LeCroy

WaveRunner® MXi

Equipped for Comprehensive Debug, Validation and Documentation

400 MHz to 2 GHz

The Essential Tools for Efficient Validation and Debug

Leading Features

- 400 MHz – 2 GHz Analog Bandwidths
- 5 GS/s per Channel (10 GS/s Max.)
- Long Capture Time with 12.5 Mpts/Ch Memory
- WaveScan™ Advanced Search Feature
- LabNotebook™ Report Generation Tool
- Advanced Math and Measurement Capabilities
- Jitter and Timing Analysis
- Customized Math and Measurements
- Powerful SMART Triggers™
- HDTV Trigger
- Large 10.4" Touch Screen
- Small 6" Deep Footprint
- Mixed Signal Option
- I²C, SPI, UART and RS-232 Trigger and Decode (Optional)
- CAN, LIN and FlexRay™ Trigger and Decode (Optional)

The WaveRunner® MXi not only provides the performance and tools required to debug and validate your signals, it goes deeper into your testing to help you understand the causes of complex problems. The high 10 GS/s maximum sampling rate and extremely long 25 Mpts memory guarantee you are capturing all of the details in your signals. The built-in search and scan functions (WaveScan™) and report generator (LabNotebook™) simplify how you find and document problems. With the wide range of analytical, statistical and customization tools, understanding and fixing those problems is quick and easy.

Performance Reimagined

The LeCroy WaveRunner MXi with its advanced triggers, fast viewing modes, measurement parameters, and serial decodes makes validation and debug simple and easy. Advanced debug, multi-domain analysis, and WaveShape Analysis are possible with tools unique to WaveRunner MXi, building on the features and capabilities of the WaveRunner Xi the WaveRunner MXi provides a higher level of analysis, measurement and customization tools, making it the most powerful and capable oscilloscope in its class.

The collection of tools, features and functions packed into this small 6" deep instrument with large 10.4" touch screen make the WaveRunner MXi a truly unique oscilloscope. With a maximum sampling rate of 10 GS/s (5 GS/s per channel) you can be confident in all your measurements knowing that even the fastest signals in your device are being captured. High sample rate is important for fast signals and edges but without long memory this rate cannot be maintained for long captures. The 25 Mpts (12.5 Mpts/Ch) fast memory guarantees maximum sample rate for 2.5 ms.

Debug, Analyze, Document

Beyond the impressive specifications, the WaveRunner MXi provides a set of tools like no other oscilloscope. Use WaveScan to search through a single capture for a rare event, or scan through live data acquisitions. The LabNotebook™ report generator lets you quickly share findings with others and even allows you to make hand written notes directly on top of the signals. With the advanced math and measurement tools you can look at every aspect of your waveforms and understand the distribution of measurements with histograms of up to 2 billion events, trends of up to 1 million measurements and a track function that shows variations in signals over time. Adding to the flexibility of the WaveRunner MXi is the ability to create your very own customer or proprietary measurements, math functions, filters or scripts and run them directly in the oscilloscope having results displayed in real time.

WaveRunner MXi Fast Memory Architecture

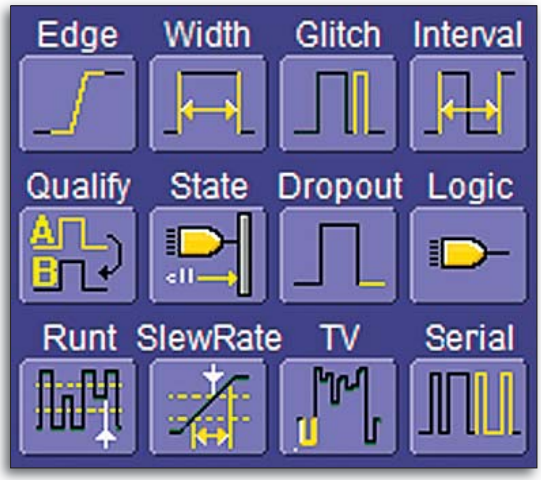
LeCroy's proprietary method of data transfer and processing permits wave shapes to be captured and processed 10–100x faster than other oscilloscopes. The result is better capability to perform advanced WaveShape Analysis, and faster debug. With WaveRunner MXi, you'll notice the difference when capturing long records and making measurements, calculating math or FFTs, or performing non-time domain analysis using statistically-based Histograms or parameter-based Tracks.

For instance, in a long 12.5 Mpts capture where it is desired to measure the periodicity of a signal, WaveRunner MXi will quickly capture and display thousands of signal periods, measure each period, calculate statistics, and display a Histogram of the measurement values. Other oscilloscopes struggle to calculate a single period value (instead of thousands) and cannot provide a Histogram view of the statistical data.

SMART Triggers™ Isolate Events

The WaveRunner MXi oscilloscope provides a multitude of basic and advanced (SMART) Triggers to meet any need. Advanced triggers isolate specific events of interest, and provide a complete view of the signal activity around that event.

Trigger on what you expect (widths, glitches, video, logic patterns, etc.) and also trigger on unusual signals (dropouts, intervals, runts, slew rates). Trigger on signals down to 1 ns in width (500 ps for width and glitch trigger), or use an "A" condition to qualify a "B" trigger.



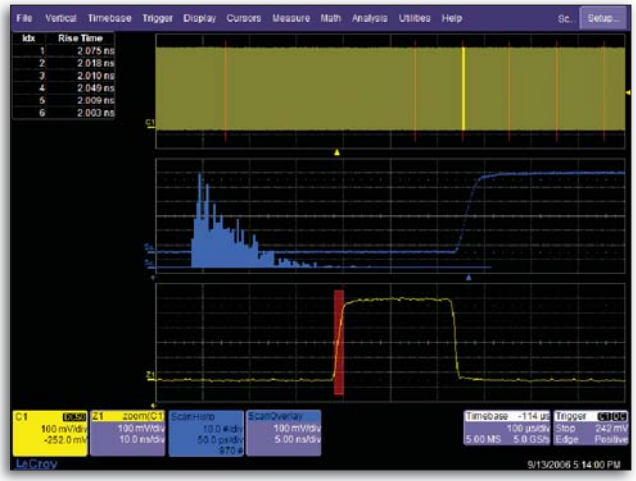
Advanced Math Characterization

WaveRunner 104MXi oscilloscopes contain dozens of standard math functions, and powerful capabilities, such as long memory FFTs, Trending, Tracking, Sparsing, Interpolation, a variety of Persistence Views, and user customized math and measurements (MATLAB® or Visual Basic formats). Numerous specialized capabilities are available as part of optional application specific packages. The toolset is rich and deep, and sure to solve any complex problem.

WaveScan™ Advanced Search

WaveScan provides powerful isolation capabilities that hardware triggers can't provide. WaveScan provides the ability to locate unusual events in a single capture (i.e., capture and search), or "scan" for an event in many acquisitions over a long period of time. Select from more than 20 search modes (frequency, rise time, runt, duty cycle, etc.), apply a search condition, and begin scanning.

Since the scanning "modes" are not simply copies of the hardware triggers, the utility and capability is much higher. For instance, there is no "frequency" trigger in any oscilloscope, yet WaveScan allows for "frequency" to be quickly "scanned." This allows the user to accumulate a data set of unusual events that are separated by hours or days, enabling faster debugging. When used in multiple acquisitions, WaveScan builds on the traditional LeCroy strength of fast processing and will quickly scan millions of events for unusual occurrences.



LabNotebook™ – A Unique Tool for Documentation and Report Generation

The LabNotebook feature provides a report generation tool to save and document all your work. Saving all displayed waveforms, relevant settings, and screen images is all done with a single button press.

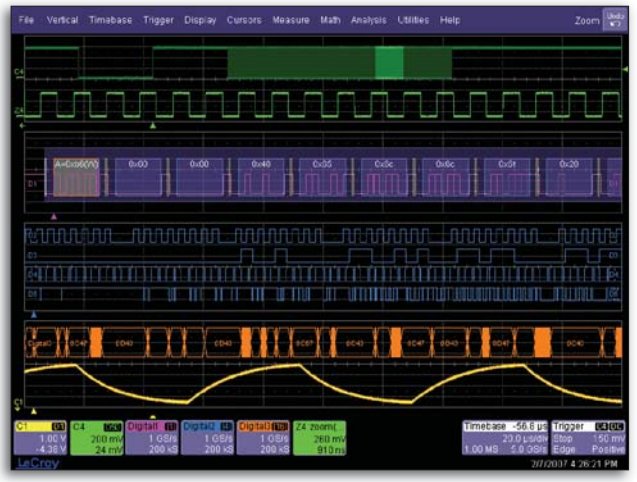
Easy report generation allows you to annotate screen images and helps you share your findings and communicate important results. Reports can even be emailed directly from the oscilloscope. With the Flashback functionality LabNotebook lets you recall your settings from any report and use them to reproduce previous measurements.

I²C, SPI, UART, RS-232, LIN, FlexRay and CAN Trigger & Decode (Optional)

Complete I²C, SPI, UART, RS-232, LIN, FlexRay and CAN serial triggering, including powerful conditional data triggering, allows quick and easy isolation of specific events on your embedded controller. Trigger on DATA in specific locations of long I²C EEPROM reads, or trigger on sensor values outside of a certain range. Intuitive, color-coded decode overlay helps you understand your serial data signals quickly. Search for data patterns, or view the protocol data in a table. Export table data to Excel.®

MS Series Mixed Signal Oscilloscope Option

Add high-performance mixed signal capability to a WaveRunner MXi. Capture digital signals up to 500 MHz with up to 50 Mpts/Ch memory, 2 GS/s, and 18 or 36 channels.



WaveRunner MXi Probe Options

High-performance probes are an essential tool for accurate signal capture. Consequently LeCroy offers an extensive range of probes to meet virtually every application need. Optimized for use with LeCroy oscilloscopes, these probes set new standards for responsiveness and signal detection.

ZS Series High Impedance Active Probes

Leading Features:

- 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)
- LeCroy ProBus system

ADP305 and ADP300

Leading Features:

- 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
- LeCroy ProBus system

PPE1.2KV, PPE2KV, PPE4KV, PPE5KV, PPE6KV, PPE20KV

Leading Features:

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

CP030 and CP031

Leading Features:

- 30 A_{rms} continuous current
- 50 or 100 MHz bandwidth
- Measure pulses up to 50 A_{peak}
- Small form factor accommodates large conductors with small jaw size
- LeCroy ProBus system

AP031

Leading Features:

- Lowest priced differential probe
- 15 MHz bandwidth
- 700 V maximum input voltage
- Works with any 1 MΩ input oscilloscope

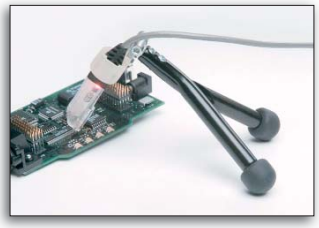
AP033 and AP034

Leading Features:

- 500 MHz and 1 GHz bandwidth
- 10,000:1 CMRR
- Wide dynamic range, low noise
- LeCroy ProBus system

HFP2500

Leading Features:



- 2.5 GHz bandwidth, 0.7 pF input capacitance
- Interchangeable tips for a variety of probing needs
- Hands free probing with probe holder
- AutoColor ID matches probe color to channel
- LeCroy ProBus system

Specifications

	WaveRunner 44MXi	WaveRunner 64MXi	WaveRunner 104MXi	WaveRunner 204MXi
Bandwidth (@ 50 Ω)	400 MHz	600 MHz	1 GHz	2 GHz
Rise Time	875 ps	500 ps	300 ps	180 ps
Input Channels	4	4	4	4
Display	10.4" Color flat-panel TFT-LCD, 800 x 600 SVGA, touch screen			
Sample Rate (single-shot)	5 GS/s	5 GS/s (10 GS/s interleaved)		
Sample Rate (RIS mode)	200 GS/s			
Standard Record Length	12.5 Mpts/Ch (25 Mpts interleaved)			
Standard Capture Time	up to 2.5 ms on all four channels at 5 GS/s			
Vertical Resolution	8 bits			
Vertical Sensitivity (V/div)	2 mV/div–10 V/div (1 MΩ); 2 mV/div–1 V/div (50 Ω)			
Vertical (DC Gain) Accuracy	±1.0% of full scale (typical); ±1.5% of full scale ≥ 10 mV/div (warranted)			
BW Limit	20 MHz, 200 MHz			
Maximum Input Voltage	50 Ω: 5 V_{rms}, 1 MΩ: 400 V max. (DC + Peak AC ≤ 5 kHz)			50 Ω: 5 V_{rms} 1 MΩ: 250 V max. (DC + Peak AC ≤ 10 kHz)
Input Coupling	AC, DC, GND (DC and GND for 50 Ω)			
Input Impedance	1 MΩ || 16 pF, or 50 Ω			1 MΩ || 20 pF, or 50 Ω
Probing System	BNC or ProBus			
Probes	One passive probe per channel (standard)			
Timebase Range	Real time: 200 ps/div–10 s/div, RIS mode: 200 ps/div to 10 ns/div, Roll mode: up to 1000 s/div			
Timebase Accuracy	≤ 5 ppm @ 25 °C (typical) (≤ 10 ppm @ 5–40 °C)			
Trigger Modes	Normal, Auto, Single, and Stop			
Trigger Sources	Any input channel, External, Ext/10, or line; slope and level unique to each source (except for line trigger)			
Trigger Coupling	DC, AC, HFRej, LFRej			
Pre-trigger Delay	0–100% of full scale			
Post-trigger Delay	0–10,000 divisions			
Trigger Hold-off	1 ns to 20 s or 1 to 1,000,000,000 events			
Internal Trigger Level Range	±4.1 div from center			
External Trigger Range	EXT/10 ±4 V; EXT ±400 mV			

Triggering

Trigger Types (standard)	Edge, Glitch, Width, Logic (Pattern), Video (NTSC, PAL, SECAM, HDTV – 720p, 1080i, 1080p), Runt, Slew Rate, Interval (Signal or Pattern), Dropout, Qualified (State or Edge)

Zoom

Zooming	Use front panel QuickZoom button, or use touch screen or mouse to draw a box around the zoom area.

Specifications

Standard

Math Tools

Display up to four math function traces (F1-F4). 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)
custom (MATLAB,® VBScript) – limited points
derivative
deskew (resample)
difference (–)
enhanced resolution (to 11 bits vertical)
envelope
exp (base e)
exp (base 10)
fft with power averaging, power density, real and imaginary components, frequency domain parameters, and fft on up to 25 Mpts
floor
histogram of 2 billion events
integral
invert (negate)
log (base e)
log (base 10)
product (x)
ratio (/)
reciprocal
rescale (with units)
roof
(sinx)/x
square
square root
sum (+)
trend (datalog) of 1 million events
zoom (identity)

Measure Tools

Display any 8 parameters together with statistics, including their average, high, low, and standard deviations. Histicons provide a fast, dynamic view of parameters and waveshape characteristics.

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

Standard Software Tools

Advanced Math and Measure

- Parameter math – add, subtract, multiply, or divide two different parameters. Invert a parameter and rescale parameter values
- Histograms with 19 histogram parameters
- Track graphs of any measurement parameter
- Narrow-band power measurements
- Auto-correlation function
- Sparse function
- Cubic interpolation function

Customization Software

- Creation of your own measurement parameter or math function, using third-party software packages, and display of the result in the scope. Supported third-party software packages include:

  – VBScript – MATLAB – Excel®

- CustomDSO – create your own user interface in a oscilloscope dialog box
- Addition of macro keys to run VBScript files
- Support for plug-ins

Jitter and Timing Analysis Software

- Jitter and timing parameters, with "Track" graphs of

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

- Edge@lv parameter (counts edges)
- Persistence histogram, persistence trace (mean, range, sigma)

Ordering Information

Product Description	Product Code
WaveRunner MXi Series Oscilloscopes	
2 GHz, 4 Ch, 5 GS/s, 12.5 Mpts/Ch (10 GS/s, 25 Mpts/Ch in Interleaved Mode) with 10.4" Color Touch Screen Display	WaveRunner 204MXi
1 GHz, 4 Ch, 5 GS/s, 12.5 Mpts/Ch (10 GS/s, 25 Mpts/Ch in Interleaved Mode) with 10.4" Color Touch Screen Display	WaveRunner 104MXi
600 MHz, 4 Ch, 5 GS/s, 12.5 Mpts/Ch (10 GS/s, 25 Mpts/Ch in Interleaved Mode) with 10.4" Color Touch Screen Display	WaveRunner 64MXi
400 MHz, 4 Ch, 5 GS/s, 12.5 Mpts/Ch (25 Mpts/Ch in Interleaved Mode) with 10.4" Color Touch Screen Display	WaveRunner 44MXi
Included with Standard Configuration	
÷10, 500 MHz, 10 MΩ Passive Probe (Total of 1 Per Channel)	
Getting Started Manual and Quick Reference Guide	
CD-ROMs containing Utility Software	
Optical 3-button Wheel Mouse – USB	
Standard Ports; 10/100Base-T Ethernet, USB 2.0 (5), SVGA Video out, Audio in/out, RS-232	
Protective Front Cover	
Accessory Pouch	
Standard Commercial Calibration and Performance Certificate	
3-year Warranty	
Application Specific Software Options	
Digital Filter Software Package	WRXi-DFP2
Disk Drive Measurement Software Package	WRXi-DDM2
PowerMeasure Analysis Software Package	WRXi-PMA2
Serial Data Mask Software Package	WRXi-SDM
Ethernet Application Software Package	QPHY-ENET*
USB 2.0 Compliance Test Software Package	QPHY-USB†
EMC Pulse Parameter Software Package	WRXi-EMC
Electrical Telecom Mask Test Package	ET-PMT

* TF-ENET-B required. † TF-USB-B required.

Product Description	Product Code
Serial Data Options	
I^2C Trigger and Decode Option	WRXi-I2Cbus TD
SPI Trigger and Decode Option	WRXi-SPIbus TD
UART and RS-232 Trigger and Decode Option	WRXi-UART-RS232bus TD
LIN Trigger and Decode Option	WRXi-LINbus TD
CANbus TD Trigger and Decode Option	CANbus TD
CANbus TDM Trigger, Decode, and Measure/Graph Option	CANbus TDM
FlexRay Trigger and Decode Option	WRXi-FlexRaybus TD
FlexRay Trigger and Decode Physical Layer Test Option	WRXi-FlexRaybus TDP

A variety of Vehicle Bus Analyzers based on the WaveRunner MXi platform are available. These units are equipped with a Symbolic CAN trigger and decode.

Product Description	Product Code
MS Series Mixed Signal Oscilloscope Options	
500 MHz, 18 Ch, 2 GS/s, 50 Mpts/Ch Mixed Signal Oscilloscope Option	MS-500
250 MHz, 36 Ch, 1 GS/s, 25 Mpts/Ch (500 MHz, 18 Ch, 2 GS/s, 50 Mpts/Ch Interleaved) Mixed Signal Oscilloscope Option	MS-500-36
250 MHz, 18 Ch, 1 GS/s, 10 Mpts/Ch Mixed Signal Oscilloscope Option	MS-250
Probes and Amplifiers*	
Set of 4 ZS1500, 1.5 GHz, 0.9 pF, 1 MΩ High Impedance Active Probe	ZS1500-QUADPAK
Set of 4 ZS1000, 1 GHz, 0.9 pF, 1 MΩ High Impedance Active Probe	ZS1000-QUADPAK
2.5 GHz, 0.7 pF Active Probe	HFP2500
1 GHz Active Differential Probe (÷1, ÷10, ÷20)	AP034
500 MHz Active Differential Probe (x10, ÷1, ÷10, ÷100)	AP033
30 A; 100 MHz Current Probe – AC/DC; 30 A_{rms}; 50 A_{rms} Pulse	CP031
30 A; 50 MHz Current Probe – AC/DC; 30 A_{rms}; 50 A_{rms} Pulse	CP030
30 A; 50 MHz Current Probe – AC/DC; 30 A_{rms}; 50 A_{peak} Pulse	AP015
150 A; 10 MHz Current Probe – AC/DC; 150 A_{rms}; 500 A_{peak} Pulse	CP150
500 A; 2 MHz Current Probe – AC/DC; 500 A_{rms}; 700 A_{peak} Pulse	CP500
1,400 V, 100 MHz High-Voltage Differential Probe	ADP305
1,400 V, 20 MHz High-Voltage Differential Probe	ADP300
1 Ch, 100 MHz Differential Amplifier	DA1855A

*A wide variety of other passive, active, and differential probes are also available. Consult LeCroy for more information.

Hardware Accessories*	
10/100/10000Base-T Compliance Test Fixture	TF-ENET-B†
USB 2.0 Testing Compliance Test Fixture	TF-USB-B
External GPIB Interface	WS-GPIB
Soft Carrying Case	WRXi-SOFTCASE
Hard Transit Case	WRXi-HARDCASE
Mounting Stand – Desktop Clamp Style	WRXi-MS-CLAMP
Rackmount Kit	WRXi-RACK
Mini Keyboard	WRXi-KYBD
Removable Hard Drive Package (Includes Removeable Hard Drive Kit and Two Hard Drives)	WRXi-RHD
Additional Removable Hard Drive	WRXi-RHD-02

* A variety of local language front panel overlays are also available.

† Includes ENET-2CAB-SMA018 and ENET-2ADA-BNCSMA.

Customer Service

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

LeCroy
1-800-5-LeCroy
www.lecroy.com

Local sales offices are located throughout the world.
To find the most convenient one visit www.lecroy.com

WRMXiDSrevA_21May08
10K LG