

Keysight Technologies

N9342C Handheld Spectrum Analyzer (HSA) 7 GHz

Data Sheet



Field testing just got easier

www.keysight.com/find/hsa

If you are making measurements in the field, the N9342C 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 N9342C HSA lets you automate routine tasks to save time and ensure consistent results. Field testing just got easier with the Keysight Technologies, Inc. N9342C HSA.

Your job just got easier:

- Get the features you need in a field-ready instrument.
- Gain confidence in your measurements with benchtop performance in a handheld instrument.
- Innovative task planner (www.keysight.com/find/taskplanner) reduces test setup time by 95%, delivers test automation and consistency, and makes it easy to capture test results, generate reports, and share task plans with others.

Definitions and requirements

This data sheet contains specifications and supplemental information for the Keysight N9342C handheld spectrum analyzer. The differences between specifications, typical performance, and nominal values are described as follows.

Definitions

"Specifications" describe the performance of parameters 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. 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.

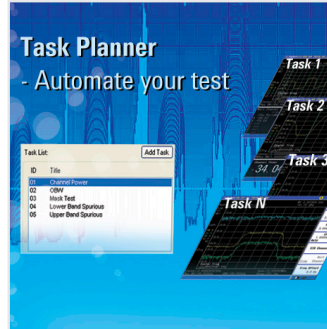
Conditions required to meet specifications

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

Keysight certifies that this product met its published specifications at the time of shipment from the factory. Keysight 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 | 100 kHz to 7 GHz (usable to 9 kHz) | AC coupled. Select Option BB1 for low frequency performance enhancement | |
| 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 7 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 | 20 to 30 °C |
| | 100 kHz | < -97 dBc/Hz, typical -99 dBc/Hz | Center frequency 500 MHz |
| | 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 | |
| EMI bandwidth (CISPR compliant) | 200 Hz, 9 kHz, 120 kHz, 1 MHz | Option EMC required | |
| Accuracy | ± 10% nominal | | |
| Resolution filter shape factor | < 5:1 nominal | -60 dB/-6 dB bandwidth ratio | |
| 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 | | | |
| 100 kHz to 2 MHz | Displayed average noise level (DANL) to +10 dBm | Preamp off | |
| 2 MHz to 7 GHz | Displayed average noise level (DANL) to +20 dBm | | |
| Input attenuator range | 0 to 50 dB, in 1 dB steps | | |
| Maximum safe input level | | | |
| Average continuous power | +33 dBm, 3 minutes maximum | Input attenuator setting ≥ 20 dB, 2 MHz to 7 GHz | |
| DC voltage | ± 50 VDC maximum | | |
| Displayed average noise level ¹ | | | |
| Preamp off | Normalized to 1 Hz | Minimum RBW | |
| 100 kHz to 1 MHz | -108 dBm, typical -127 dBm | -98 dBm, typical -117 dBm | |
| 1 to 10 MHz | -128 dBm, typical -146 dBm | -118 dBm, typical -136 dBm | |
| 10 to 500 MHz | -142 dBm, typical -146 dBm | -132 dBm, typical -136 dBm | |
| 500 MHz to 2.5 GHz | -141 dBm, typical -145 dBm | -131 dBm, typical -135 dBm | Reference level ≤ -50 dBm |
| 2.5 to 4 GHz | -140 dBm, typical -144 dBm | -130 dBm, typical -134 dBm | |
| 4 to 6 GHz | -138 dBm, typical -142 dBm | -128 dBm, typical -132 dBm | |
| 6 to 7 GHz | -136 dBm, typical -140 dBm | -126 dBm, typical -130 dBm | |
| Preamp on | | | |
| 100 kHz to 1 MHz | -131 dBm, typical -150 dBm | -121 dBm, typical -140 dBm | |
| 1 to 10 MHz | -148 dBm, typical -163 dBm | -138 dBm, typical -153 dBm | |
| 10 to 500 MHz | -161 dBm, typical -164 dBm | -151 dBm, typical -154 dBm | |
| 500 MHz to 2.5 GHz | -159 dBm, typical -162 dBm | -149 dBm, typical -152 dBm | Reference level ≤ -70 dBm |
| 2.5 to 4 GHz | -158 dBm, typical -161 dBm | -148 dBm, typical -151 dBm | |
| 4 to 6 GHz | -155 dBm, typical -158 dBm | -145 dBm, typical -148 dBm | |
| 6 to 7 GHz | -150 dBm, typical -154 dBm | -140 dBm, typical -144 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, dB μ V, W, V, dBmV EMF, dB μ V 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 | $\leq 1\%$ of signal level | Nominal |
| Detectors | Normal, positive peak, sample, negative peak, average (video, RMS, voltage), quasi-peak (option EMC required) | | |
| Number of traces | 4 | | |

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) | | | | |
| Trace functions | Clear/write, maximum hold, minimum hold, average | | | |
| Level measurement error | Excluding input VSWR mismatch ± 1.5 dB | 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 ± 0.4 dB with 5-min warm-up | | |
| Reference level ¹ | | | | |
| Setting range | -100 to 30 dBm | Steps of 1 dB | | |
| Setting resolution | Log scale | 0.01 dB | | |
| | Linear scale | Same as log ($2.236 \mu\text{V}$ to 7.07 V) | | |
| Accuracy | 0 | | | |
| RF input VSWR (at tuned frequency) | | | | |
| 10 MHz to 3 GHz | $< 1.5:1$ | Nominal, 10 or 20 dB attenuation | | |
| 3 to 7 GHz | $< 2.0:1$ | | | |
| Spurious response | | | | |
| Second harmonic distortion | < -65 dBc, 50 MHz to 3 GHz < -70 dBc, 3 to 7 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 | $+5.5$ dBm | | $+7$ dBm |
| | 300 MHz to 7 GHz | $+8.5$ dBm | | $+10$ dBm |
| Input related spurious | < -73.5 dBc | < -75 dBc | -30 dBm signal at input mixer Exception: -65 dBc (F1-21.4 MHz, with F1 input frequency) -65 dBc (F1-5.35 MHz, with F1 input frequency) -65 dBc (F1=4155 MHz, with F1 input frequency) | |
| Inherent residual response | < -85 dBm, typical -93 dBm | < -90 dBm, typical -98 dBm | Input terminated and 0 dB RF attenuation, preamplifier off | |

1. 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 \geq 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 | \pm 12 ms to \pm 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, \pm 7% at 0 to 150 mA (nominal) | |
| | -12.6 Vdc, \pm 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 | 15 W | Typical |
| Battery operating time (fully charged battery) | 4 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 PA7) | | |
| Frequency range | 100 kHz to 7 GHz | |
| Gain | 25 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 7 GHz | |
| Carrier power accuracy | ± 1.8 dB | Nominal |
| Carrier power range | -30 to +10 dBm | 100 kHz to 2 MHz |
| | -30 to +20 dBm | 2 MHz to 7 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 | ± 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 | ± 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 | ± 4% | Nominal |
| Displayed resolution | 0.1% | |
| FSK measurement | | |
| FSK deviation | 100 Hz to 400 kHz | |
| Symbol rate range | 100 Hz to 20 kHz | $1 \leq B^1 \leq 20$ |
| | 20 to 50 kHz | $1 \leq B \leq 8$ |
| | 50 to 100 kHz | $1 \leq B \leq 4$ |
| Accuracy | ± 4% | Nominal |
| Displayed resolution | 0.01 Hz | |

1. B 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 | | |
| Span range | Any span | |
| RBW range | > = 1 kHz | VBW is fixed and equal to RBW ¹ |
| Gate delay range | 12 μs to 10 s | 200 ns resolution |
| Gate length range | 84 μs to 10 s | 200 ns resolution |
| Gate sources | External | |
| | Periodic timer | Sync sources include free and external Period: 0 to 20.0 s (It should be greater than gate delay plus gate length) Offset: -5 to +5 s |
| Cable and antenna test (Option CA7) | | |
| Frequency range | 5 MHz to 7 GHz | |
| Frequency resolution | 100 kHz | |
| Output power | -4 to +2 dBm | Nominal |
| Measurement speed | 2 s (full span 5 MHz to 7 GHz) | |
| Number of data points | 461 | |
| Directivity of calibrator | > 40 dB | N9311X-201 mechanical OSL calibrator |
| Return loss | | |
| Range | 0 to 60 dB | |
| Accuracy | $A = 20 \times \log_{10} \left(1.1 + 10^{(-D-RL)/20} + 0.016 \times 10^{(-RL/20) + 10^{(-3+RL/20)}} \right)$ | Nominal, after average |
| | D: Directivity of calibrator RL: Return loss value of DUT | |
| Resolution | 0.01 dB | |
| Voltage standing wave ratio (VSWR) | | |
| Range | 1 to 65 | |
| Resolution | 0.01 | |
| Accuracy | Refer to return loss accuracy | |
| Cable loss | | |
| Range | 0 to 30 dB | |
| Resolution | 0.01 dB | |
| Distance-to-fault (DTF) | | |
| Vertical range | 0 to 60 dB | Return loss |
| | 1 to 65 | VSWR |
| Range | (Number of data points - 1) x resolution | Number of data points = 461 |
| Resolution (meter) | $(1.5 \times 10^8) \times (V_p)/(f_2 - f_1)$ Hz | V_p is the cable's relative propagation velocity f_2 is the stop frequency f_1 is the start frequency |
| Immunity to interference | | |
| On-channel | +17 dBm | Nominal |
| On-frequency | -5 dBm | Nominal |

1. 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.

Specifications *(continued)*

| Option specifications (continued) | | Supplemental information |
|---|--|---|
| 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 | Keysight 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 | Keysight 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.keysight.com/find/taskplanner for more information.

Specifications *(continued)*

| Option specifications (continued) | | Supplemental information | |
|--|---|--|--|
| Baseband input (Option BB1) | | | |
| Frequency range | 9 kHz to 12 MHz, usable to 3 kHz | | |
| Frequency span | 100 Hz to 11.997 MHz | | |
| Frequency resolution | 1 Hz | | |
| Measurement range | 9 kHz to 2 MHz | Displayed average noise level (DANL) to +10 dBm | |
| | 2 MHz to 12 MHz | Displayed average noise level (DANL) to +20 dBm | |
| Overall amplitude accuracy | 9 kHz to 100 kHz | ± 2.5 dB | 20 to 30 °C, 30 to 70% RH, peak detector, preamp off, input signal -50 to 0 dBm, 95% percentile |
| | 100 kHz to 12 MHz | ± 1.5 dB | |
| | Normalized to 1 Hz | Minimum RBW | |
| Displayed average noise level | 9 kHz to 100 kHz, nominal -145 dBm | 9 kHz to 100 kHz, nominal -135 dBm | RMS detector, trace averaging > 40, 0 dB input attenuation, input terminated 50 Ω, reference level < -35 dBm |
| | 100 kHz to 12 MHz, -155 dBm, typical -158 dBm | 100 kHz to 12 MHz, -145 dBm, typical -148 dBm | |
| Phase noise | 10 kHz nominal -118 dBc/Hz | | Center frequency 10 MHz |
| | 30 kHz nominal -120 dBc/Hz | | |
| | 100 kHz nominal -127 dBc/Hz | | |
| | > 200 kHz nominal -130 dBc/Hz | | |
| Residual responses | < -120 dBm nominal | 9 kHz to 12 MHz | |
| Second harmonic distortion | < -55 dBc nominal | Input frequency > 100 kHz, mixer signal level at -30 dBm, input attenuation 0 dB, preamp off, reference level -30 dBm, 20 to 30 °C | |
| Third order intermodulation distortion | < -55 dBc nominal | Two -20 dBm tones at input mixer, spaced by 100 kHz, input attenuation 0 dB, preamp off, reference level ≥ -20 dBm, 20 to 30 °C | |
| VSWR | < 2.0:0 nominal | 10 or 20 dB attenuation, 300 kHz to 12 MHz | |