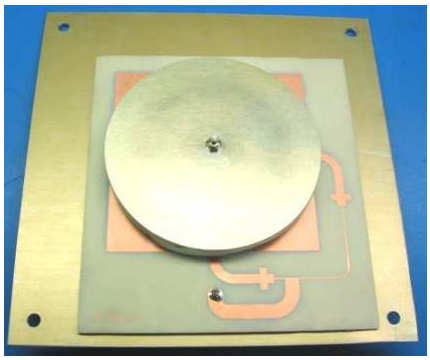
Preliminary Datasheet

# SSTL SGR-GEO SPACE GPS RECEIVER

**The SGR-GEO is a spacecraft orbit determination sub-system designed for small and large GEO satellite applications. The SGR-GEO provides GPS standard time, position and velocity in a compact qualified unit, with its first flight on Giove-A. The SGR-GEO has 24 channels enabling a very fast time to first fix, and supports multiple antennas to improve visibility under changing vehicle orbit configurations.**

The Global Positioning System (GPS) consists of a constellation of 24 satellites at an altitude of 20,000 km and can be used for positioning on land, at sea, in air or in space. The SGR-GEO receives and decodes the L-Band signals from several GPS satellites and through ranging techniques is able to calculate the position of the spacecraft to an accuracy of 50 metres, and can also be used to determine accurate velocity and time.



*Prototype Antenna for the SGR-GEO*

*Protoflight SGR-GEO for GSTB-V2/A*

Surrey Satellite Technology Ltd (SSTL) is a leading manufacturer of small satellites and sub-systems. SSTL has designed, built and launched 26 satellites since UoSAT-1 in 1980. The SGR-GEO combines SSTL's knowledge of spacecraft sensors and systems with terrestrial GPS technology to offer a sophisticated spacecraft navigation system.

### Features

- **SGR chipset** is based on the GP4020 GPS baseband processor and a GP2021 Zarlink correlator.
- **Flight proven software** used on previous members of SGR family.
- **OCXO** for improved accuracy frequency reference to ensure accuracy of time in receiver when no GPS signals are being tracked.
- **Radiation** susceptibility is mitigated by use of shielding. The SGR has countermeasures against Single Event Upsets and Latch-ups (SEU/SEL).
- **Primary interfaces** to the SGR comprise of RS422 (point-to-point) and CAN bus (industrial multi-node Controller Area Network).
- **Code** stored in Flash memory to enable rapid booting and future functional upgrades, even once in orbit.
- **Windows** program provided to monitor and control the SGR and to view and process logged data from the SGR.
- **Testing and PA** plans available. Environmental and Acceptance Testing and PA plans can be tailored to suit customer.

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## Applications

- Position and orbit determination in MEO, GEO, GTO
- Time-stamping, on-board clock synchronisation
- Small and large satellites
- Manoeuvring space vehicles

## Characteristics

- 24 L1 C/A code channels
- Suitable for GEO (1 antenna) and GTO applications (2 antennas).
- Time (UTC): 1µs
- Position (determined) : 50-100 m radial, 10-15 m horizontal
- Position (coasting): <300m vertical.
- Dynamic Capability: 12 $kms^{-1}$, 2 g
- Time to First Fix (TTFF): TBD. Can be improved by initialisation from host
- Data Interfaces: RS422 or LVDS, CAN-bus,
- Pulse-Per-Second outputs: TTL, RS422 or LVDS
- Power: 5 watts at 28 volts
- Size: 100 x 120 x 50 mm (TBC)
- Total Mass: 2.5 kg (TBC)
- Estimated life in GEO orbit: 7-10 years (15 yr upgrade planned)

## Qualification / Heritage

- SGR-GEO demonstrator being flown on Giove-A (GSTB-V2/A)
- SGR-10/20 flown on 9 satellites including NASA's DART Rendezvous mission and ESA's PROBA-1

## Related Products

- SGR-05U and SGR-05P: Miniaturised low power receivers.
- SGR-10: 2 Antennas; position, velocity and time determination
- SGR-20: 4 Antennas; position, velocity, time and attitude.

## Issue Number & Notice

***SSTL-9604.*** This data sheet is for preliminary information purposes and can be changed without any notice.