SNA6000A Series Vector Network Analyzer

DS09050_E01A

SIGLENT TECHNOLOGIES CO.,LTD

SNA6000A

1 General Description

The SIGLENT SNA6000A series of Vector Network Analyzers have a frequency range of 100 kHz to 13.5 GHz and 100 kHz to 26.5 GHz, which support 2/4-port scattering parameter, differential-parameter, and time-domain parameter measurements. The SNA6000A 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 SNA6000A 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

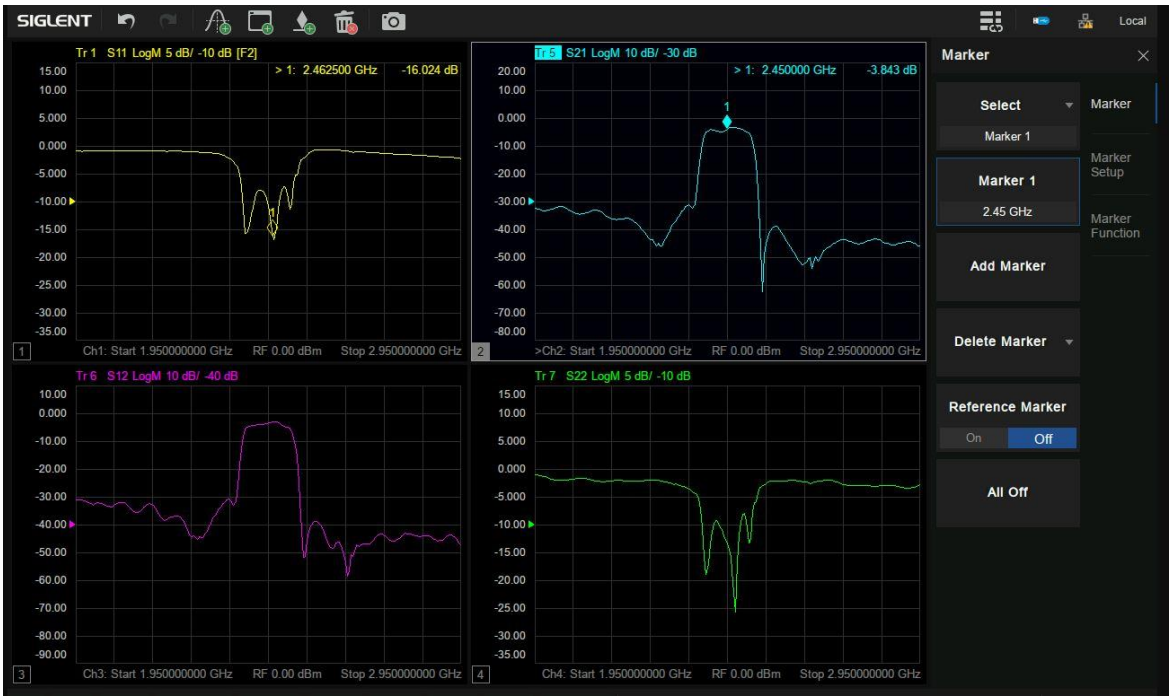
- Frequency range: 100 kHz - 13.5 GHz and 100 kHz - 26.5 GHz
- Frequency resolution: 1 Hz
- Level resolution: 0.05 dB
- Range of IFBW: 1 Hz~10 MHz
- Setting range of output level: -55 dBm ~ +10 dBm
- Dynamic range: 135 dB
- Types of calibration: Response calibration, Enhanced Response calibration, Full-one 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
- 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/DVI-D/DP

3 Models and key specifications

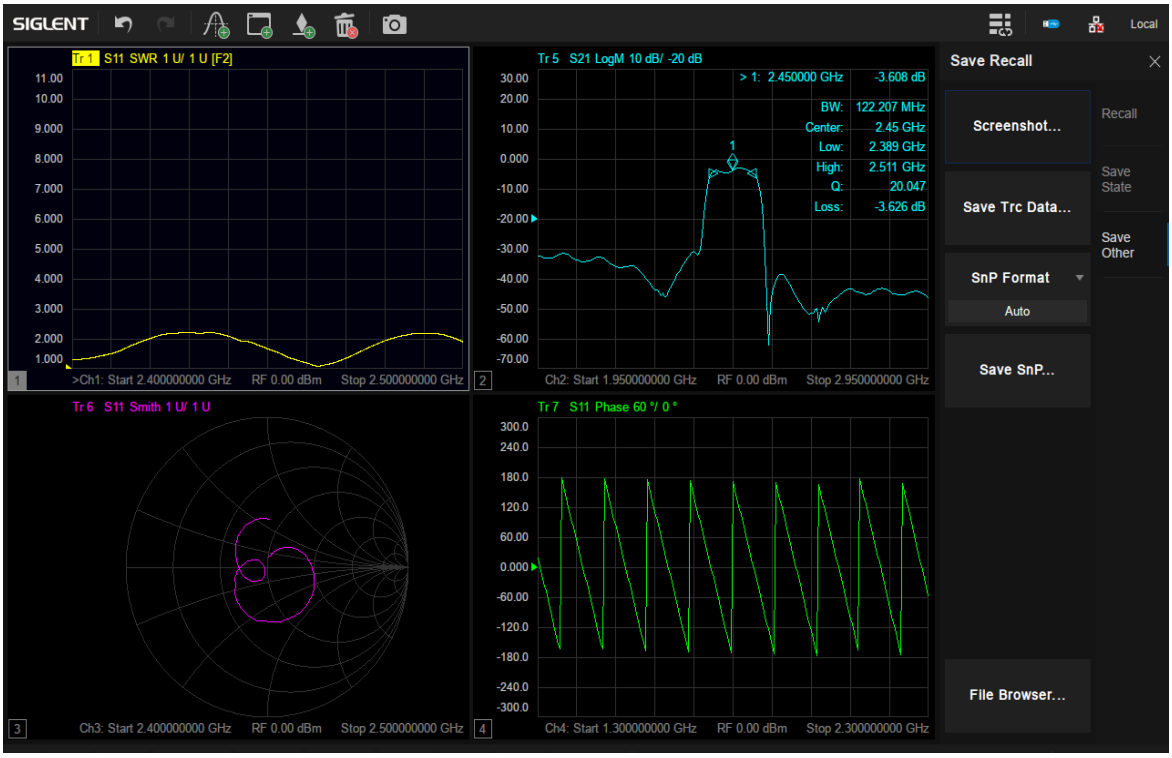
Model	SNA6034A SNA6134A	SNA6032A SNA6132A	SNA6024A SNA6124A	SNA6022A SNA6122A
Frequency range	100kHz-26.5GHz		100kHz-13.5GHz	
Ports	4	2	4	2
Frequency resolution	1 Hz			
Level resolution	0.05 dB			
Range of IFBW	1 Hz~10 MHz			
Number of points	2 to 100,001			
Setting range of output level	-55 dBm ~ +10 dBm			
Dynamic range	135 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			
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/DVI-D/DP			

4 Design Features

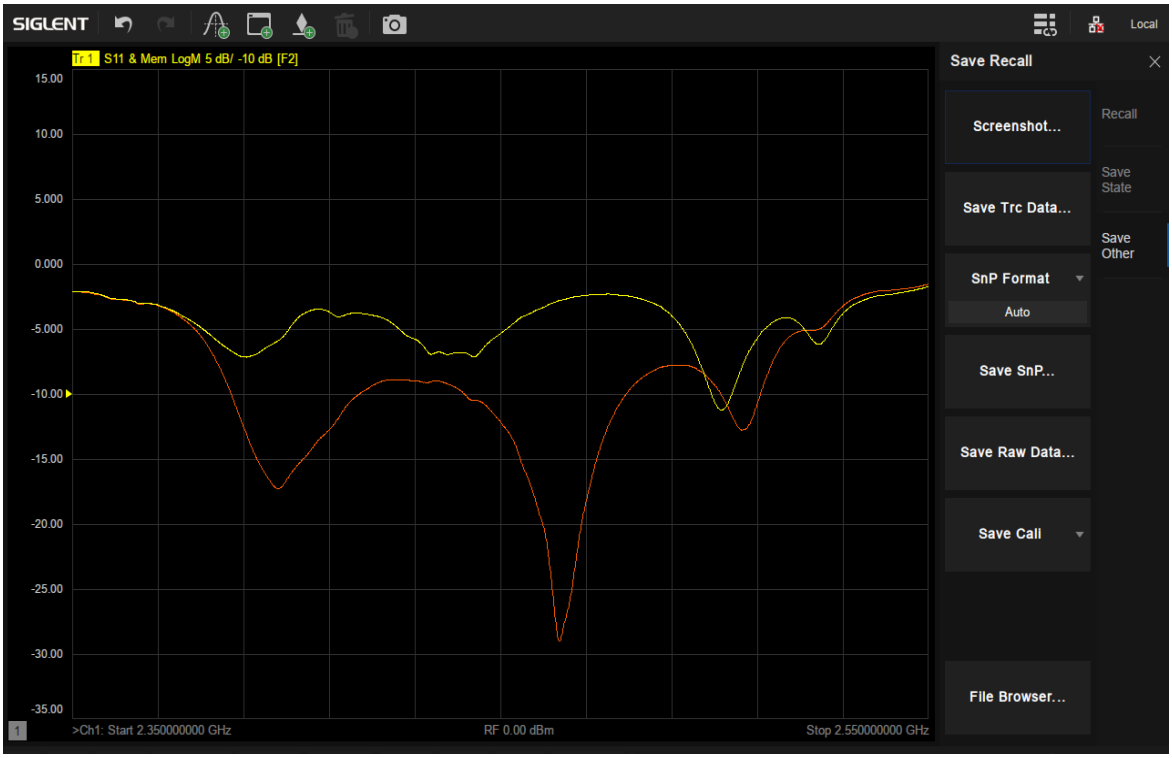
Multi-window display:



Multi-format display:

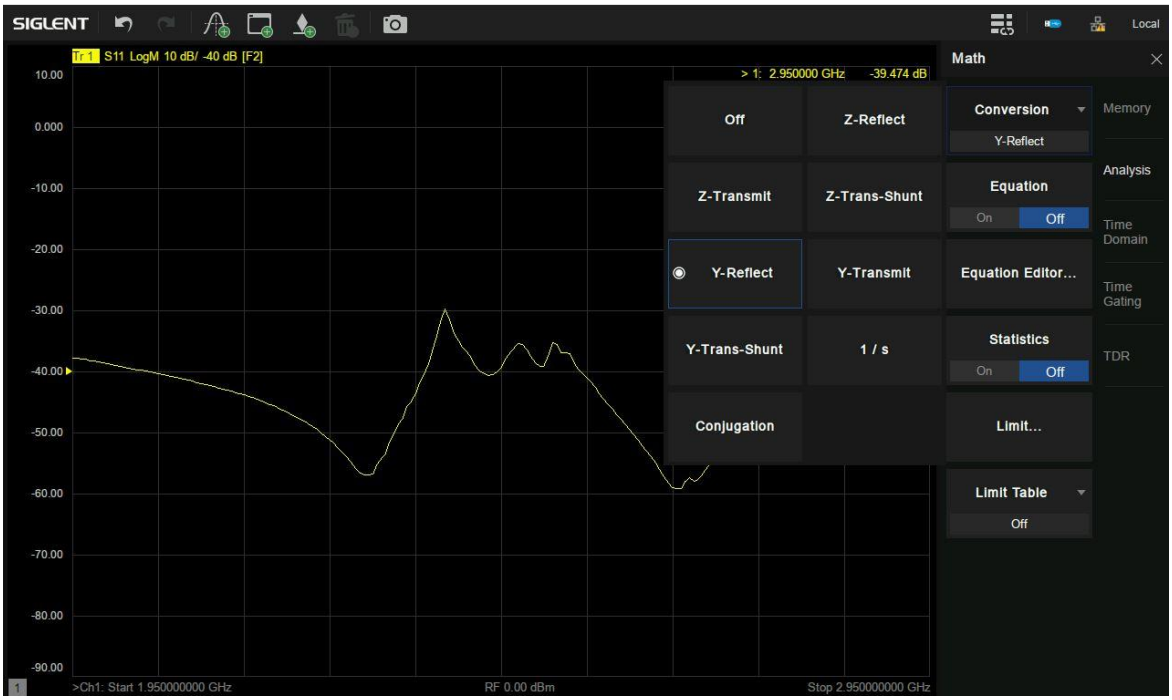


Display and compare memory and current data:

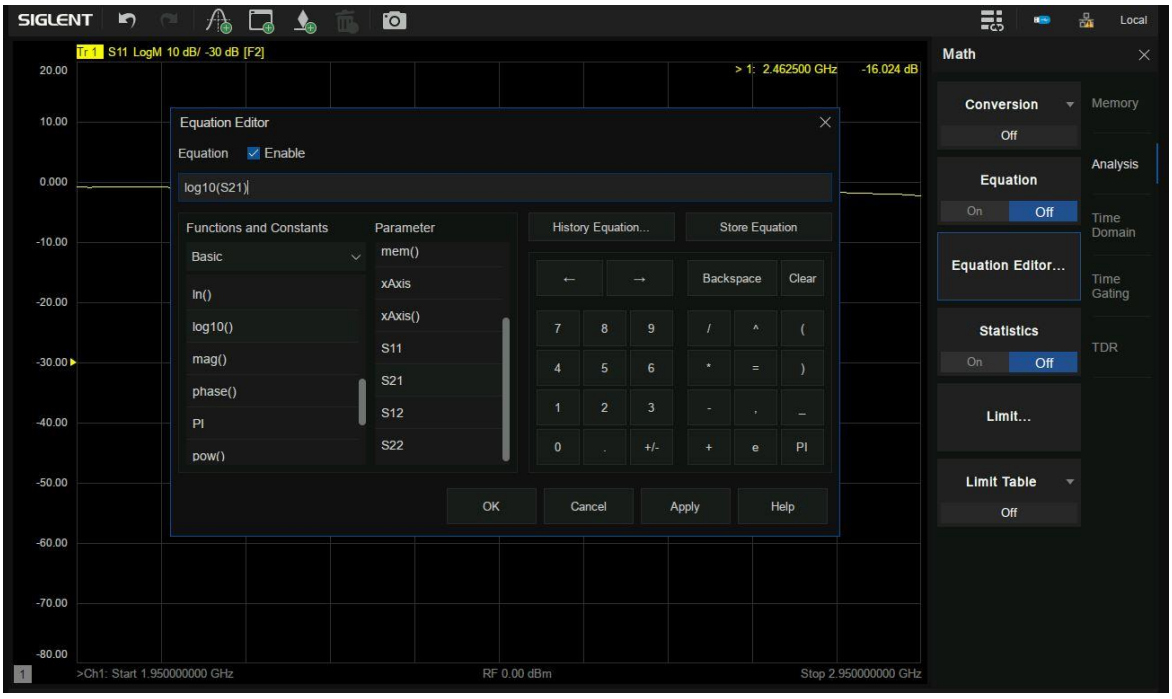


Display data hold:

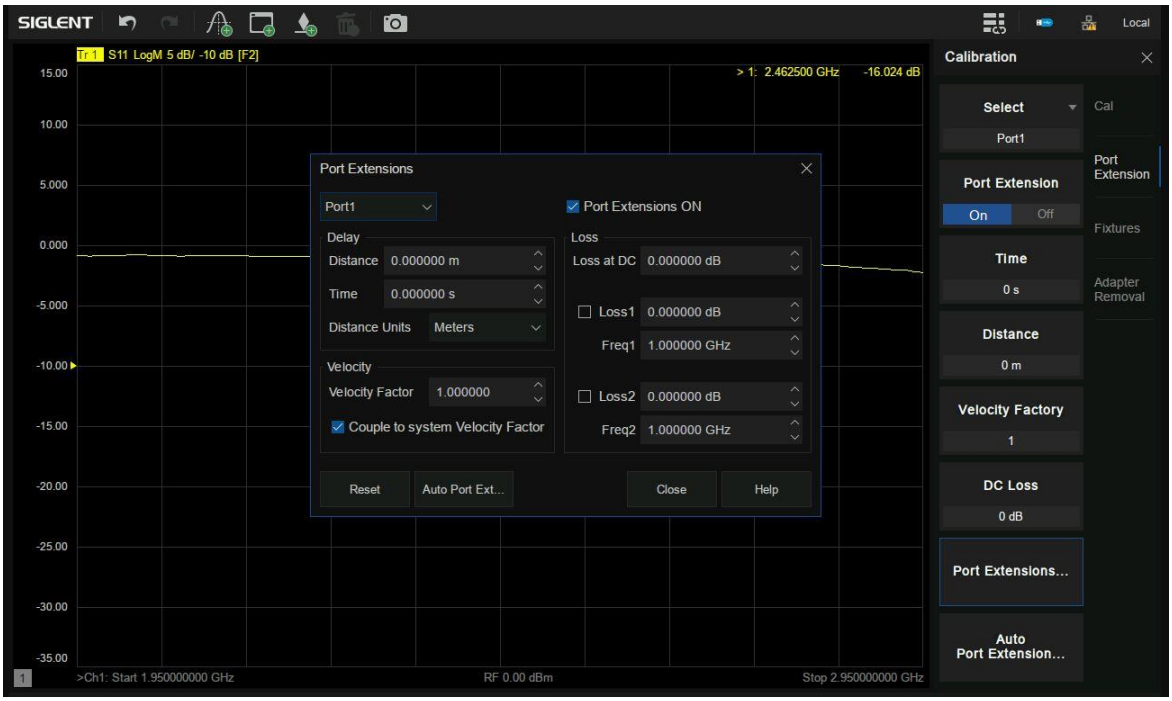
Impedance conversion:



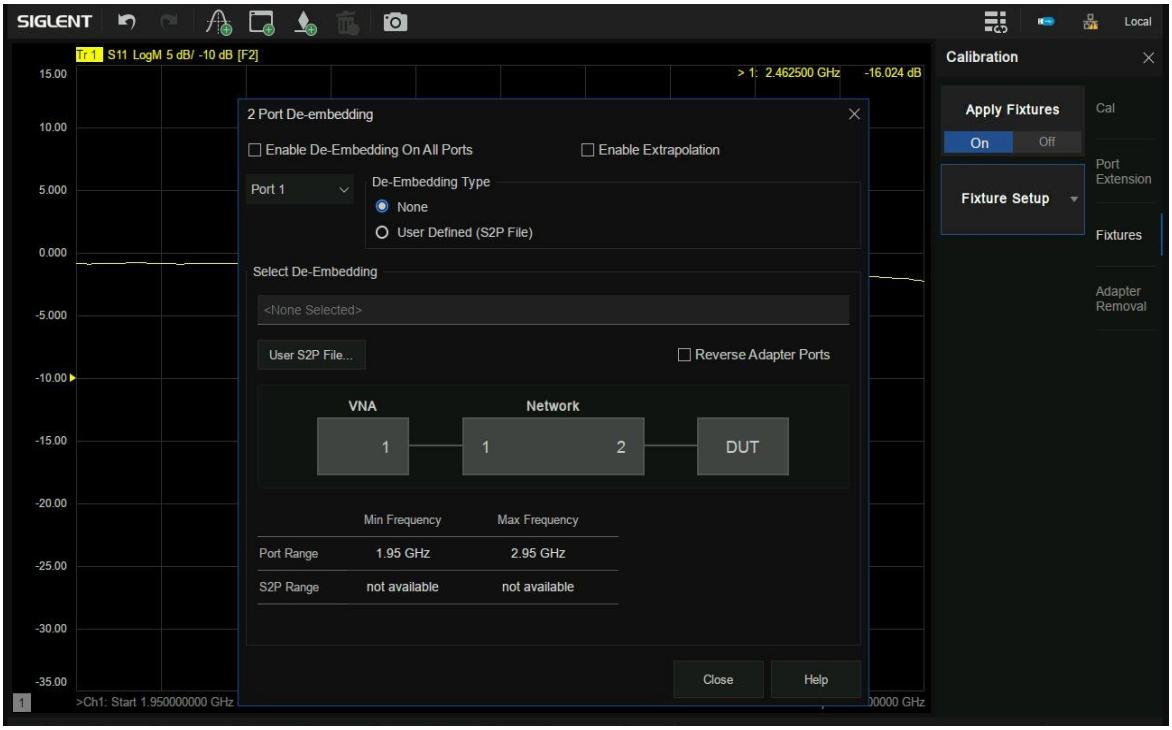
Equation Editor:



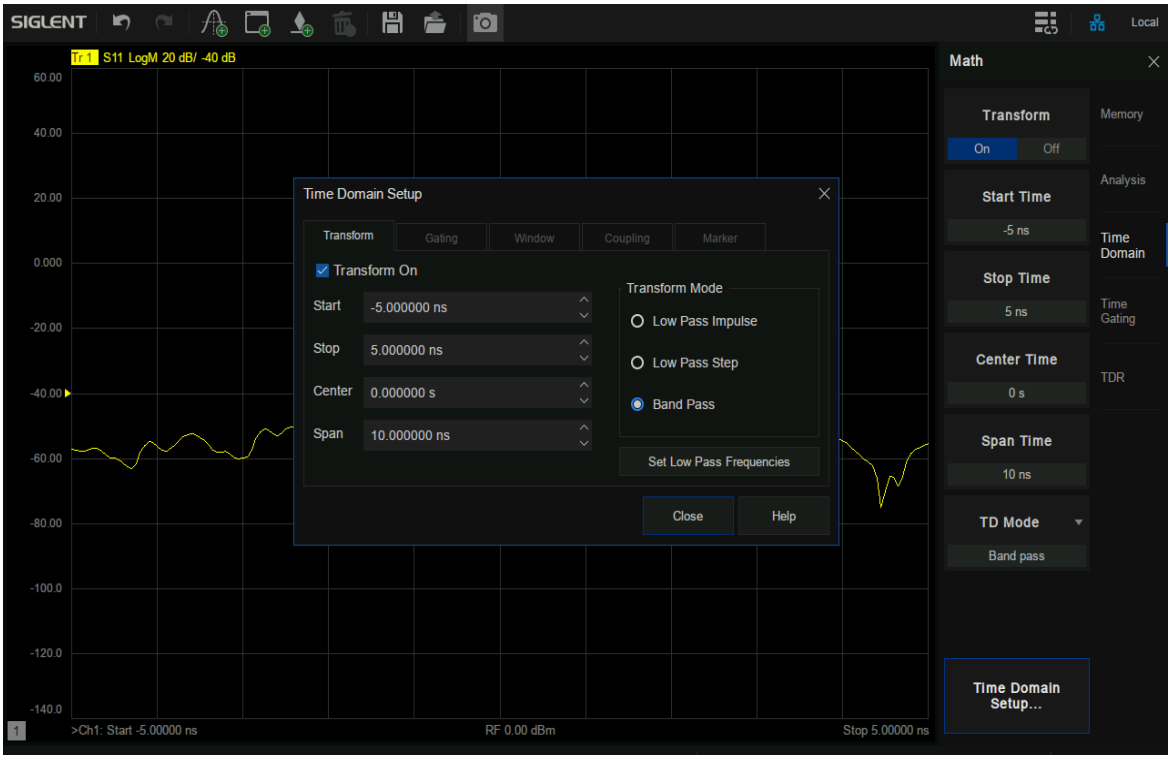
Port Extensions:



Embedding and De-Embedding:

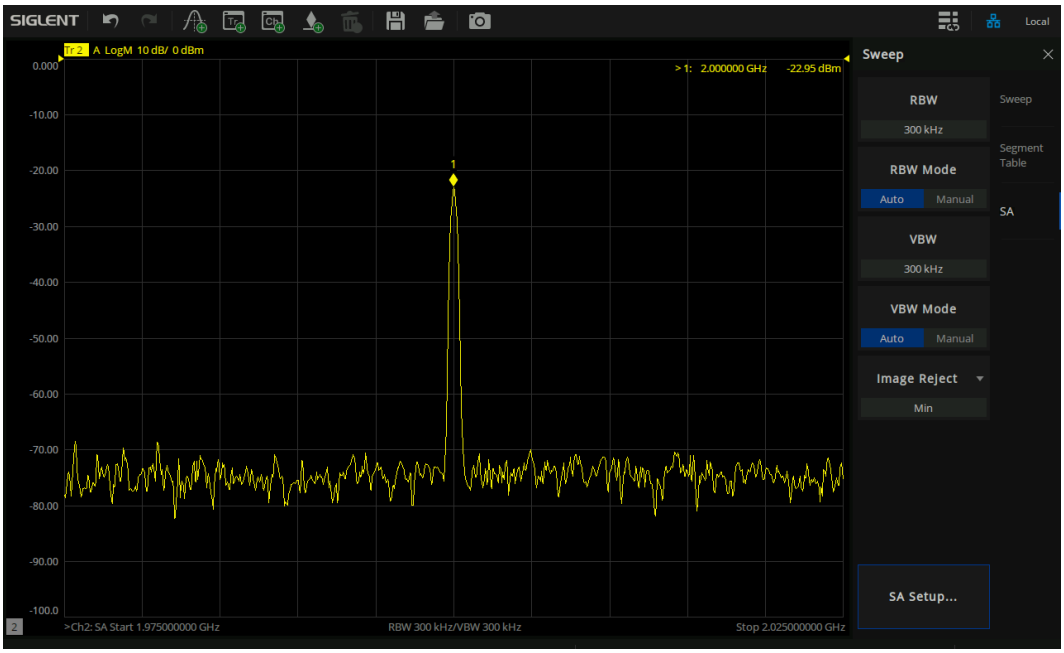


Time-Domain analysis

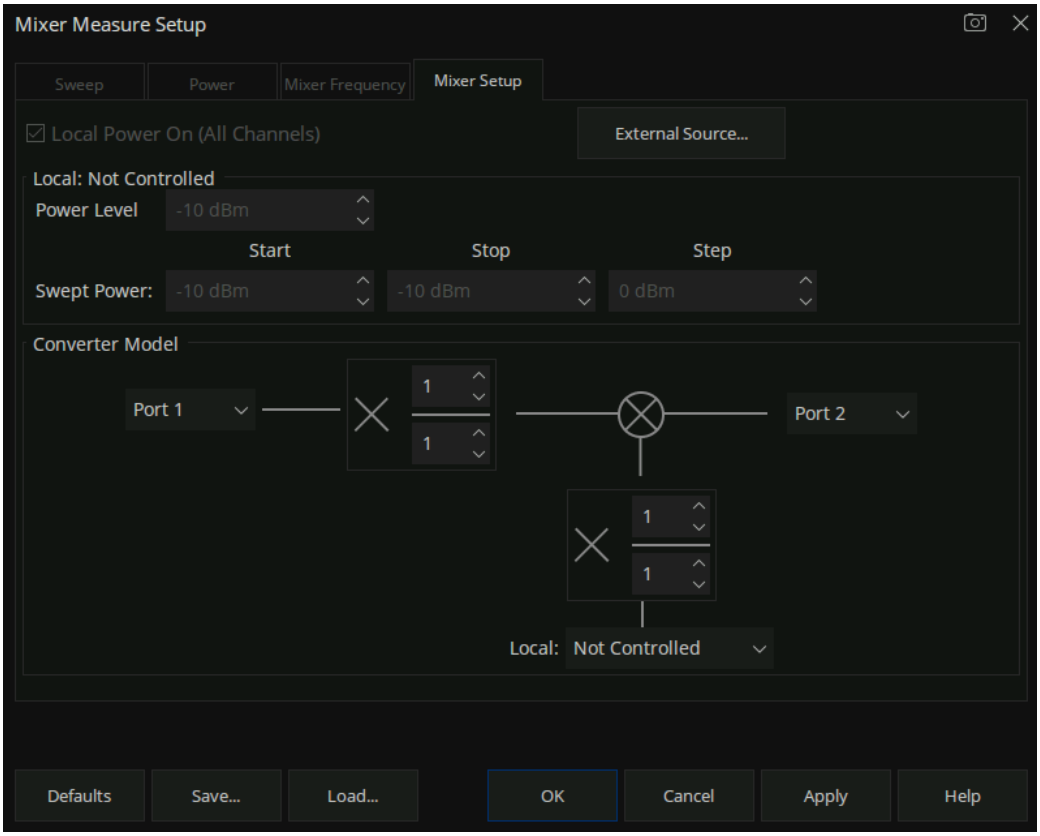


Enhanced Time-Domain analysis(TDR)

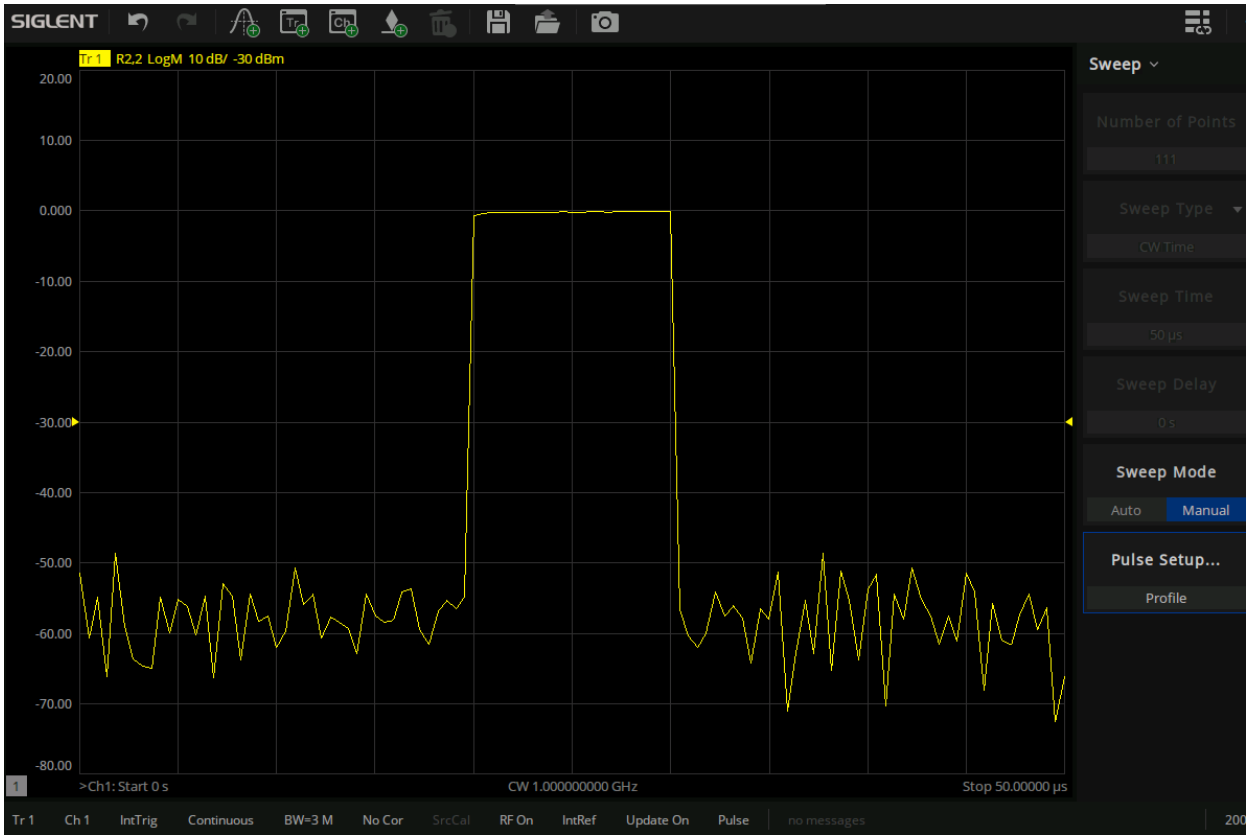
Spectrum analysis



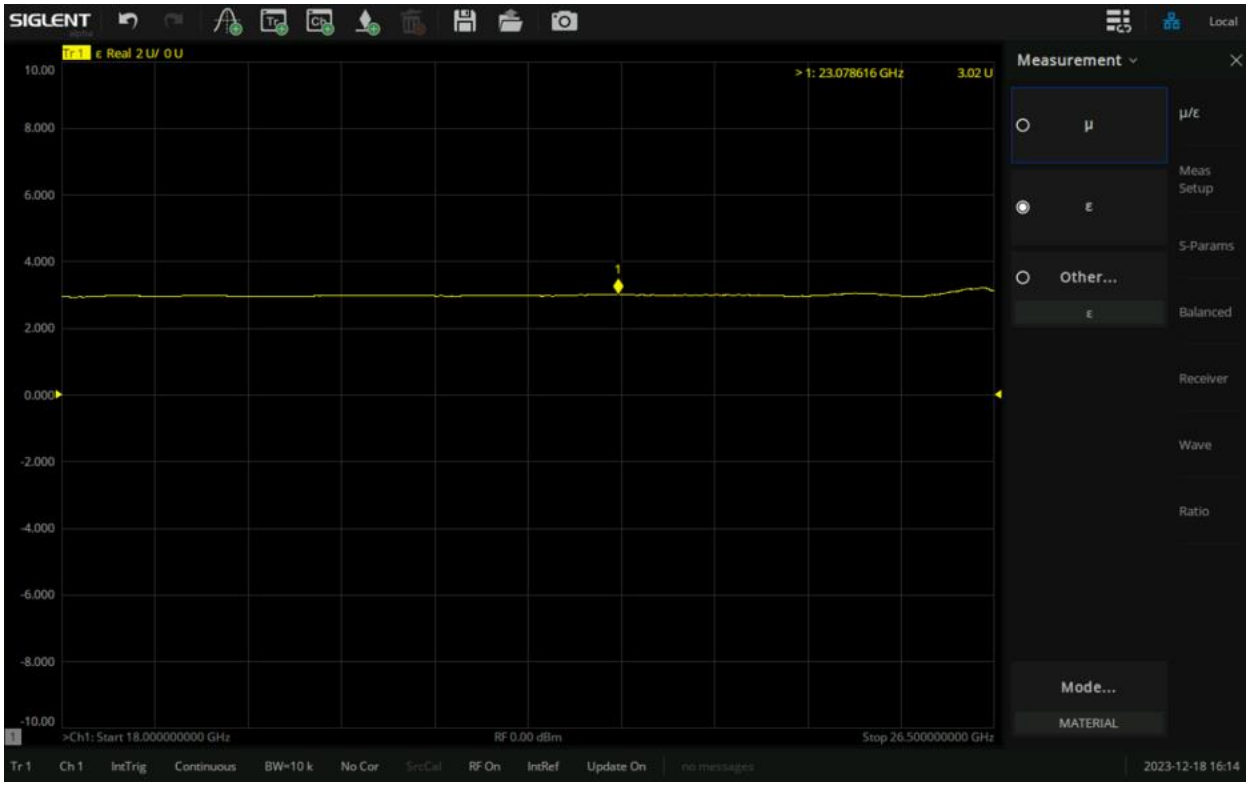
Scalar mixer measurement



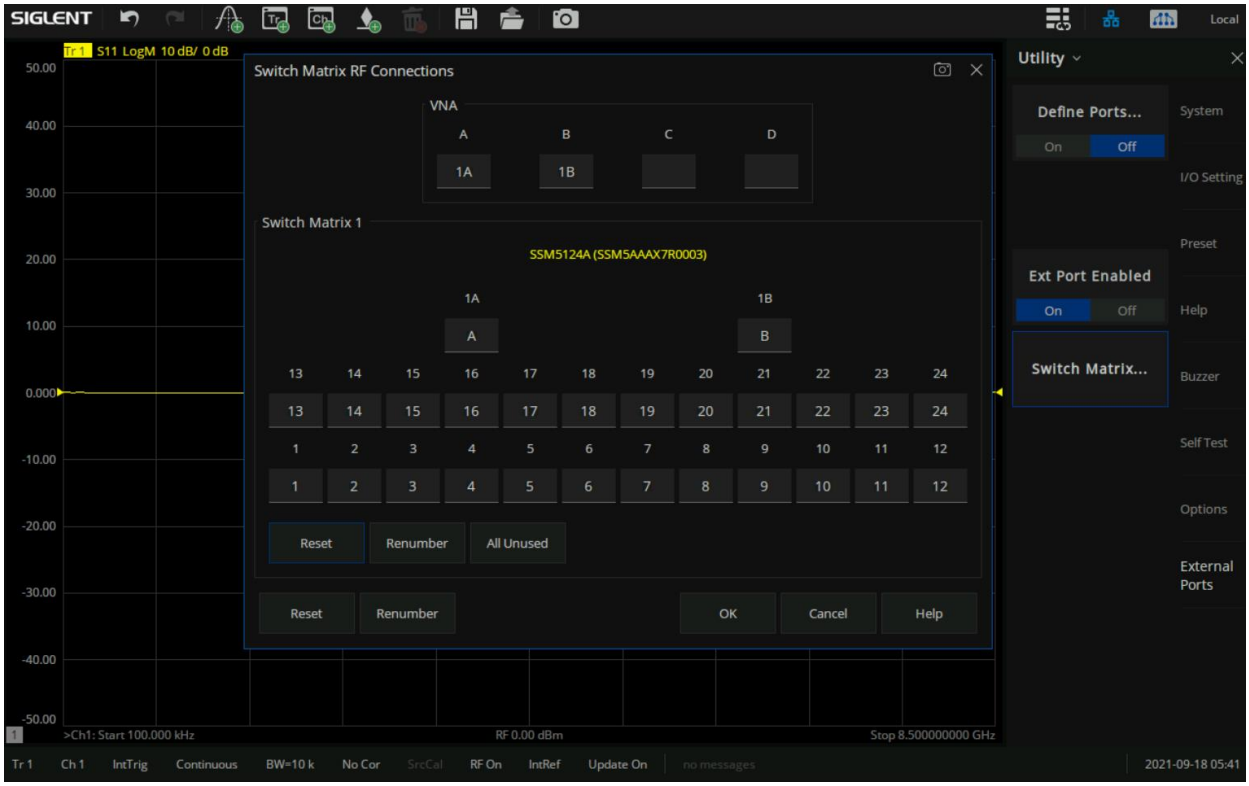
Pulse Modulation



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℃ 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.

Specification: All products are guaranteed to meet published specifications at room temperature (approximately 25℃), 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℃). 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

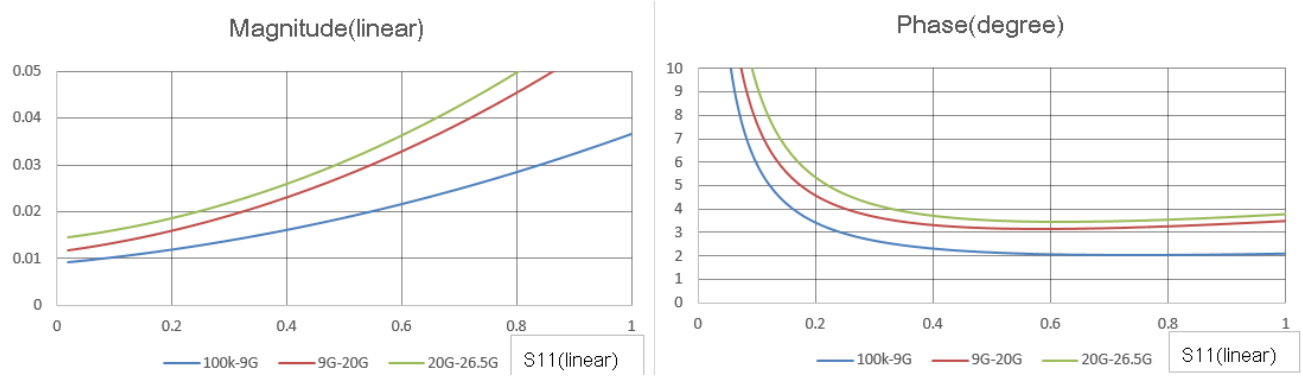
Frequency range	IFBW	Specification(dB)	Typical (dB)
100 kHz- 1 MHz	10Hz	120	125
1 MHz- 500 MHz		125	135
500 MHz- 1 GHz		130	139
1 GHz- 20 GHz		135	142
20 GHz- 24 GHz		127	135
24 GHz- 26.5 GHz		120	128

6.2 Corrected system performance with calibration kit

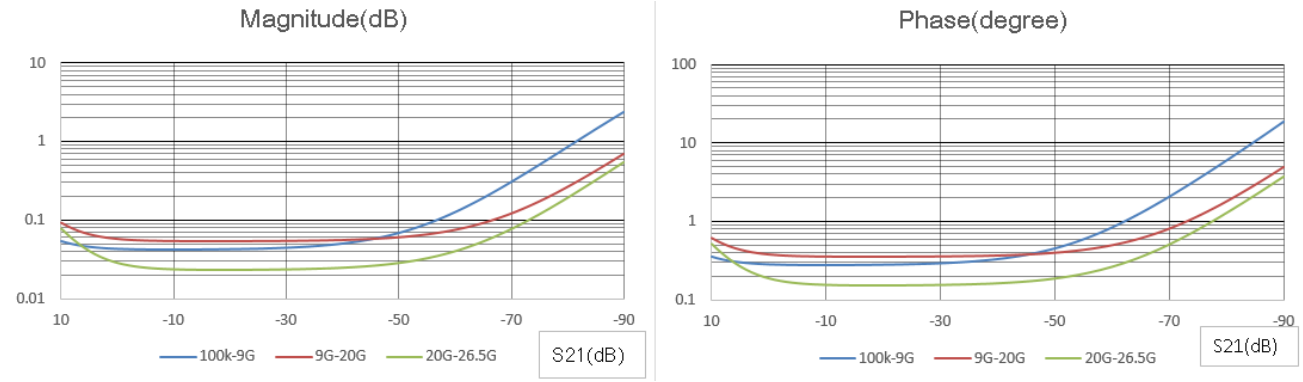
User correction: On, system correction: On; Corrected system performance with Keysight 85052D 3.5mm calibration kit, isolation calibration performed.IFBW is 10 Hz, no averaging applied to data, and environmental temperature is 25℃ (± 5℃), with < 1℃ deviation from calibration temperature.

Specification (dB)	100 kHz-9 GHz	9 GHz-20 GHz	20 GHz-26.5 GHz
Directivity	41	36	35
Source match	36	29	27
Load match	41	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.

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	±1
Transmission tracking	±1.4	±1.4	±1	±1

6.4 Test port output (Source)

6.4.1 Test port output frequency

Description	Specification
Frequency range	
SNA6034A/ SNA6032A/ SNA6134A/ SNA6132A	100 kHz to 26.5 GHz
SNA6024A/ SNA6022A/ SNA6124A/ SNA6122A	100 kHz to 13.5 GHz
Frequency resolution	1 Hz
CW accuracy	
Standard	± 1.0 ppm (23 ± 3℃)
Option: SNA6000-HPR	± 0.1 ppm (23 ± 3℃)
Source stability	
Standard	± 1.0 ppm (0 to 40℃) ± 0.5 ppm/year，± 3.0 ppm/20 year
Option: SNA6000-HPR	± 1 ppb (0 to 40℃) ± 50 ppb/year

6.4.2 Test port output power

Description	Specification	Typical
Preset power	0 dBm	
Level accuracy		
100 kHz - 10 MHz	±2.0 dB@0 dBm	
10 MHz - 20 GHz	±1.5 dB@0 dBm	
20 GHz- 26.5 GHz	±2.0 dB@0 dBm	
Level linearity		
100 kHz- 1 MHz	±0.5 dB（-20 dBm to 10 dBm）	
1 MHz- 500 MHz	±0.5 dB（-20 dBm to 10 dBm）	
500 MHz- 1 GHz	±0.5 dB（-20 dBm to 10 dBm）	
1 GHz- 20 GHz	±0.5 dB（-20 dBm to 10 dBm）	
20 GHz- 24 GHz	±0.5 dB（-20 dBm to 7 dBm）	
24 GHz- 26.5 GHz	±0.5 dB（-20 dBm to 5 dBm）	
Range		
100 kHz- 1 MHz	-55 dBm to 10 dBm	
1 MHz- 500 MHz	-55 dBm to 10 dBm	
500 MHz- 1 GHz	-55 dBm to 10 dBm	
1 GHz- 20 GHz	-55 dBm to 10 dBm	
20 GHz- 24 GHz	-55 dBm to 7 dBm	
24 GHz- 26.5 GHz	-55 dBm to 5 dBm	
Sweep range		
100 kHz- 1 MHz	-55 dBm to 10 dBm	
1 MHz- 500 MHz	-55 dBm to 10 dBm	
500 MHz- 1 GHz	-55 dBm to 10 dBm	
1 GHz- 20 GHz	-55 dBm to 10 dBm	
20 GHz- 24 GHz	-55 dBm to 7 dBm	
24 GHz- 26.5 GHz	-55 dBm to 5 dBm	
Max leveled power		
100 kHz- 1 MHz	10 dBm	11 dBm
1 MHz- 500 MHz	10 dBm	13 dBm
500 MHz- 1 GHz	10 dBm	12 dBm
1 GHz- 20 GHz	10 dBm	10 dBm

20 GHz- 24 GHz	7 dBm	10 dBm
24 GHz- 26.5 GHz	5 dBm	8 dBm
Level resolution		0.05 dB

6.4.3 Test port output signal purity

Description	Specification	Typical
2nd or 3rd harmonics (0 dBm)		
100 kHz to 10 MHz	<–20 dBc	
10 MHz to 26.5 GHz	<–25 dBc	
Non-harmonic spurious (0 dBm)	<-30 dBc	

6.5 Test port input

6.5.1 Test port input levels

Description	Specification	Typical
Max input level		
100 kHz-26.5 GHz	+10 dBm	
Damage input level		
100 kHz-26.5 GHz	+27 dBm (RF) or 35 V (DC)	
Level accuracy		
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	
Crosstalk		
100 kHz- 500 kHz	-95 dB	-110 dB
500 kHz- 5 MHz	-110 dB	-140 dB
5 MHz- 13.5 GHz	-120 dB	-125 dB
13.5 GHz- 26.5 GHz	-108 dB	-115 dB
Noise floor		
100 kHz- 500 MHz	-115 dBm/Hz	-125 dBm/Hz
500 MHz- 1 GHz	-125 dBm/Hz	-135 dBm/Hz
1 GHz- 8 GHz	-130 dBm/Hz	-135 dBm/Hz
8 GHz- 20 GHz	-135 dBm/Hz	-135 dBm/Hz
20 GHz- 26.5 GHz	-130 dBm/Hz	-135 dBm/Hz
100 kHz- 500 MHz	-115 dBm/Hz	-130 dBm/Hz
Compression level(+10 dBm)		
Magnitude		
100 kHz- 13.5 GHz	0.5 dB	0.3 dB
13.5 GHz- 26.5 GHz	1.0 dB	0.5 dB
Phase		
100 kHz- 13.5 GHz	5 deg	1 deg
13.5 GHz- 26.5 GHz	5 deg	1.5 deg

6.5.2 Trace noise

Description	Specification	Typical
Note:Setting max output power		
Transmission trace noise magnitude		
100 kHz- 10 MHz (IFBW=1 kHz)	0.005 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
Reflection trace noise magnitude		
100 kHz- 10 MHz (IFBW=1 kHz)	0.005 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)	0.012 dB rms	0.0025 dB rms
Transmission trace noise phase		
100 kHz- 10 MHz (IFBW=1 kHz)	0.012 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- 26.5 GHz (IFBW=10 kHz)	0.05 deg rms	0.02 deg rms
Reflection trace noise phase		
100 kHz- 10 MHz (IFBW=1 kHz)	0.01 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- 26.5 GHz (IFBW=10 kHz)	0.05 deg rms	0.02 deg rms

6.5.3 Stability

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

6.5.4 Dynamic accuracy

Description	Specification
Relative to -10 dBm input power	
Magnitude	
10 dBm	± 0.19 dB
-30 dBm	± 0.05 dB
-100 dBm	± 2.5 dB
Phase	
10 dBm	± 4.5 deg
-30 dBm	± 0.25 deg
-100 dBm	± 16.5 deg

6.6 Pulsed-RF

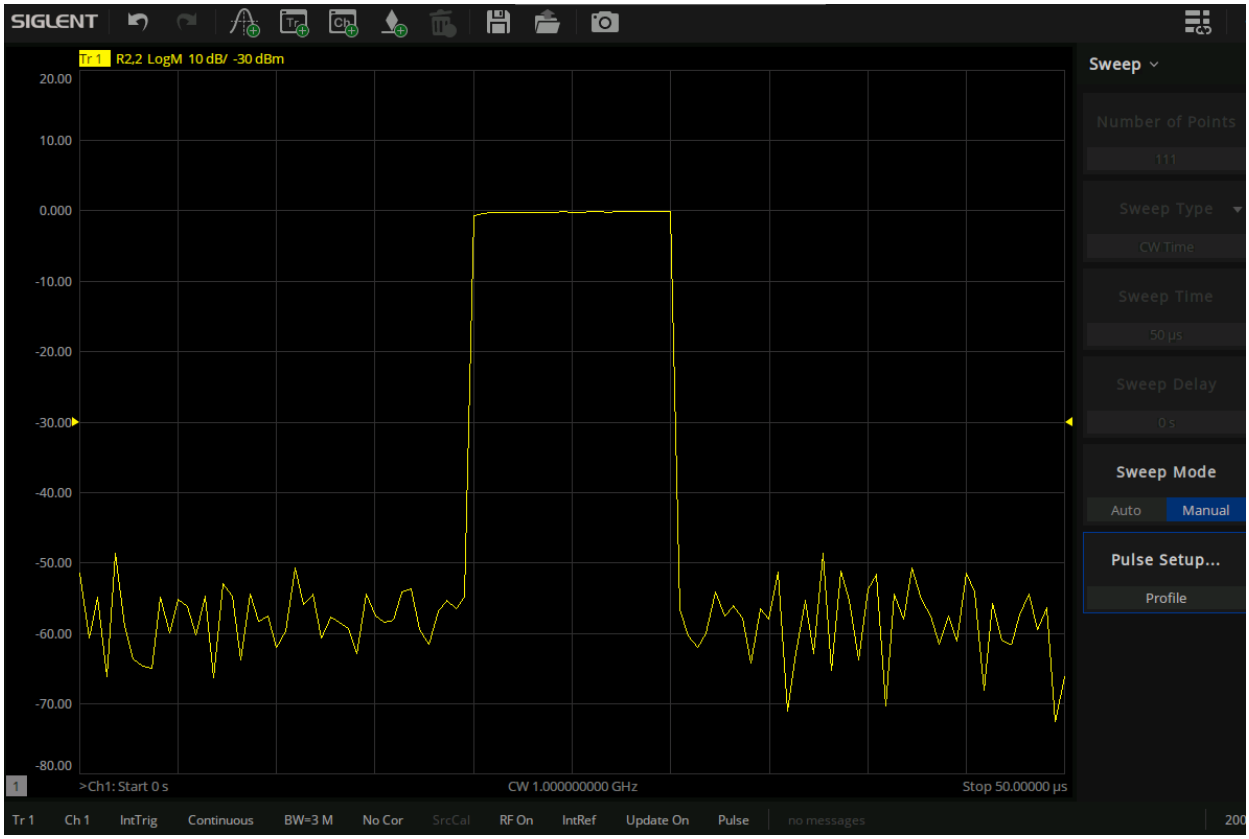
6.6.1 Pulse Modulation On/Off Ratio (dB)

Description	Typical
100 kHz- 13.5 GHz	80
13.5 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

Start frequency: 100 kHz, Stop frequency: 26.5GHz; 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
Start frequency: 100 kHz, Stop frequency: 26.5GHz; 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
Start frequency: 100 kHz, Stop frequency: 26.5GHz; 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
Start frequency: 100 kHz, Stop frequency: 26.5GHz; 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

8 Enhanced Time Domain Analysis with TDR (SNA6000-TDR)

Description	SNA6022/4A、SNA6122/4A	SNA6032/4A、SNA6132/4A
Bandwidth	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%)	33.1 ps	16.9 ps
TDR step response resolution in free space (min) (εr = 1)	5 mm	2.5 mm
TDR impulse width (min)	44.7 ps	22.8 ps
DUT length (max)	1.25 μs	
Eye diagram data rate (max)	10.8 Gb/s	21.2 Gb/s

9 General information

Description	Characteristics
Operating environment	
Temperature	0 to 40 ℃
Humidity	Type tested at 20 to 80%, wet bulb temperature < 29 °C (non-condensing)
Altitude	0 to 3000 m
Non-operating storage environment	
Temperature	-20 ℃ to 60 ℃
Humidity	Type tested at 20 to 90%, wet bulb temperature < 40 °C (non-condensing)
Altitude	0 to 15000 m
Size	W×H×D=426×251×494.5 mm
Weight	4-port or SNA6034A/SNA6134A: 19 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.	

10 Front panel information

Description	Characteristics
RF connectors	3.5mm NMD（male），50Ω（SNA6132/4A、SNA6122/4A）
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
Ext trigger input connector	
Type	BNC, female
Input level	5V TTL
Ext trigger output connector	
Type	BNC, female
Max output current	20 mA
Output level	3.3V TTL
Ext ref-signal input connector	
Type	BNC, female
Input frequency	10 MHz ±10 ppm
Input level	-3 dBm to +10 dBm
Input impedance	50Ω
Int ref-signal output connector	
Type	BNC, female
Output frequency	10 MHz ± 1 ppm
Signal type	Sinewave
Output level	0 dBm ± 3 dB into 50 Ω
Output impedance	50 Ω
Bias tee input connector	
Type	BNC, female
Max voltage	± 35 VDC
Max current (no degradation RF specification)	± 300 mA
Max current (damage level)	500 mA
Video output	HDMI/DVI-D/DP
USB (USBTMC) interface	USB-B 3.0, USB-A 3.0
LAN	10/100/1000 BaseT Ethernet
Power	100~240 Vrms 50/60 Hz
Power consumption	4-port: 170 W (typical)

12 Ordering Information

Items	Description	Order number
Products	4 ports, 26.5G Vector Network Analyzer	SNA6034A
	2 ports, 26.5G Vector Network Analyzer	SNA6032A
	4 ports, 13.5G Vector Network Analyzer	SNA6024A
	2 ports, 13.5G Vector Network Analyzer	SNA6022A
	4 ports, 26.5G Vector Network Analyzer (Includes front panel jumper interface)	SNA6134A
	2 ports, 26.5G Vector Network Analyzer (Includes front panel jumper interface)	SNA6132A
	4 ports, 13.5G Vector Network Analyzer (Includes front panel jumper interface)	SNA6124A
	2 ports, 13.5G Vector Network Analyzer (Includes front panel jumper interface)	SNA6122A
Standard Accessories	1 x Quick-start, 1 x Power-cable, 1 x USB-cable, 1 x calibration-certificate, 1 x Wireless mouse, 1 x Protective Cover	
Optional Accessories	High-performance reference source	SNA6000-HPR
	Time-Domain analysis	SNA6000-TDA
	Enhanced Time-Domain analysis	SNA6000-TDR
	Spectrum analysis	SNA6000-SA
	Scalar mixer measurement	SNA6000-SMM
	Pulse measurement	SNA6000-PM
	Material Measurement	SNA6000-MT
	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.

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