

Research Migration Project

<https://esim.fossee.in/research-migration-project>



The Research Migration Project is an initiative of FOSSEE, IIT Bombay that promotes the use of eSim for reproducing published research circuits originally implemented using proprietary simulation tools. The objective is to migrate these validated designs to eSim to build an open source resource database.

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Affiliation / Institution : *Professor, Department of Electronics and Telecommunication Engineering, St. Vincent Pallotti College of Engineering and Technology, Gawasi Manapur, Wardha Road, Nagpur, Maharashtra, India, Pin Code:-441108

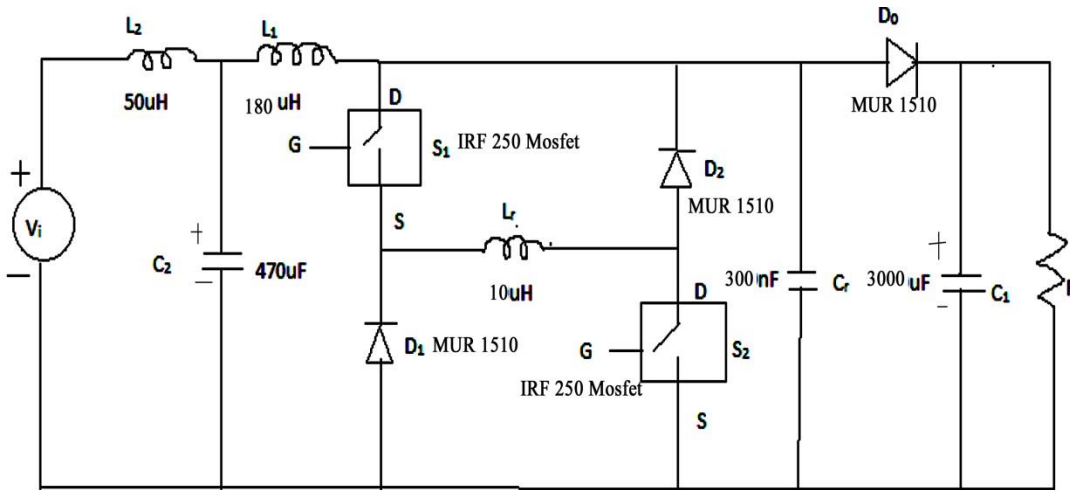
Title of the circuit : *Esim Simulation of High Efficiency Zero Voltage Switching(ZVS) and zero current switching(ZCS) DC- DC Boost converter for Solar PV Systems applications

Theory/Description : *Soft switching DC-DC converters play an important role in deciding the efficiency of the solar PV system. In order to improve the efficiency of energy conversion for a photovoltaic (PV) system, a soft-switching boost converter is used. The energy efficiency increases due to reduced switching losses in soft switching converters. The circuit of ZVS boost converter has been analysed. This circuit uses a main switch using a simple auxiliary resonant circuit, composed of an auxiliary switch, a diode, a resonant inductor, and a resonant capacitor. The conventional boost converter decreases the efficiency because of hard switching, which generates losses when switches are turned on/off. All switches in the adopted circuit perform zero-current switching by the resonant inductor at turn-on and zero-voltage switching by the resonant capacitor at turn-off. This switching pattern reduces the switching losses, voltage and current stresses of both switching devices. Switches S1 and S2 are MOSFETs IRF250, capacitors C1 and C2 are electrolytic capacitors and capacitor Cr is an AC capacitor. The auxiliary circuit consists of an auxiliary switch (S2), a resonant capacitor (Cr), a resonant inductor (Lr), and two diodes (D1 and D2).

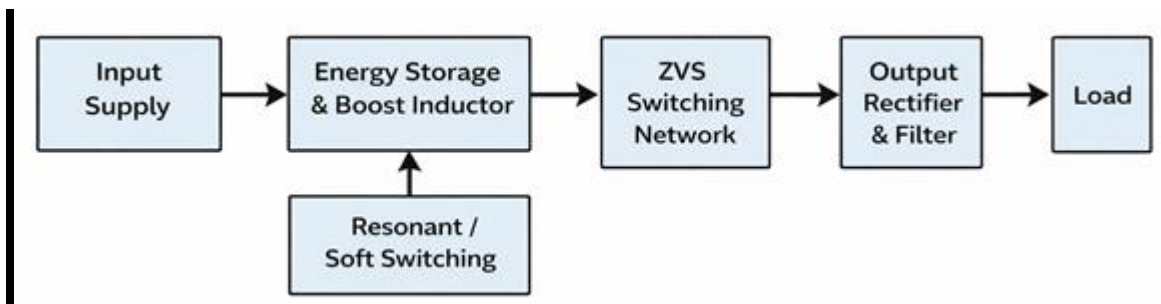
Reason to reproduce with eSim : This circuit is suitable for simulation on E-sim environment as this software is open source and user friendly free software which can be easily used by everyone. Open source softwares are highly beneficial for technical community and professionals as these are freewares. IITs always promote and support opensource software platforms for in depth understanding of circuits and coding and moreover a lot of free educational resources are also provided by IIT spoken tutorial project team to learn all these platforms. Use of this software promotes the results improvement and validation of them with ease.

Expected Outcome/outputs : *The circuit simulates especially ZVS and ZCS condition along with voltage and current waveforms of the switches

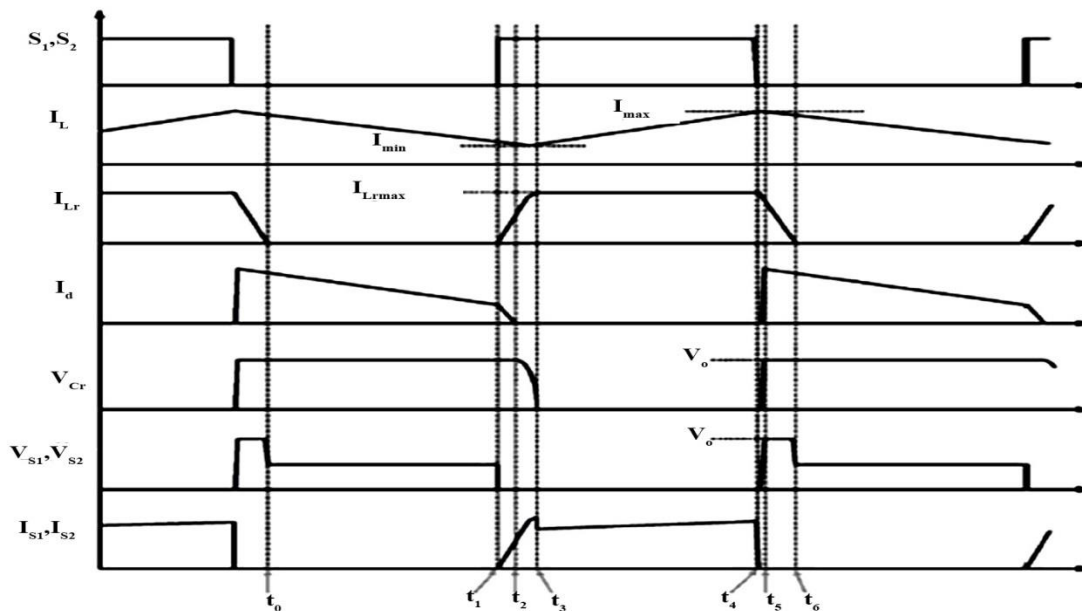
Circuit Diagram(s) : *The circuit diagram of the mentioned circuit is as follows



Block Diagram (s) : Figure below shows the block diagram of the circuit



Expected Results (Input, Output waveforms and/or Multimeter readings) :



Research Paper/Journal/etc. : *(Providing at least one relevant research paper, journal article, or patent reference is mandatory. The reference should be directly related to the proposed circuit. Proposals submitted without a valid reference will not be accepted.)

Title : Design and Application For PV Generation System Using A Soft-Switching

- Boost Converter With SARC
Author : Sang-Hoon Park, Gil-Ro Cha, Yong-Chae Jung, and Chung-Yuen Won
Page No. : Vol. 57, No. 2, February 2010, pp 515-522
Link :- <https://ieeexplore.ieee.org/document/5332307>
 - **Source/Reference(s) :** IEEE Transactions On Industrial Electronics, Vol. 57, No. 2, February 2010, pp 515-522
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Note: Fields marked with an asterisk (*) are mandatory and must be filled for successful submission.