

TEKTRONIX

MDO3024

The Tektronix MDO3024 is a 200 MHz, 4-channel Mixed Domain Oscilloscope from the MDO3000 series, integrating an RF spectrum analyzer, arbitrary function generator, logic analyzer, protocol analyzer, and a digital voltmeter in a single compact instrument.

SPECIFICATIONS

General

Interfaces	USB 2.0 Host (2x Front, 1x Rear), USB 2.0 Device, LAN (10/100 Base-T Ethernet), Video Out (DB-15 SVGA)
Display	9 in. (229 mm) WVGA (800 x 480) widescreen color TFT-LCD

Physical

Operating Temperature	0 to +50 °C °C
Dimensions (W×H×D)	370 mm x 203 mm x 147 mm (14.6 in. x 8.0 in. x 5.8 in.) mm
Weight	4.2 kg (9.2 lbs) kg

Analog Vertical System

Analog Input Channels	4
Analog Bandwidth (-3 dB)	200 MHz
Calculated Rise Time (10% to 90%)	1.75 ns (typical)
Input Coupling	AC, DC, GND
Input Impedance	1 MOhm +/-1% 13 pF, 50 Ohm +/-1%
Vertical Resolution	8 bits (11 bits with High Resolution mode)
Hardware Bandwidth Limits	20 MHz
DC Gain Accuracy	+/-1.5% for 5 mV/div and above
Maximum Input Voltage (1 MOhm)	300 V RMS Cat II
Maximum Input Voltage (50 Ohm)	5 V RMS

Digital Vertical System

Digital Channels	16 (with optional MDO3MSO upgrade)
Digital Threshold Selections	TTL, CMOS, ECL, PECL, User-defined
Digital User-defined Threshold Range	-15 V to +25 V
Digital Maximum Input Voltage	-20 V to +30 V
Digital Minimum Voltage Swing	500 mV
Digital Input Resistance	101 kOhm
Digital Probe Loading	8 pF
Digital Vertical Resolution	1 bit

Horizontal System - Analog

Maximum Real-time Sample Rate	2.5 GS/s (all channels)
Maximum Record Length	10 Mpoints (all channels)
Time Base Range	1 ns/div to 1000 s/div
Channel-to-Channel Deskew Range	+/-125 ns
Maximum Duration at Highest Sample Rate	4 ms

Horizontal System - Digital

Digital Sample Rate (Main)	500 MS/s (2 ns resolution)
Digital Record Length (Main)	10 Mpoints
Digital Sample Rate (MagniVu)	8.25 GS/s (121.2 ps resolution)
Digital Record Length (MagniVu)	10k points centered on trigger
Digital Minimum Detectable Pulse Width	2 ns (typical)
Digital Channel-to-Channel Skew	500 ps (typical)

Spectrum Analyzer

RF Input Channels	1
Standard RF Frequency Range	9 kHz to 200 MHz
Optional RF Frequency Range	9 kHz to 3 GHz (with MDO3SA upgrade)
RF Capture Bandwidth	Up to 3 GHz (ultra-wide)

Arbitrary/Function Generator

Arbitrary Function Generator Channels	1 (with optional MDO3AFG upgrade)
AFG Maximum Frequency	50 MHz
AFG Waveforms	13 predefined types and user-defined arbitrary
AFG Sample Rate	250 MS/s
AFG Record Length	128 kpoints

Integrated Instruments

Digital Voltmeter Measurements	4-digit AC RMS, DC, and AC+DC RMS (free with registration)
Frequency Counter Resolution	5-digit (free with registration)

Display & User Interface

Maximum Waveform Capture Rate	>280,000 wfm/s (FastAcq)
Wave Inspector	Dedicated front panel controls with zoom, pan, and automated search

Trigger System

Trigger Modes	Auto, Normal, Single
Trigger Coupling	DC, AC, HF Reject, LF Reject, Noise Reject
Trigger Holdoff Range	20 ns to 8 s
Optional Protocol Support	I2C, SPI, RS-232/422/485/UART, USB 2.0, CAN, LIN, FlexRay, MIL-STD-1553, Audio
Edge Trigger Sensitivity	0.4 div from DC to 50 MHz, increasing to 1 div at rated bandwidth (DC-coupled)
Trigger Jitter	< 8 ps RMS (typical)

Acquisition Modes

Acquisition Modes	Sample, Peak Detect, Averaging, Envelope, High Resolution, Roll
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Waveform Analysis

Waveform Math	Arithmetic (Add, Subtract, Multiply, Divide), Advanced Math, FFT
Automated Measurements	30 automatic measurements

Environmental & Compliance

Non-Operating Temperature Range	-40 °C to +71 °C
Operating Altitude	Up to 3,000 meters
Non-Operating Altitude	Up to 12,000 meters

Vertical System

Vertical Sensitivity Range (1 M Ω)	1 mV/div to 10 V/div
Vertical Sensitivity Range (50 Ω)	1 mV/div to 1 V/div
Channel-to-Channel Isolation	$\geq 100:1$ at ≤ 100 MHz; $\geq 30:1$ at > 100 MHz

Horizontal System

Timebase Accuracy	± 10 ppm over any ≥ 1 ms interval
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Spectrum Analyzer - RF Input

RF Input Connector	Type-N female
RF Input VSWR	< 1.5:1 (9 kHz to 3 GHz, typical)
RF Maximum Operating Input Level	+20 dBm (0.1 W) average continuous power, ± 40 V DC
RF Absolute Maximum Input Level	+30 dBm (1 W) average continuous power, ± 40 V DC

Arbitrary Function Generator

AFG Amplitude Range (50 Ω)	1 mVp-p to 2.5 Vp-p
AFG Amplitude Range (Hi-Z)	2 mVp-p to 5 Vp-p
AFG Sine Frequency Range	0.1 Hz to 50 MHz
AFG Square/Pulse Frequency Range	0.1 Hz to 25 MHz
AFG Ramp/Triangle Frequency Range	0.1 Hz to 500 kHz
AFG Vertical Resolution	14 bits
AFG Jitter (RMS)	500 ps (typical)
AFG Sine Harmonic Distortion	<-40 dBc (< 20 kHz), <-35 dBc ($\geq$ 20 kHz) for 1 Vpp into Hi-Z
AFG Sine THD	< 1% (10 Hz to 20 kHz, 1 Vpp, typical)
AFG Sine SFDR	-40 dBc (10 Hz to 50 MHz, 1 Vpp, typical)
AFG Frequency Resolution	0.1 Hz or 4 digits (whichever is greater)

Power and Environmental

Power Consumption	120 W maximum
Ventilation Clearance	50.8 mm (2 in) required on left side and rear

Standard Accessories

Standard Analog Probes	4x TPP0250 (250 MHz, 10X, 3.9 pF passive probes)
Optional Digital Probe	P6316 16-channel logic probe (included with option MDO3MSO)

RF Input

RF DANL	<-109 dBm/Hz (9 kHz - 50 kHz), <-126 dBm/Hz (50 kHz - 5 MHz), <-138 dBm/Hz (5 MHz - 2 GHz), <-128 dBm/Hz (2 GHz - 3 GHz)
RF Level Resolution	0.1 dB

Digital Channels

Digital Channel Threshold Accuracy	$\pm(100 \text{ mV} + 3\% \text{ of threshold setting})$
Digital Channel Input Dynamic Range	$\pm 10 \text{ V}$ about threshold

Environmental

Operating Humidity	High: 40 °C to 50 °C, 10% to 60% RH; Low: 0 °C to 40 °C, 10% to 90% RH
Non-Operating Humidity	High: 40 °C to 60 °C, 5% to 55% RH; Low: 0 °C to 40 °C, 5% to 90% RH
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

Inputs & Outputs

USB Ports	1x USB 2.0 host (front), 1x USB 2.0 host (rear), 1x USB 2.0 device (rear, USBTMC support)
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TECHNOLOGY

Mixed Domain Oscilloscope

APPLICATIONS

Embedded Design, Power Measurement, EMI Troubleshooting, Education, and Manufacturing Test

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