

# Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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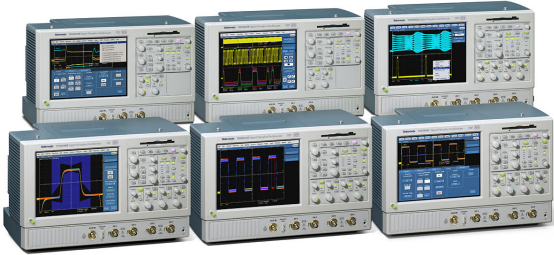
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# Digital Phosphor Oscilloscope

## TDS5034B • TDS5054B • TDS5104B Data Sheet



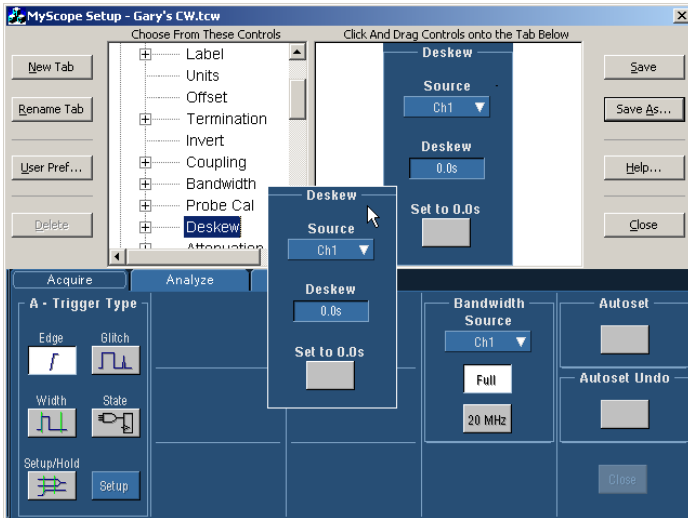
- 10.4 in. Bright Display
- Standard Touchscreen on TDS5054B and TDS5104B
- Suite of Advanced Triggers
- Communication Mask Testing
- Pass/Fail Limit Testing
- Remote Viewing and Control
- E-mail on Event
- CD-RW Drive
- Interoperability with Tektronix Logic Analyzers
- GPIB Controller

### Features & Benefits

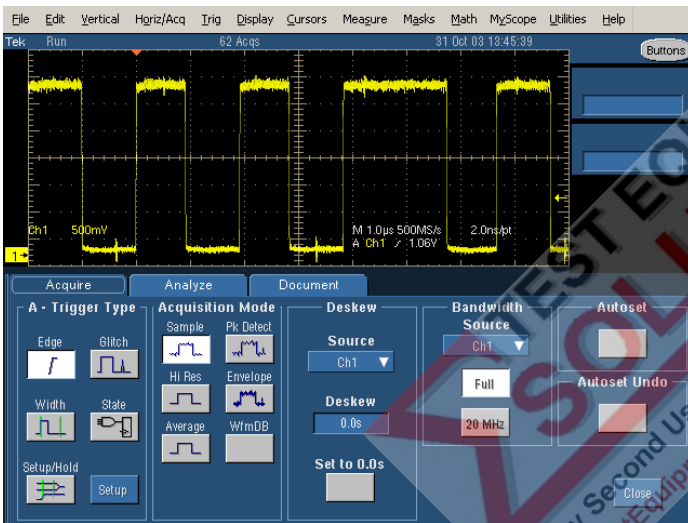
- 350 MHz, 500 MHz, and 1 GHz Bandwidth Models
- 4 Channels on all Models
- Up to 5 GS/s Sample Rate
- Up to 16 M Record Length
- 100,000 wfms/s Maximum Waveform Capture Rate
- MyScope™ Custom Control Windows Enhance Productivity
- Right-Mouse-Click Menus for Exceptional Efficiency
- OpenChoice® Platform with Windows 2000 Delivers Built-in Networking and Analysis
- Small Footprint / Lightweight

### 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
- Electromechanical
- Biomedical
- Industrial Control



MyScope: MyScope control windows are created using a simple, visual drag-and-drop process.



MyScope: Once created, they are just like other control windows in the instrument and are easily accessed from either the menu or button bars.

## The World's Easiest-to-Use Midrange Oscilloscope

### MyScope™ Custom Control Windows

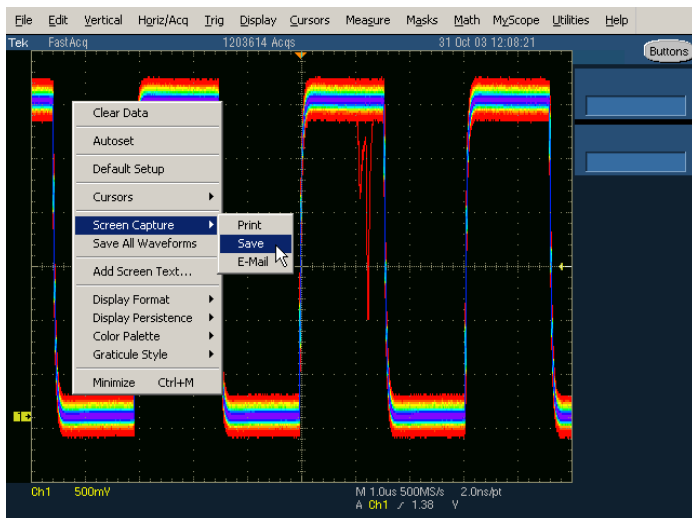
The TDS5000B models offer a Tektronix-exclusive MyScope customizable oscilloscope user interface. MyScope is a powerful feature that allows you to build your own control windows with only the controls, features, and capabilities that you care about and are important in your job. Only with Tektronix oscilloscopes, 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 relearn 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 coworker 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.

### Right-Clicks

The TDS5000B Series also enables a comprehensive suite of right-mouse-click menus to make simple things as they should be – simple. Right-click menus are context sensitive, meaning the choices presented in the menu depend on where you right-clicked the mouse. This makes right-click menus extremely intuitive. Want to change the cursor type? Right-click on a cursor or the cursor readouts. Want to change the reference levels of an automatic measurement? Right-click on the measurement. Want to change trigger parameters? Right-click on the trigger readouts. Want to change a waveform's color? Right-click on the waveform handle. Virtually all objects on the oscilloscope display have right-click menus associated with them that include all the appropriate actions or features relative to those objects. There are also right-click menus for regions of the display in addition to just objects. For example, right-clicking in the main graticule brings up a menu with choices such as Clear Data, Default Setup, Autoset, Screen Captures, Save All Waveforms, and Add Screen Text, providing single-click access to many of your most commonly performed tasks.

The customization and efficiency provided by MyScope control windows and right-click menus make the TDS5000B models the world's easiest-to-use midrange oscilloscopes, enabling you to achieve levels of productivity you wouldn't have thought possible with your current oscilloscope.



Elusive Glitch. Fast waveform capture rate, enabled by Tektronix proprietary DPX acquisition technology, maximizes the probability of capturing elusive glitches and other infrequent events.

## The Performance and Feature Set You Expect

### Performance

The TDS5000B digital phosphor oscilloscopes (DPO) deliver 350 MHz, 500 MHz, or 1 GHz bandwidth, 5 GS/s real-time sample rate, up to 16 M record length, and a suite of advanced triggers, enabling you to capture and characterize even your most demanding signals. DPOs provide unmatched insight into signal behavior by displaying, storing, and analyzing complex signals in real-time using three dimensions of signal information: amplitude, time, and distribution of amplitude over time. The TDS5000B DPO models, enabled by Tektronix proprietary DPX® acquisition technology,

delivers greater than 100,000 waveforms per second capture rates. Some oscilloscope vendors claim high waveform capture rates for short bursts of time, but only DPOs, enabled by DPX technology, can deliver these fast waveform capture rates on a sustained basis – saving minutes, hours, or even days by quickly revealing the nature of faults so sophisticated trigger modes can be applied to isolate them.

### Advanced Waveform Analysis

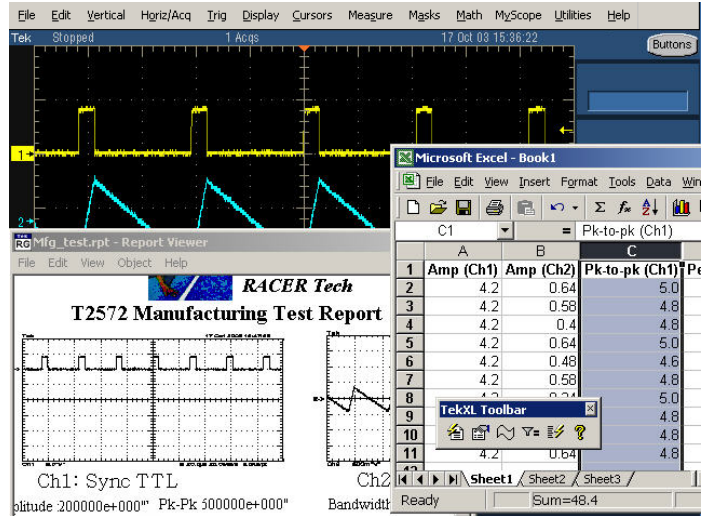
The TDS5000B models include a complete parametric measurement system for signal characterization. Select from 53 automatic measurements using a graphical palette that logically organizes measurements into Amplitude, Time, Combination, Histogram, and Communications categories. Gather further insight into your measurement results with statistical data such as mean, min, max, standard deviation, and population. Waveform cursors make it easy to measure trace-to-trace timing characteristics, while cursors that link between YT and XY display modes make it easy to investigate phase relationships and Safe Operating Area violations. Define and apply math expressions to waveform data for on-screen results in terms that you can use. Access common waveform math functions with the touch of a button. Or, for advanced applications, create algebraic expressions consisting of waveforms sources, math functions, measurement values, scalars, and user-adjustable variables with an easy-to-use calculator-style editor.

Applied measurement extensions can be installed to enhance the TDS5000Bs' capabilities. These software applications build on the precision acquisition performance of the TDS5000B Series to address the need for application-specific measurements to quickly quantify device and system performance. Optional applications include power measurement and analysis, jitter and timing analysis, disk drive measurements, ANSI/ITU telecom pulse compliance, and Ethernet compliance testing.

## OpenChoice Architecture

The TDS5000B Series includes open access to the MS Windows 2000 operating environment. While the instrument remains a dedicated oscilloscope, the ability to access the MS Windows desktop creates a powerful tool. Built-in applications such as WordPad, Paint, and a Web browser allow you to concurrently maintain lab notes while working with the instrument. This saves time and eliminates error-prone steps associated with transporting images for later report development. Other applications such as Microsoft Word or Excel, MATLAB, and LabVIEW can be used with the instrument to accomplish local documentation or signal analysis. Installation of the oscilloscope on the LAN enables Web-based information browsing, e-mail exchange, printing, and file sharing. Using the embedded PCI bus, waveform data can be moved directly from acquisition to analysis applications on the Windows desktop at much faster speeds than conventional GPIB transfers.

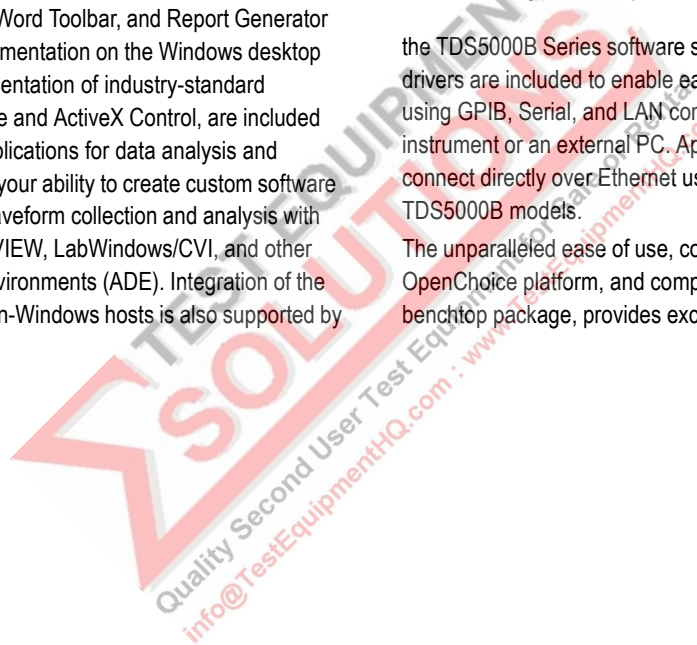
In addition, the OpenChoice architecture provides a comprehensive software infrastructure for faster, more versatile operations. Data transfer programs, such as the Excel Toolbar, Word Toolbar, and Report Generator are used to simplify analysis and documentation on the Windows desktop or on external PCs. Tektronix' implementation of industry-standard protocols, such as TekVISA™ interface and ActiveX Control, are included for using and enhancing Windows applications for data analysis and documentation. These tools enhance your ability to create custom software to automate multistep processes in waveform collection and analysis with Visual BASIC, C, C++, MATLAB, LabVIEW, LabWindows/CVI, and other common Application Development Environments (ADE). Integration of the oscilloscope with external PCs and non-Windows hosts is also supported by

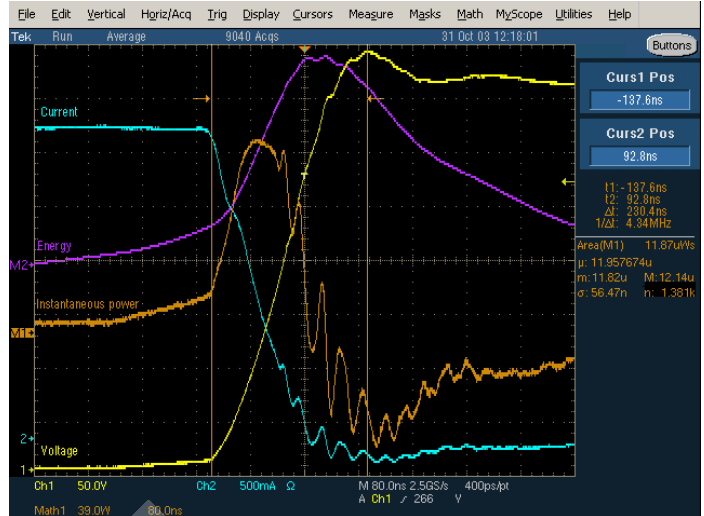
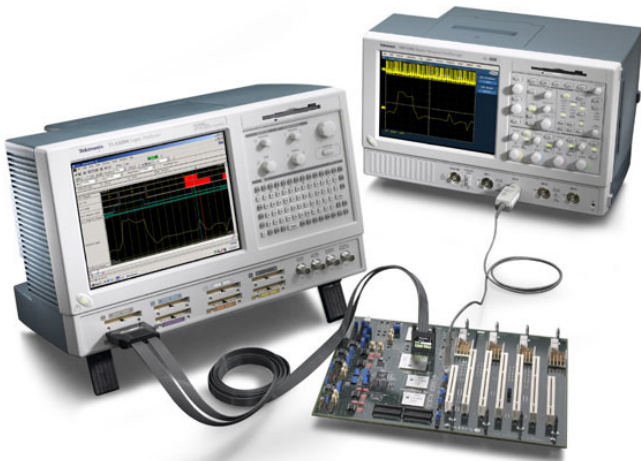


OpenChoice Platform. Capturing data into Microsoft Excel using the unique Excel Toolbar and then creating a custom report using the Tektronix Report Generator.

the TDS5000B Series software solutions. Plug-and-play and IVI instrument drivers are included to enable easy communication with the oscilloscope using GPIB, Serial, and LAN connections from programs running on the instrument or an external PC. Applications, and other LAN resources, can connect directly over Ethernet using the VXI 11.2 server included on the TDS5000B models.

The unparalleled ease of use, coupled with the TDS5000B's performance, OpenChoice platform, and comprehensive feature set all in a compact benchtop package, provides exceptional value.





Digital Design and Debug. Tektronix Integrated View (iView) fully integrates the performance and measurement accuracy of a Tektronix oscilloscope with the multichannel and powerful triggering capabilities of a Tektronix logic analyzer in one display, allowing designers to quickly verify and debug their designs.

## Applications

The TDS5000B's performance features make it ideal for a multitude of applications, such as digital design and debug, power measurements, communications mask testing, and video design.

### Digital Design and Debug

The interoperability of the TDS5000B oscilloscopes with the Tektronix TLA5000 Series logic analyzer made possible by Tektronix Integrated View (iView™) enables digital designers to solve signal integrity challenges and effectively debug and verify their systems more quickly and easily. The iView feature fully integrates the industry-leading performance and measurement accuracy of a Tektronix oscilloscope with the multichannel and powerful triggering capabilities of a Tektronix logic analyzer. This integration allows designers to view time-correlated digital and analog data

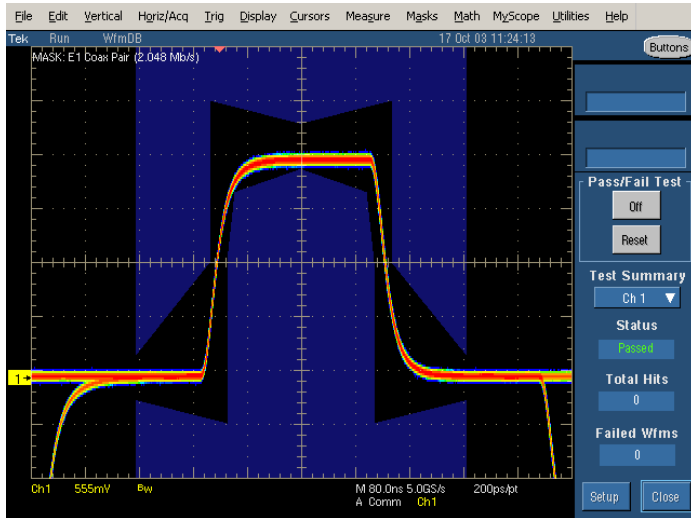
Power Measurements. Channel 1 (yellow, labeled Voltage) shows the turn-off voltage on the FET of a switching power supply, with current on Channel 2 (blue, labeled Current). The Math 1 waveform, M1 (orange, labeled Power), is the instantaneous power resulting from the multiplication of the voltage and current waveforms (Ch. 1 \* Ch. 2). The Math 2 waveform, M2 (purple, labeled Energy), is the result of a calculation of the integral of M1, a math-on-math operation of the TDS5000B models. An energy measurement, located to the right of the display, is a gated measurement made on M1 and includes statistics.

in the same display window and isolate the analog characteristics of the digital signals that are causing failures in their systems.

The iView Wizard simplifies this integration of the oscilloscope and logic analyzer by guiding the user through setup and connection. No user calibration is required. And, once set up, the iView feature is completely automated. The result – an integrated tool set for digital design and troubleshooting.

### Power Measurements

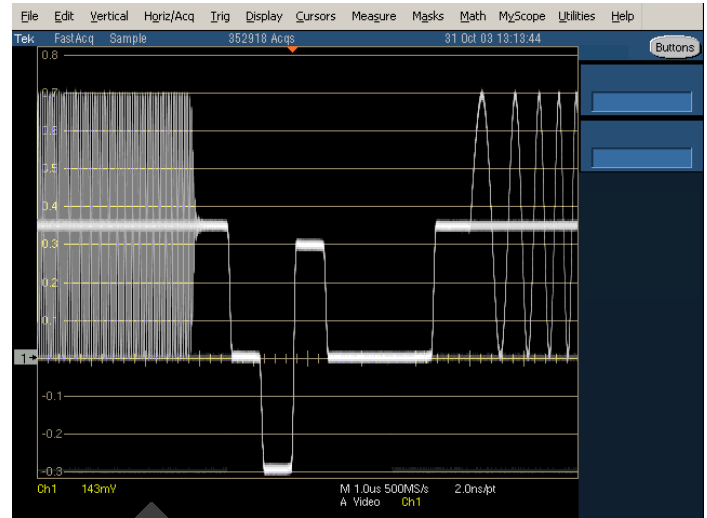
The TDS5000B's powerful and flexible measurements, math, and math-on-math capabilities make them ideal solutions for making power measurements, such as voltage, current, instantaneous power, and energy for power device designers.



Communication Mask Testing. Testing an E1 signal against the mask specified by the standard.

### Communications Mask Testing

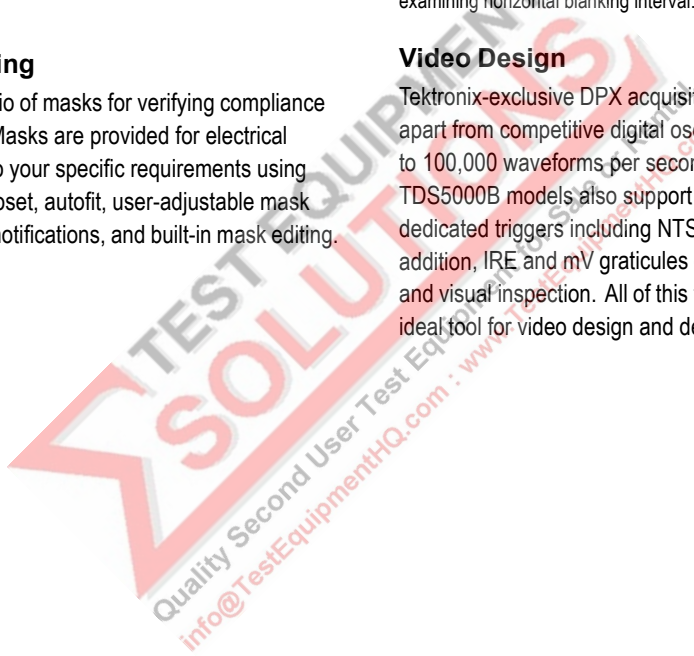
Option SM provides a complete portfolio of masks for verifying compliance to serial communications standards. Masks are provided for electrical standards. Easily tailor mask testing to your specific requirements using features such as one-button mask autoselect, autofit, user-adjustable mask margin tolerance, hit counting, failure notifications, and built-in mask editing.



Video Design. Illustration of triggering on an analog HDTV tri-level sync signal and examining horizontal blanking interval.

### Video Design

Tektronix-exclusive DPX acquisition technology sets the TDS5000B Series apart from competitive digital oscilloscopes, enabling the capture of up to 100,000 waveforms per second for a live, analog-like display. The TDS5000B models also support a wide variety of video standards with dedicated triggers including NTSC, PAL, SECAM, and analog HDTV. In addition, IRE and mV graticules can be selected for easier measurements and visual inspection. All of this together makes the TDS5000B Series an ideal tool for video design and development.



## Characteristics

### Vertical System

Characteristic	TDS5034B	TDS5054B	TDS5104B
Input Channels		4	
Analog Bandwidth (-3 dB) 5 mV/div - 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 $\Omega$	$\pm 1\%$		
Input Impedance, 50 $\Omega$	$\pm 1\%$		$\pm 2.5\%$
Input Sensitivity, 1 M $\Omega$	1 mV/div to 10 V/div		
Input Sensitivity, 50 $\Omega$	1 mV/div to 1 V/div		
Vertical Resolution	8 bits (>11 bits w/ averaging)		
Max Input Voltage, 1 M $\Omega$	150 V CAT I, $\leq 400$ V peak. Derate at 20 dB/decade to 9 V <sub>RMS</sub> above 200 kHz		
Max Input Voltage, 50 $\Omega$	5 V <sub>RMS</sub> with peaks $< \pm 30$ V		$< 100$ mV/div $< 1$ V <sub>RMS</sub> $\geq 100$ mV/div $< 5$ V <sub>RMS</sub>
DC Gain Accuracy	1.5% with offset set to 0 V		
Offset Range, 1 M $\Omega$	1 mV/div - 99.5 mV/div $\pm 1$ V 100 mV/div - 1 V/div $\pm 10$ V 1.01 V/div - 10 V/div $\pm 100$ V		
Offset Range, 50 $\Omega$	1 mV/div - 99.5 mV/div $\pm 1$ V 100 mV/div - 1 V/div $\pm 10$ V		1 mV/div - 50 mV/div $\pm 0.5$ V 50.5 mV/div - 99.5 mV/div $\pm 0.25$ V 100 mV/div - 500 mV/div $\pm 5$ V 505 mV/div - 1 V/div $\pm 2.5$ V
Channel-to-Channel Isolation for Any Two Channels at Equal Vertical Scale	$\geq 100:1$ at $\leq 100$ MHz and $\geq 30:1$ at $> 100$ MHz up to the rated bandwidth		

### Timebase System

Characteristic	Description
Timebase Range	200 ps/div to 1000 s/div
Timebase Delay Time Range	(s/div $\times$ 10) to 1000 s
Channel-to-Channel Deskew Range	$\pm 75$ ns
Timebase Accuracy	15 ppm
Delta Time Measurement Accuracy	(0.06/sample rate + 15 ppm $\times$  Reading ) RMS
Trigger Jitter (RMS)	8 ps <sub>RMS</sub> (typical)
Long-term Sample Rate and Delay Time Accuracy	$\pm 15$ ppm over any $\geq 1$ ms interval

### Acquisition System

Characteristic	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)

Characteristic	TDS5034B	TDS5054B / TDS5104B
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

Characteristic	Description
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 $2 \times 10^9$ 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



**Trigger System**

Characteristic	Description
<b>Sensitivity</b>	
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
<b>Trigger Level Range</b>	
Any Channel	$\pm 10$ divisions from center of screen
External (auxiliary in)	$\pm 8$ 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 $\mu$ s to 12 s maximum

**Trigger Modes**

Mode	Description
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 nonstandard 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 4 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 s
Trigger Delay by Events	1 to 10,000,000 Events

**Waveform Measurements**

Characteristic	Description
Automatic Measurements	53 of which 8 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 ( $\mu$ ), Standard Deviation ( $\sigma$ ), $\mu \pm 1\sigma$ , $\mu \pm 2\sigma$ , $\mu \pm 3\sigma$
Communications Related	Extinction Ratio (abs. %, dB), Eye Height, Eye Width, Eye Top, Eye Base, Crossing %, Jitter (P-P, RMS, $6\sigma$ ), Noise (P-P, 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

**Waveform Processing/Math**

Characteristic	Description
Arithmetic	Add, subtract, multiply, and divide waveforms
Algebraic Expressions	Define extensive algebraic expressions including waveforms, scalars, user-adjustable variables, and results of parametric measurements e.g. $(\text{Integral}(\text{Ch1}-\text{Mean}(\text{Ch1})) * 1.414 * \text{VAR1})$
Math Functions	Average, Invert, Integrate, Differentiate, Square Root, Exponential, Log 10, Log e, Abs, Ceiling, Floor, Min, Max, Sin, Cos, Tan, ASin, ACos, ATan, Sinh, Cosh, Tanh
Frequency Domain Functions	Spectral magnitude and phase, real and imaginary spectra
Vertical Units	Magnitude: Linear, dB, dBm Phase: degrees, radians, group delay
Window Functions	Rectangular, Hamming, Hanning, Kaiser-Bessel, Blackman-Harris, Gaussian, Flatop2, Tek Exponential
Limit Testing	Compare live waveforms against a known "golden" reference waveform with user-defined vertical and horizontal tolerances

**Display Characteristics**

Characteristic	Description
Display Type	10.4 in. Liquid-crystal active-matrix color display
Touchscreen	Standard on TDS5054B and TDS5104B. Optional touchscreen on TDS5034B
Display Resolution	640 horizontal $\times$ 480 vertical pixels
Waveform Styles	Vectors, Dots, Intensified Samples, Variable Persistence, Infinite Persistence
Display Format	YT, XY, XYZ
Color Palettes	Individual color palettes for Record View and FastAcq/WfmDB modes include Normal, Green, Gray, Temperature, Spectral, and User Defined

**Computer System and Peripherals**

Characteristic	Description
Operating System	Windows 2000
CPU	Intel Celeron Processor, 2.0 GHz
PC System Memory	512 MB
Internal Hard Disk Drive	$\geq$ 80 GB capacity
CD-RW Drive	Side-panel CD-RW drive, $\geq$ 24x read and write speed
Mouse	Optical wheel mouse, USB interface

**OpenChoice Features**

Characteristic	Description
TekVISA	Application Programmers Interface (API) for Windows developers. Documentation includes descriptions and samples of programming test and measurement applications on the unit in Visual BASIC, C, and C++
TekVISA Control (TVC)	Active controls to make access to TekVISA easy for integration into Microsoft Windows applications
VXI-11 Server	An Application Programmers Interface (API) for LAN connectivity from non-Windows environments
Plug-and-play Drivers	Provides support to run National Instrument's LabVIEW and LabWindows on an external PC connected to a TDS5000B or on the oscilloscope itself. Instrument drivers are version specific and might not support the version of your software development tools
IVI Drivers	Provides support for new and existing program environments utilizing the IVI instrumentation standard, such as LabVIEW, LabWindows/CVI, MATLAB, Visual BASIC, and C/C++. Instrument drivers are version specific and might not support the version of your software development tools
Excel and Word Toolbars	Provides direct access to screen images, waveform data, and measurements on the oscilloscope from a toolbar in Excel and/or Word
Report Generator	Enables the ability to design and create customized report templates that extract the oscilloscope's waveforms, settings, measurements, and other on-screen information with a click of the mouse

## Input/Output Ports

Port	Description
Auxiliary Input	Front-panel BNC connector. Trigger level range is adjustable from +8 V to -8 V. The maximum input voltage is $\pm 20$ V (DC + peak AC) and input resistance is $\geq 1.5$ k $\Omega$
Probe Compensator Output	Front-panel pins. Amplitude 1 V $\pm 1\%$ into a $\geq 10$ k $\Omega$ load, frequency 1 kHz $\pm 5\%$
Analog Signal Output	Rear-panel BNC connector, provides a buffered version of the signal that is attached to the Channel 3 input (4-channel models only). Amplitude: 50 mV/div $\pm 20\%$ into a 1 M $\Omega$ load, 25 mV/div $\pm 20\%$ into a 50 $\Omega$ load. Bandwidth (typical): 100 MHz into a 50 $\Omega$ load
Auxiliary Output Levels	Rear-panel BNC connector, provides a TTL-compatible, negative-polarity pulse when the oscilloscope triggers
External Reference In	Rear-panel BNC connector. 9.8 MHz to 10.2 MHz
Parallel Port	IEEE 1284, DB-25 connector
Audio Ports	Miniature phone jacks for stereo microphone input and stereo line output
USB Port	Four USB 2.0 ports allows connection or disconnection of USB keyboard and/or mouse while oscilloscope power is on
Keyboard Port	PS-2 compatible
Mouse Port	PS-2 compatible
LAN Port	RJ-45 connector, supports 10Base-T and 100Base-T
Serial Port	DB-9 COM1 port
Video Port	DB-15 female connector; connect a second monitor to use dual-monitor display mode. Supports basic requirements of PC99 specification and display resolutions up to 1,920 $\times$ 1,440
GPIB Port	IEEE 488.2 standard, can be configured for talk/listen or controller mode
Oscilloscope VGA Video Port	DB-15 female connector, connect to show the oscilloscope display on an external monitor or projector

## Power Source

Characteristic	Description
Power	100 to 240 V <sub>RMS</sub> $\pm 10\%$ , 47 to 63 Hz; CAT II, or 115 V <sub>RMS</sub> $\pm 10\%$ , 360 to 440 Hz
Power Consumption	<220 W

## Physical Characteristics

Configuration	Benchtop	Rackmount	Benchtop	Rackmount
<b>Dimensions</b>	<b>mm</b>		<b>in.</b>	
Height	361	267	11.2*1	10.5
Width	447	483	17.6	19
Depth	288	231*2	11.35	9.1*2
<b>Weight</b>	<b>kg</b>		<b>lb.</b>	
Net	11.23	13.49	24.75	29.75
Shipping	25.63	—	56.5	—
<b>Cooling</b>	76 mm required on left side		3 inches required on left side	
Cooling Clearance				

\*1 Does not include accessory pouch.

\*2 From rack mounting rear to back of instrument.

## Environmental

Characteristic	Description
<b>Temperature</b>	
Operating	+5 °C to +45 °C
Nonoperating	-20 °C to +60 °C without diskette in floppy drive
<b>Humidity</b>	
Operating	20% to 80% relative humidity with a maximum wet bulb temperature of +29 °C at or below +45 °C, noncondensing. Upper limit derates 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
<b>Altitude</b>	
Operating	10,000 ft. (3,048 m)
Nonoperating	40,000 ft. (12,190 m)
<b>Random Vibration</b>	
Operating	0.1 G <sub>RMS</sub> from 5 to 500 Hz, 10 minutes each axis, 3 axes, 30 minutes total
Nonoperating	2.0 G <sub>RMS</sub> from 5 to 500 Hz, 10 minutes each axis, 3 axes, 30 minutes total
<b>Regulatory Certifications</b>	
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-xx), Front Cover (200-4651-xx), Mouse (119-6936-xx), 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-xx), 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.

## Recommended Probes

Probe	Description
P5050	500 MHz, 10x passive probe
P6243	1.0 GHz active probe
P6245	1.5 GHz active probe
P6246	400 MHz differential probe
P6247	1.0 GHz differential probe
P6248	1.7 GHz differential probe
P6250	DC to 500 MHz, 42 V, Differential Probe (requires TCA-BNC adapter)
P6251	DC to 1 GHz, 42 V, Differential Probe (requires TCA-BNC adapter)

## Recommended Accessories

Accessory	Order Number
Service Manual	Order 071-1362-xx
Transit Case	Order 016-1937-xx
Probe Calibration, Compensation, and Deskew Adapter	Order 067-0405-xx
Power Deskew Fixture	Order 067-1478-xx
Mini Keyboard	Order 118-9402-xx
USB Test Fixture	Order TDSUSBF
Ethernet Test Fixture	Order through Crescent Heart Software (www.c-h-s.com)

## Instrument Options

(Available on all models unless indicated otherwise)

Option	Description
Opt. 18	Touchscreen interface for TDS5034B
Opt. 3M	Increase record length to 16 MSamples max (1ch.) for TDS5034B
Opt. 1K	Oscilloscope cart
Opt. 1R	Rackmount kit
Opt. SM	Communication mask testing
Opt. VNM	CAN bus decode requires ATM1 trigger module
Opt. PS1	Power Bundle that includes TCP202 DC-coupled Current Probe, P5205 High-voltage Differential Probe, TDSPWR3 Power Measurement Software, and Power Deskew Fixture
Opt. CP2*3	TDSCPM2 - ANSI/ITU telecom pulse compliance testing software
Opt. ET3	TDSET3 - Ethernet compliance test software
Opt. J2*4	TDSDDM2 - Disk drive measurements software
Opt. JA3	TDSJIT3 v2.0 Advanced - Jitter and timing analysis software
Opt. JE3	TDSJIT3 v2.0 Essentials - Jitter and timing analysis software
Opt. PW3	TDSPWR3 - Power measurements software
Opt. USB	USB 2.0 compliance test software only

\*3 Requires Option SM.

\*4 Not available on TDS5034B

## Power Plug Options

Option	Description
Opt. A0	North America
Opt. A1	Universal Euro
Opt. A2	United Kingdom
Opt. A3	Australia
Opt. A4	240 V North America
Opt. A5	Switzerland
Opt. A6	Japan
Opt. A10	China
Opt. A99	No power cord or AC adapter

## Manual Options

Option	Description
Opt. L0	English Manual
Opt. L1	French Manual
Opt. L3	German Manual
Opt. L5	Japanese Manual
Opt. L7	Simple Chinese Manual
Opt. L8	Traditional Chinese Manual
Opt. L9	Korean Manual
Opt. L10	Russian Manual

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USA 1 (800) 426-2200

For other areas contact Tektronix, Inc at: 1 (503) 627-7111

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**Service Options**

Option	Description
Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

**Instrument Upgrades**

Upgrades equivalent to original options can be ordered to extend instrument performance after initial purchase. Users can install upgrades without opening the instrument case or requiring on-site service (except for touchscreen upgrade for TDS5034B). To upgrade, order a TDS5BUP with one or more of the following options: 18, 1K, M03, 1R, SM, CP2, ET3, J2, JE3, JA3, PW3, USB, VNM. Factory installation of selected options is available by ordering Option IF on your TDS5BUP upgrade order.



Product(s) are manufactured in ISO registered facilities.



**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](http://www.tektronix.com)



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