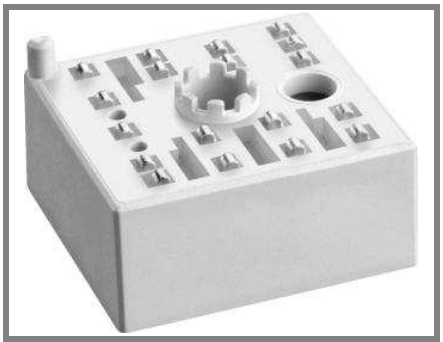


MiniSKiiP®0

1-phase bridge rectifier + 3-phase bridge inverter

**SKiiP 02NEC066V3**

## Features

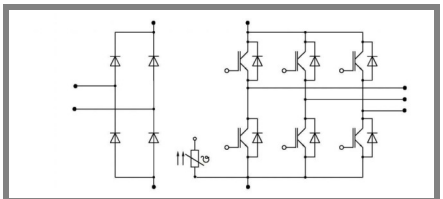
- Trench IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

## Typical Applications*

- Inverter up to 5 kVA
- Typical motor power 2,2 kW

## Remarks

- Case temperature limited to $T_C$= 125°C max.
- Product reliability results are valid for $T_j$=150°C
- SC data: $t_p \leq 6$ µs; $V_{GE} \leq 15$ V; $T_j$ = 150°C; $V_{CC}$ = 360 V
- $V_{CEsat}$, $V_F$ = chip level values



NEC

| Absolute Maximum Ratings | | $T_S$= 25°C, unless otherwise specified | |
|---|---|---|---|
| **Symbol** | **Conditions** | **Values** | **Units** |
| **IGBT - Inverter** | | | |
| $V_{CES}$ | | 600 | V |
| $I_C$ | $T_s$ = 25 (70) °C, $T_j$ = 150 °C | 19 (14) | A |
| $I_C$ | $T_s$ = 25 (70) °C, $T_j$ = 175 °C | 20 (16) | A |
| $I_{CRM}$ | $t_p$ = 1 ms | 20 | A |
| $V_{GES}$ | | ±20 | V |
| **Diode - Inverter** | | | |
| $I_F$ | $T_s$ = 25 (70) °C, $T_j$ = 150 °C | 20 (15) | A |
| $I_F$ | $T_s$ = 25 (70) °C, $T_j$ = 175 °C | 20 (18) | A |
| $I_{FRM}$ | $t_p$ = 1 ms | 20 | A |
| **Diode - Rectifier** | | | |
| $V_{RRM}$ | | 800 | V |
| $I_F$ | $T_s$ = 70 °C | 35 | A |
| $I_{FSM}$ | $t_p$ = 10 ms, sin 180 °, $T_j$ = 25 °C | 220 | A |
| i²t | $t_p$ = 10 ms, sin 180 °, $T_j$ = 25 °C | 240 | A²s |
| $I_{tRMS}$ | per power terminal (20 A / spring) | 20 | A |
| $T_j$ | IGBT, Diode | -40...+175 | °C |
| $T_{stg}$ | | -40...+125 | °C |
| $V_{isol}$ | AC, 1 min. | 2500 | V |

| Characteristics | | $T_S$= 25°C, unless otherwise specified | | | |
|---|---|---|---|---|---|
| **Symbol** | **Conditions** | **min.** | **typ.** | **max.** | **Units** |
| **IGBT - Inverter** | | | | | |
| $V_{CE(sat)}$ | $I_{Cnom}$ = 10 A, $T_j$ = 25 (150) °C | 1,1 | 1,45 (1,65) | 1,85 (2,05) | V |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 1 mA | | 5,8 | | V |
| $V_{CE(TO)}$ | $T_j$ = 25 (150) °C | | 0,9 (0,7) | 1,1 (1) | V |
| $r_{CE}$ | $T_j$ = 25 (150) °C | | 60 (100) | 80 (110) | mΩ |
| $C_{ies}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 0,58 | | nF |
| $C_{oes}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 0,12 | | nF |
| $C_{res}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 0,04 | | nF |
| $R_{CC'+EE'}$ | spring contact-chip $T_s$ = 25 (150 )°C | | | | mΩ |
| $R_{th(j-s)}$ | per IGBT | | 2 | | K/W |
| $t_{d(on)}$ | under following conditions | | 25 | | ns |
| $t_r$ | $V_{CC}$ = 300 V, $V_{GE}$ = ±15 V | | 25 | | ns |
| $t_{d(off)}$ | $I_{Cnom}$ = 10 A, $T_j$ = 150 °C | | 190 | | ns |
| $t_f$ | $R_{Gon}$ = $R_{Goff}$ = 39 Ω | | 40 | | ns |
| $E_{on}$ ($E_{off}$) | inductive load | | 0,5 (0,3) | | mJ |
| **Diode - Inverter** | | | | | |
| $V_F$ = $V_{EC}$ | $I_F$ = 10 A, $T_j$ = 25 (150) °C | | 1,3 (1,3) | 1,6 (1,6) | V |
| $V_{(TO)}$ | $T_j$ = 25 (150) °C | | 0,9 (0,8) | 1 (0,9) | V |
| $r_T$ | $T_j$ = 25 (150) °C | | 40 (50) | 60 (70) | mΩ |
| $R_{th(j-s)}$ | per diode | | 2,5 | | K/W |
| $I_{RRM}$ | under following conditions | | 15,8 | | A |
| $Q_{rr}$ | $I_{Fnom}$ = 10 A, $V_R$ = 300 V | | 1,5 | | µC |
| $E_{rr}$ | $V_{GE}$ = 0 V, $T_j$ = 150°C | | 0,5 | | mJ |
| | $di_F/dt$ = 810 A/µs | | | | |
| **Diode - Rectifier** | | | | | |
| $V_F$ | $I_{Fnom}$ = 15 A, $T_j$ = 25 °C | | 1,1 | | V |
| $V_{(TO)}$ | $T_j$ = 150 °C | | 0,8 | | V |
| $r_T$ | $T_j$ = 150 °C | | 20 | | mΩ |
| $R_{th(j-s)}$ | per diode | | 1,5 | | K/W |
| **Temperature Sensor** | | | | | |
| $R_{ts}$ | 3 %, $T_r$ = 25 (100) °C | | 1000(1670) | | Ω |
| **Mechanical Data** | | | | | |
| w | | | 21,5 | | g |
| $M_s$ | Mounting torque | 2 | | 2,5 | Nm |

 © by SEMIKRON

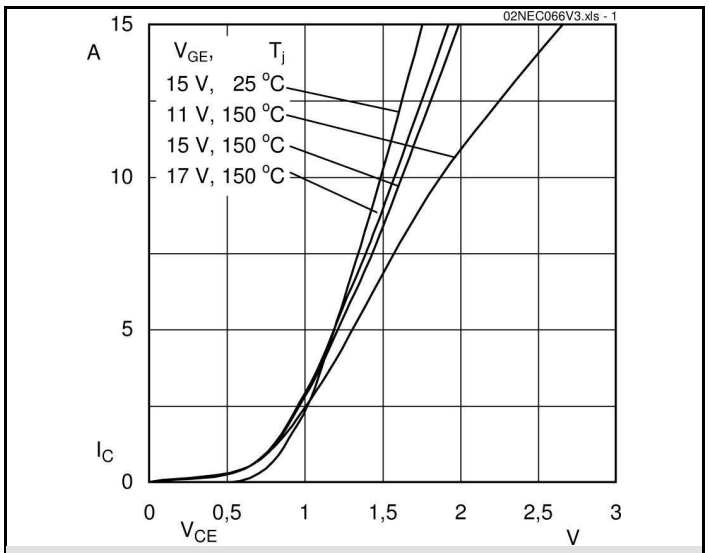



Fig. 1 Typ. output characteristic

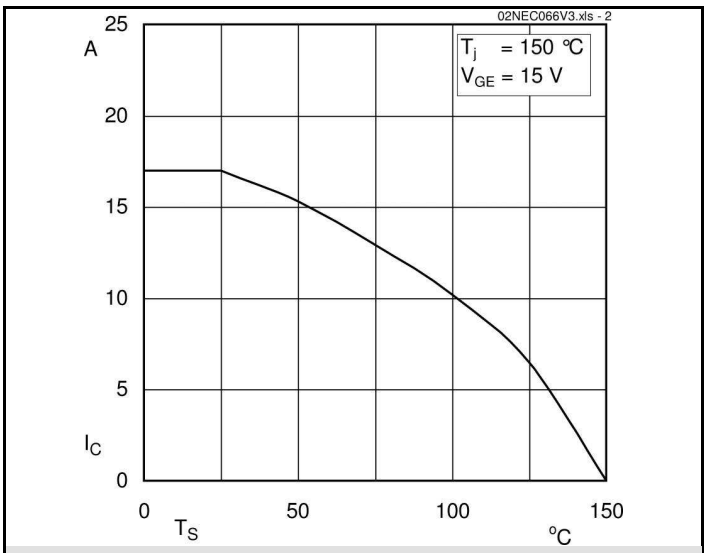



Fig. 2 Typ. rated current vs. temperature

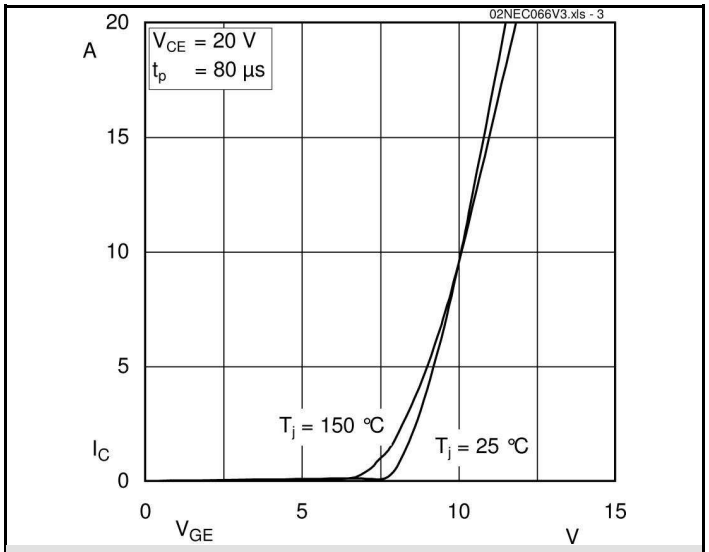



Fig. 3 Typ. transfer characteristic

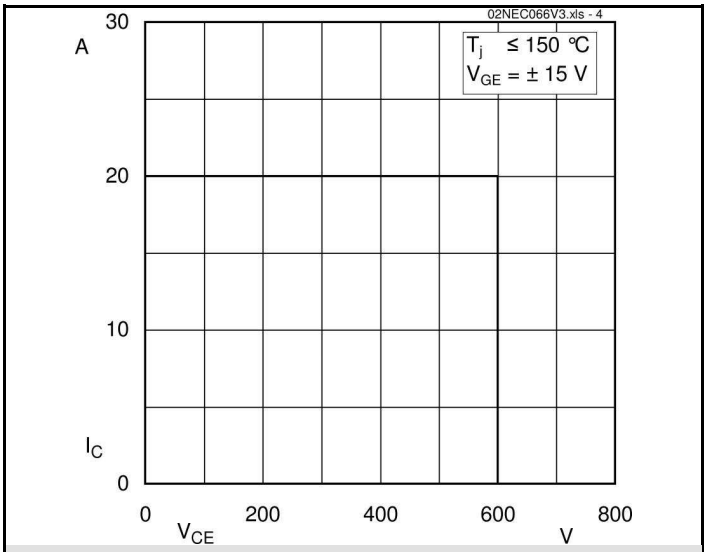



Fig. 4 Reverse bias safe operating area

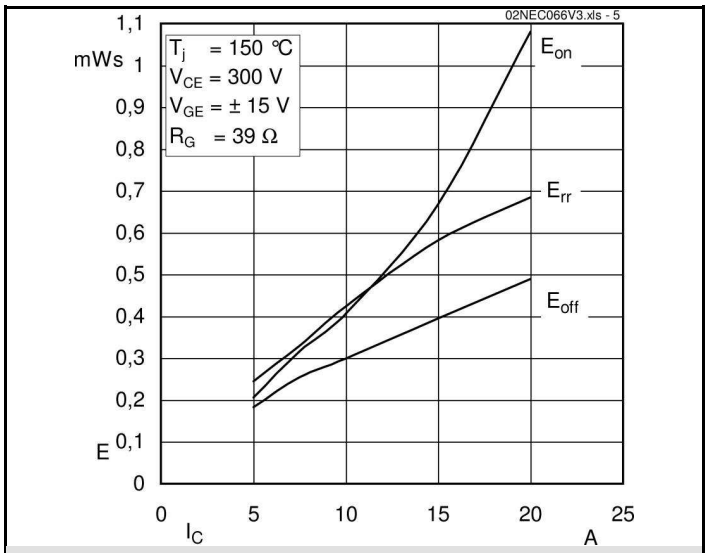



Fig. 5 Typ. Turn-on /-off energy = f ($I_C$)

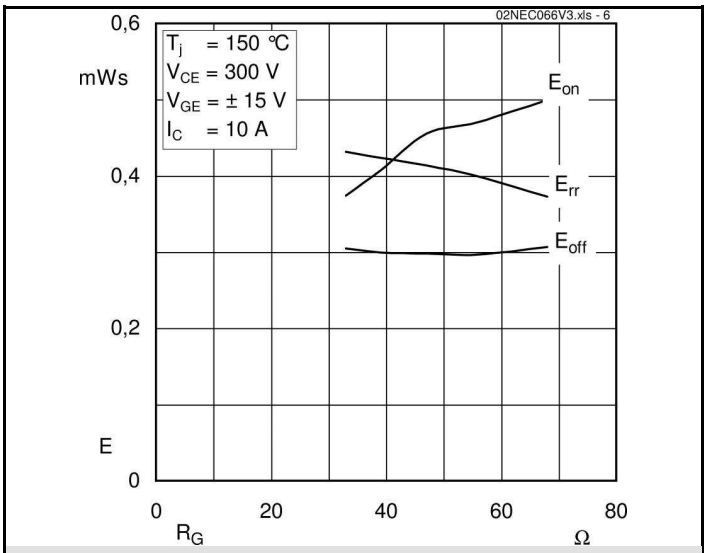



Fig. 6 Typ. Turn-on /-off energy = f ($R_G$)

 © by SEMIKRON

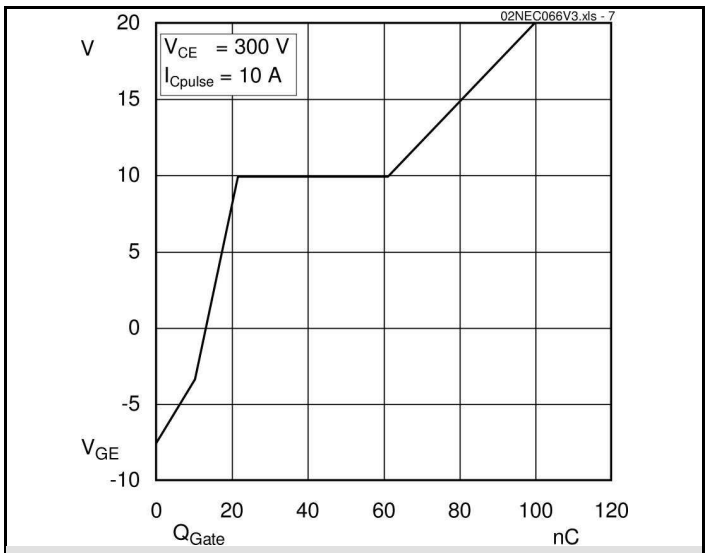



Fig. 7 Typ. gate charge characteristic

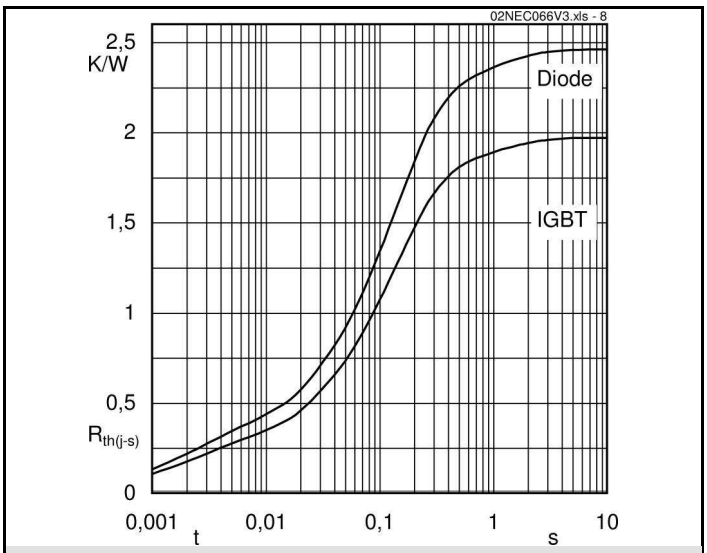



Fig. 8 Typ. thermal impedance

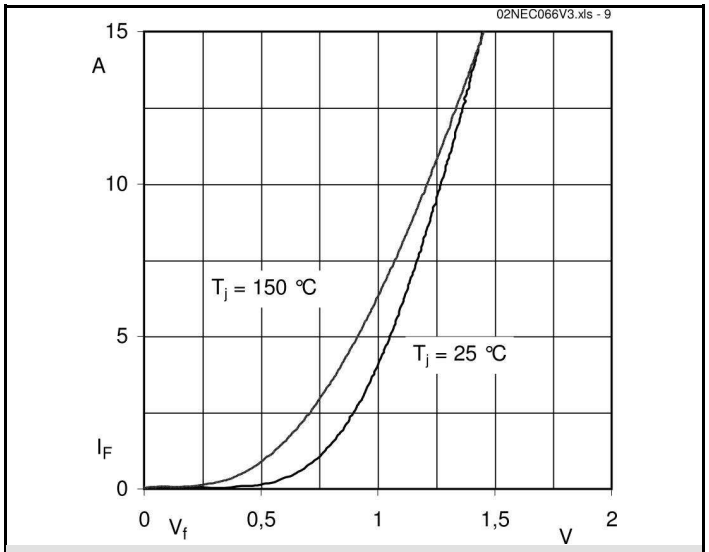



Fig. 9 Typ. freewheeling diode forward characteristic

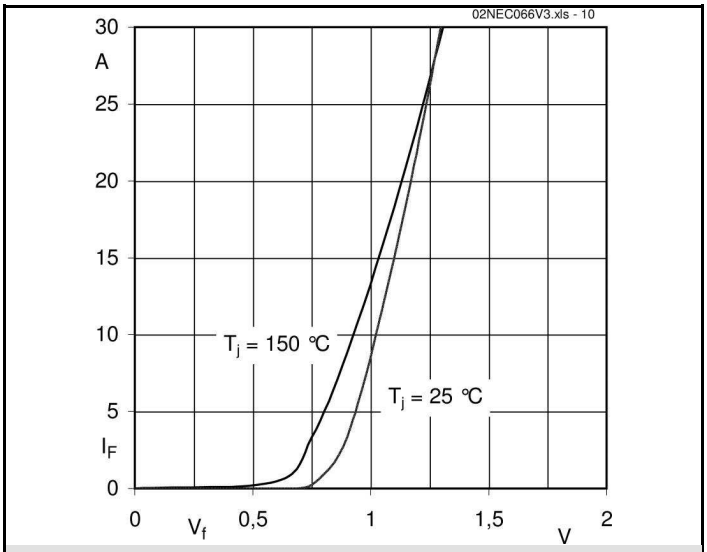
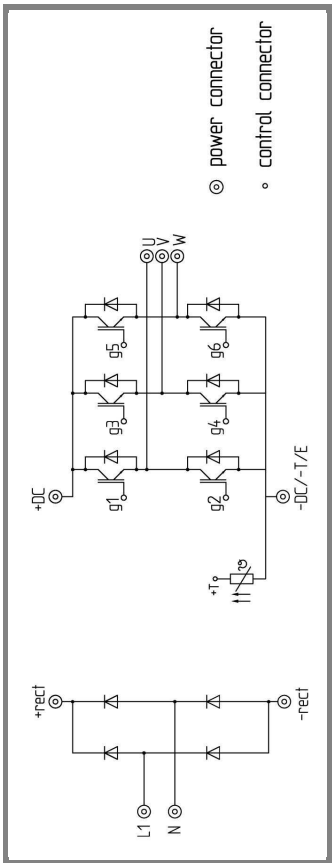
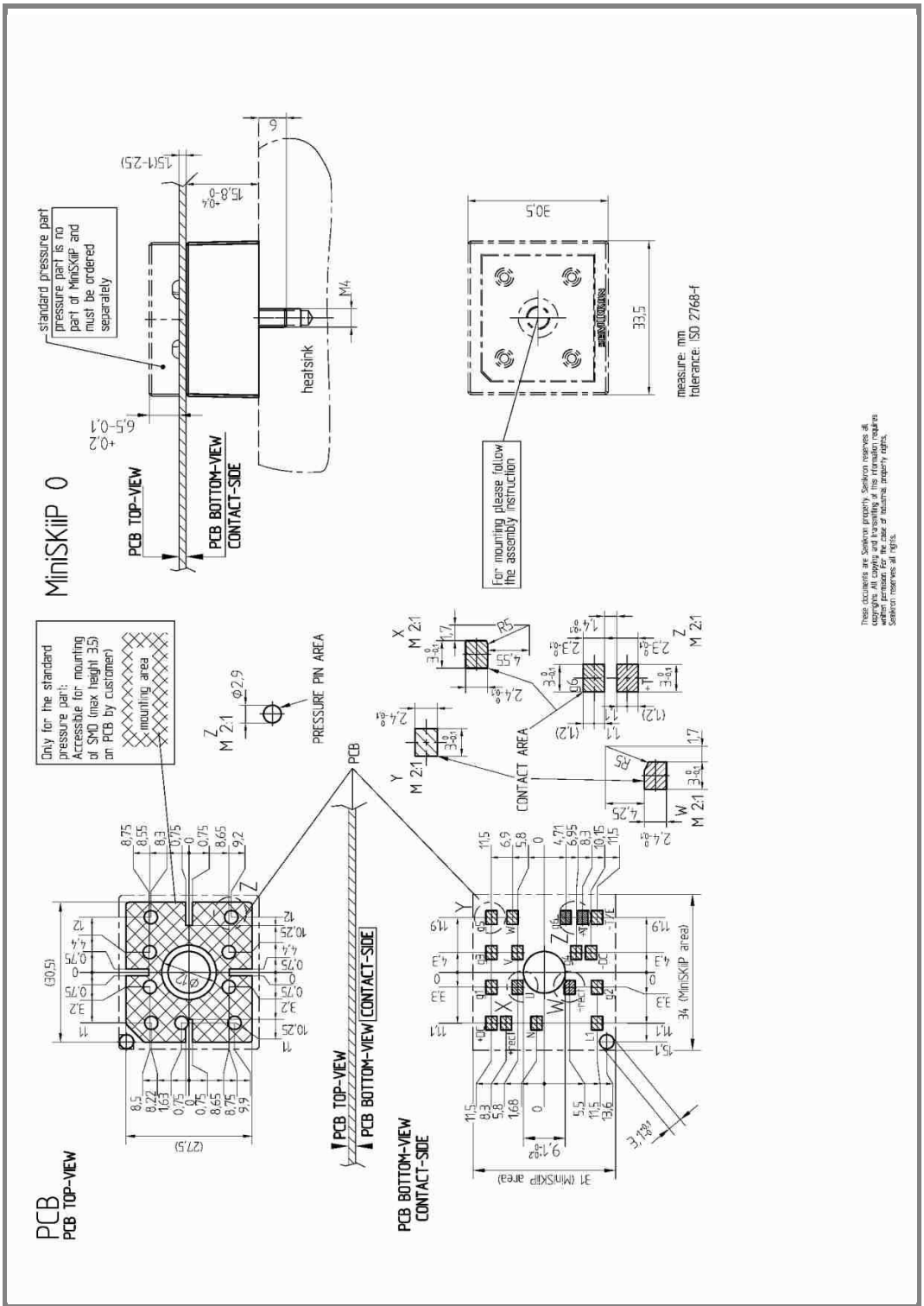



Fig. 10 Typ. input bridge forward characteristic

 © by SEMIKRON




circuit




pinout, dimensions

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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.

 © by SEMIKRON