

Digital Storage Oscilloscopes

► TDS1002 • TDS1012 • TDS2002 • TDS2012 • TDS2014 • TDS2022 • TDS2024



TDS1000 and TDS2000 Series Oscilloscopes. Colorful Performance at a Black and White Price.

The TDS1000 Series and TDS2000 Series digital storage oscilloscopes deliver an unbeatable combination of superior performance, unmatched ease-of-use and affordability in an ultra lightweight, portable package. These new products extend the performance and ease-of-use features in the former TDS200 Series, the benchmark for low-cost oscilloscopes.

Affordable Digital Performance

With up to 200 MHz bandwidth and 2 GS/s maximum sample rate, no other color digital storage oscilloscope offers as much bandwidth and sample rate for the price. The TDS1000 and TDS2000 Series oscilloscopes

provide accurate real-time acquisition up to their full bandwidth. These instruments offer advanced triggering, such as pulse width triggering and line-selectable video triggering, and 11 standard automatic measurements on all models. The Fast Fourier Transform (FFT) math function allows the user to analyze, characterize and troubleshoot circuits by viewing frequency and signal strength (standard on all models).

Simple User Interface

The simple user interface makes these instruments easy to use, reducing learning time and increasing efficiency. Classic, analog-style controls provide instant, front-panel access to

► Features & Benefits

60 MHz, 100 MHz and 200 MHz Bandwidths

Sample Rates up to 2 GS/s

2 or 4 Channels

Color or Monochrome LCD Display

Autoset Menu with Waveform Selection

Probe Check Wizard To Ensure Correct Probe Usage

Context-sensitive Help

Dual Time Base

Advanced Triggering

11 Automatic Measurements

Multi-language User Interface

Waveform and Setup Memories

FFT Standard on All Models

Extended Capabilities Are Provided with Optional TDS2CMA Module, WaveStar™ Software and Probes

► Applications

Service and Repair

Education and Training

Manufacturing Test and Quality Control

Design and Debug

COMPUTING

COMMUNICATIONS

VIDEO

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the most frequently used functions. The autoset function automatically detects sine waves, square waves and video signals, and provides readouts of relevant measurements. This function also allows the user to select additional views of the signal, such as rising and falling edges, video lines and fields, and FFT. The probe check wizard aids the user in setting the attenuation factor and compensating the probe. The context-sensitive help menu with indexed and hyper-linked topics allows the user to selectively learn about the operation of any oscilloscope function. The color LCD display on the TDS2000 Series models dedicates a different color for each trace and its associated readouts to simplify viewing complex signals on multiple channels.

► Characteristics

Acquisition Modes

Peak Detect – High frequency and random glitch capture. Captures glitches as narrow as 12 ns typical using acquisition hardware at all time/div settings from 5 μ s/div to 50 s/div.

Sample – Sample data only.

Average – Waveform averaged, selectable: 4, 16, 64, 128.

Single Sequence – Use the Single Sequence button to capture a single triggered acquisition sequence at a time.

Trigger System (Main Only)

Trigger Modes – Auto, Normal, Single Sequence.

Trigger Types

Edge (rising or falling) – Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: AC, DC, Noise Reject, HF Reject, LF Reject.

► TDS1000 and TDS2000 Series Electrical Characteristics

	TDS1002	TDS1012	TDS2002	TDS2012	TDS2014	TDS2022	TDS2024
Display (1/4 VGA LCD)	Mono	Mono	Color	Color	Color	Color	Color
Bandwidth* ¹	60 MHz	100 MHz	60 MHz	100 MHz	100 MHz	200 MHz	200 MHz
Channels	2	2	2	2	4	2	4
External Trigger Input	Yes on all models						
Sample Rate on each channel	1.0 GS/s	1.0 GS/s	1.0 GS/s	1.0 GS/s	1.0 GS/s	2.0 GS/s	2.0 GS/s
Record Length	2.5 K points on all models						
Vertical Resolution	8-bits						
Vertical Sensitivity	2 mV to 5 V/div on all models with calibrated fine adjustment						
DC Vertical Accuracy	±3% on all models						
Vertical Zoom	Vertically expand or compress a live or stopped waveform						
Max Input Voltage	300 V _{RMS} CAT II; derated at 20 dB/decade above 100 kHz to 13 V _{p-p} AC at 3 MHz and above						
Position Range	2 mV to 200 mV/div ±2 V >200 mV to 5 V/div ±50 V						
BW Limit	20 MHz for all models						
Input Coupling	AC, DC, GND on all models						
Input Impedance	1 M Ω in parallel with 20 pF						
Time Base Range	5 ns to 50 sec/div	5 ns to 50 sec/div	5 ns to 50 sec/div	5 ns to 50 sec/div	5 ns to 50 sec/div	2.5 ns to 50 sec/div	2.5 ns to 50 sec/div
Time Base Accuracy	50 ppm						
Horizontal Zoom	Horizontally expand or compress a live or stopped waveform						

*¹ Bandwidth is 20 MHz at 2 mV/div, all models.

Video – Trigger on all lines or individual line, odd/even or all fields from composite video, or broadcast standards (NTSC, PAL, SECAM).

Pulse Width (or Glitch) – Trigger on a pulse width less than, greater than, equal to or not equal to a selectable time limit ranging from 33 ns to 10 sec.

Trigger Source

2-channel models – CH1, CH2, Ext, Ext/5, AC Line.

4-channel models – CH1, CH2, CH3, CH4, Ext, Ext/5, AC Line.

Trigger View

Displays trigger signal while trigger view button is depressed.

Trigger Signal

Frequency Readout

Provides a frequency readout of the trigger source.

Cursors

Types – Voltage, Time.

Measurements – $[\Delta]T$, $1/[\Delta]T$ (frequency), $[\Delta]V$.

Measurement System

Automatic Waveform Measurements – Period, Frequency, +Width, –Width, Rise-time, Fall-time, Max, Min, Peak-to-Peak, Mean, Cycle RMS.

Waveform Processing

Operators – Add, Subtract, FFT.

FFT – Windows: Hanning, Flat Top, Rectangular; 2048 sample points.

Sources –

2-channel models: CH1 - CH2, CH2 - CH1, CH1 + CH2.

4-channel models: CH1 - CH2, CH2 - CH1, CH3 - CH4, CH4 - CH3, CH1 + CH2, CH3 + CH4.

Nonvolatile Storage

Waveform Display – Two 2500 point reference waveforms.

Waveform Storage – 2-channel models: Two 2500 point reference waveforms. 4-channel models: Four 2500 point reference waveforms.

Setups – 10 front-panel setups.

Display Characteristics

Display –

Monochrome models: 1/4 VGA, backlit passive LCD with adjustable multi-level contrast and inverse video selectable from front panel.

Color models: 1/4 VGA, passive color LCD with color on black background with adjustable multi-level contrast.

Interpolation – $\sin(x)/x$.

Display Types – Dots, vectors.

Persistence – Off, 1 sec, 2 sec, 5 sec, infinite.

Format – YT and XY.

Autoset Menu

Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo autoset.

► Autoset Menu for Multiple Signal Types

Signal Type	Autoset Menu Choices
Square wave	Single-cycle Multi-cycle Rising or Falling Edge
Sine Wave	Single-cycle Multi-cycle FFT Spectrum
Video (NTSC, PAL, SECAM)	Field: All, Odd or Even Line: All or Selectable Line Number

I/O Interface

TDS2CMA Communications Extension Module

Printer Port – Centronics-type parallel.

GPIO (IEEE std. 488-1987) Programmability –

Full talk/listen modes. Control of all modes, settings and measurements. Includes WaveStar™ software for oscilloscopes, 30-day product demo.

RS-232 Programmability – Full talk/listen modes.

Control of all modes, settings and measurements. Baud rate up to 19,200. 9-Pin, DTE.

Printer Capability (Requires TDS2CMA Module)

Graphics File Formats – TIFF, PCX (PC Paintbrush), BMP (Microsoft Windows), EPS (Encapsulated Postscript) and RLE.

Printer Formats – Bubble Jet, DPU-411, DPU-412, DPU-3445, Thinkjet, Deskjet, LaserJet, and Epson (9- or 24-Pin).

Layout – Landscape or Portrait.

Environmental and Safety

Temperature –

Operating: 0°C to +50°C.

Nonoperating: –40°C to +71°C.

Humidity –

Operating and Nonoperating: up to 90% RH at or below +30°C.

Operating: up to 60% RH up to 50°C.

Nonoperating: up to 60% RH up to 55°C.

Altitude –

Operating and Nonoperating: up to 3,000 m.

Electromagnetic Compatibility – Meets Directive 89/336/EEC, amended by 93/68/EEC, meets or exceeds EN55011 Class A Radiated and Conducted Emissions; FCC 47 CFR, Part 15, Subpart B, Class A; Australian EMC Framework, demonstrated per Emission Standard AS/NZS 2064; Russian GOST EMC regulations.

Safety – UL3111-1, CSA1010.1, IEC61010-1, EN61010-1.

Physical Characteristics

INSTRUMENT

Dimensions	mm	in.
Width	323.8	12.75
Height	151.4	5.96
Depth	124.5	4.90
Weight	kg	lbs.
Instrument only	2.0	4.4
with accessories	2.2	4.9

INSTRUMENT SHIPPING

Package Dimensions	mm	in.
Width	476.2	18.75
Height	266.7	10.50
Depth	228.6	9.00

RM2000 RACKMOUNT

Dimensions	mm	in.
Width	482.6	19.00
Height	177.8	7.00
Depth	108.0	4.25

Instrument Accessories

TDS2CMA – Communications Extension Module (Includes user and programmer manuals. Does not include I/O cable).

AD007 – LAN/WAN GPIB converter.

AC220 – Soft case for carrying instrument.

HCTDS32 – Hard plastic case for carrying instrument (requires AC220).

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RM2000 – Rackmount kit.

Service Manual (TDS1000 and TDS2000 Series Digital Storage Oscilloscopes) – English Only (071-1076-00).

Programmer Manual (TDS200, TDS1000 and TDS2000 Series Digital Storage Oscilloscopes) – English only (071-1075-00).

WaveStar™ Software for Oscilloscopes (WSTR0) – Windows 95/98/NT 4.0 application for waveform capture, analysis, documentation and control from your PC.

Operator Training Kit – Extensive instructions and step-by-step lab exercises provide education about the operation of the TDS1000 and TDS2000 Series oscilloscopes. Kit includes a self-paced CD-ROM-based manual and signal source board. (TNGTDS01). Optional hard copy manual is available for order separately.

Probes

P2200 – 10X – 1X switchable passive probe (200 MHz when 10X is selected).

P6015A – 1000X high voltage passive probe (75 MHz).

P5100 – 100X high voltage passive probe (250 MHz).

P5200 – High voltage active differential probe (25 MHz).

P6021 – 60 MHz AC current probe.

P6022 – 120 MHz AC current probe.

A621 – 2000 A AC current probe/BNC.

A622 – 100 A AC/DC current probe/BNC.

AM503S – AC/DC current probe system.

► Ordering Information

TDS1002, TDS1012, TDS2002, TDS2012, TDS2014, TDS2022, TDS2024 Digital Storage Oscilloscopes

Standard Accessories

Probes – P2200 200-MHz 10X – 1X Switchable Passive Probes (one per channel).

Documentation – User manual.

Power cord.

NIM/NIST-Traceable Certificate of Calibration.

Warranty Information

Three year warranty covering all labor and parts, excluding probes.

International Power Plugs

Standard – U.S. 120 V, 60 Hz (161-0066-00).

Opt. A1 – Universal Euro 220 V, 50 Hz (161-0066-09).

Opt. A2 – United Kingdom 240 V, 50 Hz (161-0066-10).

Opt. A3 – Australia 240 V, 50 Hz (161-0066-11).

Opt. A5 – Switzerland 220 V, 50 Hz (161-0154-00).

Opt. AC – China 240 V, 50 Hz (161-0304-00).

Opt. 99 – No power cord.

Accessory Cables

GPIB, 1 m (3.3 ft.) – Order 012-0991-01.

GPIB, 2 m (6.6 ft.) – Order 012-0991-00.

RS-232, 9-Pin female to 25-Pin male, 4.6 m (15 ft.), for Modems – Order 012-1241-00.

RS-232, 9-Pin female to 9-Pin female, null modem, for computers – Order 012-1379-00.

RS-232, 9-Pin female to 25-Pin female, null modem, for computers – Order 012-1380-00.

RS-232, 9-Pin female to 25-Pin male, null modem, for printers – Order 012-1298-00.

Centronics, 25-Pin male to 36-Pin Centronics, 2.4 m (8 ft.), for Parallel Printer Interfaces – Order 012-1214-00.

International User Manual (TDS1000 and TDS2000 Series Digital Storage Oscilloscopes, includes TDS2CMA user information)

Standard – English (071-1064-00).

Opt. L1 – French (071-1065-00).

Opt. L2 – Italian (071-1066-00).

Opt. L3 – German (071-1067-00).

Opt. L4 – Spanish (071-1068-00).

Opt. L5 – Japanese (071-1069-00).

Opt. L6 – Portuguese (071-1070-00).

Opt. L7 – Simplified Chinese (071-1071-00).

Opt. L8 – Traditional Chinese (071-1072-00).

Opt. L9 – Korean (071-1073-00).

Opt. LR – Russian (071-1074-00).

Translated front panel overlays included with their respective user manuals (except Russian).

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