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Solar photovoltaic system Fast Acting MPPT Algorithm for Soft Switching Interleaved Boost Converter

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Abstract

Conventional DC-DC converters operate at high frequencies, which causes noise, high output voltage ripple, and high switching voltage stress. These issues reduce the effectiveness of traditional boost converters and cause low voltage gain. Soft switching modified interleaved boost converter with twin linked inductors is utilized to solve the aforementioned issues. By sharing the input current, the primary windings of two linked inductors are parallel connected to reduce current ripple at the input side. The stress on the switch voltage and output voltage ripple are reduced by output capacitors connected in series. Additionally, the secondary of two coupled inductors is coupled in series.

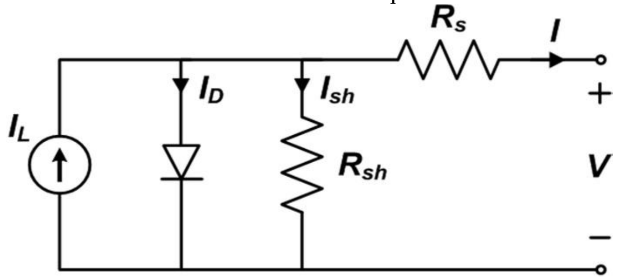
INTRODUCTION

Many industries today need DCDC converters with large voltage gains.For instance, to increase the lo w voltage to high voltage for a grid-connected system[2], DC-DC converters with high step-up and huge input current are needed. High voltage gain DC-DC converters are needed to raise a battery voltage of[3] 12 volts up to 100 volts under steady operati on for high intensity discharge lamps (HID)[4], electric vehicles, and backup energy systems[5].

SYSTEM MODELING

MATHEMATICAL MODELING OF PV ARRAY

Equivalent model of the PV Cell



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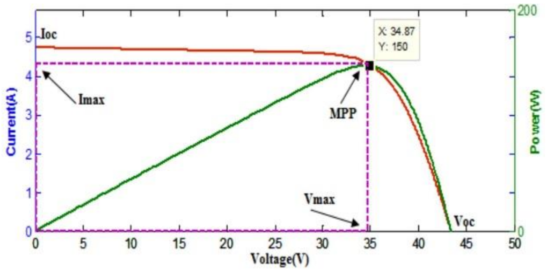
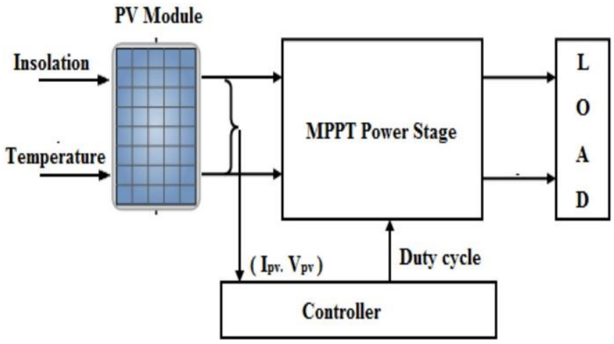
I-V AND P-V CHARACTERISTICS

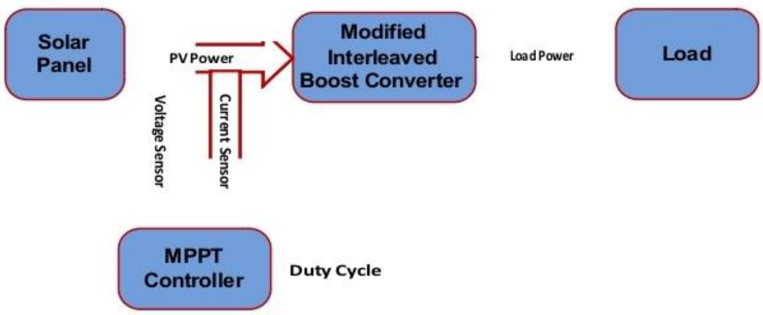


. V-I curves of BPSX 150s PV module with MPPT

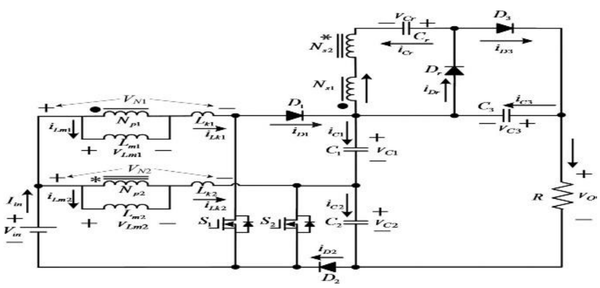
MAXIMUM POWER POINT TRACKING ALGORITHM



PROPOSED SOFT SWITCHING INTERLEAVED BOOST CONVERTER (SSIBC)



a). Circuit diagram of SSIBC (b) Gate control signal



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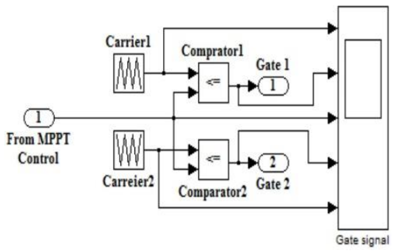


RESULTS OF SIMULATION AND DISCUSSION

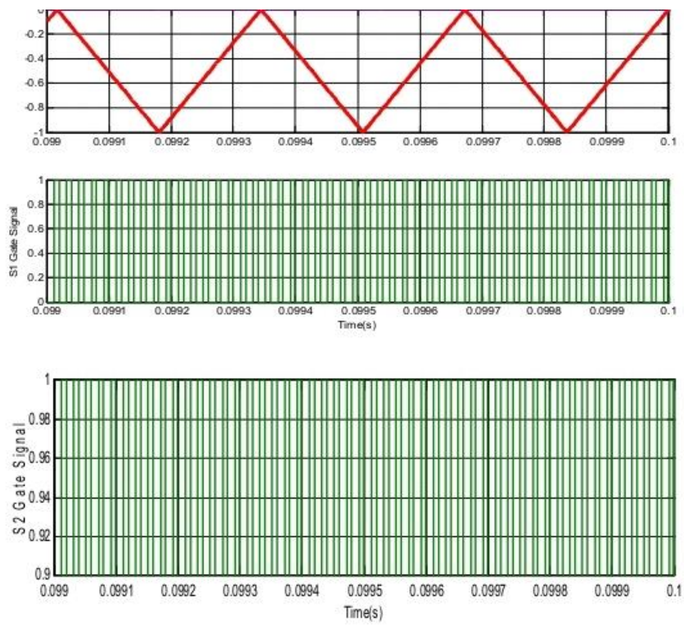
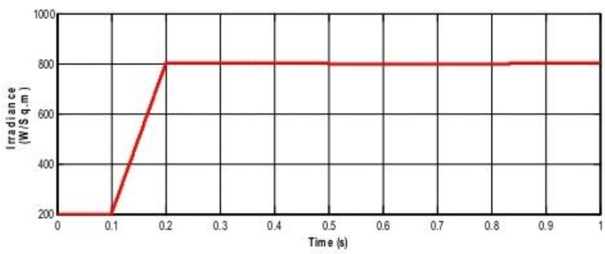


Figure. 6. Control Gate signal of soft switch interleaved boost converter



(a)

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CONCLUSION

PV cells can interact with the suggested SSIBC to change low voltage input into high voltage output. When compared to the traditional boost converter, the proposed boost interleaved converter with MPP T algorithm has advantages such as lower voltage stress, quicker transient response for varying irradia tion, low input current ripple, high efficiency, lower electromagnetic emission, and improved reliabilit y.

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[5] Y. P. Hsieh, J. F. Chen, T. J. Liang, and L. S. Yang, "Novel high step-up DC-DC converter for distributed generation system," *IEEE Trans. Ind. Electron.*, vol. 60, no. 4, pp. 1473–1482, Apr. 2013.