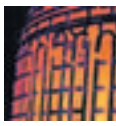
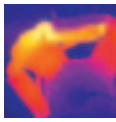
ThermaCAM™ Phoenix

The premier infrared solution for industrial, scientific and military applications





- Extremely sensitive InSb detector
- 320 x 256 FPA for high resolution images
- Broad dynamic range
- High speed data acquisition (up to 40 Mega-Pixels per second)
- Analysis software available

ThermaCAM™ Phoenix - The scientific infrared camera against which all others will be compared

The Phoenix is the perfect choice for any infrared industrial, scientific, non-destructive testing or military application that requires the highest flexibility and performance. The Phoenix features 14-bit extended dynamic range, snapshot exposure mode, high frame rate capability and excellent resolution within a small, rugged package. The Phoenix is a modular system, consisting of a camera head and a signal processing electronics back end, the Real-Time Imaging Electronics (RTIE) or Data Acquisition System (DAS).

Extremely sensitive InSb detector delivers unmatched image quality

Extremely small temperatures are easily detected by the cooled InSb (Indium Antimonide) sensor in the Phoenix. The InSb detector offers extraordinary midwave (3.0 μm - 5.0 μm or 1.5 μm - 5.0 μm options available) imaging performance and provides ultra-precise measurement accuracy and superior image resolution of 320 x 256 pixels.

Advanced CMOS Sensor Design Features

Phoenix infrared sensors are built using FLIR's own standard CMOS readout integrated circuits (ROICs). These ROICs offer many advanced features, including snapshot (simultaneous) pixel exposure, adjustable gain, variable exposure times, windowing, and invert/revert.

Real-time 14-bit digital output and analysis

Utilizing the 14-bit RS-422 digital output connector on the RTIE, the Phoenix can feed continuous digital data at 14.75 megapixels per second into a PC for recording and analysis. The DAS has the ability to take up to 40 megapixels per second of the digital data straight from the camera head into the PC based system for analysis and storage. Both systems are compatible with a wide variety of software packages.

Supported features include:

- windowing capability to allow frame rates greater than 38 kHz
- built-in programmable trigger delays
- adjustable integration time
- a variety of synchronization modes to synchronize the camera to external events

Broad dynamic range

With the Phoenix you can analyze individual frames that cover wide temperature ranges and still be able to detect minute thermal differences.

High-speed data acquisition

The Phoenix has the ability to output extremely high data rates of up to 345 Hz in full frame rate and up to 38 kHz utilizing windowing modes.

Robust design

Designed for severe environments, the camera head offers both conductive and convective cooling for operation over wide ranges of temperature and environmental conditions.

A wide range of accessories

FLIR Systems offers a wide range of optics to support all possible applications ranging from telescopes to microscopes. All Phoenix lenses are interchangeable.

Real-Time Imaging Electronics (RTIE)

The Real-Time Imaging Electronics (RTIE) is a dedicated electronics subsystem that provides both analog and digital video, at data rates up to 14.75 megapixels per second.

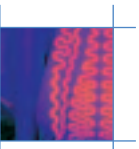
The RTIE furnishes real-time pixel gain and off-set corrections, and generates PAL (NTSC optional), as well as S-Video. The Phoenix employs a "Split" architecture configuration under which the camera head is separated from the electronics by either a 3 or 13 meter interface cable.

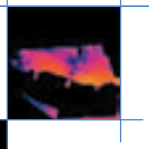
The Phoenix is designed to be remotely controlled through a graphical user interface (GUI) camera control application, running on a user-furnished PC. The Phoenix architecture supports field installation of camera software updates.

DAS Electronics

The DAS includes a proprietary camera interface/sync processor board capable of handling data rates up to a maximum of 40 megapixels per second.

The Phoenix system's "split" architecture configuration allows for 3 or 13 meter separation between camera head and DAS electronics. Synchronization modes, windowing capabilities and triggering features of the RTIE are common to the DAS system. One key difference between RTIE and DAS systems is a provision for two additional read-out channels in the DAS. This enables DAS electronics to capitalize on and extract the maximum performance capabilities of the FPA. Frame rates of 38 kHz are supported.





TECHNICAL SPECIFICATIONS

CAMERA SPECIFICATIONS

Performance Figure of Merit	Noise Equivalent TemperatureDifference (NETD)
Spec Performance	< 25 milliKelvin
Dynamic Range	14 bits
Max Frame Rates with RTIE Electronics	320 x 256: 120 frames per sec in full frame; 13.6 kHZ in smallest window (2 x 64)
Max Frame Rates with DAS Electronics	320 x 256: 345 frames per sec in full frame; 38 kHZ in smallest window (2 x 128)

CAMERA HEAD SPECIFICATIONS

Detector	Indium Antimonide (InSb)
Spectral Range	1.5 - 5.0 microns
Cold Filter Bandpass	3.0 - 5. µm standard
Resolution	320 x 256 pixels
Detector size	30 x 30 µm
Well Capacity	18 M electrons
Integration Type	Snapshot
Integration Time (Electronic shutter speed)	9 µs to full frame time
Sensor Assembly f/#	f/2.5 standard, f/4.1 optional
Sensor Cooling	Stirling closed cycle cooler; optional Liquid Nitrogen (LN_2)
Lens Mount	Bayonet Twist-Lock

Physical specifications

Size (L x W x H)	190.5 mm x 111.8 mm x 132.1 mm (7.5" x 4.4" x 5.2")
Weight	3.2 kg (7 lbs.)
Base Mounting	6.4 mm x 508.0 mm (1/4" x 20" w/guide pin notch)
Thermal Management	Conductive & convective
Operational Temperature	-20°C to +71°C
Operational Altitude	0 to 12.2 km (0 to 40,000 feet)
Shock	20g, 11mS half sine pulse
Vibration	6.7 G RMS random vibe, all 3 axis
Humidity	< 95% Relative Humidity

ELECTRICAL INTERFACE REAL-TIME IMAGAGING ELECTRONICS (RTIE)

Analog Video	PAL (NTSC optional) via BNC connector; S-Video
Digital Video	14-bit parallel, RS-422 compatible
Output Data Rate	14.75 Mpixels/sec
Non-Uniformity Compensation (NUC) Tables	8 non-volatile memory
External Sync Inputs (TTL)	Frame & line sync; composite sync in (GenLock) via BNC
External Sync Outputs (TTL)	Frame & line sync via BNC
External Sync I/O (RS-422)	Same as TTL plus clock out, D-Sub connector
Camera Control	Via standard 9-pin RS-232 serial port and PC-based control program

Physical specifications

Size (L x W x H)	152.4 mm x 152.4 mm x 127 mm (6.0" x 6.0" x 5.0")
Weight	2.7 kg (6 lbs.)
Base Mounting	6.4 mm x 508.0 mm (1/4" x 20" w/guide pin notch)
Thermal Management	Conductive & Convective
Operational Temperature	-20°C to +71°C
Operational Altitude	0 to 12.2 km (0 tot 40,000 feet)
Shock	20g, 11 mS half sine pulse
Vibration	6.7 G RMS random vibe, all 3 axis
Humidity	< 95% Relative Humidity

ELECTRICAL INTERFACE DIGITAL ACQUISITION SYSTEM (DAS)

Analog Video	DAS furnishes digital video only, via a VGA window on the PC display
Digital Video	14-bit digital
Output Data Rate	40 Mpixels/sec
Non-Uniformity Compensation (NUC) Tables	Limited by hard drive size
External Sync Inputs (TTL)	Frame & line sync in via BNC
External Sync Outputs (TTL)	Frame & line sync; integration valid via BNC
External Sync I/O (RS-422)	Same as TTL plus clock out, D-Sub connector
Camera Control	Via local hosted user interface program on PC

Physical specifications

Size (L x W x H)	330.2 mm x 254.0 mm 431.8 mm (13" x 10" x 17")
Weight	15.4 kg (34 lbs.)
Base Mounting	Portable or Rackmount PC
Thermal Management	Convective
Temperature/Altitude	Commercial/industrial
Shock	Commercial/industrial environment
Vibration	Commercial/industrial environment
Humidity	Commercial/industrial environment

OPTICS - OPTIONAL

Field of View, HxV

Microscope	1x, 2.5x, and/or 4x
13 mm	40.5 x 32.9 degrees FoV
25 mm	21.7 x 17.5 degrees FoV
50 mm	11.0 x 8.8 degrees FoV
100 mm	5.5 x 4.4 degrees FoV

60/180/500 mm Triple Field of View:

60 mm (9.1° x 7.3° FoV)
180 mm (3.1° x 2.4° FoV)
500 mm (1.1° x 0.9° FoV)

50/250 mm Dual Field of View:

50 mm (11° x 8° FoV)
250 mm (2.2° x 1.8° FoV)

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