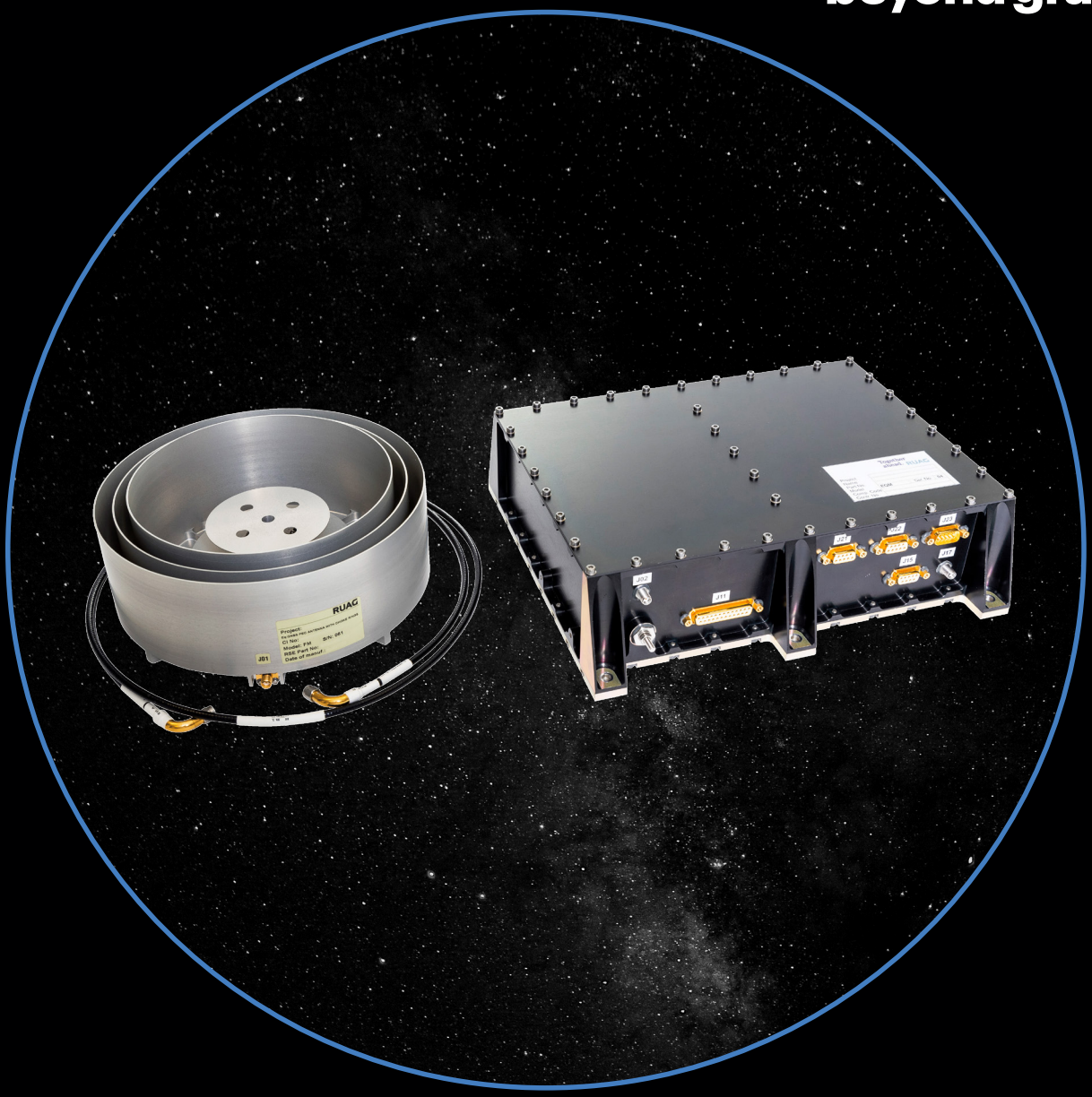
beyond gravity



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) soft- ware upgrade. With Precise Orbit Determination (POD) based on on-ground post-processed dual-frequency receiver data a satellite position measurement accu- racy 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.)

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)

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

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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 mm^3 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)

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