

Low-temperature resistant high-frequency switching power supply for IDC server rooms



Article Overview

High-frequency, high-density server PSUs using GaN or SiC devices with LLC or phase-shifted full-bridge topologies provide efficient, low-temperature operation suitable for IDC server rooms.

Key Design Considerations

High-Frequency Switching and Power Density: Modern server PSUs leverage high-frequency switching to reduce magnetic component size and increase power density, enabling compact designs suitable for 1U or 2U server racks while maintaining high efficiency. LLC resonant converters and phase-shifted full-bridge (PSFB) topologies are commonly used to achieve zero-voltage switching (ZVS), minimizing switching losses and thermal stress even at elevated frequencies.

Wide Bandgap Semiconductors: Gallium Nitride (GaN) and Silicon Carbide (SiC) devices allow higher switching frequencies and lower conduction losses compared to traditional silicon MOSFETs. These devices improve thermal performance, enabling PSUs to operate reliably in low-temperature environments while maintaining high efficiency and power density.

Real-Time MCU Control: High-frequency PSUs benefit from real-time microcontroller (MCU) control, which provides precise PWM management, fast transient response, and optimized control loops. MCUs like the TMS320F280039C enable high-resolution PWM, valley switching, and slope compensation, ensuring stable operation under rapid load changes common in server environments. Therm...

Article Content

Jan 04, 2026

Data center & server room, Power, Cooling and rack

Discover our Data Centers & Server Room power protection, precision cooling, and IT equipment racks for

Mar 20, 2026

Back to Basics: The Importance of Switching Frequency | Vicor

The importance of switching frequency quickly becomes apparent to systems designers bringing regulated power to on-board

Jun 25, 2026

3.3 kW high-frequency and high-density PSU for server and

3.3 kW power supply unit (PSU) which targets specifications for server and datacenter applications. This document describes the

Jan 02, 2026

Power Solution Options for Data Center Applications

Designing a power supply for data center server, switch and hardware accelerator applications is challenging. There are strict

Nov 15, 2025

PowerPlus High Frequency Power Supply | NWL

NWL first developed the PowerPlus™ switch mode power supply (SMPS) to provide an integrated high

Jul 19, 2026

Modeling and Simulation of High-frequency Switching Power Supplies

These power supplies are widely used in a variety of applications, such as telecommunications, computing, automotive electronics,

Oct 01, 2025

8kW Hot-Swap Reference Design For 48V Artificial Intelligence Servers

Description With the advancements in artificial intelligence (AI) and machine learning (ML), enterprise servers have

Feb 24, 2026

Data center temperature and humidity guidelines

ASHRAE's data center temperature and humidity standards help admins determine what the environment of the

Sep 28, 2025

High-Frequency Design in Switching Power Supplies

As devices become smaller and more powerful, the need for switching power supplies that can operate at higher frequencies has

Jan 12, 2026

HIGH POWER SWITCHING POWER SUPPLY

The control chip of the DC voltage stabilized power supply adopts the mature imported components at present and the power

Jul 13, 2026

Design and Implementation of High Voltage Solid State Switching High ...

The experimental results show that the SiC-JFET cascaded solid-state switch has the characteristics of fast switching speed and low

Jun 28, 2026

The Influence of the Operating Temperature on the Service ...

In view of any thermal loads that may occur within the service life, an initially more expensive switched-mode power

Dec 05, 2025

Power Solution Options for Data Center Applications

The 5-mm-by-7-mm QFN package achieves a low thermal resistance of 8.1°C per watt and integrates both high- and low-side

May 07, 2026

Feasibility of very high temperature ac-dc switching power supply

I'm involved in a product design (on the mechanical side, to be clear that I'm not an EE) where we need a very compact

Jul 03, 2026

Server Power | LITEON

Server Power LITEON provides a full range of platinum to titanium efficiency grade power supplies for CRPS, GPU and SLIM series

Feb 16, 2026

Server power supply units (PSU) | Infineon Technologies

Infineon end-to-end server PSU solutions leverage a hybrid Si, SiC, GaN portfolio for modern AI data centers. This enables up to

May 01, 2026

Infineon Technologies REF_3K3W_HFHD_PSU High Power Density

The REF_3K3W_HFHD_PSU power supply exhibits a fully integrated transformer structure and includes a baby-boost

Sep 07, 2025

Thermal Management & Reliability in Switching Power

Switching power supplies are the backbone of modern electronics, delivering high efficiency

Apr 28, 2026

3.3 kW high-frequency and high-density PSU for server and

The PSU also features a baby-boost converter to comply with the hold-up time specifications of server applications with a reduced

Nov 14, 2025

Using Low-Voltage Devices in High-Voltage Server Power Supplies

The increasing power demand in data centers, led by advances in artificial intelligence, is driving the need for

Mar 04, 2026

Switching Power Supply Design for High Voltage and Current

High Power Systems For high voltage/low current, or for low voltage/high current, there are switching regulator ICs

Jan 05, 2026

Frequency Selection in Switching Power Supply Designs (Part I)

Part I will discuss calculating for the key variables of switching frequency, as well as the challenges with higher frequencies. Part II

Nov 02, 2025

Renesas Electronics Corporation

A global leader in microcontrollers, analog, power and SoC products, Renesas delivers trusted embedded design innovation to

May 03, 2026

Integrated Very-High-Frequency Switch Mode Power Supplies: Design ...

This paper presents a power supply using an increased switching frequency to minimize the size of energy storing

May 09, 2026

Server Power Supply

They provide high switching frequency and deliver ultra-low on-resistance ($R_{DS(on)}$)

Aug 21, 2025

High-frequency Switching Power Supplies

High-frequency Switching Power Supplies: Theory and Design George Chryssis
McGraw-Hill, 1989 - Technology & Engineering -

Sep 03, 2025

SiC MOSFET application in 6.6kW High-Frequency

This paper presents the performance of SiC over Si components in a high-frequency LLC

Mar 17, 2026

SiC solutions for datacenter power supplies | Wolfspeed

As the market moves towards high-power density design and tighter space constraints, the TO-Leadless (TOLL)

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