

## KEYSIGHT TECHNOLOGIES (AGILENT HP)

# DSO6104A

The Keysight (formerly Agilent) DSO6104A is a high-performance 1 GHz, 4-channel digital storage oscilloscope. Equipped with MegaZoom III technology, it features 1 Mpts of standard deep memory (upgradeable to 8 Mpts), a 6.3-inch XGA color flat-panel display, a waveform update rate of up to 100,000 waveforms per second, and 256 levels of intensity gradation. The DSO6104A delivers exceptional signal visibility and flexible triggering capabilities, including analog HDTV, CAN, I2C, LIN, SPI, and USB, making it a reliable diagnostic instrument for embedded design and debug applications. It can also be upgraded to an MSO (Mixed Signal Oscilloscope) at any time.

## SPECIFICATIONS

### General

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| Interfaces      | Standard USB, LAN (LXI Class C), GPIB, and XGA video output                 |
| Display         | 6.3-inch VGA (640 x 480) color flat-panel TFT-LCD with 256 intensity levels |
| Real-Time Clock | Internal, battery-backed                                                    |

### Physical

|                       |                                                               |
|-----------------------|---------------------------------------------------------------|
| Power Supply          | 100 - 240 VAC, 50/60 Hz; 100 - 120 VAC, 400 Hz; 120 W maximum |
| Operating Temperature | 0 °C to +55 °C °C                                             |
| Dimensions (W×H×D)    | 354 mm × 188 mm × 282 mm mm                                   |
| Weight                | 4.9 kg kg                                                     |

### Key Performance Specifications

|                                                |                                                |
|------------------------------------------------|------------------------------------------------|
| Analog Bandwidth                               | 1 GHz                                          |
| Analog Channels                                | 4                                              |
| Digital Channels                               | None standard (upgradeable to 16 MSO channels) |
| Maximum Real-Time Sample Rate (Single-Channel) | 4 GSa/s                                        |
| Maximum Real-Time Sample Rate (Half-Channel)   | 4 GSa/s                                        |
| Maximum Real-Time Sample Rate (All-Channel)    | 2 GSa/s                                        |
| Standard Memory Depth                          | 1 Mpts                                         |
| Maximum Memory Depth (Optional Upgrade)        | 8 Mpts (with Option L01)                       |
| Waveform Update Rate                           | Up to 100,000 waveforms/sec                    |
| Vertical Resolution (A/D Converter)            | 8 bits                                         |
| Built-In Hardware Counter                      | 5-digit hardware counter                       |

## Acquisition Modes

|                      |                                         |
|----------------------|-----------------------------------------|
| High Resolution Mode | Up to 12 bits of resolution (real-time) |
| Peak Detect Mode     | 250-ps peak detect                      |
| Averaging Mode       | Selectable from 2 to 65,536 averages    |

## Vertical System - Analog Channels

|                                         |                                                         |
|-----------------------------------------|---------------------------------------------------------|
| Input Coupling                          | AC, DC                                                  |
| Input Impedance (Selectable)            | 1 M $\Omega$ $\pm$ 1%    14 pF, or 50 $\Omega$ $\pm$ 1% |
| Input Sensitivity Range (1 M $\Omega$ ) | 2 mV/div to 5 V/div                                     |
| Input Sensitivity Range (50 $\Omega$ )  | 2 mV/div to 1 V/div                                     |
| Maximum Input Voltage (1 M $\Omega$ )   | CAT I 400 Vpk, CAT II 300 Vpk                           |
| Maximum Input Voltage (50 $\Omega$ )    | 5 Vrms                                                  |
| Vertical Gain Accuracy                  | $\pm$ 2.0% of full scale                                |
| Channel-to-Channel Isolation            | $\geq$ 40 dB from DC to 1 GHz                           |
| Hardware Bandwidth Limits               | Approx. 20 MHz, selectable                              |

## Horizontal System

|                                 |                        |
|---------------------------------|------------------------|
| Time Base Range                 | 500 ps/div to 50 s/div |
| Time Base Accuracy              | $\pm$ 15 ppm           |
| Channel-to-Channel Deskew Range | $\pm$ 100 ns           |
| Horizontal Modes                | Main, Zoom, Roll, XY   |

## Trigger System

|                                    |                                                                  |
|------------------------------------|------------------------------------------------------------------|
| Trigger Modes                      | Normal, Auto, Single, Force                                      |
| Trigger Sources                    | Channel 1, Channel 2, Channel 3, Channel 4, Line, External       |
| Trigger Coupling                   | AC, DC, HF Reject, LF Reject, Noise Reject                       |
| Trigger Holdoff Range              | 60 ns to 10 s                                                    |
| Edge Triggering                    | Rising, falling, or alternating edges on any source              |
| Pulse Width Triggering             | Positive or negative pulses from 2 ns to 10 s                    |
| Pattern Triggering                 | Trigger on logical AND of channel values                         |
| Video/TV Triggering                | NTSC, PAL, SECAM, HDTV (480p, 720p, 1080i, 1080p)                |
| Serial Protocol Triggering Options | I2C, SPI, CAN, LIN                                               |
| Trigger Jitter                     | < 10 ps RMS                                                      |
| Trigger Sensitivity (Internal)     | < 10 mV/div: greater of 1 div or 5 mV; $\geq$ 10 mV/div: 0.6 div |
| Trigger Sensitivity (External)     | DC to 100 MHz: 100 mV (1:1), 100 MHz to 1 GHz: 500 mV (1:1)      |
| Glitch Trigger Minimum Width       | 2 ns                                                             |

## Waveform Measurements & Math

|                                      |                                                                     |
|--------------------------------------|---------------------------------------------------------------------|
| Automatic Voltage Measurements       | Vpp, Vmax, Vmin, Vtop, Vbase, Vamp, Vavg, Vrms                      |
| Automatic Time Measurements          | Period, Frequency, Rise time, Fall time, +Width, -Width, Duty cycle |
| Automatic Phase & Delay Measurements | Phase, Delay                                                        |
| Measurement Statistics               | Display of mean, min, max, standard deviation, and count            |
| Waveform Math Operators              | Add, subtract, multiply, FFT                                        |
| FFT Window Functions                 | Hanning, Flat Top, Rectangular                                      |
| FFT Vertical Scale                   | dB, Vrms                                                            |

## Display & User Interface

|                                     |                                 |
|-------------------------------------|---------------------------------|
| Display Type                        | 6.3-inch color TFT-LCD          |
| Display Resolution                  | 640 x 480 (VGA)                 |
| Waveform Intensity Gradation Levels | 256 intensity levels            |
| Built-In Help System                | Available in multiple languages |

## Connectivity & Interfaces

|                                     |                                              |
|-------------------------------------|----------------------------------------------|
| USB Host Ports (Front & Rear Panel) | 1 front panel, 1 rear panel (USB 2.0)        |
| USB Device Port (PC Connection)     | 1 rear panel (USB 2.0 device)                |
| LAN Port                            | RJ-45, 10/100Base-T (LXI Class C compliant)  |
| GPIO Interface                      | Standard rear panel IEEE-488                 |
| Auxiliary Output                    | Trig out on rear panel, 10 MHz reference out |
| Video Output Port                   | VGA video output                             |
| Web Browser Remote Control Support  | Built-in Web server                          |
| Reference Clock Input/Output        | Built-in 10 MHz reference in/out             |

## Environmental & Safety Compliance

|                              |                                           |
|------------------------------|-------------------------------------------|
| Storage Temperature Range    | -40 °C to +70 °C                          |
| Operating Humidity Range     | Up to 95% RH at +40 °C                    |
| Operating Altitude (Maximum) | Up to 4,600 m (15,000 ft)                 |
| Safety Certifications        | UL61010-1, CSA22.2 No. 61010-1, EN61010-1 |

## Power Specifications

|                             |       |
|-----------------------------|-------|
| Power Consumption (Maximum) | 120 W |
|-----------------------------|-------|

## Options & Accessories

|                                       |                                            |
|---------------------------------------|--------------------------------------------|
| Standard Included Probes              | Four 10073C 10:1 passive probes (500 MHz)  |
| Compatible Active/Differential Probes | Agilent AutoProbe interface compatible     |
| Serial Bus Analysis Licenses          | I2C/SPI (Option LSS), CAN/LIN (Option AMS) |
| Memory Depth Upgrade Licenses         | Up to 8 Mpts optional (Option 080)         |
| Battery Power Option                  | Not supported on this model                |
| Secure Environment Mode               | Option SEC                                 |

**Performance**

|                      |        |
|----------------------|--------|
| Calculated Rise Time | 350 ps |
|----------------------|--------|

**Environmental & Standards**

|                                  |                                                |
|----------------------------------|------------------------------------------------|
| Vibration and Shock Standard     | Meets MIL-PRF-28800F, Class 3 random vibration |
| Recommended Calibration Interval | 2 years                                        |

**Connectivity & Software**

|                      |                              |
|----------------------|------------------------------|
| File Storage Formats | BMP, PNG, CSV, ASCII XY, BIN |
|----------------------|------------------------------|

**Acquisition**

|                                 |        |
|---------------------------------|--------|
| Peak Detect Minimum Pulse Width | 250 ps |
| Horizontal Resolution           | 2.5 ps |

**Vertical System**

|                                   |       |
|-----------------------------------|-------|
| Input Capacitance (1 M $\Omega$ ) | 14 pF |
|-----------------------------------|-------|

**Triggering**

|                                               |                                      |
|-----------------------------------------------|--------------------------------------|
| Trigger Level Range (Internal)                | $\pm 6$ divisions from center screen |
| Trigger Level Range (External, 1 M $\Omega$ ) | $\pm 8$ V                            |
| Trigger Level Range (External, 50 $\Omega$ )  | $\pm 2$ V                            |

**Connectivity & Standards**

|                 |             |
|-----------------|-------------|
| LXI Compliance  | LXI Class C |
| Probe Interface | AutoProbe   |

**Math & Analysis**

|                |             |
|----------------|-------------|
| FFT Resolution | 1024 points |
|----------------|-------------|

**Power Requirements**

|                          |                                                  |
|--------------------------|--------------------------------------------------|
| AC Input Voltage Range   | 100 - 240 VAC                                    |
| AC Input Frequency Range | 50/60 Hz (100 - 240 VAC), 400 Hz (100 - 120 VAC) |

**Security**

|                    |                                                 |
|--------------------|-------------------------------------------------|
| Security Lock Slot | Compatible with standard Kensington style locks |
|--------------------|-------------------------------------------------|

**Environmental**

|                  |                    |
|------------------|--------------------|
| Pollution Degree | Pollution Degree 2 |
|------------------|--------------------|

**TECHNOLOGY**

MegaZoom III

**APPLICATIONS**

Embedded system design, digital debug, serial bus analysis, automotive electronics testing

