D9110MPLP
Low Speed MIPI Protocol Trigger and Decode

for Infiniium Oscilloscopes

Introduction

The D9110MPLP software package for Infiniium oscilloscopes gives you the ability to trigger and decode RFEE, I3C, and SPMI low-speed MIPI signals. This package applies to all Infiniium Oscilloscopes.


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Product Overview

Since MIPI protocols transfer bits serially, using a traditional oscilloscope has limitations. Manually converting captured 1's and 0's to protocol requires significant effort, cannot be done in short time, and includes potential for human error. In addition, traditional scope triggers are not sufficient for specifying protocol-level conditions.

Extend your oscilloscope capability with the Keysight D9110MPLP decode and trigger package. This application makes it easy to debug and test designs that include MIPI RFFE, I3C, and SPMI buses using your Infiniium series oscilloscope:

- Set up your oscilloscope to show MIPI 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 MIPI protocol decode features the application will support:

- MIPI RFFE specification v1.10, v2.0 and v2.1 decode and trigger

- MIPI I3C SDR, HDR-DDR, and I2C legacy standard, fast, and fast mode plus decode and trigger

- MIPI SPMI v1.0 and v2.0 decode and trigger

- Decodes traffic between multiple masters and slaves

- Parity check on traffic to ensure data accuracy

- Supports search capability for various frames, sequences and errors
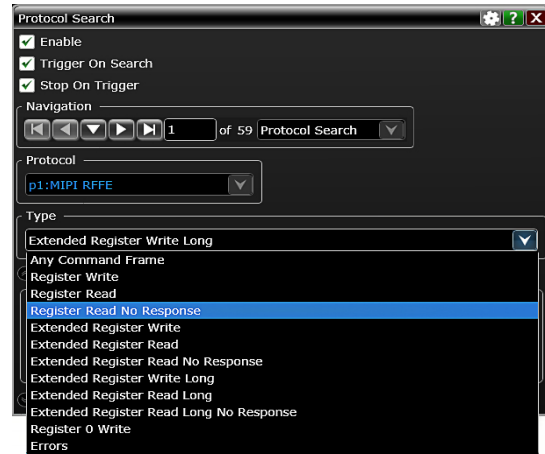
Figure 1. Quickly access the software-based trigger via the trigger or search menus. Software-based triggering enables quick setup of data, remote, or error frames.
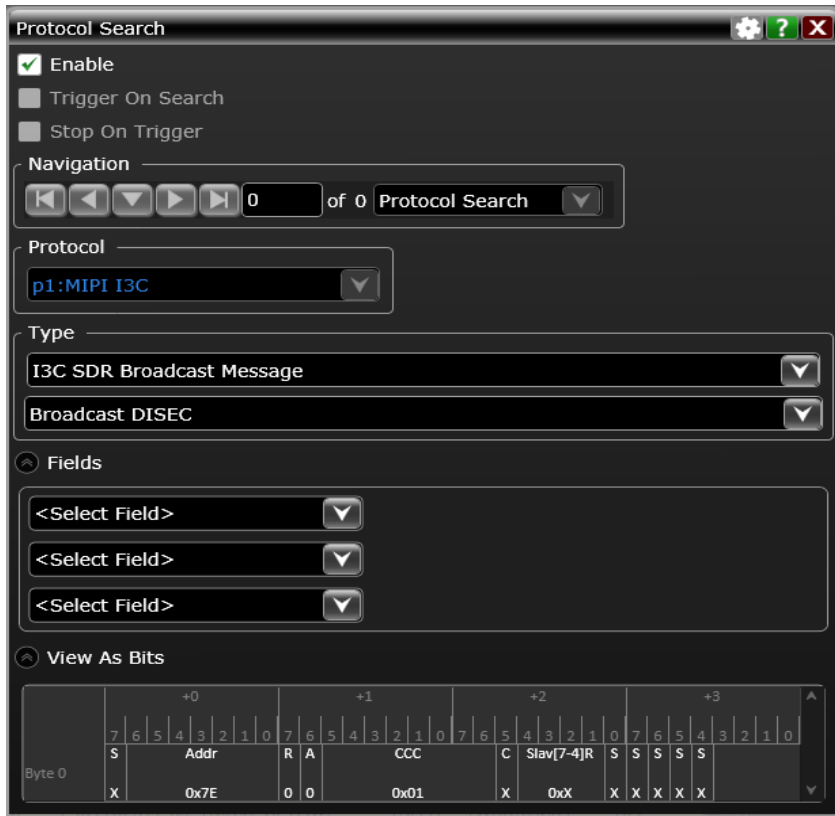
Figure 2. Post-acquisition searching for MIPI I3C signals.
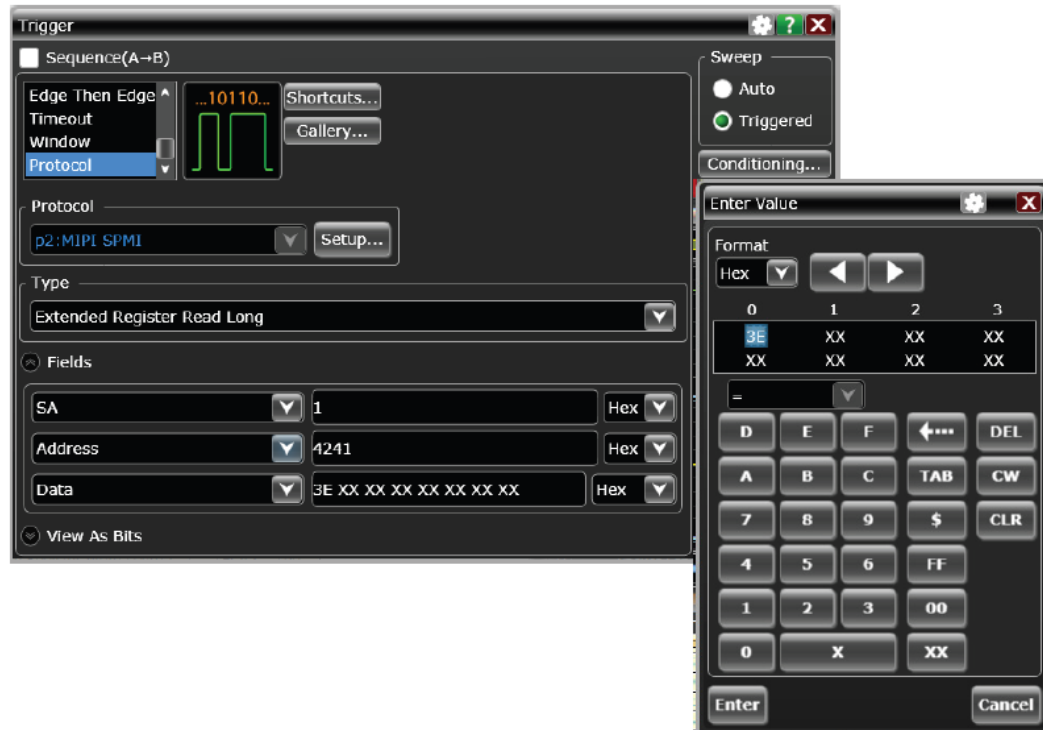

Figure 3. In-depth trigger and searching on MIPI SPMI data.

RFFE

The MIPI Alliance Specification for RF Front-End Control Interface (RFFE) was developed to offer a common and widespread method for controlling RF front-end devices. The interface can be applied to the full range of RF front-end components to simplify product design, configuration and integration, and to facilitate interoperability of components supplied by different vendors. The conveniences make it easier for manufacturers to address end-user needs for faster data speeds and better call quality, develop scalable solutions, and expedite time to market for new designs in the mobile, automotive and IoT sectors.

Specifications and Characteristics

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Signal sources (data and clock)	Any analog channel Any digital channel (MSO models only) Any waveform math Any waveform memory
Protocols supported	v1.10, v2.0, v2.1
Data rate	Up to 26 Mbps
Auto setup	Automatically configures trigger levels, decode thresholds, sample rate, memory depth, holdoff, and trigger
Decode options	Decode is automatic once data and clock sources are selected
Trigger options	Any command frame, register read/write, register read (no response), extended register read/write, extended register read/write long,extended register read (no response), register 0 write, master read/write, master ownership handover, interrupt summary and identification, errors Selectable fields (define up to three): SA, address, data, byte count, MID, ack, MID BOM, ISI, INT[0-15] Error selections: command/address fame parity, data/MOH frame parity, invalid zero value, unknown packet
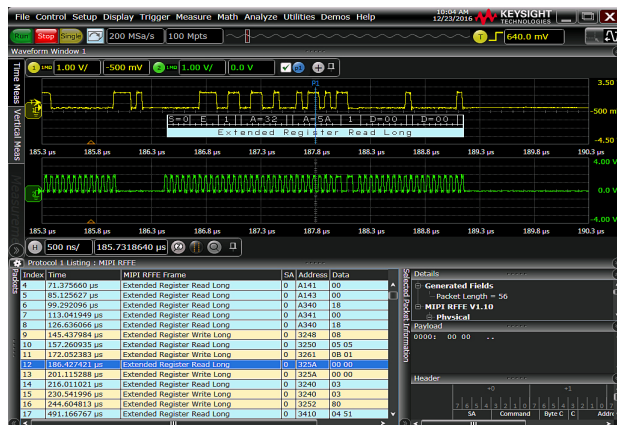
Figure 4. dual view showing the physical layer with a time-aligned decode, as well as a smaller protocol table below.
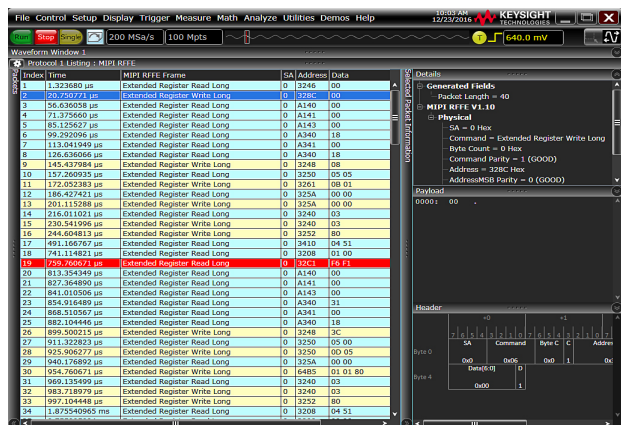

Figure 5. The protocol table can be maximized to show index number, time stamp, packet type, and data values.

I3C

Improved Inter Integrated Circuit (I3C) is one of MIPI® (Mobile industry Processor Interface) standard aimed for next generation Sensor interface. This new interface improved upon the feature of I2C (inter Integrated Circuit) and provide backward compatibility with Legacy I2C devices. I3C is consist of 2 two bidirectional wires called SDA, SCL and optimized for multiple slave devices which controlled by one I3C master device at a time. I3C supports Higher speed than Legacy I2C which is 12.5 MHz and supporting several new high data rate (HDR) mode called as HDR-DDR (Double Data Rate), HDR-TSL (Ternary Symbol Legacy) and HDR-TSL (Ternary Symbol for Pure bus). D9110MPLP can also identify legacy I2C messages using address registration, so you can distinguish the communication between I3C and legacy I2C protocol data and find ACK or NACK errors based on address.

Figure 6. Using up to 3 field values of specific packet type, it is possible to trigger on specific pattern that you want to see.
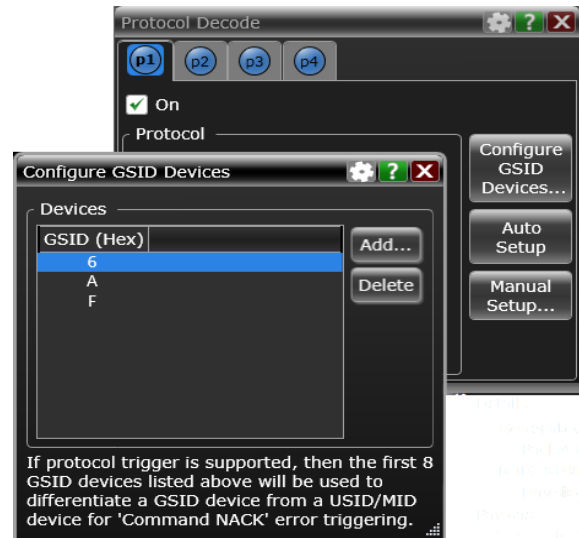
Specifications and Characteristics

Signal sources (SDA, SCL)	Any analog channel Any digital channel (MSO models only) Any waveform math Any waveform memory
Supported protocols	Legacy I2C: standard mode, fast mode, fast mode plus I3C: SDR, HDR-DDR Subtypes: v0.80, v1.00
Baud rate	Up to 12.5 Mbps
Auto setup	Automatically configures trigger levels, decode thresholds, sample rate, memory depth, holdoff, and trigger
Decode options	IBI payload size (BCR[2]) support: on or off GETMXDS with turnaround: on or off
Trigger options [1]	Start/Restart, Stop, Legacy I2C message I3C SDR messages: typical, direct, broadcast, direct/broadcast MRL with IBI payload I3C HDR messages: restart, exit I3C modes: HDR-DDR, HDR-TSP, HDR-TSL Errors

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

SPMI

System Power Management Interface (SPMI) is a MIPI (Mobile Industry Processor Interface) standard to managing power in mobile devices or other applications that appreciate it features. This interface can have up to 4 Masters and up to 16 Slaves in the one bus, so that multiple masters, like AP (Application Processor) or RFIC (Radio Frequency IC), or BBIC (Baseband IC) can control on or more power switches, PMIC (Power Management IC) or Protocol activated LDO regulators (Low Drop Out) with just 2 electrical lanes (SDATA and SCLK).

The biggest advantage of using this interface is that it is possible to control device status like Wakeup, Sleep, Reset, and Shutdown without sideband signal lanes. This helps engineers save space in compact form factor designs. Real time power related chip control provides more optimized power consumption on each of the SPMI interfaced chips. D9110MPLP also supports GSID (Group Slave identifier) so that if the system master supports GSID to send the same protocol command to several slaves, it will not show ACK/NACK error.

Figure 7. Because of differences between USID and GSID, D9110MPLP allows for the configuring of GSID of up to 8 sets allowing the systems operator to identify proper behavior depending on GSID address.

Specifications and Characteristics

Signal sources	Any analog channel Any digital channel (MSO models only) Any waveform math Any waveform memory
Supported protocols	Subtypes: v1.00, v2.00
Baud rate	Up to 26 Mbps
Auto setup	Automatically configures trigger levels, decode thresholds, sample rate, memory depth, holdoff, and trigger
Decode options	GSID configuration
Trigger options	Command frame, no response frame, reset, sleep, shutdown, wakeup, authenticate, master read/write, transfer bus ownership, device descriptor block master/slave read, register read/write, extended register read/write (normal or long), register 0 write, bus arbitration, errors

1. All read command triggers can look for a no-response. Various fields can be defined for further trigger definition. For a complete list of all trigger fields and variables, please contact Keysight.

Ordering Information

Recommended oscilloscopes

The protocol triggering and decode software is compatible with Keysight Infiniium Series oscilloscopes with operating software revision 6.30 or higher. All signals can be probed passive probes. (Some Infinium oscilloscopes require high impedance adapters for passive probes connection.)

To ensure you continue to receive all the latest software updates and enhancements on your MXR and UXR-Series scopes, you will need to have a current core software subscription. A node-locked perpetual core software license and a minimum 1-year updates and enhancements subscription is included with new MXR and UXR-Series scopes. The subscription can be extended to 3 or 5 years at the time of purchase and can then be renewed later for a fee.

Flexible software licenses

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 (6, 12, 24, or 36 months).

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 E8900-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.

Selecting your license

Step 1. Choose your software product (e.g. D9110MPLP)

Step 2. Choose your license term: perpetual or time-based.

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

To ensure you continue to receive all the latest software updates and enhancements on your MXR and UXR-Series scopes, make sure your core software subscription is current.

Example

If you selected:	Your quote will look like this:	
	Part Number	**Description**
D9110MPLP node-locked perpetual license	D9110MPLP	Low Speed MIPI Protocol Trigger and Decode
	R-B5P-001-A	Node-locked perpetual license
D9110MPLP transportable subscription 6-month license	D9110MPLP	Low Speed MIPI Protocol Trigger and Decode
	R-B7P-004-F	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

Subscription Based Compliance Test Software Suites

Each suite comes with a 12, 24, or 36-month software suite subscription.

Suite license	Technology generation and variants coverage (current)
SW02MIPI MIPI Full TX Test Suite	• C-PHY TX Validation (D9010CPHC) • D-PHY TX Validation (D9020DPHC) • M-PHY TX Validation, HS-GEARs 1-4 (D9040MPHC) • M-PHY TX Validation, HS-GEARs 1-5 (D9050MPHC) • C-PHY and D-PHY Protocol Validation (D9010MCDP) • M-PHY Protocol Validation (D9010MPMP) • LowSpeed Protocol Validation (D9010MPLP)

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