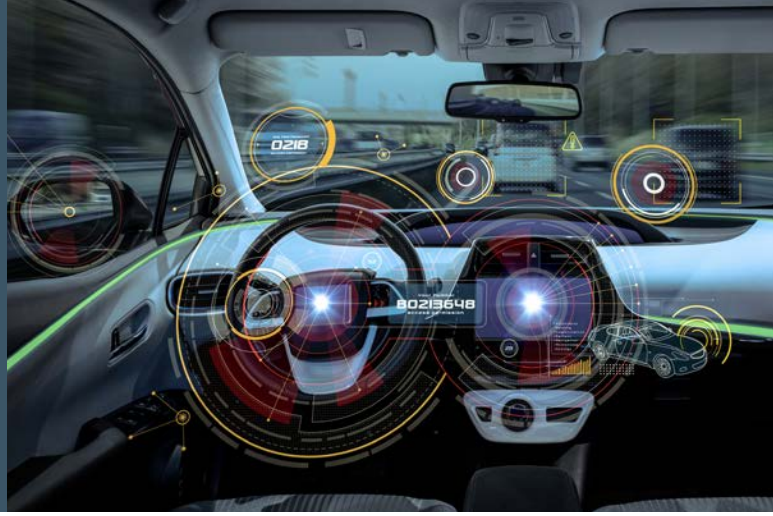
VICOR

Case study:
Central DC-DC converter



Significantly reducing the size and weight of DC-DC conversion

Customer's challenge

A traditional silver box power supply is large. It's difficult to fit in tight spaces and its heavy weight inhibits engineers' goals to increase driving range between charges. The supply and other silver boxes – on board charger and inverter – all require liquid cooling that adds more weight and complexity. A discrete solution likely won't work on a different platform, and re-engineering to scale power up and down requires significant cost and time frames. The key challenges were:

- Volume of space required to power all loads in an EV
- Hundreds of potential fail points in soldering and connections
- Reduce weight from the boxes

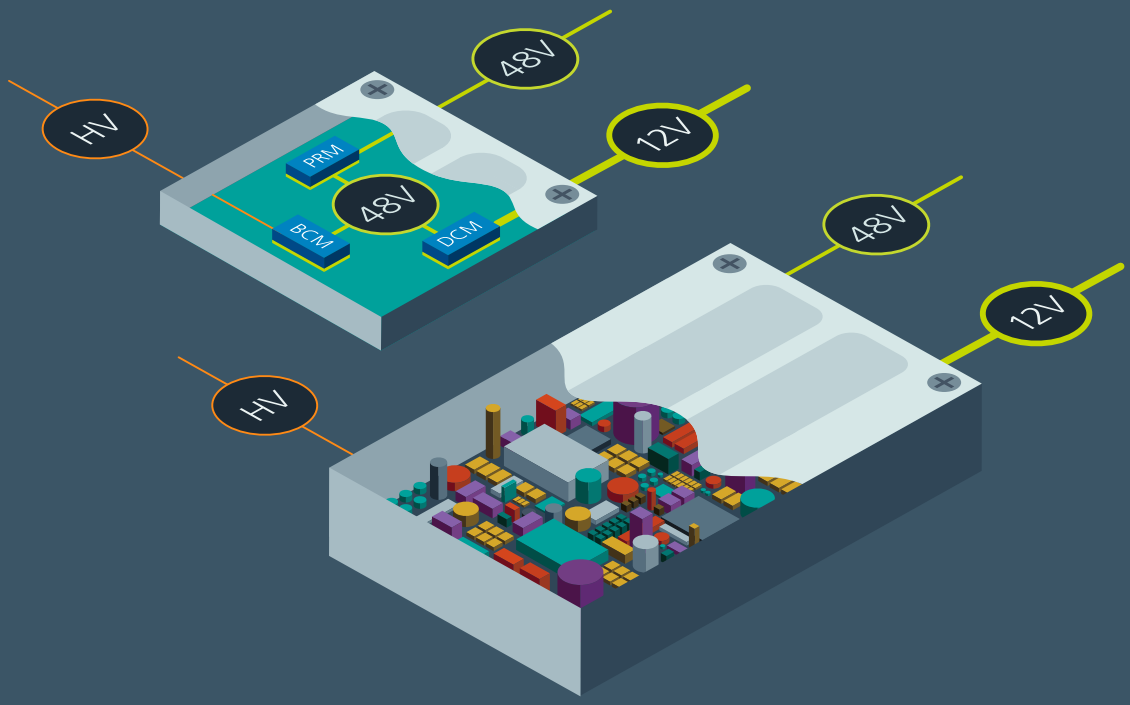
The Vicor solution

Vicor power modules are industry leading in high density power conversion. Their packaging protects inside components from harsh environmental conditions, eliminating creepage and clearance issues that make discrete solutions so large and heavy. Power modules provide conversion that's already tested, with simple passive thermal management, and are easy to adapt for use in different vehicle platforms. Their much smaller volume also makes it feasible to combine DC-DC conversion, on board charging and inverter into one box. Key benefits were:

- Up to 20kW of power in a very compact, lightweight solution
- Isolation incorporated within the module eliminates extra components, further reducing weight

Lightweight, power-dense modules downsize EV power conversion

The BCM6135 power module converts the high voltage battery power down to a 48V SELV at 98% efficiency. The PRM3735 is used to provide a regulated 48V rail, while the DCM3735 converts 48V to a 12V regulated rail. Modules can be easily paralleled to provide as much power as is needed downstream. With the miniature dimensions of power modules, the resulting overall volume of the power supply is small enough to be located within tight spaces in the vehicle engine compartment where a bulky, heavy discrete power supply simply would not fit.





Automotive BCM® bus converter

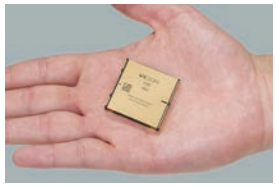
Isolated fixed ratio
Input: 520 – 920V
Output: 32.5 – 57.5V
Current: Up to 80A
Power: 2.5kW
Peak efficiency: 97.3%
61.3 x 35.3 x 7.42mm

vicorpower.com/automodules



Automotive PRM™ regulator

Non-isolated regulated
Input: 31 – 58V
Output: 36 – 54V
Power: 2.5kW
Peak efficiency: 99.2%
36.7 x 35.4 x 7.4mm



Automotive DCM™ DC-DC converter

Non-isolated regulated
Input: 35 – 58V
Output: 8 – 16V
Power: 2.5kW
Peak efficiency: 96.5%
36.7 x 35.4 x 5.2mm

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