

Agilent V3500A Handheld RF Power Meter

Data Sheet



The first palm-sized power meter from Agilent Technologies that delivers high lab quality RF power measurements for installation and maintenance or R&D lab environments



Why Agilent's Power Meters and Sensors?



Reliable, high-performing solutions

Every power meter and sensor from Agilent consistently delivers great results.



A sure investment for many years to come

Code-compatibility between power meters reduces the need for re-coding. Not only that, all Agilent power meters are backward-compatible with most legacy power sensors.



One specific application: One right solution

Agilent offers a wide selection of power meters and sensors for practically all application needs—wireless communications, radar pulse measurements, component test and more.



Global network support

No matter where you are, Agilent is committed to giving you the 24-hour support you need regarding our products, applications or services.

Agilent's power meters have long been recognized as the industry standard for RF and microwave power measurements.

Compact, Portable Solutions for Today's RF Power Measurements

For production testing



- Compact build saves rack space
- Simple set-up and usage
- Wide dynamic and frequency range

For R&D and design verification



- Compact build saves bench space
- Simple set-up and usage
- Wide dynamic and frequency range
- High accuracy
- Advanced troubleshooting of designs with built-in backlight display for easy readings and data recording

For installation and maintenance



- Integrated power sensor eliminates the need to carry separate sensor
- Lightweight and rugged
- Truly portable (with AA batteries)
- Wide dynamic and frequency range
- Quick and easy testing with built-in backlight display

Associated with mobile phones and infrastructure, wireless sensors and transceivers, and WiMAX™, WLAN, RFID, mobile radio, Zigbee, and *Bluetooth*® devices

Introducing the New Member of the Power Meter Family – the Agilent V3500A

Key features

- Broad 10 MHz to 6 GHz frequency range enables use in variety of applications, including test of mobile phones and infrastructures, WLAN devices, RFID readers, and WiMAX devices
- Large dynamic range of –63 dBm to +20 dBm measures various types of signals, either directly from the device-under-test or through layers of cabling and fixtures
- Integrated power sensor eliminates the need to carry a separate sensor and makes it the most compact and portable RF power measurement instrument
- Internal power reference enables self-calibration and excludes the need to perform independent calibration before using the instrument
- Compensate for cable losses with the Relative Offset function that can add an offset to the display ranging between –99.99 dB and +99.99 dB
- Absolute accuracy up to ± 0.21 dB enables more precise characterization of devices, tighter test limits, and more accurate fixture calibration

The Agilent V3500A handheld RF power meter is a compact, portable instrument that makes lab quality RF power measurements in both field and R&D laboratory environments. With an absolute accuracy up to ± 0.21 dB, a wide frequency range of 10 MHz to 6 GHz, and measurement range of –63 dBm to +20 dBm, the V3500A is suitable for a wide variety



of RF measurement applications. Its built-in power sensor eliminates the need for users to carry both an instrument and a separate sensor module, and the same sensor is used when duplicating tests or measurements for better repeatability. Truly portable, the V3500A fits easily into your hand or a toolkit and optional loop holster carrying case with shoulder strap is also available to fit your need. To optimize flexibility, it's capable of drawing operating power from batteries, an AC-DC converter module, or a computer via the USB interface. With its features and very attractive price, the V3500A truly redefines superior value.

High accuracy in both the lab and field

Whether it's used in the field or on the factory floor, the Agilent V3500A makes lab quality RF measurements quickly and easily. Its absolute accuracy up to ± 0.21 dB, enables more precise characterization of devices, tighter test limits, and more

accurate fixture calibration. In the laboratory, it can be used as an RF power data-logger. Using normal or high speed mode, it easily captures and transfers data to your personal computer through its built-in USB interface (cable supplied), allowing for trend or drift analysis. Despite its small package, the V3500A provides outstanding accuracy on the bench, replacing much larger and more expensive instrumentation.

Convenient utilities

The V3500A incorporates several handy and practical utilities that make it easier than ever to attain high quality RF measurements with this handheld instrument. Compensate the display reading for any losses or gains between the location where the level of power is desired and the actual point where the power can be measured. Typically the compensation will be required for cable loss. The relative offset factor can be as large as 99.99 dB, and the offset can be programmed with a resolution of 0.01 dB. A number of averaging values can be used when the signal you want to measure varies significantly with time. A hold command saves a measurement that is made in a hard to reach area until the instrument can be retrieved. A backlight can be illuminated when making measurements in poorly lit areas. To maximize battery life, the V3500A can be set up to turn off the backlight or the instrument entirely after a specific period of time. Once the instrument utilities are setup in the manner you prefer, the instrument state can be saved for the next use.



Take a Closer Look

RF connector

In the RF world, cables are often equipped with N-connectors and SMA connectors. N-connectors are commonly used on test instrumentation, because they are rugged, can handle high powers, and perform well up to about 18 GHz.

This section contains information about how to make RF signal connections to the Type N male RF connector (50 Ω characteristic impedance—refer to Figure 1) of the V3500A for power measurement.

Connection for a power measurement

NOTE: When connecting the Type N connector of the V3500A to a Type N female connector for a power measurement, observe the following proper practice for tightening the connection.

While holding the body of the power meter in one hand, turn the Type N male connector nut to tighten the connection (do not turn the body of the V3500A). Continue to do so until the connection is hand-tight. It is important to turn the nut of the connector rather than the body of the power meter when tightening the connection.

USB port

NOTE: The term *USB (Universal Serial Bus)* is used in this data sheet. *USB* is simply another term for the *Universal Serial Bus*.

The power meter has a USB 2.0 interface with a USB type Mini-B port (refer to Figure 2). The V3500A can be remotely programmed over this USB interface. In addition to programming, the V3500A can be powered by the USB. With the USB connected and providing power, and the optional external power disconnected, the V3500A will be powered from USB regardless of whether batteries are present.

NOTE: The interface is *USB 2.0 compatible*, but with an interface speed of *12 Mbps*.

External power connector

The power connector provides a connection for the optional external power supply (refer to Figure 2). If the external power supply is connected, the V3500A will be powered by the external supply, regardless of whether USB power or batteries are present.

CAUTION: Only connect the optional external power supply (V3500A-PWR) to this connector. Instrument damage may result if improper power is applied.

Battery power

The V3500A can also be powered by two AA batteries. If installed, the batteries will power the V3500A only if the external power supply and USB are not connected.

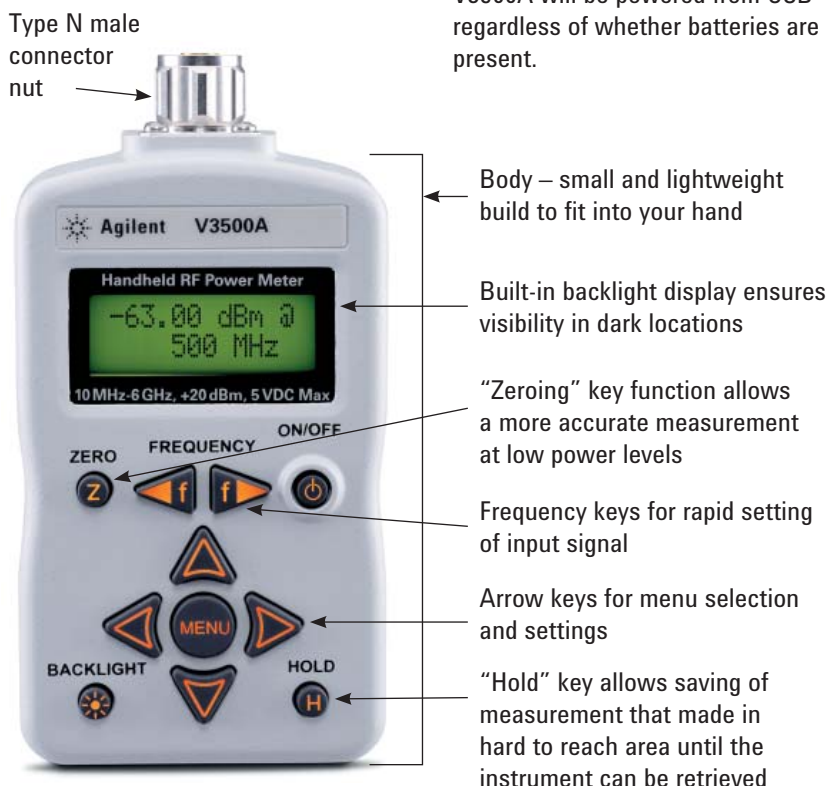


Figure 1. Signal connection



Figure 2. USB and power connector

Specifications

The following specifications are based on performance at a temperature of 23 °C ± 5 °C unless stated otherwise.

Product specifications		
Category	Specifications	
Frequency range	10 MHz to 6 GHz	
Power range	–60 dBm to +20 dBm	
Maximum power	+23 dBm, 5 VDC	
Power accuracy	At 23 °C ±5 °C ¹	At 0 °C to 50 °C
Frequency range	+20 dBm to +6 dBm	+20 dBm to +6 dBm
10 MHz to 3.75 GHz	±0.23 dB	±0.33 dB
3.75 GHz to 6 GHz	±0.20 dB	±0.44 dB
Frequency range	+6 dBm to –9 dBm	+6 dBm to –9 dBm
10 MHz to 3.75 GHz	±0.26 dB	±0.33 dB
3.75 GHz to 6 GHz	±0.40 dB	±0.55 dB
Frequency range	–9 dBm to –29 dBm	–10 dBm to –29 dBm
10 MHz to 3.75 GHz	±0.18 dB	±0.29 dB
3.75 GHz to 6 GHz	±0.19 dB	±0.34 dB
Frequency range	–29 dBm to –39 dBm	–30 dBm to –40 dBm
10 MHz to 3.75 GHz	±0.22 dB	±0.32 dB
3.75 GHz to 6 GHz	±0.25 dB	±0.44 dB
Frequency range	–39 dBm to –50 dBm	–39 dBm to –50 dBm
10 MHz to 3.75 GHz	±0.36 dB	±0.48 dB
3.75 GHz to 6 GHz	±0.39 dB	±0.65 dB
Frequency range	–50 dBm to –55 dBm	–50 dBm to –55 dBm
10 MHz to 3.75 GHz	±1.37 dB	±1.47 dB
3.75 GHz to 6 GHz	±1.81 dB	±1.97 dB
Linearity	At 23 °C ±5 °C	At 0 °C to 50 °C
–40 dBm to +6 dBm	±0.1 dB	±0.2 dB
–50 dBm to –40 dBm	±0.4 dB	±0.5 dB
–50 dBm to –55 dBm	±1.0 dB	±1.1 dB
Noise floor	At 0 °C to 50 °C	
	–61 dBm	
Speed	Normal	~2 readings per second (> –30 dBm approximately) ~1 readings per second (≤ –30 dBm approximately)
	High-speed	~23 readings per second (> –30 dBm approximately) ~10 readings per second (≤ –30 dBm approximately)

1. Customer spec after warm up time of 30 minutes

$$X = (x, f) + K(=2) \cdot \delta(x, f) + \Delta_t[x, f[18^\circ - 28^\circ \text{C}]] + \mu$$

where

X is mean of the data taken in the frequency range stated (x, f) .

δ is standard deviation of the data taken in the frequency range stated (x, f) .

x is measured value at test frequencies.

f is frequency range over which data was taken for specification.

μ is measurement uncertainty.

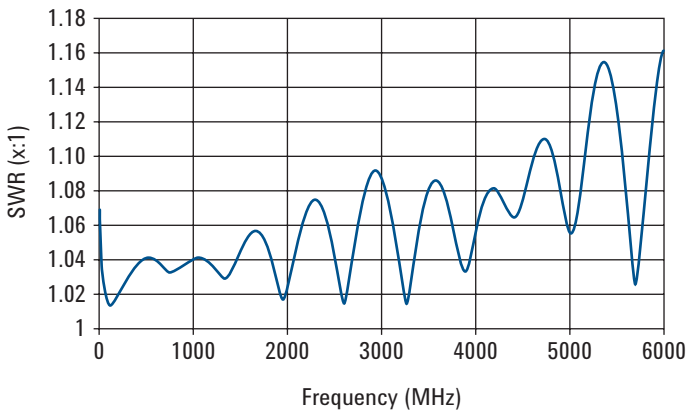
Δ_t is change associated temperature variation.

18 ° – 28 °C is the statistics generated separately at these temperatures and larger statistical value used in setting spec.

Specifications (continued)

SWR performance for different frequency band

SWR	
Frequency band	SWR (0 °C to 50 °C)
10 MHz to 3.75 GHz	1.13
3.75 GHz to 6 GHz	1.22



Typical SWR performance

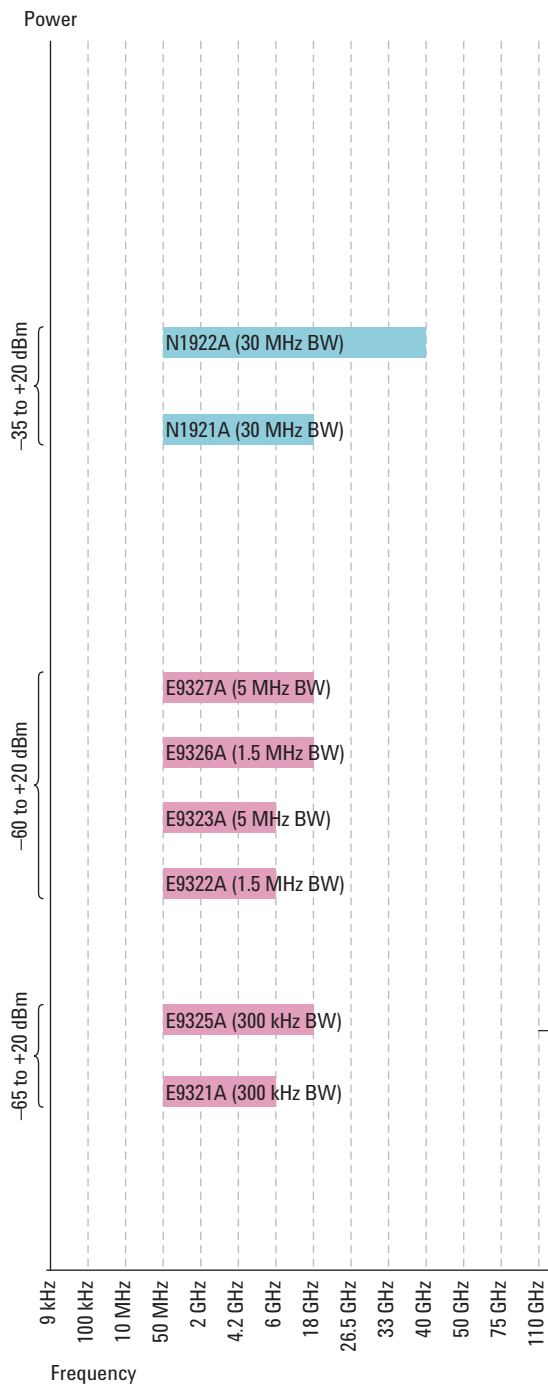
Specifications (continued)

Product characteristics	
Power (equipped with auto-shutoff)	<ul style="list-style-type: none">• Two 1.5 V alkaline AA batteries (typical battery life: 17.5 hours¹ with low battery indicator• USB interface cable (Standard-A to Type-B)²• Optional external DC power supply³ (V3500A-PWR)
Display	<ul style="list-style-type: none">• 4 digits with backlight and auto-shutoff feature• Hold feature—most recent reading is shown on the display and is no longer updated
Connector	<ul style="list-style-type: none">• USB 2.0 interface with a mini-B USB connector⁴• Type N male RF connector (50 Ω characteristic impedance)
Operating environment	<ul style="list-style-type: none">• At 0 ° to 50 °C• Up to 80% RH for temperature up to 35 °C, non-condensing• Altitude up to 2,000 meters
Storage compliance	<ul style="list-style-type: none">• -10 °C to 70 °C• Non-operating maximum humidity: 90% at 65 °C, non-condensing
EMC compliance	Certified with <ul style="list-style-type: none">• IEC 61326-2-1:2005/EN 61326-2-1:2006• Canada: ICES-001:2004• Australia/New Zealand: AS/NZS CISPR11:2004
Pollution degree	Pollution Degree 2
Dimensions (W × H × D)	79 mm × 134 mm × 49 mm (without N-connector)
Weight	0.5 kg
Waranty	<ul style="list-style-type: none">• One year for the V3500A Handheld RF Power Meter• Three months for the standard shipped and optional accessories
Calibration cycle	One year

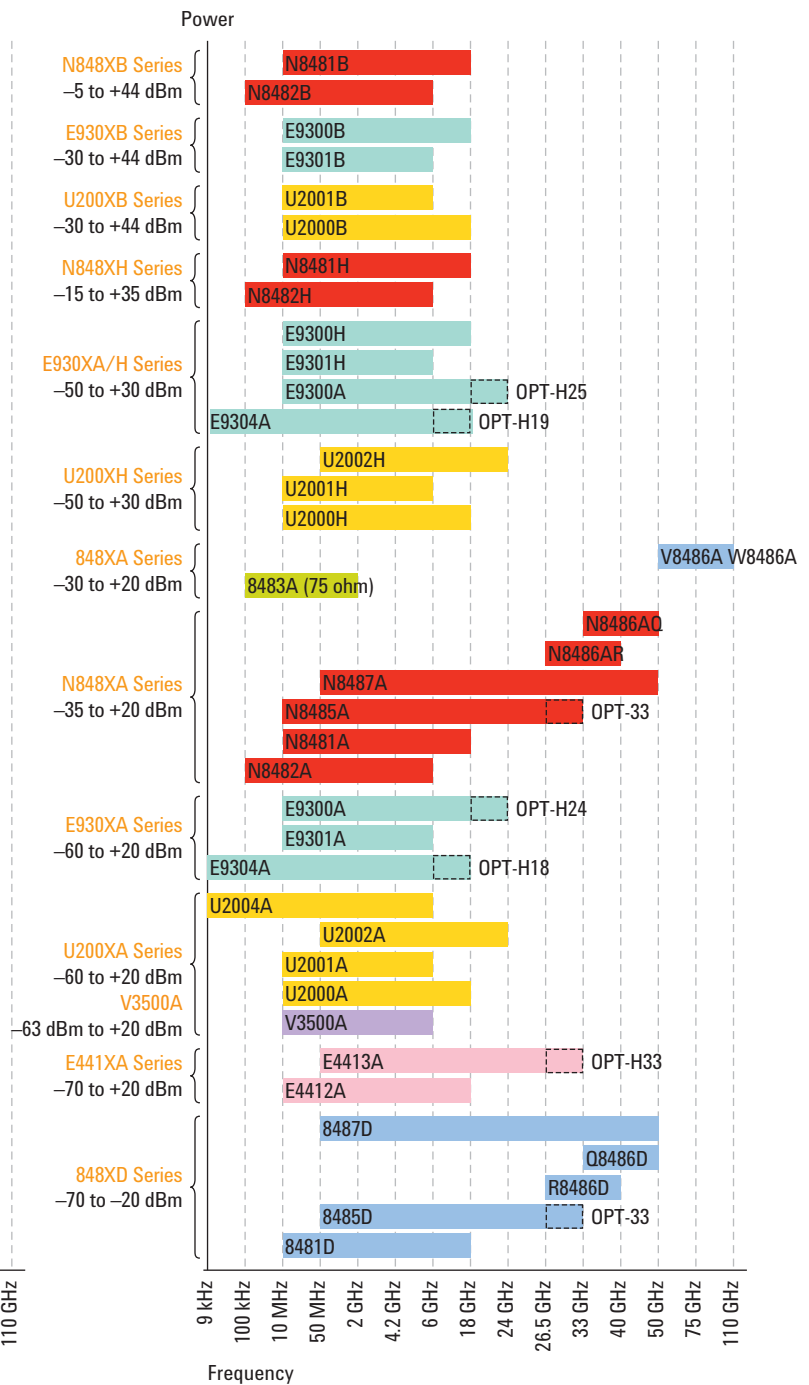
1. Typical battery life was measured in the default conditions from the factory at 500 MHz with backlight off and no USB communications. With backlight on, typical battery life is 2.5 hours.
2. With the USB connected and providing power, and the optional external power disconnected, the V3500A will be powered from USB regardless of whether batteries are present.
3. If the external power supply is connected, the V3500A will be powered by the external supply, regardless of whether USB power or batteries are present.
4. The interface is USB 2.0 compliant but with an interface speed of 12 Mbps.

Agilent Power Meter and Power Sensors Selection Guide

Peak-and-average power sensors
(breakdown by dynamic range)



Average power sensors
(breakdown by dynamic range)



Ordering Information



V3500A handheld RF power meter

Standard shipped accessories

USB interface cable Type A to Mini-B, 2.5 meter (8.2 feet)



CD-ROM	Agilent V3500A Product Reference CD-ROM
--------	---

Accessories, calibration and documentation options

V3500A-PWR	External power supply
V3500A-SHL	Holster carry case with shoulder strap
V3500A-CA1	USB cable type A to Mini-B, 2.5 meter (8.2 feet)
V3500A-ABA	English User's Guide
V3500A-0B1	English User's Guide and Installation Guide
V3500A-0BW	English Service Guide
V3500A-ABJ	Japanese User's Guide
V3500A-AB2	Simplified Chinese User's Guide



myAgilent

www.agilent.com/find/myagilent

A personalized view into the information most relevant to you.



www.axiestandard.org

AdvancedTCA® Extensions for Instrumentation and Test (AXIe) is an open standard that extends the AdvancedTCA for general purpose and semiconductor test. Agilent is a founding member of the AXIe consortium.



www.lxistandard.org

LAN eXTensions for Instruments puts the power of Ethernet and the Web inside your test systems. Agilent is a founding member of the LXI consortium.



www.pxisa.org

PCI eXTensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Agilent Channel Partners

www.agilent.com/find/channelpartners

Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.

Bluetooth and the Bluetooth logos are trademarks owned by Bluetooth SIG, Inc., U.S.A. and licensed to Agilent Technologies, Inc.

WiMAX is a trademark of the WiMAX Forum.



Three-Year Warranty

www.agilent.com/find/ThreeYearWarranty

Agilent's combination of product reliability and three-year warranty coverage is another way we help you achieve your business goals: increased confidence in uptime, reduced cost of ownership and greater convenience.



Agilent Advantage Services

www.agilent.com/find/AdvantageServices

Accurate measurements throughout the life of your instruments.



www.agilent.com/quality

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:
www.agilent.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	(11) 4197 3600
Mexico	01800 5064 800
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 375 8100

Europe & Middle East

Belgium	32 (0) 2 404 93 40
Denmark	45 45 80 12 15
Finland	358 (0) 10 855 2100
France	0825 010 700*
	*0.125 €/minute
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
United Kingdom	44 (0) 118 927 6201

For other unlisted countries:

www.agilent.com/find/contactus

(BP-3-1-13)

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2013
Published in USA, April 4, 2013
5990-5483EN



Agilent Technologies