ROHDE & SCHWARZ

FSUP50

The Rohde & Schwarz FSUP50 is a high-performance Signal Source Analyzer and Spectrum Analyzer operating in the frequency range of 20 Hz to 50 GHz. Combining the capabilities of a top-tier spectrum analyzer with a highly sensitive phase noise tester utilizing the PLL method, the FSUP50 is designed for complete characterization of oscillators and analysis of analog/digital modulated signals.

SPECIFICATIONS

General

Interfaces	GPIB (IEEE 488.2), LAN (10/100 Base-T), USB 2.0, VGA, RS-232, PS/2
Display	8.4" color SVGA TFT LCD, 800 × 600 pixels
Display Resolution	800 × 600 pixels (SVGA)
Hard Disk Type	Removable HDD

Physical

Power Supply	100 V to 240 V AC, 50 Hz to 400 Hz
Operating Temperature	5 °C to 40 °C °C
Dimensions (W×H×D)	435 mm × 192 mm × 460 mm mm
Weight	17.5 kg kg

Frequency and Signal Input

Frequency Range	20 Hz to 50 GHz
RF Input Impedance	50 Ω
Input VSWR (10 MHz to 3.6 GHz)	< 1.5
Input VSWR (3.6 GHz to 8 GHz)	< 1.8
Input VSWR (8 GHz to 26.5 GHz)	< 2.0
Input VSWR (26.5 GHz to 50 GHz)	< 2.5
Maximum Safe Input Level (RF Power)	+30 dBm (1 W) with attenuation ≥ 10 dB
Maximum Safe Input Level (DC Voltage)	0 V
RF Attenuator Range	0 dB to 75 dB
RF Attenuator Step Size	5 dB
RF Input Connector Type	2.4 mm female

Phase Noise Measurement Performance

Phase Noise Measurement Frequency Range	1 MHz to 50 GHz (extendable to 110 GHz with external mixers)
Phase Noise Offset Frequency Range	1 Hz to 30 MHz (10 mHz to 30 MHz with option R&S FSUP-B60 or R&S FSUP-B61)
Phase Noise Sensitivity at 1 GHz (10 Hz Offset)	<-120 dBc/Hz (with cross-correlation option, typ. -134 dBc/Hz)
Phase Noise Sensitivity at 1 GHz (1 kHz Offset)	<-146 dBc/Hz (with cross-correlation option, typ. -152 dBc/Hz)
Phase Noise Sensitivity at 1 GHz (10 kHz Offset)	<-158 dBc/Hz (with cross-correlation option, typ. -160 dBc/Hz)
Phase Noise Sensitivity at 1 GHz (1 MHz Offset)	<-165 dBc/Hz (with cross-correlation option)
Phase Noise Sensitivity at 1 GHz (10 MHz Offset)	<-170 dBc/Hz (with cross-correlation option)
Cross-Correlation Maximum Number of Averages	Up to 10000
Measurement Accuracy	±1.5 dB (typical, offset < 10 MHz)
AM Noise Measurement Range	1 Hz to 30 MHz offset
Baseband Noise Measurement Range	1 Hz to 30 MHz

VCO Characterization

Tuning Voltage (Vtune) Range	-10 V to +28 V
Tuning Voltage Resolution	100 µV
Tuning Voltage Maximum Current	20 mA
Supply Voltage (Vsupply) Range	0 V to +16 V
Supply Voltage Resolution	1 mV
Supply Voltage Maximum Current	200 mA
VCO Parameter Sweeps	Frequency vs. voltage, Tuning slope, Sensitivity, Push/Pull (supply rejection)
Tuning Voltage (Vtune) Noise Density	< 10 nV/√Hz (at 10 kHz offset)
Supply Voltage (Vsupply) Noise Density	< 100 nV/√Hz (at 10 kHz offset)
Measured VCO Parameters	Frequency, Tuning Sensitivity, Output Power, Current, RF Phase Noise

Transient and Allan Variance Analysis

Transient Frequency Range	10 MHz to 50 GHz
Jitter Analysis Integration Range	User-configurable integration limits

Spectrum Analyzer Mode

Video Bandwidth (VBW) Range	1 Hz to 10 MHz
Displayed Average Noise Level (DANL)	<-150 dBm (at 1 GHz, 1 Hz RBW, preamplifier off)

Internal Reference Frequency

Internal Reference Frequency	10 MHz
External Reference Input Frequency	1 MHz to 20 MHz (in 1 Hz steps)

Connectivity & Peripheral Interfaces

Tuning Voltage Output Connector	BNC female (on front panel)
Supply Voltage Output Connector	BNC female (on front panel)
External Reference Input Connector	BNC female (rear panel)
External Reference Output Connector	BNC female (rear panel)
Baseband Noise Input Connector	BNC female (front panel)
IF Output Port	BNC female, 21.4 MHz (rear panel)
Trigger Input Connector	BNC female (rear panel)
Trigger Output Connector	BNC female (rear panel)

Software and Post-Processing

Supported Measurement Applications	Phase Noise, VCO Characterization, Transient Analysis, Spectrum Analysis, Vector Signal Analysis (optional)
VCO Characterization Suite	Automated measurement of frequency, tuning slope, power, and supply current vs. Vtune
Transient Analysis Software	Frequency and phase settling vs. time with extensive trigger modes
Remote Control Command Set	SCPI (Standard Commands for Programmable Instruments)

Power Requirements

Line Voltage Range	100 V to 240 V AC (nominal)
Line Frequency	50 Hz to 400 Hz

Physical and Environmental Specifications

Storage Temperature Range	-40 °C to +70 °C

Certifications and Compliance

Safety Standards Compliance	IEC 61010-1, EN 61010-1, CAN/CSA-C22.2 No. 1010.1
Electromagnetic Compatibility (EMC)	EN 55011 Class B, EN 61326-1
Recommended Calibration Cycle	12 months

Phase Noise Measurement

Phase Noise Offset Range with Option FSUP-B60	1 mHz to 30 MHz

System

Operating System	Windows XP Embedded
Hard Disk Drive Capacity	≥ 40 GB (removable hard disk standard or option FSUP-B18)

Spectrum Analyzer

Number of Sweep Points	101 to 30001
Resolution Bandwidth Filter Types	Gaussian (3 dB), EMI (6 dB), Channel, RRC, FFT
Detector Types	Max Peak, Min Peak, Auto Peak, Sample, RMS, Average, Quasi-Peak
Sweep Time Range (Frequency Domain)	2.5 ms to 16000 s
Sweep Time Range (Time Domain)	1 µs to 16000 s

Baseband Noise Measurement

Baseband Input Frequency Range	1 Hz to 30 MHz
Baseband Input Impedance	50 Ω / 1 MΩ (switchable)
Baseband Input Maximum Input Voltage	1 V (RMS) / 10 V (DC)

VCO Tester

Tuning Voltage Source Impedance	< 0.1 Ω
Supply Voltage Source Impedance	< 0.1 Ω

Remote Control

Command Set Compatibility	R&S FSU, R&S FSP, HP 8566B/8568B/8560E/8561E/8562E/8563E/8564E/8565E (emulation)

Frequency

External Mixer Support	Supported up to 110 GHz (with option FSUP-B21)

Receiver & Spectrum Analyzer

Internal Preamplifier Option	20 dB gain up to 26.5 GHz (with option FSUP-B23)

Measurement Demodulation

I/Q Demodulation Bandwidth	10 MHz (standard), 28 MHz (with option FSUP-B28)

RF Input

YIG Preselector	Built-in (3.6 GHz to 50 GHz), bypassable

Interfaces

Noise Source Drive Voltage	28 V (pulsed, rear BNC)
User Port	25-pin D-Sub, for control of external devices
GPIB Interface Connector	24-pin Amphenol (IEEE 488)

Environmental

Maximum Operating Altitude	4600 m
Maximum Storage Altitude	12000 m

TECHNOLOGY

Phase-Locked Loop (PLL) Phase Noise Measurement & Heterodyne Spectrum Analysis

APPLICATIONS

Signal Source Analysis, Phase Noise Measurement, and VCO Characterization