

In this paper, a novel high-efficiency bidirectional isolated DC-DC converter that can be applied to an energy storage system for battery charging and discharging is proposed. By integrating a coupled inductor and switched-capacitor voltage doubler, the proposed converter can achieve isolation and bidirectional power flow. The proposed topology comprises five ...

The expanding share of renewable energy sources (RESs) in power generation and rise of electric vehicles (EVs) in transportation industry have increased the significance of energy storage systems (ESSs). Battery is considered as the most suitable energy storage technology for such systems due to its reliability, compact size and fast response.

This paper presents a novel single-phase non-isolated bidirectional buck converter topology. The proposed converter uses a basic switching cell structure with a coupled inductor and an interleaving switching scheme. This article addresses a crucial challenge in bidirectional DC-DC conversion by prioritizing reducing output current ripples and minimizing ...

2 Analysis of the proposed converter. Fig. 1 shows the proposed bidirectional converter. In the boost mode, the switch S 2 is operated to accumulate energy in the input inductor L and when the switch S 2 is turned off, the stored energy is delivered to the load through the body diode of S 1. When the converter operates in buck mode, the power to the output will ...

Today, in many power conversion applications, bidirectional DC-DC converters are used, especially for energy storage integration. DC voltage is being increasingly used in many applications, such as lighting, renewable energy sources, energy storage integration, data centers, and motor drives []. For electrical drive systems, even in the case ...

The essential features and principles of the portable bidirectional energy storage converter proposed in this paper, which is based on a second-order generalized integrator phase-locked loop, are theoretically investigated. Formulas are also generated using small signals to address this issue.

8 Bidirectional DC-DC Converters for Energy Storage Systems Hamid R. Karshenas 1,2, Hamid Daneshpajoo 2, Alireza Safaei 2, Praveen Jain 2 and Alireza Bakhshai 2 1Department of Elec. & Computer Eng., Queen's University, Kingston, 2Isfahan University of Tech., Isfahan, 1Canada 2Iran 1. Introduction Bidirectional dc-dc converters (BDC) have recently received a lot of ...

This article proposes a bidirectional single-phase dc-ac converter with triple port converter (T-PC) for application of energy storage. This proposed converter provides three ports such as ac port, dc port, and dc bus

port to achieve three power interfacing ports. For the direct conversion process, dc port is directly connected to T-PC, and direct power will be exchanged between energy ...

This paper proposes a bidirectional dc-dc converter for residential micro-grid applications. The proposed converter can operate over an input voltage range that overlaps the output voltage range. This converter uses two snubber capacitors to reduce the switch turn-off losses, a dc-blocking capacitor to reduce the input/output filter size, and a 1:1 transformer to ...

Li S et al (2018) Hybrid bidirectional DC-DC converter with low component counts. IEEE Trans Ind Appl 54(2):1573-1582. Article Google Scholar Lai CM et al (2018) Development of a bidirectional DC/DC converter with dual-battery energy storage for hybrid electric vehicle system. IEEE Trans Veh Technol 67(2):1036-1052

24.2.3  $\pi$ -uk Derived Converter. Figure 24.3 illustrates the Cuk converter which has characteristics of continuous input and output current flow in both the directions by means of employing pair of bidirectional power switches in place of the diode and power switch combination of the regular circuit configuration. Some modifications have been implemented in the ...

This paper presents a new control method for a bidirectional DC-DC LLC resonant topology converter. The proposed converter can be applied to power the conversion between an energy storage system and a DC bus in a DC microgrid or bidirectional power flow conversion between vehicle-to-grid (V2G) behavior and grid-to-vehicle (G2V) behavior. ...

A thorough review on non-isolated bidirectional dc-dc converters for ESDs is presented in [], where several topologies are analyzed in detail. A qualitative comparison among some popular approaches is also presented in Table 1 in terms of component count and behavior of the battery current in boost mode. For high-power applications, the bidirectional interleaved ...

An improved hybrid bidirectional DC-DC converter is proposed in this paper which is suitable to be deployed in energy storage applications interfacing the DC bus of a microgrid. The converter utilizes voltage boosting techniques such as a switched-capacitor network and coupled inductor to achieve a large voltage conversion ratio. Furthermore, the converter requires a small number ...

1 INTRODUCTION. Bidirectional DC/DC converters are used to manage the battery for several electric power applications such as small energy storage systems, mini electric vehicles, and uninterruptible power supplies [1-5]. Generally, low-voltage batteries are used in small-scale energy storage system or devices because it is easy to handle and relatively ...

For dc microgrid energy interconnection, this article proposes a multiport bidirectional converter, leveraging three shared half-bridges. This converter achieves high voltage gain with fewer transformer turns ratios.

Utilizing interleaved operation and a reverse-coupled inductor on the low-voltage side ensures a minimal ripple in the battery charging current. Each output port ...

Energy storage Isolated bidirectional dc-ac dc-dc converter converter ac grid (IBDC) Isolation barrier Fig. 13. ... Small Signal Analysis of a Dual Half Bridge Isolated ZVS Bi-directional DC-DC Converter for Electrical Vehicle Applications,&quot; Power Electronics Specialists Conference, 2006. pp. 2777-2782, ISBN 0-7803-9033-4, Recife, Brazil, June ...

As the most common and economical energy storage devices in medium-power range are batteries and super-capacitors, a dc-dc converter is always required to allow energy exchange between storage device and the rest of system. Such a converter must have bidirectional power flow capability with flexible control in all operating modes.

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