SVA1000X Series

Spectrum & Vector Network Analyzer

SIGLENT TECHNOLOGIES CO.,LTD

SVA1015X

General Description

The SIGLENT SVA1000X series spectrum & vector network analyzers are powerful and flexible tools for broadcast and RF device testing. With a wide frequency range from 9 kHz to 1.5 GHz, the analyzer delivers reliable automatic measurements and plenty of features including a tracking generator and multiple modes of operation: the base model is a swept super-heterodyne spectrum analyzer and optional functions include a vector network analyzer, a Frequency Domain Reflectometer based distance-to-fault locator, and a modulation analyzer. Applications include broadcast monitoring/ evaluation, site surveying, EMI pre-compliance, research and development, education, production and maintenance.

Features and Benefits

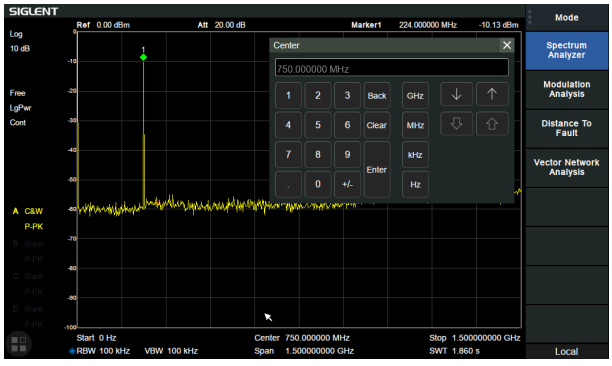
- All-Digital IF Technology
- Frequency Range from 9 kHz to 1.5 GHz
- -156 dBm/Hz Displayed Average Noise Level (Typ.)
- -99 dBc/Hz @10 kHz Offset Phase Noise (1 GHz, Typ.)
- Level Measurement Uncertainty < 1.2 dB (Typ.)
- 1 Hz Minimum Resolution Bandwidth (RBW)
- Preamplifier Standard
- Tracking Generator Standard
- Vector Network Analysis (Opt.)
- Distance To Fault (Opt.)
- Modulation Analysis (Opt.)
- EMI Pre-compliance Test Kit (Opt.)
- Advanced Measurement Kit (Opt.)
- 10.1 Inch (1024x600) Multi-Touch Screen, Mouse and Keyboard supported
- Web Browser Remote Control on PC and Mobile Terminals

Model and Main index

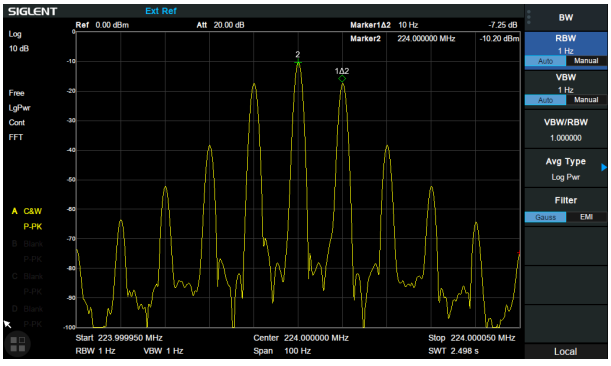
Model	SVA1015X
Frequency Range	9 kHz~1.5 GHz
Resolution Bandwidth	1 Hz~1 MHz
Displayed Average Noise Level	-156 dBm/Hz
Phase Noise	<-99 dBc/Hz@1 GHz, 10 kHz offset
Total Amplitude Precision	≤1.2 dB
Touch Screen	Standard
Tracking Generator	Standard
Vector Network Analysis	S11, S21
Distance To Fault	10 MHz-1.5 GHz
Modulation Analysis	AM, FM, ASK, FSK
Advanced Measurement Kit	CHP, ACPR, OBW, TOI, Monitor
EMI Pre-compliance Test Kit	EMI Filter and Quasi-Peak Detector, Easy Spectrum software
Communication Interface	LAN, USB Device, USB Host, USB-GPIB
Remote Control Capability	SCPI / Labview / IVI , based on USB-TMC / VXI-11 / Socket / Telnet
Remote Controller	Easy Spectrum software, Web Browser

Design features

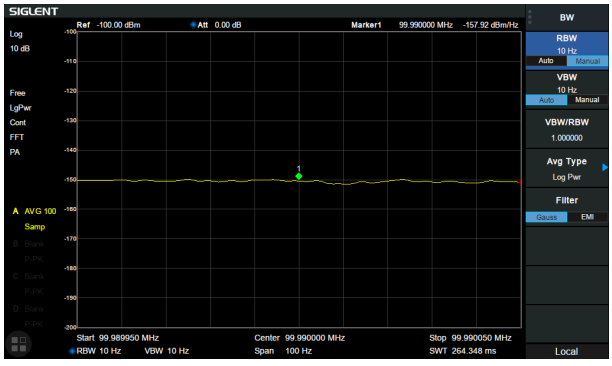
10.1 Inch (1024x600) Multi-Touch Screen



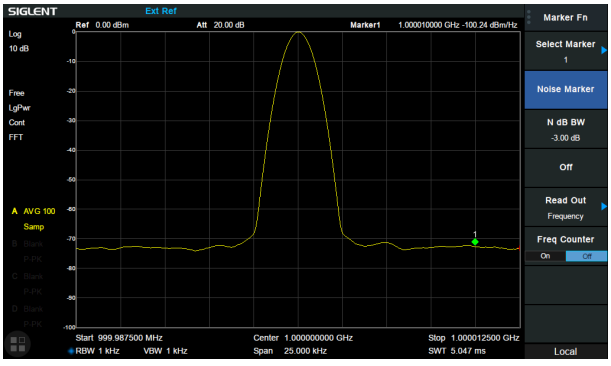
Minimum 1 Hz Resolution Bandwidth (RBW)



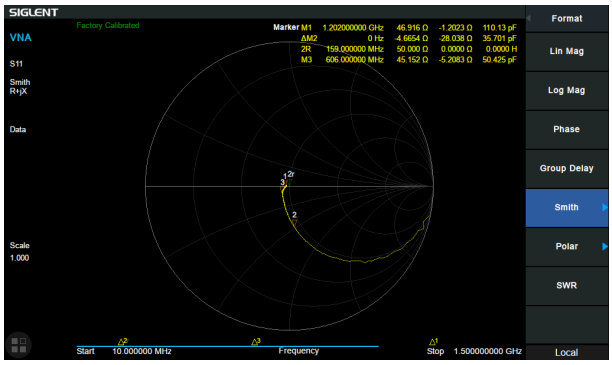
-156 dBm/Hz Displayed Average Noise Level



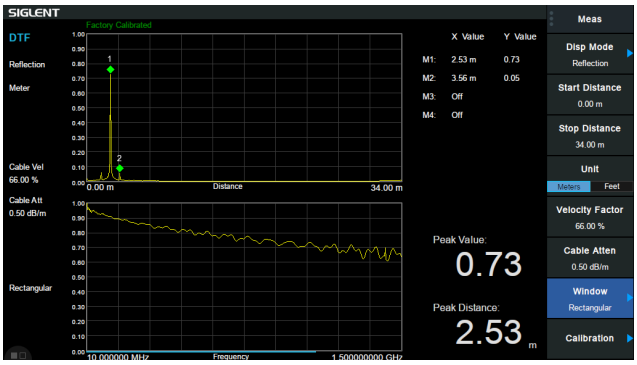
Phase noise <-99 dBc/Hz@1 GHz, offset 10 kHz



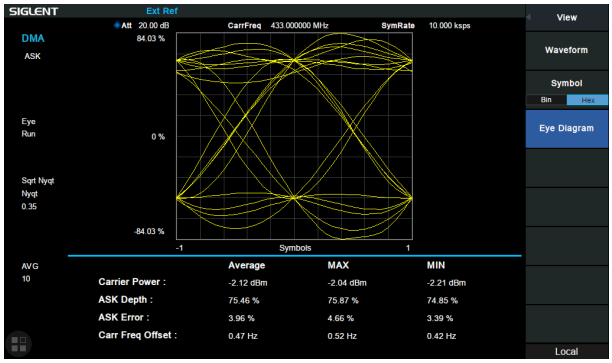
Smith Chart in Vector Network Analysis Mode



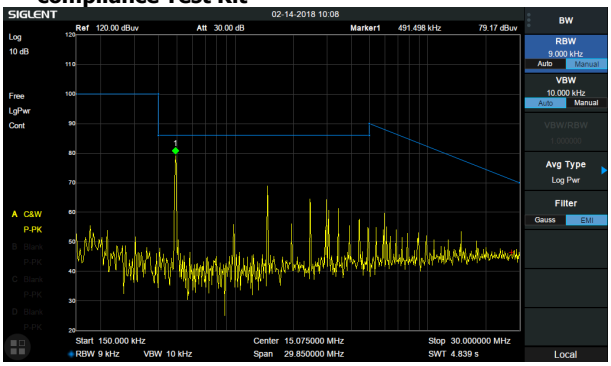
Cable Fault Locator in Distance to Fault Mode



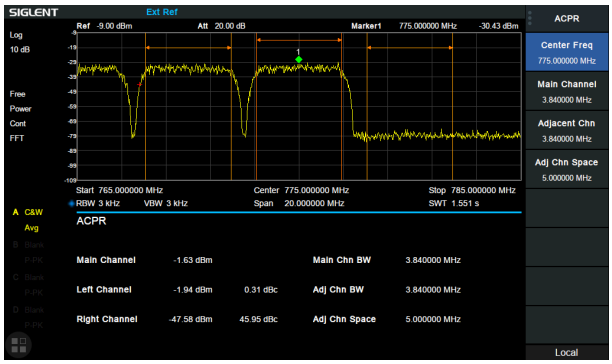
ASK/FSK Eye Diagram in Modulation Analysis Mode



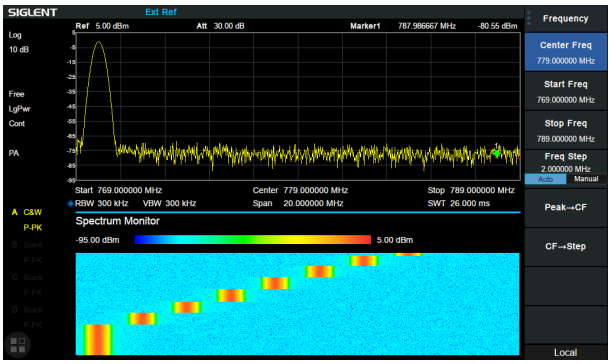
EMI filter and Quasi-peak Detector in EMI Pre-compliance Test Kit



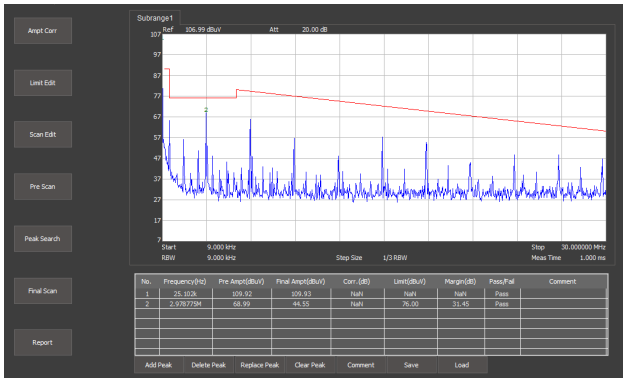
ACPR in Advanced Measurement Kit



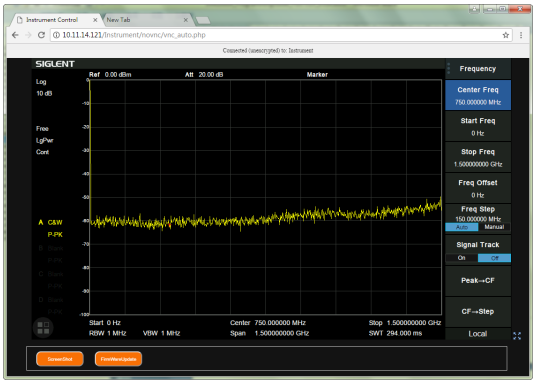
Spectrum Monitor in Advanced Measurement Kit



Easy Spectrum Software in EMI Pre-compliance Test Kit



Remote Control through Web Browser



Utility Kit

Near Field Probe Set SRF5030

Near Field Probe Set SRF5030T

USB-GPIB Adaptor

Soft Carrying Bag

Mechanical Calibration Kit

Specifications

Specifications are valid under the following conditions: The instrument is within the calibration period, has been stored between 0 and 50°C for at least 2 hours prior to use, and has been powered on and warmed up for at least 40 minutes. The specifications include the measurement uncertainty, unless otherwise noted.

Specifications: All products are guaranteed to meet published specifications when operating temperatures from 5 to 45°C, unless otherwise noted.

Typical: Performance deemed typical implies that 80 percent of the measurement results will meet the typical published performance with a 95th percentile confidence level at room temperature (approximately 25°C). Typical performance is not warranted and does not include measurement uncertainty.

Nominal: The expected performance or design attribute.

Frequency Characteristic	
Frequency	
Frequency range	9 kHz-1.5 GHz
Frequency resolution	1 Hz
Frequency Span	
Range	0 Hz, 100 Hz to 1.5 GHz
Accuracy	± Span / (number of sweep points - 1)
Internal Reference Source	
Reference frequency	10.000000 MHz
Frequency reference accuracy	± [(time since last adjustment × frequency aging rate) + temperature stability + calibration accuracy]
Initial calibration accuracy	<1 ppm
Temperature stability	<1 ppm/year, 0 °C~50 °C
Frequency aging rate	<0.5 ppm/first year, 3.0 ppm/20 years
Marker	
Marker resolution	Span / (number of sweep points - 1)
Marker uncertainty	± [frequency indication × frequency reference uncertainty + 1% × span + 10% × resolution bandwidth + marker resolution]
Frequency counter resolution	0.01 Hz
Frequency counter uncertainty	± [frequency indication × frequency reference accuracy + counter resolution]
Bandwidths	
Resolution bandwidth (-3dB)	1 Hz~1 MHz, in 1-3-10 sequence
Resolution filter shape factor	< 4.8 : 1 (60 dB:3 dB), Gaussian-like
RBW uncertainty	<5%
Video bandwidth (-3dB)	1 Hz ~3 MHz, in 1-3-10 sequence
VBW uncertainty	<5%

Amplitude Characteristic

Amplitude and Level

Measurement range	DANL to +10 dBm, 100 kHz~1 MHz, preamplifier off DANL to +20 dBm, 1 MHz~1.5 GHz, preamplifier off
Reference level	-100 dBm to +30 dBm, 1 dB steps
Preamplifier	20 dB (nom.), 9 kHz~1.5 GHz
Input attenuation	0~30 dB, 1 dB steps
Maximum input DC voltage	+/- 50 VDC
Maximum average RF power	30 dBm, 3 minutes, fc≥10 MHz, attenuation >20 dBm, preamp off
Maximum damage level	33 dBm, fc≥10 MHz, attenuation >20 dBm, preamp off

Displayed Average Noise Level (DANL)

	20 °C~30 °C,attenuation = 0 dB, sample detector, trace average >50		
Preamp off		RBW = 10 Hz	Normalized to 1 Hz
	100 kHz~1 MHz	-91 dBm, -97 dBm (typ.)	-101 dBm, -107 dBm (typ.)
	1 MHz~10 MHz	-114 dBm, -120 dBm (typ.)	-124 dBm, -130 dBm (typ.)
	10 MHz~1 GHz	-118 dBm, -124 dBm (typ.)	-128 dBm, -134 dBm (typ.)
	1 GHz~1.5 GHz	-111 dBm, -117 dBm (typ.)	-121 dBm, -127 dBm (typ.)
Preamp on	100 kHz~1 MHz	-110 dBm, -118 dBm (typ.)	-120 dBm, -128 dBm (typ.)
	1 MHz~10 MHz	-137 dBm, -142 dBm (typ.)	-147 dBm, -152 dBm (typ.)
	10 MHz~1 GHz	-140 dBm, -146 dBm (typ.)	-150 dBm, -156 dBm (typ.)
	1 GHz~1.5 GHz	-132 dBm, -138 dBm (typ.)	-142 dBm, -148 dBm (typ.)

Phase Noise

	20 °C~30 °C, fc = 1 GHz
Phase noise	<-95 dBc/Hz@10 kHz offest, <-99 dBc/Hz (typ.)
	<-96 dBc/Hz@100 kHz offest, <-98 dBc/Hz (typ.)
	<-115 dBc/Hz@1 MHz offest, <-120 dBc/Hz (typ.)

Level Display

Logarithmic level axis	10 dB to 200 dB
Linear level axis	0 to reference level
Units of level axis	dBm, dBmV, dBuV, dBuA, Volt, Watt
Number of display points	751
Number of traces	4
Trace detectors	Positive-peak, Negative-peak, Sample, Normal, Average(Voltage/RMS/Video), Quasi-peak
Trace functions	Clear write, Max Hold, Min Hold, View, Blank, Average, Math

Frequency Response

	20 °C to 30 °C, 30% to 70% relative humidity, attenuation = 20 dB, reference frequency 50 MHz
Preamp off	±0.8 dB, ±0.4 dB (typ.)
Preamp on	±0.9 dB, ±0.4 dB (typ.)

Error and Accuracy

Resolution bandwidth switching uncertainty	Logarithmic resolution ±0.2 dB, liner resolution ±0.01, nominal, 10 kHz RBW	
Input attenuation switching uncertainty	20 °C to 30 °C, fc = 50 MHz, preamp off, 1 to 30 dB relative to 20 dB ± 0.5 dB	
Absolute amplitude accuracy	20 °C to 30 °C, fc = 50 MHz, RBW = 1 kHz, VBW = 1 kHz, peak detector, attenuation = 20 dB, 95th percentile reliability	
	Preamp off	±0.4 dB, fc = 50 MHz, input signal -20 dBm
	Preamp on	±0.5 dB, fc = 50 MHz, input signal -40 dBm
Total amplitude accuracy	20 °C to 30 °C, Fc>100 kHz, input signal -50 dBm~0 dBm, preamp off, 95th percentile reliability	RBW = 1 kHz, VBW = 1 kHz, peak detector, attenuation = 20 dB,
	± 1.2 dB	
RF input VSWR	input attenuation 10 dB, 1 MHz~1.5 GHz <1.5 (nom.)	

Amplitude Characteristic

Distortion and Spurious Responses

Second harmonic distortion	-65 dBc (nom.) fc≥50 MHz, mixer level -30dBm, attenuation = 0dB, preamp off, 20 °C to 30 °C
Third-order intercept	+8 dBm (typ.) fc≥50 MHz, two -20 dBm tones at input mixer spaced by 100 kHz, attenuation = 0 dB, preamp off, 20 °C to 30 °C
1dB Gain Compression	>-5 dBm (nom.) fc≥50 MHz, attenuation = 0 dB, preamp off, 20 °C to 30 °C
Residual response	<-90 dBm input terminated = 50 Ω, attenuation = 0 dB, 20 °C to 30 °C
Input related spurious	<-65 dBc Mixer level = -30 dBm, 20 °C to 30 °C

Sweep and Trigger

Sweep time	1 ms to 1500 s	
Sweep accuracy	Accuracy, Speed	
Sweep mode	Sweep	FFT
	RBW=30 Hz~1 MHz	RBW=1 Hz~10 kHz
Sweep rule	Single, Continuous	
Trigger source	Free, Video, External	
External trigger	5 V TTL level, rising edge/falling edge	

Options

Tracking Generator

Frequency range	5 MHz~1.5 GHz
RBW	30 Hz~1 MHz, only sweep mode
Output level	-20 dBm~0 dBm
Output level resolution	1 dB
Output flatness	+/-3 dB
Output maximum reverse level	Mean power:30 dBm,DC: ±50 V_{DC}

EMI Pre-compliance Test Kit

Resolution bandwidth (6 dB)	200 Hz,9 kHz,120 kHz
Detector	Quasi-peak (following CISPR 16-1-1)
Dwell time	0 us~10 s
PC Application Software	EasySpectrum EMI pre-compliance test Software

Vector Network Analysis

Measurement	S11, S21
Frequency Range	10 MHz~1.5 GHz
Dynamic Range	75 dB, 10 kHz RBW
Trace Noise	0.1 dB rms, 10 kHz RBW
Output Power	0 dBm (Nom.)
Format	Lin Mag, Log Mag, Phase, Group Delay, Smith Chart, Polar Chart, SWR
Sweep Point	751

Distance to Fault

Frequency Range	10 MHz~1.5 GHz
Distance Resolution	0.1 m x Velocity Factor
Windows	Rectanglar, Hamming

Digital Modulation Analysis Mode		
Frequency range	5 MHz to 1.5 GHz	
Carrier Power Accuracy	±2 dB, nominal	
Carrier Power Range	-30 dBm to +20 dBm, nominal	
ASK		
Symbol rate range	1 kHz to 100 kHz	
Modulation depth/index range	5% to 95%	
Accuracy	±4%, nom.	
FSK		
Symbol rate range (β = deviation/Symbol rate)	1 kHz to 20 kHz 1≤β≤20	
	25 kHz to 50 kHz 1≤β≤8	
	50 kHz to 100 kHz 1≤β≤4	
FSK deviation	1 kHz to 400 kHz	
Accuracy	±4%, nom.	
AM		
Modulation rate range	20 Hz to 100 kHz	
Accuracy	1 Hz, nom.	Modulation rate < 1 kHz
	< 0.1% modulation rate, nom.	Modulation rate ≥ 1 kHz
Modulation depth range	5% to 95%	
Accuracy	±4%, nom.	
FM		
Modulation rate range	20 Hz to 200 kHz	
Accuracy	1 Hz, nom.	Modulation rate < 1 kHz
	< 0.1% modulation rate, nom.	Modulation rate ≥ 1 kHz
Frequency deviation	1 kHz to 400 kHz	
Accuracy	±4%, nom.	
Advanced Measurement Kit		
Power Measurement	Channel Power, ACPR, OBW, T-Power	
Non-Linear Measurement	TOI	
Spectrum Monitor	Waterfall	

External input and external output	
Front panel Interface	
Front panel RF input	50 Ω, N-female
Front panel tracking generator output	50 Ω, N-female
10 MHz reference output	10 MHz, >0 dBm, 50 Ω, BNC-female
10 MHz reference input	10 MHz, -5dBm~+10dBm, 50 Ω, BNC-female
External trigger input	1 kΩ, 5V TTL , BNC-female
Rear Panel Interface	
USB device	USB- 2.0
LAN	LAN (VXI-11) , 10/100 Base, RJ-45
10 MHz reference output	10 MHz, >0 dBm, 50 Ω, BNC-female
10 MHz reference input	10 MHz, -5 dBm~+10 dBm, 50 Ω, BNC-female
External trigger input	1 kΩ, 5V TTL , BNC-female
Remote Controller	
Easy Spectrum	V1.0.5.0 and higher
Web Browser	HTML 5 Supported
General Specification	
Display	TFT LCD, 1024×600 (waveform area 751×501), 10.1 inch multi-touch screen
Storage	Internal(Flash) 256 MByte, external(USB storage device)32 GByte
Source	Input voltage range(AC) 100 V~240 V, AC frequency supply 45 Hz~440 Hz, Power consumption 3 5W
Temperature	Working temperature 0°C to 50°C, Storage temperature -20°C to 70°C
Humidity	0°C to 30°C, ≤95% Relative humidity; 30°C to 50°C, ≤75% Relative humidity
Dimensions	393 mm×207 mm×116.5 mm (W×H×D)
Weight	4.40 kg (9.7 lb)
Electromagnetic Compatibility and Safety	
EMC	EN 61326-1:2006
Electrical safety	EN 61010-1:2010

Ordering Information

Product Description	SVA1000X	Order Number
Product Code	Spectrum Analyzer, 9 kHz~1.5 GHz	SVA1015X
Standard configurations	Quick Start, USB Cable, Power Cord	
Utility Options	Advanced Measurement Kit	SVA1000X-AMK
	Utility Kit: N(M)-SMA(M) cable N(M)-N(M) cable N(M)-BNC(F) adaptor(2 pcs) N(M)-SMA(F) adaptor(2 pcs) 10 dB attenuator	UKitSSA3X
	N(M)-SMA(M) cable, 70cm, 6 GHz	N-SMA-6L
	N(M)-N(M) cable, 70cm, 6 GHz	N-N-6L
	N(M)-BNC(M) cable, 70cm, 2 GHz	N-BNC-2L
	USB-GPIB Adaptor	USB-GPIB
	Soft carrying bag	BAG-SCC
EMI Options	EMI Measurement Kit: EMI Filter and Quasi Peak Detector, EMI test option in EasySpectrum Software	SVA1000X-EMI
	Near Field Probe Kit SRF5030: 4 H-probes (25 mm, 10 mm, 5 mm, 2mm), 30 MHz~3 GHz	SRF5030
	Near Field Probe Kit SRF5030T: 3 H- probes (20 mm, 10 mm, 5 mm), 1 E-probes (5 mm), 300 kHz~3 GHz	SRF5030T
Vector Network Analysis Options	Vector Network Analysis	SVA1000X-VNA
	Distance To Fault	SVA1000X-DTF
	Mechanical Calibration Kit: Open(M), Short(M), Match(M,50), Through(F-F), 50 Ω, 4 GHz	F503ME
Modulation Analysis Options	ASK, FSK	SVA1000X-DMA
	AM, FM	SVA1000X-AMA

SVA1000X Series

Spectrum & Vector Network Analyzer

About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales,production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, function/arbitrary waveform generators, digital multimeters, DC power supplies, spectrum analyzers, isolated handheld oscilloscopes and other general purpose test instrumentation. Since its first oscilloscope, the ADS7000 series, was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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