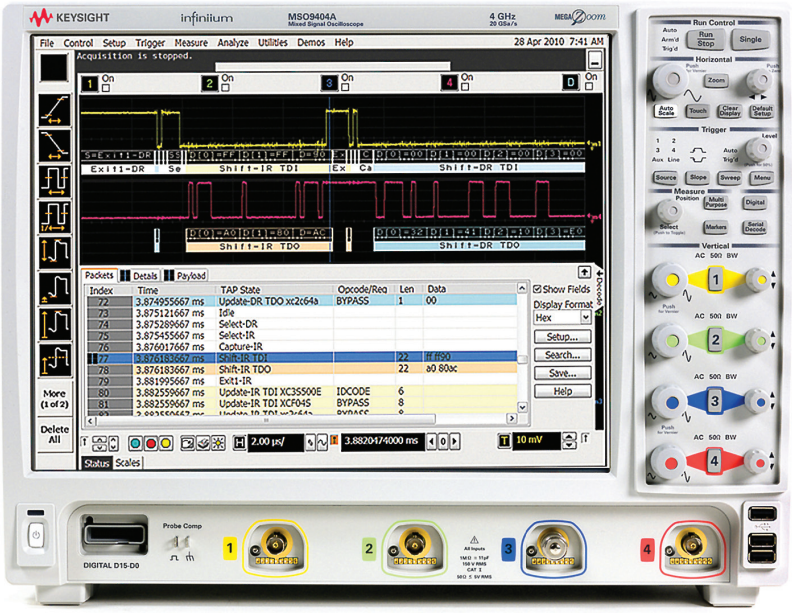
Keysight Technologies
JTAG (IEEE 1149.1) Protocol Triggering and decode for Infiniium Series Oscilloscopes

Data Sheet



This application is available in the following license variations.

- Order N8817A for a user-installed license.
- Order option 042 for a factory-installed license with new oscilloscopes
- Order N5435A option 038 for a server-based license that works on 9000, 9000 H-, 90000, and 90000 X-Series

KEYSIGHT TECHNOLOGIES

JTAG (IEEE 1149.1) Decode Overview

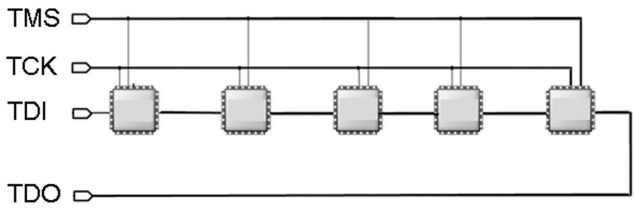
JTAG, also known as IEEE 1149.1, is one of the most successful electronic standards of all times. JTAG scan chains are a critical piece of nearly every electronic design. JTAG has become a critical technology for not only manufacturing testing, but also for development teams. What happens when you need to see JTAG bus transactions for debug?

While oscilloscopes have long been used to view JTAG signal integrity and timing issues, the Keysight Technologies, Inc. Infiniium Series is the first scope family to support JTAG protocol decode.

Extend your scope capability with Keysight's JTAG decode application. This application displays real-time time-aligned decode of JTAG (IEEE 1149.1).

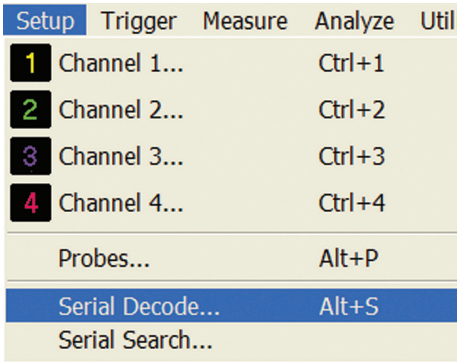
- See real-time time-aligned decode of JTAG (IEEE 1149.1) from TDI, TDO, TMS and TCK signals.
- Quickly describe each unique scan chain and import BSDL files for each device in the chain
- View JTAG protocol including device names, OPCODES, and flagging of certain error conditions
- Use time-correlated views to move between protocol and physical layer views.

The N8817A application provides real-time, at-speed, JTAG decode from TMS, TDI, TDO and TCK signals acquired on either scope or digital (MSO) channels. Signals must be probed at the periphery of the scan chain, and cannot be probed in the middle of the scan chain.



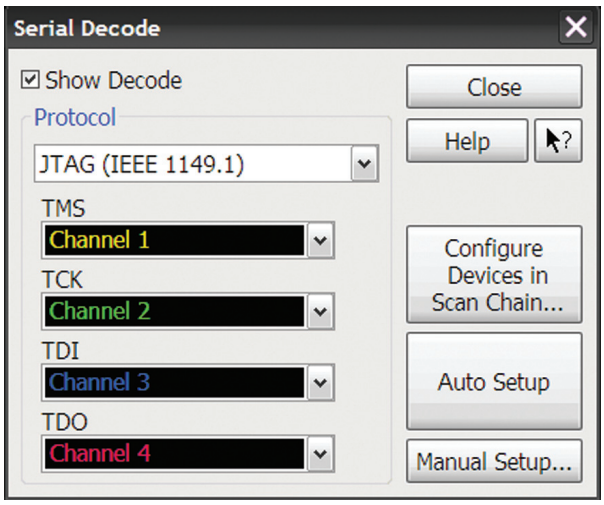
Easy to find

Turn decode on/off in the "setup" menu. View decode embedded on the waveform display or in the protocol viewer listing window. (See pages 4-6).

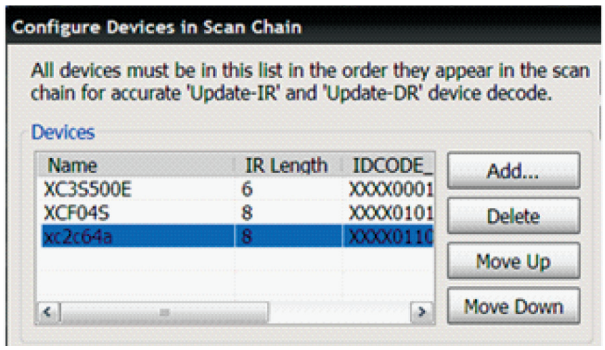


JTAG Scan Chain Setup

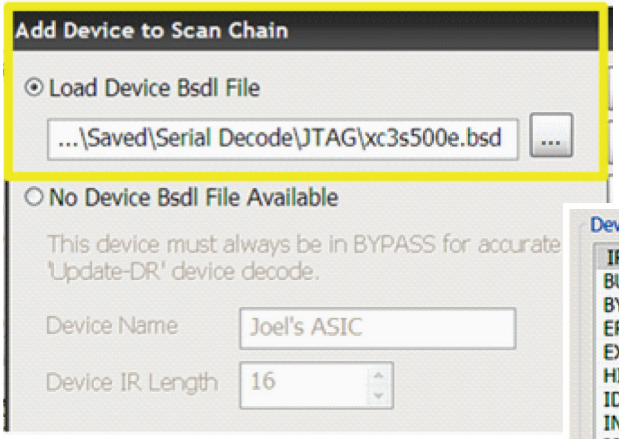
1. Assign the channel that you are using to acquire each JTAG signal. If your scan chain also includes TRST, you can connect any unused scope or digital channel to TRST and trigger on and display it.

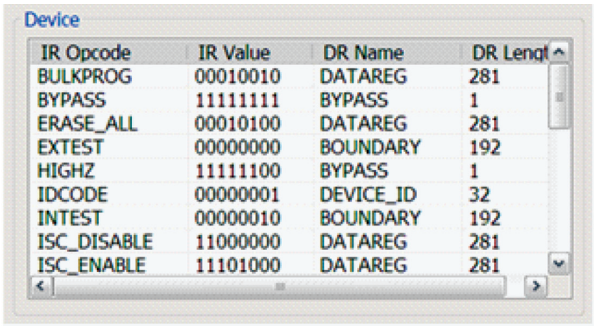


2. Specify how many devices are in the scan chain and their order.



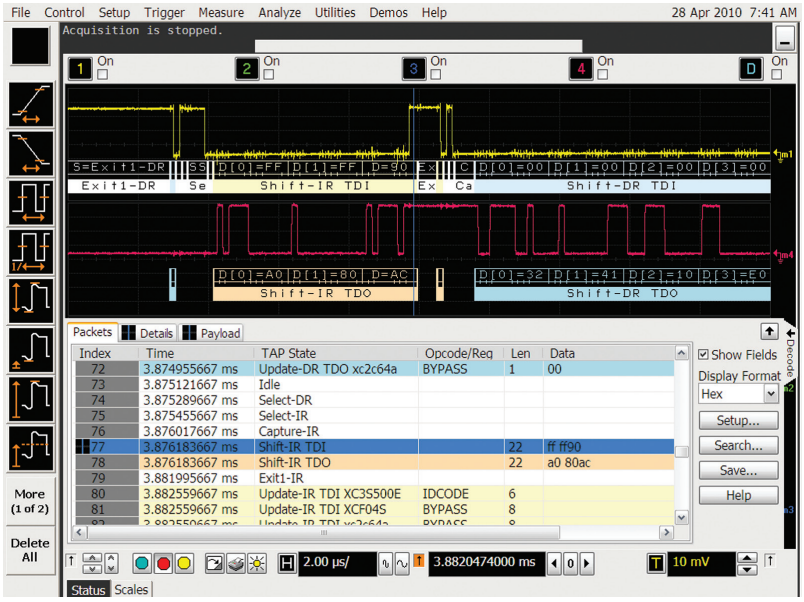
3. Import a BSDL file for each device. Have a device that does not have a BSDL file? BYPASS the device and tell the JTAG decode application the width of the instruction register so that the application can provide correct decodes.



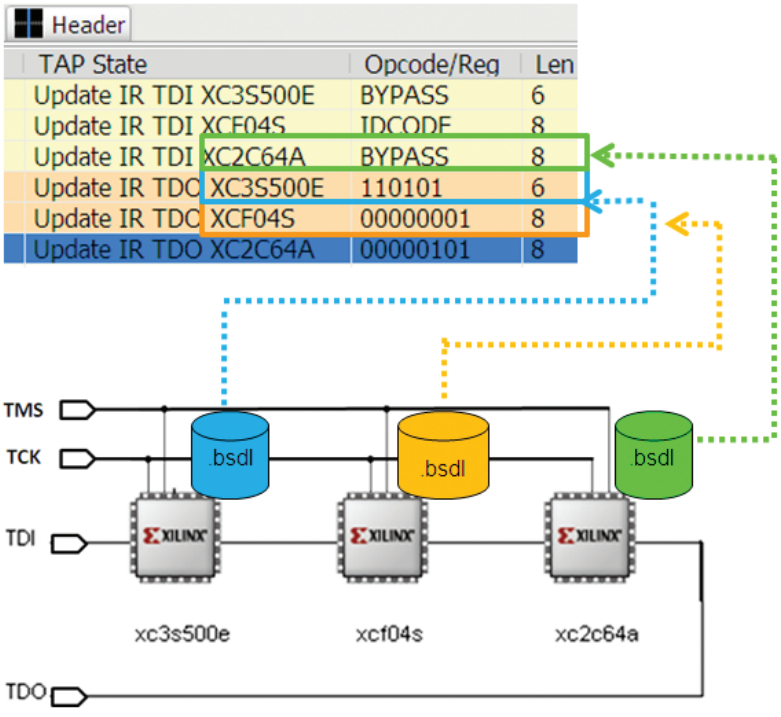


JTAG Decode

Quickly move between. physical and JTAG protocol layer information using the time-correlated marker. Display protocol content using embedded decode in the waveform area. Or, see protocol events in a compact listing format show on the lower portion of the display. Minor tick marks indicate clock transitions. Major tick marks indicate segments of the JTAG packet.



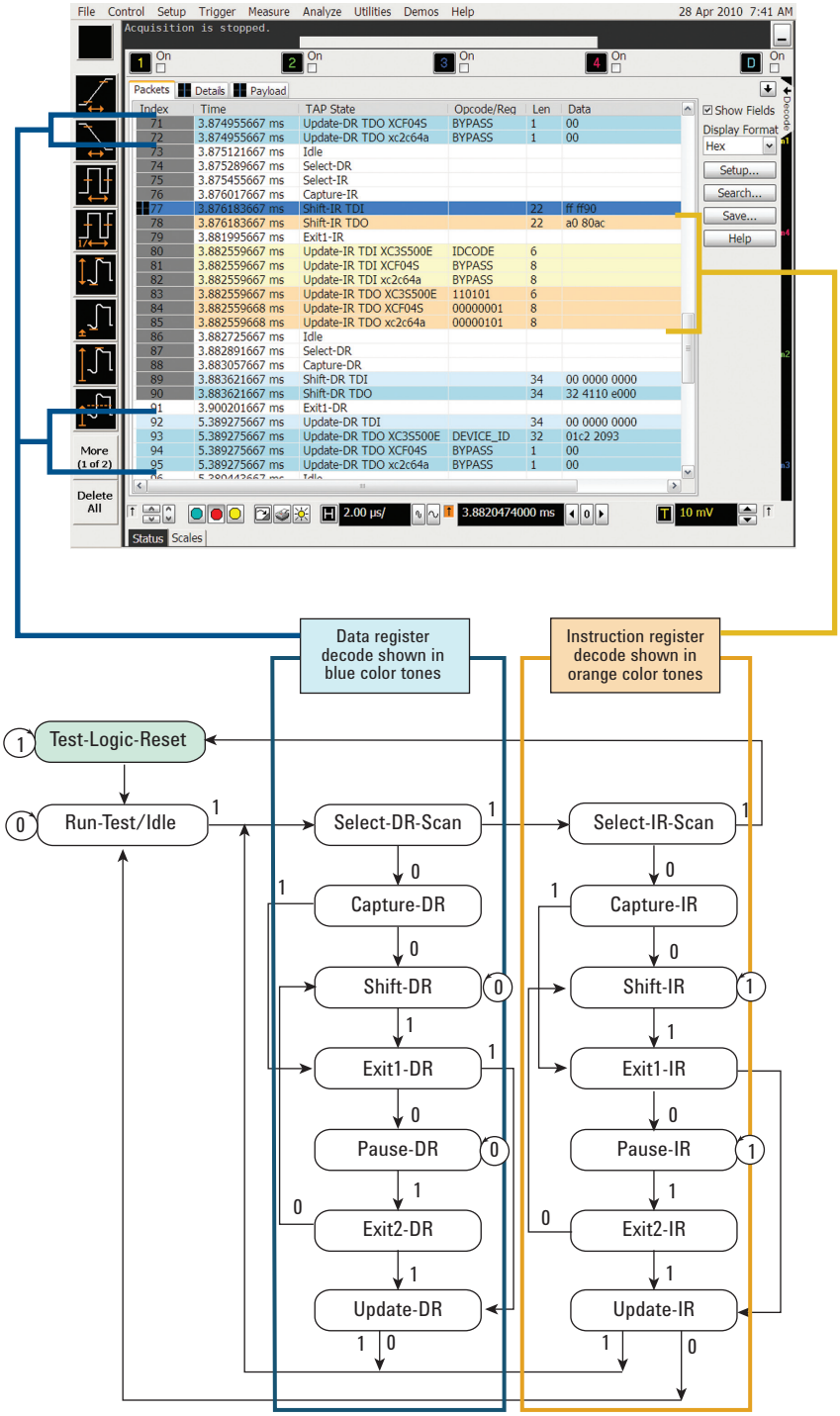
The scope will use instruction opcodes and length in the BSDL file to make the decode easier to understand. In addition, device names in the BSDL file are displayed by the scope so the user can make sense of decode that can contain instructions and values from multiple devices as shown in this example.



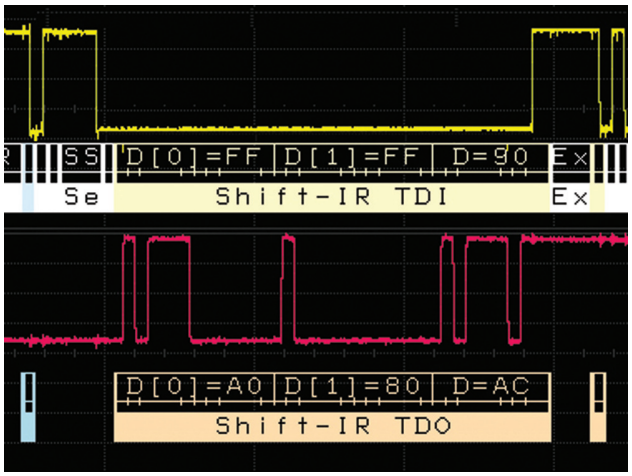
JTAG Decode (continued)

Compact Protocol Viewing Using the Full- screen Listing.

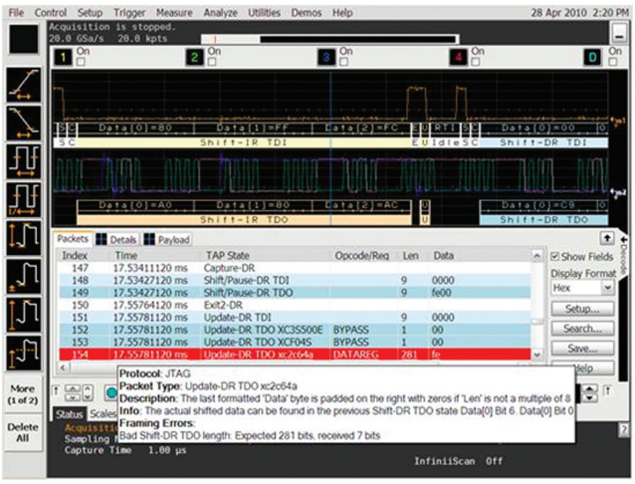
The protocol viewer window shows the time stamp value, TAP controller state, opcodes/register, length, and the data value. Data in the listing window can be saved to a .csv or .txt file for off-line analysis.



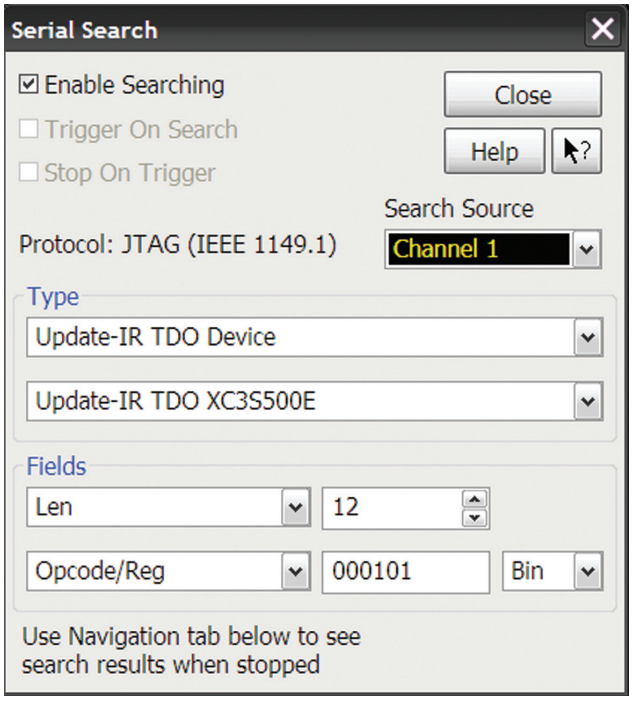
JTAG Decode (continued)



See decode below waveforms.

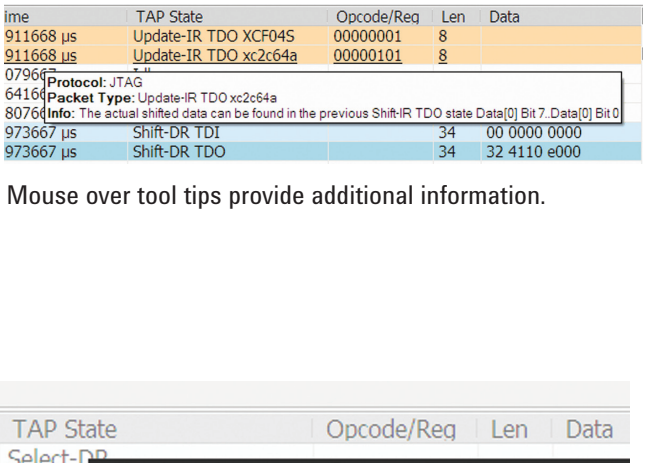


The application includes error detection. Errors are flagged when the number of bits shifted does not correspond to the expected register length for the IR Opcodes given, and if the actual IDCODE shifted in does not match the IDCODE in the BSDL file.

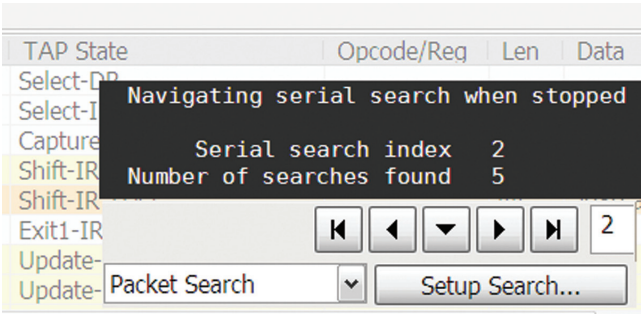


Post acquisition searching

Search acquired protocol for specified packets..



Mouse over tool tips provide additional information.



Post acquisition searching

Quickly move to the next occurrence of a specified event.

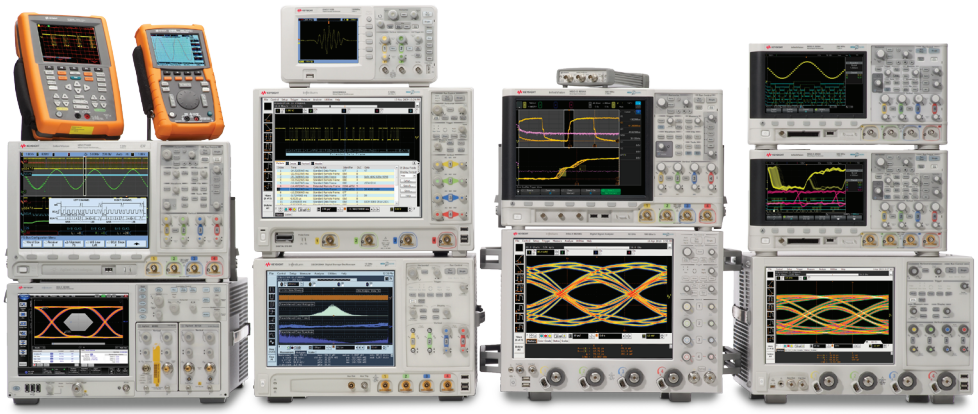
JTAG Application Specifications and Characteristics

JTAG Signals	TCK, TMS, TDI, and TDO. TRST can additionally be acquired by a spare scope or digital channel but is not used for protocol decode
JTAG Sources	Analog channels 1,2,3, or 4
	Digital channels 0 through 15 Any waveform memory
Speeds	All (up to bandwidth of scope).
Decoded Fields	TAP state, instruction registers, data registers, length, and data values.
Triggering (HW based) (SW based)	Edge trigger typically used on channel acquiring TMS signal. Searching and trigger Idle, Reset, Select DR, Exit DR, Shift/pause DR TDI, Shift/pause DR TDO, Exit1 DR, Pause DR, Exit 2 DR, Update DR TDI, Update DR TDI, Update DR TDO, Update DR TDO, Select IR, Capture IR, Shift/pause IR TDI, Shift/pause IR TDO, Exit1 IR, Pause IR, Exit 2 IR, Update IR

Ordering Information

This application is compatible with all 9000, 9000 H-, 90000 and 90000 X-Series oscilloscope models with version 2.5 or greater software.

Software applications	Factory-installed option for new scope purchase	User-installed stand-alone product number	Server-based license (N5435A option)
JTAG Protocol triggering and decode	042	N8817A	038



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