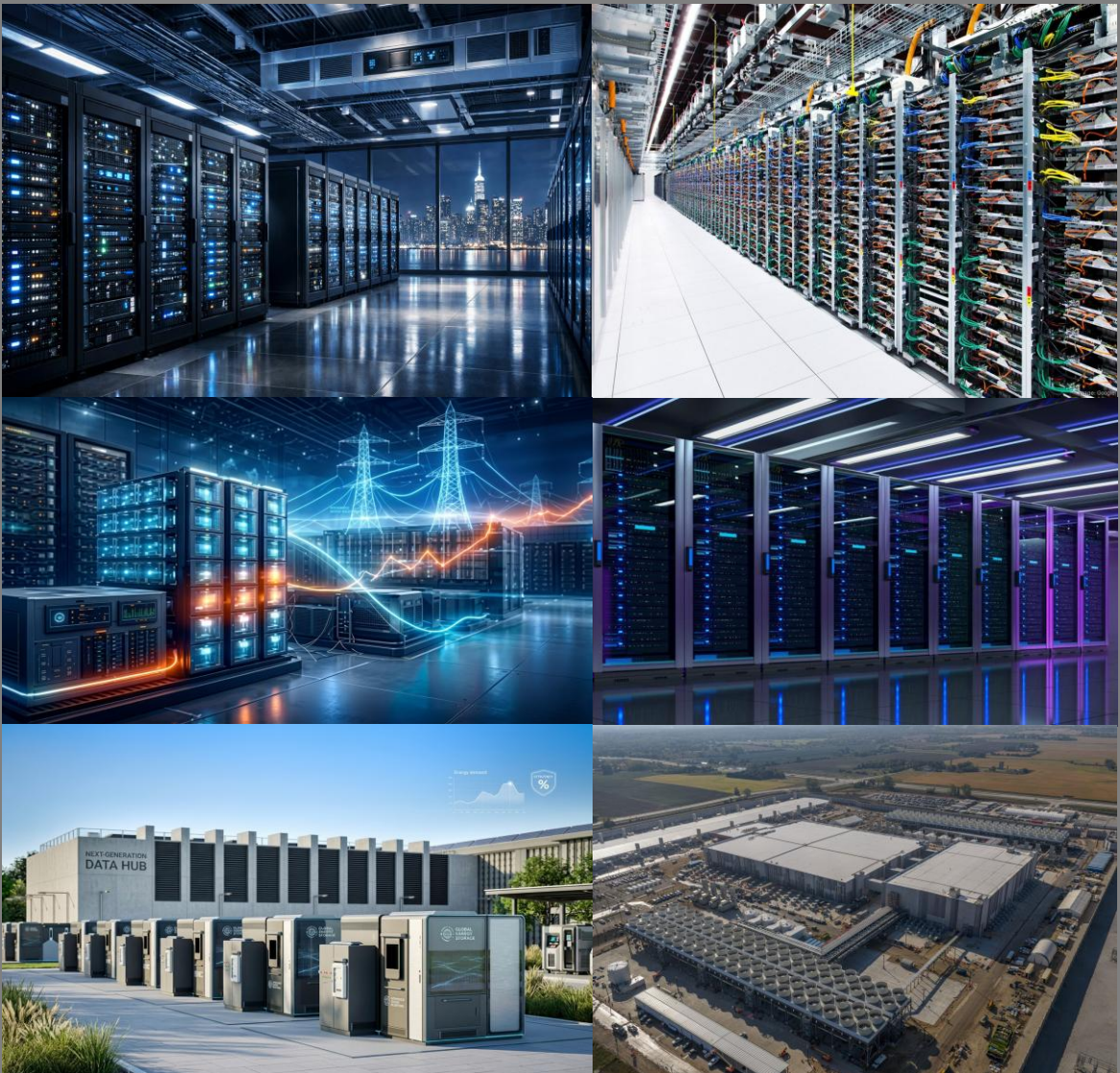


IceMOS Technology

High Power MOSFETs Powering AI Datacenters

Substrate-to-System Innovations for Next-Generation 1MW+ Hyperscale Racks



<https://www.icemostech.com>

High-Density AI Server Power Architecture

Powering the Next Wave of Intelligence

Training trillion-parameter AI models requires thousands of synchronized GPUs handling terabytes of intra-rack data simultaneously. This extreme throughput forces a structural shift from classic IT trays to ultra-high-density blade servers, pushing individual rack power demands past 1 Megawatt (MW) in the near future. The reality is simple - there is no AI without enough power.

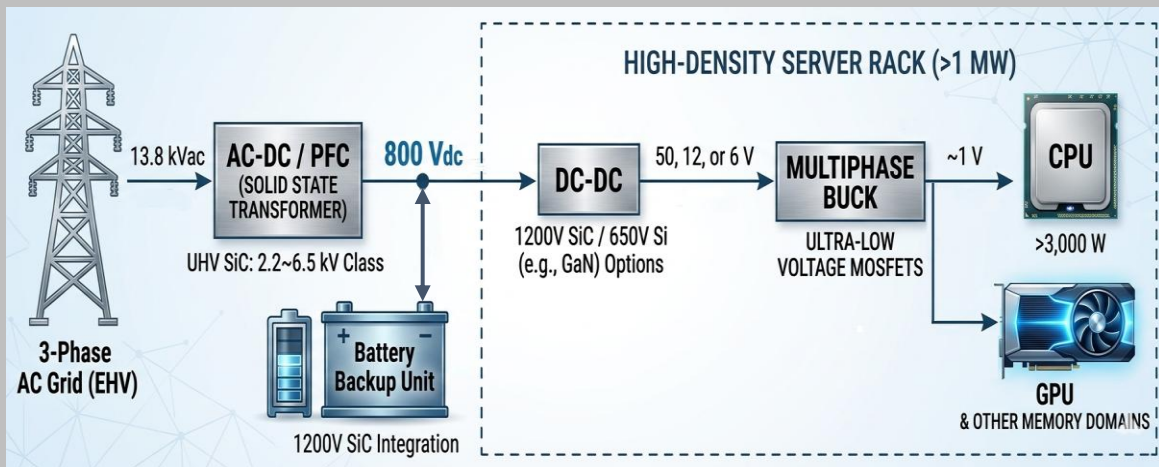
The Shift to Integrated High-Voltage DC

To solve this 1MW bottleneck, AI server power architectures are moving toward higher distribution voltages and fewer conversion stages to drastically improve efficiency and power density. In next-generation data centers, infrastructure is standardizing on a centralized 800V DC rack-level bus architecture, which aligns with emerging Open Compute Project (OCP) standards (like ORv3).

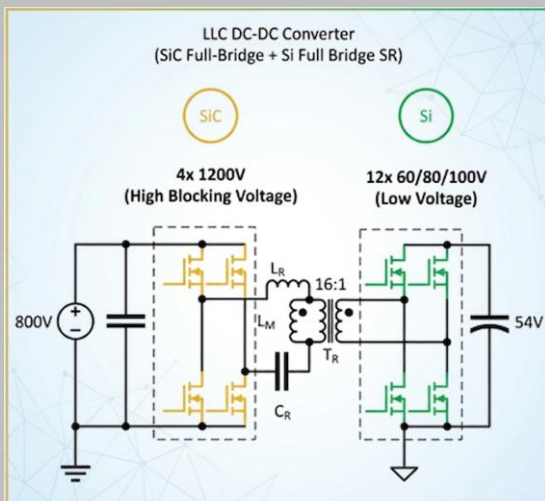
While battery backup units (BBUs), eFuses, and hot-swap functionalities remain essential for system ride-through, protection, and serviceability, they are no longer scattered—they are evolving into fully integrated, high-voltage implementations right at the rack level.

Optimized Path to the xPU

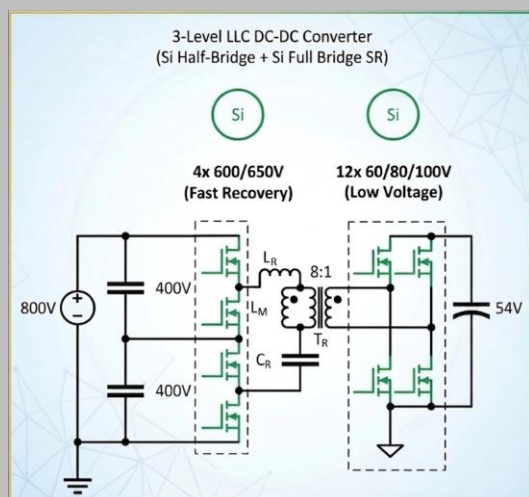
From this primary 800V bus, power is distributed down through highly efficient intermediate bus stages (50V, 12V, or 6V). It is then delivered directly to multiphase buck point-of-load (PoL) converters, supplying the xPU and other low-voltage loads with the ultra-high efficiency and tight regulation required to keep thermals perfectly in check.



Power Management System: From 800V Distribution to Intermediate Buses and LV Board Rails



Option 1: High-Efficiency 800 V to IBC Conversion - 10 kW SiC + Si Cascaded Design for Hyperscale Rack Systems



Option 2: Scalable 800 V to IBC Power Architecture - 10 kW All-Silicon Building Block for Megawatt IT Racks

Optimizing the Path from Grid to GPU

Power from the 800V bus is stepped down through intermediate stages (50V/12V/6V) to multiphase buck point-of-load (PoL) converters supplying the xPU.

- Our 60V–100V low-voltage Si MOSFETs deliver $1\text{m}\Omega R_{DS(on)}$ for maximum efficiency at the processor's doorstep.
- Our 600V/650V Si MOSFETs optimize multi-level topologies.
- Our 1200V SiC MOSFETs excel in the full-bridge LLC stage for high blocking voltage and fast switching.

IceMOS Generation	Product	BVDSS	ID	RDSON	Qg	FOM	Trr/Qrr	Package
		Min. (V)	Max. (A)	Max. (mΩ)	Typ. (nC)	(Ω · nC)	(ns)/(us)	
Silicon Low Voltage	*ICEK012GL6	60	250	1.26	85	0.11	78/0.142	DFN5*6
	*ICEK013GL6	60	220	1.3	168	0.22	69/0.15	DFN5*6
	*ICEK014G6	60	223	1.4	147	0.21	80/0.124	DFN5*6
	*ICEK012G8LK	80	283	1.28	113	0.14	110/0.26	DFN5*6
	*ICEK100GL10LK	100	55	10	35	0.35	53/0.075	DFN5*6
SuperJunction K series FAST Recovery	*ICEK55NF60	600	55.1	38	136	5.17	130/0.8	TOLL, TO220
	*ICEK49NF60	600	49.1	45	117	5.27	132/1.0	TOLL, TO247, TO220
	*ICEK42NF60	600	42	58	95	5.51	90/0.8	W, TO, TOLL
	*ICEK35NF60	600	35	68	83	5.64	111/0.6	TO220 or W
	*ICEK26NF65T	650	25.6	99	48	4.75	114/0.7	TOLL, W
SiC M Series High Blocking Voltage	*ICE13M120W4	1200	118	16.5	210	3.47	37/2.2	W4L
	*ICE14M120W4	1200	111	19	165	3.14	15/0.379	W4L
	*ICE16M120W4	1200	112	22	279	6.14	33/0.842	W4L
	*ICE31M120W4	1200	57	40	63	2.52	8/0.217	W4L
	*ICE12M140W4	1400	124	15.4	177	2.73	19/0.368	W4L

Package Codes: TO=TO220, FP=Full Pak, W4L=TO247-4L, W=TO247, D=TO252, DPAK, L=DFN88, LK=DFN56, B=TO263, T=TOLL

* In qualification; samples available upon request

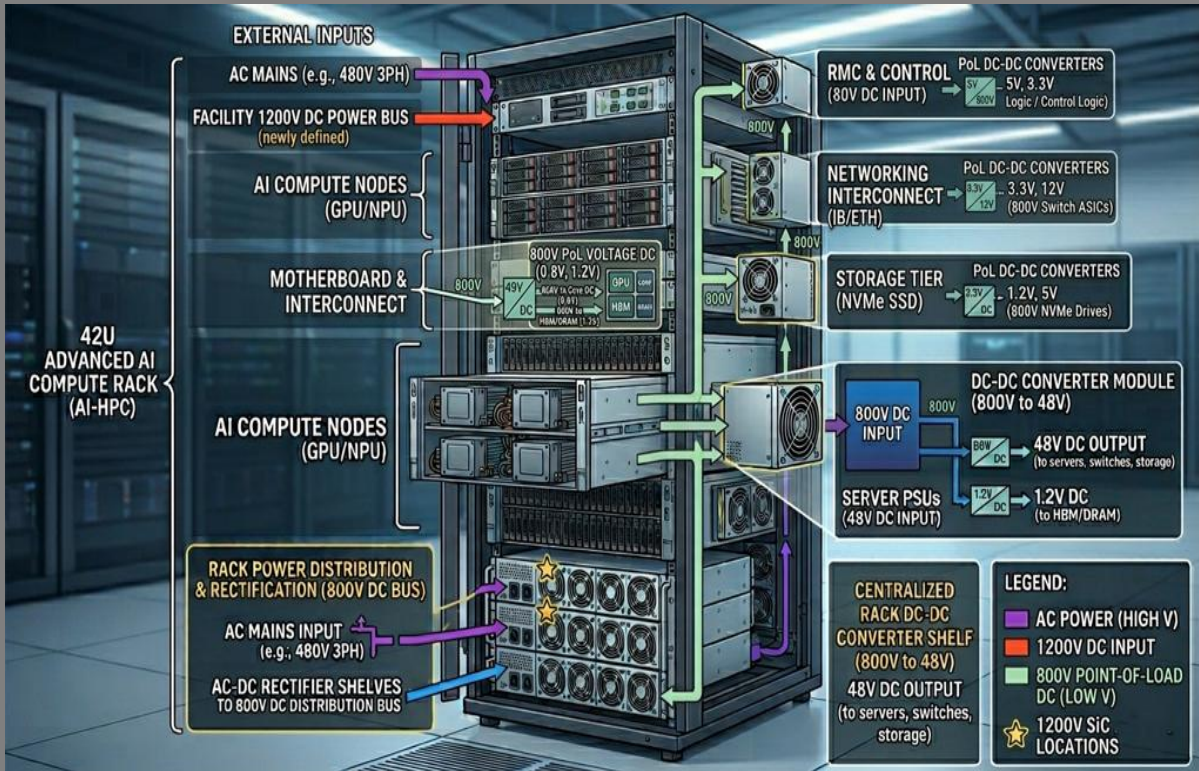
Device Selection Guide by Power Topology & Data Server Application

MOSFET Gen / Series	Voltage Rating (BVDSS)	Target Architecture Domain	AI Data Server System Placement	Critical Engineering Role & Value
Silicon Low Voltage (Ultra-Low $R_{DS(on)}$)	60 V–100 V	Intermediate Bus & Processor Doorstep	<ul style="list-style-type: none"> • Secondary Synchronous Rectification (SR) • eFuse & Hot-Swap Protection Modules • Input Stages for Multiphase Buck Converters 	Delivers $<1.3\text{m}\Omega R_{DS(on)}$ in advanced TOLL/SMD packaging. Minimizes I ² R conduction losses when stepping down power to the extreme current demands of the xPU.
SuperJunction K-Series (Fast Recovery)	600 V–650 V	Multi-Level High-Voltage Stages	<ul style="list-style-type: none"> • 3-Level LLC DC-DC Converters • Front-End PFC Units • High-Frequency Auxiliary Supplies 	Optimized with fast-recovery characteristics to drastically lower switching losses during high-frequency soft-switching cycles in multi-level topologies.
SiC M-Series (High Blocking Voltage)	1200 V–1400 V	Centralized 800 V DC Bus Infrastructure	<ul style="list-style-type: none"> • Full-Bridge LLC Primary Stages • Front-End AC-DC Solid State Transformers • Integrated Battery Backup Units (BBU) 	Provides the extreme blocking voltage and ultra-low Qg required to handle raw primary power safely, enabling safe power scaling to 1 MW+ rack levels.

Engineering Sustainable AI Infrastructure

On a global scale, the explosion of AI infrastructure is outpacing traditional power generation, turning energy efficiency into a critical regulatory and operational necessity. As data center power consumption demands an unprecedented share of worldwide grids, minimizing conversion losses is critical.

Our low $R_{DS(on)}$ MOSFET technology delivers the thermal and electrical performance needed to dramatically lower PUE, ensuring your high-density AI infrastructure satisfies increasingly stringent global efficiency regulations.



IceMOS: Advanced Power & Substrate Engineering

At IceMOS, we combine pioneering power discrete design with proprietary fabrication capabilities to deliver the high-voltage solutions demanded by the AI revolution. Backed by over 70+ granted and 15+ pending patents, our core architectures enable unprecedented efficiency across the data center ecosystem and high-growth microelectronics sectors.

Proprietary Fabrication & Substrate Leadership

From our proprietary fabrication facility in Belfast, Ireland, IceMOS delivers advanced engineering substrates that maximize speed, reliability, and thermal efficiency. This rugged foundation is engineered specifically to meet the strict demands of next-generation power devices, MEMS sensors, and photonics in dense AI environments.

Global Supply Chain Integrity & Compliance

We ensure your architecture scales sustainably and responsibly. All IceMOS products are fully RoHS and REACH compliant. We maintain a strictly vetted, conflict-free supply chain—guaranteeing that zero minerals are sourced from conflict zones, so your infrastructure meets both global environmental mandates and rigorous ethical corporate standards.

Ready to optimize your next-gen power architecture?

- Contact our Applications engineering team for custom simulation models.
- Request an IceMOS engineering sample kit today.

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 Production Selection
 Table

