

**SKiiP<sup>®</sup> 2**

## 6-pack - integrated intelligent Power System

### Power section

#### SKiiP 292GD170-375CTV

### Features

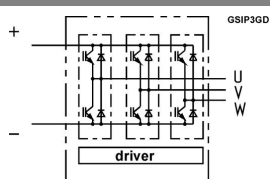
- SKiiP technology inside
- Low loss IGBTs
- CAL diode technology
- Integrated current sensor
- Integrated temperature sensor
- Integrated heat sink
- IEC 60721-3-3 (humidity) class 3K3/IE32 (SKiiP<sup>®</sup> 2 System)
- IEC 68T.1 (climate) 40/125/56 (SKiiP<sup>®</sup> 2 power section)

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

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
$I_C$	$T_s = 25\text{ (70) °C}$	250 (188)	A
<b>Inverse diode</b>			
$I_F = -I_C$	$T_s = 25\text{ (70) °C}$	250 (188)	A
$I_{FSM}$	$T_j = 150\text{ °C}$ , $t_p = 10\text{ ms}$ ; sin.	2160	A
$I^2t$ (Diode)	Diode, $T_j = 150\text{ °C}$ , 10 ms	23	kA <sup>2</sup> s
$T_j, (T_{stg})$	AC, 1 min. (mainterminals to heat sink)	- 40 (- 25) ... + 150 (125)	°C
$V_{isol}$		4000	V

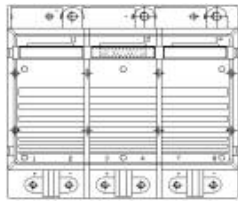
Characteristics		$T_s = 25\text{ °C}$ unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{CESat}$	$I_C = 200\text{ A}$ , $T_j = 25\text{ (125) °C}$		3,3 (4,3)	3,9	V
$V_{CEO}$	$T_j = 25\text{ (125) °C}$		1,7 (2)	2 (2,3)	V
$r_{CE}$	$T_j = 25\text{ (125) °C}$		8,1 (11,7)	9,6 (13,2)	mΩ
$I_{CES}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = V_{CES}$ , $T_j = 25\text{ (125) °C}$		(15)	1	mA
$E_{on} + E_{off}$	$I_C = 200\text{ A}$ , $V_{CC} = 900\text{ V}$ $T_j = 125\text{ °C}$ , $V_{CC} = 1200\text{ V}$			173	mJ
					254
$R_{CC'} + EE'$	terminal chip, $T_j = 125\text{ °C}$		0,5		mΩ
$L_{CE}$	top, bottom		15		nH
$C_{CHC}$	per phase, AC-side		0,8		nF
<b>Inverse diode</b>					
$V_F = V_{EC}$	$I_F = 200\text{ A}$ , $T_j = 25\text{ (125) °C}$		2,3 (2,1)	2,9	V
$V_{TO}$	$T_j = 25\text{ (125) °C}$		1,3 (1)	1,6 (1,3)	V
$r_T$	$T_j = 25\text{ (125) °C}$		5 (5,6)	6,3 (7)	mΩ
$E_{rr}$	$I_C = 200\text{ A}$ , $V_{CC} = 900\text{ V}$ $T_j = 125\text{ °C}$ , $V_{CC} = 1200\text{ V}$			21	mJ
					25
<b>Mechanical data</b>					
$M_{dc}$	DC terminals, SI Units	6		8	Nm
$M_{ac}$	AC terminals, SI Units	13		15	Nm
w	SKiiP <sup>®</sup> 2 System w/o heat sink		2,7		kg
w	heat sink		6,6		kg

Thermal characteristics (P16 heat sink; 295 m <sup>3</sup> /h); " r " reference to temperature sensor						
$R_{th(j-s)I}$	per IGBT				0,08	K/W
$R_{th(j-s)D}$	per diode				0,267	K/W
$R_{th(s-a)}$	per module				0,036	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	62	10		1
$Z_{th(j-r)D}$		29	205	32		0,13
$Z_{th(r-a)}$		11,1	18,3	3,5	3,1	0,001
						0,13
						0,001
						6
						0,02



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**SKiiP® 2**

## 6-pack - integrated intelligent Power System

**6-pack integrated gate driver**

**SKiiP 292GD170-375CTV**

### Gate driver features

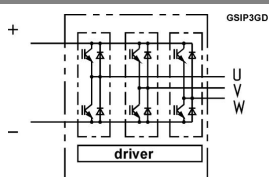
- CMOS compatible inputs
- Wide range power supply
- Integrated circuitry to sense phase current, heat sink temperature and DC-bus voltage (option)
- Short circuit protection
- Over current protection
- Over voltage protection (option)
- Power supply protected against under voltage
- Interlock of top/bottom switch
- Isolation by transformers
- Fibre optic interface (option for GB-types only)
- IEC 68T.1 (climate) 25/85/56 (SKiiP® 2 gate driver)

Absolute Maximum Ratings			
Symbol	Conditions	Values	Units
$V_{S1}$	stabilized 15 V power supply	18	V
$V_{S2}$	unstabilized 24 V power supply	30	V
$V_{iH}$	input signal voltage (high)	15 + 0,3	V
dv/dt	secondary to primary side	75	kV/ $\mu$ s
$V_{isolIO}$	input / output (AC, r.m.s., 2s )	4000	Vac
$V_{isol12}$	output 1 / output 2 (AC, r.m.s., 2s )	1500	Vac
$f_{max}$	switching frequency	20	kHz
$T_{op} (T_{stg})$	operating / storage temperature	- 25 ... + 85	°C

Characteristics				$T_a = 25\text{ }^\circ\text{C}$	
Symbol	Conditions	min.	typ.	max.	Units
$V_{S1}$	supply voltage stabilized	14,4	15	15,6	V
$V_{S2}$	supply voltage non stabilized	20	24	30	V
$I_{S1}$	$V_{S1} = 15\text{ V}$	$340+550 \cdot f/f_{max} + 3,5 \cdot (I_{AC}/A)$			mA
$I_{S2}$	$V_{S2} = 24\text{ V}$	$250+400 \cdot f/f_{max} + 2,6 \cdot (I_{AC}/A)$			mA
$V_{iT+}$	input threshold voltage (High)	11,2			V
$V_{iT-}$	input threshold voltage (Low)	5,4			V
$R_{IN}$	input resistance	10			k $\Omega$
$t_{d(on)IO}$	input-output turn-on propagation time	1,2			$\mu$ s
$t_{d(off)IO}$	input-output turn-off propagation time	3			$\mu$ s
$t_{pERRRESET}$	error memory reset time	9			$\mu$ s
$t_{TD}$	top / bottom switch : interlock time	2,3			$\mu$ s
$I_{analogOUT}$	8 V corresponds to max. current of 15 V supply voltage (available when supplied with 24 V)	250			A
$I_{Vs1outmax}$	output current at pin 13/20/22/24/26	50			mA
$I_{A0max}$	logic low output voltage	5			mA
$V_{0l}$	logic high output voltage	0,6			V
$V_{0H}$	logic high output voltage	30			V
$I_{TRIPSC}$	over current trip level ( $I_{analog OUT} = 10\text{ V}$ )	313			A
$I_{TRIPLG}$	ground fault protection	72			A
$T_{tp}$	over temperature protection	110	120		°C
$U_{DCTRIP}$	trip level of $U_{DC}$ -protection ( $U_{analog OUT} = 9\text{ V}$ ); (option)	1200			V

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