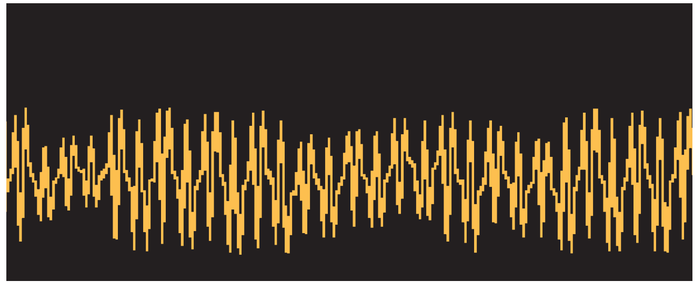
SEE THE COMPLETE PICTURE

LECROY
HIGH
PERFORMANCE
DIGITAL
OSCILLOSCOPES

LeCroy

Innovators in Instrumentation

Performance + Signal Analysis = Unsurpassed Results!



Performance

1 GHz Bandwidth

Fast edge characterization, jitter analysis, and other critical circuit analysis operations require high fidelity signal reproduction. The LeCroy 9384 and 9370 Series products offer 1 GHz bandwidth and 9350A Series offers 500 MHz bandwidth for design, debug and testing of high speed circuits.

4 GS/s Digitizing

The 9384, with up to 250 ps real time sample resolution, captures the signal details you need to characterize critical performance parameters like jitter, edge transitions, and fast transient pulses. The 9370 and 9350A Series scopes provide up to 500 ps real time sample resolution.

Up to 8,000,000 Point Record Lengths

LeCroy's SMARTMemory™ management system automatically optimizes both the sample rate and record length to provide the maximum signal detail over the longest possible time duration, with no mode switching or multiple menu selections. Combine the industry's longest record lengths—up to 2,000,000 points/channel optional and 50k points/channel standard with SMARTMemory, and you get the LeCroy advantage.

Analysis

LeCroy Digital Oscilloscopes are designed with signal analysis in mind. Processing flexibility, speed, and data protection are not an afterthought. All zoom, math, spectral and statistical analysis operations are calculated on a protected data record, assuring that your original data remains uncorrupted and can be used again and again for further analysis.

Waveform Processing

LeCroy's waveform processing system provides the power to analyze complex signals, even in the presence of noise. Functions such as integration, differentiation, rescaling, square root, reciprocal, and logarithms can be chained together for multiple operations. For example, a power measurement can be made by first squaring the signal, then rescaling it, and finally integrating the result; with the calculations and display updated after each new acquisition. This result-oriented flexibility is only available from LeCroy.

Spectral Analysis

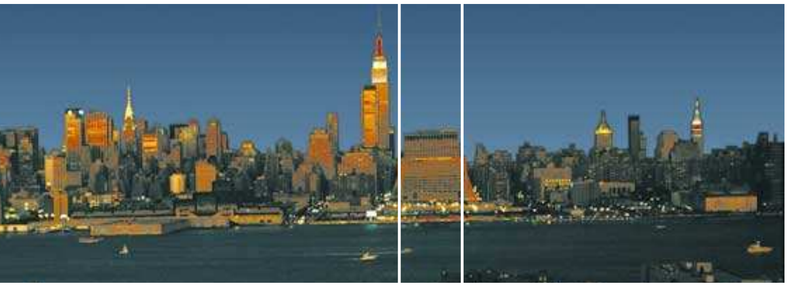
Waveform data can be viewed in the frequency domain to reveal hidden information about your signals. Problems related to noise, spurious signals, phase shifts, and unexpected power dissipation can be easily identified. And, with LeCroy scopes, FFTs and other analysis functions are performed on up to 6 Mpoint records, not just the first 10k points.

Statistical Analysis

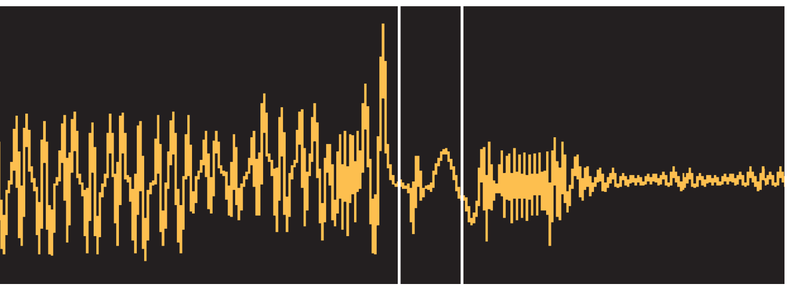
High resolution jitter analysis, bi-modal frequency detection, and amplitude variations over long time constants are just a few of the signal characteristics that can be pin-pointed using statistical analysis. By histogramming any of the 40 parametric measurements and then applying the 18 statistical parameters, hidden information in waveform data is revealed.

Open

Take a look at what you are missing if you aren't using a LeCroy Digital Oscilloscope.



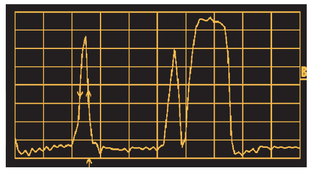
If you consider the panoramic view of New York City, as a long signal capture with full capture memory and the small inset piece as how some scopes display only a portion of the signal…



…you can realize that without LeCroy's SMARTMemory™ Management System there are events – important events, you will miss!

Get Results From LeCroy's Integrated Digital Oscilloscopes…

Capture, View, Measure, Analyze and Document – all in a single instrument!

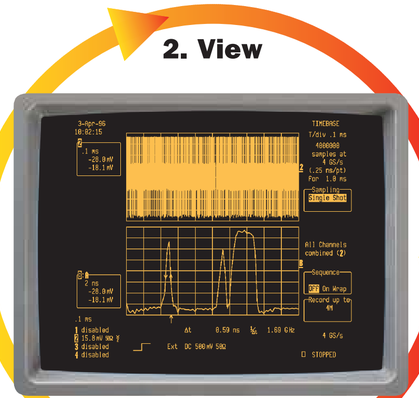


1. Capture

- LeCroy's SMARTTriggers™ enable you to trigger on elusive events in complex waveforms. Trigger on a feature almost anywhere in the data to find the point of interest.
- SMARTMemory™ and long record lengths preserve the full bandwidth of the oscilloscope to assure high accuracy in any time, amplitude, or frequency related measurements.
- LeCroy offers bandwidth to 1 GHz and sample rates to 10 GS/second.

2. View

- View all your data on a single screen. No scrolling or hunting through multiple screens or menus with LeCroy's patented display algorithm.
- Easy viewing of waveforms, scope setups, and measurement results with the industry's largest, highest resolution display.



3. Measure

- More than 40 automatic parametric measurements for complete characterization of your waveforms.
- Measurements can include a statistical summary of parametric values including the Average, Highest, Lowest, and Standard Deviation.
- Pass/Fail testing of waveform shape or measurement results, automatically!

4. Analyze

- Flexible spectrum analysis tools for waveform characterization in the frequency domain.
- Histograms for statistical insight into hard to identify phenomena like jitter, amplitude fluctuation, and frequency variations.
- Analysis tools operate on the entire record length, or any part of the record length, up to 8 MBytes.

5. Document

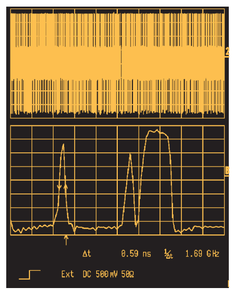
- Hard copy archiving of waveforms, scope setup, and measurement results with the optional built-in printer.
- Electronic transfer of scope screens to most popular word processing packages via floppy disk, PCMCIA Hard Disk, or SRAM Memory Card.
- Transfer waveform data, measurement results and front panel setups via GPIB, or RS232C. All LeCroy scopes are fully programmable.

Capture

Capture All Events Of Interest!

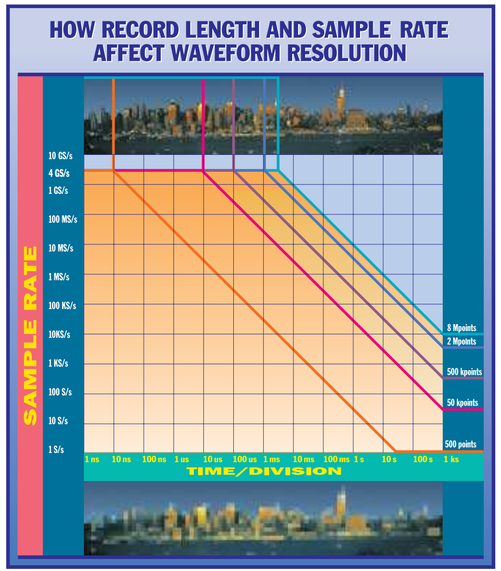
Ensure that key events are not missed with LeCroy's SMARTMemory™ Management System and SMARTTriggers™.

Having long record length in a DSO is only the first step towards having a really powerful scope. The key to power in a DSO is to manage the memory as part of a completely integrated system. SMARTMemory™ is a total memory management system

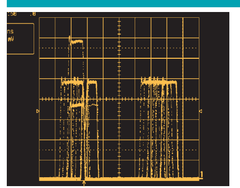


Top trace: 1 ms time window captured using 4 GS/s and 4 MBytes of record length. Bottom trace: zoomed portion showing a .59 ns pulse expanded for detailed examination.

that dynamically allocates resources of acquisition memory, CPU power, and processing RAM. Add the industries longest record length plus fast sample rates, and the result is a digital oscilloscope that can capture longer time windows with greater detail than any other on the market.



Trigger on the Events of Interest



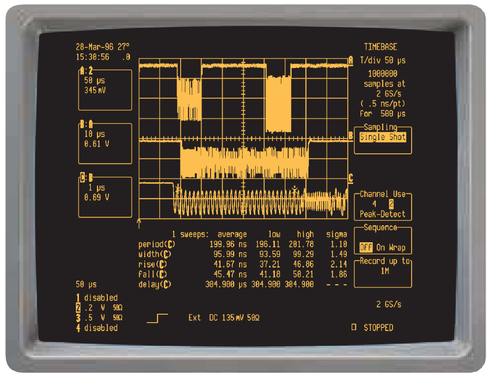
Above, Exclusion Trigger is set to eliminate pulses within a width of 50 ns. Only pulse widths that are not 50 ns wide will trigger the scope.

Exclusion trigger, a LeCroy exclusive trigger mode, captures intermittent out-of-tolerance events by triggering on signal characteristics that are outside of user defined boundaries. Trigger only on abnormal events and then use the power of LeCroy's integrated scope to view, measure, analyze and document them.

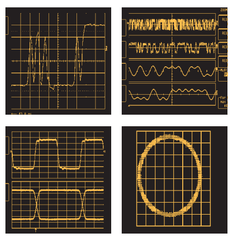
View

Get The Total Picture At A Single Glance

No scrolling or hunting through multiple screens with LeCroy's patented Waveform Display Algorithm!



Flexible Viewing

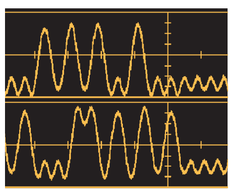


View all your waveform data on a single screen. LeCroy scopes always display the full record length used to capture the signal. Then, use up to 4 independent display grids, each with a full 8 bits of vertical resolution, to display your original waveform and up to 3 zoomed displays.

View your waveforms, measurements, and analysis quickly, easily, and accurately. Select from 1, 2, or 4 separate grids or an X-Y display. No overlaying of signals or compromising vertical resolution. Each grid's vertical and horizontal scaling can be set independently for the desired levels of detail.

Zooming for Detailed Information

Zoom factors of up to 800,000 times can be achieved for detailed viewing of critical performance characteristics, such as rise/fall times, setup and hold times, jitter, and other characteristics of interest. No mode switching or multiple menu selections are required. Simply select the portion of your waveform that you want to examine and use the independent vertical and horizontal zoom controls.



Measure

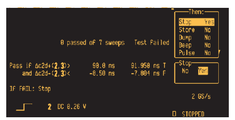
Complete Waveform Characterization

Fast, accurate, and repeatable, parametric characterization.

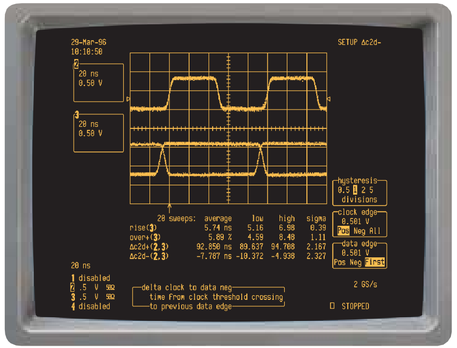
Measurements and Statistics

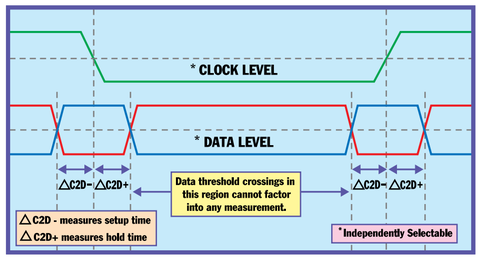
LeCroy oscilloscopes offer more than 40 automatic waveform parameters to select from. Display any 5 measurements on screen for continuous update including a distribution summary of parameter variations of: Average, Lowest, Highest, and Standard Deviation values. All measurement results are displayed below the waveform gradicule for clear viewing of results and waveforms simultaneously.

Pass/Fail Testing

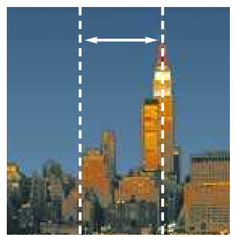


Pass/Fail Testing with parameters and waveshape masks assure repeatability and accuracy of characterization and test results. The scope will compare live waveform measurement results and waveform data to user-defined limits or waveform masks. When a failure occurs, the scope can automatically generate a hard copy or store a waveform to floppy disk, PCMCIA hard disk, or SRAM card for later retrieval and evaluation.





Setup and Hold Time Parameter Diagram



The screen above shows Setup and Hold Time Measurement results. The diagram shows the thresholds and levels that define the individual parameter values. Setup and Hold Time are just two of the powerful parametric measurements available on LeCroy's High Performance Digital Oscilloscopes.

Analyze

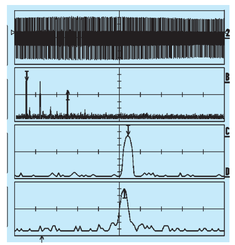
Uncover Hidden Information With Advanced Waveform Analysis

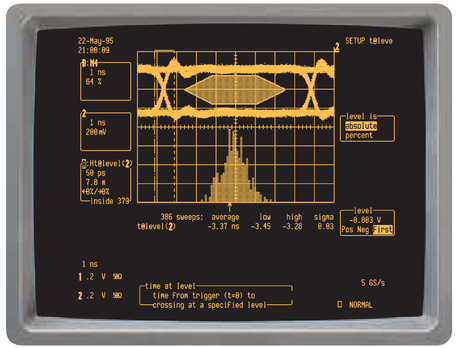
Detect events hidden in your waveform data – spectral and statistical analysis can identify and isolate events which are impossible to find in standard oscilloscope operations.

Most standard scope operations are done in the time domain. However, significant insight into what is occurring in a circuit can be gained from viewing waveforms in the frequency domain or with statistical analysis.

Spectral Analysis

The greater the number of waveform data points the higher the frequency resolution attainable in an FFT.





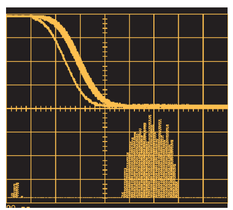
Histogram of edge transmission jitter.

For example problems caused by noise or spurious signals are very difficult to identify and characterize in the time domain, but can be quickly and easily identified using Spectral Analysis (i.e. FFT).

Because LeCroy's Spectral Analysis functions can be performed on the entire record length, up to 6 Mpoints, much greater frequency detail over the entire signal duration is available than in scopes with FFT functions which only operate on limited portions of the record length.

Statistical Analysis

Histogramming is a more efficient approach to identifying unknown anomalies. By recording waveform data over a long period of time, statistical analysis enables the user to understand the pattern of signal behavior. The result is that hard to analyze waveform parameters, like phase jitter or frequency fluctuations over long time intervals, can be accurately and easily characterized.

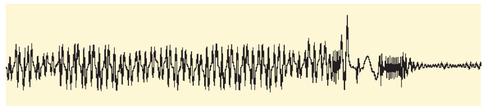


Histogram of timing jitter.

Document

Internal Printer, Floppy Drive, PCMCIA Hard Disk and PCMCIA Memory Cards – No Cables and No Frustrations In Documenting and Archiving!

A single instrument solution to all your documentation needs. Waveform printouts, TIFF files, and mass storage media, are all available internal to the oscilloscope.

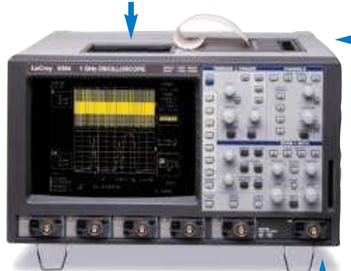


Graphics Printer

The internal graphics printer, available for the 9300 series, offers fast printouts. In less than 10 seconds you have a high resolution hard copy. The expanded form printout (up to 200X) offers exceptional detail to check signal shapes and timing.

Floppy Drive

DOS format 3.5" floppy supports either 720K or 1.44 Mbyte formats.



Hard Drive

PCMCIA portable hard drives are DOS format and can quickly store your raw data, FFT or other analysis, TIFF files for documents, front panel setups or Pass/Fail templates. The drive could also have your current engineering status report or ISO 9000 summary so that the data and document reside on the same drive.

SRAM Memory Card

PCMCIA SRAM memory cards are the fastest way to save test setups. Sizes up to 4 Mbytes are available.

Open

Specifications

ACQUISITION SYSTEMS

9370/9374/9384 Bandwidth (-3 dB):
@ 50 Ω: DC to 1 GHz
10 mV/div and above
@ 1 MΩ DC: DC to 500 MHz typ. at probe tip, with PP004 supplied.
1 GHz FET probe optional.

9350A Bandwidth (-3 dB):
@ 50 Ω: DC to 1 GHz
10 mV/div and above
@ 1 MΩ DC: DC to 500 MHz typ. at probe tip with PP005 supplied.
1 GHz FET probe optional.

No. of Channels:
4 (9384, 9374, 9354A) or 2 (9350A/9370)

No. of Digitizers:
4 (9384, 9374, 9354A) or 2 (9350A/9370)

Maximum Sample Rate and Acquisition Memories: See tables on previous page.

Sensitivity:
9384/9374/9370:
2 mV/div to 1 V/div, 50Ω
2 mV/div to 10 V/div, 1MΩ
9354A/9350A:
2 mV/div to 5 V/div

Scale factors: A wide choice of probe attenuation factors are selectable.

9384/9374/9370 Offset Range:

2.00 - 4.99 mV/div:	±400 mV
5.00 - 99 mV/div:	±1 V
0.1 - 1.0 V/div:	±10 V
1.0 - 10 V/div:	± 100 V (1MΩ only)

9354A/9350A Offset Range:

2.0 - 9.9 mV/div:	±120 mV
10.0 - 199 mV/div:	±1.2 V
0.2 - 5.0 V/div:	±24 V

DC Accuracy: Typically 1%.

Vertical Resolution: 8 bits.

Bandwidth Limiter:
9384/9374/9370: 25 MHz, 200 MHz.
9354A/9350A: 30 MHz

Input Coupling: AC, DC, GND.

Input Resistance:
1 MΩ//15 pF, 50 Ω ±1%.

Max Input:
9384/9374/9370:
1 MΩ: 400 V (DC+peak AC ≤10 kHz)
50 Ω:±5 V
9354A/9350A:
1 MΩ: 250 V (DC+peak AC ≤10 kHz)
50 Ω: ±5 V

TIME BASE SYSTEM

Timebases: Main and up to 4 Zoom Traces.

Time/Div Range: 1 ns/div to 1,000 s/div.

Clock Accuracy: ≤10 ppm

Interpolator resolution: 10 ps

Roll Mode: Range 500 ms to 1,000 s/div. For > 50k points: 10 s to 1,000 s/div.

External Clock: ≤100 MHz on EXT input with ECL, TTL or zero crossing levels. Optional 50 MHz to 500 MHz clock input.

External Reference: Optional 10MHz input.

TRIGGERING SYSTEM

Trigger Modes: Normal, Auto, Single, Stop.

Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (9384/9374/9354A: CH3, CH4). Slope, Level and Coupling for each source can be set independently.

Slope: Positive, Negative.

Coupling: AC, DC, HF, LFREJ, HFREJ.

Pre-trigger recording: 0 to 100% of full scale (adjustable in 1% increments).

Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.1 div. increments).

Holdoff by time: 10 ns to 20 s.

Holdoff by events: 0 to 99,999,999 events.

Internal Trigger Range: ±5 div.

EXT Trigger Max Input:
50 Ω ±1%: ±5 V DC (500 mW) or 5 V RMS.
9384/9374/9370: 1 MΩ//15 pF: 400 V (DC + peak AC ≤10 kHz).
9354A/9350A: 1 MΩ//15 pF: 250 V (DC + peak AC ≤10 kHz).

EXT Trigger Range: ±0.5 V (±5 V, Ext/10)

Trigger Timing: Trigger Date and Time are listed in the Memory Status Menu.

Trigger Comparator: Optional ECL output.

SMART TRIGGER TYPES

Pattern: Trigger on the logic AND of 5 inputs - CH1, CH2, CH3, CH4, and EXT Trigger, (9350A/9370): 3 inputs - CH1, CH2, EXT) where each source can be defined as High, Low or Don't Care. The Trigger can be defined as the beginning or end of the specified pattern.

Signal or Pattern Width: Trigger on width between two limits selectable from <2.5ns to 20s. Will typically trigger on glitches 1ns wide.

Exclusion Trigger: Trigger on a signal or period outside two limits selectable from <2.5 ns to 20s.

Signal or Pattern Interval: Trigger on interval between two limits selectable from 10ns to 20s.

Dropout: Trigger if the input signal drops out for longer than a time-out from 25ns to 20s.

State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on another source.

TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or nonstandard video.

ACQUISITION MODES

Random Interleaved Sampling (RIS):

9350A/9354A:	1 ns/div to 2 µs/div
9370/9374:	1 ns/div to 5 µs/div

Single shot: For transient and repetitive signals from 10 ns/div, all channels active.

Peak detect: Captures and displays 2.5 ns glitches or other high-speed events.

Sequence: Stores multiple events in segmented acquisition memories.

DISPLAY

CRT: 12.5x17.5 cm (9" diagonal) raster.

Resolution: 810 x 696 points.

Modes: Normal, X-Y, Variable or Infinite Persistence.

Real-time Clock: Date, hours, minutes, seconds.

Graticules: Internally generated; separate intensity control for grids and waveforms.

Grids: 1, 2 or 4 grids.

Formats: YT, XY, and both together.

Vertical Zoom: Up to 5x Vertical Expansion (50x with averaging, up to 40 µV sensitivity, only with WP01).

Horizontal Zoom: Waveforms can be expanded to give 2-2.5 points/division. This allows zoom factors up to 400,000x for the 9354AL, 9374L and 800,000x for the 9384 when channels are combined.

INTERNAL MEMORY

Waveform Memory: Four 16-bit memories

Processing Memory: Four 16-bit memories

Setup Memory: Four non-volatile memories. Optional Cards or Disks may be used for high-capacity waveform and setup storage.

CURSOR MEASUREMENTS

Relative Time, Relative Voltage, Absolute Time and Absolute Voltage measurements can be made.

WAVEFORM PROCESSING

Up to four processing functions may be performed simultaneously. Functions include: Negate, Identity, Summation Averaging and Sine x/x.

Average: Summed averaging of up to 1,000 waveforms in the basic instrument. 10^6 averages are possible with WP01.

Extrema: Roof, Floor, or Envelope values from 1 to 10^6 sweeps, with WP01.

ERES: Low-Pass digital filter provides up to 11 bits vertical resolution, with WP01.

FFT: Spectral Analysis with four windowing functions and FFT averaging with WP02.

PROBES

9350A/9354A:
One PP002 (10:1, 10 MΩ // 15 pF) probe supplied per channel.

9384/9374/9370:
One PP004 (10:1, 10 MΩ // 11 pF) probe supplied per channel. 300 V max input.

Model: One PP005 (X10, 10 MΩ // 11 pF) probe supplied per channel.

The 9384 family is fully compatible with LeCroy's range of FET Probes, which may be purchased separately.

Probe calibration: Max 1 V into 1 MΩ,500 mV into 50 Ω, frequency and amplitude programmable, pulse or square wave selectable, rise and fall time 1 ns typical. Alternatively, the Calibrator output can provide a trigger output or a PASS/FAIL test output.

Ordering Information

Oscilloscopes:	
9384/M/L	4 ch. Digital Oscilloscope
9384TM	4 ch. FDGP, WP01/02
Software Options:	
93XX-WP01	Waveform Math Package
93XX-WP02	FFT Processing Package
93XX-WP03	Statistical Analysis Package
93XX-DDM	Disk Drive Measurements
93XX-PRML	Supplementary Disk Drive Measurements
93XX-ORM	Optical Recording Measurements
Hardware Options:	
93XX-MC01/04	Memory Card Reader with 512K Memory Card
93XX-MC02	128K Memory Card
93XX-MC04	512K Memory Card
93XX-HDD	HD01/HD02 combination
93XX-HD01	Hard Disk Adapter
93XX-HD02	PCMCIA Hard Disk 131MB
93XX-DA01-110	PCMCIA type III external desktop adaptor for PC (110V)
93XX-DA01-220	PCMCIA type III external desktop adaptor for PC (220V)
93XX-FD01	Internal 3.5" Floppy Drive with Centronics interface
93XX-GP01	Internal Graphics Printer with Centronics interface
930X-64	64MB Processing Memory
93XX-TP	Total Performance Package WP01/WP02 + FD01

Manuals:	
938X-OM	Operator's manual
93XX-RCM	Remote Control manual
938X-SM	Service manual
93XX-HG	Hands-On Guide
Warranty & Calibration:	
93XX-CCMIL	US Military Standard
93XX-CCOFMET	Swiss OFMET Standard
93XX-CCNIST	US NIST Standard
93XX-W5	5 Year Warranty
93XX-C5	5 year Calibration Contract
93XX-T5	5 year Warranty and Calibration
Probes & Accessories:	
AP020	1 GHz Active FET Probe (10:1)
AP030	15 MHz Differential Probe
AP082	SDH STM-1E Trigger Pick-Off
AP083	SONET Trigger Pick-Off
AP54701A*	2.5 GHz 0.6pF Active Probe
AP1143A*	Probe Offset and Power Module
PP005	500 MHz 10:1 10 MΩ Passive Probe (1 per channel)
PP012	100:1 Probe
PP062	1 GHz, 10:1, 500 Ω Passive Probe
PP090	ProBus 75 to 50 Ω adapter
PP094	4 GS/s adapter

** Normally ordered together*

High Performance Scopes

LeCroy 9384 Series: 1GHz, 1GS/s

Model	9384	9384M	9384TM*	9384L
Number of channels	4	4	4	4
Maximum sample rate on 1 channel	4GS/s	4GS/s	4GS/s	4GS/s
Memory per channel	100k	500k	500k	1M
Maximum memory on 1 channel	400k	2M	2M	4M

LeCroy 9370 Series: 1GHz, 500MS/s

Model	9370	9370M	9370L	9374	9374M	9374TM*	9374L
Number of channels	2	2	2	4	4	4	4
Maximum sample rate on 1 channel	1GS/s	1GS/s	1GS/s	2GS/s	2GS/s	2GS/s	2GS/s
Memory per channel	50k	250k	2M	50k	250k	500k	2M
Maximum memory on 1 channel	100k	500k	4M	200k	1M	2M	8M

LeCroy 9350A Series: 500MHz, 500MS/s

Model	9350A	9350AM	9350AL	9354A	9354AM	9354TM*	9354AL
Number of channels	2	2	2	4	4	4	4
Maximum sample rate on 1 channel	1GS/s	1GS/s	1GS/s	2GS/s	2GS/s	2GS/s	2GS/s
Memory per channel	50k	250k	2M	50k	250k	500k	2M
Maximum memory on 1 channel	100k	500k	4M	200k	1M	2M	8M

** Includes Floppy Disk, Internal Printer, Advanced Math Waveform Processing, and Spectral Analysis Processing.*

Sales and Service
Throughout the World

Corporate Headquarters
700 Chestnut Ridge Road
Chestnut Ridge, NY 10977

In USA call 1-800-5-LeCroy (1-800-553-2769)
for direct connection to your nearest Sales
and Service facility, or FAX (914) 578-5985.

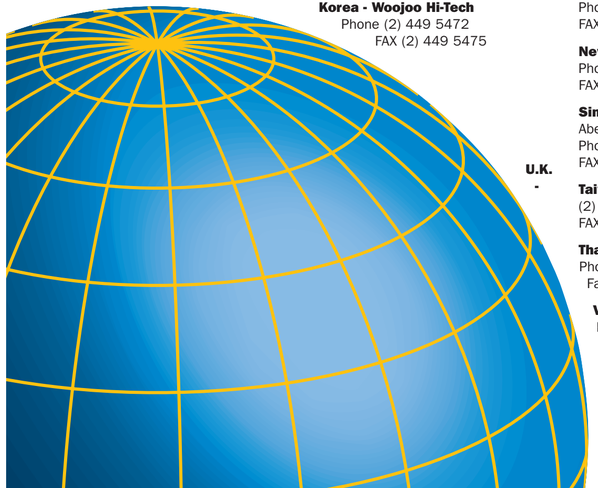
European Headquarters
LeCroy GmbH
Mannheimer Str. 175
D-69123 Heidelberg, Germany
Phone (011) 49 6221 827 073
FAX (011) 49 6221 833 827

Switzerland - Niederlenz
Phone (062) 885 8050
FAX (062) 885 8055

Germany - Heidelberg
Phone (06221) 82700
FAX (06221) 83 46 55

Italy - Venice
Phone (41) 456 9700
FAX (41) 456 9542

Australia



U.K.
-

- Scientific Devices
Phone (3) 9579 3622
FAX (3) 9579 0971

Hong Kong/PRC
Schmidt Electronics
Phone (2) 2507 0222
FAX (2) 2827 5656

India - Tata Honeywell
Phone (212) 675 532
FAX (212) 672 205

Korea - Woojoo Hi-Tech
Phone (2) 449 5472
FAX (2) 449 5475

Abingdon
Phone (01235) 533114
FAX (01235) 528796

France - Les Ulis
Phone (01) 69 18 83 20
Fax (01) 69 07 40 42

Japan - Osaka
Phone (06) 330-0961
FAX (06) 330-8096

Japan - Tokyo
Phone (03) 3376-9400
FAX (03) 3376-9587

New Zealand - Technology Gough
Phone (3) 379 8740
FAX (3) 379 6776

Singapore
Abex Engineering
Phone 841 2818
FAX 841 5988

Taiwan - LeCoIn Technology
(2) 232 6368
FAX (2) 231 9731

Thailand - Measuretronix
Phone (2) 375 2733
Fax (2) 374 9965

Vietnam - Schmidt Vietnam
Phone (4) 346 186
FAX (4) 346 188