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

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 < fc ≤ 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 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**

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.

**Spectrogram**

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.

**Field strength measurement**

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.

**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
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High accuracy power measurement

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.

AM/FM modulation analysis (Option AMA)

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.

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

ASK/FSK modulation analysis (Option DMA)

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.

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

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

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.

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

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

The detailed metrics offer you the complete understanding of the FM.
Handheld Spectrum Analyzer

**Channel table**

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.

**Safety at high input levels**

The N9340B can be used for many high power applications. 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 $\leq 50$ 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.

**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.

**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 to check for signal leakage and the identification and control of sources of interference.
See traces clearly indoors and outdoors
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
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
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.

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).

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.

* 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.

### Frequency

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>100 kHz to 3 GHz (tunable to 9 kHz)</th>
</tr>
</thead>
</table>

### Internal 10 MHz frequency reference accuracy

| Aging rate | ± 1 ppm / year |
| Temperature stability | ± 2 ppm |
| Temperature range | 0 °C to 30 °C 30 °C to 50 °C |

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

| Marker resolution | | frequency span | / | number of sweep points – 1 |
| Marker resolution | | frequency indication | × | frequency reference uncertainty + 1% × span + 20% × resolution bandwidth + marker resolution + 1 Hz |

Frequency reference uncertainty = (aging rate × period of time since adjustment + temperature stability)

### Marker frequency counter

| Resolution | 1 Hz |
| Accuracy | ± (marker frequency × frequency reference uncertainty + Counter resolution) |

Frequency reference error = (aging rate × 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) |
| Carrier offset | 100 kHz | < – 100 dBc (1 Hz) |
| Carrier offset | 1 MHz | < – 120 dBc (1 Hz) |

| Carrier offset | 20 °C to 30 °C; Typical |
| Carrier offset | f_c = 1 GHz; RBW 100 Hz; VBW 10 Hz; RMS detector |

### Resolution bandwidth (RBW)

| – 3 dB bandwidth | 30 Hz to 1 MHz |
| Accuracy | ± 5% |
| Resolution filter shape factor | < 5 : 1 |

1- 3 - 10 sequence
Nominal

### Video bandwidth (VBW)

| – 3 dB bandwidth | 3 Hz to 1 MHz |
| Accuracy | ± 5% |

1- 3 - 10 sequence
Nominal
Amplitude

Measurement range

| Displayed average noise level (DANL) to +20 dBm |

Input attenuator range : 0 to 51 dB, in 1 dB steps

Maximum safe input level

| Average continuous power : ≥ + 33 dBm; 3 minutes maximum. Nominal |
| 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 : |
| 100 kHz < f_s ≤ 1 MHz < -90 dBm |
| 1 MHz < f_s ≤ 10 MHz < -110 dBm |
| 10 MHz < f_s ≤ 1.5 GHz < -124 dBm (Typical) |
| 1.5 GHz < f_s ≤ 3 GHz < -117 dBm |
| 1.9 GHz < -122 dBm (Typical) |

| Preamp on : |
| 100 kHz < f_s ≤ 1 MHz < -115 dBm |
| 1 MHz < f_s ≤ 10 MHz < -128 dBm |
| 10 MHz < f_s ≤ 1.5 GHz < -144 dBm |
| 1.5 GHz < f_s ≤ 3 GHz < -136 dBm |
| 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, dBµV |
| Linear scale and units : 0 to 100%; ten divisions displayed. V, µA, 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 |
| Setting resolution : Steps of 1 dB |
| 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)

<table>
<thead>
<tr>
<th>Attenuator setting</th>
<th>VSWR</th>
<th>Frequency Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 dB</td>
<td>&lt; 1.8 : 1</td>
<td>10 MHz to 3.0 GHz, Nominal</td>
<td></td>
</tr>
<tr>
<td>10 dB</td>
<td>&lt; 1.8 : 1</td>
<td>100 kHz to 10 MHz, Nominal</td>
<td></td>
</tr>
<tr>
<td>20 dB</td>
<td>&lt; 1.6 : 1</td>
<td>100 kHz to 10 MHz, Nominal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 1.4 : 1</td>
<td>10 MHz to 3.0 GHz, Typical</td>
<td></td>
</tr>
</tbody>
</table>

Spurious response

- **Second harmonic distortion**: < -70 dBc
- **Third - order intermodulation**: + 10 dBm, Typical
- **Input related spurious**: < -70 dBc
- **Inherent residual response**: < -88 dBm

Sweep

**Sweep time**

- **Range**: 10 ms to 1000 s
- **Resolution**: 6 µs to 200 s
- **Span**: ≥ 1 kHz
- **Trigger delay**: 6 µs to 200 s

Front panel input / output

**RF input**

- **Connector and impedance**: Type -N female; 50 Ω, Nominal
- **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), Nominal
- **Connector and output impedance**: BNC female; 50 Ω, Nominal

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) transflective; color display

Languages


Power requirements and calibration

- Voltage: 90 to 120 or 195 to 263 VAC; 47 to 63 Hz
- Power consumption: 12 W
- Battery: 12 to 18 VDC; < 25 W
- Auto-ranging
- Tracking generator off
- Operating time (fully charged battery): 4 hours
- Charging time: 3 hours
- Life time: 300 to 500 charge cycles
- Warm-up time: 30 minutes
- Calibration cycle: One year
- Typical
- Tracking generator on

Environmental and size

- Temperature range: Operating (Battery: 0 to 50 °C)
- Storage (Battery: −20 to 50 °C)
- Relative humidity: < 95%
- Weight: 3 kg (6.6 lb)
- Dimensions: 318 × 207 × 69 mm
- Net (shipping) approximately: 3 kg (6.6 lb)
- (3.5 kg with battery)

Options

RF preamplifier (Option PA3)

- Frequency range: 1 MHz to 3 GHz
- Gain: 20 dB

Tracking generator (Option TG3)

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

Demodulation

- Frequency range: 10 MHz to 3 GHz
- Carrier power accuracy: ±2 dBm
- 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%
### Ordering Information

#### N9340B  
**Handheld Spectrum Analyzer**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N9340B</td>
<td>handheld spectrum analyzer 100 kHz to 3.0 GHz</td>
</tr>
</tbody>
</table>

*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-ITC  Hard transit case
- N9340B-IDC  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

#### 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

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### FM measurement

<table>
<thead>
<tr>
<th>Modulation rate</th>
<th>20 Hz to 200 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>1 Hz, nominal (Modulation rate &lt; 1 kHz)</td>
</tr>
<tr>
<td></td>
<td>&lt; 0.1% modulation rate, nominal (Modulation rate ≥ 1 kHz)</td>
</tr>
<tr>
<td>Deviation</td>
<td>20 Hz to 400 kHz</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±4%</td>
</tr>
</tbody>
</table>

### ASK measurement

<table>
<thead>
<tr>
<th>Symbol rate range</th>
<th>200 Hz to 100 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulation depth/index</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>10% to 95%</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±4% of reading nominal</td>
</tr>
<tr>
<td>Displayed resolution</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

### FSK measurement

<table>
<thead>
<tr>
<th>Symbol rate range</th>
<th>1 kHz to 100 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSK deviation</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1 kHz to 400 kHz</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±4% of reading nominal</td>
</tr>
<tr>
<td>Displayed resolution</td>
<td>0.01 Hz</td>
</tr>
</tbody>
</table>

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