VISION RESEARCH

PHANTOM

when it's too fast to see, and too important not to.®

Our line of 1 megapixel cameras has seven models. This data sheet covers the Phantom v211, v311, v411, v611 and v711. For information about the Phantom v1210 or v1610, see their data sheet.

DATA SHEET

For the most current version visit www.visionresearch.com
Subject to change Rev June 2012

Phantom v711

Phantom® 1 Megapixel v-Series Cameras

Choose the model that best fits your performance requirements and budget

Advanced features are standard on all models

Each model is available with or without CineMag compatibility and On-Camera Controls

Key Benefits:

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

Our line of 1 megapixel cameras is growing. We've added the Phantom v411 to this popular line of cameras giving you even more options to get the performance you need within budget.

All models feature a widescreen 1280 x 800 CMOS sensor – 25% wider than most competitive models – allowing you to **keep moving targets in-frame longer and see more of the event you are recording.** The wide sensor also allows you to get true 1280 x 720 HD images from a 1Mpx camera.

With a pixel size of 20 microns and improved quantum efficiency, **these cameras have the sensitivity you need** for even the most challenging lighting conditions.

Minimum exposure times of 1-2 microseconds (depending upon model) **eliminate blur** and **allow you to see the smallest of details.**

With throughput specifications ranging from 2 gigapixels-per-sec (Gpx/s) to 7Gpx/s, **there is a model to meet your frame-rate requirements.** At 2Gpx/s, the v211 can take over 2000 frames-per-second (fps) at full resolution. A 7Gpx/s camera (the v711) can take over 7000 fps at full resolution (7530 fps, actually!) Top speeds at reduced resolution range from 300,000 fps to 1,400,000 fps depending on camera model.

Key Features:

Custom-designed 1280 x 800 CMOS sensor

Extreme Dynamic Range (EDR): two exposures per frame

Internal Mechanical Shutter mechanism for hands-free/ remote CSRs

Memory Segmentation: up to 63 segments

Non-volatile, hot-swappable Phantom CineMag memory magazines

CineMag interface is optional on all models

Range Data Input: embed tracker data into recorded cine file

8GB, 16GB or 32GB of internal high-speed memory

ISO (ISO 12232 SAT method): 13,000 T mono, 3,900 T color

Pixel Bit-Depth: 8-, 12-bit

Gb Ethernet (10Gb Ethernet available with CineStream X2SR module.)

v611 and v711 models support a FAST option that provides frame rates of 1,000,000 fps or more as well as sub-microsecond exposure times (export controlled)

AMETEK®
MATERIALS ANALYSIS DIVISION

Phantom 1 Mpx Cameras

Phantom v311

Throughput:

v211 - 2Gpx/s

v311 - 3Gpx/s

v411 - 4Gpx/s

v611 - 6Gpx/s

v711 - 7Gpx/s

MAXIMUM SPEEDS AT VARIOUS RESOLUTIONS				
Resolution				
v211	v311	v411	v611	v711
1280 x 800				
2190	3250	4200	6240	7530
1280 x 720				
2430	3650	4670	6930	8360
512 x 512				
7810	11,700	13,900	20,970	25,000
256 x 256				
26,500	40,500	44,100	66,990	79,000
128 x 8				
300,000	500,000	600,000	1,000,000*	1,400,000*

** With FAST option installed*

All cameras support both 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, an essential requirement for most motion analysis applications.

Phantom's high-accuracy timing system means improved frame rate, frame synchronization and exposure accuracy. And a frame-synchronization (F-SYNC) signal is now available on a dedicated BNC connector on the camera connector panel for **easier cabling and increased signal integrity.**

Of course, all camera models offer the Extreme Dynamic Range feature – pioneered by Vision Research. This gives you the ability to **get two different exposures within a single frame** so areas that would otherwise be overexposed contain image detail. And, with Auto Exposure, **the camera adjusts to changing lighting conditions** automatically.

There is an internal mechanical shutter that can cut off all light to the sensor when doing a session-specific black reference (CSR). **You can now do remote CSRs through software control without the need to manually cover the lens!** With the optional Canon EOS lens mount installed you get remote control over lens aperture and focus, too. **This enables complete remote control in environments where you cannot easily access the camera.**

All models come with 8GB, 16GB or 32GB internal high-speed memory. Segmenting 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.

Or, record directly to our Phantom CineMag non-volatile, hot-swappable memory magazines. They mount on the CineMag interface of compatible cameras. Continuously record full resolution cines into a CineMag at up to780 fps. That's just over 2 minutes into the 128GB CineMag, 4.25 minutes into the 256GB, or 8.5 minutes into the 512GB version. Or, record at even higher speeds into camera RAM, then manually or automatically move your recording to the CineMag. With CineMag storage you **get maximum data protection and an ideal storage medium for secure environments.** The CineMag interface is an option on all models.

Phantom v611

	Phantom v211	Phantom v311	Phantom v411	Phantom v611	Phantom v711
Throughput / Speed	> 2 Gpx/second Max speed at full resolution of 1280 x 800 is 2190 fps Max speed at reduced resolution of 128 x 8 is 300,000 fps Minimum frame rate of 24 fps	> 3 Gpx/second Max speed at full resolution of 1280 x 800 is 3250 fps Max speed at reduced resolution of 128 x 8 is 500,000 fps Record direct to CineMag at up to 800 Mpx/second Minimum frame rate of 24 fps	> 4 Gpx/second Max speed at full resolution of 1280 x 800 is 4200 fps Max speed at reduced resolution of 128 x 8 is 600,000 fps Record direct to CineMag at up to 800 Mpx/second Minimum frame rate of 24 fps	> 6 Gpx/sec Max speed at full resolution of 1280 x 800 is 6242 fps Max speed at reduced resolution of 128 x 8 is 680,000 fps (standard), 1,000,000 fps (optional) Record direct to CineMag at up to 800 Mpx/second Minimum frame rate of 24 fps Some features are export controlled	> 7 Gpx/sec Max speed at full resolution of 1280 x 800 is 7530 fps Max speed at reduced resolution of 128 x 8 is 680,000 fps (standard), 1,400,000 fps (optional) Record direct to CineMag at up to 800 Mpx/second Minimum frame rate of 24 fps Some features are export controlled
Exposure	2 µs minimum exposure Global electronic shutter Extreme Dynamic Range (EDR) Auto Exposure Shutter Off mode for PIV	1 µs minimum exposure Global electronic shutter Extreme Dynamic Range (EDR) Auto Exposure Shutter Off mode for PIV	1 µs minimum exposure Global electronic shutter Extreme Dynamic Range (EDR) Auto Exposure Shutter Off mode for PIV	1 µs minimum exposure (standard), 300 ns (optional) Global electronic shutter Extreme Dynamic Range (EDR) Auto Exposure Shutter Off mode for PIV Some features are export controlled	1 µs minimum exposure (standard), 300 ns (optional) Global electronic shutter Extreme Dynamic Range (EDR) Auto Exposure Shutter Off mode for PIV Some features are export controlled
Record Times	10.00 seconds at maximum frame rate, maximum bit depth, largest resolution and into maximum internal memory	6.7 seconds at maximum frame rate, maximum bit depth, largest resolution and into maximum internal memory. Longer record times are available when recording directly to a CineMag.	5.2 seconds at maximum frame rate, maximum bit depth, largest resolution and into maximum internal memory. Longer record times are available when recording directly to a CineMag.	3.58 seconds at maximum frame rate, maximum bit depth, largest resolution and into maximum internal memory Longer record times are available when recording directly to a CineMag	2.97 seconds at maximum frame rate, maximum bit depth, largest resolution and into maximum internal memory Longer record times are available when recording directly to a CineMag
Image-Based Auto-Trigger	Standard				
Internal Mechanical Shutter	Standard	Standard			
Timing & Synchronization	40 ns timing resolution Frame synchronization to internal or external clock (FSYNC) IRIG in/out (modulated or unmodulated) SMPTE timecode at support frame rates Ready output Strobe output Genlock	20 ns timing resolution Frame synchronization to internal or external clock (FSYNC) IRIG in/out (modulated or unmodulated) SMPTE timecode at support frame rates Ready output Strobe output Genlock			
Signaling	Dedicated FSYNC, Trigger, Genlock, Timecode In and Timecode Out (SMPTE & IRIG) BNCs on camera body, Range Data input on camera body Capture cable with Ready, Strobe, IBAT-Trigger, Pre-Trigger, Analog Video, Additional signals available with use of optional Break-Out-Box (BoB)				
Ethernet Connection	Gb Ethernet for both control and data 10 Gb Ethernet via CineStream X2SR				
Camera Control	Optional On-Camera Controls (OCC), Phantom Camera Control (PCC) Remote Control Unit (RCU), connects to Remote port, LabView and Matlab drivers available				
Video Out	Analog video (NTSC or PAL) available on Capture Cable Two identical 4:2:2 HD-SDI ports on camera Component viewfinder port		Analog video (NTSC or PAL) available on Capture Cable Component viewfinder port Versatile Dual HD-SDI can provide 4:4:4 video (except at 60 fps), or can be two single 4:2:2 HD-SDI ports, one for playback and one always live		
Lensing	Nikon F-mount standard, Canon EOS mount optional, PL-mount optional, C-mount optional, (lens not included)				

DATA SHEET
Phantom® 1 Megapixel v-Series Cameras

Move the CineMag to a CineStation connected to a PC and **view, edit, and save your recordings using the Phantom Camera Control software** included with the camera. Keep the recordings in their original raw cine format, or convert them to TIFF, QuickTime, AVI, or other popular formats. Move files from the CineStation to a disk or video recorder via 10Gb Ethernet; 4:4:4 HD-SDI, or Component Video outputs.

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

View your recordings immediately in a variety of formats either through the HD-SDI ports on the camera, or through the component video port. There are two HD-SDI ports on the camera which can be configured in a variety of ways including 4:4:4 dual-link and simultaneous play/record (on some models).

The cameras can be controlled with the feature-rich PCC software, the Phantom RCU, or the new (optional) on-camera controls.

Phantom v311

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.

Additional Features:

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

Temperature and Humidity: 0°C - 40°C @ 8% to 80% RH

Shock: 30G, half sine wave, 11 ms, 10 times all axes (without CineMag or lens)

Vibration: 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

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