Changing the economics of space

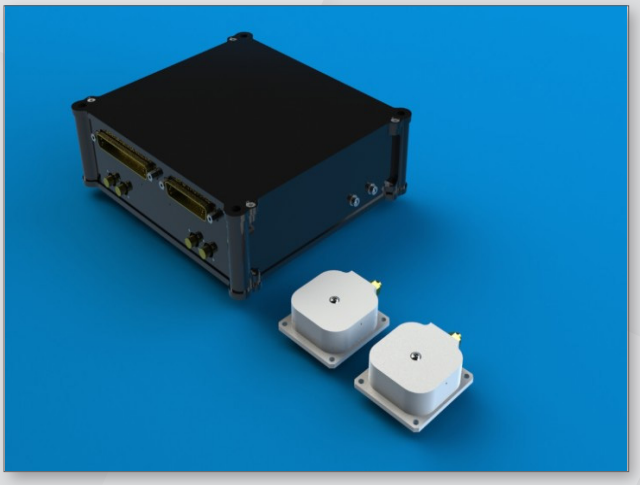
SURREY
SATELLITE TECHNOLOGY US

Subsystem

SGR-Axio

The SGR-Axio is Surrey's new-generation Space GNSS (Global Navigation Satellite System) Receiver that has a smaller footprint, requires less power, and delivers improved position, velocity, and time to low-Earth-orbit satellites. The SGR-Axio replaces the heritage SGR-10, with dual antennas and 24 GPS C/A code channels. Innovations in design enable the SGR-Axio to be configured to support GNSS signals from GPS, Galileo, and Glonass constellations, and up to four antennas on dual frequencies.

The SGR-Axio makes use of advanced commercial off-the-shelf components, with appropriate radiation mitigation for the space environment. Its architecture, software, and autonomous operation draw upon Surrey's long experience in space-borne GPS receiver design and development. The SGR-Axio retains the flexibility for reconfiguration of FPGA-based channels and signal processing schemes once in space.



Features

- 1 to 4 compact active antennas
- Reconfigurable 24 GPS L1 channels
- Fast time-to-first-fix
- Multi-GNSS capability
- Dual frequency option

Benefits

- Affordable COTS-based design
- 7+ years of design life
- Improved position, velocity, and time determination for LEO missions
- Smaller footprint
- Reduced power requirements

Heritage

- DMC-class mission (2016)
- NovaSAR-S (2015)
- Five third-party missions (2016–2020)

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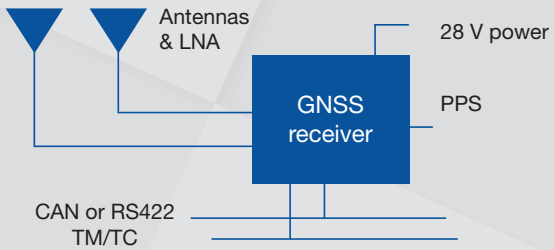
Physical Characteristics

Dimensions	160 x 180 x 50 mm
Power at 28 V	4 W in baseline mode
Mass	1 kg
Radiation	Core components tested to 10 kRads (Si); further planned
Lifetime	7.5 years LEO orbit (<800 km)
Temperature	-20°C to +50°C operating -30°C to +60°C non-operating

Typical Use



Baseline Performance Properties

Number of Channels	24
Number of Antennas	1–4
Frequencies and Signals	GPS L1 C/A code, Glonass G1 Option: Galileo E1 Dual freq.: GPS L2C, L5, Galileo E5
PPS Outputs	RS485, MLVDS (Option: TTL)
SEE Mitigation	Yes (SEE and SEL)
Typical Position*	5 m
Typical Velocity*	10 cm/s
TTFF (NVRAM)*	120 s
Time (UTC)*	100 ns
TM/TC Interface	CAN-SU or RS422 Spacewire support
Optional: Hold Over Timing (Signal Loss)	<10 µs over 10 minutes

*Under defined 680 km polar orbit, Earth pointing conditions

Product specification subject to change without notification

Advanced options:

- Supports up to 4 antennas for redundancy and advanced features; for example, extra visible mode and attitude determination
- Multiple frequencies (L1, L2C, or L5/E5)
- Galileo capability
- FPGA co-processor reconfigurable in orbit with up to 100 extra channels
- Clock module for improved hold-over and reduced jitter
- Spacewire interface

Available as part of Surrey's AOCS suite:

- Magnetorquers
- Magnetometers
- Sun sensors
- Inertial sensors
- Star trackers
- Reaction wheels

December 2014

The small satellite revolution started 30 years ago with Surrey Satellite Technology—the world's premier provider of operational and commercial satellite programs with over 40 satellites launched successfully and 240 years of on-orbit experience gained.

From its Englewood, Colorado, facilities, Surrey supplies complete in-house design, manufacture, launch, and operation of small satellites, to include remote sensing, navigation, and communications payloads, avionics suites and subsystems, ground infrastructure, and training and consulting services.

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