

OCI™ Hyperspectral Imagers



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OCI™, phonetic spelling of All Seeing Eye, is a trademark and brand of BaySpec, Inc.

A New Class of Hyperspectral Imagers

BaySpec offers a new class of hyperspectral imagers (OCI™) specifically designed to address image quality and ease-of-use issues in legacy hyperspectral imaging systems. These novel series hyperspectral cameras (i.e. OCI) are the smallest and lightest of their class. Unlike conventional hyperspectral imagers that rely on intensive software effort for geo-correction or ortho-rectification, the innovative design of the OCI-UAV imagers, for example, features “true” push-broom imaging and can scan at random speeds. The goal of fundamentally eliminating artifacts caused by pitch, roll and vibrations in flight has thus been realized by the OCI Series.

All components in the OCI systems are shock-resistant and shielded from electromagnetic interference to avoid any interfere with UAV’s GPS/autopilot system. Currently, BaySpec packages a multi-motor UAV and an active vibration-isolation gimbal system for the imagers (Figure 1)



Figure 1. BaySpec’s OCI™ imager in aerial hyperspectral imaging mission.

Developing the most extensive product line on the market today, BaySpec’s line-up offers flexibility in selecting a wavelength range, spectral resolution and spatial resolution tailored for your applications. Nine different models with versatile configurations cover the 400-1700nm region and range from 8 bands of color up to 110 spectral bands (see Figure 2).



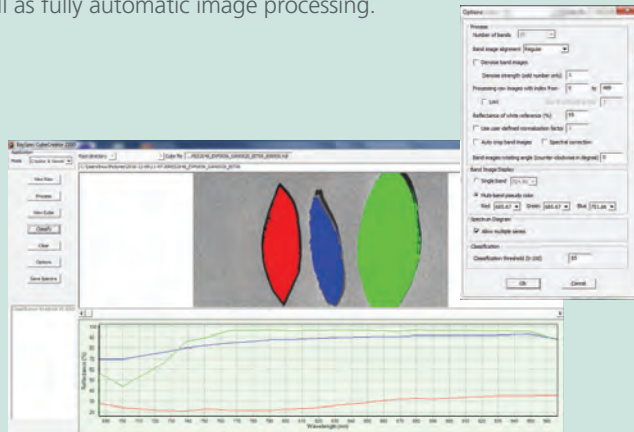
Figure 2. BaySpec’s full line of hyperspectral imagers
(a) Super lightweight and compact OCI™-UAV-1000/2000
(b) Handheld SnapShot imager for real-time monitoring
(c) Newly released OCI-F™ series for VNIR (400-1000nm) and SWIR (900-1700nm)

Model	OCI™-M	OCI™-F	OCI™-1000	OCI™-1000V	OCI™-1000B150	OCI™-FSWIR
Operation Mode	Push-broom					
Spectral Range	400-1000 nm	400-1000 nm	~ 600-1000 nm	~ 470-620 nm	475-900 nm	900-1700nm
Number of Spectral Bands	8	60(LR), 120, 220(HR)	~ 100	Up to 16	Up to 150	60, 80(HR)
Spectral Bandwidth	5-7 nm FWHM	5-7 nm FWHM	< 5 nm FWHM	< 5 nm FWHM	~ 5 nm FWHM	10-20 nm FWHM
Spatial Pixels	Up to 1000 X scan-length	800 px X scan-length	Up to 2048 x scan-length	Up to 2048 X scan-length	2000 X scan-length	250 px X s can-length
Standard Lens	35 mm (18° FOV)	16 mm (21° FOV)	35 mm (18° FOV)	35 mm (18° FOV)	35 mm (18° FOV)	16 mm (28° FOV), SWIR Optimized
Exposure Time	20 μs – 1 s	20 μs – 1 s	20 μs – 1 s	20 μs – 1 s	20 μs – 1 s	20 μs – 1 s
Wavelength Calibration	Factory calibrated (calibration fixed permanently)					
Objective Lens Interface	C-mount					
Frame Rate	Up to 120 frames/sec	Up to 50 frames/sec	Up to 120 frames/sec	Up to 120 frames/sec	Up to 120 frames/sec	Up to 50 frames/sec
Data Format	ENVI-BSQ for hyper-cube, BMP band image, ROI spectra, and RAW (pixel data)					
Operating Temperature	-20°C to +60°C	0°C to 50°C	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C	0°C to 50°C
Power Consumption	< 2 W (USB 3.0 power)	< 3 W (USB 3.0 power)	< 4 W (USB 3.0 power)	< 4 W (powered by USB 3.0)	< 4 W (USB 3.0 power)	< 5 W (USB 2.0 and USB 3.0 power)
Weight	~ 220 g (including standard lens)	~ 570 g (including standard lens)	~ 220 g (including standard lens)	~ 220 g (including standard lens)	~ 220 g (including standard lens)	~ 820 g (including standard lens)
Size	8 cm x 6 cm x 6 cm (including standard lens)	14 cm x 7 cm x 7 cm (including standard lens)	8 cm x 6 cm x 6 cm (including standard lens)	8 cm x 6 cm x 6 cm (including standard lens)	8 cm x 6 cm x 6 cm (including standard lens)	17 cm x 10 cm x 6 cm (including standard lens)
Computer Interface	USB 3.0					
Trigger	External trigger signal, WiFi remote control, or time delayed start					
Site requirements	0 to 45 °C; 0 to 95% RH					
	Single-board computer (optional)					
Weight	450 g					
Size	10 cm x 10 cm x 3 cm					
Operating System	Windows 7 PRO					
Storage	400 GB Solid-state					
Remote Control	Via WiFi (when in range)					

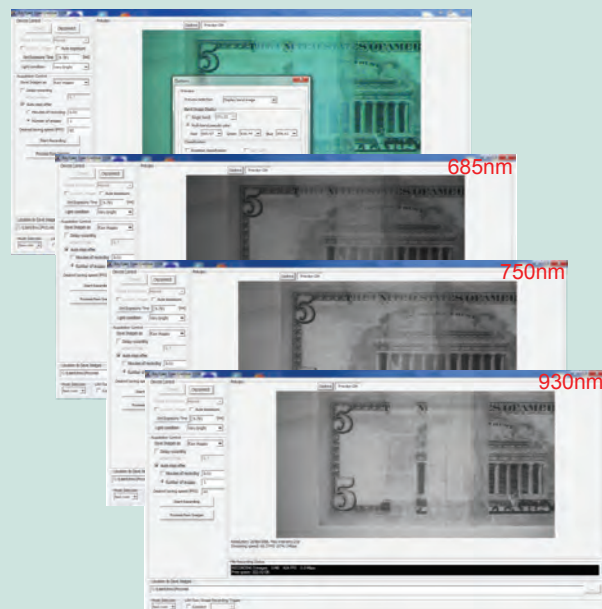
OCI™-2000HH	OCI™-2000	OCI™-2000V	OCI™-D2000
Snapshot			
~ 600-1000 nm	~ 600-1000 nm	~ 470-620 nm	475-875 nm or 475-975 with 100 nm gap starting at 600
~ 20-25	~ 20-25	~ 16	~ 35-40
12-15 nm FWHM	12-15 nm FWHM		
Up to 200 x 400	Up to 400 x 200	Up to 500 x 250	Up to 500 x 270
35 mm (18° FOV)	35 mm (18° FOV)		50 mm (13° FOV)
20 μs – 1 s	20 μs – 1 s		
Factory calibrated (calibration fixed permanently)			
C-mount	C-mount		F-mount
Up to 8 frames/sec	Up to 120 frames/sec	Up to 120 frames/sec	Up to 50 frames/sec
ENVI-BSQ for hyper-cube, BMP band images, ROI spectra, and RAW (pixel data)			
-20°C to +60°C			
Battery operated (rechargeble Lithium ion)	< 4 W (USB 3.0 power)		
~ 450 g (including standard lens)	~ 220 g (including standard lens)	~ 220 g (including standard lens)	~ 340 g (including standard lens)
7.7cm x 14.2cm x 3.6 cm (including standard lens)	8 cm x 6 cm x 6 cm (including standard lens)	8 cm x 6 cm x 6 cm (including standard lens)	10 cm x 10 cm x 3 cm (including standard lens)
Embedded PC	USB 3.0		
External trigger signal, WiFi remote control, or time delayed start			
0 to 45 °C; 0 to 95% RH			
Embedded PC	Single-board computer (optional)		
n/a	450 g		
n/a	11.5 cm x 11.5 cm x 3 cm		
Android™ operating system with touch screen	Windows 7 PRO		
64GB RAM	400 GB Solid-state		
n/a	Via WiFi (when in range)		

Software

Each imager comes with BaySpec's proprietary imaging software package including SpecGrabber, CubeCreator for acquiring hyperspectral raw image, generating hyperspectral data cube and images, and stitching multiple images, respectively. Equipped with a fast on-board minicomputer, the imager acquires full VIS-NIR hyperspectral data with fast data transfer rate (up to 120 fps) as well as fully automatic image processing.



CubeCreator's setting and classification interface

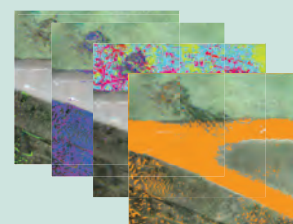
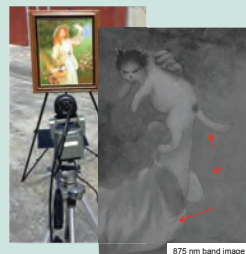
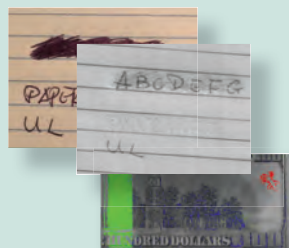
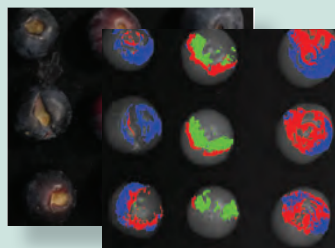
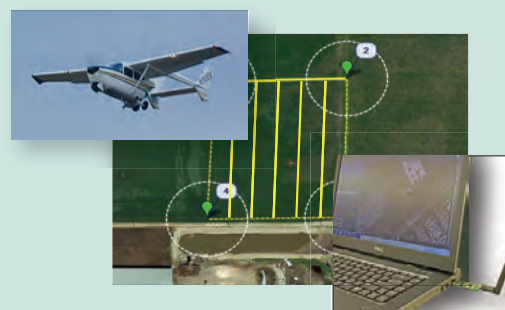


SpecGrabber's setting and real-time display interface

Applications

Featuring extreme compactness with uncompromised performance, and fully automatic operation, these novel hyperspectral imagers allow effortless adoption in many applications from precision agriculture, online material sorting, food inspection, and geospatial imaging to in vivo biomedical imaging.

- Both Pushbroom and snapshot imagers are offered
- Pushbroom works with random-speed scan
- No GPS/IMU needed for imaging reconstruction
- Video-rate hyperspectral cube acquisition by snapshot imagers
- Forever factory calibrated
- Imager <180 g
- Available in multiple turn-key packages and handheld, benchtop, UAV - airborne form factors



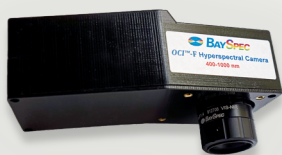
Enabling fast and easy application development

Turn-key airborne remote sensing and precision agriculture



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The **OCI™-F Series** ("All Seeing Eye") camera is a miniaturized push-broom hyperspectral camera covering the full VIS-NIR (400-1000 nm) wavelength range, with a SuperSpeed USB 3.0 interface. It features ultra-compactness (14 cm x 7 cm x 7 cm) and light weight (~ 570 g) with fast data transfer rates (up to 60 fps). As an innovative "true push-broom" imager: one can simply move the imager by hand or move the sample to finish the scan. Not dependent on a constant scanning speed, the OCI-F Series offers versatility on various platforms such as UAVs with perfect hyperspectral image stitching. Compactness, fast imaging, simple operation, and intuitive software make the OCI-F's THE choice for first-time practitioners and old-pros alike. They're Ideal for applications such as precision agriculture, remote sensing, conveyor sorting, forensics and all airborne applications.



OCI-F hyperspectral camera with standard lens. Easy mounting on UAV's, tripods, pan/tilt's and gimbals. Total weight < 570 g

Applications:

- Precision Agriculture
- Food Quality
- Sorting
- Airborne Mini UAV
- Remote Sensing
- Process Control
- Anti-Counterfeiting
- Biomedical Diagnostics
- Forensics
- Pharmaceuticals
- Security
- Counterfeit Detection
- Oceanography
- Forestry
- Estuary Monitoring
- Bathymetry

About BaySpec, Inc.

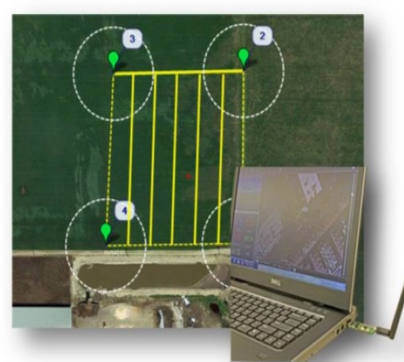
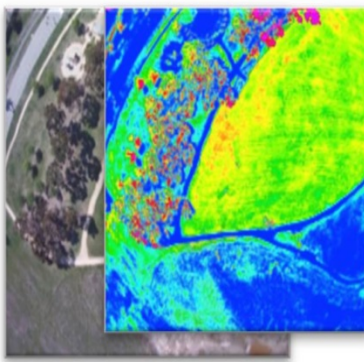
BaySpec, Inc., founded in 1999 with 100% manufacturing in the USA (San Jose, California), is a vertically integrated spectral sensing company. The company designs, manufactures and markets advanced spectral instruments, from UV-NIR spectrometers, fiber sensing interrogators, bench-top and portable NIR and Raman analyzers, Hyperspectral imagers to confocal Raman microscopes, for the biomedical, pharmaceuticals, chemical, food, semiconductor, homeland security, and the optical telecommunications industries.

KEY FEATURES:

- Full VIS-NIR coverage (400-1000 nm)
- Real-time sample preview
- Extremely compact and light-weight
- No moving parts, high reliability
- "True push-broom" scanning with random speed
- Easy integration on a variety of platforms
- Eliminates costly GPS/INS orthorectification post processing
- Yields distortion-free hyperspectral band images
- **Three models to fit your budget - select from 60, 120 or 240 bands**

	Specifications
Operation Mode	Push-broom
Spectral Range	400-1000 nm
Number of Spectral Bands	OCI-FL 60 bands OCI-F 120 bands OCI-F-HR 240 bands
Spectral Resolution	OCI-FL ~ 10-12 nm FWHM OCI-F ~ 5-7 nm FWHM OCI-F-HR ~ 3 nm FWHM
Spatial Pixels	800 px X scan-length
Standard Lens ¹	16 mm (21° FOV)
Exposure Time	20 µs - 1 s
Wavelength Calibration	Factory calibrated (calibration fixed permanently)
Objective Lens Interface	C-mount
Frame Rate	Up to 60 frames/sec
Software	3 Module Suite – SpecGrabber, CubeCreator & CubeStitcher
Data Format	Hyperspectral cube (ENVI-BSQ), Color image (BMP), Band image (BMP), ROI spectra (CSV format) and RAW (pixel data only)
Operating Temperature	0°C to 50°C
Power Consumption	< 3 W (USB 3.0 power)
Weight	~ 570 g (including standard lens)
Size	14 cm x 7 cm x 7 cm (including standard lens)
Camera Interface	USB 3.0

1. Other lenses available, please inquire.



As light in the shortwave infrared region (SWIR, 900-1700 nm) penetrates deeper and is not interfered by visible light, SWIR hyperspectral imaging offers a number of advantages compared to visible light when used for remote sensing, inspection, sorting, surveillance, quality control, and a host of other applications.

The **OCI™-F-SWIR** (OCI is a phonetic spelling of "All Seeing Eye") camera is a miniaturized push-broom hyperspectral camera covering the full SWIR (900-1700 nm) wavelength range. It features ultra-compactness (17 cm x 7 cm x 9 cm) and light weight (~820 g) with fast data transfer rates (up to 50 fps). As an innovative "true push-broom" imager: one can simply use a hand to move the imager or sample to finish the scan. Not depending on a constant scanning speed has enabled OCI-F-SWIR versatility on vast platforms such as UAVs, with perfect hyperspectral image stitching. Compactness, fast imaging, simple operation, and intuitive software make the OCI-F-SWIR very straightforward for varieties of applications.

Applications:

- Remote Sensing
- Chemical Detection
- Pharmaceuticals
- Airborne/UAV
- Security
- Precision Agriculture
- Food Quality
- Sorting
- Anti-Counterfeiting
- Biomedical Diagnostics
- Forensics
- Counterfeit Detection
- Mineral Discovery

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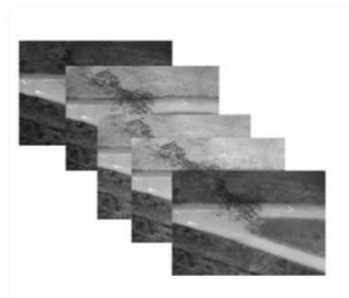
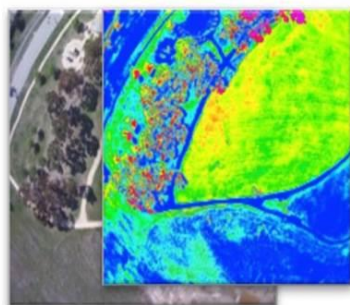
OCI-F-SWIR hyperspectral camera with a standard lens. The package is easy to mount on tripods or gimbals. Total weight ~820 g

KEY FEATURES:

- Real-time sample preview
- Extremely compact and light-weight
- No moving parts, high reliability
- "True push-broom": scanning with random speed
- Easy integration on different platforms

Performance Specifications:

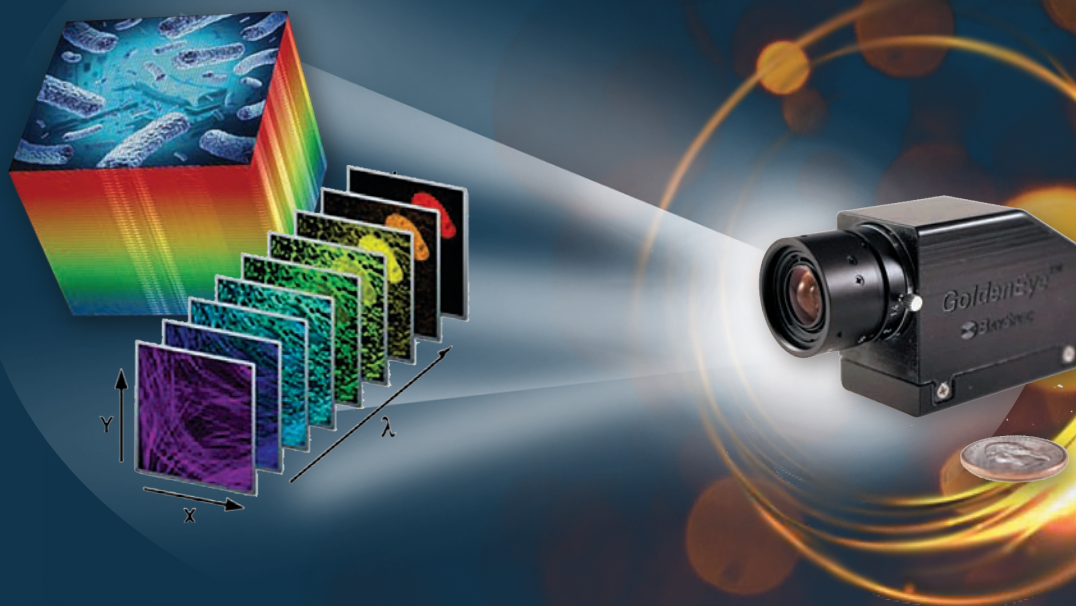
	Specifications¹
Operation Mode	Push-broom
Spectral Range	900-1700 nm
Number of Spectral Bands	Up to 80
Spectral Resolution	< 10 nm FWHM
Spatial Pixels	250 pixels X scan-length
Standard Lens	16 mm (28° FOV), SWIR optimized
Objective Lens Interface	C-mount
Frame Rate	Up to 50 frames/sec
Software	Included with BaySpec's SpecGrabber for camera control and data acquisition, and CubeCreator for hyperspectral data processing
Data Format	ENVI-BSQ hyperspectral cube, Band Image (BMP format), ROI spectra (CSV format)
Operating Temperature	0°C to 50°C
Power Consumption	< 5 W (USB 2.0 power)
Weight	~ 820 g (including standard lens)
Size	17 cm x 7 cm x 9 cm (including standard lens)
Camera Interface	USB 2.0
Trigger	External trigger signal, software time delayed start



GoldenEye™ - The Ultimate Snapshot Imager

Captures All in One Shot for VIS/NIR/SWIR

BaySpec's GoldenEye™ is the only Snapshot hyperspectral imager covering from 400 to 1700nm. Using BaySpec's FT-PI proprietary technology, this novel imager features high sensitivity and is most suitable for low light level applications, such as fluorescence imaging.



GoldenEye™ features:

- FT-PI proprietary technology
- SnapShot imager with one shot operation
- Extended range from 400 - 1700nm
- High sensitivity for low light applications



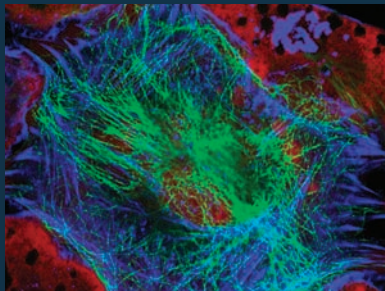
Key Specifications

Operation Mode	Snapshot
Spectral Range	400 - 1000, 900 - 1700nm
Number of Spectral Bands	Approx. 40 - 52
Spectral Resolution	7 - 12nm FWHM
Spatio Pixels	Approx. 648 X 488
Lens (Standard)	50mm (13 ° FOV) ²
Lens Interface	C-mount
Wavelength Calibration	Factory calibrated
Frame Rate	1 frames/sec

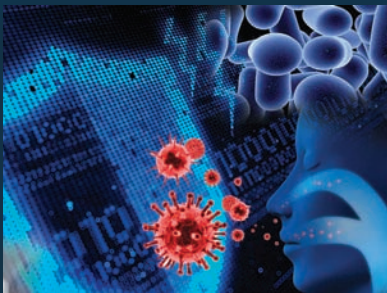
Applications



Machine Vision



Fluorescence Imaging



Medical Diagnosis



Biomedical

About Bayspec

BaySpec, Inc., founded in 1999 with 100% manufacturing in USA, is a Silicon Valley-based spectral sensing company. BaySpec designs, manufactures, and markets advanced spectral instruments, including smart handheld spectrometers, a new class of OCI™ hyperspectral imagers, novel transportable mass spectrometers, high performance UV-VIS-NIR-SWIR spectrometers, and OEM spectral engines and components, for precision agriculture, R&D, biomedical, pharmaceuticals, chemicals, food, semiconductors, health monitoring, and the optical telecommunications industry.



The **OCI™-M+**, a push broom multispectral imager, is specifically designed for aerial imaging, featuring a light weight camera with compact size. The aerial imager **OCI™-M+** comes with 12 selective bands including 3 RGB bands, and 9 spectral bands from red edge to NIR, that are most commonly used for precision agriculture. This imager is fully integrated with DJI Inspire 2 UAV allowing the maximum field coverage with high spatial resolution (4000 spatial pixels). An intuitive ground control software is also provided for automated waypoints flying. Fully integrated and easy to operate, the OCI-M+ UAV ready to fly package has made aerial imaging process very straightforward, and is ideal for applications such as precision agriculture, remote sensing, and geological survey.



KEY FEATURES:

- Extreme compact and light-weight
- No moving parts, high reliability
- Scanning with random speed for “true push-broom”
- Innovative non-slit design significantly reduces system complexity, featuring with real-time preview
- Effortless system integration
- Faster scanning with a wide-angle lens

Applications:

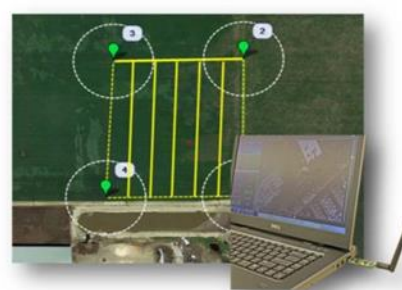
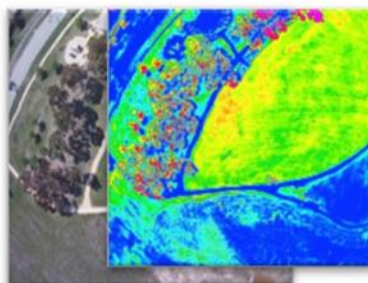
- Precision Agriculture
- Airborne Mini UAV
- Remote Sensing
- Security
- Material Detection
- Geological survey

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	Camera Specifications ¹
Operation Mode	Push-broom
Spectral Range	450-1000 nm
Number of Spectral Bands	12
Spectral Bands	Blue: 470 nm Green: 560 nm Red: 660 nm Red Edge: 690 nm, 720 nm, 760 nm, 780 nm, 800 nm Near-Infrared: 820 nm, 840 nm, 900 nm, 970 nm
Spectral Bandwidth	~6 nm FWHM
Spatial Pixels	Up to 3956 X scan-length
Standard Lens	45 mm (17° FOV)
Exposure Time	20 μ s - 1 s
Wavelength Calibration	Factory calibrated (calibration fixed permanently)
Bit Depth	12-bit
Frame Rate	20 frames/sec
Data Format	ENVI-BSQ for hyper-cube, BMP band image, ROI spectra, and RAW (pixel data)
Operating Temperature	-10°C to 40°C
Weight	460 g (with standard lens)
Size	8.5 cm x 6 cm x 6 cm (including standard lens)
	UAV Specifications
UAV	DJI Inspire 2
Flying Time	22 minutes
Accessories Included	Remote Controller, Flight Battery (2), Battery Charger, CineSSD & Station (480 GB)
	Software Included
	Waypoints flying software, BaySpec CubeCreator, BaySpec CubeStitcher

¹ Specifications subject to change without notice.



The **OCI™-UAV** hyperspectral cameras (OCI is a phonetic spelling of "All Seeing Eye") are designed specifically for use on unmanned aerial vehicles/systems (UAV/UAS), or remotely operated vehicles (ROV). Packed with a high-performance, miniature single-board-computer, they acquire VIS-NIR hyperspectral data with continuous spectral and spatial coverage. Operating of the OCI-UAV is automatic and requires minimal human intervention. The OCI-UAV and powerful package features signification reduction in size (camera head only 8 cm x 6 cm x 6 cm with a computer as compact as 10 cm x 7.5 cm x 3 cm) and weight (up to 320 g total), and faster data transfer rate (up to 120 fps) with automatic data capturing and processing. Unlike conventional hyperspectral imagers which rely on intensive software effort on hyperspectral image cube construction, the innovative design of the OCI-UAV-1000 features "True Push-broom" – imagers can move to scan at random speeds. OCI-UAV-2000 as a snapshot hyperspectral imager fundamentally eliminates artifacts caused motions in flight. These innovations significantly reduce the requirements on UAV system, so that integration is almost effortless for many UAV/ROVs. BaySpec also provides ready-to-fly hyperspectral total solutions. Extreme compactness with uncompromised performance, automatic operation and data processing make the OCI-UAV a straightforward system for applications such as precision agriculture and remote sensing.



OCI-UAV-1000 hyperspectral camera with an enclosure for gimbal mounting. ~ 180 g.



OCI-UAV system on a gimbal during flight

KEY FEATURES:

- Extremely compact and flexible
- Fast data rate up to 120 frame per second
- Innovative non-slit design significantly reduces system complexity
- No GPS/IMU needed for ground image reconstruction
- Real-time ground image preview
- Ready-to-fly system with automatic control software available

Applications:

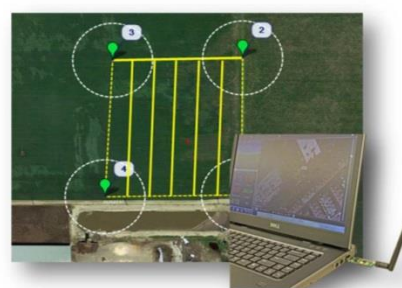
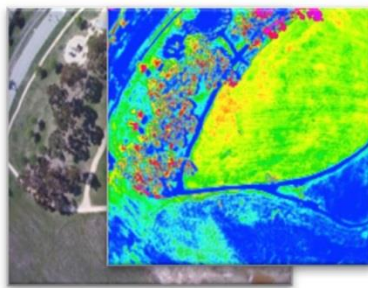
- Precision Agriculture
- Airborne Mini UAV/ROV
- Remote Sensing
- Ground Survey
- Forest Survey
- Environmental Studies
- Law Enforcements
- Forensics
- Security and Defense
- Mining and Geology
- Oil and Gas Exploration
- Ocean Monitoring

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	Specifications	
Model	OCI™-UAV-1000	OCI™-UAV-2000
Operation Mode	True Push-broom	Snapshot
Spectral Range	Approx. 600-1000 nm	Approx. 600-1000 nm
Number of Spectral Bands	Approx. 100	Approx. 20-25
Spectral Resolution	< 5 nm FWHM	12-15 nm FWHM
Spatial Pixels	Up to 2048 X scan-length	Up to 400 X 200
Lens (Standard)	35 mm (18° FOV) ¹	
Objective Lens Interface	C-mount	
Exposure Time	1 – 300 ms	
Wavelength Calibration	Factory calibrated	
Frame Rate	Up to 120 frames/sec	
Operation	Automatic; frame rate control; delayed start	
Data Storage	Up to 500G (~ 2-4 hour non-stop, high-speed, high-resolution imaging)	
Data Format	ENVI-BSQ for hyper-cube, BMP band images, ROI spectra, and RAW (pixel data)	
Operating Temperature	-20°C to +60°C	
Power Consumption	< 4 W (powered by USB 3.0)	
Size	Camera with lens: 8 cm x 6 cm x 6 cm (3.2 in x 2.3 in. x 2.3 in.)	
	Onboard computer: 10 cm x 7.5 cm x 3 cm (4.0 in x 3.0 in. x 1.2 in.)	
Weight	Camera and lens: 0.40 lb. (180 g)	
	Onboard computer: 1.0 lb. (450 g)	
Onboard OS*	Windows 7 PRO	
Data Transfer Interface	USB 3.0 SuperSpeed	
Remote Control	WiFi (when in range)	
Ready-to-fly UAV System		
Frame	700 mm Multi-rotor, shock-resistant light polymer frame	
Flight Control	Automatic control via Mission Planner	
Accessories	Autopilot, Gimbal for OCI imager	
UAV Battery	2 x 4500 mAh LiPo	
Flight Time	Up to 20 min	

¹ Choice of other lenses available.



The **OCI™-U** (OCI is a phonetic spelling of "All Seeing Eye") hyperspectral cameras are optical engines of the handheld **OCI-1000™** (push-broom) and **OCI-2000™** (snapshot) hyperspectral imagers, advanced with SuperSpeed USB 3.0 interface. They feature dramatic reduction in size (8 cm x 6 cm x 6 cm) and weight (~ 180 g) and increased data transfer rates (up to 120 fps). These hyperspectral cameras acquire VIS-NIR hyperspectral data with continuous spectral and spatial coverage. Push-broom (**OCI™-U-1000**) features "true push-broom": one can simply use a hand to move the imager or sample to scan. Fast imaging and innovations in hardware and algorithms enable the **OCI™-U-1000** finishing a scan in 5 seconds and producing a hyperspectral data cube in 30 seconds. As a snapshot imager (**OCI™-U-2000**), hyperspectral cube data can be captured instantly, and even at video or higher rates. Compactness, simple operation, and intuitive software make the OCI-U very straightforward for applications such as precision agriculture, remote sensing, forensics, and airborne applications.



OCI-U hyperspectral camera with a standard $f=35$ mm lens. The package is easy to be mounted on tripods or gimbals. Total weight < 0.4 lb. (~ 180 g)

KEY FEATURES:

- Extreme compact and light-weight
- Scanning with random speed for "true push-broom" (OCI-U-1000)
- Snapshot (OCI-U-2000), up to 120 cubes/second
- Innovative non-slit design significantly reduces system complexity, featuring with real-time preview
- Effortless system integration

Applications:

- Precision Agriculture
- Food Quality
- Sorting
- Airborne Mini UAV
- Remote Sensing
- Anti-Counterfeiting
- Biomedical Diagnostics
- Forensics
- Pharmaceuticals
- Security
- Counterfeit Detection


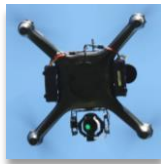
About BaySpec, Inc.

BaySpec, Inc., founded in 1999 with 100% manufacturing in the USA (San Jose, California), is a vertically integrated spectral sensing company. The company designs, manufactures and markets advanced spectral instruments, from UV-VIS spectrometers, bench-top and portable NIR and Raman analyzers, Hyperspectral imagers to confocal Raman microscopes, for the biomedical, pharmaceuticals, chemical, food, semiconductor, homeland security, and the optical telecommunications industries.

	Specifications	
Model	OCI™-U-1000	OCI™-U-2000
Operation Mode	Push-broom	Snapshot
Spectral Range ¹	600-1000 nm	600-1000 nm
Number of Spectral Bands	Up to 100	Up to 25
Spectral Resolution	< 5 nm FWHM	12-15 nm FWHM
Spatial Pixels	Up to 2048 X scan-length	Up to 200 X 400
Standard Lens	35 mm F2.8 (18° FOV)	
Exposure Time	0 - 300 ms	
Wavelength Calibration	Factory calibrated (calibration fixed permanently)	
Objective Lens Interface	C-mount	
Frame Rate	Up to 120 frames/sec	
Data Format	ENVI-BSQ for hyper-cube, BMP band image, ROI spectra, and RAW (pixel data),	
Operating Temperature	-20°C to +60°C	
Power Consumption	< 2 W (USB 3.0 power)	
Weight	~ 180 g (including standard lens)	~ 190 g (including standard lens)
Size	8 cm x 6 cm x 6 cm (including standard lens)	8 cm x 6 cm x 6 cm (including standard lens)
Computer Interface	USB 3.0	
Trigger	External trigger signal, WiFi remote control, or time delayed start	
Site requirements	0 to 45 °C; 0 to 95% RH	

¹ Customized range available, please inquire.

Based on OCI-U optical engines, we have pre-configured OCI systems for sample inspection on conveyer belt, and for UAV hyperspectral imaging system. Please inquire for details.

	OCI-U Based Systems	
	OCI™-Conveyer	OCI™-UAV
		
Optical Engine	OCI-U-1000 or 2000	OCI-UAV-1000 or 2000 ²
Conveyer speed	Up to 100 cm/s	N.A.
Power	External	From UAV battery
Computer	External	Embedded Windows/Linux with memory storage up to 1T
Data Interface	USB 3.0	USB 3.0
Weight	Depending on Application	Up to 320 g (including lens and onboard computer)
Size	Depending on Application	Camera with lens: 8 cm x 6 cm x 6 cm Onboard computer: up to 10 cm x 7.5 cm x 3 cm

² Please refer to OCI-UAV datasheet.

BaySpec's Handheld **OCI-2000™** Snapshot Hyperspectral Imager (OCI is a phonetic spelling of "All Seeing Eye") brings for the first time high performance Hyperspectral imaging in a handheld form factor weighing only approximately 1.0 lbs. (450 g). The **OCI-2000™** Imager acquires full, continuous visible-near infrared (VNIR) Hyperspectral/Multispectral data with simple point-and-shoot operation.

Snapshot (non-scanning) hyperspectral imaging is a method of capturing spectral images during a single snapshot (typical integration time is less than 30 ms), so that no scanning is involved. One of the major advantages of snapshot imaging is that it avoids motion artifacts, thereby simplifying the data processing and improving the image processing time. With the availability of large-format, low cost optical dispensing elements and detector arrays, and in ultra-miniaturized form, it is now possible for the first time to bring the promise of hyperspectral imaging to the wider public.

KEY FEATURES:

- Point-and-shoot hyperspectral imager; extremely easy to use
- Self-contained system with touchscreen computer integrated in a handheld form
- Choice of objective lenses for different field of view
- Ideal for handheld, field based imaging requiring fast acquisition speeds



OCI-2000™ Handheld Snapshot Imager

Applications:

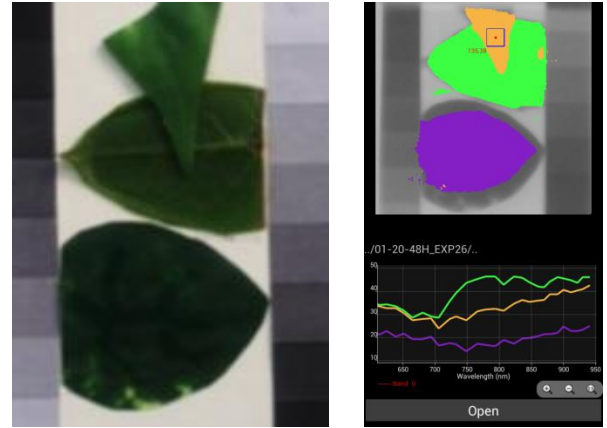
- Food Quality Sorting
- Airborne Mini UAV
- Agriculture
- Remote Sensing
- Anti-Counterfeiting
- Handheld Spectroscopy
- Medical Diagnostics
- Forensics
- Pharmaceuticals
- Security
- Counterfeit detection
- Tissue diagnostics
- OEM Systems

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Specifications:

	Specifications
Model	OCI-2000™
OPTICAL	
Spectral Range	600-1000 nm approx.
Number of Spectral Bands	~20-25
Spectral Resolution (FWHM)	< 12 nm
Pixels	200 x 400
Calibration	Factory calibrated
Objective Lens Interface	C-mount
Frame rate	Up to 8 frames/sec.
Data Format	RAW (pixel data only), BMP band images, and ENVI-BSQ for hyper-cube file
ENVIRONMENTAL	
Operating Temperature	-20°C to +60°C
COMPUTER	
Embedded PC	Android™ operating system with touch screen
Memory	64GB RAM
Battery	Rechargeable lithium ion
Power	USB data/charging port
Weight	1.0 lbs. (450 g) approx.
Size (W x H x L)	3.0 x 5.6 x 1.4 inches ³ (77 x 142 x 36) mm ^{3**}



A comparison of a snapshot image from an RGB camera vs. from **OCI-2000™**

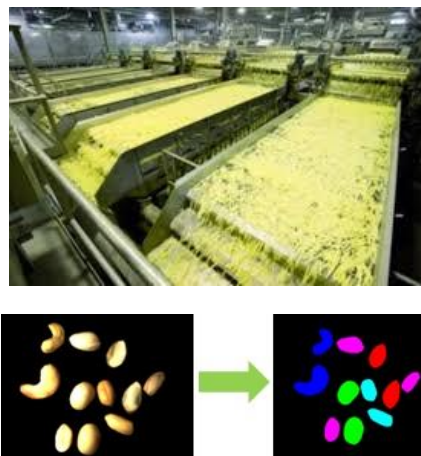
Hyperspectral cameras, compared to traditional cameras, divide the light spectrum into many small wavelength bands. Therefore, a Hyperspectral camera can capture the spectral fingerprints as spectral signatures from an object. These spectral signatures give very detailed information about the material constitutions of the imaged object

Hyperspectral imaging considerably improves the identification and classification of objects and is today recognized as a key enabling technology for next-generation industrial inspection, medical diagnosis and security applications.

Mini-UAV Sensing



Food Safety/Quality



Agriculture

