

[January 2025](#)

Electronica 2024 Showcased Power Developments For AI, EVs, Robots And Other Applications

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Visiting Electronica, a trade fair held every other year in Munich is a unique experience. It provides access to a wide range of suppliers serving the electronics industry with exhibitors representing seemingly every type of relevant component or subassembly, instrumentation, design tools, and many electronic design and manufacturing services. You won't find anything equivalent to this trade show in North America, though perhaps shows of yesteryear such as Wescon were similarly broad in scope.

In this article I present my impressions of Electronica 2024, discuss power-related developments presented at the fair, and offer a slide show of interesting power-related demos encountered on my tour of the exhibition. Among the application areas that were prominent at this year's Electronica were artificial intelligence (AI data centers and servers), electric vehicles, renewable energy systems (mainly solar) and industrial robots. Many of the power-related exhibits discussed here concern power components (especially wide-bandgap devices) and reference designs for powering equipment in these applications.

Nearly 3500 Exhibitors And 80,000 Visitors

As reported by Electronica's organizers, this year's show or trade fair—to put it in the European parlance—which ran from November 12 to 15 in Munich, drew approximately 80,000 visitors and featured 3,480 exhibitors. In reporting on participation at Electronica, organizers commented "the international electronics industry impressively demonstrated in 18 exhibition halls that digital technologies are the key to achieving a carbon-neutral future."



*Attendees entering the Electronica 2024 Exhibition. (Photo courtesy of **Messe München**).*

They continued, "In addition to sustainability, key topics such as artificial intelligence, the future of mobility, and the development of young talent sparked lively discussions at the exhibition stands and throughout the extensive supporting program." Indeed, digital technologies, sustainability, workforce development and mobility were prominent among the main themes addressed in the exhibits, as might be expected since these are the general topics of the day throughout the electronics industry.

The size of the exhibits varied widely from small booths displaying samples and literature, to massive exhibit spaces with two story structures with meeting spaces on both floors. Many booths featured counters serving food and drink to their guests.

Perhaps the largest of these exhibits belonged to the distributors of which there were many, particularly in the exhibit halls for semiconductors. This reflects the fact that, despite the many product displays available for random viewing by passing attendees, Electronica seems mainly positioned as a place for product vendors to hold meetings with customers and sales partners since so much of the industry is represented at this show. Just as an example, two of the high-rel power converter companies I met with noted that they were mainly there to meet with reps and distributors.

C1, C2, C3, C4 & C5: Semiconductors; C6: EMS & PCB

B1: EMS, PCB, and other circuit carriers
 B2: Electro-mechanics and system peripherals
 B3: Electro-mechanics and system peripherals, sensor technology



B4: Embedded systems & sensors, semiconductors
 B5: Semiconductors
 B6: Displays

A1: EMS, PCB, and other circuit carriers; A2: Electro-mechanics & system peripherals; A3: Test & measurement; A4: Power supplies; A5 & A6: Passives

Electronica 2024 fairgrounds map. (Map courtesy of Messe München).

Naturally, in attending this show, my interest lies mainly in viewing the power electronics-related exhibits. In that regard, Electronica does not disappoint as it had many displays and demos similar to those seen at events such as APEC. While it doesn't have the same types or quantity of technical presentations as the major power electronics conferences, Electronica showcased a wider range of product categories and possibly more vendors within the overall power market.

For example, there are numerous exhibits for power supply vendors, featuring both power converter products intended for use in larger systems (servers, EVs, renewable energy systems, industrial apps, etc.) as well as instrument-grade power supplies used in test and measurement. Battery makers were also represented here. Although not usually seen at power electronics conferences, some of these power supply companies also participate in other specialty conferences in the U.S. such as those focused on electric vehicles, batteries, and other areas.

A European Exhibition With A Global Flavor

Because it is a European show, it has many exhibitors who primarily market in Europe, and may not market their products heavily (or at all) in North America. On the other hand, it is also billed as a global event and show organizers observed that "the world's leading trade fair [is] more international than ever". This would seem to be supported by the large presence of companies from China—my impression was that they were exhibiting in much greater numbers than on my last visit to Electronica in 2018. And then, within this large collection of companies from different regions, it was fascinating to see how many sources there are for power semiconductors beyond the more familiar and established company names.

While there were many interesting power products to be seen at Electronica, and I will highlight a few of the memorable ones I saw in my descriptions below, the sourcing aspect of Electronica is significant in another regard. In visiting some of the booths of companies whose product lines I thought I was familiar with, I was sometimes surprised to find they had acquired new product lines that went beyond their traditional offerings.

For example, circuit protection specialist Schurter had bought an Australian manufacturer of prismatic supercaps and was displaying some of those supercaps. A sign proclaimed these parts were, "just 0.4-mm, the world's thinnest supercaps." Similarly, passives specialist Kyocera-AVX advertised power modules for inverters

and power converters such as on-board chargers (OBCs) from a company it acquired in Austria. This is now Kyocera-AVX's Sensing & Controls Division (Fig. 1).



Fig. 1. Known widely for its capacitors and other passive components, Kyocera-AVX now offers power modules, like those pictured here, through its Sensing & Controls Division.

Power-Related Highlights From The Fair

On the second day of the fair, Nov. 13, **Infineon Technologies** hosted a press roundtable in which Adam White, president of the Power & Sensor Systems division, discussed the company's leadership in the three major power semiconductor technologies (silicon, silicon carbide and gallium nitride) including the company's recent news about its "world's thinnest" 20- μm silicon power wafers, its 200-mm SiC fab, and its "world's first" 300-mm GaN power wafers. He observed that Infineon is focused on all three technologies because their "adoption is [happening] at different times. While GaN is [just] coming on, SiC is spreading."

His presentation noted the different applications targeted by the three semiconductor materials and their relative advantages. He also cited examples of notable devices being fabricated in each technology. For silicon, he cited the OptiMOS 5 Linear FET 2 for hot-swap protection in AI server and telecom applications, which boasts best-in-class tradeoffs between on-resistance and safe operating area. For silicon carbide, White noted the second-generation CoolSiC MOSFET family of 400-V to 3.3-kV rated parts for AI/Server PSUs, renewables, EV charging and train applications. And for GaN, it was bidirectional medium- and high-voltage switches for industrial and consumer applications that he pointed out.

However, a key area of focus in his presentation related to the company's efforts to address power supply requirements for AI servers. The motivations for focusing on this area revolve around projections for increases in data center, server and processor power consumption. White cited projections for data center electricity consumption driven by AI such as the global share of electricity demand rising from $\sim 2\%$ in 2022 to ~ 7 to 10% in 2030, and trends in processor and server rack power consumption (~ 700 W in 2022 to >2000 W in 2025 for processors; and ~ 10 kW per server rack in 2022 to >150 kW in 2025). In his talk he elaborated on server rack power demands saying "we were supporting 60 to 80 kW [per rack], and now going up to 150 kW and designs above 200 kW".

As noted in his presentation, these trends demand that "power management should not be an afterthought" and in response Infineon is "taking a system approach in powering AI from [power] grid to [processor] core." To illustrate the impact of this approach in terms of bulk power in the rack, White presented a roadmap for Infineon's server power supply development detailing the gains in power density the company is achieving in developing solutions for the CRPS (Common Redundant Power Supply) standard (see Fig. 2). Note the

descriptions of 12-kW single phase and >12-kW three-phase power supplies, which are expected as soon as Q2 2025 and 2026, respectively.

Power Supply Unit

For AC/DC, Infineon is addressing the growing power demand of AI



Power Supply Unit (PSU) solutions ranging from 3 kW to 12 kW and beyond

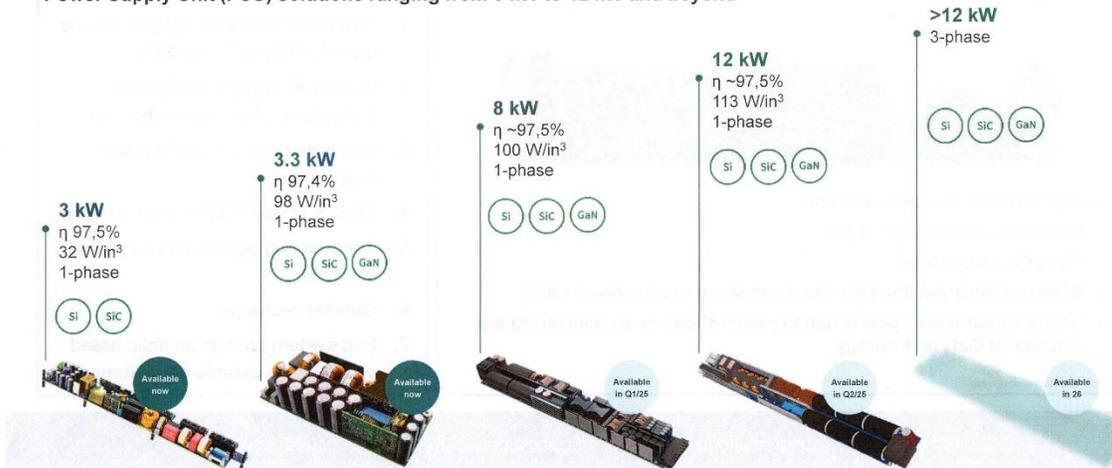


Fig. 2. Infineon will leverage all three semiconductor technologies to push power density in its server PSU reference designs to new heights.

In addition to discussing the company’s work in server power supplies, White also discussed its related development of a 12-kW partial battery backup unit (BBU), which can be used to support peak power shaving, and 48-V intermediate bus converters (IBCs), which will address requirements for higher reliability. As White observed, faulty IBCs are currently a notable source of system downtime.

He also highlighted the company’s dual-phase power modules which combine Infineon’s robust OptiMOS 6 trench technology, a chip-embedded package that enables superior power density through enhanced electrical and thermal efficiencies, and a new inductor technology to enable lower profile and therefore, true vertical power delivery. Through this “vertical power delivery,” these modules enable higher density in multiphase voltage regulator designs.

For more information on the Infineon developments discussed above, see the Datacenter and computing solutions [page](#).

Another semiconductor supplier, **Allegro Microsystems**, showed a number of power-related demos at their booth to highlight three new 48-V motor drivers, a 48-V buck regulator and a gate driver supporting SiC MOSFETs. The A89212, A89224 and A89333 motor drivers “are designed to address the thermal management needs of hybrid electric vehicles and AI servers. Complementing these drivers is the APM81815, a 48-V buck regulator designed for superior EMI performance in dual-voltage hybrid electric vehicles.” See Fig. 3.



Fig. 3. At the Allegro Microsystems booth, the A89224 was featured in a pump demo. The high level of integration of this chip, which won a Best in Show award for Embedded Computing Design, allows the motor drive to be embedded in the pump, as it was in this demo.

Meanwhile the AHV85311 is described as “a high-power isolated gate driver designed to accelerate the development of silicon carbide (SiC)-based power electronics.” The AHV85311 isolated gate driver was featured in a power train design example that delivers up to 10 kA using Wolfspeed’s SpeedVal kit. See Fig. 4 below.



Fig. 4. The AHV85311 isolated gate driver is combined with Wolfspeed’s SpeedVal kit in a design that delivers up to 10 kA. The gate driver is mounted on the blue daughter card.

According to the vendor, “this universal gate driver utilizing Power-Thru technology offers a compact, efficient solution that simplifies development and enhances overall system performance. By eliminating the need for an external transformer or isolated bias supply, it reduces size, noise and design complexity while boosting efficiency. Ideal for a range of applications, including onboard chargers (OBC), dc-dc converters, data center power supplies, solar inverters and industrial motors, it accelerates time to market with superior isolation characteristics and seamless integration for SiC power systems design.”

For more information, see the [A89212](#), [A89224](#) and [A89333](#) motor drivers, the [APM81815](#) buck regulator and the [AHV85311](#) gate driver product pages. Or contact [Daniel Torres](#) for LV motor drive or [Karsten Duechting](#) for high-voltage power.

Among the other power-related developments see at Electronica 2024 were Power Integrations' introduction of a power supply controller featuring what's described as the industry's first 1700-V gallium nitride (GaN) power switch and Pulsiv's proof of concept for a USB-C design offered as the industry's first to deliver 240 W from a single USB-C port. For more on these developments, see two product stories from the December issue of How2Power Today—"Multi-Output Switcher IC Pushes GaN To 1700 V" and "USB-C Adapter Design Demonstrates Feasibility Of 240 W From A Single IC".

For more on the many other power-related products from semiconductor, power supply and instrumentation companies that I observed at this year's Electronica, see my slide show "[Electronica 2024 Trade Fair In Pictures: Power Highlights](#)".



Reference

"[electronica 2024: The world's leading trade fair impressively demonstrates the industry's innovative strength,](#)"
Electronica post-show press release, November 15, 2024.