SSA3000X Plus

Spectrum Analyzer

DataSheet DS0703P_E01A

SIGLENT TECHNOLOGIES CO.,LTD

General Description

The SIGLENT SSA3000X Plus series spectrum analyzers are powerful and flexible tools for RF signal and network analysis.

With a frequency range to 3.2 GHz, the analyzer delivers reliable automatic measurements and multiple modes of operation: spectrum analyzer the base, optional functions include RF power measurement, vector signal modulation analysis, reflection measurement, and EMI test.

Applications include broadcast monitoring/evaluation, site surveying, S-parameter measurement, analog/digital modulation analysis, EMI pre-compliance test, research and development, education, production, and maintenance.

Features and Benefits

- Spectrum Analyzer Frequency Range from 9 kHz up to 2.1 GHz / 3.2 GHz
- -161 dBm/Hz Displayed Average Noise Level (Typ.)
- -98 dBc/Hz.@10 kHz Offset Phase Noise (1 GHz, Typ.)
- Level Measurement Uncertainty < 0.7 dB (Typ.)
- 1 Hz Minimum Resolution Bandwidth (RBW)
- Preamplifier Standard
- Tracking Generator (Opt.)
- Vector Signal Modulation Analysis Mode (Opt.)
- Reflection Measurement Kit (Opt.)
- EMI Filter and Quasi-Peak Detector Kit(Opt.)
- Advanced Measurement Kit (Opt.)
- 10.1 lnch Multi-Touch Screen , Mouse and Keyboard supported
- Web Browser Remote Control on PC and Mobile Terminals and File Operation

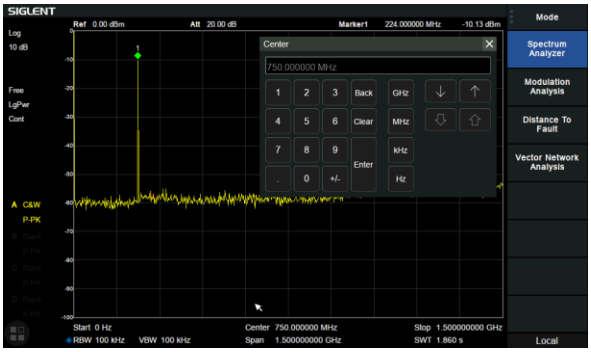
Models and Main index

Model	SSA3021X Plus	SSA3032X Plus
Frequency Range	9 kHz ~ 2.1 GHz	9 kHz~3.2 GHz
Frequency Counter Resolution	0.01 Hz	
Resolution Bandwidth	1 Hz~1 MHz	
Displayed Average Noise Level	-161 dBm/Hz	
SSB Phase Noise	< -98 dBc/Hz	
Total Amplitude Accuracy	< 0.7 dB	
Tracking Generator	100 kHz ~ 2.1 GHz	100 kHz ~ 3.2 GHz
Touch Screen	Multi Touch, Mouse and Keyboard supported	
Advanced Measurement	CHP, ACPR, OBW, CNR, Harmonic, TOI, Monitor	
Reflection Measurement	VSWR measurement using Reflection Bridge	
EMI Test	EMI Filter and Quasi-Peak Detector, Log Scale and Limit Line	
Modulation Analysis	AM, FM, ASK, FSK, MSK, PSK, QAM	
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	NI-MAX, Web Browser, Easy Spectrum software, File Explorer	

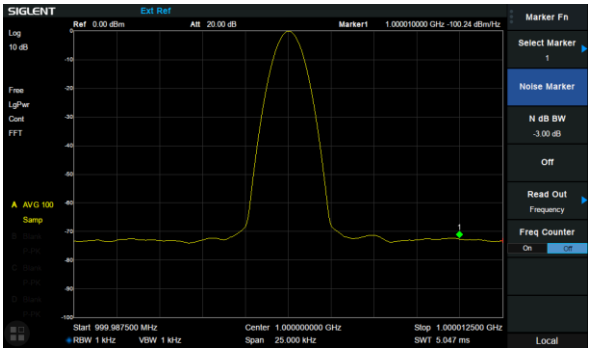
Design Features

Spectrum Analyzer Mode

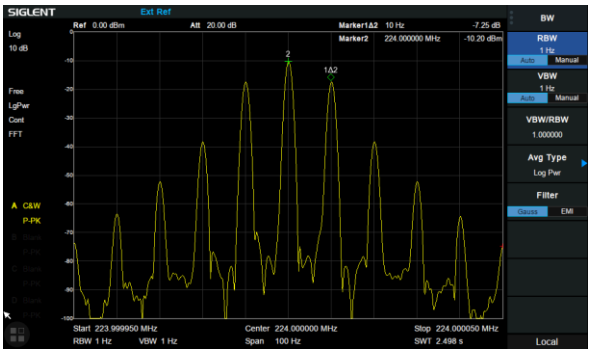
10.1 Inch Display with Multi-Touch Screen



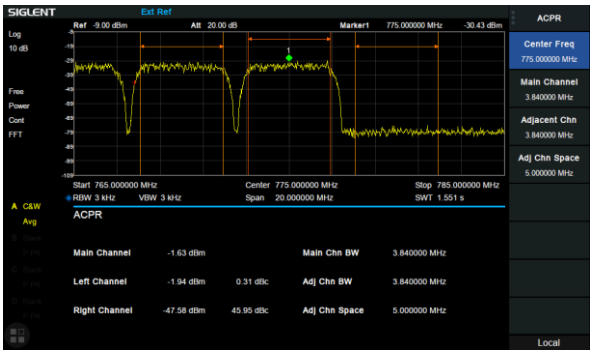
Phase noise <-98 dBc/Hz@1 GHz



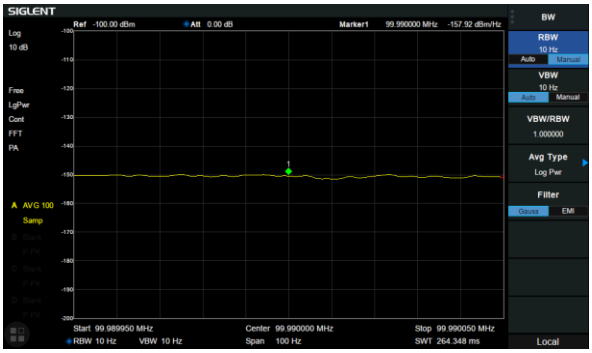
Minimum 1 Hz Resolution Bandwidth (RBW)



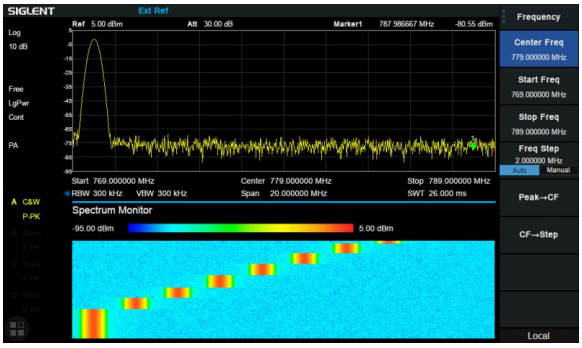
ACPR in Advanced Measurement Kit



-161 dBm/Hz Displayed Average Noise Level

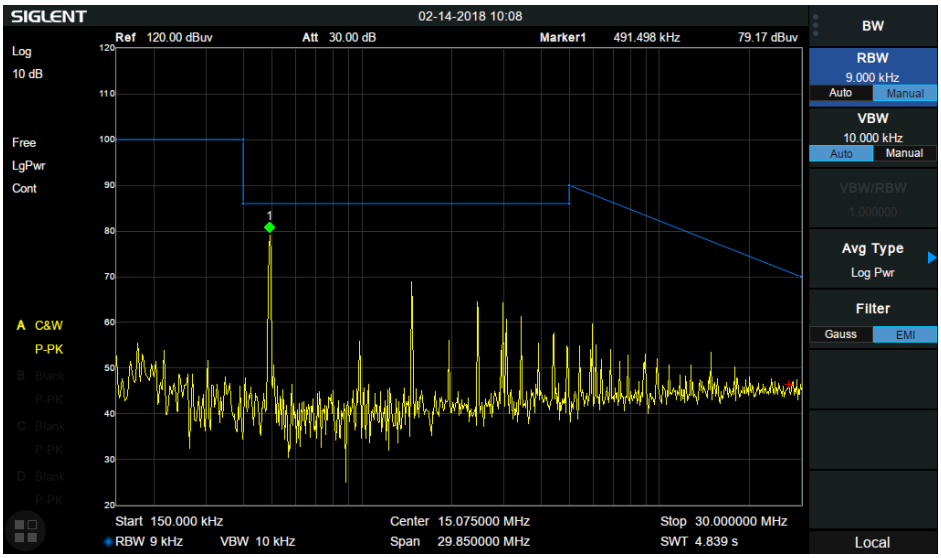


Monitor in Advanced Measurement Kit



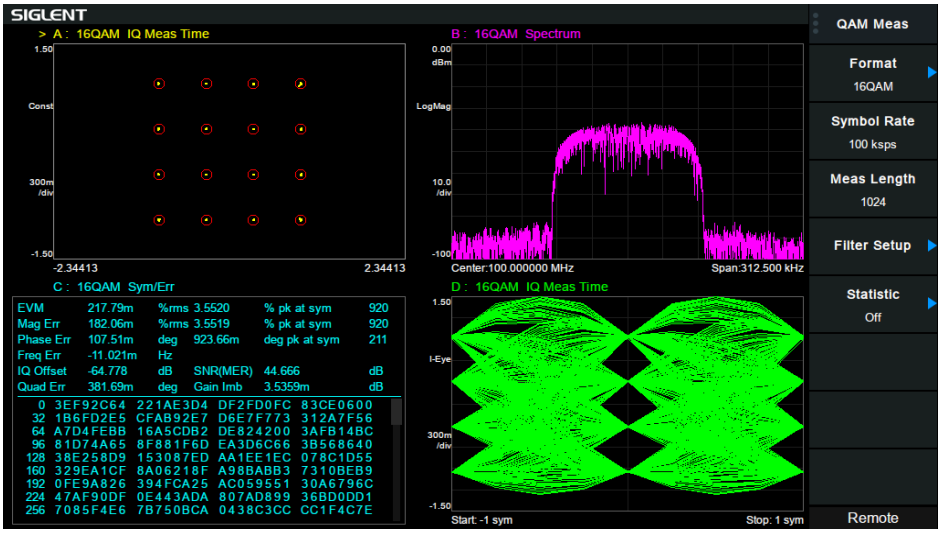
EMI Pre-Compliance Test

CISPR 16-1-1 EMI filter and Quasi-peak Detector , Log scale and Limit line



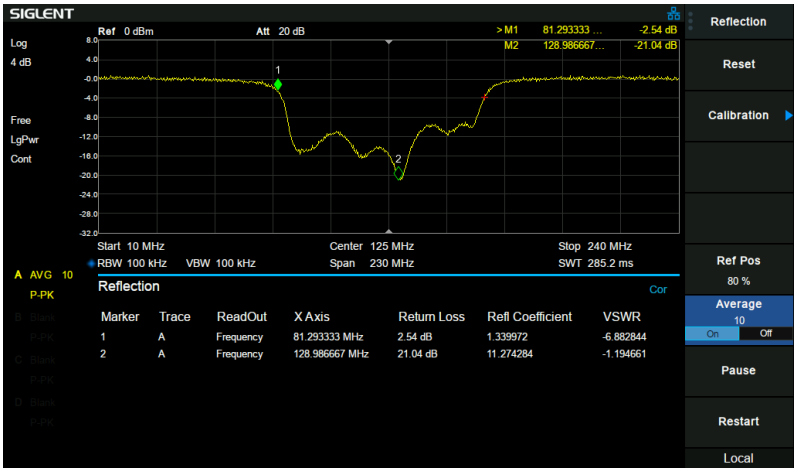
Modulation Analysis Mode

AM/FM, ASK/FSK/PSK/MSK/QAM Vector Signal Modulation Analysis, EVM evaluation



Reflection Measurement

VSWR and Return Loss measurement using External Reflection Bridge



Accessories

Utility Kit

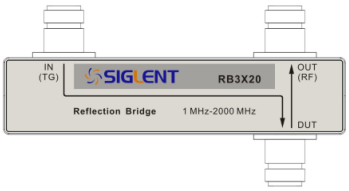
Near Field Probe Set

USB-GPIB Adaptor

6U Rack Mount

Soft Carrying Bag

Reflection Bridge



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 at room temperature (approximately 25°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.

Spectrum Analyzer Mode

Frequency and Time Characteristic

Frequency		
	SSA3021X Plus	SSA3032X Plus
Frequency range	9 kHz ~ 2.1 GHz	9 kHz ~ 3.2 GHz
Frequency resolution	1 Hz	
Frequency Span		
Range	0 Hz, 100 Hz to Max Frequency	
Accuracy	± Span / (number of display points - 1)	
Internal Reference Source		
Reference frequency	10.000000 MHz	
Reference frequency accuracy / uncertainty	± [(time since last adjustment × frequency aging rate) + temperature stability + initial 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 display points - 1)	
Marker uncertainty	± [frequency indication × reference frequency uncertainty + 1% × span + 10% × resolution bandwidth + marker resolution]	
Frequency Counter resolution	0.01 Hz	
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 ~ 1 MHz, in 1-3-10 sequence	
VBW uncertainty	<5%	
Sweep and Trigger		
Sweep time	1 ms to 3200 s	
Sweep mode	RBW = 100 Hz ~ 1 MHz, Sweep RBW = 1 Hz ~ 10 kHz, FFT	
Sweep rule	Single, Continuous	
Trigger source	Free, Video, External	
External trigger	5V TTL level, Rising edge/Falling edge	

Amplitude Accuracy and Range Specifications

Amplitude and Level			
Measurement range		DANL to +10 dBm, 100 kHz ~ 1 MHz, Preamp off DANL to +20 dBm, 1 MHz ~ 3.2 GHz, Preamp off	
Reference level		-200 dBm to +30 dBm, 1 dB steps	
Preamplifier		20 dB (nom.)	
Input attenuation		0 ~ 50 dB, 1 dB steps	
Maximum input DC voltage		+/- 50 VDC	
Maximum average power		30 dBm, 3 minutes, fc ⩾10 MHz, att > 20 dBm, preamp off	
Maximum damage level		33 dBm, fc ⩾ 10 MHz, att > 20 dBm, preamp off	
Displayed Average Noise Level (DANL)			
		SSA3021X Plus	SSA3032X Plus
		20 °C to 30 °C, att = 0 dB, RBW = 1 Hz, sample detector, trace average > 50, TG off	
Preamp off	100 kHz ~1 MHz	-107 dBm, -111 dBm (typ.)	-107 dBm, -111 dBm (typ.)
	1 MHz~10 MHz	-132 dBm, -136 dBm (typ.)	-132 dBm, -136 dBm (typ.)
	10 MHz~200 MHz	-137 dBm, -141 dBm (typ.)	-137 dBm, -141 dBm (typ.)
	200 MHz~2.1 GHz	-135 dBm, -139 dBm (typ.)	-135 dBm, -139 dBm (typ.)
	2.1 GHz~3.2 GHz		-126 dBm, -132 dBm (typ.)
Preamp on	100 kHz ~1 MHz	-132 dBm, -137 dBm (typ.)	-132 dBm, -137 dBm (typ.)
	1 MHz~10 MHz	-148 dBm, -154 dBm (typ.)	-148 dBm, -154 dBm (typ.)
	10 MHz~200 MHz	-156 dBm, -161 dBm (typ.)	-156 dBm, -161 dBm (typ.)
	200 MHz~2.1 GHz	-155 dBm, -158 dBm (typ.)	-155 dBm, -158 dBm (typ.)
	2.1 GHz~3.2 GHz		-145 dBm, -149 dBm (typ.)
SSB Phase Noise			
		20 °C to 30 °C, fc = 1 GHz	
SSB Phase noise		< -95 dBc/Hz @ 10 kHz offset, < -98 dBc/Hz (typ.)	
		< -96 dBc/Hz @ 100 kHz offset, < -97 dBc/Hz (typ.)	
		< -115 dBc/Hz @ 1 MHz offset, < -117 dBc/Hz (typ.)	
Level Display			
Logarithmic level axis		1 dB to 200 dB	
Linear level axis		0 to reference level	
Units of level axis		dBm, dBmV, dBµV, dBµA, 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, att = 20 dB, relative to fc = 50 MHz
Preamp off	±0.8 dB, ±0.4 dB (typ.)
Preamp on	±0.9 dB, ±0.5 dB (typ.)
Error and Accuracy	
Resolution bandwidth switching uncertainty	Logarithmic resolution, relative to RBW = 10 kHz
	± 0.2 dB (nom.)
Input attenuation switching uncertainty	20 °C to 30 °C, fc = 50 MHz, preamp off, relative to att = 20 dB
	± 0.5 dB
Absolute amplitude accuracy	20 °C to 30 °C, fc = 50 MHz, RBW = VBW = 1 kHz, att = 20 dB, peak detector, 95% reliability
	±0.4 dB, input signal -20 dBm, Preamp off
	±0.5 dB, input signal -40 dBm, Preamp on
Total amplitude accuracy	20 °C to 30 °C, fc>100 kHz, input signal -50 dBm ~ 0 dBm, att = 20 dB, RBW=VBW=1 kHz, peak detector, preamp off, 95% reliability
	±0.7 dB
RF input VSWR	Att = 10 dB, 1 MHz~3.2 GHz
	<1.5 (nom.)
Distortion and Spurious Responses	
Second harmonic distortion (SHI)	20 °C to 30 °C, fc ≥ 50 MHz, mixer level -20 dBm, att = 0 dB, preamp off
	-65 dBc / +45 dBm (nom.)
Third-order intercept (TOI)	20 °C to 30 °C, fc ≥ 50 MHz, two -20 dBm tones spaced by 100 kHz, att = 0 dB, preamp off
	+10 dBm (typ.)
1dB gain compression	20 °C to 30 °C, fc ≥ 50 MHz, att = 0 dB, preamp off
	> -5 dBm (nom.)
Residual response	20 °C to 30 °C, input terminated = 50 Ω, att = 0 dB
	< -90 dBm
Input related spurious	20 °C to 30 °C, mixer level = -30 dBm
	<-65 dBc

Tracking Generator (Option SSA3000XP-TG)

Frequency Parameter		
Frequency Range	SSA3021X Plus	SSA3032X Plus
	100 kHz ~ 2.1 GHz	100 kHz ~ 3.2 GHz
Frequency resolution	1 Hz, Zero Span	
RBW	100 Hz ~ 1 MHz, sweep mode	
Power Parameter		
Output level	-20 dBm ~ 0 dBm	
Output level resolution	1 dB	
Output flatness	+/-3 dB (nom.)	
Normalization Trace	Ref A/B/C->D	
VSWR	< 2 (nom.)	
Connector and Impendence	N-type female, 50 Ω	
Average safe reverse power	Total : 30 dBm (1 W)	
Maximum safe reverse level	Voltage: ±50 V_{DC}	

Reflection Measurement Kit (Option SSA3000XP-Refl)

Stimulus and Measurement		
Frequency Range	SSA3021X Plus	SSA3032X Plus
	100 kHz ~ 2.1 GHz	100 kHz ~ 3.2 GHz
RBW	100 Hz ~ 1 MHz	
Stimulus Power	-20 ~ 0 dBm	
Format	VSWR, Return Loss, Reflection Coefficient	
Calibration	Open Cal	
	(Open + Short)/2 Cal	

EMI Filter and Quasi-Peak Detector Kit (Option SSA3000XP-EMI)

Measurement	
EMI filter RBW (-6dB)	200 Hz, 9 kHz, 120 kHz, 1MHz (following CISPR 16-1-1)
Detector	Peak, Average, RMS, Quasi-peak (following CISPR 16-1-1)
QPD Dwell time	0 us ~ 10 s
EMI Receiver Software	EasySpectrum EMI pre-compliance test Software
Frequency axis	Linear, Logarithmic

Advanced Measurement Kit (Option SSA3000XP-AMK)

Power Measurement	
CHP, Channel Power	Channel Power, Power Spectral Density
ACPR, Adjacent Channel Power Ratio	Main CH Power, Left channel power, Right channel power
OBW, Occupied Bandwidth	Occupied Bandwidth, Transmit Frequency Error
T-Power, Time Domain Power	Zero Span Integrated Power
CNR, Carrier Noise Ratio	C/N, Noise Power
Non-Linear Measurement	
Harmonic measurement	Max Harmonic number 10
TOI, Third-Order Intercept	Measure the third-order products from two tones
Spectrum Monitor Measurement	
Spectrogram	

Modulation Analyzer Mode

Common Parameter		
Frequency range	SSA3021X Plus	SSA3032X Plus
	2 MHz to 2.1 GHz	2 MHz to 3.2 GHz
Carrier Power Accuracy	±2 dB (nom.)	
Carrier Power Range	-30 dBm to +20 dBm (nom.)	

Analog Modulation Analysis (Option SSA3000XP-AMA)

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.)	

Digital Modulation Analysis (Option SSA3000XP-DMA)

Measurement	
Modulation Type	ASK: 2ASK; FSK: 2,4,8,16 level; MSK: GMSK; PSK: BPSK,QPSK,OQPSK,8PSK; DPSK: DBPSK, DQPSK, D8PSK, $\pi/4$ -DQPSK, $\pi/8$ -D8PSK; QAM: 16,32,64,128,256
Meas Length	16 to 4096
Points/Symbol	4,6,8,10,12,14,16
Symbol Rate	1 ksps to 2.5 Msps, Symbol Rate* Points/Symbol <=10 Msps

Filter	
Meas/Ref Filter	Nyquist, Squrt Nyquist, Gauss, Half Sine, Rectangular
Length	2 to 128
Alpha/BT	Alpha 0.01 ~ 1, BT 0.01 ~ 10
Trace	
Trace Data	IQ Meas Time, IQ Meas Spectrum, IQ Ref Time, IQ Ref Spectrum, Time, Spectrum, Symbol Error Chart, Err Vector Time, Err Vector Spectrum, IQ Mag Err, IQ Phase Err,
Layout	Single, Stacked 2, Grid 1 2, Grid 2*2
Trace Formats	Log mag, Lin mag, Real, Imag, I-Q, Constellation, I-eye, Q-eye, Wrap Phase, Unwrap Phase, Trellis eye
Symbol Error Chart	
PSK/DPSK/MSK/QAM	EVM (rms EVM, peak EVM), Magnitude error, Phase error, IQ offset, Carrier offset, SNR Quadrature error, Gain imbalance(not support for MSK),
ASK	ASK Error, ASK depth, carrier offset
FSK	FSK Error, Magnitude error, FSK deviation, carrier offset

Inputs and Outputs

Front Panel	
RF input, Port 2	N-type female, 50 Ω (nom.)
TG Source, Port 1	N-type female, 50 Ω (nom.)
USB host	USB-A plug, version 2.0
Ear Phone Jack	3.5 mm
Rear Panel	
USB device	USB-B plug, version 2.0
LAN	10/100 Base, RJ-45
10 MHz reference output	10 MHz, >0 dBm, BNC-type female, 50 Ω (nom.)
10 MHz reference input	10 MHz, -5 to +10 dBm, BNC-type female, 50 Ω (nom.)
External trigger input	5V TTL level, BNC-type female, 10 kΩ
Remote Control	
Communication Interface	LAN, USB Device, USB Host (USB-GPIB adaptor)
Remote Control Capability	SCPI / Labview / IVI based on USB-TMC / VXI-11 / Socket / Telnet; NI-MAX; Web Browser (HTML 5 Supported); Easy Spectrum software; File Explorer (FTP)

General Specification

Structure	
Dimensions	393 mm × 207 mm × 116.5 mm (W×H×D)
Weight	Net: 4.40 kg (9.7 lb); Shipping: 5.20 kg
Display	TFT LCD, 1024 × 600, 10.1 inch multi-touch screen
Storage	Internal (Flash) 256 MB, external (USB storage device) 32 GB
Working Environment	
Source	AC voltage range: 100-240 V, 50/60 Hz or 100-120 V 400 Hz; Power consumption 35: W
Temperature	Working temperature: 0 °C to 40 °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
Altitude	Operating: less than 3 km
Electromagnetic Compatibility	
EN 61326-1: 2013 / EN 61000-3-2: 2014	Class A(The active input power of the EUT is less than 75 W. According to EN 61000-3-2, no limits are necessary.)
EN 61000-3-3: 2013	Plt: 0.65 Pst: 1.00, dmax: 4.00 % dc: 3.00 % dt Lim: 3.30 % dt>Lim: 500ms
IEC 61000-4-2: 2008	AD ±8.0 kV, CD ±4.0 kV
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	80 MHz to 1000 MHz: 10V/m, 1.4 GHz to 2.0 GHz:3 V/m, 2.0 GHz to 2.7 GHz:1V/m
IEC 61000-4-4: 2004 + A1: 2010	AC Line:±2.00 kV
IEC 61000-4-5: 2005	Line to Line: 1.0 kV, Line to Earth: 2.0 kV
IEC 61000-4-6: 2008	0.15-80 MHz:3 V 1 KHz 80% AM
IEC 61000-4-8: 2009	30 A/m, 50/60 Hz
IEC 61000-4-11: 2004	Voltage Dips:0%/0.5P; 40%/10P; 70%/25P; Short Interruptions Test Level % UT: 0%/250P
Safety	
IEC 61010-1:2010/EN 61010-1:2010	
CAN/CSA-C22.2 No.61010-1:2012, CAN/CSA-C22.2 No.61010-2-30:2012, UL 61010-1:2012, UL 61010-2-30:2012	
RoHS	
2011/65/EU	

Ordering Information

Product	Description	Order Number
Product Code	Spectrum Analyzer, 2.1 GHz	SSA3021X Plus
	Spectrum Analyzer, 3.2 GHz	SSA3032X Plus
Standard Accessories	Quick Start, USB Cable, Power Cord	
Common Options and Accessories	Tracking Generator	SSA3000XP-TG
	Advanced Measurement Kit	SSA3000XP-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-S2
	6U Rack Mount Kit	SSA-RMK
Reflection Measurement Options	Tracking Generator	SSA3000XP-TG
	Reflection Measurement	SSA3000XP-Refl
	Reflection Bridge Kit: Reflection Bridge (1 MHz ~ 4.5 GHz), N(M)-N(M) adaptors (2 pcs)	RB3X45
EMI test Options	EMI Measurement Kit: EMI Filter and Quasi Peak Detector, EMI Receiver Mode in EasySpectrum Software	SSA3000XP-EMI
	300 kHz~3 GHz Near Field Probe Kit: 3 H-probes (20/10/5 mm), 1 E-probe (5 mm)	SRF5030T
Modulation Analysis Options	ASK, FSK, MSK, PSK, QAM	SSA3000XP-DMA
	AM, FM	SSA3000XP-AMA

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, RF generators, digital multimeters, DC power supplies, spectrum analyzers, vector network analyzers, isolated handheld oscilloscopes, electronic load 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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