

Use DcDc to increase the voltage and current of solar panels





Overview

Integration of solar photovoltaic (PV) systems into a microgrid is accomplished with the help of a dual-diode, dual-capacitor, and single-switch DC-DC boost converter. At the output, a power of 400W transfer is achieved together with a voltage gain of 3.92. The converter may be operated in two primary forms, both of that are based on the ON/OFF switches. The benefits that may be noticed in practice from the hardware output are high reliability and decreased switching losses. The properties of the converter are determined via an open loop system that uses pulse width modulation (PWM) switching at 20 kHz. An examination of the step response is carried out. The validations of the proposed converter topology has been compared with the recent converter topologies. The performance of the converter.

- The DC/DC converter is designed for solar PV applications.
- At the output, a power of 400 W transfer is achieved together with a voltage gain of 3.92
- The hardware output are high reliability and decreased switching losses.
- The converter raises the 50 V DC input voltage to provide 200 V DC output voltage.

DC-DC boost converter
Microgrid
Solar PV
Switching losses.

V_M □ voltage across the switch
 V_C □ voltage across the capacitor
 V_{in} □ input voltage
 V_O □ output voltage
 i_{in} □ source current
PV □.

In recent years, there has been an increase in the use of DC microgrids for the distribution and utilization of electrical energy provided by renewable sources such as solar PV, wind turbines and fuel cells (FCs) [1]. The DC microgrid has the potential of either functioning independently or attached to the main power grid. As electrical and electronic engineering advances and research expands, renewable energy sources (RES) are becoming more important in the design of power systems. On the other hand, natural disasters and other alterations to the environment have raised awareness of the need of renewable energy sources. Solar PV systems are being utilized to produce electricity daily in greater amounts as part of a global drive to lower CO₂ emissions and accelerate the adoption of RES. Before.



Can DC-DC converters boost photovoltaic panels' output voltage?

Various DC-DC converter topologies have been proposed in the past three decades to boost the photovoltaic panels' output voltage which will be discussed in this proposal. In order to increase the life span of photovoltaic panels, the DC-DC converters should absorb continuous low ripple current from solar panels.

Why do solar panels need a DC/DC converter?

Over the past decade, there has been a significant rise in the installation of solar PV panels. Connecting PV panels in series raises the voltage output of photovoltaic generators to a higher level. The DC/DC converters employed in PV systems must have a low ripple with constant input current to achieve a high voltage gain.

Is a DC-DC converter suitable for solar energy storage systems?

With these results, the DC-DC converter circuit configuration is suitable for use in electrical energy storage systems from solar panels that have high efficiency. 42/KN/LPPM/III/ 2023, March 17, 2023. 96, 2014. Reviews, vol. 15, no. 1, pp. 713-720, 2011. 2596, p. 012028, 2023.

Is DC-DC converter suitable for photovoltaic applications?

It is suitable for photovoltaic applications. For increasing the voltage gain, it uses dual coupled inductors in series. Also, it works on low-duty cycle for preparing high voltage gain. Table 1. DC-DC converter topologies compare. Figure 8. Novel nonisolated topologies (a) [58], (b) [59], (c) [60].



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