PHANTOM® / AMETEK®
VISION RESEARCH

C-SERIES

DATASHEET

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PHANTOM C980 C540

HIGH-SPEED CAMERAS

3840 × 2160 up to 1,180 fps (C980)
2560 × 1680 up to 1,140 fps (C540)

PHANTOM HIGH-SPEED / FORZA SILICON AMETEK

FEATURES & BENEFITS

PRECISION STARTS WITH SENSOR PERFORMANCE

- Advanced BSI sensor technology with CDS delivers ultra-low read noise below 4e⁻ for outstanding image clarity and detail for reliable measurements, even in challenging imaging environments.
- Available in 4 MP and 8 MP configurations, preserving critical details with flexibility for post processing and analysis.
- Optimized for scientific imaging applications including PIV, microscopy, biomechanics and other precision imaging applications.

ADVANCED CONNECTIVITY WITH RF LENS INTEGRATION

- Native Canon RF mount with electronic lens control for modern optics integration
- Compatible with C-mount and commercial SLR-lens adapters for application flexibility
- Built-in programmable I/O, SDI video output, and onboard controls simplify synchronization and system integration.
- Onboard target storage, multi-cine partitions and continuous recording with PCC streamlines laboratory workflows.

ULTRA-COMPACT STANDALONE DESIGN

- 9.6 × 9.6 × 6.8 cm form factor is ideal for laboratory benches, test stands, microscopes and space constrained environments
- Lightweight design simplifies deployment in distributed measurement and research systems
- Integrated storage, networking and control interfaces reduce setup complexity and system footprint

IMAGE & SENSITIVITY

Sensor Type	BSI CDS	
Maximum Resolution	**C540:** 2560 × 1680	**C980:** 3840 × 2160
CAR Increments	**C540:** 1280 × 24	**C980:** 1920 × 24
Pixel Size	5 µm	
Sensor Size	**C540:** 15.3 mm 1" format	**C980:** 22 mm 4/3" format
Bit Depth	12 bit	

	EMVA 1288 Measurements (at 533 nm)	
	C540	C980
Quantum Efficiency (%)	70.7 mono 61.9 color	71 mono 62.2 color
Max. SNR (dB)	37.7	37.6
Absolute Sensitivity Threshold (p)	4.39 mono 4.77 color	4.67 mono 4.66 color
Saturation Capacity (e-)	5922 mono 5814 color	5973 mono 5955 color
Temporal Dark Noise (e-)	3.83	4.11
Dynamic Range (dB)	62.59	61.88

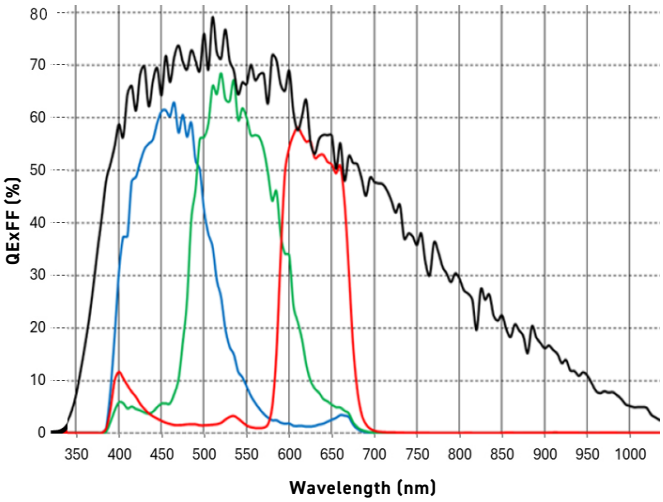
- Reported measurements were taken at 533 nm with both monochrome and color cameras, using the EMVA 1288 4.0 standard

- Visit: www.phantomhighspeed.com/emva for more information on EMVA 1288

Back Panel

SPECTRAL RESPONSE

Quantum Efficiency Monochrome and Color



CONNECTIVITY & SIGNALS

Ethernet	Standard RJ45 Ethernet
Timecode	IRIG-B
Port Descriptions	RJ45 Ethernet; Power 20-28V - Fischer 6-pin; USB-A for target storage; 3 Dedicated BNCs for Trigger, Timecode-in and SDI Video; 3 BNCs for Programmable I/O"
I/O Signals	Trigger, Timecode, Strobe, Event, F-SYNC and more
Hardware Trigger	TTL (falling or rising edge), or High-Voltage (falling or rising edge). Dedicated BNC
Software Trigger	Trigger button or Ethernet via PCC, SDK or telnet command
Synchronization	External Sync (5V TTL) via FSync or IRIG-B Timecode
Recording Features	External frame rate control, burst mode, continuous recording, multi-partitions, frame straddling
Video Output	3G SDI via full size BNC
Accessory Power	N/A

MEMORY & STORAGE		
RAM Buffer	**C540:** 14 GB	**C980:** 28 GB
Capture Duration	1.9 seconds at max resolution and max frame rate	
Multi-Cine	Up to 63 partitions	
Non-Volatile Media	Integrated USB-A port for transferring Cine files directly to commercial SSD flash drives	
Media Transfer Rates	TBD	

FRAME RATES & EXPOSURE		
Top FPS at Max Resolution	**C540:** 1140	**C980:** 1180
Maximum FPS	**C540:** 51,750 fps at 1280 × 24	**C980:** 50,820 fps at 1920 × 24
Minimum FPS	50	
Frame Timer Clock	68 MHz	
Minimum Exposure	2 µs	
PIV Features	Shutter-off mode with a stradddle time of 3.7µs (effective frame pair frequency of 270 KHz for frame straddling PIV)	
Exposure Features	Burst Mode; Auto-Exposure, Overexposure Indication in PCC	

FRAME RATE CHART

Table provides examples of common resolutions and the maximum frame rate.

MAXIMUM FRAME RATE - FPS		
Resolution (H × V)	**C540**	**C980**
3840 × 2160	N/A	1,180
3840 × 1680	N/A	1,510
3840 × 804	N/A	3,100
2560 × 2160	N/A	1,180
2560 × 1680	1,140	1,510
2560 × 1260	1,520	2,000
2560 × 1080	1,760	2,330
2560 × 720	2,620	3,450
2560 × 480	3,870	5,090
2560 × 228	7,770	10,130
2560 × 72	20,500	26,130
2560 × 24	41,360	50,820
1920 × 1920	N/A	1,320
1920 × 1260	2,000	2,000
1920 × 1080	2,330	2,330
1920 × 360	6,670	6,670
1920 × 228	10,130	10,130
1920 × 24	50,820	50,820
1280 × 24	51,750	N/A

CONTROL

Software & OS	Phantom PCC (Windows x64); SDK available for C/C++, C#, Python, MatLab and LabView
On-Camera Controls	Standard Feature. Access menu system with encoder, viewed on video monitor. Buttons for trigger, play and save – Color indicates current camera state.
Primary File Format	Phantom Cine RAW (.cine)
Alternative File Formats	Convert to formats including .mp4, .avi, Tiff and many more using PCC. Cine files are directly compatible with major video editing and motion analysis programs.
Software Features	Continuous Recording for automated workflows, Integrated Data Acquisition (NI-DAQ), support for DIC Calibration with Sync-Snapshot menu, automatic file naming, advanced Image Tools including Tone Curves, Filters and more.

MECHANICAL

Housing Variants	Available with installed RF-Mount or C-Mount
Size	9.6 × 9.6 × 6.8 cm
Weight	1.4 lbs (0.6 kg)
Lens Mounts	RF-mount supports electronic control of aperture and focus and adapters for EF and F-mounts. C-mount, M42X1.0, M42X0.75, F-mounts availalble separately
Mounting Points	Standard 1/4x20 on all sides (2X on bottom); additional M4 mounting points on all faces
Internal Shutter	N/A
Cooling	Active cooling. Quiet mode disables fans during capture.

POWER

AC Power	100-240 VAC, 40W power supply included
Voltage Range	20-28V
Power Consumption	30W typical at 24V
Battery Options	Works with 24V battery sources only, input through primary power port

ENVIRONMENTAL

Operating Temperature	-10 to +50°C
Storage Temperature	-20 to +70°C
Operating Humidity	≤85% non condensing
Operational Shock	Preliminary: 30G
Operational Vibration	Preliminary: 7.5 Grms, 50Hz-2KHz, 3 axes, 15 min/axis, IAW MIL-STD-202H Method 214-I, Test Condition B
Regulatory	TBD

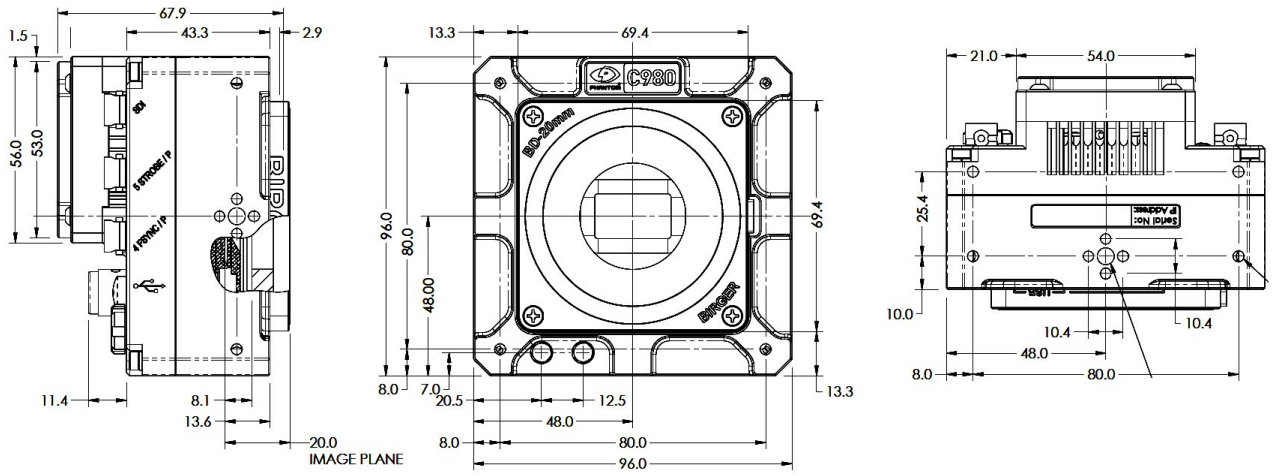
PHANTOM SERVICES

Phantom cameras are supported by an array of services engineered for users to get the most out of their Phantom camera, covering every stage from setup to analysis.

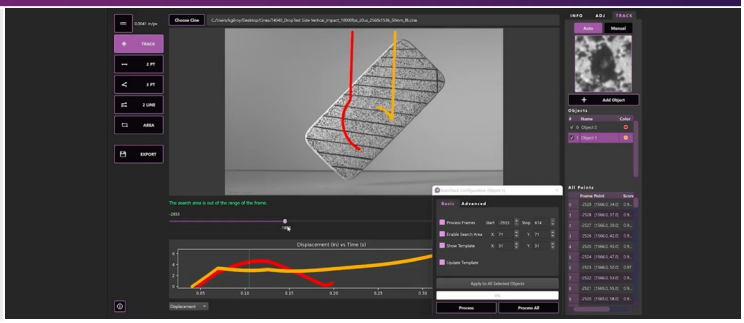
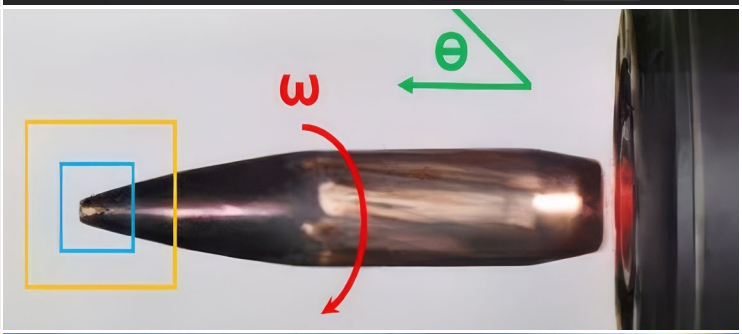
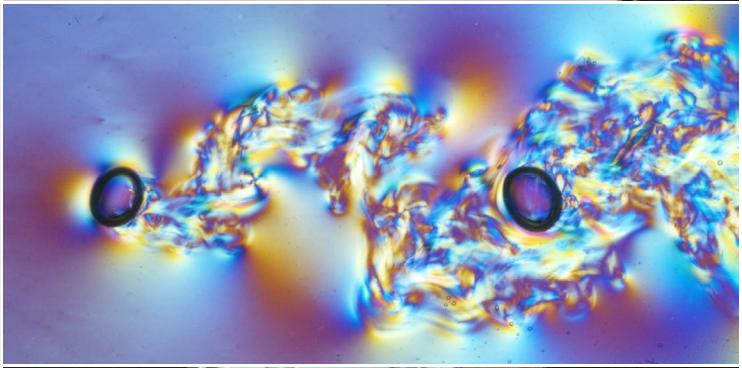
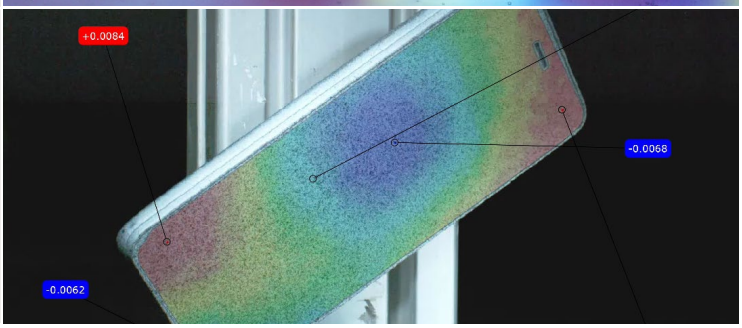
Phantom Care includes services to maintain optimal camera performance including flexible support plans, camera certification, rentals and upgrades.

Phantom Analysis includes onsite application-specific testing, expert data analysis and custom Python module development.

Phantom Academy training courses for foundational and advanced applications are available for all experience levels.



APPLICATION-SPECIFIC FEATURES

Motion Analysis / Tracking	Capture complex motion with exceptional clarity and precision. High-resolution imaging combined with ultra-low 4.14 e- read noise enables accurate object tracking, trajectory analysis, and motion measurement across a wide range of industrial, sports, biomechanics, and research applications. Fully compatible with Phantom Cine Analyzer (PCA) Track & Measure module, included with PCC 4, enables multi-point tracking with sub-pixel accuracy.	
Defense Range Testing & Projectile Tracking	Engineered for demanding outdoor and range environments, the C-Series combines high-resolution imaging with native Canon RF lens compatibility to support long focal length optics required for projectile tracking, flight analysis, and impact observation. The RF ecosystem provides access to a broad range of modern telephoto lenses while maintaining the image quality necessary for reliable measurement and event analysis	
Fluid Dynamics & Flow Visualization	Ideal for particle image velocimetry (PIV), spray analysis, combustion studies, and general flow visualization. The low-noise BSI sensor architecture and 5 µm pixel design provide clean, high-contrast imagery that improves particle detection and measurement accuracy while enabling detailed observation of fast-moving flow phenomena	
Materials Testing & Failure Analysis	Observe deformation, crack initiation, fracture events, and dynamic material behavior with high spatial resolution and excellent image quality. New to the C-Series, M42X0.75 lens mounts offer improved mechanical stability to minimize vibration, lens shift, and focus drift, reducing measurement noise and uncertainty. High frame rates combined with low sensor noise reveal critical details often missed by conventional imaging systems, helping engineers understand failure mechanisms and improve product designs.	

APPLICATION-SPECIFIC FEATURES

Life Sciences & Biomechanics	Capture rapid biological and human-motion events with the image quality required for accurate measurement and analysis. The compact camera design, low-noise sensor technology, and flexible lens integration make the C-Series well suited for biomechanics, sports science, microscopy, and laboratory-based life science research.	
Off-Board Automotive Crash Testing	Document full-scale crash events with high-resolution imagery, synchronized system integration, and proven Phantom workflow tools. The compact standalone design, programmable I/O, and high-speed networking support efficient deployment around crash tracks while delivering the image quality required for vehicle kinematics, deformation studies, and motion tracking analysis.	
Compact Systems for Advanced Imaging	The small (sub 10 cm) and lightweight camera design, 5 µm pixel sensor, and broad lens compatibility make the C-Series ideal for stereo imaging, DIC, microscopy, and high-magnification applications. Create powerful multi-camera measurement systems with specialized optics in a smaller, more affordable platform.	

ABOUT PHANTOM HIGH-SPEED

Focused. Since 1950, Phantom 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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