

VICOR Mouser China Online Seminar – Edge AI and ML

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Contents outlines

- Vicor company introduction
- Edge computer new trend and power requirement
- Concerns for power deliver and efficiency for next gen edge computer
- Vicor advantage SAC transforming power delivery
- Vicor new generation power modules comparison with legacy bricks
- Success story sharing



Vicor snapshot

- Headquartered in Andover, MA USA
- Found in 1981
- Public since 1990 (NASDAQ: VICR)
- 170+ patents, \$400M invested in proprietary power distribution architectures, power conversion topologies, control systems, and packaging technologies
- 1000+ staff, 10,000+ customers
- Proven leadership on power conversion
- www.vicorpower.com

Headquarters at 25 Frontage Street



Technical Sales Center (TSC) Locations

VICOR

Our high performance power modules enable...

Breakthrough levels of AI processing performance

Range-extending 48V architectures in electric vehicles

Advanced missioncritical functionality and data transmission Industry 4.0

Automation, autonomy and electrification for





Vicor: modular Power Delivery Networks (PDN)

System performance demands driving rapidly increasing load power

PDNs moving to higher voltages in a number of high growth markets to ease the delivery and distribution of higher power

48V

Power = *Voltage x Current*

High-density, modular power delivery solutions:

mm

Scalable Flexible

Repeatable

Proven

The power module company with the highest performance and density

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Continually providing the highest density power solutions



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6

1.5mm height

Higher efficiency and higher power density

- Provide highest power density converter
- Vicor products and applications
 - Edge computing & embedded computer
 - Clouding training AI Accelerate module & HPC or data center
 - 4G/5G and new 6G telecom instrument and core switch
 - High reliability ATEs, AI robotics
- More flexible than legacy PSU, and fast to production than discreet solution
 - Scalable power architecture with redundancy
 - Simple thermal management
 - Tailored solutions

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Vicor core value: sine amplitude conversion



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NBM[™] non-isolated bus converter module



Bidirectional 48/12V

Input: 40 – 60V

Output: 10.0 – 15.0V

Current: Up to 80A

Efficiency: Up to 97.9%

As small as 22.8 x 17.3 x 5.2mm



DCM[™] non-isolated regulated DC-DC converter modules



Input: 40 – 60V

Output: 10 – 12.5V

Power: Up to 2kW

Efficiency: Up to 96.5%

As small as 36.7 x 17.3 x 5.2mm

PMBus interface



DCM[™] isolated-regulated DC-DC converters



Input: 9 – 420V

Output: 3.3, 5, 12, 13.8, 15, 24, 28, 36, 48V

Power: Up to 1300W

Efficiency: Up to 96%

As small as 24.8 x 22.8 x 7.2mm

Optimized for array up to 8 units with no power de-rating

OVP, UVP OCP, and short circuit and thermal protection



ZVS Buck/Buck Boost regulators





Simpler strategy and implementation



Simple, modular approach

- Up to 5x power density
- Uses less valuable real estate
- Simple thermal management
- Flexible and scalable
- Simple to design and update



Complex discrete solution

- Requires considerable expertise
- Needs hundreds of components
- Change is difficult and risky

Inflexible silver box

- Adding loads, changing power or voltage levels is not practical
- Susceptible to noise and external interference

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Edge computing trends

Booming of artificial intelligence (AI) applications and services

- 80 billion IoT devices and sensors online
- Cloud computing is gradually unable to manage the massively distributed computing power and analyze the data

Edge computing offers data processing at the data source

- Cost, latency, reliability, privacy
- Self-driving cars, intelligent finance, cancer diagnosis, smart cities, intelligent transportation, and medical discovery
- Multi-access edge computing, leverage AI with 5G instrument

Edge computing trends

- Accelerated by the combination of AI and IoT (AIoT)
- Fast processing capability and low latency, high reliability
- Scalability with embedded, compactable

Application: HIRO edge micro data center (EMDC)

- EMDCs are a highly scalable, compact, edge computing resource that can operate reliably in harsh environments and deliver the speed and performance needed for today's applications
- EMDCs can integrate any type and quantity of CPUs, GPUs, FPGAs and NVM media into platforms from 1.5kW shoeboxes to 500kW containerized edge installations



Application: Auto service and router unit (SRU)

- The SRU monitors and maintains switching module and control module
- Processes protocol packets
- Manages the system and monitors the system performance according to instructions of the user and reports the device running status to the user
- Power supplier could well run over 55V due to load dump event





Summary

- 48V_{DC} power distribution, instead of 12V_{DC}
 - The higher voltage reduces I²R power losses by 16X across the power delivery network (PDN)
- High-density, high-efficiency DCM power modules contribute EMDC devices against legacy PSU
- ChiP DCM/NBM offer flexible cooling options and world-leading volumetric power density
- PRM/buck boost converter offer wide range input instruments





Thank you!

