

# FASTCAM SA4

## HIGH-SPEED IMAGING SYSTEM



**High performance CMOS sensor technology providing 3,600 fps operation at 1,024 x 1,024 pixel resolution and frame rates up to 500,000 fps at reduced resolution**

To complement the existing range of Photron high-performance high-speed imaging products, the FASTCAM SA4 delivers a fully featured system including mega-pixel resolution, high light sensitivity, high dynamic range and low noise at an attractive price level.

For demanding applications that do not require the highest frame rates but where all other aspects of system specification are important the FASTCAM SA4 is the correct choice. Applications include fluid dynamics, biomechanics, material test, airbag development and test, microscopy and automotive safety testing.

The FASTCAM SA4 is 100% compatible with the existing range of Photron products and shares features such as remote keypad with built in view finder for remote operation and support of Photron data acquisition devices.

For applications where ingress of dust would be hazardous or external fans are undesirable a sealed case option (FASTCAM SA4 RV) is available.

#### Target applications include:

- Materials research
- Ballistics
- Aerospace
- PIV
- Combustion
- Cavitation
- Fluid dynamics

## Benefits

- Performance examples:
  - 1,024 x 1,024 pixels @ 3,600 fps
  - 512 x 512 pixels @ 13,500 fps
  - 256 x 256 pixels @ 45,000 fps
  - 128 x 128 pixels @ 125,000 fps
  - 128 x 16 pixels @ 500,000 fps
- Variable Region of Interest (ROI)
- 1  $\mu$ s global shutter
- Capture 12-bit uncompressed data
- 20  $\mu$ m pixels ensure best light sensitivity for demanding high-speed or low light applications
- Equivalent ISO light sensitivity 6,400 (monochrome), 1,600 (color) measured to ISO 12232
- Phase lock to IRIG/GPS
- Composite and SDI video output for real time monitoring during set up, recording and playback
- Optional remote keypad control with integrated viewfinder
- 8GB, 16GB or 32GB memory options
- Gigabit Ethernet interface

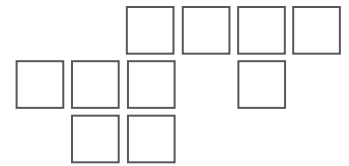


# Photron

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### Specifications: Partial Frame Rate / Recording Duration Table

FRAME RATE (fps)	RESOLUTION Horizontal Vertical		MAXIMUM SHUTTER SPEED	RECORD DURATION (12-BIT)					
				TIME (Sec.)			FRAMES		
				8GB	16GB	32GB	8GB	16GB	32GB
1,000	1,024	1,024	1 $\mu$ s 1/1,000,000 sec	5.45	10.91	21.84	5,457	10,918	21,841
2,000	1,024	1,024		2.72	5.45	10.92	5,457	10,918	21,841
3,000	1,024	1,024		1.81	3.63	7.28	5,457	10,918	21,841
3,600	1,024	1,024		1.51	3.03	6.06	5,457	10,918	21,841
5,000	1,024	768		1.45	2.91	5.82	7,276	14,558	29,121
6,750	1,024	576		1.43	2.87	5.75	9,701	19,410	38,829
6,750	768	768		1.43	2.87	5.75	9,701	19,410	38,829
7,500	1,024	512		1.45	2.91	5.82	10,914	21,837	43,682
10,000	768	512		1.45	2.91	5.82	14,552	29,116	58,243
12,500	640	480		1.49	2.98	5.96	18,627	37,269	74,551
13,500	512	512		1.61	3.23	6.47	21,829	43,674	87,365
27,000	512	256		1.61	3.23	6.47	43,658	87,349	174,730
36,000	384	240		1.72	3.45	6.90	62,092	124,230	248,505
45,000	256	256		1.94	3.88	7.76	87,317	174,698	349,461
50,000	320	192		1.86	3.72	7.45	93,138	186,345	372,758
86,400	256	128		2.02	4.04	8.08	174,634	349,397	698,922
125,000	128	128		2.79	5.59	11.18	349,269	698,794	1,397,845
225,000	128	64		3.10	6.21	12.42	698,538	1,397,589	2,795,690
360,000	128	32		3.88	7.76	15.53	1,397,077	2,795,178	5,591,381
500,000	128	16		5.58	11.18	22.36	2,794,154	5,590,357	11,182,762

<b>Sensor</b>	12-bit ADC (Bayer system color, single sensor) with 20 $\mu$ m pixel
<b>Shutter</b>	Global electronic shutter from 16.7ms to 1 $\mu$ s independent of frame rate
<b>Lens Mount</b>	Interchangeable F-mount and C-mount using supplied adapters
<b>Extended Dynamic Range</b>	Selectable in twenty steps (0 to 95% in 5% increments) to prevent pixel over-exposure
<b>Memory</b>	8GB (standard: 5,457 frames @ maximum resolution) 16GB (option: 10,918 frames @ maximum resolution) 32GB (option: 21,841 frames @ maximum resolution)
<b>Video Output 1</b>	NTSC/PAL composite VBS (BNC). Ability to zoom, pan and tilt within image via keypad. Live video during recording
<b>Video Output 2</b>	SDI: D1 digital component 1 channel (BNC) industry standard digital output NTSC and PAL
<b>Camera Control</b>	Through optional keypad with integrated viewfinder and Gigabit Ethernet or RS-422
<b>User Preset Switches</b>	Four user selectable camera function controls mounted on the camera's rear panel
<b>Low Light Mode</b>	Low light mode drops the frame rate and shutter time to their maximum values, while maintaining other set parameters, to enable users to position and focus the camera
<b>Triggering</b>	Selectable positive or negative TTL 5Vp-p or switch closure
<b>Trigger Delay</b>	Programmable delay on selected input and output triggers, 100ns resolution
<b>Timing</b>	Internal clock or external source
<b>Phase Lock</b>	Enables cameras to be synchronized precisely together to a master camera or external source, such as IRIG/GPS time codes

<b>Event Markers</b>	Ten user entered event markers mark specific events within the image sequence in real time. Immediately accessible through software
<b>Dual Speed Recording</b>	Enables the recording speed to be changed up or down by a factor of 2, 4 or 8 during a recording
<b>Trigger Modes</b>	Start, End, Center, Manual, Random, Random Reset, Random Center, Random Manual and Duals Speed Recording
<b>Saved Image Formats</b>	JPEG, AVI, TIFF, BMP, RAW, PNG, MOV and FTIF. Images can be saved with or without image or comment data
<b>Data Display</b>	Frame Rate, Shutter Speed, Trigger Mode, Date or Time, Status (Playback/Record), Real Time, Frame Count and Resolution
<b>Partitioning</b>	Up to 64 memory segments for multiple recording in memory
<b>Data Acquisition</b>	Supports Photron MCDL and DAQ
<b>Cooling</b>	Actively cooled
<b>Operating Temperature</b>	0 - 40 degrees C (32 - 104 degree F) Range Version increases upper limit to 45 deg. C (113 deg. F)
<b>Mounting</b>	1 x 1/4 - 20 UNC, 1 x 3/8 - 16 UNC, 6 x M6
<b>Dimensions</b>	160mm (6.30")H x 153mm (6.02")W x 242.5mm (9.55")D *excluding protrusions
<b>Weight</b>	5.9 kg (13 lbs)
<b>Power Requirements</b>	100V-240V AC ~ 1.5A, 50-60Hz DC operation 20 - 36 V DC, 100VA

Specifications subject to change without notice

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SLOW MOTION IMAGING SOLUTIONS