TELEDYNE LECROY
Everywhereyoulook™

LabMaster 9 Zi-A Series (13 GHz – 45 GHz)

High Bandwidth Modular Oscilloscope Systems

The Ultimate in Performance—High Bandwidth, High Channel Count, High Sample Rate

LabMaster 9 Zi-A modular oscilloscope systems completely re-define oscilloscope performance and capabilities.

LabMaster 9 Zi-A provides more of everything, and its modular design provides the simplest upgrade path in bandwidth and channel count. ChannelSync™ ensures precise synchronization of all channels in all acquisition modules using a single-distributed 10 GHz clock and a single trigger circuit. The result is the highest timebase accuracy and an ultra-low 250 fs jitter between all channels, identical to that provided with a single, standard oscilloscope package.

LabMaster 9 Zi-A is available with bandwidths up to 45 GHz, sample rates up to 120 GS/s and up to 80 input channels. Upgrade flexibility is designed in—start with a minimum configuration and add channels over time by simply adding additional acquisition modules, upgrade bandwidth on existing modules, or mix and match bandwidths in one system. A server-class CPU packs additional processing power for the immense amounts of data made possible by LabMaster 9 Zi-A.

LabMaster enables the leading-edge technologies that provide enhanced high speed data transfer and communication—such as 28–32 Gb/s SERDES, multi-lane serial data (40/100 GbE, PCIe Gen3), DDR, and optical coherent modulation communications. It's also ideal for defense and aerospace applications where high channel count and high bandwidth are both required.

A LabMaster 45 GHz System that provides two channels at 45 GHz, four channels at 30 GHz, and eight channels at 20 GHz. Two 45 GHz or

four 30 GHz inputs provide direct cabled inputs for high-speed differential signals. 20 GHz maximum channel capability is 80 channels - twenty times what is provided by conventional oscilloscopes.

1. High performance—45 GHz bandwidth (8 ps risetime$_{20-80\%}$), 120 GS/s sample rate, up to 80 channels, up to 768 Mpts of analysis memory
2. Modular—start with four channels and grow your system over time. Spread out your investment as funds permit
3. Wide bandwidth upgrade range (13–45 GHz) provides investment protection
4. ChannelSync architecture utilizes a 10 GHz distributed clock for precise alignment of all acquisition systems
5. Single trigger circuit for all modules eliminates additive trigger jitter that occurs with 10 MHz clocking and trigger synchronization of multiple conventional oscilloscopes
6. Simple—connect and acquire—Teledyne LeCroy has done the hard work for you
7. 325 MB/s data transfer rate from the LabMaster to a separate PC with Teledyne LeCroy Serial Interface Bus (LSIB) option
8. Server-class multi-core processor combines with X-Stream II streaming architecture for fast acquisition and analysis—33.6 GHz effective CPU clock rate and 24 GB of RAM standard (expandable to 192 GB)
9. Utilize the built-in 15.3" widescreen (16 x 9) high resolution WXGA color touch screen display—or connect your own with up to WQXGA 2560 x 1600 pixel resolution
10. Low Jitter Measurement Floor and highly stable timebase over long acquisitions
11. Deepest standard toolbox with more measurements, more math, more power
12. SDAIII "CompleteLinQ" options provide four simultaneous eye diagrams and jitter calculations for multi-lane or single-lane, multiple location analysis, noise measurements and crosstalk analysis
13. Eye Doctor™ II and Virtual Probe Signal Integrity Toolsets provide real-time de-embedding, emulation, and equalization on serial data channels
14. Up to 14.1 Gb/s Serial Trigger available - 80-bit NRZ and 8b/10b Symbol triggering (with 9xxMZi-A models only)

INNOVATIVE OSCILLOSCOPE SOLUTIONS

The pace of innovation is accelerating. Oscilloscopes with more channels, and more bandwidth on many channels, are needed.

LabMaster 9 Zi-A is the first fundamentally different oscilloscope design in 30 years. LabMaster 9 Zi-A builds on the acquisition and analysis excellence of the Teledyne LeCroy WaveMaster 8 Zi-A to create an entirely new class of oscilloscopes that is modular, inherently upgradeable, and infinitely flexible while retaining all of the performance excellence which Teledyne LeCroy is known for.

LabMaster 9 Zi-A systems can be configured for massive numbers of channels at 20 GHz or with twenty channels at 45 GHz or something in between. Acquisition modules with different bandwidths and channel counts can even be mixed and matched.

Performance is not sacrificed with LabMaster 9 Zi-A. Proven SiGe components ensure high performance with Digital Bandwidth Interleaving (DBI) providing upgrade paths and bandwidth performance not otherwise available. ChannelSync ensures precise synchronization of all acquisition modules. The result is the best possible oscilloscope in the world, in every possible way.

"Master" Control Module

The MCM-Zi Master Control Module provides a built-in display, control panel, CPU, and the ChannelSync 10 GHz distributed clock that is the heartbeat of the system and which provides precise synchronization between all oscilloscope channels. High speed multi-lane PCIe connections are made to the "Slave" Acquisition Modules for control and data transfer.

A LabMaster 9 Zi-A system with 16ch @ 20 GHz and 8ch @ 30 GHz system in an OC910 cart. A 16 channel system as shown is ideal for multi-lane serial data characterization or coherent optical MIMO and few-mode fiber analysis.

System

The entire system simply and quickly connects together to create a functional, single oscilloscope package, but without the normal input channel or bandwidth limitations—operation is the same as a conventional oscilloscope. All waveforms are viewable on the built-in 15.3" display or on a variety of optional or user-supplied displays (up to 2560 x 1600 resolution).

System configuration may be done with one of two "Master" modules. The entire system design speaks to a level of sophistication and integration not seen before in laboratory equipment.

"Master" Acquisition Module

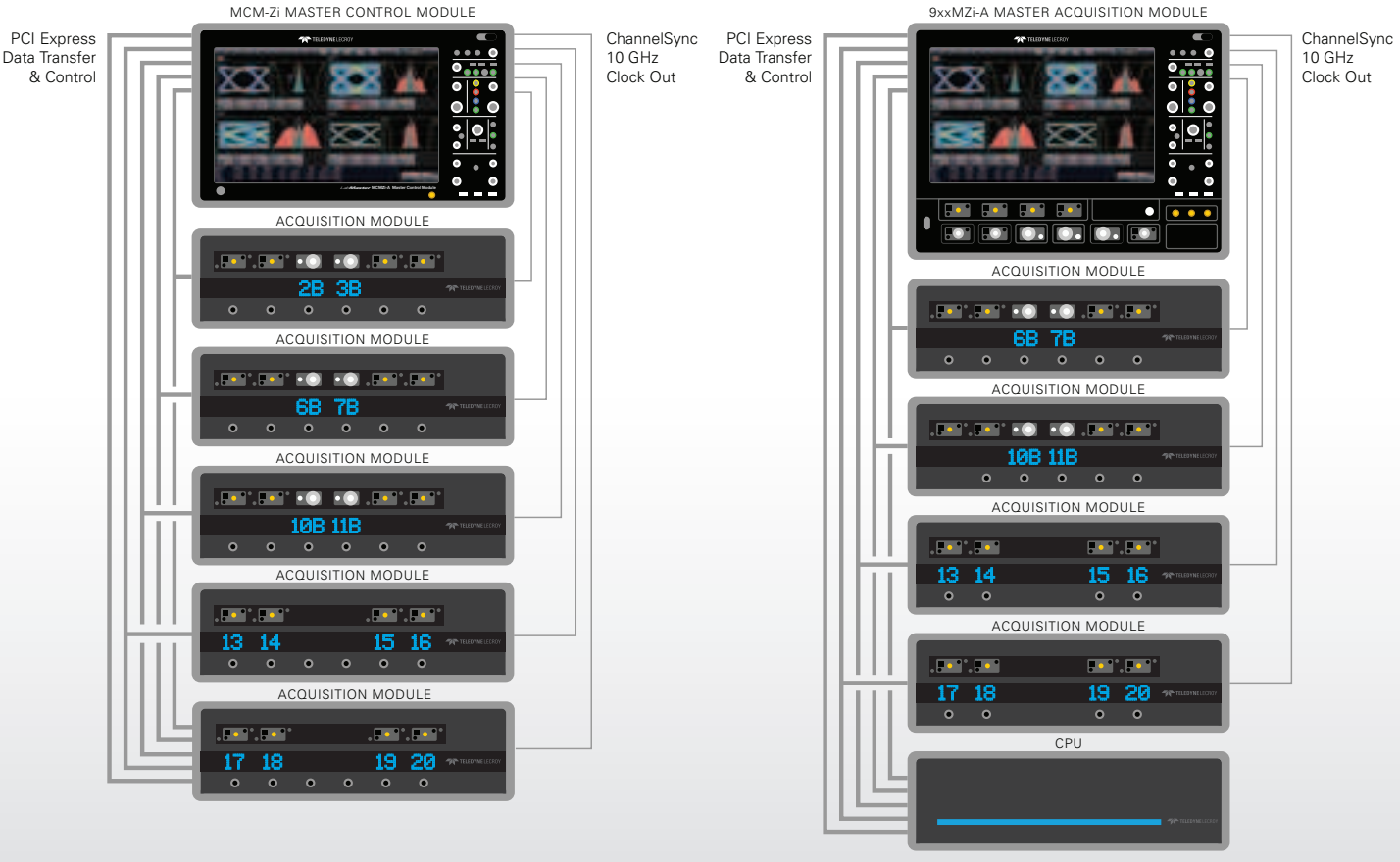
The 9xxMZi-A Master Acquisition Module is similar to the "Master" Control Module, except that it contains an acquisition module and the CPU is a separate module. High speed multi-lane PCIe connections are made to the "Slave" Acquisition Modules for control, and to the CPU for data transfer. Note that although this module alone looks like a conventional oscilloscope, it lacks an internal Central Processing Unit (CPU) – all data is sent to the server-class CPU for processing.

Additional Acquisition Modules

The 9xxSZi-A Acquisition Modules are tightly integrated to the Master with the ChannelSync 10 GHz distributed clock and a multi-lane PCI Express connection— From 1 to 20 Acquisition Modules can be configured with a single Master. All acquired data is sent to the server-class CPU for processing. Lighted channel indicators intelligently and dynamically indicate the input channel assignments, depending on the operator setup.

Central Processing Unit (CPU)

Teledyne LeCroy has spared no expense by providing a server-class CPU using Intel Xeon™ X5660 processors (2.8 GHz per core, six cores per processor, and two processors per CPU = 33.6 GHz total effective clock speed). 24 GB of RAM is standard (up to 192 GB optionally available). Coupled with Teledyne LeCroy's proprietary X-Stream II streaming architecture, the CPU muscles its way through the immense amounts of acquisition data made possible by LabMaster 9 Zi-A. (Supplied as a separate module with the 9xxMZi-A and included inside the MCM-Zi).



The system images shown on pages 4 and 6 are configured with the Master Acquisition Module (as shown on the left).

PERFORMANCE EXCELLENCE & INVESTMENT PROTECTION

The LabMaster 9 Zi-A platform provides a modular, building block approach to minimizing initial investment while at the same time providing future flexibility. The minimum configuration is four channels at 13 GHz with maximum upgrade to 20, 40, or 80 channels at 45, 30, or 20 GHz respectively with up to 768 Mpts/ch of analysis memory.

20 GHz, 4 Channel Core Acquisition Module

A SiGe acquisition system—the same one utilized in the WaveMaster 8 Zi-A oscilloscope product line—is operated comfortably within its 20+ GHz bandwidth rating and forms the basic acquisition building block of the LabMaster acquisition modules. Signal fidelity is exceptional, and modules are available at attractive price points down to 13 GHz bandwidth.

Digital Bandwidth Interleave for Upgradeability

As memory and sample rate can be interleaved, so can bandwidth. Using high performance technologies and digital signal processing (DSP), Teledyne LeCroy provides additional bandwidth on one or two channels with 6th generation Digital Bandwidth Interleaving (DBI). This approach can add 2 channels at 30 GHz and 1 channel at 45 GHz to the 20 GHz acquisition building block. Signal fidelity nearly equals that of sampling oscilloscopes, but with none of the acquisition limitations.

Maximum Flexibility

Start with one Master Control Module and one Acquisition. Upgrade Acquisition Modules to include more memory or more bandwidth. Add additional acquisition modules at any time without returning equipment to the factory for modification or re-calibration. Spread out your capital investment over a longer period of time, and make only the investments you need when you need them.

4 Channels at 13 GHz

Minimum intial purchase is a LabMaster MCM-Zi Master Control Module and a 913SZi-A Acquisition Module. This provides four channels at 13 GHz.

Upgrade to 8 Channels at 20 GHz

Then upgrade the Acquisition Module to a 20 GHz LabMaster 920SZi-A, and add another LabMaster 920SZi-A 20 GHz Acquisition Module.

Upgrade to 8 Channels at 20 GHz 2 Channels at 30 or 36 GHz Add More Memory

Then upgrade the Acquisition Module to a 30 GHz model. Increase acquisition memory to 256 Mpt/Ch. Add an additional 24 GB of RAM to the CPU.

Upgrade to
16 Channels at 20 GHz
8 channels at 30 GHz
4 Channels at 45 GHz

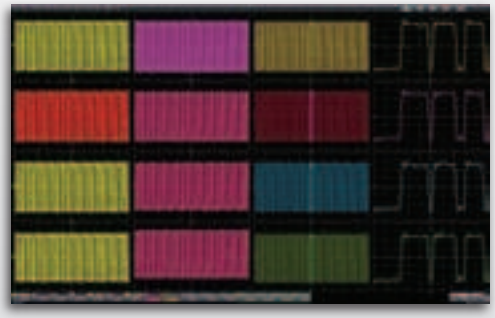
Upgrade all Acquisition Modules to 45 GHz maximum bandwidth with 768 Mpts/Ch acquisition memory. Add two additional 45 GHz Acquisition Modules with maximum memory. (Note: maximum capability supported by MCM-Zi alone is five acquisition modules).

Beyond 20 Input Channels

Easily expand beyond 20 channels (5 acquisition modules) with the LabMaster CMH-20Zi ChannelSync Mainframe Hub. This permits capability for up to 80 channels at 20 GHz with the same precise ChannelSync performance as described for the basic system.

The ChannelSync Mainframe Hub redistributes the 10GHz clock and the Master module's PCIe synchronization signals. It outputs up to 20 identical sets of signals that are connected to up to 20 acquisition modules to provide up to 80 channels at 20 GHz, up to 40 channels at 30 GHz, or up to 20 channels at 45 GHz. Precision between all acquisition modules is maintained identically to the basic system.

The ChannelSync Mainframe Hub is populated with one "card" for each acquisition module that is to be connected. These cards can be purchased at any time to minimize the upfront cost.



ChannelSync

ChannelSync precisely synchronizes all acquisition modules. This screen image shows four differential signals input to four different acquisition modules and all signals are perfectly synchronized.

COMPLETE APPLICATION COVERAGE

10 to 28+ Gb/s SERDES Development

Development and characterization of high-speed SERDES is actively occurring to support faster electrical datacom and telecom transfer rates. Sampling oscilloscopes lack the data collection and analysis capability necessary to understand the root cause of deterministic jitter issues, such as that provided by Teledyne LeCroy's SDA III Serial Data Analysis software.

For 28 Gb/s SERDES development, LabMaster 9 Zi-A can be cost-effectively configured for two channels at 30/36 GHz and 8 channels at 20 GHz, providing a good balance between high speed characterization and multi-lane development. LabMaster 10 Zi can provide even higher bandwidth (up to 65 GHz).

Optical Transmission Using Coherent Modulation

Cloud computing demands are driving rapid developments in buildouts of 28 GBaud (112 Gb/s) DP-QPSK coherent modulation systems while at the same time research is progressing on even faster speeds. LabMaster 9 Zi-A systems are competitive solutions with attractive upgrade paths to more channels and more bandwidth.

Parallel optical systems, such as frequency-parallel coherent optical super-channels or spatially-parallel coherent optical multiple-input-multiple-output (MIMO) systems, have been gaining attention due to their ability to scale fiber capacities and to obtain higher transmission rates with lower speed components. LabMaster 9 Zi-A systems based on multiple 20 GHz acquisition modules are an effective means to achieve 12 (or more) input channels for Coherent MIMO and few-mode fiber transmission testing and validation.

Defense and Aerospace Applications

Both high channel counts and high bandwidth are often required in defense and aerospace applications. LabMaster 9 Zi-A systems can be configured in a variety of channel counts and bandwidth to meet these needs. Teledyne LeCroy's Serial Interface Bus (LSIB) allows data transfer rates from the oscilloscope to a separate stand-alone PC at speeds up to 325 MB/s and record lengths up to 768 Mpts/ch. ChannelSync in LabMaster 9 Zi-A eliminates time spent integrating multiple conventional oscilloscopes into single multi-oscilloscope systems, and provides precise synchronization between all acquisition modules. Customization capabilities permit automated control or user-created math functions and measurement parameters to run in the oscilloscope, enabling the simple deployment of proprietary algorithms from within the oscilloscope user interface.

Multi-Lane Serial Data

As serial data rates have increased, serial data has also become "parallel" with multiple lanes utilized to achieve higher effective data transfer rates. 40/100 GbE with up to 10 lanes at 10 Gb/s each, 100 GbE with up to 4 lanes at 28 Gb/s each, and PCI Express with up to 16 lanes at 8 Gb/s each, all using differential signaling, are obvious examples.

LabMaster 9 Zi-A can be configured in up to 80 channels at 20 GHz, or up to 40 channels at 30 GHz. This can be especially helpful for crosstalk analysis or lane skew measurements. For instance, by sending active data over all lanes and utilizing SDAIII-CompleteLinQ Serial Data Analysis to view up to four simultaneous eye diagrams and jitter measurements, complex lane interactions and "victim/aggressor" behavior can be observed. Bad behaviors can be characterized and debugged with Teledyne LeCroy's Crosstalk, EyeDrII and Virtual Probe tools provided in SDAIII-CompleteLinQ. Lane skew measurements are simple when all of the lanes can be viewed simultaneously. Additionally, two separate oscilloscope channels (with math subtraction) for one differential signal provides better signal fidelity and jitter measurement accuracy compared to using additional differential probes or amplifiers with similar or lower cost, and circuit connection is greatly simplified.

ENABLING HIGH-SPEED SERDES DEVELOPMENTS

The pace of SERDES development is accelerating, driven by increasing network traffic, the desire for reduction in lane count to simplify design and development, and the need to maintain the same (or higher) aggregate data transfer speeds. 10–12 Gb/s speeds previously developed are now commonly deployed with up to 10 lanes in 100 GbE, and demands are now focusing on 25–32 Gb/s speeds.

LabMaster 9 Zi-A is uniquely suited to the demands of the high-speed SERDES market. It's ability to provide up to 45 GHz of real-time bandwidth with two or more input channels is beneficial for accurate characterization of 28–32 Gb/s signals that have significant power spectral density at > 32 GHz. Oscilloscope risetime$_{20-80\%}$ is an impressive 8 ps, necessary speed when the unit interval (UI) is a mere 36 ps wide (or less). The 768 Mpts/Ch acquisition memory provides the ability to capture very long patterns, permitting deterministic jitter (Dj) decomposition on long patterns—something not possible in a sampling oscilloscope. Two input channels provides the ability to input a differential signal pair into the oscilloscope, eliminating the bandwidth, noise, and accuracy constraints inherent in a separate, external differential amplifier.

Multiple Configurations Provide Flexibility

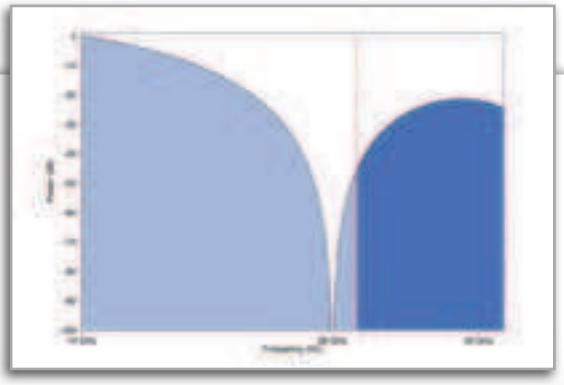
In addition to 2 channels at 45 GHz, a LabMaster system will also provide 4 channels at 30 GHz or 8 channels at 20 GHz for testing and debugging of multiple lanes at lower bandwidth. This can be especially useful for crosstalk analysis or lane skew testing when multiple lanes are deployed. Thus, a 45 GHz LabMaster can deployed in a variety of ways and serve many important application needs in the same lab.

Superior Serial Data Analysis and Debug Tools

Teledyne LeCroy's SDAIII-CompleteLinQ Serial Data Analysis products provide unique capability to simultaneously calculate and display four eye diagrams and jitter measurements from four separate lanes or one lane probed or modeled in four different locations. Measure vertical noise and perform crosstalk analysis, and use 8 and 12-port S-parameters and built-in EyeDrII and VirtualProbe tools to de-embed Crosstalk.

A variety of serial decode annotations are available for common encoding schemes, as well as serial protocols. Teledyne LeCroy's combination of serial decoders and ProtoSync™ protocol analysis views permits link layer debugging on initial SERDES transmissions before protocol analyzer hardware is typically available.

How Much Bandwidth is Needed?



Limited oscilloscope bandwidth slows signal rise times and attenuates important high frequency content necessary to properly characterize high-speed SERDES. The use of 45 GHz of oscilloscope bandwidth allows capture of important 3rd harmonic information, increasing the capability to accurately measure jitter and otherwise accurately characterize the 28 Gb/s component.

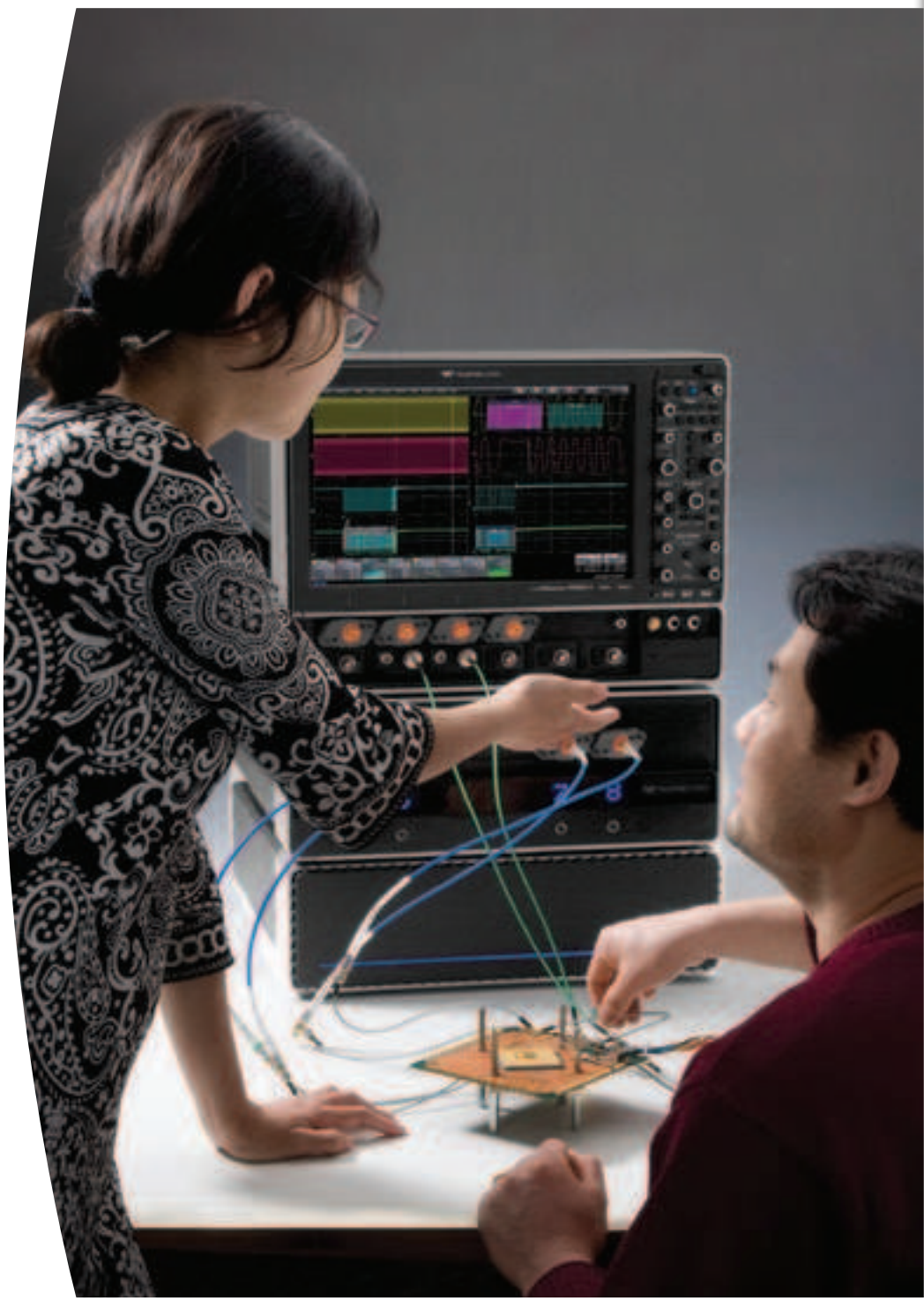
The use of a sampling oscilloscope is no solution—sampling oscilloscopes can only be used with repetitive signals, and provide no ability to post-process the data to decompose deterministic jitter and understand root cause.

MULTI-LANE SERIAL DATA TESTING

LabMaster 9 Zi-A systems provide unique capability to capture and analyze massive numbers of channels at very high bandwidth—up to 80 channels at 20 GHz or 40 channels at 30 GHz—with precise synchronization amongst all channels using Teledyne LeCroy's ChannelSync. This is an ideal solution for serial data standards with many lanes of data at high bit rates, such as 40/100 GbE and PCI Express. Additionally, serial decode, protocol analysis, eye diagram, jitter measurement, and crosstalk analysis tools can be applied for single or multi-lane analysis and system validation.

Up to 80 Channels at up to 20 GHz

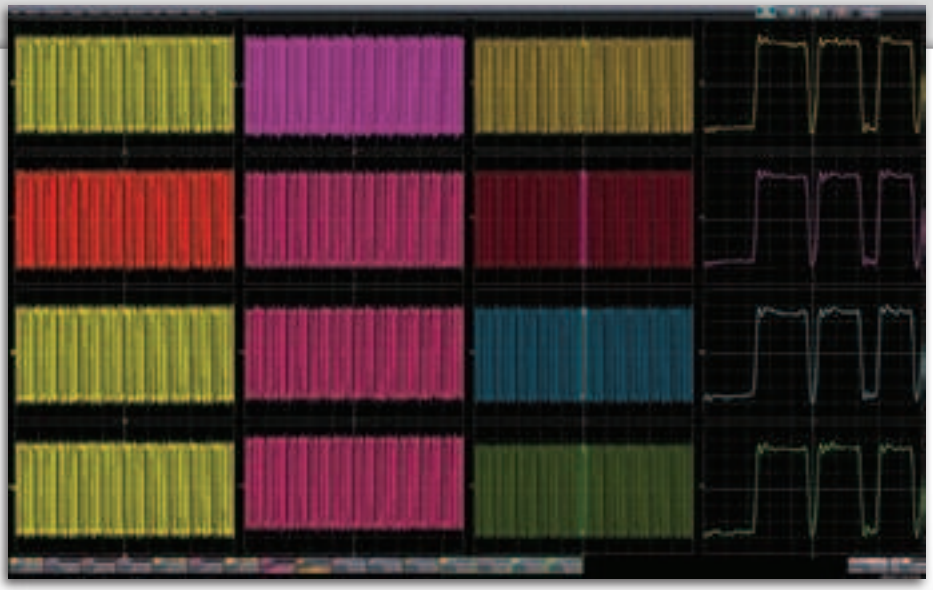
LabMaster 9 Zi-A may be configured with 4 to 80 channels and from 13 to 20 GHz of bandwidth. Jitter between all 20 GHz channels is exceptionally low. Signal fidelity is pristine with exceptional rise time, step response, and total and random jitter measurement floor. High effective number of bits (ENOB) over the complete operating frequency range, especially in the crucial mid-band, ensures the most noise-free display of signals. For higher speed serial data signals, 2 to 10 channels at 30 GHz may be desired. In addition to the higher bandwidth, these systems also provide double the input channels at 20 GHz of bandwith.



New Possibilities

Previously, oscilloscopes were limited to 4 channels, and could only be extended beyond that with significant limitations and user effort. LabMaster 9 Zi-A simplifies everything—it is easy and automatic to configure many channels. Just connect the acquisition modules together, perform a quick and simple deskew procedure, and view all the acquisition data on a single display. In addition, the modular Acquisition Modules minimize incremental channel cost, making it more cost-effective to purchase more

ChannelSync Provides Precise Synchronization Between All Acquisition Modules



ChannelSync in LabMaster 9 Zi-A emulates the architecture of a single oscilloscope package, even though as many as 80 different channels are available for use. A single 10 GHz distributed clock signal is generated and used in the "Master" and also distributed to all Acquisition Modules. The 10 GHz clock frequency—1000 times faster than the 10 MHz reference clocks commonly used to synchronize lab equipment—ensures precise synchronization and high timebase accuracy between all acquisition modules. Additionally, a single trigger circuit for all modules eliminates additive trigger jitter that occurs with 10 MHz clocking and trigger synchronization of multiple conventional oscilloscopes.

Acquisition Modules are automatically identified to the Master Control Module, and a simple and quick ChannelSync calibration corrects for any static acquisition skew between all acquisition modules. The result is up to eighty oscilloscope channels all operating as a single oscilloscope package.

oscilloscope channels instead of expensive probes. Furthermore, by cabling signals into the scope instead of using a differential probe or amplifier, noise is decreased by 3 dB or more, with higher user confidence in the overall signal fidelity of the complete measurement system.

Flexibility, Upgradeability, Investment Protection

LabMaster 9 Zi-A makes it easy to spread out your capital costs over time and purchase only what you need when you need it. Start with the minimal channel count and bandwidth configuration and add more Acquisition Modules, or upgrade existing Acquisition Modules to a higher bandwidth, as needs change. Acquisition Modules can be mixed together in any combination of bandwidth, so it is possible to configure a system with two channels at 30 or 45 GHz for single lane serial data analysis, and eight (or more) channels for multi-lane testing of four (or more) differential signals using cabled inputs.

Unique Multi-Lane CompleteLinQ Test Capability

Only a LabMaster system provides the capability to simultaneously view four or more differential lanes of serial data traffic with direct cabled inputs, thus increasing the accuracy and signal fidelity compared to using differential probes or external amplifiers, with similar or lower cost. Once three or more differential lanes are captured, SDAIII-CompleteLinQ Serial Data Analysis software can be used to measure jitter and eye diagrams on up to four lanes, and perform "victim" and "aggressor" crosstalk analysis through direct vertical noise measurements and crosstalk analysis tools.

Simple Multi-Lane System Validation

Multi-lane serial data systems have specifications for allowable lane-to-lane skew. By viewing all lanes simultaneously, and applying serial decoders as necessary, validaton of skew tolerance is a fast process.

28+ GBAUD OPTICAL COHERENT MODULATION ANALYSIS

LabMaster 9 Zi-A combines the world's fastest real-time bandwidth and four input channels with pristine signal fidelity to meet the advanced research and development requirements for optical coherent modulation analysis on long-haul telecommunication systems.

Four Channels at 45 GHz

A LabMaster 9 Zi-A four channel 45 GHz system is the ultimate in bandwidth and sample rate for the highest speed characterization of DP-QPSK or 16-QAM optical coherent modulation systems. These systems provide 120 GS/s (2.67x oversampling) on all four channels for accurate capture of in-phase and quadrature-phase modulated signals in two polarizations. The 45 GHz acquisition system has low noise and high effective number of bits (approximately 5.0 ENOB at 45 GHz) for minimal receiver sensitivity penalties at high analog bandwidths. ChannelSync ensures high phase stability between all tributaries - at least 2.5 times better than competitive solutions. This ensures the best possible accuracy in constellation diagram analysis.

45 GHz rise time$_{20-80\%}$ is an astonishing 8ps—clearly beneficial when testing 40 to 80 GBaud DP-QPSK or faster 16-QAM symbol rates utilizing baseband signals with unit intervals (UI) as small as 25 ps.

Upgradeable and Expandable

LabMaster 9 Zi-A may also be configured as a four channel 30 GHz system and two channel 45 GHz system. While providing lower bandwidth on all four channels, it does

provide two channels at 45 GHz for single-polarization characterization. This configuration can later be upgraded to four channels at 45 GHz with the addition of two additional Slave Acquisition Modules, which can be added at any time without returning the other components to Teledyne LeCroy for calibration or integration. It also provides for the ability to grow the system over time as needs change. This can be the ideal system for 56 GBaud DP-QPSK research and testing, allowing upgrade and expansion as symbol rates go higher.

Complete Customization and Fast Data Transfer

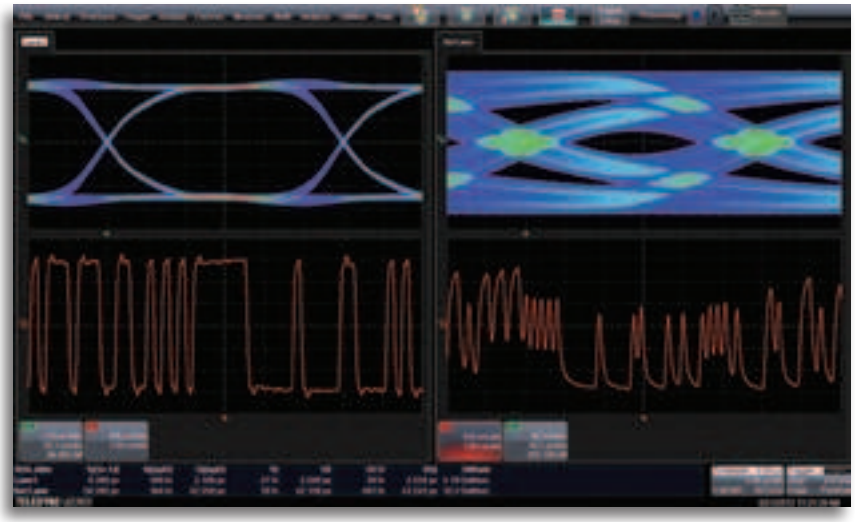
All configurations of LabMaster 9 Zi-A support the needs of researchers with complete customization capability through the use of the XDEV software capability. This provides the ability to integrate a MATLAB, C/C++, JScript (JAVA) or Visual Basic script into the oscilloscope's processing stream. This capability is ideal for emulating the receiver equalization since it allows proprietary user-generated algorithms to be created and run directly within the oscilloscope operating environment. The result may then be displayed on the oscilloscope in real-time, and computed results may be exported like any channel.

The server-class CPU can also be equipped with Teledyne LeCroy's Serial Interface Bus (LSIB) to allow acquired data to be transferred to another computer at speeds up to 325 MB/s. The combination of acquisition, customization, processing, and data export capabilities in LabMaster 9 Zi-A allow it to be used as the single lab data acquisition and processing tool, or leveraged solely as a data acquisition device with fast offload of acquired data to another CPU for further analysis.

28 GBaud Optical Coherent Modulation Analysis Using WaveMaster 8 Zi-A

Teledyne LeCroy's WaveMaster 820Zi-A four channel 20 GHz oscilloscope is an economical alternative to a LabMaster 9 Zi-A system for characterizing 28 GBaud dual-polarization QPSK or 16-QAM coherent modulated signals. This oscilloscope uses the same acquisition system as the LabMaster 9 Zi-A, and can be upgraded in bandwidth to two channels at 30 GHz for more accurate characterization of a single polarization. Consult Teledyne LeCroy for more details.

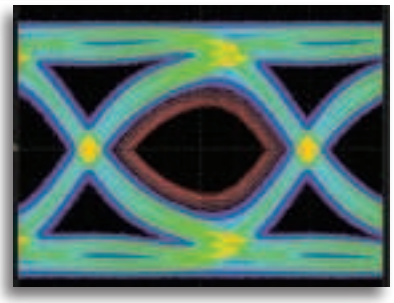
SDAIII-CompleteLinQ SERIAL DATA ANALYSIS PRODUCTS



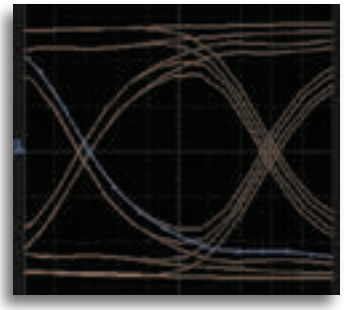
The Teledyne LeCroy SDAIII-CompleteLinQ Serial Data Analysis products contain multi-lane eye and jitter analysis, LaneScape™ comparison modes, vertical noise measurements, and crosstalk analysis tools. These capabilities provide the deepest insight into the behavior of multi- or single-lane serial data systems.

SDAIII Core Toolset

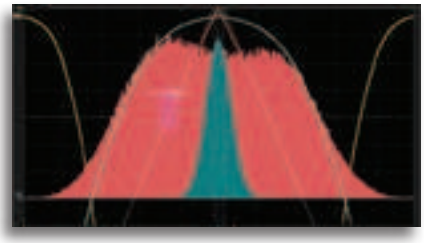
Teledyne LeCroy provides the most complete toolset in the industry for jitter measurements and eye diagram/jitter analysis. Rj and Dj are separated and Dj is decomposed using one of three dual-Dirac algorithms. Eye diagrams containing all acquired unit intervals are rendered 10-100x faster than competitive systems. Eye diagram analysis tools, such as the extrapolated IsoBER plot, aid insight. Multiple additional tools, such as Tracks, Histograms, and Spectrum waveforms, 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.



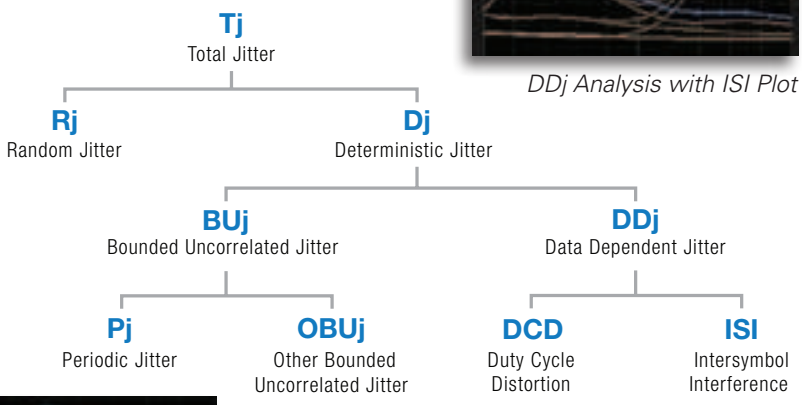
Eye with IsoBER

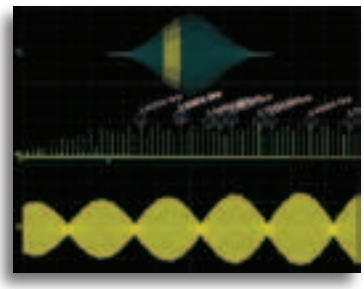


DDj Analysis with ISI Plot



Rj+BUj Analysis





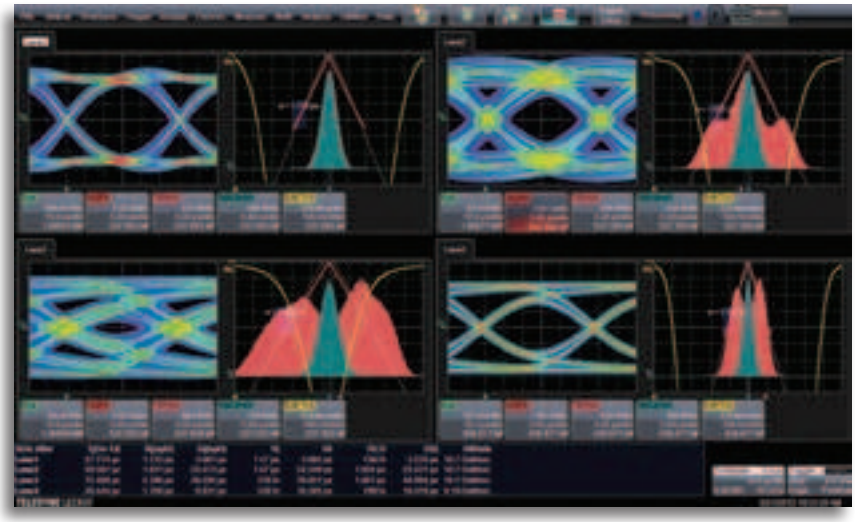
Pj Analysis

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

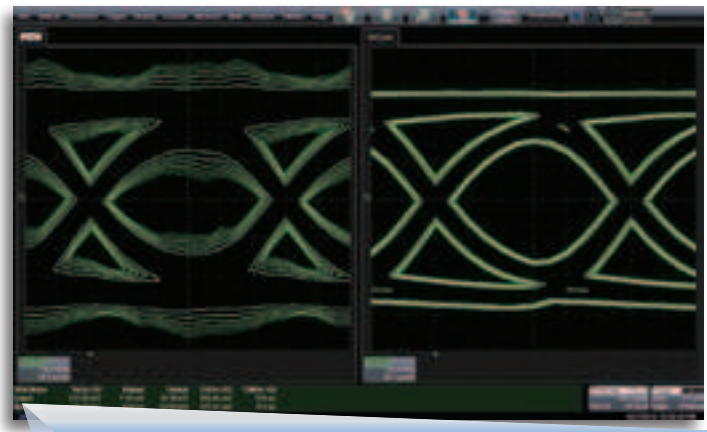
Measure up to 4 Lanes Simultaneously



"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 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.



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	33.38 mV	646 µV	24.93 mV	172.41 mV	131 ps

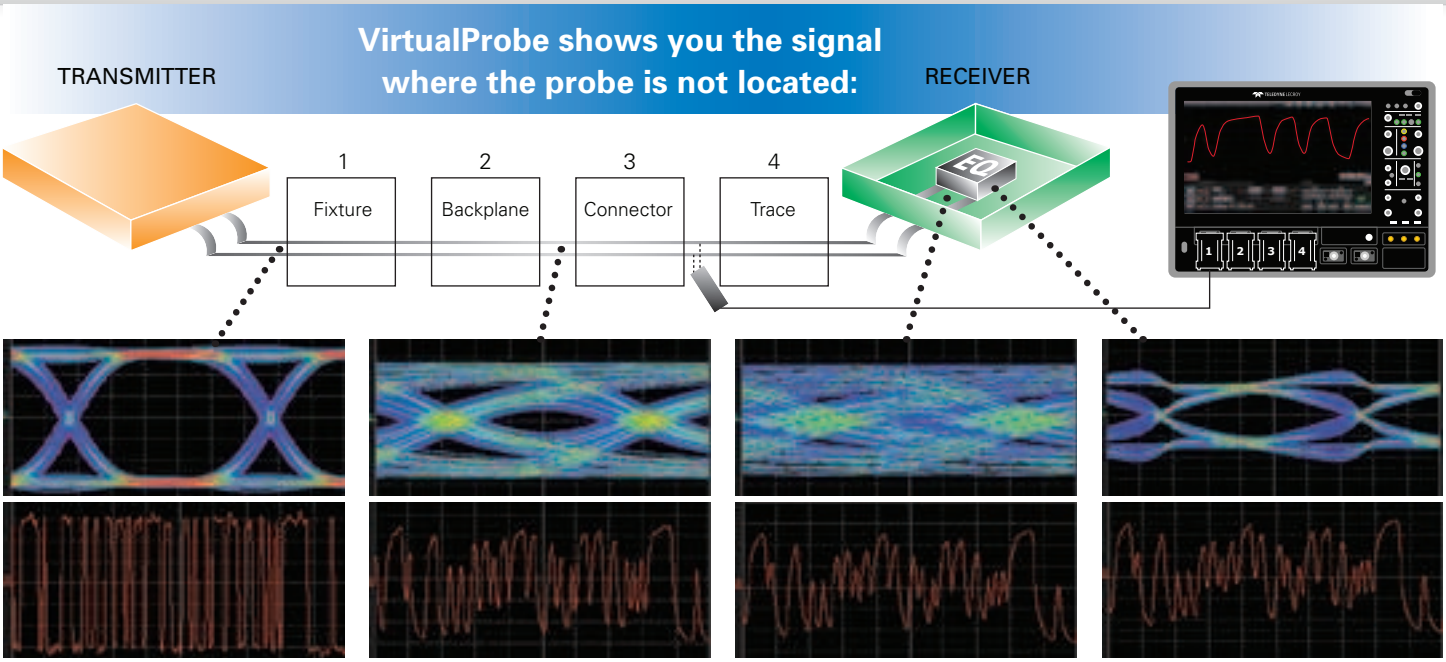
CompleteLinQ Does it All

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



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:

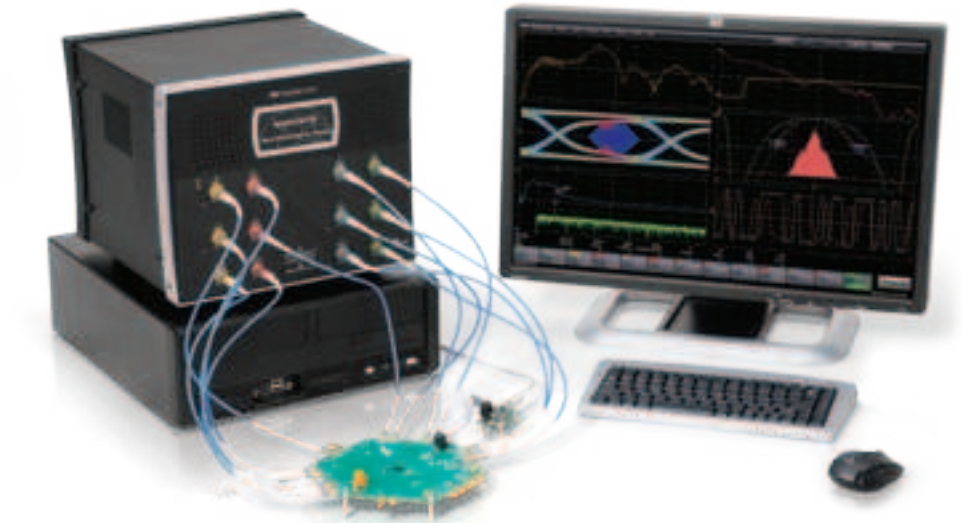
- **Development of measurement-based simulation models**
- **Design validation**
- **Compliance testing**
- **High-performance TDR**
- **PCB testing**
- **Portable measurement requirements**

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.

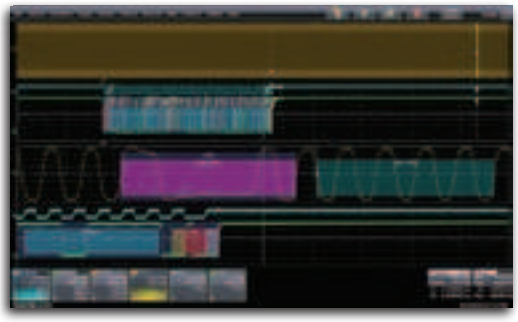
Characterize Crosstalk with 8 and 12-port SPARQs

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.

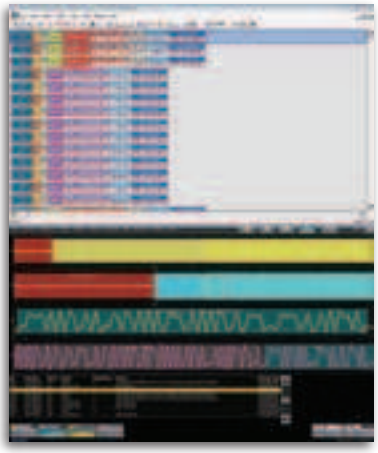
MOST COMPLETE DEBUG SOLUTION FROM 13–45 GHz

Complete System Debug

Understanding the relationships between different signals is vital to fast debug. Only LabMaster 9 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.

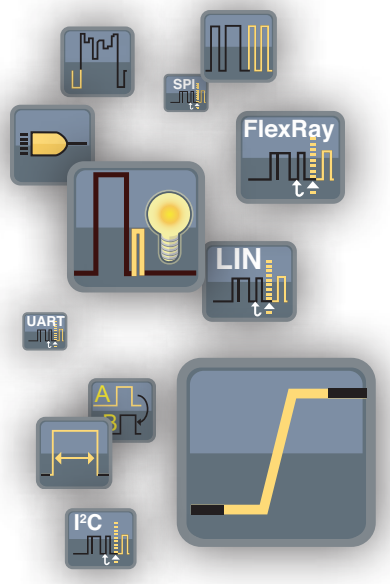
Serial Decode—A Whole New Meaning to Insight

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, 6.5 or 14.1 Gb/s true-hardware serial trigger (option, available wth 9xxMZi-A Master Acquisition Module only), 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 signal options all connect to the LabMaster 9 Zi-A Master Acquisition Module. All LabMaster 9 Zi-A Master Acquisition Modules 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. Acquisition Modules from 13–45 GHz support ProLink probe connections, and support 2.92 mm probe connections from 25 to 36 GHz, and 2.4 mm connections at 45 GHz.

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 wave-forms 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. (Note: Triggering on digital lines is not possible when used with LabMaster).

DEEP INSIGHT CLARIFIES COMPLEX SIGNALS

All Oscilloscope Tools are not Created Equal

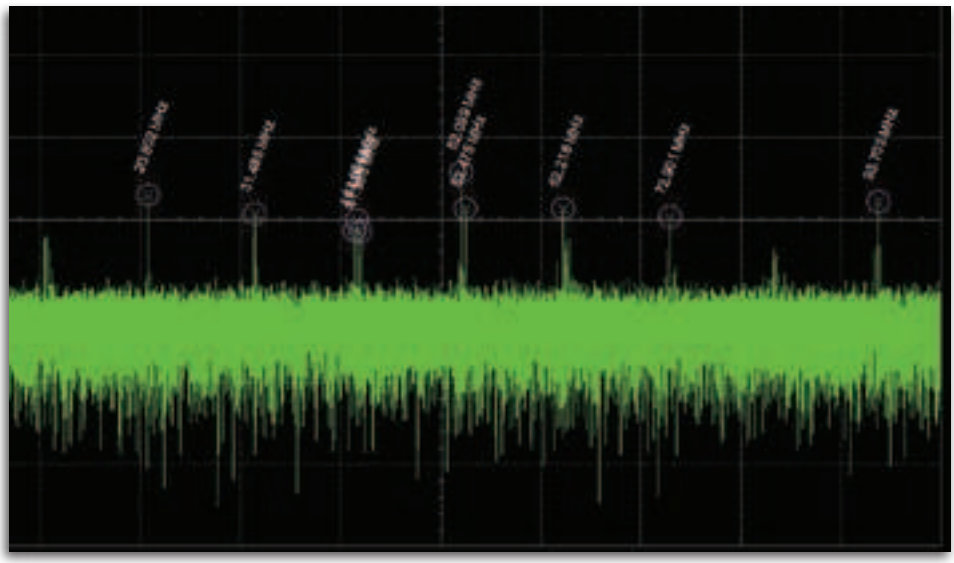
LabMaster 9 Zi-A has the deepest standard toolbox of any oscilloscope, providing more measure, math, graphing, statistical, and other tools, and more ways to leverage the tools to get the answer faster. While many other oscilloscopes provide similar looking tools, Teledyne LeCroy allows the most flexibility in applying the tools to any waveform.

Customized Tools

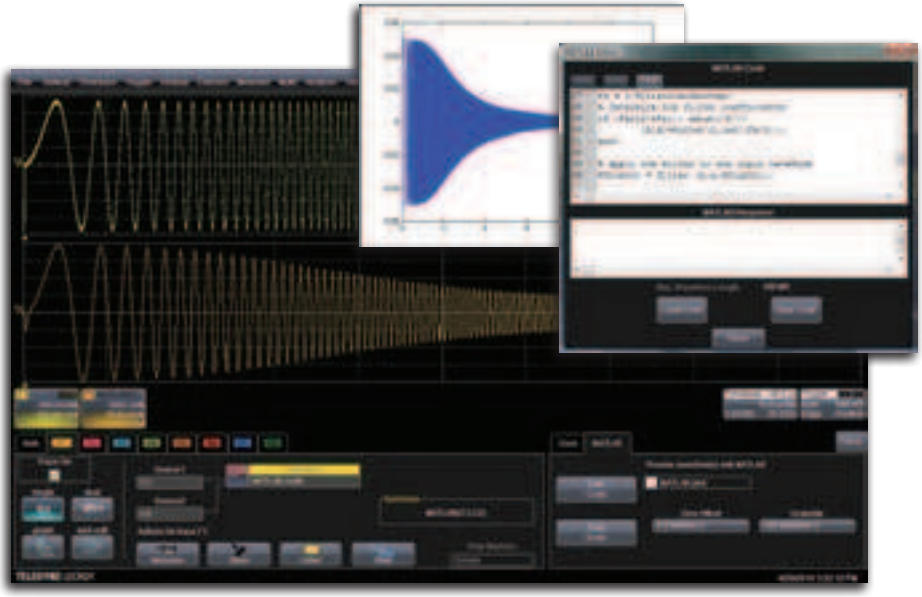
Only Teledyne LeCroy completely integrates third party programs into the oscilloscope's processing stream by allowing you to create and deploy a new measurement or math algorithm directly into the oscilloscope environment and display the result on the oscilloscope in real-time! There is no need to run 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

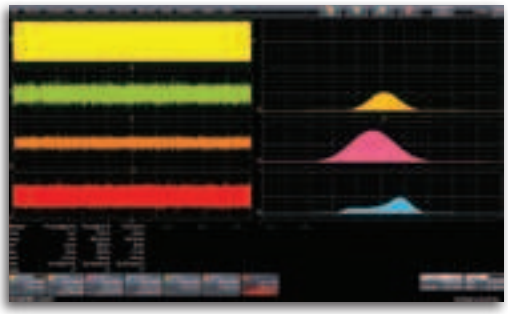
Track plots measurement values on the Y-axis and time on the X-axis to display a measurement change time-correlated to the original channel acquisition—perfect for intuitive understanding of behaviors in frequency modulated (FM) or pulse width modulated (PWM) circuits and jitter measurements, including 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.



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®.



Capture a single clock channel (yellow) and display Track graphs and Histograms simultaneously of multiple jitter parameters.

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

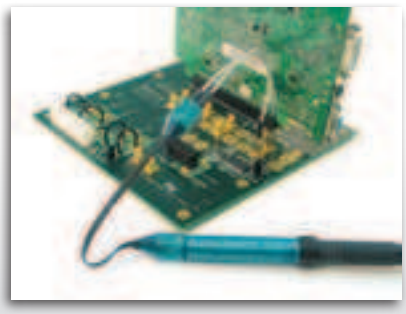
Circuit and signal loading is reduced by more than 50% with WaveLink high bandwidth probes compared to competitive probes. In the mid-band frequency range, the difference is even more apparent.

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

LabMaster 9 Zi-A acquisition modules support a broad range of probes for a variety of applications. (Note: all modules don't include 1 MΩ input capability necessary for some probes - consult specifications for details).

ZS Series High Impedance Active Probes

- 1 GHz (ZS1000) and 1.5 GHz (ZS1500) 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, 1 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

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

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

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
  - N-Cycle
  - N-Cycle with start selection
  - Frequency @ level
  - Period @ level
  - Half Period
  - Width @ level
  - Time Interval Error @ level
  - Setup
  - Hold
  - Skew
  - 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 (LM9Zi-SDAIII)
(Included in LM9Zi-SDAIII option, Standard on SDA MCM-Zi and DDA MCM-Zi 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
  - One Level
  - Zero Level
  - Eye Amplitude
  - Eye Width
  - Eye Crossing
  - Avg. Power
  - Extinction Ratio
  - Mask hits
  - Mask out
  - Bit Error Rate
  - 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
- Periodic Jitter (Pj) Meas Param
- Rj+BUj Histogram
- Rj+BUj Spectrum
- Rj+BUj Track
- 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 (LM9Zi-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 (LM9Zi-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 (LM9Zi-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 (LM9Zi-CBL-DE-EMBED)
(Standard on SDA MCM-Ziand DDA MCM-Zi)

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 (LM9Zi-8B10B D)
(Standard on SDA MCM-Zi and DDA MCM-Zi

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 (LM9Zi-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 (LM9Zi-DDM2)
(Standard on DDA MCM-Zi)

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

SPECIFICATIONS

Vertical System

	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Analog Bandwidth @ 50 Ω (-3 dB) (2.4/2.92 Inputs)				30 GHz	45 GHz
Analog Bandwidth @ 50 Ω (-3 dB) (ProLink Input)	13 GHz (≥ 10 mV/div)	16 GHz (≥ 10 mV/div)	20 GHz (≥ 10 mV/div)	20 GHz (≥ 10 mV/div)	20 GHz (≥ 10 mV/div)
Analog Bandwidth @ 50 Ω (-3 dB) (ProBus Input)	For 9xxMZi-A "Master" Acquisition Module: 3.5 GHz (≥10 mV/div) For MCM-Zi Master Control Module: Not Applicable				
Analog Bandwidth @ 1 MΩ (-3 dB) (ProBus Input)	For 9xxMZi-A "Master" Acquisition Module: 500 MHz (typical, ≥2 mV/div) For MCM-Zi Master Control Module: Not Applicable				
Rise Time (10–90%, 50 Ω)	32.5 ps (test limit, flatness mode)	28.5 ps (test limit, flatness mode)	22 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)	24.5 ps (flatness mode)	21.5 ps (flatness mode)	16.5 ps (flatness mode)	11.5 ps (flatness mode)	8.0 ps (flatness mode)
Input Channels	Up to 80, depending on configuration selected. (Any combination of up to 80 ProLink input channels, or 4 ProBus input channels)			Up to 40 @ 30 GHz. Up to 80 @ 20 GHz (Any combination of 20 GHz ProLink inputs or 2 ProBus input channels). Max number of channels depends on configuration selected	Up to 20 @ 45 GHz Up to 40 @ 30 GHz Up to 80 @ 20 GHz (Any combination of 20 GHz ProLink inputs or 2 ProBus input channels). Max number of channels depends on configuration selected
Bandwidth Limiters	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	**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	**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			**2.92mm 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	**2.4/2.92mm 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	**ProLink Inputs:** 50 Ω: DC, GND **ProBus Inputs:** 1 MΩ: AC, DC, GND; 50 Ω: DC, GND			**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, GND; 50 Ω: DC, GND
Maximum Input Voltage	**50 Ω (ProLink):** ±2 Vmax @ ≤ 100mV/div, 5.5V_{rms} @ > 100mV/div **50 Ω (ProBus):** ±5 Vmax, 3.5 V_{rms} **1 MΩ (ProBus):** 250 V max. (peak AC: < 10 kHz + DC)			**2.92 mm Inputs:** ±2 Vmax @ ≤ 100mV/div, 5.5V_{rms} @ > 100mV/div **50 Ω (ProLink):** ±2 Vmax @ ≤ 100mV/div, 5.5V_{rms} @ > 100mV/div **50 Ω (ProBus):** ±5 Vmax, 3.5 V_{rms} **1 MΩ (ProBus):** 250 V max. (peak AC: < 10 kHz + DC)	**2.4/2.92 mm Inputs:** ±2 Vmax @ ≤ 100mV/div, 5.5V_{rms} @ > 100mV/div **50 Ω (ProLink):** ±2 Vmax @ ≤ 100mV/div, 5.5V_{rms} @ > 100mV/div **50 Ω (ProBus):** ±5 Vmax, 3.5 V_{rms} **1 MΩ (ProBus):** 250 V max. (peak AC: < 10 kHz + DC)

SPECIFICATIONS

	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Vertical System (cont'd)					
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)			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)				
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			**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 M Ω (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)	1.80 mV_{rms} (typical)	1.90 mV_{rms} (typical)	2.20 mV_{rms} (typical)	2.90 mV_{rms} (typical)	3.90 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:** ±1V @ 2–140 mV/div ±10 V @ 142m V–1.40 V/div ±100 V @ 1.42 V–10 V/div			**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:** ±1V @ 2–128 mV/div ±10V @ 130 mV–1.28 V/div ±100 V @ 1.3V–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 ±10V @ 130 mV–1.28 V/div ±100 V @ 1.3V–10 V/div
DC Vertical Offset Accuracy	±(1.5% of offset setting +1.5% F.S. +1 mV) (test limit)				
Horizontal System					
Timebases	Internal timebase with 10 GHz clock frequency common to all input channels. Single, distributed 10 GHz clock for all channels ensures precise synchronization with timing accuracy between all channels identical to that provided within a single, conventional oscilloscope package				
Time/Division Range	**Real-time Mode:** 20 ps/div–64 s/div; **RIS Mode:** 20 ps/div–10 ns/div, user selectable at ≤10ns/div; **Roll Mode:** Not Available			**For ≥ 25 GHz Mode:** **Real-time Mode:** 20 ps/div–640 µs/div, depending on memory length **For ≤ 20 GHz Mode:** **Real-time Mode:** 20 ps/div–64 s/div; **RIS Mode:** 20 ps/div–10 ns/div, user selectable at ≤10ns/div; **Roll Mode:** Not Available	
Clock Accuracy	< 1 ppm + (aging of 0.5 ppm/yr from last calibration)				

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	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Horizontal System (cont'd)					
Sample Clock Jitter	Up to 10 µs Acquired Time Range: 100fs$_{rms}$ (Internal Timebase Reference) Up to 6.4 ms Acquired Time Range: 150fs$_{rms}$ (Internal Timebase Reference)				
Delta Time Measurement Accuracy	$\sqrt{2} * \sqrt{\left(\frac{Noise}{SlewRate}\right)^2} + (Sample\ Clock\ Jitter)^2\ (RMS) + (clock\ accuracy * reading)\ (seconds)$				
Jitter Measurement Floor	$\sqrt{\left(\frac{Noise}{SlewRate}\right)^2} + (Sample\ Clock\ Jitter)^2\ seconds_{rms}\ (TIE)$				
Jitter Between Channels (TIE, typical, measured at maximum bandwidth)	<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 Timebase Reference (Input)	10 MHz; 50 Ω impedance, applied at the rear input of 9xxMZi-A Master Acquisition Module or MCM-Zi Master Control Module				
External Timebase Reference (Output)	10 MHz; 50 Ω impedance, output at the rear of 9xxMZi-A Master Acquisition Module or MCM-Zi Master Control Module				
Acquisition System					
Single-Shot Sample Rate/Ch	40 GS/s on each channel. (80 GS/s when combining channels using the optional WM8Zi-2X80GS External Interleaving Device)			80 GS/s on each channel in ≥ 25 GHz Mode. 40 GS/s on each channel in ≤ 20 GHz Mode. (80 GS/s in ≤ 20 GHz Mode when combining channels using the optional WM8Zi-2X80GS External Interleaving Device)	120 GS/s on each channel in 45 GHz Mode 80 GS/s on each channel in ≥ 25 GHz Mode 40 GS/s on each channel in ≤ 20 GHz Mode (80 GS/s in < 20 GHz Mode when combining channels using the optional WM8Zi-2X80GS External Interleaving Device)
Random Interleaved Sampling (RIS)	200 GS/s for repetitive signals (20 ps/div to 10 ns/div)			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	256 Mpts/Ch			512 Mpts/Ch (2 Ch operation)	768 Mpts/Ch (1 Ch operation)
Standard Memory (4 Ch / 2 Ch / 1Ch) (Number of Segments)	20M / 20M / 20M (2000) Memory and Sample Rate can be doubled in half channel mode with use of WM8Zi-2X80GS External Interleaving Device.			40 M / 40 M / 40M (1000) (In ≤ 20 GHz Modes, reference memory specification for 20 GHz LabMaster)	60M / 60M / 60M (1000) (In < 30 GHz or < 20 GHz Modes, reference memory specification for 30 GHz and 20 GHz LabMasters)

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	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Acquisition System (cont'd)					
Memory Options (4 Ch / 2 Ch / 1 Ch) (Number of Segments)	**S-32 Option:** 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, memory and sample Rate can be doubled in half channel mode with use of WM8Zi-2X80GS External Interleaving Device.			**S-32 Option:** 64M / 64M / 64M (3,500) **M-64 Option:** 128M / 128M / 128M (7,500) **L-128 Option:** 256M / 256M / 256M (15,000) **VL-256 Option:** 512M / 512M / 512M (15,000) (In ≤ 20 GHz Modes, reference memory specification for 20 GHz LabMaster)	**S-32 Option:** 96M / 96M / 96M (3,500) **M-64 Option:** 192M / 192M / 192M (15,000) **L-128 Option:** 384M / 384M / 384M (15,000) **VL-256 Option:** 768M / 768M / 768M (15,000) (In < 30 GHz or < 20 GHz Modes, reference memory specification for 30 GHz and 20 GHz LabMasters
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	Using 9xxMZi-A Master Acquisition Module: Any Ch 1-4 (Edge, Window, TV, SMART, Cascade triggers), AUX or AUX/10, or internal Fast Edge on 9xxMZi-A; any input channel (Edge trigger only) on 9xxSZi-A Acquisition Modules (Channels 5 and higher). Using MCM-Zi Master Control Module: Any Ch 1-4 of the first 9xxSZi-A Acquisition Module input (Edge, Window, TV, SMART, Cascade triggers), or internal Fast Edge on the MCM-Zi module; any input channel (Edge trigger only) on additional 9xxSZi-A Acquisition Modules (Channels 5 and higher). 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				
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 (2.4 / 2.92mm Inputs)	N/A			(For 9xxMZi-A "Master" Acquisition Module or Ch 1-4 of a 9xxSZi-A "Slave" Acquisition Module when used with an MCM-Zi Master Control Module): 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 (ProBus Inputs)	(For 9xxMZi-A "Master" Acquisition Module or Ch 1-4 of a 9xxSZi-A "Slave" Acquisition Module when used with an MCM-Zi Master Control Module): 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 (ProLink Inputs)	(For 9xxMZi-A "Master" Acquisition Module or Ch 1-4 of a 9xxSZi-A "Slave" Acquisition Module when used with an MCM-Zi Master Control Module): 3 div @ < 13 GHz, 1.5 div @ < 3 GHz, 1.0 div @ < 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)	(For 9xxMZi-A "Master" Acquisition Module or Ch 1-4 of a 9xxSZi-A "Slave" Acquisition Module when used with an MCM-Zi Master Control Module): 3 div @ < 15 GHz, 1.5 div @ < 3 GHz, 1.0 div @ < 200 MHz (for DC, AC, LFRej coupling, ≥ 10 mV/div, 50 Ω)			

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	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Triggering System (cont'd)					
External Trigger Sensitivity, (Edge Trigger)	For 9xxMZi-A "Master" Acquisition Module only: 2 div @ < 1 GHz, 1.5 div @ < 500 MHz, 1.0 div @ < 200 MHz, (for DC coupling)				
Max. Trigger Frequency, SMART Trigger	For 9xxMZi-A Master Acquisition Module or Ch 1-4 of a 9xxSZi-A Acquisition Module when used with an MCM-Zi Master Control Module: 2.0 GHz @ ≥ 10 mV/div (minimum triggerable width 200 ps)				
External Trigger Input Range	For 9xxMZi-A "Master" Acquisition Module only: 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 200ps to 20 s, or on intermittent faults				
Width (Signal or Pattern)	Triggers on positive, negative, or both widths with widths selectable as low as 200ps 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. Delay 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 (Optional)					
Data Rates (Available only with 9xxMZi-A Master Acquisition Module)	Option LM9Zi-6GBIT-80B-8B10B-TD: 600 Mb/s to 6.5 Gb/s, Channel 4 input only Option LM9Zi-14GBIT-80B-8B10B-TD: 600 Mb/s to 14.1 Gb/s, Channel 4 input only			Option LM9Zi-6GBIT-80B-8B10B-TD: 600 Mb/s to 6.5 Gb/s, Channel 4 input only Option LM9Zi-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)	
Pattern Length	80-bits, NRZ or eight 8b/10b symbols				
Clock and Data Outputs	No Clock and Data Recovery outputs provided				

SPECIFICATIONS

	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Low Speed Serial Protocol Triggering (Optional)					
Optionally available	Using 9xxMZi-A Master Acquisition Module: I²C, SPI (SPI,SSPI,SIOP), UART-RS232, CAN, LIN, FlexRay, I²S (Audio), MIL-1553				
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.				
Color Waveform Display					
Type	On 9xxMZi-A "Master" Acquisition Module or 9CZi-A Master Control Module: 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 40 traces. Simultaneously display channel, zoom, memory and math traces				
Grid Styles	Auto, Single, Dual, Quad, Octal, X-Y, Single + X-Y, Dual + X-Y, Twelve, Sixteen, Twenty				
Waveform Representation	Sample dots joined, or sample dots only				
Integrated Second Display					
Type	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) For 9xxMZi-A Master Acquisition Module - reqauires ordering of option LM9Zi-VIDEOCARD-Zi-EXTDISP-15 to replace the standard video card in the LabMaster CPU, so performance described in "External Monitor Port" is no longer provided. MCM-Zi Master Control Module provides all video outputs required, and supports extended desktop operation.				
Resolution	Determined by display chosen by user				
High-Speed Digitizer Output (Option)					
Type	Option LSIB-2. Installs in LabMaster 9xxMZi-A CPU or LabMaster MCM-Zi Master Control Module and uses one available PCIe slot normally used by a 9xxSZi-A Module.				
Transfer Rates	up to 325 MB/s (typical) - Maximum of 4 channels (consult Teledyne LeCroy for >4 channels)				
Output Protocol	PCI Express, Gen 1 (4 lanes utilized for data transfer)				
Control Protocol	TCP/IP				
Command Set	Via Windows Automation, or via Teledyne LeCroy Remote Command Set				
Processor/CPU					
Type	In 9xxMZi-A CPU or MCM-Zi Master Control Module: Intel® Xeon™ X5660 2.8 GHz (or better). There are two processors in each CPU, and each processor has 6 cores for a total of 12 cores and an effective processor speed of 33.6 GHz				
Processor Memory	24 GB standard. Up to 192 GB optionally available				
Operating System	Microsoft Windows® 7 Professional Edition (64-bit)				
Real Time Clock	Date and time displayed with waveform in hardcopy files. SNTP support to synchronize to precision internal clocks				
Setup Storage					
Front Panel and Instrument Status	Store to the internal hard drive, over a network, or to a USB-connected peripheral device				
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. Installs in LabMaster 9xxMZi-A CPU or MCM-Zi Master Control Module and uses one available PCIe slot normally used by a 9xxSZi-A Module				
LSIB Port (optional)	Supports PCIe Gen1 x4 protocol with Teledyne LeCroy supplied API. Installs in LabMaster 9xxMZi-A CPU or MCM-Zi Master Control Module and uses one available PCIe slot normally used by a 9xxSZi-A Module				
Ethernet Port	Supports 10/100/1000Base-T Ethernet interface (RJ45 port)				
USB Ports	9xxMZi-A CPU or MCM-Zi Master Control Module: minimum 2 total USB 2.0 ports on rear of unit to support Windows compatible devices 9xxMZi "Master" Acquisition Module or MCM-Zi Master Control Module: minimum 3 total USB 2.0 ports on front of unit to support Windows compatible devices				
External Monitor Port	In 9xxMZi-A CPU: Dual Link DVI compatible to support internal display on 9xxMZi-A Master Acquisition Module (1280 x 768 pixel resolution) or customer-supplied monitor with up to WQXGA (2560 x 1600 pixel) resolution. Add LM9Zi-VIDEOCARD-EXTDESKTOP replacement videocard to support two DVI-D monitors with extended desktop. (max 1920 x 1200 pixel resolution for both monitors). In MCM-Zi Master Control Module: Dual Link DVI compatible to support internal display on MCM-Zi Master Control Module (1280 x 768 pixel resolution) and customer-supplied monitor with up to WQXGA (2560 x 1600 pixel) resolution using extended desktop mode.				

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	13 GHz LabMaster 9 Zi-A	16 GHz LabMaster 9 Zi-A	20 GHz LabMaster 9 Zi-A	30 GHz LabMaster 9 Zi-A	45 GHz LabMaster 9 Zi-A
Power Requirements					
Voltage	LabMaster 9xxMZi-A Master Acquisition Module and 9xxSZi-A: 100–240 VAC ±10% at 45–66 Hz; 100–120 VAC ±10% at 380–420 Hz; Automatic AC Voltage Selection, Installation Category II LabMaster 9xxMZi-A CPU: 100–240 VAC ±10% at 45-66 Hz; Automatic AC Voltage Selection, Installation Category II LabMaster MCM-Zi Master Control Module: 100–240 VAC ±10% at 45-66 Hz; Automatic AC Voltage Selection, Installation Category II				
Max. Power Consumption	9xxMZi-A Master Acq. Module – 850 W / 850 VA 9xxMZi-A CPU – 400 W / 400 VA 9xxSZi-A Acq. Module – 700 W / 700 VA MCM-Zi Master Control Module - 450 W / 450 VA. Each Module and the CPU has a separate power cord			9xxMZi-A Master Acq. Module – 900 W / 900 VA 9xxMZi-A CPU – 400 W / 400 VA 9xxSZi-A Acq. Module – 750 W / 750 VA MCM-Zi Master Control Module - 450 W / 450 VA. Each Module and the CPU has a separate power cord	
Environmental					
Temperature (Operating)	+5 °C to +40 °				
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				
Altitude (Non-Operating)	Up to 40,000 ft. (12,192 m)				
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)	9xxMZi-A Master Acquisition Module – 14" H x 18.4" W x 16" D (355 x 467 x 406 mm) 9xxMZi-A CPU – 5.7" H x 18.2" W x 20.8" D (145 mm x 462 mm x 527 mm) 9xxSZi-A Acquisition Module – 7" H x 18.2" W x 20.8" D (177 mm x 462 mm x 527 mm) MCM-Zi Master Control Module - 10.9" H x 18.2" W x 15.6" D (277 x 462 x 396 mm)				
Weight	9xxMZi-A Master Acquisition Module – 48 lbs. (22 kg) 9xxMZi-A CPU – 29 lbs. (13 kg) 9xxSZi-A Acquisition Module – 37 lbs. (17 kg) MCM-Zi Master Control Module - 47 lbs. (21.4 kg)			930MZi-A Master Acq. Module – 55 lbs. (25 kg) 9xxMZi-A CPU – 29 lbs. (13 kg) 93xSZi-A Acquisition Module – 44 lbs. (20 kg) MCM-Zi Master Control Module - 47 lbs. (21.4 kg)	945MZi-A Master Acq. Module – 57 lbs. (26 kg) 9xxMZi-A CPU – 29 lbs. (13 kg) 945SZi-A Acquisition Module – 46 lbs. (21 kg) MCM-Zi Master Control Module - 47 lbs. (21.4 kg)
Shipping Weight	9xxMZi-A Master Acquisition Module – 70 lbs. (32 kg) 9xxMZi-A CPU – 36 lbs. (16 kg) 9xxSZi-A Acquisition Module – 44 lbs. (20 kg) MCM-Zi Master Control Module - 56 lbs. (25.5 kg)			930MZi-A Master Acq. Module – 77 lbs. (35 kg) 9xxMZi-A CPU – 29 lbs. (13 kg) 93xSZi-A Acquisition Module – 51 lbs. (23 kg) MCM-Zi Master Control Module - 56 lbs. (25.5 kg)	945MZi-A Master Acq. Module – 79 lbs. (36 kg) 9xxMZi-A CPU – 29 lbs. (13 kg) 945SZi-A Acq.Module – 53 lbs. (24 kg) MCM-Zi Master Control Module - 56 lbs. (25.5 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				

ORDERING INFORMATION

Product Description	Product Code
LabMaster 9 Zi-A Series Master Control Modules	
LabMaster Master Control Module with 15.3" WXGA Color Display.	LabMaster MCM-Zi
SDA Master Control Module with 15.3" WXGA Color Display (provides add'l standard software and 32 Mpt/Ch memory)	SDA MCM-Zi
DDA Master Control Module with 15.3" WXGA Color Display (provides add'l standard software and 32 Mpt/Ch memory)	DDA MCM-Zi
LabMaster 9 Zi-A Series Master Acquisition Modules	
13 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch LabMaster *Master* Acquisition Module with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	LabMaster 913MZi-A
16 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch LabMaster *Master* Acquisition Module with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	LabMaster 916MZi-A
20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch LabMaster *Master* Acquisition Module with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	LabMaster 920MZi-A
30 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch LabMaster *Master* Acquisition Module (20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch) with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	LabMaster 930MZi-A
45 GHz, 120 GS/s, 1 Ch, 60 Mpts/Ch LabMaster *Master* Acquisition Module (30 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch; 20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch) with 15.3" WXGA Color Display. 50 Ω and 1 MΩ Input	LabMaster 945MZi-A
LabMaster 9 Zi-A Series Acquisition Modules	
13 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch LabMaster Acquisition Module with 50 Ω input	LabMaster 913SZi-A
16 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch LabMaster Acquisition Module with 50 Ω input	LabMaster 916SZi-A
20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch LabMaster Acquisition Module with 50 Ω input	LabMaster 920SZi-A
30 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch LabMaster Acquisition Module with 50 Ω input (20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch)	LabMaster 930SZi-A
45 GHz, 120 GS/s, 1 Ch, 60 Mpts/Ch LabMaster Acquisition Module with 50 Ω input (30 GHz, 80 GS/s, 2 Ch, 40 Mpts/Ch; 20 GHz, 40 GS/s, 4 Ch, 20 Mpts/Ch)	Labmaster 945SZi-A

Product Description	Product Code
Included with LabMaster MCM-Zi Standard Configuration	
Power Cable for the Destination Country, Optical 3-button Wheel Mouse USB 2.0, Printed Getting Started Manual, Anti-virus Software (Trial Version), Microsoft Windows 7 License, Commercial NIST Traceable Calibration with Certificate, 3-year Warranty	
Included with LabMaster 9xxMZi-A Standard Configuration	
÷10, 500 MHz Passive Probe (Qty. 4 on 4–20 GHz units, Qty. 2 on 30–45 GHz units) ProLink to K/2.92 mm Adapter: 4 each LPA-K-A, PCIe x 8 cable, 2m long, DVI cable for WXGA connection, 2m long, Power Cable (quantity 2) for the Destination Country, Optical 3-button Wheel Mouse, USB 2.0, Printed Getting Started Manual, Anti-virus Software (Trial Version), Microsoft Windows 7 License, Commercial NIST Traceable Calibration with Certificate, 3-year Warranty	
Included with LabMaster 9xxSZi-A Standard Configuration	
ProLink to K/2.92 mm Adapter: 4 each LPA-K-A, PCIe x 8 cable, 2m long, PCIe x 4 cable, 2m long, Power Cable for the Destination Country, ChannelSync 10 GHz clock cable, 2m long, Commercial NIST Traceable Calibration with Certificate, 3-year Warranty	
ChannelSync Expansion Products	
ChannelSync Mainframe Hub to permit LabMaster expansion to up to 20 acquisition modules	LabMaster CMH20-Zi
Expansion ChannelSync module card for ChannelSync Mainframe Hub. One required per connected acquisition module	LabMaster CMH-1ACQMODULE-Zi
Memory Options	
20 Mpts/Ch Standard Memory for LabMaster Acquisition Module	LM9Zi-STD
32 Mpts/Ch Standard Memory for LabMaster Acquisition Module. Used with SDA MCM-Zi	SDA9Zi-STD
32 Mpts/Ch Standard Memory for LabMaster Acquisition Modules. Used with DDA MCM-Zi	DDA9Zi-STD
32 Mpts/ch Memory Option for LabMaster Acquisition Module	LM9Zi-S-32
64 Mpts/Ch Memory Option for LabMaster Acquisition Modules	LM9Zi-M-64
64 Mpts/Ch Memory Option for LabMaster Acquisition Modules. Used with SDA MCM-Zi	SDA9Zi-M-64
64 Mpts/Ch Memory Option for LabMaster Acquisition Modules. Used with DDA MCM-Zi	DDA9Zi-M-64
128 Mpts/Ch Memory Option for LabMaster Acquisition Modules	LM9Zi-L-128
128 Mpts/Ch Memory Option for LabMaster Acquisition Modules. Used with SDA MCM-Zi	SDA9Zi-L-128
128 Mpts/Ch Memory Option for LabMaster Acquisition Modules Used with DDA MCM-Zi	DDA9Zi-L-128
256 Mpts/Ch Memory Option for LabMaster Acquisition Modules	LM9Zi-L-256
256 Mpts/Ch Memory Option for LabMaster Acquisition Modules. Used with SDA MCM-Zi	SDA9Zi-L-256
256 Mpts/Ch Memory Option for LabMaster Acquisition Modules. Used with DDA MCM-Zi	DDA9Zi-L-256

ORDERING INFORMATION

Product Description	Product Code
Sampling Rate Options	
80 GS/s on 2 Ch Sampling Rate Option (not available for 930xZi-A or 945xZi-A) Includes two separate external interleaving devices with storage case	WM8Zi-2X80GS
CPU, Computer and Other Hardware Options for LabMaster MCM-Zi Master Control Module	
Additional 500 GB Hard Drive for MCM-Zi	MCM-Zi-500GB-RHD-02
48 GB RAM Upgrade for MCM-Zi	MCM-Zi-24-UPG-48GBRAM
96 GB RAM Upgrade for MCM-Zi	MCM-Zi-24-UPG-96GBRAM
192 GB RAM Upgrade for MCM-Zi	MCM-Zi-24-UPG-192GBRAM
GPIB Option for MCM-Zi	GPIB-3
CPU, Computer and Other Hardware Options for LabMaster 9xxMZi-A Master Acquisition Modules	
Additional 500 GB Hard Drive for LM9xxMZi-A	LM9Zi-500GB-RHD-02
48 GB RAM Upgrade for LM9xxMZi-A	LM9Zi-24-UPG-48GBRAM
96 GB RAM Upgrade for LM9xxMZi-A	LM9Zi-24-UPG-96GBRAM
192 GB RAM Upgrade for LM9xxMZi-A	LM9Zi-24-UPG-192GBRAM
GPIB Option for LabMaster MCM-Zi	GPIB-3
CPU Video Card to support Zi-EXTDISP-15 2nd Touch Screen Display	LM9Zi-VIDEOCARD-ZI-EXTDISP-15
CPU Video Card to support Extended Desktop (replaces standard video card)	LM9Zi-VIDEOCARD-EXTDESKTOP
Serial Data and Crosstalk Analysis	
Bundle - Multi-Lane SDA LinQ Framework, including Eye, Jitter, Noise, Crosstalk Measurements, with EyeDrII and VirtualProbe	LM9Zi-SDAIII-CompleteLinQ SDA9Zi-CompleteLinQ DDA9Zi-CompleteLinQ
Multi-Lane Serial Data Analysis LinQ Framework, Eye, Jitter, Noise and Crosstalk Measurements	LM9Zi-SDAIII-CrossLinQ SDA9Zi-CrossLinQ DDA9Zi-CrossLinQ
Multi-Lane Serial Data Analysis LinQ Framework, Eye and Jitter Measurements	LM9Zi-SDAIII-LinQ SDA9Zi-LinQ DDA9Zi-LinQ
Single-Lane Serial Data Analysis Framework, Eye, Jitter, Noise and Crosstalk Measurements	LM9Zi-SDAIII-Crosstalk SDA9Zi-Crosstalk DDA9Zi-Crosstalk
Single-Lane Serial Data Analysis Framework, Eye and Jitter Measurements	LM9Zi-SDAIII
Signal Integrity Toolkits	
Advanced De-embedding, Emulation and Virtual Probing Toolkit	LM9Zi-VIRTUALPROBE
Signal Integrity Toolkit - Channel & Fixture De-embedding/Emulation, Tx/Rx Equalization	LM9Zi-EYEDRII
Bundle - EyeDrII and VirtualProbe Toolkits	LM9Zi-EYEDRII-VP
Cable De-embed Option	LM9Zi-CBL-DE-EMBED

Product Description	Product Code
Serial Data Compliance	
SDAIII Serial Data Analysis Option	LM9Zi-SDAIII
QualiPHY Enabled 10GBase-KR Software Option	QPHY-10GBase-KR
QualiPHY Enabled BroadR-Reach Software Option	QPHY-BroadR-Reach
QualiPHY Enabled LPDDR2 Software Option	QPHY-LPDDR2
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 MIPI D-PHY Software Option	QPHY-MIPI-DPHY
QualiPHY Enabled MOST50 ePHY Software Option	QPHY-MOST50
QualiPHY Enabled MOST150 oPHY Software Option	QPHY-MOST150
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	
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	
600 Mb/s to 6.5 Gb/s High-speed 80bit NRZ and 8b/10b Symbol Serial Pattern Trigger Also includes 8b/10b Decode. Available for use with LabMaster 9xxMZi-A Master Acquisition Modules only.	LM9Zi-6GBIT-80B-8B10B-TD
600 Mb/s to 14.1 Gb/s 80-bit NRZ and 8b/10b Serial Trigger. Also includes 8b/10b Decode. Available for use with LabMaster 9xxMZi-A Master Acquisition Modules only.	LM9Zi-14GBIT-80B-8B10B-TD
64b/66b Decode Annotation Option	LM9Zi-64b66b D
8b/10b Decode Decode Annotation Option	LM9Zi-8B10B D

ORDERING INFORMATION

Product Description	Product Code
Serial Data Triggers and Decoders (cont'd)	
ENET Decode Option	LM9Zi-ENETbus D
Ethernet 10G Decode Option	LM9Zi-ENET10Gbus D
PCI Express Decode Annotation Option	LM9Zi-PCIEbus D
USB 3.0 Decode Annotation Option	LM9Zi-USB3bus D
USB 2.0 Decode Annotation Option	LM9Zi-USB2bus D
USB2-HSIC Decode Option	LM9Zi-USB2-HSICbus D
SATA Decode Annotation Option	LM9Zi-SATAbus D
SAS Decode Annotation Option	LM9Zi-SASbus D
Fibre Channel Decode Annotation Option	LM9Zi-FCbus D
D-PHY Decode Option	LM9Zi-DPHYbus D
DigRF 3G Decode Option	LM9Zi-DigRF3Gbus D
DigRF v4 Decode Option	LM9Zi-DIGRFv4bus D
Audiobus Trigger and Decode Option for I^2S, LJ, RJ, and TDM	LM9Zi-Audiobus TD
Audiobus Trigger, Decode, and Graph Option for I^2S, LJ, RJ, and TDM	LM9ZiAudiobus TDG
Manchester Decode Option	LM9Zi-Manchesterbus D
MIPI D-PHY Decode Annotation Option	LM9Zi-DPHYbus D
MIPI D-PHY Decode and Physical Layer Test Option	LM9Zi-DPHYbus DP
MIPI M-PHY Decode Annotation Option	LM9Zi-MPHYbus D
MIPI M-PHY Decode Annotation and Physical Layer Test Option	LM9Zi-MPHYbus DP
I^2C Bus Trigger and Decode Option	LM9Zi-I2Cbus TD
SENT Decode Option	LM9Zi-SENTbus D
SPI Bus Trigger and Decode Option	LM9Zi-SPIbus TD
LIN Trigger and Decode Option	LM9Zi-LINbus TD
UART and RS-232 Trigger and Decode Option	LM9Zi-UART-RS232bus TD
FlexRay Trigger and Decode Option	LM9Zi-FlexRaybus TD
FlexRay Trigger, Decode, and Physical Layer Test Option	LM9Zi-FlexRaybus TDP
CANbus TD Trigger and Decode Option	LM9Zi-CANbus TD
CANbus TDM Trigger, Decode and Measure/Graph Option	LM9Zi-CANbus TDM
MIL-STD-1553 Trigger and Decode Option	LM9Zi-1553 TD
ARINC 429 Symbolic Decode Option	LM9Zi-ARINC429bus DSymbolic
PROTObus MAG Serial Debug Toolkit	LM9Zi-PROTObus MAG
Decode Annotation and Protocol Analyzer Synchronization Software Option	LM9Zi-ProtoSync
Decode Annotation and Protocol Analyzer + BitTracer Synchronization Software Option	LM9Zi-ProtoSync-BT
Mixed Signal Solutions	
250 MHz, 1 GS/s, 18 Ch, 10 Mpts/Ch Mixed Signal Oscilloscope Option	MS-250
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

Product Description	Product Code
General Purpose and Application Specific Software Options	
Spectrum Analysis Option	LM9Zi-SPECTRUM
Digital Filter Software Package	LM9Zi-DFP2
Serial Data Mask Software Package	LM9Zi-SDM
Disk Drive Measurements Software Package	LM9Zi-DDM2
Disk Drive Analyzer Software Package	LM9Zi-DDA
Advanced Optical Recording Measurement Package	LM9Zi-AORM
Electrical Telecom Mask Test Software Package	LM9Zi-ET-PMT
EMC Pulse Parameter Software Package	LM9Zi-EMC
Power Analysis Option	LM9Zi-PWR
Clock Jitter Analysis with Four Views Software Package	LM9Zi-JITKIT
High Speed Output Accessories	
High-speed PCIe Gen 1 x4 Digitizer Output	LSIB-2
PCI Express x1 Express Card Host Interface for Laptop Express Card Slot	LSIB-HOSTCARD
PCI Express x1 Host Interface Board for Desktop PC	LSIB-HOSTBOARD
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
Miscellaneous	
LabMaster Oscilloscope Cart	OC-910
Master Acquisition Module + CPU Rackmount Kit	LM9Zi-MASTER+CPU-RACKMOUNT
MCM-Zi Rackmount Kit	MCM-Zi-RACKMOUNT
LabMaster MCM-Zi Softcase	MCM-Zi-SOFTCASE
LabMaster 9xxSZi-A or CPU Module Softcase	LM9Zi-SLAVE-CPU-SOFTCASE

ORDERING INFORMATION

Product Description	Product Code
Probes and Probe Accessories	
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 6 GHz Differential Amplifier Module with Adjustable Tip	D600A-AT*
WaveLink 3GHz Differential Amplifier Module with Adjustable Tip	D300A-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

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