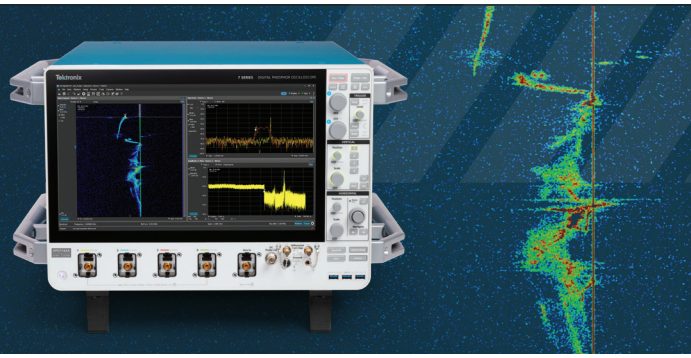
Tektronix

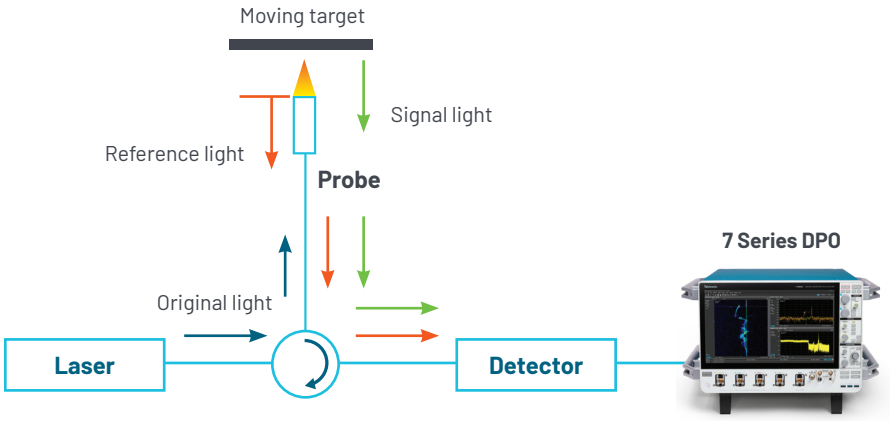
tek.com/research/photonic-doppler-velocimetry

Photonic Doppler Velocimetry (PDV)



Precisely Measure Single Shot Events

Photonic Doppler Velocimetry (PDV) is a powerful method for accurately measuring the velocity of materials during shock events. At the heart of a PDV experiment are two closely connected tasks: capturing "single shot" events—brief, high-intensity moments that can't be repeated—using a high-bandwidth oscilloscope, and validating the PDV system's performance through machine diagnostics, which often involves multi-channel oscilloscopes and function generators to ensure signal integrity and system reliability.



To fully understand the material response, researchers often gather data from multiple laser channels, along with inputs from other sensors. Since the signals are often low in amplitude, capturing clean, accurate data is critical. High-fidelity acquisition ensures that the insights drawn from these complex, high-speed experiments are both meaningful and reliable.

Recommended Equipment for Single Shot Data Acquisition

Ideal for high-fidelity data capture in high-energy physics applications like PDV

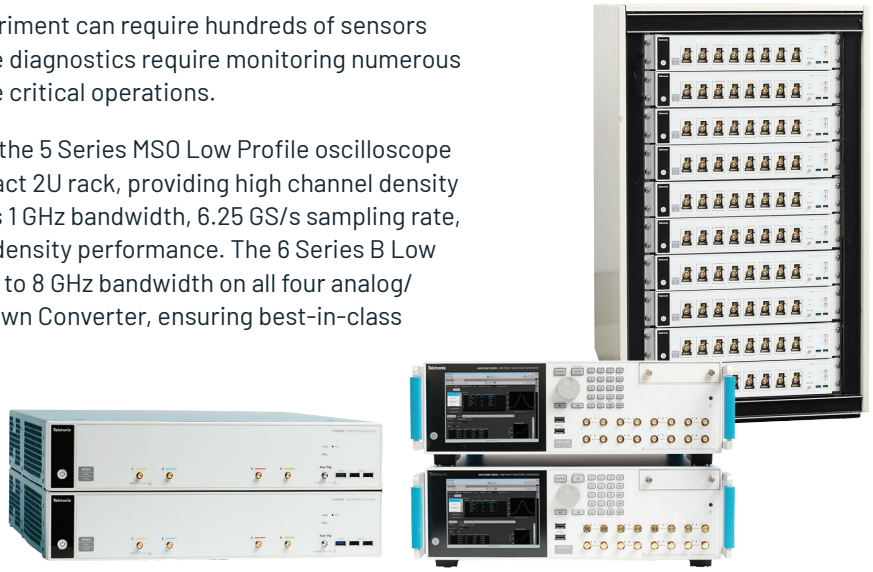
	Product	Description	Advantage
Hardware	DPO714AX	7 Series DPO oscilloscope from 8 GHz to 25 GHz bandwidth	High bandwidth options and superior signal fidelity ensure precise measurement of high-speed events with accurate single-shot acquisitions.
	DPO72004SX: 25 GHz or higher bandwidth	DPO70000SX performance oscilloscope up to 70 GHz bandwidth	
	LPD64: 1 GHz - 8 GHz	6 Series Low Profile Digitizer between 1 GHz and 8 GHz bandwidth	
Software	RL-X Extended Record Length - OPT	Optional: Record length to extend acquisition time.	Extends acquisition time for comprehensive data capture.
Software	Spectrum View 5-SV-RFVT or 6-SV-RFVT (Spectrograms)	Optional: Enables SignalVU PC software with 5/6 series and provides RF vs time traces (frequency, magnitude, and phase).	Provides RF vs time traces for detailed signal analysis.
Software	5 and 6 Series B MSO: Spectrum View with options 5-SV-RFVT or 6-SV-RFVT to add RF vs. Time traces and the ability to output I & Q data	Makes use of the integrated DDC found in the 5 and 6 series B MSO oscilloscopes.	Easily see your FFT data in a high-resolution Spectrogram, uncovering insights more quickly.
	7 Series DPO: Output data directly to SignalVu-PC with the CON7NL-SVPC (node-locked) or CON7FL-SVPC (floating)	Makes use of the software DDC in SignalVu-PC on the 7 Series DPO.	
Service Plan	Comprehensive service plans	Premier service plan including loaner unit, free calibration, full damage coverage, and more.	Ensures minimal downtime for your critical, complex equipment.
Service Plan	Factory Verified Calibration	Comprehensive service plan including precise calibration, firmware upgrades, maintenance, and more.	Restores your instrument to factory-new condition.

High Fidelity, High Channel Density for Machine Diagnostics

Monitoring a PDV system to validate a single shot experiment can require hundreds of sensors and precision acquisition hardware. Effective machine diagnostics require monitoring numerous sensors and precision acquisition hardware to validate critical operations.

In applications that demand extreme channel density, the 5 Series MSO Low Profile oscilloscope offers 8 channels and auxiliary trigger input in a compact 2U rack, providing high channel density at a low cost-per-channel. Each FlexChannel™ delivers 1 GHz bandwidth, 6.25 GS/s sampling rate, and 12-bit resolution, setting a new standard for high-density performance. The 6 Series B Low Profile Digitizer features a 25 GS/s sample rate and DC to 8 GHz bandwidth on all four analog/spectral channels, with a 2 GHz RF hardware Digital Down Converter, ensuring best-in-class low noise and ENOB.

The AWG5200 and AFG31000 signal generators provide the flexibility and control needed to test the accuracy of PDV measurements and verify proper system functionality.



Recommended Equipment for Machine Diagnostics

Ideal for monitoring and validating hardware operations in a PDV system

	Product	Description	Advantage
Hardware	MSO58LP: 1 GHz **AND/OR** LPD6	5 Series Low Profile 6 Series Low Profile Digitizer between 2.5 GHz and 8 GHz bandwidth. Multiple oscilloscopes can be daisy-chained in a series to help synchronize and coordinate other devices.	High channel density and synchronization for comprehensive sensor data acquisition.
Hardware	AFG31000 **OR** AWG5200	Generate precise signals for calibration and testing. The AFG31000 and AWG5200 signal generators provide the flexibility and control needed to test the accuracy of PDV measurements and verify proper system functionality.	Precise signal generation for calibration and testing accuracy.
Service Plan	Comprehensive service plans	Premier service plan including loaner unit, free calibration, full damage coverage, and more.	Ensures minimal downtime for your critical, complex equipment.
Service Plan	Factory Verified Calibration	Comprehensive service plan including precise calibration, firmware upgrades, maintenance, and more.	Restores your instrument to factory-new condition.

Contact your local salesperson today for details.

tek.com/research/photonic-doppler-velocimetry