

D9010MPMP

MIPI M-PHY Protocol Trigger and Decode Package

for Infiniium Oscilloscopes

The D9010MPMP software package for Infiniium oscilloscopes gives you the ability to trigger and decode various MIPI® M-PHY® based protocols, such as CSI-3®, DigRFSM, LLISM, USB 3.0 SSIC, UFS, and UniPro®. This package applies to all Infiniium Oscilloscopes.



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Product Overview

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. As well, traditional scope triggers are not sufficient for specifying protocol-level conditions.

Extend your scope capability with the Keysight Technologies, Inc. D9010MPMP MIPI M-PHY triggering and decode application. This application makes it easy to debug and test designs that include DigRF, LLI, CSI-3, UniPro, UFS, and SSIC buses using your Infiniium Series oscilloscope.

The benefit of an oscilloscope with MIPI decoding is viewing the physical layer and protocol layer simultaneously. Time-correlated views help quickly troubleshoot serial protocol problems back to their timing or signal integrity root cause. Viewing decoded information on up to four live or saved waveforms couldn't be simpler – just use Infiniium's Auto Setup (Figure 1).

Quickly move between physical and protocol layer information using the time-correlated tracing marker (Figure 2). 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. Measurements are automatically time-correlated with measurements on other scope channels.

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

D9010MPMP also provides access to a rich set of integrated protocol-level triggers. The application includes a suite of configurable protocol-level trigger conditions specific to MIPI M-PHY buses. 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.

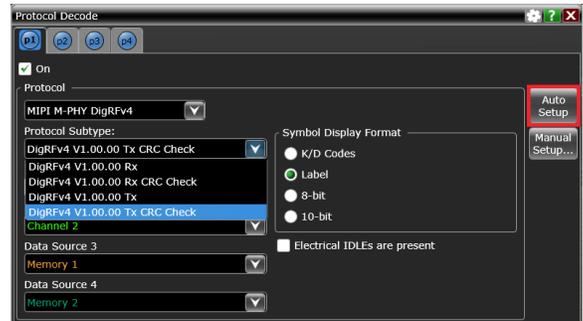


Figure 1. Set up your scope to show any protocol decode in seconds using the Auto Setup key.

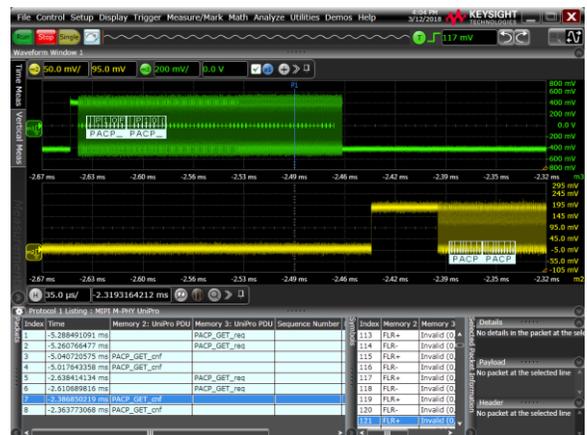


Figure 2. Time correlation between signal and decoded data.

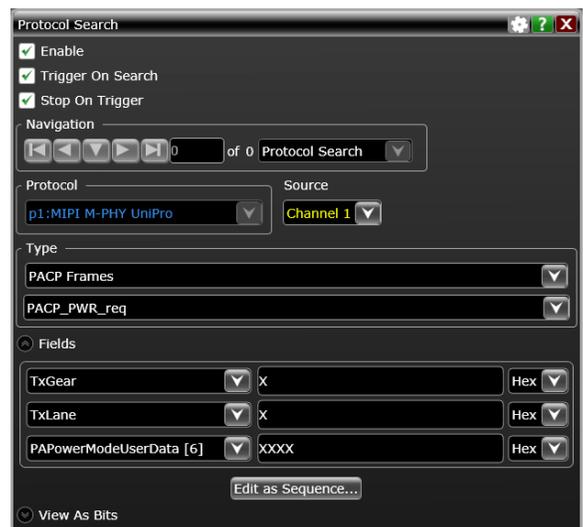
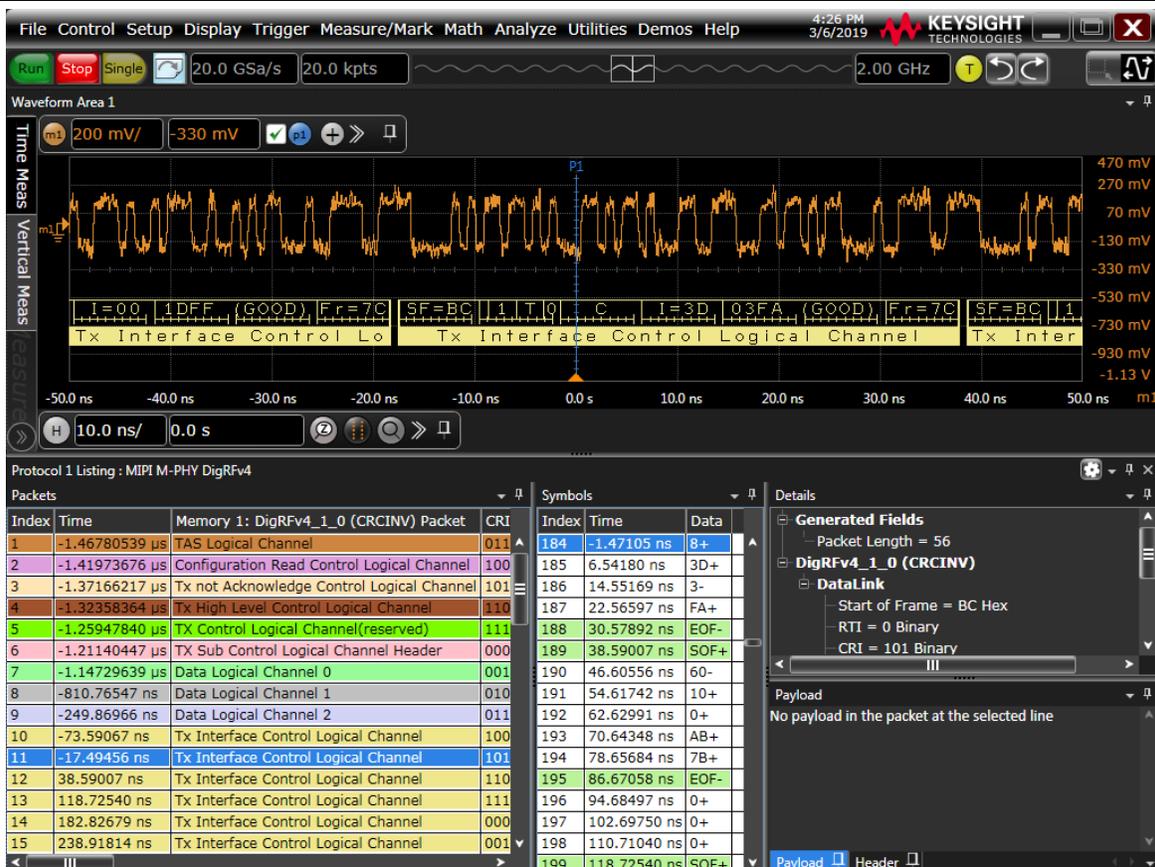


Figure 3: Fully customizable protocol searching and triggering.

DigRF v4 (M-PHY)

Keysight MIPI DigRF v4 (M-PHY) protocol decode software support SYS-BURST mode decode along with HS-BURST (High speed) mode. Keysight MIPI DigRF v4 (M-PHY) protocol decoder software supports both high speed (HS-BURST) and low speed (SYS-BURST) modes on Tx and Rx packets. Also, decodes with or without cyclical redundancy check (CRC) support.

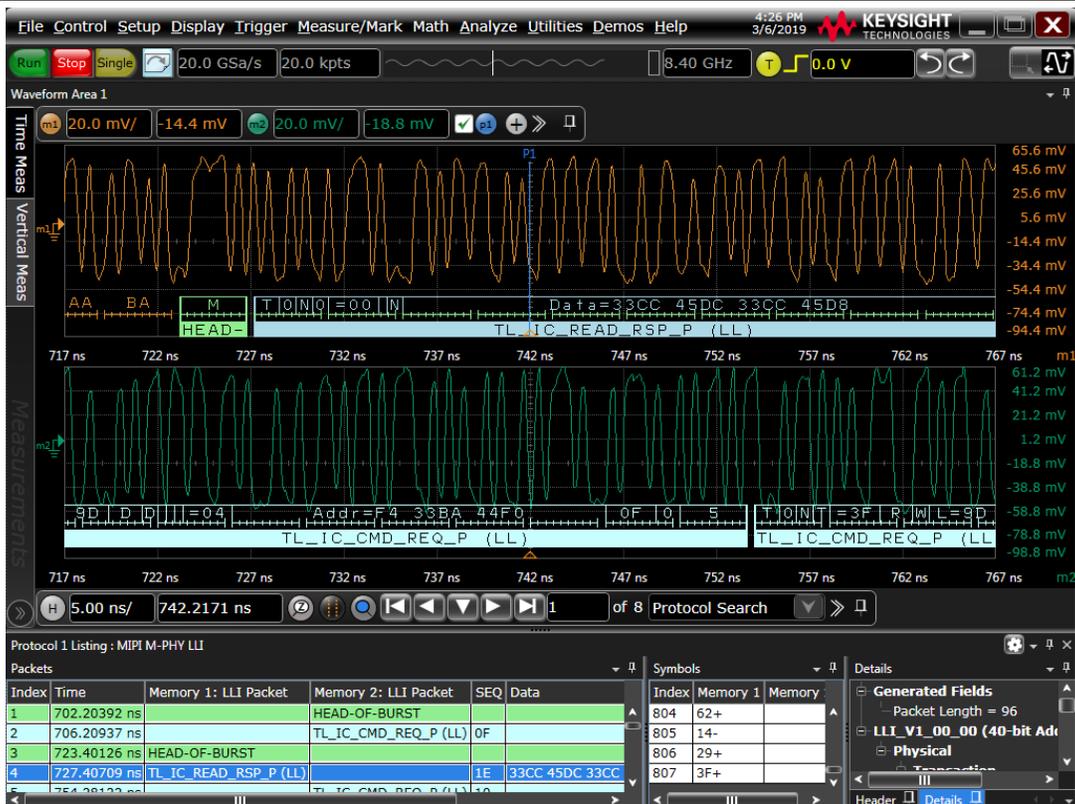
Specifications and Characteristics	
Supported protocols	DigRF v4 1.00.00 Subtypes: Rx, Tx with and without CRC Check
Signal sources	Any analog channel Any function Any waveform memory
Data rate	Up to Gear 3 (5.83 Gbps)
Auto setup	Automatically configures scope settings for proper MIPI DigRF v4 decode and software-based protocol search including memory depth, sample rate and measurement thresholds.
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Electrical IDLES: yes or no
Search/Trigger options	DLC, SDLC, Tx, and Rx frames Symbol sequence Errors



LLI (Low Latency Interface)

D9010MPMP supports LLI v1.0 and v2.1 decode and triggering, high-speed (HS-BURST) and low-speed Pulse Width Modulation (PWM-BURST) decoding, decode on Tx and Rx traffic, and search capability for various frames, sequences and errors.

Specifications and Characteristics	
Supported protocols	LLI v1.0 (36-bit and 40-bit addressing) LLI v2.1 (36-bit and 40-bit addressing)
Signal sources	Any analog channel Any function Any waveform memory
Data rate	Up to Gear 3 (5.83 Gbps)
Auto setup	Automatically configures scope settings for proper MIPI LLI decode and software-based protocol search including memory depth, sample rate and measurement thresholds.
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Multilane: yes or no Electrical IDLEs: yes or no
Search/Trigger options	PA, DL messages LLI, Service transactions Head-of-burst, Tail-of-burst Symbol sequence NACK, Error



CSI-3 (Camera Serial Interface 3)

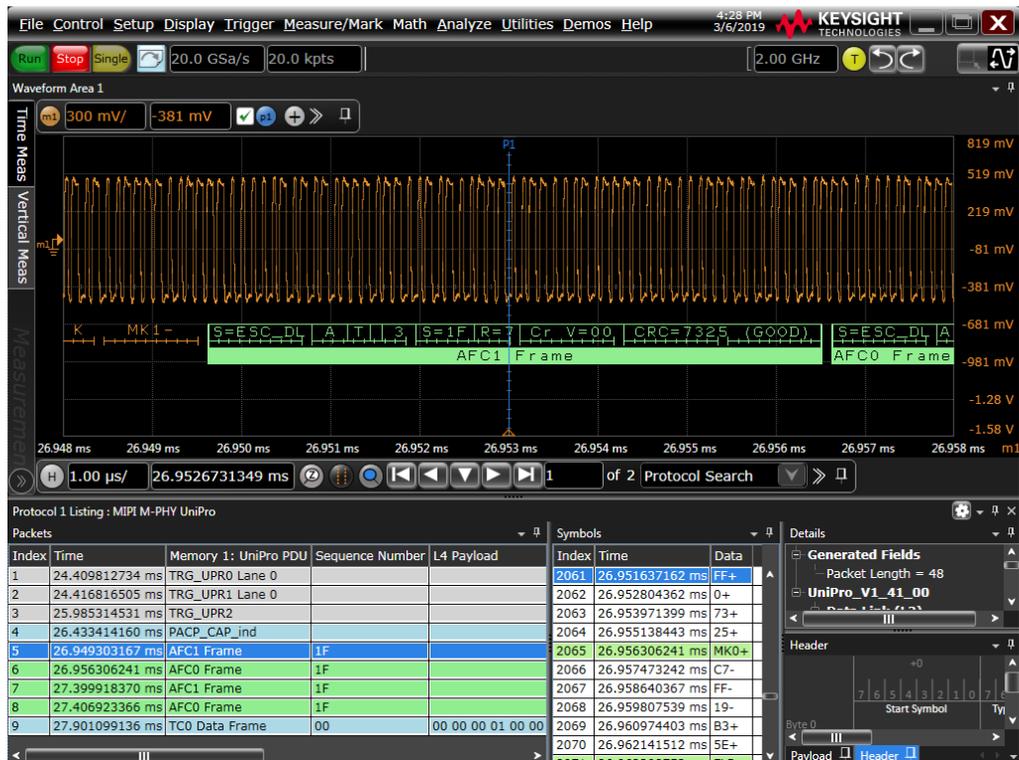
Camera Serial Interface version 3.0 (CSI-3) standard was developed by MIPI Alliance to increase performance throughput and greater feature set from CSI-2 standard. The CSI-3 interface runs on top of the MIPI M-PHY electrical layer as well as the MIPI UniPro protocol layer that is also developed by MIPI Alliance standard body. D9010MPMP supports CSI-3 v1.0 decode and triggering, and it can be used together with the MIPI UniPro protocol decode to show both CSI-3 and UniPro packets at once. It can also decode High-Speed (HS-BURST) and Low-Speed Pulse Width Modulation (PWM-BURST) modes and supports search capability for Host and Device transactions as well as symbol sequence and errors.

Specifications and Characteristics	
Supported protocols	CSI-3 v1.0
Signal sources	Any analog channel Any function Any waveform memory
Data rate	Up to Gear 3 (5.86 Gbps)
Auto setup	Automatically configures scope settings for proper MIPI CSI-3 decode and software-based protocol search including memory depth, sample rate and measurement thresholds.
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Descramble: yes or no Electrical IDLEs: yes or no
Search/Trigger options	CSI-3 packet CSI-2 legacy, short and long packets Symbol sequence Errors

UniPro

D9010MPMP decodes MIPI UniPro High-Speed (HS-BURST) and Low-Speed Pulse Width Modulation (PWM-BURST) modes. It can also decode an ADAPT sequence, which should be sent for receiver equalization optimization on Gear4 speed, so that an engineer can find issues on Gear4 speeds that might occur from a transmitter sending wrong ADAPT patterns, or if a receiver equalizer does not settle within an ADAPT sequence.

Specifications and Characteristics	
Supported protocols	UniPro v1.41 UniPro v1.60 UniPro v1.80
Signal sources	Any analog channel Any function Any waveform memory
Data rate	Up to Gear 4 (11.66 Gbps)
Auto setup	Automatically configures scope settings for proper MIPI UniPro decode and software-based protocol search including memory depth, sample rate and measurement thresholds.
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Descramble: yes or no Electrical IDLEs: yes or no
Search/Trigger options	ADAPT and Symbol sequences L2 and PACP frames Triggers, Control, Errors



UFS (Universal Flash Storage)

UFS is a flash storage specification for mobile devices, computers and consumer electronic devices. The standard is being developed by the JEDEC Solid State Technology Association. The electrical interface for UFS uses the MIPI M-PHY and UniPro specifications that were developed by the MIPI Alliance standard body. D9010MPMP Decodes High-Speed (HS-BURST) and Low-Speed Pulse Width Modulation (PWM-BURST) modes.

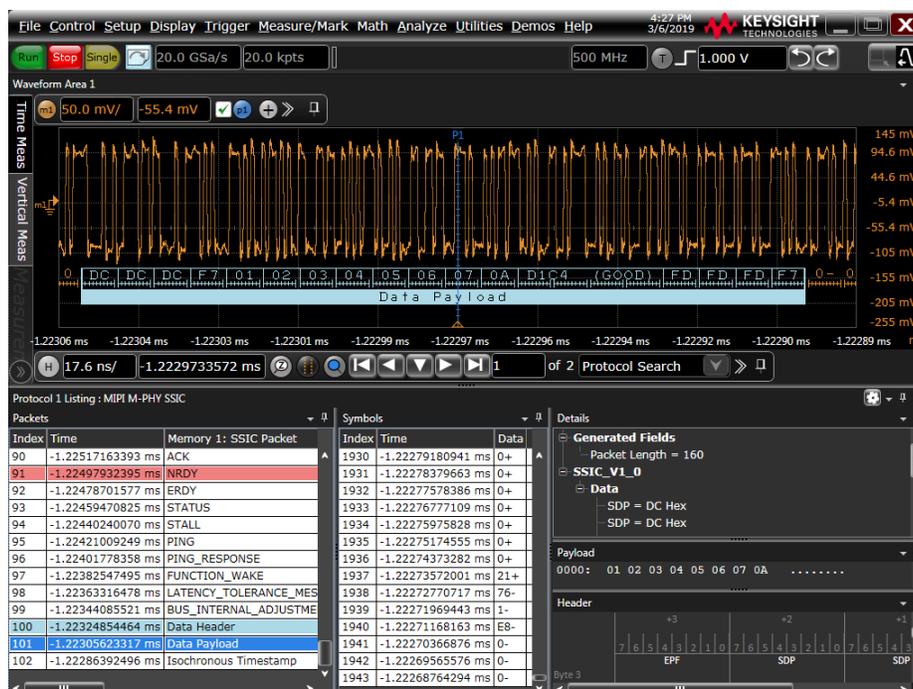
Specifications and Characteristics	
Supported protocols	UFS v1.1 UFS v2.0 UFS v2.1 UFS v3.0
Signal sources	Any analog channel Any function Any waveform memory
Data rate	Up to Gear 4 (11.66 Gbps)
Auto setup	Automatically configures scope settings for proper MIPI UFS decode and software-based protocol search including memory depth, sample rate and measurement thresholds.
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Descramble: yes or no Electrical IDLEs: yes or no
Search/Trigger options	Host to target transactions Target to host transactions Symbol sequence Errors



SSIC (SuperSpeed Inter-Chip)

The SSIC standard was developed by the USB-IF standard body, leveraging MIPI Alliance MIPI M-PHY electrical layer to transfer USB 3.0 protocol. It allows USB 3.0 intellectual properties to be adopted into mobile designs. D9010MPMP supports SSIC specification v1.0 decode and triggering and can be used together with N8805A USB 3.0 protocol decode to show both SSIC and classic USB 3.0 packets. It can also decode High-Speed (HS-BURST) and Low-Speed Pulse Width Modulation (PWM-BURST) modes.

Specifications and Characteristics	
Supported protocols	SSIC v1.0
Signal sources	Any analog channel Any function Any waveform memory
Data rate	Up to Gear 3 (5.86 Gbps)
Auto setup	Automatically configures scope settings for proper MIPI UFS decode and software-based protocol search including memory depth, sample rate and measurement thresholds.
Decode options	Symbol display format: K/D codes, label, 8-bit, 10-bit Descramble: yes or no Electrical IDLEs: yes or no
Search/Trigger options	Ordered sets Link commands Packets: link mgmt., transaction, device notification transaction, data, isochronous timestamp, SSIC RRAP Control Symbol sequence Errors



Hardware Requirements

Recommended oscilloscopes

D9010MPMP is compatible with Keysight Infiniium Series oscilloscopes with operating software revision 6.30 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	Oscilloscope Models
Gear 1 (Up to 1.46 Gbps)	6 GHz	2	S-Series, V-Series
Gear 2 (Up to 2.92 Gbps)	12 GHz	2	V-Series, Z-Series, UXR Series
Gear 3 (Up to 5.83 Gbps)	20 GHz	2	V-Series, Z-Series, UXR Series
Gear 4 (Up to 11.66 Gbps)	25 GHz	2	V-Series, Z-Series, UXR Series

Recommended accessories

Your recommended accessories may change depending on the M-PHY protocol you are working with. The below table of descriptions and matrix is a good starting point. It represents probes and accessories needed to probe two lanes. Contact Keysight for more information.

Model Number	Description	Quantity (for two lanes)
1169B	InfiniiMax II 12-GHz differential probe amplifier	2
N5442A	Precision BNC 50 Ω adapter (if using a V-Series, Z-Series with 1169B)	2
E2669B	Differential probe connectivity kit (contains needed probe heads)	1

Ordering Information and Related Literature

Flexible Software Licensing and KeysightCare Software Support Subscriptions

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

License Terms

Perpetual – Perpetual licenses can be used indefinitely.

Time-based – Time-based 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.

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.

Time-based licenses include a software support subscription through the term of the license.

KeysightCare Software Support Subscription provides peace of mind amid evolving technologies.

- Ensure your software is always current with the latest enhancements and measurement standards.
- 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.

Selecting your license

- Step 1.** Choose your software product (eg. D9010MPMP).
- Step 2.** Choose your license term: perpetual or time-based.
- 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.

Examples

If you selected:	Your quote will look like:	
D9010MPMP node-locked perpetual license with a 12-month support subscription	Part Number	Description
	D9010MPMP	MIPI M-PHY Protocol Decode/Trigger Software
	R-B5P-001-A	Node-locked perpetual license
	R-B6P-001-L	KeysightCare support subscription, node-locked–12 months
D9010MPMP transportable time-based 6-month license	Part Number	Description
	D9010MPMP	MIPI M-PHY Protocol Decode/Trigger Software
	R-B4P-001-F	6-months, node-locked KeysightCare support subscription

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

Related literature

Type	Description / URL
Brochure	Infiniium S-Series (500 MHz to 8 GHz real time oscilloscope)
Brochure	Infiniium V-Series (8 GHz to 33 GHz real time oscilloscope)
Data Sheet	Infiniium UXR Series (13 GHz to 110 GHz real time oscilloscope)
Brochure	30 Things Only Infiniium Oscilloscopes Can Do

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

