

## 2-pack-integrated intelligent Power System

### Power section

#### SKiiP 1513GB172-3DL

#### Preliminary Data

#### Features

- SKiiP technology inside
- Trench 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 60068-1 (climate) 40/125/56
- UL recognized file no. E63532

1) with assembly of suitable MKP capacitor per terminal (SEMIKRON type is recommended)

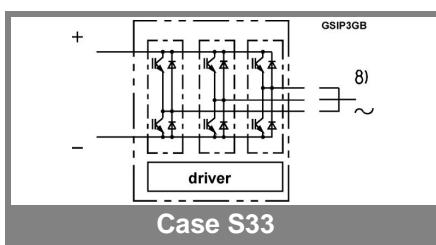
8) AC connection busbars must be connected by the user; copper busbars available on request

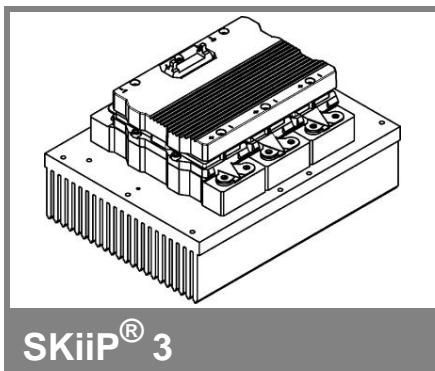
Absolute Maximum Ratings		$T_s = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values		Units
<b>IGBT</b>				
$V_{CES}$		1700		V
$V_{CC}$ <sup>1)</sup>	Operating DC link voltage	1200		V
$V_{GES}$		$\pm 20$		V
$I_C$	$T_s = 25 (70)^\circ\text{C}$	1500 (1125)		A
<b>Inverse diode</b>				
$I_F = - I_C$	$T_s = 25 (70)^\circ\text{C}$	1250 (950)		A
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10$ ms; sin	10200		A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10 ms	520		kA <sup>2</sup> s
$T_j$ ( $T_{stg}$ )		- 40 ... + 150 (125)		°C
$V_{isol}$	rms, AC, 1 min, main terminals to heat sink	4000		V
$I_{AC\text{-terminal}}$	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.
<b>IGBT</b>				
$V_{CEsat}$	$I_C = 900$ A, $T_j = 25 (125)^\circ\text{C}$ ; measured at terminal	1,9 (2,2)	2,4	V
$V_{CEO}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal	1 (0,9)	1,2 (1,1)	V
$r_{CE}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal	1 (1,4)	1,3 (1,7)	mΩ
$I_{CES}$	$V_{GE} = 0$ V, $V_{CE} = V_{CES}$ , $T_j = 25 (125)^\circ\text{C}$	3,6 (216)		mA
$E_{on} + E_{off}$	$I_C = 900$ A, $V_{CC} = 900$ V	585		mJ
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 1200$ V	863		mJ
$R_{CC+EE'}$	terminal chip, $T_j = 25^\circ\text{C}$	0,17		mΩ
$L_{CE}$	top, bottom	4		nH
$C_{CHC}$	per phase, AC-side	5,1		nF
<b>Inverse diode</b>				
$V_F = V_{EC}$	$I_F = 900$ A, $T_j = 25 (125)^\circ\text{C}$ ; measured at terminal	2 (1,8)	2,15	V
$V_{TO}$	$T_j = 25 (125)^\circ\text{C}$	1,1 (0,8)	1,2 (0,9)	V
$r_T$	$T_j = 25 (125)^\circ\text{C}$	1 (1,1)	1,1 (1,2)	mΩ
$E_{rr}$	$I_C = 900$ A, $V_{CC} = 900$ V	108		mJ
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 1200$ V	128		mJ
<b>Mechanical data</b>				
$M_{dc}$	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 (PX 16 heat sink with fan SKF16B-230-1); "s" reference to heat sink; "r" reference to built-in temperature sensor (acc.IEC 60747-15)							
$R_{th(j-s)I}$	per IGBT			per diode			
$Z_{th}$	$R_i$ (mK/W) (max. values)			$\tau_{ai}$ (s)			
	1	2	3	4	1	2	3
$Z_{th(j-r)I}$	3,4	9,6	7	0	363	0,18	0,04
$Z_{th(j-r)D}$	12	12	18	20	30	5	0,25
$Z_{th(r-a)}$	2,1	20	5,5	1,4	210	85	11

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## 2-pack-integrated intelligent Power System

2-pack  
integrated gate driver  
SKiiP 1513GB172-3DL

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

Absolute Maximum Ratings		$T_a = 25^\circ\text{C}$ , 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)	4000	V
$V_{isolPD}$	partial discharge extinction voltage, rms, $Q_{PD} \leq 10 \text{ pC}$	1500	V
$V_{isol12}$	output 1 / output 2 (AC, rms, 2 s)	1500	V
$f_{sw}$	switching frequency	9	kHz
$f_{out}$	output frequency for $I=I_C$ ; sin.	1	kHz
$T_{op} (T_{stg})$	operating / storage temperature	- 40 ... + 85	°C

Characteristics $(T_a = 25^\circ\text{C})$						
Symbol	Conditions	min.	typ.	max.		
$V_{S2}$	supply voltage non stabilized	13	24	30		
$I_{S2}$	$V_{S2} = 24 \text{ V}$	$380 + 34 * f/\text{kHz} + 0,00015 * (I_{AC}/A)^2$				
$V_{IT+}$	input threshold voltage (High)	12,3				
$V_{IT-}$	input threshold voltage (Low)	4,6				
$R_{IN}$	input resistance	10				
$C_{IN}$	input capacitance	1				
$t_{d(on)IO}$	input-output turn-on propagation time	1,3				
$t_{d(off)IO}$	input-output turn-off propagation time	1,3				
$t_{pERRRESET}$	error memory reset time	9				
$t_{TD}$	top / bottom switch interlock time	3,3				
$I_{analogOUT}$	max. 5 mA; 8 V corresponds to 15 V supply voltage for external components	1500				
$I_{s1out}$	max. load current	50				
$I_{TRIPSC}$	over current trip level ( $I_{analog OUT} = 10 \text{ V}$ )	1875				
$T_{tp}$	over temperature protection	110	120			
$U_{DCTRIP}$	$U_{DC}$ -protection ( $U_{analog OUT} = 9 \text{ V}$ ); (option for GB types)	not implemented				

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