POWER ELECTRONICS FOR GREEN HYDROGEN

SEMIKRON DANFOSS

Green Hydrogen

Electrolysis

Semikron Danfoss has a comprehensive power module portfolio to support DC and AC coupled electrolysis up to several megawatts. Semikron Danfoss also offers modules with dedicated drivers such as the high-power SKiiP IPMs equipped with silicon or silicon carbide chips which are ready to address 1500V_{DC} applications. Further offerings include ready-to-use power electronic assemblies to address time-to-market challenges. These assemblies are available as active and passive rectifiers and choppers in 2-level and 3-level configurations.

MEDIUM POWER AC SYSTEMS

200kW - 1MW

- Active rectifiers
- Choppers

High efficiency systems
Compact designs and high power density

Products
SEMiX 5
SEMiX 3 Press-Fit
SEMITRANS Classic
SEMITRANS 10
SEMITRANS 20
SKiiP 4/7 IPM
Drivers
Power Electronic Stacks

HIGH POWER AC SYSTEMS

1MW - 5MW

- Controlled and uncontrolled rectifiers
- Active rectifiers
- Choppers

High efficiency systems
Compact designs and high power density

Products
SEMiX 5
SEMiX 3 Press-Fit
SEMITRANS Classic
SEMITRANS 10
SEMITRANS 20
SEMIPACK
SKiiP 4/7 IPM
Drivers
Power Electronic Stacks
Discretes

Fuel Cells

For interfacing with fuel cells, Semikron Danfoss offers a wide selection of power modules for use in isolated or non-isolated DC/DC conversion stages, as well as for DC/AC inverters configured in traditional or advanced topologies. These modules are equipped with the latest generation silicon and silicon carbide to create converters with kilowatt to megawatt power levels. In addition, blocking diodes are available for preventing reverse current flow to fuel cells to meet isolation requirements.

RESIDENTIAL

< 10kW

- Isolated DC/DC converters
- High frequency rectification
- Single or 3-phase inverters
- Blocking diodes

Highest efficiency systems with the latest silicon carbide chips

SiC diodes for HF rectification

Products

SEMITOP E

SEMIPACK

Drivers

POWER CONDITIONING SYSTEMS
BACKUP POWER SYSTEMS

10kW - 500kW

- Boosters
- Inverters
- Blocking diodes

Compact designs and high power density

Common and advanced topologies

Products

SEMITOP E

MiniSKiiP

SEMiX 5

SEMiX 3 Press-Fit

SEMITRANS Classic

SEMITRANS 10

Drivers

Innovative **Power Modules** and **Solutions** that **Push the Limits of SiC**

SEMITOP E2 for the Highest Performance

By utilizing advanced 2kV SiC technology, the SEMITOP E2 performs exceptionally well in 1500V solar and ESS applications. This cutting-edge design allows for compact installations while maximizing overall performance. Designed with low stray inductance, this module features an innovative baseplate-less design, optimized for efficient liquid cooling.

Key Features

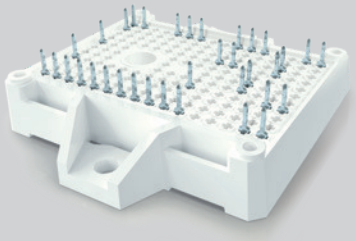
- Baseplate-less design, optimized for liquid cooling
- Industry standard package design
- 2kV blocking voltage enables 1500V_{DC} with 2-level topology
- Scalable through paralleling
- Low stray inductance
- Optimized thermal performance

SEMITRANS for Extreme Power Density

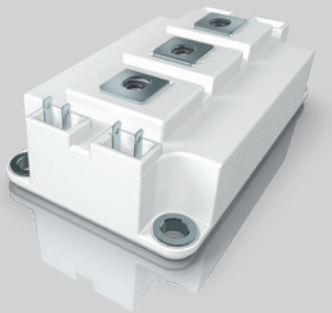
Thanks to new 2kV SiC technology, the SEMITRANS power modules boost the power density of power electronics compared to 3-level silicon solutions. A high blocking voltage capability offers safety for 2-level converters operating at 1500V, simplifying converter design. The SEMITRANS 20 offers an optimized construction for scaling to even higher power levels through paralleling. The SEMITRANS 3 enables medium power converter design, bridging the gap from low to high power.

Key Features

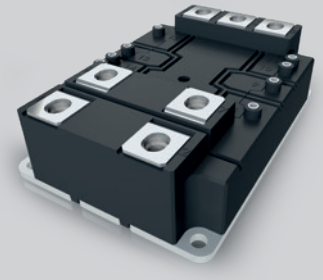
- Industry standard package design
- 2kV blocking voltage enables 1500V_{DC} with 2-level topology
- Scalable through paralleling
- Low thermal resistance package design
- Low inductance for fast switching
- 20% lower losses compared to 3-level silicon design, reducing cooling effort



SEMITOP®E2
150kW up to 250kW



SEMITRANS®3
200kW up to 400kW



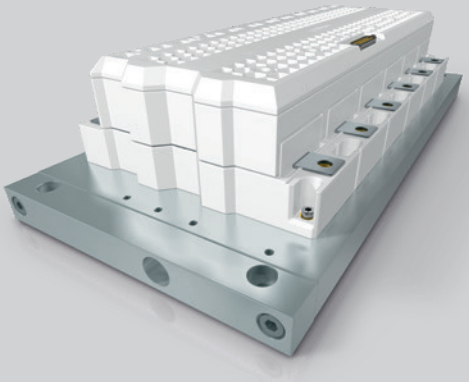
SEMITRANS®20
from 500kW

SKiiP 4 SiC IPM for Reduced Time-to-Profit

The new SKiiP 4 SiC with 2kV SiC devices enable safe operation of 1500V applications thanks to an integrated driver, current sensing, and protection functions. The SKiiP includes an air- or water-cooled heatsink and is 100% tested. The digital driver enables the use of multiple SiC MOSFET suppliers, and the current rating is adjustable based on the quantity of chips in parallel.

Key Features

- 2kV blocking voltage enables 1500V_{DC} with 2-level topology
- Includes driver, current sensor, and liquid- or air-cooled heatsink
- Driver includes Semikron Danfoss ASIC and multiple protection features
- 100% burn-in testing



SKiiP®4 SiC

500kW up to 2MW

SEMITACK RE SiC for Increased Integration

Our power electronic stacks empower customers to thrive in dynamic markets and tackle global challenges with confidence. The latest SEMISTACK RE leverages 2kV SiC technology, enabling a simplified 2-level design for 1500V applications. Its modular, interconnectable architecture integrates SKiiP 4 SiC with DC Link and busbarring, delivering higher integration and accelerating your time-to-profit.

Key Features

- 2kV blocking voltage enables 1500V_{DC} with 2-level topology
- Shortest time to market
- Cost savings in R&D, production and qualification
- Global Semikron Danfoss stack production footprint
- Highly experienced engineering team

SEMISTACK® RE SiC

1.5MW up to 8MW

Compact Module for Current Source Rectifiers

In electrolysis applications it is required to supply the electrolyzer with constant current and variable voltage. A power electronic converter is necessary to accomplish this. The easiest solutions are thyristor or diode rectifiers in combination with a chopper, thus not meeting grid code requirements.

A current source rectifier topology elegantly fulfills the above requirements. This topology has the inherent feature of achieving a power factor of unity on the grid side while providing a buck function in a compact setup.

This topology requires a unidirectional switch in a low inductance package. The switch is comprised with an IGBT in series with a diode to achieve bidirectional blocking capability.

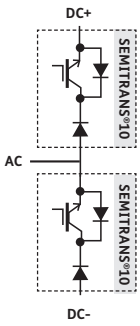
The SEMITRANS 10 module is a cost effective, flexible platform and is very well suited for high power applications. The current source rectifier switch is implemented in one SEMITRANS 10 module with a nominal current rating 1400A and with a blocking voltage of 1700V.

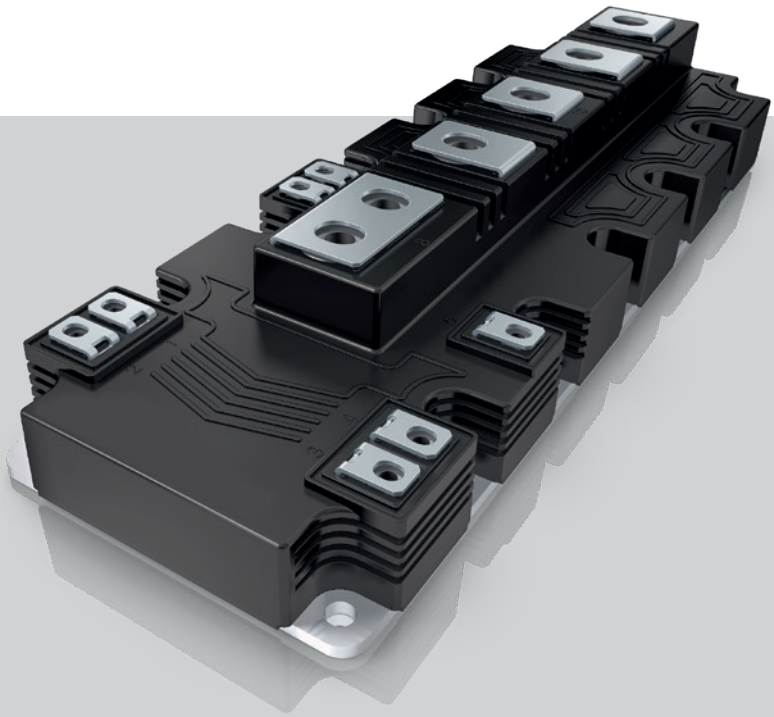
Key Features

- Industry standard module housing
- Optimized module design
- Current source rectifier switch in one package
- Robust mechanical design

SKM1400GALD17P4

SEMITRANS®10- Current source rectifier phase leg





Current Source
SEMITRANS®10
Rectifier switch
up to 1400A

Increased Performance
in 3-Level Topologies

In medium power electrolysis applications, the trend is to increase stack voltages for improved efficiency. In parallel, high power electrolysis applications also require higher voltages (up to 1500V_{DC}) due to increased power ratings. The 3-level NPC topology addresses this trend towards higher operating voltage. However, creating an NPC phase leg with individual half-bridge modules presents problems with external inductance in the commutation loop.

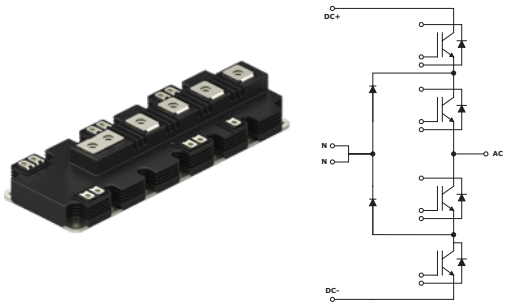
The SEMITRANS 10 P3L utilizes our packaging expertise to fit an entire NPC phase leg in a single power module. For even higher power converters, the SEMITRANS 10 MLI utilizes a unique split-NPC approach to build a compact, powerful phase leg.

By incorporating the latest Generation 7 IGBTs, additional area is available inside the module to increase the clamping diode rating. This enables the modules to efficiently operate in both inversion and conversion modes.

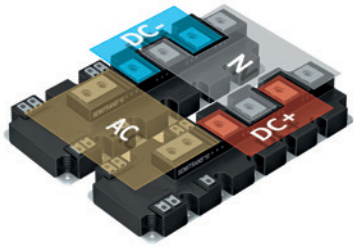
Key Features

- Reduced magnetics cost thanks to 3-level topology
- Up to 1.5MW with liquid cooling
- Based on latest Generation 7 IGBTs
- Reduced cable diameters or cable losses with up to 1500V_{DC} operation
- Reduced cooling requirements thanks to low losses

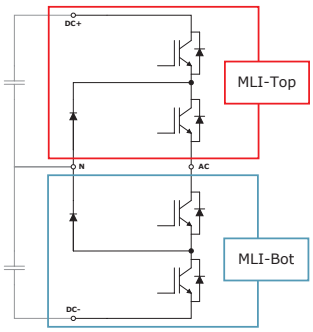
SEMITRANS® 10 P3L
Compact NPC phase-leg up to 500kW



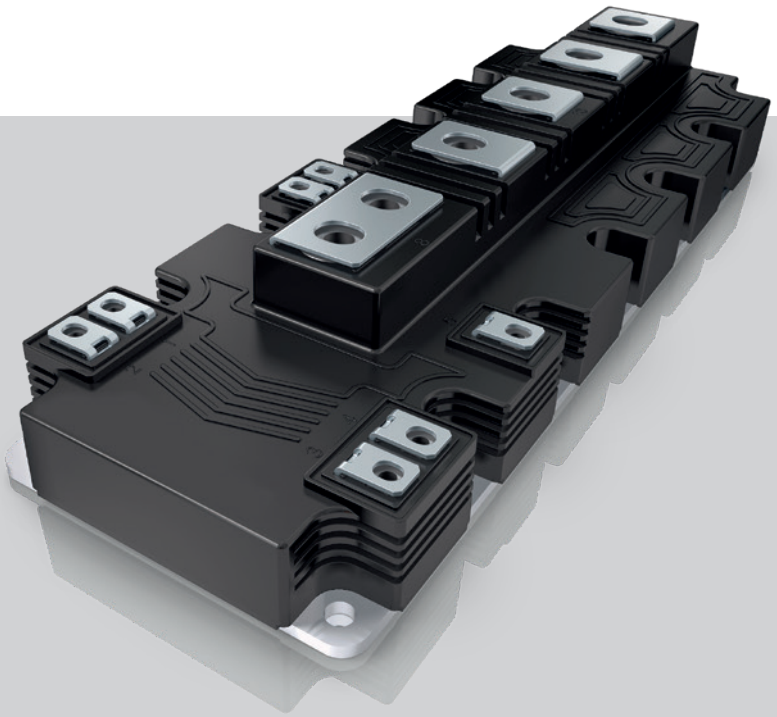
SEMITRANS® 10 MLI
NPC phase-leg split between twomodules
for up to 1.5MW



SKM1400MLI12TM7



SKM1400MLI12BM7



SEMITRANS®10
500kW up to 1.5MW


ELECTROLYSIS
PROCESS
HYDROGEN
YDROGEN
H2
H2O

Most Flexible Rectifiers **for High Power Multipulse Rectification**

When first released, the SEMIPACK set a new industry standard for power semiconductor modules. It was the first fully isolated power module available on the market and it was the basis for many innovations to come.

Today, almost 50 years later, SEMIPACK is still setting benchmarks. With a mean on-state current of up to 145A and a super low thermal resistance the 6th generation of SEMIPACK 1 is the most powerful 20mm module available in the market.
The complete SEMIPACK product line consists of uncontrolled, half-controlled and full-controlled rectifier modules in six module lines covering voltage classes from 1200V to 2200V, insulation voltages of 3.6kV, 4.8kV@1s and rated currents from 20A to 1360A.

With all of this, the SEMIPACK is the ideal module platform for medium- to high-power rectification.

Scalable Product Range

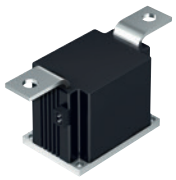
Six industrial standard housings
Covering 20A to 1360A in 1200/2400V
Uncontrolled, half-controlled, fully-controlled rectifier legs and switches

Setting Benchmarks - 6th Generation of SEMIPACK 1

I_{TAV}/ I_{FAV} up to 145A and I_{TSM}/I_{FSM} up to 2210A
New, lighter baseplate for optimal heat spread
50% lower R_{th} compared with market standard
Full lineup for applications up to 75kW

SEMIPACK® 5
B6U up to 1.5MW

SEMIPACK® 6
B6U up to 2.5MW



SEMIPACK® 1
6th Generation

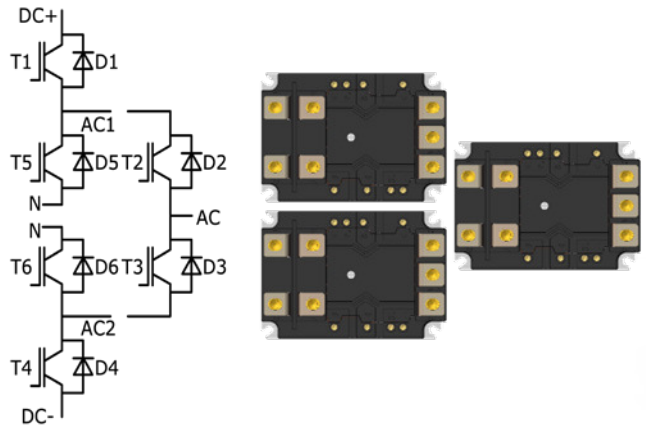
The **New Standard** in **High Power**

Meet increasing power demands for renewable, drive, and electrolyzer applications with the SEMITRANS 20. The symmetrical layout and low inductance package allow for simple paralleling up to 5MW and beyond, including 3-level topologies such as ANPC for ultra-low harmonic active rectification. The 1700V SEMITRANS 20 also includes sintering technology to increase reliability for harsh and environmental challenging applications.

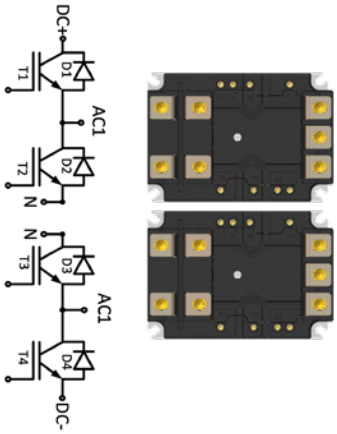
Key Features

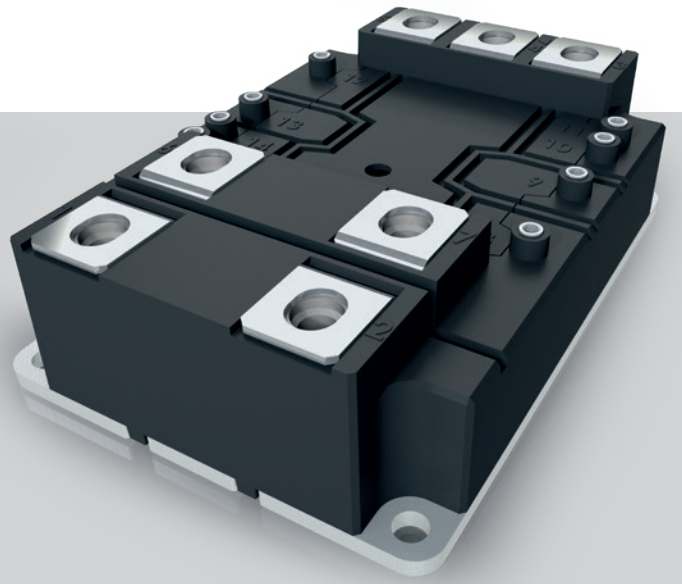
- 1200V and 1700V half-bridge modules
- Simplified inverter design for reduced assembly and material costs
- Low inductance package for high switching frequencies with the latest technology
- Three AC terminal connectors for low operating temperatures, even at high loads
- Simple paralleling of modules thanks to symmetrical module design
- New standard package for high power applications
- Sinter technology in 1700V for harsh applications

Three **SEMITRANS® 20** modules form a 1.5MW ANPC phase leg



Two **SEMITRANS® 20** modules form a 1MW 3-level chopper





SEMITRANS® 20
500kW up to 5MW

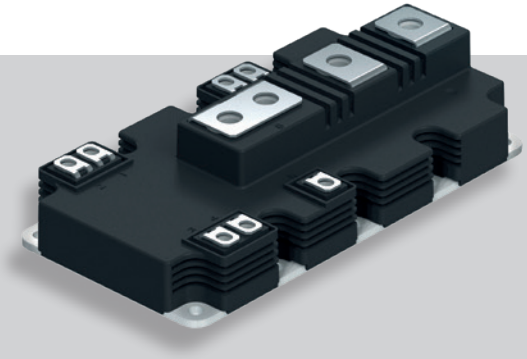
Increase Converter **Compactness in Medium Power**

Today in green hydrogen applications the demand of power dense inverters has already been extended from low to medium power ranges. SEMITRANS 10 is an industry package popular among designers. SEMITRANS 10 P2 or P3L are attractive modules in 2-level, 3-level NPC or TNPC configurations from Semikron Danfoss.

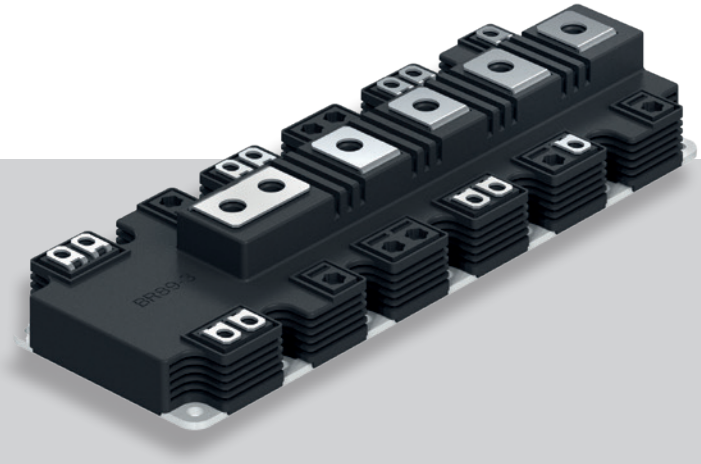
Thanks to latest Generation 7 IGBTs, compact and simplified design are achieved in medium power arena whether it is electrolysis or fuel cells applications.

Key Features

SEMITRANS 10 P2
1200V IGBT: 900A
Latest Generation 7 IGBTs
High power density
SEMITRANS 10 P3L
NPC and TNPC topology
Full 3-level NPC or 3-level TNPC
Latest Generation 7 IGBTs
Extended current rating
Highest power density
High voltage margin (1200V on all positions)



SEMITRANS® 10 P2
Half-bridge
up to 200kW



SEMITRANS 10 P3L®
3-level NPC or TNPC phase leg
Up to 750kW

Low Profile Reverse Current Blocking Diode

In fuel cell application, a reverse current blocking diode is necessary to prevent current flowing from the upstream converter to the fuel cell stack. This blocking diode is typically on the main current path and is carrying heavy current. Depending upon application, it maybe inserted on the positive current path or on positive and negative current paths simultaneously. It is also desired to have high isolation voltage and low profile power module. In addition a cost effective power module is desired without compromising performance and reliability.

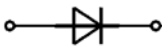
SEMiX 3p is an industry housing module platform that is able to address all the above challenges. The reverse current blocking diode is implemented in one SEMiX 3p module with a current rating, $I_{FAV@85C}$=956A, an isolation voltage, V_{isol} =4000V and blocking voltage, V_{RRM}=2200V. In addition 17mm terminal height realizes significant improvement compared to existing modules with higher height.

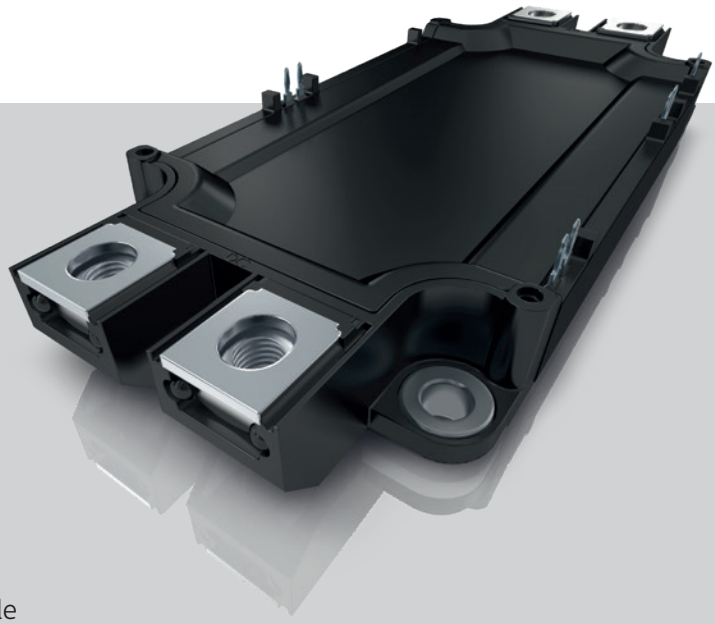
The SEMiX 3p rectifier module simplifies design and accomplishes implementation of reverse current blocking diode in an industry standard housing module. Thus achieving low profile and high isolation voltage requirements simultaneously. Hence, this module SEMiX 3p rectifier portfolio.

Key Features

- Industry standard module housing
- Low Profile
- High isolation voltage
- High blocking voltage
- Enhanced power and environmental robustenes

SEMiX883KE22p





SEMiX® 3p
reverse current blocking diode
up to 1000A

Best-in-Class 3-Level Modules for **Fuel Cell Electric Vehicle** Air Compressors

High-speed compressors in the range 20kW to 60kW in Fuel Cell Electric Vehicles (FCEV) pose significant challenges. Inverters need to switch at high switching frequencies to support the compressor's high fundamental frequency and at the same time be cost-efficient. Two well-known 3-level topologies effectively addresses these concerns.

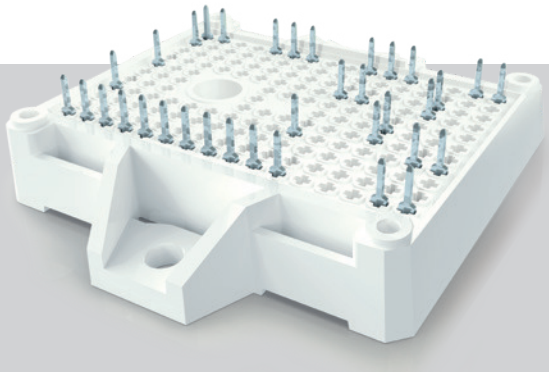
Semikron Danfoss offers two product lines based on the latest silicon chips. SEMITOP E and MiniSKiiP allow for compact 3-level designs. Other options with hybrid Si/SiC are also available to balance cost and performance.

SEMITOP E 3-level NPC topology

Highest efficiency thanks to optimised Si or Si/SiC chipsets
Improved robustness against humidity
3-level NPC phase leg per module in E2 housing

MiniSKiiP 3-level TNPC topology

Power density master
3-level TNPC topology, 1200V/650V with optimized Si chipsets
MiniSKiiP 2 or MiniSKiiP 3 packages

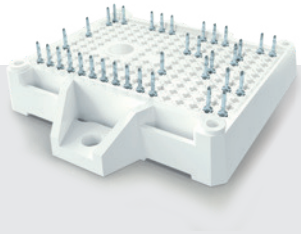


SEMITOP® E2
3-level NPC module
up to 200A Si or hybrid SiC

MiniSKiiP®
3-level TNPC module
up to 200A Si

Product Portfolio

IGBT and Rectifier Modules



SEMITOP® E

5kW to 50kW

Exceeding the Standard for Superior Performance

- Industry standard baseplate-less housing in two sizes
- PCB-based, press-fit connections
- 650V / 1200V IGBT: 10A to 100A
  1200V SiC: 40A to 300A
- Sixpack, half-bridge, buck/boost/symmetrical boost and 3-Level NPC/TNPC topologies
- Optimized mounting concept and pre-applied TIM provide lowest thermal resistance in class
- RGA IGBT and Generation 7 IGBT for true multiple sourcing

MiniSKiiP ®

0.4kW 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 and full SiC: 30 to 150A
  1600V / 2200V Rectifiers: up to 229A
- 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
- Easy manufacturing of single-PCB multi-axis designs
- RGA IGBT and Generation 7 IGBT for true multiple sourcing

SEMIPACK®

800V 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
- Diodes, thyristors in half-controlled, fully controlled and uncontrolled topologies
- Different technologies for certain packages: high reliability pressure contact or cost-effective wire-bonded modules
- Perfect for reverse current blocking applications
- Ideal for multi-pulse passive rectification

Discretes – Diodes

- Uncontrolled passive rectification
- Voltage range up to 2200V
- Current range up to 1500A
- Metal case with epoxy or ceramic insulation
- Rugged construction
- Industry standard case
- Capsule package for double-sided cooling
- Flat design for single-sided cooling

Discretes – Thyristors

- Controlled rectification
- Voltage range up to 1800V
- Current range from 340A up to 1200A
- Metal case with epoxy or ceramic insulation
- Rugged construction
- Industry standard case
- Capsule package for double-sided cooling
- Flat design for single-sided cooling

SEMITRANS® Classic

100kW to 1MW

The Proven Power Electronics Package

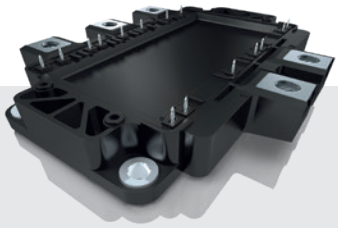
Robust industry standard package for multiple sourcing in 6 housing sizes

600V / 650V / 1200V / 1700V IGBT: 50A to 900A
1200V / 2000V Full SiC: 250A to 650A

Half-bridge, single switch and buck/boost topologies, ready for TNPC / NPC / ANPC topology

Multiple IGBT sources including Generation 7 IGBTs

Full power TNPC topology thanks to half-bridge and AC switch (common emitter) with increased free-wheeling diode rating



SEMiX® 5

50kW to 150kW

Extended Porfolio with Superior Thermal and Dynamic Performance

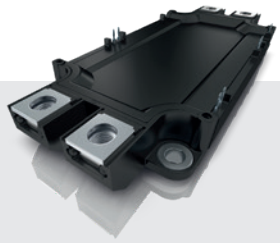
Industry standard baseplate module

650V / 1200V / 1700V IGBT: 150A to 400A

Sixpack, NPC and TNPC topologies

Optimized module layout for maximum heat transfer

Enhanced thermal and electrical diode performance



SEMiX® 3 Press-Fit

55kW to 350kW

For Scalable Large-Power Designs

Industry standard press-fit design with 17mm height

Optimized design for maximum power density

1600V / 2200V Rectifier: up to 500A (half-bridge)/800A (single switch)
2200V / 1000A blocking diode

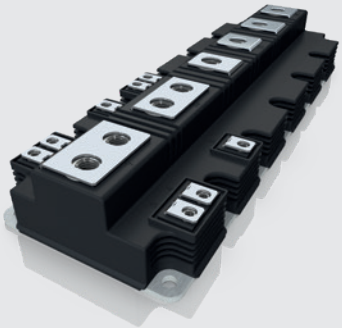
650V / 1200V / 1700V IGBT: 225A to 900A

1200V Hybrid SiC: 600A

Complete and standard topologies available: half-bridge, buck and boost, full controlled, half controlled and uncontrolled rectifiers, blocking diodes

Direct driver assembly

Available with integrated shunt resistor for current measurement



SEMITRANS® 10

500kW to 2MW

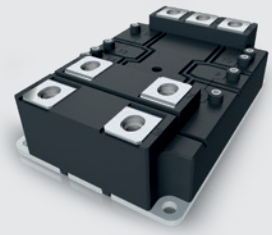
Robust High Power Module

Established high power module package

1200V / 1700V IGBT: 450A to 1800A
2300V IGBT: 1800A

Half-bridge, buck/boost, TNPC, NPC, and split NPC topologies

Full multiple sourcing thanks to Generation 7 IGBT M7



SEMITRANS® 20

from 500kW

The New Standard in High Power

The latest industry standard power module for high power applications

1200V / 1700V IGBT: 1200A to 1800A

2000V SiC: 1700A (1mΩ)

Half-bridge topology

Low stray inductance, high power density package

Increased reliability thanks to the latest packaging technology


H2
HYDROGEN
ENERGY
STORAGE
H2
H2

Intelligent Power Modules – IPMs
The Most Powerful IPM in the Market

The SKiiP IPM product line set the benchmark for high performance and robust inverter designs. Both SKiiP 4 and SKiiP 7 feature high power densities combined with flexible cooling options such as air or water cooling, as well as with customized heatsinks. Reliable driver technology, integrated current sensors and comprehensive protection functions complete the IPM design.

SKiiP 7 has become increasingly popular through the industrial applications. With its sixpack or half-bridge topologies, it covers a current range of 500A to 2400A.

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

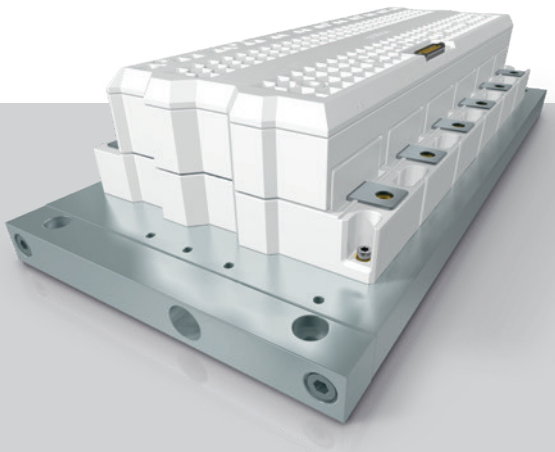
To ensure maximum reliability and service life, the power circuitry is 100% solder-free. Sinter die attach technology replaces the solder layer, the common cause of module lifetime limitations, thus improving power and thermal cycling capability.

High Performance Cooling (HPC) technology has been introduced, to provide 25% more output power capability compared to standard water cooling. A double-sided mounting HPC is also available, enabling ever higher power density.

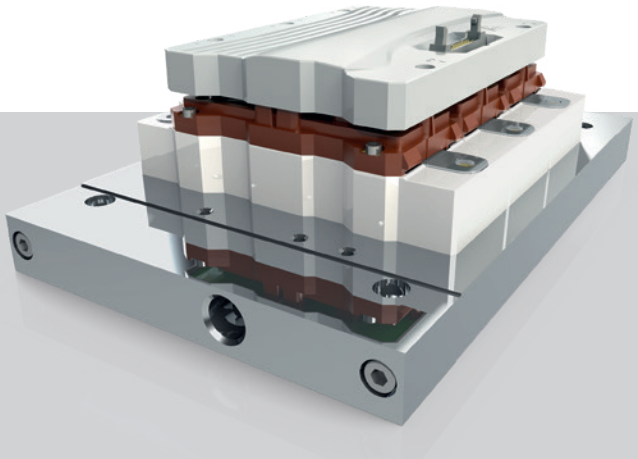
The integrated gate driver in the SKiiP 4 has set new standards in terms of reliability and enhanced functionality through its CAN interface. The digital driver guarantees safe isolation between the primary and secondary side for both switching signals and parameter measurements. The CAN interface allows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

Key Features

Half-bridges and sixpacks
1200V / 1700V IGBT: 500A to 3600A 2000V SiC: 1200A to 2400A
Flexible cooling options: air, water or customized cooling options
Parallel operation for even higher output power possible



SKiiP®4
up to 2MW
available with full SiC MOSFETs



SKiiP®7
150kW up to 2.4MW


H2

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 1000V. Our standard stacks cover an output current range of 70A to 4000A and building blocks based on three level topologies that are ready to use in 1500V_{DC} environment.

Water-Cooled IGBT Stacks
SKiiPRACK
SEMISTACK RE

Air-Cooled IGBT Stacks
SEMIKUBE
SEMIKUBE SlimLine
SEMIKUBE MLI (1500V capable)

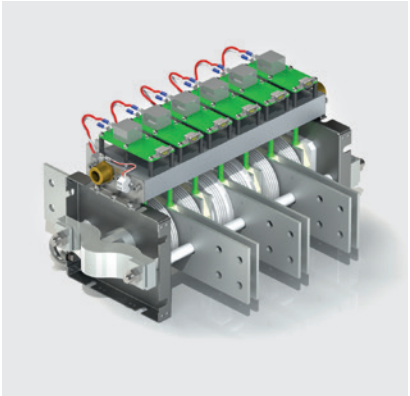
Diode/Thyristor Stacks
SEMISTACK CLASSIC B6U/B6C/W3C

Customized Stacks (>5MW)

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

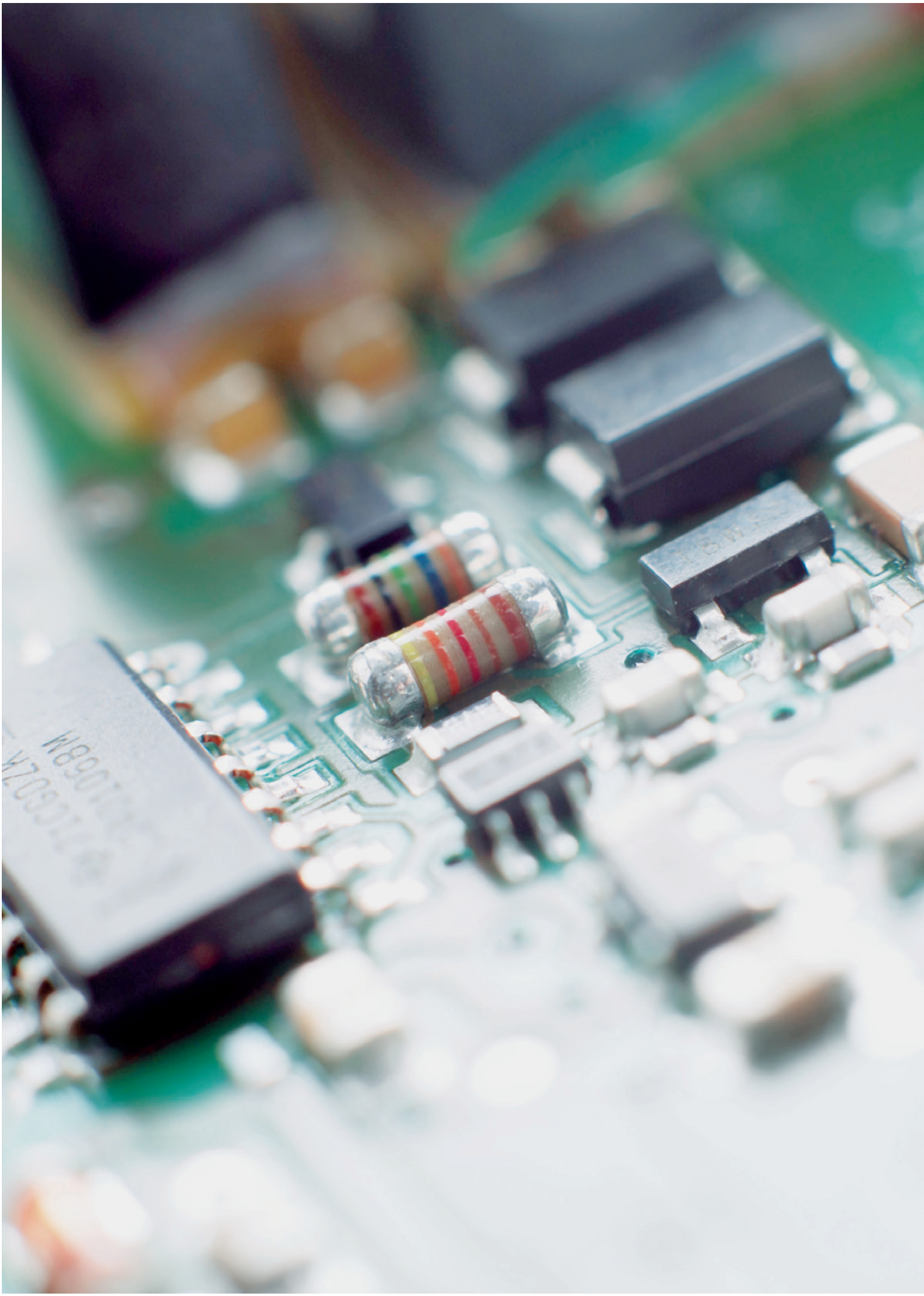
Four Key Factors to Your Success

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



Customized Stacks
3000A controlled rectifier

SEMISTACK® RE
up to 5MW AFE/Chopper



Product Portfolio
IGBT Driver

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.

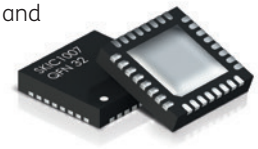
Our IGBT drivers are available as two-channel driver cores suitable for any standard semiconductor power module or as Plug-and-Play solutions, which perfectly fit the SEMiX 3 Press-Fit, SEMITRANS 10 and other compatible modules.

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. The Plug-and-Play drivers connect directly to most common standard IGBT modules. The IGBT driver cores fit with our 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 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.

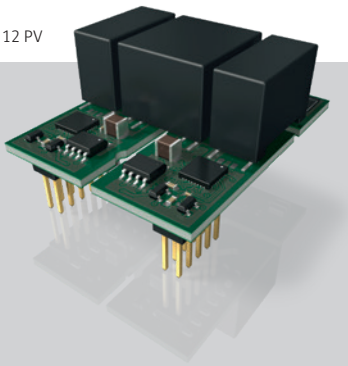
Compact Design
Our SKIC ASIC technology enables very compact system design with minimal peripheral components. With highly integrated signal processing and multi-channel failure management, our ASICs offer robust gate control



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 12 PV

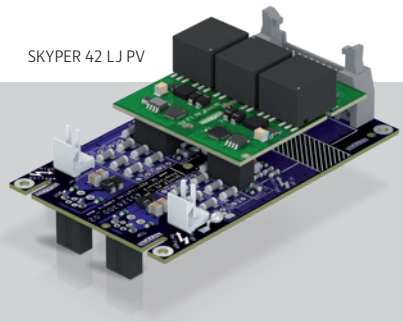


Driver Cores
Two-channel driver cores for PCB integration with Semikron Danfoss ASIC technology and integrated safety functions

SKYPER 12 Press-fit

Plug-and-Play Driver
Two-channel drivers for direct module mounting with electrical or optical interface

SKYPER 42 LJ PV



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 to offer modules with pre-applied thermal interface material (TIM). We now have over two decades of experience and more than 33 million pre-printed modules in the field. We design print patterns for each module type for the best TIM distribution and thickness when the module is mounted to a heatsink. These patterns are printed in a clean environment using automated silkscreen and stencil machines. Statistical process control (SPC) is used to ensure consistency. Special packaging ensures the TIM arrives in pristine condition.

We offer either thermal grease or phase change material (PCM) based on customer needs (e.g., performance or reduced handling effort) and module type. Baseplate-less modules benefit from low-viscosity materials like thermal paste. Our High Performance Thermal Paste (HPTP) provides top-tier thermal performance with optimized filler content.

For easier assembly, most power modules are also available with pre-applied PCM. PCM is solid at room temperature but becomes fluid during operation, filling gaps for thermal contact. HP-PCM, our exclusive High Performance Phase Change Material, combines the benefits of PCM with the performance of the best thermal paste.

For field serviceability, compressible graphite sheets are an innovative option. Panasonic Industry has overcome the shortcomings of traditional graphite sheets with a new compressible pyrolytic graphite sheet called G-TIM (GraphiteTIM).

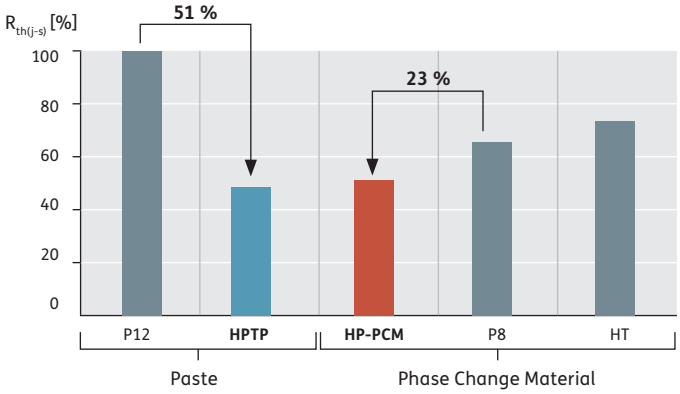
This compressible sheet conforms to the underside of the module during mounting. The crystalline structure of the graphite outstanding long-term stability. Panasonic offers pre-cut graphite sheets for Semikron Danfoss modules.

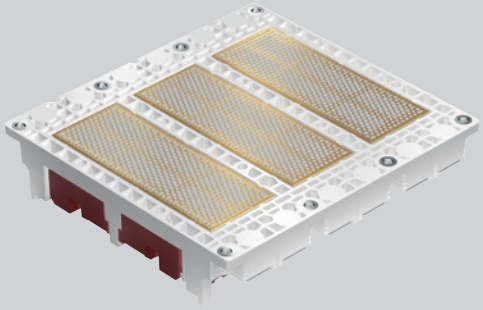
Key Features

- Best possible thermal performance
- Simplified logistics and reduced production costs
- Improved assembly robustness
- Increased lifetime and reliability

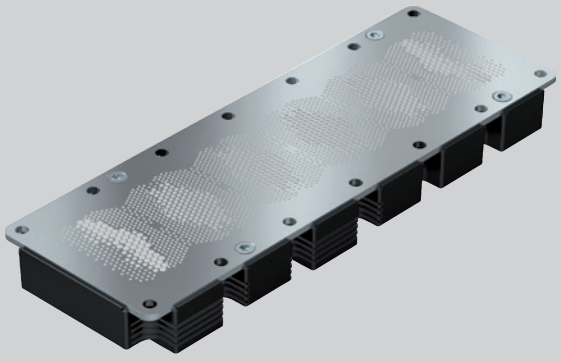
Portfolio

- **HPTP:** High Performance Thermal Paste
- **HP-PCM:** High Performance Phase Change Material





Baseplate-less module with pre-applied thermal paste



Baseplate module with pre-applied phase change material

THE ULTIMATE PARTNER IN POWER ELECTRONICS

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 sustainably and thus to significantly reduce overall CO_2 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.

05/2025

SEMIKRON DANFOSS

Semikron Danfoss GmbH
Husumer Strasse 251
24941 Flensburg, Germany

Semikron Danfoss International GmbH
Sigmundstrasse 200
90431 Nuremberg, Germany

www.semikron-danfoss.com