Tektronix®

Digital Phosphor Oscilloscopes

DPO4000 Series Datasheet

- USB and CompactFlash on Front Panel for Quick and Easy Storage

- Built-in Ethernet Port

- Plug 'n' 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

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 lb. (5 kg)!

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

- Electromechanical Design and Analysis

- Biomedical Product Development
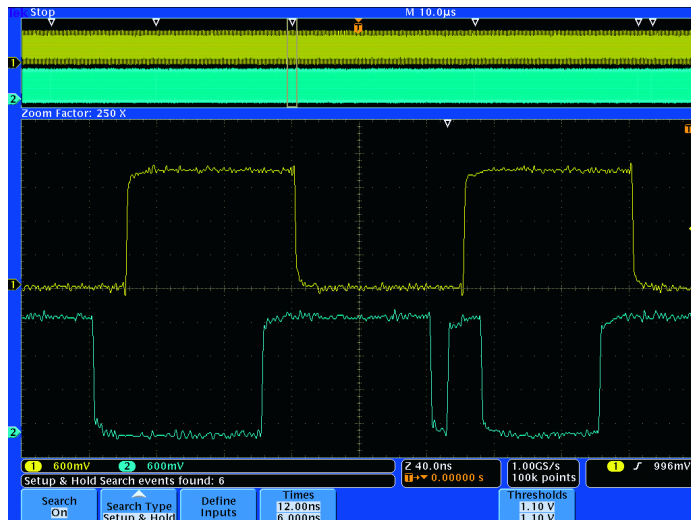
- Industrial Control

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

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

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 midrange oscilloscopes either come standard with, or can be optionally upgraded to, multi-megapoint record lengths. These megapoint 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
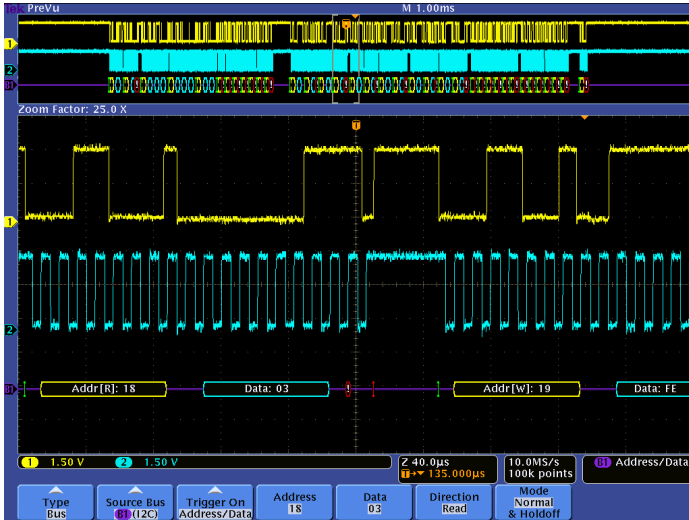
Series redefines expectations for working with long record lengths with the following innovative new Wave Inspector® controls:

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.

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** ($\leftarrow$) and **Next** ($\rightarrow$) 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** ($\leftarrow$) and **Next** ($\rightarrow$) buttons. Search types include edge, pulse width, runt, logic, setup and hold, rise/fall time, and I2C, SPI, CAN, LIN, FlexRay, and RS-232/422/485/UART packet content.

Time	Identifier	DLC	Data	CRC	Missing Ack
−2.03ms	549	1	A1	110B	
−1.78ms	55F	7	Remote Frame	3BBB	
−1.57ms	11DEBBBB	3	57 B0 3E	3BBB	
−1.27ms	3B1	1	FF	110B	
−1.01ms	55F	7	A2 56 EF 00 17 D2 88	3BBB	
−806µs	1DE	2	C4 66	3BBB	
−498µs	76B	4	9E 1D 0F AA	110B	
−246µs			Error Frame		
−38.0µs	11DEBBBB	1	75	3BBB	
270µs	3B1	2	A1 EF	110B	
522µs	76B	4	Remote Frame	3BBB	
730µs	11DEBBBB	1	57	3BBB	
1.04ms	549	1	C8	110B	
1.29ms	55F	2	EF 70	3BBB	
1.50ms	76B	4	02 EE F0 82	3BBB	
1.81ms	549	2	B4 CD	110B	
2.06ms	3B1	1	E0	3BBB	
2.27ms	55F	6	EF 00 1D 0F 56 A1	3BBB	
2.57ms	1DE	3	67 2F 36	110B	
2.83ms	76B	3	EE F0 82	3BBB	
3.03ms	549	1	4C	3BBB	

Triggering on a specific data packet going across an I²C 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.

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

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 I²C, SPI, CAN, Lin, FlexRay, and RS-232/422/485/UART.

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 subpacket 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 I²C, 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 time stamped 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.
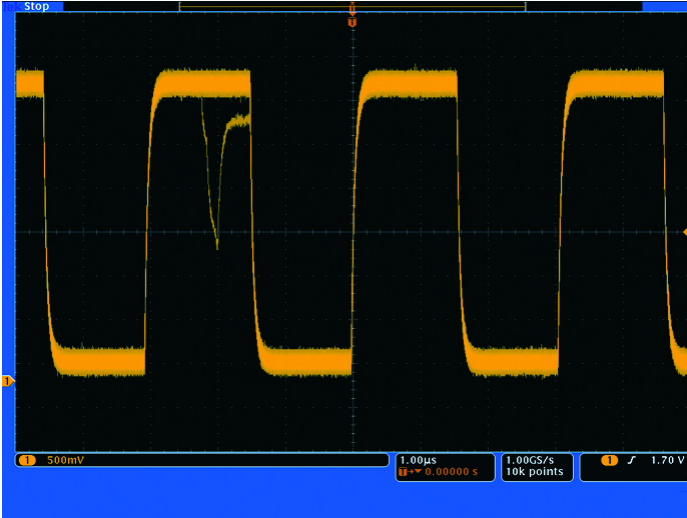
Fast waveform capture rate maximizes the probability of capturing elusive glitches and other infrequent events.
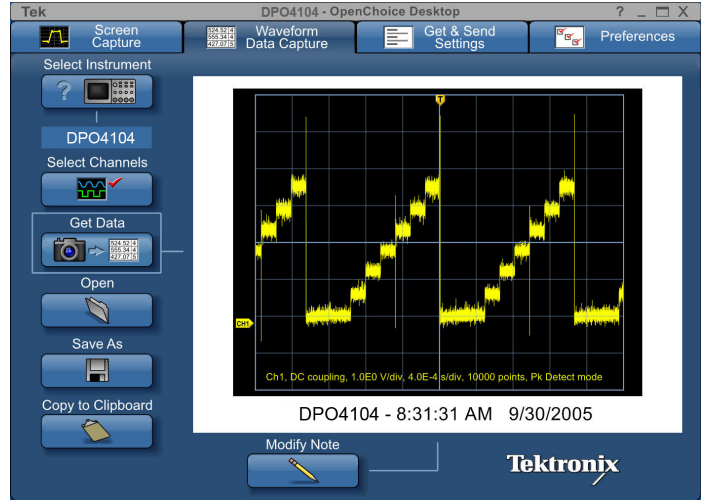

OpenChoice® Desktop – Standard software seamlessly connects the oscilloscope to a PC.

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 in. deep) and light weight (11 lb.), the DPO4000 Series offers exceptional performance, a large 10.4 in. XGA display and knob per channel vertical controls.

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 through USB, GPIB, or Ethernet, enabling more versatile solutions in ATE environments.

The DPO4000 Series delivers an unprecedented new level of USB plug 'n' 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 Microsoft Excel and Word
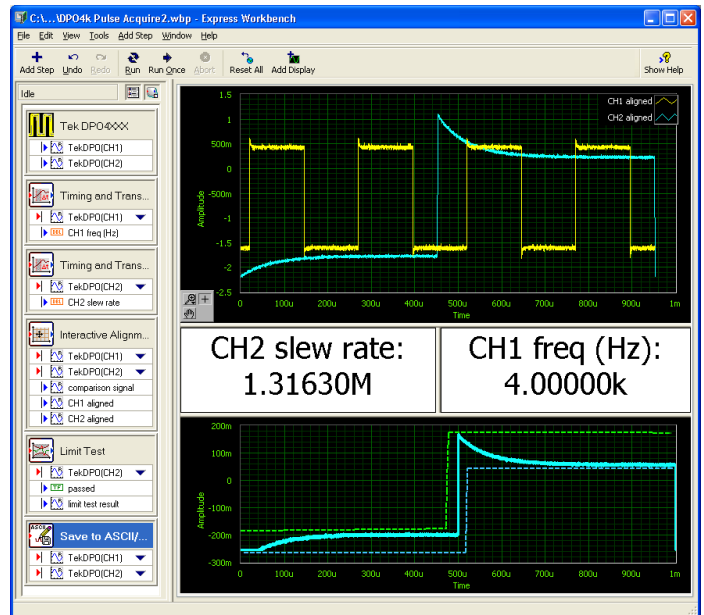

NI LabVIEW SignalExpress Tektronix Edition (SIGEXPTE) – Fully interactive measurement acquisition and analysis software developed jointly with National Instruments, and optimized for the DPO4000 Series.

toolbars enabling fast and easy direct communication with your Windows PC. USB and CompactFlash ports on the front panel enable simple transfer of screenshots, 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.
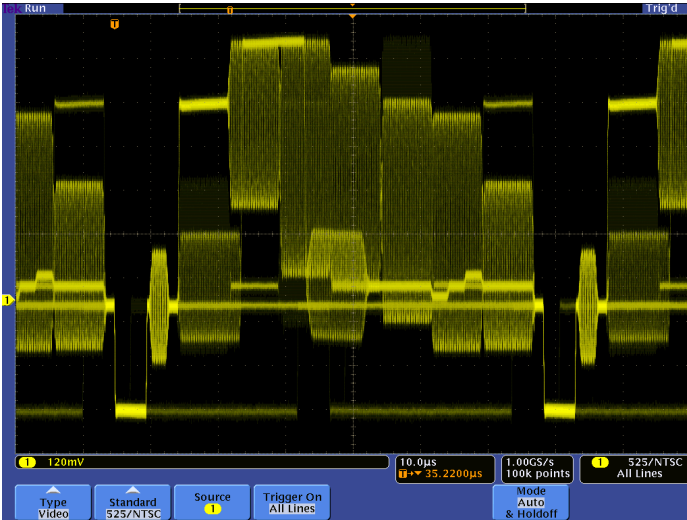
Viewing an NTSC video signal. Notice the intensity-graded view provided by the DPO's ability to represent time, amplitude, and distribution of amplitude over time.

Tektronix' Integrated View feature (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.
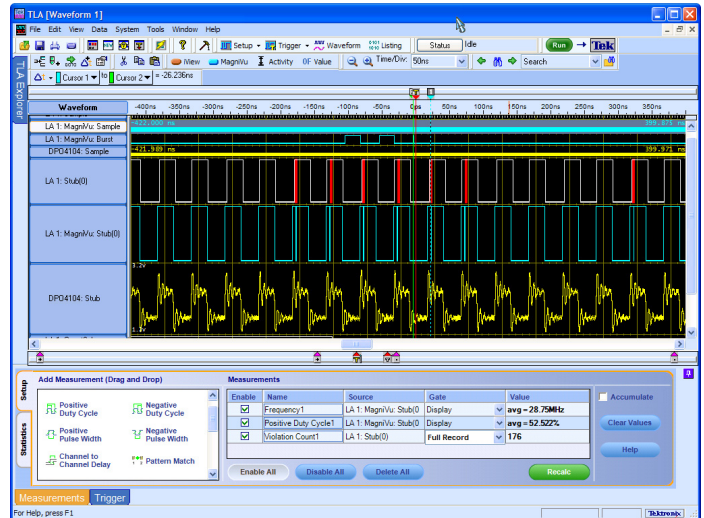
Other Applications

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 (nonstandard) 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 multichannel 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 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.

Characteristics

Vertical System

Characteristic	DPO4034	DPO4054	DPO4104
Input Channels	4	4	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 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

Characteristic	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
Time Base Range (s/div)	1 ns to 400 s		400 ps to 400 s
Time Base Delay Time Range	-10 divisions to 50 s		
Channel-to-Channel Deskew Range	±100 ns		
Time Base Accuracy	±5 ppm over any ≥1 ms interval		

Trigger System

Characteristic	Description
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

Mode	Description
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

Mode	Description
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
I²C (optional)	Trigger on Start, Repeated Start, Stop, Missing ACK, Address (7 or 10 bit), Data, or Address and Data on I²C 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

Characteristic	Description
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

Option	Description
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)) × 1.414 × VAR1)

Software

Application	Description
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, through 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

Characteristic	Description
Display Type	10.4 in. (264 mm) liquid-crystal TFT color display
Display Resolution	1,024 (H) × 768 (V) 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/s

Input/Output Ports

Port	Description
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 through 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

Characteristic	Description
Power Source Voltage	100 to 240 V ±10%
Power Source Frequency	47 – 66 Hz (90 to 264 V) 360 – 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**	**lb.**
Net	5	11
Shipping	10	22
Rackmount Configuration	5U	
Cooling Clearance	2 in. (51 mm) required on left side and rear of instrument	

Environmental

Characteristic	Description
Temperature	
Operating	0 °C to +50 °C
Nonoperating	-20 °C to +60 °C
Humidity	
Operating	High: 40 °C to 50 °C, 10% to 60% Relative Humidity Low: 0 °C to 40 °C, 10% to 90% Relative Humidity
Nonoperating	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)
Nonoperating	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
Nonoperating	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

Product	Description
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-xx), CompactFlash Memory Card; ≥32 MB (156-9413-xx), User Manual (071-2121-xx), Documentation CD (063-3903-xx), 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-xx), Three-year Warranty.
Please specify power plug and manual version when ordering.

Application Modules

Module	Description
DPO4EMBD	Embedded Serial Triggering and Analysis Module. Enables triggering on packet-level information on I2C 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 time-stamp 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 time-stamp 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 time-stamp 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 time-stamp information
DPO4VID	HDTV and Custom (nonstandard) Video Triggering Module

Instrument Options

Power Plug Options

Option	Description
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]

Option	Description
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

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

Service Options[2]

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

[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.

Recommended Probes

Probe	Description
TAP1500	1.5 GHz TekVPI™ active probe
TAP1500X2	Bundle of two 1500 MHz active probes, single-ended with TekVPI Interface; Certificate of traceable calibration standard
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

Accessory	Description
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-xx
ACD4000	Soft transit case
HCTEK4321	Hard transit case (requires ACD4000)
RM4000	Rackmount Kit
AMT75*3	1 GHz, 75 Ω adapter

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

Warranty

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

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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.tek.com**

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