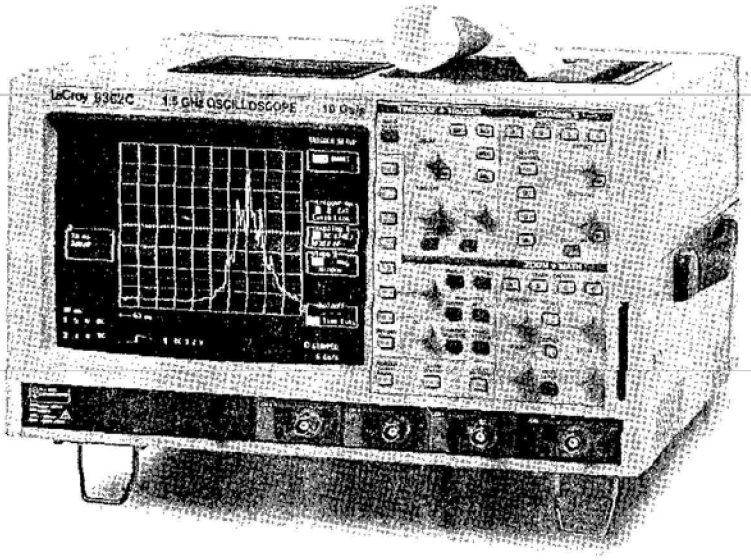
9360C Series Digital Oscilloscopes 300 MHz - 1.5 GHz Bandwidth, 2.5 GS/s - 10 GS/s



Main Features

- *2.5 GS/s (9361C) and 10 GS/s (9362C) Max Sample Rate*
- *300 MHz Single-shot (9361C) and 1.5 GHz Analog Bandwidth (9362C)*
- *Record Length to 25,000 points*
- *42 Automatic Measurements*
- *SMART Trigger®*
- *Automatic Pass/Fail Testing*
- *Advanced Signal Processing*
- *Floppy Disk and Centronics Port Standard*
- *Internal Printer and Hard Disk Options*
- *Fully Programmable via GPIB/RS-232-C*

Digital oscilloscopes from LeCroy are designed to save engineers valuable time in troubleshooting and problem-solving.

Each oscilloscope is an integrated and powerful system providing the capability to:

- Capture fast signal events with high resolution.
- View data like never before, giving you more information more quickly, with a large CRT and advanced zooming techniques.
- Analyze your signal to get answers quickly and more accurately with a powerful processing system and math packages.

High Sampling Rates

The 9361C and 9362C DSOs employ proprietary digitizers that provide these instruments with exceptionally fast single-shot digitizing speeds. The 9361C operates up to 2.5 GS/s. The 9362C maximum single-shot sample rate of 10 GS/s (in single-channel mode) makes it the fastest available digital oscilloscope. In dual channel mode, the two independent digitizers on the 9362C will operate simultaneously at 5 GS/s ensuring high-resolution, channel-to-channel timing measurements.

High Bandwidth

The 300 MHz bandwidth of the 9361C equates to a risetime of about 1 ns, making this instrument the ideal real-time replacement for general purpose analog oscilloscopes. The 1.5 GHz analog bandwidth and the 750 MHz single-shot bandwidth make the 9362C the perfect scope for capturing fast pulses and analyzing fine timing relationships.

Single Shot and Repetitive Capture

At fast timebase settings, most DSOs use repetitive sampling techniques to digitize signals. Repetitive sampling techniques require many recurrences of the signal to complete each acquisition. If the signal is non-repetitive in nature, or if the signal is unstable from one repetition to the next due to glitches or drift, repetitive sampling techniques result in erroneous data. Fast digitizing DSOs such as the 9361C and 9362C resolve this dilemma by capturing infrequent or changing events faithfully every time.

SMART Trigger System

To capture rare or complex conditions, SMART Trigger functions are available. These include Glitch, with 2.5 ns resolution to trigger down to 1 ns, and Dropout mode, which triggers when the signal disappears for a selectable

FFT: Spectral Analysis with five windowing functions and FFT averaging (with option WP02).

Histogramming and trending: The Parameter Analysis package permits in-depth diagnostics on waveform parameters (with option WP03).

AUTOSETUP

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

Autosetup Time: Approximately 3 seconds.

Vertical Find: Automatically sets sensitivity and offset.

PROBES

Model: 9361C: One PP002 probe is supplied per channel. DC to 250 MHz typical at probe tip, 600 V max. The 9360C series 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: Possible by GPIB and RS-232 for all front-panel controls, as well as all internal functions.

RS-232-C Port: Asynchronous up to 115.2 kb/s for computer/terminal control or printer/plotter connection.

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

Centronics Port: Hardcopy parallel interface, standard.

Hardcopy: TIFF and BMP formats are available for importing to desktop publishing programs. The following drivers are available: HP DeskJet (color or BW), HP ThinkJet, QuietJet, LaserJet, PaintJet, EPSON; HP 7470 and 7550 plotters, and HPGL compatible plotters. An optional, internal, high-resolution graphics printer is also available.

Output Formats: ASCII waveform output is compatible with spread-sheets, MATLAB and MathCad. Binary output is also available.

PC Card (PCMCIA Type I/II/III) Ports: For memory cards, ATA compatible flash cards and removable hard disks - optional.

Floppy Disk: High density 3.5" floppy disk drive (DOS format) is standard.

GENERAL

Temperature: 10° to 35° C (50° to 95° F) rated 0° to 45° C (32° to 113° F) operating.

Humidity: <80%.

Shock & Vibration: Conforms to selected sections of MIL-PRF-28800F, Class 3.

Power: 90-250 V AC, 45-66 Hz, 150 W (9361C), 200 W (9362C)

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

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

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

Warranty: Three years.

APPROVALS

EMC: Conforms to EN55022 (Emissions), EN50082-1 and (Immunity).

Safety: The oscilloscope has been designed to comply with EN55022 Installation Category (Over-voltage Category) II, Pollution Degree 2.

UL and cUL Approved: UL standard: UL 3111-1; cUL Canadian Standard *CSA-C22.2 No. 1010.1-92.*

CE

9360C Series - Ordering Information

Digital Oscilloscopes:	Product Code	Price
2 Ch, 300 MHz, 2.5 GS/s, 500 to 25k Memory/Ch DSO	9361C	$ 6,990
2 Ch, 1.5 GHz, 10 GS/s, 500 to 25k Memory/Ch DSO	9362C	14,990
Included with Standard Configuration:		
Two 10:1 10 MΩ Passive Probes (9361C)	PP002	80
Operator's Manual	936XC-OM-E	85
Remote Control Manual	93XX-RCM	85
Floppy Disk Drive	FD01	590
Probes & Accessories:		
1 GHz Active FET Probe (10:1) With ProBus Connector	AP020	990
15 MHz (±700 V) Differential Probe, x10, x100	AP031	300
15 MHz (±1400 V) Differential Probe, x20, x200	AP032	300
A Wide Range of Differential Amplifiers and Probes are available		
50 MHz Current Probe	AP015	1,500
2.5 GHz, 0.6pF Active Probe	AP54701A*	2,944
Probe Offset and Power Module	AP1143A	1,568
10:1, 8 GHz, 500Ω Passive Probe	PP063	750
100:1, 1 GHz, 500Ω Passive Probe	PP064	95
100:1, 400 MHz, 50 MΩ High Voltage Probe, 2 kV Max. DC+Peak AC	PPE2KV	190
1000:1, 100 MHz, 50 MΩ High Voltage Probe, 20 kV(40 kV Peak)	PPE20KV	1,573
Rackmount Adaptor for 9300 Series DSO	RM01	100
Software Options:		
Advanced Waveform Math Package	WP01	1,250
Spectrum Analysis Package	WP02	1,250
Parameter Analysis Package	WP03	1,250
Disk Drive Measurements	DDM	3,000
Supplementary Disk Drive Measurements	PRML	1,250
Hardware Options:		
Memory Card Reader with 512K Memory Card	MC01/04	500
Type III PCMCIA Slot & 170 Mbyte Portable Hard Drive (HD01 & HD02)	HDD	990
Type III PCMCIA Slot	HD01	590
PCMCIA Hard Disk 170 MB	HD02	499
4 MB ATA Flash Card (requires HD01 option)	4MBFC	399
Internal Graphics Printer Option	GP01	890
Warranty & Calibration:		
NIST Calibration Certificate	93XX-CC	175
MIL STD Calibration	93XX-CCMIL	275
Swiss Office of Metrology Calibration	93XX-CCOFMET	175
5 Year Repair Warranty	93XX-W5	545
5 Year NIST Calibration Contract	93XX-C5	650
5 Year Warranty & NIST Calibration	93XX-T5	975

* Requires Model AP1143A Power Supply

period of time. Other trigger modes include Pattern (9362C), Interval, State- or Edge-Qualified and TV (9361C).

Automatic Parametric Measurements and Statistics

The 9361C and 9362C provide more than 40 parametric measurements and their Average, Highest, Lowest values and Standard Deviation. Pass/Fail Testing allows up to 5 parameters to be tested against selectable thresholds. Waveform Limit Testing can also be performed using masks which may be defined inside the instrument. Any failure can cause pre-programmed actions such as Hardcopy, Save, GPIB Service Request, Pulse Out or Beep.

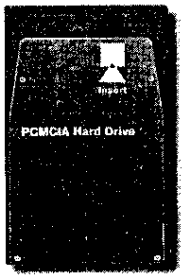
Internal Printer

Most printers and plotters can be driven via GPIB, RS-232-C and Centronics interfaces. The 936xC series offers an optional internal printer which can produce a 126 x 90 mm full resolution screen dump in under 10 seconds at the push of a button.

The unique Strip Chart format expands the horizontal axis of the printer up to 200 cm per division for viewing fine waveform detail within long memory acquisitions.

Mass Storage

All LeCroy scopes offer a 3.5" 1.44 MB floppy disk drive which stores traces, setups, screen graphics and masks. Data are stored as DOS files, which may be read directly by a PC. PCMCIA memory cards and hard disk options are also available.



Data can be saved on an optional PCMCIA portable hard disk drive

Remote Interfacing

GPIB and RS-232-C interfaces may be used for full remote control of the instrument. All front-panel and internal processing functions can be controlled via either interface.

Multiple Display Modes

The high-resolution raster display shows from one to four independent waveform grids. Four Zoom/Math traces may be used for zooming waveforms or for signal processing. Persistence display mode allows easy viewing of signal changes over time and XY mode. Cursors are usable in all display modes.

Advanced Waveform Math Package

Option WP01 provides Summed and Continuous Averaging, Waveform Math Functions, Extrema and Enhanced Resolution Modes. Functions can be chained together, allowing complex computations. Waveform operations can be performed on live, stored, processed or expanded waveforms. The package is fully programmable over GPIB or RS-232-C. WP01 extends the processing capabilities of the 936xC series and eliminates the need for external computers and controllers for processing.

Spectral Analysis Package

Option WP02 provides comprehensive spectral analysis capabilities, permitting the system designer to identify characteristics which may not be apparent in the time domain. WP02 provides a wide selection of windowing functions, as well as averaging in the frequency domain. Spectral analysis can be performed on repetitive and single events. Users can obtain time and frequency values simultaneously and compare phases of the various frequency components with each other.

Automated Parametric Measurements and Statistics

Option WP03 provides extensive analysis capabilities including trending and histogramming of key parameters. Detailed analysis can easily be performed on difficult-to-measure waveform phenomena such as amplitude fluctuation and timing jitter. Live displays include a line graph representing the trend of a parameter or bar chart showing the statistical distribution of selected waveform parameter measurements. Statistical information can be extracted directly from the histograms using automatic statistical measurements including max, min, average, median, standard deviation, etc.

Acquisition System

9361C Bandwidth (-3 dB):
@ 50 Ω: DC to 300 MHz

9362C Bandwidth (-3 dB):
@ 50 Ω: DC to 1.5 GHz (RIS on 2 Ch)
@ 50 Ω: DC to 750 MHz (Single shot on 2 Ch).

No. of Channels: 2
No. of Digitizers: 2

Maximum Sample Rate:
9361C: 2.5 GS/s (Ch 1 & 2)
9362C: 10 GS/s (Ch 1), 5 GS/s (Ch 1 & 2), 10 GS/s (RIS Ch 1 & 2, from 0.2 ns/div to 5 µs/div)

Sensitivity:
9361C: 2 mV/div to 5 V/div, fully variable.
9362C: 2 mV/div to 1 V/div, fully variable; (2 mV vertical scaling factor calculated).

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

Offset Range:

9361C:	2.0 - 9.9 mV/div:	±120 mV
	10.0 - 199 mV/div:	±1.2 V
	0.2 - 5.0 V/div:	±24 V
9362C:	Greater than ±8 div	

DC Accuracy:
9361C: ±3%.
9362C: ±(3% FS + 3% offset)

Vertical Resolution: 8 bits

Input Coupling:
9361C: AC, DC, GND
9362C: DC, GND

Input Impedance:
9361C: 1 MΩ//15 pF or 50 Ω ±1%
9362C: 50 Ω ±2%

Max Input:
9361C @ 1 MΩ: 250 V (DC+peak AC ≤10 kHz); 50 Ω: ±5 V DC (500 mW) or 5 V RMS

9362C: 50 Ω: ±5 V ≥100 mV/div
±2 V <100 mV/div

Bandwidth Limiter (9361C): 30 MHz

Timebase System

Timebases: Main and up to 4 zoom traces.

Time/Div Range:
9361C: 1 ns/div to 1,000 s/div
9362C: 200 ps/div to 1,000 s/div

Clock Accuracy: ≤10 ppm

Timebase Accuracy: ±0.07%

Roll Mode: ranges 500 ms to 1,000 s/div.

Record Length:
9361C: 25 to 25,000 points (500 points for timebase settings from 20 ns/div to 500 ns/div.)

9362C: Up to 25,000 points in RIS mode or at 100 MS/s. (up to 1000 points at 10 GS/s.)

Triggering System

Trigger Modes: Normal, Auto, Single, Stop.

Trigger Sources: CH1, CH2, Line (9361C), EXT, EXT/10.

Slope:
9361C: Positive, Negative, Window (BiSlope).
9362C: Positive, Negative.

Coupling:
9361C: AC, DC, HF, LFREJ, HFREJ
9362C: DC, "DC Auto-level".

Pre-trigger recording: 0 to 100% of full scale (adjustable in 1% increments)
9361C: 0 to 80% at 10 ns/div.
9362C: 0 to 75% at 10 ns/div.

Post-trigger: 0 to 10,000 divisions, adjustable in 0.1 div increments

Holdoff by time: 25 ns to 20 s

Holdoff by events: 0 to 10^9 events.

Internal Trigger Range: ±5 div

EXT Trigger Max Input:
9361C: 1 MΩ//15 pF, 250 V (DC + peak AC)
9362C: 50 Ω: ±5 VDC (500 mW), 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 (9362C only): Trigger on the logic combination of 3 inputs - CH1, CH2, and EXT Trigger, 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 Width: Trigger on width between two limits selectable from <2.5 ns to 20 s. Will typically trigger on glitches 1 ns wide.

Signal Interval: Trigger on interval between two signal edges selectable from 10 ns to 20 s.

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

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 (9361C only): Allows selection of both line (up to 1500) and field number (up to 8) for PAL (SECAM), NTSC or non-standard video.

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. The floppy disk or optional cards may also be used for high-capacity waveform and setup storage.

Cursor Measurements

Relative Time: A pair of arrow cursors measure time difference and voltage difference relative to each other.

Relative Voltage: A pair of line cursors measure voltage differences.

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.

Display

CRT: 12.5 x 17.5 cm (9" diagonal) raster.

Resolution: 810 x 696 points.

Modes: Normal, XY, Variable or Infinite Persistence.

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

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

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

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).

Maximum Horizontal Zoom Factors: 1,000x. Waveforms can be expanded to give 2-2.5 points/division.

Waveform Processing

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

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

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

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

Sampled data is always available, even when a trace is turned off (with option WP01).