Photron

HIGH-SPEED CAMERAS FOR SLOW MOTION ANALYSIS

NOVA

The FASTCAM NOVA Series brings together unique CMOS image sensor technologies and extensive high-speed digital imaging expertise to provide a camera with the flexibility to be used in a wide variety of applications.

NOVA S6, S9, S12, S16

Camera Performance Specifications

Model	FASTCAM Nova S16	FASTCAM Nova S12	FASTCAM Nova S9	FASTCAM Nova S6
Full Frame Performance	16,000fps 1024 x 1024 pixels	12,800fps 1024 x 1024 pixels	9,000fps 1024 x 1024 pixels	6,400fps 1024 x 1024 pixels
Maximum Frame Rate	1,100,000fps (128 x 16 pixels)*	1,000,000fps (128 x 16 pixels)*	900,000fps (128 x 16 pixels) *	800,000fps (128 x 16 pixels) *
Light Sensitivity	ISO 64,000 monochrome, ISO 16,000 color			
Minimum Exposure Time	Global electronic shutter to 0.2µs selectable independent of frame rate (subject to export control)			
Ruggedized Mechanical Calibration Shutter	Standard feature			
Dynamic Range (ADC)	12-bit monochrome 36-bit color			
Memory Capacity Options	8GB, 16GB, 32GB, 64GB, or 128GB			
Memory Partitions	Up to 128 memory segments			
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 16 pixels (vertical)			
Trigger Inputs	Selectable TTL (+/- 5V) and Switch (NO or NC)			
Trigger Delay	Programmable on selected input / output triggers: 100ns resolution			
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: trigger, sync, ready, rec, exposure			
Trigger Modes	Start, end, center, manual, random, random reset, record on command			
Time Code Input	IRIG-B (selectable at beginning or end of frame exposure)			
External Sync	+/- TTL 5Vp-p Variable frequency sync			
Camera Control Interface	High-speed 1/10 Gigabit Ethernet			
Image Data Display	Frame rate,resolution, shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count			
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAWW, MRAW, AVI, MOV - Images can be saved with or without image data and in 8-bit, 16-bit or bit depth of sensor			
Supported OS	Microsoft Windows operating system including: 8.1, 10, 11 (32/64-bit)			
Lens Mount	M42, F-mount (G-type lens compatible) and C-mount provided - Optional lens mounts available include Canon EF remote control mount			
External Storage	Optional FAST Drive 4TB high-speed SSD			

* **Frame rates above 225,000fps and exposure times below 1µs may be subject to export control regulations in some areas**

nova S20

Camera Performance Specifications

Model	FASTCAM NOVA S20	
Bit Version	**10- bit**	**12- bit**
Full Frame Performance	18,750fps 1024 x 1024 pixels	16,500fps 1024 x 1024 pixels
Dynamic Range (ADC)	10-bit monochrome 30-bit color	12-bit monochrome 36-bit color
Maximum Frame Rate	1,100,000fps* (128 x16)	
Light Sensitivity	ISO 64,000 monochrome, ISO 16,000 color	
Minimum Exposure Time	Global electronic shutter to 0.2µs selectable independent of frame rate (subject to export control)	
Ruggedized Mechanical Calibration Shutter	Standard feature	
Memory Capacity Options	8GB, 16GB, 32GB, 64GB, 128GB	
Memory Partitions	Up to 128 memory segments	
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 16 pixels (vertical)	
Trigger Inputs	Selectable TTL (+/- 5V) and Switch (NO or NC)	
Trigger Delay	Programmable on selected input / output triggers: 100ns resolution	
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: trigger, sync, ready, rec, exposure	
Trigger Modes	Start, end, center, manual, random, random reset, record on command	
Time Code Input	IRIG-B (selectable at beginning or end of frame exposure)	
External Sync	+/- TTL 5Vp-p Variable frequency sync	
Camera Control Interface	High-speed 1/10 Gigabit Ethernet	
Image Data Display	Frame rate, resolution, shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count	
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAWW, MRAW, AVI, MOV	
Supported OS	Microsoft Windows operating system including: 8.1, 10, 11 (32/64-bit)	
Lens Mount	M42, F-mount (G-type lens compatible) and C-mount provided - Optional lens mounts available include Canon EF remote control mount	
External Storage	Optional FAST Drive 4TB high-speed SSD	

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4K Cameras

Photron's high resolution high-speed cameras can capture even the smallest details with stunning clarity and precision. Whether used for filming large-scale automotive safety crash tests, observation of micro-fluidic flows for 'lab-on-a-chip' device devlopment, or creating visually stunning artistic works, our 4K high-speed cameras are revolutionizing the way we capture and experience the world around us.

nova R5-4K AND R3-4K

Camera Performance Specifications

Model	FASTCAM NOVA R3-4K	FASTCAM NOVA R5-4K
Full Frame Performance	750fps 4096 x 2304 pixels	1,250fps 4096 x 2304 pixels
Maximum Frame Rate	150,000fps (2048 x 8 pixels)	200,000fps (2048 x 8 pixels)
Light Sensitivity	ISO 3,200 monochrome, ISO 640 color	
Minimum Exposure Time	Global electronic shutter to 2.0µs selectable independent of frame rate	
Ruggedized Mechanical Calibration Shutter	Standard feature	
Dynamic Range (ADC)	12-bit monochrome 36-bit color	
Memory Capacity Options	16GB, 34GB, 64GB, 128GB	
Memory Partitions	Up to 128 memory segments	
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 8 pixels (vertical)	
Trigger Inputs	Selectable TTL (+/- 5V) and Switch (NO or NC)	
Trigger Delay	Programmable on selected input / output triggers: 100ns resolution	
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: trigger, sync, ready, rec, exposure	
Trigger Modes	Start, end, center, manual, random, random center, random manual, record on command	
Time Code Input	IRIG-B (selectable at beginning or end of frame exposure)	
External Sync	+/- TTL 5Vp-p Variable frequency sync	
Camera Control Interface	High-speed 1/10 Gigabit Ethernet	
Image Data Display	Frame rate, resolution, shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count	
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAWW, MRAW, AVI, MOV	
Supported OS	Microsoft Windows operating system including: 8.1, 10, 11 (32/64-bit)	
Lens Mount	M42, F-mount (G-type lens compatible) and C-mount provided - Optional lens mounts available include Canon EF remote control mount	
External Storage	Optional FAST Drive 4TB high-speed SSD	

FASTCAM Mini R5-4K AND R3-4K

Camera Performance Specifications

Model	FASTCAM MINI R3-4K	FASTCAM MINI R5-4K
Full Frame Performance	750fps 4096 x 2304 pixels	1,250fps 4096 x 2304 pixels
Maximum Frame Rate	150,000fps (2048 x 8 pixels)	200,000fps (2048 x 8 pixels)
Light Sensitivity	ISO 4,000 monochrome, ISO 800 color	
Minimum Exposure Time	Global electronic shutter to 2.0µs selectable independent of frame rate	
Ruggedized Mechanical Calibration Shutter	Standard feature	
Dynamic Range (ADC)	12-bit monochrome / 36-bit color	
Memory Capacity Options	16GB, 32GB, 64GB	
Memory Partitions	Up to 128 memory segments	
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 8 pixels (vertical)	
Trigger Inputs	Selectable TTL (+/- 5V) and Switch (NO or NC)	
Trigger Delay	Programmable on selected input / output triggers: 100ns resolution	
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: trigger, sync, ready, rec, exposure	
Trigger Modes	Manual, random reset, random manual	
Time Code Input	IRIG-B (selectable at beginning or end of frame exposure)	
External Sync	+/- TTL 5Vp-p Variable frequency sync	
Camera Control Interface	High-speed 1/10 Gigabit Ethernet	
Image Data Display	Frame rate, resolution shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count	
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAWW, MRAW, AVI, MOV, GRAW	
Supported OS	Microsoft Windows operating system including: 8.1, 10, 11 (32/64-bit)	
Lens Mount	M42, F-mount (G-type lens compatible) and C-mount provided - Optional lens mounts available include Canon EF remote control mount	

FASTCAM Mini

Small yet powerful, the FASTCAM Mini series of high-speed cameras is redefining what users should expect from their camera. All models are engineered for reliable operation under high-G loads, making them ideally suited for automotive and military use, whilst their performance matches the demands of a broad range of research and industrial applications.

FASTCAM Mini AX

Camera Performance Specifications

Model	Mini AX50	Mini AX100	Mini AX200
Full Frame Performance	2,000fps 1024 x 1024 pixels	4,000fps 1024 x 1024 pixels	6,400fps 1024 x 1024 pixels
Maximum Frame Rate	Type 170K-S: 170,000fps (128 x 16 pixels)	Type 200K-S: 212,500fps (128 x 16 pixels) Type 540K-S: 540,000fps* (128 x 16 pixels)	Type 200K-S: 216,000fps (128 x 16 pixels) Type 540K-S: 540,000fps* (128 x 16 pixels) Type 900K-S: 900,000fps* (128 x 16 pixels)
Light Sensitivity	ISO 50,000 monochrome, ISO 25,000 color		
Minimum Exposure Time	Global electronic shutter to 1.05µs selectable independent or frame rate (260ns option available with Mini AX200 type 900K only) *		
Ruggedized Mechanical Calibration Shutter	Standard feature		
Dynamic Range (ADC)	12-bit monochrome 36-bit color		
Memory Capacity Options	8GB, 16GB, 32GB		
Memory Partitions	Up to 64 memory segments		
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 16 pixels (vertical)		
Trigger Inputs	Selectable +/- TTL 5V and switch closure		
Trigger Delay	Programmable on selected input / output triggers: 100ns resolution		
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: trigger, sync, ready, rec, exposure		
Trigger Modes	Start, end, center, manual, random, random reset, image trigger, time lapse, record on command		
Time Code Input	IRIG-B		
External Sync	+/- TTL 5Vp-p Variable frequency sync		
Camera Control Interface	High-speed Gigabit Ethernet		
Image Data Display	Frame rate, resolution, shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count		
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAW, RAWW, MRAW, AVI, WMV, FTIF, MOV - Images can be saved with or without image data and in 8-bit, 16-bit or 36-bit depth of sensor where supported		
Supported OS	Microsoft Windows operating system including: 7, 8, 8.1, 10, 11 (32/64-bit)		

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FASTCAM Mini UX

Camera Performance Specifications

Model	Mini UX50	Mini UX100
Full Frame Performance	2,000fps 1280 x 1024 pixels	4,000fps 1280 x 1024 pixels
Maximum Frame Rate	Type 160K: 160,000fps (1280 x 8 pixels)	Type 200K: 200,000fps (640 x 8 pixels) Type 800K: 800,000fps (640 x 8 pixels) *
Light Sensitivity	ISO 10,000 monochrome, ISO 5,000 color	
Minimum Exposure	Global electronic shutter 3.9µs (1.01µs at maximum frame rates)	
Dynamic Range (ADC)	12-bit monochrome 36-bit color	
Memory Capacity Options	8GB, 16GB, 32GB	
Memory Partitions	Up to 64 memory segments	
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 8 pixels (vertical) - minimum 640 x 8	
Trigger Inputs	Selectable +/- TTL 5V and switch closure	
Trigger Delay	Programmable on selected input / output triggers: 100ns resolution	
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: trigger, sync, ready, rec, exposure	
Trigger Modes	Start, end, center, manual, random	
Time Code Input	IRIG-B	
External Sync	+/- TTL 5Vp-p Variable frequency sync	
Camera Control Interface	High-speed Gigabit Ethernet	
Image Data Display	Frame rate, resolution, shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count	
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAW, RAWW, MRAW, AVI, WMV, FTIF, MOV - Images can be saved with or without image data and in 8-bit, 16-bit or 36-bit depth of sensor where supported	
Supported OS	Microsoft Windows operating system including: XP, Vista, 7, 8, 8.1, 10, 11 (32/64-bit)	

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FASTCAM MH6

For challenging applications in research, defense and automotive safety testing, the FASTCAM MH6 offers a unique, cost-effective and rugged high-speed imaging solution where simultaneous recording from multiple positions or locations in hazardous or space limited areas is necessary. Up to 6x 'HD' or 12x 'ST' camera heads are controlled from a single module combining views and distributing trigger and synchronisation signals greatly simplifying connections between hardware.

Performance and Operation Specifications

	HD Camera Head	ST Camera Head
Full frame performance	750fps, 1920 x 1400 pixels	1,000fps, 800 x 600 pixels
1,000fps	1920 x 1080 pixels (FHD)	800 x 600 pixels (SVGA)
2,000fps	1280 x 800 pixels	800 x 312 pixels
5,000fps	1280 x 256 pixels	800 x 120 pixels
Sensor size / Pixel size	12.67 x 9.24mm / diagonal 15.68mm 6.6µm square pixel	5.28 x 3.96mm / diagonal 6.6mm 6.6µm square pixel
Light Sensitivity	ISO 5,000 color, ISO 12,500 monochrome	
Minimum Exposure Time	Global electronic shutter to 4µs selectable independent of frame rate	
Dynamic Range (ADC)	8-bit monochrome, 24-bit color	
Memory Capacity	24GB shared between active channels. With automatic NVRAM back up	
Data Storage	Built-in 512GB SSD with autosave function	
Input / Output	Input: Trigger (TTL/Switch), sync, ready, event, IRIG Output: Trigger, sync, ready, rec, exposure	
Camera Control Interface	High-speed Gigabit Ethernet and USB3	
Supported OS	Microsoft Windows operating systems including: 7, 8, 8.1, 10, 11 (32/64-bit)	

Performance and Operation Specifications

Mechanical		
	HD Camera Head	ST Camera Head
Lens Mount	C-mount	M10.5
Total Camera Cable Length	7m / 10m	8m / 11m
Head Size (HWD)	35.4mm x 35mm x 35.4mm (1.38in x 1.39in x 1.39in)	15mm x 15mm x 15mm (0.59in x 0.59in x 0.59in)
Head Weight	100 grams (0.22lbs)	12 grams (0.026lbs)
Processor Size (HWD)	210mm x 70mm x 150mm (8.27in x 2.76in x 5.91in)	
Processor Weight	3kg (6.61lbs)	
Environmental		
Operating Temperature	0 to 40C, 32˚ to 104˚F	
Storage Temperature	-20 to 60C, -4˚ to 140˚F	
Humidity	85% or less (non-condensing)	
Operational Shock Camera Head	160G, 10ms, 6-axes, 1,000 times	
Operational Shock Processor	100G, 10ms, 6-axes, 1,000 times	

INFINICAM

INFINICAM is a high-speed streaming camera capable of capturing and transferring 1.2-megapixel of image data to PC memory at 1,000fps via USB 3.1. The latest version of the SDK supports Python, a common language in the computer vision/machine vision field, in addition to C++. This makes real-time image processing with INFINICAM possible with easy intuitive programming. INIFINICAM is also compatible with StreamPix and TroublePix Software from Norpix to provide a comprehensive off-the-shelf high-speed camera solution.

Performance and Operation Specifications

Model Name	INFINICAM UC-1
Sensor Type	CMOS
Sensor Size	12.8mm x 10.24mm
Pixel Size	10µm
Maximum Effective Resolution	1246 x 1024
Maximum Frame Rate (Full Frame)	988fps
Maximum Frame Rate (Split Frame)	31,157fps
Minimum Exposure Time	6.5µsec
Shutter Method	Global Shutter
Dynamic Range	Monochrome 8-bit (color not available)
Interface	USB 3.1 Gen 1 Type-C
Lens Mount	C-mount
External Synchronisation Signal	2.5 Vp-p (DIN connector male)
Camera Housing	Unsealed air-cooled (with fan)
Dimensions / Weights	55(W) x 55(H) x 55(D) mm / 280g (excluding protruding parts and accessories)
Storage Temperature / Humidity	20 to 60°C/85% or less (no condensation)
Operating Temperature / Humidity	0-45°C/ 80% or less
DC Power Supply	5V (USB Vbus supply)

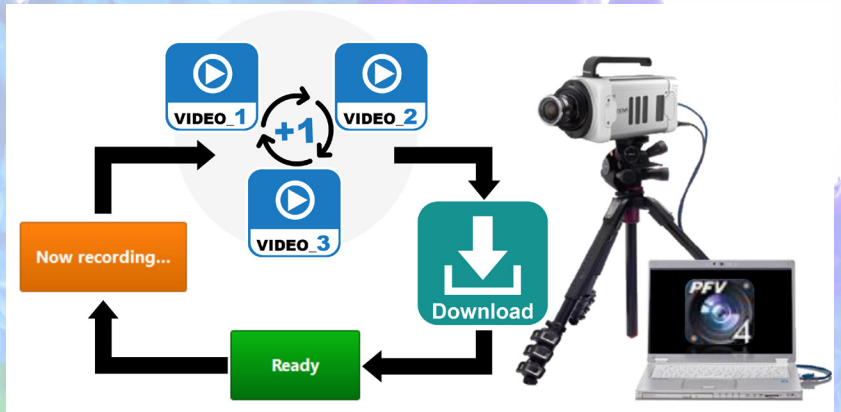
Development Environment

OS	Microsoft Windows 10/11 64-bit
CPU	AVX2 - compatible processors
Real-time Image Processing	Multi-core CPU and high-speed SSD (NVMe, PCI-express) recommended

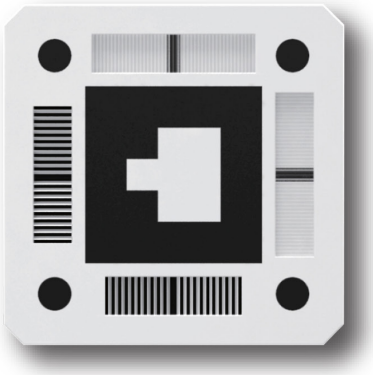
PFV4

For 30 years, users have praised the intuitive nature of the Photron FASTCAM Viewer.

This next generation of PFV maintains the usability pf previous versions by delivering not only the expected functionality required for camera configuration and image capture, but also including powerful time-saving tools for post processing, image analysis, data acquisition and PFV Mobile for Microsoft Windows, Android and iOS tablet devices. PFV is placed in the heart of your new system.



6D-MARKER

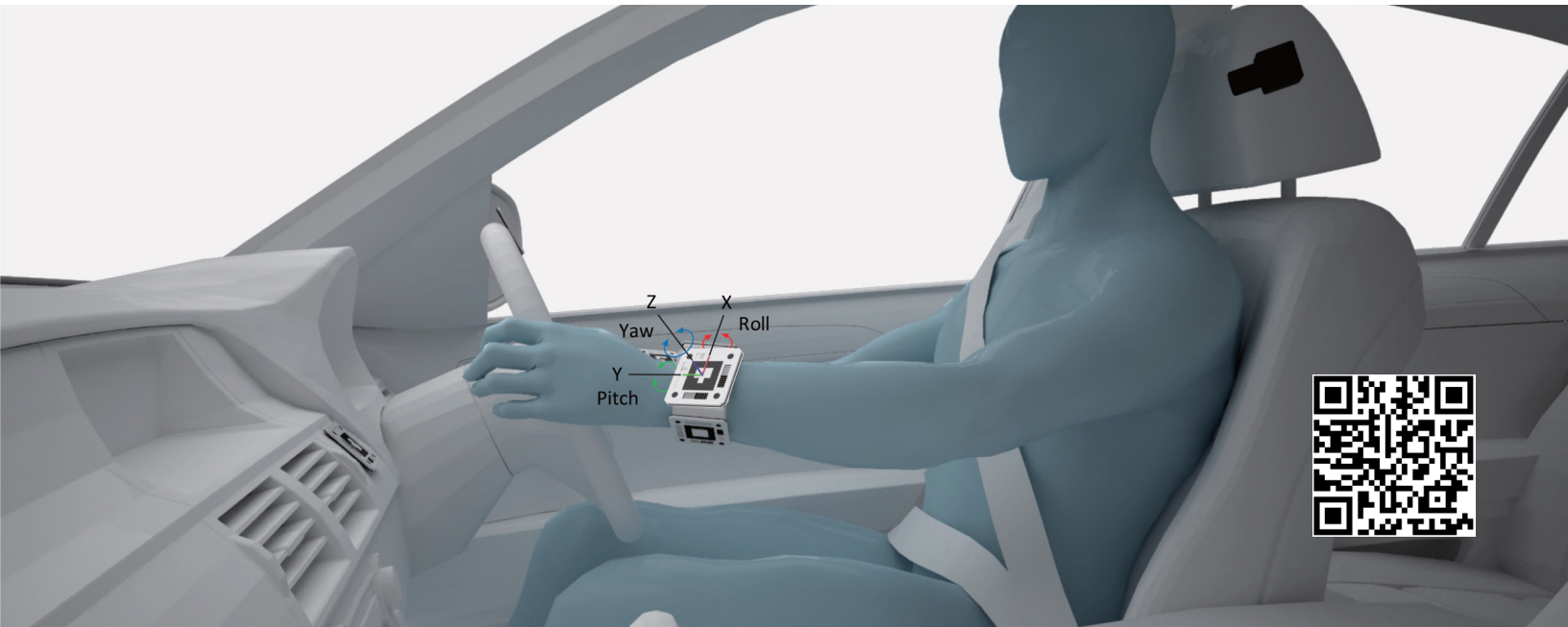


The 6-D Marker is a simple motion capture system that can track and measure 3D image data with six degrees of freedom (X, Y, Z, Roll, Pitch, and Yaw) using only one camera and one 6D-Marker. It's compact structure allows users to measure various automotive tests, including engine vibration and vehicle impacts, which are difficult to analyze with a standard motion capture system.

With 6D-Marker's high precision printed reference points at the four corners, six degree of freedom, or 6DoF (X, Y, Z, Roll, Pitch, and Yaw) can be measured using only a single marker.

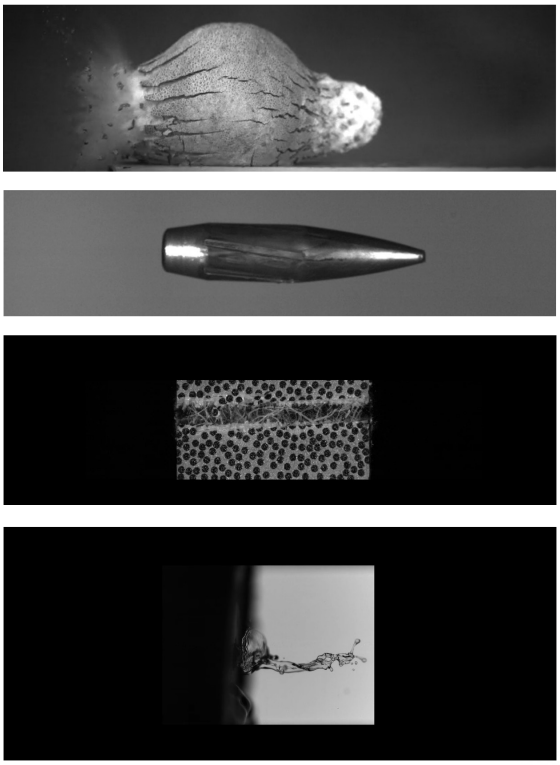
The VMP (variable moire pattern) placed on the upper right hand sides of the marker is a lenticular lens with a moire pattern that changes according to the viewing angle. It can measure the markers orientation angle more accurately than conventional AR markers when the image is shot from the front.

In addition, the FDP (flip detection pattern), located on the left hand and lower sides is the part where the black and white pattern is reversed according to the viewing angle, and indicates the markers physical orientation. The symbol at the center of the marker is used to identify each marker, with up to 32 (0-31) variations available.



PHARSIGHTED

The Pharsighted E9•80S and E9•100S ultra high-speed camera is the world's first backside-illuminated, full-frame high speed camera. With unparalleled speed and unmatched light sensitivity the E9 cameras are ideally suited for applications requiring visualization at over 100,000fps.



Camera Performance Specifications

Model	E9·100S	E9·80S
Full Frame Performance	640 x 480 pixels at 326,000fps	640 x 480 pixels at 272,000fps
Example Frame Rates	640 x 384 pixels at 404,000fps 640 x 256 pixels at 593,000fps 640 x 128 pixels at 1,108,000fps	640 x 384 pixels at 336,000fps 640 x 256 pixels at 492,000fps 640 x 128 pixels at 918,000fps
Minimum Exposure Time	Global electronic shutter to 59ns selectable independent of frame rate	Global electronic shutter to 98ns selectable independent of frame rate
Dynamic Range (ADC)	9-bit	
Memory Capacity	108GB , 216GB, or 432GB	
Memory Partitions	Up to 1024 memory segments	
Sensor Size / Pixel Size	33.28 x 24.96mm / 52µm	
Camera Control Interface	1 / 2.5 / 5 / 10G Ethernet	
Video Output	HD-SDI signal	
Video Conversion	Conversion of .SLOW to common video and image formats such as .AVI & .TIFF	
Operating System Compatibility	Windows, MAC OS, and Linux	

Photonic Lattice

2D BIREFRINGENCE MEASUREMENT SYSTEMS

Provide high-speed birefringence measurement of transparent materials for residual stress evaluation, or transparent films for the evaluation of phase uniformity, ranging from microscopic (~50cm) in the visible and NIR spectrums.The PA series measures birefringence and phase difference in glass and other low phase different target, with high resolution of 5 million pixels at high speed, for low phase difference with a measurement range of 0 to 130nm. The WPA series expands the measurement range of phase difference from 0 to 3,500nm by measuring birefringence / phase difference distribution over three wavelengths and can be used for measuring large transparent resin products.

HIGH-SPEED POLARIZATION CAMERA / INTERFEROMETER

The world's fastest polarized high-speed camera to visualize the "internal stress" and "orientation structure" of transparent materials. The Photron Crysta is a high-speed polarization camera for dynamic two-dimensional analysis of birefringence and is a powerful tool to understand phenomena such as birefringence, retardation, stress and impact fracture mechanisms of materials and fluids.

IN-LINE / OFF-LINE MAPPING-TYPE BIREFRINGENCE MEASUREMENT SYSTEM

An automated high-speed polarization scanning system to inspect and record, with a high degree of phase shift and principal axis orientation uniformity, the birefringence in optical film production lines with high accuracy in real time, both on the production line and in the research lab. Our Kamakiri system can be custom engineered to fit any production line. We have manufactured and installed systems for 200mm width measurement and large systems exceeding 5m production line widths.

POLARIZATION IMAGING CAMERA

Our PI / WPI cameras are capable to obtain polarization information real-time, as a normal image, and a high-resolution. They are used in many areas including recognition of dark objects using their polarization signature, real-time polarization monitoring of laser beams, etc. In addition to PI capabilities of recording the Degree of Linear Polarization (DOLP) and man axis orientation angle, our WPI systems provide full-fledged recording of the stokes parameters and Degree of Polarization (DOP), which is necessary in partial polarization situations.

CREDIBILITY AND REPUTATION THROUGH TECHNOLOGICAL ACHIEVEMENT

Developments in advanced imaging technologies pioneered by Photron over the past 25 years are now being utilized in high-speed camera systems designed for a range of scientific and industrial applications. Photron has invested in the development of unique, advanced CMOS image sensors, the core technology of high-speed photography. Innovations in this area have lead to a rapid increase in camera performance, allowing high-speed imaging to be applied to important new application areas.

THE HIGHEST QUALITY DESIGN, MANUFACTURING AND SUPPORT

As an ISO9001:2008 certified manufacturer, Photron manufactures its full range of high-speed camera systems at its own facility located in Yonezawa City, Yamagata Prefecture, Japan. International technical support centers located in the USA, Europe, Japan, and China ensure fast and professional local support for Photron camera users around the world.

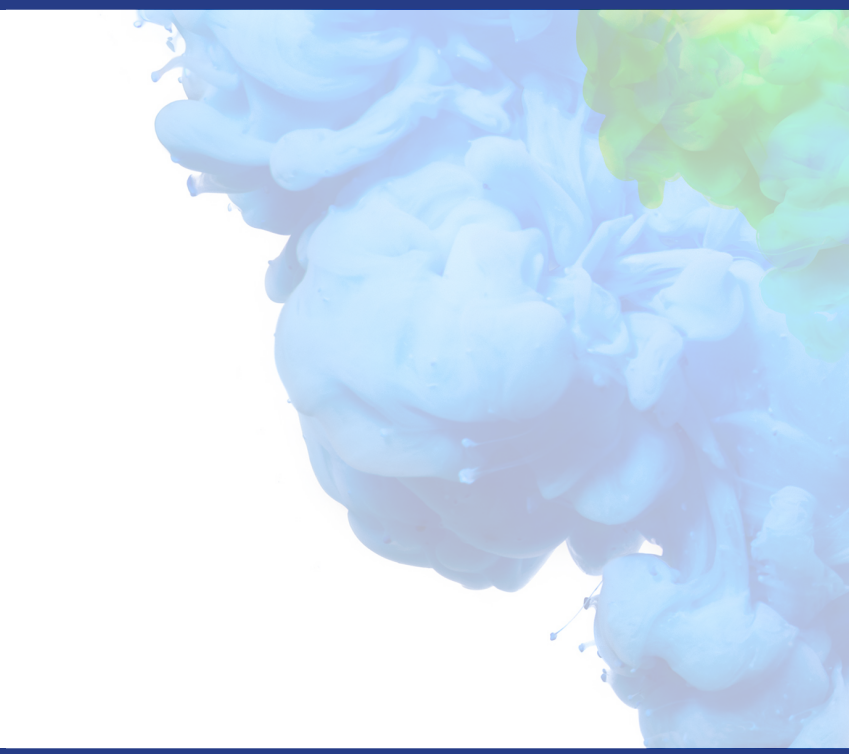
PHOTRON IS A LEADING NAME WORLDWIDE IN HIGH-SPEED IMAGING

Used in internationally renowned research facilities in more than 30 countries worldwide, Photron FASTCAM high-speed cameras are trusted to provide high quality results in the most challenging applications and environments. Photron continues to utilize the latest technological innovations to further advance product performance to meet the most demanding requirements from users around the world.

HIGH-SPEED IMAGING APPLICATIONS KNOWLEDGE

For more than 30 years, Photron has focused on the design and application of high-speed imaging products. Photron application engineers have a wealth of knowledge and experience in demanding imaging requirements and are able to advise both new and experienced users on high-speed imaging solutions and imaging techniques to achieve optimum results.

PHOTRON AUTHORIZED DISTRIBUTOR



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