



Advanced Test Equipment Corp.

www.atecorp.com 800-404-ATEC (2832)

Agilent Technologies E8257D Option H60/H65

User's and Service Guide Supplement

Use this manual with the following PSG Manuals:

PSG E8257D/67D Documentation Set: E8251-90350

11970 Series Harmonic Mixers User's Guide: 11970-90031

11970 Series Harmonic Mixers Data Sheet: 5968-1445E

E4448A PSA Manual: E4440-90273

E4407B ESA Manual: E4401-90429

E4438C ESG Manual: E4400-90500



Agilent Technologies

Manufacturing Part Number: E8251-90099

Printed in USA March 2010

Supersede February 2006

© Copyright 2006, 2010 Agilent Technologies, Inc. All rights reserved.

Warranty Statement

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED “AS IS,” AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, AGILENT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. AGILENT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD AGILENT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

DFARS/Restricted Rights Notice

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

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). The instrument must have a current calibration.
- *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.

Contents

E8257D Option H60/H65

Introduction	2
Description	2
Verifying the Shipment	3
Nominal Performance Specification	3
Operational and Verification Procedure	6
Upconverting the Frequency	7
Downconverting the Frequency	8
Verification Procedure	9
Verifying Mixer Performance up to 50 GHz	9
Equipment Required for Measurement up to 50 GHz	9
Option H60 Test	11
4 GHz Upconverter RF Measurement	11
23 GHz Upconverter RF Measurement	11
50 GHz Upconverter RF Measurement	11
Option H65 Test	12
20 GHz Upconverter RF Measurement	12
23 GHz Upconverter RF Measurement	12
50 GHz Upconverter RF Measurement	12
Verifying Mixer Performance at 65 GHz	13
Equipment Required 65 GHz Measurement	13
65 GHz Upconverter RF Measurement	14
Replaceable Parts	15
Mixer Assembly	16
Safety and Regulatory Information	17
Introduction	17
Before Applying Power	17
Connector Care and Cleaning	17
Declaration of Conformity	17
Statement of Compliance	17
General Safety Considerations	18
Cautions	18
Servicing	19
Regulatory Information	20
Instrument Markings	20
Battery Collection	21
Compliance with German Noise Requirements	21
EMC Information	21
Electrostatic Discharge Protection	22
Agilent Support, Services, and Assistance	23
Service and Support Options	23
Contacting Agilent	23
Shipping Your Analyzer to Agilent for Service or Repair	23

Contents

E8257D Option H60/H65

Introduction

This manual supplement describes the differences in the E8257D Option H60 and H65 in comparison to the E8257D standard instrument. Refer to the PSG E8257D/67 Signal Generators User's (E8251-90353).

Description

The E8257D Option H60 and H65 provide a double-balanced microwave mixer that is installed internally on the rear panel with connectors for easy access to the mixer ports. These options can be used with a another source, such as the E4438C or E8267D to upconvert an RF frequency to 65 GHz or downconvert an RF frequency to DC (Option H60) or 1 GHz (Option H65).

It is recommended that Option H60 be ordered with Option 567 to utilize the Option H60 frequency range of 65 GHz. It is also recommended that Option H65 be ordered with Option 520, 532, or 540. The Option H65 mixer has internal LO frequency doubler that enables the use of an E8257D Option 520 to be used to upconvert a 20 GHz RF frequency to 60 GHz. Option 1EA is also recommended for Option H65 due to the mixer requiring more power for optimal performance.

Refer to the microwave mixer data sheets, [Figure 1 on page 4](#) and [Figure 2 on page 5](#) for further information regarding the Option H60 and H65 mixer nominal performance.

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 [“Agilent Support, Services, and Assistance”](#) on page 23.

Table 1 **Content List**

Item	Agilent Part Number	Qty
RF Cable (2.4 mm)	5360-9820	2
RF Cable (3.5 mm)	5062-6674	1
Adapter	1250-2188	1

Nominal Performance Specification

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. Refer to [Figure 1 on page 4](#) and [Figure 2 on page 5](#) for more information. The performance listed below does not include connector and cable losses.

H60 mixer nominal performance:

LO port frequency range 2.7 to 65 GHz

RF port frequency range 4.0 to 65 GHz

IF port frequency range DC to 3 GHz (up to 4 GHz with 15 dB conversion loss)

Nominal conversion loss 12 dB (plus cable and connector losses at 65 GHz RF)

H65 mixer nominal performance:

IF port frequency range 1 to 22 GHz

LO port frequency range 5 to 30 GHz (LO has built-in freq doubler)

RF port frequency range 20 to 65 GHz

Nominal conversion loss 13 dB (plus cable and connector losses at 65 GHz RF)

Figure 1 E8257D Option H60 Mixer Data Sheet

- 7 dB Typical Conversion Loss
- 25 dB Typical LO to RF Isolation
- 4 to 65 GHz RF Coverage
- 2.40 mm RF/LO

**Guaranteed Specifications
(From -55°C to +100°C)**

Conversion Loss / Noise Figure (SSB):

FR, FL	4.0 to 44.0 GHz	7.0 dB typ	9.5 dB max
FI	DC to 1.5 GHz		
FR, FL	4.0 to 44.0 GHz	8.5 dB typ	11.5 dB max
FI	1.5 to 3.0 GHz		
FR, FL	4.0 to 65.0 GHz	9.5 dB typ	15.0 dB max
FI	DC to 3.0 GHz		

Third Harmonic LO Conversion Loss:

FL	2.67 to 21.67 GHz	23 dB typ	30 dB max
RF	8.0 to 65.0 GHz		
FI	DC to 3.0 GHz		

Isolation:

LO-RF	4.0 to 44.0 GHz	25 dB typ	20 dB min
LO-IF	4.0 to 44.0 GHz	25 dB typ	
RF-IF	4.0 to 44.0 GHz	25 dB typ	

Input 1dB Compression:

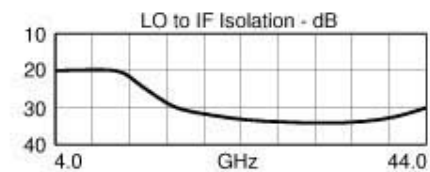
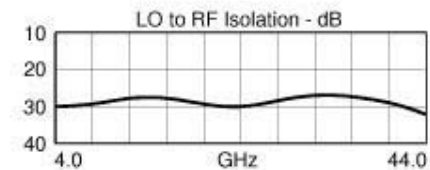
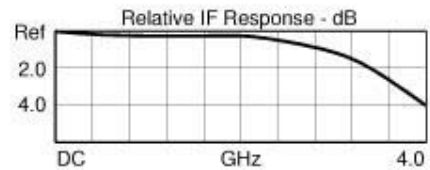
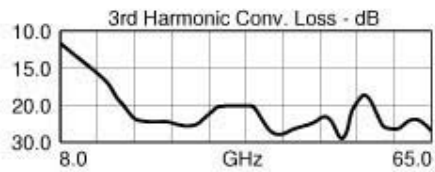
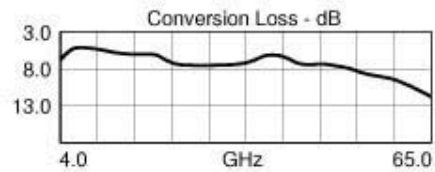
L Version	LO @ +9 to +13 dBm	+2 dBm typ
-----------	--------------------	------------

Input Two-Tone Third Order Intercept Point:

L Version	LO @ +9 to +13 dBm	+12 dBm typ
-----------	--------------------	-------------

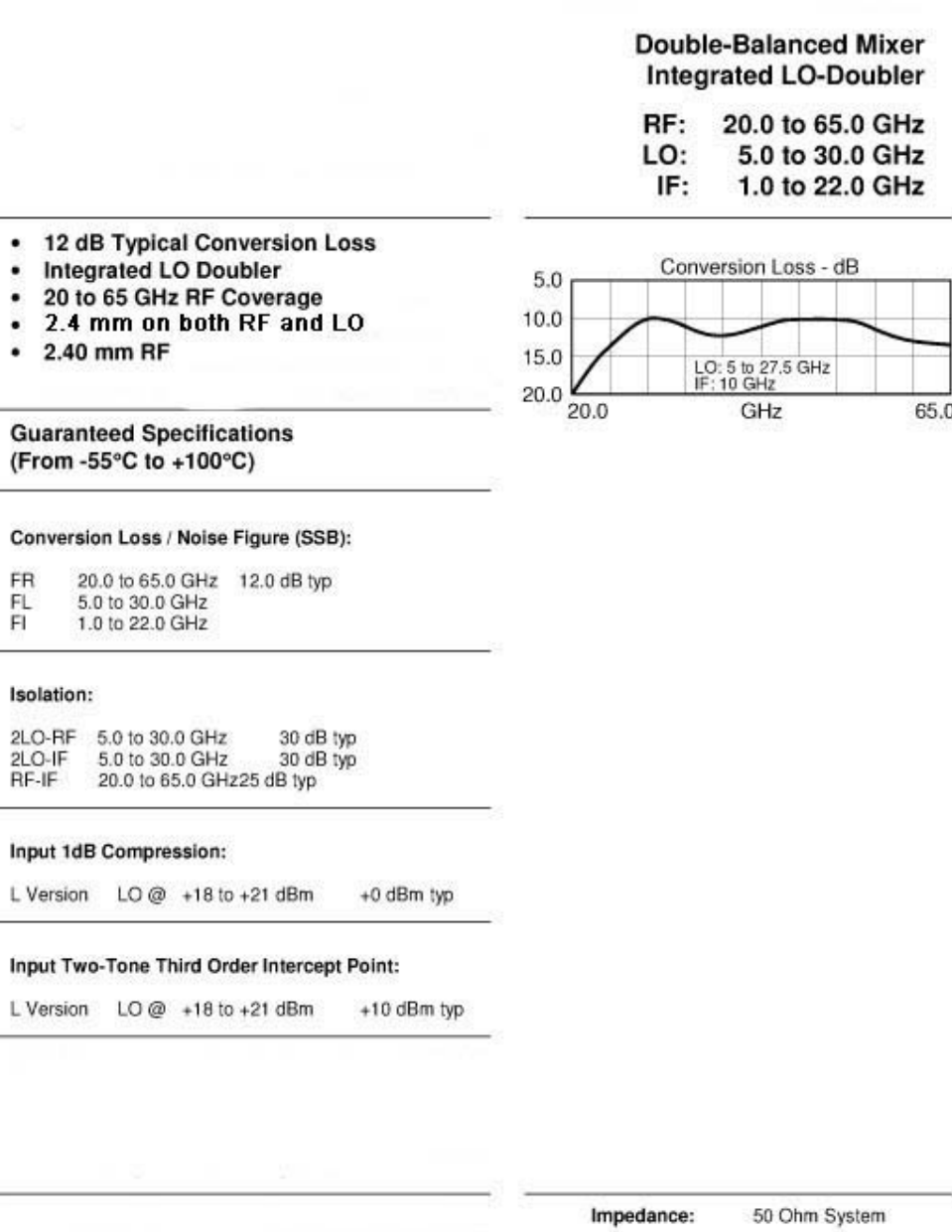
Double-Balanced Mixer

RF: 4.0 to 65.0 GHz
LO: 2.7 to 65.0 GHz
IF: DC to 3.0 GHz



Impedance: 50 Ohm System

Figure 2 E8257D Option H65 Mixer Data Sheet



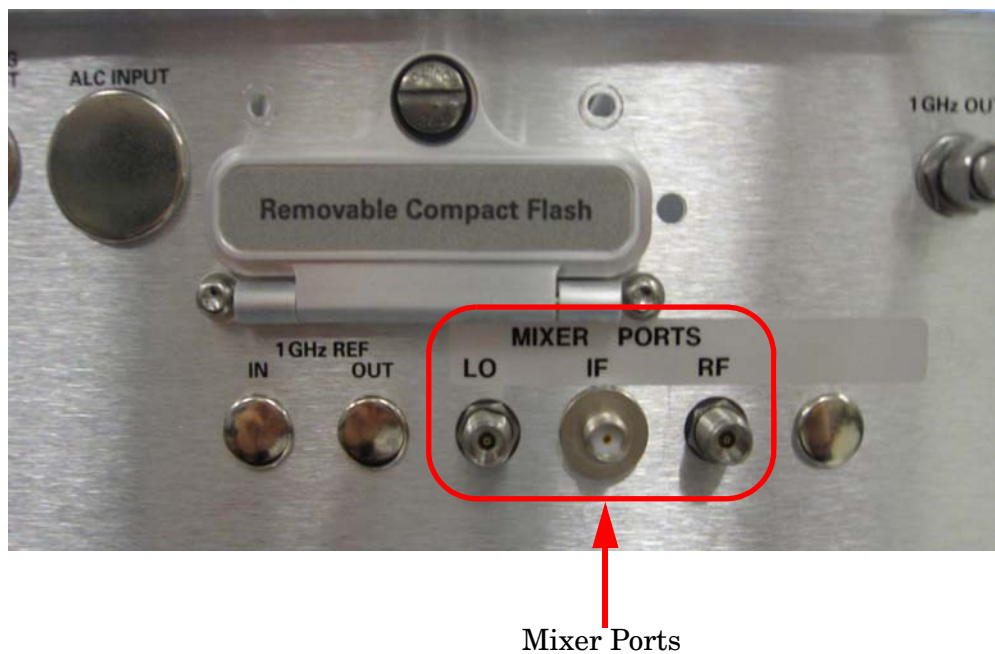
Operational and Verification Procedure

The E8257D Option H60 or H65 can be used to upconvert or downconvert the frequency of your source. Refer to [Figure 3](#).

CAUTION Inputs are ESD sensitive. We recommend that you keep the connector covers on when not in use. Refer to [“Electrostatic Discharge Protection”](#) on page 22.

1. Connect the adapter to the E8257D Option H60/65 RF Output. Refer to [Table 2](#) on [page 9](#).
2. Connect the RF cable (5063-9820) from the adapter to the LO Port on the E8257D rear panel.

Figure 3 Rear Panel



Upconverting the Frequency

The upconverted frequency signal can be measured on the RF port on the E8257D Option H60/H65 rear panel.

1. **Preset** the instrument with Option H60/H65.
2. Set the power level to +13 dBm. Refer to Input 1 dB Compression for optimal LO Input Power in [Figure 1 on page 4](#) and [Figure 2 on page 5](#).
3. Connect your source to the E8257D Option H60/H65 IF port on the rear panel, using a 3.5 mm cable such as the (5062-6674).
4. Connect the second cable (5360-9820) to the RF Port.
5. To upconvert your source frequency set the E8257D Option H60 frequency to the desired RF Output frequency minus your source frequency. For Option H65 set the frequency to the desired RF minus your source frequency and divide by 2. See the equations below. (The IF is subtracted from the upconverted RF for the LO frequency).

NOTE Filtering may be required to remove the unwanted signals. The RF Output frequency will have the difference of the E8257D Option H60/H65 as well as the two original frequencies along with the sum upconverted product.

Equation 1 Upconverted Frequency (H60)

$$\text{Upconverted RF} = LO(\text{E8257DH60}) + IF(\text{yoursource})$$

Equation 2 Upconverted Frequency (H65)

$$\text{Upconverted RF} = LO(\text{E8257DH65}) \times 2 + IF(\text{yoursource})$$

NOTE The LO Port has a frequency doubler on the LO Input (H65 only). The E8257D Option H65 frequency output will be set to half the desired LO frequency.

Downconverting the Frequency

The down converted frequency signal can be measured on the IF port on the E8257D Option H60/H65 rear panel.

1. Preset the instrument with Option H60/H65.
2. Set the power level to +13 dBm. Refer to Input 1 dB Compression for optimal LO Input Power in [Figure 1 on page 4](#) and [Figure 2 on page 5](#).
3. Connect your source to the E8257D Option H60/H65 RF port on the rear panel, using a 2.4 mm cable such as the (5063-9820).
4. Connect the cable (5062-6674) to the IF Port.
5. To downconvert your source frequency set the E8257D Option H60 frequency to your source frequency minus the desired IF Output. For Option H65 set the frequency to the source frequency minus the desired IF Output frequency and divide by 2. See the equations below. (The IF is subtracted from the upconverted RF for the LO frequency).

NOTE Filtering may be required to remove the unwanted signals. The IF Output frequency will have the sum of the E8257D Option H60/H65 as well as the two original frequencies along with the difference down converted product.

Equation 3 Downconverted Frequency (H60)

$$\text{Downconverted IF} = \text{RF}(\text{yoursource}) - \text{LO}(\text{E8257DH60})$$

Equation 4 Downconverted Frequency (H65)

$$\text{Downconverted IF} = \text{RF}(\text{yoursource}) - \text{LO}(\text{E8257DH65}) \times 2$$

NOTE The LO Port has a frequency doubler on the LO Input (H65 only). The E8257D Option H65 the frequency output will be set to half the desired LO frequency.

Verification Procedure

This procedure will verify the mixer is functioning in the E8257D Option H60/H65 for frequency upconversion.

There are two methods you may use to verify the mixer is functioning. The first method will test an upconverted frequency up to 50 GHz and uses minimal equipment. The second method will test an upconverted frequency up to 65 GHz.

Verifying Mixer Performance up to 50 GHz

This test will measure three frequency points (low end, 23 GHz and 50 GHz). The 50 GHz test requires that the DUT have Option 550 or 567 for Option H60. Units with Option H65 can have Option 540, 532 or 520.

Equipment Required for Measurement up to 50 GHz

- E4438C or equivalent 3 GHz signal generator (Option H60)
- E8257D or equivalent 20 GHz signal generator (Option H65)
- E4448A or equivalent spectrum analyzer
- Cable (5063-9820) (x2)
- Cable (5062-6674)
- Adapters, customer supplied (refer to [Table 2 on page 9](#)).

Table 2 Recommended Adapters

Instrument Options	Adapter Description	Agilent Part Number
520, 532	3.5 mm (f) to (f)	5061-5311
540, 550 and 567	2.4 mm (f) to 3.5 mm (f)	1250-2187
540, 550 and 567	2.4 mm (f) to 2.4 mm (f)	1250-2188
1ED	2.4 mm (f) to Type-N (m)	11903D
1ED	3.5 mm (f) to Type-N (m)	1250-1744

Connect the following equipment for the verification procedure:

1. **Preset** all of the test equipment.
2. Connect the adapter to the RF Output on the E8257D Option H60/H65 front panel. Refer to [Table 2 on page 9](#).
3. Connect the RF cable (5063-9820) to the adapter and connect the RF cable to the LO Port on the E8257D rear panel.
4. Connect the E4438C/E8257D or equivalent source to the E8257D Option H60/H65 IF port on the rear panel, using a 3.5 mm cable such as the (5062-6674). Adapters may be required, see [Table 2 on page 9](#). Refer to [Figure 3 on page 6](#) for rear panel connections.
5. Connect the E4448A or equivalent spectrum analyzer (with a 10 dB attenuator on the input) to the E8257D Option H60/H65 RF port on the rear panel, using a 2.4 mm cable such as the (5063-9820). Adapters may be required.

NOTE *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.

Option H60 Test

4 GHz Upconverter RF Measurement

1. Set the E8257D Option H60 frequency to 2.7 GHz.
2. Set the Power Level to +13 dBm > RF On > MOD Off.
3. Set your Source frequency to 1.3 GHz and the Power Level to 0 dBm.
4. On the E4448A, set the Center Frequency to 4 GHz and Span to 100 MHz.
5. Place the marker on the 4 GHz signal, use Trace > Max Hold and measure -30 dBm (± 5 dB). Cable loss and amplitude accuracy of the spectrum analyzer will effect the measured value.

23 GHz Upconverter RF Measurement

1. Set the E8257D Option H60 frequency to 20 GHz.
2. Set the Power Level to +13 dBm > RF On > MOD Off.
3. Set your Source frequency to 3 GHz and the Power Level to 0 dBm.
4. On the E4448A, set the Center Frequency to 23 GHz and Span to 100 MHz.
5. Place the marker on the 23 GHz signal, use Trace > Max Hold and measure -30 dBm (± 5 dB). Cable loss and amplitude accuracy of the spectrum analyzer will effect the measured value.

50 GHz Upconverter RF Measurement

1. Set the E8257D Option H60 frequency to 47 GHz.
2. Set the Power Level to +13 dBm > RF On > MOD Off.
3. Set your Source frequency to 3 GHz and the Power Level to 0 dBm.
4. On the E4448A, set the Center Frequency to 50 GHz and Span to 100 MHz.
5. Place the marker on the 50 GHz signal, use Trace > Max Hold and measure -35 dBm (± 5 dB). Cable loss and amplitude accuracy of the spectrum analyzer will effect the measured value.

NOTE Nominal loss through a 10 dB attenuator and cable is 17 dB at 50 GHz.

Option H65 Test

20 GHz Upconverter RF Measurement

1. Set the E8257D Option H65 frequency to 9 GHz.
2. Set the Power Level to +13 dBm (or +18 dBm with Option 1EA) > RF On > MOD Off.
3. Set your Source frequency to 2 GHz and the Power Level to 0 dBm.
4. On the E4448A, set the Center Frequency to 20 GHz and Span to 100 MHz.
5. Place the marker on the 20 GHz signal, use Trace > Max Hold and measure -47 dBm (± 5 dB) or -37 dBm (± 5 dB) with Option 1EA. Cable loss and amplitude accuracy of the spectrum analyzer will effect the measured value.

23 GHz Upconverter RF Measurement

1. Set the E8257D Option H65 frequency to 10 GHz.
2. Set the Power Level to +13 dBm (or +18 dBm with Option 1EA) > RF On > MOD Off.
3. Set your Source frequency to 3 GHz and the Power Level to 0 dBm.
4. On the E4448A, set the Center Frequency to 23 GHz and Span to 100 MHz.
5. Place the marker on the 23 GHz signal, use Trace > Max Hold and measure -45 dBm (± 5 dB) or -35 dBm (± 5 dB) with Option 1EA. Cable loss and amplitude accuracy of the spectrum analyzer will effect the measured value.

50 GHz Upconverter RF Measurement

1. Set the E8257D Option H65 frequency to 20 GHz.
2. Set the Power Level to +13 dBm (or +18 dBm with Option 1EA) > RF On > MOD Off.
3. Set your Source frequency to 10 GHz and the Power Level to 0 dBm.
4. On the E4448A, set the Center Frequency to 50 GHz and Span to 100 MHz.
5. Place the marker on the 50 GHz signal, use Trace > Max Hold and measure -47 dBm (± 5 dB) or -40 dBm (± 5 dB) with Option 1EA. Cable loss and amplitude accuracy of the spectrum analyzer will effect the measured value.

NOTE Nominal loss through a 10 dB attenuator and cable is 17 dB at 50 GHz.

Verifying Mixer Performance at 65 GHz

This procedure verifies the mixer performance of the E8257D Option H60/H65 at 65 GHz. The upconverted frequency signal can be measured at the RF port on the E8257D Option H60/H65 rear panel.

To test the E8257D Option H60 set your source to 3 GHz and the E8257D Option H60 frequency to 62 GHz. This will allow you to measure the upconverted frequency at 65 GHz, using a spectrum analyzer. (The 11970A mixer must be connected to the E4448A spectrum analyzer when measuring above 50 GHz).

To test the E8257D Option H65 set your source to 15 GHz and set the frequency of the E8257D Option H65 to 25 GHz. This will allow you measure the upconverted frequency of 65 GHz. (The 11970A mixer must be connected to the E4448A spectrum analyzer when measuring above 50 GHz).

NOTE The E8257D Option H65 will require Option 532, 540, 550 or 567 for the 25 GHz LO frequency.

Equipment Required 65 GHz Measurement

- E4438C, E8257D or E8267D or equivalent source
Frequency range 15 GHz for Option H65
Frequency range 3 GHz for Option H60
- E4448A or E4407B Option AYZ or equivalent spectrum analyzer with external mixer capability (LO and IF ports to meet 11970V harmonic mixer requirements)
- 11970V-009 Mixer Connection Kit
- 11970V Waveguide Harmonic Mixer
- V281B Coaxial to Waveguide Adapter
- Cable (5063-9820) (x2)
- Cable (5062-6674)
- Adapters (customer supplied)

65 GHz Upconverter RF Measurement

Connect the following equipment for the verification procedure:
Refer to [Figure 3 on page 6](#).

1. **Preset** all of the test equipment.
2. Connect the adapter to the RF Output on the E8257D Option H60/H65 front panel.
Refer to [Table 2 on page 9](#).
3. Connect the RF cable (5063-9820) to the adapter and connect the RF cable to the LO Port on the E8257D rear panel.
4. Connect the E4438C/E8257D or equivalent source to the E8257D Option H60/H65 IF port on the rear panel, using a 3.5 mm cable such as the (5062-6674). Adapters may be required, see [Table 2 on page 9](#). Refer to [Figure 3 on page 6](#) for rear panel connections.
5. Connect the V281B adapter to the 11970V harmonic mixer.
6. Connect the 11970V harmonic mixer to the E4448A spectrum analyzer, using the 11970V-009 mixer connection kit.
7. Connect the 11970V RF Input to the E8257D Option H60/H65 mixer RF port on the rear panel. The V281B adapter must be connected to the 11970V. Refer to “[Equipment Required 65 GHz Measurement](#)” on page 13 for waveguide to coaxial adapter.
8. Set the E4448A (or equivalent) parameters as follows:
 - External Mixer Input on the E4448A or E4407B
Select:
[Input/Output] > Input Mixer > Input Mixer = Ext > Ext Mixer Band > 50-75 GHz (V)
 - Center Frequency 65 GHz
 - Span 100 MHz
 - Ref Level 0 dBm
9. Place the marker on the 65 GHz signal and verify the approximate power level.
(The harmonic mixer has a 35 dB loss).
 - Option H60 -52 dBm (± 5 dB) nominal
 - Option H65 -60 dBm (± 5 dB) LO Input +13 dBm (nominal)
-52 dBm (± 5 dB) LO Input +18 dBm (nominal)

NOTE *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.

Replaceable Parts

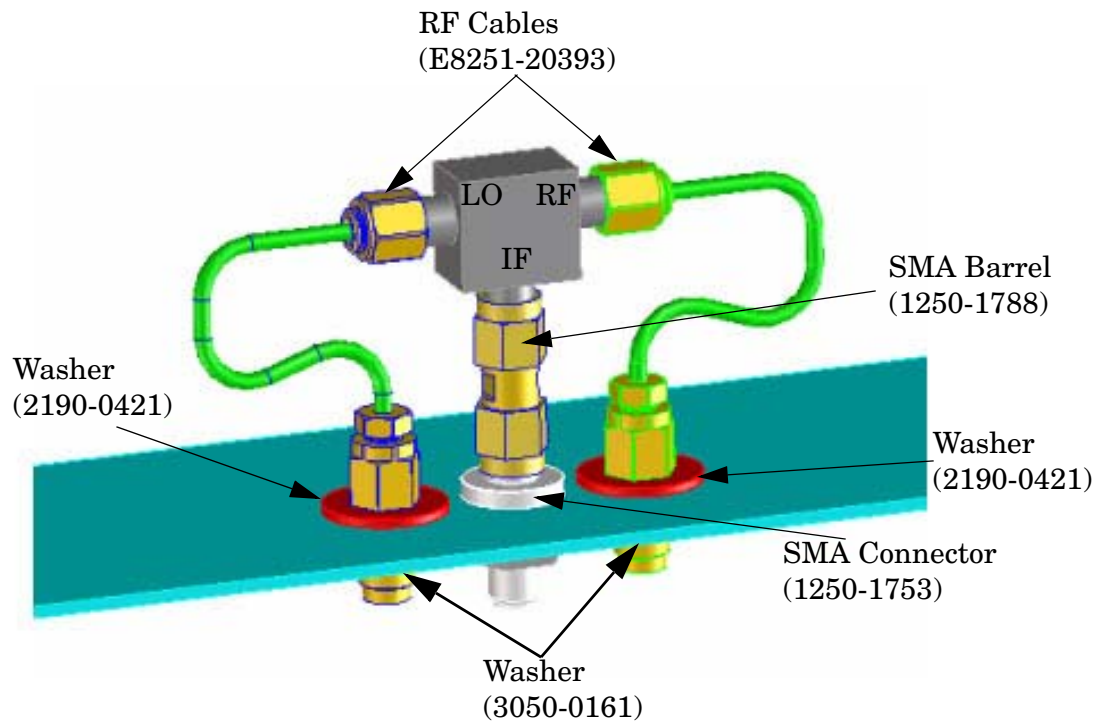
NOTE Special options are built to order; long lead times may be encountered when ordering replacement parts.

Description	Agilent Part Number	Qty
Adapter (coax SMA female to SMA female)	1250-1753	1
Adapter (coax SMA male to SMA male)	1250-1788	1
Adapter (coax 2.4 mm female to 2.4 mm female)	1250-2188	1
Cable Assembly (36 in, 2.4 mm)	5063-9820	1
Hole Plug (Dome-HD for 0.312-D-hole stl)	6960-0023	2
Hole Plug (.75-D-hole steel)	6960-0003	1
H60/H65 Rear Panel (analog, UNM and IEM)	E8251-00368	1
RF Cable (2.4 mm male to 2.4 mm female)	E8251-20393	2
H60/H65 Rear Panel Label (LO IF RF, 0.7 in spacing silver)	E8251-80055	1
User's and Service Guide (Option H60/H65)	E8251-90099	1
U-Wave Mixer Dbl Bal (Option H60)	0955-1848	1
<i>or</i> U-Wave Mixer Dbl Bal (Option H65)	0955-1871	1
Washer (1/4 in)	2190-0421	3

Mixer Assembly

Refer to [Figure 4](#) for replacement part identification.

Figure 4 Cable and Mixer Configuration



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

WARNING **To prevent electrical shock, disconnect the [Agilent Technologies E8257D Option H60/H65](#) 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.**

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 **Keep isopropyl alcohol away from heat, sparks, and flame. Store in a tightly closed container. It is extremely flammable. In case of fire, use alcohol foam, dry chemical, or carbon dioxide; water may be ineffective.**

Declaration of Conformity

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

Statement of Compliance

This instrument has been designed and tested in accordance with CAN/CSA 22.2 No. 61010-1-04, UL Std No. 61010-1 (Second Edition), and IEC 61010-1 (Second Edition).

General Safety Considerations

Cautions

Cautions applicable to this instrument.

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 2.

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.

Servicing

Warnings applicable to this instrument.

-
- | | |
|----------------|--|
| WARNING | Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer's instructions. |
|----------------|--|
-
- | | |
|----------------|--|
| 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 | 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 while it is being opened. |
|----------------|---|
-
- | | |
|----------------|---|
| WARNING | This product is designed for use in Installation Category II and Pollution Degree 2. |
|----------------|---|
-
- | | |
|----------------|--|
| WARNING | No operator serviceable parts inside. Refer servicing to qualified personnel. |
|----------------|--|
-
- | | |
|----------------|---|
| 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. |
|----------------|---|
-

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.



This symbol indicates that the instrument requires alternating current (ac) input.



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. This instrument complies with Canada: CSA 22.2 No. 61010-1-04.



This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.



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



Direct Current.



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



This is a required mark signifying compliance with an EMC requirement. The C-Tick mark is a registered trademark of the Australian Spectrum Management Agency.



China RoHS regulations include requirements related to packaging, and require compliance to China standard GB18455-2001.



This symbol indicates compliance with the China RoHS regulations for paper/fiberboard packaging.

Battery Collection

Do not throw batteries away but collect as small chemical waste, or in accordance with your country's requirements. You may return the battery to Agilent Technologies for disposal. Refer to [“Contacting Agilent” on page 23](#) for assistance.

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

EMC Information

Complies with European EMC Directive 2004/108/EC

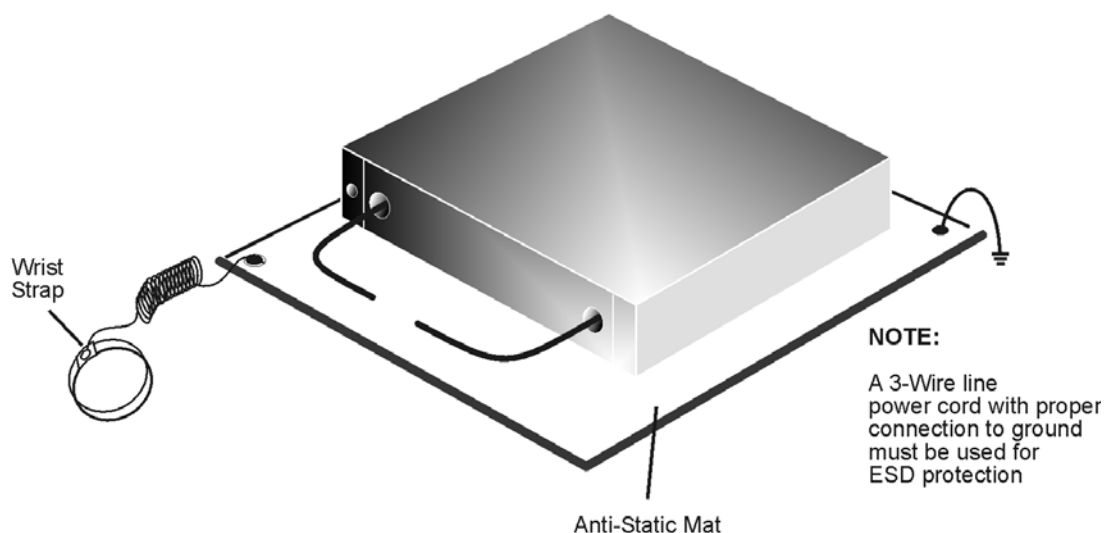
- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme a la norme NMB du Canada.

Electrostatic Discharge Protection

Protection against electrostatic discharge (ESD) is essential while removing assemblies from or connecting cables to the network analyzer. Static electricity can build up on your body and can easily damage sensitive internal circuit elements when discharged. Static discharges too small to be felt can cause permanent damage. To prevent damage to the instrument:

- *always* have a grounded, conductive table mat (9300-0797) in front of your test equipment.
- *always* wear a grounded wrist strap (9300-1367) with grounding cord (9300-0980), connected to a grounded conductive table mat, having a 1 M Ω resistor in series with it, when handling components and assemblies or when making connections.
- *always* wear a heel strap (9300-1126) when working in an area with a conductive floor. If you are uncertain about the conductivity of your floor, wear a heel strap.
- *always* ground yourself before you clean, inspect, or make a connection to a static-sensitive device or test port. You can, for example, grasp the grounded outer shell of the test port or cable connector briefly.
- *always* ground the center conductor of a test cable before making a connection to the analyzer test port or other static-sensitive device. This can be done as follows:
 1. Connect a short (from your calibration kit) to one end of the cable to short the center conductor to the outer conductor.
 2. While wearing a grounded wrist strap, grasp the outer shell of the cable connector.
 3. Connect the other end of the cable to the test port and remove the short from the cable.

Figure 3 ESD Protection Setup



ku310b

Agilent Support, Services, and Assistance

Service and Support Options

The analyzer's standard warranty is a one-year return to Agilent Technologies service warranty.

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

Contacting Agilent

Assistance with test and measurements needs and information or finding a local Agilent office are available on the Web 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 Agilent product by its model number and full serial number. With this information, the Agilent representative can determine the warranty status of your unit.

Shipping Your Analyzer to Agilent for Service or Repair

IMPORTANT Agilent 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 Agilent for repair.

If you wish to send your instrument to Agilent 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.
- Ship the analyzer using the original or comparable antistatic packaging materials.
- Contact Agilent for instructions on where to ship your analyzer.

