

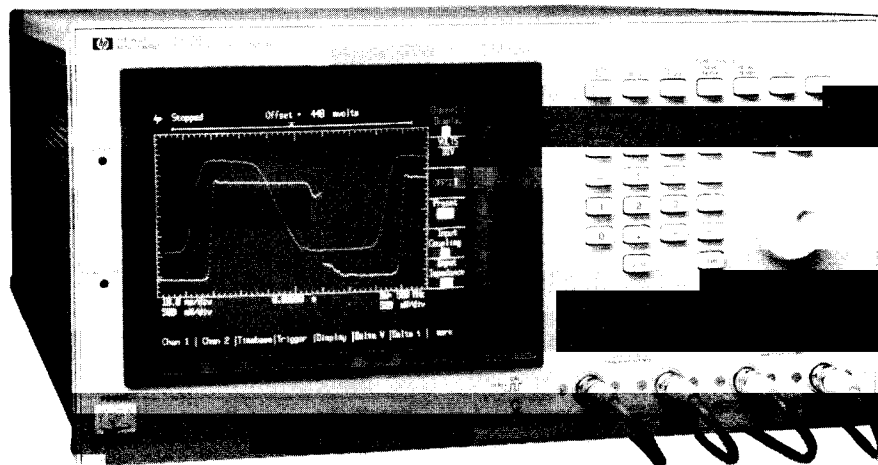
# OSCILLOSCOPES & WAVEFORM ANALYZERS

Digitizing Oscilloscopes

HP 54111D

65

- 2 Gigasample/second, one channel when used with HP 54114A
- 500 MHz repetitive bandwidth
- 8k memory depth
- HP PaintJet printer color output



HP 54111D  
DESIGNED FOR  
**HP-IB**  
SYSTEMS

## HP 54111D: High-speed General-Purpose Scope

The HP 54111D can be configured as a 2 gigasample/second (G Sa/s), one channel oscilloscope or as a two channel 1 gigasample/second oscilloscope with a memory depth of 8k samples per channel. The HP 54111D retains all of the key features and user friendliness of the HP 54100/110 oscilloscopes, such as automatic measurements, autoscaling, cursors, and a color display. Plus, the HP 54111D adds features necessary for controlling and managing the added memory depth, such as scroll, zoom, and memory bar.

### Key Contributions

- 2 gigasamples/second digitizing rate (maximum)
- 500 MHz bandwidth
- 8k memory per channel
- Up to eight bits of vertical resolution with bandwidth limits
- Two channels of simultaneous capture at up to 1 G Sa/s
- Pre-trigger information
- Automatic measurements
- Fully HP-IB programmable
- Advanced logic triggering capabilities
- Instant hard-copy output

### Memory Bar Simplifies Data Viewing

The HP 54111D provides 8k samples of memory per channel. This results in a minimum of 16 screens of waveform information in single-shot acquisitions. To simplify management of all this data, the HP 54111D displays a memory bar. The memory bar is displayed along the top edge of the graticule and shows the portion of memory being viewed relative to the entire memory record. In addition, the trigger point is also shown along the memory bar.

### General-purpose to Special Applications

With a 2 gigasample/second digitizing rate, the HP 54111D gives you the fastest sampling rate available in a general-purpose digitizing oscilloscope. However, the HP 54111D is much more than an instrument for capturing fast single-shot transients. With random repetitive sampling, this instrument provides a bandwidth of 500 MHz for high-speed circuit design and test.

In addition to its single-shot and repetitive capabilities, the HP 54111D provides flexible input coupling with a side dynamic range for viewing and analyzing a variety of signals. Use this scope for just about any general-purpose application from very slow to very high-speed repetitive or non-repetitive waveforms.

### Ultra high digitizing rate

No longer do you need a manual analog storage oscilloscope to capture high-speed single-shot phenomena found in:

- high-speed pulse analysis
- nuclear test studies
- plasma discharge
- high voltage arcing
- high frequency bursts

All these single-shot events can be captured easily at 2 G Sa/s, with 4  $\mu$ s of data stored for review and analysis. (8  $\mu$ s over HP-IB).

### High-speed ECL design

Non-repetitive glitches appearing on the clock signal can be captured easily with the 500 MHz single-shot performance of the HP 54111D with the HP 54114A two-gigasample/second test set. Four  $\mu$ s of pre-trigger data is invaluable for determining the cause of the glitch.

### High-speed semiconductor design

Single-shot performance of 500 MHz permits you to measure the outputs from latches (one-time events for multiple clock periods in ECL circuits).

### Laser and high-energy research

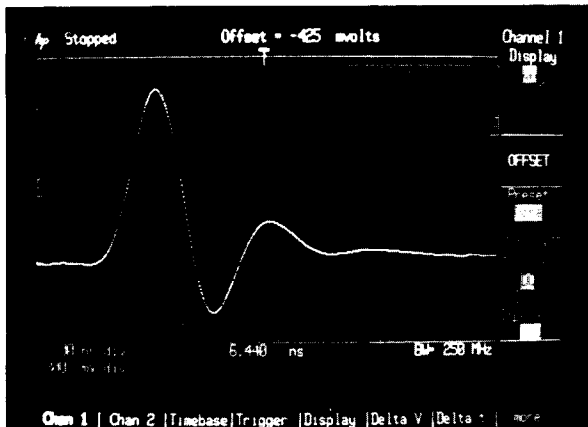
Photo detector pulses can be measured with single-shot capture using the 2 GHz sampling rate and built-in automatic measurements. Infinite persistence can also be used to show and measure maximum variations of the waveform to the 500 MHz bandwidth.

The HP 54111D's two simultaneous 1 gigasample/second channels give you the single-shot performance of the most advanced analog storage oscilloscopes, but with all the advantages and ease of use of a digitizing oscilloscope. And with a staggered over-sampling technique, the HP 54111D provides this single-shot performance with up to eight bits of non-blooming vertical resolution.

# OSCILLOSCOPES & WAVEFORM ANALYZERS

## Digitizing Oscilloscopes (cont'd)

HP 54111D



With a 1 gigasample/second digitizing rate, the HP 54111D captured this laser pulse single-shot.

### Data communications

Combine 2 gigasample/second (GSA/s) digitizing rate with eight kbytes of memory depth per channel, for an invaluable tool for analyzing high-speed serial waveforms such as data communications or radar testing.

### High bandwidth applications

Not only is the HP 54111D digitizing oscilloscope useful for single-shot phenomena, but it also samples repetitively, giving you 500 MHz bandwidth with high signal fidelity. Use this oscilloscope for general-purpose applications, from very slow to very high-speed repetitive or non-repetitive waveforms.

### Computer-aided test

The HP 54111D has many features that make it an excellent tool in computer-aided test. Its repetitive bandwidth and digitizing rate allow it to cover a wide range of automatic measurement applications. In addition, this instrument has many features that enhance test throughput time, such as built-in automatic measurements, fast acquisition cycles, and deep memory.

### Input range and conditioning

The HP 54111D has the widest input dynamic range and coupling capabilities of any HP digitizing oscilloscopes. The input sensitivity can be set from 1 mV/div to 5 V/div. All input coupling is internal and programmable. The selections include: ac, dc, 1 M $\Omega$ , 50 $\Omega$ , and ground. These input signal conditioning features make the HP 54111D more general-purpose for the circuit designer and test engineer.

### HP 54111D Specifications

Vertical (voltage)	Single-shot		Repetitive
	2 channel	1 channel with HP 54114A	
<b>Channels</b>		2	2
<b>Bandwidth</b>	250 MHz	500 MHz	500 MHz
<b>Transition time</b>	1.4 ns	700 ps	700 ps
<b>Vertical resolution</b>	8 bits/25 MHz, 7 bits/100 MHz, 6 bits/250 MHz	8 bits/50 MHz, 7 bits/200 MHz, 6 bits/500 MHz <sup>a</sup>	6 bits, 8 bits with averaging
<b>Vertical gain accuracy</b>	±2% of full-scale <sup>2</sup>		
<b>dc offset accuracy</b>	±1.5% of setting		
<b>Measurement accuracy</b>	±gain accuracy ± offset accuracy ± resolution		
single data point	±gain accuracy ± 2 × resolution		
between data points on the same waveform	±gain accuracy ± 2 × resolution		
<b>dc offset range:</b>	±200 mV (1 mV/div to 4.9 mV/div) ±1 V (5 mV/div to 49 mV/div) ±10 V (50 mV/div to 0.49 V/div) ±100 V (0.5 V/div to 5 V/div)		

<b>Input coupling:</b>	ac/dc/dc-50 $\Omega$ /ground
<b>Input impedance:</b>	1 M $\Omega$ at 6.5 pF or 50 $\Omega$ (dc)
<b>Maximum input voltage</b>	1M $\Omega$ : ±40V [dc + peak ac] 50 $\Omega$ : 5Vrms

### Horizontal (time)

<b>Digitizing rate</b>	1 GSA/s to 50 SA/s
<b>Deflection factor</b>	500ps/div to 1 s/div
<b>Memory depth per channel</b>	8k (8 $\mu$ s at 1GSA/s), single shot only
<b>Delay range (pre-trigger)</b>	-8 $\mu$ s at 50 $\mu$ s/div and less, increasing to -160s at 1 s/div
<b>Delay range (post-trigger)</b>	0.16s at 0.5 $\mu$ s/div and less, increasing to 10,000s at 1 s/div

### Time measurement accuracy

	single-shot	repetitive
single channel	±300ps ±0.03% of reading	±100ps ±0.03% of reading
dual channel	±600ps ±0.03% of reading	±200ps ±0.03% of reading

Triggering	Internal	External
<b>Sources</b>	channels 1, 2	inputs 3, 4
<b>Sensitivity</b>		
dc to 200MHz	0.1 × full scale <sup>a</sup>	15mV (1:1)
200MHz to 500MHz	0.2 × full scale <sup>a</sup>	45mV (1:1)
<b>Trigger level range</b>	±3 × full scale	
<b>Input resistance</b>	not applicable	1 M $\Omega$
<b>Maximum input voltage</b>	not applicable	±10V [dc + peak ac]
<b>Input operating range</b>	not applicable	±1V (1:1) [dc + peak ac]

<sup>1</sup>Raw Data

<sup>2</sup>When calibrated to probe tip using front panel calibration source. Applies to major ranges (5 mV/div, 10 mV/div, 20 mV/div, 50 mV/div, 100 mV/div, 200 mV/div, 500 mV/div, 1 V/div, and 2 V/div). All continuous settings between these ranges are ± 3% of full-scale.

<sup>3</sup>Applies to settings 5 mV/div and above.

### Ordering Information

HP 54111D 2 gigasample/second digitizing oscilloscope

Opt W30 Extended repair service. See page 723.

### Price

\$28,900

+ \$675