TELEDYNE LECROY
Everywhereyoulook™

High Speed Serial Trigger and Decode

6.5 & 14.1 Gbps 80 bit NRZ, 8b/10b and 64b/66b

Key Features

- **Hardware triggering for up to 14.1 Gbps data rates**
- **Built-in signal equalization for high trigger reliability and stability**
- **80-bit NRZ pattern triggering**
- **8b/10b and 64b/66b symbol triggering**
  - **Comprehensive pattern, block, symbol, and primitive triggering**
  - **Trigger on invalid symbols**
  - **Trigger on running disparity errors**
- **8b/10b and 64b/66b decoding with intuitive, easy-to-read decode overlay on the waveform**
- **Ideal for:**
  - PCI Express®
  - SAS
  - Serial ATA
  - USB 3.0
  - DisplayPort
  - DVI
  - HDMI
  - Ethernet
  - FibreChannel
  - IEEE 1394B
  - InfiniBand
  - Serial Rapid IO (SRIO)
  - XAUI

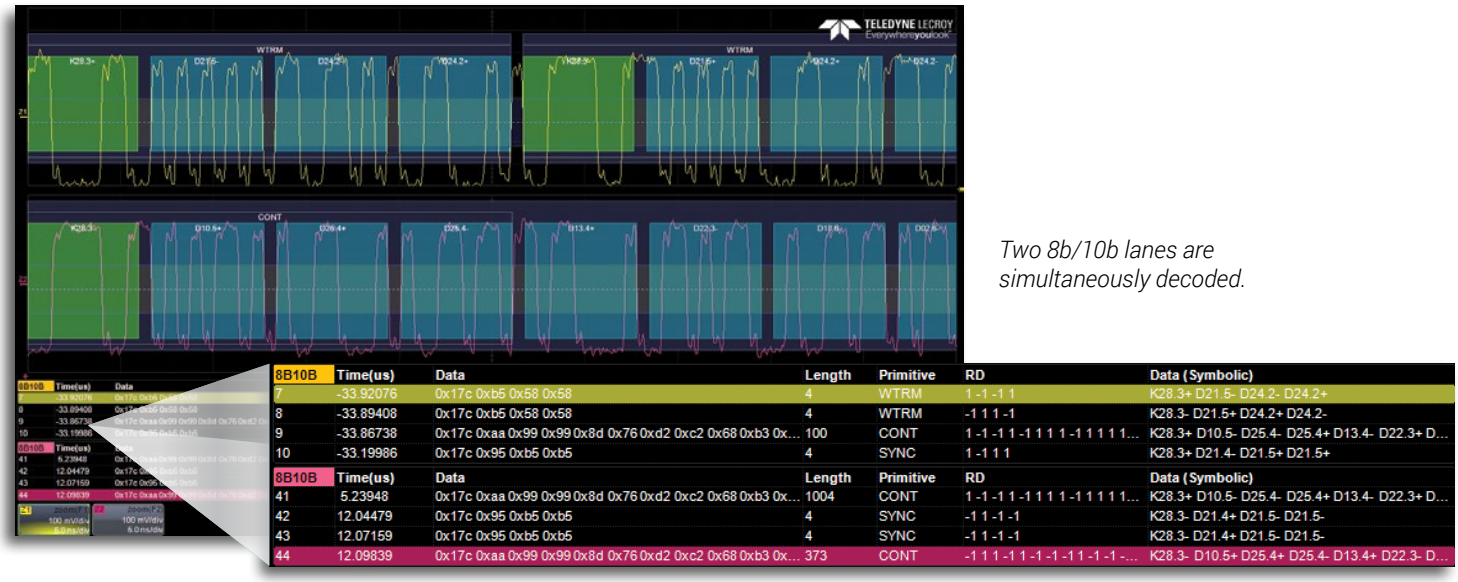
Rapidly pinpoint and debug problems with NRZ, 8b/10b and 64b/66b signals using the high-speed serial trigger and decode options. Hardware trigger products with maximum bitrates of 6.5 and 14.1 Gbps are available for WaveMaster 8 Zi-B and LabMaster 10 Zi-A series oscilloscopes, and include 8b/10b and 64b/66b decoders.

6.5 and 14.1 Gbps Hardware Triggers

The 6.5 and 14.1 Gbps high-speed trigger and decode products are hardware options that can trigger on NRZ serial data patterns of up to 80 bits, and on specific features of 8b/10b or 64b/66b signals. The trigger board's FPGA searches for events in real-time and initiates triggers on every occurrence. Debugging high speed serial bus systems has never been easier, especially on systems that rely on NRZ, 8b/10b or 64b/66b encoding.

Annotated Decoder Complements Triggering

The 8b/10b and 64b/66b symbol decoder features annotate information on the physical layer waveform. Color-coded sections make it easy to understand where blocks and symbols start and stop. Decode annotation information expands or contracts depending on the timebase setting or zoom ratio. The decode operation is fast, even with long acquisitions. Decode annotation provides the ability to view protocol traffic on the oscilloscope and verify that the link is alive and transmitting properly. It also aids in debugging problems that are not solely analog or digital in nature, such as interoperability issues, uncertain error causes, and physical layer issues not evident with a protocol analyzer.



Two 8b/10b lanes are simultaneously decoded.

Multi-Lane Capability for Lane Skew Validation

Up to four decoders at a time may be employed to make lane-to-lane frame skew validation on high-speed multi-lane systems.

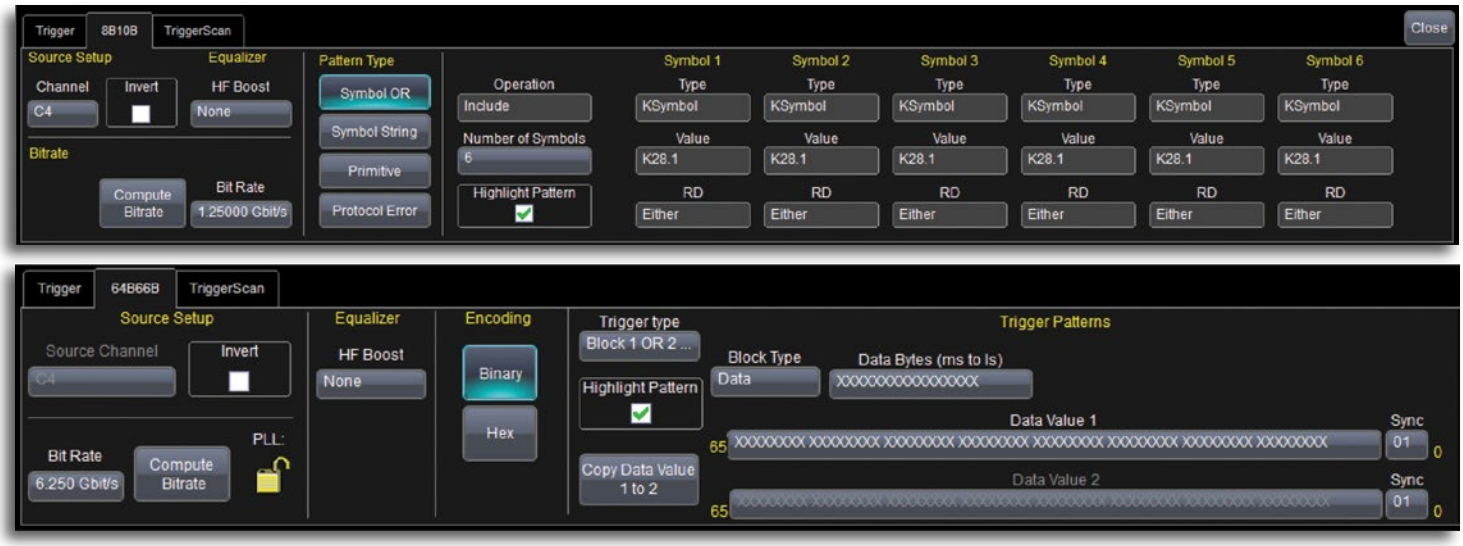
8b/10b and 64b/66b Symbolic Trigger

Both the 6.5 and 14.1 Gbps hardware options include the capability to trigger on features of 8b/10b and 64b/66b-encoded signals. For 8b/10b, you can select to trigger on specific symbols, symbol strings, primitives or errors in order to debug signal characteristics of the 8b/10b signal itself, or to understand the behavior of other signals that are synchronous to 8b/10b patterns. For 64b/66b, users can trigger on features of matching (or mismatched) blocks of the unscrambled signal. Specify data, control and error blocks, or trigger on invalid sync bits or types through the trigger dialog.

Convenient Table Display and Search

Long oscilloscope acquisition memory provides long capture times of serial data transmissions. Decoded symbol information is conveniently shown in a table format, where users can search for specific symbols and zoom to the symbol's location in the signal. Table data may be exported as a .csv file.

Trigger Dialogs



8b/10b and 64b/66b set-up dialogs allow you to configure all aspects of the triggering setup.

6.5 Gbps and 14.1 Gbps Trigger and Decode

Data Rate	600 Mb/s to 6.5 Gbps for 6GBIT-80b-SYMBOL-TD 600 Mb/s to 14.1 Gbps for 14GBIT-80b-SYMBOL-TD. *64b/66b triggering only available on signal rates ≥ 6.25 Gb/s.*	
	Trigger Capability	
Trigger Input	Oscilloscope analog Channel 4 only.	
Trigger Design	True hardware protocol trigger internal to oscilloscope.	
Format	**8b/10b specific features:** Primitive or Symbolic. 80-bit NRZ: Hexadecimal or Binary.	**64b/66b specific features:** Data or Control Block, Sync bits.
Trigger Setup	**8b/10b specific features:** 80-bit NRZ: Trigger on either of two data patterns in an "OR" configuration (each up to 80 bits long). Trigger on up to 6 different "K" or "D" symbols in an "OR" configuration. Trigger on a string up to 8 symbols long. Trigger on a single primitive. Trigger on a symbol error. Select Running Disparity +, -, or either for each symbol. Trigger on a specific primitive from one of the primitive sets listed below.	**64b/66b specific features:** Block 1 OR 2 match. Block 1 THEN 2. Invalid SYNC. Invalid TYPE. Block 1 match / mismatch. Block 2 match / mismatch. Data / control byte values.
Primitive Setup	Select from PCIe 1.x, PCIe 2.0, SATA, SAS, XAUI, USB3.0, or user-defined sets (8b/10b only).	
Error Triggering	**8b/10b specific features:** Trigger on invalid "K" or "D" Symbol Codes (those not considered to be one of the 256 valid symbols). Trigger on a Running Disparity Error. Trigger on either of the above two errors.	**64b/66b specific features:** Invalid SYNC. Invalid TYPE.
	Decode Capability	
Format	8b/10b: Hexadecimal (byte), 8b/10b Symbol, or Primitive. 64b/66b: Primitive.	
Decode Setup	Select Data Rate, source input, threshhold %.	
Decode Input	Any analog Channel, Memory or Math trace.	
# of Decode Waveforms	Up to 4 unique Tx or Rx lanes may be decoded at one time. In addition, zooms can be displayed (with decoded information).	
Location	Overlaid on physical layer waveform, on Grid.	
Visual Aid	Color coding for hexadecimal bytes, 8b/10b bytes/symbols. 64b/66b blocks as appropriate. Decode information is intelligently annotated based on timebase setting.	
	Search Capability	
Pattern Search	Search by the following: Primitive (protocol specific list, if applicable), Next Symbol, Next Invalid Symbol.	
	Other	
Compatible With	6GBIT-80b-SYMBOL-TD (Trigger & Decode) comes as standard on SDA 8 Zi. Option compatibility for other models is as follows: Trigger is fully compatible with WaveMaster/SDA 8 Zi Series, LabMaster 9 Zi-A Series using 9xxMZi-A Master Acquisition Module, and LabMaster 10 Zi Series.	
	14GBIT-80b-SYMBOL-TD (Trigger & Decode) Option compatibility is as follows: Trigger is fully compatible with WaveMaster/SDA 8 Zi Series, LabMaster 9 Zi-A Series using 9xxMZi-A Master Acquisition Module and LabMaster 10 Zi Series.	
	Decode is fully compatible with WaveMaster/SDA 8 Zi Series, LabMaster 9 Zi-A Series (all) and LabMaster 10 Zi Series. For decode, bandwidth of oscilloscope must be equal to bit rate with a minimum oscilloscope sample rate of 4x the bit rate.	

ORDERING INFORMATION

Product Description	Product Code
Serial Data Trigger and Decode Options	
80-bit NRZ, 8b/10b, and 64b/66b 6.5 Gbps Serial Trigger option for WaveMaster 8 Zi. Also includes 8b/10b and 64b/66b decode.	WM8Zi-6GBIT-80b-SYMBOL-TD
80-bit NRZ, 8b/10b, and 64b/66b 6.5 Gbps Serial Trigger option for LabMaster 10-xxZi Acquisition Module. Also includes 8b/10b and 64b/66b decode.	LM10Zi-6GBIT-80b-SYMBOL-TD
80-bit NRZ, 8b/10b, and 64b/66b 14.1 Gbps Serial Trigger option for WaveMaster 8 Zi. Also includes 8b/10b and 64b/66b decode.	WM8Zi-14GBIT-80b-SYMBOL-TD
80-bit NRZ, 8b/10b, and 64b/66b 14.1 Gbps Serial Trigger upgrade from 6.5 Gbps to 14.1 Gbps for SDA 8Zi. Also includes 8b/10b and 64b/66b decode.	SDA8Zi-UPG-14GBIT-80b-SYMBOL-TD
80-bit NRZ, 8b/10b, and 64b/66b14.1 Gbps Serial Trigger option for LabMaster 10-xxZi Acquisition Module. Also includes 8b/10b and 64b/66b decode.	LM10Zi-14GBIT-80b-SYMBOL-TD

A wide variety of other decode annotation options are available for Teledyne LeCroy oscilloscopes.
Additionally, 64b/66b and 8b/10b decoder options are separately available.
Consult ordering information for the oscilloscope series for more information.

Recommended Accessories	
Decode Annotation and Protocol Analyzer Synchronization Option for WaveMaster/SDA 8 Zi and LabMaster 10 Zi Oscilloscopes	ProtoSync
Decode Annotation, Protocol Analyzer + BitTracer Synchronization Option for WaveMaster/SDA 8 Zi and LabMaster 10 Zi Oscilloscopes	ProtoSync-BT

Customer Service

Teledyne LeCroy oscilloscopes and probes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our digital oscilloscopes are fully warranted for three years and our probes are warranted for one year.

This warranty includes:

- No charge for return shipping
- Long-term 7-year support
- Upgrade to latest software at no charge

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1-800-5-LeCroy
teledynelecroy.com

Local sales offices are located throughout the world.
Visit our website to find the most convenient location.

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