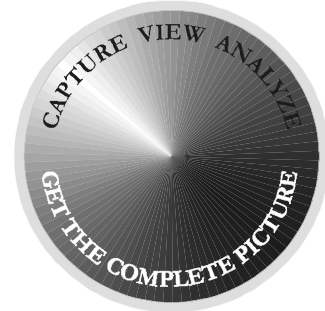


➤ **9304C Series, 9310C Series, 9314C Series**

**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
<b>Number of Channels</b>	Four		Two			Four		
<b>Acquisition Memory per Channel</b>	50 k	200 k	50 k	200 k	1 M	50 k	200 k	1 M

**Input Coupling:** AC, DC, GND



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

**Max. Input:**

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

**Acquisition Modes**

**Random Interleaved Sampling (RIS):** For repetitive signals from 1 ns/div to 10  $\mu$ 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  $\mu$ 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:**  $\pm 5$  div

**EXT Trigger Max Input:**

➤ 50  $\Omega$   $\pm 1$  %:  $\pm 5$  V DC (500 mW) or 5 V rms

➤ 1 M $\Omega$ /15 pF: 250 V max. (DC + peak AC  $\leq 10$  kHz)

**EXT Trigger Range:**  $\pm 0.5$  V ( $\pm 5$  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

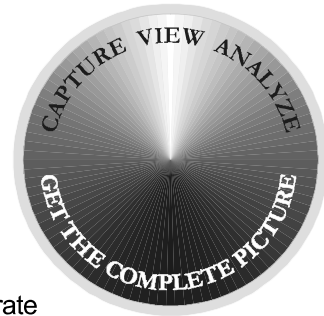
**Probe calibration:** Max 1 V into 1 M $\Omega$ , 500 mV into 50  $\Omega$ , frequency and amplitude programmable, pulse or square wave able to be selected, rise and fall time 1 ns typical (calibrator also offers trigger or Pass/Fail output)



# 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  $\mu$ V sensitivity)  
**Horizontal Zoom:**

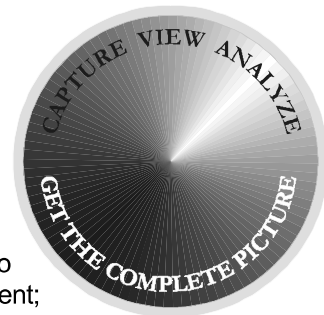


Model			Zoom Factor
9304C	9310C	9314C	1000x
9304CM	9310CM	9314CM	5000x
9310CL		9314CL	20 000x

# 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



## **9304C Series, 9310C Series, 9314C Series**

---

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



## Specifications

**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

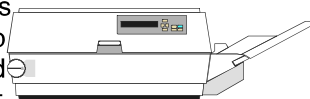
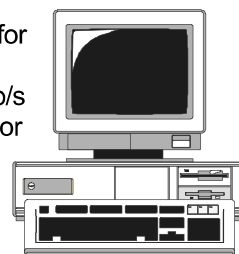
**GPIB Port:** (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer; command language compliant with IEEE-488.2

**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,



## 9304C Series, 9310C Series, 9314C Series

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.*