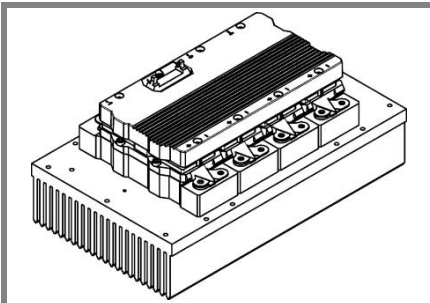


# SKiiP 2413GB123-4DL



SKiiP® 3

## 2-pack-integrated intelligent Power System

### Power section

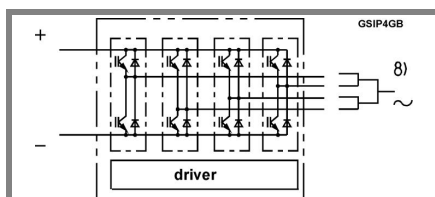
#### SKiiP 2413GB123-4DL

Data

### Power section 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 60068-1 (climate) 40/125/56
- UL recognized File no. E63532

- 1) with assembly of suitable MKP capacitor per terminal
- 8) AC connection busbars must be connected by the user; copper busbars available on request



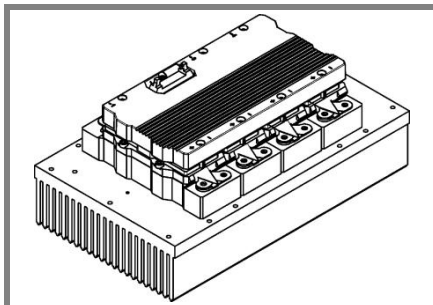
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Absolute Maximum Ratings		$T_s = 25^\circ\text{C}$ unless otherwise specified	
Symbol	Conditions	Values	Units
<b>IGBT</b>			
$V_{CES}$	Operating DC link voltage	1200	V
$V_{CC}^{1)}$		900	V
$V_{GES}$		$\pm 20$	V
$I_C$	$T_s = 25 (70)^\circ\text{C}$	2400 (1800)	A
<b>Inverse diode</b>			
$I_F = -I_C$	$T_s = 25 (70)^\circ\text{C}$	1860 (1400)	A
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10$ ms; sin.	13500	A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10 ms	911	kA <sup>2</sup> s
$T_j$ , ( $T_{stg}$ )	rms, AC, 1 min, main terminals to heat sink per AC terminal, rms, $T_s = 70^\circ\text{C}$ , $T_{terminal} < 115^\circ\text{C}$	- 40 ... + 150 (125)	$^\circ\text{C}$
$V_{isol}$		3000	V
$I_{AC-terminal}$		400	A

Characteristics		$T_s = 25^\circ\text{C}$ unless otherwise specified						
Symbol	Conditions	min.	typ.	max.	Units			
<b>IGBT</b>								
$V_{CEsat}$	$I_C = 1200$ 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)	V			
$r_{CE}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal		0,7 (0,9)	0,9 (1,2)	m $\Omega$			
$I_{CES}$	$V_{GE} = 0$ V, $V_{CE} = V_{CES}$ , $T_j = 25 (125)^\circ\text{C}$		4,8 (144)		mA			
$E_{on} + E_{off}$	$I_C = 1200$ A, $V_{CC} = 600$ V		442		mJ			
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 900$ V		780		mJ			
$R_{CC+EE}$	terminal chip, $T_j = 25^\circ\text{C}$		0,13		m $\Omega$			
$L_{CE}$	top, bottom		3		nH			
$C_{CHC}$	per phase, AC-side		6,8		nF			
<b>Inverse diode</b>								
$V_F = V_{EC}$	$I_F = 1200$ 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			
$r_T$	$T_j = 25 (125)^\circ\text{C}$		0,5 (0,7)	0,6 (0,8)	m $\Omega$			
$E_{rr}$	$I_C = 1200$ A, $V_{CC} = 600$ V		84		mJ			
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 900$ V		112		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		3,1		kg			
w	heat sink		9,7		kg			
<b>Thermal characteristics (PX 16 heat sink with fan SKF 16B-230-1); "s" reference to heat sink; "r" reference to built-in temperature sensor</b>								
$R_{th(j-s)I}$	per IGBT			0,015	K/W			
$R_{th(j-s)D}$	per diode			0,029	K/W			
$Z_{th}$	$R_i$ (mK/W) (max. values)	tau,(s)						
		1	2	3	4			
$Z_{th(j-r)I}$	5,6	6	6,4	0	363	0,18	0,04	1
$Z_{th(j-r)D}$	10	8,4	14,8	14,8	50	5	0,25	0,04
$Z_{th(r-a)}$	3,1	17,3	3,7	0,9	230	78	13	0,4

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# SKiiP 2413GB123-4DL



SKiiP® 3

## 2-pack-integrated intelligent Power System

2-pack  
integrated gate driver  
SKiiP 2413GB123-4DL

Data

### Gate driver features

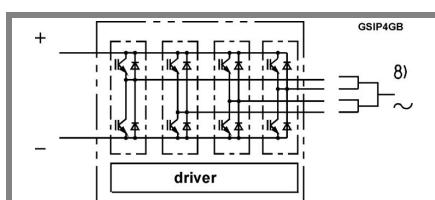
- CMOS compatible inputs
- Wide range power supply
- Integrated circuitry to sense phase current, heat sink temperature and DC-bus voltage (option)
- Short circuit protection
- Over current protection
- Over voltage protection (option)
- Power supply protected against under voltage
- Interlock of top/bottom 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/ $\mu\text{s}$
$V_{isolIO}$	input / output (AC, rms, 2s)	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
$f_{sw}$	switching frequency	8	kHz
$f_{out}$	output frequency for $I_{peak(1)} = I_C$	8	kHz
$T_{op} (T_{stg})$	operating / storage temperature	- 40 ... + 85	$^\circ\text{C}$

Characteristics		$(T_a = 25^\circ\text{C})$			
Symbol	Conditions	min.	typ.	max.	Units
$V_{S2}$	supply voltage non stabilized	13	24	30	V
$I_{S2}$	$V_{S2} = 24$ V	$324 + 50 \cdot f / \text{kHz} + 0,00011 \cdot (I_{AC}/A)^2$			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		1,3		$\mu\text{s}$
$t_{d(off)IO}$	input-output turn-off propagation time		1,3		$\mu\text{s}$
$t_{pERRRESET}$	error memory reset time		9		$\mu\text{s}$
$t_{TD}$	top / bottom switch interlock time		3,3		$\mu\text{s}$
$I_{analogOUT}$	max. 5mA; 8 V corresponds to 15 V supply voltage for external components		2400		A
$I_{s1out}$	max. load current			50	mA
$I_{TRIPSC}$	over current trip level ( $I_{analog OUT} = 10$ V)		3000		A
$T_{tp}$	over temperature protection	110		120	$^\circ\text{C}$
$U_{DCTRIP}$	$U_{DC}$ -protection ( $U_{analog OUT} = 9$ V); (option for GB types)		not implemented		V

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