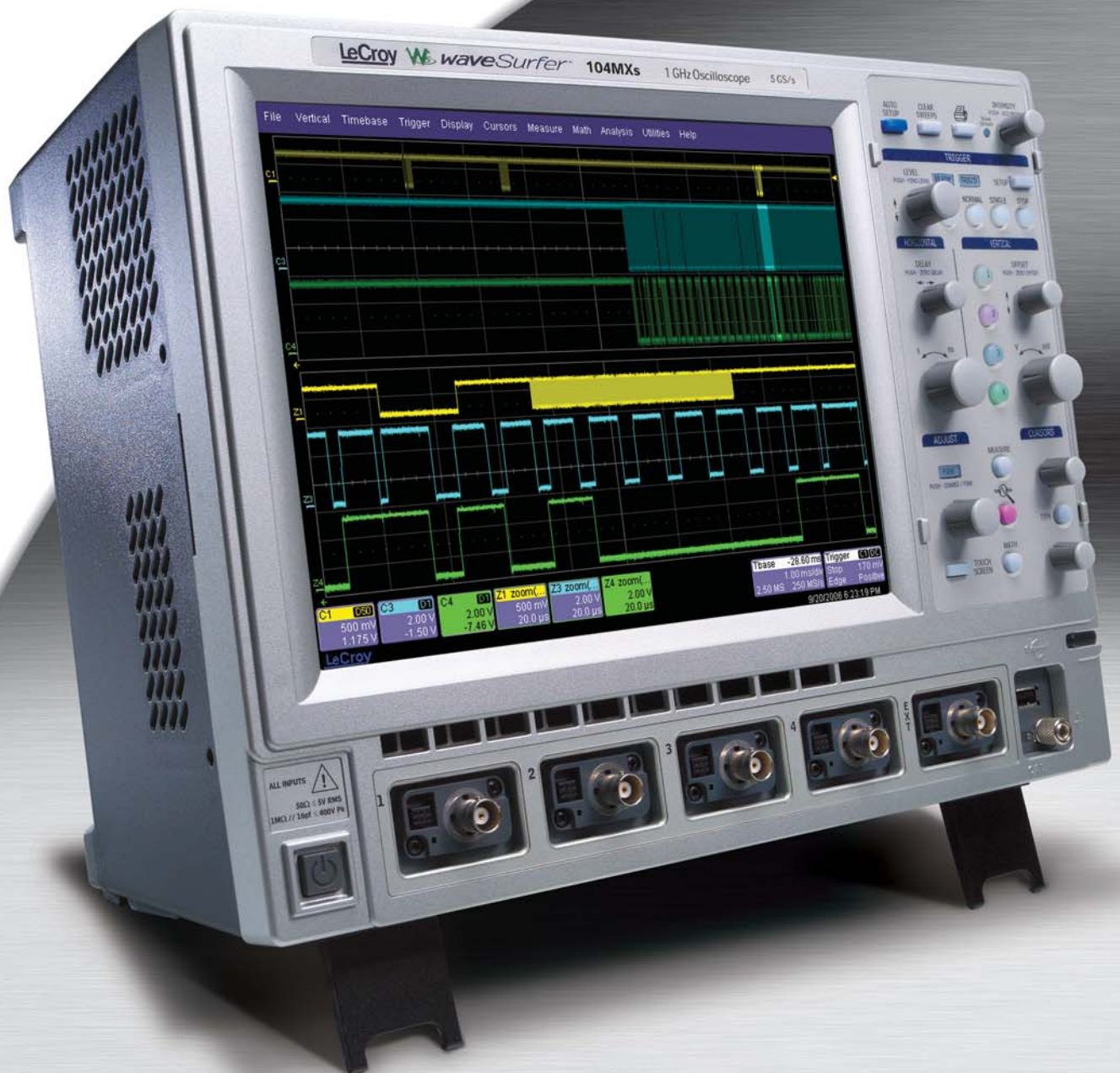


# LeCroy

## WaveSurfer® MXs

**The Specs You Want—  
The Features You Need**  
200 MHz to 1 GHz



# The Essential Tools for Efficient Validation and Debug



## Leading Features

- **Bandwidths from 200 MHz to 1 GHz**
- **Up to 5 GS/s**
- **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 Option**
- **I<sup>2</sup>C, SPI, UART, RS-232, CAN, and LIN Trigger and Decode (Optional)**

**With fast sampling on each channel and 10 Mpts/Ch memory the WaveSurfer® MXs is an outstanding choice from 200 MHz to 1 GHz. Along with class leading specs, the WaveSurfer MXs 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 acquisitions; easy documentation; and report generation as well as long memory that is fast and does not slow you down. In addition, the WaveSurfer MXs provides the largest set of math and measure tools available on any oscilloscope in this class.**

## Fast Validation and Debug

The WaveSurfer® MXs 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 MXs provides outstanding specs, advanced triggers plus great math and measurement tools. The long 10 Mpts/Ch memory guarantees you will maintain high sample rates over longer acquisitions and make sure you do not miss key aspects of your waveform.

## Advanced Math and Measurement

While other oscilloscopes in this class offer the basic math tools (add, subtract, multiple, divide, and FFT) the WaveSurfer MXs includes more advanced tools such as enhanced resolution, integral, derivative, summed, and continuous averaging and square root to name a few. Plus the WaveSurfer MXs computes FFTs up to 1 Mpt where other oscilloscopes have limitations. The design of the WaveSurfer MXs 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 MXs is designed for fast processing especially when math, measurements, and FFTs are being used.

## Powerful 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.

## Long Capture Time

Standard fast acquisition memory of 10 Mpts/Ch provides long capture time. 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 user interface. WaveSurfer MXs long memory is also thoughtfully designed to respond quickly even when measurements, math, or serial decoders are being used.



## WaveScan™ Advanced Search

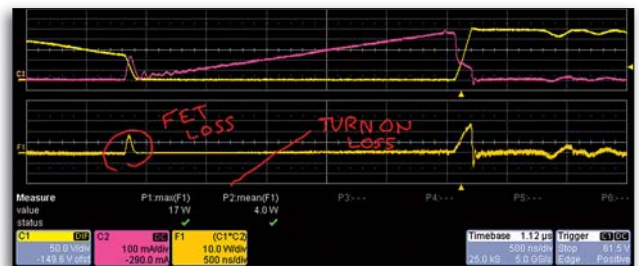
WaveScan provides powerful isolation capabilities that hardware triggers can't provide. WaveScan provides the ability to locate unusual events in a single capture (i.e., capture and search), or “scan” for an event in many acquisitions over a long period of time. Select from more than 20 search modes (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 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.

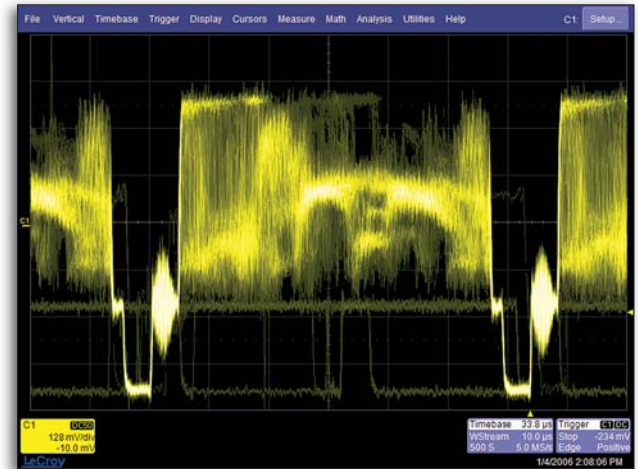
Easy report generation allows you to annotate screen images and helps you share your findings and communicate important results. Reports can even be emailed directly from the oscilloscope. With the Flashback functionality LabNotebook lets you recall your settings from any report and use them to reproduce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



## WaveStream™ Fast Viewing Mode

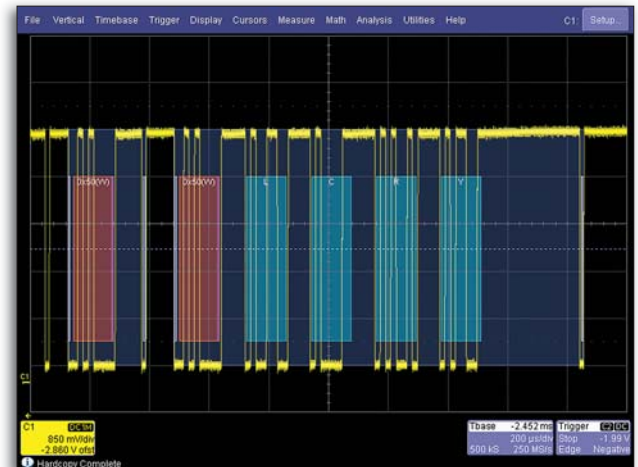
WaveStream provides a vibrant, intensity graded (256 levels) display with a fast update rate to closely simulate the look and feel of an analog oscilloscope. WaveStream is most helpful in viewing signals that have signal jitter or signal anomalies, or for applying a visual check before creating an advanced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



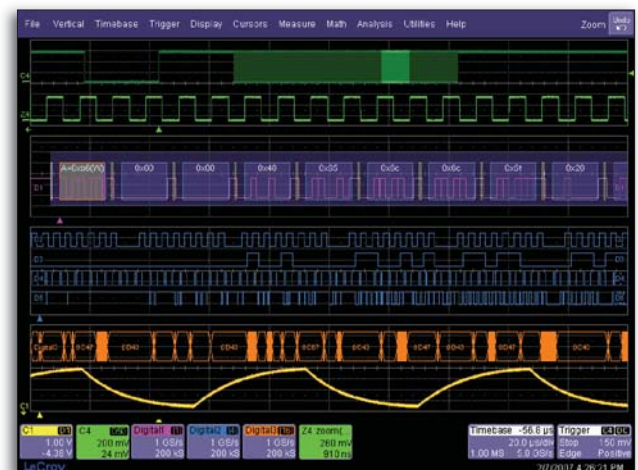
## I<sup>2</sup>C, SPI, UART, RS-232, LIN, and CAN Trigger & Decode (Optional)

Complete I<sup>2</sup>C, 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 I<sup>2</sup>C 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 WaveSurfer MXs. Capture digital signals up to 500 MHz with up to 10 Mpts/Ch memory, 2 GS/s, and 18 or 36 channels.



# WaveSurfer MXs Probe Options

LeCroy offers an extensive range of probes options for WaveSurfer MXs. Leverage your investment with these items.

## ZS Series High Impedance Active Probes

### Leading Features:

- 1 GHz (ZS1000) and 1.5 GHz (ZS1500) bandwidths
- High Impedance (0.9 pF, 1 M $\Omega$ )
- Extensive standard and available probe tip and ground connection accessories
- $\pm 12$  Vdc offset (ZS1500)
- LeCroy ProBus system



## CP030 and CP031

### Leading Features:

- 30 A<sub>rms</sub> continuous current (50 A<sub>peak</sub>)
- 50 or 100 MHz bandwidth
- Small form factor accommodates large conductors with small jaw size
- LeCroy ProBus system



## ADP305 and ADP300

### Leading Features:

- 20 MHz and 100 MHz bandwidth
- 1,000 V<sub>rms</sub> common mode voltage
- 1,400 V<sub>peak</sub> differential voltage
- EN 61010 CAT III
- 80 dB CMRR at 50/60 Hz
- LeCroy ProBus system



## AP031

### Leading Features:

- Lowest priced differential probe
- 15 MHz bandwidth
- 700 V maximum input voltage
- Works with any 1 M $\Omega$  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



## 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 M $\Omega$  input oscilloscope

# Specifications

	WaveSurfer 24MXs	WaveSurfer 44MXs	WaveSurfer 64MXs	WaveSurfer 104Xs
Bandwidth (@ 50 $\Omega$ )	200 MHz	400 MHz	600 MHz	1 GHz
Rise Time	1.75 ns	875 ps	500 ps	300 ps
Input Channels	4	4	4	4
Display	10.4" Color flat-panel TFT-LCD, 800x600 SVGA, touch screen			
Sample Rate (single-shot)	2.5 GS/s		2.5 GS/s (5 GS/s interleaved)	5 GS/s
Sample Rate (RIS mode)	50 GS/s			
Standard Record Length	10 Mpts/Ch (all channels)			
Standard Capture Time	up to 4 ms at 2.5 GS/s			
Vertical Resolution	8 bits			
Vertical Sensitivity (V/div)	2 mV/div–10 V/div (1 M $\Omega$ ); 2 mV/div–1 V/div (50 $\Omega$ )			
Vertical (DC Gain) Accuracy	$\pm$ 1.0% of full scale (typical); $\pm$ 1.5% of full scale $\geq$ 10 mV/div (warranted)			
BW Limit	20 MHz	20 MHz, 200 MHz		
Maximum Input Voltage	50 $\Omega$ : 5 V <sub>rms</sub> , 1 M $\Omega$ : 400 V max. (DC + Peak AC $\leq$ 5 kHz)			50 $\Omega$ : 5 V <sub>rms</sub> 1 M $\Omega$ : 250 V max. (DC + Peak AC $\leq$ 10 kHz)
Input Coupling	AC, DC, GND (DC and GND for 50 $\Omega$ )			
Input Impedance	1 M $\Omega$    16 pF, or 50 $\Omega$			1 M $\Omega$    20 pF, or 50 $\Omega$
Probing System	BNC or ProBus			
Probes	One passive probe per channel (standard)			
Timebase Range	200 ps/div–1000 s/div (roll mode from 500 ms/div–1000 s/div)			
Timebase Accuracy	$\leq$ 5 ppm @ 25 $^{\circ}$ C (typical) ( $\leq$ 10 ppm @ 5–40 $^{\circ}$ 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, HFRrej, LFRrej			
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	$\pm$ 4.1 div from center			
External Trigger Range	EXT/10 $\pm$ 4 V; EXT $\pm$ 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)
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## Measure, Zoom, and Math Tools

Standard Parameter Measurements	Up to 6 of the following parameters can be calculated at one time on any waveform: Amplitude, Area, Base (Low), Delay, Duty, Fall Time (90%-10%), Fall Time (80%-20%), Frequency, Maximum, Mean, Minimum, Overshoot+, Overshoot-, Period, Peak-Peak, Phase, Rise Time (10%-90%), Rise Time (20%-80%), RMS, Skew, Standard Deviation, Top (High), Width+, Width-. Measurements can be gated.
Zooming	Use front panel QuickZoom button, or use touch screen or mouse to draw a box around the zoom area.
Standard Math	Operators include Sum, Difference, Product, Ratio, Absolute Value, Averaging (summed and continuous), Derivative, Envelope, Enhanced Resolution (to 11 bits), Floor, Integral, Invert, Reciprocal, Roof, Square, Square Root and FFT (up to 1 Mpt with power spectrum output and rectangular, VonHann, and FlatTop windows). 1 math function may be defined at a time, 2 functions may be chained together.

# Ordering Information

## Product Description Product Code

### WaveSurfer MXs Series Oscilloscopes

1 GHz, 5 GS/s, 4 Ch, 10 Mpts/Ch with 10.4" Color Touch Screen Display	WaveSurfer 104MXs
600 MHz, 2.5 GS/s (5 GS/s interleaved) 4 Ch, 10 Mpts/Ch with 10.4" Color Touch Screen Display	WaveSurfer 64MXs
400 MHz, 2.5 GS/s, 4 Ch, 10 Mpts/Ch with 10.4" Color Touch Screen Display	WaveSurfer 44MXs
200 MHz, 2.5 GS/s, 4 Ch, 10 Mpts/Ch with 10.4" Color Touch Screen Display	WaveSurfer 24MXs

### 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
Standard Ports: 10/100Base-T Ethernet, USB 2.0 (5), SVGA Video out, Audio in/out, RS-232
Protective Front Cover
Standard Commercial Calibration and Performance Certificate
3-year Warranty

### General Accessories

Keyboard Accessory	WSXs-KYBD
Optical Mouse Accessory	WSXs-MOUSE
External GPIB Accessory	WS-GPIB
Hard Carrying Case	WSXs-HARDCASE
Soft Carrying Case	WSXs-SOFTCASE
Rack Mount Accessory	WSXs-RACK
Accessory Pouch	WSXs-POUCH

### Mounting Accessory

Clamp Mounting Stand	WSXs-MS-CLAMP
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### Local Language Overlays

German Front Panel Overlay	WSXs-FP-GERMAN
French Front Panel Overlay	WSXs-FP-FRENCH
Italian Front Panel Overlay	WSXs-FP-ITALIAN
Spanish Front Panel Overlay	WSXs-FP-SPANISH
Japanese Front Panel Overlay	WSXs-FP-JAPANESE
Korean Front Panel Overlay	WSXs-FP-KOREAN
Chinese (Tr) Front Panel Overlay	WSXs-FP-CHNES-TR
Chinese (Simp) Front Panel Overlay	WSXs-FP-CHNES-SI
Russian Front Panel Overlay	WSXs-FP-RUSSIAN

### Software Options

Electrical Telecom Mask Test Software Package	WSXs-ET-PMT
Windows Lockout Software Option	WSXs-LOCKOUT

## Product Description Product Code

### Serial Data Options

I <sup>2</sup> C Trigger and Decode Option	WSXs-I2Cbus TD
SPI Trigger and Decode Option	WSXs-SPIbus TD
UART and RS-232 Trigger and Decode Option	WSXs-UART-RS232bus TD
LIN Trigger and Decode Option	WSXs-LINbus TD
CAN Trigger and Decode Option	CANbus TD

### 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
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 <sub>rms</sub> ; 50 A <sub>peak</sub> Pulse	CP031
30 A; 50 MHz Current Probe – AC/DC; 30 A <sub>rms</sub> ; 50 A <sub>peak</sub> Pulse	CP030
30 A; 50 MHz Current Probe – AC/DC; 30 A <sub>rms</sub> ; 50 A <sub>peak</sub> Pulse	AP015
150 A; 10 MHz Current Probe – AC/DC; 150 A <sub>rms</sub> ; 500 A <sub>peak</sub> Pulse	CP150
500 A; 2 MHz Current Probe – AC/DC; 500 A <sub>rms</sub> ; 700 A <sub>peak</sub> 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.

### 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



1-800-5-LeCroy  
[www.lecroy.com](http://www.lecroy.com)

**Local sales offices are located throughout the world.  
To find the most convenient one visit [www.lecroy.com](http://www.lecroy.com)**