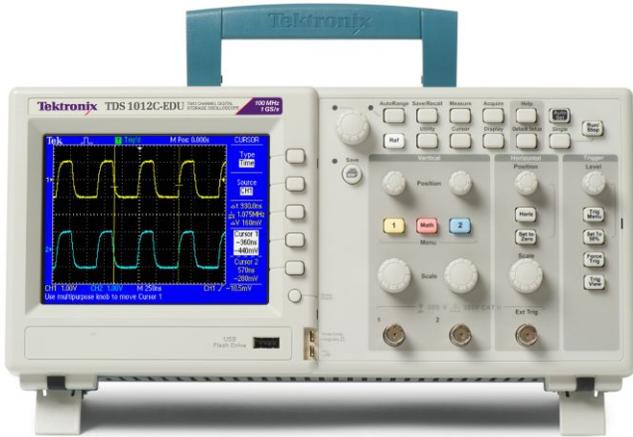# Digital Storage Oscilloscopes
## TDS1000C-EDU Series Datasheet

The TDS1000C-EDU Digital Oscilloscope Series is designed specifically to meet the needs of today's schools and universities. Packed with features and built-in tools, the TDS1000C-EDU is easy to learn and simple to operate - idea for first-time oscilloscope users and students. Featuring the same user interface as other members of the Tektronix TDS Oscilloscope Family, your students will learn to operate the world's most popular oscilloscope platform, with over 500,000 oscilloscopes in operation worldwide.

## Key performance specifications

- 100 MHz, 60 MHz, 40 MHz bandwidth models

- 2 channels on all models

- Up to 1 GS/s sample rate on all channels

- 2.5k point record length on all channels

- Advanced triggers including pulse width trigger and line-selectable video trigger

## Key features

- 16 automated measurements and FFT analysis for simplified waveform analysis

- Autoset and signal auto-ranging

- Probe check wizard

- 11-language user interface and context-sensitive help

- 144 mm (5.7 inch) active TFT color display

- Small footprint and lightweight - only 124 mm (4.9 inches) deep and 2 kg (4.4 lb)

- USB 2.0 Host Port on the front panel for quick and easy data storage

- USB 2.0 Device Port on the rear panel for easy connection to a PC or direct printing to a PictBridge®-compatible printer

- 3-year warranty

## Performance and price

To simplify integration with your existing curriculum, the TDS1000C-EDU also includes an Education Resource CD filled with tools to help you students master the use of an oscilloscope. The TDS1000C-EDU offers the tools and performance you need at a price you can afford.

## Digital precision for accurate measuring

With up to 100 MHz bandwidth and 1 GS/s maximum sample rate, no other digital storage oscilloscope offers as much bandwidth and sample rate for the price. Tektronix proprietary sampling technology provides real-time sampling with a minimum of 10X oversampling on all channels, all the time to accurately capture your signals. Sampling performance is not reduced when using multiple channels.

## Critical tools for troubleshooting your device

Advanced triggers - rising/falling edge, pulse width, and video - help you quickly isolate your signals of interest. Once you've captured a signal, advanced math capabilities and automated measurements can speed you analysis. Quickly perform an FFT or add, subtract, or multiply waveforms. Sixteen automated measurements quickly and reliably calculate important signal characteristics such as frequency or rise rime.
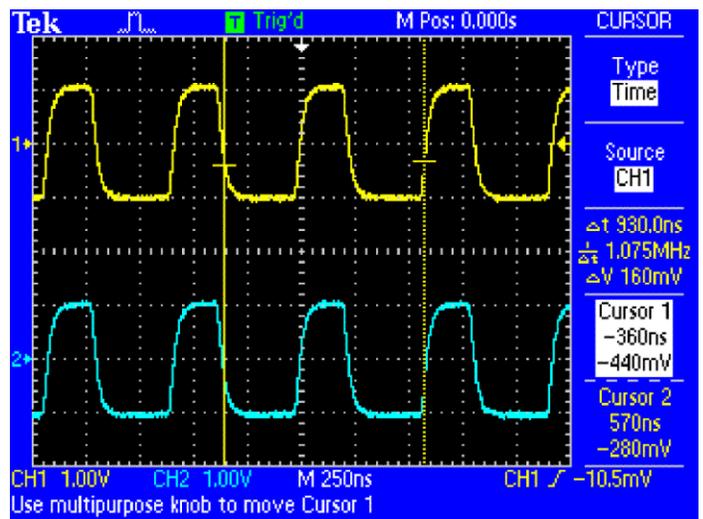
Quickly and easily capture waveforms

## Designed to make your work easy

The TDS1000C-EDU Series oscilloscopes are designed with the ease of use and familiar operation you have come to expect from Tektronix.

### Intuitive operation

The intuitive user interface with dedicated per-channel vertical controls, auto-setup, and auto-ranging makes these instruments easy to use, reducing learning time and increasing efficiency.

### Help when you need it

The built-in Help menu provides you with important information on your oscilloscope's features and functions. Help is provided in the same language as the user interface.

### Probe check wizard

Check out your probe compensation before making measurements with just one button that starts a fast, easy procedure.

### Flexible data transfer

The USB host port on the front panel enables you to save your instrument settings, screenshots, and waveform data in a flash.

### Easy PC Connectivity

Easily capture, save, and analyze measurement results by connecting to your PC with the rear-panel USB device port and the included copy of OpenChoice® PC Communications Software. Simply pull screen images and waveform data into the stand-alone desktop application or directly into Microsoft Word and Excel. Alternatively, if you prefer not use your PC, you can simply print your image directly to any PictBridge®-compatible printer.
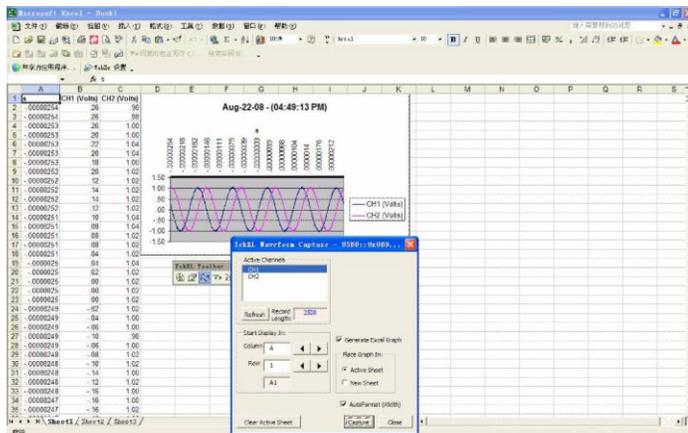


Easily capture, save and analyze measurement results with OpenChoice PC Communications software

## Performance you can count on

In addition to industry-leading service and support, every TDS1000C-EDU Series oscilloscope comes backed with a 3-year warranty as standard.

## Education resources

Every TDS1000C-EDU model includes an Education Resource CD filled with tools to help your students master the use of an oscilloscope. The Education Resource CD includes two Student Labs and Instructor's Guides and two Primers. The Student Lab and Instructor's Guide explains the basics of oscilloscope operation complete with hands-on exercises for your students. The Student Lab and Instructor's Guide explains the fundamentals of probing and how probes can affect measurement quality. The two Primers included are the most popular and widely-used from Tektronix - the and .



The included Education Resource CD is filled with tools to help your students master the use of an oscilloscope.

# Specifications

All specifications apply to all models unless noted otherwise.

## Overview

|  | TDS1001C-EDU | TDS1002C-EDU | TDS1012C-EDU |
|---|---|---|---|
| Display (QVGA LCD) | TFT on all models | | |
| Bandwidth | 40 MHz | 60 MHz | 100 MHz |
| Channels | 2 channels on all models | | |
| External trigger input | Included on all models | | |
| Sample rate on each channel | 500 MS/s | 1.0 GS/s | 1.0 GS/s |

## Vertical system

| | |
|---|---|
| **Record length** | 2.5k points at all time bases 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 |
| **Maximum input voltage** | 300 $V_{RMS}$ CAT II; derated at 20 dB/decade above 100 kHz to 13 $V_{p-p}$ AC at 3 MHz |
| **Position range** | 2 mV to 200 mV/div +2 V;<br>>200 mV to 5 V/div + 50 V |
| **Bandwidth limit** | 20 MHz for all models |
| **Input impedance** | 1 MΩ in parallel with 20 pF |
| **Input coupling** | AC, DC, GND on all models |

## Horizontal system

| | |
|---|---|
| **Time base accuracy** | 50 ppm |
| **Horizontal zoom** | Horizontally expand or compress a live or stopped waveform |

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## Trigger system

| | |
|---|---|
| **Trigger modes** | Auto, Normal, Single Sequence |

| **Trigger types** | |
|---|---|
| **Edge (rising/falling)** | Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: AC, DC, Noise Reject, HR Reject, LF Reject |
| **Video** | Trigger on all lines or individual lines, 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 s |

| | |
|---|---|
| **Trigger source** | CH1, CH2, Ext, Ext/5, AC Line |
| **Trigger view** | Displays the trigger signal while the Trigger View button is depressed. |
| **Trigger signal frequency readout** | Provides a frequency readout of the trigger source |

## Acquisition system

| **Acquisition modes** | |
|---|---|
| **Peak detect** | High-frequency and random glitch capture. Captures glitches as narrow as 12 ns (typical) using acquisition hardware at all time-base settings from 5 µs/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 |
| **Roll mode** | At acquisition time base settings of >100 ms/div |

## Waveform measurements

| | |
|---|---|
| **Automatic waveform measurements** | Period, Frequency, +Width, -Width, Rise Time, Fall Time, Max, Min, Peak-to-Peak, Mean, RMS, Cycle RMS, Cursor RMS, Duty Cycle, Phase, Delay |

| **Cursors** | |
|---|---|
| **Types** | Amplitude and time |
| **Measurements** | ΔT, 1/ΔT (frequency), ΔV |

## Waveform math

| | |
|---|---|
| **Operators** | Add, Subtract, Multiply, FFT |
| **Sources** | CH1 - CH2, CH2 - CH1, CH1 + CH2, CH1 x CH2 |
| **FFT** | Windows, Hanning, Flat Top, Rectangular |
| | 2,048 sample points |

## Waveform math

| | |
|---|---|
| **Autoset menu** | Single-button, automatic setup of all channels for vertical, horizontal, and trigger systems, with undo Autoset. |
| | Autoset-menu signal-type choices are: |
| **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 Event |
| | Line: All or Selectable Line Number |
| **Autorange** | Automatically adjust vertical and/or horizontal oscilloscope settings when a probe is moved from point to point, or when a signal exhibits large changes |

## Display characteristics

| | |
|---|---|
| **Display** | QVGA color TFT |
| **Interpolation** | Sin (x)/x |
| **Display types** | Dots, vectors |
| **Persistence** | Off, 1 s, 2 s, 5 s, infinite |
| **Format** | YT and XY |

## Input-output interfaces

| | |
|---|---|
| **USB Ports** | 2 USB 2.0 ports |
| | The USB host port on the front panel supports USB flash drives |
| | The USB device port on the back of the instrument supports connection to a PC and to all PictBridge-compatible printers |
| **GPIB** | Optional |

## Nonvolatile storage

| | |
|---|---|
| **Reference waveform display** | Two 2.5k point reference waveforms |
| **Waveform storage without USB flash drive** | Two 2.5k point for all models |
| **Maximum USB flash drive size** | 64 GB |
| **Waveform storage with USB flash drive** | 96 or more reference waveforms per 8 MB |
| **Setups without USB flash drive** | 10 front-panel setups |
| **Setups with USB flash drive** | 4,000 or more front-panel setups per 8 MB |
| **Screen images with USB flash drive** | 128 or more screen images per 8 MB |
| | The actual number of images depends on the file format selected |
| **Save All with USB flash drive** | 12 or more Save All operations per 8 MB |
| | A single Save All operation creates 3 to 9 files (setup, image, plus one file for each displayed waveform) |

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## Power source

**Power source**

| | |
|---|---|
| **Source voltage** | Full range: 100 to 240 $V_{AC}$ RMS ±10%, Installation Category II (covers range of 90 to 264 $V_{AC}$) |
| **Power consumption** | Power consumption: Less than 30 W at 85 to 275 $V_{AC}$ input |

## Physical characteristics

**Instrument dimensions**

| | |
|---|---|
| **Height** | 158.0 mm (6.2 inches) |
| **Width** | 326.3 mm (12.8 inches) |
| **Depth** | 124.2 mm (4.9 inches) |

**Instrument weight**

| | |
|---|---|
| **Instrument only** | 2.0 kg (4.4 lb) |
| **Instrument with accessories** | 2.2 kg (4.9 lb) |

**Shipping package dimensions**

| | |
|---|---|
| **Height** | 266.7 mm (10.5 inches) |
| **Width** | 476.2 mm (18.7 inches) |
| **Depth** | 228.6 mm (9.0 inches) |

**RM2000 rackmount dimensions**

| | |
|---|---|
| **Height** | 177.8 mm (7.0 inches) |
| **Width** | 482.6 mm (19.0 inches) |
| **Depth** | 108.0 mm (4.3 inches) |

## EMC, environment, and safety

**Temperature**

| | |
|---|---|
| **Operating** | 0 to +50 °C |
| **Non-operating** | -40 to +71 °C |

**Humidity**

| | |
|---|---|
| **Operating** | Up to 80% RH at or below +40 °C |
| | Up to 45% RH up to +50 °C |
| **Non-operating** | Up to 80% RH at or below +40 °C |
| | Up to 45% RH up to +50 °C |

**Altitude**

| | |
|---|---|
| **Operating** | Up to 3,000 m |
| **Non-operating** | Up to 3,000 m |

| | |
|---|---|
| **Electromagnetic compatibility** | Meets Directive 2004/108/EC, EN 61326-2-1 Class A; Australian EMC Framework |

| | |
|---|---|
| **Safety** | UL61010-1:2004, CSA22.2 No. 61010-1:2004, EN61010-1:2001, IEC61010-1:2001, EU Low Voltage Directive 2006/95/EC |

# Ordering information

## Models

| | |
|---|---|
| **TDS1001C-EDU** | 40 MHz, 2 Ch, 500 MS/s, TFT DSO |
| **TDS1002C-EDU** | 60 MHz, 2 Ch, 1 GS/s, TFT DSO |
| **TDS1012C-EDU** | 100 MHz, 2 Ch, 1 GS/s, TFT DSO |

## Instrument options

### Language options

| | |
|---|---|
| **Opt. L0** | English (front-panel label on instrument) |
| **Opt. L1** | French (front-panel overlay) |
| **Opt. L2** | Italian (front-panel overlay) |
| **Opt. L3** | German (front-panel overlay) |
| **Opt. L4** | Spanish (front-panel overlay) |
| **Opt. L5** | Japanese (front-panel overlay) |
| **Opt. L6** | Portuguese (front-panel overlay) |
| **Opt. L7** | Simplified Chinese (front-panel overlay) |
| **Opt. L8** | Traditional Chinese (front-panel overlay) |
| **Opt. L9** | Korean (front-panel overlay) |
| **Opt. L10** | Russian (front-panel overlay) |

User manual (PDF) in 11 languages are available on the documentation CD and for download from www.tektronix.com/manuals. There are no printed user manuals.

### Power plug options

| | |
|---|---|
| **Opt. A0** | North America power plug (115 V, 60 Hz) |
| **Opt. A1** | Universal Euro power plug (220 V, 50 Hz) |
| **Opt. A2** | United Kingdom power plug (240 V, 50 Hz) |
| **Opt. A3** | Australia power plug (240 V, 50 Hz) |
| **Opt. A4** | North America power plug (240 V, 50 Hz) |
| **Opt. A5** | Switzerland power plug (220 V, 50 Hz) |
| **Opt. A6** | Japan power plug (100 V, 110/120 V, 60 Hz) |
| **Opt. A10** | China power plug (50 Hz) |
| **Opt. A11** | India power plug (50 Hz) |
| **Opt. A12** | Brazil power plug (60 Hz) |
| **Opt. A99** | No power cord |

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## Service options

**Opt. D1**               Calibration Data Report

**Opt. R5**               Repair Service 5 Years (including warranty)

**Opt. SILV100**      Standard warranty extended to 5 years

Probes and accessories are not covered by the oscilloscope warranty and Service Offerings. Refer to the datasheet of each probe and accessory model for its unique warranty and calibration terms.

## The Tektronix customer service advantage

You can trust Tektronix to offer unequaled engineering expertise and a customer-centric approach to ensure the optimal performance of your Tektronix products and maximize the lifetime value of your Tektronix investment. With service from Tektronix you get:

- Access to the source of product knowledge; unsurpassed technical expertise
- Your challenges solved by front-line technical experts, design engineering reinforcement, and online support tools
- Comprehensive and thorough support provided worldwide, including software and firmware updates, data reports, and adjustments
- Efficiency and convenience; no-hassle service from initial service call to turnaround and delivery
- Flexible repair and calibration service with access to the best on-call technical trouble shooting staff in the industry, with over 20 years of training per support engineer
- Customer-centric approach dedicated to serving your needs everyday with services designed to optimize your product performance, increase productivity and ROI by delivering a fixed cost of ownership, and efficient management of service

# Standard accessories

## Probes

**TPP0101**      Two (2) 100 MHz 10X passive probes

## Accessories

**Power cord** — Please specify plug option

**NIM/NIST** — Traceable Certificate of Calibration

**Documentation** — TDS2000C and TDS1000C-EDU Compliance and Safety Instructions

TDS2000C and TDS1000C-EDU Documentation CD

**OpenChoice PC Communications Software** — Enables fast and easy communication between a Windows PC and the TDS2000C Series using USB. Transfer and save settings, waveforms, measurements, and screen images

**Educator Classroom and Lab Resource CD** — Contains lab experiments for oscilloscopes and probes, and and primers.

**3-year warranty** — Covering labor and parts for defects in materials and workmanship for a minimum of 3 years, excluding probes and accessories.

Probes and accessories are not covered by the oscilloscope warranty and Service Offerings. Refer to the datasheet of each probe and accessory model for its unique warranty and calibration terms.

## Recommended accessories

### Probes

| | |
|---|---|
| **TPP0101** | 10X passive probe, 100 MHz bandwidth |
| **TPP0201** | 10X passive probe, 200 MHz bandwidth |
| **P2220** | 1X/10X passive probe, 200 MHz bandwidth |
| **P6101B** | 1X passive probe (15 MHz, 300 $V_{RMS}$ CAT II rating) |
| **P6015A** | 1000X high-voltage passive probe (75 MHz) |
| **P5100A** | 100X high-voltage passive probe (500 MHz) |
| **P5200** | High-voltage active differential probe (25 MHz) |
| **P6021** | 15 A, 60 MHz AC-current probe |
| **A621** | 2000 A, 5 to 50 kHz, AC-current probe |
| **A622** | 100 A, 100 kHz, AC/DC current probe/BNC |
| **TCP303/TCPA300** | 150 A, 15 MHz AC/DC current probe/amplifier |
| **TCP305/TCPA300** | 50 A, 50 MHz AC/DC current probe/amplifier |
| **TCP312/TCPA300** | 30 A, 100 MHz AC/DC current probe/amplifier |
| **TCP404XL/TCPA400** | 500 A, 2 MHz AC/DC current probe/amplifier |

### Accessories

| | |
|---|---|
| **TEK-USB-488** | GPIB-to-USB converter |
| **AC2100** | Soft carrying case for instrument |
| **HCTEK4321** | Hard plastic carrying case for instrument |
| **RM2000B** | Rackmount kit |
| **077-0444-xx** | Programmer manual, English only, PDF only, downloadable from www.tektronix.com/manuals |
| **077-0446-xx** | Service manual, English only, PDF only, downloadable from www.tektronix.com/manuals |
| **174-4401-xx** | USB host to device cable, 3 feet long |

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tektronix.com.

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