

DATASHEET

SEMIKRON
20NAB12T45

OTHER SYMBOLS:

RGB ELEKTRONIKA AGACIAK CIACIEK
SPÓŁKA JAWNA

Jana Długosza 2-6 Street
51-162 Wrocław
Poland

✉ biuro@rgbelektronika.pl

☎ +48 71 325 15 05



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SKiiP 22 NAB 12 - SKiiP 22 NAB 12 I

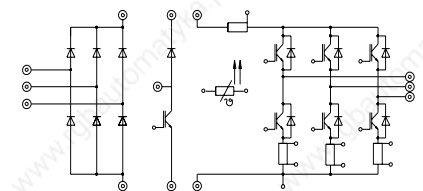
Absolute Maximum Ratings		Values	Units
Symbol	Conditions ¹⁾		
Inverter & Chopper			
V_{CES}		1200	V
V_{GES}		± 20	V
I_C	$T_{\text{heatsink}} = 25 / 80 \text{ }^\circ\text{C}$	23 / 15	A
I_{CM}	$t_p < 1 \text{ ms}; T_{\text{heatsink}} = 25 / 80 \text{ }^\circ\text{C}$	46 / 30	A
$I_F = -I_C$	$T_{\text{heatsink}} = 25 / 80 \text{ }^\circ\text{C}$	24 / 17	A
$I_{FM} = -I_{CM}$	$t_p < 1 \text{ ms}; T_{\text{heatsink}} = 25 / 80 \text{ }^\circ\text{C}$	48 / 34	A
Bridge Rectifier			
V_{RRM}		1500	V
I_D	$T_{\text{heatsink}} = 80 \text{ }^\circ\text{C}$	25	A
I_{FSM}	$t_p = 10 \text{ ms}; \sin. 180^\circ, T_j = 25 \text{ }^\circ\text{C}$	700	A
I^2t	$t_p = 10 \text{ ms}; \sin. 180^\circ, T_j = 25 \text{ }^\circ\text{C}$	2400	A ² s
T_j		- 40 ... + 150	$^\circ\text{C}$
T_{stg}		- 40 ... + 125	$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V

MiniSKiiP 2 SEMIKRON integrated intelligent Power SKiiP 22 NAB 12 SKiiP 22 NAB 12 I ³⁾ 3-phase bridge rectifier + braking chopper + 3-phase bridge inverter

Case M2



Characteristics		min.	typ.	max.	Units	
Symbol	Conditions ¹⁾					
IGBT - Inverter & Chopper						
V_{CESat}	$I_C = 15 \text{ A}$ $T_j = 25 (125) \text{ }^\circ\text{C}$	-	2,5(3,1)	3,0(3,7)	V	
$t_{d(on)}$	$V_{CC} = 600 \text{ V}; V_{GE} = \pm 15 \text{ V}$ $I_C = 15 \text{ A}; T_j = 125 \text{ }^\circ\text{C}$ $R_{gon} = R_{goff} = 82 \text{ }^\circ\Omega$ inductive load	-	55	110	ns	
t_r		-	45	90	ns	
$t_{d(off)}$		-	400	600	ns	
t_f		-	70	100	ns	
$E_{on} + E_{off}$		-	4,0	-	mJ	
C_{ies}	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}, 1 \text{ MHz}$	-	1,0	-	nF	
R_{thjh}	per IGBT	-	-	1,4	K/W	
Diode ²⁾ - Inverter & Chopper						
$V_F = V_{EC}$	$I_F = 15 \text{ A}$ $T_j = 25 (125) \text{ }^\circ\text{C}$	-	2,0(1,8)	2,5(2,3)	V	
V_{TO}	$T_j = 125 \text{ }^\circ\text{C}$	-	1,0	1,2	V	
r_T	$T_j = 125 \text{ }^\circ\text{C}$	-	53	73	m Ω	
I_{RRM}	$I_F = 15 \text{ A}, V_R = - 600 \text{ V}$ $di_F/dt = - 400 \text{ A}/\mu\text{s}$ $V_{GE} = 0 \text{ V}, T_j = 125 \text{ }^\circ\text{C}$	-	16	-	A	
Q_{rr}		-	2,7	-	μC	
E_{off}		-	0,6	-	mJ	
R_{thjh}		per diode	-	-	1,7	K/W
Diode - Rectifier						
V_F	$I_F = 35 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$	-	1,2	-	V	
R_{thjh}	per diode	-	-	1,6	K/W	
Temperature Sensor						
R_{TS}	$T = 25 / 100 \text{ }^\circ\text{C}$		1000 / 1670		Ω	
Shunts (SKiiP 22 NAB 12 I)						
$R_{cs(dc)}$	5 % ⁴⁾		16,5		m Ω	
$R_{cs(ac)}$	1 %		10		m Ω	
Mechanical Data						
M_1	case to heatsink, SI Units	2	-	2,5	Nm	
Case	mechanical outline see page B 16 – 8		M2			



UL recognized file no. E63532

- specification of shunts and temperature sensor see part A
- common characteristics see page B 16 – 4

- ¹⁾ $T_{\text{heatsink}} = 25 \text{ }^\circ\text{C}$, unless otherwise specified
- ²⁾ CAL = Controlled Axial Lifetime Technology (soft and fast recovery)
- ³⁾ With integrated DC and/or AC shunts
- ⁴⁾ accuracy of pure shunt, please note that for DC shunt no separate sensing contact is used.

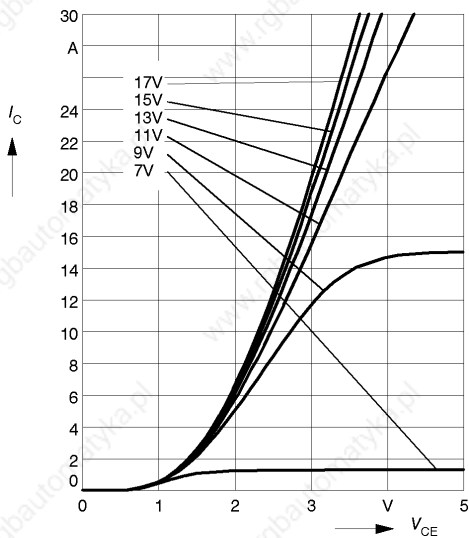


Fig. 1 Typ. output characteristic, $t_p = 80 \mu s$; $25 \text{ }^\circ\text{C}$

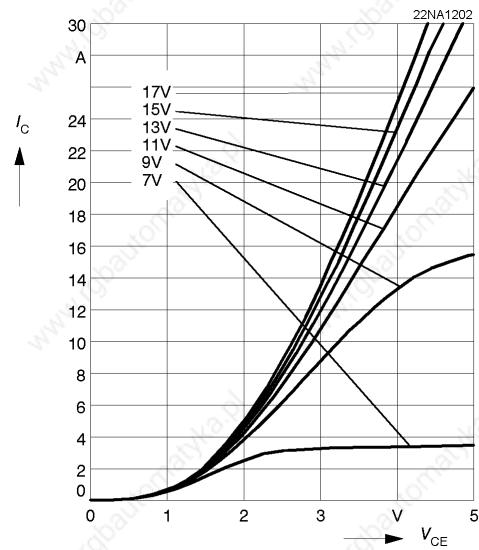


Fig. 2 Typ. output characteristic, $t_p = 80 \mu s$; $125 \text{ }^\circ\text{C}$

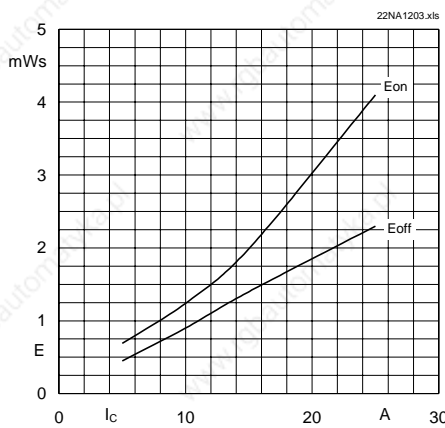


Fig. 3 Turn-on /-off energy = $f(I_C)$

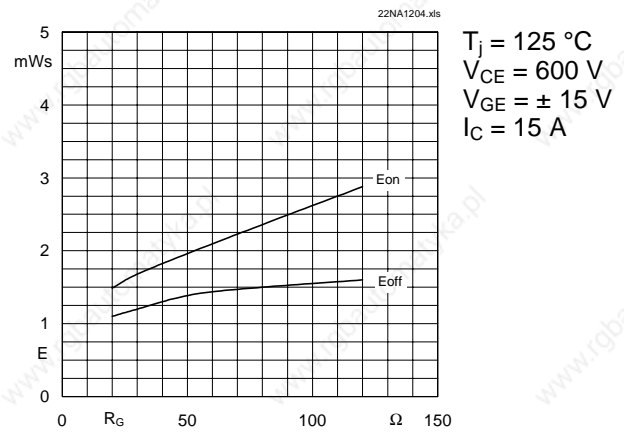


Fig. 4 Turn-on /-off energy = $f(R_G)$

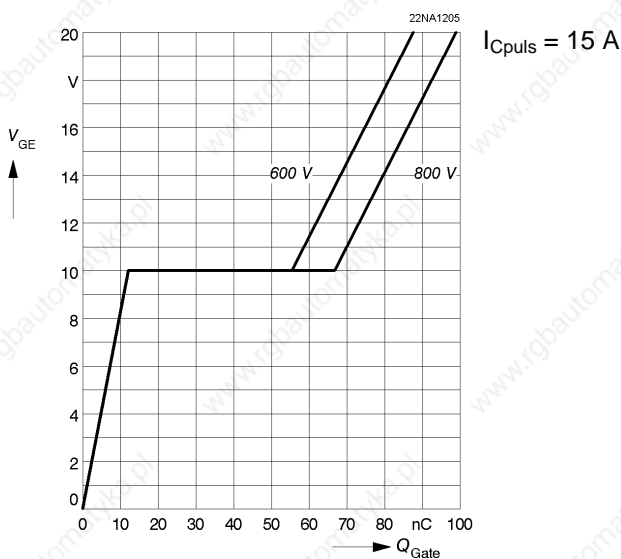


Fig. 5 Typ. gate charge characteristic

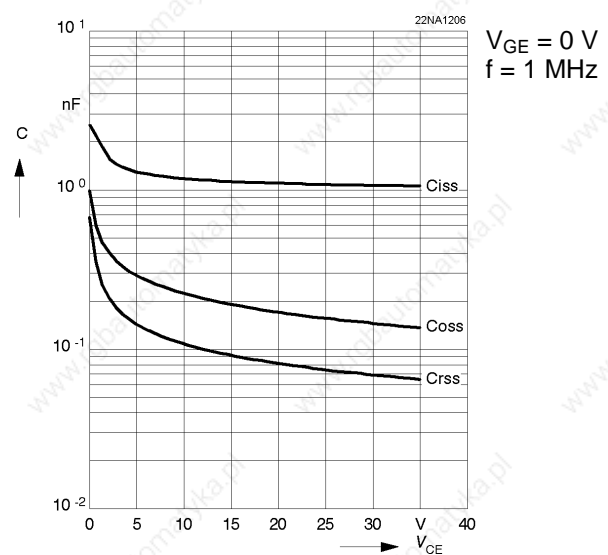


Fig. 6 Typ. capacitances vs. V_{CE}

MiniSKiiP 1200 V

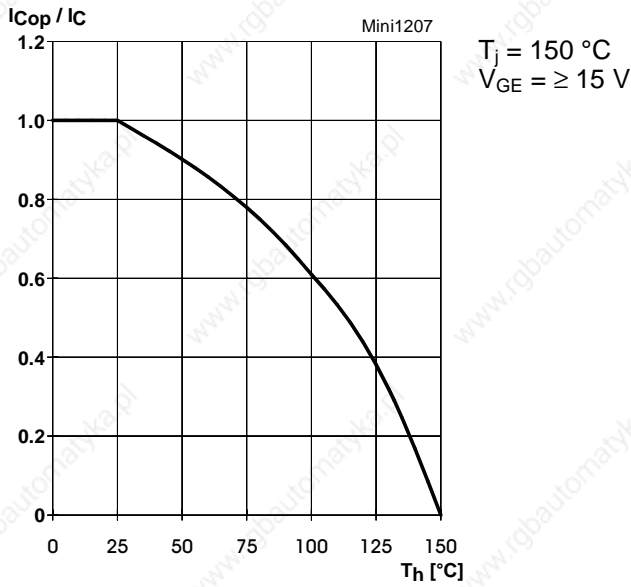


Fig. 7 Rated current of the IGBT $I_{C_{op}} / I_C = f(T_h)$

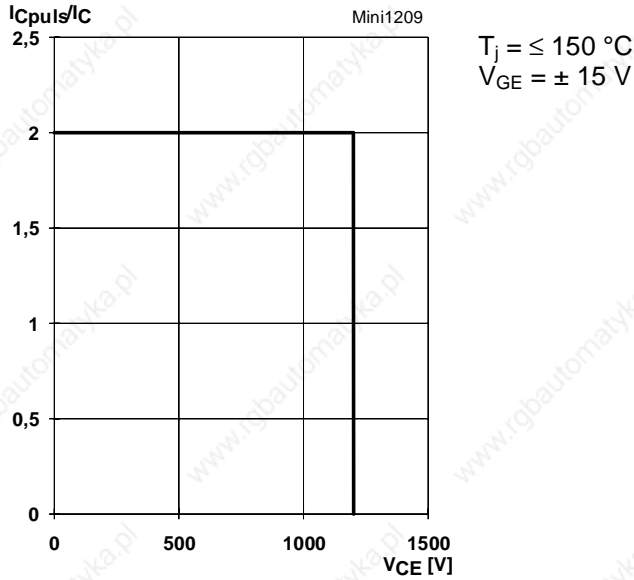


Fig. 9 Turn-off safe operating area (RBSOA) of the IGBT

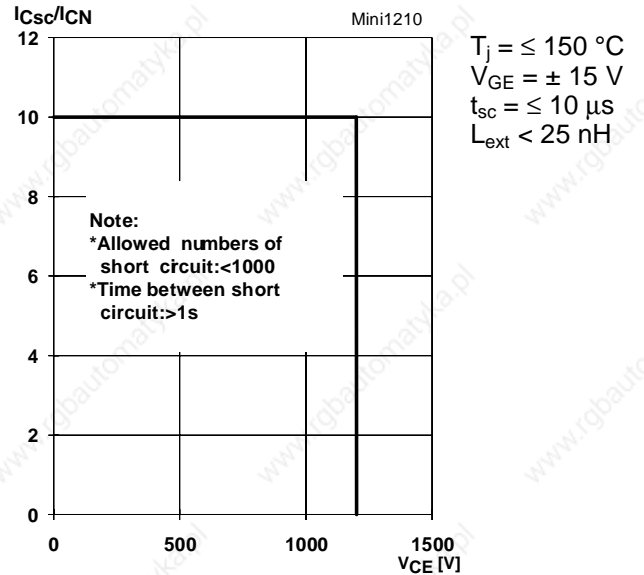


Fig. 10 Safe operating area at short circuit of the IGBT

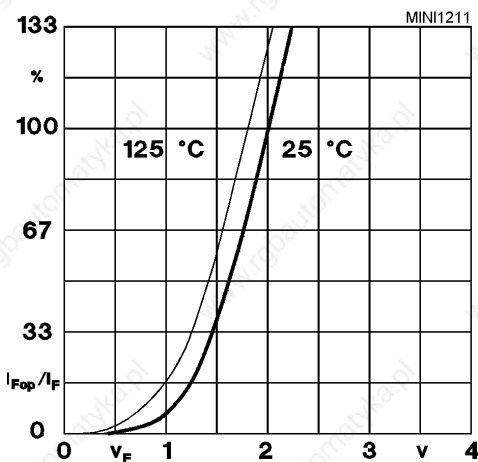


Fig. 11 Typ. freewheeling diode forward characteristic

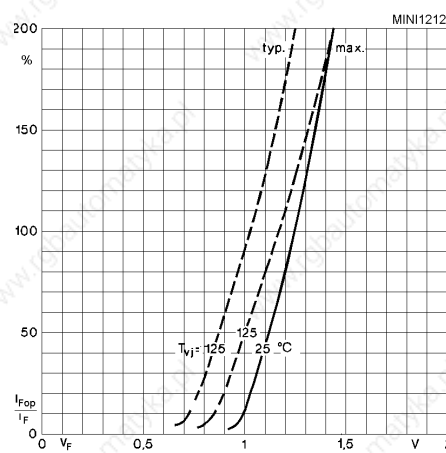
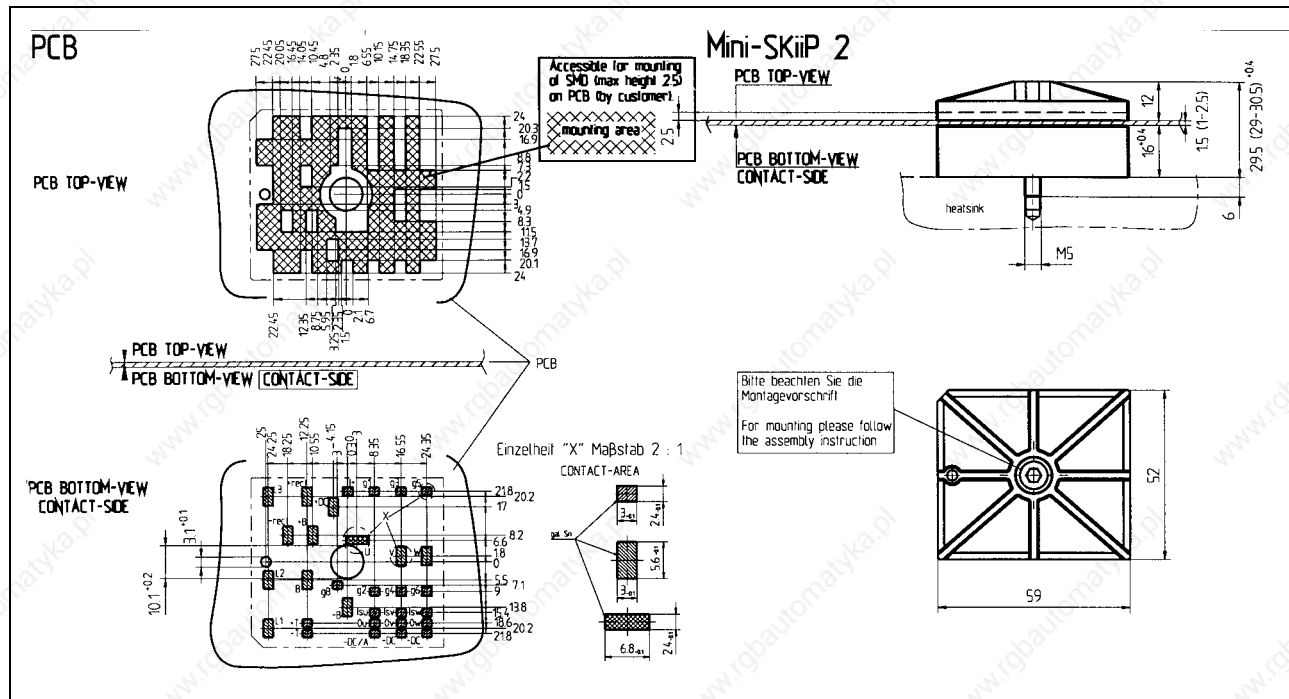
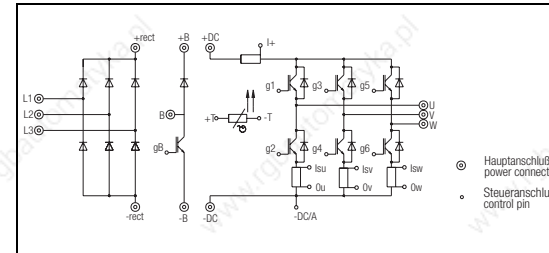


Fig. 12 Forward characteristic of the input bridge diode

MiniSKiiP 2

SKiiP 20 NAB 06 ... Circuit
 SKiiP 21 NAB 06 ... Case M2
 SKiiP 20 NAB 12 ... Layout and connections for the
 SKiiP 22 NAB 12 ... customer's printed circuit board

Note: The shunts are available
 only by option I



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