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Author: Mr. Ali Bunyatzada

Azercosmos, Space Agency of Republic of Azerbaijan, Azerbaijan, ali.bunyatzada@azercosmos.az

Mr. MAHAMMAD MAHMUDOV

Azercosmos, Space Agency of Republic of Azerbaijan, Azerbaijan, m.maqamed95@gmail.com

Mr. Emil Sadigov

Azercosmos, Space Agency of Republic of Azerbaijan, Azerbaijan, emil.sadigov@azercosmos.az

Mr. Farid Guliyev

Azercosmos, Space Agency of Republic of Azerbaijan, Azerbaijan, farid.guliyev@azercosmos.az

THE PRINCIPLES OF DESIGNING AND DEVELOPING AN EPS (ELECTRONIC POWER SYSTEM) FOR A 1U CUBESAT

Abstract

This paper aims to provide the necessary principles of designing and developing an Electrical Power System (EPS) for a 1U CubeSat. The EPS will be responsible for generating, storing, and distributing power to the various subsystems of the CubeSat, such as the communication system, attitude determination and control system, and payload.

The EPS design will be done using Altium Designer Software. Once the design is completed, various calculations will be performed in the Systems Tool Kit (STK) software to simulate the behavior of the CubeSat in its intended orbit. These calculations will help determine the power requirements of the EPS and ensure that it can meet the power demands of the CubeSat mission. Using STK, one can determine the battery and solar panel requirements for a CubeSat by analyzing its orbit, mission parameters, power consumption, and generation according to the solar exposure.

After the calculations are complete, the EPS design will be ordered as a printed circuit board (PCB) from a reputable manufacturer. Once the PCB is received, several tests will be performed to ensure that it meets the requirements and specifications of the CubeSat mission. These tests will include a visual inspection to ensure that the PCB matches the design and does not have any defects or damages, a continuity test to check for open or short circuits, a power and ground test to ensure that the voltage levels are correct, and functionality test to verify the EPS circuitry is performing as expected.

The successful completion of this project will result in a functional and reliable EPS for a 1U CubeSat. The EPS will be able to satisfy the power requirements of the mission and provide an appropriate power supply to different subsystems. This EPS design and the applied principles can be a starting point for other CubeSat projects. Described methodologies can also be modified and adapted according to the specific requirements of various missions.