## I. Power section

| Absolute maximum ratings | | $T_s$ = 25°C unless otherwise specified | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Units** |
| IGBT | | | |
| $V_{CES}$ | | 1200 | V |
| $V_{CC}$ 1) | Operating DC link voltage | 900 | V |
| $V_{GES}$ | | ± 20 | V |
| $I_C$ | $T_s$ = 25 (70) °C | 1800 (1350) | A |
| Inverse diode | | | |
| $I_F = -I_C$ | $T_s$ = 25 (70) °C | 1800 (1350) | A |
| $I_{FSM}$ | $T_j$ = 150 °C, $t_p$ = 10ms; sin | 12960 | A |
| $I^2t$ (Diode) | Diode, $T_j$ = 150 °C, 10ms | 840 | $kA^2s$ |
| $T_j$ , ($T_{stg}$) | | -40...+150 (125) | °C |
| $V_{isol}$ | rms, AC, 1min | 3000 | V |
| $I_{AC\text{-}terminal}$ | per AC terminal, rms, $T_s$ = 70°C, $T_{terminal}$ <115°C | 400 | A |

| Characteristics | | $T_s$ = 25°C unless otherwise specified | | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Units** |
| IGBT | | | | | |
| $V_{CEsat}$ | $I_C$ = 900A, $T_j$ = 25 (125)°C; measured at terminal | – | 2,3 (2,5) | 2,6 | V |
| $V_{CEO}$ | $T_j$ = 25 (125) °C; at terminal | – | 1,1 (1,0) | 1,3 (1,2) | V |
| $r_{CE}$ | $T_j$ = 25 (125) °C; at terminal | – | 1,3 (1,7) | 1,5 (1,9) | mΩ |
| $I_{CES}$ | $V_{GE}$=0,$V_{CE}$=$V_{CES}$,$T_j$=25(125) °C | – | 3,6 (108) | – | mA |
| $E_{on}$ + $E_{off}$ | $I_C$=900A, Vcc=600V | – | 270 | – | mJ |
| | $T_j$=125°C Vcc=900V | – | 476 | – | mJ |
| $L_{CE}$ | top, bottom | – | 4 | – | nH |
| $C_{CHC}$ | per phase , AC side | – | 3,0 | – | nF |
| $R_{CC'\text{-}EE'}$ | terminal-chip, $T_j$=25 °C | – | 0,17 | – | mΩ |
| Inverse diode | | | | | |
| $V_F = V_{EC}$ | $I_F$= 900A; $T_j$ = 25(125) °C measured at terminal | – | 1,8 (1,5) | 2,3 | V |
| $V_{TO}$ | $T_j$ = 25 (125) °C | – | 1,0 (0,7) | 1,2 (0,9) | V |
| $r_T$ | $T_j$ = 25 (125) °C | – | 0,9 (0,9) | 1,2 (1,2) | mΩ |
| $E_{RR}$ | $I_C$=900A Vcc=600V | – | 72 | – | mJ |
| | $T_j$=125°C Vcc=900V | – | 92 | – | mJ |
| Mechanical data | | | | | |
| $M_{dc}$ | DC terminals, SI Units | 6 | – | 8 | Nm |
| $M_{ac}$ | AC terminals, SI Units | 13 | – | 15 | Nm |
| w | SKiiP® 3 System w/o heat sink | – | 2,4 | – | kg |
| w | heat sink | – | 5,2 | – | kg |
| Thermal characteristics (NWK 40; 8l/min; 50%glyc.); "s" reference to heat sink; "r" reference to built-in temperature sensor (acc. IEC 60747-15) | | | | | |
| $R_{thjsIGBT}$ | per IGBT | – | – | 0,017 | °C/W |
| $R_{thjsdiode}$ | per diode | – | – | 0,033 | °C/W |

| $Z_{th}$ | $R_i$ (mK/W) (max. values) | | | | tau$_i$(s) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| $IGBT_{jr}$ | 1,4 | 6,8 | 7,8 | 0,0 | 69,00 | 0,35 | 0,02 | 1,0 |
| $diode_{jr}$ | 2,6 | 4,0 | 17,7 | 17,7 | 50,0 | 5,0 | 0,25 | 0,04 |
| $heatsink_{ra}$ | 4,6 | 4,7 | 1,1 | 0,6 | 48 | 15 | 2,8 | 0,4 |

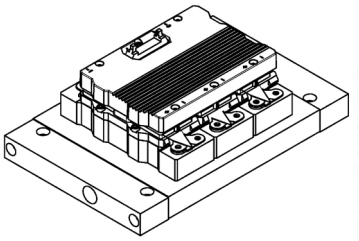
## SKiiP® 3

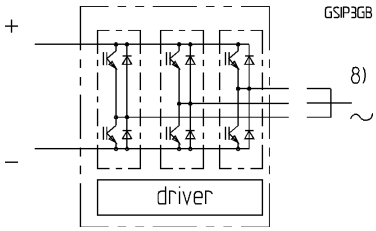
## SK integrated intelligent Power 2-pack

## SKiiP 1803GB122-3DW

Preliminary data

Case S33






**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® 3 System)
- IEC 68T.1 (climate) 40/125/56 (SKiiP® 3 power section)
- UL recognized File no. E63532 (SKiiP® 3 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

## SKiiP 3®

## SK integrated intelligent Power

## SKiiP 1803GB122-3DW

Preliminary data

**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) 40/85/56 (SKiiP® 3 gate driver)

## II. Integrated gate driver

### Absolute maximum ratings

| Symbol | Term | Value | Unit |
|---|---|---|---|
| $V_{S2}$ | unstabilized 24V power supply | 35 | V |
| $V_{iH}$ | input signal voltage (high) | 15 + 0,3 | V |
| dv/dt | secondary to primary side | 75 | kV/µs |
| $V_{isolIO}$ | input / output (AC, rms, 2 s) | 3000 | V |
| $V_{isolPD}$ | partial discharge extinction voltage, rms, $Q_{PD} \leq 10$ pC; | 1170 | V |
| $V_{isol12}$ | output 1 / output 2 (AC, rms, 2s) | 1500 | V |
| f | switching frequency | 10 | kHz |
| $T_{op}$ ($T_{stg}$) | operating / storage temperature | - 40 ... + 85 | °C |

### Electrical characteristics ($T_a$ = 25 °C)

| Symbol | Term | Values min | typ | max. | Units |
|---|---|---|---|---|---|
| $V_{S2}$ | supply voltage non stabilized | 13 | 24 | 30 | V |
| $I_{S2}$ | $V_{S2}$ = 24V; 278 + 29*f / kHz + 0,00015 * $(I_{AC}/A)^2$ | | | | mA |
| $V_{iT+}$ | input threshold voltage (High) | 11,2 | – | – | V |
| $V_{iT-}$ | input threshold voltage (Low) | – | – | 5,4 | V |
| $R_{in}$ | input resistance | – | 10 | – | kΩ |
| $C_{in}$ | input capacitance | – | 1 | – | nF |
| $t_{d(on)IO}$ | input-output turn-on propagation time | – | 1,1 | – | µs |
| $t_{d(off)IO}$ | input-output turn-off propagation time | – | 1,6 | – | µs |
| $t_{pERRRESET}$ | error memory reset time | – | 9 | – | µs |
| $t_{TD}$ | top/bottom switch: interlock time | – | 3,3 | – | µs |
| $I_{analogOUT}$ | max. 5mA ; 8 V corresponds to | – | 1500 | – | A |
| $I_{S1out}$ | 15 V supply voltage for external components; max load current | – | – | 50 | mA |
| $I_{TRIPSC}$ | over current trip level ( $I_{analog\ OUT}$ = 10V) | – | 1875 | – | A |
| $T_{tp}$ | over temperature protection | 110 | – | 120 | °C |
| $U_{DCTRIP}$ | $U_{DC}$-protection ( $U_{analog\ OUT}$ = 9V) (option for GB types) | not implemented | – | – | V |

For electrical and thermal design support please use SEMISEL. Access to SEMISEL is via SEMIKRON website http://www.semikron.com.