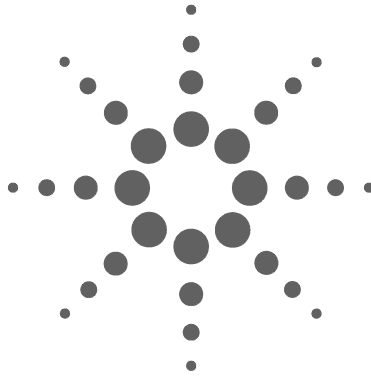




Agilent N4219B Packet Analysis Probe for Serial ATA

User's Guide



Agilent Technologies

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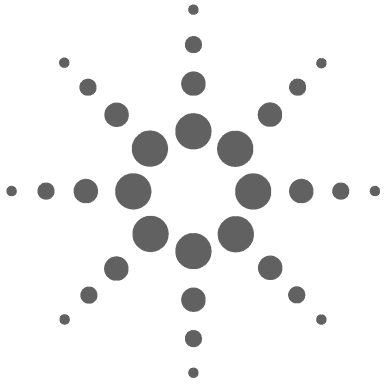
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1 Equipment and Requirements



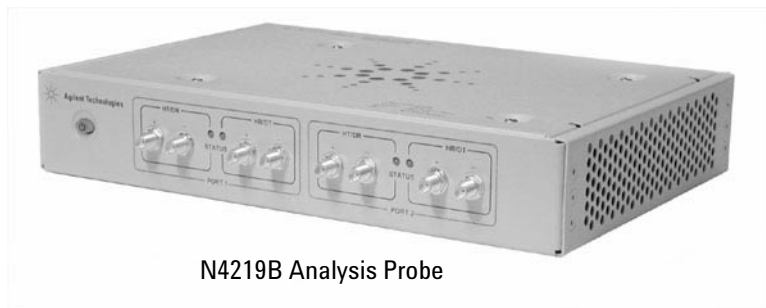
Equipment Supplied

This section lists equipment supplied with the analysis probe and equipment requirements for using the analysis probe.

The equipment supplied with the analysis probe is listed below:

- Agilent N4219B analysis probe.
- Logic analyzer configuration files, and Serial ATA tool software on CD-ROM.
- This *User's Guide*.
- Power supply.
- Power cord for the analysis probe.

If the cord you received is not appropriate for your electrical power outlet type, contact your Agilent Technologies sales and service office. Use only the power cord supplied with the analysis probe.



N4219B Analysis Probe



Power Cord



Power Supply

Additional Equipment Required

In addition to the items supplied with the analysis probe, you need all of the following items:

- One Agilent N4218A interposer per port, up to two total.



- An Agilent 16900-series logic analysis system or an Agilent 1680/90-series logic analyzer, with 68 channels per port for bidirectional analysis.
- Two 100-pin probe cables per port, up to four total. (Agilent E5385A or E5378A, as appropriate for your logic analyzer card.)



Bench Space for the Analysis Probe

Take care to allow space for the analysis probe be placed near the target system and the logic analysis system.

Allow at least 12 cm (4.5 in) clearance behind the analysis probe for connecting the logic analyzer cables.

Allow at least 9 cm (3.5 in) clearance in front of the analysis probe for connecting the interposer cables.

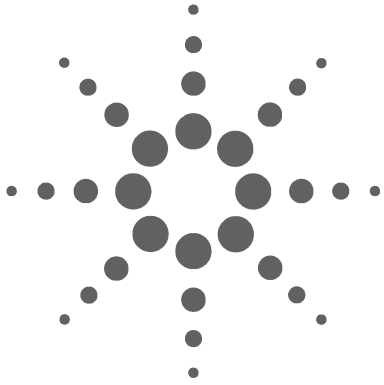
Allow at least 5 cm (2 in) clearance on both sides of the analysis probe for proper cooling.

CAUTION

Do not block the airflow holes on the sides of the analysis probe box. Blocked airflow may cause overheating and equipment damage

Position the analysis probe and power supply so that it is not difficult to unplug the power cord.

See "Mechanical Characteristics" on page 33 for the dimensions of the analysis probe.



2 Connecting the Analysis Probe



Installing Logic Analyzer Cards

You should install logic analyzer cards into your logic analysis system before you install software.

Refer to the *Installation Guide* for your logic analysis system for more information.

Deciding how many logic analyzer cards to use

To capture complete information about traffic in both directions of a Serial ATA link, you need one card. When you load a configuration file, the card will be split into two modules, one for each direction of traffic.

If you are using both ports of the analysis probe (to capture traffic on two Serial ATA links), you need two cards. These cards should be installed separately, *not* connected together as a pair. The two cards may be of different types.

Connecting the Analysis Probe to a Serial ATA Link

This section describes:

- Connecting the analysis probe to a power source.
- Inserting the interposer into a Serial ATA link.
- Connecting the interposer to the analysis probe.
- Connecting the logic analyzer to the analysis probe.

To connect the analysis probe to a power source

The analysis probe is shipped from the factory with a power supply and cord appropriate for your country. If the cord you received is not appropriate for your electrical power outlet type, contact your Agilent Technologies sales and service office.

Position the analysis probe and power supply so that it is not difficult to unplug the power cord.

2 Connecting the Analysis Probe

WARNING



Maintain ground to avoid electrical shock. Use only the power supply and power cord supplied with the analysis probe. Connect the power cord only to a properly grounded electrical power outlet.

- 1 Connect the power cord to the power supply and to a socket outlet.



- 2 Connect the 12V power cord to the back of the analysis probe.



Ensure the power supply plug is completely seated in the power input receptacle.

To turn power ON

- Press the power button on the front of the analysis probe.



The power button is lighted when the switch is ON.

It is best to power on the analysis probe *before* loading a configuration file into the logic analysis system.

You may turn the analysis probe on before or after the logic analysis system is turned on. You may connect and disconnect the Serial ATA cables and the logic analyzer pods while the analysis probe and logic analyzer are powered on.

When you turn on the analysis probe, self-test and calibration will take about 45 seconds.

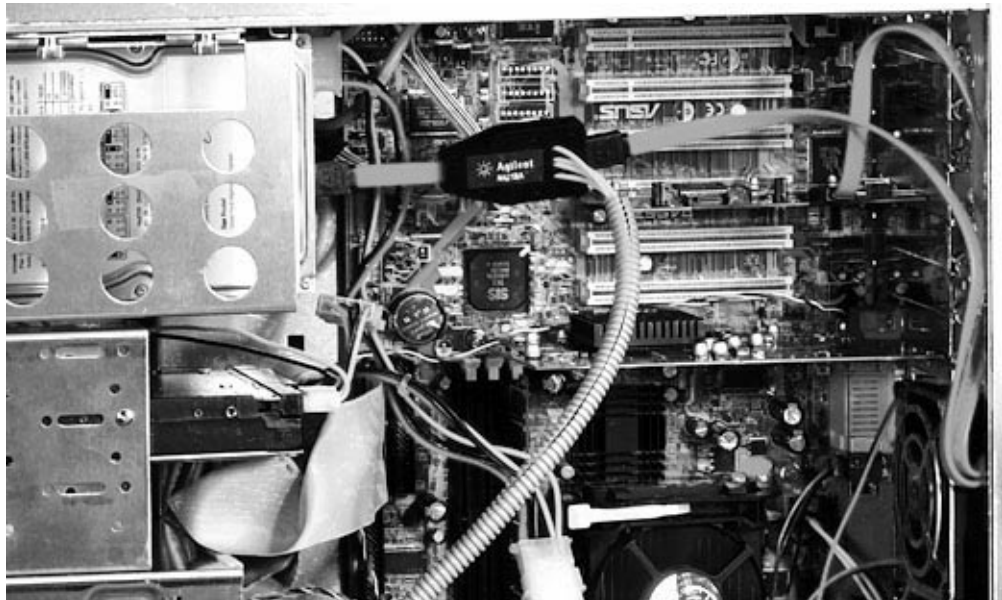
To turn power OFF

- Press the power button on the front of the analysis probe.

To insert the interposer into a Serial ATA link

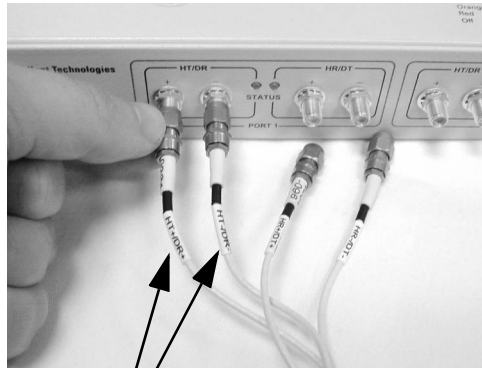
You can plug the interposer into the Serial ATA link wherever it fits best.

- 1 Disconnect the Serial ATA cable at either the host (computer) or device (disk drive) end.
- 2 Plug the N4218A Serial ATA cable into the interposer.
- 3 Plug the interposer into the connector on your host or device.



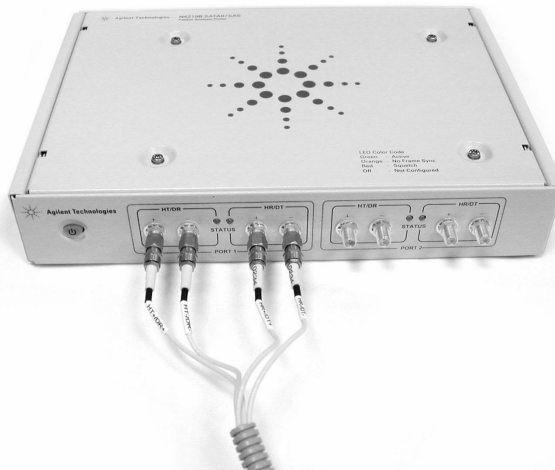
To connect the interposer to the analysis probe

- Connect each of the 4 cables from the interposer to the matching connector on the analysis probe. Refer to the labels on the cables. Use your fingers to tighten the connections.



Labels

The labels indicate the positive and negative sides of each signal pair. For example, “HR+/DT+” is the positive side of the differential pair which carries traffic from the device to the host (Host Receive/Device Transmit).

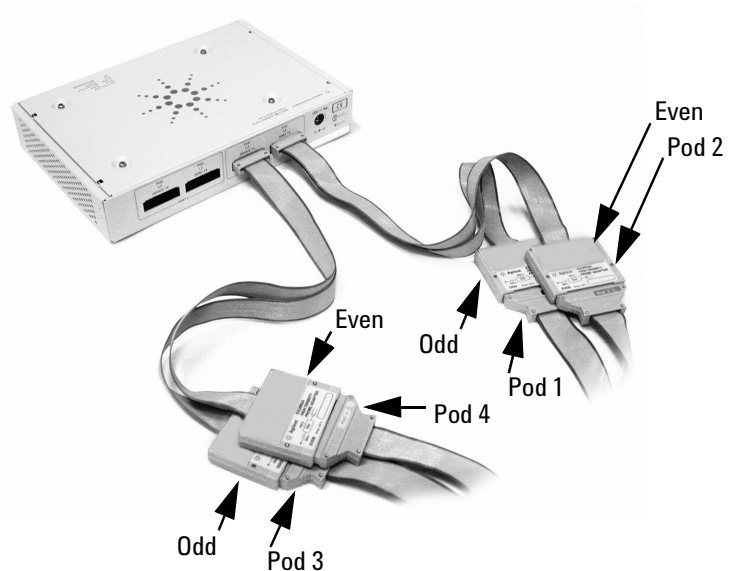


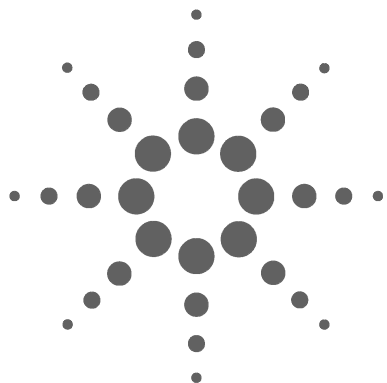
To connect the logic analyzer to the analysis probe

- 1 Connect the 100-pin probe cables to the connectors on the back of the analysis probe, according to the label.



- 2 Connect one 100-pin probe cable to each pair of cables coming from the logic analyzer.





3 Configuring a 16900-Series Logic Analysis System

CAUTION

Initially set up the tools and the analyzer bus/signal definitions by loading a configuration file. Do not attempt to change the bus/signal names using the **Setup>Bus/Signal** dialog. To control what data is displayed, use the configuration options in the packet decoder tool.



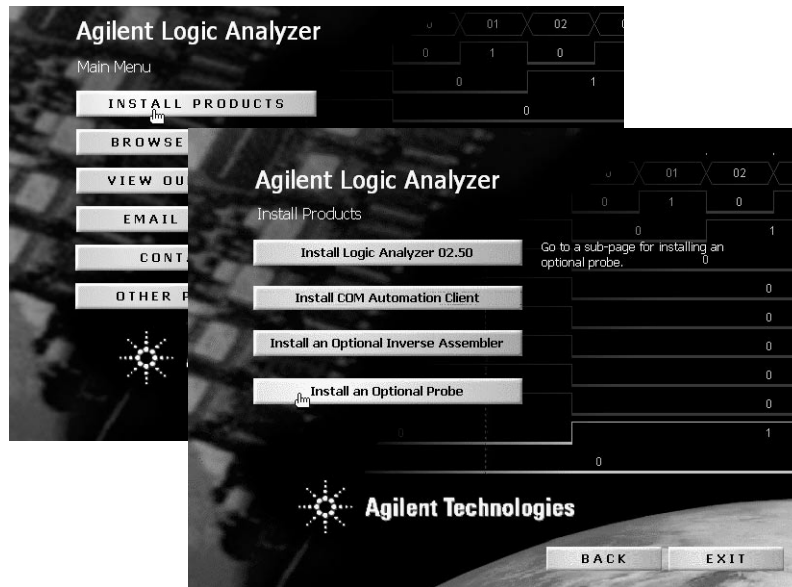
Installing Logic Analyzer Cards

You should install logic analyzer cards into your logic analysis system before you install software. For Serial ATA analysis, there is no need to physically connect the cards together to create a multi-card module.

Refer to the Agilent Technologies *16900-Series Logic Analysis Systems Installation Guide* for instructions on installing the logic analyzer cards.

Installing the Software

- 1 Insert the product CD and select **Install Products>Install an Optional Probe>Install Serial ATA Packet Analysis Probe**, then follow the instructions which are displayed.



- 2 Follow the instructions on the Entitlement certificate to install the license for the software. For more information, go to the Index tab in the online help and click "license."

Loading Configuration Files

You configure the logic analyzer by loading a configuration file. The information in the configuration file includes:

- Signal/bus names and channel assignments for the logic analyzer.
- Tool configuration including logic analyzers, probes, packet decoders, and Listing displays.

To load a provided configuration file

- 1 Close the logic analyzer window, if it is open.
- 2 Select **Start>Programs>Agilent Logic Analyzer>Agilent Serial ATA Default Configs**.
- 3 Click on the configuration you want:

Load N4219B 1 Port, 2 Directions (1 Split Analyzer) for analyzing one Serial ATA link, one or both directions.

Load N4219B 2 Ports, 2 Directions each (2 Split Analyzers) for analyzing two Serial ATA links.

When you click on a configuration file, the logic analyzer software will start and configure itself to use the Serial ATA probe.

To load a provided configuration file without restarting the logic analyzer software

- 1 Select **File>Open....**
- 2 Navigate to the configuration file.

The location may vary depending on your operating system. For Windows 2000 the default location is:

C:\Documents and Settings\All Users\Documents\Agilent Technologies\Logic Analyzer\Default Configs\Agilent\N4219B\

- 3 Select the file and click **Open**.

To save a configuration file

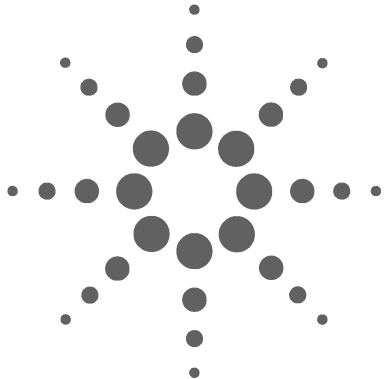
The provided configuration file is read-only. If you modify the configuration and want to save your work, select **File>Save As...** and save the configuration with a new name.

Configuring Signal Thresholds

CAUTION

Do not change the signal thresholds.

Remember that the logic analyzer is connected to the analysis probe. Changing these parameters will only disrupt the communication between the analysis probe and the logic analyzer—it will not affect how the analysis probe acquires Serial ATA signals.



4 Making Measurements

After you have connected the analysis probe and loaded a configuration file, follow these steps to make a measurement:

- 1** Calibrate the analysis probe
- 2** Set preferences
- 3** Set up the logic analyzer to trigger on Serial ATA packets
- 4** Run the measurement
- 5** View the Listing display.
- 6** Use the Packet Decode tool or the Filter/Colorize tool to hide or highlight information in the Listing display.

Detailed information about these tasks is in the online help.

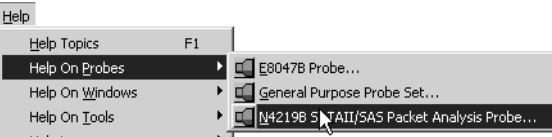


Using the Logic Analyzer

See the online help for information on configuring the analysis probe and making measurements.

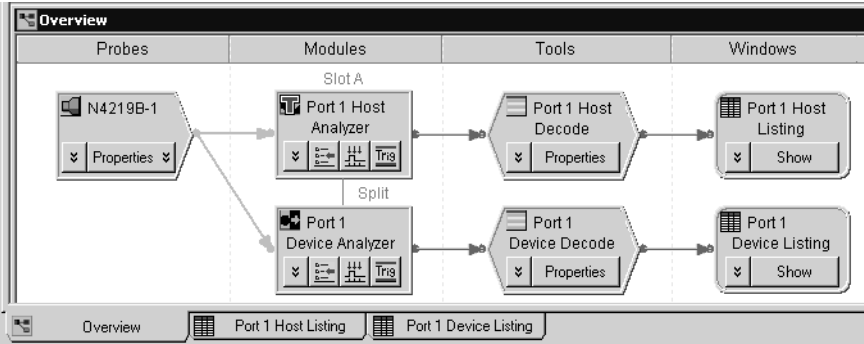
To view online help

When the probe software is installed and licensed, help is added to the Help menu at the top of the logic analyzer window and to the Contents section of the Help window.



To see an overview of how tools are set up

Select the Overview tab at the bottom of the logic analyzer window.



Interpreting the Status Lights

The Status LEDs tell you the status of the connection to the Serial ATA link.

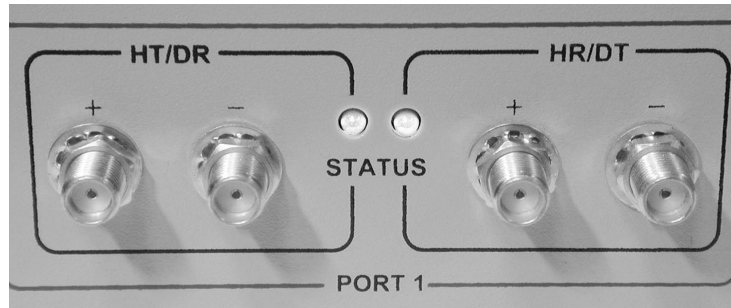
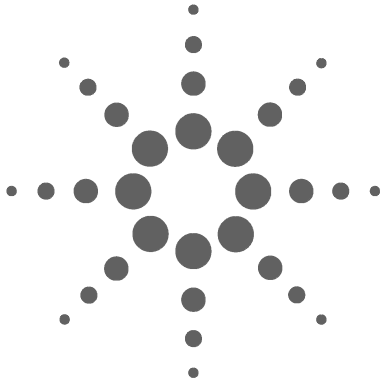


Table 1 Status LEDs

Light	Description
Green	Active (switching activity is detected, and the data is fully aligned and framed up at the character level)
Orange	No Frame Sync (switching activity is detected, but the probe is unable to recover a clock or is unable to properly frame characters)
Red	Squelch (no differential signal is detected)
Off	Not Configured (the probe is not looking for activity on the port; load a configuration file into the logic analyzer to enable the port)

4 Making Measurements



5 Troubleshooting and Repair



Troubleshooting Problems with the Displayed Data

If no data is displayed after a run

- ✓ Check that the logic analyzer is correctly connected to the analysis probe.
- ✓ Check that the interposer is correctly connected to the analysis probe.
- ✓ Load one of the supplied configuration files. If the format specification (the mapping of signals from the logic analyzer pods to labels) is changed, the Serial ATA tool will work incorrectly or not at all.

If registers appear in the wrong place

If you see a “Register - Host to Device” FIS under the “Device Packet Decode” label or a “Register - Device to Host” FIS under the “Host Packet Decode” label:

- ✓ Check that the logic analyzer connection to the analysis probe is not reversed.
- ✓ Check that the interposer connection to the analysis probe is not reversed.

If CONT primitives do not appear in the listing

This is normal behavior. CONTs are translated to the preceding primitive in 8B mode. To see all of the data in its raw form, use 10B mode.

Service and Repair Information

To return a part to Agilent Technologies for service

- 1 Follow the procedures in the “Troubleshooting...” chapters to make sure that the problem is caused by a hardware failure, not by configuration or cabling problems.
- 2 In the U.S., call 1-877-4Agilent (1-877-424-4536). Outside the U.S., call your nearest Agilent sales office. Ask them for the address of the nearest Agilent service center.

To locate a sales or service office near you, go to the world-wide web site:

<http://www.tm.agilent.com>

and select Contact Us.

- 3 Package the part and send it to the Agilent service center.

Keep any parts which you know are working.

- 4 When the part has been replaced, it will be sent back to you.

The unit returned to you will have the same serial number as the unit you sent to Agilent.

The Agilent service center can also troubleshoot the hardware and replace the failed part. To do this, send your entire measurement system to the service center, including the logic analysis system and cables.

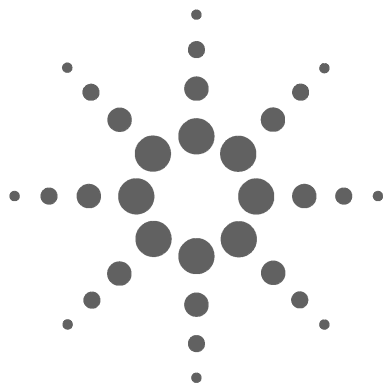
In some parts of the world, on-site repair service is available. Ask an Agilent sales or service representative for details.

To get replacement parts

The repair strategy for this product is board replacement. However, some mechanical parts may be replaced if they are damaged or lost. Contact your Agilent Technologies Sales Office for further information.

5 Troubleshooting and Repair

For some parts, exchange assemblies are available when a repairable assembly is returned to Agilent Technologies. These assemblies have been set up on the “Exchange Assembly” program. This allows you to exchange a faulty assembly with one that has been repaired, calibrated, and performance verified by the factory. The cost is significantly less than that of a new assembly.



6

Characteristics, Regulatory, and Safety Information



Analysis probe—operating characteristics

The following operating characteristics are not specifications, but are typical operating characteristics for the Agilent N4219B analysis probe.

Table 2 Connectors

Serial ATA Inputs	Serial ATA male and female connectors on the N4218A interposer. Maximum SATA rate supported is 3.0 Gb/s. The interposer is an 8:1 passive divider off of the SATA link.
Analysis Probe Inputs	8 SMA connectors, for use only with one or two Agilent N4218A interposers.
Logic Analyzer Outputs	Four 100-pin Samtec connectors

Table 3 Electrical Characteristics

Electrical Characteristics	
Power Requirements (Power Supply)	Input: 100-240 V, 1.5 A, 50/60 Hz, IEC 320 connector Output: 12 V, 5 A CAT II (Line voltage in appliance and to wall outlet)
Power Requirements (N4219B Analysis Probe)	Input: 12 V DC, 5 A. Use only with the provided power supply. CAT I (Mains isolated) Maximum transient level 500V
Power Requirements (N4218A Interposer)	Not applicable (passive device)
Rise Time (input)	The intrinsic 20-80% rise time of a differential signal through the N4218A interposer (from one SATA connector to the other) is 130ps. The rise time numbers can be convolved with the 20-80% rise times of the rest of the system to give a total rise time of the system, for example: $T_{\text{tot}} = (T_a^2 + T_b^2 + T_{\text{interposer}}^2 + T_c^2 + T_d^2)^{1/2}$
Rise Time (output)	The intrinsic 20-80% rise time of a differential signal out the N4218A interposer (from SATA connector to SMA connector terminated into 50 ohms) is 65 ps.

Table 3 Electrical Characteristics

Electrical Characteristics	
Electrical Length	The electrical length of the N4218A interposer (from one SATA connector to the other) is 635ps.

Table 4 Mechanical Characteristics

Mechanical Characteristics	
Analysis Probe Dimensions	Width: 25 cm (9.75 in) Height: 4.5 cm (1.75 in) Depth: 18.5 cm (7.25 in) See "Bench Space for the Analysis Probe" on page 8 for ventilation requirements.
Interposer Dimensions	Length: 11.4 cm (4.5 in) Width: 3 cm (1.2 in) Height: 1.2 cm (0.5 in) Cable length: 152 cm (60 in)

Table 5 Environmental Characteristics (Operating)

Environmental Characteristics (Operating)	
Temperature	Operating/non-operating: +20° to +30° C (+68° to +86° F)
Altitude	Operating/nonoperating 4,600 m (15,000 ft)
Humidity	Up to 50% noncondensing. Avoid sudden, extreme temperature changes which could cause condensation on the circuit board. For indoor use only. Pollution degree 2: Normally only dry non-conductive pollution occurs. Occasionally a temporary conductivity caused by pollution may occur.

Safety Notices

This apparatus has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

Warnings

- Before turning on the instrument, you must connect the protective earth terminal of the instrument to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. You must not negate the protective action by using an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.
- Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuseholders. To do so could cause a shock or fire hazard.
- If you energize this instrument by an auto transformer (for voltage reduction or mains isolation), the common terminal must be connected to the earth terminal of the power source.
- Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.
- Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- Do not install substitute parts or perform any unauthorized modification to the instrument.
- Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.
- Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
- Do not use the instrument in a manner not specified by the manufacturer.

To clean the instrument

If the instrument requires cleaning: (1) Remove power from the instrument. (2) Clean the external surfaces of the instrument with a soft cloth dampened with a mixture of mild detergent and water. (3) Make sure that the instrument is completely dry before reconnecting it to a power source.

Safety Symbols



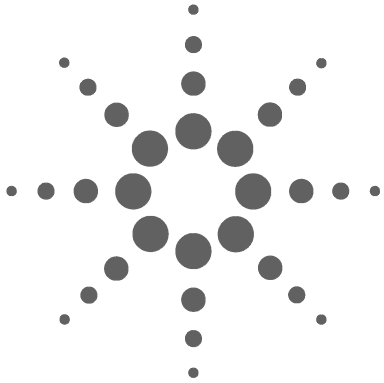
Instruction manual symbol: the product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product..



Hazardous voltage symbol.



Earth terminal symbol: Used to indicate a circuit common connected to grounded chassis.



Glossary

Analysis Probe A probing solution connected to the target microprocessor. It provides an interface between the signals of the target microprocessor and the inputs of the logic analyzer. Also known as a “preprocessor” or an “LAI.”

Intermodule Bus The intermodule bus (IMB) is a bus in the frame that allows the measurement modules to communicate with each other. Using the IMB, you can set up one instrument to arm another. Data acquired by instruments using the IMB is time-correlated.

Label Labels are used to group and identify logic analyzer channels. A label consists of a name and an associated bit or group of bits. On 16900-series logic analyzers, labels are usually called “bus/signal names.”

LAI Logic Analyzer Interface, see *Analysis Probe*.

Machine (16700-series logic analysis systems only) Each measurement is handled by a different machine. Each machine is represented in the Workspace window by an icon. Typically, a machine corresponds to a single logic analyzer *module*. Logic analyzer resources such as pods and trigger terms cannot be shared by the machines. A module can be split into several machines.

Master Card In a module, the master card controls the data acquisition or output. The logic analysis system references the module by the slot in which the master card is plugged. For example, a 5-card Agilent Technologies 16755A would be referred to as *Slot C: machine* because the master card is in slot C of the mainframe. The other cards of the module are called expansion cards.

Module A “virtual” logic analyzer card, which uses a single timebase in its operation and which functions as a single instrument. A module might contain signals from several logic



analyzer cards, or a single card might be split into two modules. When a module has more than one card, the module is identified by the slot where the *master card* is installed.

Symbol Symbols represent patterns and ranges of values found on labeled sets of bits. Two kinds of symbols are available:

1) Object file symbols – Symbols from your source code, and symbols generated by your compiler. Object file symbols may represent global variables, functions, labels, and source line numbers.

2) User-defined symbols – Symbols you create.

Target System The device under test.

Trigger Specification A set of conditions that must be true before the instrument triggers. See the printed or online documentation of your logic analyzer for details.

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