

TEKTRONIX

MSO72304DX

The Tektronix MSO72304DX is a high-performance 23 GHz Mixed Signal Oscilloscope within the MSO70000DX series. It features 4 analog channels and 16 digital channels, offering industry-leading signal fidelity, high sample rates up to 100 GS/s on 2 channels, and comprehensive trigger and analysis tools.

SPECIFICATIONS

General

Interfaces	USB 2.0, USB 3.0, LAN (10/100/1000 Base-T Ethernet), GPIB, LXI Class C, DVI, DisplayPort
Display	12.1-inch color TFT-LCD touch screen, 1024 x 768 pixels (XGA)

Physical

Power Supply	100 to 240 V AC $\pm 10\%$ (50/60 Hz), 115 V AC $\pm 10\%$ (400 Hz), 980 VA maximum
Operating Temperature	5 °C to 45 °C °C
Dimensions (W×H×D)	451 mm × 298 mm × 489 mm mm
Weight	24 kg kg

Vertical System - Analog Channels

Analog Input Channels	4
Analog Bandwidth	23 GHz
Rise Time (10% to 90%)	18 ps (typical)
Rise Time (20% to 80%)	13 ps (typical)
Input Coupling	DC
Input Impedance	50 Ω $\pm 1.5\%$
Input Sensitivity Range	6.25 mV/div to 600 mV/div
Vertical Resolution	8-bit (11-bit with averaging)
DC Gain Accuracy	$\pm 2\%$
Offset Range	± 3.4 V to ± 6.0 V (scale dependent)
Position Range	± 5 divisions

Vertical System - Digital Channels

Digital Input Channels	16
Threshold Groupings	2 groups of 8 channels
Threshold Range	-2.0 V to +4.5 V
Threshold Accuracy	$\pm (100$ mV + 3% of threshold setting)
Minimum Detectable Pulse Width	160 ps

Horizontal System & Acquisition

Maximum Real-time Sample Rate (Analog)	100 GS/s (2 channels), 50 GS/s (4 channels)
Maximum Sample Rate (Digital)	12.5 GS/s
MagniVu Digital Sample Rate	50 GS/s (20 ps resolution)
Maximum Record Length (Standard)	31.25 Mpoints (4 channels), 62.5 Mpoints (2 channels)
Maximum Record Length (Optional)	Up to 250 Mpoints on 4 channels (Opt. 20XL) or 500 Mpoints on 4 channels (Opt. 50XL)
Timebase Range	20 ps/div to 1000 s/div
Timebase Delay Time Range	-5.0 ks to 1.0 ks
Channel-to-Channel Deskew Range	±75 ns
Timebase Accuracy	±1.5 ppm (initial accuracy), ±1.0 ppm/year aging
Acquisition Modes	Sample, Peak Detect, Envelope, Average, Hi-Res, Waveform Database

Trigger System

Trigger Sources	Analog channels 1-4, Digital channels D0-D15, Auxiliary In, Line
Trigger Coupling	DC, AC, HF Rej, LF Rej, Noise Rej
Trigger Holdoff Range	250 ns to 12 s
Trigger Level Range	±120% of full scale (any channel), ±8 V (Auxiliary In)
Edge Triggering	Positive, negative, or dual slope on any channel
Glitch/Pulse Width Triggering	Trigger on glitches down to 150 ps
Runt Triggering	Trigger on a pulse that crosses one threshold but fails to cross a second threshold
Timeout Triggering	Trigger on an event which remains high, low, or either for a specified time period (300 ps to 1 s)
Pattern/State Triggering	Trigger when a logical pattern goes true or false, or is clocked by another channel
Setup/Hold Violation Triggering	Trigger on setup and hold violations from -100 ns to +100 ns (setup time) and -1.0 ns to +102 ns (hold time)
Transition Time (Slew Rate) Triggering	Trigger on pulse edge rates that are faster or slower than specified
Visual Triggering (Optional)	Define up to 8 2D areas on-screen to isolate specific waveform events
Trigger Jitter	<100 fs RMS (typical, with enhanced triggering on)
B-Event Trigger Frequency	9 GHz (maximum, typical)
Setup Time Range	-100 ns to +100 ns
Hold Time Range	-1.0 ns to +102 ns
Glitch Trigger Width Range	150 ps to 1 s
Width Trigger Range	150 ps to 1 s
Timeout Trigger Range	300 ps to 1 s
Transition Time Trigger Range	150 ps to 1 s

Waveform Measurements and Analysis

Automatic Measurements	53 built-in measurements including amplitude, time, histogram, and communication metrics
Measurement Statistics	Mean, Minimum, Maximum, Standard Deviation, Population
Reference Levels	User-definable in percent or volts (10%, 50%, 90% typical)
Waveform Histograms	Vertical or horizontal, with statistics (mean, std dev, peak-to-peak, hits)
Waveform Math (Basic Operations)	Add, Subtract, Multiply, Divide
Advanced Math	User-defined algebraic expressions, calculus (integrate, differentiate), filtering, and FFT
Fast Fourier Transform (FFT) Window Types	Rectangular, Hamming, Hanning, Kaiser-Bessel, Blackman-Harris, Gaussian, Flattop

Display and User Interface

Display Type	Liquid crystal active matrix color TFT
Display Size (Diagonal)	12.1 in (307.3 mm)
Display Resolution	1024 x 768 pixels (XGA)
Waveform Update Rate	Greater than 300,000 waveforms per second (FastAcq mode)
Display Modes	Vector, Dot, Infinite Persistence, Variable Persistence

Computer System & Storage

Operating System	Windows 7 Ultimate (64-bit)
Processor / CPU	Intel Core i7 Quad-Core, 2.5 GHz
System Memory (RAM)	8 GB
Solid State Drive (SSD) Capacity	Greater than or equal to 480 GB (removable SSD)

Connectivity & Interface Ports

Front Panel Probe Interface	TekConnect / SMA
External Reference Input	10 MHz or 100 MHz (selectable)
Reference Output	10 MHz
USB Ports (Front)	1 USB 3.0, 1 USB 2.0
USB Ports (Rear)	2 USB 3.0, 4 USB 2.0
LAN Port	RJ-45, 10/100/1000 Mbps Gigabit Ethernet
Video Output Ports	DVI-I, DisplayPort
GPIO Interface	IEEE 488.2
LXI Compliance	LXI Class C Version 1.3

Physical and Environmental

Dimensions (Height)	298 mm
Dimensions (Width)	451 mm
Dimensions (Depth)	489 mm
Weight (Net)	24 kg
Power Source Voltage	100 to 240 V AC $\pm 10\%$, 50/60 Hz; 115 V AC $\pm 10\%$, 400 Hz
Power Consumption	980 VA maximum
Non-Operating Temperature	-20 °C to 60 °C
Humidity (Operating)	8% to 80% relative humidity at up to 32 °C; 5% to 45% relative humidity above 32 °C up to 45 °C
Altitude (Operating)	3000 m (9843 ft.)

Compliance & Calibration

Safety Certifications	UL 61010-1, CSA 61010-1, EN 61010-1, IEC 61010-1
Electromagnetic Compatibility (EMC)	2004/108/EC; EN 61326-2-1
Calibration Interval	1 year
Warranty Period	1 year

Vertical System (Analog)

Effective Number of Bits (ENOB)	5.5 bits (at 10 GHz, typical), 5.0 bits (at 23 GHz, typical)
Random Noise Floor	0.34 mV RMS (at 10 mV/div, 23 GHz bandwidth, typical)
Amplitude Flatness	± 0.5 dB (from DC to 50% of nominal bandwidth, typical)

Timebase / Horizontal System

Channel-to-Channel Delay (Analog)	≤ 10 ps (after deskew, typical)
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Digital System (MSO)

Maximum Digital Toggle Rate	2.5 GHz (with P6780 logic probe)
Digital Probe Compatibility	P6717A, P6780
Digital Channel Input Resistance	20 k Ω

General Specifications

Cooling Clearance	76 mm (3 in.) required on left and right sides, 51 mm (2 in.) required on rear
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Logic Probe Options

Compatible Differential Logic Probe	P6780
Compatible Single-ended Logic Probe	P6717A
P6780 Logic Probe Bandwidth	2.5 GHz
P6717A Logic Probe Bandwidth	350 MHz

Acquisition System

Equivalent Time Sample Rate	Up to 10 TS/s
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External Interfaces

External Display Resolution Support	Up to 1920 × 1200 pixels
LXI Version Support	Version 1.3 Class C

TECHNOLOGY

Mixed Signal Oscilloscope (MSO)

APPLICATIONS

High-speed serial bus design, jitter and noise analysis, RF signal characterization, DDR/LPDDR memory validation

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