

➤ 9304C Series, 9310C Series, 9314C Series

Signal Capture



Acquisition System

Note: Where a particular model or a series is NOT mentioned, the specification concerned applies to all related models.

Bandwidth (-3 dB):

- **9304C Series**
 - @ 50 Ω: DC to 200 MHz
 - @ 1 MΩ: DC to 160 MHz typical at probe tip
- **9310C/9314C Series):**
 - @ 50 Ω: DC to 400 MHz
 - @ 1 MΩ: DC to 230 MHz typical at probe tip

Number of Channels:

- **9304C/9314C Series:** four
- **9310C Series:** two

Number of Digitizers:

- **9304C/9314C Series:** four
- **9310C Series:** two

Max. Sample Rate: 100 MS/s simultaneously on each channel

Sensitivity: 2 mV/div to 5 V/div, fully variable

Scale Factors: Wide range of probe attenuation factors

Offset Range:

- 2.00–9.9 mV/div: ±120 mV
- 10.0–199 mV/div: ±1.2 V
- 0.2–5.0 V/div: ±24 V

DC Accuracy: ±2 % full scale (eight divisions) at 0 V offset

Vertical Resolution: 8 bits

Bandwidth Limiter: 30 MHz

Model	9304C	9304CM	9310C	9310CM	9310CL	9314C	9314CM	9314CL
Number of Channels	Four		Two			Four		
Acquisition Memory per Channel	50 k	200 k	50 k	200 k	1 M	50 k	200 k	1 M

Input Coupling: AC, DC, GND



Specifications



Input Impedance: 1 M Ω /15 pF (system capacitance using PP002) or 50 Ω \pm 1 %

Max. Input:

- 50 Ω : \pm 5 V DC (500 mW) or 5 V rms
- 1 M Ω : 250 V max (DC + peak AC \leq 10 kHz)

Acquisition Modes

Random Interleaved Sampling (RIS): For repetitive signals from 1 ns/div to 10 μ s/div

Single shot: For transient and repetitive signals from 50 ns/div

Sequence: Stores multiple events in segmented acquisition memories

Deadtime Between Segments: \leq 80 μ s

Number of Segments Available:

Model			Segments
9304C	9310C	9314C	2–200
9304CM	9310CM	9314CM	2–500
9310CL	9314CL		2–2000

Timebase System

Timebases: Main and up to four Zoom Traces

Time/Div Range: 1 ns/div to 1000 s/div

Clock Accuracy: \leq \pm 0.002%

Interpolator resolution: 10 ps

Roll Mode: Ranges 500 ms–1000 s/div

For > 50 000 points: 10–1000 s/div

External Clock: \leq 100 MHz on EXT input with ECL, TTL or zero crossing levels

Triggering System

Modes: Normal, Auto, Single, and Stop

Sources: CH1, CH2 (plus CH3 and CH4 on four-channel models), Line, Ext, Ext/10; Slope, Level and Coupling able to be set independently

Slope: Positive, Negative, Window (Bislope)

Coupling: AC, DC, HF (up to 500 MHz), LFREJ, HFREJ

Pre-trigger Recording: 0–100 % of full scale adjustable in 1 % increments

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Post-trigger Delay: 0–10 000 divisions adjustable in 0.1 div increments

Holdoff by Time: 10 ns–20 s

Holdoff by Events: 0–99 999 999 events

Internal Trigger Range: ± 5 div

EXT Trigger Max Input:

➤ 50 Ω ± 1 %: ± 5 V DC (500 mW) or 5 V rms

➤ 1 M Ω /15 pF: 250 V max. (DC + peak AC ≤ 10 kHz)

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

Trigger Timing: Trigger Date and Time listed in “Memory Status” menu

SMART Trigger Types

Signal Width: Triggers on width between two limits of between 2.5 ns and 20 s

Signal Interval: Triggers on interval between two limits of between 10 ns and 20 s

Dropout: Triggers if the input signal drops out for a time-out longer than 25 ns–20 s

State/Edge Qualified: Triggers on any source only if a given state or transition — number of events, time interval — on another source

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

Exclusion Trigger: Triggers only on shorter-than-normal (defined) aberrations

Autosetup

AUTOSETUP button: Sets timebase, trigger and sensitivity to display wide range of repetitive signals — amplitude 2 mV to 40 V; frequency above 50 Hz; Duty cycle greater than 0.1%

Autosetup Time: Around two seconds

Vertical Find: Automatically sets sensitivity and offset



Probes

Probe Model: One PP002 probe supplied per channel; FET probes, purchased separately, fully compatible with entire scope series

Probe calibration: Max 1 V into 1 M Ω , 500 mV into 50 Ω , frequency and amplitude programmable, pulse or square wave able to be selected, rise and fall time 1 ns typical (calibrator also offers trigger or Pass/Fail output)



Signal Viewing

Display

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

Resolution: 810 x 696 points

Grids: 1, 2, or 4 grids.

Formats: YT, XY and both together

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

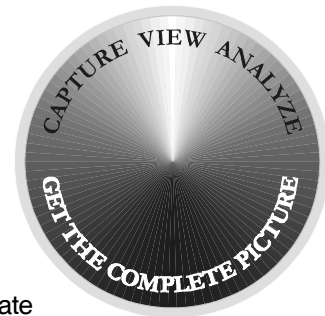
Waveform Style: Vectors, which can be switched on and off, connect individual sample points highlighted as dots

Modes: Normal, XY, Variable or Infinite Persistence

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

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

Horizontal Zoom:



Model			Zoom Factor
9304C	9310C	9314C	1000x
9304CM	9310CM	9314CM	5000x
9310CL		9314CL	20 000x

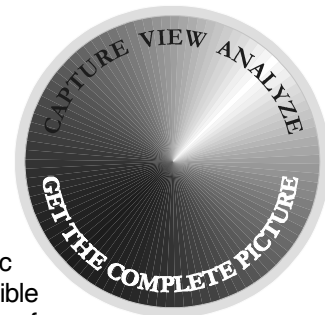
Signal Analysis

Waveform Processing

Processing Functions: Add, Subtract, Multiply, Divide, Negate, Identity and Summation Averaging; four functions performable at one time

Average: Summed averaging of up to 1000 waveforms in the basic instrument; up to 10^6 averages possible with optional WP01 Advanced Waveform Math Package

Extrema: Roof, Floor or Envelope values of from 1 to 10^6 waveforms with optional WP01 Advanced Waveform Math Package



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ERES: Low-Pass digital filter provides up to 11 bits vertical resolution; sampled data always available, even when trace turned off; any of above modes usable without destroying data — with WP01 Option

FFT: Spectral Analysis with five windowing functions and FFT averaging, with optional WP02 Spectrum Analysis Package

Histogramming and Trending: With optional WP03 Parameter Analysis Package, in-depth diagnostics on waveform parameters

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 for high-capacity waveform and setup storage

Cursor Measurements

Relative Time: Arrow cursors measure time and voltage differences relative to each other

Relative Voltage: Horizontal bars measure voltage differences up to $\pm 0.2\%$ full-scale in single-grid mode

Absolute Time: Cross-hair marker measures time relative to trigger and voltage with respect to ground

Absolute Voltage: Reference bar measures voltage with respect to ground

Interfacing

Remote Control: By GPIB and RS-232-C for all front-panel controls, internal functions

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

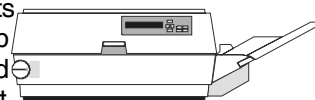
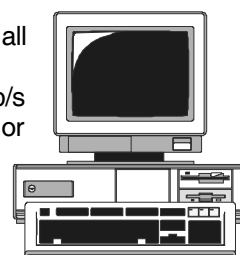
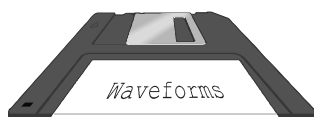
GPIB Port: (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer; command language compliant with IEEE-488.2

Centronics Port: Hardcopy interface

PC Card (PCMCIA I/III Ports): Optional for memory cards, flash cards and removable hard disks

Floppy Disk: High density 3.5-inch floppy disk drive (DOS format)

Hardcopy: TIFF and BMP formats available for import to Desktop Publishing programs; printers and plotters — HP DeskJet, HP ThinkJet, QuietJet, LaserJet, PaintJet, and EPSON printers; HP 7400 and 7500 series, or HPGL compatible plotters





Specifications

- Optional internal, high-resolution graphics printer
- Output Formats:** Binary, or ASCII waveform output compatible with spreadsheets, MATLAB™, MathCad™

General

Auto-calibration: Ensures specified DC and timing accuracy

Temperature: 5 to 40 °C (41 to 104 °F) rated

Humidity: 80 % for temperatures up to 31 °C, decreasing linearly to 50 % relative humidity at 40 °C

Altitude: Up to 2000 m (6560 ft) operating, 40 °C max

Power: 90–250 V AC, 45–66 Hz, 150 W

Battery Backup: Front-panel settings maintained for two years

Dimensions: (HWD) 8.5 x 14.5 x 16.25 inches / 264 x 397 x 453 mm

Weight: 12.5 kg (27.5 lb.) net, 18 kg (40 lb.) shipping

Warranty: Three years

Conformity

EMC: EN 50082-1 conformity

Safety: Designed to comply with EN 61010-1; UL and cUL listed, File E 170588: Protection Category I, Installation (Over-Voltage) Category II, Pollution Degree 2

See Declaration of Conformity for further details.