

Principle of AC-DC power supply module



Overview

Understanding Power Supply Modules: Definition, In this article, we will explore the definition, working principles, and applications of power AC DC Power.

Key Takeaways

An AC-DC power supply module converts alternating current (AC) from the mains into stable direct current (DC) using rectification, filtering, and voltage regulation stages. Working Principle



1. AC Input: The module receives AC voltage from the mains, typically 110V or 220V at a fixed frequency. This AC input is the standard form of electricity supplied to homes and industrial equipment . 2. Rectification: The AC voltage is converted into DC voltage using a rectifier circuit, commonly a bridge rectifier composed of four diodes. This process transforms both the positive and negative halves of the AC waveform into a unidirectional current, producing a pulsating DC . 3. Filtering: The rectified DC contains ripples and noise. Capacitors and sometimes inductors are used to smooth the voltage, reducing fluctuations and providing a more stable DC output . 4. Voltage Regulation: To maintain a constant output voltage regardless of input variations or load changes, the module employs a voltage regulator. This can be a linear regulator, which dissipates excess energy as heat, or a switching regulator, which rapidly switches the current on and off to efficiently control voltage levels . Feedback circuits monitor the output and adjust the conduction of transistors or MOSFETs to stabilize the voltage . 5. Output Stage: The regulated DC voltage is delivered to the load, ensuring electronic devices receive the required power for proper operation. In isolated modules, the input and output grounds are separated to prevent interference and protect against surges .

Types of AC-DC Power Supplies

- Linear Power Supplies: Convert AC to DC directly with linear regulation. They are simple but bulky due to large transformers and less efficient at high power .
- Switching Power Supplies: Use high-frequency switching to convert AC to DC efficiently, allowing smaller transformers and higher power density .

Key Considerations

- Grounding: Input and output grounds are carefully managed to maintain isolation and safety .
- Inrush and Leakage Currents: Protective components like thermistors and varistors manage surge currents and leakage to prevent damage .
- Applications: AC-DC modules are widely used in consumer electronics, industrial automation, and embedded systems to provide reliable DC power . In summary, an AC-DC power supply module operates by receiving AC input, rectifying it to DC, filtering out ripples, regulating the voltage, and delivering stable DC output to electronic devices, with design variations depending on efficiency, size, and application requirements.

Article Content

Understand the working principle of ACDC module power supply

In summary, the ACDC module power supply receives AC input, undergoes rectification, filtering, and voltage stabilization

Module 3.0 Introduction to Switched Mode Power Supplies.

Introduction to Switched Mode Power Supplies. SMPS circuits are considerably more complex than the linear stabilised power

What Is Power Supply Module? Key Features and Applications

A power supply module is a compact device that converts AC (Alternating Current) power from the mains into DC (Direct Current)

A Comprehensive Guide to Module Power Supply Types: Functions ...

Module power supplies are critical components in modern electronics, offering compact, efficient, and reliable

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