Radiation Protection

Radiation

Radiation is a general denomination of all the high-energy particles and electromagnetic waves that exist in outer space, outside of Earth most inner layers of protective atmosphere and magnetic field. This radiation comes from multiple sources yet electronics are particularly vulnerable high-energy particles from Galactic Cosmic Rays (GCRs) and Solar Particle Events (SPEs). Radiation can cause malfunctions, known as single-event upsets (SEUs), which may lead to corrupted data, software crashes, or even permanent damage to sensitive components like microprocessors.

Considering this context measures have to be taken in order to avoid potential risks caused by the phenomena.

Measures taken

To limit the effects of radiation different measures are taken to ensure it’s effects are non-critical to the mission. Periodic reboots are performed after a configurable specified period of time in order to avoid potential persistent errors in the code created by radiation.

Power cycling is not performed as it is not compatible with our hardware design. Despite this, under certain battery charge conditions, the MCU power is shut down in order to prevent complete battery discharge. This may act in our favour in situations when the OBC doesn’t reduce it’s battery consumption due to it being stuck by radiation caused errors, performing a shut down power on cycle. EDAC and CRC measures are not currently designed or implemented, mostly due to most data handling being centralized ans straightforward.

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