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REVIEW ON ONLINE HYBRID INVERTOR

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ABSTRACT

In today's modernised world, with rising fuel costs, increasing concerns for global climate change, and a growing worldwide demand for electricity, utilizing renewable sources such as solar power becomes necessity rather than a luxury. The main focus is on providing energy at reasonable price but soon the day will come when the utilities will be focusing on encompassing sustainable use and environmental improvement into their agendas. In this paper a real-time, grid connected solar panel is designed in order to provide power to the loads from solar panel at day time and switch the power to the constant DC sources as soon as the solar power falls below a predefined limit. This switching of power from solar panel to constant source is controlled through switch.

INTRODUCTION

The solar energy, which comes from the sun and can be converted into electrical energy and heat. Solar energy is the best renewable source of energy in India Due to its proximity to the equator, India receives abundant sunlight throughout the year. Solar PV solution has the potential to transform the lives of 450 million people, who rely on highly subsidized kerosene oil and other fuels, primarily to light up their homes. Energy plays a vital role in our day to day life. The degree of development and civilization of a country is measured by the amount of consumption of energy by human beings. Energy demand is increasing as the population is increasing, urbanization and industrialization. The world's fossil fuel supply. Coal, petroleum and natural gases will thus be depleted in a few hundred of years. The rate of energy consumption is increasing & supply is depleting which is resulting in inflation and energy shortage. This is called energy crisis. Hence alternative or renewable sources of energy have to be developed to meet future energy requirement. Now the point is what renewable and non-renewable energy are. Non-Renewable Energy These are the energy sources that we are using and cannot create in a short period of time. However, we get most of our energy from non-renewable energy sources, which include the fossil Fuels – oil, natural gas, and coal.

The following features of solar power make it the most viable renewable source of energy for India:

- Solar energy is available in abundance.
- Available across the country – unlike other renewable sources, which have geographical limitations.
- Available throughout the year.
- Decentralized / off-grid applications – addressing rural electrification issues.
- Modularity and scalability.
- It causes no pollution to the environment.

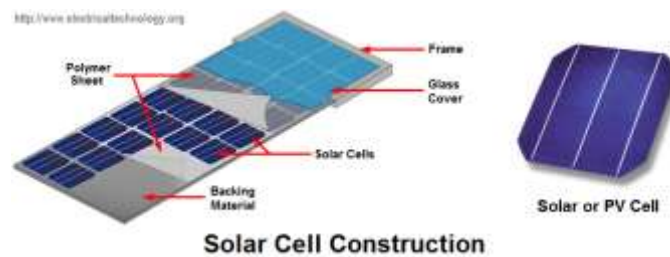


SOLAR PANEL

SOLAR ENERGY: AN INTRODUCTION

PHOTOVOLTAIC CELL

The basic Photovoltaic (PV) cells, or solar cells are referred to, a semiconductor device that convert sunlight into direct current (DC) electricity. A silicon photovoltaic cell is a thin wafer consisting of a very thin layer of phosphorous doped (N-type) silicon on top of a thicker layer of boron-doped (P-type) silicon. Electric field is created on top surface of the cell where these two materials comes in contact (the P-N junction.) Whenever sunlight strikes on the surface of a PV cell, This electric field generate direction & momentum to the light stimulated electrons due to which the current flows to the electrical load. The total generated energy depends on the size, surface area and intensity of sunlight striking on the surface of solar panel. For ex. Under the sunlight a typical commercial photovoltaic cell with surface area of 25 square inches will generate about 2 watts of peak power, if the intensity of sunlight is 40% then the cell will produce about 0.5v of energy



A PV array is the complete power-generating unit, consisting of a number of Photovoltaic panels. Solar energy has so far played an almost non-existent role in the Indian energy mix. The grid-connected capacity in the country now standing at 481.48 MW, while the overall solar energy potential has been estimated at 50,000 MW. On the upside, the market is set to grow significantly in the next 10 years, driven mainly by rising power demand, escalating fossil fuel prices,. India has great potential to generate electricity from solar energy and india is to emerge as a solar energy hub.



SOLAR PANEL

EQUIPMENTS USED

SOLAR PANELS

A Solar Panel (also Solar module, PV module or PV panel) is a packaged, connected assembly of photovoltaic cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each panel is rated by its Direct current output power under standard test conditions, and typically ranges from 100 to 320 watts. Solar panels use light energy (photons) from the sun to generate electricity through the PV effect. Most of modules use wafer-based crystalline silicon cells or thin-film cells based on cadmium telluride or silicon. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must be protected from mechanical damage and moisture so that they are covered with a thin

layer of glass, Here, we are using panel of 12V and has power rating of 8W. PV. Figure shows the PV panel used during this entire project.



SOLAR PANEL 12V, 8W

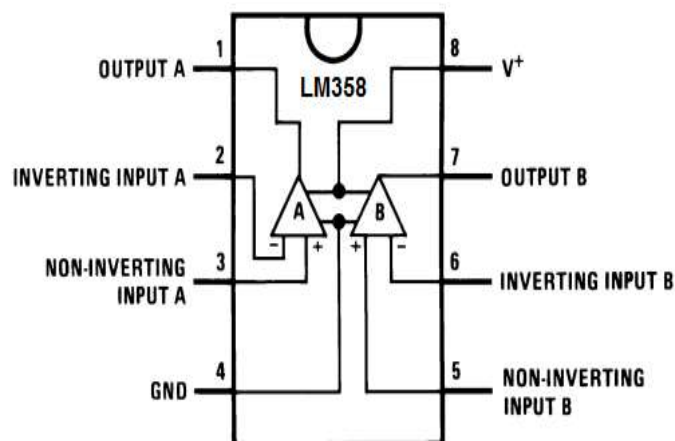
INTEGRATED CIRCUIT

LM358.

These IC contain two high gain op-amp which are designed to operate from single supply over a wide range of voltages. The difference between two supplies varies from 3V-32V VCC at least 1.5V which is more than the input common-mode voltage e.g. these devices can be operated directly from the standard 5-V supply used in digital systems and easily can provide the required interface electronics without additional ± 5 V supplies.



LM358



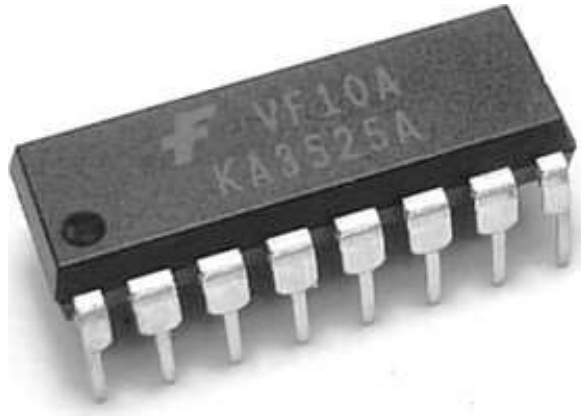
PIN DIAGRAM OF LM358

KA3525A

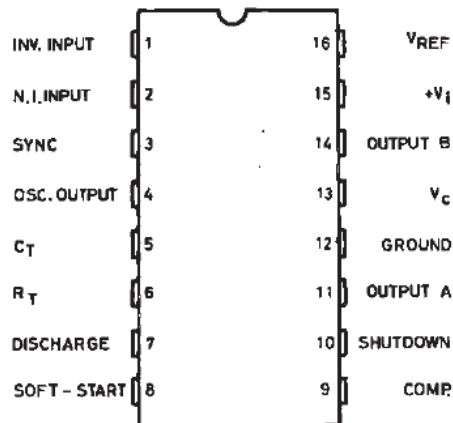
The KA3525A is a monolithic IC that includes all of the control circuits necessary for a pulse width modulating regulator. There are voltage reference, an error amplifier, a PWM, an oscillator, an under-voltage lockout, a soft start circuit, and the output driver in the chip.

FEATURES

- $5V \pm 1\%$ Reference
- Oscillator Sync terminal
- Internal Soft Start.
- Deadtime Control
- Under-Voltage Lockout

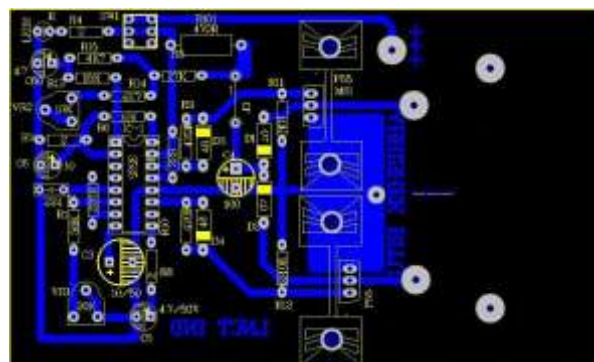


KA3525



PIN DIAGRAM OF KA3525A

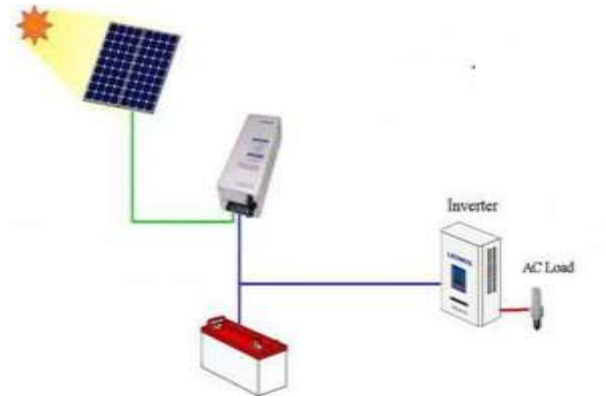
CIRCUIT DIAGRAM



CIRCUIT LAYOUT

DESIGNED LOAD FOR GIVEN SOLAR POWER

The Load has been designed in accordance with the solar power available. For PV panel a constant load of 220V and 5W has been designed to which the panel can supply the power during daytime for about 8 hours. 5W DC bulb. The figure below shows the designed load .



LOAD

A circuit diagram has also been shown In this case also the power can be consumed from the panel for about 8 hours during day time. Above figure shows the designed load.

SMART CHARGING SYSTEM OF BATTERY

Circuit consist of auto cutt off facility which helps in overcharging of battery and increase the life of battery this work with both PV supply and DC supply so that one should not keep an eye on battery to charge or discharge and indicators are also placed there for the indication of low battery and full battery

ADVANTAGES

- Photovoltaic cell energy production is obtaining more significance as a source of renewable energy and has many features which include everlasting pollution free energy production scheme, maintainance free, and direct sunbeam to energy conversion
- By this user has option to use the system in two possible operating modes one is stand alone mode and another is power saving mode that can be used in emergency too
- By the use of this easily we can switch power if we are lack of power from solar panel

CONCLUSION

By this system we can use the energy in both the ways in online mode and in backup mode in the day time the energy can be obtained from sunlight and can be stored in the battery and another option is of direct power supply so this can be used in stand alone mode as well as emergency mode. The geographical condition of india is too good so approximately 300 days in a year are Sunday on which we get direct sunlight so it can be consumed in this way which is free of cost energy production and pollution free energy production. the switching between solar panel and constant source have been successfully done during bad weather conditions when sunlight was low, at evening time and at morning time automatically.

REFERENCES

- I. www.tektronix.com/tds2000
- II. www.oen.com
- III. www.google.com
- IV. www.texasinstruments.com
- V. <http://terrawiseshomes.com/index.php/solar-photovoltaic/>
- VI. <https://www.mouser.com/ds/2/149/KA3525A-1010657>
- VII. <http://www.onsemi.com/PowerSolutions/product.do?id=KA3525A>