

Design Photovoltaic System with Constant Output using SEPIC Converter

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Abstract -The photovoltaic (PV) system gives variable output voltage due to temperature and insolation variation with respect to time. This project presents the design of a SEPIC converter for getting constant output voltage from PV system using a simple control circuit. The SEPIC is designed to make the power flow from PV module to load effectively and maintaining constant output voltage.

Key Words: PV module, Solar panel, Sepic converter, MPPT

1. INTRODUCTION

Now a day everywhere in the world solar energy is use because of energy crisis. Solar provides carbon footprint per unit of energy production is 95% lower than that of fossil fuel power plants. For produces energy solar panels used which contents PV module that converts solar energy into electricity and it gives variable output voltage due to temperature and insolation variation with respect to time. This project presents the design of a SEPIC converter for getting constant output voltage from PV system using a simple control circuit.

The SEPIC is a DC to DC converter in which the output voltage is having same polarity as that of input voltage. One benefit of the SEPIC converter is that the input ripple current in the input capacitor is continuous. This reduces the amount of input capacitance necessary for low-ripple voltage, which reduces EMI (Electro Magnetic Interference). SEPIC converter maintains a fixed output voltage regardless of whether the input voltage. It is difficult to maintain constant output from PV module during all hours in a day .In recent years; many research works have addressed development of solar system. In a SEPIC with PV module input & peak current module control has been developed including small signal model of SEPIC, PV voltage controller & MPPT controller.

2.1.1 Solar panel

Sr.no	Description	Specification
1	Short circuit current	2.0A
2	Voltage at MPP	15
3	Current at MPP	2.15
4	Open circuit voltage	20V
5	Maximum power	35W

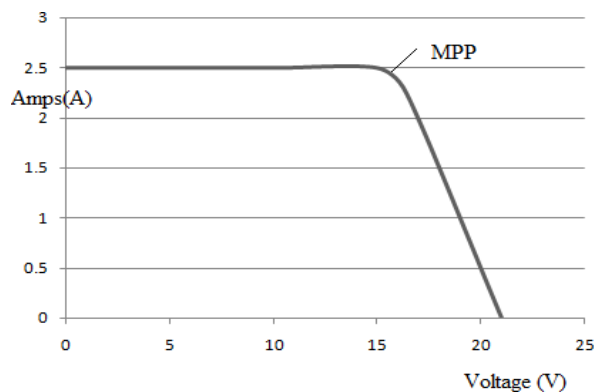


FIGURE 2.1.1 V-I characteristics of solar panel

2.1.2 SEPIC CONVERTER

A SEPIC is used as power factor correction stage is good solution for power supplies in electronic blasts. SEPIC converter is the best alternative to track maximum power from PV panel. The maximum power tracking for PV panel using dc-dc converter is developed without using micro controller. The nominal duty cycle of the main switch in the SEPIC converter is adjusted to a value, so that the input resistance of the converter is equal to the equivalent output resistance of the solar panel at the MPPT. A SEPIC is applied to interface a thermoelectric power generator output to battery & to track maximum power point (MPPT) of TE power generation. Power distribution system having central power supply whose output is connected to load which is regulated by constant frequency techniques.

Sr.no	Description	Specification
1	Input Voltage	11V DC -20V DC
2	Output Voltage Switching	14.25V DC
3	Output Current	1.42A
4	Ripple	40%
5	Duty Cycle range	0.55 to 0.42
6	Switching frequency	330KHz

Table 2.1.2 specifications of SEPIC converter

2.2.3 CONTROLLER



The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter(8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. In this project two controllers are used one is for controlling LCD, voltage control another is used for PWM techniques

2.2 SIMULATION

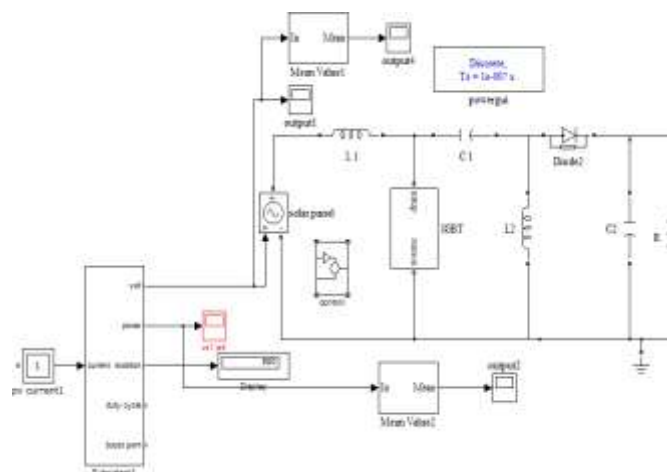
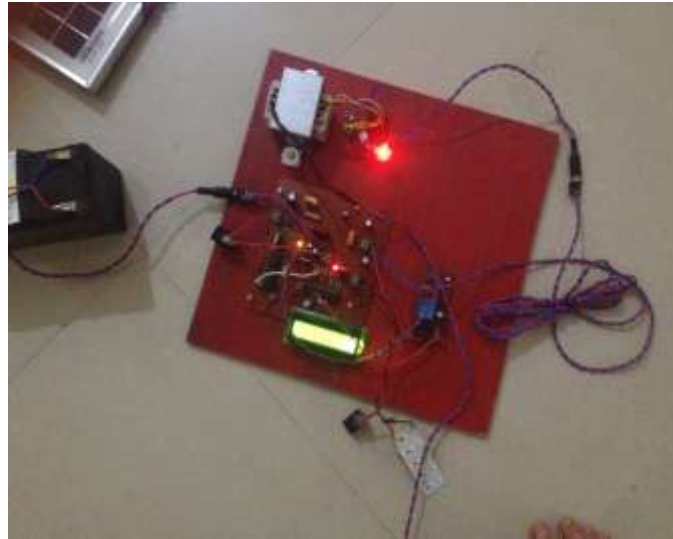


FIGURE 2.2 SIMULATION OF SYSTEM

2.3 ACTUAL SETUP



3. CONCLUSION

According to this system, this project has introduced hardware implementation of DC-DC SEPIC converter for applications of renewable energy using PWM based charge controller. The solar panels output voltage is varying, hence for getting or maintaining the constant output voltage, the PWM based charge controller using SEPIC converters are used. By using extra inductors and capacitors in the SEPIC converter, high voltage gain and low current undulation are produced. Therefore, efficiency of the proposed converter is increased. By adjusting the range of dc voltage, SEPIC converters are allowed to maintain constant output voltage. By using hardware implementation, performing an operation of the proposed system. Also at environmental condition and changing load, SEPIC converter gives the constant output voltage.

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