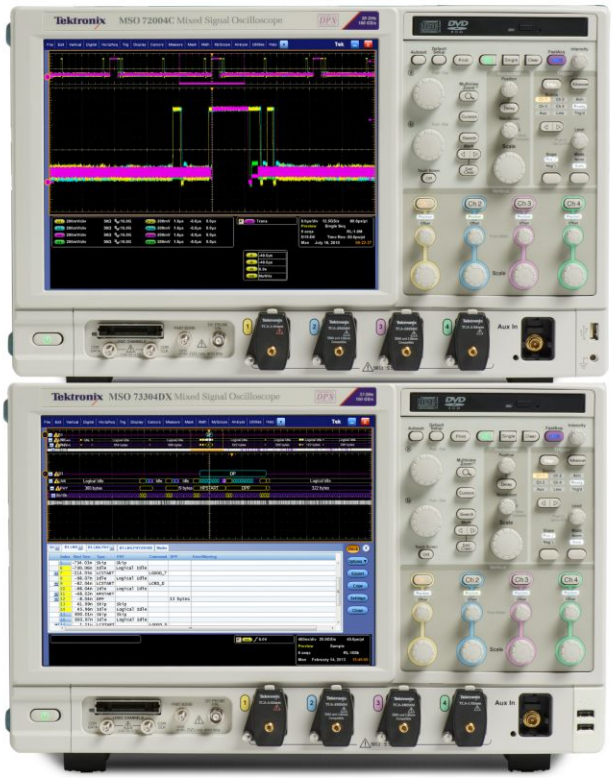
Tektronix®

Digital and Mixed Signal Oscilloscopes

MSO/DPO70000 Series Datasheet



Engineers rely on an oscilloscope throughout their design cycle, from prototype turn-on to production testing. The MSO/DPO70000 Series oscilloscopes' unique capabilities combined with exceptional signal acquisition performance and analysis accelerate your measurement tasks.

Key performance specifications

- Up to 33 GHz analog bandwidth and rise time as fast as 9 ps. Enables measurement on the latest high-speed serial standards
- True 33 GHz Real-time Analog Bandwidth on 2 Channels with 33 GHz models
- Industry-leading sample rate and timing resolution
  - 100 GS/s on 2 Channels (33, 25, 23, 20, 16, and 12.5 GHz models)
- Four-channel Simultaneous Performance
  - Up to 23 GHz Bandwidth
  - Up to 50 GS/s Real-time Sample Rate
  - Up to 500 Megasample Record Length with MultiView Zoom™ for quick navigation
  - Fastest Waveform Capture Rate with >300,000 wfms/s maximum per channel
- 16 Logic Channels with 80 ps Timing Resolution for Debug of digital and analog signals (MSO70000 Series only)
- Unique iCapture® capability enables viewing analog characteristics of digital channels with single probe connection
- 6.25 Gb/s Real-time Serial Trigger – Assures triggering on the first instance of a specified NRZ or 8b/10b pattern to allow isolation of pattern-dependent effects
- Application Support for High-speed Serial Industry Standards, wideband RF, Power supplies, and memory – Enables standard-specific certification, measurement automation, and ease of use

Key features

- Superior signal integrity and excellent signal-to-noise ratio – observe the truest representation of your waveform
- Pinpoint® triggering – minimize time spent trying to acquire problem signals for efficient troubleshooting and shortened debug time
- Visual Trigger – precisely qualify triggers and find unique events in complex waveforms
- Search and Mark – provides waveform or serial bus pattern matching and software triggers for signals of interest
- Automated Serial Analysis options for PCI Express, 8b/10b encoded serial data, I^2C, SPI, CAN, LIN, FlexRay, RS-232/422/485/UART, USB 2.0, HSIC, MIL-STD-1553B, and MIPI® D-PHY and M-PHY
- P7600 and P7500 TriMode™ probing system – perfectly matched signal connectivity
- P6780, P6750, and P6717A high-performance 17-channel logic probes with bandwidths up to 2.5 GHz for connections to today's fast digital signals (MSO70000 Series only)

Connectivity

- USB 2.0 host port on both the front panel and rear panel for quick and easy data storage, printing, and connecting a USB keyboard
- Integrated 10/100 Ethernet port for network connection and Video Out port to export the oscilloscope display to a monitor or projector

Quick selection guide

Model	Analog Bandwidth	Analog Sample Rate – 2/4 Channels	Standard Memory – Analog + Digital	Analog Channels	Logic Channels
DPO70404C	4 GHz	25 GS/s	31 MS	4	—
MSO70404C	4 GHz	25 GS/s	62 MS	4	16
DPO70604C	6 GHz	25 GS/s	31 MS	4	—
MSO70604C	6 GHz	25 GS/s	62 MS	4	16
DPO70804C	8 GHz	25 GS/s	31 MS	4	—
MSO70804C	8 GHz	25 GS/s	62 MS	4	16
DPO71254C	12.5 GHz	100 GS/s / 50 GS/s	31 MS	4	—
MSO71254C	12.5 GHz	100 GS/s / 50 GS/s	62 MS	4	16
DPO71604C	16 GHz	100 GS/s / 50 GS/s	31 MS	4	—
MSO71604C	16 GHz	100 GS/s / 50 GS/s	62 MS	4	16
DPO72004C	20 GHz	100 GS/s / 50 GS/s	31 MS	4	—
MSO72004C	20 GHz	100 GS/s / 50 GS/s	62 MS	4	16
DPO72304DX	23 GHz	100 GS/s / 50 GS/s	31 MS	4	—
MSO72304DX	23 GHz	100 GS/s / 50 GS/s	62 MS	4	16
DPO72504DX	25 GHz	100 GS/s / 50 GS/s	31 MS	4	—
MSO72504DX	25 GHz	100 GS/s / 50 GS/s	62 MS	4	16
DPO73304DX	33 GHz	100 GS/s / 50 GS/s	31 MS	4	—
MSO73304DX	33 GHz	100 GS/s / 50 GS/s	62 MS	4	16

Application support

- High-speed serial industry standards compliance
- SignalVu® RF and vector signal analysis
- DDR memory bus analysis

Applications

- Design verification including signal integrity, jitter, and timing analysis
- Design characterization for high-speed, sophisticated designs
- Certification testing of serial data streams for industry standards
- Memory bus analysis and debug
- Prototype turn-on and power supply verification
- Research and investigation of transient phenomena
- Production testing of complex systems
- Spectral analysis of transient or wide-bandwidth RF signals

System turn-on and verification

From the time a design is first powered up through the initial operational checks, the MSO/DPO70000 Series provide the features you need.

Uncompromised four-channel acquisition

With very low noise and up to 50 GS/s sample rate on all four channels the DPO70000 Series ensures that signal integrity checks and timing analysis can be done without worrying about noise and jitter in the scope distorting the measurements. Single-shot bandwidths up to 23 GHz on all four channels ensure that you'll capture your signals of interest without worrying about undersampling when using more than 1 or 2 channels.

For applications requiring the lowest internal noise and jitter, 100 GS/s performance further reduces noise and jitter and provides additional measurement headroom.

Unmatched acquisition and signal-to-noise performance

The superior signal integrity and excellent signal-to-noise ratio of the MSO/DPO70000 Series ensures confidence in your measurement results.

- Up to 33 GHz, matched across 4 channels
- Bandwidth enhancement eliminates imperfections in frequency response all the way to the probe tip. User-selectable filters for each channel provide magnitude and phase correction for more accurate representation of extremely fast signals. In addition, only Tektronix allows the user to disable the bandwidth enhancement for applications needing the highest measurement throughput.
- Simultaneous high sample rate on all channels captures more signal details (transients, imperfections, fast edges)
  - 100 GS/s on 2 channels and 50 GS/s on all analog channels for the 12.5 through 33 GHz models
  - 25 GS/s on all analog channels for the 4, 6, and 8 GHz models
  - 12.5 GS/s on all logic channels in the MSO70000 Series
- Low jitter noise floor and high vertical accuracy provide additional margin in your measurements
- Long record length provides high resolution and extended-duration waveform capture
  - Standard 31 MS per channel on the DPO70000 Series and 62 MS on the MSO70000 Series
  - Optional up to 125 MS on all four channels (4, 6, and 8 GHz models) and 250 MS (12.5 through 20 GHz models) on all four channels; up to 500 MS on four channels/1 GS on two channels for 23, 25, and 33 GHz models.
  - On the MSO70000 Series, the record length of logic channels matches the analog record lengths for uncompromised analog and digital acquisition
  - MultiView Zoom helps you manage long records, compare and analyze multiple waveform segments
- With high signal-to-noise ratio and low internal noise floor, the MSO/DPO70000 Series enable you to perform precise characterization measurements. When debugging a DUT, a low noise floor and maximum signal fidelity of the measurement instrument allows you to find the smallest anomalies affecting the DUT's performance. For RF signals, a lower noise floor translates into a higher dynamic range, opening the MSO/DPO70000 Series to a wider range of applications.

Widest range of probing solutions

Whether you need to measure 8 Gb/s serial data, fast digital logic, or switching currents from your new power supply design, Tektronix offers a vast array of probing solutions, including active single-ended, differential, logic, high voltage, current, optical, and a wide range of probe and oscilloscope accessories.

P7633 Low Noise TriMode probes simplify complex measurement setups.

P6780 Differential Logic probes provide high-bandwidth connections for up to 16 digital signals.

16-channel digital acquisition (MSO70000 Series)

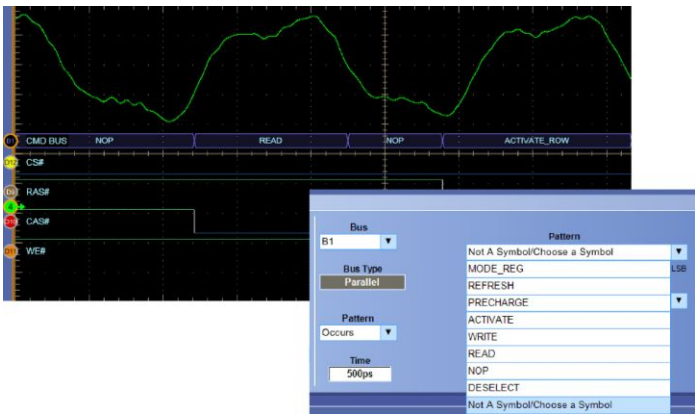
When you have many interfaces to verify, the MSO70000 Series with 4 analog and 16 logic channels enables efficient channel-to-channel timing checks. With timing resolution of 80 ps, the MSO70000 Series' digital acquisition system enables you to make precise timing measurements on as many as 20 channels simultaneously.

iCapture™ – One connection for analog and digital (MSO70000 Series)

The number of signals that must be verified can often make the checkout of a design long and involved. By using the iCapture™ digital-to-analog multiplexer feature, you can easily verify the analog characteristics of any of the 16 signals connected to the MSO70000 Series' digital channels without changing probes or connections. Using iCapture™, you can quickly view the analog characteristics of any input channel. If the signal is working as expected, relegate it to a digital-only view and continue testing other lines.

Bus decoding and triggering

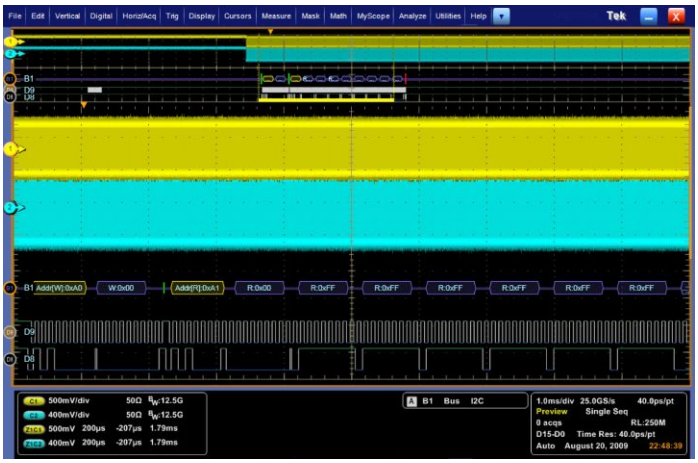
Verifying your system operation often requires the ability to see specific system states on a key bus such as the DDR SDRAM interface. The MSO/DPO70000 Series includes parallel and serial bus decoding that provides deeper insight into the system's behavior. Using the bus triggering capability of the MSO/DPO70000 Series to isolate the exact state needed or find invalid bus sequences is as easy as defining the bus and choosing the bit pattern or symbolic word that describes the desired state. In addition, serial bus decoding for 8b/10b encoded data, I^2C, SPI, RS-232/422/485/UART, USB, and MIPI® DSI and CSI2 buses enables you to identify where control and data packets begin and end as well as identify subpacket components such as address, data, CRC, etc.



Symbolic bus formats simplify identifying system states and setting up bus triggers.

Deep record length available on all channels

Longer duration events such as power supply sequencing and system status words can be analyzed without sacrificing timing resolution using the long memory depths available on all four analog channels in the DPO70000 Series as well as the 16 logic channels of the MSO70000 Series. Optional memory depths up to 125 MS (Option 10XL) on the 4, 6, and 8 GHz models, 250 MS (Option 20XL) on the 12.5 through 20 GHz models and 500 MS (4 channels)/1 GS (2 channels) with option 50XL on the 23 through 33 GHz models are available.



10 ms duration capture of synchronous high-speed and low-speed signals at 25 GS/s.

Power supplies can be a critical failure point in any system. Careful testing of the power delivery system's power on sequence can be time consuming. The MSO70000 Series provides independent logic thresholds for each logic channel enabling multiple logic voltages to be set up and observed simultaneously for quick verification of the system's power rails.

Protocol and serial pattern triggering

To verify serial architectures, the serial pattern triggering for NRZ serial data streams with built-in clock recovery in the MSO/DPO70000 Series allows correlating events across physical and link layers. The instruments can recover the clock signal, identify transitions, and allow you to set the desired encoded words for the serial pattern trigger to capture. This feature comes standard on the MSO70000 Series and is available on the DPO70000 Series as Option ST6G. For higher bit rate standards like USB 3.0, the 8b/10b serial pattern trigger and decode covers data rates up to 6.25 Gb/s.

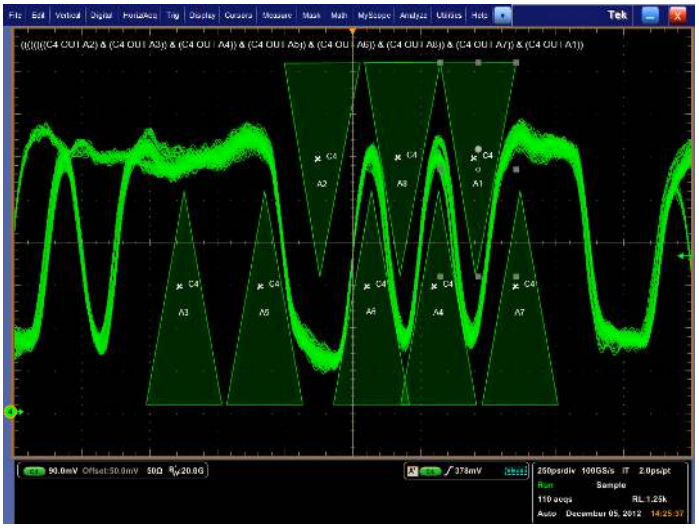
Pattern lock triggering adds an extra dimension to NRZ serial pattern triggering by enabling the oscilloscope to take synchronized acquisitions of a long serial test pattern with outstanding time base accuracy. Pattern lock triggering can be used to remove random jitter from long serial data patterns. Effects of specific bit transitions can be investigated, and averaging can be used with mask testing. Pattern lock triggering supports up to 6.25 Gb/s NRZ serial data streams and is standard on the MSO70000 Series instruments, or is included as part of Option ST6G on the DPO70000 Series.

Visual Trigger – Find the signal of interest quickly

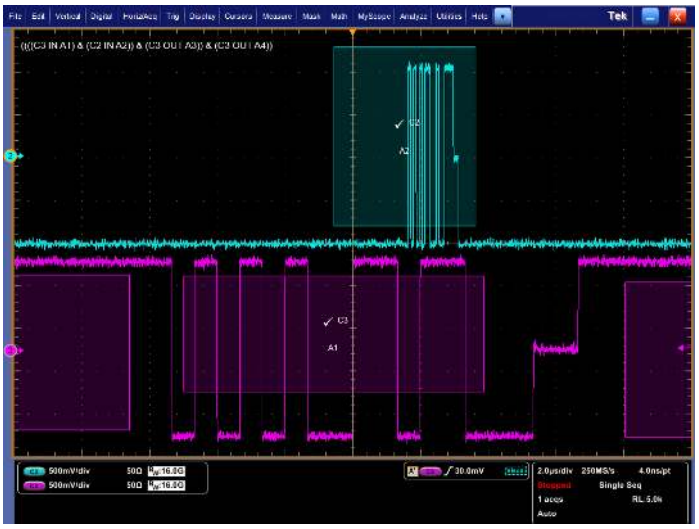
Finding the right cycle of a complex bus can require hours of collecting and sorting through thousands of acquisitions for an event of interest. Defining a trigger that isolates the desired event speeds up debug and analysis efforts.

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.



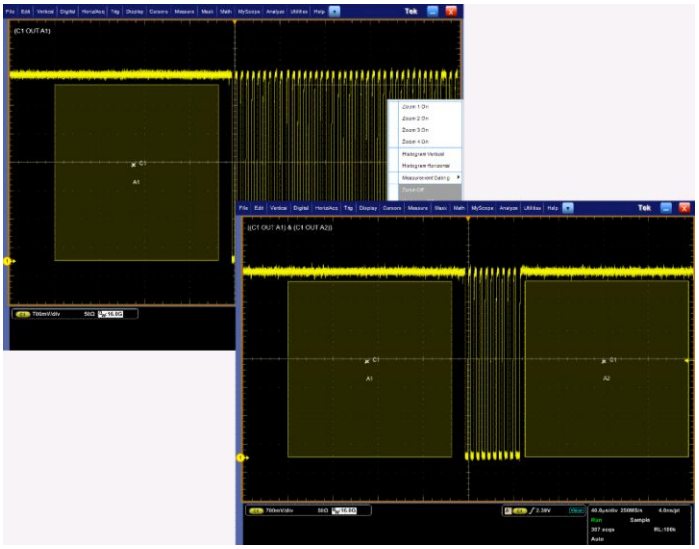
Multiple channel triggering. Visual Trigger areas can be associated with events spanning multiple channels such as packets transmitted on two USB2.0 buses simultaneously.

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.

System characterization and margin testing

When a design is working correctly and the next task is to fully characterize its performance, the MSO/DPO70000 Series offers the industry's most comprehensive set of analysis and certification tools, such as math expressions, waveform mask testing, pass/fail testing, event searching, and event marking. Tools for automation reduce the tedium, increase reliability, and speed up the process of making hundreds of characterization measurements.

Advanced waveform analysis

Full analysis of the power, voltage, and temperature corners of your system under test can be very time consuming. The MSO/DPO70000 Series offer a wide range of built-in advanced waveform analysis tools.

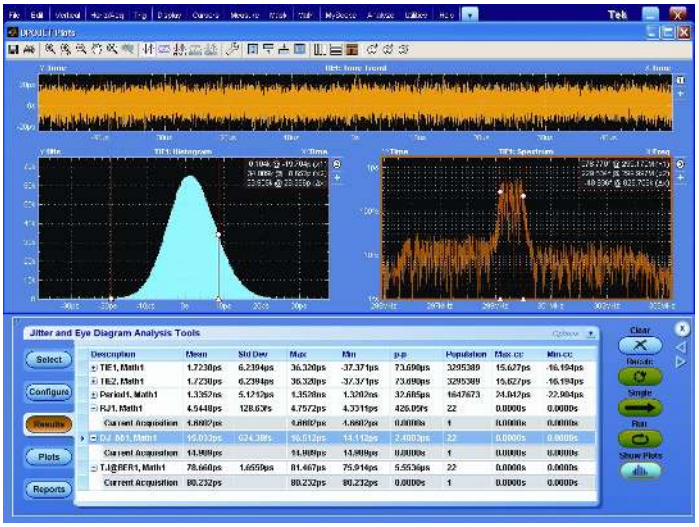
Waveform cursors make it easy to measure trace-to-trace timing characteristics, while cursors that link between YT and XY display modes make it easy to investigate phase relationships and Safe Operating Area violations. Select from 53 automatic measurements using a graphical palette that logically organizes measurements into Amplitude, Time, Histogram, and Communications categories. Gather further insight into your measurement results with statistical data such as mean, min, max, standard deviation, and population.

Define and apply math expressions to waveform data for on-screen results in terms that you can use. Access common waveform math functions with the touch of a button. Or, for advanced applications, create algebraic expressions consisting of live waveforms, reference waveforms, math functions, measurement values, scalars, and user-adjustable variables with an easy-to-use calculator-style editor.

With deep acquisition memory, margin testing can be done over many cycles and long duration trends in the data can be observed. Plus, data from the oscilloscope can be captured into Microsoft Excel using the unique Excel toolbar, and formatted into custom reports using the Word toolbar provided with the MSO/DPO70000 Series.

Automated tools to increase measurement throughput

Ease of use and measurement throughput are key when a large number of measurements must be completed with a performance oscilloscope. MSO70000 Series come standard with the DPOJET Advanced Jitter and Eye Diagram measurement application, providing the tools you need to quickly perform a high volume of measurements and collect statistics. DPOJET Essentials is standard on the DPO70000 Series with the DPOJET advanced version available as an option. Application-specific measurement packages are also available that extend DPOJET and perform the extensive set of tests required by industry standard groups. User-defined measurements can be added to DPOJET using the Application Developers Kit (ADK) that comes standard with the oscilloscope.



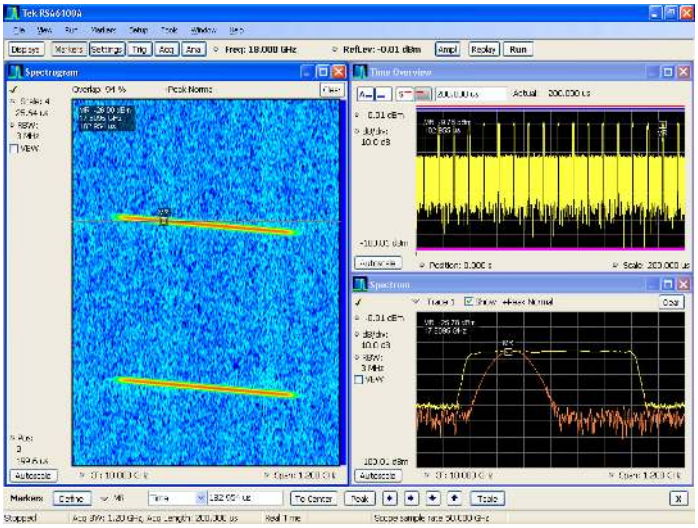
DPOJET Jitter and Eye Diagram Analysis – Simplify identifying signal integrity concerns, jitter, and their related sources with DPOJET software. DPOJET provides the highest sensitivity and accuracy available for real-time oscilloscopes.

Error detector

When performing receiver testing on a serial transceiver, a BER measurement is often required. The MSO/DPO70000 series offer an optional built-in error detector function for 8b/10b-encoded signals. The built-in error detector comes with presets for testing PCIe, USB3.0, and SATA signals up to 6 Gb/s. The error detector settings can be customized to work with a generic 8b/10b-encoded signal and can be set to detect bit, character, or frame errors. When an error is detected, the scope will trigger and display the waveform bits where the error occurred.

RF and vector signal analysis

When vector signal analysis of RF or baseband signals is needed, the optional SignalVu® application enables measurements in multiple domains (frequency, time, phase, modulation) simultaneously. SignalVu® measurements are fully correlated with the scope's time domain acquisition and triggering. Time domain events, such as commands to an RF subsystem, can be used as trigger events, while the subsystem's RF signal can be seen in the frequency domain. SignalVu also provides wireless standards measurements such as IEEE 802.11 a/b/g/j/p/n/ac that can be correlated in the time domain [1].



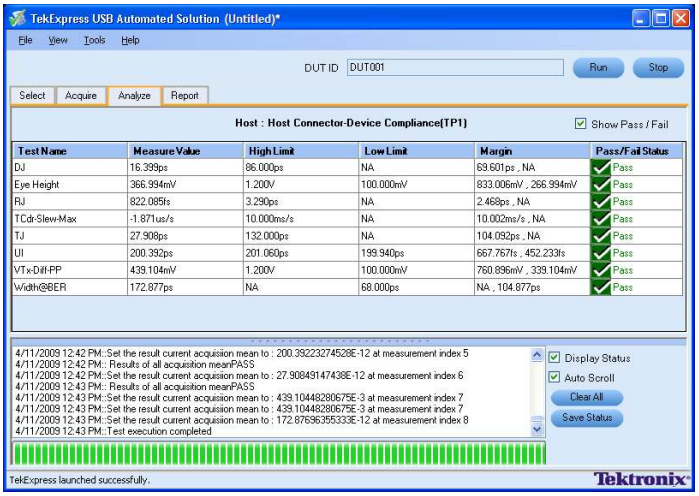
SignalVu® Vector Signal Analysis – Easily verify wide-bandwidth designs such as wideband radar, high data-rate satellite links, WLAN 802.11, or frequency-hopping radios and characterize wideband spectral events. SignalVu® combines the functionality of a vector signal analyzer, a spectrum analyzer, and the powerful triggering capabilities of the MSO/DPO70000 Series – all in a single package.

TekExpress® software automation framework

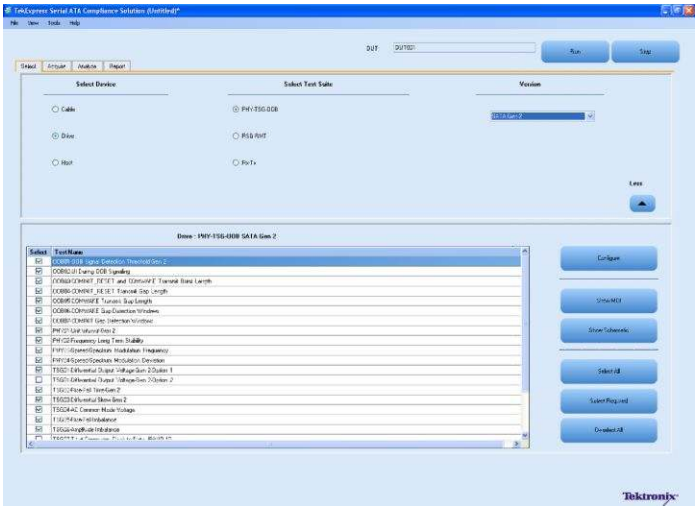
The TekExpress® software automation framework has been developed for automated one-button testing of high-speed serial data standards. TekExpress® efficiently executes the required tests for many serial standards such as SATA, SAS, MIPI® D-PHY, MHL, MIPI® M-PHY, PCI Express®, USB 3.0, DisplayPort, and 10GBASE-T Ethernet. Run on an external Windows PC, the TekExpress® software orchestrates the instrument setup and control sequences to provide complete test results for complete design validation.

Beyond using the TekExpress® framework, custom applications that you develop yourself using application development environments such as MATLAB® can further extend the tool set of the MSO/DPO70000 Series.

Characterization measurements depend upon accuracy and repeatability. The wide bandwidth and unmatched signal fidelity of the MSO/DPO70000 analog front end ensures that your signal quality measurements such as rise times are faithful and amplitude correct with flatness of ±0.5 dB.

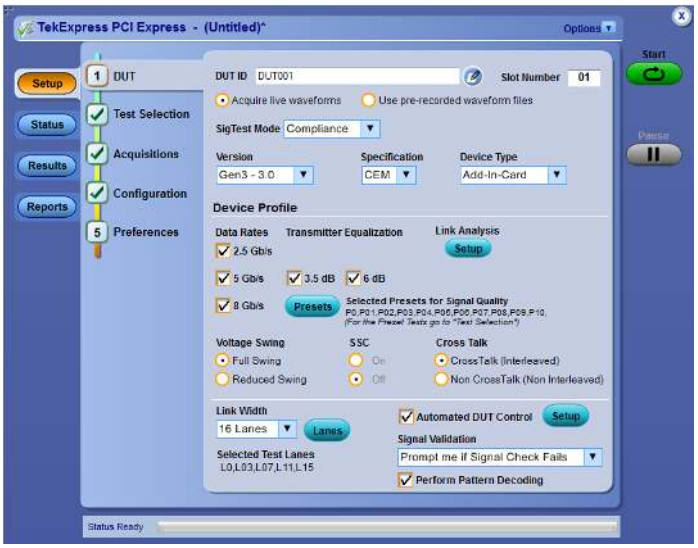


TekExpress® USB 3.0 Automated Test Software (Option USB-TX) – TekExpress® USB 3.0 provides an automated, simple, and efficient way to test USB 3.0 transmitter and receiver hosts and devices consistent with the requirements of the SuperSpeed Universal Serial Bus Electrical Compliance Test Specification. The application automates selection of appropriate fixture de-embed, CTLE and reference channel emulation filters and measurement selections based on device type, test type, test points, and selected probes. In addition, USB-TX leverages DPOJET allowing debug and advanced characterization of USB 3.0 solutions.

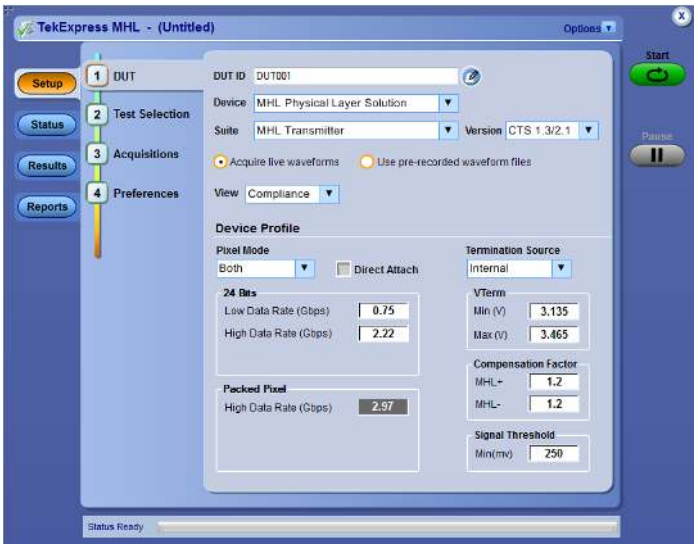


TekExpress® SATA Automated Compliance Test Software – Complete support for SATA Gen1/2/3 defined test suites for transmitters and receivers. Reduce your compliance test time by approximately 70% with simple, efficient automation of all required test suites with TekExpress® software. Also included is auto-recognition of all required test equipment, precise DUT/Host control, and one-button testing.

1 Also check http://www.tek.com/signalvu for the latest information.



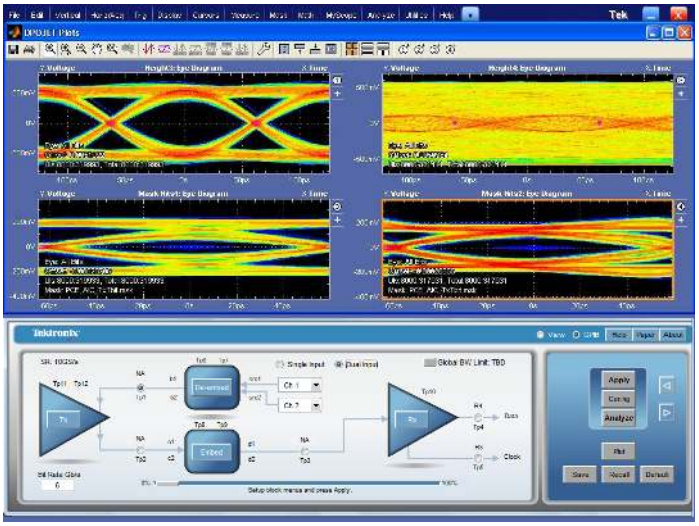
TekExpress® PCI Express Gen 1/2/3 Automated Test Software (Option PCE3) - Provides the most comprehensive solution for PCI Express Gen 1/2/3 transmitter compliance testing as well as debug and validation of PCI Express devices against the PCI-SIG specifications. The application automates selection of appropriate fixture de-embed and reference channel emulation filters and measurement selections based on test type, device data rate, transmitter equalization, link width, and selected probes. In addition, the Option PCE3 application includes a TekExpress compliance automation solution that integrates the PCI-SIG's Sigtest test software with Tektronix' DPOJET-based PCI Express Jitter and Eye Diagram & SDLA Serial Data Link Analysis Visualizer analysis tools for debug. Results are presented in a comprehensive HTML format for engineering test documentation.



TekExpress® MHL Advanced Analysis and Compliance Software (Option MHD) - Provides the most comprehensive solution for MHL 1.0/2.0/1.3/2.1 compliance testing as well as debug and validation of MHL devices against the latest MHL specifications. The application automates Transmitter, Sink and Dongle Electrical tests. Results are presented in a comprehensive HTML format for engineering test documentation

Custom filter and de-embed capability

Create your own filters or use the filters provided as standard with the MSO/DPO70000 Series to enhance your ability to isolate or remove a component of your signal (noise or specific harmonics of the signal). These customizable FIR filters can be used to implement signal-processing techniques, such as removing signal pre-emphasis or minimizing the effects of fixtures and cables connected to the device under test. Using the optional Serial Data Link Analysis Visualizer (SDLA64) application, you can gain further insight into serial data links with the capability to emulate the serial data channel from its S-parameters, remove reflections, cross-coupling, and loss caused by fixtures, cables, or probes, and open closed eyes caused by channel effects using receiver equalization techniques, such as CTLE, DFE, FFE. IBIS-AMI models for silicon-specific receiver equalization can used to observe on-chip behavior.

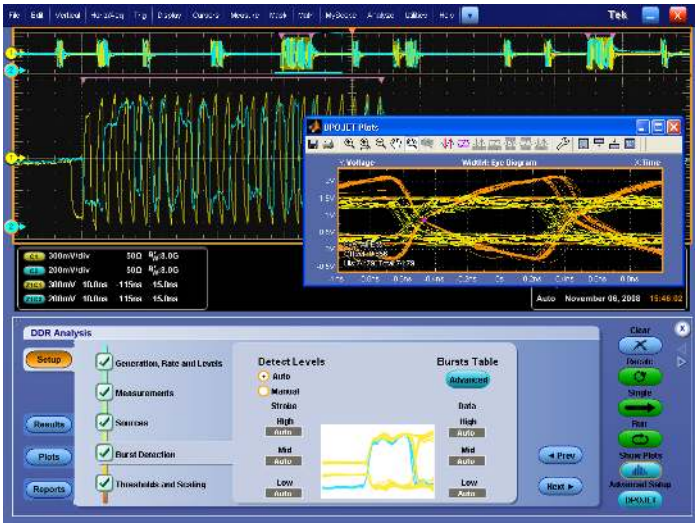


SDLA - Serial Data Link Analysis Visualizer (Option SDLA64) – Offers the capability to emulate the serial data channel, de-embed fixtures, cables, or probes, and add or remove equalization. Option SDLA64 also provides processing of waveforms with IBIS-AMI Receiver Equalization, or CTLE, FFE and/or DFE equalization. DPOJET provides advanced measurement and jitter analysis of the resulting waveforms.

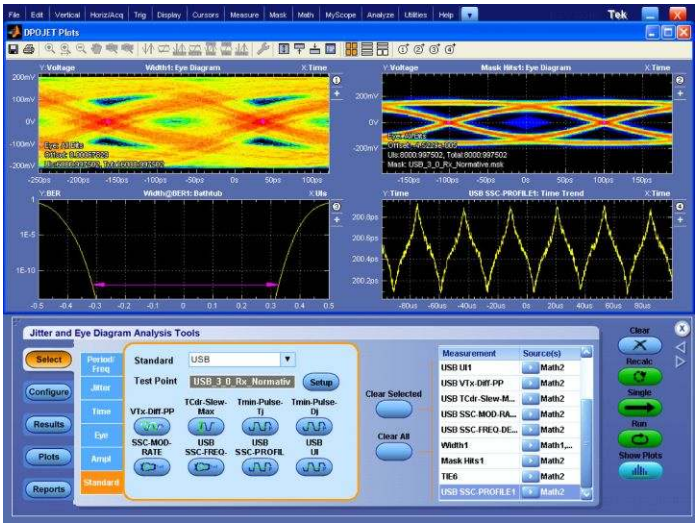
Application-specific solutions – enable standard-specific certification, measurement automation, and extended signal analysis

Accurate, Simple, and Customizable Physical Layer Certification Testing – For designers with industry-standard certification needs, standard-specific compliance and analysis modules that configure the pass/fail waveform mask and measurement limit testing are available as options on the MSO/DPO70000 Series. Modules are available for PCI Express®, DDR Memory, Serial ATA, SAS, HDMI, Ethernet, DisplayPort, MIPI® D-PHY and M-PHY, Power Supplies, and USB.

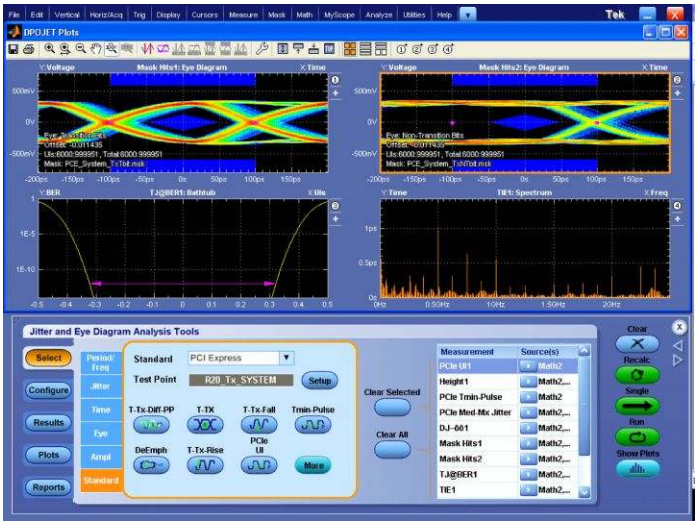
See the following list for highlights of the available application-specific solutions:



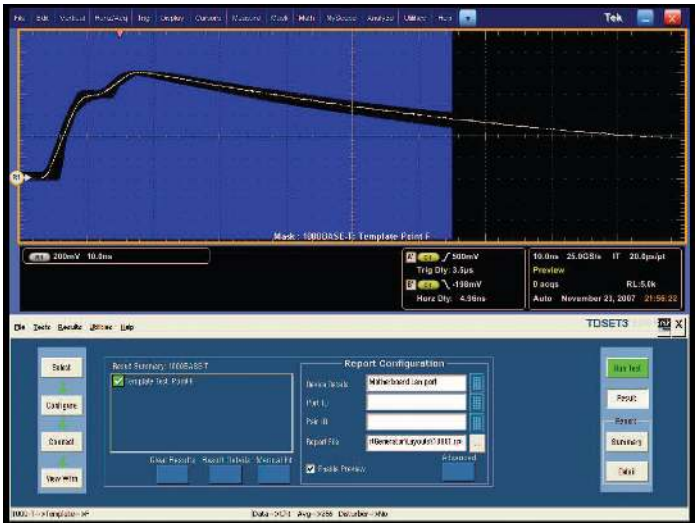
DDR Memory Bus Analysis (Option DDRA) – Automatically identify DDR1, LPDDR, LPDDR2, LPDDR3, DDR2, DDR3, DDR4, and GDDR3 Reads and Writes and makes JEDEC conformance measurements with pass/fail results on all edges in every Read and Write burst. DDRA provides capabilities for measurements of clock, address, and control signals. In addition to enabling conformance testing DDRA with DPOJET is the fastest way to debug complex memory signaling issues. DDRA can also use the Command/Address lines to trigger on specific read/write states when running on the MSO70000 Series Mixed Signal Oscilloscope, which offers 16 channels of digital logic probing.



USB 3.0 Transmitter Test Solution (Option USB3) – Perform verification, characterization, and debug of USB 3.0 devices. Measurements are implemented in DPOJET and are compliant to the USB 3.0 specification. For compliance and automation, USB-TX is available.

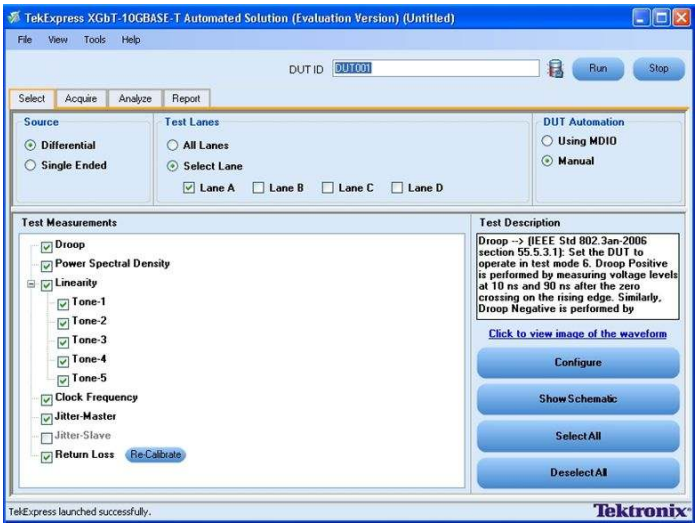


PCI Express® Transmitter Compliance and Debug (Option PCE3) – Analyze the performance of your PCI Express® Rev 1.0, 2.0, or 3.0 (draft spec) design with comprehensive test support. Using DPOJET, Option PCE3 enables tests that conform to PCI-SIG standards.

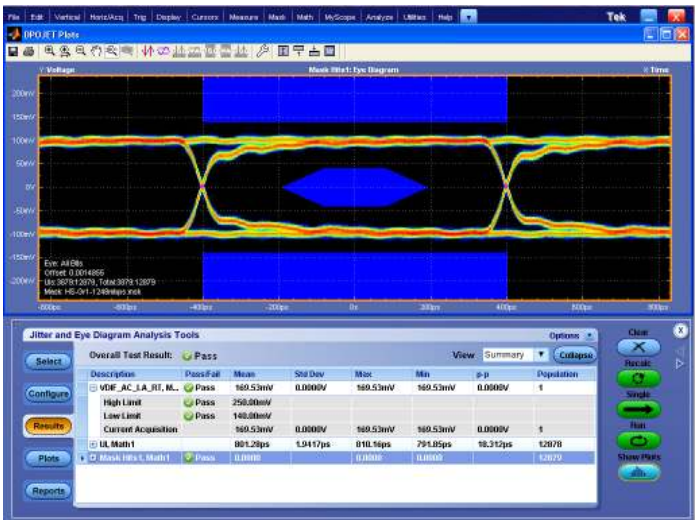


Ethernet Compliance Test Solution (Option ET3) – Receive full PHY layer support for Ethernet variants 10BASE-T, 100BASE-TX, and 1000BASE-T with the comprehensive, integrated Tektronix® Ethernet tool set. Analog verification, automated compliance software, and device characterization solutions are all included.

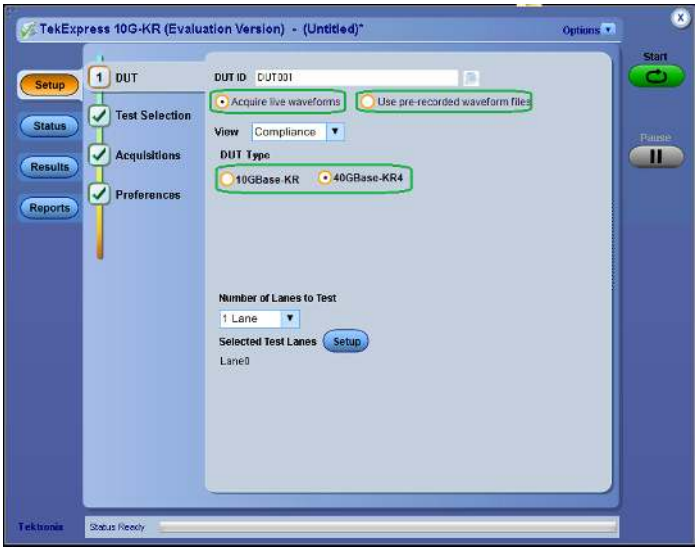
MIPI® D-PHY Characterization and Analysis Solution (Option D-PHY) – Verify to the D-PHY specification by rapidly characterizing and discovering sources of jitter and signal integrity concerns using the fully flexible and customizable test setup. Using DPOJET, Option D-PHY enables transmitter high-speed data-clock timing measurements, along with a full range of electrical characteristics in high-speed or low-power modes.



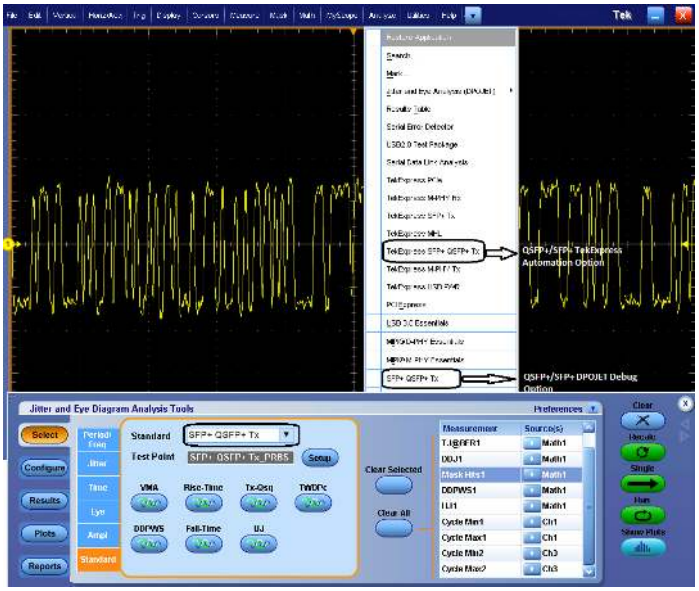
XGbT 10GBASE-T Automated Compliance Software – Quickly perform 10GBASE-T measurements per the IEEE 802.3an-2006 standard including Power Spectral Density (PSD), Power Level, and Linearity, with a simplified instrument configuration. XGbT provides flexible control over test configurations and analysis parameters, enabling more in-depth device characterization.



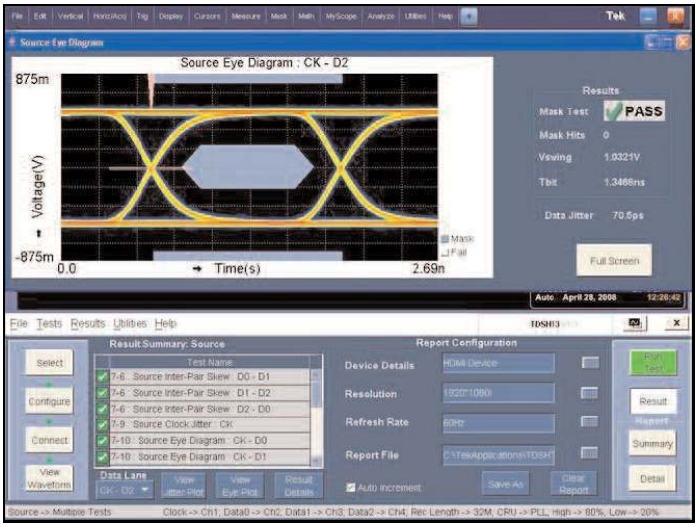
MIPI® M-PHY Debug, Analysis, Characterization and Conformance Test Solution (Option M-PHY) – Verify to the M-PHY specification by rapidly characterizing and discovering sources of jitter and signal integrity concerns. Using DPOJET, Option M-PHY enables transmitter signaling and timing measurements such as differential transmit eye diagrams, rise and fall times, slew rate, amplitude parameters, common mode voltages on each lane for both the large and small amplitude configurations, as well as the terminated and unterminated cases.



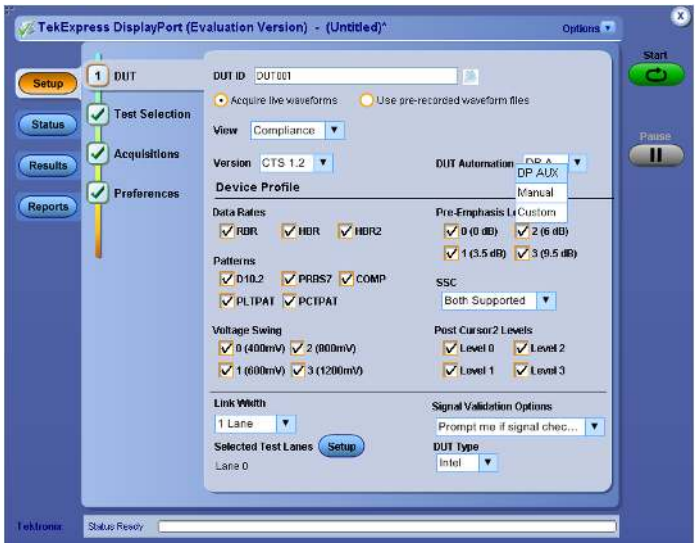
10GBASE-KR/KR4 Compliance and Debug Solution (Option 10G-KR) - Automated compliance measurements for IEEE 802.3ap-2007 specifications. This option includes an automated compliance solution and debugging with DPOJET. The automated test setup measures transmitter equalization levels generating 12 results for each tap and 120 results for 9 different measurements in approximately 15 minutes.



Tektronix SFP+ QSFP+ Tx is developed on a Real Time Oscilloscope platform, which is the platform of choice for engineers designing their products around SFF-8431 & SFF-8634 technology. Option SFP-TX and SFP-WDP enable both an Automation Solution (for Compliance) and DPOJET Option (for Debug), Users can save up to 80% on testing time compared to manual testing. TWDPc - Transmitter Waveform Distortion Penalty for Copper Measurements are available with Option SFP-WDP. SFF-8431 SFP+ TWDPc based Matlab code is integrated into the SFP-WDP option to make sure Engineers can use this measurement in the automated setup.



HDMI Compliance Test Solution (Option HT3) – A fast, efficient solution for HDMI compliance measurement challenges, no matter if you are working on a Source, Cable, or Sink solution. This application provides all the HDMI compliance test solutions you need to ensure quality and interoperability.



DisplayPort Compliance Test Solution (Option DP12) – Supports DisplayPort Compliance Test Standard (CTS) source test with four-line simultaneous testing using the Tektronix® P7300SMA Series probes and DisplayPort software. Detailed test reports with waveform plots, pass/fail results, and margin analysis are included.

Power Measurement and Analysis Software (Option PWR) – DPOPWR, Advanced Power Measurement and Analysis software allows the user to configure multiple measurements with custom defined settings, measure and analyze power dissipation in switching devices, and magnetic parameters in a single acquisition. The Trajectory plot computes turn-on loss, turn-off loss and Conduction loss parameters for each cycle. Measurements such as Phase, Conduction loss, amplitude, and Voltage harmonics provide more insight to Input/Output characterization of power supplies. A single mht format file with append feature provides an easy way of generating reports which include measurements, test results, and plot images.

Certification

This is the start of your concept. Before a product can go to market, you often need to complete a series of certification tests on the industry-standard high-speed serial buses in your design. These tests can involve many hours of wrestling with test fixtures, reading certification documents, and collecting sufficient data to validate that your system passes the required tests.

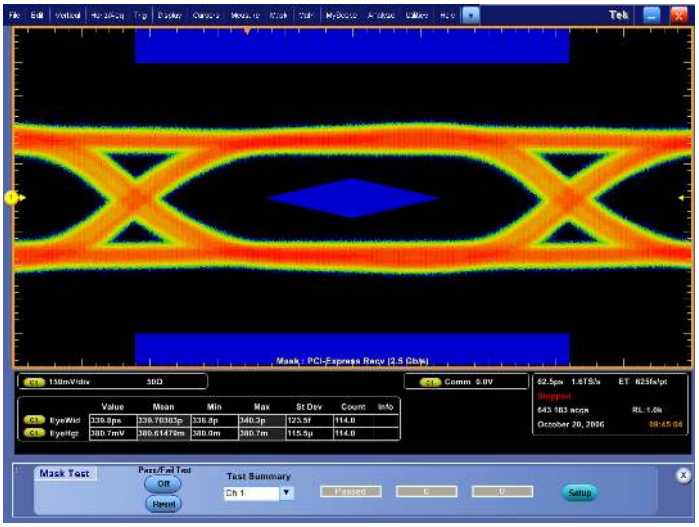
MSO70000 – A dedicated solution configured for today's high-speed serial design challenges

The MSO70000 Mixed Signal Oscilloscopes are specially configured to address high-speed serial data designs by encapsulating many of the serial domain features needed for high-speed serial verification and characterization. These standard features on the MSO70000 Series are options on the DPO70000 Series.

Serial pattern triggering – Real-time serial pattern triggering and protocol decode with built-in clock recovery recovers the clock signal, identifies the transitions, and decodes characters and other protocol data. You can see the 8b/10b bit sequences decoded into their words for convenient analysis, and set the desired encoded words for the serial pattern trigger to capture. With pattern lock triggering, the MSO70000 Series can synchronize to long serial test patterns with data rates up to 6.25 Gb/s and remove random jitter.

DPOJET jitter, timing, and eye diagram analysis – The MSO70000 Series features the highest-accuracy jitter and timing measurements as well as comprehensive analysis algorithms. Tight timing margins demand stable, low-jitter designs. You can make jitter measurements over contiguous clock cycles on every valid pulse in a single-shot acquisition. Multiple measurements and trend plots quickly show system timing under variable conditions, including Random, Deterministic, and Bounded Uncorrelated Jitter separation.

Communications mask testing – Provides a complete portfolio of masks for verifying compliance to serial communications standards. Over 150 masks including the following standards are supported – PCI Express®, ITU-T/ANSI T1.102, Ethernet IEEE 802.3, ANSI X3.263, Sonet/SDH, Fibre Channel, InfiniBand, USB, Serial ATA, Serial Attached SCSI, IEEE 1394b, RapidIO, OIF Standards, Open Base Station Architecture Initiative (OBSAI), Common Public Radio Interface (CPRI).



Communications mask testing.

62 MS record length – 62 MS on all four channels provides a longer time sequence at high resolution. Optional record lengths up to 125 MS for the 4, 6, and 8 GHz models, 250 MS for the 12.5 through 20 GHz models and 500 MS (4 channels)/1 GS (2 channels) on 23 to 33GHz models extend the acquisition time sequence.

With standard features that extend the functionality of the Tektronix DPO70000 Series to address high-speed serial signal analysis and certification, the MSO70000 Series offers a specialized instrument that efficiently addresses your design challenges.

Protocol Decode for High Speed Serial buses

The MSO/DPO70000 Series oscilloscopes provide optional protocol analysis for HSS buses such as PCI Express gen 1/2/3, MIPI D-PHY (CSI, DSI) and 8b/10b-encoded buses. With these capabilities, bit sequences can be decoded into familiar commands and data packets for faster analysis. With the PCI Express decoder, the data is displayed in a protocol-aware view using characters and terms from the standard, such as the ordered sets: SKP, Electrical Idle, and EIEOS

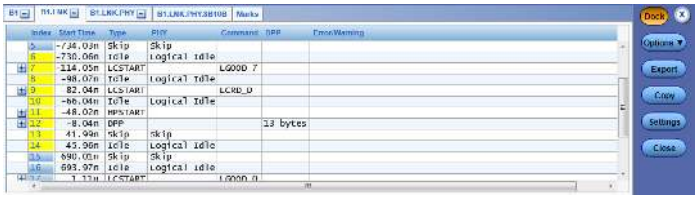
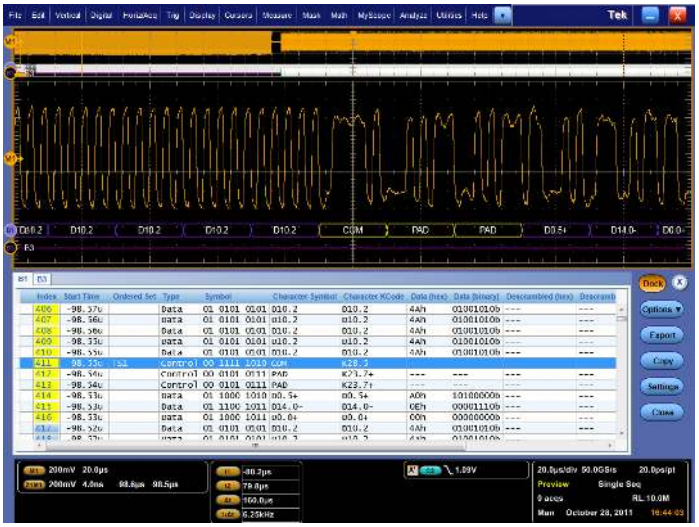


Table View of the Bus Protocol. The results table provides a protocol view of the bus and with a mouse click allows correlation of what is happening in the physical layer to what is happening in the protocol layers.



Protocol and Electrical Views of an HSS Bus. The data in the results table and the acquired waveform are time correlated, enhancing the ability to identify possible causes of protocol errors due to electrical signaling.

Both the 8b/10b serial bus trigger and the advanced search and mark feature on the oscilloscope are integrated with the HSS protocol decode to quickly isolate events of interest in a HSS data stream.

User-selectable bandwidth limit filters

While wide bandwidth is needed to characterize your high-speed serial designs, certification testing can require a specific instrument bandwidth appropriate for the signal's data rate in order to correlate test results between different test labs. The MSO/DPO70000 Series feature user-selectable bandwidth limiting filters. Using these bandwidth limit filters which range from 500 MHz to 32 GHz, you will ensure that your measurement is done using the bandwidth specified by the industry standard.

Debugging

Throughout the design cycle, MSO/DPO70000 Series oscilloscopes provide the ability to debug malfunctioning subsystems and isolate the cause. With the high waveform capture rate of FastAcq® you can quickly identify signal anomalies that occur intermittently – saving minutes, hours, or even days by quickly revealing the nature of faults so sophisticated trigger modes can be applied to isolate them. Using Pinpoint® triggers, infrequent events such as glitches or signal runts caused by bus contention or signal integrity issues can be captured, analyzed, and then eliminated.

FastAcq® – Expedites debugging by clearly showing imperfections

More than just color grading or event scanning, the FastAcq® proprietary DPX® acquisition technology captures signals at more than 300,000 waveforms per second on all four channels simultaneously, dramatically increasing the probability of discovering infrequent fault events. And with a simple turn of the intensity knob you can clearly “see a world others don't see”, displaying the complete picture of your circuit's operation. Some oscilloscope vendors claim high waveform capture rates for short bursts of time, but only MSO/DPO70000 Series oscilloscopes, enabled by DPX® technology, can deliver these fast waveform capture rates on a sustained basis.

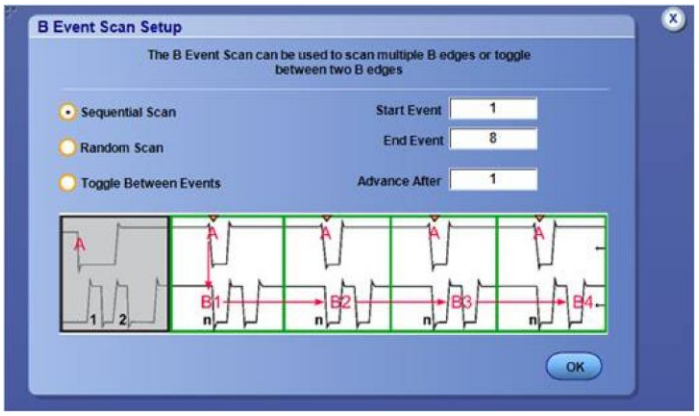
Pinpoint® trigger

Whether you're trying to find a problem signal or need to isolate a section of a complex signal for further analysis, like a DDR Read or Write burst, Tektronix Pinpoint® triggering provides the solution. Pinpoint® triggering allows selection of virtually all trigger types on both A and B trigger events delivering the full suite of advanced trigger types for finding sequential trigger events. Pinpoint® triggers provide trigger reset capabilities that begin the trigger sequence again after a specified time, state, or transition so that even events in the most complex signals can be captured. Other oscilloscopes typically offer less than 20 trigger combinations; Pinpoint® triggering offers over 1400 combinations, all at full performance. Visual Trigger extends the Pinpoint Triggering's capabilities, adding another level of trigger qualification to find important events in a wide variety of complex signals.

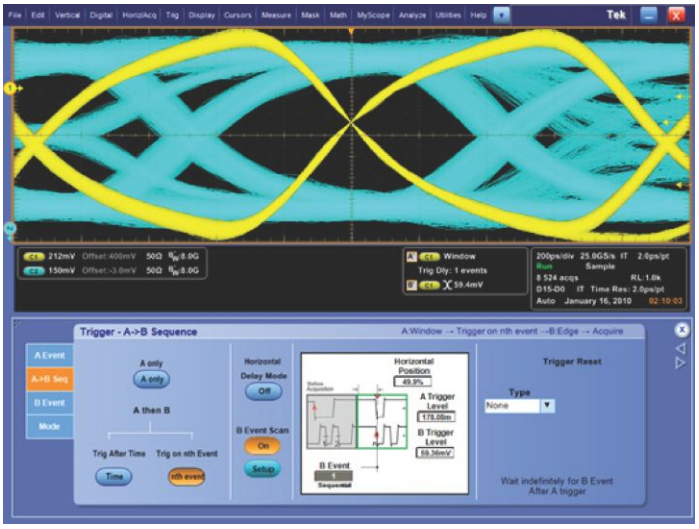
With Enhanced Triggering, trigger jitter is reduced to <100 fs. With this stability at the trigger point, the trigger point can be used as a measurement reference.

B scan event trigger

Users who wish to create eye diagrams from data bursts synchronized or initiated by an A event will find the B Event Scan trigger function especially useful. B Event Scan is an A to B trigger sequence that will trigger and capture burst event data of interest defined by the B Event setup menu. Captured bits can be scanned in a sequential or randomized fashion, alternatively the trigger can toggle between two successive B trigger events.



B Event Scan identifies specific events to build an eye diagram.



Use B Event Scan trigger on DDR DQS edges used to construct an eye diagram of all bits in a burst.

Logic pattern triggering

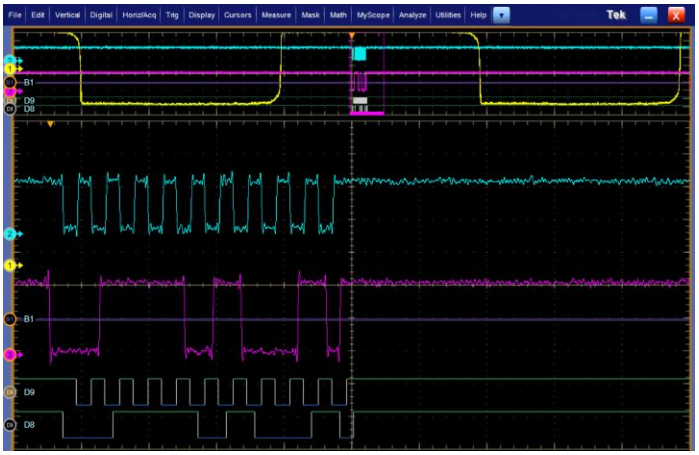
Logic pattern triggering allows logic qualification that controls when to look for faults and ignore events that do not occur during the desired state. On the MSO70000 Series, up to 20-bit wide logic pattern triggering enhances the Pinpoint® trigger capabilities by helping you isolate the specific system state and analog events that are causing system failure.

Digital A then analog B triggering (MSO70000 Series only)

Advanced triggering capabilities include Digital A then Analog B to help you to identify a specific digital pattern or system state and then wait for an analog event such as a runt pulse to trigger the acquisition.

Integrated logic channels (MSO70000 Series only)

The MSO70000 Series extends the debug capabilities of a 4-channel oscilloscope with an additional 16 logic channels that can be used to provide system level context when the fault occurs. This context, such as an illegal system state or error, may be the clue that leads to the root cause. When other oscilloscopes require you to use a logic analyzer to see the digital data you need to solve your debugging challenge, the MSO70000 Series can effectively debug and verify many digital timing issues in the system more quickly and easily. With 80 ps timing resolution and channel-to-channel skews of as little as 160 ps, the integrated logic channels allow you to view and measure time-correlated digital and analog data in the same display window.



Integrated Logic Channels – Provide time-correlated analog and digital visibility for system debugging.

FastFrame™

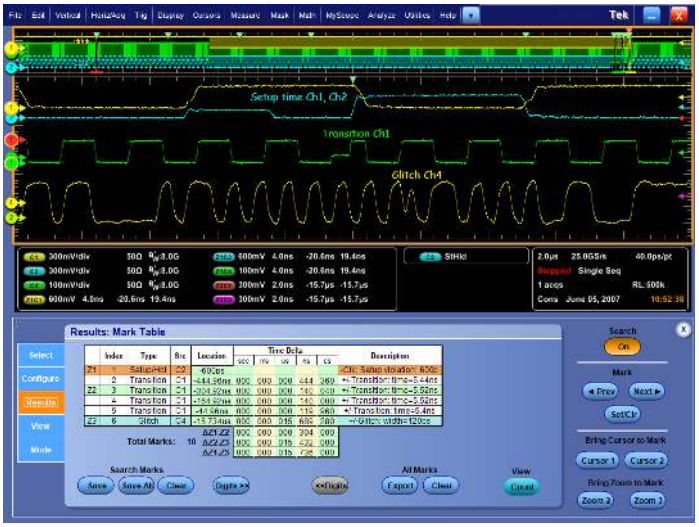
When the key events you are interested in are widely spaced in time, such as bursts of activity on a bus, the FastFrame™ segmented memory feature on the MSO/DPO70000 Series enables you to capture the events of interest while conserving acquisition memory. Using multiple trigger events, FastFrame™ captures and stores short bursts of signals and saves them as frames for later viewing and analysis. On the MSO70000 Series, FastFrame™ and bus or logic triggering enable you to capture your fastest, bursty signals on the analog channels at the highest sample rate while the logic channel trigger recognizes the bus cycle of interest. Capturing thousands of frames is possible, so long-term trends and changes in the bursting signal can be analyzed.

iCapture™ (MSO70000 Series only)

When an anomaly is seen on digital lines, iCapture™ delivers new insight into the analog behavior of the digital signals. With iCapture™, you can route any 4 of the 16 logic channels to the MSO70000 Series' analog acquisition system so that these signals can be viewed in finer detail. The unique multiplexer circuitry of iCapture™ provides simultaneous digital and analog views of signals without needing to move the logic probe or double probe the circuit.

Advanced search and mark

Isolating the key event causing your system failure can often be a tedious task. With the Advanced Event Search and Mark feature standard on the MSO/DPO70000 Series, examining data and highlighting important events, skipping the unimportant ones, and enhancing the comprehension of event relationships is made easy. With ASM, you'll be able to navigate through long record length acquisitions effortlessly and quickly locate the event you have been trying to find. Advanced searches can be defined individually or using the scope's trigger settings as the definition for the search. Even Visual Trigger areas can be used as part of the ASM criteria.



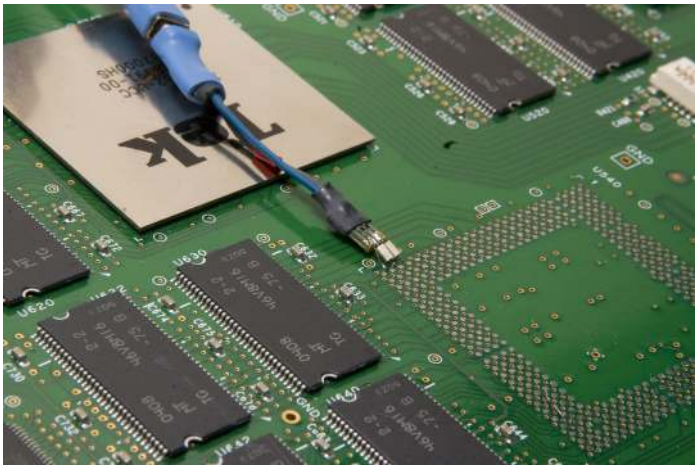
Advanced Search and Mark – Highlights important events and provides convenient previous and next buttons and mouse clicks to navigate between events of interest effortlessly.

Embedded serial bus (I^2C, SPI, RS-232/422/485, UART, USB) decoding and triggering

The MSO/DPO70000 Series instruments provide integrated support for a broad range of serial buses – I^2C, SPI, RS-232/422/485/UART, and USB. This support for up to 16 separate serial buses enables you to monitor or debug subsystems and components, such as frequency synthesizers, D/A converters, and Flash Memory that are controlled or monitored through serial control buses. While monitoring or debugging these serial buses alone is relatively easy, decoding events on the serial bus can also enable more complex system-level debugging. When you experience an issue with a higher-speed serial interface, the clue to what is going wrong may be found by using the serial bus decode feature to observe the data on your I^2C, SPI, RS-232/422/485/UART, or USB interface.

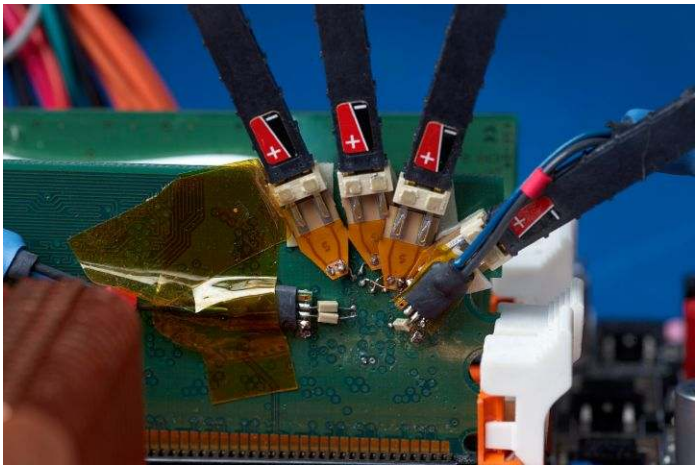
Probing – analog and digital

Often the biggest challenge in debugging a system is getting access to the required signals. Tektronix offers a wide array of probing solutions, including the P7600 and P7500 TriMode™ probing system with bandwidths that are perfectly matched to the MSO/DPO70000 Series. The P7600 and P7500 TriMode™ probes allow you to switch among differential, single ended, and common-mode measurements without moving the probe from its connection points. The P7600 series combines low noise, 33 GHz bandwidth and the convenience of Trimode probing. The P7500 Series offers probes with performance from 4 GHz to 25 GHz and offers several low-cost solder tips with quick connection features that allow moving the probe to various solder points fast and easy.



The low-cost solder tips available for the P7500 TriMode™ probes allow quick connection so moving the probe to various solder points is fast and easy.

On the MSO70000 Series, the P6780 differential, P6750 high-density D-Max®, and P6717A general-purpose logic probes provide connectivity to low-speed and high-speed digital signals with low loading, small size, and a range of accessories for soldering or browsing.



Solder tip accessories designed for the P6780 differential logic probes provide access to signals on tightly spaced vias and fine-pitched components.

Production testing

In addition to assisting engineers with design tasks, the MSO/DPO70000 Series allow test engineers to test analog and digital signals with a wide range of clock speeds and data rates. Rackmount options are available for mounting the MSO/DPO70000 Series into an EIA standard 19 inch (487 mm) rack. An IEEE 488.2 standard GPIB interface is standard on all models.

LXI Class C

Using the LXI Web Interface, you can connect to the MSO/DPO70000 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, as well as status and modification of network settings. All web interaction conforms to the LXI Class C specification.

OpenChoice® analysis tools

The OpenChoice® Software allows you to customize your test and measurement system with familiar analysis tools. The analysis and networking features of the OpenChoice® software add more flexibility to Tektronix MSO/DPO70000 Series oscilloscopes: Using the fast embedded bus, waveform data can be moved directly from acquisition to analysis applications on the Windows® desktop at much faster speeds than conventional GPIB transfers.

Implementation by Tektronix of industry-standard protocols, such as TekVISA™ interface and ActiveX controls, are included for using and enhancing Windows® applications for data analysis and documentation. IVI instrument drivers are included to enable easy communication with the oscilloscope using GPIB, RS-232, and LAN connections from programs running on the instrument or an external PC.

The Application Development Kit (ADK) extends the OpenChoice® framework to support custom end-user and third-party application development. ADK documentation describes how to implement the Data Store Public Interface to speed internal transfer of waveform data through user-created data processing algorithms and display the results in real time on the oscilloscope screen. The Data Store Public Interface is >2X faster than traditional GPIB-based data transfer techniques. The Data Store Public Interface is accessible through MathWorks MATLAB® or .NET languages such as C# or Visual Basic. Other features of the ADK include a DPOJET plug-in that enables users to add custom measurements to this market-leading timing and jitter analysis tool. The ADK provides comprehensive documentation and coding examples to aid the user in developing their own unique analysis tool kit to quickly capture and analyze their signals.

Research

With industry-leading acquisition speed and signal-to-noise ratio performance, the MSO/DPO70000 Series can provide researchers with tools that allow them to capture, display, and analyze high-speed and transient signals with unmatched precision.

Full control of acquisition and display parameters

You have full control of the instrument's acquisition modes. Choose the mode you need to do your job the fastest: Automatic, Constant Sample Rate, or Manual settings. When you are doing signal exploration and want a lively signal, the default Automatic mode provides you with the liveliest display update rate. If you want the highest real-time sample rate that will give you the most measurement accuracy, then the Constant Sample Rate mode is for you. It will maintain the highest sample rate and provide the best real-time resolution. Finally, the Manual mode ensures direct and independent control of the sample rate and record length for applications requiring specific settings.

Document tools

The OpenChoice® architecture provides a comprehensive software infrastructure for faster, more versatile operations. Data transfer utilities, such as the Excel or Word toolbar plug-ins can be used to simplify analysis and documentation on the Windows® desktop or on an external PC.

Unmatched usability

The MSO/DPO70000 Series instruments excel in usability with a suite of productivity features, such as a touch screen, flat menu structures, intuitive graphical icons, knob-per-channel vertical controls, right clicks, mouse wheel operation, and familiar Windows-based controls.

Remote Desktop

When your oscilloscope is connected to a network, use the Windows® Remote Desktop utility to access your oscilloscope from across the lab or across the globe.

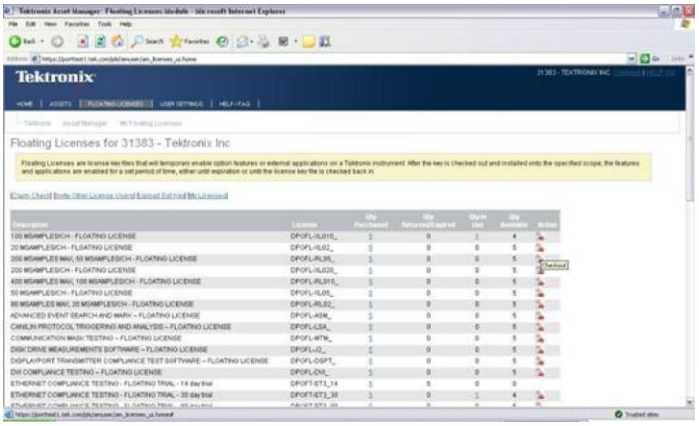
MyScope® – Create your own control windows

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® button and menu selection on the oscilloscope button/menu bar, just like any other control window. You can make an unlimited number of custom control windows, enabling each person who uses the oscilloscope in a shared environment to have their own unique control window. MyScope® control windows will 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 enables the power user to be far more efficient. Everything you need is found in one control window rather than navigating through multiple menus to repeat similar tasks.

Option asset management: floating or fixed

Many Tektronix application solutions and hardware options are enabled with an encrypted license key that is entered through the oscilloscope's Utilities menu. You now have two options. The first option is a fixed license applied to a specific scope serial number and is permanently enabled. A fixed license cannot be moved from one oscilloscope to another.

The second option is a floating license. Floating licenses provide the capability to move a license-key enabled option from one oscilloscope to another. This capability helps users with distributed teams and several Tektronix MSO/DPO70000, or DPO7000, and MSO/DPO5000 Series oscilloscopes to better manage their assets and deploy applications or other options such as extended memory to the oscilloscope where it is needed.



This view in the floating license system identifies the license's current user and location allowing you to easily manage your floating license inventory.

Managing and deploying floating licenses uses an easy online licensing management system. All floating license management functions are maintained on Tektronix secure servers and no infrastructure or your company IT department involvement is necessary. Simply utilize your myTek account to access, track, and deploy your oscilloscope floating-license enabled options.

Performance you can count on

Depend on Tektronix® to provide you with performance you can count on. All Tektronix® products are backed with industry-leading service and support.

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

Model overview

	DPO70404C, MSO70404C	DPO70604C, MSO70604C	DPO70804C, MSO70804C	DPO71254C, MSO71254C	DPO71604C, MSO71604C	DPO72004C, MSO72004C	DPO72304DX, MSO72304DX	DPO72504DX, MSO72504DX	DPO73304DX, MSO73304DX
Analog channels	4	4	4	4	4	4	4	4	4
Digital channels (MSO70000 Series only)	16	16	16	16	16	16	16	16	16
Analog bandwidth (user-selectable DSP enhance) (–3 dB)	4 GHz	6 GHz	8 GHz	12.5 GHz	16 GHz	20 GHz	23 GHz (2 Ch) 23 GHz (4 Ch)	25 GHz (2 Ch) 23 GHz (4 Ch)	33 GHz (2 Ch) 23 GHz (4 Ch)
Hardware Analog Bandwidth (-3 dB)	4 GHz	6 GHz	8 GHz	12.5 GHz	16 GHz (typical)	16 GHz (typical)	23 GHz	25 GHz	33 GHz
Rise time (typical)	10% to 90%: 98 ps 20% to 80%: 68 ps	10% to 90%: 65 ps 20% to 80%: 45 ps	10% to 90%: 49 ps 20% to 80%: 34 ps	10% to 90%: 32 ps 20% to 80%: 22 ps	10% to 90%: 24.5 ps 20% to 80%: 17 ps	10% to 90%: 18 ps 20% to 80%: 14 ps	10% to 90%: 17 ps 20% to 80%: 13 ps	10% to 90%: 16 ps 20% to 80%: 12 ps	10% to 90%: 13 ps 20% to 80%: 9 ps

Model overview

	DPO70404C, MSO70404C	DPO70604C, MSO70604C	DPO70804C, MSO70804C	DPO71254C, MSO71254C	DPO71604C, MSO71604C	DPO72004C, MSO72004C	DPO72304DX, MSO72304DX	DPO72504DX, MSO72504DX	DPO73304DX, MSO73304DX
Sample rate (1, 2 ch) (maximum sample rate is 50 GS/s on digital channels routed to an analog channel through the iCapture™ analog mux)	25 GS/s	25 GS/s	25 GS/s	100 GS/s	100 GS/s	100 GS/s	100 GS/s	100 GS/s	100 GS/s
Sample rate (3, 4 ch)	25 GS/s	25 GS/s	25 GS/s	50 GS/s	50 GS/s	50 GS/s	50 GS/s	50 GS/s	50 GS/s
Sample rate (ET/IT mode)	5 TS/s	5 TS/s	5 TS/s	10 TS/s	10 TS/s	10 TS/s	10 TS/s	10 TS/s	10 TS/s
Record length, points (each channel, standard)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)	31.25 M 62.5 M (MSO70000 Series)
Record length (each channel, Opt. 5XL, DPO70000 series)	62.5 M	62.5 M	62.5 M	62.5 M	62.5 M	62.5 M	62.5 M	62.5 M	62.5 M
Record length (each channel, Opt. 10XL)	125 M	125 M	125 M	125 M	125 M	125 M	125 M	125 M	125 M
Record length (each channel, Opt. 20XL)	N/A	N/A	N/A	250 M	250 M	250 M	250 M	250 M	250 M
Record length (each channel, Opt. 50XL)	N/A	N/A	N/A	N/A	N/A	N/A	500 M each channel, 1G on 2 channels	500 M each channel, 1G on 2 channels	500 M each channel, 1 G on 2 channels
Timing resolution	40 ps (25 GS/s)	40 ps (25 GS/s)	40 ps (25 GS/s)	10 ps (100 GS/s)	10 ps (100 GS/s)	10 ps (100 GS/s)	10 ps (100 GS/s)	10 ps (100 GS/s)	10 ps (100 GS/s)
Duration at highest sample rate (standard)	1.25 ms 2.5 ms (MSO70000 Series)	1.25 ms 2.5 ms (MSO70000 Series)	1.25 ms 2.5 ms (MSO70000 Series)	0.31 ms 0.61 ms (MSO70000 Series)	0.31 ms 0.61 ms (MSO70000 Series)	0.31 ms 0.61 ms (MSO70000 Series)	0.31 ms 0.61 ms (MSO70000 Series)	0.31 ms 0.61 ms (MSO70000 Series)	0.31 ms 0.61 ms (MSO70000 Series)
Duration at highest sample rate (Opt. 5XL, DPO70000 series)	2.5 ms	2.5 ms	2.5 ms	0.63 ms	0.63 ms	0.63 ms	0.63 ms	0.63 ms	0.63 ms
Duration at highest sample rate (Opt. 10XL)	5.0 ms	5.0 ms	5.0 ms	1.3 ms	1.3 ms	1.3 ms	1.3 ms	1.3 ms	1.3 ms
Duration at highest sample rate (Opt. 20XL)	—	—	—	2.5 ms	2.5 ms	2.5 ms	2.5 ms	2.5 ms	2.5 ms
Duration at highest sample rate (Opt. 50XL)	—	—	—	—	—	—	5 ms each channel, 10 ms 2 channels	5 ms each channel, 10 ms 2 channels	5 ms each channel, 10 ms 2 channels
Vertical noise (% of full scale) (50 mV/div, bandwidth filter on, max sample rate) (typical)	0.28%	0.32%	0.35%	0.36%	0.36%	0.56%	0.58%	0.58%	0.58%
Time base range (Auto mode)	20 ps/div to 1000 s/div	20 ps/div to 1000 s/div	20 ps/div to 1000 s/div	10 ps/div to 1000 s/div	10 ps/div to 1000 s/div	10 ps/div to 1000 s/div	10 ps/div to 1000 s/div	10 ps/div to 1000 s/div	10 ps/div to 1000 s/div
Timing resolution (ET/IT mode)	200 fs	200 fs	200 fs	100 fs	100 fs	100 fs	100 fs	100 fs	100 fs

Model overview

	DPO70404C, MSO70404C	DPO70604C, MSO70604C	DPO70804C, MSO70804C	DPO71254C, MSO71254C	DPO71604C, MSO71604C	DPO72004C, MSO72004C	DPO72304DX, MSO72304DX	DPO72504DX, MSO72504DX	DPO73304DX, MSO73304DX
Delta time measurement accuracy (RMS over <100 ns Duration; Single Shot; Signal Rise Time = 1.2 × Scope Rise Time; 100 mV/div, bandwidth filter on, max sample rate)	1.48 ps	1.33 ps	1.24 ps	1.23 ps	1.15 ps	1.43 ps	639 fs	639 fs	555 fs
Jitter noise floor (with BWE enabled) (typical)	340 fs	300 fs	300 fs	270 fs	270 fs	290 fs	<380 fs	<365 fs	<325 fs

Vertical system – Analog channels

Bandwidth limit

Depending on instrument model: 33 GHz to 1 GHz in 1 GHz steps, or 500 MHz

Depending on instrument model, hardware-only bandwidth settings at 33, 25, 23, 20, 16, 12.5, 8, 6, and 4 GHz

Channel-to-Channel isolation

Any two channels at equal vertical scale

0 GHz to 10 GHz: ≥120:1

>10 GHz to 12 GHz: ≥80:1

>12 GHz to 15 GHz: ≥50:1

>15 GHz to 20 GHz: ≥25:1

>20 GHz to 33 GHz: ≥20:1

DC gain accuracy

±2% (of reading)

Channel delay (typical)

≤10 ps for any two channels at equal V/div and coupling on C models

≤1 ps for any two channels at equal V/div and coupling on DX models

Effective number of bits (typical)

5.5 bits at 50 mV/div, bandwidth filter on, max bandwidth up to 13 GHz, max sample rate

Signal-to-Noise ratio (typical)

34 dB

Input coupling

DC (50 Ω), GND

Input resistance selection

50 Ω ±3%, 1 MΩ with TCA-1MEG adapter

Input sensitivity range

23 GHz, 25 GHz, and 33 GHz models

6.25 mV/div to 600 mV/div (62.5 mV to 6 V full scale)

20 GHz models

20 to 500 mV/div (200 mV to 5 V full scale)

10 mV/div at 18 GHz (100 mV full scale)

All other models

10 mV/div to 500 mV/div (100 mV to 5 V full scale)

Maximum input voltage, 50 Ω

Also determined by TekConnect® accessory.

23 GHz, 25 GHz, and 33 GHz models

≤1.2 V_{FS}: ±1.5 V relative to the termination bias (30 mA maximum), ±5 V absolute maximum input.

>1.2 V_{FS}: 8.0 V.

All other models

<5.0 V_{RMS} for ≥100 mV/div; 1.0 V_{RMS} for <100 mV/div

Vertical system – Analog channels

Termination voltage range	
23 GHz, 25 GHz, and 33 GHz models	≤1.2 V_{FS}: -3.5 V to +3.5 V >1.2 V_{FS}: 0 V.
All other models	0 V only
Offset accuracy	
10 mV/div to 99.5 mV/div	±(0.35% (offset value-position) + 1.5 mV + 1% of full scale)
100 mV/div to 500 mV/div	±(0.35% (offset value-position) + 7.5 mV + 1% of full scale)
Offset range	
23 GHz, 25 GHz, and 33 GHz models	+3.4 V to –3.4 V
All other models	10 mV/div: ±450 mV 20 mV/div: ±400 mV 50 mV/div: ±250 mV 100 mV/div: ±2.0 V 200 mV/div: ±1.5 V 500 mV/div: ±0.0 V
Passband flatness (20, 50, 100, 250 mV/div) (typical)	±0.5 dB to 50% of nominal bandwidth
Position range	±5 div
Vertical resolution	8 bit (11 bit with averaging)

Vertical system – Digital channels

Digital bandwidth	
With P6780 logic probe	2.5 GHz
With P6750 or P6717A logic probe	1 GHz
Input resistance selection	
With P6780 logic probe	20 kΩ to ground per side or 40 kΩ differential mode ± 2.0%, 0.5 pF
With P6750 or P6717A logic probe	20 kΩ ± 1.0%, 3 pF
Trigger clock/qualifier input	1
Vertical resolution	1 bit
Thresholds	One per channel, independently set
Threshold accuracy	±75 mV + 3% of threshold setting
Threshold resolution	5 mV

Vertical system – Digital channels

Threshold voltage range	
With P6780 logic probe	–2 to +4.5 V
With P6750 or P6717A logic probe	–1.5 to +4.0 V
Minimum voltage swing	300 mV_{p-p}
Maximum input voltage	±15 V nondestruct

Horizontal system

Channel-to-Channel deskew range	±75 ns
Time base accuracy	±1.5 ppm initial accuracy, aging <1 ppm per year
Time base delay time range	–5.0 ks to 1.0 ks
Trigger jitter	<100 fs_{RMS} (1 ps_{RMS} [typical] with enhanced triggering off)

Acquisition system - Analog channels

Acquisition modes	
Sample	Acquires and displays sampled values
Average	From 2 to 10,000 waveforms can be included in an average waveform
Envelope	From 1 to 2×10^9 waveforms included in min-max envelope
Hi-Res	Real-time boxcar averaging reduces random noise and increases resolution
Peak detect	Capture and display narrow glitches at all real-time sampling rates. Glitch widths: 1 ns at ≤125 MS/s; 1/sample rate at ≥250 MS/s
FastAcq®	FastAcq® optimizes the instrument for analysis of dynamic signals and capture of infrequent events, capturing >300,000 wfms/s on all TekConnect channels simultaneously, standalone configuration only
FastFrame™	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. TekConnect channels only, standalone configuration only
Roll mode	Scrolls sequential waveform points across the display in a right-to-left rolling motion. Works at sample rates up to 10 MS/s with a maximum record length of 40 MS. TekConnect channels only, standalone configuration only
Waveform database	Accumulates waveform data providing a three-dimensional array of amplitude, time, and counts. TekConnect channels only, standalone configuration only

Acquisition system – Digital channels

Maximum sample rate (all channels)	12.5 GS/s
Timing resolution	80 ps
Channel-to-Channel timing uncertainty	<160 ps
Minimum detectable pulse width	<400 ps
Maximum number of buses	16
Number of channels per bus	Up to 24 (16 logic, 4 analog, 4 math)

Pinpoint® trigger system

Trigger sensitivity	
Internal DC coupled	4% of full scale from DC to 50 MHz 10% of full scale at 4 GHz 20% of full scale at 8 GHz 50% of full scale at 11 GHz
Aux input 50 Ω (external trigger)	250 mV from DC to 50 MHz, increasing to 350 mV at 1.0 GHz
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
Main trigger modes	Auto, Normal, and Single
Trigger sequences	Main, Delayed by Time, Delayed by Events, Reset by Time, Reset by State, Reset by Transition. All sequences can include a separate horizontal delay after the trigger event to position the acquisition window in time
Trigger coupling	DC, AC (attenuates <100 Hz) HF Rej (attenuates >20 kHz) LF Rej (attenuates <200 kHz) Noise Reject (reduces sensitivity) RF coupling (increases trigger sensitivity and bandwidth at the highest operating frequencies)
Trigger holdoff range	250 ns min to 12 s max
Trigger level range	
Any channel	±120% of full scale from center of screen
Auxiliary input	±5 V
Line	0 V, not settable
Clock recovery system	
DPO Models	Requires Option ST6G or Option MTH
MSO Models	Standard
Clock recovery phase locked loop bandwidth	Fixed at FBaud/1600
Clock recovery jitter (RMS)	<0.25% bit period + 2 ps_{RMS} for PRBS data patterns <0.25% bit period + 1.5 ps_{RMS} for repeating "0011" data pattern
Minimum signal amplitude needed for clock recovery	1 div_{p-p} up to 1.25 Gbaud 1.5 div_{p-p} above 1.25 Gbaud
Tracking/Acquisition range	±2% of requested baud
Clock recovery frequency range	1.5 MBaud to 3.125 GBaud. Recovered clock and regenerated data available for use with a BERT.
Serial pattern trigger	
DPO Models	Requires Option ST6G
MSO Models	Standard

Pinpoint® trigger system

NRZ-Encoded Data	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
8b/10b-Encoded Data	Trigger on 8b/10b-encoded data at the following rates: 1.25 to 1.65, 2.1 to 3.2, 3.8 to 5.1, and 5.4 to 6.25 GBaud.
	Pattern length up to 40 bits (1 to 4 valid 10-bit characters)
	Alignment character is K28.5 (either disparity)
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.
DPO Models	Requires Option MTH
MSO Models	Standard
Bus triggers maximum toggle rate	I^2C, SPI, RS-232/422/485/UART: 10 Mb/s
	USB: low-speed, full-speed
	CAN: 1 Mb/s
	LIN: 100 kb/s
	MIL-STD-1553B: 2 Mb/s
Logic pattern trigger (MSO Models)	
Threshold range	P6780: –2 to +4.5 V
	P6717A/P6750: –1.5 to +4 V
Threshold accuracy	±100 mV + 3% of threshold setting
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.
Line trigger	Trigger on power line signal. Level fixed at 0 V.
Visual Trigger	Requires Option VET
Max number of areas	8
Area shapes	Rectangle, Triangle, Trapezoid, Hexagon, user defined shapes (can have >40 vertices)
Compatibility	Visual Trigger qualification is compatible with all trigger types and all trigger sequences

Pinpoint® trigger system

Trigger Types

Trigger	Analog Channels	MSO Logic Channels	Description
Comm [2]	X		Support for AMI, HDB3, BnZS, CMI, MLT3, and NRZ encoded signals.
Bus	X	X	Trigger on a parallel or serial bus when the specific bus value is found.
I^2C [2]	X	X	Trigger on Start, Repeated Start, Stop, Missing ACK, Address (7 or 10 bit), Data, or Address and Data.
SPI [2]	X	X	Trigger on SS or data.
CAN [3]	X	X	Trigger on Start of Frame, Frame Type, Identifier, Data, End of Frame, Missing Ack, Bit Stuff Error.
LIN [3]	X	X	Trigger on Sync, Identifier, Data, Ident and Data, Wakeup Frame, Sleep Frame, Error.
FlexRay [3]	X	X	Trigger on Start of Frame, Indicator Bits, Cycle Count, Header Fields, Identifier, Data, End of Frame, Error.
RS-232/422/485/UART [3]	X	X	Trigger on Start Bit, End of Packet, Data, and Parity Error.
USB [3]	X	X	Low-speed or Full-speed: Trigger on Sync, Reset, Suspend, Resume, End of Packet, Token (Address) Packet, Data Packet, Handshake Packet, Special Packet, Error.
MIL-STD-1553B [3]	X	X	Trigger on Sync, Command Word, Status Word, Data, RT/IMG Time, Error.
PCI Express [3]	X	X	Trigger on Patterns (including ordered sets), Character/Symbol, Error, Control Characters (gen 1 and gen 2 rates only)
Edge	X	X	Positive or negative slope on any channel or front-panel auxiliary input. Coupling includes DC, AC, noise reject, HF reject, and LF reject.
B Event Scan	X		B Event Scan is an A to B trigger sequence that will trigger and capture burst event data of interest as defined in the B Event Scan setup menu. Captured bits can be scanned in a sequential or randomized fashion, and alternatively the trigger can toggle between two successive B trigger events. Eye diagrams can be constructed with burst data acquired as a result of scanning B Event.
Glitch	X	X	Trigger on or reject glitches of positive, negative, or either polarity. Minimum glitch width is 150 ps (typical) with rearm time of 300 ps.
Pattern	X	X	Trigger when pattern goes false or stays true for specified period of time. Pattern (AND, OR, NAND, NOR) specified for four input channels (and 16 logic channels on the MSO70000 Series) defined as high, low, or don't care.
Runt	X		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.

2 Included on MSO models, optional on DPO models

3 Optional on all models

Pinpoint® trigger system

Trigger	Analog Channels	MSO Logic Channels	Description
Serial Pattern [2]	X		Trigger on NRZ-encoded data up to 6.25 Gbaud; above 1.25 Gbaud requires 8b/10b encoded data. Includes pattern lock triggering to capture repeated acquisitions of long serial test patterns up to 6.25 Gb/s.
Setup/Hold	X		Trigger on violations of both setup time and hold time between clock and data present on any two input channels.
State	X	X	Any logical pattern of channels (1, 2, 3) (and 16 logic channels on the MSO70000 Series) clocked by edge on channel 4. Trigger on rising or falling clock edge.
Timeout	X	X	Trigger on an event which remains high, low, or either, for a specified time period. Selectable from 300 ps.
Transition	X		Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative, or either.
Trigger Delay by Events	X	X	1 to 2 billion events.
Trigger Delay by Time	X	X	3.2 ns to 3 million seconds.
Visual Trigger [3]	X		Trigger when the Visual Trigger expression is satisfied.
Width	X	X	Trigger on width of positive or negative pulse either within or out of selectable time limits (down to 150 ps).
Window	X		Trigger on an event that enters or exits a window defined by two user-adjustable thresholds. Event can be time or logic qualified.

Waveform analysis

Search and Mark Events

Search for edges, glitches, or pulses of specified width. Any events found matching the search criteria are marked and placed in the Event table. The search can use positive/negative slopes or both on any channels.

When an event of interest is found, 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. Users can choose to stop acquisitions when an event is found.

Waveform measurements

Automatic measurements

53, of which 8 can be displayed on-screen at any one time; measurement statistics, user-definable reference levels, measurement within gates isolating the specific occurrence within an acquisition to measure

The DPOJET Jitter and Eye Analysis application offers additional automated and advanced measurements such as jitter.

Amplitude related

Amplitude, High, Low, Maximum, Minimum, Peak-to-Peak, Mean, Cycle Mean, RMS, Cycle RMS, Positive Overshoot, Negative Overshoot

Time related

Rise Time, Fall Time, Positive Width, Negative Width, Positive Duty Cycle, Negative Duty Cycle, Period, Frequency, Delay

Combination

Area, Cycle Area, Phase, Burst Width

Histogram related

Waveform Count, Hits in Box, Peak Hits, Median, Maximum, Minimum, Peak-to-Peak, Mean (μ), Standard Deviation (sigma), μ +1sigma, μ +2sigma, μ +3sigma

Waveform analysis

Bus decoding

Parallel	Data from selected channels is grouped as a parallel, multichannel bus and displayed as a single bus value. Display can be binary, hexadecimal, or symbolic formats
I²C [2]	SCLK and SDA channels are displayed as a bus per the Inter-Integrated Circuit specification
SPI [2]	MOSI, MISO, SCLK, and SS channels are displayed as a bus per the Serial Peripheral Interface specification
CAN [3]	CAN_H, CAN_L, TX, or RX channels are displayed as a bus
LIN [3]	Data is displayed as a bus in accordance with the LIN Version 1 or Version 2 standards
FlexRay [3]	BP, BM, TX, or RX signals are displayed as a bus
HSIC [3]	Data is displayed as a bus according to the USB2.0 HSIC standard
RS-232/422/485/UART [3]	Channel is displayed as a bus
USB [3]	Channels are displayed as a bus per the USB specification
MIL-STD-1553B [3]	Data is displayed as a bus
PCI Express [3]	Gen 1, 2, or 3 data rates are automatically detected and displayed as a bus in accordance with the PCIe standard
MIPI® D-PHY [3]	DSI or CSI2 channels are displayed as a bus per the MIPI standard
8b/10b Encoded [2]	Control and data characters are displayed as a bus

Waveform processing/math

Algebraic expressions	Define extensive algebraic expressions including Waveforms, Scalars, User-adjustable Variables, and Results of Parametric Measurements e.g. (Integral (CH1 – Mean(CH1)) × 1.414 × VAR1)
Arithmetic	Add, Subtract, Multiply, Divide Waveforms and Scalars
Filtering function	User-definable filters. Users specify a file containing the coefficients of the filter. Several example filter files are provided
Frequency domain functions	Spectral Magnitude and Phase, Real and Imaginary Spectra
Mask function	Generates a Waveform Database pixel map from a sample waveform. Sample count can be defined
Math functions	Average, Invert, Integrate, Differentiate, Square Root, Exponential, Log 10, Log e, Abs, Ceiling, Floor, Min, Max, Sin, Cos, Tan, ASin, ACos, ATan, Sinh, Cosh, Tanh
Relational	Boolean result of comparison >, <, ≥, ≤, ==, !=
Vertical units	Magnitude: Linear, dB, dBm Phase: Degrees, radians, group delay IRE and mV units
Window functions	Rectangular, Hamming, Hanning, Kaiser-Bessel, Blackman-Harris, Gaussian, Flattop2, Tek Exponential
Customized Functions using Math Plug-in Interface	An interface is provided to allow users to create their own custom math functions in MATLAB or Visual Studio

Display system

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

Computer system and peripherals

Operating system	Microsoft Windows 7 Ultimate – 64 bit OS
CPU	Intel i7-2600 processor, quad core, 3.4 GHz
System memory	8 GB (16 GB on DX models)
Hard disk drive	Rear-panel, removable hard disk drive, 500 GB capacity
Solid state drive (Option SSD)	Removable, 480 GB capacity (SSD is standard on DX models)
CD/DVD drive	Front-panel CD-R/W, DVD-R drive
Mouse	Optical wheel mouse, USB interface
Keyboard	USB interface

Input/Output ports

Auxiliary input	Front panel. See trigger specifications
Auxiliary output	Rear panel. BNC connector, 0 to 3 V; default output is A-Event Trigger low true
Probe calibration output	Front panel. BNC connector, ±10 V DC for DC probe calibration (signal available only during probe calibration)
Fast edge output	Front panel. SMA connector provides fast edge signal. 1 kHz ±20%; 810 mV (base to top) ±20% into ≥10 kΩ load; 440 mV ±20% into a 50 Ω load
Recovered clock output	Front panel. SMA connector, ≤1.25 Gb/s, Output swing ≥130 mV_{p-p} into 50 Ω at 1.25 Gb/s. Requires Option ST6G or Option MTH to enable on DPO70000 Series, standard on MSO70000 Series
Recovered data output	Front panel. SMA connector, ≤1.25 Gb/s, Output swing of 1010 repeating pattern 200 mV into 50 Ω at 1.25 Gb/s. Requires Option ST6G or Option MTH to enable on DPO70000 Series, standard on MSO70000 Series
USB interface	Front panel: Two USB 2.0 ports on 23, 25, and 33 GHz models, one on all others. Allows connection of USB keyboard, mouse, or storage device Rear panel: Four USB ports, two are USB 3.0. Allows connection of USB keyboard, mouse, or storage devices
LXI web interface (LAN eXtensions for instrumentation)	Class: LXI Class C Version: 1.3
Audio input/output	Rear panel. Miniature phone jacks for stereo microphone input and stereo line output
External time base reference in	Rear panel. BNC connector; allows time base system to phase lock to external 10/100 MHz reference. Optimized (by using a software switch) for either a highly stable clock or tracking mode
GPIB interface	Rear panel. IEEE 488.2 standard
Keyboard port	Rear panel. PS/2 compatible
LAN port	Rear panel. RJ-45 connector, supports 10BASE-T, 100BASE-T, and 1000BASE-T
Mouse port	Rear panel. PS/2 compatible
eSATA port	Rear panel. External SATA interface for eSATA storage devices

Input/Output ports

Power

100 to 240 V_{RMS}, ±10%, 50/60 Hz; 115 V_{RMS} ±10%, <870 W, 400 Hz; CAT II, <1100 VA typical

Video out port

Connect to show the oscilloscope display, including live waveforms on an external monitor or projector. The primary Windows® desktop can also be displayed on an external monitor using these ports.

Alternatively, the ports can be configured to show the secondary Windows® desktop (also called extended desktop or dual-monitor display)

Both VGA and DVI-D connectors.

Serial port

Rear panel. Two DB-9 COM1 ports

Time base reference out

BNC connector; provides TTL-compatible output of internal 10 MHz reference oscillator

Physical characteristics

Dimensions

	mm	in.
Height	298	11.74
Width	451	17.75
Depth	489.97	19.29

Rackmount dimensions

	mm	in.
Height	311	12.25
Width	480.1	18.9
Depth (from rack mounting ear to back of instrument)	546.1	21.5

Weight

	kg	lb.
Net	24	53
Shipping	34	67

Rackmount weight

	kg	lb.
Net	22	59
Kit	2.7	6

Cooling – Required clearance

	mm	in.
Top	0	0
Bottom	0	0
Left Side	76	3
Right Side	76	3
Front	0	0
Rear	0	0

Environmental

Temperature	
Operating	5 °C to +45 °C
Nonoperating	–20 °C to +60 °C
Humidity	
Operating	8% to 80% relative humidity (RH) at up to 32 °C Above +32 °C up to +45 °C; as limited by a 29.4 °C wet bulb temperature
Nonoperating	5% to 95% relative humidity (RH) Above +32 °C up to +60 °C; as limited by a 29.4 °C wet bulb temperature
Altitude	
Operating	3,000 m (9,843 ft.)
Nonoperating	12,000 m (39,370 ft.)
United States Government Configuration Baseline (USGCB) Testing	Tektronix has tested the MSO/DPO70000 Series oscilloscopes for compatibility with the security configuration for Information Technology products specified in the USGCB settings for Windows 7 and Internet Explorer
Regulatory	
Electromagnetic compatibility	2004/108/EC; EN 61326-2-1:2006
Certifications	UL 61010-1, CSA 61010-1-04, LVD 2006/95/EC, EN61010-1, IEC 61010-1

Ordering information

MSO/DPO70000 models

MSO70404C	4 GHz Mixed Signal Oscilloscope
MSO70604C	6 GHz Mixed Signal Oscilloscope
MSO70804C	8 GHz Mixed Signal Oscilloscope
MSO71254C	12.5 GHz Mixed Signal Oscilloscope
MSO71604C	16 GHz Mixed Signal Oscilloscope
MSO72004C	20 GHz Mixed Signal Oscilloscope
MSO72304DX	23 GHz Mixed Signal Oscilloscope
MSO72504DX	25 GHz Mixed Signal Oscilloscope
MSO73304DX	33 GHz Mixed Signal Oscilloscope
DPO70404C	4 GHz Digital Phosphor Oscilloscope
DPO70604C	6 GHz Digital Phosphor Oscilloscope
DPO70804C	8 GHz Digital Phosphor Oscilloscope
DPO71254C	12.5 GHz Digital Phosphor Oscilloscope
DPO71604C	16 GHz Digital Phosphor Oscilloscope
DPO72004C	20 GHz Digital Phosphor Oscilloscope
DPO72304DX	23 GHz Digital Phosphor Oscilloscope
DPO72504DX	25 GHz Digital Phosphor Oscilloscope
DPO73304DX	33 GHz Digital Phosphor Oscilloscope

Standard accessories

Accessories

071-2980-xx	User Manual (please specify language when ordering)
TCA-292MM (4 included)	TekConnect® to 2.92 mm Adapter (C models)
TCA-292D (4 included)	TekConnect® to 2.92 mm Adapter (DX models)
TCA-BNC	TekConnect® to BNC Adapter
—	Accessory Pouch
—	Front Cover
—	Mouse
—	Keyboard
—	Power Cord (please specify power plug option when ordering)
—	DVI to VGA Adapter (C models only)
—	Static Protection Wrist Strap

—	GPIB Programmer's Reference (on product HDD)
—	Performance Verification Procedure PDF File
—	Calibration Certificate Documenting NIST Traceability
—	Z 540-1 Compliance and ISO9001
---	P6717A General Purpose Logic Probe (MSO models)
---	Logic Probe Deskew Fixture (MSO models)

Instrument options

Record length options

Option	Description
Opt. 5XL	62.5 MS/Ch (Standard on MSO models)
Opt. 10XL	125 MS/Ch
Opt. 20XL	250 MS/Ch (For models of bandwidth ≥12.5 GHz only.)
Opt. 50XL	500 MS/Ch on 4 channels, 1 G/Ch on 2 channels (DX models only)

Storage options

Option	Description
Opt. SSD	Additional Removable Disk – Solid State Drive (C models only)

Trigger and search options

Option	Description
Opt. LT	Waveform Limit Testing
Opt. MTH	Mask Testing for Serial Standards. Includes hardware clock recovery for up to 3.125 Gb/s (standard on MSO models)
Opt. ST6G	Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals (Up to 6.25 Gb/s). Includes hardware clock recovery and pattern lock triggering (standard on MSO models)

Advanced analysis options

Option	Description
Opt. D-PHY	MIPI® D-PHY Essentials – Characterization and Analysis Solution (Requires Opt. DJA)
Opt. DDRA	DDR Memory Bus Analysis (Requires Opt. DJA)
Opt. DJA	DPOJET Advanced Jitter and Eye Diagram Analysis (standard on MSO models)
Opt. DP12	DisplayPort 1.2 Source Test Automation Software (Requires Opt. DJA) (Requires Opt. 5XL or higher)
Opt. DSA	Digital Serial Analysis Bundle (includes 5XL, DJA, MTH, ST6G)
Opt. ERRDT	Frame and Bit Error Rate Detector for High-speed Serial Standards (Requires Opt. ST6G)
Opt. ET3	Ethernet Compliance Test Software (Requires Ethernet Test Fixture)
Opt. FC-16G	Fiber Channel - 16G DPOJET Essentials
Opt. HSIC	HSIC Essentials - Electrical Validation and Protocol Decode Solution (Requires Opt. DJA)
Opt. HT3	HDMI Compliance Test Software
Opt. HT3DS	HDMI Direct Synthesis for HDMI 1.4
Opt. MHD	MHL Advanced Analysis and Compliance Software (Requires Opt. DJA and Opt 2XL or higher)
Opt. MOST	Electrical Compliance and Debug Test Solution for MOST50 and MOST150 (Requires Opt. DJA)
Opt. M-PHY	MIPI® M-PHY Essentials – Characterization and Analysis Solution (Requires Opt. DJA)
Opt. M-PHYTX	M-PHY Automated Transmitter Solution (Requires Opt. DJA)
Opt. M-PHYRX	M-PHY Automated Receiver Solution (Requires Opt. ST6G) (Requires Opt. ERRDT)
Opt. PCE3	PCI Express® Transmitter Compliance and Debug (Requires Opt. DJA) (For models of bandwidth ≥6 GHz only)
Opt. PWR	Advanced Power Measurement and Analysis Software
Opt. SAS3	SAS3 12 GB/s Essentials (Requires Opt. DJA and 2XL or higher) (For models of bandwidth ≥20 GHz only)
Opt. SFP-TX	SFP+ Compliance and Debug Solution (Requires Opt. DJA)
Opt. SFP-WDP	SFP+ Compliance and Debug Solution – WDP Measurement (Requires Opt. DJA)
Opt. SDLA64	Serial Data Link Analysis Visualizer
Opt. SR-AERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553B)
Opt. SR-AUTO	Automotive Serial Triggering and Analysis (CAN/LIN/FlexRay)
Opt. SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART)
Opt. SR-CUST	Custom Serial Analysis (standard on all models)
Opt. SR-DPHY	MIPI® D-PHY (DSI / CSI2) Serial Analysis
Opt. SR-EMBD	Embedded Serial Triggering and Analysis (I^2C, SPI) (standard on MSO models)
Opt. SR-ENET	Ethernet Serial Analysis (10BASE-T and 100BASE-TX)
Opt. SR-PCIE	PCI Express Serial Analysis (Opt. ST6G required for triggering)
Opt. SR-USB	USB Serial Triggering and Analysis
Opt. SVA	AM/FM/PM Audio Signal Analysis (Requires Opt. SVE)
Opt. SVE	SignalVu® Essentials – Vector Signal Analysis Software [4]
Opt. SVM	General Purpose Modulation Analysis (Requires Opt. SVE)
Opt. SVO	Flexible OFDM Analysis (Requires Opt. SVE)
Opt. SVP	Advanced Signal Analysis (including pulse measurements) (Requires Opt. SVE)
Opt. SVT	Frequency and Phase Settling Time Measurements (Requires Opt. SVE)
Opt. SV23	WLAN 802.11a/b/g/j/p measurement application (requires Opt. SVE)
Opt. SV24	WLAN 802.11n measurement application (requires Opt. SV23)
Opt. SV25	WLAN 802.11ac measurement application (requires Opt. SV24) (For models of bandwidth ≥6 GHz only)
Opt. SV26	APCO P25 compliance testing and analysis application (requires Opt. SVE)

4 Also check http://www.tek.com/signalvu for the latest information.

Option	Description
Opt. TBT-TX	Thunderbolt Transmitter Characterization, Debug, and Compliance Testing (Requires Opt. DJA and Opt. 2XL or higher) (For models of bandwidth ≥16 GHz only)
Opt. UHS2	UHS-II-Host-Tx and UHS-ii-Device-Tx Measurements (For models of bandwidth ≥6 GHz only)
Opt. USBHSIC	USB2.0 and HSIC Bundle, includes options Opt. DJA, HSIC, SR-USB, and USB
Opt. USB3	USB 3.0 Compliance and Analysis Software (Requires Opt. DJA) (For models of bandwidth ≥8 GHz only)
Opt. VET	Visual Trigger
Opt. 10G-KR	10GBASE-KR/KR4 Compliance and Debug Solution (Requires Opt. DJA) (For models of bandwidth ≥16 GHz only)

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/DPO70000, DPO7000, and MSO/DPO5000 Series oscilloscopes. Floating licenses are available for the license-key enabled options listed below.

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

Option	Description
DPOFL-ASM	Advanced Event Search and Mark
DPOFL-D-PHY	MIPI® D-PHY Essentials – Characterization and Analysis Solution (Requires Opt. DJA)
DPOFL-DDRA	DDR Memory Bus Analysis (Requires Opt. DJA)
DPOFL-DJA	Jitter and Eye Analysis Tools – Advanced (DPOJET)
DPOFL-DP12	DisplayPort 1.2 Source Test Automation Software
DPOFL-DSA	Digital Serial Analysis Bundle
DPOFL-ERRDT	Frame and Bit Error Rate Detector for High-speed Serial Standards (Requires Opt. ST6G)
DPOFL-ET3	Ethernet Compliance Testing (Requires Ethernet Test Fixture)
DPOFL-HSIC	HSIC Essentials - Electrical Validation and Protocol Decode Solution (Requires Opt. DJA) (Requires Opt. SR-CUST)
DPOFL-HT3	HDMI Compliance Testing
DPOFL-HT3DS	HDMI Direct Synthesis for HDMI 1.4
DPOFL-LT	Waveform Limit Testing
DPOFL-MOST	Electrical Compliance and Debug Test Solution for MOST50 and MOST150 (Requires Opt. DJA)
DPOFL-MPHY	MIPI® M-PHY Essentials – Characterization and Analysis Solution
DPOFL-M-PHYTX	M-PHY Automated Transmitter Solution (Requires Opt. DJA)
DPOFL-M-PHYRX	M-PHY Automated Receiver Solution (Requires Opt. ST6G) (Requires Opt. ERRDT)
DPOFL-MTH	Mask Testing, includes Hardware Clock Recovery
DPOFL-PCE3	PCI Express® Transmitter Compliance and Debug (Requires Opt. DJA) (For models of bandwidth ≥6 GHz only)
DPOFL-PTD	Protocol Trigger and Decode for 8b/10b
DPOFL-PTM-H	Serial Protocol Trigger and Decode up to 6.25 Gb/s
DPOFL-PWR	Advanced Power Measurement and Analysis Software
DPOFL-SAS3	SAS 12 GB/s Essentials (Requires Opt. DJA and Opt. 2XL or higher) (For models of bandwidth ≥20 GHz only)
DPOFL-SFP-TX	SFP+ Compliance and Debug Solution (Requires Opt. DJA)
DPOFL-SFP-WDP	SFP+ Compliance and Debug Solution – WDP Measurement (Requires Opt. DJA)
DPOFL-SDLA64	Serial Data Link Analysis Visualizer
DPOFL-SR-AERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553B)
DPOFL-SR-AUTO	Automotive Serial Triggering and Analysis (CAN/LIN/FlexRay)
DPOFL-SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART)
DPOFL-SR-DPHY	MIPI® D-PHY (DSI / CSI2) Serial Analysis
DPOFL-SR-EMBD	Embedded Serial Triggering and Analysis (I^2C, SPI)
DPOFL-SR-ENET	Ethernet Serial Analysis (10BASE-T and 100BASE-TX)
DPOFL-SR-PCIE	PCI Express Serial Analysis (Opt. ST6G required for triggering)
DPOFL-SR-USB	USB Serial Triggering and Analysis
DPOFL-ST6G	8b/10b Serial Protocol Trigger and Decode up to 6.25 Gb/s
DPOFL-STU	Upgrade from 3.125 Gb/s to 6.25 Gb/s 8b/10b Serial Protocol Trigger and Decode
DPOFL-SVA	AM/FM/PM Audio Signal Analysis (Requires Opt. SVE)
DPOFL-SVE	SignalVu® Essentials – Vector Signal Analysis Software
DPOFL-SVM	General Purpose Modulation Analysis (Requires Opt. SVE)

Option	Description
DPOFL-SVO	Flexible OFDM Analysis (Requires Opt. SVE)
DPOFL-SVP	Advanced Signal Analysis (including pulse measurements) (Requires Opt. SVE)
DPOFL-SVT	Frequency and Phase Settling Time Measurements (Requires Opt. SVE)
DPOFL SV23	WLAN 802.11a/b/g/j/p measurement application (requires Opt. SVE)
DPOFL SV24	WLAN 802.11n measurement application (requires Opt. SV23)
DPOFL SV25	WLAN 802.11ac measurement application (requires Opt. SV24) (For models of bandwidth ≥6 GHz only)
DPOFL-SV26	APCO P25 compliance testing and analysis application
DPOFL-TBT-TX	Thunderbolt Transmitter Characterization, Debug, and Compliance Testing (Requires Opt. DJA and Opt. 2XL or higher) (For models of bandwidth ≥16 GHz only)
DPOFL-UHS2	UHS-II-Host-Tx and UHS-II-Device-TX Measurements (For models of bandwidth ≥6 GHz only)
DPOFL-USB3	USB 3.0 Essentials (Requires Opt. DJA) (For models of bandwidth ≥8 GHz only)
DPOFL-USBPWR	USB Power Adapter/EPS Compliance Automated Test Solution (Not supported on 70000D models)
DPOFL-VET	Visual Trigger
DPOFL-XL02	Extended record length – 31.25 M Samples/Ch
DPOFL-XL05	Extended record length – 62.5 M Samples/Ch
DPOFL-XL010	Extended record length – 125 M Samples/Ch
DPOFL-XL020	Extended record length – 250 M Samples/Ch (For models of bandwidth ≥12.5 GHz only)
DPOFL-XL050	Extended record length - 500M Samples each Ch, 1G Samples on 2 Ch (DX models only)
DPOFL-10G-KR	10GBASE-KR/KR4 Compliance and Debug Solution (Requires Opt. DJA) (Requires Opt. SR-CUST) (For models of bandwidth ≥16 GHz only)

TekExpress application framework options

Option	Description
TEKEXP	TekExpress® Automation Framework
Opt. D-PHYTX	D-PHY Automated Solution
Opt. DIIVA	DiiVA Automation Solution
Opt. DP-SINK	DisplayPort Sink Compliance Automation Software
Opt. HEAC	HEAC Automated Solution
Opt. SAS-RSG	Stand-alone SAS Receiver Measurements
Opt. SAS-TSG	Stand-alone SAS Transmitter Measurements
Opt. SAS-TSGW	SAS Transmitter Measurements Including a Set of WDP Measurements (Requires Opt. SAS-TSG)
Opt. SATA-TSG	SATA PHY/TSG/OOB Transmitter Tests for TekExpress®
Opt. SATA-RSG	SATA RSG/RMT Receiver Tests for TekExpress®
Opt. SFP-TX	SFP+ Compliance and Debug Solution (Requires Opt. DJA) (For models of ≥16 GHz only)
Opt. SFP-WDP	SFP+ Compliance and Debug Solution with TWDPc Measurements (Requires Opt. SFP-TX) (For models of ≥16 GHz only)
Opt. USBPWR	USB Power Adapter/ EPS Compliance Automated Test Solution (Not supported on 70000D models)
Opt. USB-RMT	TekExpress® Automated USB 3.0 Receiver Solution
Opt. USB-TX	TekExpress® Automated USB 3.0 Solution (Requires Opt. DJA) (For models of bandwidth ≥8 GHz only)
Opt. XGbT	10GBASE-T Automated Solution

Upgrade options

The MSO/DPO70000 Series instruments can be easily upgraded after initial time of purchase. To upgrade an existing MSO/DPO70000, order DPO-UP and an option listed below. For example, DPO-UP DDRA.

Memory upgrades for DPO70000 Series

XL02 Standard Configuration to Option 2XL Configuration

XL05 Standard Configuration to Option 5XL Configuration

XL010	Standard Configuration to Option 10XL Configuration
XL020	Standard Configuration to Option 20XL Configuration (For models of bandwidth ≥12.5 GHz only)

Memory upgrades for MSO/ DPO70000 Series

XL25	Option 2XL Configuration to Option 5XL Configuration
XL210	Option 2XL Configuration to Option 10XL Configuration
XL220	Option 2XL Configuration to Option 20XL Configuration (For models of bandwidth ≥12.5 GHz only)
XL250	Option 2XL Configuration to Option 50XL Configuration (DPO DX models only)
XL510	Option 5XL Configuration to Option 10XL Configuration
XL520	Option5XL Configuration to Option 20XL Configuration (For models of bandwidth ≥12.5 GHz only)
XL550	Option 5XL Configuration to Option 50XL Configuration (DX models only)
XL1020	Option 10XL Configuration to Option 20XL Configuration (For models of bandwidth ≥12.5 GHz only)
XL1050	Option 10XL Configuration to Option 50XL Configuration (DX models only)

Trigger and search upgrades for MSO/DPO70000 Series

LT	Waveform Limit Testing
MTH	Mask Testing for Serial Standards with Hardware Clock Recovery
ST6G	Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals (Up to 6.25 Gb/s)
STU	Increase Protocol Triggering and Decoding from 3.125 Gb/s to 6.25 Gb/s

Advanced analysis upgrades for MSO/DPO70000 Series

ASM	Advanced Event Search and Mark
D-PHY	MIPI® D-PHY Characterization and Analysis Solution (Requires Opt. DJA)
DDRA	Upgrade to Option DDRA (Requires Opt. DJA)
DJAH	DPOJET Jitter and Eye Diagram Analysis (Upgrade for DPO70404 - DPO70804 models)
DJAU	DPOJET Jitter and Eye Diagram Analysis (Upgrade for DPO71254 - DPO73304 models)
DP12	DisplayPort 1.2 Source Test Automation Software (Requires Opt. DJA and Opt. 5XL or higher)
DSAH	Digital Serial Analysis Bundle (MSO models with SN below C240000 or B140000, all DPO models) (For models of bandwidth ≤8 GHz only)
DSAU	MSO Digital Serial Analysis Bundle (MSO models with SN below C240000 or B140000, all DPO models) (For models of bandwidth ≥12.5 GHz only)
EQ	Equalization to upgrade from Option SLE to Option SLA (Requires Opt. SLE)
ERRDTH	Frame and Bit Error Rate Detector (Requires Opt. ST6G) (For models of bandwidth ≤8 GHz only)
ERRDTU	Frame and Bit Error Rate Detector (Requires Opt. ST6G) (For models of bandwidth ≥12.5 GHz only)
ET3	Ethernet Compliance Test Software
Opt. FC-16G	Fiber Channel - 16G DPOJET Essentials
HSIC	HSIC Essentials - Electrical Validation and Protocol Decode Solution (Requires Opt. DJA) (Requires Opt. SR-CUST)
HT3	HDMI Compliance Test Software
HT3DS	HDMI Direct Synthesis for HDMI 1.4
MHD	MHL Advanced Analysis and Compliance Software (Requires Opt. DJA and Opt. 2XL or higher)
MOST	Electrical Compliance and Debug Test Solution for MOST50 and MOST150 (Requires Opt. DJA)
M-PHY	MIPI® M-PHY Characterization and Analysis Solution (Requires Opt. DJA)
PCE3	PCI Express® Transmitter Compliance and Debug (Requires Opt. DJA) (For models of bandwidth ≥6 GHz only)
PTD	Protocol Decoding for 8b/10b-encoded Serial Signals
PWR	Advanced Power Measurement and Analysis Software
SAS3	SAS 12 Gb/s Essentials (Requires Opt. DJA and Opt. 2XL or higher) (For models of bandwidth ≥20 GHz only)

SFP-TX	SFP+ Compliance and Debug Solution (Requires Opt. DJA) (For models of bandwidth ≥16 GHz only)
SFP-WDP	SFP+ Compliance and Debug Solution with TWDPc Measurements (Requires Opt. SFP-TX) (For models of bandwidth ≥16 GHz only)
SDLA64	Serial Data Link Analysis Visualizer
SR-AERO	Aerospace Serial Triggering and Analysis (MIL-STD-1553B)
SR-AUTO	Automotive Serial Triggering and Analysis (CAN/LIN/FlexRay)
SR-COMP	Computer Serial Triggering and Analysis (RS-232/422/485/UART)
SR-CUST	Custom Serial Analysis Kit for Developers (standard on all models)
SR-DPHY	MIPI® D-PHY (DSI / CSI2) Serial Analysis
SR-EMBD	Embedded Serial Triggering and Analysis (I^2C, SPI)
SR-PCIE	PCI Express Serial Analysis (Opt. ST6G required for triggering)
SR-USB	USB Serial Triggering and Analysis
SSD	Additional Removable Disk – Solid State Drive
SVA	AM/FM/PM Audio Signal Analysis (Requires Opt. SVE, SVEH, or SVEU)
SVEH	SignalVu® Essentials – Vector Signal Analysis Software (For models of bandwidth ≤8 GHz only)
SVEU	SignalVu® Essentials – Vector Signal Analysis Software (For models of bandwidth ≥12.5 GHz only)
SVM	General Purpose Modulation Analysis (Requires Opt. SVE, SVEH, or SVEU)
SVO	Flexible OFDM Analysis (Requires Opt. SVE, SVEH, or SVEU)
SVP	Advanced Pulsed Signal Analysis including Measurements (Requires Opt. SVE, SVEH, or SVEU)
SVT	Frequency and Phase Settling Time Measurements (Requires Opt. SVE, SVEH, or SVEU)
SV23	WLAN 802.11a/b/g/j/p measurement application (Requires Opt. SVE, SVEH or SVEU)
SV24	WLAN 802.11n measurement application (Requires Opt. SV23)
SV25	WLAN 802.11ac measurement application (Requires Opt. SV24) (For models of bandwidth ≥6 GHz only)
SV26	APCO P25 compliance testing and analysis application (requires Opt. SVE, SVEH or SVEU)
TBT-TX	Thunderbolt Transmitter Characterization, Debug, and Compliance Testing (Requires Opt. DJA and 2XL or higher) (For models of bandwidth ≥16 GHz only)
UHS2	UHS-II-Host-Tx and UHS-II-Device-Tx Measurements (For models of bandwidth ≥6 GHz only)
USB3	USB 3.0 Compliance and Analysis Software (Requires Opt. DJA) (For models of bandwidth ≥8 GHz only)
VETH	Visual Trigger (For models of bandwidth ≤8 GHz only)
VETU	Visual Trigger (For models of bandwidth ≥12.5 GHz only)
10G-KR	10GBASE-KR/KR4 Compliance and Debug Solution (Requires Opt. DJA) (Requires Opt. SR-CUST) (For models of bandwidth ≥16 GHz only)

Other upgrades for MSO/DPO70000 Series

IF	Upgrade Installation Service
HDD	Spare Hard Disk Drive
SSD	Spare Solid State Drive

Investment protection options

As signals get faster and new standards are developed, your investment in an MSO/DPO70000 Series instrument can evolve with your needs. You can upgrade the bandwidth of the unit you own today. You can take advantage of MSO/DPO70000 series performance improvements by upgrading your existing unit to a new series, or adding MSO features to your current DPO model. Contact your local Tektronix representative to discuss the full range of options available to ensure your MSO/DPO70000 series oscilloscope has the tools you need for your next project.

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

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

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. IF	Upgrade Installation Service
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

Recommended accessories

Probes

P7633	33 GHz Low Noise TriMode™ Probe
P7630	30 GHz Low Noise TriMode™ Probe
P7625	25 GHz Low Noise TriMode™ Probe
P7520A	25 GHz TriMode™ probe
P7516	16 GHz TriMode™ probe
P7513A	13 GHz TriMode™ differential probe
P7313	13 GHz Z-Active® differential probe
P7313SMA	13 GHz TriMode® differential SMA probe
P7508	8 GHz TriMode™ probe
P7380	8 GHz Z-Active® differential probe
P7506	6 GHz TriMode™ probe
P7504	4 GHz TriMode™ probe
P6780	Differential Input Logic probe
P6750	D-Max® Technology Logic Probe
P6717A	General-purpose Logic probe
P6251	DC to 1 GHz, 42 V, differential probe (requires TCA-BNC adapter)
P6250	DC to 500 MHz, 42 V, differential probe (requires TCA-BNC adapter)
TCPA300/TCPA400 Series	Current measurement systems
P5200/P5205/P5210	High-voltage differential probes
067-2431-xx	Probe Deskew Fixture for SMA or solder-down connections (up to 30 GHz)
067-0484-xx	Analog Probe Calibration and Deskew Fixture (4 GHz)
067-1586-xx	Analog Probe Deskew Fixture (>4 GHz)
067-1686-xx	Power Deskew Fixture

Adapters

TCA-1MEG	TekConnect® high-impedance buffer amplifier. Includes P6139A passive probe
TCA-292MM	TekConnect® to 2.92 mm adapter (20 GHz bandwidth)
TCA-292D	TekConnect® to 2.92 mm adapter (33 GHz bandwidth)
TCA-BNC	TekConnect® to BNC adapter
TCA-N	TekConnect® to N adapter
TCA-SMA	TekConnect® to SMA adapter
TCA-VPI50	50 Ω TekVPI to TekConnect adapter
TCA75	8 GHz precision TekConnect® 75 Ω to 50 Ω adapter with 75 Ω BNC input connector

Cables

DPOACQSYNC	Multi-scope synchronization kit (includes fast edge source, cables, power splitters, carrying case)
012-0991-xx	GPIB Cable (1 m)
012-0991-xx	GPIB Cable (2 m)

P6780 Logic Probe standard accessories

067-2298-xx	Deskew Fixture, logic probes
020-3035-xx	Standard adapter
020-3036-xx	Wide Body adapter
020-3032-00	25°/55° holder
020-3021-00	Heat Strip wire (4.57 m)

020-3031-xx	Hand Browsing adapter
020-3033-xx	Flex adapter
020-3038-xx	Lead set ground
020-3042-xx	Probe grouper (including header pins)
020-3034-xx	Ferrite beads
020-3037-xx	Wire tubing (4.57 m)

P6717A Logic Probe standard accessories

HEX-P6960PIN	D-MAX Probe footprint to square pin header
NEX-HD2HEADER	Mictor to square pin header adapter
067-2298-xx	Deskew Fixture, logic probes
206-0559-xx	Extension ground tip
131-5638-xx	Probe tip
206-0569-xx	IC grabber
352-1115-xx	Probe grouper
196-3501-xx	Lead sets
196-3497-xx	Ground lead sets

Memory testing

NEX-DDR3MP78BSC	DDR3 ×4/×8 Solder Chip Interposer
NEX-DDR3MP78BSCSK	DDR3 ×4/×8 Socket Chip Interposer
NEX-DDR3MP96BSC	DDR3 ×16 Solder Chip Interposer
NEX-DDR3MP96BSCSK	DDR3 ×16 Socket Chip Interposer
NEX-DDR2MP60BSC	DDR2 ×4/×8 Solder Chip Interposer
NEX-DDR2MP60BSCSK	DDR2 ×4/×8 Socket Chip Interposer
NEX-DDR2MP84BSC	DDR2 ×16 Solder Chip Interposer
NEX-DDR2MP84BSCSK	DDR2 ×16 Socket Chip Interposer
Instrumented DIMM for DDR3	Order Scope NEXVu card for UDIMM Raw Card E. (Contact http://www.nexustechnology.com)

System Test

TDSUSBF	Test Fixture for use with Opt. USB
TF-XGbT	10GBASE-T Fixture for use with Option XGbT Software
—	Ethernet Test Fixture. Order through Crescent Heart Software (http://www.c-h-s.com)
TF-HEAC-TPA-KIT	HEAC TPA-KIT consists of: Main Board; Plug A-type board; Plug C-type board; 2 × TDR board with A Receptacle; 2 × TDR board with C Receptacle
TF-HDMI-TPA-S/STX	HDMI Type C fixture set for Tx/Rx
TF-HDMIC-TPA-S/STX	TF-HDMIC-TPA-S/STX
TF-HDMIE-TPA-KIT	HDMI Type E Fixture set
TF-HDMID-TPA-P/R	HDMI Type D Fixtures
TF-MHL-TPA-TEK	MHL Fixture set
S46-6666-A-AMER	Keithley Instruments RF/Microwave switch system, 32 channel, unterminated, Americas power cord
S46-6666-A-ASIAP	Keithley Instruments RF/Microwave switch system, 32 channel, unterminated, Asia-Pacific power cord
S46-6666-A-EURAF	Keithley Instruments RF/Microwave switch system, 32 channel, unterminated, Europe/Africa power cords
TF-USB3-AB-KIT	USB 3.0 A/B Fixture/Cable Kit
TF-USB3-A-P	USB 3.0 A Plug Fixture
TF-USB3-A-R	USB 3.0 A Receptacle Fixture Kit
TF-USB3-B-R	USB 3.0 B Receptacle Fixture Kit

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-JTC	103 meter 1000BASE-T jitter test channel cable
TF-GBE-SIC	Short (4 inch (0.1 meter)) RJ45 interconnect cable
TF-XGbT	Test fixtures that complement the use of the TekEXP-XGbT solution

Transit Case (carbon fiber).

Other

K4000	Oscilloscope Cart
016-1985-xx	Rackmount Kit
077-0076-xx	Service Manual, pdf on hard drive
016-2039-00	Transit Case (metal frame, wood panels)
016-2043-00	Transit Case (carbon fiber)
TF-TEKPROTECT ESD Protection Tester:	MSO/DPO70000C instruments include TekProtect circuitry designed to stop EOS/ESD events from reaching analog channel preamp inputs, while still allowing normal signals to pass. TekProtect should be checked regularly with the TF-TEKPROTECT ESD Protection Tester to ensure the device is still working.

Warranty

One-year warranty covering all parts and labor.

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

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

ASEAN / Australasia (65) 6356 3900
Belgium 00800 2255 4835*
Central East Europe and the Baltics +41 52 675 3777
Finland +41 52 675 3777
Hong Kong 400 820 5835
Japan 81 (3) 6714 3010
Middle East, Asia, and North Africa +41 52 675 3777
People's Republic of China 400 820 5835
Republic of Korea +822 6917 5084, 822 6917 5080
Spain 00800 2255 4835*
Taiwan 886 (2) 2656 6688

Austria 00800 2255 4835*
Brazil +55 (11) 3759 7627
Central Europe & Greece +41 52 675 3777
France 00800 2255 4835*
India 000 800 650 1835
Luxembourg +41 52 675 3777
The Netherlands 00800 2255 4835*
Poland +41 52 675 3777
Russia & CIS +7 (495) 6647564
Sweden 00800 2255 4835*
United Kingdom & Ireland 00800 2255 4835*

Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
Canada 1 800 833 9200
Denmark +45 80 88 1401
Germany 00800 2255 4835*
Italy 00800 2255 4835*
Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90
Norway 800 16098
Portugal 80 08 12370
South Africa +41 52 675 3777
Switzerland 00800 2255 4835*
USA 1 800 833 9200

* 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.tek.com.

Copyright © Tektronix, Inc. All rights reserved. Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. TEKTRONIX and TEK are registered trademarks of Tektronix, Inc. All other trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

28 Jan 2016 55W-23446-25

www.tek.com

Tektronix®