

SEMIKRON

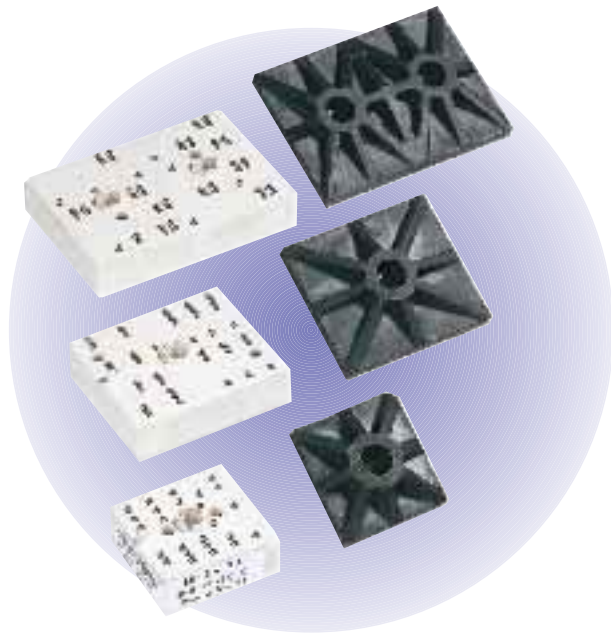
innovation + service



MiniSKiiP

■ Do it your way ■

MiniSKiiP



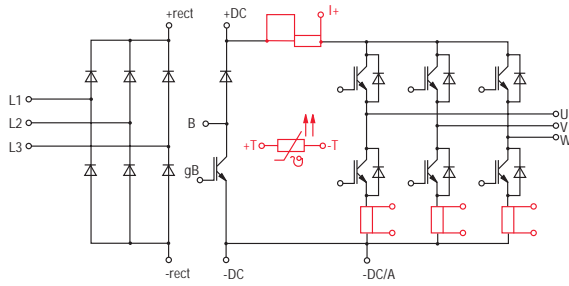
Technology

- Pressure contact of all power and auxiliary connections instead of soldered joints.
- Integration of latest chip technology:
 - Low switching loss, 600V or 1200V, homogeneous (NPT) IGBTs with antiparallel CAL-diodes
 - Ultra fast MOSFETs
 - Thyristors
 - High surge input diodes
- For isolation the MiniSKiiP uses ceramic substrate to match the thermal expansion of silicon and also to obtain the lowest possible thermal resistance.
- Pressure contact to the customer's printed circuit board instead of wave soldering.
- Chips distributed evenly over the ceramic substrate area and evenly applied pressure of the ceramic substrate to the heatsink results in a reduced thermal resistance and an optimized current density.

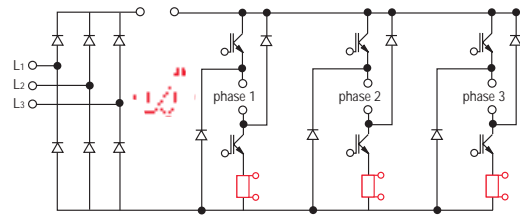
Advantages

- Utilizing the reliability of our pressure contact technology the patented MiniSKiiP is a very flexible integration system which can include any type of customer topology (standard drive, switch-reluctance-drive, UPS, PFC, resonant converter ...). In addition components such as brake switch, current sensors and temperature sensors can be integrated. All these components in one package greatly reduce handling and parts count compared to discrete designs.
- Due to the optimized current density, the matched materials for high power cycling capability as well as the pressure contact technology, the MiniSKiiP, compared to existing technologies, is the most reliable, compact and cost effective power design.
- The simple snap-on mounting with one or two standard screws allows for easy and low cost assembly method. The elimination of 20 to 40 solder connections (no cold solder joints, no bent terminals, no drill holes in p.c. board) can improve production quality greatly. In contrary to soldering production, a defect printed circuit board can be removed from the MiniSKiiP which will result in improved production yields.
- As with all SKiiP designs the latest environment consideration such as separation of material due to the elimination of hard moulding have been taken into account.

Flexible configuration examples (options red)



standard motor drive



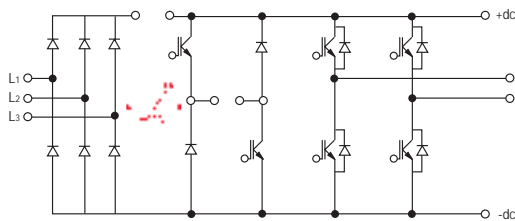
switch-reluctance drive

your topology

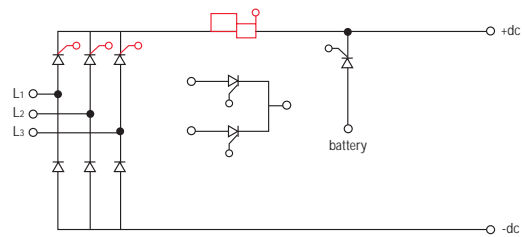


your topology

quasi-resonant-converter power supply

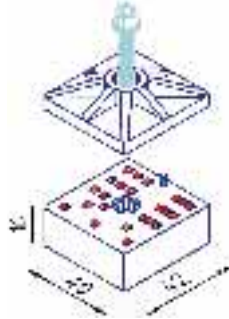


UPS rectifier



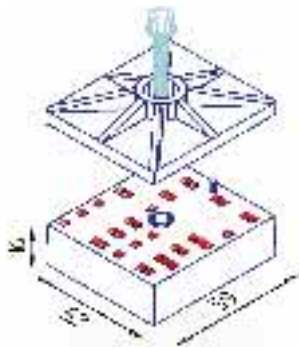
MiniSKiiP

the mechanical design



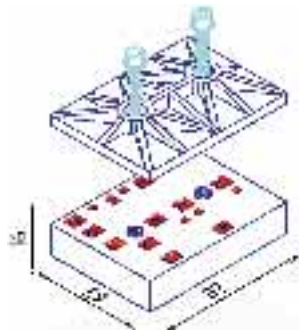
MiniSKiiP 1

230V	400V
<1kW*	-



MiniSKiiP 2

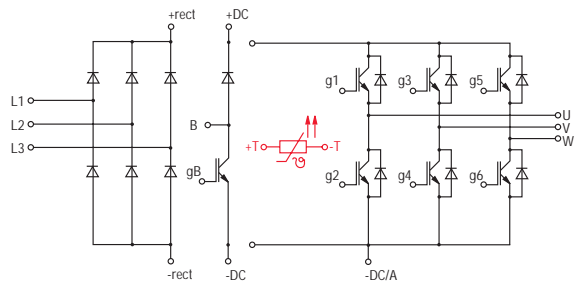
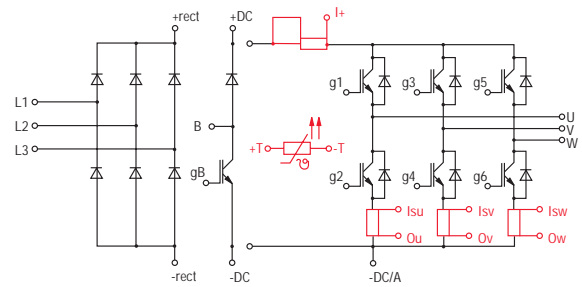
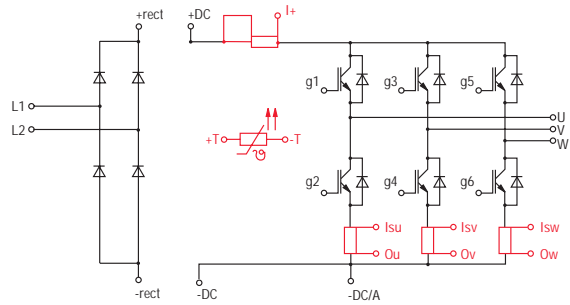
230V	400V
<3kW*	<3kW*



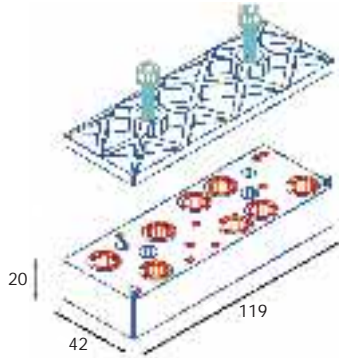
MiniSKiiP 3

230V	400V
<5kW*	<5kW*

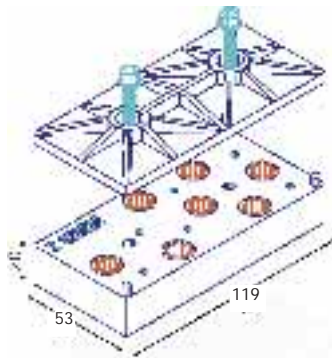
SEMIKRON standard circuits for motor drives with basic options



the mechanical design



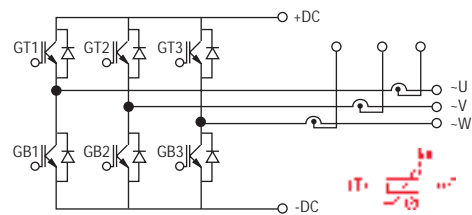
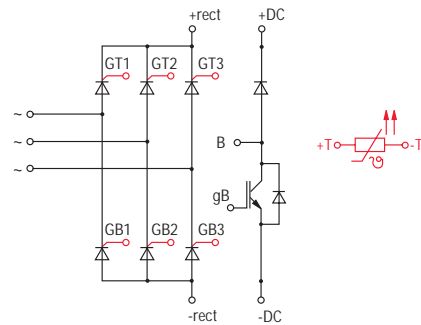
MiniSKiiP 8a
rectifier with brake



MiniSKiiP 8
Inverter

	230V	400V
	<15kW*	<15kW*

SEMIKRON standard circuits for motor drives with basic options



Current sensors:

In MiniSKiiP 1 and 2 we can integrate a variety of different current shunt values.

In MiniSKiiP 8 we offer closed loop current sensors. (see photo)



Temperature sensor:

For temperature sensing a silicon PTC resistor can optionally be integrated

Printed circuit board:

The requirements for the printed circuit board which can be used with MiniSKiiP generally do not deviate from standard FR4 material in use.

Thickness of copper layer: minimum 35µm

Surface coating in contact area: tin or tin/lead solder

Cleaning of contact area: When using "no clean flux" no cleaning is necessary.

When using other fluxes standard cleaning procedure is recommended.

MiniSKiiP ratings for basic AC/AC circuits

Designation ▲ New Type	motor power [kW]			Ic[A] IGBT 25°C/80°C	Ic[A] Cal diode 25°C	V _{CES} [V]	current shunts/sensors	temp. sensor PTC	R _{thjh} * [K/W] IGBT/ CAL diode	size	
		rectifier	brake chopper	inverter							
SKiiP 10 NEC 06 I	0.37	1~	no	11/8	20	600	4	1	3/2,7	1	
SKiiP 11 NEC 06 I	0.75	1~	no	17/12	20	600	4	1	2,3/2,7	1	
SKiiP 20 NAB 06 I	1.5	3~	yes	22/15	36	600	4	1	2,0/1,7	2	
SKiiP 21 NEB 06 I	2.2	1~	yes	27/19	36	600	4	1	1,7/1,7	2	
SKiiP 22 NAB 06 I	3	3~	yes	36/25	36	600	4	1	1,4/1,7	2	
SKiiP 20 NAB 12 I	1.5	3~	yes	16/11	16	1200	4	1	1,8/2,4	2	
SKiiP 22 NAB 12 I	2.2	3~	yes	23/15	24	1200	4	1	1,4/1,7	2	
SKiiP 30 NAB 06	3	3~	yes	36/25	57	600	-	1	1,4/1,2	3	
SKiiP 31 NAB 06	4	3~	yes	50/35	57	600	-	1	1,0/1,2	3	
SKiiP 32 NAB 06	5,5	3~	yes	75/50	75	600	-	1	0,5/1,0	3	
SKiiP 30 NAB 12	3	3~	yes	33/22	38	1200	-	1	1,0/1,2	3	
SKiiP 31 NAB 12	4	3~	yes	45/30	38	1200	-	1	0,7/1,2	3	
SKiiP 32 NAB 12	5.5	3~	yes	65/45	60	1200	-	1	0,5/1,0	3	
SKiiP 82 AC 06 I	5,5	-	-	64/44	75	600	3	1	0,85/1,0	8	
SKiiP 83 AC 06 I	7,5	-	-	100/70	130	600	3	1	0,5/0,5	8	
SKiiP 81 AC 12 I	7.5	-	-	65/45	60	1200	3	1	0,5/1,0	8	
SKiiP 82 AC 12 I	11	-	-	95/65	80	1200	3	1	0,35/0,8	8	
SKiiP 83 AC 12 I	15	-	-	125/85	80	1200	3	1	0,25/0,8	8	
SKiiP 81 ANB* 15	7.5	3~	yes					1		8a	
SKiiP 82 ANB* 15	11	3~	yes					1		8a	
SKiiP 83 ANB* 15	15	3~	yes					1		8a	
▲ SKiiP ... 063**											

* Available as ANB, AHB (half controlled input bridge) or ATB (fully controlled thyristor input bridge)

** 600V NPT/IGBTs available 1st qtr. 1999

MiniSKiiP type designation principles

AC/AC circuits

1st letter N for diode rectifier
describes input H for half-controlled rectifier

2nd letter A for 3-phase
E for single-phase

3rd letter C for IGBT inverter
describes output B for IGBT inverter plus brake

AC/DC circuits

1st letter A for 3-phase
E for single-phase

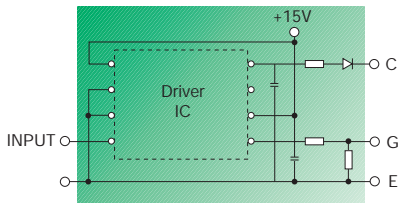
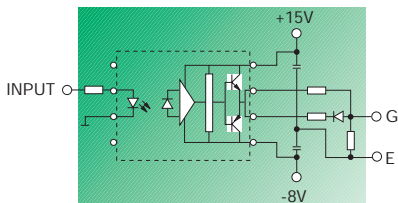
2nd letter designate chiptype
T for thyristor
H for diode/thyristor

3rd letter B for rectifier plus brake
describes circuit

Accessories



SKHIBS 01/02



■ Low cost driver modules for IGBTs

The MiniSKiiP is an integrated part of the printed circuit board. For this reason SEMIKRON has developed various low cost drivers as support service which can be purchased as additions to your printed circuit board or simply integrated into your design



Driver ASIC
SKIC 2001

- Evaluation boards for testing standard applications
- Mechanical drawings available on disc for Auto CAD 12 (.DWG, .DXF)
- MiniSKiiP databook
- Thyristor firing circuit
- IGBT drivers SKHIBS 01/02
- IGBT ASICs SKIC 2001 and SKIC 6001



example of an evaluation board for MiniSKiiP 8

MiniSKiiP

MiniSKiiP snap-on assembly

1. step



The MiniSKiiP is simply placed on the heat sink or first of all snapped on the p.c. board for initial testing.

A new thermal coating eliminates the necessity of applying a thin film of thermal compound before placing the isolated MiniSKiiP on the heatsink.

2. step



The printed circuit board is placed on top of the MiniSKiiP and the pressure cover is snapped into place. If the p.c. board and the MiniSKiiP are already snapped together as in the 1st step then the subassembly of course can be directly placed on the heatsink.

3. step



The last step is to pressurize the assembly with a standard screw. Pressure is self-adjusting. No specific mounting tools are necessary.

4. step



The complete inverter is ready for final testing.