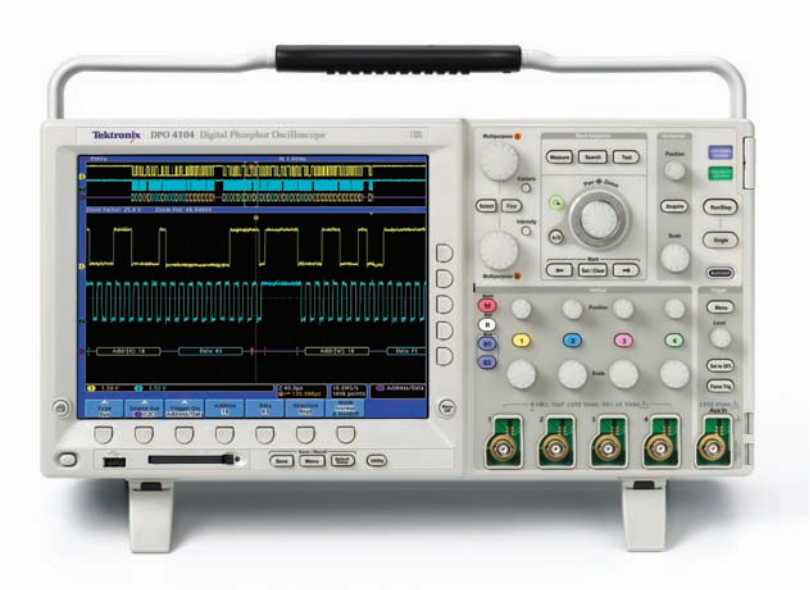
Digital Phosphor Oscilloscopes

▶ DPO4000 Series



DPO4000 Series Digital Phosphor Oscilloscopes: Debug Smarter, Not Harder!

Wave Inspector® Controls

Imagine trying to efficiently use the Internet if search engines such as Google and Yahoo didn't exist, web browser features such as Favorites and Links didn't exist or Internet Service Providers like AOL or MSN weren't around. Now you know how most modern oscilloscope users feel when trying to actually use the long record length in their digital oscilloscope. Record length, one of the key specifications of an oscilloscope, is the number of samples it can digitize and store in a single acquisition. The longer the record length, the longer the time window you can capture with high resolution (high sample rate). The first digital oscilloscopes could capture and store only 500 points which made it very difficult to acquire all relevant information around the event being investigated.

Over the years, oscilloscope vendors have provided longer and longer record lengths to meet market demands for long capture windows with high resolution to the point that most mid-range oscilloscopes either come standard with or can be optionally upgraded to, multi-mega-point record lengths. These mega-point record lengths often represent thousands of screens worth of signal activity. While standard record lengths have increased greatly over the years and can now satisfy the vast majority of applications in the marketplace, tools for effectively and efficiently viewing, navigating and analyzing long record length acquisitions have been sorely neglected until now. The DPO4000 Series redefines expectations for working with long record lengths with the following innovative new Wave Inspector® controls:

▶ Features & Benefits

1 GHz, 500, 350 MHz bandwidth models

4 channel models

Sample rates up to 5 GS/s on all channels

10 Megasample record length on all channels

50,000 wfms/s maximum waveform capture rate

Wave Inspector® controls provide unprecedented efficiency in waveform analysis

I^2C, SPI, CAN, LIN, FlexRay and RS-232/422/485/UART serial triggering and analysis options

10.4 in. (264 mm) XGA color display

Small footprint and lightweight – only 5.4 in. (137 mm) deep and 11 lbs. (5 kg)

USB and CompactFlash on front panel for quick and easy storage

Built-in Ethernet port

Plug-and-play connectivity and analysis software solutions

USB 2.0 device port for direct PC control of oscilloscope using USBTMC

Suite of advanced triggers

e*Scope® remote viewing and control

Interoperability with Tektronix Logic Analyzers

TekVPI® probe interface supports active, differential and current probes for automatic scaling and units

HDTV and custom video trigger option

▶ Applications

Embedded design and debug

Investigation of transient phenomena

Power measurements

Video design and debug

Spectral analysis

Automotive electronics design and debug

Manufacturing test and quality control

Electro-mechanical design and analysis

Bio-medical product development

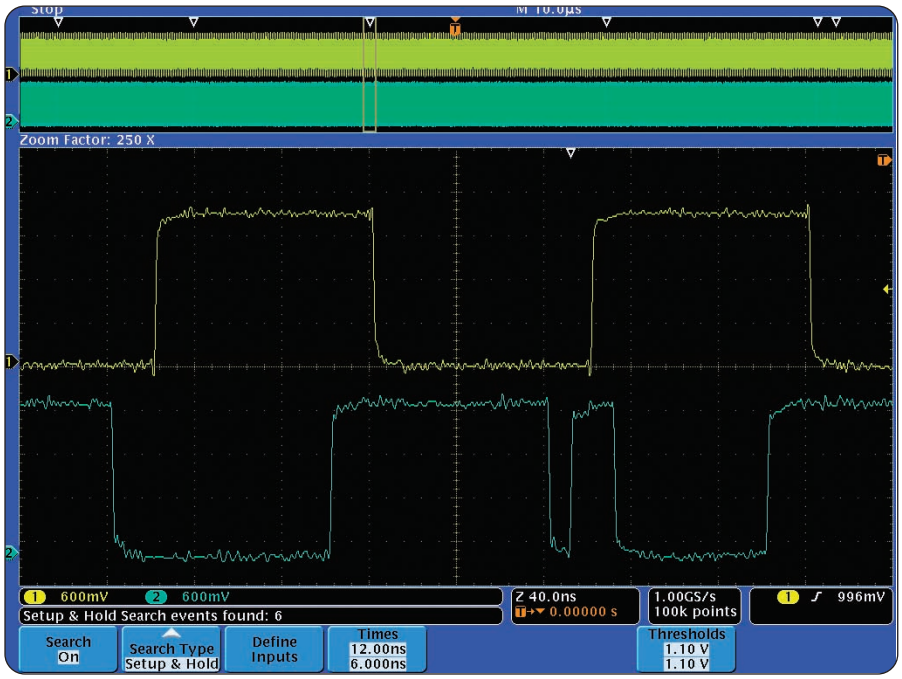
Industrial Control

Tektronix®



► Wave Inspector® Controls provide unprecedented efficiency in viewing, navigating and analyzing waveform data.

Zoom/Pan – A dedicated, two-tier front-panel knob provides intuitive control of both zooming and panning. The inner knob adjusts the zoom factor (or zoom scale); turning it clockwise activates zoom and goes to progressively higher zoom factors, while turning it counter-clockwise results in lower zoom factors and eventually turning zoom off. The outer knob pans the zoom box across the waveform to quickly get to the portion of the waveform you are interested in. The outer knob also utilizes force-feedback to determine how fast to pan on the waveform. The farther you turn the outer knob, the faster the zoom box moves. Pan direction is changed by simply turning the knob the other way. No longer do you need to navigate through multiple menus to adjust your zoom view.



► Setup and Hold search highlighting numerous setup and hold violations in a single acquisition.

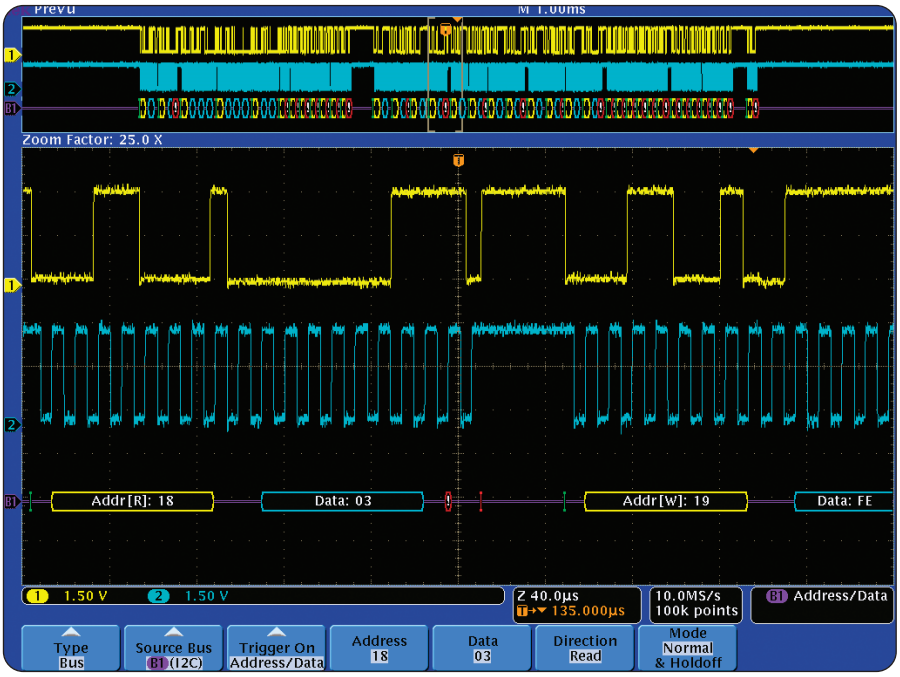
Play/Pause – A dedicated **play/pause** button on the front panel scrolls the waveform across the display automatically while you look for anomalies or an event of interest. Playback speed and direction are controlled using the intuitive pan knob. Once again, turning the knob further makes the waveform scroll faster and changing direction is as simple as turning the knob the other way.

User Marks – See something interesting on your waveform? Press the **Set Mark** button on the front panel to leave one or more "bookmarks" on the waveform. Navigating between marks is as simple as pressing the **Previous** ← and **Next** → buttons on the front panel.

Search Marks – Don't want to take the time to inspect the entire acquisition to find the event you're looking for? The DPO4000 Series features a robust waveform search feature that allows you to search through your long acquisition based on user-defined criteria. All occurrences of the event are highlighted with search marks and are easily navigated to, using the front panel **Previous** ← and **Next** → buttons. Search types include edge, pulse width, runt, logic, setup and hold, rise/fall time and I^2C, SPI, CAN, LIN, FlexRay and RS-232/422/485/UART packet content.

Serial Triggering and Analysis

One of the most common applications requiring long record length is serial data analysis in embedded system design. Embedded systems are literally everywhere. They can contain many different types of devices including microprocessors, microcontrollers, DSPs, RAM, EPROMs, FPGAs, A/Ds, D/As and I/O. These various devices have traditionally communicated with each other and the outside world using wide parallel buses. Today, however, more and more embedded systems are replacing these wide parallel buses with serial buses due to less board space required, fewer pins, lower power, embedded clocks, differential signaling for better noise immunity and most importantly, lower cost. In addition, there's a large supply of off-the-shelf building block components from reputable manufacturers, enabling rapid design development. While serial buses have a large number of benefits, they also present significant challenges that their predecessors (parallel buses) did not face. They make debugging bus and system problems more difficult, it's harder to isolate events of interest and it's more difficult to interpret what is displayed on the oscilloscope screen. With the optional DPO4AUTOMAX, DPO4COMP and DPO4EMBD modules, the DPO4000 Series addresses these problems and represents the ultimate tool for engineers working with low-speed serial buses such as I^2C, SPI, CAN, LIN, FlexRay and RS-232/422/485/UART.



▶ Triggering on a specific data packet going across an I^2C bus. Yellow waveform is data, blue waveform is clock. Bus waveform provides decoded packet content including Start, Address, Read/Write, Data, Missing Ack and Stop.

Bus Display – Provides a higher level, combined view of the individual signals (clock, data, chip enable, etc.) that make up your bus, making it easy to identify where packets begin and end and identifying sub-packet components such as address, data, identifier, CRC, etc.

Serial Triggering – Trigger on packet content such as start of packet, specific addresses, specific data content, unique identifiers, etc. on popular low-speed serial interfaces such as I^2C, SPI, CAN, LIN, FlexRay and RS-232/422/485/UART.

Bus Decoding – Tired of having to visually inspect the waveform to count clocks, determine if each bit is a 1 or a 0, combine bits into bytes and determine the hex value? Let the oscilloscope do it for you! Once you've set up a bus, the oscilloscope will decode each packet on the bus and display the value in hex, binary, decimal (LIN and FlexRay only) or ASCII (RS-232/422/485/UART only) in the bus waveform.

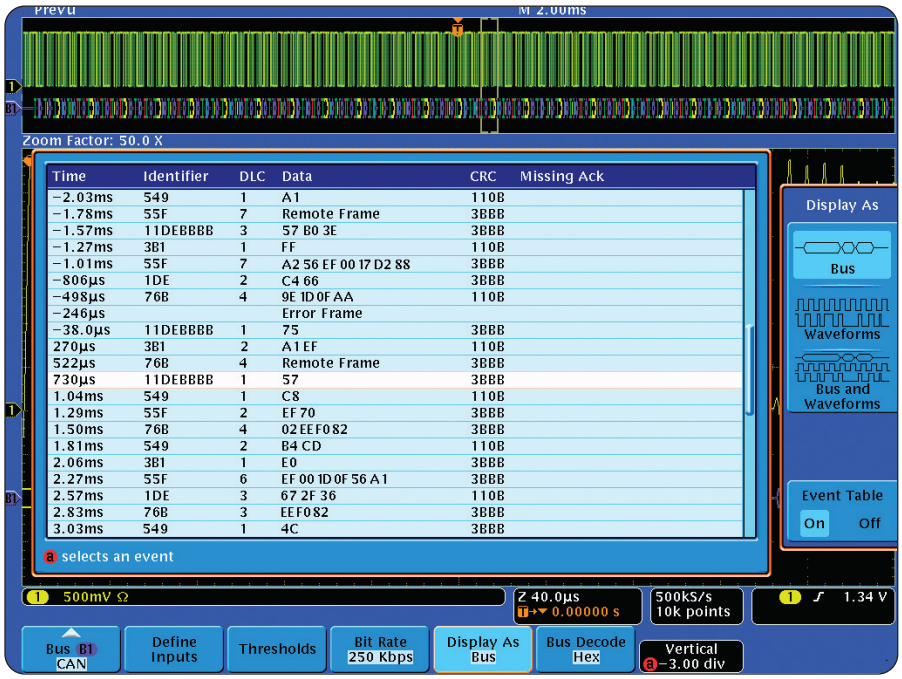
Event Table – In addition to seeing decoded packet data on the bus waveform itself, you can view all captured packets in a tabular view much like you would see on a logic analyzer. Packets are timestamped and listed consecutively with columns for each component (Address, Data, etc.).

Search – Serial triggering is very useful for isolating the event of interest, but once you've captured it and need to analyze the surrounding data, what do you do? In the past, users had to manually scroll through the waveform counting and converting bits and looking for what caused the event. With the DPO4000 Series, you can have the oscilloscope search through the acquired data for user defined criteria including serial packet content. Each occurrence is highlighted by a search mark. Rapid navigation between marks is as simple as pressing the **Previous** ← and **Next** → buttons on the front panel.

The Performance and Feature Set You Expect

The DPO4000 Series digital phosphor oscilloscopes (DPO) deliver the performance you need to visualize even your most demanding signals. Bandwidths range from 350 MHz to 1 GHz and with all models offering a minimum of 5x oversampling on all channels and sin(x)/x interpolation standard, you can be confident that even the fastest transient events will be captured and displayed accurately. The standard 10 M record length on all channels enables you to capture long windows of signal activity while maintaining fine timing resolution.

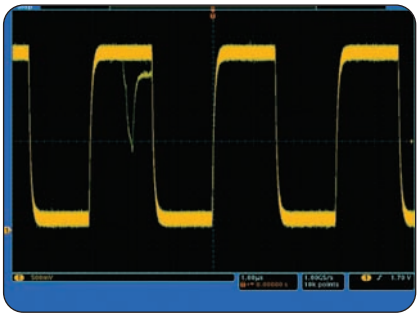
The DPO4000 Series offers a variety of analytical solutions including cursors, 29 automatic measurements, statistics and waveform math. Despite a tiny footprint (only 5.4" deep) and light weight (11 lbs.), the DPO4000 Series offers exceptional performance, a large 10.4" XGA display and knob per channel vertical controls.



► Packet decode table showing decoded Identifier, DLC, Data and CRC for every CAN packet in a long acquisition.

The new TekVPI® probe interface sets the standard for ease of use in probing. TekVPI probes feature status indicators and controls, as well as a probe menu button right on the comp box itself. This button brings up a probe menu on the oscilloscope display with all relevant settings and controls for the probe. The TekVPI interface utilizes a new probe power management architecture enabling direct attachment of current probes without requiring a separate, bulky power supply. Finally, TekVPI probes can be controlled remotely via USB, GPIB or Ethernet, enabling more versatile solutions in ATE environments.

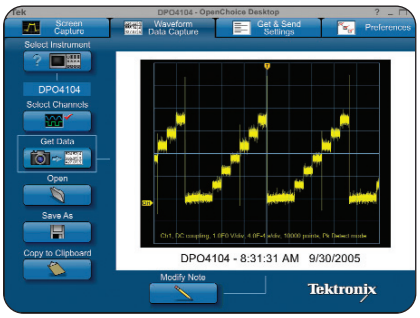
The DPO4000 Series delivers an unprecedented new level of USB plug-and-play operation and PC connectivity. Acquiring data and measurements from the instrument is as simple as connecting a USB cable from the oscilloscope to the PC. Provided applications include NI LabVIEW SignalExpress™ Tektronix Edition LE, OpenChoice® Desktop and



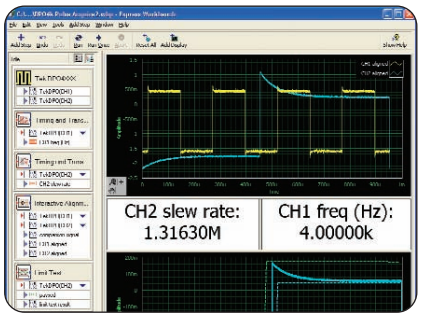
► Fast waveform capture rate maximizes the probability of capturing elusive glitches and other infrequent events.

Microsoft Excel and Word toolbars enabling fast and easy direct communication with your Windows PC. USB and CompactFlash ports on the front panel enable simple transfer of screen-shots, instrument settings and waveform data in the palm of your hand.

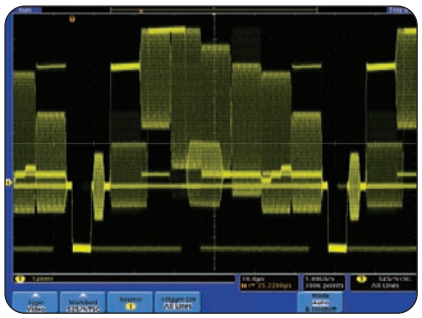
The unprecedented Wave Inspector® controls, coupled with the DPO4000's exceptional performance, comprehensive feature set and innovative package design provide exceptional value.



▶ OpenChoice® Desktop—Standard software seamlessly connects the oscilloscope to a PC.



▶ National Instruments LabVIEW SignalExpress™ Tektronix Edition (SIGEXPTE)—Fully interactive measurement acquisition and analysis software developed jointly with National Instruments and optimized for the DPO4000 Series.



▶ Viewing an NTSC video signal. Notice the intensity-graded view provided by the DPO's ability to represent time, amplitude and distribution of amplitude over time.

Other Applications

Video Design and Development

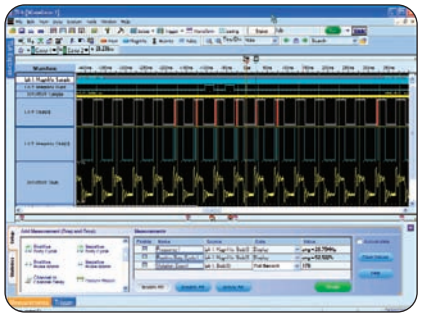
Many video engineers have remained loyal to analog oscilloscopes, believing the intensity gradations on an analog display are the only way to see certain video waveform details. The DPO4000 Series fast waveform capture rate, coupled with its intensity-graded view of the signal, provides the same information-rich display as an analog oscilloscope, but with much more detail and all the benefits of digital scopes.

Standard features such as IRE and mV graticules, holdoff by fields, video polarity and an Autoset smart enough to detect video signals, make the DPO4000 Series the easiest to use oscilloscope on the market for video applications. And with up to 1 GHz bandwidth and four analog inputs, the DPO4000 Series provides ample performance for analog and digital video use.

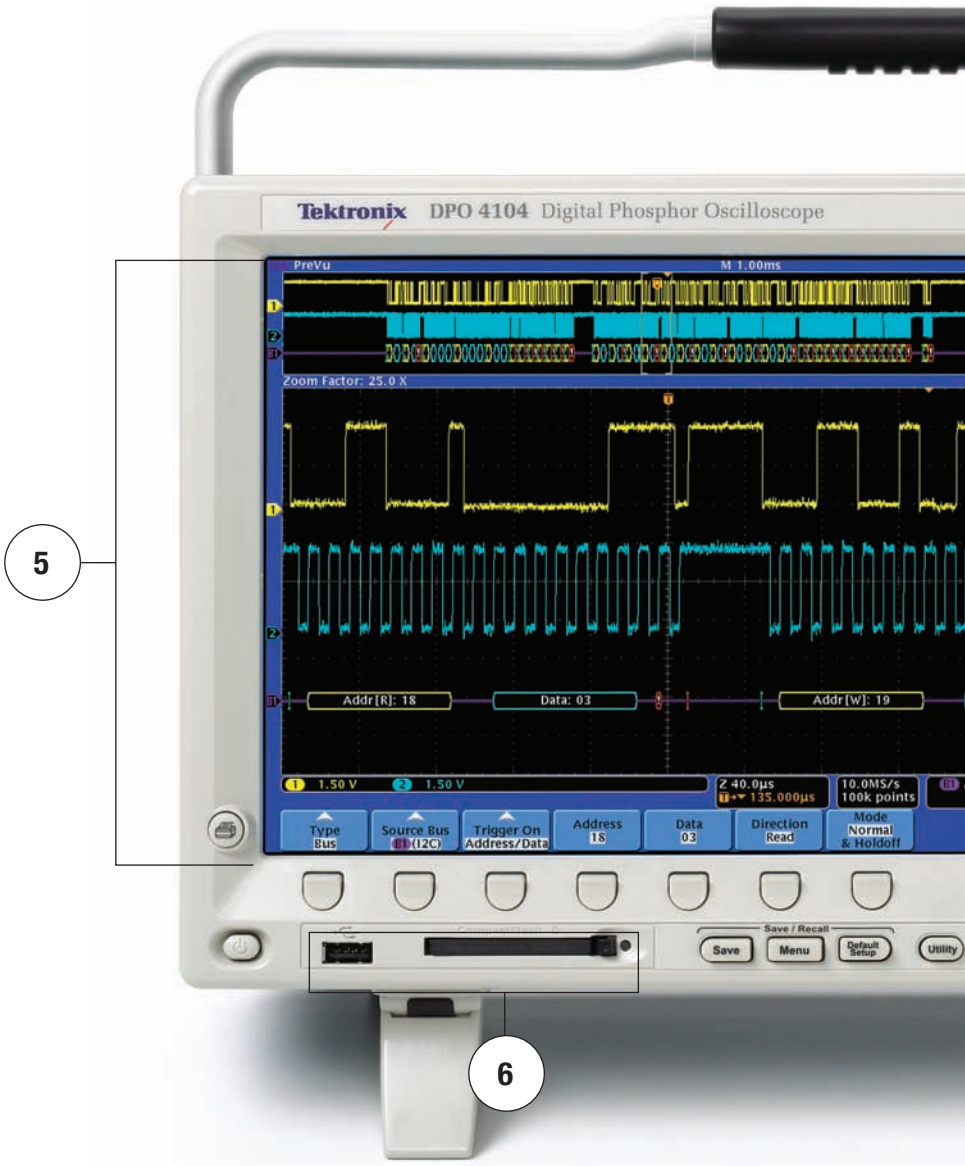
Finally, the DPO4000 Series video functionality is further extended with the optional DPO4VID video application module. DPO4VID provides the industry's most complete suite of HDTV and custom (non-standard) video triggers.

Digital Design and Debug

The interoperability of the DPO4000 Series oscilloscope with the Tektronix TLA5000 Series logic analyzer made possible by Tektronix' Integrated View (iView™) feature 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 multi-channel and powerful triggering capabilities of a Tektronix logic analyzer. This integration allows designers to view time-correlated digital and analog data in the same display window and isolate analog characteristics of digital signals that are causing failures in their systems. The iView Wizard feature simplifies this integration of the oscilloscope and logic analyzer by guiding the user through set up 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.



▶ Tektronix' Integrated View feature (iView™) fully integrates the performance and measurement accuracy of a Tektronix oscilloscope with the multi-channel and powerful triggering capabilities of a Tektronix logic analyzer in one display, allowing designers to quickly verify and debug their designs.



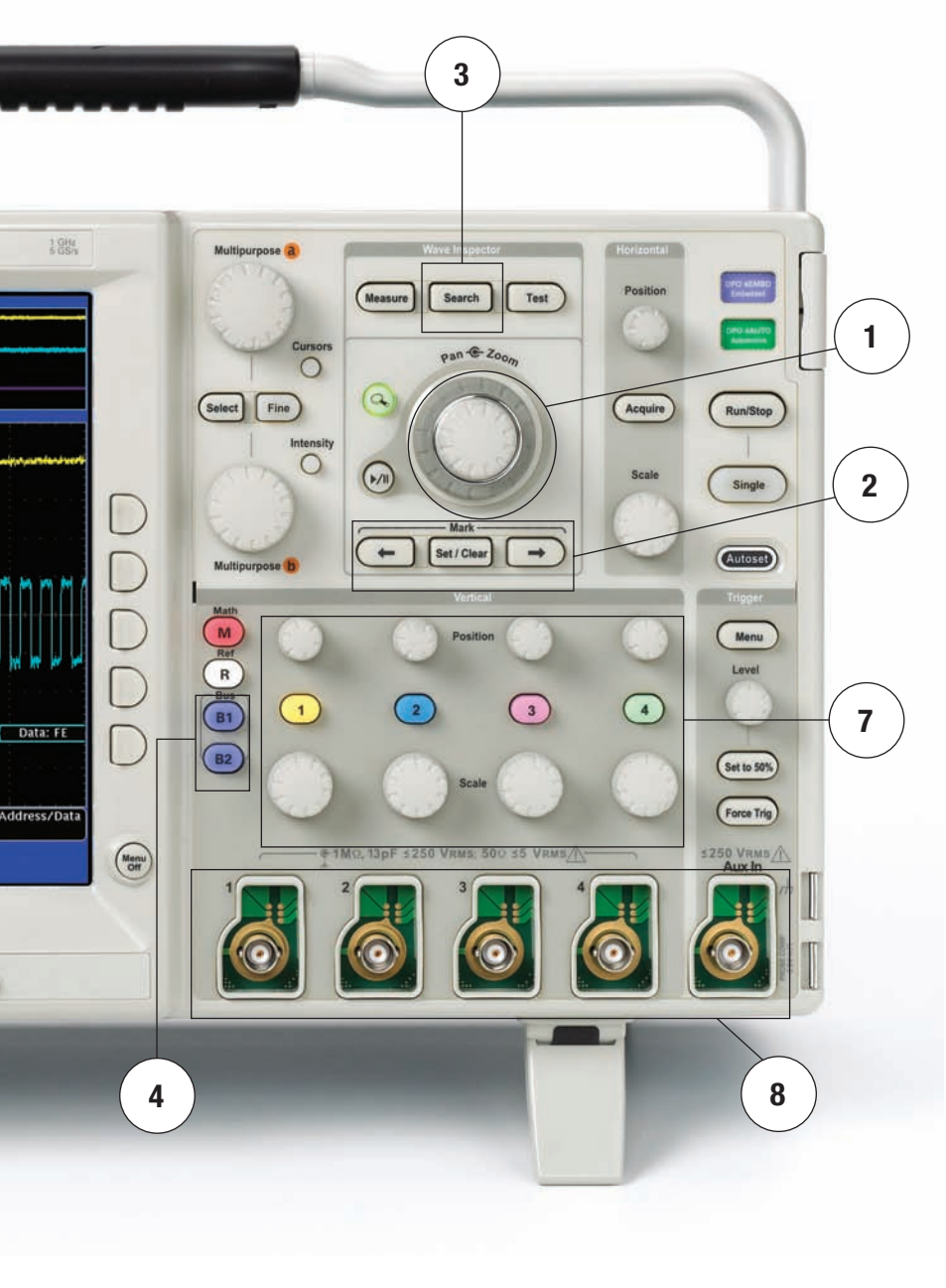
1 Zoom/Pan – Dedicated front panel controls for zooming and panning. The inner knob controls zoom factor while the outer ring adjust pans the zoom box across the waveform. Navigating your waveform has never been easier.

2 Marks – Want to mark your waveform for future reference or for quick navigation between events of interest? Simply press the Set Mark button to place "bookmarks" on your waveform. Use the ← and → buttons to navigate through user marks and search generated marks.

3 Search – Tired of turning the horizontal position knob endlessly on your current scope to find the event you're looking for? Use the DPO4000's powerful Search feature to find and mark all occurrences of an event based on user specified criteria. Search types include edge, pulse width, runt, logic, setup and hold, rise/fall time and I^2C, SPI, CAN, LIN, FlexRay and RS-232/422/485/UART packet content.

4 Serial Buses – Trigger on packet level content, view acquired data as a bus with all packets decoded into hex or binary, search through acquisitions for specific packet content and even view all packets decoded in a tabular format, much like you would see on a logic analyzer. Serial standards supported include I^2C, SPI, CAN, LIN, FlexRay and RS-232/422/485/UART packet content.

5 Stunning Display – The DPO4000 Series boasts a large, high-resolution display – 10.4 in (264 mm) and 1,024x768 resolution (XGA).





Only 5.4 in. Deep! – Despite the impressive performance, huge display and knob-per-channel controls, the DPO4000 Series is only 5.4 in. deep, saving you valuable space on your test bench.

6 Mass Storage – Use the front panel USB and CompactFlash ports for simple and convenient storage of screenshots, waveform data and oscilloscope setups. Two more USB host ports are available on the rear panel for peripheral connections as well as a USB device port for instrument control using USBTMC.

7 Vertical Controls – Knob-per-channel vertical controls provide simple and intuitive operation. No longer do you need to share one set of vertical controls across all four channels!

8 TekVPI® – TekVPI probe interface provides for direct connect current probes, intuitive comp box controls, remote control of probe settings and smarter communication between the oscilloscope and the probe.

▶ Characteristics

▶ Vertical System

	DPO4034	DPO4054	DPO4104
Input Channels	4	4	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 ns	700 ps	350 ps
Hardware Bandwidth Limits	20 MHz or 250 MHz		
Input Coupling	AC, DC, GND		
Input Impedance	1 MΩ ±1%, 50 Ω ±1%		
Input Sensitivity, 1 MΩ	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 Hi Res)		
Max Input Voltage, 1 MΩ	250 V_{RMS} with peaks ≤±400 V		
Max Input Voltage, 50 Ω	5 V_{RMS} with peaks ≤±20 V		
DC Gain Accuracy	±1.5% with offset set to 0 V		
Offset Range	**1 MΩ**	**50 Ω**	
1 mV/div to 50 mV/div	±1 V	±1 V	
50.5 mV/div to 99.5 mV/div	±0.5 V	±0.5 V	
100 mV/div to 500 mV/div	±10 V	±10 V	
505 mV/div to 995 mV/div	±5 V	±5 V	
1 V/div to 5 V/div	±100 V	±5 V	
5.05 V/div to 10 V/div	±50 V	NA	
Channel-to-Channel Isolation	≥100:1 at ≤100 MHz and ≥30:1 at >100 MHz up to the rated bandwidth for any two channels having equal volts/div settings		

▶ Horizontal System

	DPO4034	DPO4054	DPO4104
Maximum Sample Rate (all channels)	2.5 GS/s	2.5 GS/s	5 GS/s
Maximum Record Length (all channels)	10 M points		
Maximum Duration at Highest Sample Rate (all channels)	4 ms	4 ms	2 ms
Timebase Range (s/div)	1 ns to 400 s		400 ps to 400 s
Timebase Delay Time Range	–10 divisions to 50 s		
Channel-to-Channel Deskew Range	±100 ns		
Timebase Accuracy	±5 ppm over any ≥1 ms interval		

Trigger System
Main Trigger Modes – Auto, Normal and Single.
Trigger Coupling – DC, HF reject (attenuates >50 kHz), LF reject (attenuates <50 kHz), noise reject (reduces sensitivity).
Trigger Holdoff Range – 20 ns to 8 s.

Sensitivity
Internal DC Coupled – 0.4 div DC to 50 MHz increasing to 1 div at rated bandwidth.
External (auxiliary input) – 200 mV from DC to 50 MHz increasing to 500 mV at 250 MHz.

Trigger Level Range
Any Channel – ±8 divisions from center of screen.
External (auxiliary input) – ±8 V.

Acquisition Modes
Sample – Acquire sampled values.
Peak Detect – Captures glitches as narrow as 200 ps at all sweep speeds.
Averaging – From 2 to 512 waveforms included in average.
Envelope – Min-max envelope reflecting Peak Detect data over multiple acquisitions.
Hi Res – Real-time boxcar averaging reduces random noise and increases resolution.
Roll – Scrolls waveforms right to left across screen at sweep speeds slower than or equal to 40 ms/div.

Trigger Modes
Edge – Positive or negative slope on any channel or front panel auxiliary input. Coupling includes DC, HF reject, LF reject and noise reject.
Pulse Width – Trigger on width of positive or negative pulse 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.
Logic – Trigger when any logical pattern of channels goes false or stays true for specified period of time. Any input can be used as a clock to look for the pattern on a clock edge. Pattern (AND or, NAND, NOR) specified for four input channels defined as High, Low or Don't Care.
Setup and Hold – Trigger on violations of both setup time and hold time between clock and data present on any two input channels.
Rise/Fall Time – Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative or either.
Video – Trigger on all lines, odd, even or all fields on NTSC, PAL and SECAM video signals.
Extended Video (Optional) – Trigger on 480p/60, 576p/50, 720p/30, 720p/50, 720p/60, 875i/60, 1080i/50, 1080i/60, 1080p/24, 1080p/24sF, 1080p/25, 1080p/30, 1080p/50, 1080p/60 and custom bi-level and tri-level sync video standards.
I^2C (Optional) – Trigger on Start, Repeated Start, Stop, Missing ACK, Address (7 or 10 bit), Data or Address and Data on I^2C buses up to 3.4 Mb/s.
SPI (Optional) – Trigger on SS, Idle Time, MOSI, MISO or MOSI and MISO on SPI buses up to 10.0 Mb/s.
CAN (Optional) – Trigger on Start of Frame, Frame Type (data, remote, error, overload), Identifier (standard or extended), Data, Identifier and Data, End of Frame or Missing ACK or Bit Stuffing Errors on CAN signals up to 1 Mb/s. Data can be further specified to trigger on ≤, <, =, >, ≥ or ≠ a specific data value. User adjustable sample point is set to 50% by default.
RS-232/422/485/UART (Optional) – Trigger on Tx Start Bit, Rx Start Bit, Tx End of Packet, Rx End of Packet, Tx Data and Rx Data.
LIN (Optional) – Trigger on Sync, Identifier, Data, Identifier and Data, Wakeup Frame, Sleep Frame or Errors such as Sync, Parity or Checksum Errors.
FlexRay (Optional) – Trigger on Start of Frame, Type of Frame (Normal, Payload, Null, Sync, Startup), Identifier, Cycle Count, Complete Header Field, Data, Identifier and Data, End of Frame or Errors such as Header CRC, Trailer CRC, Null Frame, Sync Frame or Startup Frame Errors.
Trigger Delay by Time – 4 ns to 8 s.
Trigger Delay by Events – 1 to 9,999,999 events.

Waveform Measurements
Cursors – Waveform and Screen.
Automatic Measurements – 29, of which up to eight can be displayed on screen at any one time. Measurements include Period, Frequency, Delay, 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 and Cycle Area.
Measurement Statistics – Mean, Min, Max, Standard Deviation.
Reference Levels – User definable reference levels for automatic measurements can be specified in either percent or units.
Gating – Isolate the specific occurrence within an acquisition to take measurements, on using either the screen or waveform cursors.

Waveform Math
Arithmetic – Add, subtract, multiply and divide waveforms.
Math Functions – Integrate, Differentiate, FFT.
FFT – Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS and FFT Window to Rectangular, Hamming, Hanning or Blackman-Harris.
Advanced Math – Define extensive algebraic expressions including waveforms, math functions, scalars, up to two user adjustable variables and results of parametric measurements e.g., (Intg(Ch1-Mean(Ch1)) x 1.414 x VAR1).

Software
NI LabVIEW SignalExpress™ Tektronix Edition LE – A fully interactive measurement software environment optimized for the DPO4000 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 DPO4000 Series support for acquiring, controlling, viewing and exporting your live signal. The full version (SIGEXPTE) adds additional signal processing, advanced analysis, mixed signal, sweeping, limit testing and user-defined step capabilities and is available for a 30-day trial period standard with each instrument.
OpenChoice® Desktop – Enables fast and easy communication between a Windows PC and the DPO4000 Series, via USB or LAN. Transfer and save settings, waveforms, measurements and screen images.
IVI Driver – Provides a standard instrument programming interface for common applications such as LabVIEW, LabWindows/CVI, Microsoft .NET and MATLAB.

Display Characteristics

Display Type – 10.4 in. (264 mm) liquid crystal TFT color display.
Display Resolution – 1,024 horizontal x 768 vertical pixels (XGA).
Waveform Styles – Vectors, Dots, Variable Persistence, Infinite Persistence.
Graticules – Full, Grid, Cross Hair, Frame, IRE and mV.
Format – YT and simultaneous XY/YT.
Waveform Capture Rate – Up to 50,000 wfms/sec.

Input/Output Ports

CompactFlash Drive – Front panel access (Type 1).
USB 2.0 Full Speed Host Port – Supports USB mass storage devices and printers. Two ports available on rear-panel and one on front-panel.
USB 2.0 High Speed Device Port – Rear panel connector allows for control of oscilloscope via USBTMC or GPIB with a TEK-USB-488.
LAN Port – RJ-45 connector, supports 10/100Base-T.
XGA Video Port – DB-15 female connector, connect to show the oscilloscope display on an external monitor or projector.
Auxiliary Input – Front panel BNC connector. Input Impedance 1 MΩ. Max input 250 V_{RMS} with peaks ≤±400 V.
Probe Compensator Output – Front panel pins. Amplitude 2.5 V. Frequency 1 kHz.
Trigger Out – Rear-panel BNC connector, provides a positive polarity pulse when the oscilloscope triggers.
Kensington Lock – Rear-panel security slot connects to standard Kensington lock.

Power Source

Power Source Voltage – 100 to 240 V ±10%.
Power Source Frequency – 47 to 66 Hz (90 to 264 V), 360 to 440 Hz (100 to 132 V).
Power Consumption – 250 W maximum.

General Characteristics

► Physical Characteristics

Dimensions	mm	in.
Height	229	9.0
Width	439	17.3
Depth	137	5.4

Weight	kg	lbs.
Net	5	11
Shipping	10	22
Rackmount Configuration	5U	
Cooling Clearance	2 in. (51 mm) required on left side and rear of instrument	

Environmental

Temperature

Operating – 0 ºC to +50 ºC.
Non-Operating – –20 ºC to +60 ºC.

Humidity

Operating –
High: 40 °C to 50 °C, 10% to 60% Relative Humidity.
Low: 0 °C to 40 °C, 10% to 90% Relative Humidity.
Non-Operating –
High: 40 °C to 60 °C, 5% to 60% Relative Humidity.
Low: 0 °C to 40 °C, 5% to 90% Relative Humidity.

Altitude

Operating – 3,000 meters (9,843 feet).
Non-Operating – 12,000 meters (39,370 feet).

Random Vibration

Operating – 0.31 G_{RMS} from 5 to 500 Hz, 10 minutes each axis, 3 axes, 30 minutes total.
Non-Operating – 2.46 G_{RMS} from 5 to 500 Hz, 10 minutes each axis, 3 axes, 30 minutes total.

Regulatory

Electromagnetic Compatibility – 89/336/EEC.
Safety – UL61010-1, Second Edition; CSA61010-1 Second Edition, EN61010-1: 2001; IEC 61010-1: 2001.

Ordering Information

DPO4000 Series

DPO4034 – 350 MHz, 2.5 GS/s, 10 M record length, 4 channel digital phosphor oscilloscope.
DPO4054 – 500 MHz, 2.5 GS/s, 10 M record length, 4 channel digital phosphor oscilloscope.
DPO4104 – 1 GHz, 5 GS/s, 10 M record length, 4 channel digital phosphor oscilloscope.

All models include: One P6139A 500 MHz, 10x Passive Probe per Channel, Front Cover (200-4908-00), CompactFlash Memory Card; ≥32 MB (156-9413-00), User Manual (071-2121-xx), Documentation CD (063-3903-00), OpenChoice® Desktop Software, NI LabView SignalExpress™ Tektronix Edition LE Software, Calibration Certificate Documenting Traceability to National Metrology Institute(s) and ISO9001 Quality System Registration, Power Cord, Accessory Bag (016-1967-00), Three Year Warranty.Please specify power plug and manual version when ordering.

Application Modules

DPO4EMBD – Embedded Serial Triggering and Analysis Module. Enables triggering on packet level information on I^2C and SPI buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools and packet decode tables with timestamp information.
DPO4COMP – Computer Serial Triggering and Analysis Module. Enables triggering on packet level information on RS-232/422/485/UART buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools and packet decode tables with timestamp information.
DPO4AUTO – Automotive Serial Triggering and Analysis Module. Enables triggering on packet level information on CAN and LIN buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools and packet decode tables with timestamp information.
DPO4AUTOMAX – Extended Automotive Serial Triggering and Analysis Module. Enables triggering on packet level information on CAN, LIN and FlexRay buses as well as analytical tools such as digital views of the signal, bus views, packet decoding, search tools and packet decode tables with timestamp information.
DPO4VID – HDTV and Custom (non-standard) Video Triggering Module.

Instrument Options

Power Plug Options

Opt. A0 – North America.
Opt. A1 – Universal Euro.
Opt. A2 – United Kingdom.
Opt. A3 – Australia.
Opt. A5 – Switzerland.
Opt. A6 – Japan.
Opt. A10 – China.
Opt. A11 – India.
Opt. A99 – No Power Cord or AC Adapter.

Language Options*1

Opt. L0 – English Manual.
Opt. L1 – French Manual.
Opt. L2 – Italian Manual.
Opt. L3 – German Manual.
Opt. L4 – Spanish Manual.
Opt. L5 – Japanese Manual.
Opt. L6 – Portuguese Manual.
Opt. L7 – Simplified Chinese Manual.
Opt. L8 – Standard Chinese Manual.
Opt. L9 – Korean Manual.
Opt. L10 – Russian Manual.
Opt. L99 – No Manual.

Service Options*2

Opt. C3 – Calibration Service 3 Years.
Opt. C5 – Calibration Service 5 Years.
Opt. CA1 – Provides a single calibration event or coverage for the designated calibration interval, whichever comes first.
Opt. D1 – Calibration Data Report.
Opt. D3 – Calibration Data Report 3 Years (with Option C3).
Opt. D5 – Calibration Data Report 5 Years (with Option C5).
Opt. R5 – Repair Service 5 Years (including warranty).

Recommended Probes

TAP1500 – 1.5 GHz TekVPI® active probe.
TCP0030 – 120 MHz TekVPI 30 Ampere AC/DC current probe.
TCP0150 – 20 MHz TekVPI 150 Ampere AC/DC current probe.
TCPA300/400*3 – Current measurement systems.
TDP0500 – 500 MHz differential probe.
TDP1000 – 1 GHz differential probe.
P5205*3 – 1.3 kV, 100 MHz high voltage differential probe.
P5210*3 – 5.6 kV, 50 MHz high voltage differential probe.
P5100 – 2.5 kV, 100X high voltage passive probe.
ADA400A*3 – 100X, 10X, 1X, 0.1X high gain differential amplifier.

Recommended Accessories.

Service Manual (English only) – Order 071-1844-xx.
SIGEXPTE – NI LabVIEW SignalExpress Tektronix Edition Software.
TPA-BNC – TekVPI to TekProbe BNC Adapter.
TEK-USB-488 – GPIB to USB Adapter.
CompactFlash to USB Memory Card Reader – Order 19-6827-00.
ACD4000 – Soft Transit Case.
HCTEK4321 – Hard Transit Case (requires ACD4000).
RM4000 – Rackmount Kit.
AMT75*3 – 1 GHz, 75 Ω Adapter.

Warranty

▶ Three year warranty covering all parts and labor, excluding probes

*1 Language options include translated front panel overlay for the selected language(s).

*2 Probes and accessories are not covered by the oscilloscope warranty and Service Offerings. Refer to the datasheet of each probe and accessory model for its unique warranty and calibration terms.

*3 Requires TekVPI to TekProbe BNC adapter (TPA-BNC).

Digital Phosphor Oscilloscopes

► DPO4000 Series

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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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