

## DATA SHEET

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*Phantom v641  
Shown with optional CineMag interface  
and On-Camera Controls*

### Key Benefits:

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

The Phantom v641 is the second generation v640 camera. It's smaller and lighter than its predecessor and has a number of new convenience features requested by users.

The v641 provides a 4 megapixel sensor and greater than 6 gigapixels/second throughput. That means full-resolution frame rates of 1450 frames-per-second (fps), and 1920 x 1080 HD-resolution frame rates of 2560 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 v641 allows you to keep moving targets in-frame longer and see more of the event you are recording.

## v641

2560 x 1600 resolution

10-1450 fps at full resolution

Breakthrough sensitivity

Phantom CineMag® compatible

### Key Features:

- 10-1450 frames-per-second (fps) at full resolution.  
Maximum FPS: 219,000 @ 256 x 8
- 2560 x 1600 CMOS sensor
- Minimum Exposure (shutter speed): 1  $\mu$ s
- High-resolution timing system: Better than 20 ns resolution
- Extreme Dynamic Range (EDR): two different exposures within a single frame
- Internal Shutter Mechanism: hands-free/remote current session reference (CSR)
- Memory Segmentation: Up to 63 segments
- Non-volatile, hot-swappable Phantom CineMag memory magazines (128 GB, 256 GB & 512 GB)
- CineMag to CineStation®
- Range Data input
- Built-in Memory: 8 GB, 16 GB, 32 GB
  - Breakthrough Sensitivity: ISO (ISO-12232 SAT Method)
  - Mono: 16,000 T; 6400 D
  - Color: 1600 T; 1600 D (without OLPF)
  - Color: 1250 T; 1600 D (with OLPF)
- Pixel Bit-depth: 12-bit
- Gb Ethernet, 10 Gb Ethernet with optional CineStream X2SR module
- Image-Based Auto-Trigger
- Burst Mode
- IRIG & SMPTE Time Code
- Genlock

## v641

Phantom v641  
provides a  
4 megapixel  
sensor and  
greater than  
6 gigapixels/  
second  
throughput.

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 v641's **four megapixel resolution can be used to full advantage** at speeds that normally called for large-pixel, lower resolution cameras.

That makes the v641 ideal for applications where **high sensitivity and high resolution** are needed. Coupled with a 1.4 microseconds straddle time the v641 is ideal for **PIV applications**, for example.

Each camera supports **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 v641'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 v641 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 v641 comes standard with 8 GB of high-speed dynamic RAM, but you can order 16 GB or 32 GB 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 195 fps (360 fps for 1920 x 1080). That's about 4.5 minutes of continuous recording into the 256 GB CineMag or 9 minutes into the 512 GB 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 megapixels/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 v641.

The v641 is controlled by the feature-rich Phantom Software. If you've used any Phantom camera before, you will know how to run the v641. As an option, you can add **On-Camera Controls** (OCC) to get full control of the camera without the need to connect to a PC. We also provide a full-featured **Remote Control Unit** (RCU) for wired or wireless control.

The v641 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*    |
|------|------|---------|
| 256  | 8    | 219,200 |
| 256  | 64   | 90,200  |
| 256  | 128  | 53,900  |
| 256  | 256  | 29,800  |
| 512  | 384  | 16,200  |
| 512  | 512  | 12,300  |
| 640  | 480  | 10,700  |
| 800  | 600  | 7,370   |
| 1280 | 720  | 5,350   |
| 1280 | 800  | 4,820   |
| 1280 | 1024 | 3,780   |
| 1920 | 1080 | 2,560   |
| 2048 | 1024 | 2,700   |
| 2048 | 1600 | 1,730   |
| 2560 | 1600 | 1,450   |

*\*Typical results*

| ISO SAT   |           |           |           |
|-----------|-----------|-----------|-----------|
| Mono      |           | Color     |           |
| ISO SAT T | ISO SAT D | ISO SAT T | ISO SAT D |
| 16,000    | 6400      | 1600      | 1600      |

# DATA SHEET

## v641

### 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, CineMag or handle):  
11.5 x 5.5 x 5.0 inches (L x W x H);  
29.2 x 14 x 12.7 cm
- Weight (without lens or CineMag): 11.75 lb; 5.33 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.



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Phantom v641  
Back View



Phantom v641

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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.

