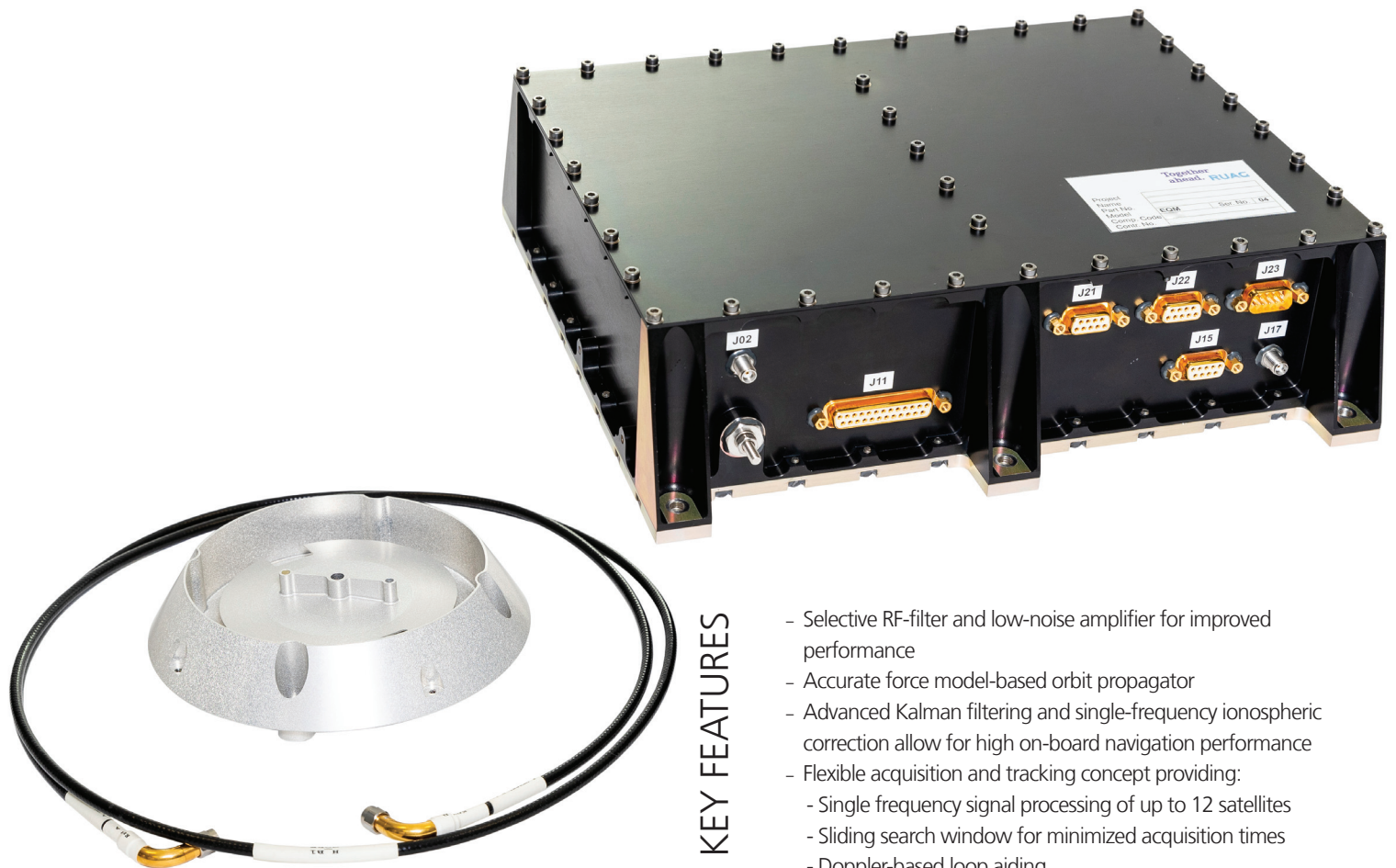


# LEORIX Multi Constellation Single-Frequency GNSS Receiver

LEORIX, the RUAG Space multi-constellation (GPS, GALILEO) single-frequency GNSS Receiver for LEO applications provides an excellent on-board real-time navigation solution accuracy of below one meter.



## KEY FEATURES

- Selective RF-filter and low-noise amplifier for improved performance
- Accurate force model-based orbit propagator
- Advanced Kalman filtering and single-frequency ionospheric correction allow for 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

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**Together  
ahead. RUAG**

## Supported GNSS Signals

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

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

## Data Products

- Navigation solution based on GPS/GALILEO constellations
- 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 the RF down-conversion chain
  - Satellites in view status
  - Satellite navigation message

## Interfaces

- 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 USO input available

## On-board Navigation Solution Accuracy

- Position: 1.0 m 3D rms
- Velocity: 2 mm/s 3D rms
- Time offset 1PPS ( $1\sigma$ ): < 50 ns (typ. 25ns rms)

## Data outputs

- L1 carrier phase error < 1.2 mm rms
- E1 carrier phase error < 1.8 mm rms
- L1 C/A code measurement error < 0.7 m rms
- E1 code measurement error < 0.7m rms

## Time to first fix

- Warm start < 90 s
- Cold start < 15 min GPS; <40 min GALILEO

## Physical / Environment

### Electronic box:

- Size: 280x240x81 mm<sup>3</sup> ; Weight: 3.0 kg
- 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
- Power consumption: 15 W avg.

### Antenna (recommended for LEO):

- Patch Excited Cup antenna
- Size: Ø 144 mm, h: 36,5 mm ; weight: 215 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:

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

From the heritage receivers 20 out of 22 delivered flight models have been launched and are functioning flawlessly in orbit to the full satisfaction of the customers.

From the successor GNSS receiver family (PODRIX, LEORIX and GEORIX) more than 40 flight models have already been delivered to the international customers.