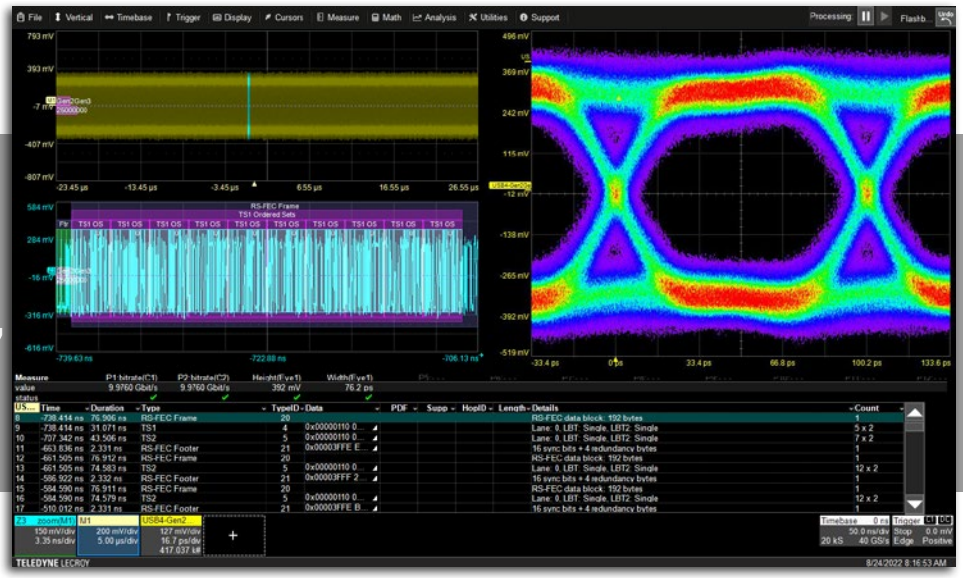
TELEDYNE LECROY
Everywhereyoulook™

USB4® Protocol Decode, Measure, Eye Diagram



Key Features

- **Capture and Decode USB4® and Thunderbolt™ Link Training Protocols**
- **USB4 and Thunderbolt SLOS Eye Diagram Measurements**
- **Use standalone or with USB4 USB4-SB TDMP for USB4 PHY-Logic Layer Debug**
- **Intuitive, color-coded overlays**
- **Interactive protocol table with zoom and pattern search**
- **Combine with Voyager M4x Protocol Exerciser/Analyzer for full PHY and Link Visibility**

Eye Measurements

USB4bus DME (Decode, Measure/Graph, and Eye Diagram) software provides eye diagram measurements recovering the clock on decoded symbols. Evaluate high-speed signal quality during link training as the transmitter sends SLOS (Symbol Lock Ordered Sets) to the receiver during link training.

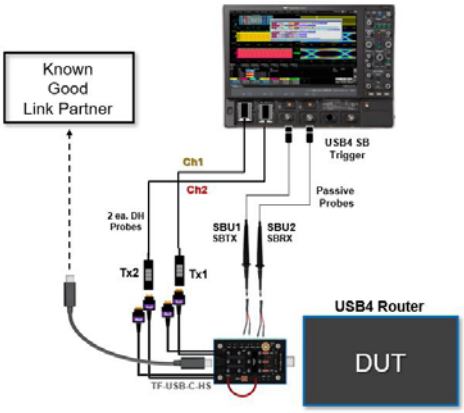
Interactive Protocol Table with Zoom and Pattern Search

Simply click on the packet of interest in the protocol table to create a zoom window of the waveform with color coded overlay showing the packet type, command type, and message details.

Use standalone or with USB4-SB TDMP Software for PHY Logic Layer Debug

Use TF-USC-C-HS (USB4 High-speed and sideband test Coupon Fixture), and DH Series differential probes with USB4bus DME and USB4-TDMP software to debug PHY link layer training failures on USB4 and Thunderbolt routers, re-timers, and active cables. The TF-USB-C-HS test coupon enables the only solution to trigger on USB4-SB signals and simultaneously capture high-speed data up to 20 Gb/s on an active link.

TF-USB-C-HS High Speed and Sideband Test Coupon



SPECIFICATIONS AND ORDERING INFORMATION

	USB4bus DME
	Definition
Protocol Setup	Select Channel Source(s) for USB4 Decode.
Trigger Setup	USB4-SB TDMP (USB4 Sideband Trigger, Decode, Measure/Graph, and Physical Layer Measurements) or Voyager M4x is recommended to trigger on link training sequence.
Format	Index, Time Stamp, Duration, Message Type, TypeID, Data, PDF, Supported, HopID, Length, Detail, Count (# of symbols if filtered).
Decode + Search Capability	
Decode Setup	**Data Rate** (Gen2Legacy, Gen3Legacy, Gen2Rounded, Gen3Rounded), **Probe Selection** (Differential, Single Ended), **Precoding Removal** (Auto, Remove, Keep), **Filter Options** (Group by Type, Ignore Frames, Ignore Idles).
Decode Input	Any analog Channel, Memory, or Math trace.
# of Decodes	Up to four buses may be decoded at one time. In addition, zooms can be displayed (with decoded information).
Table Configure, Export Table	Display up to 20 rows of decoded information for up to four different protocols or decodes in time order in a single table. Displayed information includes Index, Timestamp, and other various protocol-specific information. Table permits scrolling, touch to zoom, export to .csv file, and special display of long data or other patterns.
Decoded Ordered Sets	SKIP, SLOS1, SLOS2, CL_WAKE1.X, CL_WAKE2.X, TSNOS, De-Skew, TS1, TS2, CL2_REQ, CL1_REQ, CL2_ACK, CL1_ACK, CL0s_ACK, CL_NACK, CL_OFF.
Decode Packet Layer Types	**Packet Headers, Tunneled, Link Management** (Idle, Credit Grant, Path Credit Sync, Shared Buffers Credit Sync), **Control** (Read Request/Response, Write Request/Response, Notification, Notification Ack, Hot Plug Inter-domain request/response), **Time Sync** (Follow-up, Inter-domain time stamp).
Visual Aid	Color Coding of Message Type, Groupings (RS-FEC, 64/66b Frame, 128b/132b Frame) Header/Footer, High-level field such as SCR, Errors. Decode information is intelligently annotated based on timebase setting, and overlaid on acquired waveform.
Location	Overlaid on acquired DATA waveform, on Grid.
Pattern Search	Search for previous or next: Index, Time, Type, Count, Extended, Data, CRC, Status. Advanced search of a combination of up to the three Table Columns using AND/OR operation and specified Values.
Measure/Graph Capability	
Timing Measurements	**Message to Analog, Analog to Message, Message to Message, ΔMessage Time** (identical message on same decoder), Time@ Message (time from trigger). Serial Message may be defined by "ID =" (where applicable) and user-defined DATA with condition <=, <, =, >, >=, <>, IN RANGE, or OUT OF RANGE in any location in up to 2048 bits of data. Analog Signal may be defined by Slope (pos, neg), Level (abs or %) with Hysteresis setting. Holdoff may be set on the Analog Signal by either Time or Events (up to 1000) to preclude unwanted measurements.
Eye Diagram Test Capability	
Setup	Create up to four simultaneous Eye Diagrams (one per Serial Decoder) of the physical layer signal(s). Eye Style selectable as color- or analog-persisted. Eye Saturation adjustable from 0 to 100%.
Eye Diagram Method	Symbol Locked Eye rendering recovers the clock based on the 'mean' clock from the displayed decoded symbol. 'Apply to Zoom' provides Eye on only the selected symbol in the Decode Table, with udjustble upsampling and Eye Saturation.
Eye Parameters	Eye Height, Eye Width, (Number of) Mask Hits.
Eye Mask	Create a custom Mask using the free Teledyne LeCroy MaskMaker software utility. Store custom masks for later recall and use.
Failure Indication and Location	Mask Failure Indication ON or OFF (ON = indicated with a red circle). Mask Failure Location trace waveform displayed and interactive with Eye Mask failure table. Supports STOP trigger on Mask Failure.
Recommended Oscilloscope Performance and Compatibility	
Compatable with:	Oscilloscopes with 16 GHz of bandwidth or greater.

Ordering Information

Product Description	Product Code
USB4 Decode, Measure/Graph, and Eye Diagram Software	USB4bus DME

Additional Recommended Software

QualiPHY Enabled USB4 Transmitter and Receiver Compliance Software	QPHY-USB4-TX-RX
USB4 Sideband Trigger, Decode, Measure/Graph, and Physical Layer Measurement Software:	
LabMaster 10 Zi-A (no sideband trigger)	USB4SB DMP
SDA 8 Zi-B	USB4SB TDMP
USB Power Delivery Trigger, Decode, Measure/Graph, and Physical Layer Measurement Software:	
LabMaster 10 Zi-A (no sideband trigger)	USBPD DMP
SDA 8 Zi-B	USBPD TDMP
Protocol Analyzer Software Synchronization Options	ProtoSync

Product Description	Product Code
Recommended Test Fixture and Probes	
USB4 High Speed and Sideband Test Coupon Fixture	TF-USB-C-HS
DH Series Differential Probes (1 per lane tested):	
LabMaster 10 Zi-A	DH25-2.92, DH30-2.92
SDA 8 Zi-B	DH16-PL, DH20-PL

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.