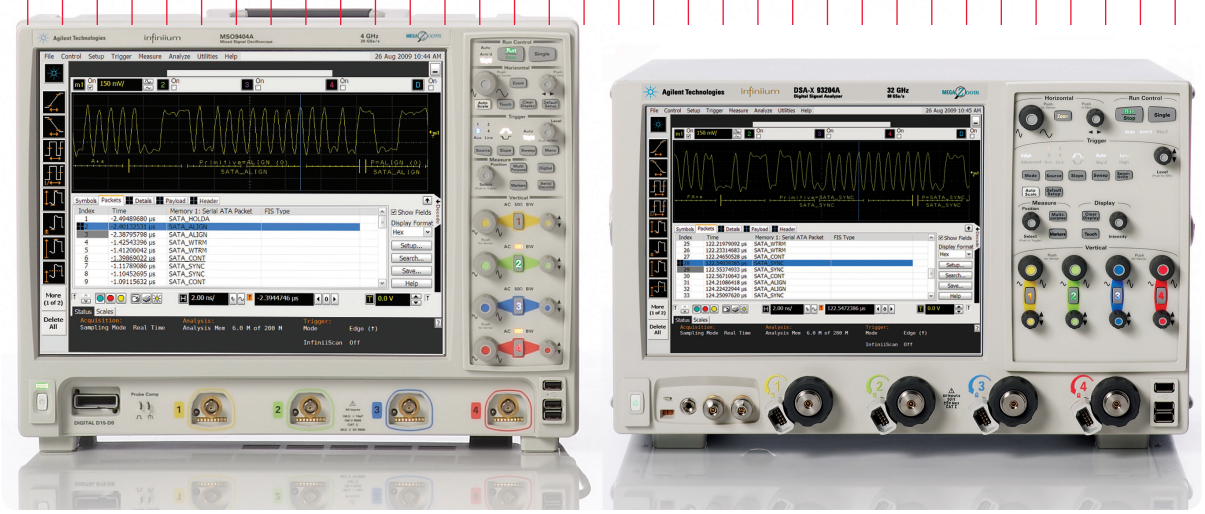
Keysight Technologies
SATA Protocol Triggering and Decode for Infiniium Series Oscilloscopes

Data Sheet



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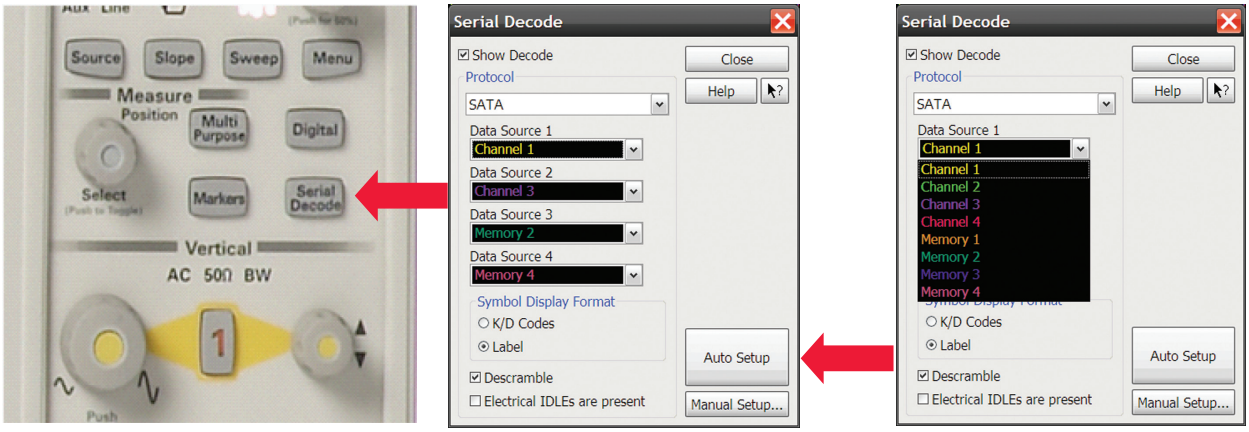
SATA

SATA (Serial Advanced Technology Attachment) Serial bus is an interface 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 sufficient for specifying protocol-level conditions.

Extend your scope capability with the Keysight Technologies, Inc. SATA triggering and decode application. This application makes it easy to debug and test designs that include SATA buses using your Infiniium Series oscilloscope.

- Set up your scope to show SATA protocol decode in less than 30 seconds.
- Get access to a rich set of integrated protocol-level triggers.
- Save time and eliminate errors by viewing packets at the protocol level.
- Use time-correlated views to quickly troubleshoot serial protocol problems back to their timing or signal integrity root cause.



Easy to find

Turn decode on/off via the "Serial Decode" button on the front of 9000 Series scopes or in the "Setup" menu. View decode embedded on the waveform display or in the protocol viewer listing window. (See pages 4–5.)

30 second SATA Setup

Configure your oscilloscope to display protocol decode in under 30 seconds. Use "Auto Setup" to automatically configure sample rate, memory depth, threshold and trigger levels, and clock recovery for SATA

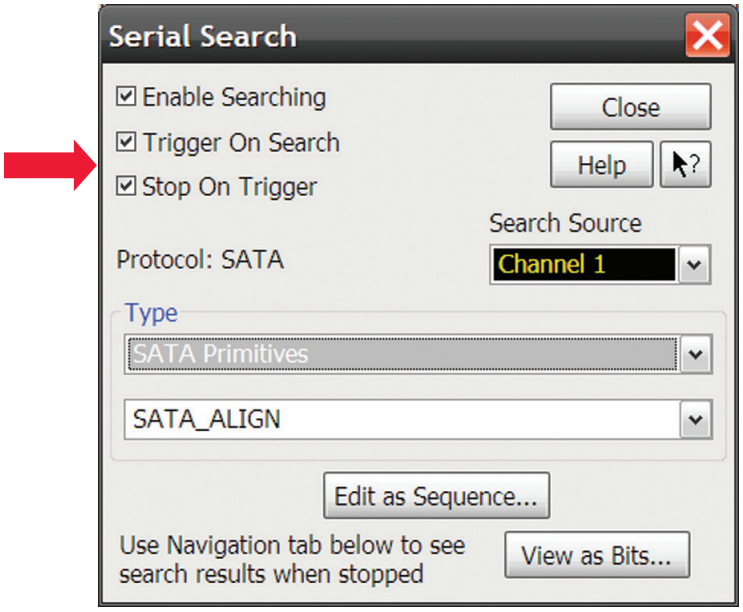
Support for both live and saved waveforms

Perform and view decode information on both live and saved waveforms. Decode up to any combination of 4 live or saved waveforms.

SATA Setup, Protocol Triggering, and Search Capabilities

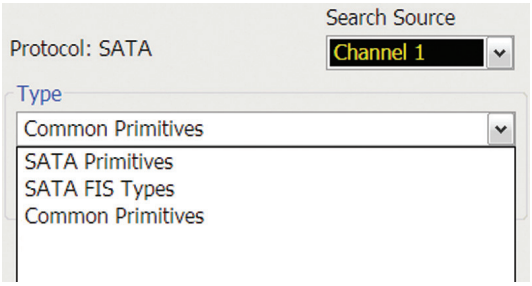
Get access to a rich set of integrated protocol-level triggers. The application includes a suite of configurable protocol-level trigger conditions specific to SATA. When serial triggering is selected, the application uses software-based triggering.

With software-based protocol triggering, the oscilloscope takes signals acquired using scope channels and reconstructs protocol frames after each acquisition. It then inspects these protocol frames against specified protocol-level trigger conditions and triggers when the condition is met.



SATA trigger and search setup

Quickly access the software-based trigger via the trigger or search menus. Software-based triggering enables quick setup of data, remote, or error frames.



Specify the type.

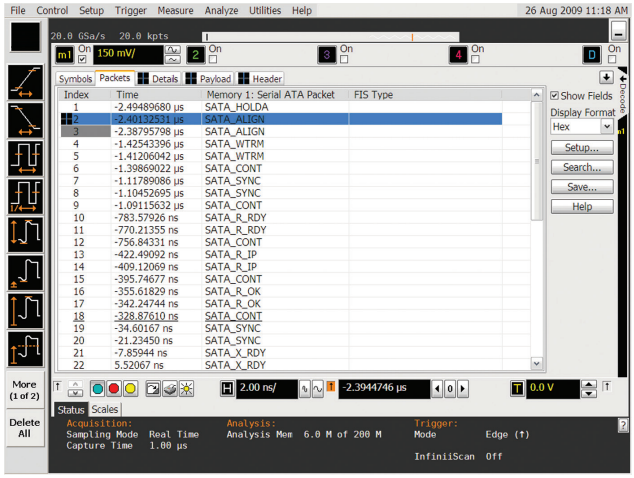
SATA primitives, SATA FIS Types and other frames can be acquired.

CAN Protocol Decode

Get access to a rich set of integrated protocol-level triggers. The application includes a suite of configurable protocol-level trigger conditions specific to SATA. When serial triggering is selected, the application uses software-based triggering.

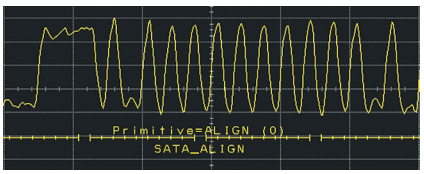
With software-based protocol triggering, the oscilloscope takes signals acquired using scope channels and reconstructs protocol frames after each acquisition. It then inspects these protocol frames against specified protocol-level trigger conditions and triggers when the condition is met.

Quickly move between physical and protocol layer information using the time-correlated tracing marker. Display protocol content using embedded decode in the waveform area, Or, see protocol events in a compact listing format. View the decode information in symbols or packets type.



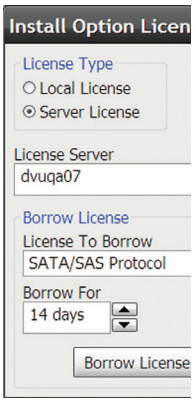
Compact protocol using the full screen listing.

The protocol viewer window shows the index number, time stamp value identifier, packet type, and data values for each SATA packet. Data in the listing window can be saved to a .csv or .txt file for off-line.



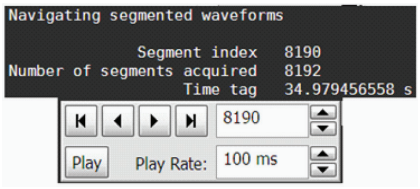
SATA decode embedded in waveform area

Utilize the oscilloscope waveform area to display decode information. Minor ticks indicate clock transitions and major ticks show segments within each SATA packet.



Using multiple scopes?

Server-based licensing allows users to borrow an application for a specified period of time.



Long time captures using segmented memory

In this example, CAN traffic was captured for near 35 seconds. Segmented memory uses time tags to track time between segment acquisitions.

SATA Application Specifications and Characteristics

SATA	
SATA sources	Analog channels 1,2, 3, or 4 Any waveform memories The application relies on probing and trigger/measurement thresholds to properly condition the signal for triggering and decode.
Data rate	1.5 Gb/s, 3.0 Gb/s and 6 Gb/s
Signal type	Single-ended, Differential
Auto setup	Automatically configures scope settings for proper SATA decode and SW-based protocol triggering including memory depth, edge triggering, holdoff, sample rate, and measurement thresholds
Decoded fields	All including extended frame format
Triggering (software-based)	Start of frame Data frame (frame containing node data for transmission) User specified value for data byte 0 in hex, binary, or decimal Immediately followed by data byte specified in hex, binary, or decimal Remote frame (frame requesting the transmission of a specific identifier) User specified identifier in hex, binary, or decimal Data or remote frame Error frame (frame transmitted by any node detecting an error)

Recommended Oscilloscopes

The SATA protocol decoder is compatible with Keysight Infiniium Series oscilloscopes with operating software revision 4.20 or higher. For oscilloscopes with earlier revisions, free upgrade software is available here: www.keysight.com/find/scope-apps-sw.

Data rate	Minimum bandwidth	Minimum channels	Compatible oscilloscopes
1.5 Gb/s	8 GHz	2	Infiniium 90000, S-Series, and Z-Series
1.5, 3.0, and 6 Gb/s	12 GHz	2	Infiniium 9000 and Z-Series

Ordering Information

To purchase the SATA protocol decoder with a new or existing Infiniium Series oscilloscope, order the following options.

Software options

Application	License type		Infiniium Z-Series	Infiniium S-Series	Infiniium 90000 Series
SATA protocol decoder	Fixed	Factory-installed	N8801A-1FP	N8801B-1FP	Option 018
		User-installed	N8801A-1FP	N8801B-1FP	N8801A-1NL
	Floating	Transportable	N8801A-1TP	N8801B-1TP	N8801A-1TP
		Server-based	N5435A-035	N5435A-035	N5435A-035
Serial data analysis with clock recover (included in DSA model)	Fixed	Factory-installed	E2688A-1FP	N5384A-1FP	Option 003
		User-installed	E2688A-1FP	N5384A-1FP	E2688A-1NL
	Floating	Transportable	E2688A-1TP	N5384A-1TP	E2688A-1TP[1,2]
		Server-based	N5435A-003	N5435A-003	N5435A-003

1. Requires software 5.00 and above.
2. Software 4.30 or above requires Windows 7. N2753A Infiniium Windows XP to 7 OS upgrade kit (oscilloscope already has M890 motherboard). N2754A Infiniium Windows XP to 7 OS and M890 motherboard upgrade kit (oscilloscope without M890 motherboard). Verify the M890 motherboard using the procedure found in the Windows 7 upgrade kit data sheet with the publication number 5990-8569EN.

Other hardware, probes and accessories

Model number	Description	Quantity
SATA Gen3 receptacle adapter	Wilder Technologies (www.wilder-tech.com/sata.htm) Luxshare-ICT (web.luxshare-ict.com/en/ProductOverview.phy)	1
11742A	DC blocking capacitor, 0.045 to 26.5 GHz, 3.5-mm (m-f) connectors	2
1169A	InfiniiMax II 12-GHz differential probe amplifier	2
N5380B	InfiniiMax II SMA probe adapter	2
E2669A	Differential probe connectivity kit (contains needed probe heads)	1

Related Literature

Publication title	Publication type	Publication number
Infiniium 9000 Series Oscilloscopes	Data sheet	5990-3746EN
Infiniium 90000 Series Oscilloscopes	Data sheet	5989-7819EN
Infiniium 90000 X-Series Oscilloscopes	Data sheet	5990-5271EN
N5411B SATA 6 Gb/s Compliance Test Software	Data sheet	5990-3594EN
Infiniium S-Series Oscilloscopes	Data sheet	5991-3904EN
Infiniium Z-Series Oscilloscopes	Data sheet	5991-3868EN

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