

## KEYSIGHT TECHNOLOGIES (AGILENT HP)

# MSO6034A

The Keysight Technologies MSO6034A is a 300 MHz, 4 analog plus 16 digital channel Mixed Signal Oscilloscope from the InfiniiVision 6000 Series. Featuring MegaZoom III deep memory, a fast 100,000 waveforms/sec update rate, and a high-definition color display with 256 levels of intensity, it delivers outstanding signal insight for debugging analog, digital, and serial bus designs.

## SPECIFICATIONS

### General

|            |                                                                      |
|------------|----------------------------------------------------------------------|
| Interfaces | LAN (LXI Class C), USB 2.0 (Host and Device), GPIB, XGA Video Output |
| Display    | 6.3-inch diagonal color active matrix TFT LCD, 640 x 480 (VGA)       |

### Physical

|                       |                                                                       |
|-----------------------|-----------------------------------------------------------------------|
| Power Supply          | 100 - 240 V AC, 50/60 Hz (also 100 - 120 V AC, 400 Hz); 120 W maximum |
| Operating Temperature | 0 to 55 °C °C                                                         |
| Dimensions (W×H×D)    | 354 mm × 188 mm × 174 mm mm                                           |
| Weight                | 4.9 kg kg                                                             |

### Analog Vertical System

|                                   |                                                        |
|-----------------------------------|--------------------------------------------------------|
| Analog Input Channels             | 4                                                      |
| Analog Bandwidth (-3 dB)          | 300 MHz                                                |
| Calculated Rise Time (10% to 90%) | 1.17 ns                                                |
| Input Coupling                    | AC, DC                                                 |
| Input Impedance                   | 1 MΩ ± 1%    14 pF, or 50 Ω ± 1.5%                     |
| Input Sensitivity Range           | 2 mV/div to 5 V/div (1 MΩ), 2 mV/div to 1 V/div (50 Ω) |
| Vertical Resolution               | 8 bits                                                 |
| Maximum Input Voltage (Analog)    | CAT I 400 Vpk (1 MΩ), 5 Vrms (50 Ω)                    |
| DC Gain Accuracy                  | ±2% of full scale                                      |
| Offset Range                      | ±5 V (< 200 mV/div), ±100 V (≥ 200 mV/div) for 1 MΩ    |
| Hardware Bandwidth Limits         | 20 MHz selectable                                      |
| Channel-to-Channel Isolation      | ≥ 40 dB from DC to 300 MHz                             |

## Digital Vertical System

|                                 |                                             |
|---------------------------------|---------------------------------------------|
| Digital Input Channels          | 16                                          |
| Threshold Groupings             | Pod 1 (D7 - D0), Pod 2 (D15 - D8)           |
| Threshold Selections            | TTL, CMOS, ECL, User-defined                |
| User-Defined Threshold Range    | $\pm 8.0$ V in 10 mV steps                  |
| Threshold Accuracy              | $\pm(100$ mV + 3% of threshold setting)     |
| Maximum Input Voltage (Digital) | $\pm 40$ V peak CAT I                       |
| Input Dynamic Range             | $\pm 10$ V about threshold                  |
| Minimum Voltage Swing           | 500 mV pp                                   |
| Input Impedance (Digital)       | $100\text{ k}\Omega \pm 2\%$    $\sim 8$ pF |
| Channel-to-Channel Skew         | 2 ns typical, 3 ns maximum                  |

## Horizontal System and Acquisition

|                            |                                                            |
|----------------------------|------------------------------------------------------------|
| Maximum Analog Sample Rate | 2 GSa/s (half-channel interleaved), 1 GSa/s (all-channels) |
| Time Base Range            | 2 ns/div to 50 s/div                                       |
| Time Base Accuracy         | 15 ppm (0.0015%)                                           |
| Channel Deskew Range       | $\pm 100$ ns                                               |

## Trigger System

|                               |                                                                                                                                                                               |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Trigger Sources               | Analog channels (1 - 4), digital channels (D0 - D15), Line, External                                                                                                          |
| Trigger Modes                 | Auto, Normal, Single                                                                                                                                                          |
| Trigger Coupling              | AC, DC, LF Reject, HF Reject, Noise Reject                                                                                                                                    |
| Trigger Holdoff Range         | 60 ns to 10 s                                                                                                                                                                 |
| Trigger Sensitivity           | Analog: greater of 0.6 div or 5.0 mV (< 10 MHz), greater of 1.0 div or 10.0 mV (10 MHz to max bandwidth); External: 100 mV (DC to 100 MHz), 250 mV (100 MHz to max bandwidth) |
| Edge Triggering               | Rising, falling, alternating on any source                                                                                                                                    |
| Pulse Width Triggering        | Trigger on positive or negative pulses from 15 ns to 10 s                                                                                                                     |
| Pattern/State Triggering      | Trigger on enter, exit, or duration of ANDed patterns (H, L, X) across analog and digital channels; State clock on any channel (edge)                                         |
| TV/Video Triggering           | NTSC, PAL, SECAM, HDTV (480p, 576p, 720p, 1080i, 1080p); triggering on positive or negative sync, field, or line                                                              |
| Duration/Timeout Triggering   | Trigger on pattern entered/exited and present for > or < time (15 ns to 10 s)                                                                                                 |
| Sequence/Runt Triggering      | Sequence triggering: Arm on event A, trigger on event B after delay or occurrence count                                                                                       |
| Serial Bus Triggering Options | I2C, SPI, CAN, LIN, USB, FlexRay (standard or optional depending on protocol)                                                                                                 |

## Acquisition Modes

|                       |                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------|
| Normal Mode           | Acquires and displays waveforms at full sample rate                                         |
| Peak Detect Mode      | Captures glitches as narrow as 1 ns at all sweep speeds                                     |
| Averaging Mode        | Selectable from 2 to 16,384 in powers of 2                                                  |
| High Resolution Mode  | Real-time boxcar average reduces random noise, increasing vertical resolution up to 12 bits |
| Segmented Memory Mode | Captures up to 1000 segments with time-tagging of each segment                              |
| Roll Mode             | Slow sweep speeds of 50 ms/div to 50 s/div                                                  |

## Waveform Measurements and Analysis

|                                   |                                                                                         |
|-----------------------------------|-----------------------------------------------------------------------------------------|
| Voltage Measurements              | Peak-to-Peak, Maximum, Minimum, Amplitude, Top, Base, Overshoot, Preshoot, Average, RMS |
| Time and Frequency Measurements   | Period, Frequency, Rise Time, Fall Time, Positive Width, Negative Width, Duty Cycle     |
| Mixed-Signal Measurements         | Delay, Phase, Channel-to-Channel Time Measurements                                      |
| Cursor Types                      | Manual (X and Y), Track Waveform, Auto Measurements                                     |
| Waveform Math Operations          | Addition, Subtraction, Multiplication, FFT                                              |
| FFT Window Types                  | Hanning, Flat Top, Rectangular                                                          |
| FFT Resolution and Frequency Span | Up to 1024 points resolution, span from DC to Nyquist frequency                         |
| Measurement Statistics            | Display of Mean, Min, Max, Standard Deviation, and Count                                |
| Mask Testing Compatibility        | Option LMT (Limit Mask Testing) compatible                                              |

## Display and User Interface

|                               |                                                                                                                                                          |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display Type                  | Color active matrix TFT LCD                                                                                                                              |
| Display Size (Diagonal)       | 6.3 inches (160 mm)                                                                                                                                      |
| Display Resolution            | 640 x 480 (VGA)                                                                                                                                          |
| Waveform Update Rate          | 100,000 waveforms/sec                                                                                                                                    |
| Waveform Intensity Levels     | 32 levels of intensity gradation                                                                                                                         |
| Graticule Options             | 8 x 10 grid, framing, grid, none                                                                                                                         |
| Local Language User Interface | Multiple languages supported (English, French, German, Spanish, Japanese, Simplified Chinese, Traditional Chinese, Korean, Russian, Italian, Portuguese) |

## Connectivity and Interfaces

|                               |                                                                                                 |
|-------------------------------|-------------------------------------------------------------------------------------------------|
| USB Host Ports                | 2 x USB 2.0 host ports (one on front panel, one on rear panel) supporting flash drives          |
| USB Device Port               | 1 x USB 2.0 high-speed device port on rear panel for PC connectivity or printing                |
| LAN Port (LXI Compliant)      | RJ-45 10/100Base-TX, LXI Class C compliant                                                      |
| GPIB Interface Port           | IEEE 488.2 interface on rear panel                                                              |
| External Trigger Input Port   | BNC connector on rear panel                                                                     |
| Trigger Out/Calibrator Output | BNC auxiliary output, can be configured as Trigger Out, Mask Out, or 10 MHz Reference Clock Out |
| Video Output Port             | 15-pin D-sub (VGA resolution)                                                                   |

## Physical and Power Specifications

|                            |                                                          |
|----------------------------|----------------------------------------------------------|
| Power Source Voltage       | 100 V to 240 V AC auto-ranging                           |
| Power Line Frequency Range | 50 Hz to 60 Hz (100 V to 240 V), 400 Hz (100 V to 120 V) |
| Power Consumption          | 120 W maximum                                            |
| Form Factor                | Benchtop, stackable                                      |
| Kensington Lock Slot       | Standard rear-panel slot                                 |

## Environmental and Compliance

|                                     |                                                   |
|-------------------------------------|---------------------------------------------------|
| Storage Temperature                 | -40 °C to +70 °C                                  |
| Operating Humidity                  | 95% relative humidity at up to +40 °C             |
| Operating Altitude                  | Up to 4,600 m (15,000 ft)                         |
| Safety Certifications               | UL 61010-1, CAN/CSA-C22.2 No. 61010-1, EN 61010-1 |
| Electromagnetic Compatibility (EMC) | IEC 61326-1, EN 61326-1, CISPR 11 Class A         |

## Accessories and Options

|                                     |                                                      |
|-------------------------------------|------------------------------------------------------|
| Standard Included Analog Probes     | 4 x 10073C 10:1 passive probes (500 MHz)             |
| Standard Included Digital Probe Kit | 1 x 16-channel digital probe kit (54620-68701)       |
| Passive Probe Compatibility         | AutoProbe interface or standard BNC                  |
| Active Probe Interface Support      | Agilent AutoProbe interface                          |
| Serial Decode Software Upgrades     | I2C/SPI (N5423A), CAN/LIN (N5424A), FlexRay (N5432A) |
| Rackmount Kit Accessories           | Option 1CM (or N2916B) rackmount kit                 |

## Performance Architecture

|                        |                          |
|------------------------|--------------------------|
| Acquisition Technology | MegaZoom III deep memory |
|------------------------|--------------------------|

## Connectivity and Data Storage

|                                    |                                                                    |
|------------------------------------|--------------------------------------------------------------------|
| Web Browser Remote Control         | Built-in web server allows remote control via standard web browser |
| Programming Language Compatibility | SCPI, Agilent 54620/54640 Series                                   |
| LXI Class Compliance               | LXI Class C                                                        |
| Exportable Waveform Formats        | CSV, ASCII, BIN                                                    |
| Exportable Image Formats           | BMP, PNG                                                           |
| Save/Recall Capabilities           | 10 nonvolatile setups and waveforms, 1 reference waveform          |

## General Technical Specifications

|                      |                                                              |
|----------------------|--------------------------------------------------------------|
| Real-Time Clock      | Built-in, battery-backed                                     |
| Built-in Help System | Available in 11 languages                                    |
| Security Features    | Option SEC (Secure Environment Mode) for erasing user memory |

## Environmental & Reliability

|                                |                        |
|--------------------------------|------------------------|
| Vibration and Shock Compliance | MIL-PRF-28800F Class 3 |
|--------------------------------|------------------------|

## Digital Channels

|                                          |                |
|------------------------------------------|----------------|
| Minimum Detectable Pulse Width (Digital) | 5 ns           |
| Digital Channel Threshold Resolution     | 10 mV          |
| Digital Channel Input Resistance         | 100 k (±2%)    |
| Digital Channel Input Capacitance        | ~8 pF          |
| Analog-to-Digital Channel Skew           | 2 ns (typical) |

## Inputs & Outputs

|                                  |                |
|----------------------------------|----------------|
| 10 MHz Reference Input Frequency | 10 MHz ± 5 ppm |
|----------------------------------|----------------|

## Storage

|                            |                         |
|----------------------------|-------------------------|
| Internal Storage Locations | 10 setups and waveforms |
|----------------------------|-------------------------|

## Triggering

|                                        |                                 |
|----------------------------------------|---------------------------------|
| Trigger Level Range (Analog Channels)  | ±6 divisions from center screen |
| External Trigger Maximum Input Voltage | 150 Vrms CAT II (1 M)           |

## Power & Environmental

|                                   |                    |
|-----------------------------------|--------------------|
| Mains Pollution Degree Compliance | Pollution Degree 2 |
|-----------------------------------|--------------------|

## TECHNOLOGY

Mixed Signal Oscilloscope (MSO)

## APPLICATIONS

Electronic design, debugging, automotive serial buses, and embedded system troubleshooting

