

Keysight M9260A PXIe Audio Analyzer

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CAUTION

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

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Safety Symbols

The following symbol on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.



Caution, risk of danger (refer to this manual for specific Warning or Caution information)

Safety Considerations

Read the information below before using this instrument.

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards for design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

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.
 - No operator serviceable inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.
 - To prevent electrical shock, disconnect the Keysight Technologies instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally. To clean the connectors, use alcohol in a well ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.
-

CAUTION

- To maintain protection from electric shock and fire, replacement components in mains circuits - including the power transformer, test leads, and input jacks - must be purchased from Keysight. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keysight to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keysight office for information.
 - The maximum working voltage for the M9260A input port is ± 46 Vp while the output port can only source up to ± 10 Vp. Do not exceed the maximum M9260A input voltage to prevent damage to the module.
-

Environmental Conditions

The M9260A is designed for indoor use and in an area with low condensation. The table below shows the general environmental requirements for this instrument.

Environmental condition	Requirement
Temperature	Operating condition
	– 0 °C to 55 °C
	Storage condition
	– –40 °C to 71 °C
Humidity	Operating condition
	– Up to 95% RH at 40 °C (non-condensing)
	Storage condition
	– Up to 90% RH at 65 °C (non-condensing)
Altitude	Up to 3000 m
Pollution degree	2

Regulatory Information

The M9260A complies with the following safety and Electromagnetic Compatibility (EMC) compliances:

Safety compliance

IEC 61010-1/EN 61010-1

EMC compliance

- IEC 61326-1/EN 61326-1 (Immunity for industrial electromagnetic environment)
- Canada: ICES/NMB-001: Issue 4, June 2006
- Australia/New Zealand: AS/NZS CISPR 11

Supplementary information:

- The product was tested in a typical configuration with Keysight Technologies test systems.
- This is a sensitive measurement apparatus by design and may have some performance loss when exposed to ambient continuous electromagnetic phenomenon.

South Korean Class A EMC declaration:

Information to the user:

This equipment has been conformity assessed for use in business environments. In a residential environment this equipment may cause radio interference.

– This EMC statement applies to the equipment only for use in business environment.







사 용 자 안 내 문

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For Class B equipment there is no current statement required.

Regulatory Markings

 <p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.</p>	 <p>This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.</p>
 <p>ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. ISM GRP.1 Class A indicates that this is an Industrial Scientific and Medical Group 1 Class A product.</p>	 <p>The RCM mark is a registered trademark of the Australian Communications and Media Authority.</p>
 <p>This symbol is a South Korean Class A EMC Declaration. This is a Class A instrument suitable for professional use and in electromagnetic environment outside of the home.</p>	 <p>This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.</p>

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product category

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is as shown below.



Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Keysight Service Center, or visit <http://about.keysight.com/en/companyinfo/environment/takeback.shtml> for more information.

Sales and Technical Support

To contact Keysight for sales and technical support, refer to the support links on the following Keysight websites:

- www.keysight.com/find/M9260A
(product-specific information and support, software and documentation updates)
- www.keysight.com/find/assist
(worldwide contact information for repair and service)

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This chapter describes the inspection, installation, and verification of the M9260A PXIe Audio Analyzer.

Introduction

The purpose of this Startup Guide is to describe the processes of inspecting and setting up the Keysight M9260A PXIe Audio Analyzer, installing the required software, and verifying the basic operation of the M9260A module.

If you have any questions after reviewing this information, please contact your local Keysight Technologies representative or contact us through our website at <http://www.keysight.com/find/M9260A>.

Related documentation

The Keysight M9260A PXIe Audio Analyzer documentation listed below can be downloaded for free through our website at <http://www.keysight.com/find/M9260A>. You can check the manual revision on the second page of each manual.

- **Keysight M9260A PXIe Audio Analyzer Startup Guide.** This manual.
- **Keysight M9260A PXIe Audio Analyzer Soft Front Panel Software and Help.** Embedded in the Soft Front Panel software.
- **Keysight M9260A PXIe Audio Analyzer Programming Guide.** For IVI-COM console applications.
- **Keysight M9260A PXIe Audio Analyzer LabVIEW G Drivers Help.**
- **Keysight M9260A PXIe Audio Analyzer Data Sheet.**
- **Keysight M9260A PXIe Audio Analyzer Service Guide.**

Step 1: Unpack and Inspect the Module

CAUTION

The M9260A PXIe Audio Analyzer is shipped in materials which prevent damage from static. The module should only be removed from the packaging in an anti-static area after ensuring that correct anti-static precautions are taken. Store all modules in anti-static envelopes when not in use.

ESD precaution

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station.

The following are the recommended ESD accessories and can be purchased from your local supplier.

- Conductive table mat with wrist-strap combination.
- Conductive floor mat with heel-strap combination.

Both types, when used together, provide a significant level of ESD protection. Of the two, only the table mat with wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 Ω of isolation from ground.

Figure 1-1 shows an example of a static-safe work station using both types of ESD protection: conductive table mat with wrist-strap combination, and conductive floor mat with heel-strap combination.

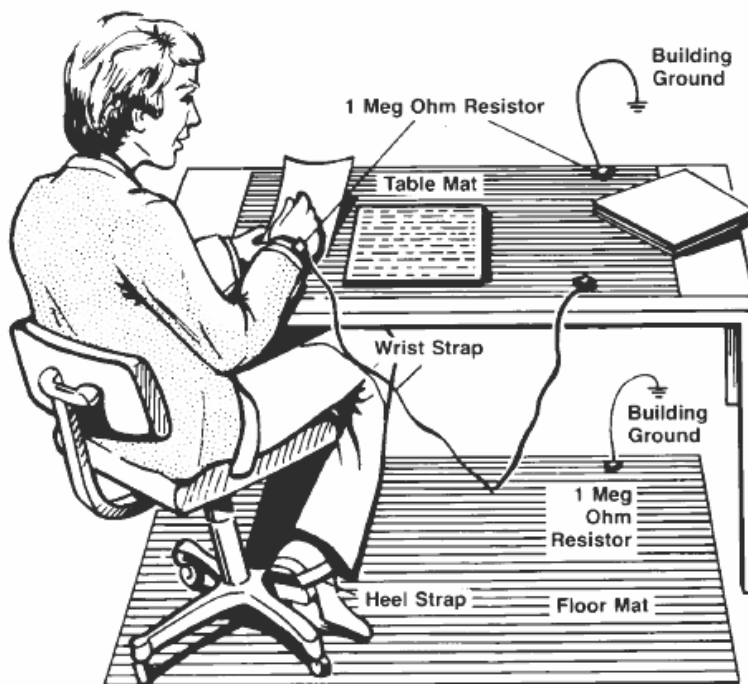


Figure 1-1 Example of a static-safe work station

WARNING

These techniques for a static-safe work station should not be used when working on circuitry with a voltage potential greater than 500 V.

Inspect the module for damage

Unpack the M9260A module from the shipping container. Keep the plastic port protectors and the shipping container for possible reuse.

After unpacking the M9260A module, carefully inspect the unit for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty.

The warranty also does not cover:

- Damage from contamination
- Normal wear and tear of mechanical components
- Manuals or fuses

CAUTION

To avoid damage when handling the M9260A module, do not touch the exposed connector pins.

NOTE

Information on preventing damage to your Keysight equipment can be found at www.keysight.com/find/tips.

Return the module for service

Should it become necessary to return the M9260A for repair or service, follow the steps below:

- 1 Review the warranty information shipped with your product.
- 2 Contact Keysight to obtain a Return Material Authorization (RMA) and return address. If you need assistance finding Keysight's contact information, go to www.keysight.com/find/assist (worldwide contact information for repair and service) or refer to the Support information on the product website at www.keysight.com/find/M9260A.
- 3 Write the following information on a tag and attach it to the defective M9260A.
 - Name and address of owner. A P.O. box is not acceptable as a return address.
 - Product model number (for example, M9260A).
 - Product serial number (for example, MYXXXXXXXX). The serial number label is located on the side panel of the module. The serial number can also be read from the Soft Front Panel interface, but only after the software is installed.
 - Description of failure or service required.
- 4 Carefully pack the module in its original ESD bag and packing carton. If the original carton is not available, use bubble wrap or packing peanuts and place the instrument in a sealed container and mark the container **"FRAGILE"**.
- 5 On the shipping label, write **"ATTENTION REPAIR DEPARTMENT"** and the RMA number.

NOTE

Refer to the product by its serial number and model number if any correspondence is required.

Step 2: Verify the Shipment Contents

The following items are included in the M9260A shipment:

- M9260A PXIe Audio Analyzer module
- Certificate of Calibration

NOTE

All software and product information files can be downloaded for free at www.keysight.com/find/M9260A.

Step 3: Install the Controller and Software

System requirements

The following table lists the minimum system requirements for Keysight IO Libraries Suite and controllers. In general, any x86 or x64 (except Itanium) architecture should work but there may be a significant decrease in performance if the processor speed is below the minimum requirements.

Table 1-1 System requirements

Operating system	Windows® 7 SP1 (32 or 64-bit) or higher
Processor speed	<ul style="list-style-type: none"> – 1.5 GHz (x86 and x64) or higher – Itanium 64 is not supported
Available memory	2 GB minimum
Available hard-disk space^[a]	2 GB available hard-disk space
Display Resolution	1024 × 768
Input Device	Mouse or a compatible pointing device
Browser	Microsoft® Internet Explorer 7 or greater
Chassis	A PXIe or PXI-H chassis peripheral slot
Embedded Controller	A Keysight embedded controller running one of the above operating systems. Note: The embedded controller must be compatible with the Keysight chassis.
Remote Controller	A desktop/laptop PC running one of the above operating systems and a Keysight interface cable (e.g. Y1202) with PCIe (desktop) or ExpressCard (laptop) interface card.

[a] Because of the installation procedures, less memory may be required for the operation than is required for the installation.

Set up the controller

The following steps describe setting up the remote controller:

- 1** Install a compatible PCIe adapter in the PC.
- 2** Connect your I/O peripherals (mouse, keyboard, and monitor) to the PC.
- 3** Connect a compatible interface cable (e.g. Keysight Y1202) from the PC to the PXIe chassis.
- 4** Power up the PXIe chassis.
- 5** Power up the PC and install the PCIe adapter drivers.

CAUTION

- During startup, power up the chassis **before** you power up the PC.
 - During shutdown, power down the PC **before** you power down the chassis.
-

The following steps describe setting up the embedded controller:

- 1** Install the embedded controller module into a compatible PXIe chassis.
- 2** Connect your I/O peripherals (mouse, keyboard, and monitor) to the embedded controller module.
- 3** Power up the PXIe chassis.

NOTE

Do not install the M9260A module in the PXIe chassis yet. The software must be installed first to allow the Keysight IO Libraries Connection Expert software to detect the M9260A module.

Install the software

Install the software for the M9260A PXIe Audio Analyzer. The latest software revision can be downloaded for free at www.keysight.com/find/M9260A.

The M9260A software consists of the following:

- Keysight IO Libraries Suite (IOLS), which includes the Keysight Connection Expert.
- Soft Front Panel (SFP), device drivers (IVI-C, IVI-COM, LabVIEW G), and related user documentation for the M9260A.

NOTE

Every PXIe module comes with its own device driver (IVI-C, IVI-COM, LabVIEW G), and soft front panel (SFP) software.

- 1 Download and launch the M9260A software installer.
- 2 Follow the installer prompts to install all software and documentation for the M9260A PXIe Audio Analyzer.

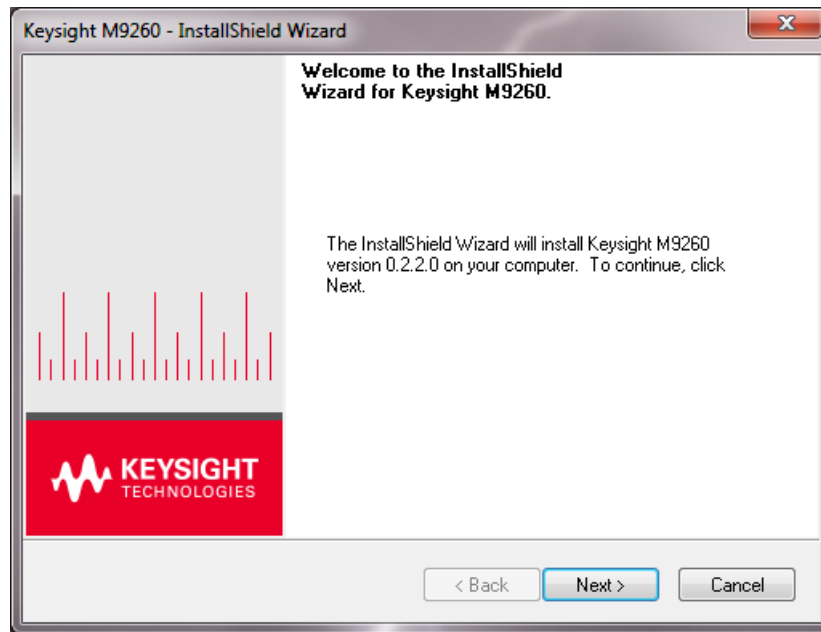


Figure 1-2 InstallShield Wizard for Keysight M9260A

- 3** Once installation is complete, power down the PC and the PXIe chassis.

Step 4: Install the Module

CAUTION

- The PXIe hardware does not support “hot-swapping” capabilities (changing modules while power is applied to the chassis).
- Before installing the M9260A module into the chassis, ensure that the chassis is powered off and unplugged to prevent damage to the module.

NOTE

The M9260A module can be used in a chassis with a PXIe or PXI-H chassis peripheral slot.

3

The module can be installed in any PXIe slot marked with a peripheral slot compatibility image (a solid circle containing the slot number).

7^H

The module can also be installed in any hybrid PXI slot marked with a peripheral slot compatibility image (the letter “H” and a solid circle containing the slot number).

- 1 Ensure that the PXIe chassis power switch is at the Off (Standby) position and the chassis power cable is unplugged.
- 2 If the chassis has multiple fan speed settings, ensure that the fans are set to automatic. Do not set the fan speed to low or turn it off.
- 3 Position the chassis so that there is ample space between the chassis fan intake and exhaust vents. Blockage by walls or obstructions affect the air flow needed for cooling. (Refer to the chassis documentation for more information about cooling).

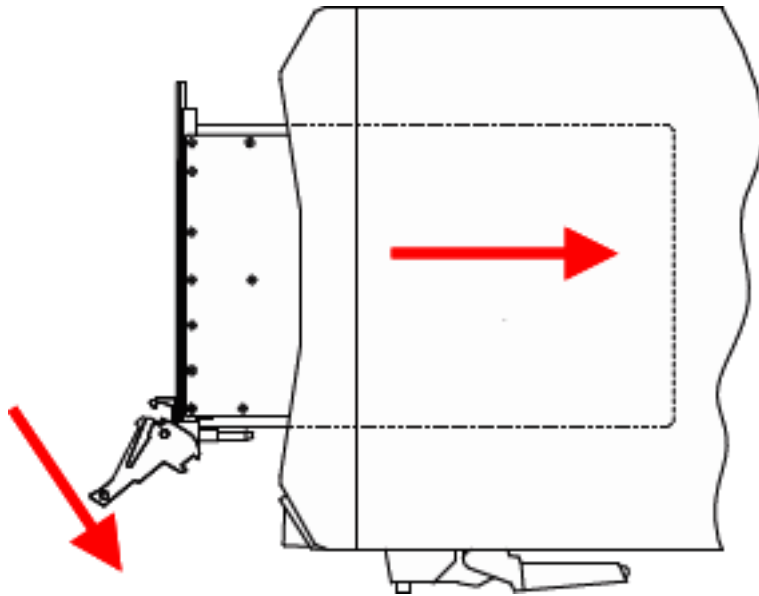


Figure 1-3 Installing the module to the chassis

- 4** Hold the module by the injector/ejector handle, and slide it into an available PXIe or hybrid slot, as shown in [Figure 1-3](#).
 - Install the module into the PXIe slot of the chassis by placing the module card edges into the front module guides (top and bottom).
 - Slide the module to the rear of the chassis and ensure that the injector/ejector handle is pushed down in the unlatched (downward) position.
 - Slide the module completely into the chassis.
 - When you begin to feel resistance, push up on the injector/ejector handle to fully seat the module into the chassis.
- 5** Latch the module by pulling up on the injector/ejector handle and secure the front panel to the chassis using the module front-panel mounting screws.
- 6** Tighten the screws on the module front panel. Performance may suffer if the screws are not tightened properly.

1 Inspection, Installation, and Verification

- 7 Verify that the PXle chassis fans are operable and free of dust that may restrict airflow.
- 8 Install all chassis covers and filler panels after installing the module. Missing filler panels may disrupt necessary air circulation in the chassis.
- 9 Plug in the power cable and power up the PXle chassis.

WARNING

Tighten the screws on the module front panel. Protection provided by the equipment could be impaired if the screws are not tightened properly.

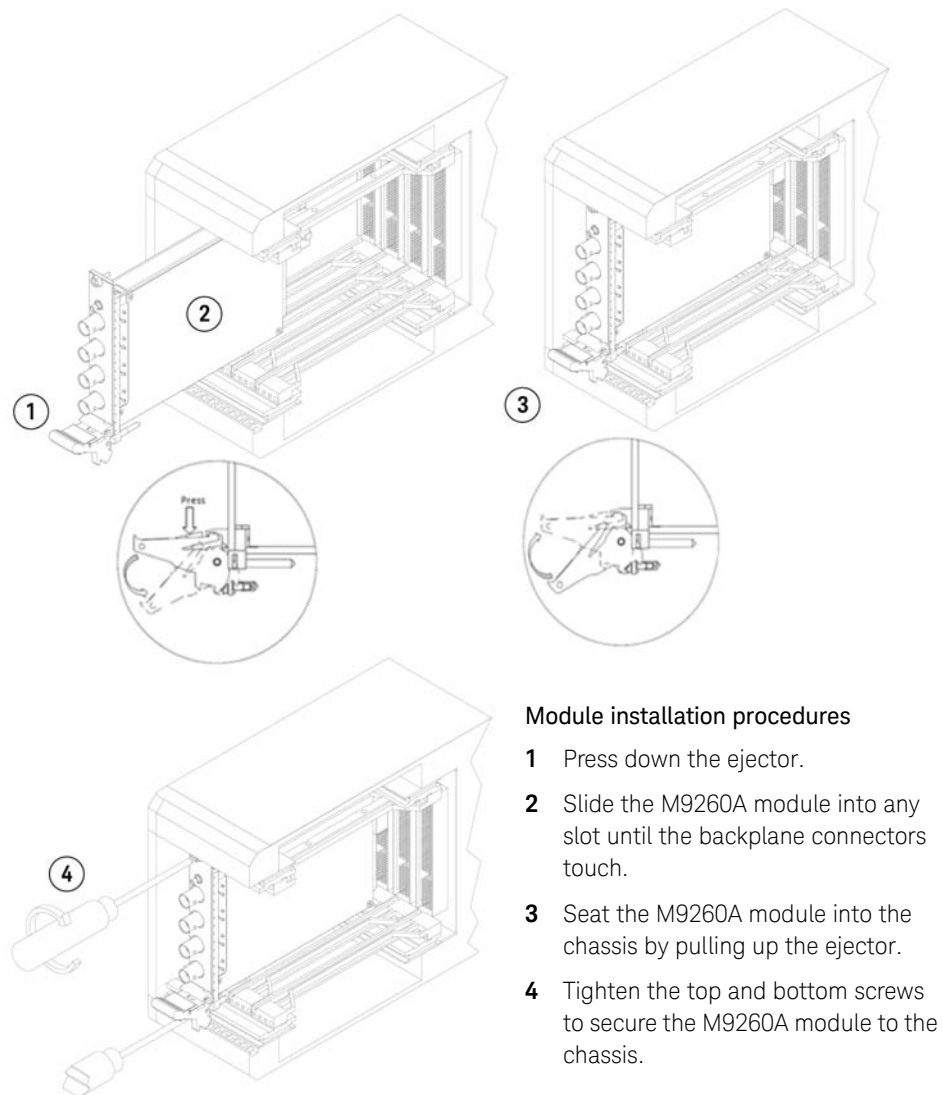


Figure 1-4 Module installation procedures

M9260A front panel

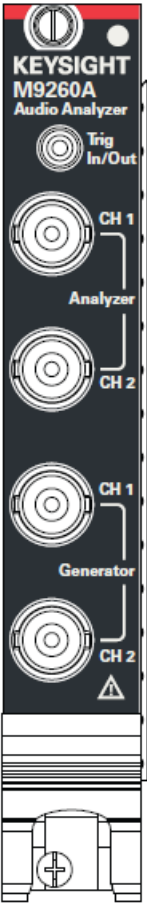


Figure 1-5 M9260A PXIe Audio Analyzer front panel

M9260A audio analyzer functional block diagram

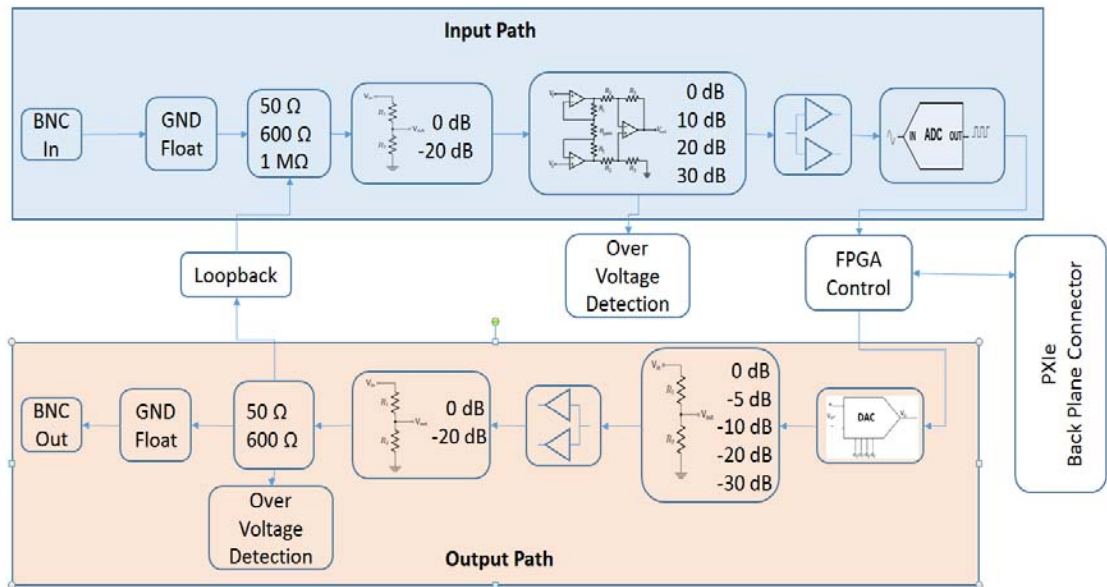


Figure 1-6 M9260A functional block diagram

Step 5: Verify the Operation of the M9260A Module

The purpose of the verification procedure for the M9260A is to ensure that the module is operating within its specifications.

The verification procedure is run using the M9260A Soft Front Panel (SFP) software included with this product. Launch the M9260A SFP by clicking its desktop shortcut icon or by clicking:

- **Start > All Programs > Keysight M9260 PXIe Module > M9260 SFP (Windows 7)**

The M9260 SFP module selection interface will display all modules that are connected and installed. Review the configuration data and launch the M9260A SFP.

The M9260A SFP will provide control over the module for operational verification procedures. A screen capture of the SFP interface is shown in [Figure 1-7](#).

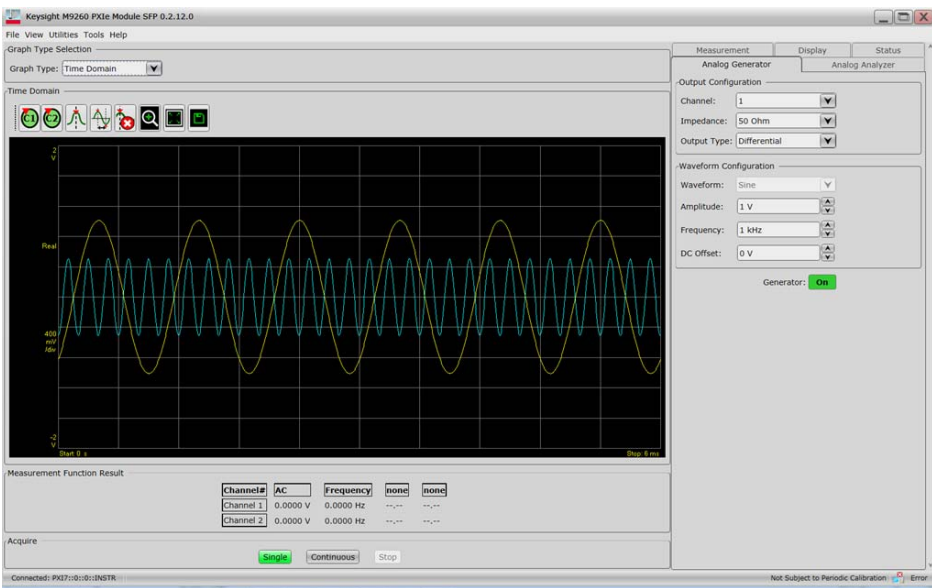


Figure 1-7 M9260A SFP interface

NOTE

- The SFP can be used as a learning tool to help you experience the module's capability and behavior through an easy-to-use GUI.
 - Refer to the Keysight M9260A Soft Front Panel Help for details on how to use the SFP software.
-

Conduct operational verification (optional)

The verification procedure in this section helps to ensure the M9260A module is operational. No external equipment is required except for two BNC to BNC cables to enable loopback configuration from the audio generator outputs to the audio analyzer inputs.

M9260A operational verification procedure

The M9260A verification procedure involves measuring the Vac, Frequency, THD+N, and THD parameters. The average value from the measured data samples will then be calculated. The measurement results (average) are then compared to the known values output from the audio generator.

- 1 Launch the M9260A Soft Front Panel (SFP).
- 2 Connect the Generator CH1 output to the Analyzer CH1 input, and the Generator CH2 output to the Analyzer CH2 input using BNC cables as shown in [Figure 1-8](#).

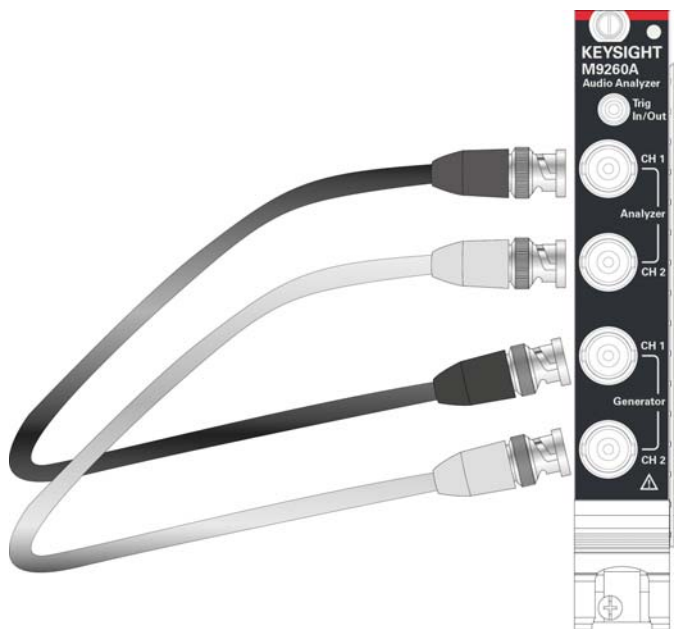


Figure 1-8 Connecting the BNC-BNC cables from the generator outputs to the analyzer inputs

- 3 Configure the M9260A PXIe Audio Analyzer using the SFP based on the settings in the following table and figures.

Table 1-2 Configuration for M9260A audio analyzer

Function	Parameter	Setting
Analog Generator	Channels	1 & 2 (Configure one channel at a time)
	Impedance	50 Ω
	Output	Differential
	Waveform	Sine
	Amplitude	1 Vp
	Frequency	1 kHz
	DC Offset	0 V
Analog Analyzer	Channels	1 & 2 (Configure one channel at a time)
	Range	1 Vp
	Connection	BNC
	Input	Differential
	Impedance	1 M Ω
	Coupling	DC
	Sample Size	32768
	Sampling Rate	192 kHz
Measurement	Function 1	AC
	Function 2	Frequency
	Function 3	THDN-Ratio
	Function 4	THD-Ratio
	Low Pass Filter (LPF)	20 kHz
	High Pass Filter (HPF)	20 Hz
	Weighting	None

The screenshot shows the 'Analog Generator' configuration window. It has three tabs at the top: 'Measurement', 'Display', and 'Status'. The 'Analog Generator' tab is selected. Below the tabs, there are two main sections: 'Output Configuration' and 'Waveform Configuration'. In the 'Output Configuration' section, 'Channel' is set to 1, 'Impedance' is 50 Ohm, and 'Output Type' is Differential. In the 'Waveform Configuration' section, 'Waveform' is Sine, 'Amplitude' is 1 V, 'Frequency' is 1 kHz, and 'DC Offset' is 0 V. Each parameter has a dropdown menu or a numeric input field with up/down arrows.

Section	Parameter	Value
Output Configuration	Channel	1
	Impedance	50 Ohm
	Output Type	Differential
Waveform Configuration	Waveform	Sine
	Amplitude	1 V
	Frequency	1 kHz
	DC Offset	0 V

Figure 1-9 Configuring the Analog Generator

The screenshot shows the 'Analog Analyzer' configuration window. It has three tabs at the top: 'Measurement', 'Display', and 'Status'. The 'Analog Analyzer' tab is selected. Below the tabs, there is an 'Input Configuration' section. In this section, 'Channel' is 1, 'Range' is 1V, and 'Connection' is BNC. There are two radio buttons for 'Loopback Source': 'Channel 1' (selected) and 'Channel 2'. Below these are 'Input Type' (Differential), 'Impedance' (1M Ohm), 'Coupling' (DC), 'Sample Size' (32768), and 'Sampling Rate' (192 kHz). Each parameter has a dropdown menu or a numeric input field with up/down arrows.

Section	Parameter	Value
Input Configuration	Channel	1
	Range	1V
	Connection	BNC
	Loopback Source	Channel 1
	Input Type	Differential
	Impedance	1M Ohm
	Coupling	DC
	Sample Size	32768
	Sampling Rate	192 kHz

Figure 1-10 Configuring the Analog Analyzer

The screenshot shows the 'Analog Analyzer' tab with the 'Measurement' sub-tab selected. It displays four measurement functions, each with a dropdown for the function and a dropdown for the unit. Below these is a 'Filter Configuration' section with dropdowns for Low Pass Filter (LPF), High Pass Filter (HPF), and Weighting. A checkbox at the bottom indicates 'Functions Measurement Enabled' is checked.

Function	Unit
Function 1: AC	V
Function 2: Frequency	Hz
Function 3: THDN-Ratio	dB
Function 4: THD-Ratio	dB

Filter Configuration:

- Low Pass Filter (LPF): 20kHz
- High Pass Filter (HPF): 20Hz
- Weighting: none

☒ Functions Measurement Enabled

Figure 1-11 Configuring the Measurement

- 4 On the Analog Generator tab, turn on the generator by clicking Generator: **Off** so that it becomes Generator: **On**.
- 5 On the Acquire section, select **Continuous** to initiate the audio analyzer to acquire data and perform the measurement. The results will be displayed under the Measurement Function Result section. [Figure 1-12](#) shows the Acquire and Measurement Function Result section.

The screenshot shows the 'Measurement Function Result' section with a table of results for two channels. Below this is the 'Acquire' section with three buttons: 'Single', 'Continuous' (highlighted in green), and 'Stop'.

Channel#	AC	Frequency	THDN-Ratio	THD-Ratio
Channel 1	0.7113 V	1000.0000 Hz	-91.0844 dB	-111.2980 dB
Channel 2	0.7116 V	1000.0000 Hz	-91.0332 dB	-111.6922 dB

Acquire:

Figure 1-12 Initiating M9260A audio analyzer data acquisition

- 6** Compare the measured values to the accuracy values as stipulated in [Table 1-3](#).
- 7** Repeat **Step 3** to **Step 6** using different output amplitude and input range values for all voltage ranges and channels. Refer to [Table 1-3](#) for the suggested output amplitude and input range values.

Table 1-3 Operational verification table

Output Amplitude	Input Range	Measurement	Low Limit	High Limit
0.316 V	0.32 V	Vac	0.2123 V	0.2346 V
		Freq	999.998 Hz	1000.02 Hz
		THD+N		< -103 dB
		THD		< -110 dB
1 V	1 V	Vac	0.7000 V	0.7142 V
		Freq	999.998 Hz	1000.02 Hz
		THD+N		< -103 dB
		THD		< -110 dB
3.16 V	3.2 V	Vac	2.2121 V	2.2568 V
		Freq	999.998 Hz	1000.02 Hz
		THD+N		< -103 dB
		THD		< -110 dB
10 V	10 V	Vac	7.0004 V	7.1418 V
		Freq	999.998 Hz	1000.02 Hz
		THD+N		< -103dB
		THD		< -110 dB
	32 V	Vac	7.0004 V	7.1418 V
		Freq	999.998 Hz	1000.02 Hz
		THD+N		< -95 dB
		THD		< -105 dB
	46 V	Vac	7.0004 V	7.1418 V

Table 1-3 Operational verification table (continued)

Output Amplitude	Input Range	Measurement	Low Limit	High Limit
10 V	46 V	Freq	999.998 Hz	1000.02 Hz
		THD+N		< -90 dB
		THD		< -105 dB

- 8** If any of the values are out of range, refer to “Return the module for service” on page 22 for details on sending the module back to Keysight Technologies for service.

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2 Characteristics and Specifications

For the characteristics and specifications of the M9260A PXIe Audio Analyzer, refer to the datasheet at

<http://literature.cdn.keysight.com/litweb/pdf/5992-1918EN.pdf>.

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This information is subject to change without notice. Always refer to the Keysight website for the latest revision.

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