AsteRx SBi3 Pro+

Ruggedized GNSS/INS receiver for integrated solutions, ready for sensor fusion

septentrio

Machine Control

Logistics

Robotics

Autonomous

AsteRx SBi3 Pro+ GNSS/INS multi-frequency receiver delivers reliable centimeter level positioning together with 3D orientation in challenging environments. Thanks to the built-in inertial sensor, it provides orientation (heading, pitch and roll) as well as dead reckoning making it ideal for systems that require positioning under any condition. This housed high-performance GNSS/INS system is ideal for rapid integration into machine control or ground robotic applications. AsteRx SBi3 Pro+ is the most flexible boxed GNSS/INS solution, offering full access to raw GNSS and INS data as well as allowing multiple antenna configurations.

KEY FEATURES

- **Centimeter-level GNSS positioning enhanced by an IMU and optionally vehicle velocity**
- **Full access to raw GNSS and IMU data**
- **Heading with a single or dual GNSS antenna**
- **Pitch and roll**
- **Robust and compact IP68 weatherproof housing**
- **AIM+ advanced anti-jamming, anti-spoofing monitoring and mitigation technology, as part of the GNSS+ algorithm suite**

Reliable and robust

The AsteRx SBi3 Pro+ is a state-of-the-art GNSS/INS rover receiver designed to provide robust and reliable positioning and 3D attitude in the most challenging environments. Septentrio's multi-constellation, multi-frequency, accurate and reliable RTK is enhanced by a powerful GNSS/INS integration accurately measuring heading, pitch and roll. While a single antenna allows a lean configuration, the dual antenna enables heading measurement without the need for movement. AsteRx SBi3 Pro+ 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.

Ideal for any integration

The AsteRx SBi3 Pro+ is not only delivering an already integrated position, but it also provides raw GNSS and IMU data, already synchronized and in a single data stream for customers that will integrate those components with other sensors for a larger data fusion system (i.e. lidar). Having GNSS and IMU hardware already integrated and data streams already synchronized will enable customers to focus on their own core technology without having to integrate GNSS and IMU sensors themselves.

Easy-to-integrate

The AsteRx SBi3 Pro+ delivers a full INS system on a single board for the maximum ease of hardware integration. Septentrio's web interface, software tools such as lever arm optimization and support material found in the Knowledge Base make the integration process easy and fast.

AsteRx SBi3 Pro+

FEATURES

GNSS signals

544 Hardware channels for simultaneous tracking of most visible signals:

- GPS: L1 C/A, L1C, L2C, L2 P, L5
- GLONASS: L1 C/A, L2C/A
- BeiDou: B1I, B2I, B3I
- Galileo: E1, E5a, E5b, E5 AltBOC
- QZSS: L1C/A ; L2C ; L5
- SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM

Septentrio's patented GNSS+ technologies

- **AIM+** industry leading anti-jamming, anti-spoofing interference monitoring & mitigation technology
- **FUSE+** fusion of RTK positioning with an intertial sensor and more
- **IONO+** advanced scintillation mitigation
- **APME+** a posteriori multipath estimator for code and phase multipath mitigation
- **LOCK+** superior tracking robustness under heavy mechanical shocks or vibrations
- **RAIM+** (Receiver Autonomous Integrity Monitoring)

Formats

Septentrio Binary Format (SBF), fully documented with sample parsing tools
NMEA 0183, v3.01, v4.0
RTCM v2.x, v3.x (MSM messages included)
CMR v2.0 and CMR+

Connectivity

3 Hi-speed serial ports (RS232)
Ethernet port (TCP/IP, UDP, LAN 10/100 Mbps)
Power over ethernet
1 High-speed/full-speed USB device port
2 Event markers
FTP server
16 GB internal memory
NTRIP (client)

PERFORMANCE

Integrated position accuracy [1,2]

	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 [1,2,3]

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

Integrated attitude accuracy [1,2,3]

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

INS velocity [1,2,3]

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

IMU performance

Gyroscope performance

Input range	± 500°/s
Bias in-run instability	2.7°/hr
Random walk / noise density	0.15 - 0.2°/√hr

Accelerometer performance

Input range	±8 g
Bias in-run instability [4]	2.7 - 4.4 µg
Random walk / noise density [4]	17.0 - 24.8 µg/√Hz

Maximum update rate

Integrated position	100 Hz
Latency [7]	<20 ms
GNSS measurements	2 Hz
IMU raw data	200 Hz

Time precision

xPPS out	5 ns
Event accuracy	< 20 ns

Time to first fix

Cold start [5]	< 45 s
Warm start [6]	< 20 s
Re-acquisition avg.	avg 1 s

Tracking performance (C/N0 threshold)

Tracking	20 dB-Hz
Acquisition	33 dB-Hz

Dead reckoning positioning and attitude accuracy [2,8]

GNSS/INS

Duration (s)	Horizontal (m)	Vertical (m)	Heading (deg)	Pitch/roll (deg)
5	0,106	0,04	0,35	0,04
10	0,306	0,06	0,35	0,06
30	3,006	0,25	0,4	0,1

PHYSICAL AND ENVIRONMENTAL

AsteRx SBi3

Size	102 × 36 × 118 mm 4.0 × 1.4 × 4.6 in
Weight	490 g / 17.3 oz
Input voltage	4.5 to 36 VDC

Power consumption

GPS/GLO L1/L2	1.3 W
All signals, all GNSS constellations	1.5 W
Maximum	2.5 W

Connectors

Antenna	2 x TNC female
ETH	ODU 4 pins female
COM1/GPIO	ODU 7 pins female
PWR/USB/COM2/COM3	ODU 7 pins female

Antenna(s)

Output voltage	5 VDC
Maximum current	150 mA

Environment

Operating temperature	-30° C to +65° C -22° F to +149° F
Storage temperature	-40° C to +75° C -40° F to +167° F
Humidity	MIL-STD-810G, Method 507.5, Procedure I
Dust	MIL-STD-810G, Method 510.5, Procedure I
Shock	MIL-STD-810G, Method 516.6, Procedure I/II
Vibration	MIL-STD-810G, Method 514.6, Procedure I

Certification

RoHS, WEEE, CE, FCC

[1] Open-sky conditions
[2] RMS levels
[3] Baseline < 40 Km
[4] Z-axis (lower value is for X & Y)
[5] No information available (no almanac, no approximate position)
[6] Ephemeris and approximate position known
[7] 98% of samples
[8] RTK fix before outage
[9] Using high accuracy and low latency velocity input

MS /02/2025

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