

POWER ELECTRONICS FOR DC FAST CHARGERS



EV Chargers



Performance Range

As electric vehicles become widespread, so must the infrastructure to charge them. One of the main requirements for the widespread use of electric vehicles is an accessible EV charging infrastructure. Governments and industries worldwide are preparing to invest in charging infrastructures.

Availability and costs are the key to success in the fast growing EV Charger market. As the specialist in power electronics, we use state-of-the-art topologies featuring standard components, guaranteeing both excellent efficiency and availability. Semikron Danfoss offers a comprehensive portfolio of products that meet the needs of fast charge equipment from as little as 8kW up to the megawatt range.





- **Modular Power Blocks**
- **Passenger EV Chargers**
- **Bus Chargers**

Compact designs and high power density

High reliability to reduce downtime

Forward-looking topologies

High efficiency

Products

PowerCell

SEMITOP E1/E2

SEMiX 5

SEMiX 3 Press-Fit

SEMITRANS

SKiM 63/93

SEMIPACK

Drivers

Power Electronic Stacks



PRODUCT HIGHLIGHT

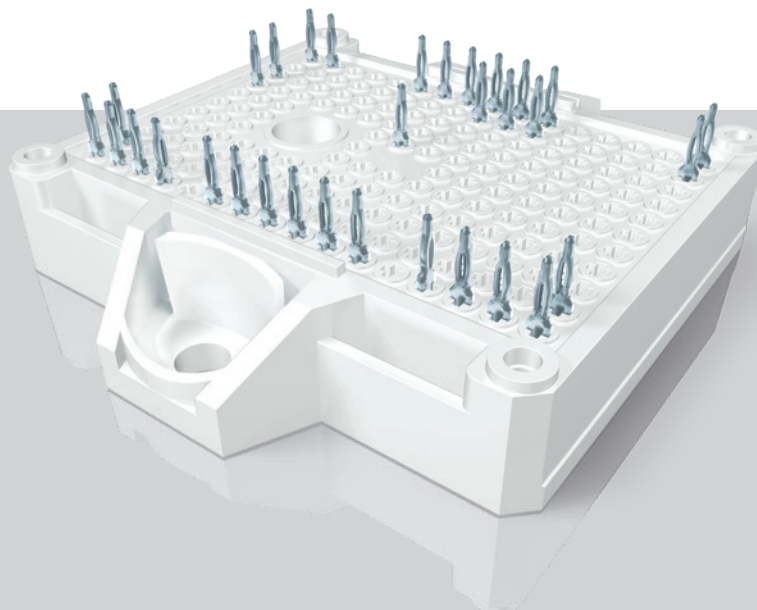
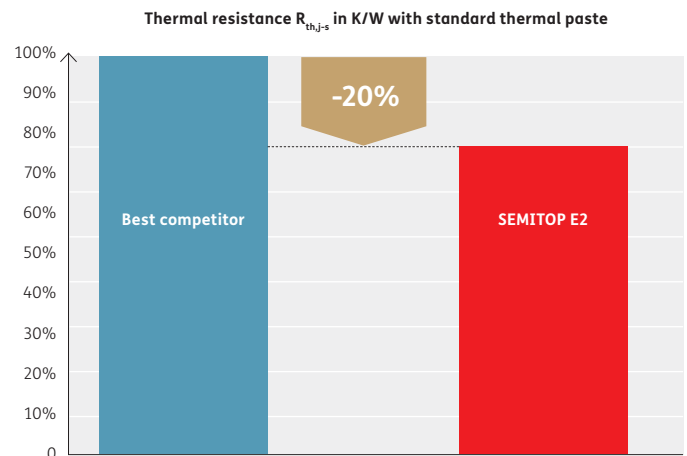
Industrial Standard Combined with Superior Performance

DC Fast Chargers require a power dense PFC, DC/DC, and output rectifier, all available in the SEMITOP E1/E2 packages. With a low inductance design, fast switching Si and SiC chips may be used to their full potential. Achieve supply chain safety with this industrial standard module in a wide array of topologies.

Key features

Low inductance package
Multiple sourcing down to chip level
Optimised footprint
Flexible architecture
2-screw concept
Press-Fit terminals
12mm module height
No baseplate

The thermal resistance is up 20% lower than the closest competitor using standard thermal paste. Using High Performance Thermal Paste (HPTP), a further 25% reduction is possible.



SEMITOP® E1/E2

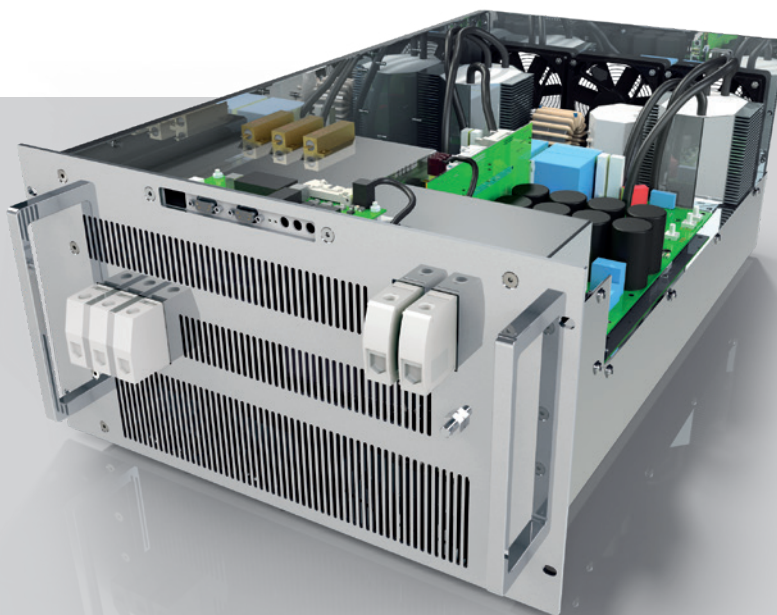
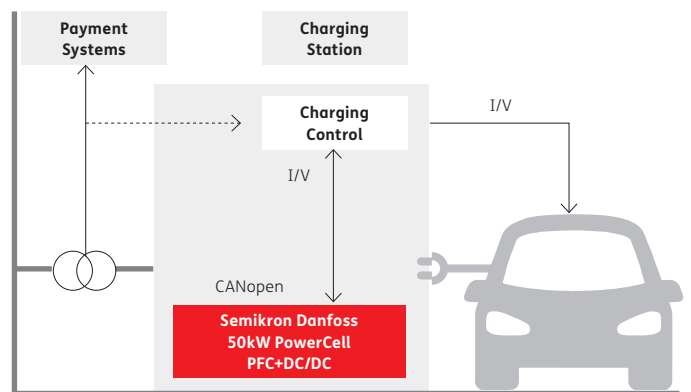
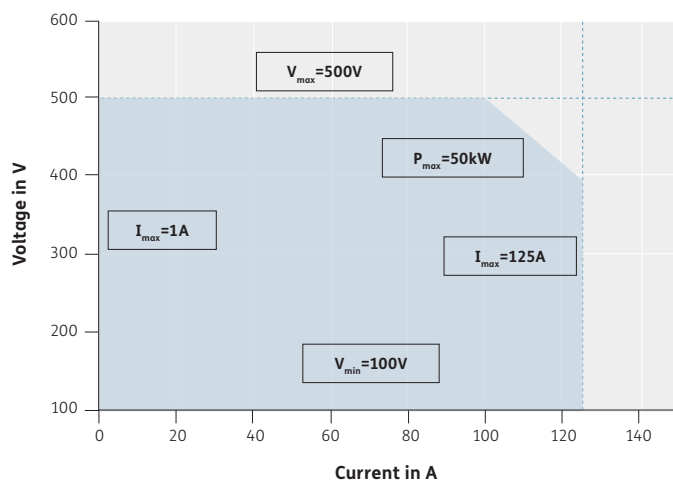
8kW up to 120kW

Modular and Flexible Power for Your Charger Portfolio

The 50kW PowerCell is a full power converter including PWM controller and filters. With a modular design, the PowerCell may be paralleled to 350kW and beyond. The output voltage can seamlessly change between 500V_{DC} and 1000V_{DC} to meet any power requirement in the market.

Key features

50kW rated power
500V _{DC} or 1000V _{DC} Isolated output
Scalable for high power charging
CANopen communication protocol
Easy integration and maintenance – all connections at the front
Parallel operation for high power charging
Integrated transformer for safe galvanic isolation



PowerCell

50kW up to 350kW



Product Portfolio

Power Modules



SEMIPACK® | 800V up to 2200V

Bipolar modules from the market leader

6 housing sizes SEMIPACK 1 to 6

800V to 2200V: 20A to 1360A

Semikron Danfoss diode and thyristor chips

Diode and thyristor in un-, half- and full-controlled topologies

Different technologies for certain packages: high reliability pressure contact or cost-effective wire bonded modules

Enhanced isolation voltage of 4.8kV/1s available on request

SiC Schottky Diode modules up to 300A



SEMIX® 3Press-Fit | 100kW - 400kW

Exceeding the standard for superior performance

Industry standard press-fit design with 17mm high housing height

650V / 1200V / 1700V IGBT: 225A to 700A
1200V Hybrid SiC: 600A

Half-Bridge and split NPC topologies

Direct driver assembly

Available with integrated shunt resistor



SEMIX® 5 | 50kW - 150kW

Extended standard for superior thermal and dynamic performance

Industry standard baseplate module

650V / 1200V / 1700V IGBT: 100A to 400A

Sixpack, NPC, TNPC, PFC, and half-controlled Bridge Rectifier topologies

Optimised module layout for maximum heat transfer

Enhanced thermal and electrical diode performance



SEMITRANS® | 50kW - 200kW

The proven power electronics package

Robust industry standard package for multiple sourcing in 6 housing sizes

600V / 650V / 1200V / 1700V IGBT:

25A to 900A

1200V SiC: 125A to 500A

Half-bridge, single switch and brake chopper topology

Multiple IGBT sources

Increased power range in 62mm thanks to portfolio extension in 1200V and 1700V half-bridges:

1200V / 600A

1700V / 500A



SKiM® 63/93 | 50kW - 150kW

High reliability design using sinter technology

Power module in sixpack configuration with three separate half-bridges

650V / 1200V / 1700V IGBT:

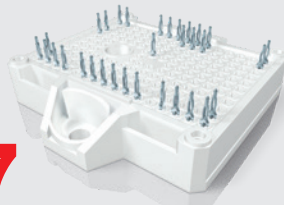
300A to 900A

1200V Hybrid SiC: 450A

Sixpack and buck/boost topologies

Low inductance design thanks to symmetrical layout

Solder-free module and driver PCB mounting



SEMITOP® E1/E2 | 8kW - 120kW

Extended standard for superior thermal and dynamic performance

Baseplate-less industry standard power module in two housing sizes

Press-fit pins for solder-less connection to PCB

650V and 1200V: 10A to 250A

Three-level, H-Bridge, Half-Bridge, Vienna and rectifier topologies

Optimised mounting concept and pre-applied High Performance Thermal Paste provide lowest thermal resistance in class

Soft and fast switching 650V IGBT S5 and H5

Hybrid and full SiC modules up to 1200V/250A



Power Electronic **Stack Platforms** for **Fully Qualified** Inverter Assemblies Tailored to Your **Specific Needs**

Standard Stacks

Our Power Electronic Stacks enable our customers to succeed in dynamic markets and meet any global challenge. We deliver Rectifier-, IGBT- and SiC-based stacks for AC voltages from 380V to 690V. Our standard stacks cover a output current range from 70A to 4000A.

Water-Cooled IGBT Stacks

SKiiPRACK
SEMIKUBE MLI

Air-Cooled IGBT Stacks

SEMIKUBE
SEMIKUBE SlimLine

Diode/Thyristor Stacks

SEMISTACK CLASSIC B6U/B6C/W3C

Customised Stacks

In addition to standard stacks, Semikron Danfoss has vast experience in developing customer-specific solutions. Engineers are available in our stack centres around the globe to offer such solutions by adapting existing platforms or designing customized converters.

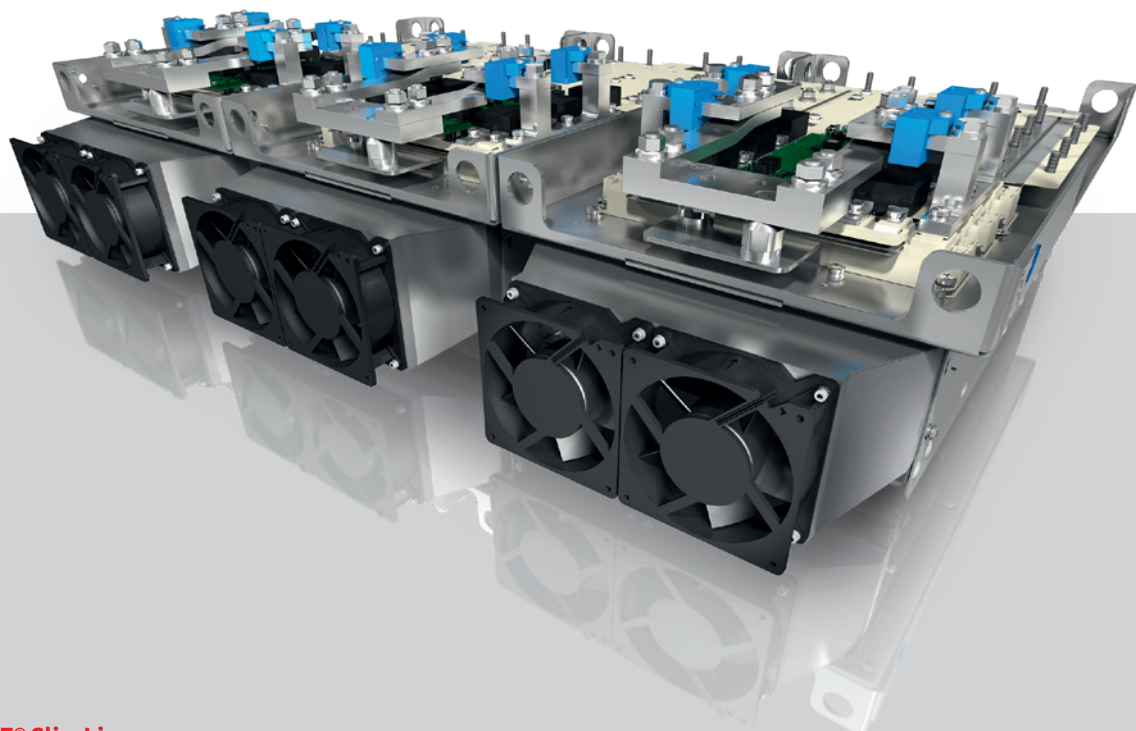
Four key factors for your success

Shortest time to market

Cost savings in R&D, production and qualification

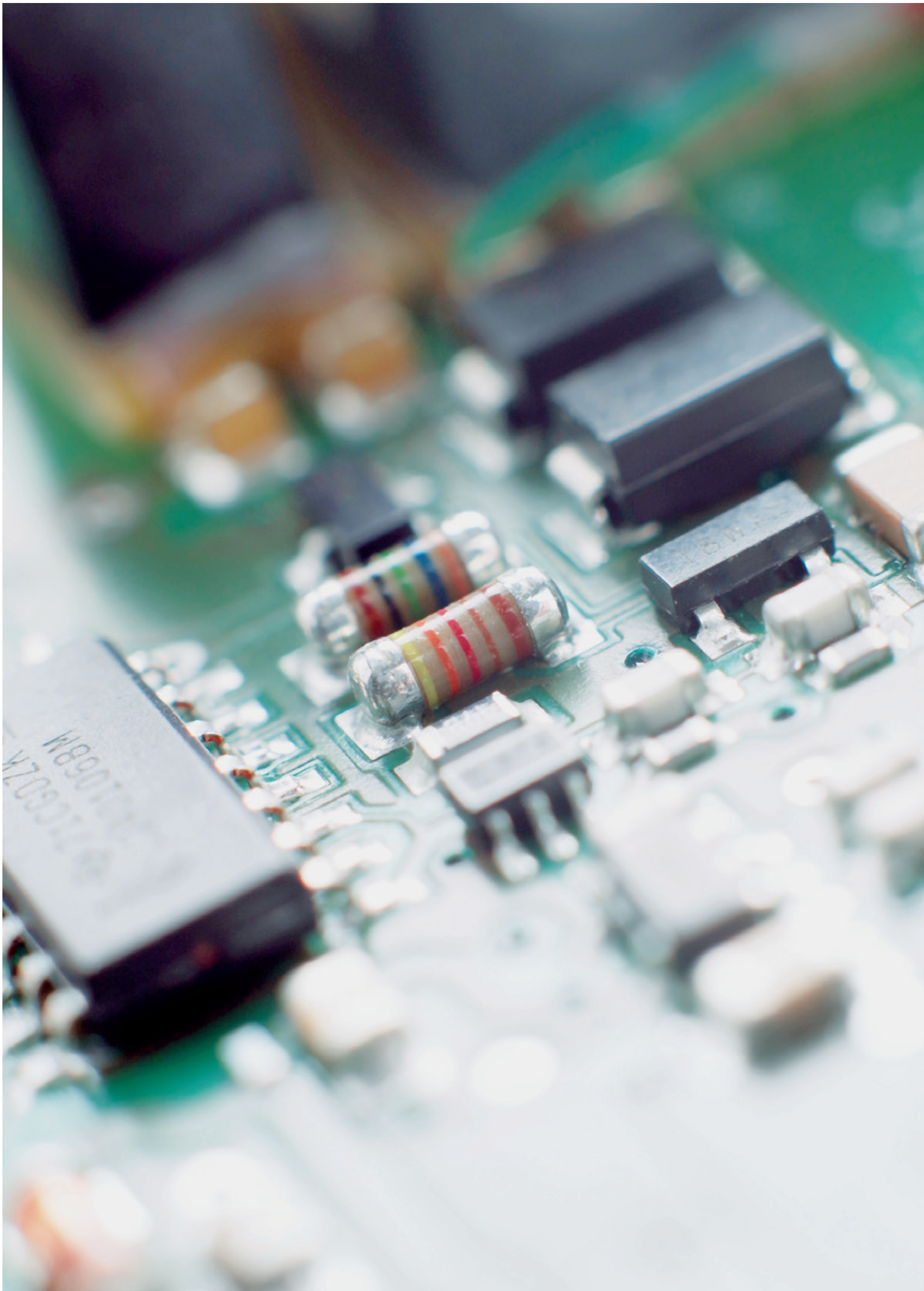
Global Semikron Danfoss stack production footprint

Highly experienced engineering team



SEMIKUBE® SlimLine

Air-cooled IGBT Power Stack



Product Portfolio IGBT Driver

Above the Standard

The unique product portfolio enables access to all established industries with a one-stop solution that combines state-of-the-art power modules and driver electronics.

Our IGBT drivers are available as two-channel driver cores suitable for any standard semiconductor power module or as Plug-and-Play solutions, which perfectly fit the SEMiX 3 Press-Fit, SEMITRANS 10 and compatible modules.

Cost Efficient

Achieve outstanding system compactness and create space- and cost-effective inverter designs with our drivers, utilizing highly integrated ASIC technology. Isolated DC-link voltage and temperature sensor signals at the driver's interface along with over-voltage and over-temperature lockout also help to reduce system costs significantly.

Time Efficient

More than 25 years of experience in developing innovative IGBT driver electronics enables Semikron Danfoss to have a short-term solution for almost every challenge related to driver electronics. Our Plug-and-Play drivers connect directly to most common standard IGBT modules. The IGBT driver cores fit with the adapter boards or application sample PCBs. For the latter, Semikron Danfoss shares the entire manufacturing data to decrease development time, speeding up the time-to-market.

Reliable

Our SKYPER and SKHI are well-known, highly robust and reliable IGBT driver solutions under demanding environmental conditions. Over many years of field operation experience the proprietary IGBT driver technology has been relentlessly developed further. This technology sets new standards for the essential features of safe gate control, reliable gate protection and reinforced insulation.

Key factors

Reinforced insulation for signal and power transmission

Two-channel driver

Up to 1700V transients

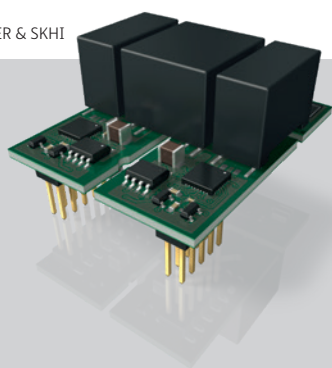
Up to 1500V continuous DC bus voltage

8Apk to 35Apk per channel

1W to 4.2W peak per channel

Suitable for multi-level topologies and Generation 7 IGBT

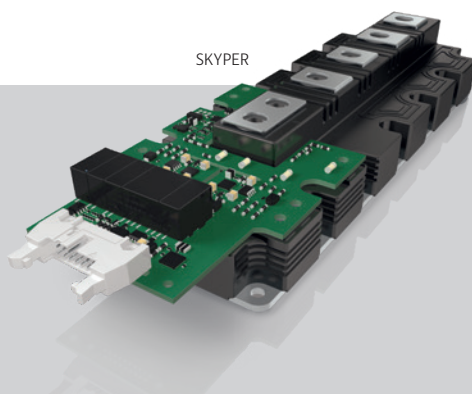
SKYPER & SKHI



Driver Cores

Two-channel driver cores for PCB integration with Semikron Danfoss ASIC technology and integrated safety functions

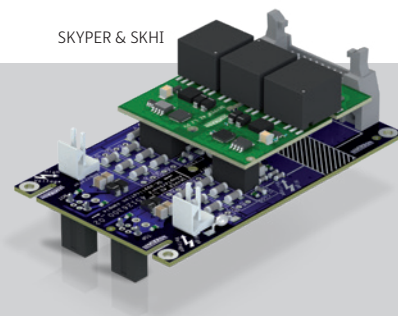
SKYPER



Plug-and-Play Driver

Two-channel drivers for direct module mounting with electrical or optical interface

SKYPER & SKHI



Adapter Board and Application Samples

Adapter boards for driver core mounting to Semikron Danfoss IGBT and SiC modules



Thermal Interface Materials

Stay Cool – Heat Dissipation is Our Job

Semikron Danfoss was the first power module manufacturer on the market to offer power modules with pre-applied thermal interface material. With more than two decades of field experience and more than 17 million pre-printed modules in the field, benchmarks are being set. The modules with pre-applied TIM are printed in a clean environment on an automated and SPC controlled silkscreen and stencil printing line.

For each requirement, we offer the right choice of material. In addition to the standard silicone thermal grease, phase change materials and high performance thermal paste with improved thermal performance are also available.

Semikron Danfoss offers either thermal grease or phase change materials depending on customer requirements (e.g. performance increase, reduced handling effort) and module type (with or without baseplate). Phase change materials have a solid consistency at room temperature, fully exploiting the advantages a non-smearing TIM layer offers, with no drawbacks. Baseplate-less modules, on the other hand, usually require a lower-viscosity material to help improve robustness during assembly. Here, thermal grease is the preferred solution.

Key features

Increased productivity thanks to reduced handling costs and improved logistics

Low thermal resistance with optimised TIM layer thickness

Improved lifetime and reliability

Improved assembly robustness

Modules can be shipped directly to the assembly line without any additional treatment processes

Lower overall costs

Portfolio

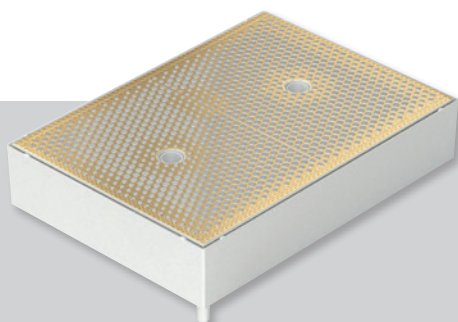
P8: Phase Change Material for highest performance

HT: Phase Change Material for highest sink temperature

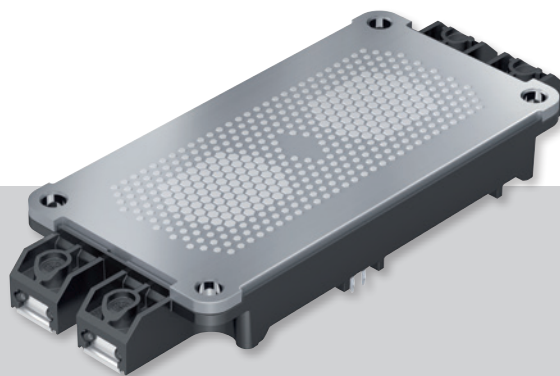
HPTP: High Performance Thermal Paste

P12: Standard Thermal Paste

HP-PCM: High Performance Phase Change Material



**Baseplate-less
Power Modules**



**Baseplate
Power Modules**

Semikron Danfoss is a global technology leader in power electronics. Our product offerings include semiconductor devices, power modules, stacks and systems. In a world that is going electric, Semikron Danfoss technologies are more relevant than ever. With our innovative solutions for automotive, industrial and renewable applications we help the world utilize energy more efficiently and sustainable and thus to significantly reduce overall CO₂ emissions – facing one of the biggest challenges today. We take care of our employees and create value for our customers by investing significantly in innovation, technology, capacity, and service to deliver best-in-industry performance and for a sustainable future.



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Note: All information is based on our present knowledge and is to be used for information purposes only. The specifications of our products may not be considered as an assurance of component characteristics.

