

CUBERT HYPERSENSPECTRAL

Real-time Spectral Imaging for **BIOMEDICAL** Applications
Catalogue 2025

Meet the Hyperspectral Experts

Welcome to Cubert – pioneers in hyperspectral snapshot cameras for real-time solutions, made in Ulm, Germany.

Since 2012, we've been breaking new ground in hyperspectral imaging, working closely with our customers to explore innovative applications across diverse fields.

Snapshot Imaging for Real-Time Applications

At Cubert, we provide advanced, ready-to-use hyperspectral cameras designed for true snapshot imaging. This unique capability enables live applications like real-time monitoring, object tracking, and video-based analysis, transforming hyperspectral data capture for various applications



Meet the Hyperspectral Experts

Customization and Expertise in Integration

Every project is unique, and at Cubert, we focus on tailoring our technology to meet your specific requirements.

We integrate our cameras seamlessly into your systems, handling everything from camera adjustments to lighting, interfaces, and connectivity – so you can focus on your work without needing to master the technology.

Our strong CUVIS software and custom algorithms ensure accurate, on-target analysis, without requiring you to be an expert in hyperspectral imaging. And with our SDK, you have the option to integrate the cameras yourself, while we're always here to support you – because we're the experts.



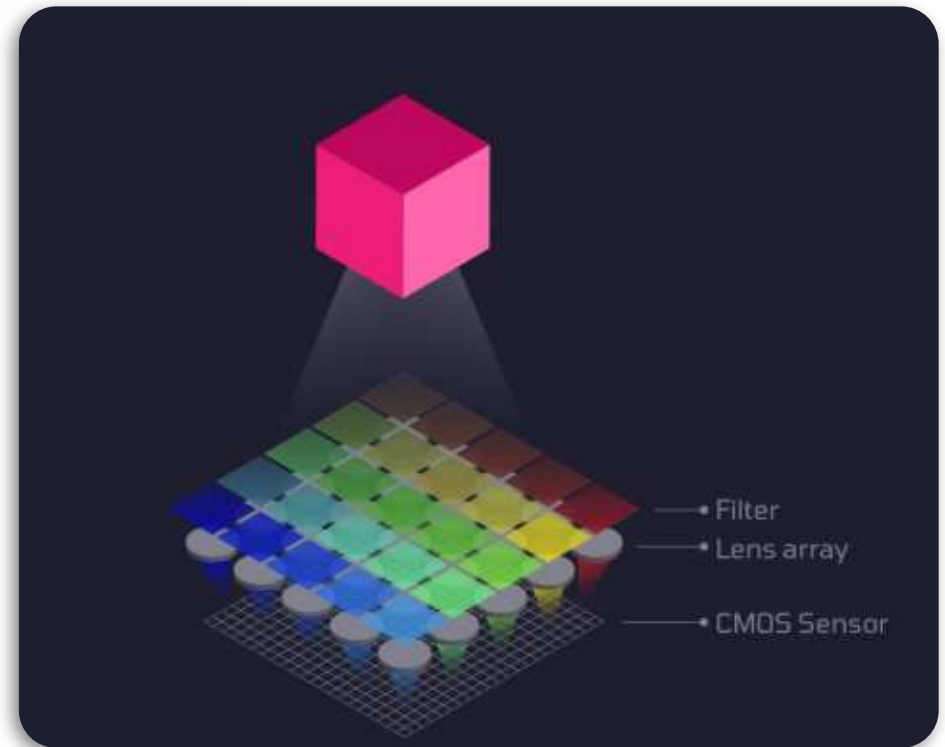
What is Snapshot HSI?

Why Cubert?

Snapshot hyperspectral imaging captures the complete hyperspectral data cube of the object to be examined in a single exposure (snapshot). Cubert cameras are therefore particularly fast and ideal for capturing moving objects. Accordingly, Snapshot HSI is ideal for applications that require fast, detailed spectral analysis, such as in medicine.

Cubert's HSI snapshot technology enables fast, secure, error-free data acquisition, forming the basis for reliable real-time diagnostics.

Thanks to the absence of moving parts, the cameras are lightweight, compact, resistant to mechanical stress, and easy to integrate into existing systems such as microscopes. They cover the visible, near-infrared, and short-wave infrared ranges.



Basic principle of our cameras. The object is seen by a multiple of microlenses on one sensor array, each equipped with its own particular bandpass filter.

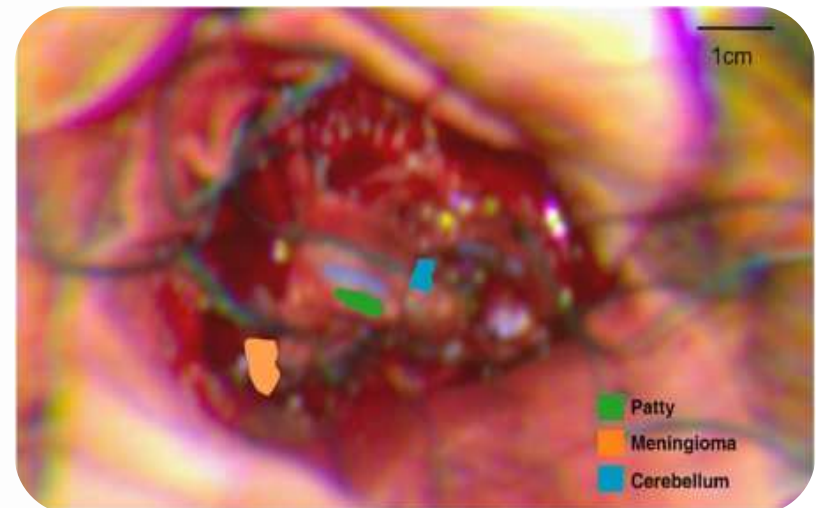
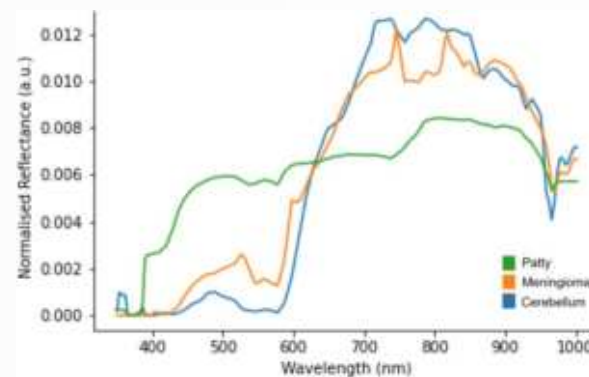
Neuro-oncological surgery

HSI provides real-time information that is not visible to the naked eye, without the need for markers. It allows images to be captured at video speed with high spectral resolution. The camera was integrated into an imaging system so that the neurosurgical workflow was minimally disrupted.

Picture: Intra-operative use of lightfield HSI system (ULTRIS X50), annotated regions of interest (RoIs) on sRGB image reconstructed from HSI data.

MacCormac, O., Noonan, P., Janatka, M., Horgan, C. C., Bahl, A., Qiu, J., ... Shapey, J. (2023). *Lightfield hyperspectral imaging in neuro-oncology surgery: an IDEAL 0 and 1 study*. *Frontiers in Neuroscience*, 17.

<https://doi.org/10.3389/fnins.2023.1239764>

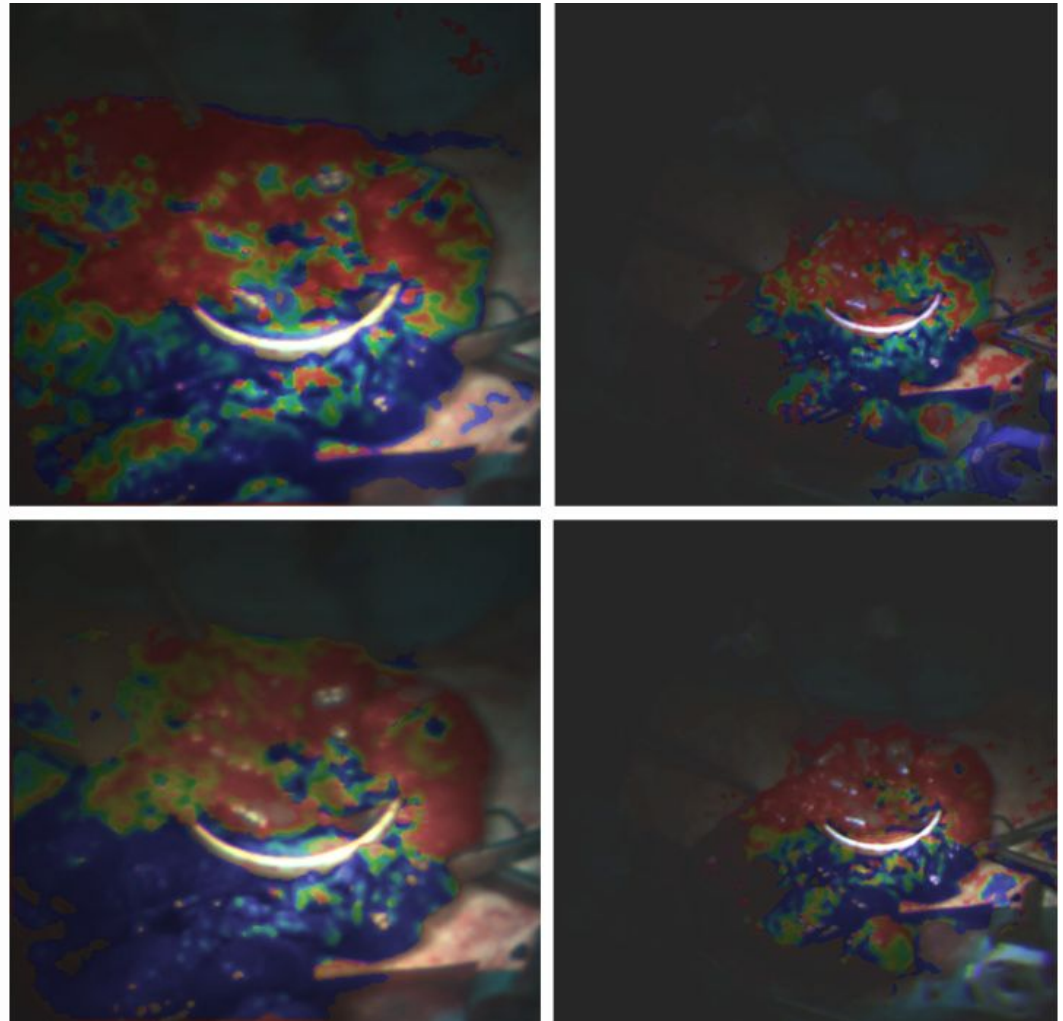


Visceral surgery

Adequate blood flow to the tissue is essential for healing, and HSI imaging provides accurate analysis and visualization of tissue oxygen saturation (SO_2). For this purpose, two hyperspectral cameras with different wavelength ranges were combined for detailed analysis.

Picture: Visualization of oxygenation levels in the exteriorized bowel segment directly before resection and anastomosis, analyzed using ULTRIS X20 (Right) and S5 (left)

Kray, S., Schmid, A., Wisotzky, E. L., Gerlich, M., Apweiler, S., Hilsmann, A., Greiner, T., Eisert, P., & Kneist, W. (2025). *Intraoperative perfusion assessment by continuous, low-latency hyperspectral light-field imaging: development, methodology, and clinical application*. In *Proc. SPIE 13306, Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XXIII*, 1330606. <https://doi.org/10.1117/12.3042238>



Alzheimer's disease

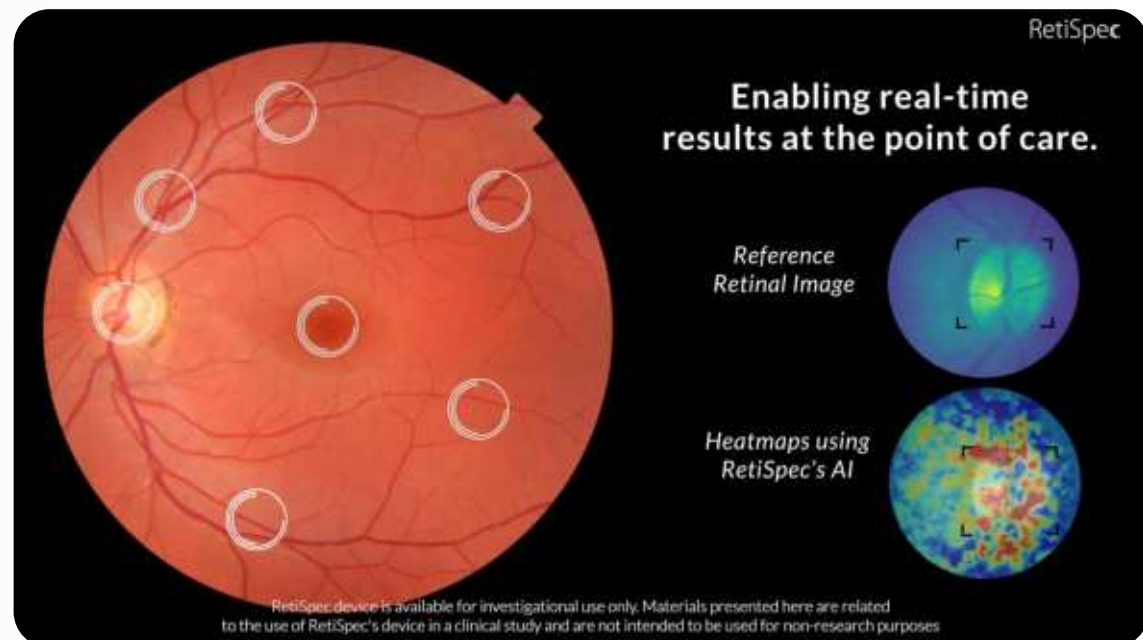
Alzheimer's disease is preceded by a thinning of the retina, which can be easily examined using optical methods. This involves measuring the intensity of the light reflected or transmitted by the retina as a function of wavelength. AI (artificial intelligence) examines the information from the generated data cube. This novel concept for ophthalmoscopes allows Alzheimer's to be detected non-invasively, easily, and cost-effectively.



Camera: Customized system

Source: Courtesy of Retispec

(<https://www.retispec.com/>)

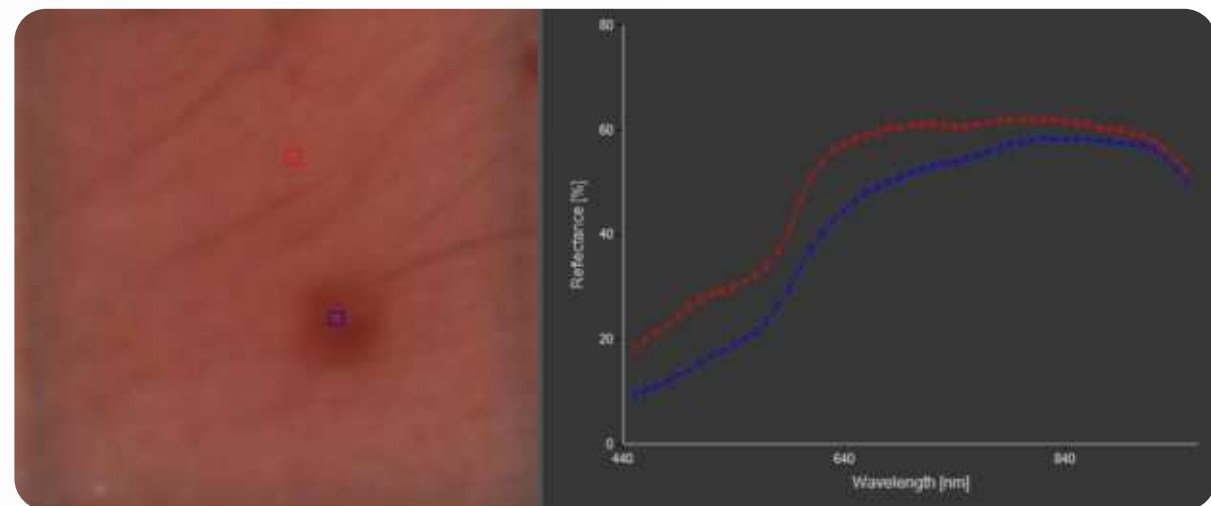


Skin Cancer

The assessment of skin lesions is complex. Snapshot hyperspectral cameras enable the entire hypercube of a single image of the skin lesions to be captured in real time. The inclusion of near-infrared enables the detection of reflections from deeper tissue layers for improved diagnostic capabilities.

Camera: Hyperspectral Dermatoscope, based in ULTRIS SR5 with integrated and calibrated light source

Hetz, M. J., Garcia, C. N., Haggemüller, S. & Brinker, T. J. (2024). *Advancing dermatological diagnosis: Development of a hyperspectral dermatoscope for enhanced skin imaging*. arXiv:2403.00612.



Our products

Our Camera Products for Biomedical Applications

Our biomedical imaging portfolio includes four hyperspectral camera systems covering a wide range of clinical and research needs. The **ULTRIS X20**, while not microscope-compatible, is one of the most precise snapshot hyperspectral cameras available and serves as a scientific reference in many studies.

The **ULTRIS 5**, **XMR**, and **SWIR1** offer full C-mount flexibility, making them suitable for microscopy, endoscopy, and customized optical setups.

The following pages present each camera in more detail.

Camera Model	Spectral Range	Spectral Bands	Spatial Resolution	Frame Rate	Weight	C-mount / Microscope	Field of View
ULTRIS 5	450 - 850 nm	51	290 x 275 px				
S5				12 Hz	126 g	no	15°
SR5				12 Hz	182 g	yes	flexible
H5				75 Hz	520 g	no	15°
HR5				75 Hz	576 g	yes	flexible
ULTRIS X20	350 - 1000 nm	164	410 x 410 px	8 Hz	350 g	no	35°
ULTRIS XMR	430 - 910 nm	61	1000 x 1000 px	17 Hz	700 g	yes	flexible
ULTRIS SWIR1	980 - 1650 nm	38	200 x 200 px	80 Hz	140 g	yes	flexible

Affordable Versatility

ULTRIS 5

**Compact & Swift: Advancing
Hyperspectral Imaging**

ULTRIS 5

is the most affordable and smallest HSI camera, with a compact design, fast performance of 75 Hz, and can be connected to all common microscopes and endoscopes.

The ULTRIS 5 is available in four version - two of them are high frame rate with up to 75 fps, and two of them are available with an optical adapter that allows to mount the camera on microscopes and other optical devices, or to add different objective to change field of view.



Premium Scientific Grade

ULTRIS X20

**Hyperspectral
Powerhouse for Highest
Standards**

The ULTRIS X20 stands as a premium scientific-grade camera, distinguished by its exceptional spectral resolution and quality. Encompassing the entire VNIR range (**UV VIS NIR**), it delivers comprehensive spectral coverage essential for diverse applications. With a substantial resolution of 410x410 pixels, this camera excels in capturing detailed imagery, making it an ideal choice for applications demanding top-notch precision and scientific accuracy.



High Resolution Spectral Camera

ULTRIS XMR

Revolutionizing Imaging Across Industry

The ULTRIS XMR captures 61 spectral channels simultaneously at **1 Megapixel resolution** each, enabling real-time imaging and video spectroscopy for rich, detailed data analysis. Its user-friendly design is perfect for lab and field use, offering fast data capture via USB3 and robust performance in various environments. Enhanced by AI-powered Cuvis.ai software, it simplifies surface classification. Customizable to meet specific needs, the ULTRIS XMR is ideal for applications like **object tracking** and **dynamic monitoring** across diverse industries.



SWIR Snapshot Pioneer

ULTRIS SWIR 1

Hyperspectral Snapshot SWIR Camera at Video Rates

The **ULTRIS SWIR 1** stands as the pioneering hyperspectral snapshot SWIR camera, leveraging cutting-edge light field technology. Distinguished by its remarkable speed, boasting an **80 Hz** frame rate, it proves highly effective in capturing dynamic scenes with precision. Covering the SWIR range from **980 to 1650 nm**, this camera provides unique spectral insights essential for a myriad of applications. Notably adaptable, it allows for lens changes through a **C-Mount adapter**, further enhancing its versatility across a diverse range of applications.



Our products

Cubert CUVIS Software Suite

The CUVIS Software Suite efficiently unifies all necessary steps for hyperspectral data: acquisition, processing, calibration, visualization, and analysis in one streamlined environment.

Built for results, not complexity, CUVIS stores all relevant calibration data directly within each dataset via a redesigned session format, simplifying file handling and support. The interface is clear, fast, and multi-lingual.

In short: CUVIS reduces friction, increases reliability, and gives you full control over your hyperspectral workflow.



Our products



Software Development Kit (SDK)

This robust SDK enhances the flexibility of our imaging systems, allowing seamless integration into a wide range of applications. With wrappers for **Python**, **C++**, and **C#**, Cuvis provides a comprehensive development environment, catering to diverse programming preferences. This expansion in SDK capabilities ensures optimal compatibility and ease of use for developers across different platforms and coding languages.

The **CUVIS SDK**, coupled with **CUVIS AI**, our innovative open-source platform for applying machine learning in hyperspectral imaging, is now conveniently accessible on GitHub. Visit <https://github.com/cubert-hyperspectral> to learn more.

At Cubert, we specialize in **Hyperspectral Snapshot technology**, offering high-performance cameras tailored to diverse fields such as **OEM integration**, **scientific research**, **security**, and **biomedical imaging**.

Our portfolio includes a range of powerful cameras designed for precise data capture and analysis, ensuring you get the most reliable results.

Each camera is supported by our proprietary **software SDK**, enabling seamless integration into your systems and providing developers the tools needed for advanced applications.



ULTRIS X20



ULTRIS X20 Plus



ULTRIS 5



ULTRIS XMR



ULTRIS SWIR 1

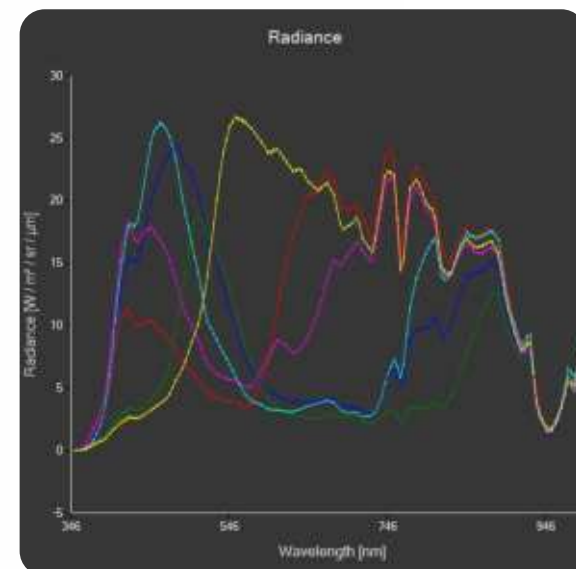
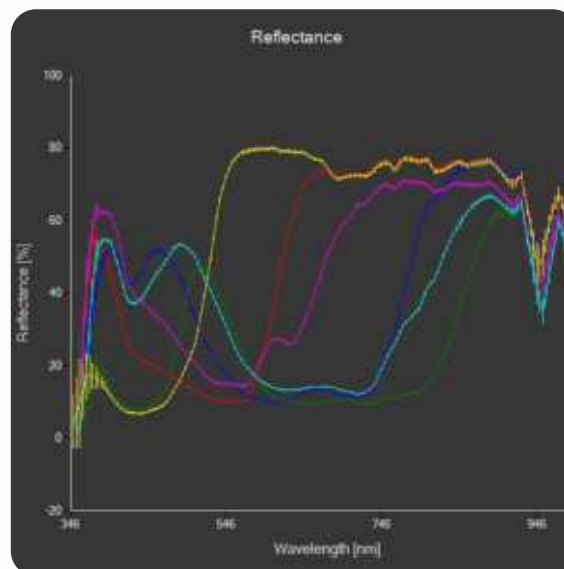
	ULTRIS 5	ULTRIS X20 / X20 Plus	ULTRIS XMR	ULTRIS SWIR 1
	Entry / OEM Camera	Premium UV-VIS-NIR Camera	Next-Gen HR Camera	Hyperspectral SWIR Camera
Applications	OEM (food, quality control), life science (skin, brain, surgery), compatible with medical imaging devices, affordable HSI camera for scientists	UAV-based aerial mapping, remote sensing, field and lab use, scientific research, reference model for exploring wavelengths in industrial applications	Real-time tracking and monitoring, security-related tasks, chemical imaging across multiple fields, life science (skin, brain, surgery), compatible with medical imaging devices	All SWIR applications, from remote sensing to industrial quality control (e.g., detecting water content/humidity), compatible with C-mount devices
Key Features	Most versatile, available C-mount lens adapter, as high-speed version with up to 75 fps, and as ruggedized version.	Highest quality, X20 Plus adds a high-resolution panchromatic sensor, ideal for UAV aerial imaging. Pansharpening for improved spatial resolution.	Next-gen camera with 17 fps, powered via USB3, offering the highest spectral resolution of the lineup. Easy to use with integrated relay lens for mounting any C-mount lenses and optical systems.	First hyperspectral snapshot SWIR camera, extremely fast (80 fps), USB3 connection. Ideal for industries requiring SWIR imaging.
Price Range	Entry-level	Premium	Mid-range	Mid-range
Wavelength Range	450 - 850 nm	350 - 1000 nm	430 - 910 nm	980 - 1650 nm
Spectral Bands	51	164	61	38
Spectral Sampling	8 nm	4 nm	8 nm	18 nm
FWHM	26 nm @ 532 nm	Constant 10 nm	Constant 25 nm	Avg. 80 nm
Bandpass Filter	LVF	Mosaic	Mosaic	LVF
Spatial Resolution	290 x 275 pixel	410 x 410 pixel, X20P: 1886 x 1886 pixel (Pan)	1000 x 1000 pixel	200 x 200 pixel
Total Data Points	51 x 79 750 (4M)	164 x 168 100 (24.5M)	61 x 1 000 000 (61M)	38 x 40 000 (1.5M)
Lens / Optics	C-mount 2/3"	-	C-mount 4/3"	C-mount 2/3", 1"
FOV (Field of View)	15° (w/o lens) / lens-dependent	35°	lens-dependent	lens-dependent
Max Frame Rate	15 Hz / 75 Hz (HFR)	max 4 Hz	17 Hz (8 bit) / 12 Hz (12 bit)	80 Hz
Data Link	GigE / 10 GigE (HFR)	GigE	USB 3.0	USB 3.0
Integration Time	0.1 – 1000 ms	0.1 – 1000 ms	0.1 – 1000 ms	0.1 – 1000 ms
Data Depth	12 bit	12 bit	12 bit	12 bit
Technology	Light Field	Light Field, Dual Sensor (X20P)	Light Field	Light Field
Readout	Global Shutter	Global Shutter	Global Shutter	Global Shutter
Sensor	Sony IMX264	CMOSIS CMV20000, Sony IMX264 (X20P)	Sony IMX540	Sony IMX990
File size processed	< 8 MB	< 55 MB	~300 MB	3 MB
Weight	126 g	350 g / 630 g (X20P)	700 g	140 g (w/o lens)
Dimensions	29 x 29 x 65 mm	60 x 60 x 57 mm / 86 x 121 x 105 mm (X20P)	40 x 40 x 217 mm	30 x 30 x 85 mm (w/o lens)
Options	C-mount adapter High Frame Rate (HFR) Industrial Housing (IP66)	only X20: Industrial Housing (IP66) Underwater Housing (IP68)	Wavelength range customizable	-

Radiometric Calibration

Over the past few years, we have made significant advancements to our basic software, which we are excited to share with our customers.

Thanks to our improved manufacturing capabilities, we are now able to perform radiometric calibration on all camera products. This means that all of our cameras, in addition to the well-known data formats of **Raw Data** and **Reflectance**, are now able to take **Radiance** data as well. This is crucial for any calibration process, whether it's in-field or in-lab, or for the precise characterization of light, just to name a few examples.

Reflectance, which is the dimensionless ratio of reflected to incident radiation, and radiance, which describes the energy flux leaving the surface and has a physical unit ($\text{W}/\text{m}^2 \text{ sr nm}$), are both now supported.



GET IN CONTACT WITH OUR SALES TEAM



Dr. Viktoriya Tsyganskaya

Sales Operations Manager

+49 731 708156 - 78

tsyganskaya@cubert-gmbh.de



Dr. Marie-Theres Heine

Head of Sales

+49 731 708156 - 70

marie-theres.heine@cubert-gmbh.de



Barbara Darnell

Sales Manager USA & Canada

M: 1.617.586.5952

darnell@cubert-gmbh.de



Dr. Matthias Locherer

Director Global Market Development

+49 731 708156 - 70

locherer@cubert-gmbh.de