

Keysight Technologies E8257D Option H30

User's Guide

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Where to Find the Latest Information

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<http://www.keysight.com/find>

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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.

WARNING

A **WARNING** 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 personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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E8257D Option H30

Description

The E8257D Option H30 adds a mixer and coax switch to enable the E8257D to upconvert the RF signal (input is provided on the rear panel) to a higher frequency which will be the sum and difference of the RF input signal and frequency set on the E8257D.

The coaxial switch allows the E8257D with Option H30 to be switched from standard synthesizer mode to upconverter mode. This allows the instrument to be used as a standard source instrument, as well as an upconverter. The synthesizer and upconverter modes can be selected on the front panel or by remote command. The upconverted output signal is the same as the front panel RF output. The input connector is a SMA type female that is located on the rear panel.

The Option H30 can be ordered with Option 520 or Option 540. For instruments that include Option 520, signals can be upconverted from 200 kHz to 26 GHz. For instruments that include Option 540, signals can be upconverted from 6 to 46 GHz.

Nominal Performance Characteristics

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.

Table 1 Option H30 with Option 520 (20 GHz)

Description	Frequency
Rear panel frequency range	100 kHz to 6 GHz
Conversion loss for upconverted signal to the front panel	–10 to –15 dBm
Front panel RF upconverted frequency range	200 kHz to 26 GHz
Usable IF Bandwidth (dependent on the IF frequency used on rear panel)	$< 2 \text{ dB over } 1 \text{ GHz span } \leq 3 \text{ GHz IF Frequency}$ $< 20 \text{ dB over } 1 \text{ GHz span } > 3 \text{ GHz IF Frequency}$

Table 2 Option H30 with Option 540 (40 GHz)

Description	Frequency
Rear panel frequency range	100 kHz to 6 GHz
Conversion loss for upconverted signal to the front panel	–10 dB (6 GHz) to –28 dB (46 GHz)
Front panel RF upconverted frequency range	6 to 46 GHz
Usable IF Bandwidth (depends on the IF frequency used on rear panel) ¹	$< 2 \text{ dB over } 1 \text{ GHz span } \leq 3 \text{ GHz IF Frequency}$ $< 20 \text{ dB over } 1 \text{ GHz span } > 3 \text{ GHz IF Frequency}$

1. Conversion loss and IF bandwidth flatness will degrade contingent on the IF Input frequency and the upconverted frequency. Refer to [Figure 1](#) and [Figure 2](#).

NOTE When in upconverter mode, the displayed RF output power level is LO drive. The displayed RF power in upconverter mode does not represent the power of the upconverted signal at the RF output.

The maximum RF power output of Option H30 is reduced by 2 dBm due to the added insertion loss of the coax transfer switch required for the design. For units with Option H30, subtract 2 dBm from the power output specifications listed in [Table 1](#) of the standard user's guides E8251-90253 and E8251-90353.

Figure 1 Upconverted RF Flatness

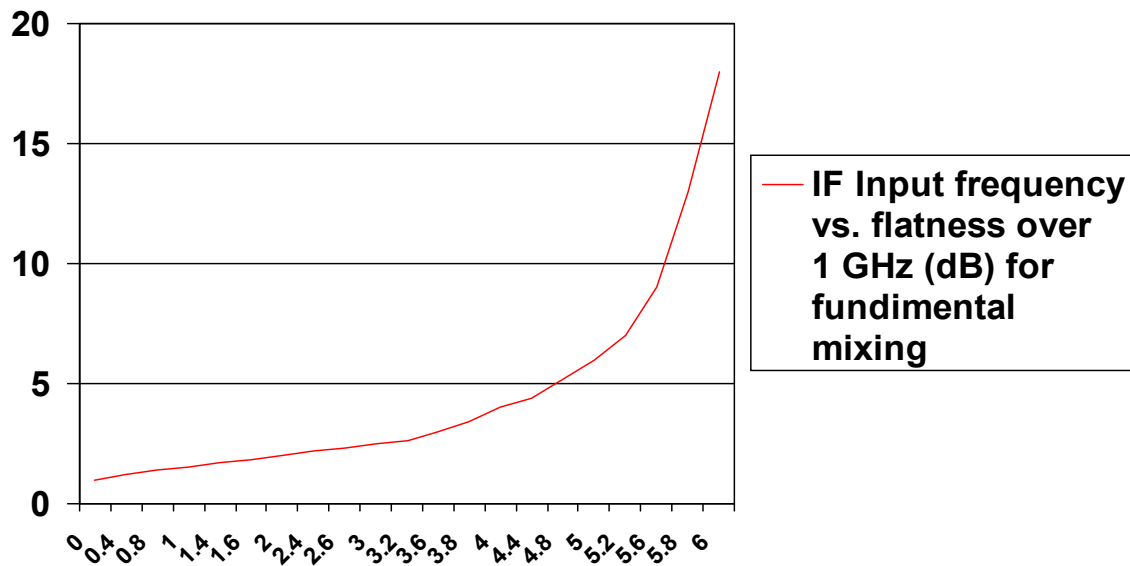
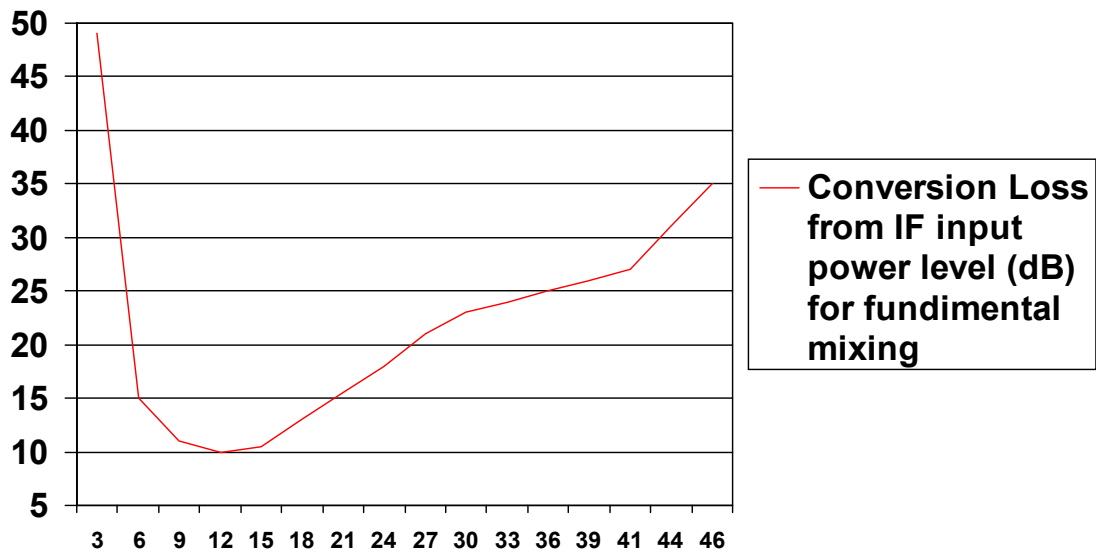


Figure 2 Upconverted RF Conversion Loss



Operation and Performance Verification

Documentation Conventions

The following key conventions are used throughout this document.

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

Option H30 Operation (520 or 540)

To use Option H30 as a standard instrument, refer to the standard User’s Guide.

To use Option H30 as an RF upconverter, refer to the following procedure:

CAUTION	Maximum power into the rear panel RF upconverter input must not exceed +20 dBm.
CAUTION	Damage to upconverter mixer can result if the reverse power into the RF output port on the front panel occurs while in upconverter mode.
NOTE	Refer to “Nominal Performance Characteristics” on page 3 for performance considerations.

- Step 1.** Remove the protective connector from the RF up converter Input on the rear panel.
- Step 2.** Set the RF source (customer supplied) to within the recommended power and frequency ranges.
- Step 3.** Connect the RF source to the H30 rear panel RF upconverter input using a suitable RF cable and adapters as necessary. It is recommended that the user set the power level of Option H30 to +10 dBm for best performance.

To activate upconverter mode from the front panel, press:

[FREQUENCY] > MORE, MORE > UPC ON/OFF (to activate mode)

Use the same front panel key to return the instrument to normal synthesizer mode.

The command **UPC ON** can be used to remotely select the upconverter mode. Use the command **UPC OFF** to return the instrument to normal synthesizer mode.

Performance Verification

The Keysight E8257D Option H30 functionality can be verified using the following equipment and methods:

Option H30 must first meet standard product specifications with the exception that the power output may be degraded by up to 2.0 dBm. (Subtract 2.0 dBm from the Option 1E1 output power specification).

Refer to the [Table 3 on page 6](#) for a list of equipment needed in addition to Option H30 being tested:

Table 3 Equipment Required

Keysight Instrument	Keysight Part Number
50 GHz Spectrum Analyzer	8565EC or equivalent
6 GHz RF Signal Source	E4438C or equivalent
RF Cable (SMA male, 3 ft)	5061-6669
RF Cable (2.4 mm, 3 ft)	5063-9820
SMA Female to Type-N Adapter	1250-1250
2.4 mm to 2.4 mm Female Adapter	11900B (or comparable)

Step 1. Set the RF Source power level to -10 dBm and frequency to 6 GHz.

Step 2. Connect the RF Source to the E8257D Option H30 rear panel RF Upconverter Input, using an RF cable and adapters.

Press: **[FREQUENCY] > MORE, MORE > UPC ON/OFF (to activate mode)**

An audible click should be heard from the E8257D Option H30 as the transfer switch switches the upconverter mixer LO to the coupler output and the mixer RF out to the 1E1 step attenuator's input.

Step 3. For instruments with *Option 540* set the instrument to upconverter mode, set power level to +8 dBm and CW frequency to 40 GHz. Verify that a 46 GHz signal appears on the spectrum analyzer when in upconverter mode and is not present when in standard synthesizer mode. The level of the upconverter IF signal (6 GHz + 40 GHz = 46 GHz) is nominally -28 dBm.

or

For instruments with *Option 520* set the instrument to the upconverter mode, set power level to +8 dBm and CW frequency to 20 GHz. Verify on the spectrum analyzer that a 26 GHz signal appears when in upconverter mode and is not present when in standard synthesizer mode. The level of the upconverter IF signal (6 GHz + 20 GHz = 26 GHz) is nominally -28 dBm. Since this is a functional test only, measurement uncertainty is not taken into account. This verifies the switch path and mixer are functioning.

Troubleshooting

If there is no signal a problem has occurred. First check the equipment setup, verifying outputs on the sources and connections. Refer to [Figure 4](#) through [Figure 7](#).

Verify that the E8257D Option H30 Upconverter switch is working:

MID Board or Coaxial Switch

The following procedure will aid in determining whether the MID board or the coax switch (87222E) is functional.

- Step 1.** Select upconverter mode on/off, then listen for the coax switch to click. If it doesn't click, check the ribbon cable connection to the switch (under switch/mixer assembly). Remove the switch end of the cable from the switch and verify:

pin 1 for +32 Vdc,
pin 7 for +5 Vdc or 0 Vdc
pin 8 for +5.2 Vdc
pin 9 for Ground

If the voltages are incorrect, verify the ribbon cable connection to the MID board assembly. The ribbon cable should be connected to J14.

- Step 2.** Cycle the upconverter mode on/off repeatedly while looking at pin 7 voltage. Pin 7 should toggle from +5 Vdc (upconverter mode on) to 0 Vdc (upconverter mode off). If pin 7 voltage does not toggle, either the MID board or a configuration error is at fault. Consult with Keysight Service for repair. Refer to [“Keysight Support, Services, and Assistance” on page 17](#).

- Step 3.** If the voltages and control signal are present at the ribbon cable as verified in step 1, reconnect the ribbon cable to the coax switch and select upconverter mode and toggle it ON/OFF.

To verify the switch is not ultra quiet, measure the ports on the coax switch while toggling the upconverter mode.

(Coupler out) PORT 1 PORT 2 (mixer LO input)
(Atten. input) PORT 4 PORT 3 (mixer RF output)

Port 4 should connect to port 3 in upconverter On mode and port 1 in upconverter Off mode. If it doesn't, replace the 87222E coax switch.

Upconverter Mixer

The following procedure will aid in determining if the upconverter mixer is functional:

CAUTION Possible damage may occur if RF upconverter input levels exceed 20 dBm or if reverse power is applied at the RF output connector. First verify all cable configurations are correct before applying a signal to the instrument.

The RF step attenuator cable to the coax switch is functional if the instrument operates as a standard synthesizer.

The RF cable from the coupler output is also functional if the instrument operates as a standard synthesizer.

- Step 1.** Verify that the RF cable is connected from the connector labeled RF upconverter on the rear panel to the mixer's IF input port. Verify the power at the connection to the mixer with RF Source applied.
- Step 2.** Verify the power through the cables to LO Input of the mixer (bottom connector). The power should be close to the power level coming from the Coupler Output. Replace the cables if power insertion loss is excessive and damage is suspected. These cables have a K-type connector and a 2.92 mm adapter should be used for mating to connectors.
- Step 3.** If all of the cables have been verified and are functional, verify the mixer orientation with the markings on the outside of the mixer LO down, RF Connector up and IF Connector facing rear of instrument. Replace the mixer and verify its functionality by following the verification procedure.

Repair Information

Figure 4 Top View

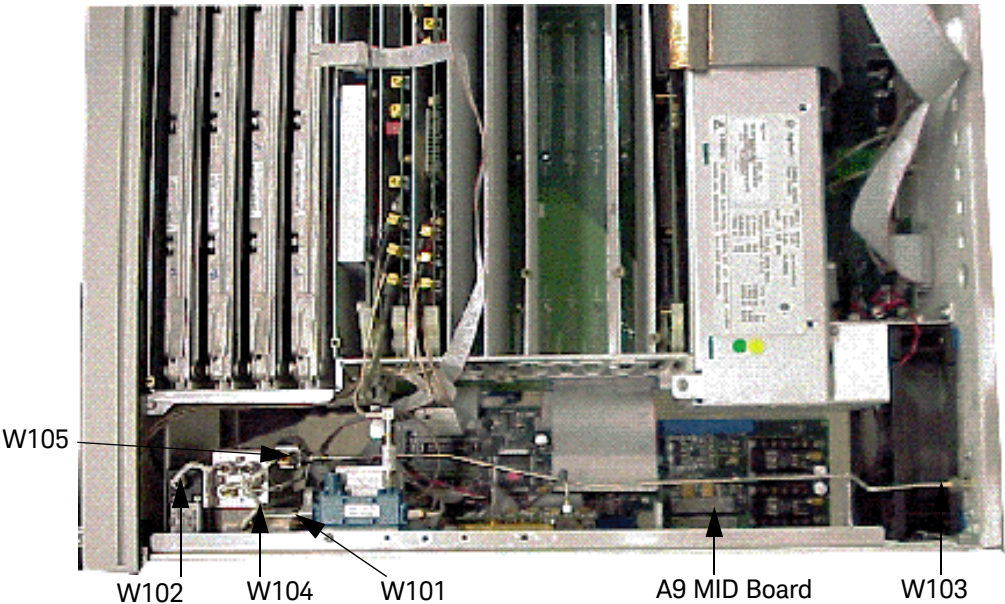


Figure 5 Semi-rigid Cables (front view)

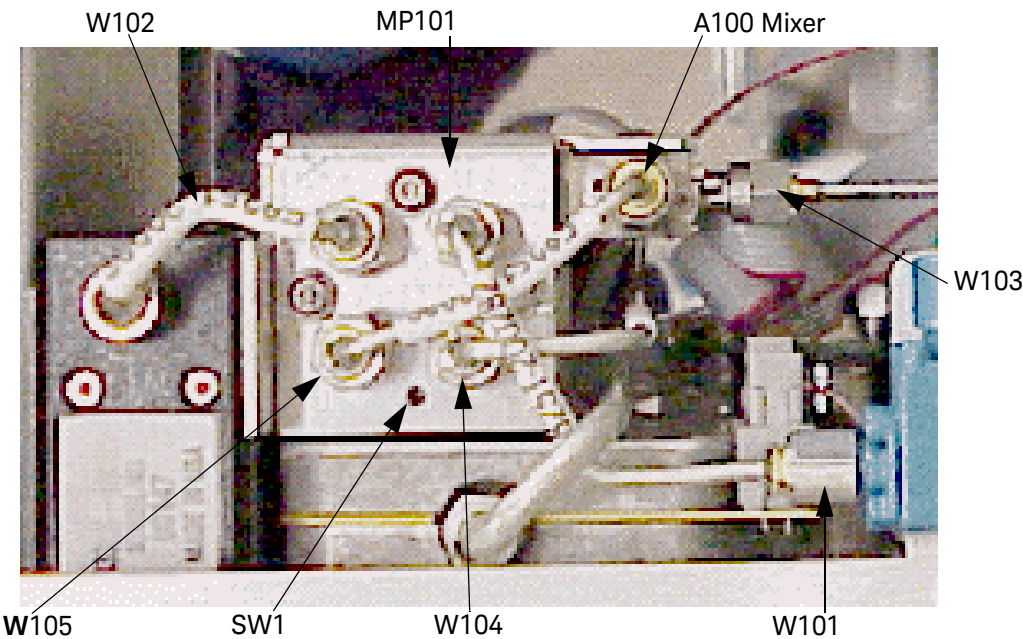


Figure 6 Ribbon Cable

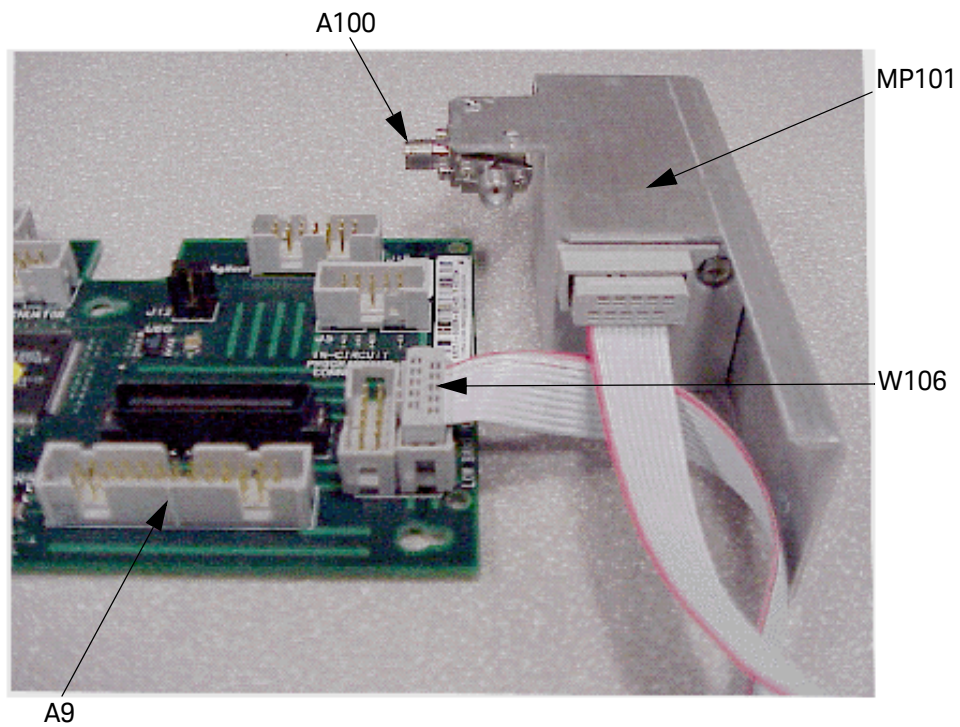
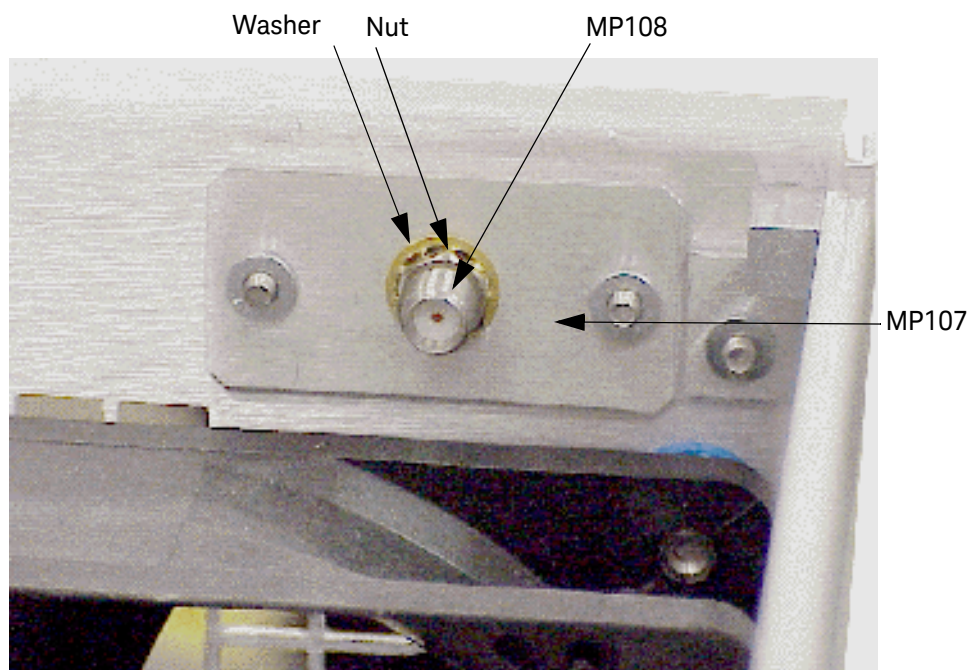


Figure 7 Bracket (rear panel)



Replaceable Parts

Reference Designator	Description	Keysight Part Number	Qty
A100	Mixer 6 GHz to 46 GHz (Opt H30 with Opt 540)	0955-1447	1
A100	Mixer 6 GHz to 26 GHz (Opt H30 with Opt 520)	0955-0488	1
SW1	Coax transfer switch, 4 port, 50 W, 50 GHz	87222-60030	1
W101	RF Cable Coupler- SW (Opt H30 with Opt 540)	E8251-20082	1
W101	RF Cable Coupler- Switch (Opt H30 with Opt 520)	E8251-20173	1
W102	RF Cable Attenuator - SW	E8251-20083	1
W103	RF Cable Mixer IF - Rear Panel	E8251-20084	1
W104	RF Cable Mixer LO - SW (Opt H30 with Opt 540)	E8251-20085	1
W104	RF Cable Mixer LO - SW (Opt H30 with Opt 520)	E8251-20172	1
W105	RF Cable Mixer R - SW (Opt H30 with Opt 540)	E8251-20086	1
W105	RF Cable Mixer R - SW (Opt H30 with Opt 520)	E8251-20171	1
W106	Ribbon Cable Conn. to Coax Switch	8120-6187	1

Safety and Information

Introduction

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument.

This product has been designed and tested in accordance with accepted industry standards, 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.

Safety Earth Ground

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

CAUTION	Always use the three prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage and the risk of electrical shock.
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Declaration of Conformity

A copy of the Declaration of Conformity is available upon request, or a copy is available on the Keysight Technologies web site at <http://regulations.keysight.com/DoC/search.htm>

Statement of Compliance

This product has been designed and tested in accordance with accepted industry standards, 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.

Before Applying Power

Verify that the premises electrical supply is within the range of the instrument. The instrument has an autoranging power supply.

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.
----------------	---

CAUTION	The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.
----------------	---

CAUTION	Always use the three prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage and the risk of electrical shock.
----------------	---

CAUTION	This product is designed for use in Installation Category II and Pollution Degree.
----------------	--

CAUTION	Before switching on this instrument, make sure the supply voltage is in the specified range.
----------------	--

CAUTION	Verify that the premise electrical voltage supply is within the range specified on the instrument.
----------------	--

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.
----------------	---

WARNING	For continued protection against fire hazard replace line fuse only with same type and rating. The use of other fuses or material 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 the user to dangerous voltages. Disconnect the instrument from all voltage sources before opening.
----------------	--

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

WARNING	The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device).
----------------	--

Connector Care and Cleaning Precautions

Remove the power cord to the instrument. To clean the connectors use alcohol in a well ventilated area. Allow all residual alcohol moisture to evaporate, and fumes to dissipate prior to energizing the instrument.

WARNING	To prevent electrical shock, disconnect the E8257D Option H30 from mains electrical supply 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 flammable cleaning materials are used, the material shall not be stored, or left open in the area of the equipment. Adequate ventilation shall be assured to prevent the combustion of fumes, or vapors.
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Regulatory Information

This section contains information that is required by various government regulatory agencies.

Instrument Markings



The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.



The AC symbol indicates the required nature of the line module input power.



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 symbol indicates that the power line switch is ON.



This symbol indicates that the power line switch is in the STANDBY position.



This symbol indicates that the power line switch is in the OFF position.



This symbol is used to identify a terminal which is internally connected to the product frame or chassis.



The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)



The CSA mark is a registered trademark of the CSA International.

ISM1-A

This mark designates the product is an Industrial Scientific and Medical Group 1 Class A product (reference CISPR 11, Clause 5)

ICES/NMB-001

This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001).



Direct Current.

IP 2 0

The instrument has been designed to meet the requirements of IP 2 0 for egress and operational environment.



The RCM mark is a registered trademark of the Australian Communications and Media Authority



Indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.



This symbol on all primary and secondary packaging indicates compliance to China standard GB 18455-2001.



South Korean Certification (KC) mark; includes the marking's identifier code which follows the format: MSIP-REM-YYY-ZZZZZZZZZZZZZZ.

Electrical Safety Compliance

SAFETY

Complies with European Low Voltage Directive 2014/35/EU

- IEC/EN 61010-1:2010, 3rd Edition
- Canada: CSA C22.2 No. 61010-1-12
- USA: UL std no. 61010-1, 3rd Edition
- Acoustic statement (European Machinery Directive 2022/42/EC, 1.7.4.2U)
 Accoustical noise emission
 LpA<70 dB
 Operator position
 Normal operation mode
 Per ISO 7779

EMI and EMC Compliance

EMC

Complies with European EMC Directive 2014/30/EU

- IEC 61326-1:2012/EN 61326-1:2013
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11:2011
- ICES/NMB-001
 This ISM device complies with Canadian ICES-001.
 Cet appareil ISM est conforme a la norme NMB du Canada.
- South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

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Keysight Support, Services, and Assistance

Service and Support Options

There are many other repair and calibration options available from the Keysight Technologies support organization. These options cover a range of service agreements with varying response times. Contact Keysight for additional information on available service agreements for this product.

Contacting Keysight

Assistance with test and measurement needs, and information on finding a local Keysight office are available on the Internet at:

<http://www.keysight.com/find/assist>

You can also purchase accessories or documentation items on the Internet at:

<http://www.keysight.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 Keysight product by its model number and full serial number. With this information, the Keysight representative can determine the warranty status of your unit.

Shipping Your Product to Keysight for Service or Repair

IMPORTANT

Keysight Technologies reserves the right to reformat or replace the internal hard disk drive in your analyzer as part of its repair. This will erase all user information stored on the hard disk. It is imperative, therefore, that you make a backup copy of your critical test data located on the analyzer's hard disk before shipping it to Keysight for repair.

If you wish to send your instrument to Keysight Technologies for service or repair:

- Include a complete description of the service requested or of the failure and a description of any failed test and any error message.
- Remove and retain the front handles and all rack mount hardware. The analyzer should be sent to Keysight in the same configuration as it was originally shipped.
- Remove and retain the front handles and all rack mount hardware. The analyzer should be sent to Keysight in the same configuration as it was originally shipped.
- Contact Keysight for instructions on where to ship your analyzer.

