



SKiM<sup>®</sup> 5

## IGBT Modules

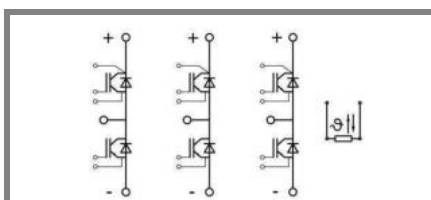
### SKiM 601GD126DM

#### Features

- Trench gate IGBT with field stop layer
- Low inductance case
- Fast & soft inverse CAL diodes
- Isolated by AlN DCB (Direct Copper Bonded) ceramic plate
- Pressure contact technology for thermal contacts
- Spring contact system to attach driver PCB to the control terminals
- Integrated temperature sensor

#### Typical Applications\*

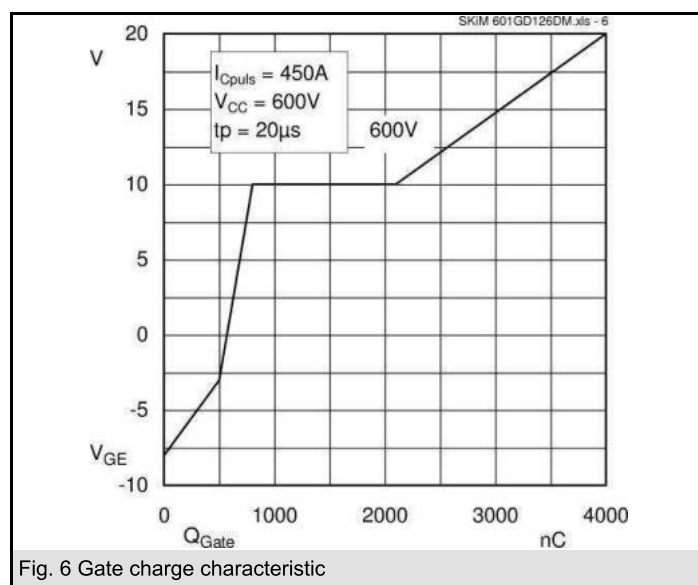
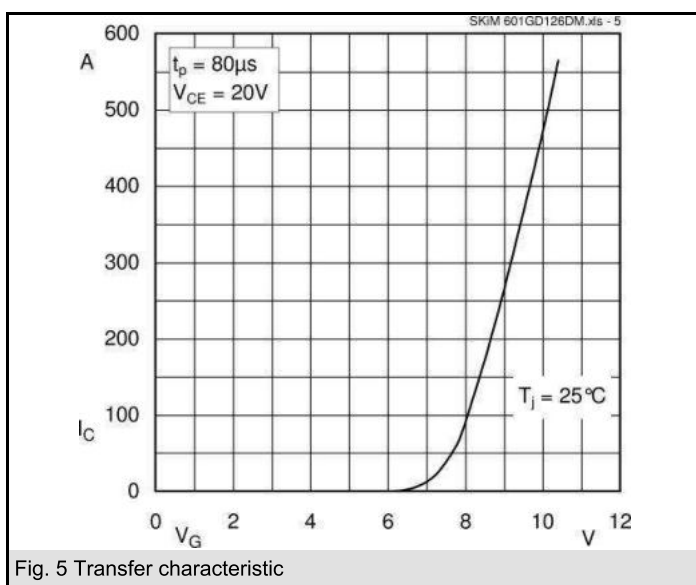
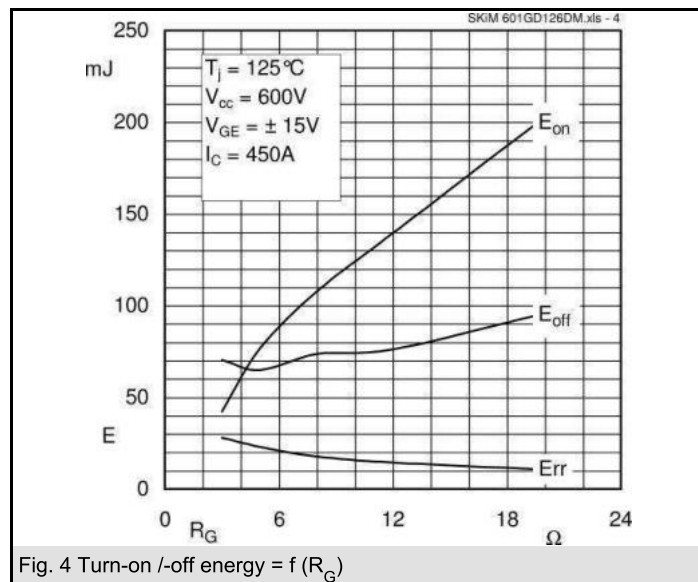
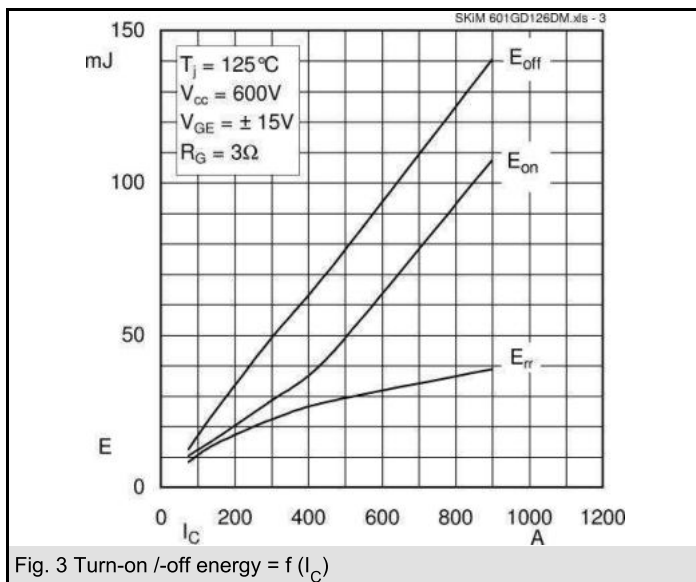
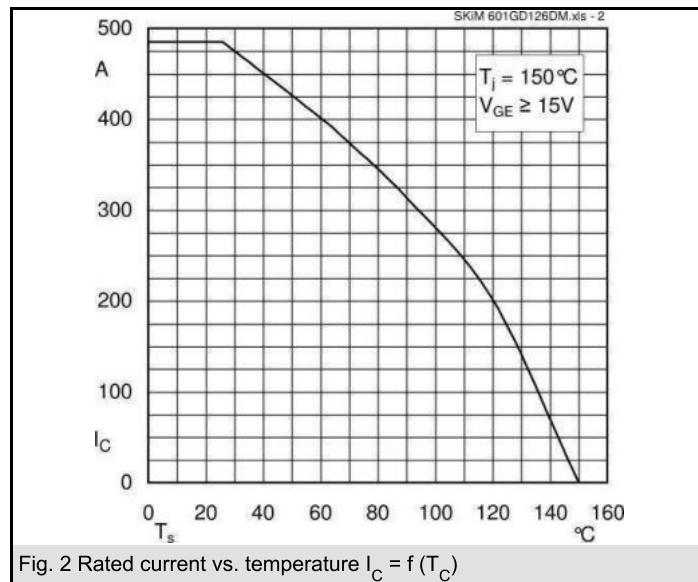
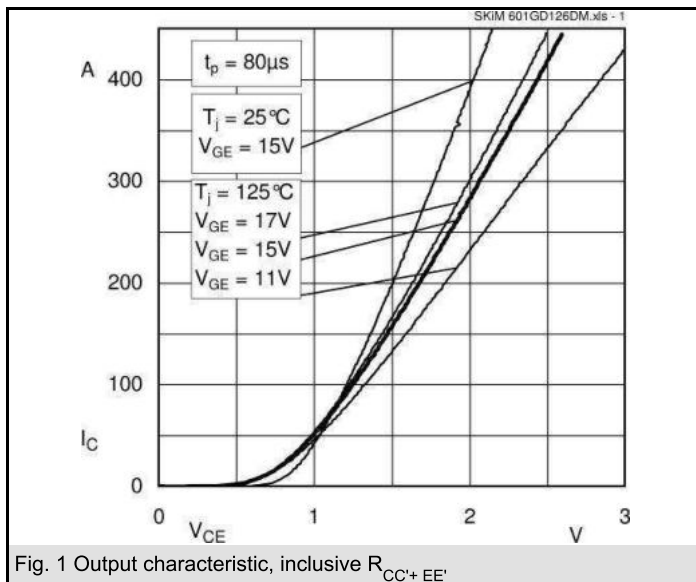
- Switched mode power supplies
- Three phase inverters for AC motor speed control

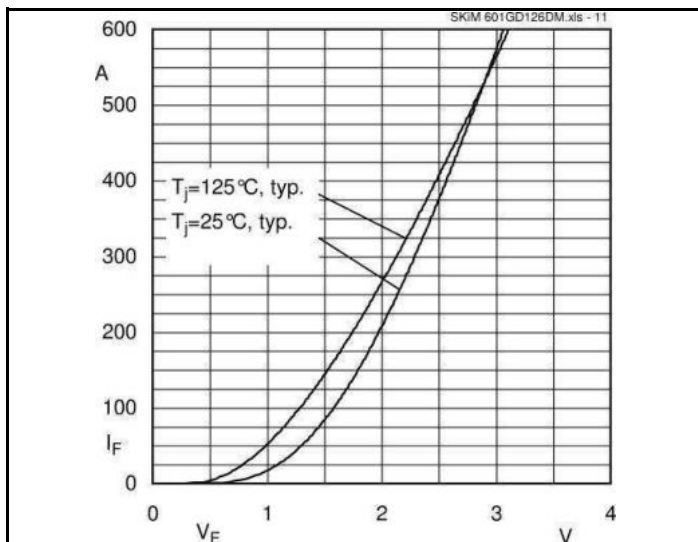
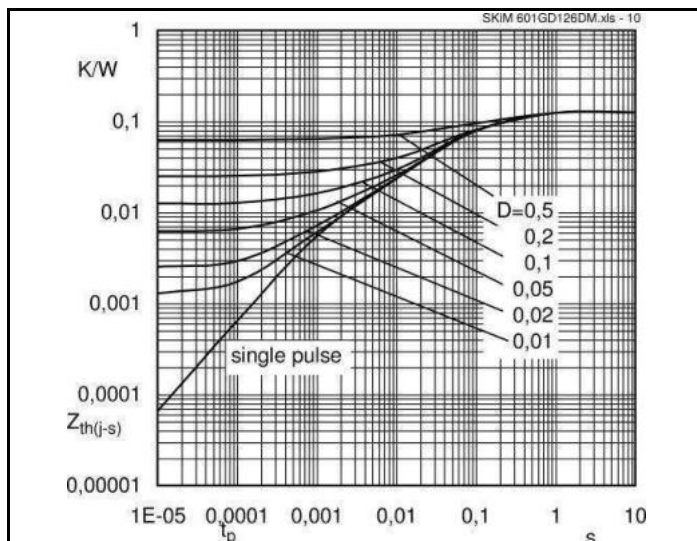
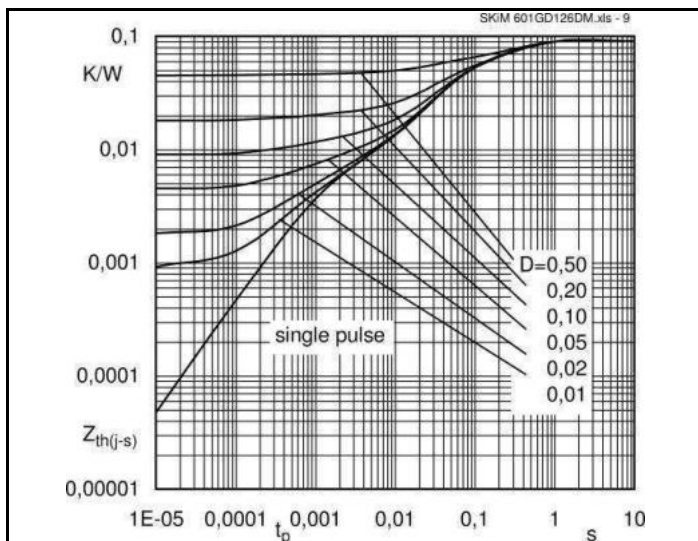
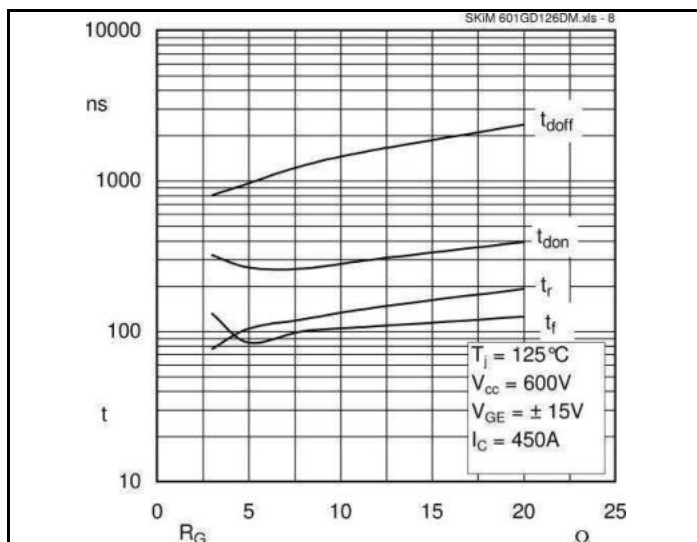
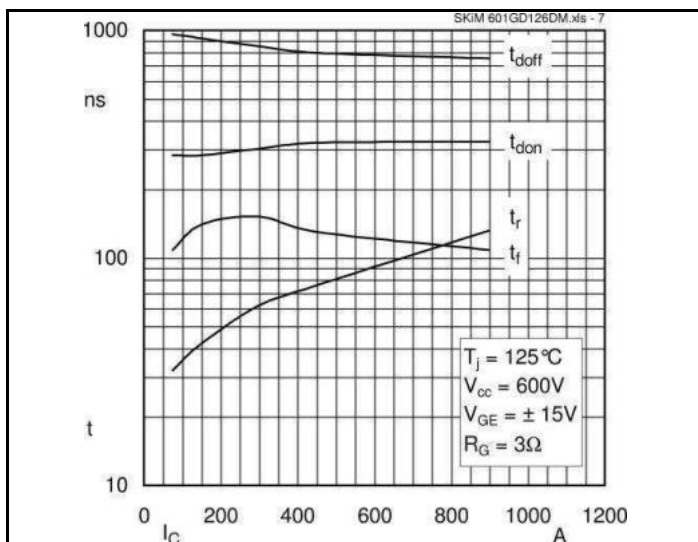


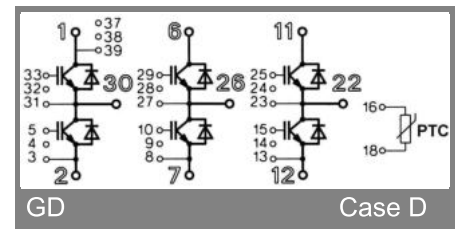
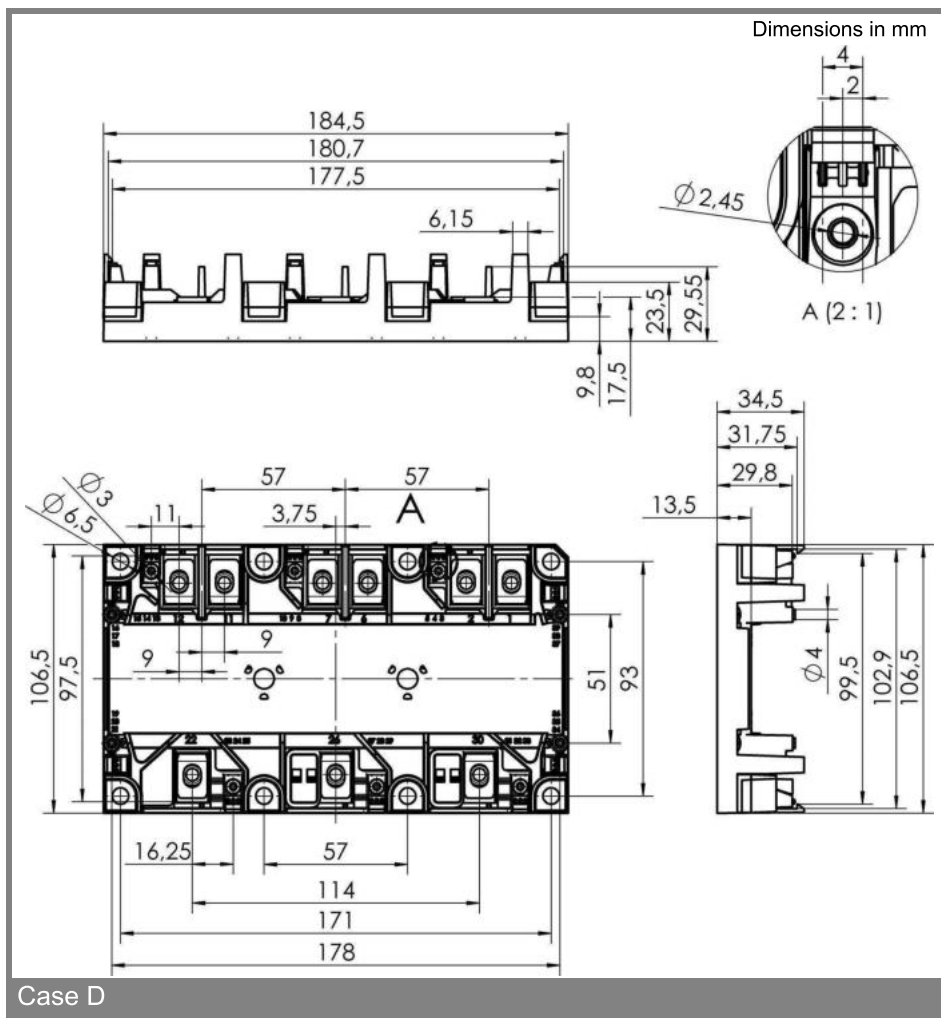
GD

| Absolute Maximum Ratings |                                                    | $T_c = 25\text{ °C}$ , unless otherwise specified |       |
|--------------------------|----------------------------------------------------|---------------------------------------------------|-------|
| Symbol                   | Conditions                                         | Values                                            | Units |
| <b>IGBT</b>              |                                                    |                                                   |       |
| $V_{CES}$                | $T_s = 25\text{ (70) °C}$                          | 1200                                              | V     |
| $I_C$                    | $t_p = 1\text{ ms}$                                | 480 (370)                                         | A     |
| $I_{CRM}$                |                                                    | 900                                               | A     |
| $V_{GES}$                |                                                    | $\pm 20$                                          | V     |
| $T_j$ ( $T_{stg}$ )      |                                                    | - 40 ... + 150 (125)                              | °C    |
| $T_{cop}$                | max. case operating temperature                    | 125                                               | °C    |
| $V_{isol}$               | AC, 1 min.                                         | 2500                                              | V     |
| <b>Inverse diode</b>     |                                                    |                                                   |       |
| $I_F$                    | $T_s = 25\text{ (70) °C}$                          | 450 (340)                                         | A     |
| $I_{FRM}$                | $t_p = 1\text{ ms}$                                | 900                                               | A     |
| $I_{FSM}$                | $t_p = 10\text{ ms}$ ; sin.; $T_j = 150\text{ °C}$ | 3300                                              | A     |

| Characteristics                |                                                                                               | $T_c = 25\text{ °C}$ , unless otherwise specified |           |             |       |
|--------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------|-----------|-------------|-------|
| Symbol                         | Conditions                                                                                    | min.                                              | typ.      | max.        | Units |
| <b>IGBT</b>                    |                                                                                               |                                                   |           |             |       |
| $V_{GE(th)}$                   | $V_{GE} = V_{CE}$ ; $I_C = 18\text{ mA}$                                                      | 4,95                                              | 5,8       | 6,55        | V     |
| $I_{CES}$                      | $V_{GE} = 0$ ; $V_{CE} = V_{CES}$ ; $T_j = 125\text{ °C}$                                     |                                                   |           | 0,6         | mA    |
| $V_{CEO}$                      | $T_j = 25\text{ (125) °C}$                                                                    |                                                   | 1 (0,9)   | 1,2 (1,1)   | V     |
| $r_{CE}$                       | $T_j = 25\text{ (125) °C}$                                                                    |                                                   | 1,6 (2,4) | 2,1 (3)     | mΩ    |
| $V_{CESat}$                    | $I_{Cnom} = 450\text{ A}$ ; $V_{GE} = 15\text{ V}$ ; $T_j = 25\text{ (125) °C}$ on chip level |                                                   | 1,7 (2)   | 2,15 (2,45) | V     |
| $C_{ies}$                      | $V_{GE} = 0$ ; $V_{CE} = 25\text{ V}$ ; $f = 1\text{ MHz}$                                    |                                                   | 35        |             | nF    |
| $C_{oes}$                      | $V_{GE} = 0$ ; $V_{CE} = 25\text{ V}$ ; $f = 1\text{ MHz}$                                    |                                                   | 2,5       |             | nF    |
| $C_{res}$                      | $V_{GE} = 0$ ; $V_{CE} = 25\text{ V}$ ; $f = 1\text{ MHz}$                                    |                                                   | 2,4       |             | nF    |
| $L_{CE}$                       |                                                                                               |                                                   |           | 20          | nH    |
| $R_{CC'+EE'}$                  | resistance, terminal-chip $T_c = 25\text{ (125) °C}$                                          |                                                   | 0,9 (1,1) |             | mΩ    |
| $t_{d(on)}$                    | $V_{CC} = 600\text{ V}$                                                                       |                                                   | 250       |             | ns    |
| $t_r$                          | $I_{Cnom} = 450\text{ A}$                                                                     |                                                   | 55        |             | ns    |
| $t_{d(off)}$                   | $R_{Gon} = R_{Goff} = 3\text{ Ω}$                                                             |                                                   | 800       |             | ns    |
| $t_f$                          | $T_j = 125\text{ °C}$                                                                         |                                                   | 120       |             | ns    |
| $E_{on} (E_{off})$             | $V_{GE} \pm 15\text{ V}$                                                                      |                                                   | 42 (70)   |             | mJ    |
| $E_{on} (E_{off})$             | with SKHI 65; $T_j = 125\text{ °C}$<br>$V_{CC} = 600\text{ V}$ ; $I_C = 450\text{ A}$         |                                                   |           |             | mJ    |
| <b>Inverse diode</b>           |                                                                                               |                                                   |           |             |       |
| $V_F = V_{EC}$                 | $I_{Fnom} = 300\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_j = 25\text{ (125) °C}$                |                                                   | 2 (1,8)   | 2,55 (2,3)  | V     |
| $V_{TO}$                       | $T_j = 25\text{ (125) °C}$                                                                    |                                                   | 1,1       | 1,45 (1,25) | V     |
| $r_T$                          | $T_j = 25\text{ (125) °C}$                                                                    |                                                   | 3,3       | 3,5 (3,5)   | mΩ    |
| $I_{RRM}$                      | $I_F = 450\text{ A}$ ; $T_j = 125\text{ °C}$                                                  |                                                   |           |             | A     |
| $Q_{rr}$                       | $V_{GE} = V$ di/dt = A/μs                                                                     |                                                   |           |             | μC    |
| $E_{rr}$                       | $R_{Gon} = R_{Goff} =$                                                                        |                                                   |           |             | mJ    |
| <b>Thermal characteristics</b> |                                                                                               |                                                   |           |             |       |
| $R_{th(j-s)}$                  | per IGBT                                                                                      |                                                   |           | 0,09        | K/W   |
| $R_{th(j-s)}$                  | per FWD                                                                                       |                                                   |           | 0,125       | K/W   |
| <b>Temperature Sensor</b>      |                                                                                               |                                                   |           |             |       |
| $R_{TS}$                       | $T = 25\text{ (100) °C}$                                                                      |                                                   | 1 (1,67)  |             | kΩ    |
| tolerance                      | $T = 25\text{ (100) °C}$                                                                      |                                                   | 3 (2)     |             | %     |
| <b>Mechanical data</b>         |                                                                                               |                                                   |           |             |       |
| $M_1$                          | to heatsink (M5)                                                                              | 2                                                 |           | 3           | Nm    |
| $M_2$                          | for terminals (M6)                                                                            | 4                                                 |           | 5           | Nm    |
| w                              |                                                                                               |                                                   |           | 460         | g     |







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.