

IAF SPACE POWER SYMPOSIUM (C3)
Interactive Presentations - IAF SPACE POWER SYMPOSIUM (IP)

Author: Mr. Adeel Amjad
Institute of Space Technology (IST), Pakistan, adeel2800@gmail.com

Dr. Muhammad Rizwan Mughal
Aalto University, Finland, rizwan920@gmail.com

Mr. UMAIR ALTAF
Institute of Space Technology (IST), Pakistan, umairaltaf@ieee.org

Prof. Leonardo M. Reyneri
Politecnico di Torino, Italy, leonardo.reyneri@polito.it

Mr. Jaan Praks
Aalto University School of Science and Technology, Finland, jaan.praks@aalto.fi

DESIGN OF PCU ON SMART CUBESAT COMPLAINT PANEL

Abstract

The main idea behind this paper is to reduce the harness mass for CubeSat by designing all the necessary subsystems on the interior sides of the panels; thus providing enough empty space for payloads. The exterior side of the panel hosts solar panels for electricity generation whereas the interior side of the panels houses the electronics. The primary function of this paper is panel design for generation, conditioning, storage and distribution of power to onboard modules. The paper describes the design of an efficient Power Conditioning Unit for modular CubeSats. The PCU has been designed using COTS and utilizes efficient maximum power point tracking (MPPT). It converts the solar energy in to electrical power with an efficiency of 0.27 and then convert this power in to unregulated Power Distribution Bus 14-V with the help of a switching DC-DC regulator. The comparison between different MPPT algorithms and the selection of most suitable algorithm has been presented in this design. The selection of other components based on the power requirements for 1U CubeSat has be described. Moreover the power loss analysis and the efficiency of the switching regulator has also been measured. The power loss and power degradation analysis has been given computed after finalizing the design of the PCU.