Agilent N9344C Handheld Spectrum Analyzer (HSA)

1 MHz to 20 GHz (tunable to 9 kHz)

Data Sheet

Field testing just got easier

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If you are making measurements in the field, the Agilent N9344C handheld spectrum analyzer (HSA) makes your job easier. It's got the features you need for operating in tough field environments, and its measurement performance gives you confidence the job's been done right. The N9344C HSA lets you automate routine tasks to save time and ensure consistent results. Field testing just got easier with the Agilent N9344C HSA.

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Your job just got easier:

- Get the features you need in a **field-ready** instrument.
- Gain confidence in your measurements with **benchtop** performance in a handheld instrument.
- Innovative **task planner** (www.agilent.com/find/taskplanner) reduces test setup time by 95%, delivers test automation and consistency, and makes it easy to capture test results, generate reports, and share task plans with others.

Definitions and requirements

This data sheet contains specifications and supplemental information for Agilent N9344C handheld spectrum analyzer. The differences between specifications, typical performance, and nominal values are described as follows.

Definitions

"Specifications" describe the performance of parameters covered by the product warranty and apply to temperatures ranging from -10 to 50 °C, unless otherwise noted.

95th percentile values indicate the breadth of the population (> 2) of performance tolerances expected to be met in 95% of the cases with a 95% confidence, for any ambient temperature in the range of 20 to 30 °C. In addition to the statistical observations of a sample of instruments, these values include the effects of the uncertainties of external calibration references. These values are not warranted. These values are updated occasionally if a significant change in the statistically observed behavior of production instruments occurs.

"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 of 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.

Conditions required to meet specifications

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

- The analyzer is within its calibration cycle.
- Under auto couple control, except when Swp Time Rule is set to Accuracy.
- Any analyzer that has been stored at a temperature range inside the allowed storage range but outside the allowed operating range must be stored at an ambient temperature within the allowed operating range for at least two hours before being turned on.
- The analyzer has been turned on at least 30 minutes.

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 (NIST), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization (ISO) members.

Specifications

Specification			Supplemental information
Frequency			
Frequency range		1 MHz to 20 GHz (tunable to 9 kHz)	AC coupled
Internal 10 MHz frequency reference accuracy			
Aging rate		± 1 ppm/year	
Temperature stability		± 1 ppm	Referenced to frequency reading at 25 °C. Temperature varied at max. of 2 °C per minute. Control voltage held at voltage control range midpoint
Frequency readout accuracy with marker (start, stop, center, marker)			
Marker resolution		(frequency span)/(sweep points - 1)	
Uncertainty		± (frequency indication × frequency reference uncertainty + 1% × span + 20% × resolution bandwidth + marker resolution + 1 Hz)	Frequency reference uncertainty = (aging rate x period of time since adjustment + temperature stability)
Marker frequency counter			
Resolution		1 Hz	
Accuracy		± (marker frequency × frequency reference uncertainty + counter resolution)	RBW/span ≥ 0.02; marker level to displayed noise level > 25 dB; frequency offset 0 Hz
Frequency span			
Range		0 Hz (zero span), 100 Hz to 20 GHz	
Resolution		1 Hz	
Accuracy		± (0.22% x span + span/(sweep points - 1))	Nominal
SSB phase noise			
Carrier offset	30 kHz	< -86 dBc/Hz, typical -89 dBc/Hz	20 to 30 °C
	100 kHz	< -97 dBc/Hz, typical -99 dBc/Hz	Center frequency 500 MHz
	1 MHz	< -115 dBc/Hz, typical -119 dBc/Hz	
Resolution bandwidth (RBW)			
-3 dB bandwidth		10 Hz to 3 MHz	1-3-10 sequence
Accuracy		± 5%, RBW = 10 Hz to 1 MHz	Nominal
		± 10%, RBW = 3 MHz	
Resolution filter shape factor		< 5:1	Nominal; 60 dB/3 dB bandwidth ratio; digital, Gaussian-like
Video bandwidth (VBW)			
-3 dB bandwidth		1 Hz to 3 MHz	1-3-10 sequence
Accuracy		± 10%, VBW = 1 Hz to 1 MHz	Nominal

Specifications (continued)

Amplitude specifications			Supplemental information
Measurement range			
1 to 500 MHz		Displayed average noise level (DANL) to +10 dBm	Preamp off
500 MHz to 20 GHz		Displayed average noise level (DANL) to +20 dBm	
Input attenuator range		0 to 50 dB, in 5 dB steps	
Maximum safe input level			
Average continuous power		+30 dBm, 3 minutes maximum	Input attenuator setting ≥ 20 dB, 1 MHz to 20 GHz
DC voltage		± 50 VDC maximum	
Displayed average noise level [1]			
Preamp off			
1 to 10 MHz		-125 dBm, typical -140 dBm	Reference level ≤ -50 dBm
10 MHz to 3 GHz		-137 dBm, typical -142 dBm	
3 to 7 GHz		-135 dBm, typical -140 dBm	
7 to 10 GHz		-139 dBm, typical -142 dBm	
10 to 13 GHz		-137 dBm, typical -140 dBm	
13 to 16 GHz		-136 dBm, typical -139 dBm	
16 to 18 GHz		-134 dBm, typical -139 dBm	
18 to 20 GHz		-126 dBm, typical -131 dBm	
Preamp on			
1 to 10 MHz		-140 dBm, typical -156 dBm	Reference level ≤ -70 dBm
10 MHz to 3 GHz		-150 dBm, typical -154 dBm	
3 to 6 GHz		-145 dBm, typical -150 dBm	
6 to 13 GHz		-151 dBm, typical -155 dBm	
13 to 16 GHz		-149 dBm, typical -153 dBm	
16 to 18 GHz		-147 dBm, typical -151 dBm	
18 to 20 GHz		-137 dBm, typical -142 dBm	
Level display range			
Log scale		10 to 100 dB, 10 divisions displayed, 1, 2, 5, 10 dB/division	
Linear scale		0 to 100%, 10 divisions displayed	
Scale units		dBm, dBmV, dBµV, W, V, dBmV EMF, dBµV EMF, V EMF	
Sweep (trace) points		461	
Marker level readout resolution	Log scale	0.01 dB	
	Linear scale	≤ 1% of signal level	Nominal
Detectors		Normal, positive peak, sample, negative peak, average (video, RMS, voltage)	
Number of traces		4	

1. RMS detector, trace averaging > 40, 0 dB input attenuation, input terminated 50 Ω, 1 kHz resolution bandwidth, normalized to 1 Hz, 20 to 30 °C.

Specifications (continued)

Amplitude specifications (continued)			Supplemental information
Level display range (continued)			
Trace functions		Clear/write, maximum hold, minimum hold, average	
Level measurement error	1 MHz to 7 GHz	Excluding input VSWR mismatch ± 1.3 dB	• 20 to 30 °C, 30 to 70% RH, peak detector, preamp off, input signal -50 to 0 dBm, 95% percentile • Swp Time Rule is set to Accuracy • Adds additional ± 0.3 dB when Swp Time Rule is set to Speed
	7 to 18 GHz	± 1.6 dB	
	18 to 20 GHz	± 1.8 dB	
Reference level [2]			
Setting range		-100 to +30 dBm	Steps of 1 dB
Setting resolution	Log scale	0.01 dB	
	Linear scale	Same as log (2.236 µV to 7.07 V)	
Accuracy		0	
RF input VSWR (at tuned frequency)			
1 MHz to 7 GHz		< 1.5:1	Nominal, ≥ 10 dB attenuation
7 to 18 GHz		< 2:1	
18 to 20 GHz		< 2.5:1	
Spurious response			
Second harmonic distortion		< -65 dBc, typical < -70 dBc, 50 MHz to 7 GHz	Mixer signal level at -30 dBm, input attenuation 0 dB, preamp off, 20 to 30 °C
		< -80 dBc, typical < -90 dBc, 7 to 20 GHz	
Third order intermodulation distortion (third order intercept)		+8 dBm, typical +9 dBm, 50 to 300 MHz	Two -20 dBm tones at input mixer, spaced by 100 kHz, input attenuation 0 dB, preamp off, reference level ≥ -30 dBm, 20 to 30 °C
		+9 dBm, typical +11 dBm, 300 MHz to 8 GHz	
		+10 dBm, typical +12 dBm, 8 to 13 GHz	
		+13 dBm, typical +15 dBm, 13 to 20 GHz	
Input related spurious		< -60 dBc, typical < -70 dBc	• -30 dBm signal at input mixer, span < 2.9 GHz • Exception: -55 dBc (2 x F1 = center frequency -5,890 MHz, 7 GHz < center frequency < 10 GHz, with F1 input frequency)
Inherent residual response		< -95 dBm, typical -110 dBm, 1 MHz to 7 GHz	Input terminated and 0 dB RF attenuation, preamplifier off
		< -85 dBm, typical -93 dBm, 7 to 20 GHz	

2. Reference level only affects the display not the measurement, so trace data markers do not cause additional errors in measurement results.

Specifications (continued)

Sweep specifications		Supplemental information
Sweep time		
Range	2 ms to 1000 s	Span ≥ 100 Hz
	600 ns to 200 s	Span = 0 Hz (zero span)
Sweep mode	Continuous, single	
Sweep time rule	Accuracy, speed	
Trigger source	Free run, video, external, RF burst	
Trigger slope	Selectable positive or negative edge	
Trigger delay	± 12 ms to ± 12 s	Nominal, span = 0 Hz (zero span)
Front panel input/output		**Supplemental information**
RF input		
Connector and impedance	Type-N female, 50 Ω	Nominal
10 MHz reference/external trigger input		
Reference input frequency	10 MHz	
Reference input amplitude	0 to +10 dBm	
Trigger voltage	5 V TTL level	Nominal
Connector	BNC female, 50 Ω	Nominal
Probe power		
Voltage/current		+15 Vdc, ± 7% at 0 to 150 mA (nominal)
		-12.6 Vdc, ± 10% at 0 to 150 mA (nominal)
		GND
Connectivity		
USB host	USB Type-A female, compatible with USB 2.0 full speed	
USB device	USB Type-mini AB female, compatible with USB 2.0 full speed	
LAN	RJ-45, 10 Base-T	
General specifications		**Supplemental information**
Display		
Resolution	640 pixels x 480 pixels	
Size and type	170 mm (6.5 in) TFT color display	
Languages		
On-screen GUI	English, Simplified Chinese, Traditional Chinese, French, German, Italian, Japanese, Korean, Russian, Spanish, Portuguese	

Specifications (continued)

General specifications (continued)		Supplemental information
Power requirements and calibration		
Adaptor voltage	100 to 240 V AC, 50 to 60 Hz	Auto-ranging
	15 V DC, 5.3 A, 80 W max	
Power consumption	16 W	Typical
Battery operating time (fully charged battery)	3.5 hours	Tracking generator off, preamplifier on
	3 hours	Tracking generator on, preamplifier on
Charging time	3 hours	
Life time	300 to 500 charge cycles	
Warm-up time	30 minutes	
Calibration cycle	One year	
Environmental and size		
Temperature range	-10 to +50 °C	Operating (battery: 0 to 50 °C)
	-40 to +70 °C	Storage (battery: -20 to 50 °C)
Relative humidity	< 95%	
Weight	3.2 kg (7 lbs)	Net (shipping) approximately, 3.6 kg (7.9 lbs) with battery
Dimensions	318 mm × 207 mm × 69 mm (12.5 in x 8.15 in x 2.7 in)	Approximately (W x H x D)

Option specifications		Supplemental information
Spectrum monitor (Option SIM)		
Display modes	Spectrogram	
	Spectrum trace	
	Combination of spectrogram and spectrum trace in one screen	
RF preamplifier (Option P20)		
Frequency range	1 MHz to 20 GHz	
Gain	15 dB	Nominal
Tracking generator (Option TG7)		
Frequency range	5 MHz to 7 GHz	
Output level	0 to -20 dBm	1 dB steps
VSWR	< 2.0:1	Nominal
Connector and impedance	Type-N female, 50 Ω	
AM/FM modulation analysis (Option AMA)		
Frequency range	10 MHz to 20 GHz	
Carrier power accuracy	< 7 GHz, ± 1.5 dB	Nominal
	7 to 18 GHz, ± 1.8 dB	Nominal
	18 to 20 GHz, ± 2.0 dB	Nominal
Carrier power range	-30 to +10 dBm	1 to 500 MHz
	-30 to +20 dBm	500 MHz to 20 GHz
Carrier power displayed resolution	0.01 dBm	

Specifications (continued)

Option specifications (continued)		Supplemental information
AM/FM modulation analysis (Option AMA) (continued)		
AM measurement		
Modulation rate	20 Hz to 100 kHz	
Accuracy	1 Hz	Nominal (modulation rate < 1 kHz)
	< 0.1% modulation rate	Nominal (modulation rate > 1 kHz)
Depth	5 to 95%	
Accuracy	± 4%	Nominal
FM measurement		
Modulation rate	20 Hz to 200 kHz	
Accuracy	1 Hz	Nominal (modulation rate < 1 kHz)
	< 0.1% modulation rate	Nominal (modulation rate > 1 kHz)
Depth	20 Hz to 400 kHz	
Accuracy	± 4%	Nominal
Time-gated spectrum analysis (Option TMG)		
Gated sweep		
Span range	Any span	
RBW range	> = 1 kHz	VBW is fixed and equal to RBW [3]
Gate delay range	200 ns to 10.0 s	200 ns resolution
Gate length range	200 ns to 10.0 s	200 ns resolution, 12 µs minimum
Gate sources	External	
	RF burst	
	Periodic timer	• Sync sources include free, external, and RF burst • Period: 0 to 20.0 s (*It should be greater than gate delay plus gate length)* • Offset: -5 to +5 s
RF burst		
Level range		-60 to -20 dBm plus attenuation (nominal)
Bandwidth (-10 dB)		8 MHz (nominal)
Frequency limitations		If the start or center frequency is too close to zero, LO feedthrough can degrade or prevent triggering. How close is too close depends on the bandwidth

3. For efficiency and convenience, RBW is restricted to be equal to or greater than 1 kHz and VBW is restricted to be equal to RBW.

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Revised: June 8, 2011

Product specifications and descriptions in this document subject to change without notice.

Printed in USA, August 1, 2011
5990-7193EN

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