Agilent Technologies E4402B Option H3B

User's and Service Guide

Agilent Technologies
E4402B Option H3B

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Use this manual with the following document:
ESA-E Manual Set

Agilent Technologies

Manufacturing Part Number: E4401-90511
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Warranty Statement

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Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

WARNING	**Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

CAUTION	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

Definitions

- *Specifications* describe the performance of parameters covered by the product warranty (temperature –0 to 55 °C, unless otherwise noted.)
- *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 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.
- *Characteristic Performance* describes performance parameter that the product is expected to meet before it leaves the factory, but is not verified in the field and is not covered by the product warranty. A characteristic includes the same guard bands as a specification.

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Contents

E4402B Option H3B

Description

The Agilent Technologies E4402B Option H3B provides a local oscillator output on the rear panel of the ESA using an SMA (f) connector, for use with the Aerodynex Sideband Adapter (ATSA–N/P–06R2–AG) for TV modulator and transmitter measurements.. This option is not compatible with option 1DN, Tracking Generator.

The center frequency of the first LO output is 3.9214 GHz when the E4402B is tuned to a center frequency of 0 Hz, and is 4.7214 GHz when the E4402B is tuned to a center frequency of 800 MHz.

The nominal output power of the LO Output is greater than –5 dBm from 3.9214 GHz to 4.9214 GHz (when the E4402B is tuned to a center frequency between 0 Hz and 1.0 GHz) and is greater than –10 dBm for higher LO frequencies (Center Frequencies greater than 1 GHz) (when the E4402B is tuned to a center frequency above 1.0 GHz).

Any device connected to this output must have a 50 Ω impedance. The Agilent Technologies E4402B Option H3B comes with a 50 Ω termination that is to be installed on the 1st LO Output connector when not in use. Failure to teminate the output connector with 50 Ω may degrade the frequency response of the E4402B.

The Agilent Technologies E4402B Option H3B is not compatible with the Tek 1405 sideband adapter or the Aerodynex ATSA.

In all other respects, the Agilent Technologies E4402B Option H3B is the same as the standard E4402B.

Verifying the Shipment

After the instrument has been unpacked, keep the original packaging materials so they can be used if you need to transport the instrument. Inspect the instrument and all accessories for any signs of damage that may have occurred during shipment. If your instrument or any accessories appear to be damaged or missing refer to "Contacting Agilent Sales and Service Offices" on page 16.

Connecting to the Spectrum Analyzer

The following set-up is one example of how a typical measurement may be performed using the E4402B Spectrum Analyzer with the Option H3B. Refer to Table 1 for a list of equipment needed.

Table 1 Material and Equipment Required[1]

Description	Agilent Part Number	Qty
Adapter Type-N (m) to BNC (f)	1250-0780	1
Cable SMA (m)	5062-6674	1
Cable BNC (m)	8120-2582	2
Modulator or Transmitter Under Test	n/a	1
Aerodynex Sideband Adapter	n/a	1
Adapter Coax (m) to BNC (f)	n/a	1

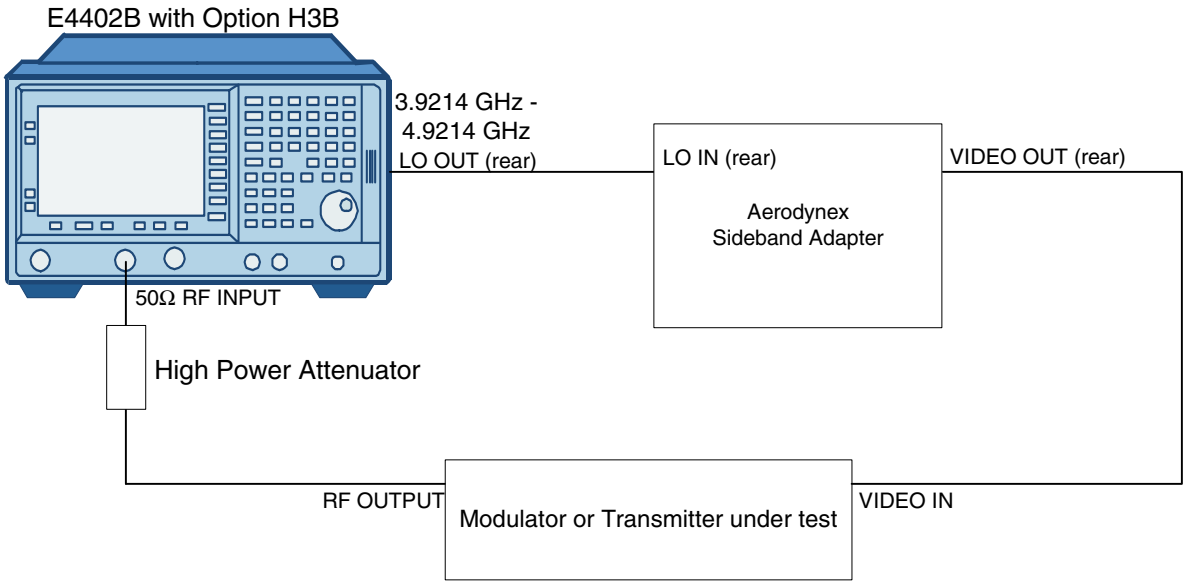
1. These items are not shipped with the E4402B H3B

1. Connect one end of the SMA cable (5062-6674) to the Aerodynex Sideband Adapter (ATSA–N/P–06R2–AG) LO IN to the SMA connector labeled “1st LO Out” on the rear panel of the E4402B Spectrum Analyzer. Refer to Figure 1 on page 5.
2. Attach the BNC cable (8120-2582) from the Video Out on the rear of the Aerodynex Sideband Adapter (ATSA–N/P–06R2–AG) to the Video In on the transmitter or modulator under test.
3. Secure the appropriate adapters (Type N to BNC) to the ends of the BNC cable (8120-2582) and attach to the 50 Ω RF Input of the E4402B Spectrum Analyzer and the other end to the output of the modulator.

CAUTION A directional coupler or high power attenuator may be needed to keep the DUT output power from exceeding +30 dBm or 1 W max safe input.

WARNING **Connecting the RF input of the E4402B to source with greater than +30 dBm of output power will damage the spectrum analyzer.**

Figure 1 Hardware Setup



Typeface Key Conventions

The following key conventions are used throughout this document.

- **[HARDKEYS]** are labeled front panel keys
- **SOFTKEYS** are unlabeled key whose function is indicated on the instrument display

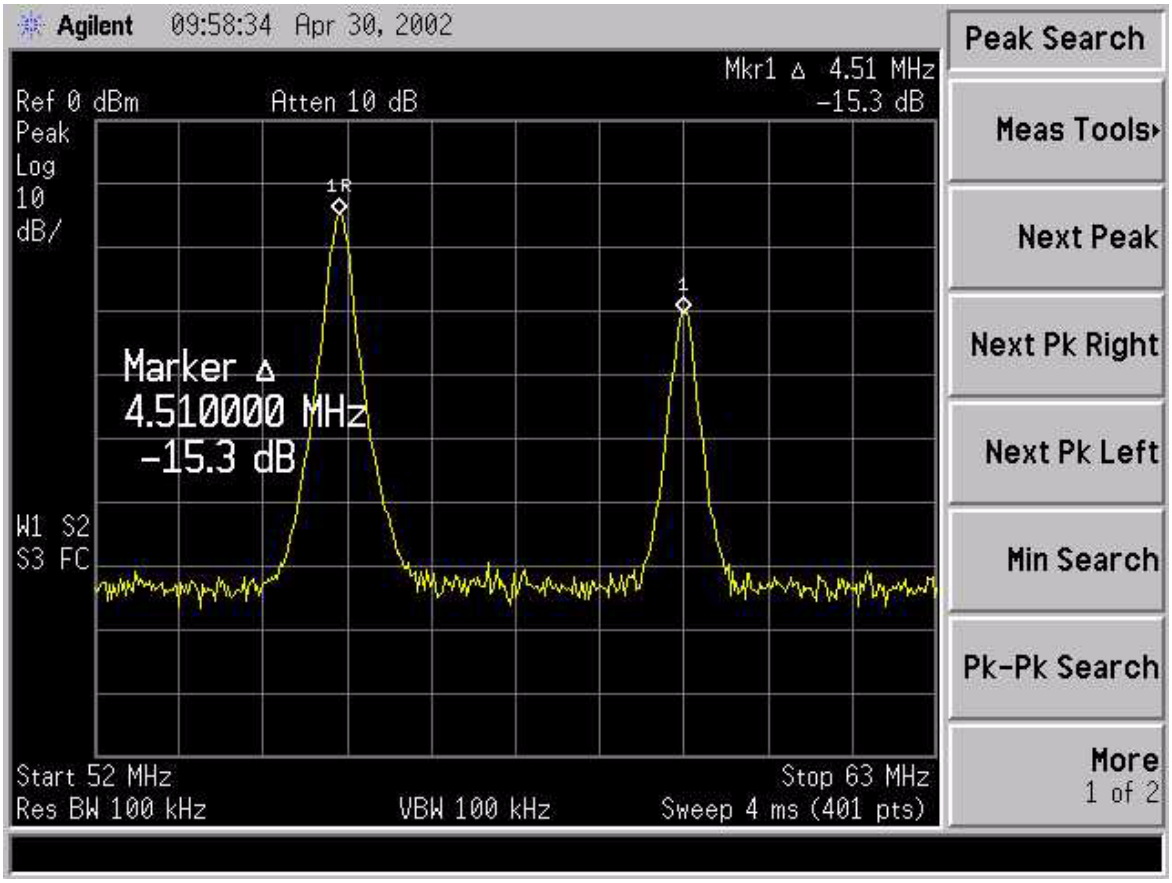
Making Measurements

The instructions describe the setup for a simple measurement that may be made using the equipment listed in Table 1 on page 4 and the configuration in Figure 1 on page 5.

1. Turn **On** all of the equipment. Allow the equipment to warm up for the required specified time as indicated in each of the instrument operating manuals.
2. Turn **Off** the Auto Align routine before making your measurements.
   Perform the following keystrokes:
   [System] > Alignments > Auto Align > Off
3. Select the desired channel on the modulator, or use the assigned transmitter frequency. Channel two (≈ 55.25 MHz) has been selected for this example.
4. Perform the following keystrokes:
   [Frequency] > Start Freq > [52 MHz]
   [Frequency] > Stop Freq > [63 MHz].

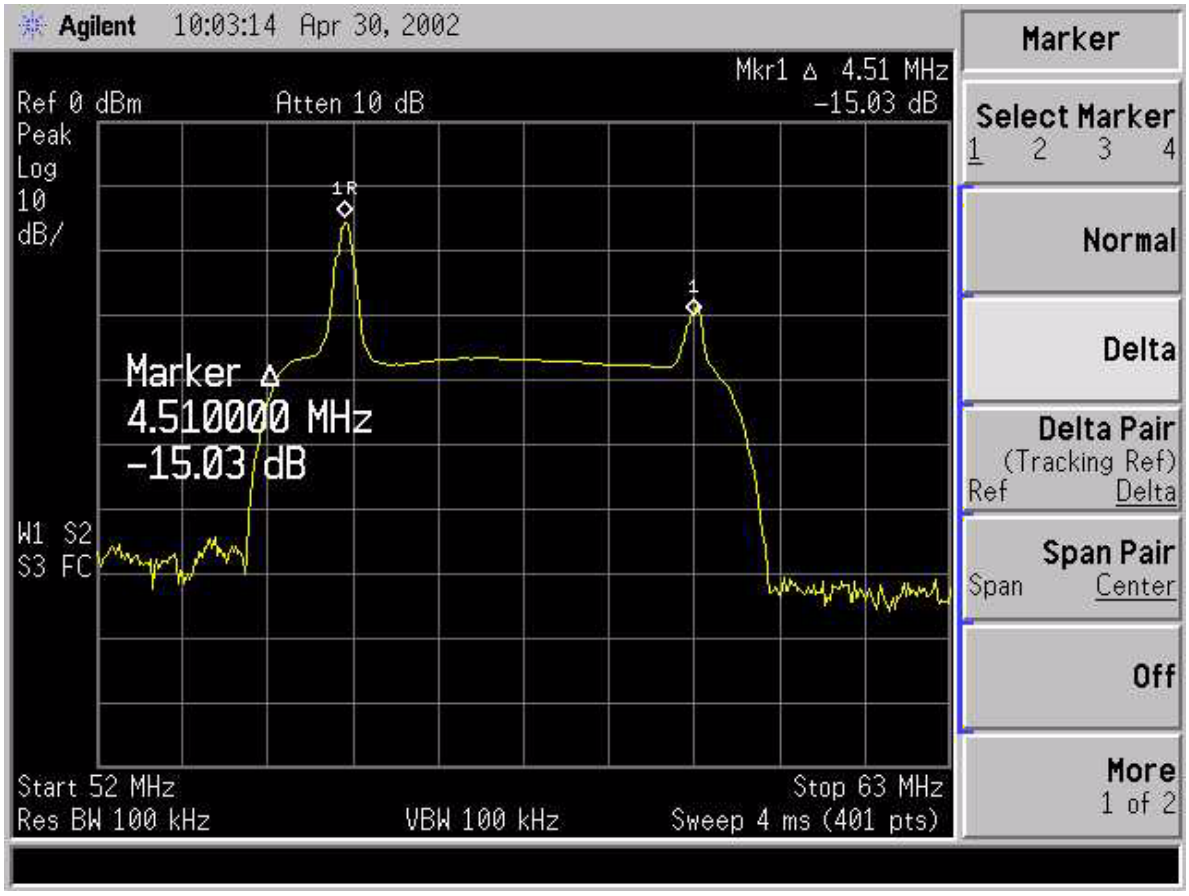
After you have completed the setup, refer to Figure 2 for an example of the waveform on the screen of the E4402B.

Figure 2 Typical Signal after E4403B Option H3B Setup



1. Slowly adjust the Aerodynex Sideband Adapter course “Transmitter Frequency” knob to the desired frequency. Use the “Fine” adjust knob if more accuracy is desired. The waveform displayed on the E4402B Spectrum Analyzer will display the bandwidth of the transmitter or modulator under test. Refer to Figure 3. Refer to the Aerodynex Sideband Adapter documentation for more information on making measurements.

Figure 3 Example of a Video Signal



Performance Verification

The purpose of the electrical test is to verify the response of the H3B option in the ESA. The H3B option provides an output frequency range from 3.9214 GHz to 4.9214 GHz with a power level ≥ – 5 dBm.

Equipment Required

- Test Spectrum Analyzer with a frequency range of > 6 GHz
- RF Cable (3.5 mm)

1. Turn on the spectrum analyzer and press **[Preset].**
2. Turn off the Auto Align function of the DUT and on the test spectrum analyzer, if so equipped.
3. Connect the H3B Output, on the rear of the ESA DUT, to the RF Input on the spectrum analyzer using an RF cable and adapter, if required.
4. Press **[Frequency]** on the ESA DUT and set the start frequency to 0 Hz and the stop frequency to 1.1 GHz. Set the Sweep time to 10 sec.
5. Press **[Frequency]** on the test spectrum analyzer and set the start frequency to 3 GHz and the stop frequency to 5 GHz.
6. Set the RF level on the test spectrum analyzer to 0 dBm.
7. Increase the test spectrum analyzer sweep time to approximately 20 seconds for improved display clarity.
8. Leave all other ESA DUT and test spectrum analyzer settings autocoupled.
9. Set the test spectrum analyzer markers 1 and 2 to frequencies of 3.9214 GHz to 4.9214 GHz, respectively.
10. Press **[View Trace]** > **Max Hold** on the test spectrum analyzer.
11. Verify that the test spectrum analyzer signal trace is ≥ –5 dBm between 3.9214 GHz and 4.9214 GHz.

Repair Information

The H3B can occupy Slot 5 or 6 and will appear to be empty. Note that Slot 6 actually contains the Option H3B RF cable. Verify that Option H3B has been installed by checking the serial tag on the rear panel of the instrument and verifying the terminated 3.5mm “LO Output” connector is installed on the rear panel of the instrument.

The following photos show the replaceable assemblies. Refer to “Replaceable Parts” on page 10.

Figure 4 LO Output (J15)

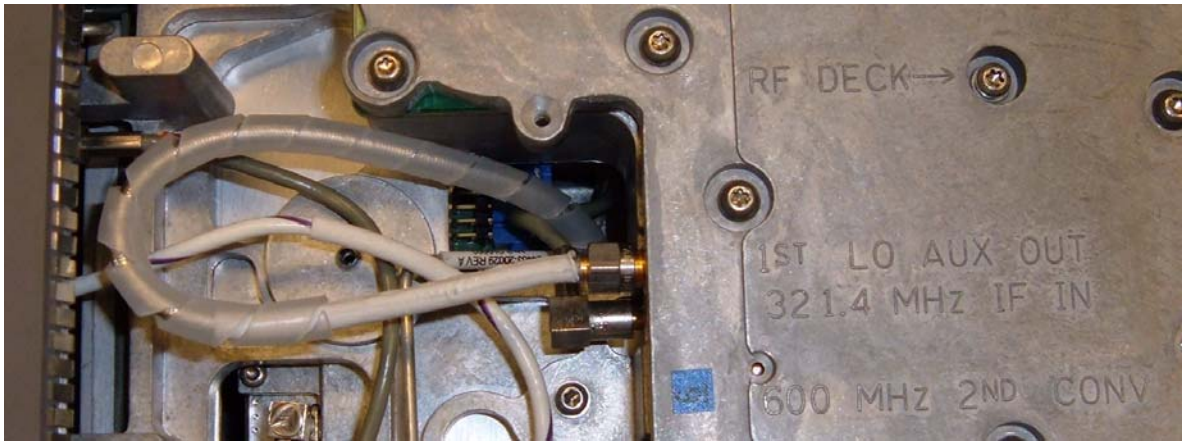
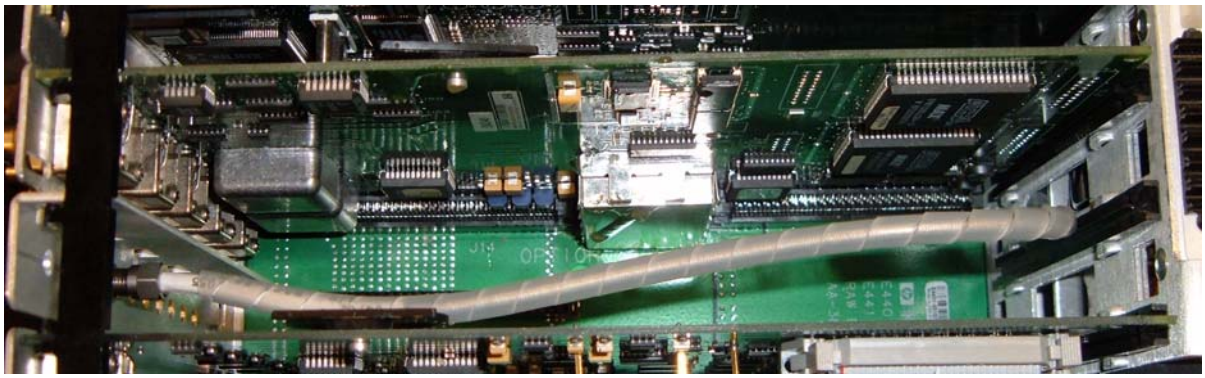


Figure 5 Cable Routing



Replaceable Parts

NOTE Special options are built to order, so long lead times may be encountered when ordering replacement parts.

Description	Agilent Part Number	Qty
Spiral Wrap - 16 inches	0890-0025	1
Adapter - Coax SMA (f) – SMA (f)	1250-1666	1
Termination – 50 Ω	1810-0118	1
Nut - Hex 1/4	2950-0223	1
Washer 1/4	3050-0420	1
Cable Assembly – 18 inches	5062-6665	1
Rear Panel – H3B	E4401-00085	1

Safety and Regulatory Information

Introduction

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Before Applying Power

Verify that the product is configured to match the available main power source. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

Connector Care and Cleaning

If alcohol is used to clean the connectors, the power cord to the instrument must be removed. All cleaning should take place in a well ventilated area. Allow adequate time for the fumes to disperse and moist alcohol to evaporate prior to energizing the instrument.

WARNING **To prevent electrical shock, disconnect the Agilent Technologies model product from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

Declaration of Conformity

For a copy of the manufacturer's Declaration of Conformity for this apparatus, contact your local Agilent Technologies office or sales representative. Refer to "Contacting Agilent Sales and Service Offices" on page 16.

Statement of Compliance

This product has been designed and tested in accordance with the standards listed on the Manufacturer's Declaration of Conformity, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Shipping Instructions

You must always call the Agilent Technologies Instrument Support Center to initiate service before retuning your instrument to a service office. See "Contacting Agilent Sales and Service Offices" on page 16. Always transport or ship the instrument using the original packaging if possible. If not, comparable packaging must be used. Attach a complete description of the failure symptoms.

Compliance with Canadian EMC Requirements

This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme a la norme NMB du Canada.

Compliance with German Noise Requirements

This is to declare that this instrument is in conformance with the German Regulation on Noise Declaration for Machines (Laermangabe nach der Maschinenlaermrerordnung-3. GSGV Deutschland).

Acoustic Noise Emission/Geraeuschemission	
LpA<70 dB	Lpa<70 dB
Operator Position	am Arbeitsplatz
Normal Operation	normaler Betrieb
per ISO 7779	nach DIN 45635 t. 19

Warnings

WARNING **The WARNING notice denotes a hazard. It calls attention to a procedure which if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.**

Warnings applicable to this instrument are:

WARNING **To prevent electrical shock, disconnect the Agilent Technologies instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.**

WARNING **If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.**

WARNING **For continued protection against fire hazard replace line fuse only with same type and rating:**
- **United States—F 0.5A/250V, Part Number 2110-0202**
- **Europe—F 3.15A/250V, Part Number 2110-0655**

The use of other fuses or material is prohibited.

WARNING **This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall be inserted only into a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the product is likely to make the product dangerous. Intentional interruption is prohibited.**

WARNING **These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**

WARNING **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**

WARNING **This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010-1: 2001.**

WARNING **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.**

WARNING **If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.**

Cautions

CAUTION The CAUTION notice denotes a hazard. It calls attention to an procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the product. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met

Cautions applicable to this instrument are:

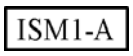
CAUTION Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding (by not using this cord) can cause instrument damage.

CAUTION This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010-1:2001.

CAUTION This instrument has autoranging line voltage input; be sure the supply voltage is within the specified range.

CAUTION Ventilation Requirements: When installing the instrument in a cabinet, the convection into and out of the instrument must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, forced convection must be used.

Instrument Markings

	When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information.
	This symbol indicates hazardous voltages.
	The laser radiation symbol is marked on products that have a laser output.
	This symbol indicates that the instrument requires alternating current (ac) input.
	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The CSA mark is a registered trademark of the Canadian Standards Association.
	This symbol indicates the product meets the Australian Standards.
	This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).
	This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).
	This symbol indicates that the power line switch is ON.
	This symbol indicates that the power line switch is OFF or in STANDBY position.
	Safety Earth Ground. This is a Safety Class I product (provided with a protective earthing terminal). An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and secured against any unintended operation.

Contacting Agilent Sales and Service Offices

Assistance with test and measurement needs, and information on finding a local Agilent office are available on the Internet at:
http://www.agilent.com/find/assist

You can also purchase accessories or documentation items on the Internet at:
http://www.agilent.com/find

If you do not have access to the Internet, contact your field engineer.

NOTE In any correspondence or telephone conversation, refer to the product by its model number and full serial number. With this information, the Agilent representative can determine whether your unit is still within its warranty period.