Accelerating the transition to 800 VDC power architectures

What data centers can learn from electric vehicles

It is a pivotal moment for the data center industry. Emerging 800 VDC architectures are a logical next step in streamlining grid-to-chip power delivery, putting pressure on data center operators to move quickly, reduce uncertainty, and scale confidently. In stark contrast, the automotive industry is defined by a mature ecosystem of 800 V components, design practices, and safety standards.

Why reinvent the wheel? If data center operators leverage technology and experience from the automotive sector, it can help ease and accelerate the transition to 800 VDC architectures.

	AUTOMOTIVE		DATA CENTER	
	Legacy (48 V MHEV)	**Modern** (800 V MHEV)	**Future** (800 VDC)	**Traditional** (48 VAC)
POWER SOURCE	• Limited power via 48 V battery	• Limited power via 800 V battery	• Unlimited power via the grid • Battery backup unit	• Unlimited power via the grid
POWER TRANSMISSION	• Cables and wiring	• EVSE cables • Interlock loop monitoring	• Switchgear • Busway and cables	• Switchgear • Busway and cables
POWER ELECTRONICS	• Power distribution unit • 48 V AC/DC inverter • 48 V-12 V DC/DC converter	• Power distribution unit • 800 V AC/DC inverter • 800 V-12 V DC/DC converter	• Active rectifier / solid state transformer • 800 V-50 V DC/DC converter • Step-down converters	• Power distribution unit • 50 V power shelf • Step-down converters
		800 VDC architectures with cross-industry opportunities		

Why automotive and why now?

The automotive industry has had years to develop and refine 800 VDC systems, while data centers are early in a very fast ramp.

AUTOMOTIVE	800 VDC	DATA CENTER
Mature ecosystem	Current status	Initial launch
20+	Years to ramp	3
Voltage increases limited by torque	End state	Future voltage increases planned
Limited by battery	System energy limits	Unlimited from grid
Trained technicians and untrained owners	System access	Trained technicians only
Disconnect and de-energize without limits	Maintenance approach	Limit de-energization to maximize uptime
No control over temperature, moisture, vibration	Operating environment	Controlled environment, but rapidly shifting parameters

What can be learned?

There are substantial lessons to be learned from the automotive sector, provided data center operators also understand the differences between the two industries. Some lessons can be directly applied, some require adaptation, and some show how standards and safety frameworks must evolve industry-wide.

Automotive iterated and advanced:

- Vehicle efficiency
- Thermal performance
- Charging speeds
- Manufacturing processes

Data centers can leverage existing:

- Technologies and processes
- Supply chains and components
- Standards and certifications

Adoption can help improve:

- Deployment timelines
- Thermal performance
- Charging speeds
- Manufacturing processes

Want to learn more? Download the white paper from Flex and UL Solutions

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