

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

Signal Capture

Acquisition System

- 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

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



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: $\approx$ 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: $\approx$ $\pm$ 0.002%

Interpolator resolution: 10 ps

Roll Mode: Ranges 500 ms–1000 s/div

For > 50 000 points: 10–1000 s/div

External Clock: $\approx$ 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



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

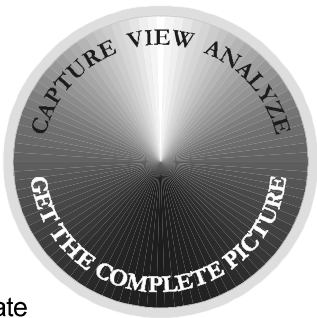
Probe calibration: Max 1 V into 1 M Ω , 500 mV into 50 Ω , frequency and amplitude programmable, pulse or square wave able to be selected, rise and fall time 1 ns typical (calibrator also offers trigger or Pass/Fail output)



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:

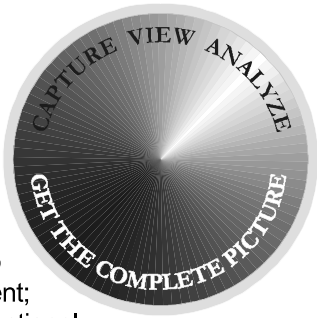


Model			Zoom Factor
9304C	9310C	9314C	1000x
9304CM	9310CM	9314CM	5000x
9310CL		9314CL	20 000x

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



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

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

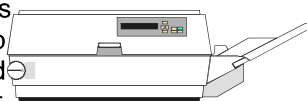
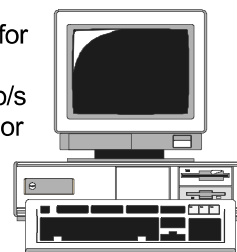
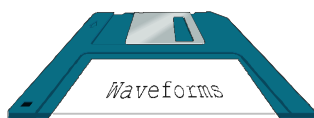
GPIB Port: (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer; command language compliant with IEEE-488.2

Centronics Port: Hardcopy interface

PC Card (PCMCIA II/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,



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QuietJet, LaserJet, PaintJet, and EPSON printers; HP 7400 and 7500 series, or HPGL compatible plotters

➤ 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.