FLIR SYSTEMS

The Global Leader in Infrared Cameras

THERMOVISION™
SC4000
SC6000 **HS**
HIGH SPEED SERIES

The **ThermoVision® HS Series** is the premier infrared solution for advanced industrial, scientific and military applications.

> Simultaneous Analog and Digital Data Output

> Adjustable and Triggered Integration Times

> Gigabit Ethernet, Camera Link™ and USB

> Selectable Preset Sequencing

> Integrated IRIG-B Time Stamp

> Optimized for ThermaCAM® RTools and ThermaCAM® Researcher Software

> Compatible with ThermaCAM RTools HSDR and ThermaCAM Researcher HSDR

> On-Board Temperature Calibration Available

ThermoVision HS Series -
Raising the bar for Scientific Infrared Cameras

The ThermoVision High Speed Series cameras are the new standard for advanced industrial, scientific and military thermal imaging and measurement applications. The rugged one-piece design, fast pixel clock and rich feature set in a simplified platform is ideal when flexibility and unequaled performance is vital.

HS Series Features

- **FPA gain modes for low background applications**
- **Adjustable integration times**
- **FPA windowing capability for increased frame rates**
- **Built-in programmable delays**
- **Variety of external synchronization modes**
- **Dynamic range extension with super-framing**
- **SDK available**

High Performance Camera Head

Available with a 320 x 256 or 640 x 512 focal plane array, the HS Series camera line offers unmatched spectral sensitivity in multiple wave bands. Combined with an extremely sensitive detector and high speed readout design the camera provides extraordinary image quality for the most demanding applications.

Multiple Wavebands

The ThermoVision HS series cameras are available in various wavebands to cover imaging applications across the spectrum.

NIR	MWIR	LWIR
VisGaAs/InGaAs	BB InSb / InSb	QWIP
400-1700µm / 900-1700µm	1.5 - 5.0µm / 3 - 5µm	8 - 9.2µm

Working in multiple wavebands becomes simplified with the HS Series cameras, as they operate on a common hardware and software platform.

High Speed Data Output

The HS Series cameras output 14-bit digital data at rates up to 50 Megapixels per second, yielding 125Hz of 640 x 512 / 420Hz of 320 x 256 imagery. For higher speed applications, increased frame rates can be achieved by windowing the focal plane array. The sub-sample window sizes and locations are easily defined using the camera control software.

640 x 512 - 125 fps
496 x 240 - 327 fps
288 x 180 - 651 fps
192 x 100 - 1504 fps
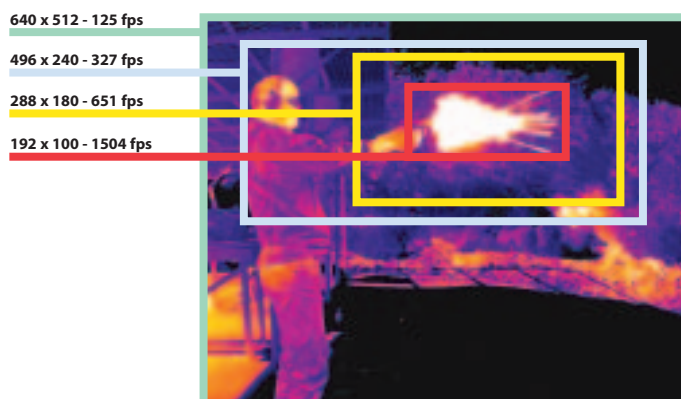
*Example of SC6000 window sizes and corresponding frame rates.*

Advanced FPA Features

The focal plane array (FPA) is the heart of any infrared camera system and a major component of overall system performance. The HS Series systems FPA incorporates FLIR's own proprietary readout technology in the form of a standard CMOS integrated circuit (ROIC). FLIR's ROICs offer many advanced features, including snapshot simultaneous pixel exposure, adjustable gain, variable exposure times, windowing, invert/revert and precise external synchronization.

Independent Digital & Analog Data Streams

The HS Series camera systems have a built-in frame buffer for simultaneous and independent analog and digital output. An example of this capability would be sending corrected imagery to a video monitor while sending uncorrected data to a digital recording system. This capability also works in windowing mode maintaining the analog video output.
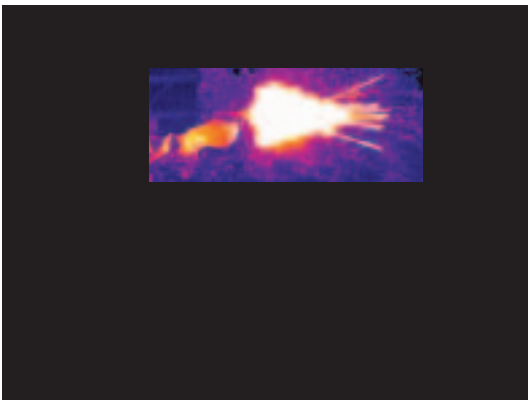
Analog video output in window mode. Image window is surrounded by black edges.

Advanced Synchronization

The HS Series systems have several advance synchronization options:

- **GENLOCK IN** - Synchronize the analog/composite video display to other video sources.
- **SYNC IN** - Synchronize the start of detector integration (exposure), to an external event.
- **INT ACTIVE** - Monitor when the camera integration is active (exposure length).
- **SYNC OUT** - Use the camera as a master to clock an external instrument.
- **IRIG-B** - Synchronize the camera from an IRIG input.

Built-in IRIG-B

With IRIG-B embedded directly into the HS Series systems, each data frame collected is time stamped deterministically to the millisecond. The IRIG-B can also be used as a synchronization source.

Rugged One-piece Mechanical Design

The rugged one-piece design enables operation over a wide range of temperature and environmental conditions.

A Wide Range of Optics

FLIR Systems offers a wide range of optics to support all possible applications ranging from telescopes to microscopes.

Seamless Integration with RTools/HSDR — Researcher/HSDR

The High Speed Data Recorder (HSDR) is a PC-based digital recording system designed to record, display, and analyze images from the HS Series cameras. The HSDR software platform is based upon FLIR's ThermaCAM RTOOLS and ThermaCAM Researcher Software Suites. The HSDR systems can accurately record full camera data rates to removable, nonvolatile storage for up to three hours with zero dropped frames. The system also features real-time image display and analysis during data recording.
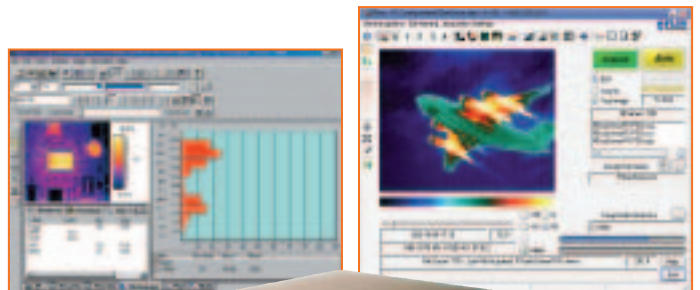
The FLIR ThermaCAM® HSDR

	SC4000 HS-NIR / SC6000 HS-NIR	SC4000 HS-MWIR / SC6000 HS-MWIR	SC4000 HS-LWIR / SC6000 HS-LWIR
Detector Specifications			
Detector	Indium Gallium Arsenide (InGaAs)	Indium Antimonide (InSb)	Gallium Arsenide (GaAs) Quantum Well Infrared Photodetectors(QWIP)
Spectral Range	0.9 - 1.7 µm	3.0 - 5.0 µm	8.0 - 9.2 µm
Broadband Option	0.4 - 1.7 µm (VisGaAs)	1.5 - 5.0 µm	NA
Resolution	320 (H) x 256 (V) / 640 x 512	320 (H) x 256 (V) / 640 x 512	320 (H) x 256 (V) / 640 x 512
Pixel Pitch	30 x 30 / 25 x 25 µm	30 x 30 / 25 x 25 µm	30 x 30 / 25 x 25 µm
Electronics & Data Rate			
Integration Type	Snapshot	Snapshot	Snapshot
Integration Time (Electronic Shutter Speed)	3 µS to full frame time	9 µS to full frame time	9 µS to full frame time
Read-out Modes	Asynchronous Integrate while read Asynchronous Integrate then read Special Integrate then read	Asynchronous Integrate while read Asynchronous Integrate then read	Asynchronous Integrate while read Asynchronous Integrate then read
Dynamic Range	14 bits	14 bits	14 bits
Data Rate	50 MHz	50 MHz	50 MHz
Full Frame Rate	Programmable 1Hz - 420Hz / 1 Hz - 125 Hz	Programmable 1Hz - 420Hz / 1 Hz - 125 Hz	Programmable 1Hz - 420Hz / 1 Hz - 125 Hz
Subwindowing	Yes — user defined	Yes — user defined	Yes — user defined
Minimum Window Size			
Superframing	Yes — up to 4 presets	Yes — up to 4 presets	Yes — up to 4 presets
Preset Sequencing	Yes — up to 4 presets	Yes — up to 4 presets	Yes — up to 4 presets
Performance Specifications			
NEI / NETD	Low Gain: 3E-10W/cm² High Gain: 1.5E-7W/cm²	< 25mK (18mK typical)	< 35mK
Well Capacity	Low Gain: x M electrons / Low Gain: 2.5 M electrons High Gain:.17 K electrons / High Gain: 93 K electrons	18 M electrons / 11 M electrons	18 M electrons / 11 M electrons
Operability	>99.5% >99.8% typical	>99.5% >99.8% typical	>99.5% >99.8% typical
Camera Specifications			
Sensor Assembly f/#	Set by lens iris	f/2.5 standard, f/4.1 optional	f/2.5 standard, f/4.1 optional
Sensor Cooling	Thermoelectric cooler	Stirling closed cycle cooler; optional Liquid Nitrogen (LN₂)	Stirling closed cycle cooler
Lens Mount	C-Mount / Canon FD	Twist-lock Bayonet	Twist-lock Bayonet
Power	24 VDC	24 VDC	24 VDC
Advanced Communication and Data Transfer			
Command and Control	USB, Gigabit Ethernet		
Data	Gigabit Ethernet - Digital Camera Link - Digital Composite (BNC) - Analog		

Lenses - Optionally Available		
InSb Camera Lenses - (3.0 - 5.0 microns)		
Lens Focal Length	**320 x 256 Resolution**	**640 x 512 Resolution**
13 mm	40.5° x 32.9° FoV	63.2° x 52.4° FoV
25 mm	21.7 x 17.5° FoV	35.5° x 28.7° FoV
50 mm	11.0° x 8.8° FoV	18.2° x 14.6° FoV
100 mm	5.5° x 4.4° FoV	9.1° x 7.3° FoV
Dual Field of View 50/250 mmElectronics & Data Rate	50 mm (11° x 8° FoV) 250 mm (2.2° x 1.8° FoV)	50 mm (18.2° x 14.6° FoV) 250 mm (3.7° x 2.9° FoV)
Triple Field of View 60/180/500 mm	60 mm (9.1° x 7.3° FoV) 180 mm (3.1° x 2.4° FoV) 500 mm (1.1° x 0.9° FoV)	60 mm (15.2° x 12.2° FoV) 180 mm (5.1° x 4.1° FoV) 500 mm (1.8° x 1.5° FoV)
Microscope	1x 2.5x 4x	1x 2.5x 4x
QWIP Camera Lenses - QWIP Cameras (8.0 - 9.2 microns)		
Lens Focal Length	**320 x 256 Resolution**	**640 x 512 Resolution**
13 mm	40.5° x 32.9° FoV	63.2° x 52.4° FoV
25 mm	21.7 x 17.5° FoV	35.5° x 28.7° FoV
50 mm	11.0° x 8.8° FoV	18.2° x 14.6° FoV
100 mm	5.5° x 4.4° FoV	9.1° x 7.3° FoV
InGaAs Camera Lenses - InGaAs Cameras (0.9 - 1.7 microns)		
Lens Focal Length	**320 x 256 Resolution**	**640 x 512 Resolution**
8 mm	62° x 51° FoV	On request
16 mm	33° x 27° FoV	On request
25 mm	22° x 17° FoV	25.5 x 28.7
50 mm	11° x 9° FoV	18.2 x 14.6

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View a SC4000/6000 Video at
www.flirthermography.com/hsseries

Made in U.S.A.