PHANTOM®
TMX-SERIES

DATASHEET



PHANTOM TMX 7510 TMX 6410 TMX 5010

HIGH-SPEED CAMERAS

Up to 76,000 fps at 1280 x 800 (7510), over
300,000 fps at 1280 x 192 and 640 x 384
Very high sensitivity

FEATURES & BENEFITS

DESIGNED FOR TRUE HIGH-SPEED APPLICATIONS

- 3 performance models offer extreme high frame rates at larger resolutions, up to 1.75 Million fps* at 1280 x 32 and 640 x 64 (TMX7510). 1 µs minimum exposure standard, 95ns with FAST option.
- Real data, for real results: Frame rates are actual, with no interpolation. 2 x 2 Binning Mode provides double the vertical resolution at high frame rates for added flexibility.
- Very high native light sensitivity, made possible by the industry's first back side illuminated (BSI) sensor.

FOCUS ON DATA MANAGEMENT

- Record multiple experiments with up to 512GB of memory that can be partitioned up to 511 times.
- 10Gb Ethernet is standard for the fastest data download directly from the camera's RAM buffer.
- Use the Phantom CineMag V, for up to 8TB of nonvolatile memory and fast image transfer.

**with export controlled FAST option*

VISION RESEARCH

AMETEK® MATERIALS ANALYSIS DIVISION

FRAME RATES & EXPOSURE

Top FPS at Max Resolution	7510: 76,000	6410: 65,940	5010: 50,725
Maximum FPS	7510: 875,000 1,750,000 with FAST option*	6410: 758,330 1,516,660 with FAST option*	5010: 583,330 1,166,660 with FAST option*
Minimum FPS	100		
CAR Increments	Standard: 256 x 32, Binned: 128 x 64		
Minimum Exposure	1 µs standard, 95ns with FAST option*		
Electronic Shutter	Global Shutter		
PIV Features	Shutter-off mode with a straddle time of 229ns Supports Burst Mode		
Exposure Features	Extreme Dynamic Range (EDR), Auto Exposure		

IMAGING

Sensor Type	CMOS, Back Side Illuminated (BSI)	
Maximum Resolution	1280 x 800	Binned: 640 x 384
Bit Depth	12-bit	
Pixel Size	18.5 µm	Binned: 37 µm
Sensor Size	23.7 x 14.8 mm; 27.94 mm diagonal	
ISO Daylight (12232 STD)	Mono 40,000; Color 12,500	Binned: Mono 50,000; Color 12,500
ISO Tungsten (12232 STD)	Mono 125,000; Color 16,000	Binned: Mono 160,000; Color 12,500
Exposure Index	Mono 40,000 - 200,000; Color 12,500 - 64,000	

FRAME RATE CHART

Table provides examples of common resolutions and frame rates. The record times shown are for 256GB RAM at the frame rate shown. Duration will be 1/2 for 128GB and double for 512GB. Binned Mode has Mono Output Only.

Maximum Frame Rate - FPS; (256GB Record time - Sec)						
	TMX-7510		TMX-6410		TMX-5010	
Resolution (H x V)	Standard	Binned	Standard	Binned	Standard	Binned
1280 x 800	76,000 (2.2)		65,940 (2.5)		50,725 (3.3)	
1280 x 640	94,590 (2.2)		81,980 (2.5)		63,060 (3.3)	
1280 x 480	126,500 (2.2)		109,630 (2.5)		84,330 (3.3)	
1280 x 448	134,610 (2.2)		116,660 (2.5)		89,740 (3.3)	
1280 x 384	156,710 (2.2)		135,820 (2.5)		104,470 (3.3)	
1280 x 320	187,500 (2.2)		162,500 (2.5)		125,000 (3.3)	
1280 x 256	233,330 (2.2)		202,220 (2.5)		155,550 (3.3)	
1280 x 192	308,820 (2.2)		267,640 (2.5)		205,880 (3.3)	
640 x 384		308,820 (2.2)		267,640 (2.5)		205,880 (3.3)
1280 x 160	375,000 (2.2)		325,000 (2.5)		250,000 (3.3)	
640 x 320		375,000 (2.2)		325,000 (2.5)		250,000 (3.3)
1280 x 128	456,520 (2.2)		395,650 (2.6)		304,340 (3.4)	
640 x 256		456,520 (2.2)		395,650 (2.6)		304,340 (3.4)
1280 x 96	617,640 (2.2)		535,290 (2.6)		411,760 (3.3)	
640 x 192		617,640 (2.2)		535,290 (2.6)		411,760 (3.3)
1280 x 64	772,050 (2.7)		758,330 (2.7)		583,330 (3.5)	
640 x 128		772,050 (2.7)		758,330 (2.7)		583,330 (3.5)
FAST OPTION						
1280 x 64	875,000 (2.3)		758,330 (2.7)		583,330 (3.5)	
640 x 128		875,000 (2.3)		758,330 (2.7)		583,330 (3.5)
1280 x 32	1,750,000 (2.3)		1,516,660 (2.7)		1,166,660 (3.5)	
640 x 64		1,750,000 (2.3)		1,516,660 (2.7)		1,166,660 (3.5)

*Certain Phantom cameras are held to export licensing standards.
Details available at: www.phantomhighspeed.com/export

CONNECTIVITY & SIGNALS

Ethernet	10Gb and Gigabit standard	
Timecode	IRIG-B modulated and un-modulated	
Port Descriptions	Ethernet	Locking RJ45
	Power	Fischer 3-pin
	Battery back-up	Fischer 3-pin
	VF (View Finder) Power	Hirose 4-pin
	Range Data	Fischer 8-pin
	Remote	Fischer 5-pin
	GPS	Fischer 6-pin
	Capture	Fischer 12-pin
	USB	Yes for WiFi dongle
	Video output	3G-SDI (2 BNCs)
	Dedicated BNC	Trigger, Timecode-in, 3G-SDI
	Programmable I/O BNC	4 ports
I/O Signals	Programmable I/O for Fsync, Strobe, Ready, Timecode-out, Event, Memgate, Pretrigger. Assign and define signals in PCC	
Hardware Trigger	Dedicated BNC, Trigger Button	
Software Trigger	Via PCC over Ethernet	
Synchronization	External Sync via FSync or IRIG Timecode	
Recording Features	Burst mode, Continuous recording & AutoSave to CineMag	
Video Output	3G-SDI	
Accessory Power	4-pin Hirose for 12V monitors up to 1 Amp	



TMX Back Panel

CONTROL

Software & OS	Phantom PCC (Windows); SDK available for C++, C#, MatLab and LabView
On-camera Controls	Standard Feature. Access menu system with encoder, viewed on video monitor. Buttons for trigger, play and save
Primary File Format	Phantom Cine RAW (.cine)
Alternative File Formats	Easily convert to formats including .mp4, Apple ProRes .mov, .avi, Tiff, JPG, PNG and many more using PCC. Cine files are directly compatible with many major video editing and motion analysis programs
Highlighted Software Features	Integrated Data Acquisition (NI-DAQ), DIC Calibration Support with Sync-Snapshot menu, Continuous recording, Image Processing

MEMORY & STORAGE

RAM Buffer	128GB, 256GB, 512GB RAM options
Multi-Cine	Up to 511 Partitions
Non-Volatile Media	Phantom CineMag V optional. Supports auto-save, direct record and video playback.
Media Transfer Rates	2TB CineMag V = 1,000 Mpx/sec 8TB CineMag V = 1,200 Mpx/sec

MECHANICAL

Housing Variants	CineMag and non-CineMag compatible variants
Size (Without Handle)	Non-CineMag: 7 x 7 x 11.7" (17.8 x 17.8 x 29.7 cm) CineMag: 7 x 7.4 x 11.7" (17.8 x 18.6 x 29.7 cm)
Weight	20 lbs (9.1 kg)
Lens Mounts	F-Mount standard (aperture support for Nikon G-style lenses). Also available: Canon EF (with electronic focus and iris control), C-mount, M42-Mount
Mounting Points	2 (4 total) on the bottom, 2 (4 total) on side, 4 (8 total) on handle
Internal Shutter	Standard, for remote black references
Cooling	Active cooling. Quiet mode disables fans during capture

GLOBAL SUPPORT NETWORK

The Phantom TMX product line is supported by Vision Research's Global Service and Support network, offering PhantomCare Performance Services from multiple sites around the globe. Maximize the value of your Phantom camera with a selection of professional services from which to choose.

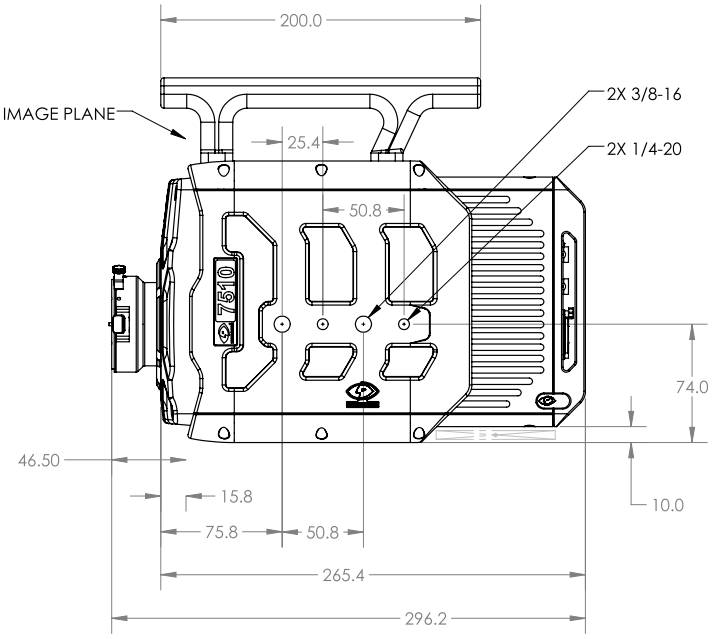
Learn more about our service offering at
www.phantomhighspeed.com/Service-Support

POWER

AC Power	100-240 VAC, 400W power supply included
Voltage Range	20-28VDC Primary and Secondary
Power Consumption	325W typical, 395W maximum with accessories (Max frame rate, CineMag, View Finder, Remote)

ENVIRONMENTAL

Operating Temperature	-10 to +50°C
Storage Temperature	-20 to +70°C
Operational Shock	MIL-STD-202H Method 213-B. Rated 30G; sawtooth wave, 11ms, +/- 10 pulses all axes
Operational Vibration	MIL-STD-202H Method 214-i; Test Condition A. Rated 5.3 Grms; 15 min/axis
Regulatory	Made in the USA CE Emissions – CE Compliant EN 61326-1 CE Immunity – CE Compliant EN 61326-1 FCC – CFR 47, Part 15, Subpart B & ICES-0003, Class A KC Emissions – KC Compliant KN32 KC Immunity – KC Compliant KN35 Safety - IEC 60950-1



ABOUT VISION RESEARCH

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.

VISION RESEARCH

AMETEK® MATERIALS ANALYSIS DIVISION

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