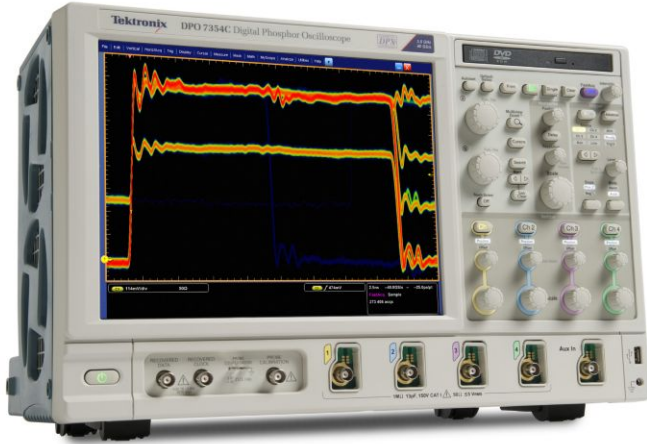


# Digital Phosphor Oscilloscopes

## DPO7000 Series Datasheet



Tektronix understands that engineers rely on an oscilloscope throughout their design cycle, from prototype turn-on to production testing. The DPO7000 Series oscilloscopes' unique capabilities combined with exceptional signal acquisition performance and analysis accelerate your measurement tasks.

### Key performance specifications

- 3.5 GHz, 2.5 GHz, 1 GHz, and 500 MHz bandwidth models
- Up to 40 GS/s real-time sample rate on one channel, up to 20 GS/s on two channels, and up to 10 GS/s on three or four channels
- Up to 500 megapoint record length with MultiView Zoom™
- >250,000 wfms/s maximum waveform capture rate with FastAcq™
- FastFrame™ segmented memory acquisition mode with >310,000 waveforms per second capture rate
- User-selectable bandwidth limit filters for better low-frequency measurement accuracy

### Key features

- Ease of use features
  - Pinpoint® Triggering provides the most flexible and highest performance triggering, with over 1400 combinations to address virtually any triggering situation
  - Visual Trigger and Search precisely qualifies triggers and finds unique events in complex waveforms
  - Advanced Search and Mark to find specific events in the entire waveform
  - MyScope® custom control windows and right mouse click menus for exceptional efficiency
  - 53 automated measurements, waveform histograms, and FFT analysis for simplified waveform analysis
  - TekVP!® Probe Interface supports active, differential, and current probes for automatic scaling and units
  - 12.1 in. (307 mm) bright XGA display with touch screen
- Optional serial triggering and analysis
  - Automated Serial Triggering, Decode, and Search Options for I<sup>2</sup>C, SPI, CAN, LIN, FlexRay, RS-232/422/485/UART, MIL-STD-1553, and USB 2.0
  - Automated Serial Analysis Options for MIPI® D-PHY DSI-1 and CSI-2, 8b/10b, Ethernet, and PCI Express
  - Clock Recovery from serial data streams
  - 64-bit NRZ Serial Pattern Trigger for isolation of pattern-dependent effects up to 1.25 Gb/s
- Optional technology specific analysis
  - Software Solutions provide built-in domain expertise for MIPI® D-PHY, Ethernet, BroadR-Reach, MOST, and USB 2.0 Compliance Testing, Jitter, Timing, Eye Diagrams, Power, DDR Memory Bus Analysis, and Wideband RF
  - Limit and Mask Testing provide quick insight into signal characteristics

### Connectivity

- USB Host Ports on the front and side panels for quick and easy data storage, printing, and connecting USB peripherals
- Integrated 10/100/1000BASE-T Ethernet port for network connection and Video Out port to export the oscilloscope display to a monitor or projector
- Microsoft® Windows 7 64-bit operating system for easy connectivity and integration into your environment
- LXI Class C compliant

## Simplified analysis for complex digital designs

With the DPO7000C Digital Phosphor Oscilloscope Series, you can analyze analog and serial bus signals with a single instrument to quickly find and diagnose problems in complex designs. Bandwidths up to 3.5 GHz and sample rates up to 40 GS/s ensure you have the performance you need to see fast-changing signal details. To capture long windows of signal activity while maintaining fine timing resolution, the DPO7000C Series offers a deep record length of up to 25 M points standard on all channels and an optional record length of up to 500 M points on one channel.

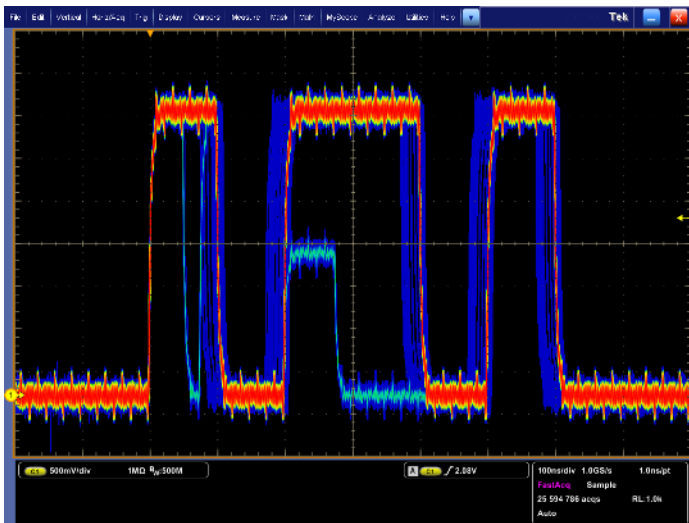
With Advanced Search and Mark and MultiView Zoom™ features for rapid waveform navigation, and more than 15 optional software and analysis packages for common technologies and in-depth analysis tasks, the DPO7000C Series from Tektronix provides the feature-rich tools you need to simplify and speed debug of your complex design.

## Comprehensive features speed every stage of debug

The DPO7000C Series offers a robust set of features to speed every stage of debugging your design – from quickly discovering an anomaly and capturing it, to searching your waveform record for the event and analyzing its characteristics and your device's behavior.

### Discover

To debug a design problem, first you must know it exists. Every design engineer spends time looking for problems in their design, a time-consuming and frustrating task without the right debug tools.



Discover – Fast waveform capture rate - over 250,000 wfm/s - maximizes the probability of capturing elusive glitches and other infrequent events.

The DPO7000C Series offers the industry's most complete visualization of signals, providing fast insight into the real operation of your device. Tektronix proprietary FastAcq™ technology delivers a fast waveform capture – greater than 250,000 waveforms per second – that enables you to see glitches and other infrequent transients within seconds, revealing the true nature of device faults. A digital phosphor display with color intensity grading shows the history of a signal's activity by using color to identify areas of the signal that occur more frequently, providing a visual display of just how often anomalies occur.

### Capture

Discovering a device fault is only the first step. Next, you must capture the event of interest to identify root cause.

The DPO7000C Series provides a complete set of triggers – including runt, glitch, width, timeout, transition, pattern, state, setup/hold violation, window, comm, and serial pattern – to help quickly find your event. Enhanced Triggering reduces trigger jitter at the trigger point. In this mode, the trigger point can be used as a measurement reference.



Capture – Triggering on a specific transmit data packet going across an RS-232 bus. A complete set of triggers, including triggers for specific serial packet content, ensures you quickly capture your event of interest.

To enable complex system debug and validation, the DPO7000C Series provides Pinpoint® triggering, using Silicon Germanium (SiGe) technology to provide trigger performance up to the bandwidth of the oscilloscope and over 1400 trigger combinations. Most other trigger systems offer multiple trigger types only on a single event (A event), with the delayed trigger (B event) selection limited to edge-type triggering, and often do not provide a way to reset the trigger sequence if the B event doesn't occur. But Pinpoint triggering provides a full suite of advanced trigger types on both A and B triggers with Reset triggering to begin the trigger sequence again after a specified time, state, or transition so that even events in the most complex signals can be captured.

Finding the right characteristic of a complex signal can require hours of collecting and sorting through thousands of acquisitions for the event of interest. Defining a trigger that isolates the desired event and shows data only when the event occurs speeds up this process. Visual Trigger and Search makes the identification of the desired waveform events quick and easy by scanning through all waveform acquisitions and comparing them to on-screen areas (geometric shapes).

With up to a 500 M point record length, you can capture many events of interest, even thousands of serial packets, in a single acquisition for further analysis while maintaining high resolution to zoom in on fine signal details. Investigate multiple segments of your waveform capture simultaneously with MultiView Zoom™ to quickly compare events in real time. FastFrame™ Segmented Memory mode enables you to make efficient use of large records by capturing many trigger events in a single record eliminating large time gaps between events of interest. View and measure the segments individually or as an overlay.

From triggering on specific packet content to automatic decode in multiple data formats, the DPO7000C Series provides integrated support for a broad range of serial buses – I<sup>2</sup>C, SPI, CAN, LIN, FlexRay, RS-232/422/485/UART, MIL-STD-1553, Ethernet, USB 2.0, and MIPI D-PHY. The ability to decode up to 16 serial buses simultaneously means you gain insight into system-level problems quickly.

### Search

Finding your event of interest in a long waveform record can be time consuming without the right search tools. With today's record lengths pushing beyond a million data points, locating your event can mean scrolling through thousands of screens of signal activity.

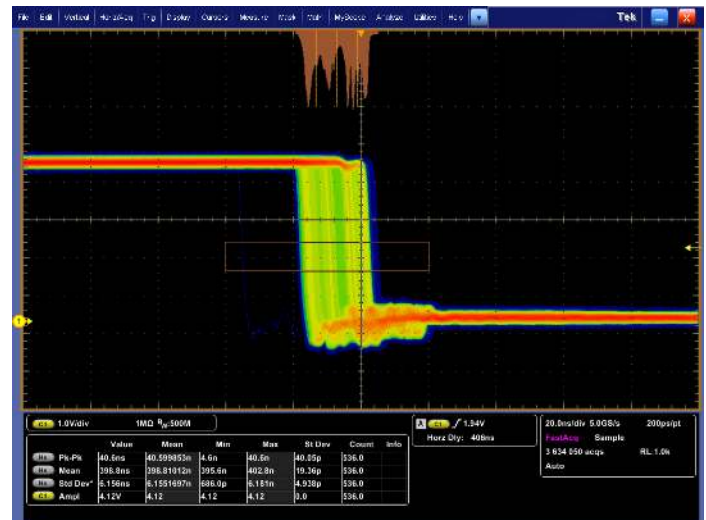


Search – Results of an advanced search for a runt pulse or a narrow glitch within a long waveform record. Each instance of the runt or glitch is automatically marked for easy reference.

The DPO7000C Series offers the industry's most comprehensive search and waveform navigation with the standard Advanced Search and Mark feature and front-panel controls. User marks allow you to mark any location that you may want to reference later for further investigation. Or, automatically search your entire record for the criteria you define. Along the way it will automatically mark every occurrence of your defined event so you can quickly move between events. The advanced search and mark capability of the DPO7000C Series can search for up to eight different events simultaneously and stop a live acquisition when it finds an event of interest, saving even more time.

### Analyze

Verifying that your prototype's performance matches simulations and meets the project's design goals requires analyzing its behavior. Tasks can range from simple checks of rise times and pulse widths to sophisticated power loss analysis, characterization of system clocks, and investigation of noise sources. The DPO7000C Series offers a comprehensive set of integrated analysis tools including waveform- and screen-based cursors, 53 automated measurements, advanced waveform math including arbitrary equation editing, custom MATLAB and .NET math plug-in analysis functions, waveform histograms, and FFT analysis.



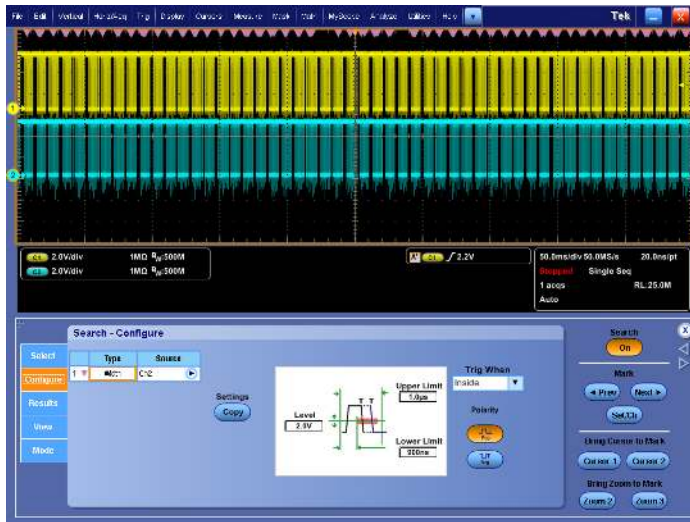
Analyze – Waveform histogram of a falling edge showing the distribution of edge position (jitter) over time. Included are numeric measurements made on the waveform histogram data. A comprehensive set of integrated analysis tools speeds verification of your design's performance.

Every DPO7000C Series oscilloscope includes the DPOJET Essentials jitter and eye pattern analysis software package, extending the oscilloscope's measurement capabilities to take measurements over contiguous clock and data cycles in a single-shot real-time acquisition. This enables measurement of key jitter and timing analysis parameters such as Time Interval Error and Phase Noise to help characterize possible system timing issues. Analysis tools such as plots for time trends and histograms quickly show how timing parameters change over time, and spectrum analysis quickly shows the precise frequency and amplitude of jitter and modulation sources.

Specialized application support for serial bus debug and compliance test, jitter and eye pattern analysis, power supply design, limit and mask testing, DDR memory bus analysis, and wideband RF is also available.

### Advanced search and mark

A 25 M point standard record length represents thousands of screens of information. The DPO7000C Series enables you to find your event in seconds with Advanced Search and Mark.



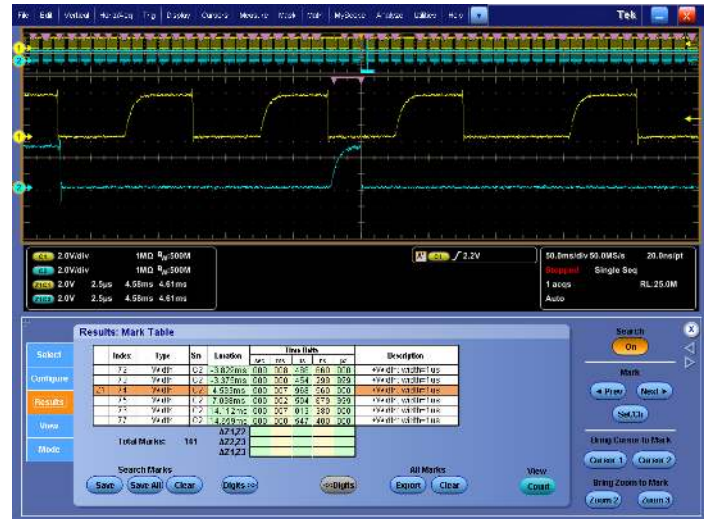
Search step 1: You define what you would like to find.

### User marks

Press the Set/Clear front-panel button to place one or more marks on the waveform. Navigating between marks is as simple as pressing the Previous (←) and Next (→) buttons on the front panel.

### Search marks

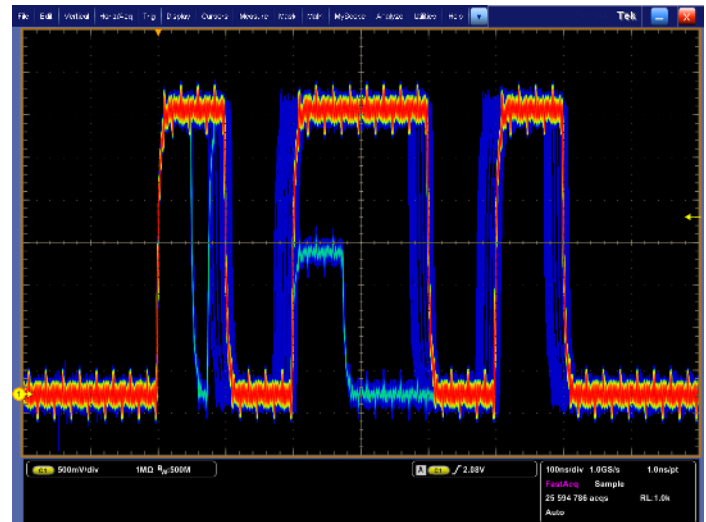
The Search button allows you to automatically search through your long acquisition looking for user-defined events. All occurrences of the event are highlighted with search marks and are easily navigated to, using the front-panel Previous (←) and Next (→) buttons. Search types include edge, glitch, width, timeout, runt, pattern, state, setup and hold, transition, and window.



Search step 2: Advanced Search and Mark automatically searches through the record and marks each event with a solid colored triangle. You can then use the Previous and Next buttons to jump from one event to the next.

### Digital phosphor technology

The DPO7000C Series' digital phosphor technology provides you with fast insight into the real operation of your device. Its fast waveform capture rate – greater than 250,000 wfms/s – gives you a high probability of quickly seeing the infrequent problems common in digital systems: runt pulses, glitches, timing issues, and more.



Digital phosphor technology enables greater than 250,000 wfms/s waveform capture rate and real-time color grading on the DPO7000C Series.

Waveforms are superimposed with one another and waveform points are color coded by frequency of occurrence. This quickly highlights the events that occur more often over time or, in the case of infrequent anomalies, occur less often.

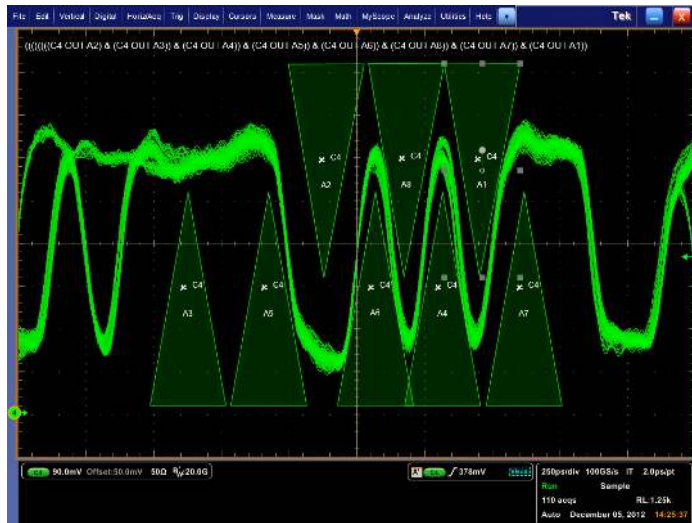
With the DPO7000C Series, you can choose infinite persistence or variable persistence, determining how long the previous waveform acquisitions stay on-screen. This allows you to determine how often an anomaly is occurring.

## Visual Trigger – Find the signal of interest quickly

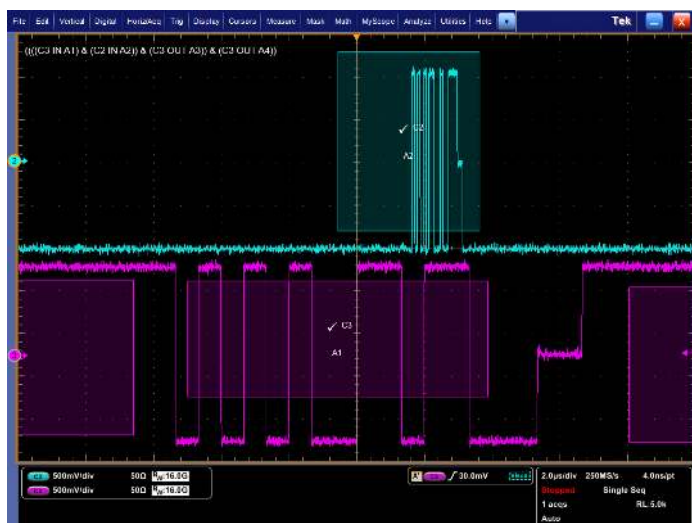
Finding the right cycle of a complex bus can require hours of collecting and sorting through thousands of acquisitions for an event of interest. Defining a trigger that isolates the desired event speeds up debug and analysis efforts.

Visual Trigger qualifies the Tektronix Pinpoint Triggers by scanning through all waveform acquisitions and comparing them to on-screen areas (geometric shapes). Up to eight areas can be created using a mouse or touchscreen, and a variety of shapes (triangles, rectangles, hexagons, or trapezoids) can be used to specify the desired trigger behavior. Once shapes are created, they can be edited interactively to create ideal trigger conditions

Visual Trigger extends the Tektronix oscilloscope's triggering capabilities for a wide variety of complex signals as illustrated by the examples shown here.



Customized serial triggering. Visual Trigger set to find a serial data pattern of 1101 0101.



Multiple channel triggering. Visual Trigger areas can be associated with events spanning multiple channels such as packets transmitted on two USB2.0 buses simultaneously.

By triggering only on the most important signal events, Visual Trigger can save hours of capturing and manually searching through acquisitions. In seconds or minutes, you can find the critical events and complete your debug and analysis efforts. Using the Mark All Trigger Events feature, once your Visual Trigger is set, your oscilloscope can automatically search the entire acquired waveform for all events with the same characteristics and mark them for you - a great time-saving feature.

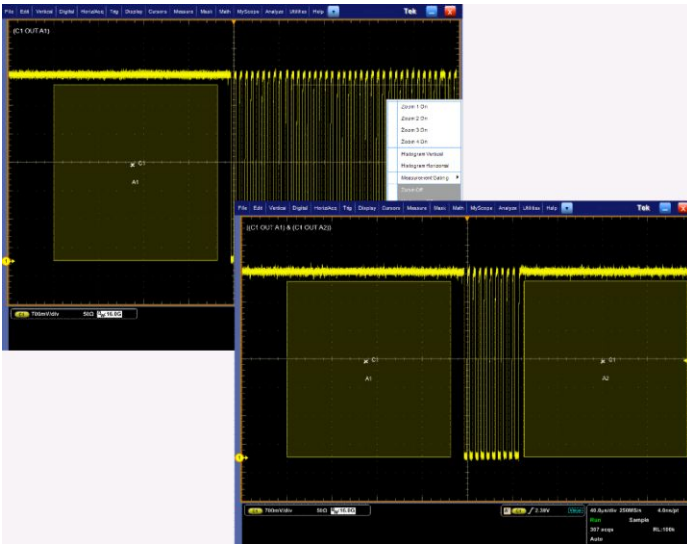
DDR memory bus events involve clocks, strobes and data channels as well as multiple amplitudes and bursts of data.



DDR memory. Visual Trigger used to isolate a rare occurrence of a write burst on a specific bit pattern in DDR3. The trigger event is a Write DQ burst of 11000000, when the DQ launch starts from a non-tri-state voltage value. DDR memory bus events involve clocks, strobes and data channels as well as multiple amplitudes and bursts of data.



Boolean logic trigger qualification. Boolean logic using logical OR allows the user to simultaneously monitor each bit and capture the occurrence of an anomaly at any point in the acquisition.



Trigger on the width of a burst of 10 pulses. By drawing a "Must be outside" area before the first clock pulse and a second "Must be outside" area after the tenth pulse, as shown, you can define a Visual Trigger setup that captures the desired burst width.

### Serial triggering and analysis (optional)

On a serial bus, a single signal often includes address, control, data, and clock information. This can make isolating events of interest difficult. The DPO7000C Series offers a robust set of tools for debugging serial buses with automatic trigger and decode on I<sup>2</sup>C, SPI, CAN, LIN, FlexRay, RS-232/422/485/UART, MIL-STD-1553, and USB 2.0, and decode for MIPI D-PHY DSI-1 and CSI-2, 8b/10b, Ethernet, and PCI Express serial buses.

#### Serial triggering

Trigger on packet content such as start of packet, specific addresses, specific data content, unique identifiers, etc. on popular serial interfaces such as I<sup>2</sup>C, SPI, CAN, LIN, FlexRay, RS-232/422/485/UART, MIL-STD-1553, and USB 2.0.



Triggering on a specific OUT Token packet on a USB full-speed serial bus. A bus waveform provides decoded packet content including Start, Sync, PID, Address, End Point, CRC, Data values, 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 subpacket components such as address, data, identifier, CRC, etc.

#### 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 DPO7000C Series will decode each packet on the bus, and display the value in hex, binary, decimal (USB only) or ASCII (USB and RS-232/422/485/UART only) in the bus waveform.

#### Event table display

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 in a software listing. Packets are time stamped and listed consecutively with columns for each component (Address, Data, etc.).



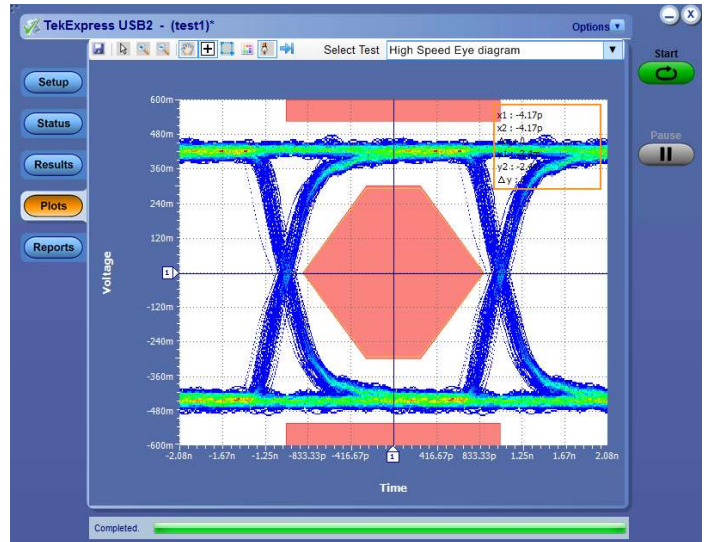
Event table showing decoded serial packet data in a long acquisition.

### Bus searching

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 DPO7000C Series, you can have the oscilloscope automatically 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.

### Serial bus compliance test (optional)

Software packages for automated compliance test are available for BroadR-Reach (Option BRR), MIPI D-PHY (Option D-PHY), Ethernet 10BASE-T, 10BASE-Te, 100BASE-TX, and 1000BASE-T (Option ET3), MOST50 and MOST150 electrical (Option MOST), and USB 2.0 (Option USB2) physical-layer devices. These software packages enable you to conduct testing using the standard's specified compliance tests.



USB 2.0 Automated Compliance Testing.

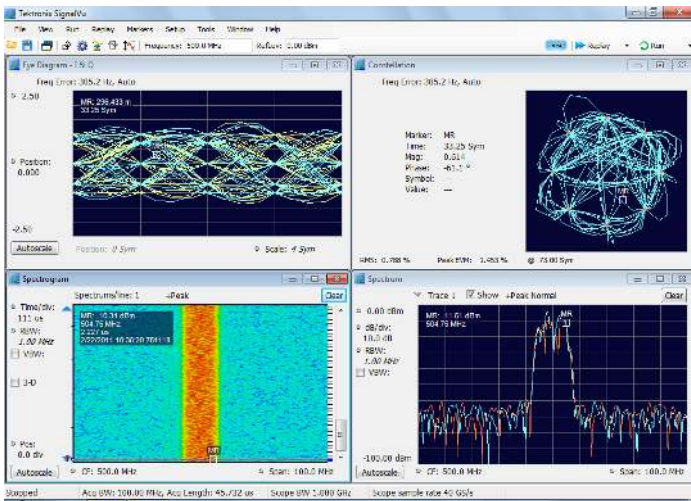
### Power analysis (optional)

The optional power analysis software package (Option PWR) enables quick and accurate analysis of power quality, switching loss, harmonics, magnetic measurements, safe operating area (SOA), modulation, ripple, amplitude and timing measurements, and slew rate (di/dt, dv/dt). Automated, repeatable power measurements are available with a touch of a button; no external PC or complex software setup is required. The package includes a report generation tool to automatically create detailed reports to document your measurement results.



Switching Loss measurements. Automated power measurements enable quick and accurate analysis of common power parameters.





SignalVu™ enables detailed analysis in multiple domains.

## Designed to make your work easier

### Large high-resolution display

The DPO7000C Series features a 12.1 in. (307 mm) XGA color display with an integrated touch screen for seeing intricate signal details.

### Dedicated front-panel controls

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.

### Connectivity

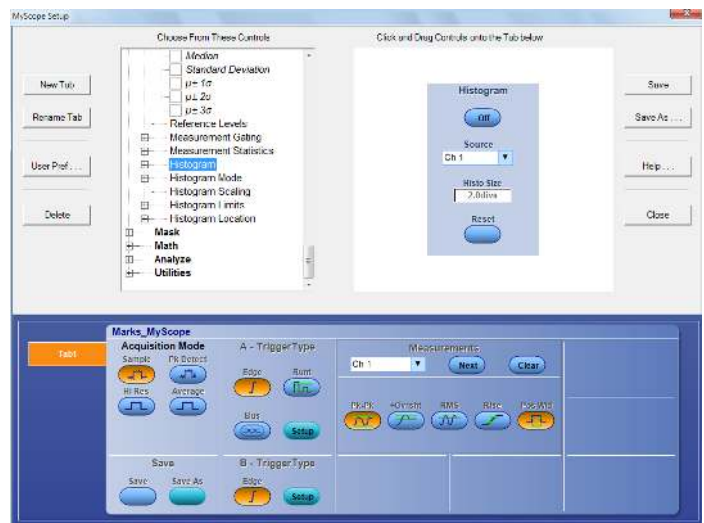
USB 2.0 host ports on the front and side panels enable easy transfer of screenshots, instrument settings, and waveform data to a USB thumb drive. The rear panel contains a GPIB port for controlling the oscilloscope remotely from a computer. An integrated 10/100/1000BASE-T Ethernet port enables easy connection to networks and a Video Out port allows the oscilloscope display to be exported to an external monitor or projector. PS-2 ports for keyboard and mouse are included for security-conscious applications that require the USB ports to be disabled. A standard removable hard disk drive makes customizing settings for different users easy and enables use in secure environments.

## TekVPI® probe interface

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

## MyScope® custom control window

Easily create your own personalized "toolbox" of oscilloscope features 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 menu selection on the oscilloscope. This is ideal in a shared resource environment where each person can have their own custom control interface suited to their particular use. MyScope control windows benefit all oscilloscope users, eliminating the ramp-up time that many face when returning to the lab after not using an oscilloscope for a while, and enabling power users to be far more efficient.



MyScope custom control windows are created with a simple drag-and-drop process enabling each user to have a unique interface.

## Floating licenses

Floating licenses offer an alternative method to manage your Tektronix asset. Floating licenses allow license-key enabled options to be easily moved among all your MSO/DPO5000, DPO7000, and DPO/DSA/MSO70000 Series of Tektronix oscilloscopes. Floating licenses are available for many license-key enabled options. To order a floating version of an option license add "DPOFL-" prefix to the option name. (e.g. DPOFL-ET3)

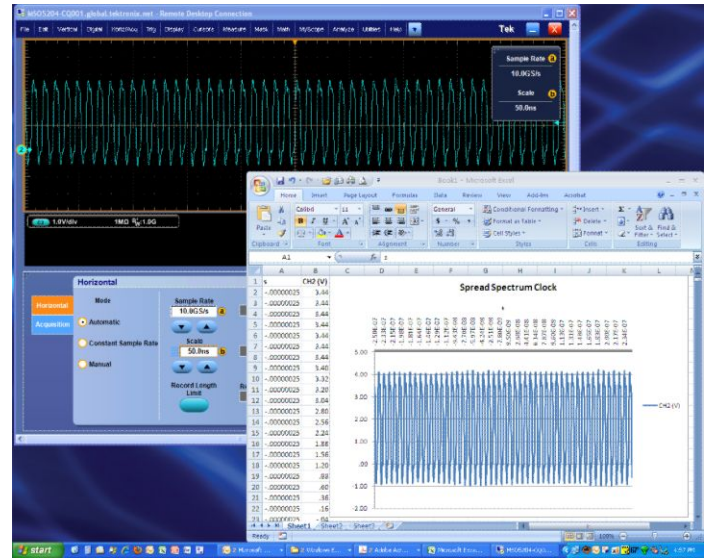
Check [www.tektronix.com](http://www.tektronix.com) for additional information about floating license options.

## Interoperability with logic analyzer

The Tektronix Integrated View (iView™) data display enables digital designers to solve signal integrity challenges and effectively debug and verify their systems more quickly and easily. This integration allows designers to view time-correlated digital and analog data in the same display windows, and isolate the analog characteristics of the digital signals that are causing system failures. No user calibration is required. And, once set up, the iView feature is completely automated.

## Remote operation and extended analysis

There are many ways to connect to your DPO7000C Series oscilloscope to conduct extended analysis. The first makes use of the Windows Remote Desktop capability – connect directly to your oscilloscope and operate the user interface remotely through the built-in Remote Desktop. A second way to connect is through Tektronix OpenChoice® software which makes use of the fast embedded bus, transferring waveform data directly from acquisition to analysis applications on the Windows desktop at much faster speeds than conventional GPIB transfers. Industry-standard protocols, such as TekVISA™ interface and ActiveX controls are included for using and enhancing Windows applications for data analysis and documentation.IVI-COM instrument drivers are included to enable easy communication with the oscilloscope using GPIB, serial data, and LAN connections from programs running on the instrument or an external PC. Or, use the Software Developer's Kit (SDK) to help 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). Microsoft® Excel and Word toolbars are included to simplify data capture and transfer directly to these programs running on the Windows desktop. A third way to connect to your oscilloscope is through NI LabVIEW SignalExpress Tektronix Edition, enabling 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.



Capture data into Microsoft Excel using the unique Excel toolbar, and create custom reports using the Word toolbar.

## Specifications

All specifications apply to all models unless noted otherwise.

### Model overview

	DPO7054C	DPO7104C	DPO7254C	DPO7354C
Input Channels	4			
Bandwidth	500 MHz	1 GHz	2.5 GHz	3.5 GHz
Rise Time 10% to 90% (Typical)	460 ps	300 ps	160 ps	115 ps
Rise Time 20% to 80% (Typical)	310 ps	200 ps	100 ps	95 ps
DC Gain Accuracy	±1% with offset/position set to 0			
Bandwidth Limits	Depending on instrument model: 3.0 GHz, 2.5 GHz, 2 GHz, 1 GHz, 500 MHz, 250 MHz, and 20 MHz			
Effective Number of Bits (Typical, sine wave input at instrument bandwidth, 50 mV/div, 50 Ω Input Impedance, maximum sample rate, 20k point record length)	6.8 bits	6.7 bits	5.6 bits	5.6 bits

## Model overview

		DPO7054C	DPO7104C	DPO7254C	DPO7354C
Random Noise (RMS, typical, sample mode, full BW, maximum sample rate)					
Step Gain	500 mV	11.9 mV	13.2 mV	19.7 mV	23.5 mV
	200 mV	5.0 mV	5.57 mV	8.71 mV	10.9 mV
	100 mV	2.75 mV	3.27 mV	5.23 mV	6.6 mV
	50 mV	1.2 mV	1.36 mV	2.0 mV	2.35 mV
	20 mV	0.5 mV	0.574 mV	0.866 mV	1.03 mV
	10 mV	0.28 mV	0.328 mV	0.523 mV	0.61 mV
	5 mV	0.185 mV	0.229 mV	0.343 mV	0.41 mV
	2 mV	0.11 mV	0.135 mV	0.135 mV	0.19 mV
1 mV	0.09 mV	0.095 mV	0.095 mV	0.12 mV	
		DPO7054C	DPO7104C	DPO7104C with Option 2SR	DPO7254C/DPO7354C
Maximum Sample Rate (1 ch)		20 GS/s	20 GS/s	40 GS/s	40 GS/s
Maximum Sample Rate (2 ch)		10 GS/s	10 GS/s	20 GS/s	20 GS/s
Maximum Sample Rate (3-4 ch)		5 GS/s	5 GS/s	10 GS/s	10 GS/s
Maximum Equivalent Time Sampling Rate		4 TS/s			
Maximum Record Length with Standard Configuration		125 M (1 ch), 50 M (2 ch), 25 M (3-4 ch)			
Maximum Record Length with Option 5RL		250 M (1 ch), 125 M (2 ch), 50 M (3-4 ch)			
Maximum Record Length with Option 10RL		—	—	—	500 M (1 ch) 250 M (2 ch) 125 M (3-4 ch)
Maximum Duration at Highest Real-time Sample Rate (1 ch)		1-2 ms with standard record length, up to 10 ms with optional record length			
Time Base Range		1.25 ps/div to 1000 s/div	1.25 ps/div to 1000 s/div	1.25 ps/div to 1000 s/div	1.25 ps/div to 1000 s/div
Time Resolution (in ET/IT mode)		500 fs	500 fs	250 fs	250 fs

## Vertical system – Analog channels

<b>Input impedance</b>	1 M $\Omega$ $\pm$ 1% with 13 pF $\pm$ 2 pF, 50 $\Omega$ $\pm$ 1%
<b>Input coupling</b>	AC, DC, GND
<b>Input sensitivity</b>	1 M $\Omega$ : 1 mV/div to 10 V/div 50 $\Omega$ : 1 mV/div to 1 V/div
<b>Vertical resolution</b>	8 bit (>11 bit with Hi Res)
<b>Delay between any two channels, typical</b>	$\leq$ 100 ps (50 $\Omega$ , DC coupling and equal V/div at or above 10 mV/div)
<b>Channel-to-Channel isolation</b>	(Any two channels at equal Vertical Scale settings) (Typical) $\geq$ 100:1 at $\leq$ 100 MHz $\geq$ 30:1 between 100 MHz and 2.5 GHz $\geq$ 20:1 between 2.5 GHz and 3.5 GHz

## Vertical system – Analog channels

<b>Max input voltage 1 M<math>\Omega</math></b>	$\pm 150$ V, derate at 20 dB/decade to 9 V <sub>RMS</sub> above 200 kHz
<b>Max input voltage 50 <math>\Omega</math></b>	5 V <sub>RMS</sub> , with peaks $\leq \pm 24$ V
<b>Offset range</b>	1 mV/div to 50 mV/div: $\pm 1$ V 50.5 mV/div to 99.5 mV/div: $\pm(1.5$ V – 10 divisions) 100 mV/div to 500 mV/div: $\pm 10$ V 505 mV/div to 995 mV/div: $\pm(15$ V – 10 divisions) 1 V/div to 5 V/div: $\pm 100$ V 5.05 V/div to 10 V/div: $\pm(150$ V – 10 divisions)
<b>Offset accuracy</b>	1 mV/div to 9.95 mV/div: $\pm 0.2\%$ $\times$ (offset – position) $\pm 0.1$ div $\pm 1.5$ mV 10 mV/div to 99.5 mV/div: $\pm 0.35\%$ $\times$ (offset – position) $\pm 0.1$ div $\pm 1.5$ mV 100 mV/div to 1 V/div: $\pm 0.35\%$ $\times$ (offset – position) $\pm 0.1$ div $\pm 15$ mV 1.01 V/div to 10 V/div: $\pm 0.25\%$ $\times$ (offset – position) $\pm 0.1$ div $\pm 150$ mV
<b>Position range</b>	$\pm 5$ divisions

## Horizontal system

<b>Time base delay time range</b>	-10 divisions to 1000 s
<b>Channel-to-channel deskew range</b>	$\pm 75$ ns
<b>Delta time measurement accuracy</b>	$((0.06 / \text{sample rate}) + (2.5 \text{ ppm} \times \text{Reading})) \text{ RMS}$
<b>Trigger jitter (RMS)</b>	1.5 ps <sub>RMS</sub> with enhanced triggering OFF <100 fs <sub>RMS</sub> with enhanced triggering ON
<b>Jitter noise floor</b>	<1 ps <sub>RMS</sub> (<2 ps <sub>Peak</sub> ) for record duration <10 $\mu$ s (typical) <2.5 ps <sub>RMS</sub> for record duration <30 ms <65 parts/trillion for record durations <10 s
<b>Time base accuracy</b>	$\pm 2.5$ ppm + aging <1 ppm per year

## Acquisition system

<b>Acquisition modes</b>	
<b>Sample</b>	Acquires and displays sampled values
<b>Peak detect</b>	Captures and displays narrow glitches at all real-time sampling rates. Glitch widths: 1 ns at $\leq 10$ GS/s
<b>Averaging</b>	From 2 to 10,000 waveforms can be included in an average waveform
<b>Envelope</b>	From 1 to $2 \times 10^9$ waveforms included in min-max envelope
<b>Hi-Res</b>	Real-time boxcar averaging reduces random noise and increases resolution
<b>Roll mode</b>	Scrolls sequential waveform points across the display in a right-to-left rolling motion at sweep speeds slower than 50 ms/div. Works at sample rates up to 10 MS/s with a maximum record length of 40 MS
<b>FastAcq™</b>	FastAcq™ optimizes the instrument for analysis of dynamic signals and capture of infrequent events, capturing >250,000 wfms/s on all 4 channels simultaneously

**Acquisition system**

<b>Waveform database</b>	Accumulates waveform data providing a three-dimensional array of amplitude, time, and counts
<b>FastFrame™</b>	Acquisition memory divided into segments; maximum trigger rate >310,000 waveforms per second. Time of arrival recorded with each event. Frame finder tool helps to visually identify transients

**Pinpoint® trigger system****Trigger sensitivity**

<b>Internal DC coupled</b>	0.7 div from DC to 50 MHz, increasing to 1.2 div at rated analog bandwidth (typical), up to 2.5 GHz. 2.5 div at 3.5 GHz
<b>Aux input (external trigger)</b>	250 mV from DC to 50 MHz, increasing to 350 mV at 250 MHz (typical)
<b>1 MΩ</b>	

**Trigger delay by time** 3.2 ns to 3,000,000 s

**Trigger delay by events** 1 to 2,000,000,000 events

**Main trigger modes** Auto, Normal, and Single

**Enhanced triggering** Enhanced triggering corrects the difference in timing between the trigger path and the acquired data path (supports all Pinpoint trigger types on both A- and B-Events except pattern trigger); Default On (user-selectable); Not available in FastAcq mode.

**Trigger sequences** Main, Delayed by Time, Delayed by Events, Reset by Time, Reset by State, Reset by Transition, B Event Scan. All sequences can include separate horizontal delay after the trigger event to position the acquisition window in time.

**Communications-related triggers** 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 the standard. Requires Option MTM .

**Video trigger formats and field rates** Triggers from negative sync composite video, field 1 or field 2 for interlaced systems, any field, specific line, or any line for interlaced or noninterlaced systems. Supported systems include NTSC, PAL, SECAM, and HDTV 1080/24sF, 1080p/25, 1080i/50, 1080i/60, 1080p/24, 720p/60, 480p/60

**Serial pattern trigger**

**NRZ-Encoded Data** DPO7254C and DPO7354C only, requires Opt. ST1G. Up to 64 bit serial word recognizer, bits specified in binary (high, low, don't care) or hex format. Trigger on NRZ-encoded data up to 1.25 GBaud.

**Clock recovery system** (DPO7254C and DPO7354C only, requires Opt. ST1G or MTM)

<b>Clock recovery phase locked loop bandwidth</b>	Fixed at FBaud/500
<b>Clock recovery frequency range</b>	1.5 MBaud to 1.25 GBaud
<b>Clock recovery jitter (RMS)</b>	20 pS <sub>RMS</sub> + 1.25% Unit Interval RMS for PRBS data patterns 20 pS <sub>RMS</sub> + 1.25% Unit Interval RMS for repeating "0011" data pattern
<b>Clock recovery tracking/ acquisition range</b>	±5% of requested baud rate (typical)
<b>Minimum signal amplitude needed for clock recovery</b>	1 div <sub>p-p</sub> up to 1.25 Gbaud

**Trigger level range**

<b>Any channel</b>	±12 divisions from center of screen
<b>Auxiliary input</b>	TekVPI interface; ±5 V (50 Ω); 150 V, derate at 20 dB/decade to 9 V <sub>RMS</sub> above 200 kHz (1 MΩ)
<b>Line</b>	Fixed at 0 V

**Pinpoint® trigger system**

<b>Trigger coupling</b>	DC AC (attenuates <60 Hz) HF Rej (attenuates >30 kHz) LF Rej (attenuates <80 kHz) Noise Reject (reduces sensitivity)
<b>Trigger holdoff range</b>	250 ns min to 100 s
<b>Trigger types</b>	A Event and Delayed B Event trigger types: edge, glitch, width, runt, timeout, transition time, logic pattern, logic state, setup/hold, window - all except Edge, Pattern, and State can be Logic State qualified by up to two channels.
<b>Edge</b>	Positive, negative, or either slope on any channel or front-panel auxiliary input. Coupling includes DC, AC, noise reject, HF reject, and LF reject.
<b>Glitch</b>	Trigger on or reject glitches of positive, negative, or either polarity. Minimum glitch width is 170 ps (typical) with rearm time of 250 ps (for DPO7254C or DPO7354C).
<b>Width</b>	Trigger on width of positive or negative pulse either within or outside selectable limits (225 ps to 10 s).
<b>Runt</b>	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.
<b>Window</b>	Trigger on an event that enters or exits a window defined by two user-adjustable thresholds. Event can be time or logic qualified.
<b>Timeout</b>	Trigger on an event which remains high, low, or either, for a specified time period (300 ps to 1 s).
<b>Transition</b>	Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative, or either.
<b>Setup/Hold</b>	Trigger on violations of both setup time and hold time between clock and data present on any two input channels.
<b>Logic Pattern</b>	Trigger when pattern goes false or stays true for specified period of time (300 ps to 1 s). Pattern (AND, OR, NAND, NOR) specified for all analog input channels defined as high, low, or don't care.
<b>Logic State</b>	Any logical pattern of channels (1, 2, 3) clocked by edge on channel 4. Trigger on rising or falling clock edge.
<b>Parallel Bus</b>	Trigger on specified data value on defined parallel bus.
<b>Video</b>	Trigger on all lines, specific line number, odd, even, or all fields on NTSC, PAL, SECAM, and HDTV 480p/60, 576p/50, 875i/60, 720p/30, 720p/50, 720p/60, 1080i/24sF, 1080i/50, 1080p/25, 1080i/60, 1080p/24, 1080p/25, 1080p/50, 1080p/60, Bi-level, Tri-level.
<b>Visual Trigger</b>	Trigger on up to 8 user-specified areas, including rectangle, triangle, trapezoid, hexagon, and user-specified shapes on any of the analog channels.
<b>Optional trigger types</b>	
<b>Serial Pattern</b>	Captures serial data stream with built-in clock recovery for NRZ standards up to 1.25 Gb/s. Extended with pattern lock triggering to capture repeated acquisitions of long serial data patterns. Provided as part of Opt. ST1G.
<b>Comm</b>	Support for AMI, HDB3, BnZS, CMI, MLT3, and NRZ encoded signals. Provided as part of Option MTM.
<b>I<sup>2</sup>C</b>	Trigger on Start, Repeated Start, Stop, Missing ACK, Address (7 or 10 bit), Data (1-5 bytes), or Address and Data on I <sup>2</sup> C buses up to 10 Mb/s. Provided as part of Opt. SR-EMBD.
<b>SPI</b>	Trigger on Slave Select, Idle Time, or Data (1-6 words) on SPI buses up to 10 Mb/s. Provided as part of Opt. SR-EMBD.
<b>CAN</b>	Trigger on Start of Frame, Frame Type (Data, Remote, Error, or Overload), Identifier, Data, Identifier and Data, End of Frame, Missing Ack, Bit Stuff Error or CRC Error on CAN buses up to 1 Mb/s. Provided as part of Opt. SR-AUTO.
<b>LIN</b>	Trigger on Sync, Identifier, Data, Ident and Data, Wakeup Frame, Sleep Frame, and Error on LIN buses up to 1 Mb/s. Provided as part of Opt. SR-AUTO.
<b>FlexRay</b>	Trigger on Indicator Bits (Normal, Payload, Null, Sync, Startup), Cycle Count, Header Fields (Indicator Bits, Identifier, Payload Length, Header CRC, and Cycle Count), Identifier, Data, Identifier and Data, End Of Frame, and Error on FlexRay buses up to 10 Mb/s. Provided as part of Opt. SR-AUTO.
<b>MIL-STD-1553B</b>	Trigger on Sync, Command Word, Status Word, Data Word, Idle Time, and Error on MIL-STD-1553 buses up to 1 Mb/s. Provided as part of Opt. SR-AERO.
<b>RS-232/422/485/UART</b>	Trigger on Start Bit, End of Packet, Data (1-5 words), and Parity Error on RS-232 buses up to 10 Mb/s. Provided as part of Opt. SR-COMP.

**Pinpoint® trigger system****USB 2.0 Low speed**

Trigger on Sync, Reset, Suspend, Resume, End of Packet, Token (Address) Packet, Data Packet, Handshake Packet, Special Packet, Error. Provided as part of Opt. SR-USB.

Token Packet Trigger – Any token type, SOF, OUT, IN, SETUP; Address can be specified for Any, OUT, IN, and SETUP token types. Address can be further specified to trigger on  $\leq$ ,  $<$ ,  $=$ ,  $>$ ,  $\geq$ ,  $!=$  a particular value, or inside or outside a range. Frame number can be specified for SOF token using Binary, Hex, Unsigned Decimal, and Don't Care digits.

Data Packet Trigger – Any data type, DATA0, DATA1; Data can be further specified to trigger on  $\leq$ ,  $<$ ,  $=$ ,  $>$ ,  $\geq$ ,  $!=$  a particular data value, or inside or outside of a range.

Handshake Packet Trigger – Any handshake type, ACK, NAK, STALL.

Special Packet Trigger – Any special type, Reserved.

Error Trigger – PID Check, CRC5 or CRC16, Bit Stuffing.

**USB 2.0 Full speed**

Trigger on Sync, Reset, Suspend, Resume, End of Packet, Token (Address) Packet, Data Packet, Handshake Packet, Special Packet, Error. Provided as part of Opt. SR-USB.

Token Packet Trigger – Any token type, SOF, OUT, IN, SETUP; Address can be specified for Any, OUT, IN, and SETUP token types. Address can be further specified to trigger on  $\leq$ ,  $<$ ,  $=$ ,  $>$ ,  $\geq$ ,  $!=$  a particular value, or inside or outside a range. Frame number can be specified for SOF token using Binary, Hex, Unsigned Decimal, and Don't Care digits.

Data Packet Trigger – Any data type, DATA0, DATA1; Data can be further specified to trigger on  $\leq$ ,  $<$ ,  $=$ ,  $>$ ,  $\geq$ ,  $!=$  a particular data value, or inside or outside a range.

Handshake Packet Trigger – Any handshake type, ACK, NAK, STALL.

Special Packet Trigger – Any special type, PRE, Reserved.

Error Trigger – PID Check, CRC5 or CRC16, Bit Stuffing.

**USB 2.0 High speed**

No protocol-level triggering. Provided as part of Opt. SR-USB.

USB 2.0 High speed decoding and search only available on  $\geq 1$  GHz models.

**Waveform analysis****Search and Mark Events**

Use Advanced Search and Mark to automatically mark events and document waveforms. Search positive/negative slopes or both, glitches, runs, pulse widths, transition rate, setup and hold, timeout, windows, or find any logic or state pattern, up to 8 different event types on any of the 4 analog channels. Search DDR Read or Write bursts with Opt. DDRA.

When an event of interest is found with a hardware trigger, other similar events can be found using "Mark All Trigger Events in Record" in the Pinpoint trigger control windows.

The Event table summarizes all found events. All events are time stamped in reference to trigger position. You can choose to stop acquisitions when an event is found.

**Waveform measurements****Cursors**

Waveform and Screen

**Automatic measurements**

53, of which 8 can be displayed on-screen at any one time

**Measurement Statistics**

Mean, Minimum, Maximum, 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 screen or waveform cursors

**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 ( $\sigma$ ),  $\mu + 1\sigma$ ,  $\mu + 2\sigma$ ,  $\mu + 3\sigma$

## Waveform analysis

<b>Eye-pattern related</b>	Extinction Ratio (absolute, %, dB), Eye Height, Eye Width, Eye Top, Eye Base, Crossing %, Jitter (p-p, RMS, 6sigma), Noise (p-p, RMS), Signal/Noise Ratio, Cycle Distortion, Q-Factor
<b>Waveform Histograms</b>	A waveform histogram provides an array of data values representing the total number of hits inside a user-defined region of the display. A waveform histogram is both a visual graph of the hit distribution and a numeric array of values that can be measured. Sources – Channel 1, Channel 2, Channel 3, Channel 4, Ref 1, Ref 2, Ref 3, Ref 4, Math 1, Math 2, Math 3, Math 4 Types – Vertical, Horizontal
<b>Waveform processing/math</b>	
<b>Number of Math Waveforms</b>	Up to 4
<b>Arithmetic</b>	Add, Subtract, Multiply, Divide Waveforms and Scalars
<b>Algebraic expressions</b>	Define extensive algebraic expressions including waveforms, scalars, user-adjustable variables, and results of parametric measurements. Perform math on math using complex equations. e.g. (Integral (CH1 – Mean(CH1)) × 1.414 × VAR1)
<b>Math functions</b>	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
<b>Relational</b>	Boolean result of comparison >, <, ≥, ≤, ==, !=
<b>Frequency domain functions</b>	Spectral Magnitude and Phase, Real and Imaginary Spectra
<b>FFT vertical units</b>	Magnitude: Linear, dB, dBm Phase: Degrees, radians, group delay
<b>FFT window functions</b>	Rectangular, Hamming, Hanning, Kaiser-Bessel, Blackman-Harris, Gaussian, Flatop2, Tek Exponential
<b>Waveform definition</b>	As an arbitrary math expression
<b>Filtering function</b>	User-definable filters. Users specify a file containing the coefficients of the filter. Several example filter files are provided
<b>Customized Functions using Math Plug-in Interface</b>	An interface is provided to allow users to create their own custom math functions in MATLAB or Visual Studio
<b>Mask function</b>	Generates a Waveform Database pixel map from a sample waveform. Sample count can be defined

## Software

<b>IVI Driver</b>	Provides a standard instrument programming interface for common applications such as LabVIEW, LabWindows/CVI, Microsoft .NET and MATLAB. IVI-COM standard
<b>LXI Class C Web Interface</b>	Connect to the DPO7000C Series through a standard web browser by simply entering the oscilloscope's IP address in the address bar of the browser. The web interface enables viewing of instrument status and configuration, and status and modification of network settings. All web interaction conforms to LXI Class C specification

## Display system

<b>Display type</b>	307.3 mm (12.1 in.) liquid-crystal active-matrix color display
<b>Display resolution</b>	1024 horizontal × 768 vertical pixels (XGA)
<b>Waveform styles</b>	Vectors, Dots, Variable Persistence, Infinite Persistence
<b>Color palettes</b>	Normal, Green, Gray, Temperature, Spectral, and User-defined
<b>Format</b>	YT, XY
<b>Horizontal divisions</b>	10
<b>Vertical divisions</b>	10

## Computer system and peripherals

<b>Operating system</b>	Windows 7 Ultimate 64-bit Instrument operation verified with version 1.1 of the National Institute of Standards and Technology (NIST) DSS Baseline Requirements, also known as the United States Government Configuration Baseline (USGCB)
<b>CPU</b>	Intel i7-2600 processor, quad core, 3.4 GHz
<b>System memory</b>	≥8 GB
<b>Hard disk drive</b>	Removable hard disk drive, ≥500 GB capacity (3.5 in. SATA)
<b>CD/DVD drive</b>	Front-panel CD-R/W, DVD-R drive
<b>Mouse</b>	Optical wheel mouse, USB interface
<b>Keyboard</b>	Order 119-7083-xx for small keyboard; USB interface and hub

## Input/Output ports

<b>USB 2.0 High-speed Host Ports</b>	Supports USB mass storage devices, printers, keyboard, and mouse. Ports on front and side panels of the instrument. Can be disabled individually
<b>GPIB interface</b>	Rear panel. IEEE 488.2 standard
<b>LAN port</b>	RJ-45 connector, supports 10BASE-T, 100BASE-T, and 1000BASE-T
<b>Video out port</b>	DVI-I and VGA connectors, connect to show the oscilloscope display on an external monitor or projector. Support for extended desktop and clone mode
<b>Audio input/output</b>	Miniature phone jacks for stereo microphone input and stereo line output
<b>Keyboard port</b>	PS/2 compatible
<b>Mouse port</b>	PS/2 compatible
<b>Auxiliary input</b>	Front panel. See trigger specifications
<b>Auxiliary Out (Software switchable)</b>	Trigger Out: A TTL compatible pulse when the oscilloscope triggers Time Base Reference Out: A TTL compatible output of internal 10 MHz reference oscillator
<b>External time base reference in</b>	Time base system can phase lock to an external 10 MHz reference (10 MHz ±1%)
<b>Analog Signal Output</b>	BNC connector provides a buffered version of the Ch3 signal. 50 mV/div ±20% into a 1 MΩ load, 25 mV/div ±20% into a 50 Ω load. Bandwidth is 100 MHz into a 50 Ω load
<b>Probe compensator output</b>	Front-panel pins Amplitude: 1 V ±20% into a ≥50 Ω load Frequency: 1 kHz ±5%
<b>Recovered Clock (DPO7254C and DPO7354C only)</b>	(Enabled by Opt. MTM.) BNC connector, ≤1.25 Gb/s, output swing ≥130 mV <sub>p-p</sub> into 50 Ω

## Input/Output ports

Recovered Data (DPO7254C and DPO7354C only) (Enabled by Opt. MTM.) BNC connector,  $\leq 1.25$  Gb/s, output swing 200 mV into  $50 \Omega$

LXI web interface (LAN eXtensions for instrumentation) Class: LXI Class C Version: 1.3

## Power source

Power Source 100 to 240 V  $\pm 10\%$ , 47 to 63 Hz, <550 W  
115 V<sub>RMS</sub>  $\pm 10\%$ , 360 to 440 Hz, <500 VA

## Physical characteristics

Dimensions	mm	in.
Height	292	11.48
Width	451	17.75
Depth	265	10.44

Rackmount dimensions	mm	in.
Height	331	12.25
Width	479	18.85
Depth (from rack mounting ear to back of instrument)	231.75	9.12

Weight	kg	lb.
Net	15	32
Shipping	28.9	63.75

Rackmount weight	kg	lb.
Net	17.4	37.5
Kit	2.5	5.5

Cooling – Required clearance	mm	in.
Top	0	0
Bottom	0	0
Left Side	76	3
Right Side	0	0
Front	0	0
Rear	0	0

**Environmental****Temperature**

<b>Operating</b>	+5 °C to +45 °C, with noncondensing conditions
<b>Nonoperating</b>	-40 °C to +71 °C, with 15 °C/hour maximum gradient, without CD/DVD media installed in disk drive

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**Humidity**

<b>Operating</b>	8% to 80% relative humidity (RH) with a maximum wet bulb temperature of 29 °C at or below +45 °C, noncondensing. Upper limit derated to 30% RH at +45 °C
<b>Nonoperating</b>	5% to 90% relative humidity (RH) with a maximum wet bulb temperature of 29 °C at or below +60 °C, noncondensing. Upper limit derated to 20% RH at +60 °C

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**Altitude**

<b>Operating</b>	3,000 m (9,843 ft.)
<b>Nonoperating</b>	12,192 m (40,000 ft.)

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**Regulatory**

<b>Electromagnetic compatibility</b>	2004/108/EC
<b>Certifications</b>	UL61010-1; CSA61010-1, EN61010-1; IEC 61010-1

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**United States Government Configuration Baseline (USGCB) Testing**

Tektronix has tested the DPO7000 Series oscilloscopes for compatibility with the security configuration for Information Technology products specified in the USGCB settings for Windows 7 and Internet Explorer

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## Ordering information

### DPO7000C models

DPO7054C	500 MHz, 5/10/20 GS/s (4/2/1 ch), 25 M record length, 4-channel digital phosphor oscilloscope
DPO7104C	1 GHz, 5/10/20 GS/s (4/2/1 ch), 25 M record length, 4-channel digital phosphor oscilloscope
DPO7254C	2.5 GHz, 10/20/40 GS/s (4/2/1 ch), 25 M record length, 4-channel digital phosphor oscilloscope
DPO7354C	3.5 GHz, 10/20/40 GS/s (4/2/1 ch), 25 M record length, 4-channel digital phosphor oscilloscope

### Standard accessories

P6139B	One passive voltage probe per analog channel (500 MHz, 10X, 8 pF)
—	Front cover
071-298x-xx	User Manual (please specify language when ordering)
—	GPIB programmer's reference PDF file
—	Performance verification procedure PDF file
—	Advanced Search and Mark, DPOJET Essentials, Visual Trigger and Search, Limit Test, and SR-CUST Custom serial analysis all included standard
—	Accessory pouch
—	Mouse
—	Calibration Certificate documenting measurement traceability to National Metrology Institute(s), Z 540-1 Compliance and ISO9001
—	Power Cord (please specify power plug option when ordering)
—	One-year warranty

### Instrument options

#### Record length options

Opt. 5RL	250 M max, 50 M/ch
Opt. 10RL	500 M max, 125 M/ch (DPO7254C and DPO7354C)

#### Sample rate options

Opt. 2SR	Double maximum real-time sample rate to 40/20/10 GS/s on 1/2/4 ch (DPO7104C only)
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#### Storage options

Opt. SSD	Solid State Hard Disk Drive, ≥300 GB
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## Advanced analysis options

Option	Description
Opt. BRR	BroadR-Reach Compliance Testing (Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture)
Opt. DDRA	DDR Memory Bus Analysis (Requires Opt. DJA) (For models of bandwidth $\geq 1$ GHz only)
Opt. DJA	Jitter and Eye Analysis Tools – Advanced (DPOJET)
Opt. DJAN	DPOJET Noise, jitter, and eye analysis tools (Requires Opt. DJA)
Opt. D-PHY	MIPI® D-PHY Essentials – Transmitter Debug, Characterization, and Compliance Test Solution (Requires Opt. DJA) (For models of bandwidth $\geq 2.5$ GHz only)
Opt. ET3	Ethernet Compliance Test Software (Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture)
Opt. HSIC	USB HSIC protocol decode and electrical validation (Requires Opt. DJA) (For models of bandwidth $\geq 2.5$ GHz only.)
Opt. MOST	Electrical Compliance and Debug Test Solution for MOST50 and MOST150 (Requires Opt. DJA)
Opt. MTM	Mask Testing for ITU-T, ANSI T1.102, Ethernet, SONET/SDH, Fibre Channel, USB 2.0, IEEE 1394b, Rapid I/O, OIF, CPRI, and Serial Video; (includes hardware clock recovery on DPO7254C/DPO7354C)
Opt. PWR	Power Measurement and Analysis Software
Opt. SR-AERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553). Enables triggering on packet-level information on MIL-STD-1553 buses as well as analytical tools such as bus views, packet decoding, search tools, and packet decode tables with time stamp information
Opt. SR-AUTO	Automotive Serial Triggering and Analysis (CAN/LIN/FlexRay). 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
Opt. SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART). 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
Opt. SR-DPHY	MIPI® D-PHY Serial Analysis. Enables analysis of MIPI DSI-1 and CSI-2 buses with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information
Opt. SR-EMBD	Embedded Serial Triggering and Analysis (I <sup>2</sup> C, SPI). Enables triggering on packet-level information on I <sup>2</sup> C and 2-wire and 3-wire 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
Opt. SR-ENET	Ethernet Serial Analysis (10BASE-T, 100BASE-TX). Enables analysis of Ethernet buses as well as analytical tools such as bus views, packet decoding, search tools, and packet decode tables with time stamp information
Opt. SR-PCIE	PCI Express Serial Analysis. Enables analysis of PCI Express buses with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information (For models of bandwidth $\geq 1$ GHz only) ( Due to large volumes of data, use of standard high-capacity hard drive rather than the smaller SSD is recommended.)
Opt. SR-USB	USB 2.0 Serial Triggering and Analysis (LS, FS, HS). Enables triggering on packet-level content for low-speed and full-speed USB serial buses. Also enables analytical tools such as bus views, packet decoding, search tools, and packet decode tables with time stamp information for low-speed, full-speed, and high-speed USB serial buses. USB High Speed supported only on $\geq 1$ GHz models
Opt. SR-810B	8b/10b Serial Analysis. Enables analysis of 8b/10b buses with analytical tools such as digital views of the signal, bus views, packet decoding, search tools, and packet decode tables with time stamp information
Opt. ST1G	64-bit NRZ Serial Trigger and 8b/10b Serial Protocol Decode (includes Opt. SR-810B) (For models of bandwidth $\geq 2.5$ GHz only)
Opt. SVA	AM/FM/PM Audio Signal Analysis (Requires Opt. SVE)
Opt. SVE	SignalVu® Essentials – Vector Signal Analysis Software
Opt. SVM	SignalVu® General Purpose Modulation Analysis (Requires Opt. SVE)
Opt. SVO	SignalVu® Flexible OFDM Analysis (Requires Opt. SVE)
Opt. SVP	SignalVu® Advanced Signal Analysis (including pulse measurements) (Requires Opt. SVE)
Opt. SVT	SignalVu® Frequency and Phase Settling Time Measurements (Requires Opt. SVE)
Opt. SV23	WLAN 802.11a/b/g measurement application (Requires Opt. SVE) (For models of bandwidth $\geq 2.5$ GHz only)

Option	Description
Opt. SV24	WLAN 802.11n measurement application (Requires Opt. SVE and SV23) (For models of bandwidth $\geq 2.5$ GHz only)
Opt. SV26	SignalVu® APCO P25 measurements (Requires Opt. SVE)
Opt. SV27	SignalVu® Bluetooth Basic LE TX SIG measurements (Requires Opt. SVE) (For models of bandwidth $\geq 2.5$ GHz only)
Opt. USB2	USB 2.0 Automated Compliance Test Application (Requires TDSUSBF (USB Test Fixture). $\geq 2$ GHz bandwidth required for high-speed USB)
Opt. USBPWR	Automated compliance test solution for USB power adapters

**TekExpress application framework options**

Option	Description
TEKEXP	TekExpress® Automation Framework
Opt. D-PHYTX	D-PHY Automated Solution (Requires Opt. DJA) (For models of bandwidth $\geq 2.5$ GHz only)
Opt. HEAC	HEAC Automated Solution (Requires Opt. DJA, 2RL, MTM, ST1G) (For models of bandwidth $\geq 2.5$ GHz only)

**Bundle Options**

These bundled items must be purchased at the same time as the instrument purchase.

Option	Description
Opt. PS2	Power Solution Bundle: DPOPWR, THDP0200, TCP0030A, 067-1686-xx (Deskew Fixture)
Opt. PS3	Power Solution Bundle: DPOPWR, TMDP0200, TCP0020, 067-1686-xx (Deskew Fixture)

**Floating license options**

Floating licenses offer an alternative method to manage your Tektronix asset. Floating licenses allow license-key enabled options to be easily moved among all your MSO/ DPO5000, DPO7000, and DPO/DSA/MSO70000 Series of Tektronix oscilloscopes. Floating licenses are available for the following license-key enabled options.

Check <http://www.tek.com/products/oscilloscopes/floatinglicenses> for additional information about floating license options.

Option	Description
DPOFL-BRR	BroadR-Reach Compliance Testing (Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture)
DPOFL-DDRA	DDR Memory Bus Analysis (Requires Opt. DJA) (For models of bandwidth $\geq 1$ GHz only)
DPOFL-DJA	Jitter and Eye Analysis Tools – Advanced (DPOJET)
DPOFL-DJAN	DPOJET Noise, jitter, and eye analysis tools (Requires Opt. DJA)
DPOFL-D-PHY	MIPI® D-PHY Transmitter Debug, Characterization and Compliance Test Solution (Requires Opt. DJA) (For models of bandwidth $\geq 2.5$ GHz only)
DPOFL-ET3	Ethernet Compliance Testing (Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture)
DPOFL-HSIC	USB HSIC protocol decode and electrical validation (Requires Opt. DJA) (For models of bandwidth $\geq 2.5$ GHz only.)
DPOFL-MOST	Electrical Compliance and Debug Test Solution for MOST50 and MOST150 (Requires Opt. DJA)
DPOFL-MTM	Mask Testing for ITU-T, ANSI T1.102, Ethernet, SONET/SDH, Fibre Channel, USB 2.0, IEEE 1394b, Rapid I/O, OIF, CPRI, and Serial Video; (includes hardware clock recovery on DPO7254C/DPO7354C)
DPOFL-PWR	Power Measurement and Analysis
DPOFL-SR-AERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553). Enables triggering on packet-level information on MIL-STD-1553 buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-SR-AUTO	Automotive Serial Triggering and Analysis (CAN/LIN/FlexRay). 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, and packet decoding
DPOFL-SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART). 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, and packet decoding
DPOFL-SR-DPHY	MIPI® D-PHY Serial Analysis. Enables analysis of MIPI DSI-1 and CSI-2 buses with analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-SR-EMBD	Embedded Serial Triggering and Analysis (I <sup>2</sup> C, SPI). Enables triggering on packet-level information on I <sup>2</sup> C and SPI buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding

Option	Description
DPOFL-SR-ENET	Ethernet Serial Analysis (10BASE-T and 100BASE-TX) Ethernet Serial Analysis. Enables analysis of Ethernet buses with analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-SR-PCIE	PCI Express Serial Analysis. Enables analysis of PCI Express buses with analytical tools such as digital views of the signal, bus views, and packet decoding (For models of bandwidth $\geq 1$ GHz only) (Due to large volumes of data, use of standard high-capacity hard drive rather than the smaller SSD is recommended)
DPOFL-SR-USB	USB 2.0 Serial Triggering and Analysis (LS, FS, HS). Enables triggering on packet-level content for low-speed and full-speed USB serial buses. Also enables analytical tools such as digital views of the signal, bus views, and packet decoding for low-speed, full-speed, and high-speed USB serial buses. USB High Speed supported only on $\geq 1$ GHz models
DPOFL-SR-810B	8b/10b Serial Analysis. Enables analysis of 8b/10b buses with analytical tools such as digital views of the signal, bus views, and packet decoding
DPOFL-ST1G	64-bit NRZ Serial Trigger and 8b/10b Serial Protocol Decode (includes Opt. SR-810B) (For models of bandwidth $\geq 2.5$ GHz only)
DPOFL-SVA	SignalVu <sup>®</sup> AM/FM/PM Audio Signal Analysis (Requires Opt. SVE)
DPOFL-SVE	SignalVu <sup>®</sup> Essentials – Vector Signal Analysis Software
DPOFL-SVM	SignalVu <sup>®</sup> General Purpose Modulation Analysis (Requires Opt. SVE)
DPOFL-SVO	SignalVu <sup>®</sup> Flexible OFDM Analysis (Requires Opt. SVE)
DPOFL-SVP	SignalVu <sup>®</sup> Advanced Signal Analysis (including pulse measurements) (Requires Opt. SVE)
DPOFL-SVT	SignalVu <sup>®</sup> Frequency and Phase Settling Time Measurements (Requires Opt. SVE)
DPOFL-SV23	WLAN 802.11a/b/g measurement application (Requires Opt. SVE) (For models of bandwidth $\geq 2.5$ GHz only)
DPOFL-SV24	WLAN 802.11n measurement application (Requires Opt. SVE and SV23) (For models of bandwidth $\geq 2.5$ GHz only)
DPOFL-SV26	SignalVu <sup>®</sup> APCO P25 measurements (Requires Opt. SVE)
DPOFL-SV27	SignalVu <sup>®</sup> Bluetooth Basic LE TX SIG measurements (Requires Opt. SVE) (For models of bandwidth $\geq 2.5$ GHz only)
DPOFL-USB2	USB 2.0 Automated Compliance Test Application (Requires TDSUSBF USB Test Fixture) $\geq 2$ GHz bandwidth required for high-speed USB.
DPOFL-USBPWR	Automated compliance test solution for USB power adapters

## Power plug options

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

## Language options

Opt. L0	English manual
Opt. L1	French manual
Opt. L3	German manual
Opt. L5	Japanese manual

Opt. L7	Simplified Chinese manual
Opt. L8	Traditional Chinese manual
Opt. L9	Korean manual
Opt. L10	Russian manual
Opt. L99	No manual

### Service options

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. G3	Complete Care 3 Years (includes loaner, scheduled calibration, and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration, and more)
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

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 accessories

<b>Probes</b>	Tektronix offers over 100 different probes to meet your application needs. For a comprehensive listing of available probes, please visit <a href="http://www.tektronix.com/probes">www.tektronix.com/probes</a> .
<b>TAP3500</b>	3.5 GHz TekVPI active single-ended probe
<b>TAP2500</b>	2.5 GHz TekVPI active single-ended probe
<b>TAP1500</b>	1.5 GHz TekVPI active single-ended probe
<b>TDP3500</b>	3.5 GHz TekVPI differential voltage probe with $\pm 2$ V differential input voltage
<b>TDP1500</b>	1.5 GHz TekVPI differential voltage probe with $\pm 8.5$ V differential input voltage
<b>TDP1000</b>	1 GHz TekVPI differential voltage probe with $\pm 42$ V differential input voltage
<b>TDP0500</b>	500 MHz TekVPI differential voltage probe with $\pm 42$ V differential input voltage
<b>TCP0150</b>	20 MHz TekVPI™ 150 Ampere AC/DC current probe
<b>TCP0030A</b>	120 MHz TekVPI 30 Ampere AC/DC current probe
<b>TCP0020</b>	50 MHz TekVPI 20 Ampere AC/DC current probe
<b>TMDP0200</b>	$\pm 750$ V, 200 MHz high-voltage differential probe
<b>THDP0200</b>	$\pm 1.5$ kV, 200 MHz high-voltage differential probe
<b>THDP0100</b>	$\pm 6$ kV, 100 MHz high-voltage differential probe
<b>P5100A</b>	2.5 kV, 500 MHz, 100X high-voltage passive probe
<b>P6015A</b>	20 kV, 75 MHz high-voltage passive probe
<b>P6158</b>	3 GHz, 20X low-capacitance passive probe
<b>Accessories</b>	
<b>077-0076-xx</b>	Service Manual, pdf on hard drive (pdf only)
<b>077-0010-xx</b>	Programmer Manual (pdf only)
<b>077-0063-xx</b>	Performance Verification and Specification (pdf only)

016-1985-xx	Rackmount Kit
065-0917-xx	Removable HD Spare with rotational media
016-1979-xx	Front HD option for Rackmount Kit
119-7083-xx	Mini Keyboard (USB interface)
119-7275-xx	Mini multimedia keyboard
016-1970-xx	Transit Case
K420	Oscilloscope Cart

**Cables**

012-0991-xx	GPIB Cable (1 m)
012-0991-xx	GPIB Cable (2 m)

**Test fixtures**

067-1686-xx	Probe Calibration / Power Deskew Test Fixture
TDSUSBF	Test Fixture for use with Opt. USB2
TF-GBE-ATP	10/100/1000BASE-T Advanced Test Package (consists of test fixture PCB set, RJ45 interconnect cable, and 1000BASE-T jitter test channel cable)
TF-GBE-BTP	10/100/1000BASE-T Basic Test Package (consists of test fixture PCB set and RJ45 interconnect cable)
TF-GBE-EE	Additional test fixture for Energy Efficient Ethernet measurements. Order through Crescent Heart Software ( <a href="http://www.c-h-s.com">http://www.c-h-s.com</a> )

**Adapters**

TPA-BNC	TekVPI-to-TekProbe BNC Adapter
P6701B	Optical/Electrical Converter (Multi Mode). Requires TekVPI® to TekProbe BNC adapter (TPA-BNC).
P6703B	Optical/Electrical Converter (Single Mode). Requires TekVPI® to TekProbe BNC adapter (TPA-BNC).

**Software**

TekScopeNL-BAS	TekScope Anywhere™ Waveform Analysis and Visualization Node locked license.
TekScopeFL-BAS	TekScope Anywhere™ Waveform Analysis and Visualization floating license.
TekScopeNL-DJA	Advanced Jitter Analysis for TekScope Anywhere™ Node locked license.

## Upgrade options

To upgrade your DPO7000C Series oscilloscope, order DPO-UP and option listed below. For example, DPO-UP DDRA.

**To upgrade record length:**

RL25	From standard 25M/channel configuration to Opt. 5RL configuration
RL210	From standard 25M/channel configuration to Opt. 10RL configuration
RL510	From Opt. 5RL configuration to Opt. 10RL configuration

**To add a Solid State Hard Disk Drive:**

SSD	Add an additional removable Solid State Drive (customer installable)
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**To upgrade to a higher-capacity Hard Disk Drive:**

HDD7	Add an additional higher-capacity removable Hard Disk Drive (customer installable)
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**To upgrade DPO7000C Series with:**

BRR	Add Opt. BRR - BroadR-Reach Compliance Testing (Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture)
DDRA	Add Option DDRA (Requires Opt. DJA) (For models of bandwidth $\geq 1$ GHz only)
DJAM	Add Opt. DJA – Jitter and Eye Analysis Tools - Advanced (DPOJET)
DJAN	Add Opt. DJAN - DPOJET Noise, jitter, and eye analysis tools (Requires Opt. DJA)

<b>D-PHY</b>	Add Opt. D-PHY – MIP1® D-PHY Transmitter Debug, Characterization, and Compliance Test Solution (Requires Opt. DJA) (For models of bandwidth ≥2.5 GHz only)
<b>ET3</b>	Add Opt. ET3 – Ethernet Compliance Testing (Requires Opt. DJA) (Requires TF-GBE-BTP or TF-GBE-ATP Ethernet Test Fixture)
<b>HSIC</b>	Add Opt. HSIC - USB HSIC protocol decode and electrical validation (Requires Opt. DJA) (For models of bandwidth ≥2.5 GHz only.)
<b>MOST</b>	Add Opt. MOST – MOST Essentials - Electrical Compliance and Debug Test Solution for MOST50 and MOST150 (Requires Opt. DJA)
<b>MTM</b>	Add Opt. MTM – Mask Testing
<b>PWR</b>	Add Opt. PWR – Power Measurement and Analysis
<b>SR-AERO</b>	Add Opt. SR-AERO – Aerospace Serial Triggering and Analysis (MIL-STD-1553). Enables triggering on packet-level information on MIL-STD-1553 buses as well as analytical tools such as digital views of the signal, bus views, and packet decoding
<b>SR-AUTO</b>	Add Opt. SR-AUTO – Automotive Serial Triggering and Analysis (CAN/LIN/FlexRay). 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, and packet decoding
<b>SR-COMP</b>	Add Opt. SR-COMP – Computer Serial Triggering and Analysis (RS-232/422/485/UART)
<b>SR-DPHY</b>	Add Opt. SR-DPHY – MIP1® D-PHY Serial Analysis (DSI-1 and CSI-2)
<b>SR-EMBD</b>	Add Opt. SR-EMBD – Embedded Serial Triggering and Analysis (I <sup>2</sup> C, SPI)
<b>SR-ENET</b>	Add Opt. SR-ENET – Ethernet Serial Analysis (10BASE-T, 100BASE-TX)
<b>SR-PCIE</b>	Add Opt. SR-PCIE – PCI Express Serial Analysis. Enables analysis of PCI Express buses with analytical tools such as digital views of the signal, bus views, and packet decoding (For models of bandwidth ≥1 GHz only) ( Due to large volumes of data, use of standard high-capacity hard drive rather than the smaller SSD is recommended.)
<b>SR-USB</b>	Add Opt. SR-USB – USB 2.0 Serial Triggering and Analysis (LS, FS, HS)
<b>SR-810B</b>	Add Opt. SR-810B – 8b/10b Serial Analysis. Enables analysis of 8b/10b buses with analytical tools such as digital views of the signal, bus views, and packet decoding
<b>SSD</b>	Add Opt. SSD – Solid State Hard Drive
<b>ST1G</b>	Add Opt. ST1G – 64-bit NRZ Serial Trigger and 8b/10b Serial Protocol Decode (includes Opt. SR-810B) (For models of bandwidth ≥2.5 GHz only)
<b>SVEM</b>	Add Opt. SVE – SignalVu Essentials Vector Signal Analysis
<b>SVA</b>	Add Opt. SVA – SignalVu AM/FM/Direct Audio Measurements (Requires Opt. SVE)
<b>SVM</b>	Add Opt. SVM – SignalVu General Purpose Modulation Analysis (Requires Opt. SVE)
<b>SVO</b>	Add Opt. SVO– SignalVu Flexible OFDM Analysis (Requires Opt. SVE)
<b>SVP</b>	Add Opt. SVP – SignalVu Pulse Advanced Signal Analysis (Requires Opt. SVE)
<b>SVT</b>	Add Opt. SVT – SignalVu Settling Time Measurements - Frequency and Phase (Requires Opt. SVE)
<b>SV23</b>	Add Opt. SV23 - WLAN 802.11a/b/g measurement application (Requires Opt. SVE) (For models of bandwidth ≥2.5 GHz only)
<b>SV24</b>	Add Opt. SV24 - WLAN 802.11n measurement application (Requires Opt. SVE and SV23) (For models of bandwidth ≥2.5 GHz only)
<b>SV26</b>	Add Opt. SV26 - SignalVu® APCO P25 measurements (Requires Opt. SVE)
<b>SV27</b>	Add Opt. SV27- SignalVu® Bluetooth Basic LE TX SIG measurements (Requires Opt. SVE) (For models of bandwidth ≥2.5 GHz only)
<b>USB2</b>	Add Opt. USB2 – USB 2.0 Automated Compliance Test Application (Requires TDSUSBF (USB Test Fixture). ≥2 GHz bandwidth required for high-speed USB)
<b>USBPWR</b>	Add Opt. USBPWR - Automated compliance test solution for USB power adapters



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



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\* European toll-free number. If not accessible, call: +41 52 675 3777

**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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