

Applications That Benefit from PXI Oscilloscopes

Submitted by [Keysight Technologies](#)

Oscilloscopes are primarily used for bench-top applications taking advantage of the large fast displays for viewing waveforms. They provide an intuitive user interface with front panel controls so engineers can easily perform waveform acquisitions and measurements. The large displays allow waveform panning and scaling both during and after acquisition completion which is very helpful for debugging. The ability to horizontally split the display to show a zoomed portion of the waveform is commonly supported in scopes and helps search for short anomalies within long acquisitions.

It not as widely known, that PXI scopes also provide these usability features. Scope technology, migrated to a modular PXI format has retained many typical scope features, packaged in a smaller footprint, and utilizes the fast PCIe interfaces to maintain a high display refresh rate. PXI oscilloscopes, which are being used more frequently in test applications, use full featured soft front panels (SFP) allowing the same intuitive scope control and waveform visualization. PXI scope SFP's are designed with the same focus on operator usability as the benchtop scopes, and even include use of LCD touch screen display controls. For example, when combined with a touchscreen display the M924xA scope waveforms can be panned and zoomed with simple touch interactions. The M924xA also supports Zone Touch Triggering which allows easy setup of difficult-to-define trigger events by just drawing a box with your finger. Although the M924xA is a PXI scope, the user interface has been optimized for fast refresh rates.

Digitizers have been used in automated test equipment (ATE) systems and high density multi-channel applications, rather than oscilloscopes, for their high resolution and dynamic range. Digitizers return acquired data to controllers via fast multi-lane PCIe buses for software processing. The data analysis is performed within application software and displayed at the controller, so there's no need for an embedded display. However, measurements like waveform averaging and advance waveform triggers are not possible.

PXI oscilloscopes go beyond a digitizer's capability and provide measurement tools directly in the module. PXI test systems that benefit from an oscilloscope rather than a digitizer include applications that require higher bandwidth, up to 1 GHz. Oscilloscopes provide a lower resolution and dynamic range, typically 8 bits, compared to a digitizer which offers 12 to 16-bit resolution and for many applications 8-bits is enough resolution. Oscilloscopes provide fast waveform $\sin x/x$ reconstruction, and corrections for phase and magnitude errors using on-board DSP. Scopes offer many choices for trigger qualifiers and fast measurements are possible using either on-board capabilities or by using the scope's application specific software. PXI scopes able to take advantage of the large portfolio of scope probing solutions including passive and

active probes for both voltage and current, as well as high voltage, differential and even optical versions probes, the same as desktop oscilloscopes.

PXI oscilloscopes are a benefit in many of the same applications as benchtop scopes, including the following:

- Serial protocol debug and conformance testing where scopes provide built-in serial protocol triggering and decode capability for both serial protocol debug and conformance testing. Serial messaging can be verified, and signal timing and level faults are easily observed.
- Serial bus jitter analysis with clock recovery where scopes with high sample rates and specialized triggering systems provide serial bus eye and jitter analysis. Infinite persistence display modes allow monitoring eye opening over long durations without consuming significant memory.
- Electronic functional test ATE systems when scope resolution is sufficient and built-in measurements or advanced triggering can be used.

PXI oscilloscopes, much like bench scopes can add functionality for specific measurements or applications using additional software. For example, waveform generation, frequency response analysis, mask limit testing, video/TV, power analysis, serial decode, and automotive serial triggering and analysis are a few software options for the PXI M924xA oscilloscope.

Oscilloscopes are a must when installing, calibrating and troubleshooting electronics. Engineers rely on the ability to see and measure signals within their designs. ATE systems are no exception and they benefit from applying oscilloscope capabilities in a PXI format for the applications mentioned.

For more information on [PXI oscilloscope features and capabilities](#).