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Research paper

Design and analysis of a high voltage gain DC - DC converter for renewable energy applications

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Abstract

The project deals with a completely unique high voltage gain, high-efficiency dc–dc device supported coupled inductance, intermediate ca-pacitance, and run energy recovery theme. The input energy nonheritable from the supply is initial keep within the force field of coupled inductance and intermediate capacitance in an exceedingly lossless manner. In different stages, its passed to the output. Victimization MPPT technique, most power is tracked and therefore the most output voltage gain is achieved. By attaining soft change losses may also be cor-rected.

Keywords: *Microcontroller; High Voltage Dc-Dc Converter; Photovoltaic Panel.*

1. Introduction

Generally, the galvanically disconnected dc– dc converters for MLPE applications can be ordered as those with a double stage or with a single stage power conversion. Here, the front-end half bridge rectifier, quasi z-source converter is used for voltage power generation. To improve the proficiency of the double stage conver- sion approach, the combination of a synchronous boost converter with a series Resonant dc–dc converter. In a single-stage dc–dc power conversion, the primary inverter ought to work inside a wide input voltage range and optimization of the efficiency could become an issue. Here, various methodologies were created to accomplish better execution.

2. Methodology

In this project, we proposed voltage-increasing technique.Also, PV array is used to convert solar energy into electricity, and The proposed converter is that it incurs "low loss switching" during turn ON, without any extra circuit. When it turn ON, the current flows through it.
In this method the energy is absorbed through the PV panel,where the electricity is produced MPPT(maximum power point tracking) will extract maximum power from the generated electricity. Then DC-DC converter is used to boost up the voltage to reach the load. The supply is given in variation to the Control circuit and driver circuit as necessary.

3. Circuit diagram

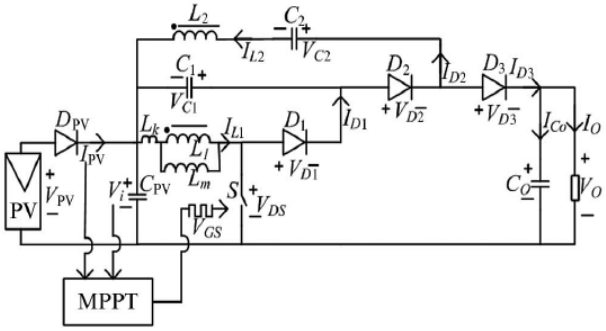


Fig. 1: Design of High Voltage Dc-Dc Converter

3.1. PV array

A photovoltaic system includes solar PV power system, or PV system through it designed to supply usable solar power.None of these are 100 percent efficient. It is the main component for solar power generation. it is designed by individual cells attached together a complete photovoltaic array.
Photovoltaic array comprising of solar panels are the predominant power generation components of renewable distributed energy resources, PV panel absorbs heat energy from the sun light and converts it into electricity

3.2. MPPT

It is used to extract maximum power under all condition from solar panel. it gives triggering pulse to MOSFET switch based on that switch operates. It gets a reference voltage and current from the solar panel and triggered pulse is given to the MOSFET switch. The tracking waveform is as shown,

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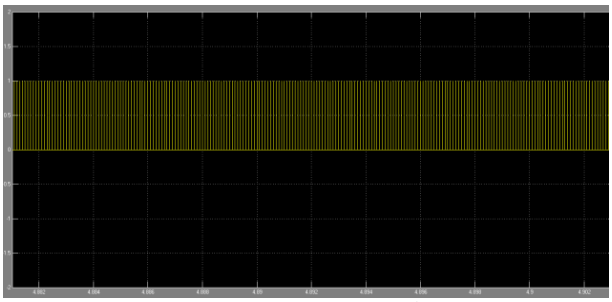


Fig. 2: MPPT Tracking Waveform.

4. High gain DC to DC converter

In proposed system DC-DC converter is used for low loss switching. As the system designed by passive clamp circuit, leakage energy is reduced. it is mainly used to boost up the energy obtained from the solar panel, coupled inductor gives gain expression to boost up the voltage.

4.1. Block diagram

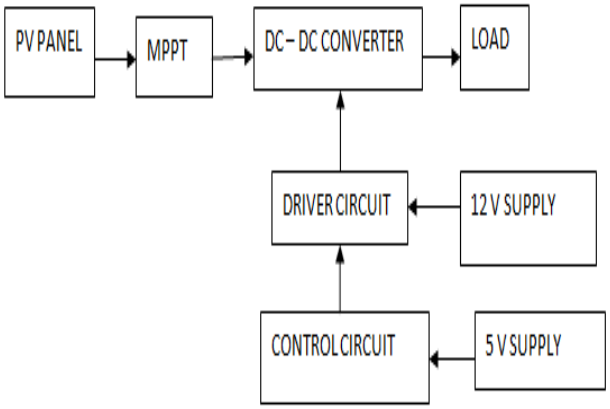


Fig. 3: Block Diagram High Voltage DC-DC Converter for Photovoltaic Applications.

4.2. Simulation

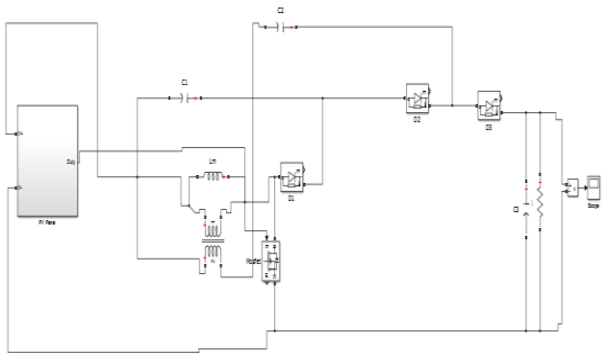


Fig. 4: Simulation Diagram.

5. PIC micro controller

PIC microcontroller is used to obtain the gate signal.PIC 16F887 was used to generate Sine Wave gate signals. Both have 40 pins with different functions.

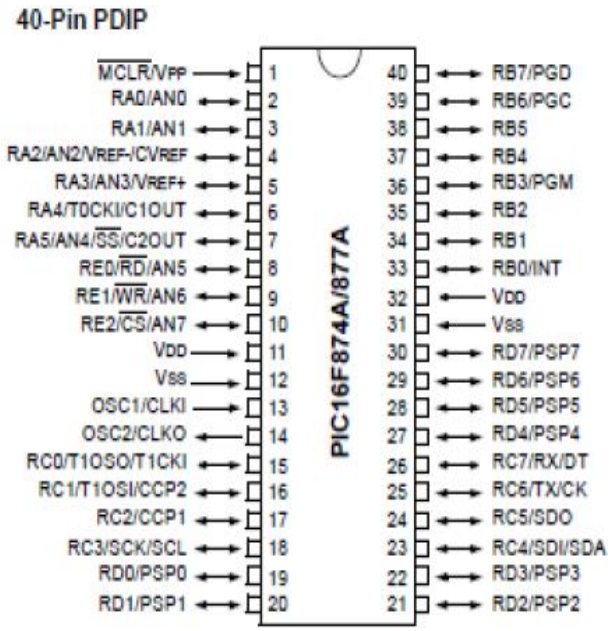


Fig. 5: PIC Microcontroller.

Two PICs were programmed in order to drive switches for Modified Sine Wave and Sine Wave inverter. Program MPLAB was used to write the PICs codes.

6. Simulation part

6.1. Simulation input

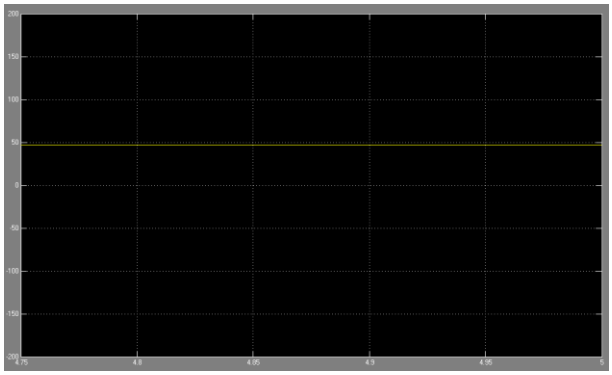


Fig. 6: Input Voltage Supply.

6.2. Simulation output

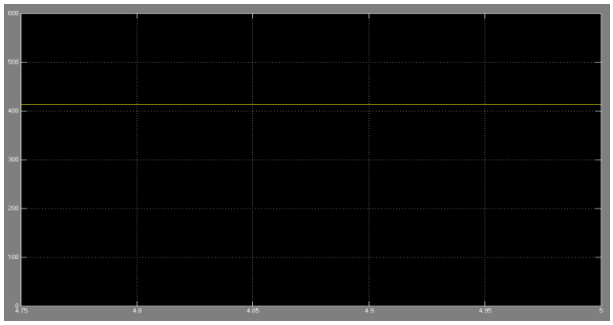


Fig. 7: Output Voltage Supply.

7. Conclusion

This paper has presented a galvanically detached high advance up dc-dc converter for the photovoltaic applications..Moreover,the proposed topology achieves high efficiency and high output voltage gain.less number of switches are used.The multimode operation of the proposed converter was described along with steady-

state waveform and analysis of operating states. Besides, it includes the consistent input current over the entire voltage and load input terminals. The converter model in view of the nonspecific si-MOSFETs accomplishes the greatest effectiveness of 97.4% in the nominal mode and the rated power of 25W.

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