VICOR

Case study: Harvesting robots



Rugged, reliable, and efficient power modules maximize uptime in harsh environments

Customer's challenge

Harvesting robots are machines designed to perform various tasks on farms, often autonomously. They are equipped with sensors, cameras, and GPS systems to navigate and understand their environment. These large robotic vehicles or equipment are typically powered from a high-voltage DC source of 400V or more. The key goals were:

- Increase productivity
- High power density to support higher voltage inputs
- A robust and reliable design to maintain continued operation

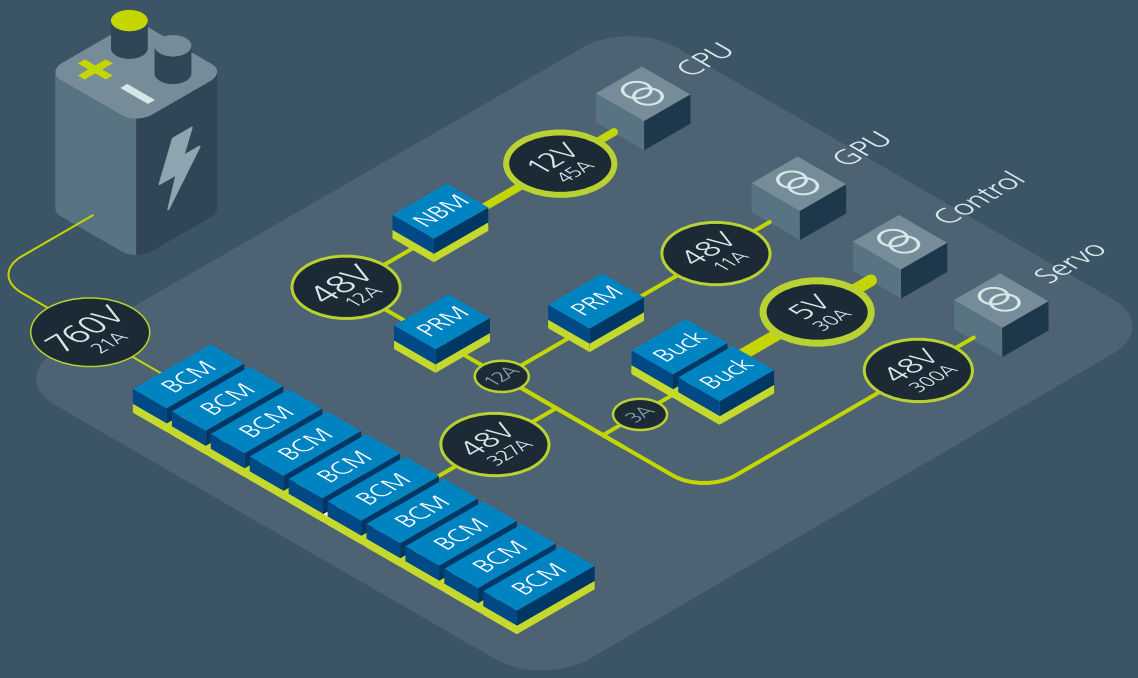
The Vicor solution

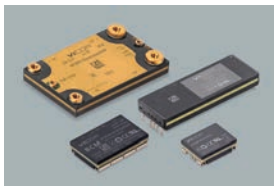
Vicor fixed-ratio power modules enable safe conversion of 400V or 800V batteries typically used in these applications to 48V SELV and reach more than 1,600W of power. The high efficiency of these modules, along with downstream Vicor PoL converters and regulators, greatly reduces power losses and simplifies thermal management, increasing productivity and reliability. Key benefits were:

- Safely convert high-voltage power to SELV
- Rugged, highly integrated power modules for high reliability
- Higher efficiency reduces power losses

The Power Delivery Network

In this type of design, the Vicor BCM® converter series can provide high-voltage battery conversion to a safe, nominal 48V. One example is the BCM4414 capable of more than 1,600W at greater than 97% efficiency from its 111 x 36 x 9mm package. The BCM is a fixed ratio converter with an output voltage 1/16 of the input voltage. Fixed ratio or regulated point-of-load converters such as Vicor NBMs™, PRMs™, ZVS Buck and ZVS Buck-Boost regulators power individual, downstream, lower-voltage rails as needed.





BCM® bus converter

Isolated fixed-ratio

Input: 800 – 48V

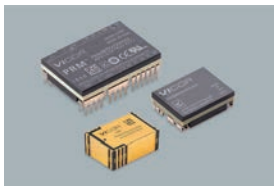
Output: 2.4 – 55.0V

Current: Up to 150A

Peak efficiency: 98%

As small as
22.0 x 16.5 x 6.7mm

vicorpower.com/bcm



PRM™ regulator

Non-isolated regulated

Input: 48V (36 – 75V)

Output: 48V (5 – 55V)

Power: Up to 600W

Peak efficiency: 98%

As small as
22.0 x 16.5 x 6.73mm

vicorpower.com/prm



NBM™ bus converter

Non-isolated fixed-ratio

Input: 36 – 60V

Output: 7.2 – 15.3V

Power: Up to 2400W

Peak efficiency: 98%

As small as 23 x 17 x 5.2mm

vicorpower.com/nbm



ZVS buck regulator

Non-isolated regulated

Input:12V (8 – 18V),
24V (8 – 42V), 48V (30 – 60V)

Output: 2.2 – 16V

Current: Up to 22A

Peak efficiency: 98%

As small as
10.0 x 10.0 x 2.56mm

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