

**SolarInnovate Energy Solutions**

# **Photovoltaic dual-wave inverter**



## Overview

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Why are PV inverters so popular?

As PV systems need an electronic interface to be connected to the grid or standalone loads, the PV market has started appealing to many power electronics manufacturers. Improvements in design, technology and manufacturing of PV inverters, as well as cost reduction and high efficiency, are always the main objectives, [see References 1, 2].

Is a power converter suitable for photovoltaic applications?

For this reason, the power converter, based on a dual-stage topology, has been investigated and experimentally evaluated for photovoltaic applications. The converter performs MPPT and grid connection by means of an ARM Cortex M3-based STM32F103xx microcontroller, which is proven to be well suited for such an application.

What is a dual-stage inverter for grid-connected applications?

Table 1. The dual-stage inverter for grid-connected applications includes a DC-DC converter to amplify the voltage and a DC-AC inverter to control the current injected into the grid. Figure 3. The DC-DC converter is depicted in Figure 3 together with the DC-AC converter and LCL filter.

What are the components of a PV converter?

The converter consists of an input capacitor, C1, six switches, M1 - M6, six freewheeling diodes, two rectifier diodes, D1 and D2, a HF transformer with turns ratio equal to 1.2 and a DC link capacitor C2. The transformer provides voltage isolation between the PV array and the grid, improving overall system safety.

What is a single-phase grid-connected inverter?

A single-phase grid-connected inverter, with unipolar pulse-width modulation, operates from a DC voltage source and is characterized by four modes of

operation or states. Two modes take place during the positive load current period and two modes in the negative load current period, as shown in Table 6. Table 6.

How is inverter current transformed?

The inverter current is transformed, using Park equations, in the two components referred to the rotating DQ reference frame of the grid voltage. These components,  $I_d$  and  $I_q$ , are proportional to active and reactive generated power, respectively.

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