

### I. Power section

Absolute maximum ratings		$T_s = 25^\circ\text{C}$ unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
$V_{CES}$	Operating DC link voltage	600	V
$V_{CC}^{1)}$		400	V
$V_{GES}$		$\pm 20$	V
$I_C$		$T_s = 25 (70)^\circ\text{C}$	1600 (1200)
Inverse diode			
$I_F = -I_C$	$T_s = 25 (70)^\circ\text{C}$	1600 (1200)	A
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10\text{ms}$ ; sin	16000	A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10ms	1280	$\text{kA}^2\text{s}$
$T_j, (T_{stg})$	AC, 1min.	-40 (-25) ... +150 (125)	$^\circ\text{C}$
$V_{isol}$		2500	V

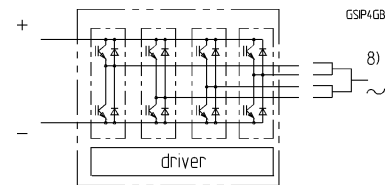
Characteristics $T_s = 25^\circ\text{C}$ unless otherwise specified									
Symbol	Conditions	min.	typ.	max.	Units				
IGBT									
$V_{CESat}$	$I_C = 1600\text{A}$ , $T_j = 25 (125)^\circ\text{C}$	-	2,3 (2,6)	2,6	V				
$V_{CEO}$	$T_j = 25 (125)^\circ\text{C}$	-	0,8 (0,7)	1,0 (0,9)	V				
$r_{CE}$	$T_j = 25 (125)^\circ\text{C}$	-	0,9 (1,2)	1,0 (1,3)	$\text{m}\Omega$				
$I_{CES}$	$V_{GE}=0, V_{CE}=V_{CES}, T_j=25(125)^\circ\text{C}$	-	(80)	1,6	$\text{mA}$				
$E_{on} + E_{off}$	$I_C=1600\text{A}$ , $V_{CC}=300\text{V}$	-	-	144	$\text{mJ}$				
	$T_j=125^\circ\text{C}$ , $V_{CC}=400\text{V}$	-	-	211	$\text{mJ}$				
$R_{CC}^{EE}$	terminal chip, $T_j = 125^\circ\text{C}$	-	0,13	-	$\text{m}\Omega$				
$L_{CE}$	top, bottom	-	3,8	-	nH				
$C_{CHC}$	per phase, AC-side	-	3,2	-	nF				
Inverse diode									
$V_F = V_{EC}$	$I_F = 1600\text{A}$ ; $T_j = 25(125)^\circ\text{C}$	-	1,5 (1,5)	1,8	V				
$V_{TO}$	$T_j = 25 (125)^\circ\text{C}$	-	0,8 (0,6)	1,0 (0,8)	V				
$r_T$	$T_j = 25 (125)^\circ\text{C}$	-	0,4 (0,5)	0,5 (0,6)	$\text{m}\Omega$				
$E_{RR}$	$I_C=1600\text{A}$ , $V_{CC}=300\text{V}$	-	-	51	$\text{mJ}$				
	$T_j=125^\circ\text{C}$ , $V_{CC}=400\text{V}$	-	-	61	$\text{mJ}$				
Mechanical data									
$M_{dc}$	DC terminals, SI Units	6	-	8	Nm				
$M_{ac}$	AC terminals, SI Units	13	-	15	Nm				
w	SKiiP <sup>®</sup> 2 System w/o heat sink	-	3,5	-	kg				
w	heat sink	-	8,5	-	kg				
Thermal characteristics (P16 heat sink; 275 $\text{m}^3/\text{h}$ ); "r" reference to temperature sensor									
$R_{thjrIGBT}$	per IGBT	-	-	0,028	$\text{K/W}$				
$R_{thjrdiode}$	per diode	-	-	0,050	$\text{K/W}$				
$R_{thra}$	per module	-	-	0,033	$\text{K/W}$				
$Z_{th}$	$R_i$ (mK/W) (max.)	$\tau_i$ (s)							
		1	2	3	4				
$IGBT_{jr}$		3	21	3	-	1	0,13	0,001	-
$diode_{jr}$		6	39	6	-	1	0,13	0,001	-
$heatsink_{ra}$		1,6	22,0	7,0	2,4	494	165	20	0,03

### SKiiP<sup>®</sup> 2

### SK integrated intelligent Power 2-pack

### SKiiP 1602GB061-459CTV

Case S4



### Features

- SKiiP technology inside
- low loss IGBTs
- CAL diode technology
- integrated current sensor
- integrated temperature sensor
- integrated heat sink
- IEC 60721-3-3 (humidity) class 3K3/IE32 (SKiiP<sup>®</sup> 2 System)
- IEC 68T.1 (climate) 40/125/56 (SKiiP<sup>®</sup> 2 power section)

1) with assembly of suitable MKP capacitor per terminal (SEMIKRON type is recommended)

8) AC connection busbars must be connected by the user; copper busbars available on request

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee, expressed or implied is made regarding delivery, performance or suitability.

## SKiiP 1602GB061-459CTV

### SKiiP 2®

### SK integrated intelligent Power

### SKiiP 1602GB061-459CTV

## II. Integrated gate driver

Absolute maximum ratings			
Symbol	Term	Value	Unit
V <sub>S1</sub>	stabilized 15V power supply	18	V
V <sub>S2</sub>	unstabilized 24V power supply	30	V
V <sub>iH</sub>	input signal voltage (high)	15 + 0,3	V
dv/dt	secondary to primary side	75	kV/μs
V <sub>isolIO</sub>	input / output (AC)	2500	Vac
V <sub>isol12</sub>	output 1 / output 2 (AC)	1500	Vac
f <sub>max</sub>	switching frequency	15	kHz
T <sub>op</sub> (T <sub>stg</sub> )	operating / storage temperature	- 25 ... + 85	°C

#### Gate driver features

- CMOS compatible inputs
- wide range power supply
- integrated circuitry to sense phase current, heat sink temperature and DC-bus voltage (option)
- short circuit protection
- over current protection
- over voltage protection (option)
- power supply protected against under voltage
- interlock of top/bottom switch
- isolation by transformers
- fibre optic interface (option for GB-types only)
- IEC 68T.1 (climate) 25/85/56 (SKiiP® 2 gate driver)

Electrical characteristics (T <sub>a</sub> = 25 °C)			Values			
Symbol	Term		min	typ	max.	Units
V <sub>S1</sub>	supply voltage stabilized		14,4	15	15,6	V
V <sub>S2</sub>	supply voltage non stabilized		20	24	30	V
I <sub>S1</sub>	V <sub>S1</sub> = 15V	$290 + 470 \cdot f / f_{max} + 1,3 \cdot (I_{AC}/A)$				mA
I <sub>S2</sub>	V <sub>S2</sub> = 24V	$220 + 320 \cdot f / f_{max} + 1,0 \cdot (I_{AC}/A)$				mA
V <sub>iT+</sub>	input threshold voltage (High)		11,2	–	–	V
V <sub>iT-</sub>	input threshold voltage (Low)		–	–	5,4	V
R <sub>in</sub>	input resistance		–	10	–	kΩ
t <sub>d(on)IO</sub>	turn-on propagation time (system)		–	1,1	–	μs
t <sub>d(off)IO</sub>	turn-off propagation time (system)		–	1,4	–	μs
t <sub>pERRRESET</sub>	error memory reset time		9	–	–	μs
t <sub>TD</sub>	top/bottom switch: interlock time		–	3,3	–	μs
I <sub>analogOUT</sub>	8 V corresponds to max. current of 15 V supply voltage (available when supplied with 24V)		–	1322	–	A
I <sub>Vs1outmax</sub>			–	–	50	mA
I <sub>AOmax</sub>	output current at pin 12/14		–	–	5	mA
V <sub>ol</sub>	logic low output voltage		–	–	0,6	V
V <sub>oH</sub>	logic high output voltage		–	–	30	V
I <sub>TRIPSC</sub>	over current trip level ( I <sub>analog OUT</sub> = 10V)		–	1652	–	A
I <sub>TRIPLG</sub>	ground fault protection		–	–	–	A
T <sub>ip</sub>	over temperature protection		110	–	120	°C
U <sub>DCTRIIP</sub>	trip level of U <sub>DC</sub> -protection ( U <sub>analog OUT</sub> = 9V); (option)		400	–	–	V

For electrical and thermal design support please use SEMISEL. Access to SEMISEL is via SEMIKRON website <http://semisel.semikron.com>. Further questions can be placed via <http://faq.semikron.com/>.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.