

Digital and Mixed Signal Oscilloscopes

DPO/DSA70000B and MSO70000 Series Data Sheet



Features & Benefits

- On All Four Channels Simultaneously
 - 20, 16, 12.5, 8, 6, and 4 GHz Bandwidth Models
 - Up to 50 GS/s Real-time Sample Rate
 - Up to 250 Megasample Record Length with MultiView Zoom™ Feature for Quick Navigation
 - Fastest Waveform Capture Rate with >300,000 wfms/s Maximum per Channel
- Uncompromised Bandwidth – Up to 20 GHz on all 4 channels enables measurement on the latest high-speed serial standards
- Superior Signal Integrity and Excellent Signal-to-Noise Ratio – Observe the truest representation of your waveform
- 16 Logic Channels with 80 ps Timing Resolution for Debug of Digital and Analog Signals (MSO70000 only)

- Pinpoint® Triggering – Minimize time spent trying to acquire problem signals for efficient troubleshooting and shortened debug time
- 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
- Search & Mark – Provides waveform pattern matching and software triggers for signals of interest
- P7500 TriMode™ Probing System – Perfectly matched signal connectivity from 4 GHz to 20 GHz
- Application Support for High-speed Serial Industry Standards, RF, Power Supplies, and Memory – Enables standard-specific certification, measurement automation, and ease of use
- P6780 and P6717 High-performance 17-channel Logic Probes with Bandwidths up to 2.5 GHz for Connections to Today's Fast Digital Signals (MSO70000 only)

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



P7500 TriMode probes simplify complex measurement setups.



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

Tools for Your Complete Design Cycles

Tektronix understands that engineers rely on an oscilloscope throughout their design cycle, from prototype turn-on to production testing. The DPO/DSA70000B and MSO70000 Series oscilloscopes' unique capabilities combined with exceptional signal acquisition performance and analysis accelerate your measurement tasks.

Unmatched Acquisition and Signal-to-Noise Performance

The superior signal integrity and excellent signal-to-noise ratio of the DPO/DSA70000B and MSO70000 Series ensures confidence in your measurement results.

- High bandwidth, up to 20 GHz, matched across 4 channels
- Bandwidth enhancement eliminates imperfections in frequency response all the way to the probe tip. The user-selectable filter for each channel provides 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)
 - 50 GS/s on all analog channels for the 12.5, 16, and 20 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
- Lowest jitter noise floor and highest vertical accuracy provide additional margin in your measurements
- Long record length provides high resolution and extended-duration waveform capture
 - Standard 10 MS per channel on the DPO70000B and MSO70000 Series and 20 MS on the DSA70000B Series
 - Optional up to 125 MS on all four channels for the 4, 6, and 8 GHz models
 - Optional up to 250 MS on all four channels for the 12.5, 16, and 20 GHz models
 - On the MSO70000 Series, the record length of logic channels match 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 DPO/DSA70000B and MSO70000 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 that might affect the DUT's performance. For RF signals, a lower noise floor translates into a higher dynamic range, opening the DPO/DSA70000B and MSO70000 for 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.

Quick Selection Guide

| Model | Analog Bandwidth | Analog Sample Rate 4 Channels | Standard Memory – Analog + Digital | Analog Channels | Logic Channels |
|-----------|------------------|----------------------------------|---------------------------------------|-----------------|----------------|
| DPO70404B | 4 GHz | 25 GS/s | 10 MS | 4 | |
| DSA70404B | 4 GHz | 25 GS/s | 20 MS | 4 | |
| MSO70404 | 4 GHz | 25 GS/s | 10 MS | 4 | 16 |
| DPO70604B | 6 GHz | 25 GS/s | 10 MS | 4 | |
| DSA70604B | 6 GHz | 25 GS/s | 20 MS | 4 | |
| MSO70604 | 6 GHz | 25 GS/s | 10 MS | 4 | 16 |
| DPO70804B | 8 GHz | 25 GS/s | 10 MS | 4 | |
| DSA70804B | 8 GHz | 25 GS/s | 20 MS | 4 | |
| MSO70804 | 8 GHz | 25 GS/s | 10 MS | 4 | 16 |
| DPO71254B | 12.5 GHz | 50 GS/s | 10 MS | 4 | |
| DSA71254B | 12.5 GHz | 50 GS/s | 20 MS | 4 | |
| MSO71254 | 12.5 GHz | 50 GS/s | 10 MS | 4 | 16 |
| DPO71604B | 16 GHz | 50 GS/s | 10 MS | 4 | |
| DSA71604B | 16 GHz | 50 GS/s | 20 MS | 4 | |
| MSO71604 | 16 GHz | 50 GS/s | 10 MS | 4 | 16 |
| DPO72004B | 20 GHz | 50 GS/s | 10 MS | 4 | |
| DSA72004B | 20 GHz | 50 GS/s | 20 MS | 4 | |
| MSO72004 | 20 GHz | 50 GS/s | 10 MS | 4 | 16 |

System Turn-on and Verification

From the time a design is first powered up through the initial operational checks, the DPO/DSA70000B and MSO70000 Series provide the features you need.

Uncompromised Four-channel Acquisition

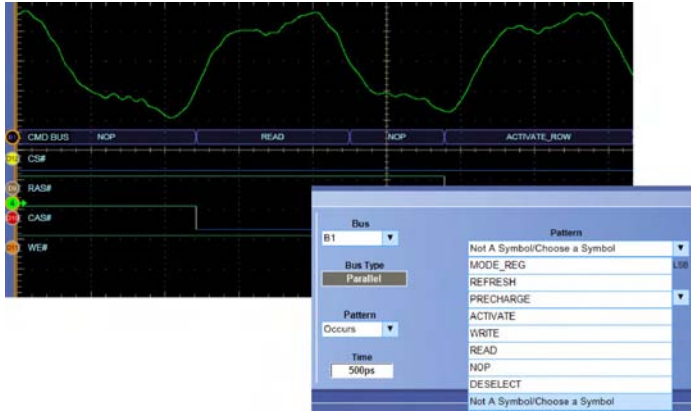
With the industry's lowest noise and up to 50 GS/s sample rate on all four channels the DPO70000B Series ensures that signal integrity checks and timing analysis can be done without worrying about noise and jitter in the scope distorting the measurements. Single-shot bandwidths up to 20 GHz on all four channels ensure that you'll capture your signals of interest without worrying about undersampling when using more than 1 or 2 channels.

16-channel Digital Acquisition (MSO70000 only)

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's 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 only)

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. 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.



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



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

Bus Decoding and Triggering (MSO70000 only)

Verifying your system operation often requires the ability to see specific system states on a key bus such as the DDR SDRAM interface. The MSO70000 includes parallel and low-speed serial bus decoding that provides deeper insight into the system's behavior. Using the bus triggering capability of the MSO70000 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.

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 DPO/DSA70000B 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 and 250 MS (Option 20XL) on the 12.5, 16, and 20 GHz models are available.

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 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 DPO/DSA70000B and MSO70000 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 DSA70000B Series and is available on DPO70000B and MSO70000 models as Option PTH. Option PTH and the DSA70000B Series cover serial standards up to 3.125 Gb/s. For higher bit rate standards like USB 3.0, Option PTU on the DPO70000B Series and Option STU on the DSA70000B Series extend 8b10b triggering and decode 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 stream and is standard on the DSA70000B instruments, or is included as part of Option PTH on the DPO70000B and MSO70000 models.

System Characterization and Margin Testing

When a design is working correctly and the next task is to fully characterize its performance, the DSA70000B 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 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 DPO/DSA70000B and MSO70000 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 DPO/DSA70000B and MSO70000 products.

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.

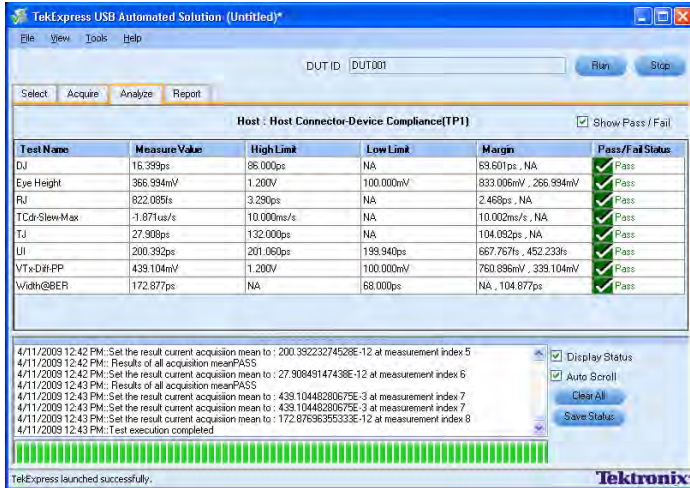


DPOJET Jitter and Eye Diagram Analysis – Simplify identifying signal integrity concerns, jitter, and their related sources with DPOJET software. DPOJET provides the highest sensitivity and accuracy available for real-time oscilloscopes.

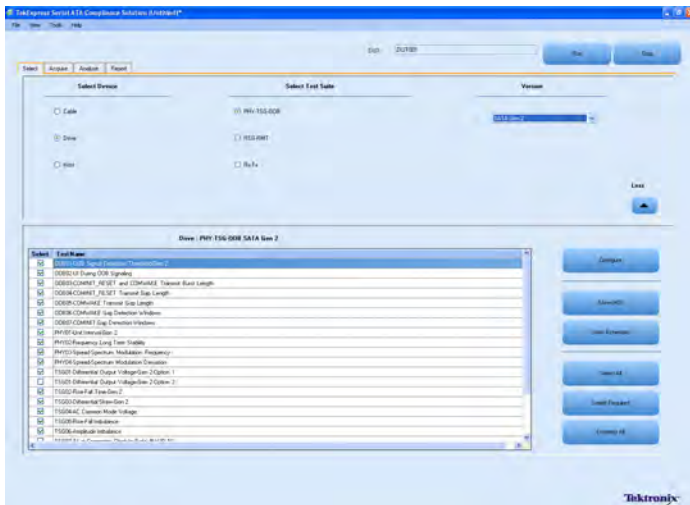
The DSA70000B comes standard with the DPOJET Advanced Jitter and Eye Diagram measurement application, providing the tools you need to quickly perform a high volume of measurements and collect statistics. DPOJET is available on the DPO70000B and MSO70000 as Option DJA. Application-specific measurement packages are also available that extend DPOJET and perform the extensive set of tests required by industry standard groups.

RF and Vector Signal Analysis

When vector signal analysis of RF or baseband signals are 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 a RF subsystem, can be used as trigger events, while the subsystem's RF signal can be seen in the frequency domain.



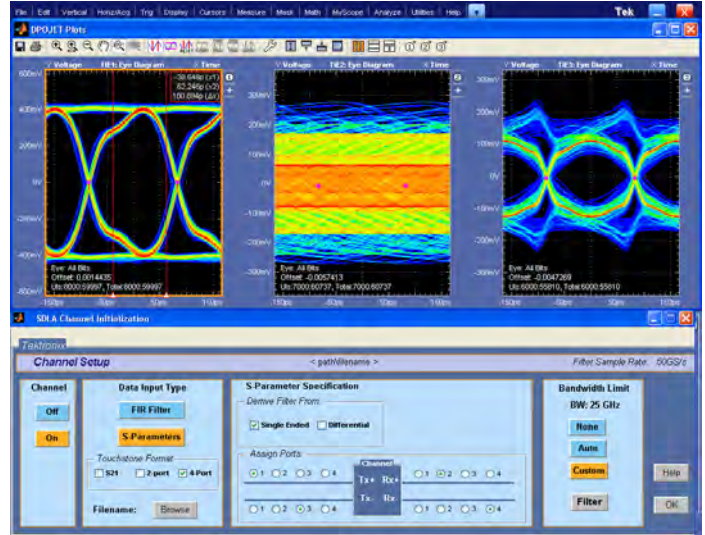
TekExpress USB 3.0 Automated Test Software (Option USB-TX) – TekExpress USB 3.0 provides an automated, simple, and efficient way to test USB 3.0 transmitter hosts and devices consistent with the requirements of the SuperSpeed Universal Serial Bus Electrical Compliance Test Specification. The application automates selection of appropriate 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 for debug and advanced characterization of USB 3.0 solutions.



TekExpress SATA Automated Compliance Test Software – Complete support for SATA Gen1 and SATA Gen2 defined test suites. 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.

TekExpress™ Software Automation Framework

The TekExpress software automation framework has been developed for automated one-button testing of high-speed serial data standards. Built on top of National Instruments TestStand product, TekExpress efficiently executes the required tests for many serial standards like SATA Rev 3.0,



SDLA - Serial Data Link Analysis (Option SLE and SLA) – Offers the capability to emulate the serial data channel, de-embed a fixture or other network, and add or remove transmitter equalization. Option SLA adds processing of waveforms with FFE and DFE equalizations and automatic equalizer training. DPOJET provides advanced measurement and jitter analysis of the resulting waveforms.

USB 3.0, DisplayPort, and 10GBASE-T Ethernet. Run on an external Windows PC, the TekExpress SATA 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 DPO/DSA70000B and MSO70000 Series.

Characterization measurements depend upon accuracy and repeatability. The wide bandwidth and unmatched signal fidelity of the DPO/DSA70000B and MSO70000 analog front end ensures that your signal quality measurements such as rise times are faithful with capture of the signal's 5th harmonic and flatness of ±0.5 dB.

Custom Filter and De-embed Capability

Create your own filters or use the filters provided as standard with the DPO/DSA70000B and MSO70000 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 (SDLA) application, you can gain further insight into serial data links with the capability to emulate the serial data channel from its S-parameters, de-embed the fixture or other network, and add or remove transmitter equalization (de-emphasis/pre-emphasis).

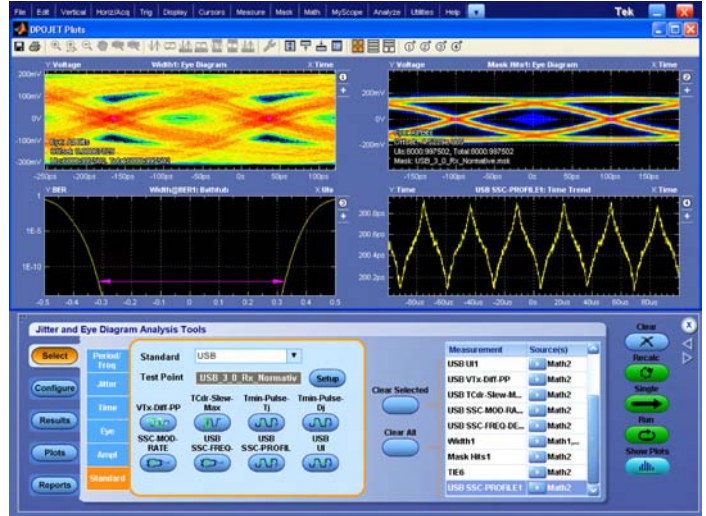
Certification

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.

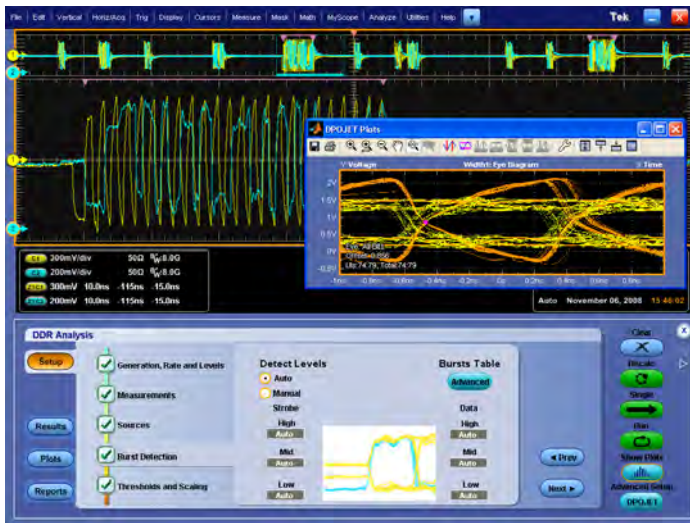
Application-specific Solutions – Enable Standard-specific Certification, Measurement Automation, and Extended Signal Analysis

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 to the DPO/DSA7000B and MSO7000. Modules are available for PCI Express, DDR Memory, Serial ATA and SAS, InfiniBand, HDMI, Ethernet, DisplayPort, DVI, UWB, MIP® D-PHY, Power Supplies, and USB.

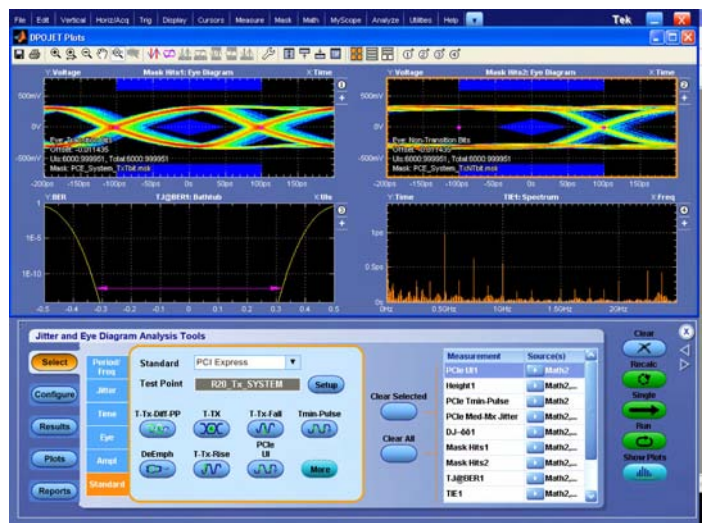
See the following list for highlights of the available application-specific solutions.



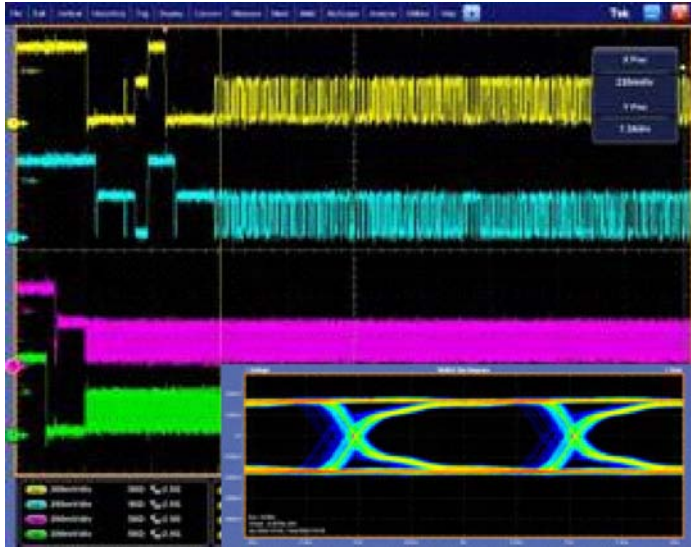
USB 3.0 Transmitter Test Solution (Option USB3) – Perform verification, characterization, and debug of USB 3.0 devices. Measurements are implemented in DPOJET and are compliant to the USB 3.0 specification. For compliance and automation, USB-TX is available, which also includes Option USB3.



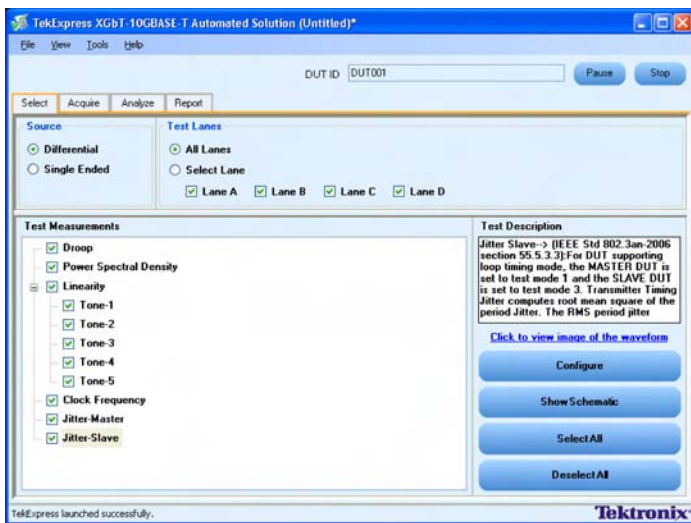
DDR Memory Bus Analysis (Option DDRA) – Automatically identify DDR1, LPDDR1, LPDDR2, DDR2, DDR3, and GDDR3 Reads and Writes and makes JEDEC conformance measurements with pass/fail results on all edges in every Read and Write burst. DDRA provides capabilities for measurements of clock, address, and control 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 MSO7000 Series Mixed Signal Oscilloscope, which offers 16 channels of digital logic probing.



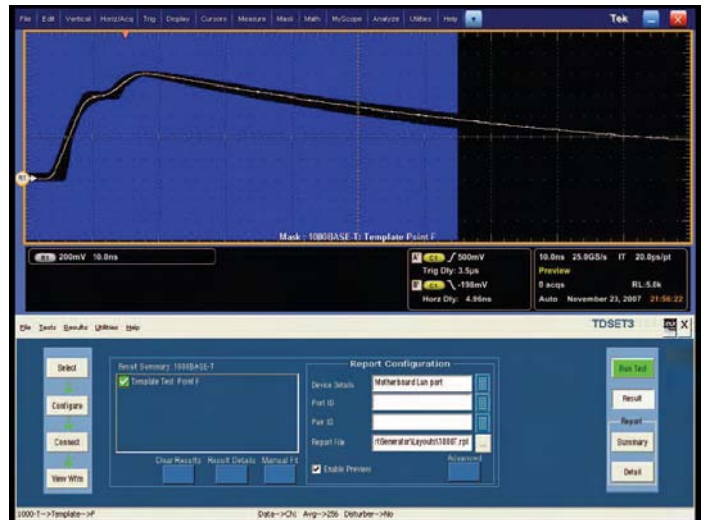
PCI Express Analysis Test Solution (Option PCE) – Analyze the performance of your PCI Express Rev 1.0, 2.0, or 3.0 (draft spec) design with comprehensive test support. Using DPOJET, Option PCE enables tests that conform to PCI-SIG standards.



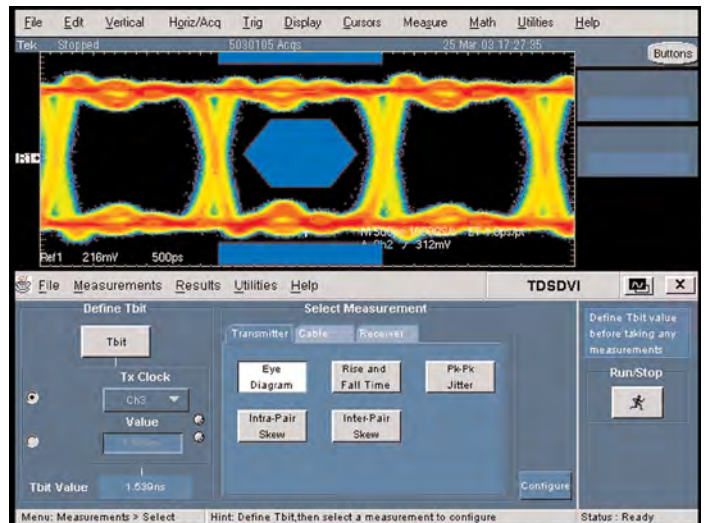
MIPI® D-PHY Transmitter Characterization and Compliance Test Solution (Option D-PHY) – Verify to the D-PHY specification, rapidly characterize and discover sources of jitter and signal integrity concerns. Perform high-speed data-clock timing measurements, along with other electrical characteristics in high-speed or low-power modes.



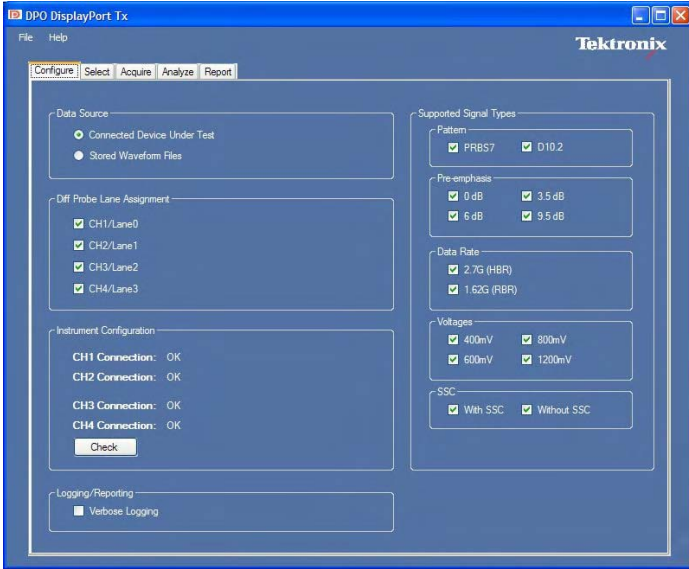
XGbt 10GBASE-T Automated Compliance Software – Quickly perform 10GBASE-T measurements per the IEEE 802.3an-2006 standard including Power Spectral Density (PSD), Power Level, and Linearity, with a simplified instrument configuration. XGbt provides flexible control over test configurations and analysis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



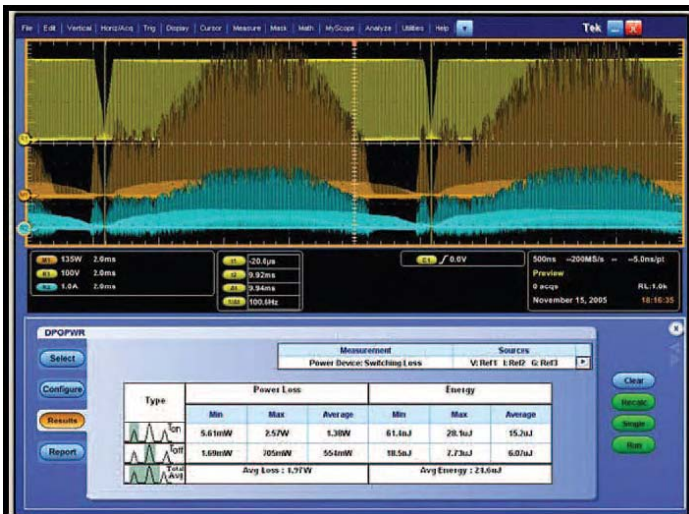
Ethernet Compliance Test Solution (Option ET3) – Receive full PHY layer support for Ethernet variants 10BASE-T, 100BASE-TX, and 1000BASE-T with the comprehensive, integrated Tektronix Ethernet tool set. Analog verification, automated compliance software, and device characterization solutions are all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



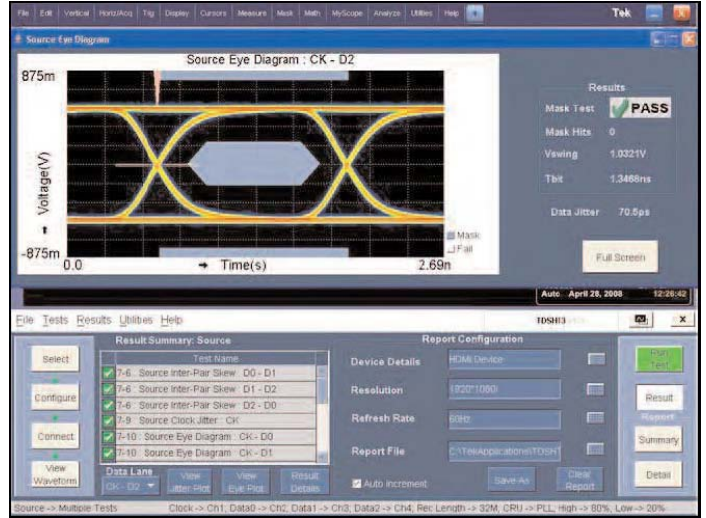
DVI Compliance Test Solution (Option DVI) – Obtain quick and dependable results with the DVI compliance test software. Automated testing based on pass/fail detection dramatically enhances productivity.



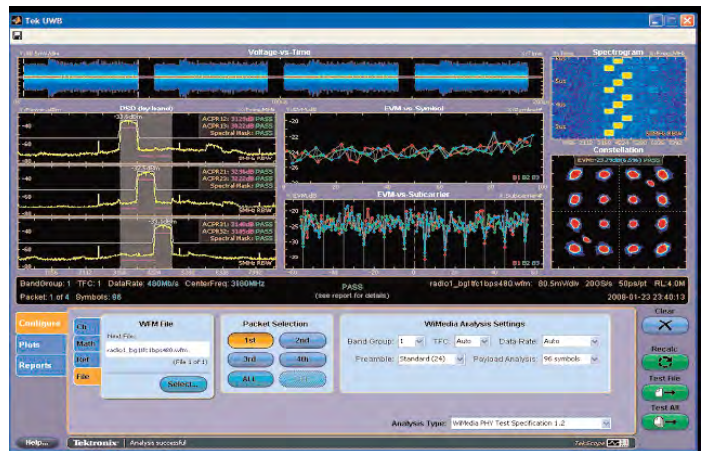
DisplayPort Compliance Test Solution (Option DSPT) – Support DisplayPort Compliance Test Standard (CTS) source test with four-line simultaneous testing using the Tektronix P7300SMA Series probes and DisplayPort software. Detailed test reports with waveform plots, pass/fail results, and margin analysis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



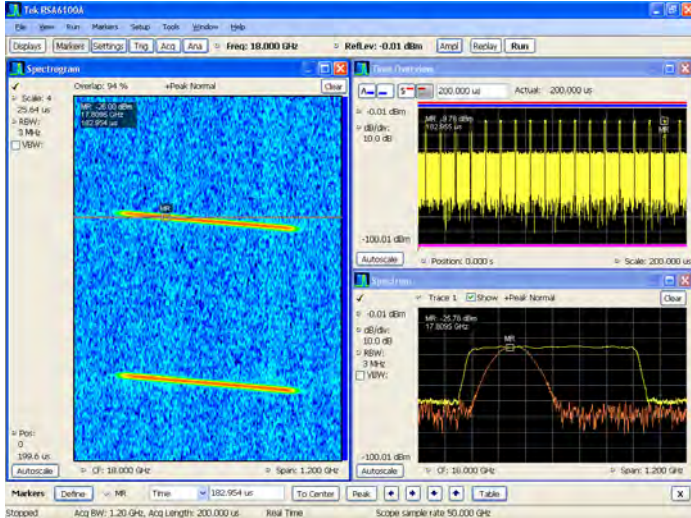
Power Measurement and Analysis Software (Option PWR) – Improve the efficiency of switching power supplies with increased power densities. Measure and analyze power dissipation in power supply switching devices and magnetic components, and generate detailed test reports in customizable formats.



HDMI Compliance Test Solution (Option HT3) – 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.



Ultra-Wideband Spectral Analysis Software (Option UWB) – Analyze hundreds of packets, TFC, and data-rate combinations. In addition, the automatic WiMedia modulation analysis configuration will analyze how complex wideband signals change frequency and amplitude with time using real-time spectrograms spanning 20 GHz.



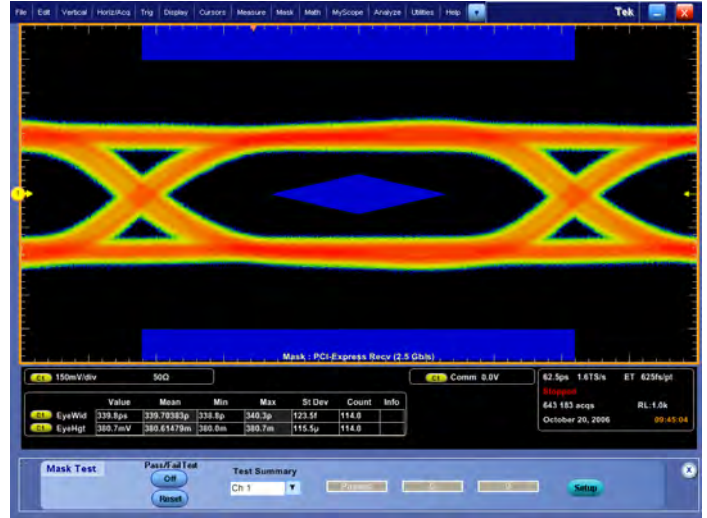
SignalVu™ Vector Signal Analysis – Easily verify wide-bandwidth designs such as wideband radar, high data-rate satellite links, or frequency-hopping radars and characterize wideband spectral events. SignalVu combines the functionality of a vector signal analyzer, a spectrum analyzer, and the powerful triggering capabilities of the DPO/DSA70000B and MSO70000 – all in a single package.

DSA70000B – A Dedicated Solution Configured for Today’s High-speed Serial Design Challenges

The DSA70000B Digital Serial Analyzer is 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 DSA70000B Series are options on the DPO70000B and MSO70000 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, or you can set the desired encoded words for the serial pattern trigger to capture. With pattern lock triggering, the DSA70000B can synchronize to long serial test patterns up to 6.25 Gb/s and remove random jitter. The DSA70000B Series covers serial standards up to 3.125 Gb/s with an option to support up to 6.25 Gb/s (Option STU).

DPOJET Jitter, Timing, and Eye Diagram Analysis – The DSA70000B 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 and Deterministic Jitter separation.



Communications Mask Testing

Communications Mask Testing – Provides a complete portfolio of masks for verifying compliance to serial communications standards. 156 masks for 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.

20 MS Record Length – 20 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, 16, and 20 GHz models extend the acquisition time sequence.

Advanced Event Search and Mark – Finding important events such as fast or slow transitions, setup and hold violations, or logic patterns within a long-duration capture is made easy with the pattern matching and software triggering functionality of Event Search and Mark.

With standard features that extend the functionality of the Tektronix DPO70000B Series to address high-speed serial signal analysis and certification, the DSA70000B Series offers a specialized instrument that efficiently addresses your design challenges.

DSA Feature Set in the MSO70000

If you need to combine the functionality of the DSA70000B and the MSO70000, the DSA options for the MSO70000 provide the DSA’s high-speed serial test features in an MSO (see Option DSAH or DSAU in the Ordering Information section below).

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 DPO/DSA70000B and MSO70000 Series feature user-selectable bandwidth limiting filters. Using these bandwidth limit filters which range from 500 MHz to 19 GHz, you will ensure that your measurement is done using the bandwidth specified by the industry standard.

Debugging

Throughout the design cycle, DPO/DSA70000B and MSO70000 Series oscilloscopes provide the ability to debug malfunctioning subsystems and isolate the cause. Using FastAcq's high waveform capture rate, 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.

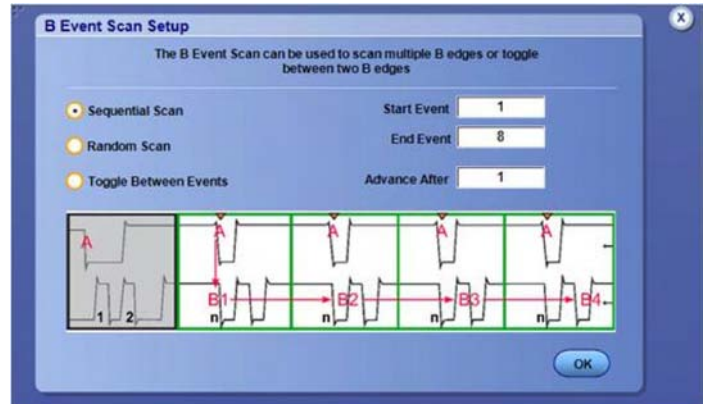
FastAcq – Expedites Debugging by Clearly Showing Imperfections

More than just color grading or event scanning, FastAcq's 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 DPO/DSA70000B and MSO70000 oscilloscopes, enabled by DPX technology, can deliver these fast waveform capture rates on a sustained basis.

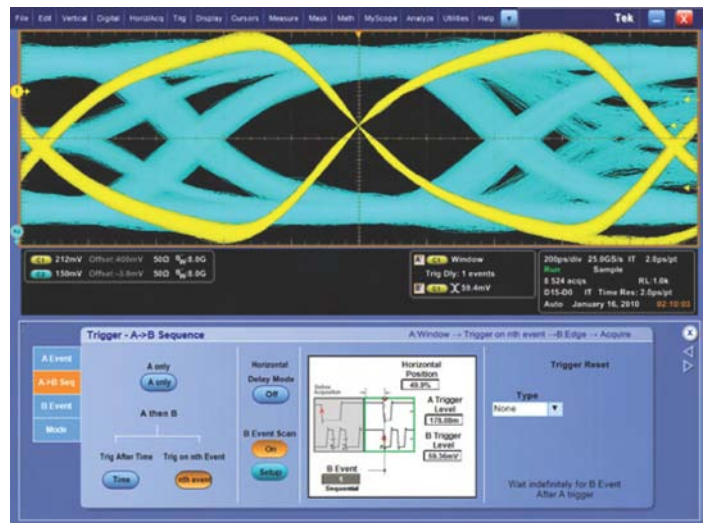
Pinpoint® Trigger

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. The Pinpoint trigger system uses Silicon Germanium (SiGe) technology to provide very high trigger sensitivity with very low trigger jitter and the ability to capture very narrow glitches. 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.

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.



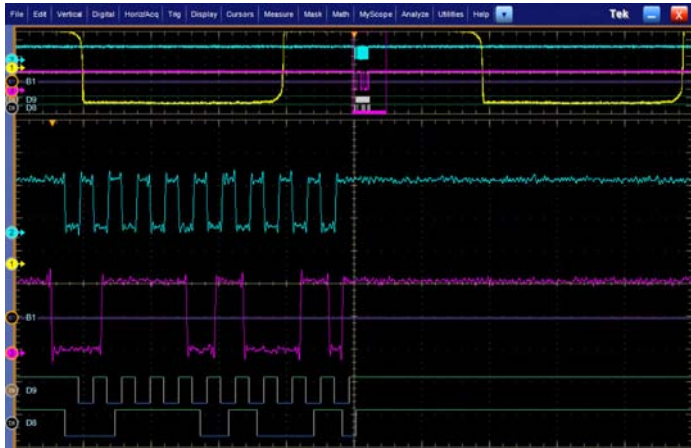
B Event Scan identifies specific events to build an eye diagram.



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

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 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.



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

Logic Pattern Triggering

Logic pattern triggering allows logic qualification that controls when to look for the 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 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 only)

The MSO70000 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 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.

iCapture (MSO70000 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's analog acquisition system so that these signals can be viewed in finer detail. iCapture's unique multiplexer circuitry provides simultaneous digital and analog views of signals without having to move the logic probe or double probe the circuit.



Advanced Search and Mark – Highlights important events, skips unimportant ones, and navigates between events of interest effortlessly.

FastFrame

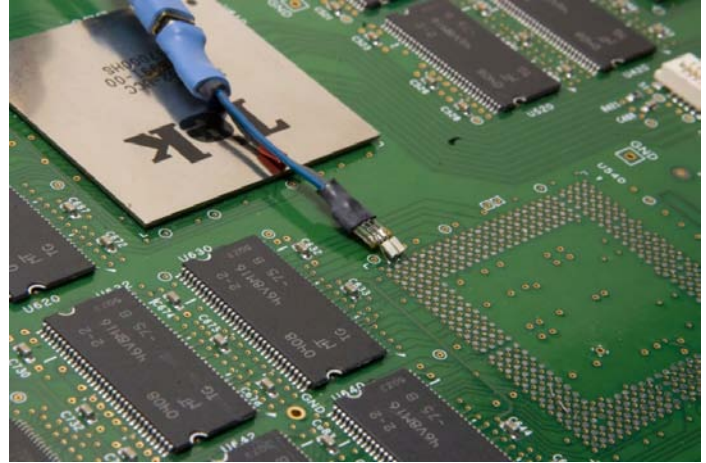
When the key events you are interested in are widely spaced in time, such as bursts of activity on a bus, FastFrame segmented memory feature on the DPO/DSA7000B and MSO7000 Series enables you to capture the events of interest while conserving acquisition memory. Using multiple trigger events, FastFrame captures and stores short bursts of signals and saves them as frames for later viewing and analysis. On the MSO70000, 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.

Advanced Search and Mark

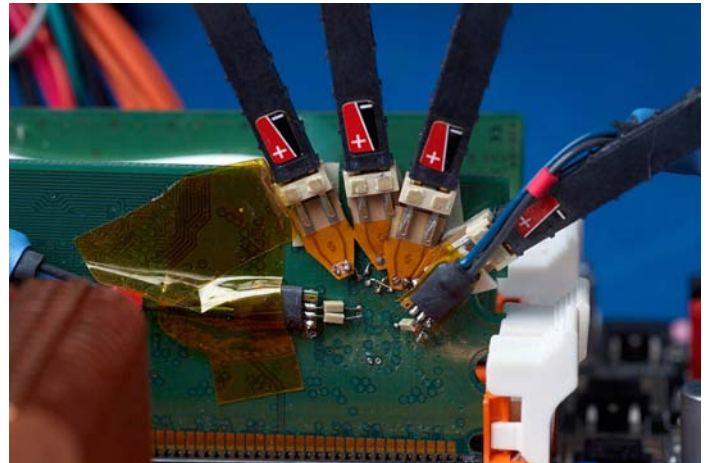
Isolating the key event causing your system failure can often be a tedious task. With the Advanced Event Search and Mark (Option ASM) feature examining data and highlighting important events, skipping the unimportant ones, and enhancing the comprehension of event relationships is made easy. With ASM, you'll be able to navigate between the events of interest effortlessly and uncover that rare event you have been trying to find.

Embedded Serial Bus (I²C, SPI) Decoding and Triggering (MSO70000 only)

The MSO70000 Series instruments provide I²C and SPI serial bus decoding and bus triggering that enable you to monitor or debug subsystems and components, such as frequency synthesizers, D/A converters, and Flash Memory that are controlled or monitored using I²C or SPI serial 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



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.



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

by using the MSO70000 Series bus decode feature to observe the data on your I²C or SPI 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 P7500 TriMode probing system with bandwidths that are perfectly matched to the DPO/DSA7000B and MSO70000 Series. The P7500 TriMode probes allow you to switch among differential, single ended, and common-mode measurements without moving the probe from its connection points. The P7500 Series offers probes with performance from 4 GHz to 20 GHz and offers several low-cost solder tips with quick connection features that allow moving the probe to various solder points fast and easy.

On the MSO70000, the P6780 and P6717 logic probes provide connectivity to low-speed and high-speed digital signals with low loading, small size, and a range of accessories for soldering and browsing.

Production Testing

In addition to assisting engineers with design tasks, the DPO/DSA70000B and MSO70000 can provide test engineers with the ability to test analog and digital signals with a wide range of clock speeds and data rates. Rackmount options are available for mounting the DPO/DSA70000B and MSO70000 into an EIA standard 19 inch (487 mm) rack. An IEEE 488.2 standard GPIB interface is standard on all models.

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 DPO/DSA70000B and MSO70000 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. Or, use the Software Developer's Kit (SDK) to help create custom software to automate multistep processes in waveform collection and analysis with Visual BASIC, C, C++, MATLAB, LabVIEW, LabWindows/CVI, and other common Application Development Environments. Integration of the oscilloscope with external PCs and non-Windows hosts is also supported.

Research

With industry-leading acquisition speed and signal-to-noise ratio performance, the DPO/DSA70000B and MSO70000 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.

TekLink™

When you need to capture a large number of signals simultaneously, TekLink allows you to synchronize multiple DPO/DSA70000B and MSO70000 oscilloscopes and acquire more than four analog channels. TekLink enables synchronized capture on up to 4 oscilloscopes with one trigger event.

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 DPO/DSA7000B 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

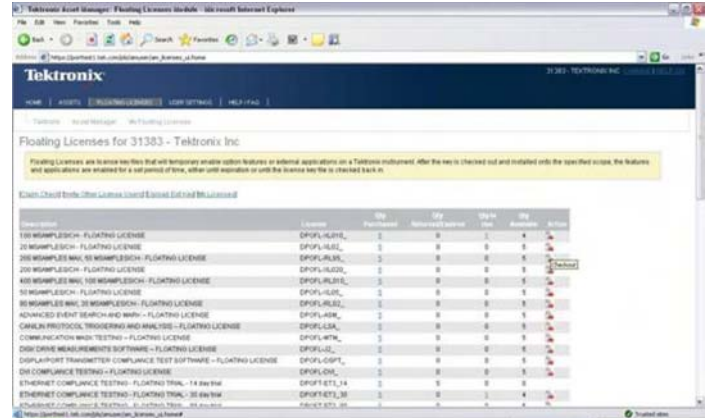
When your oscilloscope is connected to a network, use the Windows Remote Desktop utility to access your oscilloscope from across the lab or across the globe.

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



This view identifies license location to easily manage your floating license inventory.

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 customers with distributed teams and several Tektronix DPO/DSA7000B, MSO70000, or DPO7000 oscilloscopes to better manage their assets and deploy applications or other options such as extended memory to the oscilloscope where it is needed.

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.

Characteristics

Vertical System

| Characteristic | DPO70404B DSA70404B MSO70404 | DPO70604B DSA70604B MSO70604 | DPO70804B DSA70804B MSO70804 | DPO71254B DSA71254B MSO71254 | DPO71604B DSA71604B MSO71604 | DPO72004B DSA72004B MSO72004 |
|---|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Bandwidth (User-selectable DSP enhance) | 4 GHz | 6 GHz | 8 GHz | 12.5 GHz | 16 GHz | 20 GHz |
| Hardware Analog Bandwidth (-3 dB) | 4 GHz | 6 GHz | 8 GHz | 12.5 GHz | 16 GHz (typical) | 16 GHz (typical) |
| Input Channels | 4 | 4 | 4 | 4 | 4 | 4 |
| Logic Channels (MSO70000 only) | 16 | 16 | 16 | 16 | 16 | 16 |
| Rise Time 10% to 90% (Typical) | 98 ps | 65 ps | 49 ps | 32 ps | 24.5 ps | 18 ps |
| Rise Time 20% to 80% (Typical) | 68 ps | 45 ps | 34 ps | 22 ps | 17 ps | 14 ps |
| Vertical Noise (% of full scale) (Typical)*1 | 0.28% | 0.32% | 0.35% | 0.38% | 0.43% | 0.77% |
| Bandwidth Limits | Depending on instrument model: 19 GHz, 18 GHz, 17 GHz, 16 GHz, 15 GHz, 14 GHz, 13 GHz, 12 GHz, 11 GHz, 10 GHz, 9 GHz, 8 GHz, 7 GHz, 6 GHz, 5 GHz, 4 GHz, 3 GHz, 2 GHz, 1 GHz, or 500 MHz | | | | | |
| Channel-to-Channel Isolation (Any two channels at equal vertical scale settings) | ≥120:1 (for input frequency 0 to 10 GHz) ≥80:1 (for input frequency >10 GHz to 12 GHz) ≥50:1 (for input frequency >12 GHz to 15 GHz) ≥25:1 (for input frequency >15 GHz) | | | | | |
| DC Gain Accuracy | ±2% (of reading) | | | | | |
| Delay between Any Two Channels (Typical) | ≤20 ps for any two channels with equal V/div and coupling settings ≤50 ps with BW enhance enabled (BWE) | | | | | |
| Effective Number of Bits (Typical) | 5.4 bits*2 | | | | | |
| Input Coupling | DC (50 Ω), GND | | | | | |
| Input Impedance | 50 Ω ±2%, 1 MΩ with TCA-1MEG adapter | | | | | |
| Input Sensitivity | | | | | | |
| 18 GHz and below | 10 mV/div to 500 mV/div (100 mV to 5 V full scale) | | | | | |
| 20 GHz and 19 GHz | 20 to 500 mV/div (200 mV to 5 V full scale) | | | | | |
| Max Input Voltage, 50 Ω | <5.0 V _{RMS} for ≥100 mV/div; also determined by TekConnect accessory 1.0 V _{RMS} for <100 mV/div | | | | | |
| Offset Accuracy 10 mV/div – 99.5 mV/div | ±(0.35% (offset value-position) + 1.5 mV + 1% of full scale) | | | | | |
| 100 mV/div – 500 mV/div | ±(0.35% (offset value-position) + 7.5 mV + 1% of full scale) | | | | | |
| Offset Range | 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 at 25 °C | | | | | |
| Position Range | ±5 div | | | | | |
| Vertical Resolution | 8 bit (11 bit with averaging) | | | | | |

*1 50 mV/div, bandwidth filter on.

*2 50 mV/div, bandwidth filter on, max bandwidth up to 13 GHz, max sample rate.

Logic Channels (MSO70000 only)

| Characteristic | MSO70404 | MSO70604 | MSO70804 | MSO71254 | MSO71604 | MSO72004 |
|-------------------------------|----------|--|----------|---------------------------------------|----------|----------|
| Input Channels | | | | 16 | | |
| Trigger Clock/Qualifier Input | | | | 1 | | |
| Analog Bandwidth | | | | | | |
| With P6780 logic probe | | | | 2.5 GHz | | |
| With P6717 logic probe | | | | 350 MHz | | |
| Input Impedance | | | | | | |
| With P6780 logic probe | | 20 k Ω to ground per side or 40 k Ω differential mode \pm 2.0%, 0.5 pF | | | | |
| With P6717 logic probe | | 20 k Ω \pm 1.0%, 3 pF | | | | |
| Vertical Resolution | | | | 1 bit | | |
| Threshold Levels | | | | One per channel, independently set | | |
| Threshold Accuracy | | | | \pm 75 mV + 3% of threshold setting | | |
| Threshold Resolution | | | | 5 mV | | |
| Logic Threshold Range | | | | | | |
| With P6780 logic probe | | | | -2 to +4.5V | | |
| With P6717 logic probe | | | | -1.5 to +4.0V | | |
| Minimum Voltage Swing | | | | 300 mV _{p-p} | | |
| Maximum Input Voltage | | | | \pm 15 V nondestruct | | |

Horizontal Time Base System

| Characteristic | DPO70404B DSA70404B MSO70404 | DPO70604B DSA70604B MSO70604 | DPO70804B DSA70804B MSO70804 | DPO71254B DSA71254B MSO71254 | DPO71604B DSA71604B MSO71604 | DPO72004B DSA72004B MSO72004 |
|--|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Time Base Range | 20 ps/div to 1000 s/div | | | 10 ps/div to 1000 s/div | | |
| Time Resolution (in ET/IT mode) | 200 fs | | | 100 fs | | |
| Channel-to-Channel Deskew | Range \pm 75 ns | | | | | |
| Delta Time Measurement Accuracy RMS over <100 ns Duration; Single Shot; with Signal Rise Time = 1.2 \times Scope Rise Time | 1.61 ps | 1.29 ps | 1.14 ps | 940 fs | 900 fs | 1.02 ps |
| Jitter Noise Floor (Typical) (With BW bandwidth enhance enabled) | 450 fs | 450 fs | 450 fs | 300 fs | 300 fs | 400 fs |
| Time Base Accuracy | \pm 1.5 ppm initial accuracy, aging <1 ppm per year | | | | | |
| Time Base Delay Time Range | -5.0 ks to 1.0 ks | | | | | |
| Trigger Jitter (RMS) | 1 pS _{RMS} (typical) with enhanced triggering OFF <100 fS _{RMS} with enhanced triggering ON | | | | | |

Acquisition System

| Characteristic | DPO70404B DSA70404B MSO70404 | DPO70604B DSA70604B MSO70604 | DPO70804B DSA70804B MSO70804 | DPO71254B DSA71254B MSO71254 | DPO71604B DSA71604B MSO71604 | DPO72004B DSA72004B MSO72004 |
|---|------------------------------------|--|------------------------------------|------------------------------------|--|------------------------------------|
| Sample Rates | | | | | | |
| Real-time Mode 1, 2, 3, or 4 Channel (Max) | | 25 GS/s | | | 50 GS/s | |
| ET/IT Mode (Max) | | 5 TS/s | | | 10 TS/s | |
| Maximum Record Length per Channel | | | | | | |
| With Standard Configuration | | 10 M on all four channels (DPO70000B and MSO70000 Series) 20 M on all four channels (DSA70000B Series only) | | | | |
| With Record Length Option 2XL | | 20 M on all four channels (DPO70000B and MSO70000 Series) | | | | |
| With Record Length Option 5XL | | 50 M on all four channels | | | | |
| With Record Length Option 10XL | | 125M on all four channels | | | | |
| With Record Length Option 20XL | | N/A | | | 250 M on all four channels | |
| Maximum Duration at Highest Real-time Resolution | | | | | | |
| Timing Resolution | | 40 ps (25 GS/s) | | | 20 ps (50 GS/s) | |
| Max Duration with Standard Memory | | 0.4 ms DPO70000B and MSO70000 Series; 0.8 ms for DSA70000B Series | | | 0.2 ms DPO70000B and MSO70000 Series; 0.4 ms for DSA70000B Series | |
| Max Duration with Option 2XL | | 0.8 ms (DPO70000B and MSO70000 Series) | | | 0.4 ms (DPO70000B and MSO70000 Series) | |
| Max Duration with Option 5XL | | 2.0 ms | | | 1.0 ms | |
| Max Duration with Option 10XL | | 5.0 ms | | | 2.5 ms | |
| Max Duration with Option 20XL | | N/A | | | 5.0 ms | |

Logic Channels (MSO70000 only)

| Characteristic | MSO70404 | MSO70604 | MSO70804 | MSO71254 | MSO71604 | MSO72004 |
|---|------------------------------------|----------|---------------------------------------|-------------------------------------|----------|----------|
| Sample Rate – All Channels (Max) | | | 12.5 GS/s | | | |
| Timing Resolution | | | 80 ps | | | |
| Displayed Channel-to-Channel Timing Uncertainty | | | <160 ps | | | |
| Maximum Record Length per Channel | 125M on all channels (Option 10XL) | | | 250 M on all channels (Option 20XL) | | |
| 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) | | | |

Acquisition Modes

| Mode | Description |
|---------------------------------------|---|
| Averaging | From 2 to 10,000 waveforms included in average |
| Envelope | From 1 to 2×10^9 waveforms included in min-max envelope |
| FastAcq | FastAcq optimizes the instrument for analysis of dynamic signals and capture of infrequent events |
| Maximum FastAcq Waveform Capture Rate | >300,000 wfms/s on all 4 channels simultaneously |
| 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 |
| Hi-Res | Real-time boxcar averaging reduces random noise and increases resolution |
| Peak Detect | Captures and displays narrow glitches at all real-time sampling rates: 1 ns at ≤ 125 MS/s; 1/sample rate at ≥ 250 MS/s |
| 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 |
| Sample | Acquires and displays sampled values |
| Waveform Database | Accumulates waveform database providing three-dimensional array of amplitude, time, and counts |

Pinpoint® Trigger System

| Sensitivity | DPO and MSO Models | DSA Models |
|--|--|---------------------|
| 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 | |
| External (Auxiliary Input) 50 Ω | 250 mV from DC to 50 MHz, increasing to 350 mV at 1.0 GHz | |
| Trigger Characteristics | | |
| A Event and Delayed B Event Trigger Types | Edge, Glitch, Runt, Width, Transition Time, Time-out, Pattern, 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 separate horizontal delay after the trigger event to position the acquisition window in time | |
| Clock Recovery System | Requires Option PTH or Option MTH | Standard |
| Clock Recovery Phase Locked Loop Bandwidth | Fixed at FBaud/1600 | |
| Clock Recovery Frequency Range | 1.5 MBaud to 3.125 GBaud | |
| 8b10b Max Baud Rate | Requires Option PTU | Requires Option STU |
| | 6.25 GBaud | |
| Communications-related Triggers | Requires Option MTH | Standard |
| | 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 | |
| Serial Pattern Trigger | Requires Option PTH | Standard |
| | 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 | |
| | Trigger on 8b/10b-encoded data from 1.25 to 3.125 GBaud (40 bits) | |
| | Requires Option PTU | Requires Option STU |
| | Trigger on 8b/10b-encoded data up to 5 GBaud (40 bits) | |
| Threshold Range | | |
| P6780 | -2 to +4.5 V | |
| P6717 | -1.5 to +4 V | |
| Threshold Accuracy | ±100 mV + 3% of threshold setting | |
| Maximum I ² C, SPI Bus Toggle Rate | 10 MHz | |
| 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 | |
| Enhanced Triggering | User-selectable; 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); Not available in FastAcq mode | |
| Line | Trigger on power line signal. Level fixed at 0 V | |
| 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 | |
| Trigger Coupling | DC, AC (attenuates <100 Hz) HF Rej (attenuates >20 kHz) LF Rej (attenuates <200 kHz) Noise Reject (reduces sensitivity) | |
| Trigger Holdoff Range | 250 ns min to 12 s max | |
| Trigger Level Range Internal | ±120% of full scale from center of screen | |

Trigger Modes

| Mode | Analog Channels | MSO Logic Channels | Description |
|-------------------------|-----------------|--------------------|---|
| Comm | X | | Standard feature on the DSA7000B, provided as part of Option MTH on the DPO7000B and MSO7000 Series. Support for AMI, HDB3, BnZS, CMI, MLT3, and NRZ encoded signals |
| Bus | X | X | Trigger on a parallel, I ² C, or SPI bus when the specific bus value is found. (MSO7000 Series 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 using B Event Scan |
| 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 MSO7000) 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 |
| Serial Pattern | X | | Trigger on NRZ-encoded data up to 3.125 Gbaud (5 Gbaud with Option PTU or Option STU); above 1.25 Gbaud requires 8b/10b encoded data. Extended with pattern lock triggering to capture repeated acquisitions of long serial test patterns up to 6.25 Gb/s |
| Setup/Hold State | X | X | Trigger on violations of both setup time and hold time between clock and data present on any two input channels |
| Time-out | X | X | Any logical pattern of channels (1, 2, 3) (and 16 logic channels on the MSO7000) clocked by edge on channel 4. Trigger on rising or falling clock edge |
| Transition | X | X | Trigger on an event which remains high, low, or either, for a specified time period. Selectable from 300 ps |
| Trigger Delay by Events | X | X | Trigger on pulse edge rates that are faster or slower than specified. Slope may be positive, negative, or either |
| Trigger Delay by Time | X | X | 1 to 2 billion events |
| Width | X | X | 3.2 ns to 3 million seconds |
| Window | X | | Trigger on width of positive or negative pulse either within or out of selectable time limits (down to 150 ps) |
| | | | Trigger on an event that enters or exits a window defined by two user-adjustable thresholds. Event can be time or logic qualified |

Search and Mark Events

| Event | Description |
|----------|---|
| Basic | Mark any events and document waveforms. Search positive, negative slopes or both on any channels. 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 |
| Advanced | Search glitches or runts, as well as transition rate, pulse width, setup and hold, time-out, window violations, or find any logic or state pattern on any number of channels. Search DDR Read or Write bursts with Option DDRA |

Waveform Analysis

Waveform Measurements

| Measurement | Description |
|------------------------|---|
| 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 |
| Amplitude Related | Amplitude, High, Low, Maximum, Minimum, Peak-to-Peak, Mean, Cycle Mean, RMS, Cycle RMS, Positive Overshoot, Negative Overshoot |
| Combination | Area, Cycle Area, Phase, Burst Width |
| Eye-pattern Related | Extinction Ratio (absolute, %, dB), Eye Height, Eye Width, Eye Top, Eye Base, Crossing %, Jitter (p-p, RMS, 6sigma), Noise (p-p, RMS), Signal/Noise Ratio, Cycle Distortion, Q-Factor |
| Histogram Related | Waveform Count, Hits in Box, Peak Hits, Median, Maximum, Minimum, Peak-to-Peak, Mean (μ), Standard Deviation (σ), $\mu+1\sigma$, $\mu+2\sigma$, $\mu+3\sigma$ |
| Time Related | Rise Time, Fall Time, Positive Width, Negative Width, Positive Duty Cycle, Negative Duty Cycle, Period, Frequency, Delay |

Bus Decoding (MSO70000 only)

| Characteristic | Description |
|------------------|---|
| 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 |
| I ² C | SCLK and SDA channels are displayed as a bus per the Inter-Integrated Circuit specification |
| SPI | MOSI, MISO, SCLK, and SS channels are displayed as a bus per the Serial Peripheral Interface specification |

Waveform Processing/Math

| Measurement | Description |
|----------------------------|---|
| Algebraic Expressions | Define extensive algebraic expressions including Waveforms, Scalars, User-adjustable Variables, and Results of Parametric Measurements e.g. $(\text{Integral}(\text{CH1} - \text{Mean}(\text{CH1})) \times 1.414 \times \text{VAR1})$ |
| Arithmetic | Add, Subtract, Multiply, Divide Waveforms and Scalars |
| Filtering Functions | 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 pixmap 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 |

Display, Computer, I/O**Display**

| Characteristic | Description |
|----------------------|--|
| Color Palettes | Normal, Green, Gray, Temperature, Spectral, and User-defined |
| Display Format | YT, XY |
| Display Resolution | XGA 1024 horizontal × 768 vertical pixels |
| Display Size | Diagonal: 307.3 mm (12.1 in.) |
| Display Type | Liquid-crystal active-matrix color display |
| Horizontal Divisions | 10 |
| Vertical Divisions | 10 |
| Waveform Styles | Vectors, Dots, Variable Persistence, Infinite Persistence |

Computer System and Peripherals

| Characteristic | DPO/DSA Models | MSO Models |
|------------------|--|-----------------------------------|
| Operating System | Microsoft Windows XP Embedded | |
| CPU | Intel Pentium 4 Processor, 3.4 GHz | Intel Core 2 Duo Processor, 3 GHz |
| PC System Memory | 2 GB | 4 GB |
| Hard Disk Drive | Rear-panel, removable hard disk drive, 160 GB capacity | |
| CD/DVD Drive | Front-panel CD-R/W, DVD-R drive | |
| Mouse | Optical wheel mouse, USB interface | |
| Keyboard | USB interface | |

Input/Output Ports**Front Panel**

| Port | DPO/DSA Models | MSO Models |
|-----------------------------|---|------------|
| Aux Trigger Input | See trigger specifications | |
| DC Probe Calibration Output | BNC connector, ±10 V DC for DC probe calibration (signal available only during probe calibration) | |
| Fast Edge Output | 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 | SMA connector, ≤1.25 Gb/s, Output swing ≥130 mV _{p-p} into 50 Ω at 1.25 Gb/s. Requires Option PTH or Option MTH to enable on DPO70000B and MSO70000, standard on DSA70000B | |
| Recovered Data | SMA connector, ≤1.25 Gb/s, Output swing of 1010 repeating pattern 200 mV into 50 Ω at 1.25 Gb/s. Requires Option PTH or Option MTH to enable on DPO70000B and MSO70000, standard on DSA70000B | |
| USB 2.0 Port | Allows connection of USB keyboard, mouse, or storage device | |

Rear Panel

| Port | DPO/DSA Models | MSO Models |
|---------------------------------|---|--|
| Audio Ports | Miniature phone jacks for stereo microphone input and stereo line output | |
| Aux Trigger Output | BNC connector, 0 to 3 V; default output is A-Event Trigger low true | |
| External Time Base Reference In | 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 | |
| GPIO Port | IEEE 488.2 standard | |
| Keyboard Port | PS/2 compatible | |
| LAN Port | RJ-45 connector, supports 10BASE-T, 100BASE-T, and 1000BASE-T | |
| Mouse Port | PS/2 compatible | |
| Parallel Port | IEEE 1284, DB-25 connector | Alternatively, the DVI-I port can be configured to show the secondary Windows desktop (also called extended desktop or dual-monitor display) |
| eSATA port | N/A | External SATA interface for eSATA storage devices |
| Power | 100 to 240 V _{RMS} , ±10%, 50/60 Hz; 115 V _{RMS} ±10%, <870 W, 400 Hz; CAT II, <1100 VA typical | |
| External Video Ports | 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 | |
| Scope XGA Video Port | 15-pin D-sub connector on the rear panel, video is IBM XGA compatible | N/A |
| DVI-I Video Port | N/A | DVI connector, female. DVI to VGA 15-pin D-sub connector adapter provided |
| Serial Port | DB-9 COM1 port | Two DB-9 COM1 ports |
| TekLink™ | Synchronizes multiple Tektronix oscilloscopes together to allow simultaneous acquisition of more than four channels | |
| Time Base Reference Out | BNC connector; provides TTL-compatible output of internal 10 MHz reference oscillator | |
| USB 2.0 Ports | Four. Allow connection of USB keyboard, mouse, or storage device | |
| Windows Video Port | 15-pin D-sub connector on the rear panel; connects a second monitor to use dual-monitor display mode allowing analysis results and plots to be viewed along with the oscilloscope display. Video is DDC2B compliant | N/A |

Physical Characteristics
Dimensions

| Benchtop Configuration | mm | in. |
|--|--------|-------|
| Height | 298 | 11.74 |
| Width | 451 | 17.75 |
| Depth | 489.97 | 19.29 |
| Weight | kg | lb. |
| Net | 24 | 53 |
| Shipping | 34 | 67 |
| Rackmount Configuration | 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 | 22 | 59 |
| Kit | 2.7 | 6 |

Mechanical

| 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

| Characteristic | Description |
|-------------------------------|---|
| 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.) |
| 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

Models

| Model | Description |
|-----------|--|
| MSO70404 | 4 GHz Mixed Signal Oscilloscope |
| MSO70604 | 6 GHz Mixed Signal Oscilloscope |
| MSO70804 | 8 GHz Mixed Signal Oscilloscope |
| MSO71254 | 12.5 GHz Mixed Signal Oscilloscope |
| MSO71604 | 16 GHz Mixed Signal Oscilloscope |
| MSO72004 | 20 GHz Mixed Signal Oscilloscope |
| DPO70404B | 4 GHz Digital Phosphor Oscilloscope |
| DPO70604B | 6 GHz Digital Phosphor Oscilloscope |
| DPO70804B | 8 GHz Digital Phosphor Oscilloscope |
| DPO71254B | 12.5 GHz Digital Phosphor Oscilloscope |
| DPO71604B | 16 GHz Digital Phosphor Oscilloscope |
| DPO72004B | 20 GHz Digital Phosphor Oscilloscope |
| DSA70404B | 4 GHz Digital Serial Analyzer |
| DSA70604B | 6 GHz Digital Serial Analyzer |
| DSA70804B | 8 GHz Digital Serial Analyzer |
| DSA71254B | 12.5 GHz Digital Serial Analyzer |
| DSA71604B | 16 GHz Digital Serial Analyzer |
| DSA72004B | 20 GHz Digital Serial Analyzer |

All Models Include: Accessory pouch, front cover, mouse, keyboard, quick start user manual (071-173x-xx), (4) TekConnect® to 2.92 mm adapters (TCA-292MM) and (1) TekConnect-to-BNC adapter (TCA-BNC), DPO70000B Series product software CD/DVD-ROM, Optional applications software CD/DVD-ROM, performance verification procedure PDF file, GPIB programmer's reference (on product software CD/DVD-ROM), calibration certificate documenting NIST traceability, Z 540-1 compliance and ISO9001, power cord, one-year warranty.

Note: Please specify quick-start user manual language and power plug when ordering.

Options

Instrument Options

| Option | DPO7000B | DSA7000B | MSO70000 | Description |
|---|----------|----------|--|---|
| Record Length Options | | | | |
| Opt. 2XL | X | Standard | X | 20 MS/Ch |
| Opt. 5XL | X | X | X | 50 MS/Ch |
| Opt. 10XL | X | X | X | 125 MS/Ch |
| Opt. 20XL*7 | X | X | X | 250 MS/Ch |
| MSO70000 Digital Signal Analyzer Options | | | | |
| Opt. DSAH | | | X, for MSO70404, MSO70604, or MSO70804 | MSO Digital Serial Analysis Bundle, includes Opt. 2XL, ASM, DJA, MTH, and PTH |
| Opt. DSAU | | | X, for MSO71254, MSO71604, or MSO72004 | MSO Digital Serial Analysis Bundle, includes Opt. 2XL, ASM, DJA, MTH, and PTH |
| Trigger and Search Options | | | | |
| Opt. ASM | X | Standard | X | Advanced Event Search and Mark |
| Opt. LT | X | X | X | Waveform Limit Testing |
| Opt. MTH | X | Standard | X | Mask testing for Serial Standards up to 6 Gb/s. Includes hardware clock recovery for up to 6.25 Gb/s |
| Opt. PTH | X | Standard | X | Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals up to 3.125 Gb/s. Includes hardware clock recovery and pattern lock triggering |
| Opt. PTU | X | | X | Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals up to 6.25 Gb/s |
| Opt. STU | | X | | Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals up to 6.25 Gb/s |
| Advanced Analysis Options | | | | |
| Opt. D-PHY | X | X | X | MIPI® D-PHY Essentials – Characterization and Compliance Test Solution |
| Opt. DDRA*8 | X | X | X | DDR Memory Bus Analysis |
| Opt. DJA | X | Standard | X | DPOJET Jitter and Eye Diagram Analysis |
| Opt. DSPT*10, 13 | X | X | X | DisplayPort Compliance Test Solution |
| Opt. DVI | X | X | X | DVI Compliance Test Solution |
| Opt. ERRDT*14 | X | X | X | Frame and Bit Error Rate Detector for High-speed Serial Standards (Available through the programmable interface only) |
| Opt. ET3*3 | X | X | X | Ethernet Compliance Test Software |
| Opt. HEAC | X | X | X | HEAC Automated Solution |
| Opt. HT3 | X | X | X | HDMI Compliance Test Software |
| Opt. HT3DS | X | X | X | HDMI Direct Synthesis for HDMI 1.4 |
| Opt. IBA*6 | X | X | X | InfiniBand Compliance Module for RT-Eye Analysis Software |
| Opt. PCE*11 | X | X | X | PCI Express™ Analysis Software |
| Opt. PWR*5 | X | X | X | Power Measurement and Analysis Software |
| Opt. RTE | X | X | X | RT-Eye Serial Data Compliance and Analysis Software |
| Opt. SLA | X | X | X | Serial Data Link Analysis Advanced (with Equalization) |
| Opt. SLE | X | X | X | Serial Data Link Analysis Essentials (no Equalization) |
| Opt. SST*6 | X | X | X | SATA and SAS Analysis Software Module for RT-Eye Analysis Software |
| Opt. SVE | X | X | X | SignalVu™ Essentials – Vector Signal Analysis Software |
| Opt. SVM*9 | X | X | X | General Purpose Modulation Analysis. Requires Opt. SVE |
| Opt. SVP*9 | X | X | X | Advanced Signal Analysis (including pulse measurements). Requires Opt. SVE |
| Opt. SVT | X | X | X | Frequency and Phase Settling Time Measurements. Requires Opt. SVE |
| Opt. USB*4 | X | X | X | USB 2.0 Compliance Test Software |
| Opt. USB3*10, 12, 15 | X | X | X | USB 3.0 Compliance and Analysis Software |
| Opt. UWB | X | X | X | Ultra-Wideband Spectral Analysis (includes WiMedia Alliance PHY interf. testing) |
| Opt. UWBE | X | X | X | Ultra-Wideband Spectral Analysis Essentials |

| Option | DPO70000B | DSA70000B | MSO70000 | Description |
|---|-----------|-----------|----------|---|
| Opt. XGbT | X | X | X | 10GBASE-T Automated Solution |
| TekExpress Application Framework Options | | | | |
| Opt. TEKEXP | X | X | X | TekExpress Automation Framework |
| Opt. SATA-TSG*12 | X | X | X | SATA PHY/TSG/OOB Transmitter Tests for TekExpress |
| Opt. SATA-RSG*12 | X | X | X | SATA RSG/RMT Receiver Tests for TekExpress |
| Opt. SATA-RXTX*12 | X | X | X | SATA Rx/Tx Channel Tests for TekExpress |
| Opt. SATA-DHB*12 | X | X | X | SATA TekExpress SW Bundle (TSG, RSG, RXTX for Hosts or Devices) |
| Opt. SATA-SI*12 | X | X | X | SATA SI Cable Tests for TekExpress |
| Opt. USB-RMT | X | X | X | TekExpress Automated USB 3.0 Receiver Solution |
| Opt. USB-TX*10, 12, 15 | X | X | X | TekExpress Automated USB 3.0 Solution |

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 DPO/DSA70000B, MSO70000, and DPO7000 Tektronix oscilloscopes. Floating licenses are available for many license-key enabled options. To order a floating version of an option license add "DPOFL-" prefix to the option name. (e.g. DPOFL-ET3)
 Check www.tek.com/products/oscilloscopes/floatinglicenses for additional information about floating license options.

*3 Requires Ethernet Test Fixture.

*4 Requires TDSUSB (USB Test Fixture).

*5 At least Opt. 2XL and a TCA-1MEG TekConnect 1 MΩ buffer amplifier are recommended for use.

*6 Requires Opt. RTE.

*7 For models of bandwidth ≥12.5 GHz only.

*8 Requires DJA and ASM.

*9 Requires Opt. SVE, SVEH, or SVEU.

*10 For models of bandwidth ≥8 GHz only.

*11 Requires Opt. DJA on DPO70000B and MSO70000 Series.

*12 Requires TekExpress Automation Framework.

*13 Requires Opt. DJA and 5XL.

*14 Requires Opt. PTH, PTU, or STU.

*15 Requires Opt. DJA.

User Manual Options

| Option | Description |
|----------|-------------------------|
| Opt. L0 | English manual |
| Opt. L1 | French manual |
| Opt. L3 | German manual |
| Opt. L5 | Japanese manual |
| Opt. L7 | Simple Chinese manual |
| Opt. L8 | Standard Chinese manual |
| Opt. L9 | Korean manual |
| Opt. L10 | Russian manual |
| Opt. L99 | No manual |

Power Plug Options

| Option | Description |
|----------|--|
| Opt. A0 | US plug, 115 V, 60 Hz |
| Opt. A1 | Euro plug, 220 V, 50 Hz |
| Opt. A2 | UK plug, 240 V, 50 Hz |
| Opt. A3 | Australian plug, 240 V, 50 Hz |
| Opt. A5 | Swiss plug, 220 V, 50 Hz |
| Opt. A6 | Japanese plug, 100 V, 110/120 V, 60 Hz |
| Opt. A10 | China plug, 50 Hz |
| Opt. A11 | India plug, 50 Hz |
| Opt. A99 | No power cord |

Service Options

| Option | Description |
|----------|--|
| Opt. CA1 | Single calibration or functional verification |
| Opt. C3 | Calibration Service 3 Years |
| Opt. C5 | Calibration Service 5 Years |
| Opt. D1 | Calibration Data Report |
| Opt. D3 | Calibration Data Report 3 Years (with Opt. C3) |
| Opt. D5 | Calibration Data Report 5 Years (with Opt. C5) |
| Opt. R3 | Repair Service 3 Years |
| Opt. R5 | Repair Service 5 Years |
| Opt. IN | Product Installation Service |
| Opt. IF | Upgrade Installation Service |

Recommended Accessories**Probes**

| Probe | Description |
|------------------------|--|
| P7520 | 20 GHz TriMode™ probe |
| P7516 | 16 GHz TriMode™ probe |
| P7513A | 13 GHz TriMode™ probe |
| P7313SMA | 13 GHz TekConnect® differential SMA probe |
| P7508 | 8 GHz TriMode™ probe |
| P7380SMA | 8 GHz TekConnect® differential SMA probe |
| P7506 | 6 GHz TriMode™ probe |
| P7504 | 4 GHz TriMode™ probe |
| P6780 | Differential Input Logic probe |
| P6717 | 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 |

Adapters

| Adapter | Description |
|-----------|--|
| TCA-1MEG | TekConnect high-impedance buffer amplifier. Includes P6139A passive probe |
| TCA-292MM | TekConnect to 2.92 mm connectors |
| TCA-BNC | TekConnect-to-BNC adapter |
| TCA-N | TekConnect-to-N adapter |
| TCA-SMA | TekConnect-to-SMA adapter |
| TCA75 | 8 GHz precision TekConnect 75 Ω to 50 Ω adapter with 75 Ω BNC input connector |

Cables

| Cable | Order Number |
|------------------|--------------|
| Centronics Cable | 012-1214-xx |
| GPIO Cable (1 m) | 012-0991-xx |
| GPIO Cable (2 m) | 012-0991-xx |
| RS-232 Cable | 012-1298-xx |

P6780 Standard Accessories

| Accessory | Order Number |
|---------------------------------------|--------------|
| Standard Adapter | 020-3035-xx |
| Wide Body Adapter | 020-3036-xx |
| 25°/55° Holder | 020-3032-00 |
| Heat Strip Wire (4.57 m) | 020-3021-00 |
| Hand Browsing Adapter | 202-3031-xx |
| Flex Adapter | 020-3033-xx |
| Lead Set Ground | 020-3038-xx |
| Probe Grouper (including header pins) | 020-3042-xx |
| Ferrite Beads | 020-3034-xx |
| Wire Tubing (4.57 m) | 020-3037-xx |

P6717 Standard Accessories

| Accessory | Order Number |
|----------------------|--------------|
| Extension Ground Tip | 206-0559-xx |
| Probe Tip | 131-5638-xx |
| IC Grabber | 206-0569-xx |
| Probe Grouper | 352-1115-xx |
| Lead Sets | 196-3501-xx |
| Ground Lead Sets | 196-3497-xx |

Accessories

| Accessory | Order Number |
|--|---|
| D-MAX Probe Footprint to Square Pin Header Adapter | NEX-P6960PIN |
| MICTOR to Square Pin Header Adapter | NEX-HD2HEADER |
| DDR3 ×4/×8 Solder Chip Interposer | NEX-DDR3MP78BSC |
| DDR3 ×4/×8 Socket Chip Interposer | NEX-DDR3MP78BSCSK |
| DDR3 ×16 Solder Chip Interposer | NEX-DDR3MP96BSC |
| DDR3 ×16 Socket Chip Interposer | NEX-DDR3MP96BSCSK |
| DDR2 ×4/×8 Solder Chip Interposer | NEX-DDR2MP60BSC |
| DDR2 ×4/×8 Socket Chip Interposer | NEX-DDR2MP60BSCSK |
| DDR2 ×16 Solder Chip Interposer | NEX-DDR2MP84BSC |
| DDR2 ×16 Socket Chip Interposer | NEX-DDR2MP84BSCSK |
| Spare HDD for DPO/DSA70000B and MSO70000 Series | 065-0834-xx |
| Test Fixture for Use with Opt. USB | TDSUSBF |
| 10GBASE-T Fixture for Use with Option XGbT Software | TF-XGbT |
| Ethernet Test Fixture | Order through Crescent Heart Software (http://www.c-h-s.com) |
| Crescent Heart Systems; Serial ATA ZP test fixture set for Host, Device, and Cable testing | TF-SATA-SET-IV-ZP |
| Crescent Heart Systems; ESerial ATA ZP test fixture set for Host, Device, and Cable testing | TF-ESATA-SET-IV-ZP |
| 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-HEAC-TPA-KIT |
| EFFICERE INC; HDMI Type C fixture set for Rx and cable testing | ET-HDMIC-TPA-S |
| EFFICERE INC; HDMI Type C fixture set for Tx testing | ET-HDMIC-TPA-STX |
| EFFICERE INC; HDMI Type A fixture set for Rx and cable testing | ET-HDMI-TPA-S |
| EFFICERE INC; HDMI Type A fixture set for Tx testing | ET-HDMI-TPA-STX |
| HDMI Direct Synthesis method for Sink and Cable physical layer compliance testing for HDMI 1.3a specifications | HT3DS |

Accessory**Order Number**

| | |
|---|---|
| KEITHLEY INSTRUMENTS INC; RF/Microwave switch system, 32 channel, unterminated, Americas power cord | S46-6666-A-AMER |
| KEITHLEY INSTRUMENTS INC; RF/Microwave switch system, 32 channel, unterminated, Asia-Pacific power cord | S46-6666-A-ASIAP |
| KEITHLEY INSTRUMENTS INC; RF/Microwave switch system, 32 channel, unterminated, Europe/Africa power cords | S46-6666-A-EURAF |
| USB 3.0 A/B Fixture/Cable Kit | TF-USB3-AB-KIT |
| USB 3.0 A Plug Fixture | TF-USB3-A-P |
| USB 3.0 A Receptacle Fixture Kit | TF-USB3-A-R |
| USB 3.0 B Receptacle Fixture Kit | TF-USB3-B-R |
| 1000/100/10BASE-T Advanced Test Package (consists of test fixture PCB set, RJ45 interconnect cable, and 1000BASE-T jitter test channel cable) | TF-GBE-ATP |
| 1000/100/10BASE-T Basic Test Package (consists of test fixture PCB set and RJ45 interconnect cable) | TF-GBE-BTP |
| 103 meter 1000BASE-T jitter test channel cable | TF-GBE-JTC |
| Short (4 inch (0.1 meter)) RJ45 interconnect cable | TF-GBE-SIC |
| Test fixtures that complement the use of the TekEXP-XGbT solution | TF-XGbT |
| Instrumented DIMM for DDR3 | Order Scope NEXVu card for UDIMM Raw Card E. (Contact http://www.nexustechology.com) |
| Oscilloscope Cart | K4000 |
| Analog Probe Calibration and Deskew Fixture (4 GHz) | 067-0484-xx |
| Analog Probe Deskew Fixture (>4 GHz) | 067-1586-xx |
| Customer Deskew Fixture MSO70000 | 067-2083-xx |
| Power Deskew Fixture | 067-1686-xx |
| Rackmount Kit | 016-1985-xx |
| Service Manual | 071-1740-xx |
| Transit Case | 016-1977-xx |

Instrument Upgrades

The DPO/DSA7000B and MSO70000 instruments can be easily upgraded after initial time of purchase.

To upgrade an existing DPO7000B, DSA7000B, or MSO70000 order the appropriate model number and option listed below. For example, DPO7UP DDRA.

Upgrade Model Numbers

| DPO7000B | DSA7000B | MSO70000 |
|----------|----------|----------|
| DPO7UP | DPO7UP | DPO-UP |

Upgrade Options

| Option | Description |
|---|--|
| Memory | |
| Upgrade record length on a DPO7000B or MSO70000 Series from: | |
| XL02 | Standard Configuration to Option 2XL Configuration |
| XL05 | Standard Configuration to Option 5XL Configuration |
| XL010 | Standard Configuration to Option 10XL Configuration |
| XL020*7 | Standard Configuration to Option 20XL Configuration |
| Upgrade record length on a DPO7000B, DSA7000B, or MSO70000 Series from: | |
| XL25 | Option 2XL Configuration to Option 5XL Configuration |
| XL210 | Option 2XL Configuration to Option 10XL Configuration |
| XL220*7 | Option 2XL Configuration to Option 20XL Configuration |
| XL510 | Opt. 5XL Configuration to Opt. 10XL Configuration |
| XL520*7 | Opt. 5XL Configuration to Opt. 20XL Configuration |
| XL1020*7 | Opt. 10XL Configuration to Opt. 20XL Configuration |
| Trigger and Search | |
| Upgrade DPO7000B, DSA7000B, or MSO70000 Series with: | |
| ASM*16 | Advanced Event Search and Mark |
| LT | Waveform Limit Testing |
| MTH*16 | Mask testing for Serial Standards with Hardware Clock Recovery |
| PTH*16 | Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals (Up to 3.125 Gb/s) |
| PTU*17 | Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals (Up to 6.25 Gb/s) |
| STU*18 | Protocol Triggering and Decoding for 8b/10b-encoded Serial Signals (Up to 6.25 Gb/s) |
| Advanced Analysis | |
| Upgrade DPO7000B, DSA7000B, or MSO70000 Series with: | |
| CP2*19 | ANSI/ITU Telecom Pulse Compliance Testing Software |
| D-PHY | MIPI® D-PHY Essentials |
| DDRA*20 | Upgrade to Option DDRA |
| DJAH | DPOJET Jitter and Eye Diagram Analysis (Upgrade for DPO70404B - DPO70804B or MSO70404 - MSO70804 models) |
| DJAU | DPOJET Jitter and Eye Diagram Analysis (Upgrade for DPO71254B - DPO72004B or MSO71254 - MSO72004 models) |

| Option | Description |
|-----------------|---|
| RJUP | Upgrade DSA7000B with RT-Eye Serial Data Compliance and Analysis Software |
| DSAH | MSO Digital Serial Analysis Bundle (Upgrade for MSO70404 - MSO70804 models) |
| DSAU | MSO Digital Serial Analysis Bundle (Upgrade for MSO71254 - MSO72004 models) |
| DSPT | DisplayPort Compliance Test Solution |
| DVI | DVI Compliance Test Solution |
| EQ*21 | Equalization to upgrade from Option SLE to Option SLA |
| ERRDTH*14 | Frame and Bit Error Rate Detector (Upgrade for DPO70404B - DPO70804B, DSA70404B - DSA70804B, or MSO70404 - MSO70804 models) |
| ERRDTU*14 | Frame and Bit Error Rate Detector (Upgrade for DPO71254B - DPO72004B, DSA71254B - DSA72004B, or MSO71254 - MSO72004 models) |
| ET3 | Ethernet Compliance Test Software |
| FBD | FB-DIMM Memory Bus Analysis |
| HEAC | HEAC Automated Solution |
| HT3 | HDMI Compliance Test Software |
| HT3DS | HDMI Direct Synthesis for HDMI 1.4 |
| IBA*6 | InfiniBand Compliance Module for RT-Eye Analysis Software |
| J2 | TDSDDM2 Disk-drive Analysis Software |
| JA3 | TDSJIT3 Advanced Jitter and Timing Measurements Software |
| JE3 | TDSJIT3 Essentials Jitter and Timing Measurements |
| JEA | Upgrade from Jitter Essentials to Jitter Advanced |
| PCE*22 | PCI Express™ Analysis Software |
| PTD | Protocol Decoding for 8b/10b-encoded Serial Signals |
| PWR | Power Measurement and Analysis Software |
| RTE | RT-Eye Serial Data Compliance and Analysis Software |
| SLA | Serial Data Link Analysis Advanced (with Equalization) |
| SLE | Serial Data Link Analysis Essentials (No Equalization) |
| SST*6 | SATA and SAS Analysis Software Module for RT-Eye Analysis Software |
| SVEH*23 | SignalVu™ Essentials – Vector Signal Analysis Software |
| SVEU*7 | SignalVu™ Essentials – Vector Signal Analysis Software |
| SVM | General Purpose Modulation Analysis. Requires Option SVE |
| SVP | Advanced Pulsed Signal Analysis including Measurements. Requires Option SVE |
| SVT | Frequency and Phase Settling Time Measurements. Requires Opt. SVE |
| USB | USB 2.0 Compliance Test Software |
| USB3*10, 12, 15 | USB 3.0 Compliance and Analysis Software |
| UWB | Ultra-Wideband Spectral Analysis (includes WiMedia Alliance PHY interf. testing) |
| UWBE | Ultra-Wideband Spectral Analysis Essentials |
| VNM*24 | TDSVNM CAN and LIN Timing and Protocol Decode (Triggering not included) |
| XGbT | 10GBASE-T Automated Solution |

| Option | Description |
|---|--|
| TekExpress Application Framework | |
| TEKEXP | TekExpress Automation Framework |
| USB-RMT | TekExpress Automated USB 3.0 Receiver Solution |
| USB-TX*10, 12, 15 | TekExpress Automated USB 3.0 Solution |
| Other | |
| IF | Upgrade Installation Service |

*6 Requires Opt. RTE.

*7 For models of bandwidth ≥ 12.5 GHz only.

*10 For models of bandwidth ≥ 8 GHz only.

*12 Requires TekExpress Automation Framework.

*14 Requires Opt. PTH, PTU, or STU.

*15 Requires Opt. DJA.

*16 Standard feature on DSA70000B models.

*17 For DPO70000B and MSO70000 models only.

*18 For DSA70000B models only.

*19 Requires Opt. MTH.

*20 Requires Opt. ASM and DJA.

*21 Requires Opt. SLE.

*22 Requires Opt. RTE or DJA.

*23 For models of bandwidth ≤ 8 GHz only.

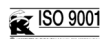
*24 CAN/LIN trigger module available – Order ATM1 through Crescent Heart Software.

Instrument Bandwidth Upgrades

The analog bandwidth of the DPO70000B, DSA70000B, and MSO70000 instruments can be easily upgraded after initial time of purchase. To upgrade your instrument's bandwidth, order one of the products listed below.

| DPO70000B and DSA70000B Series | | |
|---------------------------------------|-------------------------|--------------|
| Current Bandwidth | Bandwidth After Upgrade | Model Number |
| 4 GHz | 6 GHz | BWU4T6 |
| 4 GHz | 8 GHz | BWU4T8 |
| 4 GHz | 12.5 GHz | BWU4T12 |
| 4 GHz | 16 GHz | BWU4T16 |
| 4 GHz | 20 GHz | BWU4T20 |
| 6 GHz | 8 GHz | BWU6T8 |
| 6 GHz | 12.5 GHz | BWU6T12 |
| 6 GHz | 16 GHz | BWU6T16 |
| 6 GHz | 20 GHz | BWU6T20 |
| 8 GHz | 12.5 GHz | BWU8T12 |
| 8 GHz | 16 GHz | BWU8T16 |
| 8 GHz | 20 GHz | BWU8T20 |
| 12.5 GHz | 16 GHz | BWU12T16 |
| 12.5 GHz | 20 GHz | BWU12T20 |
| 16 GHz | 20 GHz | BWU16T20 |

| MSO70000 Series | | |
|------------------------|-------------------------|--------------|
| Current Bandwidth | Bandwidth After Upgrade | Model Number |
| 4 GHz | 6 GHz | MBWU4T6 |
| 4 GHz | 8 GHz | MBWU4T8 |
| 4 GHz | 12.5 GHz | MBWU4T12 |
| 4 GHz | 16 GHz | MBWU4T16 |
| 4 GHz | 20 GHz | MBWU4T20 |
| 6 GHz | 8 GHz | MBWU6T8 |
| 6 GHz | 12.5 GHz | MBWU6T12 |
| 6 GHz | 16 GHz | MBWU6T16 |
| 6 GHz | 20 GHz | MBWU6T20 |
| 8 GHz | 12.5 GHz | MBWU8T12 |
| 8 GHz | 16 GHz | MBWU8T16 |
| 8 GHz | 20 GHz | MBWU8T20 |
| 12.5 GHz | 16 GHz | MBWU12T16 |
| 12.5 GHz | 20 GHz | MBWU12T20 |
| 16 GHz | 20 GHz | MBWU16T20 |



Product(s) are manufactured in ISO registered facilities.



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

Contact Tektronix:

- ASEAN / Australasia** (65) 6356 3900
- Austria** 00800 2255 4835*
- Balkans, Israel, South Africa and other ISE Countries** +41 52 675 3777
- Belgium** 00800 2255 4835*
- Brazil** +55 (11) 3759 7600
- Canada** 1 800 833 9200
- Central East Europe, Ukraine, and the Baltics** +41 52 675 3777
- Central Europe & Greece** +41 52 675 3777
- Denmark** +45 80 88 1401
- Finland** +41 52 675 3777
- France** 00800 2255 4835*
- Germany** 00800 2255 4835*
- Hong Kong** 400 820 5835
- India** 000 800 650 1835
- Italy** 00800 2255 4835*
- Japan** 81 (3) 6714 3010
- Luxembourg** +41 52 675 3777
- Mexico, Central/South America & Caribbean** (52) 56 04 50 90
- Middle East, Asia, and North Africa** +41 52 675 3777
- The Netherlands** 00800 2255 4835*
- Norway** 800 16098
- People's Republic of China** 400 820 5835
- Poland** +41 52 675 3777
- Portugal** 80 08 12370
- Republic of Korea** 001 800 8255 2835
- Russia & CIS** +7 (495) 7484900
- South Africa** +41 52 675 3777
- Spain** 00800 2255 4835*
- Sweden** 00800 2255 4835*
- Switzerland** 00800 2255 4835*
- Taiwan** 886 (2) 2722 9622
- United Kingdom & Ireland** 00800 2255 4835*
- USA** 1 800 833 9200

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

Updated 25 May 2010

For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tektronix.com



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.

17 Jun 2010

55W-23446-3

