

➤ 9344C Series, 9350C Series, 9354C Series

## Signal Capture

### Acquisition System



### Bandwidth (- 3 dB):

- **9344C Series**
  - @ 50 Ω: DC to 500 MHz
    - 100 mV/div: 400 MHz
    - 50 mV/div and below: 350 MHz
  - @ 1 MΩ: DC to 500 MHz typical at tip of optional FET probe AP020
- **9350C/9354C Series:**
  - @ 50 Ω: DC to 500 MHz
    - 100 mV/div: 400 MHz
    - 50 mV/div and below: 350 MHz
  - @ 1 MΩ: DC to 500 MHz typical at tip of optional FET probe AP020

### Number of Channels:

- **9344C/9354C Series:** four
- **9350C Series:** two

### Number of Digitizers:

- **9344C/9354C Series:** four
- 9350C Series:** two

9344C Series					
CHANNELS USED (PEAK DETECT ON/OFF)	MAX SAMPLE RATE	MEMORY PER CHANNEL (IN POINTS) PER MODEL			ACTIVE CHANNELS
		C	CM	CL	
All (Peak Detect Off)	250 MS/s	50k	250k	2M	All
All (Peak Detect ON)	100 MS/s data	25k data	100k data	1M data	All
	200 MS/s peak	25k peak	100k peak	1M peak	
Two Channels Paired (Peak Detect OFF)	500 MS/s	100k	500k	4M	CH 2 and CH 3
Four Channels Combined (Peak Detect OFF)	1000 MS/s	250k	500k	4M	CH 2



# Specifications

9350C/9354C Series					
CHANNELS USED (PEAK DETECT ON/OFF)	MAX SAMPLE RATE	MEMORY PER CHANNEL (IN POINTS) PER MODEL			ACTIVE CHANNELS
		C	CM	CL	
All (Peak Detect OFF)	500 MS/s	50k	250k	2M	All
All (Peak Detect ON)	100 MS/s data	25k data	100k data	1M data	All
	400 MS/s peak	25k peak	100k peak	1M peak	2.5 ns peak detect
Two Channels Paired (Peak Detect OFF)	1 GS/s	100k	500k	4M	9350C/M/L
					9354C/M/L
					CH 1
					CH 2 + CH 3
FOUR-CHANNEL MODELS ONLY					
Four Channels Combined by PP092 Adapter (Peak Detect OFF)	2 GS/s	250k	1M	8M	CH 2 (PP092 input)
9354CTM					
All (Peak Detect OFF)	500 MS/s	500 000			All
Two Channels Paired (Peak Detect OFF)	1 GS/s	1M			CH 2 and CH 3
All Peak Detect ON	100 MS/s data	250k data			All
	400 MS/s peak	250k peak			2.5 ns peak detect
Four Channels Combined by PP092 Adapter (Peak Detect OFF)	2 GS/s	2M			CH 2 (PP092 input)

**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:** typically 1%

**Vertical Resolution:** 8 bits

**Bandwidth Limiter:** 30 MHz

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

## 9344C Series, 9350C Series, 9354C Series



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

**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 2  $\mu$ s/div

- **9344C Series, 9350CM/CL, 9354CM/CL/CTM:** For repetitive signals from 1 ns/div to 5  $\mu$ s/div

**Single shot:**

- **9344C Series:** For transient and repetitive signals from 20 ns/div (all channels active)
- **9350C, 9354C Series:** For transient and repetitive signals from 10 ns/div (all channels active)

**Peak Detect:**

- **9344C Series:** Captures and displays 5 ns glitches and other high-speed events
- **9350C, 9354C Series:** Captures and displays 2.5 ns glitches and other high-speed events

**Sequence:** Stores multiple events in segmented acquisition memories

**Deadtime Between Segments:** =80  $\mu$ s

**Number of Segments Available:**

Model				Segments
9344C	9350C	9354C		2–200
9344CM	9350CM	9354CM	9354CTM	2–500
9344CL	9350CL	9354CL		2–2000

### Timebase System

**Timebases:** Main and up to four Zoom Traces

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

**Clock Accuracy:** =10 ppm

**Interpolator resolution:** 10 ps

**Roll Mode:**

- **9344C:** Ranges 500 ms–1000 s/div
- **9350C, 9354C Series:** Ranges 500 ms–1000 s/div; >50 000 points: 10–1000 s/div

**External Clock:** =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  
**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 or Pattern Width:** Triggers on width between two limits of between 2.5 ns and 20 s  
**Signal or Pattern 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  
**Pattern Trigger:**  
➤ **Two-channel models:** Triggers on the logic combination of the three inputs CH 1, CH 2 and EXT Trigger, where each source can be defined as High, Low or Don't Know and the trigger as the pattern's beginning or end  
➤ **Four-channel models:** Triggers on the logic combination of the five inputs CH 1, CH 2, CH 3, CH 4 and EXT Trigger,

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where each source can be defined as High, Low or Don't Know and the trigger as the pattern's beginning or end



# Specifications

## 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, DC to 250 MHz typical at probe tip, 600 V max.; FET probes, purchased separately, fully compatible with entire scope series

**Probe calibration:** Max 1 V into 1 MΩ, 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

**Gaticules:** 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 μV sensitivity, with optional WP01 Advanced Waveform Math Package)

**Horizontal Zoom:** Waveforms can be expanded to give 2–2.5 points/div



Model			Zoom Factor
9344C	9350C	9354C	2000x
9344CM	9350CM	9354CM	10 000x

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9354CTM			50 000x
9344CL	9350CL	9354CL	100 000x



# Signal Analysis

### Waveform Processing

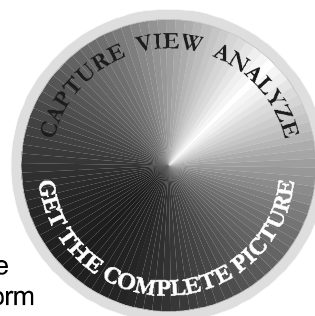
**Processing functions:** Add, Subtract, Multiply, Divide, Negate, Identity, Summation Averaging, and Sine x/x; four functions performable at one time **Average:** Summed averaging of up to 1000 waveforms in the basic instrument; up to  $10^6$  averages possible with optional WP01 Advanced Waveform Math Package

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

**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 or disks 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,

QuietJet, LaserJet, PaintJet, and

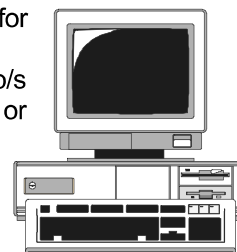
EPSON printers;

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, 230 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:** 13 kg (28.6 lb.) net, 18.5 kg (40.7 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.*