

# SNA5000A Series Vector Network Analyzer



DS09050\_E04B



**CALTRON PTE LTD**














**SIGLENT TECHNOLOGIES CO.,LTD**

# SNA5000A

## 1 General Description

The SIGLENT SNA5000A series of Vector Network Analyzers have a frequency range of 9 kHz to 8.5 GHz and 100 kHz to 26.5 GHz, which support 2/4-port scattering parameter, differential-parameter, and time-domain parameter measurements. The SNA5000A 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 SNA5000A series VNAs also support scattering-parameter correction of SOLT, SOLR, TRL, Response, and Enhanced Response for increased flexibility in R&D and manufacturing applications.

## 2 Features

-  Frequency range: 9 kHz - 8.5 GHz and 100 kHz - 26.5 GHz
-  Frequency resolution: 1 Hz
-  Level resolution: 0.05 dB
-  Range of IFBW: 1 Hz~10 MHz
-  Setting range of output level: -55 dBm ~ +10 dBm
-  Dynamic range: 125 dB
-  Types of calibration: Response calibration, Enhanced Response calibration, Full-one port calibration, Full-two port calibration, Full-three port calibration, Full-four 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, Material Measurement, Gain Compression measurement, Vector mixer measurement
-  Internal Bias-Tee connections
-  Interface: LAN, USB Device, USB Host (USB-GPIB)
-  Remote control: SCPI/ Labview/ IVI based on USB-TMC / VXI-11 / Socket /Telnet / WebServer
-  12.1-inch touch screen
-  Video output: HDMI

### 3 Models and key specifications

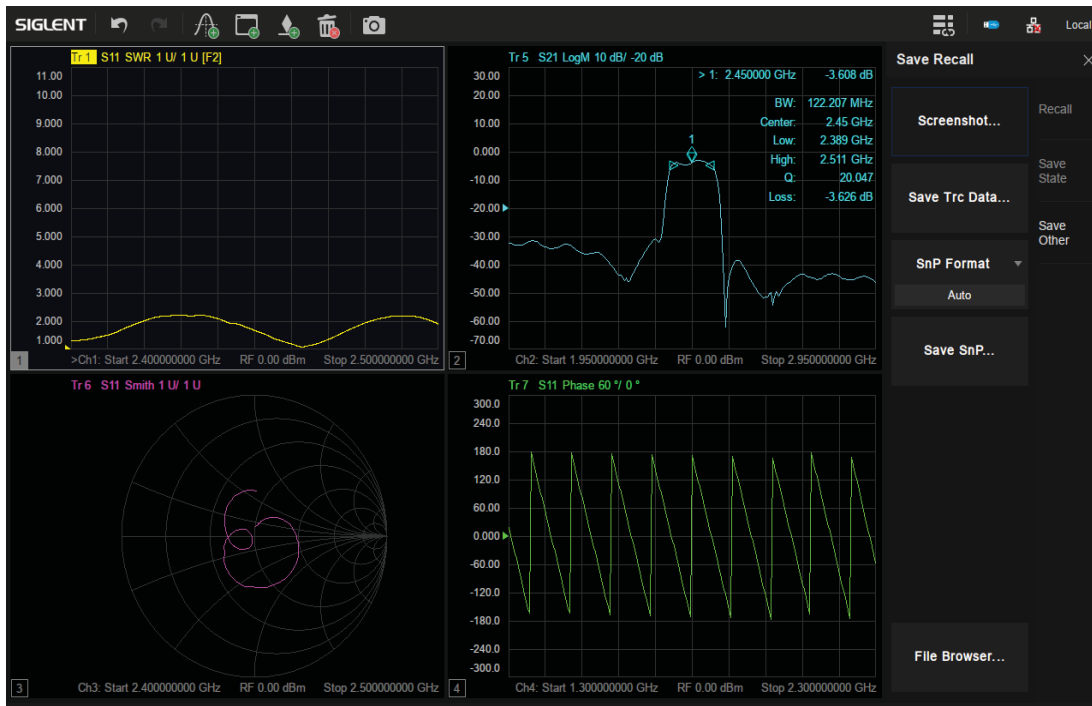
Model	SNA5002A/ SNA5004A	SNA5012A/ SNA5014A	SNA5022A	SNA5032A
Frequency range	9kHz-4.5GHz	9kHz-8.5GHz	100kHz-13.5GHz	100kHz-26.5GHz
Ports	2/4	2/4	2	2
Frequency resolution	1 Hz			
Level resolution	0.05 dB			
Range of IFBW	1 Hz~10 MHz			
Number of points	2 to 20,001			
Setting range of output level	-55 dBm ~ +10 dBm			
Dynamic range	125 dB			
Types of calibration	Response calibration, Enhanced Response calibration, Full-one port calibration, Full-two port calibration, Full-three port calibration, Full-four 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, Material Measurement, Gain Compression measurement, Vector mixer 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	12.1-inch touch screen			
Video output	HDMI			

## 4 Design Features

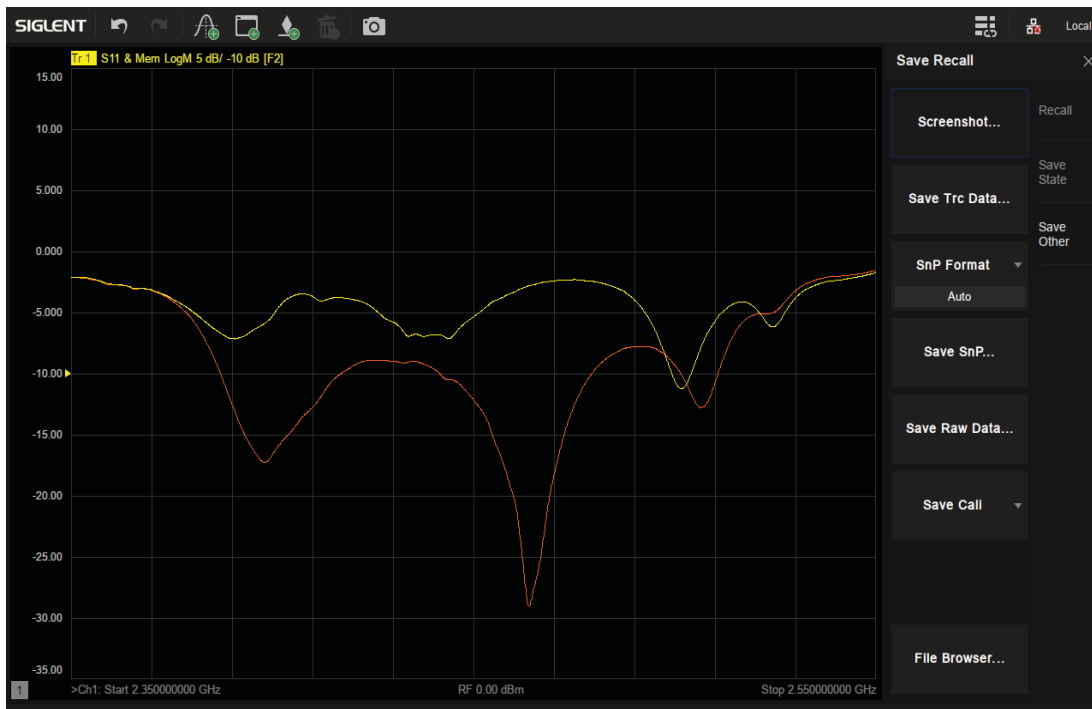
Multi-window display:



Multi-format display:



Display and compare memory and current data:



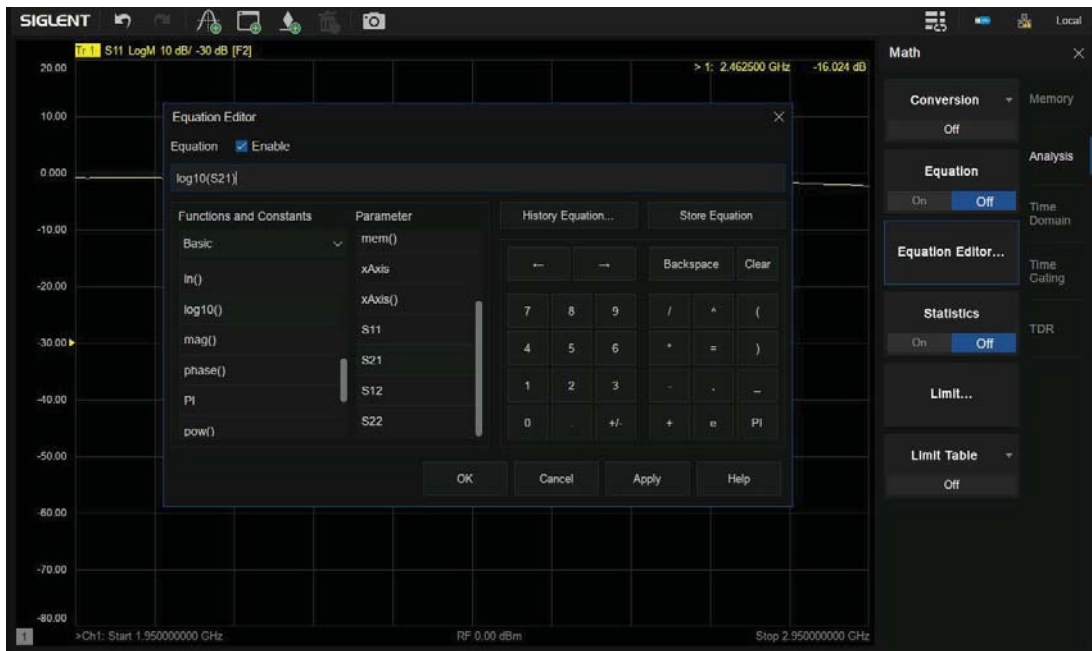
Display data hold:



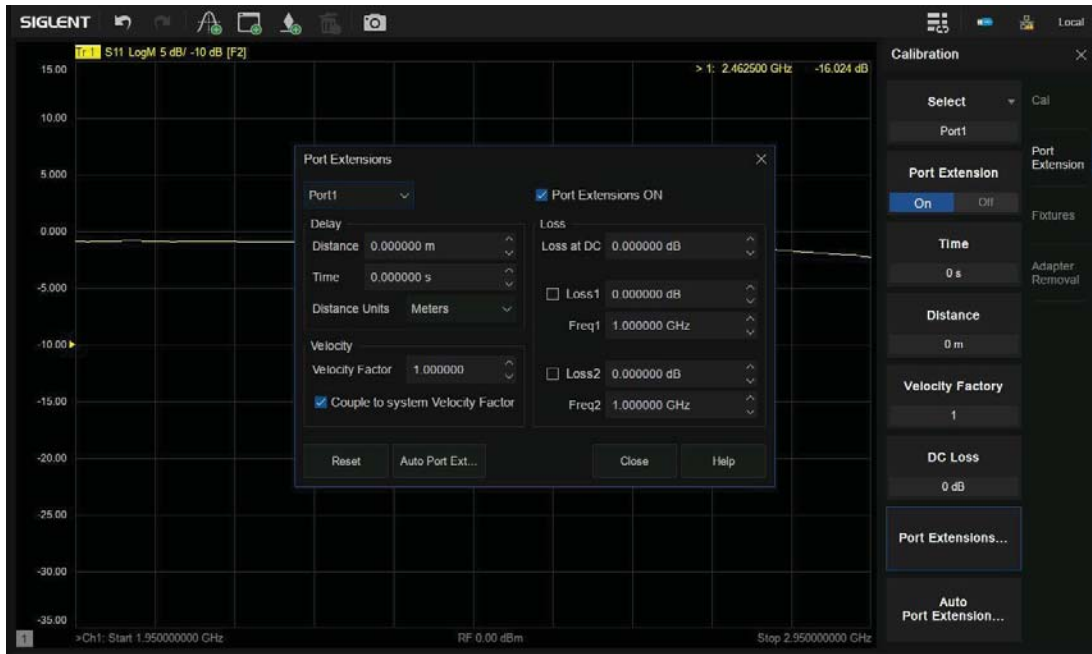
Impedance conversion:



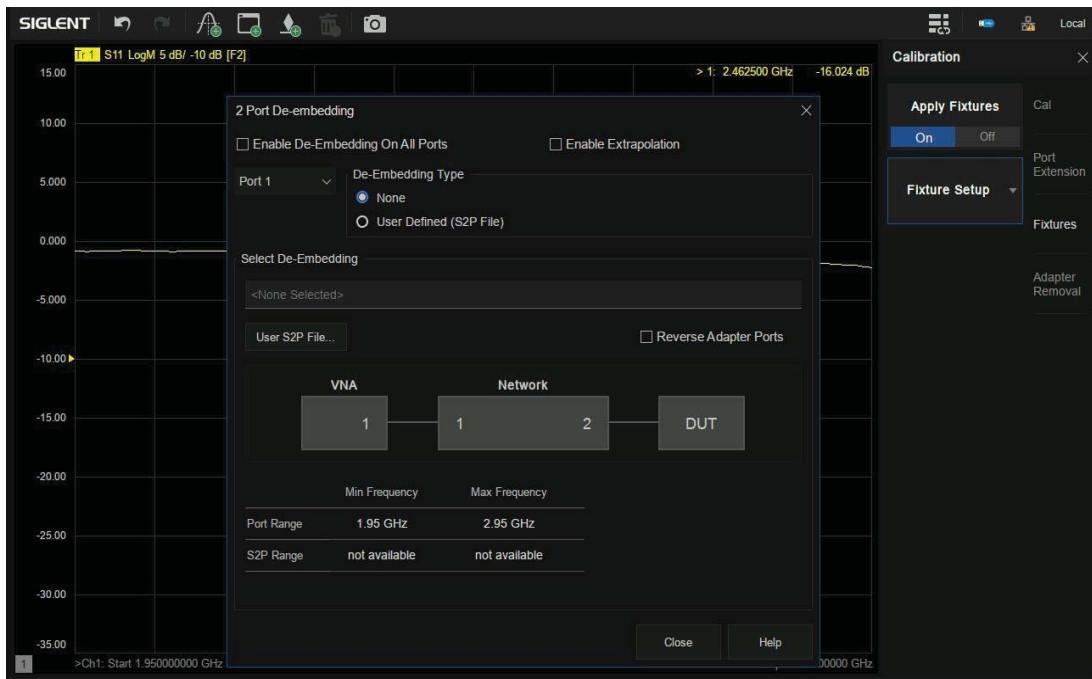
Equation Editor:



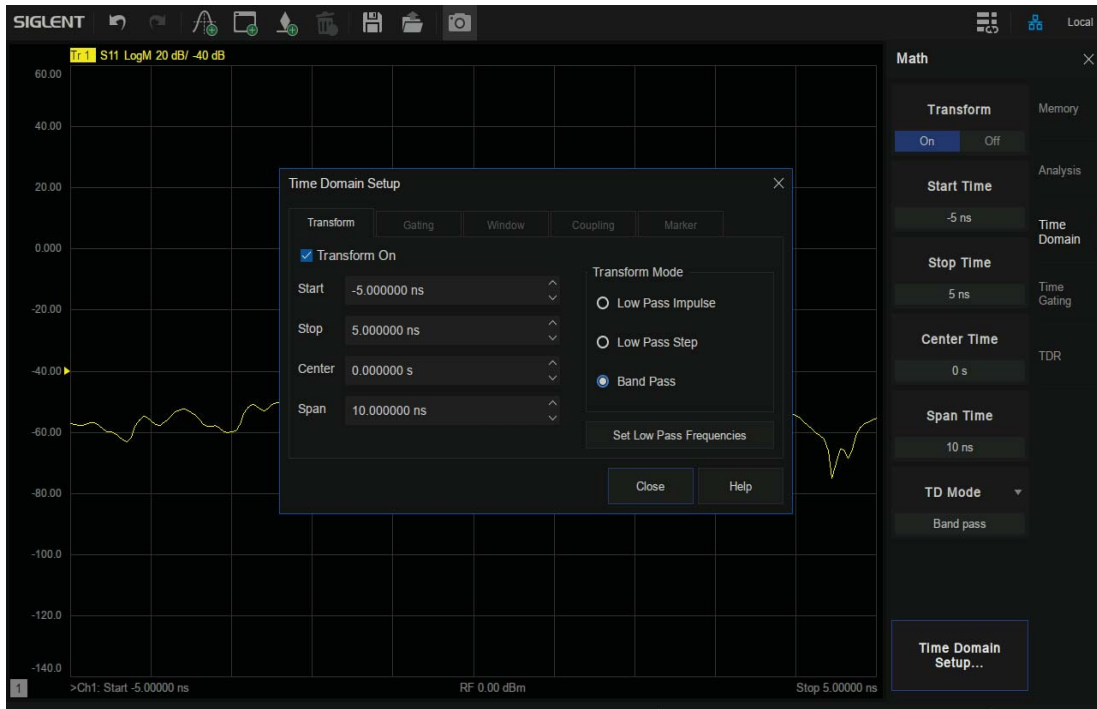
Port Extensions:



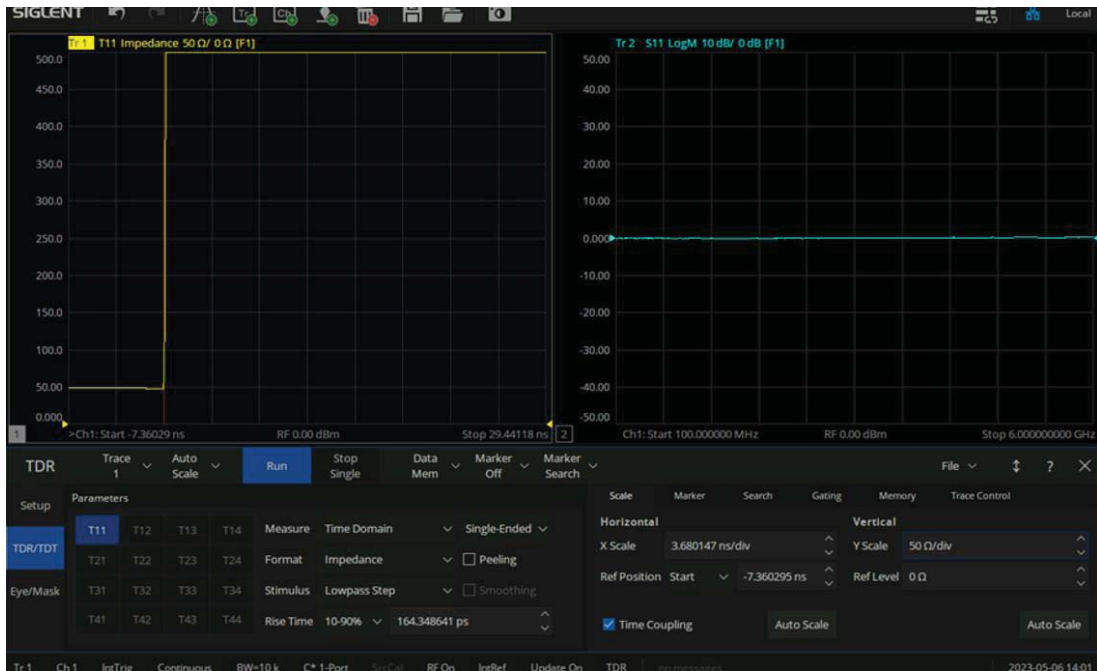
Embedding and De-Embedding:



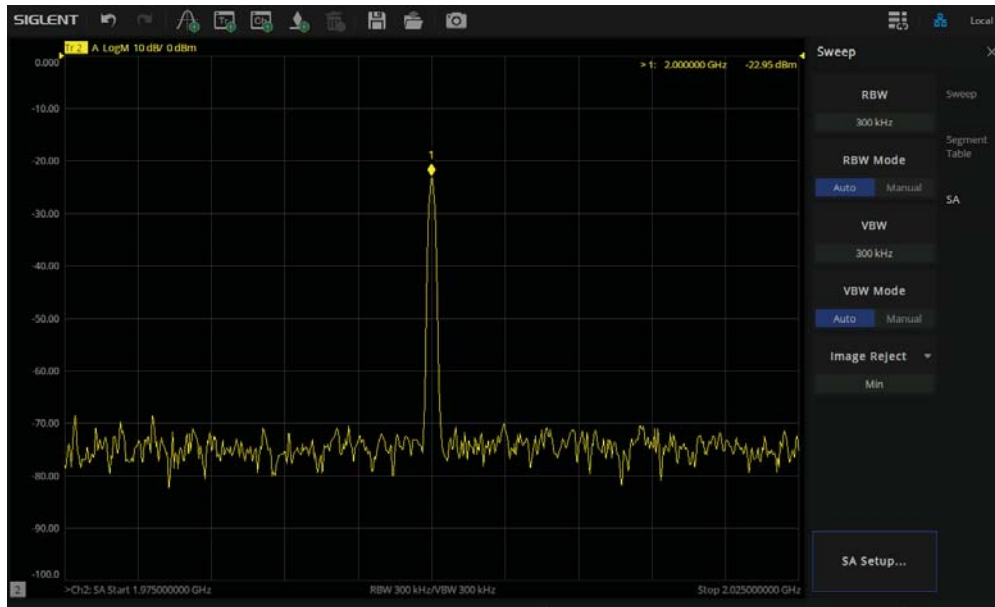
Time-Domain analysis



Enhanced Time-Domain analysis(TDR)



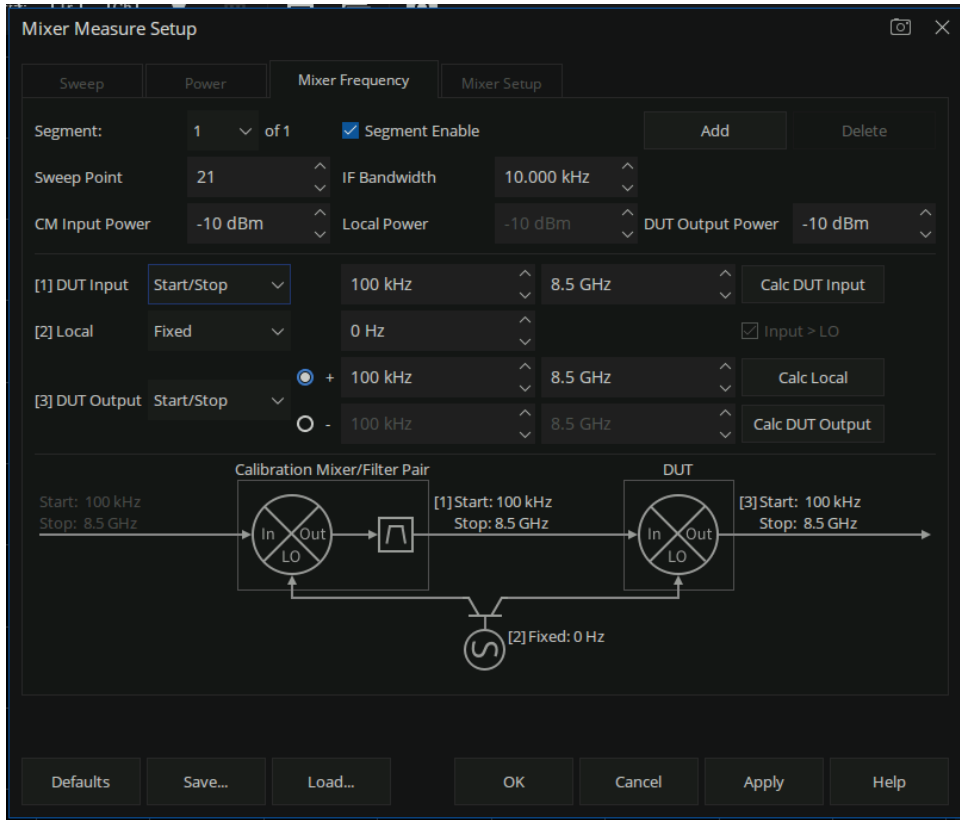
## Spectrum analysis



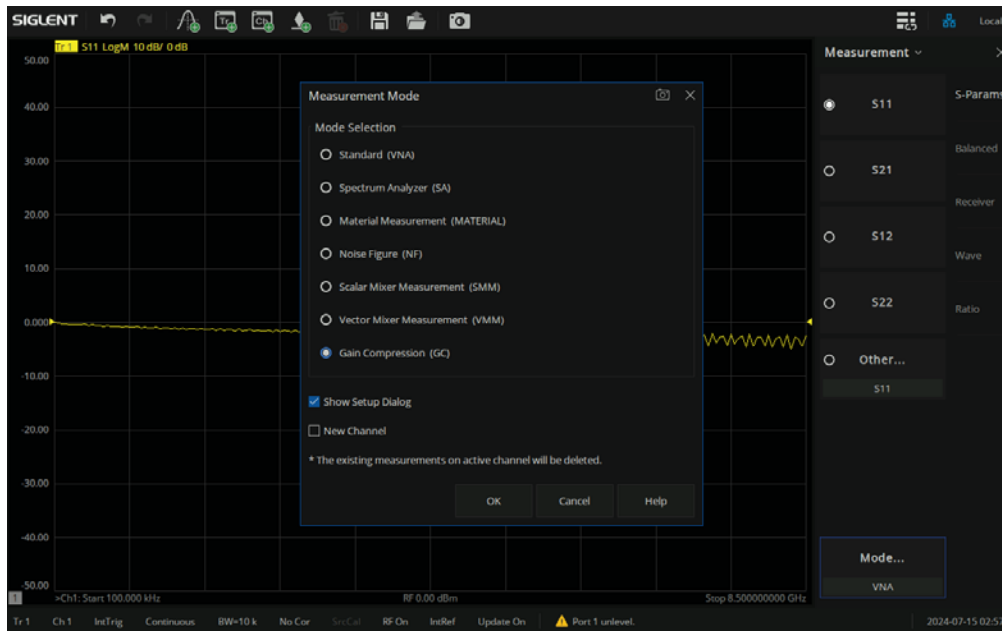
## Scalar mixer measurement

The screenshot shows the 'Mixer Measure Setup' dialog box with a dark theme. It has four tabs: 'Sweep', 'Power', 'Mixer Frequency', and 'Mixer Setup', with 'Mixer Setup' currently selected. The 'Local Power On (All Channels)' checkbox is checked. There is an 'External Source...' button. The 'Local: Not Controlled' section includes a 'Power Level' dropdown set to '-10 dBm'. Below this are 'Swept Power' settings with 'Start' and 'Stop' dropdowns both set to '-10 dBm' and a 'Step' dropdown set to '0 dBm'. The 'Converter Model' section features a block diagram with 'Port 1' on the left and 'Port 2' on the right. The diagram consists of a multiplier block (X) with a gain of 1, followed by a circled multiplier block (⊗), and then another multiplier block (X) with a gain of 1. Below the second multiplier block is a 'Local: Not Controlled' dropdown. At the bottom of the dialog are buttons for 'Defaults', 'Save...', 'Load...', 'OK', 'Cancel', 'Apply', and 'Help'.

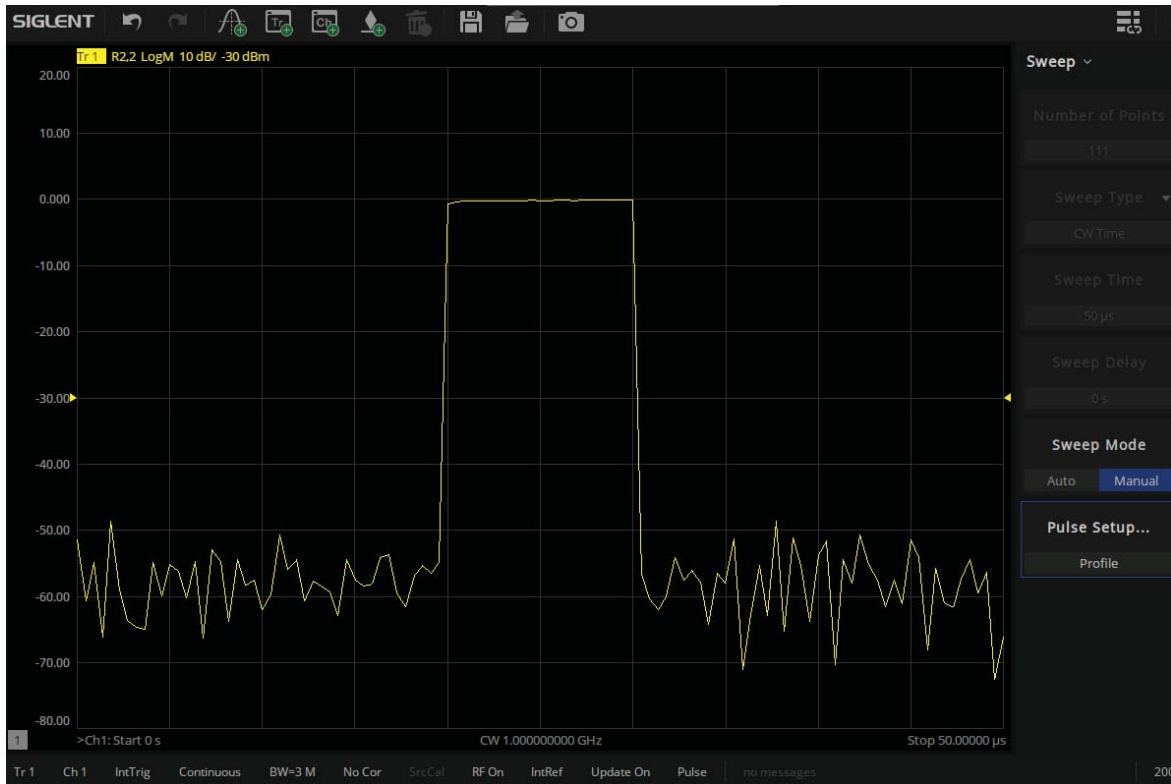
Vector mixer measurement



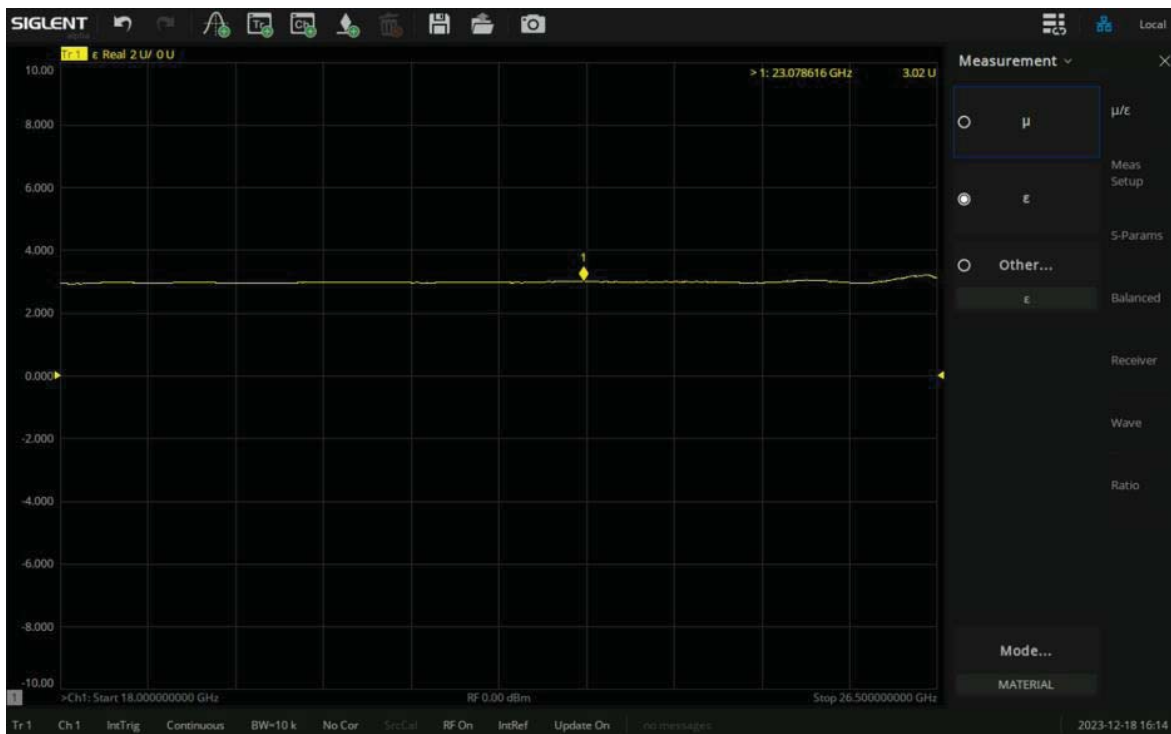
Gain Compression measurement



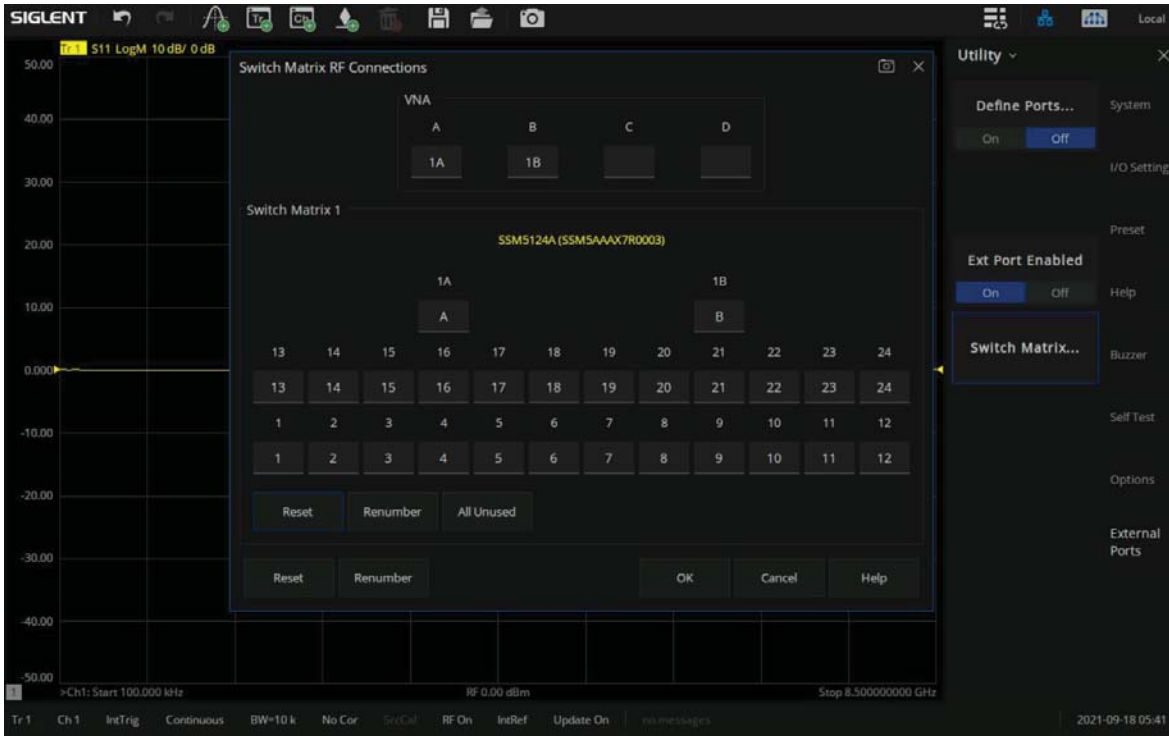
## Pulse Modulation



## Material Measurement



Switch matrix measurement



## 5 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(Spec.):** All products are guaranteed to meet published specifications at room temperature (approximately 25°C), unless otherwise noted.

**Typical(Typ.):** 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.

## 6 Specifications

### 6.1 Dynamic range

#### SNA5002A/SNA5012A/SNA5004A/SNA5014A

Frequency range	IFBW	Specification(dB)	Typical (dB)
9 kHz-18 kHz	10Hz	85	102
18 kHz-30 kHz		90	105
30 kHz-100 kHz		95	107
100 kHz-300 kHz		105	117
300 kHz-500 kHz		120	130
500 kHz-1 MHz		125	136
1 MHz-5 GHz		125	140
5 GHz-6.8 GHz		123	133
6.8 GHz-7.7 GHz		120	130
7.7 GHz-8 GHz		119	129
8 GHz -8.5 GHz		117	127

#### SNA5022A/SNA5032A

Frequency range	IFBW	Specification(dB)	Typical (dB)
100 kHz-10 MHz	10Hz	115	125
10 MHz-3 GHz		125	135
3 GHz-9 GHz		125	135
9 GHz-13.5 GHz		118	125
13.5 GHz-20 GHz		115	125
20 GHz-26.5 GHz		110	120

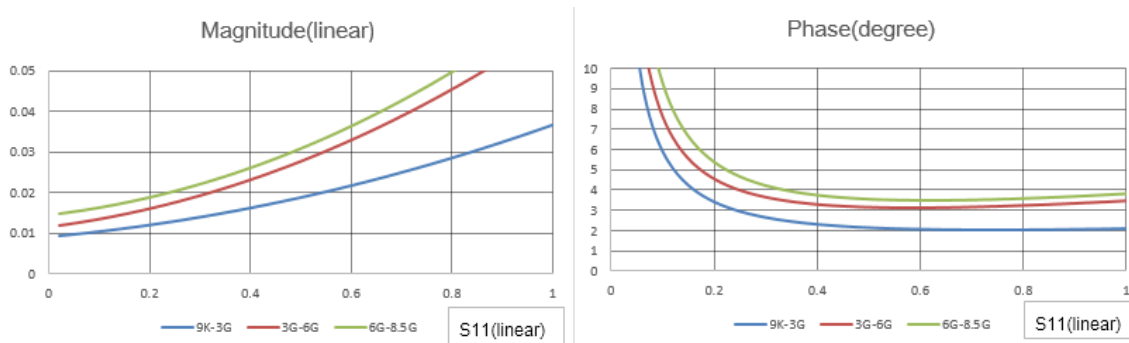
## 6.2 Corrected system performance with calibration kit

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.

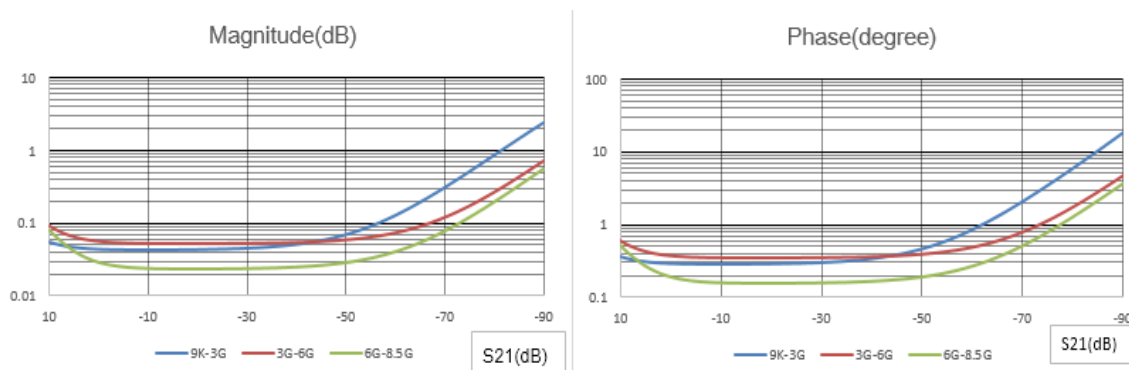
SNA5002A/SNA5012A/SNA5004A/SNA5014A

Specification (dB)	9 kHz-3 GHz	3 GHz-6 GHz	6 GHz-8.5 GHz
Directivity	41	39	37
Source match	36	30	29
Load match	41	37	35
Reflect tracking	$\pm 0.004$	$\pm 0.003$	$\pm 0.004$
Transmission tracking	$\pm 0.06$	$\pm 0.09$	$\pm 0.11$

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



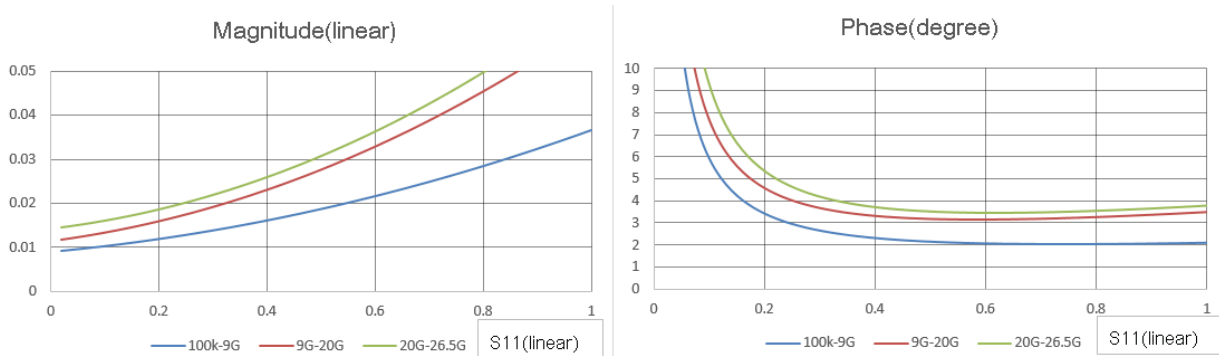
Transmission uncertainty (Specification, Power: -10 dBm, IFBW:10 Hz):



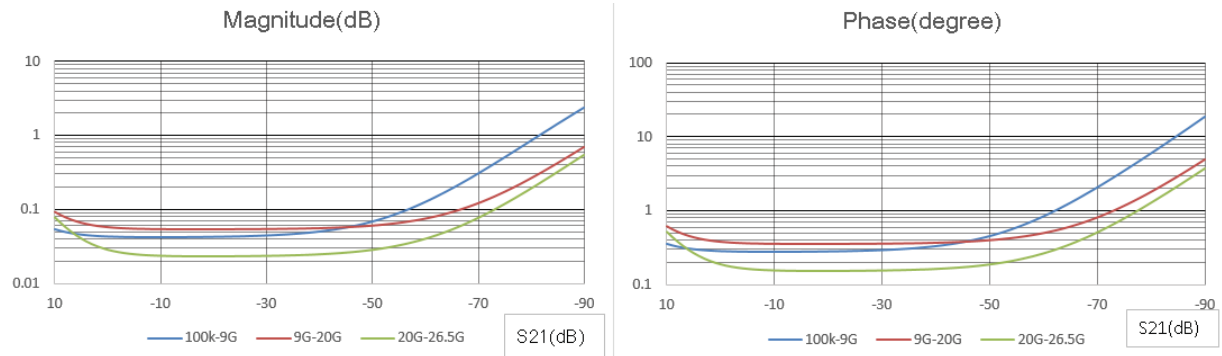
SNA5022A/SNA5032A

Specification (dB)	100 kHz-9 GHz	9 GHz-20 GHz	20 GHz-26.5 GHz
Directivity	40	36	35
Source match	35	29	27
Load match	39	36	33
Reflect tracking	±0.004	±0.003	±0.01
Transmission tracking	±0.06	±0.09	±0.5

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



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



### 6.3 Uncorrected system performance

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

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Specification (dB)	9 kHz-30 MHz	30 MHz-3 GHz	3 GHz-6 GHz	6 GHz-8.5 GHz
Directivity	22	22	20	16
Source match	22	22	20	16

Load match	6	12	11	10
Reflect tracking	±1.0	±1.0	±1.0	±1.0
Transmission tracking	±1.0	±1.0	±1.0	±1.0

SNA5022A/SNA5032A

Specification (dB)	100 KHz-1 GHz	1 GHz-9 GHz	9 GHz-20 GHz	20 GHz-26.5 GHz
Directivity	20	20	16	13
Source match	20	20	16	13
Load match	8	11	7	7
Reflect tracking	±1.4	±1.4	±1.0	±1.0
Transmission tracking	±1.4	±1.4	±1.0	±1.0

## 6.4 Test port output (Source)

### 6.4.1 Test port output frequency

Description	Specification
<b>Frequency range</b>	
SNA5002A, SNA5004A	9 kHz to 4.5 GHz
SNA5012A, SNA5014A	9 kHz to 8.5 GHz
SNA5022A	100 kHz to 13.5 GHz
SNA5032A	100 kHz to 26.5 GHz
<b>Frequency resolution<sup>1</sup></b>	
9 KHz – 3.8 GHz	1 Hz
3.8 GHz – 7.8 GHz	2 Hz
7.8 GHz – 13.5 GHz	4 Hz
13.5 GHz – 26.5 GHz	8 Hz
<b>CW accuracy</b>	
Standard	± 1.0 ppm (23 ± 3°C )
Option: SNA5000-HPR	± 0.1 ppm (23 ± 3°C )
<b>Source stability</b>	
Standard	± 1.0 ppm (0 to 40°C ) ± 0.5 ppm/year, ± 3.0 ppm/20 year
Option: SNA5000-HPR	± 1 ppb (0 to 40°C ) ± 50 ppb/year

<sup>1</sup> Firmware revision V2.13 or later is required.

## 6.4.2 Test port output power

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Description	Specification	Typical
Preset power	0 dBm	
Level accuracy	$\pm 1.5$ dB@0 dBm <sup>1</sup>	
<b>Level linearity</b>		
9 kHz- 18 kHz	$\pm 0.75$ dB(-20 dBm to -5 dBm)	
18 kHz- 30 kHz	$\pm 0.75$ dB(-20 dBm to 0 dBm)	
30 kHz- 70 kHz	$\pm 0.75$ dB(-20 dBm to 2 dBm)	
70 kHz- 100 kHz	$\pm 0.75$ dB(-20 dBm to 5 dBm)	
100 kHz- 300 kHz	$\pm 0.75$ dB(-20 dBm to 7 dBm)	
300 kHz- 4.5 GHz	$\pm 0.75$ dB(-20 dBm to 10 dBm)	
4.5 GHz- 6.8 GHz	$\pm 0.75$ dB(-20 dBm to 8 dBm)	
6.8 GHz- 7.7 GHz	$\pm 0.75$ dB(-20 dBm to 5 dBm)	
7.7 GHz- 8 GHz	$\pm 0.75$ dB(-20 dBm to 4 dBm)	
8 GHz- 8.5 GHz	$\pm 0.75$ dB(-20 dBm to 0 dBm)	
<b>Range</b>		
9 kHz- 18 kHz	-55 dBm to -5dBm	
18 kHz- 30 kHz	-55 dBm to 0 dBm	
30 kHz- 70 kHz	-55 dBm to 2dBm	
70 kHz- 100 kHz	-55 dBm to 5dBm	
100 kHz- 300 kHz	-55 dBm to 7dBm	
300 kHz- 4.5 GHz	-55 dBm to 10 dBm	
4.5 GHz- 6.8 GHz	-55 dBm to 8 dBm	
6.8 GHz- 7.7 GHz	-55 dBm to 5 dBm	
7.7 GHz- 8 GHz	-55 dBm to 4 dBm	
8 GHz- 8.5 GHz	-55 dBm to 0 dBm	
<b>Sweep range</b>		
9 kHz- 18 kHz	-55 dBm to -5dBm	
18 kHz- 30 kHz	-55 dBm to 0 dBm	
70 kHz- 100 kHz	-55 dBm to 2dBm	
30 kHz- 70 kHz	-55 dBm to 5dBm	
100 kHz- 300 kHz	-55 dBm to 7dBm	

300 kHz- 4.5 GHz	-55 dBm to 10 dBm	
4.5 GHz- 6.8 GHz	-55 dBm to 8 dBm	
6.8 GHz- 7.7 GHz	-55 dBm to 5 dBm	
7.7 GHz- 8 GHz	-55 dBm to 4 dBm	
8 GHz- 8.5 GHz	-55 dBm to 0 dBm	
<b>Max leveled power</b>		
9 kHz- 18 kHz	-5 dBm	-1 dBm
18 kHz-30 kHz	0 dBm	2 dBm
30 kHz- 70 kHz	2 dBm	5 dBm
70 kHz-100 kHz	5 dBm	7 dBm
100 kHz-300 kHz	7 dBm	10 dBm
300 kHz- 4.5 GHz	10 dBm	13 dBm
4.5 GHz- 6.8 GHz	8 dBm	10 dBm
6.8 GHz-7.7 GHz	5 dBm	8 dBm
7.7 GHz- 8 GHz	4 dBm	6 dBm
8 GHz- 8.5 GHz	0 dBm	4 dBm
<b>Level resolution</b>		0.05 dB

<sup>1</sup> The level accuracy of 9 kHz- 18 kHz is  $\pm 1.5\text{dB}@-5\text{dBm}$

#### SNA5022A/SNA5032A

Description	Specification	Typical
Preset power	0 dBm	
<b>Level accuracy</b>		
100 kHz - 10 MHz	$\pm 2.0\text{ dB}@0\text{ dBm}$	
10 MHz - 20 GHz	$\pm 1.5\text{ dB}@0\text{ dBm}$	
20 GHz- 26.5 GHz	$\pm 2.0\text{ dB}@0\text{ dBm}$	
<b>Level linearity</b>		
100 kHz- 10 MHz	$\pm 0.75\text{ dB} (-20\text{ dBm to } 10\text{ dBm})$	
10 MHz- 3 GHz	$\pm 0.75\text{ dB} (-20\text{ dBm to } 10\text{ dBm})$	
3 GHz- 9 GHz	$\pm 0.75\text{ dB} (-20\text{ dBm to } 10\text{ dBm})$	
9 GHz- 13.5 GHz	$\pm 1.0\text{ dB} (-20\text{ dBm to } 5\text{ dBm})$	
13.5 GHz- 20 GHz	$\pm 1.0\text{ dB} (-20\text{ dBm to } 5\text{ dBm})$	
20 GHz- 26.5 GHz	$\pm 1.2\text{ dB} (-20\text{ dBm to } 0\text{ dBm})$	

<b>Range</b>		
100 kHz- 10 MHz	-55 dBm to 10 dBm	
10 MHz- 3 GHz	-55 dBm to 10 dBm	
3 GHz- 9 GHz	-55 dBm to 10 dBm	
9 GHz- 13.5 GHz	-55 dBm to 5 dBm	
13.5 GHz- 20 GHz	-55 dBm to 5 dBm	
20 GHz- 26.5 GHz	-55 dBm to 0 dBm	
<b>Sweep range</b>		
100 kHz- 10 MHz	-55 dBm to 10 dBm	
10 MHz- 3 GHz	-55 dBm to 10 dBm	
3 GHz- 9 GHz	-55 dBm to 10 dBm	
9 GHz- 13.5 GHz	-55 dBm to 5 dBm	
13.5 GHz- 20 GHz	-55 dBm to 5 dBm	
20 GHz- 26.5 GHz	-55 dBm to 0 dBm	
<b>Max leveled power</b>		
100 kHz- 10 MHz	10 dBm	11 dBm
10 MHz- 3 GHz	10 dBm	13 dBm
3 GHz- 9 GHz	10 dBm	12 dBm
9 GHz- 13.5 GHz	5 dBm	10 dBm
13.5 GHz- 20 GHz	5 dBm	10 dBm
20 GHz- 26.5 GHz	0 dBm	8 dBm
<b>Power resolution</b>		0.05 dB

#### 6.4.3 Test port output signal purity

Description	Specification	Typical
<b>2nd or 3rd harmonics (0 dBm)</b>		
9 kHz to 100 kHz		<-15 dBc
100 kHz to 26.5 GHz		<-25 dBc
<b>Non-harmonic spurious (0 dBm)</b>		<-30 dBc

## 6.5 Test port input

### 6.5.1 Test port input levels

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Description	Specification	Typical
<b>Max input level</b>		
9 kHz-8.5 GHz	+10 dBm	
<b>Damage input level</b>		
9 kHz-8.5 GHz	+27 dBm (RF) or 35 V (DC)	
<b>Crosstalk</b>		
9 kHz- 18 kHz	-75 dB	-96 dB
18 kHz-50 kHz	-90 dB	-106 dB
50 kHz-100 kHz	-90 dB	-110 dB
100 kHz-500 kHz	-110 dB	-120 dB
500 kHz- 1 MHz	-115 dB	-130 dB
1 MHz- 5.8 GHz <sup>2</sup>	-125 dB	-140 dB
5.8 GHz-8.5 GHz	-115 dB	-130 dB
<b>Noise floor</b>		
9 kHz- 100 kHz	-100 dBm/Hz	-115 dBm/Hz
100 kHz-300 kHz	-110 dBm/Hz	-125 dBm/Hz
300 kHz-500 kHz	-115 dBm/Hz	-130 dBm/Hz
500 kHz- 1 MHz	-120 dBm/Hz	-136 dBm/Hz
1 MHz- 5 GHz <sup>2</sup>	-125 dBm/Hz	-140 dBm/Hz
5 GHz-8.5 GHz	-120 dBm/Hz	-135 dBm/Hz
<b>Compression level(+10 dBm)</b>		
<b>Magnitude</b>		
9 kHz- 100 kHz	0.3dB	0.09 dB
100 kHz- 8.5GHz	0.2dB	0.08dB
<b>Phase</b>		
9 kHz- 100 kHz	0.5 deg	0.36 deg
100 kHz- 8.5GHz	0.5 deg	0.3 deg

<sup>2</sup> 467.25MHz and 471.5MHz points do not meet the specs requirement.

SNA5022A/SNA5032A

Description	Specification	Typical
<b>Max input level</b>		
100 kHz-26.5 GHz	+10 dBm	
<b>Damage input level</b>		
100 kHz-26.5 GHz	+27 dBm (RF) or 35 V (DC)	
<b>Level accuracy</b>		
100 kHz - 10 MHz	±2.5 dB@0 dBm	
10 MHz - 20 GHz	±1.5 dB@0 dBm	
20 GHz- 26.5 GHz	±2.0 dB@0 dBm	
<b>Crosstalk</b>		
100 kHz- 10 MHz	-100 dB	-110 dB
10 MHz- 3GHz <sup>3</sup>	-125 dB	-140 dB
3 GHz- 13.5 GHz	-120 dB	-125 dB
13.5 GHz- 26.5 GHz	-105 dB	-115 dB
<b>Noise floor</b>		
100 kHz- 10 MHz	-110 dBm/Hz	-120 dBm/Hz
10 MHz- 3 GHz <sup>3</sup>	-122 dBm/Hz	-132 dBm/Hz
3 GHz- 9 GHz	-125 dBm/Hz	-135 dBm/Hz
9 GHz- 13.5 GHz	-125 dBm/Hz	-135 dBm/Hz
13.5 GHz- 20 GHz	-122 dBm/Hz	-132 dBm/Hz
20 GHz- 26.5 GHz	-118 dBm/Hz	-128 dBm/Hz
<b>Compression level(+10 dBm)</b>		
<b>Magnitude</b>		
100 kHz- 13.5 GHz	0.5 dB	0.3 dB
13.5 GHz- 26.5 GHz	1.0 dB	0.5 dB
<b>Phase</b>		
100 kHz- 13.5 GHz	5 deg	1 deg
13.5 GHz- 26.5 GHz	5 deg	1.5 deg

<sup>3</sup> 20MHz and 30MHz points do not meet the specs requirement.

**6.5.2 Trace noise**

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Description	Specification	Typical
Note:Setting max output power		
<b>Transmission trace noise magnitude</b>		
9 kHz- 50 kHz (IFBW=1 kHz)	0.005 dB rms	0.0015 dB rms
50 kHz- 1 MHz (IFBW=1 kHz)	0.003 dB rms	0.0015 dB rms
1 MHz- 8 GHz (IFBW=10 kHz)	0.003 dB rms	0.0015 dB rms
8 GHz-8.5 GHz(IFBW=10 kHz)	0.005 dB rms	0.0025 dB rms
<b>Reflection trace noise magnitude</b>		
9 kHz- 50 kHz (IFBW=1 kHz)	0.005 dB rms	0.0015 dB rms
50 kHz- 1 MHz (IFBW=1 kHz)	0.003 dB rms	0.0010 dB rms
1 MHz- 8 GHz (IFBW=10 kHz)	0.003 dB rms	0.0015 dB rms
8 GHz-8.5 GHz(IFBW=10 kHz)	0.005 dB rms	0.0020 dB rms
<b>Transmission trace noise phase</b>		
9 kHz- 50 kHz (IFBW=1 kHz)	0.04 deg rms	0.02 deg rms
50 kHz- 1 MHz (IFBW=1 kHz)	0.03 deg rms	0.015 deg rms
1 MHz- 8.5 GHz (IFBW=10 kHz)	0.05 deg rms	0.02 deg rms
<b>Reflection trace noise phase</b>		
9 kHz- 50 kHz (IFBW=1 kHz)	0.03 deg rms	0.015 deg rms
50 kHz- 1 MHz (IFBW=1 kHz)	0.03 deg rms	0.015 deg rms
1 MHz- 8.5 GHz (IFBW=10 kHz)	0.05 deg rms	0.020 deg rms

SNA5022A/SNA5032A

Description	Specification	Typical
Note:Setting max output power		
<b>Transmission trace noise magnitude</b>		
100 kHz- 10 MHz (IFBW=1 kHz)	0.009 dB rms	0.0015 dB rms
10 MHz- 13.5 GHz (IFBW=10 kHz)	0.006 dB rms	0.0015 dB rms
13.5 GHz- 26.5 GHz (IFBW=10 kHz)	0.015 dB rms	0.0025 dB rms
<b>Reflection trace noise magnitude</b>		
100 kHz- 10 MHz (IFBW=1 kHz)	0.003 dB rms	0.0015 dB rms
10 MHz- 13.5 GHz (IFBW=10 kHz)	0.009 dB rms	0.0015 dB rms
13.5 GHz- 26.5 GHz (IFBW=10 kHz)	0.015 dB rms	0.0025 dB rms
<b>Transmission trace noise phase</b>		

100 kHz- 10 MHz (IFBW=1 kHz)	0.05 deg rms	0.02 deg rms
10 MHz- 13.5 GHz (IFBW=10 kHz)	0.05 deg rms	0.015 deg rms
13.5 GHz- 20 GHz (IFBW=10 kHz)	0.06 deg rms	0.02 deg rms
20 GHz- 26.5 GHz (IFBW=10 kHz)	0.09 deg rms	0.05 deg rms
<b>Reflection trace noise phase</b>		
100 kHz- 10 MHz (IFBW=1 kHz)	0.03 deg rms	0.015 deg rms
10 MHz- 13.5 GHz (IFBW=10 kHz)	0.05 deg rms	0.015 deg rms
13.5 GHz- 20 GHz (IFBW=10 kHz)	0.07 deg rms	0.02 deg rms
20 GHz- 26.5 GHz (IFBW=10 kHz)	0.09 deg rms	0.05 deg rms

### 6.5.3 Stability

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Description	Specification	Typical
<b>Magnitude</b>		
9 kHz- 3 GHz		± 0.005 dB/°C
3 GHz- 8.5 GHz		± 0.014 dB/°C
<b>Phase</b>		
9 kHz- 3 GHz		± 0.1 deg/°C
3 GHz- 8.5 GHz		± 0.3 deg/°C

SNA5022A/SNA5032A

Description	Specification	Typical
<b>Magnitude</b>		
100 kHz- 13.5 GHz		± 0.01 dB/°C
13.5 GHz- 26.5 GHz		± 0.05 dB/°C
<b>Phase</b>		
100 kHz- 13.5 GHz		± 0.1 deg/°C
13.5 GHz- 26.5 GHz		± 0.9 deg/°C

#### 6.5.4 Dynamic accuracy

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Description	Specification
<b>Relative to -10 dBm input power</b>	
<b>Magnitude</b>	
10 dBm	± 1.9 dB
0 dBm	± 0.08 dB
-20 dBm	± 0.12 dB
-30 dBm	± 0.19 dB
-40 dBm	± 0.25 dB
-50 dBm	± 0.36 dB
-60 dBm	± 0.49 dB
-70 dBm	± 0.65 dB
-80 dBm	± 0.95 dB
-90 dBm	± 1.65 dB
-100 dBm	± 2.0 dB
<b>Phase</b>	
10 dBm	± 15.6 deg
0 dBm	± 0.46 deg
-20 dBm	± 0.62 deg
-30 dBm	± 1.19 deg
-40 dBm	± 1.25 deg
-50 dBm	± 2.36 deg
-60 dBm	± 2.49 deg
-70 dBm	± 4.65 deg
-80 dBm	± 6.95 deg
-90 dBm	± 8.35 deg
-100 dBm	± 10.38 deg

SNA5022A/SNA5032A

Description	Specification
<b>Relative to -10 dBm input power</b>	
<b>Magnitude</b>	
10 dBm	± 2.29 dB

0 dBm	$\pm 0.09$ dB
-20 dBm	$\pm 0.13$ dB
-30 dBm	$\pm 0.19$ dB
-40 dBm	$\pm 0.27$ dB
-50 dBm	$\pm 0.39$ dB
-60 dBm	$\pm 0.59$ dB
-70 dBm	$\pm 0.85$ dB
-80 dBm	$\pm 1.95$ dB
-90 dBm	$\pm 2.35$ dB
-100 dBm	$\pm 2.5$ dB
<b>Phase</b>	
10 dBm	$\pm 14.5$ deg
0 dBm	$\pm 1.45$ deg
-20 dBm	$\pm 1.85$ deg
-30 dBm	$\pm 3.99$ deg
-40 dBm	$\pm 5.27$ deg
-50 dBm	$\pm 6.39$ deg
-60 dBm	$\pm 8.59$ deg
-70 dBm	$\pm 10.85$ deg
-80 dBm	$\pm 11.95$ deg
-90 dBm	$\pm 12.35$ deg
-100 dBm	$\pm 16.5$ deg

## 6.6 Pulsed-RF

### 6.6.1 Pulse Modulation On/Off Ratio (dB)

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Description	Typical
9 kHz- 4.5 GHz	80
4.5 GHz- 8.5 GHz	70

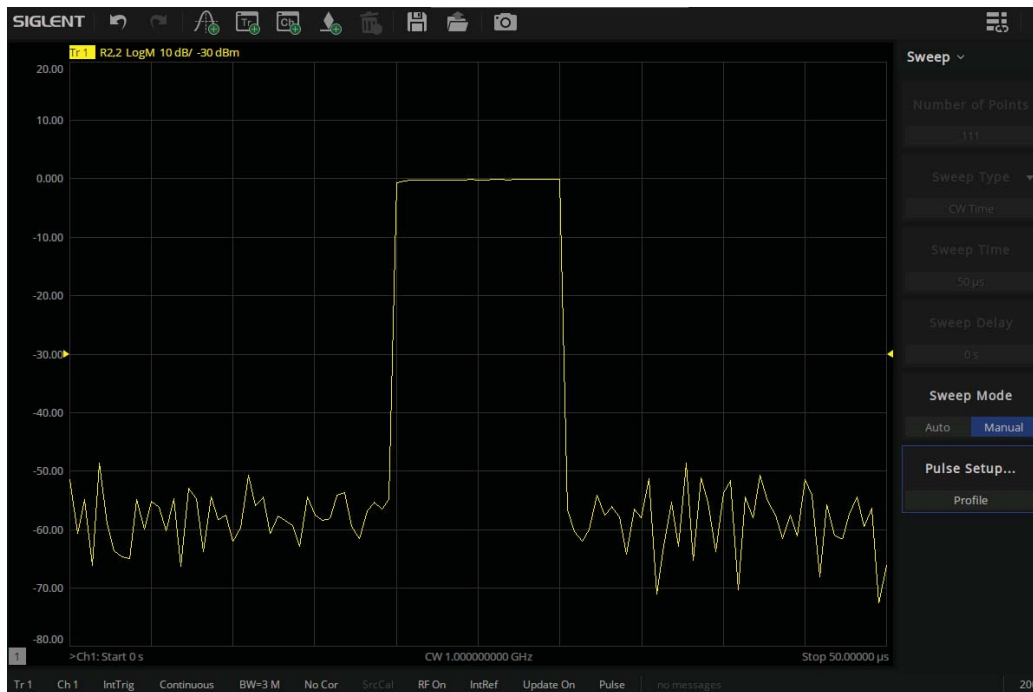
SNA5022A/SNA5032A

Description	Typical
9 kHz- 4.5 GHz	80
4.5 GHz- 26.5 GHz	70

### 6.6.2 Pulse Modulation

Description	Typical
Minimum pulse width	10 usec
Minimum pulse period	30 usec
Maximum pulse period	26 sec

Pulse Modulation Shape Example



## 7 Sweep time

SNA5002A/SNA5012A/SNA5004A/SNA5014A

Start frequency: 100 kHz, Stop frequency: 8.5 GHz; IFBW: 500 kHz.				
Points	201	401	1601	6401
Uncorrected	15 ms	17 ms	35 ms	141 ms
2-port cal	30 ms	34 ms	70 ms	282 ms
4-port cal(8.5GHz)	60 ms	68 ms	140 ms	564 ms
Start frequency: 100 kHz, Stop frequency: 8.5 GHz; IFBW: 100 kHz.				
Points	201	401	1601	6401
Uncorrected	17 ms	20 ms	46 ms	185 ms
2-port cal	34 ms	40 ms	92 ms	370 ms
4-port cal(8.5GHz)	68 ms	80 ms	184 ms	740 ms
Start frequency: 100 kHz, Stop frequency: 8.5 GHz; IFBW: 10 kHz.				
Points	201	401	1601	6401
Uncorrected	33 ms	52 ms	175 ms	698 ms
2-port cal	66 ms	104 ms	350 ms	1396 ms
4-port cal(8.5GHz)	132 ms	208 ms	700 ms	2792 ms
Start frequency: 100 kHz, Stop frequency: 8.5 GHz; IFBW: 1 kHz.				
Points	201	401	1601	6401
Uncorrected	193 ms	372 ms	1452 ms	5806 ms
2-port cal	386 ms	744 ms	2904 ms	11612 ms
4-port cal(8.5GHz)	772 ms	1488 ms	5808 ms	23224 ms

SNA5022A/SNA5032A

<b>Start frequency: 100 kHz, Stop frequency: 26.5GHz; IFBW: 500 kHz.</b>				
Points	201	401	1601	6401
Uncorrected	30 ms	54 ms	70 ms	229 ms
2-port cal	60 ms	108 ms	140 ms	458 ms
<b>Start frequency: 100 kHz, Stop frequency: 26.5GHz; IFBW: 100 kHz.</b>				
Points	201	401	1601	6401
Uncorrected	31 ms	57 ms	82 ms	275 ms
2-port cal	62 ms	114 ms	164 ms	550 ms
<b>Start frequency: 100 kHz, Stop frequency: 26.5GHz; IFBW: 10 kHz.</b>				
Points	201	401	1601	6401
Uncorrected	47 ms	89 ms	209 ms	784 ms
2-port cal	94 ms	178 ms	418 ms	1568 ms
<b>Start frequency: 100 kHz, Stop frequency: 26.5GHz; IFBW: 1 kHz.</b>				
Points	201	401	1601	6401
Uncorrected	208 ms	409 ms	1487 ms	5895 ms
2-port cal	416 ms	818 ms	2974 ms	11790 ms

## 8 Enhanced Time Domain Analysis with TDR (SNA5000-TDR)

Description	SNA5002/4A	SNA5012/4A	SNA5022A	SNA5032A
Bandwidth	4.5 GHz	8.5 GHz	13.5 GHz	26.5 GHz
Input Impedance	50 Ohm			
DC damage Level at test port	35 V			
Maximum test port input voltage (Hot TDR Mode)	1.5Vpp			
TDR stimulus	Step, Impulse			
TDR step amplitude	1 mV to 5 V			
TDR step rise time (min) (10% to 90%)	99.1 ps	52.5 ps	33.1 ps	16.9 ps
TDR step response resolution in free space (min) ( $\epsilon_r = 1$ )	14.9 mm	7.9 mm	5 mm	2.5 mm
TDR impulse width (min)	134.1 ps	71.0 ps	44.7 ps	22.8 ps
DUT length (max)	13.8 $\mu$ s		1.25 $\mu$ s	
Eye diagram data rate (max)	3.6 Gb/s	6.8 Gb/s	10.8 Gb/s	21.2 Gb/s

## 9 General information

Description	Characteristics
<b>Operating environment</b>	
Temperature	0 to 40 °C
Humidity	Type tested at 20 to 80%, wet bulb temperature < 29 °C (non-condensing)
Altitude	0 to 3000 m
<b>Non-operating storage environment</b>	
Temperature	-20 °C to 60 °C
Humidity	Type tested at 20 to 90%, wet bulb temperature < 40 °C (non-condensing)
Altitude	0 to 15000 m
Size	W×H×D=378×284×126 mm
Weight	2-port: 5.5 kg; 4-port or SNA5032A/SNA5022A: 7.5 kg
<b>EMC</b>	
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
<b>Safety</b>	
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.

## 10 Front panel information

Description	Characteristics
RF connectors	Type-N, female, 50Ω (SNA5002A/SNA5012A/SNA5004A/SNA5014A) 3.5mm NMD (male), 50Ω (SNA5032A/SNA5022A)
Damage level	+27 dBm or ±35 VDC
Display Resolution	12.1 inch TFT color LCD with touch screen ; WXGA (1280 x 800)
USB interface	USB-A 2.0

## 11 Rear panel information

Description	Characteristics
<b>Ext trigger input connector</b>	
Type	BNC, female
Input level	5V TTL
<b>Ext trigger output connector</b>	
Type	BNC, female
Max output current	20 mA
Output level	3.3V TTL
<b>Ext ref-signal input connector</b>	
Type	BNC, female
Input frequency	10 MHz ±10 ppm
Input level	-3 dBm to +10 dBm
Input impedance	50Ω
<b>Int ref-signal output connector</b>	
Type	BNC, female
Output frequency	10 MHz ± 5 ppm
Signal type	Sinewave
Output level	0 dBm ± 3 dB into 50 Ω
Output impedance	50 Ω
<b>Bias tee input connector</b>	
Type	BNC, female
Max voltage	± 35 VDC
Max current (no degradation RF specification)	± 300 mA
Max current (damage level)	500 mA
Video output	HDMI

<b>USB (USBTMC) interface</b>	USB-B 2.0
<b>LAN</b>	10/100 BaseT Ethernet
<b>Power</b>	100~240 Vrms 50/60 Hz 100~120 Vrms 400 Hz
<b>Power consumption</b>	2-port: 50 W (typical), 4-port: 70 W (typical) SNA5032A/SNA5022A: 85 W (typical)

## 12 Ordering Information

Items	Description	Order number
<b>Products</b>	2 ports, 4.5G Vector Network Analyzer	SNA5002A
	2 ports, 8.5G Vector Network Analyzer	SNA5012A
	4 ports, 4.5G Vector Network Analyzer	SNA5004A
	4 ports, 8.5G Vector Network Analyzer	SNA5014A
	2 ports, 13.5G Vector Network Analyzer	SNA5022A
	2 ports, 26.5G Vector Network Analyzer	SNA5032A
<b>Standard Accessories</b>	1 x Quick-start, 1 x Power-cable, 1 x USB-cable, 1 x calibration-certificate, 1 x Wireless mouse, 1 x Protective Cover	
<b>Optional Accessories</b>	High-performance reference source	SNA5000-HPR
	Time-Domain analysis	SNA5000-TDA
	Enhanced Time-Domain analysis	SNA5000-TDR
	Spectrum analysis	SNA5000-SA
	Scalar mixer measurement	SNA5000-SMM
	Performance Tests	SNA5000-PV
	Pulse measurement	SNA5000-PM
	Material Measurement	SNA5000-MT
	Gain Compression measurement	SNA5000-GC
	Vector mixer measurement	SNA5000-VMM
	SEM5000A series electronic calibrators	SEM5000A
	N-type, Male, 50Ω Calibration Kit, 0-4.5GHz	F503ME
	N-type, Female, 50Ω Calibration Kit, 0-4.5GHz	F503FE
	N-type, Male, 50Ω Calibration Kit, 0-9GHz	F504MS
	N-type, Female, 50Ω Calibration Kit, 0-9GHz	F504FS
	N-type, Male, 50Ω Calibration Kit, 0-9GHz	Y504MS
N-type, Female, 50Ω Calibration Kit, 0-9GHz	Y504FS	

N-type, Male and Female, 50Ω Calibration Kit,0-9GHz	F504TS
N-type, Male and Female, 50Ω Calibration Kit,0-18GHz	F505TS
3.5 mm, Male, 50Ω Calibration Kit, 0-4.5GHz	F603ME
3.5 mm, Female, 50Ω Calibration Kit, 0-4.5GHz	F603FE
3.5 mm, Male, 50Ω Calibration Kit, 0-9GH	F604MS
3.5 mm, Female, 50Ω Calibration Kit, 0-9GHz	F604FS
3.5 mm, Male and Female, 50Ω Calibration Kit, 0-9GHz	F604TS
3.5 mm, Male, 50Ω Calibration Kit, 0-26.5GHz	Y606MS
3.5 mm, Female, 50Ω Calibration Kit, 0-26.5GHz	Y606FS
3.5 mm, Female, 50Ω Calibration Kit, 0-26.5GHz	F606FS
3.5 mm, Male and Female, 50Ω Calibration Kit, 0-26.5GHz	F606TS
50Ω Waveguide calibration kit, 18-26.5GHz	KWR42A
N(M)-SMA(F) RF Cable DC~6 GHz,1000 mm	S06-NMSF-1M
N(M)-SMA(F) RF Cable DC~18 GHz,1000 mm	S18-NMSF-1M
2.9 mm(M)- 2.9 mm (F) RF Cable DC~40 GHz,1000 mm	S40-29M29F-1M
N(M)-SMA(M) RF Cable DC~18 GHz,1000 mm	N-SMA-18L
N(M)-N(M) RF Cable DC~18 GHz,1000 mm	N-N-18L
SMA(M)-SMA(M) RF Cable DC~18 GHz,1000 mm	SMA-SMA-18L
SMA(M)-SMA(M) RF Cable DC~26.5 GHz,1000 mm	SMA-SMA-26L
SMA(F)-SMA(M) RF 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 Adapter	USB-GPIB
RF demonstration board	SNA-TB01
Adjustable Differential TDR probe DC-18 GHz	ADP-18
Adjustable Differential TDR probe DC-26.5 GHz	ADP-26
Adjustable Single-end TDR probe DC-18 GHz	ASP-18
Adjustable Single-end TDR probe DC-26.5 GHz	ASP-26



## 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.

### Headquarters:

SIGLENT Technologies Co., Ltd  
Add: Bldg No.4 & No.5, Antongda Industrial  
Zone, 3rd Liuxian Road, Bao'an District,  
Shenzhen, 518101, China  
Tel: + 86 755 3688 7876  
Fax: + 86 755 3359 1582  
Email: sales@siglent.com  
Website: int.siglent.com

### North America:

SIGLENT Technologies America, Inc  
6557 Cochran Rd Solon, Ohio 44139  
Tel: 440-398-5800  
Toll Free: 877-515-5551  
Fax: 440-399-1211  
Email: info@siglentna.com  
Website: www.siglentna.com

### Europe:

SIGLENT Technologies Germany GmbH  
Add: Staetzlinger Str. 70  
86165 Augsburg, Germany  
Tel: +49(0)-821-666 0 111 0  
Fax: +49(0)-821-666 0 111 22  
Email: info-eu@siglent.com  
Website: www.siglenteu.com

**CALTRON PTE LTD**  
email: [caltron@caltron.sg](mailto:caltron@caltron.sg)  
[www.caltron.sg](http://www.caltron.sg)

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