

## DATA SHEET

### v640

2560 x 1600

10-1500 fps at full resolution

Breakthrough sensitivity

Phantom CineMag® compatible

#### Key Features:

10-1500 frames-per-second (fps) at full resolution.  
Maximum FPS: 300,000 @ 256 x 16

2560 x 1600 CMOS sensor

Minimum Exposure (shutter speed): 1 µs

High-resolution timing system: Better than 20 ns 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 63 segments

Non-volatile, hot-swappable Phantom CineMag memory magazines (128 GiB, 256 GiB & 512 GiB)

CineMag to CineStation®

Range Data input

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

Breakthrough Sensitivity: ISO (12232 SAT) 1000 Color, 4000 Mono; QE 60% peak; NEP 0.011 fJ

Pixel Bit-depth: 8- and 12-bit

Gb Ethernet

View recordings immediately via video-out ports

Versatile Dual HD-SDI ports configured to meet your needs



#### Key Benefits:

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

In 2006, Vision Research introduced the world's first 4 megapixel digital high-speed camera – the Phantom v10. Look how far we've come since then!

Based on a camera architecture first introduced with the Phantom v12.1, the v640 provides a 4 megapixel sensor and greater than 6 gigapixels/second throughput. That means full-resolution frame rates of 1500 frames-per-second (fps), and 1920 x 1080 HD-resolution frame rates of 2700 fps. The minimum frame rate is 10 fps.

**Take the wide view** with our custom-designed 2560 x 1600 pixel CMOS sensor. The aspect ratio of the v640 allows you to keep moving targets in-frame longer and see more of the event you are recording.

Shutter speeds down to 1 microsecond and a **global electronic shutter** allow for crisp, sharp images with little or no image blur or motion artifacts.

With a peak quantum efficiency (QE) of 60% – greatly improved over current sensor designs – and a significant reduction in readout noise, along with the addition of microlens technology, the v640's **four megapixel resolution can be used to full advantage** at speeds that normally called for large-pixel, lower resolution cameras.

Phantom v640 provides a 4 megapixel sensor and greater than 6 gigapixels/second throughput.

That makes the v640 ideal for applications where **high sensitivity and high resolution** are needed. Coupled with a 1.2 microseconds straddle time the v640 is ideal for **PIV applications**, for example.

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 v640's **high-resolution timing system** yields a timing resolution of better than 20 nanoseconds. Frame rate, frame synchronization and exposure accuracy are all improved over previous generations of high-speed cameras. And, an external frame synchronization signal is available via a dedicated BNC for easier cabling and increased signal integrity. A GenLock input is available for synchronizing the playback of recorded cines to other video gear.

Of course, the v640 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 cutting off all light to the sensor when doing a session-specific black reference (CSR). You now can do **remote CSRs** through software control without the need to manually cover the lens!

The v640 comes standard with 8 GiB of high-speed dynamic RAM, but you can order 16 GiB or 32 GiB versions. Our **segmented memory** allows you to divide this into up to 63 segments so you can take multiple shots back-to-back without the need to download data from the camera.

You are able to 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 200 fps (370 fps for 1920 x 1080). That's about 4.25 minutes of continuous recording into the 256 GiB CineMag or 8.5 minutes into the 512 GiB CineMag.

Or, record at higher speeds into camera RAM, then manually or automatically move your cine to the CineMag. If you need to **take multiple shots back-to-back**, you don't have to wait for a time-consuming download of camera memory over Ethernet. Instead, just upload the camera memory to a CineMag at about 800 MB/second, then take your next shot!

With CineMag storage you get maximum data protection and an ideal storage medium for secure environments.

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 10 Gb Ethernet, dual HD-SDI, or Component Video outputs.

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

**View your recordings immediately.** There are two **Versatile Dual HD-SDI ports** that can be used in one of four different modes: 2 identical 4:2:2 outputs; 1 dual HD-SDI 4:4:4 output; independent 4:2:2 outputs where one is live and one is playback; or 4:4:4 playback on the dual HD-SDI while you have a live image on the component viewfinder. Yes, a component video viewfinder port has been added so any viewfinder compatible with our Phantom HD camera can now be used with the v640.

The v640 is controlled by the feature-rich Phantom Software. If you've used any Phantom camera before, you will know how to run the v640.

The v640 comes in two base models, either with or without a CineMag interface. An optical low-pass filter is available as an option.

H	V	FPS*
2560	1600	1,500
2048	1600	1,800
2048	1024	2,800
1920	1080	2,700
1280	800	5,250
1280	720	5,850
800	600	8,250
640	480	12,500
512	512	15,000
512	384	19,800
256	256	39,500
128	128	72,000
128	64	125,000
128	8	300,000

*\*Typical results*

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### Additional Features:

- Analog video out: PAL, NTSC & HD Component (720p)
- HD-SDI: All standard formats, Versatile Dual HD-SDI outputs
- Lensing: F-mount, C-mount, PL-mount
- Optional optical low-pass filter
- 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: 0°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 CineMag
- Operational Shock: 30G, half sine wave, 11ms,  
10 times all axes (without CineMag  
or lens) to Mil-Std-810 G
- Operational Vibration: 0.25G, 5-500 Hz, all axes without  
CineMag

### 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.

**VISION**  
**RESEARCH**

An **AMETEK** Company

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All specifications are subject to change without notice.

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AMETEK Vision Research's digital high-speed cameras are subject to the export licensing jurisdiction of the Export Administration Regulations. As a result, the export, transfer, or re-export of these cameras to a country embargoed by the United States is strictly prohibited. Likewise, it is prohibited under the Export Administration Regulations to export, transfer, or re-export AMETEK Vision Research's digital high-speed cameras to certain buyers and/or end users.

Customers are also advised that some models of AMETEK Vision Research's digital high-speed cameras may require a license from the U.S. Department of Commerce to be: (1) exported from the United States; (2) transferred to a foreign person in the United States; or (3) re-exported to a third country. Interested parties should contact the U.S. Department of Commerce to determine if an export or a re-export license is required for their specific transaction.