

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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TESTING THE NVIDIA JETSON XAVIER NX MODULE FOR THE SONATE-2 NANO SATELLITE
MISSION

Abstract

SONATE-2 is a 6U+, LEO CubeSat mission, which will demonstrate the feasibility of in-orbit image processing using neural networks. These networks shall also be trained on-board. Therefore, a powerful computational unit with a small form factor and low power consumption is needed. One possible candidate, the NVIDIA Jetson Xavier NX is analysed and tested for a possible use in this mission. Thus, thermal vacuum chamber tests, total ionizing radiation dose tests, single event effect tests and vibration tests were performed to expose the module to conditions equivalent to space environment present in LEO. The module has been Total Ionizing Dose (TID) tested with a Co-60 source at a dose of 10 krad. Single Event Effect (SEE) testing has been done with protons at energy levels of 30, 50 and 68 MeV. In addition to that, vibration tests have been conducted on acceptance level for a launch with a Soyuz-2 rocket for a containerized CubeSat. The thermal-vacuum tests included an outgassing test and a thermal cycling test with 5 cycles from -30°C to 90°C. After the TID tests, the vibration tests and the thermal tests, no damage to the module could be detected. During the outgassing test, a total mass loss of at least 0.08 % was measured. During the SEE tests, two single event effects occurred, of which one caused the device to reboot and another one caused a memory error in the modules eMMC memory. Thus, it is recommended to implement a redundancy strategy for the content of the eMMC memory and operate the device, such that spontaneous reboots do not lead to critical failures.