

**DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING
Faculty of Engineering and Technology, SRM University.**

MINI PROJECT REPORT

EVEN SEMESTER-2020-21

Lab code & Name : 18ECC201J Analog Electronics Circuit

Year & Semester : II Year, IV sem

Project Title : Step Up Converter (Boost Converter)

Lab Supervisor : S. Sowmyaranjan

Team Members : Yokesh.G – RA1911043010008
 S. Lalith Kishore – RA1911043010014
 Shailendhra Sudhakar - RA1911043010013

| | | | |
|---|------------|------------|-----------|
| Reg. No | RA19110430 | RA19110430 | RA1911043 |
| Mark split up ↓ | 10008 | 10014 | 010013 |
| Novelty in the project work (1 marks) | | | |
| Level of understanding of the design formula (2 marks) | | | |
| Contribution to the project (1 Marks) | | | |
| Report writing (1 Marks) | | | |
| Total (10 Marks) | | | |

Date: 30.04.2021

Signature of Lab Supervisor

STEP UP CONVERTER (DC – DC)

OBJECTIVE

The boost converter is used to "step-up" an input voltage to some higher level, required by a load.

ABSTRACT

The main purpose of this project is to introduce a design and development method of a dc-dc boost converter with constant output voltage. From a fluctuating or a variable input voltage, boost converter is able to step up the input voltage to a higher constant dc output voltage using voltage feedback technique. By this technique, the output of the converter is measured and compared with a reference voltage. The differential of the compared value will be used to produce a pulse width modulation signal to control switch in the boost converter. Simulation results describe the performance of the proposed design.

INTRODUCTION

Study the working principle of step up (dc – dc) converter.

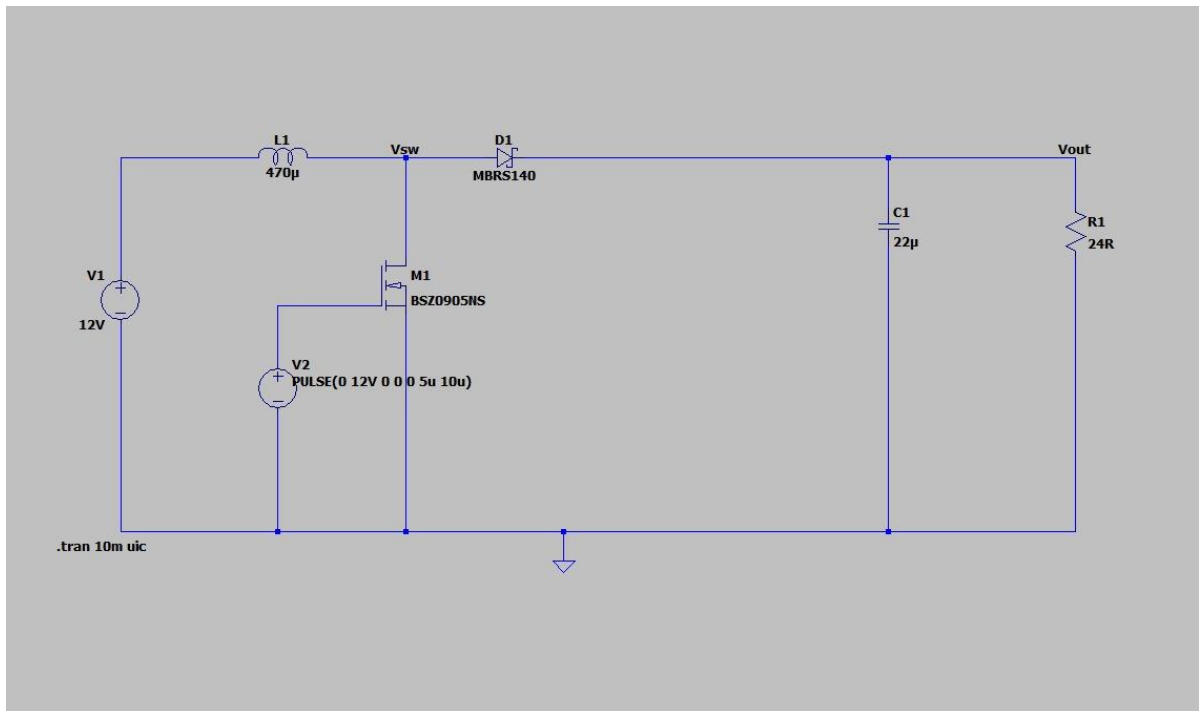
HARDWARE REQUIREMENT/DESCRIPTION

MOSFET- BSZ0905NS, Schottky Diode- MBR140, Inductor, Capacitor, Resistor, Voltage Sources, Connecting Wires, etc.

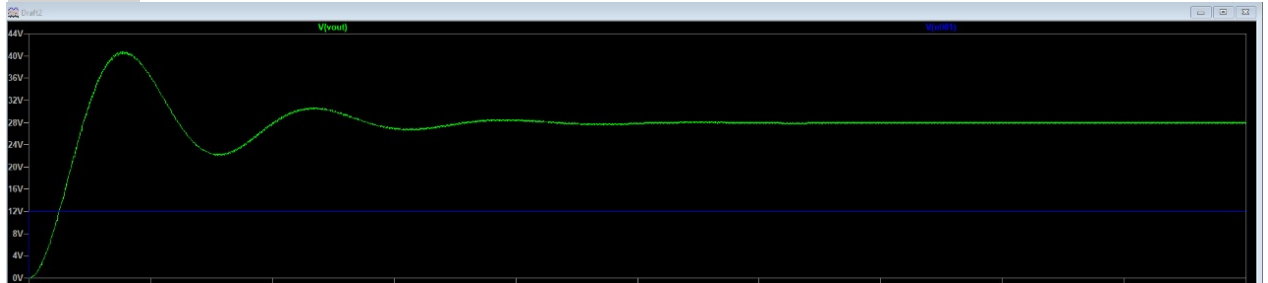
CIRCUIT/COMPONENT SPECIFICATIONS

| | |
|-----------------------------|--------|
| Supply voltage (V_{in}) | 12V |
| Output Voltage | 28 V |
| Inductance | 470 uH |
| Capacitance | 22uF |
| Resistance | 24 ohm |
| Duty Cycle | 0.5 |

CIRCUIT DIAGRAM



OUTPUT



DESIGN FORMULA

In this circuit average output voltage, is calculated by the formula,

$$V_o = V_s / (1-D)$$

DESIGN ISSUES

- Duty Cycle cannot be changed once fixed.

APPROACH/METHODOLOGY

A Boost converter steps up a DC voltage from the input to the output. The circuit operation depends on the conduction state of the MOSFET:

On-state: The current through the inductor increases linearly and the diode blocks.

Off-state: Since the current through the inductor cannot abruptly change the diode must carry the current so it commutates and begins conducting. Energy is transferred from the inductor to the capacitor resulting in a decreasing inductor current. During steady state the circuit is said to operate:

- In discontinuous conduction mode if the inductor current reaches zero and
- In continuous conduction mode if the inductor current never reaches zero.

CONCLUSION

Thus the supply voltage is stepped up to the required output voltage.

REFERENCES

<https://www.plexim.com/academy/power-electronics/boost-conv>

<http://www.completepowerelectronics.com/boost-regulator-tutorial-topology-working-advantages-applications/>

APPENDIX

MOSFET



MOSFET, in short, is a metal oxide semiconductor field-effect transistor used to switch or amplify voltages in circuits.

DIODE



A diode is a semiconductor device that essentially acts as a one-way switch for current. It allows current to flow easily in one direction, but severely restricts current from flowing in the opposite direction.

INDUCTOR



An inductor is a passive electronic component which is capable of storing electrical energy in the form of magnetic energy. Basically, it uses a conductor that is wound into a coil, and when electricity flows into the coil from the left to the right, this will generate a magnetic field in the clockwise direction.

CAPACITOR



Capacitor is a passive component used to store charge. The charge (q) stored in a capacitor is the product of its capacitance (C) value and the voltage (V) applied to it. Capacitors offer infinite reactance to zero frequency so they are used for blocking DC components or bypassing the AC signals.

RESISTOR



A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.