

D9010PCIP

PCI Express® and SATA/SAS Protocol Trigger/Decode for
Infiniium oscilloscopes

Introduction

The D9010PCIP is a powerful software package with the ability to trigger and decode two of the most important protocols to date. PCIe Gen1 through Gen4 and SATA/SAS. Compatible with a wide range of Infiniium oscilloscopes from Keysight, the latest UXR B-Series, to the legendary Z, V, and 90000-Series lineup.



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Product Overview

The Keysight D9010PCIP Infiniium protocol viewer software provides packet-level decode for PCI Express and SATA/SAS signals built directly into the real-time oscilloscope. This software provides you with a quick and simple way to isolate signal integrity problems from a logic-level perspective caused by coding errors on bi-directional serial data streams. This capability allows you to test, debug, and characterize your designs to the logic and link layer. D9010PCIP Infiniium protocol decode software has decode options that support both PCIe 4.0 at 16GT/s as well as legacy PCIe speeds of 8GT/s, 5GT/s, and 2.5GT/s. D9020ASIA is highly recommended for equalization and opening closed eye diagrams when it comes to PCIe Gen4 signal integrity analysis.

SATA (Serial Advanced Technology Attachment) and SAS (Serial Attached SCSI) serial buses are interfaces used to connect ATA hard drives to a computer's motherboard. However, since these protocols transfer bits serially, using a traditional oscilloscope has limitations. Manually converting captured 1's and 0's to protocol requires significant effort, can't be done in real-time, and includes potential for human error. As well, traditional scope triggers are not enough for specifying protocol-level conditions.

D9010PCIP uses built-in, intelligent, automated setup algorithms to configure the software to decode serial buses with just a push of a button.

- Set up and decode in less than 30 seconds.
- Access a rich set of integrated protocol-level triggers.
- Save time by eliminating errors through packet view at the protocol level.
- Enable time-correlated views to quickly troubleshoot serial protocol issues caused by timing or signal integrity.

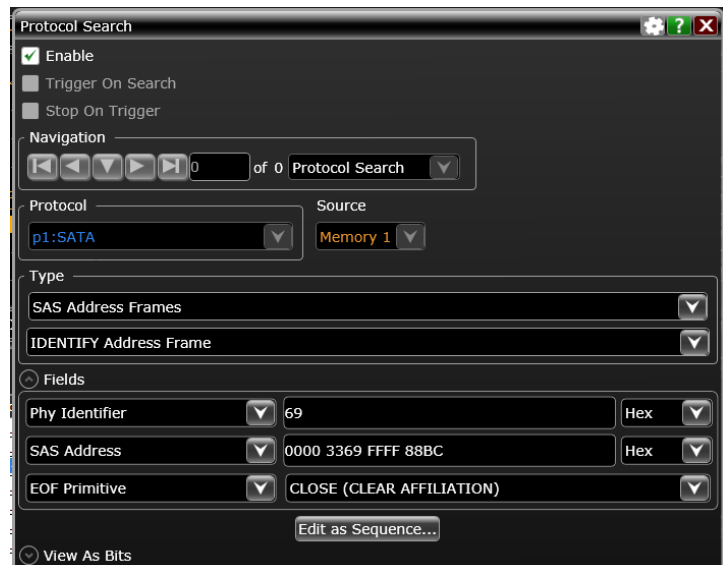


Figure 1. Extreme levels of detail afforded by the SAS protocol search.

You can search through a rich set of integrated protocol-level triggers and configurable protocol-level trigger conditions specific to PCIe, SAS, and SATA. A software-based triggering takes the acquired signals and reconstructs the protocol frames after each acquisition. It then inspects these protocol frames against specified protocol-level trigger conditions and executes the triggers when the condition is met.

PCI Express

Features

The D9010PCIP Infiniium protocol trigger and decode software offers several features to simplify the validation of your PCI Express designs:

- Setup wizard for quick setup, configuration, and test
- Packet-level decode of ordered sets as well as link and logical physical layers
- Serial data analysis with 128/130-bit streams (Gen3, Gen4)
- Serial data analysis with 8B/10B symbols (Gen1, Gen2)
- Decode of scrambled and unscrambled symbols
- Bi-directional symbol and packet-level decode
- Simultaneous display of packet/symbol lists and waveform overlay
- Capability to save symbol and packet data lists to .csv and .txt files
- Packet decode details tab provides detailed information on packets:
 - Channel information
 - Listing index
 - Link ordered set type
 - Control symbols
 - Reserved-bit settings
 - Data payload popup
 - CRC
 - Packet length
- Payload display shows data payload
- Unique packet-waveform correlation marker “blue line” makes it easy to scroll through waveforms to view synchronized
 - Comprehensive serial search capabilities
 - Trigger and stop on search
 - Primitive, control symbol, and packet search capability

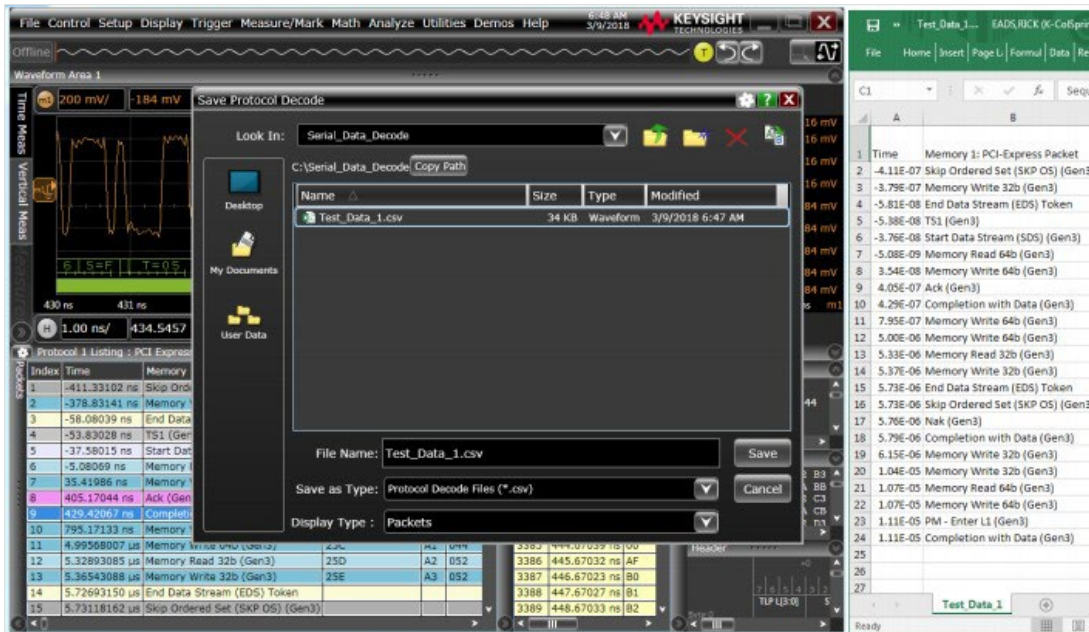


Figure 2. Saving symbol, packet, and waveform data.



Figure 3. The auto-setup button for PCI Express. SAS and SATA have similar auto-setup buttons.

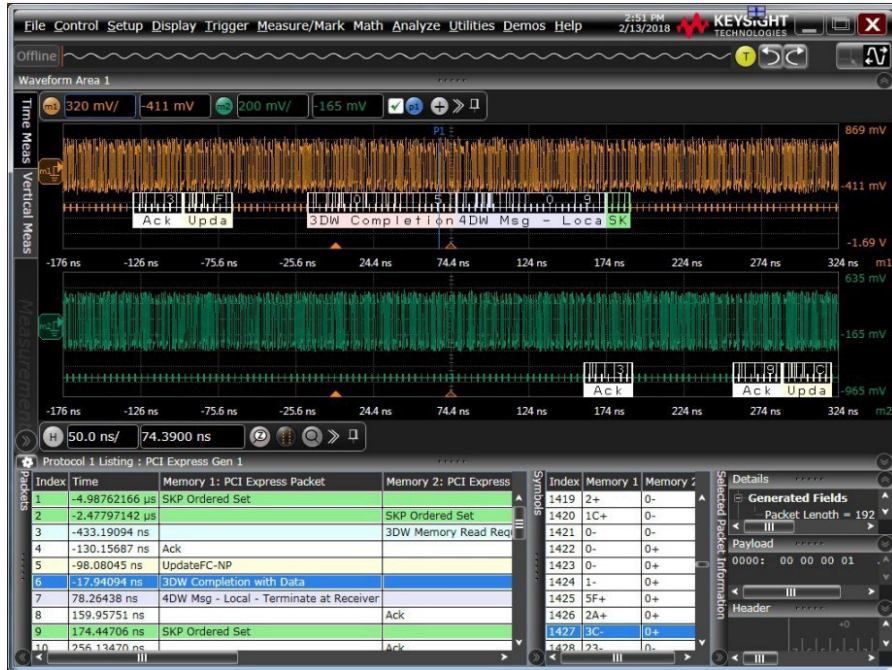


Figure 4. A bi-directional waveform packet and listing window are displayed simultaneously.

PCIe

Specifications and characteristics

Signal sources	Any analog channel Any waveform math Any waveform memory
Protocols supported	PCI Express Gen 1, 2, 3 and 4
Auto setup	Automatically configures trigger levels, decode thresholds, sample rate, memory depth, holdoff, trigger, and more for each generation of PCI Express
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit (Gen 1) Descramble: Yes or No Electrical IDLEs are present: Yes or No Lane selection (per data source): 0 Single, [0-31] Multi
Trigger options (via search) ¹	Gen 1, 2 Ordered sets, FTS, EIOS, EIEOS, TS, TS1, TS2, compliance patterns Gen 3, 4 Ordered sets, SKP, control SKP, FTS, EIOS, EIEOS, SDS, TS, TS1, TS2, invalid zero sequence, compliance patterns

1. For a complete list of all trigger fields and variables, please contact Keysight.

SATA / SAS

Specifications and characteristics

Signal sources	Any analog channel Any waveform math Any waveform memory
Data rates	1.5 Gbps, 3 Gbps, 6 Gbps
Auto setup	Automatically configures trigger levels, decode thresholds, sample rate, memory depth, holdoff, and trigger
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Descramble: yes or no Electrical IDLEs are present: yes or no
Trigger options ¹	SATA primitives SATA FIS types Common primitives SAS primitives SAS address frames SAS frames SSP frames Vendor-defined frames SMP frames Symbol sequence Errors

1. For a complete list of all trigger fields and variables, please contact Keysight.

Ordering Information

Recommended oscilloscopes

The protocol triggering and decoding software is compatible with Keysight Infiniium-Series oscilloscopes with operating software revision 6.30 or higher. The table below determines the bandwidth needed on which application.

Standard	Data rate	Recommended bandwidth
PCIe Gen 1	2.5 GT/s	6 GHz
PCIe Gen 2	5 GT/s	12 GHz
PCIe Gen 3	8 GT/s	20 GHz
PCIe Gen 4	16 GT/s	25 GHz
SATA Gen 1	1.5 Gbps	4 GHz
SATA Gen 2	3 Gbps	12 GHz
SATA Gen 3	6 Gbps	16 GHz
SAS	3 Gbps	8 GHz
SAS-2	6 Gbps	16 GHz
SAS-3	12 Gbps	30 GHz

Recommended software, fixtures, and cables

Please note that although only one probe and probe head are required it is recommended that you order two differential probes and probe heads — one for each direction of the signal.

Description	Keysight model number(s)	Comments
SATA / SAS test accessories		
SATA Gen3 receptacle adapter	Wilder Technologies	
DC blocking capacitor (26.5 GHz)	11742A	Quantity 2
InfiniiMax II 12 GHz differential probe	1169A	Quantity 2
InfiniiMax II SMA probe adapter	MX0105A	Quantity 2
Diff. probe connectivity kit	E2669A	
PCI Express test accessories		
InfiniiMax III 25 GHz probe amplifier	N2802A	
SMA probe head	N5444A	
InfiniiMax III QuickTip probe head	N2849A	
InfiniiMax III 26 GHz solder-in tip	N2836A	
Matched pair of SMA cables	15443A	
Serial data equalization software	D9020ASIA	

Flexible software licenses and KeysightCare Software Support Subscriptions

Keysight offers a variety of flexible licensing options to fit your needs and budget. Choose your license term and license type.

License terms

Perpetual – Perpetual licenses can be used indefinitely.

Subscription – Subscription licenses can be used through the term of the license only.

License types

Node-locked – License can be used on one specified instrument/computer.

Transportable – License can be used on one instrument/computer at a time but may be transferred to another using Keysight Software Manager (internet connection required).

USB Portable – License can be used on one instrument/computer at a time but may be transferred to another using a certified USB dongle (available for additional purchase with Keysight part number SW1000-D10).

Floating (single site) – Networked instruments/computers can access a license from a server one at a time. Multiple licenses can be purchased for concurrent usage.

KeysightCare Software Support Subscriptions

Perpetual licenses are sold with a 12 (default) and up to 60-month software support subscription with a user-selected start and end date. Support subscriptions can be renewed for a fee after that.

Subscription licenses include a software support subscription through the term of the license, from 3 to 36 months, with a user-selected start date.

Selecting your license

Step 1. Choose your software product (e.g. D9020ASIA)

Step 2. Choose your license term: perpetual or subscription.

Step 3. Choose your license type: node-locked, transportable, USB portable, or floating.

Step 4: Depending on the license term, choose your support subscription duration.

Example

If you selected: **Your quote will look like this:**

D9020ASIA Node-locked	Part number D9020ASIA	Description Advanced Signal Integrity Software (EQ, InfiniiSimAdv, Crosstalk) Node-locked perpetual license
Perpetual license	SW1000-LIC-01 SW1000-SUP-01	Node-locked KeysightCare software support subscription with user-selected start and end dates
D9020ASIA Transportable Subscription 6-month license	Part number D9020ASIA SW1000-SUB-01	Description Advanced Signal Integrity Software (EQ, InfiniiSimAdv, Crosstalk) 6-months, transportable subscription license

To configure your product and request a quote:

<http://www.keysight.com/find/software>

Contact your Keysight representative or authorized partner for more information or to place an order:

www.keysight.com/find/contactus

PCI-SIG®, PCIe® and the PCI Express® are US registered

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