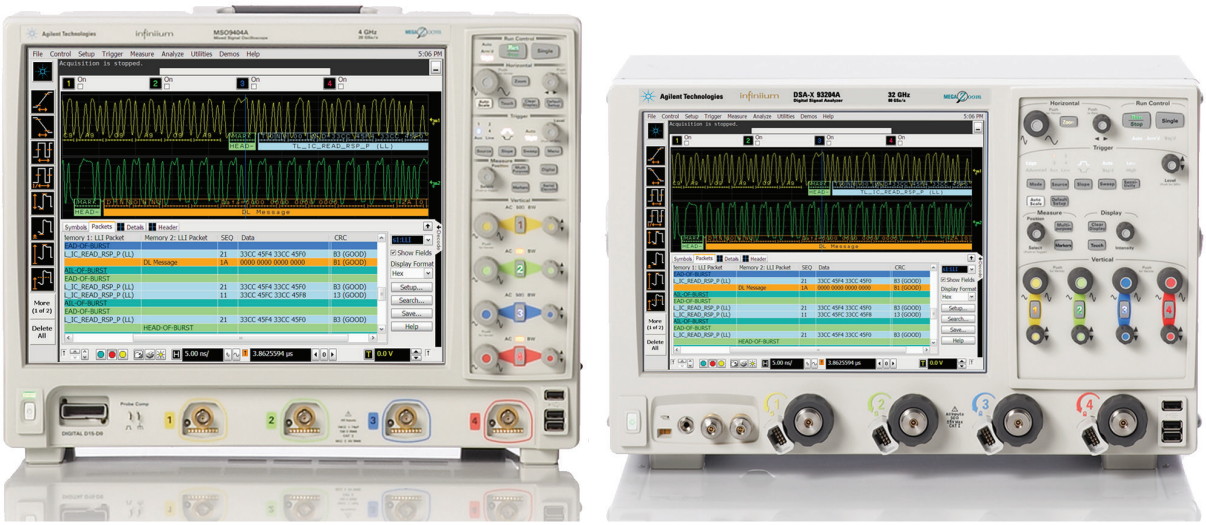
MIPI LLI (M-PHY) Protocol Triggering and Decode for Infiniium Series Oscilloscopes

Data Sheet



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MIPI LLI (M-PHY)

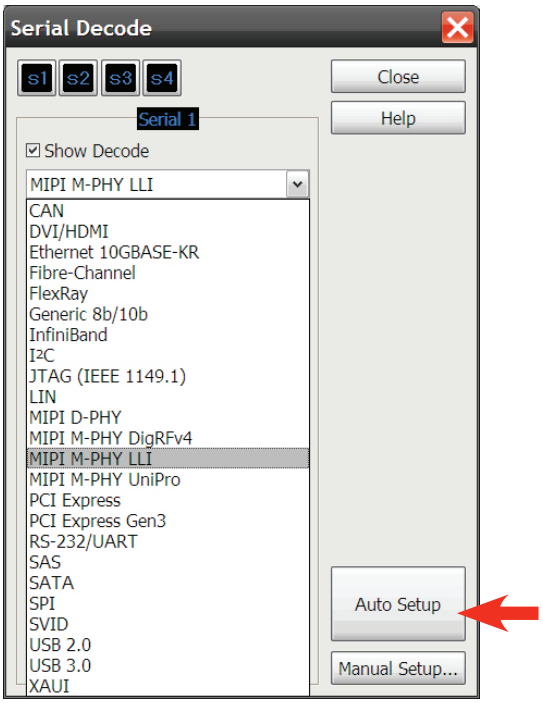
MIPI (Mobile Industry Processor Interface) serial buses are the backbone for communication in mobile products. The serial bus interface provides content-rich points for debug and test. However, since these protocols transfer bits serially, using a traditional oscilloscope has limitations. Manually converting captured 1's and 0's to protocol requires significant effort, can't be done in real-time, and includes potential for human error. In addition, traditional scope triggers are not sufficient for specifying protocol-level conditions.

Extend your scope capability with Agilent's MIPI Low Latency Interface (LLI) triggering and decode application. This application makes it easy to debug and test designs that include MIPI LLI buses using your Infiniium Series oscilloscope.

- Set up your scope to show MIPI LLI 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

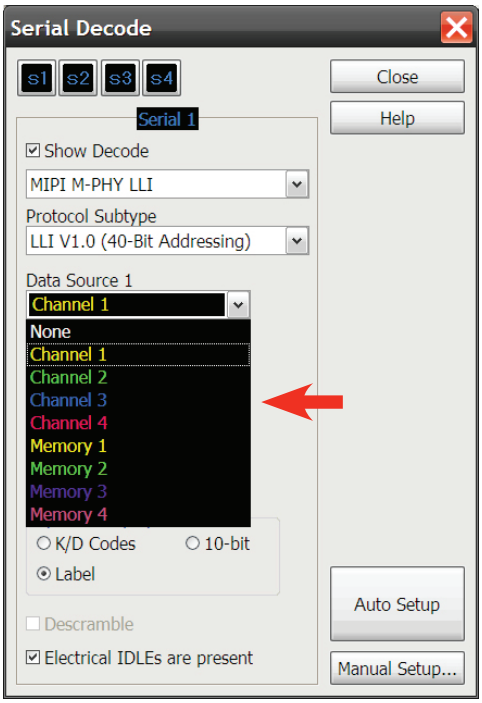
The following are the MIPI LLI protocols and features that will be supported by the application.

1. Supports LLI v1.0 decode and triggering
2. Decodes high-speed (HS-BURST) and low-speed Pulse Width Modulation (PWM-BURST) modes
3. Decodes with cyclical redundancy check (CRC) support
4. Supports decode on Tx and Rx traffics
5. Supports search capability for various frames, sequences and errors



30-second MIPI 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.



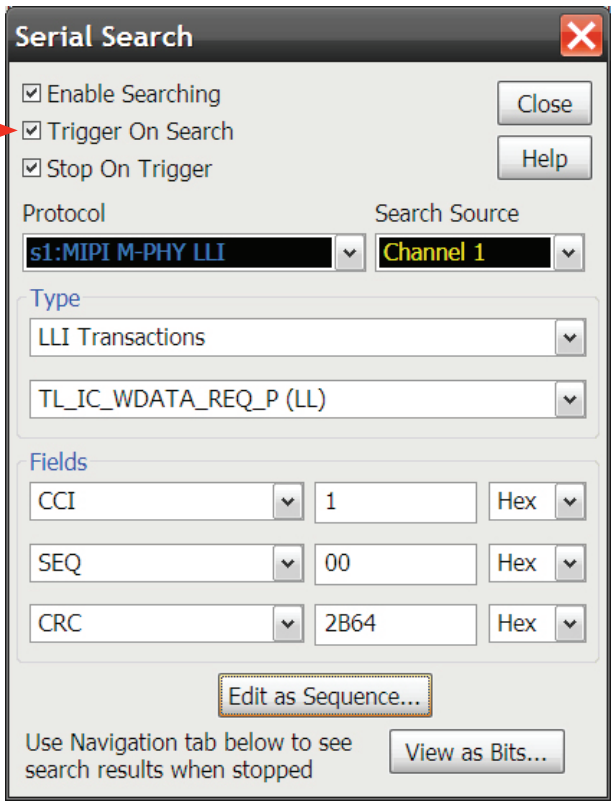
Support for live and saved waveforms

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

MIPI LLI (M-PHY) 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 MIPI LLI. When serial triggering is selected, the application uses software-based triggering.

With software-based protocol triggering, the oscilloscope takes signals acquired using either the scope or digital 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.



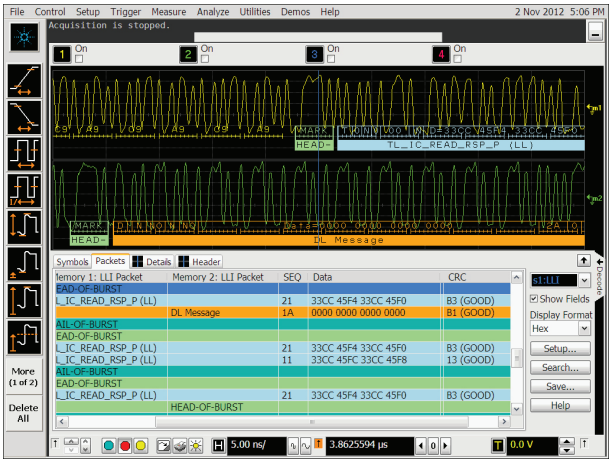
MIPI trigger and search setup

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

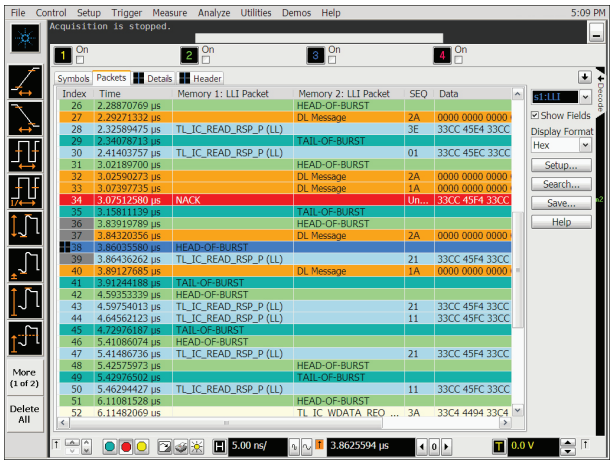
MIPI LLI (M-PHY) Protocol Decode

Get access to a rich set of integrated protocol-level triggers. The application includes a suite of configurable protocol-level trigger conditions specific to MIPI LLI. 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.

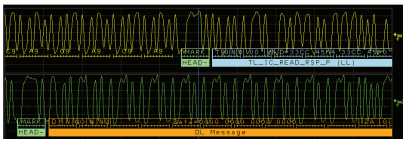


Quickly move between physical and MIPI LLI protocol layer information using the time-correlated tracing marker. Display protocol content using embedded decode in the waveform area, or see protocol events in a compact listing format. Minor tick marks indicate clock transitions. Major tick marks indicate segments of the serial packet MIPI LLI measurements are automatically time-correlated with measurement on other scope channels.



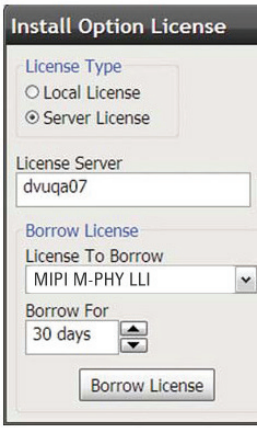
Compact protocol using the full screen listing

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



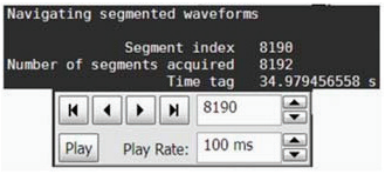
MIPI LLI decode embedded in waveform area

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



Using multiple scopes?

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



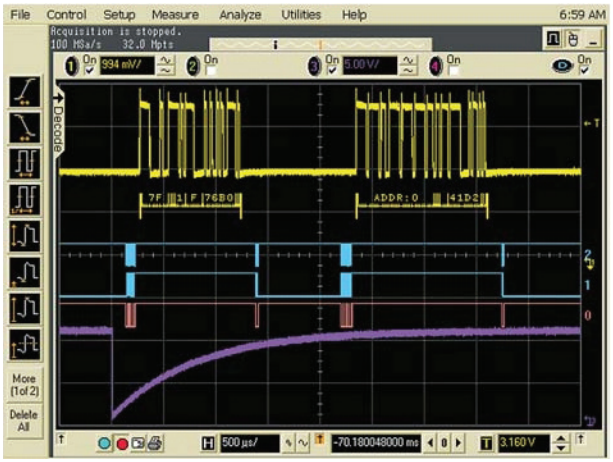
Long time captures using segmented memory

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

MIPI LLI (M-PHY) Protocol Decode *Continued*

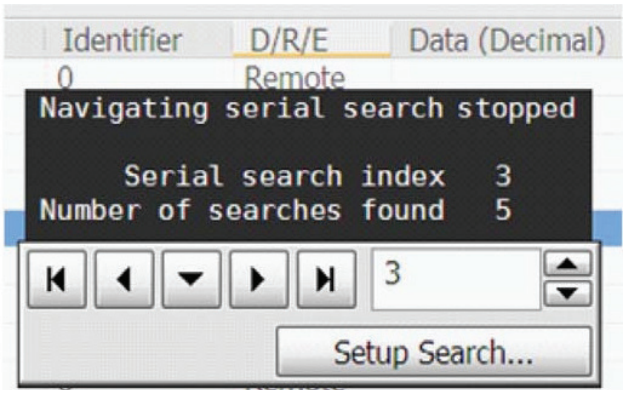
Time correlation with other system activity

Protocol measurements are automatically time-correlated with measurements taken on other analog or digital (on MSO models) channels.



Precise MSO triggering and display

Mixed-signal oscilloscope measurement in a mobile system using both digital and analog acquisition channels.



Post-acquisition searching

Search acquired protocol listings using a menu that is identical to the trigger menu. Quickly move to next occurrence of a specified event.

MIPI LLI (M-PHY) Application Specifications and Characteristics

MIPI	
MIPI 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. Differential probing may be required
Data rate	Up to 6 Gbps
Protocol type	LLI v1.0
Auto setup	Automatically configures oscilloscope settings for proper MIPI LLI decode and software-based protocol search including memory depth, edge triggering, holdoff, sample rate, and measurement thresholds
Decoded fields	All including extended frame format
Triggering (software-based)	PA message Service transactions DL message LLI transactions Head-of-burst Tail-of-burst NACK Symbol sequence Error

Recommended oscilloscopes

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

Data rate	Minimum bandwidth	Minimum channels	Compatible oscilloscopes
Gear 1 (Up to 1.46 Gbps)	6 GHz	2	Infiniium 9000, S-Series, 90000 and Z-Series
Gear 2 (Up to 2.92 Gbps)	12 GHz	2	Infiniium 90000 and Z-Series
Gear 3 (Up to 5.83 Gbps)	20 GHz	2	Infiniium 90000 and Z-Series

Ordering information

To purchase the LLI 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	Infiniium 9000 Series
LLI protocol decoder	Fixed	Factory-installed	N8809A-1FP	N8809B-1FP	Option 053	–
		User-installed	N8809A-1FP	N8809B-1FP	N8809A-1NL	N8809B-1NL
	Floating	Transportable	N8809A-1TP	N8809B-1TP	N8809A-1TP	N8809B-1TP
		Server-based	N5435A-049	N5435A-049	N5435A-049	N5435A-049
Serial data analysis with clock recovery (included in DSA model)	Fixed	Factory-installed	E2688A-1FP	N5384A-1FP	Option 003	Option 003
		User-installed	E2688A-1FP	N5384A-1FP	E2688A-1NL	N5384A-1NL
	Floating	Transportable	E2688A-1TP	N5384A-1TP	E2688A-1TP[1,2]	N5384A-1TP[1,2]
		Server-based	N5435A-003	N5435A-003	N5435A-003	N5435A-003

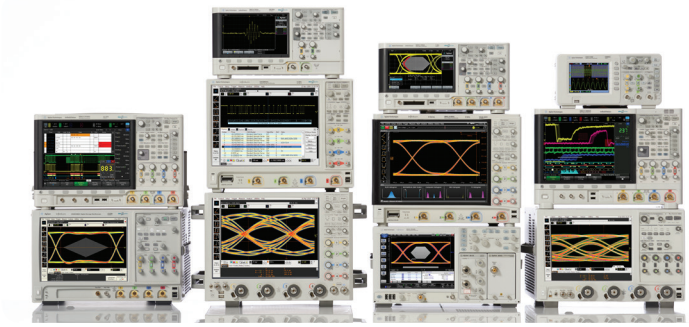
1. *Requires software 5.00 and above.*
2. *Software 4.30 or above requires Windows 7. N2753A Infiniium Windows XP to 7 OS upgrade kit (oscilloscope already has M890 motherboard). N2754A Infiniium Windows XP to 7 OS and M890 motherboard upgrade kit (oscilloscope without M890 motherboard). Verify the M890 motherboard using the procedure found in the Windows 7 upgrade kit data sheet with the publication number 5990-8569EN.*
3. *For full switch configuration, please refer to* www.agilent.com/find/switching *or the brochure Automated Switching Solution for Oscilloscopes with the publication number 5991-2413EN.*

Other hardware, probes and accessories

Model number	Description	Quantity
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 X-Series Oscilloscopes	Data sheet	5990-5271EN
Infiniium 90000 Series Oscilloscopes	Data sheet	5989-7819EN
Infiniium S-Series Oscilloscopes	Data sheet	5991-3904EN
Infiniium Z-Series Oscilloscopes	Data sheet	5991-3868EN
U7249A MIPI M-PHY Compliance Test Software for Infiniium Oscilloscopes	Data sheet	5990-8933EN



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