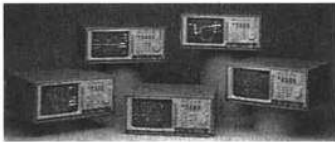


OSCILLOSCOPES

Digitizing Oscilloscopes

HP 54501A, 54502A, 54503A, 54504A, 54510A

- Choice of 100 MHz, 250 MHz, 400 MHz, 500 MHz bandwidth
- Single-shot and repetitive signal performance
- Up to 4 channels
- Fully programmable
- Automatic pulse parameter measurements
- Dual-time-base windowing (except HP 54510A)
- Pan and zoom (HP 54510A)
- Automatic limit testing
- Three-year warranty
- Affordable



HP 54501A, 54502A, 54503A,
54504A, 54510A



The HP 54500 Family of Digitizing Oscilloscopes

A Family of Affordable Digitizing Oscilloscopes

There are 5 models in the HP 54500 family of digitizing oscilloscopes. For repetitive signals, the HP 54501A and 54503A offer 100 MHz and 500 MHz, respectively, and 4-channel, general-purpose performance. When single-shot capability is important, the HP 54502A and 54504A provide, respectively, 100 MHz and 50 MHz single-shot, and they both provide 400 MHz repetitive signal bandwidths. Using custom ADC design and other custom-integrated circuits, the HP 54510A boosts single-shot performance to 250 MHz as the first 1 gigasample-per-second portable oscilloscope. All these instruments deliver surprising performance at an affordable price.

The Digitizing Advantage

The HP 54500 family of oscilloscopes has features and functions that were previously available only on considerably higher-priced instruments. Like the HP 54100 series digitizing oscilloscopes, these instruments include all the digitizing advantages, such as autoscale, pushbutton hard-copy output, automatic measurements, nonvolatile setup and waveform memories, and full HP-IB programmability.

Affordable Automation

The HP 54500 family's fully programmable setup and data acquisition capabilities can be used with your HP Vectra PC, IBM PC, or other compatible personal computer. The built-in HP-IB interface, the simplified, self-documenting programming language, and the high data throughput rate provide a modestly priced yet powerful automated test system.

Easy to Use

All members of the HP 54500 family have a simplified user interface that makes them easy to operate. Adjustments are made with a single front-panel knob or numeric keypad. Automatic measurements, hard-copy output, and instrument setup are performed with simple keystrokes. Operation is intuitive and straightforward.

Advanced Logic and TV Triggering

Hewlett-Packard's advanced logic triggering is a standard feature in the HP 54500 family. Use it to trigger on a wide variety of user-specified conditions. Trigger on edge, pattern, state, or trigger-after-delay to capture such elusive events as timing violations or transient bus phenomena.

Select line and field for a variety of video waveforms. The 54500 family makes it easy to focus on the video information you need to capture.

Measurement Limit Test

Using measurement limit test, the HP 54500 family can automatically characterize a circuit or device over temperature or time—without human supervision. Specify upper and lower limits for any 3 of the instrument's automatic measurements, and leave it running unattended. If a measurement exceeds predefined limits, the violating waveform, measurements, and other display data can be automatically stored or transferred to an external printer or controller.

These instruments can automatically calculate maximum, minimum, average, and most recent values for all measurements, making device or circuit characterization even more accurate.

Dual-time-base Windowing¹

Dual-time-base windowing lets you zoom in on fine details of the waveform you are measuring. Similar to the dual-delayed sweep feature found on some analog oscilloscopes, dual-time-base windowing gives you a time-expanded view of a smaller portion of the waveform, defined by you with the instrument's easy-to-use cursors.

Lightweight and Portable

Members of the HP 54500 family weigh only 22 pounds and are easily transported. Their small size allows them to fit easily in the trunk of a car, making them ideal for field applications. An optional soft carrying case is also available, as well as a sturdy transit case for safe shipment. See page 163 for accessories.

¹The HP 54510A has "Pan and Zoom" in place of this feature (see page 149).

HP 54501A 100 MHz, 4-Channel Digitizing Oscilloscope

The HP 54501A is a 100 MHz, 4-channel digitizing oscilloscope designed primarily for repetitive signal applications. It has all the digitizing advantages of oscilloscopes much higher in price. Ease of use and general-purpose features such as TV trigger, dual-time-base windowing, advanced logic triggering, automatic measurements and full HP-IB programmability make it a powerful tool for both manual and automated test applications.

HP 54501A Specifications and Characteristics

Vertical (voltage)

Bandwidth	
dc-coupled	dc to 100 MHz (-3dB)
Repetitive:	dc to 1 MHz
Single-shot:	(Based on 10 points per period of input signal.)
ac-coupled	10 Hz to 100MHz (-3dB)
Repetitive:	10 Hz to 1 MHz
Single-shot:	(Based on 10 points per period of input signal.)
Rise time	3.5 ns
Calculated from: Rise time = $\frac{0.35}{\text{bandwidth}}$	
Number of channels	4 (2+2) Channels 2 and 3 are limited attenuator inputs, optimized for digital signals.
Simultaneous channels	2+2 Channels 1 and 4 are acquired simultaneously. If four channels are used, data is acquired alternately by channels 1 and 4, then 2 and 3.
Vertical sensitivity range	5 V/div to 5 mV/div
Vertical gain accuracy (dc)	± 1.5%
Vertical resolution	± 0.4% - 8 bit A/D (Since expansion is used for 5 mV/div range, A/D resolution is 7 bits 0.8% in that range.) ± 0.1% - 10 bits via HP-IB (with averaging)
Maximum sample rate	10 Megasamples/second
Memory depth	501 points (display) 1024 points (via HP-IB) For single-shot via HP-IB, maximum memory depth is 501 points. For 2ns/div time base range, memory depth is 200 points. For 5ns/div time base range, maximum memory depth via HP-IB is 501 points.
Input RC (nominal)	1 MΩ, 16 pF
Input coupling	ac, dc
Max input voltage	± 250 V [dc + peak ac (< 10 kHz)]
Offset range	Sensitivity range: Available offset: 5 to 50 mV/div ± 2V 0.1 to 1 V/div ± 20V 1 to 5 V/div ± 200V
Offset accuracy	± 2% of offset ± 0.2 X (V/div) ± 0.075 division/Δ° C from calibration temperature
Dynamic range	± 16 divisions from center operating range for dc + peak ac input.
Channel-to-channel isolation	40 dB dc to 20 MHz 30 dB 20 MHz to 100 MHz (with channels at equal sensitivity)
Voltage measurement accuracy	
Single cursor:	gain accuracy + offset accuracy + A/D resolution
Dual cursor:	gain accuracy + (2 × A/D resolution) (single channel)

Horizontal (time)

Time base range	2 ns/div to 5 s/div	
Time base accuracy	0.005%	
Maximum time base resolution	100 ps	
Delta-t accuracy	1 ns ± (5E-5) × delta t ± 0.02 × (t/div) Delta-t accuracy for dual-cursor, single-channel measurement, or for channel-to-channel measurement after visual time null calibration has been performed.	
Delay range (post-trigger)	Time base setting	Available delay
	50 ms to 5 s	40 × (s/div)
	100 μs to 20 ms	1 s
	2 ns to 50 μs	10,000 × (s/div)
Delay range (pre-trigger)	10 μs to 5 s	-40 × (s/div)
	20 ns to 5 μs	-200 μs
	2 ns to 10 ns	-10,000 × (s/div)

Triggering

Trigger sensitivity	
5mV/div:	dc to 20MHz, 0.1 × full-scale 20MHz to 100MHz, 0.25 × full-scale
All Other:	dc to 20MHz, 0.05 × full-scale 20MHz to 100MHz, 0.125 × full-scale
Trigger pulse width (minimum)	7 ns
Trigger level range	± 6 div from center

Specifications valid for temperature range ±10° C from calibration temperature with 8 averages selected and channel(s) in sensitivity range 1, 2, or 5.

Power requirements: Voltage: 115/230 V ac, -25% to +15% 48 to 66 Hz. Power 350 VA maximum.

Weight: Net: approximately 10 kg (22 lb). Shipping: approximately 20 kg (44 lb).

Size: 194.3 mm H × 422.3 mm W × 355.6 mm D (7.65 in × 16.62 in × 14 in). Does not include front panel protrusions.

Ordering Information

The HP 54501A digitizing oscilloscope comes complete with two HP 10432A 10:1 10 MΩ probes, an operating and programming manual, a service manual, a power cord, and a three-year warranty.

HP 54501A Digitizing Oscilloscope	qty 1	Price
	qty ≥ 2 (each)	\$3,990
Opt 908 Rack Mount Kit (5061-6175)		\$3,872
Opt 910 One Additional Operating/Programming Manual (54501-90901) and One Additional Service Manual (54501-90902)		+ \$250
Opt 090 Delete Probes		+ \$75
		- \$200

☎ For off-the-shelf shipment, call 800-452-4844.