VICOR

Case study: C5ISR armored vehicle battery charger



C5ISR battery charger provides kilowatts of power in harsh environments

Customer's challenge

Charging stations outside vehicles provide personnel immediate access to critical electronic equipment. This presents significant challenges: electronics must function reliably in harsh environmental conditions and the power solution must simultaneously recharge multiple devices at a high-power level (8kW) within limited physical space while managing a wide input voltage range from the rectified 3-phase generator. The key challenges were:

- Perform with available space without impacting weight
- Effectively manage kilowatts of power and different input ranges
- Deliver consistently reliable operation under extreme operational stressess

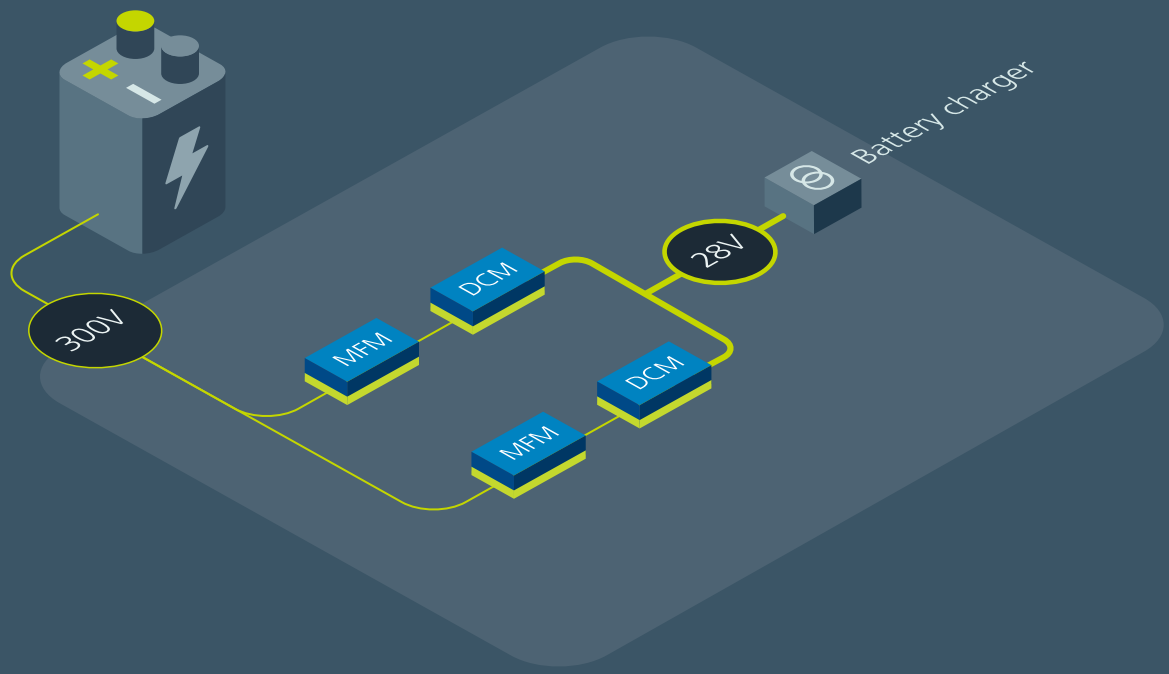
The Vicor solution

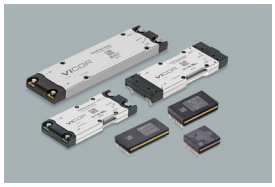
Vicor high-performance power modules offer a robust solution for external vehicle charging stations. These high-power density modules deliver kilowatts of power in a small space, preserving vehicle space. Their ruggedized and thermally adept packaging ensures reliable operation under extreme conditions, meeting stringent standards like MIL-STD-810. They efficiently handle voltage variations from the vehicle's generator, providing a consistent power supply and enabling simultaneous, high-power charging of multiple devices. The key benefits were:

- A compact power solution that provides kilowatts of power
- Rugged and reliable power modules that withstand the external environment
- Wide input range to handle variations in voltage

The power delivery network

The demanding vehicle application achieves high output power (8kW) from a parallel configuration of eighteen highly efficient DCM™ DC-DC converter moduless. These converters, housed in thermally-adept ChiP packaging for optimal cooling, offer a wide input voltage range to accommodate fluctuating vehicle power sources. Their unique design enables simple paralleling without output derating, effectively acting as a single high-current source. MFM™ DCM filters are DC front-end modules used in conjunction with DCMs and provide EMI filtering and transient protection to meet MIL standards.





MIL-COTS DCM™ DC-DC converter

Isolated regulated

Input: 28, 30, 270V

Output: 3.3, 5, 12, 15, 24, 28, 48V

Power: Up to 1300W

Peak efficiency: 96%

As small as 0.98 x 0.90 x 0.28in

vicorpower.com/mil-cots-dcm



MIL-COTS MFM™ filter

Input filter for DCMs

Input: 28V (16 – 50V), 270V (160 – 420V)

Current: Up to 22A

As small as 44.6 x 35.5 x 9.2mm

vicorpower.com/mfm

©2017 – 2025 Vicor Rev 1.0 4/2025