

# Noise Measurement Software FS-K3 for Spectrum Analyzers FSE, FSIQ, FSP and FSU

Outperforming any conventional noise measurement system

Spectrum Analyzers FSE, FSP and FSU as well as Signal Analyzers FSIQ from Rohde & Schwarz feature high sensitivity and level accuracy – in conjunction with switchable, calibrated noise sources – and are thus ideal for automatic measurement of noise figure and gain.

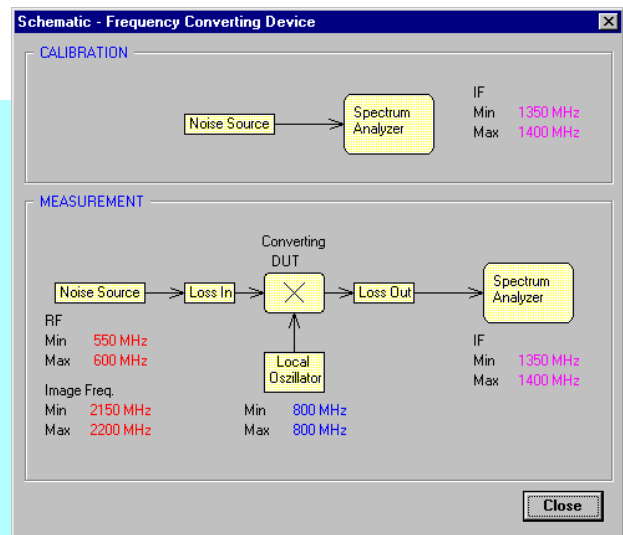
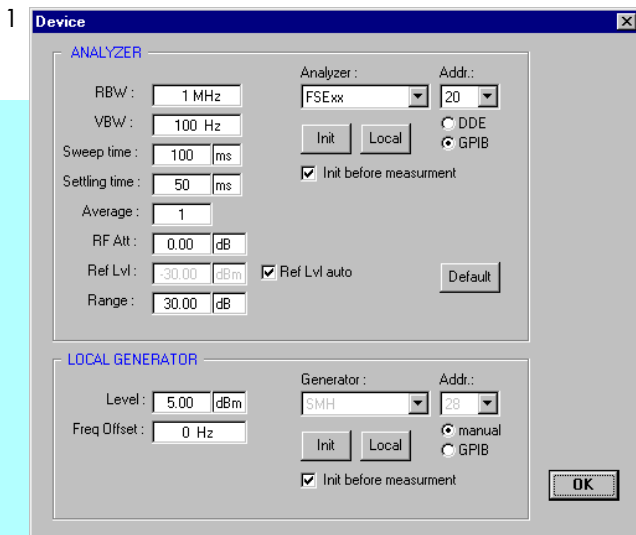
Noise Measurement Software FS-K3 provides the high-grade analyzers with features otherwise only offered by special noise measurement systems. At a given frequency or in a selectable frequency range the following parameters can be measured:

- Noise figure in dB
- Noise temperature in K
- Gain in dB

FS-K3 used with Analyzers FSE, FSIQ, FSP or FSU has the advantage over conventional noise measurement systems that a large variety of further RF measurements can also be performed.

The measurement results are output as a graph or a list. Up to eight measurements can be represented in a diagram.

# Noise Measurement Software FS-K3 ...



3

Frequency	ENR
10 MHz	13.14
100 MHz	13.21
1000 MHz	13.22
2000 MHz	13.17
3000 MHz	13.26
4000 MHz	13.38
5000 MHz	13.53
6000 MHz	13.63
7000 MHz	13.81
8000 MHz	14.08
9000 MHz	14.39
10 GHz	14.56
11 GHz	14.79
12 GHz	14.96



The combination of Noise Measurement Software FS-K3 and Analyzers FSE, FSIQ, FSP or FSU offers the following advantages over conventional noise measurement systems:

- Frequency range up to 26.5 GHz (depending on analyzer model) for noise measurements in the microwave range without need for an additional downconverter
- Resolution bandwidths variable in steps of 1/2/3/5 (FSP: 1/3) for optimum matching to narrowband DUTs

While conventional noise measurement systems are only suitable for deter-

mining the noise and gain characteristics of the DUT, FSE, FSIQ, FSP or FSU also allows the highly sensitive measurement of:

- harmonics
  - intermodulation
  - spurious responses
- and of many other RF-relevant criteria.

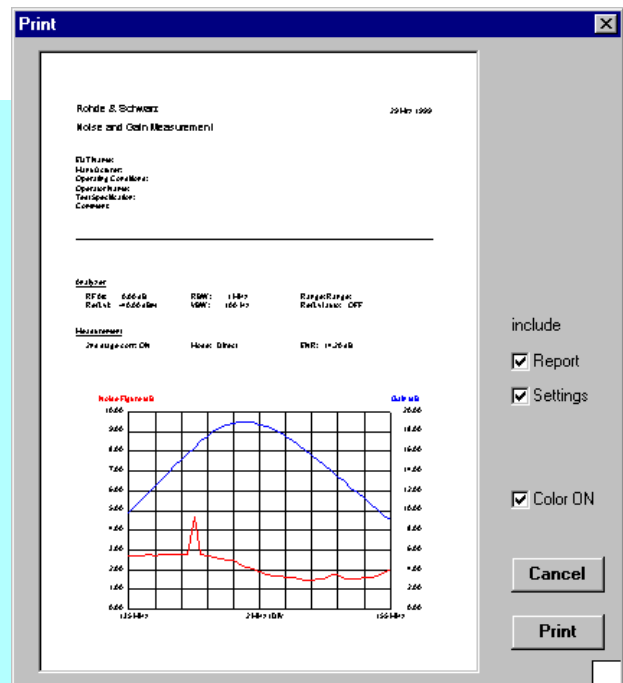
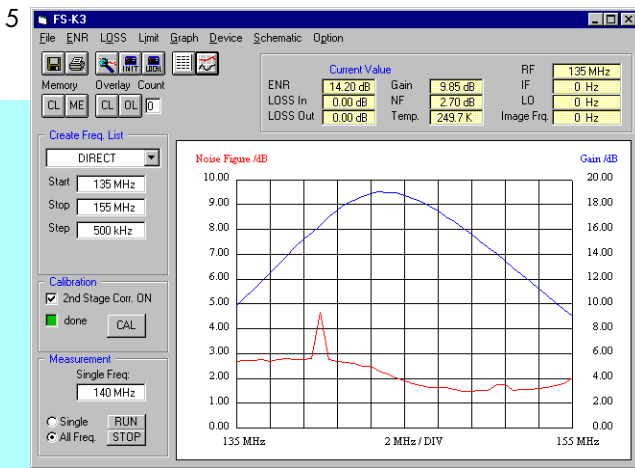
The versatility of this FSE/FSIQ/FSP/FSU-based noise measurement set is not at the expense of the measurement accuracy, which essentially is determined by the accuracy of the noise source calibration and the mismatch. The largest error affecting the measuring instrument, ie the linearity of its log

characteristic, is minimized in Analyzers FSE, FSIQ, FSP and FSU by individual calibration.

## Easy to operate

FS-K3 runs under the operating systems Windows 3.1, Windows 95 and Windows NT. The software for controlling the analyzer can be run on a Spectrum Analyzer FSE in conjunction with Computer Function FSE-B15, on a Signal Analyzer FSIQ (which includes Windows NT as standard) or on a Spectrum Analyzer FSP/FSU via an internal interface, or on a PC via the IEEE bus. Windows ensures easy and famil-

# ... outperforming conventional noise measurement systems



- 1 to 3 The familiar Windows user interface makes for convenient settings
- 4 Spectrum Analyzer FSE, an external PC and the power supply for the DUT: this is all you need to set up an extremely convenient measurement system for noise and many other parameters
- 5 Measurements on a GaAs preamplifier show an anomaly at 140 MHz, whose cause is easily traceable in the spectrum analyzer mode
- 6 The documentation of results includes instrument setups and DUT description

iar operation. The measurement results can be further processed, eg for documentation or presentation, using Windows standard software.

An unlimited number of complete measurement routines can be stored. They facilitate reproducible and error-free measurements and include:

- Frequency range
- Noise source characteristics
- Type of DUT (amplifier, mixer, low-noise converter)
- Analyzer settings
- Measurement results

## Applications

### Highly sensitive measurements on amplifiers

Noise figure measurements respond even to very small disturbances. In example (5) measurements are carried out on a GaAs preamplifier showing an irregularity at 140 MHz.

The interference source can be detected and eliminated with an Analyzer FSE, FSIQ, FSP or FSU. The analysis of the disturbed frequency range is made easily by switching to the spectrum analyzer mode.

### Measurements on frequency-converting DUTs, eg low-noise converters

FS-K3 allows the noise figure and the gain for instance of LNCs for direct satellite reception to be measured without any problems despite the great frequency difference of typ. 10 GHz between the input and output. A particular asset in these measurements is the extremely wide dynamic range, allowing the direct determination of gain values up to 60 dB. Even higher values can be measured when the DUT is followed by an attenuator, which is taken into account automatically. The software supports measurements on frequency-converting DUTs using a fixed LO frequency or a fixed IF. It allows the user to select the sidebands to be measured and controls external generators for mixer measurements via the IEEE bus. To control a signal generator when using FSP, Noise Measurement Software FS-K3 has to be installed on an external process controller. A graphic overview assists the user in frequency setting (2).

## Specifications

<b>Frequency range</b>	100 kHz to 26.5 GHz (depending on analyzer model)
Measurement bandwidth	1 kHz to 5 MHz
<b>Noise measurements</b>	
Level range	0 dB to 25 dB
Resolution	0.01 dB
Measurement accuracy	±0.2 dB (preamplification 20 dB, noise figure 5 dB, bandwidth 1 MHz)
<b>Gain measurements</b>	
Level range	0 dB to 60 dB
Resolution	0.01 dB
Measurement accuracy	±0.2 dB (preamplification 20 dB, noise figure 5 dB, bandwidth 1 MHz)

## Required hardware and software

Analyzers	FSEA, FSEB, FSEM FSIQ3, FSIQ7, FSIQ26 or FSP3, FSP7, FSP13, FSP30 FSU3, FSU8
Recommended noise source	NoiseCom 346 (see Table below)
Power supply	via 28 V connector on rear panel of FSE/FSIQ/FSP (BNC)
Preamplifier	gain approx. 20 dB, noise figure max. 5 dB



### Control via external PC/IEEE bus

CPU	80 486 or better
RAM	≥4 Mbyte
Graphics card	VGA or better
Software	Windows 3.1, Windows 95 or NT
Interface	IEC 625-1 (IEEE 488)
Interface card	National Instruments AT/TNT/PC card

### Control via FSE

Required option	Computer Function FSE-B15 (DDE interface of Windows)
-----------------	---

### Control via FSIQ

no options required

### Control via FSP, FSU

keyboard PSP-Z2

## Ordering information

### Order designation

Noise Measurement Software	FS-K3	1057.3028.02
----------------------------	-------	--------------

### Options

Computer Function for FSE (WindowNT)	FSE-B15	1073.5696.06
2nd IEC/IEEE-Bus Interface	FSE-B17	1066.4017.02
Noise source	see Table below	

**Note:** If the FS-K3 software is installed into an FSE with FSE-B15 or an FSIQ, the optional 2nd IEC/IEEE-Bus Interface is required in the FSE/FSE-B15 or FSIQ to control a signal generator (e.g. SMIQ). If the software has been installed into the FSP or FSU, it is not possible to control a signal generator in mixer measurements.

Noise source*	RF connector	Frequency range (GHz)	Output level (dB)	VSWR (max. upon ON/OFF)	
				0.01 to 5 GHz	5 to 18 GHz
NC 346 A	SMA male	0.01 to 18	5 to 7	1.15:1	1.25:1
NC 346 A Precision	APC 3.5 male	0.01 to 18	5 to 7	1.15:1	1.25:1
NC 346 A Option 1	N male	0.01 to 18	5 to 7	1.15:1	1.25:1
NC 346 A Option 2	APC 7	0.01 to 18	5 to 7	1.15:1	1.25:1
NC 346 A Option 4	N female	0.01 to 18	5 to 7	1.15:1	1.25:1
NC 346 B	SMA male	0.01 to 18	14 to 16	1.15:1	1.25:1
NC 346 B Precision	APC 3.5 male	0.01 to 18	14 to 16	1.15:1	1.25:1
NC 346 B Option 1	N male	0.01 to 18	14 to 16	1.15:1	1.25:1
NC 346 B Option 2	APC 7	0.01 to 18	14 to 16	1.15:1	1.25:1
NC 346 B Option 4	N female	0.01 to 18	14 to 16	1.15:1	1.25:1
NC 346 C	APC 3.5 male	0.01 to 26.5	13 to 17	1.15:1	1.25:1 1.35:1 (18 to 26.5 GHz)
NC 346 D	SMA male	0.01 to 18	19 to 25	1.5:1	1.5:1
NC 346 D Precision	APC 3.5 male	0.01 to 18	19 to 25	1.5:1	1.5:1
NC 346 D Option 1	N male	0.01 to 18	19 to 25	1.5:1	1.5:1
NC 346 D Option 2	APC 7	0.01 to 18	19 to 25	1.5:1	1.5:1
NC 346 D Option 3	N female	0.01 to 18	19 to 25	1.5:1	1.5:1
NC 346 E	APC 3.5 male	0.01 to 26.5	19 to 25	1.5:1	1.5:1 1.5:1 (18 to 26.5 GHz)

\* Noise sources supplied by NoiseCom; specifications from NoiseCom



ROHDE & SCHWARZ GmbH & Co. KG · Mühlhofstrasse 15 · 81671 München, Germany · P.O.B. 801469 · 81614 München, Germany

Telephone +49 89 41 29 0 · www.rohde-schwarz.com · CustomerSupport: Tel. +49 180 512 42 42, Fax +49 89 41 29 13 777

E-mail: CustomerSupport@rohde-schwarz.com