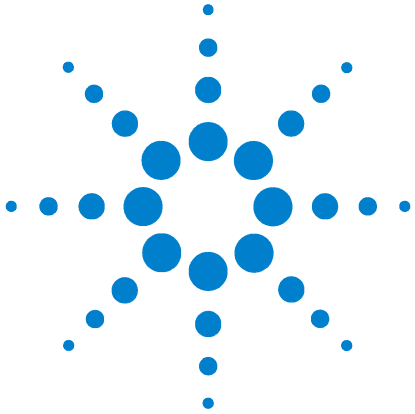


Agilent E8257D
Option HAR

User's and Service Guide



Agilent Technologies

Notices

© Agilent Technologies, Inc. 2007

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

E8251-90319

Edition

October 2007

Printed in USA

Agilent Technologies, Inc.
1601 California Street
Palo Alto, CA 94304 USA

Warranty

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 of 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 shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

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 Notices

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.

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.

Contents

E8257D Option HAR

Description . . . 2
Verifying the Shipment . . . 2
Block Diagram . . . 2
Specifications . . . 3
Phase Noise . . . 3
Maximum Level Output Power . . . 3
Typical Performance . . . 4
Phase Noise . . . 4
Amplitude . . . 4
Modulation . . . 6
Frequency Modulation . . . 6
Phase Modulation . . . 6
Amplitude Modulation . . . 7
Pulse Modulation . . . 7
ALC Performance . . . 7
Ramp Sweep . . . 7
Operation . . . 8
E8257D Option HAR Using the E5500 Phase Noise Measurement Subsystem . . . 8
Service . . . 9
Troubleshooting . . . 9
Replaceable Parts . . . 11
Performance Test . . . 11
Setting up the E5500 Software . . . 12
10 MHz Phase Noise Test Limits . . . 13
10 MHz Test Procedure . . . 13
Making the 10 MHz Measurement . . . 15
100 MHz Phase Noise Test Limits . . . 16
100 MHz Test Procedure . . . 16
Making the 100 MHz Measurement . . . 18
Appendix . . . 19
Modifying Synthesizer Self Test Limits . . . 19
Safety and Regulatory Information . . . 20
Introduction . . . 20
Cleaning the Instrument . . . 20
Connector Care and Cleaning . . . 20
Declaration of Conformity . . . 20
Statement of Compliance . . . 21
Shipping Instructions . . . 21
Compliance with Canadian EMC Requirements . . . 21
Compliance with German FTZ Emissions Requirements . . . 21
Compliance with German Noise Requirements . . . 21
General Safety Considerations . . . 22
Safety Earth Ground . . . 22
Before Applying Power . . . 22
Servicing . . . 23
Electrostatic Discharge Protection . . . 24
Regulatory Information . . . 25
Instrument Markings . . . 25
Contacting Agilent Sales and Service Offices . . . 26

Contents

E8257D Option HAR

Description

The E8257D Option HAR is a frequency divider designed to provide improved phase noise in the 0.98 MHz to 500 MHz frequency range of the E8257D Signal Generator.

The Option HAR uses frequency division as a replacement for heterodyne mixing to create frequencies in the 0.98 to 500 MHz range. This provides improved phase noise in this mode. The mode will be referred to as “Divider Mode” throughout this document.

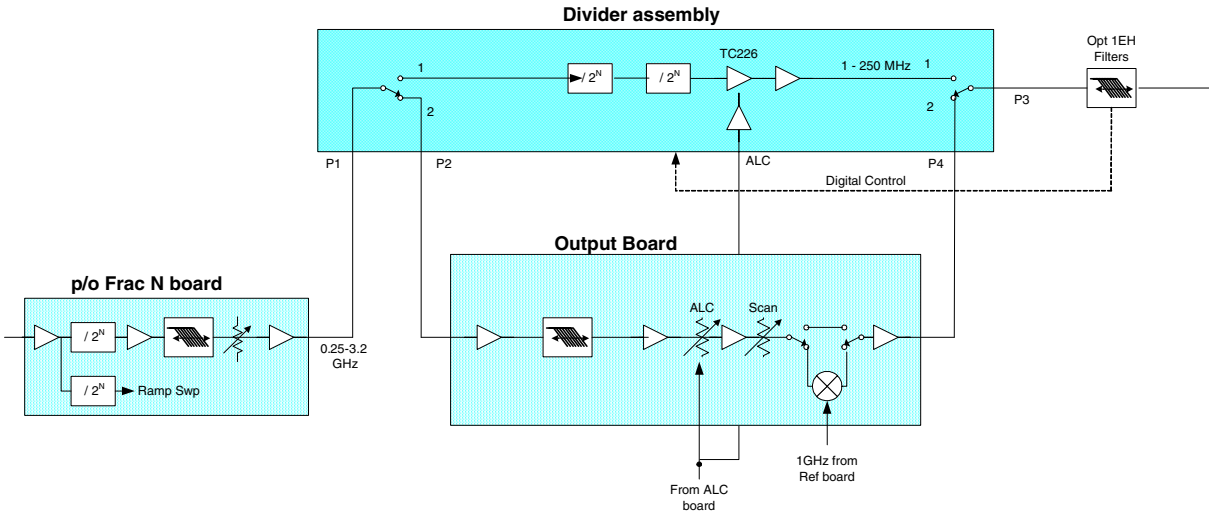
Verifying the Shipment

After the unit has been unpacked, keep the original packaging materials so it can be used if you need to transport the instrument.

After the test set has been unpacked, keep the original packaging materials so they can be used if you need to transport the instrument.Inspect the test set and all accessories for any signs of damage that may have occurred during shipment. If your test set or any accessories appear to be damaged or missing refer to “Contacting Agilent Sales and Service Offices” on page 26.

Block Diagram

Figure 1 Block Diagram



Specifications

The E8257D Option HAR provides improved absolute phase noise in the 0.98 to 500 MHz frequency range. To achieve these improvements the Divider Mode must be turned On. See “Operation” on page 8.

The E8257D Option HAR impacts standard instrument performance for frequencies ≤ 3.2 GHz. Standard operation for frequencies above 3.2 GHz has not been affected. If Divider Mode is left on for frequencies outside of 0.98 to 500 MHz the “ALC Bandwidth” will be limited to 100 Hz.

Phase Noise

Divider Mode On

Table 1 E8257D Option HAR Specifications[1] (25 °C)

Frequency	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz
10 MHz	–93	–120	–142	–152	–158	–158
100 MHz	–73	–100	–122	–140	–145	–145

1. +16 dBm

Divider Mode Off

Standard performance per the E8257D data sheet.

Maximum Level Output Power

Divider Mode On

Typical performance see Table 4 and Table 5 on page 5.

Divider Mode Off

Table 2 Maximum Power Specification Impacts

Frequency	Delta
250 kHz to 3.2 GHz	–3 dB from Standard specification
> 3.2 GHz	no change from standard specifications

Typical Performance

Phase Noise

Table 3 Absolute Single Sideband Phase Noise (dBc/Hz) Frequency Offset from Carrier[1] (Typical)[2]

Carrier Frequency (MHz)	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz
1 MHz	–120	–142	–155	–160	–160	–160
10 MHz	–106	–132	–148	–160	–160	–160
100 MHz	–86	–112	–129	–144	–149	–149
160 MHz	–81	–107	–122	–142	–145	–145
250 MHz	–76	–104	–121	–138	–142	–142
500 MHz	–70	–98	–115	–132	–136	–136

1. +16 dBm
2. Divider Mode On.

Amplitude

Table 4 Option 520 Maximum Leveled Output Power[1] dBm[2] (Typical)[3]

Carrier Frequency	Lowband Filter	
	Off	On[4]
1 MHz	19	19
10 MHz	19	13
100 MHz	17	11
160 MHz	17	11
250 MHz	17	10
500 MHz	16	10

1.Amplitude accuracy is not specified in diver mode.
2.Divider Mode On.
3.Option 1EA installed. Divider mode on, without Option IEA max power is the lower of 10 dBm, or refer to Table 4.
4.For improved amplitude accuracy the lowband filters must be on.

Table 5 Option 532 or 540 Maximum Leveled Output Power[1] dBm[2] (Typical)[3]

Carrier Frequency	Lowband Filter	
	Off	On[4]
1 MHz	15	15
10 MHz	15	10
100 MHz	15	9
160 MHz	15	8
250 MHz	15	8
500 MHz	13	9

1.Amplitude accuracy is not specified in diver mode.
2.Divider Mode On.
3.Option 1EA installed. Divider mode on, without Option IEA max power is the lower of 10 dBm, or refer to Table 5.
4.For improved amplitude accuracy the lowband filters must be on.

Table 6 Harmonic Level dBc[1] (Typical)[2]

Carrier Frequency	Lowband Filter	
	Off	On
< 10 MHz	– 10	– 10
10 to 500 MHz	– 10	– 55

1. Divider Mode On.
2. Harmonic levels in divider mode are high (the output is a square wave)

Modulation

Frequency Modulation

Table 7 Maximum FM Modulation Deviation (Typical)[1]

Carrier Frequency	kHz
> 0.98 MHz to 1.953 MHz	3.906
> 1.953 MHz to 3.906 MHz	7.8125
> 3.906 MHz to 7.813 MHz	15.625
> 7.813 MHz to 15.63 MHz	31.25
> 15.63 MHz to 31.25 MHz	62.5
> 31.25 MHz to 62.5 MHz	125
> 62.5 MHz to 125 MHz	250
> 125 MHz to 250 MHz	500
> 250 MHz to 500 MHz	1000

1.Divider Mode On.

Phase Modulation

Table 8 Maximum Phase Modulation (Typical)[1]

Carrier Frequency	Normal Bandwidth Mode (radians)	High Bandwidth Mode (radians)
> 0.98 MHz to 1.953 MHz	0.0039063	0.0039063
> 1.953 MHz to 3.906 MHz	0.0078125	0.0078125
> 3.906 MHz to 7.813 MHz	0.015.625	0.015.625
> 7.813 MHz to 15.63 MHz	0.03125	0.03125
> 15.63 MHz to 31.25 MHz	0.0625	0.0625
> 31.25 MHz to 62.5 MHz	125	0.125
> 62.5 MHz to 125 MHz	250	0.250
> 125 MHz to 250 MHz	500	0.500
> 250 MHz to 500 MHz	10	1

1.Divider Mode On.

Amplitude Modulation

AM modulation is not recommended in divider mode. In divider mode, ALC Bandwidth is limited to 100 Hz and dynamic range is restricted below 500 MHz.

Pulse Modulation

Divider Mode On:

Standard Pulse (UNU) can not be used in divider mode. Option UNW can be used.

Divider Mode Off:
Pulse On/Off ratio is degraded by 10 dB from 2.0 to 3.2 GHz in Standard Pulse (UNU). Option UNW is not affected.

ALC Performance

The ALC bandwidth is limited to 100 Hz in divider mode. Operation with ALC off is not recommended.

Ramp Sweep

Ramp Sweep is unavailable with Divider Mode On.

Operation

E8257D Option HAR requires firmware revision ≥ C.04.94.

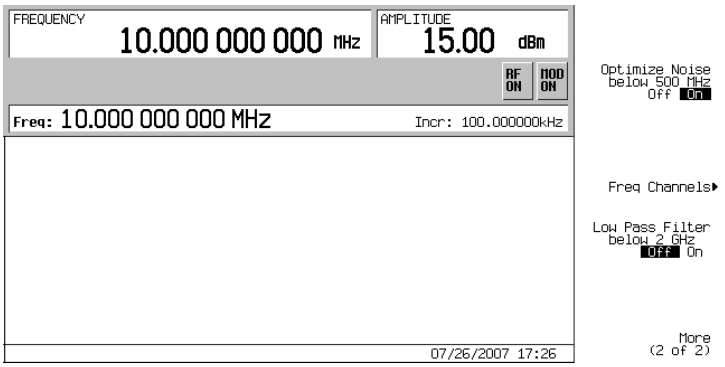
To turn on the frequency divider circuitry (Divider Mode) select **[Frequency]** > **MORE (1 of 3)** > **MORE (2 of 3)** > **Optimize noise below 500 MHz** > toggle **On** or **Off**. The normal preset state is Off.

The SCPI command is as follows:

[:SOURce]: LFDivider ON|OFF|1|0

[:SOURce]: LFDivider?

Figure 2 Frequency Divider Circuitry



E8257D Option HAR Using the E5500 Phase Noise Measurement Subsystem

The E5500 software currently does not recognize Option HAR. To improve reference phase noise when using your E8257D Option HAR with the E5500, manually turn the Divider Mode On (refer to Operation), when the “Agilent E5500 Instrument Connections” window appears.

Service

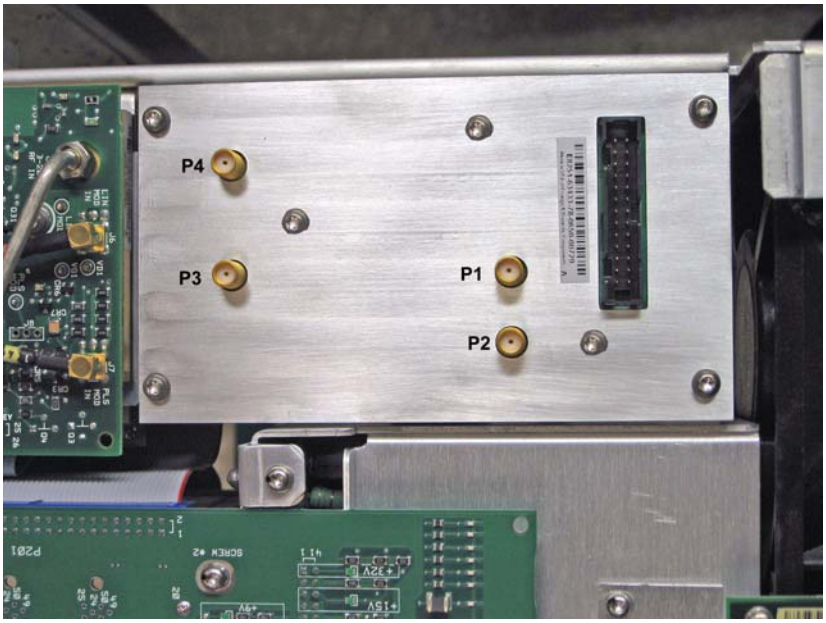
Troubleshooting

1. Before troubleshooting E8257D Option HAR, verify that the standard instrument is operating properly with the Divider Mode Off. If not, troubleshoot in Standard Mode.
2. For the instrument to operate properly with the Option HAR circuitry installed (Divider Mode On or Off), licenses are needed for the following options:
   - Option HAR
   - Option 1EH
3. If the Phase Noise in Divider Mode is does not meet specification (refer to "Performance Test" on page 11), replace the Divider Assembly.
4. Measure the losses through Option HAR in Standard Mode (Divider Mode Off).

Table 9 Divider Assembly

Assembly	Path	Frequency	Loss
Divider Assembly E8251-60433	P1 to P2	250 MHz to 3.2 GHz	≤ 3 dB
Divider Assembly E8251-60433	P4 to P3	250 MHz to 3.2 GHz	≤ 3 dB

Figure 3 Divider Assembly with Connectors Labeled



5. If there is excessive loss in one path, replace the Divider Assembly.
6. If there is excessive loss in both paths, remove the ribbon cable from the Divider Assembly and measure the following voltages at the end of the ribbon cable.

Pin	Voltage
23	> 14.5
24	≤ –4.5
25	> 8
26	≤ –14.5

7. If any of the voltages are wrong, measure the same voltages on the Lowband Filter Assembly (J6).
   a. If the voltage at pin 25 is incorrect, measure the voltage on the motherboard at P142, pin 7.
      1. If the voltage at P142, pin 7 is < 8 volts, replace the Motherboard.
      2. If the Motherboard is working properly, replace the Lowband Filter Assembly.
   b. If the voltage on the Lowband Filter Assembly (J6) pin 23, 24 or 26 is incorrect.
      1. Replace the Lowband Filter Assembly.
      2. If the Lowband Filter Assembly is working properly, replace the ribbon cable from the Lowband Filter Assembly to the Divider Assembly.
8. Set the instrument frequency to 1 MHz, Output power to maximum and RF On.
9. With all other cables connected, make the following measurements on the Divider Assembly with a spectrum analyzer.

	P2		P3	
Divider Mode	On	Off	On	Off
Frequency	256 MHz	999 MHz	1 MHz	1 MHz
Amplitude	–35 dBm	+9 dBm	+12 dBm	+11 dBm

10. If the frequencies at connector P2 are incorrect.
    a. Troubleshoot the standard synthesizer system.
11. If the amplitude at connector P2 is incorrect.
    a. Replace the Divider Assembly.
12. If the frequencies or amplitude at connector P3 are incorrect.
    a. Replace the Divider Assembly.

Replaceable Parts

Table 10 Replaceable Parts

Description	Agilent Part Number
Option 1EH Board	E8251-60595
Div Board	E8251-60433
Ribbon Cable	E8251-60594
Cable (Frac-N to Div)	E8251-20394
Cable (Div to Lowband filter)	E8251-20395
Cable (Lowband Out to Div)	E8251-20396
Cable (Div to Lowband filter)	E8251-20397

- If the mother board is changed, it must be replaced with an E8251-60441 or later.
- If the modulation filter (5087-7061) is changed, reuse the thermal pad.
- If the synthesizer assembly (E8251-60328) is replaced, refer to "Appendix" on page 19 to modify the self test limits.

Performance Test

Table 11 Performance Test Equipment

Instrument	Critical Specifications (for this test)	Recommended Model
Phase Noise System	Sensitivity	E5504B Option 001

Setting up the E5500 Software

Step 1. If necessary, install the E5500 revision A.03.03 (or later) software.

Step 2. Open the E5500 Software User Interface.

Step 3. Select **System** > **Asset Manager**.

Step 4. Verify that the Agilent E8257D is listed under Source. If not, double-click Source and click **Next**.

Step 5. In the list of **Sources**, select **Agilent E8257D** and click **Next**.

Step 6. In the **Interface** drop-down menu, select **GPIB**.

Step 7. In the **Address** field, enter the GPIB address of the E8257D. Example, 19.

Step 8. Verify that the **Library** field identifies **Agilent Technologies VISA**.

Step 9. Click **Next** > **Finish**.

Step 10. In the list of **Sources**, select **Agilent E8257D**.

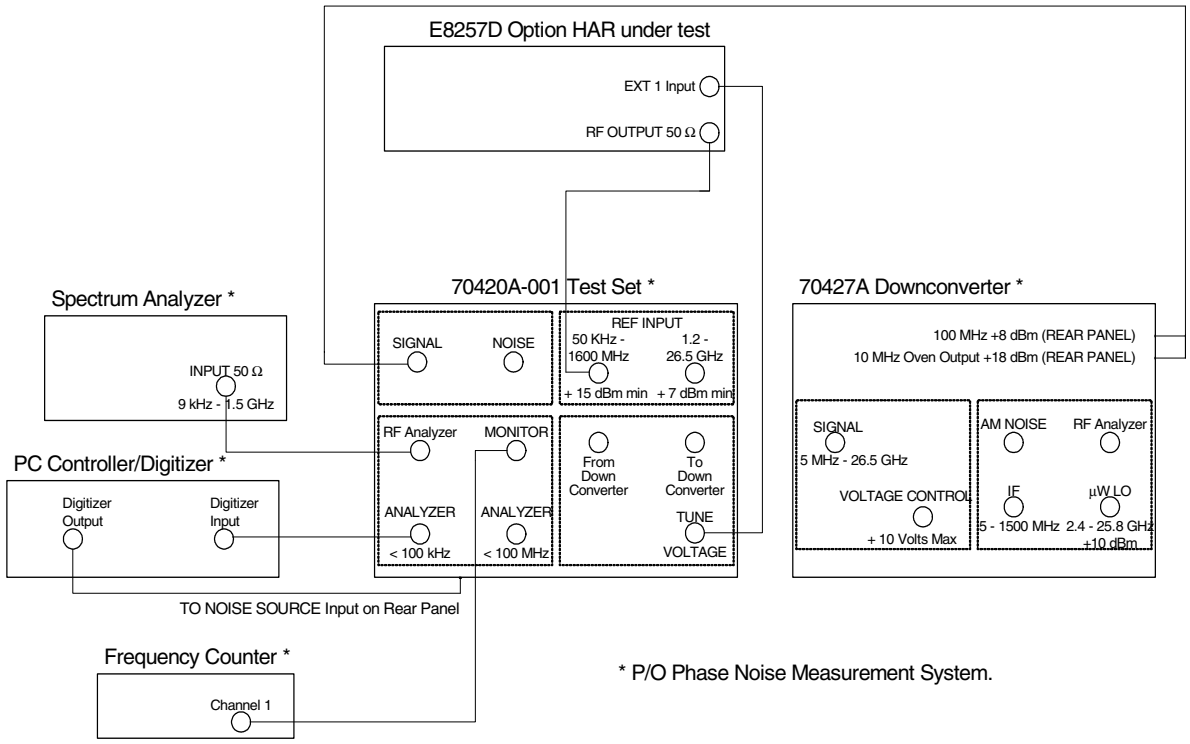
Step 11. Select the icon with the green check-mark. Verify that the connection to the selected asset has been completed. Press **OK**.

Step 12. Verify that the **Library** field identifies **Agilent Technologies VISA**.

Step 13. Close the **Asset Manager**.

Step 14. Verify that the Phase Noise System is connected as shown in Figure 4. The connections from the 70427A should not be made at this time. The user will be instructed to make the appropriate connections as part of the following Performance Test procedure.

Figure 4 Test Setup Block Diagram



10 MHz Phase Noise Test Limits

Table 12 Phase Noise Test Limits

10 MHz	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz
Noise Spec	–93	–120	–142	–152	–158	–158

10 MHz Test Procedure

Using the E5504B Phase Noise Measurement System.

Step 1. Select **Define** > **Limit Lines**.

Step 2. Enter the Noise Spec data (Table 12) in the **Upper Noise Limit** tab.

Step 3. Select **Define** > **Measurement**. Refer to Table 13.

Table 13 10 MHz Phase Noise System Setup

Parameter	Setting
Type and Range Tab:	
Measurement Type	Absolute Phase Noise (using a phase locked loop)
Start Offset Frequency	1 Hz
Stop Offset Frequency	2 MHz (2E+6)
FFT Averages	10
FFT Quality	High Resolution
Swept Quality	High Resolution
Source Tab:	
Carrier Source Connected	Test Set
Carrier Source Frequency	10 MHz (10E+6)
Carrier Source Power	+15 dBm
Detector Input Frequency	No entry needed
Reference Source Power	16 dBm
VCO Tune Constant	0.1 ppm x Carrier 0.1 ppm x 10 MHz = 1 Hz/Volt
VCO Tune Range	±5 Volts
VCO Input Resistance	600 Ohms
Cal Tab:	
Measure Phase Detector Constant	Measure Phase Detector Constant
Calculate VCO Tune Constant	Measure VCO Tune Constant
Verify calculated phase lock loop suppression	Check
If Limit is exceeded	Use Theoretical Value
Block Diagram Tab:	
Carrier Source	Manual
Downconverter	None
Reference Source	Agilent E8257D
Phase Detector Mode	Automatic Detector Selection
Test Set Tune Voltage Destination	Reference Source
VCO Tune Mode	DC FM
Test Set Tab:	
Input Attenuation	0 dB
LNA Low Pass Filter	Auto
LNA Gain	Auto Gain
PLL Integrator Attenuation	0 dB
Downconverter Tab:	
Input Attenuation	Auto
IF Gain	Auto
Microwave/Millimeter Band	Microwave (0 to 26.5 GHz)
Reference Chain Reference	10 MHz
Graph Tab:	
Title	10 MHz Agilent E8257D SNxxxxxxxx

Table 13 10 MHz Phase Noise System Setup

Parameter	Setting
Graph Type	Single-sideband Phase Noise (dBc/Hz)
X Scale Minimum	1 Hz
X Scale Maximum	100E+6
Y Scale Maximum	0
Y Scale Minimum	–170
Normalize Trace Data to	1 Hz Bandwidth

Making the 10 MHz Measurement

Step 1. In the Measure drop-down menu verify that the Pause at Connect Diagram is selected. If not, select it.

Step 2. In the **Measure** drop-down menu select **New Measurement**.

Step 3. Select **Yes** in the **Do you want to perform a new Calibration and Measurement?** dialog box. The **Agilent E5500 Instrument Connections** window will appear.

Step 4. On the 70427A rear panel, remove the jumper from the 105 MHz Oven Out to 10 MHz In. Refer to Figure 4 on page 13.

Step 5. Connect the 10 MHz Oven Out on the 70427A rear panel to the Signal Input on the 70420A.

Step 6. Turn On the Divider Mode. Refer to “Operation” on page 8.

Step 7. Select **Continue** and allow Phase Noise Measurement to complete.

Step 8. Compare the estimated mean value of the trace with the noise specification line (lower line). If the estimated mean value of the trace falls on or below the specification line, the LNSG is regarded as having met the noise specification.

Step 9. Print the E5500 Phase Noise Plot.

Step 10. Connect the jumper that was removed in Step 4.

100 MHz Phase Noise Test Limits

Table 14 Phase Noise Test Limits

100 MHz	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz
Noise Spec	–73	–100	–122	–140	–145	–145

100 MHz Test Procedure

Using the E5504B Phase Noise Measurement System.

Step 1. Select **Define** > **Limit Lines**.

Step 2. Enter the Noise Spec data (Table 14) under the **Upper Noise Limit** tab.

Step 3. Select **Define** > **Measurement**. Refer to Table 15.

Table 15 100 MHz Phase Noise System Setup

Parameter	Setting[1]
Type and Range Tab:	
Measurement Type	Absolute Phase Noise (using a phase locked loop)
Start Offset Frequency	1 Hz
Stop Offset Frequency	**20 MHz (20E+6)**
FFT Averages	10
FFT Quality	High Resolution
Swept Quality	High Resolution
Source Tab:	
Carrier Source Connected	Test Set
Carrier Source Frequency	**100 MHz (100E+6)**
Carrier Source Power	+15 dBm
Detector Input Frequency	No entry needed
Reference Source Power	16 dBm
VCO Tune Constant	0.1 ppm x Carrier 0.1 ppm x **100 MHz = 10 Hz/Volt**
VCO Tune Range	±5 Volts
VCO Input Resistance	600 Ohms
Cal Tab:	
Measure Phase Detector Constant	Measure Phase Detector Constant
Calculate VCO Tune Constant	Measure VCO Tune Constant
Verify calculated phase lock loop suppression	Check
If Limit is exceeded	Use Theoretical Value
Block Diagram Tab:	
Carrier Source	Manual
Downconverter	None
Reference Source	Agilent E8257D
Phase Detector Mode	Automatic Detector Selection
Test Set Tune Voltage Destination	Reference Source
VCO Tune Mode	DC FM
Test Set Tab:	
Input Attenuation	0 dB
LNA Low Pass Filter	Auto
LNA Gain	Auto Gain
PLL Integrator Attenuation	0 dB
Downconverter Tab:	
Input Attenuation	Auto
IF Gain	Auto
Microwave/Millimeter Band	Microwave (0 to 26.5 GHz)
Reference Chain Reference	10 MHz
Graph Tab:	

Table 15 100 MHz Phase Noise System Setup

Parameter	Setting[1]
Title	**100 MHz** Agilent E8257D SNxxxxxxxx
Graph Type	Single-sideband Phase Noise (dBc/Hz)
X Scale Minimum	1 Hz
X Scale Maximum	100E+6
Y Scale Maximum	0
Y Scale Minimum	–170
Normalize Trace Data to	1 Hz Bandwidth

1.Delta settings are indicated with a bold font.

Making the 100 MHz Measurement

Step 1. In the Measure drop-down menu verify that the Pause at Connect Diagram is checked. If not, select it.

Step 2. In the **Measure** drop-down menu select **New Measurement**.

Step 3. Select **Yes** in the **Do you want to perform a new Calibration and Measurement?** dialog box. The **Agilent E5500 Instrument Connections** window will appear.

Step 4. Connect the 100 MHz +8 dBm Output on the 70427A rear panel to the Signal Input on the 70420A. Refer to Figure 4 on page 13.

Step 5. Turn On the Divider Mode. Refer to “Operation” on page 8.

Step 6. Select **Continue** and allow Phase Noise Measurement to complete.

Step 7. Compare the estimated mean value of the trace with the noise specification line (lower line). If the estimated mean value of the trace falls on or below the specification line, the LNSG is regarded as having met the noise specification.

Step 8. Print the E5500 Phase Noise Plot.

Appendix

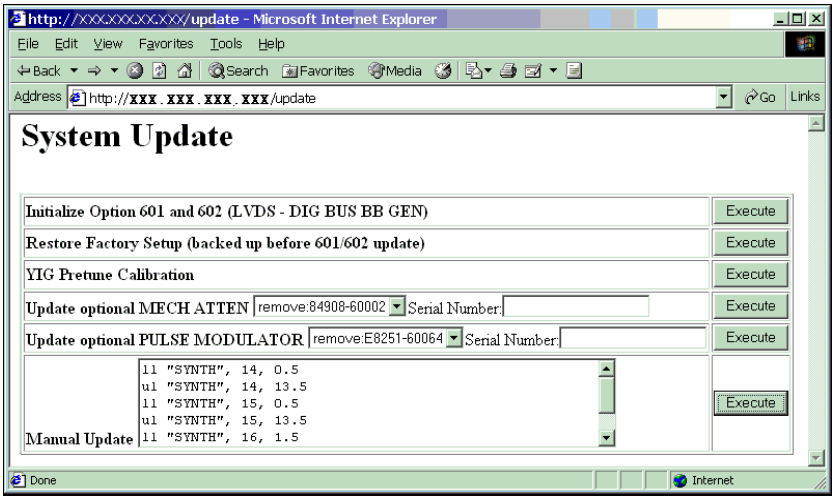
Modifying Synthesizer Self Test Limits

This procedure allows you to modify the synthesizer A6 Frac N self test limits for test 704, after replacing the A6 Frac N assembly. (Firmware versions C.04.70 and later).

Open a browser window and type the IP address of the instrument, followed by '/update' as shown: http://xxx.xxx.xxx.xxx/update.

1. Enter the following text in the "Manual Update" form as shown below.

```
ll "SYNTH", 14, 0.5
ul "SYNTH", 14, 13.5
ll "SYNTH", 15, 0.5
ul "SYNTH", 15, 13.5
ll "SYNTH", 16, 1.5
ul "SYNTH", 16, 13.5
ky 53004
```



2. Press **Execute** (next to the manual update form). When the update is complete "Operation Completed" will be displayed.
3. Cycle the power on the instrument.

If you need to revert to the standard self test limits, use the following sequence:

```
ll "SYNTH", 14, 1.5
ul "SYNTH", 14, 13.5
ll "SYNTH", 15, 3.0
ul "SYNTH", 15, 13.5
ll "SYNTH", 16, 2.0
ul "SYNTH", 16, 13.5
ky 51873
```

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.

Cleaning the Instrument

WARNING **To prevent electrical shock, disconnect the Agilent Technologies E8257D Option HAR 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.**

Connector Care and Cleaning

Cleaning connectors with alcohol shall only be done with the instrument power cord removed, and in a well ventilated area. Allow all residue alcohol moisture to evaporate and the fumes to dissipate 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.**

Use isopropyl alcohol with adequate ventilation and avoid contact with eyes, skin, and clothing. It causes skin irritation, may cause eye damage, and is harmful if swallowed or inhaled. It may be harmful if absorbed through the skin. Wash thoroughly after handling.

In case of spill, soak up the sand or earth. Flush spill area with water. Dispose of isopropyl alcohol in accordance with all applicable federal, state, and local environmental regulations.

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 26.

Statement of Compliance

This instrument has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument 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 26. 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 FTZ Emissions Requirements

This product complies with the German FTZ 526/527 Radiated Emissions and Conducted Emission requirements.

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

General Safety Considerations

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 instrument, will make the instrument dangerous. Intentional interruption is prohibited.**

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.

Cautions applicable to this instrument.

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 Second Edition and 664 respectively.

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.

Servicing

Warnings applicable to this instrument.

WARNING	**To prevent electrical shock, disconnect the Agilent Technologies E8257D Option HAR from the 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	**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.**

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.**

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.**

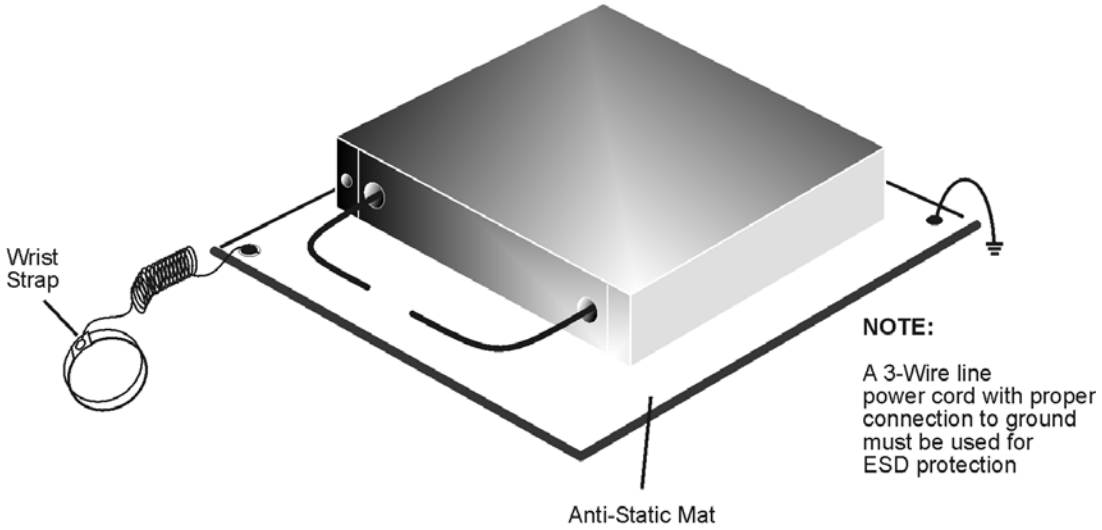
Electrostatic Discharge Protection

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 MΩ 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 5 ESD Protection Setup



Regulatory Information

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 instruction 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 Canadian Standards Association. This instrument complies with Canada: CSA 22.2 No. 000000061010-1, Second Edition.

ISM1-A

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

ICES/NMB-001

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



Direct Current.



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.

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.