PHANTOM® V12.1

ViSiON **RESEARCH**

Key Features:

*Up to 6242 frames-per-second (fps) at full resolution.
Maximum fps: 680,000 standard, 1,000,000 optional*

1280 x 800 CMOS sensor

*Exposure Time (shutter speed):
1μs standard
Sub-microsecond shuttering:
300ns, programmable in 18ns increments (optional)*

High-resolution timing system: better than 20ns resolution

Extreme Dynamic Range (EDR): two different exposures within a single frame

Internal shutter: hands-free/remote current session reference (CSR)

*Memory Segmentation:
Up to 64 segments*

High-Definition, 1280 x 800, 1 million fps, sub-μs shutter, Phantom CineMag® compatible

WHEN IT'S TOO FAST TO SEE, AND TOO IMPORTANT NOT TO®

One million fps is the new benchmark in high-speed imaging. Introducing the Phantom V12.1– a megapixel camera capable of taking 1,000,000 pictures-per-second.

With the Phantom V12 camera, Vision Research broke the high-speed digital imaging speed barrier. With the V12.1, the fastest camera now adds remote/automatic black referencing, dual independent HD-SDI outputs, a component viewfinder port, high-speed synchronization and range data input.

Take the wide view with our custom-designed 1280 x 800 CMOS sensor. The wide aspect ratio of the V12.1 allows you to see more of the event you are recording with a "widescreen" view.

Get 6,242 frames-per-second (fps) at full resolution. At lower resolutions, you will get even higher frame rates, up to 1,000,000 fps (optional).

More Key Features:

Non-volatile, hot-swappable Phantom CineMag memory magazines (256GB & 512GB)

CineMag to CineStation®

Range Data input

Built-in Memory: 8GB, 16GB, 32GB

ISO (ISO-12232 SAT):
6400 Mono
1600 Color

Pixel Bit-depth: 8- and 12-bit

GB Ethernet

View recordings immediately via video-out port

Dual-link HD-SDI
4:4:4 output or,
playback and live images simultaneously

With an active pixel size of 20 microns and improved quantum efficiency, the Phantom V12.1 camera has **sensitivity** superior to our acclaimed V7.3. So, even if you are using our sub-microsecond shuttering, you'll get the highest sensitivity with the lowest noise possible.

That's right. You can eliminate blur and see the most minute detail by using our optional **sub-microsecond shuttering**. Down to 300 nanoseconds, programmable in 18ns increments.

Each camera supports **8- and 12-bit pixel depth**. Smaller bit-depth gives you more recording time and smaller files. Greater bit-depth gives you more gray levels and finer detail. With the greater latitude of 12-bits, you can pull more detail out of the image.

The V12.1's **high-resolution timing** system yields a timing resolution of better than 20ns. Frame rate, frame synchronization and exposure accuracy are all improved over previous generations of high-speed cameras. And, a frame synchronization signal is now available via a dedicated BNC for easier cabling and increased signal integrity. This makes the camera perfect for **PIV applications** with a 500 nanosecond straddle time and no image lag.

Of course, the V12.1 offers our unique **Extreme Dynamic Range** (EDR) feature giving you the ability to get two different exposures within a single frame. And, with **auto exposure**, the camera adjusts to changing lighting conditions automatically.

There is an **internal shutter** for shading the sensor when doing a session-specific black reference (CSR). Whenever you do a CSR from the Phantom Software, the shutter closes automatically. You no longer have to manually shade the sensor with a lens cap!

The V12.1 comes with 8GB of high-speed dynamic RAM standard, but you can order 16GB or 32GB versions. Our **segmented memory** allows you to divide this into up to 64 segments so you can take multiple shots back-to-back without the need to download data from the camera.

Or, record directly to our **Phantom CineMag** non-volatile, hot-swappable memory magazines. They mount on the CineMag compatible version of the camera. Continuously record full resolution cines into non-volatile memory at up to 1000 fps.

Resolution/Speed Charts*

H	V	FPS
1280	800	6,242
1280	720	6,933
1024	768	7,921
1024	512	11,854
800	600	11,364
720	576	13,485
640	480	18,769
512	512	20,978
512	384	27,865
512	256	41,483
512	128	81,024
512	64	155,207
512	32	284,171
320	240	54,516
256	256	66,997
256	128	128,998
256	64	240,096
256	32	423,190
256	16	683,994
256	8	980,392
128	128	183,250
128	96	236,239
128	64	330,469
128	32	560,224
128	16	852,514
128	8	1,000,000

	128	256	512	768	1024	1280
8	1,000,000	980,392	763,941	632,511	534,759	463,177
16	852,514	683,994	490,196	381,970	312,891	264,970
32	560,224	423,190	284,171	214,684	172,503	143,472
64	330,469	240,096	155,207	114,220	90,637	74,934
96	236,239	168,067	106,371	77,911	61,402	50,709
128	183,250	128,998	81,024	59,059	46,464	38,296
256	96,749	66,997	41,483	30,042	23,548	19,362
512	49,724	34,140	20,978	15,156	11,854	9,735
768	33,479	22,906	14,042	10,134	7,921	6,501
800	32,161	22,006	13,485	9,730	7,605	6,242

Move the CineMag from the camera to a **CineStation** connected to a PC and view, edit, and save your cines using the Phantom Software supplied with the camera. Keep them in their original cine raw format, or convert them to TIFF, QuickTime, AVI, or a number of other formats. Move the files from the CineStation to a disk or tape deck via GB Ethernet, dual HD-SDI, or Component Video outputs. (A 10GB Ethernet interface is available.)

When used on a tracking mount, elevation and azimuth data can be transfered to the camera and associated with image frames through our unique **Range Data** input.

A video-out port on the camera allows you to connect to a component video monitor and **view your recordings immediately** in a variety of formats including NTSC, PAL, SDI and high-definition 720p. And, there are **two HD-SDI** ports that can be used together for 4:4:4 video out, or used independently (giving you one for playback while the other is used for live preview.) A component video viewfinder port has been added so any viewfinder compatible with our Phantom HD camera can now be used with the V12.1.

The V12.1 is controlled by the feature-rich Phantom Software. If you've used any Phantom camera before, you will know how to run the V12.1. And, we'll ship you a trial version of Image System's TEMA Starter for Phantom for motion analysis applications.

The V12.1 comes in two base models, either with or without a CineMag interface. The base models operate at up to 680,000 fps and 1us exposure. An option is available to enable 1,000,000 fps and 300ns exposure. All models come in either color or monochrome configurations.

* Assumes optional 1,000,000 fps, 300nsec upgrade is installed.

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Additional Features:

Analog video out: PAL, NTSC & HD Component (720p)

HD-SDI: 720p

Lensing: F-mount, C-mount, PL-mount

Size (without lens): 12.25 x 5.5 x 5.0 in.
(L,W,H) 31.1 x 14 x 12.7 cm

Weight (without lens): 12 lbs (5.4 Kg)

Power: 90 Watts @ 24 VDC, without CineMag

Operating Temperature: 10°C to 40°C @ 8% to 80% RH

Storage Temperature: -10°C to 55°C

Non-operational Shock: 33G, half sine wave, 11ms, all axes without lens

Operational Shock: 5.56G, half sine wave, 11ms, all axes

Operational Vibration: 0.25G, 5-500 Hz, all axes

CE safety and emissions certified

Focused

Since 1950, Vision Research has been shooting, designing, and manufacturing **high-speed cameras**. Our single focus is to invent, build, and support the most advanced cameras possible.

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