

SolarInvert Energy Solutions

The role of high-frequency bidirectional inverter



Overview

The bidirectional inverter plays a crucial role in modern power systems by ensuring efficient energy conversion and storage. Does a high operating frequency improve the performance of a bidirectional converter?

Given the high performance of SiC, it is expected that a high operational frequency might contribute to improving the performance and reducing the size and cost of passive components in a bidirectional converter. Inverters with higher operating frequency are used in variable-frequency AC sources.

What is a bidirectional inverter?

Unlike conventional inverters that only convert DC (direct current) to AC (alternating current), bidirectional inverters can also convert AC back to DC, allowing energy to be stored or fed back into the grid. This functionality is essential for applications like renewable energy systems, microgrids, and battery backup solutions.

Does a bidirectional inverter affect the efficiency of a DC distribution system?

The bidirectional inverter connected to the grid is a crucial component of DC distribution systems, however its operation can have an impact on the systems' overall efficiency. The usual load profile of such systems in residential buildings is quite dynamic, with multiple periods of light load, especially when compared to high-demand sectors.

Should you use a bidirectional inverter in a solar energy system?

Using a bidirectional inverter in a solar energy system offers several advantages: Bidirectional inverters allow for efficient two-way power conversion between AC and DC, enabling the system to charge batteries from both solar panels and the grid, and to supply power from batteries during outages.

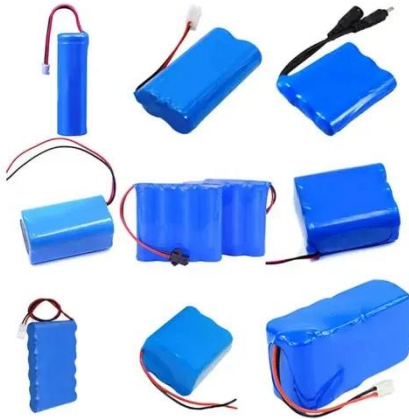
What is a high operating frequency inverter?

Inverters with higher operating frequency are used in variable-frequency AC sources. Energy storage systems (ESS) and electric vehicles (EVs) are among the applications for which higher operating frequencies are required [14 – 17].

Can synchronous bidirectional inverters reduce light-load efficiency?

A high-efficiency synchronous H6 bidirectional inverter (Fig 1) was thus proposed by the authors of to reduce the negative impact on light-load efficiency. By utilizing SiC MOSFETs, they were able to reach an impressive efficiency of 98.3% at a load of 20%. Fig 1. Synchronous bidirectional inverter topology.

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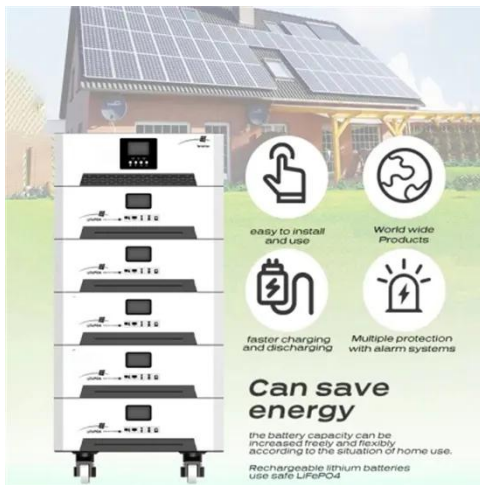
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