Agilent V3500A Handheld RF Power Meter

Service Guide

Agilent Technologies

Notices

Manual Part Number

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CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

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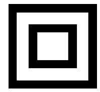
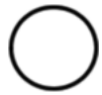
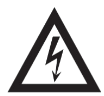
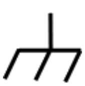
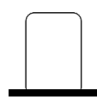
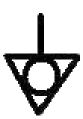
Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current (DC)		Equipment protected throughout by double insulation or reinforced insulation
	Alternating current (AC)		Off (supply)
	Both direct and alternating current		On (supply)
	Three-phase alternating current		Caution, risk of electric shock
	Earth (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Protective conductor terminal		Caution, hot surface
	Frame or chassis terminal		Out position of a bi-stable push control
	Equipotentiality		In position of a bi-stable push control

Regulatory Markings

CE ISM 1-A	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.	N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
ICES/NMB-001	ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est confomre a la norme NMB-001 du Canada.		This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING

- **Observe all markings on the instrument before connecting any wiring to the instrument.**
- **Do not operate the instrument in an explosive atmosphere or in the presence of flammable gases or fumes.**
- **Do not service or perform adjustments alone. Under certain condition, hazardous voltages may exist, even with the equipment switched off. To avoid dangerous electric shock, service personnel must not attempt internal service or adjustment unless another person, capable of rendering resuscitation or first aid, is present.**
- **Do not substitute parts or modify equipment to avoid the danger of introducing additional hazards. Return the instrument to Agilent Sales Office for service and repair to ensure the safety features are maintained.**
- **Do not operate damaged equipment as the safety protection features built into this instrument may have been impaired, either through physical damage, excessive moisture, or any other reason. Remove power and do not use the instrument until safe operation can be verified by service-trained personnel. If necessary, return the instrument to Agilent Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.**

CAUTION

- Ensure proper insertion of battery in the power meter, and follow the correct polarity.

In This Guide...

1 Characteristics and Specifications

This chapter describes the instrument characteristics and specifications of the V3500A Handheld RF Power Meter.

2 Service and Maintenance

This chapter provides you with the general service and maintenance information, and battery replacement procedure.

3 Performance Tests

This chapter provides you the step-by-step performance verification and adjustment test for the V3500A Handheld RF Power Meter.

4 Repair Guide

This chapter details the replaceable parts for the V3500A Handheld RF Power Meter. It also explains how to assemble and disassemble the power meter.

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1
Characteristics and Specifications

This chapter describes the instrument characteristics and specifications of the V3500A Handheld RF Power Meter.

Product Characteristics

POWER

Equipped with auto-shutoff

- Two 1.5 V alkaline AA batteries (Typical battery life: 17.5 hours[1] with low battery indicator)
- USB interface cable (Standard-A to Type-B)[2]
- Optional external DC power supply[3] (V3500A-PWR)

DISPLAY

- 4-digits with backlight and auto-shutoff feature
- Hold feature — most recent reading is shown on the display and is no longer updated

CONNECTOR

- USB 2.0 interface with a mini-B USB connector[4]
- Type-N male RF connector (50 Ω characteristic impedance)

OPERATING ENVIRONMENT

- 0 °C to 50 °C
- 80% RH for temperature up to 35 °C, non-condensing
- Altitude up to 2000 meters

STORAGE COMPLIANCE

- –10 °C to 70 °C
- Non-operating maximum humidity: 90% at 65 °C, non-condensing

EMC COMPLIANCE

Certified with

- 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

WARRANTY

- 3 years for the V3500A Handheld RF Power Meter
- 3 months for the standard shipped and optional accessories

CALIBRATION CYCLE

Recommended 1 year

[1] Typical battery life was measured in default conditions at 500 MHz with backlight off and without USB communications. With backlight on, the typical battery life is 2.5 hours.

[2] With the USB cable connected to provide power and the optional external power disconnected, the external power supply (V3500A-PWR) will be powered from the USB cable — regardless of whether batteries are present.

[3] If the V3500A-PWR power supply is connected, it will be powered by the external supply — regardless of whether the USB power or batteries are present.

[4] The interface is USB 2.0 compatible with an interface speed of 12 Mbps.

Product Specifications

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

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 – 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 6GHz	*±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**	**–9 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**	**–29 dBm to –39 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; *±0.12 dB*	*±1.47 dB*
3.75 GHz to 6 GHz	±1.81 dB; *±0.13 dB*	*±1.97 dB*

Category	Specifications	
Linearity	At 23 °C ±5 °C	At 0 °C – 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 – 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

$$X = (x,f) + K(= 2) \cdot \delta(x,f) + \Delta_E(x,f[18° - 28°C]) + \mu$$

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_E is change associated temperature variation.

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

SWR

The SWR performance graph is shown in Figure 1-1.

Table 1-1 SWR performance for different frequency band

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

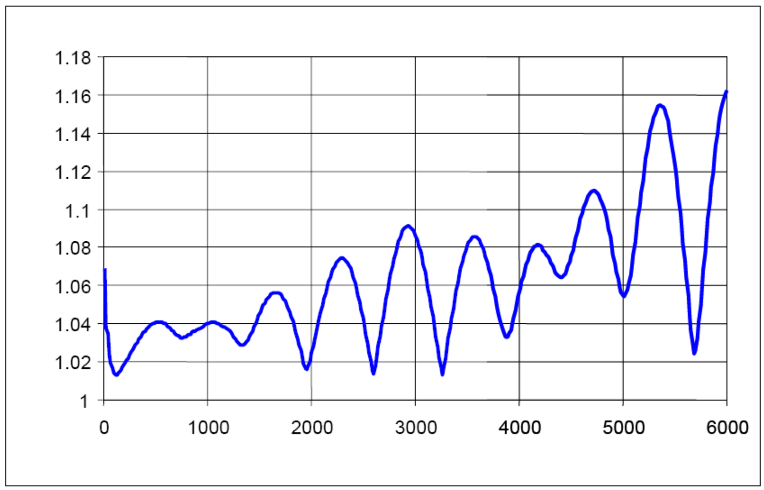

Figure 1-1 Typical SWR performance

2
Service and Maintenance

This chapter provides you with the general service and maintenance information, and battery replacement procedure.

General Information

Cleaning

Use a clean, damp cloth to clean the body of the V3500A Handheld RF Power Meter.

RF connectors care

Use a solution of pure isopropyl or ethyl alcohol to clean the connectors but do keep in mind that these solutions are flammable.

Clean the connector only at a static free workstation. Electrostatic discharge to the center pin of the connector will render the power meter inoperative.

Clean the connector face by first using a blast of compressed air. If the compressed air fails to remove contaminants, use a cotton swab dipped in isopropyl or ethyl alcohol. If the swab is too big, use a round wooden toothpick wrapped in a lint free cloth dipped in isopropyl or ethyl alcohol.

CAUTION

The RF connector bead deteriorates when contacted with any chlorinated or aromatic hydrocarbon such as acetone, thrichlorethane, carbon tetrachloride, and benzene.

Do not attempt to clean connectors with anything metallic such as pins or paper clips.

Battery Replacement

The V3500A is powered by two 1.5 V AA batteries. To ensure that the meter performs as specified, it is recommended that you replace the battery as soon as the low battery indicator is flashing. See the following procedures for battery replacement:

1. Loosen the screw on the battery cover using a Phillips screwdriver.
2. Replace the specified batteries, ensure the correct polarity of the batteries.
3. Tighten the screw on the battery cover and turn on the power meter.

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3
Performance Tests

This chapter provides you the step-by-step performance verification and adjustment test for the V3500A Handheld RF Power Meter.

Performance Tests

The procedures in this chapter test the power meter electrical performance using the specification in Chapter 1 as the performance standards. The performance tests given in this chapter are suitable for incoming inspection or preventive maintenance. During any performance test, all shields and connecting hardware must be in place.

Test Procedures

It is assumed that the person performing the following tests understands how to operate the specified test equipment. Equipment settings, other than those for the power meter, are stated in general terms. It is assumed that the person will select the proper cables, adapters, and probes required for the test setup illustrated in this chapter.

Equipment List

Table 3-1 lists all the equipment required for the performance tests. If a substitution must be made, the equipment used must meet the critical specifications.

Table 3-1 Equipment required for performance tests

Equipment Required	Recommended Models	Critical Specifications
Network analyzer	• Agilent E5071C (Option 280) • Agilent 8753ES (Option 006) • Agilent 8753E (Option 006)	Frequency range: 10 MHz to 6 GHz
Calibration kit	• Agilent 85032B • Agilent 85032E • Agilent 85032F	Type-N connector 50 Ω characteristic impedance Frequency range: 10 MHz to 6 GHz
Signal source	• Agilent E8257D (Option 520, 532, 540, 550 1EA, 550 1EU)	Ability to output +6 dBm from 10 MHz to 6 GHz
Power splitter	Agilent 11667A	
Power meter	• Agilent E4417A • Agilent E4419A/B • Agilent E4418B	Dual channel Absolute accuracy: ±0.5% Power reference accuracy: ±0.9%
Power sensor	• Agilent 8481A • Agilent E9301A • Agilent N8482A	Ability to measure 0 dBm power from 10 MHz to 6 GHz
Incident sensor	• Agilent 8481A • Agilent E9301A • Agilent N8482A	Ability to measure 0 dBm power from 10 MHz to 6 GHz
Function generator	33250A	Ability to output +12 dBm at 50 MHz
Fixed attenuator	8491A (Option 010)	
1 dB step attenuator	Agilent 8494G	Characterized by standard lab Accuracy: ±0.01 dB VSWR @ 50 MHz: ≤1.05

Table 3-1 Equipment required for performance tests (continued)

Equipment Required	Recommended Models	Critical Specifications
10 dB step attenuator	Agilent 8496G	Characterized by standard lab Accuracy: ±0.005 dB+0.0052 dB/step VSWR @ 50 MHz: ≤1.05
Switch driver	Agilent 11713A	

Performance Verification

Power source test

1 Remove the battery cover of the power meter using a Phillips screw driver.

2 Insert two 1.5 V alkaline AA batteries into the battery holder and turn the power meter ON. Make sure that the display and the keypad are working by pressing every key on the keypad.

3 Leave the AA batteries in the battery holder and connect the USB interface cable (Standard- A to Type-B) to the PC. Make sure that the power meter continues to operate normally without any interruptions such as display glitch or any sort of display changes when the USB interface cable is inserted.

4 Using the universal switching power supply, plug the adaptor output into the 5 V, 150 mA input on the power meter. Make sure that the power meter continues to operate normally without any interruptions such as display glitch or any sort of display changes.

5 Remove the two 1.5 V alkaline AA batteries from the power meter, and make sure that the power meter is still operating normally.

6 Unplug the USB interface cable and make sure that the power meter is still operating normally with the universal switching power supply connected.]

SWR Test

Specifications

Electrical Characteristics	Performance Limits
SWR (10 MHz to 3.75 GHz)	1.13
SWR (3.75 GHz to 6 GHz)	1.22

Equipment

- Network analyzer: Agilent E5071C (Option 280), 8753ES (Option 006), or 8753E (Option 006)
- Calibration kit: Agilent 85032B, 85032E, or 85032F

Test setup

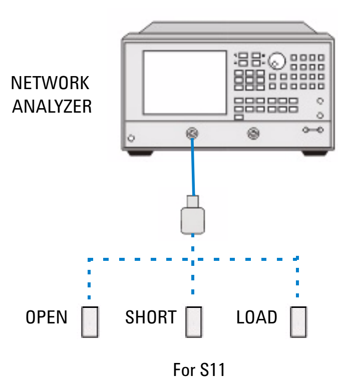

Figure 3-1 SWR test setup

Procedure

1 Preset the vector network analyzer (VNA) to factory default settings.

2 Set the stimulus of VNA to the following settings and select Channel 1 as the test channel.

- Power level = 0 dBm
- IF BW = 10 Hz
- Averaging = 1

3 Select the proper calibration kit shown on the calibration menu of VNA.

4 Select 1-Port (S11) calibration on the calibration menu of VNA.

5 Perform calibration using open, short, and load as shown in Figure 3-1 on page 15.

6 Save the calibration results and recall calibration results.

7 Set the VNA to the following settings:

- Measure S11 parameter
- Display format as SWR
- Output format as linear marker
- Auto scale

8 Connect the unit under test (UUT) directly to Port 1 of VNA as shown in Figure 3-2 on page 17.

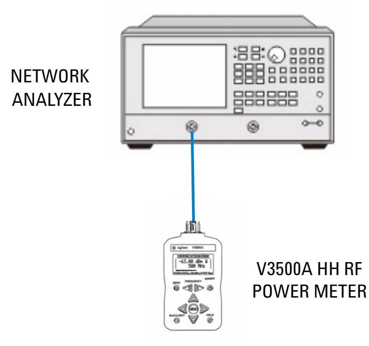

Figure 3-2 UUT connected to Port 1 of the VNA

9 Perform a sweep and read the trace data for all sweep points.

10 Find the test point readings from the trace data array. The output reading shows SWR results.

NOTE The sweep segment one is an extra sweep segment which allows VTO saturation and settling time to get better results. The trace data from segment one should be thrown away before the results are obtained.

Frequency Response Test

Specifications

Electrical Characteristics	Performance Limits
Frequency response (10 MHz to 3.75 GHz)	±0.26 dB
Frequency response (3.75 GHz to 6 GHz)	±0.4dB

Equipment

- Signal source: Agilent E8257D Agilent E8257D (Option 520, 532, 540, 550 1EA, or 550 1EU)
- Power meter: Agilent E4417A or E4419A/B
- Power sensor: Agilent 8481A, E9301A, or N8482A
- Incident sensor: Agilent 8481A, E9301A, or N8482A
- Power splitter: Agilent 11667A

Test setup

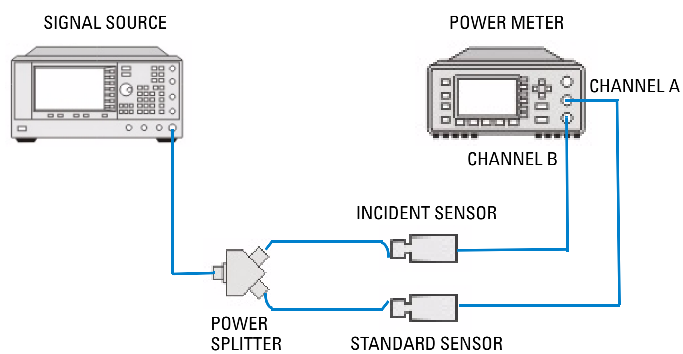

Figure 3-3 Frequency response test setup

Procedure

1 Set the power meter measurement unit as dBm.

2 Zero and calibrate the incident sensor on the power meter Channel B and the power sensor (standard sensor) on the power meter Channel A, respectively.

3 Set up the instruments as shown in Figure 3-3 on page 18.

4 Set the source frequency as 10 MHz and power level as 6 dBm. Turn on RF output.

5 Load the calibration factor of the stadard sensor and incident sensor for the current frequency into power meter if necessary.

6 Measure and store the power ratio of Channel A to Channel B for the current frequency.

$$\text{Ratio} = P_{STD} - P_{INC0}$$

7 Repeat step 4 to step 6 for each frequency point between 10 MHz and 6 GHz.

8 Turn off the source RF output.

9 Zero the UUT and set the measurement unit to dBm.

10 Make connections as indicated in Figure 3-4 on page 19.

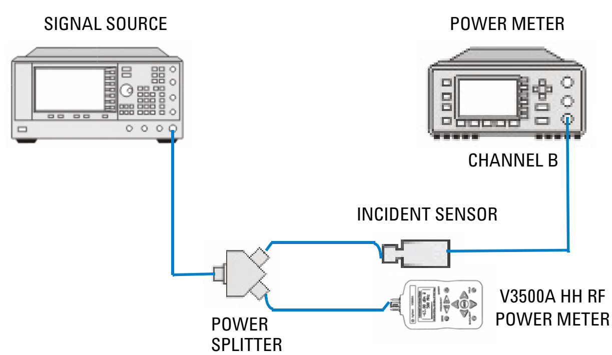

Figure 3-4 UUT connected for frequency response test

11 Set the source frequency based on the test frequency and turn on RF output.

12 Load the calibration factor of incident sensor for the current frequency into the power meter if necessary.

13 Set the current frequency for UUT.

14 Measure and store the power meter Channel B input power for the current frequency (P_{INC}).

15 Measure and store the UUT input power for the current frequency (P_{UUT}).

16 Repeat step 11 to step 15 for each test frequency determined in step 7.

17 Turn off the source RF output.

18 Calculate the UUT frequency response at each frequency.

$$\text{UUT Frequency Response} = P_{UUT} - (P_{INC} + (P_{STD} - P_{INC0}))$$

Linearity Test

Specifications

Electrical Characteristics	Performance Limits
Linearity test	±0.1 dB

Equipment

- Function generator: Agilent 33250A
- Power splitter: Agilent 11667A
- Fixed attenuator: Agilent 8491A (Option 010)
- Power meter: Agilent E4418B
- Power sensor: Agilent N8482A
- 1 dB step attenuator: Agilent 8494G
- 10 dB step attenuator: Agilent 8496G
- Switch driver: 11713A

Test setup

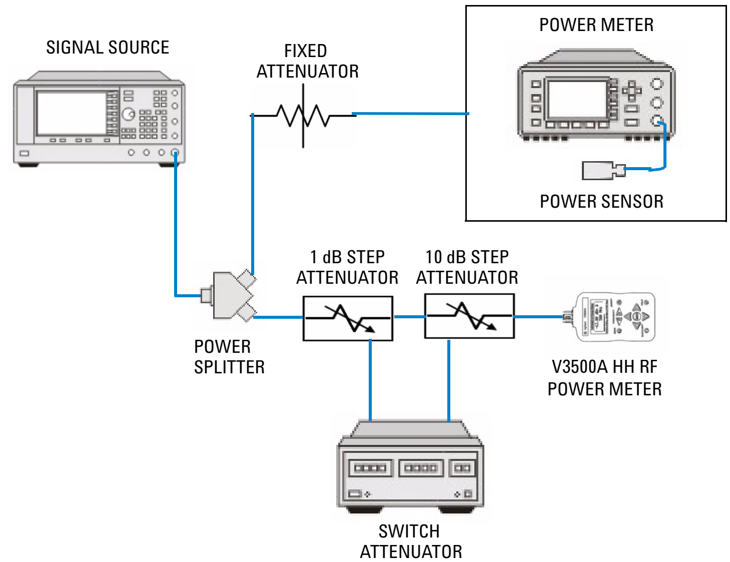

Figure 3-5 Linearity test setup

Procedure

1. Zero the UUT.
2. Zero and calibrate the reference sensor using a power meter.
3. Set up the instruments as shown in Figure 3-5 on page 22.
4. Set the UUT measurement unit as dBm.
5. Set the UUT test frequency as 50 MHz.
6. Set the power meter measurement unit as dBm.
7. Set both 1 dB step attenuator and 10 dB step attenuator to 0 dB attenuation.
8. Obtain the total insertion loss of the two step attenuators, Att_0.
9. Set the source to output 50 MHz and 6 dBm CW signal.

10 Fine-tune the source until the UUT reading of 0.00 dBm ±0.01 dB. Record the UUT reading as P_{t0} and record the power meter reading as P_{m0}.

11 Increase the source output power by 6 dB.

12 Set the attenuation of 1 dB step attenuator and 10 dB step attenuator for the current test point according to Table 3-2 on page 24.

13 Obtain the precise attenuation of the two step attenuators for the current test point Att_1 and Att_{10}.

14 Record the UUT reading as P_t and record the power meter reading as P_m.

15 Calculate the linearity error according to the equation below, and compare it with its specification.

$$\text{Linearity} = P_t - P_S$$

$$P_S = P_m - \text{Offset} - (Att_{10} + Att_1)$$

$$\text{Offset} = P_{m0} - (P_{t0} + Att_0)$$

Table 3-2 Attenuator settings

Test Condition	Total Attenuation (dB)	8494G Setting (dB)	8496G Setting (dB)	11713A SCPI Command
+6 dBm	0	0	0	B12345678
+5 dBm	1	1	0	A5B1234678
+4 dBm	2	2	0	A6B1234578
+3 dBm	3	3	0	A56B123478
+2 dBm	4	4	0	A7B1234568
+1 dBm	5	5	0	A57B123468
0 dBm	6	6	0	A67B123458
–1 dBm	7	7	0	A567B12348
–2 dBm	8	8	0	A78B123456
–3 dBm	9	9	0	A578B12346
–4 dBm	10	10	0	A678B12345
–5 dBm	11	1	10	A15B234678
–6 dBm	12	2	10	A16B234578
–7 dBm	13	3	10	A156B23478
–8 dBm	14	4	10	A17B234568
–9 dBm	15	5	10	A157B23468
–10 dBm	16	6	10	A167B23458
–11 dBm	17	7	10	A1567B2348
–12 dBm	18	8	10	A178B23456
–13 dBm	19	9	10	A1578B2346
–14 dBm	20	10	10	A1678B2345
–15 dBm	21	1	20	A25B134678
–16 dBm	22	2	20	A26B134578
–17 dBm	23	3	20	A256B13478

Table 3-2 Attenuator settings (continued)

Test Condition	Total Attenuation (dB)	8494G Setting (dB)	8496G Setting (dB)	11713A SCPI Command
–18 dBm	24	4	20	A27B134568
–19 dBm	25	5	20	A257B13468
–20 dBm	26	6	20	A267B13458
–21 dBm	27	7	20	A2567B1348
–22 dBm	28	8	20	A278B13456
–23 dBm	29	9	20	A2578B1346
–24 dBm	30	10	20	A2678B1345
–25 dBm	31	1	30	A125B34678
–26 dBm	32	2	30	A126B34578
–27 dBm	33	3	30	A1256B3478
–28 dBm	34	4	30	A127B34568
–29 dBm	35	5	30	A1257B3468
–30 dBm	36	6	30	A1267B3458
–31 dBm	37	7	30	A12567B348
–32 dBm	38	8	30	A1278B3456
–33 dBm	39	9	30	A12578B346
–34 dBm	40	10	30	A12678B345
–35 dBm	41	1	40	A35B124678
–36 dBm	42	2	40	A36B124578
–37 dBm	43	3	40	A356B12478
–38 dBm	44	4	40	A37B124568
–39 dBm	45	5	40	A357B12468
–40 dBm	46	6	40	A367B12458

Noise Test

Specifications

Electrical Characteristics	Performance Limits
Noise test	–61 dBm

Procedure

1 Zero the UUT.
2 Set the UUT measurement unit as dBm.
3 Set the UUT averaging to 32.
4 Set the UUT measurement mode to normal speed.
5 Record the UUT reading as P_t and compare against specification.

Performance Test Record

Agilent V3500A Handheld RF Power Meter

Tested by ________________________

Serial Number ____________________

Date ____________

SWR

Frequency	SWR

Accuracy

Frequency	P_{STD}	P_{INC0}	P_{UUT}	P_{INC}	Frequency Response[1]

[1] Frequency response = $P_{UUT} - (P_{INC} + (P_{INC} + (P_{STD} - P_{INC0}))$

Linearity

$A_{TT0} = 0$

$P_{t0} =$ ______

$P_{m0} =$ ______

Offset = $P_{m0} - (P_{t0} + A_{TT0})$

Att_1	Att_{10}	P_t	P_m	P_S[1]	Linearity[2]

[1] $P_S = P_m - \text{Offset} - (Att_{10} + Att_1)$

[2] Linearity = $P_t - P_S$

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Repair Guide

This chapter details the replaceable parts for the V3500A Handheld RF Power Meter. It also explains how to assemble and disassemble the power meter.

Introduction

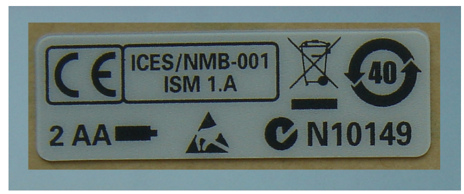
This chapter contains details of some of the higher level components and assemblies which can be ordered from Agilent Technologies. It also details how to assemble and disassemble the V3500A Handheld RF Power Meter for repair. The contents included are:

1. **Replaceable Parts**
2. **Required Tools**
3. **Disassembly Instructions**
4. **Reassembly Instructions**

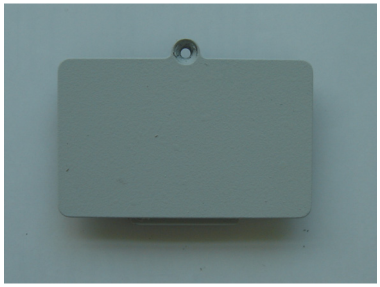
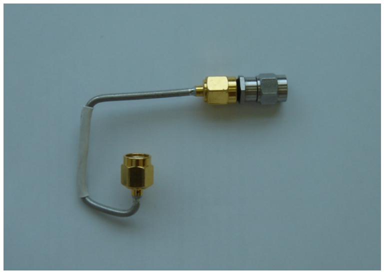
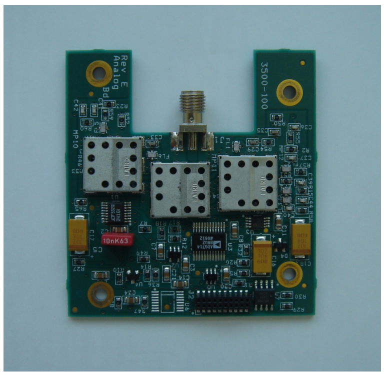
To order a part, contact your local Agilent, quote the Agilent part number, specify the quantity required, and address the order to the nearest Agilent Technologies Sales and Service Office.

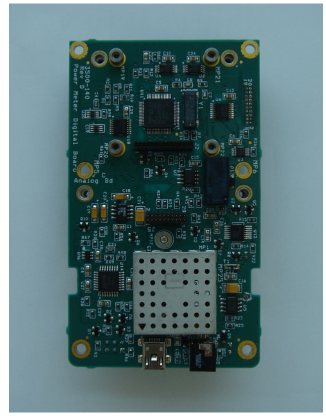
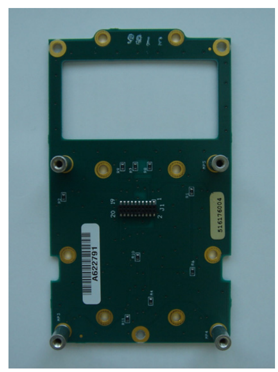
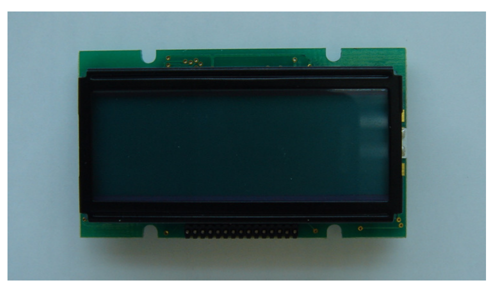
To return your instrument for repair or replacement, refer to "Returning Instrument for Service" on page 41.

Replaceable Parts

Agilent Part Number	Description	Visual
V3500-34301	Front panel label	
V3500-34302	USB and power label	
V3500-34303	Rear panel label	
V3500-36005	N-male to SMA female connector	

Agilent Part Number	Description	Visual
V3500-40001	Keypad	
V3500-40100	Housing	
V3500-40101	Back cover	

Agilent Part Number	Description	Visual
V3500-40102	Battery door	
V3500-61300	Semi rigid cable 0.085	
V3500-66500	Analog board assembly	

Agilent Part Number	Description	Visual
V3500-66503	Digital board assembly SPO kit - Programmed	
V3500-69300	Display assembly	
V3500-69301	Character LCD display module	

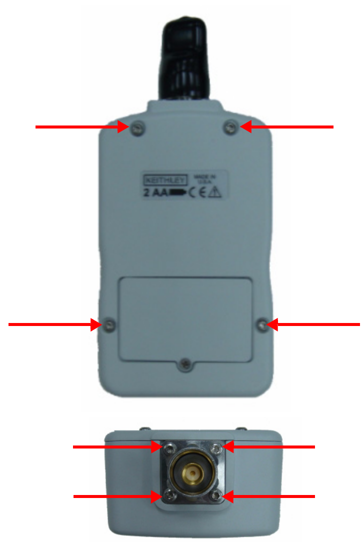
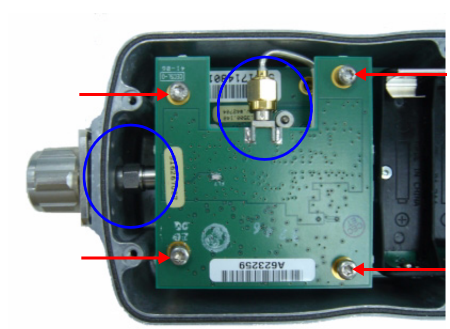
Required Tools

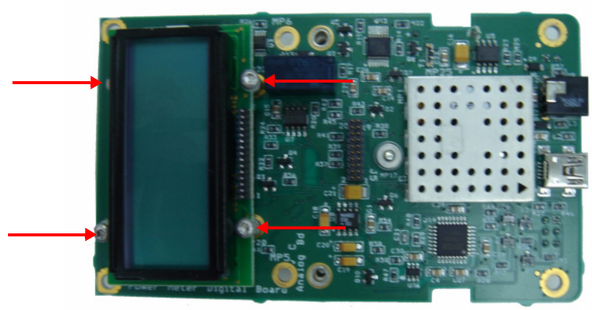
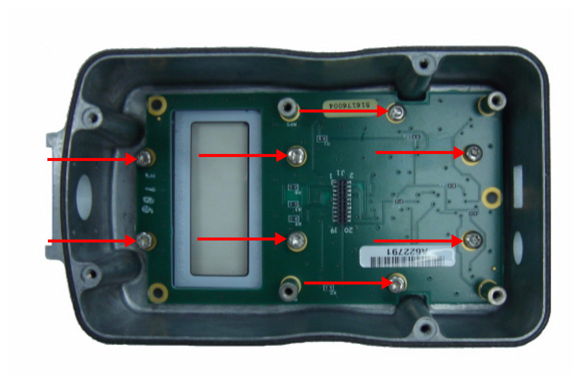
The required tools and torque values for fasteners are listed below:

Item	Description/Default	Range of Values
Fit battery door and back cover	T10 screwdriver	5 in-lbs
Fit analog board assembly	T10 screwdriver	5 in-lbs
Fit digital board assembly	T10 screwdriver	5 in-lbs
Fit display board assembly	T10 screwdriver	5 in-lbs
Fit character LCD display module	T7 screwdriver	1 in-lb
Fit character LCD display module	3.5 mm torque wrench	8 in-lbs

Disassembly Instructions

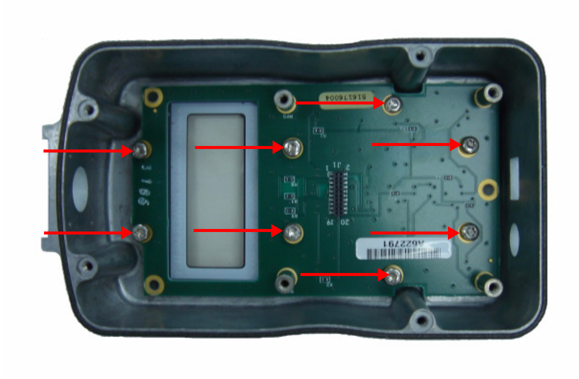
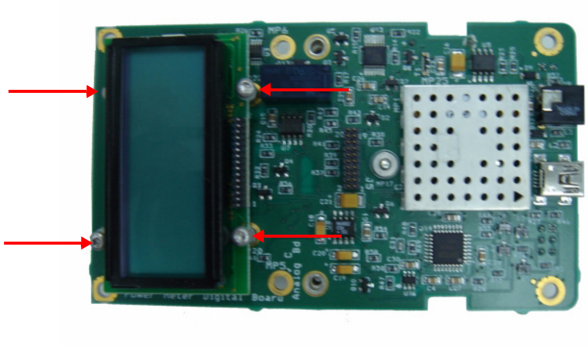
Follow the instructions below to disassemble the V3500A Handheld RF Power Meter.

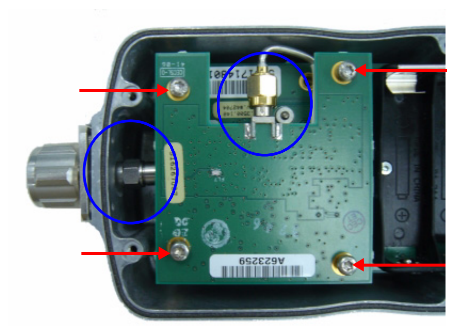
Instructions	Visual
• Remove the 4-40x3/8 TPH screw from the back cover with 5 in-lbs T10 driver. • Remove the 4-40x1/4 TPH screws from N-male to SMA female connector with 5 in-lbs T10 driver (if RF connector needs to be replaced).	
• Remove the 4-40x1/4 TPH screws from the analog board assembly with 5 in-lbs T10 driver. • Remove the connections (between attenuator and SMA port of type-N connector and between semi-rigid cable and SMA (f) (connector of analog board) to 8 in-lbs using 3.5 mm torque wrench.	

Instructions	Visual
Remove the 4-40x1/4 TPH screws from the digital board assembly with 5 in-lbs T10 driver.	
Remove the 2-56x1/4 TPH screws from the character LCD display module with 1 in-lb T7 driver.	
Remove the 4-40x3/16 TPH screws from the display assembly with 5 in-lbs T10 driver.	

Reassembly Instructions

The reassembly process is simply the reverse of the disassembly process. Follow the instructions below to reassemble the V3500A Handheld RF Power Meter.

Instructions	Visual
• Insert the 4-40x3/16 TPH screw (V3500-36002) – 8 pieces, into the indicated locations of the display board using a T10 driver and torque it to 5 in-lbs.	
• Put the nylon washers on top of standoffs. • Insert the character LCD display module into J2 on the digital board assemble. • Place another nylon washer on a 2-56x1/4 TPH screw and then insert the screw through the slot in the display, through the washer, and into standoff. Turn the screw enough to engage with the threads in the standoff, but do not tighten it down. This will make it easier to insert the washers between the display and the other three standoffs. • Repeat the above steps for the other three standoffs of the digital board. • Once they are all done, torque the 4 screws using to 1 in-lb using T7 driver.	

Instructions	Visual
• The four locations indicated show where each hole in the digital board will line up with the standoffs on the keyboard. Look through the holes indicated in the picture. Shift the board until the holes are concentric with the threaded holes in the standoffs in the keyboard. Once the board is aligned, press down on it so that the connector J5 on the digital board engages with the connector J1 on the keyboard. Be sure to have the jumper wire clamped the hole on the digital board and the standoff on the keyboard. • Insert the 4-40x1/4 TPH screw (V3500-36001) – 4 pieces, into the four holes and torque it to 5-in lbs using T10 driver.	
• Connect the attenuator to the SMA port of the N type connector, finger tighten it. • Set the analog board (V3500-66500) loosely into the housing. • Thread the nut of the semi-rigid cable onto the SMA connector (J1) of the analog board. Fingers tighten it only at this point. • Use the screw holes as the visual alignment guide. Align the board until the holes in the analog board are aligned with the threaded holes in the standoffs on the digital board. Once they are aligned, press down the analog board to engage connector J2 to connector J3 on the digital board. • Insert the 4-40x1/4 TPH screw – 4 pieces, into the four holes and torque it to 5 in-lbs using a T10 driver. • Using a 3.5mm torque wrench, tighten the connections (between the attenuator and the SMA port of type-N connector and between the semi-rigid cable and SMA (f) connector of analog board) to 8 in-lbs using 3.5 mm torque wrench.	

Instructions	Visual
Attach the battery door onto back cover. Insert the split ring washer – 4 pieces and 4-40x3/8 TPH screw – 4 pieces. Tighten the connections to 5 in-lbs using a T10 driver.	

Returning Instrument for Service

Before shipping your instrument for repair or replacement, Agilent recommends that you acquire the shipping instructions from the Agilent Technologies Service Center. A clear understanding of the shipping instructions is necessary to secure your product for shipment.

1 Write the following information on a tag and if attach to the instrument.
    - Name and address of owner
    - Instrument model number
    - Instrument serial number
    - Description of the service required or failure indications
2 Remove all accessories from the instrument. Do not include accessories unless they are associated with the failure symptoms.
3 Protect the instrument by wrapping in plastic or heavy paper.
4 Pack the instrument using foam or other shock absorbing material and place it in a strong shipping container.

    You are recommended to use the original shipping material or order materials from an Agilent Technologies Sales Office. If both options are not available, place 8 to 10 cm (3 to 4 inches) of shock-absorbing and static-free packaging material around the instrument to avoid movement during shipping.
5 Seal the shipping container securely.
6 Mark the shipping container as FRAGILE.

    In the ensuing correspondence, refer to the instrument by its model number and full serial number.

NOTE It is recommended that you always insure your shipments.

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Contact us

To obtain service, warranty, or technical assistance, contact us at the following phone or fax numbers:

United States:
(tel) 800 829 4444 (fax) 800 829 4433
Canada:
(tel) 877 894 4414 (fax) 800 746 4866
China:
(tel) 800 810 0189 (fax) 800 820 2816
Europe:
(tel) 31 20 547 2111
Japan:
(tel) (81) 426 56 7832 (fax) (81) 426 56 7840
Korea:
(tel) (080) 769 0800 (fax) (080) 769 0900
Latin America:
(tel) (305) 269 7500
Taiwan:
(tel) 0800 047 866 (fax) 0800 286 331
Other Asia Pacific Countries:
(tel) (65) 6375 8100 (fax) (65) 6755 0042

Or visit Agilent World Wide Web at:
www.agilent.com/find/assist

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