

Digital Protocol Analyzers

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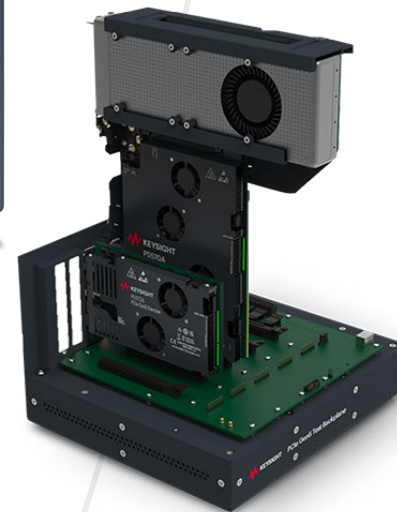
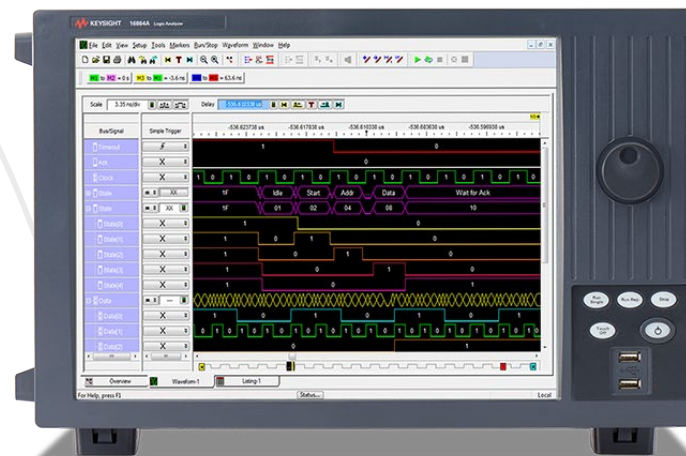


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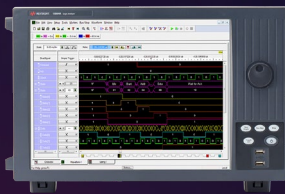
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Keysight Support Services

Keysight Digital Protocol Analyzers

One family. 3 classes.



PORTABLE LOGIC ANALYZERS

LA1-class

- 34 to 136 Channels
- 128 Mpts Maximum memory depth



DDR LOGIC ANALYZER

LA4-class

- 136 Channels
- 400 Mpts Maximum memory depth



PCIE PROTOCOL ANALYZERS

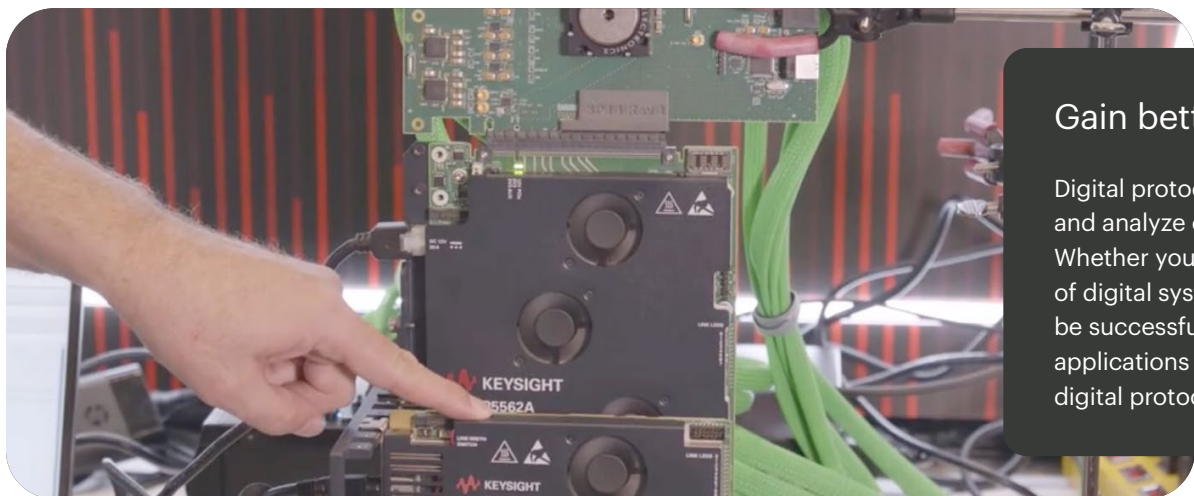
LA5-class

- 32 GT/s to 64 GT/s Maximum data rate
- NRZ PAM4 Protocols

Introduction

Keysight Digital Protocol Analyzers — from memory interfaces to high-speed serial protocols

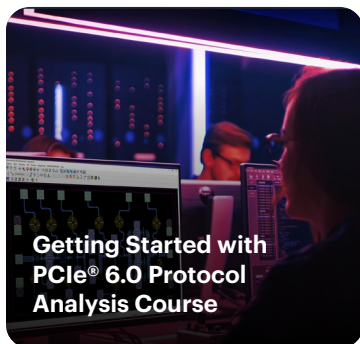
Keysight digital protocol analyzers are now offered in three capability classes. Explore our portfolio of digital protocol analyzers, built to meet the demands of embedded system design and high-speed interface validation. Portable logic analyzer includes the LA1-class for field debugging, double data rate (DDR) analyzer includes the LA4-class for precise memory validation, and Peripheral Component Interconnect Express® (PCIe®) analyzer includes the LA5-class for compliance and performance testing. To help you make informed decisions, we provide a comprehensive library of [digital protocol analyzer resources](#).



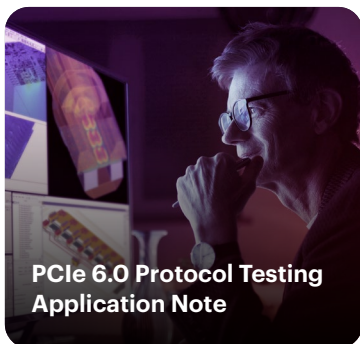
Gain better visibility into digital systems

Digital protocol analyzers are critical to capture, decode, and analyze communication protocols between digital devices. Whether you need to verify, debug, or validate the behavior of digital systems, you need accurate and reliable tools to be successful. Keysight resources cover basic to complex applications to help you develop a deeper understanding of digital protocol analyzers.

Here are a few examples of the resources you will find to help you select the digital protocol analyzer that is right for you:



**Getting Started with
PCIe® 6.0 Protocol
Analysis Course**



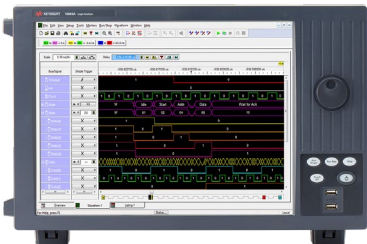
**PCIe 6.0 Protocol Testing
Application Note**



**Your Pathway to PCIe 6.0
Solution Brief**

Logic Analyzers

Keysight logic analyzers enable you to precisely capture, analyze, and debug digital signals in embedded systems, memory designs, and high-speed digital interfaces. Select the logic analyzer you need by considering factors like the number of channels, maximum memory depth, and supported standards. Explore our range of portable and DDR logic analyzers to find the one that is right for your application.



Portable logic analyzers

LA1-class



DDR logic analyzer

LA4-class

Number of channels	34 to 136 channels	136 channels
Maximum memory depth	128 Mpts	400 Mpts
Standards	LPDDR4, LPDDR3, LPDDR2, LPDDR, DDR4, DDR3, DDR2, DDR	LPDDR5, LPDDR4, LPDDR3, LPDDR2, LPDDR, DDR5, DDR4, DDR3, DDR2, DDR
Brands included	16860 Series	U4164A

Explore

Explore

Portable Logic Analyzers

High-performance digital signal analysis and debugging

Keysight LA1-class logic analyzers include the 16860 Series, which delivers compact high-performance digital signal analysis for debugging, verifying, and optimizing DDR and low-power DDR (LPDDR) memory systems. They feature high channel count, deep memory, fast timing speed, and the ability to view time-correlated oscilloscope results directly on the logic analyzer. Choose one of our popular configurations or configure one specific to your application.

[Learn more about our portable logic analyzers](#)

High channel count

Simultaneously analyze multiple digital signals, ideal for monitoring interfaces with multiple signal lines, correlating signal activity across subsystems, and validating critical system timing.

Deep memory

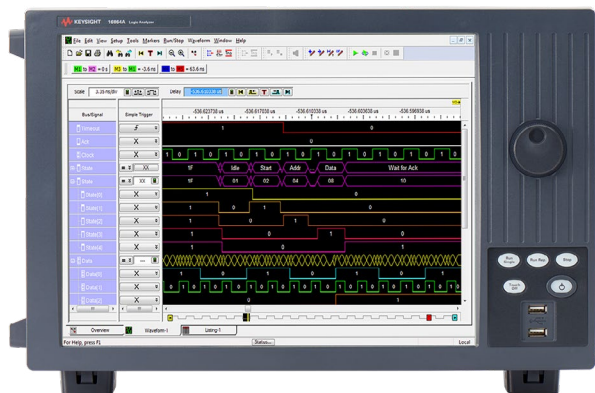
Capture more data in a single acquisition — required for longer signal capture of high-speed systems with fast sampling rates and for analyzing complex or intermittent signals.

Fast timing speed

Capture digital signals with up to 5 GHz timing resolution to accurately detect short pulses, glitches, and timing anomalies, ideal for measuring critical signal relationships and diagnosing signal integrity issues.

Integrated scope view

Integrated, time-correlated oscilloscope waveforms displayed on the logic analyzer ensure accurate timing between analog and digital signals and enable signal integrity validation.



Number of channels	34 to 136
Maximum memory depth	128 Mpts
Standards	LPDDR4, LPDDR3, LPDDR2, LPDDR, DDR4, DDR3, DDR2, DDR
Signal type	Differential, single-ended
Maximum timing speed	5 GHz conventional / 12.5 GHz timing zoom

[View popular configurations](#)

DDR Logic Analyzer

Modular high-speed memory validation and debugging

Keysight LA4-class DDR logic analyzer includes the U4164A, which is ideal for high-speed digital design validation and debugging, particularly DDR and LPDDR memory systems, including DDR5 / LPDDR5. It features an ultra-high channel count, ultra-deep memory, and data rates up to 4 Gb/s. The DDR logic analyzer has two modes of operation — quad sample state and 10 GHz channel timing — enhancing signal capture accuracy and enabling high-resolution timing analysis and identification of timing issues in deep traces. Request a quote for our DDR logic analyzer today.

[Learn more about our modular DDR logic analyzer](#)

Ultra-high channel count

Supports up to 136 channels per module and scales to 680 channels in a single 5-slot chassis using an external host PC, ideal for testing of complex, multi-bus systems.

Ultra-deep memory

Capture long-duration signals with up to 400 Mpts of memory per module, enabling detailed analysis of complex sequences and rare events without missing critical data.

High-speed state mode

Capture high-speed DDR and LPDDR memory activity with clock-synchronized state mode up to 4 Gb/s for accurate protocol analysis and reliable validation.

Quarter-channel timing mode

Ultra-high-resolution timing analysis with a 10 GHz sampling rate, ideal for capturing fast signal transitions, glitches, and timing anomalies.



Number of channels	136
Maximum memory depth	400 Mpts
Standards	LPDDR5, LPDDR4, LPDDR3, LPDDR2, LPDDR, DDR5, DDR4, DDR3, DDR2, DDR
Maximum state mode data rate	4 Gb/s
Timing mode	10 GHz

Get quote

PCIe® Protocol Analyzers, Exercisers, and Backplanes

Keysight PCIe protocol analyzers, exercisers, and backplanes provide critical tools for validating, testing, and debugging PCIe and Compute Express Link (CXL) interfaces across all development stages. These tools are used to monitor and decode PCIe traffic, simulate real-world host or device behavior, and enable thorough compliance and interoperability testing. With support for the latest PCIe and CXL specifications and data rates, they help you identify protocol errors, verify link training, and ensure reliable system performance. Explore our PCIe protocol analyzers, exercisers, and backplanes to find the one that is right for your application.



PCIe protocol analyzers
LA5-class



PCIe protocol exercisers
LA5-class



PCIe protocol backplane
LA5-class

Maximum data rate	32 GT/s to 64 GT/s	32 GT/s to 64 GT/s	64 GT/s
Protocols	NRZ, PAM4	NRZ, PAM4	NRZ, PAM4
Standards	CXL 1.1, CXL 2.0, PCIe 6.0, PCIe 5.0, PCIe 4.0, PCIe 3.0, PCIe 2.0, PCIe 1.0	CXL 1.1, CXL 2.0, PCIe 6.0, PCIe 5.0, PCIe 4.0, PCIe 3.0, PCIe 2.0, PCIe 1.0	CXL 1.1, CXL 2.0, PCIe 6.0, PCIe 5.0, PCIe 4.0, PCIe 3.0, PCIe 2.0, PCIe 1.0
Brands included	P5552A P5570A	P5551A P5573A	P5563B

Explore

Explore

Explore

PCIe Protocol Analyzers

Precision PCIe protocol analysis

Keysight LA5-class PCIe protocol analyzers includes the P5552A and P5570A, they provide deep insight into PCIe communication, enabling you to capture, decode, and analyze high-speed data traffic with precision. These analyzers help identify protocol-level issues, validate system performance, and accelerate debugging in complex PCIe designs. By delivering comprehensive visibility into data transactions, timing, and protocol compliance, they help you validate communication between devices that use the PCIe interface. Choose one of our popular configurations or configure one specific to your application.

[Learn more about our PCIe protocol analyzers](#)

Broad protocol support

Supports all PCIe generations (1.0 to 6.0) and CXL, enabling validation of both legacy PCIe devices and next-generation memory and accelerator technologies.

Large trace memory

Capture extended PCIe activity without data loss using up to 16 GB of trace memory with real-time compression, ideal for analyzing complex transactions and debugging intermittent issues.

Built-in equalization

Designed to minimize channel impairments to the high-speed traffic observed between the host system and your device, maximizing signal integrity.

Convenient form factor

The single-card design with secure bracket mounts ensures fast, convenient setup and stability on the lab bench, protecting prototypes and maintaining signal integrity during testing.



Maximum data rate	32 GT/s to 64 GT/s
Protocols	NRZ, PAM4
Standards	CXL 1.1, CXL 2.0, PCIe 6.0, PCIe 5.0, PCIe 4.0, PCIe 3.0, PCIe 2.0, PCIe 1.0

[View popular configurations](#)

PCIe Protocol Exercisers

PCIe traffic generation and simulation

Keysight LA5-class PCIe protocol exercisers includes the P5551A and P5573A, these PCIe protocol exercisers generate and simulate PCIe traffic, enabling you to rigorously test and validate the performance and robustness of PCIe devices and systems. By emulating a wide range of real-world scenarios and error conditions, our PCIe protocol exercisers help you uncover design flaws, verify compliance, and optimize system behavior under various workloads. Choose one of our popular configurations or configure one specific to your application.

[Learn more about our PCIe protocol exercisers](#)

Broad protocol emulation

Supports all PCIe generations (1.0 to 6.0) and CXL, enabling generation of protocol traffic to create realistic test scenarios for legacy and next-generation PCI and CXL devices.

Link training control

Enables precise configuration of parameters like lane speed, width, equalization settings, and timing to establish and validate stable PCIe and CXL links under a wide range of conditions.

Enhanced error injection

Introduces controlled protocol errors and challenging traffic conditions, enabling thorough validation of device resilience, error recovery mechanisms, and system robustness.

Flexible lane configurations

Supports x1, x4, x8, and x16 lane widths for testing PCIe devices across link configurations to validate performance, link training, and compliance across varying bandwidth needs.



Maximum data rate	32 GT/s to 64 GT/s
Protocols	NRZ, PAM4
Standards	CXL 1.1, CXL 2.0, PCIe 6.0, PCIe 5.0, PCIe 4.0, PCIe 3.0, PCIe 2.0, PCIe 1.0

[View popular configurations](#)

PCIe Protocol Backplane

Optimized PCIe connection interface

Keysight LA5-class protocol backplane includes the P5563B, which provides a stable and signal-optimized interface for PCIe and CXL add-in cards. Our PCIe protocol backplane ensures that you can thoroughly evaluate device performance, signal integrity, and protocol compliance under real-world conditions. Its robust mechanical design and broad form-factor compatibility make it an important tool for accelerating development cycles and delivering next-generation computing, storage, and networking solutions with confidence. Request a quote or order a Keysight PCIe protocol backplane today.

[Learn more about our PCIe protocol backplane](#)

High-speed data support

Enables accurate and reliable testing of PCIe 6.0 data rates up to 64 GT/s per lane, which is critical for validating signal integrity, protocol compliance, and performance in next-generation devices.

Enhanced signal integrity

Designed according to the PCI-SIG® Card Electromechanical (CEM) specification to reduce crosstalk, maintain impedance, and optimize signal transmission between the backplane and PCIe devices.

Form factor compatibility

Supports the Enterprise and Data Center SSD Form Factor (EDSFF) and Open Compute Project Network Interface Card (OCP-NIC), enabling testing of diverse data center, storage, and networking devices.

Integrated power supply

Features a low-noise, high-efficiency power supply with PCIe auxiliary power available, reliably accommodating high-power endpoint devices for stable and consistent performance testing.



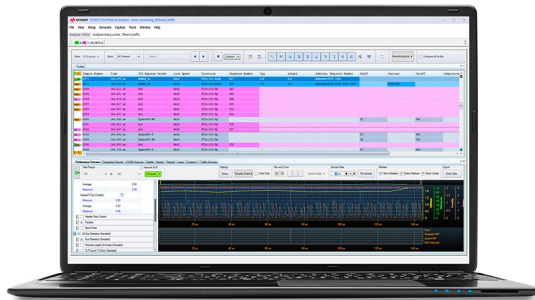
Maximum data rate	64 GT/s
Protocols	NRZ, PAM4
Standards	CXL 1.1, CXL 2.0, PCIe 6.0, PCIe 5.0, PCIe 4.0, PCIe 3.0, PCIe 2.0, PCIe 1.0

[View popular configurations](#)

Software and Accessories

Find compatible software and accessories for your digital protocol analyzer

Explore the powerful suite of Keysight protocol exerciser, compliance, and traffic analysis software, designed to complement our PCIe and CXL protocol analyzers, exercisers, and backplanes. Enhance your setup with high-performance accessories — including probes, interposers, cables, and connectors — to ensure accurate, repeatable measurements across your test environment. Explore our digital protocol analyzer software and accessories to make the right measurements for your application.



Unlock the full potential of your digital protocol analyzer with software, including:

- protocol exerciser
- protocol compliance test suites
- protocol traffic analysis

[Explore software](#)



Extend the capabilities of your digital protocol analyzer with the right accessories for high-speed digital testing, including:

- probes
- interposers
- cables and cable connectors
- flying leads

[Explore accessories](#)

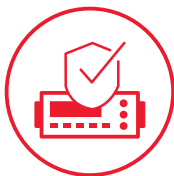
Keysight Support Services

Explore the services that are right for you

Keysight Support Services can reduce your learning curve, enhance your uptime, guarantee the accuracy of your testing equipment, and provide the expertise you require, precisely when and where you need it.

Maximize your instrument uptime, quickly optimize your test measurements, and get the answers you need at our fastest available times. KeysightCare curated support plans bundle critical services with prioritized response and turnaround times. **High-performance instruments include one year of KeysightCare Assured.**

Explore support services



Calibration

Ensure your test system performs to specification and meets local and global standards.



Repair

Restore equipment to original functionality and specifications with trained technicians.



KeysightCare

Innovate at speed with curated support plans and prioritized response and turnaround times.



Education

Make measurements quickly with eLearning and in-house, instructor-led training.



Keysight Support

Get 24x7 access to service requests, case management help, and technical articles.



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.

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