AsteRx-i D UAS

GNSS/INS positioning and attitude receiver for easy UAS integration

septentrio

UAV

Mapping

Precision Agriculture

Robotics

Autonomous

AsteRx-i D UAS delivers reliable centimeter-level positioning combined with 3D orientation in demanding environments. With its onboard inertial sensor, it provides continuous positioning even during short GNSS outages (coasting) which could happen near tall structures or under foliage.

KEY FEATURES

▶ **Reliable and accurate IMU-enhanced GNSS positioning down to the cm level**

▶ **Full attitude - heading, pitch and roll**

▶ **Lightweight, low power and compact**

▶ **AIM+ Advanced Interference Mitigation technology, as part of the GNSS+ algorithm suite**

▶ **High-update rate, low-latency positioning and attitude**

▶ **Resilient to vibrations and shocks**

▶ **44 pins I/O connector for autopilots such as Pixhawk**

▶ **Camera shutter synchronization**

Reduced   SWaP

AsteRx-i D UAS is designed for demanding SWaP requirements, reducing its size, weight and power consumption. Consuming typically 2 W* with a total weight of under 60 g*, it is ideal for UAVs and small robots where space and payload are at a premium. The 4.5-30 V input power range allows powe-ring the receiver directly from the UAS power bus. The IMU is soldered directly onto the board removing the need for connectors and bolts, resulting in reduced weight and size of the receiver.

Reliability and interference robustness

Septentrio's multi-constellation, multi-frequency, accurate and reliable RTK is further enhanced by a powerful GNSS/INS integration. Benefiting from a GNSS heading initialization, AsteRx-i D UAS provides 3D attitude and positioning directly from the start. It features Advanced Interference Mitigation (AIM+) technology which can suppress the widest variety of interferers, from simple continuous narrowband signals to the most complex wideband and pulsed jammers.

Ease of integration

Mounted on a UAS-tailored carrier board, the AsteRx-i D UAS integrates seamlessly into light UAV and robotics platforms. Septentrio's open interfaces and software tools (WebUI, RxTools) make it easy to integrate, configure a nd control AsteRx-i D UAS.

* Preliminary values

AsteRx-i D UAS

FEATURES

GNSS technology

The AsteRx-i D UAS supports tracking of the following signals:

- GPS: L1, L2
- GLONASS: L1, L2
- Galileo[1]: E1, E5b
- BeiDou[1]: B1, B2
- SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM (L1)
- QZSS: L1, L2

Septentrio's patented GNSS+ technologies

- **AIM+** unique anti-jamming and monitoring system against narrow and wideband interference
- **APME+** a posteriori multipath estimator for code and phase multipath mitigation
- **LOCK+** superior tracking robustness under heavy mechanical shocks or vibrations
- **IONO+** advanced scintillation mitigation

RAIM (Receiver Autonomous Integrity Monitoring)
RTK-INS (rover)[1]

Formats

Septentrio Binary Format (SBF), fully documented with sample parsing tools
RTCM v2.x and v3.x (input only)
CMR and CMR+ (input only)
NMEA 0183 v2.3, v3.01, v4.0 (output only)

Interfaces

Wide range power supply input
On-board logging on micro-SD card (max 32 GB)
Plug compatible with Pixhawk and ArduPilot
1 PPS output
Ethernet
2 Event markers for camera shutter synchronisation
Push-button start/stop logging on the SD-card

Connectivity

1 Hi-speed serial port (LV TTL)
1 Hi-speed RS232 port
44 PIN connector I/O, SAMTEC TMM-122-03-S-S-MW
1 Full-speed micro USB device port

SUPPORTING COMPONENTS

Embedded Web UI with full control and monitoring functionality.

RxTools, a complete and intuitive GUI tool set for receiver control, monitoring, data analysis and conversion.

GNSS receiver communication SDK. Available for both Windows and Linux.

Optional accessories

- Antennas
- GeoTagZ re-processing software and SDK library for Unmanned Systems

PERFORMANCE[8]

Integrated position accuracy [2,3]

	Horizontal	Vertical
Standalone	1.2 m	1.9 m
SBAS	0.6 m	0.8 m
DGPS	0.4 m	0.7 m

RTK-INS [2,3,4]

Horizontal accuracy	0.6 cm + 0.5 ppm
Vertical accuracy	1 cm + 1 ppm
Initialisation	7 s

Integrated attitude accuracy [2,3,4]

	Non RTK mode	RTK mode
Heading	0.3°	0.2°
Pitch/roll	0.04°	0.02°

INS velocity [2,3,4]

	Non RTK mode	RTK mode
Velocity	0.05 m/s	0.02 m/s

Position accuracy after outages

Outage duration (s)	Horizontal error (RMS)	Vertical error (RMS)
5	0.1 m	0.03 m
10	0.3 m	0.05 m
30	3.0 m	0.24 m

Attitude accuracy after outages

Outage duration (s)	Heading error (RMS)	Pitch/Roll error (RMS)
5	0.23°	0.06°
10	0.25°	0.07°
30	0.3°	0.12°

IMU performance

Gyroscope performance

Input range	± 450°/s
Bias in-run instability	7°/hr
Random walk / noise density	0.15°/√hr

Accelerometer performance

Input range	±16 g
Bias in-run instability	0.014 mg
Random walk / noise density	57 µg/√Hz

Maximum update rate

Integrated position	100 Hz
Latency	<20 ms

Post-processing:

GNSS measurements	2 Hz
IMU raw data	200 Hz

Time precision

PPS out	5 ns
Event accuracy	< 20 ns

Time to first fix

Cold start [5]	< 45 s
Warm start [6]	< 20 s
Re-acquisition	avg 1.2 s

Tracking performance (C/N0 threshold)[7]

Tracking	20 db-Hz
Acquisition	33 db-Hz

PHYSICAL AND ENVIRONMENTAL

SWaP

Size[8]	47.5 × 70 × 20 mm
	1.87 × 2.75 × 0.79 in
Weight[8]	60 g / 2.1 oz
Input voltage	5 VDC or 4.5–30 VDC

Antenna

Antenna connectors	2 × U.FL
Antenna supply voltage	3 - 5.5 VDC
Maximum antenna current	200 mA
Antenna gain range	15-45 dB

System power consumption[8]

Typical configuration	2,2 W
Onboard logging	100 mW

Environment

Operating temperature	-40° C to +85° C
	-40° F to +185° F
Storage temperature	-40° C to +85° C
	-40° F to +185° F
Humidity	5% to 95% (non-condensing)
Vibration	MIL-STD-810G
Certification	RoHS, WEEE

[1] Optional feature
[2] Open-sky conditions
[3] RMS levels
[4] Baseline < 40 Km
[5] No information available (no almanac, no approximate position)
[6] Ephemeris and approximate position known
[7] Depends on user settings of tracking loop parameters, Max speed 600 m/s
[8] Preliminary values

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