VISION RESEARCH

PHANTOM

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

DATA SHEET

For the most current version visit www.phantomhighspeed.com
Subject to change Rev March 2020

VEO 1310 S & L

Phantom® VEO 1310

High-speed Camera

1280 x 960 at 10,860 fps
1280 x 720 at 14,300 fps

Leading VEO Frame Rates and Light Sensitivity with advanced features in a compact & rugged design

The newest addition to the Phantom VEO family incorporates the latest in imaging technology to deliver premium performance in a compact, easy to use and reliable camera system.

Highest VEO Frame Rates

Capture over 13 Gigapixels per second (Gpx/s) at full resolution. Binning mode is included for increased frame rates at 640 x 480 and below.

Superior Light Sensitivity

The native ISO of 25,000 (mono) is more than double other VEO models allowing greater flexibility of optics and lighting when working with challenging subjects.

Imaging Specifications

Custom 12-bit CMOS sensor, global shutter sensor, 18 µm pixels, global shutter with correlated double sampling (CDS).

	Standard	Binning mode (mono output only)
Max Pixel Resolution	1280 x 960	640 x 480
FPS at max res	10,860 fps	40,300 fps
Sensor Size	23 x 17.2 mm	23 x 17.2 mm
ISO (12232 STD)	Mono: 25,000D / 80,000T Color: 6,400D / 8,000T	50,000D / 125,000T Color: 8,000D / 10,000T
Exposure Index	Mono 25,000 - 125,000 Color: 6,400 - 32,000	Mono: 50,000 - 250,000 Color: 8,000 - 40,000

*Recommended Exposure Index (E.I.) range is specified.

Key Specifications:

Throughput: 13 Gpx/sec at full resolution

Memory: 18GB, 36GB or 72GB RAM
Multi-Cine: Partition RAM up to 63 segments

Gb Ethernet (standard) and 10Gb Ethernet (optional) for control and download. Both protocols use same port.

Minimum exposure is 1µs; 689 ns with FAST option (export controlled)

Available in two body styles: L and S

- L-models have standard connectors for software-based control.
- S-models include ruggedized connectors, CFast compatibility, on-camera controls, battery input and additional signals.

Rugged design: High-G Rated (nondestructive up to 30G standard, 100G without shutter). Milled aluminum housing with electronics isolated from airflow

Made in USA

AMETEK®
MATERIALS ANALYSIS DIVISION

DATA SHEET

Resolution/Speed Chart & Record Times

	1310	1310 Binned (mono output)
Resolution*	Max Frames per Second; (72GB rec time in seconds)**	
1280 x 960	10,860 (3.6)	-
1280 x 804	12,906 (3.6)	-
1280 x 720	14,350 (3.6)	-
960 x 960	13,330 (3.9)	-
640 x 480	30,030 (5.1)	40,300 (3.9)
480 x 480	30,030 (6.9)	40,300 (4.2)
320 x 240	57,360 (10.7)	105,260 (5.7)
320 x 168	78,900 (10.8)	140,430 (6.2)
320 x 120	105,260 (10.9)	180,680 (6.6)
320 x 72	158,038 (11.9)	253,270 (7.6)
320 x 24	316,930 (15.3)	423,350 (11.9)

FAST option does not change the maximum frame rate, only the minimum exposure.

* More resolutions are available.

** Record times shown are to 72GB RAM. Divide by 2 for 36GB and 4 for 18GB RAM options.

'L' Model	Connectivity	'S' Model
RJ45 (Gb Ethernet Standard, 10Gb Optional)	Ethernet	8-pin Fischer (Gb Ethernet Standard, 10Gb Optional)
6-pin Fischer 16-32VDC	Power Input	6-pin Fischer 16-32VDC; Secondary 12V input for Battery via Capture Port
2 BNC Ports	Programmable I/O	4 BNC Ports
Yes	Trigger Input	Yes
Yes (IRIG-B)	Dedicated Timecode Input	Yes (IRIG-B)
No	Rear SDI Port	Yes (3G HD-SDI)
Via 6-pin Power	Serial RS232	Via 6-pin Power
None	Range Data	Dedicated 6-pin Fischer
None	On-Cam Controls	Yes (buttons, encoder)
None	USB	Yes, for WiFi Dongle
None	Removable Media	CFast 2.0 Cards (NTFS)

Vision Research Global Support Network

The Phantom VEO 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 menu of professional support services. Learn more about our service and support options at www.phantomhighspeed.com/Service-Support

Select Features

Binning Mode: For increased frame rates and sensitivity at 640 x 480 resolution and below. Binning is included on both color and mono cameras; however, the output is always mono with binning enabled.

10Gb Ethernet Option: Download entire 72GB of data in as little as 2 minutes.

CFast Workflow (S-Model): Use standard CFast 2.0 cards, formatted NTFS. Transfer Cine RAW files from RAM at ~90 MB/second. Drag-and-drop the files from card using standard readers on Windows or Mac operating systems.

Image-based Auto Trigger (IBAT): Trigger the camera (or even multiple connected cameras) from motion detected within the live image per the parameters set up in PCC.

Camera Control & File Formats

Phantom PCC software for setup, control, download, image manipulation and motion analysis

Native file format is Phantom Cine Raw (.cine). Cines can be easily converted to other formats including h.264 mp4, Apple ProRes .mov, AVI, Tiff, JPEG, DPX, DNG and many more using PCC. Cine Raw files directly compatible with many major video editing and motion analysis program

SDK with both Labview and Matlab support is available

Mechanical & Environmental

Dimensions: L-model: 5 x 5 x 5" (127mm³);
S-model: 5 x 5 x 5.5" (127 x 127 x 140 mm)

Weight: 6 lbs. (2.7Kg) L-model; 6.6 lbs (3Kg) S-model

Lens Mount: Choices include Nikon F with G-style lens support, C-mount, and Canon EF with electronic lens control

Mounting Points: 2X standard 1/4x20 on 3 sides, with additional points for custom mounting plates. VEO handle, Cheese Plates and other CAMEO VEO accessories are compatible.

Cooling: Actively cooled. Sealed system keeps electronics isolated from airflow. Quiet mode temporarily disables the fan.

Operational Temperature: -10°C - +50°C

Storage Temperature: -20°C - +70°C

Operational Shock: MIL-STD-202G Method 213-B. Rated 30G with shutter; 100G without; sawtooth wave, 11ms, +/- 10 pulses all axes

Vibration Rating: MIL-STD-202G Method 214-A. Rated 12Grms; Figure 2A-1, Test Condition D, 15 min per axis

VISION RESEARCH

AMETEK® MATERIALS ANALYSIS DIVISION

Vision Research, Inc. | 100 Dey Rd. Wayne, NJ 07470, USA
Tel: +1 973.696.4500 | phantomhighspeed.com

Certain Phantom cameras are held to export licensing standards.
Please visit www.phantomhighspeed.com/export for more information.

Phantom® VEO 1310

Select resolutions, maximum frame rates and record duration. Many more resolutions and rates are available, contact us for specific requirements not listed here.

	Standard Mode	Record time at Max FPS (seconds)			Binned Mode Mono Output Only	Record time at Max FPS (seconds)		
Resolution (H x V)	Max Frame Rate (FPS)	72GB RAM	36GB RAM	18GB RAM	Binned Mode Max (FPS)	72GB RAM	36GB RAM	18GB RAM
1280 x 960	**10,860**	3.60	1.80	0.90	**-**	-	-	-
1280 x 864	**12,030**	3.60	1.80	0.90	**-**	-	-	-
1280 x 804	**12,900**	3.60	1.80	0.90	**-**	-	-	-
1280 x 720	**14,350**	3.60	1.80	0.90	**-**	-	-	-
1280 x 684	**15,080**	3.60	1.80	0.90	**-**	-	-	-
1280 x 504	**20,210**	3.70	1.80	0.90	**-**	-	-	-
1280 x 360	**27,760**	3.80	1.90	0.90	**-**	-	-	-
1280 x 240	**40,300**	3.90	1.90	0.90	**-**	-	-	-
1280 x 120	**73,510**	4.20	2.10	1.00	**-**	-	-	-
1280 x 72	**109,640**	4.70	2.30	1.10	**-**	-	-	-
1280 x 12	**284,310**	10.00	5.00	2.50	**-**	-	-	-
1200 x 600	**17,130**	3.90	1.90	0.90	**-**	-	-	-
1120 x 960	**11,580**	3.90	1.90	0.90	**-**	-	-	-
1120 x 540	**20,190**	4.00	2.00	1.00	**-**	-	-	-
960 x 960	**13,330**	3.90	1.90	0.90	**-**	-	-	-
960 x 720	**17,620**	3.90	1.90	0.90	**-**	-	-	-
960 x 600	**21,000**	4.00	2.00	1.00	**-**	-	-	-
960 x 480	**25,990**	4.00	2.00	1.00	**-**	-	-	-
800 x 600	**24,200**	4.10	2.00	1.00	**-**	-	-	-
720 x 720	**20,330**	4.50	2.20	1.10	**-**	-	-	-
640 x 960	**15,380**	5.00	2.50	1.20	**-**	-	-	-
640 x 480	**30,030**	5.10	2.50	1.20	**40,300**	3.90	1.90	0.90
640 x 360	**39,420**	5.20	2.60	1.30	**52,060**	4.00	2.00	1.00
640 x 240	**57,360**	5.30	2.60	1.30	**73,510**	4.20	2.10	1.00
640 x 120	**105,260**	5.70	2.80	1.40	**125,000**	4.90	2.40	1.20
640 x 96	**126,360**	5.90	2.90	1.40	**145,360**	5.20	2.60	1.30
640 x 72	**158,030**	6.30	3.10	1.50	**173,650**	5.80	2.90	1.40
640 x 48	**210,900**	6.90	3.40	1.70	**215,610**	6.90	3.40	1.70
640 x 36	**253,270**	7.60	3.80	1.90	**-**	-	-	-
640 x 24	**316,930**	8.60	4.30	2.10	**284,310**	10.00	5.00	2.50
640 x 12	**423,350**	11.90	5.90	2.90	**-**	-	-	-
480 x 480	**30,030**	6.90	3.40	1.70	**49,530**	4.20	2.10	1.00
480 x 312	**45,060**	7.10	3.50	1.70	**72,500**	4.40	2.20	1.10
480 x 120	**105,260**	7.70	3.80	1.90	**154,250**	5.20	2.60	1.30
320 x 960	**15,380**	9.80	4.90	2.40	**-**	-	-	-
320 x 312	**45,060**	10.20	5.10	2.50	**84,170**	5.60	2.80	1.40
320 x 240	**57,360**	10.30	5.10	2.50	**105,260**	5.70	2.80	1.40
320 x 120	**105,260**	10.90	5.40	2.70	**180,680**	6.60	3.30	1.60
320 x 96	**126,360**	11.30	5.60	2.80	**210,900**	6.90	3.40	1.70
320 x 72	**158,030**	11.90	5.90	2.90	**253,270**	7.60	3.80	1.90
320 x 48	**210,900**	12.70	6.30	3.10	**316,930**	8.60	4.30	2.10
320 x 24	**316,930**	15.30	7.60	3.80	**423,350**	11.90	5.90	2.90
80 x 24	**316,930**	34.60	17.30	8.60	**423,350**	31.10	15.50	7.70
80 x 12	**423,350**	38.80	19.40	9.70	**-**	-	-	-

Increased frame rates are possible at specific resolutons with 'Exposure in PIV' selected in PCC. In this mode the camera is always exposing frames at the maximum exposure time for the given frame rate. With the VEO 1310 FAST option installed (export controlled) the frame rates are further increased for a maximum frame rate of over 600,000 fps, at the resolutions indicated below.

640 x 12 PIV MODE	**560,380**	9.00	4.50	2.20	**-**	-	-	-
640 x 12 W/ PIV + FAST	**604,160**	8.30	4.10	2.10	**-**	-	-	-
320 x 24 PIV MODE	**316,930**	15.30	7.70	3.80	**560,380**	8.70	4.30	2.10
320 x 24 W/ PIV + FAST	**316,930**	15.30	7.70	3.80	**604,160**	8.00	4.00	2.00