



Delivering high current at very low voltage



Customer's challenge

Satellite communication usually requires a large dish antenna. In addition, for moving vehicles, planes and boats antenna-positioning motors and controllers are needed to ensure that the antenna accurately tracks the relative position of the satellite. Mounting these cumbersome assemblies in a position to maintain a clear visual satellite connection is often impractical. This customer was developing an electronically steered solid-state phased-array antenna with no positioning motors to significantly reduce the antenna profile. The key goals were:

- The antenna's processing signals required a well-regulated 1.5V 80A supply
- Provide a small, robust and reliable low profile power solution
- Accommodate future ASIC designs requiring lower core voltage and higher currents



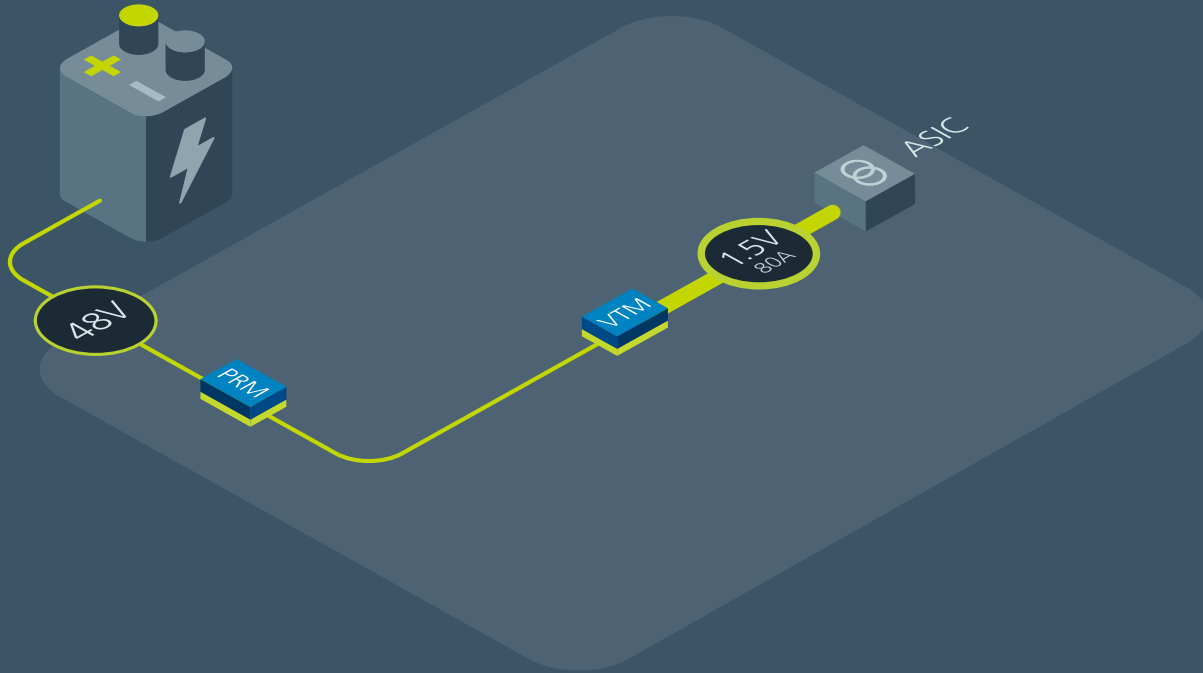
The Vicor solution

Factorized Power Architecture (FPA) separates the regulation and voltage transformation stages into separate components. The resultant design flexibility simplified the implementation and met the system requirements of small size and a low profile. Fast load response and high switching frequency eliminated many hold-up capacitors saving space. Key benefits were:

- Performance maximized by fast response of FPA to ASIC's pulsed current demands
- Reduced footprint (11cm²) and ultra-low profile (<7mm)
- Future ASICs with lower voltages (<1V) and higher currents (+100A) can use the same, scalable, small-footprint architecture

Factorized Power Architecture provides high current to the ASIC in the lowest profile

The Power Delivery Network: The Vicor VTM (transformation) supplied the high current 1.5V rail and was placed close to the ASIC. The PRM (regulation) was sited at the PCB edge since its 48V output bus to the VTM carried only low currents and provided reduced bus distribution losses. This arrangement saved space and optimized voltage regulation at the ASIC. To analyze this power chain, go to **Vicor Whiteboard** online tool.



PRM regulator modules

Input: 48V (36 – 75V)

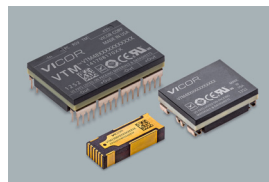
Output: 48V (5 – 55V)

Power: Up to 600W

Peak efficiency: Up to 97%

As small as 22 x 16.5 x 6.73mm

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VTM current multipliers

Input: 0 – 60V

Output: 0 – 55V

Current: Up to 115A

Peak efficiency: Up to 96%

As small as 22.83 x 8.52 x 4.9mm

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