

SKiP 513GD173-3DUL

I. Power section

Absolute maximum ratings		$T_s = 25^\circ\text{C}$ unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}	Operating DC link voltage	1700	V
$V_{CC}^{1)}$		1200	V
V_{GES}		± 20	V
I_C		$T_s = 25 (70)^\circ\text{C}$	500 (375)
Inverse diode			
$I_F = -I_C$	$T_s = 25 (70)^\circ\text{C}$	375 (280)	A
I_{FSM}	$T_j = 150^\circ\text{C}$, $t_p = 10\text{ms}$; sin	4320	A
I^2t (Diode)	Diode, $T_j = 150^\circ\text{C}$, 10ms	93	kA^2s
$T_j, (T_{stg})$		-40...+150 (125)	$^\circ\text{C}$
V_{isol}	rms, AC, 1min	4000	V
$I_{AC-terminal}$	per AC terminal, rms, $T_s = 70^\circ\text{C}$, $T_{terminal} < 115^\circ\text{C}$	400	A

Characteristics $T_s = 25^\circ\text{C}$ unless otherwise specified									
Symbol	Conditions	min.	typ.	max.	Units				
IGBT									
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 (0,9)	1,2 (1,1)	V				
r_{CE}	$T_j = 25 (125)^\circ\text{C}$; at terminal	-	3,0 (4,1)	3,9 (5,0)	$\text{m}\Omega$				
I_{CES}	$V_{GE}=0, V_{CE}=V_{CES}, T_j=25(125)^\circ\text{C}$	-	1,2 (72)	-	mA				
$E_{on} + E_{off}$	$I_C=300\text{A}$, $V_{CC}=900\text{V}$	-	242	-	mJ				
	$T_j=125^\circ\text{C}$, $V_{CC}=1200\text{V}$	-	357	-	mJ				
L_{CE}	top, bottom	-	12	-	nH				
C_{CHC}	per phase, AC side	-	1,7	-	nF				
R_{CC-EE}	terminal-chip, $T_j=25^\circ\text{C}$	-	0,50	-	$\text{m}\Omega$				
Inverse diode									
$V_F = V_{EC}$	$I_F = 300\text{A}$; $T_j = 25(125)^\circ\text{C}$ measured at terminal	-	1,6 (1,5)	2,0	V				
V_{TO}	$T_j = 25 (125)^\circ\text{C}$	-	1,1 (0,8)	1,3 (1,0)	V				
r_T	$T_j = 25 (125)^\circ\text{C}$	-	1,7 (2,3)	2,3 (3,0)	$\text{m}\Omega$				
E_{RR}	$I_C=300\text{A}$, $V_{CC}=900\text{V}$	-	43	-	mJ				
	$T_j=125^\circ\text{C}$, $V_{CC}=1200\text{V}$	-	51	-	mJ				
Mechanical data									
M_{dc}	DC terminals, SI Units	6	-	8	Nm				
M_{ac}	AC terminals, SI Units	13	-	15	Nm				
w	SKiP [®] 3 System w/o heat sink	-	2,4	-	kg				
w	heat sink	-	7,5	-	kg				
Thermal characteristics (PX16 heat sink with fan SKF16B-230-1); "s" reference to heat sink; "r" reference to built-in temperature sensor (acc. IEC 60747-15)									
$R_{thjsIGBT}$	per IGBT	-	-	0,059	$^\circ\text{C/W}$				
$R_{thjsdiode}$	per diode	-	-	0,115	$^\circ\text{C/W}$				
Z_{th}	R_i (mK/W) (max. values)					τ_i (s)			
		1	2	3	4				
$IGBT_{jr}$		10,2	28,8	21,0	0,0	363,0	0,18	0,04	1,0
$diode_{jr}$		36,0	36,0	54,0	60,0	30,0	5,0	0,25	0,04
$heatsink_{ra}$		2,1	20,0	5,5	1,4	210	85	11,0	0,4

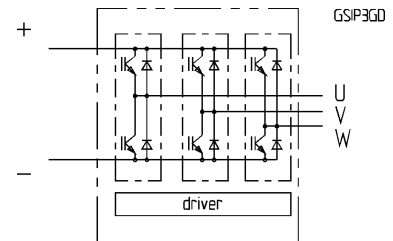
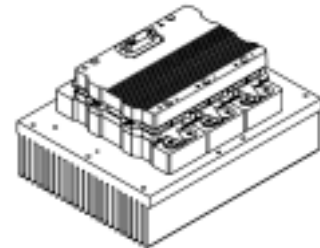
SKiP[®] 3

SK integrated intelligent Power 6-pack

SKiP 513GD173-3DUL

Preliminary data

Case S33



Features

- SKiP 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 (SKiP[®] 3 System)
- IEC 68T.1 (climate) 40/125/56 (SKiP[®] 3 power section)
- UL recognized File no. E63532 (SKiP[®] 3 power section)

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

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SKiiP 513GD173-3DUL

SKiiP 3®

SK integrated intelligent Power

SKiiP 513GD173-3DUL

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 transformers
- fibre optic interface (option for GB-types only)
- IEC 68T.1 (climate) 40/85/56 (SKiiP® 3 gate driver)

II. Integrated gate driver

Absolute maximum ratings

Symbol	Term	Value	Unit
V _{S2}	Unstabilized 24V power supply	30	V
V _{iH}	Input signal voltage (high)	15 + 0,3	V
dv/dt	Secondary to primary side	75	kV/μs
V _{isolIO}	Input / output (AC, rms, 2 s)	4000	V
V _{isolPD}	Partial discharge extinction voltage, rms, Q _{PD} ≤ 10 pC;	1500	V
V _{isol12}	Output 1 / output 2 (AC, rms, 2s)	1500	V
f	Switching frequency	13	kHz
T _{op} (T _{stg})	Operating / storage temperature	- 40 ... + 85	°C

Electrical characteristics (T_a = 25 °C)

Symbol	Term	Values			Units
		min	typ	max.	
V _{S2}	Supply voltage non stabilized	13	24	27	V
I _{S2}	V _{S2} = 24V	365 + 45*f / kHz + 0,00111 * (I _{AC} /A) ²			mA
V _{IT+}	Input threshold voltage (High)	11,2	–	–	V
V _{IT-}	Input threshold voltage (Low)	–	–	5,4	V
R _{in}	Input resistance	–	10	–	kΩ
C _{in}	Input capacitance	–	1	–	nF
t _{d(on)IO}	input-output turn-on propagation time	–	1,1	–	μs
t _{d(off)IO}	input-output turn-off propagation time	–	1,1	–	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; max load current	–	500	–	A
I _{S1out}		–	–	50	mA
I _{TRIPSC}	over current trip level (I _{analog OUT} = 10V)	–	625	–	A
T _{tp}	over temperature protection	110	–	120	°C
U _{DCTRIP}	U _{DC} -protection (U _{analog OUT} = 9V) (option for GB types)	1200	–	–	V

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