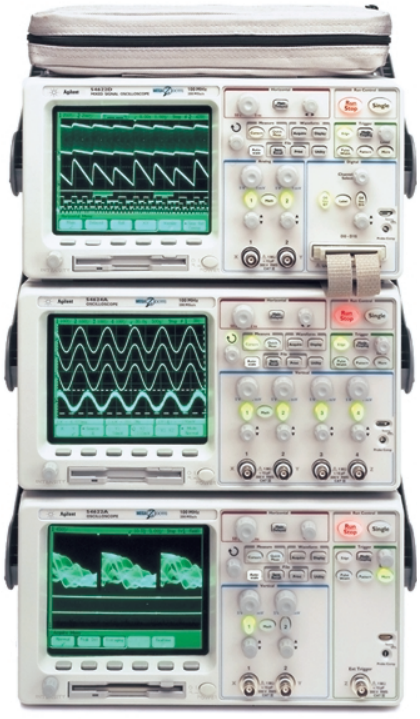
Agilent Technologies 54620-Series Oscilloscopes

Product Overview

Easily see what's happening in your mixed analog and digital designs!

- **Unique 2 + 16-channel MSO and 2- or 4-channel models**
- **2 MB MegaZoom deep memory per channel**
- **Patented high-definition display system**
- **Flexible triggering including I^2C**
- **60- and 100-MHz, 200 MSa/s**



Multiple configurations to meet your needs

If you work with both analog and digital components, Agilent Technologies 54620-Series oscilloscopes can help you easily see more of what's going on in your designs. The unique 2+16-channel mixed signal oscilloscope (MSO) models and the traditional 2- and 4-channel models are optimized with just the capabilities you need for verifying and debugging designs that include A/Ds, D/As, DSPs and embedded 8- or 16-bit microcontrollers. These scopes give you the tools you need to solve your mixed analog and digital engineering challenges more easily.

What makes these scopes so ideal for mixed analog and digital analysis? The 54620-series scopes combine three critical features:

- 2 MB of MegaZoom deep memory on each channel so you can capture long, non-repeating signals, maintain high sample rate and quickly zoom in on areas of interest
- a revolutionary ultra-responsive, high-definition display that's a clearer "window into your world" – it lets you see more signal detail than ever before
- flexible triggering that lets you easily isolate and analyze the complex signals and fault conditions common in mixed analog and digital designs.

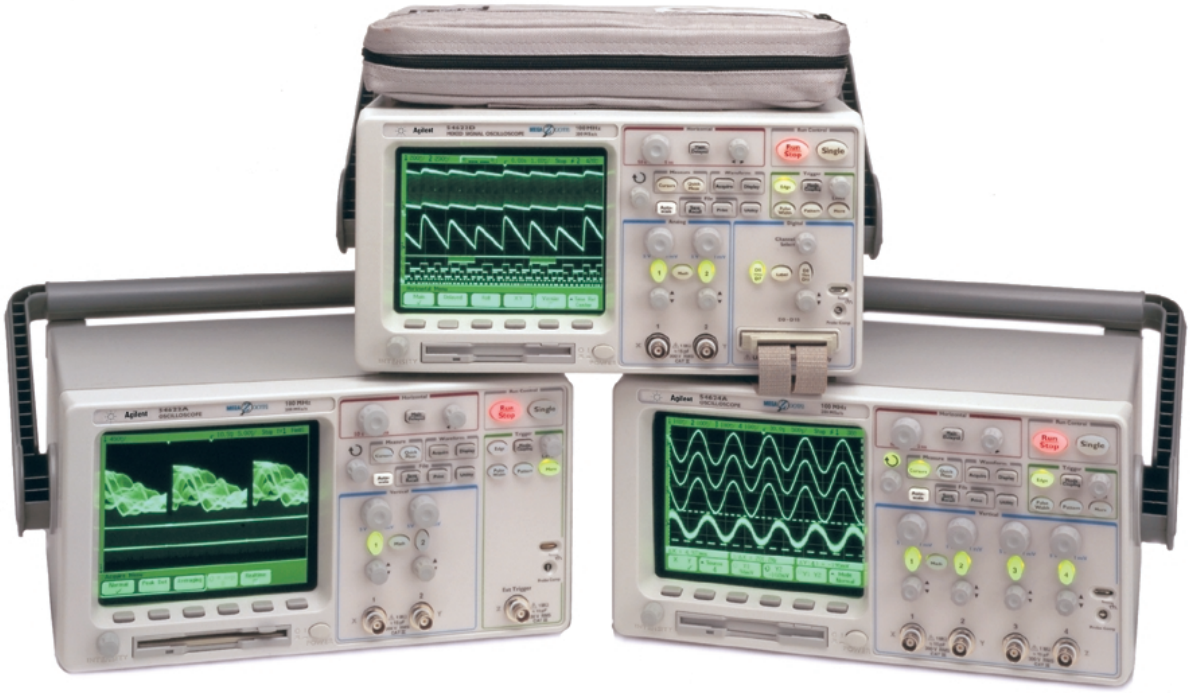
This combination of capabilities is tailored to give you the measurement power you need to get your mixed analog and digital job done faster.

At Agilent Technologies, we focus on developing products that help you do your job better. That's why 54620-Series scopes are optimized for your needs and why they come in a variety of configurations. Choose the one that's right for your application and your budget.

Agilent Technologies

Innovating the HP Way

Selection Guide



2 + 16-Channel Mixed Signal Oscilloscope (MSO) shown with 2- and 4-channel models

Selection Guide

Model	Bandwidth	Sample Rate	Memory	Channels
Agilent 54621A	60 MHz	200 MSa/s	2 MB/channel	2
Agilent 54621D	60 MHz	200 MSa/s	2 MB/channel	2+16
Agilent 54622A	100 MHz	200 MSa/s	2 MB/channel	2
Agilent 54622D	100 MHz	200 MSa/s	2 MB/channel	2+16
Agilent 54624A	100 MHz	200 MSa/s	2 MB/channel	4

2 + 16-Channel Mixed Signal Oscilloscope (MSO)

The Mixed Signal scopes (models 54621D and 54622D):

The 60- and 100-MHz mixed signal oscilloscopes (MSO), with 2 analog channels and 16 digital channels, uniquely combine the detailed signal analysis of a scope with the multi-channel timing measurements of a logic analyzer. They let you see the complex interactions among your signals on up to 18 channels at the same time. No more guesswork and no more poking around to see a few channels at a time. These scopes can easily conquer mixed analog and digital debugging problems that a traditional scope can't begin to address, because they let you simultaneously test and monitor the high-speed digital control signals and the slower analog signals in your design. The combination of analog channels, digital timing channels and MegaZoom deep memory with triggering across all 18 channels provides totally new ways to debug mixed analog and digital 8- or 16-bit microcontroller-based designs. Plus, the MSOs are built on the same scope foundation as the other 54620 models, so they look and feel like a familiar scope.

4-channel scope (model 54624A):

If your designs include heavy analog content, the 100-MHz 54624A will give you the channel count and measurement power you need, including MegaZoom deep memory, high-definition display and flexible triggering. Whether you're testing designs with four inputs, such as anti-lock brakes, or monitoring multiple outputs of a power supply, the 4-channel model helps you get your debug and verification done with ease.

2-channel scopes (models 54621A and 54622A):

The two-channel models bring all the benefits of MegaZoom deep memory, high-definition display, and flexible triggering to those value-minded designers with lower channel requirements. Available in both 60- and 100-MHz models, they give you an affordable way to see long time periods while maintaining high sample rate so you can see details in your designs.

MegaZoom Deep Memory

With 2 MB of MegaZoom deep memory behind every channel, 54620-Series scopes give you deep-memory capture without the sluggish response and complex operation you've had to tolerate with other deep-memory scopes. And unlike the alternatives, MegaZoom deep memory is not a special mode; it operates with the same familiar controls you use for regular scope measurements. That means it's always available to help you do a better job finding details buried in complex signals, discovering anomalies in the absence of good trigger events, correlating high-speed digital control signals with slower analog signals and capturing infrequent events.

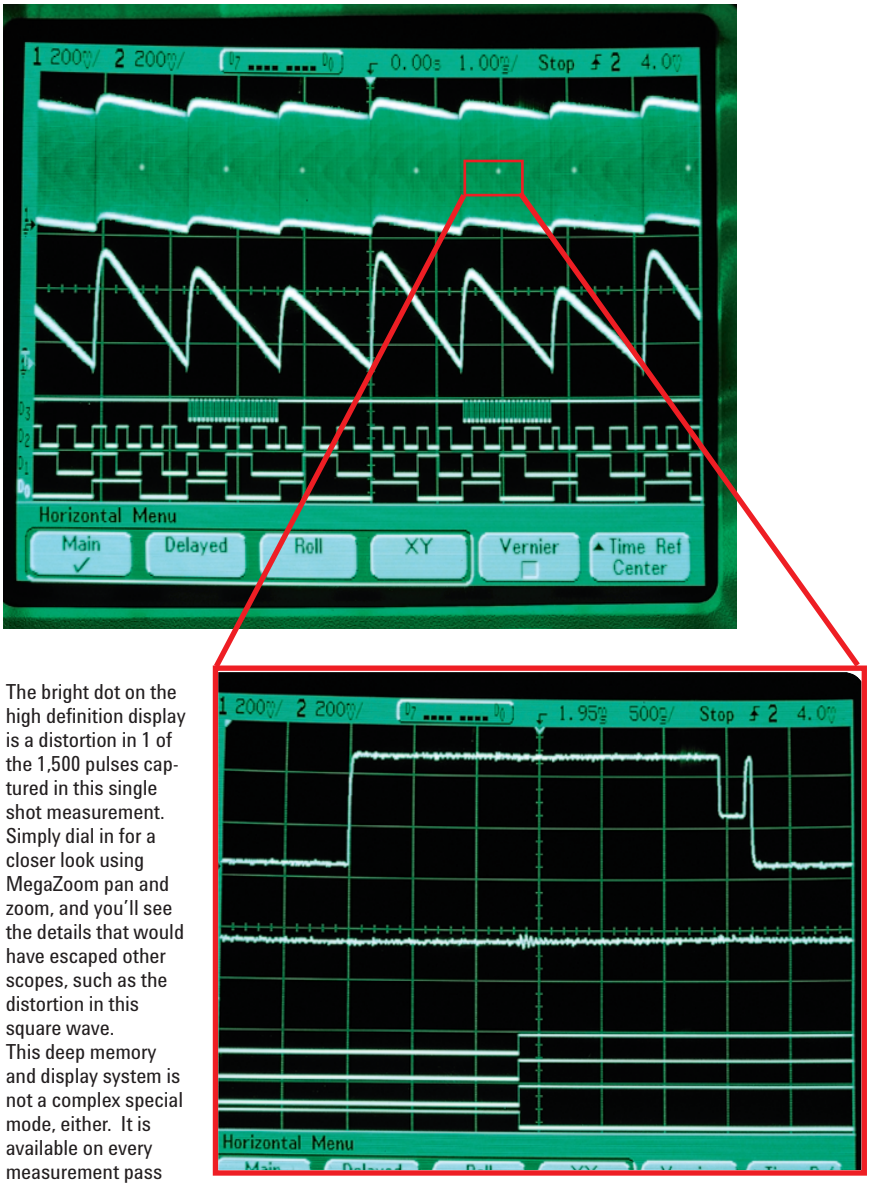
The dilemma of having to trigger twice to get a long time capture or to see detailed resolution is solved with MegaZoom deep memory as you can have both with a single measurement. Deep memory means that the sample rate can be kept high even when capturing long time periods. You'll have a hard time finding another scope that easily lets you collect 10 milliseconds of data with the ability to see 5 nanosecond details like you can with MegaZoom deep memory.

Thanks to multiple processors optimized for the task of signal acquisition, storage and display, the new 54620-Series scopes are the only deep-memory scopes that respond instantly to your control inputs, and have fast, responsive displays and easy-to-use pan and zoom. Compare them to other scopes in this price range – only the 54620-Series gives you long time capture and detailed resolution with fast, easy MegaZoom pan and zoom.

Revolutionary high-definition display

When you combine MegaZoom deep memory with a patented high-definition display system, you get an accurate and responsive "window into your world". The MegaZoom deep memory is mapped into 32 levels of intensity on a display which has superior horizontal resolution. And because the screen update rate is more than 25 times faster than typical digital scopes, you get a responsive display that reflects changes in your waveform instantaneously – so you see a more realistic representation of your signals.

This revolutionary design gives you more insight into your designs than ever before. With deep memory and a high-definition display system, there is less chance to miss a narrow occasional transient, less chance to miss a glitch or distorted edge that impacts circuit operation, and less chance to miss all those subtle details that can take weeks to find with a traditional scope.



The bright dot on the high definition display is a distortion in 1 of the 1,500 pulses captured in this single shot measurement. Simply dial in for a closer look using MegaZoom pan and zoom, and you'll see the details that would have escaped other scopes, such as the distortion in this square wave. This deep memory and display system is not a complex special mode, either. It is available on every measurement pass at full speed.

Flexible triggering

With mixed analog and digital designs, sometimes it is hard to trace an anomaly back to its root cause unless you can trigger on it and correlate it with another signal. With the 54620-Series scopes, triggering is no longer a hassle. They come with flexible triggering capabilities (edge, pulse width, pattern, TV, sequence, I²C and duration) across all channels so you can easily isolate and analyze complex signals and interactions common in your mixed analog and digital designs.

If you are working with micro-controllers that use I²C serial communications, you'll be glad to discover that 54620-Series scopes help you fine-tune your debugging. Use I²C trigger mode to first help verify your inter-IC communication handshaking. Then you can use the I²C trigger to ensure that the correct data is being transmitted to the desired device.

Standard features

Agilent 54620-Series scopes include the standard features you need to get your job done easier and faster.

Connectivity made easier

- **Parallel and RS-232 interfaces** make connection to printers and PCs a snap. And the 54620-Series scopes come with standard parallel and RS-232 interfaces on the rear panel. For faster data transfers, an optional GPIB interface module is also available.
- **IntuiLink, a free software application, simplifies PC connectivity** when you need to transfer images and waveform data to your PC. IntuiLink lets you focus more time on design issues rather than on programming. With the click of a button on IntuiLink's toolbar, you can download data or insert a snapshot of an oscilloscope screen directly into your Microsoft® Excel spreadsheets or Word documents, or save the image as a bitmap file. Once the data is in an Excel spreadsheet, you can leverage Excel's extensive analysis functions to create custom graphs and views.

For more information on IntuiLink, please see the IntuiLink datasheet with Agilent publication number 5980-3115EN or visit the URL **www.agilent.com/find/intuilink**

Built-in floppy drive

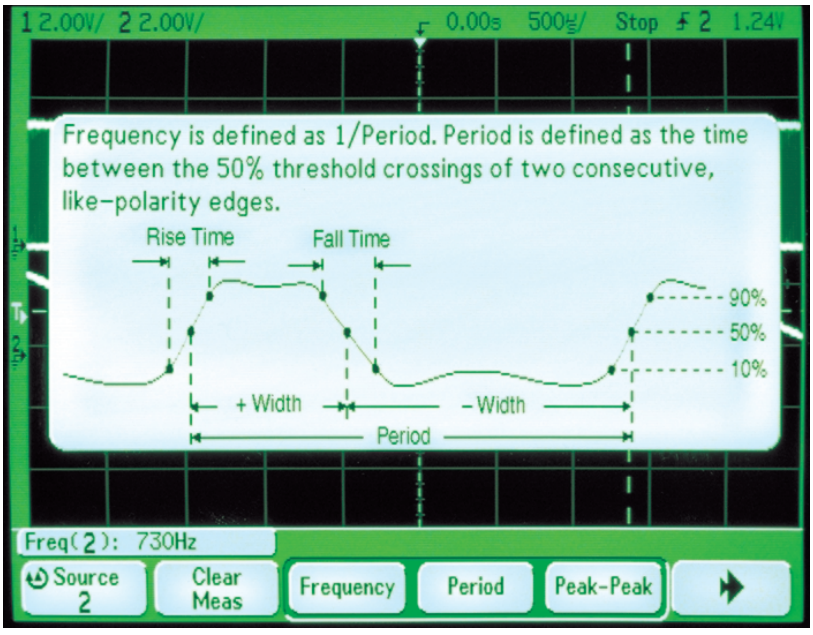
A built-in 1.44 MB floppy drive makes it easy for you to store waveform data, screen images, and scope setups. You can store your waveform images as TIF or BMP files and your waveform data as ASCII files for easy import into other PC applications. If you share your lab equipment with others, you can save your measurement setups and traces to diskette, making it simple to reproduce your every-day setups as well as your advanced configurations.

Built-in help

An innovative built-in help system in nine different languages (English, French, German, Spanish, Italian, Japanese, Korean, Traditional and Simplified Chinese) gives you quick access to the help you need. If you have a question about a particular feature, simply press and hold the corresponding front-panel key for a few seconds, and a help screen pops up to explain its function. You'll no longer have to look for the manual when you need assistance setting up scope functions or making complex measurements – help is at your fingertips.

Other standard features include:

- **Waveform math with FFTs:** Analysis functions include -, *, Integrate, and Differentiate, as well as Fast Fourier Transforms.
- **5-ns peak detect** means you won't have to worry about missing narrow glitches.
- **Autoscale** lets you quickly display any active signals, automatically setting the vertical, horizontal and trigger controls for the best display.
- **Printer connectivity** is easy for Deskjets, Laserjets, or integrated thermal printer option with the standard parallel port on the rear panel.
- **High resolution mode** offers up to 12 bits of resolution in real-time (single-shot) modes, reducing noise. This is accomplished by averaging sequential data points and mapping the average to the display when at slow sweep speeds.
- **3-year warranty:** All 54620-Series scopes include a full 3-year warranty with optional 5-year warranty coverage.
- **Money-back guarantee:** Get a full refund if you're not satisfied with your purchase for any reason. See page 12 for more information.



Press and hold any key for built-in Help, such as this description of the frequency measurement.

Probes and Accessories

To get the most out of your scope, you need the right probes and accessories for your particular application. That's why Agilent Technologies offers a complete family of innovative probes and 54620-Series scopes. For more comprehensive information, please see the Agilent 54620-Series Oscilloscopes Probes and Accessories data sheet. You can get a copy by calling 1-800-452-4844 or by visiting our website at www.agilent.com/find/megazoom.

Passive Probes

Agilent 10070-family passive probes are high-quality, general-purpose probes designed for optimal performance with 54620-Series oscilloscopes. Ruggedized for general-purpose measurements, these probes are tested to ensure that they operate in the toughest of conditions. They come with a variety of accessories to make your job easier.

Mixed Signal Oscilloscope Logic Probes

The probes for the 54621D and 54622D MSOs are the same ones used with Agilent industry-leading high-performance logic analyzers. This means we can offer the best performance, great value and access to the industry's broadest range of logic probing accessories.

The 10089A 2 x 8-signal logic probe with flying leads makes it possible to connect at several different places on your DUT. The probe cable provides two sets of eight channels so you can work conveniently with only one set if that's all you require. This probe is included with your MSO scope.

The 10085A 16-channel logic probe and termination adapter is designed to make it easy to connect to industry-standard 20-pin board connectors.

Agilent Passive Probes Selection Guide

	10070C	**10074C** (shipped with scope)	**10076A** high-voltage probe	**N2771A** high-voltage probe
Probe Bandwidth	20 MHz	150 MHz	250 MHz	50 MHz
Probe Risetime (Calculated)	< 17.5 ns	< 2.33 ns	< 1.4 ns	< 7 ns
Attenuation Ratio	1:1	10:1	100:1	1000:1
Input Resistance (when terminated into 1 MΩ)	1 MΩ	10 MΩ	66.7 MΩ	100 MΩ
Input Capacitance	Approx 70 pF	Approx 15 pF	Approx. 3 pF	Approx. 1 pF
Maximum Input (dc + peak ac)	500 Vpk CAT I (mains isolated) 400 Vpk CAT II (post receptacle mains)	500 Vpk CAT I (mains isolated) 400 Vpk CAT II (post receptacle mains)	4000 Vpk	15 kV dc, 10 kVrms 30 kV dc + peak ac
Compensation Range	None	9 – 17 pF	6 – 20 pF	7 – 25 pF
Probe sense	Yes	Yes	Yes	No

Differential Probe

Use the Agilent N2772A differential probe with any of the 54620-Series oscilloscopes to safely measure floating circuits with the oscilloscope grounded. With 20 MHz bandwidth and switchable attenuation of 20:1 and 200:1, this probe provides the versatility for a broad range of applications including high-voltage circuits.

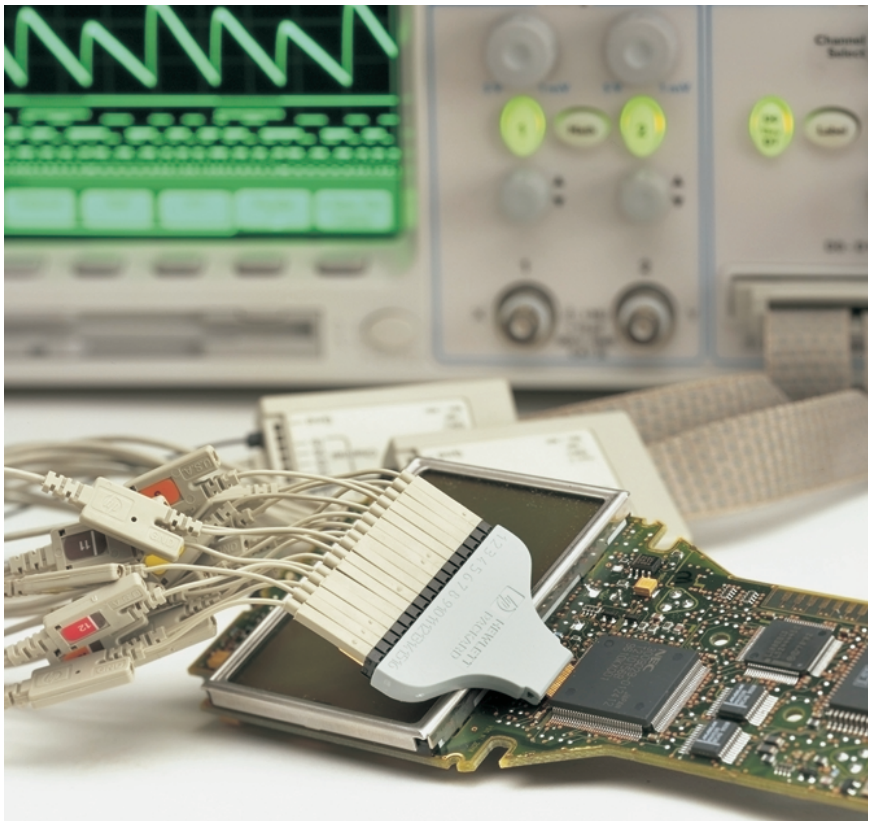
This probe requires a 9 V battery or an Agilent N2773A power supply.

Current Probe

The Agilent 1146A AC/DC current probe provides accurate display and measurement of current from 100 mA to 100 A_{rms}, dc to 100 KHz, without needing to make an electrical connection to the circuit. The N2774A is a high bandwidth current probe featuring wide bandwidth (DC-50MHz), low noise (<2.5 mA_{rms}) and low circuit insertion loss. The probes use hall-effect technology to measure dc current and a current transformer to sense ac current. The N2774A requires an Agilent N2775A power supply.

Wedge probe adapter

Agilent's Wedge probe adapter for probing 0.5 mm and 0.65 mm ICs is mechanically non-invasive, so you get reliable contact with no chance of shorting. Available in 16-, 8- and 3-signal versions, this innovative accessory makes connecting to fine-pitch ICs easier than ever before.



16-pin Wedge probe adapter for probing 0.5 mm or 0.65 mm ICs

Printer Kit

The Agilent N2727A printer kit provides everything you need for easy documentation directly from your 54620-Series scope. It lets you easily print the screen display and key setup parameters and is powered directly from the oscilloscope. In addition to the thermal printer, the kit includes a printer pouch, a parallel cable, power cable and enough paper for you to print 200 screen images with setup information.

BNC adapters and feed-through terminations

See the 54620-Series Probes and Accessories data sheet for a wide variety of BNC adapters and feed-through terminations.

PC connectivity

GPIB: If you need fast data transfers, equip your 54620-Series scope with the optional N2757A GPIB interface module that easily snaps on the rear of the scope. Agilent also offers GPIB cards for your PC as well as GPIB cables to complete the connection to your test system.

RS-232 cable: If you need an RS-232 cable for your 60-MHz 54620-Series scope, order the Agilent 34398A RS-232 cable. It comes standard with 100-MHz models.

Miscellaneous accessories

Testmobile scope cart: The Agilent 1183A testmobile makes sharing your scope easy. A Kinsington lock can be attached to the rear of the scope to secure your equipment.

Carrying case: The Agilent 1185A carrying case makes transporting and shipping your 54620-Series oscilloscope safe and simple. A scope, optional module and other accessories fit neatly inside the padded shell of hard plastic and the case is lockable for shipment.

Rack mount kit: The Agilent 1186A or option 1CM rack mount kit positions your 54620-Series scope in the center of the rack. Each kit includes a custom shelf with rails, 6 BNC pass-throughs and all necessary screws.

Performance Characteristics

* Denotes Warranted Specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ± 10°C from firmware calibration temperature.

Acquisition: Analog Channels

Sample Rate
200 MSa/s maximum per scope channel

Memory Depth
2 MB/channel
4 MB max with single scope channel on (Single mode)

Vertical Resolution
8 bits

Peak Detection
5 ns

Averaging
selectable from 2, 4, 8, 16, 32, 64 ... to 16k

High Resolution Mode
12 bits of resolution when > 200 us/div, (average mode with ave = 1)

Filter:
Sinx/x interpolation (single shot BW = sample rate/4) with vectors on.

Acquisition: Digital Channels (on 54621D and 54622D only)

Sample Rate
400 MSa/s maximum

Memory Depth Per Channel
8 channels same pod
8 MB/channel maximum
2 pods in use
4 MB/channel maximum

Vertical Resolution
1 bit

Glitch Detection (min pulse width)
5 ns

Vertical System: Analog Channels

Scope Channels
54621A/D, 54622A/D
Ch 1 and 2 simultaneous acquisition
54624A Ch 1, 2, 3 and 4 simultaneous acquisition

54621A/D
Bandwidth (~3 dB)*
dc to 60 MHz
ac coupled
3.5 Hz to 60 MHz
Calculated risetime
~5.8 ns (= 0.35/bandwidth)

54622A/D, 54624A
Bandwidth (~3 dB)*
dc to 100 MHz
ac coupled
3.5 Hz to 100 MHz
Calculated risetime
~3.5 ns (= 0.35/bandwidth)

Single Shot Bandwidth
50 MHz

[1] 1 mV/div is a magnification of 2 mV/div setting. For vertical accuracy calculations, use full scale of 16 mV for 1 mV/div sensitivity setting.

Range[1]
1 mV/div to 5 V/div

Maximum Input
CAT I 300 Vrms, 400 Vpk
CAT II 100 Vrms, 400 Vpk
with 10074C 10:1 probe:
CAT I 500 Vpk, CAT II 400 Vpk

Offset Range
± 5 V on ranges < 10 mV/div
±25 V on ranges 10 mV/div to 199 mV/div
±100 V on ranges ≥ 200 mV/div

Dynamic Range
Lesser of ± 8 div or ± 32 V

Input Resistance
1 MΩ ± 1%

Input Capacitance
~ 14 pF

Coupling
ac, dc, ground

BW Limit
~ 20 MHz selectable

Channel-to-Channel Isolation
dc to 20 MHz > 40 dB (with channels at same V/div);
20 MHz to max bandwidth > 30 dB

Probes
10:1 10074C shipped standard for each analog channel

Probe ID (Agilent/HP & Tek Compatible)
Auto probe sense

ESD Tolerance
± 2 kV

Noise Peak-to-Peak
2% full scale or 1 mV, whichever is greater

Common Mode Rejection Ratio
20 dB @ 50 MHz

DC Vertical Gain Accuracy*[1]
± 2.0% full scale

DC Vertical Offset Accuracy
< 200 mV/div
± 0.1 div ± 1.0 mV ± 0.5% offset value
≥ 200 mV/div
± 0.1 div ± 1.0 mV ± 1.5% offset value

Single Cursor Accuracy[1]
±{DC Vertical Gain Accuracy + DC Vertical Offset Accuracy + 0.2% full scale (~1/2 LSB) }
Example: for 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset, accuracy = ±{2.0%(80 mV) + 0.1 (10 mV) + 1.0 mV + 0.5% (5 mV) + .2%(80 mV)} = ± 3.78 mV

Dual Cursor Accuracy*[1]
±{DC Vertical Gain Accuracy + 0.4% full scale (~1 LSB)}
Example: for 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset, accuracy = ±{2.0%(80 mV) + .4%(80 mV)} = ± 1.92 mV

Vertical System: Digital Channels (54621D and 54622D only)

Number of Channels
16 Digital – labeled D15 – D0

Threshold Selections
Pod 1: D7 – D0, Pod 2: D15 – D8

Maximum Input Voltage
± 40 V peak CAT I

Threshold Range
± 8.0 V in 10 mV increments

Threshold Accuracy*
± (100 mV + 3% of threshold setting)

Input Dynamic Range
±10 V about threshold

Minimum Input Voltage Swing
500 mV peak-to-peak

Input Capacitance
~ 8 pF

Input Resistance
100 kΩ, ±2% at probe tip

Channel-to-Channel Skew
2 ns typical, 3 ns maximum

Horizontal:

Range
5 ns/div to 50 s/div

Resolution
40 ps

Vernier
1-2-5 increments when off, 25 minor increments between major settings when on

Reference Positions
Left, Center, Right

Delay Range
Pre-trigger (negative delay)
Greater of 1 screen width or 10 ms
Post-trigger (positive delay)
500 seconds

Analog Delta-t Accuracy
Same Channel*
± 0.01% reading ± 0.1% screen width ± 40 ps
Example: for signal with pulse width of 10 µs, scope set to 5 µs/div (50 µs screen width), delta-t accuracy = ±{.01%(10 µs) + 0.1%(50 µs) + 40 ps} = 51.04 ns
Channel-to-Channel
± 0.01% reading ± 0.1% screen width ± 80 ps

Performance Characteristics

* Denotes Warranted Specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ± 10°C from firmware calibration temperature.

Digital Delta-t Accuracy (non-Vernier settings)

Same Channel

± 0.01% reading ± 0.1% screen width ± (1 digital sample period, 2.5 or 5 ns based on sample rate of 200/400 MSa/s)
Example: for signal with pulse width of 10 µs, scope set to 5 µs/div (50 µs screen width), and single pod active (400 MSa/s), delta-t accuracy = ±{.01%(10 µs) + 0.1% (50 µs) + 2.5 ns} = 53.5 ns

Channel-to-Channel

± 0.01% reading ± 0.2% screen width ± (1 logic sample period, 2.5 or 5 ns) ± chan-to-chan skew (2 ns typical, 3 ns maximum)

Delay Jitter

10 ppm

RMS Jitter

0.025% screen width + 100 ps

Modes

Main, Delayed, Roll, XY

XY

Z Blanking

1.4 V blanks trace
(use external trigger)

Bandwidth

Max bandwidth

Phase error @ 1 MHz

1.8 degrees

Trigger System:

Sources:

54621A/622A

Ch 1, 2, line, ext

54621D/622D

Ch 1, 2, line, ext, D15 – D0

54624A

Ch 1, 2, 3, 4, line, ext

Modes

Auto, Auto level, Triggered (normal), Single

Holdoff Time

~60 ns to 10 seconds

Selections

Edge, Pattern, Pulse Width, TV, Sequence, I²C, Duration

Edge

Trigger on a rising or falling edge of any source.

Pattern

Trigger on a pattern of high, low, and don't care levels and a rising or falling edge established across any of the sources. The analog channel's high or low level is defined by that channel's trigger level.

Pulse Width

Trigger when a positive- or negative-going pulse is less than, greater than, or within a specified range on any of the source channels.

Minimum pulse width setting

5 ns

Maximum pulse width setting

10 s

TV

Trigger on any scope channel for NTSC, PAL, PAL-M, or SECAM broadcast standards on either positive or negative composite video signals. Modes supported include Field 1, Field 2, or both, all lines, or any line within a field. Also supports triggering on non-interlaced fields. TV trigger sensitivity: 0.5 division of synch signal.

Sequence

Arm on event A, trigger on event B, with option to reset on event C or time delay.

I²C

Trigger on I²C (Inter-IC bus) serial protocol at a start/stop condition or user defined frame with address and/or data values.

Duration

Trigger on a multi-channel pattern whose time duration is less than a value, greater than a value, greater than a time value with a timeout value, or inside or outside of a set of time values.

Minimum duration setting:

5 ns

Maximum duration setting:

10 s

Autoscale

Finds and displays all active analog and digital channels (for 54621D/54622D), sets edge trigger mode on highest numbered channel, sets vertical sensitivity on analog channels and thresholds on digital channels, time base to display ~1.8 periods. Requires minimum voltage > 10 mVpp, 0.5% duty cycle and minimum frequency > 50 Hz.

Analog Channel Triggering:

Range (Internal)

± 6 div

Sensitivity*

Greater of 0.35 div or 2.5 mV

Coupling

ac (~3.5 Hz), dc, noise reject, HF reject and LF reject (~ 50 kHz)

Digital (D15 – D0) Channel Triggering (54621D and 54622D):

Threshold Range (user defined)

±8.0 V in 10 mV increments

Threshold Accuracy*

± (100 mV + 3% of threshold setting)

Predefined Thresholds

TTL = 1.4 V, CMOS = 2.5 V, ECL = -1.3 V

External (EXT) Triggering:

Input Resistance

1 MΩ, ±3%

Input Impedance

~ 14 pF

Maximum Input

CAT I 300 Vrms, 400 Vpk
CAT II 100 Vrms, 400 Vpk
with 10074C 10:1 probe:
CAT I 500 Vpk, CAT II 400 Vpk

Range

± 10 V

Sensitivity

dc to 25 MHz, < 75 mV

25 MHz to max bandwidth, < 150 mV

Coupling

ac (~ 3.5 Hz), dc, noise reject, HF reject and LF reject (~ 50 kHz)

Display System

Display

7-inch raster monochrome CRT

Throughput of Analog Channels

25 million vectors/sec per channel with 32 levels of intensity

Resolution

255 vertical by 1000 horizontal points (waveform area)

32 levels of gray scale

High-performance custom graphics display processor

400 MB/sec graphics BW / channel

2 MB SGRAM (Agilent 54621A/D and 54622A/D)

4 MB SGRAM (Agilent 54624A)

Performance Characteristics

* Denotes Warranted Specifications, all others are typical. Specifications are valid after a 30-minute warm-up period and ± 10°C from firmware calibration temperature.

Controls
- Waveform intensity on front panel
- Vectors on/off; infinite persistence on/off
- 8 x 10 grid with continuous intensity control

Built-in Help System
- Key-specific help in 9 languages displayed by pressing and holding key or softkey of interest

Real Time Clock
- Time and date (user setable)

Measurement Features

Automatic Measurements
- Measurements are continuously updated
- Cursors track current measurement

Voltage (analog channels only)
- Peak-to-Peak, Maximum, Minimum, Average, Amplitude, Top, Base, Overshoot, Undershoot, RMS (front panel: dc; GPIB: ac and dc)

Time
- Frequency, Period, + Width, - Width, Duty Cycle, X at Max (Time at max volts), delay, phase on any channels. Rise time and Fall time on analog channels only

Threshold Definition
- 10%, 50%, 90% for time measurements

Cursors
- Manually or automatically placed readout of Horizontal (X, ΔX, 1/ΔX) and Vertical (Y, ΔY). Additionally digital or analog channels can be displayed as binary or hex values

Waveform Math
- 1-2, 1*2, FFT, dV/dt, ∫Vdt.
- Source of FFT, dV/dt, ∫Vdt: scope channels 1 or 2, 1-2, 1+2, 1*2

FFT

Points
- Fixed at 2048 points

Source of FFT
- Scope channels 1 or 2, 1+2, 1-2, 1*2

Window
- Rectangular, Flattop, Hanning

Noise Floor
- -70 to -100 dB depending on averaging

Amplitude Display
- In dBV

Frequency Resolution
- 0.097656/(time per div.)

Maximum Frequency
- 102.4/(time per div.)

Storage

Save/Recall (non-volatile)
- 3 setups and traces can be saved and recalled internally

Floppy Disk
- 3.5" 1.44 MB double density

Image formats
- TIF, BMP

Data formats
- X and Y (time/voltage) values in CSV format

Trace/setup formats
- Recalled

I/O

RS-232 (serial) standard port
- 1 port: XON or DTR; 8 data bits; 1 stop bits; parity; 9600, 19200, 38400, 57600 baud rates

Parallel standard port
- Printer support

Printer Compatibility
- DeskJet, LaserJet with HP PCL 3 or greater compatibility
  - black and white @ 150x150 dpi
  - gray scale @ 600x600 dpi
- Epson
  - black and white @180x180 dpi
- Seiko thermal DPU-414
  - black and white

Optional GPIB Module
- Fully programmable with IEEE488.2 compliance

Typical GPIB throughput of 20 measurements or 20 2000-point records per second

General Characteristics

Physical:
- Size: 32.26 cm wide x 17.27 cm high x 31.75 cm deep (without handle)
- Weight: 6.35 kgs (14 lbs)

Calibrator Output
- Frequency ~1.2 kHz; Amplitude ~5 V

Trigger Out
- 0 to 5 V with 50 Ω source impedence; delay ~55 ns

Printer Power
- 7.2 to 9.2 V, 1 A

Kensington lock
- connection on rear panel for security

Power Requirements:

Line Voltage Range
- 100 – 240 VAC ±10%, CAT II, automatic selection

Line Frequency
- 47 to 440 Hz

Power Usage
- 100 W max

Environmental Characteristics:

Ambient Temperature
- Operating –10°C to +55°C
- Non-operating –51°C to +71°C

Humidity
- Operating 95% RH at 40°C for 24 hr
- Non-operating 90% RH at 65°C for 24 hr

Altitude
- Operating to 4,570 m (15,000 ft)
- Non-operating to 15,244 m (50,000 ft)

Vibration
- HP/Agilent class B1 and MIL-PRF-28800F Class 3 random

Shock
- HP/Agilent class B1 and MIL-PRF-28800F (operating 30 g, 1/2 sine, 11-ms duration, 3 shocks/axis along major axis. Total of 18 shocks)

Regulatory Information:

Safety
- IEC 61010-1:1990+A1:1992+A2:1995/ EN 61010-1:1994+A2:1995
- UL 3111
- CSA-C22.2 No. 1010.1:1992

Supplementary Information: The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC, and carries the CE-marking accordingly. The product was tested in a typical configuration with HP/Agilent test systems.

Ordering Information

54621A 2-channel 60 MHz Oscilloscope

54621D 2+16 channel 60 MHz Mixed Signal Oscilloscope

54622A 2-channel 100 MHz Oscilloscope

54622D 2+16 channel 100 MHz Mixed Signal Oscilloscope

54624A 4-channel 100 MHz Oscilloscope

Accessories Included:	**54621A**	**54621D**	**54622A**	**54622D**	**54624A**
User's Guide (localized), Service Manual, Programmer's Manual	•	•	•	•	•
Power cord	•	•	•	•	•
10074C 10:1 divider probes with readout	2	2	2	2	4
16:2 x 8 input logic input probe assembly		•		•	
Accessories pouch and front panel cover			•	•	•
IntuiLink software RS-232 cable	**	**	•	•	•

** IntuiLink Software available free on web at **www.agilent.com/find/gp**

Manual Options

(if no option is specified, English ABA will be shipped)

ABA	English	**ABD**	German	**AB0**	Traditional Chinese
ABE	Spanish	**ABF**	French	**AB1**	Korean
ABZ	Italian	**ABJ**	Japanese	**AB2**	Simplified Chinese

Available Options

Option 003 Shielding Option for use in severe environments or with sensitive devices under test – shields both ways (in and out): RS-03 Magnetic interface shielding added to CRT, and RE-02 display shield added to CRT to reduce radiated interference

Option 0B0 Delete manuals

Option 1CM Rackmount kit (same as 1186A)

Warranty and Calibration Options:

All models include a standard 3-year warranty.

Contact local sales office for prices of extended options:

A6J ANSI/NSCL Z540 calibration with test data (replaces 1BP)

W32 3-year, customer-return calibration service

W34 3-year, customer-return standard comp cal service

W50 Additional 2-year warranty (5 year total)

W52 5-year, customer-return calibration service

W54 5-year, customer-return standard comp cal service

Accessories

1183A Testmobile scope cart

1185A Carrying case

1186A Rackmount kit (same as option ICM)

N2726A Accessory pouch & front panel cover (standard with 100-MHz models, optional with 60-MHz models)

N2727A Seiko thermal printer and pouch parallel cable, power cable, 2 rolls paper, front panel cover

N2728A 10 rolls of printer paper

N2757A GPIB interface module for 54621A/D, 54622A/D or 54624A scopes

Passive Probes

10070C 1:1 passive probe with ID

10074C 10:1 150 MHz passive probe with ID

Fine Pitch Probing

10072A Fine-pitch probe kit

10075A 0.5 mm IC clip kit

E2613B 0.5mm Wedge probe adapter, 3-signal, qty 2

E2614A . 0.5 mm Wedge probe adapter, 8-signal, qty 1

E2643A 0.5 mm, Wedge probe adapter 16-signal, qty 1

E2615B 0.65mm, Wedge probe adapter, 3-signal, qty 2

E2616A 0.65 mm, Wedge probe adapter, 8-signal, qty 1

E2644A 0.65 mm,Wedge probe adapter, 16-signal, qty 1

Current Probe

1146A 100 kHz Current probe, ac/dc

N2774A 50 MHz current probe, ac/dc

N2775A . power supply for N2774A

High Voltage Probes

10076A 100:1, 4 kV 250 MHz probe with ID

N2771A 1000:1, 15 kV, 50 MHz high voltage probe

Logic Probes

10085A 16:16 logic cable and terminator (for use with 54621D/622D)

10089A 16:2 x 8 logic input probe assembly (shipped standard with 54621A/622D)

Differential Probe

N2772A 20 MHz differential probe

N2773A Differential probe power supply

Cables

10833A GPIB cable, 1m long

34398A RS-232 cable (standard with 100 MHz scopes)

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