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	2400 (1800)	A
Inverse diode			
$I_F = -I_C$	T_s = 25 (70) °C	1800 (1335)	A
I_{FSM}	T_j = 150 °C, t_p = 10ms; sin	17280	A
I^2t (Diode)	Diode, T_j = 150 °C, 10ms	1493	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 = 1200A, 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 (1,0)	V
r_{CE}	T_j = 25 (125) °C; at terminal	–	0,7 (0,9)	0,9 (1,2)	mΩ
I_{CES}	V_{GE}=0,V_{CE}=V_{CES},T_j=25(125) °C	–	4,8 (144)	–	mA
E_{on} + E_{off}	I_C=1200A, Vcc=600V	–	456	–	mJ
	T_j=125°C Vcc=900V	–	780	–	mJ
L_{CE}	top, bottom	–	3	–	nH
C_{CHC}	per phase , AC side	–	6,8	–	nF
$R_{CC'\text{-}EE'}$	terminal-chip, T_j=25 °C	–	0,13	–	mΩ
Inverse diode					
$V_F = V_{EC}$	I_F= 1200A; 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	–	0,5 (0,7)	0,6 (0,8)	mΩ
E_{RR}	I_C=1200A Vcc=600V	–	84	–	mJ
	T_j=125°C Vcc=900V	–	112	–	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	–	3,1	–	kg
w	heat sink	–	9,7	–	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	–	–	0,015	°C/W
$R_{thjsdiode}$	per diode	–	–	0,029	°C/W

Z_{th}	R_i (mK/W) (max. values)				tau$_i$(s)			
	1	2	3	4	1	2	3	4
$IGBT_{jr}$	5,6	6,0	6,4	0,0	363,0	0,18	0,04	1,0
$diode_{jr}$	10,0	8,4	14,8	14,8	50,0	5,0	0,25	0,04
$heatsink_{ra}$	3,1	17,3	3,7	0,9	230	78	13,0	0,4

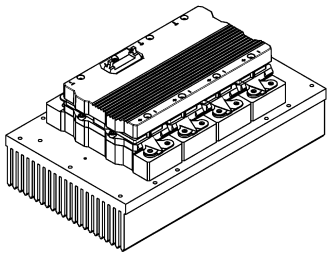
SKiiP® 3

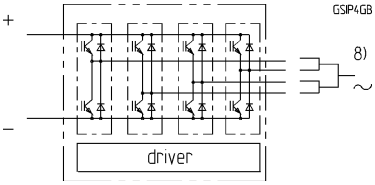
SK integrated intelligent Power 2-pack

SKiiP 2413GB123-4DL

Preliminary data

Case S43





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 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 2413GB123-4DL

Preliminary data

II. Integrated gate driver

Absolute maximum ratings

Symbol	Term	Value	Unit
V_{S2}	Unstabilized 24V 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, 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	6	kHz
T_{op} (T_{stg})	Operating / storage temperature	- 40 ... + 85	°C

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)

Electrical characteristics (T_a = 25 °C)			Values			
Symbol	Term		min	typ	max.	Units
V_{S2}	Supply voltage non stabilized		13	24	27	V
I_{S2}	V_{S2} = 24V	324 + 50*f / kHz + 0,00011 * $(I_{AC}/A)^2$				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		–	1,1	–	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		–	2400	–	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)		–	3000	–	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

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