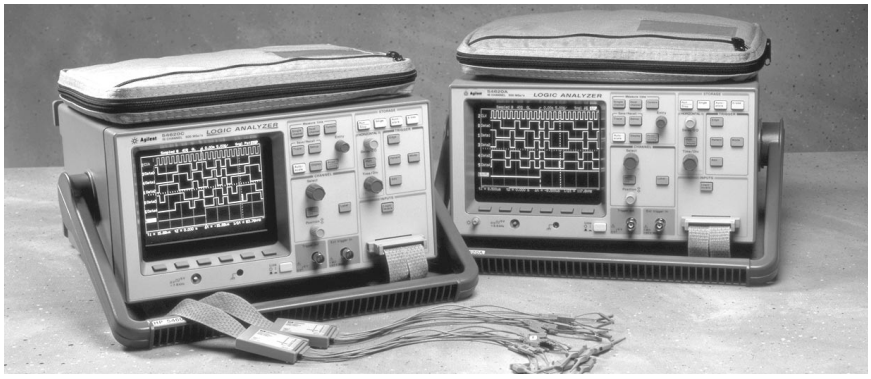
Agilent 54620A/C Logic Analyzers

Product Overview



- **16 Channels**
- **500 MSa/s**
- **3.5 ns Glitch Capture**
- **Simple Scope-Like Operation**
- **Full-Color Display with 54620C**

Do you use your scope as your primary tool for troubleshooting digital circuits because you feel that your problems are not complex enough for a logic analyzer? Do you wish that your scope had the power of a logic analyzer without the complexity and cost of one?

If so, these are the logic analyzers for you. With familiar scope-like operation and high speed display, these are logic analyzers that you can simply set on your bench and use like your scope. Because you are a scope user, these are the logic analyzers that you already know how to operate.

The Agilent Technologies 54620A/C is designed to be used with your scope to quickly troubleshoot and debug your mixed signal and digital circuits. The 54620A is the choice for tight budget situations. Its monochrome raster CRT display provides bright crisp displays of our logic waveforms. The 54620C adds a full-color active matrix LCD display. With the addition of color, the logic analyzer's 16-channel display is easy to use. Colors can be used to group or highlight channels.

The Agilent 54620A/C offers:

- Scope-like control knobs
- Auto scale for one button set-up
- Trigger Input/outputs for use with your scope
- Automatic measurements of frequency, period, duty cycle, width, channel-to-channel delay, hold time, and set-up time
- Cursor measurements and read-out of waveform values in Hex or Binary
- Edge, pattern, and advanced triggering
- Store/recall of 16 front panel setups with channel labels
- Full-color active matrix LCD display (54620C)
- Monochrome raster CRT display (54620A)
- Optional GPIB or RS-232 remote control
- Optional hard copy to GPIB, RS-232, or parallel printers
- Weight 6.8 kg/15 lb.
- 3-Year Warranty

Scope-like operation

The Agilent 54620A/C logic analyzers are designed for the person whose primary analysis tool is the oscilloscope, but often wishes for the additional power of a logic analyzer. This logic analyzer has a control panel that is very much like that of your scope. Simply turn a knob, much like you would on your scope, to make a change in the time per division or reposition a channel in the display. Analyzer set-up is simplified with a powerful Autoscale operation. Autoscale will turn on and display all channels that have activity. The time base will be set to give an optimally scaled display of all active signals.

Flexible triggering

The simplest and most scope-like triggering is provided in the edge triggering mode. The pattern mode extends the triggering to be a pattern of high, low, and "don't care" levels across all 16 of the 54620A's input channels as well as the external trigger input port. This pattern can be qualified

Agilent Technologies

Innovating the HP Way

with an edge. For those applications where more triggering power is needed to isolate the event of interest, the Advanced trigger mode is available.

High speed display
An important consideration of a troubleshooting tool is its ability to clearly display changes in the circuit under test. The 54620A/C employs an advanced four processor architecture, giving you a logic analyzer that can display changing waveforms in your system that would be missed by more traditional analyzers. Another benefit of the high speed display system is that the 54620A/C will respond instantly to your front panel control inputs. This eliminates a source of confusion in your troubleshooting process.

See more with color
The display of 16 logic channels can be somewhat confusing. By the use of color, you can group channels that are displaying related information, or specific channels can be highlighted. For example, address lines can be in one color while control lines are displayed in other colors. Alternate palettes allow the display to be customized for most favorable viewing.

Upgrade to meet your changing needs
You can upgrade the Agilent 54620A logic analyzer to produce hard copies to either printer or plotter Or, you can interface it to a computer with either GPIB or RS-232 interfaces.

Using the HP 34810B BenchLink Scope for Windows, you can easily upload the logic analyzer display to your personal computer for preparing a report, creating a presentation, or storing the analyzer's set-up for later use.

Input Channels

Number of Channels	16 numbered 0–15
Channel Input Cable	54620-61801 with channels grouped in two sets of 8. Instrument is compatible with 0650-61607 cable and accessories.
Input R&C	~100kΩ and 8pF
Maximum Input	±40 V
Dynamic Range	±10 V about threshold
Minimum Input	500 mV peak to peak about threshold
Minimum Input Voltage Overdrive	To meet timing accuracy, the threshold value must be within 20% of the 50% value of the input signal
Threshold Setting	Threshold levels can be assigned to the input channels in groups of 8 channels (0–7 and 8–15) and external trigger
Threshold Accuracy	± (13% of setting ± 100 mV)
Preset Threshold Levels	TTL—1.5 V CMOS—2.5V ECL—1.3 V
Channel to Channel Skew	2.0 ns typical 3.0 ns maximum

Horizontal System

Sweep Speeds	1 s/div to 5 ns/div Main & Delayed Sweep Extended to 5s/div with Autoglitch disabled
Accuracy	001% of reading Main, Delayed sweeps, and verniers
Horizontal Modes	Main, Main and Delayed and post acquisition pan and zoom

Cursor Accuracy

Single Channel	± (Sample Period + 0.05% of reading + 0.2% of screen width)
Dual Channel	± (Sample Period + Ch to Ch skew + 0.01% of reading + 0.2% of screen width)
Delay Jitter	10 ppm

Delay Range Pretrigger (Negative time)
Maximum delay is independent of time reference (left, center, right)

Sweep Speed (per division)	**Maximum delay divisions**
5 ns	3,231
10 ns	1,615
20 ns	807
50 ns	323
100 ns	161
200 ns	80.7
500 ns	64.6
1 µs	16
> 1 µs	16

Post-Trigger	(from trigger point to start of sweep) from 5 ns/div to 1 µs/div—8.829 ms From 2 ms/div to 1 s/div—1,048,575 times sampling period, not to exceed 100 s.
Delayed Sweep Operation	Delayed can be as fast as 5 ns/div but must be at least 2X main sweep.
Post Acquisition Pan & Zoom Operation	Acquired waveforms may be panned across the display and/or expanded for enhanced viewing by simply changing time/div or delay settings.

Acquisition System

Maximum Sample Rate	500 MSals
Resolution	Single bit
Simultaneous Channels	16
Record Length	2 k samples at periods of 8 ns and slower (sweep speeds of 1 µs/div to 1 s/div) 8 k samples at sampling periods of 2 ns and 4 ns (sweep speeds of 5 ns/div to 500 ns/div), or all sweep speeds when Autoglitch mode is disabled
Maximum Update Rate	15 full screens per second independent of the number of channels being displayed.
Glitch Detect	Automatically activated at all sweep speeds where sampling period is slowed to be greater than 4 ns (1 µs/div and slower). Will detect glitches as narrow as 3.5 ns at all activated sweep speeds.

Trigger System

Sources	All Channels & External
Auto/Normal Operation	Auto will produce a free running display if the trigger is not found. Normal causes the analyzer to wait indefinitely for a trigger to start acquiring data.

Modes: Edge, Pattern and Advanced

Edge	A single edge can be specified on channels 0–15 and External. Edge may be rising, falling, or either.

Pattern	Analyzer will trigger upon entering a pattern of high, low and don't care levels on all of the channels and external trigger input. A single edge (rising, falling, or either) can be ANDed and this pattern.
Advanced	Two unique pattern and edge terms can be combined with operations to create a very specific trigger event.
Advanced Operators	And, Or, Then, Entered, Exited, Duration> time, Duration < time, and Occurs N times. Maximum Occurrence: 2^{20}-1
Edge Recovery	Sweep speeds of 5 ns/div to 1 µs/div: 28 ns Sweep speeds of 2 µs/div and slower: 20 ns + 1 sample period
Minimum Detection Pattern Width	13 ns + Ch to Ch skew at sweep speeds of 5 ns/div to 1 µs/div. At sweep speeds of 2 µds/div and slower = (1 ns + 1 sample period + Ch to Ch skew + 0.01%)
Minimum Settable Duration	At all sweep = 2 sample periods of 16 nss, whichever is greater.

External trigger

Input R & C	~ 1 mΩ and 12 pF. Compatible with 1007X probes.
Maximum Input	± 40 V peak
Trigger Threshold Increments	+ 6 V, settable in 50 mV
Threshold Accuracy	+ 100 mV or 6% of setting whichever is greater
Minimum Input Change	200 mV pp
Minimum Pulse Width	20 ns

Trigger Output	Output is a rising edge at the trigger point.
Output Level	0 to >/=2.0 v into 50Ω 0 to >/=4.8 V open circuit
Delay	Data in to trigger out ~ 85 ns
Jitter	± (Sample period + 10 ppm)
Maximum Output Rate	2 kHz with the analyzer stopped, 20/sec running.

Display System

Display	54610A: 7" Raster CRT 54620C: 5.8" active matrix color LCD
Resolution	256 Vertical by 500 Horizontal points
Controls Graticule	Front panel intensity control Selectable 8 x 10 grid frame, or none
Storage Scope	Autostore saves previous sweeps in half bright display and the most recent sweep full bright display. This allows easy differentiation of current and historic information.

Measurement Functions

Automatic Measurements	The analyzer will perform measurements on the selected input channel(s). These measurements are continuously updated.
Single Channel	Frequency, Period, + Width, - Width, and Duty Cycle
Dual Channel	Channel to Channel delay, Hold-time, and Set-up time.
Cursor Measurements	Two cursors can be positioned on the display to make time measurements or read the value of the wave forms at the center. The cursors will track changes in time/div and delay controls. Readout in Time, 1/Time, Hex, and Binary.

Set-up Functions

Autoscale	Selects all active channels and places them in the display. Channels not previously displayed will be added below those channels already being displayed with the lowest numbered channel at the top. Higher numbered channels will be displayed in order down the display. Sweep speed is set to give an optimally scaled display of all the active channels. Triggering and ___are not affected. Requires a signal with > 49 Hz frequency. Undo Autoscale function returns the instrument to the set-up prior to Autoscale being activated.
Save/Recall	16 front panel set-ups can be stored and recalled from nonvolatile memory.
Trace Memory	Two volatile pixel memories allow storage of trace display waveforms.
Channel Labels	Each channel may be identified with a six character label. Labels can be created from a front panel label generator and a library of up to 75 present and user defined labels.
Probe Calibrator	Amplitude 5.0 V, Frequency 9.8 kHz

Power Requirements

Voltage selection	Automatic
Line Voltage Range	90 to 250 Vac
Line Frequency	48 to 445 Hz
Max. Power Consumption	100 VA

General

Environmental Characteristics	Meets the requirements of MIL-T-28800D for Type III, Class 3, Style D equipment as described below:
Ambient Temperature	
Operating:	-10°C to +55°C
Nonoperating:	-51°C to +71°C
Humidity*	
Operating:	95% RH at 40°C for 24 hours
Nonoperating:	90% RH at 65°C for 24 hours

**Tested to Hewlett-Packard environmental specification section 758 for call B-1 products*

Altitude	
Operating:	To 4,500 m (15,000 ft)
Nonoperating:	To 15,000 m (50,000 ft)
Vibration Operating	15 min along each of the three major axes; 0.025-in peak to peak displacement, 10 Hz to 55 Hzs in 1 minute cycles. Held at 10 min at 55 Hz (4 g at 55 Hz)
Shock Operating	30 g. 1/2 sine, T1-ms duration. 3 shocks/axis along major axis. Total of 18 shock.
EMI	
Commercial	Meets CISPR 11 Class A
MIL-T-28800D	Meets the requirements in accordance with MIL-T-28800 paragraph 3.8.3 table IX, and MIL-STD-461C **CE01:** Part 2 **CE03:** Part 2 **CS01:** Part 2 **CS02:** Part 2 (limited to 100 MHz) **CS06:** Part 5

RE01: Part 5 measured at 6 inches, 15 dB exceptioned from 19 kHz to 50 kHz
RE02: Part 2 (limited to 1 GHz) 10 dB relaxation, 14 kHz to 100 kHz
RS03: Part 2, limited to 3 V/meter from 14 kHz to 1 GHz.

This product meets the requirement of the European Communities (EC) EMC Directive 89/336/EEC.

Emissions:
EN55011/CISPR 11
(ISM, Group 1, Class A equipment)

Immunity		
EN50082-1	**Code**[1]	**Notes**[2]
IEC, 801-2 (ESD) 4kV CD, SkV AD	1	A
IEC 801-3 (Rad.) 3V/m	1	A
IEC 801-4 (EFT) 1kV	1	B

Size	
Height:	172.7 mm (6.8 in)
Width:	322.6 mm (12.7 in)
Depth:	317.5 mm (12.5 in)
Weight:	6.8 Kg (15 lb)
Safety	Self-certified to IEC 348/HD401, UL 1244, CSA-C22 No. 231 (series M-89)

[1]Performance Code
1 PASS—Normal operation, no effect.
2 PASS—Temporary degradation, self-recoverable.
3 PASS—Temporary degradation, operator intervention required.
4 PASS—Not recoverable, component damage.

[2]Notes
A TTL logic threshold with all cables disconnected.
B TTL logic threshold with GPIB cable connected.

Ordering Information

54620A 16-channel 500 MSa Logic Analyzer
(supplied with 16-channel input cable assembly, User and Service Guide, as specified by language option) and line cord
54820C Color 16-channel 500 MSa Logic Analyzer
(supplied with 16-channel input cable assembly, User and Service Guide, as specified by language option) and line cord

Manual Language Options (please specify one)

ABA US English	ABF French	ABO Taiwan Chinese
ABD German	ABJ Japanese	AB1 Korean
ABE Spanish	ABZ Italian	

Instrument Options
Opt. 101 Accessory Pouch and Front Panel Cover
Opt. 103 54654A Operator's Training Kit
consists of a training signal board and lab workbook
Opt. 104 1185A Carrying Case
(designed to protect the instrument for shipment or checking as airline baggage)
Opt. 106 HP 34810B BenchLink scope software.
Windows software that interfaces the instrument (with a GPIB or RS-232 module installed) to a PC for storage, analysis, or easy integration of trace images into popular desktop publishing software.
Opt. 001 RS-03 Magnetic shielding (added to the CRT)
(not compatible with the 54620C)
Opt. 1CM Rackmount Kit, seven-inch EIA standard rack mount p/n 5062-7345, compatible with fixed or pivoted slides

Optional Accessories
54650A GPIB Interface Module
54652 RS-232 and Parallel Interface Module
10070A 1.4 m 1X oscilloscope probe
10071A 1.5 m 150 MHz 10X oscilloscope probe
10072A probe adapter kit for 1007X Probes
01650-61607 16-Channel Woven Probe Cable, compatible with 1251-8106 20-pin header
01650-61608 16-Channel Probe Lead Set for use with 01650-61607 cable
E2421A SOIC Clip Adapter Kit
E2422A J lead plastic lead clip carrier test kit

Agilent Technologies' Test and Measurement Support, Services, and Assistance
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Get assistance with all your test and measurement needs at:
www.agilent.com/find/assist

Printed in U.S.A. 4/00
5968-2614EN

Agilent Technologies
Innovating the HP Way