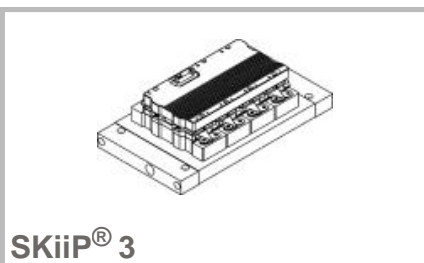




# SKiIP 2403GB172-4DW



SKiIP® 3

## 2-pack-integrated intelligent Power System

### SKiIP 2403GB172-4DW

#### Power section

#### 2-pack integrated gate driver

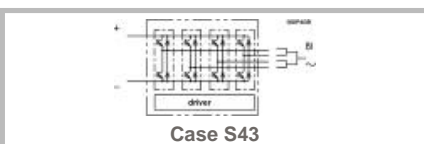
#### Data

#### 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

#### 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



Case S43

Absolute Maximum Ratings		T <sub>s</sub> = 25°C unless otherwise specified	
Symbol	Conditions	Values	Units
<b>IGBT</b>			
V <sub>CES</sub>		1700	V
V <sub>CC</sub> <sup>1)</sup>	Operating DC link voltage	1200	V
V <sub>GES</sub>		±20	V
I <sub>C</sub>	T <sub>s</sub> = 25 (70) °C	2400 (1800)	A
<b>Inverse diode</b>			
I <sub>F</sub> = -I <sub>C</sub>	T <sub>s</sub> = 25 (70) °C	1800 (1400)	A
I <sub>FSM</sub>	T <sub>j</sub> = 150 °C, t <sub>p</sub> = 10 ms; sin.	13500	A
I <sub>q</sub> (Diode)	Diode, T <sub>j</sub> = 150 °C, 10 ms	911	kA*s
T <sub>j</sub> , (T <sub>stg</sub> )		- 40 ... + 150 (125)	°C
V <sub>isol</sub>	rms, AC, 1 min, main terminals to heat sink	4000	V
I <sub>AC-terminal</sub>	per AC terminal, rms, T <sub>s</sub> = 70 °C, T <sub>terminal</sub> < 115 °C	400	A

Characteristics		T <sub>s</sub> = 25°C unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
V <sub>CEsat</sub>	I <sub>C</sub> = 1200 A, T <sub>j</sub> = 25 (125) °C;		1,9 (2,2)	2,4	V
V <sub>CEO</sub>	T <sub>j</sub> = 25 (125) °C; at terminal		1 (0,9)	1,2 (1,1)	V
r <sub>CE</sub>	T <sub>j</sub> = 25 (125) °C; at terminal		0,8 (1)	1 (1,3)	mΩ
I <sub>CES</sub>	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = V <sub>CES</sub> , T <sub>j</sub> = 25 (125) °C		4,8 (288)		mA
E <sub>on</sub> + E <sub>off</sub>	I <sub>C</sub> = 1200 A, V <sub>CC</sub> = 900 V		780		mJ
	T <sub>j</sub> = 125 °C, V <sub>CC</sub> = 1200 V		1150		mJ
R <sub>CC+EE</sub>	terminal chip, T <sub>j</sub> = 25 °C		0,13		mΩ
L <sub>CE</sub>	top, bottom		3		nH
C <sub>CHC</sub>	per phase, AC-side		4		nF
<b>Inverse diode</b>					
V <sub>F</sub> = V <sub>EC</sub>	I <sub>F</sub> = 1200 A, T <sub>j</sub> = 25 (125) °C		2 (1,8)	2,15	V
V <sub>TO</sub>	T <sub>j</sub> = 25 (125) °C		1,1 (0,8)	1,2 (0,9)	V
r <sub>T</sub>	T <sub>j</sub> = 25 (125) °C		0,8 (0,8)	0,8 (0,9)	mΩ
E <sub>rr</sub>	I <sub>C</sub> = 1200 A, V <sub>CC</sub> = 900 V		144		mJ
	T <sub>j</sub> = 125 °C, V <sub>CC</sub> = 1200 V		171		mJ
<b>Mechanical data</b>					
M <sub>dc</sub>	DC terminals, SI Units	6		8	Nm
M <sub>ac</sub>	AC terminals, SI Units	13		15	Nm
w	SKiIP® 3 System w/o heat sink		3,1		kg
w	heat sink		6,2		kg

Thermal characteristics (NWK 40; 8l/min; 50%glyc.); "s" reference to heat sink; "r" reference to built-in temperature sensor (acc. IEC 60747-15)					
R <sub>th(j-s)</sub>	per IGBT			0,013	K/W
R <sub>th(j-s)D</sub>	per diode			0,025	K/W
Z <sub>th</sub>	R <sub>i</sub> (mK/W) (max. values)				tau <sub>i</sub> (s)
	1	2	3	4	1
Z <sub>th(j-r)</sub>	1,2	5	5,8	0	69
Z <sub>th(j-r)D</sub>	2	3	13,5	13,5	50
Z <sub>th(r-a)</sub>	2,7	4,6	1,1	0,6	48
					15
					2,8
					0,4

Absolute Maximum Ratings		T <sub>a</sub> = 25°C unless otherwise specified	
Symbol	Conditions	Values	Units
V <sub>S2</sub>	unstabilized 24 V power supply	30	V
V <sub>i</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, 2s)	4000	V
V <sub>isolPD</sub>	partial discharge extinction voltage, rms, Q <sub>PD</sub> ≤ 10 pC;	1500	V
V <sub>isol12</sub>	output 1 / output 2 (AC, rms, 2s)	1500	V
	switching frequency	7	kHz

$f_{sw}$					
$f_{out}$	output frequency for $I_{peak(1)}=I_C$		7		kHz
$T_{op}$ ( $T_{stg}$ )	operating / storage temperature		- 40 ... + 85		°C
<b>Characteristics</b> <span style="float: right;">(<math>T_a = 25^\circ\text{C}</math>)</span>					
Symbol	Conditions	min.	typ.	max.	Units
$V_{S2}$	supply voltage non stabilized	13	24	30	V
$I_{S2}$	$V_{S2} = 24\text{ V}$	$430+45*f/\text{kHz}+0,00011*(I_{AC}/\text{A})$			mA
			2		
$V_{IT+}$	input threshold voltage (High)			12,3	V
$V_{IT-}$	input threshold voltage (Low)	4,6			V
$R_{IN}$	input resistance		10		kΩ
$C_{IN}$	input capacitance		1		nF
$t_{d(on)IO}$	input-output turn-on propagation time		1,3		μs
$t_{d(off)IO}$	input-output turn-off propagation time		1,3		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 15 V supply voltage for external components		2000		A
$I_{s1out}$	max. load current			50	mA
$I_{TRIPSC}$	over current trip level ( $I_{analog\ OUT} = 10\text{ V}$ )		2500		A
$T_{tp}$	over temperature protection	110		120	°C
$U_{DCTRIP}$	$U_{DC}$ -protection ( $U_{analog\ OUT} = 9\text{ V}$ ); (option for GB types)		not implemented		V

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