

## Research Article

# Generation of Three phase AC Circuit using MOSFETs

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### Abstract

The proposed system is used for generation of three phase ac circuit using MOSFETS. When we consider an odd number of not gates, the output from the last gate is the same output that we get in the first gate. But we have some time delay which we call latency this gives a feed back to the previous gate, in the last gate by this latency we get some oscillations. In a real (ideal) ring oscillator needs energy only for working. The oscillation starts spontaneously when a certain threshold voltage is applied. The frequency of oscillation will s determined by the number of gates (stages) and the applied voltage.

**Keywords:** Metal oxide semiconductor field effect transistor; Bipolar junction transistor; Center tap transformer; Threshold voltage.

### Introduction

A ring oscillator consists of odd number of not gates that are connected next to next on their end terminals the first and the last not gate is connected together [1-2]. The possibly smallest ring oscillator can be made by using 3 not gates [3-4]. Not gates can either created by n-channel Metal Oxide Semiconductor Field Effect Transistor (MOSFET) or Bipolar Junction Transistor (BJT) her no 0 volt is transferred but low voltage less than 5 volts is considered as 0 signal in such gates, it stops the current is stopped from flowing through it the path the output is taken in between the places where the signal is transferred [5-6]. A multivibrator is an electronic circuit used to implement a variety of simple two-state devices such as relaxation oscillators, timers and flip-flops [7-8]. It consists of two amplifying devices (transistor in this case) cross-coupled by resistors or capacitors. Its frequency range is around 50-60 Hz. Two NPN transistors are used in this model along with a pair of n-channel MOSFETs and a center tap transformer (CTT) to set up the voltages. Capacitors are either electrolytic or ceramic ones are used as per the frequency range [9-10].

### Proposed system

First MOSFET is also coupled with the adjacent MOSFET's gate with a million ohm

resistor in series with it. Similarly the next MOSFETs source is connected with a mega ohm resistor and then to the gate of the adjacent MOSFET it is done for 'n' number of stages and the source of the last MOSFET is connected to the gate of the first MOSFET. The output is taken from source. Here the emitters of the transistors are coupled together where the negative end of the battery along with the source of both the n channel and the base is connected to the feedback circuit of the cross coupled transistor in between which a capacitor is connected for the delay so that the oscillation takes place. The positive end of the capacitor is connected to the gate of the MOSFET. The resistors connected to collector and two other resistors connected to the collector of the transistor determine the frequency. Drain of each MOSFET is connected to the terminals of the center tap transformer. The center of the transformer is connected to the positive terminal. Schematic diagram of proposed system is shown in Fig. 1.

### Results and discussion

When we consider an odd number of not gates, the output from the last gate is the same output that we get in the first gate. But we have some time delay which we call latency this gives a feed back to the previous gate, in the last gate by this latency we get some oscillations. The

delay induces the oscillation that is the oscillation frequency is equal to twice the sum of each individual oscillations. In an real (ideal) ring oscillator needs energy only for working. When a certain threshold voltage is applied, the oscillation starts spontaneously. The frequency of oscillation will s determined by the number of gates (stages) and the applied voltage. Simulated result of proposed system is shown in Fig. 2.

Normally when a not gate works it will give a clear output of 0 that is because when there is no input in the gate of the MOSFET the current starts to flow from the source to drain of that MOSFET. If we consider three MOSFET, connected in the above mentioned manner, the time taken to complete cycle will completely invert the whole input instantly. But this is not possible in this way. Since the MOSFET takes a little time to charge. This is the thing that influences the frequency of the MOSFET.

Consider the first MOSFET being on at the beginning, this makes the second e third MOSFET to be turned on and first MOSFET off

hence it inverts the whole thing. But this is not happened as said. There will be an intermediate stage where there will be neither on or neither off stage In which the the gate receives a little voltage and allow a current to flow through the MOSFET. This stage will then receive a complete Threshold voltage (TV) and there will be no current flowing through it. Just like this there will be to be turned off. This causes the third MOSFET to be turned on and first MOSFET off hence it inverts the whole thing. But this is not happened as said.

There will be an intermediate stage where there will be neither on or neither off stage, in which the gate receives a little voltage and allow a tittle current to flow through the MOSFET. This stage will then receive a complete threshold voltage and there will be no current flowing through it. Just like this there will be another stage where the intermediate current flow will become zero and the current will flow through it.

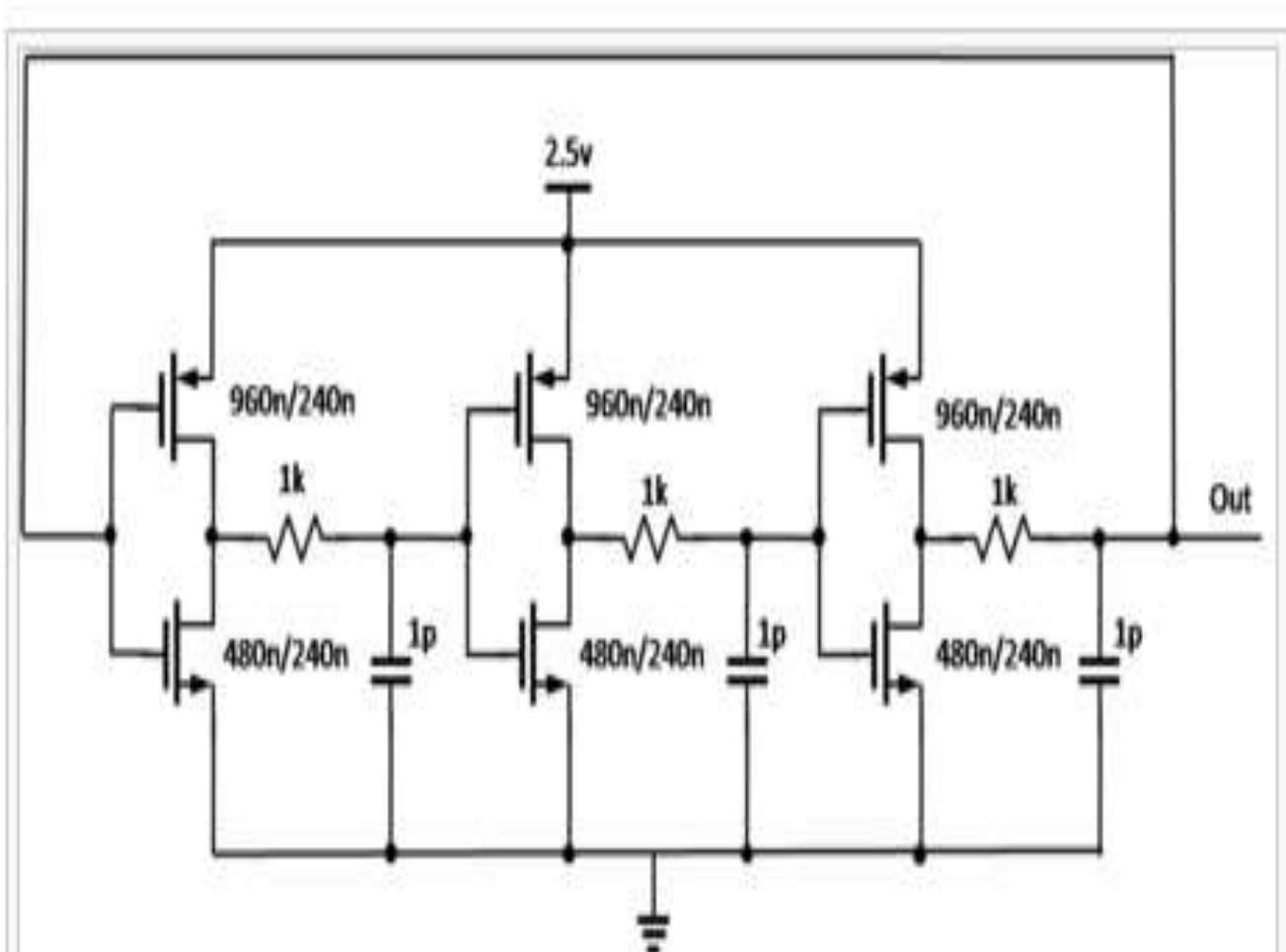


Fig. 1. Schematic diagram of proposed system

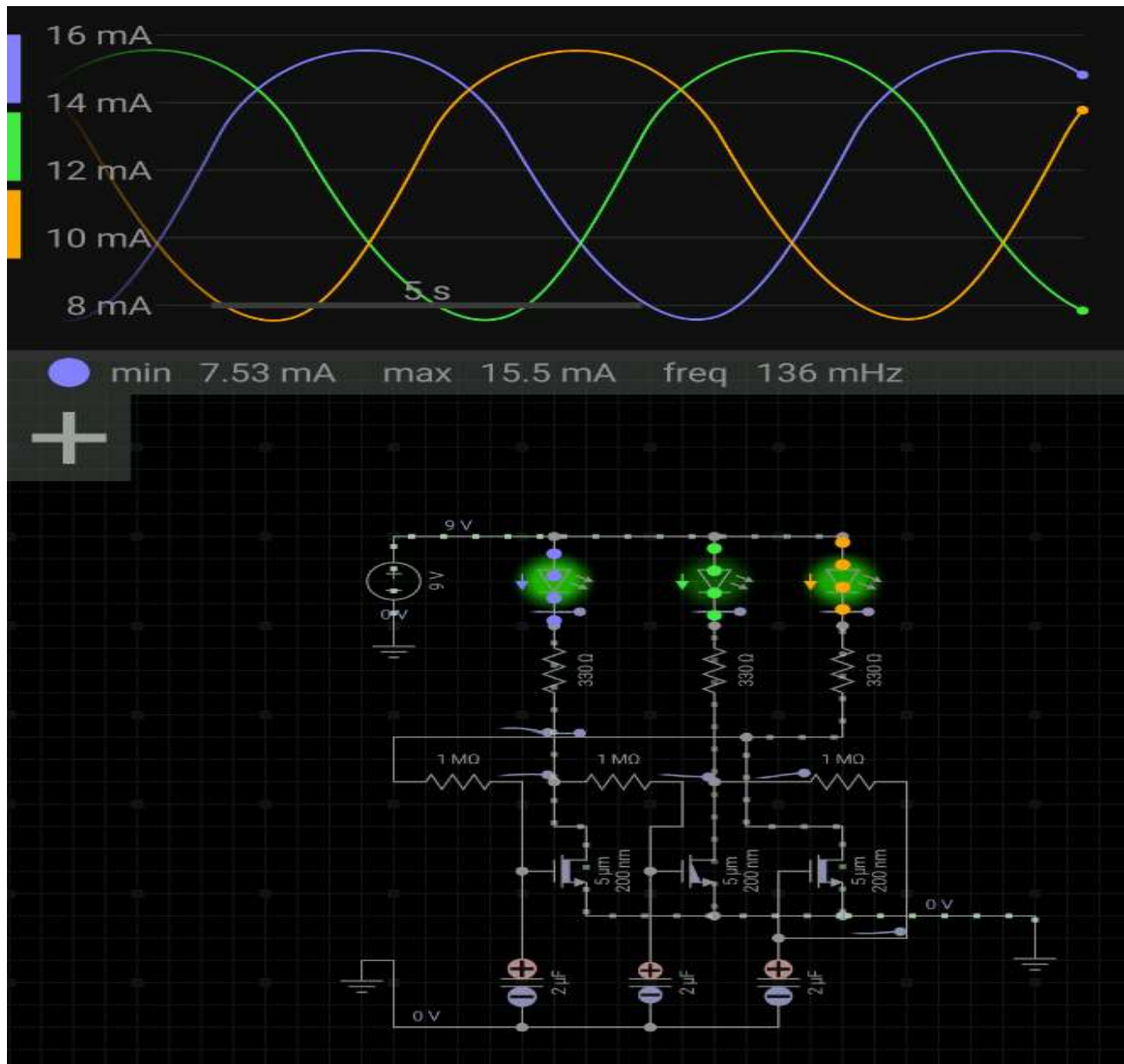


Fig. 2. Simulation of proposed system

The output in this will be sinusoidal 3 phase AC current because of the presence of this intermediate stage. This can be used in series connections which are used for decorations in stores and other functions. Since it involves 3 gates the hard disk motors are run by the output of this ring oscillator. It can be used to generate a number of phases so it can be used in power transmission. By rectifying a larger number of phases we can obtain a much perfect DC.

### Conclusions

When there is a fast flowing of electrons (i.e.) high voltage the oscillation speed is also increased. Capacitor also influences the frequency of the oscillations. But oscillations can take place without capacitors also, by the capacitance of the MOSFET. To prevent the

excess flow of electron to the gate and to improve the output voltage the 1 mega ohm resistor is used.

### Conflicts of Interest

Authors declare no conflict of interest

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