

SKiiP® 2

6-pack - integrated intelligent Power System

Power section

SKiiP 402GD061-358CTV

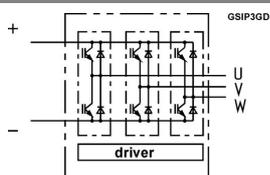
Features

- 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® 2 System)
- IEC 68T.1 (climate) 40/125/56 (SKiiP® 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
IGBT			
V_{CES}	Operating DC link voltage	600	V
$V_{CC}^{1)}$		400	V
V_{GES}		± 20	V
I_C	$T_s = 25\text{ (70) °C}$	400 (300)	A
Inverse diode			
$I_F = -I_C$	$T_s = 25\text{ (70) °C}$	400 (300)	A
I_{FSM}	$T_j = 150\text{ °C}$, $t_p = 10\text{ ms}$; sin.	4000	A
I^2t (Diode)	Diode, $T_j = 150\text{ °C}$, 10 ms	80	kA ² s
$T_j, (T_{stg})$	AC, 1 min. (mainterminals to heat sink)	- 40 (- 25) ... + 150 (125)	°C
V_{isol}		2500	V

Characteristics		$T_s = 25\text{ °C}$ unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
V_{CESat}	$I_C = 400\text{ A}$, $T_j = 25\text{ (125) °C}$		2,3 (2,6)	2,6	V
V_{CEO}	$T_j = 25\text{ (125) °C}$		0,8 (0,7)	1 (0,9)	V
r_{CE}	$T_j = 25\text{ (125) °C}$		3,8 (4,8)	4 (5)	mΩ
I_{CES}	$V_{GE} = 0\text{ V}$, $V_{CE} = V_{CES}$, $T_j = 25\text{ (125) °C}$		(20)	0,4	mA
$E_{on} + E_{off}$	$I_C = 400\text{ A}$, $V_{CC} = 300\text{ V}$ $T_j = 125\text{ °C}$, $V_{CC} = 400\text{ V}$			36	mJ
					53
$R_{CC'} + EE'$	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
Inverse diode					
$V_F = V_{EC}$	$I_F = 400\text{ A}$, $T_j = 25\text{ (125) °C}$		1,5 (1,5)	1,8	V
V_{TO}	$T_j = 25\text{ (125) °C}$		0,8 (0,6)	1 (0,8)	V
r_T	$T_j = 25\text{ (125) °C}$		1,8 (2,2)	1,9 (2,3)	mΩ
E_{rr}	$I_C = 400\text{ A}$, $V_{CC} = 300\text{ V}$ $T_j = 125\text{ °C}$, $V_{CC} = 400\text{ V}$			13	mJ
					15
Mechanical data					
M_{dc}	DC terminals, SI Units	6		8	Nm
M_{ac}	AC terminals, SI Units	13		15	Nm
w	SKiiP® 2 System w/o heat sink		2,7		kg
w	heat sink		6,6		kg
Thermal characteristics (P16 heat sink; 295 m³/h); " r " reference to temperature sensor					
$R_{th(j-s)I}$	per IGBT			0,111	K/W
$R_{th(j-s)D}$	per diode			0,2	K/W
$R_{th(s-a)}$	per module			0,036	K/W
Z_{th}	R_i (mK/W) (max. values)	tau _i (s)			
		1	2	3	4
$Z_{th(j-r)I}$		12	86	13	1
$Z_{th(j-r)D}$		22	154	24	0,13
$Z_{th(r-a)}$		11,1	18,3	3,5	0,001
					0,13
					0,001
					204
					60
					6
					0,02



Case S 3

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SKiiP® 2

6-pack - integrated intelligent Power System

6-pack integrated gate driver

SKiiP 402GD061-358CTV

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/ μ s
V_{isolIO}	input / output (AC, r.m.s., 2s)	2500	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}	$V_{S1} = 15\text{ V}$	$340+490 \cdot f/f_{max} + 3,5 \cdot (I_{CA}/A)$			mA
I_{S2}	$V_{S2} = 24\text{ V}$	$250+360 \cdot f/f_{max} + 2,6 \cdot (I_{AC}/A)$			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 Ω
$t_{d(on)IO}$	input-output turn-on propagation time	1,1			μ s
$t_{d(off)IO}$	input-output turn-off propagation time	1,4			μ s
$t_{pERRRESET}$	error memory reset time	9			μ s
t_{TD}	top / bottom switch : interlock time	2,3			μ s
$I_{analogOUT}$	8 V corresponds to max. current of 15 V supply voltage	330			A
$I_{Vs1outmax}$	(available when supplied with 24 V)	50			mA
I_{A0max}	output current at pin 13/20/22/24/26	5			mA
V_{0l}	logic low output voltage	0,6			V
V_{0H}	logic high output voltage	30			V
I_{TRIPSC}	over current trip level ($I_{analog OUT} = 10\text{ V}$)	413			A
I_{TRIPLG}	ground fault protection	96			A
T_{tp}	over temperature protection	110	120		°C
U_{DCTRIP}	trip level of U_{DC} -protection ($U_{analog OUT} = 9\text{ V}$); (option)	400			V

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