AsteRx-i S
GNSS/INS positioning and attitude receiver

septentrio

Robotics

Mapping

Automation

Logistics

UAV

AsteRx-i S delivers 3D orientation and coasting functionality for continuous accurate positioning in difficult environments. This multi-frequency GNSS receiver is integrated with an SBG IMU (Internial Measurement Unit).

KEY FEATURES

- ▶ **Reliable and accurate GNSS/INS positioning down to the cm level**

- ▶ **3D attitude - heading, pitch and roll**

- ▶ **Ultralight, low power and compact**

- ▶ **AIM+ interference monitoring and mitigation system**

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

- ▶ **Robust calibration for wide temperature ranges**

- ▶ **Single antenna for ease of integration and minimal weight**

- ▶ **Dual antenna for fast heading initialization**

Reliability, availability and accuracy at their best
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 S provides 3D attitude and positioning for the POI (point of interest).
The AsteRx-i S includes Septentrio's GNSS+ suite of positioning algorithms to convert difficult environments into good positioning. It also features AIM+ interference mitigation and monitoring system which can suppress the widest variety of interferers, from simple continuous narrowband signals to the most complex wideband and pulsed jammers.

SWaP matters
Designed around demanding requirements for size, weight and power consumption, the AsteRx-i S is ideal for small sized robots working in difficult environments. Consuming typically 1.5 W and having a unique total weight of 38 g the AsteRx-i S will ensure long lasting battery life and increased productivity. The versatility of design and range of connection interfaces extend the AsteRx-i S applicability to automation, logistics and mobile mapping.

Ease of integration
The AsteRx-i S integrates seamlessly into robotic and light UAV platforms. The IMU offers a simple, bolt-on, plug-and-play solution, designed for easy testing and integration. Septentrio's open interfaces and software tools (WebUI, RxTools) make the integration, configuration and control of the AsteRx-i S seem effortless.

AsteRx-i S

FEATURES

GNSS technology

The AsteRx-i S 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 (MSM included)
CMR and CMR+ (CMR+ input only)
NMEA 0183 v2.3, v3.01, v4.0 (output only)

Connectivity AsteRx-i S OEM board

4 Hi-speed serial ports (LVTTL) [2]
1 USB device port
1 PPS output [2]
2 Event markers
SDIO interface for logging (covers μSD, SD, eMMC)
Outputs to drive external LEDs
General purpose output

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.

PERFORMANCE

Integrated position accuracy [3,4]

	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 [3,4,5]

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

Integrated attitude accuracy [3,4,5]

	Non RTK mode	RTK mode
Heading, dual antenna[8]	0.3°	0.15°
Heading, single antenna[8]	0.3°	0.2°
Pitch/roll, dual antenna	0.04°	0.02°

INS velocity [3,4,5]

	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 [6]	< 45 s
Warm start [7]	< 20 s
Re-acquisition	avg 1.2 s

PHYSICAL AND ENVIRONMENTAL

AsteRx-i S OEM board

Size	47.5 × 70 × 7.6 mm
	1.87 × 2.75 × 0.29 in
Weight	28 g / 0.987 oz
Input voltage	3.3 VDC ± 5%

Connectors

30 pins Hirose DF40 socket
60 pins Hirose DF40 socket for expanded connectivity

IMU

Size	26.8 x 18.8 x 9.5 mm
	1.05 x 0.74 x 0.37 in
Weight	10 g / 0.35 oz
Input voltage	4 -15 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

	AsteRx-i S board + IMU
Dual antenna	1.5 W
Single antenna	1.3 W

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] One port/signal used by the IMU
[3] Open-sky conditions
[4] RMS levels
[5] Baseline < 40 Km
[6] No information available (no almanac, no approximate position)
[7] Ephemeris and approximate position known
[8] 1 meter baseline

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