

# Bodo's Power Systems®

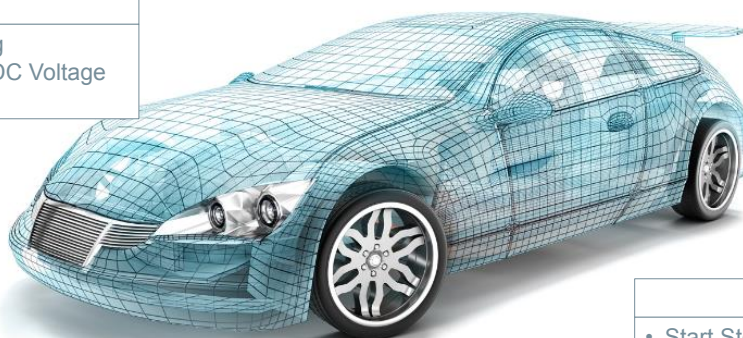
## Disrupting Conventional Electrical Power within Automotive

*During a press conference in Munich, Patrick Wadden, Global VP of Automotive Business Development, and Robert Gendron, P.E., Corporate VP, Product Marketing & Technical Resources, presented the company and especially its activities and achievements in the automotive sector; predominantly addressing the car of the future.*

*By Roland R. Ackermann, Correspondent Editor Bodo's Power Systems*

### 800V to 400V

- Enables Faster Charging
- Converts HV battery to DC Voltage for traction inverter



### 800V & 400V to 48V

Provides 48V native supply for engine coolant pumps, active suspension, chassis systems, catalytic converter warm up

### 48/12V

- Start Stop Applications, Power for Chassis Systems, power windows, heated seats, actuators
- Route 48V signal to point of load to reduce power losses, cable and harness weight, reduce size
- Provide 48V for pumps, fans, blowers or 12V for legacy rails

**VICOR**

Vicor operates two world class manufacturing facilities in Massachusetts, is exclusively focused on power conversion and vertically integrated: from silicon to system. It sells its products to the power systems market, including enterprise and high-performance computing (HPC), industrial equipment and automation, telecommunications and network infrastructure, vehicles and transportation, aerospace and defence.

Rail, military, satellites, drones, industrial are all pushing for more power, Vicor is supporting the power needs of today, covering

- HPC and Cloud AI deployment,
- Migration to the IoT enabler => 5G communication,
- More and more information being conveyed through LED Lighting
- Increasing electrification of autos (EV, hybrid, autonomous, combustion).

Within this scope, Vicor is going the extra mile, reducing weight and size. Eight out of the largest 13 automotive OEMs (making up 98% of the cars produced each year) are expected to face enormous fines in 2021 for exceeding CO2 Emission Standards, some will see fines as high as 10-20% of annual revenues (or in VW's case as high as 1.6 B€). As CO2 goals drive major architecture changes for reduced weight and size, Vicor products help OEMs reduce CO2 emissions or extend drive distance with EV vehicles, making vehicles better.

In manufacturing Vicor offers military grade processing and quality, PPAP, highly automated, computer-integrated, and scalable, supporting high volume datacenter and computing. Moreover ISO 9001:2015 qualification and certification, IATF 16949 quality management systems, certification in process, as well as complete environmental reliability testing (AECQ100) for integrated circuits available, IPC-A-610 Class 2 & 3 certification, GMW3172GM environmental/durability testing specification for electrical/electronic components and power Modules. Functional safety ISO26262 is in review.

### Each device is serialized for product traceability

Its "Automotive Center of Excellence" qualifies Vicor as a world class military supplier with world class quality and reliability, narrow gap to close on ISO/TS16949 certification in Q42019. Credentials include ISO9001:2015, where product traceability for automotive – each device is serialized. The Automotive Quality Supplier Manager started March 4, 2019. Further accomplishments and goals:

- Automotive qualified modules to GM3172 environmental and durability testing, targeting Q22019 (PowerStrip and NBM)
- Currently engaged with (4) L5 autonomous vehicle customers with 3.6KW PowerStrip development system, 8-10 pending
- Currently performing PPAP, FMEA/DFMEA with associated control plans
- Manufacturing process flow and continuous quality improvements, CPK limit and test limit enhancements through six sigma training for 35 employees
- Automotive programs with OEM's/tier-ones, SOP expectations estimated in 2023.

In addition, the company is on its way to a wide transformation to a zero defects (ZD) mindset.

### The Rise of Electrical Complexity on Wheels

To meet the challenges through rising complexity, especially in the EVs of tomorrow, Vicor offers a broad range of corresponding converters, which are essential for the following reasons:

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### New bus converter module

The 800V BCM4414 is a 1.6kW, isolated, 1/16 fixed-ratio, bus converter module (BCM), that can operate from a 500V to 800V input voltage, to deliver SELV output voltages with 97.7% peak efficiency. The new 800V module complements the existing Vicor 700V BCM4414, to create a family of products with reinforced isolation (4,242VDC) and bidirectional voltage conversion capability.

The BCM can easily be paralleled into higher power arrays and the SELV outputs can be stacked (connected in series) for higher output voltages. Both BCMs are available in a 111 x 36 x 9.3mm VIA (Vicor Integrated Adapter) package which has integrated PMBus communication, EMI filtering, and voltage-transient protection. The VIA's planar form factor package simplifies heat management and ease of interface to a wide variety of cooling technologies.

The BCMs are available in either M grade (-55 to 100°C) or T grade (-40 to 100°C).

### High-Voltage BCM family

This high-voltage BCM family addresses the need for increased density and performance in Industrial and Military 3-phase AC power supplies and in high-voltage DC transmission systems for tethered unmanned vehicles.

### Advanced cooling technique

At Embedded World Exhibition and Conference in Nuremberg earlier this year, Vicor in partnership with Future Electronics demonstrated the benefits of an advanced data center cooling technique, liquid immersion cooling with 48V components. High-performance computing applications create excessive heat and while conventional air cooling is an option, greater system efficiency is delivered using advanced cooling techniques like liquid immersion cooling. Some of the most advanced processors to date operate in immersion cooling, mitigating the thermal limitations of traditional air-cooled systems.

### Summary

Vicor addresses the power challenges of the future car, of ADAS and EV, including autonomous cars on every level. Vicor's modular approach to power provides self-produced converters with a high level of integration, advanced switching topologies and thermally adept packaging. Modular power replaces larger, heavier discrete solutions that are present in so many vehicles today. They enable a HEV, EV, and ADAS to be lighter, faster, and/or travel farther.

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