产品手册

仪器型号：P5570A

西安安泰测试科技有限公司

仪器维修|租赁|销售|测试

地址:西安市高新区纬二十六路 369 号　　电话：400-876-5512

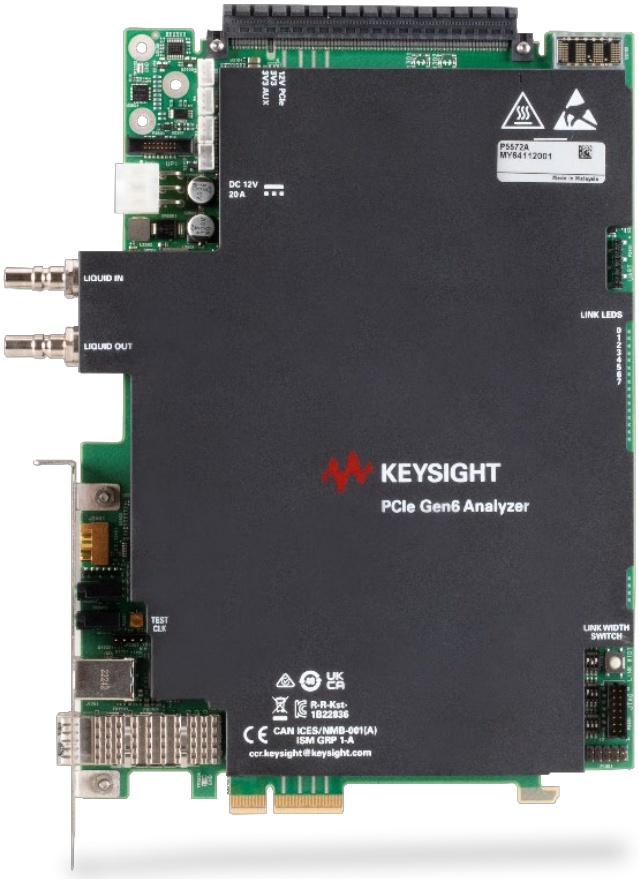
网址: www.agitekservice.com　　座机：029-88827159

P5570A

PCI Express Protocol Analyzer for PCIe 6.0

Introduction

The P5570A PCIe Protocol Analyzer enables deep protocol analysis of PCIe systems in a form factor that is easy to deploy on the lab bench and offers unparalleled signal integrity. The analyzer supports capture and decode for PCIe 1.0 through PCIe 6.0. When paired with the P5573A Protocol Exerciser, incredibly powerful PCIe validation solutions can be built.



KEYSIGHT

Product Overview

The Keysight P5570A PCIe 6.0 Protocol Analyzer features an integrated interposer design which simplifies connection and offers improved signal integrity. By removing the need for a cumbersome external analyzer chassis, setup and versatility on the lab bench are greatly improved. Additionally, this simplified design yields superior signal integrity, ensuring that the analyzer has minimal impact on the channel between the products under test.

The P5570A supports decode of up to 64 GT/s signaling and lane widths of x4, x8 and x16. Users can utilize up to 16 GB trace depth memory aided by on-board compression which greatly expands the available capture time. The analyzer supports decode of the PHY Layer (TS1/TS2/Ordered sets, Link Layer (ACK,/NAK, sequencing numbers, replay, etc), and Transaction Layer (Memory, Config, and I/O Read and Writes operations, etc)

Figure 1. P5570A PCIe 6.0 protocol analyzer

Trusted Signal Integrity

Debugging complicated interoperability issues between a PCIe Host and Device requires that any protocol analyzer interposer not disrupt the interactions between a Host and Device. The foundation of this in the P5570A is superb control of signal integrity with built in equalization and amplification that effectively removes the effects of the analyzer from the link. This provides the user with confidence that the traffic observed between the Host System and Endpoint are exactly as if the analyzer were not present.

Other analyzer designs that rely on a separate analyzer chassis often introduce physical and electrical complexities that can impact the channel. In some cases, these interposers inadvertently add channel impairments which can affect the system under test such that it cannot reliably negotiate to the highest mutually supported speeds and lane width. In other cases, an interposer may introduce retiming or redriving capability that can mask issues in the system under test by effectively improving the channel quality and enabling devices to successfully link up in configurations that could not be attainable without the analyzer present. Neither of these conditions is acceptable as they impede the ability of the test and validation engineer to gain a clear and accurate view of what is happening on the link.

The Keysight P5570A was designed deliberately to avoid these issues, to minimize channel impact and to provide the clearest and most accurate view of the traffic on the PCIe link. Thus, test and validation engineers can focus time and energy on solving protocol issues between the products under test, rather than questioning whether issues have been introduced or masked by their test equipment.

Convenient and Stable Form Factor

The single card design of the Keysight P5570A PCIe 6.0 Protocol Analyzer enables a convenient and fast setup on the lab bench. Often test configurations on the lab bench quickly become complicated, and mechanical stability of prototype devices is critical to ensure that early product samples are physically protected and that the mechanical connection between the analyzer and the products under test is solid and robust and not introducing any signal impairments due to lack of mechanical stability. The P5570A is provided with a bracket mount that enables secure attachment a server chassis. Additionally, attention has been given to providing mechanical security to add-in-card endpoints that are included in the test setup via an additional stability bracket.

Figure 2. P5570A PCIe 6.0 protocol analyzer

Combined Exerciser and Analyzer Software

Both the Keysight PCIe 6.0 P5570A Protocol Analyzer and P5573A Exerciser can be driven by a single combined software interface which with provides enhanced Exerciser Functionality for configuring Traffic Setup and improved data exchange with the Analyzer.

Via this thoughtfully designed interface, the user can configure all of the most important characteristics of the PCIe link such as lane width and link speed.

Use Case: Analyze Traffic between Root Complex and Endpoint

A common use case for the Keysight P5570A PCIe 6.0 Analyzer is to sit between a PCIe 6.0 capable root complex and a PCIe 6.0 endpoint. The analyzer will capture and decode PCIe signals between the root complex and the endpoint while also passing the signals between the devices through without interference.

The Keysight P5570A Analyzer uses an independent power supply, and passes power supplied from the Host System on to the Endpoint without interference.

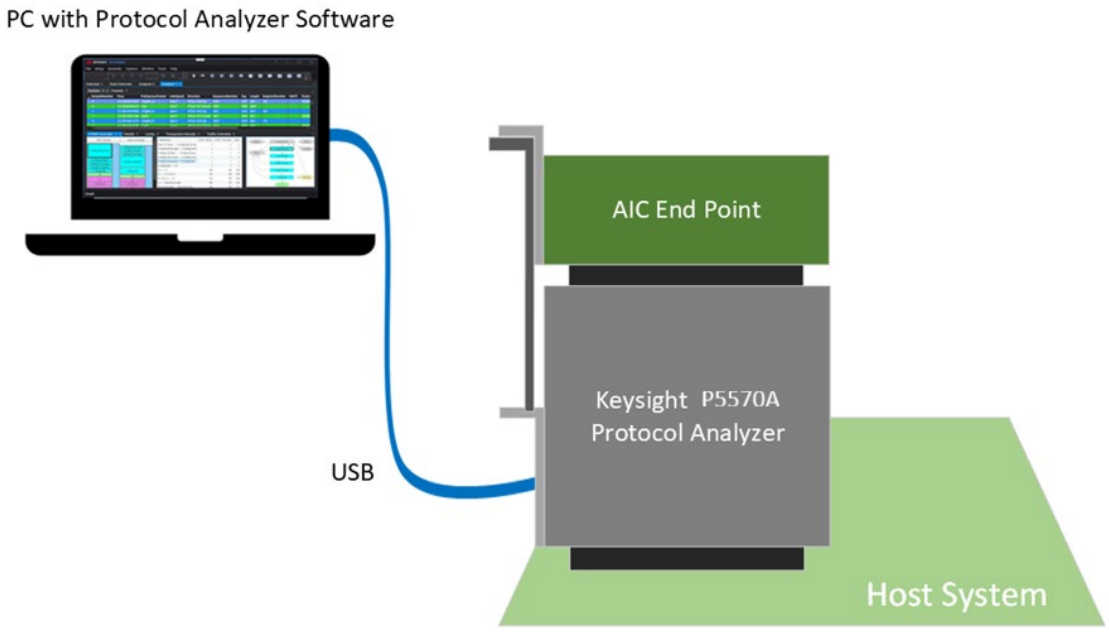


Figure 3. Use the P5570A to analyze PCIe traffic between a Root Complex and Endpoint.

Backplane Test Platform

The Keysight P5563B PCIe 6.0 Protocol Backplane Test Platform features SI enhancements to reduce crosstalk and improve signal integrity, where low-loss material in utilized to support reliable connections at 64GT/s.

- CEM form factor for endpoint devices.
- Integrated low noise power supply with Auxiliary PCIe power available for high power endpoint devices
- Stable mechanical construction for reliable operation during bring-up
- One pair of CEM slots for connecting the Exerciser with a DUT

Figure 4. P5563B Backplane Test Platform

Powerful Triggering and Filtering

The most difficult bugs to solve are intermittent with no obvious cause. Finding the root of these troublesome issues often involves setting up for long capture times. But capturing lots of data is not helpful if it cannot effectively be analyzed. Scrolling through trace captures looking for specific issues that are obscured by retraining events and other protocol ‘storms’ is an ineffective use of time.

Advanced users depend on finely tuned triggering and filtering settings to capture the traffic that they are most interested in. They avoid massive capture windows that scoop up unwanted data which slows down the analysis process both in porting the data to a PC for viewing as well as needlessly obscuring critical protocol events. The Keysight P5570A PCIe 6.0 Protocol Analyzer was designed with this use case in mind. As such, it provides both Simple and Advanced triggering modes. Simple triggers are provided that are quick for users to apply and customize. Advanced Triggers can be configured to apply a chain of If/Then logic steps to the trigger. In this way specific protocol events can be captured easily, even if they occur only after a complex series of previous events that may span a long time period.

To extend this capability even further filtering can be applied to ignore certain traffic events to extend the capture window without clogging up the capture log with unneeded data.

Traffic Decode and Analysis Capability

Solving protocol issues involves a variety of skill sets and debugging tools. Some issues require being able to see specific fields in a packet. Other problems require having an overall view of traffic patterns and errors in a given time frame. To support these needs the Keysight P5570A PCIe 6.0 Protocol Analyzer software provides several different protocol views to enable engineers to use the tool most suited to the problems they are working on.

Lane View

Lane view provides the user with a view of exactly what data is appearing on which lane of the PCIe link. With a mouse over the user can see what packet types individual bytes are associated with. Thus, in a single simple view, the user is given a comprehensive understanding of the protocol makeup.

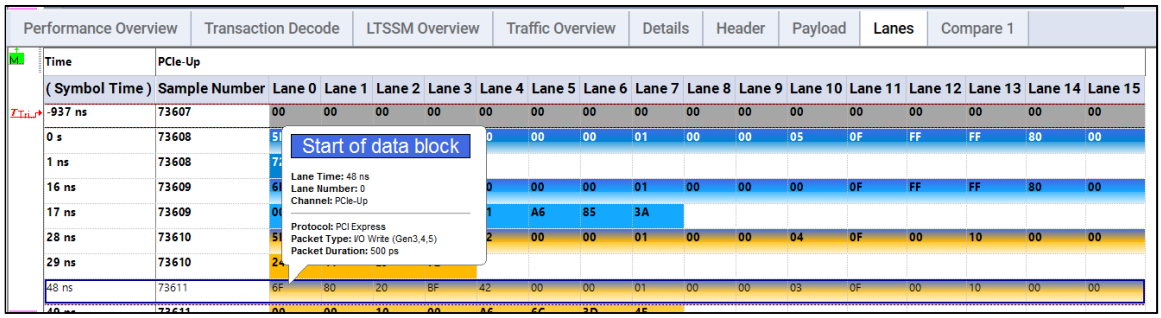


Figure 5. PCIe Protocol Analyzer Lane View

LTSSM Overview

Proper Link Training is critical to solid PCIe performance, and it is often the source of many issues. Physical differences in channels and products are manifested at the protocol layer via the LTSSM. The LTSSM Overview allows validation engineers to see progression through the LTSSM and a decode of which state both the Upstream and Downstream ports are in at a given moment. The LTSSM Overview is a powerful tool for debugging one of the most difficult and complex aspects of PCIe protocol.

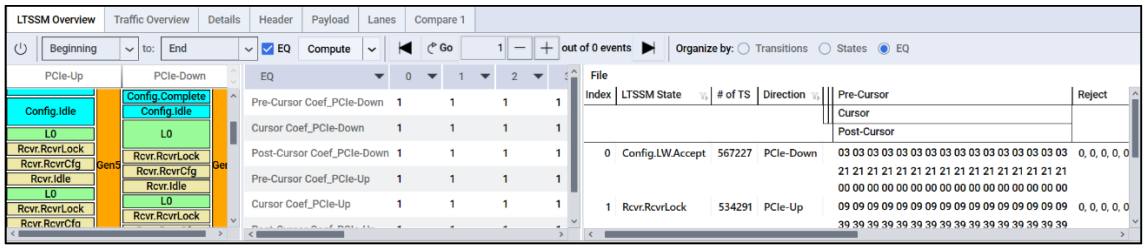


Figure 6. PCIe Protocol Analyzer LTSSM Overview

FLIT Viewer

View and examine FLITs in the up and downstream traffic through the FLIT Viewer. The ability to filter through a particular FLIT type eases the task of checking the status for errors or no errors in the FEC and also if CRC passes or otherwise. Available FLIT type, eg. Payload, Nop, Idle, Fail, Pass, etc.

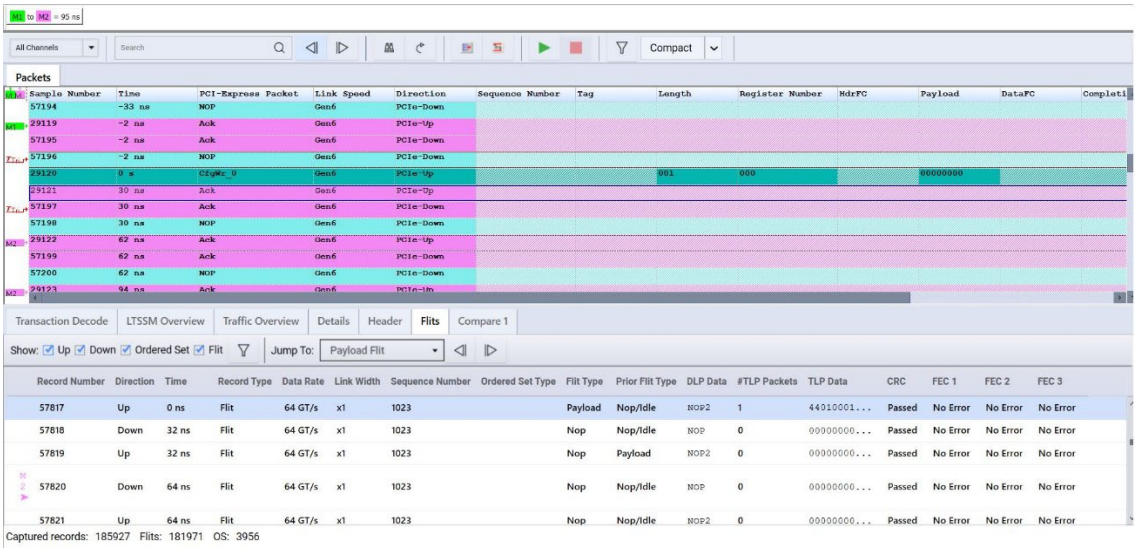


Figure 7. PCIe protocol analyzer FLIT viewer

Product Specifications

General characteristics	
Link widths	x1, x2, x4, x8 with x16 PCIe Edge connector
Data rates	2.5 GT/s (PCIe 1.0), 5.0 GT/s (PCIe 2.0), 8.0 GT/s (PCIe 3.0), 16.0 GT/s, (PCIe 4.0), 32 GT/s (PCIe 5.0) and 64GT/s (PCIe 6.0)
Speed	Up to 32 GBaud NRZ and PAM4 per lane
Clocking architecture	Common Clock architecture
Physical characteristics	
Size	Half-length PCIe module 235 mm high and 167 mm long
Weight	< 1.5 Kg
Connectors	Power input, USB 3.0, and two mini-coax connectors for trigger in and out.
Cover	The hardware board has a cover to provide rigidness to the board.
Power requirements	
Input	12 Vdc, 18 A maximum
Maximum power requirement	230 W
P5562A specifications and characteristics	
PCIe Edge Finger for system DUT	Consists of PCIe 6.0 x 16 PCB edge finger to support single slot PCIE card. The PCB has 82 gold-plated pins on top and 82 gold-plated pins on the bottom to support 164 pins, a requirement for PCIe x16 slot.

Trigger output	
Output impedance	50 ohms
Threshold voltage	VOH - 2.4 V; VOL – 0.55 V
Trigger input	
Maximum input	3.0 V
Threshold voltage (VIH)	2.0 V

Environmental specifications	
This instrument is intended for indoor use in an installation category II, pollution degree 2 environment.	
Temperature	Operating: +5 °C to +35 °C; Storage: -40 °C to +70 °C
Humidity	Operating: 15 to 85% (Relative humidity, non-condensing) Storage: 15 to 95% (Relative humidity, non-condensing)
Altitude	2000 m (6,500 feet) maximum
EMC and safety	IEC 61326-1 IEC 61010-1 / EN 61010-1 Canada: CSA C22.2 No. 61010-1 USA: UL 61010-1

Additional Recommended Hardware

While the Keysight P5570A PCIe 6.0 Protocol Analyzer offers deep insight into the interactions of PCIe Root Complex and Endpoint devices, even more powerful test configurations can be supported when the P5560A is paired with additional Keysight hardware to improve test case customization, robustness, and mechanical stability. Additional Keysight products that can accompany the P5570A are shown below.

Description	Keysight model number(s)	Comments
PCIe 6.0 protocol exerciser	P5573A	
PCIe 6.0 test system (backplane)	P5563B	

Ordering Information

Model	Description	Comments
P5575A	PCIe 6.0 Exerciser Linkwidth x4	
P5574A	PCIe 6.0 Exerciser Linkwidth x8	
P5573A	PCIe 6.0 Exerciser Linkwidth x16	
P5577PSWA	PCIe 6.0 Exerciser Software	Required for use of Exerciser
P5572A	PCIe 6.0 Analyzer Linkwidth x4	
P5571A	PCIe 6.0 Analyzer Linkwidth x8	
P5570A	PCIe 6.0 Analyzer Linkwidth x16	
P5576PSWA	PCIe 6.0 Analyzer Software	Required for use of Analyzer
R-55A-001-3	KeysightCare Assured - Extend to 3 years	
P5563B	PCIe 6.0 Test System (Backplane)	

Software Licensing and KeysightCare Software Support Subscriptions

Keysight offers a variety of licensing options to flit your needs and budget. Choose your license term, license type, and KeysightCare software support subscription.

KeysightCare software support subscriptions

Perpetual licenses are sold with a 12 (default), 24, 36, or 60-month software support subscription. Support subscriptions can be renewed for a fee after that.

Contact your Keysight representative or authorized partner for more information or to place an order:
www.keysight.com/find/contactus

For more information about Keysight's PCIe solutions, go to:
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KeysightCare software support subscription provides peace of mind amid evolving technologies.

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- Gain additional insight into your problems with live access to our team of technical experts.
- Stay on schedule with fast turnaround times and priority escalations when you need support.