Method of Manufacturing Solar Inverter

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Abstract

The dc-ac converter is a device used to convert dc supply voltage into ac voltage output and this type of converter is called inverter. Inverter is used in many types of industrial applications especially in dc-ac conversion for ac motor derives system controls and uninterrupted power supply. The main purpose of this paper is to construct a pure sine wave inverter system for application with solar energy setup.The developed system used common electronic parts such as operational amplifier gate driver, dc to dc converter and power MOSFETS .The MOSFET use controller by gate driver circuits for their operation. First the system design of inverter circuit is done using paper calculation to get properwaveform at the output and switching of MOSFETS. Next the hardware is constructed and the output waveform are shown by oscilloscope. This paper includes operation, analysis of control strategy and experiment result based on the design calculation and hardware implementation.

Keywords

Boost Converter, MOSFET, Power Inverter, Converter Transformer

Introduction

This paper is about making a general method of making a DC to AC power inverter, which aims to efficiently transform a DC power source, similar to power that would be available at an electrical wall outlet. Inverters are used in application where there is a need of AC power and DC supply is available, like solar panels or fuels cells where low voltage DC sources must be converted to AC power. The method in which the low voltage DC power is converted is completed in two steps. The first being conversion of the high voltage DC source to an AC waveform with the help of pulse width modulation. Another method to complete the desired outcome would be to first converter low voltage DC power to AC and then use a transformer to get desired output. This paper focuses on the first method described and specifically the transformation of high voltage DC source into an AC output. The input of DC voltage sources will be a battery, which is being charged using photovoltaic (PV) panels and wind turbine. There are many types of inverter. These inverters differ in their outputs providing varying level of efficiency and distortion that can affect electronic devices in different ways. The system described here uses solar inverter as key devices in a solar energy system. Solar inverters have very high efficiency, high reliability and high cost than other inverter. This paper focuses on DC to AC pure sine wave inverter.

Result

The figure 1 shows the first part of the pure sine wave inverter that is a stable source for sine wave. This circuit provides a filtered sine wave of any frequency the user desires based upon the configuration of resistor and capacitor connected to it. This circuit has four operational amplifiers in it which can either buffer or amplify the signal. Four identical RC sections contributes 45 degree phase shift, so taking outputs from alternate sections yields low-impedance quartered outputs. When an output is taken from each opamp, the circuit delivers four 45 degree phase shift sine waves. The equation for this oscillator is $\omega = 1/RC$.

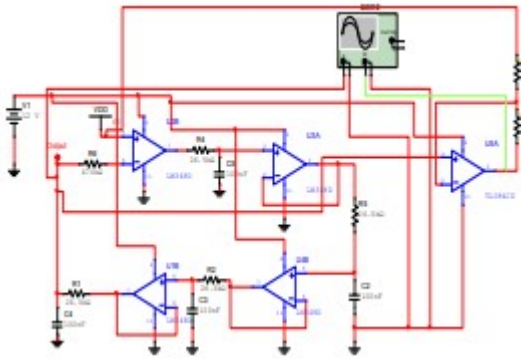

Figure 1 circuit of the converter

Conclusion

In this paper we were able to realize in producing a pure sine wave DC-AC inverter that which give the output at 60 Hz.The design is cheap to manufacture and highly efficient. The DC to AC converter has been constructed by using SG 3524(Switch Mode Power Supply IC) and ferrite core transformer. The PWM signal which is generated for MOSFETs driver is constructed using the TL 084 (OP-AMPs) and LM 339 (OP-AMP).The second goal to produce a 220 VRMS sin wave with the capability of providing 2KW of power was successfully reached. The purposed sine wave inverter produces very little harmonic distortion with specific frequency.

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