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High Frequency Inverter Using SMPS

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ABSTRACT

We are well aware about the power crisis faced by us in recent times and we are bound to face the same for quite some time in future. This situation leads to frequent load shedding and power failure. Needless to say that this has boosted the requirement of uninterrupted power supply requirement. Major chunk of the requirement is met using storage batteries and DC to AC Converters. Presently 50Hz/230v power generation is met using ferrite transformer (magnetic core based on metals and alloys).However they are heavy in weight bulky in volume and give rise to weighty boxes and overall much higher volume. Additionally metal ferrite transformer has inherent loss factor of about 10%. To overcome these problems it is proposed to use high frequency ferrite based ferrite transformer .As can be seen this process provides weight reduction by one fifth of conventional inverters, one third of volumetric reduction,5to10%better efficiency and overall cost reduction by almost 25 to 35% Hence We hope that this will provide emerging technology boost in recent future continual reduction in ferrite, and power drive system and ferrite prices will provide very good scope for further price reduction in future. As a pilot project we have developed 12v DC to 230v 50hz, 250watt system. The same design with little modification can easily be adopted up to higher power levels. At higher power, however much more precautions and care is needed for circuit and component layout, PCB design, proper shielding etc. We are used push pull topology to step up the voltage. Push pull topology is very energy efficient(almost98%).this topology converts 12v to 250v DC and latter using half bridge converter we convert these DC into AC (50 cycle)operating.

Keywords: **DC to AC Converters, bridge converter, SMPS**

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I. INTRODUCTION

The never ending drive towards smaller and lighter products poses severe challenges for the power supply designer. In particular, disposing of excess heat generated by power semiconductor is becoming more and more difficult. Consequently it is important that the power supply is as small and as efficient as possible, and over the years power supply engineers have responded to these challenges by steadily reducing the size and improving the efficiency of their designs.Switching power supplies offer not only higher efficiencies but also greater flexibility to the designer.

Recent advances in semiconductor, magnetic and passive technologies make the switching power supply an ever more popular choice in the power conversion arena. Hence inverters with superior technology resulting in low cost portable and energy efficient product will always be in great demand.DC to DC converters and DC to AC converters belong to the category of SWITCH MODE POWER SUPPLY (SMPS). In this the size of the ferrite core reduces inversely with the frequency. The transformed wave form is rectified and filtered.

II. OBJECTIVE

The objective of this project is reducing the size, volume and weight of inverter by using the new technology of SMPS (switch mode power supply). In which the ferrites are used which having the lowest weight as compare to that transformer which is used in inverter. Also ferrites having a more efficiency and cost are also low. It having less as compare to other.

- This is most efficient technology.
- This technology having less low and noise free.
- This technology is remarkably cheap with low operating cost.

III. PROPOSED ARCHITECTURE

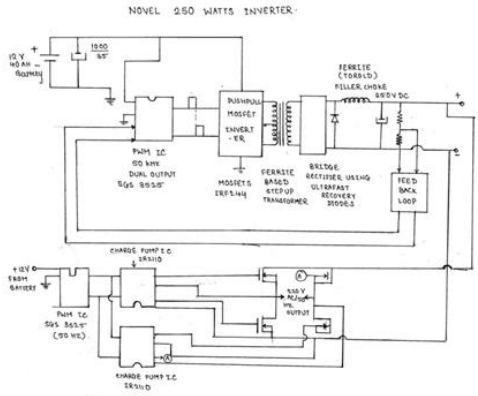
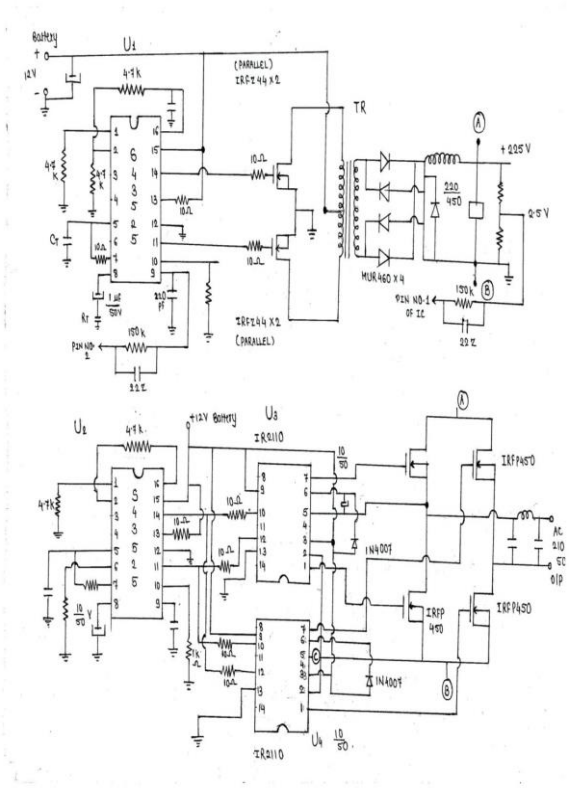


Fig 1. Block Diagram

Above fig 1. Shows block diagram of high frequency inverter using SMPS technique. Figure shows 12volt supply to the battery. During battery connection, sparks may get generated, to absorb them a capacitor C1 is connected across battery. One PWM IC of 50KHz is connected. This is used to generate a square wave. We uses two MOSFETs which are connected in parallel. This MOSFETs are connected to the ferrite transformer core. The four diodes are connected to the inductor L. The feedback is connected to the PWM IC pin. We use one more PWM IC of 50 Hz which is connected to the charge pump. The pins of charge pumps are connected to the four MOSFETs.

We get the 250 watts power at the output side. The ferrite is main part of this inverter. By using this technique we are reducing the weight of inverter also the size, volume of inverter. We reduce the cost of inverter. And we increase the efficiency of the inverter.



This is a 16 pin IC (SG3525). It is used to generate a square wave. We uses this IC because this IC having number of features and also having feedback system which is given to the pin number 1. We uses two MOSFETs in parallel, such as Q1 and Q2 having two resister of 10KOhms. This MOSFETs connected to the ferrite transformer core. Which is E shaped core. The four diodes are connected to the inductor L. After that two resister are connected which is directly connected to the feedback.

One more PWM IC is used which is used for 50KHz cycle. This IC is connected to the IR2110 that is connected to the charge pump. The charge pump is used to level shifting purpose. It gives 12V to the MOSFET. If there is small amount of current at the input side it provides 12V to the output side. Four MOSFETs are connected after the charge pump. When inverter starts working at that time only two MOSFETs are in working and remaining two are in off position. The 250 watts output we get at the output side. There are some losses occurs in the MOSFETs, diodes, and at ferrite. By using this circuit we reduces the size and volume and weight of the inverter. We increases the efficiency of the inverter.

IV. APPLICATION AND ADVANTAGES

ADVANTAGES:

- Small size and volume.
- Light weight.
- Better efficiency.
- Low cost.
- Reliable (with good design.)

DISADVANTAGES:

- A skilled techno craft is required to design and service a unit.
- System is complicated than conventional system.

APPLICATIONS:

- Being portable it surge better purpose than conventional inverter with substantial energy saving.
- In household applications.

V. RESULT

Input=10.5 to 12.5

DC Output= 230v, +/- 2%.
AC output = 220v, +/- 2%

VI. CONCLUSION

Hence we conclude that the volume and size price of substantially low than the one which are available in market. The overall cost, size, volume and the extra losses will be reduces. Hence overall efficiency is increase.

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