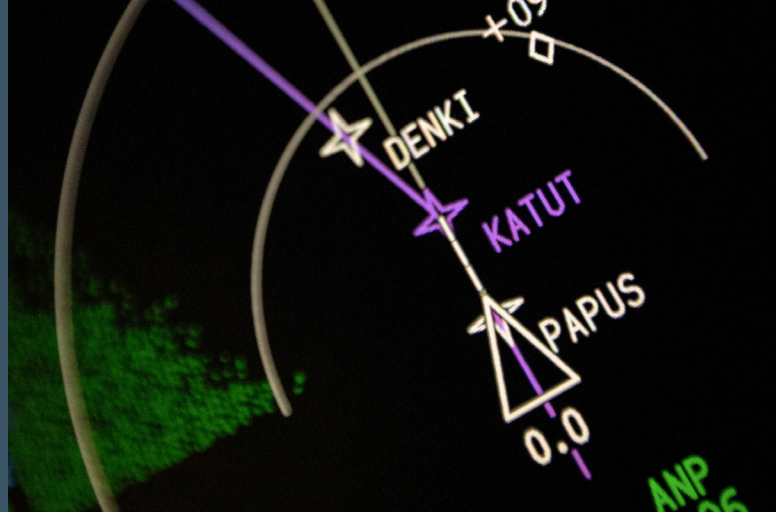
VICOR

Case study: Electronic warfare airborne radar




# High-density power modules provide an effective and scalable solution for high capacitive loads

## Customer's challenge

Airborne radar systems frequently require specific input and output voltages to support pulsed loads where large bulk capacitors are charged by constant current sources. Accommodating varying load and power requirements across system configurations requires a scalable and flexible power supply. In addition, the power supply must provide a constant switching frequency to minimize interference with sensitive onboard equipment and be compact and light due to strict airborne space limitations. The key challenges were:

- Increase power without increasing space required by the power supply
- A solution that can adapt to different power needs
- Minimize EMI interference to prevent disruption of associated electronics

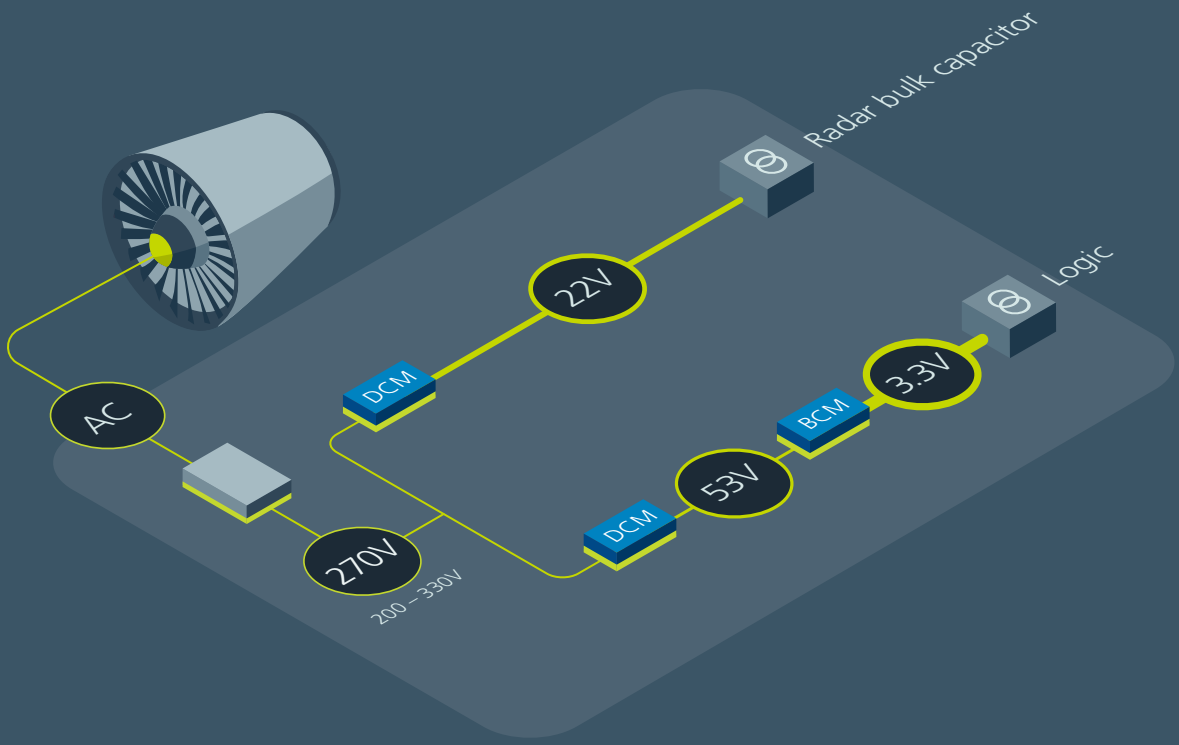
## The Vicor solution

The scalable output rails of Vicor high-density, high-efficiency power modules enable effortless power capacity adjustments by simply adding or removing converters to the power delivery network. The constant switching frequency of Vicor DCM™ DC-DC converters simplifies the necessary filtering to prevent interference with nearby sensitive equipment. This modular design ensures a straightforward implementation, resulting in a flexible, scalable, and highly efficient power solution. The key benefits were:

- Scalable modular power solution allows to easily increase and change power
- ZVS topology simplifies filtering
- High-power density provides high levels of power in a small space

## The power delivery network

On a MIL-STD 704 bus, eight DCM™ DC-DC converters are placed in parallel to create a high power 3.2kW regulated 22V output that feeds a 200µF bulk capacitor. Another DCM provides a 53V output, which is converted to a 3.3V, 300W output by a pair of fixed-ratio (K=1/16) BCM® bus converter modules.






### MIL-COTS BCM® bus converter

| |
|---|
| Isolated fixed-ratio |
| Input: 200 – 400V, 400 – 700V, 500 – 800V |
| Current: Up to 35A |
| Peak efficiency: 98% |
| As small as 1.28 x 0.86 x 0.26in |

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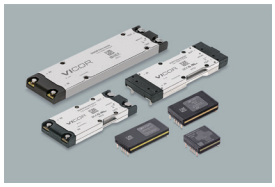

### MIL-COTS DCM™ DC-DC converter

| |
|---|
| 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 |

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