

# ULTRACAM

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# Why I fly UltraCam.

 [www.iFlyUltraCam.com](http://www.iFlyUltraCam.com)



"Exceptional price-to-performance ratio. That's why I fly UltraCam." *(Ken Potter, Keystone Aerial Surveys)*

To excel in the competitive aerial surveying market, Ken Potter knows that his organization has to fly projects quickly, accurately, and cost-effectively. That is why he chooses the high-performance UltraCam for digital-image acquisition at Keystone Aerial Surveys.

UltraCam sensor systems feature a rapid frame rate and extraordinary image footprint. The vast amount of pixels across each frame means fewer

necessary flight lines. Additional features include exchangeable, high-capacity storage devices for longer missions and cutting-edge technology to produce quality, accurate imagery.

And every UltraCam system includes the powerful UltraMap photogrammetric workflow software for postprocessing UltraCam data.

"Amazing project results,  
3-D data capability.  
That's why I fly  
UltraCam."

*Monsieur Gheorghe Munceanu,  
Société Topographie Informatique*





"Our customers literally don't want imagery from any other camera. That's why I fly UltraCam."

*(Jorge Mauro Barja Arteiro, Topocart)*

In response to logistical challenges and dangerous conditions in Africa, the Topocart team required state-of-the-art imaging and high capacity digital storage combined with the personal attention of a knowledgeable support team. That's why Topocart chooses Microsoft UltraCam.

UltraCam's flexibility, precision and image quality has supported Mr. Arteiro's ambitions of geographic expansion from Brazil to Angola, Mozambique, Spain and the United States. With

the ease and cost effectiveness of upgrades, Topocart stays on the leading edge of digital mapping technology while saving money by capturing more information in less time. Microsoft continues to assist the growing needs of businesses like Topocart with an innovation path that includes the UltraCam Eagle, featuring an ultra-large image footprint and revolutionary enhancements for high-quality imagery at unprecedented efficiencies.

"There's no comparison when you look at quality, price and operational efficiency. That's why I fly UltraCam."

*Daniel Haywood, Managing Director, Ramani Geosystems (left)*  
*Vincent Kimaiyo, Operations, Ramani Geosystems (right)*



"Reliability, efficiency, and exceptional picture quality. That's why I fly UltraCam." *(Xiang Yu, Peace Map Co., Ltd.)*

With plans to establish a high-resolution aerial image library of China and customers across 30 different government departments, Peace Map Co., Ltd. (PMC) needed a quality digital photogrammetric system to effectively serve their large market. That's why PMC chose Microsoft UltraCam for their digital-image acquisition.

Mr. Xiang knows that the cost to fly missions is his greatest operational expense. Thanks to the large image footprint and stable performance of the

UltraCam, he has seen a significant increase in efficiency compared to other digital aerial cameras. The continual innovation of the UltraCam helps PMC deliver breathtaking images to customers, reduce costs, and plan for steady growth into the future.





## Ultra-flexible

- Photogrammetry meets oblique
- Photogrammetric nadir (11,674 x 7,514 pixel) and four oblique images from one sensor
- Ideal for urban mapping and 3D city modeling
- Nadir channels: PAN, RGB, NIR
- Nadir CCD pixel size: 6.0  $\mu\text{m}$
- Nadir focal length: 80 mm
- Nadir pan-sharpen ratio: 1:2
- Oblique channels: RGB
- Oblique CCD pixel size: 6.0  $\mu\text{m}$
- Oblique focal length: 120 mm
- Max. frame rate: 1.8 s
- SSD storage size: 4 TB, 4200 images
- Weight, power: ~ 68 kg, 350 W



## Ultra-large

- 20,010 x 13,080 pixel
- Exchangeable photogrammetric lens system (80 mm, 100 mm or 210 mm)
- One system for efficient data collections at low and high altitudes
- Nadir channels: PAN, R, G, B, NIR
- Nadir CCD pixel size: 5.2  $\mu\text{m}$
- Nadir focal length: 80, 100, 210 mm
- Nadir exchangeable lens system: Yes
- Nadir pan-sharpen ratio: 1:3
- Max. frame rate: 1.8 s
- SSD storage size: 4 TB, 3900 images
- Weight, power: ~ 65-72 kg, 350 W





## Ultra-fast

- Up to 1 second frame rate
- Available in 2 image footprint sizes (14,430 x 9,420 pixel or 17,310 x 11,310 pixel)
- Nadir channels: PAN, R, G, B, NIR
- Nadir CCD pixel size: 7.2  $\mu\text{m}$  | 6.0  $\mu\text{m}$
- Nadir focal length: 70, 100 mm
- Nadir pan-sharpen ratio: 1:3
- Max. frame rate: 1.0 s | 1.35 s
- SSD storage size: 4 TB, 7500 | 5200 images
- Weight, power: ~ 65 kg, 350 W



[www.UltraCamFalcon.com](http://www.UltraCamFalcon.com)

## Ultra-handy

- Light weight of ~55 kg (121 lbs)
- UltraCam image quality @ low budget
- 11,704 x 7,920 pixel
- Ideal for smaller aircrafts and smaller projects
- Nadir channels: PAN, RGB, NIR
- Nadir CCD pixel size: 6.0  $\mu\text{m}$
- Nadir focal length: 70 mm
- Nadir pan-sharpen ratio: 1:2.12
- Max. frame rate: 2.0 s
- SSD storage size: 2 TB, 3500 images
- Weight, power: ~ 55 kg, 250 W



[www.UltraCamHawk.com](http://www.UltraCamHawk.com)



# ULTRACAM



➔ [www.UltraCamOsprey.com](http://www.UltraCamOsprey.com)



# Ultra-flexible

A whole new breed of camera, the Microsoft UltraCam Osprey digital photogrammetric camera system combines a high performing photogrammetric nadir camera with oblique capture capability, offering a more versatile dataset than other oblique systems on the market today.



More than a standard camera, the UltraCam Osprey houses two cameras in one photogrammetric grade housing, using cutting edge technology to collect photogrammetry-grade nadir images (PAN, RGB, NIR) and oblique images (RGB) simultaneously, serving applications such as cadastre, infrastructure planning, DTMOortho or DSMOrtho generation. Like all UltraCam systems, the UltraCam Osprey delivers subpixel accuracy, high dynamic range, and integrates all system components in the sensor head including the optional UltraNav direct georeferencing and flight management subsystem, as well as full UltraMap software support.

With best-in-class flight collection efficiency, the UltraCam Osprey is designed so that the full swath width of the nadir cone (11,674 pixel) can be used and oblique image overlap is high enough to generate oblique orthos as well as textured DSMs. The UltraCam Osprey is the ideal sensor system for projects such as urban mapping and 3D city modeling.

## Features

- Combines a high performing photogrammetric nadir camera with oblique capture capability.
- 3rd generation custom electronics deliver a 1 frame per 1.8 second frame rate.
- An integrated package that contains all components in the sensor head, including an optional embedded OEM UltraNav GPS/INS/FMS system, and modular solid-state storage, providing flexibility for onboard orientation of equipment.
- An in-flight exchangeable solid-state image storage system to store more than 4,200 images, resulting in minimal ground time.
- Panchromatic nadir image size 11,674 \* 7,514 pixels, with a panchromatic nadir physical pixel size of 6.0  $\mu\text{m}$ , offered by the latest CCD technology, new custom lenses and filters, and silent-board camera electronics.
- A user-focused interface with touchscreen technology to ease configuration and operation and allow in-flight control of each image.
- Power consumption at full performance, including computer and storage module: 350 watts

The UltraCam Osprey camera is designed so that the oblique and nadir images overlap. Oblique image cones are mounted rigidly in the camera with photogrammetric grade accuracy and are calibrated with respect to geometry and radiometry. Enhanced by the oblique and nadir image overlap, the oblique image orientation can be further improved by automated tie point matching. Offering 3D generation and state-of-the-art electronics under one sensor head, UltraCam Osprey is taking photogrammetry to new levels.

## Key Parameters

### Image Product Specification

- Image units: Nadir Pan, Nadir RGB, Nadir IR, Oblique Forward, Backward, Left, Right, RGB
- Image storage format in level 2: Full resolution panchromatic, separate color channels at color resolution (Nadir and oblique)
- Color at level 3: full resolution R, G, B, Near-IR channels, planar or pixel-interleaved (Nadir and oblique)

### Camera Digital Sensor Subsystem

- Panchromatic nadir image size: 11,674 \* 7,514 pixels
- Panchromatic nadir physical pixel size: 6.0  $\mu\text{m}$
- Panchromatic lens focal distance: 80 mm
- Input data quantity per image: 1055 MB
- Color (RGB Bayer pattern) oblique image size forward, backward, left and right image: 8,900 \* 6,650 pixels
- Oblique lens focal distance: 120 mm
- Maximum frame rate < 1.8 seconds per frame
- CCD signal to noise ratio: 72 dB; CCD image dynamic: 14 bit; workflow dynamic: 16 bit
- Physical dimensions of the camera; including computer and storage module: 43 cm x 43 cm x 76 cm
- Weight of the camera; including computer and storage module: ~ 68 kg
- Power consumption at full performance; including computer and storage module: ~350 W

### Camera Computer and Data Storage Subsystem

- Solid state disc pack, with RAID system for data protection
- Unlimited with use of multiple data units with approximately 4 TB (4200 images) per unit

### Camera Operational Specification

- Data recording time @ 10 cm GSD, 60 percent forward overlap, 140 kts @ 8 hours per data unit
- Image geometric accuracy: better  $\pm 2 \mu\text{m}$



# UltraCam Osprey Prime - Technical Specifications

Image Product Specification	
Image units Nadir Pan, Nadir RGB, Nadir IR, Oblique Forward, Backward, Left, Right	
Image data formats	JPEG; TIFF with options for 8 and 16 bits, standard tiff format
Image storage format in level 2	Full resolution panchromatic, separate color channels at color resolution
Camera Digital Sensor Subsystem	
Panchromatic nadir image size	11,674 * 7,514 pixels
Panchromatic nadir physical pixel size	6.0 µm
Physical format of the nadir focal plane	70.04 mm * 45.08 mm
Color (multi-spectral capability) nadir	4 channels – RGB & NIR
Color (RGB Bayer pattern) image size (nadir)	6,735 * 4,335 pixels
Color physical pixel size (oblique)	6.0 µm
PAN-sharpen ratio	1:2
Lens system NADIR	Linor Vexcel Apo-Sironar digital HR DIGARON
Panchromatic lens focal distance	80 mm
Lens aperture	f= 1/4
Total field of view, cross track (along track)	47° (31°)
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	1350 m
Color lens system focal distance	40 mm
Color lens aperture	f = 1/4.5
Total color field of view, cross track (along track)	47° (31°)
Color (RGB Bayer pattern) oblique image size forward, backward, left and right image	8,900 * 6,650 pixels
Color physical pixel size (oblique)	6.0 µm
Lens system OBLIQUE	Linor Vexcel Apo-Sironar digital HR DIGARON
Oblique lens focal distance	120 mm
Lens aperture	f= 1/4
Total field of view, cross track (along track)	45° +9,5°-15,7° (45° +/- 9,5°)
Input data quantity per image (RAW and DAT files)	1055 Mega Bytes
Shutter system	Prontor magnetic 0 HS – Vexcel
Shutter speed options	1/1000 to 1/64
Forward-motion compensation (FMC)	TDI controlled
Maximum FMC-capability	50 pixels
Frame rate per second (minimum inter-image interval)	1 frame per 1.8 seconds
CCD signal to noise ratio	72 dB
Radiometric resolution in each channel	> >12 bit
Analog-to-digital conversion at	14 bits
Workflow dynamic	16 bits
Physical dimensions of the camera; including computer and storage module	43 cm x 43 cm x 76 cm
Weight of the camera; including computer and storage module	~ 68 kg
Power consumption at full performance; including computer and storage module	~350 W
Camera Computer And Data Storage Subsystem	
Concept	Modular stack, stacked onto sensor head or released with cabling to sensor head
In-flight storage system	Solid state disc pack, with RAID system for data protection
In-flight storage capacity	Unlimited with use of multiple data units data; per data unit ~ 4,200 images
Weight of data unit	< 3 kg
Method of exchanging data units in-flight	less than 2 minutes
Physical dimensions of module	Width 43 cm x Depth 43 cm x Height 35 cm
Weight of module	< 30 kg
Power consumption at full performance	150 W
Camera Operational Specification	
Operating / storage temperature	0 °C to 45 °C / -20 °C to 65 °C
Humidity	5 % ... 95 % no condensation
Flight altitude non-pressurized (full accuracy, full temperature range)	≤ 5,000 m AGL
Flight altitude non-pressurized (reduced temperature range; 0 °C to 25 °C)	≤ 7,000 m AGL
Flight altitude pressurized aircraft	no limitation unless cabin pressure stays above 5,000 m pressure
Data transfer from aircraft to office	Shipping of data unit, or transfer by high capacity storage medium
Post-processing of collected raw images	UltraMap, UM/AT extension, PC network or Laptop
Mounting of the camera	UltraMount 3000, latest revision, PAV-80
Integrated GPS/INS/FMS system	UltraNav (Applanix POstrack OEM) full embedded into camera head
Image geometric accuracy	Better ±2 µm

# ULTRACAM

 EAGLE

 [www.UltraCamEagle.com](http://www.UltraCamEagle.com)



# Ultra-large

The Microsoft UltraCam Eagle represents a revolution in digital photogrammetric camera systems and sets new industry standards for digital aerial photography, enabling customers to soar to new heights with their mapping projects.



UltraCam Eagle builds on the award-winning UltraCam legacy and reputation, establishing Microsoft's UltraCam "third-generation" architecture.

With the UltraCam Eagle Microsoft introduces a modular housing concept, setting a new standard in component integration, which reduces sensor head size and balances weight. The updated sensor head offers an exchangeable lens system with three different focal lengths - a groundbreaking enhancement in digital photogrammetry - and is specifically designed for high-resolution digital aerial photography. UltraCam Eagle also features filters with curved

characteristics and silent-board camera electronics, further ushering in revolutionary aerial photogrammetric technology. Embedded in the integrated component package is UltraNav, a flight management and georeferencing system that includes state-of-the-art GNSS-Inertial technology, pilot displays, and flight-planning software.

The result is an ultra-reliable, ultra-efficient, ultra-large-footprint camera that screams through image acquisitions, captures the smallest details, and enables direct and swift flights that are not limited by technology.



## Features

**The most innovative and advanced UltraCam system to date, offering revolutionary product features that include:**

- Largest PAN frame image footprint of ultra-large format cameras; more than 20,000 pixels across the flight strip.
- Custom electronics that deliver 3.7 gigabits per second of image collection, resulting in a frame rate of less than 1.80 seconds and forward overlapping of 80 percent at 284 kts for 10 cm GSD images.
- An integrated package that contains all components in the sensor head, including an embedded OEM UltraNav GPS/INS/FMS system, and modular solid-state storage, providing flexibility for onboard orientation of equipment.
- An in-flight exchangeable solid-state image storage system to store more than 3,900 images, resulting in minimal ground time.
- Exchangeable lens system configurations with three different focal lengths for greater flexibility, from lower-altitude engineering applications to high-altitude orthophotography projects.
- Pixel size of 5.2  $\mu\text{m}$ , as well as enhanced PAN 7,600 gray values per pixel, offered by the latest CCD technology, new custom lenses and filters, and silent-board camera electronics.
- A user-focused interface with touchscreen technology to ease configuration and operation and allow in-flight control of each image.
- A compact unit weighing less than 75 kg (165 lbs) and reduced power consumption of 350 watts @ 24-28 VDC for increased flight efficiency.

UltraCam Eagle offers the ultimate in reliability and efficiency for digital aerial photography. With a PAN image footprint of more than 20,000 pixels across the flight strip, and an image capture rate of 1 image in 1.8 seconds, it soars beyond the traditional large-format cameras. The solid-state storage system stores 3,900 superior-quality images and can be exchanged in flight to meet any storage need.

Despite its expansive digital footprint, the UltraCam Eagle is a lightweight, integrated system that features a smaller physical footprint—taking up less aircraft space and providing the utmost in fuel economy. It also consumes less power than other cameras for even more cost savings. With UltraCam Eagle, customers can take to the skies, capture more data in less time, and complete mapping projects in fewer flight lines and with greater efficiency than ever before.

## Key Parameters

### Image Product Specification

- Image format analogous to an aerial film image at a format of 23 cm x 15 cm, scanned at 12  $\mu\text{m}$
- Image data formats: JPEG; TIFF with options for 8 and 16 bits, standard TIFF format
- Image storage format in level 2: full resolution panchromatic, separate color channels at color resolution

### Camera Digital Sensor Subsystem

- Panchromatic image size: 20,010 x 13,080 pixels
- Panchromatic physical pixel size: 5.2  $\mu\text{m}$
- Input data quantity per image: 1050 MB, 260 megapixel
- Lens system 1: 80 mm PAN and 27 mm RGBNIR
- Lens system 2: 100 mm PAN and 33 mm RGBNIR, exchangeable by a trained end user, no recalibration required after lens exchange
- Lens system 3: 210 mm PAN and 70 mm RGBNIR, exchangeable by a trained end user, no recalibration required after lens exchange
- Maximum frame rate <1.8 seconds per frame
- CCD signal to noise ratio: 72 dB
- CCD image dynamic: 14 bit; workflow dynamic: 16 bit
- Physical dimensions with 80 or 100 mm (210 mm) PAN lenses, including computer and storage module: 43 cm x 43 cm x 73 cm (80 cm)
- Weight with 80 or 100 mm (210 mm) PAN lenses, including computer and storage module: approximately 65 kg (72 kg)
- Power consumption at full performance, including computer and storage module: 350 watts

### Camera Computer and Data Storage Subsystem

- Solid-state disc pack, with RAID system for data protection
- Unlimited with use of multiple data units with approximately 4 TB (3,900 images) per unit

### Camera Operational Specification

- Data recording time @ 10 cm GSD, 60 percent forward overlap, 140 kts @ 8 hours per data unit
- Maximum forward overlap @ 10 cm GSD (@ 5 cm GSD) with 140 kts @ 90 percent (80 percent)
- Maximum flight speed @ 10 cm GSD (@ 5 cm GSD) with 80 percent forward overlap @ 268 kts (134 kts)



# UltraCam Eagle - Technical Specifications

Image Product Specification	
Image format	Analogous to an aerial film image at a format of 23 cm x 15 cm, scanned at 12 µm
Image data formats	JPEG; TIFF with options for 8 and 16 bits, standard tiff format
Image storage format in level 2	Full resolution panchromatic, separate color channels at color resolution
Color at level 3	Full resolution R, G, B, Near-IR channels, planar or pixel-interleaved
Camera Digital Sensor Subsystem	
Panchromatic image size	20,010 * 13,080 pixels
Panchromatic physical pixel size	5.2 µm
Input data quantity per image	1050 Mega Bytes
Physical format of the focal plane	104.05 mm * 68.02 mm
Color (multi-spectral capability)	4 channels – R, G, B & NIR
Color image size	6,670 * 4,360 pixels
Color physical pixel size	5.2 µm
PAN-sharpen ratio	1:3
<i>Lens system "f80"</i>	<i>Linos Vexcel Apo-Sironar digital HR</i>
Panchromatic lens focal distance	80 mm
Total field of view, cross track (along track)	66° (46°)
Lens aperture	f = 1/5.6
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	1,540 m
Color lens system focal distance	27 mm
Color lens aperture	f = 1/4.0
<i>Lens system "f100"</i>	<i>Linos Vexcel Apo-Sironar digital HR</i>
Panchromatic lens focal distance	100 mm
Total field of view, cross track (along track)	55° (37°)
Lens aperture	f = 1/5.6
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	2,019 m
Color lens system focal distance	33 mm
Color lens aperture	f = 1/4.0
<i>Lens system "f210"</i>	<i>Linos Vexcel Apo-Sironar digital HR</i>
Panchromatic lens focal distance	210 mm
Lens aperture	f = 1/5.6
Total field of view, cross track (along track)	28° (20°)
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	4,040 m
Color lens system focal distance	70 mm
Color lens aperture	f = 1/4.0
Lens systems are exchangeable by a specifically trained end user expert or Vexcel Imaging GmbH without re-calibration	
Shutter system	Prontor magnetic 0 HS – Vexcel
Shutter speed options	1/1000 to 1/64
Forward-motion compensation (FMC)	TDI controlled
Maximum FMC-capability	50 pixels
Frame rate per second (minimum inter-image interval)	1 frame per 1.8 seconds
CCD signal to noise ratio	72 dB
Radiometric resolution in each channel	>>12 bit
Analog-to-digital conversion at	14 bits
Workflow dynamic	16 bits
Physical dimensions of the camera with 80 or 100 mm (210 mm) PAN lenses; including computer and storage module	43 cm x 43 cm x 73 cm (80 cm)
Weight of the camera with 80 or 100 mm (210 mm) PAN lenses; including computer and storage module	~ 65 kg (~ 72 kg)
Power consumption at full performance; including computer and storage module	350 W
Camera Computer And Data Storage Subsystem	
Concept	Modular stack, stacked onto sensor head or released with cabling to sensor head
In-flight storage system	Solid state disc pack, with RAID system for data protection
In-flight storage capacity	Unlimited with use of multiple data units; per data unit 4 TB, ~ 3,900 images
Weight of data unit	< 3 kg
Method of exchanging data units in-flight	In less than 2 minutes
Physical dimensions of module	Width 43 cm x Depth 43 cm x Height 35 cm
Weight of module	< 30 kg
Power consumption at full performance	150 W
Camera Operational Specification	
Operating / storage temperature	0 °C to 45 °C / -20 °C to 65 °C
Humidity	5 % ... 95 % no condensation
Flight altitude non-pressurized (full accuracy, full temperature range)	≤ 5000 m AGL
Flight altitude non-pressurized (reduced temperature range; 0 °C to 25 °C)	≤ 7000 m AGL
Flight altitude pressurized aircraft	no limitation unless cabin pressure stays above 5000 m pressure
Data transfer from aircraft to office	Shipping of data unit, or transfer by high capacity storage medium
Post-processing of collected raw images	UltraMap, UM/AT extension, PC network or Laptop
Photogrammetric Production	TIFF-output compatible with Customer's photogrammetric production software
Extended Ortho Workflow	Full ortho workflow by UltraMap
Mounting of the camera	Using adapter ring for most current film camera mounts (UltraMount GSM 3000, PAV-80)
Integrated GPS/INS/FMS system	UltraNav (Applanix POSTrack OEM) full embedded into camera head
Flight planning support (external FMS)	Compatible with all major commercial systems (TrackAir, CCNS-4, ...)
Exterior orientation support (external GPS/INS system)	Compatible with all major DGPS/IMU systems (Applanix POS-AV, IGI Aero-Control, ...)
Image geometric accuracy	Better ±2 µm

# ULTRACAM

FALCON

→ [www.UltraCamFalcon.com](http://www.UltraCamFalcon.com)



# Ultra-fast

With the choice of two image footprints and two focal lengths, Microsoft UltraCam Falcon digital photogrammetric camera system provides customers with a versatile platform for aerial imaging projects.



With the introduction of the UltraCam Falcon, Microsoft continues to add products to its third-generation camera line that maximize customer benefits with sensor systems that provide unique features and capabilities at varying price points. Like all UltraCam systems, the UltraCam Falcon was designed with the different needs of aerial camera users in mind, such as varying project requirements and budget restrictions. To address these differences, the UltraCam Falcon is available in custom configurations, selected at the time of purchase, while also leveraging the impressive computing, storage, electronics and UltraNav technology introduced with the ultra-large UltraCam Eagle.

The UltraCam Falcon provides enhanced flexibility and operational efficiency compared to comparable digital camera technologies in its class. At the time of purchase, customers select from two image footprint sizes and two lens focal lengths, as well as two housing configurations. To meet the evolving needs of the customer data acquisition company, the UltraCam Falcon can be upgraded to become an UltraCam Eagle.



## Features

- Image footprint capacity: 14,430 \* 9,420 pixels or 17,310 \* 11,310 pixels across the flight strip.
- Lens focal length options: choice of 100 mm (standard) or 70 mm (wide angle) focal length PAN lens systems to meet each customer's specific project needs.
- Housing configuration options: choice of a fully integrated system or separate sensor head and external computer/storage unit, elected at time of purchase.
- An integrated package that contains all components in the sensor head, including a solid-state image storage system to store approximately 7,500 images (with 14,430 pixel footprint) and 5,200 images (with 17,310 pixel footprint). Storage units can be exchanged in flight, resulting in minimal ground time.
- Capture PAN, color and NIR data all in one pass.
- PAN 14,000 gray values per pixel, offered by the latest CCD technology and silent-board camera electronics, for optimal radiometry and photogrammetric results.
- A user-focused interface with touch-screen technology to ease configuration and operation, and allow in-flight control of each image.
- A compact unit weighing less than 65 kg (143 lbs) and reduced power consumption of 350 watts @ 24-28 VDC for increased flight efficiency.

To address the growing demand for lighter sensor packages with smaller form factors, the UltraCam Falcon integrates all system components into the sensor head, including the UltraNav embedded GPS/INS/FMS system. The result is a complete data acquisition system that sits over the camera mount, occupies less space in the aircraft, weighs less and minimizes the amount of external hardware devices, connections and cables. Installation is simpler and "cleaner".

## Key Parameters

### Image Product Specification

- Image data formats: JPEG; TIFF with options for 8 and 16 bits, standard tiff format
- Image storage format in level 2: full resolution panchromatic, separate color channels at color resolution
- Color at level 3: full resolution R, G, B, Near-IR channels, planar or pixel-interleaved

### Camera Digital Sensor Subsystem

- Panchromatic image size: 14,430 \* 9,420 (17,310 \* 11,310 pixels)
- Panchromatic physical pixel size: 7.2  $\mu\text{m}$  (6.0  $\mu\text{m}$ )
- Input data quantity per image: 546 MB | 787 MB (200 megapixel | 135 megapixel)
- Maximum frame rate < 1.0 | 1.35 seconds per frame
- CCD signal to noise ratio: 72 dB
- CCD image dynamic: 14 bit; workflow dynamic: 16 bit
- Physical dimensions with 100 mm (70 mm) PAN lenses, including computer and storage module: 43 cm x 43 cm x 73 cm
- Weight with 100 mm (70 mm) PAN lenses, including computer and storage module: approximately 65 kg
- Power consumption at full performance, including computer and storage module: 350 watts

### Camera Computer and Data Storage Subsystem

- Solid-state disc pack with RAID system for data protection
- Unlimited with use of multiple data units with approximately 4 TB (7500 images | 5200 images) per unit

### Camera Operational Specification

- Data recording time @ 10 cm GSD, 60 percent forward overlap, 140 kts @ 8 hours per data unit
- Maximum forward overlap @ 10 cm GSD (@ 5 cm GSD) with 140 kts @ 92 % (85 %) (87 % (75 %))



# UltraCam Falcon | UltraCam Falcon Prime - Technical Specifications

Image Product Specification	
Image format	Analogous to an aerial film image at a format of 23 cm x 15 cm, scanned at 15 µm
Image data formats	JPEG; TIFF with options for 8 and 16 bits, standard tiff format
Image storage format in level 2	Full resolution panchromatic, separate color channels at color resolution
Color at level 3	Full resolution R, G, B, Near-IR channels, planar or pixel-interleaved
Camera Digital Sensor Subsystem	
Panchromatic image size	14,430 * 9,420 pixels   17,310 * 11,310 pixels
Panchromatic physical pixel size	7.2 µm   6.0 µm
Input data quantity per image	546 MB   787 MB
Physical format of the focal plane	103.89 mm * 67.82 mm   103.86 mm * 67.86 mm
Color (multi-spectral capability)	4 channels – R, G, B & NIR
Color image size	4,810 * 3,140 pixels   5,770 * 3,770 pixels
Color physical pixel size	6.0 µm
PAN-sharpen ratio	1:3
<i>Sensor configuration "f70"</i> <span style="float: right;">Linor Vexcel Apo-Sironar digital HR</span>	
Panchromatic lens focal distance	70 mm
Total field of view, cross track (along track)	73° (52°)
Lens aperture	f = 1/5.6
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	972 m   1,167 m
Color lens system focal distance	23 mm
Color lens aperture	f = 1/4.0
<i>Sensor configuration "f100"</i> <span style="float: right;">Linor Vexcel Apo-Sironar digital HR</span>	
Panchromatic lens focal distance	100 mm
Total field of view, cross track (along track)	55° (37°)
Lens aperture	f = 1/5.6
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	1,400 m   1,675 m
Color lens system focal distance	33 mm
Color lens aperture	f = 1/4.0
Shutter system	Prontor magnetic 0 HS – Vexcel
Shutter speed options	1/1000 to 1/64
Forward-motion compensation (FMC)	TDI controlled
Maximum FMC-capability	50 pixels
Frame rate per second (minimum inter-image interval)	1 frame per 1.0 seconds   1 frame per 1.35 seconds
CCD signal to noise ratio	72 dB
Radiometric resolution in each channel	> 12 bit
Analog-to-digital conversion at	14 bits
Workflow dynamic	16 bits
Physical dimensions of the camera; including computer and storage module	43 cm x 43 cm x 73 cm
Weight of the camera; including computer and storage module	~ 65 kg
Power consumption at full performance; including computer and storage module	350 W
Camera Computer And Data Storage Subsystem	
Concept	Modular stack, stacked onto sensor head or released with cabling to sensor head
In-flight storage system	Solid state disc pack, with RAID system for data protection
In-flight storage capacity	Unlimited with use of multiple data units; per data unit 4 TB, ~ 7,500 images   ~ 5,200 images
Weight of data unit	< 3 kg
Method of exchanging data units in-flight	In less than 2 minutes
Physical dimensions of module	Width 43 cm x Depth 43 cm x Height 35 cm
Weight of module	< 30 kg
Power consumption at full performance	150 W
Camera Operational Specification	
Operating / storage temperature	0 °C to 45 °C / -20 °C to 65 °C
Humidity	5 % ... 95 % no condensation
Flight altitude non-pressurized (full accuracy, full temperature range)	≤ 5,000 m AGL
Flight altitude non-pressurized (reduced temperature range; 0 °C to 25 °C)	≤ 7,000 m AGL
Flight altitude pressurized aircraft	no limitation unless cabin pressure stays above 5000 m pressure
Data transfer from aircraft to office	Shipping of data unit, or transfer by high capacity storage medium
Post-processing of collected raw images	UltraMap, UM/AT extension, PC network or Laptop
Photogrammetric Production	TIFF-output compatible with Customer's photogrammetric production software
Extended Ortho Workflow	Full ortho workflow by UltraMap
Mounting of the camera	Using adapter ring for most current film camera mounts (UltraMount GSM 3000, PAV-80)
Integrated GPS/INS/FMS system	UltraNav (Applanix POSTrack OEM) full embedded into camera head
Flight planning support (external FMS)	Compatible with all major commercial systems (TrackAir, CCNS-4, ...)
Exterior orientation support (external GPS/INS system)	Compatible with all major DGPS/IMU systems (Applanix POS-AV, IGI Aero-Control, ...)
Image geometric accuracy	Better ±2 µm

# ULTRACAM

 HAWK

 [www.UltraCamHawk.com](http://www.UltraCamHawk.com)



 Microsoft

# Ultra-handy

The UltraCam Hawk is Microsoft's base model of large-format digital aerial camera systems, ideal for smaller aircraft and local projects that require a rapid response.



The UltraCam Hawk is based on the third-generation UltraCam architecture that was introduced with the UltraCam Eagle and that is also the underlying technology for the UltraCam Falcon. This architecture provides features and benefits that include:

- Housing integrates all system components into a sensor head, including the UltraNav GPS/INS/FMS system. This makes the UltraCam Hawk quick and easy to install and require minimal aircraft space.
- In flight exchangeable solid state storage with built-in RAID-like mechanism for utmost data storage reliability.
- Advanced electronics for superior frame rate and an excellent 72 dB signal-to-noise ratio for high image dynamic. Details are visible in shadows and bright areas in images.
- Fast frame rate enables flexible mission profile and addresses the growing need for increased forward overlap.



## Features

- The system sensor head integrates the sensor, computing sub-systems, solid-state devices (storage sub-system), UltraNav direct georeferencing and flight management system for maximum reliability and aircraft space and weight efficiency
- Image footprint of 92 megapixels (11,704 x 7,920 pixels pan), ideal for smaller aircraft and local projects that require a rapid response
- 1:2.12 pan-to-color ratio delivers brilliant true-color and color-infrared (CIR) image quality with unmatched radiometric range
- Panchromatic Focal Length: 70 mm, Color and NIR 33 mm
- Short frame interval allows multi-ray photogrammetry even for large-scale mapping at low altitude and high aircraft speed; forward overlap of 80% is achieved at a 10 cm pixel size at 154 knots
- High level of detail with no blur due to Forward Motion Compensation (FMC) using Time Delayed Integration (TDI)
- Pixel size on the ground (GSD) at flying height of 900 m is 8 cm (at 500 m is 4.3 cm)
- Removable storage units provide two benefits: the length of missions is limited only by the constraints of the aircraft; ground time is minimized
- Maximum use of legacy environments; supports all standard gyro-stabilized camera mounts and most common GPS/IMU and flight management systems
- Weight of the camera including computer and storage module ~ 55 kg

With the UltraCam Hawk, Microsoft now offers an unparalleled upgrade path through a complete, multi-tiered product line of systems designed to meet varying project requirements and budget restrictions and that can be upgraded to the next system level through retrofit. The UltraCam Hawk provides smaller mapping companies with an affordable option for offering a digital platform and expanding their aerial services.

## Key Parameters

### Image Product Specification

- Image data formats: JPEG; TIFF with options for 8 and 16 bits, standard tiff format
- Image storage format in level 2: full resolution panchromatic, Bayer pattern RGB and separate NIR at color resolution
- Color at level 3: full resolution R, G, B, Near-IR channels, planar or pixel-interleaved

### Camera Digital Sensor Subsystem

- Panchromatic image size: 11,704 \* 7,920 pixels
- Panchromatic physical pixel size: 6.0  $\mu$ m
- Input data quantity per image: 416 MB (90 megapixel)
- Maximum frame rate < 2.0 seconds per frame
- CCD signal to noise ratio: 72 dB
- CCD image dynamic: 14 bit; workflow dynamic: 16 bit
- Physical dimensions with 70 mm PAN lenses, including computer and storage module: 43 cm x 43 cm x 73 cm
- Weight with 70 mm PAN lenses, including computer and storage module: approximately 55 kg
- Power consumption at full performance, including computer and storage module: 350 watts

### Camera Computer and Data Storage Subsystem

- Solid state disc pack with RAID system for data protection
- Unlimited with use of multiple data units; per data unit 2.0 TB, ~ 3,500 images

### Camera Operational Specification

- Data recording time @ 10 cm GSD, 60 percent forward overlap, 140 kts @ 8 hours per data unit
- Maximum forward overlap @ 10 cm GSD (@ 5 cm GSD) with 140 kts @ 82 percent (62 percent)



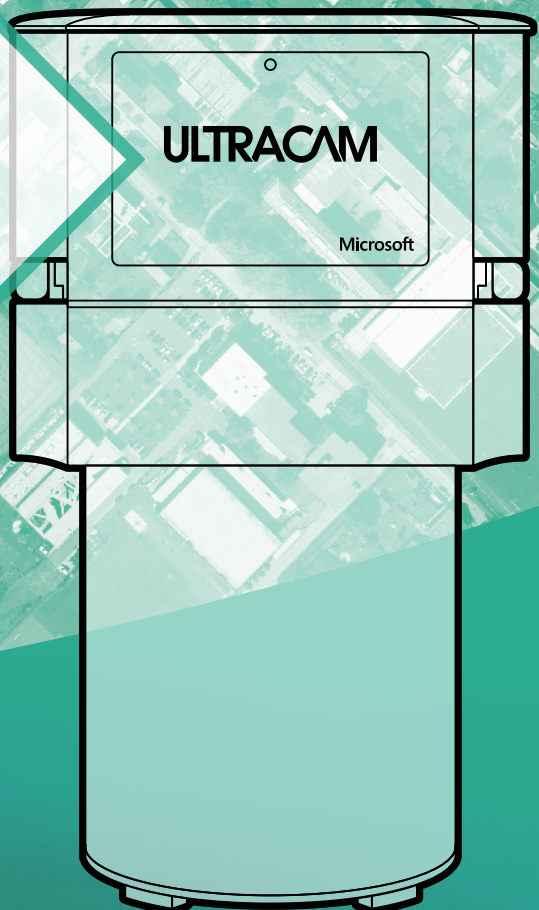
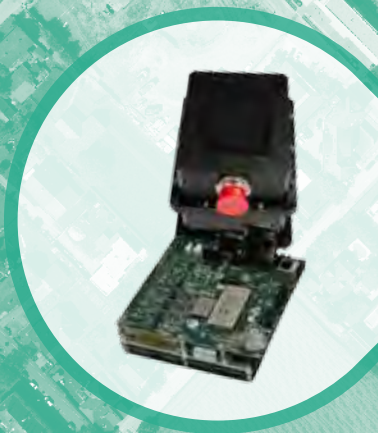
# UltraCam Hawk - Technical Specifications

Image Product Specification	
Image format	Analogous to an aerial film image at a format of 23 cm x 15 cm, scanned at 20 µm
Image data formats	JPEG; TIFF with options for 8 and 16 bits, standard tiff format
Image storage format in level 2	Full resolution panchromatic, Bayer pattern RGB and separate NIR at color resolution
Color at level 3	Full resolution R, G, B, Near-IR channels, planar or pixel-interleaved
Camera Digital Sensor Subsystem	
Panchromatic image size	11,704 * 7,920 pixels
Panchromatic physical pixel size	6.0 µm
Input data quantity per image	416 Mega Bytes
Physical format of the focal plane	70.22 mm * 47.52 mm
Color (multi-spectral capability)	4 channels – RGB & NIR
Color image size	5,320 * 3,600 pixels
Color physical pixel size	6.0 µm
PAN-sharpen ratio	1:2.12
Lens System	Linos Vexcel Apo-Sironar digital HR
Panchromatic lens focal distance	70 mm
Lens aperture	f = 1/5.6
Total field of view, cross track (along track)	53° (37°)
Flying height for PAN Pixel size on the ground of 10 cm (GSD)	1,167 m
Color lens system focal distance	33 mm
Color lens aperture	f = 1/4.0
Total color field of view, cross track (along track)	53° (37°)
Shutter system	Prontor magnetic 0 HS – Vexcel
Shutter speed options	1/1000 to 1/32
Forward-motion compensation (FMC)	TDI controlled
Maximum FMC-capability	50 pixels
Frame rate per second (minimum inter-image interval)	1 frame per 2.0 seconds
CCD signal to noise ratio	72 dB
Radiometric resolution in each channel	>>12 bit
Analog-to-digital conversion at	14 bits
Workflow dynamic	16 bits
Physical dimensions of the camera; including computer and storage module	43 cm x 43 cm x 76 cm
Weight of the camera; including computer and storage module	~ 55 kg
Power consumption at full performance; including computer and storage module	250 W
Camera Computer And Data Storage Subsystem	
Concept	Modular stack, stacked onto sensor head or released with cabling to sensor head
In-flight storage system	Solid state disc pack with RAID system for data protection
In-flight storage capacity	Unlimited with use of multiple data units; per data unit 2.0 TB, ~ 3,500 images
Weight of data unit	< 3 kg
Method of exchanging data units in-flight	In less than 2 minutes
Physical dimensions of module	Width 43 cm x Depth 43 cm x Height 35 cm
Weight of module	< 30 kg
Power consumption at full performance	130 W
Camera Operational Specification	
Operating / storage temperature	0 °C to 45 °C / -20 °C to 65 °C
Humidity	5 % ... 95 % no condensation
Flight altitude non-pressurized (full accuracy, full temperature range)	≤ 5000 m AGL
Flight altitude non-pressurized (reduced temperature range; 0 °C to 25 °C)	≤ 7000 m AGL
Flight altitude pressurized aircraft	No limitation unless cabin pressure stays above 5000 m pressure
Data transfer from aircraft to office	Shipping of data unit, or transfer by high capacity storage medium
Post-processing of collected raw images	UltraMap, UM/AT extension, PC network or Laptop
Photogrammetric Production	TIFF-output compatible with Customer's photogrammetric production software
Extended Ortho Workflow	Full ortho workflow by UltraMap
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Flight planning support (external FMS)	Compatible with all major commercial systems (TrackAir, CCNS-4, ...)
Exterior orientation support (external GPS/INS system)	Compatible with all major DGPS/IMU systems (Applanix POS-AV , IGI Aero-Control, ...)
Image geometric accuracy	Better ±2 µm

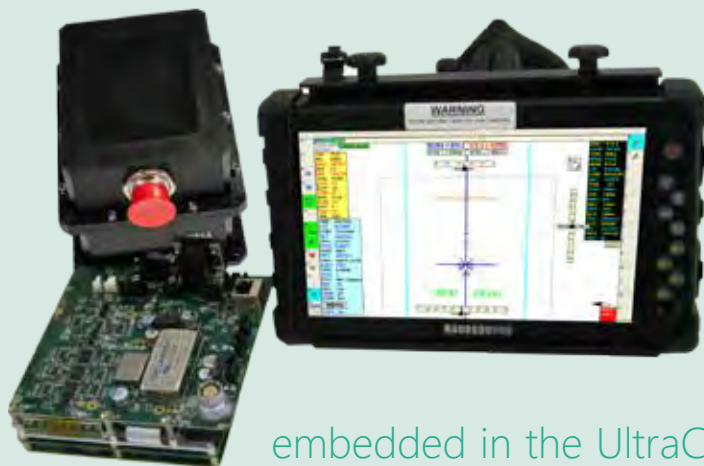
# ULTRANAV

Flight Management System

→ [www.iFlyUltraCam.com](http://www.iFlyUltraCam.com)







UltraNav is a Flight Management and Direct Georeferencing solution fully embedded in the UltraCam sensor head. Based on the industry leading POTrack from Applanix, the UltraNav is designed to maximize the aerial mapping efficiency. The solution is available in four different configurations: 010, 310, 410 and 510. The IMUs used for UltraNav are ITAR free for a maximum of operational flexibility.

UltraNav features state-of-the-art GNSS-inertial technology to reduce the number of GCP's and flight lines. Camera parameter setting and exposure triggering is done by UltraNav as well as automatic mount stabilization, resulting in precise ground coverage and precise image overlap, reducing airtime. Pilot and operator displays connect directly to the camera head for mission guidance and in-flight quality control. For intuitive mission planning with full DEM support and sophisticated GPS/INS processing office software is included, resulting in gap-free collections, consistent stereo coverage and upmost accuracy and reliability.

### **GNSS-Inertial Direct Georeferencing + Flight Management System**

- It doesn't get any easier than this! No external computers are required, which reduces the amount of boxes, cables and connectors, increases flexibility and makes handling much easier compared to a stand-alone solution. With an integrated UltraNav, the camera has the necessary connectors to connect operator display or laptop, pilot display, GPS antenna and stabilized mount directly to the camera.
- Flight planning is simplified and risk of operating errors is reduced. The UltraNav data is stored on the data units of the camera system and copied with the image data during standard data download via UltraMap. In addition, a backup for the GPS/INS data on an internal card is generated automatically.

## Mission Planning and Reporting Software

### snapView: On screen digitizing

Import raster data from various sources and formats, including Microsoft Bing Maps  
Simple, intuitive and efficient digitizing of project areas

### snapXYZ: Entering coordinates of areas or photo lines

Accepts all geographic or grid coordinates formats without conversion or calculation  
Includes a graphic viewer to visually check the correctness of the text input  
Import drawings prepared by other programs in DXF format  
Generate geophysics survey flight plans based on swath width and altitude

### snapPLAN: Flight planning c/w DEM support

Planning module used to add photo lines to digitized drawings or defined geographic areas  
Worldwide DEM support via ASTER DEM product  
Automatic stereoscopic coverage of blocks  
Prepare flight plans with hundreds of runs and thousands of photos in one single mouse click  
Interactive drawing of single strips, easily move strips and arrange until the best flight plan is achieved  
Automatically prepare pinpoint flight plans where each photo position has to conform to a given grid (geographical or map)  
Full support for line-scanner and LIDAR flight plans based on swath width and altitude  
Export flight plans via KML and Bing

### snapBASE: Project management database

Track and update the status and progress of projects  
Check the data generated during the flight and log accepted or rejected photos  
Maintain an accurate and up-to-date photo index of the project  
Generate film reports, progress reports, etc.  
Export areas flown via KML and Bing

### snapPLOT: Printing and plotting

Printing and plotting module used to quickly and easily prepare scaled photo indices  
Plot a professional A0 photo-index in less than 2 minutes

## Post-processing Software

### Applanix POSPac Mobile Mapping Suite (MMS)

#### GNSS-Aided Inertial Tools

Differential GNSS-Inertial software featuring Applanix IN-Fusion™ technology and Applanix SmartBase™ post-processed Virtual Base Station module  
Simple, intuitive and efficient digitizing of project areas

#### Photogrammetry Tools

POSEO and CalQC modules for generation of Exterior Orientation, IMU-Camera boresight calibration, mission-specific quality control



# Technical Specifications

## UltraNav GNSS-Inertial Direct Georeferencing + Flight Management System

### Features

- Advanced Applanix IN-Fusion™ GNSS-Inertial integration technology
- Advanced Trimble Maxwell 6 Custom GNSS survey technology (two chip-sets)
- 220 GNSS Channels (per chipset):
  - GPS: L1 C/A, L2C, L2E (Trimble method for tracking unencrypted L2P), L5
  - GLONASS: L1 C/A and unencrypted P code, L2 C/A and unencrypted P code
  - Galileo<sup>6</sup>: L1 BOC, E5A, E5B & E5AltBOC
  - QZSS: L1 C/A, L1C, L1 SAIF, L2C, L5
  - SBAS: L1 C/A (EGNOS/MSAS), L1 C/A and L5 (WAAS)
  - L-Band: OmniSTAR VBS, HP, XP and G2, Trimble CenterPoint RTX
  - BeiDou: B1, B2
- High precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth

### Sensor Interfaces

#### 3-axis Mount

Drift Correction	Levelling Control
T-AS (digital interface) PAV30 (RS232) (Requires POSOP) PAV80 (RS232) (Requires COMOP and IMUOP) GSM3000 (RS232) DSS Azimuth Mount (RS232) Z/I Mount (RS232)	PAV30 (RS232) PAV80 (RS232) GSM3000 (RS232) Z/I Mount (RS232)

Gimbal Encoder	Stab. Control
PAV30 (RS232) PAV80 (RS232) GSM3000 (RS232) DSS Azimuth Mount (RS232) TAS (digital interface)	GSM3000 (RS232) PAV30 (RS232) PAV80 (RS232) T-AS (digital interface) Z/I Mount (RS232)

#### Frame Camera

Triggering/MEP	Vexcel UltraCam
Data Interface	Vexcel UltraCam

### Performance Specifications<sup>1</sup> (RMS Error)

UltraNav 010	SPS	RTX <sup>3</sup>	Post-Processed <sup>4</sup>
<b>Position (m)</b>	1.5 H 3.0 V	<0.1 H <0.2 V	<0.05 H <0.1 V
<b>Velocity (m/s)</b>	0.05	0.05	0.01
<b>Roll &amp; Pitch (deg)</b>	NA	NA	NA
<b>True Heading<sup>2</sup> (deg)</b>	NA	NA	NA

UltraNav 310	SPS	RTX <sup>3</sup>	RTX Post-Processed <sup>4</sup>	SmartBase Post-Processed <sup>4</sup>
<b>Position (m)</b>	1.5 H 3.0 V	<0.1 H <0.2 V	<0.1 H <0.2 V	<0.05 H <0.1 V
<b>Velocity (m/s)</b>	0.050	0.050	0.010	0.010
<b>Roll &amp; Pitch (deg)</b>	0.030	0.020	0.015	0.015
<b>True Heading<sup>2</sup> (deg)</b>	0.10	0.08	0.035	0.035

UltraNav 410	SPS	RTX <sup>3</sup>	RTX Post-Processed <sup>4</sup>	SmartBase Post-Processed <sup>4</sup>
<b>Position (m)</b>	1.5 H 3.0 V	<0.1 H <0.2 V	<0.1 H <0.2 V	<0.05 H <0.1 V
<b>Velocity (m/s)</b>	0.050	0.050	0.005	0.005
<b>Roll &amp; Pitch (deg)</b>	0.020	0.015	0.008	0.008
<b>True Heading<sup>2</sup> (deg)</b>	0.080	0.040	0.020	0.020

UltraNav 510	SPS	RTX <sup>3</sup>	RTX Post-Processed <sup>4</sup>	SmartBase Post-Processed <sup>4</sup>
<b>Position (m)</b>	1.5 H 3.0 V	<0.1 H <0.2 V	<0.1 H <0.2 V	<0.05 H <0.1 V
<b>Velocity (m/s)</b>	0.050	0.050	0.005	0.005
<b>Roll &amp; Pitch (deg)</b>	0.008	0.008	0.005	0.005
<b>True Heading<sup>2</sup> (deg)</b>	0.070	0.040	0.008	0.008

### Input/Output

Ethernet (100 base-T)	
Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data
Logging	
Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data
Media	Internal: Embedded 4 Gbyte Flash Disk for redundant logging
RS232 NMEA ASCII Output	
Parameters	NMEA Standard ASCII messages: Position (\$INGGA), Heading (\$INHDT), Track and Speed (\$INVTG), Statistics (\$INGST)
Rate	Up to 50 Hz (user selectable)
RS232 High Rate Binary Output	
Parameters	User selectable binary messages: Time, position, attitude, speed, track, PAV30/80 output, Yaw Drift Correction
Rate	Up to IMU Data Rate (user selectable)
RS232 Input Interfaces	
Parameter	Gimbal encoder input, AUX GPS Input (RTK, NavCom Starfire, OmniStar HP), RTCM104 DGPS Corrections Input
Rate	1 to IMU Data Rate
Other I/O	
1PPA	1 pulse-per-second Time Sync output, normally high, active low pulse

### Physical Characteristics

Electronics	
Size	Internal to camera
Power	Supplied by Camera
Pilot Touch Screen	
Size	40 x 159 x 258 mm
Weight	1.2 kg
Power	Supplied by Camera

### Inertial Measurement Unit (IMU)

Type	UltraNav Model	Origin	Weight
IMU-42 <sup>5</sup>	UltraNav 310-C	EU	0.680 kg
IMU-7	UltraNav 410	US	1.0 kg
IMU-8	UltraNav 510		
IMU-52 <sup>5</sup>	UltraNav 410-C	EU	1.85 kg
IMU-46 <sup>5</sup>	UltraNav 510-C	EU	2.2 kg

<sup>1</sup> Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions and other environmental effects

<sup>2</sup> Typical mission profile, max RMS error

<sup>3</sup> Trimble RTX service, typical airborne results, subject to regional coverage and mission profile. Subscription sold separately.

<sup>4</sup> POSPac MMS

<sup>5</sup> These IMUs are exportable worldwide, subject to statutory export declaration, and standard restriction related to certain international destination.

<sup>6</sup> Developed under a License of the European Union and the European Space Agency.



# ULTRAMOUNT

Gyro Stabilization Mount

 [www.iFlyUltraCam.com](http://www.iFlyUltraCam.com)

The UltraMount product line offers UltraCam customers several options for a gyro-stabilized mount to drastically reduce movement of the airborne sensor and ensure perpendicular exposures. The UltraMount dynamically stabilizes arbitrary rotational movements of the aircraft (roll, pitch, yaw). A passive vibration isolation ring minimizes high frequency vibrations, and external IMU data can be applied to increase the stabilization accuracy. The combined benefits of the UltraMount technology significantly increase the data quality during aerial data collection.



## Specifications

	GSM3000			SSM 350L			SSM 350		
	L	W	H	L	W	H	L	W	H
<b>Angular stabilization ranges: arbitrary horizontal axis</b>	<b>± 5 deg</b>			<b>± 6 deg</b>			<b>± 8 deg</b>		
» Pitch – at 0 deg Roll	± 8.4 deg			± 8.5 deg			± 11.3 deg		
» Roll – at 0 deg Pitch	± 6.2 deg			± 8.5 deg			± 11.3 deg		
» Yaw (Drift)	± 25 deg			± 10 deg			± 15 deg		
<b>Compensable angular rates</b>	15 deg/s			15 deg/s			15 deg/s		
<b>Residual angular rate of the horizontal axes</b> (Angular rate of the base plate ± 10 deg/s at 0.5 Hz)	≤ 0.2 deg/s rms			≤ 0.5 deg/s rms			≤ 0.5 deg/s rms		
<b>Compensable angular acceleration</b>									
» at a residual angular rate of ± 0.3 deg/s rms	≥ 110 deg/s <sup>2</sup>			≥ 110 deg/s <sup>2</sup>			≥ 110 deg/s <sup>2</sup>		
» at a residual angular rate of ± 1 deg/s rms	≥ 300 deg/s <sup>2</sup>			≥ 300 deg/s <sup>2</sup>			≥ 300 deg/s <sup>2</sup>		
<b>Deviation from perpendicular</b>									
» without IMU	≤ 0.8 degrms typically								
» with IMU (accuracy depends on IMU)	≤ 0.05 degrms typically			≤ 0.1 degrms typically			≤ 0.1 degrms typically		
<b>Payload</b>	20 ... 100 kg			10 ... 60 kg			10 ... 60 kg		
<b>Operational voltage</b>	28 VDC (24... 30 VDC)			28 VDC (24... 30 VDC)			28 VDC (24... 30 VDC)		
<b>Power consumption</b>	90 W typical, 300 W max.			70 W typical, 130 W max.			70 W typical, 130 W max.		
<b>Main fuse</b>	15 Amps circuit breaker			15 Amps circuit breaker			15 Amps circuit breaker		
<b>Operating temperature</b>	- 25 °C ... + 40 °C			- 25 °C ... + 40 °C			- 25 °C ... + 40 °C		
<b>Storage temperature</b>	- 50 °C ... + 70 °C			- 50 °C ... + 70 °C			- 50 °C ... + 70 °C		
<b>Hydraulic Oil</b>	AeroShell Fluid 41			-			-		
<b>Mass</b>	Approx. 35 kg			Approx. 25 kg			Approx. 30 kg		
<b>Dimensions</b>	<b>L</b>	<b>W</b>	<b>H</b>	<b>L</b>	<b>W</b>	<b>H</b>	<b>L</b>	<b>W</b>	<b>H</b>
» (Horizontal position, hydraulic system at operational elevation)	620	560	187*						
» (Horizontal position, without vibration isolation ring)				650	580	191			
» (Horizontal position, including vibration isolation ring)							650	585	225
* = 162 mm if oil drained off	mm	mm	mm	mm	mm	mm	mm	mm	mm

## UltraMount

- The GSM 3000 hydraulic system consists of four cylinders and two servo pumps with classic gear drives and bearings to compensate for drift movement.
- The SSM 350L/350 series utilize the latest gear drive technology and an electro mechanical gimbal system that requires no oil. The lighter weight compact design contributes to lower operating costs and is appropriate for smaller aircraft. The SSM 350L/350 series has a 350 mm usable diameter and is 100% compatible with the GSM 3000 interface, which eliminates the need for new connectors.

## Contact Us

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