

Digital Phosphor Oscilloscope

► TDS5034B • TDS5054B • TDS5104B



The World's Easiest to Use Midrange Oscilloscope

MyScope® Custom Control Windows

The TDS5000B models offers Tektronix exclusive MyScope customizable oscilloscope user interface. MyScope is a powerful feature that allows you to build your own control windows with only the controls, features and capabilities that you care about and are important in your job. Only with Tektronix oscilloscopes, can you pull all the functionality you need from all the various parts of the oscilloscope into one control window, effectively creating your own personalized "toolbox" of oscilloscope features. No longer do you need to search through menus for features or re-learn how to drive the oscilloscope after a break from the lab. MyScope control windows enable you to spend your valuable time focused on the task at hand rather than navigating menus on your oscilloscope. And creating these custom control windows isn't a long drawn-out or complex process. They are easily created in a matter of minutes using a simple, visual, drag and drop

process. Once created, these custom control windows are easily accessed through a dedicated MyScope button and menu selection on the oscilloscope button/menu bar, just like any other control window. You can make an unlimited number of custom control windows, enabling each person who uses the oscilloscope, in a shared environment, to have their own unique control window. Since the control windows are stored as files on the hard drive, they can easily be transferred to other TDS5000B Series oscilloscopes, or they can even be e-mailed to a co-worker around the world when the need arises. MyScope control windows will benefit all oscilloscope users, from eliminating the ramp-up time that many face when returning to the lab after not using an oscilloscope for a while, to the power user who can now operate far more efficiently. Everything you need is found in one control window rather than having to constantly navigate through menu after menu to repeat similar tasks.

► Features & Benefits

350 MHz, 500 MHz and 1 GHz bandwidth models

4 channels on all models

Up to 5 GS/s sample rate

Up to 16 M record length

100,000 wfms/s maximum waveform capture rate

MyScope® custom control windows enhance productivity

Right-mouse-click menus for exceptional efficiency

OpenChoice® platform with Windows 2000 delivers built-in networking and analysis

Small footprint/lightweight

10.4 in. bright display

Standard touch screen on TDS5054B and TDS5104B

Suite of advanced triggers

Communication mask testing

Pass/fail limit testing

Remote viewing and control

E-mail on event

CD-RW Drive

Interoperability with Tektronix logic analyzers

GPIO controller

► Applications

Digital design and debug

Mask testing for Telecomm/Datacomm/video standards

Investigation of transient phenomena

Power measurements

Video design and debug

Spectral analysis

Automotive electronics

Manufacturing test

Electro-mechanical

Bio-medical

Industrial control

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► Characteristics

► Vertical System

	TDS5034B	TDS5054B	TDS5104B
Input Channels		4	
Analog Bandwidth (-3 dB) 5 mV/div to 1 V/div	350 MHz	500 MHz	1 GHz
Calculated Rise Time 5 mV/div (typical)	1.15 ns	800 ps	300 ps
Hardware Bandwidth Limits		150 MHz or 20 MHz	
Input Coupling		AC, DC, GND	
Input Impedance, 1 M Ω		$\pm 1\%$	
Input Impedance, 50 Ω		$\pm 1\%$	$\pm 2.5\%$
Input Sensitivity, 1 M Ω		1 mV/div to 10 V/div	
Input Sensitivity, 50 Ω		1 mV/div to 1 V/div	
Vertical Resolution		8-bits (>11-bits with averaging)	
Max Input Voltage, 1 M Ω	150 V CAT I, ≤ 400 V peak, Derate at 20 dB/decade to 9 V _{RMS} above 200 kHz		
Max Input Voltage, 50 Ω	5 V _{RMS} with peaks $< \pm 30$ V		< 100 mV/div < 1 V _{RMS} ≥ 100 mV/div < 5 V _{RMS}
DC Gain Accuracy		1.5% with offset set to 0 V	
Offset Range, 1 M Ω		1 mV/div to 99.5 mV/div ± 1 V 100 mV/div to 1 V/div ± 10 V 1.01 V/div to 10 V/div ± 100 V	
Offset Range, 50 Ω	1 mV/div to 99.5 mV/div ± 1 V 100 mV/div to 1 V/div ± 10 V		1 mV/div to 50 mV/div ± 0.5 V 50.5 mV/div to 99.5 mV/div ± 0.25 V 100 mV/div to 500 mV/div ± 5 V 505 mV/div to 1 V/div ± 2.5 V
Channel-to-channel isolation for any two channels at equal vertical scale	$\geq 100:1$ at ≤ 100 MHz and $\geq 30:1$ at > 100 MHz up to the rated bandwidth		

► Timebase System

	All Models
Timebase Range	200 ps/div to 1000 s/div
Timebase Delay Time Range	(s/div x 10) to 1000 s
Channel-to-channel Deskew Range	± 75 ns
Timebase Accuracy	15 ppm
Delta Time Measurement Accuracy	(0.06/sample rate + 15 ppm x Reading)RMS
Trigger Jitter (RMS)	8 psRMS (typical)
Long Term Sample Rate and Delay Time Accuracy	± 15 ppm over any ≥ 1 ms interval

► Acquisition System

	TDS5034B	TDS5054B / TDS5104B
Real-time Sample Rates		
1 Channel (max)		5 GS/s
2 Channels (max)		2.5 GS/s
3-4 Channels (max)		1.25 GS/s
Equivalent Time Sample Rate (max)		250 GS/s
Maximum Record Length per Channel with Standard Memory	8M/4M/2M—	16M/8M/4M
With Opt. 3M	16M/8M/4M	NA

► Maximum Duration at Highest Real-time Resolution (1 ch)

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Time Resolution (single shot)		200 ps (5 GS/s)
Max Duration with Standard Memory	1.6 ms	3.2 ms
Max Duration with Opt. 3M	3.2 ms	NA

► Acquisition Modes

FastAcq Acquisition	FastAcq optimizes the instrument for analysis of dynamic signals and capture of infrequent events Maximum FastAcq waveform capture rate is 100,000 wfms/s
Sample	Acquire sampled values
Peak Detect	Captures narrow glitches (<1 ns) at all real-time sampling rates
Averaging	From 2 to 10,000 waveforms included in average
Envelope	From 2 to 2x10 ⁹ waveforms included in min-max envelope
Hi-Res	Real-time boxcar averaging reduces random noise and increases resolution
Waveform Database	Accumulates a waveform database that provides a three dimensional array of amplitude, time and counts
FastFrame™ Acquisition	Acquisition memory divided into segments; maximum trigger rate >100,000 waveforms per second

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► Trigger System

Sensitivity

Internal DC Coupled	0.35 div DC to 50 MHz increasing to 1 div at rated bandwidth
External (auxiliary input)	400 mV from DC to 50 MHz increasing to 750 mV at 100 MHz
Main Trigger Modes	Auto, Normal and Single
Trigger Sequences	Main, Delayed by time, Delayed by events. All sequences can include separate horizontal delay after the trigger event to position the acquisition window in time
Standard Trigger Types	Edge, Glitch, Runt, Window, Width, Transition Time, Timeout, Pattern, Video, State, Setup/Hold
A Event and Delayed B Event Trigger Types	
A Event	All above types
Delayed B Event	Edge
Communications-related Triggers (requires Option SM)	Support for AMI, HDB3, BnZS, CMI, MLT3 and NRZ encoded communications signals Select among isolated positive or negative one, zero pulse form or eye patterns as applicable to standard

Trigger Level Range

Any Channel	±10 divisions from center of screen
External (auxiliary in)	±8 V
Line	Fixed at 0 V
Trigger Coupling	DC, AC (attenuate <60 Hz), HF reject (attenuate >30 kHz) LF reject (attenuates <80 kHz) Noise reject (reduce sensitivity)
Trigger Holdoff Range	1.5 µs to 12 s maximum

Trigger Modes

Edge – Positive or negative slope on any channel or front panel auxiliary input. Coupling includes DC, AC, noise reject, HF reject and LF reject.

Video – Trigger on NTSC, PAL, SECAM, analog HDTV and non-standard video formats.

Glitch – Trigger on or reject glitches of positive, negative or either polarity. Minimum glitch width is 1.0 ns with 200 ps resolution.

Width – Trigger on width of positive or negative pulse either within or out of selectable time limits ranging from 1 ns to 1 s with 200 ps resolution.

Runt – Trigger on a pulse that crosses one threshold but fails to cross a second threshold before crossing the first again. Event can be time or logic qualified (logic on four channel models only).

Window – Trigger on an event that enters or exits a window defined by two user-adjustable thresholds. Event can be time or logic qualified (logic on 4 channel models only).

Timeout – Trigger on an event which remains high, low or either, for a specified time period, selectable from 1 ns to 1 s with 200 ps resolution.

Transition – Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative or either.

Setup/Hold – Trigger on violations of both setup time and hold time between clock and data present on any two input channels.

Pattern – Trigger when pattern goes false or stays true for specified period of time. Pattern (AND, OR, NAND, NOR) specified for four input channels defined as High, Low or Don't Care.

State – Any logical pattern of channels (1, 2, 3) clocked by edge on channel 4. Trigger on rising or falling clock edge.

Comm (requires option SM) – Support for AMI, HDB3, B3ZS, B6ZS, B8ZS, CMI, NRZ and MLT3 encoded communication signals. Select among isolated positive or negative one, zero pulse form or eye patterns as applicable to standard.

Trigger Delay by Time – 16 ns to 250 seconds.

Trigger Delay by Events – 1 to 10,000,000 Events.

Waveform Measurements

Automatic Measurements – Fifty three of which eight can be displayed on screen at any one time.

Amplitude Related: Amplitude, High, Low, Maximum, Minimum, Peak to Peak, Mean, Cycle, Mean, RMS, Cycle RMS, Positive Overshoot, Negative Overshoot.

Time Related: Rise Time, Fall Time, Positive Width, Negative Width, Positive Duty Cycle, Negative Duty Cycle, Period, Frequency, Delay. Combination: Area, Cycle Area, Phase, Burst Width. Histogram Related: Waveform count, Hits in box, Peak hits, Median, Maximum, Minimum, Peak to Peak, Mean (μ), Standard Deviation (σ), $\mu \pm 1\sigma$, $\mu \pm 2\sigma$, $\mu \pm 3\sigma$. Communications Related: Extinction Ratio (abs, %, dB), Eye Height, Eye Width, Eye Top, Eye Base, Crossing %, Jitter (Pk-Pk, RMS, 6σ), Noise (Pk-Pk, RMS), Signal/Noise Ratio, Cycle Distortion, Q-Factor.

Measurement Statistics – Mean, Min, Max, Standard Deviation, Population.

Reference Levels – User definable for each of the eight measurements.

Histograms – Vertical or horizontal with linear or log scaling.

Gating – Isolate the specific occurrence within an acquisition to take measurements on.

Cursors – Horizontal Bars, Vertical Bars, Waveform and Screen.

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Power Source

Power – 100 to 240 V_{RMS} ±10%, 47 to 63 Hz; CAT II, or 115 V_{RMS} ±10%, 360 to 440 Hz.

Power Consumption – <220 W.

Physical Characteristics

BENCHTOP CONFIGURATION

Dimensions	mm	in.
Height	361	11.2* ¹
Width	447	17.6
Depth	288	11.35
Weight	kg	lbs.
Net	11.23	24.75
Shipping	25.63	56.5

RACKMOUNT CONFIGURATION

Dimensions	mm	in.
Height	267	10.5
Width	483	19
Depth	231* ²	9.1* ²
Weight	kg	lbs.
Net	13.49	29.75
Shipping	—	—

COOLING

Cooling clearance 76 mm required on left side
3 inches required on left side

*¹ Does not include accessory pouch.

*² From rack mounting rear to back of instrument.

Environmental

Temperature

Operating – +5 °C to +45 °C.

Nonoperating – –20 °C to +60 °C without diskette in floppy drive.

Humidity

Operating – 20% to 80% relative humidity with a maximum wet bulb temperature of +29 °C at or below +45 °C, noncondensing. Upper limit de-rates to 30% relative humidity at +45 °C.

Nonoperating – Without diskette in floppy disk drive. 5% to 90% relative humidity with a maximum wet bulb temperature of +29 °C at or below +60 °C, noncondensing. Upper limit derates to 20% relative humidity at +60 °C.

Altitude

Operating – 10,000 ft. (3,048 m).

Nonoperating – 40,000 ft. (12,190 m).

Random Vibration

Operating – 0.1 GRMS from 5 to 500 Hz, 10 minutes each axis, 3-axes, 30 minutes total.

Nonoperating – 2.0 GRMS from 5 to 500 Hz, 10 minutes each axis, 3-axes, 30 minutes total.

Regulatory Certifications

Electromagnetic Compatibility – 89/336/EEC.

Safety – UL61010, CSA-22.2 No. 1010.1, EN61010-1, IEC61010-1.

► Ordering Information

TDS5034B

350 MHz, 5 GS/s, 4 channel digital phosphor oscilloscope.

TDS5054B

500 MHz, 5 GS/s, 4 channel digital phosphor oscilloscope.

TDS5104B

1 GHz, 5 GS/s, 4 channel digital phosphor oscilloscope.

Includes: (1) P5050 500 MHz, 10x passive probe per channel, Accessory Pouch (016-1935-00), Front Cover (200-4651-00), Mouse (119-6936-00), Quick Start User Manual, TDS5000B Product Software CD-ROM, TDS5000B Operating System Restoration CD-ROM, GPIB Programmer's Reference, Optional Applications Software CD-ROM, *Getting Started with OpenChoice*[®] book (020-2513-00), Performance Verification Procedure PDF file, Calibration Certificate Documenting NIST Traceability, Z540-1 Compliance and ISO9001 Registration, Power Cord.

Note: Please specify power plug and manual version when ordering.

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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

Product(s) are manufactured
in ISO registered facilities.



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