

Oscilloscope Features, Options, and Accessories
































































































HDO6000A
HDO8000A
MDA800A
HDO9000
WaveRunner 8000
WavePro HD
WaveMaster 8 Zi-B
LabMaster 10 Zi-A

POWERFUL, DEEP TOOLBOX

Our “powerful, deep toolbox” starts with all the standard tools listed on the following pages. These standard tools provide exceptional capabilities for Measure & Math, Statistical Analysis, Anomaly Detection, basic Jitter Analysis, Spectrum Analysis—nearly any type of waveform analysis you can name.

Software options integrate seamlessly with the standard tools to extend your capabilities into a wide variety of applications. Our MAUI with OneTouch user interface and deep toolbox is consistently applied across product lines ranging in bandwidth from 350 MHz to 100 GHz, providing a unified user-experience and set of debug, validation and analysis capabilities that is unique in the industry.

Capture		View			Measure		Math		Analyze										Document			
Triggering	Acquire	Display Grids	Display Views	Zooming	Parameters	Parameter Analysis	Functions	Advanced Functions	Pass/Fail	Anomaly Detection	Serial Decode	Serial Message Analysis	Clock & Timing Jitter	Serial Data Jitter	Serial Data Analysis	Application Packages	Document					
1▲																	2▲					
																						
Element Key: ▲ Invented by LeCroy ★ Unique to LeCroy																						
3	4															5	6	7	8	9	10	
	5 MS/s Roll																					
11	12															13	14	15	16	17-22		23
	Sequence Mode																					
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40-45	46					
	80ch																					
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63-67	68					
																						
69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85-89	90					
																						
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107-114	115					
																						
17	18	19	20	21	22	23	63	64	65	66	67	107	108	109	110							
																						
40	41	42	43	44	45	46	85	86	87	88	89	111	112	113	114							
																						

Our heritage

Teledyne LeCroy's 50+ year heritage is in processing long records to extract meaningful insight. We invented the digital oscilloscope and many of the additional waveshape analysis tools.

Our obsession

Our tools and operating philosophy are standardized across much of our product line. This deep toolbox inspires insight; and your moment of insight is our reward.

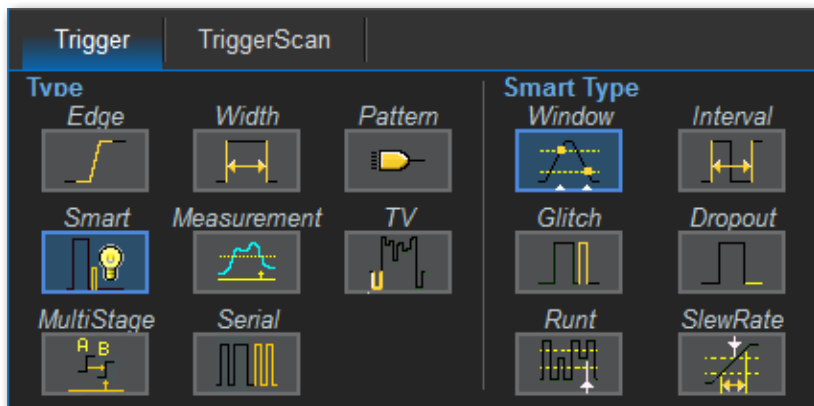
Our invitation

Our Periodic Table of Oscilloscope Tools explains the toolsets that Teledyne LeCroy has deployed in our oscilloscopes. Visit our interactive website to learn more about them.

teledynelecroy.com/tools

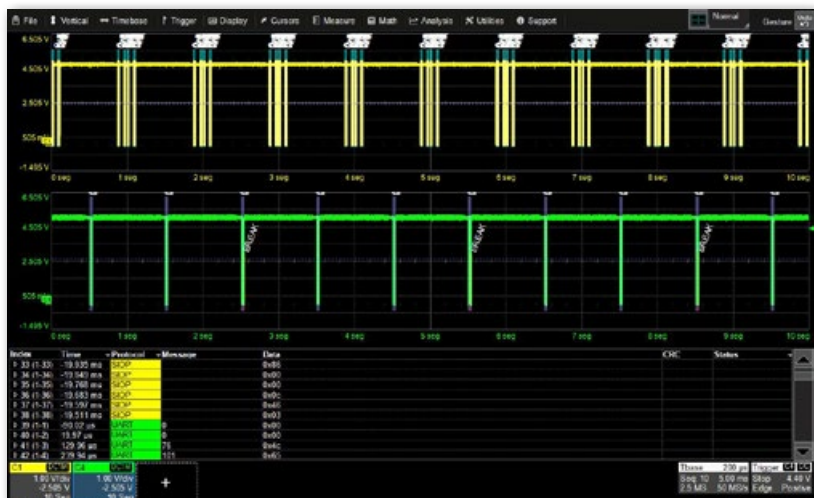
Our Probe Catalog showcases even more accessories for use with your Teledyne LeCroy oscilloscope. Go to teledynelecroy.com/probes to download a copy.

WAVEFORM ACQUISITION



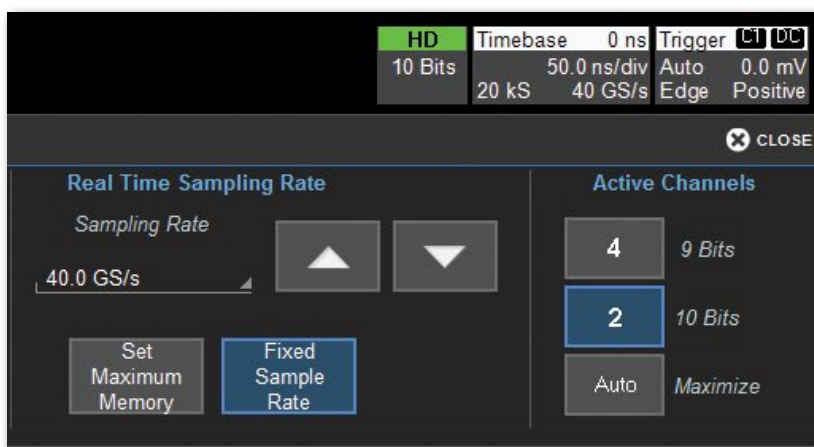
Advanced Triggering

- Multi-stage triggers permit complex qualification of multiple waveform events.
- Smart Triggers find anomalies such as runs, glitches and dropouts, or incorrect time intervals, slew rates and windows.
- Pattern Triggers permit AND, NAND, OR, or NOR qualification of parallel patterns across analog channels and digital lines.
- Measurement triggers utilize included oscilloscope measurements.
- Serial TDME Software options add protocol-specific triggers to the standard set.



Flexible Sampling Modes

- Sequence Mode provides efficient use of acquisition memory to capture hundreds or thousands of acquisition segments without “dead-time” between.
- Roll Mode displays acquired sample points “rolling” continuously from right to left at sample rates up to 5 MS/s.
- Random Interleaved Sampling (RIS) Mode allows effective sampling rates higher than the maximum single-shot sampling rate. (Not available with all oscilloscopes).



Acquisition Memory Upgrades (Oscilloscope Options)

- Standard acquisition memory permits long waveform capture times at high sample rates.
- Interleaving doubles the acquisition memory and sample rate (supported on many models).
- Memory upgrades available for most oscilloscope models—up to 5 Gpts/channel on some models.

WAVEFORM ACQUISITION



SAM40 Sensor Acquisition Module (Optional Hardware)

- Adds 8-, 16- or 24-channels of sensor input to supported 12-bit oscilloscope product lines.
- 24-bit resolution, 40 kHz bandwidth, 100 kS/s, high precision.
- Complete physical units conversion to more than 65 SI and English system units.
- IEPE/ICP sensor support with internal 4 mA bias.
- BNC input compatible with wide variety of off-the-shelf sensors.



Mixed Signal Solutions (-MS Models/MSO Oscilloscope Option)

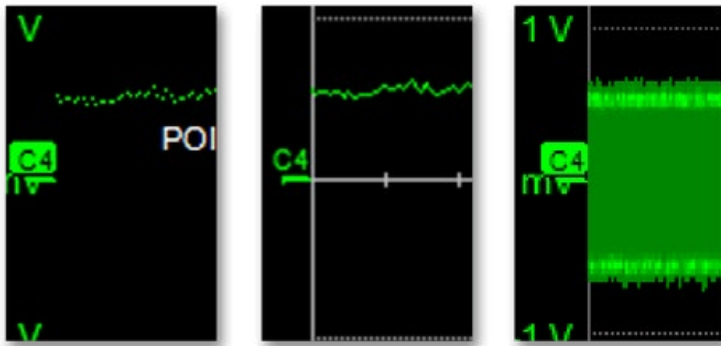
- Integrated Mixed Signal interface enables 16 lines of digital input at 1.25 GS/s.
- Flexible analog and digital cross-pattern triggering across all analog or digital channels.
- Utilize digital inputs for low-speed serial triggering or capture/decode.
- Provides advanced digital debug tools such as parallel pattern search, measurements, and simulation.
- MS-250/MS-500 external logic pods provide similar capabilities.



HDA125 High Speed Digital Analyzer (Optional Hardware)

- 9- or 18-channel models available.
- 12.5 GS/s sampling rate for 80 ps timing accuracy.
- 3 GHz leadset for capturing digital signals up to 6 Gb/s.
- QuickLink probing system with differential solder-in tips works with both HDA125 digital leadset and analog differential probes.
- Ideal for enhanced DDR Debug.

COMPREHENSIVE WAVEFORM VIEWING



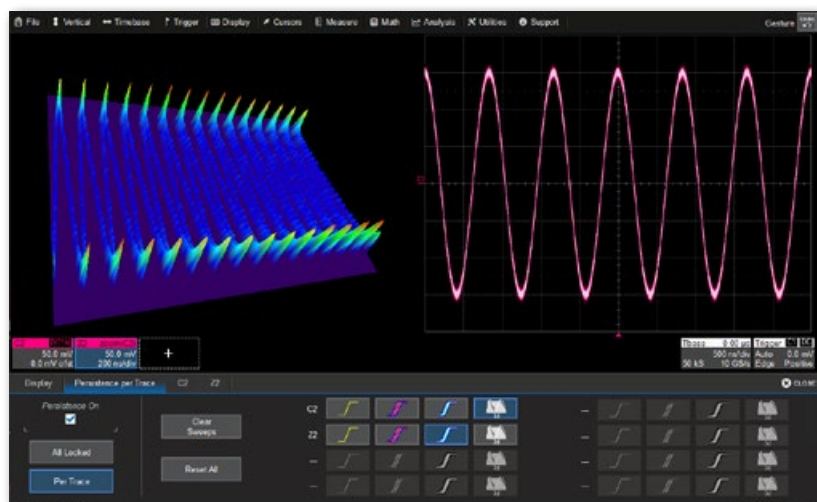
Configurable Displays

- Show/hide axis labels next to grid divisions.
- Add custom trace labels to mark points of interest on waveform.
- Adjust trace intensity to highlight rare or more frequent events in captured waveforms.
- Change intensity of grid lines relative to waveform traces.
- Choose style of waveform traces: series of dots or joined lines.



Multi-Grid Display

- Maintains full vertical resolution when acquired waveforms are minimized in height.
- More than 20 different multi-grid display selections, including X-Y and side-by-side.
- Completely user configurable—use drag-and-drop to arrange traces as desired.
- Locate any Channel, Math, Zoom, Memory, etc. trace in any grid location.



Display Persistence

- Build persistence maps from multiple acquisitions to understand how acquisitions change over time.
- Select single-color analog or full-color displays.
- Generate 3D displays of persistence maps, and rotate 3D persistence maps on three axes.
- Global or independent (per-trace) persistence settings.
- Persistence (waveform) histogram capability for both Vertical and Horizontal.

COMPREHENSIVE WAVEFORM VIEWING



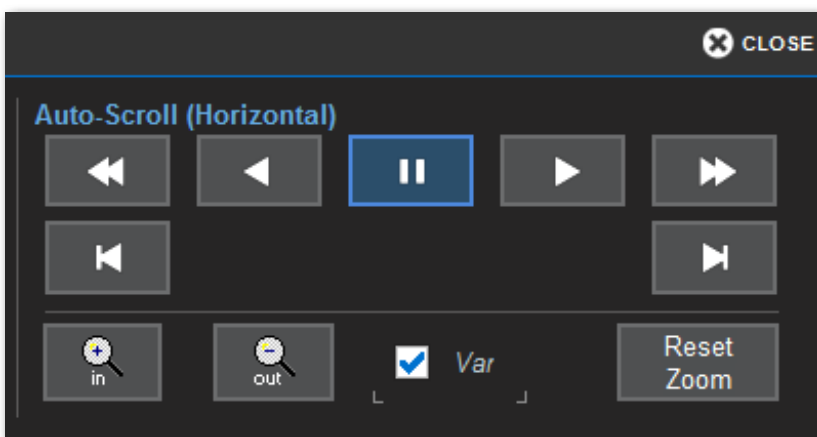
Segment Waveform Display

- Show Sequence Mode acquisition segments in five different display modes.
- Adjacent shows segments sequentially, similar to a real-time waveform but without dead-time.
- Overlay mimics persistence by stacking all segments on top of each other, time synchronized.
- Waterfall, Mosaic, and Perspective place segments in close proximity for comparison.



Comprehensive Zooming Capabilities

- Quick Zoom all waveforms with a single button press, or touch-and-drag over a trace to create individual zooms.
- Zoom both vertically and horizontally.
- Create time-locked, Multi-Zoom groups, then track all zooms together.
- Touch result tables (Serial Decode, History, WaveScan, etc.) to zoom that part of the source waveform.



Auto Scroll

- Auto Scroll applies zoom to navigating long acquisition memory.
- Automatically scroll through acquisition memory without manual knob turning.
- Forward or reverse direction at fast or slow speeds, single-stepped or continuous motion.

COMPREHENSIVE WAVEFORM VIEWING

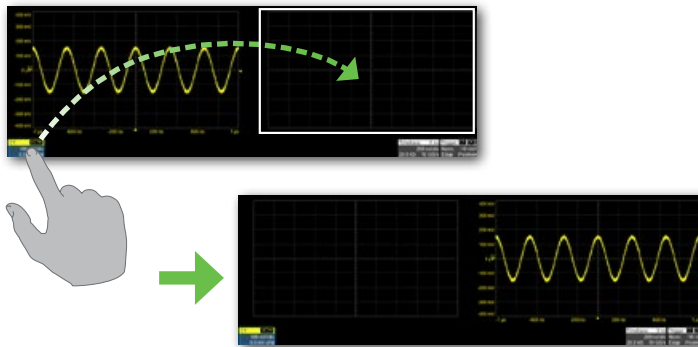


Unit Rescaling and Conversion

- Change the displayed Vertical Scale of any channel or sensor trace using a custom multiplier and/or additive constant.
- Convert to over 65 SI and English units conveniently in channel setup dialog.
- Math trace units intelligently converted based on input trace units and operation.

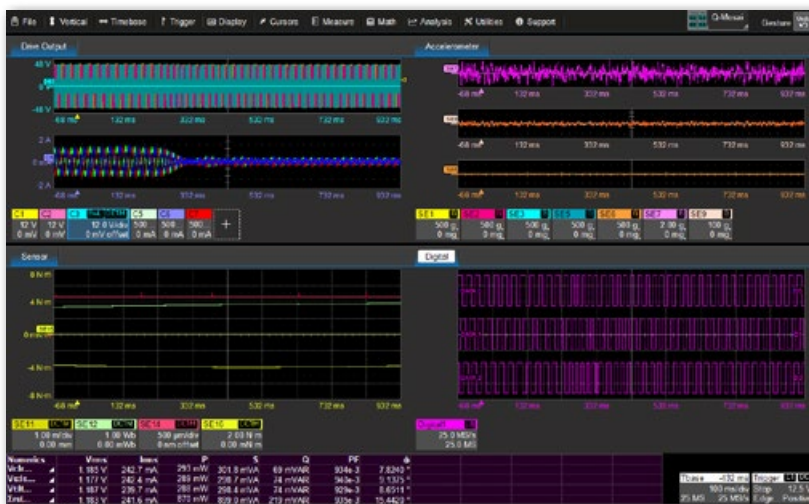
MAUI with OneTouch

- Use gestures to change setups, often with one touch.
- Drag-and-drop to move traces to new grids, create new traces or copy measurements.
- Swipe to remove traces and measurements or pan traces and lists.
- Pinch/unpinch traces to “zoom” in and out.



Q-Scope Multi-Tab Display (Q-SCAPE Software Option)

- Divide the screen into four display tabs to maximize your viewing area.
- Arrange tabs to facilitate waveform comparison: Single (stacked tabs), Dual (side-by-side tabs) or Mosaic (all tabs displayed).
- Configure each tab with different grid modes.
- Drag traces to different tabs just as you can drag them to different grids.
- Standard on all HDO8000A and MDA800A models, available as an option on some others.



ADVANCED MEASURE & MATH

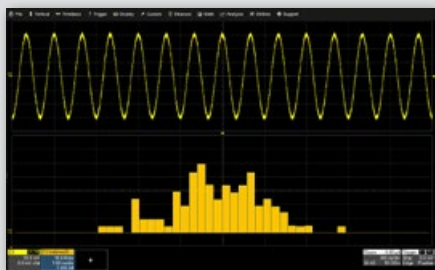
Advanced Measure

Configure up-to-12 parameters using the industry's most extensive set of standard measurements. Use custom scripts of your creation, perform math on measurement parameters, or create complex processing webs using Advanced Web Edit.



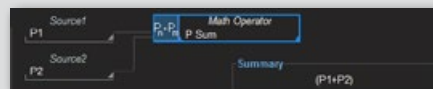
1. All Instance Measurements for each acquisition
2. Full statistics (up-to-2 billion events)
3. Histicons provide snapshot and Histograms provide detail of statistical distribution
4. Simple/Detailed Help Markers
5. Independent measurement gate for each parameter
6. Measurement Parameter Math
7. Measurement Rescaling and Unit Conversion
8. User-defined measurement Accept
9. Cyclic calculation of vertical parameters
10. Advanced Web Edit for complex measurements

Measurement Histograms & Statistics



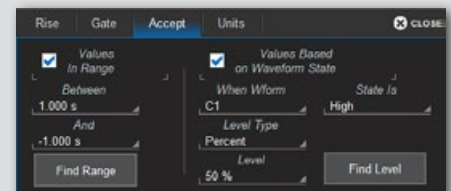
Histogram any measurement for quick visualization of statistical distribution. Apply special measurements to histogram plots for further statistical analysis.

Measurement Parameter Math



Add, subtract, multiply and divide parameters with each other or a constant. Rescale the measured parameter values.

Measurement Accept Capability



Only "accept" and display the measurement result if values are within a stated range or within another defined waveform state.

ADVANCED MEASURE & MATH

Advanced Math

Configure up-to-12 math functions using the industry's most extensive set of standard math operators. As with Measure, you can use custom scripts and algorithms of your creation, or create complex processing webs.



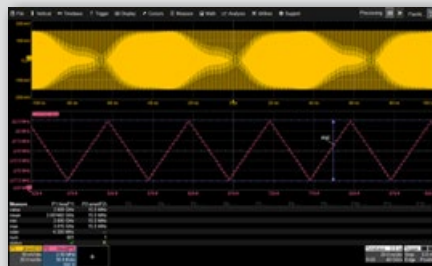
1. Dual Operator functions chain two operations
2. Advanced Web Edit for more complex functions
3. Use custom scripts in oscilloscope's real-time processing stream—MATLAB, Excel, C/C++, or VBS (with XDEV option) scripts supported
4. Graph histogram, track or trend of measurement
5. Vertically zoom each math waveform independently
6. Math waveform units intelligently rescaled and converted based on input trace units and operation
7. X-Y waveforms (available on some models)

Persistence Trace and Histogram



Create math waveforms that show persistence mean (top right), range (bottom left) or standard deviation (bottom right) of multiple acquired waveforms. Waveforms are data and can be used as input for math, measure, pass/fail testing, etc.

Track & Trend Graphing



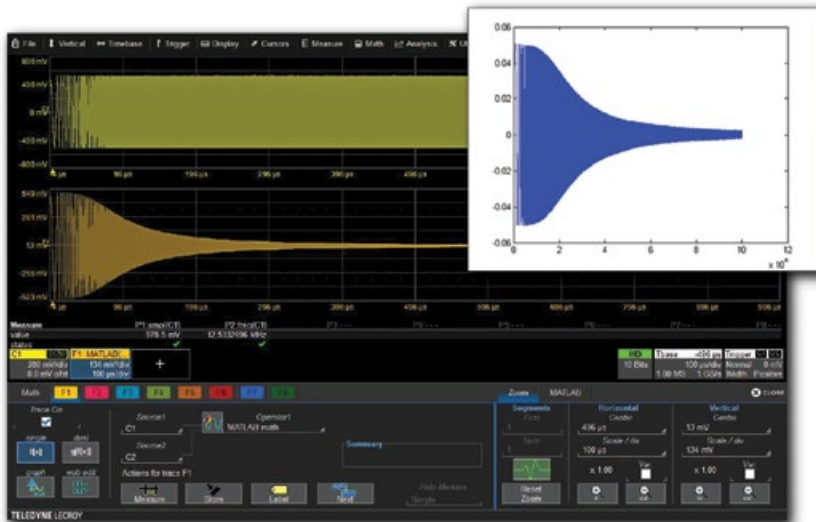
Use Track to show variation of a measurement parameter over time, time-correlated with original acquisition. Use Trend for chart recorder-like capabilities on the oscilloscope.

Advanced Web Edit



Create complex measurement or math graphical "webs" using standard measurement parameters, math functions, custom scripts (with XDEV option), or any combination thereof. Unlimited chaining of operations permitted.

ADVANCED MEASURE & MATH



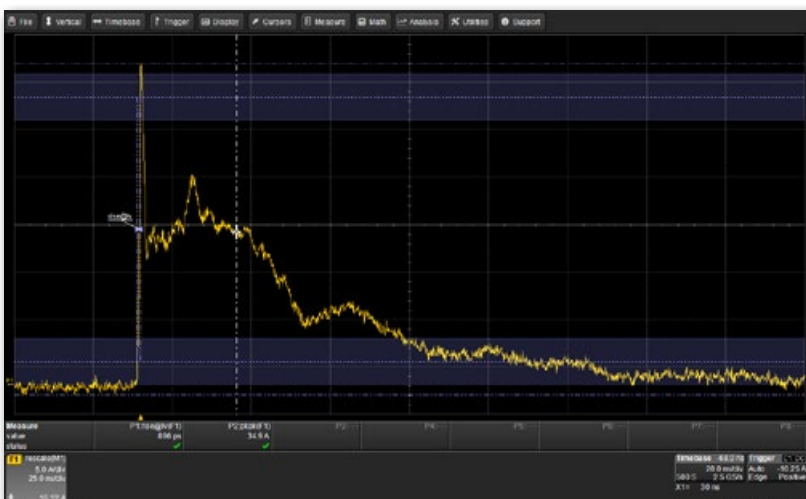
Advanced Customization (XDEV Software Option)

- Insert proprietary scripts and algorithms directly into oscilloscope's processing stream and view results in real time.
- Create plug-ins that add multiple processes with custom user interfaces.
- Support for VBScript, JavaScript, MATLAB® Script, MathCad Script, Excel® VBA, C/C++.
- Standard on WavePro, WaveMaster and LabMaster oscilloscopes, available as an option on others.



Digital Filter Package (DFP2 Software Option)

- Optional package of 13 IIR and FIR filters added to the set of Math operators.
- Apply filters to eliminate undesired spectral components and enhance the ability to examine important signal components.
- Filters include: Low-pass, High-pass, Band-pass, Band-stop, Raised Cosine, Raised Root Cosine, Gaussian and Custom.
- IIR filters permit Butterworth, Chebyshev, Inverse Chebyshev or Bessel type selection.



EMC Pulse Parameter Package (EMC Software Option)

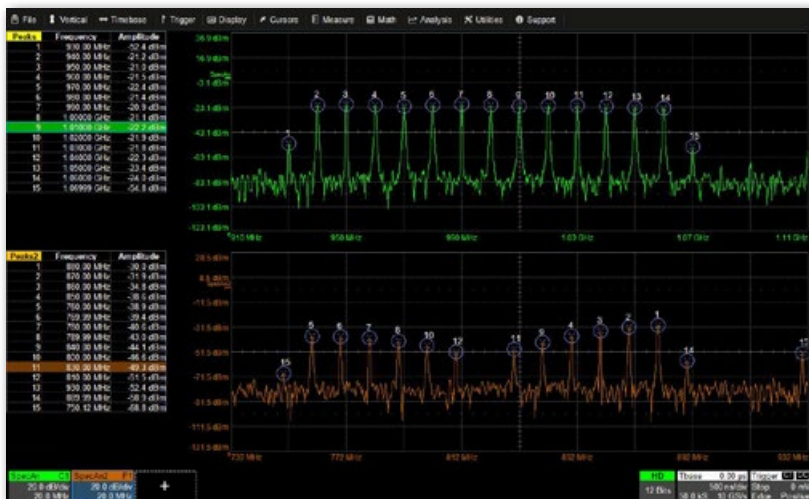
- Ignore undershoot, overshoot or tail perturbations when measuring EMC/ESD pulses.
- Set level for @level parameters using actual Peak-to-Peak, 0V - Max, or 0V - Min.
- Adds customizable measurements for EMC Level After Pulse and EMC Time to Half Value.

FFT & SPECTRAL ANALYSIS



Full Record Length FFT (500 Mpt)

- Best resolution bandwidth possible.
- Select for Magnitude, Phase, Power Spectrum, Power Density, Real, Imaginary or Magnitude Squared.
- Five different Window selections.
- Provides highest SNR when used with 12-bit HD4096 oscilloscopes.
- FFT averaging.



Dual Spectrum Analyzer (SPECTRUM Software Option)

- Spectrum Analyzer-style controls with Dual Spectrum capability.
- Automatically identify and mark peak frequencies, fundamental frequencies and harmonics on FFT traces.
- 2D or 3D spectrogram shows how spectra change over time. Rotate 3D spectrogram on three axes.
- Standard on all HDO6000A, HDO8000A and MDA800A models, optional on others.

ADVANCED ANOMALY DETECTION

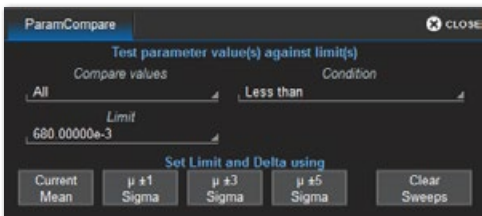
PASS/FAIL Testing

Test waveforms against a custom set of up-to-12 unique “queries” consisting of a waveform mask, single parameter comparison or dual parameter comparison. Define test “PASS” or “FAIL” using complex Boolean comparison of multiple queries. Start/Stop testing after defined number of sweeps, or run indefinitely.



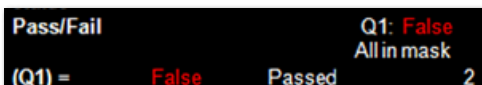
Mask Testing

- Test waveforms against industry-standard or custom masks.
- Easily create new masks from “golden” waveforms.
- Mask violations clearly marked on waveform.



Parameter Compare with Boolean Conditions

- Test parameter measurement result against a limit or a second measurement, using a wide variety of conditions.
- Define query “PASS” or “FAIL” using complex Boolean criteria.
- Set criteria using absolute values/ranges, Mean or Sigma.

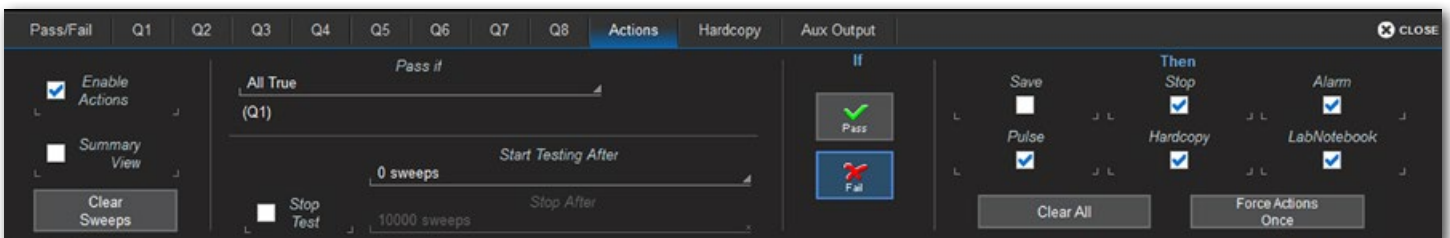


Intuitive Results Display

- Test queries all shown on intuitive table, with active queries highlighted.
- PASS or FAIL results over number of sweeps clearly displayed.

Actions

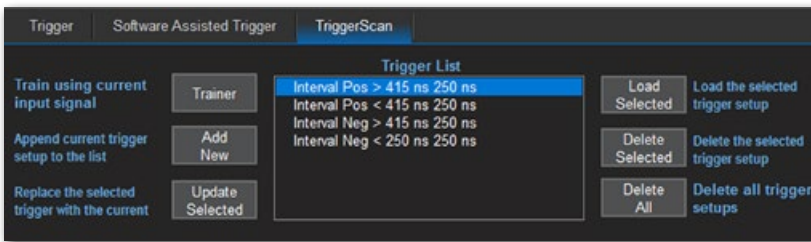
Choose one or more Actions to take when a test is passed or failed: save waveform data, save a screen image, save a LabNotebook, sound an alarm signal, send a pulse or stop acquisition.



ADVANCED ANOMALY DETECTION

TriggerScan

- TriggerScan “trains” on the type of events found in your signals and automatically configures triggers designed to find those events.
- Edit generated triggers, or manually add triggers to setup.
- Save triggers as setup files for sharing, storage and quick reloading.
- Save only the triggers you want in discrete sets for different projects.



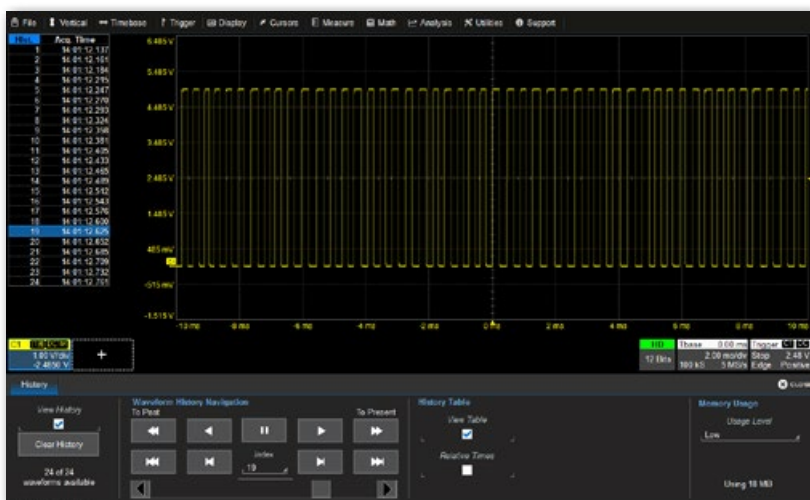
WaveScan® Advanced Search

- Search analog, digital or parallel bus signals using more than 20 different criteria, isolating events hardware triggers alone can't find, like frequencies.
- Set up a condition and scan single or multiple acquisitions over hours or days.
- Touch timestamped WaveScan table to zoom to that event.
- ScanOverlay view marks events on the waveform with color overlays; ScanHistogram view shows statistical distribution of events.



History Mode Waveform Playback

- Never miss a waveform: History Mode stores a buffer of acquisitions for later viewing and analysis.
- Always enabled and easily accessible.
- Touch timestamped History table to display a specific acquisition.
- Cursor readouts and Measure table reflect the visible acquisition.
- Available on HDO6000A, HDO8000A, MDA800A, WaveRunner 8000 and HDO9000 oscilloscopes and motor drive analyzers.



REMOTE CONTROL & CONNECTIVITY

[illegible]

Windows Automation

- Native control language of MAUI oscilloscopes; use it to control every aspect of the oscilloscope.
- Run Automation programs remotely or locally on oscilloscope.
- Remote interface via DCOM, ActiveDSO (proprietary ActiveX control) or NI-VISA.
- Free XStreamBrowser utility shows full Automation setup; use it for remote control or as programming support.

Utilities	Status	Remote	Aux Output	Date/Time	Options
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Control from

Off

TCPIP (VICP)

GPIB

LXI (VXI11)

LSIB

USBTMC

Host Name :

LCRY4251N10009

IP Address(s) :

0.0.0.0, 10.30.6.164, 0.0.0.0

Net Connections

IEEE 488.2 Remote Control

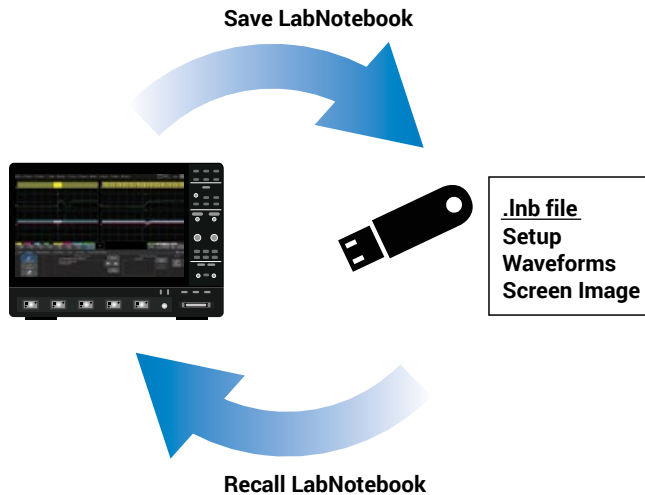
- Proprietary set of IEEE 488.2 remote commands supported on all oscilloscopes.
- Connect via TCP/IP, LXI, USBTMC or GPIB (with optional card or adapter, see below).
- Windows Automation commands supported within IEEE 488.2 remote control programs.



Data Transfer

- 10/100/1000BaseT Ethernet interfaces are provided on all instruments.
- USBTMC or USBTMC over USB 3.1 Gen1 port available on many models.
- LeCroy Serial Interface Bus (LSIB) provides direct PCIe Gen1 x 4 data transfer with Teledyne LeCroy supplied API.
- USB-GPIB Adapter (shown at left) enables the oscilloscope to connect from any USB 2.0 port to the GPIB interface of host instruments.
- IEEE 488.2 GPIB interface card (not shown) enables oscilloscope to join GPIB networks as device.

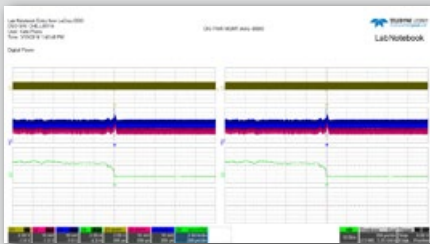
DOCUMENTATION & DATA SHARING



LabNotebook

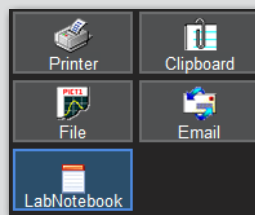
- Store all setups, waveforms and screen image in a single, composite .LNB file.
- Add descriptive notes to .LNB files, or mark up screen images.
- Recall (“Flashback”) LabNotebooks to restore oscilloscope to past state—including all setups, waveforms and table data.
- Extract component files from .LNB file, or append other files to .LNB.

Generate Reports



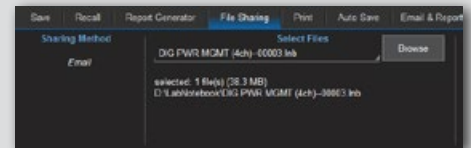
Generate preformatted .PDF, .RTF or .HTML reports from saved LabNotebooks or the oscilloscope current state. Reports can show your company logo and use Print color palette to save ink/toner.

Print



Configure Print or User button to create a LabNotebook or screen capture file.

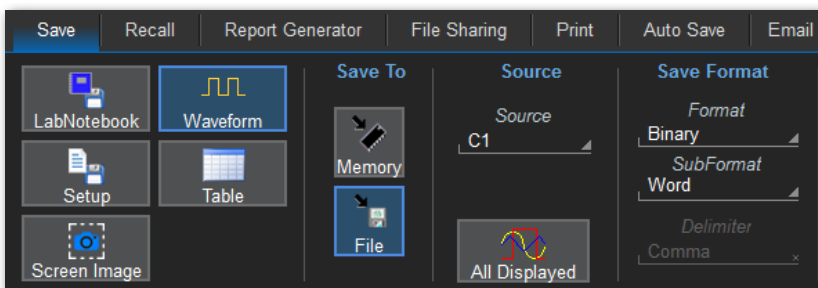
Email



Email LabNotebooks and other files from the oscilloscope. Preset the recipient address to save time.

Save/Recall

- Save all setups/waveforms to file or internal memory; recall to quickly set up oscilloscope or analyze waveforms further.
- Capture screen image and save to .JPG, .PNG, .TIF or .BMP file.
- Save table data to Excel or text file for storage and sharing.
- Auto Save waveform and table data to file with each trigger.
- Save/recall files from any network folder accessible to the oscilloscope.



STANDARD TOOLBOX AVAILABILITY

● = standard, ○ = available as an option

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi-B	LabMaster 10 Zi-A
Waveform Acquisition							
Advanced Triggers	●	●	●	●	●	●	●
Sequence Sampling Mode	●	●	● ¹	●	●	●	●
Roll Sampling Mode (5 MS/s)	●	●	● ¹	●	●	●	
RIS Sampling Mode	●	●	● ¹	●		●	
Acquisition System Hardware Modules, Options and Upgrades							
SAM40 Sensor Acquisition Module	○	○					
Integrated 16-line Digital Input w/Digital Leadset (-MS models or MSO option)	○ ²	○ ³	○ ²	○ ²	○ ²		
HDA125 High-speed Digital Analyzer with QuickLink Leadset			○		○	○	○
MS-250/MS-500 External Mixed Signal Solution			○			○	
Memory Options or Upgrades (Mpts/Ch)	○	○		○	○	○	○
Bandwidth Upgrade	○ ⁴	○ ⁴	○ ⁴	○ ⁴	○ ⁴	○ ⁴	○ ⁴
Comprehensive Waveform Viewing							
Axis and Trace Labels	●	●	●	●	●	●	●
Trace and Grid Intensity Adjustment	●	●	●	●	●	●	●
Trace Style Selection	●	●	●	●	●	●	●
Multi-Grid Displays	●	●	●	●	●	●	●
X-Y Displays	●	●	●	●	●	●	●
Display Persistence	●	●	●	●	●	●	●
Segment Waveform Displays	●	●	●	●	●	●	●
Comprehensive Zooming Capabilities (Horizontal and Vertical)	●	●	●	●	●	●	●
Auto Scroll	●	●	●	●	●	●	●
Unit Rescaling and Conversion	●	●	●	●	●	●	●
MAUI with OneTouch	●	●	●	●	●	●	●
Q-Scape Multi-Tab Display		●	○	○			
Advanced Measure & Math							
Comprehensive Standard Measurement Parameters	●	●	●	●	●	●	●
All Instance Measurements	●	●	●	●	●	●	●
Full Statistics (mean, min, max, sdev, number)	●	●	●	●	●	●	●
Histicon Display	●	●	●	●	●	●	●
Measurement Parameter Histogram with Histogram Measurements	●	●	●	●	●	●	●
Measurement Help Markers (Simple or Detailed)	●	●	●	●	●	●	●
Measurement Gates (Independent)	●	●	●	●	●	●	●
Measurement Parameter Math	●	●	●	●	●	●	●
Measurement Rescaling and Unit Conversion	●	●	●	●	●	●	●
Measurement Accept Capability	●	●	●	●	●	●	●
Cyclic Calculation of Vertical Measurement Parameters	●	●	●	●	●	●	●
Advanced Web Edit Measurements	●	●	●	●	●	●	●
Comprehensive Standard Math Functions	●	●	●	●	●	●	●
Single or Dual Operator Math Functions	●	●	●	●	●	●	●
Track and Trend Graphing of Measurement Parameters	●	●	●	●	●	●	●

STANDARD TOOLBOX AVAILABILITY

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi-B	LabMaster 10 Zi-A
Advanced Measure & Math (cont'd)							
Persistence Trace, Persistence Histogram	●	●	●	●	●	●	●
Automatic Math Rescaling and Unit Conversion	●	●	●	●	●	●	●
X-Y Waveforms		●					
Advanced Web Edit Math Functions	●	●	●	●	●	●	●
Advanced Measure/Math Customization Package (-XDEV)	○	○	○	○	○	●	●
Digital Filter Package (-DFP2)	○	○	○	○	○	○	○
EMC Pulse Parameters Package (-EMC)	○	○	○	○	○	○	○
FFT & Spectral Analysis							
Full Record Length FFT (up-to-500 Mpts)	●	●	●	●	●	●	●
Dual Spectrum Analyzer Capabilities (-SPECTRUM)	●	●	○	○	○	○	○
Advanced Anomaly Detection							
PASS/FAIL Mask Testing	●	●	●	●	●	●	●
PASS/FAIL Parameter Compare with Boolean Conditions	●	●	●	●	●	●	●
PASS/FAIL Results Display	●	●	●	●	●	●	●
TriggerScan	●	●	●	●	●	●	●
WaveScan Advanced Search	●	●	●	●	●	●	●
History Mode Waveform Playback	●	●	●	●			
Remote Control & Connectivity							
Windows Automation	●	●	●	●	●	●	●
IEEE 488.2 Remote Control	●	●	●	●	●	●	●
10/100/1000BaseT Ethernet	●	●	●	●	●	●	●
USBTMC	●	●					
USBTMC over 3.1 Gen1			●	●	●		
LSIB						○	
IEEE 488.2 GPIB Interface Card						○	○
External USB-to-GPIB Adapter	○	○	○	○	○		
Documentation & Data Sharing							
LabNotebook	●	●	●	●	●	●	●
Report Generator	●	●	●	●	●	●	●
Screen Capture	●	●	●	●	●	●	●
Network File Sharing	●	●	●	●	●	●	●
Email	●	●	●	●	●	●	●
Configurable Print/User Button	●	●	●	●	●	●	●
Configurable Print Color Palette	●	●	●	●	●	●	●
Save/Recall Setups, Waveforms, Table Data	●	●	●	●	●	●	●
Auto Save	●	●	●	●	●	●	●

1 Sequence, Roll and RIS sampling not available when in HD1024 mode.

2 Mixed Signal (-MS) model must be selected at time of initial purchase.

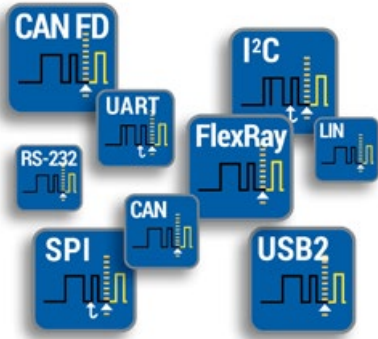
3 MSO option can be selected at time of initial purchase, or purchased later without return to service center.

4 Contact Teledyne LeCroy Service. Upgrade may require return to service center.

SERIAL MESSAGE ANALYSIS OPTIONS

Serial TDME (Software Options, see Table of Options for details on availability)

Serial Trigger, Decode, Measure/Graph and Eye Diagram (TDME) software options offer complete serial message debug and validation for over 20 supported protocols. Extend your knowledge of cause-effect behaviors and physical layer problems.



Trigger

- Trigger on protocol elements or specific DATA patterns. Includes powerful conditional DATA triggering.
- Highly adaptable ERROR Frame triggering to isolate protocol errors.
- Combine UART/SPI bytes into single “message frame” to trigger on proprietary protocols.
- Trigger on application level values with Symbolic options.



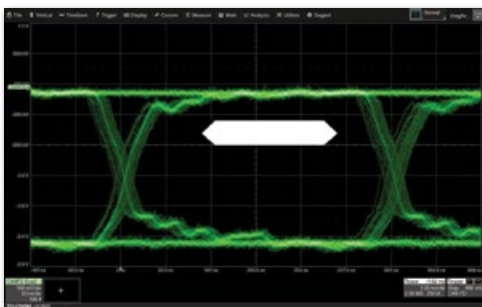
Decode

- Decode and display up-to-four protocols of any type simultaneously.
- Transparent, color-coded overlay marks protocol elements (ID, DATA, CRC, complete frame, etc.) on waveform. Decoded data listed on overlay.
- Interactive table displays interleaved records from all protocol decoders; touch a record to zoom to the waveform location. Export table data to file. Customize table display.
- User-defined decode Search zooms to the next match it finds.



Measure/Graph

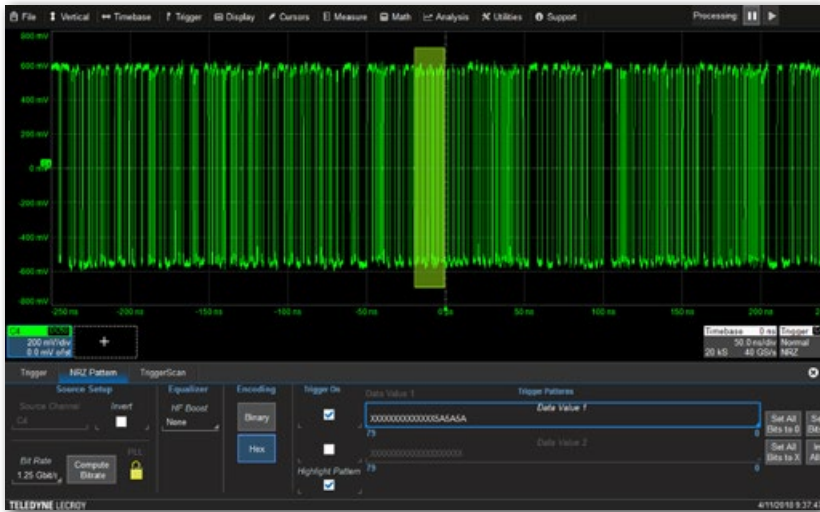
- Apply automated timing measurements to decoded data for cause-effect analysis between messages, or between messages and analog signals.
- Serial Data DAC—use Message to Value measurement to extract digital data, rescale it to an analog value, and graph it over time.
- Apply various bus measurements.
- Use with full set of standard parameter analysis tools: statistics, gating, conditional accepting, etc.



Eye Diagrams

- One “button” setup of four simultaneous eye diagrams.
- Examine different protocols, or same protocol at different points.
- Eye diagram mask tests with mask failure indicators.
- PHY test options (TDMP) provide additional eye diagrams and special measurements required by standard for high-speed/complex protocols.

SERIAL MESSAGE ANALYSIS OPTIONS



High Speed Serial Triggers (Oscilloscope Options/Optional Hardware)

- Hardware serial triggers capable of signal speeds up to 3.125 Gb/s, 6.5 Gb/s or 14.1 Gb/s.
- Enable 80-bit serial pattern, 8b/10b or 64b/66b serial triggering (as appropriate for bit rate).
- Include 8b/10b and 64b/66b decoder software.



ProtoSync Software (PROTOSYNC, PROTOSYNC-BT Software Options)

- View decoded data through a Protocol Analyzer-style user interface.
- Completely integrated with oscilloscope serial decoders; configure and launch ProtoSync view right from decoder software.
- BitTracer option shows bit-level decoding in ProtoSync view.
- Works with FiberChannel, PCIe, SAS, SATA, USB and UniPro decoders.

SERIAL MESSAGE ANALYSIS OPTIONS

Serial Message Analysis Options Availability

D = Decode only¹, TD = Trigger & Decode, TDME/TDMP = Trigger, Decode, Measure/Graph & Eye Diagrams (except where noted)

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi-B	LabMaster 10 Zi-A
80-bit NRZ and 8b/10b 3.125 Gb/s Serial Trigger, 8b/10b Decoder			o	o	o		
80-bit NRZ, 8b/10b, 64b/66b 6.5 Gb/s Serial Trigger, 8b/10b & 64b/66b Decoder						o	o
80-bit NRZ, 8b/10b, 64b/66b 14.1 Gb/s Serial Trigger, 8b/10b & 64b/66b Decode						o	o
8b/10b D						o	o
64b/66b D						o	o
ARINC 429 Symbolic D or Symbolic DME (no Trigger)	o	o	o	o	o	o	o
AudioBus (I2S) TD or TDG (no Measure or Eye Diagram, but Graph of audio data)	o	o	o	o	o	o	o ²
CAN TD or TDME, with or without Symbolic Decode	o	o	o	o	o	o	o ²
CAN FD TD or TDME (incl. Standard CAN), with or without Symbolic Decode	o	o	o	o	o	o	o ²
ENET D	o	o	o	o	o	o	o
FibreChannel D			o	o	o	o	o
FlexRay TD or TDMP (incl. additional PHY measurements)	o	o	o	o	o	o	o ²
I2C TD or TDME	o	o	o	o	o	o	o ²
LIN TD or TDME	o	o	o	o	o	o	o ²
Manchester D	o	o	o	o	o	o	o
MDIO D	o	o	o	o	o	o	o
MIL-STD-1553 TD or TDME	o	o	o	o	o	o	o ²
MIPI DigRF 3G D	o	o	o	o	o	o	o
MIPI DigRF V4 D	o	o	o	o	o	o	o
MIPI D-PHY D or DP (no Trigger or Measure/Graph)	o	o	o	o	o	o	o
MIPI M-PHY D or DP (no Trigger or Measure/Graph)			o	o	o	o	o
MIPI UniPro D			o	o	o	o	o
NRZ (packetized NRZ) D	o	o	o	o	o		
PCIe (Gen1, Gen2, Gen3, Gen4) D			o	o	o	o	o
SAS (1.0, 2.0 3.0) D			o	o	o	o	o
SATA (Gen1 and Gen2) TD			o	o	o	o	o
SENT D	o	o	o	o	o	o	o
SpaceWire D	o	o	o	o	o	o	o
SPI TD or TDME	o	o	o	o	o	o	o ¹
SPMI D	o	o	o	o	o	o	o
UART and RS-232 TD or TDME	o	o	o	o	o	o	o ²
USB 2.0 TD or TDME	o	o	o	o	o	o	o ²
USB 2.0 HSIC D	o	o	o	o	o	o	o
USB 3.0 D						o	o
ProtoSync, with or without BitTracer			o	o	o	o	o

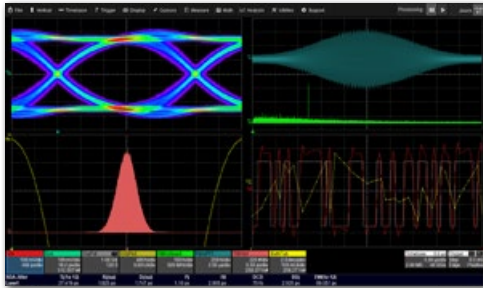
¹ Oscilloscope bandwidth must be \geq serial data bit rate, and sample rate must be \geq four times the bit rate for decoder to function.

² No trigger on LabMaster 10 Zi-A.

SERIAL DATA VALIDATION & DEBUG OPTIONS

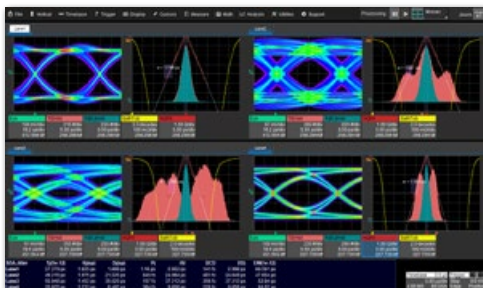
SDA II and SDA III Serial Data Jitter, Noise and Crosstalk Analysis

SDA II and SDA III software options provide fast and complete characterization of serial data systems so you can rapidly isolate the source of problems and understand why serial data fails a compliance test.



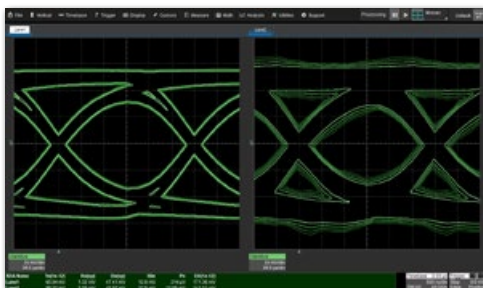
Eye Diagram & Jitter Analysis (SDA II, SDA III Software Options)

- Three dual-Dirac algorithms measure and separate jitter into R_j and D_j , with calculation of T_j . D_j decomposed further.
- Eye diagrams containing all acquired UIs rendered 10-100x faster than competitive systems.
- Eye diagram IsoBER plots, jitter tracks, histograms, bathtub curves and spectrum waveforms.
- Most comprehensive DDj analysis, including ISI behaviors.



Multi-Lane Analysis (SDA III-LINQ, SDA III-COMPLETELINQ Software Options)

- Multi-lane jitter and eye diagram analysis of four data lanes plus a stored Reference lane.
- Each "lane" can be a different serial data stream, or a different analysis of data from a single stream.
- Selectable LaneScape™ Comparison modes to simultaneously compare from two to four lanes.

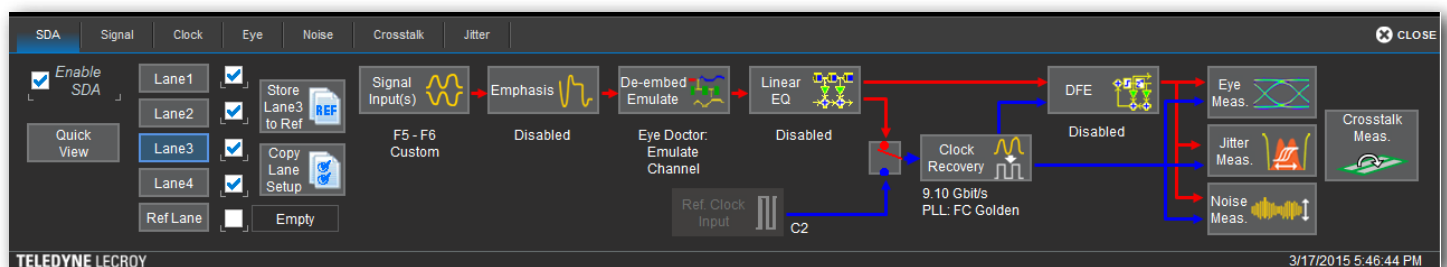


Vertical Noise & CrossTalk Analysis (SDA III-CROSSTALK, SDA III-COMPLETELINQ Software Options)

- Tools for complete aggressor/victim analysis.
- Three dual-Dirac models measure and separate noise into R_n and D_n , with calculation of T_n . D_n decomposed into IS_n and P_n in real-time.
- View noise as track, histogram or spectrum waveform.
- Crosstalk eye shows probabilistic extent of noise inside/outside the eye.
- Single-lane (-CrossTalk) or multi-lane (CrossLinQ) options available.

Eye Doctor II and Virtual Probe Integration (SDA III-COMPLETELINQ Software Option)

The SDA III-CompleteLinQ framework provides easy access to all features described above, plus integrates Eye Doctor II and Virtual Probe capabilities for TX/RX equalization, fixture/channel de-embedding and emulation.

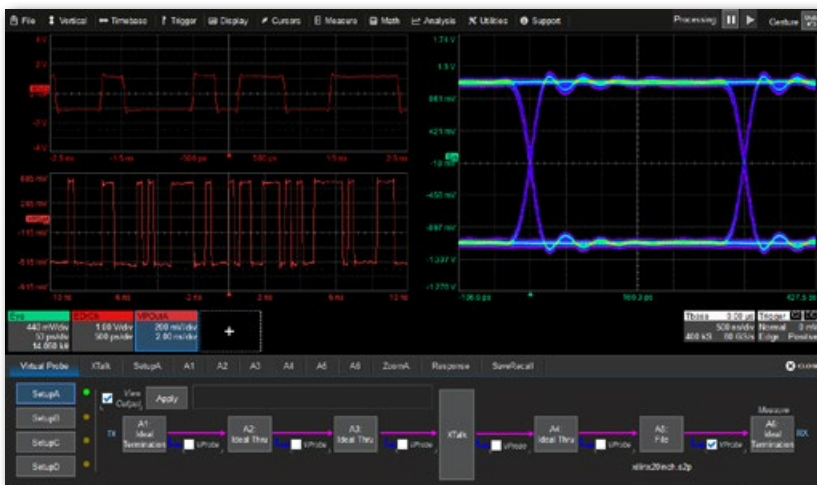


SERIAL DATA VALIDATION & DEBUG OPTIONS



Eye Doctor II (EYEDRII Software Option)

- De-embed the effects of fixtures, backplanes, etc., from simulated channel models.
- Add transmitter emphasis/de-emphasis to view the effects on channel models.
- Emulate the operation of receiver CTLE, DFE, or FFE equalizers on an acquired signal.
- Integrates with Virtual Probe and SDA III.



Virtual Probe (VIRTUALPROBE Software Option)

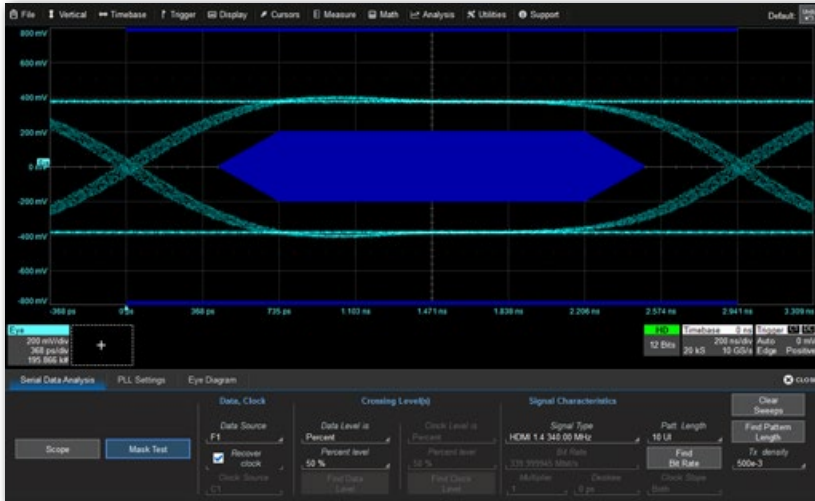
- Configure a multi-block circuit using S-parameters; Virtual Probe displays the signal as it would appear if probed before or after any block.
- Include, add or remove the electrical behavior of a block to reflect and transmit signals; also remove probe loading effects.
- View the eye at the receiver, even if not in reach of a differential probe.
- Use with Eye Doctor II to model CTLE, FFE and DFE equalizers used by your receiver.



Cable De-embedding (CBL-DE-EMBED Software Option)

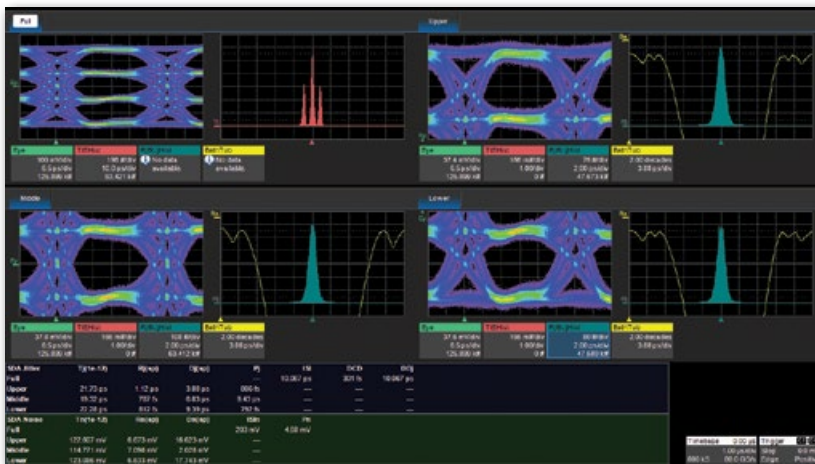
- Remove the effects of propagation delays caused by cable lengths from acquired signals, improving measurement accuracy.
- Specify cable using attenuation constants; build and save table of constants per cable for quick re-loading.

SERIAL DATA VALIDATION & DEBUG OPTIONS



Serial Data Mask Test (SDM Software Option)

- Create and test eye diagrams using a comprehensive list of standard eye pattern masks or a user-defined mask.
- Removes effects of trigger jitter using a configurable software PLL.
- Mask violations are clearly marked on the display for easy analysis.
- Automatic mask alignment and custom mask adjustments.



PAM4 Signal Analysis (PAM4 Software Option)

- PAM4 eye diagramming with Eye Height and Eye Width @BER measurements.
- Separate jitter into R_j and D_j , and noise into R_n and D_n . Calculate T_j and T_n .
- D_j jitter and D_n noise decomposition.
- IsoBER contour plot; jitter and noise tracks, histograms and spectra.
- Integrates with Eye Doctor II for equalization of PAM4 signals.
- Simulate PAM4 waveforms with JitterSim.

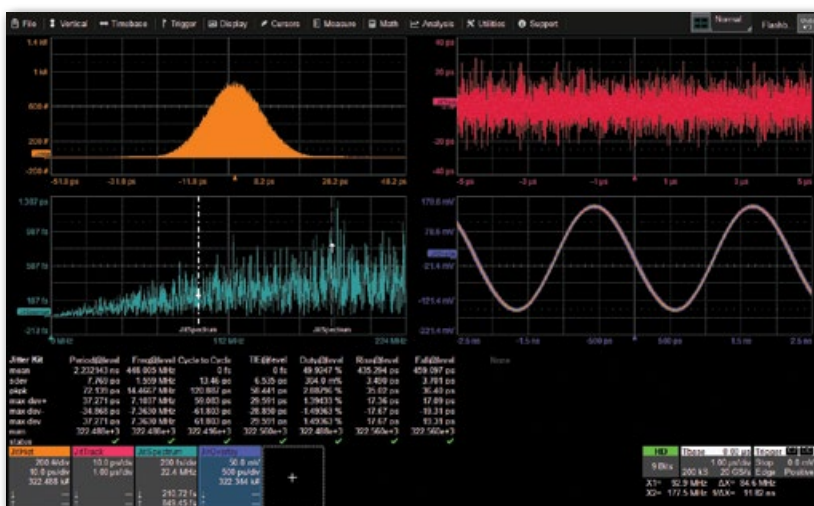
SERIAL DATA VALIDATION & DEBUG OPTIONS

Serial Data Validation & Debug Options Availability

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi-B	LabMaster 10 Zi-A
SDA II Single-lane Serial Data Eye & Jitter Analysis			o	o			
SDA III Single-lane Serial Data Eye & Jitter Analysis					o	o ¹	o ¹
SDA III-LinQ Multi-lane Serial Data Eye & Jitter Analysis						o	o
SDA III-CrossTalk Single-lane Eye, Jitter, Noise & Crosstalk Analysis						o	o
SDA III-CrossLinQ Multi-lane Eye, Jitter, Noise & Crosstalk Analysis						o	o
SDA III-CompleteLinQ Multi-lane Eye, Jitter, Noise & Crosstalk Analysis with Integrated Eye Doctor II and Virtual Probe					o	o	o
Eye Doctor II De-embedding, Emulation and Equalization			o	o	o	o	o
Eye Doctor II and Virtual Probe Bundle					o	o	o
Virtual Probe Advanced De-embedding, Emulation and Virtual Probing					o	o	o
Cable De-embedding			o	o	o	o	o
Serial Data Mask Test	o	o	o	o	o	o	o
PAM4 Signal Eye, Jitter and Noise Analysis					o	o	o

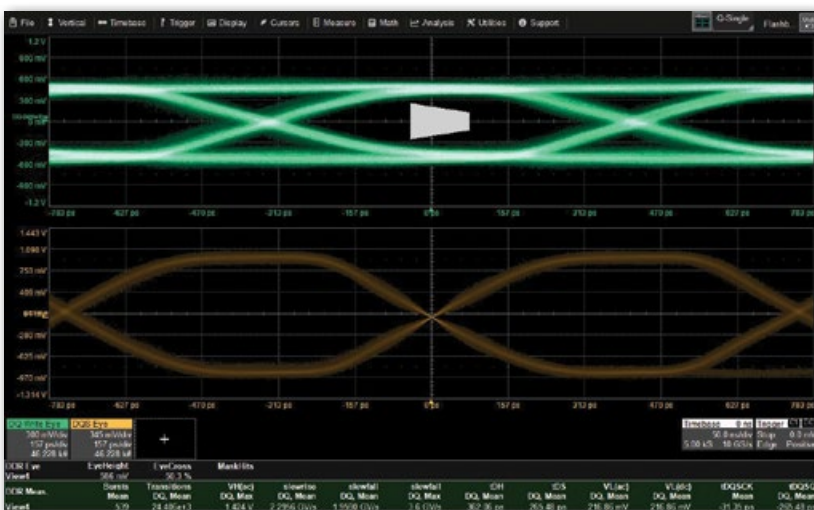
¹ Standard on SDA models.

CLOCK/CLOCK-DATA VALIDATION & DEBUG OPTIONS



Clock/Clock-Data Jitter Analysis Toolkit (JITKIT Software Option)

- Understand the basic system jitter performance of clock signals and clock-data activities.
- Four views of jitter—statistical, time, spectral and overlay.
- Direct display of jitter measurement values—max deviation + or -, worst case, peak-peak and standard deviation.
- Tabular readout of any eight (of more than 25 provided) jitter measurements.



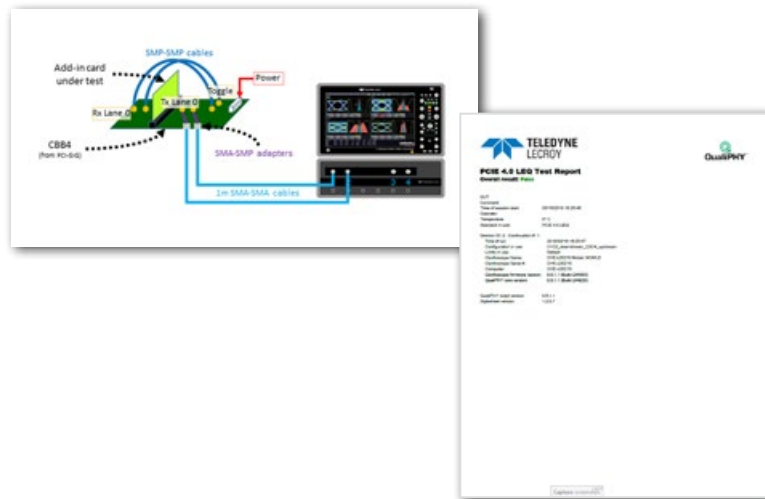
DDR Debug Toolkit (DDR*-TOOLKIT Software Option)

- Perform Read/Write burst separation and display eye diagrams, jitter analysis and measurements specific to DDR.
- Use with HDA125 to directly acquire and integrate the DDR Command Bus into the analysis, enabling advanced command triggering and searchable bus state viewing.
- Support for both standard and custom speed grades of DDR2, LPDDR2, DDR3, DDR3L, LPDDR3 and DDR4.

Clock/Clock-Data Validation & Debug Options Availability

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi-B	LabMaster 10 Zi-A
JITKIT Clock/Clock-Data Jitter Analysis Software	o	o	o	o	o	o	o
DDR2 Debug Toolkit (DDR2 and LPDDR2)			o	o	o	o	o
DDR3 Debug Toolkit (DDR3, DDR3L, LPDDR3, DDR2 and LPDDR2)			o	o	o	o	o
DDR4 Debug Toolkit (DDR4, DDR3, DDR3L, LPDDR3, DDR2 and LPDDR2)						o	o

SERIAL DATA COMPLIANCE TEST OPTIONS



QualiPHY Serial Data Compliance (QPHY-* Software Options)

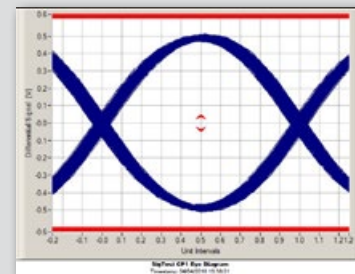
- Automated physical layer compliance testing.
- Generates a comprehensive report of test results, including oscilloscope screen images.
- Demos and diagrams guide you step-by-step through each test, with instructions for connecting all compliance test hardware.
- Compliance test hardware available.
- TX, TX-RX and TX-RX + LEQ capabilities (depending on standard).

BERT Support

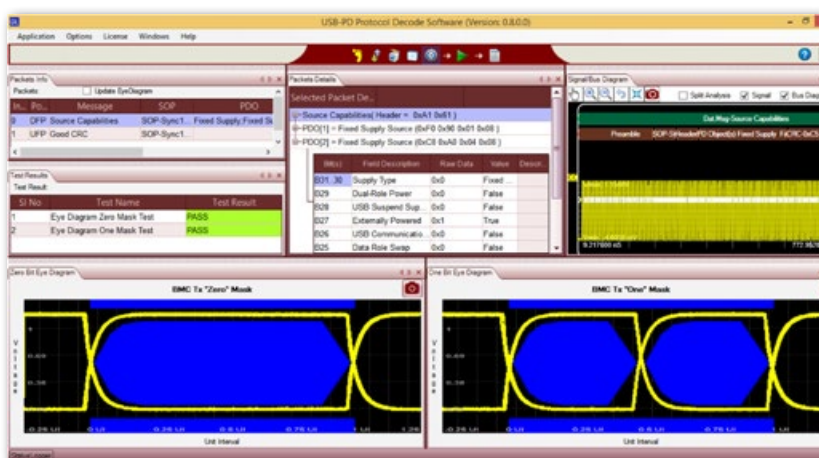


Select a few variables, and QualiPHY automates the connection to PerT3 or Anritsu BERT for Receiver and Link Equalization testing.

3rd-Party Software Integration



QualiPHY automates the interface with SigTest and other 3rd-party software required by standard.



GRL USB Power Delivery Compliance (GRL-USB-PD Software Options)

- Tests BiPhase Mark Codes (BMC), Physical Layer (PHY), Protocol (PROT) and Power Provider/Consumer (POW) Compliance of any USB Power Delivery or Type-C design.
- Supports USB Power Delivery Protocol, Compliance, Decode and Debug, along with Electrical Measurements.
- Validates Alt Modes' Entry/Exits over USB Type-C.

SERIAL DATA COMPLIANCE TEST OPTIONS

Serial Data Compliance Test Options Availability¹

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi-B	LabMaster 10 Zi-A
QualiPHY 10GBASE-KR Compliance Test						o	o
QualiPHY 10GBASE-T Transmitter and Return Loss Compliance Test						o	o
QualiPHY 1000GBASE-T1 Compliance Test						o	o
QualiPHY 56G PAM4 Compliance Test						o	o
QualiPHY BroadR-Reach Compliance Test			o	o	o	o	
QualiPHY DDR2 and LPDDR2 Compliance Test			o	o	o	o	
QualiPHY DDR3, DDR3L, LPDDR3 Compliance Test			o	o	o	o	o
QualiPHY DDR4 Compliance Test						o	o
QualiPHY DisplayPort Compliance Test						o	o
QualiPHY Embedded DisplayPort Compliance Test						o	o
QualiPHY ENET Compliance Test			o	o	o	o	
QualiPHY HDMI 2.0 Compliance Test						o	o
QualiPHY MIPI D-PHY Compliance Test			o	o	o	o	
QualiPHY MIPI M-PHY Compliance Test						o	o
QualiPHY MOST150 Compliance Test			o	o	o	o	
QualiPHY MOST50 Compliance Test			o	o	o	o	
QualiPHY PCIe Gen1 and 2 TX Compliance Test					o	o	o
QualiPHY PCIe Gen1, 2 and 3 Base TX Compliance Test						o	o
QualiPHY PCIe Gen1, 2 and 3 CEM TX, RX, and LEQ Compliance Test						o	o
QualiPHY PCIe Gen1, 2, 3 and 4 CEM TX, RX, and LEQ Compliance Test						o	o
QualiPHY SAS2 (1.5, 3.0 and 6.0 Gb/s) Compliance Test						o	o
QualiPHY SAS3 (1.5, 3.0, 6.0 and 12.0 Gb/s) Compliance Test						o	o
QualiPHY SATA (PHY, TSG, RSG and OOB) Compliance Test						o	o
QualiPHY SFI Compliance Test						o	o
QualiPHY USB Gen1 and 2 TX Compliance Test			o	o	o	o	
QualiPHY USB SuperSpeed (3.0) TX and RX Compliance Test						o	o
QualiPHY USB 3.1 TX and RX Compliance Test						o	o
GRL USB Power Delivery Compliance Test	o	o	o	o	o	o	

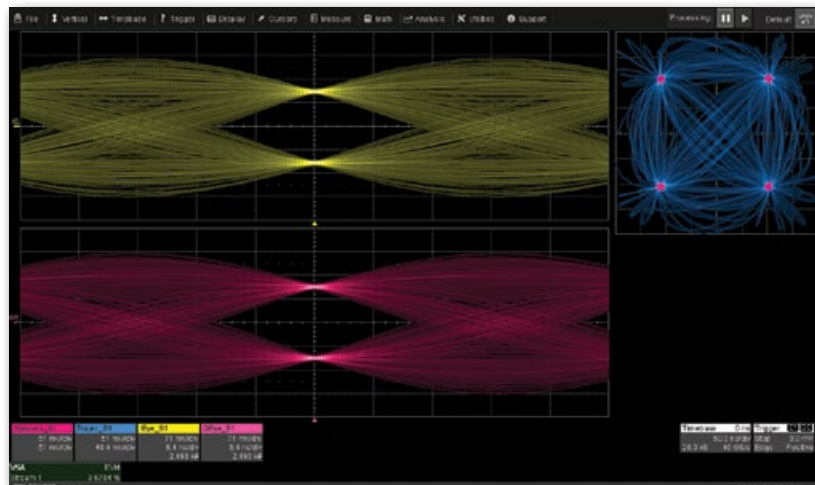
¹ May require other software options or compliance test hardware. Oscilloscope model minimum bandwidth requirements apply. Consult your Teledyne LeCroy sales representative.

MODULATION ANALYSIS OPTIONS



Optical Modulation Analysis (OPTICAL-LINQ Software Option)

- Software tools and DSP algorithms to characterize optical signals; support for QPSK, 16QAM and 64QAM modulation formats.
- Constellations, trajectories, eye diagrams and tracks of I, Q and phase EVM.
- EVM%, I & Q Bias Error, Quad Error, IQ Skew and Offset measurements.
- True BER analysis using common presets or any custom-defined bit sequence/multiplex.
- Use with IQS series or other coherent receiver.



Vector Signal Analysis (VECTORLINQ, VECTORLINQ-ADV Options)

- Demodulation and analysis of eight data streams of RF modulated or direct I-Q inputs.
- Supports PSK, QAM, Circular QAM, ASK, FSK and Custom input signal types.
- Use built-in signal processing blocks or insert custom MATLAB processing blocks anywhere in the chain.
- I-Q constellation plots, eye diagrams, spectral views and comprehensive measurements.
- OFDM visualization and analysis with VectorLinQ Advanced.

Modulation Analysis Options Availability

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi	LabMaster 10 Zi
OpticalLinQ Optical Modulation Analysis Software						o	o
IQS Series Coherent Optical Receiver & Accessories						o	o
VectorLinQ Vector Signal Analysis Software	o	o	o	o	o	o	o
VectorLinQ Advanced Vector Signal Analysis Software						o	o

POWER ANALYSIS OPTIONS



Device and Switch-Mode Power Supply Power Analysis (PWR Software Option)

- Control loop and time domain response analysis.
- Automatically identifies device measurement zones with color-coded overlays.
- Line power and harmonics tests to IEC 61000-3-2. Total harmonic distortion table shows frequency contribution.
- Measurement parameters provide details of single cycle or average device power losses.
- B-H Curve shows magnetic device saturation.



Digital Power Management Analysis (DIG-PWR-MGMT Software Option)

- Provides complete and fast understanding of power rail behaviors, such as ripple, ringing, droop, noise, settling time, etc.
- Translates DC rail behaviors into easy-to-understand device switching cycle measurements and Waveforms.
- Ideally used with the RP4030 Active Voltage/Power Rail Probes.

Power Analysis Options Availability

	HDO6000	HDO8000, MDA800	VBA/HDO9000	WaveRunner 8000	WavePro HD	DDA/SDA/WaveMaster 8 Zi	LabMaster 10 Zi
Device and Switch-Mode Power Supply Power Analysis Software	o	o	o	o	o	o	o
Digital Power Management Analysis Software	o	o	o		o		

POWER ANALYSIS - 3-PHASE ELECTRICAL & MECHANICAL



3-Phase Electrical and Mechanical Power Analysis (MDA800A Motor Drive Analyzers)

- Complete static and dynamic 3-phase electrical and mechanical power analysis, with results in a convenient Numerics table.
- Correlate high-speed control system behaviors with lower-speed power system behaviors.
- Calculate power during conventional power periods or during device switching cycles.
- Most comprehensive motor speed, position and torque sensor interface.
- Zoom+Gate mode permits fast understanding of complex, dynamic events.



Harmonics Option for MDAs (MDA800-HARMONICS Software Option)

- Calculates harmonics on the line-side (fixed frequency) or inverter/drive output (variable frequency) up to a selected harmonic order.
- Displays results in a table with concurrent spectral views.
- Adds THD per-cycle measurement capability to the Numerics table, with per-cycle Waveforms of THD over time.
- Adds "Fundamental + N" and "Range" harmonic filters to the AC Input and Drive Output setups.



The MDA800A Series Motor Drive Analyzers are built on the HDO8000A oscilloscope platform and provide three-phase electrical and mechanical power analysis. More than 10 different speed and angle sensors and torque sensors can be interfaced for mechanical power calculations. The core oscilloscope capabilities can be used for drive embedded control system testing.

ROTATING MEDIA ANALYSIS OPTIONS

Advanced Optical Recording Measurement (AORM Software Option)

- Measurement and 2-dimensional correlation of recording parameters.
- Channel emulation enables real-time signal processing in software.
- Interfaces with CLV, CAV and ZCLV type systems.

Disk Drive Analysis (DDA Software Option)

- Detects drive errors, even while signal is being processed through the channel.
- PRML Channel Emulation, with or without a reference signal.
- Analog Compare and Noise Analysis.

Disk Drive Measurement (DDM2 Software Option)

- Quick and convenient setup of the most common measurements made on a Head Signal.
- Adds Disk Standard, Disk PRML and Local Feature parameters to the oscilloscope measurement set.
- Integrates with DDA software.

Rotating Media Analysis Options Availability

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi	LabMaster 10 Zi
Advanced Optical Recording Measurement Software			o	o	o	o	o
Disk Drive Analysis Software			o	o	o	o	o
Disk Drive Measurement 2 Software			o	o	o	o	o

OSCILLOSCOPE ACCESSORIES



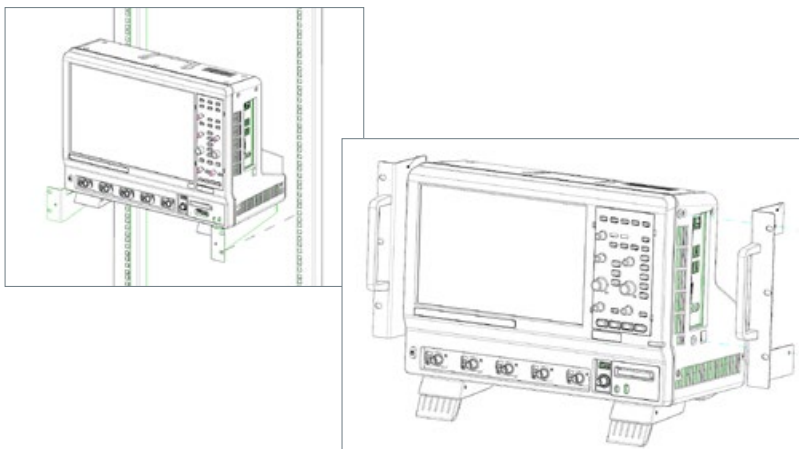
Soft Storage Case (SOFTCASE Accessory)

- Protection with less size/weight than a hard transit case.
- Hard foam-reinforced soft case.
- Thickest foam protective layer.



Soft Carrying Case (CARRYCASE Accessory)

- Carrying bag designed for easy transport of oscilloscope.
- Collapsible—stores easily.
- Thin, soft foam protective layer.



Rackmounts (RACK, RACKMOUNT Accessories)

- Support the oscilloscope for 19" rack installation.
- Uniquely designed for each model.
- Rackmount ears (shown right) attach to sides of oscilloscope to permit direct mounting into rack.
- Rackmount shelf (shown left) supports oscilloscope on shelf that mounts to rack (Note: front cover plate not shown).
- Consult Customer Service for details on which Rackmount is provided for each oscilloscope.

OSCILLOSCOPE ACCESSORIES



Oscilloscope Carts (OC910, OC1021-A, OC1024-A Accessories)

- Support larger/deeper oscilloscopes while allowing full mobility.
- Integrated strap holds oscilloscope to shelf.
- Ideal for modular oscilloscopes, oscilloscopes frequently used with other test equipment or oscilloscopes shared between labs.
- Compatibility of oscilloscope model to cart is based on cart shelf size and ability of strap to fasten around oscilloscope correctly.



Removable Drives (Oscilloscope Options and Accessories)

- Oscilloscopes with standard removable drives (middle) permit removal of the included drive for safekeeping in a secure location. Additional removable drives (RHD-02/RSSD-02, top right) may be ordered for use with the oscilloscope in other locations.
- Some oscilloscopes require a factory-installed upgrade to a removable drive (RSSD option, left). Additional removable drives (RSSD-02) may be ordered after upgrade.
- Each removable drive is supplied complete with Windows and other files necessary to run the oscilloscope.

Oscilloscope Accessories Availability

	HDO6000A	HDO8000A, MDA800A	HDO9000	WaveRunner 8000	WavePro HD	WaveMaster/SDA/DDA 8 Zi	LabMaster 10 Zi
Soft Storage Case	o	o				o	o
Soft Carrying Case			o	o	o		
Rackmounts	o	o	o	o	o	o	o
OC1021-A Oscilloscope Cart		o	o	o		o	
OC1024-A Oscilloscope Cart (with additional shelf and drawer)		o	o	o		o	
OC910 Deluxe Oscilloscope Cart						o	o
Removable Drive Option and/or Additional Removable Drives	o	o	o	o	o	o	o

MAINTENANCE AGREEMENTS

5-Year Annual Traceable Calibration (C5)

- C5 provides Annual NIST Traceable Calibration.
- C5/MIL provides Annual Z540 Traceable Calibration (before and after data included).
- C5/17025 provides Annual ISO17025 Accredited Calibration with Uncertainties (before and after data included).

5-Year Extended Warranty (W5)

- W5 extends total warranty coverage to 5 years (including oscilloscope standard 3-year warranty).

5-Year Extended Warranty with Annual Traceable Calibration (T5)

- T5 extends total warranty coverage to 5 years (including oscilloscope standard 3-year warranty) and also includes an annual NIST Traceable Calibration.
- T5/MIL extends total warranty coverage to 5 years (including oscilloscope standard 3-year warranty) and also includes an annual Z540 Traceable Calibration (before and after data included).

Worry Free (WF)

- WF5 extends total warranty coverage to 5 years (including oscilloscope standard 3-year warranty) and also includes coverage for EOS/ESD events or minor mechanical damage.

Maintenance Agreements Availability

	HDO6000	HDO8000, MDA800	VBA/HDO9000	WaveRunner 8000	WavePro HD	DDA/SDA/WaveMaster 8 Zi	LabMaster 10 Zi
5-Year Annual Traceable Calibration	o	o	o	o	o	o	o
5-Year Extended Warranty	o	o	o	o	o	o	o
5-Year Extended Warranty with Annual Traceable Calibration	o	o	o	o	o	o	o
Worry Free Warranty	o	o	o	o	o	o	o





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