



**Electro Optical Components, Inc.**

5460 Skylane Boulevard, Santa Rosa, CA 95403

Toll Free: 855-EOC-6300

[www.eoc-inc.com](http://www.eoc-inc.com) | [info@eoc-inc.com](mailto:info@eoc-inc.com)



## Datasheet

### Lightweight VIS-NIR Imaging Spectrometer

**EOC-SI-9000**

**EOC-SI-9010**

**EOC-SI-9020**

#### Feature:

- Range: 400-1000nm
- Hyperspectral resolution: < 2.6 nm or 4nm (EOC-SI-9020)
- Broad FOV: 23.5°@f=35mm (in relation to lens)
- Instantons FOV: 0.9 mrad@f=35mm (in relation to lens)
- Super Imaging Performance
- Lightweight: 1500 g, 950g, 650g;
- Powerful data storage system

#### Application:

- Geology and mineral resource investigation
- Accurate evaluation of agriculture, plant growth and yield
- Monitor forest pests and diseases and fire prevention
- Monitor coastline and marine environment
- Lawn productivity and lawn monitoring
- Lake and river environment monitoring
- Remote sensing teaching and research
- Meteorology Research;
- Ecosystem protection and mine monitoring;
- Water-quality detect, soil monitor;
- Agriculture and animal products quality detect
- Military, Defense, Homeland Security;
- Disaster prevention;

#### Description:

EOC-SI-9000, 9010, 9020 are a compact, lightweight, and miniature hyperspectral imager, and it's especially applied to drones. EOC-SI-9000 employs high spatial resolution, spectral resolution, wide imaging range etc. EOC-SI-9000 consist of two parts, one part is imaging camera lens, the other part is hyperspectral imaging. In particular, hyperspectral imager employs convex grating technology and good aberration characteristics.

EOC-SI-9000, 9010, 9020 employs 1920X1080 pixels high-performance imaging components. With crisp imaging, few image noise, integrated unique image compression algorithms, resulting in drone endurance has been greatly improved up to 3 hours.

Hyper-Spectral Imager are used to detect real time geological spectrum data such as plant, water, creatures, soil etc. They receive spectral imaging to make analysis, and build up relationship with physical and chemical properties of plants, then data collected are applied to research plant classification, growth etc. The whole system has compact design, and it employs high resolution, external push broom imaging, setup independent detection system separately in combination with outdoor rotation platform and indoor linear scanning platform and mounted in the drone to operate flight remote



# Datasheet

	EOC-SI-9000	EOC-SI-9010	EOC-SI-9020
System			
Interface	GigE or USB3.0	GigE or USB3.0	GigE or USB3.0
Memory Space	500 GB, SD card	500 GB, SD card	500 GB, SD card
Image resolution	1920X1080 pixels	1920X1080pixels	1920X1080pixels
Power Supply	12V , 5W	12V , 5W	12V , 5W
Battery life	11hrs	11hrs	11hrs
Size	300mmx70mm x70mm	300mm x 60mm x60mm	270mm x 50mm x50mm
Weight	1500 g	950g	650g
Software	data collection software, Real-time dynamic displaying of hyper-spectral image and curve; transmittance & reflectance measurement modes, flexible exposure time, speed, self-built and built-in library, image cut, spectrum identification		
Reliability			
Operating Temp Range	-0 ~ 40℃	-0 ~ 40℃	-0 ~ 40℃
Storage Temp Range	-20 ~ 65℃	-20 ~ 65℃	-20 ~ 65℃
Operating Humidity Range	≤85% RH	≤85% RH	≤85% RH
Optical Parameters（Customized）			
Spectral Range	400-1000 nm (customized range)	400-1000 nm (customized range)	400-1000 nm (customized range)
Spectral Resolution	<2.6 nm	<2.6 nm	<4 nm
Spectral Channels	1080	1080	720
Spatial Channels	1920	1920	1280
Curved Spectrum	<1/3 pixel	<1/3 pixel	<1/3 pixel
Spectrum Distortion	<1/3 pixel	<1/3 pixel	<1/3 pixel
Focal Length	35mm	35mm	35mm
FOV Range	23.5°	23.5°	21.8°
Spatial Channels @3km	2.7m	2.7m	2.7m
Scan width@3km	1.2km	1.2km	1.1 km
Slit Size	30μm	30μm	30μm

# Datasheet

Aperture	0.2(F/2.4)	0.2(F/2.4)	0.19(F/2.6)
Optical Path	All-reflective lenses, Scientifically focusing light and dark		
Average RMS Radius	14.5 um	14.5 um	9.6 um
Maximum FRS	100	100	100
Scan mode	Push-Broom Scan		
Sensor			
Sensor Type	CCD	CCD	CCD
Range	350-1100 nm	350-1100 nm	350-1100 nm
Effective Pixels	1920 X 1080	1920 X 1080	1920 X 1080
Dynamic Range	60 dB	60 dB	60 dB
Bit depth	8,10, 12, 14 bit	8,10, 12, 14 bit	8,10, 12, 14 bit
Data Acquisition	Binning hardware and software （Selective Software）		
Software			
Basic functions	Flexible to set exposure time, gain, speed, dynamic display hyperspectral image and curve		
Data processing & analyzing	It can acquire cluster analysis, single band, true-and-false color, 20 categories of vegetation colors(customized), 3D image cut, target spectra identification at one button, and unmanned processing batch Not require the 3rd party software		
Focusing	Real-time dynamic displaying of hyper-spectral image, scientifically focusing light and dark, Avoid visual focusing error		

## Material List:

PN	Materials list	QTY	Optional
1	Hyperspectral Imager (400-1000nm) Host	1set	Standard Config
2	Push-broom equipment	1set	Optional Config
3	Objectives and intensity degree calibration	1set	Standard Config
4	System platform(including operative controller and controlling software)	1set	Standard Config
5	Indoor scan PTZ	1 set	Standard Config
6	Halogen lamp	4 pcs	Standard Config
7	Standard calibration board	1 pcs	Standard Config
8	Exclusive field calibration cloth (1.2m×1.2m)	1 pcs	Standard Config
9	360 field rotation platform	1pcs	Standard Config
10	Tripod	1pcs	Standard Config

# Datasheet

11	Exclusive field high capacity Li-battery	2 pcs	Standard Config
12	Dark chamber measurement	1 pcs	Standard Config
13	Transportable field container	1 pcs	Standard Config
14	Calibration white board 10"	1pcs	Optional Config
15	8 rotors drone	1pcs	Optional Config
16	Drone undercarriage	1pcs	Optional Config
17	Data storage system	1set	Optional Config

## 1. Application

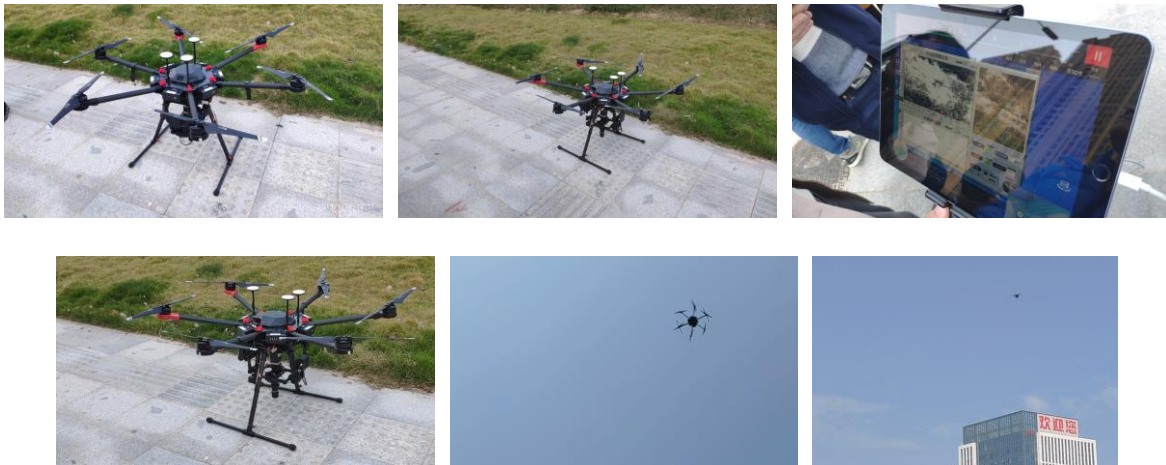


Fig 1 Drone Experiment

# Datasheet



Fig 2 Outdoor experiment scene 1



Fig 3 Outdoor experiment scene 2

# Datasheet



Fig 4 Outdoor experiment scene 3

# Datasheet

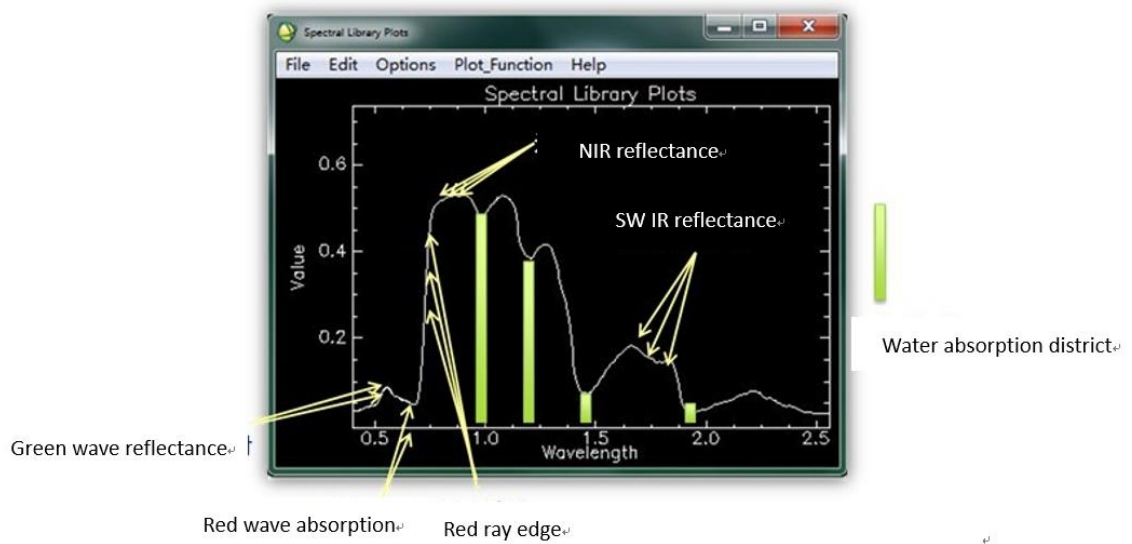


Fig 5 Outdoor experiment scene 4

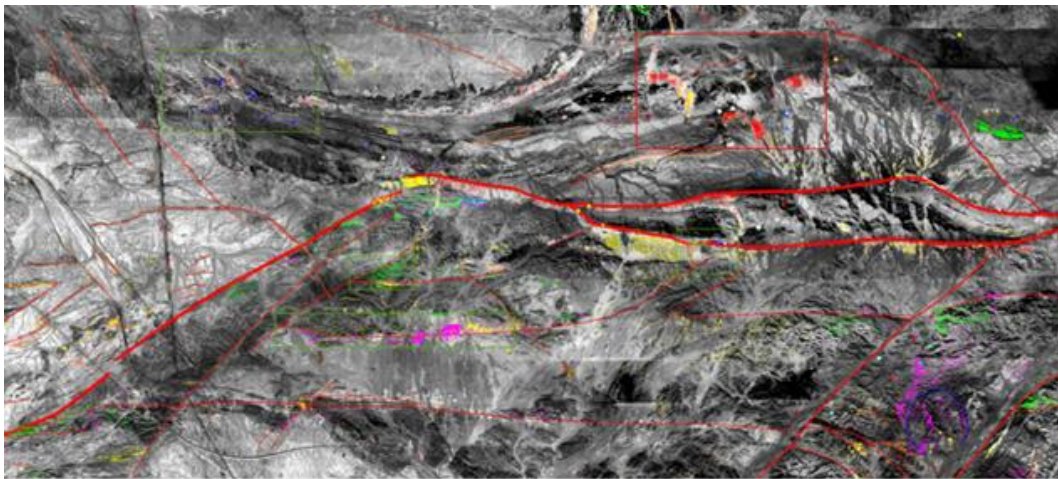


Fig 6 Outdoor experiment scene 5

# Datasheet



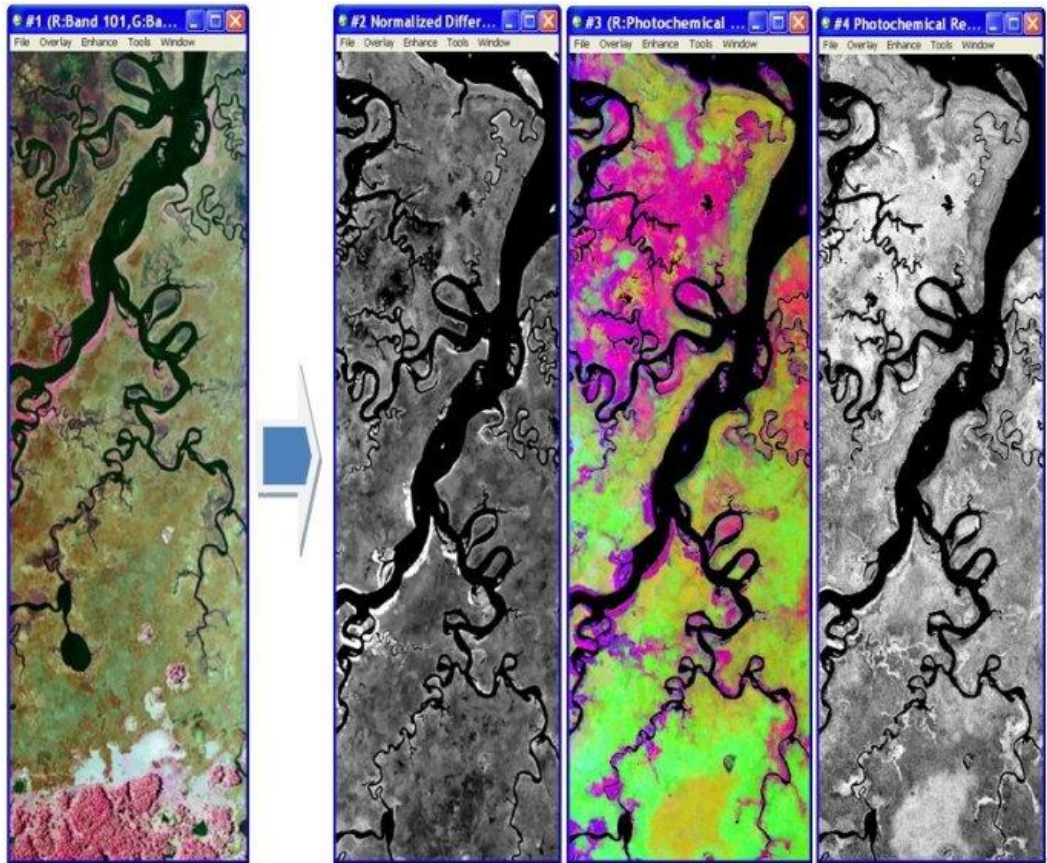
## 1.1 Mineral exploration application



Kaolinite, Calcite, Gypsum, Jarosite, Serpentine, Hornblende, Sericite, fault structure, known ore deposit

# Datasheet

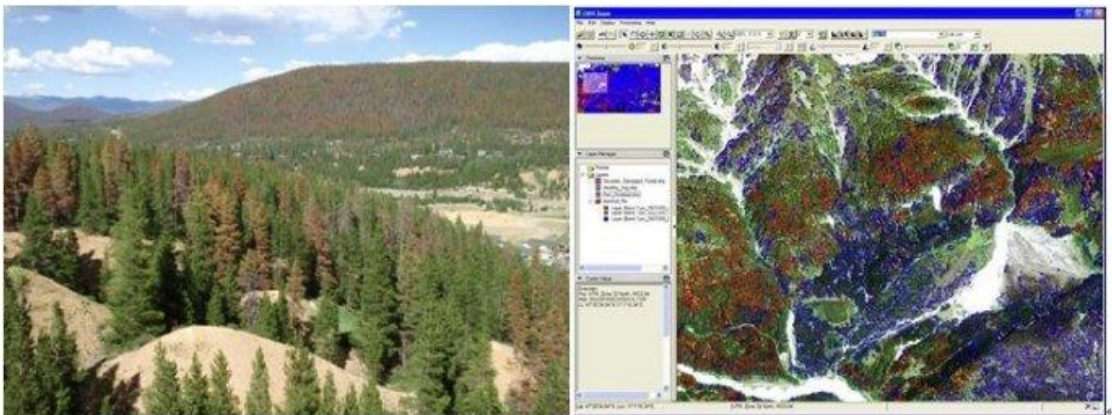
## 1.2 Plant growth application



## 1.3 Forest and wood condition assessment application

Applied to monitor disease and pest and assess forest resource.

Principle: Plant condition relates to greenness index, leave surface index, leave water content and light use efficiency.

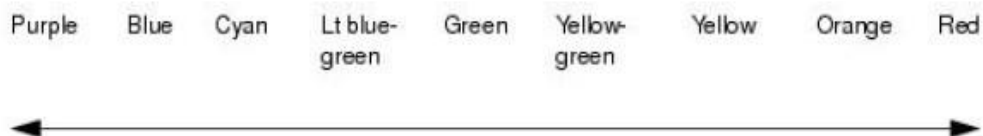
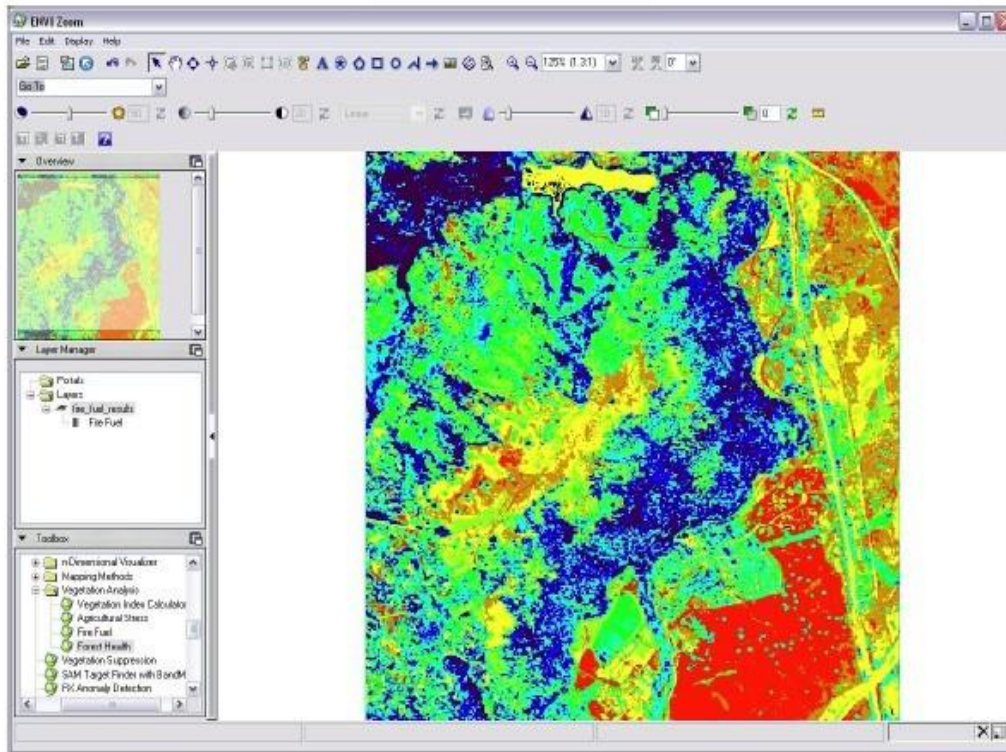


# Datasheet

## 1.4 Forest fire prevention application

Ignition possibility analysis, recognize ignition range and burning point.

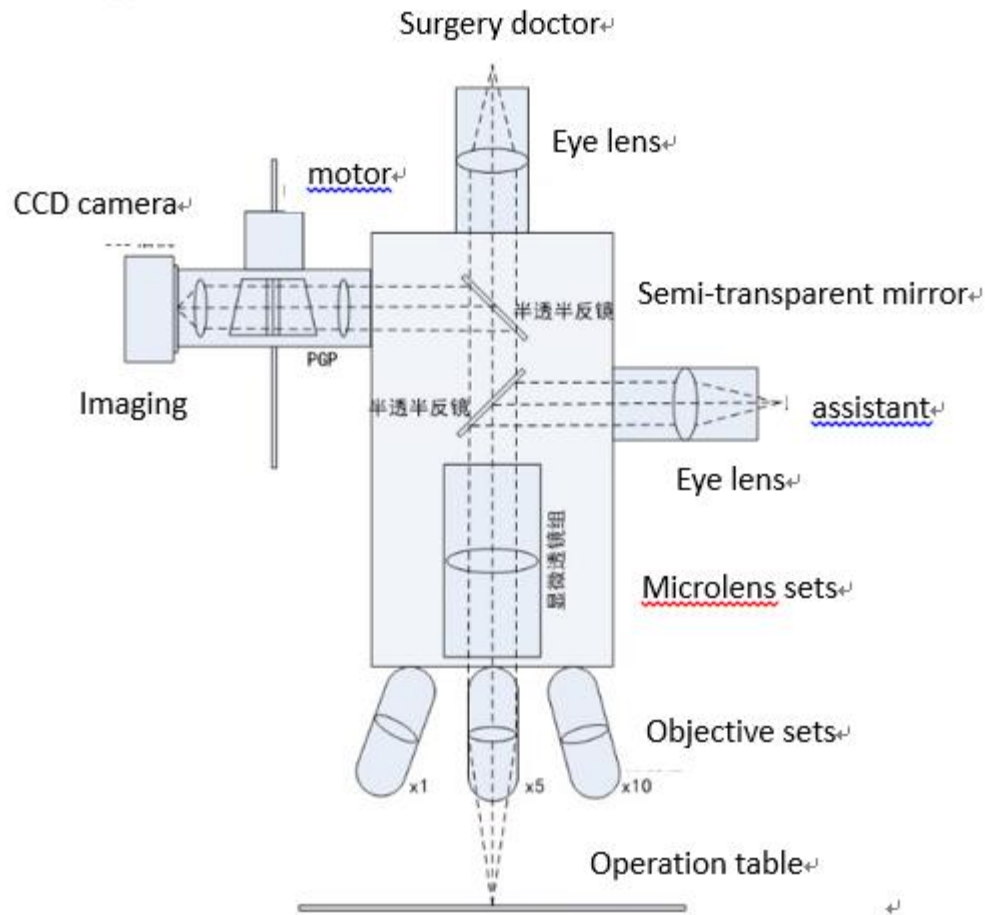
Principle: plant ignition possibility relates to greenness index, canopy water content, drought, carbon attenuation not caused by photosynthesis.



# Datasheet

## 1.4 Medical microscope imager application

Objective: Online detection in the tumor operation and navigation and positioning



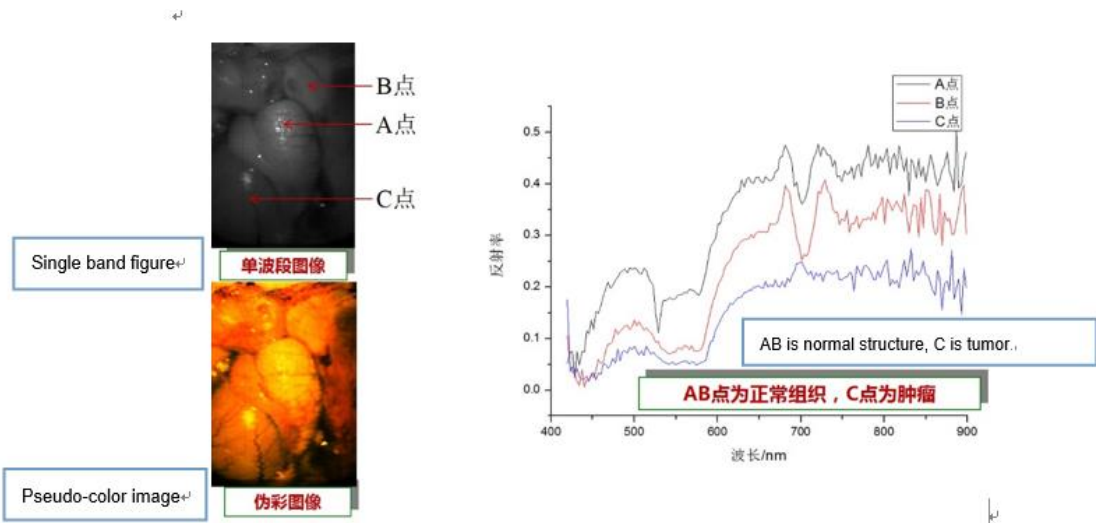
Medical microscope imager optical path schematic diagram

Figure shows medical microscope imager schematic diagram, target to be measured on the operation table goes through objective, microlens sets, then it is divided into three paths, one path is observed with eyes by surgery doctor, the second path is received and detected by imager generated by motor, and the target is spatially scanned to obtain spectrum imaging data, and goes through data analysis and imaging processing, and finally displays on screen to be seen by the doctor.

# Datasheet



Medical microscope imager figure



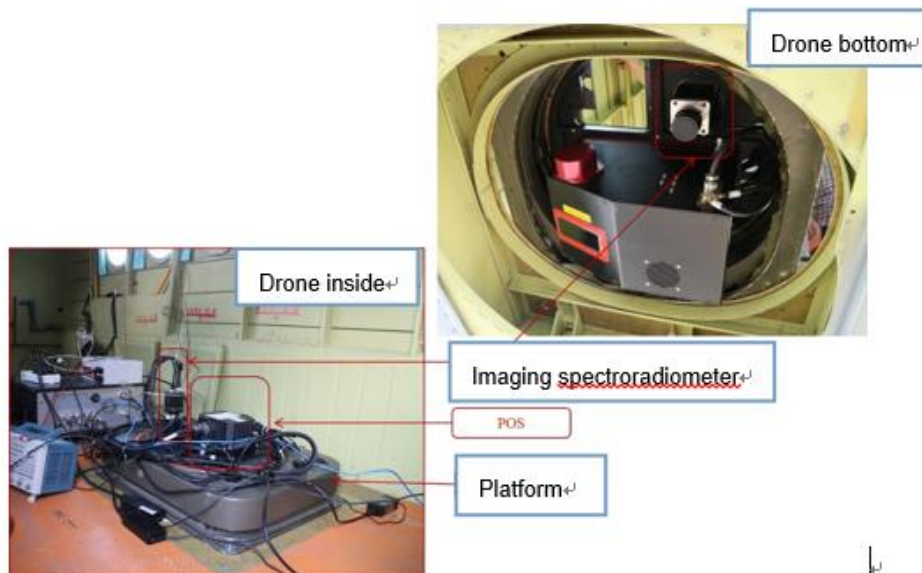
Data collected by medical microscope imager

# Datasheet

## 1.5 Airborne imaging spectroscopy application

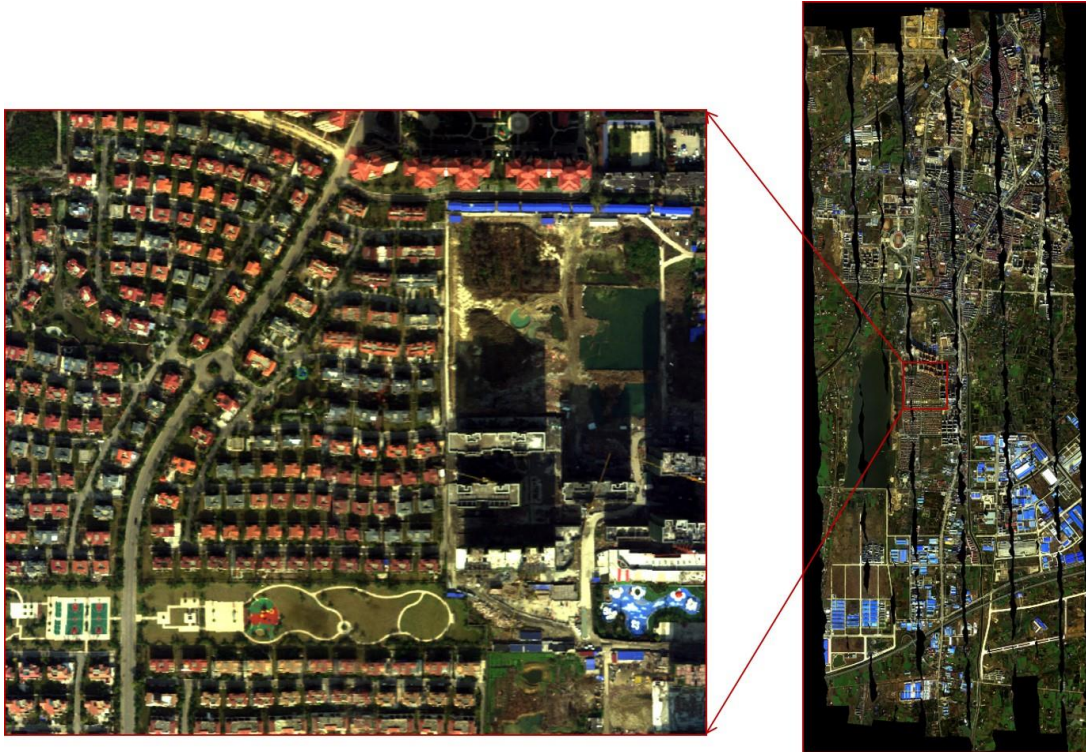
Objective: Airborne remote sensing

Application: Figure shows airborne imager consists of SpecVIEW-VIS, stable platform and POS modules. Fig 7 and Fig 8 show data was collected while drone was flying over Jinmen, Hubei province, China in December, 2014. Fig 7 shows pseudo color image processed through geometric correction, flight strip splice and radiatation correction. Fig 8 shows typical geology spectral curve.

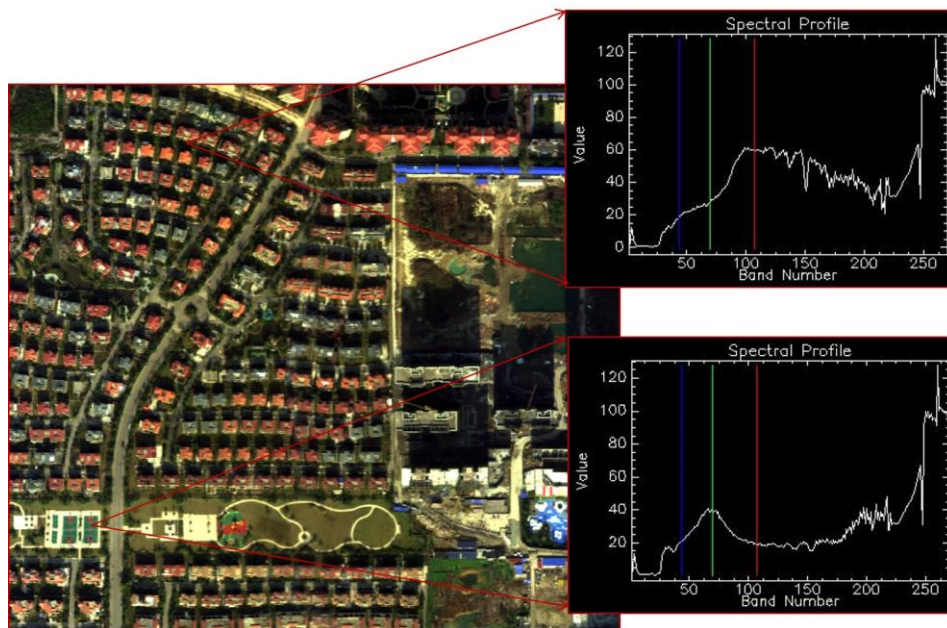


Airborne remote sensing application

# Datasheet



Airborne application data-pseudocolor image



Airborne application data-spectral curve

# Datasheet

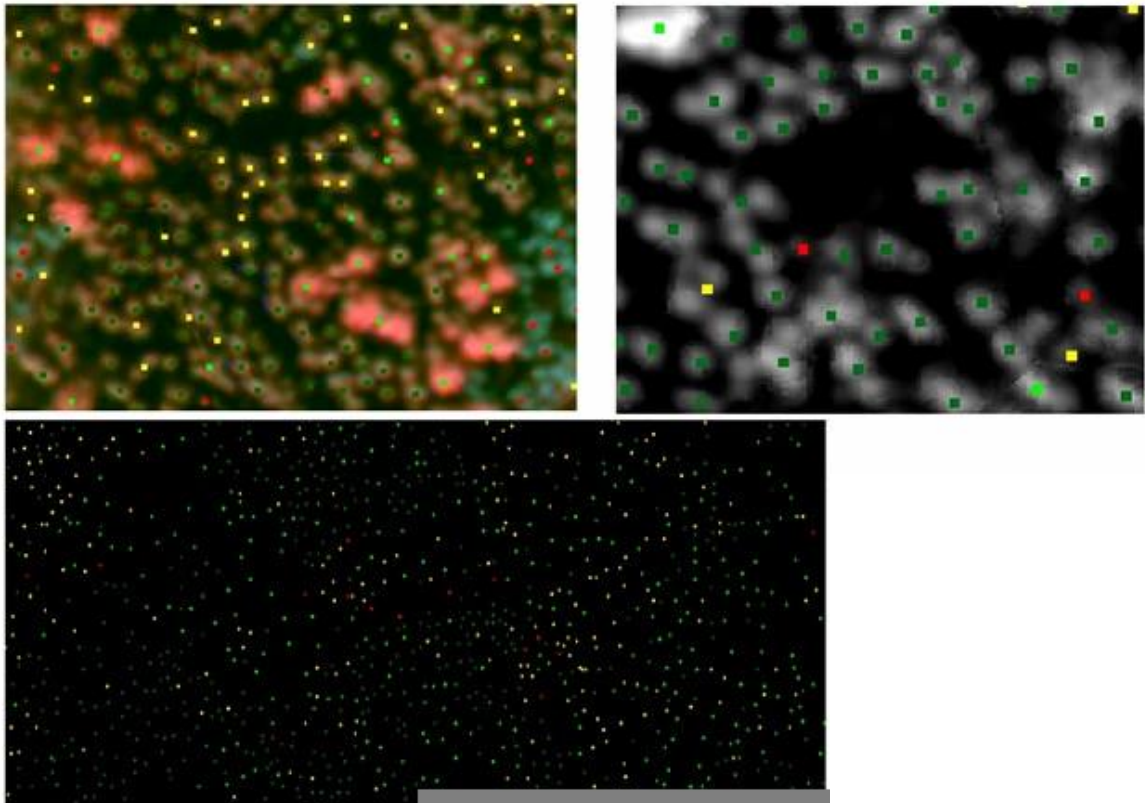


Fig 7 Forest remote sensing, Airborne hyperspectral monitor forest disease and pest

# Datasheet

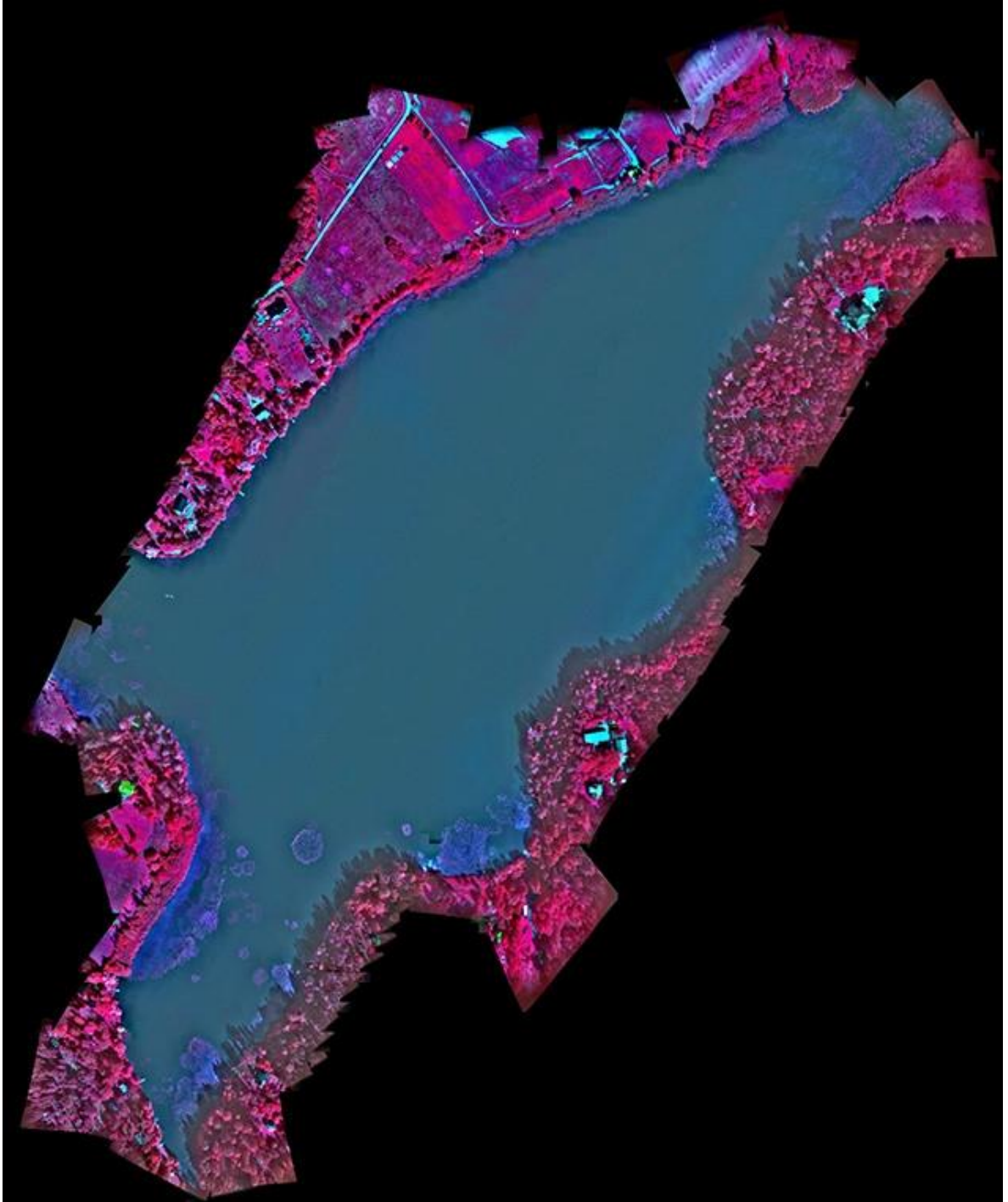


Fig 8 water creature detection (**plankton, algae, plant research**)

# Datasheet

## 2. Other hyperspectral imager



Fig 9 Other hyperspectral imagers

	EOC-SI-9000	EOC-SI-9010	EOC-SI-9020
Weight (exclude camera)	1.2Kg	0.65 kg	0.35kg
Resolution/nm	2.6	2.6	4