------|----------------------|----------------|
| NoiseCom NC346 | | | |
| NC 346 A | SMA male | 0.01 GHz to 18 GHz | 5 dB to 7 dB |
| NC 346 A precision | APC 3.5 male | 0.01 GHz to 18 GHz | 5 dB to 7 dB |
| NC 346 A option1 | N male | 0.01 GHz to 18 GHz | 5 dB to 7 dB |
| NC 346 A option 2 | APC 7 | 0.01 GHz to 18 GHz | 5 dB to 7 dB |
| NC 346 A option 4 | N female | 0.01 GHz to 18 GHz | 5 dB to 7 dB |
| NC 346 B | SMA male | 0.01 GHz to 18 GHz | 14 dB to 16 dB |
| NC 346 B precision | APC 3.5 male | 0.01 GHz to 18 GHz | 14 dB to 16 dB |
| NC 346 B option 1 | N male | 0.01 GHz to 18 GHz | 14 dB to 16 dB |
| NC 346 A option 2 | APC 7 | 0.01 GHz to 18 GHz | 14 dB to 16 dB |
| NC 346 A option 4 | N female | 0.01 GHz to 18 GHz | 14 dB to 16 dB |
| NC 346 C | APC 3.5 male | 0.01 GHz to 26.5 GHz | 13 dB to 17 dB |
| NC 346 D | SMA male | 0.01 GHz to 18 GHz | 19 dB to 25 dB |
| NC 346 D precision | APC 3.5 male | 0.01 GHz to 18 GHz | 19 dB to 25 dB |
| NC 346 D option1 | N male | 0.01 GHz to 18 GHz | 19 dB to 25 dB |
| NC 346 D option 2 | APC 7 | 0.01 GHz to 18 GHz | 19 dB to 25 dB |
| NC 346 D option 3 | N female | 0.01 GHz to 18 GHz | 19 dB to 25 dB |
| NC 346 E | APC 3.5 male | 0.01 GHz to 26.5 GHz | 19 dB to 25 dB |
| NC 346 Ka | K male | 0.1 GHz to 40 GHz | 10 dB to 17 dB |
| NC 346 V | V male | 0.1 GHz to 55 GHz | 7 dB to 21 dB |

²⁰ Noise sources supplied by NoiseCom; specifications from NoiseCom.

Ordering information

Noise figure measurement application

| Designation | Type | Order No. |
|---|--------------|--------------|
| Noise figure measurement application | R&S®FSW-K30 | 1313.1380.02 |
| Noise figure measurement application ²¹ | R&S®FSWP-K30 | 1325.4244.02 |
| Noise figure measurement application | R&S®FSV3-K30 | 1330.5045.02 |
| Noise figure measurement application | R&S®FPS-K30 | 1321.4104.02 |
| Noise figure measurement application (for R&S®FPL1000 and R&S®ZNL) ²² | R&S®FPL1-K30 | 1323.1760.02 |
| Noise figure measurement application | R&S®FSV-K30 | 1310.8355.02 |

R&S®FSW signal and spectrum analyzer

| Designation | Type | Order No. |
|---|-------------|--------------|
| Base unit | | |
| Signal and spectrum analyzer, 2 Hz to 8 GHz | R&S®FSW8 | 1331.5003.08 |
| Signal and spectrum analyzer, 2 Hz to 13.6 GHz | R&S®FSW13 | 1331.5003.13 |
| Signal and spectrum analyzer, 2 Hz to 26.5 GHz | R&S®FSW26 | 1331.5003.26 |
| Signal and spectrum analyzer, 2 Hz to 43.5 GHz | R&S®FSW43 | 1331.5003.43 |
| Signal and spectrum analyzer, 2 Hz to 50 GHz | R&S®FSW50 | 1331.5003.50 |
| Signal and spectrum analyzer, 2 Hz to 67 GHz | R&S®FSW67 | 1331.5003.67 |
| Signal and spectrum analyzer, 2 Hz to 85 GHz | R&S®FSW85 | 1331.5003.85 |
| Options | | |
| External generator control | R&S®FSW-B10 | 1313.1622.02 |
| LO/IF connections for external mixers (R&S®FSW26) | R&S®FSW-B21 | 1313.1100.26 |
| LO/IF connections for external mixers (R&S®FSW43/50/67) | R&S®FSW-B21 | 1313.1100.43 |
| LO/IF connections for external mixers (R&S®FSW85) | R&S®FSW-B21 | 1313.1100.85 |
| RF preamplifier, 100 kHz to 13.6 GHz (for R&S®FSW8/13) | R&S®FSW-B24 | 1313.0832.13 |
| RF preamplifier, 100 kHz to 26.5 GHz | R&S®FSW-B24 | 1313.0832.26 |
| RF preamplifier, 100 kHz to 43.5 GHz | R&S®FSW-B24 | 1313.0832.43 |
| RF preamplifier, 100 kHz to 50 GHz | R&S®FSW-B24 | 1313.0832.49 |
| RF preamplifier, 100 kHz to 67 GHz | R&S®FSW-B24 | 1313.0832.66 |

R&S®FSWP phase noise analyzer

| Designation | Type | Order No. |
|---|--------------|--------------|
| Base unit | | |
| Phase noise analyzer, 1 MHz to 8 GHz | R&S®FSWP8 | 1322.8003.08 |
| Phase noise analyzer, 1 MHz to 26.5 GHz | R&S®FSWP26 | 1322.8003.26 |
| Phase noise analyzer, 1 MHz to 50 GHz | R&S®FSWP50 | 1322.8003.50 |
| Options | | |
| External generator control | R&S®FSWP-B10 | 1325.5463.02 |
| LO/IF connections for external mixers (R&S®FSWP26/50) | R&S®FSWP-B21 | 1325.3848.02 |
| RF preamplifier, 100 kHz to 8 GHz (R&S®FSWP8) | R&S®FSWP-B24 | 1325.3725.08 |
| RF preamplifier, 100 kHz to 26.5 GHz (R&S®FSWP26) | R&S®FSWP-B24 | 1325.3725.26 |
| RF preamplifier, 100 kHz to 50 GHz (R&S®FSWP50) | R&S®FSWP-B24 | 1325.3725.50 |
| Mandatory options | | |
| Spectrum analyzer, 10 Hz to 8 GHz | R&S®FSWP-B1 | 1322.9997.08 |
| Spectrum analyzer, 10 Hz to 26.5 GHz | R&S®FSWP-B1 | 1322.9997.26 |
| Spectrum analyzer, 10 Hz to 50 GHz | R&S®FSWP-B1 | 1322.9997.50 |

²¹ The R&S®FSWP-B1 option is a prerequisite for using the R&S®FSWP-K30 option with the R&S®FSWP phase noise analyzer.

²² The R&S®FPL1-B5 option is a prerequisite for using the R&S®FPL1-K30 option with the R&S®FPL1000 signal and spectrum analyzer.
The R&S®ZNL3-B1 and R&S®FPL1-B5 options are prerequisites for using the R&S®FPL1-K30 option with the R&S®ZNL network analyzer.

R&S®FSVA3000 and R&S®FSV3000 signal and spectrum analyzer

| Designation | Type | Order No. |
|---|---------------|--------------|
| R&S®FSVA3000 signal and spectrum analyzer | | |
| Signal and spectrum analyzer, 10 Hz to 4 GHz | R&S®FSVA3004 | 1330.5000.05 |
| Signal and spectrum analyzer, 10 Hz to 7.5 GHz | R&S®FSVA3007 | 1330.5000.08 |
| Signal and spectrum analyzer, 10 Hz to 13.6 GHz | R&S®FSVA3013 | 1330.5000.14 |
| Signal and spectrum analyzer, 10 Hz to 30 GHz | R&S®FSVA3030 | 1330.5000.31 |
| Signal and spectrum analyzer, 10 Hz to 44 GHz | R&S®FSVA3044 | 1330.5000.44 |
| R&S®FSV3000 signal and spectrum analyzer | | |
| Signal and spectrum analyzer, 10 Hz to 4 GHz | R&S®FSV3004 | 1330.5000.04 |
| Signal and spectrum analyzer, 10 Hz to 7.5 GHz | R&S®FSV3007 | 1330.5000.07 |
| Signal and spectrum analyzer, 10 Hz to 13.6 GHz | R&S®FSV3013 | 1330.5000.13 |
| Signal and spectrum analyzer, 10 Hz to 30 GHz | R&S®FSV3030 | 1330.5000.30 |
| Signal and spectrum analyzer, 10 Hz to 44 GHz | R&S®FSV3044 | 1330.5000.43 |
| Options | | |
| Noise source control via BNC (for use with legacy noise sources) | R&S®FSV3-B28V | 1330.6664.02 |
| Additional interfaces | R&S®FSV3-B5 | 1330.3820.02 |
| External generator control | R&S®FSV3-B10 | 1330.3859.02 |
| RF preamplifier for R&S®FSVA3004/FSV3004 and R&S®FSVA3007/FSV3007 | R&S®FSV3-B24 | 1330.4049.07 |
| RF preamplifier for R&S®FSVA3013/FSV3013 | R&S®FSV3-B24 | 1330.4049.13 |
| RF preamplifier for R&S®FSVA3030/FSV3030 | R&S®FSV3-B24 | 1330.4049.30 |
| RF preamplifier for R&S®FSVA3044/FSV3044 | R&S®FSV3-B24 | 1330.4049.44 |

R&S®FPS signal and spectrum analyzer

| Designation | Type | Order No. |
|--|---|--------------|
| Base unit | | |
| Signal and spectrum analyzer, 10 Hz to 4 GHz | R&S®FPS4 | 1319.2008.04 |
| Signal and spectrum analyzer, 10 Hz to 7 GHz | R&S®FPS7 | 1319.2008.07 |
| Signal and spectrum analyzer, 10 Hz to 13.6 GHz | R&S®FPS13 | 1319.2008.13 |
| Signal and spectrum analyzer, 10 Hz to 30 GHz | R&S®FPS30 | 1319.2008.30 |
| Signal and spectrum analyzer, 10 Hz to 40 GHz | R&S®FPS40 | 1319.2008.40 |
| Options | | |
| Noise source control 0 V/28 V (mandatory for R&S®FPS-K30, not retrofittable) | R&S®FPS-B28V | 1326.5996.02 |
| RF preamplifier, 9 kHz to 7 GHz | R&S®FPS-B22 | 1321.4027.02 |
| RF preamplifier, 9 kHz to 13.6 GHz | R&S®FPS-B24 | 1321.4279.13 |
| RF preamplifier, 9 kHz to 30 GHz | R&S®FPS-B24 | 1321.4279.30 |
| RF preamplifier, 9 kHz to 40 GHz | R&S®FPS-B24 | 1321.4279.40 |
| Mandatory option | | |
| Noise source supply, BNC female, switched 28 V, max. 100 mA | R&S®FPS-B28V option noise source control connector on rear panel of R&S®FPS | |
| Recommended hardware: external preamplifier (for frequency range > 7 GHz; gain: approx. 20 dB; noise figure: max. 5 dB) | | |

R&S®FSVA and R&S®FSV signal and spectrum analyzer

| Designation | Type | Order No. |
|--|-------------|--------------|
| R&S®FSVA signal and spectrum analyzer | | |
| Signal and spectrum analyzer | R&S®FSVA4 | 1321.3008.05 |
| Signal and spectrum analyzer | R&S®FSVA7 | 1321.3008.08 |
| Signal and spectrum analyzer | R&S®FSVA13 | 1321.3008.14 |
| Signal and spectrum analyzer | R&S®FSVA30 | 1321.3008.31 |
| Signal and spectrum analyzer | R&S®FSVA40 | 1321.3008.41 |
| R&S®FSV signal and spectrum analyzer | | |
| Signal and spectrum analyzer | R&S®FSV4 | 1321.3008.04 |
| Signal and spectrum analyzer | R&S®FSV7 | 1321.3008.07 |
| Signal and spectrum analyzer | R&S®FSV13 | 1321.3008.13 |
| Signal and spectrum analyzer | R&S®FSV30 | 1321.3008.30 |
| Signal and spectrum analyzer ²³ | R&S®FSV40 | 1321.3008.39 |
| Signal and spectrum analyzer | R&S®FSV40 | 1321.3008.40 |
| Options for R&S®FSVA and R&S®FSV signal and spectrum analyzer | | |
| External generator control | R&S®FSV-B10 | 1310.9551.02 |
| LO/IF ports for external mixers | R&S®FSV-B21 | 1310.9597.02 |
| RF preamplifier, 9 kHz to 7 GHz | R&S®FSV-B22 | 1310.9600.02 |
| RF preamplifier, 9 kHz to 13.6 GHz | R&S®FSV-B24 | 1310.9616.13 |
| RF preamplifier, 9 kHz to 30 GHz | R&S®FSV-B24 | 1310.9616.30 |
| RF preamplifier, 9 kHz to 40 GHz | R&S®FSV-B24 | 1310.9616.40 |
| Recommended hardware: external preamplifier (for frequency range > 7 GHz; gain: approx. 20 dB; noise figure: max. 5 dB) | | |

R&S®FPL1000 signal and spectrum analyzer

| Designation | Type | Order No. |
|------------------------------|--------------|--------------|
| Base unit | | |
| Signal and spectrum analyzer | R&S®FPL1003 | 1304.0004.03 |
| Signal and spectrum analyzer | R&S®FPL1007 | 1304.0004.07 |
| Options | | |
| Additional interfaces | R&S®FPL1-B5 | 1323.1883.02 |
| RF preamplifier | R&S®FPL1-B22 | 1323.1719.02 |
| GPIB interface | R&S®FPL1-B10 | 1323.1890.02 |

R&S®ZNL network analyzer

| Designation | Type | Order No. |
|---|--------------|--------------|
| Base unit | | |
| Network analyzer | R&S®ZNL3 | 1323.0012.03 |
| Network analyzer | R&S®ZNL4 | 1323.0012.04 |
| Network analyzer | R&S®ZNL6 | 1323.0012.06 |
| Options | | |
| Additional interfaces | R&S®FPL1-B5 | 1323.1883.02 |
| GPIB interface | R&S®FPL1-B10 | 1323.1890.02 |
| Mandatory option | | |
| Spectrum analysis for R&S®ZNL3 | R&S®ZNL3-B1 | 1323.1802.02 |
| Spectrum analysis for R&S®ZNL4 | R&S®ZNL4-B1 | 1303.8099.02 |
| Spectrum analysis for R&S®ZNL6 | R&S®ZNL6-B1 | 1323.2067.02 |
| Recommended hardware: external preamplifier (gain: approx. 20 dB; noise figure: max. 5 dB) | | |

²³ Max. bandwidth = 10 MHz.

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