

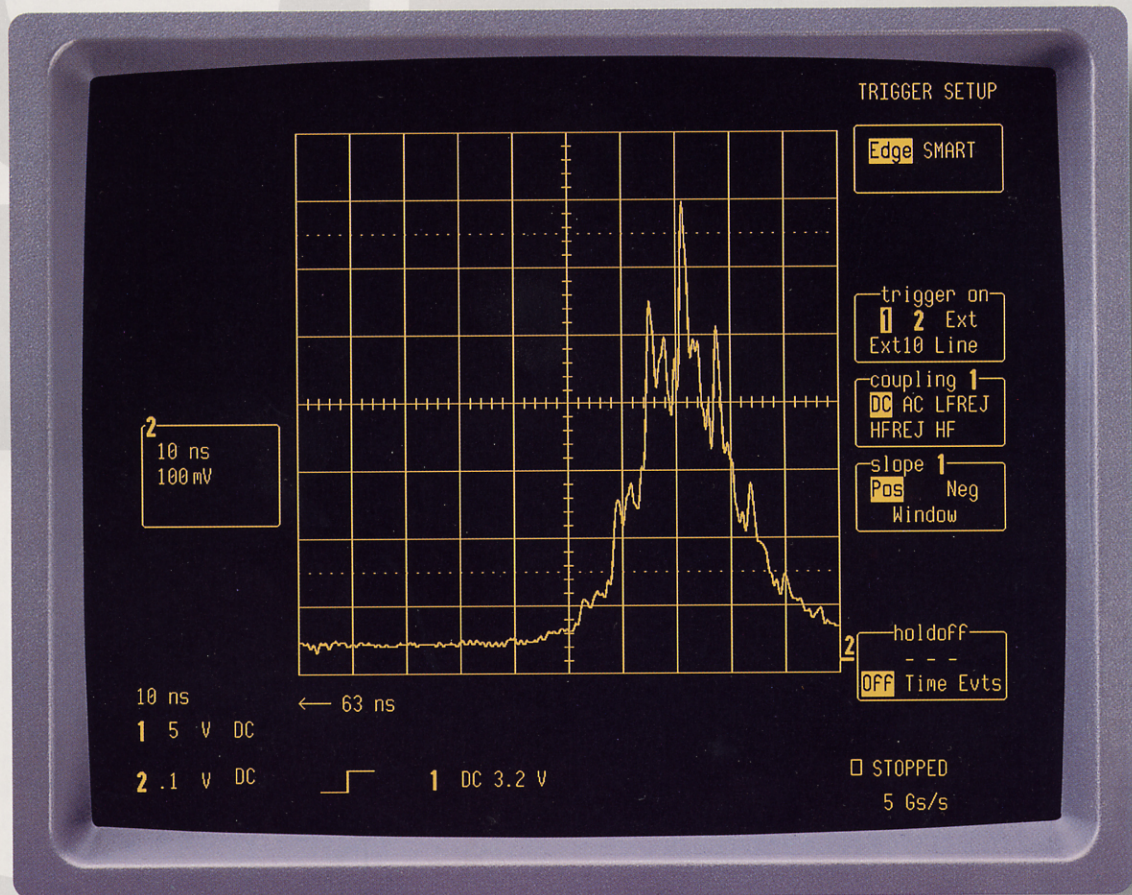
LeCroy Digital Oscilloscopes

Get the Complete Picture

9361C 9362C Datasheet

LEADING SPECIFICATIONS

- 2.5 GS/s (9361C) and 10 GS/s (9362C) Max Sample Rate
- 300 MHz Single-shot on 9361C and 1.5 GHz Analog Bandwidth on 9362C
- Record Length to 25,000 points
- 40 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/RS232



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.

The very high single shot sampling rate in the 936x series allows these scopes to perform accurate measurements of fast signals. With the ability to capture records up to 25,000 points at 10 nsec per point sampling rate you can capture longer, more complex signals. This versatility can be valuable in a wide range of applications.

LeCroy

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's 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 of the 9362C, and 750 MHz single-shot bandwidth, makes 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 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 (all standard). 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 up to 200 cm per division for viewing fine waveform detail within long memory acquisitions.

MASS STORAGE

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

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 as well as in XY mode. Cursors are usable in all display modes.

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:

9361C/9362C: 25 ns to 20s

Holdoff by events: 0 to 10⁹ events.

Internal Trigger Range: ± 5 div

EXT Trigger Max Input:

9361C: 1 M Ω /15 pF, 250V (DC + peak AC)

9362C: 50 Ω ; ± 5 VDC (500 mW), 5V 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 limits selectable from 10 ns to 20s.

Dropout: Trigger if the input signal drops out for longer than a time-out from 25 ns 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 (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 IC Memory Cards, ATA Flash Card or PC Card (PCMCIA) hard drives 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: 12.5x17.5 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 μ V 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. Standard functions include: 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).

FFT: Spectrum 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 Autsetup sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Amplitude 2 mV to 40V; 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, 600V max. The 9360C series is fully compatible with LeCroy's range of FET Probes, which may be purchased separately.

Probe calibration: Max 1V into 1 M Ω , 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 is 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 printers; 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 I/II/III) Ports: For memory cards, ATA compatible flash cards and removable hard disks (optional capability).

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), 200W (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.

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.



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

SPECTRUM ANALYSIS PACKAGE

Option WP02 provides comprehensive spectrum 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. Spectrum 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.

PARAMETER ANALYSIS PACKAGE

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, std. 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 μ s/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: \pm 120 mV

10.0 - 199 mV/div: \pm 1.2 V

0.2 - 5.0 V/div: \pm 24 V

9362C: Greater than \pm 8 div

DC Accuracy:

9361C: \pm 3%.

9362C: \pm (3% FS + 3% offset)

Vertical Resolution: 8 bits.

Input Coupling:

9361C: AC, DC, GND

9362C: DC, GND

Input Impedance:

9361C: 1 M Ω //15 pF or 50 Ω \pm 1%

9362C: 50 Ω \pm 2%

Max Input:

9361C @ 1 M Ω : 250V (DC + peak AC \leq 10 kHz)

50 Ω : \pm 5V DC (500 mW) or 5V RMS

9362C: 50 Ω : \pm 5V DC (500 mW) or 5V RMS

Bandwidth Limiter (9361C): 30 MHz

TIME BASE 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: \leq 10 ppm

Time Base Accuracy: \pm 0.07%

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

Record Length:

9361C: 25 to 25,000 points (500 points for timebases 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).

ORDERING INFORMATION

Digital Oscilloscopes:

2 channel 2.5 GS/s Digital Oscilloscope
2 channel 10 GS/s Digital Oscilloscope

Product Code

9361C
9362C

Included with Standard Configuration:

Two 10:1 10 M Ω Passive Probes (9361C)
Operator's Manual
Remote Control Manual
Floppy Disk Drive

PP002
936X-OM
93XX-RCM
FD01

PROBES & ACCESSORIES:

1 GHz Active FET Probe 10:1
15 MHz Differential Probe 10:1, 100:1 (\pm 700V)
15 MHz Differential Probe 20:1, 200:1 (\pm 1400V)
10 MHz High Gain Differential Amplifier
with Precision Source & Probe Sensing
100 MHz Differential Amplifier
with Precision Source & Probe Sensing
Current Probe 50 Amps, 50 MHz
2.5 GHz, 0.6 pF FET Probe 5:1
8 GHz, 10:1, 500 Ω Passive Probe
1 GHz, 100:1, 5 k Ω Passive Probe
100:1, 400MHz, 50 M Ω High-Voltage Probe 2 kV max.
1000:1, 100 MHz, 50 M Ω High-Voltage Probe 20 kV (40 kV peak)
Rackmount

AP020
AP031
AP032
DA1820
DA1822
DA1850
DA1855
AP015
AP54701A*
PP063
PP064
PPE2KV
PPE20KV
RM01

SOFTWARE OPTIONS:

Advanced Waveform Math Package
Spectrum Analysis Package
Parameter Analysis Package

WP01
WP02
WP03

HARDWARE OPTIONS:

Memory Card Reader with 512K Memory Card
HD01/HD02 Combination
Hard Disk Adapter
PCMCIA Hard Disk 170 MB
PCMCIA type III External Desktop Adaptor for PC (110V)
PCMCIA type III External Desktop Adaptor for PC (220V)
4 MB ATA Flash Card (requires HD01 option)
Internal Graphics Printer

MC01/04
HDD
HD01
HD02
DA01-110
DA01-220
4MBFC
GP01

MANUALS:

9361C Service Manual
9362C Service Manual

9361C-SM
9362C-SM

WARRANTY & CALIBRATION

Swiss OFMET Standard
US NIST Standard
5 Year Warranty
5 Year Calibration Contract
5 Year Warranty and Calibration

93XX-CCOFMET
93XX-CCNIST
93XX-W5
93XX-C5
93XX-T5

* Requires AP1143A

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