

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Environmental Effects and Spacecraft Protection (6)

Author: Mr. KWON RYONG
Korea, Democratic People's Republic of, khs3333@126.com

APPLICATION OF TMR METHOD TO ON-BOARD CONTROL UNIT

Abstract

The satellite travels in the radiation environment with high energy particles brought by galactic cosmic rays and created from solar flares. Due to this environment, the electronic components of the satellite like Random Access Memory (RAM) are subject to Single Event Upset (SEU) effect. This paper describes the application of Triple Modular Redundancy (TMR) design methodology aimed at mitigation of the SEU effect in the design of the payload control unit and the efficacy verified in the test. The payload control unit has employed the Digital Signal Processor (DSP), and its operation program is loaded to the memory protected by TMR method when operation starts. The SEU which happens in this memory is detected and corrected by TMR voter, improving highly the reliability of the control unit and thus, ensuring normal operation of the satellite.