

SKiiP® 2

2-pack - integrated intelligent Power System

Power section

SKiiP 432GB120-207CTV

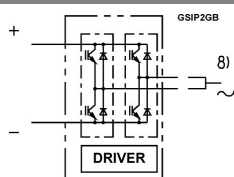
Features

- 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® 2 System)
- IEC 68T.1 (climate) 40/125/56 (SKiiP® 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

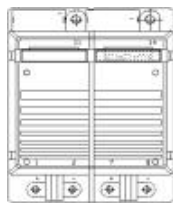
| Absolute Maximum Ratings | | $T_s = 25\text{ °C}$ unless otherwise specified | |
|--------------------------|---|---|-------------------|
| Symbol | Conditions | Values | Units |
| IGBT | | | |
| V_{CES} | Operating DC link voltage | 1200 | V |
| $V_{CC}^{1)}$ | | 900 | V |
| V_{GES} | | ± 20 | V |
| I_C | $T_s = 25\text{ (70) °C}$ | 400 (300) | A |
| Inverse diode | | | |
| $I_F = -I_C$ | $T_s = 25\text{ (70) °C}$ | 400 (300) | A |
| I_{FSM} | $T_j = 150\text{ °C}$, $t_p = 10\text{ ms}$; sin. | 2880 | A |
| I^2t (Diode) | Diode, $T_j = 150\text{ °C}$, 10 ms | 41 | kA ² s |
| $T_j, (T_{stg})$ | AC, 1 min. (mainterminals to heat sink) | - 40 (- 25) ... + 150 (125) | °C |
| V_{isol} | | 3000 | V |

| Characteristics | | $T_s = 25\text{ °C}$ unless otherwise specified | | | | | | | |
|--|---|---|-----------|-------|-------|------|-------|---|------|
| Symbol | Conditions | min. | typ. | max. | Units | | | | |
| IGBT | | | | | | | | | |
| V_{CESat} | $I_C = 350\text{ A}$, $T_j = 25\text{ (125) °C}$ | 2,6 (3,1) | 3,1 | | V | | | | |
| V_{CEO} | $T_j = 25\text{ (125) °C}$ | 1,2 (1,3) | 1,5 (1,6) | | V | | | | |
| r_{CE} | $T_j = 25\text{ (125) °C}$ | 3,8 (5) | 4,5 (5,8) | | mΩ | | | | |
| I_{CES} | $V_{GE} = 0\text{ V}$, $V_{CE} = V_{CES}$, $T_j = 25\text{ (125) °C}$ | (20) | 0,8 | | mA | | | | |
| $E_{on} + E_{off}$ | $I_C = 350\text{ A}$, $V_{CC} = 600\text{ V}$ $T_j = 125\text{ °C}$, $V_{CC} = 900\text{ V}$ | | | 105 | mJ | | | | |
| $R_{CC'} + EE'$ | terminal chip, $T_j = 125\text{ °C}$ | | 0,25 | | mΩ | | | | |
| L_{CE} | top, bottom | | 7,5 | | nH | | | | |
| C_{CHC} | per phase, AC-side | | 2,8 | | nF | | | | |
| Inverse diode | | | | | | | | | |
| $V_F = V_{EC}$ | $I_F = 300\text{ A}$, $T_j = 25\text{ (125) °C}$ | 2,1 (1,9) | 2,6 | | V | | | | |
| V_{TO} | $T_j = 25\text{ (125) °C}$ | 1,3 (1) | 1,4 (1,1) | | V | | | | |
| r_T | $T_j = 25\text{ (125) °C}$ | 2,5 (3) | 3,4 (3,9) | | mΩ | | | | |
| E_{rr} | $I_C = 350\text{ A}$, $V_{CC} = 600\text{ V}$ $T_j = 125\text{ °C}$, $V_{CC} = 900\text{ V}$ | | | 12 | mJ | | | | |
| | | | | 15 | mJ | | | | |
| Mechanical data | | | | | | | | | |
| M_{dc} | DC terminals, SI Units | 6 | | 8 | Nm | | | | |
| M_{ac} | AC terminals, SI Units | 13 | | 15 | Nm | | | | |
| w | SKiiP® 2 System w/o heat sink | | 1,9 | | kg | | | | |
| w | heat sink | | 4,7 | | kg | | | | |
| Thermal characteristics (P16 heat sink; 310 m³/h); " r " reference to temperature sensor | | | | | | | | | |
| $R_{th(j-s)I}$ | per IGBT | | | 0,064 | K/W | | | | |
| $R_{th(j-s)D}$ | per diode | | | 0,188 | K/W | | | | |
| $R_{th(s-a)}$ | per module | | | 0,043 | K/W | | | | |
| Z_{th} | R_i (mK/W) (max. values) | tau _i (s) | | | | | | | |
| | 1 2 3 4 | 1 | 2 | 3 | 4 | | | | |
| $Z_{th(j-r)I}$ | | 7 | 50 | 8 | 1 | 0,13 | 0,001 | | |
| $Z_{th(j-r)D}$ | | 21 | 144 | 23 | 1 | 0,13 | 0,001 | | |
| $Z_{th(r-a)}$ | | 13,9 | 18,9 | 6,6 | 3,6 | 262 | 50 | 5 | 0,02 |



Case S 2

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2-pack integrated gate driver

SKiiP 432GB120-207CTV

Gate driver features

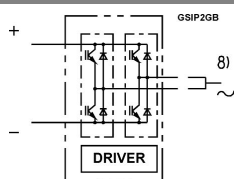
- CMOS compatible inputs
- Wide range power supply
- Integrated circuitry to sense phase current, heat sink temperature and DC-bus voltage (option)
- Short circuit protection
- Over current protection
- Over voltage protection (option)
- Power supply protected against under voltage
- Interlock of top/bottom switch
- Isolation by transformers
- Fibre optic interface (option for GB-types only)
- IEC 68T.1 (climate) 25/85/56 (SKiiP[®] 2 gate driver)

| Absolute Maximum Ratings | | | |
|-------------------------------------|---------------------------------------|---------------|-------|
| Symbol | Conditions | Values | Units |
| V _{S1} | stabilized 15 V power supply | 18 | V |
| V _{S2} | unstabilized 24 V power supply | 30 | 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, r.m.s., 2s) | 3000 | Vac |
| V _{isol12} | output 1 / output 2 (AC, r.m.s., 2s) | 1500 | Vac |
| f _{max} | switching frequency | 20 | kHz |
| T _{op} (T _{stg}) | operating / storage temperature | - 25 ... + 85 | °C |

| Characteristics | | | | (T _a = 25 °C) | |
|------------------------|--|--|------|--------------------------|-------|
| Symbol | Conditions | min. | typ. | max. | Units |
| V _{S1} | supply voltage stabilized | 14,4 | 15 | 15,6 | V |
| V _{S2} | supply voltage non stabilized | 20 | 24 | 30 | V |
| I _{S1} | V _{S1} = 15 V | 210+320*f/f _{max} +1,3*(I _{AC} /A) | | | mA |
| I _{S2} | V _{S2} = 24 V | 160+220*f/f _{max} +1,0*(I _{AC} /A) | | | 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 |
| t _{d(on)IO} | input-output turn-on propagation time | 1,2 | | | 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} | 8 V corresponds to max. current of 15 V supply voltage (available when supplied with 24 V) | 400 | | | A |
| I _{Vs1outmax} | output current at pin 12/14 | 50 | | | mA |
| I _{A0max} | logic low output voltage | 5 | | | mA |
| V _{0l} | logic low output voltage | 0,6 | | | V |
| V _{0H} | logic high output voltage | 30 | | | V |
| I _{TRIPSC} | over current trip level (I _{analog OUT} = 10 V) | 500 | | | A |
| I _{TRIPLG} | ground fault protection | | | | A |
| T _{tp} | over temperature protection | 110 | 120 | | °C |
| U _{DCTRIP} | trip level of U _{DC} -protection (U _{analog OUT} = 9 V); (option) | 900 | | | V |

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