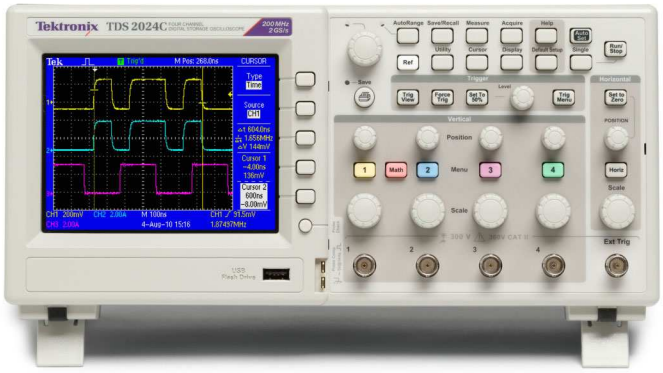
Digital Storage Oscilloscopes

TDS2000C Series Data Sheet



Features & Benefits

Key Performance Specifications

- 200 MHz, 100 MHz, 70 MHz, 50 MHz Bandwidth Models
- 2- and 4-channel Models
- Up to 2 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

Ease-of-Use Features

- 16 Automated Measurements, and FFT Analysis for Simplified Waveform Analysis
- Built-in Waveform Limit Testing
- Automated, Extended Data Logging Feature
- Autoset and Signal Auto-ranging
- Built-in Context-sensitive Help
- Probe Check Wizard
- Multiple-language User Interface
- 5.7 in. (144 mm) Active TFT Color Display
- Small Footprint and Lightweight – Only 4.9 in. (124 mm) Deep and 4.4 lb. (2 kg)

Connectivity

- USB 2.0 Host Port on the Front Panel for Quick and Easy Data Storage
- USB 2.0 Device Port on Rear Panel for Easy Connection to a PC or Direct Printing to a PictBridge®-compatible Printer
- Includes National Instrument's LabVIEW SignalExpress™ TE Limited Edition and Tektronix OpenChoice® Software for Connecting Your Bench

Lifetime Warranty*[1]

*[1] Limitations apply. For terms and conditions, visit www.tektronix.com/lifetimewarranty.

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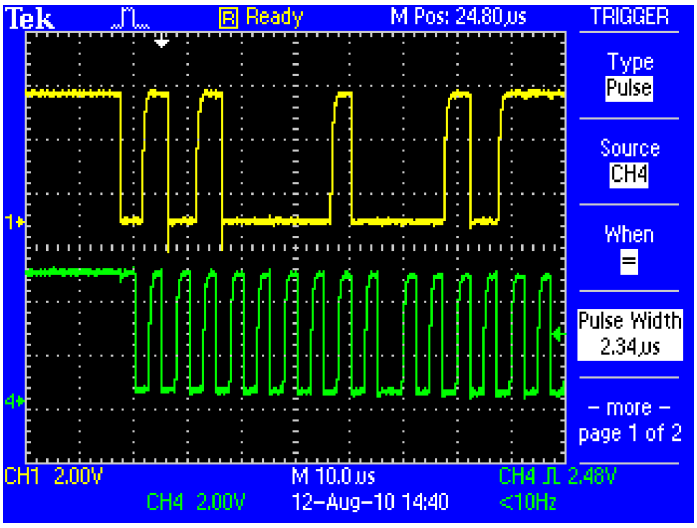


Quickly and easily capture waveforms with advanced triggering.

Performance You Need at a Price You Can Afford

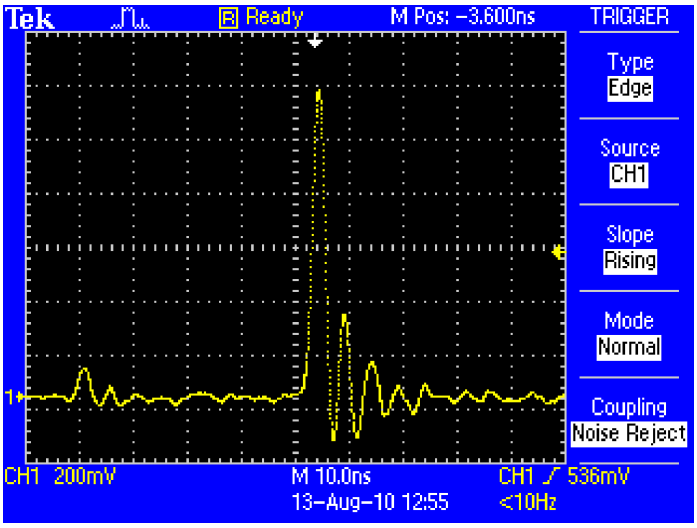
The TDS2000C Digital Storage Oscilloscope Series provides you with affordable performance in a compact design. Packed with standard features – including USB connectivity, 16 automated measurements, limit testing, data logging, and context-sensitive help – the TDS2000C Series oscilloscopes help you get more done, in less time.

Digital Precision for Accurate Measurements

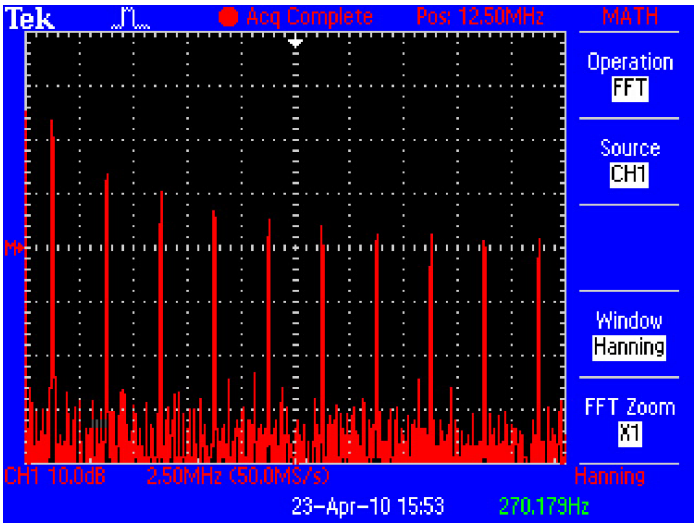
With up to 200 MHz bandwidth and 2 GS/s maximum sample rate, no other digital storage oscilloscope offers as much bandwidth and sample rate for the price. Tektronix proprietary sampling technology provides real-time sampling with a minimum of 10X oversampling on all channels, all the time to accurately 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 your 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 time, while the built-in Limit Test function enables you to easily identify problems in your signal.



See all the details other oscilloscopes might miss with Tektronix proprietary digital real-time sampling.



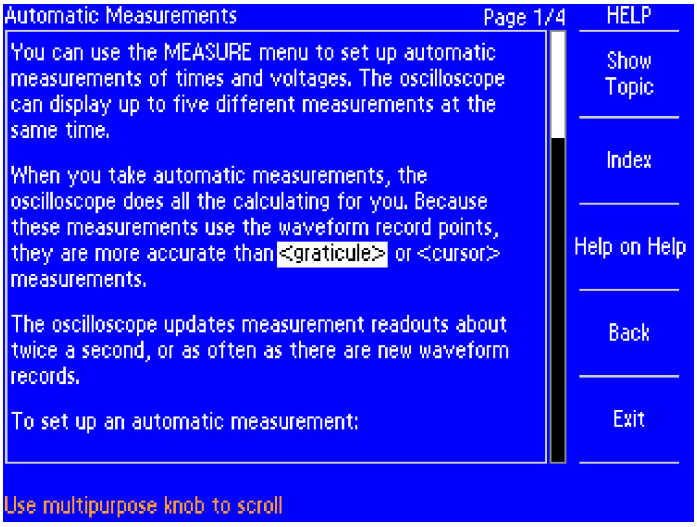
Quickly perform an FFT with the advanced math functions.

Designed to Make Your Work Easy

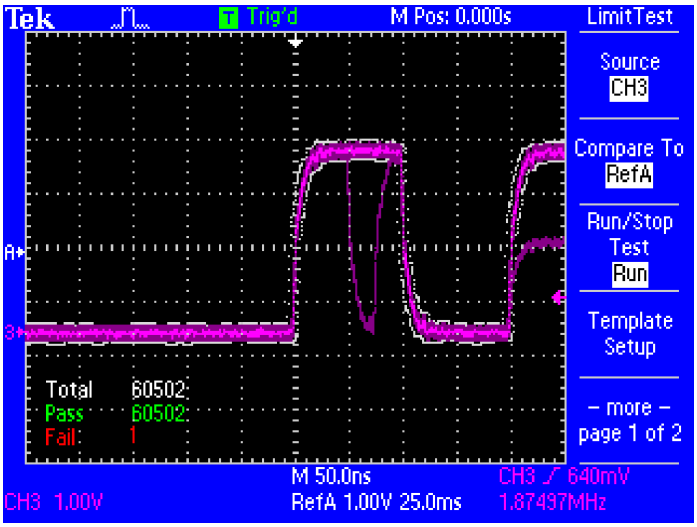
The TDS2000C Series oscilloscopes are designed with the ease of use and familiar operation you have come to expect from Tektronix.

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.



The context-sensitive Help system provides important information specific to the task you are working on.



Limit Test provides a quick Pass/Fail comparison of any triggered input signal to a user-defined template.

Help When You Need It, Where You Need It

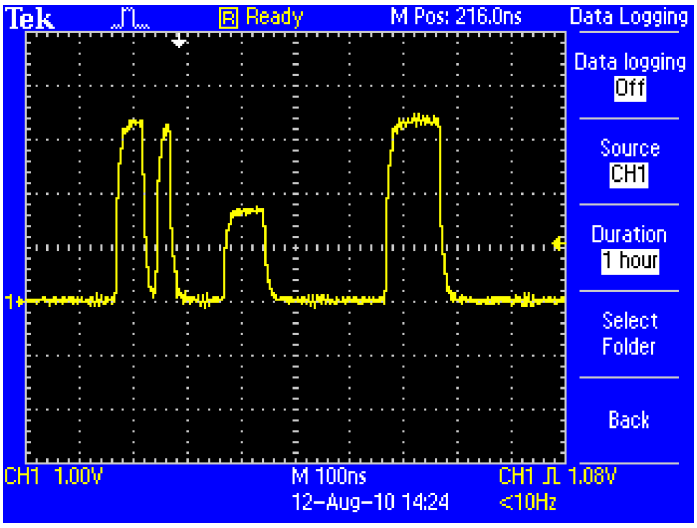
The built-in Help menu provides you with important information on your oscilloscope's features and functions. Help is provided in the same languages as the user interface.

Probe Check Wizard

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

Limit Test

The oscilloscope can automatically monitor source signals and output Pass or Fail results by judging whether the input waveform is within predefined boundaries. Specific actions can be triggered on violation including stopping waveform acquisition, stopping Limit Test functions, saving the failed waveform data or screen image to a USB memory device, or any combination of the above. This is an ideal solution for manufacturing or service applications where you need to make decisions quickly.

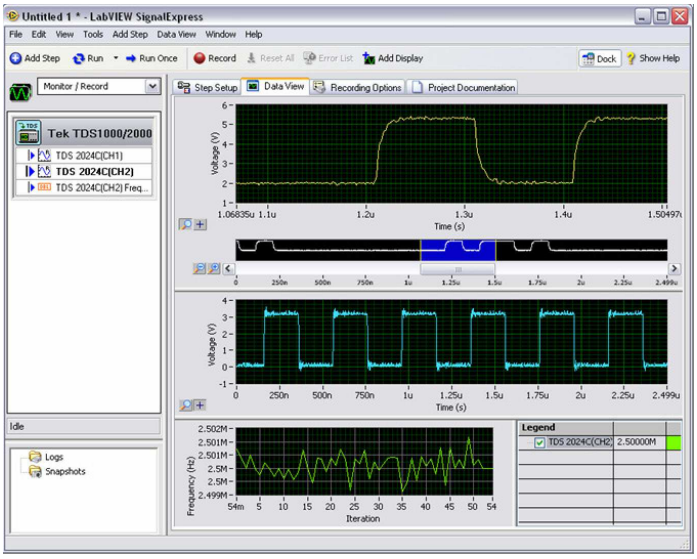


Data Logging enables automatic saving of triggered waveforms.

Conveniently use your USB flash drive to store screenshots and waveform data.

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. The built-in Data Logging feature means you can set up your oscilloscope to save user-specified triggered waveforms to a USB memory device for up to 24 hours. You can also select the "Infinite" option for continuous waveform monitoring. With this mode you can save your triggered waveforms to an external USB memory device without a duration limitation until the memory device is full. The oscilloscope will then guide you to insert another USB memory device to continue saving waveforms.



Easily capture, save, and analyze measurement results with included National Instrument's LabVIEW SignalExpress, Limited Tektronix Edition software.

Easy PC Connectivity

Easily capture, save, and analyze measurements 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 to use your PC, you can simply print your image directly to any PictBridge-compatible printer.

Connect Your Bench for Intelligent Debug

Every TDS2000C Series oscilloscope ships with an included copy of the Limited Tektronix Edition of National Instrument's LabVIEW SignalExpress for basic instrument control, data logging, and analysis.

SignalExpress supports the range of Tektronix bench instruments*[2] enabling you to connect your entire test bench. You can then access the feature-rich tools packed into each instrument from one intuitive software interface. This allows you to automate complex measurements requiring multiple instruments, log data for an extended period of time, time-correlate data from multiple instruments, and easily capture and analyze your results, all from your PC. Only Tektronix offers a connected test bench of intelligent instruments to simplify and speed debug of your complex design.

Performance You Can Count On

In addition to industry-leading service and support, every TDS2000C Series oscilloscope comes backed with a Lifetime Warranty*[1] as standard.

*[1] Limitations apply. For terms and conditions, visit www.tektronix.com/lifetimewarranty.

*[2] For a complete listing of Tektronix instruments supported by NI LabVIEW Signal Express, visit www.tektronix.com/signalexpress.

Characteristics

TDS2000C Series Digital Storage Oscilloscopes

	TDS2001C	TDS2002C	TDS2004C	TDS2012C	TDS2014C	TDS2022C	TDS2024C
Display (QVGA LCD)	TFT	TFT	TFT	TFT	TFT	TFT	TFT
Bandwidth*[3]	50 MHz	70 MHz	70 MHz	100 MHz	100 MHz	200 MHz	200 MHz
Channels	2	2	4	2	4	2	4
External Trigger Input	Included on all models						
Sample Rate on Each Channel	500 MS/s	1.0 GS/s	1.0 GS/s	2.0 GS/s	2.0 GS/s	2.0 GS/s	2.0 GS/s
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 >200 mV to 5 V/div +50 V						
Bandwidth Limit	20 MHz for all models						
Input Coupling	AC, DC, GND on all models						
Input Impedance	1 MΩ in parallel with 20 pF						
Time Base Range	5 ns to 50 s/div	5 ns to 50 s/div	5 ns to 50 s/div	2.5 ns to 50 s/div	2.5 ns to 50 s/div	2.5 ns to 50 s/div	2.5 ns to 50 s/div
Time Base Accuracy	50 ppm						
Horizontal Zoom	Horizontally expand or compress a live or stopped waveform						
I/O Interfaces							
USB Ports	USB host port on front panel supports USB flash drives USB device port on back of instrument supports connection to PC and all PictBridge-compatible printers						
GPIB	Optional						
Nonvolatile Storage							
Reference Waveform Display	(2) 2.5k point reference waveforms						
Waveform Storage without USB Flash Drive	(2) 2.5k point	(2) 2.5k point	(4) 2.5k point	(2) 2.5k point	(4) 2.5k point	(2) 2.5k point	(4) 2.5k point
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	4000 or more front-panel setups per 8 MB						
Screen Images with USB Flash Drive	128 or more screen images per 8 MB (the number of images depends on 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)						

*[3] Bandwidth is 20 MHz at 2 mV/div, all models.

Acquisition Modes

Mode	Description
Peak Detect	High-frequency and random glitch capture. Captures glitches as narrow as 12 ns (typical) 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	At acquisition time base settings of >100 ms/div

Trigger System

Characteristic	Description
Trigger Modes	Auto, Normal, Single Sequence

Trigger Types

Trigger	Description
Edge (Rising/Falling)	Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: AC, DC, Noise Reject, HF 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

Characteristic	Description
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

Characteristic	Description
Types	Amplitude, Time
Measurements	ΔT, 1/ΔT, ΔV

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.

Waveform Math

Characteristic	Description
Operators	Add, Subtract, Multiply, FFT
FFT	Windows: Hanning, Flat Top, Rectangular 2048 sample points
Sources	
2-channel models	CH1 – CH2, CH2 – CH1, CH1 + CH2, CH1 × CH2
4-channel models	CH1 – CH2, CH2 – CH1, CH3 – CH4, CH4 – CH3, CH1 + CH2, CH3 + CH4, CH1 × CH2, CH3 × CH4

Autoset Menu

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

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

Autorange

Automatically adjust vertical and/or horizontal oscilloscope settings when probe is moved from point to point, or when the signal exhibits large changes.

Display Characteristics

Characteristic	Description
Display	QVGA Active Color TFT
Interpolation	Sin(x)/x
Display Types	Dots, vectors
Persistence	Off, 1 s, 2 s, 5 s, infinite
Format	YT and XY

Multiple-language User Interface and Context-sensitive Help

Characteristic	Description
Languages Available	English, French, German, Italian, Japanese, Korean, Portuguese, Russian*4, Simplified Chinese, Spanish, Traditional Chinese

*4 Requires Russian firmware, indicated by "RUS" suffix.

Environmental and Safety

Characteristic	Description
Temperature	
Operating	0 to +50 °C
Nonoperating	–40 to +71 °C
Humidity	
Operating and nonoperating	Up to 80% RH at or below +40 °C Up to 45% RH up to +50 °C
Altitude	
Operating and nonoperating	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

Physical Characteristics

Instrument		
Dimensions	**mm**	**in.**
Width	326.3	12.85
Height	158.0	6.22
Depth	124.2	4.89
Weight	**kg**	**lb.**
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	10.5
Depth	228.6	9.0
RM2000B Rackmount	**mm**	**in.**
Width	482.6	19.0
Height	177.8	7.0
Depth	108.0	4.25

Ordering Information

Models

Model	Description
TDS2001C	50 MHz, 2 Ch, 500 MS/s, TFT DSO
TDS2002C	70 MHz, 2 Ch, 1 GS/s, TFT DSO
TDS2004C	70 MHz, 4 Ch, 1 GS/s, TFT DSO
TDS2012C	100 MHz, 2 Ch, 2 GS/s, TFT DSO
TDS2014C	100 MHz, 4 Ch, 2 GS/s, TFT DSO
TDS2022C	200 MHz, 2 Ch, 2 GS/s, TFT DSO
TDS2024C	200 MHz, 4 Ch, 2 GS/s, TFT DSO

Standard Accessories

Accessory	Description
Passive Probes, One per Channel	TPP0101: 100 MHz passive probe for TDS2001C/TDS2002C/TDS2004C TPP0201: 200 MHz passive probe for TDS2012C/TDS2014C/TDS2022C/TDS2024C
Power Cord	(Please specify plug option)
NIM/NIST	Traceable Certificate of Calibration
Documentation	User Manual (Please specify preferred language option)
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
National Instruments SignalExpress Tektronix Edition Interactive Measurement Software – Base Version	A fully interactive measurement software environment optimized for the TDS2000C Series. Enables you to instantly acquire, generate, analyze, compare, import, and save measurement data and signals using an intuitive drag-and-drop user interface that does not require any programming. Standard TDS2000C Series support for acquiring controlling, viewing, and exporting your live signal. A 30-day trial period of the Professional Version provides additional signal processing, advance analysis, mixed signal, sweeping, limit testing, and user-defined step capabilities. Order SIGEXPTE for permanent Professional Version capability
Limited Lifetime Warranty*[5]	Covers labor and parts for defects in materials and workmanship for a minimum of 10 years, excluding probes and accessories*[6]

*[5] Lifetime is defined as 5 years after Tektronix discontinues manufacturing the product, but the warranty length shall be at least ten years from date of original purchase. Lifetime warranty is nontransferable, proof of original purchase is required. Limitations apply. For terms and conditions visit www.tektronix.com/lifetimewarranty.

*[6] Probes and accessories are not covered by the oscilloscope warranty and Service Offerings. Refer to the data sheet of each probe and accessory model for its unique warranty and calibration terms.

Power Plug Options

Option	Description
A0	North America power
A1	Universal Euro power
A2	United Kingdom power
A3	Australia power
A5	Switzerland power
A6	Japan power
A10	China power
A11	India power
A12	Brazil power
A99	No power cord or AC adapter

User Manual Options

Translated front-panel overlays included with their respective user manuals.

Option	Description
L0	English manual
L1	French manual
L2	Italian manual
L3	German manual
L4	Spanish manual
L5	Japanese manual
L6	Portuguese manual
L7	Simple Chinese manual
L8	Standard Chinese manual
L9	Korean manual
L10	Russian manual

Recommended Accessories

Accessory	Description
TEK-USB-488	GPIB-to-USB converter
SIGEXPTE	National Instruments SignalExpress Tektronix Edition Interactive Measurement Software – Professional Version
AC2100	Soft Carrying Case for Instrument
HCTEK4321	Hard Plastic Carrying Case for Instrument (requires AC2100)
RM2000B	Rackmount Kit
077-0444-xx	Programmer Manual – English Only
077-0446-xx	Service Manual – English Only
174-4401-xx	USB host to device cable, 3 ft. long

Recommended Probes

Probe	Description
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
P6022	6 A, 120 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

Service Options*[6]

Option	Description
D1	Calibration Data Report

*[6] Probes and accessories are not covered by the oscilloscope warranty and Service Offerings. Refer to the data sheet of each probe and accessory model for its unique warranty and calibration terms.

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

GPIB IEEE-488

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

Contact Tektronix:

ASEAN / Australasia (65) 6356 3900

Austria 00800 2255 4835*

Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777

Belgium 00800 2255 4835*

Brazil +55 (11) 3759 7627

Canada 1 800 833 9200

Central East Europe and the Baltics +41 52 675 3777

Central Europe & Greece +41 52 675 3777

Denmark +45 80 88 1401

Finland +41 52 675 3777

France 00800 2255 4835*

Germany 00800 2255 4835*

Hong Kong 400 820 5835

India 000 800 650 1835

Italy 00800 2255 4835*

Japan 81 (3) 6714 3010

Luxembourg +41 52 675 3777

Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90

Middle East, Asia, and North Africa +41 52 675 3777

The Netherlands 00800 2255 4835*

Norway 800 16098

People's Republic of China 400 820 5835

Poland +41 52 675 3777

Portugal 80 08 12370

Republic of Korea 001 800 8255 2835

Russia & CIS +7 (495) 7484900

South Africa +41 52 675 3777

Spain 00800 2255 4835*

Sweden 00800 2255 4835*

Switzerland 00800 2255 4835*

Taiwan 886 (2) 2722 9622

United Kingdom & Ireland 00800 2255 4835*

USA 1 800 833 9200

* European toll-free number. If not accessible, call: +41 52 675 3777

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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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