

KEYSIGHT TECHNOLOGIES (AGILENT HP)

54641D

The Agilent (now Keysight Technologies) 54641D is a high-performance 2+16 channel, 350 MHz Mixed Signal Oscilloscope (MSO). Combining 2 analog channels and 16 digital timing channels, this instrument offers deep MegaZoom memory of 8 MB, a high-definition monochrome display rendering up to 25 million vectors/second with 32 levels of intensity, and advanced serial triggering including I2C, SPI, LIN, CAN, and USB. It is uniquely optimized for debugging complex designs in MCU, CPLD, and embedded system applications.

SPECIFICATIONS

General

Interfaces	RS-232, Parallel Port, 3.5-inch Floppy Drive (standard); GPIB, USB (optional via expansion modules)
Display	7-inch monochrome CRT with 32 levels of intensity
Probe Compensator Output	~1.2 Vp-p into $\geq 100\text{ k}\Omega$, ~1.2 kHz square wave
Quick Help Languages	English, French, German, Italian, Japanese, Korean, Portuguese, Russian, Simplified Chinese, Spanish, Traditional Chinese
Autoscale	Single-button automatic setup of active channels, vertical scale, horizontal scale, and trigger

Physical

Power Supply	100 - 240 V AC ($\pm 10\%$), 47 - 440 Hz, 110 W max
Operating Temperature	0 to +55 °C
Dimensions (W×H×D)	322.6 × 172.7 × 317.5 mm
Weight	4.9 kg kg

Analog Vertical System

Analog Input Channels	2
Analog Bandwidth (-3 dB)	350 MHz
Calculated Rise Time (10% to 90%)	1.0 ns
Input Coupling	AC, DC, GND
Input Impedance	1 M Ω ($\pm 1\%$) ~13 pF, or 50 Ω ($\pm 1.5\%$)
Input Sensitivity Range	2 mV/div to 5 V/div
Vertical Resolution	8 bits
Max Input Voltage (1 MOhm)	400 V (DC + peak AC)
Max Input Voltage (50 Ohm)	5 V rms
DC Gain Accuracy	$\pm 2\%$ of full scale

Digital Vertical System

Digital Channels	16
Threshold Grouping	POD 1 (D7 - D0), POD 2 (D15 - D8)
Threshold Selections	TTL, CMOS, ECL, User-defined
Threshold Voltage Range	± 6.0 V (in 10 mV increments)
Threshold Accuracy	$\pm(100$ mV + 3% of threshold setting)
Input Impedance (Digital Probe)	100 k Ω ($\pm 2\%$) ~ 8 pF
Max Input Voltage (Digital Probe)	± 40 V peak
Minimum Voltage Swing	500 mV peak-to-peak
Minimum Detectable Pulse Width	2 ns
Maximum Toggle Rate	250 MHz

Horizontal System

Maximum Real-time Sample Rate (Analog)	2 GSa/s (single-channel), 1 GSa/s (dual-channel)
Maximum Sample Rate (Digital)	1 GSa/s (8 channels), 500 MSa/s (16 channels)
Maximum Record Length (Analog)	8 MB (single-channel), 4 MB (dual-channel)
Maximum Record Length (Digital)	4 MB (8 channels), 2 MB (16 channels)
Time Base Range	1 ns/div to 50 s/div
Time Base Accuracy	$\pm 0.005\%$ (50 ppm)

Trigger System

Trigger Modes	Auto, Normal, Single
Trigger Coupling	AC, DC, LF Reject, HF Reject, Noise Reject
Trigger Holdoff Range	60 ns to 10 s
Edge Triggering	Rising, falling, or alternating edges on any channel
Pulse Width Triggering	Trigger on pulse width $>$, $<$, or $=$ a specific time (2 ns to 10 s)
Pattern/Logic Triggering	Trigger on a combination of high, low, and don't care levels
Serial Bus Triggering Options	I ² C, SPI, LIN, CAN, USB

Acquisition Modes

Sample Mode	Real-time sampling
Peak Detect Mode	Glitch capture
Averaging Mode	Selectable (2 to 16384)
High Resolution Mode	Boxcar filtering increases resolution at slow sweep speeds
Roll Mode	500 ms/div to 50 s/div

Waveform Analysis & Measurements

Automatic Voltage Measurements	Vp-p, Vmax, Vmin, Vtop, Vbase, Vamp, Vavg, Vrms, Overshoot, Preshoot
Automatic Time/Frequency Measurements	Frequency, Period, Positive Width, Negative Width, Duty Cycle, Rise Time, Fall Time, Delay, Phase
Math Functions	Addition, subtraction, multiplication, FFT
FFT Window Types	Hanning, Flat Top, Rectangular

Display & User Interface

Display Type	Monochrome LCD
Display Size (Diagonal)	5.4-inch
Waveform Update Rate	Up to 25,000,000 vectors/sec

Environmental & Compliance

Operating Temperature Range	0 °C to +55 °C
Non-Operating Temperature Range	-40 °C to +70 °C
Operating Humidity Range	95% RH at 40 °C

Trigger

Internal Trigger Sensitivity	DC to 100 MHz: 0.35 div or 3.5 mV; 100 MHz to 350 MHz: 1 div or 10 mV
External Trigger Sensitivity	DC to 100 MHz: 40 mV; 100 MHz to 350 MHz: 120 mV
External Trigger Input Impedance	1 M Ω $\pm$ 1% ~13 pF
External Trigger Input Range	$\pm$ 10 V
External Trigger Maximum Input Voltage	400 V (DC + peak AC)
External Trigger Bandwidth	DC to 350 MHz
Trigger Sources	Channel 1, Channel 2, Line, External, D0 - D15
TV Trigger Formats	NTSC, PAL, PAL-M, SECAM

Vertical System

Analog Bandwidth Limit	20 MHz (selectable)
Channel-to-Channel Isolation	DC to 350 MHz: >40 dB (with channels at same V/div)
Vertical Expansion	Center or Ground selectable
Probe Attenuation Factors	0.1x to 1000x

Acquisition

Peak Detect Glitch Pulse Width	500 ps
Averaging Factor Selections	2 to 16384 (power-of-two steps)
High Resolution Mode Resolution	Up to 12 bits (at $\geq$ 100 μ s/div)

Vertical System (Analog)

Offset Accuracy	$\pm$ (1.5% of channel offset + 2.0% of full scale + 1 mV)
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Supplied Accessories

Supplied Analog Probes	Two 10073C 10:1 passive probes (500 MHz)
Supplied Digital Probe Kit	54620-68701 16-channel digital probe kit

File Management

Internal Storage Drive	3.5-inch floppy disk drive, 1.44 MB MS-DOS format
Supported Image Formats	BMP, PCX, TIF
Supported Data Formats	CSV

General Specifications

Safety Compliance	CSA C22.2 No. 1010.1, EN 61010-1
EMC Compliance	CISPR 11, EN 50082-1

TECHNOLOGY

Mixed Signal Oscilloscope

APPLICATIONS

Embedded systems debugging, MCU/CPLD design verification, and digital-to-analog signal analysis

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