

Bidirectional grid-connected inverter design





Overview

Can a bidirectional DC-AC converter be used in a power grid?

A comprehensive experimental process was adopted to validate the two modes of operation of the bidirectional DC-AC converter proposed here when connected to the AC grid and in a power range up to 1.5 kW.

How does a bidirectional converter work?

Therefore, the bidirectional converter could operate in inverter or PFC rectifier mode, depending on the state of the AC grid. Thus, the HEMS provided a corresponding signal that forced the bidirectional converter to inject electricity into the grid (inverter mode) or to charge the batteries (PFC rectifier mode).

What is a grid-connected microgrid & a photovoltaic inverter?

Grid-connected microgrids, wind energy systems, and photovoltaic (PV) inverters employ various feedback, feedforward, and hybrid control techniques to optimize performance under fluctuating grid conditions.

What is a bidirectional DC/DC converter?

As previously mentioned, the bidirectional DC/DC converter is an interleaved DC/DC converter with the capability to either work as a buck converter when charging the battery or work as a boost converter when charging the DC Bus, hence the DC/AC converter from the battery. The specifications for this stage can be seen in Table 3-2. Table 3-2.



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[1.6-kW, Bidirectional Micro Inverter Based on GaN ...](#)

Jun 27, 2024 · This reference design implements a four-channel 1.6-kW single-phase bidirectional micro inverter based on GaN. The reference design supports four identical channels with up to ...

[Analog , Embedded processing , Semiconductor company](#)

May 11, 2022 · Analog , Embedded processing , Semiconductor company , TI



[DESIGN AND CONTROL OF NOVEL MULTI LEVEL BI ...](#)

Jan 22, 2021 · The main aim of this paper is to Design and Control a Novel Multi Level bidirectional grid-connected inverter for the battery energy storage applications. The proposed ...



[Grid-Connected Micro Solar inverter Implement Using a ...](#)

Apr 1, 2023 · This paper describes how to use a TMS320F2802x to design a micro solar inverter with low cost and high performance. Also discussed is the use of the interleaved active-clamp ...



[10-kW, GaN-Based Single-Phase String Inverter With ...](#)

Aug 29, 2024 · This reference design provides an overview into the implementation of a GaN-based single-phase string inverter with bidirectional power conversion system for Battery ...



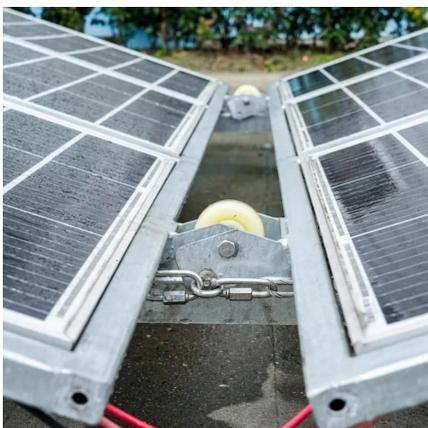
[Design & Synchronization of three phase grid connected PV](#)

Aug 20, 2022 · To design a three-phase grid-connected photovoltaic system with phase locked loop control strategie. To Design of battery charge controller alone with bidirectional DC-DC ...



[A Comprehensive Review of the Bidirectional ...](#)

Mar 6, 2023 · Furthermore, a bidirectional conversion can be made for an active power transfer between grid-vehicle (G2V) and V2G effectively. ...





[Bidirectional buck-boost converter-based active power](#)

Aug 31, 2024 · To address this issue, this paper introduces a power decoupling method. This method utilizes a bidirectional buck-boost converter, connected in parallel to the DC link, to ...



[Refined HERIC-style grid-connected PV inverter utilizing a](#)

Jan 15, 2025 · The current study presents a refined HERIC-based inverter topology utilizing a bidirectional semi-active clamping approach, specifically the RHERIC-BSAC inverter, designed ...

[Novel Control Scheme to Reduce THD in Bidirectional...](#)

Jul 24, 2025 · Recent trends emphasise the significance of bidirectional power conversion systems in grid-forming operations. Minimising total harmonic distortion (THD) in these ...



[Control and Analysis of a Grid connected Bi-Directional...](#)

Jun 17, 2023 · This paper presents a performance analysis and control of a grid connected battery energy system. A bidirectional DC-DC converter interfaced battery energy storage system is ...



[Two-Stage Bidirectional Inverter Equivalent Circuit ...](#)

Jun 10, 2025 · Two-Stage Bidirectional Inverter Equivalent Circuit Model for Distribution Grid Steady-State Analysis and Optimization
Emmanuel O. Badmus, Graduate Student Member, ...

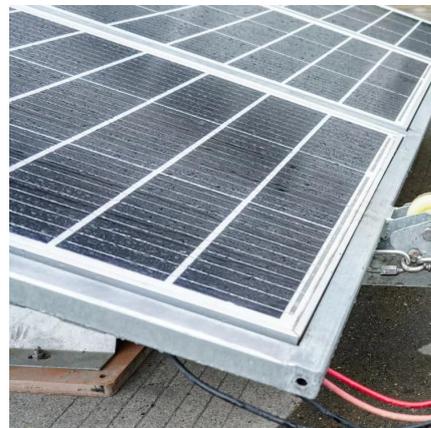


[A Bidirectional Grid-Connected DC-AC ...](#)

Feb 6, 2022 · The efficiency measurements of the bidirectional DC-AC converter, performed in grid-connected inverter mode, show that we ...

Bi-Directional Particular-Period Grid-Linked Inverter for ...

Aug 29, 2023 · The Bi-Directional Single-Stage Grid-Connected Inverter for Battery Energy Storage Coordination has a system layout that offers a straightforward and effective design for ...



[A comprehensive review of grid-connected inverter ...](#)

Oct 1, 2025 · Grid-connected inverter technologies from 2020 to 2025 have shown significant advancements in design and performance, categorized into conventional, multilevel, ...



Choosing the right DC/DC converter for your energy storage design

Sep 30, 2020 · AC/DC, DC-DC bi-directional converters for energy storage and EV applications Ramkumar S, Jayanth Rangaraju



[Parameters Design and Optimization of a ...](#)

Aug 31, 2019 · In this paper, a high frequency, interleaved, dual-buck, bidirectional, grid-connected converter topology is proposed. Free from ...

[A Bidirectional Grid-Connected DC-AC Converter for ...](#)

Feb 6, 2022 · The efficiency measurements of the bidirectional DC-AC converter, performed in grid-connected inverter mode, show that we exceeded the efficiency target of 95% over the ...



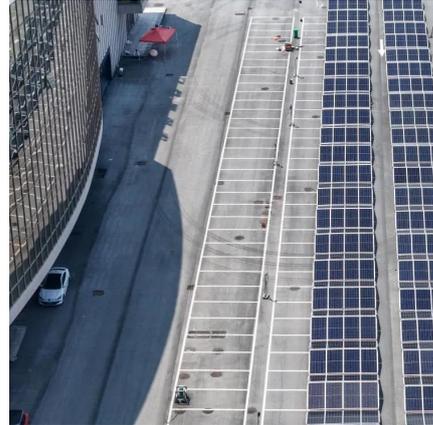
Bidirectional Single-Stage Grid-Connected Inverter for a ...

Oct 22, 2022 · MAM SCHOOL OF ENGINEERING
Abstract--The main objective of this paper is for the battery energy storage system to propose a bidirectional single-stage grid-connected ...



Bidirectional Single-Stage Grid-Connected Inverter for a ...

Dec 20, 2018 · Abstract--The main objective of this paper is for the battery energy storage system to propose a bidirectional single-stage grid-connected inverter (BSG inverter). This is ...



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