

## 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
$I_C$	$T_s = 25 (70)^\circ\text{C}$	600 (450)	A
Inverse diode			
$I_F = -I_C$	$T_s = 25 (70)^\circ\text{C}$	600 (450)	A
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10\text{ms}$ ; sin	6000	A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10ms	180	$\text{kA}^2\text{s}$
$T_j, (T_{stg})$		-40...+150 (125)	$^\circ\text{C}$
$V_{isol}$	rms, AC, 1min	2500	V
$I_{AC-terminal}$	per AC terminal, rms, $T_s = 70^\circ\text{C}$ , $T_{terminal} < 115^\circ\text{C}$	400	A

Characteristics $T_s = 25^{\circ}\text{C}$ unless otherwise specified					
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{\text{CEsat}}$	$I_C = 300\text{A}$ , $T_j = 25\ (125)^{\circ}\text{C}$ ; measured at terminal	–	1,5 (1,6)	1,8	V
$V_{\text{CEO}}$	$T_j = 25\ (125)^{\circ}\text{C}$ ; at terminal	–	0,8 (0,7)	1,0 (0,9)	V
$r_{\text{CE}}$	$T_j = 25\ (125)^{\circ}\text{C}$ ; at terminal	–	2,4 (3,1)	2,7 (3,4)	m $\Omega$
$I_{\text{CES}}$	$V_{\text{GE}}=0$ , $V_{\text{CE}}=V_{\text{CES}}$ , $T_j=25(125)^{\circ}\text{C}$	–	1,2 (36)	–	mA
$E_{\text{on}} + E_{\text{off}}$	$I_C=300\text{A}$ , $V_{\text{CC}}=300\text{V}$	–	27	–	mJ
	$T_j=125^{\circ}\text{C}$ $V_{\text{CC}}=400\text{V}$	–	39	–	mJ
$L_{\text{CE}}$	top, bottom	–	12	–	nH
$C_{\text{CHC}}$	per phase , AC side	–	1,7	–	nF
$R_{\text{CC-EE}}$	terminal-chip, $T_j=25^{\circ}\text{C}$	–	0,50	–	m $\Omega$
Inverse diode					
$V_F = V_{\text{EC}}$	$I_F= 300\text{A}$ ; $T_j = 25(125)^{\circ}\text{C}$ measured at terminal	–	1,3 (1,2)	1,5	V
$V_{\text{TO}}$	$T_j = 25\ (125)^{\circ}\text{C}$	–	0,8 (0,6)	1 (0,8)	V
$r_T$	$T_j = 25\ (125)^{\circ}\text{C}$	–	1,5 (1,9)	1,7 (2,0)	m $\Omega$
$E_{\text{RR}}$	$I_C=300\text{A}$ $V_{\text{CC}}=300\text{V}$	–	5	–	mJ
	$T_j=125^{\circ}\text{C}$ $V_{\text{CC}}=400\text{V}$	–	6	–	mJ
Mechanical data					
$M_{\text{dc}}$	DC terminals, SI Units	6	–	8	Nm
$M_{\text{ac}}$	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)					
$R_{\text{thjslIGBT}}$	per IGBT	–	–	0,059	$^{\circ}\text{C/W}$
$R_{\text{thjsdiode}}$	per diode	–	–	0,115	$^{\circ}\text{C/W}$
$Z_{\text{th}}$	$R_i$ (mK/W) (max. values)	$\tau_{\text{ai}}(\text{s})$			
	1      2      3      4	1	2	3	4
IGBT <sub>jr</sub>	10,2    28,8    21,0    0,0	363,0	0,18	0,04	1,0
diode <sub>jr</sub>	36,0    36,0    54,0    60,0	30,0	5,0	0,25	0,04
heatsink <sub>ra</sub>	2,1      20,0      5,5      1,4	210	85	11,0	0,4

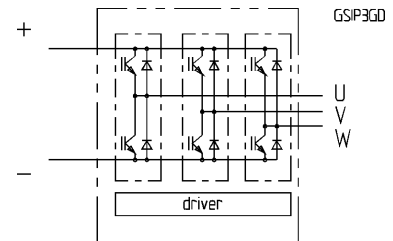
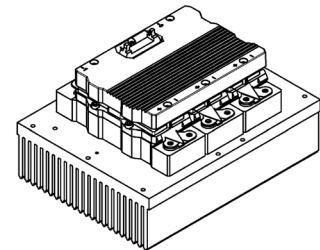
## SKiiP® 3

## SK integrated intelligent Power 6-pack

## SKiiP 613GD061-3DUL

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 (SEMİKRON type is recommended)

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## SKiiP 613GD061-3DUL

### SKiiP 3®

#### SK integrated intelligent Power

### SKiiP 613GD061-3DUL

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 <sub>S2</sub>	unstabilized 24V power supply	35	V
V <sub>iH</sub>	input signal voltage (high)	15 + 0,3	V
dv/dt	secondary to primary side	75	kV/μs
V <sub>isollO</sub>	input / output (AC, rms, 2 s)	2500	V
V <sub>isolPD</sub>	partial discharge extinction voltage, rms, Q <sub>PD</sub> ≤ 10 pC;	960	V
V <sub>isol12</sub>	output 1 / output 2 (AC, rms, 2s)	1500	V
f	switching frequency	20	kHz
T <sub>op</sub> (T <sub>stg</sub> )	operating / storage temperature	- 40 ... + 85	°C

### Electrical characteristics (T<sub>a</sub> = 25 °C)

Symbol	Term	Values			Units
		min	typ	max.	
V <sub>S2</sub>	supply voltage non stabilized	13	24	30	V
I <sub>S2</sub>	V <sub>S2</sub> = 24V	280 + 30*f / kHz + 0,00111 * (I <sub>AC</sub> /A) <sup>2</sup>			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
C <sub>in</sub>	input capacitance	–	1	–	nF
t <sub>d(on)IO</sub>	input-output turn-on propagation time	–	1,1	–	μs
t <sub>d(off)IO</sub>	input-output turn-off propagation time	–	1,1	–	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>	max. 5mA ; 8 V corresponds to 15 V supply voltage for external components; max load current	–	600	–	A
I <sub>S1out</sub>		–	–	50	mA
I <sub>TRIPSC</sub>	over current trip level ( I <sub>analog OUT</sub> = 10V)	–	750	–	A
T <sub>tp</sub>	over temperature protection	110	–	120	°C
U <sub>DCTRIIP</sub>	U <sub>DC</sub> -protection ( U <sub>analog OUT</sub> = 9V) (option for GB types)	400	–	–	V

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