AsteRx-i3 S Pro+

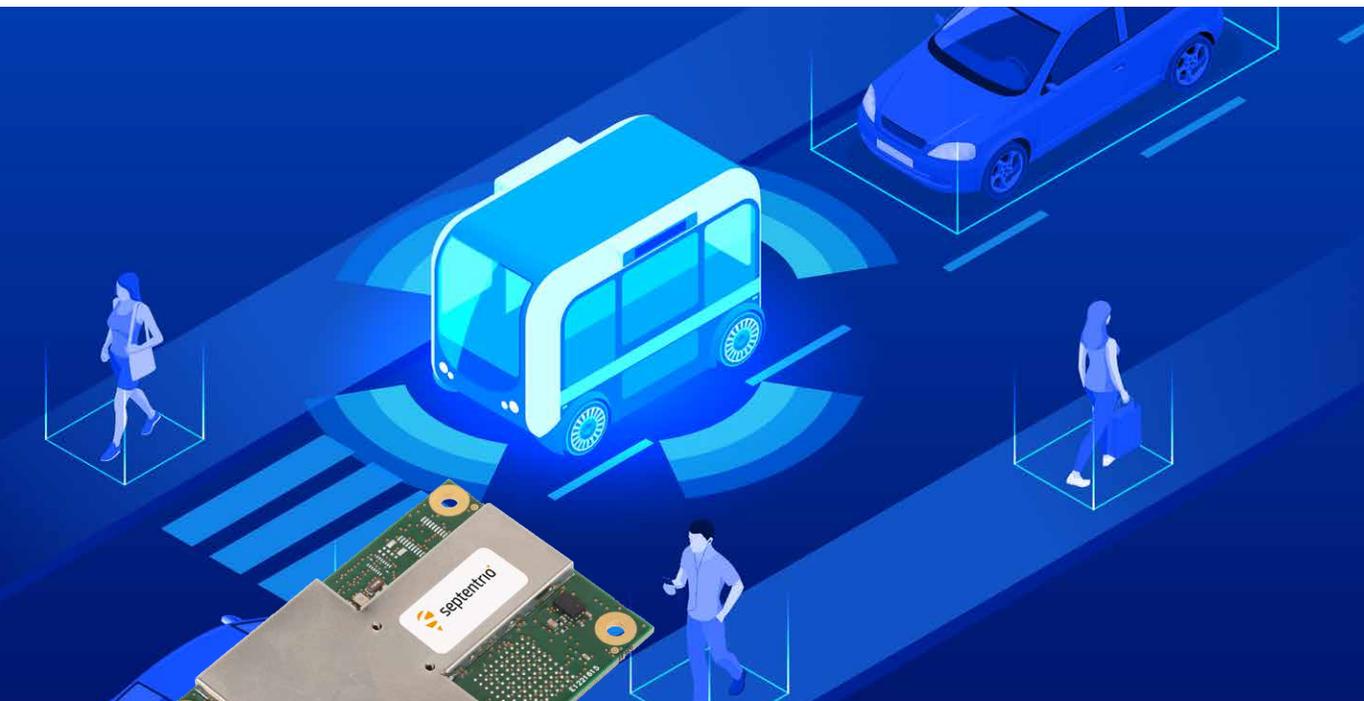**GNSS/INS board with tethered IMU for flexible installation**

septentrio

Machine Control

Logistics

Robotics

Autonomous

AsteRx-i3 S Pro+ delivers reliable centimeter level positioning combined with 3D orientation in demanding environments. Its sensor fusion provides orientation and positional dead-reckoning, making it ideal for systems that require continuous positioning even during short GNSS outages. AsteRx-i3 S Pro+ allows full flexibility of usage providing raw data and enabling tethered IMU installation precisely at the motion point-of-interest.

KEY FEATURES

▶ **Centimeter-level GNSS positioning enhanced by an IMU and optionally vehicle velocity**

▶ **Full access to raw GNSS and IMU data**

▶ **Tethered IMU**

▶ **Heading available immediately from initialization with dual antenna configuration**

▶ **Lightweight, low power and compact**

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

Reliable and robust

The AsteRx-i3 S Pro+ is a state-of-the-art GNSS/INS rover receiver designed to provide robust and reliable position and 3D attitude in the most challenging of conditions. 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-i3 S 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-i3 S 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 enables users to focus on their own core technology without having to integrate GNSS and IMU sensors themselves. The tethered IMU allows to install the board where there is more space for it and to install the IMU close to the point of interest with the orientation aligned to the frame of interest.

Easy to integrate

The AsteRx-i3 S Pro+ delivers a full INS system on a single board for the maximum ease of hardware integration. Septentrio's web interface and software tools make it easy to integrate, configure and control the AsteRx-i3 S Pro+ receiver.

AsteRx-i3 S 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
▶ SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM

Septentrio's patented GNSS+ technologies

▶ **AIM+** unique anti-jamming and monitoring system against narrow and wideband interference with spectrum analyser
▶ **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

4 Hi-speed serial ports (LVTTL)
1 USB device port (TCP/IP communication and with 2 extra serial ports)
xPPS output (max 100Hz)
Ethernet port (TCP/IP, UDP, LAN 10/100 Mbps)
2 Event markers
Outputs to drive external LEDs
General purpose output
NTRIP (client)

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

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	± 450°/s
Bias in-run instability	7°/hr
Random walk / noise density [4]	0.15°/√hr

Accelerometer performance

Input range	±16 g
Bias in-run instability [4]	0.014 mg
Random walk / noise density [4]	57 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

PHYSICAL AND ENVIRONMENTAL

OEM board

Size	47.5 × 70 × 9.32 mm
	1.87 × 2.75 × 0.36 in
Weight	27 g / 0.952 oz
Input voltage	3.3 VDC ± 5%

IMU

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

Power consumption

GPS/GLO L1/L2	1.2 W
All signals, all GNSS constellations	1.4 W

Antenna

Connectors	2 x MMCX
Antenna supply voltage	3-5.5 VDC
Maximum antenna current	150 mA
Antenna gain range	15-45 dB

I/O connectors

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

Environment

Operating temperature	-20° C to +85° C
	-4° F to +185° F
Storage temperature	-55° C to +85° C
	-67° F to +185° F
Humidity	5% to 95% (non-condensing)
Vibration	MIL-STD-810G
Certification	RoHS, WEEE, ISO 9001-2015

[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 /02/2022

septentrio