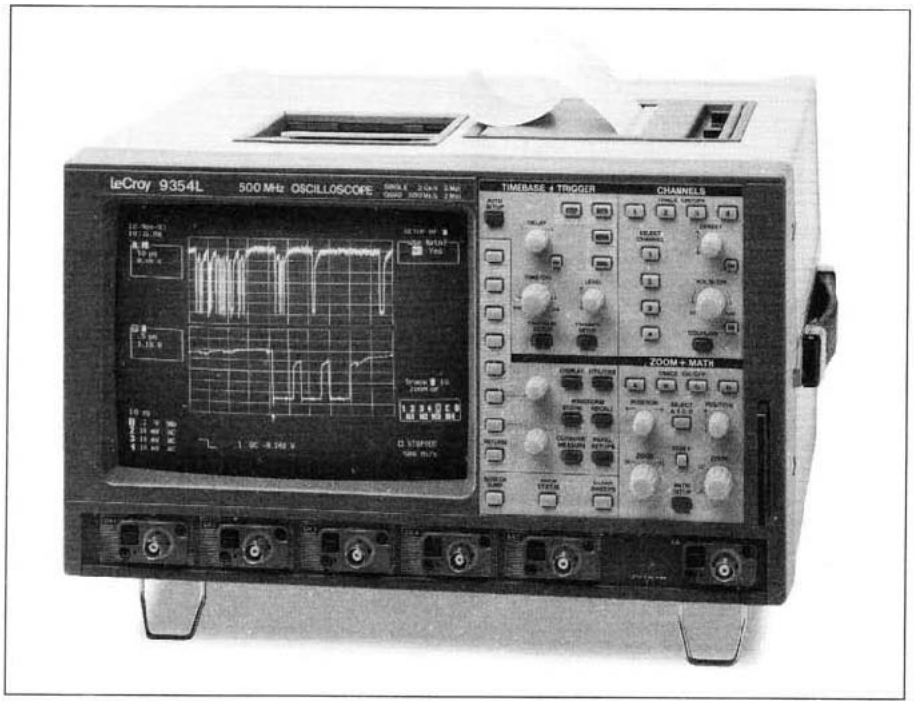
9350 Family Digital Oscilloscopes
500 MHz Bandwidth, 2 GS/s

Main Features

- Two and Four Channel versions
- Up to 8M Point record length
- Advanced Peak Detect Mode
- Glitch, Pattern, Qualified, Interval, Dropout and TV Triggers
- 8-bit vertical resolution, 11 with ERES option
- Fully programmable via GPIB and RS-232-C
- Automatic PASS/FAIL testing
- Advanced Signal Processing
- DOS Compatible Floppy Disk and Memory Card options
- Internal High Resolution Graphics Printer Option



General

High speed and long memory make this family the ideal 500 MHz general-purpose Digital Storage Oscilloscopes. Two and four channel simultaneous sampling at 500 MS/s meets demanding high-speed design applications. Even faster sampling may be achieved by combining channels, up to a maximum of 2 GS/s. Acquisition memories may also be combined, providing up to 8 M points of continuous or segmented waveform recording. Repetitive signals are digitized at up to 10 GS/s. These combined capabilities make the 9350 family the state-of-the-art in current DSO technology.

A unique peak detect scheme triggers on glitches down to 1ns and keeps the ADC sampling at 2.5 ns - even at slow time bases - *without destroying the underlying data*. This provides circuit designers with the benefits of peak detection without any loss of precision.

Live waveforms on the main timebase may be viewed simultaneously with up to 3 expansions, showing all of the signal detail. Expansions are shown as highlights on the main trace.

SMART Trigger modes like Glitch, Pattern, Dropout and TV allow you to capture precisely the events of interest. Pre- and Post-Trigger delay, and Time and Events Holdoff are also standard. The 9350 family features the proven user-interface of LeCroy's portable scopes. A bright 9" CRT allows optimum waveform viewing on a high resolution 810 x 696 pixel screen. Menus and text are arranged around the graticules - they never overwrite the waveforms. Dedicated control knobs keep the scope's performance at your fingertips.

A comprehensive range of signal processing functions including FFT and Math on live or stored waveforms, allows extensive waveform manipulation. Up to 16 MBytes of RAM are available allowing high power processing including FFT's up to 1 Mpoint. DOS compatible floppy disk and memory card options store waveforms and test setups, and simplify data transfer to any PC. An optional high resolution graphics printer is also available.

ACQUISITION SYSTEM

Bandwidth (-3 dB): DC to 500 MHz
No. of Channels: 4 (9354) or 2 (9350)
No. of Digitizers: 4 (9354) or 2 (9350)
Maximum Sample Rate:
2 GS/s (9354) or 1 GS/s (9350)
Acquisition Memory: Up to 8 M (see table below)
Sensitivity: 2 mV/div to 5 V/div, fully variable.
Scale factors: A wide choice of over 12 probe attenuation factors are selectable.
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
±20 V across the whole sensitivity range when using the AP 020 FET probe.
DC Accuracy: ≤±2% full scale.
Vertical Resolution: 8 bits.
Bandwidth Limiter: 30 MHz
Input Coupling: AC, DC, GND.
Input Impedance: 1 MΩ//15 pF or 50 Ω ± 1%.
Max Input:
1 MΩ: 250 V (DC+peak AC≤ 10 kHz)
50 Ω: ± 5 V DC (500 mW) or 5 V RMS

TIME BASE SYSTEM

Timebases: Main and up to 4 Zoom Traces.
Time/Div Range: 1 ns/div to 1000 s/div.
Clock Accuracy: ≤ 10 ppm
Interpolator resolution: 10 ps
Roll Mode: ranges 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.

TRIGGERING SYSTEM

Trigger Modes: Normal, Auto, Single.
Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (9354: CH3, CH4), Slope, Level and Coupling for each can be set independently.
Slope: Positive, Negative.
Coupling: AC, DC, HF, LFREJ, HFREJ.
Pre-trigger recording: 0 to 100% of full scale (adjustable in 0.1 div increments).
Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.01% increments).
Holdoff by time: 10 ns to 20 s.
Holdoff by events: 0 to 99,999,999 events.
Trigger Bandwidth: Up to 500 MHz using HF coupling.
Internal Trigger Sensitivity Range: ± 5 div.
EXT Trigger Max Input:
1 MΩ//15 pF: 250 V (DC+peak AC< 10 kHz)
50 Ω ± 1%: ± 5 V DC (500 mW) or 5 V RMS
EXT Trigger Range: ±0.5 V (±5 V with Ext/10)
Trigger Timing: Trigger Date and Time are listed in the Memory Status Menu.

SMART TRIGGER TYPES

Pattern: Trigger on the logic AND of 5 inputs - CH1, CH2, CH3, CH4, and EXT Trigger, (9350: 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 glitches as short as 1 nsec or on pulse widths between two limits selectable from < 2.5ns to 20s.
Signal or Pattern Interval: Trigger on an 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. The delay between these events can be defined as a number of events on the trigger channel or as a time interval.
TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or non-standard video.

ACQUISITION MODES

Random Interleaved Sampling (RIS): for repetitive signals from 1 ns/div to 2 µs/div (M,L versions: from 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 - *each of them time stamped* - in segmented acquisition memories.
Number of segments available:

9350-54	2-50
9350M-9354M	2-500
9350L-9354L	2-2,000

DISPLAY

Waveform style: Vectors connect the individual sample points, which are highlighted as dots. Vectors may be switched off.
CRT: 12.5 x 17.5 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.

Channels Used	Maximum Sample Rate	Memory Per Channel			Notes
		9350 9354	9350M 9354M	9350L 9354L	
All, Peak Detect OFF	500 MS/s	25k	100k	2M	All channels active
All, Peak Detect ON	100 MS/s data 400 MS/s peak	10k data+ 10k peaks	50k data+ 50k peaks	1M data+ 1M peaks	All channels active 2.5 ns peak detect
Paired Peak Detect OFF	1 GS/s	50k	250k	4M	9350: CH1 9354: CH2 + CH3
Paired + PP092 Peak Detect OFF	2 GS/s	100k	500k	8M	9354 models only

Digital Oscilloscopes

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

Horizontal Zoom Factors:

9350-9354	500x
9350M-9354M	2,000x
9350L-9354L	40,000x

INTERNAL MEMORY

Waveform Memory: Up to four 16-bit Memories (M1,M2,M3,M4).

Processing Memory: Up to four 16-bit Waveform Processing Memories (A,B,C,D).

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

CURSOR MEASUREMENTS

Relative Time: Two cursors provide time measurements with resolution of ±0.05% full-scale for unexpanded traces; up to 10% of the sampling interval for expanded traces. The corresponding frequency value is displayed.

Relative Voltage: Two horizontal bars measure voltage differences up to ±0.2% of full-scale in single-grid mode.

Absolute Time: A cross-hair marker measures time relative to the trigger and voltage with respect to ground.

Absolute Voltage: A reference bar measures voltage with respect to ground.

AUTOMATIC MEASUREMENTS

The following Parametric measurements are available, together with their Average, Highest, Lowest values and Standard Deviation:

amplitude	falltime	peak to peak
area	f 80-20%	period
base	f@level (abs)	risetime
cycles	f@level (%)	r 20-80%
delay	frequency	r@level(abs)
Δdelay	maximum	r@level (%)
Δt at level (abs)	mean	RMS
Δt at level (%)	median	std dev
Δt at level (t=0,abs)	minimum	top
Δt at level (t=0,%)	overshoot +	width
duty cycle	overshoot -	

Pass/Fail testing allows any 5 items (parameters and/or masks) to be tested against selectable thresholds. Waveform Limit Testing is performed using Masks which may be defined inside the instrument. Any failure will cause preprogrammed actions such as Hardcopy, Save to internal memory, Save to mass storage device (memory card or floppy disk), GPIB SRQ or Pulse Out.

WAVEFORM PROCESSING

Up to four processing functions may be performed simultaneously. Functions available are: Add, Subtract, Multiply, Divide, Negate, Identity and Summation Averaging.

Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to a million sweeps are possible with Option WP01.

Envelope*: Max, Min, or Max and Min values of up to one million sweeps.

ERES*: Low-Pass digital filter provides up to 11 bits vertical resolution.

Sampled data is always available, even when a trace is turned off. Any of the above modes can be invoked without destroying the data.

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

*Envelope and ERES modes are provided in Math Package WP01. FFT is in WP02.

AUTOSETUP

Pressing Autosetup sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2mV to 40V; frequency above 50Hz; Duty cycle greater than 0.1%).

Autosetup Time: Approximately 2 seconds.

Vertical Find: Automatically sets sensitivity and offset.

PROBES

Model: One PP002 (X10, 10 MΩ // 15 pF) probe supplied per channel.

The 9350 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.

INTERFACING

Remote Control: All front-panel controls, as well as all internal functions are possible by GPIB and RS-232-C.

RS-232-C Port (Standard): Asynchronous up to 19200 baud for computer/terminal control or printer/plotter connection.

GPIB Port (Standard): (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer. Command Language complies with requirements of IEEE-488.2.

Centronics Port: Optional hardcopy parallel interface.

Hardcopy: Screen dumps are activated by a front-panel button or via remote control. TIFF format is available for importing to Desktop Publishing programs. The following printers and plotters can be used to make hardcopies:

HP DeskJet (color or B&W), HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON printers. HP 7400 and 7500 series, or HPGL compatible plotters.

An optional internal high resolution graphics printer is also available.

GENERAL

Auto-calibration ensures specified DC and timing accuracy.

Temperature: 5° to 40° C (41° to 104° F) rated, 0° to 50° C (32° to 122° F) operating.

Humidity: < 80%.

Shock & Vibration: Meets MIL-STD-810C modified to LeCroy design specifications and MIL-T-28800C.

Power: 90-250 V AC, 45-66 Hz, 230 W.

Battery Backup: Front-panel settings maintained for two years.

Dimensions: (HWD) 8.5" x 14.5" x 16.25", 210mm x 370mm x 410mm.

Weight: 13 kg (28.6 lbs) net, 18.5 kg (40.7 lbs) shipping.

Warranty: 2 years.

ORDERING INFORMATION

For Ordering Information see Page 4.