Innovation is our Passion

Pushing the boundaries of packaging technologies.

Standard Packages are our Foundation

Meeting your needs is our mission.
More than 60 years of experience in the field of power electronics, a comprehensive portfolio of chips, modules and inverter systems, a global network of production plants and sales offices as well as our highly qualified staff – these are our success factors. SEMIKRON’s power electronics components and systems primarily address the medium output range (approx. 2kW up to 10MW).

Our products are at the heart of modern energy efficient motor drives and industrial automation systems. Further application areas include power supplies, renewable energies (wind and solar power) and utility vehicles. SEMIKRON’s innovative power electronic products enable our customers to develop smaller, more energy efficient power electronic systems. These systems in turn reduce the global energy demand.
New Products

SEMITRANS® 10 & SKYPER® Prime

SEMiX® 5
Regenerative converters are driven by two main market requirements. Increasing the output power and reduction of cost. SEMITRANS 10 & SKYPER Prime is a fully qualified Plug & Play bundle with optimised SOA characteristics. This saves costly qualification and redesign loops and at the same time offers significant performance advantages in various applications. SEMITRANS 10 offers superior switching performance based on second source IGBT series and SEMIKRON CAL diodes in a design of low stray inductance. Advanced package materials enable outstanding performance and reliability. SKYPER Prime offers galvanically isolated, highly accurate DC-link and temperature signals as a PWM signal to the controller. So very compact high power inverters can be built without costly sense circuits, cabling effort nor power supplies. In addition, second source requirements are covered even on the driver and module side.

SEMIX® 5

SEMIX 5 is a compact baseplate module with optimised AC and DC screw connections. A solder-free assembly process for the gate driver connections is possible thanks to the 17mm height and the press-fit signal connections. With an enhanced internal layout and a housing material ready for high temperature operation, the SEMIX 5 is the perfect match for demanding applications.
New Products

SEMiX® 3

Silicon Carbide Power Modules
Now with current sensing shunt resistor

The SEMiX 3 press-fit package introduced lately is now also available with a shunt resistor for current monitoring in the AC path. Footprint and main connections are identical to the standard module and the shunt is also equipped with press-fit contacts, like the other auxiliary connections. Including the current monitoring into the IGBT module reduces the inverter volume and decreases the system costs, as less material is in use. At the same time the FIT rate is enhanced, by reducing the number of necessary components in the inverter. Half-bridge modules in 1200V and 1700V are available in the new package with an adjusted shunt resistor.

Silicon Carbide Power Module

Latest chip technology – Various connection technologies, wide output power range and highest efficiency are features combined today in SEMIKRON silicon carbide power modules. Both, hybrid and full SiC modules are available in the SEMITOP packages without a baseplate, featuring solder or press-fit pins and MiniSKiiP with its SPRiNG design for low power applications. SKiM 63/93 with sintered chips, completely solder-free and highest power densities and the 62mm baseplate module SEMITRANS 3 in a robust mechanical design complete the portfolio for applications in the medium power range.
Product Lines

Overview of Product Lines 9

Product Classes

1 IGBT Modules 42
2 Silicon Carbide Modules, Full SiC, Hybrid SiC 74
3 MOSFET Modules 82
4 Thyristor/Diode Modules 88
5 Bridge Rectifier Modules 102
6 Intelligent Power Module – IPM 118
7 IGBT Driver 130
8 Stacks 134
9 Systems 164
10 Discretes, Chips, Discretes Diodes, Discretes Thyristors 152
11 Accessories, Heatsinks, Fans, Thermal Paste 164

Service & Contact

Application Manual 172
SemiSel Simulation 173
Applications & Technologies 174
Abbreviations 175
SEMIKRON Sample Request 176
SEMIKRON Online Shop 177
Worldwide Presence 178
Product Lines
MiniSKiiP®

Low cost assembly, high production run rate, high yield
Small and compact inverter design
High reliability and long product life time

Motor
Drives

Solar
Energy

Power
Quality

AC
DC

Power
Supplies
**Benefits**

An important mechanical feature of MiniSKiiP modules is the outstanding easy assembly and service friendly spring-contact for load and gate terminals. Compared to conventionally soldered modules, where expensive soldering equipment is required for time-consuming solder processes, no special tools are needed for MiniSKiiP assembly. Instead, a single screw connection is used. The printed circuit board (PCB), the power module and the heat sink are assembled in one mounting step.

This connection technology features a number of additional advantages: the PCB can be more flexible in design, as the power circuit board does not need to include holes for solder pins. The springs provide a flexible connection between the PCB and the power circuitry which is far superior to a soldered joint, particularly under thermal or mechanical stress conditions which can affect lifetime. Thanks to the high mechanical pressure provided by the springs, an air-tight, reliable electrical connection is achieved.

**Applications**

With almost 2 decades of field experience and more than 27 million modules in the field, this module platform has proven successful in all standard applications. Key applications include all kinds of inverters, such as standard drives, stand-alone drives, servo drives, system drives, solar inverters, UPS systems and welding machines. Due to the high reliability of spring contacts, applications such as agricultural vehicles or pitch motors of windmills benefit from the MiniSKiiP technology as well.

**Product range**

MiniSKiiP modules are designed for 600V/650V, 1200V and 1700V with 4A - 400A nominal chip currents, and feature Trench IGBT technology in combination with the SEMIKRON CAL diodes. 1200V Trench IGBT4 and CAL 4 diodes are designed for maximum junction temperatures of 175°C. In addition to CIB, 6-pack, twin 6-pack, H-bridge, half bridge, 3-level and uncontrolled/half-controlled rectifiers plus brake chopper, customer-specific modules are also available. For fast evaluation, lab test boards can be ordered for each module type.

**Key features**

- Solder-free SPRiNG Technology for fast and easy assembly
- Without copper baseplate for cost efficient concept
- Easy and flexible PCB routing without pin holes
- Current range 4A to 400A for inverter range up to 90kW with one product platform
- Comprehensive setup of topologies: CIB, 6-pack, twin 6-pack, H-bridge, half bridge, 3-level, bridge rectifiers with brake chopper

Further information: www.semikron.com/miniskiip
Complex topologies in compact space
Simple pin routing thanks to terminal edge positioning
Low inductance design philosophy coupled with latest chip technologies
Benefits

Complete family of fully compatible 12mm height modules for solder or solder free assembly to the PCB. One screw module for easy, fast and reliable assembly. Pins on the edges allow for more internal available space to fit the most complex topologies. Three level inverters are, for example, integrated in SEMITOP3 and SEMITOP4 housings. Low inductance design approach together with Si and SiC technologies available to offer the best in class solutions.

Applications

SEMITOP is a useful product in the low and medium power range where flexibility and high integration levels are required. Latest available chip technologies and the ability to offer compact designs make this product suitable for different and new high performing configurations like three level inverter (NPC and TNPC), double boost and interleaved boost applications covering different markets like UPS, solar, motor drives and welding.

Product range

SEMITOP may include fast Si diode, fast IGBTs and MOSFETs even for high voltage. SiC Schottky diode and MOSFET can be evaluated as well. Thus a lot of different configuration with different chip combinations are possible:
- NPC inverter up to 150A/650V
- TNPC inverter up to 150A/1200V-100A/650V
- Three-phase inverter up to 200A/600V and 100A/1200V
- CIB configurations up to 100A/600V and 50A/1200V
- MOSFET configurations up to 300A
- Three-phase bridge rectifier with DC output current up to 100A
- Many other configurations are available

Key features

- One central mounting screw for low mounting cost
- Non-baseplate design
- Insulated module
- Low thermal resistance thanks to homogeneous pressure distribution
- Through hole solder pin terminals and press-fit terminals
- High integration level possible for compact design
- 12mm height

Further information:
www.semikron.com/semitop
Reliable spring or press-fit connection
Direct driver assembly
Flat and compact inverter design
IGBT and rectifier module family for solder-free mounting

Benefits
The family concept of SEMiX includes a unification of IGBT and rectifier housings. All have the same height (17mm) and can be connected by one principle DC-link design, due to having the same interface for IGBT and rectifier stage. This saves development time and makes a simple and low-inductance DC-link profile possible. Spring or press-fit contacts allow for a gate driver mounted directly on top of the module. So there is no risk of noise on wires or loose connectors. With the flat package and separated AC and DC terminals a state-of-the-art inverter construction is possible, which is very compact. The auxiliary contacts avoid solder joints and offer highly reliable pressure contacts. This leads to an increased product reliability and lifetime. The solder-free contacts offer a fast and easy assembly process and especially spring contacts are user friendly with regard to servicing. Production at the customer site can be optimised by uniform direction of assembly (everything top down). This simplifies logistics and reduces manufacturing costs. Using the scalability of SEMiX housings, with one basic design a complete inverter line can be built with less effort. In consequence the overall costs can be reduced.

Applications
SEMiX is a flexible and application oriented module. On the basis of a scalable platform concept, modern chip technology is integrated into IGBT and rectifier modules which are used in a wide variety of applications, such as AC motor drives, switching power supplies and current source inverters. Other typical applications include matrix converters, uninterruptible power supplies and electronic welding devices.

Product range
Seven different housing sizes are available in the voltage classes 600V, 1200V and 1700V for the IGBT modules. Half-bridge, 6-pack and chopper topologies are available with a current range from 75A to 600A. Besides IGBT 3 and IGBT 4 chips, the 1200V range also includes a series with V-IGBT devices. Controlled, half-controlled and uncontrolled rectifier modules with identical footprint and 17mm height are also available. Latest packages are available with current sensing shunt resistor, 3-level topologies (NPC, T-NPC) or as buck-boost converters.

Key features
- Available in 600V, 1200V and 1700V and from 75A to 600A
- Multiple IGBT sources
- Solder free contacts for highest durability
- Comprehensive topologies for 2- and 3-level applications

Further information:
www.semikron.com/semix

Now also available with current sensing shunt resistor
SEMITRANS®

Safe operation with high DC-link voltages
Maximum power output
Multiple IGBT sources

Benefits
The SEMITRANS package provides a low-inductive design down to 10nH which can be used for AC/DC inverters from 20kW to 1.5MW. The modules are available up to 1400A and 1700V. Availability is ensured by different IGBT sources. With a market experience of over 20 years the SEMITRANS packages offers a well proven standard design.

Applications
The proven package is designed for a broad range of applications like regenerative inverters and power supplies. The long service life fits perfectly to ambitious applications like AC drives, switched reluctance and DC motors.

Product range
The SEMITRANS family offers a broad range of topologies and power ranges. All standard voltage classes from 600V to 1700V can be chosen. The current rating extends from 50A to 1400A. And the SEMITRANS package is available as half bridge, chopper, single switch, MLI and common emitter.

Key features
- Topologies: half bridge, chopper, single switch, MLI, common emitter
- Isolated copper baseplate using DBC Technology
- With integrated gate resistor
- High isolation voltage

Further information:
www.semikron.com/semitrans
No solder delamination thanks to sintered chips – SKiM 63/93

1500 temperature cycles without failure – SKiM 63/93

More than 60000 power cycles with a temperature swing of 110K – SKiM 63/93

Pressure contact SKiiP-Technology
Benefits
The SKiM modules can increase the reliability of inverters by several factors, even under substantial active and passive temperature swings. This is achieved by removing all solder layers of standard power modules, replacing them with sintered chips (SKiM 63/93), pressure contacts for the main terminals and springs for the auxiliary contacts. Thanks to the non-baseplate design and optimised chip layout, a very thin layer of thermal interface material reduces the operating temperatures significantly.

Applications
The SKiM 63/93 is designed for applications that require high inverter reliability. First of all this applies, of course, to automotive applications such as electric powertrains in electric utility vehicles, heavy-duty construction machinery and tractors, or even provide leading-edge performance in super sports and race cars. The SKiM 4/5 with its proven three level topologies can be found in ambitious applications such as solar and UPS.

Product range
The SKiM 4/5 modules are available as 6-pack, MLI and TMLI configuration with nominal currents from 200A to 600A. The SKiM 63/93 offers 3-phase inverter topologies at 600V, 1200V and 1700V. The power ranges from 20kW to 180kW with nominal currents of 300A to 900A. Modules in buck and boost configuration for 1200V, 600A complete the portfolio. Driver solutions are available as well as an optimised water cooler for fast and customer friendly evaluation. In addition, paralleling boards for a simple and powerful half-bridge configuration are also available.

Key features
- IGBT Power module in 6-pack configuration with 3 separated half bridges – SKiM 63/93
- Available in 600V, 1200V and 1700V and from 200A to 900A
- MLI and TMLI configuration – SKiM 4/5
- In 1200V, 600A also available in Buck/Boost configuration – SKiM 63/93
- Solder-free design for highest durability – SKiM 63/93
- Design without baseplate
- Solder-free mounting of the module and the driver PCB
- Low inductive design thanks to symmetrical layout

Further information:
www.semikron.com/skim
SEMIPONT®

Compact packages with screw, fast on or lead terminals
High insulation voltages
Diode, thyristor rectifier, rectifier/brake chopper and AC controller
Benefits
With blocking voltages up to 1.8kV the SEMIPONT family offers high ruggedness for harsh industrial applications. The different housings with soldered PCB connection allow for compact inverter design.

Applications
Typical application areas for the broad field of SEMIPONT power bridge rectifiers include AC and DC drives, servo drives, (controlled) field rectifiers for DC motors, (controllable) rectifiers for power supplies, input rectifiers for variable frequency drives, soft motor starters, temperature control, (controlled) battery charger rectifiers, DC motor field controllers, DC motor controllers and DC power supplies.

Product range
The SEMIPONT bridge rectifier family is available in various configurations with diode and thyristor rectifiers, rectifier/brake chopper or AC controller. The compact screw mounted packages enable fast PCB mounting. High blocking voltages of up to 1800V, high ruggedness for hard industrial application, high insulation voltages are also available.

Key features
- Diode, thyristor rectifier, rectifier/brake chopper and AC controller
- From 400V up to 1.8kV blocking voltages
- From 28A up to 207A
- Compact packages with screw, fast on or lead terminals

Further information:
www.semikron.com/semipont
Well established thyristor diode package
Market experience over 40 years
Broad power and topology range

Motor Drives  Power Quality  AC | DC  Power Supplies
Comprehensive product range –
industrial standard

**Benefits**
SEMIPACK was the first insulated module on the market, and more than 40 years later, it is still state-of-the-art. It is a well established industrial standard with regard to footprint and module outline. Due to the comprehensive product range, the optimal solution can be found for any application. With SemiSel, the free online calculation and simulation tool for losses and temperature, the power electronic system developer is able to make the perfect power module choice.

**Applications**
The target applications for the thyristor, thyristor/diode or diode modules include input rectifiers (single-phase, three-phase, uncontrolled, half-controlled or controlled) for inverters or UPS systems, soft start applications and control systems.

**Product range**
The SEMIPACK product line offers a comprehensive product range with seven module lines: with voltages from 800V to 2200V, insulation voltages of 3.6kV, 4.8kV@1s and a current range from 15A to 1200A. Uncontrolled, half-controlled and controlled rectifier modules are available as well as single thyristor or diode modules. Also, fast diodes come in SEMIPACK modules. Furthermore, different contact technologies – soldered contact, bonded contact or pressure contact modules – are available.

**Key features**
- 800V up to 2200V
- 15A up to 1200A
- Uncontrolled, half-controlled and controlled rectifier
- Single thyristors and diodes

Further information:
www.semikron.com/semipack
SEMISTART®

- Double-sided cooling for high load cycle capability
- Robust pressure contact technology
- Low thermal resistance
Benefits
The main advantage of this power module is the high current capability in a new compact design. A 400kW soft-starter featuring SEMiSTART has just one sixth of the volume of the same device with conventional capsule thyristors.

Applications
SEMiSTART, the anti-parallel thyristor module is designed with an integrated heatsink for soft-start applications.

Product range
The SEMiSTART thyristor module is offered in five current classes, two voltages classes and three sizes. In addition, due to pressure contact technology and double-sided chip cooling, these new thyristor modules can withstand overload currents of up to 3000A for a 20s duration of overload.

Key features
- 500A up to 3000A overload
- Double sided cooling
- Pressure contact

Further information:
www.semikron.com/semistart
3-in-1: Driver, semiconductors and cooling

2-3 times higher power cycling capability due to sinter technology

Completely assembled and 100% tested – including 1 hour burn-in test
Sintered chips – for high operating temperatures

Benefits
SKiiP4 is the most powerful IPM on the market. SKiiP4 modules enable the production of converter units with outputs of up to 2.1MW. The power semiconductors used in SKiiP4 modules can be operated at a junction temperature of up to 175°C. To make sure these components can be reliably used at these temperatures, the power circuitry is 100% solder-free. Sinter technology is used to create a sintered silver layer instead of the solder layer which could limit the service life of power modules. Reliability during active and passive thermal cycling is greatly improved. A further benefit is the better load cycling capability as compared to solder-based modules.

The integrated gate driver in the SKiiP4 sets new standards in terms of reliability and functionality. The digital driver guarantees safe isolation between the primary and secondary side, both for switching signals and all measurement parameters, such as temperature and DC link voltage. This means the user no longer has to introduce complex and costly circuit components to provide safe isolation. For the first time, the SKiiP drive features a CANopen diagnosis channel for the integration of additional functions.

Applications
The success story of the SKiiP family has progressed hand in hand with the advancement of the wind power market. The 4th generation SKiiP modules are a further improvement of the powerful SKiiP series. The mainstay of SKiiP4 modules is the wind power sector, with approximately 57GW out of the 122GW of wind power installed worldwide (at the end of 2009) featuring SEMIKRON solutions, in many cases SKiiP technology. Besides wind power applications, SKiiP modules can also be found in elevators, solar power and railway applications – in fact, in any area where powerful, safe and reliable IGBT IPMs are a must.

Product range
SKiiP4 is available for 1200V and 1700V. In both of these voltage classes, SKiiP4 modules come in the topologies 3GB 1800A, 4GB 2400A and – new to the SKiiP family – 6GB 3600A. The wide range of accessories is now available for both SKiiP3 and SKiiP4. Among them the fiber optic boards, the boards for paralleling of SKiiP systems and the adapter board for connection of SKiiP4 to SKiiP3 controller.

Key features
- DC-Link monitoring (SKiiP3, SKiiP4)
- Current sensors (SKiiP3, SKiiP4)
- Temperature measurement (SKiiP3, SKiiP4)
- CAN diagnostic interface (SKiiP4)
- 100% solder-free (SKiiP4)
- Water, air and customized cooler

Further information:
www.semikron.com/skiip
MTBF rate of $5 \times 10^6$ hours (29500) with new SEMIKRON ASIC chipset

Safe gate control with separate signal transmission

7kV burst durability due to interlayer connection and metal pad ASICs
**Benefits**

The high integration of SEMIKRON’s new ASIC chipset provides for safe IGBT gate control over the whole lifecycle. Short circuits are managed very fast by separate error channels. SoftOff and over voltage feedback avoid dangerous overvoltages. The mixed signal ASICs guarantee lowest tolerances over the full temperature range. MLI or paralleled IGBT topologies are managed by the adjustable error handling.

With an optimized interface and the adjustable filter setting the SKYPER IGBT driver survives external interferences over 100% of EN standards.

**Applications**

The new SKYPER 42 LJ offers the benefits of digital signal consistency while maintaining full performance. Ambitious applications such as medical or large drives up to 300kW are securely powered. SKYPER 32 is the perfect solution for industrial drives and process control applications. SKYPER 42 meets the requirements of induction heating/welding applications that call for high currents, durable solar inverters and motor drives between 300kW and 1.5MW. SKYPER Prime drives Primepack and SEMITRANS 10 modules up to 1700V and 1400A. The new SKYPER 12 PF is the benchmark for motor drives applications based on 17mm press fit modules.

**Product range**

The SKYPER drivers are available as IGBT driver cores and plug and play driver. The SKYPER platform can drive 600V, 1200V and 1700V IGBT modules. SKYPER 32 drives with a standard and a PRO version 1W per channel. The PRO version has additional protection features like external failure inputs and SoftOff. The SKYPER 42 has 4W per channel and can drive up to 2500A IGBTs. The SKYPER 42 LJ with 2W per channel closes the gap between SKYPER 32 and 42. With the new ASIC chipset, the fast failure management and the consistent signal conditioning the 42LJ is the latest driver core of SEMIRKON. The latest IGBT drivers are SKYPER Prime and SKYPER 12 PF. Both offer as fully qualified Plug & Play driver maximum performance when using SEMIX P or SEMITRANS 10 modules.

**Key features**

- Two driver channels for IGBT single and half bridges
- For 600V, 1200V and 1700V IGBT modules
- Driving up to 2500A
- Short pulse suppression and EMC cage
- SoftOff and separate error channels
- Adjustable filter and failure management
- Customized adapter boards on request

Further information:
www.semikron.com/skyper
SEMISTACK® CLASSICS

- Off-the-shelf product range
- Air cooled power assemblies
- Ready for integration

Motor Drives  Power Quality  Urban Transport Equipment
Benefits
The SEMISTACK CLASSICS family range has been set up for fast integration of an industrial rectifier. Each power bridge has been sized to embed semi-conductors with suitable RC commutation circuit, proper AC fuses and cooling devices.

Applications
- Regulated/unregulated power supplies
- Alternator excitation
- Motor control
- Soft starters
- Soft charge
- Industrial heating

Product range
The SEMISTACK CLASSICS family range consists of a 125 item list, corresponding to four electrical topologies B6C, B6HK, B6U, W3C. All rectifiers include RC commutation circuit and fuses. Some are offered with a cooling system, heatsink temperature is monitored by thermo switches. Depending on the semiconductor technology, SEMISTACK CLASSICS power assemblies can be isolated (SEMIPACK) or non-isolated (capsule and stud screw).

Key features
- 4 topologies B6C, B6U, B6HK, W3C
- Maximum continuous DC current from 60A up to 4015A\textsubscript{DC}
- Rectifier AC voltage up to 500V\textsubscript{AC}
- DC bus voltage up to 670V\textsubscript{DC}
- RC, fuses, cooling fans and thermo switches included

Further information:
www.semikron.com/semistack-classics
Pre-qualified water cooled IGBT power assemblies.

- IGBT inverter power density up to 11.4kVA/L
- 2- and 4-quadrant 3-phase converter
- Long life expectancy

Wind Energy
Solar Energy
Low voltage optimized converter for wind and solar PV

Benefits
The SEMISTACK RE offers a pre-qualified power assembly ready for integration following rigorous SEMIKRON qualification and current environmental standards (IEC 60721-3). The platform design has been optimized to get the best compromise cost/performance for a water-cooled power inverter in the megawatt power range. The book format enables a compact integration in standard industrial cabinets to achieve high power up to 6MVA low voltage. Specified for wind turbine applications, the SEMISTACK RE offers a high IGBT cycling capability and a high capacitor bank lifetime, reducing maintenance.

Applications
The SEMISTACK RE complies with wind turbine requirements, offering the capability to build 4-quadrant converters suitable with synchronous generator and double fed induction generators, with an optional brake chopper design. The platform flexibility allows to match requirement of solar PV central inverters with a DC bus voltage up to 900VDC continuous. Alternatively, SEMISTACK RE can be used in low-voltage applications requiring high power and high reliability, such as 3-phase inverters in a shipyard or in a battery energy storage unit installed close to renewable energy power plants.

Product range
The SEMISTACK RE platform offers a standard inverter size HWD 1500 x 230 x 510 mm to fit two power sub-assemblies into a 600 x 600 x 2000 mm cabinet. The standard size has a current distribution between 1000A and 1400A. For applications with lower current rating or with a stronger constraint on the cabinet size, a smaller inverter size HWD 1250 x 230 x 510 mm offers continuous output current rated from 600A to 900A_{RMS}.

The SEMISTACK RE embeds the SKiiP IPM product family which integrates the IGBT gate driver and monitoring analogue outputs (temperature, output current and DC bus voltage). As an option, a CAN interface for supervising the SKiiP. To increase power capacity up to 6MVA, SEMISTACK RE can be put in parallel, connected together through the DC bus and controlled all-like-one with a SEMIKRON paralleling board. As an option, SEMISTACK RE platform can be offered as an integration into an industrial cabinet with suitable AC and/or DC power filters, electrical and hydraulic distribution.

Key features
- Maximum continuous output current from 600A up to 1400A_{RMS}
- Switching frequency up to 5kHz
- Inverter output voltage up to 690V_{AC}
- DC bus voltage up to 1250V_{DC}
- DC bus polypropylene capacitor bank lifetime rated at 100,000 hours at 40°C
- Analogue measurement T, V_{BUS}, I_{OUT}
- CAN interface (configuration and monitoring)
- Brake chopper optional

Further information:
www.semikron.com/semistack-re
Air cooled IGBT power assembly
Maximum output current from 150A up to 1500A
Fits into 300mm cabinets
Fully integrated safety management
Air cooled IGBT converter family up to 1MVA

Benefits
Extending the SEMIKUBE portfolio, the SEMIKUBE SlimLine platform is a family of pre-qualified power assemblies which follow the same rigorous SEMIKRON qualification and certifications. The platform integrates advanced technologies which maximize performance and power density. SEMIKUBE SlimLine platform has been designed to fit applications in severe environments. Suitable for outdoor cabinets, the platform can be placed in environments subject to high temperature fluctuations. Extremely slim, the platform can be mounted into 300mm deep cabinets. SEMIKUBE, by its modular design and patented DC clamp, enables the construction of various converter topologies. The platform design facilitates easy arrangement in the cabinet owing to the separation of the main cooling air flow through the heatsink and its IP54 rated mounting flange.

Applications
Following the philosophy of the SEMIKUBE, the SEMIKUBE SlimLine is optimised for solar PV central inverters. Sized for the most commonly used central inverter ratings on the market, i.e. 500kW, 670kW up to 900kW, the SEMIKUBE SlimLine 3-phase inverter operates up to 1000VDC bus voltage. Designed in accordance with IEC 62109, the platform is poised to obtain UL 1000V recognition. SEMIKUBE SlimLine complies with most AC drives application requirements. The current measurement precision of 1% (at 25°C) allows for premium motor control required for highly dynamic applications and motion control systems.

Product range
The SEMIKUBE offers four frame sizes of continuous rated current from 150A to 1500A, using SEMITRANS 1200V IGBT Trench E4 modules. SEMIKUBE SlimLine design is optimised for 3-phase inverter topologies. Dedicated rectifier with 3-phase inverter and optional brake chopper may be added. The IGBTs are controlled by a SEMIKRON embedded driver, which provides error management, and analogue outputs of current, DC voltage and heatsink temperature. A CAN interface is available for parameter configuration and diagnostics monitoring. Air cooling for SEMIKUBE SlimLine is provided by highly efficient long life axial fans, realizing maximum power within a compact package. SEMIKUBE is a more versatile product, allowing converter construction around a common DC link, including four quadrant converters, and multiphase converters.

Key features

- Power density up to 7.5kVA/L
- Four frame sizes ranging from 75kVA up to 1300kVA
- AC output voltage up to 500VAC
- Current measurement accuracy <1%
- T_HEATSINK, V_BUS, I_OUT: analogue measurement or CAN monitoring
- Operating temperature range:
  -30°C to +60°C
- Integration into 300mm deep cabinet
- UL1741 1000V ready
- 100% tested in production

Further information:
www.semikron.com/semikube
Pre-qualified water cooled IGBT power assemblies

IGBT Inverter power density at 10.4kVA/L

Flexible mounting

High reliability and long life expectancy
**Benefits**

The SKiiPRACK offers a pre-qualified power assembly ready for integration following rigorous SEMIKRON qualification and current environmental standards (IEC 60721-3). Based on a “Cell” construction, the SKiiPRACK platform offers high flexibility for designing numerous electrical topologies and for a convenient integration into standard industrial cabinets. The SKiiPRACK has been designed for applications requesting high reliability and a long life time up to 20 years. Totally dismountable, the cell concept eases maintenance phases, reducing the time of handling and application stops.

**Applications**

The SKiiPRACK complies with wind turbine requirements, offering the capability to build 4-quadrant converters suitable for synchronous generators and double fed induction generators, with an optional brake chopper design. The platform flexibility allows matching electrical topologies of AC drive applications to power AC induction motors up to 1MW, in particular for pumps or in shipyards.

**Product range**

The SKiiPRACK platform consists of a cell HWD 525 x 375 x 470 mm to be assembled with others cells to create a functional unit in standard cabinets 600 mm deep and 2,000mm high. A cell can integrate an H-bridge, a 1-phase leg + brake chopper or 12-pulse rectifier, and combination of them can create 3-phase inverter, 4-quadrant converter or 3-phase rectifier and inverter. The output current range offers scalability from 600A to 1200A continuous.

The SKiiPRACK embeds the SkiiP IPM product family which integrates the IGBT gate driver and monitoring analogue outputs (temperature, output current and DC bus voltage). As an option, a CAN interface for supervising the SkiiP. To increase power capacity up to 5MVA, SKiiPRACK can be put in parallel, connected in a very flexible way (horizontal or vertical) together through the DC bus and controlled all-like-one with a SEMIKRON paralleling board. As an option, SKiiPRACK platform can be offered with integration in an industrial cabinet with suitable AC and/or DC power filters, electrical and hydraulic distribution.

**Key features**

- Maximum continuous output current from 600A up to 1200A_{RMS}
- Switching frequency up to 5kHz
- Inverter output voltage up to 690V\textsubscript{AC}
- DC bus voltage up to 1100 V\textsubscript{DC}
- DC bus polypropylene capacitor bank lifetime rated at 100,000 hours at 40°C
- Analogue measurement T, V\textsubscript{BUS}, I\textsubscript{OUT}
- As possible options:
  - Brake chopper, additional capacitor bank, DC bus electrolytic capacitor bank, diode/thyristor rectifier cells

Further information:
www.semikron.com/skiiprack
SKAI® 2

Suitable for battery voltages 24V up to 800V

Sintered power semiconductors

EMI compliant

“off-the-shelf” variants with gate driver interface, vector control software, automotive power connections

Utility Urban Transport

Vehicles Equipment
**Benefits**

The SKAI power electronic platform – now in its 2nd generation – comprises highly integrated inverters which provide the ideal powertrain solution for mobile electric and hybrid applications. Power densities of up to 20 kVA / liter provide a notable size reduction compared with other available standard inverter products. The systems are designed to operate with supply voltages of 24V up to 800V and with output power ratings of up to 250kVA.

The IGBT-based SKAI 2 HV inverter operates on sintered 100% solder-free 600V or 1200V power semiconductors and it features polypropylene film DC-link capacitors. The MOS-based SKAI 2 LV inverter uses the established SkiiP technology with a very low-inductive connection to the DC-link capacitors, driver electronics, latest generation DSP controller, current, voltage and temperature sensors. It is integrated in a waterproof IP67 enclosure. The compact inverters withstand high vibration amplitudes up to 10g rms. QUASAR motor control software functionally complements the system and completes this tried-and-tested package. SEMIKRON provides engineering services to support customers in the integration of the SKAI 2 inverter systems. Available services include, for instance, lifetime estimation, field application support, individual parameterization of motor control software etc.

**Applications**

The SKAI 2 "Off-the-Shelf" power electronic building block family has been introduced to cover a broad range of vehicle electrification applications. Examples are electric drivetrains with standardized motor/generator flanges to fit or retrofit the drives easily into existing vehicle designs. These types of drivetrains have been developed for many vehicle types, i.e. buses, light trucks, agriculture and construction machinery as well as marine applications or cars.

**Product range**

There are versatile SKAI 2 HV "Of-the-Shelf" variants available. The SKAI 2 LV is available as single or dual inverter for supply voltages between 24V and 120V. Cooling methods are liquid, forced air cooling or base plate. There are different optional services available like end-of-line flashing of customer specific software, lifetime estimation based on application profile analysis, field application support, individual parameterization of motor control software and further services on request.

**Key features**

- Compact integration in IP 67 enclosure
- Voltage, current and temperature sensors
- Gate driver with protection
- IGBT/ MOSFET power semiconductors
- Fully programmable digital signal processor
- EMI filters
- Versatile cooling system (liquid cooled, forced air cooled, base plate)
- DC link capacitors
- Motor control software

Further information:
www.semikron.com/skai