DESIGN OF A BUCK CONVERTER FOR STABLE VOLTAGE OUTPUT IN NANOSATELLITE APPLICATIONS

Defence S and T Technical Bulletin • Article • 2025

Ahmad, Yasser Asrul ; Kamazon, Tuan Muhammad Aidiel Tuan ; Razaman, Anis Hannani ; Saidin, Norazlina ; Khalifa, Othman Omran

Department of Electrical and Computer Engineering, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM), Malaysia

Abstract

In a nanosatellite or CubeSat operation, the size, weight and power efficiency of the satellite are critical. Traditional linear regulators, being inefficient and prone to excessive heat generation, are unsuitable for these applications. This project designed a buck converter to address these issues by efficiently reducing voltage and minimising power losses. The process included a comprehensive literature review, parameter determination, circuit design, and implementation on a printed circuit board (PCB) using KiCad. This project successfully achieved the design of a buck converter that steps down a +28 V input to a +5 V output and is capable of supplying current of up to 3 A to the load. Simulation results facilitated optimisation, leading to a highly efficient and stable buck converter suitable for CubeSat power regulation, thereby advancing robust power solutions for space missions.

Author keywords

Buck converter; CubeSat; DC-DC conversion; KiCad; voltage regulation

Funding details

Details about financial support for research, including funding sources and grant numbers as provided in academic publications.

Funding sponsor	Funding number	Acronym
Islamic University Malaysia		
International Islamic University Malaysia See opportunities by IIUM	FRGS24-347-0956	IIUM

Funding text 1
Grant (FRGS), Ministry Project ID: Islamic University Malaysia (IIUM)

Funding text 2
This project was funded by the Fundamental Research Grant (FRGS), Ministry Project ID: FRGS/1/2024/TK07/UIAM/02/1 through the International Islamic University Malaysia (IIUM) registered as FRGS24-347-0956.

Funding text 3
This project was funded by the Fundamental Research FRGS/1/2024/TK07/UIAM/02/1 through the International registered as FRGS24-347-0956.

Corresponding authors

Corresponding author	Y.A. Ahmad
Affiliation	Department of Electrical and Computer Engineering, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM), Malaysia
Email address	yasser@iium.edu.my

About Scopus

Language

Customer Service