

## SKiiP 1213GB123-2DL

### 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	1200	V
$V_{CC}^{1)}$		900	V
$V_{GES}$		$\pm 20$	V
$I_C$		$T_s = 25 (70)^\circ\text{C}$	1200 (900)
Inverse diode			
$I_F = -I_C$	$T_s = 25 (70)^\circ\text{C}$	900 (670)	A
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10\text{ms}$ ; sin	8640	A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10ms	373	$\text{kA}^2\text{s}$
$T_j, (T_{stg})$		-40...+150 (125)	$^\circ\text{C}$
$V_{isol}$	rms, AC, 1min	3000	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					
$V_{CEsat}$	$I_C = 600\text{A}$ , $T_j = 25 (125)^\circ\text{C}$ ; measured at terminal	-	1,7 (1,9)	2,1	V
$V_{CEO}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal	-	0,9 (0,8)	1,1 (1,0)	V
$r_{CE}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal	-	1,3 (1,8)	1,7 (2,2)	$\text{m}\Omega$
$I_{CES}$	$V_{GE}=0, V_{CE}=V_{CES}, T_j=25(125)^\circ\text{C}$	-	2,4 (72)	-	$\text{mA}$
$E_{on} + E_{off}$	$I_C=600\text{A}$ , $V_{CC}=600\text{V}$ $T_j=125^\circ\text{C}$ $V_{CC}=900\text{V}$	-	228	-	$\text{mJ}$
		-	390	-	$\text{mJ}$
$L_{CE}$	top, bottom	-	6	-	$\text{nH}$
$C_{CHC}$	per phase, AC side	-	3,4	-	$\text{nF}$
$R_{CC'-EE'}$	terminal-chip, $T_j=25^\circ\text{C}$	-	0,25	-	$\text{m}\Omega$
Inverse diode					
$V_F = V_{EC}$	$I_F = 600\text{A}$ ; $T_j = 25(125)^\circ\text{C}$ measured at terminal	-	1,5 (1,5)	1,8	V
$V_{TO}$	$T_j = 25 (125)^\circ\text{C}$	-	0,9 (0,7)	1,1 (0,9)	V
$r_T$	$T_j = 25 (125)^\circ\text{C}$	-	1,0 (1,3)	1,1 (1,5)	$\text{m}\Omega$
$E_{RR}$	$I_C=600\text{A}$ $V_{CC}=600\text{V}$ $T_j=125^\circ\text{C}$ $V_{CC}=900\text{V}$	-	42	-	$\text{mJ}$
		-	56	-	$\text{mJ}$
Mechanical data					
$M_{dc}$	DC terminals, SI Units	6	-	8	Nm
$M_{ac}$	AC terminals, SI Units	13	-	15	Nm
w	SKiiP <sup>®</sup> 3 System w/o heat sink	-	1,7	-	kg
w	heat sink	-	5,4	-	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)					
$R_{thjsIGBT}$	per IGBT	-	-	0,030	$^\circ\text{C/W}$
$R_{thjsdiode}$	per diode	-	-	0,058	$^\circ\text{C/W}$
$Z_{th}$	$R_i$ (mK/W) (max. values)	$\tau_i$ (s)			
		1	2	3	4
$IGBT_{jr}$		9,8	16,4	3,8	0,0
		0,37	0,06	0,01	1,0
diode <sub>jr</sub>		10,0	24,0	24,0	36,0
		50,0	5,0	0,25	0,04
heatsink <sub>ra</sub>		4,3	20,3	7,1	2,3
		160	53	9,0	0,4

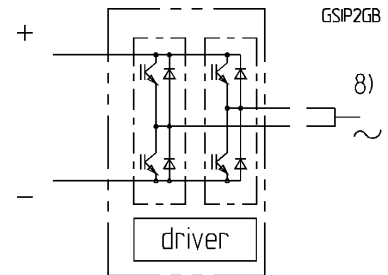
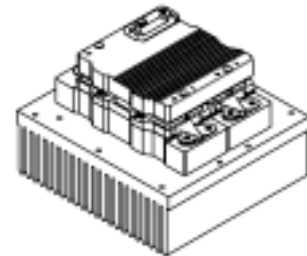
### SKiiP<sup>®</sup> 3

### SK integrated intelligent Power 2-pack

### SKiiP 1213GB123-2DL

Preliminary data

Case S23



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

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## SKiiP 1213GB123-2DL

### SKiiP 3®

### SK integrated intelligent Power

## SKiiP 1213GB123-2DL

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	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, rms, 2 s)	3000	V
V <sub>isolPD</sub>	Partial discharge extinction voltage, rms, Q <sub>PD</sub> ≤ 10 pC;	1170	V
V <sub>isol12</sub>	Output 1 / output 2 (AC, rms, 2s)	1500	V
f	Switching frequency	12	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	27	V
I <sub>S2</sub>	V <sub>S2</sub> = 24V	$274 + 25 \cdot f / \text{kHz} + 0,00022 \cdot (I_{AC}/A)^2$			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	–	1200	–	A
I <sub>S1out</sub>		–	–	50	mA
I <sub>TRIPSC</sub>	over current trip level ( I <sub>analog OUT</sub> = 10V)	–	1500	–	A
T <sub>tp</sub>	over temperature protection	110	–	120	°C
U <sub>DCTRIP</sub>	U <sub>DC</sub> -protection ( U <sub>analog OUT</sub> = 9V) (option for GB types)	not implemented	–	–	V

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