

ENGINEERING
TOMORROW

Danfoss

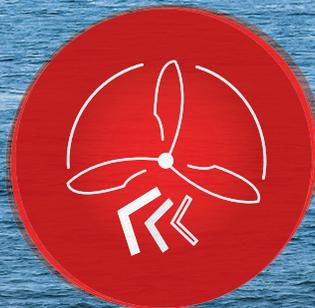
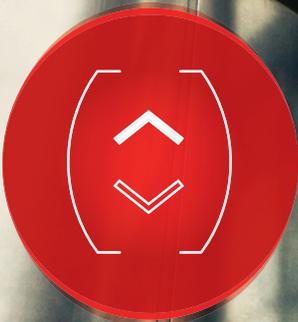
Power modules the way you want them. We stretch further to meet **your needs**

Close collaboration on reliable, innovative and customised power modules

Flexible

Product portfolio

Danfoss Silicon Power designs power modules that meet your exact requirements.



Danfoss Silicon Power is a global acting manufacturer of integrated power modules and power stacks with production in Germany that can be individually designed to meet your exact requirements. In addition to customer-specific solutions we design, manufacture and market a wide selection of plug-in compatible power modules as well as power stacks.

We cover an extensive range of business areas such as consumer appliances, industrial controls, automobile and mobile applications as well as medical equipment and renewable energy applications.

Draw upon an extensive knowledge

Through the years, Danfoss Silicon Power has gained an extensive knowledge that our customers can draw upon. We are located in Flensburg, and we invite you to visit us at our state-of-the-art facility. Collaborate with our dedicated teams in the modern and inspiring surroundings. And join us for a tour around the high-tech production facilities that combine an efficient plant layout with optimal working conditions for the people at Danfoss Silicon Power.

Optimum technology for all applications

Individual semiconductor assembly and substrate layout distinguish our customised power modules. They cover the full range from a few amperes to a maximum continuous current of more than thousands of amperes and blocking voltages from 30 volts to 1700 volts. As a further advantage, we are independent from any semiconductor wafer fabrication. We can choose the optimum semiconductor die for all applications.

Dedicated people make outstanding solutions

The task of designing outstanding integrated power modules requires highly qualified people that employ advanced development processes. At Danfoss Silicon Power, a high number of motivated and competent employees are dedicated to designing the optimum solutions with the aim of meeting our customers' exact requirements.

We strive to leave a green footprint

Our goal is to grow a healthy business that leaves the least possible impact on the environment. We are committed to manufacturing with the lowest possible consumption of energy, raw materials and other natural resources. Therefore, we are continuously adapting our quality and environmental management to the newest requirements as specified by the international ISO Standards. Today, we are certified according to ISO/TS 16949, ISO 9001, ISO 14001, ISO 50001 and OHSAS 18001.

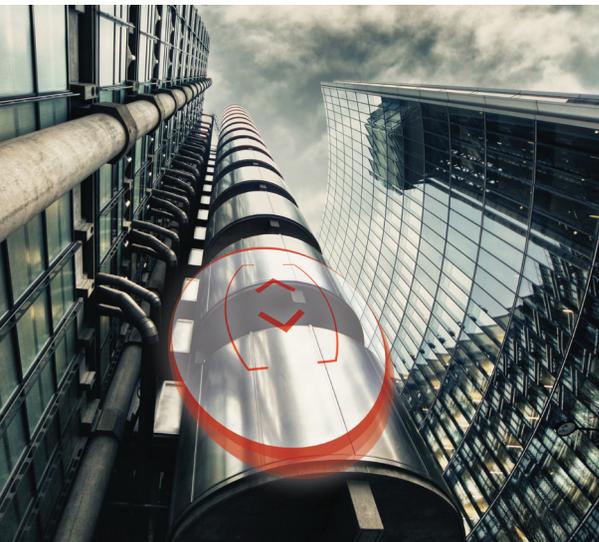
FOCUS AREAS

- Power module design
- Bonding and joining technologies
- Material sciences
- Advanced manufacturing processes
- Fast prototyping
- Reliability prediction and lifetime assessment
- Close customer collaboration on design
- Cost-effective and energy-efficient solutions
- Perfect match for dual-sourcing strategies



CORE COMPETENCIES

- Void free vacuum soldering technology controlled by x-ray
- Lead free solders for every soldering step
- All products are RoHS/REACH compliant
- Test lines for isolation, static and dynamic parameter tests
- All important processes are monitored by SPC
- Latest packaging technologies
- Full traceability
- Capacity to supply any quantity
- Semiconductor independent



Industrial applications

Danfoss Silicon Power offers a wide selection of integrated power modules for industrial applications. They are all fully configurable for such diverse applications as motor drives, solar, power supplies, welding equipment as well as off-road vehicles from golf cars to heavy-duty mining trucks.

Even manufacturers of medical equipment and UPS systems benefit from our wide-ranging expertise. Working with us, a team of application experts support you through the entire process from design and prototyping through testing and quality assurance to high-volume production.

Danfoss Silicon Power offers flexible module design and packaging configuration. Another advantage is our use of Si and SiC power semiconductors from the world's leading power semiconductor manufacturers. As a result, we are able to provide optimum solutions for virtually any industrial application.

Most of the power modules we deliver are customer specific, and we guarantee every customer the exclusive use of proprietary developments. However, we also design, manufacture and market a wide range of power modules, which are plug-in compatible to industrial standard. This makes us an ideal partner for corporations that employ dual-sourcing strategies. Either way, you benefit from cost-effective solutions that contribute unique features and capabilities to your system designs.

Our process management and design process is fast and flexible. Usually, we are able to deliver the first prototypes within a few weeks. We can start high-volume production on short notice integrating our deliveries seamlessly into your existing supply chains.





Wind power applications

Wind turbine often operate 24/7 and are exposed to extreme weather conditions. Wear is enormous and breakdowns are exceptionally expensive. This calls for rugged equipment designed for constant heavy loads.

Standard power conversion components – power modules and stacks – are not suitable for wind turbines. To function, they must be overrated or heavily serviced during the wind turbines' lifetime. In either case, standard components will increase the cost of power conversion dramatically.

Customised power modules designed by Danfoss Silicon Power to meet your application's actual mission profile will lower the cost of ownership. They will help to keep the turbines spinning and reduce the wind turbines lost production factor.

In a Danfoss power module, each component is selected to suit the specific requirement, right from the density and type of semiconductors to the material of the base plate. And yet this comes in standard housing and with flat base plates, so you do not have to modify the turbines' power-conversion system.

Danfoss power stacks give you the same benefits of customisation. What is more, they employ the innovative ShowerPower® cooling technology. This makes the power stacks smaller and more reliable and increases their efficiency. Power stacks are built on a modular concept, using Danfoss' experience in electronics that spans five decades.



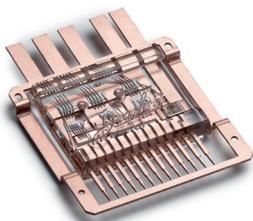


Automotive applications

New and challenging applications in future automobiles require innovative, reliable and cost-effective solutions. Little wonder that Danfoss Silicon Power is a leading partner for the automotive industry.



The market is hot for hybrid and battery-electric cars, electric power steering, integrated starter-alternators, power management and various high-power body electronics.



Do you need multi-chip semiconductor modules that meet your requirements exactly? That is what you get when you collaborate with Danfoss Silicon Power. Draw on our unique capabilities within design and manufacturing of customer-specific solutions.

Our experience in manufacturing highly reliable power electronic components spans close to three decades. We provide solutions for the most demanding power conversion applications in the automotive industry. Danfoss maintains a number of long-term partnerships with leading Tier-1 and OEM customers.



Collaborating with us, you benefit from our fundamental insight to automotive applications, mission profiles, load and temperature cycles. We know how to transfer insight into reliable and cost-effective power modules.

Our cooling concept ShowerPower® is an example of our proactive approach. As currents and voltages increase, ShowerPower® helps you keep your semiconductors cool with direct liquid cooling that delivers excellent thermal management for customer-specific, minimum-loss, minimum-space power modules. Odd-shape non-planar applications are readily applicable as well.



Our project management and design process is fast and flexible. We can deliver first prototypes in just a few weeks and start high-volume production on short notice. Delivery of power modules is integrated seamlessly into your supply chain, and you are guaranteed the exclusive use of proprietary developments.



ShowerPower®

ShowerPower® is a concept for direct liquid cooling of power modules. It offers superior thermal performance at a very low cost. With ShowerPower® it is possible to cool standard flat base plate power modules using simple low cost plastic parts. Odd-shape non-planar applications are readily applicable as well.

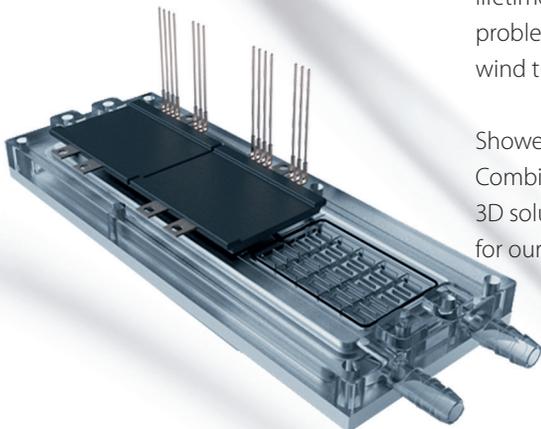
There are three key benefits to the ShowerPower® concept:

1. It eliminates the thermal interface material (TIM) that is normally used between power modules and heat sink/cold plate.
2. It provides homogenous cooling that eliminates temperature gradients across large power modules.
3. It reduces cost and increases component reliability.

Homogenous cooling is essential in many applications. Especially in power modules that comprise several power semiconductors that are switched in parallel and thus need the same operating temperatures. Homogenous cooling is particularly beneficial in wind turbine generators where huge assemblies of large power modules are running in parallel.

Elimination of the TIM leads to very high reliability. This is especially important for long lifetime applications where pump-out and dry-out effects of TIM are known to be very problematic. Consequently, the successful implementation of ShowerPower® in several wind turbine generator applications has been very profitable.

ShowerPower® offers the opportunity for easily scalable power stage solutions. Combined with transfer moulded power module technology, ShowerPower® enables 3D solutions that offer the highest power density possible. This holds great potential for our customers.



About the Danfoss Group

Danfoss was founded in 1933 and is Denmark's largest industrial group with an annual turnover of more than 4.5 billion Euro. Danfoss is a global enterprise, created by the efforts of dedicated people, with a reputation for its advanced technology in products and processes and its awareness of environmental issues.

Danfoss has modern production facilities on four continents, sales companies and representatives in more than 100 countries and 24,000 employees worldwide. The group is a world leader in the research, development and production of mechanical and electronic components for several industrial segments.

As a result, Danfoss today sets the standard within many areas of component technology. The products and services of Danfoss are used for vital functions in homes, at workplaces and in institutions – in fact in every human environment.

Danfoss is a committed group of people with meaningful working lives in an environment supporting personal development and commitment, individually as well as collectively. Visit us at www.danfoss.com



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