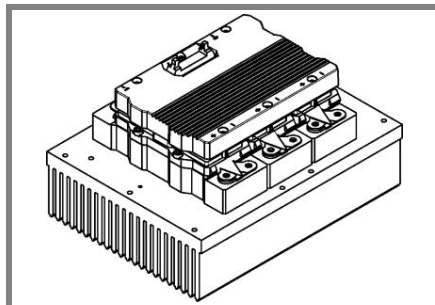


# SKiiP 513GD172-3DUL



SKiiP® 3

## 6-pack-integrated intelligent Power System

### Power section

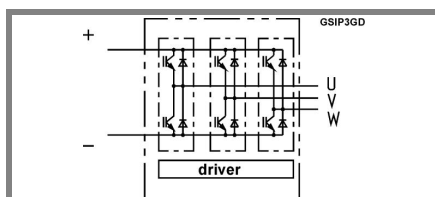
SKiiP 513GD172-3DUL

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



Case S33

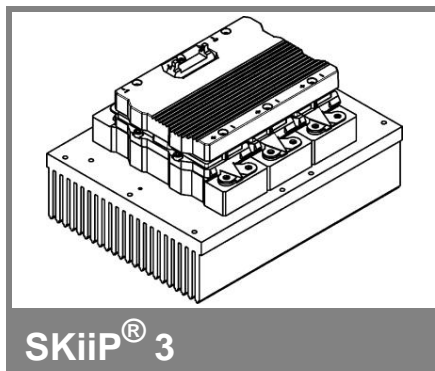
Absolute Maximum Ratings		$T_s = 25^\circ\text{C}$ unless otherwise specified	
Symbol	Conditions	Values	Units
<b>IGBT</b>			
$V_{CES}$	Operating DC link voltage	1700	V
$V_{CC}^{1)}$		1200	V
$V_{GES}$		$\pm 20$	V
$I_C$	$T_s = 25 (70)^\circ\text{C}$	500 (375)	A
<b>Inverse diode</b>			
$I_F = -I_C$	$T_s = 25 (70)^\circ\text{C}$	400 (300)	A
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10\text{ ms}$ ; sin	3500	A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10 ms	61	$\text{kA}^2\text{s}$
$T_j, (T_{stg})$	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)	$^\circ\text{C}$
$V_{isol}$		4000	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>					
$V_{CEsat}$	$I_C = 300\text{ A}$ , $T_j = 25 (125)^\circ\text{C}$ ; 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		3 (4,1)	3,9 (5)	$\text{m}\Omega$
$I_{CES}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = V_{CES}$ , $T_j = 25 (125)^\circ\text{C}$		1,2 (72)		mA
$E_{on} + E_{off}$	$I_C = 300\text{ A}$ , $V_{CC} = 900\text{ V}$		195		mJ
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 1200\text{ V}$		288		mJ
$R_{CC+EE'}$	terminal chip, $T_j = 25^\circ\text{C}$		0,5		$\text{m}\Omega$
$L_{CE}$	top, bottom		12		nH
$C_{CHC}$	per phase, AC-side		1,7		nF
<b>Inverse diode</b>					
$V_F = V_{EC}$	$I_F = 300\text{ A}$ , $T_j = 25 (125)^\circ\text{C}$ ; measured at terminal		1,9 (1,7)	2,4	V
$V_{TO}$	$T_j = 25 (125)^\circ\text{C}$		1,1 (0,8)	1,4 (1,1)	V
$r_T$	$T_j = 25 (125)^\circ\text{C}$		2,6 (2,9)	3,4 (3,7)	$\text{m}\Omega$
$E_{rr}$	$I_C = 300\text{ A}$ , $V_{CC} = 900\text{ V}$		36		mJ
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 1200\text{ V}$		43		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
<b>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)</b>					
$R_{th(j-s)I}$	per IGBT			0,059	K/W
$R_{th(j-s)D}$	per diode			0,115	K/W
$Z_{th}$	$R_i$ (mK/W) (max. values)			$\tau_{th}(s)$	
	1 2 3 4	1 2 3 4			
$Z_{th(j-r)I}$	10,2 28,8 21 0	363 0,18 0,04 1			
$Z_{th(j-r)D}$	36 36 54 60	30 5 0,25 0,04			
$Z_{th(r-a)}$	2,1 20 5,5 1,4	210 85 11 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 513GD172-3DUL



## 6-pack-integrated intelligent Power System

### 6-pack integrated gate driver SKiiP 513GD172-3DUL

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 transformer
- 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)	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, 2s)	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	$- 40 \dots + 85$	$^\circ\text{C}$

Characteristics		$(T_a = 25^\circ\text{C})$			
Symbol	Conditions	min.	typ.	max.	Units
$V_{S2}$	supply voltage non stabilized	13	24	30	V
$I_{S2}$	$V_{S2} = 24 \text{ V}$	$420 + 34 \cdot f / \text{kHz} + 0,00015 \cdot (I_{AC} / \text{A})^2$			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		$\mu\text{s}$
$I_{analogOUT}$	max. 5mA; 8 V corresponds to 15 V supply voltage for external components		500		A
$I_{s1out}$	max. load current			50	mA
$I_{TRIPSC}$	over current trip level ( $I_{analog OUT} = 10 \text{ V}$ )		625		A
$T_{tp}$	over temperature protection	110		120	$^\circ\text{C}$
$U_{DCTRIPO}$	$U_{DC}$ -protection ( $U_{analog OUT} = 9 \text{ V}$ ); ( )		1200		V

For electrical and thermal design support please use SEMISEL.

Access to SEMISEL is via SEMIKRON website <http://www.semikron.com>.

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