

High Voltage Dc Up to 3kv from Low Voltage Ac

By Using Capacitor and Diode in Lader Network

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ABSTRACT

The project is designed to develop a high voltage DC around 3KV from a supply source of 230V AC using the capacitors and diodes in a ladder network based on voltage multiplier concept. Voltage multiplier are primarily used to develop high voltage where low current is required. this project describe the concept to develop high voltage dc from a single phase ac. For safety reason our project restricted the multiplication factor to 8 such that the output would be within the 3KV This concept of generation is used in electronic appliances like the CRT's, TV Picture tubes, oscilloscope and also used in industrial applications. The design of the circuit involves voltage multiplier, whose principle is to go on doubling the voltage for each stage. Thus, the output from an 8 stage voltage multiplier can generate up to 3KV. As this is not possible to be measured by a standard multimeter, a potential divider of 10:1 is used at the output such that 200V reading means 2KV. Due to low input impedance of the multimeter, the reading would actually be approximately 7 times the input AC voltage.

Keywords: capacitor, diode, potential devider, 230v supply, multiplier circuit

1. INTRODUCTION

A voltage multiplier circuit is an electrical circuit which converts lower voltage alternating current (AC) into higher voltage direct current (DC) by means of capacitors and diodes in a ladder network.

Voltage multipliers can be further classified avoltage doublers, trippers, and quadruple's etc. based on the ratio of output voltage to input voltage. For a load is connected, the value of the output voltage decreases even though the measured value of open-circuit output voltage is several times greater than the input supply voltage.

Voltage multipliers can be further classified as voltage doublers, trippers, and quadruple's etc. based on the ratio of output voltage to input voltage. For example, if the open circuit output voltage of a multiplier circuit is twice the peak of AC input voltage, it is called a voltage doubler.

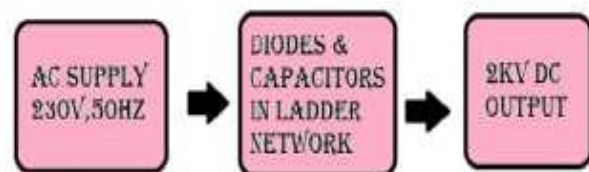
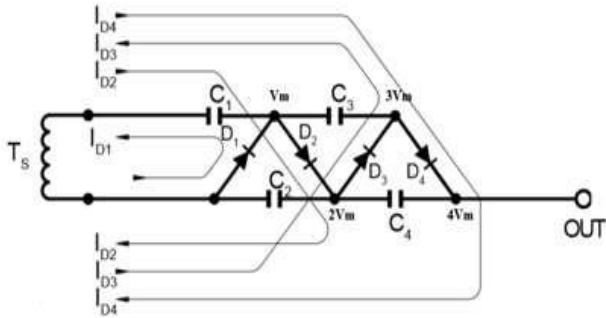


Figure 1. Block diagram of voltage multiplier

How dose multiplier works ?

High voltage it is a thing which can be generate from increase in number of stages of capacitors and diode.



When TS is Negative Peak - C1 charges through D1 to V_m

When TS is Positive Peak - V_m of TS adds arithmetically to existing potential C1, thus C2 charges to $2V_m$ through D2.

When TS is Negative Peak - C3 is charged to $2V_m$ through D3.

When TS is Positive Peak - C4 is charged to $2V_m$ through D4.

Therefore, output voltage = $V_m \times N$,

Where N = the number

2. METHODS AND MATERIAL

- Following methods are employed for generate high voltage dc upto 3kv :-

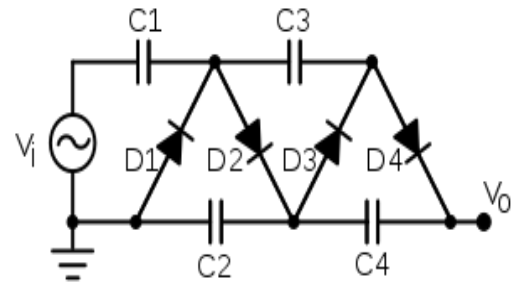
- 1.voltage control
- 2.frequency control
- 3.complexity control

Complexity control:-

When the low voltage is applied to the input side then the it converts 230V to 12V and it is pass through from the rectifier. The rectifier converts the ac voltage into the dc voltage. Then the multiplier circuit increase the voltage up to 3 KV.high voltage dc cannot be measure by any meter so when we measure

the voltage we require potential divider. It is reduce the voltage upto 10:1 ratio and then we are measure the voltage by multi meter or any meter. In this case when the number of stages are increase then the complexity of the circuit will be reduce.

SYSTEM DISCRIPTION AND RESEARCH WORK :-



When the supply is negative peak C1 charge through D1 to V_m .when supply is positive it adds existing potential C1,thus C2 charge to doubletime of the mean value through D2.again supply is negative than C3 is charged to double time through D3.repeatedly supply is positive C4 is charged to double time throughD4.

3. RESULTS AND DISCUSSION

When the low voltage is applied to the input side then the it converts 230V to 12V and it is pass through from the rectifier. The rectifier converts the ac voltage into the dc voltage. Then the multiplier circuit increase the voltage up to 3 KV.high voltage dc cannot be measure by any meter so when we measure the voltage we require potential divider. It is reduce the voltage upto 10:1 ratio and then we are measure the voltage by multi meter or any meter.

LIMITATION

- This system useful in industrial and domestic area for low power consumption.
- To make a simple design for easy to use in domestic level.

Advantages:

- The voltage multiplier circuit is Simple in construction.
- It is Easy to use.
- It have Small size. so it require less space.
- High efficiency.
- Cheap in cost.
- It is reliable.

Disadvantages:

- When the numbers of stages are increase the circuit complexity will increase.
- When the numbers of stages are increase the space requirement is increase and it becomes more costly.

4. CONCLUSION

In the voltage multiplier circuit, when the low voltage AC supply is is given the number of stages of capacitors and diodes are increase the voltage into the DC form. Voltage multiplier cans deliverer large voltages without changing the input transformer voltage. These systems are less bulky than conventional transformer rectifier sets. Different voltages can be taken at different stages without changing the input voltage. This kind of system is reliable, less complicated and light in weight.

REFERENCES

- www.wickypedia.com
- www.rsetx.in
- <http://postknow.blogspot.com>