



2021

# *i-SPEED<sup>®</sup> 7 SERIES*

THE NEXT GENERATION



**THE FASTEST JUST GOT FASTER**

2.45 MILLION FRAMES PER SECOND CAN'T BE WRONG

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# *i-SPEED® 7 SERIES*

THE NEXT GENERATION

**THE FASTEST JUST GOT FASTER**

2.45 MILLION FRAMES PER SECOND CAN'T BE WRONG

## *i-SPEED® 717*

17GP/s throughput

2072 x 1536 @ 5,315 fps

1920 x 1080 @ 7,960 fps

## *i-SPEED® 721*

21GP/s throughput

2072 x 1536 @ 6,642 fps

1920 x 1080 @ 9,944 fps

## *i-SPEED® 727*

27.1GP/s throughput

2072 x 1536 @ 8,512 fps

1920 x 1080 @ 12,742 fps

### SHARED FEATURES & OPTIONS

- 3.2MP AST CMOS sensor
- 2072 x 1536 resolution
- 13.5µm pixel size
- Up to 2.45 million fps max speed \*
- Mono 16000 – ISO expandable to 125000
- Color 4000 – ISO expandable to 32000
- Up to 2TB internal SSD
- Up to 2TB external xSSD
- Electromechanical shutter
- Synchronized Integrated Lighting Control †
- Video Trigger
- Direct Connect Rear Panel
- Rugged High-G Rated body
- Removable handle
- Mounting points for accessories
- 2 Internal batteries
- Control Display Unit (CDUe)
- Model Upgrade Program

\* Export restricted † Patent Pending



# Bigger. Brighter. Faster.

## Next Generation Ultra High-Speed AST CMOS Sensor

Introducing iX Cameras next generation  
Advanced Sensor Technology 3.2MP AST CMOS  
sensor with high sensitivity & high resolution  
to **Experience the Invisible.**<sup>™</sup>

iX Cameras designs and develops its own state-of-the-art proprietary sensors, launching the Advanced Sensor Technology (AST) initiative in 2018 with the 2.1MP, 1920 x 1080 Full HD resolution AST CMOS sensor used in their i-SPEED® 5 Series of mid-range high-speed video cameras.

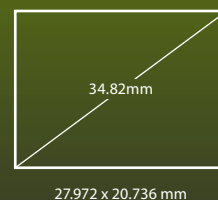
The next generation i-SPEED 7 Series cameras feature the new 3.2MP, 2072 x 1536 2K resolution AST CMOS sensor with increased light sensitivity, enhanced image clarity, proprietary black level control for deeper blacks & low noise, and ultra high resolution at speeds that reach 2.45 million frames per second and up to 27.1 gigapixels per second throughput.

The 27.1GP/s raw throughput rate is the fastest in the industry. No spatial or temporal interpolation – just raw speed with a blazingly fast 168ns shutter time. The AST sensor features a 13.5µm pixel size – perfectly optimized for the proper balance between high resolution for image clarity and exceptional light sensitivity normally found only with larger pixels. The next generation AST CMOS sensor provides high quality images for accurate analysis with its industry leading speed & sensitivity.



### SENSOR HIGHLIGHTS

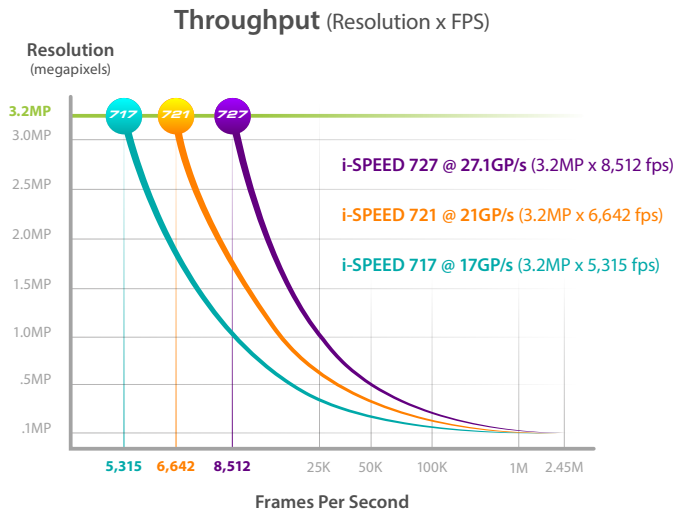
- 3.2MP AST CMOS sensor
- 2072 x 1536 resolution
- 13.5µm pixel size
- 27.1GP/s throughput
- Optimized full well capacity
- Full 12-bit dynamic range
- Dynamic pixel control
- New sensor drive engine
- Exceptional light sensitivity



# Features that Redefine Ultra High-Speed Performance

## New! Unparalleled Throughput

The next generation **i-SPEED<sup>®</sup> 7 Series 717, 721 & 727** models raise the bar with 2072 x 1536 resolution – increasing throughput speeds up to 27.1 gigapixels per second – that's 27.1 billion pixels processed every second and at even higher frame speeds than before. The balance between resolution and frame rate produces amazingly clear images at impressive resolutions – critical for accurate motion analysis.



*i-SPEED<sup>®</sup>*  
Software Suite 2.0



*i-SPEED Control One  
& Control Multi-DAQ*  
**SILC**



## New! Synchronized Integrated Lighting Control\*

The i-SPEED Software Suite 2.0 Control One & Control Multi-DAQ includes the new **Synchronized Integrated Lighting Control (SILC)** – allowing you to accurately control external lighting independent of the camera's exposure duration. The SILC features three modes for you to set up a single pulse per frame, a double pulse per frame, or change the pulse duration on alternating frames. This feature is ideal for LED and PIV laser illumination where the timing of the light in relation to the exposure can be precisely controlled. Delay, duration, and relative position for each pulse can be defined, allowing for superior lighting control and advanced camera synchronization – the possibilities are endless.

\* Patent Pending

## New! Electromechanical Shutter

Continuing the tradition of developing easy-to-use cameras, iX Cameras added an optional **electromechanical shutter** to the next generation i-SPEED 7 Series. This new feature enables remote reference, automated calibration, and sensor protection during lens changes. The electromechanical shutter makes the next generation i-SPEED 7 Series **ideal for field work** where the camera is at a distance from the user and for DIC & PIV applications where the camera must not be moved after a calibration frame.



## New! Direct Connect Rear Panel Layout

The rear panel of the next generation i-SPEED 7 Series features a new layout with more BNC connections to eliminate the feature lead. The Trigger, Sync IN/OUT and Exposure OUT ports are now conveniently located on the rear panel. Exposure OUT doubles its capacity by handling the new Synchronized Integrated Lighting Control (SILC).



**Better Gear. Better Results.** We've got the gear you need to get the job done right.





## New! Rugged High-G Rated Body Design

The next generation i-SPEED 7 Series rugged design features a **High-G rated two-piece aluminum enclosure** for exceptional protection in the lab and in challenging field environments. The redesigned all aluminum enclosure includes a **removable handle** to provide greater flexibility when mounting the camera to a static frame and in tight spaces. Removing the handle exposes two of four mounting points to facilitate the connection of accessories such as the new CDUE, lights, booms, & more.

## Up to 2TB Internal SSD Storage

Recording at high speeds and high resolutions produces huge amounts of data for your research. The next generation i-SPEED 7 Series cameras can be configured with up to 2TB of internal SSD storage to handle the job. Quickly and seamlessly transfer data from the camera's internal RAM to secure, non-volatile SSD for subsequent analysis – all without touching the camera. Greater storage capacity allows you to store more recordings and conduct tests in rapid succession without taking the time to offload your data.

## Don't Stop – Just Swap

Swappable SSD technology allows you to transfer high resolution images and video files between the i-SPEED 7 Series and your computer. The external solid state drive xSSD memory cartridges are available in 250GB, 500GB, 1TB, and 2TB capacities – the ideal solution for secure, non-volatile storage of large image & video files without interrupting your video capture process.



## i-SPEED 7 SERIES THE NEXT GENERATION

### Revolutionary CDUE for Complete Camera Control

The industry unique **CDUE** (control display unit) makes operating the camera quick, intuitive, and portable. The CDUE easily allows you to frame your field of view, set resolution, frame rate and shutter speed, record and review with the touch of a finger. Combine the CDUE with battery option for the camera and take your system to the field without the need of a laptop or power supply.



### Unplug & Go with Internal Batteries

The optional battery set adds to the portability of the next generation i-SPEED 7 Series camera, providing a one-hour charge and can be swapped with another set for extended use. Data security is essential when tests are difficult to repeat or where the threat of power loss exists. Ensure that your video will be secure and intact with internal batteries that engage as soon as external power is lost.



### i-CHEQ Status Monitoring

Monitor your camera's status at a glance and in real-time with i-CHEQ 360. View in-camera details for single or multiple camera setups with Remote i-CHEQ, part of the **i-SPEED Software Suite 2.0**. Understand your camera's exact status using the three variable color lights on the front of the camera and mirrored inside the control software.

### Real-Time Health Monitor

Observe the camera's internal condition and external environment. Use Quiet Mode to turn off fans and prevent vibration in microscopic applications. Monitor battery status, voltage information, fan speed, and camera temperature.

Battery	Present	
AC Lead	Present	Present
Battery	Present	Present
Charging	Present	Present
Charge	96%	97%
Voltage / Current	0.00 V / 0.00 A	0.00 V / 0.00 A
Cycles	0	0
Maximum Error	0	0
Calibration	Required	Required
Time Rem. (min)	1:07	1:09

# Performance & Frame Rates

## Upgrade Path Between Three Models

The next generation **i-SPEED 717** with 17GP/s throughput, the **i-SPEED 721** with 21GP/s throughput, & the **i-SPEED 727** with 27.1GP/s throughput have been designed for easy upgrades between models as performance or application requirements increase. Add additional memory and options such as xSSD storage or upgrade to a higher performance model.



## Frame Rates, Resolutions & Recording Durations to RAM

The next generation i-SPEED 7 Series models are configured with 36GB RAM and can be upgraded to 72GB, 96GB, 144GB or 288GB. More memory is ideal for long recordings and when using multiple buffers for your research. The internal memory may be allocated as a single buffer or divided up to 16 separate buffers, allowing for multiple recordings without pausing to save between recording sessions.

The i-SPEED 7 Series models share recording duration results at frame rates up to 5,315 fps. The optimal frame rates and recording times at 2K resolution and FHD (full high-definition) resolution for each camera model are highlighted in the chart below.

Frame Rates & Resolution					Maximum Recording Time to RAM (seconds)														
i-SPEED 7 Series	FPS	Resolution			36GB			72GB			96GB			144GB			288GB		
		717	721	727	717	721	727	717	721	727	717	721	727	717	721	727	717	721	727
	1,000	2072 x 1536			8.1	16.2			21.6	32.4			64.8						
	2,000	2072 x 1536			4.0	8.1			10.8	16.2			32.4						
	5,000	2072 x 1536			1.6	3.2			4.3	6.5			13.0						
717 @ 2K ▶	5,315	2072 x 1536			1.5	3.0			4.1	6.1			12.2						
721 @ 2K ▶	6,642	2072 x 1536			1.2	2.4			3.2	4.9			9.7						
	7,500	1736 x 1284	1969 x 1428	2072 x 1536	1.5	1.2	1.1	3.1	2.5	2.2	4.1	3.3	2.9	6.2	4.9	4.3	12.3	9.8	8.6
717 @ FHD ▶	7,960	1920 x 1080			1.5	3.1			4.1	6.1			12.2						
727 @ 2K ▶	8,512	2072 x 1536			1.0	1.9			2.5	3.8			7.6						
721 @ FHD ▶	9,944	1920 x 1080			1.2	2.4			3.3	4.9			9.8						
	10,000	1512 x 1098	1680 x 1242	1920 x 1374	1.6	1.2	1.0	3.1	2.5	1.9	4.1	3.3	2.5	6.2	4.9	3.8	12.4	9.9	7.6
727 @ FHD ▶	12,742	1920 x 1080			1.0	1.9			2.5	3.8			7.6						
	15,000	1232 x 888	1344 x 1008	1568 x 1134	1.6	1.3	1.0	3.1	2.5	1.9	4.2	3.4	3.4	6.3	5.1	3.9	12.6	10.1	7.7
	20,000	1064 x 762	1176 x 864	1344 x 960	1.6	1.3	1.0	3.2	2.5	2.0	4.2	3.4	3.4	6.4	5.1	4.0	12.7	10.1	8.0
	30,000	840 x 624	952 x 696	1064 x 798	1.6	1.3	1.0	3.3	2.6	2.0	4.4	3.5	3.5	6.6	5.2	4.0	13.1	10.4	8.1
	50,000	672 x 546	840 x 462	840 x 606	1.7	1.3	1.0	3.4	2.7	2.0	4.5	3.5	3.5	6.7	5.3	4.0	13.4	10.6	8.1
	100,000	672 x 216	840 x 216	840 x 294	1.8	1.4	1.0	3.5	2.8	2.1	4.7	3.8	3.8	7.1	5.7	4.2	14.2	11.4	8.3
	200,000	672 x 96	840 x 96	840 x 134	2.0	1.6	1.1	4.0	3.2	2.2	5.3	4.3	4.3	8.0	6.4	4.4	16.0	12.8	8.9
	500,000	672 x 24	672 x 42	672 x 54	3.2	1.8	1.4	6.4	3.7	2.8	8.5	4.9	4.9	12.8	7.3	5.7	25.6	14.6	11.4
	750,000	448 x 24	448 x 36	672 x 30	3.2	2.1	1.7	6.4	4.3	3.4	8.5	5.7	5.7	12.8	8.5	6.8	25.6	17.0	13.6
	1,000,000	336 x 24	448 x 24	560 x 24	3.2	2.4	1.9	6.4	4.8	3.8	8.5	6.4	6.4	12.8	9.6	7.7	25.6	19.2	15.3
	2,450,000	280 x 12			3.1	6.3			8.3	12.5			25.0						

Additional resolutions & speeds available on request. Cameras with frame rates higher than 225,000 fps are optional. Specifications subject to change.



# Tech Specs

## IMAGER

Sensor Type	Custom AST CMOS
Sensor Resolution	2072 x 1536 pixels
Sensor Size	27.972 x 20.736 mm
Sensor Diagonal	34.82mm
Pixel Size	13.5µm
Bit Depth	12-bit (36-bit color)
Sensitivity (gain)	Mono: 16000 native – ISO expandable to 125000 Color: 4000 native – ISO expandable to 32000
Frame Rate	225,000 fps standard
optional frame rates	1,000,000 fps* 2,450,000 fps* maximum
Shutter Type	Global exposure
Shutter Integration Time	1µs minimum standard
optional fast modes	168ns* @ 2.45M fps 277ns* @ 1M fps
WDR	Wide Dynamic Range

## SYNCHRONIZATION & CAPTURE

Trigger	TTL T0 to 0–100%
Trigger Modes <sup>1</sup>	Circular, ROC, BROCC
Sync	10Hz–350kHz
Luminance Histogram	Iris & light assistance
I-CHEQ 360	Camera status LEDs
I-Focus	Focusing & depth of field information
I-Expose	High/low exposure highlight
Control	PC or CDUE
IRIG Input	IRIG-B to sub 1µs
Internal Memory	36GB standard, configurable to 288GB

## CONNECTIVITY

Video Outputs	HD-SDI, HDMI
USB	USB-A
Network	1Gb Ethernet port using RJ-45 connector
Video Formats <sup>2</sup>	IXV, AVI (compressed or uncompressed)
Image Sequence Formats	TIFF, JPG, RAW
Ethernet Control	1Gb
Remote Control	Via supplied software

## PC SOFTWARE

Standard Control	i-SPEED <sup>®</sup> Control ONE
Premium Control	i-SPEED <sup>®</sup> Control MULTI-DAQ
Editing	i-SPEED <sup>®</sup> Movie Maker
Analysis	Xcitex ProAnalyst <sup>®</sup> Lite
Viewer	i-SPEED <sup>®</sup> Viewer
Software Developers Kit	C++
Synchronized Data Acquisition	USB DAQ, 8 options
Language	Local language (where available)

## PHYSICAL & ENVIRONMENTAL

Dimensions (WHL)	14.75 x 6.0 x 5.75 in (374 x 150 x 143.5 mm)
Weight (with batteries)	18.7 lb (8.5 kg)
Input Voltage	12–36V
Power Consumption	150W nominal, 200W maximum
Mounting	1/4–20 & 3/8–16 tripod plate
Battery	2x 14.4V 90Wh
Battery Life	1 hour (with both batteries installed)
Lens Mount	Custom, swappable lens plate
EMC	EN55032-A, EN55024
Safety	BS EN61010-1 (camera), IEC60950 (PSU)
CE Marking	EMC Directive (camera), EMC Directive, LV Directive (PSU)
Lead Free	RoHS Directive
WEEE	Compliant
IP Rating	IP 20
Temperature	Operation: -14 <sup>†</sup> to 122° F (-10 <sup>†</sup> to 50° C) Storage: -4 to 140° F (-20 to 60° C)
Pressure	71 to 106 kPa
Relative Humidity	95% at 104° F non-condensing
G-Shock	30 G @ 11 ms IEC 68-2-27 Ea, 30 G @ 2 ms IEC 68-2-29 Eb
Power Input Connector	LEMO 6-Pin
Trigger Input	BNC 75 Ω
I/O Connector	LEMO 10-Pin, 12V, Remote Power, IRIG-IN, GPIO 0, 1, GPI 2, Trigger In

## PURCHASING OPTIONS

CDUE	Portable touchscreen controller display unit
Sensor	Mono or Color
Memory	36GB standard, 72GB, 96GB, 144GB, 192GB or 288GB
Optional Frame Rates	1,000,000 fps* 2,450,000 fps* maximum
Shutter Integration Time	1µs standard 277ns* @ 1M fps 168ns* @ 2.45M fps
Internal SSD	500GB, 1TB or 2TB available
External xSSD	250GB, 500GB, 1TB or 2TB available
Lens Mounts	Nikkor D F mount with or without shutter, Nikkor G F mount with or without shutter, C mount & Canon EF mount
Warranty	two-year limited warranty, up to three years coverage available
Internal Batteries	Set of 2 batteries

\* Export restricted.

<sup>†</sup> Cameras must be powered on above 32° F (0° C) and can operate down to -14° F (-10° C).

1 Select from three trigger modes:

**Normal** – camera is triggered manually or with software.

**ROC** (Record on Command) – press trigger to record, release to stop.

**BROC** (Burst Record on Command) – allows you to set the number of frames to be recorded during the burst. The trigger can be pressed multiple times until the memory buffer is full.

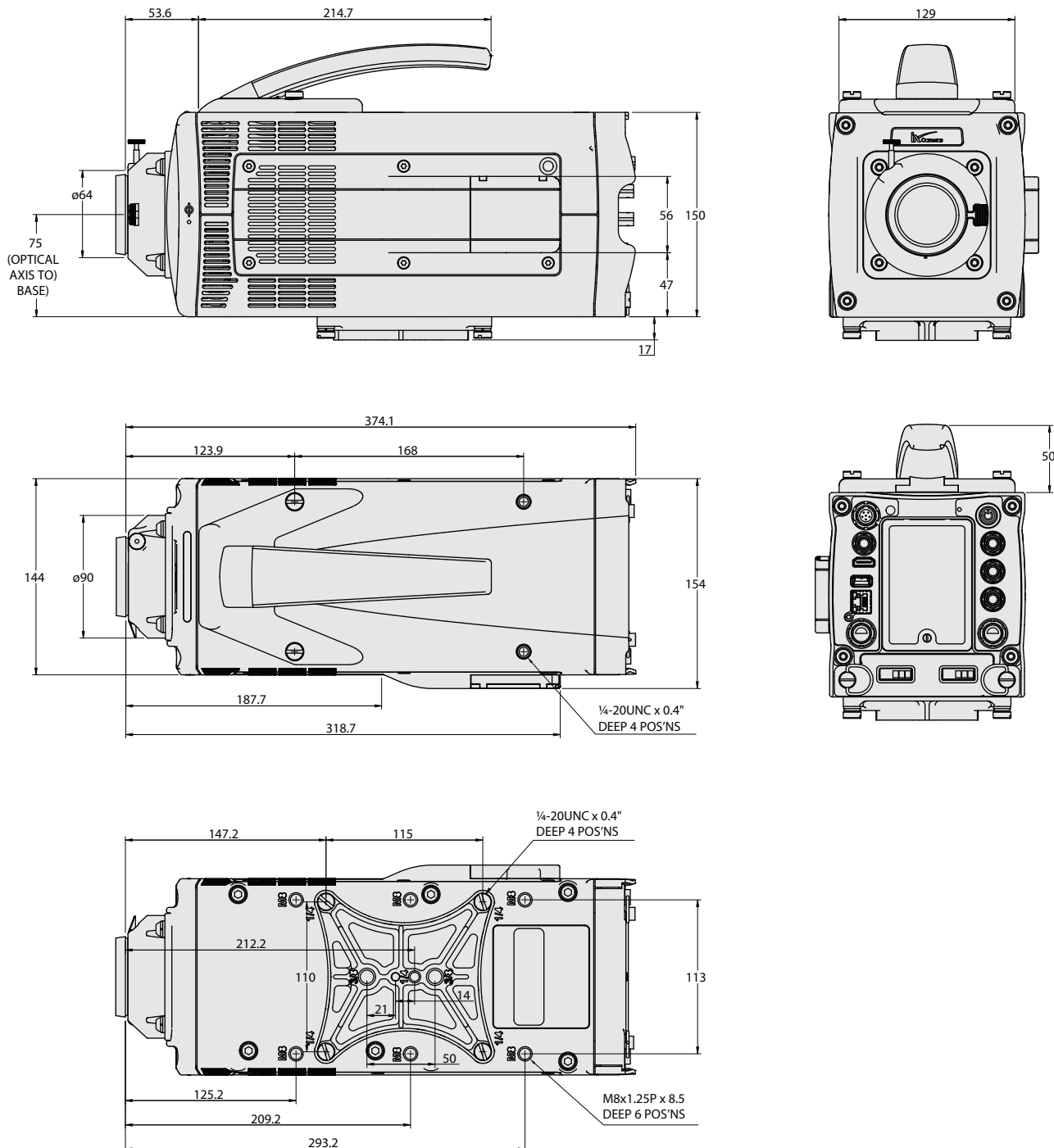
2 The **IXV format** is a proprietary video format allowing greater control over bit depth and processing, but is only readable with i-SPEED Viewer software.

# iX Cameras Shares its CAD Models

The next generation i-SPEED® 7 Series camera is a critical component in your ultra high-speed imaging solution... and you might want to accessorize it to get the job done right.

Commercially available accessories can fulfill most requirements, but some situations require a bit extra. This may be a simple bracket to mount an accessory to the camera or a complex, full OEM system integration. Whatever your requirement, accurate and complete interface data is a must. iX Cameras provides open access to CAD model data to help you get your job done right.

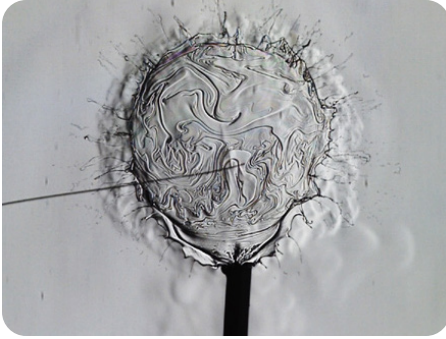
For more information visit: [https://ix-cameras.com/high-speed\\_camera\\_support/high-speed\\_camera\\_CAD\\_models.php](https://ix-cameras.com/high-speed_camera_support/high-speed_camera_CAD_models.php)





# Up to 2.45 Million FPS Can't Be Wrong – for any Application

The next generation i-SPEED® 7 Series ultra high-speed cameras with the new AST CMOS sensor are the perfect imaging solution for capturing ultra high-speed events in the lab and on the test range. Record your research with confidence and without compromising high resolution at high recording speeds.



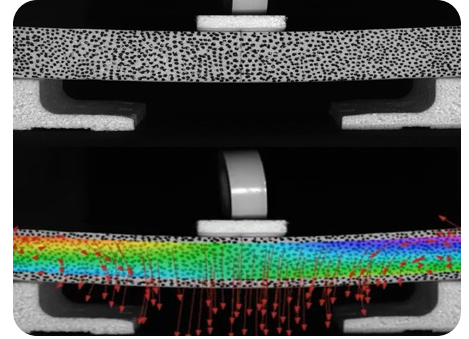
## Fluid Dynamics

Combine high resolution with integrated lighting control for perfect capture of fluids with zero motion blur.



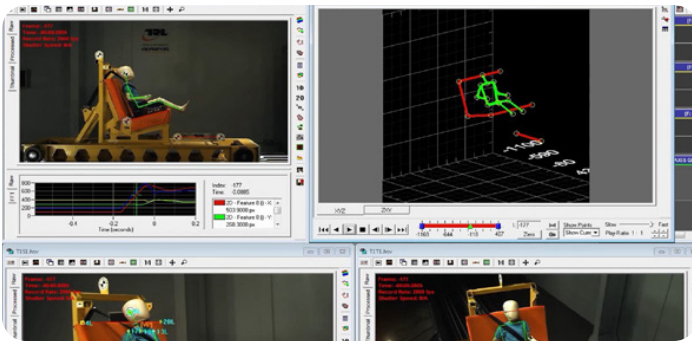
## Ballistics

Industry leading bullet stopping speed with ground breaking 2K resolution – 2072 x 1536 pixels up to 27.1GP/s throughput.



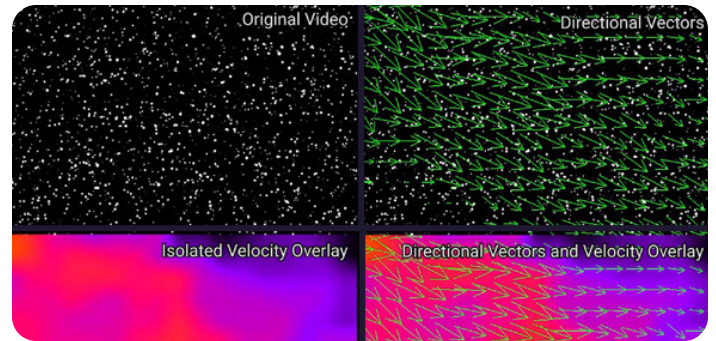
## Digital Image Correlation (DIC)

The next generation AST CMOS high resolution sensor enables small particle correlation with zero interpolation for DIC research.



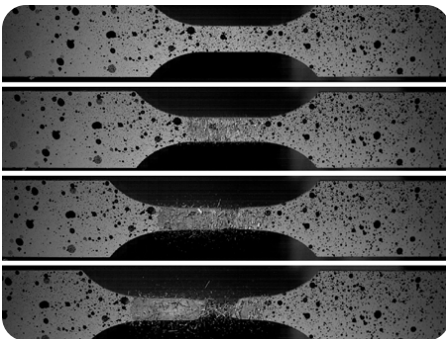
## Motion Analysis

The high-speed, high resolution & high dynamic range of the next generation i-SPEED 7 Series allows for perfect 2D & 3D analysis.



## Particle Image Velocimetry (PIV)

The next generation AST CMOS sensor with 13.5µm pixel size – perfectly optimized for PIV applications, delivering high-speed, high resolution & sensitivity.



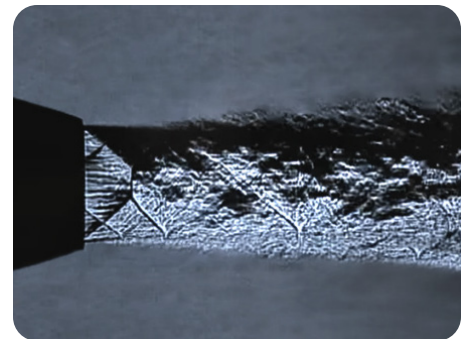
## Scientific Research

Confidently complete extreme tests with the feature-rich, next generation i-SPEED 7 Series ultra high-speed video cameras.



## Fragmentation

Built tough for extreme environments – the next generation i-SPEED 7 Series rugged High-G Rated body is built from a solid billet of aluminum for exceptional protection.



## High-Speed Schlieren

Excel with traditional mirror & modern digital techniques with the high sensitivity & resolution of the next generation AST CMOS sensor.

Photo credit: Dr. Charles E. Tinney, Research Scientist, Applied Research Laboratories, The University of Texas at Austin



**Better Gear. Better Results.** We've got the gear you need to get the job done right.





# i-SPEED® Software Suite 2.0

Our cameras set us ahead.  
Our software sets us apart.



**Experience** unparalleled features and the most complete set of functions to control your next generation i-SPEED 7 Series camera via ultra-fast Gigabit Ethernet. Load & control single and multiple camera configurations or connect remotely for uninterrupted access to restricted areas. Available in standard or premium versions for PC laptop, desktop or the optional CDUe (control display unit).

## Two levels to suit your application requirements:

- **Standard:** includes **Control One** to control a single camera, **Xcitex ProAnalyst® LITE** for analyzing data and **Viewer** for viewing & sharing videos from a PC or CDUe.
- **Premium:** includes **Control Multi-DAQ** to control multiple cameras and synchronize with data acquisition devices, **Movie Maker** for editing, **Xcitex ProAnalyst®** for analyzing data and **Viewer** for viewing & sharing videos.



## New Features!

**Video Trigger** – The latest feature of the i-SPEED Software Suite 2.0 lets you define trigger levels in manual mode or choose auto mode and have the software calibrate trigger levels for you. A real-time track mode has been added for triggering the camera in a dynamically changing environment such as cloud cover.

**Synchronized Integrated Lighting Control (SILC)\*** – Control One & Control Multi-DAQ include the new SILC – allowing you to accurately control external lighting independent of the camera's exposure duration. SILC features three modes, allowing you to set up a single pulse per frame, a double pulse per frame, or change the pulse duration on alternating frames. Delay, duration, and relative position for each pulse can be defined, allowing for superior lighting control and advanced camera synchronization.

**Local Languages** – The i-SPEED Software Suite 2.0 will be available in local languages to accommodate our worldwide customer base.



**Software Development Kit (SDK)** – iX Cameras will provide the SDK kit and the technical support to customize the software to meet your specific application. We'll work with you to integrate program commands into your own software – allowing you full control over functions and features in your next generation i-SPEED 7 Series ultra high-speed video camera.

\* Patent Pending



### i-SPEED Control

#### RECORD

Customized connection with crowd's nest layout window – instantly sync & record with multiple cameras:

- Choose multiple configurations for a single camera
- Quickly configure a new camera & capture settings using the simplified connection control panel



### i-SPEED Movie Maker

#### EDIT

Renderless editing suite with virtually no render lag:

- The world's only editing software designed specifically for high-speed video
- Focuses on frame rate & speed
- Available with Control Multi-DAQ



### Xcitex ProAnalyst®

#### ANALYZE

Your i-SPEED 7 camera becomes a precision measurement device with **Xcitex ProAnalyst®** – the world's most advanced motion analysis software:

- Analyze, graph, and output speed, acceleration, fluid dynamics, PIV & more with optional toolkits
- Available with Control Multi-DAQ



### i-SPEED Viewer

#### SHARE

Play just about anything:

- View & import saved files directly from the camera
- Align & play multiple file types
- Load and control video & playback speed without load times – instantly load & play multi-gigabyte files



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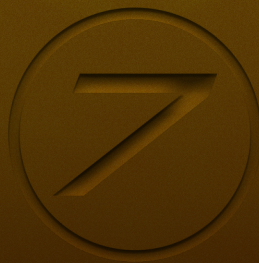
1920 x 1080 @ 9,944 fps

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27.1GP/s throughput

2072 x 1536 @ 8,512 fps

1920 x 1080 @ 12,742 fps



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

**HADLAND®**  
IMAGING

**West Coast**

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phone: 1-408-203-2727  
[www.hadlandimaging.com](http://www.hadlandimaging.com)

**East Coast**

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Butler, NJ 07405  
USA  
phone: 1-862-228-2185

**ix** Cameras

**For more information**

Call **1-888-43HADLAND** (1-888-434-2352) or email [sales@hadlandimaging.com](mailto:sales@hadlandimaging.com)  
about ultra high-speed imaging solutions. ix Cameras on the web: [www.ix-cameras.com](http://www.ix-cameras.com)

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HI-DS-IXCIS7G2-4 03/21