# SUN SENSOR


## PERFORMANCE

| | NCSS-SA05 | NFSS-411 |
|---|---|---|
| **FUNCTIONAL CHARACTERISTICS** | | |
| Field of view | 114° | 140° |
| Update rate | >10 Hz (limited by customer ADC) | 5 Hz typical |
| Accuracy | <0.5° RMS error over FOV | ≤0.1° RMS error over the FOV |
| **PHYSICAL CHARACTERISTICS** | | |
| Dimensions | 33 mm x 11 mm x 6 mm | 34 mm x 32 mm x 20 mm |
| Mass | <5 g | <35 g |
| Power | <10 mA | <37.5 mW average, 130 mW peak |
| **ENVIRONMENTAL CHARACTERISTICS** | | |
| Thermal (operational) | -25 °C to +70 °C | -25 °C to +70 °C |
| Vibration (qualification) | 20 $g_{RMS}$ (random) | 16.3 $g_{RMS}$ (random), 5000 g shock |
| Radiation (TID) | n.a. | 10 krad (component level) |
| **INTERFACES** | | |
| Power supply | 5 $V_{DC}$ | 5 $V_{DC}$ to 50 $V_{DC}$ (5 $V_{DC}$ nominal) |
| Data | 5 analogue channels | RS-485 UART |
| Connector | 9-way female Nano-D | 9-way female Micro-D |
| Mechanical | 3 x M2 threaded holes | 4 x #2 Socket Head Cap Screw (or M2) |

**CONFIGURATION MANAGEMENT:** *Specifications are subject to change. Please refer to latest version.*

NEWSPACE SYSTEMS

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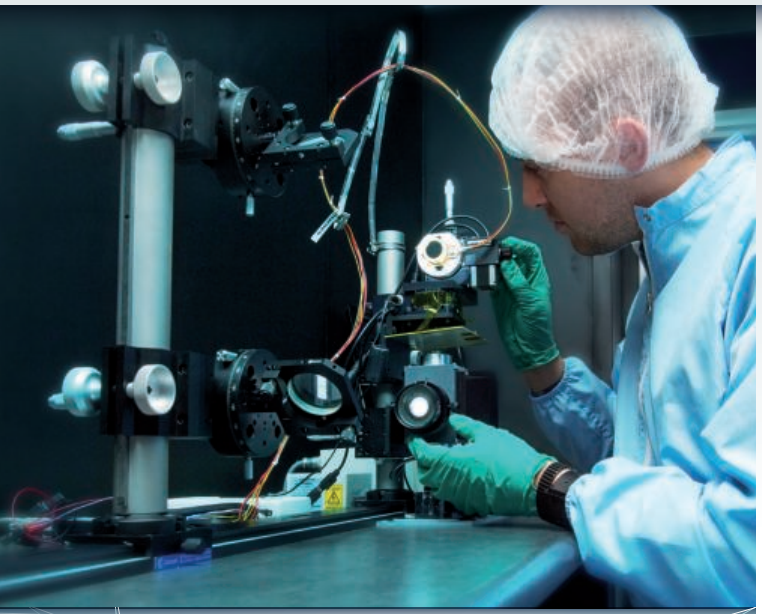

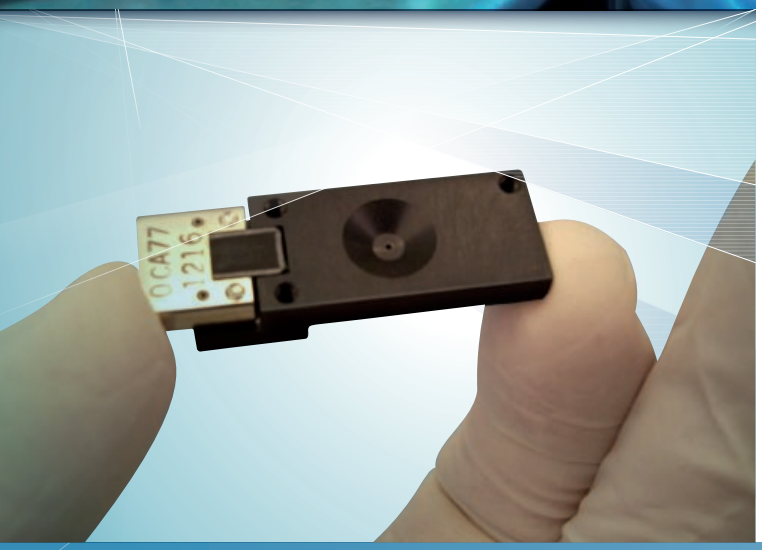

## FEATURES

- Ultra small size and low mass
- Low power
- Simple to interface
- Wide field of view
- NFSS-411: Digital architecture
- NCSS-SA05: PSD architecture
- NFSS-411: Calibration embedded
- NCSS-SA05: Simple analogue interface

## APPLICATIONS

- Accurate determination of sun-angle
- Can be used in conjunction with a magnetometer for simple attitude control
- Can be used as safe-mode sensors on gyro or star-mapper controlled systems
- NFSS-411: Four sensors can achieve full sky coverage
- NCSS-SA05: Six sensors can achieve full sky coverage

## QUALIFICATION

The NFSS-411 was first flown in 2007. Since then, it has been used on a number of constellations with a total of over 100 delivered. The NCSS-SA05 has also been delivered, more than one hundred units, to a multitude of international satellite programmes.

## UTILITY

A sun sensor determines a spacecraft's orientation with respect to the sun. The front surface of the NewSpace Systems (NSS) NFSS-411 sensor is a synthetic sapphire window with a reflective metal coating beneath. Slits are etched in the metal and sunlight passes through them and through an optical filter onto a sensor. The charge on the photo-sensors are read by the microcontroller which processes the image and computes the sun vector. the vector and other telemetry is returned to the spacecraft through the serial interface. The NSS Fine Sun Sensor accepts the configuration commands and outputs digital angles and telemetry over a serial interface to the on-board computer. The unit can be powered from unregulated DC power from the spacecraft.



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