

LECROY (TELEDYNE LECROY)

HDO4104-MS

The Teledyne LeCroy HDO4104-MS is a 1 GHz, 4-channel High Definition Oscilloscope featuring 12-bit ADC technology, a 12.1-inch widescreen touch display, and 16 integrated digital channels for comprehensive mixed-signal design and debugging.

SPECIFICATIONS

General

Interfaces	LAN (10/100/1000Base-T Ethernet), 4x USB Host (2 front, 2 rear), 1x USB Device, GPIB (optional via external adapter), LXI Class C
Display	12.1-inch widescreen capacitive touchscreen, 1280 x 800 resolution

Physical

Power Supply	100 - 240 VAC ($\pm 10\%$) at 50/60 Hz ($\pm 10\%$), 100 - 120 VAC ($\pm 10\%$) at 400 Hz; 200 W maximum power consumption
Operating Temperature	5 to 40 °C
Dimensions (W×H×D)	399 × 291 × 131 mm
Weight	5.8 kg
VESA Mount Pattern	100 mm x 100 mm

Vertical System - Analog

Analog Bandwidth (-3 dB)	1 GHz
Number of Analog Channels	4
Vertical Resolution (ADC)	12 bits
Vertical Resolution (ERES)	Up to 15 bits
Calculated Rise Time (10% to 90%)	350 ps (typical)
Input Impedance (Analog)	50 Ω $\pm 1.0\%$ or 1 M Ω $\pm 1.0\%$ 16 pF
Input Coupling	50 Ω : DC; 1 M Ω : AC, DC, GND
Input Sensitivity Range (50 Ω)	1 mV/div - 1 V/div
Input Sensitivity Range (1 M Ω)	1 mV/div - 10 V/div
DC Gain Accuracy	$\pm 0.5\%$ of full scale
Maximum Input Voltage (50 Ω)	5 Vrms
Maximum Input Voltage (1 M Ω)	400 V max (DC + Peak AC $\leq$ 10 kHz)
Hardware Bandwidth Limits	20 MHz, 200 MHz

Vertical System - Digital

Number of Digital Channels	16
Input Impedance (Digital)	100 k Ω 5.0 pF
Maximum Input Voltage (Digital)	± 30 V non-destruct
Threshold Selection	TTL, CMOS, ECL, PECL, LVDS, User-Defined
User-Defined Threshold Range	± 10 V in 10 mV steps
Minimum Input Voltage Swing	500 mV p-p

Horizontal System

Maximum Real-Time Sampling Rate (Analog)	2.5 GS/s (all channels)
Maximum Sampling Rate (Digital)	1.25 GS/s
Standard Record Length	12.5 Mpts/ch (all channels)
Maximum Record Length	25 Mpts/ch (with HDO4K-MEM-EXT option)
Time Base Range	200 ps/div - 1000 s/div
Time Base Accuracy	± 10 ppm
Minimum Detectable Pulse Width (Digital)	2 ns
Timebase Delay Range	Pre-trigger: 0% to 100% of full scale; Post-trigger: 0 to 10,000 divisions

Trigger System

Trigger Sources	Any input channel, External, Line, Ext/10
Trigger Modes	Auto, Normal, Single, Stop
Trigger Coupling	AC, DC, HFRej, LFRej
Trigger Holdoff Range	2 ns - 20 s (or 1 to 99,999,999 events)
Edge Triggering	Triggers on rising, falling, or both edges
Runt Triggering	Positive or negative runs defined by two thresholds
Pulse Width Triggering	2 ns - 20 s
Interval Triggering	2 ns - 20 s
Dropout Triggering	2 ns - 20 s
External Trigger Input Impedance	1 M Ω 16 pF
External Trigger Maximum Input Voltage	400 V max (DC + Peak AC $\leq$ 10 kHz)
Trigger Jitter	< 2.8 ps rms (typical), < 1 ps rms (typical) with Software Assisted Trigger
Internal Trigger Level Range	± 4.1 divisions from center
External Trigger Level Range	± 400 mV (EXT), ± 4 V (EXT/10)
Edge Trigger Sensitivity (Internal)	0.9 div (< 10 MHz), 1.0 div (< 200 MHz), 1.5 div (< 500 MHz), 2.0 div (< 1 GHz)

Acquisition System

Acquisition Modes	Real-time, Roll, Sequence (Segmented Memory)
Sequence Mode Segments	Up to 10,000 segments
Averaging Factor Range	Summed or continuous averaging up to 1,000,000 sweeps
Sequence Mode Minimum Inter-segment Time	1.0 μ s

Waveform Measurements and Analysis

Automatic Voltage and Time Measurements	Up to 8 displayed simultaneously with statistics
Basic Math Functions	Add, Subtract, Multiply, Divide, FFT, Absolute Value, Average, Derivative, Envelope, Enhanced Resolution, Integral, Invert, Reciprocal, Rescale, Square, Square Root, Zoom
FFT Window Types	Von Hann (Hanning), Hamming, Flat Top, Blackman-Harris, Rectangular
FFT Vertical Scale Options	dBm, dBV, Vrms, Industry Standard Units

Connectivity and Ports

Auxiliary Output	Trigger Out, Pass/Fail
Reference Clock Input	10 MHz (BNC connector)

Processor and Storage

Internal Operating System	Windows Embedded Standard 7 (64-bit)
System Memory (RAM)	4 GB (standard)

Environmental Specifications

Storage Temperature Range	-20 °C to 60 °C
Operating Humidity Range	5% to 80% RH (non-condensing) up to 30 °C

Compliance and Standards

Calibration Interval	1 year
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Display

Display Resolution	1280 × 800 (WXGA)
Touch Screen	Resistive touch screen
Display Size	12.1 inches (30.7 cm) diagonal

Analog Vertical System

Probes Interface	ProBus
Offset Range (1 M Ω)	± 1 V (1 mV - 4.98 mV), ± 1.5 V (5 mV - 9.9 mV), ± 3 V (10 mV - 19.8 mV), ± 8 V (20 mV - 99 mV), ± 15 V (100 mV - 198 mV), ± 80 V (200 mV - 990 mV), ± 150 V (1 V - 1.98 V), ± 400 V (2 V - 10 V)

Digital Vertical System

Digital Channel Maximum Input Frequency	250 MHz
Digital Threshold Settings	2 independent threshold controls (D0-D7 and D8-D15)

Connectivity

Host USB Ports	6 x USB 2.0 (2 front, 4 rear)
LAN Port	1 x RJ-45 (10/100/1000Base-T)

Math and Analysis

Zoom Traces	4 standard zoom traces
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Power

Power Consumption (Maximum)	320 VA
Power Consumption (Typical)	150 W

Vertical System

Hardware Bandwidth Limit Filters	20 MHz, 200 MHz
Channel-to-Channel Isolation	> 100:1 up to 250 MHz, > 40:1 up to 1 GHz

Digital Channels

Digital Channel Record Length	25 Mpts
Digital Channel Vertical Resolution	1 bit
Digital Input Dynamic Range	±20 V
Digital Trigger Types	Edge, Pattern, State

Interfaces

USB Device Port	1 x USB 2.0 Type-B (supports USBTMC)
External Display Outputs	1 x HDMI, 1 x DisplayPort
LXI Compliance	LXI Class C

Power Requirements

AC Input Voltage	100 to 240 VAC (±10%)
AC Input Frequency	50/60 Hz (±10%) at 100 to 240 VAC, 400 Hz (±5%) at 100 to 120 VAC

Compliance

Safety Compliance	Conforms to EN 61010-1:2010, EN 61010-2-030:2010, UL 61010-1, CAN/CSA C22.2 No. 61010-1-12
EMC Compliance	Conforms to EN 61326-1:2006, EN 61326-2-1:2006

TECHNOLOGY

Digital Oscilloscope with HD4096 High Definition Technology

APPLICATIONS

Mixed-signal design, embedded systems debugging, power analysis, and precision analog measurements

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