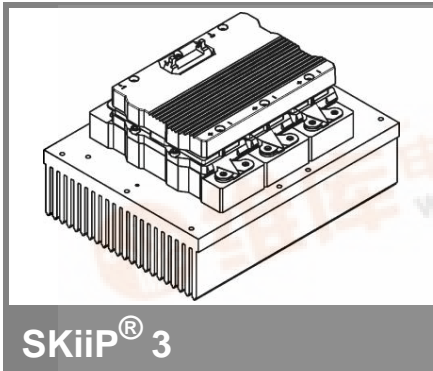


# SKiIP 513GD172-3DUL



## 6-pack-integrated intelligent Power System

### Power section

#### SKiIP 513GD172-3DUL

Preliminary Data

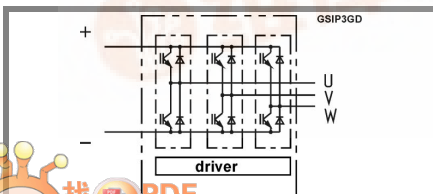
### Features

- 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

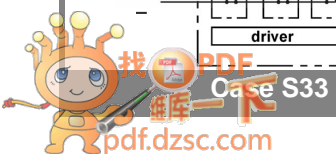
1) with assembly of suitable MKP capacitor per terminal (SEMIKRON type is recommended)

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
$I_{FSM}$	$T_j = 150^\circ\text{C}$ , $t_p = 10$ ms; sin	3500	A
$I^2t$ (Diode)	Diode, $T_j = 150^\circ\text{C}$ , 10 ms	61	$\text{kA}^2\text{s}$
$T_j$ ; ( $T_{stg}$ )		- 40 ... + 150 (125)	$^\circ\text{C}$
$V_{isol}$	rms, AC, 1 min, main terminals to heat sink	4000	V
$I_{AC-terminal}$	per AC terminal, rms, $T_s = 70^\circ\text{C}$ ,	400	A
	$T_{terminal} < 115^\circ\text{C}$		

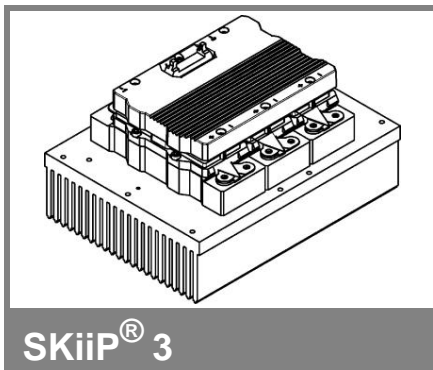
Characteristics		$T_s = 25^\circ\text{C}$ unless otherwise specified							
Symbol	Conditions	min.	typ.	max.	Units				
<b>IGBT</b>									
$V_{CEsat}$	$I_C = 300$ A, $T_j = 25 (125)^\circ\text{C}$ ; measured at terminal		1,9 (2,2)	2,4	V				
$V_{CEO}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal		1 (0,9)	1,2 (1,1)	V				
$r_{CE}$	$T_j = 25 (125)^\circ\text{C}$ ; at terminal		3 (4,1)	3,9 (5)	$\text{m}\Omega$				
$I_{CES}$	$V_{GE} = 0$ V, $V_{CE} = V_{CES}$ , $T_j = 25 (125)^\circ\text{C}$		1,2 (72)		mA				
$E_{on} + E_{off}$	$I_C = 300$ A, $V_{CC} = 900$ V		195		mJ				
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 1200$ 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>									
$V_F = V_{EC}$	$I_F = 300$ 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)	$\text{m}\Omega$				
$E_{rr}$	$I_C = 300$ A, $V_{CC} = 900$ V		36		mJ				
	$T_j = 125^\circ\text{C}$ , $V_{CC} = 1200$ 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 <sub>i</sub> (s)							
		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



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# SKiiP 513GD172-3DUL



SKiiP® 3

## 6-pack-integrated intelligent Power System

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

Preliminary 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/ $\mu\text{s}$
$V_{\text{isolIO}}$	input / output (AC, rms, 2s)	4000	V
$V_{\text{isolPD}}$	partial discharge extinction voltage, rms, $Q_{\text{PD}} \leq 10$ pC;	1500	V
$V_{\text{isol12}}$	output 1 / output 2 (AC, rms, 2s)	1500	V
$f_{\text{sw}}$	switching frequency	14	kHz
$f_{\text{out}}$	output frequency for $I = I_C$ ; sin.	1	kHz
$T_{\text{op}} (T_{\text{stg}})$	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	$420 + 34 \cdot f / \text{kHz} + 0,00015 \cdot (I_{AC} / \text{A})^2$			mA	
$V_{\text{IT+}}$	input threshold voltage (High)				12,3	V
$V_{\text{IT-}}$	input threshold voltage (Low)	4,6				V
$R_{\text{IN}}$	input resistance				10	k $\Omega$
$C_{\text{IN}}$	input capacitance				1	nF
$t_{\text{d(on)IO}}$	input-output turn-on propagation time				1,3	$\mu\text{s}$
$t_{\text{d(off)IO}}$	input-output turn-off propagation time				1,3	$\mu\text{s}$
$t_{\text{pERRRESET}}$	error memory reset time				9	$\mu\text{s}$
$t_{\text{TD}}$	top / bottom switch interlock time				3,3	$\mu\text{s}$
$I_{\text{analogOUT}}$	max. 5mA; 8 V corresponds to 15 V supply voltage for external components				500	A
$I_{\text{s1out}}$	max. load current				50	mA
$I_{\text{TRIPSC}}$	over current trip level ( $I_{\text{analog OUT}} = 10$ V)				625	A
$T_{\text{tp}}$	over temperature protection	110			120	$^\circ\text{C}$
$U_{\text{DCTRIP}}$	$U_{\text{DC}}$ -protection ( $U_{\text{analog OUT}} = 9$ V); ( )				1200	V

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