

aisa **HAWK** hyperspectral sensor

AisaHAWK is the smallest airborne SWIR hyperspectral sensor on the market. It is designed to provide high quality data in SWIR range (970 to 2500 nm). AisaHAWK employs the highest sensitivity cooled MCT SWIR detector technology and temperature stabilized optics in order to guarantee the highest stability and signal-to-noise ratio during long flight lines.



Hawk III sensor
L: 470 mm
W: 275 mm
H: 220 mm
Mass: 18 kg

AisaHAWK is the first small and low maintenance SWIR (970-2500 nm) hyperspectral sensor that provides high speed data acquisition at high sensitivity. The major advantages of the AisaHAWK are its distinctive size, high quality of data and low investment cost. AisaHAWK is the most compact SWIR hyperspectral sensor on the market, and can be quickly and easily installed in any aircraft. The AisaHAWK sensor is designed and tested to meet MIL vibration and shock specifications.

HIGH PERFORMANCE

The AisaHAWK sensor employs Mercury Cadmium Telluride (MCT) SWIR detector technology which provides the highest sensitivity and signal-to-noise ratio over the full SWIR range of 970 to 2500 nm. The transmissive imaging spectrograph is nearly independent of the polarization in the incoming light, and provides

high diffraction efficiency and uniform spectral resolution of 10 nm over the full SWIR range.

All the optics (fore optics and imaging spectrograph) and the detector assembly are temperature-stabilized. It ensures the highest radiometric stability and image quality even with varying outside air or cabin temperatures during long flight lines.

The only moving part of AisaHAWK is the shutter, used for dark image calibration between data collection sessions. Since the image data is captured without any moving parts, there is no distortion caused by mechanical inaccuracies of the sensor itself.

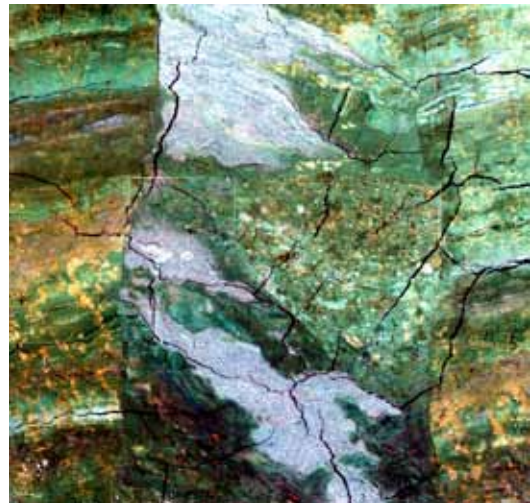
AisaHAWK can be integrated with the AisaEAGLE sensor to make a dual sensor system, which provides seamless hyperspectral data in the full range from 400 to 2500nm. For more information, please see the AisaDUAL data sheet.

AisaHAWK Airborne Hyperspectral Imaging System

SPECIM provides AisaHAWK as a full, ready-to-use system. The complete AisaHAWK system consists of

- The AisaHAWK sensor
- Data Acquisition and Power Unit (DPU) with a user-friendly interface and image acquisition software (RSCube)
- High performance GPS/IMU sensor
- CaliGeoPRO pre-processing software

For more information about the complete system, please see the AISA Systems brochure.



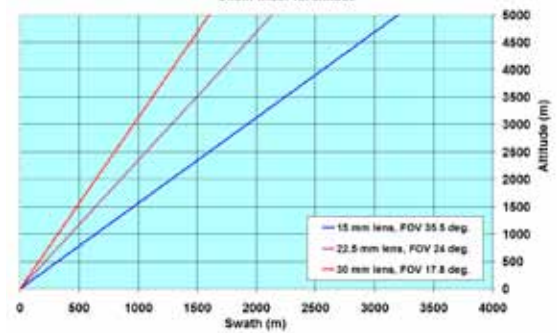
All AISA sensors can also be used for ground-based hyperspectral imaging. Ragona, D et al. have studied the classification of sediments of very similar composition and grain size using the SWIR sensor. (Courtesy of Ragona, D., Minster, B., Rockwell, T., Jasso, H.)

AisaHAWK

| OPTICAL CHARACTERISTICS | | TYPICAL SPECIFICATIONS | | |
|-------------------------------------|---|------------------------|-----------------|--|
| Spectrograph | High efficiency transmissive imaging spectrograph. Throughput practically independent of polarization. Smile and keystone < 5 microns. Spectrograph is temperature stabilized. | | | |
| Numerical aperture | F/2.0 | | | |
| Spectral range | 970 - 2500 nm | | | |
| Spectral sampling/pixel | 6.3 nm | | | |
| Spectral resolution | 12 nm | | | |
| Slit width | 30 microns | | | |
| Calibration | Sensor provided with wavelength and radiometric calibration file. | | | |
| FORE OPTICS | | | | |
| FOV | 17.8 degrees | 24.0 degrees | 35.5 degrees | |
| IFOV | 0.054 degrees | 0.075 degrees | 0.111 degrees | |
| Swath width | 0.31 x altitude | 0.43 x altitude | 0.64 x altitude | |
| Ground resolution @ 1000 m altitude | 0.97 m | 1.34 m | 2.0 m | |
| ELECTRICAL CHARACTERISTICS | | | | |
| Detector | MCT detector with maintenance-free cooler | | | |
| Number of spectral bands | 254 | | | |
| Spatial pixels | 320 | | | |
| Output | 14 bits digital | | | |
| SNR | 800:1 (peak) More detailed SNR data in various conditions available from SPECIM. | | | |
| Integration time | Adjustable, independent of frame rate | | | |
| Image rate | Up to 100 images/s | | | |
| Shutter | Electromechanical shutter for dark background registration, user controllable by software. | | | |
| Operating modes | Hyperspectral and multispectral The operator can create application specific band configurations, and quickly change from one mode or configuration to others in flight operation. | | | |
| Power consumption | | | | |
| Complete system with rack PC | 640 W | | | |
| Complete system with lightweight PC | 515 W | | | |
| ENVIRONMENTAL CHARACTERISTICS | | | | |
| Storage | - 20 ... +50 °C | | | |
| Operating | + 5 ... +40 °C, non-condensing | | | |

Disclaimer: specifications are subject to change without prior notice. Any errors or omissions are unintentional.

Swath width vs altitude



Ground pixel size vs. altitude

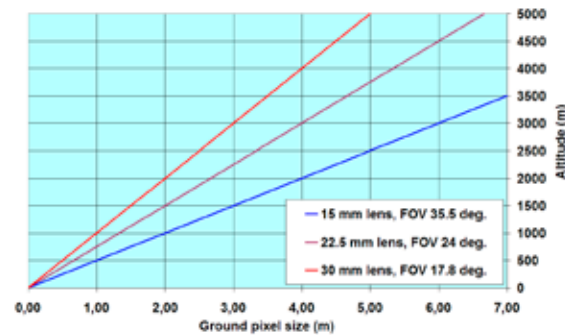
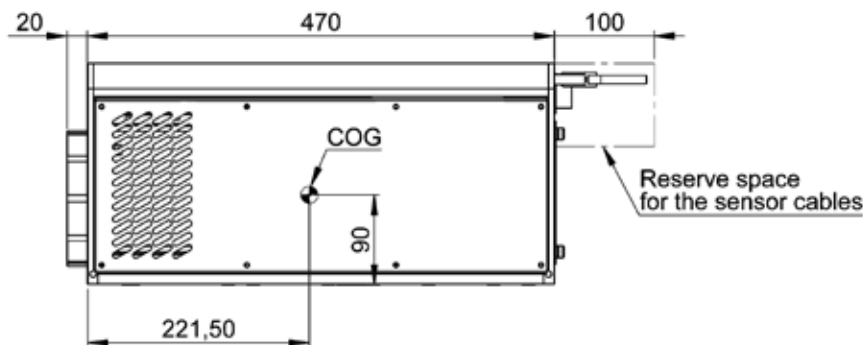
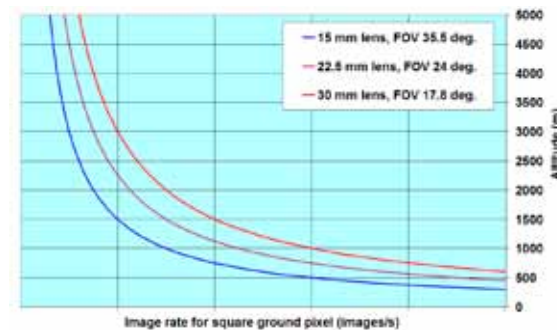
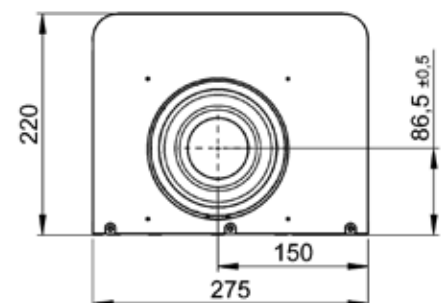


Image rate at aircraft velocity of 60 m/s (120 knots)



AisaHAWK sensor, side view



AisaHAWK sensor, front view