

DATA SHEET

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Phantom v2640

Phantom® v2640

Unprecedented image quality,
from the world's fastest
4Mpx sensor

Key Benefits:

The **Phantom v2640**, the Phantom Ultrahigh Speed family's newest addition, offers **4Mpx resolution and exceptional image quality at up to 26 Gpx/sec throughput**.

- ▶ **Exceptional Image Quality:** Industry leading low noise and high dynamic range, coupled with outstanding sensitivity, provide the best imaging results.
 - **Low Noise:** Noise of 7.2 e-, the lowest noise floor of any Phantom camera, for the cleanest image, especially in the hard-to-capture dark regions.
 - **High Dynamic Range:** At 64 dB, the highest of Phantom Global Shutter cameras, for the most detail.
 - **High Sensitivity:** Color ISO – 3,200D, Mono ISO – 16,000D, and Mono ISO Binned – 25,000D for outstanding light sensitivity.
- ▶ **High Speed:** At full 4Mpx resolution, the v2640 reaches 26 Gpx/sec.

Key Features:

- 4 Mpx sensor (2048 x 1952), 26Gpx throughput
- Dynamic Range: 64 dB
- Noise level: 7.2 e-
- 1µs minimum exposure standard, 499ns/142ns minimum exposure with export controlled FAST option
- 4 Available modes:
 - Standard, with CDS
 - HS, for 34% throughput increase
 - Binning (Monochrome cameras) in Standard and HS for increased throughput and sensitivity
- Up to 288GB memory, and 10Gb Ethernet standard
- Phantom CineMag® IV 1TB and 2TB compatible
- Sturdy, metal body construction
- Made in USA

Resolution	Max Frames per second (fps)	Max record time (288GB RAM)	288GB download time using 10Gb Ethernet (on an optimized system)
2048 x 1952 (Max)	6,600	7.8 seconds	9 minutes
1920 x 1080	11,750	7.9 seconds	9 minutes
1280 x 720	19,690	11.3 seconds	9 minutes

v2640

Binning

Binning groups 2x2 pixels in a square to create one large pixel. This effectively converts the 4Mpx sensor with a maximum resolution of 2048 x 1952 pixels to a 1Mpx sensor with a 1024 x 976 maximum resolution consisting of very large 27 µm pixels. Binning is available only in monochrome cameras.

Benefits of Binning:

Significantly increased light sensitivity:

The v2640 in Binned modes has ISO ratings equivalent to the Phantom UHS-12 Series, the industry leaders in high-speed light sensitivity.

Increased Frame Rates:

At full resolution, the v2640 achieves 25,030 fps in HS Binned mode, equivalent to a Phantom v2512.

Expanded Flexibility:

Converting between 4Mpx and 1Mpx capabilities greatly expands the v2640's usefulness. Switch to the 4Mpx when the application requires great detail, then switch to a 1Mpx when increased frame rate is needed.



V2640, with a 2TB CineMag

Ultimate Flexibility: The v2640 has multiple operating modes to meet all your research needs.

- **Standard mode**, for exceptional image quality at 20Gpx/sec performance
- **High Speed (HS) mode**, increasing throughput by 34% at full resolution to reach 26Gpx/sec.
- **Binned modes** (Monochrome cameras only), for significantly increased sensitivity and frame rates.
- The export controlled **FAST option**, reduces minimum exposure to 142ns, significantly reducing motion blur.

Built on UHS Platform: The v2640 has all of the standard features of the proven Phantom Ultrahigh Speed family for ease and continuity of use.

	Standard	Standard Binned	HS (High Speed)	HS Binned
Image Quality				
Read out noise [e-] (typical)	7.2	11.9	18.8	29.7
Dynamic range [dB] (typical)	64	66.2	56.7	58.5
Mono: ISO (D)	16,000	25,000	12,500	25,000
Adjustable E.I. (D)	16,000 - 80,000	25,000-125,000	12,500-64,000	25,000-125,000
Color: ISO (D)	3,200	/	3,200	/
Adjustable E.I. (D)	3,200-16,000		3,200-16,000	
Minimum exposure	1µs	1µs	1µs	1µs
Minimum exposure with FAST option	499ns	499ns	142ns	142ns
Straddle time	490ns	490ns	696ns	696ns
Frames Per Second (FPS)				
2048 x 1952	4,855	/	6,600	/
1024 x 976	9,440	18,390	14,740	25,030

ISO measured according to ISO 12232:2006 method

Data Storage and Management Focus:

Memory: The camera can be equipped with **72GB, 144GB, or 288GB** of memory that can be segmented into 63 partitions for multiple, shorter cines.

Non-volatile Memory: The camera can securely save data into a 1TB or 2TB Phantom CineMag IV. Save speed is 1GB/s, and 288GB of data can be saved in under 5 minutes. Data on a CineMag can be downloaded via a CineStation or the camera, using 1Gb or 10Gb Ethernet.

10Gb Ethernet: 1Gb and 10Gb Ethernet are standard. 10Gb Ethernet transfers data at up to 600 MB/second on optimized systems.

Sensor Specifications:

The Phantom v2640 is based on a Vision Research designed **custom CMOS sensor**. The Standard modes feature **Correlated Double Sampling (CDS)** performed directly on the sensor to provide the lowest noise possible.

Sensor specifications include:

Parameter	Specification	Benefit
Sensor Resolution	2048 x 1952	4Mpx resolution for high detail in the image
Bit Depth	12-bit	4096 gray levels for optimal image quality
Dynamic Range	64 dB (typical)	High Image quality with low noise to show the maximum, cleanest detail possible
Noise	7.2 e- (typical)	
Pixel Size	13.5 Micron	High light sensitivity, critical for increased frame rates
Sensor Size	27.6 x 26.3	Compatible with common 35mm Nikon F and Canon EOS lenses
Electronic Shutter	Global	Each pixel integrates simultaneously, reducing image artifacts
Minimum Exposure	1µs standard, 142ns with export controlled FAST option.	Helps eliminate motion blur

Environmental Specs:

Power: 100 - 240 VAC, 280 Watt power supply included
 Weight (without lens): 17 lbs, 8 oz. (8.1 Kg)
 Operating Temperature: -10 to +50 C
 10Gb Ethernet operation: +5 to +50 C
 Storage temperature: -20 to + 70 C
 Humidity: 95% non-condensing
 Regulatory: EM/EMC/ESD
 Emissions Tests EN 61326-1/FCC part 15
 Immunity Tests EN 61326-1
 Random Vibration:
 Operational 7.5 Grms, 3 axes, IAW MIL-STD-202G
 Shock:
 Operational 5.5G, 11mSec sawtooth, 3 axes, 60 pulses total.
 Non-Operational 30G, 11mSec, sawtooth, 3 axes, 60 pulses total
 Safety: IEC 60950

Connectivity:

The Phantom v2640 includes **Programmable I/O** on up to four BNC ports. Programmable I/O provides the ability to assign and define the parameters of various signals including: F-Sync, Strobe, Event, Pre-trigger, Memgate, Timecode-out, Ready, Aux and Auto-Trigger. It also contains the same signals and connectors as the UHS-12 Series cameras for ease of use and compatibility.

Camera Control:

Phantom Camera Control (PCC) Software: Used for complete setup, control, image processing and download, and includes tracking and motion analysis tools. An SDK that supports Labview and Matlab is also available for integration.

On-Camera Controls: On-camera controls are standard. Connect a video monitor to the camera and use the intuitive user interface to control most common camera settings.



Phantom v2640 - Back Panel

Advanced Features:

- **Image-Based Auto-Trigger:** Trigger the camera from motion detected within the live image, making it possible to catch unpredictable events without manually triggering the camera.
- **Internal Mechanical Shutter:** A black reference is obtained by sampling a perfectly black image. No physical access to the camera is needed.
- **Multi-Cine:** Partition internal memory into segments and make shorter recordings back-to-back without missing any action.
- **Continuous Recording:** Automatically saves a recorded cine to a disk drive on a connected PC immediately after it is recorded then re-arms the camera and waiting for the next cine. The number of recordings is limited only by the amount of available disk storage.
- **SYNC-to-Trigger:** Attaches the synchronization (F-SYNC) pulse to the trigger frame, for accurate frame comparisons among multiple repeated tests.
- **PIV features:** Extremely accurate timing, for Particle Image Velocimetry and similar measurement techniques
- **Burst Mode:** Many experiments require taking images at precisely the same time. Burst mode triggers the camera then takes a burst of images at precise time delays.
- **Quiet Fans:** Turns the fans off to eliminate vibration.

Resolution		Maximum FPS	
H	V	Standard Mode	HS Mode
2048	1952	4,855	6,600
2048	1600	5,885	8,020
2048	1440	6,510	8,880
1920	1080	8,575	11,750
1024	976	9,440	14,740
1792	800	11,370	17,820
1792	720	12,540	19,690
640	480	18,120	28,760
128	64	79,200	142,270
128	16	129,600	261,190
1792	8	144,970	303,460

Resolution		Maximum FPS	
H	V	Standard Binned	HS Binned
2048	1952		
2048	1600		
2048	1440		
1920	1080		
1024	976	18,390	25,030
896	800	22,040	33,970
896	720	24,230	37,360
640	480	34,490	53,290
128	64	129,550	204,270
896	16	190,060	303,460

Binning mode available in Monochrome cameras only

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.

Phantom® v2640



V2640 with CineMag Compatibility

Vision Research Global Support - for wherever you are

Our ultrahigh-speed camera line is supported by Vision Research's Global Service and Support network offering AMECare Performance Services from multiple sites around the globe. Maximize the value of your Phantom camera with a full menu of professional support services.

Learn more about our service and support options at www.phantomhighspeed.com/Support

Focused

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



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