MICRAN

NOISE FIGURE ANALYZER

H5M-04, H5M-18

H5M series noise figure analyzers are designed to measure noise figure and gain of amplifiers and frequency converters.

- **ACCURACY**
- **SPEED**
- **QUALITY**

NF Analyzer H5M-04 10 MHz to 4 GHz
NF Analyzer H5M-18 10 MHz to 20 GHz

H5M-04
10 MHz to 20 GHz

**H5M-18**
10 MHz to 4 GHz

Main Features

- Frequency range from 10 MHz to 4/20 GHz
- Noise figure and gain measurements
- Measurements of frequency converters with internal and external LO, with fixed or variable IF
- Built-in thermostatic YIG-preselector
- High speed measurements
- Loss compensation
- Block downconverters, which extend the upper frequency limit to 50 GHz
- SCPI standard interface commands.

Description

The H5M series high performance noise figure analyzers are optimized for noise figure measurement, designed to make fast, accurate, repeatable measurements.

These analyzers utilize the traditional Y-factor noise figure measuring method. The Y-factor technique involves the use of a noise source that has a pre-calibrated Excess Noise Ratio (ENR). Y-factor is a ratio of two noise power levels, one is measured with the noise source ON and the other with the noise source OFF.

Software
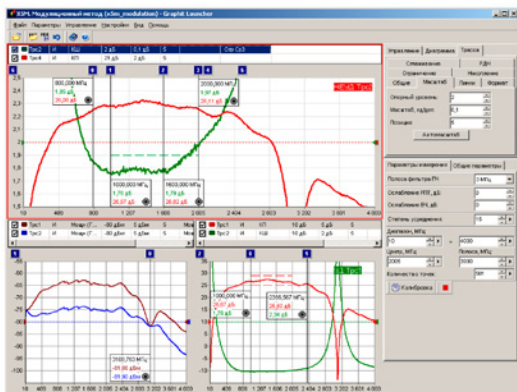
- User-friendly interface
- Configurable system markers
- Four measuring diagrams and an unlimited number of memory traces
- Flexible reporting system
- Save / load measuring profiles
- Equation editor to perform complex mathematical operations

Instrument Operation

The noise figure analyzer H5M under control software Graphit is a modern tool for the analysis of receivers and amplifiers parameters.

The complete Y-factor measurement of device under test (DUT) noise figure and gain consists of two steps. The first step is called calibration and is done without the DUT in place. The noise source is usually connected directly to the input of the instrument. At the end of calibration, the instrument stores the measured values and the computed values of instrument's own noise figure. Then it normalizes its noise figure and gain displays, ready for the next step involving the DUT.

Correction of measured results is available. There are tables of values vs frequency for losses between noise source and DUT, and between DUT and analyzer.

The H5M series analyzers are built on the architecture of virtual instrumentation. This architecture is simple to use, allows to improve the performance and reduce the cost of the analyzer. Open source programming interface compliant with the SCPI, allows the user to control the analyzer via a third-party software. Adaptive synchronization system allows the analyzer to work together with other devices as a part of measuring systems.
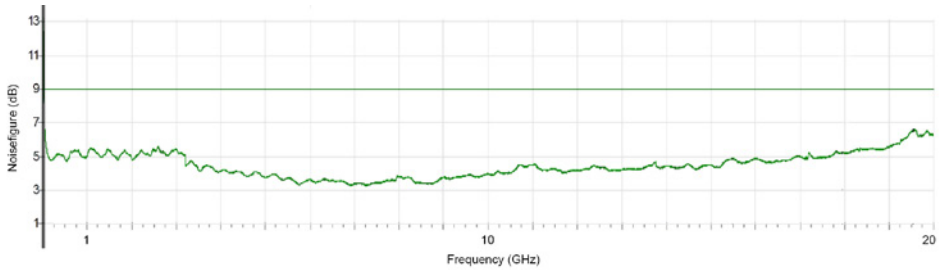
Specification

Frequency

	H5M-04	H5M-18
Frequency range	10 MHz to 4 GHz	10 MHz to 20 GHz
IF bandwidth	3 MHz, 1 MHz, 300 kHz, 100 kHz	
Frequency reference	2.5 ppm	

Noise Figure and Gain

Instrument model	Frequency range	Instrument's own noise figure
H5M-18	10 MHz to 3 GHz	< 5.5 dB
	3 GHz to 13.2 GHz	< 5.0 dB
	13.2 GHz to 20 GHz	< 6.0 dB
H5M-04	10 MHz to 4 GHz	< 6.0 dB

## H5M-18 own noise figure at +23°C ±3°C

	H5M-04	H5M-18

Noise figure measurement range
   Noise source ENR 4-7 dB
   Noise source ENR 12-17 dB
   Noise source ENR 20-22 dB
	0 - 20 dB
	0 - 30 dB
	0 - 35 dB	

NF, instrument uncertainty	±0.1 dB	
Gain measurement range	-20 to +30 dB	
Gain, instrument uncertainty	±0.1 dB	

RF Input

	H5M-04	H5M-18
SWR	≤ 1.5:1	≤ 1.4:1
Connector type	Type N (female) - option 11P Type NMD 3.5 мм (male) - option 13H	

H5M-18 own SWR at +23°C ±3°C
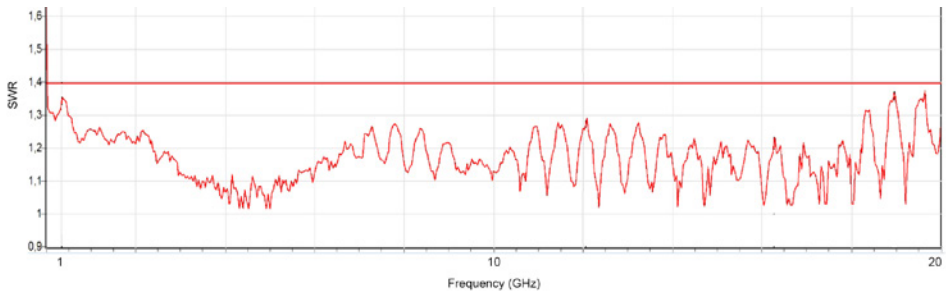
Additional Option

Option ATA/70 — electromechanical step attenuator:
   Built-in 70 dB electromechanical step attenuator with 10 dB step at the analyzer input allows to measure the characteristic of wideband amplifiers and converters with high gain .
Option APA — bias tee:
   Built-in bias tee allows to work with amplifiers and converters which are DC supplied via the center conductor of the coaxial. The maximum supply voltage up to ± 20 V, current up to 500 mA.

Measurement

Sweep:

  Number of points: 2 to 5001 or fixed frequency

  Setting: start/stop, center/span, averaging, IF bandwidth

  Sweep trigger: continuous or single

Modes:

  Amplifier

  Downconverter in DUT: with fixed or variable IF

  Upconverter in DUT: with fixed or variable IF

  Loss compensation: There are tables of values vs frequency for losses between noise source and DUT, and between DUT and analyzer

Display units:

  Noise figure: Noise figure (F dB) or as a ratio (F)

  Gain: Gain (G dB) or as a ratio (G)

  Y-factor: Y-factor (Y dB) or as a ratio (Y)

  Effective noise temperature: Effective input noise temperature in Kelvin or °C

  Phot: Relative power density in dB or as a ratio

  Pcold: Relative power density in dB or as a ratio

General Specification

	H5M-04	H5M-18
Noise source drive output connector type	BNC, female	
Output voltage	28 V	
Power requirements	198 to 242 V (47–66 Hz)	
Power consumption	90 W	140 W
Dimensions (H, D, W)	170 × 260 × 380 mm	210 × 400 × 430 mm
Weight	9 kg	16 kg

Operating conditions
  Temperature range
  Humidity range at 25 °C
	+5 to +40 ºC
	Up to 90 %	

Noise Source Selection

The GSHM2 series have two types noise sources. First type have a 15 dB ENR and the second — 6 dB ENR. It is very important to choose the right type of noise source.

15 dB ENR noise source is suitable for:
- In case of general-purpose measurements up to 30 dB;
- User-calibrating the fullest dynamic range of an instrument before measuring high-gain devices.

6 dB ENR noise source is suitable for:
- Active devices measurement, when changes in the source impedance are affected to accuracy;
- DUT with a very low noise figure;
- In case of the device's noise figure does not exceed 15 dB.

Specification	GSHM2
Uncertainty	±0.22 dB
Voltage supply	28 ±0.28 V
Current supply	< 35 mA
Type connector	BNC (female)
Operation temperature range	+5 to +40 °C
Dimensions, (H, D, W)	140x30x25 mm
Weight	< 0.15 kg

Noise source	Frequency range	ENR	SWR	Type connectors
GSHM2-18A-01 GSHM2-18A-11	10 MHz to 18 GHz	4 to 7 dB	<1.25:1	type III (male) type N (male)
GSHM2-18B-01 GSHM2-18B-11	10 MHz to 18 GHz	13 to 16 dB	<1.30:1	type III (male) type N (male)
GSHM2-20A-03 GSHM2-20A-13	10 MHz to 20 GHz	4 to 7 dB	<1.25:1	type IX var 3 (male) type 3,5 mm (male)
GSHM2-20B-03 GSHM2-20B-13	10 MHz to 20 GHz	13 to 16 dB	<1.30:1	type IX var 3 (male) type 3,5 mm (male)

Information

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