

SPACE POWER SYMPOSIUM (C3)
Small and Very Small Advanced Space Power Systems (4)

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DESIGN OF SECONDARY SOURCE OF POWER, FAULT MONITORING AND PROTECTION
SYSTEMS FOR NANO SATELLITE STUDSAT 2A/2B

Abstract

STUDSAT - 2 (STUDent SATellite) are twin nano satellites each weighing about 7Kg in mass and with dimensions 30*30*15cm which aims to prove Inter-Satellite Communication between STUDSAT 2A and STUDSAT 2B under the STUDSAT (STUDent SATellite) Program. STUDSAT is a venture of seven engineering colleges of South India to build small satellites with less cost and to prove cutting edge technologies in space sector like in orbit separation mechanism, inter-satellite communication, CMOS multispectral camera as payload for remote sensing applications and implementation of drag sail for demonstration of de-orbiting mechanism. The Electrical Power System is one of the most integral parts of any satellite. In case of small satellites, solar cells are commonly used for power generation. The generated power is stored for eclipse period and power is distributed throughout the satellite. For a LEO orbit, the satellite will be in sunlit region for about 63 mins of one complete orbit, thus secondary sources of power plays an important role in satellites. Power demands are present throughout the orbit, during sunlit period the power demands are met due to continuous power generation. But during eclipse, the power demands are met using secondary sources like batteries. Fault monitoring, detection and protection is necessary to make the system reliable. Occurrence of fault and types of fault has been studied. The fault must be detected and reported to the On Board Computer and vice versa using suitable interface. The study on types of faults, sensor for detection of faults has been completed. This paper will present the in detail study on the batteries and the Lithium Ion battery chosen for twin nano satellites, the battery capacity calculations, power budget for the mission, the design and testing of the batteries charge regulators for various conditions, battery protection circuit design and testing, testing of boards for fault monitoring, detection and protection of loads. The matlab analysis, simulations are completed; the circuits for the charge regulator and protection circuits are being designed.