

Article Overview

Photovoltaic diode module patents cover innovations in diode protection, packaging, and modeling for solar modules, enhancing reliability, thermal management, and electrical performance.

Key Patents and Innovations

1. Diode Module for Solar Protection (CN102683446A) This patent describes a diode module designed to protect solar photovoltaic cells. It features an aluminium substrate with insulating steel foils, with multiple diode chips arranged between the foils. The diode chips are covered with an epoxy plastic layer, and high-power diodes are directly sintered onto an AL PCB to improve heat dissipation, reduce packaging costs, and enhance reliability. The design emphasizes simple structure, convenient use, and improved thermal management . 2. Clip Bond Packaging Photovoltaic Diode Module (CN219180495) This utility model introduces a clip bond process for rapid packaging of diode modules. It includes a first and second frame, crystal grains, and conductors, with a plastic package body covering the assembly. The design allows high reliability, good electrical and thermal conductivity, and the inclusion of V-shaped grooves for water vapor discharge. This approach improves yield and applicability in photovoltaic systems . 3. Angle-Adjustable Diode Module (CN219145335) This patent focuses on a module with a diode body fixed on an aluminum substrate inside a main box. It features an angle-adjustable rotary joint for connecting photovoltaic equipment, allowing tight attachment to the back plate and improving mounting stability and ease of use. The design enhances linkage performance and operational convenience . 4. Single Diode Model Parameter Calculation (PCT/CN2024/124944) This patent covers a method and system for calculating parameters of a photovoltaic module using a single diode model. It allows modeling under various test conditions without a complete I-V curve, using performance parameters like short-circuit current, open-circuit voltage, and temperature coefficients. This innovation is significant for simulation, production, and optimization of photovoltaic modules .

Summary of Trends in Photovoltaic Diode Module Patents

- o Thermal Management: Direct sintering of diodes on aluminum substrates and epoxy encapsulation improve heat dissipation.
- o Packaging Efficiency: Clip bond and plastic encapsulation methods enable rapid assembly and high yield.
- o Electrical Performance: Designs focus on reliable current conduction, voltage stability, and protection against overcurrent.
- o Modeling and Simulation: Single diode models facilitate parameter identification and performance prediction without full I-V curves.
- o Structural Flexibility: Angle-adjustable joints and modular frames enhance installation adaptability and mechanical stability. These patents collectively demonstrate a focus on enhancing reliability, thermal and electrical performance, and manufacturability of photovoltaic diode modules, reflecting ongoing innovation in

solar energy protection and module optimization.

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H10F19/00 Integrated devices, or assemblies of multiple devices, comprising at least one photovoltaic cell covered by group

Abstract Bypass diodes are essential components for mitigating mismatch losses and hotspot formation in photovoltaic

In times of climate change and increasing resource scarcity, the importance of sustainable renewable energy

The present invention relates to a bypass diode assembly for a photovoltaic module, to a photovoltaic module comprising at

This page includes the patent name, patent number, legal status, invention/applicant, technical efficacy and accompanying drawings

A photovoltaic module is shown. The module is made up of a set of cells. Each cell comprises silicon while a graphene electrode is

However, such material has not been cataloged or analyzed from a perspective of the

Another is thin-film solar panels, which use a second-generation technology with cells

The number of photovoltaic inventions started to grow considerably in the late 1990s, increasing more than seventeen

The photovoltaic system includes a maximum power point (MPP) tracking module configured to perform MPP tracking

The utility model relates to the technical field of semiconductors, and provides a photovoltaic diode module, which aims to solve the

For example, worldwide solar photovoltaic capacity had grown to 512 Gigawatts by the end of 2018 (representing 27%

This chapter outlines the results of patent analyses regarding recent developments in photovoltaics, with a



Photovoltaic diode module patents

special focus on the four

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Patent application US 20090025778 describes a photovoltaic device having a bypass diode extending between the

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