

KEYSIGHT TECHNOLOGIES (AGILENT HP)

MSOX3104T

The Keysight InfiniiVision MSOX3104T is a high-performance 1 GHz, 4-channel mixed signal oscilloscope featuring 16 integrated digital channels. Standard with an 8.5-inch capacitive touchscreen, the MSOX3104T integrates multiple instruments into one, featuring a class-leading waveform update rate of over 1,000,000 waveforms per second and standard zone touch triggering for simplified signal isolation.

SPECIFICATIONS

General

Interfaces	USB 2.0 host (two front, one rear), USB 2.0 device, LAN (10/100Base-T), WVGA video out
Display	8.5-inch WVGA capacitive touch screen TFT-LCD (800 x 480)
Internal Storage	4 GB internal non-volatile memory
Kensington Lock Slot	Yes (rear panel)

Physical

Power Supply	100 to 120 V (50/60/400 Hz), 100 to 240 V (50/60 Hz), 100 W max
Operating Temperature	0 °C to +55 °C °C
Dimensions (W×H×D)	381 mm × 204 mm × 142 mm mm
Weight	3.85 kg kg

Analog Vertical System

Analog Input Channels	4
Analog Bandwidth (-3 dB)	1 GHz
Calculated Rise Time (10% to 90%)	350 ps
Input Coupling	AC, DC
Input Impedance	1 MΩ ±1% (14 pF), 50 Ω ±1.5%
Input Sensitivity Range	1 mV/div to 5 V/div (1 MΩ), 1 mV/div to 1 V/div (50 Ω)
Vertical Resolution	8 bits
Max Input Voltage (1 MOhm)	300 Vrms, 400 Vpk CAT I
Max Input Voltage (50 Ohm)	5 Vrms CAT I
DC Gain Accuracy	±2.0% full scale (≥ 10 mV/div), ±3.0% full scale (< 10 mV/div)
Offset Range	±2 V (1 mV/div to 200 mV/div), ±50 V (> 200 mV/div to 5 V/div) for 1 MΩ
Channel-to-Channel Isolation	≥ 40 dB (DC to 1 GHz)

Digital Vertical System

Digital Channels	16
Threshold Grouping	Pod 1 (D0 to D7), Pod 2 (D8 to D15)
Threshold Selections	TTL (+1.4 V), 5V CMOS (+2.5 V), 3.3V CMOS (+1.65 V), 2.5V CMOS (+1.25 V), ECL (-1.3 V), PECL (+3.7 V), User-defined
Threshold Voltage Range	± 8.0 V in 10 mV steps
Threshold Accuracy	$\pm(100$ mV + 3% of threshold setting)
Input Impedance (Digital Probe)	100 k Ω $\pm 2\%$ (~ 8 pF) at probe tip
Max Input Voltage (Digital Probe)	± 40 V peak
Minimum Voltage Swing	500 mVpp
Minimum Detectable Pulse Width	5 ns
Maximum Toggle Rate	250 MHz

Horizontal System

Maximum Real-time Sample Rate (Analog)	5 GSa/s (half-channel), 2.5 GSa/s (all channels)
Maximum Sample Rate (Digital)	1.25 GSa/s (all channels)
Maximum Record Length (Analog Channels)	4 Mpts (half-channel), 2 Mpts (all channels)
Maximum Record Length (Digital Channels)	4 Mpts (one pod), 2 Mpts (two pods)
Time Base Range	500 ps/div to 50 s/div
Time Base Delay Range	Pre-trigger: Greater of 1 screen width or 250 μ s; Post-trigger: 1 s to 500 s
Channel-to-Channel Deskew Range	± 75 ns
Time Base Accuracy	± 1.6 ppm (including aging)

Trigger System

Trigger Modes	Normal, Auto, Single, Force
Trigger Coupling	AC, DC, LF Reject, HF Reject, Noise Reject
Trigger Holdoff Range	40 ns to 10.0 s
Trigger Sensitivity	0.6 div or 4.5 mV (< 10 MHz), 1.0 div or 7.5 mV (10 MHz to 1 GHz) at 50 Ω
Edge Triggering	Rising, falling, alternating, or either edge on any channel
Pulse Width Triggering	2 ns to 10 s
Runt Triggering	Trigger on a pulse that crosses one threshold but fails to cross the second threshold before crossing the first again
Timeout Triggering	Trigger when a channel stays high, low, or either for a specified time (40 ns to 10 s)
Logic Triggering	Trigger on any logical pattern of channels, qualified by a transition or duration
Setup and Hold Triggering	Trigger on setup time and/or hold time violations between clock and data
Rise/Fall Time Triggering	2 ns to 10 s
Zone Touch Trigger	Draw a box on the screen to isolate signals with 'must intersect' or 'must not intersect' conditions

Acquisition Modes

Sample Mode	Standard acquisition mode
Peak Detect Mode	Capture glitches as narrow as 250 ps at all sweep speeds
Averaging Mode	Selectable from 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 65536
High Resolution Mode	Real-time boxcar averaging reduces random noise and increases vertical resolution (up to 12 bits)
Segmented Memory Mode	Segmented memory optimizes acquisition memory for capturing low-duty-cycle events (up to 1000 segments)
Roll Mode	At slower time base settings (50 ms/div and slower)

Waveform Analysis & Measurements

Automatic Voltage Measurements	Peak-to-peak, Maximum, Minimum, Amplitude, Top, Base, Overshoot, Preshoot, Average, RMS
Automatic Time/Frequency Measurements	Period, Frequency, Rise time, Fall time, Positive width, Negative width, Duty cycle, Phase, Delay
Math Functions	Add, subtract, multiply, divide, FFT, integrate, differentiate, square root, Ax+B, Low pass filter, High pass filter
FFT Window Types	Hanning, Flat Top, Rectangular, Blackman-Harris

Display & User Interface

Waveform Update Rate	$\geq 1,000,000$ waveforms per second
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Optional Integrated Instruments

Arbitrary/Function Generator Channels	1 channel (optional, WaveGen)
AFG Maximum Frequency	20 MHz
AFG Waveforms	Sine, Square, Ramp, Pulse, DC, Noise, Sine Cardinal (Sinc), Exponential Rise, Exponential Fall, Cardiac, Gaussian, Arbitrary
AFG Vertical Resolution	14 bits
Digital Voltmeter Channels	3-digit DVM (standard, operates with same probes)
Frequency Counter Resolution	8-digit hardware frequency counter (standard)

Environmental & Compliance

Non-Operating Temperature Range	-40 °C to +70 °C
Operating Humidity Range	Up to 95% RH at +40 °C (non-condensing)
Operating Altitude	Up to 3,000 m (9,842 ft)

Accessories

Standard Analog Probes	N2894A 700 MHz passive probe (1 per analog channel)
Standard Digital Probe	N2756A 16-channel MSO cable kit

Maintenance

Calibration Interval	2 years
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Inputs & Outputs

Probe Interface	AutoProbe interface
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Search & Navigate

Hardware Search	Search and navigate on edge, pulse width, rise/fall time, runt, setup/hold, and serial packets
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Connectivity Options

Optional LAN/VGA Interface	Standard (built-in LAN and VGA)
Optional GPIB Interface	DSOXGPIB module

Acquisition

Segmented Memory Max Segments	1000
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Environmental

Operating Vibration	Meets MIL-PRF-28800F Class 3 random
Operating Shock	Meets MIL-PRF-28800F Class 3, 30 g, half-sine, 11 ms

Analysis

Frequency Response Analysis (Bode Plot)	10 Hz to 20 MHz (requires WaveGen option)
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Connectivity

USB Host Ports	3 ports (2 front, 1 rear), USB 2.0
USB Device Port	1 port (rear), USB 2.0 High-Speed
LXI Compliance	LXI Class C
Trigger Out BNC	Yes (rear panel)

Analog Inputs

Hardware Bandwidth Limit	20 MHz (selectable)
Probe Attenuation Factors	0.1X to 10000X

Trigger

Trigger Jitter	< 1.6 ps RMS
Trigger Types (Optional Serial)	I2C, SPI, UART/RS232/RS422/RS485, CAN, CAN FD, LIN, FlexRay, SENT, CXPI, I2S, MIL-STD 1553, ARINC 429, USB 2.0

Digital Channels

Digital Channel Timing Resolution	625 ps
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TECHNOLOGY

InfiniiVision 3000T X-Series

APPLICATIONS

Mixed-signal design and debug, embedded systems, automotive electronics, power analysis

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