With a 9-inch WVGA display, 20 million point record length and 1 GS/s sample rate, TBS2000 Series Oscilloscopes capture and display significantly more signal to help you evaluate designs faster. Easily and confidently analyze your signals with new on-waveform cursor readouts and 32 automated measurements, each with informative tips to help you quickly choose the right one. The TekVPI® probe interface works with traditional BNC connections, but also enables wide application coverage with the latest active voltage probes and current probes.

**Key performance specifications**
- 2 and 4 analog channel models
- 100 and 70 MHz bandwidth models
- Up to 1 GS/s sampling rate
- 20 M record length on all channels
- 5 year warranty

**Key features**
- 9-inch WVGA color display
- 15 horizontal grids show 50% more signal

**Connectivity**
- USB 2.0 host port on the front panel for quick and easy data storage
- Wi-Fi interface provides wireless communications capability
- USB 2.0 device port on rear panel for easy connection to a PC
- LXI compliant 10/100BASE-T Ethernet port for remote control over LAN

**Education**
- Courseware function presents lab exercise guidance on the display
- Fully compatible with TekSmartLab lab management software for education

**Designed to make your work easier**

The TBS2000 Series is designed for easy operation and quick hands-on learning. Dedicated controls provide quick access to important settings, so you can evaluate signals faster. Many oscilloscopes provide 8 vertical divisions and 10 horizontal divisions, but the TBS2000 gives you 10 vertical divisions and **15 horizontal divisions**, so you can see more of your signal. The display also offers more room for measurement results and menu information.

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1 A Wi-Fi adapter is available in some countries from Tektronix distributors as an accessory, model TEK-USB-WIFI. See Ordering Information for details.
Designed for outstanding waveform visualization and analysis

Long record length with pan and zoom — Record length is selectable, from 2000 samples up to 20 million samples for capturing long time periods. The exceptionally long record length will help you find signal anomalies and verify digital communications. To help navigate long acquisitions, the Zoom function lets you quickly pan through the record and zoom in to see signal details.

In Zoom mode, the upper display gives an overview of up to 20 M points. The detailed zoomed view is shown in the lower display.

Versatile triggering and acquisition modes — The trigger system is designed for troubleshooting today's mixed signal designs. Beyond a basic edge trigger, it also includes pulse width and runt triggering, which are especially useful for troubleshooting digital sections of your designs. Pulse width triggering is perfect for hunting narrow glitches or timeout conditions. You specify a voltage threshold and a width, and the oscilloscope triggers when the pulses are too narrow, too wide, or of a particular duration. Runt triggering is designed to capture signals that are shorter in amplitude than expected. It lets you specify two voltage thresholds and a width. If a pulse amplitude falls between the two thresholds, the oscilloscope will trigger.

The cursor readouts are presented on the waveform display. Cursors can be used to measure time, amplitude, or both.
The default acquisition mode is Sample Mode which works well for most applications. However, the instrument also offers Peak Detect Mode which is useful for hunting spikes, and Average Mode which can help reduce noise on repetitive signals.

Automated measurements are easier than ever — A comprehensive set of automated measurements enable fast and convenient testing for a wide range of signals and applications.

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On-screen scope fundamentals
Scope Intro is a brief handbook embedded in the TBS2000. Pressing the front panel Function button gives you access to information on oscilloscope basic operations, as well as an overview of the TBS2000 and TekSmartLab Lab Management System for education.

First in its class with wireless communications
On the rear of the instrument, you will find several communications ports. The USB device port or LAN port can be used to control the instrument using the fully-documented command set.

Wi-Fi adapters are configured through integrated setup menus and support seamless wireless communications
The TBS2000 is the first oscilloscope in its class to support wireless communication. Plug a Wi-Fi dongle into the USB host port and set the interface for Wi-Fi from the front panel. A Wi-Fi dongle is available as TEK-USB-WIFI. Several off-the-shelf dongles have also been tested and their operation confirmed.

LXI embedded Web page for instrument control
LXI is an industry standard based on LAN connectivity for flexible, reliable, and efficient communication and control. TBS2000 supports LXI Core 2011. The TBS2000 LXI Web page can be accessed by simply typing the instrument IP address into any Web browser.
TekVPI® Interface and active probe support
The TekVPI probe interface sets the standard for ease of use in probing. With this interface the TBS2000 Series supports a wide range of the latest voltage and current probes, providing coverage for many applications. These probes are powered by and communicate with the TBS2000 through the interface. Scale factors and status information, such as error conditions, are sent to the instrument for processing and display. This saves you from having to manually set scale factors, calculate offsets, or monitor for open jaw conditions or the need to degauss your current probes.

TekVPI probes communicate scale settings, ranges, and status to the TBS2000.

Innovative new education solutions
The TBS2000 offers distinctive new ways to enable educators to devote more time to teaching circuit concepts instead of lab setup and management.

The Courseware function allows students to see lab information on the instrument display.

The integrated Courseware function allows professors to load lab exercises on the instrument to give students guidance at each station, and provides a structured framework into which students can capture data to incorporate into their reports. Over 100 sample lab exercises are available for download from the Tektronix Courseware Resource Center.

The TBS2000 can be easily integrated into the TekSmartLab System. Together they enable educators to preset a lab full of instruments with a few mouse-clicks, and allow lab instructors to track every student's progress from one central workstation.

Performance you can count on
Tektronix has industry-leading service and support, and every TBS2000 series oscilloscope is backed with a standard 5-year warranty.
Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

Model overview

<table>
<thead>
<tr>
<th></th>
<th>TBS2072</th>
<th>TBS2102</th>
<th>TBS2074</th>
<th>TBS2104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog channels</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>70 MHz</td>
<td>100 MHz</td>
<td>70 MHz</td>
<td>100 MHz</td>
</tr>
<tr>
<td>Sample rate</td>
<td>1 GS/s</td>
<td>1 GS/s</td>
<td>1 GS/s</td>
<td>1 GS/s</td>
</tr>
<tr>
<td>Record length</td>
<td>20 M points</td>
<td>20 M points</td>
<td>20 M points</td>
<td>20 M points</td>
</tr>
</tbody>
</table>

Vertical system analog channels

<table>
<thead>
<tr>
<th>Hardware bandwidth limits</th>
<th>20 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input coupling</td>
<td>DC, AC, or GND</td>
</tr>
<tr>
<td>Input impedance</td>
<td>1 MΩ ± 2 %, 11.5 pF ± 2.5 pF</td>
</tr>
<tr>
<td>Input sensitivity range</td>
<td>2 mV/Div to 5 V/Div</td>
</tr>
<tr>
<td>Vertical resolution</td>
<td>8 bits</td>
</tr>
<tr>
<td>Maximum input voltage, 1 MΩ</td>
<td>300 V RMS with peaks ≤ ±450 V</td>
</tr>
</tbody>
</table>

Acquisition modes

- **Sample**: Acquire sampled values.
- **Peak Detect**: Captures glitches as narrow as 3.5 ns at all sweep speeds.
- **Average**: From 2 to 512 waveforms included in average.
- **Roll**: Scrolls waveforms right to left across the screen at sweep speeds slower than or equal to 40 ms/div (400 ms/div at 20M record length).

Math modes

- **All units**: Ch 1 - Ch 2, Ch 2 - Ch 1, Ch 1 + Ch 2, Ch 1 X Ch 2
- **FFT**: Ch 3 - Ch 4, Ch 3 + Ch 4, Ch 4 - Ch 3, Ch 3 X Ch 4

- **DC balance**: ± (1 mV +0.1 div)
- **DC gain accuracy**: ± 3% 10 mV/Div through 5 V/Div, ± 4% typical 2 mV/Div and 5 mV/Div
Vertical system analog channels

DC voltage measurement accuracy
average mode

Average of 16 waveforms

\[ \pm (\text{DC Gain Accuracy}) \times |\text{reading} - (\text{offset} - \text{position})| + \text{Offset Accuracy} + 0.11 \text{ div} + 1 \text{ mV} \]

Delta Volts between any two averages of ≥16 waveforms acquired with the same oscilloscope setup and ambient conditions

\[ \pm (\text{DC Gain Accuracy} \times |\text{reading}| + 0.08 \text{ div} + 1.4 \text{ mV}) \]

Vertical position range
± 5 divisions

Vertical offset ranges

<table>
<thead>
<tr>
<th>Volts/Div setting</th>
<th>Offset range, 1 MΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 mV/div to 200 mV/div</td>
<td>± 0.8 V</td>
</tr>
<tr>
<td>&gt; 200 mV/div to 5 V/div</td>
<td>± 20 V</td>
</tr>
</tbody>
</table>

Analog bandwidth, DC coupled

100 MHz models: DC to ≥100 MHz for 2 mV/div through 5 V/div.
70 MHz models: DC to ≥70 MHz for 2 mV/div through 5 V/div.

Common mode rejection ratio (CMRR), typical
100:1 at 60 Hz, reducing to 10:1 with 50 MHz sine wave with equal Volts/div and coupling settings on each channel.

Channel-to-channel isolation

<table>
<thead>
<tr>
<th>TBS2072, TBS2074</th>
<th>TBS2102, TBS2104</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥100:1 at ≤70 MHz</td>
<td>≥100:1 at ≤100 MHz</td>
</tr>
</tbody>
</table>

Horizontal system analog channels

Maximum duration of time captured at highest sample rate (all channels)
1 ms

Time base range
2 ns/div to 100 sec/div

Time-base delay time range
-15 divisions to 5000 s

Deskew range
±100 ns

Time base accuracy
±25 ppm over any ≥1 ms interval

Trigger system

Trigger modes
Auto, Normal, and Single

Trigger holdoff range
20 ns to 8 s

Trigger types

Edge
Positive or negative slope on any channel. Coupling includes DC, HF reject, LF reject, and noise reject.

Pulse width
Trigger on width of positive or negative pulses that are >, <, =, or ≠ a specified period of time.

Runt
Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again.

Trigger coupling analog channels
DC, Noise Reject, High Freq Reject, Low Freq Reject.
**Trigger system**

<table>
<thead>
<tr>
<th>Trigger Source</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog inputs</td>
<td>0.4 division from DC to 50 MHz</td>
</tr>
<tr>
<td></td>
<td>0.6 divisions &gt;50 MHz to 100 MHz</td>
</tr>
</tbody>
</table>

**Trigger level ranges**

Input channels: ± 4.90 divisions from center screen

**Data storage**

<table>
<thead>
<tr>
<th>Nonvolatile memory retention time, typical</th>
<th>No time limit for Front Panel Settings, saved waveforms, setups, and calibration constants.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-Time clock</td>
<td>A programmable clock providing time in years, months, days, hours, minutes, and seconds.</td>
</tr>
</tbody>
</table>

**Waveform measurements**

<table>
<thead>
<tr>
<th>Cursors</th>
<th>Time, amplitude and screen.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated measures</td>
<td>32, of which up to six can be displayed on-screen at any one time. Measurements include: Period, Frequency, Rise Time, Fall Time, Positive Duty Cycle, Negative Duty Cycle, Positive Pulse Width, Negative Pulse Width, Burst Width, Phase, Positive Overshoot, Negative Overshoot, Peak to Peak, Amplitude, High, Low, Max, Min, Mean, Cycle Mean, RMS, Cycle RMS, Positive Pulse Count, Negative Pulse Count, Rising Edge Count, Falling Edge Count, Area, Cycle Area, Delay FR, Delay FF, Delay FR, and Delay RR.</td>
</tr>
<tr>
<td>Gating</td>
<td>Isolate the specific occurrence within an acquisition to take measurements on, using either the screen, between waveform cursors or full record length.</td>
</tr>
</tbody>
</table>

**Waveform math**

<table>
<thead>
<tr>
<th>Arithmetic</th>
<th>Add, subtract, and multiply waveforms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFT</td>
<td>Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning, or Blackman-Harris.</td>
</tr>
</tbody>
</table>

**Remote control software**


**Display system**

<table>
<thead>
<tr>
<th>Display type</th>
<th>9 inch (228 mm) wide format liquid crystal TFT color display.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display resolution</td>
<td>800 horizontal by 480 vertical displayed pixels (WVGA).</td>
</tr>
<tr>
<td>Waveform styles</td>
<td>Vectors, Variable Persistence, and Infinite Persistence.</td>
</tr>
<tr>
<td>Graticules</td>
<td>Grid, None.</td>
</tr>
<tr>
<td>Format</td>
<td>YT and XY.</td>
</tr>
</tbody>
</table>
## Input output ports

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USB 2.0 high-speed host port</strong></td>
<td>Supports USB mass storage devices, Wi-Fi dongle, One port available on rear panel and one on front panel.</td>
</tr>
<tr>
<td><strong>USB 2.0 high-speed device port</strong></td>
<td>Rear-panel connector allows for communication/control of oscilloscope through USBTMC or GPIB with a TEK-USB-488.</td>
</tr>
<tr>
<td><strong>Device port</strong></td>
<td>Compatible USB-WIFI dongles</td>
</tr>
<tr>
<td><strong>Rear-panel connector</strong></td>
<td>Supports communication/control of oscilloscope through USBTMC or GPIB with a TEK-USB-488.</td>
</tr>
<tr>
<td><strong>TBS2xxx USBWIFI option</strong></td>
<td>TEK-USB-WIFI accessory</td>
</tr>
<tr>
<td><strong>TP-LINK TL-WN823N, NETGEAR WNA1000M, WNA3100M</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LAN port (Ethernet)</strong></td>
<td>RJ-45 connector, supports 10/100BASE-T.</td>
</tr>
<tr>
<td><strong>Probe compensator</strong></td>
<td>Amplitude: 5 V, Frequency: 1 kHz</td>
</tr>
<tr>
<td><strong>Kensington-style lock</strong></td>
<td>Rear-panel security slot connects to standard Kensington-style lock.</td>
</tr>
</tbody>
</table>

## Power source

<table>
<thead>
<tr>
<th>Power Source Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power source voltage</strong></td>
<td>100 to 240 V&lt;sub&gt;AC&lt;/sub&gt; RMS ±10%</td>
</tr>
<tr>
<td><strong>Power source frequency</strong></td>
<td>45 Hz to 65 Hz (90 to 264 V)</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>80 W maximum</td>
</tr>
<tr>
<td><strong>Power source frequency</strong></td>
<td>360 Hz to 440 Hz (100 to 132 V)</td>
</tr>
</tbody>
</table>

## Physical characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td>TBS2xx2: Height: 174.9 mm (6.89 in)</td>
</tr>
<tr>
<td></td>
<td>Width: 372.4 mm (14.66 in)</td>
</tr>
<tr>
<td></td>
<td>Depth: 103.3 mm (4.07 in)</td>
</tr>
<tr>
<td></td>
<td>TBS2xx4: Height: 201.5 mm (7.93 in)</td>
</tr>
<tr>
<td></td>
<td>Width: 412.8 mm (16.25 in)</td>
</tr>
<tr>
<td></td>
<td>Depth: 128.1 mm (5.04 in)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>TBS2xx2: 2.62 kg (5.8 lbs.), standalone instrument.</td>
</tr>
<tr>
<td></td>
<td>5.1 kg (11.2 lbs.), when packaged for domestic shipment.</td>
</tr>
<tr>
<td></td>
<td>TBS2xx4: 4.17 kg (9.2 lbs.), stand-alone instrument.</td>
</tr>
<tr>
<td></td>
<td>7 kg (15.4 lbs.), when packaged for domestic shipment.</td>
</tr>
<tr>
<td><strong>Cooling clearance</strong></td>
<td>50 mm (2 in) required on left side and rear of instrument.</td>
</tr>
</tbody>
</table>
# EMC, environment, and safety

## Temperature

<table>
<thead>
<tr>
<th>State</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>0 °C to +50 °C (+32 °F to 122 °F)</td>
</tr>
<tr>
<td>Nonoperating</td>
<td>-40 °C to +71 °C (-40 °F to 160 °F)</td>
</tr>
</tbody>
</table>

## Humidity

<table>
<thead>
<tr>
<th>State</th>
<th>Range</th>
</tr>
</thead>
</table>
| Operating   | High: +30 °C to +50 °C, 5% to 60% relative humidity  
              | Low: 0 °C to +30 °C, 5% to 95% relative humidity  |
| Nonoperating| High: +30 °C to +55 °C, 5% to 60% relative humidity  
              | Low: 0 °C to +30 °C 5% to 95% relative humidity    |

## Altitude

<table>
<thead>
<tr>
<th>State</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>Up to 3,000 meters (9,842 feet)</td>
</tr>
<tr>
<td>Non-Operating</td>
<td>Up to 12,000 meters (39,370 feet)</td>
</tr>
</tbody>
</table>

## Regulatory

<table>
<thead>
<tr>
<th>Category</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
</tr>
</tbody>
</table>
## Ordering information

### Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBS2072</td>
<td>70 MHz, 1 GS/s, 20 M record length, 2-channel digital phosphor oscilloscope</td>
</tr>
<tr>
<td>TBS2102</td>
<td>100 MHz, 1 GS/s, 20 M record length, 2-channel digital phosphor oscilloscope</td>
</tr>
<tr>
<td>TBS2074</td>
<td>70 MHz, 1 GS/s, 20 M record length, 4-channel digital phosphor oscilloscope</td>
</tr>
<tr>
<td>TBS2104</td>
<td>100 MHz, 1 GS/s, 20 M record length, 4-channel digital phosphor oscilloscope</td>
</tr>
</tbody>
</table>

### Standard accessories

<table>
<thead>
<tr>
<th>Probes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPP0100</td>
<td>100 MHz, 10x passive probe (one per analog channel)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>063-4472-xx</td>
<td>Documentation CD</td>
</tr>
<tr>
<td>071-3078-xx</td>
<td>Installation and safety manual</td>
</tr>
<tr>
<td>077-1149-xx</td>
<td>Programmer manual, available on documentation CD and on Tek Web</td>
</tr>
<tr>
<td>-</td>
<td>Power cord</td>
</tr>
<tr>
<td>-</td>
<td>Calibration certificate documenting traceability to National Metrology Institute(s) and ISO9001 quality system registration</td>
</tr>
</tbody>
</table>

### Warranty

Five-year warranty covering all parts and labor, excluding probes.

### Recommended accessories

#### Probes

- **P5100A**: 2.5 kV, 500 MHz, 100X high-voltage passive probe
- **TDP0500**: 500 MHz TekVPI® differential voltage probe with ±42 V differential input voltage
- **THDP0200**: ±1.5 kV, 200 MHz high-voltage differential probe
- **THDP0100**: ±6 kV, 100 MHz high-voltage differential probe
- **TAP1500**: 1.5 GHz TekVPI® active voltage probe
- **TCP0020**: 50 MHz TekVPI® 20 Ampere AC/DC current probe
- **TCP0030A**: 120 MHz TekVPI® 30 Ampere AC/DC current probe
- **TCP0150**: 20 MHz TekVPI® 150 Ampere AC/DC current probe
- **TCP2020**: 50 MHz TekVPI® 20 Ampere AC/DC current probe

#### Accessories

- **TPA-BNC**: TekVPI® to TekProbe® BNC adapter
- **ACD2000**: Soft transit case, for TBS2072 and TBS2102
- **ACD4000**: Soft transit case, for TBS2074 and TBS2104
- **TEK-DPG**: TekVPI® Deskew pulse generator signal source
- **067-1686-XX**: Power measurement deskew and calibration fixture
- **TEK-USB-WIFI**: USB Wi-Fi® dongle for TBS2000 series only
- **TEK-USB-488**: GPIB-to-USB adapter

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2 Certified to comply with CE, FCC and IC regulations. Available in Australia, Canada, China, EU Region, New Zealand, and United States. For other compatible Wi-Fi adapters, see Compatible USB-WIFI dongles under Input/Output ports specifications.
**Instrument options**

- **TBS2XXX USBWIFI**
  - USB Wi-Fi dongle for TBS2000 series only
- **TBS2XXX P2221**
  - Replaces standard probes with P2221 probes (200 MHz passive voltage probes with 1x/10x attenuation)

**Power plug**

- Opt. A0: North America power plug (115 V, 60 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, 50/60 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

**Language options**

- Opt. L0: English front panel overlay
- 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

Language options include translated front-panel overlay only, manuals with different language are available on Tek web.

**Service options**

- Opt. D1: Calibration Data Report
Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.


Product Area Assessed: The planning, design/development and manufacture of electronic Test and Measurement instruments.