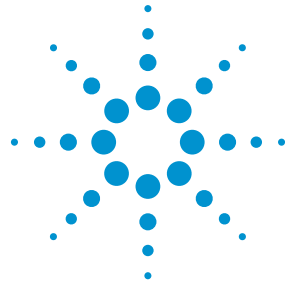


Agilent U4301A
PCI Express® 3.0
Analyzer Module



Data Sheet



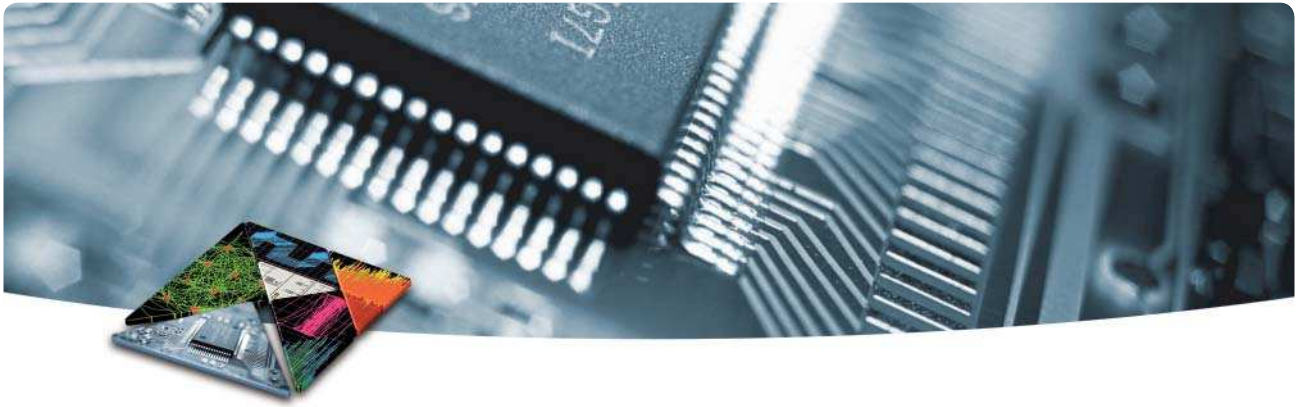
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Agilent Technologies



OVERVIEW

Product description

Agilent Technologies' high speed U4301A PCI Express® 3.0 analyzer module is a protocol analyzer supporting all PCI Express® applications from Gen1 through Gen3 and speeds, including 2.5 GT/s (Gen1) and 5.0 GT/s (Gen2) through PCIe 8 GT/s (Gen3) and with link widths from X1 to X16. The U4301A analyzer captures and decodes PCI Express data and displays it in a packet viewer window.

The U4301A analyzer is a blade that is installed in an AXle two or five slot chassis or optionally the Agilent AMP two slot chassis.

Probing is provided by the U4321A solid slot interposer probe, U4324A flying lead solder down probe, or the U4322A mid bus probe based on Agilent's soft touch technology.

Stimulus and response testing of the PCIe system is accomplished with the addition of the U4305A PCIe Gen3 exerciser.

A link training sequencer state machine (LTSSM) exerciser provides stimulus for testing PCIe links up to the full speed of Gen3 systems.

Features

- Supports PCI Express generation 1, 2, & 3 protocol architecture including lane speeds 2.5 Gb/s, 5.0 Gb/s, and 8.0 Gb/s.
- Supports lane widths X1, X2, X4, X8, and X16.
- Trigger in/out to synchronize with additional test tools
- Actual data displayed in lane view format with packet highlighting
- Stimulus response testing with the addition of the U4305A exerciser
- Compact AXle modular system configuration

Analysis and debug



- Support for Gen1 through Gen3, x1 through x16 link width
- 4 GB of capture buffer per module
- Passive non-intrusive probing that leverages ESP technology

Industry leading probes



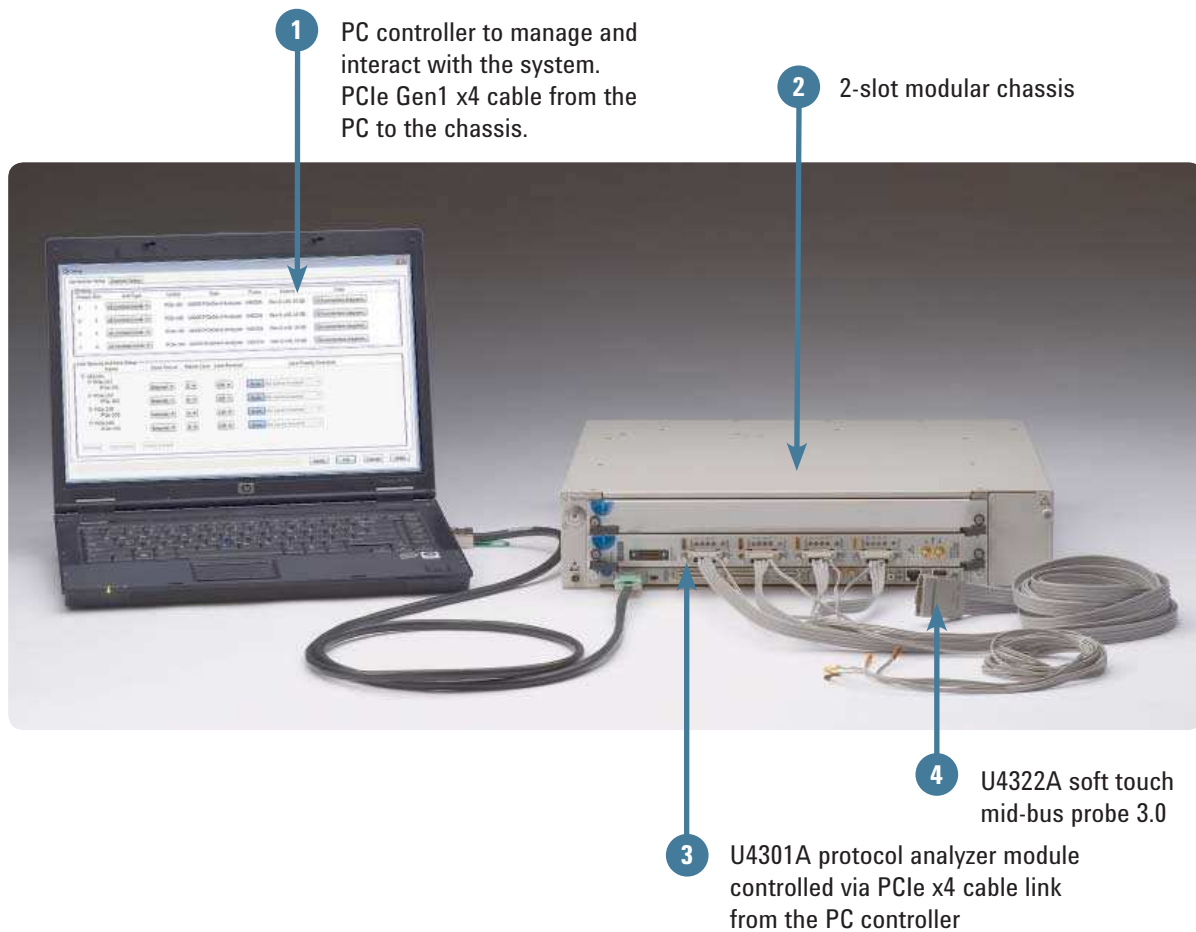
- The mid-bus probe supports x1 to x16 unidirectional or x1 to x8 bidirectional
- The solid slot interposer will support x1 to x16 unidirectional or bidirectional
- The flying lead solder down probe offers support for X1 & X2 bidirectional capability on a single probe. Other standard lane width configuration support is X4, X8, & X16

Stimulus and test U4305A exerciser



- Support for Gen1 through Gen3 and link widths of X1 through X16
- Link testing from X1 through X16, using automated LTSSM exerciser
- PCIe, MR-IOV, and SR-IOV stimulus response testing
- Industry's smallest form-factor, and scalable architecture
- Protocol test card (PTC) test suite support for PCIe Gen2 and Gen3 specification

SYSTEM ARCHITECTURE OVERVIEW



Configuration

Step 1	<p>Order the U4301A analyzer module</p> <p>Select the option for the number of lanes to be tested and software license for 5 Gbps or 8 Gbps applications</p> <p>Refer to ordering information for details</p>
Step 2	<p>Order a modular chassis</p> <p>Recommended chassis is the Agilent M9502A 2-slot AXIe chassis</p> <p>or optionally the Agilent M9505A 5-slot AXIe chassis</p>
Step 3	Order the PCIe interface adapter and cable. Refer to ordering information for details
Step 4	<p>Order the probe for your measurement application</p> <ul style="list-style-type: none"> • U4321A solid slot interposer 3.0: order the option for the number of lanes to be tested • U4322A mid bus probe based on Agilent soft touch technology • U4324A flying lead solder down probe: order the option for the number of lanes to be tested
Step 5	<p>Add the exerciser for stimulus/response testing</p> <ul style="list-style-type: none"> • U4305 exerciser: order the option for the number of lanes to be tested and software licenses for number of lanes to be tested as well as applications such as end node or root complex emulation, LTSSM, MR-IOV, or SR-IOV emulation

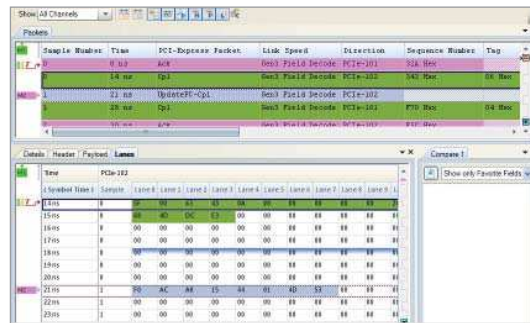
Note: The slot interposer and exerciser lane width is fixed and is not upgradable due to the connector size being a function of lane width. A smaller lane width probe can be used in a wider lane application, but only those lower lanes will be tested. Agilent does not recommend or support the use of lane converters.

PRODUCT FEATURES AND BENEFITS OVERVIEW

U4301A analyzer module

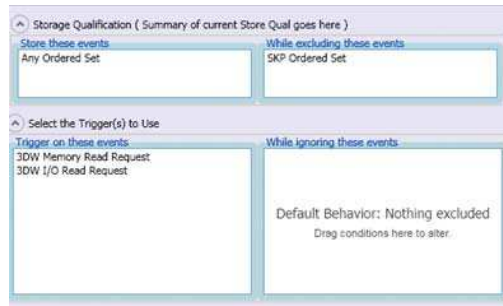
Effective presentation of protocol interactions from physical layer to transaction layer

- Lane view with packet highlighting to show the actual data on the bus
- Industry standard spreadsheet format protocol viewer with:
 - Highlighting by packet type or direction
 - Easy flow columns to better understand the stimulus and response nature of the protocols
 - Context sensitive columns to show only the relevant information, minimizing the need to scroll horizontally
- Flexible GUI configuration to meet debug needs, with pre-defined GUI layouts for link training debug, config accesses and general I/O



Simple and powerful state-based triggering

- New simple trigger mode makes it easy to setup single event triggers
- Powerful state-based triggering including
 - Four states supported in trigger sequencer
 - Triggering on patterns (ordered set patterns or packet types)
 - Internal counters and timers
- External trigger in/out



Powerful hardware features ensure capture of important transition events

- Large capture buffer, for long recording sessions with 4 GB per module (X1-X8 bidirectional) and 8 GB for X16 bidirectional
- PCIe Gen1 x4 link to the host PC, provides up to 10 Gb/s of data download saving valuable test time
- LEDs to show lane status and speed for fast understanding of current link status



U4301A analyzer module characteristics and specifications

*Environmental specifications as per the main frame except maximum operating temperature = 40 °C

Trigger input: Input Z = 50 ohms, Vmax = 3.3 V

Trigger output: 2.0 V

Minimum trigger duration: 20 ns

Host PC requirements

Processor speed: 1 GHz 32-bit (x86) or 1 GHz 64-bit (x64) 2 GB minimum available

memory running Windows XP Professional (32-bit) or Windows 7 (32-bit or 64-bit);

Available hard disc space: 1.5 GB

Support for DirectX 9 graphics with 128 MB graphics memory recommended,

(Super VGA graphics is supported)

Microsoft Internet Explorer 7 or greater

Compatible with a PCIe Gen1 x4 interface module

PRODUCT FEATURES AND BENEFITS OVERVIEW

Probing

Accurate data recovery with consistent representation of the signal

U4321A slot interposer

- ESP (equalizing snoop probe) technology ensures accurate data recovery in all Gen3 platforms and all link width x1 through x16
- High fidelity signal capture ensures design problems can be reproduced
- Mechanical stabilization for the device under test's (DUT's) end point and to ensure firm PCIe slot connections

Characteristics

Power: 12vdc, 1.25A max

Power supply; Agilent part number 0950-5160

Input: 100-250 VAC, 50 to 60 Hz



Accurate data recovery with flexible use model

U4322A mid bus probe

- Provides signal capture in situations where no PCIe connector is available.
- Micro spring-pin probe based on Agilent's soft touch technology provides reliable contact to signal pads
- Independent reference clock per four lanes for maximum layout flexibility

Characteristics

Input: 25V max or 3 Vrms into 250 ohms

Temperature: Operating 0 to 40 °C

Storage -40 to 70 °C

Humidity: 15 to 95% non-condensing

Altitude: 3,000 m (10,000 ft)



Thorough link testing

U4305A PCI exerciser

- Addition of the U4305A provides PCIe,MR-IOV and SR-IOV stimulus response testing
- Predefined LTSSM sequences simplify state transition testing
- Predefined protocol test card (PTC) test cases applied to Lane 0 only, provide specification compliance feedback
- Full speed testing of Gen 1 through Gen 3 systems
- All lane widths supported at full speed
- End point emulation and act as a down stream component (DSC)
- Root complex emulation and act as an upstream component (USC)

Specifications

Refer to the U4305A data sheet pub number 5990-8458EN for detailed characteristics and specifications.



Accurate data recovery with full channel mapping support & flexible probe points

U4324A flying lead solder down probe

- Provides signal capture in situations where no PCIe slot connector or PCIe standard mid bus footprint is available.
- Low channel count per probe to reduce unnecessary expense for unused channel leads
- Independent reference clock tap for maximum layout flexibility
- Low cost, easily replaceable N5426A zero insertion force (ZIF) tips to maximize probe use life



Characteristics

Input: 10V max common mode

Capacitive loading: 0.250 fF

Temperature: Operating +5 to +40 °C

Storage: -40 to 70 °C

Humidity: Operating 80% RH @ 40 °C

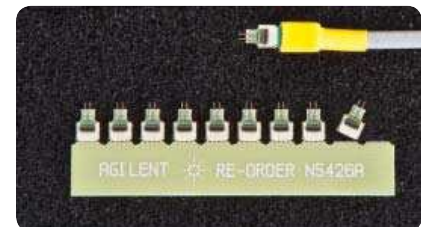
Storage: 90% RH @ 65 °C

Vibration: 2.09 Grms (5 – 500 Hz random)

Shock: 1.6 m/s [63 in/s] (2 mS half sine)

N5426A ZIF tip kit

- The ZIF tip is a connection accessory used to connect the U4324A flying lead cable to the channel on the DUT
- One side of the ZIF tip connects to the flying lead and is soldered to the DUT on the other end
- The ZIF tip is calibrated to the U4324A flying lead; no impedance changes should take place to the ZIF tip
- 10 ZIF tips per kit



Characteristics

Input: 10V max common mode

Capacitive loading: 0.250 fF

Temperature: Operating +5 to +40 °C

Storage: -40 to 70 °C

Humidity: Operating 80% RH @ 40 °C

Storage: 90% RH @ 65 °C

Vibration: 2.09 Grms (5 – 500 Hz random)

Shock: 1.6 m/s [63 in/s] (2mS half sine)

Related Agilent Literature

Publication title	Pub number
<i>Hardware and Probing for PCI Express Gen3 User's Guide</i> available at Agilent.com/find/U4301A	U4301-97000
<i>Agilent Technologies PCI Express® Design and Test – From Electrical to Protocol Brochure</i>	5989-5594EN
<i>Agilent Technologies U4305A PCIe 3.0 Exerciser, Data Sheet</i>	5990-8458EN
<i>PCIe 3.0 Analyzer User Guide</i>	U4301-97001

ORDERING INFORMATION

U4301A analyzer module

A specific configuration is required to determine the lane width to be tested

Model number	Description
U4301A-A01	Link width X1
U4301A-A04	Link width X4
U4301A-A08	Link width X8
U4301A-A16	Link width X16
U4301A-AN2	Software license for PCIe Gen2, 5 Gbps
U4301A-AN3	Software license for PCIe Gen3, 8 Gbps

Modular chassis and computer interface

The recommended chassis is the 2 slot AXIe configuration

Chassis type	Model number	PC configuration	Interface	Cable
AXIe (recommended)	M9502A 2 slot AXIe	Lap top	M9045A	Y1200A
		Desk top	M9047A	Y1200A

Probe selection

Probe type	Model number	Description
Solid slot interposer 8 Gbps <i>Note: The U4321A interposer probe lane width is fixed and is not upgradable to accommodate different lane widths due to the fact that the connector size is a function of lane width. Agilent does not recommend or support the use of lane converters</i>	U4321A-A01	Link width X1
	U4321A-A04	Link width X4
	U4321A-A08	Link width X8
	U4321A-A16	Link width X16
Mid-bus probe	U4322A	Mid-bus probe based on Agilent soft touch technology for applications where no standard PCIe connector is available for testing
	U4322A-R05	Set of 5 retention modules
	U4317A	Gen3 to Gen2 mid bus adaptor
Flying lead probe	U4324A	4 channel/probe
	N5426A	ZIF tip kit (10 pcs)

Stimulus/response tester

	Model number	Description
Exerciser card	U4305A-E01	Link width X1
PCIe exerciser and PCIe LTSSM exerciser for PCIe 3.0, PCIe 2.0 and PCIe 1.0 <i>Note the U4305A PCIe exerciser lane width is fixed and is not upgradable to accommodate different lane widths due to the fact that the connector size is a function of lane width. Agilent does not recommend or support the use of lane converters</i>	U4305A-E04	Link width X4
	U4305A-E08	Link width X8
	U4305A-E16	Link width x16
	U4305A-EX3	Software license for the exerciser
	U4305A-LT3	LTSSM software license
	U4305A-MR2	Multi-root visualization software license
	U4305A-022	ECRC testing
	U4305A-023	SR-IOV emulation
	U4305A-024	Increase to 5 function emulation
PTC test suite for PCIe 3.0 and PCIe 2.0	U4305A-021	PCIe spec compliance test suite



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