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# Switched Boost DC and AC Converter

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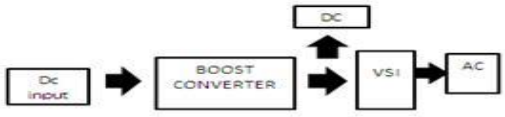
**Abstract:** The power production in now-a-days is mainly based on Non-Renewable energy sources. Due to that the fossil resources are reduces day by day. In order to prevent that we should use Renewable energy sources to produce electricity. Power electronics is a field which improves the usage of renewable energy sources. The introductions invent in the field is mainly based on increasing efficiency and reducing the power loss. This converter is a combination of DC boost converter and s single phase voltage source inverter (VSI) in order to provide boosted AC voltage at the output side of the converter along with boosted DC supply. The production of power to supply home appliances is the ultimate aim of this converter. Such applications are glowing of LED's along with fan etc.. Here the voltage given to the converter is only 48V. But the output by this converter is very high when compared to the input (i.e.) 192V DC voltage and 192Vrms AC voltage .This is verified by using the simulation done on MATLAB 2013.

**Keywords:** Boost converter, VSI, AC and DC voltage.

## 1. INTRODUCTION

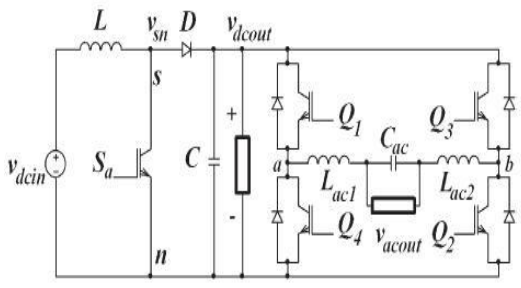
The boost converter is a converter which can convert the low input dc voltage to high dc voltage at the output based on its duty cycle ratio. The voltage source inverter is one which can convert input dc voltage into output ac voltage. By cascading the boost converter and the voltage source inverter together this proposed converter is developed. Here the boosted output can be obtained by adjusting the duty cycle ratio of boost converter from the range of 0.5<Duty cycle<1




BLOCK DIAGRAM OF PROPOSED CONVERTER

The electromagnetic interference is less in this converter because the boost converter is operating at very high frequency of about 100KHZ. The boost converter operation is the major part in the proposed converter. The recent research in the power electronics is to reduce the EMI effects in the converters. The inverter part in the Converter is does the work of converting the boosted dc voltage into corresponding ac voltage. No switch is operates for a long time, they are operates at regular interval. Thus the switches used in this circuit does not experience any hard.

## 2. PROPOSED CIRCUIT

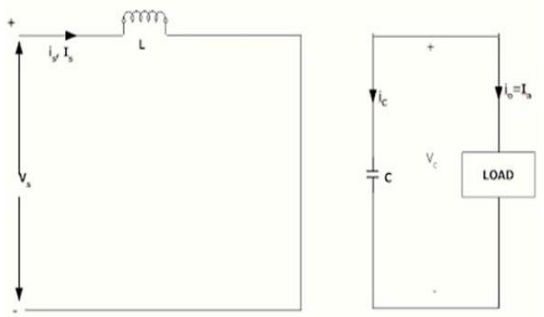



The proposed circuit is operates under two modes. They are

I. Shoot through interval
II. Non-Shoot through interval

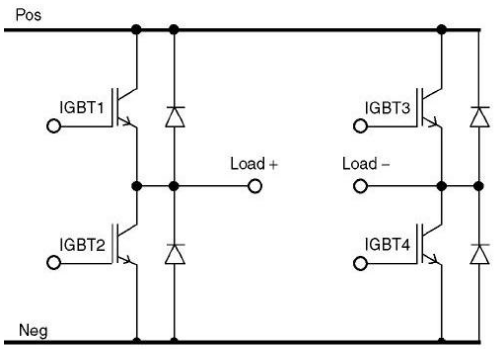
### I. SHOOT THROUGH

In this mode switch $S_a$ is short circuited thus all the input current is shorted to neutral point. Therefore no current is fed after $S_a$. At this time the capacitor is discharges to provide continue supply to the Dc load and the inverter circuit.




### II. NON-SHOOT THROUGH

In this interval $S_a$ is open circuited, thus input voltage and the energy stored in the inductor is get discharges to the load and the inverter circuit connected to it. The capacitor connected across the load is charging in this interval.





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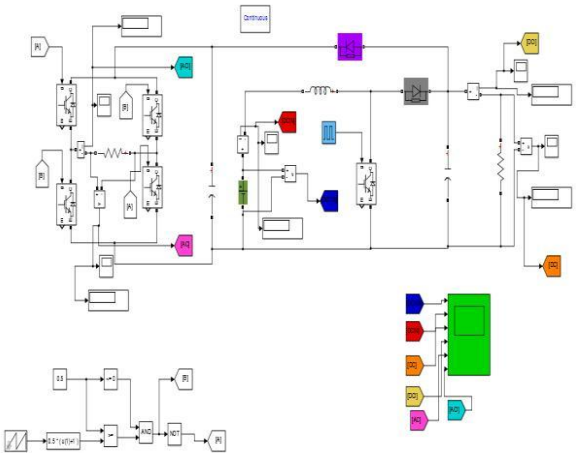
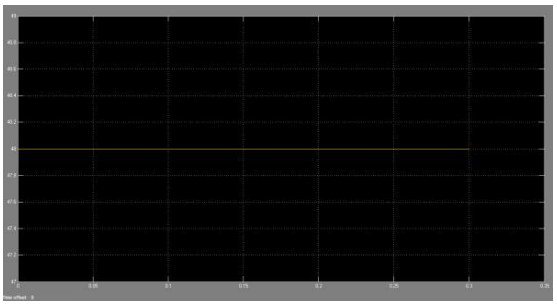
The inverter connected to the boost converter is continuously working in order to provide continuous ac power supply to the ac load in both two modes of the boost converter.

IGBT1 and IGBT2 –conducts for positive cycle.
IGBT3 and IGBT4 –conducts for negative cycle.

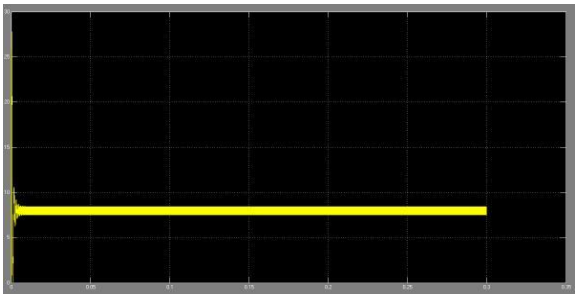
## 3. MATLAB SIMULATION



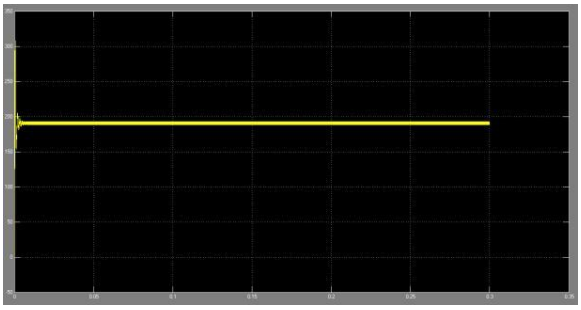
## 4. SIMULATION RESULTS



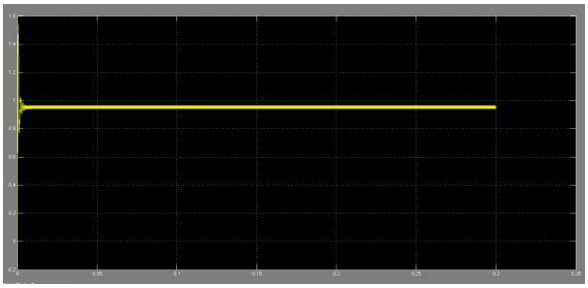
INPUT VOLTAGE



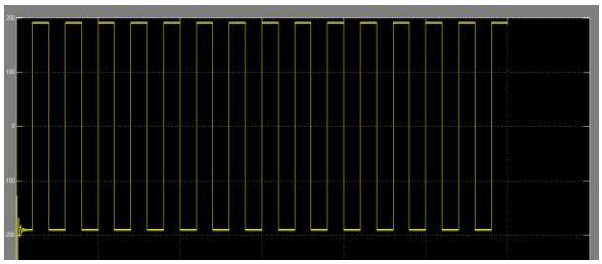
INPUT CURRENT



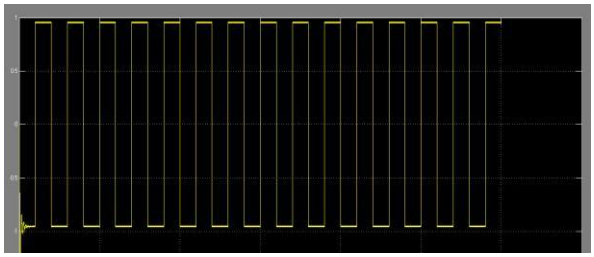
OUTPUT DC VOLTAGE



OUTPUT DC CURRENT



OUPUT AC VOLTAGE



OUTPUT AC VOLTAGE

## 5. CALCULATION FORMULA

i) Vo=Vin/(1-D);
ii) L1=(Vin*D)/(fs*delI);
iii) C1=(D/(2*fs*R));

## 6. COMPONENTS RANGE

| COMPONENTS | RANGE |
|---|---|
| Vin | 48V |
| L | 400μH |
| C | 20μF |
| VO dc | 192V |
| VO ac | 192Vrms |
| $F_S$ | 100 khz |
| Rdc,Rac | 100 ohm |
| Duty cycle ratio | 75% |

## 7. CONCLUSION

The efficiency of the converter is about **95%.** And the level of boosted output voltage is controlled by using the duty cycle ratio from 0.5<Duty cycle <1 (i.e.) from double the input voltage to maximum output voltage. Due to less input voltage it favors renewable energy utilization.

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Because, the low input voltage easily generated by utilization of renewable energy sources such as solar energy, wind energy etc.. And the produced output is high therefore it can be easily used for general applications. The dc output obtained is used for battery charging purposes and so on. Due to high efficiency the power loss is also less.

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