

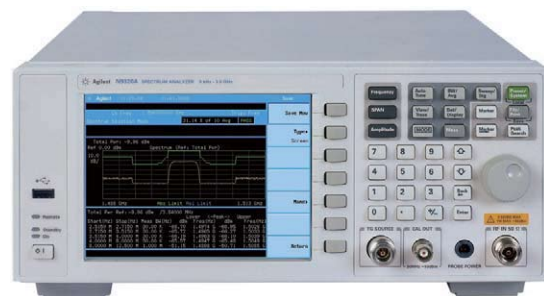
## Agilent N9320A Spectrum Analyzer

### Technical Overview

- 9 kHz to 3 GHz range
- 10 Hz to 1 MHz RBW
- -148 dBm DANL with pre-amp
- +13 dBm third-order intercept



All the essentials of an  
Agilent spectrum analyzer  
with a price/performance  
that's easy to afford

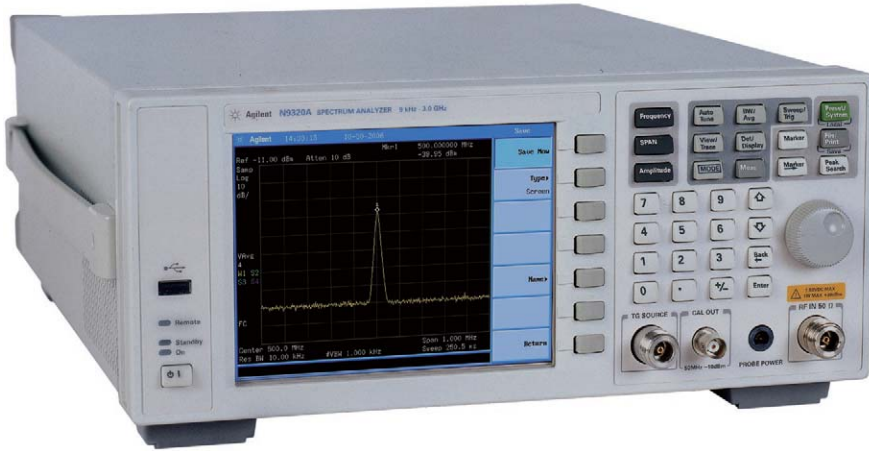


N9320A Spectrum Analyzer

# N9320A

## Spectrum Analyzer

# Low-cost manufacturing



Whatever type of consumer or general-purpose RF electronics devices or components you are manufacturing, you know that spectrum analysis provides essential information on their performance, characteristics and interaction.

And in today's competitive world, you need this analysis to be fast, accurate, and reliable yet, most importantly, truly cost-effective.

### Needing faster and more cost effective RF analysis of today's consumer electronics devices and components?

Maybe its low- or high-frequency RFID systems, or perhaps Wi-Net devices, or the latest in cordless phones you are manufacturing?

Or perhaps it is the RF components and devices that these items incorporate the filters, mixers, amplifiers or antennas that you develop and produce, and that you must evaluate and test?

That is what an Agilent N9320A spectrum analyzer brings you, whether you are identifying and eliminating sources of unwanted interference or checking the stability of circuit components or sub-assemblies.

You'll want to make just sufficient performance checks to develop fully your products, and to ensure first-rate product design and production quality while simultaneously reducing costs and time to market.

If you're wondering how to reduce manufacturing test overheads without compromising quality, your answer is here.

#### RF component characterization

#### Filters – Mixers Antennas

- Distortion
- Frequency response
- Gain/Loss

#### Consumer and general electronic devices

#### Cordless phones – Wi-Net/WiMAX – RFID/DSRC – TV – Radio – DAB

- Spectrum tests
- Power measurements
- EMI/RFI evaluation

#### Powerful measurement set

- Channel power
- Occupied bandwidth
- Adjacent channel power
- Intermodulation distortion (third-order intercept)
- Spectrum emission mask

## Simplify common power measurement tasks

Single-key auto-tuning allows you quickly to home in on the highest-level signal across the bandwidth. Centering this signal on the screen, the analyzer simultaneously reduces the frequency span. Auto-scaling and ranging enhance accurate, speedy measurement.

When you find yourself having repeatedly to make the same type of complex measurement or measurement sequence, it is useful to know some shortcuts. That's what we have provided for you in your N9320A spectrum analyzer.

You will find that the in-built suite of power measurements shortens routine test set up time by simplifying keypad/menu selection.

Selecting these directly from the soft-key menu also helps ensure accuracy of test set up.

The N9320A spectrum analyzer continues the Agilent tradition that today's testers should be easy to set up, and simple to use.

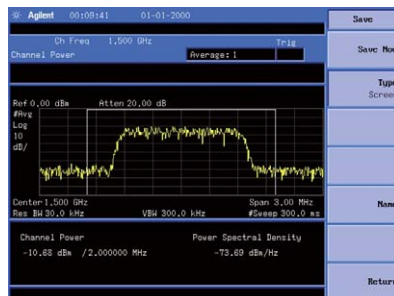
Those familiar with other Agilent spectrum analyzers will find similar, user interfaces here in this low-cost tester, allowing for simpler set up and making measurements.

## Power measurements made easy using the measurement suite

One of the most fundamental measurements performed by spectrum analyzers is the frequency-domain measurement of RF power. However, detailed analysis of a signal often requires standards-defined spectral mask tests or more complex power/bandwidth measurement combinations.

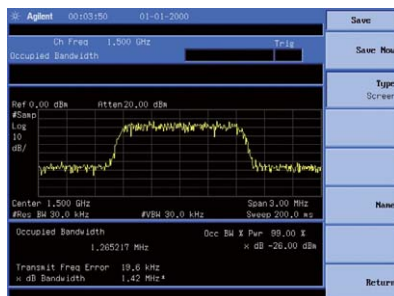
### Channel power

Accuracy and speed of the integrated channel power and computed power spectral density from the RMS averaging detector.



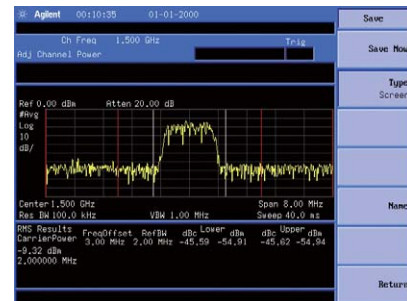
### Occupied bandwidth

Specifying the power percentage places markers at the upper and lower frequencies of the appropriate bandwidth representing this power.



## Adjacent channel power (ACP)

Fast, accurate simultaneous filtered RMS power measurement in up to six offset power bands. Ideal for mobile telephony applications.



Of course, you retain the flexibility to tailor each measurement task to your specific needs when necessary. And you'll find it easy to distinguish between signals having large level differences since the analyzer has one of the widest dynamic ranges for a tester in its price range.

## Simple PC connection via USB

It is easy and convenient to operate your spectrum analyzer from a PC connected to the USB ports. USB ports on front and back panels make interconnection to a PC particularly straightforward.

Each analyzer comes with PC-based virtual panel software utilities and drivers. These replicate all controls and setup parameters of the large, full-color display on the analyzer's front panel. Analyzer control is then through the PC's virtual panel display

Furthermore, this software provides useful and straightforward data analysis productivity tools for you, allowing uncomplicated data logging and archiving of important test results, including graphics.

# Built to perform – priced for you to compete

## R&D



When it comes to receiving the best return from your R&D equipment budget, turn to Agilent's new generation of low-cost sources and analyzers.

### Limited on your R&D budget?

You'll find an N9320A spectrum analyzer equally versatile for low-budget R&D applications, too. It is equally suitable for new RF design verification or when initiating a low-cost project for product enhancements and extensions.



Wherever you deploy your engineering and hardware resources, everyone will find operating an N9320A spectrum analyzer straightforward.

Multi-language screens and manuals enhance usability as design and manufacturing services move around the world: shortly, other languages will follow.

## Installation and maintenance



Your N9320A has all-round application in field installation and maintenance. A strong, handy carrying case and front and rear transit bumpers protect your analyzer when in transit.

### An effective, professional field installation and maintenance tool

Most installation and maintenance tasks demand fast, cost effective test solutions. Being small and lightweight, an N9320A spectrum analyzer is as functional and indispensable in low-cost bench repair applications as it is for field troubleshooting.

Detecting low signal levels whilst simultaneously resolving closely-spaced frequencies is a fundamental requirement for RF testing. Employing one of the best combinations of sensitivity and narrow resolution bandwidth (RBW) ensures that an N9320A spectrum analyzer will readily handle these tasks.

## Bench repair

So whether it is to aid straightforward device tuning on the bench, or carrying out more complex repair or regular maintenance on base stations in the field, the N9320A spectrum analyzer will find a place in any RF technician's toolkit.



The N9320A can become portable with handle and bumper. It makes the N9320A an ideal choice for installation and maintenance.



# Education



Using Agilent test equipment in your educational establishment guarantees you are upholding the highest standards for the future, for tomorrow's engineers.

Learning how to use test instrumentation, and understanding how RF signal interact are fundamentals for electronics studies. Spectrum analysis is one test essential to good circuit design. It brings signal interactions to light for students and helps explain signal mixing processes.

The keen price/performance combination in this spectrum analyzer, part of the low-cost series from Agilent Technologies, means that you do not need to limit students to one or two pieces of equipment to a class.

Now you have the opportunity to put Agilent's renowned quality and precision into every student's hands.

Help your students and trainees gain the edge. There is now no need to compromise on the quality of their test equipment.

Educators hold Agilent testers in the highest esteem. Therefore, you can be confident and proud of your standards in the classroom: and your students will have confidence in their experimental results. Your students will be able to focus on RF circuit experimentation and signal analysis exercises, because spectrum analyzer operation is straightforward.

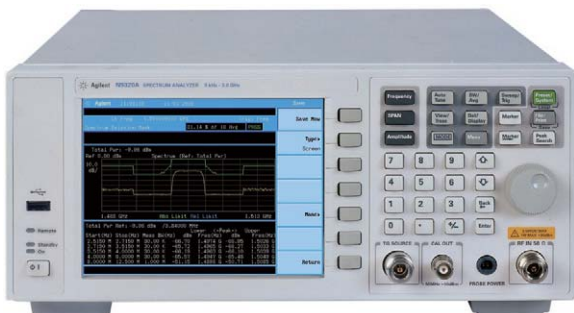
You'll find it has sufficient performance for many basic research projects, too, where you need an inexpensive, fast, high-quality, general-purpose RF signal analyzer.

## Affordable, fast support

When you rely on Agilent test equipment for your manufacturing process, installation procedures, or maintenance programs, you need to know that you can call on superior customer support in case of problems.

Buying test equipment from Agilent's new low-cost series puts you in touch with top-line service and support should you need it. So, you can be confident that you are making the right choice for the right price.

## Take a closer look – see how cost-effective spectrum analysis performance can really be



One of Agilent Technologies new test instruments in the compact, low-cost series.

You'll find an Agilent N9320A spectrum analyzer provides outstanding measurement speed and performance for its price – check out its availability today and buy with confidence.

# Specifications

Specifications apply under the following conditions:

- After a warm-up time of 45 minutes,
- At an ambient temperature specified in the data sheet, and within a valid calibration period.
- Data designated as “typical” or “nominal” are not covered by product warranty.

## Supplemental information

### Frequency

#### Frequency

<b>Range:</b>	9 kHz to 3 GHz 100 kHz to 3 GHz	AC coupled Preamp on
<b>Set-up resolution:</b>	1 Hz	

#### Internal 10 MHz frequency reference

<b>Aging rate:</b>	±1 ppm / year	
<b>Temperature stability:</b>	±1 ppm	0 °C to +50 °C; reference 25 °C
<b>Supply voltage stability:</b>	± 0.3 ppm	± 5 %

#### Frequency readout accuracy (start, stop, center, marker)

<b>Marker resolution:</b>	(frequency span)/(number of sweep points – 1)
<b>Uncertainty:</b>	± (frequency indication x frequency reference uncertainty*+1% x span + 20% x resolution bandwidth + marker resolution)

#### Marker frequency counter

<b>Resolution:</b>	0.1 Hz, 1 Hz, 10 Hz, 100 Hz, 1 kHz	Selectable
<b>Accuracy:</b>	±{(marker frequency) (frequency reference uncertainty*) + (counter resolution)}	RBW/span ≥ 0.02; Marker level to displayed noise level>30 dB(RBW≥1 kHz) Marker level to displayed noise level>40 dB (RBW<1 kHz)
*Frequency reference uncertainty = (aging rate)/(period since adjustment) + (Supply voltage stability) + (temperature stability).		

#### Frequency span

<b>Range:</b>	0 Hz (zero span), 100 Hz to 3 GHz.
<b>Resolution:</b>	1 Hz
<b>Accuracy:</b>	±(1 % of span) + 2(span/460)

#### Phase noise

<b>Offset from CW signal:</b>		$f_c = 1 \text{ GHz};$
<b>10 kHz:</b>	< -88 dBc/Hz < -90 dBc/Hz	<i>Typical</i>
<b>100 kHz:</b>	< -100 dBc/Hz < -102 dBc/Hz	<i>Typical</i>
<b>1 MHz:</b>	< -110 dBc/Hz < -112 dBc/Hz	<i>Typical</i>

#### Residual FM

≤ 100 Hz peak to peak in 100 ms	1 kHz RBW, 1 kHz VBW
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#### Resolution bandwidth (RBW)

<b>Accuracy:</b>	10 Hz to 1 MHz in 1-3-10 sequence ±20 % ±5 %	-3 dB bandwidth 1 kHz to 1 MHz RBW 10 Hz to 300 Hz RBW
<b>Resolution filter shape factor:</b>	< 15 < 20 < 5	<i>Nominal</i> ; 3 kHz to 1 MHz RBW <i>Nominal</i> ; 1 kHz RBW <i>Nominal</i> ; 10 Hz to 300 Hz RBW

**Video bandwidth (VBW)** 1 Hz to 1 MHz in 1-3-10 sequence. -3 dB bandwidth; single-pole low-pass RC filter

## Amplitude

**Measurement range**  
 10 MHz - 3 GHz: Displayed average noise level (DANL) to +30 dBm  
 1 MHz - 10 MHz: DANL up to 23 dBm  
 100 kHz - 1 MHz: DANL up to 20 dBm

**Input attenuator range** 0 to 70 dB, in 1 dB steps

### Maximum damage level

**Average continuous power:**  $\geq +40$  dBm  
**Peak pulse power:**  $\geq +50$  dBm (100 W)  
**DC voltage:** 50 VDC maximum  
 Input protection switch opens at  $>33$  dBm with  $\geq 10$  dB input attenuation

Input attenuator setting  $\geq 10$  dB  
 For  $<10$   $\mu$ sec pulse width,  
 $<1$  % duty cycle, and input attenuation  $\geq 40$  dB)

### 1 dB gain compression

**Total power at input mixer:**  $> 0$  dBm  
**Total power at the preamp:**  $> -20$  dBm

Typical;  $f_c \geq 50$  MHz; preamp off  
 Typical ;  $f_c \geq 50$  MHz; preamp on

*Mixer power level (dBm) = input power (dBm) - input attenuation (dB).*  
*Total power at the preamp (dBm) = total power at the input (dBm) - input attenuation (dB).*

### Displayed average noise level

**Preamp off:**  
**9 kHz to 100 kHz**  $< -90$  dBm  
**100 kHz to 1 MHz**  $< -90$  dBm -  $3 \times (f / 100\text{kHz})$  dB  
**1 MHz to 10 MHz**  $< -124$  dBm  
**10 MHz to 3 GHz**  $< -130$  dBm +  $3 \times (f / 1 \text{ GHz})$  dB

Typical

*0 dB RF attenuation; RBW 10 Hz; VBW 1 Hz, sample detector; reference level -60 dBm.*

**Preamp on:**  
**100 kHz to 1 MHz**  $< -108$  dBm -  $3 \times (f / 100\text{kHz})$  dB  
**1 MHz to 10 MHz**  $< -142$  dBm  
**10 MHz to 3 GHz**  $< -148$  dBm +  $3 \times (f / 1 \text{ GHz})$  dB

*0 dB RF attenuation; RBW 10 Hz; VBW 1 Hz, sample detector; reference level -70 dBm.*

### Level display range

**Log scale and units:** dBm, dBmV, dB  $\mu$ V, dB  $\mu$ A  
**Linear scale and units:**  $\mu$ V, mV, V,  $\mu$ A, mA, A,  $\mu$ W, mW, W  
**Measurement points:** 461  
**Marker level readout resolution:** 0.03 dB  
 0.01 % of reference level  
**Number of traces:** 4  
**Detectors:** Positive-peak, negative-peak, sample, normal, RMS  
**Trace functions:** Clear/write; maximum hold; average; minimum hold; view

Log scale  
 Linear scale

### Frequency response

**200 kHz to 3.0 GHz:**  $\pm 0.8$  dB  
**Preamp off**  
**1 MHz to 3.0 GHz:**  $\pm 1.5$  dB  
**Preamp on**

10 dB attenuation, reference: 50 MHz,  
 20 to 30 °C.  
 0 dB attenuation, reference: 50 MHz,  
 20 to 30 °C.

### Input attenuation switching uncertainty at 50 MHz

<b>Attenuator setting:</b>	0 to 70 dB in 1 dB steps	
<b>0 to 60 dB attenuation:</b>	$\pm(0.3 \text{ dB} + 0.01 \times \text{attenuator setting})$	Reference 10 dB

### Absolute amplitude accuracy

<b>Preamp off:</b>	$\pm 0.3 \text{ dB}$	Reference level $-10 \text{ dBm}$ ; input attenuation 10 dB
<b>Preamp on:</b>	$\pm 0.4 \text{ dB}$	Reference level $-30 \text{ dBm}$ ; input attenuation 10 dB

Center frequency 50 MHz; RBW 1 kHz; VBW 1 kHz; amplitude scale log; span 100 kHz; sweep time coupled, sample detector, signal at reference level.

### Reference level

<b>Setting range:</b>	$-60 \text{ dBm}$ to $+30 \text{ dBm}$ , in steps of 1 dB, 2 dB, 5 dB or 10 dB	Preamp off
	$-100 \text{ dBm}$ to $-10 \text{ dBm}$ , in steps of 1 dB, 2 dB, 5 dB or 10 dB	Preamp on
<b>Setting resolution:</b>	0.1 dB	Log scale
	1 % of reference level	Linear scale

### Reference level accuracy

<b>+30 to <math>-10 \text{ dBm}</math></b>	Same as attenuation accuracy
<b><math>-10</math> to <math>-30 \text{ dBm}</math></b>	$\pm 0.3 \text{ dB}$
<b><math>-30</math> to <math>-60 \text{ dBm}</math></b>	$\pm 0.5 \text{ dB}$
<b><math>-60</math> to <math>-80 \text{ dBm}</math></b>	$\pm 0.7 \text{ dB}$
<b><math>-80</math> to <math>-90 \text{ dBm}</math></b>	$\pm 0.9 \text{ dB}$

Center frequency 50 MHz; all auto, and referenced to  $-10 \text{ dBm}$  ( $-30 \text{ dBm}$ , p reamp on).  
When reference level  $> -80 \text{ dBm}$ , RBW = 1 kHz, otherwise RBW = 10 Hz.

### Level measurement uncertainty

<b>10 MHz to 3 GHz:</b>	$\pm 2 \text{ dB}$	95 % confidence level; 20 to 30 °C; reference level 0 to $-50 \text{ dBm}$ ; input attenuation 10 dB; RBW 1 kHz; VBW 1 kHz; amplitude scale log; log range 0 to $-50 \text{ dB}$ from reference level; sweep time coupled; signal input 0 to $-50 \text{ dBm}$ ; after calibration; preamplifier off.
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### Spurious response

<b>Second harmonic distortion: (second harmonic intercept)</b>	+35 dBm +43 dBm	$10 \text{ MHz} \leq f_c \leq 500 \text{ MHz}$ $500 \text{ MHz} < f_c \leq 3 \text{ GHz}$ Preamplifier off ; input level $-20 \text{ dBm}$ ; input attenuation 10 dB
<b>Third-order intermodulation: (third order intercept)</b>	+10 dBm	+13 dBm nominal; 100 MHz to 3 GHz Preamplifier off; two $-20 \text{ dBm}$ tones, 10 dB input attenuation with separation $\geq 200 \text{ kHz}$
<b>Input related spurious: Residual response: (inherent)</b>	$< -60 \text{ dBc}$ $< -83 \text{ dBm}$	$-30 \text{ dBm}$ signal at input mixer Input terminated and 0 dB RF attenuation, preamplifier off

## Sweep

### Sweep time

<b>Range:</b>	10 ms to 4000 s 20 $\mu\text{s}$ to 4000 s	Span $> 0 \text{ Hz}$ Span = 0 Hz (zero span)
<b>Sweep mode:</b>	Continuous; single	
<b>Trigger source:</b>	Free run; video; external	
<b>Trigger slope:</b>	Positive or negative edge; selectable	



### Tracking generator source output (optional)

<b>Warm-up:</b>	45 minutes	
<b>Output frequency range:</b>	100 kHz to 3.0 GHz	9 kHz settable
<b>Output power level</b>		
Range:	– 30 dBm to 0 dBm in 0.1 dB steps	
<b>Absolute accuracy:</b>	± 0.75 dB	20 to 30 °C, at 50 MHz with coupled source attenuator, referenced to –20 dBm
<b>Output flatness:</b>		Referenced to 50 MHz, –20 dBm
<b>100 kHz to 10 MHz</b>	± 3 dB	
<b>10 MHz to 3 GHz</b>	± 2 dB	
<b>Connector and impedance:</b>	N-type female; 50 ohm	
<b>VSWR:</b>	< 1.5 : 1	300 kHz to 3.0 GHz, input attenuator ≥ 12 dB

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### Front panel input/output

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#### RF Input

<b>Connector and impedance:</b>	N-type female; 50 ohm	
<b>VSWR:</b>	<1.5 : 1	300 kHz to 3.0 GHz, input attenuator ≥ 10 dB

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#### Calibration output

<b>Amplitude:</b>	–10 dBm ± 0.3 dB
<b>Frequency:</b>	50 MHz
<b>Accuracy:</b>	Same as frequency reference
<b>Connector and impedance:</b>	BNC-type female; 50 ohm

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#### Probe power

<b>Voltage/current:</b>	+15 V, 150 mA max
	–12.6 V, 150 mA max

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#### USB host

<b>Connector and protocol:</b>	A plug; Version 1.1
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### Rear panel input/output connections

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#### 10 MHz reference output

<b>Output amplitude:</b>	>0 dBm
<b>Connector and Output Impedance:</b>	BNC-type female; 50 ohm

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#### 10 MHz reference input

<b>Input amplitude:</b>	–5 dBm to +10 dBm
<b>Frequency lock range:</b>	±5 ppm of specified external reference input frequency
<b>Connector and input impedance:</b>	BNC-type female; 50 ohm

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### External trigger input

<b>Input amplitude:</b>	5 V TTL level
<b>Connector and Input impedance:</b>	BNC-type female; 10 k ohm

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<b>VGA output:</b>	VGA analog RGB	31.5 kHz horizontal, 60 Hz vertical sync rates; non-interlaced VGA compatible
<b>Connector:</b>	D-sub 15-pin female	
<b>Screen resolution:</b>	640 x 480	

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### General

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Internal data storage:	16 MB nominal	
<b>Power supply:</b>	100-240 VAC; 50 to 60 Hz	Auto-ranging
<b>Power consumption:</b>	< 65 W	
<b>Warm-up time:</b>	45 minute	
<b>Temperature range:</b>	+5 °C to + 45 °C –20 °C to + 70 °C	Operating Storage
<b>Weight:</b>	9.1 kg (20 lb)	Net approximately; without options
<b>Dimensions:</b>	132.5 x 320 x 400 mm 5.2 x 12.6 x 15.7 in	Approximately; without handle

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# Ordering information

<b>Model number</b>	<b>Description</b>
<b>N9320A</b>	Spectrum analyzer 9 kHz to 3.0 GHz Accessories supplied as standard with each tester: <ul style="list-style-type: none"><li>· User's Guide<ul style="list-style-type: none"><li>Hard copy and on CD-ROM (Chinese for mainland China; English for other countries and regions)</li></ul></li><li>· Programming Reference Guide on CD-ROM (English language)</li></ul>
<b>Manuals and CD</b>	
<b>N9320A-AB2</b>	Chinese User's Guide
<b>N9320A-ABA</b>	English User's Guide
<b>Options</b>	
<b>N9320A-PA3</b>	3 GHz preamplifier
<b>N9320A-TG3</b>	3 GHz tracking generator
<b>N9320A-1HB</b>	Handle and bumpers
<b>N9320A-1CM</b>	Rack-mount kit
<b>N9320A-1TC</b>	Hard transit case
<b>Warranty and service</b>	
<b>R-51B-001-3C</b>	Standard warranty is one year. 1-year return-to-Agilent warranty extended to 3 years
<b>Calibration</b>	
<b>R-50C-011-3</b>	Agilent calibration upfront support plan, 3-year coverage



**Agilent Technologies related product for manufacturing test, field maintenance and education**

**N9310A RF Signal Generator**

Low-cost signal generator covering 9 kHz to 3 GHz, with I/Q modulation: an ideal companion signal source for the N9320A spectrum analyzer.

Find out today how other Agilent products will help solve your test needs.

 **Agilent Email Updates**

[www.agilent.com/find/emailupdates](http://www.agilent.com/find/emailupdates)  
Get the latest information on the products and applications you select.

**Remove all doubt**

Your repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Agilent equipment throughout its lifetime. Your equipment will be serviced by Agilent-trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.

Agilent offers a wide range of additional expert test and measurement services for your equipment, including initial start-up assistance onsite education and training, as well as design, system integration, and project management.

For more information on repair and calibration services, go to [www.agilent.com/find/removealldoubt](http://www.agilent.com/find/removealldoubt)

[www.agilent.com](http://www.agilent.com)  
[www.agilent.com/find/n9320a](http://www.agilent.com/find/n9320a)

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office.

Online assistance:  
[www.agilent.com/find/assist](http://www.agilent.com/find/assist)

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