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Introducing the HP 54112D Digitizing Oscilloscope

Introduction

The Hewlett-Packard 54112D digitizing oscilloscope provides a 400 megasample/second digitizing rate, full HP-IB programmability, four channels with 64k bytes per channel memory, and a powerful feature set for a wide range of applications.

Not only does the HP 54112D allow you to make four-channel simultaneous, high speed single-shot acquisition, but its extensive feature set makes it useful as a general-purpose oscilloscope.

For extensive waveform evaluation, the HP 54112D provides four 64k deep memories that can be viewed and measured. In addition, such easy-to-use features as zoom, pan and automated measurements are available at the press of a key.

Special Features

- 400 megasample/second digitizing rate
- 100 megahertz bandwidth in both repetitive and real-time modes
- 64k or 8k selectable memory per channel
- 8 waveform memories and 2 pixel memories
- Four-channel simultaneous capture at the full digitizing rate
- Pre- and post-trigger viewing capability
- Automatic triggering and display scaling
- Automatic waveform measurements with continuous update
- Waveform math functions
- 10 front-panel setup save and recall registers
- General-purpose input coupling
- Digital triggering capabilities
- Full color display
- Hardcopy output to printer or plotter
- Fully programmable over the HP-IB

**VERTICAL
(VOLTAGE)**

Specifications****

Channels	4	
Bandwidth (-3dB)*	Real-time	Repetitive
	dc-coupled ac-coupled	dc to 100 MHz 10 Hz to 100 MHz
Transition Time	See "Operating Characteristics"	
Deflection Factor (full scale=8 div)	5 mV/div to 5 V/div continuous	
Resolution (% of full scale)	6 bits (1.6%), 8 bits with averaging (0.4%)	
DC Gain Accuracy	±2% of full-scale**	
DC Offset Accuracy	±1.5% of setting ±0.2 div***	
DC Measurement Accuracy single data point	±Gain Acc. ± Offset Acc. ± Resolution	
between data points on the same waveform	±Gain Acc. ± 2 x Resolution	
DC Offset Range	±1 V (5 mV/div to 49mV/div) ±10 V (50 mV/div to 499 mV/div) ±40 V (500 mV/div to 5 V/div)	
Input Coupling	ac/dc/dc-50 Ω	
Maximum Safe Input Voltage	±40 Volts @ 1 MΩ (dc +peak ac), 5 Vrms @ 50 Ω	

Note

All voltages in table correspond to a 1:1 attenuation setting. If a 10:1 probe is attached, multiply all voltages by ten. The HP 10033A has a maximum voltage of ±200 V.

- * Bandwidth for settings 1 mV/div to 4 mV/div is reduced to 150 MHz.
- ** When calibrated to probe tip using the 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.
- *** Increases to ±0.4 divisions at 5 mV/div to 9 mV/div
- **** Applies for temperature ranges ±5° C from point of last software calibration.

**HORIZONTAL
(TIME)**

	Real-time	Repetitive
Digitizing Rate	400 megasample/s to 50 sample/s	
Deflection Factor	2 ns/div to 1 s/div	
Memory Depth Per Channel	64k or 8k	501
Pre-trigger Delay Range	- 160 μ s at timebase settings 249 ns/div and faster, increasing to -1200 sec at 1 s/div.	
Post-trigger Delay Range	0.16 s at timebase settings .5 μ s/div and faster, increasing to 10,000 seconds at 1 s/div.	
Time Interval Measurement Accuracy single channel	± 500 ps ± 0.002 of reading*	
dual channel	± 1 ns $\pm 0.002\%$ of reading.**	

* Decreased to ($\pm 0.2\%$ of time range $\pm 0.002\%$ of reading) for time ranges 200 ns and slower. Time range is (time/div \times 10).

** Decreased to ($\pm 0.4\%$ of time range $\pm 0.002\%$ of reading) for time ranges 200 ns and slower. Time range is (time/div \times 10).

TRIGGERING

Sources	Internal Channels 1,4	External Trig.
Sensitivity	0.1 of full-scale, 100 MHz BW	20 mV (1:1) 50 MHz BW
Trigger Level Range	$\pm 3 \times$ full-scale	± 5 V (1:1)
Maximum Safe Voltage	NA	± 40 V (dc + peak ac),
Input Operating Range	NA	± 5 V (1:1) (dc + peak ac)

1. The trigger level range is centered on the Offset level.
2. Trigger level range is limited to ± 600 mV from 25 to 49 mV/div inclusive, ± 6 V from 250 to 499 mV/div inclusive, and by the maximum safe input voltages at 2 V/div and above.
3. The ± 25 mV of hysteresis in the external trigger is not included in this specification.
4. When the external trigger is used with a 1 Mohm 10:1 inputs (HP 10017A/033A/431A) and instrument menus are set up to reflect the 10:1 probe, the software provides the correct scaling to compensate for the difference in input resistance.

TRIGGER	Trigger Modes	<p>Edge trigger: on any source.</p> <p>Pattern trigger: a pattern can be specified for all sources. Each source can be specified as high, low, or don't care. Trigger can occur on the last edge to enter the specified pattern or the first edge to exit the specified pattern.</p> <p>State trigger: a pattern can be specified for any of the sources. Trigger can be set to occur on an edge of either polarity on the source specified as the clock (not one of the pattern sources) when the pattern is present or not present. Setup time for the pattern to be present prior to the clock edge is < 4 ns; hold time is zero. Maximum clock repetition rate is 80 MHz.</p>
	Delay Trigger	<p>Events-delayed mode: the trigger can be armed by an edge on any source, then triggered by the nth edge on any other source. The number of events, n, can be set from 1 to 16,000,000. Maximum event counting rate is 35 MHz.</p> <p>Time-delayed mode: the trigger can be armed by an edge on any source, then triggered by the first edge on any other source after a specified time has elapsed.</p>

Display		Data Display Resolution: 501 points horizontally by 256 points vertically.
	Data Display Formats	<p>Split screen: channel displays are two or four divisions high, corresponding to quad or dual display mode.</p> <p>Full screen: channels are overlaid and are eight divisions high.</p>
	Display Modes	<p>Variable persistence: the time that each data point is retained on the display can be varied from 200 ms to 10 seconds, or it can be displayed in the infinite persistence mode.</p> <p>Averaging: the number of averages can be varied from 1 to 64. On each acquisition, 1/n times the new data is added to (n-1)/n of the previous value at each time coordinate. Averaging operates continuously; the average does not converge to a final value after n acquisitions, except over HP-IB.</p>

General Characteristics

ENVIRONMENTAL CONDITIONS

Temperature

Operating: +0°C to + 45° C (+32° F to + 113° F)

Non-operating: -40° C to +75° C (-40° F to +167° F)

Humidity

Operating: up to 95% relative humidity (non-condensing) at +40° C (+104° F)

Non-operating: up to 90% relative humidity at +65° C (+149° F).

Altitude

Operating: up to 4600 metres (15,000 ft)

Non-operating: up to 15,300 metres (50,000 ft).

Vibration

Operating: random vibration 5-500 Hz, 10 minutes per axis, ~0.3 grams.

Non-operating: random vibration 5-500 Hz, 10 minutes per axis, ~2.41 grms; resonant search 5-500 Hz swept sine, 1 octave/min sweep rate, 5 minute resonant dwell @ 4 resonances per axis.

POWER REQUIREMENTS

Voltage: 115/230 V ac, -25% to + 15%, 48-66 Hz.

Power: 350 watts maximum, 700 VA maximum.

WEIGHT

Net: approximately 25 kg (55 lb).

Shipping: approximately 32 kg (70 lb).