

Agilent N9344C Handheld Spectrum Analyzer (HSA)

20 GHz

Data Sheet



Field testing just got easier

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If you are making measurements in the field, the Agilent N9344C handheld spectrum analyzer (HSA) makes your job easier. It's got the features you need for operating in tough field environments, and its measurement performance gives you confidence the job's been done right. The N9344C HSA lets you automate routine tasks to save time and ensure consistent results. Field testing just got easier with the Agilent N9344C HSA.



Your job just got easier:

- Get the features you need in a **field-ready** instrument.
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Definitions and requirements

This data sheet contains specifications and supplemental information for Agilent N9344C handheld spectrum analyzer. The differences between specifications, typical performance, and nominal values are described as follows.

Definitions

"Specifications" describe the performance of parameters covered by the product warranty and apply to temperatures ranging from -10 to 50 °C, unless otherwise noted.

95th percentile values indicate the breadth of the population (> 2) of performance tolerances expected to be met in 95% of the cases with a 95% confidence, for any ambient temperature in the range of 20 to 30 °C. In addition to the statistical observations of a sample of instruments, these values include the effects of the uncertainties of external calibration references. These values are not warranted. These values are updated occasionally if a significant change in the statistically observed behavior of production instruments occurs.

"Typical" describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range of 20 to 30 °C. Typical performance does not include measurement uncertainty.

"Nominal values" indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

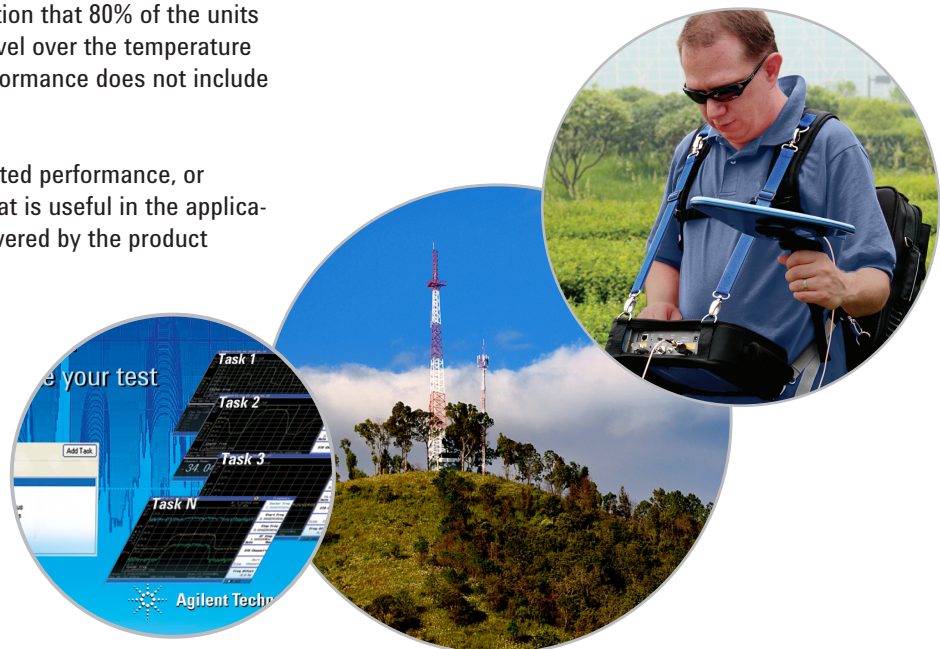
Conditions required to meet specifications

The following conditions must be met for the analyzer to meet its specifications.

- The analyzer is within its calibration cycle.
- Under auto couple control, except when Swp Time Rule is set to Accuracy.
- Any analyzer that has been stored at a temperature range inside the allowed storage range but outside the allowed operating range must be stored at an ambient temperature within the allowed operating range for at least two hours before being turned on.
- The analyzer has been turned on at least 30 minutes.

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (NIST), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization (ISO) members.



Specifications

| Specification | | Supplemental information |
|--|--|---|
| Frequency | | |
| Frequency range | 1 MHz to 20 GHz (usable to 9 kHz) | AC coupled |
| Internal 10 MHz frequency reference accuracy | | |
| Aging rate | ± 1 ppm/year | |
| Temperature stability | ± 1 ppm | Referenced to frequency reading at 25 °C. Temperature varied at max. of 2 °C per minute. Control voltage held at voltage control range midpoint |
| Frequency readout accuracy with marker (start, stop, center, marker) | | |
| Marker resolution | (frequency span)/(sweep points - 1) | |
| Uncertainty | ± (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) | RBW/span ≥ 0.02; marker level to displayed noise level > 25 dB; frequency offset 0 Hz |
| Frequency span | | |
| Range | 0 Hz (zero span), 100 Hz to 20 GHz | |
| Resolution | 1 Hz | |
| Accuracy | ± (0.22% × span + span/(sweep points - 1)) | Nominal |
| SSB phase noise | | |
| Carrier offset | 30 kHz | < -86 dBc/Hz, typical -89 dBc/Hz |
| | 100 kHz | < -97 dBc/Hz, typical -99 dBc/Hz |
| | 1 MHz | < -115 dBc/Hz, typical -119 dBc/Hz |
| Resolution bandwidth (RBW) | | |
| -3 dB bandwidth | 10 Hz to 3 MHz | 1-3-10 sequence |
| Accuracy | ± 5%, RBW = 10 Hz to 1 MHz | Nominal |
| | ± 10%, RBW = 3 MHz | |
| Resolution filter shape factor | < 5:1 | Nominal; 60 dB/3 dB bandwidth ratio; digital, Gaussian-like |
| Video bandwidth (VBW) | | |
| -3 dB bandwidth | 1 Hz to 3 MHz | 1-3-10 sequence |
| Accuracy | ± 10%, VBW = 1 Hz to 1 MHz | Nominal |

Specifications (continued)

| Amplitude specifications | | | Supplemental information | |
|--|--------------|---|---|---------------------------|
| Measurement range | | | | |
| 1 to 500 MHz | | Displayed average noise level (DANL) to +10 dBm | Preamp off | |
| 500 MHz to 20 GHz | | Displayed average noise level (DANL) to +20 dBm | | |
| Input attenuator range | | 0 to 50 dB, in 5 dB steps | | |
| Maximum safe input level | | | | |
| Average continuous power | | +30 dBm, 3 minutes maximum | Input attenuator setting ≥ 20 dB, 1 MHz to 20 GHz | |
| DC voltage | | ± 50 VDC maximum | | |
| Displayed average noise level ¹ | | | | |
| Preamp off | | Normalized to 1 Hz | Minimum RBW | |
| 1 to 10 MHz | | –125 dBm, typical –140 dBm | –115 dBm, typical –130 dBm | Reference level ≤ –50 dBm |
| 10 MHz to 3 GHz | | –137 dBm, typical –142 dBm | –127 dBm, typical –132 dBm | |
| 3 to 7 GHz | | –135 dBm, typical –140 dBm | –125 dBm, typical –130 dBm | |
| 7 to 10 GHz | | –139 dBm, typical –142 dBm | –129 dBm, typical –132 dBm | |
| 10 to 13 GHz | | –137 dBm, typical –140 dBm | –127 dBm, typical –130 dBm | |
| 13 to 16 GHz | | –136 dBm, typical –139 dBm | –126 dBm, typical –129 dBm | |
| 16 to 18 GHz | | –134 dBm, typical –139 dBm | –124 dBm, typical –129 dBm | |
| 18 to 20 GHz | | –126 dBm, typical –131 dBm | –116 dBm, typical –121 dBm | |
| Preamp on | | | | |
| 1 to 10 MHz | | –140 dBm, typical –156 dBm | –130 dBm, typical –146 dBm | Reference level ≤ –70 dBm |
| 10 MHz to 3 GHz | | –150 dBm, typical –154 dBm | –140 dBm, typical –144 dBm | |
| 3 to 6 GHz | | –145 dBm, typical –150 dBm | –135 dBm, typical –140 dBm | |
| 6 to 13 GHz | | –151 dBm, typical –155 dBm | –141 dBm, typical –145 dBm | |
| 13 to 16 GHz | | –149 dBm, typical –153 dBm | –139 dBm, typical –143 dBm | |
| 16 to 18 GHz | | –147 dBm, typical –151 dBm | –137 dBm, typical –141 dBm | |
| 18 to 20 GHz | | –137 dBm, typical –142 dBm | –127 dBm, typical –132 dBm | |
| Level display range | | | | |
| Log scale | | 10 to 100 dB, 10 divisions displayed, 1, 2, 5, 10 dB/division | | |
| Linear scale | | 0 to 100%, 10 divisions displayed | | |
| Scale units | | dBm, dBmV, dBμV, W, V, dBmV EMF, dBμV EMF, V EMF | | |
| Sweep (trace) points | | 461 | | |
| Number of markers | | 6 | | |
| Marker functions | | Normal, frequency counter, noise marker, band power and AM/FM demod (tune and listen) | | |
| Marker level readout resolution | Log scale | 0.01 dB | | |
| | Linear scale | ≤ 1% of signal level | | |
| Detectors | | Normal, positive peak, sample, negative peak, average (video, RMS, voltage) | | |
| Number of traces | | 4 | | |
| Trace functions | | Clear/write, maximum hold, minimum hold, average | | |

1. RMS detector, trace averaging > 40 , 0 dB input attenuation, input terminated 50 Ω , 1 kHz resolution bandwidth, 20 to 30 °C.

Specifications (continued)

| Amplitude specifications (continued) | | | | Supplemental information |
|--|------------------|--|-------------------------------------|---|
| Level display range (continued) | | | | |
| Level measurement error | 1 MHz to 7 GHz | Excluding input VSWR mismatch ± 1.3 dB | | <ul style="list-style-type: none">• 20 to 30 °C, 30 to 70% RH, peak detector, preamp off, input signal -50 to 0 dBm, 95% percentile• Swp Time Rule is set to Accuracy• Adds ± 0.3 dB when Swp Time Rule is set to Speed• Adds ± 0.3 dB with 5-minute warm-up |
| | 7 to 18 GHz | ± 1.6 dB | | |
| | 18 to 20 GHz | ± 1.8 dB | | |
| Reference level ² | | | | |
| Setting range | | -100 to $+30$ dBm | | Steps of 1 dB |
| Setting resolution | Log scale | 0.01 dB | | |
| | Linear scale | Same as log (2.236 μ V to 7.07 V) | | |
| Accuracy | | 0 | | |
| RF input VSWR (at tuned frequency) | | | | |
| 1 MHz to 7 GHz | | $< 1.5:1$ | | Nominal, ≥ 10 dB attenuation |
| 7 to 18 GHz | | $< 2:1$ | | |
| 18 to 20 GHz | | $< 2.5:1$ | | |
| Spurious response | | | | |
| Second harmonic distortion | | < -65 dBc, typical < -70 dBc, 50 MHz to 7 GHz < -80 dBc, typical < -90 dBc, 7 to 20 GHz | | Mixer signal level at -30 dBm, input attenuation 0 dB, preamp off, 20 to 30 °C |
| Third order intermodulation distortion (third order intercept) | | 5-min warm-up | 30-min warm-up | Two -20 dBm tones at input mixer, spaced by 100 kHz, input attenuation 0 dB, preamp off, reference level ≥ -30 dBm, 20 to 30 °C |
| | 50 to 300 MHz | $+6.5$ dBm, typical $+7.5$ dBm | $+8$ dBm, typical $+9$ dBm | |
| | 300 MHz to 8 GHz | $+7.5$ dBm, typical $+9.5$ dBm | $+9$ dBm, typical $+11$ dBm | |
| | 8 to 13 GHz | $+8.5$ dBm, typical $+10.5$ dBm | $+10$ dBm, typical $+12$ dBm | |
| | 13 to 20 GHz | $+11.5$ dBm, typical $+13.5$ dBm | $+13$ dBm, typical $+15$ dBm | |
| Input related spurious | | < -59 dBc, typical < -69 dBc | < -60 dBc, typical < -70 dBc | <ul style="list-style-type: none">• -30 dBm signal at input mixer, span < 2.9 GHz• Exception: -55 dBc ($2 \times F1 =$ center frequency -5.890 MHz, $7\text{ GHz} <$ center frequency < 10 GHz, with F1 input frequency) |
| Inherent residual response | 1 MHz to 7 GHz | < -93.5 dBm, typical -108.5 dBm | < -95 dBm, typical -110 dBm | Input terminated and 0 dB RF attenuation, preamplifier off |
| | 7 GHz to 20 GHz | < -83.5 dBm, typical -91.5 dBm | < -85 dBm, typical -93 dBm | |

2. Reference level only affects the display not the measurement, so trace data markers do not cause additional errors in measurement results.

Specifications (continued)

| Sweep specifications | | Supplemental information |
|---|---|--|
| Sweep time | | |
| Range | 2 ms to 1000 s | Span ≥ 100 Hz |
| | 600 ns to 200 s | Span = 0 Hz (zero span) |
| Sweep mode | Continuous, single | |
| Sweep time rule | Accuracy, speed | |
| Trigger source | Free run, video, external, RF burst | |
| Trigger slope | Selectable positive or negative edge | |
| Trigger delay | ± 12 ms to ± 12 s | Nominal, span = 0 Hz (zero span) |
| Front panel input/output | | Supplemental information |
| RF input | | |
| Connector and impedance | Type-N female, 50 Ω | Nominal |
| 10 MHz reference/external trigger input | | |
| Reference input frequency | 10 MHz | |
| Reference input amplitude | 0 to +10 dBm | |
| Trigger voltage | 5 V TTL level | Nominal |
| Connector | BNC female, 50 Ω | Nominal |
| Probe power | | |
| Voltage/current | +15 Vdc, ± 7% at 0 to 150 mA (nominal) | |
| | −12.6 Vdc, ± 10% at 0 to 150 mA (nominal) | |
| | GND | |
| Connectivity | | |
| USB host | USB Type-A female, compatible with USB 2.0 full speed | |
| USB device | USB Type-mini AB female, compatible with USB 2.0 full speed | |
| LAN | RJ-45, 10 Base-T | |
| General specifications | | Supplemental information |
| Display | | |
| Resolution | 640 pixels x 480 pixels | |
| Size and type | 170 mm (6.5 in) TFT color display | |
| Internal memory | | |
| System memory | 64 MB | For system use. Not user accessible |
| User memory | 64 MB | User accessible. Able to store about 14,000 traces |
| Languages | | |
| On-screen GUI | English, Simplified Chinese, Traditional Chinese, French, German, Italian, Japanese, Korean, Russian, Spanish, Portuguese | |

Specifications (continued)

| General specifications (continued) | | Supplemental information |
|--|--|---|
| Power requirements and calibration | | |
| Adaptor voltage | 100 to 240 V AC, 50 to 60 Hz | Auto-ranging |
| | 15 V DC, 5.3 A, 80 W max | |
| Power consumption | 16 W | Typical |
| Battery operating time (fully charged battery) | 3.5 hours | Tracking generator off, preamplifier on |
| | 3 hours | Tracking generator on, preamplifier on |
| Charging time | 3 hours | |
| Life time | 300 to 500 charge cycles | |
| Warm-up time | 5 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) |
| Altitude | 9,144 meters (30,000 feet) | Operating with battery |
| | 3,000 meters (9,840 feet) | Operating with AC to DC adapter |
| | 15,240 meters (50,000 feet) | Non-operating |
| Relative humidity | < 95% | |
| Weight | 3.2 kg (7 lbs) | Net (shipping) approximately, 3.6 kg (7.9 lbs) with battery |
| Dimensions | 318 mm × 207 mm × 69 mm (12.5 in × 8.15 in × 2.7 in) | Approximately (W × H × D) |
| Option specifications | | Supplemental information |
| Channel scanner (Option SCN) | | |
| Scan modes | Top N, bottom N, and list | |
| Channels displayed | 1 to 20 | |
| Display orientation | Vertical | Number of channels ≤ 5 |
| | Horizontal | Number of channels > 5 |
| Chart | Bar chart, and time chart | |
| Log file | .CSV and .KML | |
| Radio standards | Pre-defined and user-defined. Pre-defined standards include the major wireless communication standards such as GSM, CDMA, W-CDMA, LTE, WiMAX, etc. | |
| Spectrum monitor (Option SIM) | | |
| Display modes | Spectrogram | |
| | Spectrum trace | |
| | Combination of spectrogram and spectrum trace in one screen | |
| RF preamplifier (Option P20) | | |
| Frequency range | 1 MHz to 20 GHz | |
| Gain | 15 dB | Nominal |
| Tracking generator (Option TG7) | | |
| Frequency range | 5 MHz to 7 GHz | |
| Output level | 0 to –20 dBm | 1 dB steps |
| VSWR | < 2.0:1 | Nominal |
| Connector and impedance | Type-N female, 50 Ω | |

Specifications (continued)

| Option specifications (continued) | | Supplemental information |
|--|----------------------------|--|
| AM/FM modulation analysis (Option AMA) | | |
| Frequency range | 10 MHz to 20 GHz | |
| Carrier power accuracy | < 7 GHz, ± 1.5 dB | Nominal |
| | 7 to 18 GHz, ± 1.8 dB | Nominal |
| | 18 to 20 GHz, ± 2.0 dB | Nominal |
| Carrier power range | -30 to +10 dBm | 1 to 500 MHz |
| | -30 to +20 dBm | 500 MHz to 20 GHz |
| 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 | $\pm 4\%$ | Nominal |
| 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) |
| Depth | 20 Hz to 400 kHz | |
| Accuracy | $\pm 4\%$ | Nominal |
| ASK/FSK modulation analysis (Option DMA) | | |
| Frequency range | 2.5 MHz to 6 GHz | |
| Carrier power accuracy | ± 2 dB | Nominal |
| Carrier power range | -30 to +20 dBm | Nominal |
| Carrier power displayed resolution | 0.01 dBm | |
| ASK measurement | | |
| Symbol rate range | 100 Hz to 100 kHz | |
| Modulation depth/index | 5 to 95% | |
| Accuracy | $\pm 4\%$ | Nominal |
| Displayed resolution | 0.1% | |
| FSK measurement | | |
| FSK deviation | 100 Hz to 400 kHz | |
| Symbol rate range | 100 Hz to 20 kHz | $1 \leq \beta^* \leq 20$ |
| | 20 to 50 kHz | $1 \leq \beta \leq 8$ |
| | 50 to 100 kHz | $1 \leq \beta \leq 4$ |
| Accuracy | $\pm 4\%$ | Nominal |
| Displayed resolution | 0.01 Hz | |
| Time-gated spectrum analysis (Option TMG) | | |
| Gated sweep | | |
| Span range | Any span | |
| RBW range | ≥ 1 kHz | VBW is fixed and equal to RBW ³ |
| Gate delay range | 12 μ s to 10 s | 200 ns resolution |
| Gate length range | 84 μ s to 10 s | 200 ns resolution |

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

Specifications (continued)

| Option specifications (continued) | | Supplemental information |
|--|--|---|
| Time-gated spectrum analysis (Option TMG) | | |
| Gated sweep (continued) | | |
| Gate sources | External | |
| | RF burst | |
| | Periodic timer | <ul style="list-style-type: none">• Sync sources include free, external, and RF burst• Period: 0 to 20.0 s <i>(It should be greater than gate delay plus gate length)</i>• Offset: –5 to +5 s |
| RF burst | | |
| Level range | | –60 to –20 dBm plus attenuation (nominal) |
| Bandwidth (–10 dB) | | 8 MHz (nominal) |
| Frequency limitations | | If the start or center frequency is too close to zero, LO feedthrough can degrade or prevent triggering. How close is too close depends on the bandwidth. |
| Built-in GPS receiver and GPS antenna (Option GPS) | | |
| GPS information tagging | Longitude, latitude, and altitude | |
| GPS antenna | Built-in | |
| Frequency accuracy with GPS on | ± 50 ppb | |
| External GPS antenna connector | SMA-F | External GPS antenna, N934xC-GPA, is offered as an optional accessory |
| USB peak and average power sensor support (Option PWP) | | |
| Power sensor supported | Agilent U2020 X-series USB peak and average power sensor | |
| Frequency range | 50 MHz to 40 GHz | Sensor dependent |
| Peak power dynamic range | –30 to +20 dBm | |
| USB average power sensor support (Option PWM) | | |
| Power sensor supported | Agilent U2000 Series USB power sensor | |
| Frequency range | 9 kHz to 24 GHz | Sensor dependent |
| Dynamic range | –60 to +44 dBm | Sensor dependent |
| Security features (Option SEC) | | |
| Security erase | Erase the entire user flash memory by writing single character “1” over all memory locations | Non-recoverable |
| Port control | Disable/enable LAN port or USB port | |
| Task planner for test automation (Option TPN) | | |
| Task plan execution mode | Auto, manual, and manual if fail | |
| Task plan file | .TPN | Complementary task plan editor is available with HSA PC software |
| Number of tasks | Maximum 20 in a single .TPN file | |
| Measurements supported | Regular spectrum analysis and power suite (channel power, ACPR, and OBW) | |

Visit www.agilent.com/find/taskplanner for more information.

3. For efficiency and convenience, RBW is restricted to be equal to or greater than 1 kHz and VBW is restricted to be equal to RBW.

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