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WIRELESS POWER TRANSFER SYSTEM FOR CHARGING ELECTRIC VEHICLES USING MAGNETIC RESONANCE

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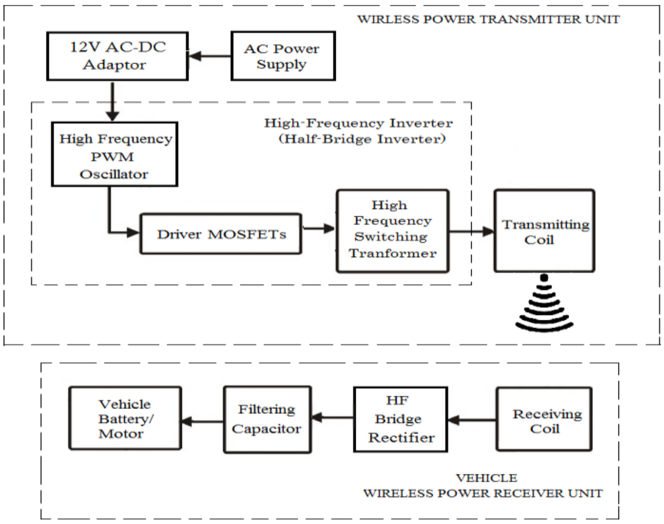
Abstract-- Electric Vehicles are the best option in nowadays because they are pollution free and it have less expenditure. Electric Vehicles have more power than Petrol, Diesel and CNG Vehicles. For increasing use of electric Vehicles, we need to find the various option to charge batteries of electric vehicles. For that purpose, wireless power transfer is best solution to charge the electric vehicles. Nowadays electric cars and bikes have big market and demand. We need to adapt this technology because in future the use of electric vehicles will be rise. For charging batteries of vehicles, we need make charging station for it. But that option is costly. That option is loss of time and money. The main aim of our project to develop good technology for electric vehicles battery charging and to save money as well as time using magnetic resonance.

Keywords- Wireless Power Transfer, Electric Vehicle, Inductive Power Transfer.

INTRODUCTION



Nowadays the greatest problem that the world facing today is the environmental pollution. The air pollution takes place major role in the environmental pollution. Now is a time to save our environment. According to Environment Défense Fund (EDF) it is estimated that the vehicle running on petrol and diesel cause 27% pollution which is one third part of the total pollution. But now electric vehicles are playing important role to reduce environmental pollution. However, the today's electric vehicle has some drawbacks high price, long charging time and Limited driving range to overcome this we have to add some new technology in it that is Wireless Power

Transfer (WPT) buy magnetic resonance, to charge or directly run the cars by electrification of roads. Nowadays it is need to spread the charging network and this Wireless Power Transfer max charging of electric vehicles more convenient.

MODEL DESIGN

Block Diagram-:

Wireless power transfer, wireless power transmission is the transmission of electrical energy without any wire and cables as physical touch contact. In a wireless power transmission system, a transmitter device, run by electric power from a power source, generates an electromagnetic field around it, which transmits power around space to a receiver device, which exports power from the field and supplies it to an electrical weight. The technology of wireless power transmission can exclude the use of the wires and batteries, therefore adding the waving, convenience, and safety of an electronic device for all druggies. Wireless power transfer is useful to power electrical bias where yanking wires are awkward, dangerous, or aren't possible.

Figure. Block Diagram

TRANSMISSION CIRCUIT-:

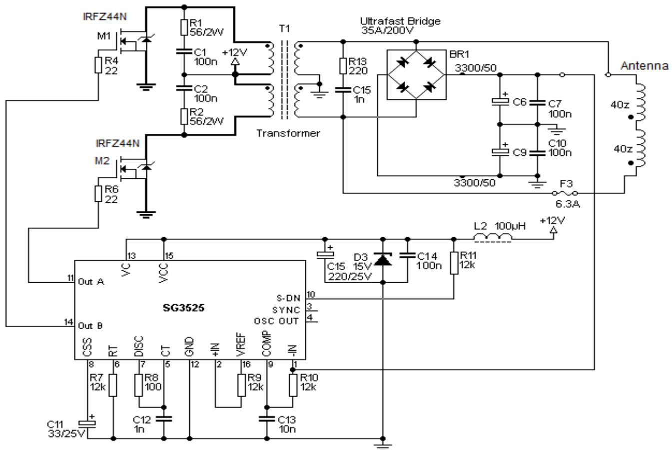


Figure. Transmitter Circuit

This is transmitter circuit for electric vehicle. When we placed transmission coil it give power to receiving coil.

RECIEVER CIRCUIT-:

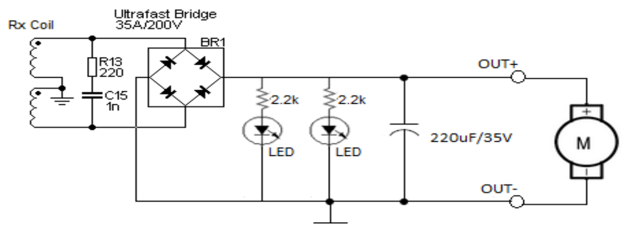


Figure. Receiver Circuit

Receiver has a receiving coil which has same resonant frequency of the transmitter coil. So when placed near the transmitter coil it will pick up the electromagnetic field and convert sit into the high frequency AC current. Output of receiver coil is given to a high frequency rectifier which converts HF AC to DC voltage output. A capacitor filter at the output of rectifier filters the ripple in DC and gives a stable DC output voltage. A DC output is produced at the output of receiver which is used to power any DC loads.

CALCULATION-:

Frequency Calculation of Transmitter & Receiver coils-:

The calculations are done on internet through components specifications as follows-

Air Core Coil Inductance calculations –

The following is formula which calculates the inductance of an air core inductance

L = (d^2 * n ^2) / (18d +401)

where,

L is inductance in micro-Henrys,

d is coil diameter in inches,

l is coil length in inches, and

n is number of turns.

d (coil diameter in inches) = 4.5 (inches)

l (Coil length in inches) = 0.393701 (inches)

n (number of turns) = 120 (60+60 turns)

L (inductance)= 3014.01455 (µH)

Microhenry to Nanohenry Conversion-:

Microhenry=3014.01455

Nanohenry=3014014.55

LC Resonance Frequency Calculation-:

When capacitor is placed in Series or parallel, they will have a resonant frequency which is determined by the

following way-

Frequency = 0.0749 (MHz)

Capacitance = 1.50e +3 (PF)

Inductance = 3.01e +6.

2*pi* F = 1/sqrt (L*C) = 0.0749 megahertz

F = 74.9 Kilohertz.

Frequency calculation of transmitter coil –

L= (d^ 2 *n12)/(18d+401)

d (coil diameter in inches) = 3.5 (inches)

1 (coil length in inches) =5

n (No. of turn) = 100

L (inductance) =1475.90361µH

Frequency = 0.0720 (MHz)

Capacitance = 3.30e + 3(pF)

Inductance =1.48e+6(nH)

F = 72.0 kHz

Frequency Calculation of Receiver-:

L= (d^2 * n^2)/(18d+40I)

d = 3.0 inches

l = 25 inches

n = 100

L = 1406.25000 µH

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F = 0.073MHz

Capacitance = 3.30 e + 3 (pf)

Inductance= 1.4le+6 (nh)

F = 73.8kHz

MODEL-:

Actual Model

COMPONENTS-:

IC KA3525A-:

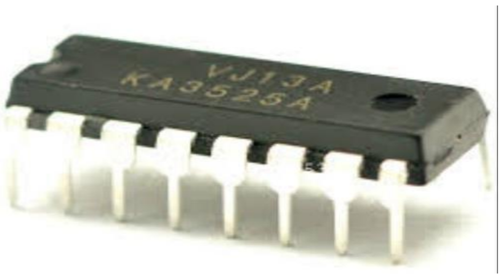

Figure. IC KA3525A

It's a pure sine surge inverter, it generates regulated voltage in boost and Buck motor.

MOSFET KA7812-:

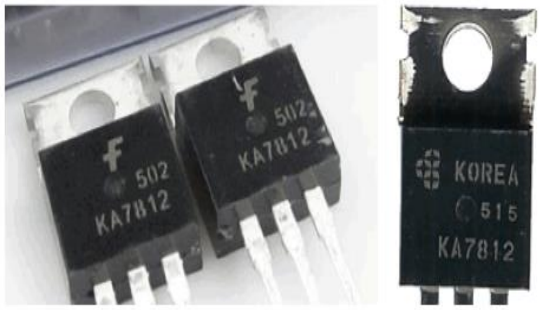

Figure. MOSFET KA7812

It is three terminal positive controller they're primarily designed to regulate voltage.

Step-down transformer-:

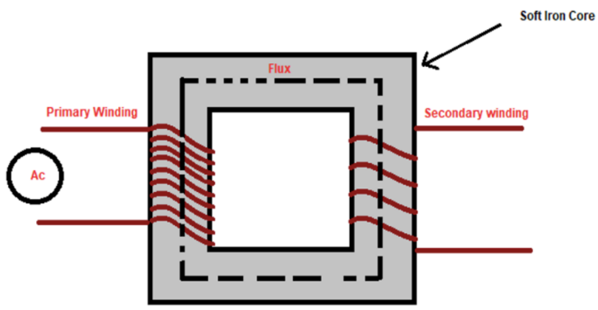

Figure. Transformer

It is used to control current it convert high voltage to low voltage.

Capacitor-:

Figure. Capacitor

Then capacitor act as sludge and also reduces the ripple voltage

Resistor-:

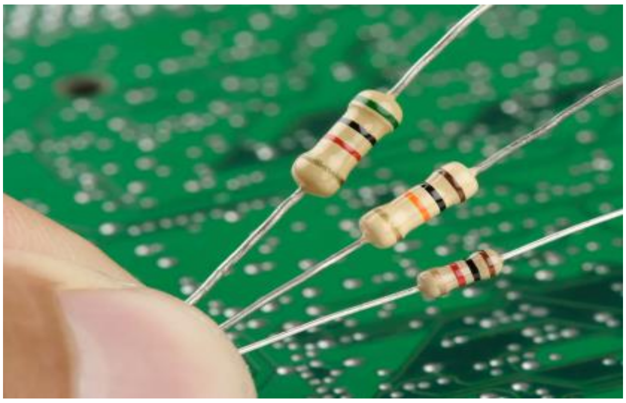

Figure. Resistor

Resistor can reduce current and acclimate signal position and also can divide the voltage

Diode-:

Figure. Diode

Diode conducts the electrical current in unidirectional it's extensively used operation to also the AC to DC.

LED-:

Figure. LED

It preforms the part of indicators in circuit.

RESULT-:

Air Core Coil Inductance = 3.01e+3 µH

Frequency of Transmitter coil = 72.0 kHz

Frequency of Receiving coil = 73.8kHz

CONCLUSION-:

In our project we have introduced wireless charging for electric vehicles, we have introduced a controller that use in wireless electric vehicles (EV) Charing system to charge electric vehicles without using any wire or cables. The proposed controller is able of automatic -tuning the switching operations of the converter to the resonance frequency of the wireless power transfer system, and hence eliminates the demand for switching frequency tuning also it is enables soft -switching operations in the converter, which will result in a significant growth in the efficiency of the power electronic converter, which electric vehicle charging based on inductive power transfer (IPT) system is new technology that to bring more convenience and safety to the use of electric vehicle since it eliminates the electrical contacts ,it would not get effected by safety and rain hence it is safe to use in all-weather conditions.as well as reliable, robust and clean way of charging electric vehicles, it also reduces the risk of electric shock.

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