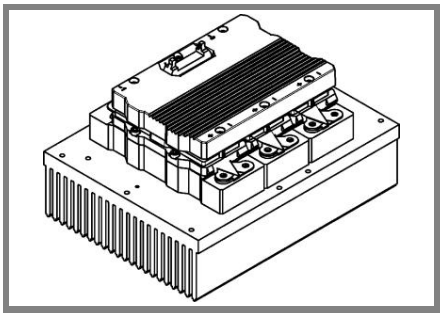


SKiiP® 3

6-pack-integrated intelligent Power System

**Power section**

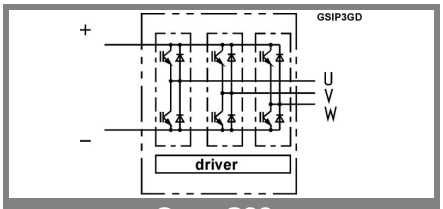
**SKiiP 613GD123-3DUL**

Data

## Power section features

- SKiiP technology inside
- Trench IGBTs
- CAL HD diode technology
- Integrated current sensor
- Integrated temperature sensor
- Integrated heat sink
- IEC 60721-3-3 (humidity) class 3K3/IE32 (SKiiP® 3 System)
- IEC 60068-1 (climate) 40/125/56
- UL recognized file no. E63532

1) with assembly of suitable MKP capacitor per terminal




Case S33

| **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 | 600 (450) | A |
| **Inverse diode** | | | |
| $I_F$ = - $I_C$ | $T_s$ = 25 (70) °C | 470 (350) | A |
| $I_{FSM}$ | $T_j$ = 150 °C, $t_p$ = 10 ms; sin | 3500 | A |
| I²t (Diode) | Diode, $T_j$ = 150 °C, 10 ms | 61 | kA²s |
| $T_j$, ($T_{stg}$) | | - 40 ... + 150 (125) | °C |
| $V_{isol}$ | rms, AC, 1 min, main terminals to heat sink | 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** | | | | | |
| $V_{CEsat}$ | $I_C$ = 300 A, $T_j$ = 25 (125) °C; measured at terminal | | 1,7 (1,9) | 2,1 | V |
| $V_{CEO}$ | $T_j$ = 25 (125) °C; at terminal | | 0,9 (0,8) | 1,1 (1) | V |
| $r_{CE}$ | $T_j$ = 25 (125) °C; at terminal | | 2,6 (3,7) | 3,3 (4,4) | mΩ |
| $I_{CES}$ | $V_{GE}$ = 0 V, $V_{CE}$ = $V_{CES}$, $T_j$ = 25 (125) °C | | 1,2 (36) | | mA |
| $E_{on}$ + $E_{off}$ | $I_C$ = 300 A, $V_{CC}$ = 600 V | | 110 | | mJ |
| | $T_j$ = 125 °C, $V_{CC}$ = 900 V | | 195 | | mJ |
| $R_{CC+EE'}$ | terminal chip, $T_j$ = 25 °C | | 0,5 | | mΩ |
| $L_{CE}$ | top, bottom | | 12 | | nH |
| $C_{CHC}$ | per phase, AC-side | | 1,7 | | nF |
| **Inverse diode** | | | | | |
| $V_F$ = $V_{EC}$ | $I_F$ = 300 A, $T_j$ = 25 (125) °C measured at terminal | | 1,5 (1,5) | 1,8 | V |
| $V_{TO}$ | $T_j$ = 25 (125) °C | | 0,9 (0,7) | 1,1 (0,9) | V |
| $r_T$ | $T_j$ = 25 (125) °C | | 2 (2,7) | 2,3 (3) | mΩ |
| $E_{rr}$ | $I_C$ = 300 A, $V_{CC}$ = 600 V | | 21 | | mJ |
| | $T_j$ = 125 °C, $V_{CC}$ = 900 V | | 28 | | 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 | | 7,5 | | kg |

**Thermal characteristics (PX16 heat sink with fan SKF16B-230-1); "s" reference to heat sink; "r" reference to built-in temperature sensor (acc.IEC 60747-15)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $R_{th(j\text{-}s)I}$ | per IGBT | | | | | | 0,059 | K/W |
| $R_{th(j\text{-}s)D}$ | per diode | | | | | | 0,115 | K/W |
| $Z_{th}$ | $R_i$ (mK/W) (max. values) | | | | $tau_i$(s) | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| $Z_{th(j\text{-}r)I}$ | 10,2 | 28,8 | 21 | 0 | 363 | 0,18 | 0,04 | 1 |
| $Z_{th(j\text{-}r)D}$ | 36 | 36 | 54 | 60 | 30 | 5 | 0,25 | 0,04 |
| $Z_{th(r\text{-}a)}$ | 2,1 | 20 | 5,5 | 1,4 | 210 | 85 | 11 | 0,4 |

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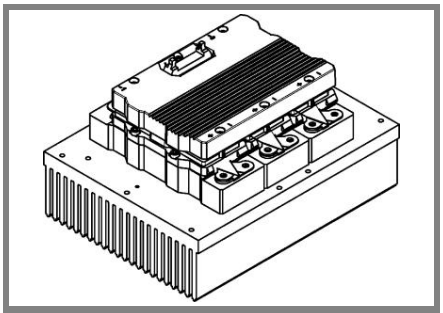

**SKiiP® 3**

# 6-pack-integrated intelligent Power System

**6-pack**
**integrated gate driver**
**SKiiP 613GD123-3DUL**

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 transformer
- IEC 60068-1 (climate) 40/85/56
- UL recognized file no. 242581

**Absolute Maximum Ratings** $T_a$ = 25 °C unless otherwise specified

| Symbol | Conditions | Values | Units |
|---|---|---|---|
| $V_{S2}$ | unstabilized 24 V power supply | 30 | V |
| $V_i$ | 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, 2 s) | 1500 | V |
| $f_{sw}$ | switching frequency | 15 | kHz |
| $f_{out}$ | output frequency for $I_{peak(1)}=I_C$ | 15 | kHz |
| $T_{op}$ ($T_{stg}$) | operating / storage temperature | - 40 ... + 85 | °C |

**Characteristics** ($T_a$ = 25 °C)

| Symbol | Conditions | min. | typ. | max. | Units |
|---|---|---|---|---|---|
| $V_{S2}$ | supply voltage non stabilized | 13 | 24 | 30 | V |
| $I_{S2}$ | $V_{S2}$ = 24 V | | 365+37*f/kHz+0,00111*($I_{AC}$/A)$^2$ | | mA |
| $V_{iT+}$ | input threshold voltage (High) | | | 12,3 | V |
| $V_{iT-}$ | input threshold voltage (Low) | 4,6 | | | V |
| $R_{IN}$ | input resistance | | 10 | | kΩ |
| $C_{IN}$ | input capacitance | | 1 | | nF |
| $t_{d(on)IO}$ | input-output turn-on propagation time | | 1,3 | | µs |
| $t_{d(off)IO}$ | input-output turn-off propagation time | | 1,3 | | µs |
| $t_{pERRRESET}$ | error memory reset time | | 9 | | µs |
| $t_{TD}$ | top / bottom switch interlock time | | 3 | | µs |
| $I_{analogOUT}$ | max. 5 mA; 8 V corresponds to 15 V supply voltage for external components | | 600 | | A |
| $I_{s1out}$ | max. load current | | | 50 | mA |
| $I_{TRIPSC}$ | over current trip level ($I_{analog}$ OUT = 10 V) | | 750 | | A |
| $T_{tp}$ | over temperature protection | 110 | | 120 | °C |
| $U_{DCTRIP}$ | $U_{DC}$-protection ( $U_{analog\ OUT}$ = 9 V); (option for GB types) | | 900 | | V |

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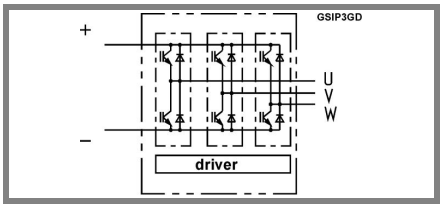


**Case S33**