VICOR

Case study:
Automotive active suspension



High density power conversion makes active suspensions viable

Customer's challenge

xEV customers expect the improved ride and safety that active suspensions provide. It's been difficult to implement because 12V actuators are so large they won't fit at all 4 wheels. Native 48V actuators would be necessary. The resulting power solution would need to regenerate power when the shock returns to its neutral position and react instantly to changes in power load and direction. The key challenges were:

- Existing 12V systems cannot provide adequate power
- 800V is too dangerous to route through the vehicle body
- Traditional converters cannot change direction or boost power as quickly as necessary

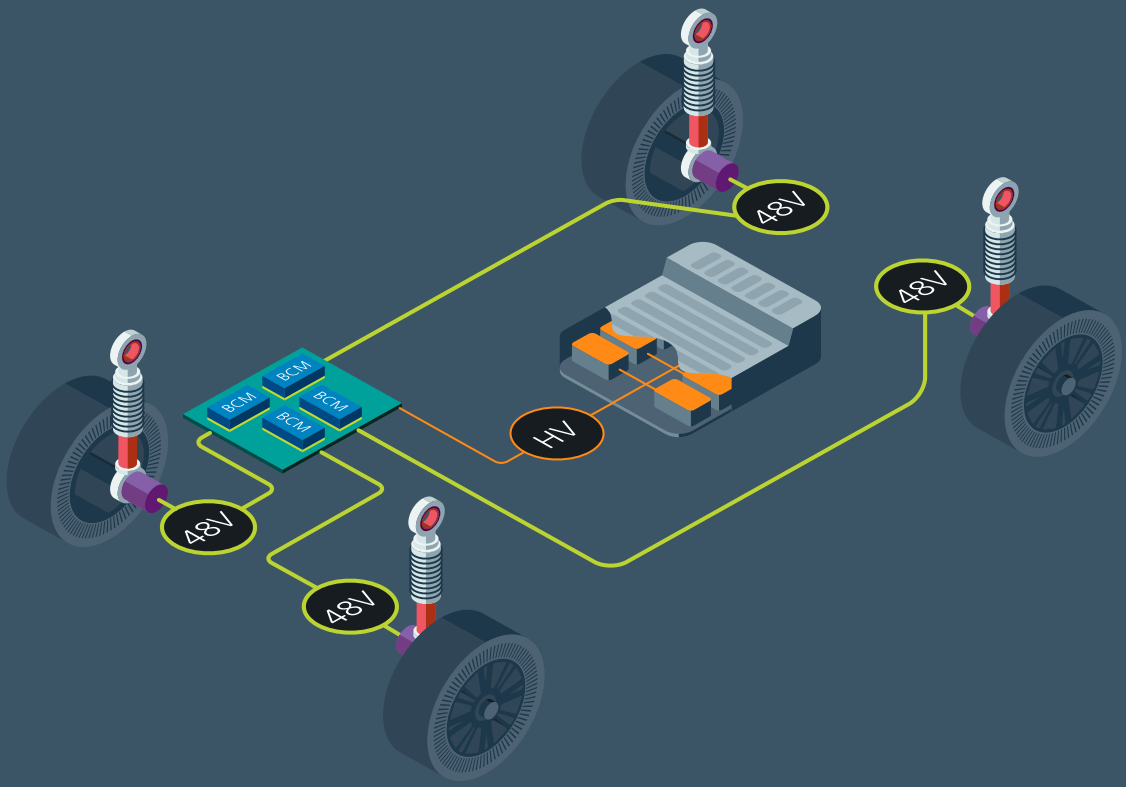
The Vicor solution

With their compact size, Vicor power modules can be easily packaged near the high voltage traction battery, making it feasible to implement active suspension by efficiently sending power to 48V actuators at all 4 wheels. The bidirectional power modules can provide the power necessary (4 to 6kW) to bring the shock down – and unlike discrete solutions – can respond instantly to provide the same amount of regenerative power back to the battery as the shock returns to its neutral position. Key benefits were:

- Power modules can both boost and buck the amount of power necessary
- Fast transient response
- Power modules provide conversion that's tested, with simple thermal management, and easy to adapt for use in different vehicle platforms

Power dense and compact power modules safely convert high voltages to provide high power at 48V

BCM6135 bidirectional power modules convert the HV coming from the EV battery to a safe 48V SELV which is then routed to each wheel's suspension system. Each BCM provides 2.5kW of power, allowing each wheel to function – consuming or regenerating power back to the battery – independently of each other.





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 BCM® bus converter

Isolated fixed ratio
Input: 260 – 410V
Output: 32.5 – 51.5V
Current: Up to 65A
Power: 2.5kW
Peak efficiency: 97.9%
61.3 x 35.3 x 7.42mm

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