PRODUCT DATASHEET

FASTCAM MINI W5

FASTCAM series by Photron

FASTCAM MINI W5

2.4-megapixel CMOS Image Sensor:
2048 x 1152 @ 5,000 FPS
1920 x1080 @ 5,280 FPS
1,280 x 720 @ 8,000 FPS

Maximum Frame Rate: 200,000fps

Class Leading Light Sensitivity:
ISO 10,000 monochrome
ISO 2,000 color

Global Electronic Shutter:
2µs independent of frame rate

Dynamic Range (ADC):
12-bit monochrome
36-bit color

Compact and Lightweight:
120mm (H) x 120mm (W) x 94.4mm (D)
4.72″ (H) x 4.72″ (W) x 3.71″ (D)
Weight: 2.1kg (4.63lbs.)

Internal Recording Memory:
16GB, 32GB, 64GB

Fast 1/10-Gigabit Ethernet Interface: Provides camera control and high-speed image download to standard PC

Fan Stop Function:
Remotely switch off cooling fans to eliminate vibration when recording at high magnifications

High-G Rated:
Suitable for application in high-G environments. Operation tested to 100G, 10ms, 6-axes

HIGH-RESOLUTION, HIGH-SPEED IMAGING FOR RESEARCH AND INDUSTRY

The Photron FASTCAM Mini W5 cameras are compact, high-performance high-speed cameras designed to deliver exceptional image quality, light sensitivity, and versatility in demanding research and industrial environments.

Engineered for clarity in low-light conditions, these cameras offer outstanding light sensitivity—ISO 10,000 (monochrome) and ISO 2,000 (color)—ensuring sharp, detailed images even in challenging environments. With 12-bit image recording, users benefit from superior dynamic range and precise image data ideal for accurate analysis and post-processing.

Compact yet powerful, the FASTCAM Mini W series is ideal for a wide range of applications, including: Scientific and academic research, Automotive safety testing and airbag deployment, Aerospace and Defense Research, Materials and Component Testing, Fluid Dynamics, and Bio Mechanics and Sports Technology.

Key features of the FASTCAM MINI W series include an internal mechanical shutter that allows for remote system calibration, a high-performance 10-Gigabit Ethernet interface for seamless camera control and fast image download, memory segmentation that enables recording into one memory partition while downloading from another, and compatibility with various industry-standard lens formats such as Nikon G-Type, C-mount, and Canon EF lenses. Support for the latest generation Canon RF format adds direct lens control of aperture and remote operation of not just focus and aperture but also zoom*.

*Supported lenses - requires optional Canon 'Power Zoom' adapter.

Additionally, the design of the FASTCAM MINI W boasts a "sealed body" construction to safeguard sensitive electronics against dust and corrosive particles. This ensures optimal performance and longevity for the camera.

Intuitive and feature rich Photron FASTCAM Viewer (PFV) software is included with each FASTCAM MINI W camera. Also included is a Photron Device Control SDK that allows integration of the camera with user-specific software, and libraries for controlling the camera within a MATLAB® or LabView environment.

Light Sensitivity:

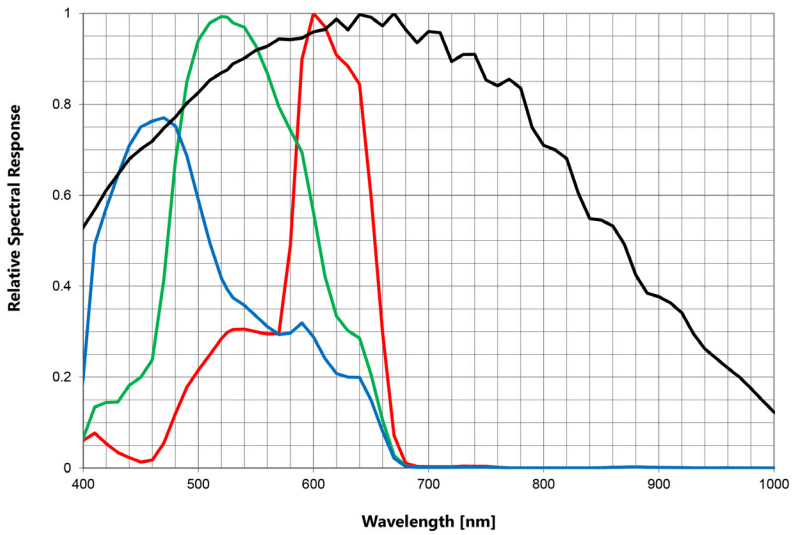
FASTCAM MINI W SERIES	
Monochrome models	ISO 10,000
Color models	ISO 2,000

Image Sensor:
The FASTCAM MINI W5 cameras use an advanced CMOS image sensor optimized for light sensitivity and high image quality that is unique to Photron.

A 13-micron pixel pitch gives a sensor size at full image resolution of 26.62 x 14.98mm (diagonal 30.55mm).

Sensor Type	Proprietary Design Advanced CMOS
Maximum Resolution (pixels)	2048 x 1152 pixels
Sensor Size / Diagonal	26.62 x 14.98mm / 30.55mm
Pixel Size (microns)	13µm x 13µm
Mircolens Array	Yes
Quantum Efficiency	TBD
Fill Factor	TBD
Color Matrix	Bayer CFA (single sensor)
Light Sensitivity	ISO 10,000 monochrome ISO 2,000 color
Shutter	Global Electronic Shutter 2.0µs independent of frame rate

FASTCAM MINI W5 Relative Spectral Response Curves - Monochrome and color



Camera Performance Specifications

Model	FASTCAM MINI W5
Full Frame Performance	5,000fps 2048 x 1152 pixels
High Quality (HQ) Mode	2,000fps 2048 x 1152 pixels
Maximum Frame Rate	200,000fps (2048 x 8 pixels)
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 64 memory segments
Region of Interest	Selectable in steps of 128 pixels (horizontal) x 128 pixels (vertical)
Trigger Inputs	Selectable +/- TTL 5V and switch input (may be configured 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, start, center, end
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, shutter speed, trigger mode, date/time, status, real time / IRIG time, frame count, resolution
Saved Image Formats	BMP, TIFF, JPEG, PNG, RAWW, MRAW, GRAW, AVI, MOV
Supported OS	Microsoft Windows operating system including: 8.1, 10, 11 (32/64-bit)

High-Speed Gigabit Ethernet Interface:
The FASTCAM MINI W5 camera include a high-speed 1/10-Gigabit Ethernet Interface to provide reliable camera control and fast download of image data.

Dedicated I/O:
A dedicated BNC connection for a contact closure hardware trigger input supporting NO, NC opertion is provided. In addition, two programmable inputs and two programmable output channels provide direct connection for common tasks such as synchronization of multiple cameras and operation in conjunction with Data Acquisition (DAQ) hardware.

Ruggedized Mechanical Calibration Shutter:
The ruggedized mechanical shutter is fitted as standard on all FASTCAM MINI W5 camera, allowing sensor black balance calibration to be carried out remotely from the system control software.

Optional Canon Lens Mounts:
In addition to the standard Nikon G type and C-mount lens adapters, all FASTCAM MINI W5 camera include support for an optional Canon lens adapter, controlled remotely. The EF lens adapter, through Photron FASTCAM Viewer (PFV), not only enables remote operation of lens focus and aperture but also adds Auto-Focus capability.

Support for the latest generation Canon RF lenses adds direct lens control of aperture and also remote operation of zoom* in addition to focus and aperture, essential for when the camera is to be located where access is limited.

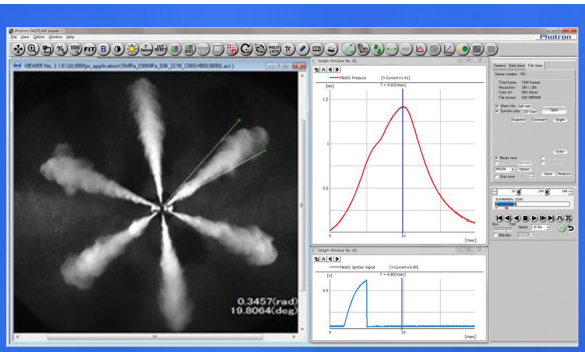
*Supported lenses only, requires optional Canon Power Zoom Adapter

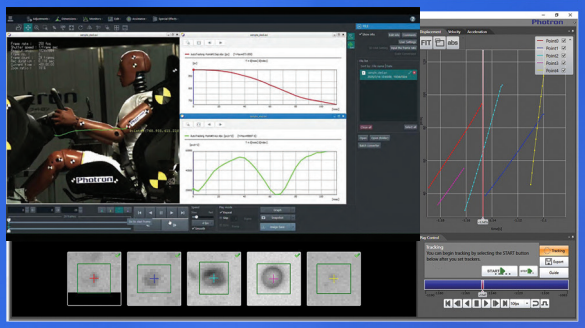
Camera Operation Features

Frame Synchronization	Accurate frame synchronization with other cameras and with external and unstable frequencies.
Memory Partitions	Up to 128 memory segments.
Low Light Mode	Operation at minimum frame rate with separately adjustable shutter time to allow easy camera set-up and focus in ambient lighting.
IRIG Phase Lock	Enables multiple cameras to be synchronized together with other instrumentation equipment or to a master external time source.
Internal Time Delay Generator	Allows programmable delays to be set on input and output triggers; 100ns resolution.
Event Markers	Up to ten user-entered event markers to define specific events within the recorded image sequence .
Download While Recording	FASTCAM MINI W5 camera support Partition Recording Mode, allowing image data captured in one memory partition to be downloaded while at the same time recording into another partition.
Automatic Download	The system can be set to automatically download image data to the control PC and, when download is complete to re-arm in readiness for the next trigger with automatically incremented file names.
Software Binning	Virtual pixel binning (2x2, 4x4 etc.) allows increased light sensitivity with reduced image resolution without changing camera field of view.

Operation Software Features

Image Calibration	2D image calibration allows the measurement of distance and angle from the image. A calibration grid overlay can be superimposed on the image.
Image Overlay	A stored reference image may be overlaid on the live image to allow accurate camera positioning to achieve the same view as a previous test.
Import of Multiple Image Sequences	Multiple image sequences can be loaded and simultaneously replayed. Timing of image sequences can be adjusted to create a common time reference. Time based synchronization allows images captured at different frame rates to be synchronized.
High Dynamic Range Mode	Making use of the full sensor dynamic range, HDR mode allows enhanced detail in both light and dark areas of an image to be displayed simultaneously.
Background Subtraction	In order to highlight subtle changes in an image, Background Subtraction allows a reference image to be subtracted from a recorded sequence. Details including propagation of shock waves and surface changes during impact can be visualized using the feature.
Line Profile	A line profile representing grey levels along a line drawn across any region of the image is displayed. In live mode the Line Profile can be used to ensure optimum image focus is achieved.
Histogram	A histogram displaying grey levels within a user-defined image area is displayed. In live mode the Histogram can be used to ensure that optimum exposure levels are set for the scene being recorded.





Photron FASTCAM Viewer:
Photron FASTCAM Viewer software (PFV) has been designed to provide an intuitive and feature rich user interface for the control of Photron high-speed cameras, data saving, image replay and simple motion analysis. Operation menus provide access to features for advanced camera operation and image enhancement. Tools are provided to allow image calibration and easy measurement of angles and distances from image data. Also included are a C++ SDK and wrappers for LabView and MATLAB ®.

An optional software plug-in module provides synchronization between Photron high-speed cameras and data acquired through National Instruments data acquisition systems. Synchronized data captured by the DAQ system provides waveform information which can be viewed alongside high-speed camera images.

Photron FASTCAM Analysis 2 (PFA2):
Available as an option, the second generation of Photron FASTCAM Analysis (PFA2) autmated 2D tracking, permits the user to obtain quantitative data for displacement, velocity and acceleration from acquired high speed images. Its supports tracking of up to 30 user defined points with a choice of 4 tracking algorithms, static and dynamic coordinate systems, image pre and post processing and powerful graphing tools.

Frame Rate / Image Resolution

FASTCAM MINI W5							
Resolution	Maximum Frame Rate	Recording Duration			Frame Count		
(h x v pixels)	MINI W5	64GB	32GB	16GB	64GB	32GB	16GB
2048 x 1152	5,000	3.879	1.937	0.966	19,394	9,685	4,830
1920 x 1080	5,280	4.179	2.087	1.041	22,065	11,018	5,495
2048 x 1024	5,500	3.967	1.981	0.988	21,818	10,895	5,434
2048 x 704	8,000	3.967	1.981	0.988	31,735	15,848	7,904
1280 x 720	8,000	6.206	3.099	1.546	49,647	24,792	12,365
2048 x 576	10,000	3.879	1.937	0.966	38,788	19,370	9,661
640 x 480	12,500	11.916	5.950	2.968	148,945	74,380	37,097
2048 x 256	20,000	4.364	2.179	1.087	87,273	43,582	21,737
2048 x 128	40,000	4.364	2.179	1.087	174,546	87,165	43,474
2048 x 96	50,000	4.655	2.324	1.159	232,728	116,220	57,966
2048 x 64	72,000	4.849	2.421	1.208	349,093	174,330	86,949
2048 x 32	112,500	6.206	3.099	1.546	698,186	348,661	173,898
2048 x 16	165,000	8.463	4.226	2.108	1,396,373	697,322	347,797
2048 x 8	200,000	13.964	6.973	3.478	2,792,746	1,394,645	695,594

* Specifications subject to change without notice.

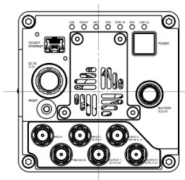
Variable Region of Interest:
Region of Interest (ROI) or sub-windowing allows a user-specified portion of the sensor to be defined to capture images. By using a reduced portion of the image area, the frame rate at which images are recorded can be increased. The FASTCAM MINI W5 camera allow the ROI to be set in increments of 128 pixels horizontal and 128 pixels vertical.

External Frame Synchronization:
The FASTCAM MINI W5 cameras can be fully synchronized with an external source to allow the timing of when each individual image is captured to be precisely referenced. The camera can be accurately synchronized to unstable frequencies allowing complex events such as combustion in rapidly accelerating or decelerating engines to be recorded and studied.

Record During Download Operation:
The FASTCAM MINI W5 cameras' recording memory can be divided into multiple active sections. The user can record an on-going event in one memory partition while at the same time download a previously recorded image sequence in order to improve workflow and optimize camera operation.

Mechanical and Environmental Specifications	
Mechanical	
Lens Mount	F-mount (G-type lens compatible) Optional lens mounts include C-mount, Canon EF, Canon RF, and M42 adapter
Camera Mountings	2x 1/4 - 20 UNC & 4x M5 (top, base, and RH side)
External Dimensions	
Camera Body (excluding protrusions)	120mm (H) x 120mm (W) x 93mm (D) 4.72" (H) x 4.72" (W) x 3.66" (D)
Weight	
Camera Body	2.1kg (4.63lbs)
Environmental	
Operating Temperature	-10 to 40C, 14˚ to 104˚F
Storage Temperature	-20 to 60C, -4˚ to 140˚F
Humidity	85% or less (non-condensing)
Cooling	Internal fan cooling (fan-off mode supported)
Operational Shock	100G, 11ms, 6-axes 1000 times/axis
Power	
AC Power (with supplied adapter)	100 to 240V, 50 to 60Hz
DC Power (primary input)	22 to 32V, 70VA
DC Power (battery input)	22 to 32V, 70VA

(Rear View)



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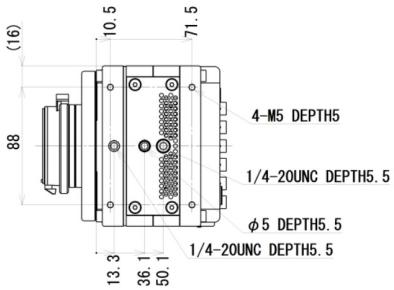
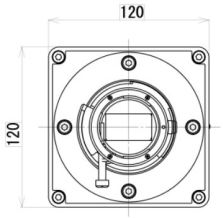
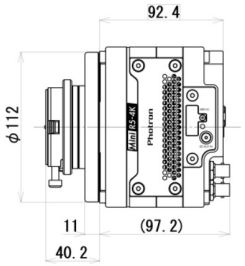


(Front View)



(Left Side View)



(Right Side View)

(Bottom View)

Nikon G-Type Compatible Lens Mount:

FASTCAM MINI W5 cameras are equipped with an objective lens mount compatible with readily avail-able Nikon G-type lenses. Controls provided within the lens mount allow the adjustment of lens aperture on lenses without external iris control.

Optional Canon Lens Mounts:
In addition to the standard Nikon G type and C-mount lens adapters, all FASTCAM MINI W5 cameras include support for an optional Canon lens adapter. The EF lens adapter, through Photron FASTCAM Viewer (PFV), not only enables remote operation of lens focus and aperture but also adds Auto-Focus capability.

Support for the latest generation Canon RF lenses adds direct lens control of aperture and also remote operation of zoom* in addition to focus and aperture, essential for when the camera is to be located where access is limited.

*Supported lenses only, requires optional Canon Power Zoom Adapter

Operation Environments:
The 'sealed body' design of the FASTCAM MINI W5 cameras ensure optimum air flow and prevents dust and corrosive particles from being ingested within the internal camera body where they can damage sensitive electronics. The fans may be disabled during recording for any vibration sensitive measurements.

The FASTCAM MINI W5 cameras have been extensively tested to ensure operation for extended periods in ambient temperatures up to 40C.