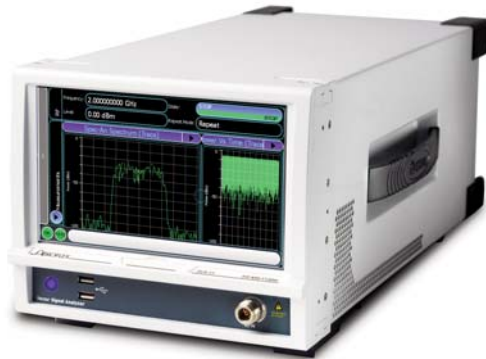


S-Series

SVA Vector Signal Analyzer



AEROFLEX
A passion for performance.

Compact, easy to use, vector analyzer for R&D, manufacturing and the field

- Wide band cover: SVA-6 - 250 kHz to 6 GHz
SVA-13 - 250 kHz to 13 GHz
- Input level range to +30 dBm
- Maximum instantaneous bandwidth: 90 MHz
- Digitizer ADC resolution: 13 bits
- Digital downconverter with sample rates up to 250 MS/s
- List mode for fast frequency and level settling time: <250 μ s
- Displayed Average Noise Level: typ. -148 dBm/Hz
- Spurious free dynamic range: 75 dB
- Intermodulation free dynamic range: 75 dB
- Up to 512 MByte sample memory
- Real-time streaming output of sample data
- Generic modulation analysis and spectrum analysis as standard
- Measurement suite options for wireless communications test
- Half-rack width, 4U high with 8.5 inch touch screen user-interface
- Synchronization and interaction with SGD signal generator and other S-Series modules
- "Aerolock" interlocking mechanism for multiple instrument applications
- USB, LAN and GPIB remote control
- Low cost of ownership through modular design

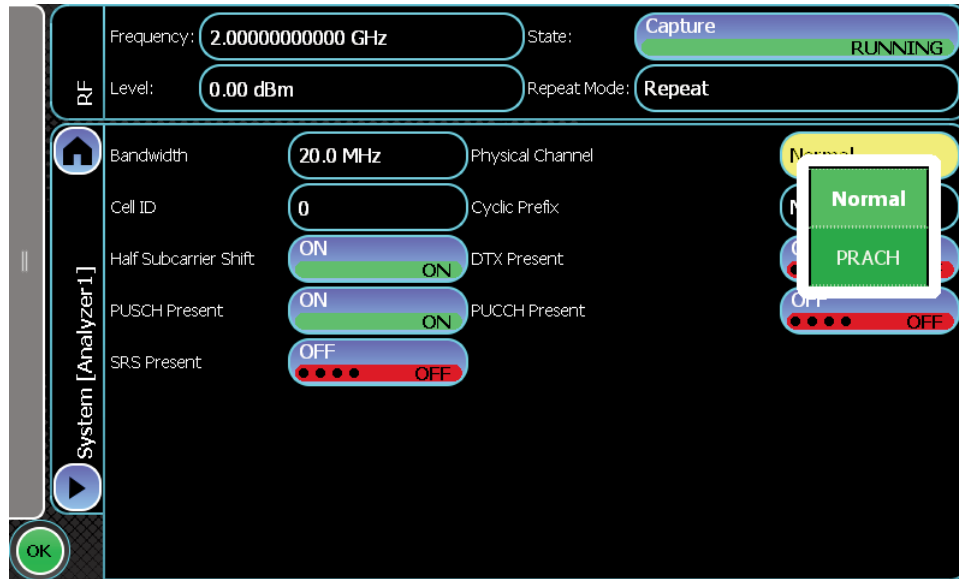
The SVA employs a large touch-screen user-interface to provide a vector analyzer with unparalleled ease-of-use. The small form-factor and light weight ensure minimum footprint on the bench or test system and maximum portability. The SVA converts RF signals into digital IF or I&Q sampled data providing vector signal analysis of RF signals with functionality and performance required in the laboratory or the manufacturing test system. With high linearity, low noise and excellent level accuracy, the SVA is ideally suited for the analysis of WLAN, WMAN, WPAN, 2G, 3G, 4G cellular radio signals as well as general purpose analog and digitally modulated signal analysis. A spectrum analyzer mode provides the features and controls you would expect from a conventional spectrum analyzer.

For the very latest specifications visit www.aeroflex.com

Display and User-Interface

A large 8.5 inch touch-screen LCD enables all relevant set-up information to be displayed on one screen, and without the need to select configurations from lower level menu structures. It is intuitive, easy to use, clear, with large characters and a wide viewing angle. Touch targets are sufficiently large to ensure usability even when wearing gloves.

A mouse and keyboard may also be connected to allow ease of use when using Windows™ features.



Using the touch-screen to set up LTE FDD uplink measurement

Performance Highlights

Level Range: Peak signal powers up +30 dBm can be input directly and with a maximum sensitivity down to typically -148 dBm/Hz, very low level signals are easily discernible from noise, especially useful when measuring transmitter spurious outputs.

Control of RF input level is provided using reliable, high speed electronic switched attenuation. To optimize downconverter operating conditions, RF attenuation is selectable in 1 dB steps to a maximum of 31 dB. IF attenuation is automatically selected in a 35 dB range with 1 dB resolution in order to optimize the ADC operating point thus optimizing of dynamic range for a wide range of input signal powers and signal characteristics.

Level Accuracy: With a total measurement uncertainty of typically ± 0.3 dB below 3 GHz, accurate RF power measurements are made possible. Together with < 0.08 dB repeatability error, high production yields can be maintained.

High Dynamic Range: The SVA is designed for difficult transmitter measurements such as burst power in TDD and TDMA systems and spectral emissions on cellular terminals. Measurement of GSM burst power ramps with over 80 dB dynamic range is possible in a single step. ACLR and spectral mask measurements on WCDMA signals can also be made in a single step with a measurement range of typically 68 dB for ACLR.

Wide Bandwidth: -1 dB bandwidth of up to 90 MHz is achieved.

Amplitude and phase correction can be applied to provide amplitude flatness of ± 0.1 dB over a 5 MHz bandwidth and ± 0.25 dB flatness for bandwidths up to 67 MHz. Phase compensation ensures phase flatness of $< \pm 0.03$ radians across the entire corrected bandwidth.

Low Phase Noise: At 2 GHz, 20 kHz offset, the typical phase noise is -116 dBc/Hz. Noise floor at 2 GHz is typically -138 dBc/Hz at 10 MHz offset.

Fast Switching: Below 6 GHz, frequency settling can be achieved in typically 250 μ s, making the SVA ideal for high productivity RFIC testing.

Flexible ADC: Sample data is available as digital IF samples at the full ADC sample rate or as digitally downconverted, decimated and re-sampled I & Q data samples at a user defined rate. Sample data may be streamed out of the rear panel data interface. Samples rates of up to 62.5 MSa/s can be supported for streaming applications e.g. in radio system emulation type applications or for producing uninterrupted time records for RF events. On board sample memory supports acquisition of up to 256 M x 16 bit samples. The ability to commence processing of captured IQ whilst acquisition is still in progress provides near real time measurement speed.

Data reduction is supported whereby the user can select a subset of acquired data to be passed for processing. This reduces unnecessary data transmission and can help improve measurement speed. This can be especially useful for TDMA type systems such as GSM. It makes it possible to only transfer active burst data for analysis reducing the number of samples to transfer by approximately 80%.

Data acquisition can be edge triggered and the sample length defined by the user or it may be gated in which case the acquisition period is defined by the gate width.

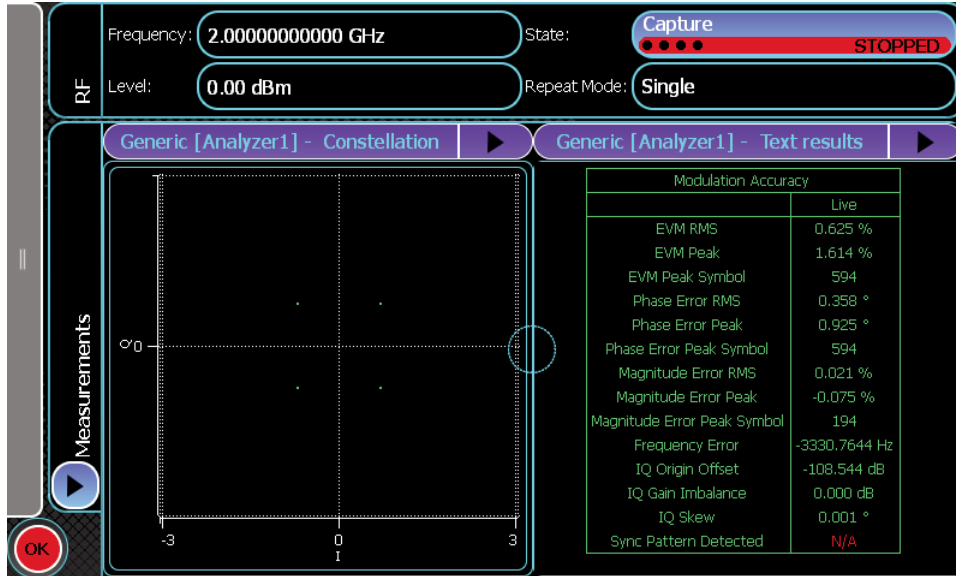
Triggering and Synchronization: The SVA's highly versatile acquisition trigger modes maximize flexibility in synchronized measurement applications. Acquisition can be triggered by software or hardware triggers including the rear panel TTL and digital inputs. Internal IF video and frequency selective IQ level triggering can be derived from the received signal with facilities to prevent false triggering from noisy signals. All trigger modes are supported by a user definable +ve and -ve trigger delay.

A trigger hold off mode is provided to allow control of trigger re-arming. This can be especially useful when acquiring TDD type signals as used in WLAN and WIMAX.

List Mode: This feature enables the digitizer to be pre-loaded with up to 128 combinations of different frequency and level settings. All digitizer internal hardware settings are pre-calculated making re-selection of a new frequency possible in typically 250 μ s. This feature is ideally suited for fast mobile phone transmitter alignment applications and is complemented by similar features in the SGD Digital RF Signal Generator in support of the corresponding fast mobile phone receiver alignment. Channelized timer mode allows setting of variable list dwell period (in output samples).

Measurement Personality Highlights

As standard the SVA is supplied with generic demodulation capability for FSK, PSK, QAM and analog (AM/FM) demodulation.



Generic QPSK demodulation- Constellation and text results

Also included as standard is a spectrum analysis function providing frequency and time domain analysis of digitized I & Q data. Analysis can be performed for frequency spans up to 200 MHz. The resolution bandwidth is continuously variable from 1 Hz to 10 MHz using 3 dB or noise equivalent bandwidth windows.

The range of spectrum measurement functions include:

Channel Power and Adjacent Channel Power Measurement: The user defines the channel configuration to be measured (i.e. channel width, channel spacing, center frequency, etc). The measurement then computes the central channel RMS power as an absolute and the adjacent channel powers relative to this from the FFT spectrum. Four adjacent channels are examined (two either side of the central channel). In manual mode up to 99 channels can be specified each with arbitrary channel spacing and channel width.

Occupied Bandwidth is calculated from the FFT spectrum by a function that returns the bandwidth in which a user defined percentage of the total signal power is occupied.

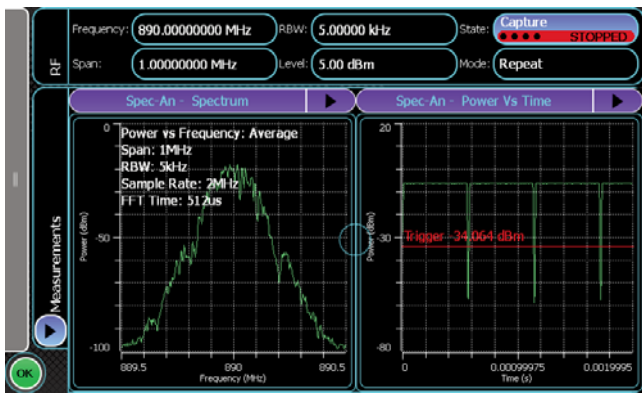
FFT spectrum can be configured as either RMS averaged or peak hold in which case the function will output an averaged result or retain peak values if repeatedly called. The number of averages is user defined.

A marker power function is provided together with a marker peak find and a next peak search function. These enable measurement of discrete signals within the FFT spectrum.

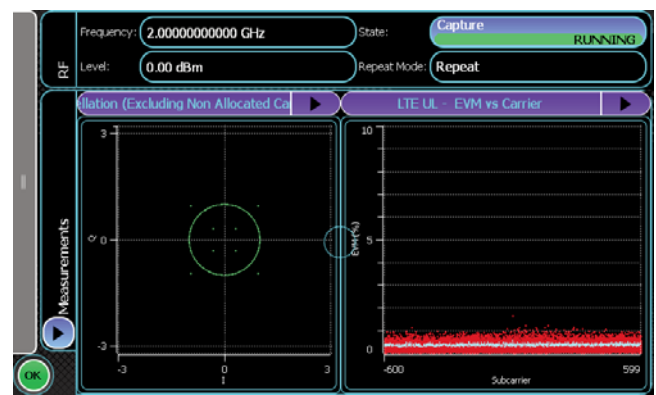
Time domain analysis functions include computation of average power of a range of IQ data samples plus power and frequency versus time. The time window for analysis can be the entire IQ sample array or any user defined subset.

Optional Analysis Libraries

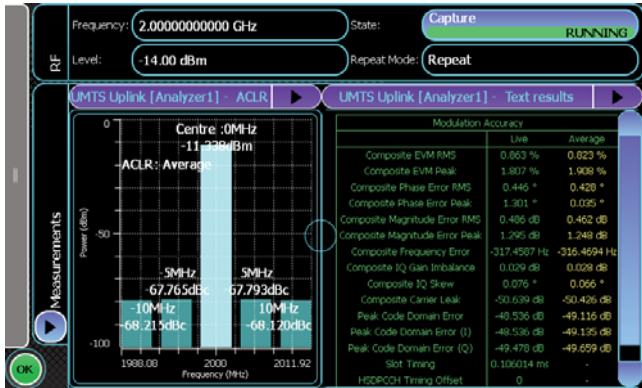
Signal analysis libraries are available for measurement of most 2G, 3G, 4G, WMAN, WPAN, WLAN and LTE transmissions. These provide measurement of power, modulation quality and spectrum parameters in accordance with the relevant standards for mobile terminal testing, ideal for both laboratory and production use.



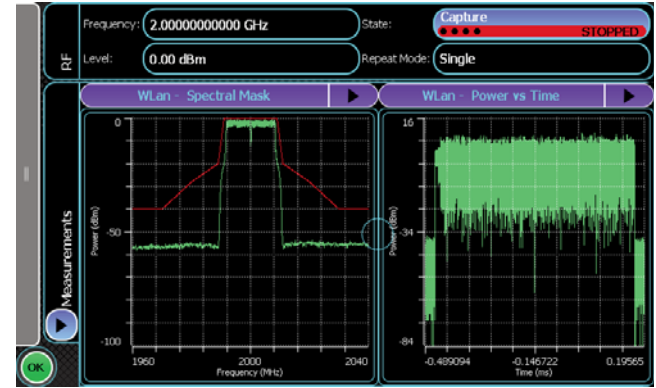
GSM, 8 slots, FFT and Power vs. Time



LTE FDD UL Constellation and EVM vs. Carrier



UMTS UL ACLR and text results



WLAN Spectral Mask and Power vs. Time

A full description and specification for each measurement personality is provided in a separate datasheet.

Modular instrument concept employing Aeroflex's "Aerolock" interlocking mechanism

The SVA is complemented by the SGD Digital RF Signal Generator and the two RF instruments are designed to work as a pair. The two instruments may be connected physically, using the "Aerolock" interlocking mechanism, and electrically via a USB interface. It is then possible to control the two units as a test system, with the settings of both instruments controlled via a common user-interface. Such a test system may be further enhanced with the addition of one or more of a selection of S-Series modules which mount above or below instruments. "Aerolock" is an ingenious, simple and strong interlocking mechanism allowing S-Series instruments and a full-rack width module, or two half-rack width modules, to be joined as one, creating a bespoke test solution. Weighing-in at less than 8 kg each, two S-Series instruments joined together may be easily carried within the laboratory, the factory or the field without necessitating a 2-person lift.



Aerolock™ interlocking mechanism



An SGD and SVA joined together as one

Remote Operation

The SVA supports remote control via USB, LAN and GPIB interfaces using SCPI format commands where possible. Remote desktop and VNC are also supported allowing off-site remote control.

Non-Volatile Memory

Full instrument stores may be independently named allowing quick search of required memory. No settings data is stored in any other memory location within the instrument.

Removable Hard Disk (Option)

For use in secure areas, the optional removable hard disk allows easy removal of all sensitive instrument settings stores and captured data in the event the instrument is required to leave the secure area.

Low Cost of Ownership

The SVA comes with a standard 2-year warranty and recommended 2-year calibration periodicity. Options to extend the warranty to five years are available.

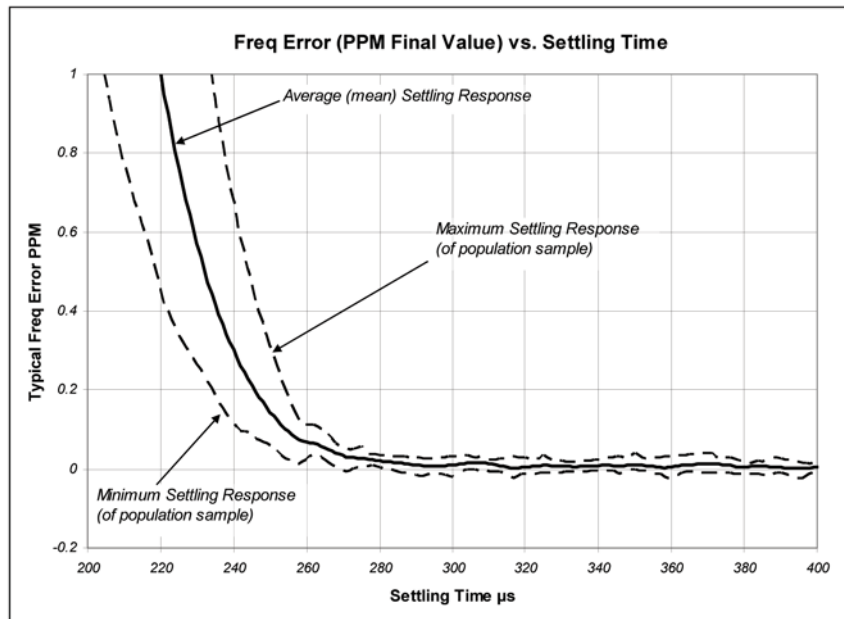
The SVA's modular architecture means that repair can be effected in 30 minutes by replacement using calibrated exchange modules.

The instrument's software may be installed simply from a USB port so that upgrades and bug fixes can be performed with the minimum down-time and maximum convenience. The latest software version will always be available on Aeroflex's web site.

All specifications apply after a warm-up period of 20 minutes.

Frequency

Range	250 kHz to 6 GHz (SVA-6) 250 kHz to 13 GHz (SVA-13)									
Resolution	≤3 GHz, 1 Hz									
	≤6 GHz, 2 Hz									
	≤9 GHz, 3 Hz									
	>9 GHz, 6 Hz									
Accuracy	As frequency reference									
Settling Time	Typical times taken to be settled at final frequency Up to 3 GHz settled to 0.7 ppm or 1 kHz whichever is the smaller >3 GHz, ≤6 GHz settled to 2 kHz >6 GHz, ≤9 GHz settled to 3 kHz >9 GHz settled to 6 kHz <table border="1"><tr><td>Loop bandwidth</td><td><500 MHz</td><td>>500 MHz</td></tr><tr><td>Normal</td><td>2 ms</td><td>325 μs</td></tr><tr><td>Narrow</td><td colspan="2">10 ms</td></tr></table>	Loop bandwidth	<500 MHz	>500 MHz	Normal	2 ms	325 μs	Narrow	10 ms	
Loop bandwidth	<500 MHz	>500 MHz								
Normal	2 ms	325 μs								
Narrow	10 ms									



Typical frequency settling times

Response is a composite of 10 devices at different settling frequencies. Freq error direction has been adjusted where necessary to display a positive response.

Level

Maximum Input Power	+30 dBm with 10 dB input attenuation	
RF Input Attenuator	0 to 31 dB in 1 dB steps	
IF Attenuator	0 to 35 dB in 1 dB steps	
Accuracy at 23C ±5C	<500 MHz	<±1.0 dB (typ ±0.5 dB)
	≥500 MHz, ≤3 GHz	<±0.7 dB (typ ±0.3 dB)
	>3 GHz, ≤6 GHz	<±1.0 dB
	>6 GHz	<±2.0 dB
	Temperature stability	±0.02 dB/°C, ≤6 GHz ±0.06 dB/°C, > 6 GHz
Repeatability	≤6 GHz, better than ±0.08 dB >6 GHz, better than ±0.15 dB after warm up following a return from a change of frequency or level valid for at least 2 hours and excluding temperature influence	
Settling Time (List Mode)	≤3 GHz	<±0.3 dB, 250 μs
	>3 GHz, ≤6 GHz	<±0.5 dB, 250 μs
	>6 GHz	<±0.5 dB, 750 μs
Input Impedance	50 Ω nominal	
Input VSWR (Return Loss)	≤6 GHz	<1.4:1 (16 dB)
	>6 GHz, ≤10.5 GHz	<1.5:1 (14 dB)
	>10.5 GHz	<1.95:1 (10 dB)

List Mode

Channel Parameters	Frequency Level (defined as input level or as RF and IF attenuator settings) Dwell period (in output samples)
List Addresses	128 (numbered 0 to 127)
Settling Time	See frequency data
Address Sources	Manual (software commanded) External (hardware triggered) Internal (counter timer)
External Mode Trigger Sources	Digital input, TTL+ve, TTL-ve
Counter Mode (internal)	Time mode (common to all channels): dwell time 250 μ s to 10 s with resolution of 0.1 μ s Sample mode (channelized): up to 232 output samples

Spectral Purity

SSB Phase Noise (typical dBc/Hz ambient room temperature):

Fc	2 GHz		5 GHz	12 GHz
	Loop Bandwidth			
Offset	Narrow	Wide	Narrow	
100 Hz	-55	-85		
1 kHz	-85	-103		
10 kHz	-114	-103		
20 kHz	-116	-110	-108	-100
100 kHz	-133	-130		
1 MHz	-136	-136		
10 MHz	-138	-138		

Linearity and Noise

<p>Third Order Intermodulation</p>	<p>≥ 30 MHz, < 6 GHz -75 dBc typ. (2 CW tones at up to 0 dBm per tone, 500 to 5000 kHz spacing, manual mode)</p>																																				
<p>Adjacent Channel Leakage Ratio (in any 3GPP band below 3 GHz)</p>	<p>Better than 60 dB (3GPP downlink test model 1) Better than 65 dB typ, (3GPP uplink)</p>																																				
<p>Spurious (excluding IF image frequencies and harmonic responses)</p>	<p>-70 dBc typ. (within the analysis bandwidth at the digitizer reference level)</p>																																				
<p>Harmonic Distortion</p>	<table border="1"> <thead> <tr> <th data-bbox="767 423 938 523">Incident Power</th> <th data-bbox="938 423 1115 523">Incident Frequency</th> <th data-bbox="1115 423 1295 523">2nd Harmonic (dBc typ.)</th> </tr> </thead> <tbody> <tr> <td data-bbox="767 523 938 683" rowspan="5">0dBm</td> <td data-bbox="938 523 1115 555">850 MHz</td> <td data-bbox="1115 523 1295 555">-78</td> </tr> <tr> <td data-bbox="938 555 1115 587">1900 MHz</td> <td data-bbox="1115 555 1295 587">-88</td> </tr> <tr> <td data-bbox="938 587 1115 619">2500 MHz</td> <td data-bbox="1115 587 1295 619">-65</td> </tr> <tr> <td data-bbox="938 619 1115 651">5000 MHz</td> <td data-bbox="1115 619 1295 651">-72</td> </tr> <tr> <td data-bbox="938 651 1115 683">6500 MHz</td> <td data-bbox="1115 651 1295 683">-70</td> </tr> <tr> <td data-bbox="767 683 938 842" rowspan="5">-5dBm</td> <td data-bbox="938 683 1115 715">850 MHz</td> <td data-bbox="1115 683 1295 715">-83</td> </tr> <tr> <td data-bbox="938 715 1115 746">1900 MHz</td> <td data-bbox="1115 715 1295 746">-95</td> </tr> <tr> <td data-bbox="938 746 1115 778">2500 MHz</td> <td data-bbox="1115 746 1295 778">-72</td> </tr> <tr> <td data-bbox="938 778 1115 810">5000 MHz</td> <td data-bbox="1115 778 1295 810">-76</td> </tr> <tr> <td data-bbox="938 810 1115 842">6500 MHz</td> <td data-bbox="1115 810 1295 842">-75</td> </tr> <tr> <td data-bbox="767 842 938 991" rowspan="5">-10dBm</td> <td data-bbox="938 842 1115 874">850 MHz</td> <td data-bbox="1115 842 1295 874">-90</td> </tr> <tr> <td data-bbox="938 874 1115 906">1900 MHz</td> <td data-bbox="1115 874 1295 906">-100</td> </tr> <tr> <td data-bbox="938 906 1115 938">2500 MHz</td> <td data-bbox="1115 906 1295 938">-79</td> </tr> <tr> <td data-bbox="938 938 1115 970">5000 MHz</td> <td data-bbox="1115 938 1295 970">-82</td> </tr> <tr> <td data-bbox="938 970 1115 991">6500 MHz</td> <td data-bbox="1115 970 1295 991">-78</td> </tr> </tbody> </table>	Incident Power	Incident Frequency	2nd Harmonic (dBc typ.)	0dBm	850 MHz	-78	1900 MHz	-88	2500 MHz	-65	5000 MHz	-72	6500 MHz	-70	-5dBm	850 MHz	-83	1900 MHz	-95	2500 MHz	-72	5000 MHz	-76	6500 MHz	-75	-10dBm	850 MHz	-90	1900 MHz	-100	2500 MHz	-79	5000 MHz	-82	6500 MHz	-78
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<p>Residual Responses (No signal input, RF input terminated in 50 Ω, minimum RF and IF attenuation)</p>	<p>≤ 6 GHz, better than -95 dBm, (typ. -100) > 6 GHz, better than -95 dBm typ.</p>																																				
<p>Noise Spectral Density (No signal input, RF input terminated in 50 Ω, minimum RF and IF attenuation)</p>	<p>< 500 MHz < -135 dBm/Hz (typ -148) ≥ 500 MHz, ≤ 5.8125 GHz < -140 dBm/Hz (typ -147) > 5.8125 GHz < -137 dBm/Hz (typ -147)</p>																																				

A/D Conversion

Resolution	13 bits																													
ADC Clock	250 MHz																													
Sample Rate Control, IQ Data	15.3 kSa/s to 250 MSa/a																													
Resolution	0.1 Hz when the sample rate is entered as a real number Sample rate can be entered as a fraction made up of integers																													
Sample Rate Accuracy	As per frequency standard																													
Amplitude Flatness (correction on)	<table border="1"> <thead> <tr> <th rowspan="2">Operating Frequency</th> <th colspan="4">IF Bandwidth (MHz)</th> </tr> <tr> <th><±0.1 dB Flatness</th> <th><±0.25 dB Flatness</th> <th><±0.65 dB Flatness</th> <th><±1.0 dB typ. Flatness</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>5</td> <td></td> <td></td> <td></td> </tr> <tr> <td><500 MHz</td> <td></td> <td>15</td> <td></td> <td>20</td> </tr> <tr> <td>≤1 GHz</td> <td></td> <td>33</td> <td></td> <td>36</td> </tr> <tr> <td>>1 GHz</td> <td></td> <td></td> <td>67</td> <td>90</td> </tr> </tbody> </table>	Operating Frequency	IF Bandwidth (MHz)				<±0.1 dB Flatness	<±0.25 dB Flatness	<±0.65 dB Flatness	<±1.0 dB typ. Flatness	All	5				<500 MHz		15		20	≤1 GHz		33		36	>1 GHz			67	90
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>1 GHz			67	90																										
Phase Flatness	< 500 MHz ±0.03 radians pk-pk to 15 MHz ≤1 GHz ±0.03 radians pk-pk to 36 MHz >1 GHz ±0.03 radians pk-pk to 67 MHz																													
Data Output	A sample data block (equal to the data capture length) can be stored to the memory internal to the SVA IF data samples have 16 bit resolution IQ data samples can be 16 or 32 bit resolution																													
Sample Memory	256 M x 16 bit samples																													

Triggering

Trigger Mode	Single, Repeat
Trigger Type	Edge, Gated, None (software triggered)
Hardware Trigger Sources	Internal IF or IQ, data (with user-defined level threshold) and timer External TTL
Trigger Polarity	+ve or -ve (Edge trigger) Gate high, Gate low (Gated trigger)
Trigger Functions	
Pre-trigger	0 to sample length
Delayed trigger	0 to +2 GSa
Trigger Latency	0 to 1 sample at the output sample rate
Trigger Hold Off	Min trigger hold-off: 0 (default) Max trigger hold-off: 65536 μs in 1 μs steps

Spectrum Analyzer Mode

Frequency Span	Variable between 2 kHz to 200 MHz and zero span
Resolution	1 Hz
RBW	Variable between 1 Hz to 10 MHz
Resolution	1 Hz
Window Type	NEBW: Gaussian 3 dB: Gaussian fixed: Blackman Harris 5 term
Sample Time	Up to 333 seconds
Resolution	1 ns
Channel Power and Adjacent Channel Power Measurement	2 upper and 2 lower or user defined up to 99
Channel filter alpha	0.0 to 1.0
Channel spacing	up to 15 MHz
Channel width	up to 25 MHz
Occupied Bandwidth Percentage Range	1% to 99.99%
N Peaks	Frequency and power output for up to 10 signal peaks sorted in order of descending power
Average Power	The RMS average power for all IQ samples
Markers	4 markers plus delta marker
Marker Functions	Marker power & frequency with peak search, next peak, peak track Power and time Frequency and time
Traces	Live, avg, max, hold Spectrum trace, power versus time trace, frequency versus time trace Text results summary

Reference Frequency Oscillator

Type	OCXO
Frequency	10 MHz
Temperature stability (0 to 50C)	$< \pm 1 \times 10^{-8}$ typ.
Ageing rate	< 1 in 10^9 per day (< 0.001 ppm) < 1 in 10^7 per year (< 0.1 ppm)

Memory (80 GB Hard Disk)

Up to 500 full instrument setting stores

Each memory store may be given a unique name

Captured IQ data may be saved to the hard disk

Removable Hard Disk – (Option 005)

For use in secure areas, the removable hard disk may be extracted from the rear panel by releasing two screws.

The removable hard disk also contains the instrument's operating software.

General Data

Remote Control

Systems	GPIB (IEEE 488) Ethernet (TCP/IP)
Command set	SCPI
Interface functions	SH1; AH1; T6; L4; SR1; RL1; PP0; DC1; DT1; C0; E2

Recommended Calibration Cycle

24 months

Weight

<8 kg

Dimensions - H x W x D

195 mm (178 mm without feet - 4U) x 222 mm x 490 mm

Instrument includes side strap handle and front tilt feet.

Instrument includes Aerolock™ interlocking mechanism with modules mounted above and below, and to another S-Series instrument on either side.

Front Panel Connectors

RF Input	50 Ω N-type
2 x USB 2.0	Used with a memory stick for transferring memory stores, ARB waveforms or other files in or out of the instrument Mouse or keyboard input

Rear Panel Connectors

RF Input	50 Ω N-type (option 007)
TTL Trigger	BNC – LVTTTL logic input thresholds. Damage levels: -5 / +10 V
Digital IO	IF or IQ 16 bit LVDS data via Aurora interface (Infiniband connector)
4 x USB 2.0	Used with a memory stick for transferring memory stores, captured IQ data or other files in or out of the instrument Module plug & play connection
Reference frequency input	50 Ω BNC accepts 10 MHz at 200 mV to 2 V RMS into 50 Ω or 100 k Ω nominal Damage levels: -0.5 / +3 V
Reference frequency output	BNC – 10 MHz at 2 V pk-pk nominal square wave into 50 Ω Damage levels: -0.5 / +3 V
GPIB Interface	As described under Remote Control
LAN Interface	As described under Remote Control

Environmental

Rated range of use	
Temperature	0 to 50C
Humidity	Up to 93% at 40C
Altitude	Up to 3050 m
Conditions of storage and transport	
Temperature	-40 to +71C
Humidity	Up to 95% at 40C
Altitude	Up to 4600 m
EMC	EN 61326-1:2006, Emissions Class B, Immunity Table 1 – Performance Criteria B
Safety	EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use-Part 1, General requirements.
Mechanical	MIL-PRF-28800F Class 3

Power Requirements

AC Supply	100 – 240 V ~ (Limit 90 - 264 V) 50 - 60 Hz ~ (Limit 45 - 66 Hz) 110 VA max.
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User Interface

Screen size	8.5 inch, 16:9 aspect ratio, colour touch screen
Keys / switches	Power on / standby Home key

ORDERING INFORMATION

SVA-6	250 kHz to 6 GHz RF Digitizer and Vector Analyzer
SVA-13	250 kHz to 13 GHz RF Digitizer and Vector Analyzer
Option 005	Removable Storage Disk
Option 007	Rear panel connectors

Spectrum Analysis and Generic Demodulation measurement suites included.

Analysis options:

Option 150	Modulation analysis package- Basic (options 152, 102, 103, 104, 106, 109)
Option 151	Modulation analysis package- Advanced (options 150, 107, 108)
Option 152	3GPP (GSM, EDGE, EGPRS, EGPRS2, WCDMA, HSPA, HSPA+) Measurement suite
Option 102	3GPP2 (CDMA2000, 1xEVDO (0+A)) Measurement suite
Option 103	WLAN (a, b, g, n) Measurement suite
Option 106	Bluetooth V.11 + V.21 + EDR + Version 4 Measurement suite
Option 107	LTE FDD Rel. 8 Measurement suite
Option 108	LTE TDD Rel. 8 Measurement suite
Option 109	TD-SCDMA (3GPP TDD-LCR) Measurement suite

Extended Warranty Options

Option 203	3 year warranty
Option 204	4 year warranty
Option 205	5 year warranty

Supplied Accessories

AC supply lead

Getting Started manual

CD-ROM containing operating manual

CD-ROM containing factory test results

Optional Accessories

47000/xxx	Operating manual (paper format)
46880/xxx	Service manual supporting repair to module level (includes semi-automatic adjustment software)
43129/189	1.5 m GPIB lead
46662/836	Soft carry case
46662/835	Hard transit case
23448/030	USB Type A - Type B cable, 1.5 m
46884/xxx	LAN cable, 1.5 m
46884/xxx	LAN crossover cable, 1.5 m
46885/505	Single instrument rack mounting kit (front panel brackets)
46885/506	Double instrument rack mounting kit (front panel brackets)
43139/042	RF double screened connector cable 50 Ω , 1.5 m, BNC (m)
54311/095	RF double screened connector cable 50 Ω , 1 m, type N connectors

54311/092 Coaxial adapter N male to BNC female

59999/163 Precision coaxial adapter N male to SMA female

Complementary S-Series instruments and modules (see separate datasheets)

SGD-3/6 100 kHz - 3/6 GHz Digital RF Signal Generator

SCO-6 10 MHz - 6 GHz Combiner module

SPA-6 10 MHz - 6 GHz Power Amplifier module

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