



TENSOR TECH

FSS100 & CSS100 Fine & Coarse Sun Sensor



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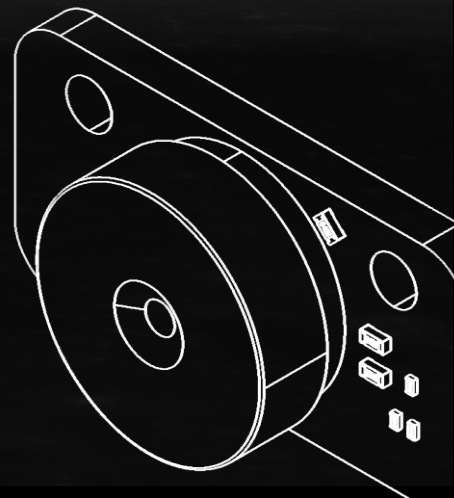
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Introduction to FSS100 Nano Fine Sun Sensor

Fine Sun Sensors measure the sun vector on satellite body reference frame using specially designed optical structures and electronics. Sun vector information should be fed into the attitude determination and control system (ADCS) to facilitate the attitude determination process. Fine Sun Sensors are comparatively accurate than magnetometers; Moreover, they are smaller, lighter, cheaper, consume less power, and update faster than star trackers or earth sensors.

FSS100 was designed and manufactured by Tensor Tech feature for their tiny size. Customers can easily install these devices on top of their CubeSat. Moreover, a micro-controller is embedded into FSS100 with an error table for a tabulated correction. Therefore, optimal performance could be extracted via in-factory calibration in Tensor Tech; or, users can calibrate these sensors by themselves using the supported software.

Please noted that fine sun sensors and coarse sun sensors could only work when the satellite is orbiting to locations where the sun is capturable; in addition, a sun model calculation is necessary for telling the attitude of a satellite. Details could be found in the FSS100 user manual or consulting with Tensor Tech's team.

Performance

- ☒ Type: 2 axis, digital sun sensor embedded with calibration error table and micro-controller
- ☒ Field of view (FOV): +/- 60 deg; 45 deg for the optimal performance
- ☒ Accuracy: +/- 0.1 deg with 45 deg of the FOV of view; +/- 0.5 deg with 60 deg of the FOV
- ☒ Sampling rate: 4, 8, 16, 32 Hz adjustable by the user

Electrical

- ☒ Supply voltage: 3.3V
- ☒ Power consumption @ sampling: < 2mA
- ☒ Power require @ IDLE: < 0.5mA

Mechanical

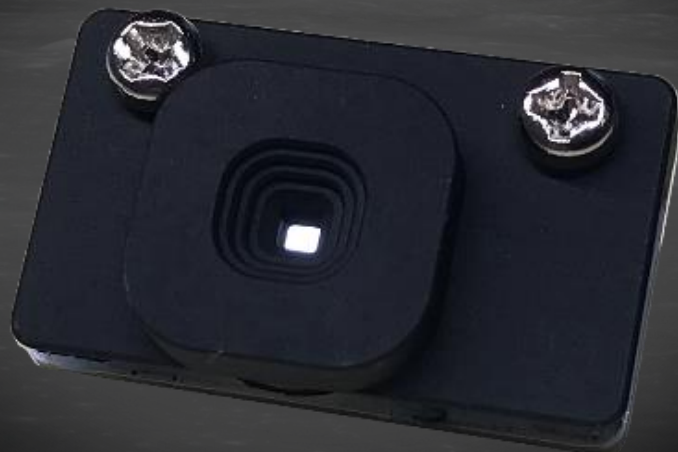
- ☒ Dimensions: 20.00 × 10.00 × 5.70 mm
- ☒ Mass: < 4 g

Reliability

- ☒ Fly heritage since 2021
- ☒ Design life: > 3 years
- ☒ Radiation tolerance: > 10 krad
- ☒ Operating temperature: -20 deg C to 60 deg C

Interface

- ☒ FSS100 communicate with the on board computer (OBC) or the ADCS computer with I2C interface. Supporting software will be provided for users to calibrate or making functional checks with the FSS100.



Introduction to CSS100 Coarse Sun Sensor

This analog-type coarse sun sensor is probably the simplest sun sensing element in satellite attitude determination technology. Usually, a photodiode or a photoresistor is used. Here we use the former in CSS100 to extract better sensitivity and stability. In this case, the coarse sun sensor can not only serve as a digital indication device that tells users if a specific face of the satellite faces. Furthermore, it can tell users a rough sun vector angle to the normal line on the surface of the sun sensor. That is why we call these coarse sun sensors to have a 1 axis attitude determination capability.

Multiple sun sensors are recommended to be installed on different faces of the satellite to maximize the field of view of the sun sensor array. Ideally, six coarse sun sensors should be installed on each of the six sides of the satellite (considering a CubeSat here). That way, even if the satellite is in a tumbling condition, the coarse sun sensor can at least serve as a rough attitude determination sensor and co-work with a magnetometer to perform a rough pointing job.

Performance

- ☞ Type: 1 axis, analog type coarse sun sensor
- ☞ Field of view: +/- 60 deg
- ☞ Accuracy: +/- 10 deg

Electrical

- ☞ Supply voltage: 3.3V
- ☞ Power consumption: < 0.1mA

Machanical

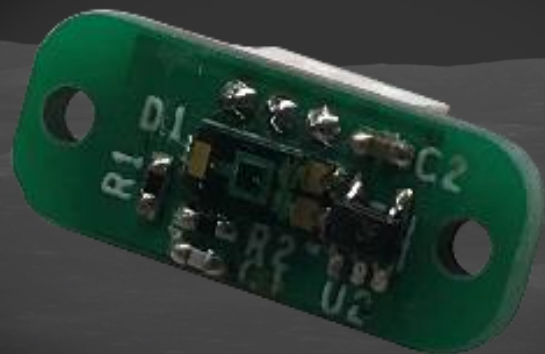
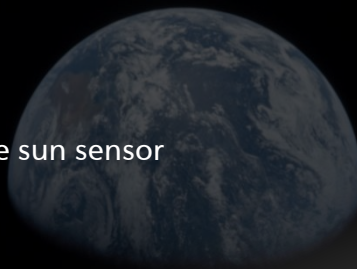
- ☞ Outer dimensions: 20.00 × 10.00 × 5.70 mm
- ☞ Mass: < 0.5 g

Reliability

- ☞ Design life: > 3 years
- ☞ Radiation tolerance: > 10 krad
- ☞ Operating temperature: -20 deg C to 60 deg C

Interface

- ☞ Vcc, GND, and output lines are the only three pins in CSS100. An analog-to-digital converter (ADC) should be installed for the user to extract the information in a CSS100.





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