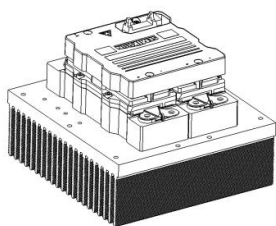


# SKiiP 1013GB172-2DL V3



SKiiP® 3

## 2-pack-integrated intelligent Power System

### Power Section

#### SKiiP 1013GB172-2DL V3

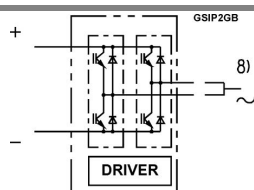
Preliminary Data

### Power section 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



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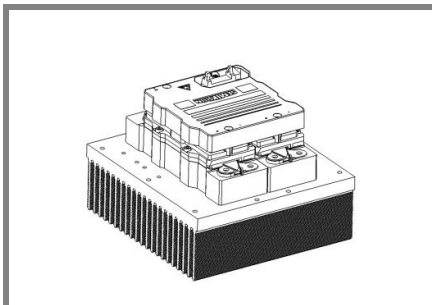
Absolute Maximum Ratings		$T_s = 25\text{ °C}$ unless otherwise specified	
Symbol	Conditions	Values	Units
<b>IGBT</b>			
$V_{CES}$	Operating DC link voltage	1700	V
$V_{CC}^{1)}$		1200	V
$V_{GES}$		$\pm 20$	V
$I_C$	$T_s = 25\text{ (70) °C}$	1000 (750)	A
<b>Inverse diode</b>			
$I_F = -I_C$	$T_s = 25\text{ (70) °C}$	830 (630)	A
$I_{FSM}$	$T_j = 150\text{ °C}$ , $t_p = 10\text{ ms}$ ; sin	6900	A
$I^2t$ (Diode)	Diode, $T_j = 150\text{ °C}$ , 10 ms	238	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
$I_{AC-terminal}$	per AC terminal, rms, $T_s = 70\text{ °C}$ ,	400	A
	$T_{terminal} \leq 115\text{ °C}$		

Characteristics		$T_s = 25\text{ °C}$ unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{CEsat}$	$I_C = 600\text{ A}$ , $T_j = 25\text{ (125) °C}$ ; measured at terminal		1,9 (2,2)	2,4	V
$V_{CEO}$	$T_j = 25\text{ (125) °C}$ ; at terminal		1 (0,9)	1,2 (1,1)	V
$r_{CE}$	$T_j = 25\text{ (125) °C}$ ; at terminal		1,5 (2,1)	1,9 (2,5)	mΩ
$I_{CES}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = V_{CES}$ ; $T_j = 25\text{ (125) °C}$		2,4 (144)		mA
$E_{on} + E_{off}$	$I_C = 600\text{ A}$ , $V_{CC} = 900\text{ V}$		390		mJ
	$T_j = 125\text{ °C}$ , $V_{CC} = 1200\text{ V}$		575		mJ
$R_{CC+EE}$	terminal chip, $T_j = 25\text{ °C}$		0,25		mΩ
$L_{CE}$	top, bottom		6		nH
$C_{CHC}$	per phase, AC-side		3,4		nF
<b>Inverse diode</b>					
$V_F = V_{EC}$	$I_F = 600\text{ A}$ , $T_j = 25\text{ (125) °C}$ ; measured at terminal		2 (1,8)	2,15	V
$V_{TO}$	$T_j = 25\text{ (125) °C}$		1,1 (0,8)	1,2 (0,9)	V
$r_T$	$T_j = 25\text{ (125) °C}$		1,5 (1,7)	1,6 (1,8)	mΩ
$E_{rr}$	$I_C = 600\text{ A}$ , $V_{CC} = 900\text{ V}$		72		mJ
	$T_j = 125\text{ °C}$ , $V_{CC} = 1200\text{ V}$		86		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		1,7		kg
w	heat sink		5,4		kg
<b>Thermal characteristics (P3016 heat sink with fan SKF 16B-230-1); "s" reference to heat sink; "r" reference to built-in temperature sensor (acc. IEC 60747-15)</b>					
$R_{th(j-s)I}$	per IGBT			0,03	K/W
$R_{th(j-s)D}$	per diode			0,058	K/W
$Z_{th}$	$R_i$ (mK/W) (max. values)	tau <sub>i</sub> (s)			
		1	2	3	4
$Z_{th(j-r)I}$		9,8	16,4	3,8	0
$Z_{th(j-r)D}$		10	24	24	36
$Z_{th(r-a)}$		4,3	20,3	7,1	2,3
				160	53
					9
					0,04
					0,4

\* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of

our personal.

# SKiiP 1013GB172-2DL V3



SKiiP® 3

## 2-pack-integrated intelligent Power System

2-pack  
integrated gate driver  
SKiiP 1013GB172-2DL V3

Preliminary Data

### Gate driver features

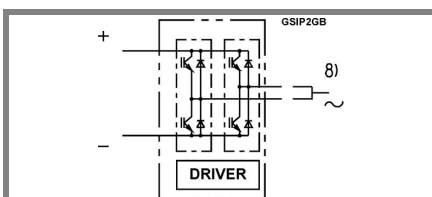
- CMOS compatible inputs
- Wide range power supply
- Integrated circuitry to sense phase current, heat sink temperature
- Short circuit protection
- Over current protection
- Over voltage protection (option)
- Power supply protection against under voltage
- Interlock of top/bottom switch
- Isolation by transformers
- Fibre optic interface (option for GB-types only)
- IEC 60068-1 (climate) 40/85/56

Absolute Maximum Ratings		$T_a = 25\text{ °C}$ 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/ $\mu$ s
$V_{isolIO}$	input / output (AC, rms, )	4000	V
$V_{isolPD}$	partial discharge extinction voltage, rms, $Q_{PD}$ pC;	1500	V
$V_{isol12}$	output 1 / output 2 (AC, rms, )	1500	V
$f_{sw}$	switching frequency	14	kHz
$f_{out}$	output frequency for $I_{peak(1)}=I_C$	14	kHz
$T_{op}$ ( $T_{stg}$ )	operating / storage temperature	- 40 ... + 85	°C

Characteristics		$T_a = 25\text{ °C}$ unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
$V_{S2}$	supply voltage non stabilized	13	24	30	V
$I_{S2}$	$V_{S2} = 13V - 30V$	$210+29*f/kHz+0,00023*(I_{AC}/A)^2$			mA
$V_{IT+}$	input threshold voltage (High)			12,3	V
$V_{IT-}$	input threshold voltage (Low)	4,6			V
$R_{IN}$	input resistance		10		k $\Omega$
$C_{IN}$	input capacitance		1		nF
$t_{d(on)IO}$	input-output turn-on propagation time		1,4		$\mu$ s
$t_{d(off)IO}$	input-output turn-off propagation time		1,4		$\mu$ s
$t_{pERRRESET}$	error memory reset time		12,2		$\mu$ s
$t_{TD}$	top / bottom switch interlock time		3,3		$\mu$ s
$I_{analogOUT}$	max. 5mA; 8 V corresponds to 15 V supply voltage for external components		1000		A
$I_{s1out}$	max. load current			50	mA
$I_{TRIPSC}$	over current trip level ( $I_{analog OUT} = 10 V$ )		1250		A
$T_{tp}$	over temperature protection	110		120	°C
$U_{DCTRIP}$	$U_{DC}$ -protection ( $U_{analog OUT} = 9 V$ ); (option for GB types)		not implemented		V

For electrical and thermal design support please use SEMISEL.  
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Case S23