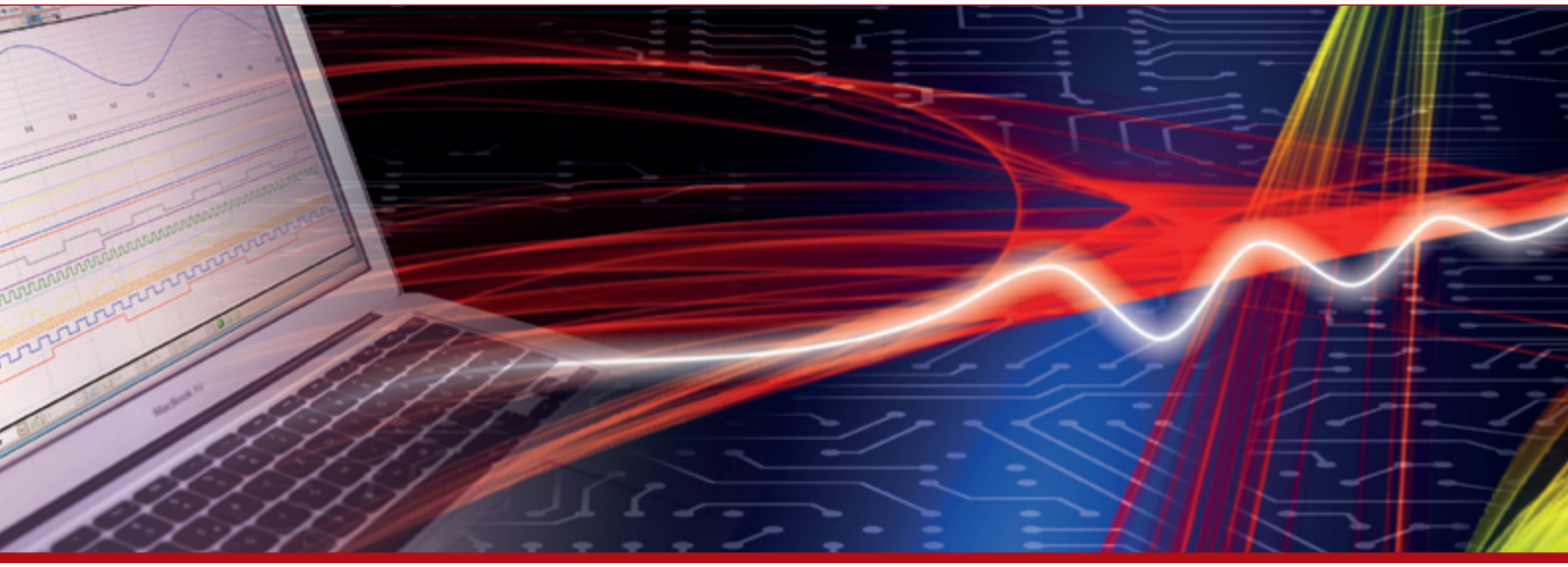
Product Datasheet - Technical Specifications



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SHA800A

Spectrum & Network Analyzer

DataSheet EN_01A

SIGLENT TECHNOLOGIES CO.,LTD

General Description

The SIGLENT SHA850A, a handheld portable spectrum analyzer and cable-and-antenna analyzer, is a powerful and flexible tool for those field and outdoor RF applications. Including communication engineering, telecom operation and maintenance, radio management, factory production, education and teaching and many other fields.

With a frequency range up to 7.5 GHz, the analyzer delivers reliable automatic measurements and multiple modes of operation. A spectrum analyzer, including built-in amplifier and independent signal source, fast scanning speed, high sensitivity, can achieve broadcast monitoring, channel power scanning, wireless interference location, power monitoring, electromagnetic compatibility, and other functions. A cable and antenna tester including built-in DC voltage bias, with a 1-path-2-port vector network analysis function, can measure TDR, VSWR, port matching debugging, insertion loss measurement, tower amplifier debugging, cable fault location, Smith chart, etc.

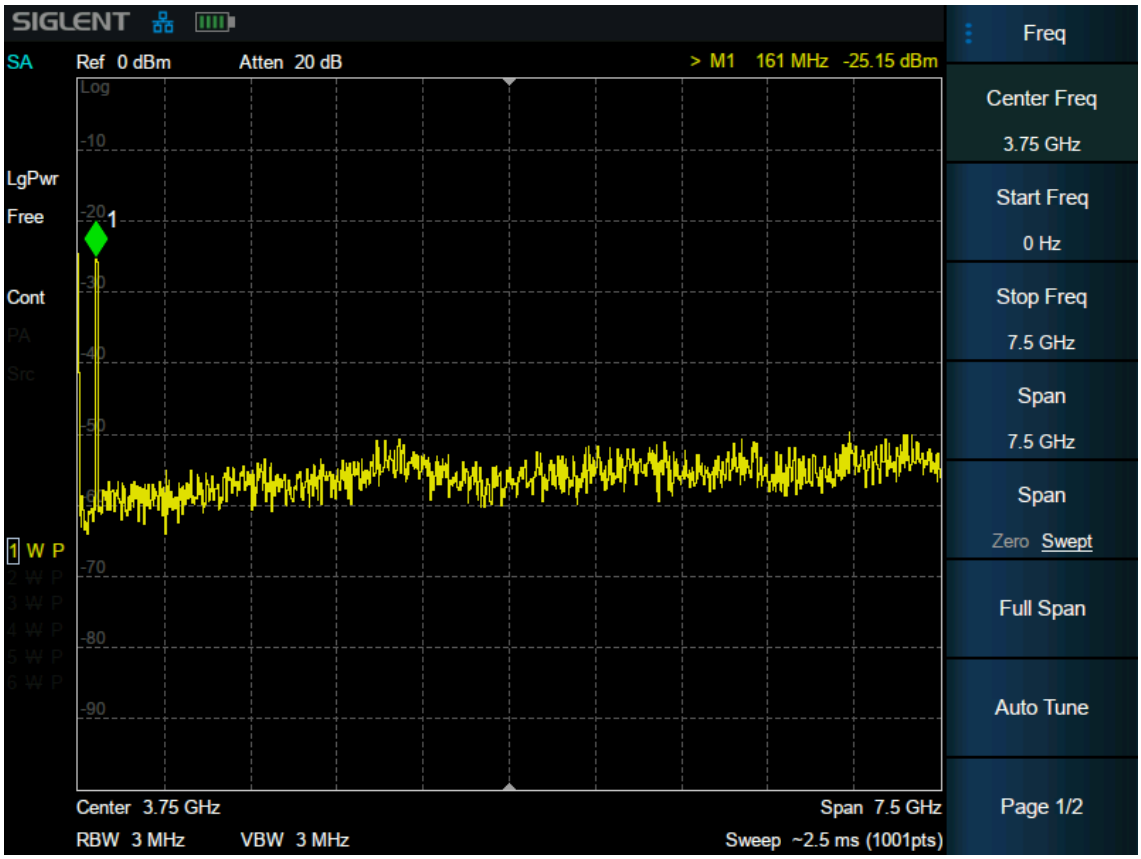
Features and Benefits

- Spectrum Analyzer Frequency Range from 9 kHz up to 7.5 GHz, -165 dBm/Hz Displayed Average Noise Level (Typ.), -104 dBc/Hz.@10 kHz Offset Phase Noise (1 GHz, Typ.), 1 Hz up to 10 MHz Minimum Resolution Bandwidth (RBW), Preamplifier and independent signal source up to 7.5 GHz, GPS positioning and logging
- Cable and Antenna Test Frequency Range from 100 kHz up to 7.5 GHz, Distance To Fault and Time Domain Analysis
- Vector Network Analyzer, Bias out up to 32VDC
- Typical working time 4 hours, 3.2 kg net weight, 8.4 Inch Multi-Touch Screen , Mouse and Keyboard supported

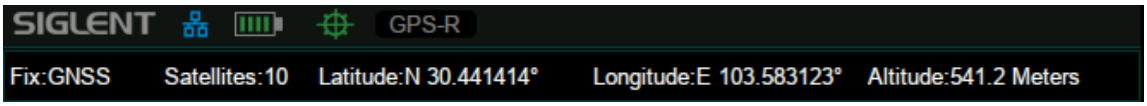
Model	SHA851A	SHA852A
Spectrum Analyzer	9 kHz~3.6 GHz	9 kHz~7.5 GHz
Cable and Antenna Test	100 kHz~3.6 GHz	100 kHz~7.5 GHz

Design Features

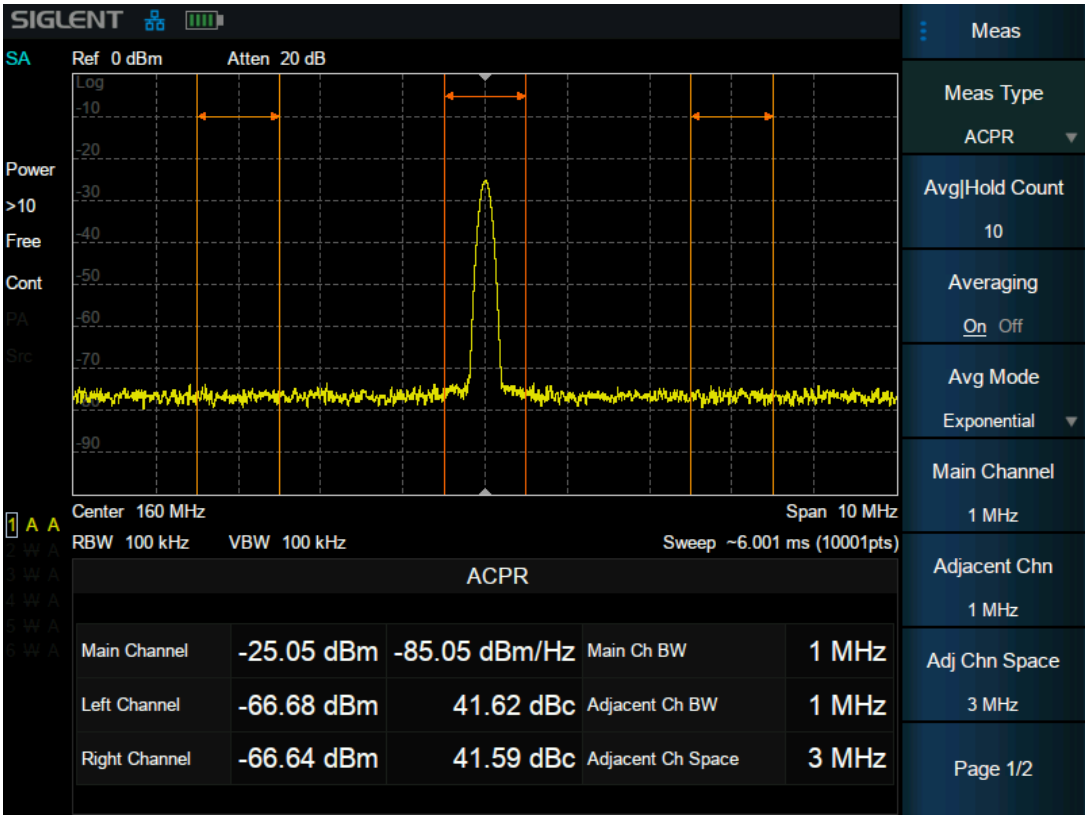
Spectrum Analyzer
8.4 inch multi-touch screen and full keyboard control



GPS Location and trace log recorder, sync 10MHz reference clock



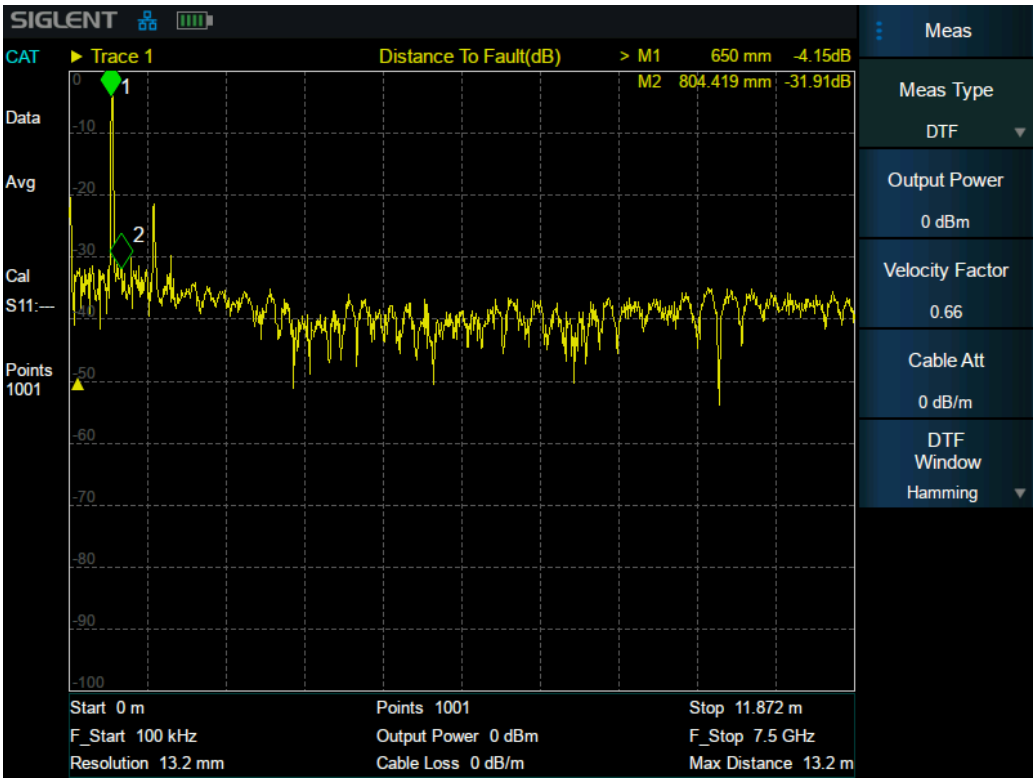
Channel Power and ACPR measurement



Interference analysis with directional antenna

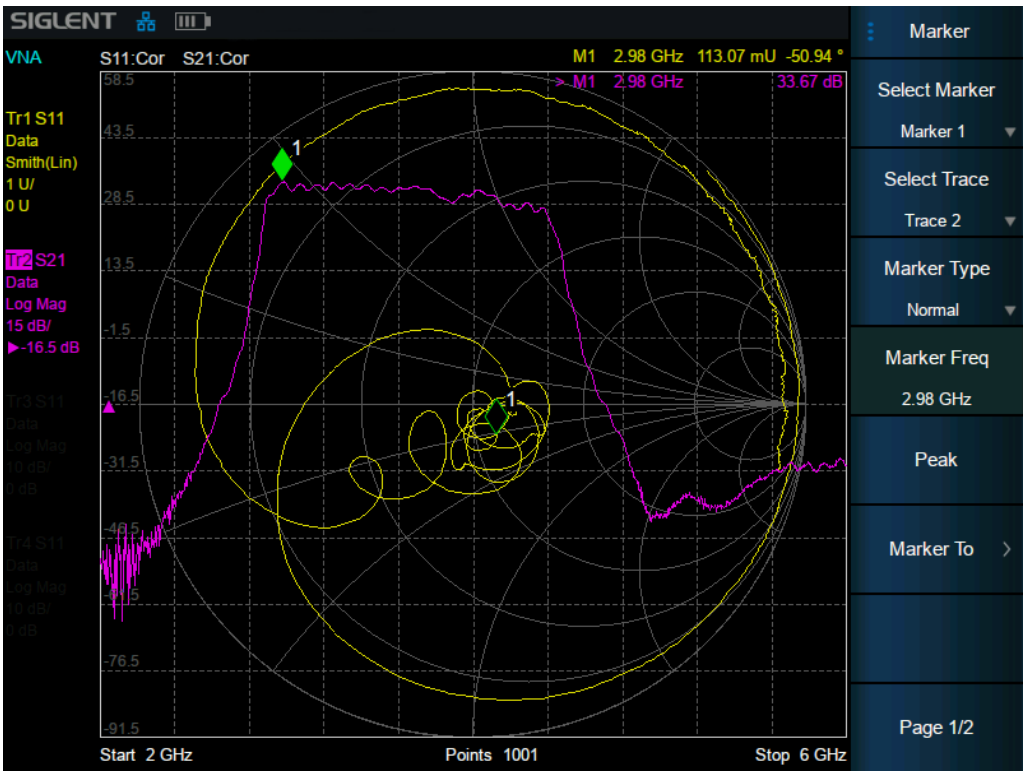
Cable and Antenna Test

Cable and Antenna Test based on Timing Domain Analysis



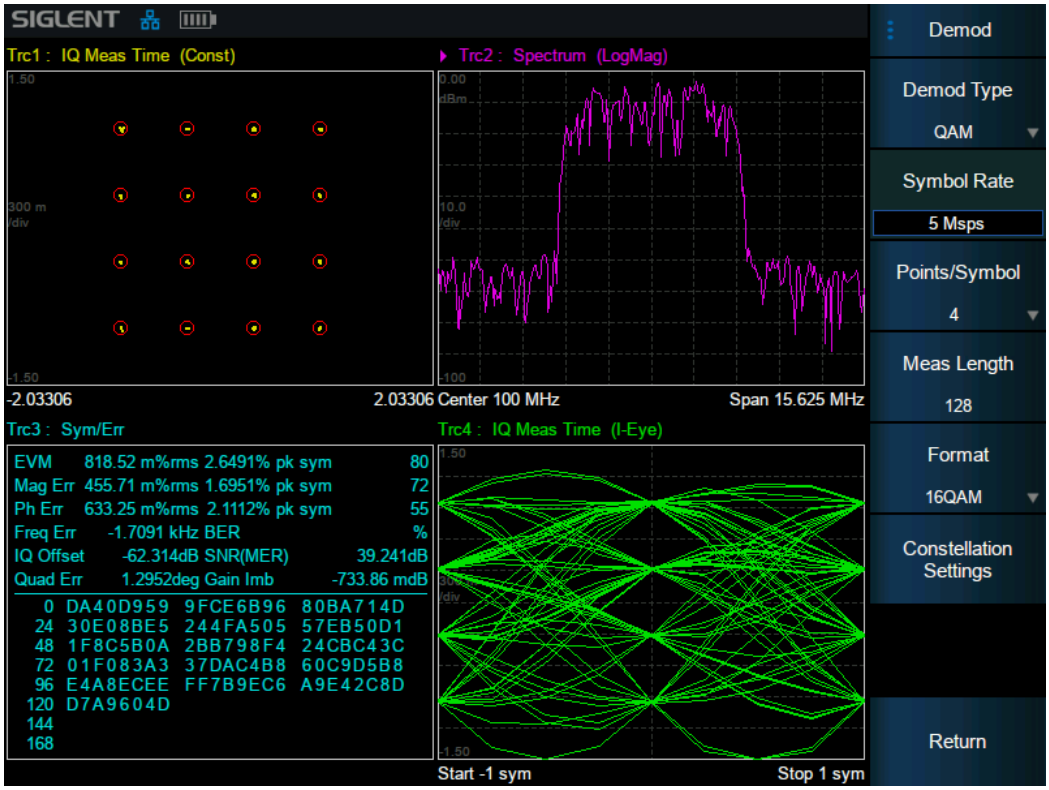
Vector Network Analyzer

100kHz-7.5GHz Vector S11 and S21 measurement, Multi Formats Overlay Display



Modulation Analysis

AM/FM/PM analog modulation, and ASK/FSK/PSK/MSK/QAM digital modulation analysis



Accessories

Utility Kit

Near Field Probe Set

50Ω Calibration Kit

GPS Antenna

Portable Bag

Directional Antenna 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 60 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

Frequency and Time Characteristic

Frequency			
		SHA851A	SHA852A
Frequency range		9 kHz~3.6 GHz	9 kHz~7.5 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 ℃~50 ℃	
Frequency aging rate		<0.5 ppm/first year, 3.0 ppm/20 years	
Accuracy, synced to GPS		±0.01 ppm	
Accuracy, unsynced to GPS		±0.4 ppm	
Marker			
Marker resolution		Span / (number of display points - 1)	
Marker uncertainty		± [frequency indication × reference frequency uncertainty + 1% × span + ½ * marker resolution + 1 Hz]	
Frequency Counter resolution		0.1 Hz	
Bandwidths			
Resolution bandwidth (-3dB)		1 Hz ~ 3 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 ~ 10 MHz, in 1-3-10 sequence	
VBW uncertainty		<5%	
Sweep and Trigger			
Sweep time		1 ms to 5000 s	1 ms to 7500 s
RBW	Sweep	3 Hz ~ 3 MHz	
	FFT	1 Hz ~ 10 kHz	
Sweep points		201~10001	
Sweep rule		Single, Continuous	
Trigger source		Free, Video, External, Periodic	
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 ~ 7.5 GHz, Preamp off
Reference level	-200 dBm to +30 dBm, 1 dB steps
Preamplifier	25 dB (nom.)
Input attenuation	0~50 dB, 1 dB steps
Maximum input DC voltage	+/- 50 VDC
Maximum damage level	33 dBm, fc ⩾ 10 MHz, att > 20 dBm, preamp off, in 3 minutes
Level Display	
Logarithmic level axis	1 dB to 200 dB
Linear level axis	0% to 100% (reference level)
Units of level axis	dBm, dBmV, dBμV, dBμA, Volt, Watt
Number of traces	6
Trace detectors	Positive-peak, Negative-peak, Sample, Normal, Average(Voltage/RMS/Video)
Trace functions	Clear write, Max Hold, Min Hold, View, Blank, Average, Math

SSB Phase Noise	
Offset	20 °C to 30 °C, fc = 1 GHz, Normalized to 1 Hz
10 kHz	-100 dBc/Hz, -104 dBc/Hz (typ.)
100 kHz	-100 dBc/Hz, -104 dBc/Hz (typ.)
1 MHz	-114 dBc/Hz, -117 dBc/Hz (typ.)

Displayed Average Noise Level (DANL)			
		SHA851A	SHA852A
	20 °C to 30 °C, att = 0 dB, RBW = 1 Hz, sample detector, trace average > 50, TG off		
Preamp off	100 kHz ~1 MHz	-132 dBm, -136 dBm (typ.)	-132 dBm, -136 dBm (typ.)
	1 MHz~10 MHz	-142 dBm,-145 dBm (typ.)	-142 dBm, -145 dBm (typ.)
	10 MHz~600 MHz	-140 dBm, -143 dBm (typ.)	-140 dBm, -143 dBm (typ.)
	600 MHz~1.8 GHz	-138 dBm, -141 dBm (typ.)	-138 dBm, -141 dBm (typ.)
	1.8 GHz~3.05 GHz	-134 dBm, -138 dBm(typ.)	-134 dBm, -138 dBm (typ.)
	3.05 GHz~3.65 GHz	-137 dBm, -141 dBm (typ.)	-137 dBm, -141 dBm (typ.)
	3.65 GHz~4.15 GHz		-137 dBm, -140 dBm (typ.)
	4.15 GHz~5.05 GHz		-135 dBm, -139 dBm (typ.)
	5.05 GHz~5.9 GHz		-135 dBm, -138 dBm (typ.)
	5.9 GHz~6.7 GHz		-136 dBm, -139 dBm (typ.)
	6.7 GHz~7.5 GHz		-134 dBm, -137 dBm (typ.)
Preamp on	100 kHz ~1 MHz	-132 dBm, -136 dBm (typ.)	-132 dBm, -136 dBm (typ.)
	1 MHz~10 MHz	-162 dBm, -165 dBm (typ.)	-162 dBm, -165 dBm (typ.)
	10 MHz~600 MHz	-159 dBm, -162 dBm (typ.)	-159 dBm, -162 dBm (typ.)
	600 MHz~1.8GHz	-158 dBm, -161 dBm (typ.)	-158 dBm, -161 dBm (typ.)
	1.8 GHz~3.05 GHz	-156 dBm, -160 dBm (typ.)	-156 dBm, -160 dBm (typ.)
	3.05 GHz~3.65 GHz	-158 dBm, -161 dBm (typ.)	-158 dBm, -161 dBm (typ.)
	3.65 GHz~4.15 GHz		-158 dBm, -160 dBm (typ.)
	4.15 GHz~5.05 GHz		-157 dBm, -160 dBm (typ.)
	5.05 GHz~5.9 GHz		-156 dBm, -159 dBm (typ.)
	5.9 GHz~6.7 GHz		-155 dBm, -158 dBm (typ.)
	6.7 GHz~7.5 GHz		-154 dBm, -156 dBm (typ.)

Frequency Response		
	20 °C to 30 °C, 30% to 70% relative humidity, att = 20 dB, relative to 50 MHz	
Preamp off	±0.8 dB, ±0.4 dB (typ.)	
Preamp on	±1.2 dB, ±0.6 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, att =0~50dB	
	± 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, fc≥1 MHz	
	1 MHz~3.05 GHz	1.7 (nom.)
	3.05 GHz~7.5 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	
	50 MHz~3.05 GHz	-65 dBc / +45 dBm (nom.)
	3.05 GHz~3.75 GHz	-80 dBc / +60 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	
	50 MHz~3.05 GHz	+9.5 dBm (typ.)
	3.05 GHz~7.5 GHz	+16 dBm (typ.)
1dB gain compression	20 °C to 30 °C, fc ≥ 50 MHz, two tones frequency interval ≥10MHz, RBW<1kHz,att = 0 dB, preamp off	
	> 8 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	

Source (SHA850-SOR)

Frequency Parameter		
	SHA851A	SHA852A
Frequency Range	100 kHz ~ 3.6 GHz	100 kHz ~ 7.5 GHz
Frequency resolution	1 Hz	
Source Type	CW，CW Offset	
Power Parameter		
Output level	-40 dBm ~ 0 dBm	
Output level resolution	1 dB	
Output flatness	±2 dB (nom.)	
Normalization Trace	Ref A/B/C/D-> Ref trace	
VSWR	< 2 (nom.)	
Connector and Impendence	N-type female, 50 Ω	
Average safe reverse power	Total 27 dBm (0.5 W)	
Maximum safe reverse level	±50 V DC	

Advanced Measurement Kit (SHA850-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	

Cable and Antenna Test

Measurement		
	SHA851A	SHA852A
Frequency Range	100 kHz~3.6 GHz	100 kHz~7.5 GHz
Sweep Points	101~10001, default 1001	
Port1 Stimulus Power	-40dBm ~ 0dBm (nom.)	
Maximum Distance (meters)	(Sweep Points - 1) x Velocity Factor x Light of Speed (m/s) / (Stop Frequency - Start Frequency (Hz))	
Resolution (meters)	Maximum Distance / Sweep Points	
Calibration	Open Response Short Response Response Through Full 1-Port(OSL)	
Velocity Factor	0.1~1	
Cable Loss	-10 dB/m ~ 100 dB/m	
Trace	Mem, Math, Hold, Display	
Meas Type	DTF, Return Loss, VSWR, Cable Loss(1-Port), Insertion Loss(2-Port), TDR, DTF & TDR, DTF & Return Loss, TDR & Return Loss	
Distance to Fault(DTF)	Locate problems or faults in a length of cable or transmission line	
	Format: Log Mag(dB), VSWR, Lin Mag Distance Unit: Meters, Feet Window Type: Rectangular, Hamming	
Time Domain Reflectometry (TDR)	Locate problems and identify the type of problem in a length of cable or transmission line.	
	Format: Impedance(ohm), linear rho Distance Unit: as DTF Stimulus Type: Impulse, Step Frequency Type: Low-pass Window Type: Kaiser Kaiser β : 0~13 Time Gate Type: Band Pass, Notch Time Gate Shape: Normal, Maximum, Wide, Minimum Time Gate Range: Start Distance ~ Stop Distance	
Cable Loss(1-Port)	Measure the accumulated losses throughout the length of the cable	
Insertion Loss(2-Port)	Measure the loss through a DUT or cable over a specified frequency range	

Vector Network Analyzer (SHA850-VNA)

Stimulus and Measurement				
		SHA851A		SHA852A
Frequency Range		100 kHz ~ 3.6 GHz		100 kHz ~ 7.5 GHz
Measurement		S11, S21		
IFBW		10 kHz		
Port1 Stimulus Power		-40dBm ~ 0dBm (nom)		
Format		Lin Mag, Log Mag, Phase, Group Delay, SWR, Smith Chart (Lin/Phase, Log/Phase, Real/Imag, R+j*X, G+j*B), Polar Chart (Lin/Phase, Log/Phase, Real/Imag)		
Sweep Points		101~10001, default 1001		
Trace		4 traces, Mem, Math, Hold, Overlay		
Marker		(6+Ref)* 4 traces		
Calibration				
Directivity of Calibration		F504ME, Log mag, Average=50, >50MHz		
		> 40 dB		
Dynamic Range		S21, IFBW=10 kHz, Port1 level=0 dBm, Log Mag, Average=50		
	100 kHz ~ 1 MHz	102 dB, 108 dB (typ.)		102 dB, 108 dB (typ.)
	1 MHz ~ 1.5 GHz	109 dB, 114 dB (typ.)		109 dB, 114 dB (typ.)
	1.5 GHz ~ 3.6 GHz	107 dB, 112 dB (typ.)		107 dB, 112 dB (typ.)
	3.6 GHz ~ 6.5 GHz			105 dB, 109 dB (typ.)
	6.5 GHz ~ 7.5 GHz			102 dB, 107 dB (typ.)
Reflection trace noise (IFBW=10 kHz)		frequency	amplitude（dB rms）	phase（deg rms）
		100 kHz~3.5 GHz	0.02	0.3
		3.5 GHz~6.5 GHz	0.03	0.5
		6.5 GHz~7.5 GHz	0.06	1.1
Transmission trace Noise (IFBW=10 kHz)		frequency	amplitude（dB rms）	phase（deg rms）
		100 kHz~3.5 GHz	0.015	0.18
		3.5 GHz~7.5 GHz	0.015	0.40
Calibration Type		Short Response		
		Open Response		
		Full 1-Port(OSL)		
		Response Through		
		Enhanced Response		
Port Extensions		Port 1, Port 2, Auto Open Port 1		
System Z0		50 Ω		
Velocity Factor		0.1~1		

Analog Modulation Analysis (SHA850-AMA)

Common Parameter		
	SHA851A	SHA852A
Carrier Frequency Range	2 MHz ~ 3.6 GHz	2 MHz ~ 7.5 GHz
Carrier Power Accuracy	±2 dB (nom.)	
Carrier Power Range	-30 dBm to +20 dBm (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.)	
PM		
Modulation rate range	50 Hz~50 kHz	
Accuracy	1 Hz(nom.)	Modulation rate < 1 kHz
	< 0.1% modulation rate (nom.)	Modulation rate ≥ 1 kHz
Frequency deviation	0.2~100 rad	
Accuracy	±4%(nom.)	

Digital Modulation Analysis (SHA850-DMA)

Common Parameter		
	SHA851A	SHA852A
Frequency Range	2 MHz ~ 3.6 GHz	2 MHz ~ 7.5 GHz
Carrier Power Accuracy	± 2 dB (nom.)	
Carrier Power Range	-30 dBm to +20 dBm (nom.)	
Measurement		
Modulation Type	ASK: 2ASK; FSK: 2FSK, 4FSK, 8FSK, 16FSK; 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 5 Msps, Symbol Rate* Points/Symbol ≤20 Msps	
Trigger Holdoff	500 ms	
Burst	Burst power sync, BERT	
Filter		
Meas/Ref Filter	Nyquist, Sqrt 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, IQ Mag Err, IQ Phase Err Symbol Error Chart, Err Vector Time, Err Vector Spectrum,	
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.)
Source, Port 1	N-type female, 50 Ω (nom.)
USB Host	USB-A plug, version 2.0
Ear Phone Jack	3.5 mm
USB Device	USB-C plug, version 2.0
LAN	LAN (VXI11), 10/100 Base,RJ-45
GPS Antenna (GPS Receiver)	SMA(F), 3.3V, 50Ω
Bias out (SHA850-BIAS)	SMB(F), 12V-32V，0.1V step
10 MHz reference input	10 MHz, -5 to +10 dBm, BNC-type female, 50 Ω (nom.)
External trigger input	1 KΩ, 5V TTL level, BNC-type female
Remote Control	
Communication Interface	LAN, USB-TMC,GPIB (USB-GPIB adaptor)
Remote Control Capability	SCPI / Labview / IVI based on USB-TMC / VXI-11 / GPIB / Socket / Telnet NI-MAX Web Browser (HTML 5 Supported);

General Specification

Structure	
Dimensions	310 mm × 215 mm × 78.5 mm (W×H×D)
Weight	Net: 3.20 kg (7.0 lb)
Display	TFT LCD, 800 × 600, 8.4 inch multi-touch screen
Storage	Internal (Flash) 3.2 GByte, external (USB storage device) 32 GByte
Working Environment	
Source	AC voltage range: 100-240 V, 50/60 Hz or 100-120 V, 400 Hz;
Power consumption	20 W (typ.)
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
Altitude	Operating: less than 3 km (10000 feet)
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
Safety	
CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11 CAN/CSA-C22.2 No. 61010-2-030:2018 UL 61010-1:2012/R:2018-11 UL 61010-2-030:2018	
RoHS	
2011/65/EU	

Ordering Information

Product	Description	Order Number
Product Code	Spectrum & Vector Network Analyzer, 9 kHz~3.6 GHz	SHA851A
	Spectrum & Vector Network Analyzer, 9 kHz~7.5 GHz	SHA852A
Standard Accessories	Quick Start, USB type-C cable, Power cord, AC-DC adapter, Rechargeable lithium battery, Portable bag	
Options	SHA851A to SHA852A	SHA850-F2
	Source	SHA850-SOR
	Vector Network Analysis	SHA850-VNA
	Advanced Measurement Kit	SHA850-AMK
	Analog Modulation Analysis	SHA850-AMA
	Digital Modulation Analysis	SHA850-DMA
	DC Bias Out	SHA850-BIAS
	GPS Receiver	SHA850-GPS
	GPS Logging(need GPS Receiver)	SHA850-GPSM
General Accessories	Rechargeable lithium battery	SHA800-BAT
	AC-DC adapter	SHA800-AP
	Portable bag	SHA800-BG
	GPS antenna, SMA(M), 100cm	ANT-GPS1
	S5000 Directional Antenna Suit: S5001-VHF(10 MHz~200 MHz), S5001-UHF(200 MHz~500 MHz), S5001-LP(500 MHz~8 GHz), Preamp(10 dB, 9 kHz~8 GHz)	ANT-DA1
	Near field probe kit：300 kHz~3 GHz, H-field probes(20 mm,10 mm,5 mm), E-field probe(5 mm)	SRF5030T
	Utility Kit: N(M)-SMA(M) cable(6 GHz), N(M)-N(M) cable(6 GHz), N(M)-BNC(F) adaptor x2, N(M)-SMA(F) adaptor x2, 10 dB 1W attenuator	UKitSSA3X
	N(M)-BNC(M) cable, DC~2 GHz, 700 mm	N-BNC-2L
	N(M)-SMA(M) cable, DC~6 GHz, 700 mm	N-SMA-6L
	N(M)-N(M) cable, DC~6 GHz, 700 mm	N-N-6L
	N(M)-N(M) cable ,DC~18 GHz，1000 mm	N-N-18L
	N(M)-SMA(M) cable ,DC~18 GHz，1000 mm	N-SMA-18L
	SMA(M)-SMA(M) cable ,DC~18 GHz，1000 mm	SMA-SMA-18L
CAT&VNA Accessories	N type Integrated Calibration Kit, Male, DC~9GHz,50 Ω	Y504MS
	N type Integrated Calibration Kit, Female, DC~9GHz,50 Ω	Y504FS
	N type Precision Calibration Kit, DC~9GHz, 50 Ω	F504TS
	3.5mm type Precision Calibration Kit, DC~9GHz, 50 Ω	F604TS