ROSS 5800 Streak Camera System

SYDOR TECHNOLOGIES

COMPLEX MEASUREMENTS—CRITICAL RESULTS

Applications:

- **VISAR - Large format and well focused image boundaries ensure clarity of Interferometric line pattern**
- **Streaked Spectroscopy - Custom coupling to spectrometers for state of the art spectroscopy configurations**
- **Laser Induced Discharge - Photocathode gating provides fast shuttering of unwanted light**
- **Detonics - Rugged in-situ calibration for inaccessible environments**

A streak camera is a powerful scientific instrument used to study ultra-fast phenomena, ideal for high-bandwidth recording of optical events. It efficiently converts fast optical signals to a spatial signal that can be read out with a conventional camera, resulting in a record of the light intensity versus time. They are used to study optical events in the visible spectrum spanning from a single nanosecond to multiple milliseconds.

Streak cameras play a critical role in physics, life sciences, fusion research, and advanced technology industries. The components and systems are delicate and extremely complex to manufacture. Because of the complexities,

Features:

- Simultaneous optimization of temporal and spatial resolution with Sydor exclusive streak tube
- Large format Cathode and Phosphor
- Ultimate sensitivity without using an MCP
- Ultra fast time resolutions below 5ps with >500 data points per image

Sydor is one of the very few worldwide manufacturers of streak cameras, and the leading supplier to critical US and European laboratories.

What is a Streak Camera? Find out more >

ABOUT THE SYDOR ROSS 5800 STREAK CAMERA

The Sydor ROSS 5800 is a large format, modern, fully digital streak system that images a large Cathode onto a phosphor screen, where it is direct imaged by a state-of-the-art CCD camera. It combines a high spatial resolution and time resolution of down to 5ps at the fastest speed, which makes it well suited for applications that need to measure fast events (<< 1ns) over a large aperture (~22mm).

The system pairs a custom streak tube with a low-noise, single photon sensitive readout camera. The large format, high clarity imaging allows more than 500 data points to be captured per image in both axes of time and space. The optional Optical Calibration Module (OCM) allows in- situ streak camera calibration; ideal for systems mounted in a way that makes them difficult to access, harsh shock environments, or systems requiring frequent experimental adjustments. Together, these systems provide unparalleled performance, giving rise to measurements with precision within 1%.

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The ROSS 5800 streak tube has a number of unique properties, including:

- **Dual-slot accelerating electrodes:** Minimizes the space-time astigmatism by tuning the voltages on the slots, allowing the streak tube to focus in both space and time simultaneously, without the typical tradeoff between temporal and spatial resolution.
- **A curved phosphor:** Matches the focal plane curvature, resulting in improved image quality and temporal resolution towards the edges of the active image area.
- **Optimized streak tube magnification:** The 1.2x streak tube magnification has been specifically designed to match the readout camera supplied with the ROSS 5800.

All of Sydor's streak camera systems come with the Sydor ROSSApp software, which is packed with useful features that provide total control and monitoring of the streak camera performance. Users can apply custom scripting for easy automation of repetitive tasks, including post-processing tasks. It is designed with two user role interfaces; one for users and the other for engineering diagnostics. Examples of the ROSSApp real-time image analysis capabilities include fitting, background subtractions and tube distortion corrections. Images are stored in standard formats for direct integration to common image analysis tools. Additional features include software closed-loop voltage stability and graphical based scripting capability for task automation.

Sydor Technologies has experience in developing custom cameras, integrating customer-supplied materials, and providing vacuum-sealed airboxes. Inquire today!

TIMING

- **Time resolution:** <5 ps
- **Repetition rate :** Up to 0.5 Hz
- **Sweep window timing configuration:** Every Sweep window duration is custom, for the best temporal resolution and total data acquisition duration optimized to a customer's experimental timing needs
- **Sweep window ranges:** See separate sweep window configuration diagram for options
- **Trigger jitter:** <25 ps
- **Photocathode gating:** Yes (as standard)
- **Number of sweep speeds per timing board: 4-8** (depending on sweep duration chosen)
- **Trigger signals:** 5V TTL (50 Ohm)

STREAK TUBE FEATURES

- **Number of data points resolvable per image (space axis):** >500
- **Number of data points resolvable per image (time axis):** >500
- **Photocathode materials:** S20B, Low Noise S20, S20 (others possible dependent on spectral response requirements)
- Input windows: Fused Silica, MgF2 or Sapphire
- **Accelerating electrode configuration:** Dual slot electrode architecture gives maximum electron throughput and independent adjustment of electrode voltages gives optimum focal and temporal tuning
- **Tube magnification:** 1.2 (Optimized to pair with the large format CCD)

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- **Phosphor design:** Curved to match curved focal plane
- **Image size on phosphor:** Approximately 27 mm
- **Shielding:** Mu metal shielding (prevents distortions from Earth's magnetic fields)
- **System gain:** >100 CCDe-/photoelectron
- **Dynamic range:** Better than 10,000:1 depending on sweep speeds
- **Static spatial resolution :** >10 LP/mm at better than 70% contrast, with a spatially averaged contrast over the entire image of up to 70%
- **Dynamic spatial resolution:** >10 LP/mm (at up to 70% contrast) at center of the image. Measured at sweep windows in the nanoseconds range
- **Number of sweep speeds per timing board:** 4-8 (depending on sweep duration chosen)
- **Trigger signals:** 5V TTL (50 Ohm)

INPUT OPTIONS AND OPTICS

- **Integrated fiber input (for timing fiducials or similar):** 2 as standard; Periscope design features inputs which do not block the optical path from the input to the cathode
- **Spectrometer options:** Coupling to most spectrometers possible with recommended optional spectrometer interface modules allow precise alignment of spectrometer to streak camera
- **Offner input optics:** As standard the system uses all-reflective optics to minimize chromatic aberrations
- **VISAR Optics:** VISAR Optics available on request
- **Slit adjustment:** Manual or motorized and calibrated adjustment of slit opening (minimum separation 50 µm)
- **Calibration Inputs:** Optional OCM optical calibration module available

READOUT CAMERAS

- **Camera options:** Liquid cooled Scientific CCD
- **Camera resolutions:** 2048 x 2048 or 4096 x 4096 (hardware binning possible to match tube resolutions and increase signal), camera dependent
- **Read noise:** Down to 4e- per pixel (depending on readout settings)
- **Pixel size:** 13.5 um (SI-1900s) or 9 µm (SI-1000)

PC & SOFTWARE

- **Software:** ROSSApp software lifetime license included with system. Controls complete camera system either locally or remotely for acquisition and image processing
- **Calibration features:** Factory generated calibration files included at shipment, plus re-calibration options accessible in software
- **Power:** Standard mains supply (120/240 V)
- **Operating system:** Windows

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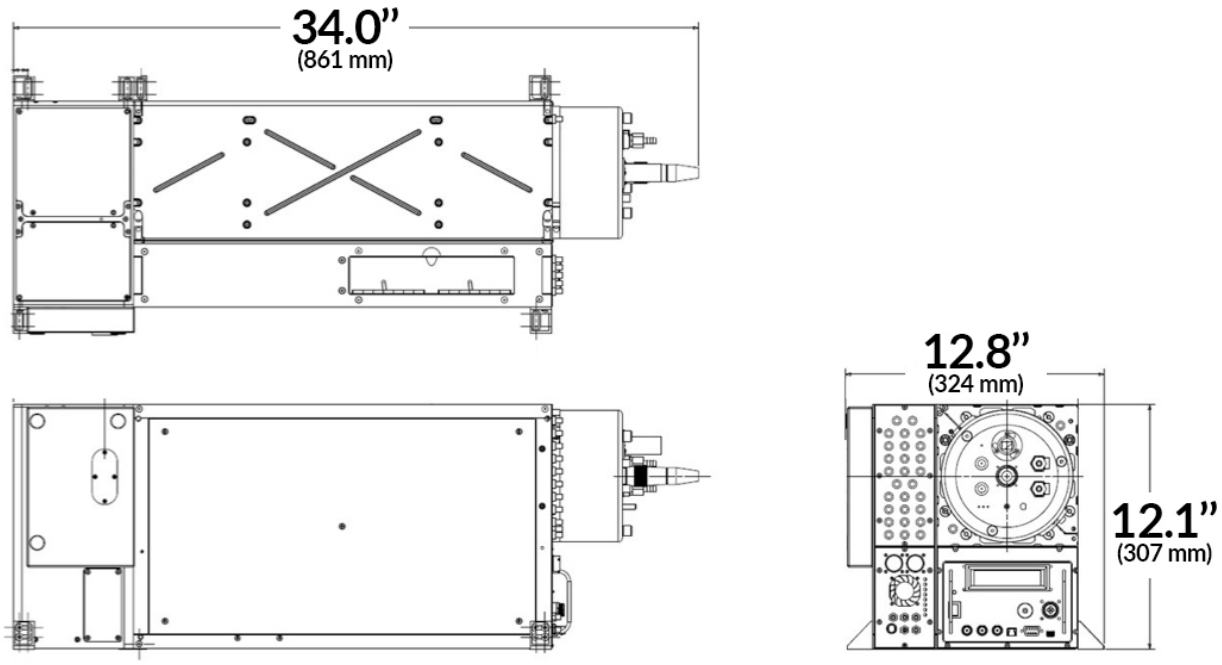
PRODUCT DIMENSIONS (INCHES)



BENEFITS OF WORKING WITH SYDOR TECHNOLOGIES

- Trusted and proven supplier to major US and worldwide labs running critical experiments
- Offer inclusive support from our PhD support staff via telephone and email for the life of the system
- Factory calibration and QA of all systems for ultimate confidence in performance.
- Recommended operating parameters provided with every system
- Annual on-site, hybrid, or remote maintenance plans
- Accessory packages for table-top calibration
- Turnkey VISAR optical systems
- Complete design & integration services

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