

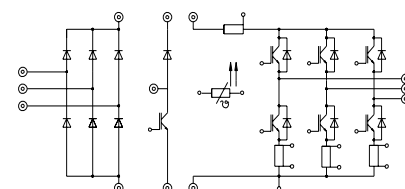
## SKiiP 22 NAB 12 - SKiiP 22 NAB 12 I

| Absolute Maximum Ratings           |                                                            |                |                  |
|------------------------------------|------------------------------------------------------------|----------------|------------------|
| Symbol                             | Conditions <sup>1)</sup>                                   | Values         | Units            |
| Inverter & Chopper                 |                                                            |                |                  |
| V <sub>CES</sub>                   |                                                            | 1200           | V                |
| V <sub>GES</sub>                   |                                                            | ± 20           | V                |
| I <sub>C</sub>                     | T <sub>heatsink</sub> = 25 / 80 °C                         | 23 / 15        | A                |
| I <sub>CM</sub>                    | t <sub>p</sub> < 1 ms; T <sub>heatsink</sub> = 25 / 80 °C  | 46 / 30        | A                |
| I <sub>F</sub> = -I <sub>C</sub>   | T <sub>heatsink</sub> = 25 / 80 °C                         | 24 / 17        | A                |
| I <sub>FM</sub> = -I <sub>CM</sub> | t <sub>p</sub> < 1 ms; T <sub>heatsink</sub> = 25 / 80 °C  | 48 / 34        | A                |
| Bridge Rectifier                   |                                                            |                |                  |
| V <sub>RRM</sub>                   |                                                            | 1500           | V                |
| I <sub>D</sub>                     | T <sub>heatsink</sub> = 80 °C                              | 25             | A                |
| I <sub>FSM</sub>                   | t <sub>p</sub> = 10 ms; sin. 180 °, T <sub>j</sub> = 25 °C | 700            | A                |
| I <sup>2</sup> t                   | t <sub>p</sub> = 10 ms; sin. 180 °, T <sub>j</sub> = 25 °C | 2400           | A <sup>2</sup> s |
| T <sub>j</sub>                     |                                                            | - 40 ... + 150 | °C               |
| T <sub>stg</sub>                   |                                                            | - 40 ... + 125 | °C               |
| V <sub>isol</sub>                  | AC, 1 min.                                                 | 2500           | V                |

| Characteristics                          |                                                                                                                                                                                                                                                                   |      |             |          |       |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------|----------|-------|
| Symbol                                   | Conditions <sup>1)</sup>                                                                                                                                                                                                                                          | min. | typ.        | max.     | Units |
| IGBT - Inverter & Chopper                |                                                                                                                                                                                                                                                                   |      |             |          |       |
| V <sub>CEsat</sub>                       | I <sub>C</sub> = 15 A    T <sub>J</sub> = 25 (125) °C<br>V <sub>CC</sub> = 600 V; V <sub>GE</sub> = ± 15 V<br>I <sub>C</sub> = 15 A; T <sub>J</sub> = 125 °C<br>R <sub>gon</sub> = R <sub>goff</sub> = 82 Ω<br>inductive load                                     | –    | 2,5(3,1)    | 3,0(3,7) | V     |
| t <sub>d(on)</sub>                       |                                                                                                                                                                                                                                                                   | –    | 55          | 110      | ns    |
| t <sub>r</sub>                           |                                                                                                                                                                                                                                                                   | –    | 45          | 90       | ns    |
| t <sub>d(off)</sub>                      |                                                                                                                                                                                                                                                                   | –    | 400         | 600      | ns    |
| t <sub>f</sub>                           |                                                                                                                                                                                                                                                                   | –    | 70          | 100      | ns    |
| E <sub>on</sub> + E <sub>off</sub>       |                                                                                                                                                                                                                                                                   | –    | 4,0         | –        | mJ    |
| C <sub>ies</sub>                         | V <sub>CE</sub> = 25 V; V <sub>GE</sub> = 0 V, 1 MHz                                                                                                                                                                                                              | –    | 1,0         | –        | nF    |
| R <sub>thjh</sub>                        | per IGBT                                                                                                                                                                                                                                                          | –    | –           | 1,4      | K/W   |
| Diode <sup>2)</sup> - Inverter & Chopper |                                                                                                                                                                                                                                                                   |      |             |          |       |
| V <sub>F</sub> = V <sub>EC</sub>         | I <sub>F</sub> = 15 A    T <sub>J</sub> = 25 (125) °C<br>T <sub>J</sub> = 125 °C<br>T <sub>J</sub> = 125 °C<br>I <sub>F</sub> = 15 A, V <sub>R</sub> = – 600 V<br>di <sub>F</sub> /dt = – 400 A/μs<br>V <sub>GE</sub> = 0 V, T <sub>J</sub> = 125 °C<br>per diode | –    | 2,0(1,8)    | 2,5(2,3) | V     |
| V <sub>TO</sub>                          |                                                                                                                                                                                                                                                                   | –    | 1,0         | 1,2      | V     |
| r <sub>T</sub>                           |                                                                                                                                                                                                                                                                   | –    | 53          | 73       | mΩ    |
| I <sub>RRM</sub>                         |                                                                                                                                                                                                                                                                   | –    | 16          | –        | A     |
| Q <sub>rr</sub>                          |                                                                                                                                                                                                                                                                   | –    | 2,7         | –        | μC    |
| E <sub>off</sub>                         |                                                                                                                                                                                                                                                                   | –    | 0,6         | –        | mJ    |
| R <sub>thjh</sub>                        |                                                                                                                                                                                                                                                                   | –    | –           | 1,7      | K/W   |
| Diode - Rectifier                        |                                                                                                                                                                                                                                                                   |      |             |          |       |
| V <sub>F</sub>                           | I <sub>F</sub> = 35 A, T <sub>J</sub> = 25 °C<br>per diode                                                                                                                                                                                                        | –    | 1,2         | –        | V     |
| R <sub>thjh</sub>                        |                                                                                                                                                                                                                                                                   | –    | –           | 1,6      | K/W   |
| Temperature Sensor                       |                                                                                                                                                                                                                                                                   |      |             |          |       |
| R <sub>TS</sub>                          | T = 25 / 100 °C                                                                                                                                                                                                                                                   |      | 1000 / 1670 |          | Ω     |
| Shunts (SKiiP 22 NAB 12 I)               |                                                                                                                                                                                                                                                                   |      |             |          |       |
| R <sub>CS(dc)</sub>                      | 5 % <sup>4)</sup>                                                                                                                                                                                                                                                 |      | 16,5        |          | mΩ    |
| R <sub>CS(ac)</sub>                      | 1 %                                                                                                                                                                                                                                                               |      | 10          |          | mΩ    |
| Mechanical Data                          |                                                                                                                                                                                                                                                                   |      |             |          |       |
| M <sub>1</sub>                           | case to heatsink, SI Units<br>mechanical outline see page<br>B 16 – 8                                                                                                                                                                                             | 2    | –           | 2,5      | Nm    |
| Case                                     |                                                                                                                                                                                                                                                                   |      | M2          |          |       |

**MiniSKiiP 2**  
**SEMIKRON integrated intelligent Power**  
**SKiiP 22 NAB 12**  
**SKiiP 22 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.

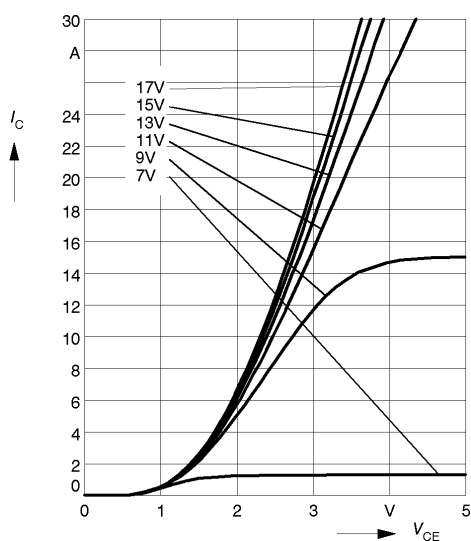


Fig. 1 Typ. output characteristic,  $t_p = 80 \mu s$ ;  $25^\circ C$

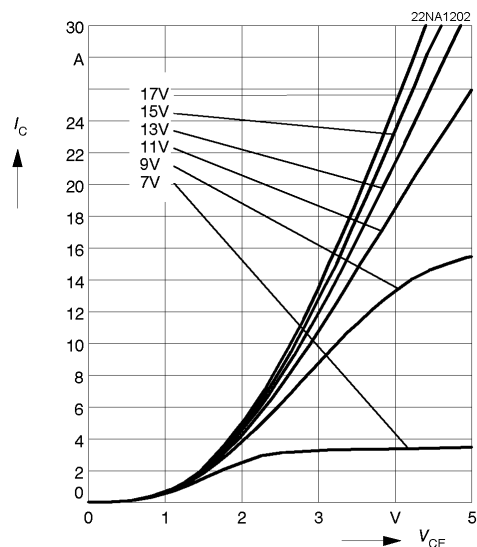


Fig. 2 Typ. output characteristic,  $t_p = 80 \mu s$ ;  $125^\circ C$

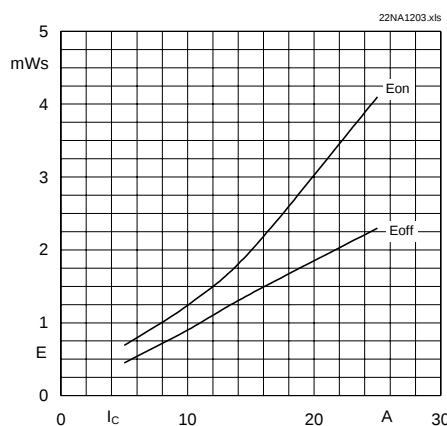


Fig. 3 Turn-on /-off energy =  $f(I_C)$

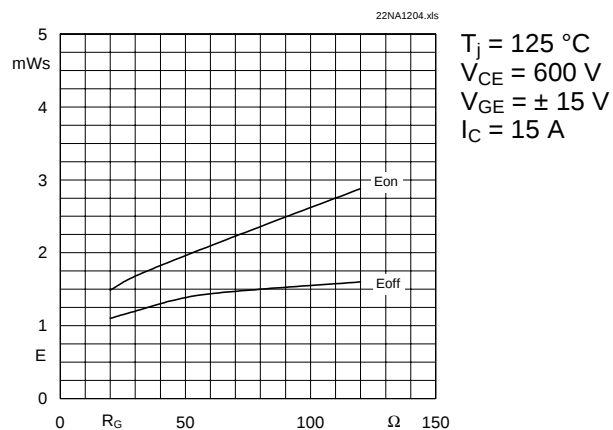


Fig. 4 Turn-on /-off energy =  $f(R_G)$

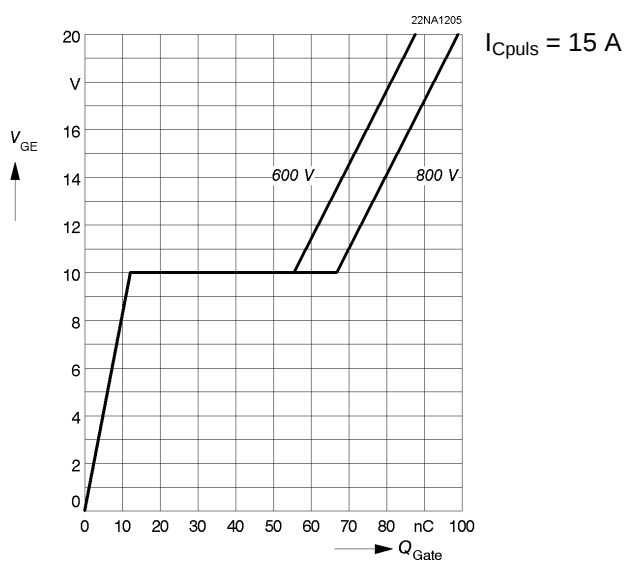


Fig. 5 Typ. gate charge characteristic

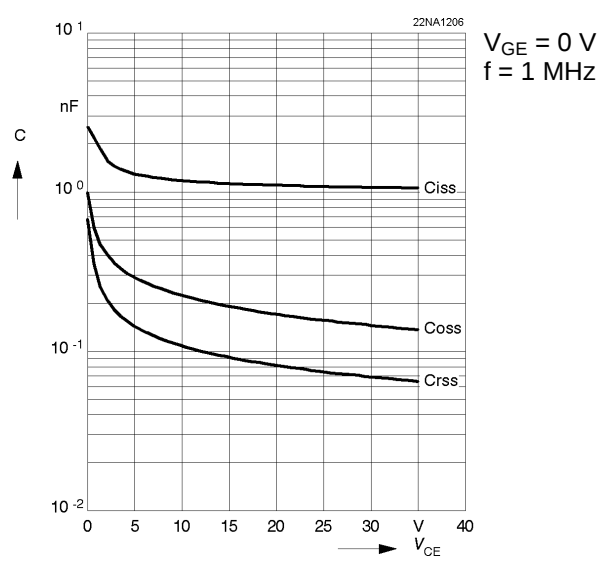


Fig. 6 Typ. capacitances vs.  $V_{CE}$

MiniSKiiP 1200 V

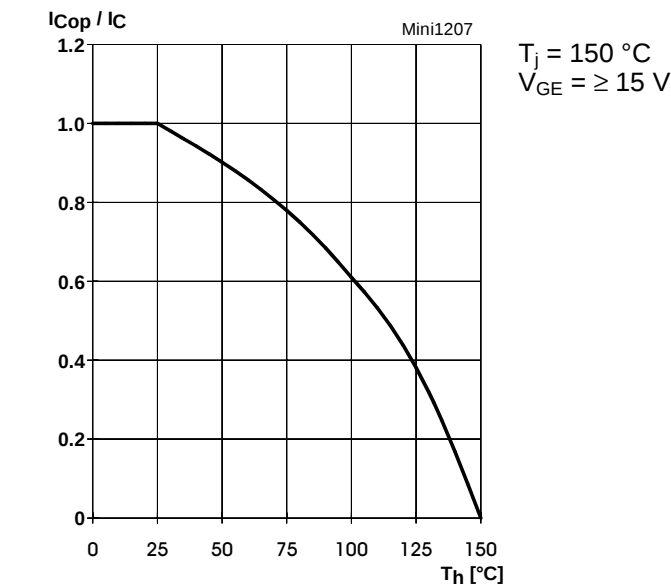


Fig. 7 Rated current of the IGBT  $I_{COP} / I_C = f(T_h)$

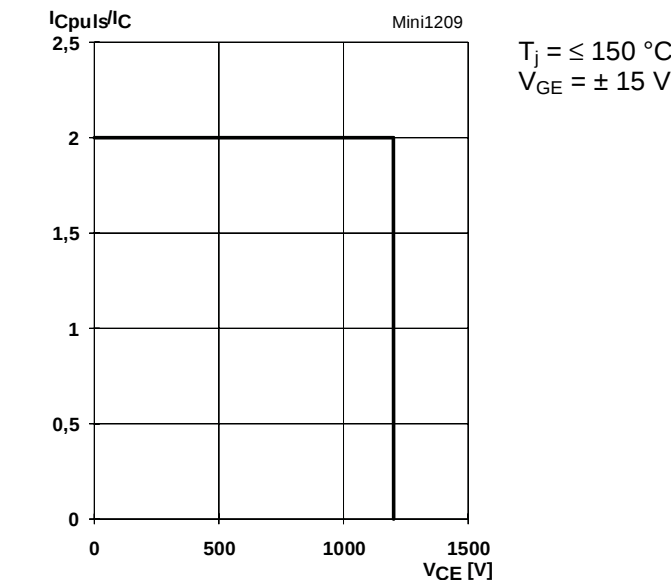


Fig. 9 Turn-off safe operating area (RBSOA) of the IGBT

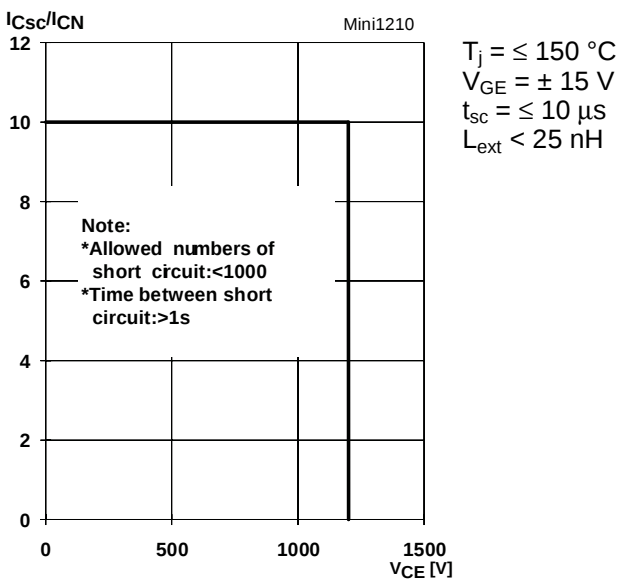


Fig. 10 Safe operating area at short circuit of the IGBT

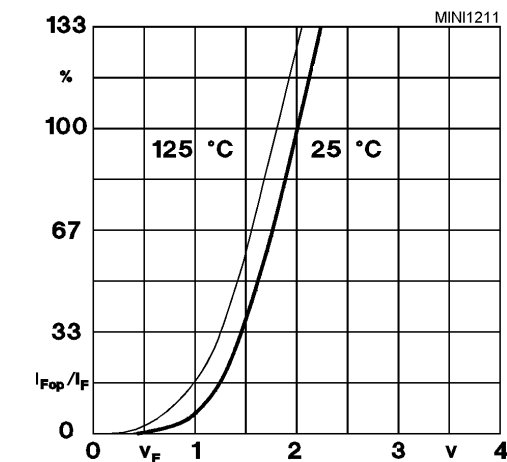


Fig. 11 Typ. freewheeling diode forward characteristic

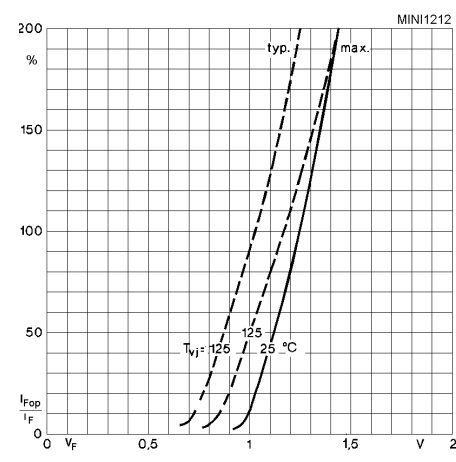


Fig. 12 Forward characteristic of the input bridge diode

