

LECROY (TELEDYNE LECROY)

WaveRunner 104MXi

The Teledyne LeCroy WaveRunner 104MXi is a high-performance 4-channel Digital Storage Oscilloscope (DSO) offering a 1 GHz analog bandwidth and a real-time sampling rate up to 10 GS/s. Engineered with standard 12.5 Mpts/channel acquisition memory (expandable to 25 Mpts on interleaved channels), it features a large 10.4-inch SVGA touch screen display, advanced triggering capabilities, and an extensive suite of mathematical and analysis tools ideal for troubleshooting and validating complex designs.

SPECIFICATIONS

General

Interfaces	LAN (10/100/1000Base-T RJ-45), 6 x USB 2.0 (1 front, 5 side), SVGA Video Out, RS-232, GPIB (optional)
Display	10.4-inch color TFT-LCD touch screen, 800 x 600 (SVGA)

Physical

Power Supply	100 to 240 VAC ($\pm 10\%$) at 50/60 Hz; 100 to 120 VAC at 400 Hz; Max 340 W
Operating Temperature	5 °C to 40 °C °C
Dimensions (W×H×D)	340 mm × 260 mm × 152 mm mm
Weight	7.26 kg
VESA Mounting	100 mm × 100 mm VESA compliant

Vertical System

Analog Bandwidth (-3 dB)	1 GHz
Number of Channels	4
Vertical Resolution	8-bit (up to 11-bit with Enhanced Resolution ERES)
Input Coupling	AC, DC, GND (50 Ω is DC only)
Input Impedance	1 M Ω 16 pF or 50 Ω
Calculated Rise Time (10% to 90%)	375 ps (typical)
DC Gain Accuracy	$\pm 1.5\%$ of full scale
Vertical Sensitivity (1 M Ω)	2 mV/div - 10 V/div
Vertical Sensitivity (50 Ω)	2 mV/div - 1 V/div
Maximum Input Voltage (1 M Ω)	400 V max (DC + Peak AC $\leq$ 10 kHz)
Maximum Input Voltage (50 Ω)	5 Vrms
Hardware Bandwidth Limiters	20 MHz, 200 MHz
Vertical Resolution (with ERRES)	Up to 11 bits
Low Frequency Limit (AC Coupling)	< 10 Hz (typical, at input BNC)
Channel-to-Channel Isolation	40 dB (typical, from DC to 1 GHz)

Horizontal System & Acquisition

Maximum Sampling Rate (Single-channel)	10 GS/s (interleaved)
Maximum Sampling Rate (Multi-channel)	5 GS/s (4 channels)
Standard Memory Depth	25 Mpts (interleaved), 12.5 Mpts/ch (4 channels)
Time Base Range	200 ps/div - 1000 s/div
Channel-to-Channel Deskew Range	±4.5 ns

Trigger System

Trigger Modes	Auto, Normal, Single, Stop
Trigger Coupling	AC, DC, HFRej, LFRej
Standard Trigger Types	Edge, Width, Glitch, Period, Timeout, Dropout, Pattern, TV-Trigger
Advanced / Protocol Triggers	I2C, SPI, UART/RS-232, CAN, LIN (optional software dependent)
Trigger Level Range	Internal: ±4.1 div from center; External: ±400 mV (with Ext/10: ±4 V)
Trigger Holdoff Range	100 ns to 20 s (or events)
Trigger Jitter	≤ 3 ps rms (typical)
Edge Trigger Sensitivity	1.0 div (DC to 1 GHz) at 50 Ω

Acquisition Modes & Signal Processing

FFT Window Types	von Hann (Hanning), Hamming, Flat Top, Blackman-Harris, Rectangular
Waveform Math Operators	Sum, Difference, Product, Ratio, FFT, Derivative, Integral, Rescale

Measurements & Analysis

Automatic Voltage Measurements	Amplitude, Base, Max, Min, Mean, Peak-to-Peak, RMS, Top
Automatic Time & Frequency Measurements	Frequency, Period, Rise Time, Fall Time, Width, Duty Cycle, Delay, Phase
Measurement Statistics	Mean, Min, Max, Standard Deviation, Count
Cursor Measurements	Time, Voltage, Tracking

Input/Output Interfaces

External Trigger Input	Front-panel BNC
External Video Display Output	15-pin D-Sub (SVGA) connector

Power & Physical Characteristics

Cooling	Forced air, temperature-controlled fan
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Environmental & Compliance

Storage Temperature Range	-20 °C to +60 °C
Operating Humidity Range	5% to 80% relative humidity (non-condensing)
Operating Altitude	Up to 3,048 m (10,000 ft)
Safety Certifications	UL 61010-1, EN 61010-1
Electromagnetic Compatibility (EMC)	EN 61326, FCC Class A

Processing System

Operating System	Windows XP Embedded
System Memory (RAM)	1 GB standard
Internal Storage	40 GB (or larger) hard disk drive

Connectivity & I/O

Probe Interface	Teledyne LeCroy ProBus
USB Ports	5 × USB 2.0 (1 front, 4 rear)
LAN Port	1 × 10/100/1000Base-T (RJ-45)
GPIB Port	Optional (via external USB-GPIB adapter or PCIe card)
Auxiliary Output	Rear-panel BNC (Trigger Out or Pass/Fail)

Data Management & Export

Waveform Storage Formats	Binary, ASCII, Excel, MATLAB, Mathcad
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General & Calibration

Calibration Interval	1 year
Standard Passive Probes	4 × PP008 (10:1, 500 MHz, 10 M Ω)

Acquisition

Optional Memory Depths	None (12.5 Mpts/ch standard, 25 Mpts interleaved)
Waveform Interpolation	Linear, Sin(x)/x
Sequence Mode Segments	Up to 10,000 (option dependent); 1,000 standard

Triggering

External Trigger Input Range	EXT: ± 400 mV; EXT/10: ± 4 V; EXT/100: ± 40 V
External Trigger Input Impedance	1 M Ω 15 pF or 50 Ω
External Trigger Max Input Voltage (1 M Ω)	400 V max (DC + Peak AC < 10 kHz)
External Trigger Max Input Voltage (50 Ω)	5 V rms

Timebase

10 MHz Reference Input	BNC, 10 MHz
10 MHz Reference Output	BNC, 10 MHz

Auxiliary I/O

Calibration Output	1 kHz square wave, 1 V p-p into ≥ 100 k Ω
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Math & Analysis

Optional Serial Protocol Decoders	I2C, SPI, UART, CAN, LIN, FlexRay, MIL-STD-1553
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TECHNOLOGY

Digital Storage Oscilloscope

APPLICATIONS

Electronic Design and Debugging, Power Analysis, Serial Data Analysis, Embedded Systems

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