



PHANTOM[®]
VEO-E SERIES

DATASHEET



PHANTOM VEO E-310L VEO E-340L

COMPACT HIGH-SPEED CAMERAS

1280 x 800 up to 3,200 fps (E-310L)

2560 x 1600 up to 800 fps (E-340L)

FEATURES & BENEFITS

PHANTOM VEO-E SERIES HIGH-SPEED CAMERAS

Phantom VEO high-speed cameras are utilized every day in demanding test & measurement applications around the world.

The VEO platform is known for high quality & dependable image capture due to proprietary sensor design, rugged & compact housings, unique workflow features & overall system versatility.

VEO-E models offer many of the same features & are:

- 20% smaller & lighter than our core VEO models.
- Designed for efficient & easy set up with industry standard connections.
- Cost-effective for laboratories & academic institutions.

NOW AVAILABLE:

VEO-E Series E225 models with maximum frame rate of 225,000 fps @ reduced resolutions.

HADLAND[®]
IMAGING

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AMETEK[®]
VISION RESEARCH



IMAGE & SENSITIVITY

	E-310L	E-340L
Sensor Type	CMOS with Global Shutter	
Maximum Resolution	1280 x 800	2560 x 1600
CAR Increments	64 x 8	128 x 4
Pixel Size	20 μm	10 μm
Sensor Size	25.6 x 16 mm	
Bit Depth	12-bit	
	EMVA 1288 Measurements @ 532 nm	
	E-310L	E-340L
Quantum Efficiency %	33.9% mono	60.2% mono
	29.5% color	43.6% color
Max. SNR (dB)	44.1	44.6
Absolute Sensitivity Threshold (p)	99.4 mono	40.4 mono
	115.9 color	54.1 color
Saturation Capacity (e-)	25,918 mono	14,512 mono
	27,880 color	14,335 color
Temporal Dark Noise (e-)	33.1	23.8

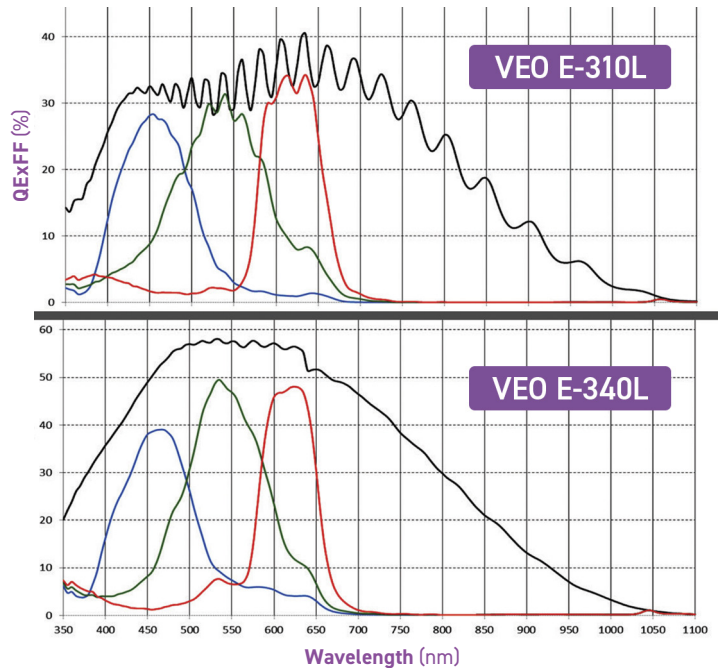
Measurements recorded at 532 nm with monochrome & color cameras using the EMVA 1288 3.1 standard. Visit www.phantomhighspeed.com/emva for more about EMVA 1288.



Phantom VEO Series Rear Panel

SPECTRAL RESPONSE

Quantum Efficiency: Monochrome & Color



CONNECTIVITY & SIGNALS

Ethernet	Gigabit Ethernet
Timecode	IRIG-B modulated & unmodulated
Port Descriptions	Rear Ports 2 TC IN: BNC – Timecode-In 5 I/O: BNC – Programmable I/O +16–32V DC: Fischer 6-pin port for main power ETHERNET: RJ45 port for control/data transfer 1 TRIGGER: BNC – Trigger-in 3 I/O: BNC – Programmable I/O Front Ports SDI: DIN (mini-BNC) 3G-SDI video out HDMI: HDMI Type A video out VF PWR: HIROSE 4-pin for monitor/viewfinder
Programmable I/O Signals	Programmable I/O (2 ports) for FSync, Strobe, Ready, Timecode-Out, Event In, Pre-trigger, assign & define signals in PCC
Hardware Trigger	Dedicated BNC
Software Trigger	via Ethernet & Image-Based Auto Trigger (IBAT)
Synchronization	External Sync via FSync or IRIG Timecode
Recording Features	Burst Mode, Image-Based Auto Trigger (IBAT) & Continuous Recording
Video Output	3G-SDI via Din & Micro HDMI Type D port
Accessory Power	HIROSE 4-pin for 12V monitors up to 1 Amp



MEMORY & STORAGE	
RAM Buffer	18GB & 36GB RAM options
Multi-Cine	Up to 64 partitions
Nonvolatile Media	N/A
Media Transfer Rates	N/A

FRAME RATES & EXPOSURE		
	E-310L	E-340L
Top FPS @ Max Resolution	3,260 fps	800 fps
1 Megapixel FPS	3,260 fps	2,950 fps
Maximum FPS	650,000 fps	287,000 fps
	E-310L-E225: 225,000 fps	E-340-E225: 225,000 fps
Minimum FPS	24 fps	
Minimum Exposure	1 µs	
PIV Features	Shutter Off Mode with straddle time of 480 ns (E-310L) & 1.7 µs (E-340L); supports Burst Mode	
Exposure Features	EDR (Extreme Dynamic Range), autoexposure & overexposure indication over video in PCC	

FRAME RATE CHART

Examples of common resolutions & frame rates. Record times (seconds) are for 36GB RAM at frame rate shown. Duration will be half for 18GB RAM.

MAXIMUM FRAME RATES FOR 36GB RECORD TIME IN SECONDS				
Resolution (H x V)	E-310L	E-310L-E225	E-340L	E-340L-E225
2560 x 1600			800 fps (3.9)	800 fps (3.9)
2560 x 1440			890 fps (3.9)	890 fps (3.9)
1536 x 1536			1,320 fps (4.1)	1,320 fps (4.1)
1920 x 1080			1,540 fps (4)	1,540 fps (4)
1280 x 1280			1,850 fps (4.2)	1,850 fps (4.2)
1280 x 800	3,260 fps (7.7)	3,260 fps (7.7)	2,950 fps (4.2)	2,950 fps (4.2)
1280 x 720	3,630 fps (7.7)	3,630 fps (7.7)	3,270 fps (4.2)	3,270 fps (4.2)
640 x 480	10,100 fps (8.3)	10,100 fps (8.3)	8,430 fps (4.9)	8,430 fps (4.9)
512 x 512	11,500 fps (8.5)	11,500 fps (8.5)	9,250 fps (5.2)	9,250 fps (5.2)
256 x 256	39,700 fps (9.9)	39,700 fps (9.9)	26,800 fps (7.3)	26,800 fps (7.3)
128 x 128	120,400 fps (13)	120,400 fps (13)	64,500 fps (12)	64,500 fps (12)
128 x 64	224,900 fps (13)	224,900 fps (13)	108,700 fps (14)	108,700 fps (14)
128 x 32	397,100 fps (15)	225,000 fps (25)	165,100 fps (19)	165,100 fps (19)
128 x 8	650,000 fps (38)	225,000 fps (100)	270,000 fps (46)	225,000 fps (50)
128 x 4			287,000 fps (87)	225,000 fps (100)

* Export controlled FAST option.



CONTROL

Software & OS	Phantom Camera Control (PCC) – Windows 64; SDK for C/C++, C#, Python, MatLab & LabView
On-Camera Controls	N/A
Primary File Format	Phantom Cine RAW (.cine)
Alternative File Formats	Easily convert to formats including MP4, Apple ProRes, MOV, AVI, TIFF, JPG, DNG & more using PCC. Cine files compatible with video editing & motion analysis programs.
Software Features	Continuous recording for automated workflows, Integrated Data Acquisition (NI-DAQ), support for DIC Calibration with Sync-Snapshot menu, advanced image tools including crop & resample, tone curves, filters & more.

MECHANICAL

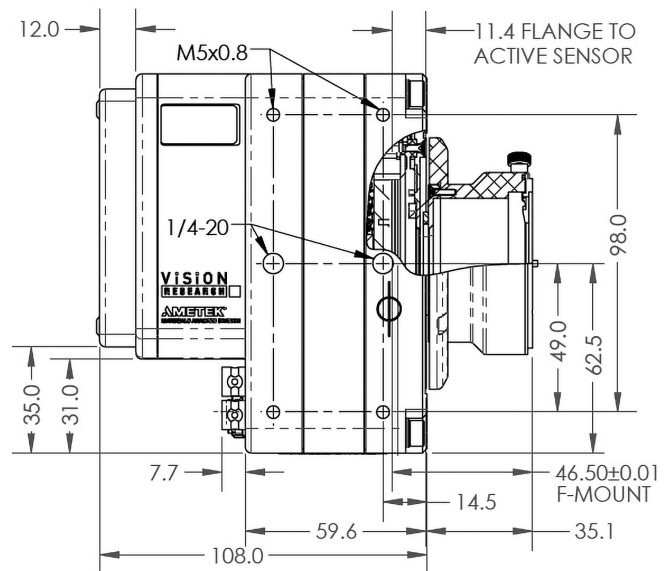
Housing	L model
Dimensions	5 x 5 x 4.2 inches (12.7 x 12.7 x 10.8 cm)
Weight	4 lb (1.8 kg)
Lens Mounts	Nikon F mount (aperture support for G style lenses) Canon EF mount (with electronic focus & iris control) PL mount C mount
Mounting Points	1/4-20: 6 total – 2 bottom, 2 side & 2 on top M5x0.8: 20 total – 4 on each side & 4 on front
Internal Shutter	Standard, for remote black references
Cooling	Active cooling; Quiet Mode disables fans during video capture

POWER

AC Power	100V to 240V AC, 80W power supply included
Voltage Range	20V to 28V DC Primary
Power Consumption	40W typical
Battery Options	Works with 16V to 32V battery sources only, no battery mount option or dedicated backup port.

ENVIRONMENTAL

Operating Temperature	14° to 122° F (-10° to 50° C)
Storage Temperature	-4° to 158° F (-20° to 70° C)
Relative Humidity	≤85% noncondensing
Operational Shock	30G, 11 msec sawtooth, 3 axes, 2 directions per axis, 10 shocks per direction (60 pulses total)
Operational Vibration	MIL-STD-202G Method 214-A. Rated 12 gRMS; Figure 2A-1, Test Condition D, 15 min per axis
Regulatory Made in USA	Emissions – CE & UKCA Compliant EN 61326-1 Immunity – CE & UKCA Compliant EN 61326-1 FCC – CFR 47, Part 15, Subpart B & ICES-003, Class A KC Emissions – KC Compliant KN32 KC Immunity – KC Compliant KN35 Safety – IEC 60950-1 (2012)



**BETTER GEAR.
BETTER RESULTS.**
We've got the gear you need to get the job done right.

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SCAN FOR MORE INFO ABOUT PHANTOM CAMERAS
& ULTRA HIGH-SPEED DIC SOLUTIONS



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For more information

Call 1-888-43HADLAND (1-888-434-2352) or email, sales@hadlandimaging.com about ultra high-speed visible, infrared, schlieren & Flash X-ray imaging solutions. Phantom on the web: www.phantomhighspeed.com

See the action for yourself in **The Vault @ Hadland Imaging**, our R&D Training Center in Santa Cruz, CA.

Call or email us to schedule your **hands-on experience with ultra high-speed imaging solutions!**

Specifications subject to change.

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