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SEMIKRON

SKiiP 31 NAB 12

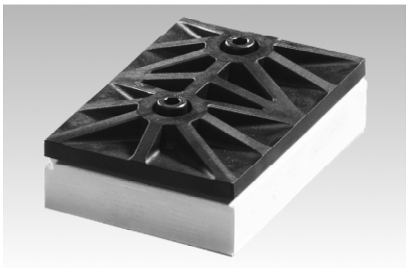
Absolute Maximum Ratings			
Symbol	**Conditions** [1]	**Values**	**Units**
Inverter	(Chopper see SKiiP 22 NAB 12)		
V_{CES}		1200	V
V_{GES}		± 20	V
I_C	$T_{heatsink}$ = 25 / 80 °C	45 / 30	A
I_{CM}	t_p < 1 ms; $T_{heatsink}$ = 25 / 80 °C	90 / 60	A
$I_F = -I_C$	$T_{heatsink}$ = 25 / 80 °C	38 / 26	A
$I_{FM} = -I_{CM}$	t_p < 1 ms; $T_{heatsink}$ = 25 / 80 °C	76 / 52	A
Bridge Rectifier			
V_{RRM}		1500	V
I_D	$T_{heatsink}$ = 80 °C	35	A
I_{FSM}	t_p = 10 ms; sin. 180 °, T_j = 25 °C	700	A
I^2t	t_p = 10 ms; sin. 180 °, T_j = 25 °C	2400	A^2s
T_j		– 40 . . . + 150	°C
T_{stg}		– 40 . . . + 125	°C
V_{isol}	AC, 1 min.	2500	V

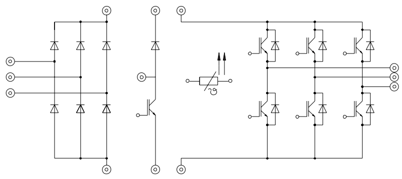
Characteristics					
Symbol	**Conditions** [1]	**min.**	**typ.**	**max.**	**Units**
IGBT - Inverter					
V_{CEsat}	I_C = 30 A T_j = 25 (125) °C	–	2,5(3,1)	3,0(3,7)	V
$t_{d(on)}$	V_{CC} = 600 V; V_{GE} = ± 15 V	–	55	110	ns
t_r	I_C = 30 A; T_j = 125 °C	–	55	110	ns
$t_{d(off)}$	$R_{gon} = R_{goff}$ = 39 Ω	–	400	600	ns
t_f	inductive load	–	45	90	ns
$E_{on} + E_{off}$		–	7,8	–	mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V, 1 MHz	–	2,0	–	nF
R_{thjh}	per IGBT	–	–	0,7	K/W
IGBT - Chopper *					
V_{CEsat}	I_C = 15 A T_j = 25 (125) °C	–	2,5(3,1)	3,0(3,7)	V
$t_{d(on)}$	V_{CC} = 600 V; V_{GE} = ± 15 V	–	55	110	ns
t_r	I_C = 15 A; T_j = 125 °C	–	45	90	ns
$t_{d(off)}$	$R_{gon} = R_{goff}$ = 82 Ω	–	400	600	ns
t_f	inductive load	–	70	100	ns
$E_{on} + E_{off}$		–	4,0	–	mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V, 1 MHz	–	1,0	–	nF
R_{thjh}	per IGBT	–	–	1,4	K/W
Diode [2] - Inverter (Diode [2] - Chopper see SKiiP 22 NAB 12)					
$V_F = V_{EC}$	I_F = 25 A T_j = 25 (125) °C	–	2,0(1,8)	2,5(2,3)	V
V_{TO}	T_j = 125 °C	–	1,0	1,2	V
r_T	T_j = 125 °C	–	32	44	mΩ
I_{RRM}	I_F = 25 A, V_R = – 600 V	–	25	–	A
Q_{rr}	di_F/dt = – 500 A/µs	–	4,5	–	µC
E_{off}	V_{GE} = 0 V, T_j = 125 °C	–	1,0	–	mJ
R_{thjh}	per diode	–	–	1,2	K/W
Diode - Rectifier					
V_F	I_F = 35 A, T_j = 25 °C	–	1,2	–	V
R_{thjh}	per diode	–	–	1,6	K/W
Temperature Sensor					
R_{TS}	T = 25 / 100 °C		1000 / 1670		Ω
Mechanical Data					
M_1	case to heatsink, SI Units	2	–	2,5	Nm
Case	mechanical outline see page B 16 – 9		M3		

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

MiniSKiiP 3
SEMIKRON integrated intelligent Power
SKiiP 31 NAB 12
3-phase bridge rectifier + braking chopper + 3-phase bridge inverter

Case M3





UL recognized file no. E63532

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

Options
- also available with powerful chopper. For characteristics please refer to Inverter IGBT

1) $T_{heatsink}$ = 25 °C, unless otherwise specified
2) CAL = Controlled Axial Lifetime Technology (soft and fast recovery)

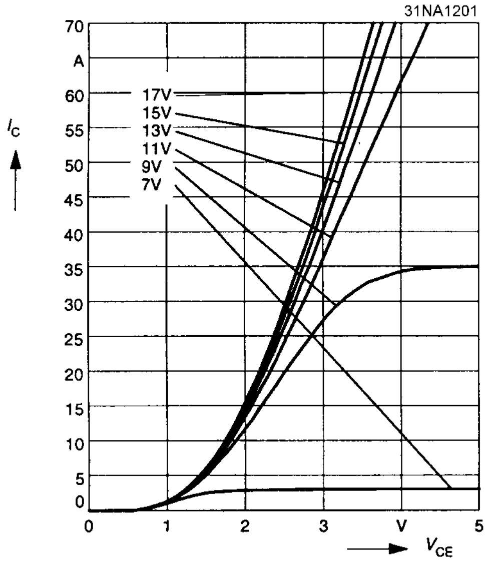


Fig. 1 Typ. output characteristic, t_p = 80 µs; 25 °C

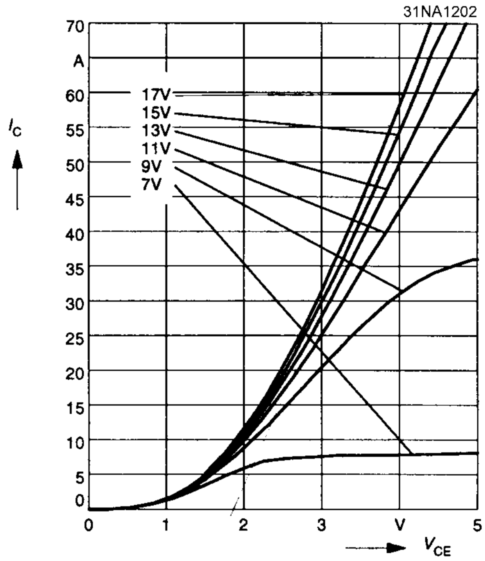
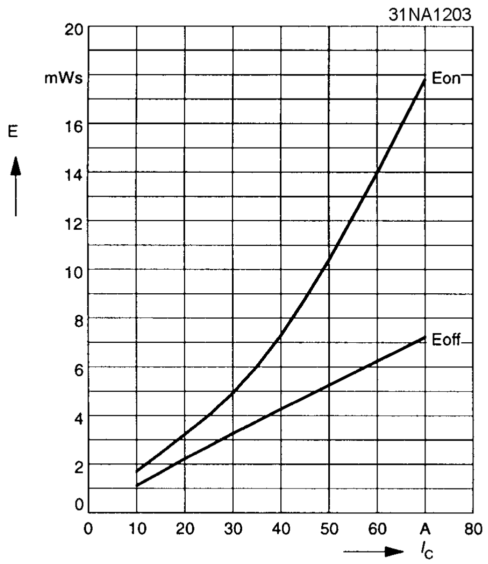
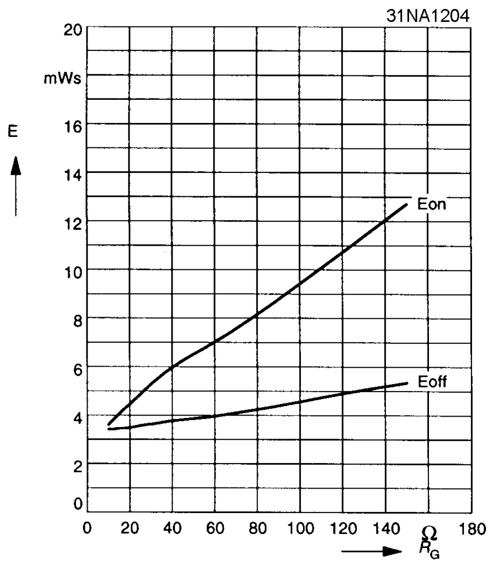


Fig. 2 Typ. output characteristic, t_p = 80 µs; 125 °C



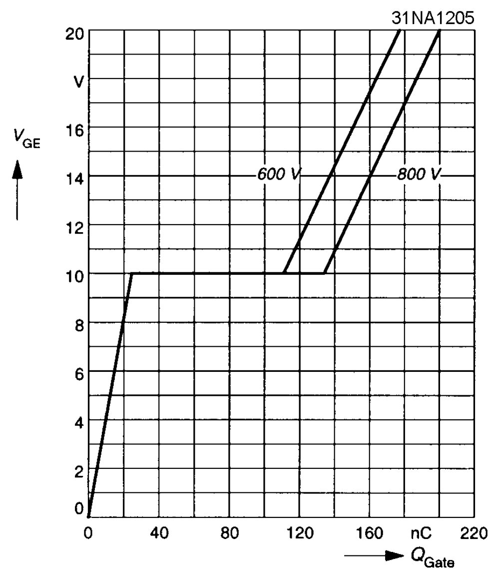
T_j = 125 °C
V_{CE} = 600 V
V_{GE} = ± 15 V
R_G = 39 Ω

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



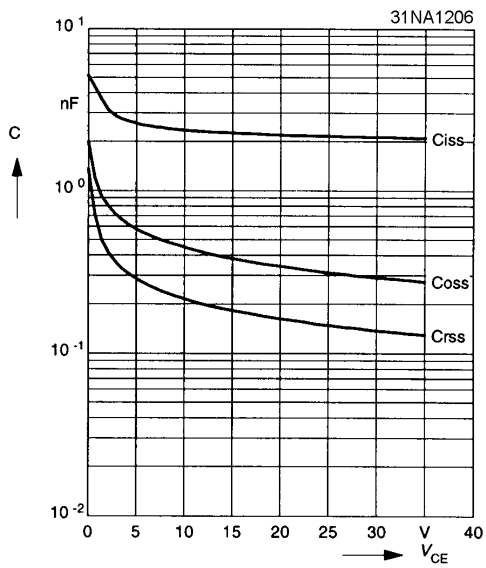
T_j = 125 °C
V_{CE} = 600 V
V_{GE} = ± 15 V
I_C = 35 A

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



I_{Cpuls} = 35 A

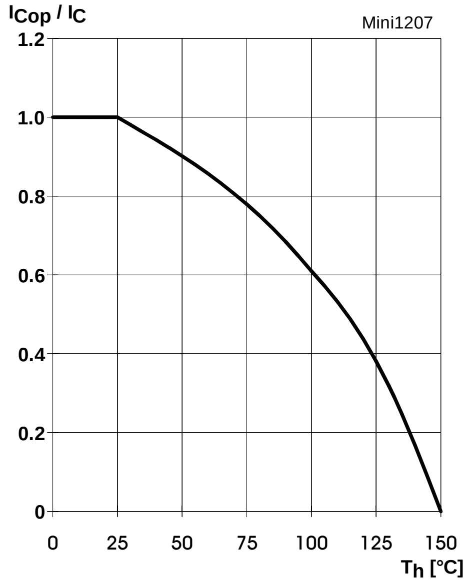
Fig. 5 Typ. gate charge characteristic



V_{GE} = 0 V
f = 1 MHz

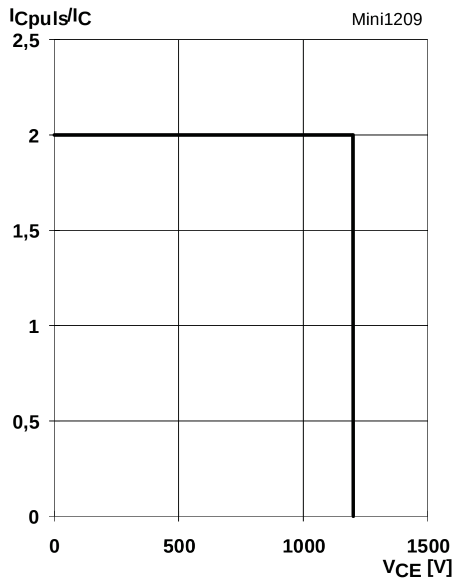
Fig. 6 Typ. capacitances vs. V_{CE}

MiniSKiiP 1200 V



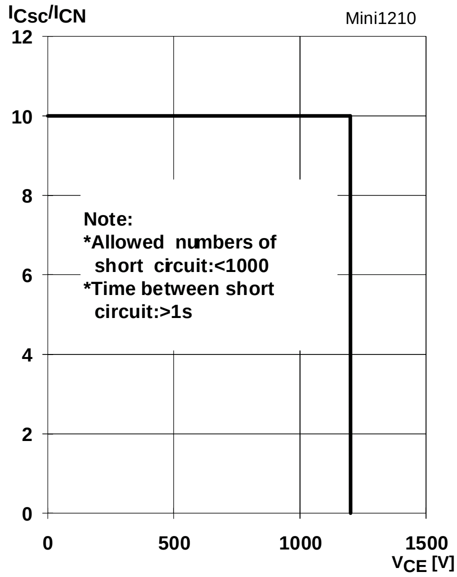
T_j = 150 °C
V_{GE} = ≥ 15 V

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



T_j = ≤ 150 °C
V_{GE} = ± 15 V

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



T_j = ≤ 150 °C
V_{GE} = ± 15 V
t_{sc} = ≤ 10 µs
L_{ext} < 25 nH

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

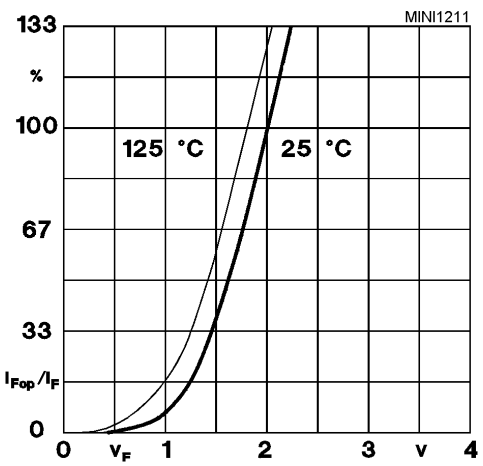


Fig. 11 Typ. freewheeling diode forward characteristic

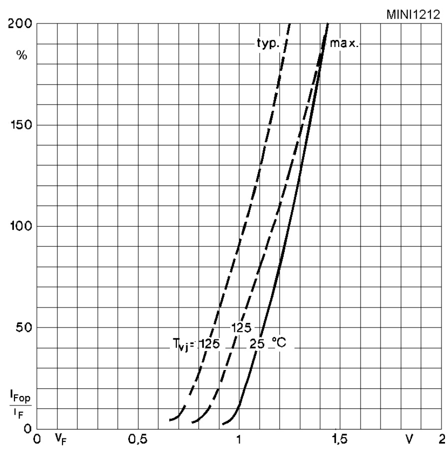


Fig. 12 Forward characteristic of the input bridge diode

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MiniSKiiP 3

SKiiP 30 NAB 06	Circuit
SKiiP 31 NAB 06	Case M3
SKiiP 32 NAB 06	Layout and connections for the
SKiiP 30 NAB 12	customer's printed circuit board
SKiiP 31 NAB 12	
SKiiP 32 NAB 12