TELEDYNE LECROY
Everywhere**you**look™

WaveMaster® 8 Zi-A Series
4 GHz – 45 GHz

Exceptional Performance and Superior Serial Data Analysis

- Up to 20 GHz on 4 Channels
- Up to 45 GHz Bandwidth at 120 GS/s
- Multi-Lane Serial Data Eye, Jitter and Crosstalk Analysis
- 14.1 Gb/s Hardware Serial Trigger Available

Up to 45 GHz Bandwidth, 120 GS/s

**High Bandwidth
Real-time Oscilloscopes with
Exceptional Performance**

WaveMaster 8 Zi-A combines high bandwidth (45 GHz) and sample rate (120 GS/s) with superior signal fidelity performance and 20 GHz on all four input channels. Availability of models from 4 to 45 GHz with complete bandwidth upgradability throughout the entire product range makes it easy and affordable to stay current with emerging high-speed technologies and serial data standards.

WaveMaster 8 Zi-A is standard with the highest performance CPU in its class - an Intel® Core™ i7-2600 Quad-core (2.6 GHz per core, up to 3.8 GHz in Turbo mode) with 8 GB of RAM (upgradeable to 32 GB).

The oscilloscope's X-Stream™ II architecture fully leverages the CPU's speed in all aspects — 10-100 times faster analysis processing on maximum record lengths, instantaneous instrument responsiveness, and 20 times faster off-line data transfer.

With SDAIII-CompleteLinQ Serial Data and Crosstalk Analysis software, you can simultaneously display four eye diagrams and calculate Tj, Rj, Dj, and Dj decomposition on four lanes or four locations in one lane. Use the EyeDrII and Virtual Probing toolsets to assist in analyzing lane interactions, including de-embedding crosstalk with S8p and S12p S-parameter files. Crosstalk analysis tools provide ability to measure vertical amplitude noise and deconvolve into Tn, Rn, Dn and Dn decomposition, and perform additional analysis to determine root cause of high noise.

1. Industry leading performance—45 GHz bandwidth, 120 GS/s sample rate, 768 Mpts of analysis memory

2. Widest bandwidth upgrade range (4–45 GHz) provides best investment leverage

3. Intel® Core™ i7-2600 Quad-core, 2.6 GHz (per core, up to 3.8 GHz in Turbo mode) CPU with 8 GB of RAM (upgradeable to 32 GB)

4. Low Jitter Measurement Floor and highly stable timebase over long acquisitions

5. Deepest toolbox with more measurements, more math, more power

6. 15.3" widescreen (16x9) high resolution WXGA color touch screen display—25% larger than 12.1" displays

7. X-Stream II streaming architecture — 10–100 times faster analysis and better responsiveness than other oscilloscopes

8. Crosstalk and Vertical Noise Analysis

9. SDAIII "LinQ" options provide four simultaneous eye diagrams and jitter calculations for multi-lane serial data link analysis, or for or single-lane, multiple location analysis

10. Eye Doctor™ II and Virtual Probe Signal Integrity Toolsets provide real-time de-embedding, emulation, and equalization on serial data channels and complex networks

11. 325 MB/s data transfer rate from oscilloscope to PC with Teledyne LeCroy Serial Interface Bus (LSIB) option

12. Up to 14.1 Gb/s Serial Trigger available - 80-bit NRZ and 8b/10b Symbol triggering

13. Largest selection of serial triggers and decoders—more than 19—available to provide a total system view

14. 50 Ω and 1 MΩ inputs with both ProBus and ProLink probe interfaces on all models provide support for every probe manufactured by Teledyne LeCroy without requiring external adapters or probe amplifiers
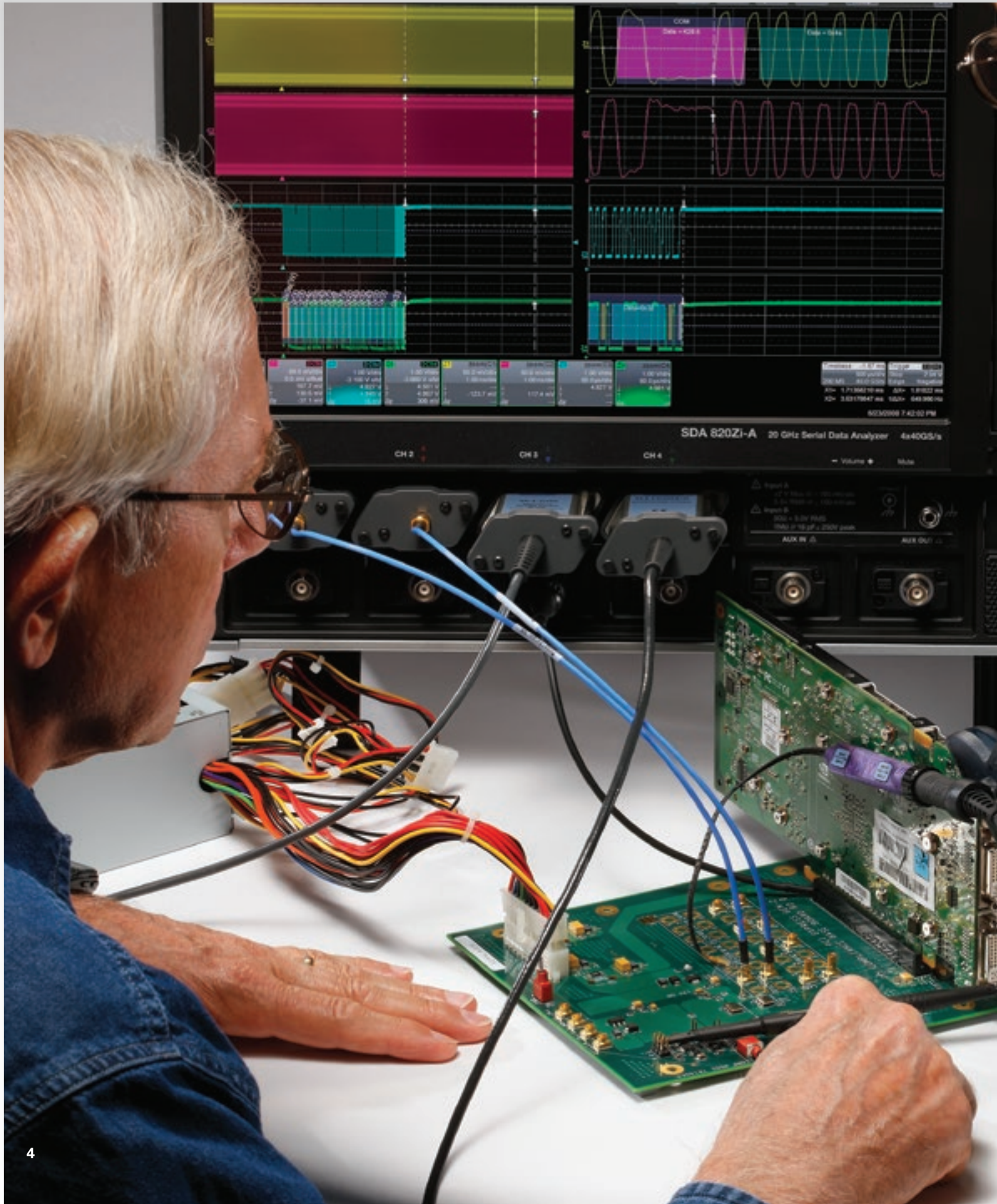
World's Fastest Single-Chip ADC

Monolithic, custom-designed Silicon Germanium (SiGe) 40 GS/s Analog-to-Digital Converter (ADC) is the world's fastest single-chip ADC.
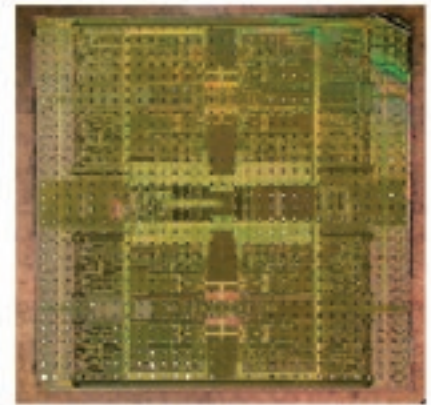
High Bandwidth, Upgradeable, Superior Serial Data Analysis Tools

Industry-Leading Real-Time Oscilloscope Series - Models up to 45 GHz

Teledyne LeCroy has utilized widely adopted and proven SiGe processes, custom 2nd generation ASIC designs, and 6th generation Digital Bandwidth Interleave (DBI) technology to achieve unprecedented real-time oscilloscope performance:

- 45 GHz
- 120 GS/s
- 768 Mpts/Ch Analysis Memory

20 GHz four channel performance is provided on all models from 20 to 45 GHz. In all cases, signal fidelity is pristine with exceptional rise time, step response, jitter measurement floor, and electrical noise performance. High effective number of bits (ENOB) over the complete operating frequency range, especially in the crucial mid-band, ensures the most noise-free display of signals.

Best Upgradeability and Investment Protection

By utilizing the same platform for all models from 4 to 45 GHz, we help you best protect your investment and give you future flexibility.

Up to 14.1 Gb/s Serial Trigger

The highest speed true-hardware serial trigger provides capability for 80-bit NRZ serial pattern, or 8b/10b symbol triggering.

A 6.5 Gb/s serial trigger is included standard with SDA 8 Zi-A models, and this may be upgraded to 14.1 Gb/s capability.

Either serial trigger may be added to WaveMaster 8 Zi-A and DDA 8 Zi-A models.

Multi-Lane Serial Data and Crosstalk Analysis

The world's first and only serial data analysis software to provide four simultaneous eye diagrams, jitter measurements, and jitter analysis. Crosstalk analysis provides vertical noise measurements and crosstalk debug tools. Add Teledyne LeCroy's Eye Doctor™ II and Virtual Probe Signal Integrity Tools for more power. Analyze full record lengths to better understand low frequency system behaviors. Unique jitter decomposition algorithms are provided to better understand system behaviors.

THE BEST HIGH BANDWIDTH INVESTMENT

Superior High Bandwidth Performance

As memory and sample rate can be interleaved, so can bandwidth. Using high-performance technologies and digital signal processing (DSP), Teledyne LeCroy uses high-speed SiGe analog components comfortably within their rated bandwidth range (20+ GHz) while providing additional bandwidth on one or two channels using 6th generation Digital Bandwidth Interleaving (DBI). This approach provides 4 channels at 20 GHz, 2 channels at 30 GHz, and 1 channel at 45 GHz, with better signal fidelity compared to "stretching" of components beyond their rated bandwidth. It also best leverages proven technologies with known and high reliability to minimize up-front purchase costs.

Learn More

teledynelecroy.com/dl/864

teledynelecroy.com/dl/2943

teledynelecroy.com/dl/2960

Proven SiGe Components Ensure High Performance

Silicon Germanium (SiGe) is the most widely adopted and deployed semiconductor fabrication process with many years of commercial deployment.

Additionally, it has none of the thermal conductivity, reliability, yield, cost, and other concerns that captive, in-house processes must contend with.

Low Jitter Measurement Floor and High Timebase Stability

An exceptionally accurate and stable timebase is incorporated for the best possible jitter measurement accuracy. Teledyne LeCroy provides highly stable measurements at full (768 Mpts) record lengths, simplifying debug of low frequency events.

Widest Bandwidth Upgrade Range: 4–45 GHz

SDA 845Zi-A

WaveMaster 820Zi-A

All WaveMaster 8 Zi-A oscilloscopes are implemented with a single hardware platform. To extend bandwidth beyond 20 GHz, Teledyne LeCroy has leveraged DBI technology to minimize initial costs—the module that doubles the bandwidth slides into a separate slot in the WaveMaster 8 Zi-A platform.

Best Investment Protection

From the perspective of bandwidth, sample rate, processing speed, responsiveness, display size, and range of capability, the WaveMaster 8 Zi-A platform is clearly superior and will remain so for many years to come. With the widest bandwidth upgrade range, an engineer who is working on current generation technologies today can confidently know that WaveMaster 8 Zi-A will support the next generations of technology several years from now.

World's Fastest Single-chip ADC

The monolithic 40 GS/s ADC is the fastest single-chip ADC. Compared to other approaches that use multiple ADC chips per channel, or single-chip ADCs with more than 100 interleaved converters, the Teledyne LeCroy approach is a simpler, more elegant solution for maintaining proper timing, phasing, and offset between the on-chip ADCs. The result is vastly improved spurious free dynamic range (SFDR) compared to other oscilloscopes in its class.

High-speed Memory

Custom high-speed memory chips on multiple memory plug-in cards achieve up to 256 Mpts/Ch (or up to 768 Mpts/Ch interleaved with some models and options). X-Stream II architecture ensures fast and complete processing of full record lengths with no limitations on analysis memory.

7

Deep Insight for Analysis

An oscilloscope's operating performance is as important as its electrical performance. The best operating performance comes from a design that seamlessly integrates the operating system, the hardware processor and the waveform processing method. Each component is important but only the Teledyne LeCroy's X-Stream II waveform processing method unleashes amazing speed performance and no compromise in responsiveness. The result is a drastic reduction in calculation time which, when paired with Teledyne LeCroy's deep measurement and analysis toolbox, allows an engineer to generate deep insight about their design.

WaveMaster 8 Zi-A excels at performing complex calculations on long waveforms, enabling users to gain waveform insight with confidence. Here, a 40 Mpts PCIe Gen1 waveform acquisition is acquired and fully analyzed in a matter of seconds—nearly 100x faster than competitive oscilloscopes.

Teledyne LeCroy —The Analysis Memory Leader

Teledyne LeCroy has found a way to make long acquisition memory seamless and pain free to use. The WaveMaster 8 Zi-A Series' proprietary X-Stream II architecture supports capturing, zooming, measuring and analyzing multiple waveforms at up to 768 Mpts deep. WaveMaster 8 Zi-A's proprietary architecture design is augmented with an Intel® Core™ i7-2600 Quad-core processor (15.2 GHz GHz effective clock rate in Turbo mode), high-speed serial data buses, Windows® 7 64-bit OS and 8 GB of RAM standard (upgradeable to 32 GB). What you experience is processing speed 10–100x faster compared to other oscilloscopes in this class.

Instantaneous Responsiveness

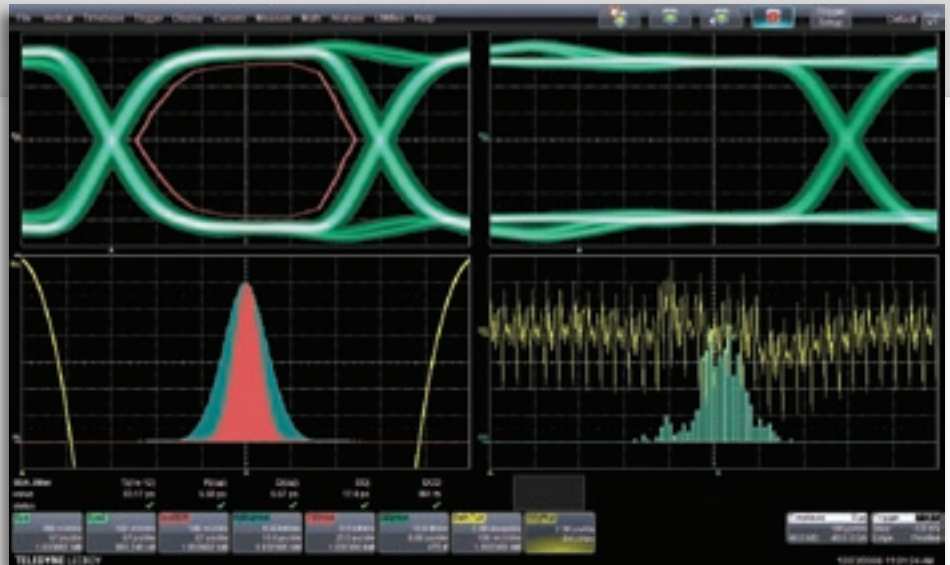With WaveMaster 8 Zi-A oscilloscopes you will experience remarkable responsiveness. Acquiring and manipulating the longest record lengths and performing the most complex WaveShape Analysis are all easily handled at the same time, unlike competitive oscilloscopes that become painfully slow to respond when long memory is applied. Bottom line: oscilloscopes no longer need to carry a penalty for operating with long memory.

Fast Off-line Data Transfer

When the application calls for post-processing data off-line, an optional Teledyne LeCroy Serial Interface Bus (LSIB) high-speed 325 MB/s option provides data transfer 20–100x faster than any other test instrument. For remote control, WaveMaster 8 Zi-A is Class C compliant with the LXI standard, the latest industry standard for Ethernet remote control operation. WaveMaster 8 Zi-A supports standard LXI features such as a LAN interface, VXI11 Discovery, a web server and IVI-C & IVI-COM drivers.

X-Stream II Architecture

Optimized for Fast Throughput

X-Stream II architecture enables high throughput of data—even when the oscilloscope is performing multiple 100 Mpts (or larger) waveforms. X-Stream II uses variable waveform segment lengths to enable all processing intensive calculations to take place in fast CPU cache memory, thus improving calculation speed and efficiency. The result—10–100x faster processing compared to other oscilloscopes.

Learn More

teledynelecroy.com/dl/5213

Optimized for Long Memory

X-Stream II has no analysis memory length restrictions, regardless of analysis type, since the variable waveform segment length can always be limited to a size that can fit in CPU cache memory. Other oscilloscopes with conventional architectures cannot make this claim, and often have limitations on analysis memory of 5–20% the length of their acquisition memory under the best conditions.

Optimized for Responsiveness

By dynamically allocating buffers to maximize memory availability, the WaveMaster 8 Zi-A Series embodies the fastest front panel responsiveness. Oscilloscopes from other manufacturers can suffer from annoying delays during simple zoom operations, but not WaveMaster 8 Zi-A.

Learn More

teledynelecroy.com/dl/5214

SERIAL DATA PHYSICAL LAYER COMPLIANCE TESTING

Compliance Testing Key Features

- **Full support for Transmitter, Receiver and Signal Integrity testing**

- **Transmitter Testing (SDA 8 Zi-A Serial Data Analyzer)**

  – **QualiPHY Compliance Test Packages simplify test and reporting**

  – **Connection Diagrams ensure the proper testing configuration**

  – **Report Generation includes all of the testing values and the appropriate limits**

  – **Stimulate the DUT for transmitter testing using the PeRT[3]**

- **Receiver Testing (PeRT[3])**

  – **BER Generator & Detector**

  – **Multichannel Operations**

  – **Protocol Support**

  – **Jitter Tolerance Testing**

  – **Integrated Pattern Generator**

  – **Protocol Level Error Detection**

  – **Stress Injection Capable**

  – **SSC Support**

  – **Pre-emphasis**

  – **Input Sensitivity Testing**

- **Impedance Testing (SPARQ)**

  – **SPARQ satisfies numerous transmitter, receiver, cable and fixture compliance testing requirements for standards such as:**

    - **SATA**
    - **USB**
    - **PCI Express**
    - **HDMI**
    - **SAS**
    - **Fibre Channel**
    - **DisplayPort**

The combination of the SDA 8 Zi-A Serial Data Analyzer, the PeRT[3] and the SPARQ provides the most comprehensive solution for serial data compliance testing. These three pieces of equipment enable a full suite of physical layer compliance testing and debugging ability that will guarantee the best signal integrity for your serial data signals.

Transmitter Compliance Testing

The addition of a QualiPHY software option to the SDA 8 Zi-A oscilloscope constitutes the ideal instrument for physical layer compliance testing. QualiPHY reduces the time and effort needed to perform compliance testing on a wide array of high-speed serial buses by automating the process with connection diagrams and a comprehensive report of results including screenshots. QualiPHY

uses all of the powerful oscilloscope features to perform the compliance test quickly and easily.

Receiver Testing

The Protocol Enabled Receiver Transmitter Tolerance Tester (PeRT[3]) fills the space between physical layer test and protocol layer test, providing a new, 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[3] test system is not just a new instrument; it's an entirely new instrument class.

Complete End-to-end Testing

When using the SDA 8 Zi-A oscilloscope for transmitter only testing, the user is still required to stimulate the product under test to output the required test patterns.

Likewise, when using the PeRT[3] for receiver only testing, the specifications require the user to calibrate the jitter output sources prior to performing the receiver test. When combining the SDA 8 Zi-A oscilloscope with the PeRT[3], not only can each of these needs be met, but all of the testing can be automated and included in a single test report.

Automated Compliance Testing for the Following Standards:

- 10/100/1000 BaseT ENET
- USB 2.0
- MIPI D-PHY
- DDR2 / DDR3
- PCI Express
- DisplayPort
- SAS
- HDMI
- UWB
- SATA
- USB 3.0

By utilizing the power of the SDA 8 Zi-A, the PeRT[3] and the SPARQ, the most comprehensive serial data testing can be performed with unparalleled simplicity. Transmitters, receivers, cables and fixtures can all be characterized to ensure compliance.

Signal Integrity Testing

The SPARQ Signal Integrity Network Analyzer performs a wide range of compliance tests, including: Impedance, Return Loss, Impedance Imbalance, Insertion Loss, Crosstalk (Near- and Far-end), Differential-to-common-mode conversion, Common-to-differential-mode conversion, Intra-pair Skew and Voltage Transfer functions. All measurements can be made in differential-mode, common-mode or single-ended, as applicable.

Data Rate Configuration Chart

Standard	Bit Rate	Minimum Bandwidth	Recommended Oscilloscope
PCI Express Gen1	2.5 Gb/s	6 GHz	SDA 808Zi-A or Above
ExpressCard	2.5 Gb/s	8 GHz	SDA 808Zi-A or Above
InfiniBand	2.5 Gb/s	8 GHz	SDA 808Zi-A or Above
Serial Rapid I/O	2.5 Gb/s	8 GHz	SDA 808Zi-A or Above
DisplayPort 1.1	2.7 Gb/s	8 GHz	SDA 808Zi-A or Above
HyperTransport 2.0	2.8 Gb/s	8 GHz	SDA 808Zi-A or Above
SAS Gen1	3 Gb/s	8 GHz	SDA 808Zi-A or Above
Serial Rapid I/O	3.125 Gb/s	8 GHz	SDA 808Zi-A or Above
SGMII	3.125 Gb/s	8 GHz	SDA 808Zi-A or Above
XAUI	3.125 Gb/s	8 GHz	SDA 808Zi-A or Above
FireWire	3.2 Gb/s	8 GHz	SDA 808Zi-A or Above
HDMI 1.4	3.4 Gb/s	8 GHz	SDA 813Zi-A or Above
SATA Gen2	3 Gb/s	10 GHz	SDA 808Zi-A or Above
DDR4	4 GT/s	10 GHz	SDA813Zi-A or Above
Fibre Channel 4GFC	4.25 Gb/s	13 GHz	SDA 813Zi-A or Above
Serial Rapid I/O	4.25 Gb/s	13 GHz	SDA 813Zi-A or Above
InfiniBand	5 Gb/s	13 GHz	SDA 813Zi-A or Above
PCI Express Gen2	5 Gb/s	13 GHz	SDA 813Zi-A or Above
PCI Express Gen3	8 Gb/s	13 GHz	SDA 813Zi-A or Above
Serial Rapid I/O	5 Gb/s	13 GHz	SDA 813Zi-A or Above
HyperTransport 3.0	5.2 Gb/s	13 GHz	SDA 813Zi-A or Above
USB 3.0	5 Gb/s	13 GHz	SDA 813Zi-A or Above
DisplayPort 1.2	5.4 Gb/s	16 GHz	SDA 816Zi-A or Above
GDDR5	6 Gb/s	16 GHz	SDA 816Zi-A or Above
SAS Gen2	6 Gb/s	16 GHz	SDA 816Zi-A or Above
SATA Gen3	6 Gb/s	16 GHz	SDA 816Zi-A or Above
Serial Rapid I/O	6.25 Gb/s	16 GHz	SDA 816Zi-A or Above
HyperTransport 3.1	6.4 Gb/s	16 GHz	SDA 816Zi-A or Above
QPI (Quick Path Interconnect)	6.4 Gb/s	16 GHz	SDA 816Zi-A or Above
10GBase-KR	10.3125 Gb/s	20 GHz	SDA 820Zi-A or Above
SFI/SFP+	10.3125 Gb/s	20 GHz	SDA 820Zi-A or Above
CEI-11	11Gbps	25 GHz	SDA 825Zi-A or Above
SAS12	12 Gb/s	25 GHz	SDA 825Zi-A or Above
InfiniBand	25.78125 Gb/s	30 to 65 GHz	SDA 830Zi-A, LabMaster 9 Zi-A or LabMaster 10 Zi up to 65 GHz
CEI-25/28	25–28 Gb/s		

The SPARQ can perform all serial data compliance tests currently made with TDR or VNA instruments — only easier.
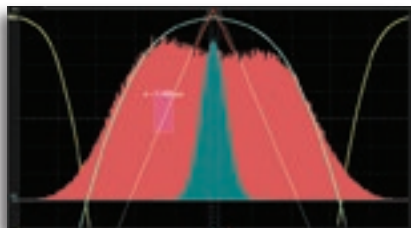
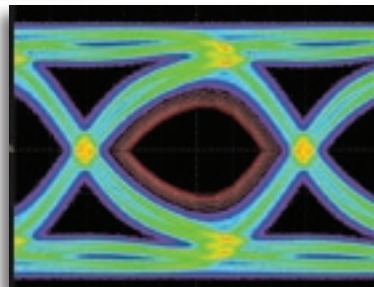# SDAIII-CompleteLinQ SERIAL DATA ANALYSIS PRODUCTS
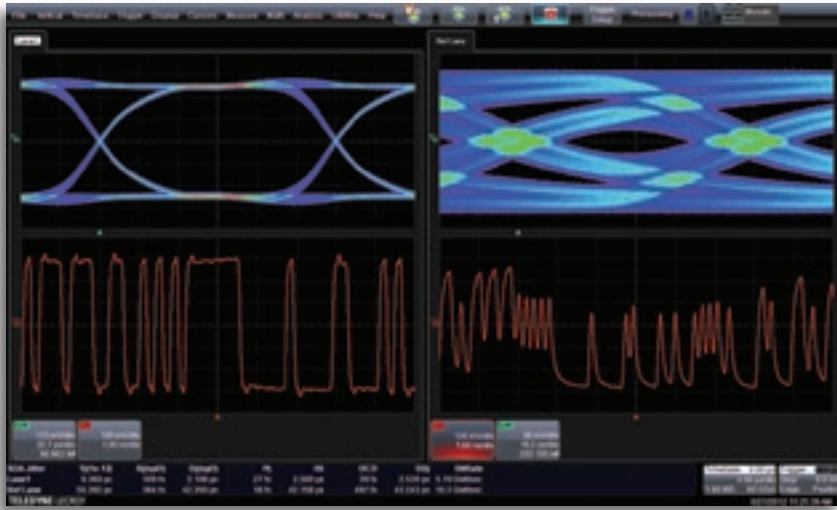
The Teledyne LeCroy SDAIII-CompleteLinQ Serial Data Analysis products contain multi-lane eye and jitter analysis, LaneScape™ comparison modes, vertical noise measurements, and crosstalk analysis tools. These capabilities provide the deepest insight into the behavior of multi- or single-lane serial data systems.
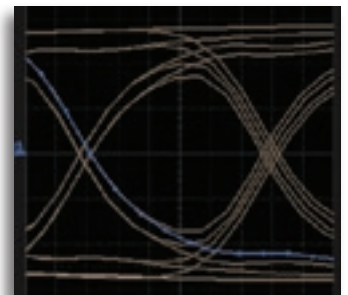
SDAIII Core Toolset

Teledyne LeCroy provides the most complete toolset in the industry for jitter measurements and eye diagram/ jitter analysis. Rj and Dj are separated and Dj is decomposed using one of three dual-Dirac algorithms. Eye diagrams containing all acquired unit intervals are rendered 10-100x faster than competitive systems. Eye diagram analysis tools, such as the extrapolated IsoBER plot, aid insight. Multiple additional tools, such as Tracks, Histograms, and Spectrum wa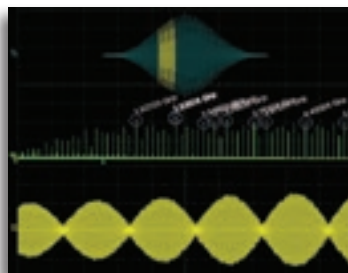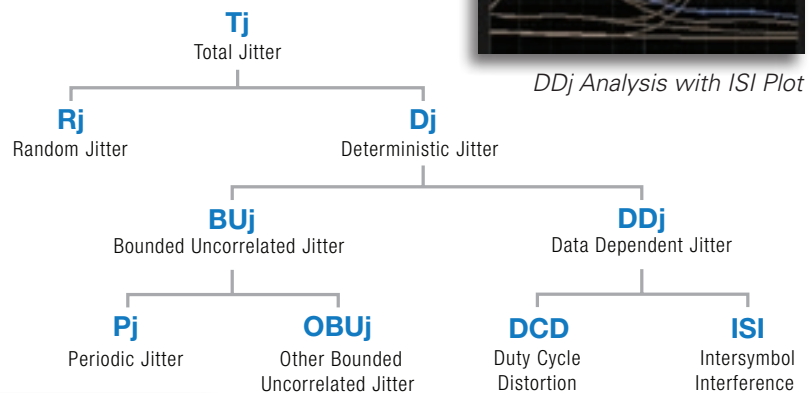veforms, enhance the understanding of jitter causes. Sophisticated pattern analysis tools, such as Intersymbol Interference (ISI) measurements and plots, provide deep insight into Data Dependent Jitter (DDj) behavior.

Eye with IsoBER

DDj Analysis with ISI Plot

Rj+BUj Analysis

Tj
Total Jitter

Rj
Random Jitter

Dj
Deterministic Jitter

BUj
Bounded Uncorrelated Jitter

DDj
Data Dependent Jitter

Pj
Periodic Jitter

OBUj
Other Bounded Uncorrelated Jitter

DCD
Duty Cycle Distortion

ISI
Intersymbol Interference

Pj Analysis

Three Jitter Methodologies

Choose from three dual-Dirac models to separate jitter into total, random and deterministic components (Tj, Rj, Dj). The Spectral Rj Direct method determines Rj directly from the jitter spectrum, and is the most used algorithm. Spectral Rj+Dj CDF Fit follows the FibreChannel MJSQ model. In situations where large amounts of crosstalk/BUj raise the spectral noise floor, the NQ-Scale method will provide more accurate separation of Rj and Dj, and therefore more accurate Tj results.

OPTIONAL SDAIII UPGRADES

Measure up to 4 Lanes Simultaneously

"LinQ" products provide extensive multi-lane analysis capabilities. Quickly understand lane-to-lane differences in jitter measurements, eye diagrams, and jitter analysis. Perform aggressor on/off analysis, and see the results from both scenarios simultaneously. Save the analysis of a particular scenario to the Reference Lane, and configure a LaneScape™ Comparison mode to compare the Reference to either one, two or all lanes. Each "lane" can be a different serial data lane, or a different analysis of data from a single serial data lane - ideal for comparing different equalization schemes (using Eye Doctor II option)
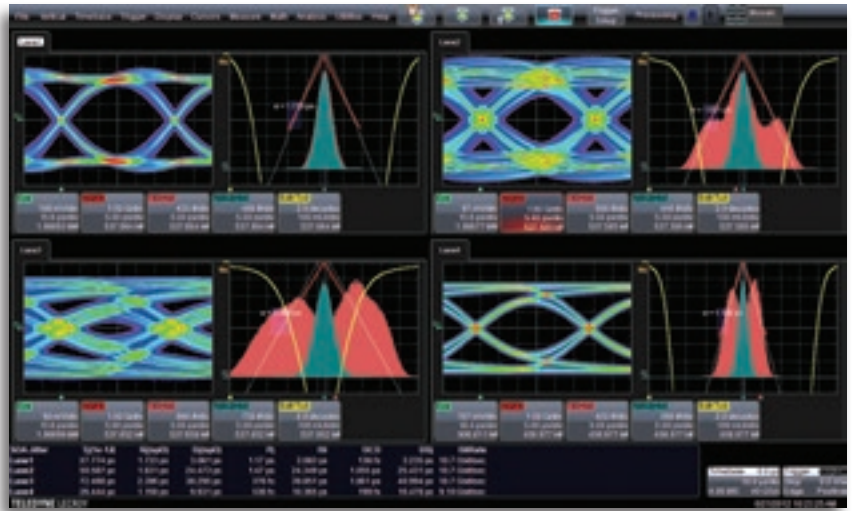
or examining system behaviors at different locations in the lane (using probes or the VirtualProbe option).

Vertical Noise and Crosstalk

The Crosstalk and CrossLinQ packages provide vertical noise measurements and crosstalk analysis tools for

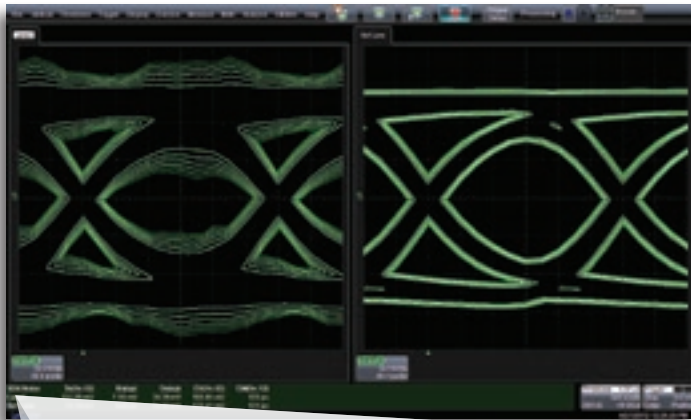| SDA Noise	Tn(1e-12)	Rn(sp)	Dn(sp)	EH(1e-12)	EW(1e-12)
Lane1	131.28 mV	7.18 mV	34.39 mV	105.04 mV	125 ps
Ref Lane	33.30 mV	646 µV	24.93 mV	172.41 mV	131 ps

complete aggressor/victim analysis. Use one of three dual-Dirac models to measure and separate noise into total (Tn), random (Rn) and deterministic (Dn) components, and further decompose Dn into Intersymbol Interference Noise (ISIn) and Periodic Noise (Pn). Only Teledyne LeCroy performs this analysis on real-time oscilloscopes. Similar to jitter analysis, noise can be viewed as a noise track, histogram and spectrum, providing insight into the vertical noise resulting from coupling to other active serial data lanes or other interference sources. The Crosstalk Eye shows the probabilistic extent of noise both inside and outside the eye, quickly showing the impact of excessive noise that is not possible to see in a traditional eye diagram.

CompleteLinQ Does it All

The CompleteLinQ user interface framework provides easy access to all features described above, and also integrates EyeDoctorII and VirtualProbe capabilities for Tx/Rx equalization and fixture/channel de-embedding/emulation. Order SDAIII-CompleteLinQ to equip your oscilloscope with all of Teledyne LeCroy's Serial Data Analysis and Signal Integrity tools.
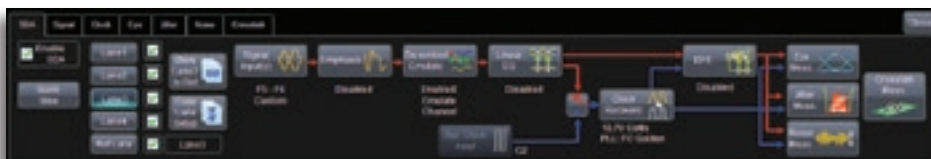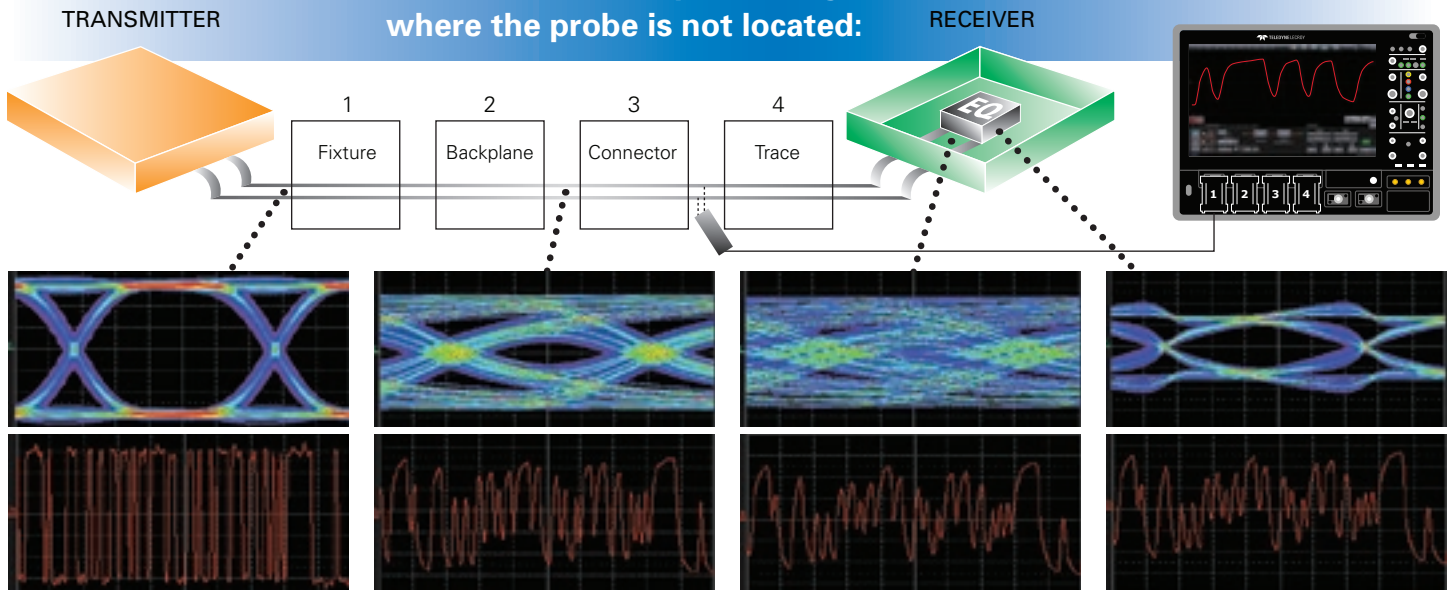

Learn More:
teledynelecroy.com/SDAIII

View our short introductory video:
http://lcry.us/YB0qyY

EYEDOCTOR™II AND VIRTUALPROBE SIGNAL INTEGRITY TOOLS

VirtualProbe shows you the signal where the probe is not located:

TRANSMITTER   RECEIVER

| 1 | 2 | 3 | 4 |
| Fixture | Backplane | Connector | Trace |

Virtually probe the signal at the transmitter with the fixture present, and then de-embed its effects form the measurement.

View the signal between structures to understand losses, ISI and crosstalk caused by backplanes, interconnects and connectors.

See what the eye looks like at the receiver - even if it is not in reach of a differential probe.

Use EyeDoctor to open the eye by modeling CTLE, FFE and DFE equalizers used by your receiver.

As signal speeds and data rates continue to rise, signal integrity effects such intersymbol interference (ISI) and crosstalk become more prevalent and challenging. Use Teledyne LeCroy's Advanced Signal Integrity tools to transform your measured signal to include the effects of de-embedding, emulation and equalization algorithms.

De-embed, Equalize and Emulate with EyeDoctorII

Curious to know what your signal would look like without fixture effects? Do you need to understand how ISI and crosstalk of a modeled channel will affect your jitter margin? Or are you seeking to determine which equalization schemes will do the best job of opening a closed eye? The EyeDoctorII package includes easy configuration of basic de-embed/emulation scenarios, CTLE, DFE and FFE equalizers, and transmitter emphasis/de-emphasis.

Advanced De-embedding, Emulation and Virtual Probing

The VirtualProbe package expands the de-embedding and emulation capabilities of EyeDoctorII. Configure a multi-block circuit using modeled S-parameters or measured with a Teledyne LeCroy SPARQ (or other VNA), and VirtualProbe will build the transfer function that returns the signal as it would appear before or after any block in the circuit. The electrical behavior of a block to reflect and transmit signals can be included, added or removed in order to de-embed or emulate fixtures or channels. Probe loading effects can also be removed. When used in conjunction with the Crosstalk, CrossLinQ or CompleteLinQ SDAIII options, crosstalk between lanes can be modeled using 8 and 12-port S-parameters. Use the Teledyne LeCroy SPARQ to measure these S-parameters at a fraction of the price of a VNA.

Use EyeDoctorII and VirtualProbe with SDAIII CompleteLinQ products

When using EyeDoctorII and VirtualProbe on oscilloscopes enabled within the SDAIII-CompleteLinQ products, configure de-embedding, emulation and equalization from the same simple flow-chart dialog as all other serial data analysis features. When enabled with the "LinQ" option to enable 4 lanes, users can configure EyeDoctorII and VirtualProbe configurations on each lane, facilitating rapid comparisons of different de-embedding and equalization setups.

Learn More

teledynelecroy.com/dl/1023
teledynelecroy.com/vid/M0T6WEC0JYQ
teledynelecroy.com/dl/1216
teledynelecroy.com/dl/1136

SPARQ SIGNAL INTEGRITY NETWORK ANALYZER

The SPARQ signal integrity network analyzers connect directly to the device under test (DUT) and to PC-based software through a single USB connection for quick, multi-port S-parameter measurements.

SPARQ is the ideal instrument for characterizing multi-port devices common in signal integrity applications at a fraction of the cost of traditional methods. It is ideal for:

- **Development of measurement-based simulation models**
- **Design validation**
- **Compliance testing**
- **High-performance TDR**
- **PCB testing**
- **Portable measurement requirements**

High-bandwidth, Multi-port S-parameters for the Masses

S-parameter measurements are most often produced by the vector network analyzer (VNA), a difficult instrument that is beyond many

budgets. SPARQ is very affordable and simplifies measurements, making S-parameters accessible to all.

PC-based, Small and Portable

Traditional instruments that produce S-parameters are large and fundamentally stationary. The SPARQ, in contrast, is small and weighs less than 20 lbs. It connects to any standard PC through a USB 2.0 interface, allowing SPARQ to run where computing power is easily upgraded.

S-parameters, Quick

VNA measurements begin with the unpleasant and complex task of calibration. This involves multiple connections that can produce misleading results due to operator

error. The SPARQ provides calibrated measurements with a single connection to the DUT and offers simple setup choices. Start and complete the entire measurement with a single button press.

Internal Calibration

SPARQ takes a revolutionary approach to calibration by building in calibration standards. This enables measurements to be made without multiple connection steps and removes the need for additional electronic calibration (ECAL) modules. Calibration proceeds quickly without user intervention, so one can calibrate often without resorting to the use of out-of-date saved calibrations.

Characterize Crosstalk with 8 and 12-port SPARQs

Don't just model crosstalk - measure it. With the 8 and 12 port SPARQs, characterize interconnects with two and three differential lanes in order to obtain S-parameters needed for simulations of aggressor/victim/aggressor topologies.

15
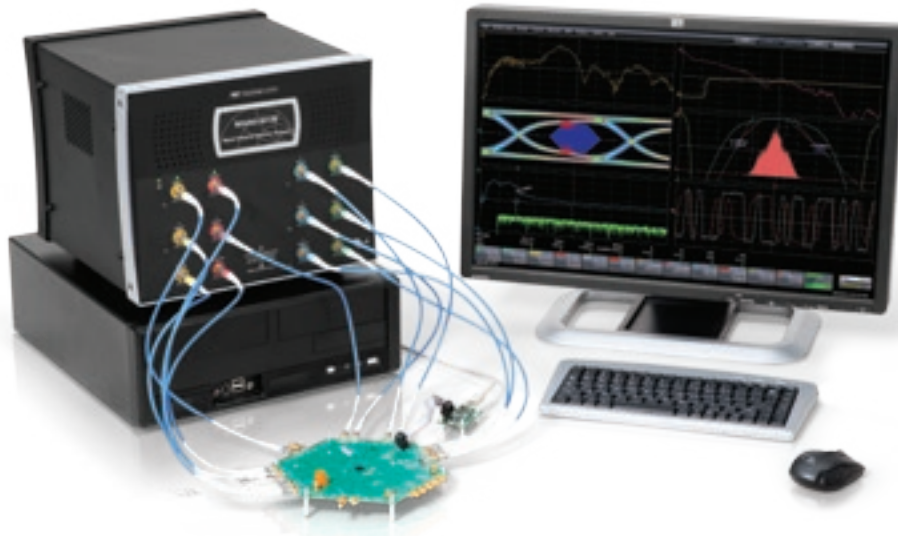
Complete System Debug

Understanding the relationships between different signals is vital to fast debug. Only WaveMaster 8 Zi-A combines the best of general purpose oscilloscopes (low-speed serial triggers and decoders, mixed signal capability, high impedance probing) to allow easy correlation between low-speed (serial data control words, power supply noise, or parallel data transmissions) and high speed events.

Capture 5 ms (100 Mpts) of low-speed and high-speed waveforms. Decode low and high speed serial data signals.Easily zoom, and validate timing relationships between signals.
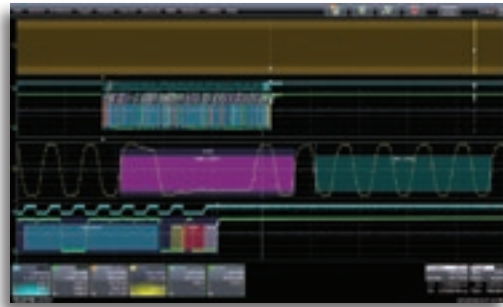

Get more insight with multiple views of your serial data transmissions.

## Serial Decode—A Whole New Meaning to Insight

Over 19 different protocols are supported with serial decoders (many with hardware protocol triggers as well). Use ProtoSync with PCIe, USB, SATA, SAS, and Fibre Channel to get a dual-display view of both oscilloscope-generated decode annotations and protocol analyzer software views. Search on protocol data in a table and export table data to an Excel file.

Learn More
teledynelecroy.com/dl/3005

More Trigger Capability Isolates More Problems More Quickly

15 GHz Edge trigger, up to 14.1 Gb/s true-hardware serial trigger available, 10 different SMART triggers, four-stage Cascade™ triggering, Measurement trigger, and TriggerScan™ are all standard and allow you to isolate the problem quickly and begin to focus on the cause. A full range of protocol serial triggers (I^2C, SPI, UART, RS-232, Audio (I^2S, LJ, RJ, TDM), CAN, LIN, FlexRay, MIL-STD-1553 and many others) are also available.
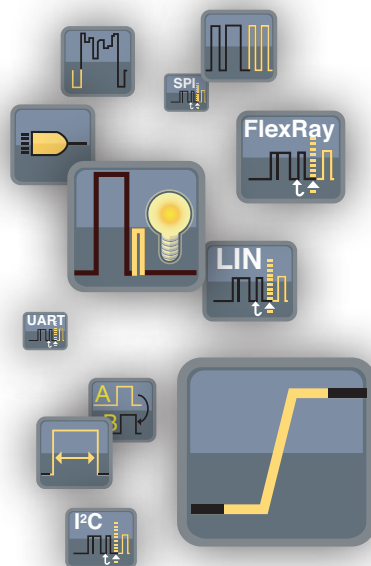
15 GHz Edge Trigger

Search and Scan to Understand

Search a captured waveform for hundreds of different measurement parameters or other conditions using WaveScan. Set complex conditions, view search results on the waveform and in a table, and quickly zoom and jump to an entry. "Scan" for events that can't be triggered in hardware.

Freedom from Probing Limitations

High bandwidth differential probes (up to 25 GHz), single-ended active probes, current probes, high-voltage, and mixed signals all connect to the WaveMaster 8 Zi-A oscilloscope and give you a total system view. All WaveMaster 8 Zi-A oscilloscopes contain selectable 50 Ω and 1 MΩ input capability and can be used with any Teledyne LeCroy probe—passive or active—without requiring external adapters or power supplies.

Fully Integrated Mixed Signal Oscilloscope (4 + 36) Option

Add Mixed Signal Oscilloscope (MSO) operation using the MS Series mixed signal options to acquire up to 36 digital lines time-correlated with analog waveforms and completely integrated with the scope operation. In addition to acquiring digital lines, they are also helpful for monitoring low-speed signals, such as serial data clock, data, and chip select signals, thus preserving the analog channels for higher speed requirements.

DEEP INSIGHT CLARIFIES COMPLEX SIGNALS

All Oscilloscope Tools are not Created Equal

WaveMaster 8 Zi-A has the deepest standard toolbox of any oscilloscope, providing more measure, math, graphing, statistical, and other tools, and more ways to leverage the tools to get the answer faster. While many other oscilloscopes provide similar looking tools, Teledyne LeCroy allows the most flexibility in applying the tools to any waveform.

Customized Tools

Only Teledyne LeCroy completely integrates third party programs into the scope's processing stream by allowing you to create and deploy a new measurement or math algorithm directly into the oscilloscope environment and display the result on the oscilloscope in real-time! There is no need to run a separate program, or ever leave the oscilloscope window. Use C/C++, MATLAB, Excel, JScript (JAVA), and Visual Basic to create your own customized math functions, measurement parameters, or other control algorithms.

Graphical Track, Trend, and Histogram Views

Track plots measurement values on the Y-axis and time on the X-axis to display a measurement change time-correlated to the original channel acquisition—perfect for intuitive understanding of behaviors in frequency modulated (FM) or pulse width modulated (PWM) circuits and jitter measurements,
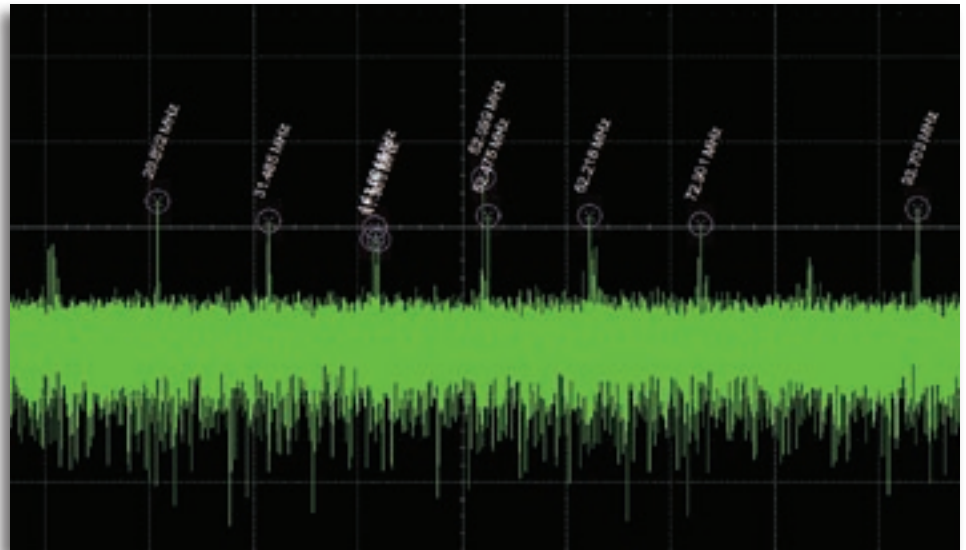
X-Stream II fast throughput streaming architecture makes difficult analysis and deep insight possible. Above, an FFT is applied to a 50 Mpts waveform to determine root cause failure. The high frequency resolution this provides enables deep insight into signal pathologies.
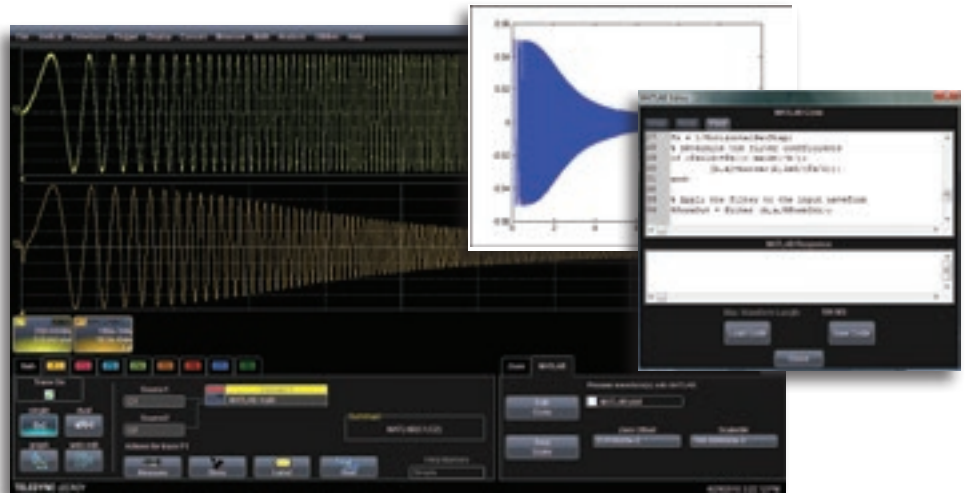
XDEV Customization software package being used to implement a 1 MHz Butterworth filter using MATLAB®.

including modulation or spikes. Histograms provide a visual distribution representation of a large sample of measurements, allowing faster insight. Trends are ideal for plotting slow changes in measurement values.
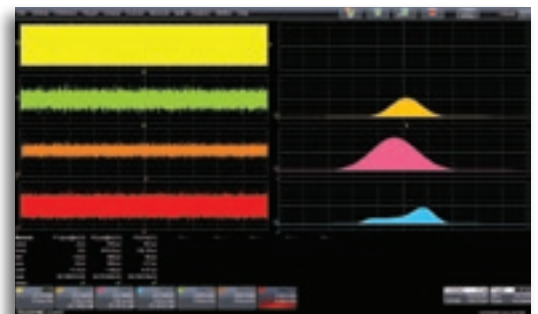
Capture a single clock channel (yellow) and display Track graphs and Histograms simultaneously of multiple jitter parameters.

APPLICATION SPECIFIC SOLUTIONS

In addition to the general purpose WaveShape Analysis tools, application specific solutions are available for Serial Data Compliance, Embedded Design, Digital Design, and Automotive. These packages extend the Teledyne LeCroy standard measurement and analysis capabilities and expand your oscilloscope's utility as your needs change.

Up to 14.1 Gb/s Serial Trigger

The world's fastest oscilloscope true hardware protocol trigger - 600 Mb/s to 14.1 Gb/s! Trigger on up to an 80-bit NRZ serial pattern, or on an 8b/10b symbol string.

ProtoSync Solutions

ProtoSync links physical layer waveforms, data link layer decode annotation and table information, and full transaction layer protocol analysis together. By simply touching a decode table entry in the oscilloscope software or a packet in the protocol analysis software, all views are automatically synchronized and aligned for quick and easy debug. ProtoSync supports PCIe Gen1/2/3, USB2/3, SATA, SAS, and Fibre Channel.

Serial Data Trigger/Decode and PROTObus MAG Serial Debug Toolkit

More than 19 trigger and decode options provide powerful conditional serial data protocol triggering, intuitive color-coded decode overlays, and a table summary with search and zoom capabilities. Additionally, PROTObus MAG (measure, analysis, graph) Serial Debug Toolkit provides the ability to quickly validate and analyze serial data cause-effect relationships and plot digitally encoded data as an analog waveform.

Data Transfer Speeds up to 325 MB/s

Teledyne LeCroy's Serial Interface Bus (LSIB) option enables direct connection to the PCI Express® x4 high-speed data bus in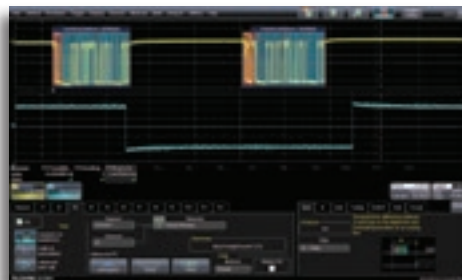 the oscilloscope to enable data transfer rates up to 325 MB/s—20–100x faster than other methods. All that is required is installation of an optional LSIB card in the oscilloscope and the corresponding host board (card) for desktop (laptop) PC in the remote computer. Data transfer is easily enabled through a supplied application program interface (API).

Serial Data Compliance Test Solutions

QualiPHY serial data compliance packages provide easy to use step-by-step instructions for a broad set of serial data standards. With fast automated performance, illustrated instructions and comprehensive reporting capability, QualiPHY packages are the best solution for compliance testing. For standards not supported with QualiPHY compliance packages, jitter and eye diagram test toolsets are generally included in the SDA 8 Zi-A models.

Digital Filter Software Package (WM8Zi-DFP2)

Create and apply a variety of FIR and IIR digital filters to your capture waveforms or processed traces.
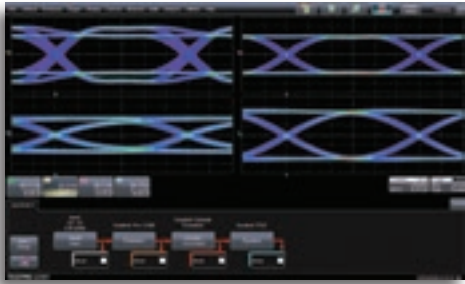
Eye Doctor II—Advanced Signal Integrity Tools (WM8Zi-EYEDRII)

Eye Doctor II and Virtual Probe Signal Integrity Tools provide the ability to add precision to signal integrity measurements by allowing subtraction of fixture effects and emulation of emphasis, serial data channels and provide for receiver equalization.

Learn More

teledynelecroy.com/dl/1023
teledynelecroy.com/vid/M0T6WEC0JYQ
teledynelecroy.com/dl/1216
teledynelecroy.com/dl/1136
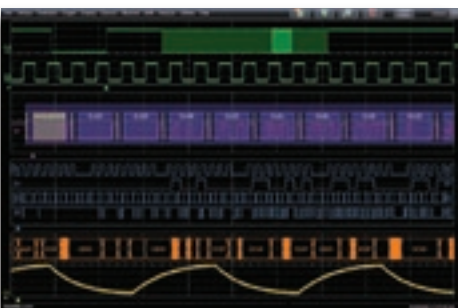
Mixed Signal Oscilloscope Option (MS-250/MS-500)

The Mixed Signal options allow the WaveMaster 8 Zi-A to convert to a mixed signal oscilloscope with up to 36 digital channels with 2 GS/s digital sample rate and 50 Mpts/Ch.
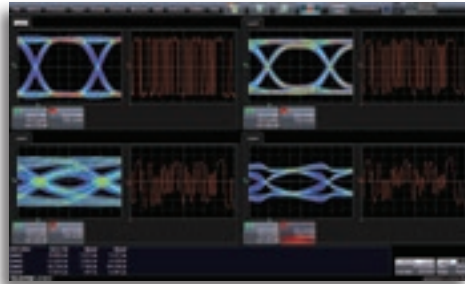
Virtual Probe Signal Integrity Tools (WM8Zi-VIRTUALPROBE)

Provides ability to define a complex serial data channel or other complex topology with up to six circuit elements that may be embedded or de-embedded from the signal path, allowing "probing" at a location different than the measured position.

Spectrum Analyzer Analysis Package (WM8Zi-SPECTRUM)

SPECTRUM converts the controls of your oscilloscope to those of a spectrum analyzer. Adjust the frequency span, resolution and center frequency. Apply filtering to your signal and watch the frequency signature change in real time. A unique peak search labels spectral components and presents frequency and level in a table. Touch any line to move to that peak.
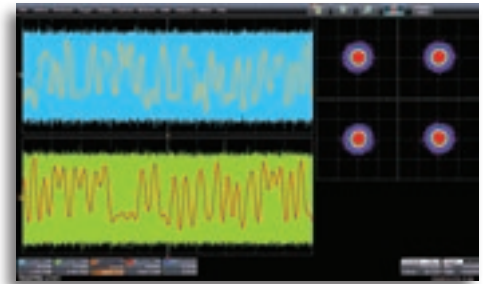
Optical Coherent Modulation Analysis

For Optical Coherent Modulation analysis at 112 Gb/s (28 GBaud) or higher, Teledyne LeCroy's 8 Zi-A oscilloscopes are the ideal digital acquisition system. 20 GHz four channel models (820Zi-A) with upgrade paths to 30 or 45 GHz are an economical and versatile solution for 28 GBaud testing. For > 28 GBaud testing, Teledyne LeCroy provides a variety of bandwidth and channel count solutions at 30, 36, 50, 60, and 65 GHz. Consult Teledyne LeCroy for more details.

Learn More

teledynelecroy.com/dl/1314
teledynelecroy.com/dl/3005

HIGH BANDWIDTH PROBING SOLUTIONS

Ultra-wideband Architecture for Superior Signal Fidelity

Teledyne LeCroy's WaveLink® high bandwidth differential probes utilize advanced differential traveling wave (distributed) amplifier architecture to achieve superior high frequency analog broadband performance.

Highest Bandwidth (25 GHz) Solder-In Lead

Up to 25 GHz Solder-In performance with system (probe + oscilloscope) rise times equal to that of the oscilloscope alone.

Ultra-compact Positioner (Browser) Tip

The most compact positioner tip browser with bandwidth up to 22 GHz makes probing in confined areas easy.

Superior Probe Impedance Minimizes Circuit Loading

Circuit and signal loading is reduced by more than 50% with WaveLink high bandwidth probes compared to competitive probes. In the mid-band frequency range, the difference is even more apparent.

Superior Signal Fidelity and Lowest Noise

WaveLink has exceptional noise performance. In fact, the combination of the probe and the oscilloscope results in measurement performance that is nearly identical to that of a cable input.

D2505-A-PS 25 GHz probe system with Solder-In lead and browser positioner tip.

	D1305-A, D1305-A-PS	D1605-A, D1605-A-PS	D2005-A, D2005-A-PS	D2505-A, D2505-A-PS
Bandwidth	Dxx05-SI and Dxx05-PT Tips 13 GHz	Dxx05-SI and Dxx05-PT Tips 16 GHz	Dxx05-SI and Dxx05-PT Tips 20 GHz	Dxx05-SI Lead 25 GHz Dxx05-PT Tip 22 GHz typical 20 GHz guaranteed
Rise Time (10–90%)	Dxx05-SI and Dxx05-PT Tips 32.5 ps (typical)	Dxx05-SI and Dxx05-PT Tips 28 ps (typical)	Dxx05-SI and Dxx05-PT Tips 20 ps (typical)	Dxx05-SI Lead 17.5 ps (typical) Dxx05-PT Tip 19 ps (typical)
Rise Time (20–80%)	Dxx05-SI and Dxx05-PT Tips 24.5 ps (typical)	Dxx05-SI and Dxx05-PT Tips 21 ps (typical)	Dxx05-SI and Dxx05-PT Tips 15 ps (typical)	Dxx05-SI Lead 13 ps (typical) Dxx05-PT Tip 14 ps (typical)
Noise (Probe)	< 14 nV/√Hz (1.6 mV$_{rms}$) (typical)	< 14 nV/√Hz (1.8 mV$_{rms}$) (typical)	< 18 nV/√Hz (2.5 mV$_{rms}$) (typical)	< 18 nV/√Hz (2.8 mV$_{rms}$) (typical)
Input Dynamic Range	2.0 V$_{pk-pk}$, (±1.0 V) (nominal)			
Input Common Mode Voltage Range	±4 V (nominal)			
Input Offset Voltage Range	±2.5 V Differential (nominal)			
Impedance (mid-band, typical)	**Dxx05-SI Lead:** 300 Ω at 6 GHz, 525 Ω at 13 GHz, 600 Ω at 16 GHz, 300 Ω at 20 GHz, 120 Ω at 25 GHz **Dxx05-PT Tip:** 160 Ω at 6 GHz, 450 Ω at 13 GHz, 240 Ω at 16 GHz, 210 Ω at 20 GHz			

Dxx30-PS Differential Probe Systems

Available in 8, 10, and 13 GHz, the Dxx30 models have an optional SMA/SMP lead set for attaching to the device under test (DUT). Additionally, solder-in, positioner (browser) tip, and square pin leads are available.

BROAD RANGE OF PROBING SOLUTIONS

WaveMaster 8 Zi-A oscilloscope support a broad range of probes for a variety of applications.

ZS Series High Impedance Active Probes

- 1 GHz (ZS1000), 1.5 GHz (ZS1500) and 2.5 GHz (ZS2500) bandwidths
- High Impedance (0.9 pF, 1 MΩ)
- Extensive standard and available probe tip and ground connection accessories
- ±12 Vdc offset (ZS1500)
- Teledyne LeCroy ProBus system

High-Voltage Passive Probes

- Suitable for safe, accurate high-voltage measurements
- 1.2 kV to 20 kV
- Works with any 1 MΩ input oscilloscope

Current Probes

- Range of probes from 30 A_{rms} (50 A_{peak}) to 500 A_{rms} (700 A_{peak})
- 2 MHz to 100 MHz bandwidths
- Small form factor accommodates large conductors with small jaw size
- Teledyne LeCroy ProBus system

ZD Series Differential Probes

- 200 MHz, 500 MHz, GHz and 1.5 GHz bandwidths
- Wide range of probing accessories
- Teledyne LeCroy ProBus system

High-Voltage Differential Probes

- 20 MHz and 100 MHz bandwidth
- 1,000 V_{rms} common mode voltage
- 1,400 V_{peak} differential voltage
- EN 61010 CAT III
- 80 dB CMRR at 50/60 Hz
- Teledyne LeCroy ProBus system

WaveLink Differential Probes

- 4 and 6 GHz models
- Solder-In, Browser, Quick Connect, Square Pin, Positioner Tip and HiTemp Cables

WaveLink Medium Bandwidth Differential Probes

- 8, 10, and 13 GHz models
- 3.5 V_{p-p} Input Dynamic Range
- ±4 V Offset
- Solder-in, Positioner (Browser), Square Pin, and SMA/SMP lead connection

Optical-to-Electrical Converter (OE695G)

- Frequency range DC to 9.5 GHz (electrical, -3 dB)
- Reference receiver support from 8GFC to 10GFC FEC, or Custom (<12.5 Gb/s)
- 62.5/125 µm multi-mode or single-mode fiber input
- Broad wavelength range (750 to 1650 nm)
- +7 dBm (5 mW) max peak optical power
- Low noise (as low as 25 pW/√Hz)

SPECIFICATIONS

Vertical System	WaveMaster 804Zi-A (SDA)	WaveMaster 806Zi-A (SDA)	WaveMaster 808Zi-A (SDA/DDA)	WaveMaster 813Zi-A (SDA)	WaveMaster 816Zi-A (SDA)	WaveMaster 820Zi-A (SDA, DDA)
Analog Bandwidth @ 50 Ω (-3 dB) (ProLink Input)	4 GHz (≥ 10 mV/div)	6 GHz (≥ 10 mV/div)	8 GHz (≥ 10 mV/div)	13 GHz (≥ 10 mV/div)	16 GHz (≥ 10 mV/div)	20 GHz (≥ 10 mV/div)
Analog Bandwidth @ 50 Ω (-3 dB) (ProBus Input)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)
Analog Bandwidth @ 1 MΩ (-3 dB) (ProBus Input)	500 MHz (typical, ≥ 2 mV/div)					
Rise Time (10–90%, 50 Ω)	95 ps (test limit, flatness mode)	63 ps (test limit, flatness mode)	49 ps (test limit, flatness mode)	32.5 ps (test limit, flatness mode)	28.5 ps (test limit, flatness mode)	22 ps (test limit, flatness mode)
Rise Time (20–80%, 50 Ω)	71 ps (flatness mode)	47 ps (flatness mode)	37 ps (flatness mode)	24.5 ps (flatness mode)	21.5 ps (flatness mode)	16.5 ps (flatness mode)
Input Channels	4 (Any combination of ProLink and ProBus inputs)					
Bandwidth Limiters	20 MHz, 200 MHz, 1 GHz	20 MHz, 200 MHz, 1 GHz, 4 GHz	20 MHz, 200 MHz, 1 GHz, 4 GHz, 6 GHz	20 MHz, 200 MHz, 1 GHz, 4 GHz, 6 GHz, 8 GHz	20 MHz, 200 MHz, 1 GHz, 4 GHz, 6 GHz, 8 GHz, 13 GHz	20 MHz, 200 MHz, 1 GHz, 4 GHz, 6 GHz, 8 GHz, 13 GHz, 16 GHz
Input Impedance	ProLink Inputs: 50 Ω ±2% for ≤ 100 mV/div, 50 Ω ±3% for > 100 mV/div ProBus Inputs: 50 Ω ±2% or 1 MΩ ‖ 16 pF, 10 MΩ ‖ 11 pF with supplied Probe					
Input Coupling	ProLink Inputs: 50 Ω: DC, GND ProBus Inputs: 1 MΩ: AC, DC, GND; 50 Ω: DC, GND					
Maximum Input Voltage	50 Ω (ProLink): ±2 V max. @ ≤ 100 mV/div, 5.5 V_{rms} @ > 100 mV/div 50 Ω (ProBus): ±5 V max., 3.5 V_{rms} 1 MΩ (ProBus): 250 V max. (peak AC: < 10 kHz + DC)					
Channel-Channel Isolation	DC to 10 GHz: 50 dB (> 315:1) 10 to 15 GHz: 46 dB (> 200:1) 15 to 20 GHz: 40 dB (> 100:1) (For any two ProLink input channels, same or different v/div settings, typical)					
Vertical Resolution	8 bits up to 11 bits with enhanced resolution (ERES)					

SPECIFICATIONS

Vertical System	WaveMaster 825Zi-A (SDA)	WaveMaster 830Zi-A (SDA, DDA)	WaveMaster 845Zi-A (SDA)
Analog Bandwidth @ 50 Ω (-3 dB) (2.4/2.92 mm input)	25 GHz	30 GHz	45 GHz
Analog Bandwidth @ 50 Ω (-3 dB) (ProLink Input)	20 GHz (≥ 10 mV/div)	20 GHz (≥ 10 mV/div)	20 GHz (≥ 10 mV/div)
Analog Bandwidth @ 50 Ω (-3 dB) (ProBus Input)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)	3.5 GHz (≥ 10 mV/div)
Analog Bandwidth @ 1 MΩ (-3 dB) (ProBus Input)	500 MHz (typical, ≥ 2 mV/div)		
Rise Time (10–90%, 50 Ω)	17.5 ps (test limit, flatness mode)	15.5 ps (test limit, flatness mode)	10.5 ps (test limit, flatness mode)
Rise Time (20–80%, 50 Ω)	13 ps (flatness mode)	11.5 ps (flatness mode)	8.0 ps (flatness mode)
Input Channels	4 (Any combination of 20 GHz ProLink inputs or 3.5 GHz ProBus inputs), 3 (1 @ full BW, 2 with ProLink or ProBus input), or 2 (@ full BW)		4 (Any combination of 20 GHz ProLink inputs or 3.5 GHz ProBus inputs), 3 (1 @ 30 GHz, 2 with either ProLink or ProBus input), 2 at 30 GHz, 1 at 45 GHz
Bandwidth Limiters	For ≤ 20 GHz Mode: 20 MHz, 200 MHz, 1 GHz, 4 GHz, 6 GHz, 8 GHz, 13 GHz, 16 GHz For > 20 GHz Mode: 20 GHz	For ≤ 20 GHz Mode: 20 MHz, 200 MHz, 1 GHz, 4 GHz 6 GHz, 8 GHz, 13 GHz, 16 GHz For > 20 GHz Mode: 20 GHz, 25 GHz	For ≤ 20 GHz Mode: 20 MHz, 200 MHz, 1 GHz, 4 GHz, 6 GHz, 8 GHz, 13 GHz, 16 GHz For 25 and 30 GHz Mode: 20 GHz, 25 GHz, 30 GHz For 45 GHz Mode: none
Input Impedance	2.92 mm Inputs: 50 Ω ±2% for ≤ 79 mV/div, 50 Ω ±3% for > 79 mV/div ProLink Inputs: 50 Ω ±2% for ≤ 100 mV/div, 50 Ω ±3% for > 100 mV/div ProBus Inputs: 50 Ω ±2% or 1 MΩ ‖ 16 pF, 10 MΩ ‖ 11 pF with supplied Probe		2.4/2.92 mm Inputs: 50 Ω ±2% for ≤ 79 mV/div, 50 Ω ±3% for > 79 mV/div ProLink Inputs: 50 Ω ±2% for ≤ 100 mV/div, 50 Ω ±3% for > 100 mV/div ProBus Inputs: 50 Ω ±2% or 1 MΩ ‖ 16pF, 10 MΩ ‖ 11 pF with supplied Probe
Input Coupling	2.92 mm Inputs: 50 Ω: DC, GND ProLink Inputs: 50 Ω: DC, GND ProBus Inputs: 1 MΩ: AC, DC, GND; 50 Ω: DC, GND		2.4/2.92 mm Inputs: 50 Ω: DC, GND ProLink Inputs: 50 Ω: DC, GND ProBus Inputs: 1 MΩ: AC, DC, 50 Ω: DC, GND
Maximum Input Voltage	2.92 mm Inputs: ±2 Vmax @ ≤ 100 mV/div, 5.5 V_{rms} @ > 100 mV/div 50 Ω (ProLink): ±2 Vmax @ ≤ 100 mV/div, 5.5 V_{rms} @ > 100 mV/div 50 Ω (ProBus): ±5 Vmax, 3.5 V_{rms} 1 MΩ (ProBus): 250 Vmax (peak AC: < 10 kHz + DC)		2.4/2.92 mm Inputs: ±2 Vmax @ ≤ 100 mV/div, 5.5 V_{rms} @ > 100 mV/div 50 Ω (ProLink): ±2 Vmax @ ≤ 100 mV/div, 5.5 V_{rms} @ > 100 mV/div 50 Ω (ProBus): ±5 Vmax, 3.5 V_{rms} 1 MΩ (ProBus): 250 Vmax (peak AC: < 10 kHz + DC)
Channel-Channel Isolation	DC to 10 GHz: 50 dB (> 315:1) 10 to 15 GHz: 46 dB (> 200:1) 15 to 20 GHz: 40 dB (> 100:1) 20 GHz to Max BW: 30 dB (> 32:1) (For any two ProLink or 2.92 mm input channels, same or different v/div settings, typical)		
Vertical Resolution	8 bits up to 11 bits with enhanced resolution (ERES)		

SPECIFICATIONS

Vertical System (cont'd)	WaveMaster 804Zi-A (SDA)	WaveMaster 806Zi-A (SDA)	WaveMaster 808Zi-A (SDA/DDA)	WaveMaster 813Zi-A (SDA)	WaveMaster 816Zi-A (SDA)	WaveMaster 820Zi-A (SDA, DDA)
Sensitivity	50 Ω (ProLink): 2 mV–1 V/div, fully variable (2–9.9 mV/div via zoom) 50 Ω (ProBus): 2 mV–1 V/div, fully variable 1 MΩ (ProBus): 2 mV–10 V/div, fully variable					
DC Vertical Gain Accuracy (Gain Component of DC Accuracy)	±1% F.S. (typical), offset at 0 V; ±1.5% F.S. (test limit), offset at 0 V					
Vertical Noise Floor (50 mV/div)	1.20 mV$_{rms}$ (typical)	1.60 mV$_{rms}$ (typical)	1.80 mV$_{rms}$ (typical)	1.80 mV$_{rms}$ (typical)	1.90 mV$_{rms}$ (typical)	2.20 mV$_{rms}$ (typical)
Offset Range	50 Ω (ProLink): ±500 mV @ 2–100 mV/div ±4 V @ > 100 mV/div–1 V/div 50 Ω (ProBus): ±750 mV @ 2–100 mV/div ±4 V @ > 100 mV/div–1 V/div 1 MΩ: ±1 V @ 2–140 mV/div ±10 V @ 142 mV–1.40 V/div ±100 V @ 1.42 V–10 V/div					
DC Vertical Offset Accuracy	±(1.5% of offset setting + 1.5% F.S. + 1 mV) (test limit)					

Horizontal System

Timebases	Internal time base common to 4 input channels
Time/Division Range	20 ps/div–128 s/div, depending on memory length **Real-time Mode:** 20 ps/div–64 s/div; **RIS Mode:** 20 ps/div–10 ns/div; user selectable at ≤ 10 ns/div; **Roll Mode:** 100 ms/div up to 128 s/div, user selectable at ≥ 100 ms/div and ≤ 5 MS/s
Clock Accuracy	< 1 ppm + (aging of 0.5 ppm/yr from last calibration)
Sample Clock Jitter	Up to 10μs Acquired Time Range: 100 fsrms (Internal Timebase Reference) Up to 6.4ms Acquired Time Range: 150 fsrms (Internal Timebase Reference)
Delta Time Measurement Accuracy	$\sqrt{2} * \sqrt{\left(\dfrac{Noise}{SlewRate}\right)^2 + (Sample\ Clock\ Jitter)^2}$ (RMS) + (clock accuracy * reading) (seconds)
Jitter Measurement Floor	$\sqrt{\left(\dfrac{Noise}{SlewRate}\right)^2 + (Sample\ Clock\ Jitter)^2}$ seconds$_{rms}$ (TIE)

Jitter Between Channels (TIE, typical, measured at maximum bandwidth)	<500 fs$_{rms}$	<450 fs$_{rms}$	<425 fs$_{rms}$	<325 fs$_{rms}$	<300 fs$_{rms}$	<250 fs$_{rms}$

Trigger and Interpolator Jitter	< 0.1 ps$_{rms}$ (typical, software assisted), 2 ps$_{rms}$ (typical, hardware)
Channel-Channel Deskew Range	±9 x time/div. setting or 25 ns max. (whichever is larger), each channel
External Time base Reference (Input)	10 MHz; 50 Ω impedance, applied at the rear input
External Time base Reference (Output)	10 MHz; 50 Ω impedance, output at the rear

SPECIFICATIONS

Vertical System (cont'd)	WaveMaster 825Zi-A (SDA)	WaveMaster 830Zi-A (SDA, DDA)	WaveMaster 845Zi-A (SDA)
Sensitivity	**50 Ω (2.92 mm):** 10 mV–500 mV/div, fully variable **50 Ω (ProLink):** 2 mV–1 V/div, fully variable (2–9.9 mV/div via zoom) **50 Ω (ProBus):** 2 mV–1 V/div, fully variable **1 MΩ (ProBus)** 2 mV–10 V/div, fully variable		**50 Ω (2.4/2.92 mm):** 10 mV–500 mV/div, fully variable **50 Ω (ProLink):** 2 mV–1 V/div, fully variable (2–9.9 mV/div via zoom) **50 Ω (ProBus):** 2 mV–1 V/div, fully variable **1 MΩ (ProBus):** 2 mV–10 V/div, fully variable
DC Vertical Gain Accuracy (Gain Component of DC Accuracy)	±1% F.S. (typical), offset at 0 V; ±1.5% F.S. (test limit), offset at 0 V		
Vertical Noise Floor (50 mV/div)	2.80 mV$_{rms}$ (typical)	2.90 mV$_{rms}$ (typical)	3.90 mV$_{rms}$ (typical)
Offset Range	**50 Ω (2.92 mm):** ±500 mV @ 10–79 mV/div ±4 V @ 80 mV/div–500 mV/div **50 Ω (ProLink):** ±500 mV @ 2–100 mV/div ±4 V @ >100 mV/div–1 V/div **50 Ω (ProBus):** ±750 mV @ 2–100 mV/div ±4 V @ >100 mV/div–1 V/div **1 MΩ:** ±1 V @ 2–128 mV/div ±10 V @ 130 mV–1.28 V/div ±100 V @ 1.3 V–10 V/div		**50 Ω (2.4/2.92 mm):** ±500 mV @ 10–79 mV/div ±4 V @ 80 mV/div–500 mV/div **50 Ω (ProLink):** ±500 mV @ 2–100 mV/div ±4 V @ >100 mV/div–1 V/div **50 Ω (ProBus):** ±750 mV @ 2–100 mV/div ±4 V @ > 100 mV/div–1 V/div **1 MΩ:** ±1V @ 2–128 mV/div ±10 V @ 130 mV–1.28 V/div ±100 V @ 1.3 V–10 V/div
DC Vertical Offset Accuracy	±(1.5% of offset setting + 1.5% F.S. + 1 mV) (test limit)		

Horizontal System

Timebases	Internal time base common to 4 input channels		
Time/Division Range	For ≥ **25 GHz Mode:** **Real-time Mode:** 20 ps/div–640 µs/div, depending on memory length For ≤ **20 GHz Mode:** 20 ps/div–128 s/div, depending on memory length **Real-time Mode:** 20 ps/div–64 s/div; **RIS Mode:** 20 ps/div–10 ns/div, user selectable at ≤10 ns/div; **Roll Mode:** 100 ms/div up up to 128 s/div, user selectable at ≥ 100 ms/div and ≤ 5 MS/s		
Clock Accuracy	< 1 ppm + (aging of 0.5 ppm/yr from last calibration)		
Sample Clock Jitter	Up to 10µs Acquired Time Range: 100 fsrms (Internal Timebase Reference) Up to 6.4ms Acquired Time Range: 150 fsrms (Internal Timebase Reference)		
Delta Time Measurement Accuracy	$\sqrt{2} * \sqrt{\left(\dfrac{Noise}{SlewRate}\right)^2 + (Sample\ Clock\ Jitter)^2}$ *(RMS) + (clock accuracy * reading) (seconds)*		
Jitter Measurement Floor	$\sqrt{\left(\dfrac{Noise}{SlewRate}\right)^2 + (Sample\ Clock\ Jitter)^2}$ *seconds$_{rms}$ (TIE)*		
Jitter Between Channels (TIE, typical, measured at maximum bandwidth)	<250 fs$_{rms}$		
Trigger and Interpolator Jitter	< 0.1 ps$_{rms}$ (typical, software assisted), 2 ps$_{rms}$ (typical, hardware)		
Channel-Channel Deskew Range	±9 x time/div. setting or 25 ns max. (whichever is larger), each channel		
External Time base Reference (Input)	10 MHz; 50 Ω impedance, applied at the rear input		
External Time base Reference (Output)	10 MHz; 50 Ω impedance, output at the rear		

SPECIFICATIONS

Acquisition System	WaveMaster 804Zi-A (SDA)	WaveMaster 806Zi-A (SDA)	WaveMaster 808Zi-A (SDA/DDA)	WaveMaster 813Zi-A (SDA)	WaveMaster 816Zi-A (SDA)	WaveMaster 820Zi-A (SDA, DDA)
Single-Shot Sample Rate/Ch	40 GS/s on 4 Ch (80 GS/s on 2 Ch using optional WM8Zi-2X80GS External Interleaving Device)					
Random Interleaved Sampling (RIS)	200 GS/s for repetitive signals (20 ps/div to 10 ns/div)					
Maximum Trigger Rate	1,000,000 waveforms/second (in Sequence Mode, up to 4 channels)					
Intersegment Time	1 µs					
Maximum Acquisition Memory	256 Mpts/Ch					
Standard Memory (4 Ch/2 Ch/1 Ch) (Number of Segments)	20M / 20M / 20M (32M / 32M / 32M) (Memory and Sample Rate can be doubled in 1 or 2 Ch mode with use of WM8Zi-2X80GS External Interleaving Device) (2000)					
Memory Options (4 Ch/2 Ch/1 Ch) (Number of Segments)	S-32 Option (WaveMaster models only): 32M / 32M / 32M (7,500) — M-64 Option: 64M / 64M / 64M (15,000) — L-128 Option: 128M / 128M / 128M (15,000) — VL-256 Option: 256M / 256M / 256M (15,000) — Note: On all memory options, WM8Zi-2X80GS External Interleaving Device permits 80 GS/s on 1 or 2 Ch with twice the memory)					

Acquisition Processing

Averaging	Summed averaging to 1 million sweeps continuous averaging to 1 million sweeps
Enhanced Resolution (ERES)	From 8.5 to 11 bits vertical resolution
Envelope (Extrema)	Envelope, floor, or roof for up to 1 million sweeps
Interpolation	Linear or Sin x/x

Triggering System

Modes	Normal, Auto, Single, and Stop				
Sources	Any input channel, Aux, Aux/10, Line, or Fast Edge. Slope and level unique to each source (except line trigger)				
Coupling Mode	DC, AC, HFRej, LFRej				
Pre-trigger Delay	0–100% of memory size (adjustable in 1% increments of 100 ns)				
Post-trigger Delay	0–10,000 divisions in real time mode, limited at slower time/div settings or in roll mode				
Hold-off by Time or Events	From 2 ns up to 20 s or from 1 to 99,999,999 events				
Internal Trigger Range	±4.1 div from center				
Trigger Sensitivity with Edge Trigger (Ch 1–4) 1.85/2.4/2.92mm Inputs	Not Applicable				
Trigger Sensitivity with Edge Trigger (Ch 1–4) ProBus Inputs	2 div @ < 3.5 GHz 1.5 div @ < 1.75 GHz 1.0 div @ < 200 MHz (for DC coupling, ≥ 10 mV/div, 50 Ω)				
Trigger Sensitivity with Edge Trigger (Ch 1–4) ProLink Inputs	2 div @ < 4 GHz, 1.5 div @ < 3 GHz, 1.0 div @ < 200 MHz, (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)	2 div @ < 6 GHz 1.5 div @ < 3 GHz 1.0 div @ < 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)	2 div @ < 8 GHz 1.5 div @ < 3 GHz 1.0 div @ < 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)	3 div @ < 13 GHz 1.5 div @ < 3 GHz 1.0 div @ < 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)	3 div @ < 15 GHz 1.5 div @ < 3 GHz 1.0 div @< 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)

SPECIFICATIONS

Acquisition System	WaveMaster 825Zi-A (SDA)	WaveMaster 830Zi-A (SDA, DDA)	WaveMaster 845Zi-A (SDA)
Single-Shot Sample Rate/Ch	40 GS/s on 4 Ch (80 GS/s on 2 Ch when operated in ≥ 25 GHz Mode)		40 GS/s on 4 Ch (80 GS/s on 2 Ch when operated in ≥ 25 GHz Mode), 120 GS/s on 1 Ch when operated in 45 GHz Mode)
Random Interleaved Sampling (RIS)	For ≥ 25 GHz Mode: Not applicable For < 25 GHz Mode: 200 GS/s for repetitive signals (20 ps/div to 10 ns/div)		
Maximum Trigger Rate	1,000,000 waveforms/second (in Sequence Mode, up to 4 channels)		
Intersegment Time	1 µs		
Maximum Acquisition Memory	512 Mpts/Ch (2 Ch operation)		768 Mpts/Ch (1 Ch operation)
Standard Memory (4 Ch / 2 Ch / 1Ch) (Number of Segments)	40M / 40M (64M / 64M) (1000)		60M (96M) (1000)
Memory Options (2 Ch / 1 Ch for 25 or 30 GHz) (1 Ch for 45 GHz) (Number of Segments)	S-32 Option (WaveMaster models only): 64M / 64M (3,500) M-64 Option: 128M / 128M (7,500) L-128 Option: 256M / 256M (15,000) VL-256 Option: 512M / 512M (15,000) Note: In ≤ 20 GHz Modes, reference memory specification for WaveMaster 820Zi-A.		S-32 Option (WaveMaster models only): 96M (3,500) M-64 Option: 192M (7,500) L-128 Option: 384M (15,000) VL-256 Option: 768M (15,000) Note: In ≤ 30 GHz or ≤ 20 GHz Modes, reference memory specification for WaveMaster 830Zi-A and 820Zi-A respectively.

Acquisition Processing

Averaging	Summed averaging to 1 million sweeps continuous averaging to 1 million sweeps
Enhanced Resolution (ERES)	From 8.5 to 11 bits vertical resolution
Envelope (Extrema)	Envelope, floor, or roof for up to 1 million sweeps
Interpolation	Linear or Sin x/x

Triggering System

Modes	Normal, Auto, Single, and Stop
Sources	Any input channel, Aux, Aux/10, Line, or Fast Edge. Slope and level unique to each source (except line trigger)
Coupling Mode	DC, AC, HFRej, LFRej
Pre-trigger Delay	0–100% of memory size (adjustable in 1% increments of 100 ns)
Post-trigger Delay	0–10,000 divisions in real time mode, limited at slower time/div settings or in roll mode
Hold-off by Time or Events	From 2 ns up to 20 s or from 1 to 99,999,999 events
Internal Trigger Range	±4.1 div from center
Trigger Sensitivity with Edge Trigger (Ch 1–4) 1.85/2.4/2.92mm Inputs	3 div @ < 15 GHz 1.5 div @ < 3 GHz 1.0 div @ < 200 MHz (for DC coupling, ≥ 10 mV/div, 50 Ω)
Trigger Sensitivity with Edge Trigger (Ch 1–4) ProBus Inputs	2 div @ < 3.5 GHz 1.5 div @ < 1.75 GHz 1.0 div @ < 200 MHz (for DC coupling, ≥ 10 mV/div, 50 Ω)
Trigger Sensitivity with Edge Trigger (Ch 1–4) ProLink Inputs	3 div @ < 15 GHz 1.5 div @ < 3 GHz 1.0 div @< 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)

SPECIFICATIONS

Triggering System (cont'd)	WaveMaster 804Zi-A (SDA)	WaveMaster 806Zi-A (SDA)	WaveMaster 808Zi-A (SDA/DDA)	WaveMaster 813Zi-A (SDA)	WaveMaster 816Zi-A (SDA)	WaveMaster 820Zi-A (SDA, DDA)
External Trigger Sensitivity (Edge Trigger)	2 div @ < 1 GHz 1.5 div @ < 500 MHz 1.0 div @ < 200 MHz (for DC, coupling)					
Max. Trigger Frequency, SMART Trigger	2.0 GHz @ ≥ 10 mV/div (minimum triggerable width 200 ps)					
External Trigger Input Range	Aux (±0.4 V); Aux/10 (±4 V)					

Basic Triggers

Edge	Triggers when signal meets slope (positive, negative, or either) and level condition
Window	Triggers when signal exits a window defined by adjustable thresholds
TV-Composite Video	Triggers NTSC or PAL with selectable line and field HDTV (720p, 1080i, 1080p) with selectable frame rate (50 or 60 Hz) and Line or CUSTOM with selectable Fields (1–8), Lines (up to 2000), Frame Rates (25, 30, 50, or 60 Hz), Interlacing (1:1, 2:1, 4:1, 8:1), or Synch Pulse Slope (Positive or Negative)

SMART Triggers™

State or Edge Qualified	Triggers on any input source only if a defined state or edge occurred on another input source. Holdoff between sources is selectable by time or events
Qualified First	In Sequence acquisition mode, triggers repeatably on event B only if a defined pattern, state, or edge (event A) is satisfied in the first segment of the acquisition. Holdoff between sources is selectable by time or events
Dropout	Triggers if signal drops out for longer than selected time between 1 ns and 20 s
Pattern	Logic combination (AND, NAND, OR, NOR) of 5 inputs (4 channels and external trigger input). Each source can be high, low, or don't care. The High and Low level can be selected independently. Triggers at start or end of the pattern

SMART Triggers with Exclusion Technology

Glitch	Triggers on positive or negative glitches with widths selectable as low as 200 ps to 20 s, or on intermittent faults
Width (Signal or Pattern)	Triggers on positive, negative, or both widths with widths selectable as low as 200 ps to 20 s, or on intermittent faults
Interval (Signal or Pattern)	Triggers on intervals selectable between 1 ns and 20 s
Timeout (State/Edge Qualified)	Triggers on any source if a given state (or transition edge) has occurred on another source. Holdoff between sources is 1 ns to 20 s, or 1 to 99,999,999 events
Runt	Trigger on positive or negative runts defined by two voltage limits and two time limits. Select between 1 ns and 20 ns
Slew Rate	Trigger on edge rates. Select limits for dV, dt, and slope. Select edge limits between 1 ns and 20 ns
Exclusion Triggering	Trigger on intermittent faults by specifying the expected behavior and triggering when that condition is not met

Cascade (Sequence) Triggering

Capability	Arm on "A" event, then Trigger on "B" event. Or Arm on "A" event, then Qualify on "B" event, and Trigger on "C" event. Or Arm on "A" event, then Qualify on "B" then "C" event, and Trigger on "D" event
Types	Cascade A then B: Edge, Window, Pattern (Logic) Width, Glitch, Interval, Dropout, or Measurement. Measurement can be on Stage B only. Cascade A then B then C (Measurement): Edge, Window, Pattern (Logic), Width, Glitch, Interval, Dropout, or Measurement. Measurement can be on Stage C only. Cascade A then B then C: Edge, Window, Pattern (Logic). Cascade A then B then C then D: Edge, Window, Pattern (Logic), or Measurement. Measurement can be on Stage D only.
Holdoff	Holdoff between A and B, B and C, C and D is selectable by time (1ns to 20s) or number of events. Measurement trigger selection as the last stage in a Cascade precludes a holdoff setting between the prior stage and the last stage.

High-speed Serial Protocol Triggering

Data Rates	Option WM8Zi-6GBIT-80B-8B10B-TD: 600 Mb/s to 6.5 Gb/s, Channel 4 input only Option WM8Zi-14GBIT-80B-8B10B-TD: 600 Mb/s to 14.1 Gb/s, Channel 4 input only (Standard on SDA models: 600 Mb/s to 6.5 Gb/s, Channel 4 input only. Option SDA8Zi-UPG-14GBIT-80B-8B10B-TD: 600 Mb/s to 14.1 Gb/s, Channel 4 input only)
Pattern Length	80 bits NRZ, eight 8b/10b symbols
Clock and Data Outputs	No Clock and Data Recovery outputs provided

Low Speed Serial Protocol Triggering (Optional)

	I²C, SPI (SPI, SSPI, SIOP), UART-RS232, CAN, LIN, FlexRay, MIL-STD-1553, AudioBus

Measurement Trigger

	Select from a large number of measurement parameters trigger on a measurement value with qualified limits. Can be used as only trigger or last event in a Cascade Trigger.

SPECIFICATIONS

Triggering System (cont'd)	WaveMaster 825Zi-A (SDA)	WaveMaster 830Zi-A (SDA, DDA)	WaveMaster 845Zi-A (SDA)
External Trigger Sensitivity (Edge Trigger)	2 div @ < 1 GHz 1.5 div @ < 500 MHz 1.0 div @ < 200 MHz (for DC, coupling)		
Max. Trigger Frequency, SMART Trigger	2.0 GHz @ ≥ 10 mV/div (minimum triggerable width 200 ps)		
External Trigger Input Range	Aux (±0.4 V); Aux/10 (±4 V)		

Basic Triggers

Edge	Triggers when signal meets slope (positive, negative, or either) and level condition
Window	Triggers when signal exits a window defined by adjustable thresholds
TV-Composite Video	Triggers NTSC or PAL with selectable line and field HDTV (720p, 1080i, 1080p) with selectable frame rate (50 or 60 Hz) and Line or CUSTOM with selectable Fields (1–8), Lines (up to 2000), Frame Rates (25, 30, 50, or 60 Hz), Interlacing (1:1, 2:1, 4:1, 8:1), or Synch Pulse Slope (Positive or Negative)

SMART Triggers™

State or Edge Qualified	Triggers on any input source only if a defined state or edge occurred on another input source. Holdoff between sources is selectable by time or events
Qualified First	In Sequence acquisition mode, triggers repeatably on event B only if a defined pattern, state, or edge (event A) is satisfied in the first segment of the acquisition. Holdoff between sources is selectable by time or events.
Dropout	Triggers if signal drops out for longer than selected time between 1 ns and 20 s
Pattern	Logic combination (AND, NAND, OR, NOR) of 5 inputs (4 channels and external trigger input). Each source can be high, low, or don't care. The High and Low level can be selected independently. Triggers at start or end of the pattern

SMART Triggers with Exclusion Technology

Glitch	Triggers on positive or negative glitches with widths selectable as low as 200 ps to 20 s, or on intermittent faults
Width (Signal or Pattern)	Triggers on positive, negative, or both widths with widths selectable as low as 200 ps to 20 s, or on intermittent faults
Interval (Signal or Pattern)	Triggers on intervals selectable between 1 ns and 20 s
Timeout (State/Edge Qualified)	Triggers on any source if a given state (or transition edge) has occurred on another source. Holdoff between sources is 1 ns to 20 s, or 1 to 99,999,999 events
Runt	Trigger on positive or negative runts defined by two voltage limits and two time limits. Select between 1 ns and 20 ns
Slew Rate	Trigger on edge rates. Select limits for dV, dt, and slope. Select edge limits between 1 ns and 20 ns
Exclusion Triggering	Trigger on intermittent faults by specifying the expected behavior and triggering when that condition is not met

Cascade (Sequence) Triggering

Capability	Arm on "A" event, then Trigger on "B" event. Or Arm on "A" event, then Qualify on "B" event, and Trigger on "C" event. Or Arm on "A" event, then Qualify on "B" then "C" event, and Trigger on "D" event
Types	Cascade A then B: Edge, Window, Pattern (Logic) Width, Glitch, Interval, Dropout, or Measurement. Measurement can be on Stage B only. Cascade A then B then C (Measurement): Edge, Window, Pattern (Logic), Width, Glitch, Interval, Dropout, or Measurement. Measurement can be on Stage C only. Cascade A then B then C: Edge, Window, Pattern (Logic). Cascade A then B then C then D: Edge, Window, Pattern (Logic), or Measurement. Measurement can be on Stage D only.
Holdoff	Holdoff between A and B, B and C, C and D is selectable by time (1ns to 20s) or number of events. Measurement trigger selection as the last stage in a Cascade precludes a holdoff setting between the prior stage and the last stage.

High-speed Serial Protocol Triggering

Data Rates	Option WM8Zi-6GBIT-80B-8B10B-TD: 600 Mb/s to 6.5 Gb/s, Channel 4 input only Option WM8Zi-14GBIT-80B-8B10B-TD: 600 Mb/s to 14.1 Gb/s, Channel 4 input only (Note: Channel 3 input will capture signal for triggering when oscilloscope is in ≥25 GHz mode) (Standard on SDA models: 600 Mb/s to 6.5 Gb/s, Channel 4 input only. Option SDA8Zi-UPG-14GBIT-80B-8B10B-TD: 600 Mb/s to 14.1 Gb/s, Channel 4 input only)
Pattern Length	80 bits NRZ, eight 8b/10b symbols
Clock and Data Outputs	No Clock and Data Recovery outputs provided

Low Speed Serial Protocol Triggering (Optional)

	I²C, SPI (SPI, SSPI, SIOP), UART-RS232, CAN, LIN, FlexRay, MIL-STD-1553, AudioBus

Measurement Trigger

	Select from a large number of measurement parameters trigger on a measurement value with qualified limits. Can be used as only trigger or last event in a Cascade Trigger.

SPECIFICATIONS

Color Waveform Display	WaveMaster 804Zi-A (SDA)	WaveMaster 806Zi-A (SDA)	WaveMaster 808Zi-A (SDA/DDA)	WaveMaster 813Zi-A (SDA)	WaveMaster 816Zi-A (SDA)	WaveMaster 820Zi-A (SDA, DDA)
Type	Color 15.3" flat panel TFT-Active Matrix LCD with high resolution touch screen					
Resolution	WXGA; 1280 x 768 pixels					
Number of Traces	Display a maximum of 16 traces (up to 40 with some software options). Simultaneously display channel, zoom, memory and math traces.					
Grid Styles	Auto, Single, Dual, Quad, Octal, X-Y, Single+X-Y, Dual+X-Y					
Waveform Representation	Sample dots joined, or sample dots only					

Integrated Second Display

Supports touch screen integration of user-supplied second display with split-grid capability.
(Note: touch screen driver for second display may not be a Fujitsu driver)

Processor/CPU

Type	Intel® Core™ i7-2600 Quad, 2.6 GHz (up to 3.8 GHz in Turbo mode) (or better)
Processor Memory	8 GB standard for STD memory (20 Mpt), S-32 and M-64 memory options 16 GB standard for L-128 and VL-256 memory options Up to 32 GB optional
Operating System	Microsoft Windows® 7 Professional Edition (64-bit)
Real Time Clock	Date and time displayed with waveform an in hardcopy files. SNTP support to synchronize to precision internal clocks

Interface

Remote Control	Via Windows Automation, or via Teledyne LeCroy Remote Command Set
Network Communication Standard	VXI-11 or VICP, LXI Class C (v1.2) Compliant
GPIB Port (Optional)	Supports IEEE – 488.2
LSIB Port (Optional)	Supports PCIe Gen1 x4 protocol with Teledyne LeCroy supplied API
Ethernet Port	Supports 10/100/1000BaseT Ethernet interface (RJ45 port)
USB Ports	Minimum 6 total (incl. 3 front panel) USB 2.0 ports support Windows compatible devices
External Monitor Port	15 pin D-Type WXGA compatible to support customer-supplied external monitor. Includes support for extended desktop operation with second monitor.
Serial Port	Not Available
Peripheral Bus	Teledyne LeCroy LBUS standard

Power Requirements

Voltage	100–240 VAC ±10% at 45–66 Hz, 100–120 VAC ±10% at 380–420 Hz, Automatic AC Voltage Selection, Installation Category II
Max. Power Consumption	975 W / 975 VA

Environmental

Temperature (Operating)	+5 °C to +40 °C including CD-RW/DVD-ROM drive
Temperature (Non-Operating)	–20 °C to +60 °C
Humidity (Operating)	5% to 80% relative humidity (non-condensing) up to +31 °C. Upper limit derates to 50% relative humidity (non-condensing) at +40 °C
Humidity (Non-Operating)	5% to 95% relative humidity (non-condensing) as tested per MIL-PRF-28800F
Altitude (Operating)	Up to 10,000 ft. (3048 m) at or below +25 °C
Random Vibration (Operating)	0.5 g_{rms} 5 Hz to 500 Hz, 15 minutes in each of three orthogonal axes
Random Vibration (Non-Operating)	2.4 g_{rms} 5 Hz to 500 Hz, 15 minutes in each of three orthogonal axes
Functional Shock	20 g_{peak}, half sine, 11 ms pulse, 3 shocks (positive and negative) in each of three orthogonal axes, 18 shocks total

Physical Dimensions

Dimensions (HWD)	14" H x 18.4" W x 16" D (355 x 467 x 406 mm) height excludes feet
Weight	51.5 lbs. (23.4 kg)
Shipping Weight	70 lbs. (31.8 kg)

Certifications

CE Compliant, UL and cUL listed; conforms to EN 61326, EN 61010-1, EN61010-2-030, UL 61010-1 3rd edition, and CSA C22.2 No. 61010-1-12

Warranty and Service

3-year warranty calibration recommended annually.
Optional service programs include extended warranty, upgrades, and calibration services

SPECIFICATIONS

Color Waveform Display	WaveMaster 825Zi-A (SDA)	WaveMaster 830Zi-A (SDA, DDA)	WaveMaster 845Zi-A (SDA)
Type	Color 15.3" flat panel TFT-Active Matrix LCD with high resolution touch screen		
Resolution	WXGA; 1280 x 768 pixels		
Number of Traces	Display a maximum of 16 traces (up to 40 with some software options). Simultaneously display channel, zoom, memory and math traces.		
Grid Styles	Auto, Single, Dual, Quad, Octal, X-Y, Single+X-Y, Dual+X-Y		
Waveform Representation	Sample dots joined, or sample dots only		

Integrated Second Display

Supports touch screen integration of user-supplied second display with split-grid capability.
(Note: touch screen driver for second display may not be a Fujitsu driver)

Processor/CPU

Type	Intel® Core™ i7-2600 Quad, 2.6 GHz (up to 3.8 GHz in Turbo mode) (or better)
Processor Memory	8 GB standard for STD memory (20 Mpt), S-32 and M-64 memory options 16 GB standard for L-128 and VL-256 memory options Up to 32 GB optional
Operating System	Microsoft Windows® 7 Professional Edition (64-bit)
Real Time Clock	Date and time displayed with waveform an in hardcopy files. SNTP support to synchronize to precision internal clocks

Interface

Remote Control	Via Windows Automation, or via Teledyne LeCroy Remote Command Set
Network Communication Standard	VXI-11 or VICP, LXI Class C (v1.2) Compliant
GPIB Port (Optional)	Supports IEEE – 488.2
LSIB Port (Optional)	Supports PCIe Gen1 x4 protocol with Teledyne LeCroy supplied API
Ethernet Port	Supports 10/100/1000BaseT Ethernet interface (RJ45 port)
USB Ports	Minimum 6 total (incl. 3 front panel) USB 2.0 ports support Windows compatible devices
External Monitor Port	15 pin D-Type WXGA compatible to support customer-supplied external monitor. Includes support for extended desktop operation with second monitor.
Serial Port	Not Available
Peripheral Bus	Teledyne LeCroy LBUS standard

Power Requirements

Voltage	100–240 VAC ±10% at 45–66 Hz, 100–120 VAC ±10% at 380–420 Hz, Automatic AC Voltage Selection, Installation Category II
Max. Power Consumption	1025 W / 1025 VA

Environmental

Temperature (Operating)	+5 °C to +40 °C including CD-RW/DVD-ROM drive
Temperature (Non-Operating)	–20 °C to +60 °C
Humidity (Operating)	5% to 80% relative humidity (non-condensing) up to +31 °C. Upper limit derates to 50% relative humidity (non-condensing) at +40 °C
Humidity (Non-Operating)	5% to 95% relative humidity (non-condensing) as tested per MIL-PRF-28800F
Altitude (Operating)	Up to 10,000 ft. (3048 m) at or below +25 °C
Random Vibration (Operating)	0.5 g_{rms} 5 Hz to 500 Hz, 15 minutes in each of three orthogonal axes
Random Vibration (Non-Operating)	2.4 g_{rms} 5 Hz to 500 Hz, 15 minutes in each of three orthogonal axes
Functional Shock	20 g_{peak}, half sine, 11 ms pulse, 3 shocks (positive and negative) in each of three orthogonal axes, 18 shocks total

Physical Dimension

Dimensions (HWD)	14" H x 18.4" W x 16" D (355 x 467 x 406 mm) height excludes feet		
Weight	58 lbs. (26.4 kg)		60 lbs. (27.2 kg)
Shipping Weight	76.0 lbs. (34.5 kg)		78 lbs. (35.5 kg)

Certifications

CE Compliant, UL and cUL listed; conforms to EN 61326, EN 61010-1, EN61010-2-030, UL 61010-1 3rd edition, and CSA C22.2 No. 61010-1-12

Warranty and Service

3-year warranty calibration recommended annually.
Optional service programs include extended warranty, upgrades, and calibration services

SPECIFICATIONS

Standard

Math Tools

Display up to 8 math function traces (F1–F8). The easy-to-use graphical interface simplifies setup of up to two operations on each function trace, and function traces can be chained together to perform math-on-math.

absolute value	integral
average (summed)	interpolate (cubic, quadratic, sinx/x)
average (continuous)	invert (negate)
correlation (two waveforms)	log (base e)
	log (base 10)
derivative	product (x)
deskew (resample)	ratio (/)
difference (–)	reciprocal
enhanced resolution (to 11-bits vertical)	rescale (with units)
	roof
envelope	sparse
exp (base e)	square
exp (base 10)	square root
fft (power spectrum, magnitude, phase, up to max Mpts)	sum (+)
	zoom (identity)
floor	

Measure Tools

Display any 12 parameters together with statistics, including their average, high, low, and standard deviations. Histicons provide a fast, dynamic view of parameters and wave shape characteristics. Parameter Math allows addition, subtraction, multiplication, or division of two different parameters.

amplitude	level @ x	rms
area	maximum	std. deviation
base	mean	top
cycles	median	width
data	minimum	median
delay	narrow band phase	phase
Δ delay	narrow band power	time @ minimum (min.)
duty cycle	number of points	time @ maximum (max.)
duration	+ overshoot	Δ time @ level
falltime (90–10%, 80–20%, @ level)	– overshoot	Δ time @ level from trigger
	peak-to-peak	x @ max.
frequency	period	x @ min.
first	risetime (10–90%, 20–80%, @ level)	
last		

Pass/Fail Testing

Simultaneously test multiple parameters against selectable parameter limits or pre-defined masks. Pass or fail conditions can initiate actions including document to local or networked files, e-mail the image of the failure, save waveforms, send a pulse out at the front panel auxiliary BNC output, or (with the GPIB option) send a GPIB SRQ.

Basic Jitter and Timing Analysis Tools

This package provides toolsets for displaying parameter values vs. time, statistical views of parameters using histograms, and persistence view math functions. These tools include:

- "Track" graphs of all parameters, no limitation of number

– Cycle-Cycle Jitter	– Period @ level	– Setup
– N-Cycle	– Half Period	– Hold
– N-Cycle with start selection	– Width @ level	– Skew
– Frequency @ level	– Time Interval Error @ level	– Duty Cycle @ level
		– Duty Cycle Error

- Histograms expanded with 19 histogram parameters and up to 2 billion events
- Trend (datalog) of up to 1 million events
- Track graphs of all parameters
- Persistence histogram, persistence (range, sigma)

Standard (cont'd)

Advanced Customization

Provides capability to create a math function or measurement parameter in MATLAB, Excel, C++, JavaScript, or Visual Basic Script (VBS) format and insert it into the oscilloscope's processing stream. All results are processed and displayed on the oscilloscope grid, and are available for further processing. Also permits the creation of customized plug-ins that can be inserted into the scope user interface, control of the scope via Visual Basic scripts embedded in customized functions, and use of Teledyne LeCroy's Custom DSO capabilities.

Software Options

SDAIII Serial Data Analysis Software (WM8Zi-SDAIII)
(Included in WM8Zi-SDAIII option, Standard on SDA 8 Zi-A and DDA 8 Zi-A Models)

Total Jitter
A complete jitter measurement and analysis toolset with the SDAIII-CompleteLinQ user interface framework. The CompleteLinQ framework provides a single user interface for "LinQ", "Crosstalk", "EyeDrII" and "Virtual Probe" capabilities (purchased separately).

SDAIII provides complete serial data and clock jitter and eye diagram measurement and analysis capabilities. Eye Diagrams with millions of UI are quickly calculated from up to 512 Mpt records, and advanced tools may be used on the Eye Diagram to aid analysis. Complete TIE and Total Jitter (Tj) parameters and analysis functions are provided. Comparison of eye diagrams and jitter analysis between captured lanes and one "reference" location is provided. Includes:

- Time Interval Error (TIE) Measurement Parameter, Histogram, Spectrum and Jitter Track
- Total Jitter (Tj) Measurement Parameter, Histogram
- Spectrum
- Eye Diagram Display (sliced)
- Eye Diagram IsoBER (lines of constant Bit Error Rate)
- Eye Diagram Mask Violation Locator
- Eye Diagram Measurement Parameters

– Eye Height	– Eye Width	– Mask hits
– One Level	– Eye Crossing	– Mask out
– Zero Level	– Avg. Power	– Bit Error Rate
– Eye Amplitude	– Extinction Ratio	– Slice Width (setting)

- Q-Fit Tail Representation
- Bathtub Curve
- Cumulative Distribution Function (CDF)
- PLL Track

Jitter Decompostion Models

Three dual-dirac jitter decomposition methods are provided for maximum measurement flexibility. Q-Scale, CDF, Bathtub Curve, and all jitter decomposition measurement parameters can be displayed using any of the three methods.

- Spectral, Rj Direct
- Spectral, Rj+Dj CDF Fit
- NQ-Scale

Random Jitter (Rj) and Non-Data Dependent Jitter (Rj+BUj) Analysis

- Random Jitter (Rj) Meas Param	- Rj+BUj Spectrum
- Periodic Jitter (Pj) Meas Param	- Rj+BUj Track
- Rj+BUj Histogram	- Pj Inverse FFT

Deterministic Jitter (Dj) Analysis

- Deterministic Jitter (Dj) Measurement Parameter

SPECIFICATIONS

Software Options (cont'd)

SDAIII Serial Data Analysis Software (continued)

Data Dependent Jitter (DDj) Analysis

- Data Dependent Jitter (DDj) Param
- Duty Cycle Distortion (DCD) Param
- InterSymbol Interference (ISI) Param
- Digital Pattern display
- DDj Plot (by Pattern or N-bit Sequence)
- DDj Histogram
- ISI Plot (by Pattern)

Reference Lane

- Compare current acquisition to Reference with a side-by-side or single (tabbed) display mode

SDAIII "LinQ" Capability
(SDAIII-LinQ, SDAIII-CrossLinQ, and SDAIII-CompleteLinQ Options)

In addition to all SDAIII capabilities, "LinQ" options includes 4 lanes of simultaneous serial data analysis plus the reference lane. If EyeDrII or VirtualProbe are purchased with SDAIII "LinQ" capability, then those capabilities are provided for all four lanes.

Lanescape Comparison Mode

When multiple lanes are enabled for display, Lanescape Comparison Modes is used. Selections for this mode are as follows:

- Single: One lane is displayed at a time.
- Dual: Two lanes are selected for display.
- Mosaic: All enabled lanes are displayed.

SDAIII "Crosstalk" Capability
(Included in SDAIII-Crosstalk and SDAIII-CrossLinQ Options)

In addition to all SDAIII capabilities, "Crosstalk" options add the following noise and crosstalk measurements and analysis tools:

- Total, Random and Deterministic noise (Tn, Rn, Dn) measurements
- Breakdown of Dn into InterSymbol Interference noise (ISIn) and Periodic noise (Pn)
- Noise-based eye height and width: EH(BER) and EW(BER)
- Random noise (Rn) + Bounded Uncorrelated noise (BUn) Noise Histogram
- Q-fit for Noise Histogram
- Rn+BUn Noise Spectrum and Peak threshold
- Pn Inverse FFT Plot
- Rn+BUn Noise Track
- Crosstalk Eye Contour Plot

SDAIII-CompleteLinQ

The ultimate in serial data single or multi-lane link analysis. Provides all the capabilities mentioned above in SDAIII, "LinQ", and "Crosstalk", and also includes EyeDrII and Virtual Probe capabilities.

Eye Doctor II Advanced Signal Integrity Tools (WM8Zi-EYEDRII)

Complete set of channel emulation, de-embedding and receiver equalization simulation tools. Provides capability to emulate a serial data link, de-embed or embed a fixture, cable or serial data channel, add or remove emphasis, and perform CTLE, FFE, or DFE equalization. If purchased with SDAIII, then capabilities are accessed from within the SDAIII-CompleteLinQ user interface framework.

Virtual Probe Signal Integrity Tools
(WM8Zi-VIRTUALPROBE)

Provides ability to define a complex serial data channel or topology with up to six circuit elements that may be embedded or de-embedded, allowing "probing" at a location different than the measured position. If purchased with SDAIII and EyeDrII (or with the EYEDRII-VP or CompleteLinQ options), then capabilities are accessed from within the single SDAIII-CompleteLinQ user interface framework.

Software Options (cont'd)

Clock and Clock-Data Timing Jitter Analysis Package (WM8Zi-JITKIT)

Provides convenient setup and four views of jitter (statistical, time, spectrum, and overlaid) for a variety of horizontal, amplitude, and timing parameters. Direct display of jitter measurement values. Supports multiple simultaneous views with fast selection of multiple parameter measurements for fast and easy validation.

Cable De-embedding (WM8Zi-CBL-DE-EMBED)
(Standard on SDA 8 Zi-A and DDA 8 Zi-A)

Removes cable effects from your measurements. Simply enter the S-parameters or attenuation data of the cable(s) then all of the functionality of the SDA 8 Zi can be utilized with cable effects de-embedded.

8b/10b Decode (WM8Zi-8B10B D)
(Standard on SDA 8 Zi-A and DDA 8 Zi-A)

Intuitive, color-coded serial decode with powerful search capability enables captured waveforms to be searched for user-defined sequences of symbols. Multi-lane analysis decodes up to four simultaneously captured lanes.

Spectrum Analyzer Mode (WM8Zi-SPECTRUM)

This package provides a new capability to navigate waveforms in the frequency domain using spectrum analyzer type controls. FFT capability added to include:

- Power averaging
- Power density
- Real and imag components
- Freq domain parameters
- FFT on up to 128 Mpts

Disk Drive Measurements Package (WM8Zi-DDM2)
(Standard on DDA 8 Zi-A)

This package provides disk drive parameter measurements and related mathematical functions for performing disk drive WaveShape Analysis. Disk Drive Parameters are as follows:

– amplitude assymetry	– local time trough-peak
– local base	– local time under threshold
– local baseline separation	– narrow band phase
– local maximum	– narrow band power
– local minimum	– overwrite
– local number	– pulse width 50
– local peak-peak	– pulse width 50 –
– local time between events	– pulse width 50 +
– local time between peaks	– resolution
– local time between troughs	– track average amplitude
– local time at minimum	– track average amplitude –
– local time at maximum	– track average amplitude +
– local time peak-trough	– auto-correlation s/n
– local time over threshold	– non-linear transition shift

ORDER INFORMATION

Product Description	Product Code
WaveMaster 8 Zi-A Series Oscilloscopes	
4 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	WaveMaster 804Zi-A
6 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	WaveMaster 806Zi-A
8 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	WaveMaster 808Zi-A
13 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	WaveMaster 813Zi-A
16 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	WaveMaster 816Zi-A
20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	WaveMaster 820Zi-A
25 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch)	WaveMaster 825Zi-A
30 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch)	WaveMaster 830Zi-A
45 GHz, 120 GS/s, 1 Ch, 60 Mpts/Ch WaveMaster with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (30 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch; 20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch)	WaveMaster 845Zi-A
SDA 8 Zi-A Series Serial Data Analyzers	
4 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	SDA 804Zi-A
6 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	SDA 806Zi-A
8 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	SDA 808Zi-A
13 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	SDA 813Zi-A
16 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	SDA 816Zi-A
20 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	SDA 820Zi-A
25 GHz, 80 GS/s, 2 Ch, 64 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (20 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch)	SDA 825Zi-A
30 GHz, 80 GS/s, 2 Ch, 64 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (20 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch)	SDA 830Zi-A
45 GHz, 120 GS/s, 1 Ch, 96 Mpts/Ch Serial Data Analyzer with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (30 GHz, 80 GS/s, 2 Ch, 64 Mpts/Ch; 20 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch)	SDA 845Zi-A
DDA 8 Zi-A Series Oscilloscopes	
8 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch DDA with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	DDA 808Zi-A
20 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch DDA with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	DDA 820Zi-A
30 GHz, 80 GS/s, 2 Ch, 64 Mpts/Ch DDA with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input (30 GHz, 80 GS/s, 2 Ch, 64 Mpts/Ch; 20 GHz, 40 GS/s, 4 Ch, 32 Mpts/Ch)	DDA 830Zi-A
Included with Standard Configuration	
÷10, 500 MHz Passive Probe (Qty. 4 on 4–20 GHz units, Qty. 2 on 25–45 GHz units)	
ProLink to SMA Adapter: 4 each (for 4–8 GHz units)	LPA-SMA-A
ProLink to K/2.92 mm Adapter: 4 each (for 13–45 GHz units)	LPA-K-A
Optical 3-button Wheel Mouse, USB 2.0	
Protective Front Cover	
Printed Getting Started Manual	
Anti-virus Software (Trial Version)	
Microsoft Windows 7 License	
Commercial NIST Traceable Calibration with Certificate	
Power Cable for the Destination Country	
3-year Warranty	

Product Description	Product Code
Memory and Sample Rate Options	
80 GS/s on 2 Ch Sampling Rate Option for WaveMaster 8 Zi-A (not available for 825Zi-A, 830Zi-A, or 845Zi-A). Includes two separate external interleaving devices with storage case	WM8Zi-2X80GS
20 Mpts/Ch Standard Memory for WaveMaster 8 Zi-A. Includes 8 GB of RAM	WM8Zi-STD
32 Mpts/Ch Standard Memory for SDA 8 Zi-A Includes 8 GB of RAM	SDA8Zi-STD
32 Mpts/Ch Memory Option for WaveMaster 8 Zi-A	WM8Zi-S-32
64 Mpts/Ch Memory Option for WaveMaster 8 Zi-A	WM8Zi-M-64
64 Mpts/Ch Memory Option for SDA 8 Zi-A	SDA8Zi-M-64
64 Mpts/Ch Memory Option for DDA 8 Zi-A	DDA8Zi-M-64
128 Mpts/Ch Memory Option for WaveMaster 8 Zi-A	WM8Zi-L-128
128 Mpts/Ch Memory Option for SDA 8 Zi-A	SDA8Zi-L-128
128 Mpts/Ch Memory Option for DDA 8 Zi-A	DDA8Zi-L-128
256 Mpts/Ch Memory Option for WaveMaster 8 Zi-A	WM8Zi-VL-256
256 Mpts/Ch Memory Option for SDA 8 Zi-A	SDA8Zi-VL-256
256 Mpts/Ch Memory Option for DDA 8 Zi-A	DDA8Zi-VL-256
CPU, Computer and Other Hardware Options	
Upgrade from 160 GB Hard Drive to 500 GB Hard Drive	WM8Zi-500GB-HD
Additional 160 GB Hard Drive. Includes Windows® 7 OS, Teledyne LeCroy Oscilloscope Software and Critical Scope Operational File Duplicates	WM8Zi-160GB-RHD-02
Additional 500 GB Hard Drive. Includes Windows 7 OS, Teledyne LeCroy Oscilloscope Software and Critical Scope Operational File Duplicates	WM8Zi-500GB-RHD-02
GPIB Option for Teledyne LeCroy Oscilloscope. Half-height Card	GPIB-2
8 GB to 16 GB CPU RAM Option	WM8Zi-8-UPG-16GBRAM
8 GB to 32 GB CPU RAM Option	WM8Zi-8-UPG-32GBRAM
Serial Data and CrossTalk Analysis	
Bundle - Multi-Lane SDA LinQ Framework, including Eye, Jitter, Noise, Crosstalk Measurements, with EyeDrII and VirtualProbe	WM8Zi-SDAIII-CompleteLinQ SDA8Zi-CompleteLinQ DDA8Zi-CompleteLinQ
Multi-Lane Serial Data Analysis LinQ Framework, Eye, Jitter, Noise and Crosstalk Measurements	WM8Zi-SDAIII-CrossLinQ SDA8Zi-CrossLinQ DDA8Zi-CrossLinQ
Multi-Lane Serial Data Analysis LinQ Framework, Eye and Jitter Measurements	WM8Zi-SDAIII-LinQ SDA8Zi-LinQ DDA8Zi-LinQ
Single-Lane Serial Data Analysis Framework, Eye, Jitter, Noise and Crosstalk Measurements	WM8Zi-SDAIII-Crosstalk SDA8Zi-Crosstalk DDA8Zi-Crosstalk
Single-Lane Serial Data Analysis Framework, Eye and Jitter Measurements	WM8Zi-SDAIII
Signal Integrity Toolkits	
Advanced De-embedding, Emulation and Virtual Probing Toolkit	WM8Zi-VIRTUALPROBE
Signal Integrity Toolkit - Channel & Fixture De-embedding/Emulation, Tx/Rx Equalization	WM8Zi-EYEDRII
Bundle - EyeDrII and VirtualProbe Toolkits	WM8Zi-EYEDRII-VP
Cable De-embed Option	WM8Zi-CBL-DE-EMBED

ORDER INFORMATION

Product Description	Product Code
Serial Data Compliance	
QualiPHY Enabled 10GBase-KR Software Option	QPHY-10GBase-KR
QualiPHY Enabled BroadR-Reach Software Option	QPHY-BroadR-Reach
QualiPHY Enabled DDR2 Software Option	QPHY-DDR2
QualiPHY Enabled DDR3 Software Option	QPHY-DDR3
QualiPHY Enabled DisplayPort Software Option	QPHY-DisplayPort
QualiPHY Enabled Ethernet 10/100/1000BT Software Option	QPHY-ENET*
QualiPHY Enabled HDMI Software Option	QPHY-HDMI†
QualiPHY Enabled LPDDR2 Software Option	QPHY-LPDDR2
QualiPHY Enabled MIPI D-PHY Software Option	QPHY-MIPI-DPHY
QualiPHY Enabled MOST50 ePHY Software Option	QPHY-MOST50e
QualiPHY Enabled MOST150 oPHY Software Option	QPHY-MOST150o
QualiPHY Enabled PCIe 3.0 Software Option	QPHY-PCIe3
QualiPHY Enabled PCIe Gen1 Software Option	QPHY-PCIe
QualiPHY Enabled SATA Software Option	QPHY-SATA-TSG-RSG
QualiPHY Enabled SAS-2 Software Option	QPHY-SAS2
QualiPHY Enabled SFI Software Option	QPHY-SFI
QualiPHY Enabled USB 2.0 Software Option	QPHY-USB‡
QualiPHY Enabled SuperSpeed USB Transmitter/ Receiver Compliance Software Option	QPHY-USB3-Tx-Rx

*TF-ENET-B required. † TF-HDMI-3.3V-QUADPAK required. ‡ TF-USB-B required.
PCI Express, SuperSpeed USB (USB 3.0) and SATA Complete Hardware/Software Test Solutions are available. Consult Factory.

Serial Data Test Fixtures

Product Description	Product Code
10/100/1000Base-T Ethernet Test Fixture	TF-ENET-B*
Telecom Adapter Kit 100 Ω Bal., 120 Ω Bal., 75 Ω Unbal.	TF-ET
HDMI 50Ω Pull-Up Terminator	TF-HDMI-3.3V
HDMI Pull-Up Terminator Quad Pack	TF-HDMI-3.3V-QUADPAK
SATA 1.5 Gb/s, 3.0 Gb/s and 6.0 Gb/s Compliance Test Fixture	TF-SATA-C
SATA 1.5 Gb/s, 3.0 Gb/s and 6.0 Gb/s Compliance Test Fixture Measure Kit	TF-SATA-C-KIT
USB 2.0 Compliance Test Fixture	TF-USB-B
SuperSpeed USB Compliance Test Fixture	TF-USB3
2 x BNC to SMA Adapter	ENET-2ADA-BNCSMA
2 x 18 inch SMA to SMA Cable	ENET-2CAB-SMA018
2 x 36 inch SMA to SMA Cable	ENET-2CAB-SMA036
100 ps Rise Time Filter	RISE-TIME-FILTER-100PS
150 ps Rise Time Filter	RISE-TIME-FILTER-150PS
20 dB SMA Attenuators	20DB-SMA-ATTENUATOR

*Includes ENET-2CAB-SMA018 and ENET-2ADA-BNCSMA

Serial Data Triggers and Decoders

Product Description	Product Code
600 Mb/s to 6.5 Gb/s High-speed 80bit NRZ and 8b/10b Symbol Serial Pattern Trigger Option for WaveMaster 8 Zi/Zi-A Oscilloscopes and Disk Drive Analyzers. Also includes 8b/10b Decode. (Standard on SDA 8 Zi-A)	WM8Zi-6GBIT-80B-8B10B-TD
600 Mb/s to 14.1 Gb/s 80-bit NRZ and 8b/10b Symbol Serial Trigger. Also includes 8b/10b Decode.	WM8Zi-14GBIT-80B-8B10B-TD SDA8Zi-UPG-14GBIT-80B-8B10B-TD
64b/66b Decode Annotation Option	WM8Zi-64b66b D
8b/10b Decode Decode Annotation Option	WM8Zi-8B10B D
Ethernet 10G Decode Option	WM8Zi-ENET10Gbus D
PCI Express Decode Annotation Option	WM8Zi-PCIEbus D
USB 3.0 Decode Annotation Option	WM8Zi-USB3bus D
USB 2.0 Decode Annotation Option	WM8Zi-USB2bus D
USB2-HSIC Decode Option	WM8Zi-USB2-HSICbus D
SATA Decode Annotation Option	WM8Zi-SATAbus D
SAS Decode Annotation Option	WM8Zi-SASbus D
Fibre Channel Decode Annotation Option	WM8Zi-FCbus D
D-PHY Decode Option	WM8Zi-DPHYbus D

Product Description	Product Code
Serial Data Triggers and Decoders (cont'd)	
DigRF 3G Decode Option	WM8Zi-DigRF3Gbus D
DigRF v4 Decode Option	WM8Zi-DIGRFv4bus D
Audiobus Trigger and Decode Option for I2S, LJ, RJ, and TDM	WM8Zi-Audiobus TD
Audiobus Trigger, Decode, and Graph Option for I2S, LJ, RJ, and TDM	WM8Zi-Audiobus TDG
MIPI D-PHY Decode Annotation Option	WM8Zi-DPHYbus D
MIPI D-PHY Decode and Physical Layer Test Option	WM8Zi-DPHYbus DP
MIPI M-PHY Decode Annotation Option	WM8Zi-MPHYbus D
MIPI M-PHY Decode Annotation and Physical Layer Test Option	WM8Zi-MPHYbus DP
I2C Bus Trigger and Decode Option	WM8Zi-I2Cbus TD
SPI Bus Trigger and Decode Option	WM8Zi-SPIbus TD
LIN Trigger and Decode Option	WM8Zi-LINbus TD
UART and RS-232 Trigger and Decode Option	WM8Zi-UART-RS232bus TD
FlexRay Trigger and Decode Option	WM8Zi-FlexRaybus TD
FlexRay Trigger, Decode, and Physical Layer Test Option	WM8Zi-FlexRaybus TDP
CANbus TD Trigger and Decode Option	WM8Zi-CANbus TD
CANbus TDM Trigger, Decode and Measure/ Graph Option	WM8Zi-CANbus TDM
MIL-STD-1553 Trigger and Decode Option	WM8Zi-1553 TD
ARINC 429 Symbolic Decode Option	WM8Zi-ARINC429bus DSymbolic
PROTObus MAG Serial Debug Toolkit	WM8Zi-PROTObus MAG
Decode Annotation and Protocol Analyzer Synchronization Software Option	WM8Zi-ProtoSync
Decode Annotation and Protocol Analyzer + BitTracer Synchronization Software Option	WM8Zi-ProtoSync-BT

High-speed Digitizer Output

Product Description	Product Code
High-speed PCIe Gen1 x4 Digitizer Output	LSIB-1
PCI Express x1 Host Interface Board for Desktop PC	LSIB-HOSTBOARD
PCI Express x1 Express Card Host Interface for Laptop Express Card Slot	LSIB-HOSTCARD
PCI Express x4 3-meter Cable with x4 Cable Connectors Included	LSIB-CABLE-3M
PCI Express x4 7-meter Cable with x4 Cable Connectors Included	LSIB-CABLE-7M

Mixed Signal Testing Options

Product Description	Product Code
500 MHz, 2 GS/s, 18 Ch, 50 Mpts/Ch Mixed Signal Oscilloscope Option	MS-500
250 MHz, 1 GS/s, 36 Ch, 25 Mpts/Ch (500 MHz, 18 Ch, 2 GS/s, 50 Mpts/Ch Interleaved) Mixed Signal Oscilloscope Option	MS-500-36
250 MHz, 1 GS/s, 18 Ch, 10 Mpts/Ch Mixed Signal Oscilloscope Option	MS-250

General Purpose and Application Specific Software Options

Product Description	Product Code
Spectrum Analyzer and Advanced FFT Option	WM8Zi-SPECTRUM
Digital Filter Software Package	WM8Zi-DFP2
Serial Data Mask Software Package	WM8Zi-SDM
Disk Drive Measurements Software Package	WM8Zi-DDM2
Disk Drive Analyzer Software Package	WM8Zi-DDA
Advanced Optical Recording Measurement Package	WM8Zi-AORM
Electrical Telecom Mask Test Software Package	WM8Zi-ET-PMT
EMC Pulse Parameter Software Package	WM8Zi-EMC
Power Measure Analysis Software Package	WM8Zi-PMA2
Clock Jitter Analysis with Four Views Software Package	WM8Zi-JITKIT

ORDER INFORMATION

Product Description	Product Code

General Accessories

Product Description	Product Code
Keyboard, USB	KYBD-1
Probe Deskew and Calibration Test Fixture	TF-DSQ
Hard Carrying Case	WM8Zi-HARDCASE
Soft Carrying Case	WM8Zi-SOFTCASE
Rackmount Accessory for WM8Zi	WM8Zi-RACKMOUNT
ProLink to SMA Adapter	LPA-SMA-A
Kit of ProLink to SMA Adapters	LPA-SMA-KIT-A
ProLink to K/2.92 mm Adapter	LPA-K-A
Kit of ProLink to K/2.92 mm Adapters	LPA-K-KIT-A
Oscilloscope Cart with Additional Shelf and Drawer	OC1024
Oscilloscope Cart	OC1021

Probes and Probe Accessories

Product Description	Product Code
1.5 GHz, 0.9 pF, 1 MΩ High Impedance Active Probe	ZS1500
2.5 GHz, 0.9 pF, 1 MΩ High Impedance Active Probe	ZS2500
200 MHz, 3.5 pF, 1 MΩ Active Differential Probe	ZD200
500 MHz, 1.0 pF, Active Differential Probe	ZD500
1 GHz, 1.0 pF, Active Differential Probe	ZD1000
1.5 GHz, 1.0 pF, Active Differential Probe	ZD1500
WaveLink 4 GHz 2.5 Vp-p Differential Probe System	D410-PS
WaveLink 4 GHz 5 Vp-p Differential Probe System	D420-PS
WaveLink 6 GHz 2.5 Vp-p Differential Probe System	D610-PS
WaveLink 6 GHz 5 Vp-p Differential Probe System	D620-PS
WaveLink 8 GHz 3.5Vp-p Differential Probe System	D830-PS
WaveLink 10 GHz 3.5Vp-p Differential Probe System	D1030-PS
WaveLink 13 GHz 3.5Vp-p Differential Probe System	D1330-PS
WaveLink 13 GHz, 2.0 Vp-p Differential Probe System	D1305-A-PS
WaveLink 16 GHz, 2.0 Vp-p Differential Probe System	D1605-A-PS
WaveLink 20 GHz, 2.0Vp-p Differential Probe System	D2005-A-PS
WaveLink 25 GHz, 2.0 Vp-p Differential Probe System	D2505-A-PS
WaveLink 3GHz Differential Amplifier Module with Adjustable Tip	D300A-AT†
WaveLink 6 GHz Differential Amplifier Module with Adjustable Tip	D600A-AT*
WaveLink ProLink Platform/Cable Assembly (4–6 GHz)	WL-PLink-CASE
WaveLink ProBus Platform/Cable Assembly (4 GHz)	WL-PBus-CASE
SMA/SMP Lead Set for Dxx30 Probes	Dxx30-SMA-SMP Leads
Optical-to-Electrical Converter, DC to 9.5 GHz, 785 to 1550 nm	OE695G
7.5 GHz Low Capacitance Passive Probe (÷10, 1 kΩ; ÷20, 500 Ω)	PP066

* For a complete probe, order a WL-PLink-CASE Platform/Cable Assembly with the Adjustable Tip Module.

† For a complete probe, order a WL-PBUS-CASE Platform/Cable Assembly with the Adjustable Tip Module

A variety of other active voltage and current probes are also available. Consult Teledyne LeCroy for more information.

Customer Service

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

This warranty includes:
• No charge for return shipping
• Long-term 7-year support
• Upgrade to latest software at no charge

TELEDYNE LECROY
Every**where you** look™

1-800-5-LeCroy
teledynelecroy.com

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

wm8zi-a-ds-08jul13