

Agilent N9340B Handheld Spectrum Analyzer

Technical Overview



**Put the speed
and performance of
Agilent spectrum analysis
in the hands of your engineers
in the field**



N9340B

Handheld Spectrum Analyzer

Know your spectrum

Regardless of whether you are handling military communications, a Wireless Service Provider (WSP), or involved with spectrum management you need to avoid intermittent communication. The N9340B provides you with a reliable, accurate and detailed picture of the spectrum over which you are working.

Optimize your test time versus accuracy

When you test, you need fast data capture to help locate and identify elusive, transient interference signals. That's why every N9340B spectrum analyzer has a truly fast sweep time. It requires less time to measure across the bandwidth, to obtain more reliable test results – and helps you achieve more for the same investment of time and money.

Gain confidence in your test results

Spurious signals and noise are of great concern to all network users. A superior combination of low displayed average noise level (DANL) and single sideband (SSB) phase noise coupled with narrower resolution bandwidth (RBW) means your signal measurements are more reliable and you will have more confidence in your test results. The N9340B's low DANL and SSB phase noise helps you detect very low-level signals (spurs or noise) which are close to the carrier. You will avoid missing these difficult-to-identify signals, which would otherwise lead to an insufficient or even incorrect understanding of the spectrum.

N9340B Superior Performance Ensures the Field Test Confidence

- Superior sensitivity: lowest DANL in-the-class
- Fastest sweep speed
- Narrowest resolution available



- Frequency range: 100 kHz to 3 GHz
- DANL: (RBW=30Hz, 10 MHz < f_c ≤ 1.5 GHz)
 - -124 dBm
 - -144 dBm with preamp
- Sweep speed
 - 10 ms to 1000 s, span ≥ 1 kHz
 - < 120 ms at full span
- RBW: 30 Hz to 1 MHz in 1-3-10 sequence
- VBW: 3 Hz to 1 MHz
- SSB Phase noise: -87 dBc/Hz at 30 kHz offset
- Amplitude accuracy: ±1.5 dB

The N9340B's RBW is the narrowest in its class. The narrow 30 Hz bandwidth of the analyzer ensures that it is even easier to identify, resolve, and measure two signals that are close together. Additionally, with a resolution filter shape-factor of less than 5, the N9340B has the ability to resolve close adjacent signals with unequal amplitudes.

Moreover, the narrow RBW means that the spectrum analyzer introduces minimal noise itself, helping to further reduce noise levels and improve DANL.

Superior sensitivity

With more wireless devices on the market requiring greater bandwidth usage, the ability to discriminate between different signals becomes more challenging. It's under such demanding conditions that the superior performance of an N9340B analyzer proves its worth. The N9340B has one of the best sensitivity and

selectivity specifications. The DANL is -124 dBm with preamplifier off, or -144 dBm with preamplifier (30 Hz RBW, 10 MHz < f_c ≤ 1.5 GHz). An optional preamplifier with 20 dB gain further improves analyzer sensitivity.

Speed at your fingertips

Spectrum is a finite resource, therefore the usage requires management. Most regulatory authorities responsible for administering frequency allocation require service suppliers and network operators to perform routine monitoring of signal power and transmission frequency stability.

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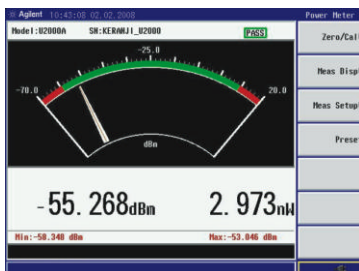
High accuracy power measurement *New*

The N9340B now supports high-accuracy, USB plug-and-play power measurements as standard when connected to an Agilent U2000 series USB power sensor. Make true average power measurements for all signal types with wide dynamic range up to 18 GHz with just the push of a button. The Agilent U2000 USB sensors require no external power supplies and with internal zeroing eliminate the need for external calibration. Without the need for additional boxes, the user can easily set up, calibrate and control the power meter/sensor via the analyzer's USB port. The N9340B can collect, display and save the power meter results.

The analyzer also provides Pass/Fail testing with user set upper and lower limits and a Pass/Fail indicator. Test results are shown in dBm and W when making absolute measurements and in dB and percentage when measurements are relative. Two display modes are available: Meter or the Chart mode to log power measurements over time.



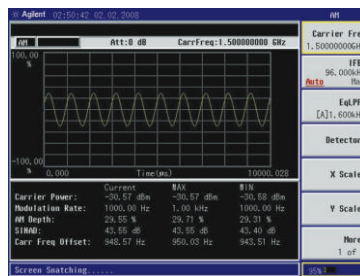
N9340B supports U2000 series USB power sensor for high accuracy power measurement.



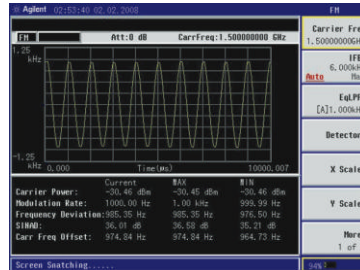
N9340B supports Meter and Chart mode to display the results of power measurement.

AM/FM modulation analysis (Option AMA) *New*

Optional AM/FM modulation analysis shows the metrics you need, including carrier power, modulation rate, AM depth/FM deviation, SINAD and carrier frequency offset. User definable limits provide Pass/Fail indicators in 4 cases: higher than carrier power, larger than AM modulation index or FM deviation, lower than AM modulation index or FM deviation, or larger than carrier frequency offset. The user can save the waveforms with metrics for reporting as well as the set-up parameters for future measurements or analysis.



The detailed metrics offer you the complete understanding of the AM.

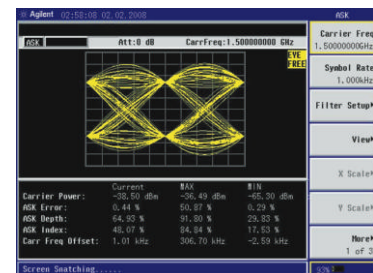


The detailed metrics offer you the complete understanding of the FM.

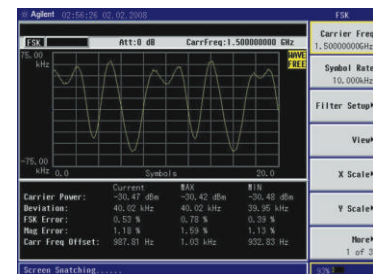
ASK/FSK modulation analysis (Option DMA) *New*

Optional ASK/FSK modulation analysis is now available. Amplitude Shift Keying (ASK) is used in RFID and optical systems. Frequency Shift Keying (FSK) is used in many applications including cordless phone, paging systems and RFID.

N9340B w/option DMA supports 4 display modes: Symbol, Waveform, ASK/FSK Error, and Eye Diagram. Included is Pass/Fail testing of higher than carrier power, higher than ASK modulation depth/FSK frequency deviation, lower than ASK modulation depth/FSK frequency deviation and higher than FSK frequency deviation. The metrics you need are shown, including carrier power, ASK/FSK error, ASK depth/FSK frequency deviation, and ASK index etc. For reports and future measurements the waveform with metrics and setup parameters can be saved.



The Eye Diagram of ASK also shows the metrics with detailed parameters.



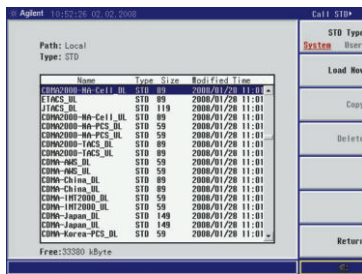
The Waveform of FSK also shows the metrics with detailed parameters.

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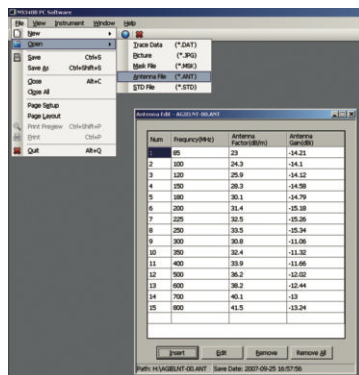
Handheld Spectrum Analyzer

Channel table *New*

For the users who prefer to tune the spectrum analyzer according to channel numbers rather than center frequency, you will find the new Channel Table feature easy-to-use. The Channel Table includes the major wireless communication standards, such as AMPS, GSM/EDGE/GPRS, CDMA, CDMA2000 etc. The Channel Table can also be edited by the user with the included N9340 PC Software. The revised Channel Table can be downloaded to the analyzer via a PC USB cable or a USB memory stick.



The channel table offers the ability to tune N9340B according to channel numbers.



The channel table is editable by N9340B PC software.

Safety at high input levels

The N9340B can be used for most cases. However, should the power level exceed 33 dBm, the input protection switch activates to protect the instrument from damage.

The maximum safe input level is > +33 dBm for 3 minutes at most (50 VDC).

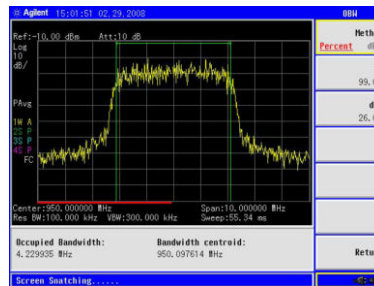
One-button measurement

The Agilent N9340B supports one-button measurements of occupied bandwidth, channel power and adjacent channel power ratio. This virtually eliminates set-up time in the field.

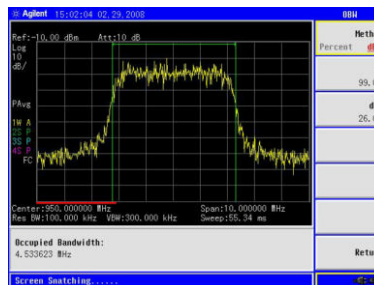
Occupied bandwidth (OBW)

An occupied bandwidth measurement integrates the power of the displayed spectrum and puts one pair of vertical lines at the frequencies between which the interested signal is contained.

An N9340B spectrum analyzer supports two ways to measure the occupied bandwidth, in percentage or in dBc.



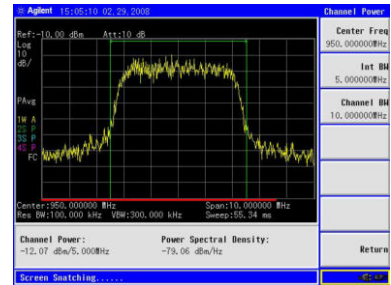
The occupied bandwidth is measured in percentage.



The occupied bandwidth is measured in dBc.

Channel power

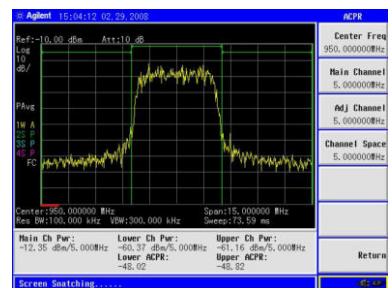
Use channel power to measure both power and power spectral density in a user-specified channel bandwidth. One pair of vertical lines on the display indicates the edges of the channel bandwidth.



It is quick and easy to set center frequency, integration bandwidth, and channel bandwidth on the panel.

Adjacent channel power ratio (ACPR)

Wireless service providers need to minimize the interference caused by power leaking into adjacent transmit channels. Adjacent channel power ratio measurements help in checking of signal spectrums and in identifying and controlling sources of interference.



Center frequency, main channel bandwidth, adjacent channel bandwidth, and channel space can be set on the panel.

N9340B Optimized Usability to Enhance Field Test Productivity

- 6.5" TFT screen with bright display for use indoors and outdoors
- Back-lit keys for night use
- Four-hour battery life
- Modern USB and LAN* connectivity for data transfer and remote control
- Multi-language UI
- Rugged design for field use



A standard soft carrying case provides further protection for your analyzer.

See traces clearly indoors and outdoors **New**

As with all the newest Agilent portable field testers, operating under challenging bright sunlight or other difficult natural lighting conditions is no problem. The unusual 6.5" TFT display with resolution of 640 x 480 pixels provides a superior, bright and clear trace for indoors and outdoors use. There is no need to ensure you operate in the shade.

Back-lit keys for night use **New**

The N9340B is installed with back-lit keys for night use. The user can see the keys clearly even in darkness. The user can adjust the brightness of keys and the duration of the key light. It offers the user the ability to operate N9340B in night.

Built-in light sensor **New**

The N9340B is installed with a light sensor in the front panel. The light-sensor can be activated to adjust the display brightness to adapt N9340B to the changing lighting conditions.

Long battery life

Testing in the field often means operating away from main power supplies. Batteries need to have the longest possible operating time before recharging. You'll find an Agilent N9340B analyzer has superior

power management, providing an impressive 4-hour battery operating time. It's easy to operate for an entire day in the field. There is an advanced, in-built battery management system. This helps provide a useful extended battery operating time of typically four hours: with just one battery and a spare, or a quick recharging from any vehicle using the supplied auto-lighter charger, you are able to operate for an entire day away from a mains power source.

Modern USB and LAN* connectivity

Remote control N9340B via SCPI over USB/LAN* is now available!

Detailed analysis of results in the field is not always convenient or possible. You will need to store the results for later investigation. N9340B supports USB memory stick for data storage and retrieval. It makes easy to transfer and safeguard your measurement data. Connecting to a PC is simple and data transfer is fast via the USB cable. In test lab and bench-top use, the USB/LAN* interface and PC software also support PC remote control of Agilent's N9340B spectrum analyzer. This allows appropriate use of a large format PC screen. Windows®-compatible software provides automatic storage of selected data and graphics.

Tough enough for the military

You will find that this Agilent analyzer is tough enough for military applications. Apart from its generally compact and rugged construction, the large rubberized grips wrap around both ends, providing additional robust protection from rough handling. The sealed keypad and screen are moisture resistant and dust proof. Of course, there is a protective carrying case that provides further protection for your analyzer.

Multi-language user interface

Users around the world will find operating Agilent N9340B is easy. In addition to English, there are ten more user-selectable, on-screen languages, including Chinese, Japanese, Korean and a number of European languages (see Specifications – General).



N9340B supports remote control via SCPI over USB and LAN*.

* LAN will be available since June, 2008.

** Windows is a U.S. registered trademark of the Microsoft Corporation.

Specifications

Specifications apply under the following conditions:

- After a warm-up time of 30 minutes, and at least two hours of operation or storage at operating temperature
- Within a valid calibration period
- Data with no given tolerances are typical values only. Data designated as 'typical' is not covered by the product warranty.

Supplemental information

Frequency

Frequency

Frequency range : 100 kHz to 3 GHz (tunable to 9 kHz) AC coupled

Internal 10 MHz frequency reference accuracy

Aging rate : ± 1 ppm / year
Temperature stability : ± 2 ppm 0 °C to 30 °C
 in addition +2 ppm / 10 °C 30 °C to 50 °C

Frequency readout accuracy with marker (Start, stop, center, marker)

Marker resolution : (frequency span) / (number of 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 reference error = (aging rate X period of time since adjustment + temperature stability)

Frequency span

Range : 0 Hz (zero span), 1 kHz to 3 GHz
Resolution : 1 Hz
Accuracy : ± span / (sweep points – 1)

SSB phase noise

Carrier offset :
 30 kHz < – 87 dBc (1 Hz) 20 °C to 30 °C; *Typical*
 100 kHz < – 100 dBc (1 Hz) *fc* = 1 GHz; RBW 100 Hz; VBW 10 Hz; RMS detector
 1 MHz < – 120 dBc (1 Hz)

Resolution bandwidth (RBW)

– 3 dB bandwidth : 30 Hz to 1 MHz 1- 3 - 10 sequence
Accuracy : ± 5% *Nominal*
Resolution filter shape factor : < 5 : 1 60 dB / 3 dB bandwidth ratio;*Nominal*;
 Digital, approximately Gaussian shape

Video bandwidth (VBW)

– 3 dB bandwidth : 3 Hz to 1 MHz 1- 3 - 10 sequence
Accuracy : ± 5% *Nominal*

Amplitude

Measurement range

Input attenuator range : 0 to 51 dB, in 1 dB steps
 Displayed average noise level (DANL) to +20 dBm

Maximum safe input level

Average continuous power : $\geq +33$ dBm; 3 minutes maximum. *Normal*
 Input attenuator setting ≥ 20 dB (input protection switch active when input level > 33 dBm)

DC voltage : 50 VDC maximum

Displayed average noise level

Preamp off : Reference level ≤ -50 dBm

100 kHz $< f_c \leq 1$ MHz < -90 dBm
 1 MHz $< f_c \leq 10$ MHz < -110 dBm
 $f_c = 50$ MHz -126 dBm (*Typical*)
 10 MHz $< f_c \leq 1.5$ GHz < -124 dBm
 1.5 GHz $< f_c \leq 3$ GHz < -117 dBm
 $f_c = 1.9$ GHz < -122 dBm (*Typical*)

Preamp on : Reference level ≤ -70 dBm

100 kHz $< f_c \leq 1$ MHz < -115 dBm
 1 MHz $< f_c \leq 10$ MHz < -128 dBm
 $f_c = 50$ MHz -146 dBm (*Typical*)
 10 MHz $< f_c \leq 1.5$ GHz < -144 dBm
 1.5 GHz $< f_c \leq 3$ GHz < -136 dBm
 $f_c = 1.9$ GHz < -142 dBm (*Typical*)

RBW = 30 Hz; VBW = 3 Hz; input terminated 50 ohm; 0 dB attenuation; RMS detector; Trace average ≥ 40

Level display range

Log scale and units : 10 to 100 dB; ten divisions displayed; 1, 2, 5, 10 dB/ division.
 dBm, dBmV, dB μ V

Linear scale and units : 0 to 100% ; ten divisions displayed.
 V, μ A, mW, W

Sweep (Trace) points : 461

Marker level readout resolution :

Log scale 0.01 dB
 Linear scale 0.01% of reference level

Detectors : Normal, Positive Peak, Sample, Negative Peak,
 Log Power Average, RMS Average, Voltage Average.

Number of traces : 4

Trace functions : Clear / write; maximum hold; average;

Level measurement error : ± 1.5 dB (excluding input VSWR mismatch)
 0.5 dB, *Typical*
 20 to 30 °C, peak detector, preamplifier off, input signal 0 dBm to -50 dBm, 20 dB input attenuation, frequency > 1 MHz, auto sweep time, RBW = 1 kHz, VBW = 1 kHz, trace average on to reduce noise

Reference level

Setting range : -100 to $+20$ dBm
 Steps of 1 dB

Setting resolution :

Log scale 0.1 dB
 Linear scale 1% of reference level

Accuracy : 0
 Because reference level affects only the display not the measurement, it causes no additional error in measurement results from trace data markers

RF Input VSWR (at tuned frequency)

Attenuator setting 0 dB	< 1.8 : 1	10 MHz to 3.0 GHz, <i>Nominal</i>
Attenuator setting 10 dB	< 1.8 : 1	100 kHz to 10 MHz, <i>Nominal</i>
	< 1.5 : 1	10 MHz to 2.5 GHz, <i>Typical</i>
	< 1.8 : 1	2.5 GHz to 3.0 GHz, <i>Typical</i>
Attenuator setting 20 dB	< 1.6 : 1	100 kHz to 10 MHz, <i>Nominal</i>
	< 1.4 : 1	10 MHz to 3.0 GHz, <i>Typical</i>

Spurious response

Second harmonic distortion : (second harmonic intercept)	< -70 dBc	Mixer level = -40 dBm
Third - order intermodulation : (third order intercept)	+ 10 dBm, <i>Typical</i>	Third-order intermodulation products; 2 x -20 dBm; reference level -10 dBm; center frequency 300 MHz; frequency separation 200 kHz
Input related spurious :	< -70 dBc	-40 dBm signal at input mixer, carry offset > 1 MHz.
Inherent residual response :	< -88 dBm	Input terminated and 0 dB RF attenuation, preamplifier off, reference level -30 dBm, f > 30 MHz, RBW ≤ 10 kHz

Sweep

Sweep time

Range :	10 ms to 1000 s 6 μs to 200 s	Span ≥ 1 kHz Span = 0 Hz (zero span)
Sweep mode :	Continuous; single	
Trigger source :	Free run; video; external	
Trigger slope :	Selectable positive or negative edge	
Trigger delay :		
Range	6 μs to 200 s	
Resolution	6 μs	

Front panel input / output

RF input

Connector and impedance :	Type -N female; 50 Ω	<i>Nominal</i>
VSWR :	< 1.5 : 1	10 MHz to 3.0 GHz, input attenuator ≥ 10 dB

10 MHz reference / External trigger input

Reference input frequency :	10 MHz	
Reference input amplitude :	0 to + 10 dBm	
Trigger voltage :	5 V TTL level (12.6 V, 150 mA maximum)	<i>Nominal</i>
Connector and output impedance :	BNC female; 50 Ω	<i>Nominal</i>

USB interface

Host connector and protocol :	A plug; Version 1.1
Device connector and protocol :	B plug; Version 1.1

General

Display

Resolution :	640 x 480 pixels
Size and type :	6.5 inch (170 mm) transfective; color display

Languages

On-Screen GUI :	English, Simplified Chinese, Traditional Chinese, French, German, Italian, Japanese, Korean, Russian, Spanish, Portuguese.
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Power requirements and calibration

Voltage :	90 to 120 or 195 to 263 VAC; 47 to 63 Hz	Auto-ranging
	12 to 18 VDC; < 25 W	
Power consumption :	12 W	<i>Typical</i>
Battery :		
Operating time (fully charged battery)	4 hours	Tracking generator off
	3 hours	Tracking generator 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 kg (6.6 lb)	Net (shipping) approximately; (3.5 kg with battery)
Dimensions :	318 × 207 × 69 mm	Approximately (W x H x D)

Options

RF preamplifier (Option PA3)

Frequency range :	1 MHz to 3 GHz	
Gain :	20 dB	<i>Nominal</i>

Tracking generator (Option TG3)

Frequency range :	5 MHz to 3 GHz	
Output level :	0 to -25 dBm	1 dB steps
Output flatness :	± 3 dB	Referenced to 50 MHz, 0 dBm
VSWR :	< 2.0 : 1	<i>Nominal</i>
Connector and impedance :	Type-N female; 50 Ω	

Demodulation

Frequency range:	10 MHz to 3 GHz	
Carrier power accuracy :	±2 dBm	
	±1 dBm	<i>Typical</i>
Carrier power displayed resolution :	0.01 dBm	

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%	<i>Nominal</i>

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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)
Deviation :	20 Hz to 400 kHz
Accuracy :	±4% Nominal

ASK measurement

Symbol rate range :	200 Hz to 100 kHz
Modulation depth/index	
Range :	10% to 95%
Accuracy :	±4% of reading nominal
Displayed resolution :	0.1%

FSK measurement

Symbol rate range :	1 kHz to 100 kHz
FSK deviation	
Range :	1 kHz to 400 kHz
Accuracy :	±4% of reading nominal $\beta^* \geq 1$ and $\beta \leq 4$
Displayed resolution :	0.01 Hz

* β is the ratio of frequency deviation to symbol rate (deviation/rate)

Ordering Information

Model number	Description
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N9340B handheld spectrum analyzer 100 kHz to 3.0 GHz

Accessories supplied as standard with each

- Multi-language Quick Start Tutorial
- CD-ROM of the manual
- Soft carrying case

Options

N9340B-PA3	3 GHz preamplifier
N9340B-TG3	3 GHz tracking generator
N9340B-AMA	AM/FM modulation analysis
N9340B-DMA	ASK/FSK modulation analysis
N9340B-1TC	Hard transit case
N9340B-1DC	Automotive 12 VDC adaptor
N9340B-BAT	Spare battery pack
N9340B-ADP	Spare AC/DC adaptor
N9340B-BCG	External battery charger
N9340B-TAD	Adaptor Type-N(m) 50 Ohm to Type-N (f) 75 Ohm DC to 1 GHz
N9340B-ABA	Manual – English
N9340B-AB2	Manual – Chinese
N9340B-ABJ	Manual – Japanese

Warranty and service

Standard warranty is one year.

R-51B-001-3C	1 year Return-to-Agilent warranty extended to 3 years
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Calibration

R-50C-001-3	Agilent Calibration Upfront Support Plan 3 year coverage
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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.

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.

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