

KEYSIGHT TECHNOLOGIES (AGILENT HP)

54520A

The Keysight (formerly Agilent HP) 54520A is a classic 500 MHz, 1 GSa/s monochrome digitizing oscilloscope from the 54500 series. Designed for high-frequency analog and digital electronic design, troubleshooting, and production testing, it features two channels with independent 500 MSa/s ADCs (interleavable to 1 GSa/s in single-channel mode), 32 Kpts of memory per channel, and 1 ns peak detect capability. It includes standard FFT analysis, a built-in 3.5-inch floppy drive, and a 9-inch monochrome amber CRT display.

SPECIFICATIONS

General

Interfaces	GPIB (HP-IB) interface, Centronics parallel printer port
Display	9-inch monochrome raster-scan CRT (amber)
Display Type	9-inch monochrome raster-scan CRT
Disk Drive Format	3.5-inch MS-DOS compatible (1.44 MB / 720 KB)
Real-time Clock	Internal, 24-hour format with battery backup
CRT Phosphor	P43 (Amber)

Physical

Power Supply	90 to 132 V AC / 198 to 264 V AC (auto-ranging), 48 to 66 Hz, 350 VA maximum
Operating Temperature	0 to +55 °C °C
Dimensions (W×H×D)	422.3 mm × 194.3 mm × 355.6 mm mm
Weight	11.8 kg kg

Vertical System

Number of Channels	2
Analog Bandwidth (-3 dB)	500 MHz
Calculated Rise Time (10% to 90%)	700 ps
Vertical Resolution (A/D Converter)	8 bits (up to 12 bits with averaging)
Input Coupling	AC, DC
Input Impedance	1 M Ω ($\pm 1\%$) 7 pF, or 50 Ω ($\pm 1\%$) selectable
Maximum Input Voltage (1 M Ω)	± 250 V (DC + peak AC)
Maximum Input Voltage (50 Ω)	5 V rms
Vertical Sensitivity Range	1 mV/div to 5 V/div
DC Gain Accuracy	$\pm 1.25\%$ of full scale
Channel-to-Channel Isolation	≥ 40 dB from DC to 250 MHz, ≥ 30 dB from 250 MHz to 500 MHz
Vertical Offset Range (1 to 50 mV/div)	± 2 V
Vertical Offset Range (50.5 to 250 mV/div)	± 10 V
Vertical Offset Range (255 mV to 5 V/div, 1 M Ω)	± 250 V
Vertical Offset Range (255 mV to 5 V/div, 50 Ω)	± 5 V
Vertical Offset Accuracy	$\pm (1.25\% \text{ of channel offset} + 2\% \text{ of full scale})$
Probe Interface	HP AutoProbe
Dynamic Range	± 8 divisions from center screen
Vertical Resolution with Averaging	Up to 12 bits

Horizontal System

Timebase Range	500 ps/div to 5 s/div
Timebase Accuracy	$\pm 0.005\%$
Horizontal Resolution	10 ps
Timebase Delay Range (Pre-trigger)	Up to -10,000 divisions or -100 s, whichever is smaller
Timebase Delay Range (Post-trigger)	Up to 1,000,000 divisions or 10,000 s, whichever is smaller
Delta-t Accuracy (Single Shot)	$\pm (0.005\% \text{ of reading} + 200 \text{ ps})$
Delta-t Accuracy (≥ 8 Averages)	$\pm (0.005\% \text{ of reading} + 50 \text{ ps})$
Trigger Jitter	10 ps rms (typical)

Acquisition System

Maximum Real-time Sample Rate (Single Channel)	500 MSa/s
Maximum Real-time Sample Rate (All Channels)	500 MSa/s
Maximum Record Length (Memory Depth)	32,768 points per channel
Peak Detect Pulse Width	1 ns
Waveform Averaging Range	2 to 2048 (in powers of 2)
Acquisition Modes	Real-time, Sequential Single Shot, Peak Detect, Averaging
Sequential Single-Shot Segments	Up to 400 segments
Sequential Single-Shot Rearm Time	< 40 μ s

Trigger System

Trigger Sources	Channel 1, Channel 2, Auxiliary, Line
Trigger Coupling	AC, DC, LF Reject, HF Reject, Noise Reject
Trigger Modes	Auto, Auto-Level, Normal, Single
Trigger Sensitivity (Internal, DC to 100 MHz)	0.5 division
Trigger Sensitivity (Internal, 100 MHz to 500 MHz)	1.0 division
Trigger Sensitivity (External, DC to 100 MHz)	40 mV
Trigger Sensitivity (External, 100 MHz to 500 MHz)	200 mV
Trigger Types	Edge, Pattern, State, Delay, Glitch (Pulse Width), TV
External Trigger Input Impedance	1 M Ω ($\pm$ 1%) 15 pF, or 50 Ω ($\pm$ 1%) selectable
External Trigger Input Range	$\pm$ 5 V (in 50 Ω), $\pm$ 100 V (in 1 M Ω)
Trigger Holdoff Range	40 ns to 320 ms
Internal Trigger Level Range	$\pm$ 1.5 x full scale from center of screen

Measurements and Waveform Analysis

Automatic Measurements	23 automatic measurements (Voltage, Time, Frequency, Phase, Delay)
Waveform Math Operations	+, -, *, integration, differentiation, FFT, invert
Fast Fourier Transform (FFT) Window Functions	Hanning, Hamming, Rectangular, Flattop
Waveform Limit Testing	Standard (mask testing with envelope templates)

Display and User Interface

Display Resolution	501 $\times$ 256 pixels (waveform area)
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Connectivity and I/O Interfaces

GPIO (IEEE-488) Interface	Standard (HP-IB), full programmability
Parallel Port	Centronics printer port
Auxiliary Output	AC Calibrator, DC Calibrator, Trigger Out

Power Requirements

Input Voltage Range	90 to 132 V AC / 198 to 264 V AC (auto-ranging)
Input Frequency Range	48 to 66 Hz
Maximum Power Consumption	350 VA

Environmental and Physical Characteristics

Operating Temperature Range	0 °C to +55 °C
Non-operating Temperature Range	-40 °C to +70 °C
Operating Humidity	Up to 95% RH at +40 °C
Operating Altitude	Up to 4,600 m (15,000 ft)
Non-operating Altitude	Up to 15,300 m (50,000 ft)

Storage

Built-in Disk Drive	3.5-inch 1.44 MB DOS-format floppy drive
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Auxiliary Features

Auxiliary Output Modes	AC Calibrator, DC Calibrator, Trigger Out, Device Triggered, or Pass/Fail
Internal Waveform Storage	4 non-volatile waveform memories and 4 non-volatile pixel memories
Internal Setup Storage	10 non-volatile setup registers

Interface & Programming

Programming Language Support	SCPI, IEEE 488.2
Supported Plotter Languages	HP-GL

Compliance & Safety

Safety Standards	CSA C22.2 No. 231, EN 61010-1 / IEC 1010-1
EMC Standards	CISPR 11 / EN 55011 Group 1 Class A

Environmental

Operating Vibration	0.38 mm p-p, 5 Hz to 55 Hz
Operating Shock	15 g, 11 ms, half-sine

TECHNOLOGY

Digitizing (DSO)

APPLICATIONS

High-frequency analog and digital electronic design, characterization, and manufacturing test

