

Agilent Technologies N5261A and N5262A

User's and Service Guide

Millimeter Head Controller

Use this manual with the following documents:

- PNA-X Series Network Analyzer On-line Help System
- Technical Overview 5989-7620EN
- OML Millimeter-wave Modules (N5256-90001)
- VDI Millimeter-wave Modules (N5256-90002)
(not on the web, only shipped with VDI Modules)
- N5250A PNA Series Microwave Network Analyzer
System (N5250-90001)



Agilent Technologies

Manufacturing Part Number: N5262-90001

Printed in USA: November 2010

Supersede: November 2009

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

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

Definitions

- *Specifications* describe the performance of parameters covered by the product warranty (temperature –0 to 55 °C, unless otherwise noted.)
- *Typical* describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.
- *Nominal* values indicate expected performance or describe product performance that is useful in the application of the product, but is not covered by the product warranty.
- *Characteristic Performance* describes performance parameter that the product is expected to meet before it leaves the factory, but is not verified in the field and is not covered by the product warranty. A characteristic includes the same guard bands as a specification.

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N5261A and N5262A

Introduction

This document describes the N5261A and N5262A Millimeter Head Controller features and options, as well as connections to the N5242A, N5244A, N5245A and N5247A PNA-X and banded millimeter-wave modules or combiners for a millimeter-wave network analyzer. For further millimeter-wave network analyzer information, refer to Technical Overview 5989-7620EN.

Typical System Configurations

Figure 1 4-Port, Broadband Millimeter-wave System

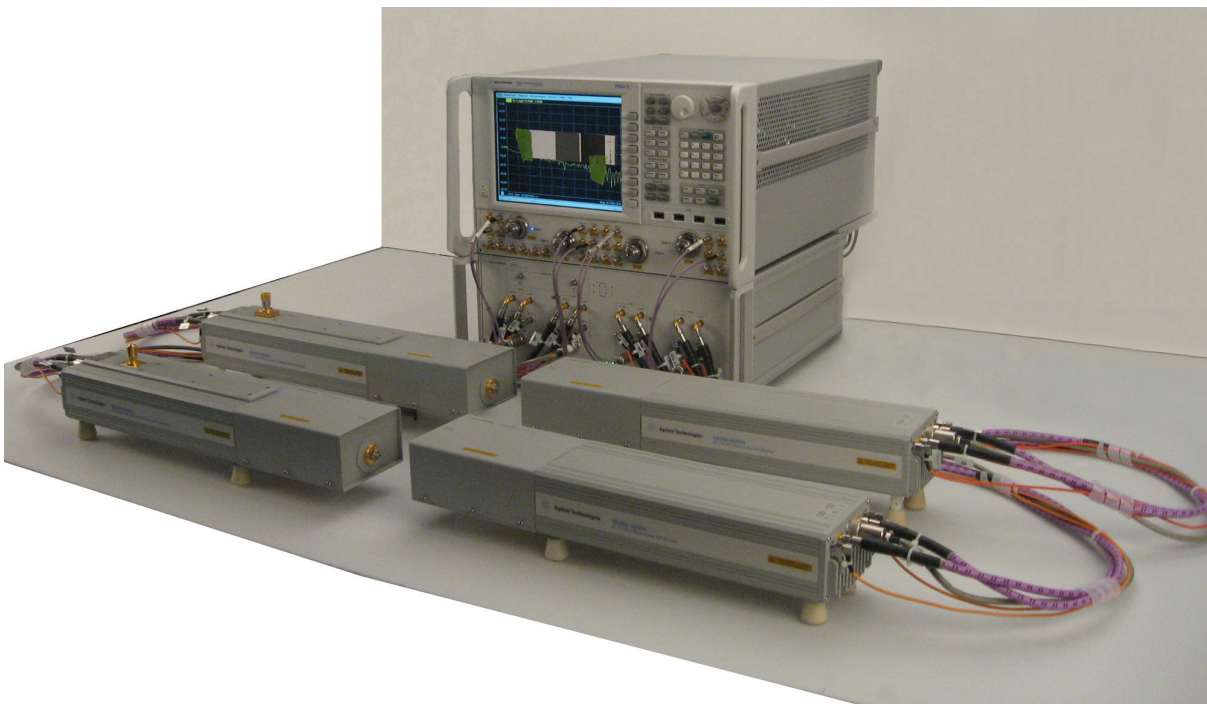


Figure 2 2-Port Banded Millimeter-wave Configuration (N5261A)

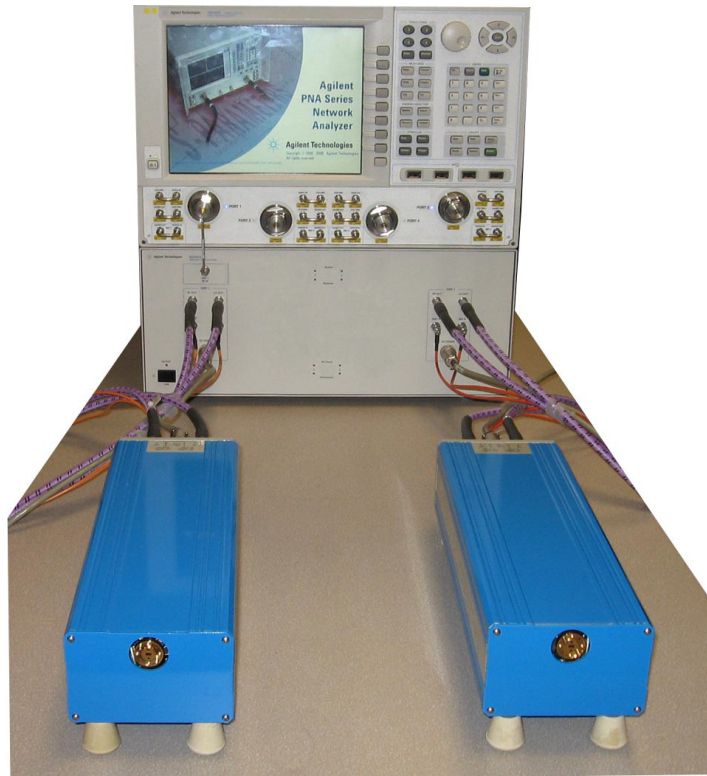


Figure 3 4-Port Banded Millimeter-wave Configuration (N5262A)



Description

The N5261/62A Millimeter Head Controller, when configured with a PNA-X and banded millimeter-wave modules, provides all of the features and functions of a millimeter-wave vector network analyzer with the frequency range of the modules used.

The N5261/62A provides the interface between the millimeter-wave modules and will be referred to throughout this document as the Test Set. The N5242A, N5244A, N5245A and N5247A will be referred to as the PNA-X.

A 10 MHz to 110 GHz broadband, single sweep, single connection (1.0 mm coaxial connector) network analyzer can be configured with the N5247A, N5250CX10 and Test Set for a full-band millimeter-wave network analyzer with 1 to 4 ports. Bias-tees and RF attenuators are available as options within the N5250CX10 modules. Refer to [Table 6 on page 13](#).

The millimeter head controller amplifies and routes the RF and LO signals to the millimeter-wave modules, and returns the downconverted reference and test IF signals to the PNA-X for processing and display. The N5261/62A Millimeter Head Controller also supplies the +12 VDC power to each millimeter-wave module. Refer to the [Figure 41](#) through [Figure 44](#) beginning on [Page 58](#).

If your network analyzer has Option 224 or 423 the N5261/62A can be configured in a system that allows the network analyzer's test ports to be used for measurements.

A typical banded system configuration is illustrated in [Figure 2](#) and [Figure 3](#), a 4-Port broadband 10 MHz to 110 GHz system is illustrated in [Figure 1](#).

Network Analyzer Requirements

The PNA-X requires the following option combinations for proper operation with the N5261/62A Millimeter Head Controller.

- PNA-X firmware revision:
 - N5242A ≥ A.08.20.04
 - N5244/45A ≥ A.08.60.07
 - N5247A ≥ A.09.30.05

Visit our 5 for firmware revision and downloads.
<http://na.tm.agilent.com/pna/firmware/firmware.htm>

- The PNA-X, requires Option 020.
- The PNA-X with Option 200, 219 or 224, requires Options 550, or 551 for a 4-Port system.
- The PNA-X Option 224 or 423, enables the user to configure the system using SRC 1 (J11 or RF1) and SRC 2 (J8 or RF2) rear panel outputs.

Available Test Set Options

PNA-X Cable Options

- Option 102 - Cable Set 2-Port N5242A to Test Set
- Option 104 - Cable Set 4-Port N5242A to Test Set
- Option 106 - 2.4 mm Cable Set for 2-Port N5244/45A to the Test Set
- Option 108 - 2.4 mm Cable Set for 4-Port N5244/45A to the Test Set
- Option 112 - 1.85 mm Cable Set for 2-Port N5247A to the Test Set
- Option 114 - 1.85 mm Cable Set for 4-Port N5247A to the Test Set

Mounting Kits

- U3021S Option 042 - Lock Link Kit to secure N5242A to the Test Set
- U3021S Option 045 - Lock Link Kit to secure N5244/45/47A to the Test Set
- Option 1CM - Rackmount Kit (5063-9215)
- Option 1CN - Front Handle Kit (5063-9228)
- Option 1CP - Rackmount with Front Handle Kit (5063-9222)

Cable Options for OML Millimeter-wave Modules

To order individual cables from the following sets contact [“Agilent Support, Services, and Assistance”](#) on page 79.

- Option 501 - 1-Port Transmission/Reflection Millimeter Module Cable Set (48 in, 1.22 m)
- Option 502 - 1-Port Transmission/Reflection Millimeter Module Cable Set (79 in, 2 m)
- Option 503 - 1-Port Transmission/Reflection Millimeter Module Cable Set (118 in, 3 m)
- Option 505 - 1-Port Transmission/Reflection Millimeter Module Cable Set (197 in, 5 m)

NOTE Each VDI module is shipped with 48 inch cables. No other cables length are available.

Verifying Your Shipment

Each N5261/62A Millimeter Head Controller product includes:

- The N5261/62A Millimeter Head Controller.
- Option specific interconnection cables and adapters. Refer [Table 1 on page 7](#). The PNA-X and Millimeter-wave modules must be ordered separately.
- The N5261/62A Millimeter Head Controller User's Guide (the document you are now reading). This document provides system connection and basic operation information, using an N5261/62A Millimeter Head Controller with banded millimeter-wave modules.

WARNING **The N5261/62A Millimeter Head Controller and the millimeter-wave modules are sensitive to electrostatic discharge (ESD). Ground your work station before unpacking and installing the millimeter-wave modules. See [“Electrostatic Discharge Protection” on page 78](#).**

To verify the contents shipped with your product, refer to the “Box Content List” included with the shipment. For a list of option components, refer to [Table 1, “N5261/62A Option List,” on page 7](#).

Inspect the shipping container. If the container or packing material is damaged, it should be kept until the contents of the shipment have been checked mechanically and electrically. If there is physical damage refer to [“Contacting Agilent” on page 79](#). Keep the damaged shipping materials (if any) for inspection by the carrier and an Agilent Technologies representative.

Option List Information

Use the table below to verify the your specific option shipment is complete.

Table 1 N5261/62A Option List

✓	Agilent Part Number	Qty	Description
	N5261A or N5262A	1	Millimeter Head Controller
	8120-6818	1	Test Set Interface Cable (W7)
	1810-0118	1	50 Ohm Load Termination (N5261A)
	1810-0118	2	50 Ohm Load Termination (N5262A)
	9230-0333	1	Envelope (Calibration Certificate)
	9320-6636	1	Functional Certificate
	N5262-90001	1	User's and Service Guide
	Option 1CM (Rackmount Kit)		
	5063-9251	1	Rackmount Kit
	Option 1CN (Rackmount Kit)		
	5063-9228	1	Front Handle Kit
	Option 1CP (Rackmount Kit)		
	5063-9222	1	Rackmount Kit with Front Handle Kit
	Option 501 (1-Port Millimeter Module Cable Set (48 inches = 1.2 meter))		
	8121-1221	2	RF 3.5 mm cable (RF Input and LO Input)
	85105-60030	1	Cable Assembly, DC Power (Bias)
	85105-60033	2	IF Cable Assembly (REF IF and TEST IF)
	N5260-60043	1	Wire Marker Kit
	Option 502 (1-Port Millimeter Module Cable Set (79 inches = 2 meter))		
	N5260-60023	2	RF 3.5 mm cable (RF Input and LO Input)
	N5260-60024	2	IF Cable Assembly (REF IF and TEST IF)
	N5260-60025	1	Cable Assembly, DC Power (Bias)
	N5260-60043	1	Wire Marker Kit
	Option 503 (1-Port Millimeter Module Cable Set (118 inches = 3 meter))		
	N5260-60026	2	RF 3.5 mm cable (RF Input and LO Input)
	N5260-60027	2	IF Cable Assembly (REF IF and TEST IF)
	N5260-60028	1	Cable Assembly, DC Power (Bias)
	N5260-60043	1	Wire Marker Kit

Table 1 N5261/62A Option List (Continued)

Option 505 (1-Port Millimeter Module Cable Set (197 inches = 5 meter))			
N5260-60029	2	RF 3.5 mm cable (RF Input and LO Input)	
N5260-60030	2	IF Cable Assembly (REF IF and TEST IF)	
N5260-60031	1	Cable Assembly, DC Power (Bias)	
N5260-60043	1	Wire Marker Kit	
U3021S Option 042 (Lock Link Kit to N5242A PNA-X to Test Set)			
5023-0132	1	Locking Feet Kit	
0515-2317	2	Screw	
N5242-20138	1	Right Foot	
N5242-20139	1	Left Foot	
U3021S Option 045 (Lock Link Kit to N5244/45/47A PNA-X to Test Set)			
5023-0132	1	Locking Feet Kit	
0515-2317	2	Screw	
N5245-20130	1	Right Foot	
N5245-20131	1	Left Foot	
N5261A Option 102 (Cable Set 2-Port PNA-X to Test Set)			
5061-9038	6	Rear Panel Cable Assembly W5, W8 (x5)	
N5262-20016	1	RF Cable, SRC 1 to 2-Port PNA-X, W3	
N5261A Option 104 (Cable Set 4-Port PNA-X to Test Set)			
5061-9038	6	Rear Panel Cable Assembly W5, W8 (x5)	
N5262-20018	1	RF Cable, SRC 1 to 4-Port PNA-X, W1	
N5261A Option 106 (2.4 mm Cable Set 2-Port PNA-X to Test Set)			
5061-9038	6	Rear Panel Cable Assembly W5, W8 (x5)	
N5262-20023	1	RF Cable, SRC1 to 2 Port PNA (W1)	
N4903-61250	1	Adapter, 2.4 mm male to APC-3.5 female	
N5261A Option 108 (2.4 mm Cable Set 4-Port PNA-X to Test Set)			
5061-9038	6	Cable Assembly W5, W8 (x5)	
N5262-20026	1	RF Cable, SRC1 to 4 Port PNA (W1)	
N4903-61250	1	Adapter, 2.4 mm male to APC-3.5 female	
N5261A Option 112 (1.85 mm Cable Set 2-Port PNA-X to N5247A)			
5061-9038	7	Cable Assembly W5 (x1), W8 (x6)	
N5262-20023	1	RF Cable, SRC1 to 2 Port PNA (W1)	
N5261A Option 114 (1.85 mm Cable Set 4-Port PNA-X to N5247A)			
5061-9038	8	Cable Assembly W5,W6 and W8 (x6)	
N5262-20026	1	RF Cable, SRC1 to 4 Port PNA (W1)	
N5262-20032	1	1.85 RF Cable - SRC1 to 4 Port PNA	

Table 1 N5261/62A Option List (Continued)

N5262A Option 102 (Cable Set 2-Port PNA-X to Test Set)			
5061-9038	7	Cable Assembly W5, W8 (x6)	
N5262-20016	1	RF Cable, SRC1 to 2-Port PNA-X (W3)	
N5262-20017	1	RF Cable, SRC2 to 2-Port PNA-X (W4)	
N5262-20020	1	RF Cable, SRC2 to 2-Port PNA-X (W9)	
N5262A Option 104 (Cable Set 4-Port PNA-X to Test Set)			
5061-9038	8	Cable Assembly W5, W6 and W8 (x6)	
N5262-20018	1	RF Cable, SRC1 to 4-Port PNA-X (W1)	
N5262-20019	1	RF Cable, SRC2 to 4-Port PNA-X (W2)	
N5262A Option 106 (2.4 mm Cable Set 2-Port PNA-X to Test Set)			
5061-9038	7	Cable Assembly W5, W8 (x6)	
N5262-20023	1	RF Cable, SRC1 to 2 Port PNA (W3)	
N5262-20024	1	RF Cable, SRC2 to 2 Port PNA (W4)	
N5262-20025	1	RF Cable, SRC2 to Std. 2 Port PNA (W9)	
N4903-61250	2	Adapter, 2.4 mm male to APC-3.5 female	
N5262A Option 108 (2.4 mm Cable Set 4-Port PNA-X to Test Set)			
5061-9038	8	Cable Assembly W5, W6 and W8 (x6)	
N5262-20026	1	RF Cable, SRC1 to 4 Port PNA (W1)	
N5262-20027	1	RF Cable, SRC2 to 4 Port PNA (W2)	
N4903-61250	2	Adapter, 2.4 mm male to APC-3.5 female	
N5262A Option 112 (1.85 mm Cable Set 2-Port PNA-X to N5247A)			
5061-9038	7	Cable Assembly W5 (x1), W8 (x6)	
N5262-20023	1	RF Cable, SRC1 to 2 Port PNA (W1)	
N5262-20024	1	RF Cable, SRC2 to 2 Port PNA (W4)	
N5262-20025	1	RF Cable, SRC2 to Std. 2 Port PNA (W9)	
N5262A Option 114 (1.85 mm Cable Set 4-Port PNA-X to N5247A)			
5061-9038	8	Cable Assembly W5, W6 and W8 (x6)	
N5262-20026	1	RF Cable, SRC1 to 4 Port PNA (W1)	
N5262-20027	1	RF Cable, SRC2 to 4 Port PNA (W2)	

Compatible Millimeter-wave Modules

Agilent offers millimeter modules manufactured by Olsen Microwave Labs (OML) and Virginia Diodes Inc (VDI) for use with the N5261/62A millimeter-wave module controllers for banded vector network analyzer systems. The compatible OML modules have VNA2 in the model number. Refer to [Table 2](#) through [Table 5](#).

Millimeter waveguide modules may be ordered with an adjustable RF attenuator, RF and LO Internal Amplifiers, or IF Amp Bypass Jumpers. OML modules and the N5260CX10 combiner require cable set options, refer to “[Cable Options for OML Millimeter-wave Modules](#)” on page 5.

The N5250CX10 combiner modules contain a Transmission/Reflection millimeter-wave module (67 to 110 GHz) and a combiner with a 1.0 mm coaxial connector to configure a broadband 10 MHz to 110 GHz vector network analyzer. Refer to [Table 6 on page 13](#).

Transmission/Reflection millimeter-wave modules contain an RF source multiplier, dual directional coupler, reference downconverter and a test downconverter. The Transmission/Reflection millimeter-wave module is usually the primary module of a millimeter-wave VNA system. A single Transmission/Reflection module allows the measurement of S11 reflection coefficient only.

T millimeter-wave modules are “receive only” modules that contain a test downconverter to receive the test signal from a Transmission/Reflection millimeter-wave module. The use of a Receiver module, as the second module, allows the system capability to measure S11 and S21 only.

T2 series is a “dual receive only” module that contain two test downconverters to receive test signals from two antennas, a power splitter or two Transmission/Reflection millimeter-wave modules.

The use of two Transmission/Reflection modules in the millimeter-wave VNA system allows for all four S-parameters to be measured. The test downconverters of Transmission/Reflection modules are the receivers for the signal from the modules sources. When the two modules waveguide are connected, S11 and S21 are measured in the forward direction, S22 and S12 are measured when the signal path is reversed. If a 4-Port system is configured with Transmission/Reflection modules, all 16 S-parameter measurements can be made on a 4-Port device.

NOTE	S12 requires a Transmission/Reflection module on Port 2, and a Receiver or Transmission/Reflection module on Port 1.
	S21 requires a Transmission/Reflection module on Port 1, and a Receiver or Transmission/Reflection module on Port 2.
	S34 requires a Transmission/Reflection module on Port 4, and a Receiver or Transmission/Reflection module on Port 3.
	S43 requires a Transmission/Reflection module on Port 3, and a Receiver or Transmission/Reflection module on Port 4.

Table 2 Transmission/Reflection Modules (OML, “T/R”)

Waveguide Modules	Frequency (GHz)	Waveguide Band
N5256AW02	325 to 500	WR-2.2
N5256AW03	220 to 325	WR-03
N5256AW05	140 to 220	WR-05
N5256AW06	110 to 170	WR-06
N5256AW08	90 to 140	WR-08
N5256AW10	75 to 110	WR-10
N5256AW12	60 to 90	WR-12
N5256AW15	50 to 75	WR-15
N5256AW22	33 to 50	WR-22
N5256AX10	67 to 110	WR-10
N5256AX12	56 to 94	WR-12

Table 3 Receiver Module (OML, “T”)

Waveguide Modules	Frequency (GHz)	Waveguide Band
N5257AR02	325 to 500	WR-2.2
N5257AR03	220 to 325	WR-03
N5257AR05	140 to 220	WR-05
N5257AR06	110 to 170	WR-06
N5257AR08	90 to 140	WR-08
N5257AR10	75 to 110	WR-10
N5257AR12	60 to 90	WR-12
N5257AR15	50 to 75	WR-15
N5257AR22	33 to 50	WR-22

Table 4 Dual Receiver Modules (OML, “T2”)

Waveguide Modules	Frequency (GHz)	Waveguide Band
N5258AD02	325 to 500	WR-2.2
N5258AD03	220 to 325	WR-03
N5258AD05	140 to 220	WR-05
N5258AD06	110 to 170	WR-06
N5258AD08	90 to 140	WR-08
N5258AD10	75 to 110	WR-10
N5258AD12	60 to 90	WR-12
N5258AD15	50 to 75	WR-15
N5258AD22	33 to 50	WR-22

Table 5 Transmission/Reflection Module and Options (VDI)

Model Number	Frequency (GHz)	Waveguide Band
N5262AW15-TST	50 to 75	WR-15
N5262AW10-TST	75 to 110	WR-10
N5262AW08-TST	90 to 140	WR-8.0
N5262AW06-TST	110 to 170	WR-6.0
N5262AW05-TST	140 to 220	WR-5.1
N5262AW03-TST	220 to 325	WR-3.4
N5262AW02-TST	325 to 500	WR-2.2
N5256AW01-TST	500 to 750	WR-1.5
N5262AW01-TST	750 to 950	WR-1.0

Table 6 N5250CX10 Modules and Combiner Options^{1, 2}

N5250CX10-L05: Left combiner assembly without adjustable attenuator, or bias tee.
N5250CX10-L10: Left combiner assembly with adjustable attenuator, no bias tee.
N5250CX10-L15: Left combiner assembly with bias tee, and no adjustable attenuator.
N5250CX10-L20: Left combiner assembly with adjustable attenuator, and bias tee.
N5250CX10-R10: Right combiner assembly, no bias tee and no adjustable attenuator.
N5250CX10-R15: Right combiner assembly with adjustable attenuator, and no bias tee.
N5250CX10-R20: Right combiner assembly, with bias tee and no adjustable attenuator.
N5250CX10-R30: Right combiner assembly with adjustable attenuator, and bias tee.

1. Includes 1.85 mm cable set (30 inch) for connecting the combiner to the PNA-X RCVR IN and SOURCE OUT.
2. To be used with non-banded systems.

Cable Loss and Input Power

It is recommended that you review the input requirements for the millimeter-wave module selected for use, and calculate the power needed. Refer to the documentation included with your module. To determine the power available at the end of the cable, calculate the cable loss using [Figure 4](#) or [Table 7](#), then subtract the cable loss from the RF and LO Out characteristic power of 10 dBm. You may also use a power meter.

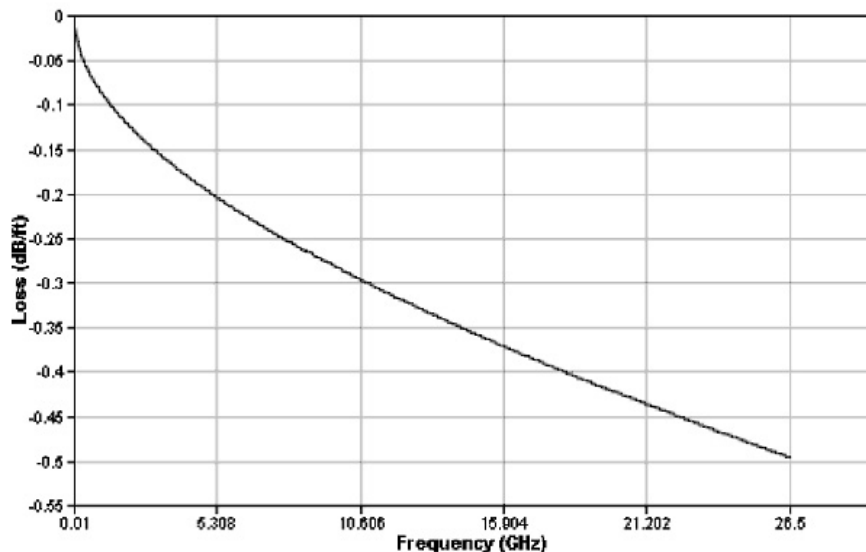
A separate DC supply is recommended if modules are greater than 5 meters from the controller. A DC bias power cable, with banana plug connectors, is available for use with a separate power supply such as E3615A for OML modules. VDI modules have a DC power supply included with the module.

If you are installing an external amplifier in the LO or RF path, ensure the amplifier's input is connected to the Test Set, and the output is connected to the millimeter-wave module's LO or RF Input. Modules with internal amplifiers are available.

Table 7 Cable Insertion Loss

Cable Option	Cable Length	7 GHz	10 GHz	18 GHz
501	4 ft. (1.22 m)	1 dB	1.2 dB	1.6 dB
502	6.58 ft. (2 m)	1.65 dB	2 dB	2.65 dB
503	9.83 ft. (3 m)	2.5 dB	3 dB	4 dB
505	16.4 ft. (5 m)	4.1 dB	5 dB	6.6 dB

Figure 4 RF Cable Loss (dB loss per foot)



Caring for Waveguide Standards and Flanges

Waveguide calibration standards and flanges should be kept clean and scratch free.

A clean surface at millimeter-wave frequencies is much more important than at lower frequencies because any debris on the waveguide surface can potentially distort the measurement results.

WARNING Use isopropyl alcohol only in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate, prior to assembling waveguide interfaces.

To remove dirt on the waveguide surface, place a few drops of isopropyl alcohol on a lint-free cloth and gently wipe the surface. To remove dust, spray the pressurized air on the waveguide surface. It is important the aperture is clear of any debris.

- Isopropyl alcohol 99.5% (Agilent p/n 8500-5344)
- Lint-free cloth or tissue (Agilent p/n 9300-0001)
- Pressurized air, for dust removal. (Agilent p/n 8500-6251)

CAUTION Ensure the standards are not damaged when you are making the connections. When connecting the standards, avoid scratching the surface of the shims. It is best to position the Null or Offset $\frac{1}{4}$ Shim onto the guide posts of the waveguide flange first, and then insert the guide pins. If you are using the guide pins, insert them into the Short or Load first, and then carefully install it onto the waveguide flange. Guide pins are not required when using a short.

Specifications

Specifications for the N5261A or N5262A Millimeter Head Controller are intended as information to confirm operation and use of the Millimeter Head Controller in a system.

Table 8 N5261/62A Characteristics

Front/Rear Panel Connector ¹	Power	Gain	Frequency Range
RF OUT Minimum ²	+10 dBm	12 to 35 dB	7.5 to 19 GHz
RF OUT Maximum ²	+13 dBm		
LO OUT Minimum ²	+10 dBm	12 to 35 dB	8 to 19 GHz
LO OUT Maximum ²	+13 dBm		
TEST IF Typical	-27 dBm	n/a	1 to 20 MHz
TEST IF Maximum ^{3, 7}	-10 dBm		
REF IF Typical	-27 dBm	n/a	1 to 20 MHz
REF IF Maximum ^{3, 7}	-10 dBm		
LO IN Minimum	-10 dBm		8 to 19 GHz
LO IN Maximum ⁷	+2 dBm		
TEST IF to A-D IF OUT ⁴	n/a	0 dB (± 2 dB)	1 to 20 MHz
REF IF to A-D IF OUT ⁵	n/a	0 dB (± 2 dB)	1 to 20 MHz
REF IF to R IF OUT ⁴	n/a	0 dB (± 2 dB)	1 to 20 MHz
SRC 1 RF IN Minimum ⁶	0 dBm	n/a	7.5 to 19 GHz
SRC 1 RF IN Maximum ⁷	+15 dBm		
SRC 2 RF IN Minimum ⁶	0 dBm	n/a	7.5 to 19 GHz
SRC 2 RF IN Maximum ⁷	+15 dBm		

1. All connectors are SMA.
2. Gain is 12 to 35 dB, ALC range > 40 dB.
3. -10 dBm is full scale to PNA-X IF Input.
4. Gain, relative to the TEST IF power level.
5. Gain, relative to the REF IF power level.
6. -10 dBm RF Input is the minimum for +8 dBm RF Output.
7. Do not exceed the maximum level or damage may occur.

Environmental Requirements

Refer to the N5242A, N5244A, N5245A or N5247A User's Guides for environmental specifications.

NOTE Samples of this product have been type-tested in accordance with the Agilent Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation and end-use; those stresses include but are not limited to temperature, humidity, shock, vibration, altitude and power-line conditions. Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

Environmental Tests

The N5261/62A complies with all applicable safety and regulatory requirements for the intended location of use and have been evaluated to assure that they are consistent with Agilent quality and reliability goals.

Heating and Cooling in the Operating Environment

Install air conditioning and heating, if necessary, to maintain the ambient temperature within the appropriate range specified for your instrument.

Required Conditions for Accuracy Enhanced Measurement

Accuracy-enhanced (error-corrected) measurements require the ambient temperature of the N5261/62A to be maintained within ± 1 °C of the ambient temperature at calibration.

The instrument can safely operate in a relative humidity of 80% for temperatures to 31 degrees C, decreasing linearly to 50% relative humidity at 40 degrees C.

CAUTION This product is designed for use in Installation Category II and Pollution Degree 2.

Instrument Weight and Dimensions

Table 9 illustrate the maximum weight and dimensions of the system components.

WARNING The network analyzer is heavy. It is recommended that two individuals, or a mechanical lift be used to lift or transport the instrument.

Table 9 Weight and Dimensions

Model	Weight	Height	Width	Depth
N5261A Millimeter Head Controller	10 kg (22 lb)	18 cm (7.1 in)	42.5 cm (16.75 in)	42.5 cm (16.75 in)
N5262A Millimeter Head Controller	11 kg (24.2 lb)	18 cm (7.1 in)	42.5 cm (16.75 in)	42.5 cm (16.75 in)

Front Panel Features

Figure 5 N5261A (2-Port) Front Panel Features

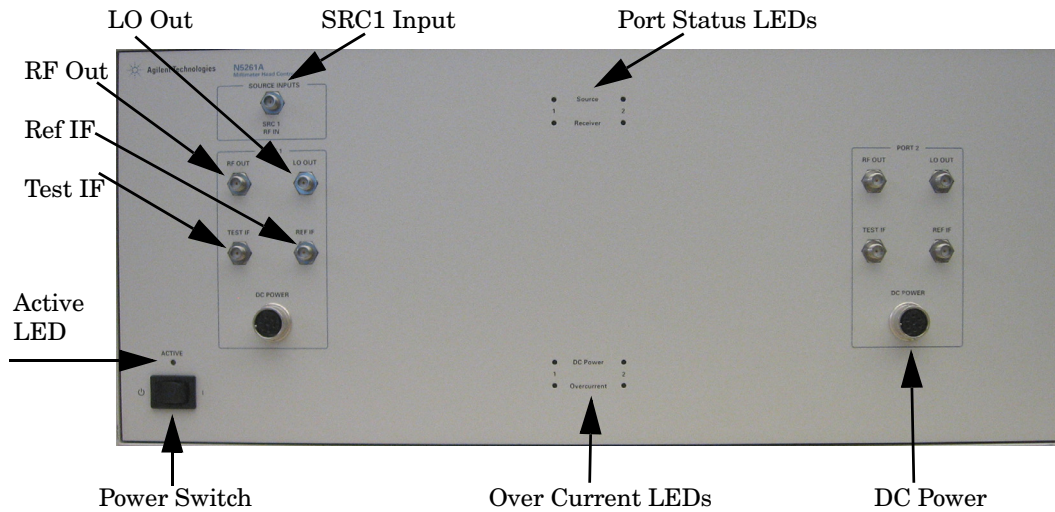
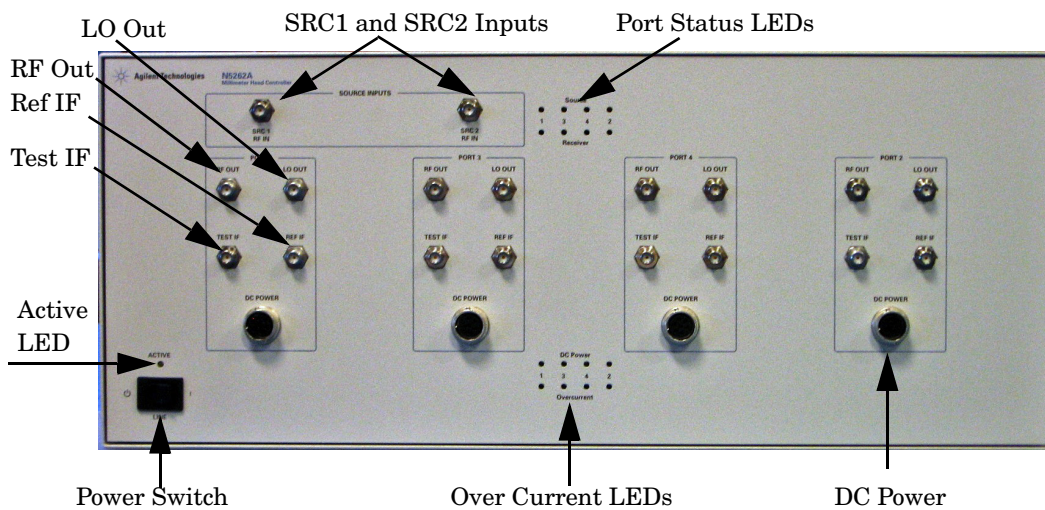


Figure 6 N5262A (4-Port) Front Panel Features



TEST IF

IF signal input connection from the millimeter module.

REF IF

Reference IF signal input connection from the millimeter module.

RF OUT

Provides an amplified RF source signal to the millimeter-wave module.

LO OUT

Provides amplified LO signal to the millimeter-wave module.

SRC1 and SRC2

Connects to the front panel PNA-X Test Ports.

Port Status LEDs

The amber LEDs indicate which source port is active. The green LEDs indicate which receiver port is active.


DC Power (Bias)

This bias supplies the +12 VDC and ground lines to the millimeter-wave modules. Pins 1 and 3 are both +12 VDC supplies. Pins 4 and 6 are the dc supply ground lines. Pins 2, 5, and 7 are unused.

DC Power/Over Current LEDs

The green LEDs indicate that the DC power bias is on. The amber LEDs indicate an over current condition.

Power Switch

-  – Standby
- | – ON (Active LED On)

This switch turns the Test Set on and off.

Active LED

- The LED is *On* when the Test Set power switch is on and addressed by a PNA-X.
- The LED is *Off* when the Test Set power switch is in Standby, or not addressed by a PNA-X.

NOTE The SRC2 Input and Ports 3 and 4 features are not present on the N5261A. Refer to [Figure 2 on page 3](#).

Rear Panel Features

Figure 7 N5261A Rear Panel Features

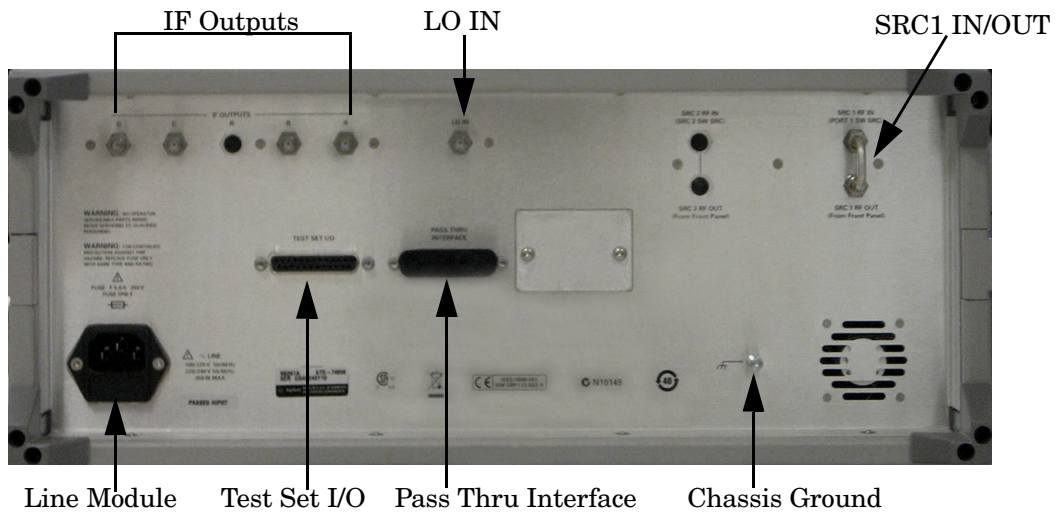
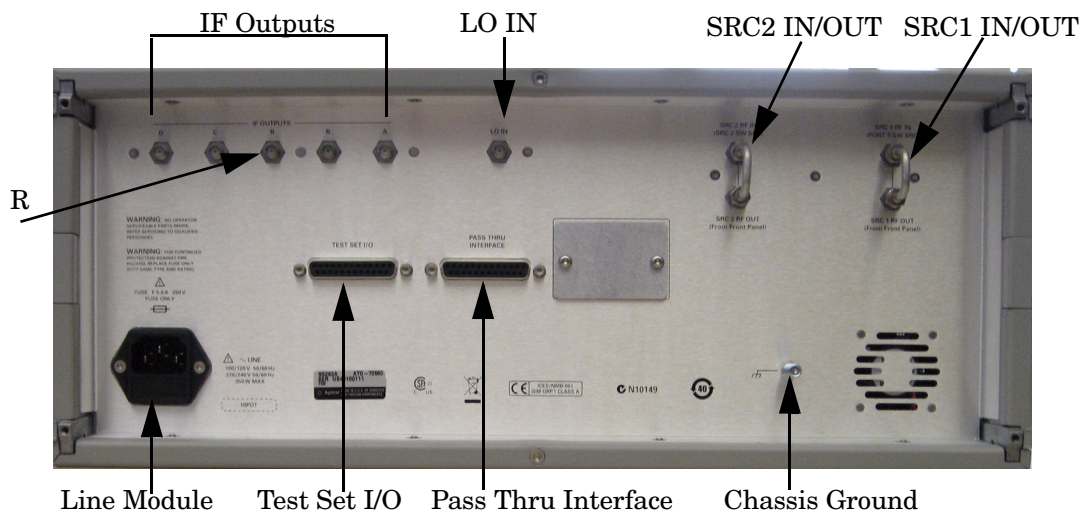


Figure 8 N5262A Rear Panel Features



IF OUTPUTs – 3.5 mm (female)

- **D** (from the Test Set to the PNA-X IF D Input)
- **C** (from the Test Set to the PNA-X IF C Input)
- **R** (from the Test Set to the PNA-X IF R Input, not installed in the N5261A)
- **A** (from the Test Set to the PNA-X IF A Input)
- **B** (from the Test Set to the PNA-X IF B Input)

LO IN

This input is from the LO drive of the PNA-X. The signal is split and amplified and then output to the front panel of the N5261/62A.

SRC 2 RF IN and SRC 2 RF OUT (Not installed in the N5261A)

Rear panel RF Input access for use with the PNA-X Option 224 or 423. SRC 2 provides the power input for RF OUT Ports 3 & 4.

SRC 1 RF IN and SRC 1 RF OUT

Test Set rear panel RF Input access for use with the PNA-X Option 224 or 423. SRC 1 provides the power input for RF OUT Ports 1 & 2.

Chassis Ground

A threaded terminal post for connecting the Test Set to a conductive object, cabinet or structure to ensure a common potential and reduce leakage current in a system. Requires an English 1/4-20 thread nut (2950-0004) and lock washer (2190-0067).

Pass Through Interface

Connection to another Test Set.

Test Set I/O

The Test Set Interface connector is used to send address and data to the Test Set from the PNA-X.

Line Module

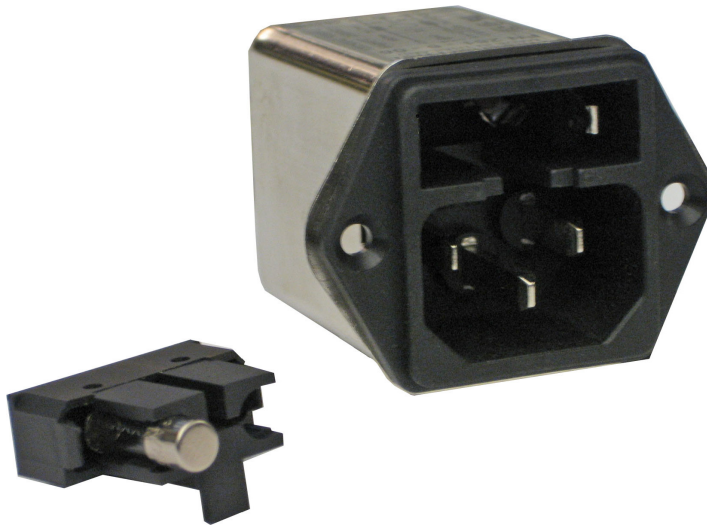
This assembly houses the line cord connection, line fuse, and line voltage selector. Remove the line module cover to replace or change the fuse. Line voltage selection is automatic and no setting is required. Recommended fuse values are printed on the rear panel of the N5261/62A.

Available Fuses

- Fuse (F 5 A/250V, 2110-0709) UL listed and CSA certified.

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.

Figure 9 Line Fuse



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

System Configuration and Operation

Site Preparation

Protect Against Electrostatic Discharge (ESD)

This is important. If not properly protected electrostatic discharge can seriously damage your analyzer, resulting in costly repair.

CAUTION To reduce the chance of electrostatic discharge, follow all of the recommendations outlined in [“Electrostatic Discharge Protection” on page 78](#).

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

Power Requirements

Before installing the PNA-X and N5261/62A, be sure that the required AC power is available at all necessary locations.

- 100/120/220/240 V (50/60 Hz)
- The instruments can operate with mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.
- Three-wire power cables (which provide a safety ground) must be used with all instruments.
- Air-conditioning equipment (or other motor-operated equipment) should not be placed on the same ac line that powers the system.
- The table below lists the maximum VA ratings and BTU/hour ratings for all instruments in the configuration. This table can be used to determine both the electrical requirements and the air conditioning requirements of the system.

Table 10 Power Requirements of a Standard Configuration

Standard Equipment	
Instrument	Maximum Watt
N5242A	450
N5244A or N5245A	450
N5247A	450
N5261/62A Millimeter Head Controller	350
Millimeter-wave modules	(powered from controller)

System Setup with N5242A, N5244A, N5245A or N5247A

Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. 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. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

WARNING This is a Safety Class 1 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.

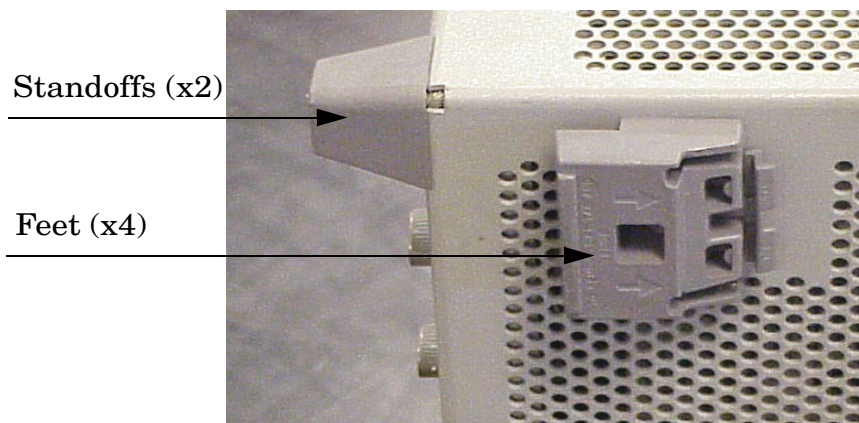
WARNING The network analyzer is heavy. It is recommended that two individuals, or a mechanical lift be used to lift or transport the instrument.

Preparing the N5242/44/45/47A Network Analyzer

The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.

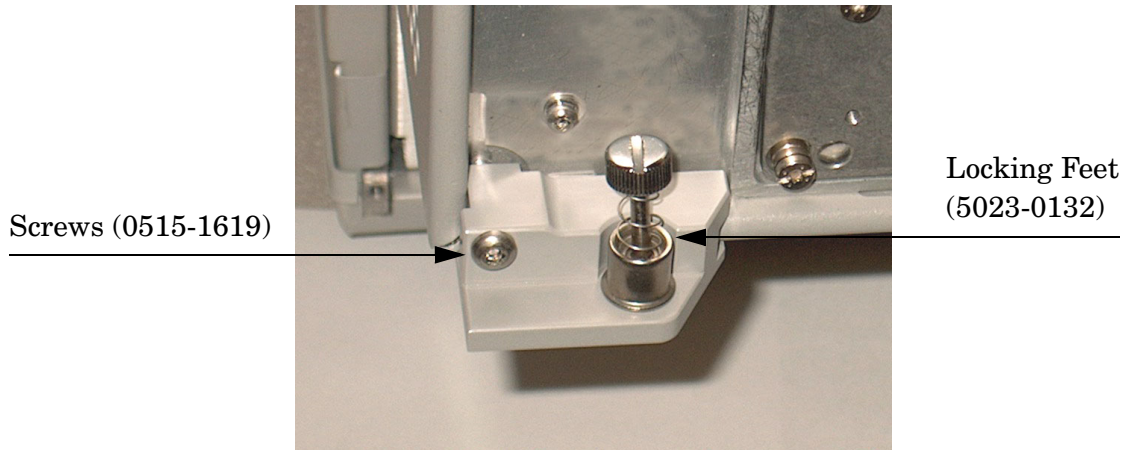
1. Remove the feet from the bottom of the network analyzer. Refer to [Figure 10](#).
2. Remove the 2 lower standoffs and screws (0515-1619) from the rear panel on the network analyzer.

Figure 10 Rear Bottom Feet



3. Install the two rear locking feet (5023-0132) onto the PNA-X, using the included screws (0515-1619), where the standoffs were removed.

Figure 11 Install Locking Feet on N5242/44/45/47A



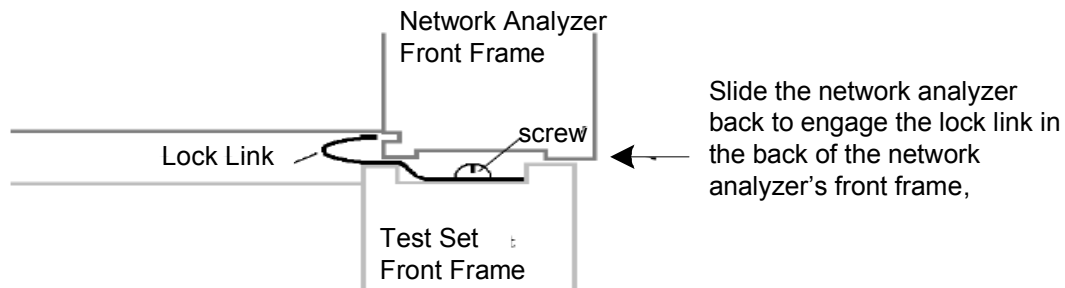
4. Install the two rear locking feet onto the N5261/62A, using two screws (0515-2317) included in shipment. Looking at the front panel, the N5242-20138 is the right foot and the N5242-20139 is the left foot for use with the N5242A. The N5245-20130 is the right foot and the N5245-20131 is the left foot for use with the N5244/45/47A.

Figure 12 Install Locking Feet on N5261/62A



5. Place the network analyzer on top of the Test Set and ensure that the front frame of the network analyzer is positioned slightly forward of the locks that are attached to the Test Set. Slide the network analyzer back so the locks engage the front frame of the analyzer.

Figure 13 Locking the Analyzer



6. Secure the network analyzer's lower locking feet to the Test Set upper locking feet, using the spring-loaded screws on the locking feet. Refer to [Figure 14 on page 27](#). If the network analyzer's lower locking feet are not aligned with the screw holes in the Test Set's upper locking feet, loosen the screws securing the feet to the instrument slightly to align and tighten.

Figure 14 Locking Feet Screws**NOTE**

There are two Lock-Foot kits available. Refer to [“Mounting Kits” on page 5](#) and [“Contacting Agilent” on page 79](#) for ordering information.

- PNA-X – 5023-0132 (Kit includes locking feet and screws)
- Test Set – N5242-20138 is the right foot and N5242-20139 is the left foot for use with N5242A. N5245-20130 is the right foot and N5245-20131 is the left foot for use with N5244A/45/47A.
- Screw – 0515-2317 (rear feet to the Test Set)

PNA-X and Test Set Front Panel Connections

This procedure connects the Test Set to a PNA-X. If your PNA-X has Options 224 or 423 front panel connections are optional. The connectors listed in [Table 8](#) must be torqued to 57 N-cm (5 in-lb).

CAUTION Turn *off* the power to the system when connecting or disconnecting cabling or damage can occur.

1. Connect the front panel interconnect cables from the PNA-X to the N5261/62A Millimeter Head Controller. The rear panel jumper (SCR1 and SCR2) must be installed if you are using a front panel SRC cable (W1 - W4, W9). Refer to [Table 1 on page 7](#) for your specific option cable part numbers. Refer to [Figure 15](#), [Figure 16](#) and [Figure 17](#).

Figure 15 N5261A Front Panel Cabling

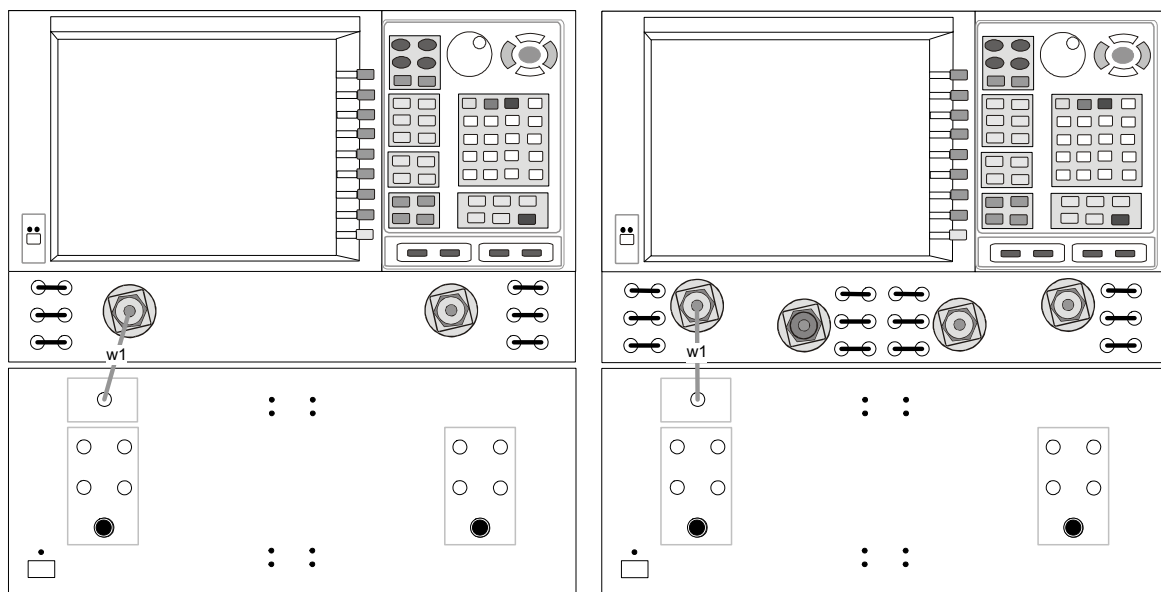


Figure 16 N5262A Front Panel Cabling

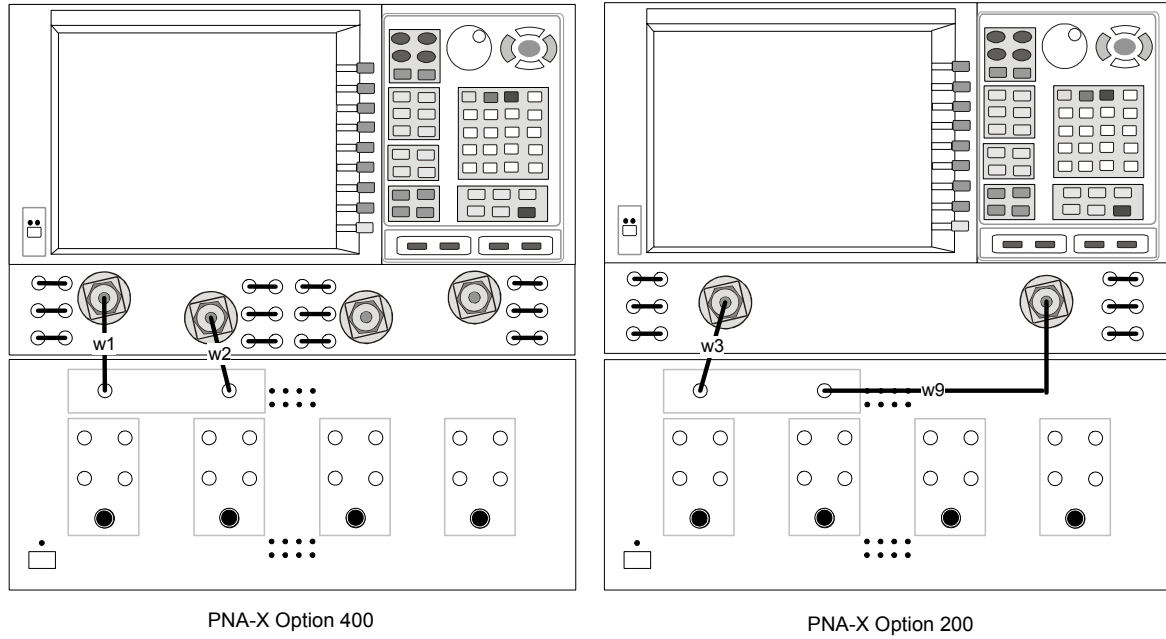
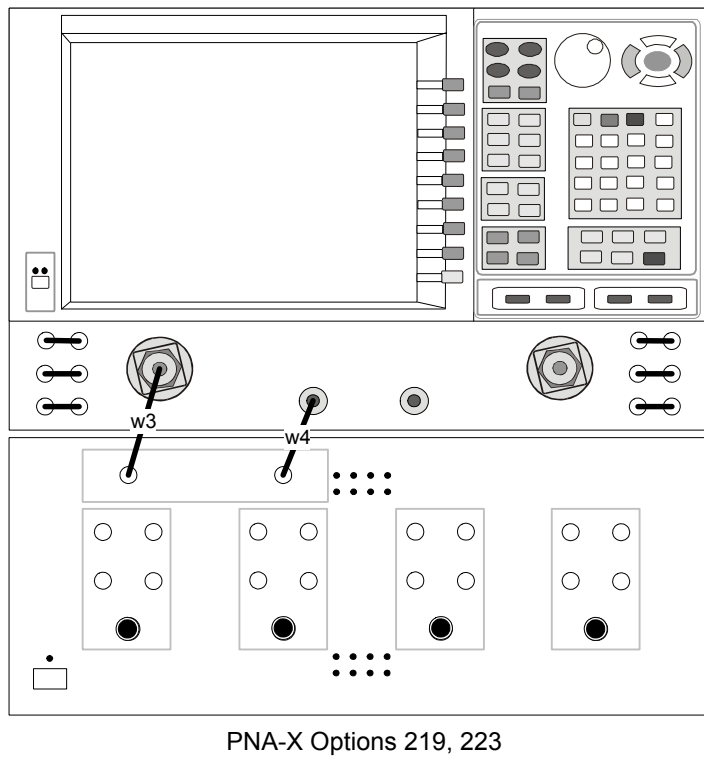


Figure 17 N5262A System RF Cables (PNA-X Options 219 & 223)



PNA-X and Test Set Rear Panel Connections

The connectors listed in [Table 11](#) must be torqued to 57 N-cm (5 in-lb).

1. Connect the PNA-X rear panel IF INPUTS to the Test Set IF OUTPUTs (D, C, R, B and A), using cables (W8, 5061-9038). Refer to [Figure 18](#), “N5242/44/45A 2-Port Rear Panel Cabling,” [Figure 19](#), “N5242/44/45A 4-Port Rear Panel Cabling,” and [Figure 20](#), “N5247A Rear Panel Cabling.”
2. Connect the Test Set LO IN to the PNA-X LO OUT (J5), using cable (W8, 5061-9038).
3. Connect the cable (W7, 8120-6818) from the PNA-X Test Set I/O to the N5261/62A Millimeter Head Controller Test Set I/O.

NOTE If you are using the N5261/62A SRC 1 or SRC 2 front panel cable connections, ensure that the jumpers (E8356-20072) are installed on the rear panel.

4. If you are using a PNA-X with Options 224 or 423 remove one jumper on the N5261A SRC 1, or two jumpers on the N5262A SRC 1 and SRC 2 RF IN (E8356-20072).
5. Connect cable (W5, 5061-9038) on the N5261A, and cables (W5, W6, 5061-9038) on the N5262A. Adapters (N4903-61250) are required on the N5244A and N5245A. Refer to [Table 11](#).

Table 11 Cable SRC 1 and SRC 2 Connections

Test Set	N5242A	N5244/45A ¹	N5247A
SRC 1	J11	J11	RF1
SRC2	J8	J8	RF2

1. Requires a 2.4 mm male to 3.5 mm female adapter.

Figure 18 N5242/44/45A 2-Port Rear Panel Cabling

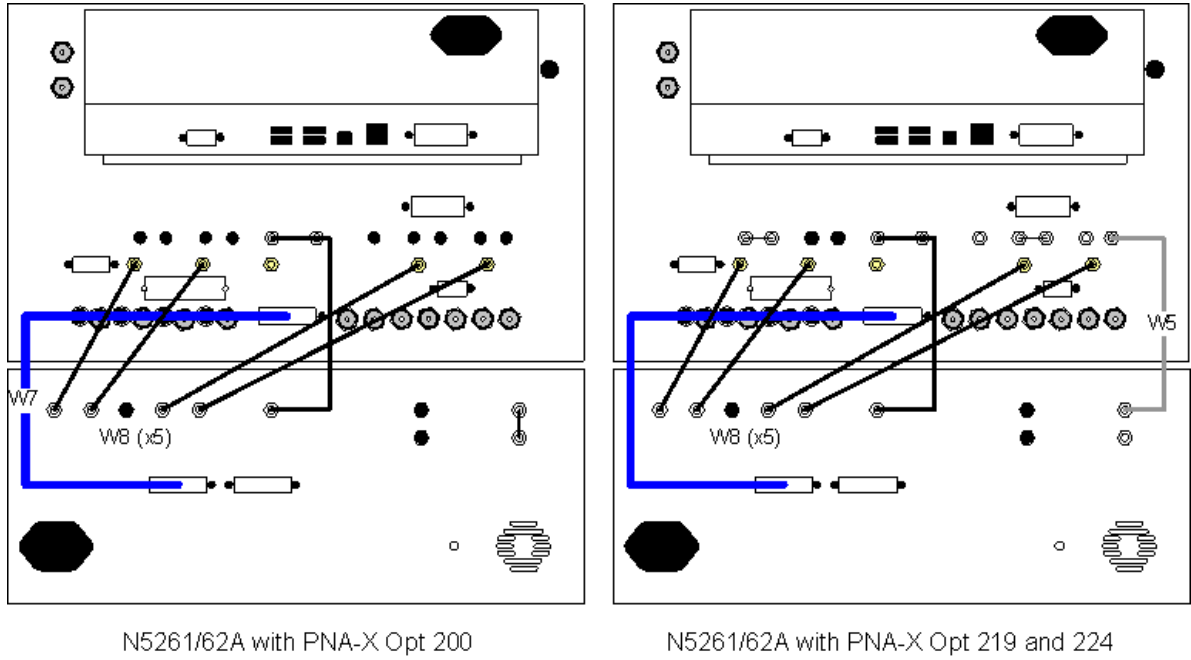


Figure 19 N5242/44/45A 4-Port Rear Panel Cabling

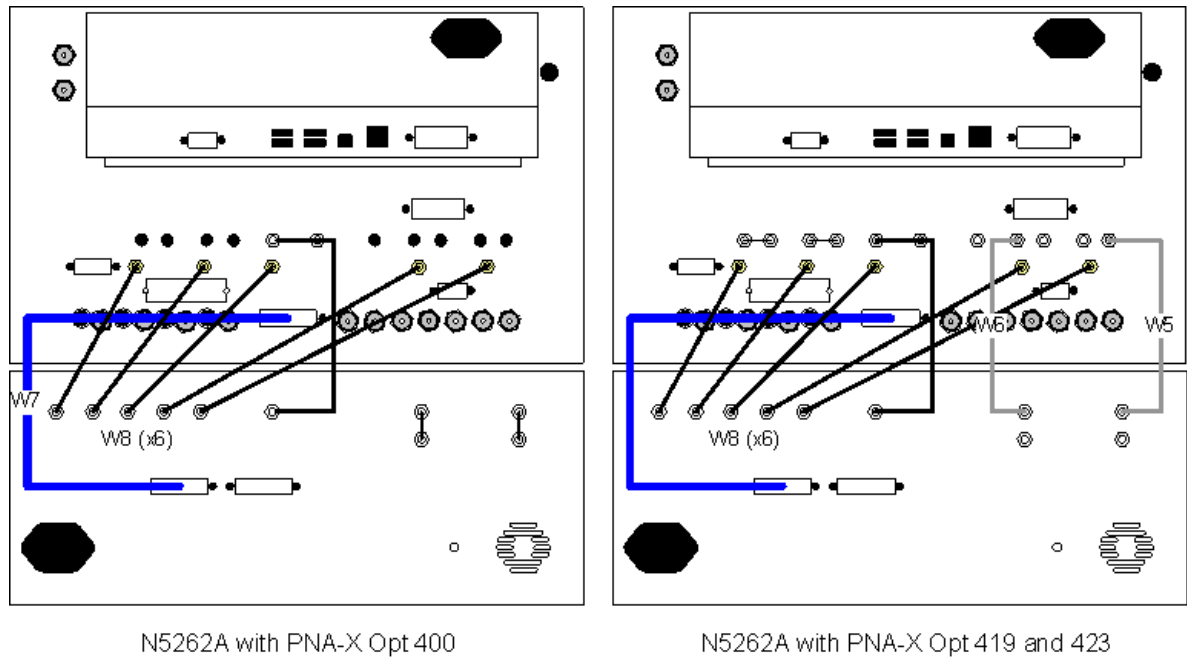


Figure 20 N5247A Rear Panel Cabling

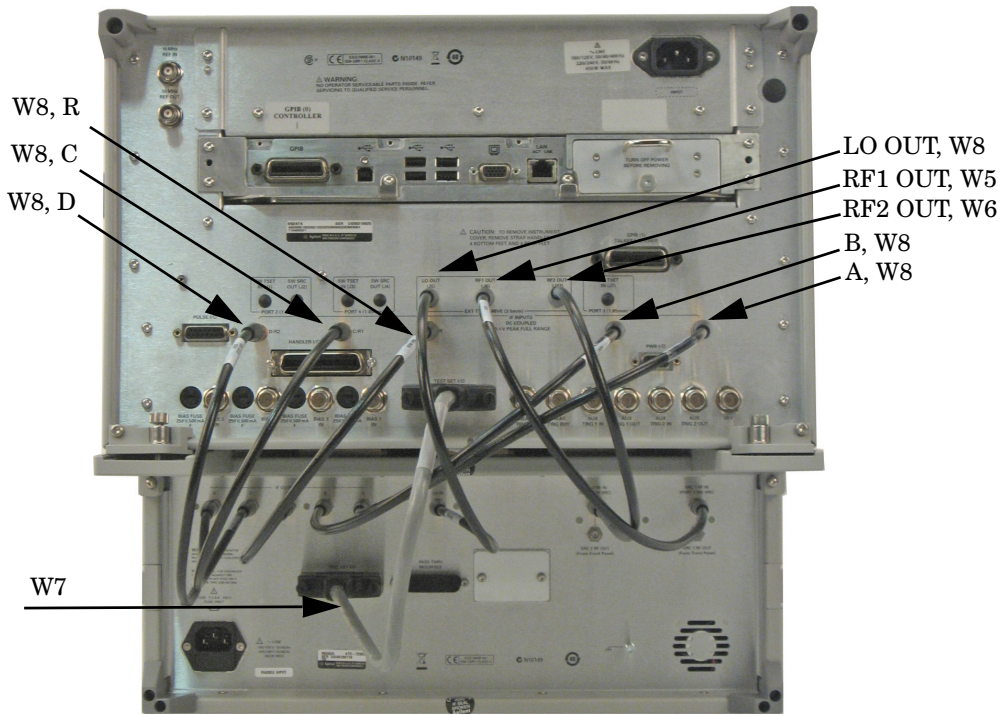
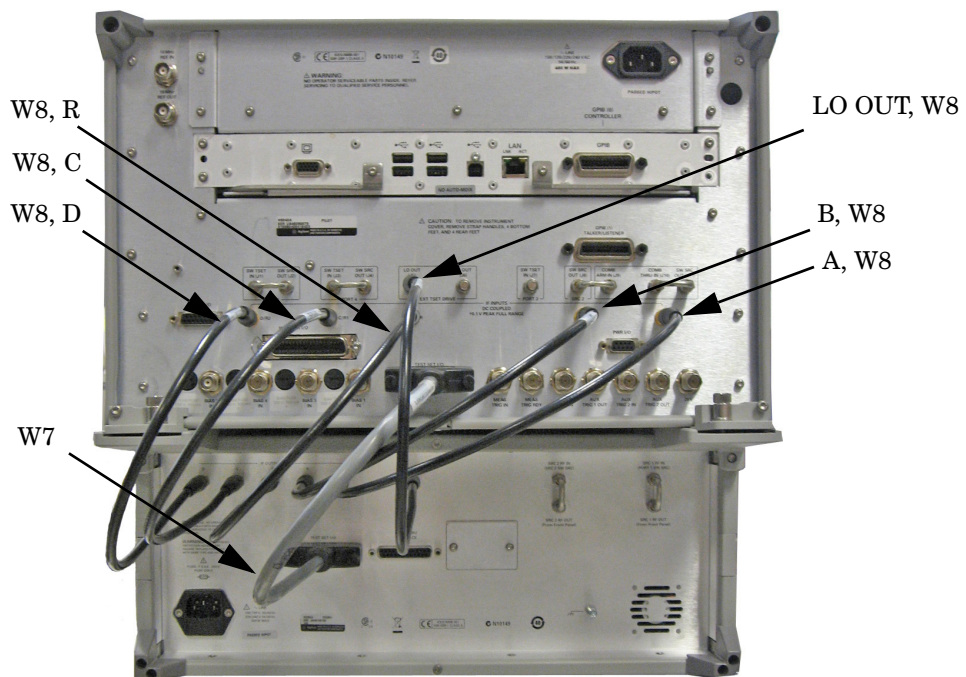


Figure 21 N5242/44/45A Rear Panel Cabling



Millimeter-wave Module Connections

1. Install the front panel interconnections between the N5261/62A Millimeter Head Controller and the modules as shown in [Figure 23 on page 34](#). Refer to [Table 1 on page 7](#) for your specific option cable part numbers. Continue with [step 2](#) if you are using N5247A with a combiner module.

If a millimeter-wave module is not installed on a port, a 50 Ohm termination (1810-0118) must be installed on the N5261A or N5262A LO OUT connector.

CAUTION Turn *off* the N5261/62A power when connecting or disconnecting the millimeter-wave module or damage can occur.

Attach the cables in the numeric sequence.

Table 12 Millimeter Head Connections

Sequence	From: Millimeter Head	To: N5261A or N5262A
Transmission/Reflection Millimeter Head Connections		
1	DC Power; +12V @ 1.5A (Bias)	DC Power ¹
2	RF INPUT	RF Out ²
3	LO INPUT	LO Out ²
4	REF IF	REF IF
5	Test IF or MEAS IF	TEST IF
Receiver Millimeter Head Connections		
1	DC Power; +12V @ 1.5A (Bias)	DC Power
2	LO INPUT	LO Out ²
3	Test IF or MEAS IF	TEST IF
Dual Receiver Millimeter Head Connections		
1	DC Power; +12V @ 1.5A (Bias)	DC Power
2	LO INPUT	LO Out ²
3	Test IF or MEAS IF	TEST IF
4	Test IF or MEAS IF	TEST IF

1. A separate DC supply is recommended, such as E3615A, if modules are greater than 5 meters from the controller. A DC power cable with a banana plug connector (N5260-60042) is available for use with OML modules. VDI millimeter modules include a required separate power supply.
2. Option 505 or 503 cable sets require external amplifiers, due to the RF insertion loss of the LO and RF signals into the module. Refer to [“Compatible Millimeter-wave Modules” on page 10](#).

Figure 22 OML Module Connections

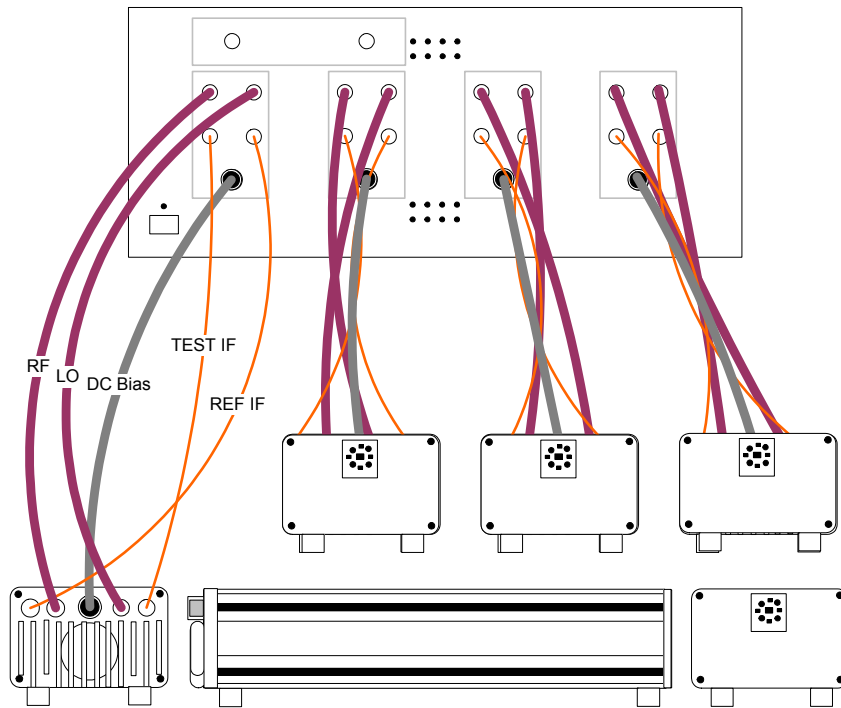
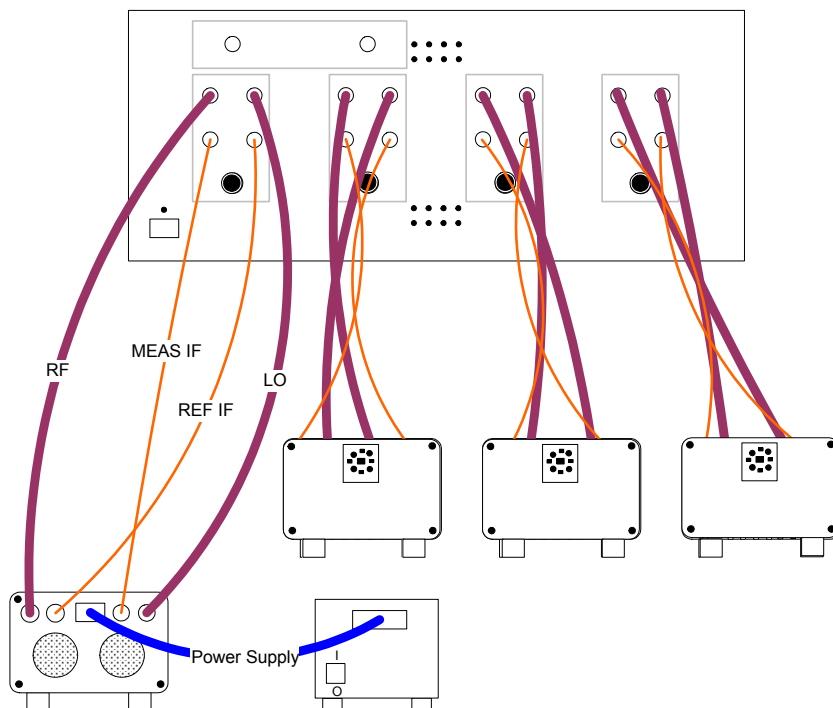


Figure 23 VDI Module



N5250CX10 Combiner Module Connections

Up to four combiners can be installed. On a 4-Port system the left combiners are installed on ports 1 & 3 and the right combiners are installed on ports 2 & 4. On a 2-Port system the left combiner is installed on Port 1, and the right combiner is installed on Port 2. Begin on [Page 33, step 1](#).

2. On the N5247A front panel remove the two jumpers (N5247-20107) from CPLR ARM to RCVR IN and SOURCE OUT to CPLR THRU on the ports you are using.
3. Install a 1.85 mm coaxial cable (8121-1233) on the N5247A RCVR IN to the modules RCVR IN. Refer to [Table 13](#) and [Figure 25 on page 37](#).
4. Install a 1.85 mm coaxial cable (8121-1233) on the N5247A SOURCE OUT to the modules RF IN. Refer to [Table 13](#) and [Figure 25 on page 37](#).
5. Repeat [step 3](#) and [step 4](#) for each module installed.
6. If you are using a 4156C connect the following cables to a N5250CX10 module with bias-tee. Refer to the SMU documentation by visiting us on the web at: <http://agilent.com>, type *modular SMU series* in the search field.
 - a. Three Cascade Triax to a sub-mini-triax cable (104-330-LC). These are used to connect the bias-tee connectors on the N5250CX10 combiner module.
 - b. Three Trompeter Triax Barrels (BJ78). These are used to connect the Cascade cables to the Agilent cables.
 - c. Two 24 inch Agilent Triax to Triax cables (16294A). These are used to connect the SMU's FORCE and SENSE connections to the Triax barrel through the N5250CX10 sub-mini-triax cables.
 - d. One Agilent Triax to Triax cable (16293H). These are used for the GNDU connection from the SMU to the N5250CX10.

NOTE Only one GNDU connection is needed in a multiple port system, therefore modules 2, 3 and 4 will only need a quantity of two for [step a](#) and [step b](#). No Triax cable is required in [step d](#), modules 2, 3 and 4.

Table 13 Front Panel Cable Connections

PNA-X	Combiner	Receiver
Port 1	Left	A
Port 2	Right	B
Port 3	Left	C
Port 4	Right	D

Figure 24 N5250CX10 Combiners

Left Test Heads

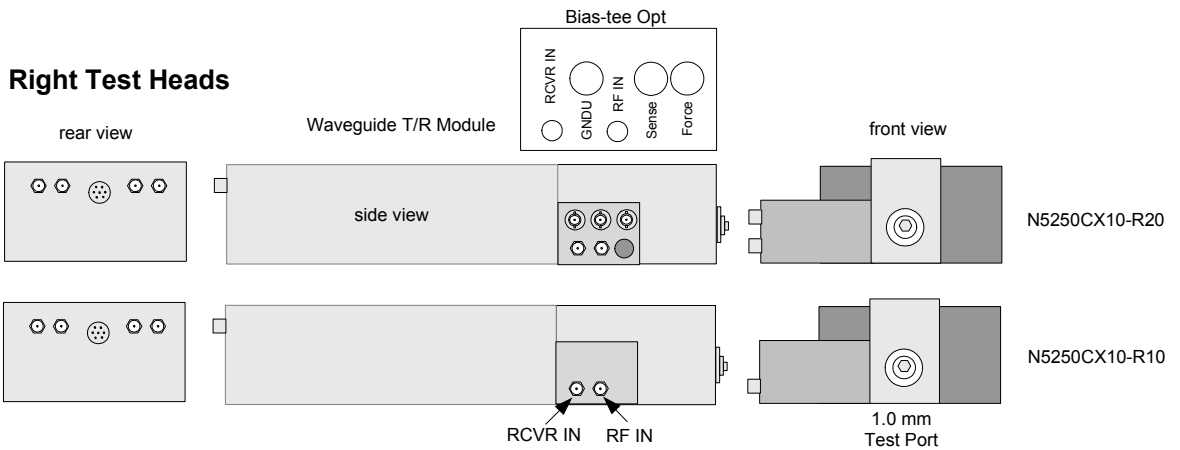
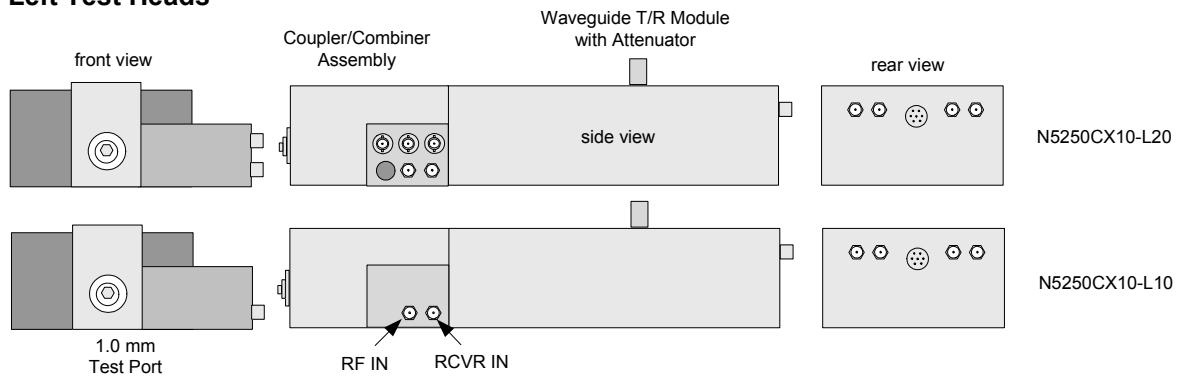
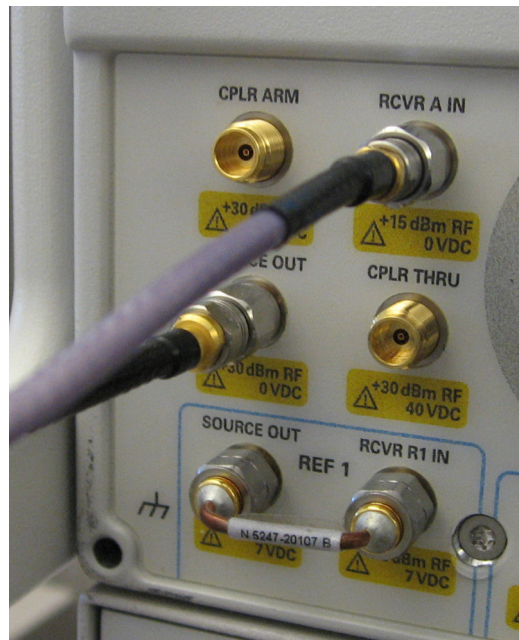
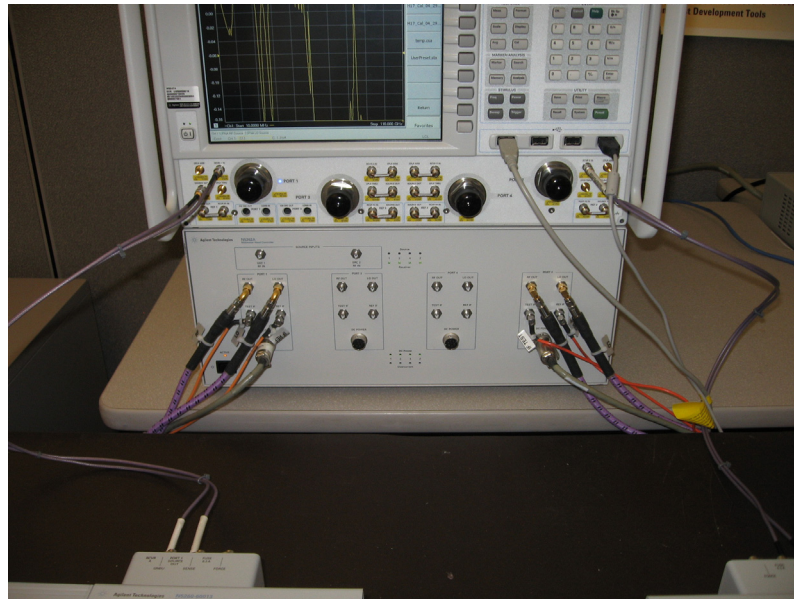


Figure 25 N5247A and N5262A with N5250ACX10 Combiner Connections



Controlling the N5261/62A with the PNA-X

This section will describe how to set up and operate the N5261/62A Millimeter Head Controller with the N5242A.

The N5261/62A Millimeter Head Controller is considered a “slave” instrument. A PNA-X must be used to control the Test Set.

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

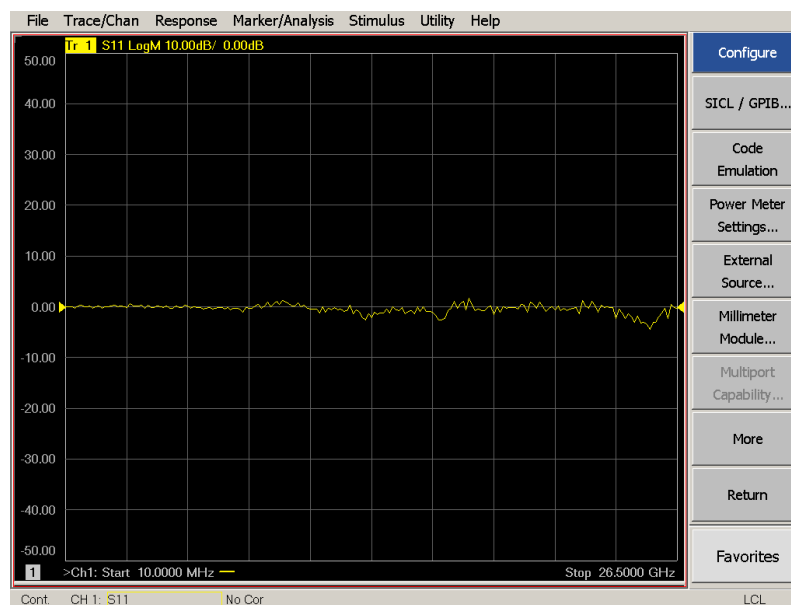
PNA-X Millimeter Mode

The PNA-X millimeter mode selects the application that will enable the PNA-X to control the N5261/62A Millimeter Head Controller. The PNA-X millimeter mode allows you to configure the system for the millimeter-wave module you are using. Refer to the PNA-X Help menu for more information.

How to Access Millimeter Mode

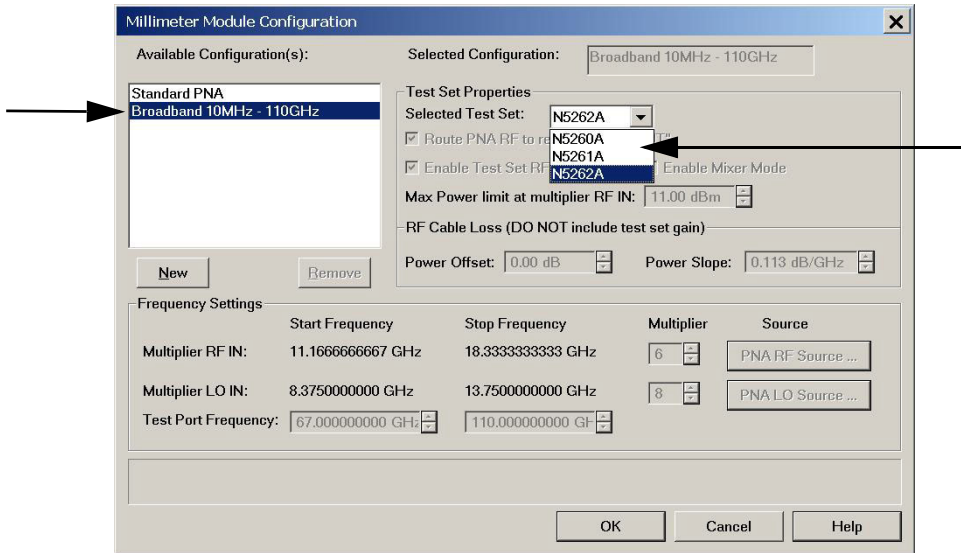
1. Connect your system and turn On all of the equipment.
2. To access the millimeter application select **[System] > Configure > Millimeter Module**.

Figure 26 Selecting Millimeter Mode



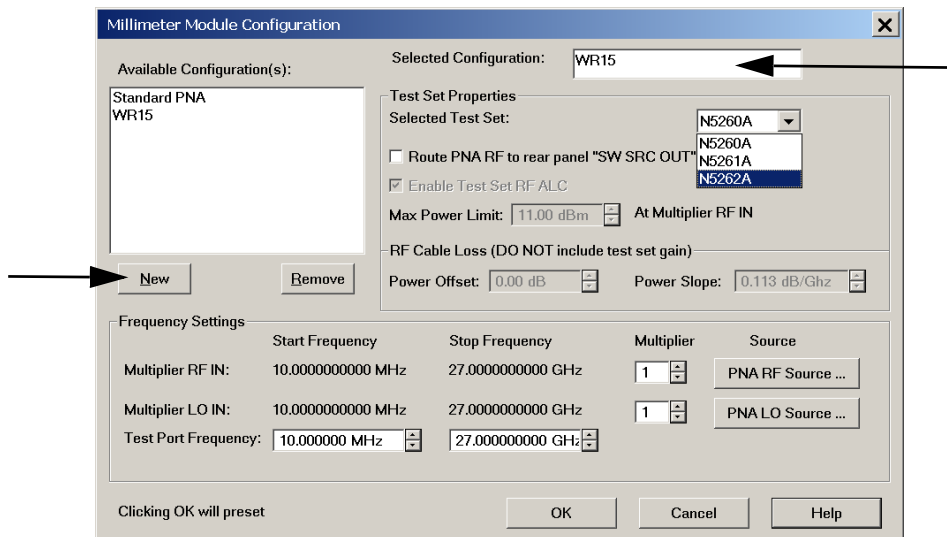
3. Select the system you have configured.
 - Broadband system select **Broadband 10 MHz - 110 MHz**, continue to [step 9](#).
 - Banded system select **New**, continue to [step 4](#).
4. In the “**Selected Configuration**” dialog enter a title, such as WR15 or Millimeter PNA-X. See [Figure 28](#).

Figure 27 Broadband Configuration



5. Select the Test Set you are using from the drop-down menu (N5261A or N5262A).

Figure 28 Banded Configuration



6. Enter the **Multiplier RF IN** number. Example: (WR15 = 4). Refer to [Figure 29](#) and [Table 14 on page 41](#), or the documentation shipped with your module.
7. Enter the **Multiplier LO IN** number. Example: (WR15 = 5) Refer to [Figure 29](#) and [Table 14 on page 41](#), or the documentation shipped with your module.
8. In the **Test Port Frequency** dialog box enter the **Start** and **Stop Frequency** of the millimeter-wave module. Example: (WR15 = 50 GHz and 75 GHz)
9. Select **Route PNA RF to rear panel “RF OUT”** if you have connected the PNA-X SW SRC OUT to the Test Set’s rear panel SRC IN. Do *not* select **Route PNA RF to rear panel “RF OUT”** if SRC IN is connected on the front panel.

The ALC mode (**Enable Test Set RF ALC**) is normally *on* in Default Mode or Receiver Leveling Mode. The **Max Power limit at the multiplier’s RF IN** is set to not exceed 11 dBm. Note: 11 dBm is not the input power to the millimeter-wave module. If the user decreases the PNA-X RF power, the power into the millimeter-wave modules can be reduced.

If the ALC mode (**Enable Test Set RF ALC**) is turned *off*, the max power may be set by the user in the **Max Power limit at the multiplier’s RF IN** dialog box. If the user adjusts the PNA-X RF power, the RF power into the millimeter-wave modules will change, but will not exceed the specified max power in the dialog box. It is recommended that ALC (**Enable Test Set RF ALC**) be turned *off* in Pulse Mode. Without ALC the power control is less accurate.

10. Select **OK**. The PNA will preset for millimeter operation after you select **OK** in the next dialog window.

Figure 29 Millimeter System Selections

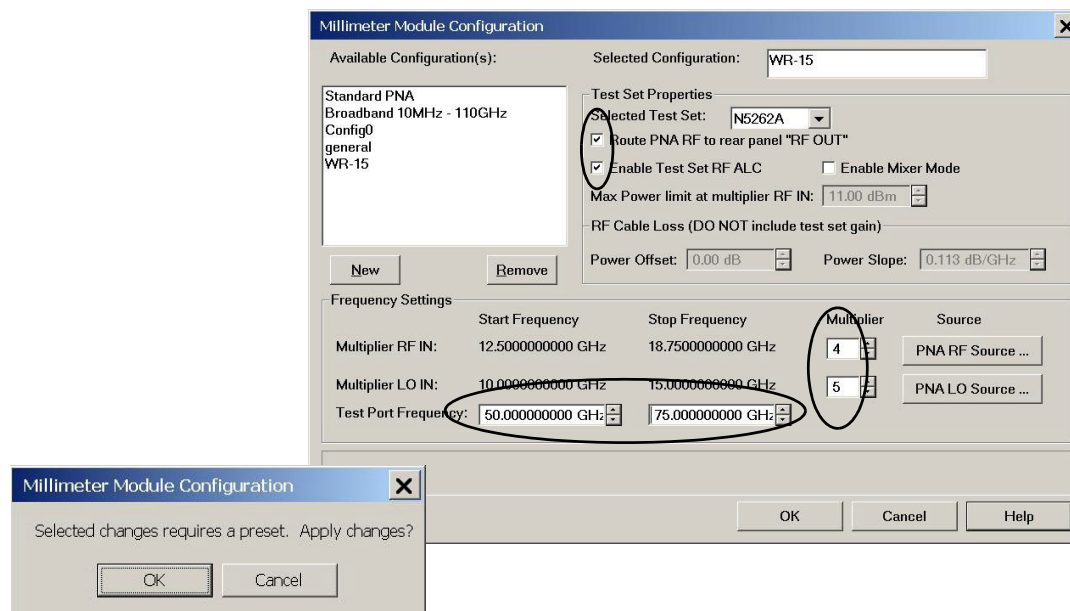


Table 14 RF and LO Harmonic Multipliers (OML only)¹

Band	Freq Range of Operation (GHz)	RF Freq Range (GHz)	RF Harmonic Multiplier	LO Freq Range ± IF Offset (GHz)	LO Harmonics Multiplier
WR-15	50 to 75	12.5 to 18.8	4	10.0 to 15.0	5
WR-12	60 to 90	10.0 to 15	6	12.0 to 18.0	5
WR-10	75 to 110	12.5 to 18.4	6	9.3 to 13.8	8
WR-08	90 to 140	7.5 to 11.7	12	11.2 to 17.5	8
WR-06	110 to 170	9.1 to 14.2	12	11.0 to 17.0	10
WR-05	140 to 220	11.6 to 18.4	12	14.7 to 18.0	12
WR-04	170 to 260	8.5 to 13	20	12.1 to 18.6	14
WR-03	220 to 325	12.2 to 18.1	18	12.2 to 18.1	18

1. Refer to your product documentation for RF and LO frequency, and multiplier values.

NOTE Harmonic multiplier values for VDI modules are given in the documentation shipped with the modules.

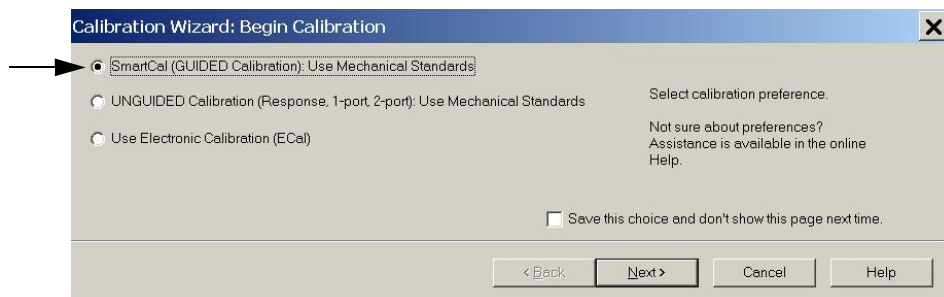
Calibrating the System

NOTE In millimeter mode the receivers are always active for all ports, therefore the receiver LED port indicators will always be illuminated. Depending on the ports selected, the source LEDs may be on or off.

This section will provide information to calibrate the network analyzer millimeter-wave system, using a waveguide, or 1.0 mm coaxial (85059A) mechanical standards. Refer to the PNA-X Help menu for further information.

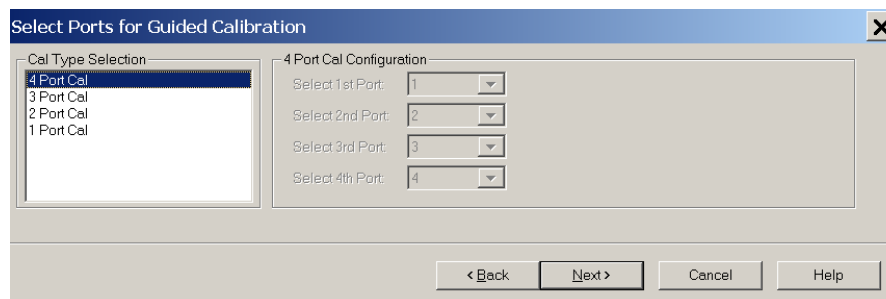
1. Set the systems **Frequency Range**, **IF Bandwidth** and **Number of Points** to be used in your measurements.
2. Select **[CAL] > CAL Wizard** on the PNA-X.
3. Select **SmartCal (GUIDED Calibration) > Next**.

Figure 30 Cal Method



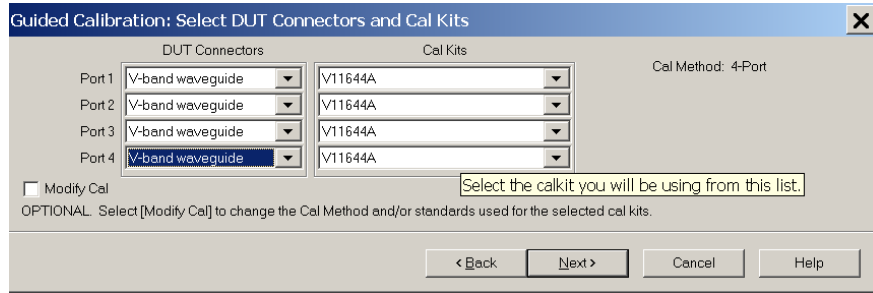
4. Select the ports to be calibrated > **Next**.

Figure 31 Select Ports for Smart Cal



5. Select the required Cal Kit from the drop-down menu for the waveguide band you are using. If your calibration kit is not in the drop-down list import your calibration data, refer to the PNA Help menu.

Figure 32 Cal Kit Selection List



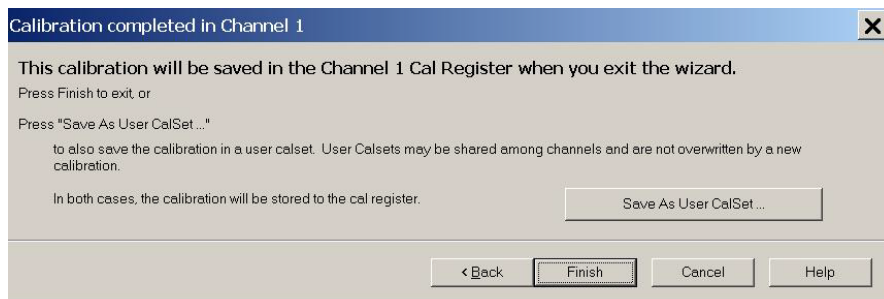
6. Press **OK > Next**.
7. Follow the prompts for Smart Cal.

Figure 33 Example: Smart Cal Prompt



8. Select **Save As User CalSet** to save the calibration. It is recommended to save it as “User CalSet”.

Figure 34 Save Cal



Operational Check

There are two methods to verify your system.

- Non-System Operational Check for the N5261A or N5262A. Verifies that the Test Set is operating with no system components required. Perform this check if you suspect there is a problem with the Test Set.
- System Operational Check for the system. Verifies the configured system is operating correctly. Requires all system components and calibration kit.

Non-System Operation Check

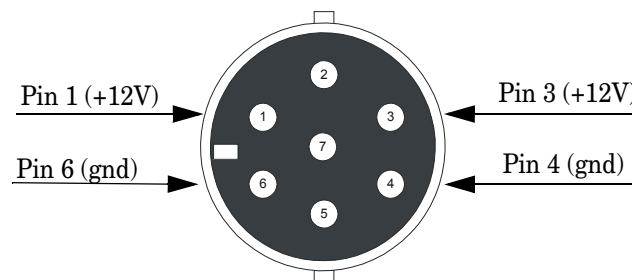
The following procedure verifies the N5261/62A without system components.

Required Equipment

- PNA, PNA-L, PNA-X or equivalent 7 GHz to 20 GHz network analyzer with Test Set I/O interface.
- Two RF flexible cables with 3.5 mm connectors (5062-6696 or equivalent)
- Three SMA adapters (female to female)
- Voltmeter
- Power meter and sensor

Verifying the N5261/62A (Millimeter Head Controller)

1. Turn on the PNA, PNA-L or PNA-X and the N5261/62A.
2. Verify that the PNA, PNA-L or PNA-X is in “Standard PNA” mode.
3. Verify DC voltage supplies on each of the front panel DC power connectors. Pins 1 and 3 = +12 V, Pins 4 and 6 = ground



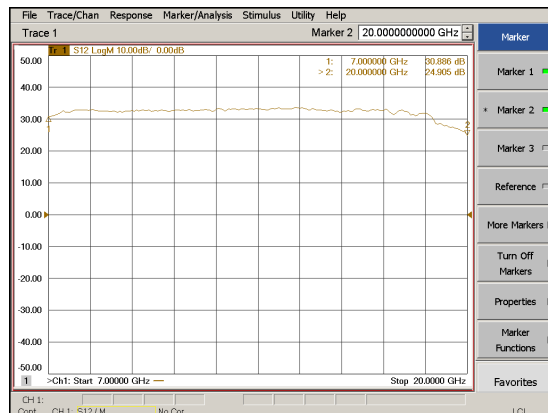
4. Measure the LO OUT and SRC1 & SRC2 RF paths.
 - a. Connect the Test Set I/O cable from the PNA to the N5261A or N5262A.
 - b. Select **[Preset]**.
 - c. Select **[Freq] > Start > [7 GHz]**.

- d. Select **Stop** > **[20 GHz]**.
- e. Select **[Power]** > **[-30]** > **[Enter]**.
- f. Select **[Meas]** > **S12**.
- g. Connect the RF cables with adapters to the PNA, PNA-L or PNA-X Port 1 and Port 2.
- h. Connect the two RF cables together with adapter.
- i. Normalize the trace. Select **[Memory]** > **Normalize**. You will see a flat line at 0 dB.
- j. Remove the adapter from the cables and connect the Port 2 cable to the rear panel LO IN.
- k. Connect the PNA, PNA-L or PNA-X Port 1 to Test Set port LO OUT and verify the LO Output gain is approximately 30 dB (± 5 dB) at 7 to 20 GHz. Refer to [Figure 35](#).
- l. Select **[Power]** > **[-3]** > **[Enter]**. Measure the LO OUT power using a power meter. Refer to [Table 8 on page 16](#). Repeat the step [step k](#) and [step l](#) for each LO OUT port.
- m. Remove the SRC1 IN to SRC1 OUT rear panel jumper.
- n. Connect the PNA, PNA-L or PNA-X Port 1 to the Test Set SRC1 IN.
- o. Connect Port 2 to the rear panel SRC1 OUT.
- p. Verify the power loss. The trace typically slopes down at -1 dBm to -2 dBm. Refer to [Table 8 on page 16](#).
- q. Remove the SRC2 IN to SRC2 OUT rear panel jumper and repeat for SRC2 IN and SRC2 OUT.

Table 15 SRC1/2 and LO RF Path Measurement

From the Rear Panel	To the Front Panel	Measure Gain/Loss
SRC1 OUT	SRC1 IN	-1 dB (± 1 dB)
SRC2 OUT (N5262A)	SRC2 IN (N5262A)	-1 dB (± 1 dB)
LO IN	LO OUT	+30 dB (± 5 dB)

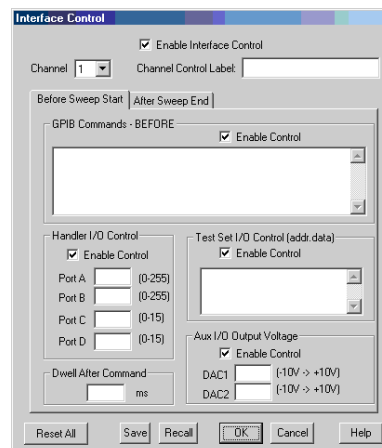
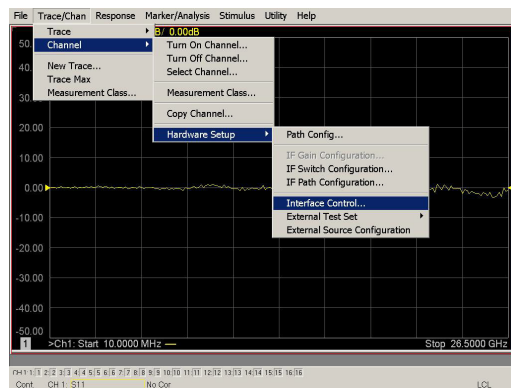
Figure 35 LO Output Gain



5. Measure RF OUT.

- a. Re-install the SRC1 IN to SRC1 OUT rear panel jumper.
- b. Select **[Preset]**.
- c. Select **[Freq] > Start > [7 GHz]**.
- d. Select **Stop > [20 GHz]**.
- e. Select **[Power] > [-20] > [Enter]**.
- f. Select **[Meas] > S12**.
- g. Connect the two RF cables together with adapter.
- h. Normalize the trace. Select **[Memory] > Normalize**.
- i. Remove the adapter and connect Port 2 to SRC1 IN.
- j. Connect the PNA-X Port 1 to the Test Set RF OUT.
- k. Select **Trace/Chan > Channel > Hardware Setup > Interface Control**. Select **Enable Interface Control** and type the I/O command **0.1** in the Test Set I/O Control (addr.data) panel > **OK**. Verify the gain level using [Table 16 on page 47](#) and [Figure 36 on page 47](#).
- l. Select **[Power] > [-3] > [Enter]**. Measure the RF OUT power using a power meter. Refer to [Table 8 on page 16](#). Repeat the [step k](#) and [step l](#) for each RF OUT port.

NOTE The PNA, PNA-L or PNA-X Series Network Analyzer comes with the Interface Control application. Information regarding this application can be found in the PNA's Help menu, Interface Control. The application is shown below.



- m. Repeat [step j](#) and [step k](#) for Ports 2, 3 and 4 RF OUT. When verifying Ports 3 and 4 move the Port 2 cable to SRC 2 IN. Refer to [Table 16 on page 47](#) for the I/O command.
- n. Send command 32.1 to turn ALC *off* for Ports 1 or 2. Confirm the RF power level increases on Port 1 when ALC is turned off. Repeat for Port 2.
- o. Send command 32.2 to turn ALC *off* for Ports 3 or 4. Confirm the RF power level increases on Port 3 when ALC is turned off. Repeat for Port 4.

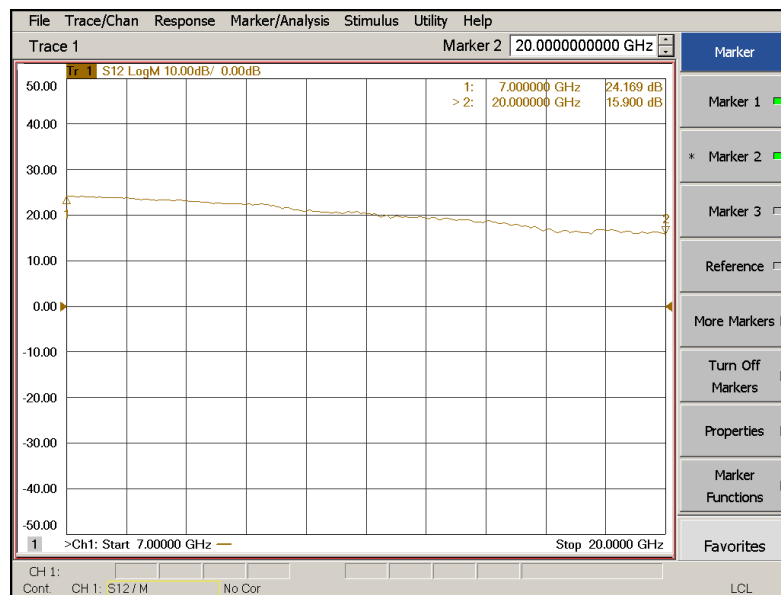
ALC Off Commands:

- 32.0 turns ALC *on* for SRC 1 IN (Ports 1 and 2) and SRC 2 IN (Ports 3 and 4)
- 32.1 turns ALC *off* for SRC 1 IN (Ports 1 and 2)
- 32.2 turns ALC *off* for SRC 2 IN (Ports 3 and 4)

Table 16 I/O Command for RF Paths

From: Front Panel	To: Front Panel	Command	Gain
SRC 1 IN	Port 1 RF OUT	0.1	20 dB (±5 dB)
SRC 1 IN	Port 2 RF OUT	0.2	20 dB (±5 dB)
SRC 2 IN (N5262A)	Port 3 RF OUT	0.16	20 dB (±5 dB)
SRC 2 IN (N5262A)	Port 4 RF OUT	0.32	20 dB (±5 dB)

Figure 36 RF Output Power



6. Measuring the TEST IF and REF IF Inputs to A, B, C, D and R Outputs. Refer to [Table 17 on page 49](#).
 - a. Connect the Test Set I/O cable from the PNA to the N5261A or N5262A.
 - b. Select **[Preset]**.
 - c. Select **[Freq] > Start > [10 MHz]**.
 - d. Select **Stop > [20 MHz]**.
 - e. Select **[Power] > [-20] > [Enter]**.
 - f. Select **[Measure] > S21**.
 - g. Connect the two RF cables together with adapter.
 - h. Normalize the trace. Select **[Memory] > Normalize**.
 - i. Remove the adapter and connect the PNA, PNA-L or PNA-X Port 1 to the front panel Test Set Port 1, TEST IF.
 - j. Connect Port 2 to the Test Set A IF OUT on the rear panel.
 - k. Select **Trace/Chan > Channel > Hardware Setup > Interface Control**. Select **Enable Interface Control** and type the I/O command **16.8** in the Test Set I/O Control (addr.data) panel > **OK**. Verify the power level using [Table 17](#). Commands are not required for the N5261A.
 - l. Repeat [step j](#) and [step k](#) for each TEST IF port.
 - m. Connect the PNA, PNA-L or PNA-X Port 1 to the front panel Port 1 REF IF.
 - n. Connect Port 2 to the rear panel D IF OUT.
 - o. Send the I/O command 16.8 and verify the power level. Refer to [Table 17](#).
 - p. Repeat [step m](#), [step n](#) and [step o](#) for each REF IF port.

Table 17 IF Path Measurement

From: TEST IF Front Panel	To: N5261A Rear Panel IF OUT	To: N5262A Rear Panel IF OUT	Command ¹	Gain
Port 1 TEST IF	A	A	16.8	0 dB (\pm 2 dB)
Port 2 TEST IF	B	B	16.4	0 dB (\pm 2 dB)
Port 3 TEST IF	n/a	C	16.2	0 dB (\pm 2 dB)
Port 4 TEST IF	n/a	D	16.1	0 dB (\pm 2 dB)
Port 1 REF IF	C	D	16.8	0 dB (\pm 2 dB)
Port 1 REF IF	n/a	R	16.33	0 dB (\pm 2 dB)
Port 2 REF IF	D	C	16.4	0 dB (\pm 2 dB)
Port 2 REF IF	n/a	R	16.2	0 dB (\pm 2 dB)
Port 3 REF IF	n/a	A	16.2	0 dB (\pm 2 dB)
Port 3 REF IF	n/a	R	16.56	0 dB (\pm 2 dB)
Port 4 REF IF	n/a	B	16.1	0 dB (\pm 2 dB)
Port 4 REF IF	n/a	R	16.20	0 dB (\pm 2 dB)

1. Commands are not required for the N5261A.

7. Verifying front panel LEDs.

- a. Connect the Test Set I/O cable from the PNA, PNA-L or PNA-X to the N5261A or N5262A.
- b. Send the TEST I/O command 64.17 and verify the Active LED (amber) and Port 1 Source (amber) & Receiver (green) Status LEDs are on.
- c. Send the TEST I/O command 64.34 and verify Port 2 S & R Status LEDs are on.
- d. Send the TEST I/O command 64.68 and verify Port 3 S & R Status LEDs are on.
- e. Send the TEST I/O command 64.136 and verify Port 4 S & R Status LEDs are on.
- f. Verify that the DC power LEDs are on.

NOTE In millimeter mode the receivers are always active for all ports, therefore the receiver LED port indicators will always be illuminated. Depending on the ports selected, the source LEDs maybe on or off.

Banded System Operational Check

Refer to the N5250A PNA Series Microwave Network Analyzer System (N5250-90001), Chapter 6 for the System Check and System Performance Verification Check for non-banded systems.

The System Operator's Check procedure confirms that the system functions normally. There are no hard specifications for the system measurement performance, only general guidelines are provided for evaluating the system operation results. The procedure can also be used to verify that your millimeter-wave modules are functioning properly.

Technical judgment is required when evaluating the results. The purpose of the System Operation Check is to detect significant degradations in the system that make the performance unacceptable. The calibration kit and test environment can affect the System Operation Check results. Refer to [“Site Preparation” on page 23](#).

When any part of the operator's check provides unsatisfactory results, refer to [“N5261A and N5262A Troubleshooting” on page 62](#) to determine the cause of the problem.

Required Equipment

- A calibration kit compatible with the millimeter-wave modules.

An Agilent, VDI or OML calibration kit may be used with the system. The Agilent calibration kit definition is included with the PNA-X firmware. If an VDI or OML calibration kit is used with the millimeter-wave modules, the calibration kit definition must be entered in the PNA-X. To enter, use the PNA-X function “Import Cal Kit” to import the .ckt file from a USB pen drive. (Search the Help index for the keywords “modify calibration kit.”) Include the calibration kit serial number in the calibration kit definition name/description.

- Waveguide extension section for each Banded module.
- 3/32 Ball Driver, or VDI Calibration Tool Kit
- 5/16 Open or 8 in-lb Torque Wrench

Preparing the PNA-X

1. Connect the PNA-X, the N5261/62A, and the millimeter-wave modules as described in [“System Setup with N5242A, N5244A, N5245A or N5247A” on page 24](#).
2. Turn On the N5261/62A and the PNA-X.
3. Configure the PNA-X for operation with the millimeter-wave modules. Refer to [“Controlling the N5261/62A with the PNA-X” on page 38](#). For further information use the Help menu in the PNA-X. Search the Help index for the keyword “N5261/62A” to find the appropriate information.

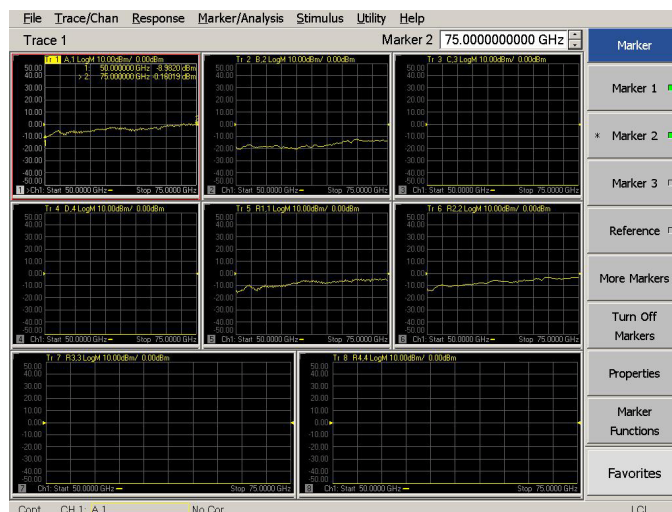
System Operational Check Procedure

This procedure assumes that you have a Transmission/Reflection module on each port. If not, the procedure will have to be modified appropriately.

The System Operational Check procedure verifies that the banded system is connected correctly and the modules, Test Set and PNA-X are operating properly.

1. Allow the system to warm up for at least 30 minutes.
2. Attach a waveguide extension section to each module's waveguide flange port to protect the modules waveguide connector.
3. Verify that the PNA-X is in Millimeter Mode and that the frequency range is correct for the configured millimeter system.
4. To verify the port as a receiver, perform the following steps:
 - a. Connect a short to Port 1.
 - b. Select **[Avg] > IF Bandwidth > 10 > [Enter]**.
 - c. Display all receivers on the PNA-X screen using the following menu selections: **[System] > Service > Utilities > Receiver Display**.
 - d. Compare the A,1 and R1,1 traces to the traces on the RefPort/TestPort page from OML for the millimeter-wave module on Port 1. The general level and shape should be similar but not necessarily identical.
 - e. If you are using more than one Transmission/Reflection module move the short to Port 2. If you are only testing one port proceed to [step 6](#).
 - f. Compare the B,2 and R2, 2 traces to the traces on the RefPort/TestPort page from OML for the millimeter-wave module on Port 2. The general level and shape should be similar, but not necessarily identical.
 - g. Repeat [step e](#) and [step f](#) for Port 3 and compare trace 3 C,3 and R3, 3.
 - h. Repeat [step e](#) and [step f](#) for Port 4 and compare trace 4 D,4 and R4, 4.

Figure 37 Example: Banded Receiver Display

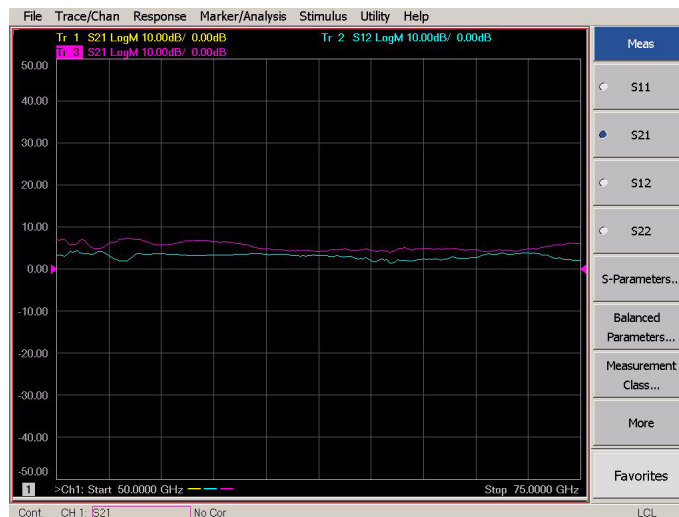


5. Measure a Thru Connection.

- Connect the Port 1 to Port 2 module, and Port 3 to Port 4 module (N5262A) to form thru connections.
- Delete the trace 1, S11. Select **Trace/Chan > Trace > Delete Trace**.
- Select **[Preset] > Trace/Chan > Trace > New Trace**. Select S12, S21, S34 and S43. This test confirms that the modules are sourcing and receiving. Refer to your millimeter-wave modules power curve data from OML, included with the your module.

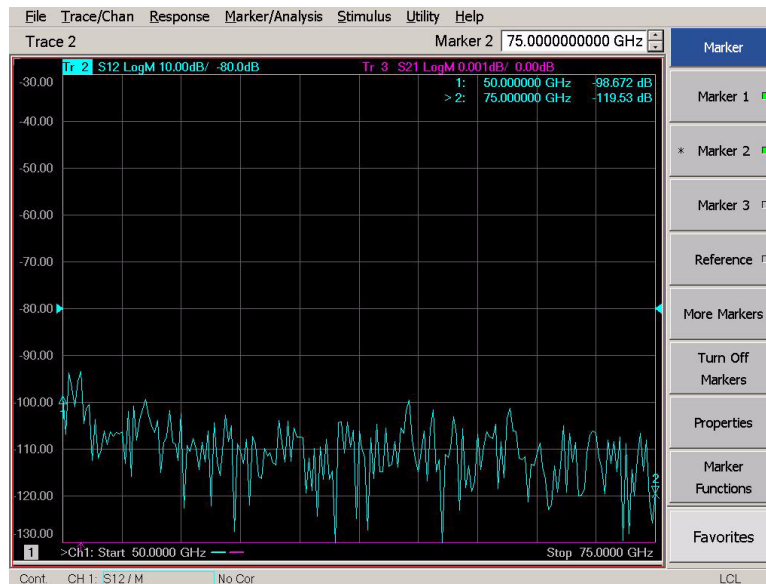
NOTE S12 requires a Transmission/Reflection module or combiner on Port 2.
 S21 requires a Transmission/Reflection module or combiner on Port 1.
 S34 requires a Transmission/Reflection module or combiner on Port 4.
 S43 requires a Transmission/Reflection module or combiner on Port 3.

Figure 38 Uncalibrated S12 and S21 with two Transmission/Reflection Modules



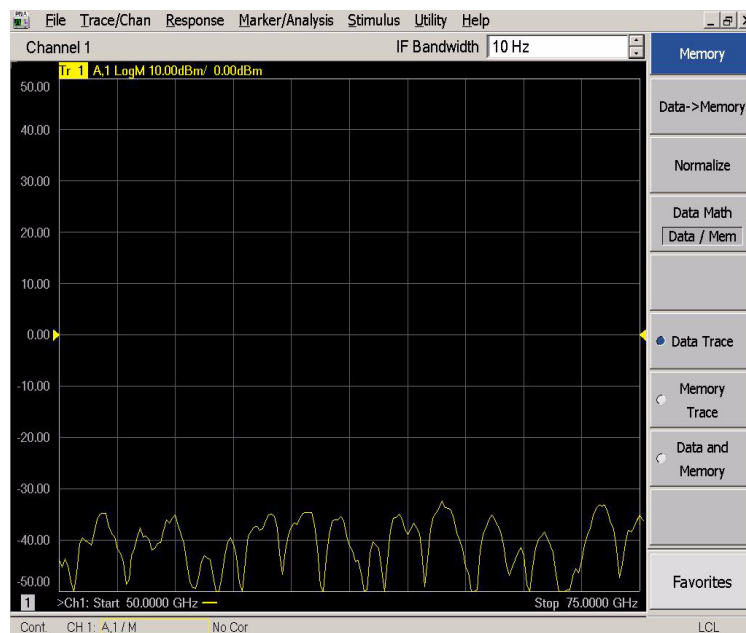
6. Measure the Dynamic Range of each Millimeter-wave module.
 - a. Measure S11 for a 1-Port system, or S12 and S21 for a 2-Port system, or S12, S21, S34 and S43 for a 4-Port system.
 - b. Select **[Avg] > IF Bandwidth [10] > [Enter]**.
 - c. Set the power level to the maximum for each band.
 - d. For a 1-Port system connect a short to the test port. For a 2-Port or 4-Port system connect the module ports together to form thru connections. Refer to [step 5](#) for connections.
 - e. Normalize each trace. Select the trace and press **[Memory] > Normalize**.
 - f. For a 1-Port module remove the TEST IF cable from the Test Set or module. For a 2-Port or 4-Port system disconnect the module ports and connect a load or short to all module ports.
 - g. Select **[Scale] > Reference Level > [-80] > [Enter]**. Set the reference as needed to view each trace.
 - h. The S11, S12, S21, S34 or S43 traces show non-calibrated system dynamic range. The dynamic range will vary depending on the modules used, and the configuration of the system. Reference your modules document for performance information. See [Figure 39](#).
 - i. Select **[Memory] > Data Math > Off** and review the traces for noise floor performance.

Figure 39 Dynamic Range Trace Example



7. Verify the uncorrected directivity of each Transmission/Reflection module. This step is not required for Receiver only modules.
 - a. Set the PNA-X for 10 Hz IFBW. Select **[Avg]** > **IF Bandwidth [10]** > **[Enter]**.
 - b. Display receiver A trace. Select **[System]** > **Service** > **Utilities** > **Receiver Display**.
 - c. Double click A1 window for a full display in [Figure 37 on page 51](#).
 - d. Connect a short to module Port 1.
 - e. Normalize the trace. Select **[Memory]** > **Normalize**.
 - f. Remove the short and connect a load to module Port 1.
 - g. Observe the response. This is the “rough” coupler directivity.
 - h. Repeat [step 7](#) for Ports 2 (B,2), 3 (C,3) and 4 (D,4).

Figure 40 Directivity Trace Example



Theory of Operation

Functional Block and Assembly Information

The N5261A/62A routes PNA-X LO and RF signals to a millimeter-wave module. This allows the PNA-X to up-convert for a millimeter-wave source and down-convert a received millimeter-wave frequency to an IF frequency 7.6 MHz. It also provides the DC power for the millimeter-wave module. The following components are used in the N5261/62A. Refer to the block diagrams, [Figure 41](#) through [Figure 44](#) beginning on [Page 58](#).

Test Set Controller Board (N5261-60006)

The Test Set Control board (N5261-60006) is a surface mount, printed circuit assembly (PCA) that provides a connection to the power supply, and the PNA-X Test Set I/O. The PNA-X sends address and data commands which are read by the Test Set Controller for selecting the switch paths of the SRC1 and SRC2 RF and IF switch paths. The Test Set Controller board has a programmed FPGA and memory (NovRam) with model number and gain correction values for the Amplifiers and ALC circuits. Switch S1 is set to lock the memory after calibration is been loaded. The front panel “Active” and port LEDs are only *on* when the PNA-X has addressed the N5261/62A Millimeter Head Controller. The rear panel fan is *on* when the Controller board supplies are operational.

IF the Controller board is replaced, the gain data will need to be stored into the new board. Refer to [“Contacting Agilent” on page 79](#) for the replacement procedure.

Interface Board (N5261-63001)

The Interface board is installed on top of the Test Set Controller Board. It provides switch drive signals and voltage for the solid-state switches that select RF Inputs (SRC1 or SRC2) to one of the front panel RF Outputs ports. It provides switching from the front panel TEST IF and REF IF Inputs to the rear panel IF Outputs D/R2 C/R1, R, A, B. The board also provides DC voltage, ALC control of the Amplifiers and a FPGA programmed device that enables N5261/62A Millimeter Head Controller operation.

LED Board (N5261-60005)

Two LED board assemblies are mounted to the front panel. The top LED board indicates the Source Path (amber/yellow color), or Receiver Path (green colored) shown as “S” and “R” for each Port. The bottom LED Board indicates the DC Power is *on* (green). If an over-current condition occurs on the millimeter-wave module the LED will be (amber/yellow), which could be a result of a shorted interface cable or damaged Millimeter-wave module. The LED board assemblies are connected to the Test Set Controller board by ribbon cables.

DC Power Board (N5261-60002)

The DC Power board provides connection to the power supply and self recovering fuses for each millimeter-wave module supply (+12 volt) on the front panel. The fuses are reset when the N5261/62A is turned *off*.

Power Supply (0950-4729)

The power supply (0950-4729) converts the AC line voltages to DC. This is an automatic line voltage selecting power supply. The DC supplies are connected to the Test Set control board through five wire harnesses to connectors J10, J11, J12, J13 and J14. The DC Power board is connected to connectors J5 and J8. The AC line voltage (100 to 240 V @ 50/60 Hz) is provided from the line module located on the rear panel.

Isolators (0955-1595)

Isolators are installed in the LO Output RF path for each port. These 10 watt isolators maximizes the LO power input to the millimeter-wave modules over a frequency range of 8 to 19 GHz.

LO Power Amplifier (5087-7750)

An amplifier installed in the LO Input path provides RF power required for the LO Out to the millimeter-wave module. This amplifier has an attenuator at its input to provide a good match and ensure the amplifiers output does not exceed +15 dBm.

RF and LO ALC Amplifier (5087-7771)

The Mod/Amp has adjustable gain that provides ALC leveling for the front panel RF and LO Outputs. Adjustments are made on each Mod/Amp to set the maximum output power to +12.5 dBm (R3). The output of each amplifier is connected to a coupler, and with a detector for ALC, the mod/amps provide RF and LO leveling. Gain values stored on the Test Set Controller board are used to provide a set RF and LO level when the ALC is turned *off* in the PNA-X Millimeter mode. Each Mod Amp has a Bias board (N5261-63003) installed on top that provides the power supply connection and circuitry for setting the gain of the amplifier (R3) and an SMB Input to the modulator.

Attenuator, 6 dB (0955-0243)

The 6 dB attenuators are used to attenuate the RF and LO power to the ALC detector to set the RF level for linear operation.

Attenuator, 3 dB (0955-0246)

The 3 dB attenuators are used in the SRC1 or SRC2 Mod/Amp Inputs to provide a good match and ensure it does not exceed +15 dBm.

Coupler (0955-0148)

Directional couplers with 10 dB coupling factor are used for ALC feedback for RF and LO Output leveling.

Slope Pad (N5262-20033)

A slope pad is installed on the leveling coupler of the RF Out path to compensate for the RF switch loss at higher frequencies.

Power Divider (N5262-80003)

A four-way power divider provides each Port LO Output from the LO amplifier with approximately 7.2 dB attenuation for each LO Out. Two 50 ohm terminators are installed on the unused N5261A divider paths. If a system is configured with a unused port (a 1 port reflection system for example) the front panel LO Output ports are to be terminated with a 50 ohm load (1810-0118). This keeps the power divider balanced and prevents an “open” reflective signal from entering the power divider and mixing with the RF signal.

RF Switch (5087-7733)

A solid-state switch with internal 50 ohm termination is used for switching the RF Output path for Ports 1 and 2, or Ports 3 and 4. These switches are controlled by the Test Set Controller and Interface boards.

Figure 41 N5261A Block Diagram

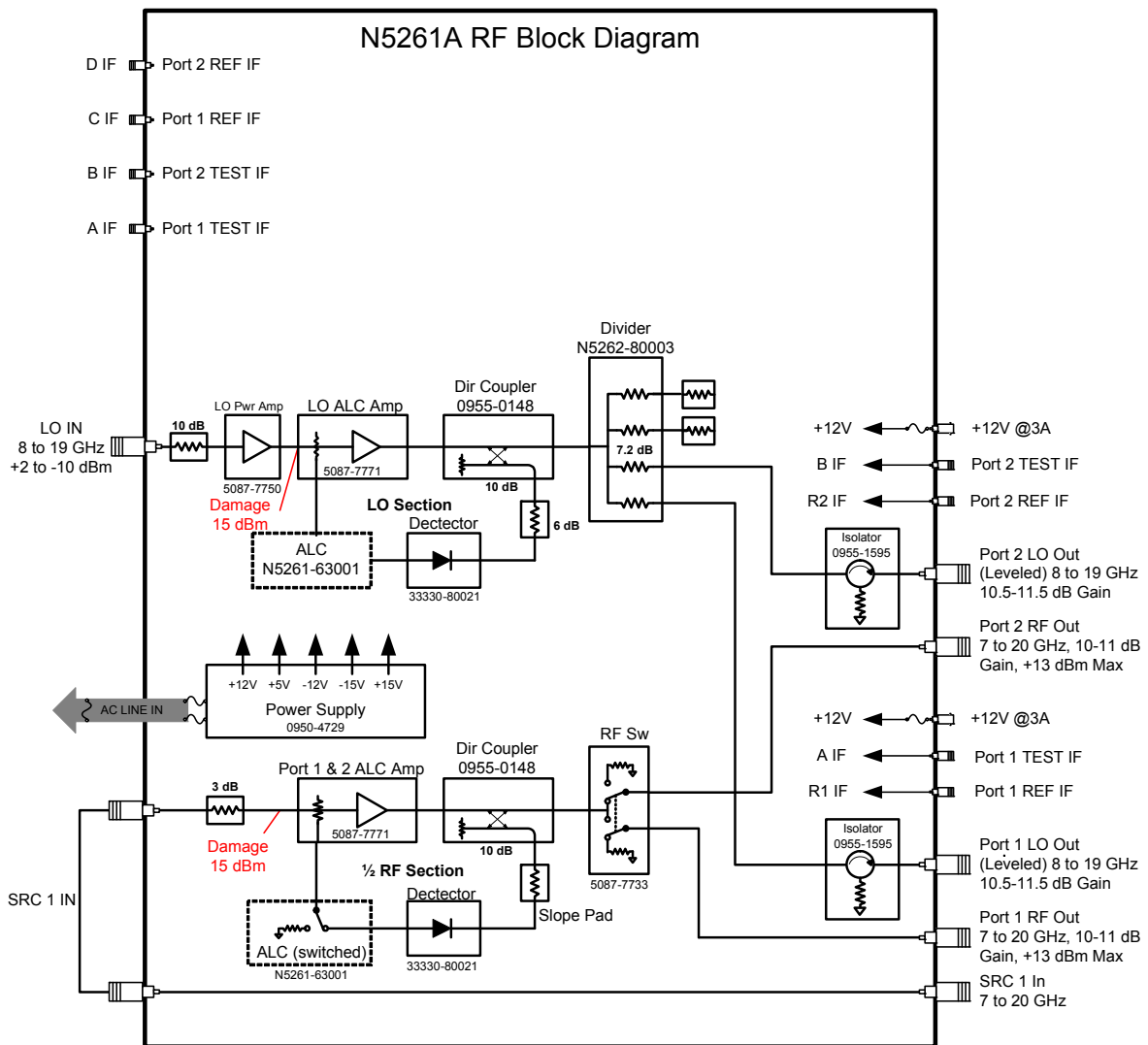


Figure 42 N5262A Block Diagram

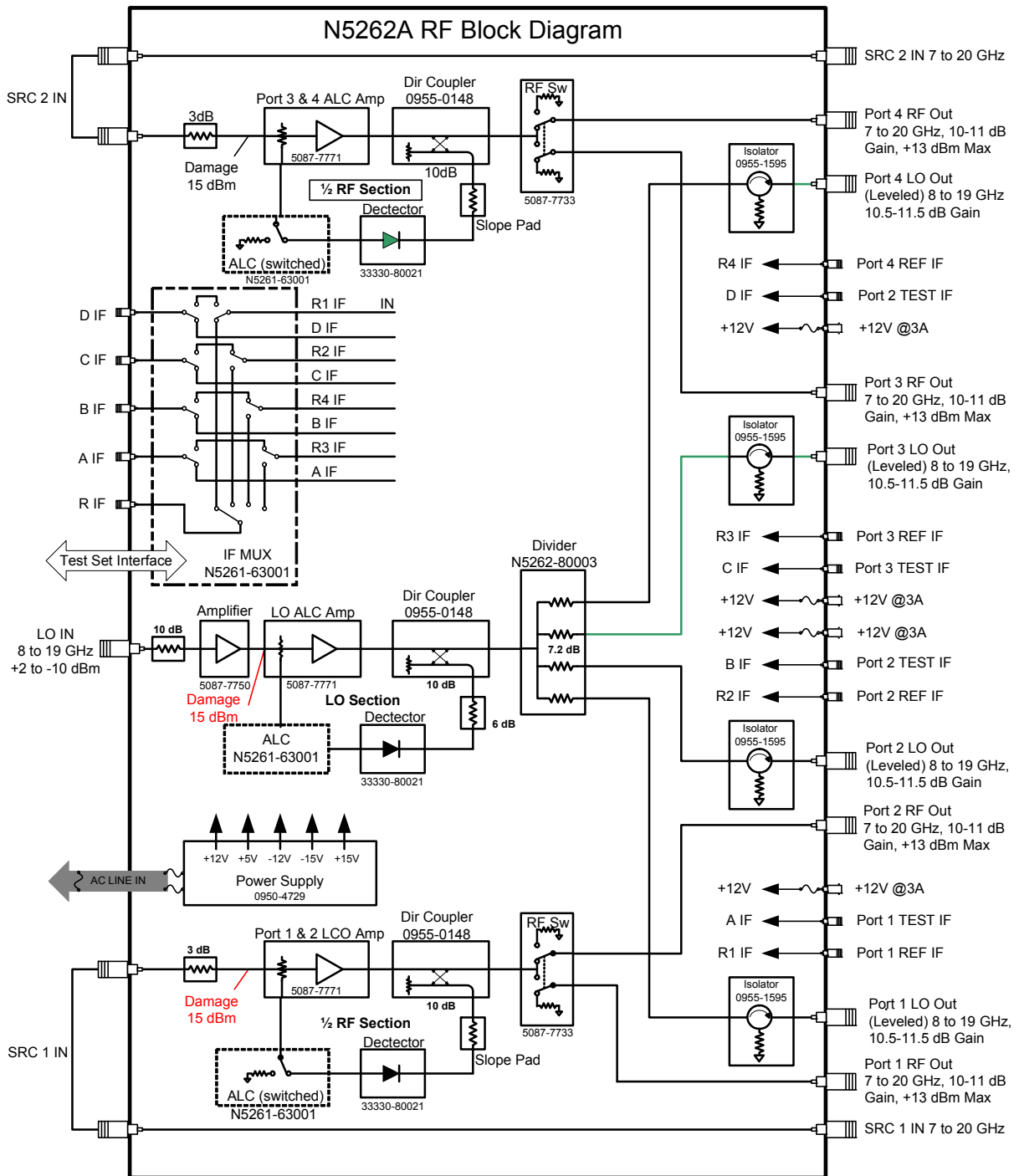


Figure 43 IF Routing 2-Port

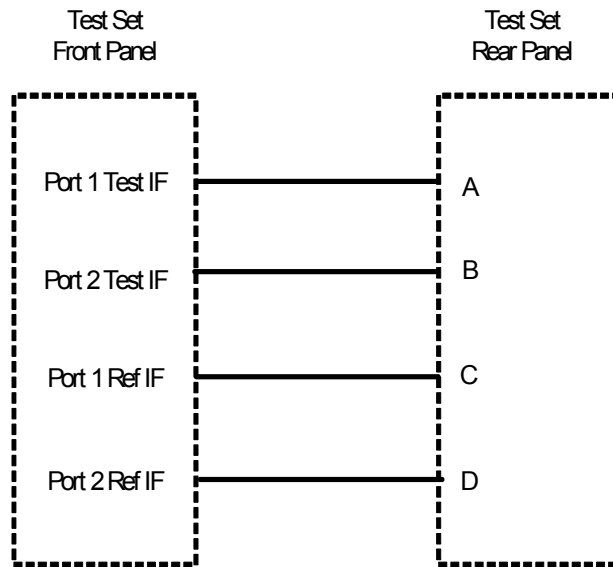
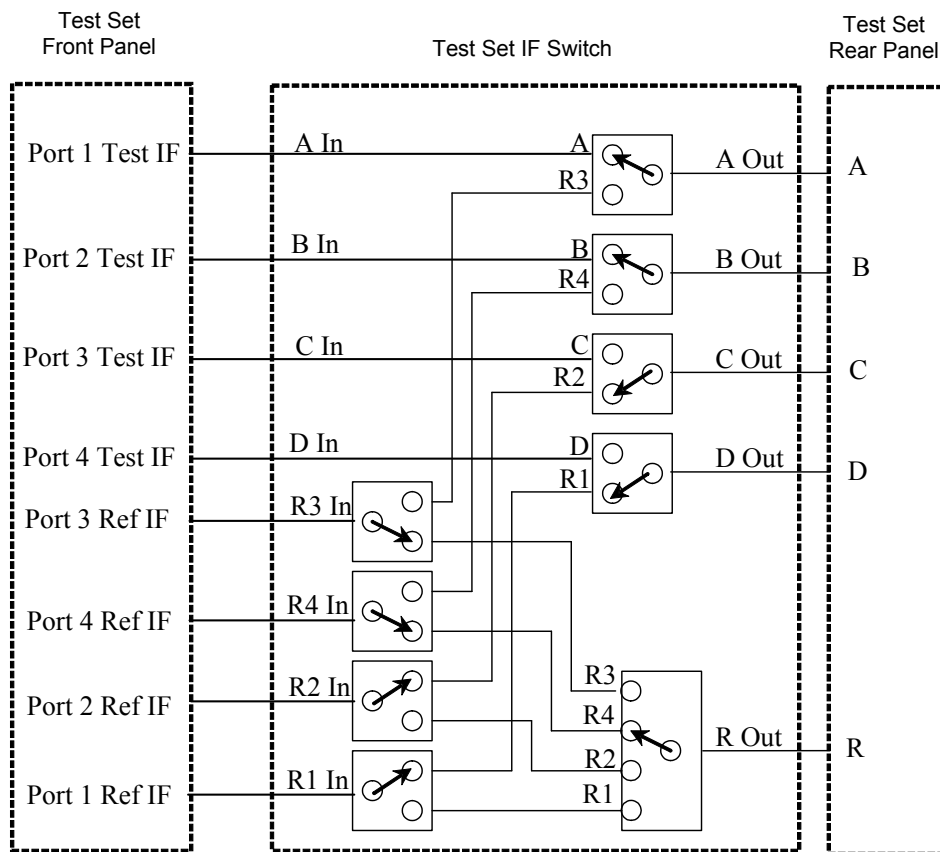


Figure 44 IF Routing 4-Port



Troubleshooting

If your configured system is not operating properly, perform the system level procedure to isolate the piece of equipment that is likely the cause of the failure.

Refer to the Agilent PNA Series: Service & Support Home Page at: <http://na.tm.agilent.com/pna> for further information.

To request service, please contact your local service center. In the US, call 800-829-4444. For a listing of service centers worldwide, please visit us at www.agilent.com/find/service.

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

System Level Troubleshooting

1. Confirm that each piece of equipment is turned On, and all PNA-X, Test Set and Module connections are correct.
2. Verify that the PNA-X has the correct options for Millimeter Mode operation. Refer to [“Network Analyzer Requirements” on page 4](#).
3. Verify that the PNA-X is in Millimeter Mode for the waveguide band of the modules used. If the Millimeter Mode is not functioning, refer to the PNA-X Help menu.
4. Substitute the suspect millimeter module with a known working module, or measure the RF and LO Input power to the module. Refer to your modules documentation for input power requirement. If the power levels are low, substitute the cables.
5. If you have a Transmission/Reflection module, place a short on the module’s test port and measure the TEST/MEAS IF and REF IF signals using a spectrum analyzer. If the signal is absent substitute the cables.
6. Verify the Test Set by performing the [“Non-System Operation Check” on page 44](#). If the test fails continue to [“N5261A and N5262A Troubleshooting” on page 62](#) or contact [“Agilent Support, Services, and Assistance” on page 79](#).
7. Confirm that the PNA-X is working properly by disconnecting it from the Test Set and performing an Operation Verification (OP VER). Refer to the PNA-X Help menu.

If the PNA-X, Test Set and Modules are functioning, but the system is not operating properly, contact [“Agilent Support, Services, and Assistance” on page 79](#).

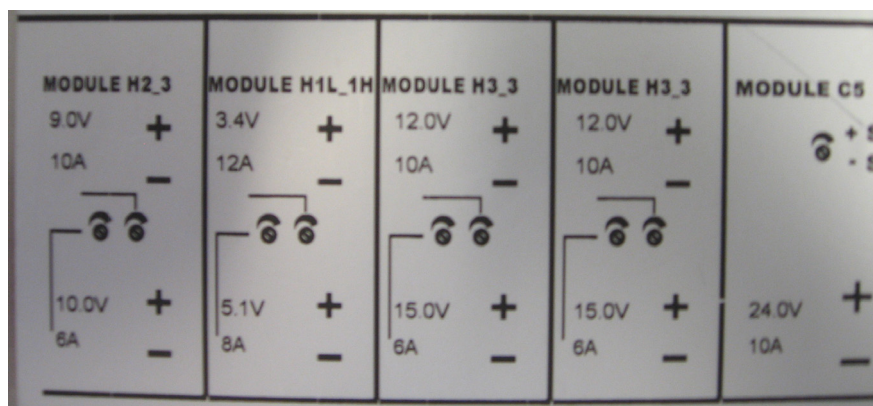
N5261A and N5262A Troubleshooting

Fan is not Operating

Suspect a power supply problem or failed fan, and perform the following troubleshooting.

1. Verify the front panel power switch (3101-4058) is operational.
2. Verify that the AC line voltage is correct (100 to 240 V @ 50/60 Hz) and that the power cord is not damaged.
 - a. If the power cord is damaged, replace it.
 - b. If the AC line voltage is incorrect, use another receptacle.
3. Verify that the line module fuse (2110-0709) is not blown. There is a spare fuse in the line module. Refer to [Figure 7 on page 20](#). If the fuse is working, continue to [step 4](#).
4. Remove the top cover. Verify that the supply LED indicators on the Test Set control board (N5261-60006) are illuminated. If the LED's are illuminated, replace the fan (87050-60027). Refer to [Figure 46 on page 68](#).
5. If the LED's are *off*, verify the voltages (+24, +5, +3, -15, -12, +15, +12, +9, and +10 Volt) on the Test Set Controller board. If the voltages are not correct, verify that J10 - J14 cables are connected correctly on both the power supply and controller board. Refer to [Figure 46 on page 68](#).
6. If the J10 - J14 cables are connected properly, measure the voltages on the power supply screw terminals. See the power supply voltages in [Figure 45 on page 62](#) and [Table 19 on page 66](#).
7. If the power supply voltages are present, but the LEDs are off, replace the controller board. Note: When replacing the controller board, the model number and RF gain values will need to be entered into the new controller board.

Figure 45 Power Supply Screw Terminal Voltage Levels



8. If power supply voltages are not present, verify and/or replace the two 8 amp fuses (2110-0342) in the line fuse assembly. Refer to [Figure 50 on page 71](#).
 - a. If the fuses are correct, replace power supply (0950-4729).

No DC Power for Millimeter-wave Modules

1. Suspect a DC power, or power supply problem.
2. Remove the top and bottom covers.
3. Inspect the DC Power Board (N5261-60002) connections.
4. Measure the +12 V (red wires) on the DC Power Board. If the +12 V is present, replace the DC power cable from the front panel (N5652-60001). If the +12 V is not present go to [step 5](#).
5. Verify that the supply LED indicators, on the Test Set Control Board (N5261-60006), are illuminated. If they are, replace the DC Power Board (N5261-60002). Refer to [Figure 46 on page 68](#). If the LED's are not illuminated, refer to [“Fan is not Operating” on page 62](#).

Over Current LEDs (amber) are On

1. Suspect a DC power, or cable short problem.
2. Remove all millimeter module connections from the front panel. If the over current LEDs are *off*, suspect the millimeter module or the DC Power Bias cable. If the LEDs are *on* continue with [step 3](#).
3. Verify that the +12 V on the front panel DC Power connectors is not shorted to ground. Refer to [“Non-System Operation Check” on page 44](#). If it is shorted to ground, replace the front panel DC Power cable (N5652-60001) or the DC Power Board (N5261-60002). If it is not shorted to ground continue to [step 4](#).
4. Exchange the LED Status Board (N5261-60005) with the DC Power LED Board and verify that the LEDs are illuminated. If the LEDs are still *on* replace the DC Power Board. If the LED's are *off* replace the DC Power LED Board (N5261-60005).

Front Panel LEDs R, S or DC Power (green) are not Illuminated

If the N5261/62A fan and power supplies are operating the following procedures can be used to verify the failure. Suspect the Test Set Controller Board (N5261-60006) or Front Panel LED Assembly (N5261-60005).

1. Verify the Test Set I/O cable (8120-6818) is installed correctly. See [“PNA-X and Test Set Rear Panel Connections” on page 30](#).
2. Using the I/O command values [Table 18](#) confirm the port status LEDs are illuminated.
3. Remove the top cover. Verify that the supply LED indicators, on the Test Set control board (N5261-60006), are illuminated.
4. If the LED's are *off*, verify the voltages (+24, +5, +3, -15, -12, +15, +12, +9 and +10 Volt) on the Test Set Controller board. If the voltages are not correct, verify that J10 - J14 cables are connected correctly on both the Power Supply and Controller Board. Refer to [“Fan is not Operating” on page 62](#).
5. Verify at least one of the Controller Board status LED is on. If not, replace the Controller Board (N5261-60006) and consult with [“Agilent Support, Services, and Assistance” on page 79](#) for the replacement procedure.
6. If the Controller Board status LEDs are on and the front panel ACTIVE LED is on, suspect the LED Board (N5261-60005) or the ribbon cable (N5261-60001). Replace if necessary.

Table 18 I/O Command Values for Receiver and Source LEDs

Address & Data ¹	Power On	Port 1	Port 2	Port 3	Port 4
64, 0	on	off	off	off	off
64, 17	on	on	off	off	off
64, 34	on	off	on	off	off
64, 68	on	off	off	on	off
64, 136	on	off	off	off	on

1. If data 0 is sent, the LEDs will turn off.

NOTE In millimeter mode the receivers are always active for all ports, therefore the receiver LED port indicators will always be illuminated. Depending on the ports selected, the source LEDs maybe on or off.

Test Ports are not Switching (RF OUT)

If the test ports are not switching, the following procedures can be used to verify the failure. The procedures assume power supplies, controller board and front panel LEDs are working. Suspect the switch interface board, ribbon cable connection or RF switch.

1. Inspect the ribbon cable connections from the RF switches to the Switch Interface board (N5261-60001). Ensure the RF jumpers (E8356-20072) are installed on SRC1 IN/OUT and SRC2 IN/OUT on the rear panel.
2. Send a Test Set I/O command to verify the path for each port. Refer to [Measure RF OUT](#) on [Page 46](#) and [Table 15 on page 45](#).
3. Substitute a known good switch, or connect a known good wire-harness cable to a suspect switch and retest. Replace if necessary.
4. Measure the switch drive voltage on the Interface board (J60 or J61, Pin 1) for a change in voltage (+13.8 V or -13.0 V), use I/O command in [Table 16 on page 47](#). Replace the interface assembly or confirm that the controller assembly is functioning with LED Port status check.

No LO Output

1. Refer to [Measure the LO OUT and SRC1 & SRC2 RF paths](#) on [Page 44](#). If one or more of the LO ports are working, suspect the power divider. If all of the ports are not working, measure the power supply on the LO preamp or ALC amp. Replace if necessary.

Table 19 Controller Board Connections (N5261-60006)

From: Controller Board	To: Connection
J8	Port Status LED (front panel)
J16	Active LED (front panel)
J10	Power Supply
J11	DC Power Board (J6)
J12	DC Power Board (J9)
J13	Power Supply
J14	Power Supply

Table 20 DC Power Board Connections (N5261-60002)

From: DC Power Board	To: Connection
J1 - J4	Front Panel DC cables (N5262-60001)
J5	Power Supply
J6	Controller Board
J7	n/a
J8	Power Supply
J9	Controller Board

Table 21 Interface Board Connections (N5261-63001)

From: Interface Board	To: Connections
J10	ALC Amp (Port 1 & 2)
J11	ALC Amp (Ports 3 & 4)
J12	LO Preamp (J1)
J13	n/a
J14	LO ALC Amp
J60	RF Switch (Ports 1 & 2)
J61	RF Switch (Ports 3 & 4)
J100	Front Panel Port-4 Test IF Output
J101	Rear Panel (D, IF Output)
J150	Front Panel Port-3 Test IF Output
J151	Rear Panel (C, IF Output)
J200	Front Panel Port-2 Test IF Output
J201	Rear Panel (B, IF Output)
J250	Front Panel Port-1 Test IF Output
J251	Rear Panel (A, IF Output)
J300	Front Panel Port-1 REF Output
J301	Front Panel Port-2 REF Output
J302	Front Panel Port-4 REF Output
J303	Front Panel Port-3 REF Output

Figure 46 N5261A Top View

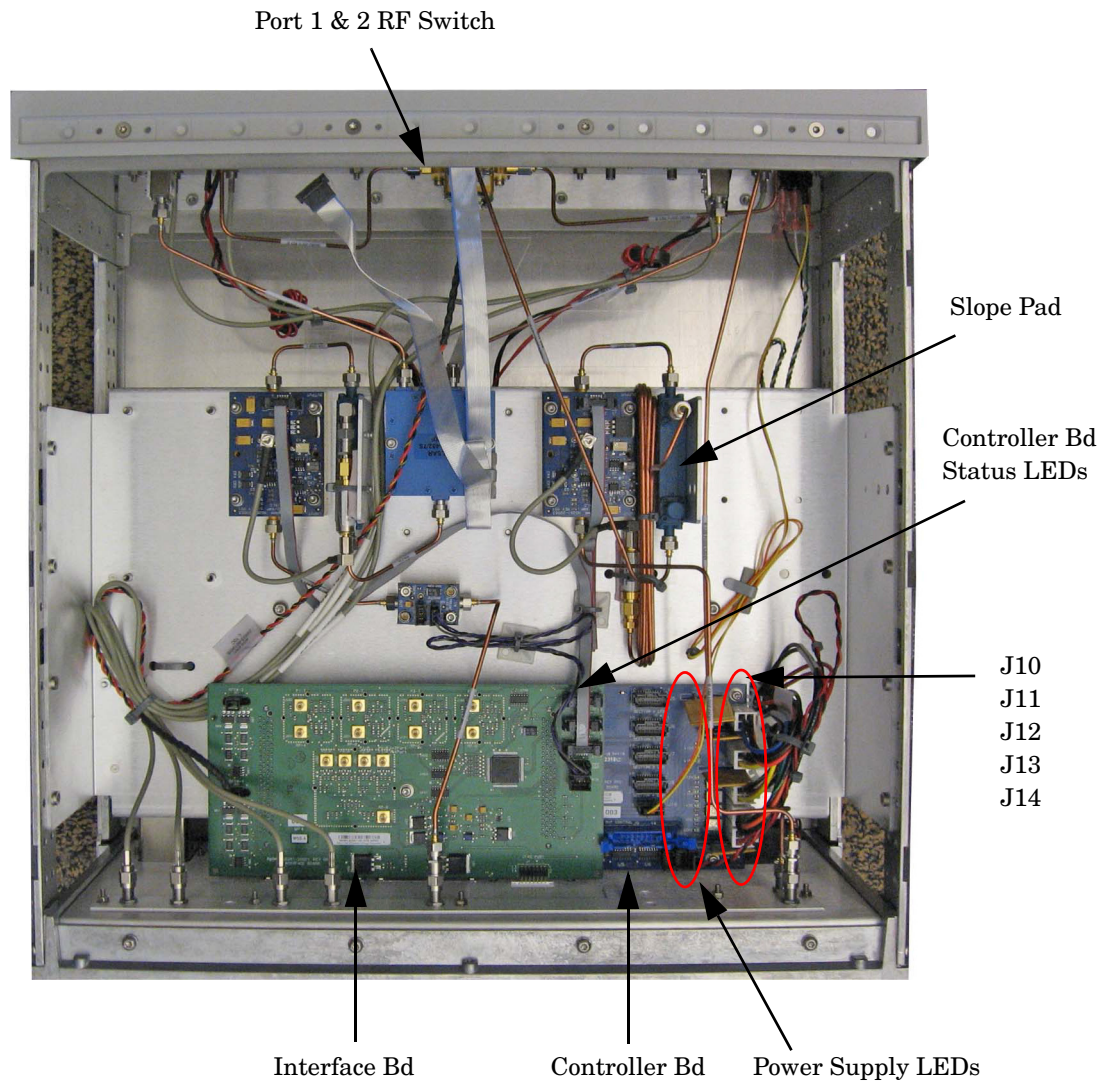


Figure 47 Slope Pad

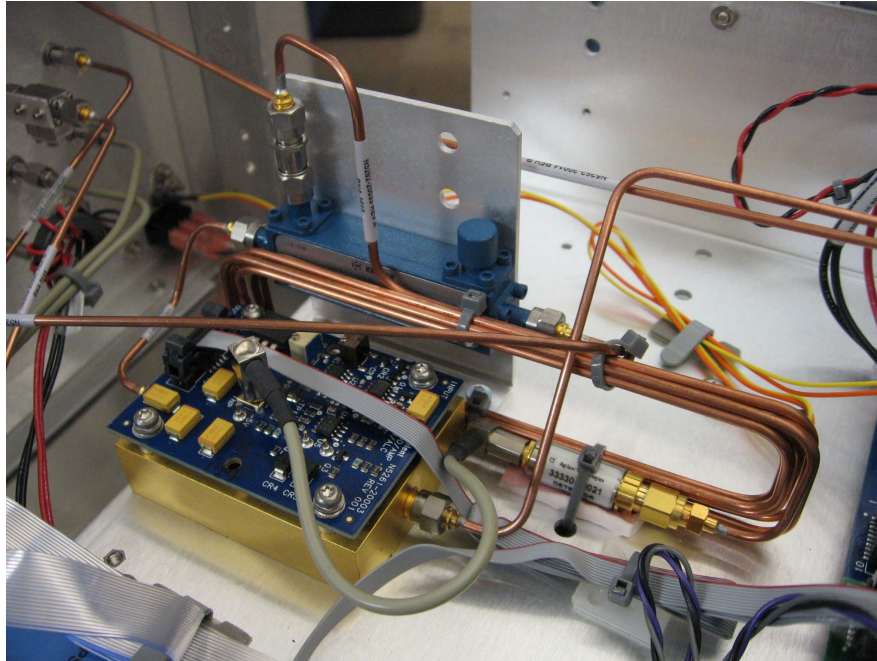


Figure 48 N5261A Top Front View

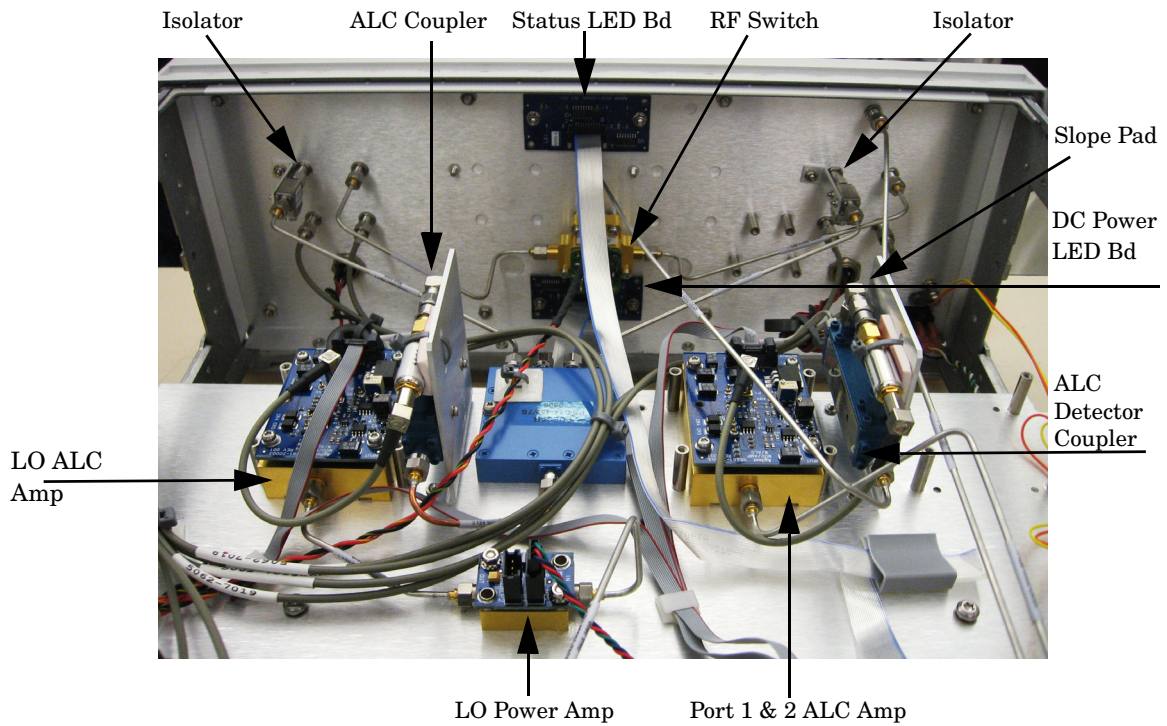


Figure 49 N5262A Top Front View

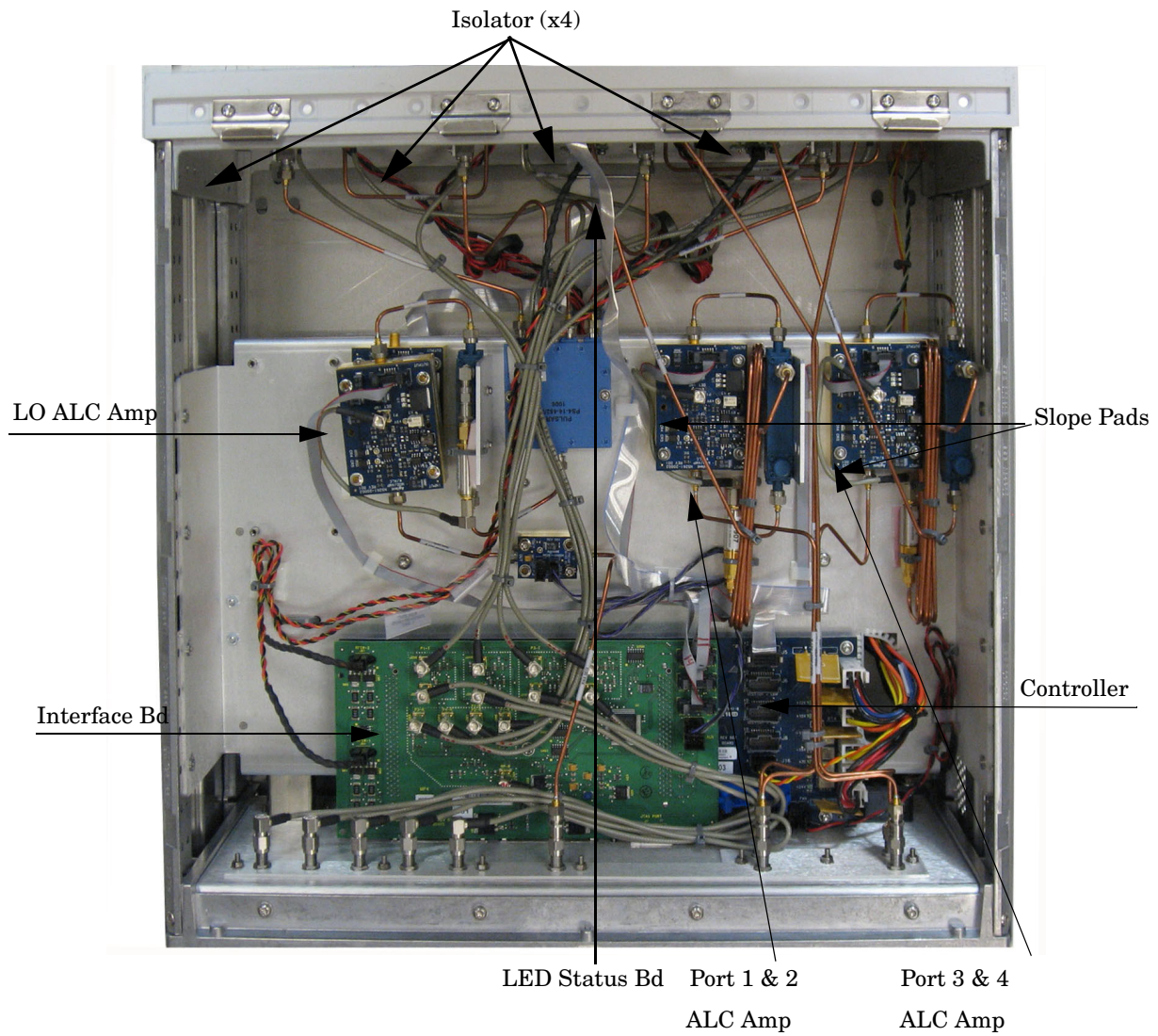
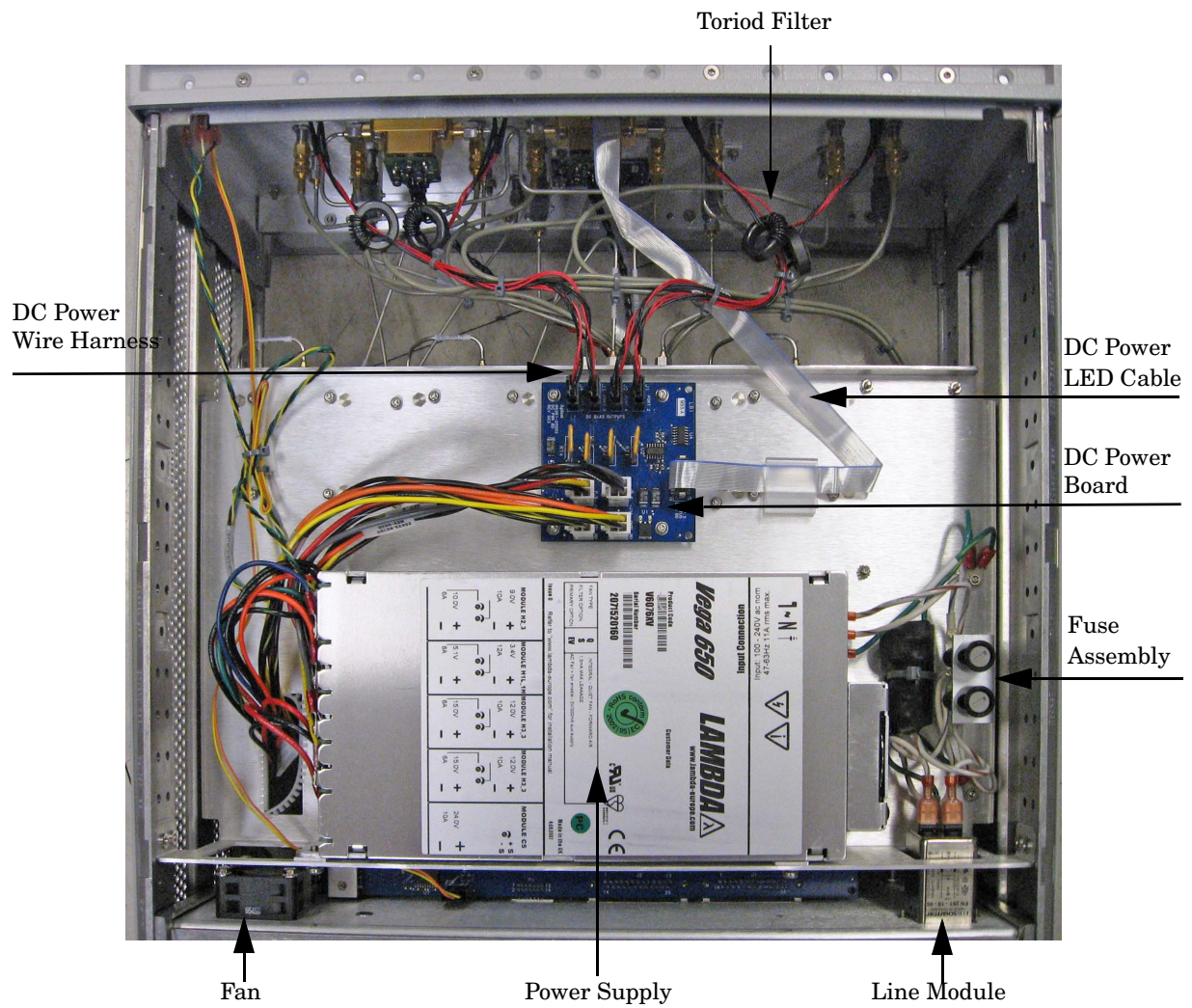


Figure 50 N5262A Bottom View



Service Information

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.

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

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.**

Replaceable Parts

Special options are built to order, so long lead times may be encountered when ordering replacement parts. For parts that are not listed in the following table refer to [“Agilent Support, Services, and Assistance” on page 79](#).

Description	Agilent Part Number
Millimeter Head Interface Bd	N5261-63001
Millimeter Head DC Power Bd	N5261-63002
LED Bd	N5261-63005
Test Set Controller Bd	N5261-60006
4-way Divider	N5262-80003
RF Cable Slope Pad	N5262-20033
Power Supply	0950-4729
Isolator	0955-1595
Buffer Amplifier	5087-7750
Modulator Amplifier	5087-7771
U-wave Attenuator (6 dB)	0955-0243
U-wave Attenuator (3 dB)	0955-0246
Directional Coupler	0955-0148
Reference Switch	5087-7733
Hex Nut	2950-0004
Detector	33330-80021
Lock Washer	2190-0067

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 N5261A and N5262A** 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 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. |
|----------------|--|
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|----------------|---|
| 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. |
|----------------|---|
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- | | |
|----------------|--|
| 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. |
|----------------|--|
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- | | |
|----------------|---|
| 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 | 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 79](#) 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 Maschinenlaermrrordnung-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

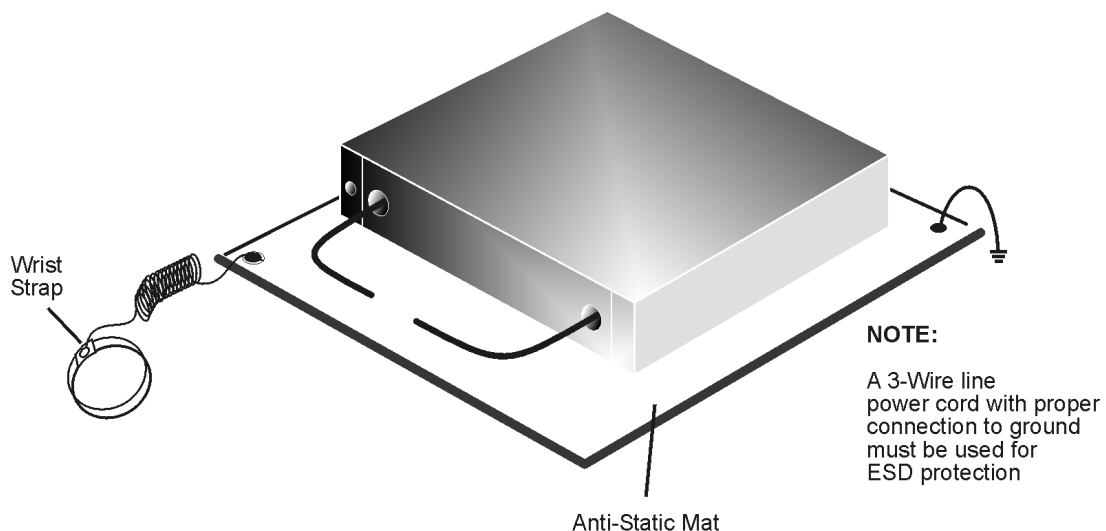
- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme a la norme NMB du Canada.

Electrostatic Discharge Protection

Protection against electrostatic discharge (ESD) is essential while removing assemblies from or connecting cables to the instrument. 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 51 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.

