Data Sheet

Integrated HSI / UAV System
Aibot X6

The industry's first integrated multi-rotor UAV and VNIR hyperspectral imaging system with full software control. Brought to you by Headwall Photonics and Leica-Geosystems.

This completely integrated package combines Headwall's Nano-Hyperspec® VNIR sensor with the Leica-Geosystems Aibot X6 multi-rotor UAS and advanced GPS technology.

Headwall's Nano-Hyperspec sensor covers the crucial Visible-Near-Infrared (VNIR) range of 400-1000nm with aberration-corrected imaging performance, very high spatial and spectral resolution, and a wide field of view. The stability of the Leica X6 UAV delivers exceptional safety and performance across a wide range of deployment scenarios. The Nano-Hyperspec sensor attaches easily to the stabilized gimbal on the X6, assuring stable imaging performance while aloft. By precisely managing parameters such as flight altitude, speed, direction and position of the sensor, the Leica X6 is perfectly suited for the collection of superb hyperspectral data. The Nano-Hyperspec contains on-board high-speed data-collection capabilities, which makes the integrated package lighter and more stable for increased flight duration. In addition, Headwall's airborne Hyperspec® III software manages key tasks such as post-processing and orthorectification.

Nano-Hyperspec® VNIR Sensor Specifications						
Wavelength range (nm)	400-1000					
Spatial bands	640					
Spectral bands	270					
Dispersion/Pixel (nm/pixel)	2.2					
FWHM Slit Image	6nm					
Integrated 2nd order filter	Yes					
f/#	2.5					
Layout	Aberration-corrected concentric					
Slit width (µm)	20					
Lens F/L (mm)	4.8	8	12	17	23	35
Angular FOV (degrees)	51°	33°	22°	16°	12°	7.7°
Per-pixel IFOV (mrad) spatial resolution	1.48	0.91	0.58	0.42	0.33	0.21
weight of lens (g)	90	90	99	85	94	92
Camera technology	Silicon CMOS					
Bit depth	12-bit					
Maximum Framerate (Hz)	300					
Detector pixel pitch (µm)	7.4					
Focal plane array format (pixels)	640 x 480					
Max Power (W)	13					
Storage capacity	480GB (~ 130 minutes at 100 fps)					
Weight without lens, GPS (lb / g)	1.15 / 522					

Leica Aibot X6 UAV Specifications

Length/width	1.05 m x 1.05 m (41.34 in.)
Height (cm / inches)	45 cm (17.72 in.)
Housing	CFRP (Carbon Fiber Reinforced Polymer), protected rotor blades
Weight (grams / pounds)	3.4Kg (7.5 lb.)
Flight weight* (excluding batteries)	4.6 Kg - 6.6Kg (10.15 lb. to 14.55 lb.) * Dependent on payload and batteries
Maximum Payload	2.0 Kg (4.4 lb.) (higher payloads on request)
Maximum Speed	50 km/h (31 mph)
Climb rate	8m/sec
Flight height (max.)	3,900 m (12,800') over MS; 2,000 m (6,562') over ground (observe local operating rules)
Maximum Flight time (ideal)	15 minutes
Operating temperature	– 20 °C to + 40 °C
Sensor	Headwall Nano-Hyperspec® VNIR (400-1000nm) aberration-corrected concentric design
Mount	User controllable; can be mounted top and bottom
Payload	Variety of standard cameras, multispectral sensors and others; plug and play
Controlling	Remote control, Tablet-PC (optional), Live-video package (LVP) or Autonomous
Power source	Lithium-polymer 5,000 –10,000 mA

Nano-Hyperspec® GPS / INS Technical Specifications

Attitude and Heading	
Static Accuracy (roll/Pitch)	0.2°.
Static Accuracy (heading) [1]	1°
Dynamic Accuracy [2]	0.3°
Angular Resolution[3]	0.5°
Dynamic Range	Pitch: ± 90 deg
	Roll/Heading: ± 180 deg
Position	
Accuracy position (SPS)	2.5 m CEP
Interfacing	
Digital Interface	RS-232 (max 921k6 bps) and USB (ext. converter)
Operating Voltage	5 - 30V
Power Consumption	610-690 mW (typical)
Interface Options I/O	SyncOut; AnalogIn (2x); SMA connector, active
GPS antenna	SMA connector, active
Maximum Operational Limits	
Altitude	18 km
Velocity	515m/s (1854 km/h)
Ambient temperature operating range [4]	-40...+85° C
Specified performance operating range [4]	0 ... +55° C

1: Depends on usage scenario. In case the Earth magnetic field is used, it must be homogeneous.
2: Under condition of a stabilized sensor fusion algorithm, and good GPS availability
3: Standard deviation of zero-mean angular random walk
4: non-condensing environment

About Headwall Photonics: Headwall is the leading designer and manufacturer of imaging spectrometers and spectral instrumentation for industrial, commercial, and government markets. Headwall's high performance spectrometers, spectral engines, and holographic diffraction gratings have been selected by OEM and end-user customers around the world for use in critical application environments. As a pioneer in advanced, patented optics technology, Headwall enjoys a market-leading position through the design and manufacture of spectral instrumentation that is customized for application-specific performance.

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