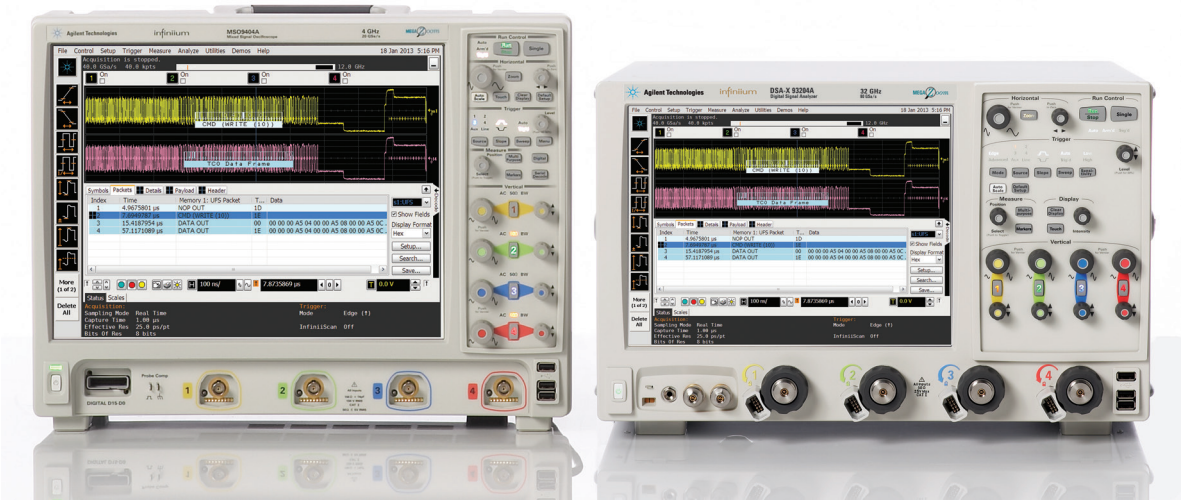
UFS (M-PHY)
Protocol Triggering and Decode for Infiniium Series Oscilloscopes

Data Sheet



Anticipate ___Accelerate ___Achieve

Agilent Technologies

UFS (M-PHY)

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. The serial bus interface provides content-rich points for debug and test. However, since this protocol transfers 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. Also, traditional scope triggers are not sufficient for specifying protocol-level conditions.

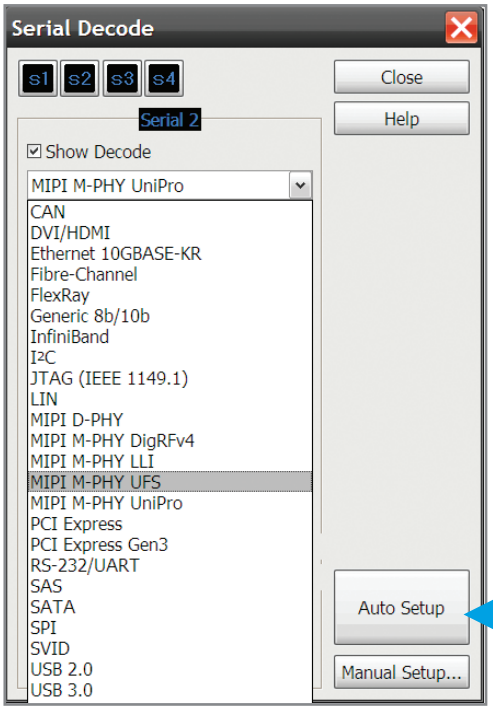
Extend your oscilloscope's capability with Agilent's UFS (M-PHY) triggering and decode application.

This application makes it easy to debug and test designs that include UFS buses using your Infiniium Series oscilloscope.

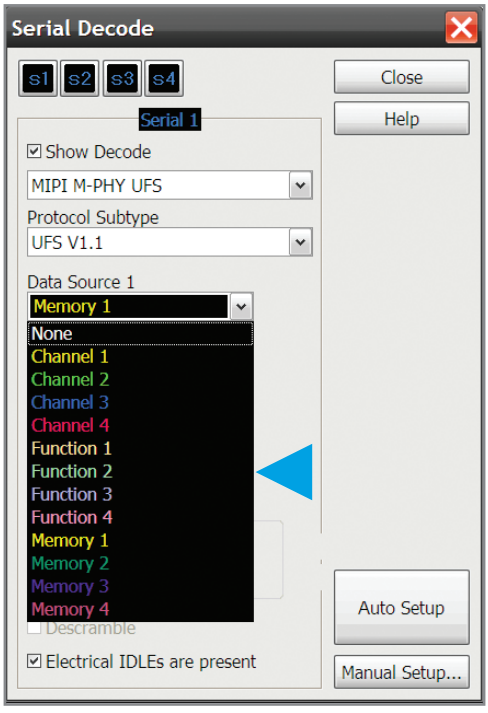
- Set up your scope to show UFS and UniPro protocol decode in less than 30 seconds.
- Get access to a rich set of integrated protocol-level triggers.
- Save time and eliminate errors by viewing packets at the protocol level.
- Use time-correlated views to quickly troubleshoot serial protocol problems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

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

1. Support JEDEC UFS v1.1 and v2.0 decode and triggering
2. Can be used together with the N8808A MIPI UniPro protocol decode to show both UFS and UniPro packets
3. Decodes High-Speed (HS-BURST) and Low-Speed Pulse Width Modulation (PWM-BURST) modes
4. Supports search capability for Host and Device transactions as well as symbol sequence and errors.



30-second UFS 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 or functions.

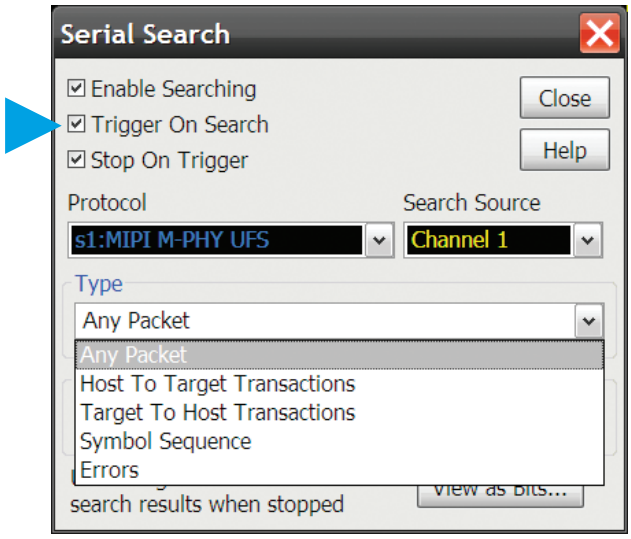
UFS (M-PHY) setup, protocol triggering and search capabilities

Get access to a rich set of integrated protocol-level triggers.

The application includes a suite of configurable protocol-level trigger conditions specific to UFS. When serial triggering is selected, the application uses software-based triggering.

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

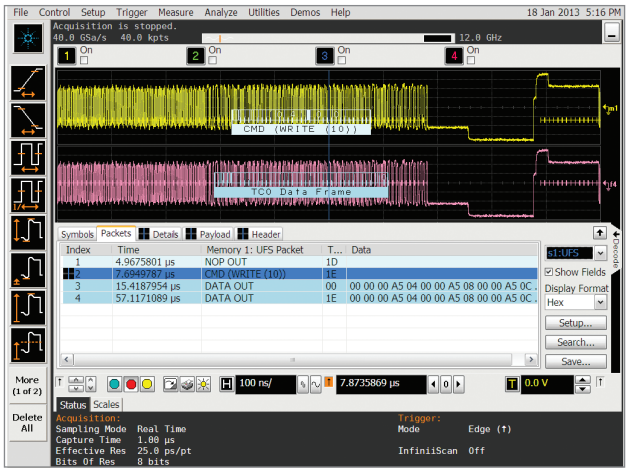


UFS trigger and search setup
Quickly access the software-based trigger via the trigger or search menus. Software-based triggering enables quick setup of data, remote or error frames.

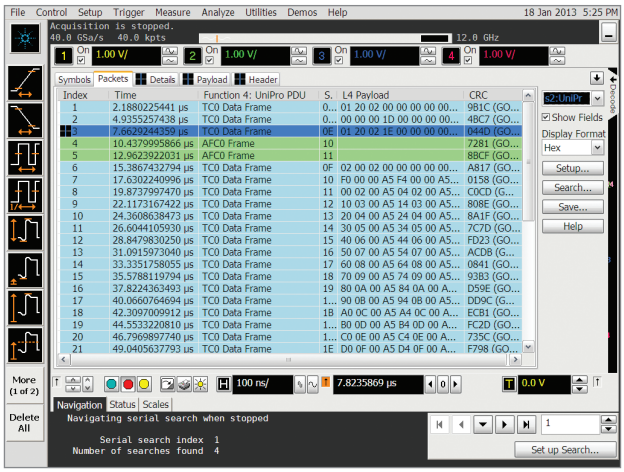
UFS (M-PHY) protocol decode

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

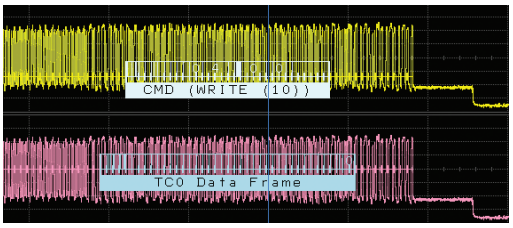
With software-based protocol triggering, the oscilloscope takes signals acquired using scope channels and reconstructs protocol frames after each acquisition. It then inspects these protocol frames against specified protocol-level trigger conditions and triggers when the condition is met.



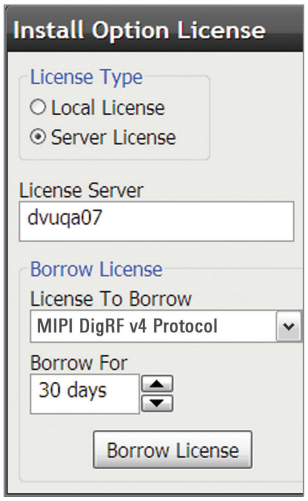
Quickly move between physical and UFS protocol layer information using the time-correlated tracing marker. Display protocol content using embedded decode in the waveform area, or see protocol events in a compact listing format. Minor tick marks indicate clock transitions. Major tick marks indicate segments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



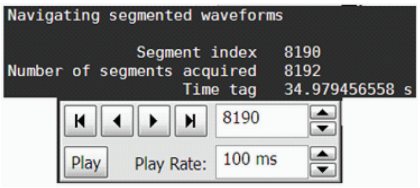
Compact protocol using the full screen listing
The protocol viewer window shows the index number, time stamp value identifier, packet type, and data values for each UFS packet. Data in the listing window can be saved to a .csv or .txt file for off-line.



UFS 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 UFS packet.



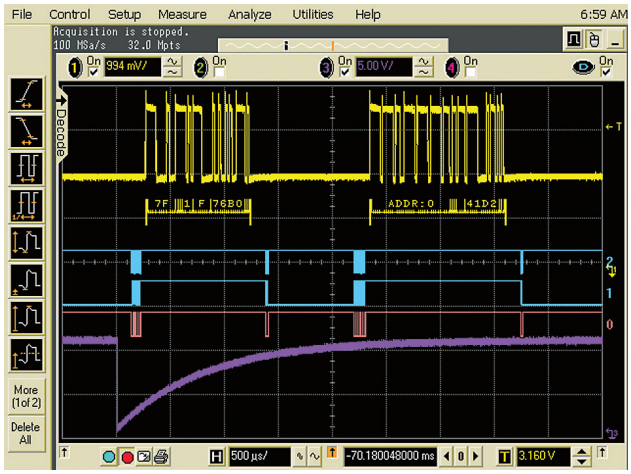
Using multiple oscilloscopes?
Server-based licensing allows users to borrow an application for a specified period of time.



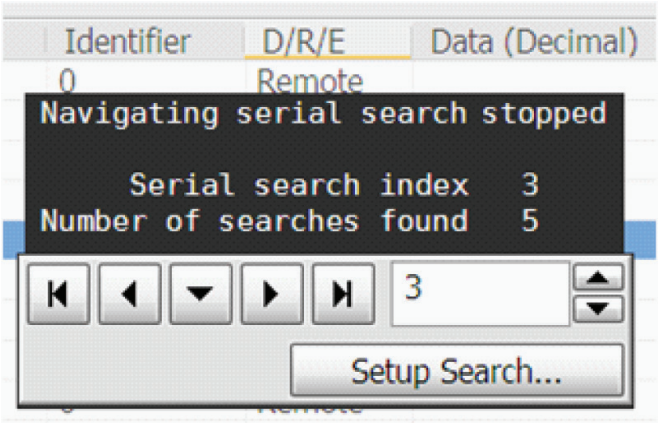
Long time captures using segmented memory
In this example, UFS traffic was captured for near 35 seconds. Segmented memory uses time tags to track time between segment acquisitions.

UFS (M-PHY) protocol decode

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.

UFS (M-PHY) application specifications and characteristics

MIPI	
MIPI sources	Analog channels 1, 2, 3, or 4 Any function and waveform memories
Data rate	The application relies on probing and trigger/measurement thresholds to properly condition the signal for triggering and decode. Differential probing may be required. Up to 5.83 Gbps
Protocol type	JEDEC UFS v1.1 and v2.0
Auto setup	Automatically configures oscilloscope settings for proper UFS 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)	Host to target transactions Target to host transactions Symbol sequence Errors

Recommended oscilloscopes

The UFS 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 UFS 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
UFS protocol decoder	**Fixed**	Factory-installed	N8818A-1FP	N8818B-1FP	Option 066	Option 066
		User-installed	N8818A-1FP	N8818B-1FP	N8818A-1NL	N8818B-1NL
	Floating	Transportable	N8818A-1TP	N8818B-1TP	N8818A-1TP	N8818B-1TP
		Server-based	N5435A-063	N5435A-063	N5435A-063	N5435A-063
UniPro protocol decoder (optional)	**Fixed**	Factory-installed	N8808A-1FP	N8808B-1FP	Option 052	-
		User-installed	N8808A-1FP	N8808B-1FP	N8808A-1NL	N8808B-1NL
	Floating	Transportable	N8808A-1TP	N8808B-1TP	N8808A-1TP[1,2]	N8808B-1TP[1,2]
		Server-based	N5435A-048	N5435A-048	N5435A-048	N5435A-048
High-speed serial data analysis (optional)	**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, 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 90000A Series Oscilloscopes	Data sheet	5989-7819EN
Infiniium S-Series Oscilloscopes	Data sheet	5991-3904EN
Infiniium Z-Series Oscilloscopes	Data sheet	5991-3868EN
Infiniium 90000 Q-Series Oscilloscopes	Data sheet	5990-9712EN
U7249A MIPI M-PHY Compliance Test Software for Infiniium oscilloscopes	Data sheet	5990-8933EN
N8808A UniPro (M-PHY) Protocol Triggering and Decode	Data sheet	5991-1595EN

Agilent Technologies Oscilloscopes

Multiple form factors from 20 MHz to > 90 GHz | Industry leading specs | Powerful applications

myAgilent
www.agilent.com/find/myagilent
A personalized view into the information most relevant to you.

www.axiestandard.org
AdvancedTCA® Extensions for Instrumentation and Test (AXIe) is an open standard that extends the AdvancedTCA for general purpose and semiconductor test. Agilent is a founding member of the AXIe consortium.

www.lxistandard.org
LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Agilent is a founding member of the LXI consortium.

www.pxisa.org
PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Three-Year Warranty
www.agilent.com/find/ThreeYearWarranty
Beyond product specification, changing the ownership experience. Agilent is the only test and measurement company that offers three-year warranty on all instruments, worldwide.

Agilent Assurance Plans
www.agilent.com/find/AssurancePlans
Five years of protection and no budgetary surprises to ensure your instruments are operating to specifications and you can continually rely on accurate measurements.

www.agilent.com/quality
Agilent Electronic Measurement Group
DEKRA Certified ISO 9001:2008
Quality Management System

Agilent Channel Partners
www.agilent.com/find/channelpartners
Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.

www.agilent.com
www.agilent.com/find/N8818A

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

Americas	
Canada	(877) 894 4414
Brazil	(11) 4197 3600
Mexico	01800 5064 800
United States	(800) 829 4444
Asia Pacific	
Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 375 8100
Europe & Middle East	
Belgium	32 (0) 2 404 93 40
Denmark	45 45 80 12 15
Finland	358 (0) 10 855 2100
France	0825 010 700* *0.125 €/minute
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
United Kingdom	44 (0) 118 927 6201

For other unlisted countries:
www.agilent.com/find/contactus
(BP-01-15-15)

Product specifications and descriptions in this document subject to change without notice.

Published in USA, May 14, 2014
5991-1874EN

Agilent Technologies