PODRIX GNSS Receiver

Precise Orbit Determination (POD) and Precise Point Positioning (PPP)

PODRIX, the RUAG Space multi-constellation (GPS, GALILEO) multi-frequency GNSS receiver for LEO applications provides excellent on-board real-time navigation with an accuracy of below 20cm with the optional Precise Point Positioning (PPP) software upgrade. With Precise Orbit Determination (POD) based on on-ground post-processed dual-frequency receiver data a satellite position measurement accuracy of a few centimeters can be achieved.

Key features

• Optional SW upgrade for Precise Point Positioning (PPP) based on Galileo's High Accuracy Service (HAS) on the E6 signal:

  – <20cm real-time position accuray

  – no PPP service subscription (fee) required

  – software option available as factory preset or later upgrade in orbit

• Antenna with improved gain and multipath suppression performance

• Internal LNAs

• Selective RF-filter and low-noise amplifier for improved performance enable long tracking arcs especially important for POD processing

• Accurate force model-based orbit propagator

• Advanced Kalman filtering allows high on- board navigation performance

• Flexible acquisition and tracking concept providing:

  – Dual-frequency signal processing of up to 18 satellites or

  – Single frequency signal processing of up to 24 satellites

• Configurable data rate per measurement type

• Autonomous start-mode determination for minimized time-to-first-fix

• Additional data products provide excellent visibility of receiver internals

• Monitoring of external ultra-stable oscillator (USO) long term drift possible

• Low mass and power consumption

Interfaces

• Antenna input

• TC/TM: MIL-STD-1553B or UART(RS-422) or SpaceWire

• PPS output nom/red/test (RS-422)

• Primary power input 28 V unregulated

• ON/OFF high level command interface or autostart upon voltage application

• Thermistor TM interfaces

• External clock input (opt.)

Data products

• Navigation solution based on GPS/GALILEO constellations

• PPS signal synchronized to GPS/GALILEO

• Low noise carrier phase measurements for each tracked signal

• Low noise code phase measurements for each tracked signal

• Support data:

  – Tracking state

  – GDOP

  – Carrier to noise (C/N) measurement of each tracked signal

  – Noise measurements of each RF down-conversion chain

  – Satellites in view status

  – Satellite navigation message

Supported GNSS Signals

Based on dedicated RF- and Mixed-Signal ASICs as well as the AGGA-4 ASIC, PODRIX is able to use the following signals:

• GPS L1 C/A

• GPS L2C-M and L2C-L

• GPS L5 I/Q

• Galileo E1 B/C

• Galileo E5a I/Q

• Galileo E6 B/C (optionally)

On-board navigation solution accuracy

Standard performance:

- Position: < 1.0 m 3D rms

- Velocity: < 2 mm/s 3D rms

- Time: < 50 ns (1σ)

With PPP software upgrade (Galileo-only mode):

- Position: < 0.2 m 3D rms

- Velocity: < 1 mm/s 3D rms

- Time: < 50 ns (1σ)

Physical / environment

Electronic box:

- Size (incl feet): 280x240x81 mm³ GDOP

(11"x 9.4"x 3.2"); Weight: 3.0 kg (6.61 lb)

- Operating temperature: -30° C to +60° C (qualification level)

- Minimum switch-on temperature: -40° C (qualification level)

- Radiation: suitable for orbits between 300 and 1500km, any inclination (>7,5 yrs)

- Power consumption: 15 W avg.

Antenna :

- Patch Excited Cup antenna with optimized multi- path performance

- Size (incl feet): Ø 200 mm (7.9"), h: 87 mm (3.4")
Weight: 735 g (1.62 lbs)

Other antennas available upon request

Time to first fix

- Warm start < 90 s

- Cold start < 15 min GPS; < 40 min GALILEO

Programs / heritage

Beyond Gravity has delivered more than 90 flight models of GNSS receivers to customers in Europe, USA, Middle East and Asia. Some example missions:

- Swarm earth-observation mission of ESA

- Sentinel-1, Sentinel-2 and Sentinel-3 A/B satellites of ESA's and the European Commission's Copernicus program (6 satellites)

- Sentinel-6/Michael Freilich A/B (NASA/ESA)

- ESA/JAXA mission Earthcare

- NASA's mission ICESat-2

- PACE (NASA)

- OSAM-1 (NASA)

- Biomass (ESA)

- FLEX (ESA)

- KOMPSAT-6, -7 (KARI)

- CAS-500 (KARI/KAI)

- WSF-M (Ball Aerospace)