## SKiiP 20 NAB 06 - SKiiP 20 NAB 06 I

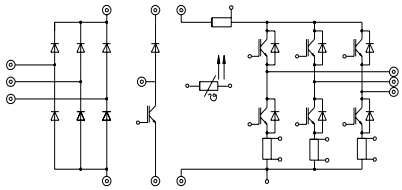


| Absolute Maximum Ratings | | | |
|---|---|---|---|
| **Symbol** | **Conditions** [1] | **Values** | **Units** |
| Inverter | | | |
| $V_{CES}$ | | 600 | V |
| $V_{GES}$ | | ± 20 | V |
| $I_C$ | $T_{heatsink}$ = 25 / 80 °C | 22 / 15 | A |
| $I_{CM}$ | $t_p$ < 1 ms; $T_{heatsink}$ = 25 / 80 °C | 44 / 30 | A |
| $I_F = -I_C$ | $T_{heatsink}$ = 25 / 80 °C | 36 / 24 | A |
| $I_{FM} = -I_{CM}$ | $t_p$ < 1 ms; $T_{heatsink}$ = 25 / 80 °C | 72 / 48 | A |
| Bridge Rectifier | | | |
| $V_{RRM}$ | | 800 | V |
| $I_D$ | $T_{heatsink}$ = 80 °C | 25 | A |
| $I_{FSM}$ | $t_p$ = 10 ms; sin. 180 °, $T_j$ = 25 °C | 370 | A |
| $I^2t$ | $t_p$ = 10 ms; sin. 180 °, $T_j$ = 25 °C | 680 | $A^2s$ |
| $T_j$ | | – 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 & Chopper | | | | | |
| $V_{CEsat}$ | $I_C$ = 15 A $T_j$ = 25 (125) °C | – | 2,1(2,2) | 2,7(2,8) | V |
| $t_{d(on)}$ | $V_{CC}$ = 300 V; $V_{GE}$ = ± 15 V | – | 35 | 70 | ns |
| $t_r$ | $I_C$ = 15 A; $T_j$ = 125 °C | – | 50 | 100 | ns |
| $t_{d(off)}$ | $R_{gon} = R_{goff}$ = 68 Ω | – | 250 | 370 | ns |
| $t_f$ | inductive load | – | 500 | 750 | ns |
| $E_{on} + E_{off}$ | | – | 2,2 | – | mJ |
| $C_{ies}$ | $V_{CE}$ = 25 V; $V_{GE}$ = 0 V, 1 MHz | – | 0,8 | – | nF |
| $R_{thjh}$ | per IGBT | – | – | 2,0 | K/W |
| Diode [2] - Inverter | | | | | |
| $V_F = V_{EC}$ | $I_F$ = 25 A $T_j$ = 25 (125) °C | – | 1,45(1,4) | 1,7(1,7) | V |
| $V_{TO}$ | $T_j$ = 125 °C | – | 0,85 | 0,9 | V |
| $r_T$ | $T_j$ = 125 °C | – | 22 | 32 | mΩ |
| $I_{RRM}$ | $I_F$ = 25 A, $V_R$ = – 300 V | – | 25 | – | A |
| $Q_{rr}$ | $di_F/dt$ = – 500 A/µs | – | 2,5 | – | µC |
| $E_{off}$ | $V_{GE}$ = 0 V, $T_j$ = 125 °C | – | 0,75 | – | mJ |
| $R_{thjh}$ | per diode | – | – | 1,7 | K/W |
| Diode [2] - Chopper | | | | | |
| $V_F = V_{EC}$ | $I_F$ = 10 A $T_j$ = 25 (125) °C | – | 1,45(1,4) | 1,7(1,7) | V |
| $V_{TO}$ | $T_j$ = 125 °C | – | 0,85 | 0,9 | V |
| $r_T$ | $T_j$ = 125 °C | – | 55 | 80 | mΩ |
| $I_{RRM}$ | $I_F$ = 10 A, $V_R$ = – 300 V | – | 13 | – | A |
| $Q_{rr}$ | $di_F/dt$ = – 200 A/µs | – | 1,5 | – | µC |
| $E_{off}$ | $V_{GE}$ = 0 V, $T_j$ = 125 °C | – | 0,45 | – | mJ |
| $R_{thjh}$ | per diode | – | – | 2,7 | K/W |
| Diode - Rectifier | | | | | |
| $V_F$ | $I_F$ = 25 A, $T_j$ = 25 °C | – | 1,2 | – | V |
| $R_{thjh}$ | per diode | – | – | 2,6 | 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 – 8 | | M2 | | |

## MiniSKiiP 2
## SEMIKRON integrated intelligent Power
## SKiiP 20 NAB 06
## SKiiP 20 NAB 06 I [3]
## 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 B16–3

**Options**

- also available with single phase rectifier (called 20 NEB 06 or 20 NEB 06 I[3])
- also available with faster IGBTs (type ... 063), data sheet on request

[1] $T_{heatsink}$ = 25 °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.

| | | |
|---|---|---|
| $R_{cs(dc)}$ | 5 % [4] | 16,5 mΩ |
| $R_{cs(ac)}$ | 1 % | 10 mΩ |

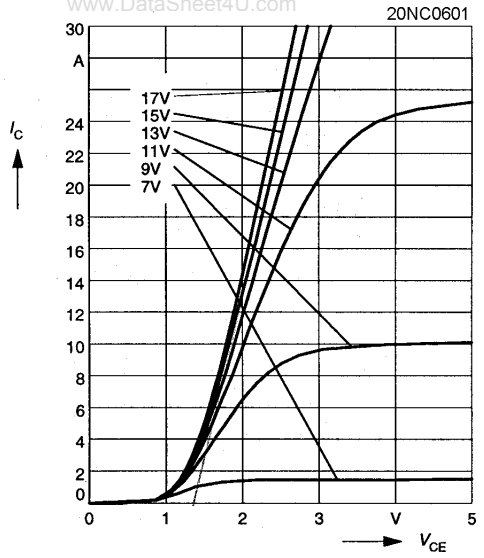



Fig. 1 Typ. output characteristic, $t_p$ = 80 µs; 25 °C

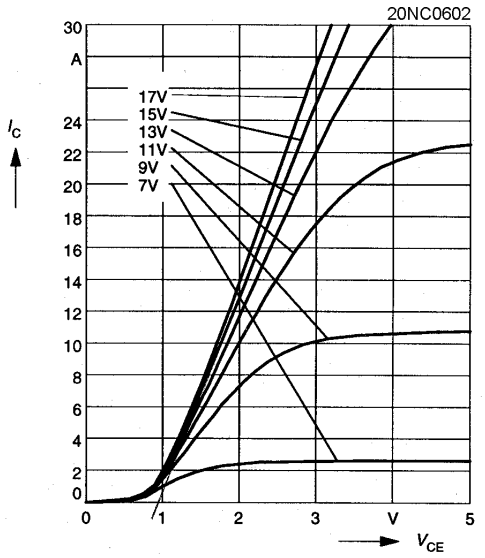
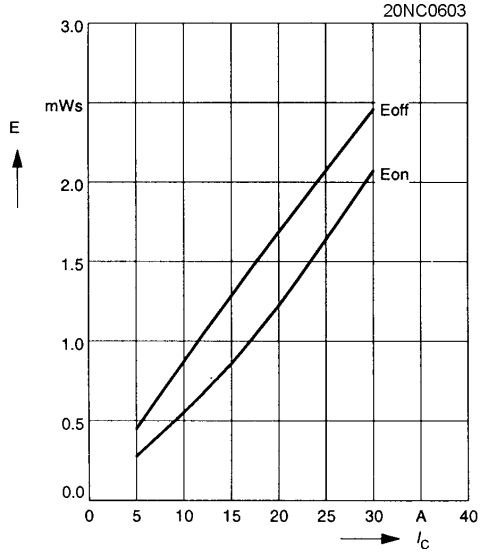
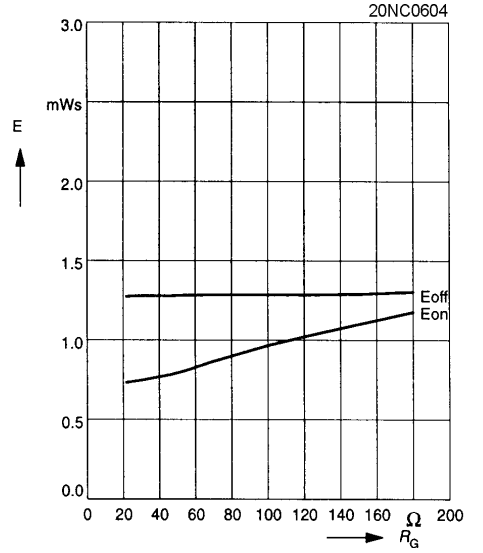



Fig. 2 Typ. output characteristic, $t_p$ = 80 µs; 125 °C



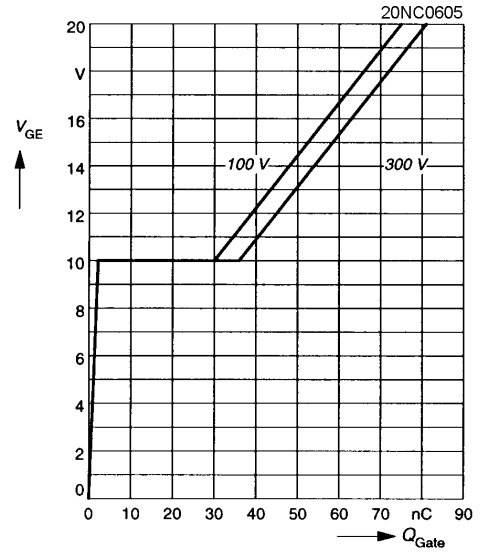

$T_j$ = 125 °C
$V_{CE}$ = 300 V
$V_{GE}$ = ± 15 V
$R_G$ = 68 Ω

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



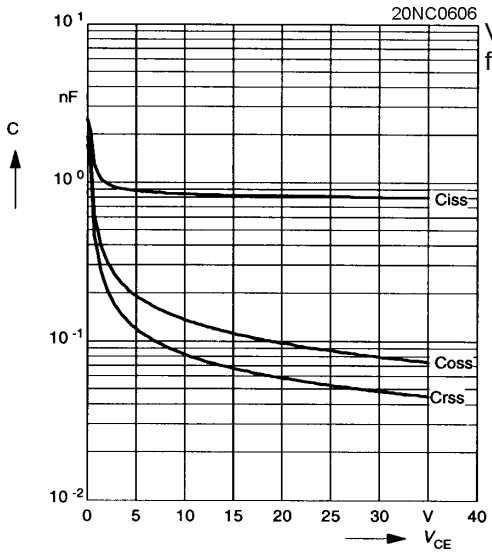

$T_j$ = 125 °C
$V_{CE}$ = 300 V
$V_{GE}$ = ± 15 V
$I_C$ = 15 A

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




$I_{Cpuls}$ = 15 A

Fig. 5 Typ. gate charge characteristic

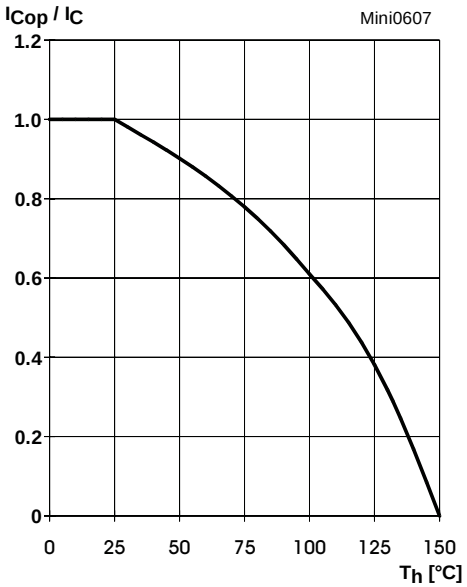



$V_{GE}$ = 0 V
f = 1 MHz

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

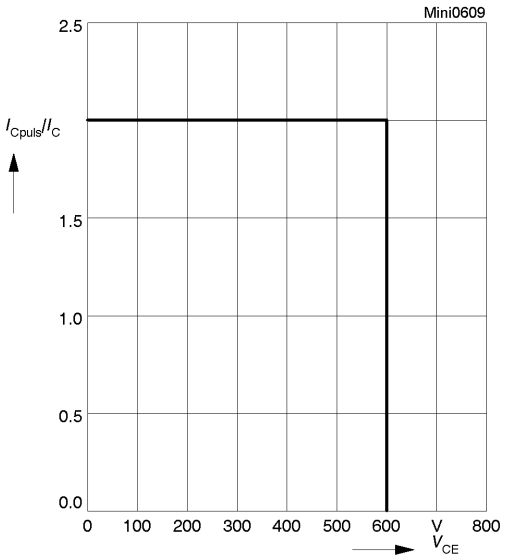
## 2. Common characteristics of MiniSKiiP

### MiniSKiiP 600 V



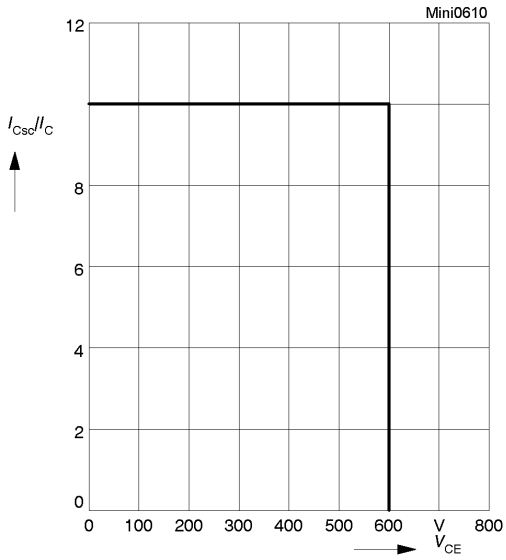

$T_j$ = 150 °C
$V_{GE}$ = ≥ 15 V

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

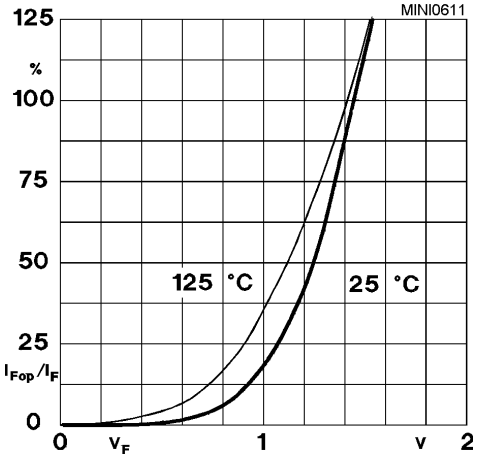



Fig. 11 Typ. freewheeling diode forward characteristic

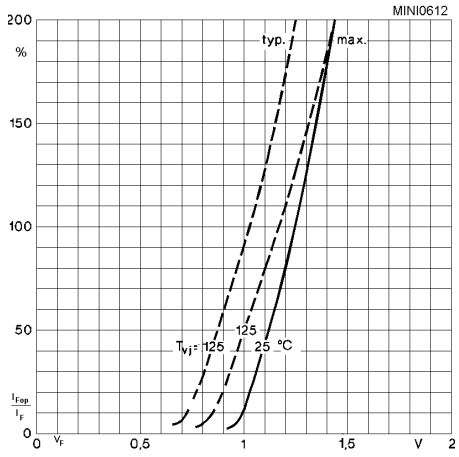
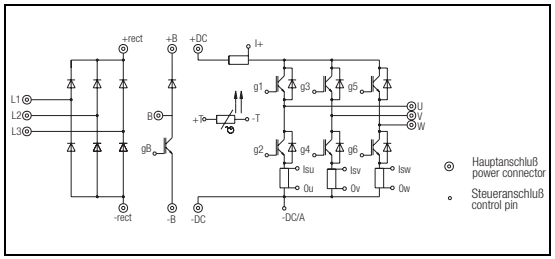


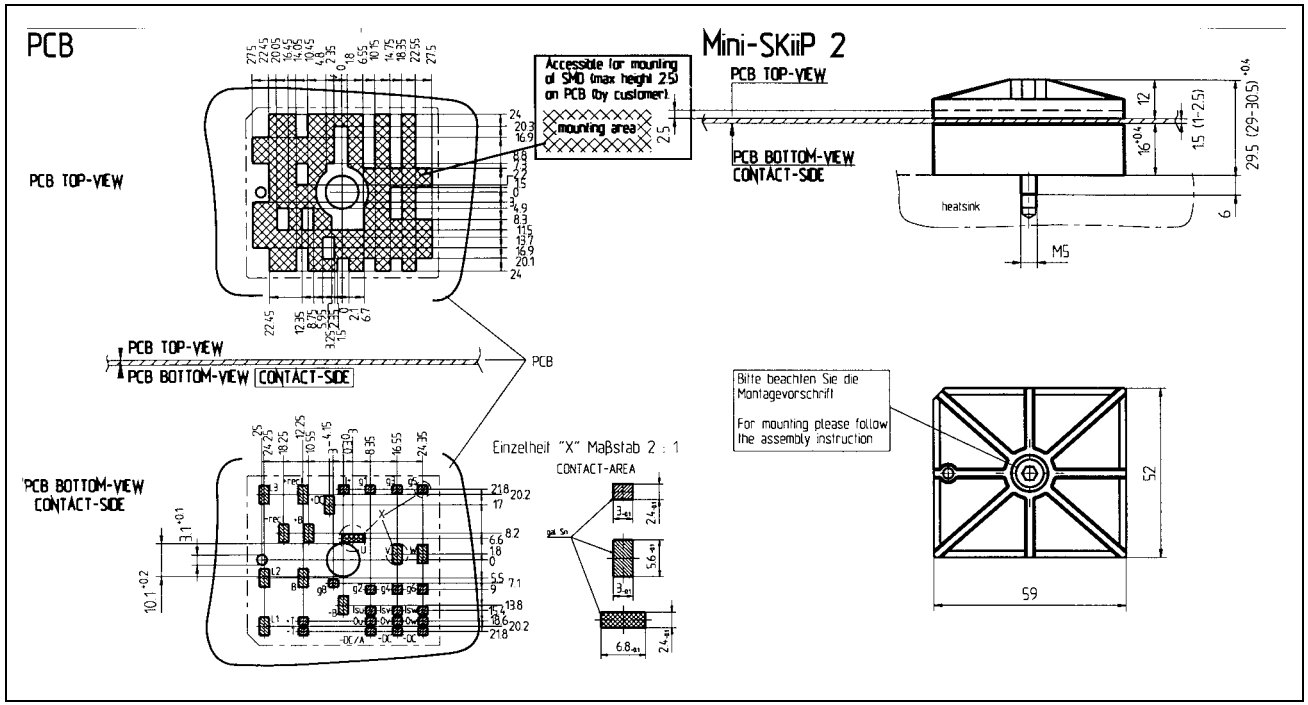

Fig. 12 Forward characteristic of the input bridge diode

## 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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