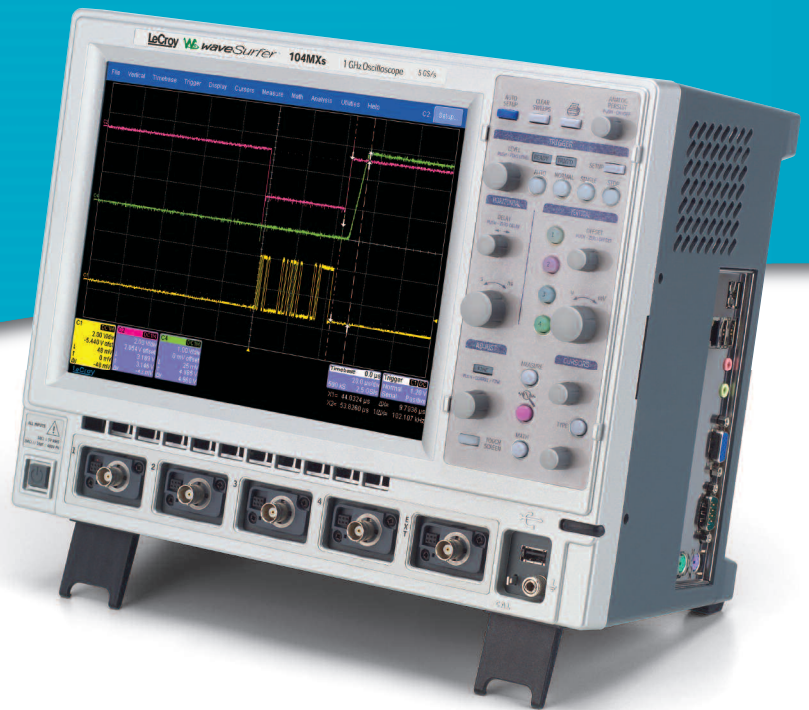# LeCroy

WaveSurfer® 104MXs

WaveSurfer 104MXs

Features

- **1 GHz Analog Bandwidth**

- **5 GS/s Per Channel**

- **Long Capture Time with 10 Mpts/Ch Memory**

- **WaveScan™ Advanced Search Feature**

- **LabNotebook™ Report Generation Tool**

- **WaveStream™ Fast Viewing Mode**

- **Powerful SMART Triggers™**

- **HDTV Trigger**

- **Large 10.4" Touch Screen**

- **Small 6" Deep Footprint**

- **Mixed Signal Options**

- **I²C, SPI, UART, RS-232, CAN, and LIN Trigger and Decode**

Fast Validation and Debug

The WaveSurfer® Xs is designed for fast validation and debug. The big display (but small footprint), simplified front panel, and graphical touch screen provide a friendly user interface for making measurements. On top of the great feature set and easy to use principles of the WaveSurfer Xs the WaveSurfer 104MXs provides outstanding specs, advanced triggers plus great math and measurement tools. With 5 GS/s on all four channels you will be able to capture your fastest signals. The 10 Mpts/Ch memory will allow you to maintain that sample rate for long captures of up to 2 ms or even longer for slower signals.

Powerful Triggering

The LeCroy WaveSurfer 104MXs provides advanced triggering to help you isolate specific events in your signals. With specialized triggers for runt, slew rates, qualified A-B and even high definition television

signals the WaveSurfer 104MXs is an extremely versatile oscilloscope.

Advanced Math and Measurement

While other oscilloscopes in this class offer the basic math tools (add, subtract, multiple, divide and FFT) the WaveSurfer 104MXs includes more advanced tools such as enhanced resolution, integral, derivative, summed and continuous averaging and square root to name a few. Plus the WaveSurfer computes FFTs up to 1 Mpts where other oscilloscopes have limitations. The design of the WaveSurfer 104MXs is not only built on great specs and features but the ability to handle math and measurements quickly. Many oscilloscopes can offer a range of triggers and functions but get bogged down with the simplest measurements statistics. The WaveSurfer 104MXs is designed for fast processing especially when math, measurements and FFTs are being used.

The Essential Tools for Efficient Validation and Debug

With 5 GS/s sampling on each chanel and 10 Mpts/Ch memory the WaveSurfer 104MXs is an outstanding choice as a 1 GHz oscilloscope. Along with class leading specs, the WaveSurfer 104MXs includes a number of unique tools that simplify how you use an oscilloscope and how you perform everyday debug and validation. These tools enable searching through long captures or dynamically searching live acquisiitons; easy documentation; and report generation as well as long memory that is fast and does not slow you down. In addition, the WaveSurfer 104MXs provides the largest set of math and measure tools available on any oscilloscope in this class.


Long Capture Time

10 Mpts/Ch of fast acquisition memory standard provides long capture time—up to 2 ms at full sample rate, and longer times at lower sample rates. This greatly assists in debugging common circuit problems such as clock/data issues and timing errors. Use the touch screen to quickly "draw a box" around the area of interest and zoom all channels to the desired area. Then, adjust zoom position and ratio from the front panel or the graphical touch screen UI. WaveSurfer 104MXs long memory is also thoughtfully designed to respond quickly even when measurements, math, or serial decoders are being used.

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
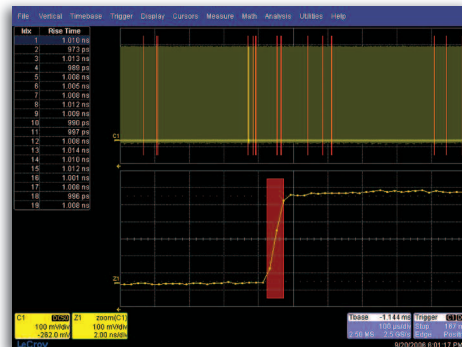

that are separated by hours or days, enabling faster debugging. When used in multiple acquisitions, WaveScan builds on the traditional LeCroy strength of fast processing of data. A LeCroy X-Stream oscilloscope will quickly scan millions of events looking for unusual occurrences, and do it much faster and more efficiently than other oscilloscopes can.
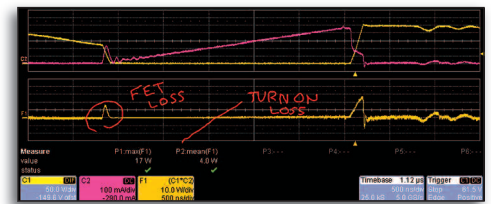
LabNotebook™ – A Unique Tool for Documentation and Report Generation

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, eliminating the need to navigate multiple menus to save all these files independently.

Easy report generation helps you share your findings and communicate important results. All screen images saved can be annotated with freehand notes using the stylus and touch screen, and then included in your report. Reports can be saved to the hard drive for later use, saved to a USB memory device or even emailed directly from the oscilloscope to you inbox. With the built in Flashback functionality LabNotebook lets you recall your settings from any report and use them to reproduce previous measurements.
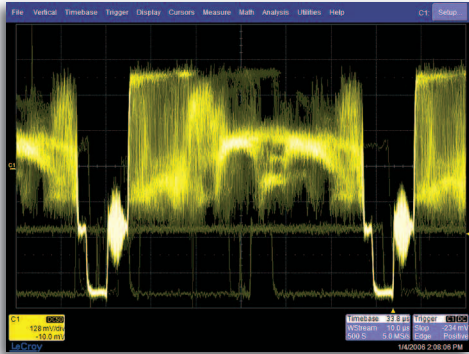
WaveStream Fast Viewing Mode

WaveStream provides a vibrant, intensity graded (256 levels) display with a fast update rate to closely simulate the look and feel of an analog oscilloscope. WaveStream is most helpful in viewing signals that have signal jitter or signal anomalies, or for applying a visual check before creating an advanced trigger or WaveScan setup to locate an unusual event.

Since the sampling rate in WaveStream mode can be as high as 5 GS/s (up to 2.5x that of other oscilloscopes), it is an excellent runt or glitch finder. Timing jitter is often visually assessed to understand approximate behavior. WaveStream makes it easy to understand jitter on edges or in eye diagrams. WaveStream also excels in allowing you to relate composite (WaveStream) to single-event (real-time sampled) behaviors. Just capture in WaveStream mode, toggle to view or zoom a single trace, then toggle back to WaveStream mode.

Powerful Basic and Advanced Triggering

A multitude of powerful and flexible triggers are provided to meet any need. Use an advanced SMART Trigger™ to isolate a specific event of interest, and

narrow the long capture around that event. Trigger on what you expect (widths, glitches, standard or high definition video, logic patterns, etc.) and also trigger on unusual signals (dropouts, intervals, runts, slew rates). LeCroy's exclusion triggering can exclude normal signals and capture only the abnormal ones, speeding up the debug of your circuits and systems. Trigger on signals down to 1 ns in width (500 ps for width and glitch trigger). Use an "A" condition to qualify a "B" trigger. Digital triggering is provided through the MS Series Mixed Signal Oscilloscope option.
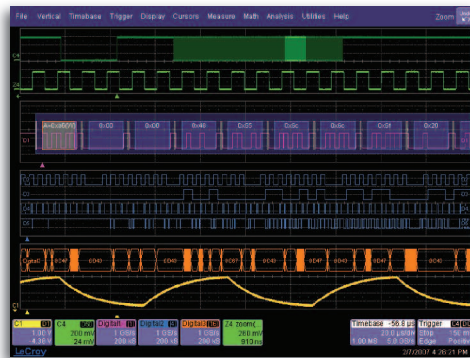

Mixed Signal Oscilloscope Option

Add high-performance mixed signal capability to a WaveSurfer 104MXs. Capture digital signals up to 500 MHz with up to 50 Mpts/Ch memory, 2 GS/s, and 18 or 36 channels.

### I²C, SPI, UART, RS-232, LIN, and CAN Trigger & Decode (optional)

Complete I²C, SPI, UART, RS-232, LIN, 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
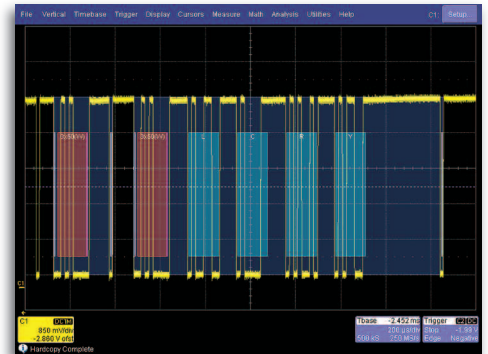
sensor values outside of a certain range. Intuitive, color-coded decode overlay helps you understand your serial data signals quickly. Search for data patterns, or view the protocol data in a table. Export table data to Excel. (Capabilities are optional).

ZS Series High Impedance Active Probes (Accessories)

LeCroy's new ZS Series of high impedance active probes provide full bandwidth at the probe tip, and the high impedance (0.9 pF, 1 MΩ) you want.
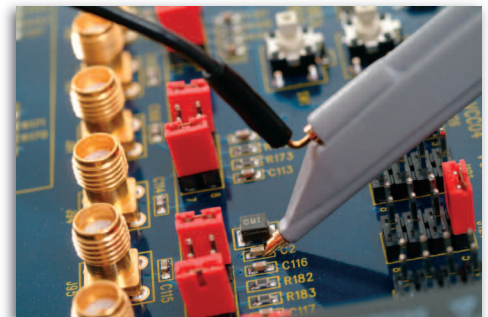
A variety of standard and available probe tip and grounding accessories are offered to meet any requirement. What's more, ZS Series probes are available for a very affordable price. Use the ZS1500 with WaveSurfer 104MXs to achieve full 1 GHz system bandwidth at the probe tip.

Specifications and Ordering Information

WaveSurfer 104MXs Specifications

Bandwidth (@ 50 Ω)	1 GHz
Rise Time	400 ps
Input Channels	4
Display	10.4" Color flat-panel TFT-LCD, 800 x 600 SVGA, touch screen
Waveform Grids	3 max. (predefined for Channels, Math and Zoom)
Sample Rate (single-shot)	5 GS/s
Sample Rate (RIS mode)	50 GS/s
Standard Record Length	10 Mpts/Ch
Standard Capture Time	up to 2 ms at full sample rate on all four channels
Vertical Resolution	8 bits
BW Limit	20 MHz, 200 MHz
Input Coupling	AC, DC, GND (DC and GND for 50 Ω)
Input Impedance	1 MΩ ‖ 20 pF, or 50 Ω
Probing System	BNC or ProBus
Probes	One PP011 (5 mm) per channel (standard)
Timebase Range	200 ps/div–1000 s/div (roll mode from 500 ms/div–1000 s/div)
Trigger Coupling	DC, AC, HFRej, LFRej
Triggering	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)
Spectral Analysis	FFT up to 1 Mpts with power spectrum output and rectangular, VonHann, and FlatTop windows

For more detailed specifications go to www.lecroy.com

Standard

Math Tools

1 math function may be defined at a time, 2 functions may be chained together

Absolute Value,	Floor,	Square,
Averaging (summed and continuous),	Integral,	Square Root,
	Invert,	Sum,
Difference,	Product,	Also adds chaining of two math functions,
Derivative,	Ratio,	
Envelope,	Reciprocal,	Rescaling to different units,
Enhanced Resolution (to 11 bits),	Roof,	1 Mpts FFTs.

Measure Tools

Six displayed on screen with Min, Max, Mean and Standard Deviation. Up to 6 of the following parameters can be calculated at one time on any waveform:

Amplitude,	Mean,	RMS,
Area,	Minimum,	Skew,
Base (Low),	Overshoot+,	Standard Deviation,
Delay,	Overshoot-,	Top (High),
Duty,	Period,	Width+,
Fall Time (90%–10%),	Peak-Peak,	Width-,
Fall Time (80%–20%),	Phase,	Measurements can be gated
Frequency,	Rise Time (10%–90%),	
Maximum,	Rise Time (20%–80%),	

Ordering Information

Product Description	Product Code
WaveSurfer MXs Digital Oscilloscope	
1 GHz, 5 GS/s, 4 Ch, 10 Mpts/Ch with 10.4" Color Touch Screen Display	WaveSurfer 104MXs

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**