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Analysis of Auto Power Controller Circuit of Laser Diode Module using Multi-Sim Simulation

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ABSTRACT

The project is an idea about on Laser diode controller circuit that used in laser cutting tool. This project study about auto power controller circuit .Auto power control circuit is used Op Amp (Amplifier) and study the output power have changing the input Power source and laser diode terminal into PNP transistor. This project tries to find a better input source with best position of the diode in output terminal. This is used in laser cutting tools also can used in future defence system.

For that Reason, find a good module for Laser Circuit with a good efficiency and work with solar energy. So in this paper we study about input power according to voltage and observe the output results.

KEYWORDS: *auto power controller circuit, Multi-sim, Input Voltage*

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I. INTRODUCTION

The concept is a space satellite defence system that uses solar energy to create a high-intensity laser beam to protect space satellites from bombardment. The idea is to convert the solar energy to high energy laser beam to destroy the all air missile and aircraft. Navigation and redder technology satellite can be modifying to space Satellite defence laser gun. Finding target is destroying by high power laser beam the generated by laser module and that energy come from solar. This protect system is too cheaper then missile system. Added one laser module and solar plate in that navigation satellite can prepare the laser gun. The project finds a better system for defence that is worked on renewable energy and low cast with eco-friendly.

Fig 1: 20W laser module

This is an imaginary idea for defence. The idea about space satellite defence system to protect from bombarding like raining by the help of solar energy to high energy laser beam. Now a days, the navigation and redder technology can find the enemy and target is destroy by missile. The missile is costly for manufacturing and it is one time used only. The cost of fuel and manufacturing process is not so developed. That give a better efficiency, low cost, high performance defence system. The idea may be success then India get a best protection.

The project is based on a circuit for controlling laser diodes, which is utilised in laser cutting tools. The auto power controller circuit is the subject of this project. The auto power control circuit employs an Op Amp (Amplifier) to investigate the output power by converting the input power supply and laser diode terminals to PNP transistors. The goal of this project is to identify a better input source with the optimal diode position in the output terminal. This can be employed in future defence systems as well as laser cutting instruments.

The laser cutting tools power is 80W electric power need to cut the metal sheet. That is work on AC Voltage 220V and current is 8 Amp.

As a result, choose an excellent laser circuit module with a high efficiency and work with solar energy. As a result, in this research, we investigate input power as a function of voltage and examine the output results.

II. block diagram

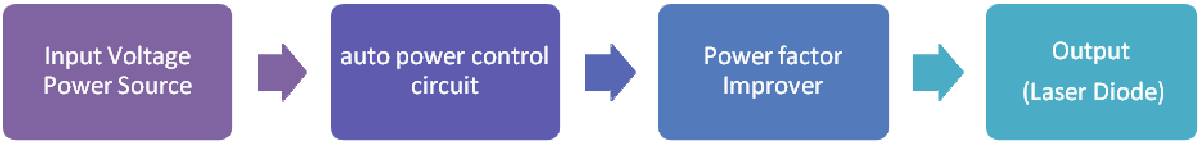


Fig.2: Block Diagram of auto power control circuit

- **Input Voltage Power Source:** Here Apply in the Circuit Alternative Current Voltage Source – 12V to 250V & Direct Current Voltage Source -6V to 140V
- **Auto Power Control Circuit(APCC):** Changing the laser diode position in output to check the variation of output results. When the laser diode is in collector of the PNP transistor is called P type and it is in emitter terminal is known as N type APCC.
- **Power factor Improver:** The resistor and capacitor is in parallel with laser diode, that is improve the stability of output power. Value of the resistor is 150K Ω and capacitor is 33µF.
- **Output (Laser Diode):** The output Check across the laser diode.

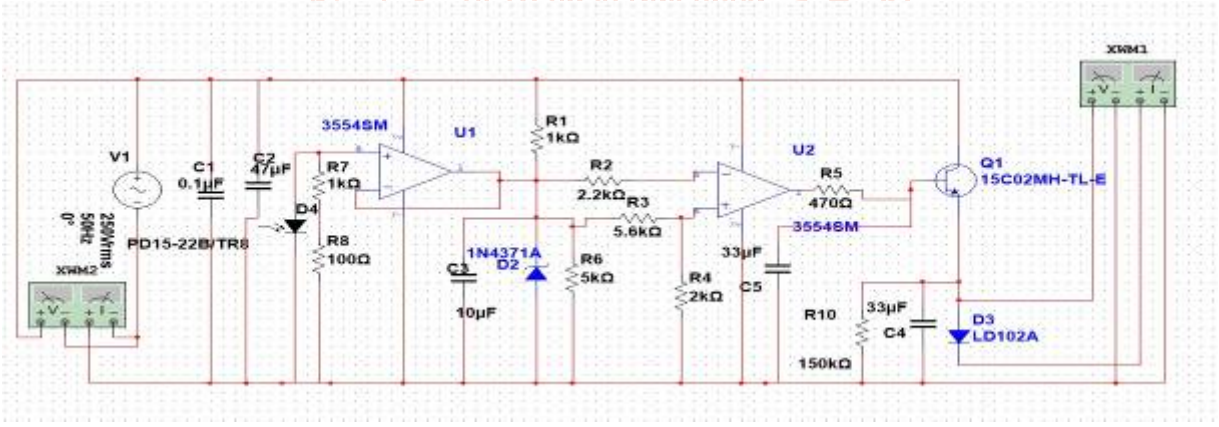


Fig 3: N type Auto power controller circuit with AC supply

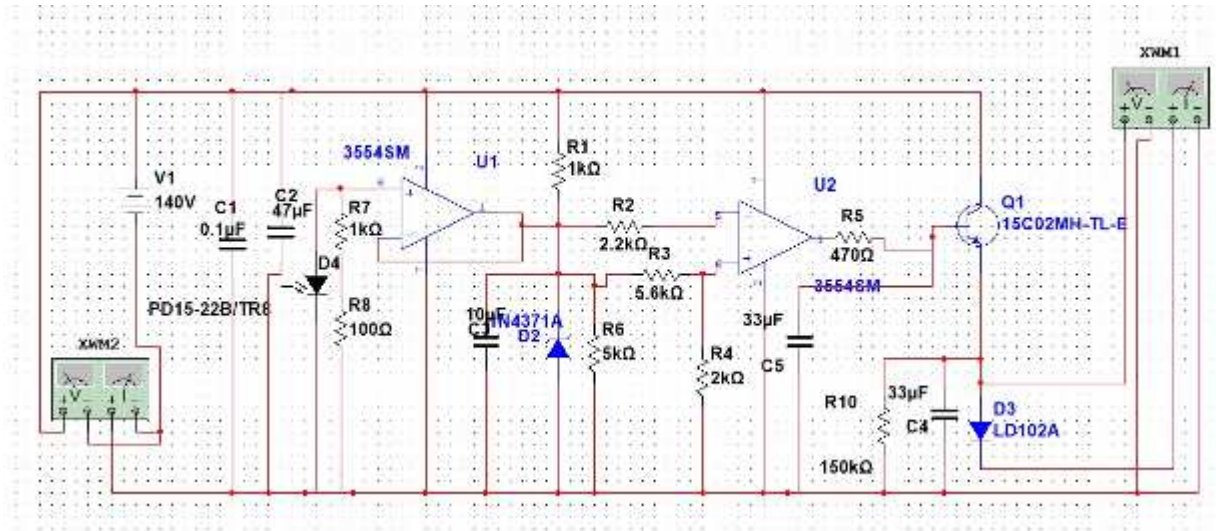


Fig 4: N type Auto power controller circuit with DC supply

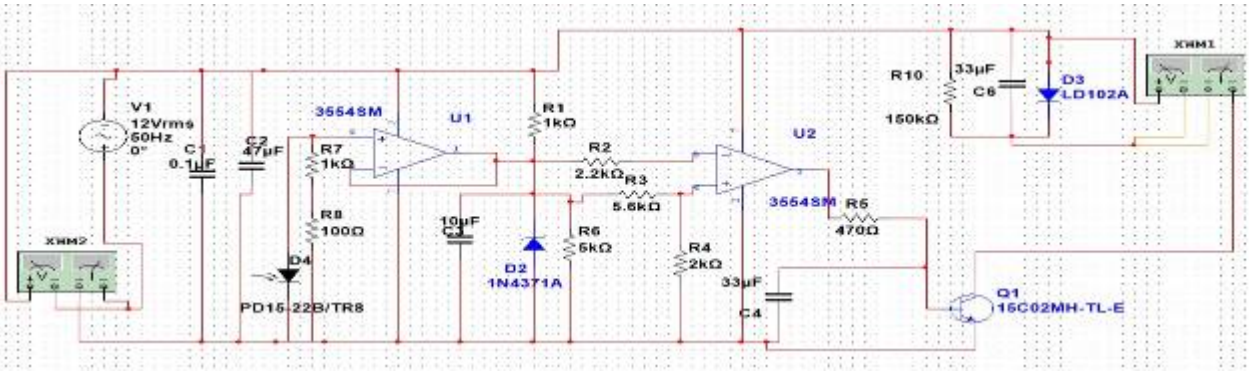


Fig 5: P type Auto power controller circuit with AC supply

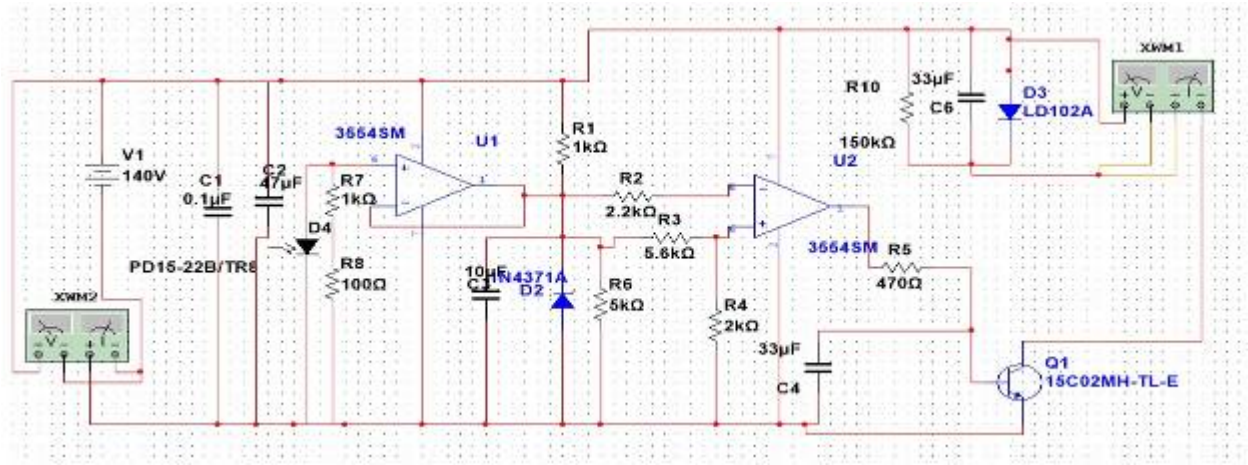


Fig 6: P type Auto power controller circuit with DC supply

III. Result:

Table describe about the input voltage and power, and Putting the Value of Voltage Source and Check the out power in Multi-Sim Software. The Output power Check by Wattmeter and the ratio is

$$\text{Ratio } \% = \left\{ Output\ power / Input\ power \right\} X\ 100$$

Table 1: Auto power controller circuit (APCC) with DC supply

Circuit Name	Voltage (V)	Input power	Output Power	Ratio (%)
P type APCC	12	34.714 W	14.296 W	41
N type APCC	12	34.672 W	14.372 W	41
P type APCC	60	0.7654 kW	0.3614 kW	47
N type APCC	60	7.000 kW	4.500 kW	64
P type APCC	140	8.009 kW	4445 kW	55
N type APCC	140	7.998 kW	4.500 kW	56

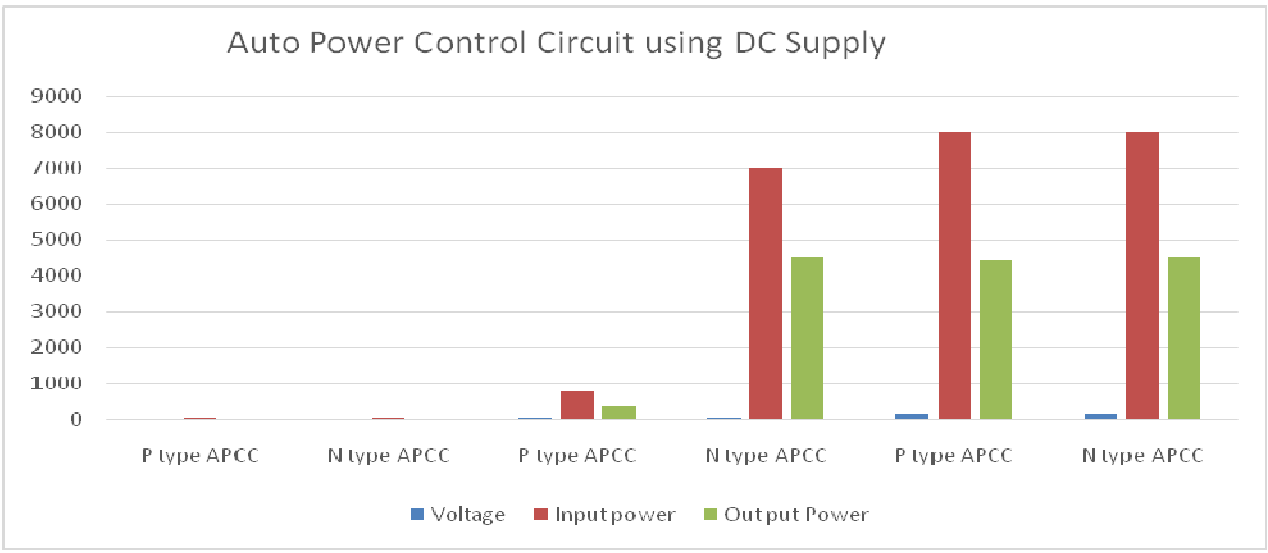
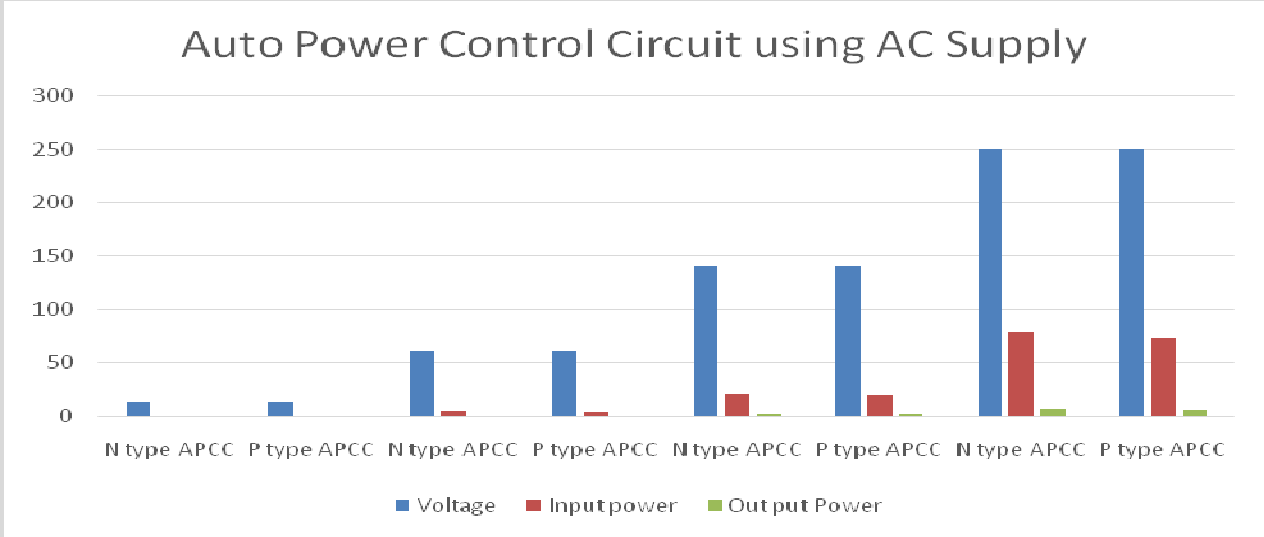


Table 2: Auto power controller circuit (APCC) with AC supply

Circuit Name	Voltage (V)	Input power	Output Power	Ratio (%)
N type APCC	12	157mW	76.67 nW	0.048834
P type APCC	12	144.4mW	1.758 mW	1.217452
N type APCC	60	4 W	0.406 mW	0.010167
P type APCC	60	3.618 W	53.409 mW	1.476202
N type APCC	140	21.07 W	1.016 W	4.822022
P type APCC	140	20.0 W	1.159 W	5.58
N type APCC	250	78.07 W	6.4 W	8.197771
P type APCC	250	73.33 W	5.1 W	6.954862



IV. Future Research :

The benefits of having a truly small high-energy laser weapons ability for the military are obvious. Scenarios of warfare are growing more urban in nature. In these types of situations, a laser weapon provides the precision needed to strike particular targets in close proximity to noncombatants without damaging them. These weapons also provide a near-instantaneous application of force to the target. This rate of application enables for the tracking and neutralisation of high-velocity weapon systems, which are only going to become more common.

V. Conclusion

Over All result of the practical is the Auto power controller circuit (APCC) with DC supply is better than the Auto power controller circuit (APCC) with AC supply. Observation of the ratio table with DC supply is more than 40 %, where AC Supply less than 10% of input. The changement of laser position it not more changes in output power.

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