DPO70000SX provides ultra-high bandwidth real time signal acquisition and analysis up to 70 GHz analog bandwidth. The patented Asynchronous Time Interleaving (ATI) architecture provides the lowest noise and highest fidelity for real time signal acquisition.

- Superior signal fidelity and excellent signal-to-noise ratio
- Stable and precise multi-channel timing for most accurate analysis
- Compact instrument package with flexibility for future expansion and simple reconfiguration

Introduction
DPO70000SX Series oscilloscopes provide the most accurate real time performance for ultra-bandwidth applications.

- Low noise, 70 GHz real time signal capture using patented ATI architecture
- Compact 5 ¼” (3U) instrument package for the most versatile multi-channel systems
- Precise, scalable performance using UltraSync multi-unit time synchronization bus
- Highest trigger performance with >25 GHz Edge trigger bandwidth, unique Envelope trigger

- 14.1 Gbps hardware serial trigger - Assures triggering on the first instance of a specified 8b10b, 64b66b, or generic NRZ pattern to allow isolation of pattern-dependent effects
- Bit error detector - Implemented within the trigger system, this feature provides simple bit error measurement against a defined pattern file, with no missed bits

Low noise, high fidelity signal acquisition is critical in ultra-bandwidth applications such as long-haul coherent optical, 400G datacom and wideband RF. The flagship DPO77002SX model uses ATI (Asynchronous Time Interleaving) architecture to achieve 70 GHz and 200 GS/s (5 ps/ Sample) real time acquisition performance. This patented, symmetric architecture elegantly creates an inherent noise advantage over legacy bandwidth interleaving methods. The DPO70000SX provides the lowest noise, highest fidelity and maximum performance for complex optical modulation analysis, jitter and noise analysis of high speed serial signaling and frequency, phase and modulation analysis of wideband RF signals.

DPO70000SX Digital Phosphor Oscilloscopes
- 13 GHz, 16 GHz, 23 GHz, or 33 GHz analog bandwidth
- 100 GS/s, 10 ps/Sample real-time sample rate
DPO70000SX ATI Performance Oscilloscopes

- 70 GHz, 59 GHz, or 50 GHz analog bandwidth
- Low-noise ATI architecture
- 200 GS/s, 5 ps/Sample real-time sample rate
Applications

- Coherent optical modulation analysis
- Research and defense data acquisition and analysis
- 100G/400G datacom system debug
- PCIe debugging and compliance testing
- High-speed serial communications debugging and compliance testing
- PCIe, USB, Thunderbolt, HDMI, DisplayPort, and more
ATI architecture delivers lowest noise

Previous real time scope solutions for digitizing ultra-high bandwidth signals distribute signal energy to two digitizing paths, and then use DSP to reconstruct the input signal. Unlike legacy schemes, Tektronix’ unique ATI architecture provides a symmetric technique that delivers all signal energy to both digitizing paths resulting in an inherent noise advantage.

The diagram shows how an input signal enters the ATI ASIC where it is sampled and alternately delivered to each digitizing subsystem. The sample clock runs at 75 GHz and effectively folds the spectrum of the input signal about 37.5 GHz prior to digitizing. Each digitizing path operates at 100 GS/s and the folded spectrum is band limited to <40 GHz to meet Nyquist criteria. The alternating phase of the sampler has the effect of inverting signal phase 180° in one digitizing path, which provides significant benefit in reconstructing the final digitized signal.

With two copies of the entire signal energy digitized, the signal spectra are "unfolded" using a DSP equivalent of the sampling process and combined to reproduce the input signal. Because two copies of the signal are being combined the process effectively averages them together, reducing random noise. Phase-inversion introduced by the sampling process causes intermediate frequency components to directly cancel one another, simplifying reconstruction and calibration.

Thus, ATI architecture provides an inherent SNR advantage over legacy digital-bandwidth interleaving techniques. These techniques immediately split an input signal into upper and lower bands of frequencies. This divides the power and the upper frequency band must be mixed down prior to digitizing while the lower band is directly digitized. This asymmetric approach can make signal reconstruction and calibration more difficult and lead to errors in pass-band frequency or phase response. The division of power removes the opportunity to reduce signal noise. ATI alleviates these issues by using a unique symmetric architecture.

A comparison of baseline noise between the Tektronix DPO77002SX and another vendor’s 63 GHz model, with both instruments set to 60 GHz bandwidth, demonstrates the effectiveness of ATI at providing the lowest noise acquisition.

JNF performance

An all-new master sample clock design which provides the remarkably low sample clock jitter of 65fsRMS, combined with the very low noise performance achieved with ATI, allows the DPO77002SX to reach new levels of jitter noise floor performance. The JNF at 300 mVFS is a mere 123 fsRMS, which even rivals lower bandwidth instruments.

The figure shows jitter analysis of 60 GHz sine wave applied to the ATI input. The result shows a clean eye with random jitter RJ <80 fsRMS.
**Compact ultra-performance oscilloscope**

DPO70000SX Series models establish a unique compact oscilloscope package that enables unprecedented workspace efficiency and mounting versatility. The SX series provides a differentiated approach to ultra-bandwidth real-time acquisition that aligns with user trends toward large external monitors, higher degrees of automation and increased separation of data collection and data analysis workspaces.

Stand-alone DPO70000SX compact models provide functionality equivalent to their bench counterparts (DPO70000DX) at half the height through addition of external display, keyboard and mouse. SX series models can host Advanced Analysis software and be automated using internal or external control just as their bench counterparts.

The DPO77002SX 70 GHz ATI Performance Oscilloscope provides one channel at 70 GHz, 200 GS/s acquisition performance or two channels at 33 GHz, 100 GS/s acquisition. The instrument includes a 70 GHz, 1.85 mm low-noise ATI input channel as well as general purpose TekConnect 2.92 mm inputs for versatile probing and signal conditioning options to 33 GHz.

The DPO73304SX model provides two channels at 33 GHz, 100 GS/s acquisition or four channels at 23 GHz, 50 GS/s real-time acquisition performance. This model provides acquisition performance similar to the DPO73304DX bench model, but in the new compact instrument form-factor.

All models in the DPO70000SX Series achieve the highest level of trigger performance available in real-time oscilloscopes, >25 GHz edge trigger performance and <40 ps glitch trigger performance. An innovative new Window trigger type enables triggering on the envelope of RF signal bursts with time-qualification to discriminate envelope width. Industry-leading pulse-width timer performance enables the most precise discrimination of specific bit-widths in high speed serial data streams and detection of "runt" pulses in the midst of pseudo-random signaling. The DPO70000SX Series Auxiliary Trigger input provides low-jitter edge triggering and uses TekConnect accessories for a wide variety of signal conditioning solutions.

**Optimal usability**

**Less than half the height of bench models**

DPO70000SX Series instruments are contained in a 5 ¼" (3U) package that optimizes space usage and enables the most versatile range of mounting configurations. Two DPO70000SX instruments stack in less height than similar-class bench instruments, yet achieve higher measurement performance.

**Complete standalone oscilloscope**

Though compact, SX models provide full standalone oscilloscope functionality and performance. They can directly host Tektronix’ Advanced Analysis applications for tasks such as jitter, noise, optical modulation or spectral analysis and do not require a separate processor or control unit.

**Familiar scope controls where you want them**

The DPO7AFP Auxiliary Front Panel is a valuable usability accessory that compliments the compact instrument package by enabling users to operate with familiar controls without requiring access to the front of an instrument.
Remote desktop operation

As with current bench-model DPO/MSO70000 Series instruments, DPO70000SX models can be operated remotely over a network using Windows® Remote Desktop. Use the Windows Remote Desktop utility to access your oscilloscope from across the lab or across the globe.

Precision synchronization for multi-unit systems

DPO70000SX Series instruments include the Tektronix UltraSync multi-unit time synchronization bus. UltraSync is used to synchronize sample clock, trigger and run-stop control across multiple units with performance equivalent to that found in monolithic scopes. UltraSync cables are available in 1 meter and 2 meter length to maximize configuration and layout versatility while preserving timing integrity of a multi-unit system.

- 12.5 GHz Sample Clock Reference
- Coordinated Trigger
- High speed data path

The UltraSync bus consists of three elements, each providing an important element of precise multi-unit operation:

- UltraSync includes a 12.5 GHz Sample Clock Reference signal sourced by the Master and used by each Extension to synchronize sample placement in the digitizing process.

Scalable performance and versatile configurations

DPO70000SX multi-unit modes enable a variety of extended performance and increased channel-count configurations. Master-Extension configurations provide additional input channels synchronized to the same degree of precision as internal channels and controlled from a single user interface as an interactive instrument or programming interface in automated applications.
This scalable approach to performance allows users to purchase performance suitable for today's requirements, such as four channels of 33 GHz, 100 GS/s acquisition while also having two channels with 70 GHz, 200 GS/s performance suitable for next-generation designs. Subsequently, two additional units can be added for a total of four channels at 70 GHz, 200 GS/s. Units in this four-unit configuration can be separately deployed as pairs or standalone units at any time to meet other test demands.

The DPO77002SX also offers a unique value proposition in single-channel 70 GHz, 200 GS/s applications such as RF analysis or pulsed laser studies. In these cases a user can purchase a single unit for 70 GHz channel performance along with two channels at 33 GHz. Additional units can be purchased at a later time and combined using UltraSync if higher channel count is needed.

The following multi-unit configurations are supported:

- 2 DPO77002SX: 2 Ch @ 70 GHz, 200 GS/s or 4 Ch @ 33 GHz, 100 GS/s
- 4 DPO77002SX: 4 Ch @ 70 GHz, 200 GS/s or 8 Ch @ 33 GHz, 100 GS/s
- 2 DPO75902SX: 2 Ch @ 59 GHz, 200 GS/s or 4 Ch @ 33 GHz, 100 GS/s
- 4 DPO75902SX: 4 Ch @ 59 GHz, 200 GS/s or 8 Ch @ 33 GHz, 100 GS/s
- 2 DPO75002SX: 2 Ch @ 50 GHz, 200 GS/s or 4 Ch @ 33 GHz, 100 GS/s
- 4 DPO75002SX: 4 Ch @ 50 GHz, 200 GS/s or 8 Ch @ 33 GHz, 100 GS/s
- 2 DPO73304SX: 4 Ch @ 33 GHz, 100 GS/s or 8 Ch @ 23 GHz, 50 GS/s
- 4 DPO73304SX: 8 Ch @ 33 GHz, 100 GS/s or 16 Ch @ 23 GHz, 50 GS/s
- 2 DPO72304SX: 4 Ch @ 23 GHz, 100 GS/s or 8 Ch @ 23 GHz, 50 GS/s
- 4 DPO72304SX: 8 Ch @ 23 GHz, 100 GS/s or 16 Ch @ 23 GHz, 50 GS/s
- 2 DPO71604SX: 4 Ch @ 16GHz, 100GS/s or 8 Ch @ 16 GHz, 50GS/s
- 4 DPO71604SX: 8 Ch @ 16GHz, 100GS/s or 16 Ch @ 16 GHz, 50GS/s
- 2 DPO71304SX: 4 Ch @ 13GHz, 100GS/s or 8 Ch @ 13 GHz, 50GS/s
- 4 DPO71304SX: 8 Ch @ 13GHz, 100GS/s or 16 Ch @ 13 GHz, 50GS/s

**Skew Stability**

UltraSync provides outstanding integration and time alignment between units in a multi-unit stack. Once channels have been deskewed in a multi-unit stack, skew is very stable over time and temperature. The specification for skew stability is ≤250 fs\text{RMS}. The following DPO77002SX skew measurement plot shows that even when including the startup temperature stabilization period (approximately 1 hour), the pk-pk variation is about 400 fs, and is about 350 fs pk-pk after the 1-hour warm-up period. This plot also shows exceptional consistency over this 12-hour data collection.

Another important aspect of skew is how the phase relationship between two channels varies with changing frequency (group delay effects). The following plot compares the performance of a DPS77004SX 70 GHz two-unit system against the performance of another vendor's 63 GHz frequency-interleaved channels. What you see here is that the UltraSync two-channel skew performance dramatically surpasses the performance of another vendor's single 63 GHz model containing two channels.

**Short signal path**

Minimizing input signal path length is especially important when working at 70 GHz ultra-high bandwidth. The compact nature of DPO70000SX creates more versatile mounting options when co-locating instrument and device under test (DUT). Options such as the Auxiliary Front Panel and Remote Desktop connection allow further flexibility by eliminating the need for direct access to the instrument front panel once connected. As a result, the SX series enables the broadest range of options when dealing with a variety of DUT configurations as compared to classic bench instruments.

Input signal path length may be minimized in multi-unit configurations by inverting one unit of a pair. The low, central location of the 70 GHz ATI input provides very small input connector spacing when operating units in this configuration.

Maximum of 4 channels displayed on-screen. Access to additional channels data available through program interface.
Instruments can also be arranged at various angles to suit DUT layout, such as at right angles for card-and-backplane situation or face-to-face around a small DUT. Layouts such as this create the shortest input signal path and maximize SNR. In addition, effects of signal path elements such as cables and adapters can be characterized and removed using the Serial Data Link Analysis application to obtain the best analysis results and insight.

Applications

High-Speed Serial

PCI Express® Transmitter Compliance and Debug (Option PCE3 and PCE4) – Analyze the performance of your PCI Express® Gen 1, 2, 3, or 4 design with comprehensive test support. Using DPOJET, Option PCE3 and PCE4 enable tests that conform to PCI-SIG standards.

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.

Datacom measurements

PAM4 and NRZ measurements – The throughput of Datacom networks continues to increase. Tek’s DPO70000SX is ready to perform standards validation for today’s 25/28 G industry standards and beyond (see chart below). The powerful combination of DPO70000SX, DPOJET Jitter and Noise Analysis, and the SDLA Serial Data Link Analysis tool performs accurate de-embedding and eye diagram analysis for these key Datacom standards. The 50 GHz to 70 GHz models provide ample bandwidth for Bessel-Thomson filter responses.

<table>
<thead>
<tr>
<th>Datacom standards</th>
<th>Recommended bandwidth</th>
<th>Tektronix scope model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10GBASE KRn</td>
<td>25 GHz</td>
<td>DPO72504DX</td>
</tr>
<tr>
<td>100GBASE KR-4, CR-4</td>
<td>59 GHz</td>
<td>DPS75904SX</td>
</tr>
<tr>
<td>25 Gb Phy KR, CR for 100G</td>
<td>59 GHz</td>
<td>DPS75904SX</td>
</tr>
<tr>
<td>Fibre Channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16Gb</td>
<td>30 GHz</td>
<td>DPS75004SX</td>
</tr>
<tr>
<td>32Gb</td>
<td>45 GHz</td>
<td>DPS75004SX</td>
</tr>
<tr>
<td>Infiniband</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDR 25Gb</td>
<td>50 GHz</td>
<td>DPS75004SX</td>
</tr>
<tr>
<td>OIF-CEI 3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEI-25G</td>
<td>70 GHz</td>
<td>DPS77004SX</td>
</tr>
<tr>
<td>OIF-CEI 3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEI-56G (PAM4)</td>
<td>70 GHz</td>
<td>DPS77004SX</td>
</tr>
<tr>
<td>CEI-56G (NRZ)</td>
<td>70 GHz</td>
<td>DPS77004SX</td>
</tr>
</tbody>
</table>

With 400 G networking, serial data transmission speeds are now reaching 56 Gb/s per channel, making NRZ signaling techniques less practical. The bandwidth efficient PAM4 (4-level pulse amplitude modulation) signaling is being widely used to achieve this new performance level. Accurate PAM4 validation is best conducted using the DPO70000SX Series, with its industry-leading low-noise ATI technology, to achieve the best test margin on your measurement results. For analysis of PAM4, the DPO70000SX Option PAM4 combines industry leading equalization tools and a robust built-in software based clock recovery, which is essential to recovering complex timing and performing analysis of high ISI PAM4 signals.
Option PAM4 offers electrical measurements and option PAM-O offers optical measurements. Both comply with IEEE and OIF specifications. Optical interfacing is provided through the use of the DPO70E Series optical probes, which include ORR filters.

IEEE 802.3bj (KR4/CR4) and IEEE 802.3bm (CAUI4) Electrical Real Time Transmitter Compliance and Characterization Solution (option 100G-TXE) - TekExpress 100G-TXE automation provides turnkey testing and debug of 100G Ethernet's three most common electrical interfaces. Tools for 100G-KR4/CR4/CAUI4 are brought together in a single 100G-TXE option to support silicon designers and system designers as they perform KR4 and CR4 validation.
Bit error detection – The bit error detector (option BITERR) is a generic simple NRZ bit error detector for serial data testing, covering data rates between 600 Mbps and 14.1 Gbps. It detects bit errors on a repeating pattern being sent by a serial transmitter. This feature utilizes the trigger system hardware, rather than waveform acquisition, so every bit is detected and verified; there are no blind periods or missed bits during bit error analysis. A pattern match file is used to define the expected incoming pattern. PRBS patterns are predefined, but users can also create their own unique pattern match files. Note that this optional feature is not protocol aware, and does not detect frame/symbol/character errors. When a bit error is detected, the oscilloscope triggers a waveform acquisition, resulting in a capture of the waveform containing the bit error. If the oscilloscope also has an optional serial decoder for the serial data stream being tested (for example, 8b10b), the acquired waveform can include decoded data, making analysis and debug of the error easier. Requires option ST14G.

Link Training – High Speed Serial Link Training Analysis - option HSSLTA - is a tool for verifying and debugging link training operation on 10 Gb through 200 Gb Ethernet links. It offers a powerful debugging capability for network equipment providers and silicon vendors concerned about interoperability issues in their designs. Link training is a complex sequence of negotiations between transmitter and receiver to determine optimal transceiver settings. HSSLTA uses the power of DPO70000SX triggering to identify link training exchanges between devices, then analyzes and displays the protocol, timing, and PHY signaling associated with link negotiation. This insight allows designers to verify the link training process and to quickly pinpoint problems when links fail to train.

The Most Efficient way to isolate link training issues:
- Real time capture of PHY-layer signaling provides detailed insight
- Control channel filtering stores essential conversation and removes redundant copies so only significant elements seen
- Time-stamped control channel elements provide further insight into link training process
- Linkage to PHY signaling provides quick navigation for exploring...
Ethernet Transmitter Test Application (Option XGBT2 and NBASET) - Automates 10GBASE-T, NBASE-T, and IEEE802.3bz (2.5G/5G) physical medium attachment (PMA) and physical-layer (PHY) electrical testing to provide a fast and accurate way of testing your Ethernet designs.

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.

Coherent optical

Coherent optical modulation analysis

Tektronix DPO70000SX oscilloscopes are ideal for modulation format analysis of 400 Gb/s and Terabit-based coherent optical networking systems. The unique architecture enables scalability to grow instrument performance by adding channels or more bandwidth; test 100 G cost effectively now and expand into 400 G or 1 Terabit later. The DPO70000SX low profile reduces concerns of signal loss in system connectivity on your coherent measurements by placing the Optical Receiver as close as possible to the instrument’s input channel.

More accurate modulation analysis starts with a lower Error Vector Magnitude (EVM) floor in the instrument. The DPO70000SX Oscilloscope utilizes ATI technology to provide the industry’s lowest noise floor supporting these measurements. In addition, the system is achieving four channels of full 70 GHz Bandwidth at 200 GS/s per channel, providing a very rich analysis environment. When used in conjunction with the OM4524 Optical Modulation Receiver, optical system research engineers can customize their DSP analysis and visualization for non-standard modulation techniques using easy customer-specific implementations with extensive customizable analysis SW that leverages Matlab™.
- 70 GHz Bandwidth on 4 Channels for 1 Terabit/s systems
- Industry-best lowest noise for low EVM
- 200 GS/s sampling on 4 channels for phase tracking
- Compact form factor with scalability for channel & bandwidth
- Customizable DSP for unique analysis needs

Display

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.

Mobile computing

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.

DDR Memory Bus Analysis (Option DDRA) – Automatically identifies 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.
RF

With its low noise and flat frequency response to 70 GHz, the DPO70000SX opens opportunities for measurement and analysis of wideband RF signals.

SignalVu® 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 an RF subsystem, can be used as trigger events, while the subsystem’s RF signal can be seen in the frequency domain.

In addition to spectrum analysis, spectrograms display both frequency and amplitude changes over time. Time-correlated measurements can be made across the frequency, phase, amplitude, and modulation domains. This is ideal for signal analysis that includes frequency hopping, pulse characteristics, modulation switching, settling time, bandwidth changes, and intermittent signals.

SignalVu can process RF, I and Q, and differential I and Q signals from any oscilloscope inputs. Math functions applied by the oscilloscope are also used by SignalVu allowing users to apply custom filtering prior to vector signal analysis.

The Microsoft Windows environment makes the use of this multi-domain analysis even easier with an unlimited number of analysis windows, all time-correlated, to provide deeper insight into signal behavior. With a user interface that adapts to your preferences (keyboard, front panel, touch screen, and mouse), SignalVu is easy to apply for both first-time users and experienced hands.

Time-correlated, multi-domain view provides a new level of insight into design or operational problems not possible with conventional analysis solutions. Here, the hop patterns of a narrowband signal can be observed using Spectrogram (lower left) and its hop characteristics can be precisely measured with Frequency vs Time display (upper left). The time and frequency responses can be observed in the two right-hand views as the signal hops from one frequency to the next.
Radar and high frequency-based analysis – The low-noise, high bandwidth DPO70000SX Series Oscilloscope is ideal for high frequency FFT-based measurement analysis. When combined with the powerful SignalVu software analysis option, the DPO70000SX instrument provides FFT (fast fourier transform) measurement capability up to 70 GHz. With its scalable instrument architecture, RF engineers can obtain a single channel unit for RF input-only measurements and grow to multi-unit configurations for comprehensive RF system validation.

Examples of high-frequency RF measurements with the DPO70000SX include:

- Chirp Linearity measurements on Radar signals (see below figure)
- Wireless LAN measurements on IEEE802.11ad/ay (64.8GHz carrier frequency)
- Monitor & debug satellite communications over K-Band (20-40 GHz)

Once low-noise waveform data is captured by the 70 GHz DPO70000SX, SignalVu can be used to demodulate the signal, and display a constellation diagram and Error Vector Magnitude (EVM) measurement and other needed measurements. SignalVu also provides detailed analysis in multiple domains as additional options, such as pulse analysis and settling time for Radar systems work, digital modulation analysis and flexible OFDM analysis for emerging modulation standards, as well as AM/FM/PM modulation and audio measurements for lower bandwidth requirements.

- Industry-low noise enables low EVM floor
- 70 GHz provides wide dynamic range and accurate chirp linearity
- Integrated FFT & Phase Plot creation provides fast, accurate frequency domain measurements

Options tailored for your wideband applications – SignalVu vector signal analysis software offers options to meet your specific application, whether it be wideband radar characterization, broadband satellite, or spectrum management. SignalVu Essentials (Opt. SVE) provides the fundamental capability for all measurements and is required for pulse analysis (Opt. SVP), settling time (Opt. SVT), digital modulation analysis (Opt. SVM), flexible OFDM analysis (Opt. SVO), and AM/FM/PM Modulation and Audio Measurements (Opt. SVA). Wideband satellite and point-to-point microwave links can be directly observed with SignalVu analysis software.

WiGig IEEE802.11ad/ay transmitter testing – Option SV30 provides comprehensive analysis for WiGig IEEE802.11ad/ay IC characterization. Used together with the DPO77002SX, it delivers the industry’s most accurate signal quality measurement at 60 GHz. Automatically detect the packet Start, as well as decode packet information in the Header; synchronize to preamble using the Golay codes in the short training field; demodulates preamble, header, and payload separately; and measures EVM in each of these sections per the standard.

SV30 provides significant margin in EVM performance compared to what is required by the standard. Channel Impulse coefficients are also available. Both Control PHY (802.11ad) and Single Carrier PHY (802.11ad and 802.11ay) are supported and this option provides analysis of 802.11ay 2.16 GHz packets or 4.23 GHz adjacent 2-channel bonded packets.

Testing and verification can be done on IF and RF setups. RF power, Received Power Indicator (RCP), Frequency error (Max, Average, Std. Deviation), DC Offset, IQ DC origin offset, IQ Gain and Phase imbalance, Signal Quality, and estimated SNR measurements are reported in the Summary display. Pass/Fail results are reported using customizable limits and the presets make the test set-up push-button.

For further insight into the signal, color coding is available in the user interface, allowing you to visualize the EVM spread across the analyzed packet with color codes differentiating regions. You can also view the demodulated symbols in tabular form with different color codes and with an option to traverse to the start of each region for easier navigation.
DPO770002SX with SV30 provides the industry’s most accurate EVM. It allows easy setup to perform transmitter measurements including time overview of the bursts, spectrum, constellation diagram, decoded burst information, and EVM measurements.

**Modulation formats**
- **802.11ad**: MCS0-12.6
- **802.11ay**: MCS1-21
- **802.11ad/ay Single carrier**: π/2 BPSK, π/2 QPSK, π/2 16QAM, π/2 64QAM
- **802.11ad Control PHY**: π/2 DBPSK

**Measurements**
- RF output power, Received Channel Power Indicator (RCPI), Estimated SNR, Frequency Error, Symbol Rate Error, IQ Origin Offset, IQ Phase Imbalance, IQ Gain Imbalance, IQ Quadrature Error, EVM results for each packet region (STF, CEF, Header and Data). Packet information includes the Packet type, Preamble, Synchronization Word or Access Code, Packet Header, Payload length, and CRC details.

**Displays**
- Constellation, EVM vs Time, Symbol Table, Summary

**Residual EVM, measured at RF (Channel 1-6) on DPO770002SX**

<table>
<thead>
<tr>
<th>Channel</th>
<th>802.11ad MCS0-12.6</th>
<th>802.11ay MCS1-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel 1-4</td>
<td>1.2 - 1.6% (-38.4 to -35.9 dBc)</td>
<td>1.2 - 1.6% (-38.4 to -35.9 dBc)</td>
</tr>
<tr>
<td>Channel 5-6</td>
<td>1.4 - 2.5% (-37.1 to -32.0 dBc)</td>
<td>1.4 - 2.5% (-37.1 to -32.0 dBc)</td>
</tr>
<tr>
<td>Channel 1-2, 2-3, 3-4 (adjacent bonded)</td>
<td>NA</td>
<td>1.2 - 1.7% (-38.4 to -35.4 dBc)</td>
</tr>
<tr>
<td>Channel 4-5, 5-6 (adjacent bonded)</td>
<td>NA</td>
<td>&lt; 2.5% (&lt; -32.0 dBc)</td>
</tr>
</tbody>
</table>

**Advanced analysis**

**DPOJET Comprehensive Jitter and Noise Analysis**

DPOJET provides engineers the highest measurement sensitivity and accuracy available in real-time instruments. With comprehensive jitter and eye-diagram analysis and decomposition algorithms DPOJET simplifies discovering signal integrity concerns and jitter and their related sources in today’s high-speed serial, digital, and communication system designs.

To support measurement on signals acquired with the DPO7OE1 optical probe, DPOJET now also provides optical measurements. These include Extinction Ratio (ER), Optical Modulation Amplitude (OMA), Optical High value, and Optical Low value.

**Noise analysis with DPOJET (Opt. DJAN)**

Jitter essentials, advanced analysis and custom extensions – DPOJET Essentials is standard on the DPO70000SX 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.
SDL A signal path de-embed and custom filters

Acceleration of signaling speeds and shrinking geometries create several challenges for next generation multi-gigabit designs and test methodologies. Designs are evolving to address these challenges with advanced equalization techniques at the transmitter and receiver. Smaller form factors make signal access more difficult, resulting in non-ideal probing points. This can lead to loss and reflections on the acquired signal due to impedance discontinuities that are not present at the ideal measurement location. The advanced techniques employed by the designs call for advanced measurement solutions. The challenge begins with the signal acquisition; capturing a signal through cables, probes and fixtures distort the signal shape. SDL A Visualizer allows you to de-embed the effects (reflections, insertion loss, and cross coupling) of the measurement circuit (cables, probes, and fixtures) from the waveform while taking into account the transmitter output and receiver input impedance. De-embedding these effects improves the accuracy of measurements and can make the difference between passing or failing a test.

Signal path equalization – Using the optional Serial Data Link Analysis Visualizer (SDL A64) 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 be used to observe on-chip behavior.

The eye diagrams below illustrate the correlated eye of a signal before a channel, after a channel, and after equalization. Eye closure due to channel effects have effectively been removed using SDL A and in this case the eye widths are within ~3 ps as shown in the eye diagram on the left and right hand sides.

Custom filters – Create your own filters or use the filters provided standard with the DPO70000SX 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.

SignalCorrect™ software and TCS70902 Calibration Source

SignalCorrect allows quick characterization of cables, fixtures and other types of interconnects using the TCS70902 fast step source and the response captured on a DPO70000SX Series real-time oscilloscope.
SignalCorrect creates a filter that you can apply to your oscilloscope inputs to de-embed your device or interconnect under test.

Counter timer

The high resolution counter/timer is a new optional feature that is made possible by the new trigger system in the DPO70000SX series oscilloscopes. This is a precision frequency counter which provides frequency analysis up to 25 GHz, with up to 13 digits of resolution and 12 digits/second. Using the internal clock, this counter is accurate to better than 1 ppm. Higher accuracy is possible using a high precision external clock source. Because this measurement is made through the trigger system, it measures each and every cycle of the signal on a continuous basis during the trigger gate time, rather than making measurements on finite blocks of data through the normal acquisition channel.

This feature provides the ability to make highly accurate clock stability measurements. In the screen capture shown, a deviation of 212 μHz of source wander is measured on an 8 GHz precision source. In this figure, the signal generator was set to 8.00000000001 GHz, and the scope measured precisely that amount.

The timer allows precise measurements between trigger events with a 200 fs resolution, and can include time measurements from an A event to a B event, where A and B events can be any valid trigger mode (e.g. Glitch, Runt, Edge, etc). This feature is useful for measuring propagation delays, or analyzing anomaly occurrence rates.

Three important distinctions between this counter/timer and conventional counter/timers are:

- > 25 GHz analog bandwidth
- Wide selection of high bandwidth scope probes available for the highest signal fidelity connection to the DUT
- Ability to view the waveform on-screen to insure the counter/timer is seeing a valid waveform, and that trigger levels are set appropriately for the waveform

Built-in analysis system

DPO70000SX includes a wide variety of built-in features for visualizing and measuring signal behaviors. Select from 54 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 DPO70000SX Series.

Custom math expressions with MATLAB

Tektronix custom math expressions with MATLAB enable users to create MATLAB scripts that process live waveform data and return results into scope math traces. Extensions can also use MATLAB features to create specialized analysis and visualizations.
Debugging
Throughout the design cycle, DPO70000SX 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 TekConnect® 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 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, 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.

The DPO70000SX Series provides the highest trigger system performance available in a real time scope. The figure shows triggering on <50 ps bit-wide runt pulses (fails to cross both thresholds within specified time) on 25.78 GBaud (100GbE) signaling. High system bandwidth and extreme trigger timer precision enable reliable capture of signal aberrations and efficient isolation of fault conditions.

In the next figure, pulse width discrimination is used to isolate pulses >40 ps and <60 ps wide, showing reliable capture of 50 ps pulses within a 20 Gbps PRBS11 sequence.

DP070000SX includes a unique Envelope trigger mode that enables direct triggering on the envelope of a modulated carrier. Edge, Width and Timeout trigger types can be applied to a detected envelope to provide stable trigger on modulated bursts or discriminate bursts of a specific width. Carrier frequency can range from 500 MHz to 20 GHz to address a broad range of applications. The figure illustrates triggering on burst of specific width.

Hardware serial pattern triggering
To verify serial architectures, the DPO70000SX Series offers two different serial pattern trigger and decode options with built-in clock recovery, enabling the ability to correlate events across physical and link layers. The instrument can recover the embedded clock signal, identify transitions, and allow you to set the desired encoded words for a specific serial pattern trigger to be captured. These features can be enabled on the DPO70000SX Series with two options. Option ST14G provides serial trigger performance from 600 Mbps to 14.1 Gbps and bit level or character level trigger and decode of 8b10b NRZ serial data streams. Option SR-6466 enables support for 64b66b NRZ serial trigger and decode and requires ST14G. Any active TekConnect input channel can be used as a source for the hardware serial trigger options.

The 160 bit (16 character) pattern match feature applies to generic NRZ serial patterns and 8b10b. It enables the oscilloscope to reliably trigger on a specific section of a serial data sequence, thereby facilitating diagnostic and debug work by isolating portions of the serial data stream. For 64b66b specific patterns, the option enables trigger on a valid or invalid sync header, control block, data block, and up to 132 bit pattern match (on 2 adjacent 64b/66b blocks).

3 FastAcq not available on ATI channels.
In addition, the hardware serial trigger feature is designed for reliable operation even in the presence of spread spectrum clocks with a range of 0-5000 pps downspread.

Visual trigger – Visual Trigger further extends the Pinpoint Triggering’s capabilities, adding another level of trigger qualification to find important events in a wide variety of complex signals. Visual Trigger qualifies 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.

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 DPO70000SX 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. Capturing thousands of frames is possible, so long-term trends and changes in the bursting signal can be analyzed. FastFrame also minimizes trigger re-arm time, allowing for acquisition of events that are very closely spaced in time. Using this feature, it is possible to reliably acquire signals that are spaced by only a few microseconds.

Extended features that are part of FastFrame include the ability to very efficiently calculate a point-point average of all frames to a single waveform (summary frame). In addition, it is possible to perform an orthogonal average, whereby multiple sets of frames can be acquired. In this mode, each #1 frame is averaged on a point-by-point basis with all other #1 frames, each #2 frame is averaged on a point-by-point basis with all other #2 frames, and so on up to the total number of frames specified. This feature provides a very efficient way to extend the dynamic range of the oscilloscope while acquiring repeatable sequences of events.

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 DPO70000SX 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.
Probing and remote-head coaxial input

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 P7700, P7600, and P7500 TriMode™ probing system with bandwidths that are perfectly matched to the DPO70000SX Series. The P7700, 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.

P7700 Series TriMode Probes

The P7700 Series TriMode probes provide the highest probe fidelity available for real-time oscilloscopes. In addition, with connectivity innovations such as solder down tips with the probe's input buffer mounted only a few millimeters from the end of the tip, the P7700 Series probes provide unmatched usability for connecting to today’s most challenging electronic designs.

DPO7OE Series Optical Probes

The DPO7OE Series Optical probes can be used as an Optical Reference Receiver for high speed serial data signals (using selectable Bessel-Thomson ORR filters), or can be used as a conventional O/E converter for general wide-bandwidth optical signal acquisition. The DPO7OE Series is compatible with DPO/MSO70000 C/DX/SX models. Connected to TekConnect channels for up to 33 GHz bandwidth. Connected to ATI channels, the DPO7OE1 provides up to 42 GHz electrical response; the DPO7OE2 provides up to 59 GHz electrical bandwidth response.

Signal acquisition

ATI input

The DPO77002SX 70 GHz ATI input channel uses industry-standard 1.85 mm coaxial connection system specified to 67 GHz, with typical performance to 70 GHz. The instrument includes a calibration-grade 1.85 mm female-female adapter installed in the ATI input connector (male) to provide mechanical protection and gender selection. Instruments also include a static protection wrist strap, torque wrench and a set of backing wrenches to facilitate proper care and installation of signal path elements, ensuring optimal measurement performance. The 1.85 mm connection system is compatible with 2.4 mm (50 GHz) elements.

TekConnect® inputs

DPO70000SX models include the TekConnect signal interconnect system, offering unparalleled versatility with a wide array of accessory signal access and conditioning solutions. The TCA292D TekConnect adapter provides 2.92 mm connection, 50 Ω coaxial environment to 33 GHz.

High performance Auxiliary Trigger input

DPO70000SX includes an Auxiliary Trigger input (TekConnect) suitable for high performance Edge triggering without consuming an acquisition channel. Aux trigger bandwidth is >10 GHz on the DPO70000SX Series with <1.5 psRMS jitter.
Channel timing deskew
All DPO70000SX models include differential fast-edge outputs matched to <1.6 ps on the front panel that provide a convenient source for aligning channel timing in a coaxial environment. Instruments include accessories to accomplish channel-to-channel timing deskew using the built-in source. Additional accessories can be purchased separately to accomplish even finer time alignment or deskew in a probe-based environment.

DPO7RF Signal Path Solutions
The DPO7RF Signal Path Solutions kits provide you with preconfigured kits of components you can use to optimize measurement performance in your ultra-high bandwidth applications. Kits include attenuators, adapters, DC Blocks, power divider, cleaning swabs, color marking bands, S-parameters and documentation.
- Kits and cables include S-parameter files and documentation on a USB memory stick
- Kits include signal path marking accessories
- Kits include cleaning swabs for proper maintenance of sensitive RF components
  
DPO7RFK1-1.85 mm characterized attenuator kit.
DPO7RFK2-Extended 1.85 mm characterized attenuator/adapter kit.
DPO7RFK3-1.85 mm deskew kit.
**Bench or rack mount**

DPO70000SX models are equally suited for bench and rack-mounted use and complemented with a number of elements to address specific environments.

UltraSync cables are available in 1 meter and 2 meter lengths to enable configuration flexibility. The default 1 meter cable is suitable for typical two- and four-unit configurations with uniformly stacked instruments. The longer cable enables combinations operating at 90° to one another or face-to-face around a DUT. Cable length can be mixed in a configuration to suit application need and time de-skewed as a system to provide precise channel-to-channel time alignment.

Instrument cases include recesses that align with feet such that stacked units mechanically engage one another for added stability. This feature also works in inverted-stacking configurations and mixed stacks that include an OM4000 Optical Receiver. Models include threaded holes for user-provided side brackets in cases where specific combinations are to be "locked" together.

DPO70000SX units may even be operated inverted if desired, to shorten OMA receiver connection distance as shown.

**Rack environment**

The DPO70000SX rack mount is a tray directly attached to the instrument. The tray occupies 1U rack height in addition to the 3U instrument and preserves a cooling channel for the unit. The rack mount also provides heavy-duty carry handles for transporting the instrument outside the rack environment.

The rack-mounting kit allows units to be mounted upright or inverted to minimize input cable length, just as when stacking on a bench.

The DPO70000SX rack-mount tray can also house a front-mounted Solid State Drive (SSD) for easy access to instrument mass storage in a rack environment.
## Specifications

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

### Model overview

<table>
<thead>
<tr>
<th></th>
<th>DPO77002SX/DPS77004SX</th>
<th>DPO75902SX/DPS75904SX</th>
<th>DPO75002SX/DPS75004SX</th>
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<tbody>
<tr>
<td><strong>ATI channel</strong></td>
<td>DP077002SX</td>
<td>DP075902SX</td>
<td>DP075002SX</td>
</tr>
<tr>
<td></td>
<td>1 ch/67 GHz</td>
<td>1 ch/59 GHz</td>
<td>1 ch/50 GHz</td>
</tr>
<tr>
<td></td>
<td>1 ch/70 GHz (typical)</td>
<td>2 ch/33 GHz</td>
<td>2 ch/50 GHz</td>
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<td>DP75904SX</td>
<td>DP75004SX</td>
</tr>
<tr>
<td></td>
<td>2 ch/33 GHz</td>
<td>2 ch/33 GHz</td>
<td>2 ch/33 GHz</td>
</tr>
<tr>
<td></td>
<td>2 ch/70 GHz (typical)</td>
<td>2 ch/50 GHz</td>
<td>2 ch/33 GHz</td>
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<tr>
<td><strong>Analog channels/bandwidth</strong></td>
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<td>DPO77002SX</td>
<td>DPO75902SX</td>
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<td>1 ch/67 GHz</td>
<td>1 ch/59 GHz</td>
<td>1 ch/50 GHz</td>
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<tr>
<td></td>
<td>1 ch/70 GHz (typical)</td>
<td>2 ch/33 GHz</td>
<td>2 ch/50 GHz</td>
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<tr>
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<tr>
<td></td>
<td>200 GS/s</td>
<td>100 GS/s</td>
<td>100 GS/s</td>
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<tr>
<td><strong>Rise time (typical)</strong></td>
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<tr>
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<td>10% to 90%: 5.6 ps</td>
<td>10% to 90%: 6.8 ps</td>
<td>10% to 90%: 7.8 ps</td>
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<td>20% to 80%: 4.3 ps</td>
<td>20% to 80%: 5.2 ps</td>
<td>20% to 80%: 6 ps</td>
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<tr>
<td></td>
<td>0.83% of full scale</td>
<td>0.83% of full scale</td>
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<td>0.71% of full scale</td>
<td>0.71% of full scale</td>
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<td>0.56% of full scale @ 0 V offset (300 mVFS)</td>
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<td><strong>Record length (each channel, Opt. 20XL)</strong></td>
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<tr>
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<td><strong>Duration at highest sample rate (Standard)</strong></td>
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<tr>
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<td>313 µs</td>
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<td>625 µs</td>
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<td><strong>Duration at highest sample rate (Opt. 20XL)</strong></td>
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<tr>
<td></td>
<td>1.25 ms</td>
<td>2.5 ms</td>
<td>1.25 ms</td>
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<tr>
<td><strong>Duration at highest sample rate (Opt. 50XL)</strong></td>
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</tr>
<tr>
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<td>5.0 ms</td>
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### DPO73304SX/DPS73308SX

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<tr>
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<th>DPO72304SX</th>
<th>DPO71604SX</th>
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<td>2 ch/33GHz, 4 ch/23GHz</td>
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<td>DP73308SX</td>
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<tr>
<td></td>
<td>4 ch/33GHz, 8 ch/23GHz</td>
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<td>DPO73304SX</td>
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<td></td>
<td>2 ch 100 GS/s, 4 ch 50 GS/s</td>
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<td>DP73308SX</td>
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<td>4 ch 100 GS/s, 8 ch 40 GS/s</td>
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<tr>
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<td>10% to 90%: 13 ps</td>
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<td>10% to 90%: 26 ps</td>
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<td>20% to 80%: 9 ps</td>
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<td>20% to 80%: 19 ps</td>
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## Model overview

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<tr>
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<th>DPO72304SX</th>
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<td>Record length (each channel, Opt. 20XL)</td>
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<td>250 M</td>
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<tr>
<td>Record length (each channel, Opt. 50XL)</td>
<td>DPO73304SX 1 G on 2 ch, 500 M on 4 ch DPS73308SX 1 G on 2 ch each unit, 500 M on 4 ch each unit</td>
<td>1 G on 2 ch, 500 M on 4 ch</td>
<td>1 G on 2 ch, 500 M on 4 ch</td>
<td>1 G on 2 ch, 500 M on 4 ch</td>
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<td>Timing resolution</td>
<td>10 ps (100 GS/s)</td>
<td>10 ps (100 GS/s)</td>
<td>10 ps (100 GS/s)</td>
<td>10 ps (100 GS/s)</td>
</tr>
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<td>Duration at highest sample rate (Standard)</td>
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<td>625 μs</td>
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<td>1.25 ms</td>
<td>1.25 ms</td>
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<tr>
<td>Duration at highest sample rate (Opt. 20XL)</td>
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<td>2.5 ms</td>
<td>2.5 ms</td>
<td>2.5 ms</td>
</tr>
<tr>
<td>Duration at highest sample rate (Opt. 50XL)</td>
<td>10 ms</td>
<td>10 ms</td>
<td>10 ms</td>
<td>10 ms</td>
</tr>
</tbody>
</table>

## Vertical system - analog channels

### Input coupling

**TekConnect channels:**

Two modes: DC, 50 ohms to a programmable termination voltage; Ground.

The termination can be connected to a DC voltage:

- ≤ 1.2 \(V_{FS}\) settings: -3.5 V to 3.5 V,
- > 1.2 \(V_{FS}\) settings: 0.0 V

**ATI channel:**

DC, 50 Ω.

### Input resistance

<table>
<thead>
<tr>
<th>(\leq 1.2 \ V_{FS}) settings</th>
<th>(50 \Omega \pm 3%) at 18 to 28 °C (64 to 82 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&gt;1.2 \ V_{FS}) settings</td>
<td>(50 \Omega \pm 4%) over 5 to 45 °C (45 to 113 °F)</td>
</tr>
<tr>
<td>ATI channel</td>
<td>(50 \Omega \pm 4%) from 18 °C to 28 °C</td>
</tr>
<tr>
<td></td>
<td>(50 \Omega \pm 3%) from 5 °C to 45 °C</td>
</tr>
</tbody>
</table>

### Sensitivity range

**TekConnect channels**

62.5 m\(V_{FS}\) to 6 \(V_{FS}\)

**ATI channel**

100 m\(V_{FS}\) to 300 m\(V_{FS}\).
Vertical system - analog channels

Maximum input voltage

TekConnect channels:
\[ \leq 1.2 \text{ V}_{	ext{FS}} \text{ settings:} \]
\[ \pm 1.5 \text{ V relative to the termination bias (30 mA maximum)} \]
\[ \pm 5 \text{ V absolute maximum input} \]
\[ > 1.2 \text{ V}_{	ext{FS}} \text{ settings:} \]
\[ \pm 8 \text{ V. Limited by maximum Vterm current and the attenuator power rating at maximum temperature.} \]

ATI channel:
\[ \pm 0.75 \text{ V}_{	ext{pk}} \]

Aux channel:
\[ \pm 5.0 \text{ V}_{	ext{pk}} \]

Input termination voltage (VTerm) range, TekConnect channels

\[ \leq 1.2 \text{ V}_{	ext{FS}} \text{ settings:} \]
-3.5 V to +3.5 V

\[ > 1.2 \text{ V}_{	ext{FS}} \text{ settings:} \]
0 V

Frequency response tolerance

All modes, BWE on, 18 ºC to 28 ºC (typical)

TekConnect channel:
Step settings TekConnect channels:
- 77.5 mV_{FS}, 151 mV_{FS}, 302 mV_{FS}, 605 mV_{FS}, 1210 mV_{FS}, 1620 mV_{FS}, 3240 mV_{FS}
- 0.5 dB from DC to 50% of nominal BW
- 1.5 dB from 50% to 80% of nominal BW
All other gain settings:
- 1.0 dB from DC to 50% of nominal BW
- 2.0 dB from 50% to 80% of nominal BW

ATI channel:
All volts/div settings
- 0.5 dB from DC to 20 GHz
- 0.75 dB from >20 GHz to 30 GHz
- 1.25 dB from >30 GHz to 68.5 GHz
- 2 dB from >68.5 GHz to 69.5 GHz
+2 / -3 dB at 70 GHz

Bandwidth limit
Depending on instrument model: 70 GHz to 1 GHz in 1 GHz steps, or 500 MHz; 5 GHz steps above 35 GHz
Hardware-only bandwidth settings at 33 GHz available on non-ATI channels. No hardware-only settings available on ATI channel.

Vertical resolution
8 bits, (11 bits with averaging)

DC gain accuracy
± 2%

Effective number of bits (typical), Average value from DC to full bandwidth of model.

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>70 GHz ATI Channel</th>
<th>59 GHz ATI Channel</th>
<th>50 GHz ATI Channel</th>
<th>33 GHz TekConnect Channels</th>
<th>23 GHz TekConnect Channels</th>
<th>16 GHz TekConnect Channels</th>
<th>13 GHz TekConnect Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.8 bits at 250 mV FS, 200GS/s</td>
<td>4.8 bits at 250 mV FS, 200GS/s</td>
<td>5.0 bits at 250 mV FS, 200GS/s</td>
<td>5.0 bits at 500 mV FS, 100GS/s</td>
<td>5.4 bits at 500 mV FS, 100GS/s</td>
<td>5.8 bits at 500 mV FS, 100GS/s</td>
<td>5.9 bits at 500 mV FS, 100GS/s</td>
</tr>
</tbody>
</table>
**Datasheet**

**Vertical system - analog channels**

<table>
<thead>
<tr>
<th>TekConnect channels</th>
<th>Full Scale voltage range</th>
<th>Offset range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62.5 mV&lt;sub&gt;FS&lt;/sub&gt; – 1.2 V&lt;sub&gt;FS&lt;/sub&gt;</td>
<td>±3.4 V</td>
</tr>
<tr>
<td></td>
<td>&gt;1.2 V&lt;sub&gt;FS&lt;/sub&gt; – 6 V&lt;sub&gt;FS&lt;/sub&gt;</td>
<td>±6 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ATI channel</th>
<th>Full Scale voltage range</th>
<th>Offset range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 mV&lt;sub&gt;FS&lt;/sub&gt; – 300 mV&lt;sub&gt;FS&lt;/sub&gt;</td>
<td>±300 mV - (10 div × Volts/div)</td>
</tr>
</tbody>
</table>

| Offset accuracy |
|-----------------|-----------------|
| Full scale voltage range | Offset accuracy |
| 62.5 mV<sub>FS</sub> to 1.2 V<sub>FS</sub> (TekConnect channels) | ±(0.4% | net offset | + 0.2% | net offset – Vterm setting | + 2.5 mV + 1% FS) |
| >1.2 V<sub>FS</sub> to 6 V<sub>FS</sub> (TekConnect channels) | ±(0.6% | net offset | + 13.4 mV + 1% FS) |
| 100 mV<sub>FS</sub> to 300 mV<sub>FS</sub> (ATI channel) | ±(0.35% | net offset | + 2 mV + 1% FS) |

| Position range | ± 5 divisions |

<table>
<thead>
<tr>
<th>Channel-to-channel crosstalk (channel isolation), typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input frequency range (up to the rated bandwidth). Assumes two channels with the same scale and bandwidth settings. The limits apply up to the bandwidth of the particular instrument.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ATI models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specified channels</td>
</tr>
<tr>
<td>ATI channels (isolation between any two [or more] ATI channels in separate units), requires UltraSync</td>
</tr>
<tr>
<td>TekConnect channels in an ATI unit (isolation between channels 1 and 3)</td>
</tr>
<tr>
<td>TekConnect channels to ATI channel (isolation between channels 1 and 3 to channel 2)</td>
</tr>
<tr>
<td>&gt;4 GHz to 10 GHz</td>
</tr>
<tr>
<td>&gt;10 GHz to 20 GHz</td>
</tr>
<tr>
<td>&gt;20 GHz to 30 GHz</td>
</tr>
<tr>
<td>&gt;30 GHz to 33 GHz</td>
</tr>
<tr>
<td>ATI channel to TekConnect (non-ATI) channels (isolation between channel 2 and channels 1 or 3)</td>
</tr>
<tr>
<td>&gt;3 GHz to 12 GHz</td>
</tr>
<tr>
<td>&gt;12 GHz to 33 GHz</td>
</tr>
<tr>
<td>&gt;33 to 70 GHz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TekConnect models (non-ATI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specified channels</td>
</tr>
<tr>
<td>Isolation between channels 1 or 2 and channels 3 or 4</td>
</tr>
<tr>
<td>Isolation between channels 1 and 2, or channels 3 and 4</td>
</tr>
<tr>
<td>&gt;2 to 10 GHz</td>
</tr>
<tr>
<td>&gt;10 to 20 GHz</td>
</tr>
<tr>
<td>&gt;20 to 33 GHz</td>
</tr>
</tbody>
</table>
**Vertical system - analog channels**

**Displayed Average Noise Level (DANL) (typical)**

- 6.25 mV/div (10 mV/div for ATI channel)
- 500 kHz span, 1 kHz RBW

Peak detector, averaged trace, input terminated

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Noise Density</th>
<th>Noise Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC-500 MHz</td>
<td>≤ -145 dBm/Hz</td>
<td>29 dB NF</td>
</tr>
<tr>
<td>500 MHz - 20 GHz</td>
<td>≤ -155 dBm/Hz</td>
<td>19 dB NF</td>
</tr>
<tr>
<td>20 GHz - 70 GHz</td>
<td>≤ -150 dBm/Hz</td>
<td>24 dB NF</td>
</tr>
</tbody>
</table>

**Signal to noise dynamic range (typical)**

- TekConnect channel:
  - 3 dBm input @ 1 GHz, 100 mV/div
  - CF 1 GHz, 50 MHz span, 1 kHz RBW, +20 MHz from center
  - 102 dB

- ATI channel:
  - -7.5 dBm input @ 65 GHz, 30 mV/div
  - CF 65 GHz, 50 MHz span, 1 kHz RBW, +20 MHz from center
  - 95 dB

**Phase noise (typical)**

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>10 kHz</th>
<th>100 kHz</th>
<th>1 MHz</th>
<th>10 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GHz</td>
<td>-113 dBc/Hz</td>
<td>-120 dBc/Hz</td>
<td>-133 dBc/Hz</td>
<td>-139 dBc/Hz</td>
</tr>
<tr>
<td>12.5 GHz</td>
<td>-95 dBc/Hz</td>
<td>-98 dBc/Hz</td>
<td>-127 dBc/Hz</td>
<td>-139 dBc/Hz</td>
</tr>
<tr>
<td>40 GHz</td>
<td>-86 dBc/Hz</td>
<td>-89 dBc/Hz</td>
<td>-110 dBc/Hz</td>
<td>-132 dBc/Hz</td>
</tr>
<tr>
<td>60 GHz</td>
<td>-82 dBc/Hz</td>
<td>-87 dBc/Hz</td>
<td>-110 dBc/Hz</td>
<td>-125 dBc/Hz</td>
</tr>
</tbody>
</table>

**2nd/3rd harmonic distortion**

- 6.25 mV/div (10 mV/div for ATI channel)

Input signal -26 dBm (-22 dBm for ATI channel)

<table>
<thead>
<tr>
<th>Fundamental</th>
<th>2nd</th>
<th>3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GHz</td>
<td>≤ -60 dBc</td>
<td>≤ -55 dBc</td>
</tr>
<tr>
<td>500 MHz - 10 GHz</td>
<td>≤ -55 dBc</td>
<td>≤ -50 dBc</td>
</tr>
<tr>
<td>10 GHz - 16.5 GHz</td>
<td>≤ -45 dBc</td>
<td>≤ -50 dBc</td>
</tr>
</tbody>
</table>

**3rd order intermodulation intercept TOI (typical)**

**TekConnect channel**

- 200 mV/div, 3 dBm input/tone
- 2.598 GHz and 2.602 GHz
- 20 MHz span, 100 kHz RBW
- +30 dBm

**ATI channel**

- 30 mV/div, -15 dBm input/tone
- 64.998 GHz and 65.002 GHz
- 20 MHz span 100 kHz RBW
- +10 dBm
<table>
<thead>
<tr>
<th>Vertical system - analog channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 Tone 3rd order intermodulation distortion (typical)</strong></td>
</tr>
<tr>
<td>TekConnect</td>
</tr>
<tr>
<td>ATI channel</td>
</tr>
<tr>
<td><strong>SFDR (typical)</strong></td>
</tr>
<tr>
<td>TekConnect channel</td>
</tr>
<tr>
<td>ATI channel</td>
</tr>
<tr>
<td><strong>Other spurious responses (typical)</strong></td>
</tr>
<tr>
<td>Interleave image (all channels)</td>
</tr>
<tr>
<td>ATI channel image</td>
</tr>
<tr>
<td><strong>Residual responses</strong></td>
</tr>
<tr>
<td>With input terminated</td>
</tr>
<tr>
<td>TekConnect channel</td>
</tr>
<tr>
<td>ATI channel</td>
</tr>
<tr>
<td><strong>Input VSWR (typical)</strong></td>
</tr>
<tr>
<td>TekConnect channel ≤ 1.2 Vfs settings</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>TekConnect channel &gt;1.2 Vfs settings</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ATI channel</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Horizontal system

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time base accuracy</td>
<td>±0.8 x 10^{-6} (within 1st year), ±0.3 x 10^{-6} aging/year after first year when operated within 23° C ±5° C after 30 minute warm-up. Typical: ±0.1 x 10^{-6} initial accuracy after adjustment.</td>
</tr>
<tr>
<td>Time base delay time range</td>
<td>-5.0 ks to 1.0 ks</td>
</tr>
<tr>
<td>Sample Clock Jitter (typical)</td>
<td></td>
</tr>
<tr>
<td>ATI channel</td>
<td>&lt;10 μs Duration: &lt;65 f_{RMS}</td>
</tr>
<tr>
<td>TekConnect channel</td>
<td>&lt;10 μs Duration: &lt;100 f_{RMS}</td>
</tr>
<tr>
<td>Trigger jitter (typical)</td>
<td>10 fs using enhanced trigger placement.</td>
</tr>
<tr>
<td>Time/Div settings</td>
<td></td>
</tr>
<tr>
<td>ATI channel (only sample rate is 200 GS/s)</td>
<td>Max RT setting: 500 μs/div (with 1G RL, 50XL option)</td>
</tr>
<tr>
<td></td>
<td>Min RT setting: 25 ps/div</td>
</tr>
<tr>
<td></td>
<td>Max IT setting: 250 μs/div (with 1G RL, 50XL option)</td>
</tr>
<tr>
<td></td>
<td>Min IT setting: 500 fs/div</td>
</tr>
<tr>
<td>TekConnect channels 4 (at max sample rate of 100 GS/s)</td>
<td>Max RT setting: 1 ms/div (with 1G RL, 50XL option)</td>
</tr>
<tr>
<td></td>
<td>Min RT setting: 50 ps/div</td>
</tr>
<tr>
<td></td>
<td>Max IT setting: 10 μs/div (with 1G RL, 50XL option)</td>
</tr>
<tr>
<td></td>
<td>Min IT setting: 500 fs/div</td>
</tr>
<tr>
<td>Delay between channels, BWE (typical)</td>
<td>≤ 500 fs between any two channels within the same box at any gain setting at 25 °C ±5 °C prior to any user adjustment. Manual adjustment available with 10 fs minimum resolution. Derate linearly to ≤ 1.5 ps at 5 °C and 45 °C.</td>
</tr>
<tr>
<td>Channel skew stability, UltraSync (typical)</td>
<td>≤ 250 f_{RMS} between any two channels between instruments at any gain setting at 25 °C ±5 °C. Derate linearly to ≤ 3 ps at 5 °C and 45 °C.</td>
</tr>
<tr>
<td>Channel-to-Channel deskew range</td>
<td>±75 ns</td>
</tr>
</tbody>
</table>

Acquisition system

<table>
<thead>
<tr>
<th>Acquisition modes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>Acquires and displays sampled values</td>
</tr>
<tr>
<td>Average</td>
<td>From 2 to 10,000 waveforms can be included in an average waveform</td>
</tr>
<tr>
<td>Envelope</td>
<td>From 1 to 2×10^6 waveforms included in min-max envelope</td>
</tr>
<tr>
<td>Hi-Res</td>
<td>Real-time boxcar averaging reduces random noise and increases resolution</td>
</tr>
<tr>
<td>Peak detect</td>
<td>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</td>
</tr>
<tr>
<td>FastAcq® (TekConnect channels only)</td>
<td>FastAcq® optimizes the instrument for analysis of dynamic signals and capture of infrequent events, capturing &gt;300,000 waveforms per second on all TekConnect channels simultaneously, standalone configuration only</td>
</tr>
<tr>
<td>FastFrame™</td>
<td>Acquisition memory divided into segments; maximum trigger rate &gt;310,000 waveforms per second. Time of arrival recorded with each event. Frame finder tool helps to visually identify transients. Available for both ATI and TekConnect channels, for all system configurations including stand-alone and multi-unit stacks using UltraSync.</td>
</tr>
<tr>
<td>Roll mode</td>
<td>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</td>
</tr>
<tr>
<td>Waveform database</td>
<td>Accumulates waveform data providing a three-dimensional array of amplitude, time, and counts. TekConnect channels only, standalone configuration only</td>
</tr>
</tbody>
</table>

4 Sample rate on TekConnect channels can be varied down to 3.125 samples/second, resulting in a max RT setting of 6.55 Ms/div, with a record length of 205 M (requires 250 M or higher RL, 20XL option)
## Pinpoint® Trigger system

### Trigger sensitivity (typical)

**Internal DC coupled**

| A-Event trigger, B-Event trigger | ≤ 5%FS from DC to 50 MHz  
|                                | ≤ 7.5%FS at 5 GHz  
|                                | ≤ 10%FS at 10 GHz  
|                                | ≤ 15%FS at 15 GHz  
|                                | ≤ 35%FS at 20 GHz  
|                                | ≤ 50%FS at 25 GHz  |

**Auxiliary input**

| 100 mV_p  | from DC to 1 GHz  
| 175 mV_p  | at 4 GHz  
| 225 mV_p  | at 8 GHz  
| 325 mV_p  | at 10 GHz  
| 800 mV_p  | at 12 GHz  |

### Edge trigger sensitivity, non-DC-coupled modes (typical)

- All sources, positive or negative edge, for vertical scale settings ≥10 mV/div and ≤1 V/div

<table>
<thead>
<tr>
<th>Trigger Coupling</th>
<th>Sensitivity</th>
</tr>
</thead>
</table>
| **NOISE REJ**    | 15%FS from DC to 50 MHz  
|                  | 22.5% at 5 GHz  
|                  | 30%FS at 10 GHz  
|                  | 45%FS at 15 GHz  
|                  | 100%FS at 20 GHz  |
| **AC**           | Same as DC-coupled limits for frequencies > 100 Hz, attenuates signals < 100 Hz |
| **HF REJ**       | Same as DC-coupled limits for frequencies < 20 kHz, attenuates signals > 20 kHz |
| **LF REJ**       | Same as DC-coupled limits for frequencies > 200 kHz, attenuates signals < 200 kHz |
| **RF**           | Minimum hysteresis / High sensitivity |

**A TRIG TekConnect**

| 2.5% FS from DC to 50 MHz  
| 2.5% FS at 5 GHz  
| 2.5% FS at 10 GHz  
| 5% FS at 15 GHz  
| 7.5% FS at 20 GHz  
| 12.5% FS at 25 GHz  |

**B TRIG TekConnect**

| 2.5% FS from DC to 50 MHz  
| 2.5% FS at 5 GHz  
| 2.5% FS at 10 GHz  
| 5% FS at 15 GHz  
| 7.5% FS at 20 GHz  
| 20% FS at 25 GHz  |

**A TRIG ATI**

| 2.5% FS from DC to 50 MHz  
| 2.5% FS at 5 GHz  
| 2.5% FS at 10 GHz  
| 5% FS at 15 GHz  
| 10% FS at 20 GHz  
| 22.5% FS at 25 GHz  |

**B TRIG ATI**

| 2.5% FS from DC to 50 MHz  
| 2.5% FS at 5 GHz  
| 2.5% FS at 10 GHz  
| 5% FS at 15 GHz  
| 10% FS at 20 GHz  
| 22.5% FS at 25 GHz  |
Pinpoint® Trigger system
A-Event and delayed B-Event trigger types

<table>
<thead>
<tr>
<th>Standalone instrument</th>
<th>DPO73304SX</th>
<th>DPO72304SX</th>
<th>DPO71604SX</th>
<th>DPO71304SX</th>
<th>DPO77002SX</th>
<th>DPO75902SX</th>
<th>DPO75002SX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger type</td>
<td>TekConnect channel</td>
<td>ATI channel</td>
<td>TekConnect channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edge</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Glitch</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Width</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Runt</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Serial (8b10b)</td>
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</tr>
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<td>Window</td>
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<td>X</td>
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</tr>
<tr>
<td>Timeout</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period/Frequency</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Envelope</td>
<td>X</td>
<td>X</td>
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<td></td>
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</tr>
<tr>
<td>Transition</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic Pattern</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Setup/Hold</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Logic state</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multi-unit configuration</th>
<th>DPO73304SX</th>
<th>DPO72304SX</th>
<th>DPO71604SX</th>
<th>DPO71304SX</th>
<th>DPO77002SX</th>
<th>DPO75902SX</th>
<th>DPO75002SX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger type</td>
<td>TekConnect channel</td>
<td>ATI channel</td>
<td>TekConnect channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edge</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glitch</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)

Variable A-Event trigger holdoff range
250 ns to 12 s + random holdoff

Trigger level or threshold range

<table>
<thead>
<tr>
<th>Trigger Source</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch1, 2, 3, or 4</td>
<td>Full scale</td>
</tr>
<tr>
<td>Auxiliary input</td>
<td>±3.65 V</td>
</tr>
<tr>
<td>Line</td>
<td>0 V, Not settable</td>
</tr>
</tbody>
</table>
## Pinpoint® Trigger system

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhanced triggering</td>
<td>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.</td>
</tr>
<tr>
<td>Line trigger</td>
<td>Trigger on power line signal. Level fixed at 0 V.</td>
</tr>
<tr>
<td>Serial pattern trigger</td>
<td>All 70000SX models. Requires Option ST14G</td>
</tr>
<tr>
<td>Visual Trigger</td>
<td>Requires Option VET</td>
</tr>
<tr>
<td>Max number of areas</td>
<td>8</td>
</tr>
<tr>
<td>Area shapes</td>
<td>Rectangle, Triangle, Trapezoid, Hexagon, user defined shapes (can have &gt;40 vertices)</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Visual Trigger qualification is compatible with all trigger types and all trigger sequences</td>
</tr>
</tbody>
</table>
### Pinpoint® Trigger system

**Trigger types**

<table>
<thead>
<tr>
<th>Trigger types</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8b/10b</td>
<td>Trigger on 8b10b buses, up to 160 bits.</td>
</tr>
<tr>
<td>64b/66b</td>
<td>Trigger on 64b/66b buses, up to 132 bits.</td>
</tr>
<tr>
<td>I²C</td>
<td>Trigger on Start, Repeated Start, Stop, Missing ACK, Address (7 or 10 bit), Data, or Address and Data.</td>
</tr>
<tr>
<td>SPI</td>
<td>Trigger on SS or data.</td>
</tr>
<tr>
<td>PCIe</td>
<td>Trigger on PCIe buses.</td>
</tr>
<tr>
<td>USB</td>
<td>Trigger on USB buses.</td>
</tr>
<tr>
<td>CAN</td>
<td>Trigger on Start of Frame, Frame Type, Identifier, Data, End of Frame, Missing Ack, Bit Stuff Error.</td>
</tr>
<tr>
<td>LIN</td>
<td>Trigger on Sync, Identifier, Data, Ident and Data, Wakeup Frame, Sleep Frame, Error.</td>
</tr>
<tr>
<td>FlexRay</td>
<td>Trigger on Start of Frame, Indicator Bits, Cycle Count, Header Fields, Identifier, Data, End of Frame, Error.</td>
</tr>
<tr>
<td>10/100BASE-T Ethernet</td>
<td>Trigger on 10/100BASE-T Ethernet buses.</td>
</tr>
<tr>
<td>Edge</td>
<td>Positive or negative slope on any channel or front-panel auxiliary input. Coupling includes DC, AC, noise reject, HF reject, LF reject, and RF coupling.</td>
</tr>
<tr>
<td>Frequency/Period</td>
<td>Trigger on event that crosses threshold twice with same slope within or outside of selectable time limits. Slope may be positive, negative or either.</td>
</tr>
<tr>
<td>Glitch</td>
<td>Trigger on or reject glitches of positive, negative, or either polarity. Minimum glitch width is 40 ps (typical) with rearm time of 50 ps (&lt;5 ns interval), 75 ps above 5 ns.</td>
</tr>
<tr>
<td>Pattern</td>
<td>Trigger when pattern goes false or stays true for specified period of time. Pattern (AND, OR, NAND, NOR) specified for four input channels.</td>
</tr>
<tr>
<td>Runt</td>
<td>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. Minimum runt width is 40 ps (typical) with rearm time of 50 ps</td>
</tr>
<tr>
<td>Serial Trigger (8b10b)</td>
<td>Trigger on 8b10b encoded data and generic NRZ serial data, up to 160 bits</td>
</tr>
<tr>
<td>Setup/Hold</td>
<td>Trigger on violations of both setup time and hold time between clock and data present on any two input channels.</td>
</tr>
<tr>
<td>State</td>
<td>Any logical pattern of channels (1, 2, 3) clocked by edge on channel 4. Trigger on rising or falling clock edge.</td>
</tr>
<tr>
<td>Timeout</td>
<td>Trigger on an event which remains high, low, or either, for a specified time period. Selectable from 300 ps.</td>
</tr>
<tr>
<td>Transition</td>
<td>Trigger on pulse edge rates. Trigger on an event which remains high, low, or either, for a specified time period. Selectable from 300 ps. that are faster or slower than specified. Slope may be positive, negative, or either.</td>
</tr>
<tr>
<td>Width</td>
<td>Trigger on width of positive or negative pulse either within or out of selectable time limits (down to 40 ps).</td>
</tr>
<tr>
<td>Window</td>
<td>Trigger on an event that enters or exits a window defined by two user-adjustable thresholds. Event can be time or logic qualified.</td>
</tr>
<tr>
<td>Visual Trigger</td>
<td>Trigger when the Visual Trigger expression is satisfied.</td>
</tr>
<tr>
<td>Envelope</td>
<td>Qualification applied to Edge, Glitch, Width or Runt trigger such that trigger type is performed on the detected envelope of a modulated carrier. Carrier frequency 250 MHz to 15 GHz. Minimum burst width &lt;20 ns, maximum gap between bursts &lt;20 ns.</td>
</tr>
</tbody>
</table>
Datasheet

Pinpoint® Trigger system

<table>
<thead>
<tr>
<th>Trigger mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger Delay by Events</td>
<td>1 to 2 billion events.</td>
</tr>
<tr>
<td>Trigger Delay by Time</td>
<td>3.2 ns to 3 million seconds.</td>
</tr>
<tr>
<td>B-Event Scan</td>
<td>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.</td>
</tr>
<tr>
<td>Arm A, Trig B</td>
<td>Arm on A, Trig on B allows for a single A arming event followed by one or more B trigger events. When combined with FastFrame, allows for very tight acquisition timing control.</td>
</tr>
</tbody>
</table>

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

54, 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 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color palettes</td>
<td>Normal, Green, Gray, Temperature, Spectral, and User-defined</td>
</tr>
<tr>
<td>Format</td>
<td>YT, XY, XYZ</td>
</tr>
<tr>
<td>Display resolution</td>
<td>1024 horizontal × 768 vertical pixels (XGA)</td>
</tr>
<tr>
<td>Display type</td>
<td>6.5 in. liquid-crystal active-matrix color display with capacitive touch screen</td>
</tr>
<tr>
<td>Horizontal divisions</td>
<td>10</td>
</tr>
<tr>
<td>Vertical divisions</td>
<td>10</td>
</tr>
<tr>
<td>Waveform styles</td>
<td>Vectors, Dots, Variable Persistence, Infinite Persistence</td>
</tr>
</tbody>
</table>

## Computer System and Peripherals

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system</td>
<td>Microsoft Windows 10 Enterprise IoT Edition</td>
</tr>
<tr>
<td>CPU</td>
<td>INTEL CORE I7-4790 S, 3.2 GHz, QUAD CORE</td>
</tr>
<tr>
<td>System memory</td>
<td>32 GB</td>
</tr>
<tr>
<td>Solid state drive</td>
<td>Removable, ≥900 GB capacity</td>
</tr>
<tr>
<td>Mouse</td>
<td>Optical wheel mouse, USB interface</td>
</tr>
<tr>
<td>Keyboard</td>
<td>USB interface</td>
</tr>
</tbody>
</table>

## Input-Output Ports

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary trigger input characteristics and range</td>
<td>50 Ω, ±5 V (DC plus peak AC)</td>
</tr>
<tr>
<td>Auxiliary output logic polarity and functionality</td>
<td>Default output is A trigger low true (a negative edge when the A trigger event occurs). You can also program the output to A trigger high true, and B trigger low or high true.</td>
</tr>
<tr>
<td>Fast Edge output step amplitude and offset</td>
<td>1200 mV differential into a 100 Ω load with a -300 mV common mode.</td>
</tr>
<tr>
<td>External reference input frequency</td>
<td>10 MHz, 100 MHz, 12.5 GHz</td>
</tr>
<tr>
<td></td>
<td>The instrument scans for either 10 MHz or 100 MHz. 12.5 GHz supported on separate SMA input.</td>
</tr>
<tr>
<td>12.5 GHz Clock In</td>
<td>1.3 V&lt;sub&gt;pp&lt;/sub&gt; (6 dBm)</td>
</tr>
<tr>
<td>B, C, D 12.5 GHz Clock Out (UltraSync)</td>
<td>1.3 V&lt;sub&gt;pp&lt;/sub&gt; (6 dBm)</td>
</tr>
<tr>
<td>Internal reference output voltage</td>
<td>(typical)</td>
</tr>
<tr>
<td>10 MHz Vout pk-pk</td>
<td>&gt; 800 mV peak-peak into 50 Ω</td>
</tr>
<tr>
<td></td>
<td>&gt; 1.6 V peak-peak into 1 MΩ (internally AC coupled).</td>
</tr>
</tbody>
</table>
### Input-output ports

**Input and output ports**

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVI-D Video port</td>
<td>A female Digital Visual Interface (DVI-D) compatible port</td>
</tr>
<tr>
<td>VGA port</td>
<td>A female Video Graphics Array (VGA) compatible port</td>
</tr>
<tr>
<td>DisplayPort</td>
<td>Two connectors (primary, secondary) provide digital display interfaces</td>
</tr>
<tr>
<td>PCIe</td>
<td>PCIe ports to configure multi-instrument systems</td>
</tr>
<tr>
<td>Trigger</td>
<td>UltraSync trigger bus</td>
</tr>
<tr>
<td>Keyboard and Mouse ports</td>
<td>PS-2 compatible, instrument must be powered down to make connection</td>
</tr>
<tr>
<td>LAN ports</td>
<td>Two RJ-45 connectors (LAN1, LAN2), support 10BASE-T, 100BASE-TX, and Gigabit Ethernet</td>
</tr>
<tr>
<td>External audio ports</td>
<td>External audio jacks for microphone input and line output</td>
</tr>
<tr>
<td>USB ports</td>
<td>Four front panel USB 2.0 connectors</td>
</tr>
<tr>
<td></td>
<td>Four rear panel USB 3.0/USB 2.0 connectors</td>
</tr>
<tr>
<td></td>
<td>One rear panel USB device connector</td>
</tr>
</tbody>
</table>

### Data storage specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonvolatile memory retention time</td>
<td>&gt;20 years</td>
</tr>
<tr>
<td>Solid state drive</td>
<td>Waveforms and setups are stored on the solid state drive.</td>
</tr>
<tr>
<td></td>
<td>Solid state drive is a ≥900 GB solid state drive (removable).</td>
</tr>
</tbody>
</table>

### Power source

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>&lt;980 W, single instrument, maximum</td>
</tr>
<tr>
<td></td>
<td>≤780 W, single unit (typical)</td>
</tr>
<tr>
<td>Source voltage and freq</td>
<td>100 V to 240 V_{\text{RMS}}, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>115 V ±10%, 400 Hz</td>
</tr>
<tr>
<td>CAT II</td>
<td></td>
</tr>
</tbody>
</table>

### Mechanical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
</table>
| Dimensions DPO70000SX models | 157 mm (6.0 in) height  
452 mm (17.8 in) width  
553 mm (21.8 in) depth |
| DPO70000SX models, Rackmount configuration | 177 mm (7.0 in) height  
440 mm (19.75 in) width  
523 mm (20.6 in) depth (from rack mounting ear to back of instrument) |
| Weight DPO70000SX models | 19 kg (42 lbs) oscilloscope only                                       |
Mechanical specifications

Cooling
Required clearances

| Top        | 0 mm (0 in) |
| Bottom     | 6.35 mm (0.25 in) minimum or 0 mm (0 in) when standing on feet, flip stands down |
| Left side  | 76 mm (3 in) |
| Right side | 76 mm (3 in) |
| Rear       | 0 mm (0 in) on rear feet |

Environmental specifications

Temperature

| Operating   | +5 °C to +45 °C |
| Nonoperating| -20 °C to +60 °C |

Humidity

| Operating          | 8% to 80% relative humidity at up to +32 °C (+90 °F) |
|                   | 5% to 45% relative humidity above +32 °C (+90 °F) up to +45 °C (+113 °F), noncondensing, and is limited by a maximum wet-bulb temperature of +29.4 °C (+85 °F) (derates relative humidity to 32% at +45 °C (+113 °F)) |
|                   | 5% to 95% relative humidity at up to +30 °C (+86 °F), |
|                   | 5% to 45% relative humidity above +30 °C (+86 °F), up to +60 °C (+140 °F), noncondensing, and is limited by a maximum wet-bulb temperature of +29.4 °C (+85 °F) (derates relative humidity to 11% at +60 °C (+140 °F)) |

Nonoperating

| Operating          | Up to 3,000 meters |
| Nonoperating       | Up to 12,000 meters |

Regulatory

Electromagnetic compatibility | 2004/108/EC; EN 61326-2-1 |
Certifications               | UL 61010-1, CSA 61010-1-04, LVD 2006/95/EC, EN61010-1, IEC 61010-1 |
Ordering information

Models

- **DPO77002SX**: 70 GHz ATI Performance Oscilloscope
- **DPO75902SX**: 59 GHz ATI Performance Oscilloscope
- **DPO75002SX**: 50 GHz ATI Performance Oscilloscope
- **DPO73304SX**: 33 GHz Digital Phosphor Oscilloscope
- **DPO72304SX**: 23 GHz Digital Phosphor Oscilloscope
- **DPO71604SX**: 16 GHz Digital Phosphor Oscilloscope
- **DPO71304SX**: 13 GHz Digital Phosphor Oscilloscope

Systems

The following DPS systems provide single-nomenclature ordering convenience for 2 instruments and a 1 meter UltraSync cable. The same options may be applied to these systems as with base models and the option will be included on both instruments. Both component instruments will have the same options associated with the system nomenclature when operating standalone.

- **DPS77004SX**: 70 GHz ATI Performance Oscilloscope System: 2 x 70 GHz, 200 GS/s or 4 x 33 GHz, 100 GS/s
- **DPS75904SX**: 59 GHz ATI Performance Oscilloscope System: 2 x 59 GHz, 200 GS/s or 4 x 33 GHz, 100 GS/s
- **DPS75004SX**: 50 GHz ATI Performance Oscilloscope System: 2 x 50 GHz, 200 GS/s or 4 x 33 GHz, 100 GS/s
- **DPS73308SX**: 33 GHz Digital Phosphor Oscilloscope System: 4 x 33 GHz, 100 GS/s or 8 5 x 23 GHz, 50 GS/s

Standard accessories

ATI channel accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Tektronix part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deskew adapter (1.85M to 2.92F)</td>
<td>103-0488-00</td>
</tr>
<tr>
<td>ATI connector saver (1.85 mm)</td>
<td>103-0474-00</td>
</tr>
<tr>
<td>ATI protective cap</td>
<td>016-2101-00</td>
</tr>
<tr>
<td>Torque wrench</td>
<td>067-2787-00</td>
</tr>
<tr>
<td>Backing wrench</td>
<td>003-1942-00</td>
</tr>
</tbody>
</table>

5 Maximum of 4 channels displayed on-screen. Additional channels data available through program interface.
Instrument accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Tektronix part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>User manual -- depends on language option</td>
<td>071-3357-xx</td>
</tr>
<tr>
<td>Front protective cover</td>
<td>200-5337-00</td>
</tr>
<tr>
<td>PCIe Host Port protective plug</td>
<td>200-5344-00</td>
</tr>
<tr>
<td>2nd ethernet port plug</td>
<td>200-5389-00</td>
</tr>
<tr>
<td>50 Ω term on Fast Edge (2X)</td>
<td>015-1022-01</td>
</tr>
<tr>
<td>TCA292D (5X) (3X on ATI instruments)</td>
<td>090-0058-00</td>
</tr>
<tr>
<td>Windows compatible keyboard</td>
<td>119-7275-xx</td>
</tr>
<tr>
<td>Windows compatible mouse</td>
<td>119-7054-xx</td>
</tr>
<tr>
<td>Static protection wrist strap</td>
<td>006-3415-05</td>
</tr>
<tr>
<td>Deskew cable (M2.92 to M2.92)</td>
<td>174-6793-00</td>
</tr>
<tr>
<td>Accessories pouch</td>
<td>016-2045-00</td>
</tr>
<tr>
<td>Best Practices manual</td>
<td>071-2989-04</td>
</tr>
<tr>
<td>RoHS info</td>
<td>071-2185-04</td>
</tr>
<tr>
<td>Calibration certification</td>
<td>001-1179-00</td>
</tr>
<tr>
<td>Cal cert envelope</td>
<td>006-8018-01</td>
</tr>
<tr>
<td>Power cord</td>
<td>Depends on option</td>
</tr>
</tbody>
</table>

Warranty
One-year warranty covering all parts and labor.

Instrument options

Record length options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opt. 10XL</td>
<td>125 MS/Ch</td>
</tr>
<tr>
<td>Opt. 20XL</td>
<td>250 MS/Ch</td>
</tr>
<tr>
<td>Opt. 50XL</td>
<td>500 MS/Ch on 4 channels, 1 GS/Ch on 2 channels</td>
</tr>
</tbody>
</table>

Advanced analysis options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opt. BITERR</td>
<td>Hi Speed Serial Bit Error Detector (Requires Opt. ST14G)</td>
</tr>
<tr>
<td>Opt. DDRA</td>
<td>DDR Memory Bus Analysis (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Opt. DDR-LP4</td>
<td>LPDDR4 Memory Bus Electrical Validation and Analysis Oscilloscope Software (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Opt. DJA</td>
<td>Jitter and Eye Analysis Tools - Advanced (DPOJET)</td>
</tr>
<tr>
<td>Opt. DJAN</td>
<td>DPOJET Noise, Jitter and Eye Analysis Tools</td>
</tr>
<tr>
<td>Opt. DP12</td>
<td>DisplayPort 1.2 Source Test Automation Software (Requires Opt. DJA and 5XL)</td>
</tr>
<tr>
<td>Opt. EDP</td>
<td>Embedded Display Port (EDP) v1.4 TX Compliance Test Package</td>
</tr>
<tr>
<td>Opt. ET3</td>
<td>Ethernet Compliance Testing</td>
</tr>
<tr>
<td>Opt. FC-16G</td>
<td>Fiber Channel - 16G Essentials (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Opt. FRCNT</td>
<td>Frequency Counter-Timer</td>
</tr>
<tr>
<td>Opt. HDM</td>
<td>HDMI 2.0 Advanced Analysis and Compliance Software for Tx tests</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
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<tr>
<td>Opt. HDM-DS</td>
<td>HDMI 2.0 Direct Synthesis for RX testing</td>
</tr>
<tr>
<td>Opt. HSSLTA</td>
<td>High Speed Serial Link Training Analysis.</td>
</tr>
<tr>
<td>Opt. HT3</td>
<td>HDMI Compliance Testing</td>
</tr>
<tr>
<td>Opt. HT3DS</td>
<td>HDMI Direct Synthesis for HDMI 1.4 (Requires Opt. HT3)</td>
</tr>
<tr>
<td>Opt. LT</td>
<td>Waveform Limit Testing</td>
</tr>
<tr>
<td>Opt. MHD</td>
<td>MHL Advanced Analysis and Compliance Software (Requires Opt. DJA and 2XL)</td>
</tr>
<tr>
<td>Opt. M-PHYTX</td>
<td>M-PHY Automated Transmitter Solution</td>
</tr>
<tr>
<td>Opt. NBASET</td>
<td>NBASE-T TekExpress Conformance and Debug Solution</td>
</tr>
<tr>
<td>Opt. PAM4</td>
<td>PAM4 Electrical Transmitter Analysis Software (Requires 33 GHZ or greater Oscilloscope Bandwidth)</td>
</tr>
<tr>
<td>Opt. PAM4-O</td>
<td>PAM4 Analysis for optical signals (Requires 33 GHZ or greater Oscilloscope Bandwidth)</td>
</tr>
<tr>
<td>Opt. PCE3</td>
<td>PCI Express Gen1/2/3 TekExpress Compliance/Debug Automation with DPOJet Measurements Software (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Opt. PCE4</td>
<td>PCI Express Gen1/2/3 TekExpress Compliance/Debug Automation with DPO/JET and SigTest Measurements Software, Gen 4 Debug with DPO/JET Measurement Library (Requires Opt. DJA and Opt. SDLA64)</td>
</tr>
<tr>
<td>Opt. PWR</td>
<td>Power Measurement and Analysis</td>
</tr>
<tr>
<td>Opt. SAS3</td>
<td>SAS-3 Tx Compliance Test Application (Requires Opt. DJA and &gt;2XL)</td>
</tr>
<tr>
<td>Opt. SAS3-TSG</td>
<td>SAS-3 Automated Tx Compliance Test Application (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Opt. SAS3-TSGW</td>
<td>SAS-3 WDP Transmitter Measurements (Requires Opt. SAS3-TSG)</td>
</tr>
<tr>
<td>Opt. SATA-TSG</td>
<td>SATA PHY/TSG/OOB Transmitter Tests for TekExpress</td>
</tr>
<tr>
<td>Opt. SATA-T-UP</td>
<td>TEKEXP Upgrade to SATA PHY/TSG/OOB Transmitter Tests for TekExpress</td>
</tr>
<tr>
<td>Opt. SC</td>
<td>SignalCorrect Cable, Channel, and Probe Compensation Software</td>
</tr>
<tr>
<td>Opt. SDLA64</td>
<td>Serial Data Link Analysis</td>
</tr>
<tr>
<td>Opt. SFP-TX</td>
<td>SFP+ Compliance and Debug Solution (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Opt. SR-EMBD</td>
<td>Embedded Serial Triggering and Analysis (I2C, SPI)</td>
</tr>
<tr>
<td>Opt. SR-ENET</td>
<td>Ethernet Serial Analysis (10BASE-T and 100BASE-TX)</td>
</tr>
<tr>
<td>Opt. SR-PCIE</td>
<td>PCI EXPRESS Serial Analysis</td>
</tr>
<tr>
<td>Opt. SR-USB</td>
<td>USB Serial Triggering and Analysis</td>
</tr>
<tr>
<td>Opt. ST14G</td>
<td>8b/10b Serial Trigger and Analysis</td>
</tr>
<tr>
<td>Opt. SR-6466</td>
<td>64b/66b Serial Trigger and Analysis (Requires Opt. ST14G)</td>
</tr>
<tr>
<td>Opt. USB2</td>
<td>USB 2.0 Automated Compliance Test Application</td>
</tr>
<tr>
<td>Opt. USBSSP-TX</td>
<td>USB 3.1 Automated TX Compliance Test Application</td>
</tr>
<tr>
<td>Opt. USBSSP-UP</td>
<td>USB-TX to USBSSP-TX Upgrade</td>
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<tr>
<td>Opt. USB-TX</td>
<td>TekExpress Automated USB 3.0 Solution</td>
</tr>
<tr>
<td>Opt. USB-TX-UP</td>
<td>TEKEXP USB-TX to USB-TX Upgrade</td>
</tr>
<tr>
<td>Opt. VET</td>
<td>Visual Trigger and Search</td>
</tr>
<tr>
<td>Opt. XGBT2</td>
<td>10GBASE-TekExpress Conformance and Debug Solution</td>
</tr>
<tr>
<td>Opt. 100G-TXE</td>
<td>IEEE-802.3bm: CAU4 and IEEE-802.3b: KR4/CR4 100Gbps Transmitter Compliance (Requires Opt. DJA or DSA and DJAN)</td>
</tr>
<tr>
<td>Opt. 40G-CR4</td>
<td>40GBASE-CR4 Debug and Automated Compliance Solution</td>
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### Spectral and modulation analysis

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>Opt. SVA</td>
<td>AM/FM/PM Audio Signal Analysis (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SVE</td>
<td>SignalVu® Essentials - Vector Signal Analysis Software</td>
</tr>
<tr>
<td>Opt. SVM</td>
<td>General Purpose Modulation Analysis (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SVO</td>
<td>Flexible OFDM Analysis (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SVP</td>
<td>Advanced Signal Analysis (including pulse measurements) (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SVT</td>
<td>Frequency and Phase Settling Time Measurements (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SV23</td>
<td>WLAN 802.11a/b/g/n measurement application (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SV24</td>
<td>WLAN 802.11n measurement application (Requires Opt SV23)</td>
</tr>
<tr>
<td>Opt. SV25</td>
<td>WLAN 802.11ac measurement application (Requires Opt SV24)</td>
</tr>
<tr>
<td>Opt. SV26</td>
<td>APCO P25 compliance testing and analysis application (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SV27</td>
<td>SignalVu Bluetooth Basic LE TX SIG measurements (Requires Opt. SVE)</td>
</tr>
<tr>
<td>Opt. SV28</td>
<td>SignalVu LTE Downlink RF measurements (Requires Opt. SVE)</td>
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<tr>
<td>Opt. SV30</td>
<td>WiGig IEEE802.11ad/ay transmitter testing (Requires Opt. SVE)</td>
</tr>
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</table>

### Storage options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>Opt. SSD</td>
<td>Additional removable drive with Microsoft Windows 10 OS, TekScope, and applications software installed</td>
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</tbody>
</table>

### 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 [www.tek.com/products/oscilloscopes/floating-licenses](http://www.tek.com/products/oscilloscopes/floating-licenses) for additional information about floating license options.

<table>
<thead>
<tr>
<th>Option</th>
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</tr>
</thead>
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<tr>
<td>DPOFL-BITERR</td>
<td>Hi Speed Serial Bit Error Detector (Requires Opt. ST14G)</td>
</tr>
<tr>
<td>DPOFL-DDRA</td>
<td>DDR Memory Bus Analysis (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DPOFL-DDR-LP4</td>
<td>LPDDR4 Memory Bus Electrical Validation and Analysis Oscilloscope Software (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DPOFL-DJA</td>
<td>Jitter and Eye Analysis Tools - Advanced (DPOJET)</td>
</tr>
<tr>
<td>DPOFL-DJAN</td>
<td>DPOJET Noise, Jitter and Eye Analysis Tools</td>
</tr>
<tr>
<td>DPOFL-DP12</td>
<td>DisplayPort 1.2 Source Test Automation Software (Requires Opt. DJA and 5XL)</td>
</tr>
<tr>
<td>DPOFL-D-PHY</td>
<td>MIPI D-PHY Transmitter Debug, Characterization and Compliance Test Solution (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DPOFL-EDP</td>
<td>Embedded Display Port (EDP) v1.4 TX Compliance Test Package</td>
</tr>
<tr>
<td>DPOFL-ET3</td>
<td>Ethernet Compliance Testing</td>
</tr>
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<td>DPOFL-FC-16G</td>
<td>Fiber Channel - 16G Essentials (Requires Opt. DJA)</td>
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<td>DPOFL-FRQCT</td>
<td>Frequency Counter-Timer</td>
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<tr>
<td>DPOFL-HDM</td>
<td>HDMI 2.0 Advanced Analysis and Compliance Software for Tx tests</td>
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<td>DPOFL-HDM-DS</td>
<td>HDMI 2.0 Direct Synthesis for RX testing</td>
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<td>DPOFL-HSSLTA</td>
<td>High Speed Serial Link Training Analysis.</td>
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<tr>
<td>DPOFL-HT3</td>
<td>HDMI Compliance Testing</td>
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<td>DPOFL-HT3DS</td>
<td>HDMI Direct Synthesis for HDMI 1.4 (Requires Opt. HT3)</td>
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<tr>
<td>DPOFL-LT</td>
<td>Waveform Limit Testing</td>
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<tr>
<td>DPOFL-MHD</td>
<td>MHL Advanced Analysis and Compliance Software (Requires Opt. DJA and 2XL)</td>
</tr>
<tr>
<td>DPOFL-M-PHY</td>
<td>MIPI M-PHY Transmitter Debug, Characterization and Compliance Test Solution (Requires Opt. DJA)</td>
</tr>
<tr>
<td>Option</td>
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</tr>
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<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DPOFL-M-PHYTX</td>
<td>M-PHY Automated Transmitter Solution</td>
</tr>
<tr>
<td>DPOFL-NBASET</td>
<td>NBASE-T TekExpress Conformance and Debug Solution</td>
</tr>
<tr>
<td>DPOFL-PAM4</td>
<td>PAM4 Electrical Transmitter Analysis Software (Requires 33 GHz or greater Oscilloscope Bandwidth)</td>
</tr>
<tr>
<td>DPOFL-PAM4-O</td>
<td>PAM4 Analysis for optical signals (Requires 33 GHz or greater Oscilloscope Bandwidth)</td>
</tr>
<tr>
<td>DPOFL-PCE3</td>
<td>PCI Express Gen1/2/3 TekExpress Compliance/Debug Automation with DPOJet Measurements Software (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DPOFL-PCE4</td>
<td>PCI Express Gen1/2/3 TekExpress Compliance/Debug Automation with DPOJET and SigTest Measurements Software, Gen 4 Debug with DPOJET Measurement Library (Requires Opt. DJA and Opt SDLA64)</td>
</tr>
<tr>
<td>DPOFL-PWR</td>
<td>Power Measurement and Analysis</td>
</tr>
<tr>
<td>DPOFL-SAS3</td>
<td>SAS-3 Tx Compliance Test Application (Requires Opt. DJA and &gt;2XL)</td>
</tr>
<tr>
<td>DPOFL-SAS3-TSG</td>
<td>SAS-3 Automated Tx Compliance Test Application (Requires Opt. DJA)</td>
</tr>
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<td>DPOFL-SAS3-TSGW</td>
<td>SAS-3 WDP Transmitter Measurements (Requires Opt. SAS3-TSG)</td>
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<td>DPOFL-SATA-TSG</td>
<td>SATA PHY/TSG/OOB Transmitter Tests for TekExpress</td>
</tr>
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<td>DPOFL-SATA-T-UP</td>
<td>TEKEXP Upgrade to SATA PHY/TSG/OOB Transmitter Tests for TekExpress</td>
</tr>
<tr>
<td>DPOFL-SC</td>
<td>SignalCorrect Cable, Channel, and Probe Compensation Software</td>
</tr>
<tr>
<td>DPOFL-SDLA64</td>
<td>Serial Data Link Analysis</td>
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<tr>
<td>DPOFL-SFP-TX</td>
<td>SFP+ Compliance and Debug Solution (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DPOFL-SFP-WDP</td>
<td>SFP+ Compliance and Debug Solution WDP Measurement (Requires Opt. DJA &amp; SFP-TX)</td>
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<tr>
<td>DPOFL-SR-EMBD</td>
<td>Embedded Serial Triggering and Analysis (I2C, SPI)</td>
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<tr>
<td>DPOFL-SR-COMP</td>
<td>Computer Serial Triggering and Analysis (RS-232/422/485/UART)</td>
</tr>
<tr>
<td>DPOFL-SR-ENET</td>
<td>Ethernet Serial Analysis (10BASE-T and 100BASE-TX)</td>
</tr>
<tr>
<td>DPOFL-SR-PCIE</td>
<td>PCI EXPRESS Serial Analysis</td>
</tr>
<tr>
<td>DPOFL-ST14G</td>
<td>8b/10b Serial Trigger and Analysis</td>
</tr>
<tr>
<td>DPOFL-SR-6466</td>
<td>64b/66b Serial Trigger and Analysis (Requires Opt. ST14G)</td>
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<tr>
<td>DPOFL-SR-USB</td>
<td>USB Serial Triggering and Analysis</td>
</tr>
<tr>
<td>DPOFL-SVA</td>
<td>AM/FM/PM Audio Signal Analysis (Requires Opt. SVE)</td>
</tr>
<tr>
<td>DPOFL-SVE</td>
<td>SignalVu® Essentials – Vector Signal Analysis Software</td>
</tr>
<tr>
<td>DPOFL-SVM</td>
<td>General Purpose Modulation Analysis (Requires Opt. SVE)</td>
</tr>
<tr>
<td>DPOFL-SVO</td>
<td>Flexible OFDM Analysis (Requires Opt. SVE)</td>
</tr>
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<td>DPOFL-SVP</td>
<td>Advanced Signal Analysis (including pulse measurements) (Requires Opt. SVE)</td>
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<td>Frequency and Phase Settling Time Measurements (Requires Opt. SVE)</td>
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<td>DPOFL-SV23</td>
<td>WLAN 802.11a/b/g/j/p measurement application (Requires Opt. SVE)</td>
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<td>WLAN 802.11n measurement application (Requires Opt. SV23)</td>
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<td>WLAN 802.11ac measurement application (Requires Opt. SV24)</td>
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<td>DPOFL-SV26</td>
<td>APCO P25 compliance testing and analysis application</td>
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<td>SignalVu LTE Downlink RF measurements (Requires Opt. SVE)</td>
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<td>DPOFL-SV30</td>
<td>WiGig IEEE802.11ad/ay transmitter testing (Requires Opt. SVE)</td>
</tr>
<tr>
<td>DPOFL-USB2</td>
<td>USB 2.0 Automated Compliance Test Application</td>
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<tr>
<td>DPOFL-USBSPP-TX</td>
<td>USB 3.1 Automated TX Compliance Test Application</td>
</tr>
<tr>
<td>DPOFL-USBSPP-UP</td>
<td>USB-TX to USBSPP-TX Upgrade</td>
</tr>
<tr>
<td>DPOFL-USB-TX</td>
<td>TekExpress Automated USB 3.0 Solution</td>
</tr>
<tr>
<td>DPOFL-USB-TX-UP</td>
<td>TEKEXP USB-TX to USB-TX Upgrade</td>
</tr>
<tr>
<td>DPOFL-VET</td>
<td>Visual Trigger and Search</td>
</tr>
<tr>
<td>DPOFL-XGBT2</td>
<td>10GBASE-TekExpress Conformance and Debug Solution</td>
</tr>
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</table>

Datasheet
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPOFL-XL010</td>
<td>Extended record length – 125 M Samples/Ch</td>
</tr>
<tr>
<td>DPOFL-XL020</td>
<td>Extended record length – 250 M Samples/Ch</td>
</tr>
<tr>
<td>DPOFL-XL050</td>
<td>Extended record length - 500M Samples each Ch, 1G Samples on 2 Ch (DX models only)</td>
</tr>
<tr>
<td>DPOFL-100G-TXE</td>
<td>IEEE-802.3bm: CAUI4 and IEEE-802.3b: KR4/CR4 100Gbps Transmitter Compliance (Requires Opt. DJA or DSA and DJAN)</td>
</tr>
<tr>
<td>DPOFL-40G-CR4</td>
<td>40GBASE-CR4 Debug and Automated Compliance Solution</td>
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</table>

**Upgrade options**

The DPO70000SX Series instruments can be easily upgraded after initial time of purchase. To upgrade an existing DPO70000SX, order DPO-UP and an option listed below. For example, DPO-UP DJAN.

**Memory upgrades for DPO70000SX Series**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>XL510</td>
<td>Standard Configuration to Option 10XL Configuration</td>
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<tr>
<td>XL520</td>
<td>Standard Configuration to Option 20XL Configuration</td>
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<tr>
<td>XL550</td>
<td>Standard Configuration to Option 50XL Configuration</td>
</tr>
<tr>
<td>XL1020</td>
<td>Option 10XL Configuration to Option 20XL Configuration</td>
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<tr>
<td>XL1050</td>
<td>Option 10XL Configuration to Option 50XL Configuration</td>
</tr>
<tr>
<td>XL2050</td>
<td>Option 20XL Configuration to Option 50XL Configuration</td>
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</tbody>
</table>

**Advanced analysis upgrades for DPO70000SX Series**

<table>
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<tbody>
<tr>
<td>BITERR</td>
<td>Hi Speed Serial Bit Error Detector (Requires Opt. ST14G)</td>
</tr>
<tr>
<td>DDRA</td>
<td>DDR Memory Bus Analysis (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DDR-LP4</td>
<td>LPDDR4 Memory Bus Electrical Validation and Analysis Oscilloscope Software (Requires Opt. DJA)</td>
</tr>
<tr>
<td>DJA</td>
<td>Jitter and Eye Analysis Tools - Advanced (DPOJET)</td>
</tr>
<tr>
<td>DJAN</td>
<td>DPOJET Noise, Jitter and Eye Analysis Tools</td>
</tr>
<tr>
<td>DP12</td>
<td>DisplayPort 1.2 Source Test Automation Software (Requires Opt. DJA and 5XL)</td>
</tr>
<tr>
<td>D-PHY</td>
<td>MIPI D-PHY Transmitter Debug, Characterization and Compliance Test Solution (Requires Opt. DJA)</td>
</tr>
<tr>
<td>EDP</td>
<td>Embedded Display Port (EDP) v1.4 TX Compliance Test Package</td>
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<td>ET3</td>
<td>Ethernet Compliance Testing</td>
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<tr>
<td>FC-16G</td>
<td>Fiber Channel - 16G Essentials (Requires Opt. DJA)</td>
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<td>HT3</td>
<td>HDMI Compliance Testing</td>
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<tr>
<td>HT3DS</td>
<td>HDMI Direct Synthesis for HDMI 1.4 (Requires Opt. HT3)</td>
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<td>LT</td>
<td>Waveform Limit Testing</td>
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<tr>
<td>MHD</td>
<td>MHL Advanced Analysis and Compliance Software (Requires Opt. DJA and 2XL)</td>
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<td>Option</td>
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<td>---------</td>
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<tr>
<td>M-PHY</td>
<td>MiPI M-PHY Transmitter Debug, Characterization and Compliance Test Solution (Requires Opt. DJA)</td>
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<td>M-PHYTX</td>
<td>M-PHY Automated Transmitter Solution</td>
</tr>
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<td>NBASET</td>
<td>NBASE-T TekExpress Conformance and Debug Solution</td>
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<td>PAM4 Electrical Transmitter Analysis Software (Requires 33 GHZ or greater Oscilloscope Bandwidth)</td>
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<td>SC</td>
<td>SignalCorrect Cable, Channel, and Probe Compensation Software</td>
</tr>
<tr>
<td>SDLA64</td>
<td>New version of SDLA (64-bit)</td>
</tr>
<tr>
<td>SFP-TX</td>
<td>SFP+ Compliance and Debug Solution (Requires Opt. DJA)</td>
</tr>
<tr>
<td>SFP-WDP</td>
<td>SFP+ Compliance and Debug Solution ? WDP Measurement (Requires Opt. DJA &amp; SFP-TX)</td>
</tr>
<tr>
<td>SR-EMBD</td>
<td>Embedded Serial Triggering and Analysis (I2C, SPI)</td>
</tr>
<tr>
<td>SR-COMP</td>
<td>Computer Serial Triggering and Analysis (RS-232/422/485/UART)</td>
</tr>
<tr>
<td>SR-ENET</td>
<td>Ethernet Serial Analysis (10BASE-T and 100BASE-TX)</td>
</tr>
<tr>
<td>SR-PCIE</td>
<td>PCI EXPRESS Serial Analysis</td>
</tr>
<tr>
<td>SR-USB</td>
<td>USB Serial Triggering and Analysis</td>
</tr>
<tr>
<td>ST14G</td>
<td>8b10b Serial Trigger and Analysis</td>
</tr>
<tr>
<td>SR-6466</td>
<td>64b66b Serial Trigger and Analysis (Requires Opt. ST14G)</td>
</tr>
<tr>
<td>USB2</td>
<td>USB 2.0 Automated Compliance Test Application</td>
</tr>
<tr>
<td>USBSPP-TX</td>
<td>USB 3.1 Automated TX Compliance Test Application</td>
</tr>
<tr>
<td>USBSPP-UP</td>
<td>USB-TX to USBSPP-TX Upgrade</td>
</tr>
<tr>
<td>USB-TX</td>
<td>TekExpress Automated USB 3.0 Solution</td>
</tr>
<tr>
<td>USB-TX-UP</td>
<td>TEKEXP USB-TX to USB-TX Upgrade</td>
</tr>
<tr>
<td>VET</td>
<td>Visual Trigger and Search</td>
</tr>
<tr>
<td>XGBT2</td>
<td>10GBASE-TekExpress Conformance and Debug Solution</td>
</tr>
<tr>
<td>100G-TXE</td>
<td>IEEE-802.3bm: CAU4 and IEEE-802.3bt: KR4/Cr4 100Gbps Transmitter Compliance (Requires Opt. DJA or DSA and DJAN)</td>
</tr>
<tr>
<td>40G-CR4</td>
<td>40GBASE-CR4 Debug and Automated Compliance Solution</td>
</tr>
</tbody>
</table>
### Spectral and modulation analysis upgrades for DPO70000SX Series

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVEU</td>
<td>SignalVu® Essentials - Vector Signal Analysis Software</td>
</tr>
<tr>
<td>SVA</td>
<td>AM/FM/PM Audio Signal Analysis (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SVE</td>
<td>SignalVu Essentials Vector Signal Analysis Software</td>
</tr>
<tr>
<td>SVM</td>
<td>General Purpose Modulation Analysis (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SVO</td>
<td>Flexible OFDM Analysis (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SVP</td>
<td>Advanced Pulsed Signal Analysis including Measurements (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SVT</td>
<td>Frequency and Phase Settling Time Measurements (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SV23</td>
<td>WLAN802.11a/b/g/j/p measurement application (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SV24</td>
<td>WLAN 802.11n measurement application (Requires Opt SV23)</td>
</tr>
<tr>
<td>SV25</td>
<td>WLAN 802.11ac measurement application (Requires Opt SV24)</td>
</tr>
<tr>
<td>SV26</td>
<td>APCO P25 compliance testing and analysis application (Requires Opt. SVE)</td>
</tr>
<tr>
<td>SV27</td>
<td>SignalVu Bluetooth Basic LE TX SIG measurements (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
<tr>
<td>SV28</td>
<td>SignalVu LTE Downlink RF measurements (Requires Opt SVE)</td>
</tr>
<tr>
<td>SV29</td>
<td>WiGig IEEE802.11ad/ay transmitter testing (Requires Opt. SVE, SVEH, or SVEU)</td>
</tr>
</tbody>
</table>

### Other upgrades

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSD-SX</td>
<td>Spare Solid State Drive - Windows 7, preconfigured with OS, TekScope, and scope applications (all 70kSX models except 70GHz)</td>
</tr>
<tr>
<td>DPOSX-SSD70G</td>
<td>Spare Solid State Drive - Windows 7, for 70GHz scopes preconfigured with OS, TekScope and scope applications (only for 70GHz models)</td>
</tr>
<tr>
<td>DPO7SXSSD-W10</td>
<td>Spare Solid State Drive - Windows 10, for scopes already licensed and running Win10. Preconfigured with OS, TekScope and scope applications. (all 70kSX models except 70 GHz, order both line items)</td>
</tr>
<tr>
<td>DPO7SXSSD-W10 opt NOL</td>
<td>Upgrade Solid State Drive - Windows 10, for scopes currently licensed and running Win7. Upgrades to Win10. Preconfigured with OS, TekScope and scope applications. (all 70kSX models except 70 GHz, order both line items)</td>
</tr>
<tr>
<td>DPO7SXSSD70GW10</td>
<td>Spare Solid State Drive - Windows 10, for 70 GHz scopes already licensed and running Win10. Preconfigured with OS, TekScope and scope applications. (only for 70 GHz models, order both line items)</td>
</tr>
<tr>
<td>DPO7SXSSD70GW10 opt UP</td>
<td>Upgrade Solid State Drive - Windows 10, for scopes currently licensed and running Win7. Upgrades to Win10. Preconfigured with OS, TekScope and scope applications. (all 70kSX models except 70 GHz, order both line items)</td>
</tr>
</tbody>
</table>

### Investment protection options

As signals get faster and new standards are developed, your investment in an DPO70000SX Series instrument can evolve with your needs. You can upgrade the bandwidth of the unit you own today. You can take advantage of DPO70000SX Series performance improvements by upgrading your existing unit to a new series. Contact your local Tektronix representative to discuss the full range of options available to ensure your DPO70000SX Series oscilloscope has the tools you need for your next project.
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

DPO7OE1  33 GHz optical probe
DPO7OE2  59 GHz optical probe
P7633  33 GHz Low Noise TriMode® Probe
P7625  25 GHz Low Noise TriMode® Probe
P7520A  25 GHz TriMode® probe
P7720  20 GHz TriMode probe with TekFlex™ connector technology
P7313SMA  13 GHz TriMode® differential SMA probe
P6251  DC to 1 GHz, 42 V, differential probe (requires TCA-BNC adapter)
TCPA300/TCPA400 Series  Current measurement systems
PS200/PS205/PS210  High-voltage differential probes
P77DESKEW P7700 Probe Deskew Fixture for SMA, solder-down, and browser connections
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 P6139 A passive probe
- TCA292D TekConnect® to 2.92 mm adapter (33 GHz bandwidth)
- TCA-BNC TekConnect® to BNC adapter
- TCA-N TekConnect® to N adapter
- TCA-VPI50 50 Ω TekVPI to TekConnect adapter
- TCA75 23 GHz precision TekConnect® 75 Ω to 50 Ω adapter with 75 Ω BNC input connector

Signal Path Solutions
- DPO7RFK1 3 dB, 6 dB, 10 dB, and 20 dB attenuator kit with 1.85 mm connectors, characterized to 70 GHz. Includes serial numbers and S-parameters for each attenuator.
- DPO7RFK2 Includes the contents of the DPO7RFK1 plus a DC Block and 4 adapters for connecting to 1.85 and 2.92 mm fixtures.
- DPO7RFK3 RF channel timing de-skew kit, 65 GHz, 1.85 mm. Kit includes a high performance power divider and 1.85 mm male-male adapter.
- DPO7RFC1 Matched cable pair, 67 GHz, 1.85 mm, male-male, 24 inch, characterized to 70 GHz with provided S-parameters.
- DPO7RFC2 Phase-stable coaxial cable, 67 GHz, 1.85 mm, male-male, 24 inch. Kit includes S-parameter data to 70 GHz.
- DPO7RFC3 Phase-stable coaxial cable, 67 GHz, 1.85 mm, male-male, 36 inch. Kit includes S-parameter data to 70 GHz.

Other
- 016-2095-xx Rackmount Kit
- 016-2102-xx SSD mounting kit (front of instrument rackmount tray)
- 077-0076-xx Service Manual, pdf on hard drive
- 016-2104-00 Transit Case (carbon fiber)
- K4000 Oscilloscope Cart
- DPO7AFP Auxiliary Front Panel
- DPO7USYNC 1 M 1 meter UltraSync cable
- DPO7USYNC 2 M 2 meter UltraSync cable
The DPO70000SX Series offers the highest performance (50/59/70 GHz models) in Tektronix’ Real Time performance oscilloscope portfolio.

The DPO70000SX Series also offers 13 GHz, 16 GHz, 23 GHz, and 33 GHz models with 4 TekConnect inputs.
Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.


Product Area Assessed: The planning, design/development and manufacture of electronic Test and Measurement instruments.
### Datasheet

<table>
<thead>
<tr>
<th>Region</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASEAN / Australasia</td>
<td>(65) 6356 3900</td>
</tr>
<tr>
<td>Austria</td>
<td>00800 2255 4835*</td>
</tr>
<tr>
<td>Brazil</td>
<td>+55 (11) 3759 7627</td>
</tr>
<tr>
<td>Central Europe &amp; Greece</td>
<td>+41 52 675 3777</td>
</tr>
<tr>
<td>France</td>
<td>00800 2255 4835*</td>
</tr>
<tr>
<td>India</td>
<td>001 800 650 1835</td>
</tr>
<tr>
<td>Luxembourg</td>
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<tr>
<td>The Netherlands</td>
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<tr>
<td>Poland</td>
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</tr>
<tr>
<td>Russia &amp; CIS</td>
<td>+7 (495) 6647564</td>
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<tr>
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<tr>
<td><strong>For Further Information.</strong></td>
<td>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 <a href="http://www.tek.com">www.tek.com</a>.</td>
</tr>
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