

SIGLENT SHN900A Series Vector Network Analyzer Owner's Manual


SHN900A Series
Vector Network
Analyzer
Data Sheet
EN01A











SIGLENT TECHNOLOGIES CO.,LTD


General Description


The SIGLENT SHN900A series of Vector Network Analyzers have a frequency range of 30 kHz to 26.5 GHz, which support 2-port scattering parameter, differential-parameter, and time-domain parameter measurements. The SHN900A series of VNAs are effective instrumentation for determining the Q-factor, bandwidth, and insertion loss of a filter, They feature impedance conversion, movement of measurement plane, limit testing, ripple test, fixture simulation, and adapter removal/insertion adjustments. The VNAs have five sweep types: Linear-Frequency mode, Log-Frequency mode, Power-Sweep mode, CW-Time mode, and Segment-Sweep mode. The SHN900A series VNAs also support scattering-parameter correction of SOLT, SOLR, TRL, Response, and Enhanced Response for increased flexibility in R&D and manufacturing applications.


Key Features

-  Frequency range: 30 kHz – 26.5 GHz
-  Frequency resolution: 1 Hz
-  Level resolution: 0.01 dB
-  Range of IFBW: 10 Hz~3 MHz
-  Setting range of output level:
-  -45 dBm ~ +10 dBm
-  Dynamic range: 110 dB(Typ.)


 Types of calibration: Response calibration, Enhanced Response calibration, Full-one port calibration, Full-two port calibration, TRL calibration

 Types of measurement: Scattering-parameter measurement, differential-parameter measurement, receiver measurement, time-domain parameter analysis, limit test, ripple test, impedance conversion, fixture simulation, adapter removal/insertion, spectrum analysis frequency offset, scalar mixer measurement, pulse measurement

 Internal Bias-Tee connections

 Support GPS, Time and Location Information Saving

 Interface: LAN, USB Device, USB Host (USB-GPIB)

 Remote control: SCPI/ Labview/ IVI based on USB-TMC / VXI-11 / Socket /Telnet / WebServer

 8.4-inch touch screen, Mouse, Keyboard

Models and Key Specifications

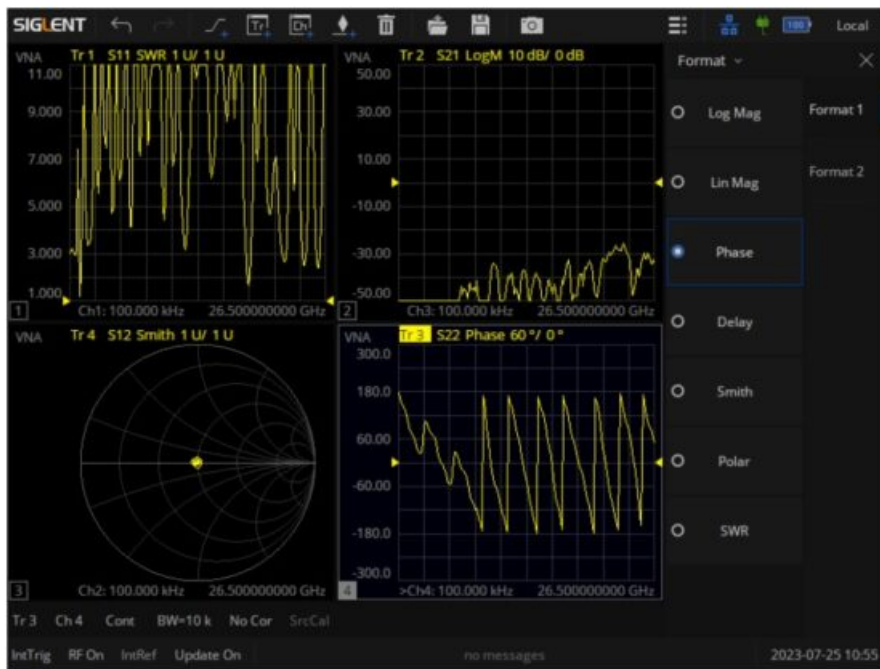
Model	SHN914A	SHN920A	SHN926A
Frequency range	30kHz-14GHz	30kHz-20GHz	30kHz-26.5GHz
Ports	2		
Frequency resolution	1 Hz		
Level resolution	0.01 dB		
Range of IFBW	10 Hz~3 MHz		
Setting range of output level	-45 dBm ~ +10 dBm		
Dynamic range	110 dB(Typ.)		
Types of calibration	Response calibration, Enhanced Response calibration, Full-one port calibration, Full-two port calibration, TRL calibration		
Types of measurement	Scattering-parameter measurement, differential-parameter measurement, receiver measurement, time-domain parameter analysis, limit test, ripple test, impedance conversion, fixture simulation, adapter removal/insertion, enhanced time-domain parameter analysis (TDR), spectrum analysis, frequency offset, scalar mixer measurement, pulse measurement		
Bias-Tees	Support		
Interface	LAN, USB Device, USB Host(USB-GPIB)		
Remote control	SCPI/ Labview/ IVI based on USB-TMC/ VXI-11/ Socket/ Telnet/ WebServer		
Display	8.4-inch touch screen		
GPS	Support		

Design Features

Multi-window display:



Multi-format display:



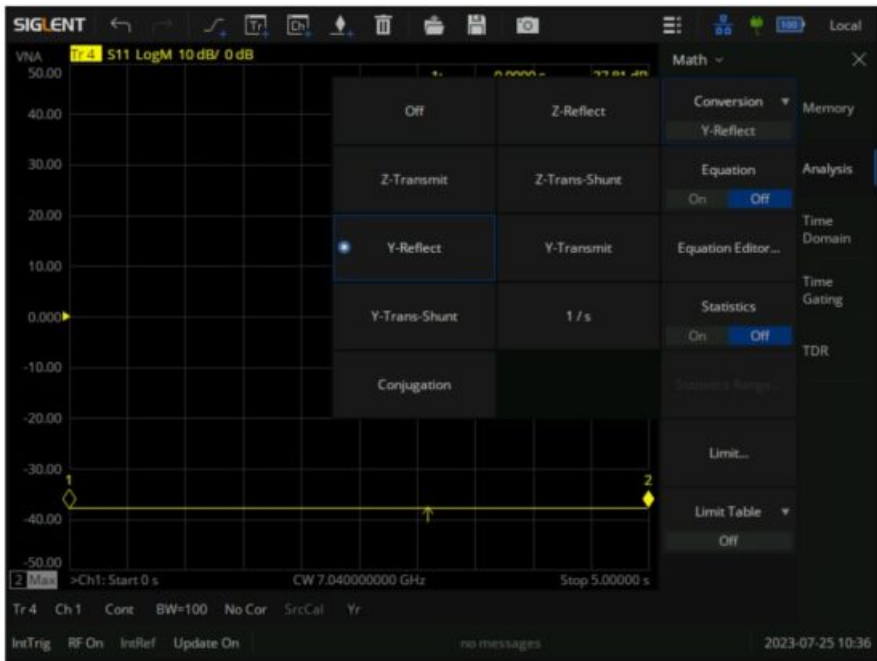
Display and compare memory and current data:



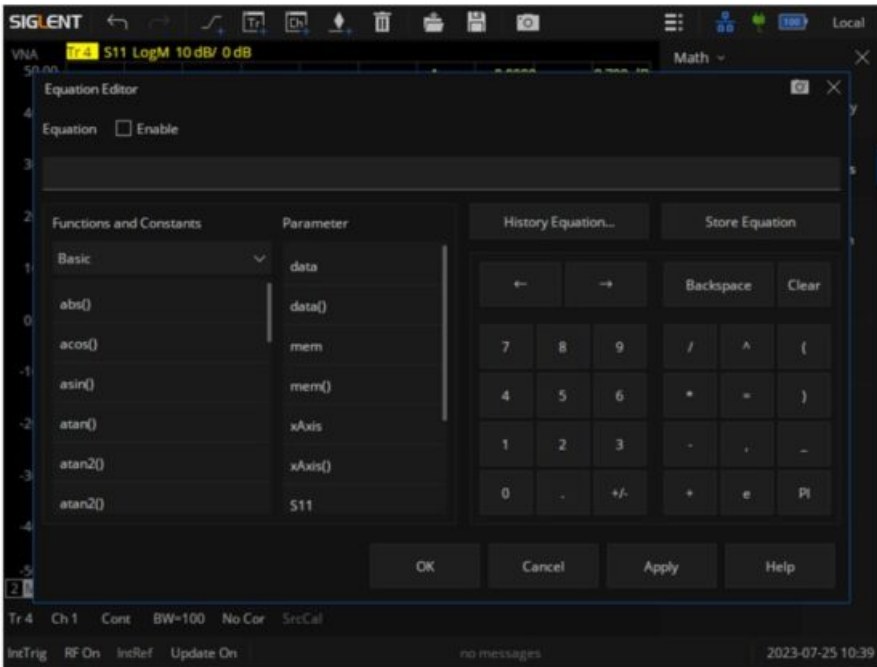
Display data hold:



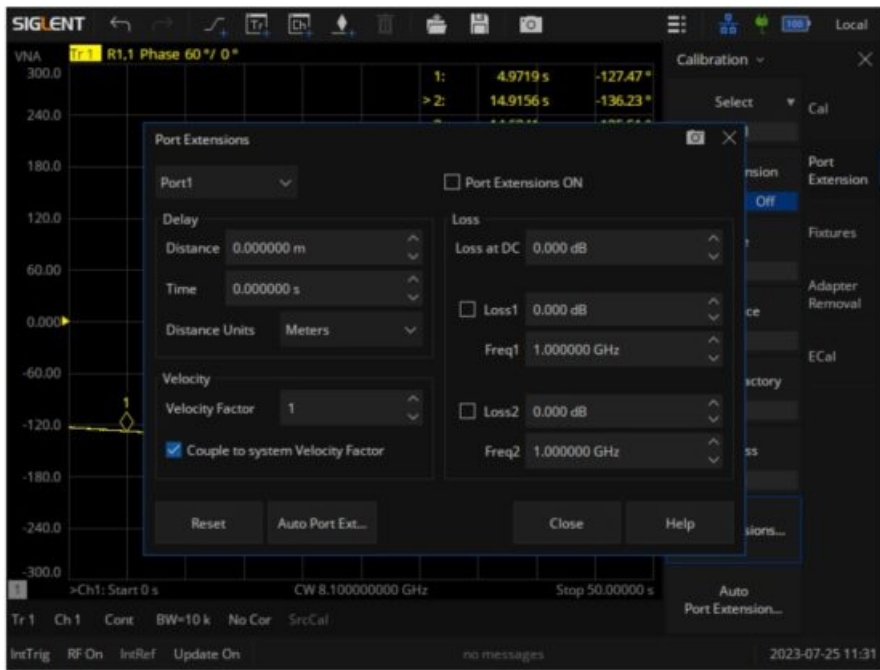
Impedance conversion:



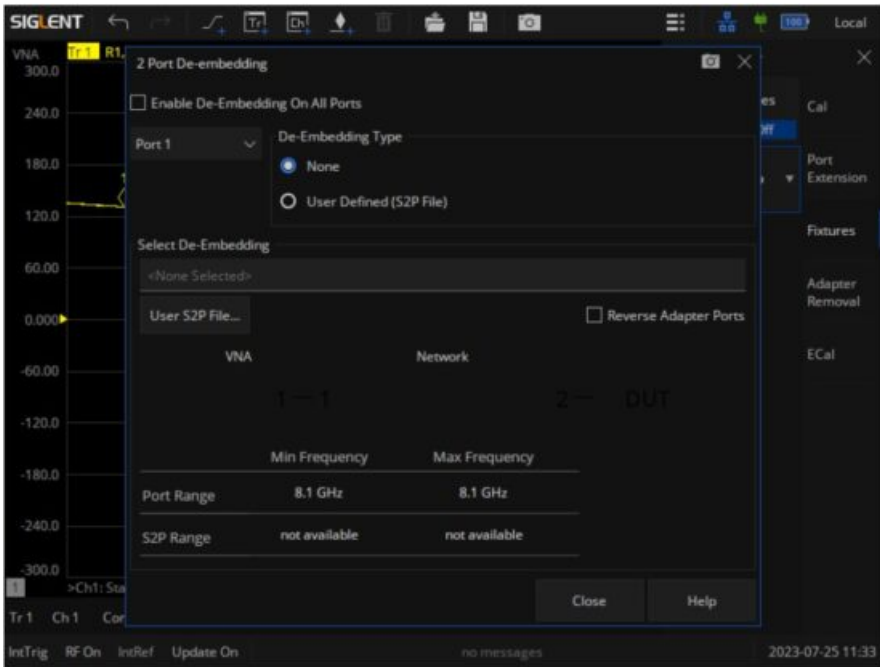
Equation Editor:



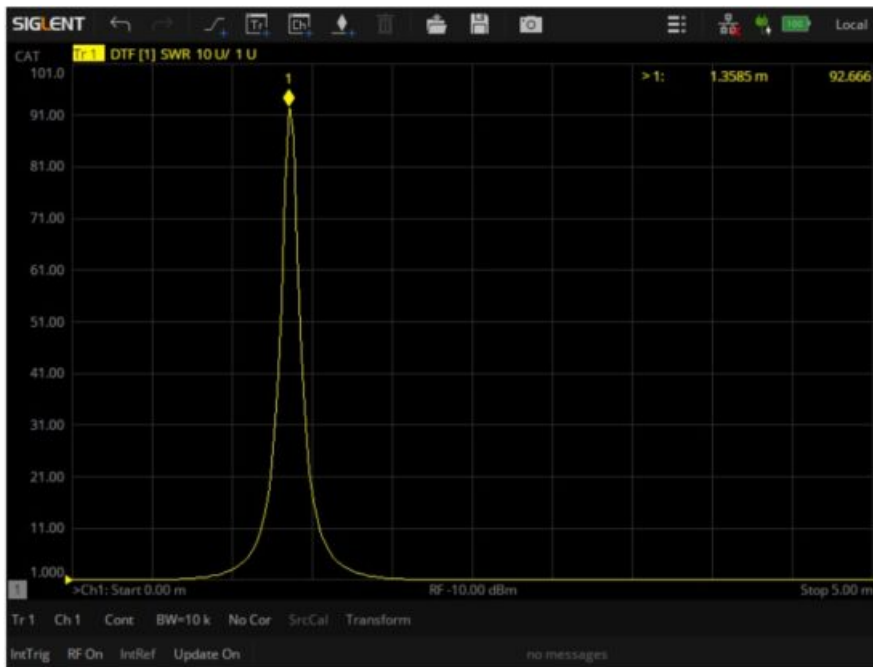
Port Extensions:



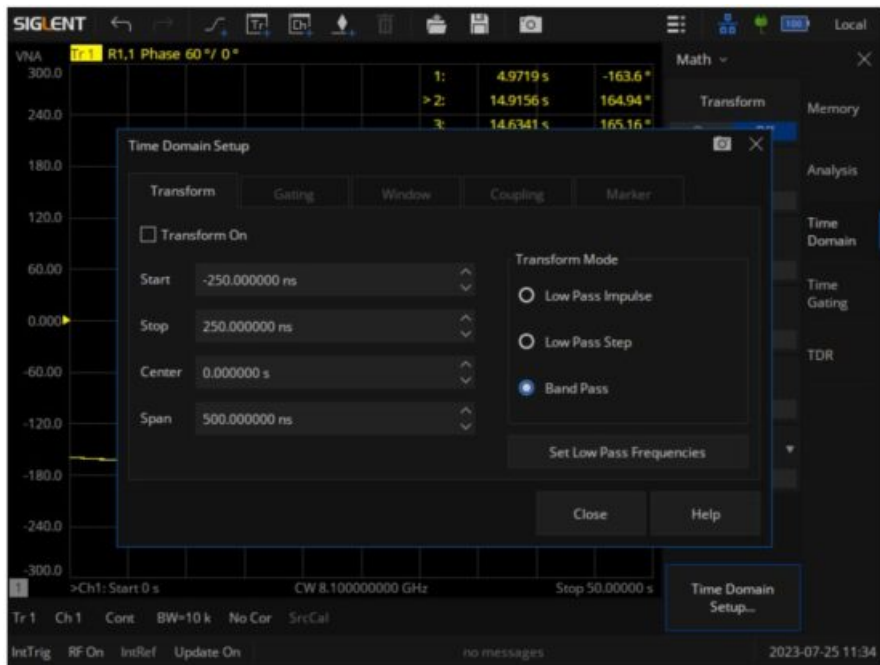
Embedding and De-Embedding:



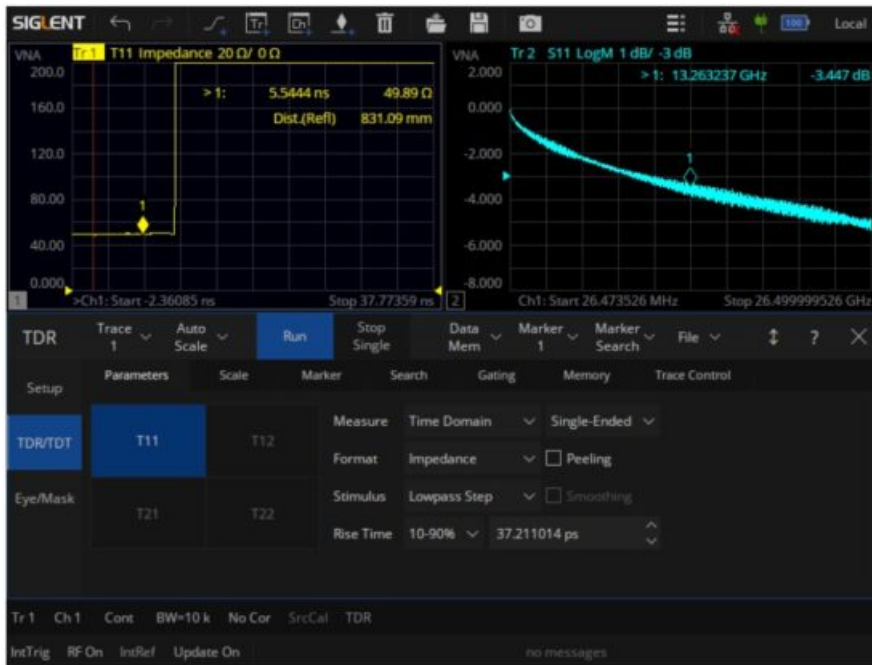
CAT



Time-Domain analysis



Enhanced Time-Domain analysis(TDR)



Spectrum analysis



Definitions

Specifications are valid under the following conditions: The instrument is within the calibration period, has been stored between 0 and 40°C for at least 2 hours before use, and has been powered on and warmed up for at least 90 minutes. The specifications include the measurement uncertainty unless otherwise noted.

Specifications: All products are guaranteed to meet published specifications 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: This value indicates the expected mean or average performance, or an attribute whose performance is by design, such as the 50 Ohm connector.

Specifications

Dynamic range

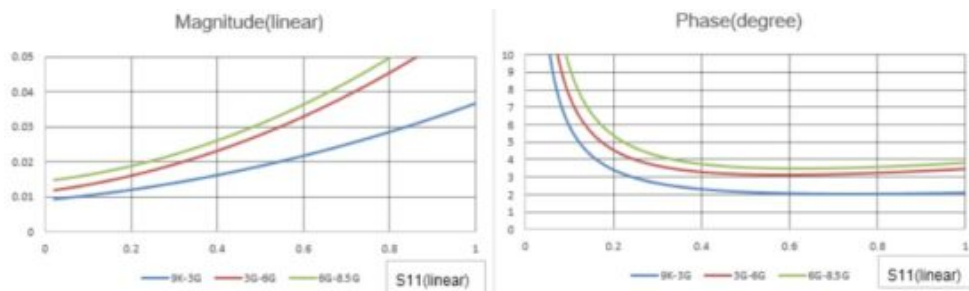
Frequency range	IFBW	Specification(dB)	Typical(dB)
30 kHz – 1 MHz	10Hz	90	100
1 MHz – 6 GHz		100	110
6 GHz – 8 GHz		80	110
8 GHz – 14 GHz		100	105
14 GHz – 24 GHz		100	105
24 GHz – 26.5 GHz		95	100

Corrected system performance with calibration kit

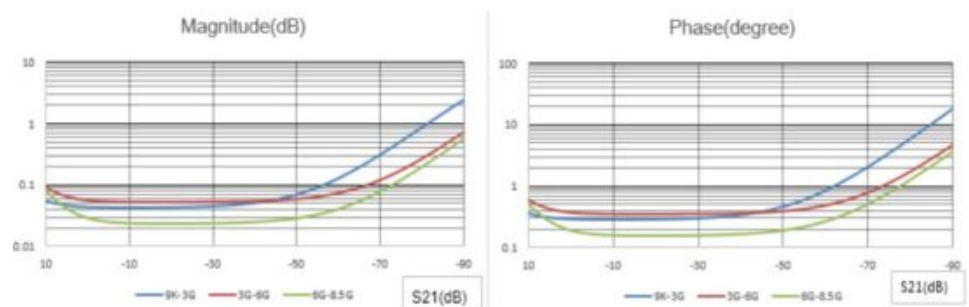
User correction: On, system correction: On; Corrected system performance with Keysight 85052D 3.5mm calibration kit, isolation calibration performed. IFBW is 10 Hz, no averaging applied to data, and environmental temperature is 25°C ($\pm 5^\circ\text{C}$), with $< 1^\circ\text{C}$ deviation from calibration temperature.

Specification (dB)	30kHz-3 GHz	3GHz-6 GHz	6GHz-14 GHz	9 GHz-20GHz	14GHz-26.5GHz
Directivity	41	39	37	37	37
Source match	36	30	29	29	29
Load match	41	37	35	35	35
Reflect tracking	± 0.004	± 0.003	± 0.004	± 0.004	± 0.004
Transmission tracking	± 0.06	± 0.09	± 0.11	± 0.11	± 0.11

Reflection uncertainty (Specification, Power: -10 dBm, IFBW:10 Hz):



Transmission uncertainty (Specification, Power: -10 dBm, IFBW:10 Hz):



Uncorrected system performance

User correction: Off, system correction: On; IFBW is 10 Hz, no averaging applied to data.

Specification (dB)	30kHz – 300kHz	300kHz – 1 GHz	1GHz-6 GHz	6 GHz-26.5GHz
Directivity	15	15	16	16
Source match	11	16	16	18
Load match	5	5	10	7
Reflect tracking	±1.4	±1.4	±1	±1
Transmission tracking	±1.4	±1.4	±1	±1

Test port output (Source)

 Test port output frequency

Description

Specification

Frequency range

SHN914A	30 kHz to 14 GHz
SHN920A	30 kHz to 20 GHz
SHN926A	30 kHz to 26.5 GHz
Frequency resolution	1 Hz

CW accuracy

Standard	± 1.0 ppm (23 ± 3°C)
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Source stability

Standard	± 1.0 ppm (0 to 40°C) ± 0.5 ppm/year, ± 3.0 ppm/20 year
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 Test port output power

Description**Specification**

Preset power

-10 dBm

Level accuracy

 ± 1.5 dB@-10 dBm 30kHz ~ 20GHz
 ± 2.5 dB@-10 dBm 20GHz ~ 26.5GHz**Level linearity**

30 kHz – 100 kHz

 ± 1 dB (-20 dBm to -11 dBm)

100 kHz – 25 MHz

 ± 1 dB (-20 dBm to 0 dBm)

25 MHz – 20 GHz

 ± 1 dB (-20 dBm to -1 dBm)

20 GHz – 26.5 GHz

 ± 2 dB (-20 dBm to -8 dBm)**Range**

30 kHz – 100 kHz

-45 dBm to -11 dBm

100 kHz – 25 MHz

-45 dBm to -5 dBm

25 MHz – 20 GHz

-45 dBm to -1 dBm

20 GHz – 26.5 GHz

-45 dBm to -8 dBm

Sweep range

30 kHz – 100 kHz

-45 dBm to -11 dBm

100 kHz – 25 MHz

-45 dBm to -5 dBm

25 MHz – 20 GHz

-45 dBm to -1 dBm

20 GHz – 26.5 GHz

-45 dBm to -8 dBm

Max leveled power

30 kHz – 100 kHz

-11 dBm (Typ.)

100 kHz – 25 MHz

-4 dBm (Typ.)

25 MHz – 100 MHz

0 dBm (Typ.)

100 MHz – 6 GHz

2 dBm (Typ.)

6 GHz – 8 GHz	0 dBm (Typ.)
8 GHz – 14 GHz	2 dBm (Typ.)
14GHz – 20 GHz	0 dBm (Typ.)
20 GHz – 26.5 GHz	-6 dBm (Typ.)
Level resolution	0.05 dB

 **Test port output signal purity**

Description	Specification
2nd or 3rd harmonics (0 dBm)	
100 kHz to 25 MHz	< -10 dBc
25 MHz to 8 GHz	< -10 dBc
9 GHz to 26.5 GHz	< -10 dBc
Non-harmonic spurious (0 dBm)	< -20 dBc

Test port input

 **Test port input levels**

Description	Specification	Typical
Max input level		
30 kHz-14 GHz	+10 dBm	
14 GHz-26.5 GHz	+10 dBm	
Damage input level		
30 kHz-26.5 GHz	+27 dBm (RF) or 35 V (DC)	
Precision		
30 kHz -1 GHz	±1.5 dB@-15 dBm	±0.2 dB@-15 dBm
1 GHz – 20 GHz	±2.0 dB@-15 dBm	±0.2 dB@-15 dBm
20 GHz – 26.5 GHz	±2.5 dB@-15 dBm	±0.5 dB@-15 dBm
Crosstalk		
30 kHz -100 kHz	-95 dB	-105 dB
100 kHz – 6 GHz	-75 dB	-120 dB
6 GHz – 9 GHz	-80 dB	-105 dB
9 GHz – 20 GHz	-95 dB	-105 dB
20 GHz – 26.5 GHz	-60 dB	-70 dB
Noise floor		
30 kHz – 50 kHz	-70 dBm/Hz	-80 dBm/Hz
50 kHz – 200 kHz	-90 dBm/Hz	-110 dBm/Hz
200 kHz – 6.2 GHz	-100 dBm/Hz	-120 dBm/Hz
6.2 GHz – 9 GHz	-90 dBm/Hz	-100 dBm/Hz
9 GHz – 22 GHz	-100 dBm/Hz	-115 dBm/Hz

22 GHz – 26.5 GHz	-80 dBm/Hz	-110 dBm/Hz
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Compression level(+10 dBm)

Magnitude

30 kHz- 26.5 GHz	1 dB
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Phase

30 kHz- 26.5 GHz	5 deg
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Trace noise

Description	Specification	Typical
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Note:Setting max output power

Transmission trace noise magnitude

30 kHz- 50 kHz (IFBW=30 Hz)	0.003 dB rms	0.0015 dB rms
50 kHz- 1 MHz (IFBW=30 Hz)	0.003 dB rms	0.0015 dB rms
1 MHz- 9 GHz (IFBW=10 kHz)	0.003 dB rms	0.0015 dB rms
9 GHz-14 GHz (IFBW=10 kHz)	0.005 dB rms	0.0025 dB rms
14GHz-26.5 GHz (IFBW=10 kHz)	0.005 dB rms	0.0025 dB rms

Reflection trace noise magnitude

30 kHz- 50 kHz (IFBW=30 Hz)	0.003 dB rms	0.0005 dB rms
50 kHz- 1 MHz (IFBW=30 Hz)	0.003 dB rms	0.0007 dB rms
1 MHz- 9 GHz (IFBW=10 kHz)	0.003 dB rms	0.0015 dB rms
9 GHz-14 GHz (IFBW=10 kHz)	0.004 dB rms	0.002 dB rms
14GHz-26.5 GHz (IFBW=10 kHz)	0.004 dB rms	0.002 dB rms

Transmission trace noise phase

30 kHz- 50 kHz (IFBW=30 Hz)	0.03 deg rms	0.015 deg rms
50 kHz- 1 MHz (IFBW=30 Hz)	0.03 deg rms	0.015 deg rms
1 MHz- 9 GHz (IFBW=10 kHz)	0.04 deg rms	0.004 deg rms
9 GHz-14 GHz (IFBW=10 kHz)	0.04 deg rms	0.004 deg rms

14GHz-26.5 GHz (IFBW=10 kHz)	0.06 deg rms	0.006 deg rms
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Reflection trace noise phase

30 kHz- 50 kHz (IFBW=30 Hz)	0.03 deg rms	0.015 deg rms
50 kHz- 1 MHz (IFBW=30 Hz)	0.03 deg rms	0.015 deg rms
1 MHz- 9 GHz (IFBW=10 kHz)	0.04 deg rms	0.004 deg rms
9 GHz-14 GHz (IFBW=10 kHz)	0.04 deg rms	0.004 deg rms
14GHz-26.5 GHz (IFBW=10 kHz)	0.06 deg rms	0.006deg rms

 **Stability**

Description	Specification	Typical
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Magnitude

30 kHz- 9 GHz		± 0.01 dB/°C
9 GHz- 26.5 GHz		± 0.05 dB/°C

Phase

30 kHz- 9 GHz		± 0.1 deg/°C
9 GHz- 26.5 GHz		± 0.3 deg/°C

 **Dynamic accuracy**

Description	Specification
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Relative to -10 dBm input power

Magnitude

-10 dBm	± 0.5 dB
-30 dBm	± 0.5 dB
-55 dBm	± 2.5 dB

Phase

-10 dBm	± 4.5 deg
-30 dBm	± 5 deg
-55 dBm	± 16.5 deg

SA Mode

Description	Specification	Typical
Power Range	-70dBm – +15dBm	
Noise Floor	110 dBm/Hz – 130dBm/Hz	130dBm/Hz
Phase Noise	$\leq -98\text{dBc/Hz}$ (1GHz@100kHz)	
Max Input Level Without Damaged	27dBm	
Residual Response	$\leq -80\text{dBm}$	-100dBm

CAT Mode

Description	Specification
DTF	Range: Velocity Factor \times Light Velocity \times (Points Number- 1)/BW \times 2 Resolution: Range/(Points Number- 1)
Return Loss Range(dB)	-6k dB – +6k dB
VSWR Resolution	1mdB – 1k dB
VSWR Range	1.001 – 1G
VSWR Resolution	0.001

Sweep time

Start frequency: 30 kHz, Stop frequency: 14 GHz; IFBW: 500 kHz

Points	201	401	1601	6401
2-port cal	28 ms	28 ms	75 ms	300 ms

Start frequency: 30 kHz, Stop frequency: 14 GHz; IFBW: 100 kHz.

Points	201	401	1601	6401
2-port cal	30 ms	30 ms	85 ms	340 ms

Start frequency: 30 kHz, Stop frequency: 14 GHz; IFBW: 10 kHz.

Points	201	401	1601	6401
2-port cal	60 ms	70 ms	350 ms	1400 ms

Start frequency: 30 kHz, Stop frequency: 14 GHz; IFBW: 1 kHz.

Points	201	401	1601	6401
2-port cal	300 ms	500 ms	2500 ms	10000 ms

Start frequency: 30 kHz, Stop frequency: 26.5 GHz; IFBW: 500 kHz.

Points	201	401	1601	6401
2-port cal	28 ms	28 ms	75 ms	300 ms

Start frequency: 30 kHz, Stop frequency: 26.5 GHz; IFBW: 100 kHz.

Points	201	401	1601	6401
2-port cal	30 ms	30 ms	85 ms	340 ms

Start frequency: 30 kHz, Stop frequency: 26.5 GHz; IFBW: 10 kHz.

Points	201	401	1601	6401
2-port cal	60 ms	70 ms	350 ms	1400 ms

Start frequency: 30 kHz, Stop frequency: 26.5 GHz; IFBW: 1 kHz.

Points	201	401	1601	6401
2-port cal	300 ms	500 ms	2500 ms	10000 ms

General information

Description

Characteristics

Operating environment

Temperature	0 to 40 °C
Humidity	85%: 40 °C, 24 hours
Altitude	0 to 3000 m

Non-operating storage environment

Temperature	-20 °C to 70 °C
Humidity	85%: 65 °C, 24 hours
Altitude	0 to 15000 m
Size	W×H×D=310 mm × 215 mm × 78.5 mm
Weight	3.2 kg

EMC

Conducted disturbance: CISPR 11/EN 55011	CLASS A group 1, 150 kHz – 30 MHz
Radiated disturbance: CISPR 11/EN 55011	CLASS A group 1, 30 MHz -1 GHz
Electrostatic discharge(ESD): IEC61000-4-2/EN61000-4-2	4.0 kV (contact), 8.0 kV (air)
Radio-frequency electromagnetic field Immunity: IEC 61000-4-3/EN 61000-4-3	10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 2 GHz); 1 V/m (2.0 GHz to 2.7 GHz)
Electrical fast transients (EFT): IEC 61000-4-4/EN 61000-4-4	2 kV (AC power ports)
Surges: IEC 61000-4-5/EN 61000-4-5	1 kV (Line to line) ; 2 kV (Line to ground)
Radio-frequency continuous conducted Immunity: IEC 61000-4-6/EN 61000-4-6	3 V, 0.15-80 MHz
Voltage dips and interruptions: IEC 61000-4-11/EN 61000-4-11	Voltage dips: 0% UT during 1 cycle; 40% UT during 10/12 cycles; 70% UT during 25/30 cycles; Voltage interruptions: 0% UT during 250 cycles

Safety

UL 61010-1:2012/R: 2018-11; CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11. UL 61010-2-030:2018; CAN/CSA-C22.2 No. 61010-2-030:2018.

Panel information

Top Panel

RF connectors	3.5mm NMD (male), 50Ω
USB Host	USB-A 2.0
USB Device	USB-C 2.0
LAN	LAN (VXI11), 10/100 Base, RJ-45
GPS Antenna	SMA Female, 3.3V, 50Ω
Bias Out	SMB Female, 12V-32V, step 0.1V
External Trigger Input	1 kΩ, 5V TTL, BNC Female
10M Reference Input	10 MHz, -5 dBm~+10 dBm, BNC Female, 50Ω

Remote control

Hardware connectors	LAN, USB-TMC, GPIB (USB-GPIB adaptor)
Remote control interfaces	SCPI/ Labview/ IVI based on USB-TMC/ VXI-11/ GPIB/ Socket/Telnet NI-MAX Web Browser (HTML 5 Supported)

Ordering Information

Items	Description	Order number
Products	2 ports, 14G Vector Network Analyzer	SHN914A
	2 ports, 20G Vector Network Analyzer	SHN920A
	2 ports, 26.5G Vector Network Analyzer	SHN926A
standard fittings	Quick Start, USB Type C Line, Rechargeable lithium battery, AC-DC adapter, Portable bag	
TDA Option	Time Domain Analysis	SHN900-TDA
TDR Option	Enhanced Time Domain Analysis	SHN900-TDR
SA Option	Spectrum analysis	SHN900-SA
	3.5mm, Male, 50Ω Calibration Kit, 0-4.5GHz	F603ME
	3.5mm, Female, 50Ω Calibration Kit, 0-4.5GHz	F603FE
	3.5mm, Male, 50Ω Calibration Kit, 0-9GHz	F604MS

3.5mm, Female, 50Ω Calibration Kit, 0-9GHz	F604FS
3.5mm, Male and Female, 50Ω Calibration Kit, 0-9GHz	F604TS
3.5mm, Male and Female, 50Ω Calibration Kit, 0-26.5GHz	F606TS
Electronic Calibration Kit	SEM5000A
RF Test Demo Board	SNA-TB01
Adjustable Differential TDR probe DC-18 GHz	ADP-18
Adjustable Differential TDR probe DC-26.5 GHz	ADP-26
Adjustable Differential TDR probe DC-18 GHz	ASP-18
Adjustable Differential TDR probe DC-26.5 GHz	ASP-26
SMA(M)-SMA(M) cable DC-18 GHz, 1000 mm	SMA-SMA-18L
SMA(M)-SMA(M) cable DC-26.5 GHz, 1000 mm	SMA-SMA-26L
SMA(F)-SMA(M) cable DC-26.5 GHz, 1000 mm	SMAF-SMA-26L
NMD 3.5 female-NMD 3.5 Male DC-26.5 GHz, 635 mm	V26-N35MN35F-25IN
NMD 3.5 female-APC 3.5 female DC-26.5 GHz, 635 mm	V26-N35FA35F-25IN
USB-GPIB Adaptor	USB-GPIB
GPS antenna, SMA(M), 1000 mm	ANT-GPS1

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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, isolated handheld oscilloscopes, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope 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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