

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

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TEST CAMPAIGN AND PRELIMINARY RESULTS OF THE ALMASAT-EO MICROSATELLITE
POWER SYSTEM

Abstract

The microsatellite ALMASat-EO, the second spacecraft being jointly developed by ALMASpace and the Microsatellite and Space Microsystems Lab of the University of Bologna, consists on a 300x300x600mm structure and about 35 kg of mass, with a modular structure made up by shop-machined Al trays. The satellite has five triple-junction solar arrays: four of them installed on the satellite lateral panels and a smaller panel placed on the top of the satellite. The spacecraft is three-axis stabilized exploiting two (redundant) three-axis magnetometers, redundant sun sensors and an Earth sensor for attitude determination, while the attitude control system is based upon a combination of a momentum/reaction wheels and three orthogonal magnetic coils. The satellite payload is a multispectral camera for Earth medium resolution images and a high-speed downlink S-band communication system. The aim of this paper is to provide a brief description of the ALMASat-EO power system design, pointing out the results of the test campaign for the main components: power board and batteries. Particular emphasis is given to the description of the power generation and consumption simulations, where four different operational configurations have been defined. In each configuration different satellite subsystems are considered and different operations are carried out. For each configuration a severe test campaign have been carried out thanks to a computer controlled Solar Array Simulator which replicates the expected behaviour of the solar panels during the orbit. The computer also manages an electronic loads board which simulates the subsystems power consumption during the simulated mission time. The test has involved real components of the power system allowing meeting all functional and performance requirements, in particular of the power board and battery packs. Detailed test campaign results will be reported in the full paper and compared to the expected performance predicted by the power budget including all selected operational configurations.