

INTERMEDIATE PROJECT

Algorythm implemenation for Four-Switch Buck-boost Converter

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1 Description

The aim of this project is implementation of a four-switch buck-boost converter [2] algorithm [3] with wide application. For this purpose a ready inverter evaluation board will be used. The scope of the program operation spans from driving mosfet gates to have programovable work modes to be sequentially programmed by the user. This project is a base for more advanced devices like Super-capacitors controller or constant current LED driver.

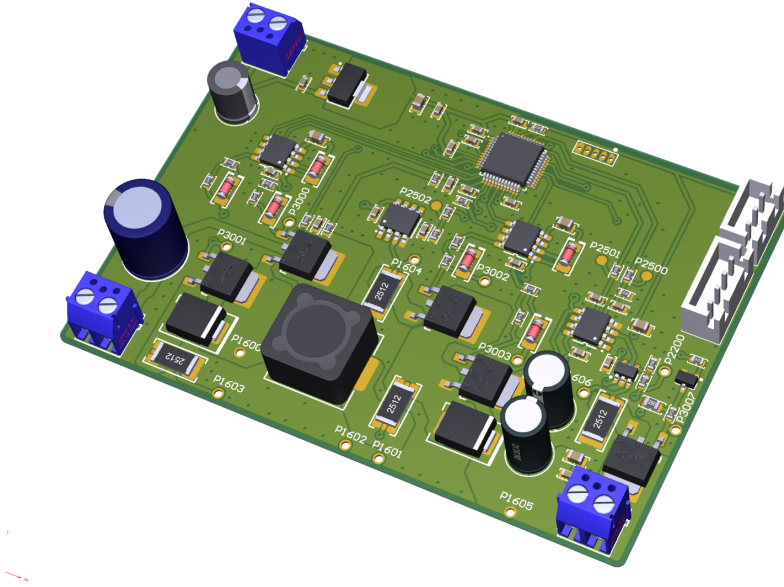


Figure 1: Evaluation inverter board

2 DC/DC Converter

DC-to-DC converter [1] is an electronic circuit or electromechanical device that converts a source of direct current (DC) from one voltage level to another. Device considered in project is able to lower or boost input voltage and is bidirectional. This converter will be able to operates as voltage source or current source.

3 Tools

STM Cube IDE will be used To program the microcontroller on board. Electronics and algorithm simulations will be conducted on LTSpice and Matlab software. Additional improvements of evaluation board will be made in Altium software

4 Main difficulties

Main difficulty is to create a robust algorithm, safety and stable operation is important. Main program has to identify events and react to them, damaging external devices is not allowed. Work of the inverter has to be under control and a lot of safety features will be used like: overcurrent, overtemperature, overvoltage, undervoltage protection. Additionally operation with li-ion batteries and Supercapacitors should be possible

5 Testing conditions

2 strongy !

References

- [1] DC-to-DC converter.
https://en.wikipedia.org/wiki/DC-to-DC_converter.
- [2] Texas Instruments. 4-Switch buck-boost bi-directional DC-DC converter.
<https://www.ti.com/tool/PMP21529#design-products>.
- [3] Wei-zhong Zhan, Hui-pin Lin, Yao Zhang, Ji-min Jin. Modeling and Controlling Strategy of Four-Switch Buck-boost Converter with Smooth Mode Transitions.
<https://www.benthamopen.com/FULLTEXT/TOEEJ-11-57>, August 2013.