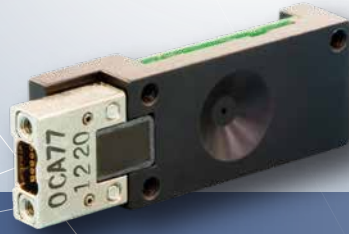
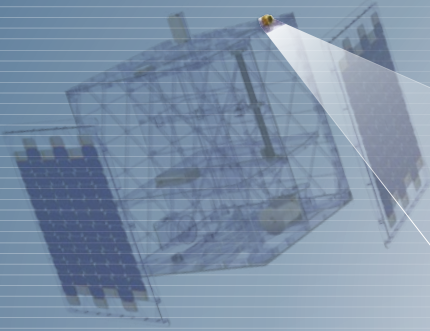


# SUN SENSOR



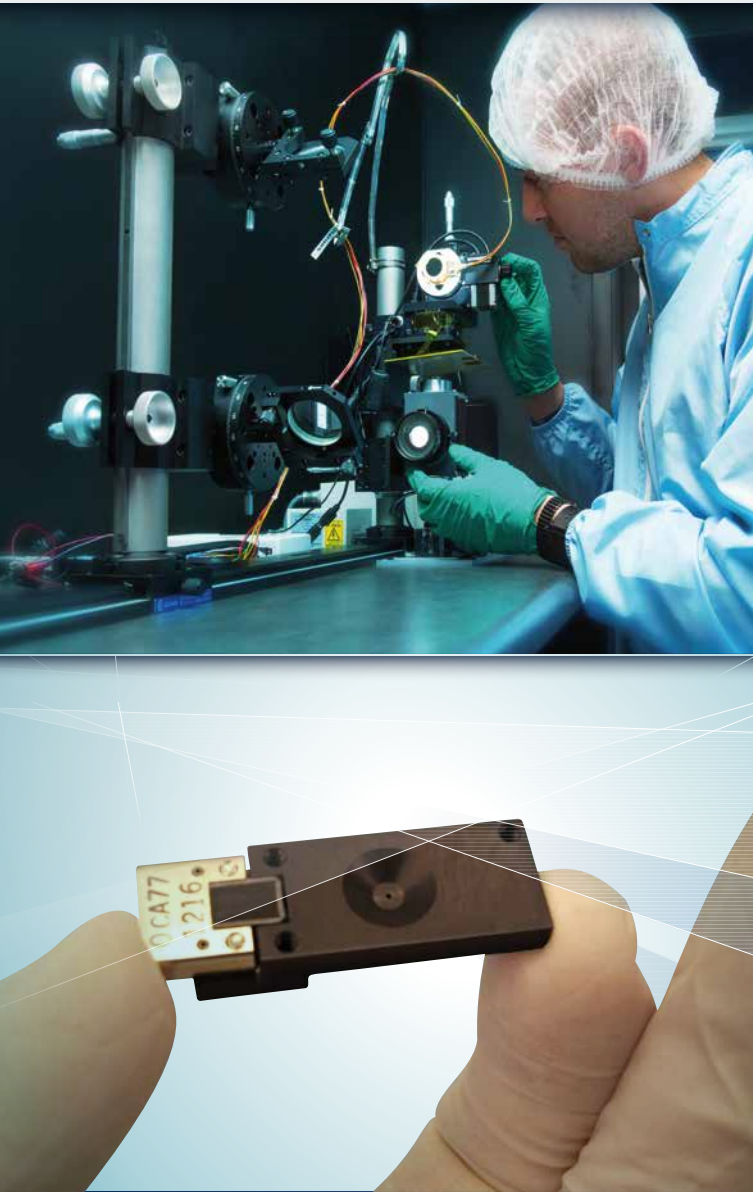
## PERFORMANCE

	NCSS-SA05	NFSS-411
<b>FUNCTIONAL CHARACTERISTICS</b>		
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 136° FOV
<b>PHYSICAL CHARACTERISTICS</b>		
Dimensions	33 mm x 11 mm x 6 mm	34 mm x 40 mm x 20 mm
Mass	<5 g	<37 g
Power	<10 mA @ 5 V	Idle: <3mA [15mW], bootloader mode <8mA [40mW], application mode Active: <30mA [150mW]
<b>ENVIRONMENTAL CHARACTERISTICS</b>		
Thermal (acceptance/operational)	-25 °C to +70 °C	-25 °C to +70 °C
Mechanical Tests (qualification)	16 g <sub>RMS</sub> (random), 20g (sin)	21.06g rms (random), 26.25g (sin), 2000g shock
Radiation (TID) (qualification)	n.a.	20 krad (component level)
<b>INTERFACES</b>		
Power supply	5 V <sub>DC</sub>	5 V <sub>DC</sub> to 50 V <sub>DC</sub> (5 V <sub>DC</sub> nominal)
Data	5 analogue channels	RS-485 UART
Connector	9-way female Nano-D	9-way socket Micro-D
Mechanical	3 x M2 threaded holes	4 x M2.5 clearance holes

**ACCEPTANCE TESTING:** All FM parts undergo random vibration (10 rms) as well as thermal cycling (four cycle ambient pressure) to five degrees beyond operational thermal specifications. However, NewSpace can perform additional environmental testing if required by a client.

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

# SUN SENSOR



## 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

Both the NFSS-411 and NCSS-SA05 are TRL 9 with in-orbit heritage. The NFSS-411 Sun Sensor has demonstrated in-orbit lifetimes of >5 years in LEO and due to its robust nature has become a preferred choice for constellation primes. To date, over 150 of the NFSS-411 units have been delivered globally. Our NCSS-SA05 Sun Sensor has been flying since 2014, with around 60 units delivered globally. The NCSS-SA05 has been used on several international programmes including a lunar mission.

## 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 NCSS-SA05 is based around a PSD analogue sensor. Each sensor comes with a specific calibration equation for maximum accuracy. The unit can be powered from unregulated DC power from the spacecraft.