

Star Tracker VST-41M

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VECTRONIC Aerospace offers with the VST-41M a high performance 3-axis star tracker for small satellite applications with the technical capabilities and radiation tolerance suitable for LEO, GEO and even for interplanetary missions. The sensor has been successfully used in several small satellite missions with outstanding in-orbit performance.

The star tracker consists of two main elements:

- The optical head with the high quality lens system (Leica) and the baffle in front of it
- The star tracker processing electronics with the on-board star catalogue



The VST-41M performs direct and autonomous measurement of the spacecraft attitude in the body fixed star tracker reference frame relative to the inertially fixed celestial reference system.

Core element of the sensor's processing electronics is a 512 x 512 pixel rad-hard CMOS sensor, especially developed for space applications, which transforms star images detected through the lens into electrical information. After the A/D conversion the CPU analyses the incoming data through a chain of several algorithms, which eliminate fixed pattern noise, objects that are too bright like the Moon or planets and then determine star positions using a barycentric algorithm.

With a focal length of 50 mm the sensor's FOV is around 14°x14° which guarantees at least 10 visible stars independent of the current attitude. After the first acquisition, which takes typically 800 ms, the sensor, operating with an update rate of 4 Hz, calculates the attitude with a 2σ accuracy of better than 18 arcsec for each individual star frame.

The probability of attitude acquisition at spacecraft angular rates lower than 0.3 deg/sec is better than 99.7%. The attitude information is provided together with other status telemetry in the form of quaternions and Euler angles. The communication interface comprises two independent asynchronous SCI's with a baud rate up to 1 Mbit.

Mechanical	
Dimensions (with baffle)	80 mm x 100 mm x 180 mm
Mass	0.7 to 0.9 kg
Mounting pattern	4 x M4 66 mm x 90 mm
Electrical	
Power consumption, max	2.5 W
Input voltage range (VCD)	9 to 18 or 18 to 40
Signal interface	RS422 / RS485
Signal characteristics	Serial asynchronous
Connector Type	SUB HD26 male, or MDM-25
Environmental	
Operating temp.range	-20°C to + 65°C
Storage temp. range	-40°C to + 80°C
Vibration	20g rms random 3 axis
Radiation tolerance	> 20 krad
Performance	
Accuracy 2σ (x,y / z axis)	18 arcsec / 122 arcsec
Acquisition probability	> 99.7%
Update rate	4Hz
Field of view	14° x 14°
Time of first acquisition	typ. 800 ms

