

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

Test equipment Solutions Ltd
Unit 8 Elder Way
Waterside Drive
Langley
Berkshire
SL3 6EP

T: +44 (0)1753 596000
F: +44 (0)1753 596001

Email: info@TestEquipmentHQ.com
Web: www.TestEquipmentHQ.com



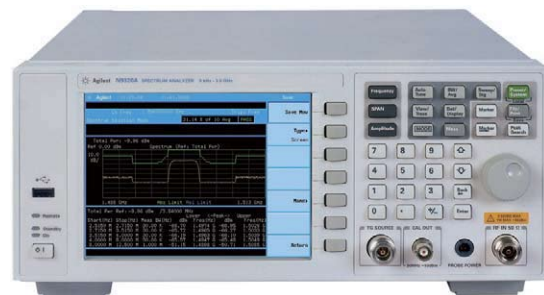
Agilent N9320A Spectrum Analyzer

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

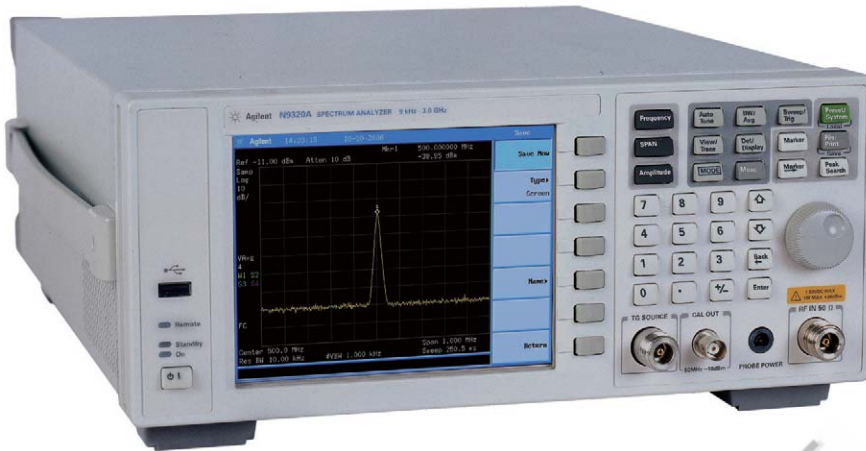


Agilent Technologies

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.

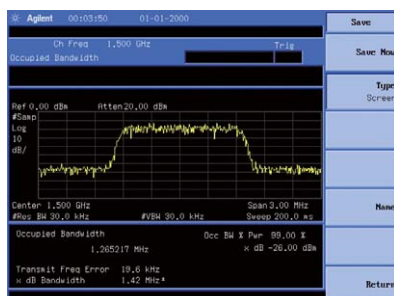
Channel power

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.

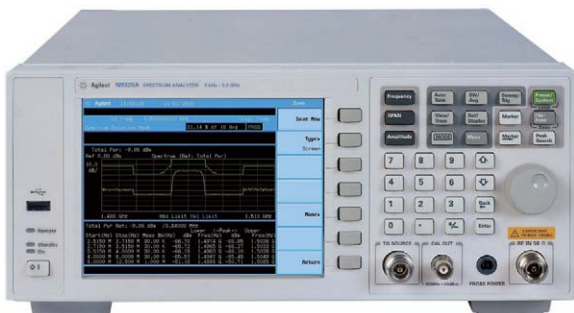
You'll find it has sufficient performance for many basic research projects, too, where you need an inexpensive, fast, high-quality, general-purpose RF signal analyzer.

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	Range: 9 kHz to 3 GHz 100 kHz to 3 GHz Set-up resolution: 1 Hz	AC coupled Preamp on
Internal 10 MHz frequency reference		
Aging rate:	±1 ppm / year	
Temperature stability:	±1 ppm	0 °C to +50 °C; reference 25 °C
Supply voltage stability:	± 0.3 ppm	± 5 %
Frequency readout accuracy (start, stop, center, marker)		
Marker resolution:	(frequency span)/(number of sweep points – 1)	
Uncertainty:	± (frequency indication x frequency reference uncertainty*+1% x span + 20% x resolution bandwidth + marker resolution)	
Marker frequency counter		
Resolution:	1 Hz, 10 Hz, 100 Hz, 1 kHz	Selectable
Accuracy:	±{(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		
Range:	0 Hz (zero span), 100 Hz to 3 GHz.	
Resolution:	1 Hz	
Accuracy:	±(1 % of span) + 2(span/460)	
Phase noise		
Offset from CW signal:		f _c = 1 GHz;
10 kHz:	< –88 dBc/Hz < –90 dBc/Hz	Typical
100 kHz:	< –100 dBc/Hz < –102 dBc/Hz	Typical
1 MHz:	< –110 dBc/Hz < –112 dBc/Hz	Typical
Residual FM		
	≤ 100 Hz peak to peak in 100 ms	1 kHz RBW, 1 kHz VBW
Resolution bandwidth (RBW)		
Accuracy:	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
Resolution filter shape factor:	< 15 < 20 < 5	Nominal; 3 kHz to 1 MHz RBW Nominal; 1 kHz RBW Nominal ; 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)Input attenuator setting ≥ 10 dBFor <10 μ sec pulse width, <1 % duty cycle, and input attenuation ≥ 40 dB)**DC voltage:** 50 VDC maximumInput protection switch opens at >33 dBm with ≥ 10 dB input attenuation**1 dB gain compression****Total power at input mixer:** > 0 dBmTypical; $f_c \geq 50$ MHz; preamp off**Total power at the preamp:** > -20 dBmTypical; $f_c \geq 50$ 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 μ V, dB μ A**Linear scale and units:** μ V, mV, V, μ A, mA, A, μ W, mW, W**Measurement points:** 461**Marker level readout** 0.03 dB

Log scale

resolution: 0.01 % of reference level

Linear scale

Number of traces: 4**Detectors:** Positive-peak, negative-peak,
sample, normal, RMS**Trace functions:** Clear/write; maximum hold;
average; minimum hold; view**Frequency response****200 kHz to 3.0 GHz:** ± 0.8 dB10 dB attenuation, reference: 50 MHz,
20 to 30 °C.**Preamp off****1 MHz to 3.0 GHz:** ± 1.5 dB0 dB attenuation, reference: 50 MHz,
20 to 30 °C.**Preamp on**

Input attenuation switching uncertainty at 50 MHz

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

Absolute amplitude accuracy

Preamplifier off:	$\pm 0.3 \text{ dB}$	Reference level -10 dBm; input attenuation 10 dB
Preamplifier on:	$\pm 0.4 \text{ dB}$	Reference level -30 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

Setting range:	-60 dBm to +30 dBm, in steps of 1 dB, 2 dB, 5 dB or 10 dB	Preamplifier off
	-100 dBm to -10 dBm, in steps of 1 dB, 2 dB, 5 dB or 10 dB	Preamplifier on
Setting resolution:	0.1 dB	Log scale
	1 % of reference level	Linear scale

Reference level accuracy

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

Center frequency 50 MHz; all auto, and referenced to -10 dBm (-30 dBm, preamp on).

When reference level > -80 dBm, RBW = 1 kHz, otherwise RBW = 10 Hz.

Level measurement uncertainty

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

Spurious response

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

Sweep

Sweep time

Range:	10 ms to 1000 s 20 μs to 200 s	Span > 0 Hz Span = 0 Hz (zero span)
Sweep mode:	Continuous; single	
Trigger source:	Free run; video; external	
Trigger slope:	Positive or negative edge; selectable	

Tracking generator source output (optional)

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

Front panel input/output

RF Input

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

Calibration output

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

Probe power

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

USB host

Connector and protocol:	A plug; Version 1.1
--------------------------------	---------------------

Rear panel input/output connections

10 MHz reference output

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

10 MHz reference input

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

External trigger input

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

VGA output:

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

General

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

Ordering information

Model number	Description
N9320A	Spectrum analyzer 9 kHz to 3.0 GHz Accessories supplied as standard with each tester: · User's Guide Hard copy and on CD-ROM (Chinese for mainland China; English for other countries and regions) · Programming Reference Guide on CD-ROM (English language)
Manuals and CD	
N9320A-AB2	Chinese User's Guide
N9320A-ABA	English User's Guide
Options	
N9320A-PA3	3 GHz preamplifier
N9320A-TG3	3 GHz tracking generator
N9320A-1HB	Handle and bumpers
N9320A-1CM	Rack-mount kit
N9320A-1TC	Hard transit case
Warranty and service	
R-51B-001-3C	Standard warranty is one year. 1-year return-to-Agilent warranty extended to 3 years
Calibration	
R-50C-011-3	Agilent calibration upfront support plan, 3-year coverage



Agilent Email Updates

www.agilent.com/find/emailupdates

Get the latest information on the products and applications you select.

Agilent Channel Partners

www.agilent.com/find/channelpartners

Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.

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.

Remove all doubt

Our 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. For information regarding self maintenance of this product, please contact your Agilent office.

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

www.agilent.com
www.agilent.com/find/n9320a

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

www.agilent.com/find/contactus

Americas

Canada	(877) 894 4414
Latin America	305 269 7500
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Thailand	1 800 226 008

Europe & Middle East

Austria	43 (0) 1 360 277 1571
Belgium	32 (0) 2 404 93 40
Denmark	45 70 13 15 15
Finland	358 (0) 10 855 2100
France	0825 010 700*
*0.125 €/minute	
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
Switzerland	0800 80 53 53
United Kingdom	44 (0) 118 9276201

Other European Countries:

www.agilent.com/find/contactus

Revised: October 1, 2009

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

© Agilent Technologies, Inc. 2010
Printed in USA, April 12, 2010
5989-5521EN



Agilent Technologies