

# SKiiP 28AHB16V1



MiniSKiiP<sup>®</sup> 2

## 3-phase bridge rectifier + brake chopper

### SKiiP 28AHB16V1

#### Features

- Fast Trench IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

#### Typical Applications\*

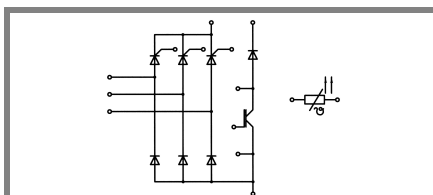
- Input bridge for inverter up to 39 kVA

#### Remarks

- $V_{CEsat}$ ,  $V_F$  = chip level value

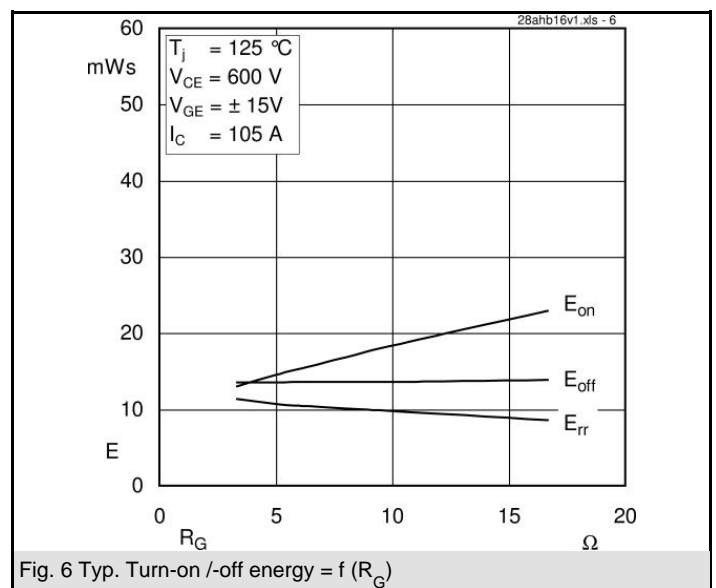
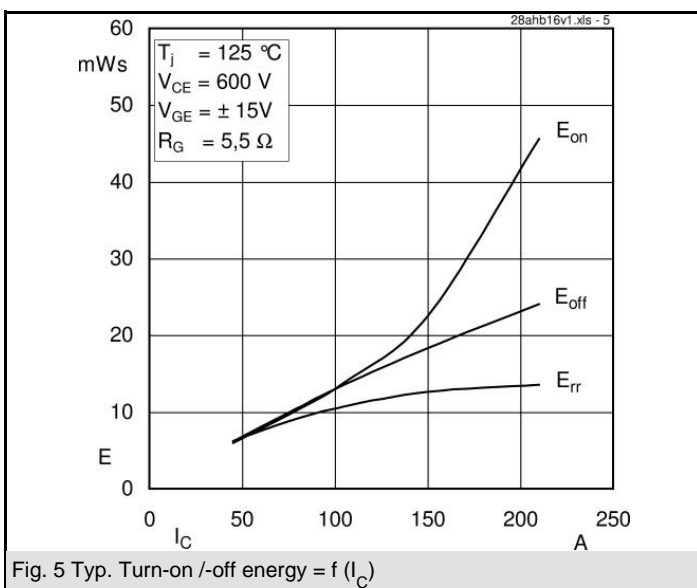
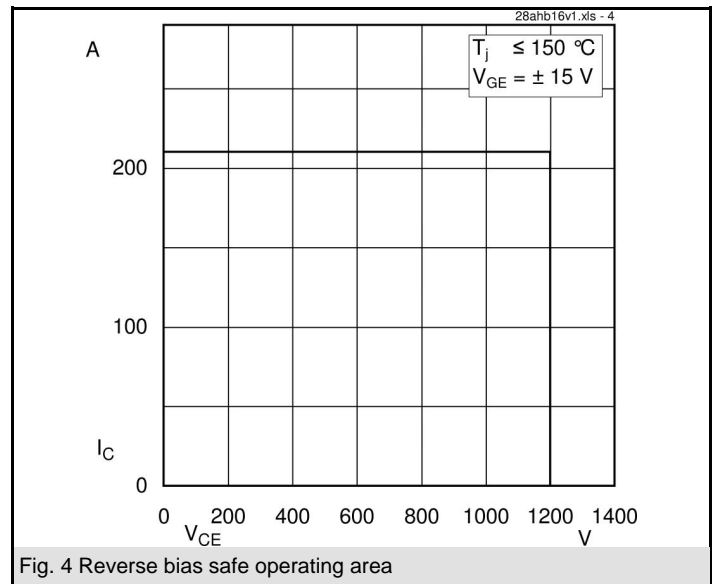
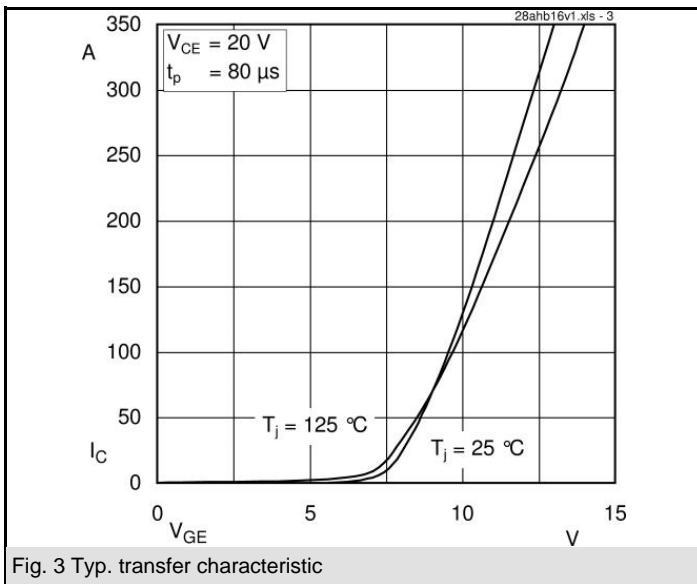
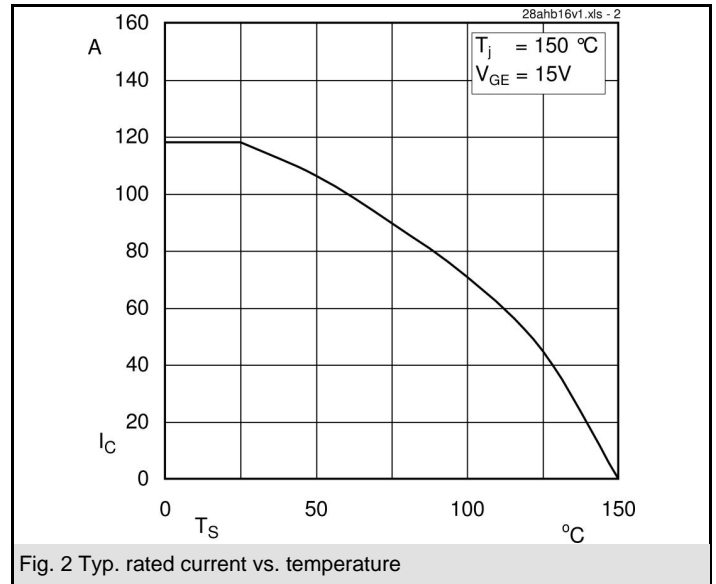
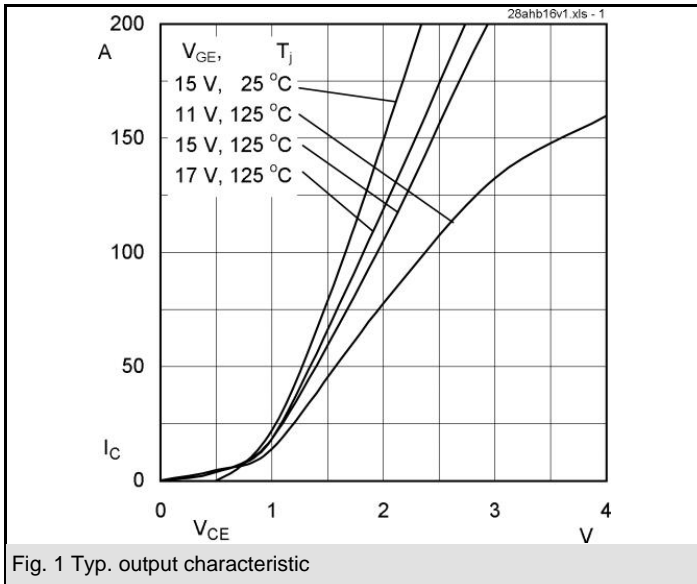
| Absolute Maximum Ratings             |                                                       | $T_s = 25\text{ °C}$ , unless otherwise specified |                  |
|--------------------------------------|-------------------------------------------------------|---------------------------------------------------|------------------|
| Symbol                               | Conditions                                            | Values                                            | Units            |
| <b>IGBT - Chopper</b>                |                                                       |                                                   |                  |
| $V_{CES}$                            |                                                       | 1200                                              | V                |
| $I_C$                                | $T_s = 25\text{ (70) °C}$                             | 118 (88)                                          | A                |
| $I_{CRM}$                            | $t_p \leq 1\text{ ms}$                                | 210                                               | A                |
| $V_{GES}$                            |                                                       | $\pm 20$                                          | V                |
| $T_j$                                |                                                       | - 40 ... + 150                                    | °C               |
| <b>Diode - Chopper</b>               |                                                       |                                                   |                  |
| $I_F$                                | $T_s = 25\text{ (70) °C}$                             | 118 (88)                                          | A                |
| $I_{FRM}$                            | $t_p \leq 1\text{ ms}$                                | 210                                               | A                |
| $T_j$                                |                                                       | - 40 ... + 150                                    | °C               |
| <b>Diode / Thyristor - Rectifier</b> |                                                       |                                                   |                  |
| $V_{RRM}$                            |                                                       | 1600                                              | V                |
| $I_F / I_T$                          | $T_s = 70$                                            | 82                                                | A                |
| $I_{FSM} / I_{TSM}$                  | $t_p = 10\text{ ms}$ , sin 180°, $T_j = 25\text{ °C}$ | 1000                                              | A                |
| $i^2t$                               | $t_p = 10\text{ ms}$ , sin 180°, $T_j = 25\text{ °C}$ | 5500                                              | A <sup>2</sup> s |
| $T_j$                                | Diode                                                 | - 40 ... + 150                                    | °C               |
| $T_j$                                | Thyristor                                             | - 40 ... + 125                                    | °C               |
| $I_{RMS}$                            | per power terminal (20 A / spring)                    | 120                                               | A                |
| $T_{stg}$                            | $T_{op} \leq T_{stg}$                                 | - 40 ... + 125                                    | °C               |
| $V_{isol}$                           | AC, 1 min.                                            | 2500                                              | V                |

| Characteristics        |                                                                     | $T_s = 25\text{ °C}$ , unless otherwise specified |           |           |       |
|------------------------|---------------------------------------------------------------------|---------------------------------------------------|-----------|-----------|-------|
| Symbol                 | Conditions                                                          | min.                                              | typ.      | max.      | Units |
| <b>IGBT - Chopper</b>  |                                                                     |                                                   |           |           |       |
| $V_{CEsat}$            | $I_{Cnom} = 105\text{ A}$ , $T_j = 25\text{ (125) °C}$              |                                                   | 1,7 (2)   | 2,1 (2,4) | V     |
| $V_{GE(th)}$           | $V_{GE} = V_{CE}$ , $I_C = 3\text{ mA}$                             | 5                                                 | 5,8       | 6,5       | V     |
| $V_{CE(TO)}$           | $T_j = 25\text{ (125) °C}$                                          |                                                   | 1 (0,9)   | 1,2 (1,1) | V     |
| $r_T$                  | $T_j = 25\text{ (125) °C}$                                          |                                                   | 6,7 (10)  | 8,6 (12)  | mΩ    |
| $C_{ies}$              | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$ |                                                   | 8,4       |           | nF    |
| $C_{oes}$              | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$ |                                                   | 1,5       |           | nF    |
| $C_{res}$              | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$ |                                                   | 1,1       |           | nF    |
| $R_{th(j-s)}$          | per IGBT                                                            |                                                   | 0,4       |           | K/W   |
| $t_{d(on)}$            | under following conditions                                          |                                                   | 65        |           | ns    |
| $t_r$                  | $V_{CC} = 600\text{ V}$ , $V_{GE} = \pm 15\text{ V}$                |                                                   | 30        |           | ns    |
| $t_{d(off)}$           | $I_{Cnom} = 105\text{ A}$ , $T_j = 125\text{ °C}$                   |                                                   | 410       |           | ns    |
| $t_f$                  | $R_{Gon} = R_{Goff} = 5,5\text{ Ω}$                                 |                                                   | 100       |           | ns    |
| $E_{on}$               | inductive load                                                      |                                                   | 14,4      |           | mJ    |
| $E_{off}$              |                                                                     |                                                   | 13,3      |           | mJ    |
| <b>Diode - Chopper</b> |                                                                     |                                                   |           |           |       |
| $V_F = V_{EC}$         | $I_{Fnom} = 105\text{ A}$ , $T_j = 25\text{ (125) °C}$              |                                                   | 1,6 (1,6) | 1,8 (1,8) | V     |
| $V_{(TO)}$             | $T_j = 25\text{ (125) °C}$                                          |                                                   | 1 (0,8)   | 1,1 (0,9) | V     |
| $r_T$                  | $T_j = 25\text{ (125) °C}$                                          |                                                   | 5,7 (7,6) | 6,7 (8,6) | mΩ    |
| $R_{th(j-s)}$          | per diode                                                           |                                                   | 0,55      |           | K/W   |
| $I_{RRM}$              | under following conditions                                          |                                                   | 160       |           | A     |
| $Q_{rr}$               | $I_{Fnom} = 105\text{ A}$ , $V_R = 600\text{ V}$                    |                                                   | 26        |           | μC    |
| $E_{rr}$               | $V_{GE} = 0\text{ V}$ , $T_j = 125\text{ °C}$                       |                                                   | 10,8      |           | mJ    |
|                        | $di_F/dt = 5400\text{ A/μs}$                                        |                                                   |           |           |       |



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| Characteristics              |                                                        | $T_s = 25\text{ °C}$ , unless otherwise specified |            |           |       |
|------------------------------|--------------------------------------------------------|---------------------------------------------------|------------|-----------|-------|
| Symbol                       | Conditions                                             | min.                                              | typ.       | max.      | Units |
| <b>Diode - Rectifier</b>     |                                                        |                                                   |            |           |       |
| $V_F$                        | $I_{Fnom} = 75\text{ A}$ , $T_j = 25\text{ °C}$        |                                                   | 1,2        |           | V     |
| $V_{(TO)}$                   | $T_j = 150\text{ °C}$                                  |                                                   | 0,8        |           | V     |
| $r_T$                        | $T_j = 150\text{ °C}$                                  |                                                   | 7          |           | mΩ    |
| $R_{th(j-s)}$                | per diode                                              |                                                   | 0,7        |           | K/W   |
| <b>Thyristor - Rectifier</b> |                                                        |                                                   |            |           |       |
| $V_T$                        | $I_{Fnom} = 120\text{ A}$ , $T_j = 25\text{ (125) °C}$ |                                                   |            | 1,8 (1,7) | V     |
| $V_{T(TO)}$                  | $T_j = 125\text{ °C}$                                  |                                                   |            | 1,1       | V     |
| $r_T$                        | $T_j = 125\text{ °C}$                                  |                                                   |            | 5         | mΩ    |
| $V_{GT}$                     | $T_j = 25\text{ °C}$                                   |                                                   |            | 3         | V     |
| $I_{GT}$                     | $T_j = 25\text{ °C}$                                   | 150                                               |            |           | mA    |
| $I_H$                        | $T_j = 25\text{ °C}$                                   |                                                   | 200        |           | mA    |
| $I_L$                        | $T_j = 25\text{ °C}$                                   |                                                   | 400        |           | mA    |
| $dv/dt_{(cr)}$               | $T_j = 125\text{ °C}$                                  |                                                   |            | 1000      | V/μs  |
| $di/dt_{(cr)}$               | $T_j = 125\text{ °C}$                                  |                                                   |            | 50        | A/μs  |
| $R_{th(j-s)}$                | per thyristor                                          |                                                   | 0,65       |           | K/W   |
| <b>Temperature Sensor</b>    |                                                        |                                                   |            |           |       |
| $R_{ts}$                     | 3 %, $T_r = 25\text{ (100) °C}$                        |                                                   | 1000(1670) |           | Ω     |
| <b>Mechanical Data</b>       |                                                        |                                                   |            |           |       |
| w                            |                                                        |                                                   | 65         |           | g     |
| $M_s$                        | Mounting torque                                        | 2                                                 |            | 2,5       | Nm    |



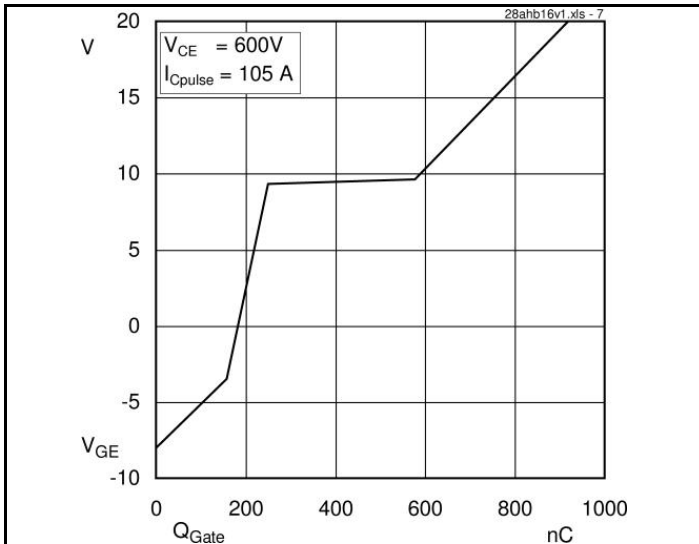


Fig. 7 Typ. gate charge characteristic

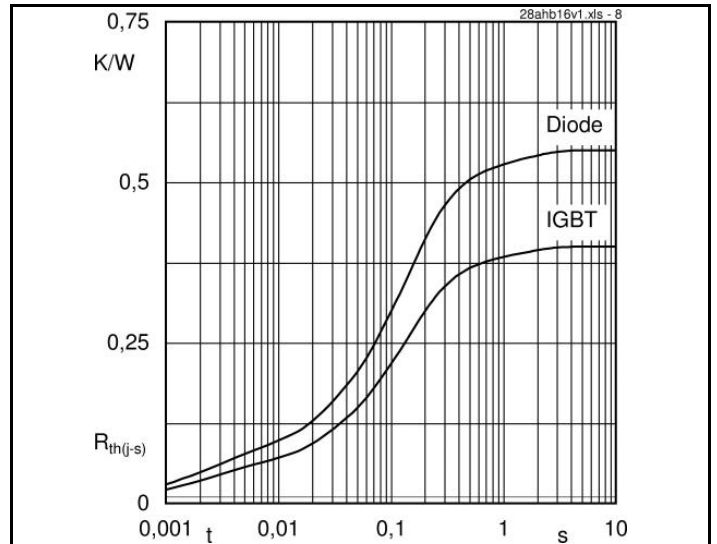


Fig. 8 Typ. thermal impedance

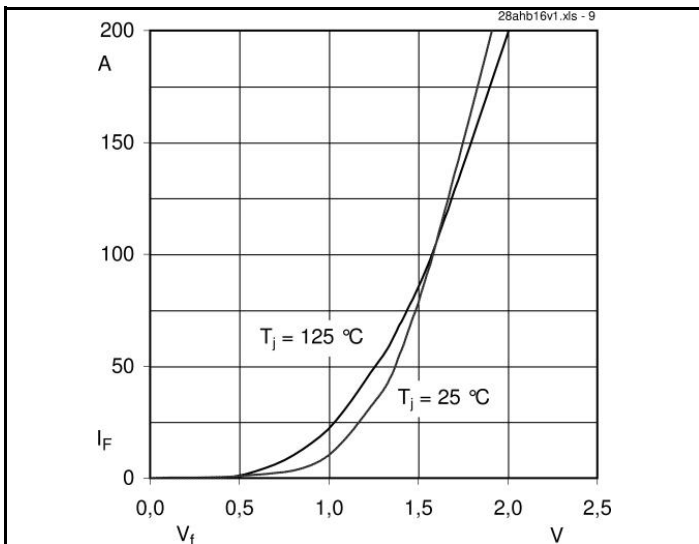


Fig. 9 Typ. freewheeling diode forward characteristic

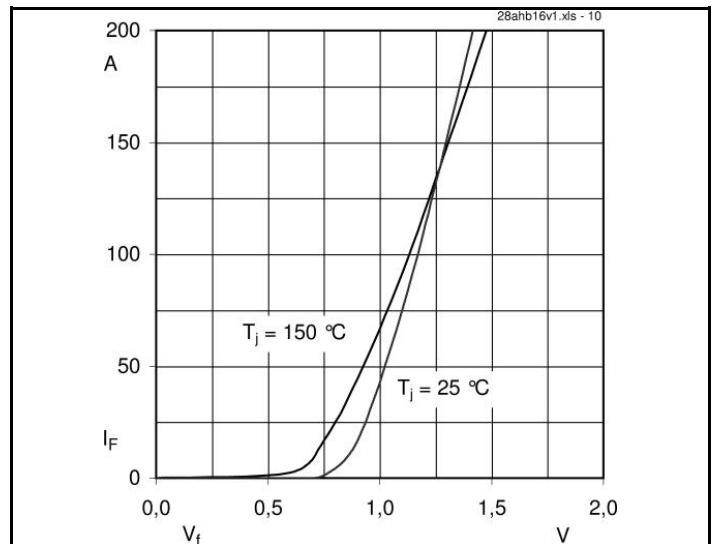


Fig. 10 Typ. input bridge forward characteristic

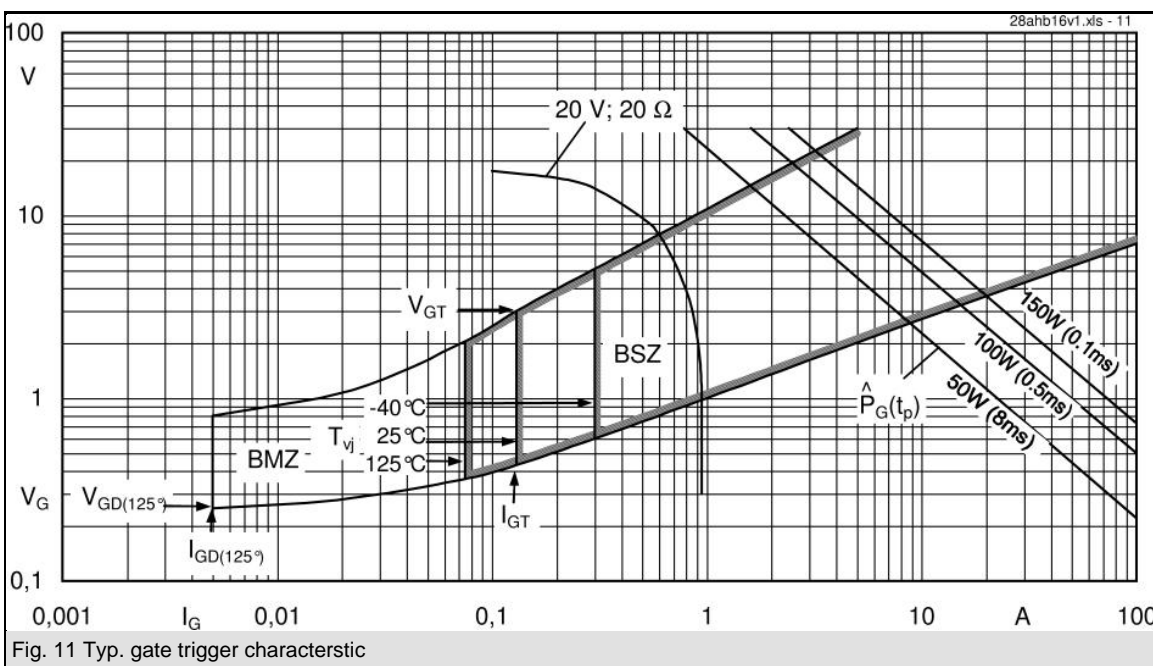
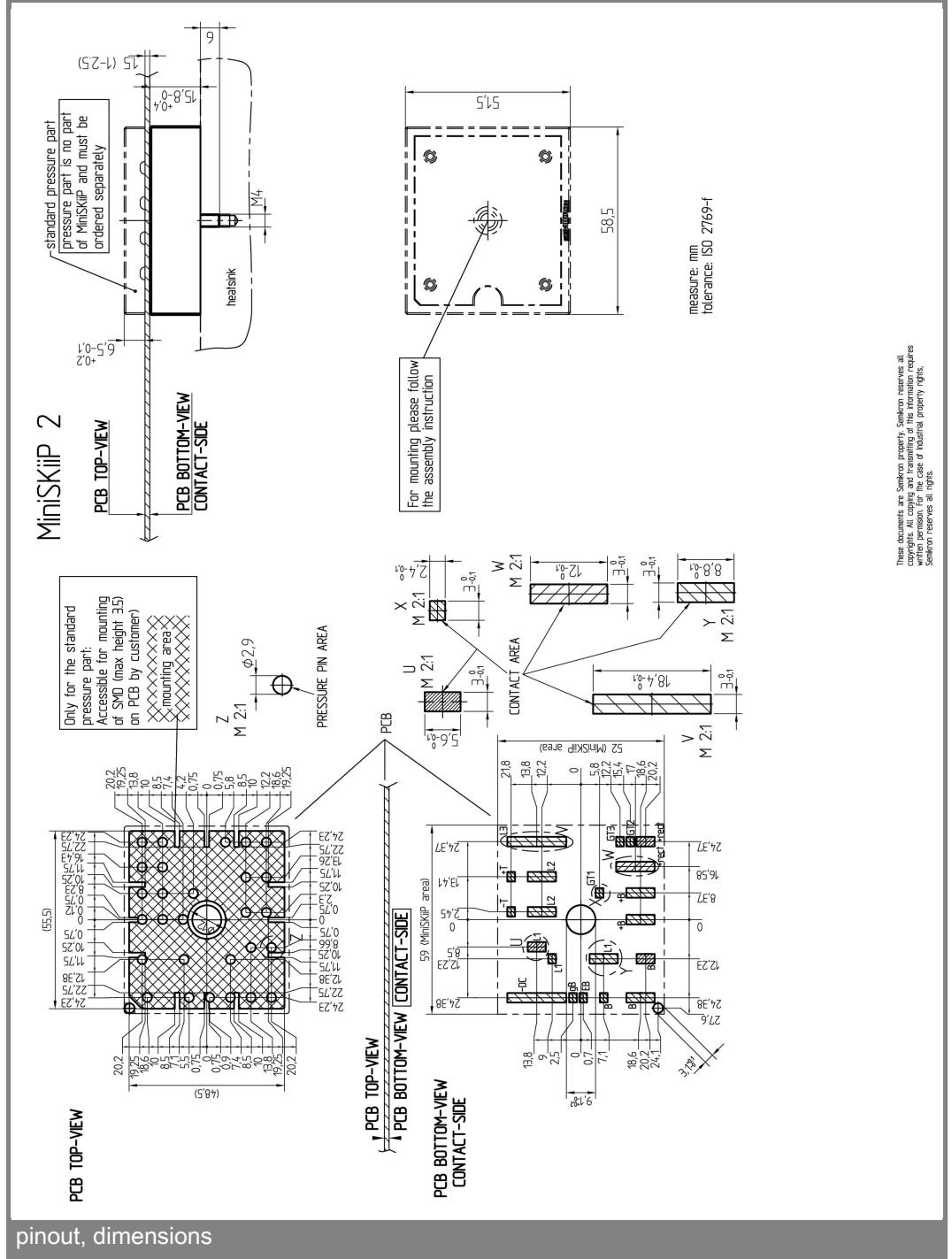
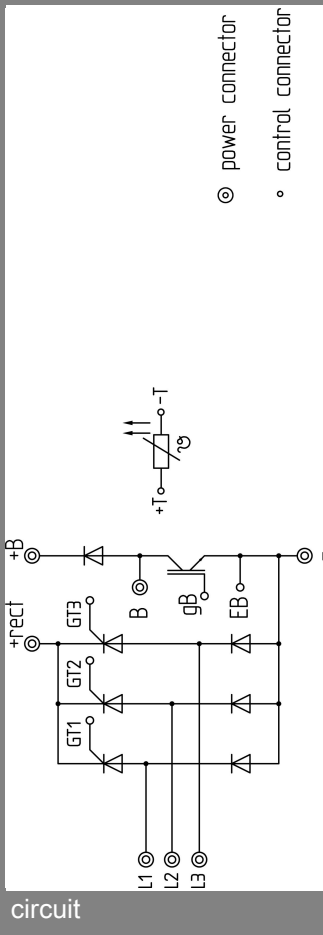


Fig. 11 Typ. gate trigger characteristic



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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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