Specifications Guide

Agilent CSA Spectrum Analyzer

Manufacturing Part Number: N1996-90021
Supercedes: N1996-90004

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Documentation is updated periodically. For the latest information about Agilent CSA spectrum analyzers, including firmware upgrades and application information, see:

http://www.agilent.com/find/csa

Table of Contents

1 CSA Specifications

Definitions and Requirements

This book contains specifications and supplemental information for the Agilent CSA spectrum analyzers. The distinction among specifications, typical performance, and nominal values are described as follows.

1.1 Definitions

- Specifications describe the performance of parameters covered by the product warranty (temperature = 0 to 50°C, unless otherwise noted).
- Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range 20 to 30° C. Typical performance does not include measurement uncertainty.
- Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

The following conditions must be met for the analyzer to meet its specifications.

1.2 Conditions Required to Meet Specifications

- The analyzer is within its calibration cycle. See the General section.
- At least 2 hours of storage or operation at the operating temperature.
- Analyzer has been turned on at least 30 minutes.

1.3 Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

Frequency

Description	Specification	Supplemental Information
Frequency Range		
Option 503	100 kHz to 3 GHz	
Option 506	100 kHz to 6 GHz	
Frequency Reference (10 MHz)		
Accuracy	≤ ± 5 ppm	Within two years of adjustment
Aging Rate (25 °C)	≤ ± 2 ppm/year	≤ ± 5 ppm/10 years nominal
Temperature Stability (0-50 °C)	≤ ± 1 ppm	
Frequency Readout Accuracy (start, stop, center, marker)	± (freq indication × frequency reference accuracy + 1% × Span + 10% × RBW + 0.5 × horizontal resolution + 1Hz)[a]	Horizontal resolution = span/(sweep points –1)
Frequency Span		
Range	0 Hz (zero span), 1 kHz to maximum frequency	
Resolution	1 kHz	
Accuracy	± span / (sweep points –1)	

a. Formula applies for RBW < 5 MHz

Description	Specification	Supplemental Information
Sweep and Trace Update Time		
Sweep Time Setting Range (Zero Span)		
Minimum	Maximum of 2/RBW or 1us	
Maximum	Minimum of 102,400/RBW or 10s, but never less than 27.3 ms	
Sweep Time Setting Range[a] (Span > 0, Manual coupled)		Settability of manually-coupled sweep time in non-zero span is dependent upon the RBW, VBW, span, detector, and sweep points.
Minimum		8.6ms or autocoupled sweeptime, whichever is greater
Maximum		4000 s [b]
Remote Sweep and Trace Transfer Speed (auto range off)		RBW auto-coupled, 501 pts
Span = 0 Hz		120 ms minimum
Span ≤ 100 MHz		300 ms
Trace Points	Settable, 2 to 1001	Defaults to 401

a. Manually-coupled sweep times are only available in non-zero spans with firmware revision ≥ A.02.00. Firmware revisions < A.02.00 only provide auto coupled sweep times in non-zero spans.

b. The maximum sweep time is highly dependent upon the combination of span, RBW, VBW, and sweep points. As a result, there will be situations where a sweep time of 4000 s is not possible.

Description	Specification	Supplemental Information
Trigger	Free run, External, RF burst, Video	
Trigger Resolution	133.33 nsec or 1/(2×RBW)	
Delayed Trigger (external, RF burst, Video)		
Range	-10 s to 10 s	RBW and VBW dependent
Resolution	1 us	
RF Burst		
Min Trigger Level (0 dB atten)		
1 GHz, preamp off		–29 dBm, nominal
2.7 GHz, preamp off		–35 dBm, nominal
1 GHz, preamp on		–51 dBm, nominal
2.7 GHz, preamp on		–53 dBm, nominal
Resolution	0.1 dB	

Description	Specification	Supplemental Information
Resolution Bandwidth (RBW)		
Range (–3 dB bandwidth)		
Non-zero Spans		
Firmware Revision ≤ A.01.99	10 Hz to 200 kHz in 1% settability (1 Hz minimum settability); 250 kHz, 300 kHz, 500 kHz, 1 MHz, 3 MHz, and 5 MHz	Step keys and knob change RBW in 1-3-10 sequence Maximum Span/RBW ratio is 5×10^7
Firmware Revision ≥ A.02.00	10 Hz to 200 kHz in 10% settability, 24 steps per decade, in the following sequence: 1.0, 1.1, 1.2, 1.3, 1.5, 1.6, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.6, 3.9, 4.3, 4.7, 5.1, 5.6, 6.2, 6.8, 7.5, 8.2, 9.1,10; and 240 kHz, 300 kHz, 510 kHz, 1 MHz, 3 MHz, 5 MHz	Step keys and knob change RBW in 1-3-10 sequence Maximum Span/RBW ratio is 5×10^7
Zero Span	3 kHz to 5 MHz in 1-3-5 sequence , 240 kHz, 1.2[a] MHz	
Accuracy (3 dB Bandwidth)		
RBW ≤ 200 kHz		
Zero Span		< 2% nominal
Span > 0		< 7% nominal
RBW = 240 kHz, 250 kHz[a], 300 kHz, 1 MHz, 3 MHz		
Zero Span		< 5% nominal
Span > 0		< 5% nominal
RBW = 5 MHz		
Zero Span		< 14% nominal
Span > 0		< 14% nominal
Selectivity (60 dB/ 3 dB bandwidth ratio)		Digital, Approximately Guasian shape
RBW ≤ 10 kHz		
Zero Span		< 6.5:1 nominal
Span > 0		< 8.4:1 nominal
10 kHz < RBW ≤ 200 kHz		
Zero Span		< 3:1 nominal

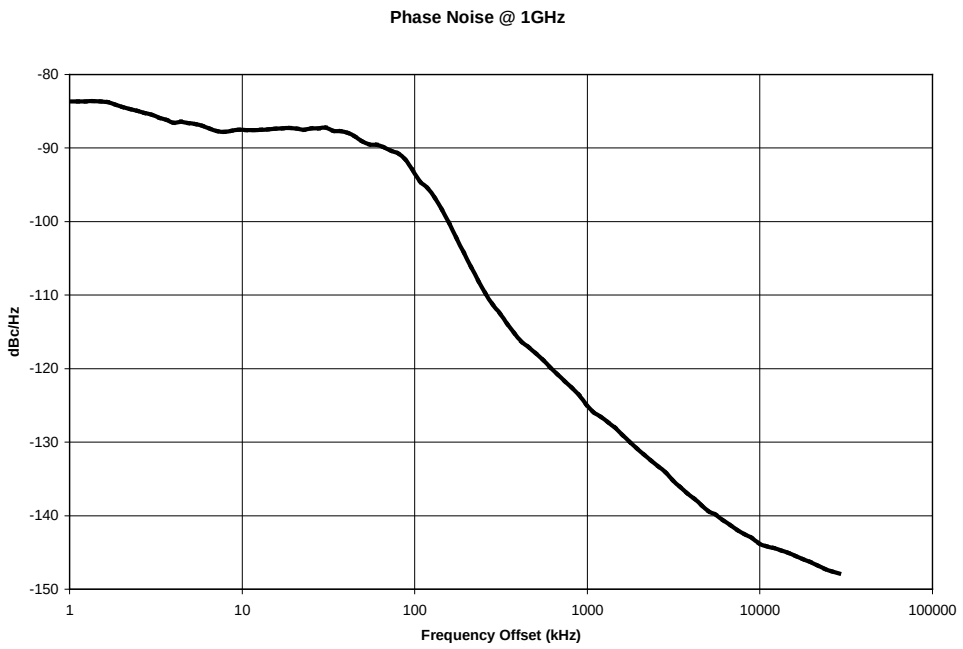
Span > 0 RBW ≥ 240 kHz[b] Zero Span Span > 0		< 8.4:1 nominal < 4.5:1 nominal < 4.5:1 nominal
Video Bandwidth (VBW) [c] Range Settability	 1 Hz to 8 MHz and 50 MHz (wide open) 1 Hz to 10 Hz in 1 Hz increments; 10 Hz to 3 MHz in 10% steps, 24 steps per decade, in the following sequence: 1.0, 1.1, 1.2, 1.3, 1.5, 1.6, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.6, 3.9, 4.3, 4.7, 5.1, 5.6, 6.2, 6.8, 7.5, 8.2, 9.1,10; and 4, 5, 6, 8 and 50 MHz	 RBW dependent

a. For firmware revision <A.02.00, the 240 kHz and 1.2 MHz RBWs are replaced by the 250 kHz and 1.25 MHz RBWs, respectively.
b. For firmware revision <A.02.00, the 240 kHz RBW is replaced by the 250 kHz RBW.
c. Video Bandwidth (VBW) is only available in firmware revisions ≥A.02.00

Description	Specification	Supplemental Information
Stability		
Noise Sidebands		
10 kHz offset		
<500 MHz		<–83 dBc/Hz typicsl
500 MHz to 2.5 GHz		<–85 dBc/Hz typical
2.5 GHz to 6 GHz		<–82 dBc/Hz typical
1 MHz offset		
10 MHz to 2.2 GHz		–124 dBc/Hz nominal
2.7 GHz to 4.8 GHz)		–124 dBc/Hz nominal
10 MHz to 6 GHz		–122 dBc/Hz nominal
Residual FM		<15 Hz p-p in 1 sec, 1 GHz center freq, 10 Hz RBW, internal ref[a], characteristic

a. Performance typically degrades when using an external reference

Nominal Phase Noise at 1 GHz



Amplitude

Description	Specification	Supplemental Information
Measurement Range	Displayed Average Noise Level to Maximum Safe Input Level	
Input Attenuator Range	0 to 40 dB in 1 dB steps	
Maximum Safe Input Level		
Average Continuous Power (Input attenuation ≥ 19 dB)	+33 dBm	
Peak Pulse Power (for < 10 µsec pulse width, <1% duty cycle, and input attenuation ≥ 19 dB)	+40 dBm	
DC	50 Vdc	
1-dB Gain Compression (Two-tone test, spacing >15 MHz)		
Input Level, 0 dB Attenuation		
Preamplifier Off		13 dBm at 1 GHz, nominal
Preamplifier On *(Options P03/P06)*		–10 dBm at 1 GHz, nominal
ADC Over Range		
Maximum mixer level[a]		–3 dBm at 1 GHz characteristic[b]

a. Input mixer level = RF input level – input attenuation + preamplifier gain
b. ADC over range limit will vary with frequency.

Description	Specification	Supplemental Information
Displayed Average Noise Level (DANL)		
(10 Hz RBW, VBW auto coupled[a], 50 Ω termination on input, 0 dB attenuation, sample detector, 25 averages)		
100 kHz to 500 kHz		< –80 dBm nominal
500 kHz to 1 MHz	< -95 dBm	
1 MHz to 10 MHz	< -110 dBm	
10 MHz to 50 MHz	< -125 dBm	
50 MHz to 2.7 GHz	< –123 + 3.79 × (frequency in GHz – 1 GHz)	< –128 + 3.79 × (frequency in GHz – 1 GHz) typical
2.7 GHz to 6 GHz	< –125 + 3.37 × (frequency in GHz – 2.7 GHz)	< –131 + 3.37 × (frequency in GHz – 2.7 GHz) typical
Preamplifier On *(Options P03/P06)*		
100 kHz to 500 kHz		< –90 dBm nominal
500 kHz to 1 MHz	< -115 dBm	
1 MHz to 10 MHz	< -130 dBm	
10 MHz to 50 MHz	< -145 dBm	
50 MHz to 2.7 GHz	< –143 + 3.66 × (frequency in GHz – 1 GHz)	< –146 + 3.66 × (frequency in GHz – 1 GHz) typical
2.7 GHz to 6 GHz	< –141 + 2.63 × (frequency in GHz – 2.7 GHz)	< –145 + 2.63 × (frequency in GHz – 2.7 GHz) typical
Display Range		
Log Scale	Ten divisions displayed; 1 dB/div to 20 dB/div in 1 dB steps	
Linear Scale	Ten divisions	
Scale Units	dBm, dBmV, dBμV, W, V, A	
Marker Readout Resolution		
Log Scale	±0.01 dB	
Linear Scale	±0.01 % of ref level	

a. Video BW (VBW) is only available with firmware revisions ≥ A.02.00.

Description	Specification	Supplemental Information
Reference Level		
Range	100 dBm to –150 dBm	
Resolution		
Log Scale	0.1 dB	
Linear Scale	0.2 % of reference level	
Accuracy	0 dB[a]	

Description	Specification	Supplemental Information
Frequency Response[b]		
(relative to 50 MHz, 10 dB attenuation)		
100 kHz to 250 kHz		
20 to 30 °C	±1.50 dB	
0 to 55 °C	±1.61 dB	
250 kHz to 10 MHz		
20 to 30 °C	±0.70 dB	
0 to 55 °C	±0.75 dB	
10 MHz to 1 GHz		
20 to 30 °C	±0.44 dB	
0 to 55 °C	±0.53 dB	
1 GHz to 2.7 GHz		
20 to 30 °C	±0.60 dB	
0 to 55 °C	±0.88 dB	
2.7 GHz to 3 GHz		
20 to 30 °C	±0.69 dB	
0 to 55 °C	±1.20 dB	
3 GHz to 6 GHz		
20 to 30 °C	±1.12 dB	
0 to 55 °C	±1.60 dB	

a. Because reference level affects only the display, not the measurement, it causes no additional error in measurement results from trace data or markers.

b. For 240 kHz to 3 MHz RBW, add the following uncertainty: ± 1.2 × A^2, where A = Span/(100 × RBW) , maximum 0.5. Specification does not apply for RBW = 5 MHz.

Description	Specification	Supplemental Information
Scale Fidelity		
(relative to the reference condition of –10 dBm at the input mixer)		
Input Mixer Level[a]		
–10 dBm to –80 dBm		
20 to 30 °C	±0.20 dB	
0 to 55 °C	±0.25 dB	
Bandwidth Switching Uncertainty		
(at tuned frequency, 10 Hz to 3 MHz RBW, referenced to 1 kHz RBW)		
20 to 30 °C	±0.32 dB	
0 to 55 °C	±0.45 dB	
Attenuator Switching Uncertainty		
(relative to the 10 dB attenuator setting)		< 0.18 dB nominal
Absolute Amplitude Accuracy		
(peak detector, preamplifier off, input signal 0 dBm to –50 dBm, 10 dB Attenuation, 1 kHz RBW)		
At 50 MHz reference		
20 to 30 °C	± 0.38 dB	
0 to 55 °C	± 0.60 dB	

a. Input mixer level = RF input level – input attenuation + preamplifier gain

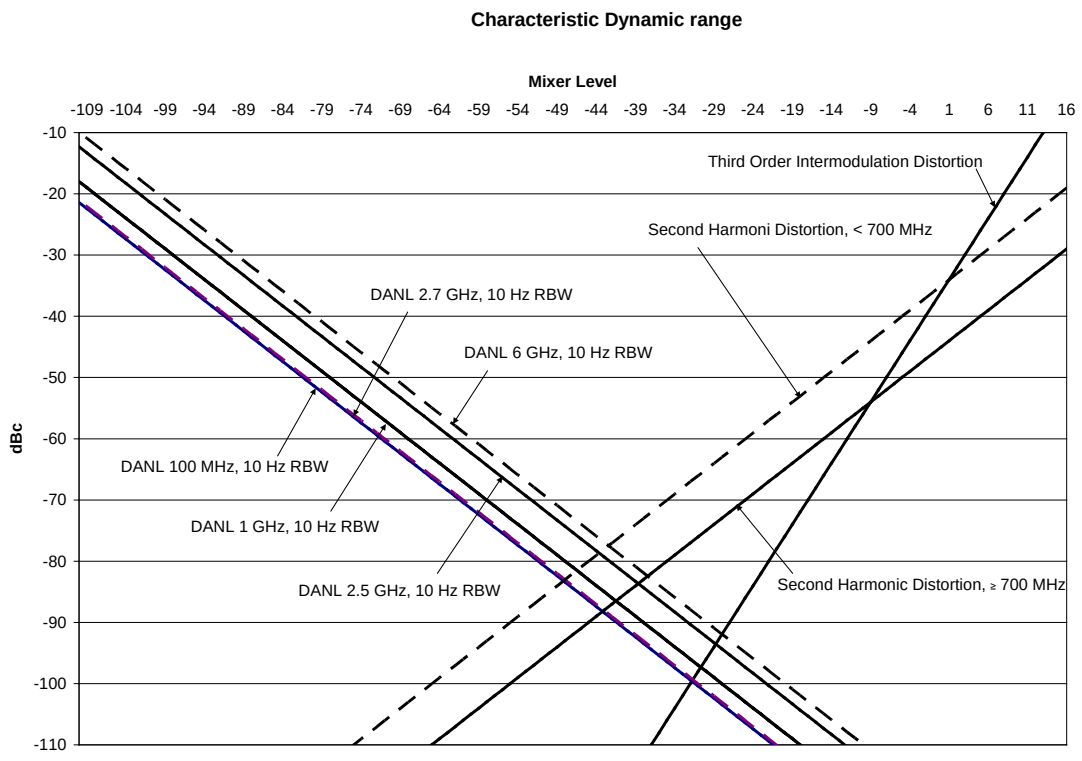
Description	Specification	Supplemental Information
Overall Amplitude Accuracy		
(peak detector, preamplifier off, input signal 0 dBm to –50 dBm, 10 dB Attenuation, RBW < 3 MHz)		
20 to 30 °C		
100 kHz to 250 kHz	± 2.40 dB	
250 kHz to 10 MHz	± 1.54 dB	
10 MHz to 1 GHz	± 1.34 dB	
1 GHz to 2.7 GHz	± 1.51 dB	
2.7 GHz to 3 GHz	± 1.60 dB	
3 GHz to 6 GHz	± 2.02 dB	
0 to 55 °C		
100 kHz to 250 kHz	± 3.00 dB	
250 kHz to 10 MHz	± 2.03 dB	
10 MHz to 1 GHz	± 1.83 dB	
1 GHz to 2.7 GHz	± 2.18 dB	
2.7 GHz to 3 GHz	± 2.50 dB	
3 GHz to 6 GHz	± 2.90 dB	
95% Confidence Absolute Amplitude Uncertainty[a]		
(20 to 30 °C degrees, peak detector, preamplifier off, input signal 0 dBm to –50 dBm, RBW ≤ 3 MHz)		
10 MHz to 1 GHz		± 0.53 dB
1 GHz to 2.7 GHz		± 0.59 dB
2.7 GHz to 3 GHz		± 0.64 dB
3 GHz to 6 GHz		± 0.76 dB

a. Absolute Amplitude Accuracy for a wide range of signal and measurement settings, with 95% confidence, attenuation settings and frequency ranges shown. The value given is computed from the observations of a statistically significant number of instruments. The computation includes the root-sum-squaring of these terms: the absolute amplitude accuracy observed at 50 MHz, the frequency response relative to 50 MHz, RBW switching uncertainty, the attenuation switching uncertainty relative to 10 dB at 50 MHz, and the measurement uncertainties of these observations.
To that root-sum-squaring result is added the environmental effects of 20 to 30 °C variation. The 95th percentiles are determined with 95% confidence.

Description	Specification	Supplemental Information
RF Input VSWR		
(at tuned frequency)		
Attenuator Setting		
10 dB		
100 kHz to 1 GHz		≤ 1.2:1 nominal
1 GHz to 4 GHz		≤ 1.4:1 nominal
4 GHz to 6 GHz		≤ 1.8:1 nominal
≥ 19 dB		
100 kHz to 1.7 GHz		≤ 1.2:1 nominal
1.7 GHz to 4 GHz		≤ 1.3:1 nominal
4 GHz to 6 GHz		≤ 1.6:1 nominal
Second Harmonic Distortion		
(Measurement conditions:)		
<700 MHz		< –60 dBc for –30 dBm signal at input mixer, +30 dBm SHI, nominal
>700 MHz		<–75 dBc for –30 dBm signal at input mixer, +45 dBm SHI, nominal
Third Order Intermodulation Distortion (TOI)		+18 dBm (nominal)
Residual Responses		< –90 dBm, nominal with exceptions as noted
(0 dB input attenuation, no signal at input, input terminated in 50Ω)		
For frequency = 10 MHz × N, where N = integer from 1 to 40		< –70 dBm, nominal

Description	Specification	Supplemental Information
Spurious Responses		< –60 dBc, nominal with exceptions as noted below, internal betteries not being charged.
Input Mixer level –10 dBm		
First IF Image Response		
RFsig=RFtune + 2 × 3435 MHz for RFtune 1.7 to 2.7 GHz		< –55 dBc, nominal
RFsig=RFtune + 2 × 765 MHz for RFtune > 2.7 GHz		< –55 dBc, nominal
Highband ½ IF Spur		
RFsig=RFtune + 765 MHz/2 for RFtune > 2.7 GHz		< –50 dBc, nominal
First IF Subharmonic		
RFsig=3435 MHz/2		< –40 dBc, nominal

Nominal Dynamic Range



Power Measurements

Description	Specification		Supplemental Information
Channel Power			
Accuracy (average detector, preamplifier off, input signal 0 dBm to –50 dBm, 10 dB Attenuation)			
20 to 30 °C	**RBW ≤ 200 kHz**	**200 kHz < RBW < 3 MHz**	
100 to 250 kHz	±2.69 dB	±2.57 dB	
250 kHz to 10 MHz	±1.83 dB	±1.71 dB	
10 MHz to 1 GHz	±1.63 dB	±1.51 dB	
1 GHz to 2.7 GHz	±1.80 dB	±1.68 dB	
2.7 GHz to 3 GHz	±1.89 dB	±1.77 dB	
3 GHz to 6 GHz	±2.31 dB	±2.19 dB	
0 to 55 °C			
100 to 250 kHz	±3.29 dB	±3.17 dB	
250 kHz to 10 MHz	±2.32 dB	±2.20 dB	
10 MHz to 1 GHz	±2.12 dB	±2.00 dB	
1 GHz to 2.7 GHz	±2.47 dB	±2.35 dB	
2.7 GHz to 3 GHz	±2.79 dB	±2.67 dB	
3 GHz to 6 GHz	±3.19 dB	±3.07 dB	
Occupied Bandwidth (OBW)			
Frequency Accuracy ($0.70 \times \text{Span} < \text{OBW} < 0.90 \times \text{Span}$; $\text{RBW} \leq \text{Span} / 100$)			±(OBW indication × frequency reference accuracy + 2% × RBW + 2.0 × horizontal resolution + 0.5 digit) nominal
Power Accuracy (using average detector)			±3.19 dB nominal
Adjacent Channel Power (ACP)			
Dynamic Range			
W-CDMA with 1 DCPH			

5 MHz offset		-60 dBc nominal
10 MHz offset		-62 dBc nominal
W-CDMA with Test Model 1		
5 MHz offset		-59 dBc nominal
10 MHz offset		-60 dBc nominal
Accuracy		
ACPR ≥-40 dBc		±0.27 dB nominal
-40 dBc > ACPR ≥-45 dBc		±0.30 dB nominal
-45 dBc > ACPR ≥-50 dBc		±0.49 dB nominal
-50 dBc > ACPR ≥-55 dBc		±1.22 dB nominal

Hardware Options

Description	Specification	Supplemental Information
Preamplifier ***(Options P03/P06)***		
Frequency Range		
Option P03	100 kHz to 3 GHz	
Option P06	100 kHz to 6 GHz	
Gain		22 dB (nominal) 1 MHz to 2.7 GHz 18 dB (nominal) > 2.7 GHz

General

Description	Specification	Supplemental Information
Calibration Cycle	1 year	
Environmental Conditions		
Operating		This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010 664 resopectively.
Altitude	3000 Meters	
Temperature Range		
Operating		
AC Power	0 to 40°C	
Battery Power	0 to 50°C	
Storage	–40 to 70 °C	
Battery	–20 to 60 °C, ≤ 80%RH	The battery packs should be stored in an environment with low humidity, free from corrosive gas at a recommended temperature range <21°C. Extended exposure to temperatures above 45°C could degrade battery performance and life.
Acoustic Emissions (ISO 7779)	< 55 dBA	
EMI Compatibility		
Radiated Emissions	CISPR 11, Class A	
Conducted Emissions	CISPR 11, Class A	
Immunity Testing		
Radiated Immunity	IEC/EN 61000-4-3	Performance criterion A
Conducted Immunity	IEC/EN 61000-4-6	Performance criterion A
ESD Immunity	IEC/EN 61000-4-2	Performance criterion B
Power Requirements	Dual battery or Agilent supplied power adaptor (150W)	Approx. 2 ½ hours battery operation

Description	Specification	Supplemental Information
Data Storage		2 MB for user states and traces
Display	8.4” color XGA TFT-LCD	1024 x 768 with anti-glare coating
Weight		
Without batteries	7.5 kg	Not including power adapter (power adapter weight 0.9 kg)
With two batteries and impact cover installed	8.5 kg	
Cabinet Dimensions		
(H × W × D)		
Without bumpers or handle	177 × 426 × 200 mm	
With bumpers and handle in carry position	200 × 481 × 420 mm	
With bumpers and handle in storage position	223 × 481 × 248 mm	

Front Panel Inputs & Outputs

Description	Specification	Supplemental Information
RF Input		
Connector	Type N, female	
Impedance		50 Ω nominal
LO Emissions		
Preamp Off, 0 dB attenuation		<–50 dBm, nominal
Preamp On, 20 dB attenuation		<–75 dBm, nominal
Probe Power Output	+15 V at 150 mA –12 V at 150 mA	
Tracking Generator Output		
Connector	Type N, female	
Impedance		50 Ω nominal
USB		
USB-A (2 ports)	USB 1.1 (full speed)	Low-power devices only

Rear Panel Inputs & Outputs

Description	Specification	Supplemental Information
USB-A		
USB-A (1 port)	USB 1.1	Low-power devices only
USB-B (1 port)	USB 1.1	Reserved for future use
LAN	10/100 base T RJ-45 connector	
Timing LAN Opt		Reserved for future use
10 MHz Reference Out		
Connector	BNC female	
Level		+5 dBm, 50 Ω nominal, AC coupled
External Reference Input		
Connector	BNC female	
Input Frequency	1 MHz, 2.048 MHz, 4.95 MHz, 10 MHz, 13 MHz, 15 MHz, 19.6608 MHz, 0.5 Hz (even second clock)	
Input Amplitude Range		
1 MHz to 19.6608 MHz		–5 dBm to +10 dBm nominal
0.5 Hz		TTL levels nominal
Impedance		
1 MHz to 19.6608 MHz		50 Ω nominal
0.5 Hz		10 kΩ nominal
Lock Range		±10ppm of selected external frequency
Lock Time		15 seconds, 30 seconds for Even second clock

Description	Specification	Supplemental Information
External Trigger Input		
Connector	BNC female	
Impedance		10 kΩ nominal
Trigger Level		
Rising Edge		1.7 V nominal
Falling Edge		1.0 V nominal
Trigger Slope	Rising/falling edge selectable	
GPS Antenna Input		Reserved for future use
Kensington Security Slot		To prevent unauthorized removal of the spectrum analyzer, you can use a Kensington Slim MicroSaver security cable to attach the analyzer to an immovable object. Your spectrum analyzer has a Kensington Security Slot located on the instrument rear panel. For more information, visit www.microsaver.com.

Regulatory Information

This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010 and 664 respectively.

This product has been designed and tested in accordance with IEC Publication 61010, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

CE	The CE mark is a registered trademark of the European Community (if accompanied by a year, it is the year when the design was proven).
	The CSA mark is the Canadian Standards Association safety mark.
ISM 1-A	This is a symbol of an Industrial Scientific and Medical Group 1 Class A product. (CISPR 11, Clause 4)
	This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/ electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a "Monitoring and Control instrumentation" product. ***Do not dispose in domestic household waste.*** ***To return unwanted products, contact your local Agilent office, or see* www.agilent.com/environment/product/ *for more information.*** **www.agilent.com/environment/product/**

Compliance with German Noise Requirements

Acoustic Noise Emission/Geraeuschemission	
LpA <70 dB	LpA <70 dB
Operator position	Am Arbeitsplatz
Normal position	Normaler Betrieb
Per ISO 7779	Nach DIN 45635 t.19

Compliance with Canadian EMC Requirements

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme a la norme NMB du Canada.

Declaration of Conformity

A copy of the Manufacturer's European Declaration of Conformity for this instrument can be obtained by contacting your local Agilent Technologies sales representative.

2 Stimulus Response Measurement Suite *(N8995A)*

Stimulus/Response [a]

Description	Specification	Supplemental Information
Frequency Range		
N8995A-SR3 or N1996A-TG3	10 MHz to 3 GHz	
N8995A-SR6 or N1996A-TG6	10 MHz to 6 GHz	
Directivity		
Uncorrected		
10 MHz to 3 GHz		25 dB nominal
3 GHz to 6 GHz		20 dB nominal
Corrected (using option SRK, Stimulus Response Calibration Kit)		
10 MHz to 2 GHz		> 49 dB nominal
2 GHz to 3 GHz		> 46 dB nominal
3 GHz to 6 GHz		> 40 dB nominal
Source match (RF Output)		
Uncorrected		
10 MHz to 3 GHz		20 dB, nominal
3 GHz to 6 GHz		15 dB, nominal
Corrected (using option SRK, Stimulus Response Calibration Kit)		
10 MHz to 2 GHz		34 dB, nominal
2 GHz to 3 GHz		31 dB, nominal
3 GHz to 6 GHz		27 dB, nominal
Frequency Resolution		60 Hz nominal

a. For firmware revisions ≤ A.01.99, you must also have either N1996A Option TG3 or N1996A Option TG6. These options provide the tracking generator hardware and VSWR bridge necessary to make these measurements. The N8995A is the only means of controlling the tracking generator hardware. For firmware revisions ≥ A.02.00, N8995A-SR3 and N8995A-SR6 provide the equivalent functionality

Description	Specification	Supplemental Information
Return Loss (RF Output)		
(≥ 4 averages)		
Range		Return Loss VSWR
10 MHz to 2 GHz		> 49 dB nominal, < 1.01:1
2 GHz to 3 GHz		> 46 dB nominal < 1.01:1
3 GHz to 6 GHz		> 40 dB nominal < 1.02:1
Resolution	0.1 dB	
Display Range	–5 dB to +150 dB	
SWR Range	1 to 500	
Accuracy (using Stimulus/Response Calibration Kit, Option SRK, and calibration and measurement performed over the same frequency range and at the same reference plane)		(nominal)
Range		< 2 GHz < 3 GHz < 6 GHz
Return loss from 5 dB to 10 dB		± 0.2 dB ± 0.2 dB ± 0.4 dB
Return loss from 10 dB to 20 dB		± 0.3 dB ± 0.5 dB ± 0.9 dB
Return loss from 20 dB to 30 dB		± 0.9 dB ± 1.3 dB ± 2.4 dB

Description	Specification	Supplemental Information
Insertion Loss		
Dynamic Range		
(source level set to –15 dBm)		
10 MHz to 3 GHz		> 70 dB nominal
3 GHz to 5 GHz		> 50 dB nominal
5 GHz to 6 GHz		> 25 dB nominal
Source Level Range	–15 dBm to –30 dBm	
Accuracy due to limited isolation		
Frequency Range		< 3 GHz < 5 GHz < 6 GHz
DUT[a] Insertion Loss 10 dB		± 0.0 dB ± 0.1 dB ± 1.4 dB
DUT[a] Insertion Loss 20 dB		± 0.0 dB ± 0.3 dB ± 3.9 dB
DUT[a] Insertion Loss 30 dB		± 0.1 dB ± 0.8 dB
DUT[a] Insertion Loss 40 dB		± 0.3 dB ± 2.4 dB
DUT[a] Insertion Loss 50 dB		± 0.8 dB
Accuracy due to imperfect match		
Frequency Range		< 3 GHz < 6 GHz
DUT[a] Return Loss 5 dB		± 1.0 dB ± 1.6 dB
DUT[a] Return Loss 10 dB		± 0.5 dB ± 0.9 dB
DUT[a] Return Loss 20 dB		± 0.2 dB ± 0.3 dB
DUT[a] Return Loss 30 dB		± 0.1 dB ± 0.1 dB
Distance to Fault (Port 1)		
Range	1 m to 300 m	
Resolution		$(1.5\times10^8) \times (VF) \times /(f_2–f_1)$ Hz[b], typically 1% of measurement distance
VSWR	1 to 500	

a. Device Under Test
b. VF is the relative propagation velocity of the cable; f_1 and f_2 are the start and stop frequencies, respectively.

3 AM/FM Modulation Analysis Measurement Suite *(N8996A)*

This chapter contains specifications for the N8996A AM/FM Modulation Analysis using the Agilent CSA including options:

- Option 1FP AM/FM analysis

AM Demodulation

Description	Specification	Supplemental Information
Input Power Range	-50 to +30 dBm with Auto-range On	
Carrier Frequency Range		
Option 503	100 kHz to 3 GHz	
Option 506	100 kHz to 6 GHz	
Demodulation Bandwidth	≤ 5MHz	(2 × Max. Mod. Rate) ≤ Max Demod BW
Max Capture Memory		160k samples
Max Capture Time		
Demodulation bandwidth (Max. capture time = Capture memory/Sample Rate)		Sampling rate / Max. measurement time
5 MHz		7.5 MHz / 21.845 ms
3 MHz		7.5 MHz / 21.845 ms
1.25 MHz		2.5 MHz/ 65.536 ms
1.0 MHz		2 MHz / 81.92 ms
500 kHz		1 MHz /163.84 ms
300 kHz		600 kHz / 273.067 ms
250 kHz		500 kHz / 327.68 ms
100 kHz		200 kHz / 819.2 ms
50 kHz		100 kHz / 1638.4 ms
30 kHz		60 kHz / 2730.7 ms
10 kHz		20 kHz / 8192.0 ms
5 kHz		10 kHz / 16.384 s
3 kHz		6 kHz / 27.3067 s
Modulation Rate Range[a]		
100 kHz ≤ f_c < 10 MHz	20 Hz to 10 kHz	
10 MHz ≤ f_c< 3/6 GHz	50 Hz to 200 kHz	

a. When the carrier frequency f_c is equal or less than 2.6 MHz, to avoid the image that appears in the IF corresponding to the negative of signal frequency, the f_c and IFBW must be chosen to satisfy IFBW<2 × (f_c-100 kHz)

Description			Specification	Supplemental Information
Modulation Rate Accuracy				
Modulation Rate < 1 kHz				1 Hz nominal
Modulation rate >= 1 kHz				< 0.1% nominal
Modulation Depth Range[a]			0 to 100%	
AM Depth Accuracy[b,c]				± 3% of reading nominal
Modulation Distortion Floor[d]				
Carrier Frequency	Modulation Rates	AM Depth		
250 kHz to 10 MHz	400 Hz	1% to 3%		< 1.5% nominal
10 MHz to 3/6 GHz	400 Hz	1% to 3%		< 2% nominal
250 kHz to 10 MHz, 10 MHz to 3/6 GHz	400 Hz	> 3%		< 0.6% nominal
250 kHz to 10 MHz, 10 MHz to 3/6 GHz	1 kHz	1% to 3%		< 2.5% nominal
250 kHz to 10 MHz, 10 MHz to 3/6 GHz	1 kHz	> 3%		< 0.7% nominal
Residual AM (50 Hz to 3 kHz BW)				< 0.1% (rms) nominal
Detectors				Available: +peak, -peak, ±peak/2, rms
Burst/Sync Search			None, RF Amplitude	
SINAD Accuracy				± 1 dB

a. This is range over which AM depth measurements may be made. The accuracy characteristic applies only over the 0.5% to 99% range.

b. For peak measurements only: AM accuracy may be affected by distortion generated by the spectrum analyzer. In the worst case this distortion can decrease accuracy by 0.1% of reading for each 0.1 % of distortion.

c. If the measured AM depth is <2%, set IFBW to Manual rather than Auto for better results.

d. The minimum IFBW (3 kHz) is used for distortion measurement.

FM Demodulation

Description	Specification	Supplemental Information
Input Power Range	-50 to +30 dBm with Auto-range ON	
Carrier Frequency Range		
Option 503	100 kHz to 3 GHz	
Option 506	100 kHz to 6 GHz	
Demodulation Bandwidth[a]	≤ 5MHz	
Max Capture Memory		160k samples
Max Capture Time		
Demoluation bandwidth		Sampling rate / Max. measurement time
5 MHz		7.5 MHz / 21.845 ms
3 MHz		7.5 MHz / 21.845 ms
1.25 MHz		2.5 MHz/ 65.536 ms
1.0 MHz		2 MHz / 81.92 ms
500 kHz		1 MHz / 163.84 ms
300 kHz		600 kHz / 273.067 ms
250 kHz		500 kHz / 327.68 ms
100 kHz		200 kHz / 819.2 ms
50 kHz		100 kHz / 1638.4 ms
30 kHz		60 kHz / 2730.7 ms
10 kHz		20 kHz / 8192.0 ms
5 kHz		10 kHz / 16.384 s
3 kHz		6 kHz / 27.3067 s
Modulation Rate Range		
100 kHz ≤ f_c < 10 MHz	20 Hz to 10 kHz	
10 MHz ≤ f_c< 3/6 GHz	50 Hz to 200 kHz	

a. When the carrier frequency f_c is equal or less than 2.6 MHz, to avoid the image that appears in the IF corresponding to the negative of signal frequency, the f_c and IFBW must be chosen to satisfy IFBW<2 × (f_c-100 kHz)

Description		Specification	Supplemental Information
Modulation Rate Accuracy			
0.2 ≤ β ≤ 100, deviation ≤ 400 kHz	Modulation rate < 1 kHz		1 Hz nominal
	Modulation rate >= 1 kHz		< 0.1% nominal
Peak Deviations			
100 kHz ≤ f_c ≤ 10 MHz		Max 40 kHz	
10 MHz ≤ f_c ≤ 3/6 GHz		Max 400 kHz	
FM Deviation Accuracy[a],			

Frequency range	Modulation Rate	Peak Deviation	β[b]		
200 kHz to 10 MHz	20 Hz to 10 kHz	≤ 40 kHz	> 0.2		± 3% of reading, nominal
10 MHz to 3/6 GHz	50 Hz to 200 kHz	≤ 400 kHz	> 0.5		± 3% of reading, nominal

Modulation Distortion Floor[c]				
Carrier Frequency	Modulation Rates	Deviation		
250 kHz to 10 MHz	400 Hz or 1 kHz	1 kHz or 3 kHz		< 1% nominal
10 MHz to 3/6 GHz	400 Hz or 1 kHz	1 kHz or 3 kHz		< 0.9% nominal

Detectors		Available: +peak, -peak, ±peak/2, rms
Burst/Sync Search	None, RF Amplitude	
SINAD Accuracy[d] (Meas Filter On and β > 1)[e]		± 1 dB nominal

a. The peak deviations that the system is capable of measuring are governed by the instrument's IFBW (Information Bandwidth) setting. The relationship is described by the equation Peak deviation (in Hz) = IFBW/2 – modulation rate. If the measured frequency deviation β<1, set IFBW to manual rather than auto to help satisfy this equation and yield better results.

b. β is the ratio of frequency deviation to modulation rate (deviation/rate).

c. If IFBW is greater than 3 kHz, Meas Filter must be On and the Demod Spectrum Span must be set to 3 kHz.

d. Measured distortion must be greater than 3% for the FM SINAD accuracy to apply. For distortions less than 3%, the noise floor of the analyzer will begin to affect the accuracy of the measurement.

e. SINAD accuracy will degrade when measuring signals with β ≤ 1. When measuring signals with β ≤ 1, some improvement may be possible by adjusting the Demod Spectrum Span (the span setting in the Demod Spectrum measurement controls the low-pass cutoff frequency of the measurement filter).