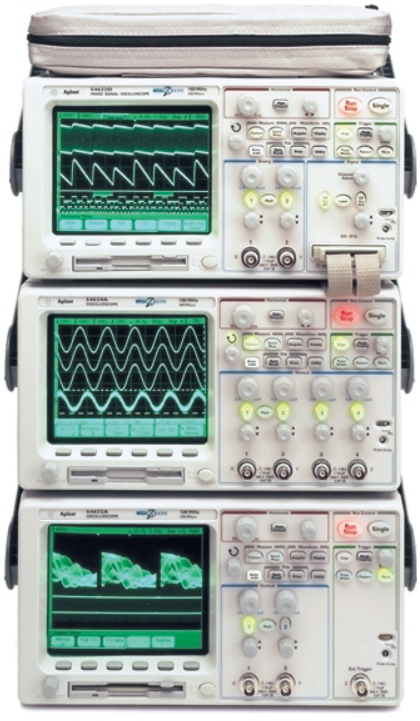
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Agilent Technologies 54620-Series Oscilloscopes

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**
- **Standard 2 MB deep memory transfer over the interface bus**



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:

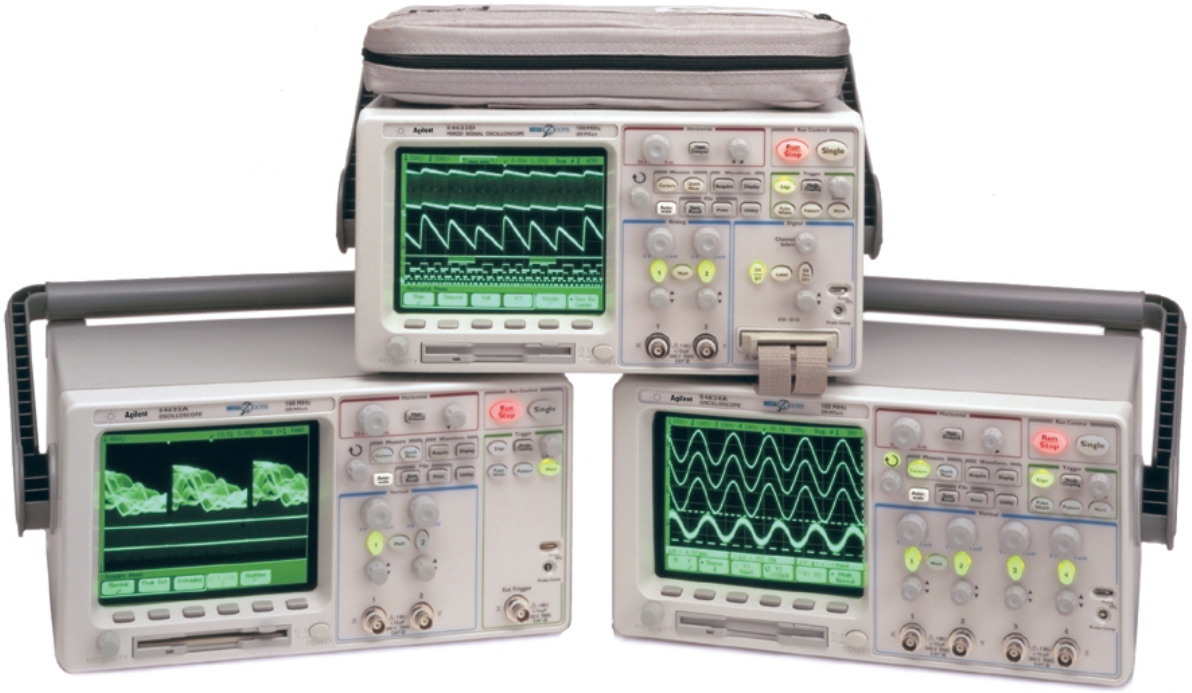
- 2 MB of MegaZoom deep memory on each channel so you can capture long, non-repeating signals, maintain high sample rate and quickly zoom in on areas of interest
- a revolutionary ultra-responsive, high-definition display that's a clearer "window into your world" – it lets you see more signal detail 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

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

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, I^2C, 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.

I^2C

Trigger on I^2C (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
- HP 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)

Call the measurement experts at Agilent Technologies

Whether your work is mostly digital, mostly analog, or somewhere in the middle, our measurement specialists can help you select the best debugging solution. Call today to talk to a knowledgeable engineer about your particular application.

See for yourself with a no-obligation, 2-week demo

If you'd like to see for yourself how an Agilent 54620-Series scope can help you solve your mixed analog and digital design problems, just give us a call. We'll arrange for you to use a 54620-Series scope in your lab for two weeks with no obligation to buy. Call 1-800-452-4844 and ask for Direct Demo or visit our website: **www.agilent.com/find/megazoom**

Money-back guarantee

Get a full refund if you're not satisfied with your purchase for any reason within 60 days in the USA or 90 days outside of the USA.

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 underlay 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 engineering 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.

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