

GEORIX Single-Frequency Multi - Constellation GNSS Receiver

GEORIX, the RUAG Space single-frequency GNSS Receiver for GTO and GEO applications provides an excellent on-board real-time navigation solution accuracy of below 20 meter (in GEO) based on an arbitrary mix of GPS and GALILEO space vehicles.



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

- GPS C/A on L1
- Galileo E1 B/C

Main Features

- Antenna with gain pattern optimised for GEO
- Detached LNAs for improved performance figures
- GTO support, e.g. for electric propulsion satellites
- Support for cross-coupling of two non-redundant antenna/LNA sets to cold-redundant electronics box
- Accurate force model-based orbit propagator
- Advanced Kalman filtering allows high on-board navigation performance
- Flexible acquisition and tracking concept providing:
 - single frequency signal processing of up to 12 satellites
 - Sliding search window for minimized acquisition times
 - Doppler-based loop aiding
- Configurable data rate per measurement type
- Autonomous start-mode determination for minimized time-to-first-fix
- Powerful parameter interface supports changes in standby and operational mode
- Additional data products provide excellent visibility of receiver internals
- Low mass and power consumption

Data Products

- Navigation solution based on GPS/GALILEO constellations
- Generation of the PPS signal synchronized to GPS/GALILEO second
- Carrier phase measurements for each tracked signal
- 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

Interfaces

- TC/TM interface: MIL-STD-1553B or UART (RS-422) or SpaceWire
- PPS output nom/red/test (RS-422)
- Primary power interface 100 V regulated
- ON/OFF high level command interface
- Thermistor TM interfaces

On-board Navigation Solution Accuracy in GEO

- Position: 20.0 m 3D rms
- Velocity: 1 cm/s 3D rms
- Time offset 1PPS (1 σ): < 0.5 ns

Time to first fix

- Warm start < 15 min (in GEO)

Physical / Environment

LNA:

- Size: 167,5x54x80 mm³ ; Weight: 0.563 kg

Electronic box:

- Size: 286x201x226 mm³ ; Weight: 9.0 kg
- Operating temperature: -30° C to +60° C (qualification level)
- Minimum switch-on temperature: -40° C (qualification level)
- Radiation: suitable for GTO (200 days) and GEO (15 years)
- Power consumption: 15 W avg.

Antenna (recommended for GEO):

- Patch Excited Cup antenna:
- Size: Ø 212 mm, h: 179 mm ; weight: 548 g

Programs/Heritage

RUAG has delivered 22 flight models of the heritage receiver, a GPS Precise Orbit Determination Receiver based on AGGA-2 and LEON ASICs:

- for the Swarm earth-observation mission of ESA, which is based on three satellites flying in formation with a common launch in 2013
- for the Sentinel-1, Sentinel-2 and Sentinel-3 A/B satellites of ESA's and the European Commission's Copernicus program (6 satellites)
- for the ESA/JAXA mission Earthcare
- for NASA's mission ICESat-2

Currently, 18 of these 22 delivered flight models have been launched and are operating flawlessly in orbit to the full satisfaction of the Customers.

For the successor, the PODRIX, LEORIX and GEORIX GNSS receivers, many flight model orders have been received. First flight models have already been delivered.