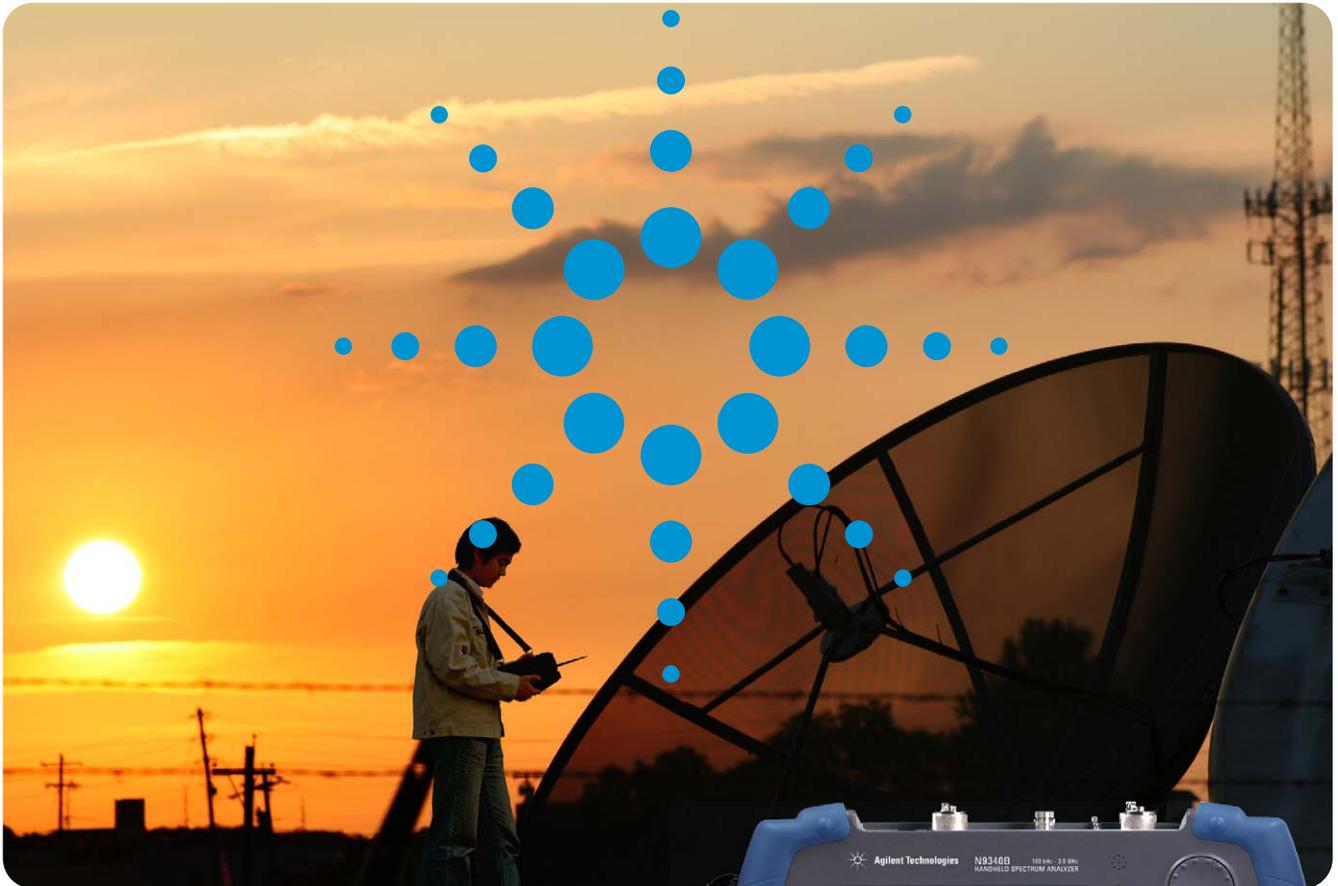


Agilent N9340B Handheld Spectrum Analyzer

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 impaired communication. The N9340B provides you with a reliable, accurate and detailed picture of your communication spectrum.

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 spectrum, to obtain more reliable test results and to help 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 a narrow 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 time
- 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 time
 - 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 closely spaced signals with unequal amplitudes.

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

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, or -144 dBm with the optional preamplifier (30 Hz RBW, 10 MHz < f_c ≤ 1.5 GHz). The optional preamplifier adds 20 dB gain for improved analyzer sensitivity.

Speed at your fingertips

The RF spectrum is a finite resource, therefore its 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.

N9340B

Handheld Spectrum Analyzer

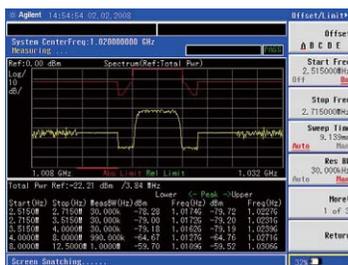
N9340B is now equipped with powerful features to address field applications using a handheld spectrum analyzer. An important application of spectrum analysis is identifying interfering signals. These often arise from illegal transmissions, and may cause impairment of services for authorized users, often resulting in financial loss. These interfering signals could possibly restrict critical communications of civil aviation and emergency services, which could jeopardize public safety.

Spectrum emission mask New

The new N9340B adds Spectrum Emission Mask (SEM) as a standard feature. SEM is a mask for out-of-channel emissions measurement. The SEM is defined relative to in-channel power.

The user can set the parameters of the main channel, out-of-channel frequency bands, and the limit lines. Included is Pass/Fail testing for the overall spectrum emission mask and each individual out-of-channel frequency range. The N9340B will trigger the failure indicator once any measurement result violates the mask.

Also displayed are the main channel power and the power level metrics relative to in-channel power for each out-of-channel frequency range. The user can save the spectrum scan, the mask, the data or screenshot for later analysis and reporting.



The spectrum emission mask shows the main channel power and the power level vectors relative to in-channel power for each out-of-channel frequency range.

N9340B Applications for Field Test

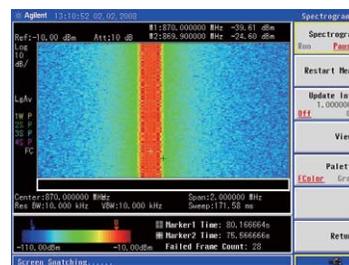
- Aerospace & Defence: radio and radar test, interference analysis, on-site repair
- Wireless Service Providers: interference analysis, on-site repair
- TV & Broadcasting: interference analysis, channel power check
- Spectrum Management Authority: spectrum monitoring

Spectrogram New

Now you can take advantage of the spectrogram display to view the behavior of varying signal parameters over time. The N9340B includes spectrogram as a standard feature. The scrolling three-dimensional display is noted for its ability to track the frequency and power behavior over the time, particularly intermittent signals. The user can use spectrogram to analyze the stability of a signal over the time, or to identify intermittent interference signals in communications systems.

There are two markers for the user to identify power versus frequency and time. Also the time interval between two consecutive colored rows can be adjusted. When a marker is put on the spectrogram, the N9340B can display the trace for the time of the selected marker.

The spectrogram data and screenshots can be saved and recalled for later analysis or reporting.



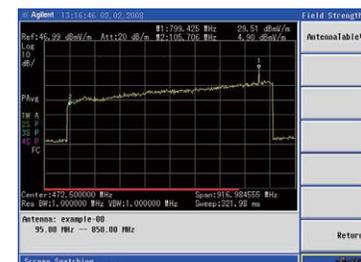
The spectrogram gives the three-dimensional display of power, frequency and time.



The trace display gives the view of the spectrogram for the time of the selected marker.

Field strength measurement New

Electric field strength measurements are frequently required for field testing of transmitter and antenna coverage. Field strength measurements are now a standard function in the N9340B. Calibrated field strength measurements are easy to make once the antenna factors are loaded into the analyzer via the provided PC software based antenna template. Either field strength (in dBμV/m, dBmV/m, or V/m) or power flux density (in dBm/m² or W/m²) can be displayed. With the amplitude offset function, the user can correct gain or loss. And finally together with the user-definable multi-limit line function, the N9340B offers the user quick and convenient field strength measurements and analysis.



The field strength measurement automatically takes into the account of the antenna factor. The antenna table is definable by the standard N9340B PC software.

N9340B

Handheld Spectrum Analyzer

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.



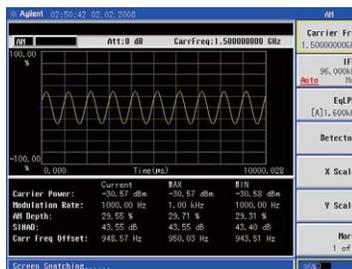
N9340B supports U2000 series USB power sensors for high accuracy power measurement.



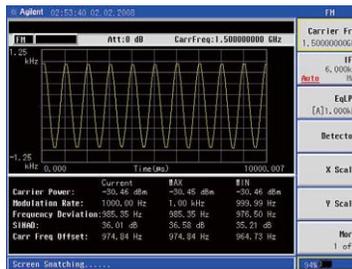
N9340B supports Meter and Chart mode to display the results of power measurements.

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.

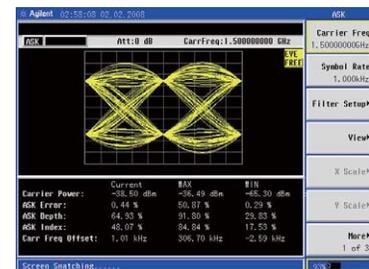


The detailed metrics offer you the complete understanding of the FM.

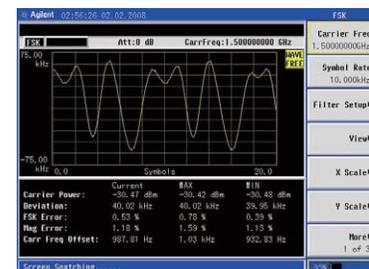
ASK/FSK modulation analysis (Option DMA) *New*

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.

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 User Interface
- 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 equipment, 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 indoor and outdoor use. There is no need to 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 easily operate N9340B at 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 to 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 extend the useful battery operating time typically up to 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 it 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) 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
 ± 0.5 dB, *Typical*

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	Span ≥ 1 kHz
	6 μs to 200 s	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

Operating temperature range:	-10°C to +50 °C (using battery)	
	0°C to +40 °C (using AC-DC adapter)	
Battery charging temperature range:	0°C to +50 °C	
Storage temperature range:	-40°C to +70 °C	
Battery storage temperature range:	-20°C to +70 °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% <i>Nominal</i>

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

Calibration

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

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.

For more information on repair and calibration services, go to

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