



USB Protocol Triggering and Decode for Infiniium 90000 Series Oscilloscopes

Data sheet



This application is available in the following license variations.

- Order N5464A for a user-installed license
- Order Option 005 for a factory-installed license with new 90000 Series oscilloscopes
- Order N5435A Option 034 for a server-based license



Agilent Technologies

Easily debug and test designs that include USB protocols using your Infiniium 90000 scope

Serial bus interfaces such as USB (universal serial bus) interfaces are widely used today in electronic designs. In many designs, USB buses can provide a content-rich point for debug and test. However, since USB 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.

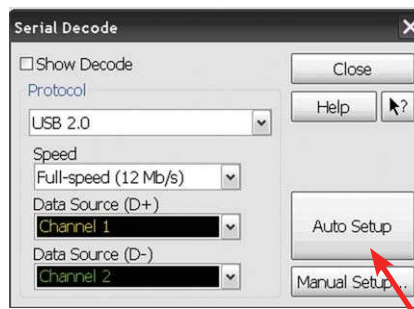
Extend your scope capability with Agilent's USB triggering and decode application. This application makes it easy to debug and test designs that include low, full, or high-speed USB protocols using your Infiniium 90000 scope.

- Set up your scope to show USB protocol decode in less than 30 seconds.
- Get access to a rich set of integrated software-based 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.

	Setup	Trigger	Measure	Analyze	Util
1	Channel 1...			Ctrl+1	
2	Channel 2...			Ctrl+2	
3	Channel 3...			Ctrl+3	
4	Channel 4...			Ctrl+4	
	Probes...			Alt+P	
	Serial Decode...			Alt+S	
	Serial Search...				

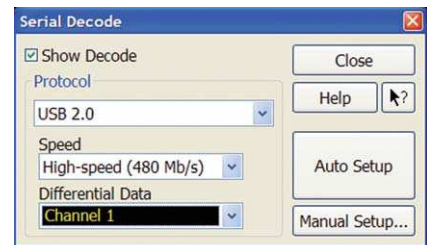
Easy to find

Turn decode on/off in the "Setup" menu. View decode embedded on the waveform display or in the protocol viewer listing window. (See pages 4-5).



30 Second USB Setup

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



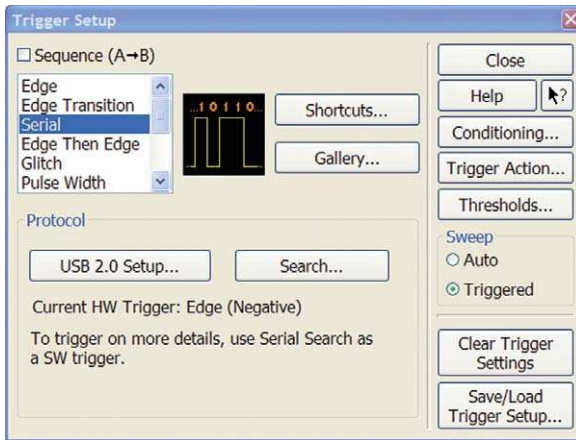
Support for all analog channels

Acquire low and full-speed USB signals using 2 single-ended probes on scope channels. Analog differential channels provide robust signal integrity for high-speed USB protocol analysis.

USB protocol triggering and searching

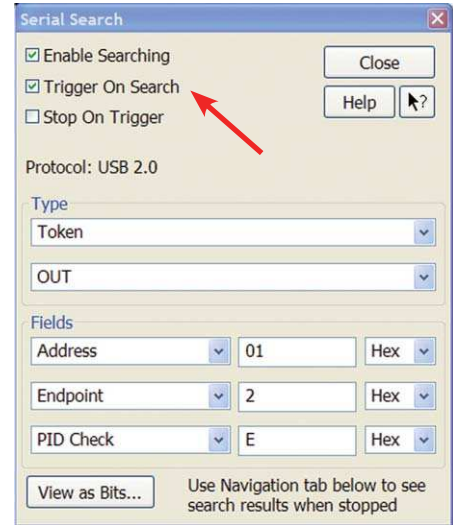
Get access to a rich set of integrated protocol level triggers. The application includes a suite of configurable protocol-level trigger conditions specific to USB. The application uses software-based search triggering when serial triggering is selected.

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



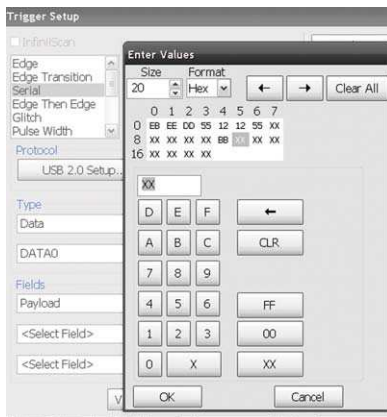
USB Trigger Setup

Quickly access protocol triggering via the scope's trigger menu.



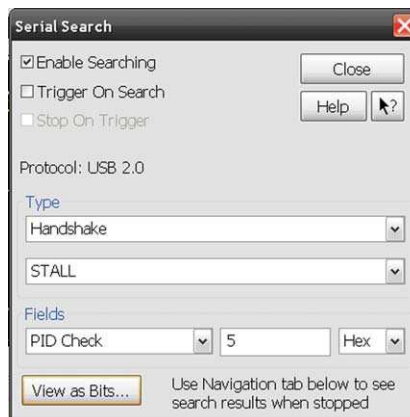
USB Trigger Setup

Choose triggers from a broad range of USB protocol, including token, data, handshakes, special and error types.



Payload editor

Use the payload editor to specify data values word by word.



Post-acquisition searching

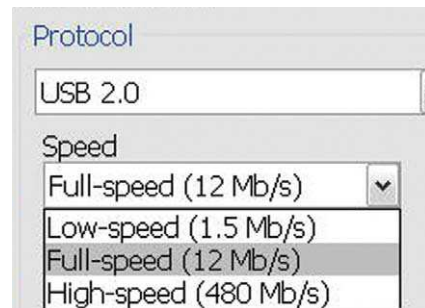
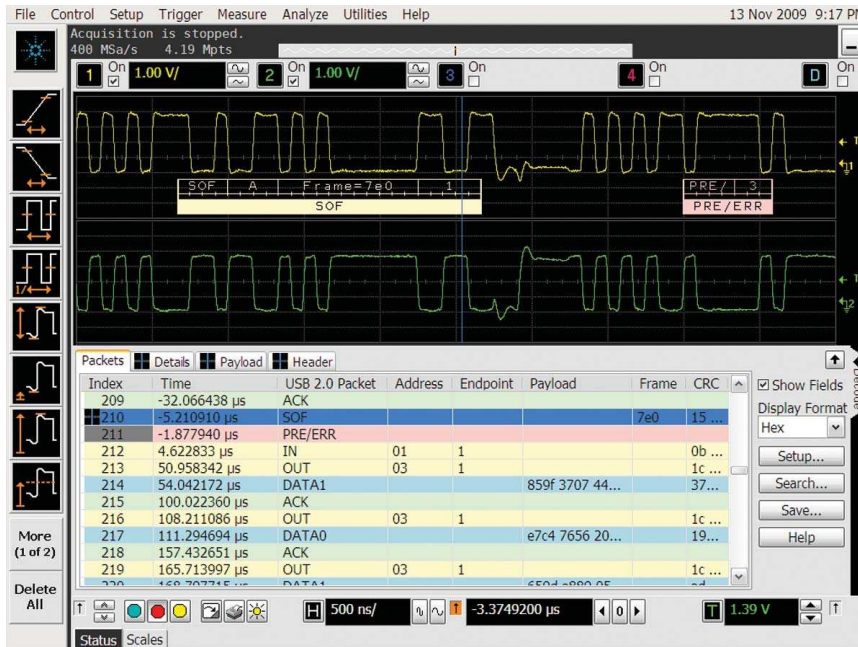
Search acquired protocol listings using a menu that is identical to the trigger menu.



Quickly find occurrences

Quickly move to next occurrence of a specified event.

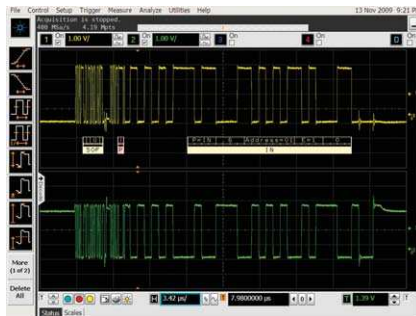
USB low and full-speed protocol decode



USB full-speed protocol decode with precise time-correlation between waveforms and listing

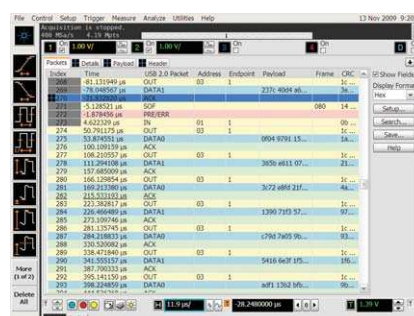
Agilent's multi-tab protocol viewer includes correlation between the waveforms and the selected packet. The selected packet, highlighted blue row in the listing, is time-correlated with the blue line in the waveform display. Move the blue tracking marker in time through waveforms and the blue bar will automatically track in the packets window. Or, scroll through the packet viewer and highlight a specific packet. The time-correlation tracking marker will move to the associated point in the waveform.

Support for low, full and high-speed USB



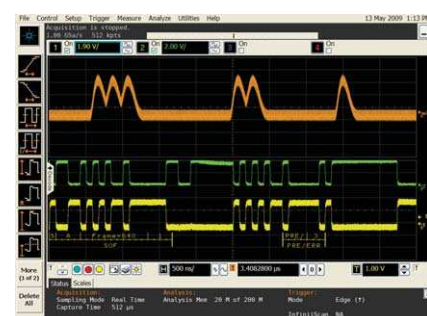
USB decode embedded in waveform area

Utilize the oscilloscope waveform area to display decode information. For USB, minor ticks indicate clock transitions and major ticks show the beginning and end of each word in the serial packet.



Full screen USB listing

Fill the entire display with compact protocol information using the full screen listing. The protocol viewer window shows the index number, time stamp value, and data content for each serial packet in the list. Scroll through all decoded serial packets to find events of interest or errors in the transmission. Data in the listing window can be saved to a .csv or .txt file for off-line analysis or documentation.



View other signals

Use scope channels simultaneously view other time-correlated signals.

USB specifications and characteristics

USB 2.0 supported speeds	Low-speed (1.5 Mb/s) Full-speed (12 Mb/s) High-speed (480 Mb/s)
Probing	Single-ended required for USB low- and full-speed Differential required for USB high-speed
D+ and D- data sources	Analog channels 1, 2, 3, or 4 Any waveform memory
Auto Setup	Automatically configures trigger levels, measurement thresholds, Volts/div, vertical offset, memory depth, sample rate, trigger and holdoff for proper decode and triggering
Trigger types (software-based trigger on search)	Token selections: Any token, OUT, IN, SOF, or SETUP AND-ing of user defined value for up to three of the following PID check, address, endpoint, or CRC Data selections: DATA0, DATA1, DATA2, MDATA AND-ing for user defined value for PID check, payload, and CRC values Handshake selections: Any handshake, ACK, NAK, NYET, STALL User selectable PID check value for handshakes Special selections Any special Reserved with user selectable PID check value Split with AND-ing of three of the following • PID check with user selectable value • Address with user selectable value • SC with choice of SSPLIT or CSPLIT • Port with user defined value • S with choice of full speed or low speed • ET with choice of isochronous, bulk, or interrupt • CRC with user defined value PING: AND-ing of user defined values for three of the following PID check, address, endpoint, CRC PRE/ERR with user defined PID check value Error selections Any error, PID error, bad 5-bit CRC, bad 16-bit CRC.

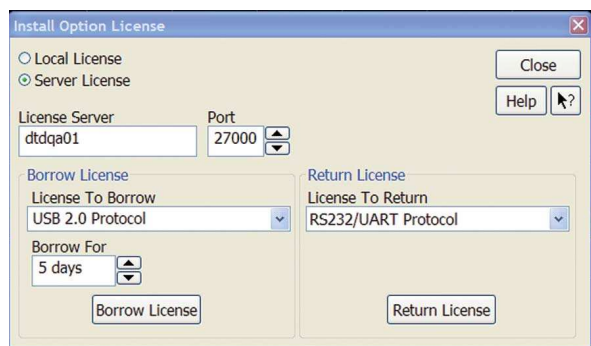
Ordering information

This application is compatible with all 90000 Series oscilloscope models.

Software applications	Factory-installed node-locked license for new scope purchases	User-installed node-locked license	Server-based license (N5435A option)
USB triggering and decode	005	N5464A	034

Related literature

Publication title	Publication type	Publication number
<i>Infiniium 90000 Series Oscilloscopes</i>	Data sheet	5989-7819EN
<i>USB Test Compliance for Infiniium Oscilloscopes</i>	Data Sheet	5989-4044EN



Sharing the applications across multiple instruments? Server-based licensing allows you to borrow an application license for a specified period of time.



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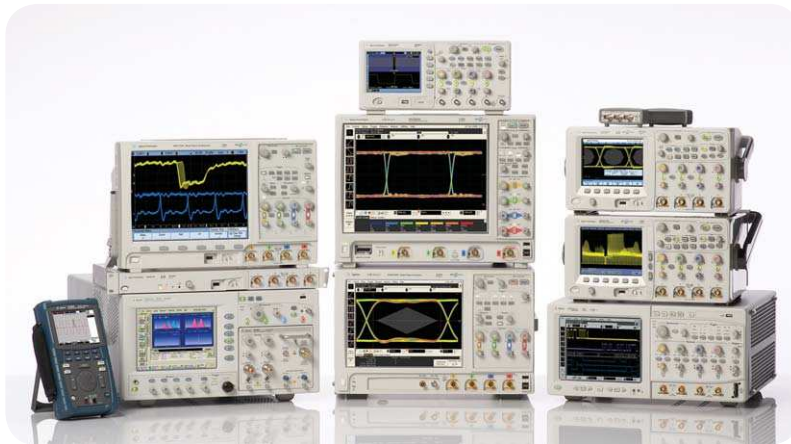
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	*0.125 €/minute
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