SEMIKRON
innovation + service

Wind Energy

Power Electronics for Wind Turbines

PERFORMANCE RANGE

YAW & PITCH DRIVES

5kW - 100kW

SEMIKRON's portfolio includes a wide range of products for wind energy applications, from small to medium power modules for pitch and yaw drives to high power components for multi-megawatt power converters. From individual modules including dedicated drivers to high power SKiiP 4 IPMs and ready-to-use power electronic stacks – SEMIKRON has the solution.

The demand for reliable spare parts to ensure continuous energy harvesting until the end of the turbine life is becoming increasingly important. SEMIKRON has a broad portfolio of products to ensure reliable operation and maintenance for wind turbine converters.

SEMIKRON products offer maximum reliability for on- and offshore wind turbines both in industry standard packages and in high power SKiiP 4 IPMs and power electronic stacks.

- Compact designs and high power density
- High peak overload capabilities
- Multiple axis in one drive or modular drives with common DC bus
- Highest reliability and lifetime

Products

- SEMITOP E1/E2
- MiniSKiiP
- SEMiX 6 Press-Fit
- SEMIPACK
- Drivers

MAIN CONVERTER

1MW - 15MW

Compact designs and high power density

High reliability in harsh environments
up to $1500V_{DC}$ and $1000V_{AC}$

Products

SEMiX 3 Press-Fit

SEMITRANS

SEMITRANS 10

SEMITRANS 20

SKiiP 3/4 IPM

Drivers

Power Electronics Stacks

SPARE PARTS & SERVICE

1MW - 15MW

SEMIKRON advanced power modules
for maximum reliability and efficiency

Customized stacks for dedicated wind turbine converters

Customized heatsinks for IPMs (SKiiP)
for integration into converters

Products

SEMiX

SKiM 63/93

SEMITRANS

SEMIPACK

SKiiP 3/4 IPM

Drivers

Power Electronic Stacks

Operation & Maintenance

Wind Turbine O&M

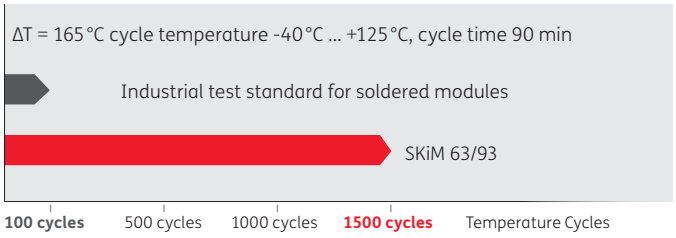
Today, over 400,000 wind turbines are in operation in the field world-wide. The demand for reliable spare parts to ensure continuous energy harvesting until the end of the turbine life is becoming increasingly important. SEMIKRON has a broad portfolio of products to ensure reliable operation and maintenance for wind turbine converters. From individual power modules, IPMs and drivers to dedicated, customized retrofit stacks – SEMIKRON has the right solution!

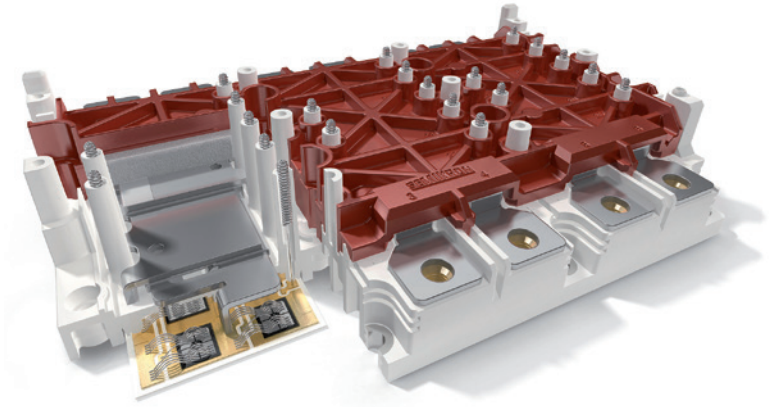
Benefits

SEMIKRON offers a broad portfolio with industry standard power modules such as the SEMITRANS and SEMiX family. It includes SKiiP IPMs with customized coolers to fit into your wind turbine converter. The range is rounded off with highly reliable stacks based on solder-free SKiM 93 modules featuring sintered chips. This technology allows for optimised thermal conductivity from chip to heatsink and runs the chip at about 20°C lower than the OEM stack. SEMIKRON also offers newly designed driver boards based on the latest SEMIKRON ASIC technology with digital signal transmission and additional protection functions.

Key features

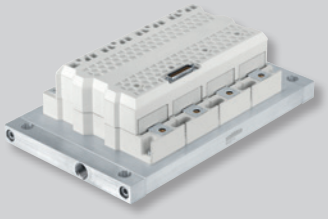
- Broad portfolio of industry standard modules
- SEMIKRON advanced power modules for maximum reliability and efficiency
- Customized stacks for dedicated wind turbine converters
- Customized heatsinks for IPMs (SKiiP) for integration into converters
- Drivers and adapter boards with highly reliable SEMIKRON ASIC technology



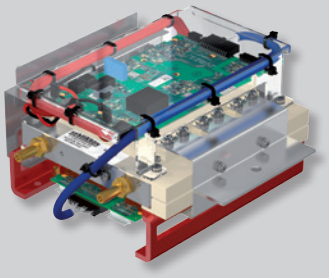


SKiM 63/93

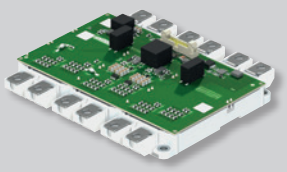
Industry standard power modules



Intelligent power modules



Customized power electronic stacks



Drivers and adapter boards


GENERATION
IGBT

Technology Highlight - New Benchmark Generation 7 IGBT

Pushing Performance in 3-Level Topologies

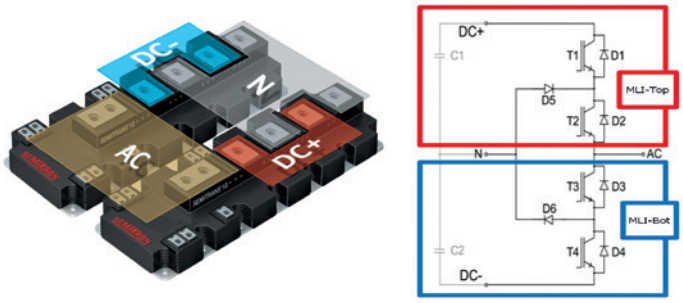
Whenever power quality and efficiency are driving factors in power electronics applications, 3-level topologies are the key. This is especially true for renewable energy applications where the combination with the latest Generation 7 IGBTs sets new benchmarks.
SEMITRANS 10 MLI enables wind turbine converters to reach voltage ranges up to 1000V_{AC} (1500V_{DC}) in 3-level NPC topology and increases converter efficiency.

For ANPC topologies, SEMIKRON's new SEMITRANS 20 power module combines lowest stray inductance, highest power density and latest Generation 7 IGBTs to set a new benchmark.

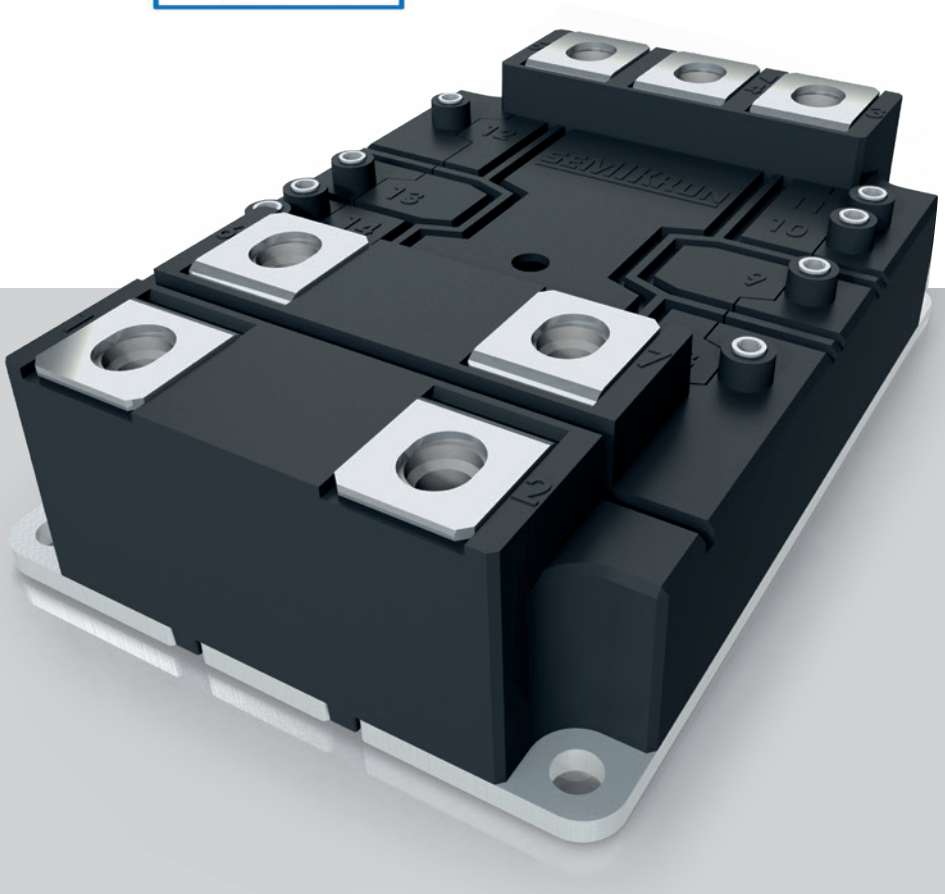
Its design based on standard half-bridge topology allows an easy ANPC setup and a low inductance DC-link connection.

Key features

- Reduced system cost thanks to 3-level topology
- Up to 1.5MW without paralleling
- Lower switching losses thanks to 1200V IGBT
- Generation 7 IGBTs
- Lower THD means lower filter requirements
- Reduced cable diameters or cable losses
- Reduced cooling requirements



Compact 1.5MW phase-leg
with SEMITRANS 10 MLI

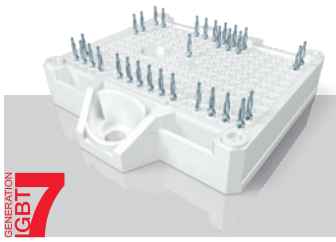


SEMITRANS®20

500kW up to 2MW

Product Portfolio

IGBT Modules



SEMITOP® E1/E2

0.4kW up to 30kW

Exceeding the standard for superior performance

PCB based and press-fit connected baseplate-less industry standard power module in two housing sizes

650V and 1200V: 10A to 100A
IGBT 4 and IGBT T7

CIB and sixpack topologies

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

Increased power density thanks to Generation 7 IGBT T7

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

MiniSKiiP®

0.4kW up to 110kW

Solder-free spring technology for minimum assembly time

Full family of power modules up to 110kW

650V / 1200V / 1700V IGBT: 4A to 400A
1200V Hybrid SiC: 50A to 150A

Comprehensive set of topologies: CIB, sixpack, twelvepacks, H-bridge, half-bridge, 3-level, bridge rectifiers with brake chopper

Easy and flexible PCB routing without pin holes

SEMiX® 6 Press-Fit

15kW up to 75kW

The complete press-fit standard

PCB based and press-fit based industry standard baseplate power module.

650V, 1200V IGBT 4 and IGBT M7:
75A to 250A
1600V and 2200V rectifier diodes:
200A and 300A

Bridge rectifier (B6U),
CIB and sixpack topologies

Latest press-fit pin technology for optimal assembly and connection reliability

IGBT 4 and Generation 7 IGBT M7 ensure high supply chain safety

SEMiX®3 Press-Fit

55kW up to 400kW

Exceeding the standard for superior performance

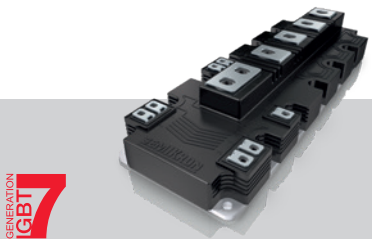
Industry standard press-fit design with 17mm high housing

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



SEMITRANS® 10

500kW up to 2MW

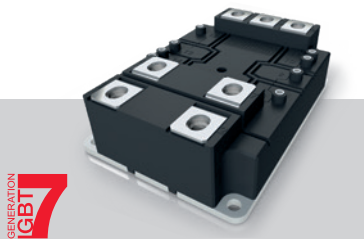
Robust high power module

Established high power module package

1200V IGBT: 1400A
1700V IGBT: 1000A and 1400A

Half-bridge and split NPC topologies

Latest Generation 7 IGBTs for for 3-level NPC modules



SEMITRANS® 20

500kW up to 2MW

The new standard in high power

The latest industry standard power module for high power applications

1200V IGBT: 1400A
1700V IGBT: 1000A and 1200A

Half-bridge topology

Low stray inductance,
high power density package

Increased reliability thanks to the latest packaging technology

Intelligent Power Modules – IPMs

For Maximum Reliability

The SKiiP IPM product line sets a benchmark for high performance and robust inverter designs. Both SKiiP 3 and SKiiP 4 feature high power densities combined with flexible cooling options such as air or water cooling, also with customized heatsinks. Reliable driver technology, integrated current sensors and comprehensive protection functions complete the IPM design.

SKiiP 3 has propagated widely through the industrial drive segment. With its sixpack or half-bridge topologies, it covers a current range from 500A up to 2400A.

Key features

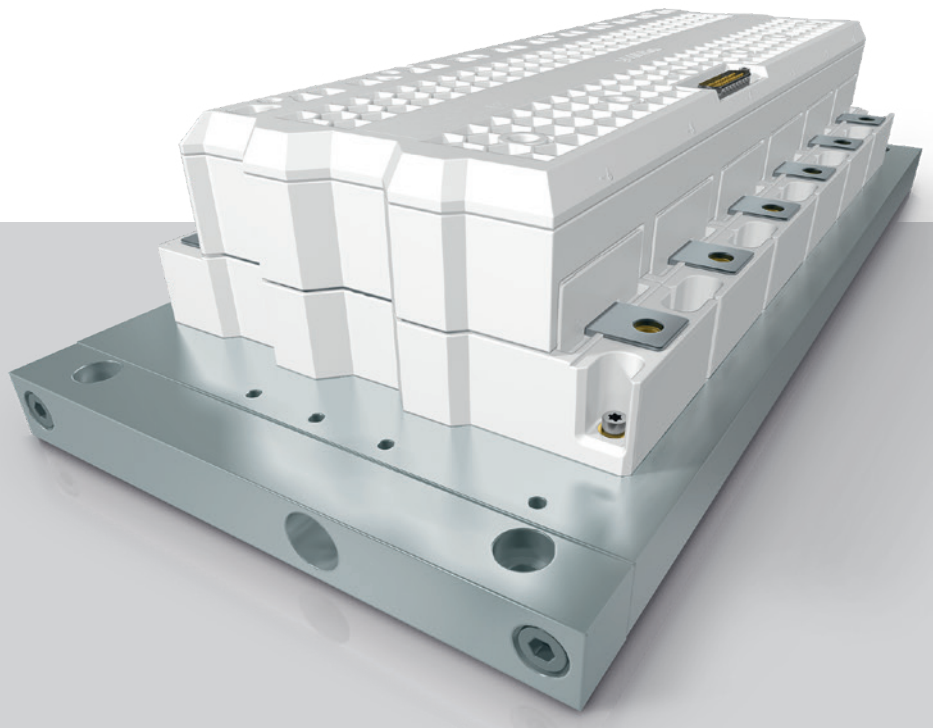
1200V and 1700V
Half-bridge and sixpack
500A to 3600A
Flexible cooling options: air, water or customized cooling options, high performance cooling, single and double side mounting water coolers
Paralleled operation for even higher output power possible

The SKiiP 4, available in half-bridge topology, has been optimized for highest power cycling requirements and covers the higher power range up to 3600A.

To ensure highest reliability and service life, the power circuitry is 100% solder-free. Sinter technology as die attach replaces the solder layer, which usually causes the limitation in lifetime. Hence, sintering improves power and thermal cycling capability.

The integrated gate driver in the SKiiP 4 has set new standards in terms of reliability and enhanced functionality through its CAN interface. The digital driver guarantees safe isolation between the primary and secondary side for both switching signals and parameter measurement. The CAN interface allows setting the SKiiP 4 configuration parameter and reading application parameter.

High performance cooling (HPC) technology has been introduced providing approximately 25% more output capability compared to standard water cooling. A double side mounting HPC water cooler is also available and enables an even higher power density.



SKiiP®4

500kW up to 3MW

The most powerful IPM in the market


WLL 650/1300 kg

Power Electronic Stack Platforms

Fully Qualified Inverter Assemblies Tailored to Your Specific Needs

Standard Stacks

SEMIKRON's Power Electronic Stacks enable our customers to succeed in dynamic markets and meet any global challenge. We deliver IGBT- and SiC-based stacks for AC voltages from 380V to 1000V. Our standard stacks cover an output current range from 70A to 1400A. Our new SEMIKUBE MLI brings all benefits of 3-level topologies in an off-the-shelf product. It includes all safety and sensing measures for your fast time-to-market.

Water-Cooled Stacks

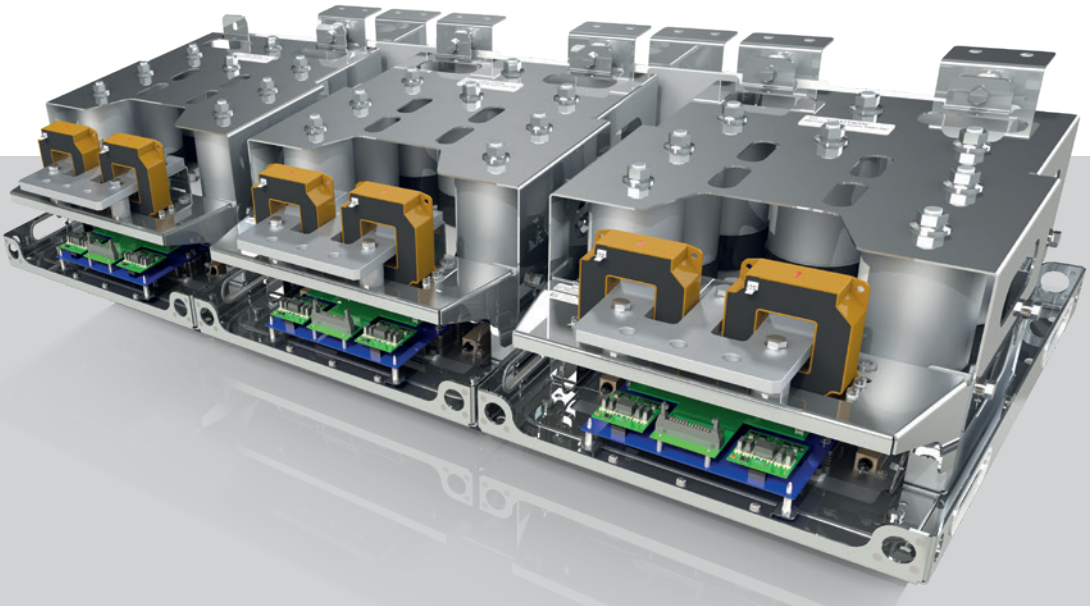
SEMIKUBE MLI
SEMISTACK RE

Customised Stacks

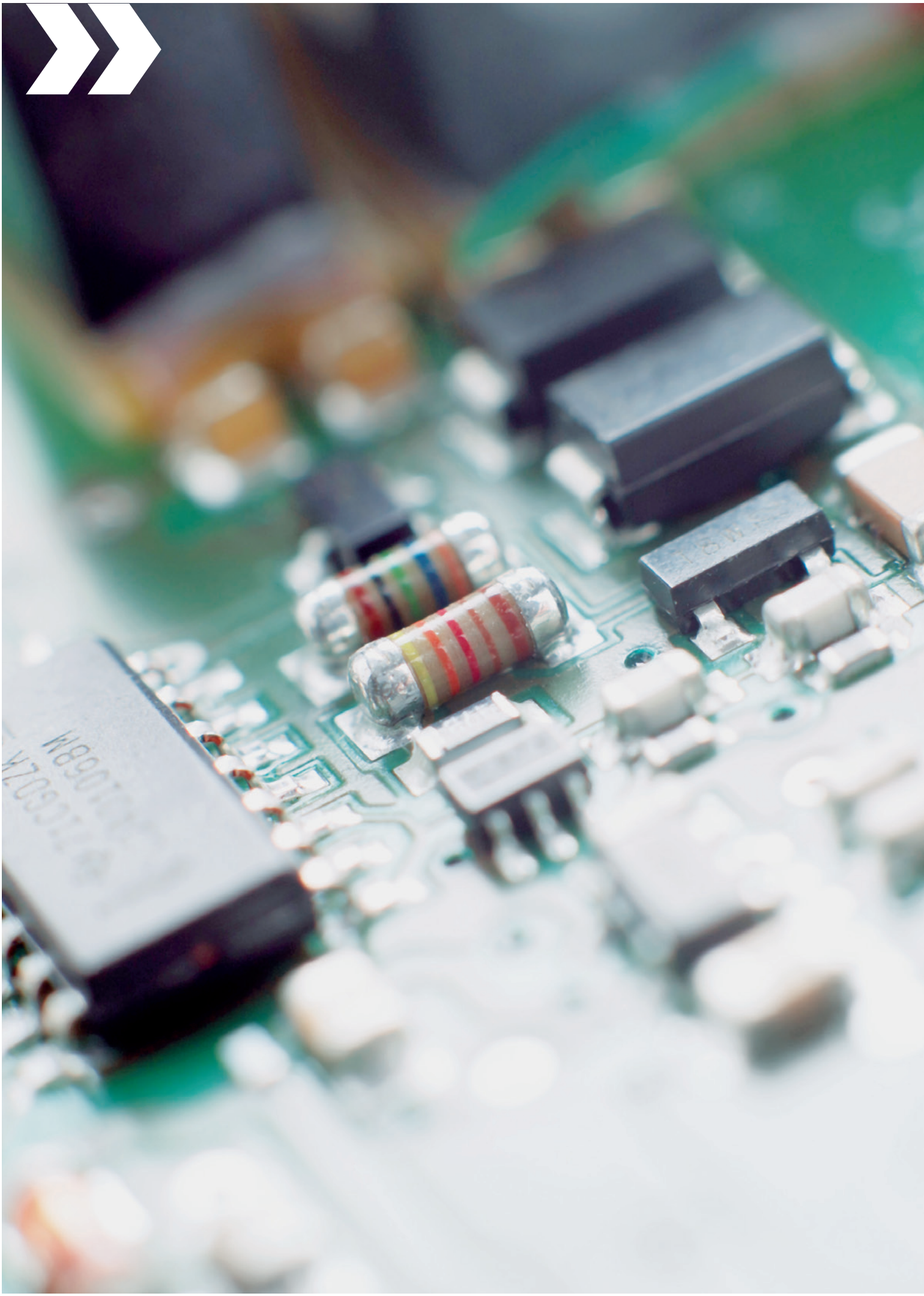
In addition to standard stacks, SEMIKRON has vast experience in developing customer-specific solutions. Engineers are available in our stack centres around the globe to offer specific solutions by adapting existing platforms or designing customized converters.

Four key factors for your succes

- Shortest time to market
- Cost savings in R&D, production and qualification
- Global SEMIKRON stack production footprint
- Highly experienced engineering team



SEMIKUBE®MLI
Water-Cooled 3-Level NPC Stack



Product Portfolio IGBT Driver

Above the Standard

SEMIKRON's 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.

SEMIKRON's 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 SEMIKRON's 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 to have a short-term solution for almost every challenge related to driver electronics. SEMIKRON's Plug-and-Play drivers connect directly to most common standard IGBT modules. The IGBT driver cores fit with SEMIKRON's adapter boards or application sample PCBs. For the latter, SEMIKRON shares the entire manufacturing data to decrease development time, speeding up the time-to-market.

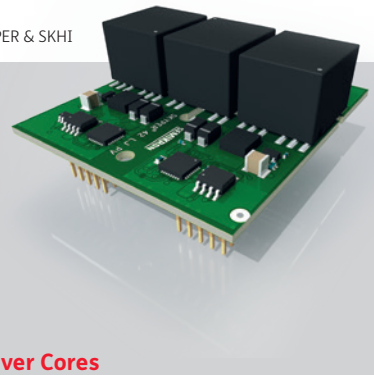
Reliable

SEMIKRON's 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

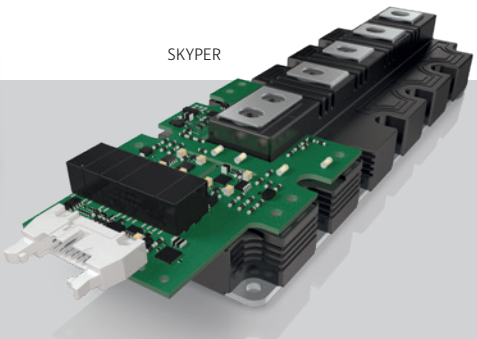
SKYPER & SKHI



Driver Cores

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

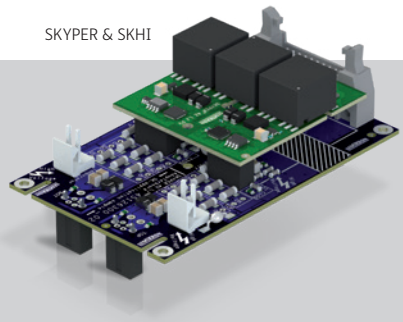
SKYPER



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 IGBT and SiC modules

Thermal Interface Materials

Stay Cool – Heat Dissipation is Our Job

SEMIKRON 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, SEMIKRON offers 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.

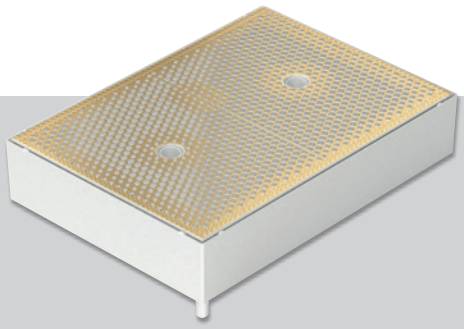
SEMIKRON offers either thermal grease or phase change materials depending on customer requirements (e.g. performance increase, reduced handling effort) and module type (with or without baseplate). Phase change materials have a solid consistency at room temperature, fully exploiting the advantages a non-smearing TIM layer offers, with no drawbacks. Baseplateless 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

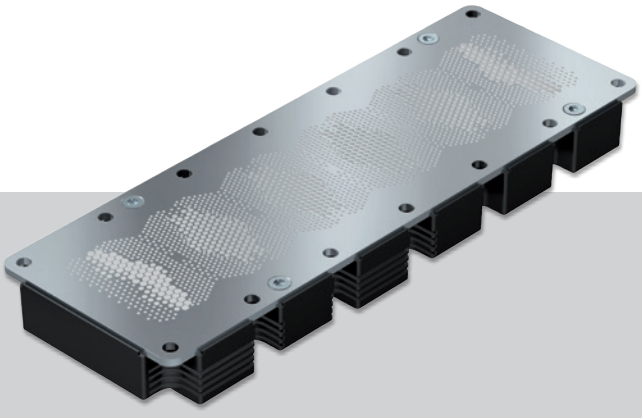
- Increased productivity thanks to reduced handling costs and improved logistics
- Low thermal resistance with optimised TIM layer thickness
- Improved lifetime and reliability
- Improved assembly robustness
- Modules can be shipped directly to the assembly line without any additional treatment processes
- 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



Baseplate-less Power Modules



Baseplate Power Modules

www.semikron.com/thermal-interface-materials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from 45,38 €
from 18,82 €
from 14,55 €
from 12,87 €

Service

Your 24/7 Online Service

SemiSel Simulation

Have you ever asked yourself “Have I selected the right power semiconductors?” Then you should check out SemiSel – SEMIKRON’s simulation tool for losses and temperatures, the perfect tool to help you select the right power semiconductors for the specific needs of your application. The first of its kind almost 20 years ago, SemiSel has been continually improved and now boasts lots of new features and functions.

Product range

Available for all SEMIKRON products:

- Rectifier diode and thyristor modules
- IGBT and fast diode modules
- SiC Schotty diodes and SiC MOSFET modules
- From 3A to 6000A rated current
- From 55V to 3300V devices

Key features

27 different power electronic circuits can be simulated
Simulations with different degrees of complexity, from simple nominal conditions to complex mission profiles
Cooling conditions for air and liquid cooled systems proposed to match the housing and devices selected
Efficiency and temperatures at a glance

Visit us at
www.semikron.com/semisel

Online Shop

Our specialty lies in the delivery of expert support to small and medium-sized enterprises by offering them the following services:

Technical & sales support

- Reply within 24 hours
- Multilingual sales and support
- Design-in-support directly from manufacturers’ specialists

Worldwide shipping

- Fast shipping to more than 100 countries
- Low-volume purchases also possible
- Shipping directly from manufacturer’s warehouse
- Over 600 conventional SCRs, IGBT modules, bridge rectifiers and IPMs in stock

Transparency & efficiency

- Transparent price breakdowns online
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- Instant quotes using the online quotation tool

Cross reference search

- Find a fully compatible SEMIKRON device for any other brand: shop.semikron.com/en/Cross-Reference-Search/

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