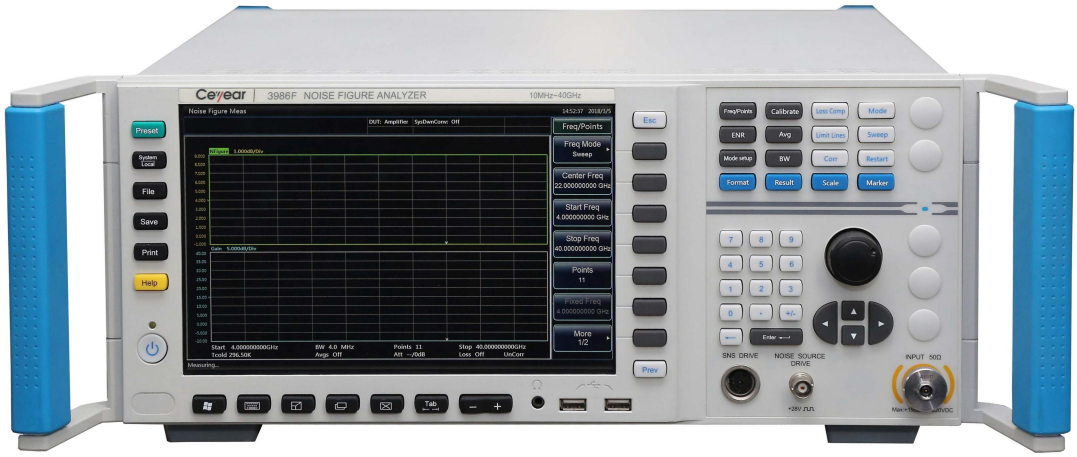
3986 Series
Noise Figure Analyzers
(10 MHz ~ 67 GHz)



Ceyear Technologies Co., Ltd

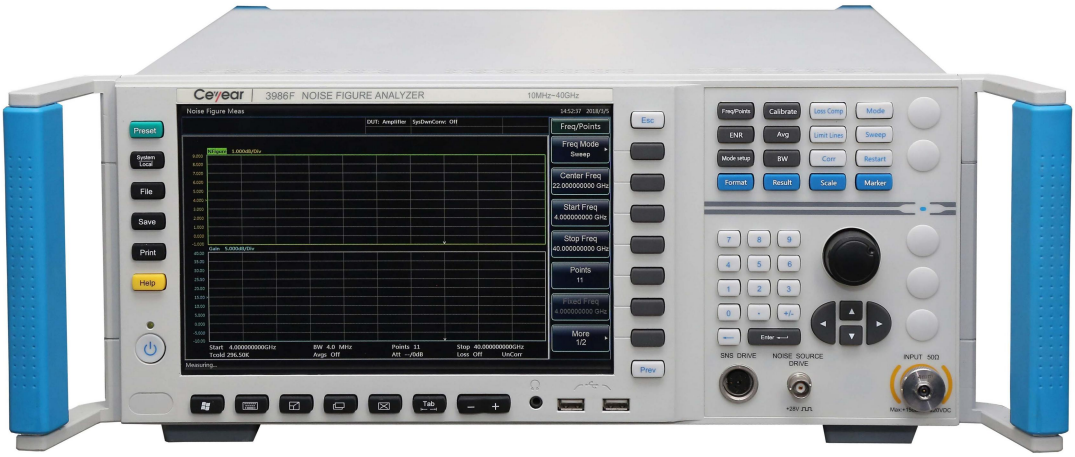
Product Overview

3986 Series Noise Figure Analyzers include 3986A (10 MHz～4 GHz), 3986D (10 MHz～18 GHz), 3986E (10 MHz～26.5 GHz), 3986F (10 MHz～40 GHz), 3986H (10 MHz～50 GHz) and 3986L (10 MHz ～ 67 GHz). Features of the product include wide-range frequency coverage, high-sensitivity reception, friendly user interface, big screen dual channel HD display, various external interfaces, and dual noise source drive etc. It can measure the noise figure and gain of amplifiers, up converters and down converters, as well as to support automatic measurement of noise figure of multi-stage converters. Guide interfaces are intuitive for setting measurement modes.

The comprehensive loss compensation function can compensate loss induced in measurement channel before and/or after the device under test by means of fixed or table forms. The built-in noise figure measurement uncertainty calculator does quantitative analysis of the uncertainty of measurement noise figure. Limit line function that provides test passed/failed notification simplifies the determination of passed/failed test. User friendly features make it easy for engineering technicians to set measurements correctly, to observe and save measurement results in different forms. They can be widely used in R&D, manufacturing, testing and technical assurance tests of electronic equipment for radar, communication, navigation etc.

Main Features

- **Wide frequency coverage**
- **High-sensitivity reception and high-precision measurement performance**
- **Chinese and English operation interface, big screen dual channel HD display**
- **Amplifier, Up converter and down converter measurement mode**
- **Single sideband and double sideband measurement function**
- **Comprehensive loss compensation function**
- **Flexible file and table processing functions**
- **Passed/failed test notification limit line function**
- **Various external interfaces**
- **Dual noise source drive**



3986 Series Noise Figure Analyzers

Wide frequency coverage

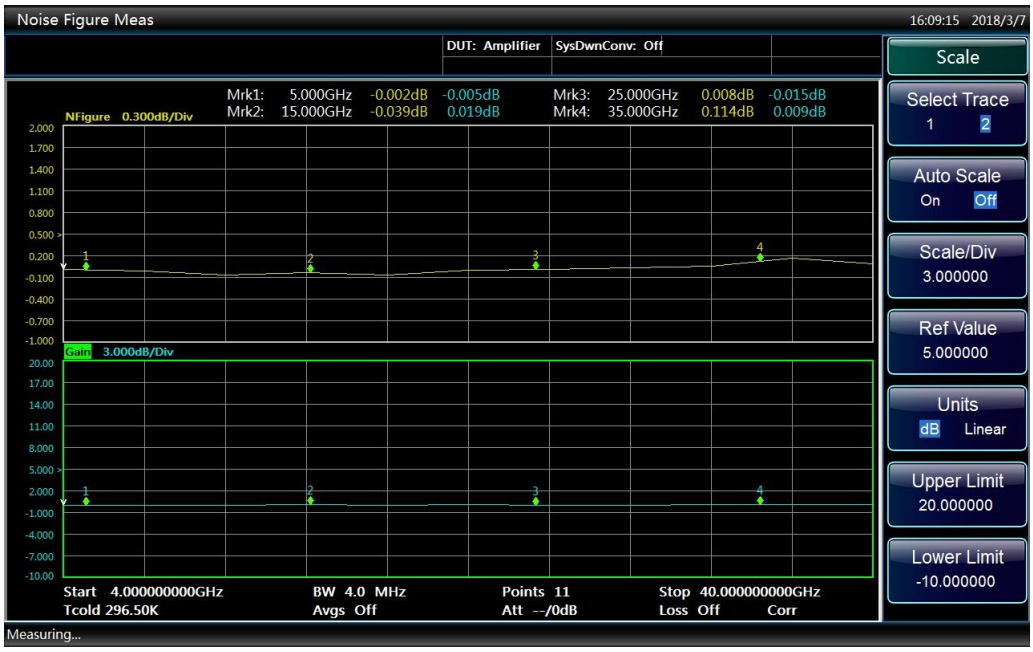
The coaxial integrated frequency of 3986 series Noise Figure Analyzers covers the range of 10 MHz～67 GHz, where 6 frequency range configurations are selectable for different user's test demand of different band. With external MMW extended frequency modules, the noise figure measurement frequency range can be extended to 110GHz.

High-sensitivity reception and high-precision measurement performance

The optimum reception sensitivity precedes -170 dBm/Hz, and the full-band reception sensitivity precedes -162 dBm/Hz. It adopts automatic adjustment and precise calibration technologies, which improve the channel gain. And the linearity within the range of noise power measurement precedes ±0.1 dB.

English operation interface with big screen dual-channel HD display

English operation interface with 10.1 inch big screen LCD monitor that can display in three formats, i.e. graphs, tables and meter display. In the form of graph display, it can display in combination the measurement results of two arbitrary parameters which change along with frequency, such as noise figure, Y factor, gain, and equivalent input noise temperature.

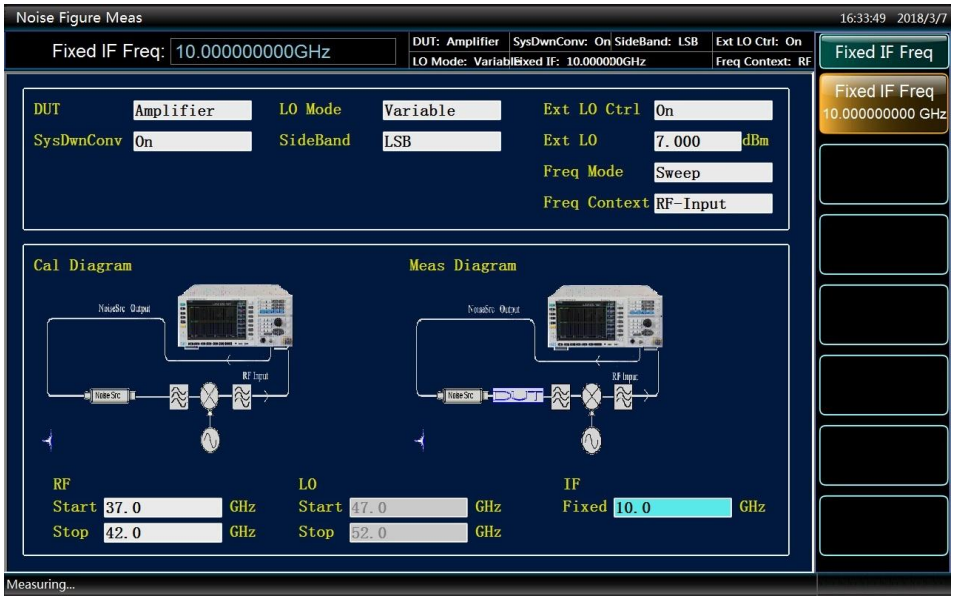


Amplifier, up converter and down converter measurement mode

Basic amplifier measurement mode is used for noise figure and gain measurement of the device under test, which falls in the amplifier category within the frequency range of the Noise Figure Analyzers. The extended frequency range measurement in the down converter mode is used for noise figure and gain measurement of amplifier, of which the frequency exceeds the frequency range of the Noise Figure Analyzers.

They have noise figure and gain measurement functions of up converters and down converters, as well as to support automatic scanning measurement of noise figure of multi-stage converters.

Interface setting in measurement mode is intuitive. All measurement settings corresponding to measurement mode can be done in the same test interface.



Single sideband and double sideband measurement function

It has the capacity of setting, controlling and data processing for the measurement of single sideband (including upper sideband and lower sideband) and double sideband. During noise figure measurement, the sideband setting must be the same as that is actually applied of the device under test.

Comprehensive loss compensation functions

Loss in the measurement channel can be compensated by means of fixed or table form before and/or after the measurement, which would greatly benefit precise measurement of noise figure of automatic test system or microwave chips.

Flexible file and table processing functions

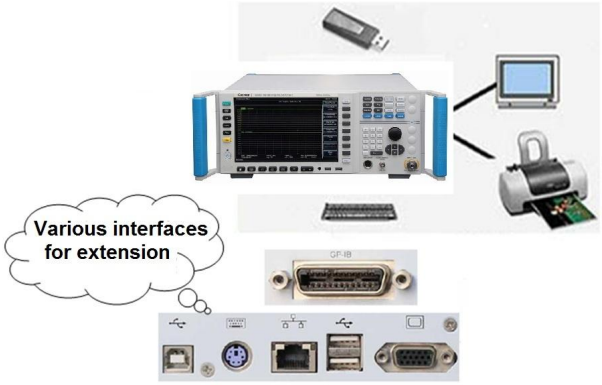
The types of files and tables that can be processed by 3986 Series Noise Figure Analyzers include limit lines, excess noise ratio table, trace file, state file, frequency list, loss compensation table and screen images. For user data process purposes, files and tables can be edited, saved, loaded, and deleted.

Pass/failed test notification limit line function

Limit line function of test pass/failed notification simplifies pass/failed test for the use of production line. Types of limit lines include upper limits and lower limits. A pair of upper and lower limit lines could be set individually for each display channel. When measurement results exceed limit range, the instrument would prompt "Limit Line Failed" notification in red.

Various external interfaces

Various external interfaces enable high re-usability. Smart interfaces like GP-IB, LAN, USB and VGA can enable user function extension and reconstruction of the test system.



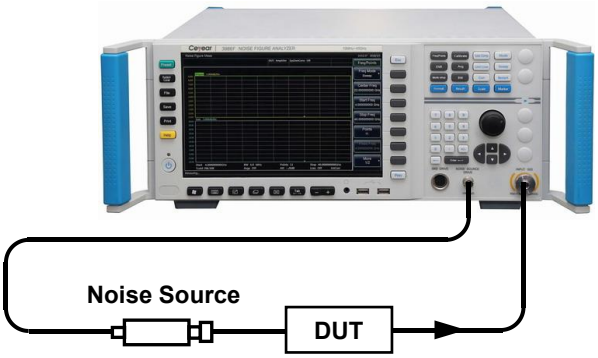
Dual noise source drive

Standard and smart noise source drive interfaces provided. Standard noise source drive interface that provides +28 V pulse drive voltage to support noise sources from multiple manufacturers. It's highly compatible. Noise Figure Analyzers can identify the connection of smart noise source and load excess noise ratio data automatically. It can also detect changes of environment temperature for temperature correction of noise figure to improve speed and accuracy of measurement.

Typical Applications

Basic amplifier measurement

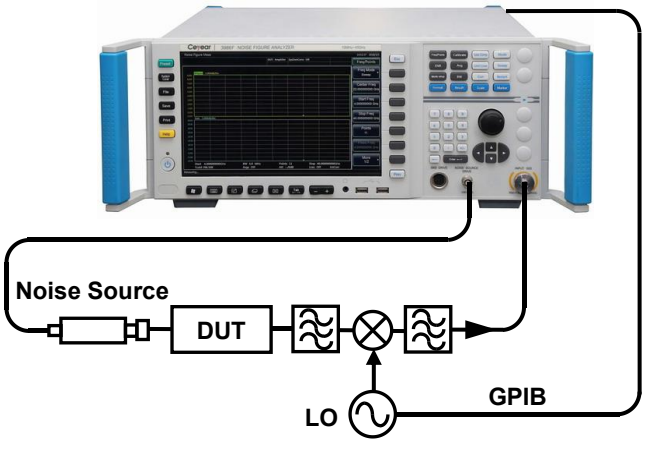
Basic amplifier measurement is the most common measurement mode. It's used for noise figure and gain measurement of the device under tests without frequency conversion (including active or passive linear units or systems like amplifiers, filters, and isolators).



Measurement Setup

System down converter measurement mode

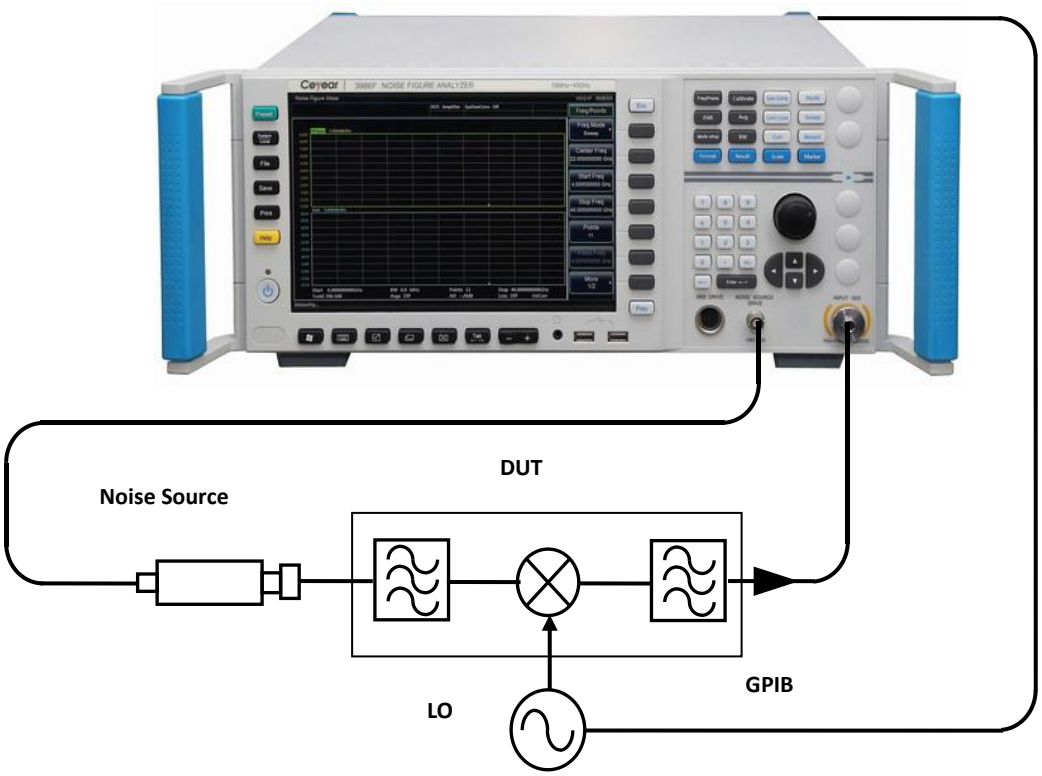
The down converter mode focuses on extended frequency range measurement of amplifier. When the frequency range of an amplifier exceeds that of the Noise Figure Analyzers, extended frequency range measurement of the noise figure is realized by an external mixer. External mixer is used during calibration and measurement as a part of the test system. To reduce the uncertainty of noise figure measurement, frequency conversion loss and noise figure of the chosen mixer should be as small as possible. Besides, the intermediate frequency output port of the mixer should be well isolated to local oscillation signals.



Measurement Setup

Up/down converter measurement

The device under test is an up/down converter installation, up converter and transmitter or down converter and receiver for instance, then the output intermediate frequency would be in the frequency range of the Noise Figure Analyzers. During up/down converter measurement, 3986 series Noise Figure Analyzers provide two modes of settings, fixed intermediate frequency, variable local oscillation and fixed local oscillation, variable intermediate frequency, which are used for measuring the RF response characters and intermediate frequency response characters of the device under test, respectively.



Measurement Setup

Technical Specifications

Table 1 Technical Specifications

Major Technical Specifications		
Frequency Range	10 MHz～4 GHz/18 GHz/26.5 GHz/40 GHz/50 GHz/67 GHz	
Accuracy of Frequency Reference	±<0.2ppm (23°C±3°C)	
Accuracy of Frequency Tuning	±< (Reference frequency error +100 kHz) 10 MHz～4 GHz	
	±< (Reference frequency error +400 kHz) 4 GHz～18/26.5/40/50/67 GHz	
Noise Figure Measurement Range	0～30 dB (ENR: 12 dB～17 dB)	
Noise Figure Measurement Uncertainty	better than ±0.1 dB	
Gain Measurement Range	-20 dB～+40 dB	
Gain Measurement Uncertainty	better than ±0.17 dB	
Input VSWR	<1.90: 1	10 MHz≤f≤4 GHz
	<2.10: 1	4 GHz<f≤18 GHz
	<2.40: 1	18 GHz<f≤26.5 GHz
	<2.40: 1	26.5 GHz<f≤40 GHz
	<2.40: 1	40 GHz<f≤50 GHz
	<2.50: 1	50 GHz<f≤67 GHz
Main Unit Self Noise Figure	3986A/D/E/F/H	
	<8.0 dB	10 MHz≤f≤4 GHz
	<7.5 dB	4 GHz<f≤18 GHz
	<8.0 dB	18 GHz<f≤26.5 GHz
	<10.0 dB	26.5 GHz<f≤40 GHz
	<12.0 dB	40 GHz<f≤50 GHz
	<12.0 dB	40 GHz<f≤50 GHz
	3986L	
	<10.0 dB	10 MHz≤f≤4 GHz
	<15.0 dB	4 GHz<f≤50 GHz
	<16.0 dB	50 GHz<f≤67 GHz
Jitter (uneven)	<0.17 dB	(Y Factor Typical Value 5 dB)
Noise source drive voltage	<1.0 V	Noise source off
	+28.0±0.10 V	Noise source on

Table2 Product Features

General Technical Specifications		
Temperature Range		Operation: 0～+40°C Storage: -40～+70°C
Electromagnetic compatibility		Comply with the following requirements of GJB 3947A-2009 provision 3.9.2: a) Conducted emission through CE102 power cable; b) Conducted susceptibility of CS101 power cable; c) Conducted susceptibility injected by CS114 harness; d) Radiated emission through RE102 electric field; e) Radiated susceptibility through RS103 electric field.
Safety		Comply with safety certificate requirements of GJB 3947A-2009 provision 3.10. a) The resistance between power input end and the chassis (power switch on engaged position) shall be no less than100 MΩ under standard atmosphere pressure and no less than 2 MΩ in damp environment. b) Apply 1500 VAC between the power input end and the chassis. And no symptom like breakdown, flash-over and flicker shall happen. c) In operation, leakage current between chassis and ground shall be no more than 3.5 mA.
Power requirements	**Voltage and frequency (nominal value)**	220 V, 50 Hz; (99～121) Vrms, (50～60/440) Hz (198～242) Vrms, (50～60) Hz
	Power consumption	Max. power consumption: 250 W Max. standby: 20 W
Monitor		1280×800, XGA 10.1"
Data storage		160 G solid state disk Support USB 2.0 standard storage units
Weight		Net weight: less than23 kg; Packaged shipping weight: 34 kg nominal value
Size		Width×Height×Depth (mm)=426×177×460 (handle, bottom, pad and side strap excluded), allowed tolerance ±10 mm. Width×Height×Depth (mm)=510×190×534 (handle, bottom, pad and side strap included), allowed tolerance ±10 mm.
Reliability		MTBF (θ_0) ≥5000 h
Front Panel Interfaces		
RF input connector	3986A	3.5 mm (m)
	3986D	3.5 mm (m)
	3986E	3.5 mm (m)
	3986F	2.4 mm (m)
	3986H	2.4 mm (m)
	3986L	1.85 mm (m)
Standard noise source	BNC female adapter	

General Technical Specifications	
drive output	
Smart noise source drive output	Multi-core connector
USB2.0 interface	For connecting mouse, keyboard, and updating software and backing up data.
Back Panel Interfaces	
Keyboard interface	Standard PS/2 interface for connecting standard computer keyboard.
Video interface	VGA interface (15-core D-SUB adapter) for connecting monitors
LAN interface	StandardRJ-45 type, 1000Base-T for software update and remote control
GP-IB Interface	IEEE-488 Bus connector, 24-pin plug (GP-IB code: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, C0) for remote control
USB2.0 interface	For connecting mouse, keyboard, and updating software and backing up data.
10 MHz reference input	50 Ω impedance, BNC female adapter, amplitude range -5 dBm～+10 dBm
10 MHz reference output	50 Ω impedance, BNC female adapter, output amplitude ≥0 dBm
Trigger input	BNC female adapter
Trigger output1	BNC female adapter
Trigger output2	BNC female adapter
Detection output	BNC female adapter

Ordering Information

Mainframe	Description
3986A	Noise Figure Analyzer (10 MHz～4 GHz)
3986D	Noise Figure Analyzer (10 MHz～18 GHz)
3986E	Noise Figure Analyzer (10 MHz～26.5 GHz)
3986F	Noise Figure Analyzer (10 MHz～40 GHz)
3986H	Noise Figure Analyzer (10 MHz～50 GHz)
3986L	Noise Figure Analyzer (10 MHz～67 GHz)

Standard Accessories	Description
1	Standard 3-phase power cord
2	USB mouse
3	User Manual
4	Programing Manual

Options	Description
3986-H01: 16603/4 seriesnoise source	As standard noise power for noise figure measurement
3986-H02: 711XX series Coaxial adapter	For connection between noise source and adapter interface of noise figure analyzer
3986-H03: Multi-core cable	For connection between smart noise source drive interface of noise figure analyzer and noise source
3986-H04: BNC (m) -BNC (m) cable	For connection between standard noise source drive interface of noise figure analyzer and noise source
3986-H05: Alloy shipping case	High strength, lightweight alloy shipping case with handle and wheels for easier handling.
3986-H98: English option	English panel, English instructions, and English operation interfaces.

Ceyear

Focus on Measurement
Explore the Future

CEYEAR TECHNOLOGIES CO., LTD
Tel: +86 532 86896691
Email: sales@ceyear.com
http://www.ceyear.com