

UAV Hyperspec Imager

ATH9010

Features

- Band range: 380~1000nm
- High spectral resolution: better than 1.3 nm
- Wide field of view: 23.4°@f=25mm (depending on the lens)
- Instantaneous field of view: 0.00977mrad@f=35 mm (related to the lens)
- Flight altitude: 50~1000 meters, recommended 100-300m
- I7 onboard computer supports up to 2T storage and can store up to 100 hours of imaging data
- 1.5m wheelbase large multi-rotor UAV with high load capacity and strong scalability;
- Ultra-long flight time: about 45 minutes, large cruising area

Application

- Geological and mineral resources exploration, soil monitoring
- Precision agriculture, crop growth and yield assessment
- Forest pest and disease monitoring and fire prevention monitoring
- Coastline and marine environment monitoring
- Pasture productivity and pasture monitoring, ecological environment protection and mine monitoring
- Remote sensing teaching and scientific research, meteorological research, disaster prevention and control
- Lake and watershed environmental monitoring, water quality testing
- Agricultural and livestock product quality testing
- Military, Defense and Homeland Security

Description

The ATH9010 series UAV hyperspectral imager is the third generation UAV hyperspectral imager launched by Optosky. It is a series of small, lightweight UAV-borne micro-hyperspectral imagers. It is powered by a highly stable six-rotor. It is composed of a highly stable UAV, a high-stability pan/tilt, a hyperspectral imager, a large-capacity storage system, a wireless image system, a GPS navigation system, a ground receiving workstation, and a ground control system.

ATH9010 (standard configuration) and ATH9010W (wide field of view) adopt high-performance detection and imaging devices of 1920×1200 pixels and 4096X3000 respectively, with clear images and less noise. The ATH9010 series also comes with high-performance hyperspectral data acquisition and processing software.

The ATH9010 series UAV hyperspectral imager can be used to measure the spectral information of plants, water bodies, soil and other surface objects in real time, and obtain spectral images. By analyzing the spectral images, it can establish a relationship with the physical and chemical properties of plants, etc., and be used for plant classification. Research on plant growth conditions, etc. The entire system is compact in design, and the main host of the imaging spectrometer has high spectral resolution. It also adopts an external push-broom imaging method. It can form an independent measurement system with a field rotating platform and an indoor linear scanning platform. It can also be mounted with a drone for aerial remote sensing operation.



1. Flight Data Sample



Figure 1 Schematic diagram of hyperspectral flight of ATH9010 UAV



Figure 2 Data chart of ATH9010 UAV hyperspectral flight

(Flight location: Jimei District, Xiamen City, Fujian Province, flight altitude: 100m; speed: 6m/s, wind speed: Level 3)

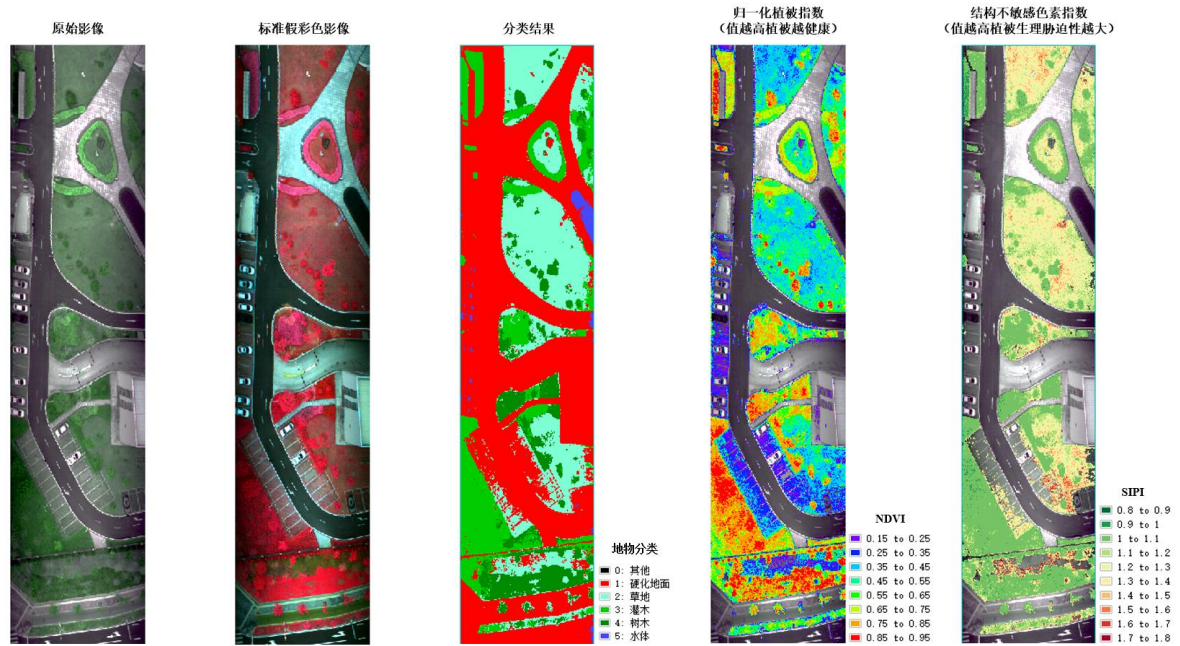


Figure 3 Figure 4 ATH9010 UAV hyperspectral data inversion results

(Flight location: Jimei District, Xiamen City, Fujian Province, flight altitude: 100m; speed: 6m/s, wind speed: Level 3)

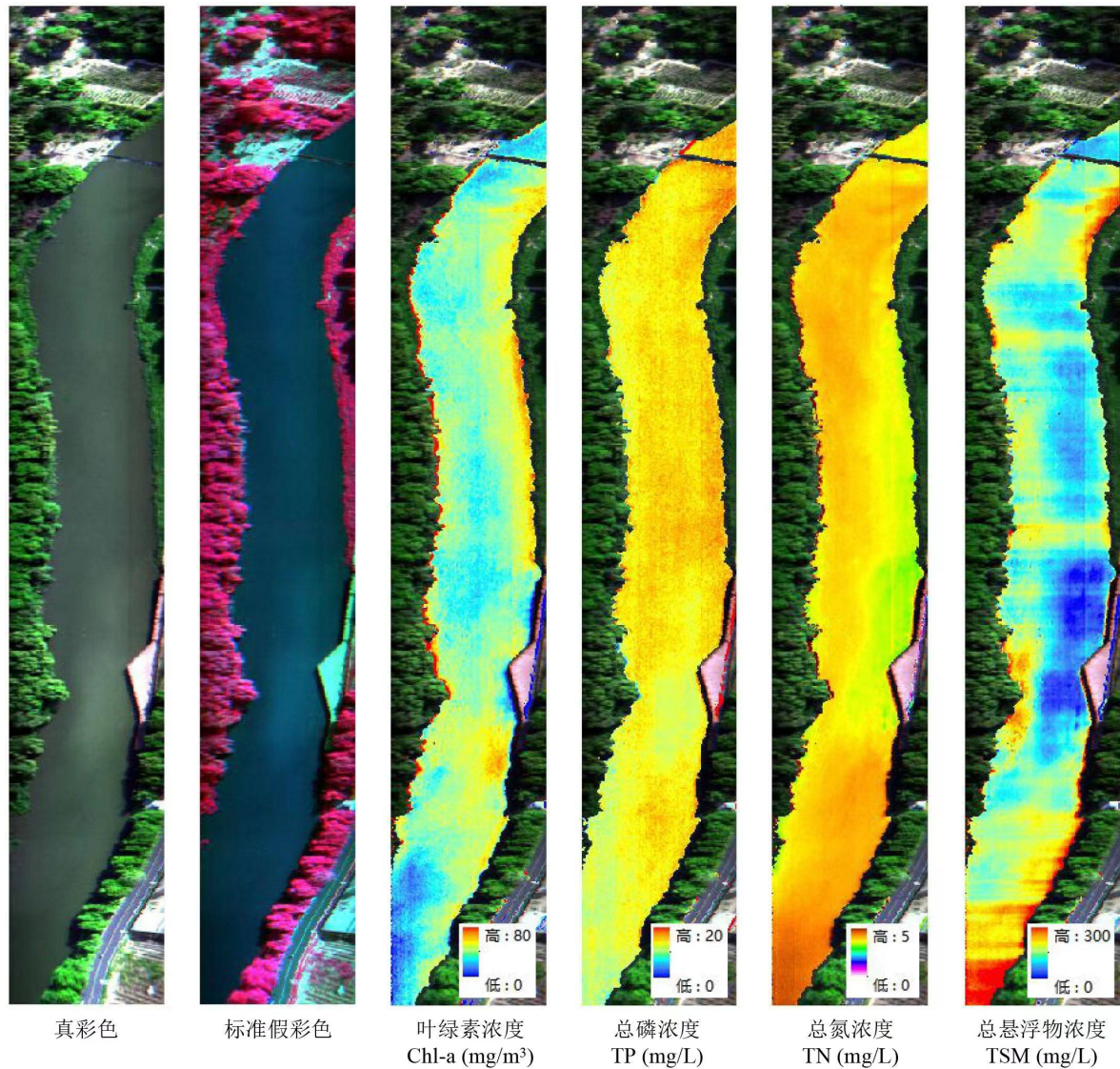


Figure 5 Inversion results of ATH9010 UAV hyperspectral river water quality detection data
(Flight location: Xiamen City, Fujian Province, flight altitude: 100m; speed: 6m/s, wind speed: Level 2)



Figure 6 ATH9010 UAV hyperspectral imager flying multi-airband hyperspectral splicing data for large-area tobacco planting

(Flight location: Changting County, Longyan, Fujian Province, flight altitude: 100m; speed: 6m/s, wind speed: Level 3)

2. Ordering Guide

Model	Feature
ATH9010	Standard configuration type, band range 380-1000nm, heavy-duty 6-rotor UAV, flight time 45 minutes
ATH9010W	Wide field of view, heavy-duty 6-rotor drone, flight time 45 minutes
ATH9010-FW	Vertical take-off and landing fixed-wing UAV, flight time 2 hours, flight distance 120km
ATH9010W-FW	Wide field of view, vertical take-off and landing fixed-wing UAV, flight time 2 hours, flight distance 120km
ATH9010-17	Standard configuration type, band range 900-1700nm, heavy-duty 6-rotor UAV, flight time 45 minutes
ATH9010-25	Standard configuration type, band range 1700-2500nm, heavy-duty 6-rotor UAV, flight time 45 minutes
ATH9010-4-17	Heavy-duty 6-rotor UAV, band range 380-1700nm
ATH9010-4-25	Heavy-duty 6-rotor UAV, band range 380-2500nm

*Note:

1.W is the abbreviation of wide field of view;

2.FX is the abbreviation of Fixed Wing UAV;

Wide-band range hyperspectral imager, due to the increased weight, general fixed-wing UAVs carry UAVs. If necessary, it can be customized. The cost of large fixed-wing drones carrying heavy loads is relatively high.



Figure 7 Flight scene of ATH9010-FW and ATH9010W-FW vertical take-off and landing fixed-wing UAV-mounted hyperspectral imagers

3. Parameter configuration

	ATH9010	/	ATH9010W
Hyperspectral Imager			
Data Interface	USB3.0	/	USB3.0
Imaging mode	Push-scan imaging		
Resolution (Before Binning)	1920 (Spectral dimension) ×	/	3000 (Spatial Dimension) ×

Product data information is current as of publication data. Products conform to specifications per the terms of Optosky Standard warranty.

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1503 Bld. A04, 3rd Software Park, Jimei, Xiamen,
361005, China
Tel: +86-592-6102588

	1200 (Spatial Dimension)		4096 (Spectral dimension)
Resolution (after binning)	480 (spectral dimension) × 300 (spatial dimension)	/	750 (spatial dimension) × 512 (spectral dimension)
Maximum frame rate	270 Hz	/	80 Hz
Onboard computer	Intel I7 CPU, 16GRAM		
Onboard storage	512 GB SSD, up to 2T		
Image resolution	1920 × 1200	/	4096 × 3000
Power supply	12V, 3W	/	12V, 5W
Reliability			
Operating Temperature Range	-10 ~ 45°C		
Storage Temperature Range	-20 ~ 65°C	/	-20 ~ 65°C
Operating Humidity Range	≤85% RH	/	≤85% RH
Optical parameters (customisable)			
Spectral range	380~1000 nm (other bands can be customised)	/	380~1000 nm (other bands can be customised)
Optimum spectral resolution	<1.5 nm	/	<1.5 nm
Spectral bending	<1/3 pixel	/	<1/3 pixel
Spectral distortion	<1/3 pixel	/	<1/3 pixel
Lens focal length	Default : 35mm, 25mm、18mm focal length lens optional		
FOV	11.5°@f=35 mm 16.16°@f=25 mm	/	16.8°@f=35 mm 23.4°@f=25mm
Instantaneous FOV	0.017mrad @ f=35 mm 0.0234mrad @f=25 mm	/	0.00977mrad@f=35 mm 0.0137mrad@f=25mm
Slit width	30μm	/	30μm
System numerical aperture	0.19(F/2.6)	/	0.2(F/2.4)
Optical path design	Fully transmissive lens, scientific dark and light focusing		Fully transmissive lens, scientific dark and light focusing
Sensor			
Sensor type	CMOS		CMOS
Detectable range	350~1100 nm		350~1100 nm
Effective pixels	1920 × 1200		4096 × 3000
Dynamic range	60 dB		72 dB
Data bit depth	12 bit		14 bit
Acquisition method	Software Binning or Hardware Binning (software selectable)		Software Binning or Hardware Binning (software selectable)
Onboard Data Acquisition System	I7 processor, 16G RAM, 512GB SSD, upgradable to 2TB		
Software			
Basic Functions	Flexible setting of		Flexible setting of exposure,

	exposure, gain and speed, dynamic display of real-time hyperspectral images and hyperspectral curves;		gain and speed, dynamic display of real-time hyperspectral images and hyperspectral curves;
Focusing	Dynamic real-time display of hyperspectral images, scientific dark and light focusing, to avoid human visualisation of focusing errors		Dynamic real-time display of hyperspectral images, scientific dark and light focusing, to avoid human visualisation of focusing errors
Software system	Data acquisition software, can real-time dynamic display of hyperspectral images and hyperspectral curves; can provide transmission, reflection and other measurement modes, can be flexibly set the exposure time, speed and other parameters, comes with a spectral library and user self-recorded libraries, can be realised image cropping, spectral recognition and other functions		Data acquisition software, can real-time dynamic display of hyperspectral images and hyperspectral curves; can provide transmission, reflection and other measurement modes, can be flexibly set the exposure time, speed and other parameters, comes with a spectral library and user self-recorded libraries, can be realised image cropping, spectral recognition and other functions

Flight platform parameters:

Heavy 6-rotor UAV	
Flight Platform	Customised long time high load capacity large 6-rotor drone
Gimbal	3-axis DC brushless motor high stability gimbal
Number of rotors	6 rotors
Take-off and landing mode	Vertical take-off and landing
Wheelbase	1500 mm
Maximum load	6 Kg
Maximum lift	5000 m
Drone size	1650 X 1410 X 500 mm
GPS positioning accuracy	0.5 m, RTK (0.1m) optional
Endurance flight time	>45 minutes
Ground station working	10 Km

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distance	
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Vertical Take-off and Landing Fixed Wing UAV (Fix Wing)	
Flight Platform	Customised long duration Vertical take-off and landing fixed wing drone
Gimbal	3-axis DC brushless motor high stability gimbal
Number of rotors	4 rotors
Take-off and landing mode	Vertical take-off and landing
Cruise Speed	25m/s (90km/h) 、Maximum Speed:37m/s(133km/h)
Maximum take-off weight	22.5kg
Navigation Satellite	GPS:L1+L2、BeiDou:B1+B2、GLONASS:L1+L2, Optional PPK/RTK post-differential/real-time differential high-precision positioning module
Landing accuracy	Horizontal $\leq \pm 0.2m$, Elevation $\leq \pm 0.5m$
Wind resistance	$\leq 12m/s$
Resistance to rain	Light rain (rainfall $\leq 10mm/24h$)
Maximum load	4 Kg
Maximum lift	5000 m
Drone size	1950mm×3800mm×525mm
GPS positioning accuracy	0.5 m, RTK (0.1m) optional
Endurance flight time	>120 minutes
Landing site	8*8m
Ground station working distance	20 Km (in case of visibility)

4. Accessory list

NO.	Commodity	Number	Optional
1	Hyperspectral imager (380-1000nm) mainframe	1 unit	Standard
2	6-rotor UAV or fixed-wing UAV	1 unit	Standard
3	Highly reliable UAV gimbals and landing gears	1 unit	Standard
4	On-board data acquisition and high-capacity data storage system	1 set	Standard
5	Battery pack	1 piece	Standard
6	Objective lens	1 set	Standard
7	Hyperspectral imaging system workstation (including operator controller and control software)	1 set	Standard
8	50cm diameter 95% field calibration whiteboard	1 piece	Standard
9	High precision indoor scanning head	1 set	Optional
10	High blue steady current halogen lamp	4 pieces	Optional
11	Standard calibration plate	1 set	Optional
12	Original imported field-specific calibration cloth (1.2m×1.2m)	1 piece	Optional

13	360 degree field rotating platform	1 piece	Optional
14	Tripod	1 piece	Optional
15	Field-specific high-capacity lithium battery	2 pieces	Optional
16	Measurement darkroom	1 piece	Optional
17	Field portable transport case	1 piece	Optional
18	Sweeping device	1 unit	Optional