

# CHRONOS 2.1-HD HIGH-SPEED CAMERA

The Chronos 2.1-HD high-speed camera offers an all-in-one, high-definition, high frame-rate solution that empowers data analysis from some of the top R&D and Aerospace facilities, Universities, and Media Producers in the world.

The budget-friendly camera is ideal for a range of applications and measurement techniques such as Vibration Analysis, Schlieren Imaging, and Particle Image Velocimetry (PIV).

Get up and running in minutes with the easy-to-use 5" touchscreen interface and extend the functionality with accessories such as microscope lenses, and high-speed specific lighting.



## MAIN FEATURES

**HD-Resolution:** 1920x1080p @ 1,000FPS (max res)

**High Frame-Rate:** 4/3" format image sensor captures up to 24,046 Frames Per Second (FPS) at lower resolution.

**All-in-One:** Completely standalone, untethered operation with a 5" inch touchscreen display and battery for portability.

**Internal Storage:** 8GB, 16GB, and 32GB RAM memory options allow for 2.7, 5.5, and 11 second recording times. Store footage via the SD card slot.

**Recording Modes:** Standard, Segmented, Running, Gated Burst and Live Slow Motion offer versatile image capture options for dynamic environments.

**Lens Mounting:** Nikon F, Canon EF and C mounts available as field-swappable options

**Color or Monochrome:** High sensitivity ISO 500-8,000 (Color) and 1,000-16,000 (Monochrome) allows filming in dynamic lighting conditions.

**Trigger Options:** I/O ports enable synchronization and remote triggering via cable, sound, and web-triggers.

**Focus Peaking:** Highlights sharp edges for quick and clear focus with zebra lines help define correct exposure.

**API:** Open source, REST-based Application Programming Interface (API) is included for integration into custom software or control environments.

## RESOLUTION/FRAME-RATE

| CHRONOS 2.1-HD<br>RESOLUTION | MAX FPS | RECORD TIME (seconds) |       |       |
|------------------------------|---------|-----------------------|-------|-------|
|                              |         | 8 GB                  | 16 GB | 32 GB |
| 1920 x 1080                  | 1,000   | 2.76                  | 5.51  | 11.02 |
| 1920 x 512                   | 2,095   | 2.78                  | 5.55  | 11.11 |
| 1440 x 1080                  | 1,434   | 2.56                  | 5.12  | 10.25 |
| 1440 x 720                   | 2,142   | 2.57                  | 5.14  | 10.29 |
| 1280 x 1024                  | 1,512   | 2.88                  | 5.77  | 11.55 |
| 1280 x 720                   | 2,142   | 2.90                  | 5.79  | 11.59 |
| 1024 x 768                   | 2,531   | 2.88                  | 5.75  | 11.50 |
| 1024 x 576                   | 3,358   | 2.89                  | 5.77  | 11.55 |
| 800 x 600                    | 4,352   | 2.73                  | 5.47  | 10.94 |
| 640 x 240                    | 10,488  | 3.54                  | 7.07  | 14.14 |
| 640 x 96                     | 24,046  | 3.87                  | 7.74  | 15.49 |

## DIMENSIONS/WEIGHT

**Lens mount:** CS/C mount (provided). Nikon F-C and Canon EF-C Adapters (optional)

**Length:** 96mm/3.78"

**Width:** 67.3mm/2.65"

**Height:** 155mm/6.11"

**Weight:** 1.06 kg  
(2.34 lbs) without lens

**Image Sensor:** 4/3"

**Battery:** EN-EL4a



# CAMERA SPECIFICATIONS - CHRONOS 2.1-HD HIGH-SPEED CAMERA

| CAMERA                   |                                                                                                                                                                                                                 |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Imaging                  | 1920x1080 @ 1000FPS                                                                                                                                                                                             |
| Memory                   | 8GB, 16GB, or 32GB                                                                                                                                                                                              |
| Record Time (in seconds) | 2.7 (8GB), 5.5 (16GB), 11 (32GB) at max resolution                                                                                                                                                              |
| Lens Mount               | CS/C mount (options available)                                                                                                                                                                                  |
| Backfocus                | Field adjustable                                                                                                                                                                                                |
| IR Filter                | 650nm, user removable, 24 x 16 x 1.1mm                                                                                                                                                                          |
| Display                  | 5" 800x480 capacitive touchscreen, 1000 nit daylight visible                                                                                                                                                    |
| Enclosure                | Anodized CNC machined aluminum                                                                                                                                                                                  |
| Cooling                  | Active cooling, variable-speed fan (fan-off option)                                                                                                                                                             |
| Dimensions               | 155mm x 96mm x 67.3mm (6.11" x 3.78" x 2.65") w/o lens                                                                                                                                                          |
| Weight                   | 1.06 kg (2.34 lbs) without lens                                                                                                                                                                                 |
| VIDEO FORMATS            |                                                                                                                                                                                                                 |
| H.264                    | Standardized MP4 files at bitrates up to 60Mbps                                                                                                                                                                 |
| Cinema DNG Raw           | Standard Adobe CinemaDNG raw files                                                                                                                                                                              |
| TIFF                     | Standard TIFF raw files with timestamps                                                                                                                                                                         |
| Storage Devices          | SD, USB, SSD, or SMB/NFS network drives                                                                                                                                                                         |
| IMAGE SENSOR             |                                                                                                                                                                                                                 |
| Resolution               | 1920x1080 @ 1000FPS maximum                                                                                                                                                                                     |
| Speed                    | 2.1Gpx/s                                                                                                                                                                                                        |
| Dimensions               | 19.2 x 10.8mm (4/3" format, 2.1-Megapixel, 2x Crop Factor)                                                                                                                                                      |
| Pixel Pitch              | 10um                                                                                                                                                                                                            |
| Sensitivity (ISO)        | Color - ISO 500 to 8000<br>Mono - ISO 1000 to 16000                                                                                                                                                             |
| Shutter                  | Electronic global shutter, 1/fps to 1us (1/1,000,000 s)                                                                                                                                                         |
| Dynamic Range            | 10.3 stops (62.4 dB)                                                                                                                                                                                            |
| Bit Depth                | 12-bit                                                                                                                                                                                                          |
| BATTERY                  |                                                                                                                                                                                                                 |
| Type                     | EN-EL4a                                                                                                                                                                                                         |
| Runtime                  | 1 hour recording                                                                                                                                                                                                |
| Charge Time              | 2 hours (0-80%) with in-camera charger                                                                                                                                                                          |
| INPUTS/OUTPUTS           |                                                                                                                                                                                                                 |
| Power Input              | 17-20V 40W (5.5/2.5mm barrel jack, positive tip)                                                                                                                                                                |
| Network                  | Gigabit Ethernet                                                                                                                                                                                                |
| Trigger                  | 2 trigger inputs/ frame strobe outputs (BNC & Aux)<br>Adjustable input threshold 0 to 6.6V<br>Electrically isolated trigger input (Aux connector)<br>Trigger with sound, laser, and lightning using accessories |
| Video                    | HDMI output 720p or 1080p (default) @ 60FPS, video only                                                                                                                                                         |

| INPUTS/OUTPUTS CONTINUED |                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------|
| USB                      | USB type A (host) and micro-B (device)                                                                                    |
| SATA                     | eSATA 3Gbps to SATA 2.5" III SSD (5V power)                                                                               |
| TRIGGER MODES            |                                                                                                                           |
| End Trigger              | Records until a defined delay after trigger                                                                               |
| Toggle                   | Starts and stops with button press                                                                                        |
| Exposure Trigger         | External signal sets synchronization frame rate                                                                           |
| Shutter Gating           | External signal sets the exposure synchronization and frame-rate                                                          |
| Frame Sync Output        | Outputs a signal indicating its frame rate and exposure                                                                   |
| TRIGGER PORTS            |                                                                                                                           |
| BNC                      | Female BNC connector                                                                                                      |
| AUX                      | Phoenix 1778890 8-pin terminal block connector, including isolated trigger input.                                         |
| SOFTWARE                 |                                                                                                                           |
| Control                  | Through web page or REST interface with USB or CAT ethernet cable                                                         |
| Stream                   | Live or Playback Mode network streaming via RTSP stream and VLC player.                                                   |
| APIs                     | HTTP REST Interface, open-source codebase                                                                                 |
| NETWORK CONTROL          |                                                                                                                           |
| Network Control          | Through web page or REST interface with USB or CAT ethernet cable                                                         |
| RECORDING MODES          |                                                                                                                           |
| Normal                   | Records into the ring buffer. Once a trigger occurs, video can be reviewed and saved.                                     |
| Segmented                | Video memory is divided into segments, each recording as in the Normal mode above. Number of segments is user selectable. |
| Gated Burst              | Frames are captured while trigger is active                                                                               |
| NORMAL SPEED RECORDING   |                                                                                                                           |
| Continuous               | Video is saved continuously at up to 60FPS to MP4 files on removable storage. Operates like a standard video camera.      |
| ASSISTIVE                |                                                                                                                           |
| Focus Aid                | Highlights sharp edges to aid focusing                                                                                    |
| Zebras                   | Rolling diagonal lines indicate clipped (overexposed) areas                                                               |
| Viewfinder Zoom          | Zooms in to allow easier focusing                                                                                         |
| Overlay                  | Displays frame and time information on top of footage                                                                     |
| ENVIRONMENTAL            |                                                                                                                           |
| Operating Temperature    | -20 °C to +40 °C (-4 °F to +104 °F)                                                                                       |