

TEKTRONIX

MDO4104-6

The Tektronix MDO4104-6 is a mixed domain oscilloscope from the MDO4000 series. It features 4 analog channels with 1 GHz bandwidth, 16 digital channels, and an integrated 6 GHz spectrum analyzer, enabling time-correlated analog, digital, and RF acquisitions in a single instrument.

SPECIFICATIONS

General

Interfaces	USB 2.0 host (4 ports), USB 2.0 device, LAN (10/100/1000BASE-T Ethernet), Video out, Auxiliary out, External reference input
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Physical

Power Supply	100 to 240 V $\pm 10\%$ (50 to 60 Hz), 115 V $\pm 10\%$ (360 to 440 Hz); 225 W maximum
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Operating Temperature	0 to +50 °C °C
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Dimensions (W×H×D)	439 mm × 229 mm × 147 mm mm
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Weight	5 kg kg
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System Configuration

Analog Channels	4
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Digital Channels	16
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RF Channels	1
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Vertical System - Analog Channels

Analog Channel Bandwidth	1 GHz
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Calculated Rise Time	350 ps
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Hardware Bandwidth Limit	20 MHz or 250 MHz
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Input Coupling	AC, DC
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Input Impedance	1 M Ω $\pm 1\%$, 50 Ω $\pm 1\%$
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Vertical Resolution	8 bits (11 bits with Hi Res)
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Maximum Input Voltage (1 M Ω)	300 Vrms CAT II with peaks $\leq \pm 425$ V
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Maximum Input Voltage (50 Ω)	5 Vrms with peaks $\leq \pm 20$ V
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Analog Vertical Sensitivity Range (1 M Ω)	1 mV/div to 10 V/div
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Analog Vertical Sensitivity Range (50 Ω)	1 mV/div to 1 V/div
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Analog DC Gain Accuracy	$\pm 1.5\%$ (for ≥ 5 mV/div, offset = 0 V)
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Horizontal System - Analog Channels

Maximum Sample Rate (1 Channel)	5 GS/s
Maximum Sample Rate (2 Channels)	5 GS/s
Maximum Sample Rate (4 Channels)	5 GS/s
Maximum Record Length	20 M
Time Base Range	400 ps to 1000 s
Maximum Duration at Highest Sample Rate (All Channels)	4 ms
Maximum Duration at Highest Sample Rate (Half Channels)	4 ms
Time Base Delay Time Range	-10 divisions to 5000 s
Channel-to-Channel Deskew Range	±125 ns

Trigger System

Trigger Modes	Auto, Normal, Single
Trigger Holdoff Range	20 ns to 8 s

Acquisition System

Sample Acquisition Mode	Acquire sampled values
Peak Detect Mode	Captures glitches as narrow as 800 ps at all sweep speeds
Averaging Mode	From 2 to 512 waveforms included in average
Envelope Mode	Min-max envelope reflecting Peak Detect data over multiple acquisitions
Hi-Res Mode	Real-time boxcar averaging reduces random noise and increases vertical resolution
Roll Mode	Scrolls waveforms right to left across screen at sweep speeds slower than or equal to 40 ms/div
Maximum Waveform Capture Rate	>50,000 wfm/s

Digital Channels (MSO)

Digital Inputs	16 channels
Maximum Input Voltage (Digital)	±42 V _{peak}
Input Dynamic Range (Digital)	30 V _{p-p} ≤ 200 MHz, 10 V _{p-p} > 200 MHz
Vertical Resolution (Digital)	1 bit
Maximum Sample Rate (Digital, Main)	500 MS/s (2 ns resolution)
MagniVu Fine Timing Resolution	60.6 ps
Maximum Record Length (Digital, Main)	20M points
Minimum Detectable Pulse Width (Digital)	1 ns (typical)
Channel-to-Channel Skew (Digital)	200 ps (typical)

Spectrum Analyzer (RF Input)

RF Frequency Range	50 kHz - 6 GHz
RF Vertical Units	dBm, dBmV, dBμV, dBμW, dBmA, dBμA
DANL (50 kHz - 5 MHz)	< -130 dBm/Hz
DANL (5 MHz - 3 GHz)	< -148 dBm/Hz
DANL (3 GHz - 6 GHz)	< -140 dBm/Hz
RF Max Operating Input Level (Average Continuous)	+30 dBm (1 W)
RF Max Damage Level (DC)	±40 V DC
RF Max Damage Level (CW Power)	+33 dBm (2 W)
RF to Analog Channel Skew	< 5 ns
RF Frequency Domain Trace Types	Normal, Average, Max Hold, Min Hold
RF Time Domain Trace Types	Amplitude vs Time, Frequency vs Time, Phase vs Time
RF Automatic Markers	One to eleven peaks identified on user-adjustable threshold/excursion
RF Manual Markers	Two manual markers indicating frequency, amplitude, noise density, and phase noise

Waveform Measurements and Analysis

Waveform Measurements and Analysis	Cursors, automatic measurements in time and frequency domains, statistics, gating, histogram, and waveform math
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Connectivity & Interfaces

Probe Compensator Output	Amplitude: 0 to 2.5 V, Frequency: 1 kHz
LXI Compliance	LXI Class C, Version V1.3

Physical Characteristics

Depth	147 mm (5.8 in.)
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Environmental

Storage Temperature	-20 to +60 °C
Operating Altitude	Up to 3,000 m (9,843 ft)
Operating Vibration	0.31 g RMS, 5 Hz to 500 Hz, 10 min per axis, 3 axes
Non-Operating Vibration	2.46 g RMS, 5 Hz to 500 Hz, 10 min per axis, 3 axes

Compliance & Regulatory

Safety Standards	UL61010-1:2004, CAN/CSA-C22.2 No. 61010-1:2004, EN61010-1:2001
Electromagnetic Compatibility	Directive 2004/108/EC

Display System

Display Resolution	1024 × 768 pixels (XGA)
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RF System

RF Input Connector	N-type female (50 Ω)
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Vertical System - Digital Channels

Digital Channel Minimum Voltage Swing	400 mV p-p
Digital Channel Threshold Accuracy	$\pm(100\text{ mV} + 3\% \text{ of threshold setting})$

TECHNOLOGY

Mixed Domain Oscilloscope

APPLICATIONS

Embedded design, system-level debugging, spectral analysis, and RF verification

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