Digital Storage Oscilloscopes

▶ TPS2012 • TPS2014 • TPS2024

100 MHz and 200 MHz Bandwidths

Sample Rates Up to 2 GS/s Real-time

2 or 4 Fully Isolated and Floating Channels, Plus Isolated External Trigger

8 Hours of Continuous Battery Operation with Two Batteries Installed, Hot-swappable for Virtually Unlimited Freedom from an AC Power Source

Optional Power Application Software Offers the Broadest Range of Power Measurements at its Price Point

Quickly Document and Analyze Measurement Results with OpenChoice® Software or Integrated CompactFlash Mass Storage

FFT Standard on All Models

Advanced Triggers to Quickly Capture the Event of Interest

Easily Operate the Oscilloscope with Traditional, Analog-style Knobs and Multi-language User Interface

Simplify Setup and Operation with Autoset Menu, Autorange, Waveform and Setup Memories, and Built-in, Context-sensitive Help

Adjust the Oscilloscope to Your Operating Environment with Backlit Menu Buttons/ Display and Brightness/ Contrast Controls

11 Automatic Measurements

▶ **Applications**

Industrial Power Design, Troubleshooting, Installation, and Maintenance

Advanced Electronics Design, Troubleshooting, Installation, and Maintenance

Automotive Design and Test

Education

TPS2000 Series Oscilloscopes Deliver Powerful Productivity from Bench to Field

As an engineer or technician, you must often make floating, or differential, measurements. You face faster edges and clocks due to the migration of higher performance technologies to widely implemented electronic systems and subsystems, with the pressure to conform to customer specifications or industry requirements.

And you may need to develop and test designs in a variety of challenging environments that demand versatility.

You can quickly tackle these tough challenges to speed the design, trouble-shooting, installation, and maintenance of components and systems with the world's first 4-isolated-channel, full featured, battery-powered oscilloscope – the TPS2000 Series.

Tektronix

Enabling Innovation

1

Digital Storage Oscilloscopes

▶ TPS2012 • TPS2014 • TPS2024

▶ Characteristics

▶ TPS2000 Series Electrical Characteristics

Feature	TPS2012	TPS2014	TPS2024
Isolated Channels	2	4	4
Bandwidth*1 (MHz)	100	100	200
Sample Rate (GS/s) Per Channel	1.0	1.0	2.0
Record Length		2.5 K points	
Display (1/4 VGA LCD)		Color	
Battery Operation		Capacity for two hot-swappable battery packs. One standard battery pack offers 4 hours of battery operation. Optional second battery pack extends battery operation to 8 hours. Continuous battery operation is possible by hot-swapping charged batteries	
Automatic Measurements		11	
Isolated External Trigger Input (Impedance Isolated)		Yes	
Vertical Resolution		8-bits (normal or with averaging)	
Vertical Sensitivity		2 mV to 5 V/div on all models with calibrated fine adjustment	
DC Vertical Accuracy		±3%	
Vertical Zoom		Vertically expand or compress a live or stopped waveform	
Max Input Voltage (1 MΩ)*2		300 V_{RMS} CAT II at BNC signal to BNC shell, 1000 V_{RMS} CAT II at probe tip to earth ground with optional P5120 passive, high-voltage probe	
Float Voltage*2		600 V_{RMS} CAT II or 300 V_{RMS} CAT III BNC shell to earth ground, 1200 V_{RMS} CAT II between any two channel commons with each of the channel commons not being more than ±600 V_{RMS} from earth ground	
Position Range		2 mV to 200 mV/div ±2 V; >200 mV to 5 V/div ±50 V	
Bandwidth Limit		20 MHz	
Linear Dynamic Range		±5 div	
Time Base Range	5 ns to 50 s/div	5 ns to 50 s/div	2.5 ns to 50 s/div
Time Base Accuracy		50 ppm	
Input Impedance		1 MΩ ±2 % in parallel with 20 pF	
Input Coupling		AC, DC, GND	
Horizontal Zoom		Horizontally expand or compress a live or stopped waveform	
FFT		Standard	
RS-232, Centronics – Parallel Ports		Standard	
PC Connectivity		Standard	
Integrated CompactFlash Mass Storage		Standard	
Power Measurements		Optional package that offers instantaneous power waveform analysis, waveform analysis, harmonics analysis, switching loss, phase angles, dv/dt and di/dt cursors	

*1 Bandwidth is 20 MHz at 2 mV/div, all models. Bandwidth is 200 MHz typical at 5 mV/div, 200 MHz models only. Bandwidth is 200 MHz typical between 40 ºC and 50 ºC, 200 MHz models only.

*2 Please refer to Environmental and Safety specifications.

4

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 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 at a time.

Scan/Roll Mode – At acquisition time base settings of ≥100 ms/div.

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.

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, Ext/10.

4-channel models – CH1, CH2, CH3, CH4, Ext, Ext/5, Ext/10.

Trigger View

Displays trigger signal while trigger view button is depressed.

Trigger Signal Frequency Readout

Provides a frequency readout of the trigger source with 6-digit resolution.

Cursors

Types – Voltage, Time.

Measurements – ΔT, 1/ΔT (frequency), ΔV, dv/dt[3], di/dt[3].

[3]Requires TPS2PWR1 power application package.

▶ 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)	Video (NTSC, PAL, SECAM) Field: All, Odd, or Even Line: All or Selectable Line Number

▶ Nonvolatile Storage

Nonvolatile Storage	Standard (with CompactFlash Mass Storage)
Reference Waveform Display	Two 2500 point reference waveforms
Waveform Storage	96 or more reference waveforms per 8 MB
Setups	4000 or more front panel setups per 8 MB
Screen Images	128 or more screen images per 8 MB (the number of images depends on file format selected)
Save All	12 or more Save All operations per 8 MB. A single Save All operation creates 2 to 9 files (setup, image, plus one file for each displayed waveform)

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, Multiply, FFT.

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

Sources –
2-channel models: CH1 – CH2, CH2 – CH1, CH1 + CH2, CH1 x CH2.
4-channel models: CH1 – CH2, CH2 – CH1, CH3 – CH4, CH4 – CH3, CH1 + CH2, CH3 + CH4, CH1 x CH2, CH3 x CH4.

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

Autorange – Allows the user to adjust waveforms on the oscilloscope screen and change test points without resetting the oscilloscope.

Display Characteristics

Display – 1/4 VGA, passive color LCD with color on black background with adjustable multi-level contrast and brightness controls.

Interpolation – Sin(x)/x.

Display Types – Dots, vectors.

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

Format – YT and XY.

I/O Interface

Printer Port (standard) – Centronics-type Parallel.
Graphics File Formats – TIFF, PCX (PC Paint Brush), BMP (Microsoft Windows), EPS (Encapsulated Postscript) and RLE.
Printer Formats – Bubble Jet, DPU-411, DPU-412, DPU-3445, Thinkjet, Deskjet, Laser Jet, Epson Dot (9- or 24-pin), Epson C60, Epson C80.
Layout – Landscape and Portrait.

RS-232 Port (standard) – 9-pin DTE.

RS-232 Programmability – Full talk/listen modes. Control of all modes, settings and measurements. Baud rate up to 19,200.

Digital Storage Oscilloscopes

▶ TPS2012 • TPS2014 • TPS2024

Mass Storage CompactFlash Memory –
Accepts any Type 1 CompactFlash card, up to and including 1 GB (card not included).

Built-in Clock/Calendar

OpenChoice® PC Communications Software –
Seamless connection from oscilloscope to PC through RS-232.

Transfer and save settings, waveforms, measurements, and screen images.

Includes a Windows desktop data transfer application in addition to convenient Microsoft Word and Excel Toolbar Add-ins.

Environmental and Safety

Temperature –
Operating: 0 ºC to +50 ºC.
Non-operating: –40 ºC to +71 ºC.

Humidity –
TPS2000 Series oscilloscopes are not intended for use in wet or damp conditions.
Operating:
high: 50 ºC / 60% RH.
low: 30 ºC / 90% RH.
Non-Operating:
high: 55 ºC to 71 ºC / 60% RH max wet bulb.
low: 30 ºC to 0 ºC / < 90% RH max wet bulb.

Altitude –
Operating: up to 3,000 m.
Non-operating: 15,000 m.

Pollution Degree 2 – Do not operate in an environment where conductive pollutants may be present (as defined in IEC61010-1:2001).

Enclosure Rating – IP30: when the CompactFlash card and power analysis software are installed (as defined in IEC60529:2001).

Electromagnetic Compatibility –
Meets the intent of Directive 89/336/EEC. Meets or exceeds: Australian EMC Framework, demonstrated per Emission Standard AS/NZS 2064.1/2.

General Certifications –
Russian GOST EMC regulations; Chinese Metrology Certification (CMC).

Safety – UL61010-1: 2004. CAN/CSA22.2 No. 1010.1: 2004. EN61010-1: 2001.
Do not float the P2220 probe common lead to >30 V_{RMS}. Use the P5120 (floatable to 600 V_{RMS} CAT II or 300 V_{RMS} CAT III) or similarly rated passive, high-voltage probe or an appropriately rated high-voltage, differential probe when floating the common lead above 30 V_{RMS}, subject to the ratings of such high-voltage probe.

▶ *Versatile Hanger.*

CAT Ratings

Overvoltage Categories

Category	Examples of Products in this Category
CAT III	Distribution-level mains, fixed installation
CAT II	Local-level mains, appliances, portable equipment
CAT I	Signal levels in special equipment or parts of equipment, telecommunications, electronics

Materials –
TPSBAT battery contains less than 8 grams equivalent Lithium.

Physical Characteristics

INSTRUMENT

Dimensions	mm	in.
Width	336.0	13.24
Height	161.0	6.33
Depth	130.0	5.10
Weight	**kg**	**lbs.**
Instrument only	2.7	6.0
with 1 battery	3.2	7.0
with 2 batteries	3.7	8.0
INSTRUMENT SHIPPING		
Package Dimensions	**mm**	**in.**
Width	476.2	18.75
Height	266.7	10.50
Depth	228.6	9.00

▶ *Battery/Charger.*

▶ *P2220 Probe.*

▶ Ordering Information

TPS2012, TPS2014, TPS2024

Digital Storage Oscilloscopes.

Standard Accessories

Probes – P2220 200 MHz, 1X/10X switchable passive probe (one per channel).

Battery (1) – Lithium-Ion battery with fuel gauge for 4-hour battery life. Two batteries required for 8 hours continuous battery operation.

TDSPCS1 OpenChoice
PC Connectivity Software – A collection of programs that enable fast and easy communication between MS Windows PCs and TPS2000 Series oscilloscopes.

Documentation – 1 each set of instruction manuals (see below for the appropriate language manual part number).

AC Adapter with Power Cord.

NIM/NIST-Traceable Certificate of Calibration.

Front Protective Cover.

Digital Storage Oscilloscopes
▶ TPS2012 • TPS2014 • TPS2024

Speed Product Development with Best-in-class Price/Performance

Tektronix' extensive portfolio of proven, state-of-the-art stimulus, probing, acquisition and analysis tools simplify and speed each phase of product design – from power-on and verification, through debug and validation, to characterization and test – to enable you to race products to your customers when they need them, if not before.

Tektronix Support Completes the Solution

Anytime you need support, anywhere in the world, depend on Tektronix Support to give you the lowest possible exposure to inconvenience, delay, or disruption of operations.

▶ Unsurpassed technical expertise and experience with 24-hour response to technical questions

▶ Industry-leading turn-around service time

▶ 90-day unconditional service warranty

▶ No fine print, no exclusions, no surprises

▶ Global support in more than 50 countries

Product(s) are manufactured in ISO registered facilities.

CE ISO 9001

3MW-17750-4

8

Tektronix

Enabling Innovation