# Stellar Gyro

## NSGY-001

### Functional Characteristics
- **Rate estimation accuracy** (3σ) ≤ 0.20 degrees/s (boresight) ≤ 0.05 degrees/s (cross-boresight)
- **Maximum slew rate** ≥ 1.00 degrees/s
- **Detection capability** $M_v \geq 5.0$
- **Maximum number of features tracked** 15
- **Standard update rate** > 1 Hz
- **Sky coverage** > 99%

### Physical Characteristics
- **Dimensions** 37.0 mm x 35.5 mm x 49.0 mm
- **Mass** < 100 g

### Environmental Characteristics
- **Thermal (operational)** -25 °C to +50 °C
- **Vibration (qualification)** 14 g$_{max}$ (random)

### Interfaces
- **Power supply** 5 VDC
- **Power Consumption** < 200 mW (average)
- **Communication** SPI
- **Connector** nano-D (P15)
- **Mechanical** Front: 3 x M3 (w/ alignment slots) Top: 2 x M3 (w/ alignment slots)

**Configuration Management:** Specifications are subject to change. Please refer to latest version.
The NewSpace stellar gyroscope uses a COTS sensor and optics resulting in a very low-cost attitude determination system that maintains accuracy during the eclipse phase. It can achieve this by using algorithms that tolerate noise and does not require a star database. It is thus far more robust against radiation damage than a standard star mapper solution would be if based on the same components.

**FEATURES**
- Active pixel CMOS detector
- Small size and low mass
- No baffle required
- Low power
- Simple to interface
- Immune to Moon and Earth in FoV

**APPLICATIONS**
- High performance 3-axis rate sensor
- Full sky sensor for agile satellites

**QUALIFICATION**
The Stellar Gyro has passed through qualification testing and is due for first launch in 2019.

**UTILITY**
The NewSpace stellar gyroscope can be used to propagate a spacecraft’s attitude from a known initial condition, without drift, while sufficient stars are common across frames. The image-based rotation estimates can complement a set of MEMS rate gyroscopes to maintain a high accuracy attitude estimate at low angular rates (where MEMS gyroscope drift is most severe).