

## SKiiP 20 NAB 12 - SKiiP 20 NAB 12 I

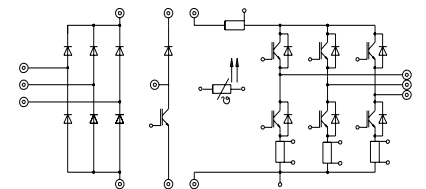
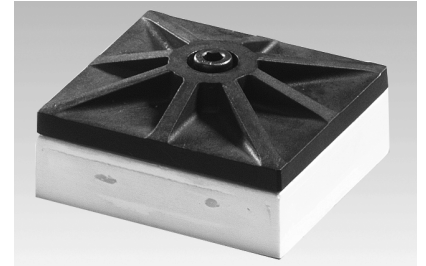
Absolute Maximum Ratings			
Symbol	Conditions <sup>1)</sup>	Values	Units
Inverter	(Chopper see SKiiP 22 NAB 12)		
$V_{CES}$		1200	V
$V_{GES}$		$\pm 20$	V
$I_C$	$T_{heatsink} = 25 / 80 \text{ }^\circ\text{C}$	16 / 11	A
$I_{CM}$	$t_p < 1 \text{ ms}; T_{heatsink} = 25 / 80 \text{ }^\circ\text{C}$	32 / 22	A
$I_F = -I_C$	$T_{heatsink} = 25 / 80 \text{ }^\circ\text{C}$	16 / 11	A
$I_{FM} = -I_{CM}$	$t_p < 1 \text{ ms}; T_{heatsink} = 25 / 80 \text{ }^\circ\text{C}$	32 / 22	A
Bridge Rectifier			
$V_{RRM}$		1500	V
$I_D$	$T_{heatsink} = 80 \text{ }^\circ\text{C}$	25	A
$I_{FSM}$	$t_p = 10 \text{ ms}; \sin. 180^\circ, T_j = 25 \text{ }^\circ\text{C}$	370	A
$I^2t$	$t_p = 10 \text{ ms}; \sin. 180^\circ, T_j = 25 \text{ }^\circ\text{C}$	680	A <sup>2</sup> s
$T_j$		- 40 ... + 150	$^\circ\text{C}$
$T_{stg}$		- 40 ... + 125	$^\circ\text{C}$
$V_{isol}$	AC, 1 min.	2500	V

Characteristics			min.	typ.	max.	Units
Symbol	Conditions <sup>1)</sup>					
IGBT - Inverter						
$V_{CESat}$	$I_C = 10 \text{ A}$ $T_j = 25 (125) \text{ }^\circ\text{C}$		-	2,7(3,3)	3,2(3,9)	V
$t_{d(on)}$	$V_{CC} = 600 \text{ V}; V_{GE} = \pm 15 \text{ V}$ $I_C = 10 \text{ A}; T_j = 125 \text{ }^\circ\text{C}$ $R_{gon} = R_{goff} = 150 \text{ }^\circ\Omega$ inductive load		-	55	110	ns
$t_r$			-	50	100	ns
$t_{d(off)}$			-	380	570	ns
$t_f$			-	80	120	ns
$E_{on} + E_{off}$			-	2,7	-	-
$C_{ies}$	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}, 1 \text{ MHz}$		-	0,53	-	nF
$R_{thjh}$	per IGBT		-	-	1,8	K/W
IGBT - 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	-	-
$C_{ies}$	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}, 1 \text{ MHz}$		-	1,0	-	nF
$R_{thjh}$	per IGBT		-	-	1,4	K/W
Diode <sup>2)</sup> - Inverter (Diode <sup>2)</sup> - Chopper see SKiiP 22 NAB 12)						
$V_F = V_{EC}$	$I_F = 10 \text{ A}$ $T_j = 25 (125) \text{ }^\circ\text{C}$		-	2,0(1,8)	2,5(2,3)	V
$V_{TO}$	$T_j = 125 \text{ }^\circ\text{C}$		-	1,0	1,2	V
$r_T$	$T_j = 125 \text{ }^\circ\text{C}$		-	80	110	m $\Omega$
$I_{RRM}$	$I_F = 10 \text{ A}, V_R = - 600 \text{ V}$ $di_F/dt = - 300 \text{ A}/\mu\text{s}$ $V_{GE} = 0 \text{ V}, T_j = 125 \text{ }^\circ\text{C}$		-	12	-	A
$Q_{rr}$			-	1,8	-	$\mu\text{C}$
$E_{off}$			-	0,4	-	mJ
$R_{thjh}$		per diode		-	-	2,4
Diode - Rectifier						
$V_F$	$I_F = 25 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$		-	1,2	-	V
$R_{thjh}$	per diode		-	-	2,6	K/W
Temperature Sensor						
$R_{TS}$	$T = 25 / 100 \text{ }^\circ\text{C}$			1000 / 1670		$\Omega$
Mechanical Data						
$M_1$	case to heatsink, SI Units		2	-	2,5	Nm
Case	mechanical outline see page B 16 - 8			M2		

\* For diagrams of the Chopper IGBT please refer to SKiiP 22 NAB 12

## MiniSKiiP 2 SEMIKRON integrated intelligent Power SKiiP 20 NAB 12 SKiiP 20 NAB 12 I <sup>3)</sup> 3-phase bridge rectifier + braking chopper + 3-phase bridge inverter

Case M2



UL recognized file no. E63532

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

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

$R_{cs(dc)}$	5 % <sup>4)</sup>	10 m $\Omega$
$R_{cs(ac)}$	1 %	10 m $\Omega$

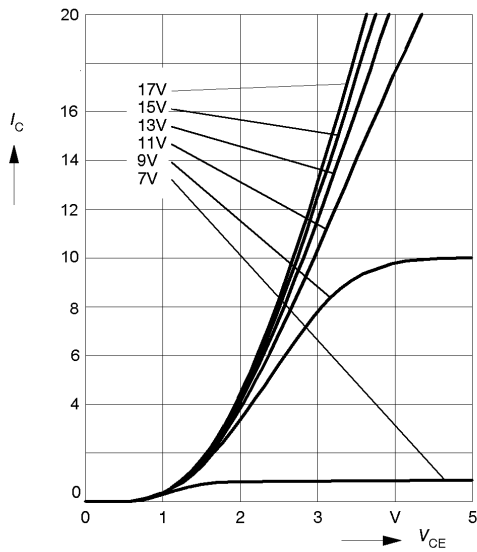


Fig. 1 Typ. output characteristic,  $t_p = 80 \mu s$ ;  $25 \text{ }^\circ\text{C}$

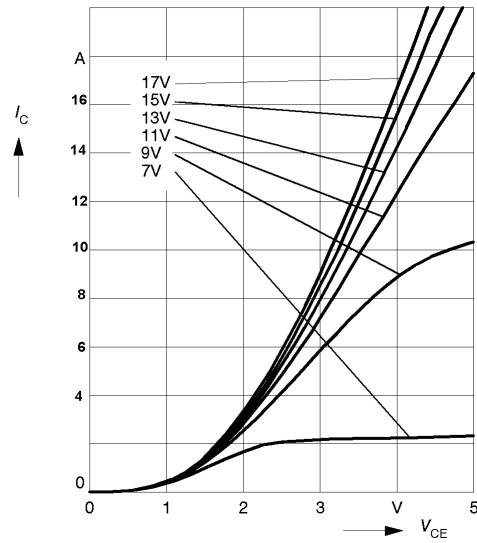


Fig. 2 Typ. output characteristic,  $t_p = 80 \mu s$ ;  $125 \text{ }^\circ\text{C}$

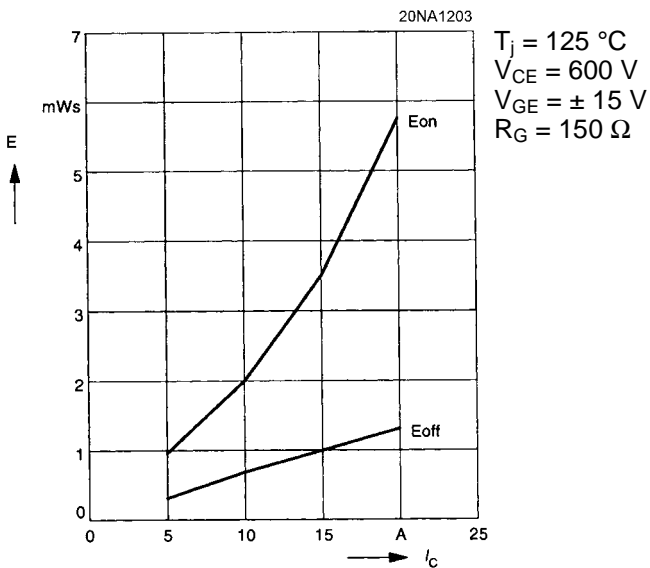


Fig. 3 Turn-on /-off energy =  $f(I_c)$

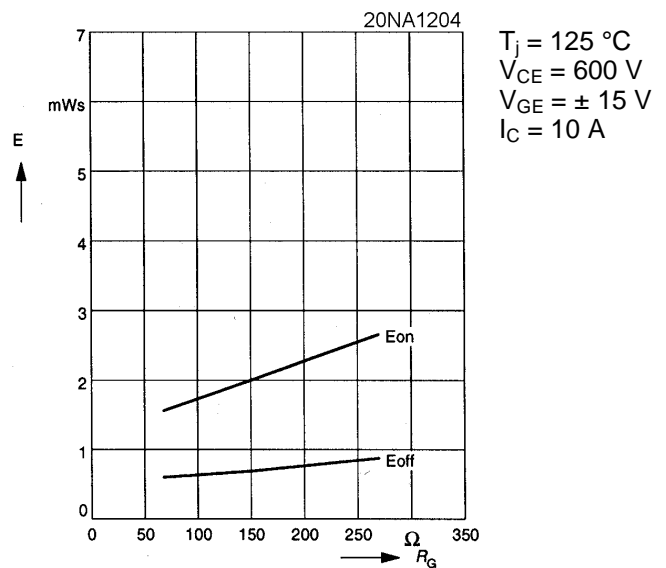


Fig. 4 Turn-on /-off energy =  $f(R_G)$

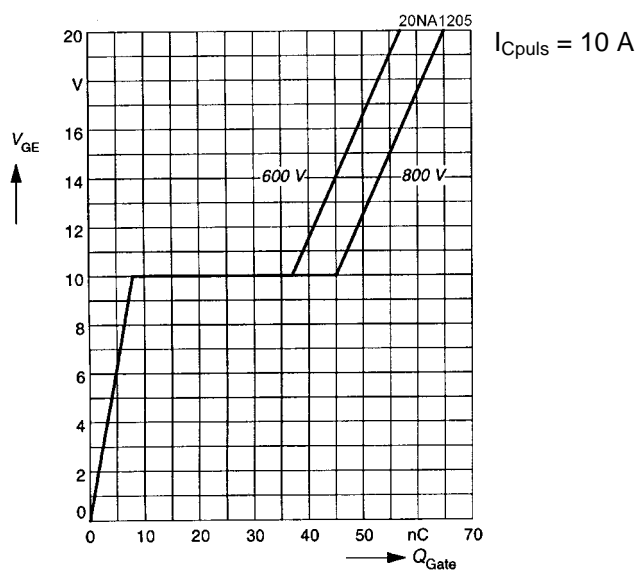


Fig. 5 Typ. gate charge characteristic

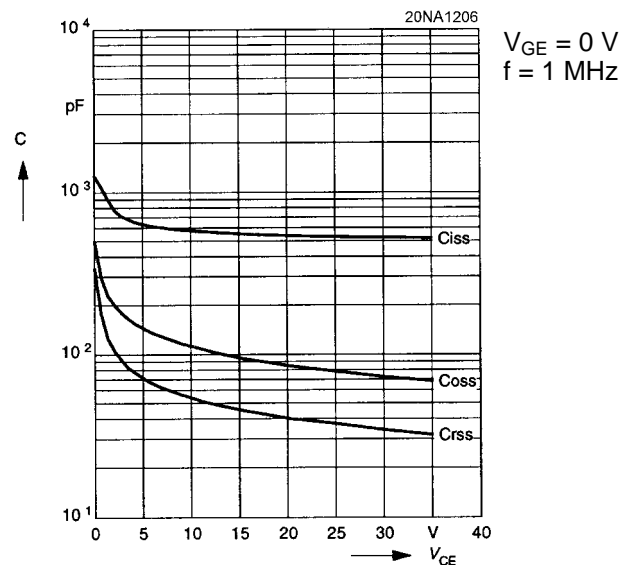


Fig. 6 Typ. capacitances vs.  $V_{CE}$

# MiniSKiiP 1200 V

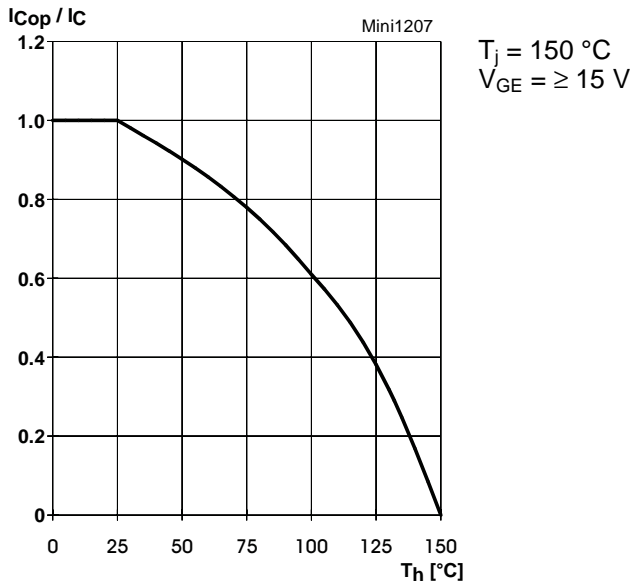


Fig. 7 Rated current of the IGBT  $I_{COp} / I_C = f(T_h)$

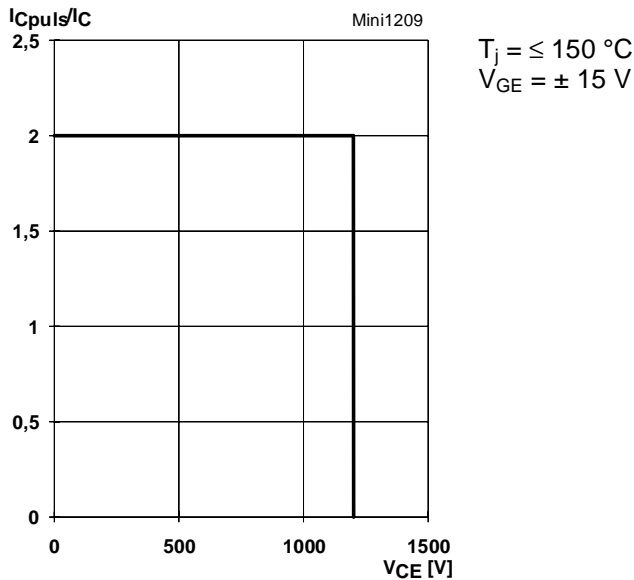


Fig. 9 Turn-off safe operating area (RBSOA) of the IGBT



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

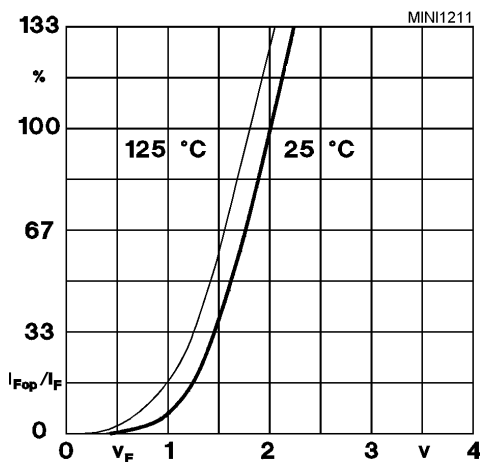


Fig. 11 Typ. freewheeling diode forward characteristic

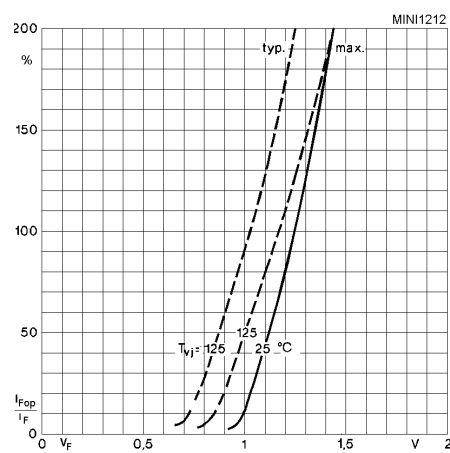


Fig. 12 Forward characteristic of the input bridge diode

