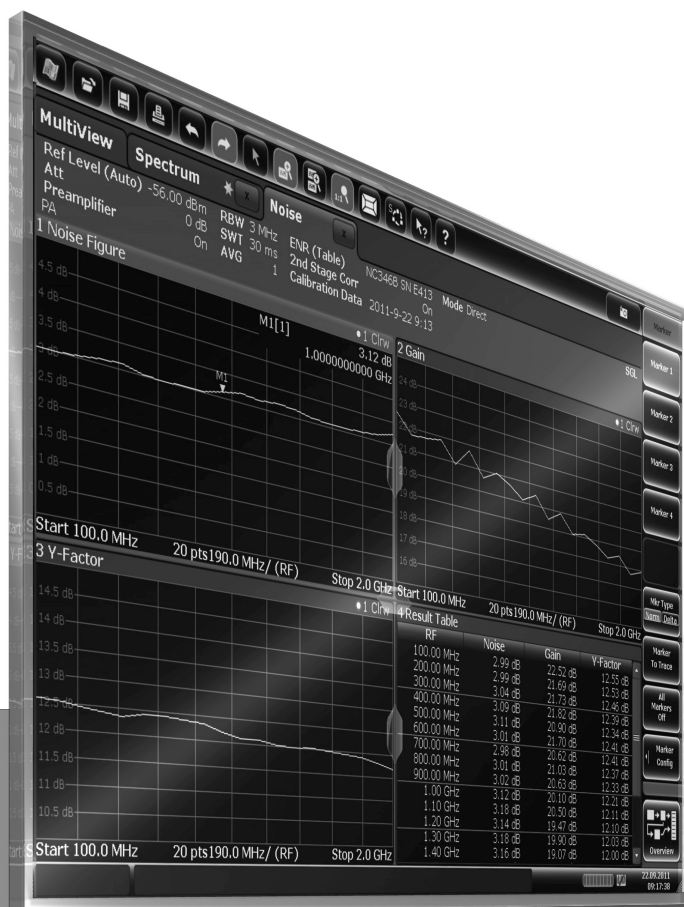


R&S®FSMR3-K30 NOISE FIGURE MEASUREMENT APPLICATION

Specifications

For R&S®FSMR3000AF Measuring Receiver



Data Sheet
Version 01.00

ROHDE & SCHWARZ

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Definitions

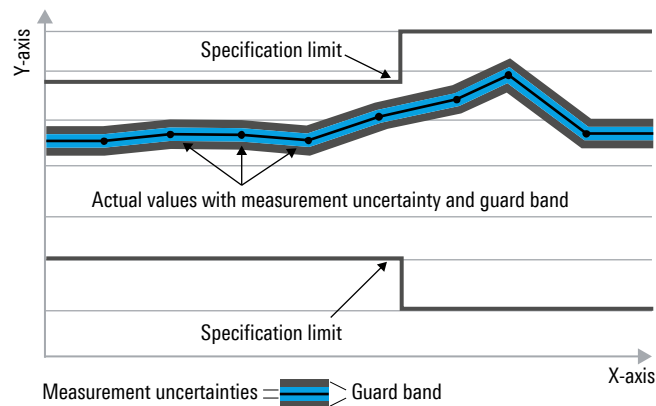
General

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.



Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under “Specifications with limits” above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

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 designated with the format “parameter: value”.

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP/3GPP2 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bits per second (Gbps), million bits per second (Mbps), thousand bits per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

Specifications

The specifications of the R&S®FSMR3-K30 noise figure measurement application are based on the data sheet specifications of the R&S®FSMR3000AF measuring receiver (PD 3608.9130.22).

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, 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	same as R&S®FSMR3000AF ¹
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Configuration

DUT configuration	RF input	direct
		fixed LO, upconverter
		fixed LO, downconverter
Measurement configuration	sweep mode	frequency sweep
		frequency table (user-defined)
	noise source type	noise diode, resistor, smart noise source
	ENR	constant, user-defined table, smart noise source table
	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	GPIO, LAN (VXI-11)
Uncertainty calculator and result uncertainty calculation		on/off
Preamplifier ²		30 dB/off

¹ Restricted IF overload, IF power trigger and auto level functionality depending on carrier frequency and bandwidth.

² R&S®FSMR3026AF/FSMR3050AF with R&S®FSMR3-B24 option.

Results

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 automatically 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	

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	10 MHz to 50 GHz ³	±0.05 dB ⁴
Gain measurement range		-20 dB to +60 dB
Resolution		0.01 dB
Accuracy	10 MHz to 50 GHz ³	±0.15 dB ⁴

³ The upper frequency limit depends on the instrument model.

⁴ With internal preamplifier (R&S®FSMR3-B24 option), gain = 30 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

Ordering Information

Designation	Type	Order No.
Noise figure measurement application	R&S®FSMR3-K30	1345.3637.02
Base unit		
Measuring receiver, 1 MHz to 26.5 GHz	R&S®FSMR3026AF	1345.4004.26
Measuring receiver, 1 MHz to 50 GHz	R&S®FSMR3050AF	1345.4004.50
Options		
RF preamplifier, 100 kHz to 26.5 GHz, for R&S®FSMR3026AF	R&S®FSMR3-B24	1345.3108.26
RF preamplifier, 100 kHz to 50 GHz, for R&S®FSMR3050AF	R&S®FSMR3-B24	1345.3108.50

Recommended hardware

Designation	Type	Order No.
Smart noise source, 10 MHz to 18 GHz	R&S®FS-SNS18	1338.8008.18
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 ⁵	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, option 1	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 B, option 2	APC 7	0.01 GHz to 18 GHz	14 dB to 16 dB
NC 346 B, 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, option 1	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

For R&S®FSMR3000AF data sheet, see PD 3608.9130.22 and www.rohde-schwarz.com

⁵ Noise sources supplied by NoiseCom; specifications from NoiseCom.

Service that adds value

- ▶ Worldwide
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- ▶ Customized and flexible
- ▶ Uncompromising quality
- ▶ Long-term dependability

Rohde & Schwarz

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Sustainable product design

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- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

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