

Space Environment Scientific Experiment(Sense) on KITSAT-3

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The magnetically trapped ions and electrons surrounding the Earth are an integral part of the Earth's environment and play an important role in many geophysical processes. In spacecraft technology the near-Earth space environments strongly influence the performance and lifetime of operational space systems. Trapped particles in the radiation belts, solar flare protons, and galactic cosmic ray can cause single event phenomena within micro-electronic devices. The total dose effects of this high-energy radiation can degrade micro-electronic devices, solar arrays, and sensors. These satellite anomalies are often associated with unusual conditions in space such as magnetic storms. The effect of the radiation belts on satellites remains a major factor in satellite lifetimes. At present, considerable effort is devoted to understanding the basic mechanisms of radiation effects on micro-electronics. The miniaturization of electronics and the digitization of logic circuits has made satellite instrumentation more susceptible to radiation damage. Also, the greater sophistication and efficiency of sensors has resulted in an increased sensitivity to background radiation. Both Korean small satellite KITSAT-1 and 2 had carried simple experimental modules to measure radiation particle distributions and radiation effects on micro-electronics on low Earth orbits. They have been significantly improved for KITSAT-3 and named Space ENvironment Scientific Experiment (SENSE). This system is designed suitable for small satellite mission. It consists of four sub-systems : High Energy Particle Telescope(HEPT), Radiation Effects on Micro-Electronics(REME), Scientific MAGnetometer(SMAG), and Electron Temperature Probe(ETP). The scientific object of SENSE is to study the high energy particle environment variations in response to solar and geomagnetic activity and its effects on micro-electronics. It will be a valuable information to satellite engineering as well as gives a good scientific results.