

# Product Line Card





**LabMaster 10 Zi-A**  
(SDA Models)



**LabMaster 9 Zi-A**  
(SDA/DDA Models)



**WaveMaster 8 Zi-B**  
(SDA/DDA 8 Zi-B)

<b>Bandwidth</b>	20 GHz to 100 GHz	13 GHz to 30 GHz	4 GHz to 30 GHz
<b>Resolution</b>	8-bit ADC resolution, 11-bit with enhanced resolution	8-bit ADC resolution, 11-bit with enhanced resolution	8-bit ADC resolution, 11-bit with enhanced resolution
<b>Rise Time</b>	4.5 ps to 19.3 ps	15.5 ps to 32.5 ps	15.5 ps to 95 ps
<b>Channels</b>	Up to 80	Up to 80	4
<b>Display</b>	15.3" WXGA Color Touch Screen	15.3" WXGA Color Touch Screen	15.3" WXGA Color Touch Screen
<b>Standard Memory</b>	20 Mpts/Ch (32 Mpts/Ch)	20 Mpts/Ch (32 Mpts/Ch)	20 Mpts/Ch (32 Mpts)
<b>Maximum Memory<sup>†</sup></b>	Up to 1536 Mpts/Ch	Up to 512 Mpts/Ch	Up to 512 Mpts/Ch
<b>Sample Rate</b>	Up to 240 GS/s	Up to 80 GS/s	Up to 80 GS/s
<b>MSO Characteristics<sup>†</sup></b>	–	3 GHz, 12.5 GS/s, 18 Ch	3 GHz, 12.5 GS/s, 18 Ch
<b>Trigger Types</b>	Edge, Width, Glitch, Pattern, Runt, Slew Rate, Interval (Period), Dropout, Qualified, Cascade (Sequence) Trigger, High-speed Serial Trigger <sup>†</sup>	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Slew Rate, Interval (Period), Dropout, Qualified, Cascade (Sequence) Trigger, High-speed Serial Trigger <sup>†</sup>	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Slew Rate, Interval (Period), Dropout, Qualified, Cascade (Sequence) Trigger, High-speed Serial Trigger <sup>†</sup>
<b>Serial Trigger and Decodet</b>	<i>Decoders only:</i> I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, Audio, ARINC 429, MIL-STD-1553, D-PHY, DigRF 3G, DigRF v4, SENT, ProtoBus Mag Toolkit, USB 1.0/1.1/2.0, USB 2.0-HSIC, Vehicle Bus Analyzer Package, ENET, Manchester, SpaceWire, SPMI, UniPro	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, Audio, ARINC 429, MIL-STD-1553, D-PHY, DigRF 3G, DigRF v4, SENT, ProtoBus Mag Toolkit, USB 1.0/1.1/2.0, USB 2.0-HSIC, Vehicle Bus Analyzer Package, ENET, Manchester, SpaceWire, SPMI, UniPro	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, Audio, ARINC 429, MIL-STD-1553, D-PHY, DigRF 3G, DigRF v4, SENT, ProtoBus Mag Toolkit, USB 1.0/1.1/2.0, USB 2.0-HSIC, Vehicle Bus Analyzer Package, ENET, Manchester, SpaceWire, SPMI, UniPro
<b>Applications Software Options</b>	PAM4, OpticalLinQ, SDAIII-CompleteLinQ Serial Data Package for Eye, Jitter and Noise Analysis, Virtual Probe, EyeDoctor II, USB 3.0, SAS2, SAS3, SATA, PCI Express, HDMI, HDMI2, DisplayPort, eDP, XAUI, FB-DIMM, InfiniBand, Fibre Channel, Ethernet, MIPI M-PHY, MIPI D-PHY, DDR, Spectrum Analyzer, EMC, Optical Recording, Jitter & Timing, Digital Filter, Advanced Customization, Disk Drive Measurement, Cable De-embedding, 80-bit NRZ, 8b/10b and 64b/66b 6.5 Gbps, Serial Data Mask, USB2-HSIC, Ethernet 10G, 10 GBase-T, 10GBaseKR, Multi-lane Serial Data Analysis, MOST150, MOST50, BroadR-Reach, Power Analyzer, VectorLinQ, VectorLinQ Adv	PAM4, OpticalLinQ, SDAIII-CompleteLinQ Serial Data Package for Eye, Jitter and Noise Analysis, Virtual Probe, EyeDoctor II, USB 3.0, SAS2, SAS3, SATA, PCI Express, HDMI, HDMI2, DisplayPort, eDP, XAUI, FB-DIMM, InfiniBand, Fibre Channel, Ethernet, MIPI M-PHY, MIPI D-PHY, DDR, Spectrum Analyzer, EMC, Optical Recording, Jitter & Timing, Digital Filter, Advanced Customization, Disk Drive Measurement, Cable De-embedding, 80-bit NRZ, 8b/10b and 64b/66b 6.5 Gbps, Serial Data Mask, USB2-HSIC, Ethernet 10G, 10 GBase-T, Multi-lane Serial Data Analysis, MOST150, MOST50, BroadR-Reach, Power Analyzer, VectorLinQ, VectorLinQ Adv	PAM4, OpticalLinQ, SDAIII-CompleteLinQ Serial Data Package for Eye, Jitter and Noise Analysis, Virtual Probe, EyeDoctor II, USB 3.0, SAS2, SAS3, SATA, PCI Express, HDMI, HDMI2, DisplayPort, eDP, XAUI, FB-DIMM, InfiniBand, Fibre Channel, Ethernet, MIPI M-PHY, MIPI D-PHY, DDR, Spectrum Analyzer, EMC, Optical Recording, Jitter & Timing, Digital Filter, Advanced Customization, Disk Drive Measurement, Cable De-embedding, 80-bit NRZ, 8b/10b and 64b/66b 6.5 Gbps, Serial Data Mask, USB2-HSIC, USB3.1, Ethernet 10G, 10 GBase-T, 10GBaseKR, Multi-lane Serial Data Analysis, MOST150, MOST50, BroadR-Reach, Power Analyzer, VectorLinQ, VectorLinQ Adv
<b>Connectivity and Storage</b>	USB Host for Storage, LAN for PC, LXI for PC, GPIB for PC <sup>†</sup>	USB Host for Storage, LAN for PC, LXI for PC, GPIB for PC <sup>†</sup>	USB Host for Storage, LAN for PC, LXI for PC, GPIB for PC <sup>†</sup>
<b>Math</b>	+, -, x, /, FFT, Absolute Value, Average, Copy, Correlation, Derivative, Deskew, Envelope, Enhanced Resolution, Exponent, Floor, Histogram, Integral, Invert, Log, Phistogram, Ptrace Mean, Ptrace Range, Ptrace Sigma, Reciprocal, Rescale, Roof, Segment, Sparse, Square, Square Root, Track, Trend, Zoom		
<b>Dimensions (HWD)</b>	MCM-Zi-A: 277 x 462 x 396 mm (10.9" x 18.2" x 15.6") LabMaster 10-xxZi Acq. Module: 202 x 462 x 660 mm (8.0" x 18.2" x 26")	MCM-Zi-A: 277 x 462 x 396 mm (10.9" x 18.2" x 15.6") LabMaster 9xxSZi-A Acq. Module: 177 mm x 462 mm x 527 mm (7" x 18.2" x 20.8")	355 x 467 x 406 mm (14" x 18.4" x 16")
<b>Weight</b>	MCM-Zi-A: 47 lbs. (21.4 kg) LabMaster 10-xxZi Acq. Module - 58 lbs. (24 kg)	MCM-Zi-A: 47 lbs. (21.4 kg) 9xxSZi-A Acq. Module – 37 lbs. (17 kg)	58 lbs. (26.4 kg)
<b>Warranty</b>	3 yr	3 yr	3 yr



	<b>WavePro 7 Zi-A (SDA/DDA 7 Zi-A)</b>	<b>HD09000/ HD09000-MS</b>	<b>HD08000/MDA800</b>	<b>WaveRunner 8000/ WaveRunner 8000-MS</b>
<b>Bandwidth</b>	1.5 GHz to 6 GHz	1 GHz to 4 GHz	350 MHz to 1 GHz	500 MHz to 4 GHz
<b>Resolution</b>	8-bit ADC resolution, 11-bit with enhanced resolution	10-bit resolution; up to 13.8 bits with Optimized Filtering	12-bit ADC resolution, 15-bit with enhanced resolution	8-bit ADC resolution, 11-bit with enhanced resolution
<b>Rise Time</b>	70 ps to 235 ps	415 ps to 100 ps	1 ns to 450 ps	700 ps to 100 ps
<b>Channels</b>	4	4	8	4
<b>Display</b>	15.3" WXGA Color Touch Screen	15.4" WXGA Widescreen Capacitive Touch Screen	12.1" Wide Color TFT-LCD Touch Screen with UHD External Monitor Support	12.1" Color WXGA
<b>Standard Memory</b>	20 Mpts/Ch 32 Mpts Interleaved	64 Mpts/Ch 128 Mpts Interleaved	50 Mpts/Ch	16 Mpts/Ch; M Models: 64 Mpts/Ch 32 Mpts Interleaved; M Models: 128 Mpts
<b>Maximum Memory<sup>†</sup></b>	Up to 256 Mpts/Ch	–	Up to 250 Mpts/Ch	–
<b>Sample Rate</b>	Up to 40 GS/s	Up to 40 GS/s	Up to 250 Mpts/Ch 2.5 GS/s	Up to 20 GS/s; M Models: Up to 40 GS/s
<b>MSO Characteristics<sup>†</sup></b>	500 MHz, 2 GS/s, 18 Ch or 36 Ch	250 MHz, 1.25 GS/s 16 Ch	250 MHz, 1.25 GS/s 16 Ch	250 MHz, 1.25 GS/s, 16 Ch
<b>Trigger Types</b>	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Slew Rate, Interval (Period), Dropout, Qualified, Cascade (Sequence) Trigger, High-speed Serial Trigger <sup>†</sup>	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Timeout, Slew Rate, Interval (Period), Dropout, Qualified, Measurement, Window, Cascade	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Timeout, Slew Rate, Interval (Period), Dropout, Qualified, Measurement, Window	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Timeout, Slew Rate, Interval (Period), Dropout, Qualified, Measurement, Window, Cascade
<b>Serial Trigger and Decode<sup>†</sup></b>	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL- STD-1553, M-PHY, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, 8b/10b, SAS, SATA, Fibre Channel, PCIe, USB 1.0/1.1/2.0, USB 2.0-HSIC, USB 3.0, SpaceWire, SPMI, UniPro	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, M-PHY, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, 8b/10b, SAS, SATA, Fibre Channel, PCIe, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire, SPMI, UniPro	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire, SPMI	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, M-PHY, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, 8b/10b, SAS, SATA, Fibre Channel, PCIe, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire, SPMI, UniPro
<b>Applications Software Options</b>	PAM4, SDAIII-CompleteLinQ Serial Data and Noise Analysis, Virtual Probe, EyeDoctor II, PCI Express, SATA, USB2.0, Ethernet, HDMI, MIPI, DDR, Spectrum Analyzer, EMC, Optical Recording, Jitter & Timing, Digital Filter, Advanced Customization, Disk Drive Measurement, Demodulation, Power Analyzer, Cable De-embedding, USB2-HSIC, Ethernet 10G, Multi-lane Serial Data Analysis, MOST150, MOST50, BroadR-Reach, VectorLinQ, VectorLinQ Adv	SDAII Serial Data Analysis, EyeDoctor II, Ethernet, MIPI D-PHY, DDR, Jitter and Timing Analysis, Digital Filter, Advanced Customization, Disk Drive Measurement, Power Analyzer, Cable De-embedding, Spectrum Analyzer, Optical Recording, Serial Data Mask, EMC Pulse Parameter, Electrical Telecom Mask Test, MOST150, MOST50, BroadR-Reach, USB 2.0	Jitter and Timing Analysis, Digital Filter, Power Analyzer, Motor Drive Power Analyzer Spectrum Analyzer, Serial Data Mask, EMC Pulse Parameter, Advanced Customization  Three-phase Electrical and Mechanical Power Analysis (as part of MDA800 Series Models)	SDAII Serial Data Analysis, EyeDoctor II, Ethernet, MIPI D-PHY, DDR, Jitter and Timing Analysis, Digital Filter, Advanced Customization, Disk Drive Measurement, Power Analyzer, Cable De-embedding, Spectrum Analyzer, Optical Recording, Serial Data Mask, EMC Pulse Parameter, Electrical Telecom Mask Test, MOST150, MOST50, BroadR-Reach, USB 2.0
<b>Connectivity and Storage</b>	USB Host for Storage, LAN port, LXI for PC, GPIB for PC <sup>†</sup>	USB Host for Storage, USB Device for PC, LAN for PC, GPIB for PC <sup>†</sup>	USB Host for Storage, USB Device for PC, LAN for PC, GPIB for PC <sup>†</sup>	USB Host for Storage, USB Device for PC, LAN for PC, GPIB for PC <sup>†</sup>
<b>Math</b>	+, -, x, /, FFT, Absolute Value, Average, Copy, Correlation, Derivative, Deskew, Envelope, Enhanced Resolution, Exponent, Floor, Histogram, Integral, Invert, Log, Phistogram, Ptrace Mean, Ptrace Range, Ptrace Sigma, Reciprocal, Rescale, Roof, Segment, Sparse, Square, Square Root, Track, Trend, Zoom			
<b>Dimensions (HWD)</b>	355 x 467 x 289 mm (14" x 18.4" x 11.4")	358 x 445 x 242 mm (14.1" x 17.5" x 9.5")	374 mm x 417 mm x 280 mm (14.72" x 16.41" x 11")	316 x 417 x 238 mm (12.44" x 16.42" x 9.37")
<b>Weight</b>	40.5 lbs. (18.4 kg)	25.8 lbs. (11.7 kg)	27 lbs (12.27 kg)	22.8 lbs. (10.3 kg)
<b>Warranty</b>	3 yr	3 yr	3 yr	3 yr

<sup>†</sup> Optional



	<b>HDO6000/ HDO6000-MS</b>	<b>HDO4000/ HDO4000-MS</b>	<b>WaveSurfer 10</b>	<b>WaveSurfer MSO MXs-B/ MXs-B</b>
<b>Bandwidth</b>	350 MHz to 1 GHz	200 MHz to 1 GHz	1 GHz	200 MHz to 1 GHz
<b>Resolution</b>	12-bit ADC resolution, 15-bit with enhanced resolution	12-bit ADC resolution, 15-bit with enhanced resolution	8-bit ADC resolution, 11-bit with enhanced resolution	8-bit ADC resolution, 11-bit with enhanced resolution
<b>Rise Time</b>	1 ns to 450 ps	1.75 ns to 450 ps	350 ps	1.75 ns to 350 ps
<b>Channels</b>	4, 4 + 16	2, 4, 2 + 16, 4 + 16	4, 4 + 18	4, 4 + 18
<b>Display</b>	12.1" Color WXGA Touch Screen	12.1" Color WXGA Touch Screen	10.4" Color SVGA Touch Screen	10.4" Color SVGA Touch Screen
<b>Memory</b>	50 Mpts/Ch	12.5 Mpts/Ch 25 Mpts Interleaved	10 Mpts/Ch, 20 Mpts interleaved	16 Mpts/Ch 32 Mpts Interleaved
<b>Maximum Memory<sup>†</sup></b>	Up to 250 Mpts/Ch	Up to 25 Mpts/Ch 50 Mpts Interleaved	10 Mpts / 20 Mpts, 16 Mpts / 32 Mpts with ADT	-
<b>Sample Rate</b>	2.5 GS/s	2.5 GS/s	10 GS/s	2.5 GS/s to 10 GS/s
<b>MSO Characteristics<sup>†</sup></b>	250 MHz, 1.25 GS/s 16 Ch	250 MHz or 500 MHz 16 Ch	250 MHz, 1 GS/s	250 MHz, 1 GS/s
<b>Trigger Types</b>	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Timeout, Slew Rate, Interval (Period), Dropout, Qualified, Measure- ment, Window, Cascade	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Slew Rate, Interval (Period), Dropout, Qualified	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Slew Rate, Interval (Period), Dropout, Qualified	Edge, Width, Glitch, Pattern, Video, HDTV, Runt, Slew Rate, Interval (Period), Dropout, Qualified
<b>Serial Trigger and Decode<sup>†</sup></b>	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire, SPMI	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire, SPMI	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire, SPMI	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay, SENT, Audio, MIL-STD-1553, D-PHY, ARINC 429, DigRF 3G, DigRF v4, ENET, Manchester, NRZ, USB 1.0/1.1/2.0, USB 2.0-HSIC, SpaceWire
<b>Applications Software Options</b>	Jitter and Timing Analysis, Digital Filter, Power Analyzer, Advanced Customization, Spectrum Analyzer, Serial Data Mask, EMC Pulse Parameter, Electrical Telecom Mask Test	Electrical Telecom Mask Test, Spectrum Analysis, Power Analysis	Advanced Debug Toolkit, Spectrum Analysis, Power Analysis	Power Analysis
<b>Connectivity and Stor- age</b>	USB Host for Storage USB Device for PC LAN for PC, GPIB for PC <sup>†</sup>	USB Host for Storage USB Device for PC LAN for PC, GPIB for PC <sup>†</sup>	USB Host for Storage LAN for PC GPIB for PC <sup>†</sup>	USB Host for Storage LAN for PC GPIB for PC <sup>†</sup>
<b>Math</b>	+, -, x, /, FFT, Absolute Value, Average, Copy, Correlation, Derivative, Deskew, Envelope, Enhanced Resolution, Exponent, Floor, Histogram, Integral, Invert, Log, Phistogram, Ptrace Mean, Ptrace Range, Ptrace Sigma, Reciprocal, Rescale, Roof, Segment, Sparse, Square, Square Root, Track, Trend, Zoom	+, -, x, /, FFT, Absolute Value, Average, Derivative, Deskew, Envelope, Enhanced Resolution, Floor, Integral, Invert, Reciprocal, Rescale, Roof, Square, Square Root, Trend, Zoom	+, -, x, /, FFT, Derivative, Deskew, Integral, Rescale, Roof, Square, Square Root, Zoom (Absolute Value, Average, Envelope, Enhanced Resolution, Exp (base e), Exp (base 10) Floor, Invert, Log (base e), Log (base 10), Reciprocal, Roof and Trend included with ADT)	+, -, x, /, FFT, Absolute Value, Average, Derivative, Deskew, Envelope, Enhanced Resolution, Floor, Integral, Invert, Reciprocal, Rescale, Roof, Square, Square Root, Zoom
<b>Dimensions (HWD)</b>	291.7 x 399.4 x 131.31 mm (11.48" x 15.72" x 5.17")	291.7 x 399.4 x 131.31 mm (11.48" x 15.72" x 5.17")	260 x 340 x 152 mm (10.25" x 13.4" x 6")	260 x 340 x 152 mm (10.25" x 13.4" x 6")
<b>Weight</b>	12.6 lbs (5.71 kg)	5.71 kg (12.6 lbs)	7.26 kg (16.0 lbs)	7.26 kg (16.0 lbs)
<b>Warranty</b>	3 yr	3 yr	3 yr	3 yr



	<b>WaveSurfer 3000</b>	<b>WaveJet Touch</b>	<b>WaveAce 2000</b>	<b>WaveAce 1000</b>
<b>Bandwidth</b>	200 MHz to 750 MHz	350 MHz / 500 MHz	70 MHz to 300 MHz	40 MHz to 100 MHz
<b>Resolution</b>	8-bit ADC resolution, 11-bit with enhanced resolution (math)	8-bit ADC resolution, 12-bit with enhanced resolution	8-bit ADC resolution	8-bit ADC resolution
<b>Rise Time</b>	1.75 ns to 550 ps	1 ns / 750 ps	5.0 ns to 1.2 ns	8.8 ns to 3.5 ns
<b>Channels</b>	2, 4, 2 + 16, 4 + 16	4	2, 4	2
<b>Display</b>	10.1" Color WSVGA Touch Screen	7.5" Color VGA Touch Screen	7" Color WQVGA	7" Color WQVGA
<b>Memory</b>	10 Mpts/Ch	2.5 Mpts/Ch 5 Mpts interleaved	12 kpts/Ch 24 kpts Interleaved	1 Mpts/Ch 2 Mpts Interleaved
<b>Maximum Memory</b>	–	–	–	–
<b>Sample Rate</b>	2 GS/s to 4 GS/s	up to 2 GS/s	1 GS/s to 2 GS/s	500 MS/s to 1 GS/s
<b>MSO Characteristics†</b>	125 MHz, 500 MS/s	–	–	–
<b>Trigger Types</b>	Edge, Width, Pattern, TV, Runt, Slew Rate, Interval (Period), Dropout, Qualified	Edge, Edge ALT, Edge OR, Pulse Width, Period, Pulse Count, Dropout, TV, Logic	Edge, Width, Video, Slope, Alternate	Edge, Width, Video, Slope, Alternate
<b>Serial Trigger and Decode†</b>	I <sup>2</sup> C, SPI, UART, RS-232, CAN, CAN FD, LIN, FlexRay	I <sup>2</sup> C, SPI, UART, RS-232 (All standard)	–	–
<b>Additional Software Options</b>	Function Generator	–	–	–
<b>Connectivity and Stor- age</b>	USB Host for Storage USB Device for PC LAN for PC, GPIB for PC†	USB Host for Storage USB Device for PC LAN for PC, GPIB for PC	USB Host for Storage USB Device for PC LAN for PC	USB Host for Storage USB Device for PC
<b>Math</b>	+, -, x, /, FFT, Absolute Value, Average, Derivative, Envelope, Floor, Integral, Invert, Reciprocal, Rescale, Roof, SinX/x, Square, Square Root, Trend, Zoom	+, -, x, FFT, Integral, Derivative	+, -, x, /, FFT	+, -, x, /, FFT
<b>Dimensions (HWD)</b>	270 x 380 x 125 mm (10.63" x 14.96" x 4.92")	190 x 330 x 124 mm (7.5" x 13" x 4.9")	163 x 360 x 124.1 mm (6.42" x 14.17" x 4.89")	163 x 313 x 115.8 mm (6.42" x 12.32" x 4.6")
<b>Weight</b>	4.81 kg (10.6 lbs)	3.7 kg (8.16 lbs)	3.33 kg (7.40 lbs)	2.78 kg (6.10 lbs)
<b>Warranty</b>	3 yr	3 yr	3 yr	3 yr

†Optional



## MDA800 Motor Drive Analyzer



### Complete Drive System Analysis

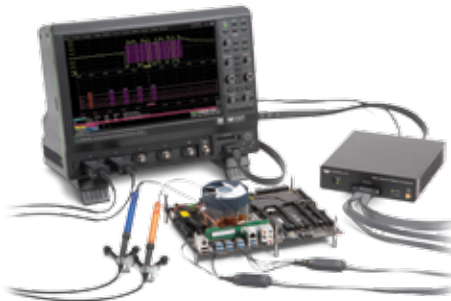
Motor Drive Analyzers provide complete three-phase power analysis from motor drive input through motor mechanical output, with results in a convenient Numeric table format. Motor speed, position, and torque integration are the most complete available. Long memory, per-cycle "synthesized" Waveforms and Zoom+Gate mode provide powerful dynamic drive and motor analysis. 8 analog input channels (MSO optional) with high resolution (12-bits), sample rate (up to 2.5 GS/s), bandwidth (up to 1 GHz) and memory (up to 250 Mpt/ch) provide unique capability to perform complete system debug on the motor drive power section, motor mechanical performance, and embedded drive control system operation.

#### Key Features:

- n Oscilloscope + Power Analyzer in one instrument
- n Complete motor drive system debug
- n Numerics measurement results table
- n Dynamic drive response analysis
- n Most complete motor mechanical integration
- n Intuitive, graphical user interface
- n HD4096 High Definition Technology
- n Harmonics Calculation option

[teledynelecroy.com/motor-drive-analyzer](http://teledynelecroy.com/motor-drive-analyzer) | [teledynelecroy.com/static-dynamic-complete](http://teledynelecroy.com/static-dynamic-complete)

## HDA125 High-speed Digital Analyzer



### The Most Flexible Mixed-Signal Test Solution

The HDA125 transforms your Teledyne LeCroy oscilloscope into the highest-performance, most flexible mixed-signal solution for high-speed digital debug and evaluation. With 12.5 GS/s digital sampling rate on 18 input channels, and the revolutionary QuickLink probing solution allowing seamless transitions from digital to high-bandwidth analog acquisitions, validation of challenging interfaces such as DDR4 has never been simpler or more comprehensive.

#### Key Features:

- n 12.5 GS/s sampling rate for 80ps timing accuracy
- n 3 GHz leadset for capturing digital signals up to 6 Gb/s
- n Add high-speed mixed-signal capability to your Teledyne LeCroy high-bandwidth oscilloscope
- n LBUS connection for precise timing synchronization
- n USB 3.1 for fast data transfer
- n Unique QuickLink probing system
- n Differential solder-in tips with 9-inch lead simplify access to difficult test points
- n Ultra low loading for superior performance
- n 8 GHz bandwidth tips are compatible with both HDA digital leadset and Teledyne LeCroy WaveLink differential analog probes for unmatched acquisition flexibility

## PeRT<sup>3</sup> Test System



### Protocol-enabled Receiver and Transmitter Tolerance Tester

The PeRT<sup>3</sup> (Protocol-enabled Receiver and Transmitter Tolerance Tester) fills the space between physical layer test and protocol test, providing a new and more intelligent capability for performance testing of receivers and transmitters. Designed to meet the test needs of engineers working with serial data transceivers and other high-speed serial data communication systems, the Teledyne LeCroy PeRT<sup>3</sup> Test System is not just a new instrument, it is an entirely new instrument class.

[teledynelecroy.com/pert3](http://teledynelecroy.com/pert3)

# TEST & MEASUREMENT INSTRUMENTS

## Optical Modulation Analyzer



### The Most Powerful, Flexible Optical Toolset

Teledyne LeCroy's IQS42 and IQS70 Coherent Optical Receivers integrate seamlessly with Teledyne LeCroy's LabMaster 10Zi-A series of real-time oscilloscopes to provide up to 65 GHz system bandwidth for optical modulation analysis of dual-polarized signals up to 130 GBaud. The Optical-LinQ optical modulation analysis software package provides real-time calibration and control of the Coherent Optical Receiver, and a wide variety of analytical views and parameters.

Key Features:

- n Up to 65 GHz system bandwidth
- n Up to 130 GBaud detectable baud rate
- n Up to 160 GS/s sample rate
- n Real-time acquisition for testing of coherent modulated optical communications links
- n Built-in dispersion compensation, polarization de-multiplexing, and carrier recovery algorithms
- n Supports DP-QPSK, DP-16QAM, and a wide variety of other PSK and QAM formats
- n Support for custom modulation formats
- n Built-in local oscillator
- n Adaptive calibration – Receiver can be disconnected and reconnected without factory calibration

[teledynelecroy.com/optical](http://teledynelecroy.com/optical)

## WaveStation Waveform Generators



### Powerful Combination of Performance and Flexibility

With 5 basic signal types, and over 40 built-in arbitrary waveforms the WaveStation is a versatile waveform generator. A variety of modulation schemes, intuitive waveform editing software and remote control capabilities, enable versatile waveform generation of waveforms up to 160 MHz. The large color display and simple user interface make it easy to generate a wide range of waveforms.

[teledynelecroy.com/wavestation](http://teledynelecroy.com/wavestation)

## Logic Analyzer



### 16 Channels, 1 GS/s, 100 MHz Input plus I<sup>2</sup>C, SPI and UART Analysis

LogicStudio 16 provides 16 channels with a high sample rate of 1 GS/s and maximum input of up to 100 MHz. The software provides a lively, dynamic waveform display with a smart, intuitive user-interface that is easily navigated by a few basic mouse clicks. LogicStudio provides a lot of tools for digital debug including timing cursors, unique zooming and panning of waveforms, a persistence display and a history mode which can replay old data captures. Additionally, protocol analysis for I<sup>2</sup>C, SPI and UART is included to decode waveforms as they are captured and provide the ability to trigger on specific address or data packets on the bus.

Try it Free—Download software here  
[teledynelecroy.com/logicstudio](http://teledynelecroy.com/logicstudio)

## Arbitrary Waveform Generators



### High Resolution Generators for Analog and Digital Waveform Generation

A waveform generator must provide flexibility to cover a wide range of applications, high-performance to meet demanding signal requirements and be easy to use. ArbStudio Arbitrary Waveform Generators meet the needs of today's engineers and technicians with uncompromised performance, a wide variety of signal types, modulation schemes and generation modes all controlled through an intuitive, easy to use software interface.

[teledynelecroy.com/arbstudio](http://teledynelecroy.com/arbstudio)

The right probe is an essential tool for accurate signal capture and Teledyne LeCroy offers an extensive range of probes to meet virtually every probing need.

## WaveLink Differential Probes (4 GHz – 25 GHz)

D610-A/D620-A, D410-A/D420-A, D600A-AT, D400A-AT, D610-A-PS, D620-A-PS, D410-A-PS, D420-A-PS D830, D830-PS, D1030, D1030-PS, D1330, D1330-PS, D1305-A, D1305-A-PS, D1605-A, D1605-A-PS, D2005-A, D2005-A-PS, D2505-A, D2505-A-PS



Differential active probes are like two probes in one. Instead of measuring a test point in relation to a ground point (like single-ended active probes), differential probes measure the difference in voltage of a test point in relation to another test point. Dx10-A/Dx20-A/Dx00A-AT 4-6 GHz differential probes are a general purpose probing solution with high input dynamic range and offset. Dxx30 8-13 GHz differential probes are a medium bandwidth, general purpose probing solution with high input dynamic range and offset. Dxx05-A 13-25 GHz differential probes are the highest bandwidth with high performance, large dynamic and offset range, and very low noise.

## Differential Probes ( $\leq 1.5$ GHz)

ZD1500, ZD1000, ZD500, ZD200



High bandwidth, excellent common-mode rejection ratio (CMRR) and low noise make these active differential probes ideal for applications such as automotive development (e.g. FlexRay) and failure analysis, as well as wireless and data communication design. The ProBus interface allows sensitivity, offset and common-mode range to be displayed on the oscilloscope screen.

## Active Voltage Rail Probe

RP4030



The RP4030 is designed specifically to probe a 50Ω DC power/voltage rail. The probe has large built-in offset, low attenuation (noise), and high DC input impedance. Built-in offset and low attenuation permit the power/voltage rail to be offset in the oscilloscope by its mean DC voltage with high oscilloscope gain (sensitivity) to achieve a noise-free view of small signal variations. The high DC input impedance eliminates loading of the DC rail.

## ZS Series High Impedance Active Probes

ZS4000, ZS2500, ZS1500, ZS1000



The ZS Series probes provide high impedance and an extensive set of probe tips and ground accessories to handle a wide range of probing scenarios. The high 1 MΩ input resistance and low 0.9 pF input capacitance mean this probe is ideal for all frequencies. The ZS Series probes provide full system bandwidth for all Teledyne LeCroy oscilloscopes having bandwidths of 4 GHz and lower.

## High Voltage Fiber Optically-isolated Probes

HVFO103



The HVFO is an affordable, optimally designed probe for measurement of small signals floating on an HV bus in power electronics designs or for EMC, EFT, ESD, and RF immunity testing sensor monitoring. It far surpasses the measurement capabilities and signal fidelity of both conventional HV differential probes and acquisition systems that rely on galvanic high voltage isolation. Furthermore, it mitigates the need to rely on dangerous test setups that require floating the oscilloscope and probe.

## High Voltage Differential Probes

HVD3102, HVD3106-6M, HVD3106, HVD3206, HVD3206-6M, HVD3605, AP031



HVD Series high voltage differential probes permit measurements on power electronics circuits with floating voltages without reference to the ground, allowing the oscilloscope to be safely grounded. Excellent CMRR is provided at high frequencies and is combined with low inherent noise, high offset voltage capabilities, and high DC gain accuracy to make them an ideal choice for probing high voltage and floating control signals in single and three-phase power electronics designs.

## Current Probes

AP015, CP030, CP030A, CP030-3M, CP031, CP031A, CP150, CP150-6M, CP500, DCS015



Teledyne LeCroy current probes are available in a variety of models for a wide range of applications. The full range of Teledyne LeCroy current probes includes models with bandwidths up to 100 MHz, peak currents up to 700 A and sensitivities to 1 mA/div. Teledyne LeCroy current probes are often used in applications such as the design and test of switching power supplies, motor drives, electric vehicles, and uninterruptible power supplies.

## High Voltage Passive Probes

HVP120, PPE4KV, PPE5KV, PPE6KV



High voltage probes are suitable for a wide range of applications where high-voltage measurements must be made safely and accurately. There are several fixed-attenuation probes covering a range from 1 kV to 6 kV and varying transient overvoltage ratings. All of these high voltage probes feature a spring loaded probe tip and a variety of standard accessories to make probing high voltages safe and easy. Additionally, all of the high voltage probe have a probe sense pin to automatically configure the oscilloscope for use with the probe.

## Passive Probes

PP006C, PP016, PP019, PP020, PP021, PP022, PP023, PP024, PP025, PP026



Passive probes are the standard probe provided with most oscilloscopes. Typical passive probes provide a /10 attenuation and feature a high input resistance of 10 MΩ. This high input resistance means that passive probes are the ideal tool for low frequency signals since circuit loading at these frequencies is minimized. Passive probes are designed to handle voltages of at least 400 V, some as high as 600 V. Teledyne LeCroy passive probes feature an attenuation sense pin which tells the oscilloscope to scale the waveforms automatically requiring no user input.

## High Performance Differential Amplifier

DA1855A, DA1855-PR2



The DA1855A is a stand-alone, high-performance differential amplifier providing the fastest overdrive recovery of any commercially available product. This unique capability allows the amplifier to make measurements that would normally be limited by oscilloscope overdrive recovery.



## PCI Express®



### Summit™ Z416 Protocol Exerciser

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓ 16 GT/s ✓

The Summit Z416 is Teledyne LeCroy's fifth generation protocol exerciser, with support for PCI Express at the Gen4 data rates of up to 16 GT/s. The Summit Z4-16 supports protocol generation and protocol analysis in one tool providing a complete test and development system for engineers working on PCI Express 4.0 designs.



### Summit T416 Analyzer

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓ 16 GT/s ✓

The Summit T416 is Teledyne LeCroy's highest performance PCI Express analyzer, and offers advanced features such as: support for PCI Express Spec 4.0; data rates of 2.5 GT/s, 5.0 GT/s, 8.0 GT/s, and 16.0 GT/s; full data capture on bidirectional link widths of x1, x2, x4, x8 and x16; and up to 128GB of trace memory. The product is ideal for high-performance protocol development for add-in boards, servers and workstations, and for customers currently working on PCIe 3.0 or who wish to support PCIe 4.0.



### Summit Z3-16 Exerciser

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓

The Summit Z3-16 is Teledyne LeCroy's fourth generation protocol exerciser, with support for PCI Express at the Gen3 data rates of up to 8 GT/s. The Summit T3-16 Analyzer and Summit Z3-16 Exerciser provide a complete test and development system for engineers working on PCI Express 3.0 designs. It is approved by the PCI-SIG as a protocol verification tool for PCIe 3.0.



### Summit T3-8 Analyzer

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓

The Summit T3-8 supports PCI Express 3.0 in a smaller package designed for lane widths up to x8. Features include data rates of 2.5 GT/s, 5 GT/s and 8 GT/s; full data capture on bidirectional lane widths of x1, x2, x4 and x8 (x16 is available using two units); and 4 GB of trace memory. The system offers performance monitoring, LTSSM, equalization decodes and much more.



### Summit T34 Analyzer

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓

The Summit T34 provides a low-cost and extremely portable analyzer that fully supports PCI Express 3.0 protocol analysis. The Summit T34 can capture up to 4 lanes of traffic and is configurable up to 32 GB trace depth with a single unit. Larger trace depths can be achieved by cascading a second unit, providing up to 64 GB of trace memory.



### Summit T28 Analyzer

2.5 GT/s ✓ 5 GT/s ✓

The Summit T28 supports PCI Express 2.0 designs in a compact and economical package. Features include data rates of 2.5 GT/s and 5 GT/s; full data capture on bidirectional lane widths of x1, x2, x4 and x8; and 4 GB of trace memory. The system offers performance monitoring, LTSSM, equalization decodes and much more.



### Summit T24 Analyzer

2.5 GT/s ✓ 5 GT/s ✓

With advanced features such as support for PCI Express Spec 2.0, data rates of both 2.5 and 5 GT/s, lane widths from x1 to x4, and a full 2 GB of trace memory, the Summit T24 provides unmatched capability and flexibility for developers and users of advanced PCI Express products. The Summit T24 is the most cost effective PCI Express Analyzer available in the market today.



### PCIe Gen2 Protocol Test Card

2.5 GT/s ✓ 5 GT/s ✓

The Teledyne LeCroy Protocol Test Card (PTC) is a multimodal test board used for checking adherence to the protocol-oriented sections of the PCI Express 2.0 specification. The Teledyne LeCroy Protocol Test Card has been selected by the PCI-SIG as the official compliance test tool for PCI Express 2.0 at PCI-SIG Workshops.



### ProtoSync® PE Oscilloscope Decode

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓

Provided as an option to Teledyne LeCroy's WaveMaster and WavePro Series of oscilloscopes, ProtoSync PE goes beyond simple decode annotation and provides the intuitive CATC Trace and BitTracer views of the captured waveform, with a time and zoom correlation of physical layer signals, protocol packets, and logic analyzer byte views on a single instrument.



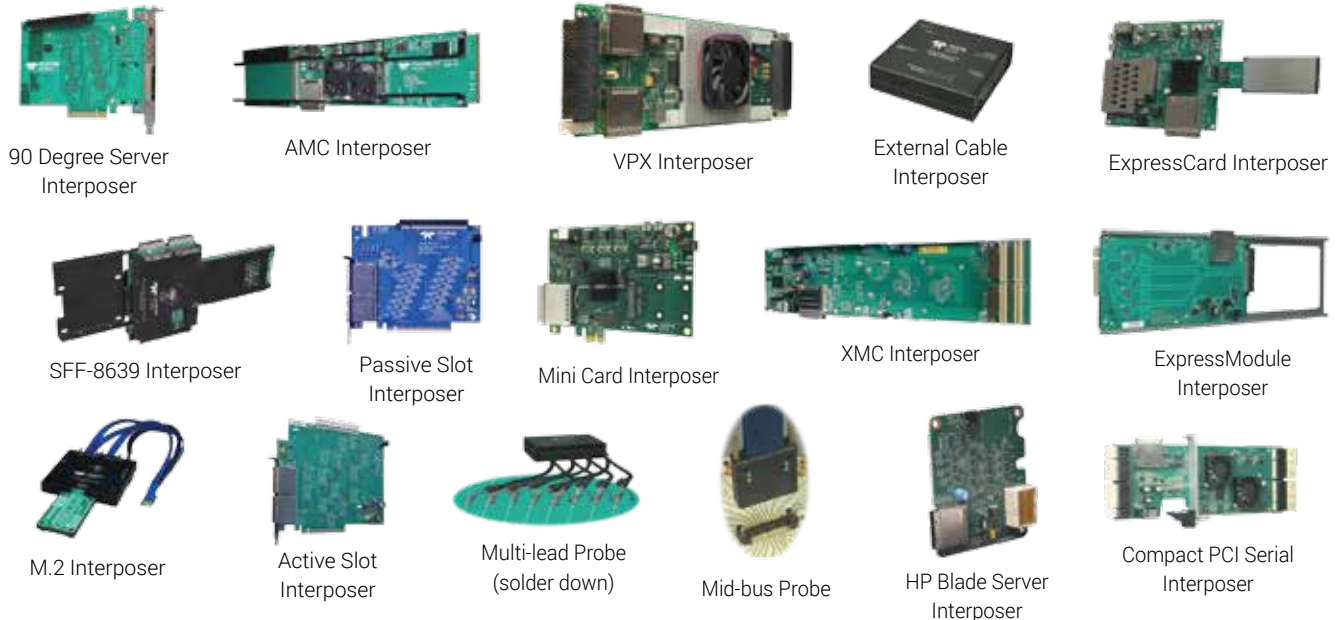
### SimPASS™ PE Simulation Analysis

2.5 GT/s ✓ 5 GT/s ✓ 8 GT/s ✓

Teledyne LeCroy's new SimPASS PE software application brings all the analytical and decoding power of a protocol analyzer to the pre-silicon stage of simulation design verification. Decode, troubleshoot and debug your simulation code before taking the expensive step of committing the design to silicon.

## Interposers and Probes for PCI Express

Teledyne LeCroy offers the industry's widest range of PCI Express interposers and probes, including a wide variety of specialty probes designed to make it simple and easy to probe sophisticated high-speed serial designs.



## Serial Attached SCSI (SAS) and Serial ATA (SATA)



### Sierra™ T244 Protocol Verification System

**1.5G ✓ 3G ✓ 6G ✓ 12G ✓ 24G ✓**

The Sierra T244 is the flagship SAS 4.0 protocol analyzer platform designed to non-intrusively capture up to four 24 Gb/s SAS logical links providing unmatched analysis and debug capabilities for developers working on next generation storage systems. With best-in-class features including T.A.P.4™ probing, 128GB recording memory, and Super-Speed 3.0 data upload ports, the Sierra T244 system provides countless innovations in data analysis to help reduce time-to-market for storage developers.



### Sierra M124A Protocol Verification System

**1.5G ✓ 3G ✓ 6G ✓ 12G ✓**

The Sierra M124 is the next generation platform in the industry-leading Sierra family of SAS and SATA protocol test systems from Teledyne LeCroy. As the first SAS 3.0 protocol test platform to implement linear probing technology and a non-retimed pass-through signal, the Sierra M124 provides transparent simultaneous protocol analysis of up to four 12 Gb/s SAS ports.



### Sierra M122A Protocol Verification System

**1.5G ✓ 3G ✓ 6G ✓ 12G ✓**

The Sierra M122 is the two-port version of the industry-leading Sierra M124 SAS and SATA protocol test system. Featuring Teledyne LeCroy most advanced linear probing technology, the Sierra M122 provides unmatched accuracy while simultaneously analyzing up to two 12 Gb/s SAS ports.



### Sierra M6-2 Protocol Verification System

**1.5G ✓ 3G ✓ 6G ✓**

The Sierra™ M6-2 system provides an economical alternative to the industry-leading Sierra M6-4 for customers that require only 1 or 2 SAS/SATA ports. While providing all of the traffic generation, emulation, error injection, and compliance test capabilities of the M6-4 the Sierra M6-2 delivers this in a more compact package with significant cost savings.



### Sierra M6-1 Analyzer Systems

**1.5G ✓ 3G ✓ 6G ✓**

The Sierra M6-1 Analyzer models are ultra-portable single port systems capable of operating at 1.5, 3 or 6 Gb/s SAS or SATA data rates, and equipped with 2 or 4 GB of memory. Sierra M6-1 analyzers are software compatible with the Teledyne LeCroy SAS/SATA Protocol Suite, and offer world class analysis or error injection at price points within reach of every budget.



### Sierra M6-1 InFusion Systems

**1.5G ✓ 3G ✓ 6G ✓**

The Sierra M6-1 InFusion model performs as a stand-alone 1.5, 3, 6 Gb/s error injector, allowing engineers to modify traffic in order to verify real-world fault handling. The Sierra M6-1 InFusion is software compatible with the Teledyne LeCroy SAS/SATA Protocol Suite and is the ideal tool for stress testing systems while running real traffic and actual workloads.

## Fibre Channel Over Ethernet (FCoE)



### SierraNet™ M408

10G ✓ 40G ✓

The Teledyne LeCroy SierraNet M408 is the most advanced integrated 10G & 40G Ethernet protocol analyzer system available. Based on Teledyne LeCroy's next generation platform, the SierraNet M408 provides 100% recording of all Ethernet traffic at full line rates on all ports, while maintaining the link integrity through custom-designed pass-through probe technology.



### SierraNet™ M168

10G ✓

The SierraNet M168 is an 8-port multi-function protocol analyzer and error injector supporting up to 10G Ethernet and up to 16G Fibre Channel protocols in a single platform. The SierraNet M168 provides up to 32 GB of trace memory, eight SFP+ FlexPorts (cascadable up to 64 SFP+ FlexPorts with additional M168 systems), external trigger IN/OUT, and a host of additional features in a lightweight, 1U-sized enclosure.



### SierraNet™ T328

25G ✓ 50G ✓ 100G ✓

The SierraNet T328 system provides 25/50/100Gbps Ethernet and Gen 6 (32/128G) Fibre Channel data capture and protocol verification for developers & protocol test engineers in LAN, SAN, NAS and other Ethernet and Fibre Channel applications. Available with eight SFP28 FlexPorts™ for maximum configuration and utility, the SierraNet T328 offers world-class protocol analysis capabilities with an easy to use, customizable hardware & software interface, large capture buffers, and the most advanced T.A.P3 capture, triggering and filtering capabilities in the industry.

## Fibre Channel (FC)



### SierraFC™ M164 Protocol Analysis System

1G ✓ 2G ✓ 4G ✓ 8G ✓ 16G ✓

The SierraFC M164 provides up to 16 Gb/s Fibre Channel data capture and protocol analysis for developers in storage systems, storage networking, and avionics applications. The SierraFC M164 supports 4 recording channels with 16 GB of trace memory.

## Universal Serial Bus (USB)



### Voyager™ M310C Protocol Verification System

1.5M ✓ 12M ✓ 480M ✓ 5G ✓

The Voyager M310C is Teledyne LeCroy's USB protocol verification system designed for the latest evolution of universal serial bus, USB 3.1, USB Type-C and Power Delivery 3.0. Leveraging Teledyne LeCroy's extensive expertise in high-speed serial data analysis, the Voyager M310C provides traffic generation and recording of USB 3.1, 3.0 and 2.0 at data rates up to 10 Gb/s.



### Voyager™ M3x Protocol Verification System

1.5M ✓ 12M ✓ 480M ✓ 5G ✓

The Voyager M3x is Teledyne LeCroy's 7th generation USB protocol verification system designed for the next evolution of universal serial bus known as SuperSpeed USB. Leveraging Teledyne LeCroy's extensive expertise in high-speed serial data analysis, the Voyager provides traffic generation and recording of both USB 2.0 and 3.0 at data rates up to 5 Gb/s.



### USB Advisor™ T3 Analyzer

1.5M ✓ 12M ✓ 480M ✓ 5G ✓ 10G ✓

The USB Advisor T3 protocol analyzer is an inexpensive, small form-factor, but full featured analysis system for those testing USB 3.0 and USB 2.0 devices. It captures, displays, and analyzes bus traffic using the CATC Trace™ display software. It automatically highlights protocol errors while displaying a chronological list of packets with full decoding of USB device classes.



### Mercury™ T2C/Mercury T2

1.5M ✓ 12M ✓ 480M ✓

The Mercury T2C is the industry's first portable hardware-based USB protocol analyzer that supports the USB Type-C and Power Delivery 3.0 standards, including capture and decoding of all packets over the new USB Type-C Configuration Channel (CC). The Mercury T2C analyzer includes adapters allowing users to utilize the Mercury T2C with their existing devices and hosts, creating an analyzer which is both backward-compatible and future-safe. The Mercury T2 is the industry's smallest, most affordable hardware-based USB 2.0 protocol analyzer that combines the defacto standard CATC Trace display with powerful analysis features.

## DDR4



### Kibra™ 480 DDR3 & DDR4 Protocol Analyzer

The Teledyne LeCroy Kibra 480 is a stand-alone protocol analyzer that provides comprehensive DDR3 and DDR4 JEDEC timing analysis. Sitting in-line on a live system, the analyzer uses a proprietary probe implementation to allow loss-less capture of high speed DDR transactions while automatically identifying timing and protocol violations.

## MIPI® M-PHY® Protocol Analyzer



### Eclipse™ X34

GEAR1 ✓ GEAR2 ✓ GEAR3 ✓ G0-G7 ✓

The Teledyne LeCroy Eclipse MIPI M-PHY protocol analyzer is for customers developing M-PHY GEAR 1/2/3 at up to x4 lane width. This protocol analyzer is the first to support the PCIe® 3.1 specification, which includes the M-PCIe ECN released by PCI-SIG® last year. M-PCIe combines the PCI Express (PCIe) protocol layer with the low power M-PHY physical layer bringing high-end PCIe performance and software capabilities to low power mobile devices.

The Frontline family of Bluetooth protocol analyzers and tools support every profile and protocol in the entire Bluetooth specification. From Bluetooth "classic" (BR/EDR) to Bluetooth low energy (LE) technology, Frontline protocol analyzers make it easier to get products to market faster by helping troubleshoot, debug, and decode these complex communication streams.

## Frontline Developer Tools



### Sodera Wideband Bluetooth Protocol Analyzer

The Frontline Sodera is a highly portable, wideband Bluetooth protocol analyzer that captures ALL Bluetooth traffic. The Sodera concurrently captures all Bluetooth packets (BR/EDR/LE) across all channels, including paging, inquiry, secure connections, secure simple pairing, and data exchange packets. Its compact size and quick-change battery allow easy, on-the-go testing in automobiles and other power-sparse environments. Supports the latest Bluetooth specification to debug all classic and low energy Bluetooth connections in the 2.4 GHz band.



### Sodera LE Wideband Bluetooth® Protocol Analyzer

The Frontline Sodera LE is a wideband Bluetooth protocol analyzer capable of sniffing all Bluetooth low energy channels simultaneously and passing detected packets on to the Frontline software for analysis and review. The Bluetooth low energy specification is rapidly being updated with modification that enable the "Internet of Things" (IoT) and our connected world. Sodera LE uses a software defined radio, which gives flexibility to keeping up with these specification changes. Supports the latest Bluetooth specification to debug low energy Bluetooth connections in the 2.4 GHz band.



### BPA 600 Dual Mode Bluetooth Protocol Analyzer

The Frontline BPA 600 Dual Mode Bluetooth Protocol Analyzer is a USB powered tool designed to capture, decode, analyze and debug classic BR/EDR Bluetooth and low energy communications with minimal setup. Decodes all Bluetooth classic and low energy traffic including advertising packets, data packets and LL control packets, and providing visibility into all three advertising channels concurrently, even before the connection is established. Supports all Bluetooth specifications through 4.2.



### BPA low energy Bluetooth Protocol Analyzer

The Frontline BPA low energy Protocol Analyzer is a USB powered tool designed to capture, decode, analyze and debug Bluetooth low energy communications with minimal setup. Decodes all Bluetooth low energy traffic including advertising packets, data packets and LL control packets, and providing visibility into all three advertising channels concurrently, even before the connection is established. Supports all Bluetooth low energy specifications through 4.2.



### Bluetooth low energy Innovator Suite

Bundle including Frontline BPA low energy Analyzer and testing services for one Bluetooth low energy-enabled product. Analyzer decodes all Bluetooth low energy traffic, and testing services utilize the same tool to do testing on customer device, providing project overview, test bed, executive summary, recommendations, and appendix, as well as related capture files for reference and instruction.



### 802.11 a/b/g/n Protocol Analyzer

The Frontline 802.11 a/b/g/n protocol analyzer provides passive capture of 802.11 a/b/g/n data communications, utilizing a 250GB on-board buffer, and can be linked to BPA 600 or Sodera to view Bluetooth and Wi-Fi packets synchronized on the same timeline. Debug conflicts and collisions occurring as a result of Bluetooth and 802.11 data being transmitted in the same 2.4GHz range.



### NFC Protocol Analyzer

The Frontline NFC Protocol Analyzer is a highly portable USB powered tool designed to analyze and debug NFC-A, NFC-B, and NFC-F communications. It is used to capture, analyze and debug NFC technology as used in applications demanding device to device, device to tag, and device as tag data transfer, and in situations where out-of-band pairing is being exploited by Bluetooth applications.



### High Speed UART (HSU) Protocol Analyzer

The Frontline HSU Protocol Analyzer is a capture and analysis tool for debugging elusive HCI communication issues between a Bluetooth host and controller. Capable of non-intrusive analysis supporting data rates up to 8 Mbps and Bluetooth HCI protocols including H4, H5 and BCSP. Provides a non-intrusive window into native-format bus performance, and command and response tokens.



### SD/SDIO Protocol Analyzer

The Frontline SD/SDIO Protocol Analyzer is a USB powered non-intrusive tool to capture, decode and analyze SD, SDIO, MMC and SPI communications, as well as Bluetooth data carried over the SDIO physical layer. It supports applications and systems using the standard SD form factor connection as well as embedded applications (via. Pin header for signal connections), and allows developers and testers to decode not only basic SD (SD and SPI mode) protocol layer, but the SDIO Bluetooth protocol layer as well. Quickly and easily search decoded frames, significantly reducing time spent debugging SD/SDIO device protocol and timing issues.



## Frontline Industrial Network Tools



The **RS-232 ComProbe II** passively monitors and actively tests asynchronous equipment, circuits and software applications on serial data communications networks. It plugs into a PC's USB port to tap into RS-232 circuit.

The RS-232 ComProbe II is compatible with **NetDecoder** and **Serialtest** software protocol analyzers and is also sold in bundles with other industrial hardware components.



The **RS-422/485 ComProbe II** monitors and captures Asynchronous RS-422/584 communications. It plugs into a PC's USB port and has screw terminal connectors to tap into the RS-422/485 circuit.

The RS-422/485 ComProbe II is compatible with **NetDecoder** and **Serialtest** software protocol analyzers and is also sold in bundles with other industrial hardware components.



The **Ethernet ComProbe** is a non-intrusive, passive network tap that captures bi-directional Ethernet data.

The Ethernet ComProbe is compatible with **NetDecoder** and **Ethertest** software protocol analyzers and is also sold in bundles with other industrial hardware components. It is compatible with the **Wireshark** protocol analyzer.



Frontline's **CC-Link ComProbe** is a CLPA certified CC-Link network monitor. It is a complete solution for testing and trouble-shooting CC-Link and CC-Link IE products and networks.

The CC-Link ComProbe is compatible with the **NetDecoder** software protocol analyzer and is also sold in bundles with other industrial hardware components.



The **NetDecoder - DH+ Analyzer** is a comprehensive data capture, debugging, network monitoring and analysis tool for troubleshooting DH+ networks.

The DH+ Analyzer works with Rockwell Automation's **1784-U2DHP** to capture DH+ data. Uses the **NetDecoder** software protocol analyzer.



The **NetDecoder - ControlNet Analyzer** provides a comprehensive troubleshooting and diagnostics solution for solving communication problems on ControlNet networks.

The ControlNet analyzer supports two of Rockwell Automation's interface cards: **1784-PCC** card for PCMCIA interfaces and **1784-U2CN** for USB interfaces. Uses the **NetDecoder** software protocol analyzer.



The **NetDecoder - DeviceNet Analyzer** provides a comprehensive troubleshooting and diagnostics solution for solving communication problems on DeviceNet networks.

The DeviceNet analyzer supports Rockwell Automations **1784-U2DN USB** interface and Molex-SST's PCI and PCMCIA interface cards. Uses the **NetDecoder** software protocol analyzer.

## NetDecoder Software

Frontline's NetDecoder™ is award winning software designed to diagnose and troubleshoot communication problems in industrial networks. Frontline's NetDecoder analyzer has the ability to monitor and provide detailed timing, data and messaging information for serial, fieldbus, and Ethernet networks.

The NetDecoder protocol analyzer is used in many industries including Oil & Gas, Food and beverage, Electric power transmission, Water or sewer management, and Factory automation.

### The NetDecoder analyzer supports these technologies:

#### Serial Protocols

Modbus RTU  
Modbus ASCII  
DNP3 over serial  
DF1/PCCC  
IEC 60870-5-101  
IEC 60870-5-103  
BSAP Bristol Babcock  
ABB COMLI  
Emerson ROC  
BACNet  
IEC-60870-5-102  
Saia-Burgess S-Bus  
CC-Link

#### Ethernet Protocols

Modbus/TCP  
EtherNet/IP (CIP and PCCC)  
Allen-Bradley's CSP/PCCC  
DNP3 over Ethernet  
IEC 60870-5-104  
PROFINET  
CC-Link IE

#### Industrial Bus Protocols

Allen-Bradley's Data Highway Plus (DH+)  
DeviceNet  
ControlNet  
Allen-Bradley DH-485  
CAN 2.0 A

## Serialtest Software

Serialtest Async is software used to passively monitor and actively test serial asynchronous (async) communication circuits and networked equipment, at speeds up to 921.6 Kbps. The product offers an economical solution for debugging, testing, and troubleshooting equipment, circuits and software applications on serial data communication networks. Typical test application areas include utility meter reading, railroad signal and switch monitoring, PC-based control, lottery and gaming, credit authorization, and the Internet.

## Ethertest Software

Ethertest is a general purpose Ethernet communications monitor and protocol analyzer for 10Mbps, 100Mbps and 1Gbps Ethernet local area networks. Performs full 7 layer decodes on TCP/IP, SMB, NetBIOS, Novell NetWare, and more. Interfaces with the LAN through a PC's standard network Interface Card (NIC). In applications ranging from financial institutions to manufacturing facilities, network engineers will find Etherest easy to work with but loaded with features.

## quantumdata 980 Series

The Teledyne LeCroy quantumdata 980 series Advanced Test Platforms are module based systems that can accommodate multiple 980 series modules. The modules offer a rich set of test solutions for a variety of digital video interfaces: HDMI, DisplayPort, SDI, HDBaseT and MHL. The modules offer both video generation (transmitter) functions for testing sinks (displays) and video and protocol analysis (receiver) functions for testing source devices. The HDMI modules offer approved compliance test solutions for both HDMI sources and sinks for both HDMI 1.4 and 2.0 versions.

There are two (2) 980 platforms available:

**980B – 5 module test system with a large embedded screen**

**980R – 5 module, rack mountable test system with a 7" touch screen.**

### 980B Advanced Test Platform

The desktop 980B Advanced Test System is a flexible modular test system that can accommodate up to five (5) 980 series modules.



### 980R Advanced Test Platform

The desktop or rack-mountable 980R Advanced Test System is a flexible modular test system that can accommodate up to five (5) 980 series modules.



### 980 HDMI 1.4 Protocol Analyzer module

The 980 HDMI 1.4 Protocol Analyzer provides deep visibility into the HDMI or MHL stream video, audio, metadata, control data and protocol data. The module provides approved compliance testing for HDMI 1.4 HDCP (versions 1.4 and 2.2) & MHL sources, sinks and repeater devices.



### 980 HDMI 2.0 Protocol Analyzer/Generator module

The 980 HDMI 2.0 Protocol Analyzer/Generator (commonly referred to as *HDMI 2.0 Rx/Tx Protocol Analyzer module*) provides deep visibility into the HDMI 2.0 video, audio, metadata, control data and protocol data. The module provides approved compliance testing for HDMI 2.0 sources and sinks up to 600MHz and HDCP 2.2 compliance testing for HDMI 2.0 sources, sinks and repeaters. The module supports functional testing and compliance testing for high dynamic range (HDR) on UHD source devices. (Note: Tx port has limited function.)



### 980 HDMI 2.0 Video Generator module

The 980 HDMI 2.0 Video Generator module supports video and audio functional and compliance testing for HDMI 2.0 Ultra HDTVs at TMDS character rates up to 600MHz. The module supports functional testing and compliance testing for high dynamic range (HDR) on UHD TVs.



### 980 12G-SDI Video Generator module

980 SDI Video Generator module supports video and audio functional testing of next gen broadcast monitors and conversion devices up to 12G-SDI. The module is equipped with four (4) 12G-SDI-capable output ports. The output ports can be aggregated for Dual link HD-SDI and Quad link 3G-SDI operation. A gen-lock input supporting both SD analog black burst and HD tri-level to sync the output clocks with a "house sync" but the module can also run off its internal clock. In a future release the module will support analysis of 12G-SDI source devices on its four (4) 12G-capable input ports.



### 980 DisplayPort Video Generator / Analyzer module

The 980 DP1.2 Video Generator / Analyzer module supports video, audio and protocol functional testing of high-end DP displays and sources at HBR2 link data rates up to 5.40 Gb/s on 1, 2 & 4 lanes including tests for multi-stream transport (MST). The module also supports Link Layer compliance testing for sink devices and HDCP 2.2 compliance testing for source, sink and repeater devices.



### 980 HDMI Phy & Protocol Aux Channel Analyzer module

The 980 HDMI 2.0 Phy & Protocol Aux Channel Analyzer module is equipped with an HDMI Tx port and an HDMI Rx port for running tests on HDMI auxiliary channels such as the DDC channel and the CEC bus. Support HDMI 2.0 CEC compliance testing.



## quantumdata 780 Series

The Teledyne LeCroy quantumdata 780 series handheld test instruments are portable, feature rich, video/audio generators and protocol analyzers that enable you to conduct quick verification testing and troubleshooting of digital video systems and analog video displays on-site or in the R&D lab. The 780 instruments are equipped with both digital video transmitter (output) ports and receiver (input) ports enabling you to test audio, video and protocols of various digital video source and sink (display) devices as well as cables and distribution equipment.



### 780AH Video Generator / Analyzer

The 780AH HDMI Video Generator / Analyzer is an affordable, battery powered, portable, handheld HDMI video/audio generator and protocol analyzer. The instrument is equipped with both HDMI output and input ports for testing video, audio and protocols—including HDCP 2.2—on any type of HDMI device including cables and distribution equipment up to 300MHz. The instrument is operated through the convenient touch screen.



### 780BH Video Generator / Analyzer

The 780BH HDMI Video Generator / Analyzer is a battery powered, portable, handheld HDMI video/audio generator and protocol analyzer. The instrument is equipped with both HDMI output and input ports for testing video, audio and protocols—including HDCP 2.2—on HDMI source and sink devices as well as cables and distribution equipment up to 300MHz. The instrument is operated through the convenient 7 inch touch screen. A status bar on the bottom of the display provides at-a-glance status of the output and input ports.



### 780C Multi-Interface Interoperability Tester

The 780C Multi-Interface Interoperability Tester is a portable, handheld multi-interface video/audio generator and protocol analyzer. The 780C is the only portable test instrument equipped with HDMI and 3G-SDI ports while also offering HDBaseT ports. The HDMI and HDBaseT ports operate at pixel rates up to 300MHz. The instrument is equipped with both output and input ports for testing video, audio and protocols on source and sink devices as well as cables and distribution equipment. The instrument is operated through the convenient 7 inch touch screen. A status bar on the bottom of the display provides at-a-glance status of the output and input ports.



### 780D HDMI Protocol Analyzer / Generator

The 780D 600MHz HDMI Protocol Analyzer / Generator for UHD Testing is a portable, handheld video/audio generator and protocol analyzer. The 780D is equipped with both HDMI and HDBaseT output and input ports for testing video, audio and protocols—including HDMI HDCP 2.2—on source and sink devices as well as cables and distribution equipment up to 600MHz for HDMI. The instrument is operated through the convenient 7 inch touch screen. A status bar on the bottom of the display provides at-a-glance status of the output and input ports.



### 780E Multi-Protocol Analyzer / Generator

The 780E Multi-Protocol Analyzer / Generator for HDMI, DisplayPort and HDBaseT, is a handheld digital video/audio generator and protocol analyzer. The 780E is the only portable test instrument equipped with HDMI and DisplayPort ports while also offering HDBaseT ports. The 780E supports testing video, audio and protocols—including HDCP 2.2 on HDMI and DisplayPort—on source and sink devices as well as cables and distribution equipment up to 600MHz for HDMI and up to 5.4Gb/s link rates on DisplayPort. The instrument is operated through the convenient 7 inch touch screen. A status bar on the bottom of the display provides at-a-glance status of the output and input ports.

## quantumdata 804 Series

The Teledyne LeCroy rack mountable 804, 804A and 804B series Video Generators are optimized for testing modern HDMI flat panel TVs. The 804 series instruments feature four (4) HDMI outputs—all active simultaneously—for testing HDTVs with multiple HDMI inputs. This eliminates the need for splitters often required for testing each HDMI input on an HDTV. The 804 series instruments can output component analog and composite analog video as well as HDMI. The 804 instruments are equipped with all the standard video timings, test patterns and audio formats necessary for testing HDTVs including tests for HDMI protocols such as HDCP, EDID and CEC.



### 804 225MHz HDMI Video Generator

The 804A Video Test Generator supports testing of HD TVs and displays at TMDS character rates up to 225 MHz on its HDMI outputs. This enables testing of 1080p60 resolutions at 50/60Hz with 12 bit deep color. The 804 instrument supports functional protocol tests such as HDCP and EDID.



### 804A 300MHz HDMI Video Generator

The 804A Video Test Generator supports testing of HD and UHD TVs and displays at pixel rates up to 300 MHz on its HDMI outputs. This enables testing of high end 4K resolutions at 50/60Hz with HDMI 2.0 4:2:0 pixel encoding. The instrument also supports testing of 21:9 format resolutions at or below 300 MHz pixel rate. The 804A instrument supports functional protocol tests such as HDCP and EDID including new data elements related to HDMI 2.0.



### 804B 600MHz HDMI Video Generator

The 804B Video Test Generator supports testing of HD and UHD TVs and displays at pixel rates up to 600 MHz on its HDMI outputs. This enables testing of high end 4K resolutions at 50/60Hz with HDMI 2.0 4:4:4 pixel encoding. The instrument also supports testing of 21:9 format resolutions at or below 600 MHz pixel rate. The 804B instrument supports functional protocol tests such as HDCP (versions 1.4 & 2.2) and EDID including new data elements related to HDMI 2.0.



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