

9361, 9362 Fast Digitizing Oscilloscopes

Main Features

- **10 GS/s max single shot sampling on 9362, 2.5 GS/s on 9361**
- **Repetitive sampling mode with 1.5 GHz bandwidth on 9362**
- **750 MHz single-shot bandwidth on 9362, 300 MHz on 9361**
- **Single-shot acquisition available on all timebases**
- **8-bit vertical resolution; 11 with ERES option**
- **Glitch, Interval, Dropout, Video and State-Qualified Triggers**
- **Advanced signal processing**
- **Record length to 25,000 points**
- **Automatic PASS/FAIL testing**
- **36 Automatic measurements**
- **Internal 3.5" floppy disk and PCMCIA portable hard drive storage options**
- **Internal high resolution graphics printer option**

The 9362's 10 GS/s sample rate makes it the fastest single shot digital scope available. It is ideal for applications like digital design, which require high bandwidth single-shot acquisition. Its two independent digitizers are clocked simultaneously to make precise timing measurements. Fast single-shot pulses can be characterized with 100 psec resolution in single channel mode or 200 psec resolution using both channels.

With 1.5 GHz bandwidth, the 9362 is also ideal for characterizing high-speed repetitive signals. Optional FET probes ensure low loading and high bandwidth.

The 9361 is an excellent oscilloscope for looking at single shot events with slower risetimes. It samples on 2 channels simultaneously at 2.5 GS/s sampling rate with 300 MHz bandwidth.

SMART Trigger modes like Glitch, Window and Dropout allow you to capture precisely the events of interest. Once signals are triggered, a range of signal processing functions, on live or stored waveforms, allows waveform manipulation without destroying the underlying data.

Menus and text are arranged around the waveform graticules - they never overwrite the waveforms. Each of the main control functions is dedicated to a single knob, to keep the scope's performance at your fingertips.

The 9360 series features the proven user-interface of LeCroy's portable scope family. A bright 9" CRT allows optimum waveform viewing on a high resolution 810 x 696 pixel screen.

Optional packages for FFT and extensive Waveform Processing (including Enhanced Resolution processing to 11 bits) are available.

DOS compatible memory card, PCMCIA portable hard drive and floppy disk options store waveforms and test setups, and make transferring data to your PC easier than ever before. An optional high resolution graphics printer is also available.

ACQUISITION

No. of Channels: 2

No. of Digitizers: 2

Maximum Sample Rate: 10 GS/s in single channel mode, 5 GS/s simultaneously on each channel for 9362, 2.5 GS/s for 9361.

Bandwidth (-3 dB): 1.5 GHz (repetitive) 750 MHz (single shot) for 9362, 300 MHz for 9361.

Sensitivity: 2 mV/div to 5 V/div (9361), to 1 V (9362), fully variable.

Offset Range: ± 8 divisions.

DC Accuracy: $\pm(3\% \text{ FS} + 3\% \text{ offset} + 1\text{mV})$.

Vertical Resolution: 8 bits.

Analog Bandwidth Selections: 30 MHz (9361 only) and full.

Input Coupling: AC, DC, GND.

Input Impedance: 1 M Ohm||15 pF 50 Ohms $\pm 1\%$ or 1 M Ohm||15 pF (9361 only).

Max Input: 1 M Ohm:250V (DC+peak AC<10KHz) 50 Ohms: $\pm 5\text{V DC}$ (500 mW) or 5VRMS.

Scale Factors: Probe attenuation is sensed automatically.

WAVEFORM PROCESSING

Up to four processing functions may be performed simultaneously. Available functions are: Add, Subtract, Multiply, Divide, Negate, Identity, Sin (x)/x and the following:

Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to 106 averages are possible with Option WP01.

Envelope*: Max, Min, or Max and Min values of from 1 to 106 waveforms are displayed.

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

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

*Envelope and ERES modes are provided in Optional Math Package WP01.

TIME BASE SYSTEM

Timebases: Main and up to 4 Zoom Traces. Any 4 viewed simultaneously.

Time/Div Range: 1 ns/div to 1000 s/div (9361); 500psec/div to 5 s/div (9362)

Timebase Accuracy: $\pm 0.07\%$.

Record Length: 500 to 25,000 points

(500 points for timebase settings from 500 ns/div to 1 ns/div).

Roll Mode: on ranges 500 ms to 1000 s/div.

TRIGGERING SYSTEM

Trigger Modes: Normal, Auto, Single, Stop.

Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (Slope, Level and Coupling for each can be set independently.)

Slope: Positive, Negative, Window (BiSlope).

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

Pre-trigger recording: 0 to 100% of full scale (0 to 75% at 10ns/div) adjustable in 1% steps.

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

Holdoff by time: 25 ns to 20s.

Holdoff by events: 0 to 109 events.

Trigger Bandwidth: Up to 500 MHz using HF coupling.

Ext Trigger Input: 1 M Ohm||15pF, 250V Max.

Ext Trigger Range:

± 500mV, ± 5V with Ext/10

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

SMART TRIGGER TYPES

Pulse Width: Trigger on pulse width between two limits selectable from less than 2.5ns to 20s. Typically triggers on glitches down to 1 ns.

Interval Width: Trigger on pulse spacing between two limits selectable from 2.5ns to 20s.

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

State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on one of the other possible sources. The delay between these events can be defined as a number of events on the trigger channel.

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

DISPLAY

Waveform style: Vectors connect the individual sample points, which are highlighted as dots.

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

Resolution: 810x696 points.

Modes: Normal, X-Y, Persistence.

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

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

Grids: 1, 2 or 4 grids.

Formats: YT, XY, and both together.

Persistence: Normal or Infinite.

Zoom: Up to 200x Horizontal and up to 5x Vertical Expansion (50x with averaging, up to 40 mV sensitivity).

AUTOMATIC MEASUREMENTS

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

amplitude	delta t at level (t=0,abs)	overshoot +
area	delta t at level (t-0%)	overshoot -
base	duty cycle	peak to peak
cmean	falltime	period
cmedian	f80-20%	risetime
crms	f@level (abs)	r20-80%
csdev	f@level (%)	r@level (abs)
cycles	frequency	r@level (%)
delay	maximum	RMS
delta delay	mean	std dev
delta t at level (abs)	median	top
delta t at level (%)	minimum	width

Parameters are calculated as defined by ANSI/IEEE Std 181-1977 "Standard on Pulse Measurement and Analysis by Objective Techniques". In addition, Rise and Fall times may be measured at 10 % and 90% levels, or 20% and 80% levels, or any other user-specified levels.

delta delay provides time between midpoint transition of two sources, for making propagation delay measurements.

delta t at level allows the same measurement to be made at any specified level.

Two cursors are used to define the region over which these parameters are calculated.

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

Relative Voltage: Two horizontal bars measure voltage differences up to $\pm 0.2\%$ of fullscale in single-grid mode.

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

Pass/Fail testing allow up to five of the listed parameters to be tested against selectable thresholds. Waveform Limit Testing is performed using templates which may be defined inside the instrument.

INTERNAL MEMORY

Waveform Memory: Four 16-bit Reference Memories (M1,M2,M3,M4) for full 25k records.

Processing Memory: Four 16-bit Waveform Processing Memories (A,B,C,D) 25k each.

Setup Memory: Four non-volatile panel memories.

AUTOSETUP

Sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2mV to 40V; frequency above 50Hz; Duty Cycle > 0.1%).

Autosetup Time: Approximately 2 seconds.

Vertical Find: Automatically sets sensitivity & offset.

INTERFACING

Remote Control of all front-panel controls, as well as all internal functions, is possible by GPIB and RS-232.

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

GPIB Port: (IEEE-488.2) Talker/listener for computer control and fast data transfer.

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

HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON compatible printers. HP 7400 and 7500 series, Phillips 8151, Graphtek FP5301 and compatible plotters. An internal high resolution graphics printer is also available.

MASS STORAGE OPTIONS

Optional 3.5" Floppy Disk drive and PCMCIA standard portable hard drive and memory cards allow storage of traces, screen graphics, setups and Pass/Fail templates.

GENERAL

Temperature:

10° to 35° C (50° to 95° F) rated, 0° to 45° C (32° to 113° 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, 150W

Battery Backup: Front-panel settings maintained for two years

Dimensions: (HWD)

8.5"x14.5"x16.25" 210mm x 370mm x 410mm

Weight: 10kg (22lbs) net 15.5kg (34lbs) shipping

Warranty: 3 years