Performance Specifications

The following are performance specifications for the HP 54510A Digitizing Oscilloscope.

Vertical

Bandwidth (-3dB, dc coupled):[1] dc to 250 MHz

Rise Time:[2] 1.4 ns

Input R (selectable): 1 MΩ ± 1% or 50 Ω ± 1%

Maximum Input Voltage[3]
1 MΩ: ± 250 V [dc + peak ac(< 10 kHz)]
50 Ω: 5 V$_{rms}$

Offset Accuracy:[4] ± (1% of channel offset + 2% of full scale)

Voltage Measurement Accuracy (dc) [4,5]
Dual Cursor: ± (1.25% of full scale + 0.032 × V/div)
Single Cursor: ± (1.25% of full scale + offset accuracy + 0.016 × V/div)

Horizontal

Delta-t Accuracy[6]
Repetitive (≥ 8 averages): ± (0.005% × delta-t + 2E-6 × delay setting + 100 ps)
Real Time (single acquisition): ± (0.005% × delta-t + 2E-6 × delay setting + 150 ps)

Trigger

Trigger Sensitivity[4]
Internal (dc to 50 MHz): 0.5 division
Internal (50 MHz to 250 MHz): 1.0 division
External (dc to 250 MHz): 100 mV$_{p-p}$ into 50 Ω

NOTES:

1. Upper bandwidth reduces by 2.5 MHz for each °C above 35°C. Bandwidth in Repetitive mode is typically greater than 300 MHz.

2. Rise time figures are calculated from: $t_r = 0.35/\text{Bandwidth}$.

3. On ranges $\leq$ 50 mV/div, the maximum overdrive of the input must not exceed 100 V.

4. Magnification is used below 7 mV/div range so vertical resolution and accuracies are correspondingly reduced. Below 7 mV/div, full scale is defined as 56 mV.

5. Voltage measurement accuracy decreases 0.06% per °C from firmware calibration temperature. This specification is valid for a temperature range $\pm$ 10° from software calibration temperature. Specification applies to both modes; repetitive and realtime (single acquisition).

6. Specification applies at the maximum sampling rate. At lower sampling rates the specification is $\pm$ (0.005% $\times$ delta-t + (2 $\times$ 10^{-6}) $\times$ delay setting +0.15 $\times$ sample interval) for bandwidth limited signals ($t_r = 1.4 \times$ sample interval). Sample interval is defined as 1/(sample rate). Specification also applies to those automatic measurements computing time intervals on identical slope edges (i.e. pos-pos, neg-neg).

Performance Characteristics

The following are performance characteristics of the HP 54510A Digitizing Oscilloscope.

Vertical

Switchable Bandwidth Limits
ac-coupled (lower -3 dB frequency): 90 Hz
LF reject (lower -3 dB frequency): 450 Hz
Bandwidth Limit (upper -3 dB frequency): 30 MHz

Number of Channels: 2 (simultaneous acquisition)

Vertical Sensitivity Range: 1 mV/div to 5 V/div

Vertical Gain Accuracy (dc):[1,2] $\pm$ 1.25% of full scale

Vertical Resolution:[2] 8 bits over 8 divisions (± 0.4%), 10 bits via HP-IB with averaging (± 0.1%)

Maximum Sample Rate: 1 GSa/s

Waveform Record Length:[3] 8001 points real time, 501 points repetitive

Input C: 7 pF nominal

Input Coupling: ac, dc

Offset Range: Vertical Sensitivity   Available Offset

Vertical Sensitivity	Available Offset
1 mV - 50 mV/div	± 2 V
> 50 mV - 250 mV/div	± 10 V
> 250 mV - 1.25 V/div	± 50 V
> 1.25 V - 5 V/div	± 250 V

Dynamic Range: ± 1.5 × full scale from center of screen

Channel-to-channel Isolation (with channels at equal sensitivity):
dc to 50 MHz: 40 dB
50 to 250 MHz: 30 dB

NOTES:

1. Gain accuracy decreases 0.08% of full scale per °C from firmware calibration temperature. This characteristic is valid for a temperature range ± 10°C from software calibration temperature. Characteristic applies to both modes; repetitive (eight or more averages) and real time (single acquisition).

2. Expansion is used below 7 mV/div range so vertical resolution and accuracies are correspondingly reduced. Below 7 mV/div full scale is defined as 56 mV.

3. Available over HP-IB, waveform record length is:

Real Time-	8,000 points
Repetitive-	500 points

Horizontal   **Time Base Range:** 1 ns/div to 5 s/div

Time Base Resolution: 20 ps

Delay Range (post-trigger): 10,000 × (s/div)

Delay Range:	Time/div Setting	Available Delay
(pretrigger)	100 ns - 5 s/div	− 160 × (s/div)
	1 ns - 50 ns/div	− 8 μs

Trigger   **Trigger Pulse Width** (minimum)
        Internal: 1.75 ns
        External: 2.8 ns

Trigger Level Range
        Internal: ± 1.5 × full scale from center of screen
        External: ± 2 V