

**SEMITOP®3**

**3-phase bridge rectifier +  
brake chopper + 3-phase  
bridge inverter**  
**SK 20 DGD L 066 ET**

Target Data

## Features

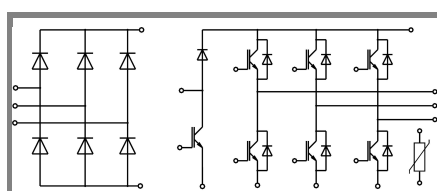
- Compact design
- One screw mounting
- Heat transfer and isolation through direct copper bonded aluminium oxide ceramic (DCB)
- Trench IGBT technology
- CAL technology FWD
- Integrated NTC temperature sensor

## Typical Applications\*

- Inverter up to 6,3 kVA
- Typ. motor power 4 kW

## Remarks

- $V_{CE,sat}$ ,  $V_F$  = chip level value
- SC data:  
 $t_p \leq 6\mu s$ ;  $V_{GE} \leq 15V$ ;  $T_j = 150^\circ C$ ;  $V_{CC} = 360V$
- $V_{isol} = 3000V$  AC, 50Hz, 1s



**DGD L - ET**

| Absolute Maximum Ratings         |                                               | $T_s = 25^\circ C$ , unless otherwise specified |                  |
|----------------------------------|-----------------------------------------------|-------------------------------------------------|------------------|
| Symbol                           | Conditions                                    | Values                                          | Units            |
| <b>IGBT - Inverter, chopper</b>  |                                               |                                                 |                  |
| $V_{CES}$                        |                                               | 600                                             | V                |
| $I_C$                            | $T_s = 25 (70)^\circ C$ , $T_j = 175^\circ C$ | 30 (24)                                         | A                |
| $I_C$                            | $T_s = 25 (70)^\circ C$ , $T_j = 150^\circ C$ | 27 (21)                                         | A                |
| $I_{CRM}$                        | $I_{CRM} = 2 \times I_{Cnom}$ , $t_p = 1$ ms  | 40                                              | A                |
| $V_{GES}$                        |                                               | $\pm 20$                                        | V                |
| $T_j$                            |                                               | -40 ... + 175                                   | $^\circ C$       |
| <b>Diode - Inverter, chopper</b> |                                               |                                                 |                  |
| $I_F$                            | $T_s = 25 (70)^\circ C$ , $T_j = 150^\circ C$ | 27 (20)                                         | A                |
| $I_F$                            | $T_s = 25 (70)^\circ C$ , $T_j = 175^\circ C$ | 31 (24)                                         | A                |
| $I_{FRM}$                        | $I_{FRM} = 2 \times I_{Fnom}$ , $t_p = 1$ ms  | 40                                              | A                |
| <b>Diode - Rectifier</b>         |                                               |                                                 |                  |
| $V_{RRM}$                        |                                               | 800                                             | V                |
| $I_F$                            | $T_s = 70^\circ C$                            | 26                                              | A                |
| $I_{FSM}$                        | $t_p = 10$ ms, sin 180°, $T_j = 25^\circ C$   | 220                                             | A                |
| $i^2t$                           | $t_p = 10$ ms, sin 180°, $T_j = 25^\circ C$   | 240                                             | A <sup>2</sup> s |
| $T_j$                            |                                               | -40 ... + 175                                   | $^\circ C$       |
| $T_{sol}$                        | Terminals, 10 s                               | 260                                             | $^\circ C$       |
| $T_{stg}$                        |                                               | -40 ... + 125                                   | $^\circ C$       |
| $V_{isol}$                       | AC, 1 min.                                    | 2500                                            | V                |

| Characteristics                  |                                                                     | $T_s = 25^\circ C$ , unless otherwise specified |             |             |            |
|----------------------------------|---------------------------------------------------------------------|-------------------------------------------------|-------------|-------------|------------|
| Symbol                           | Conditions                                                          | min.                                            | typ.        | max.        | Units      |
| <b>IGBT - Inverter, chopper</b>  |                                                                     |                                                 |             |             |            |
| $V_{CE(sat)}$                    | $I_{Cnom} = 20$ A, $T_j = 25 (150)^\circ C$                         |                                                 | 1,45 (1,65) | 1,85 (2,05) | V          |
| $V_{GE(th)}$                     | $V_{GE} = V_{CE}$ , $I_C = 0,29$ mA                                 | 5                                               | 5,8         | 6,5         | V          |
| $V_{CE(TO)}$                     | $T_j = 25 (150)^\circ C$                                            |                                                 | 0,9 (0,85)  | 1 (0,9)     | V          |
| $r_{CE}$                         | $T_j = 25 (150)^\circ C$                                            |                                                 | 27,5 (40)   | 37,5 (52,5) | m $\Omega$ |
| $C_{ies}$                        | $V_{CE} = 25$ V, $V_{GE} = 0$ V, $f = 1$ MHz                        |                                                 | 1,1         |             | nF         |
| $C_{oes}$                        | $V_{CE} = 25$ V, $V_{GE} = 0$ V, $f = 1$ MHz                        |                                                 | 0,071       |             | nF         |
| $C_{res}$                        | $V_{CE} = 25$ V, $V_{GE} = 0$ V, $f = 1$ MHz                        |                                                 | 0,32        |             | nF         |
| $R_{th(j-s)}$                    | per IGBT                                                            |                                                 | 1,95        |             | K/W        |
| $t_{d(on)}$                      | under following conditions                                          |                                                 | 16          |             | ns         |
| $t_r$                            | $V_{CC} = 300$ V, $V_{GE} = -7/+15$                                 |                                                 | 15          |             | ns         |
| $t_{d(off)}$                     | $I_{Cnom} = 20$ A, $T_j = 150^\circ C$                              |                                                 | 166         |             | ns         |
| $t_f$                            | $R_{Gon} = R_{Goff} = 15 \Omega$                                    |                                                 | 40          |             | ns         |
| $E_{on} (E_{off})$               | inductive load                                                      |                                                 | 0,3 (0,6)   |             | mJ         |
| <b>Diode - Inverter, chopper</b> |                                                                     |                                                 |             |             |            |
| $V_F = V_{EC}$                   | $I_F = 20$ A, $T_j = 25 (150)^\circ C$                              |                                                 | 1,4 (1,4)   | 1,7 (1,7)   | V          |
| $V_{(TO)}$                       | $T_j = 25 (150)^\circ C$                                            |                                                 | 1 (0,9)     | 1,1 (1)     | V          |
| $r_T$                            | $T_j = 150 ( )^\circ C$                                             |                                                 | 20 (25)     | 30 (35)     | m $\Omega$ |
| $R_{th(j-s)}$                    | per diode                                                           |                                                 | 2,46        |             | K/W        |
| $I_{RRM}$                        | under following conditions                                          |                                                 | 32          |             | A          |
| $Q_{rr}$                         | $I_{Fnom} = 20$ A, $V_R = 300$ V                                    |                                                 | 2           |             | $\mu C$    |
| $E_{rr}$                         | $V_{GE} = 0$ V, $T_j = 150^\circ C$<br>$di_F/dt = -3300$ A/ $\mu s$ |                                                 | 0,2         |             | mJ         |
| <b>Diode rectifier</b>           |                                                                     |                                                 |             |             |            |
| $V_F$                            | $I_{Fnom} = 15$ A, $T_j = 25^\circ C$                               |                                                 | 1,1         |             | V          |
| $V_{(TO)}$                       | $T_j = 150^\circ C$                                                 |                                                 | 0,8         |             | V          |
| $r_T$                            | $T_j = 150^\circ C$                                                 |                                                 | 20          |             | m $\Omega$ |
| $R_{th(j-s)}$                    | per diode                                                           |                                                 | 2,15        |             | K/W        |
| <b>Temperature Sensor</b>        |                                                                     |                                                 |             |             |            |
| $R_{ts}$                         | 5 %, $T_r = 25 (100)^\circ C$                                       |                                                 | 5000(493)   |             | $\Omega$   |
| <b>Mechanical Data</b>           |                                                                     |                                                 |             |             |            |
| w                                |                                                                     |                                                 | 30          |             | g          |
| $M_s$                            | Mounting torque                                                     | 2,25                                            |             | 2,5         | Nm         |

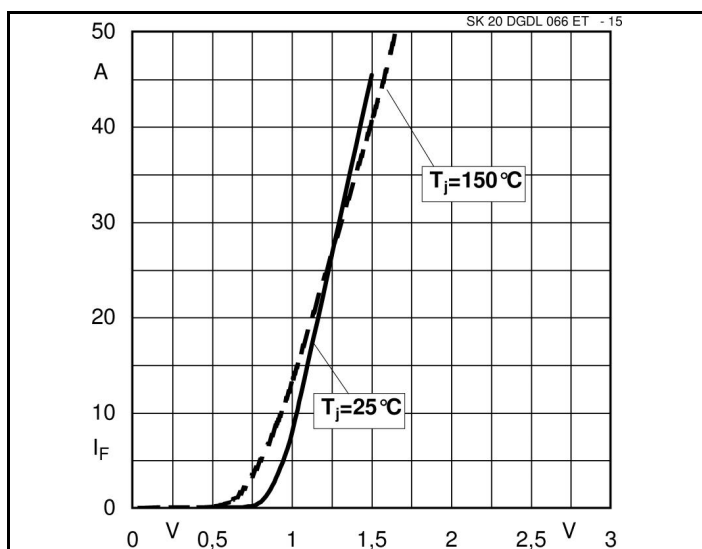


Fig. 15 Input Bridge Diode forward characteristic

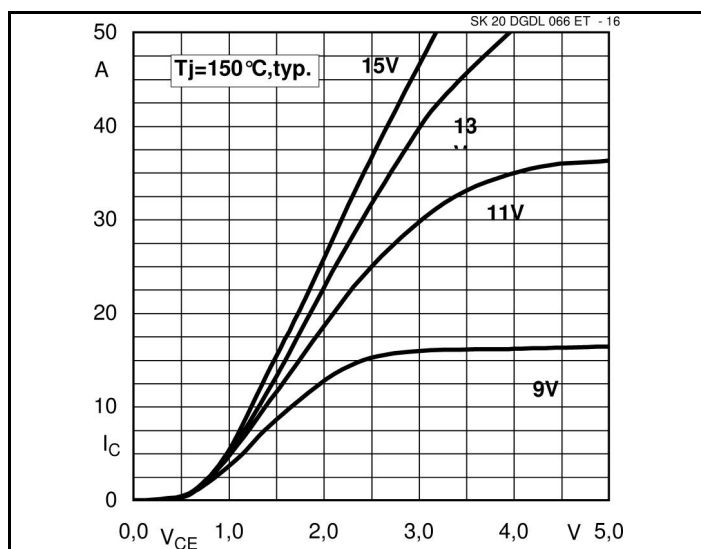


Fig. 16 Typical Output Characteristic

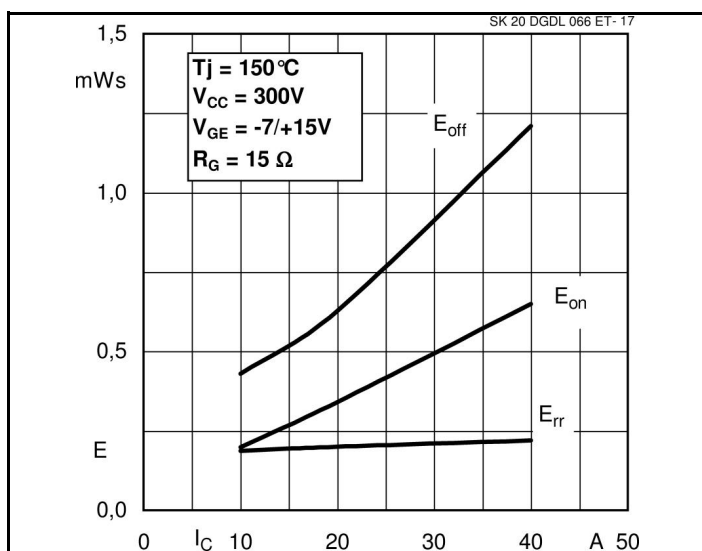


Fig. 17 Turn-on/off energy =  $f(I_C)$

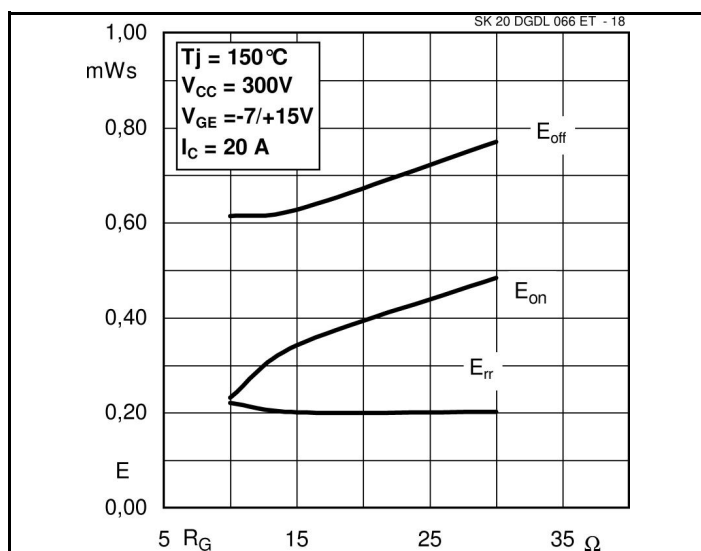


Fig. 18 Turn-on/off energy =  $f(R_G)$

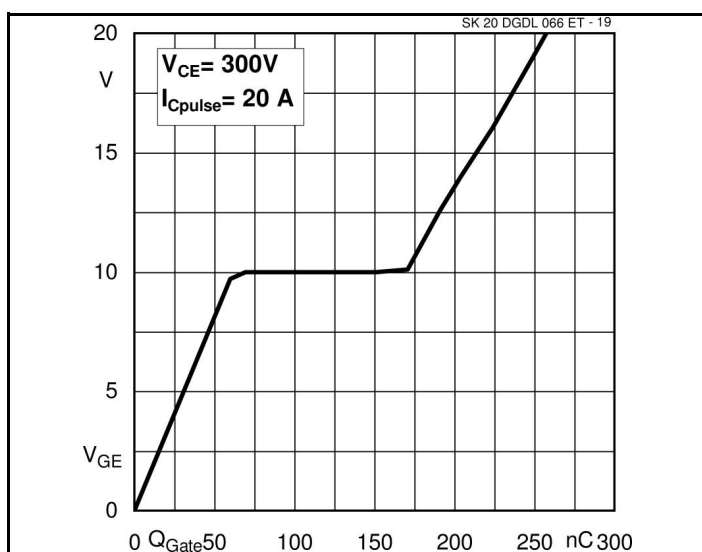
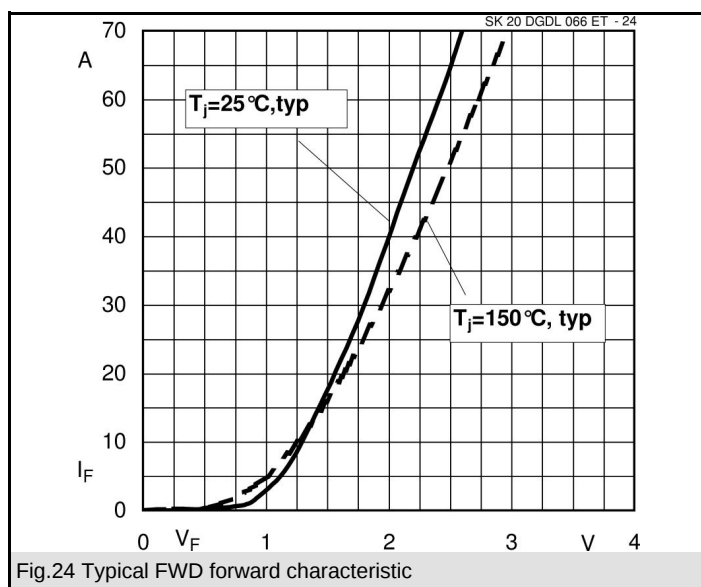
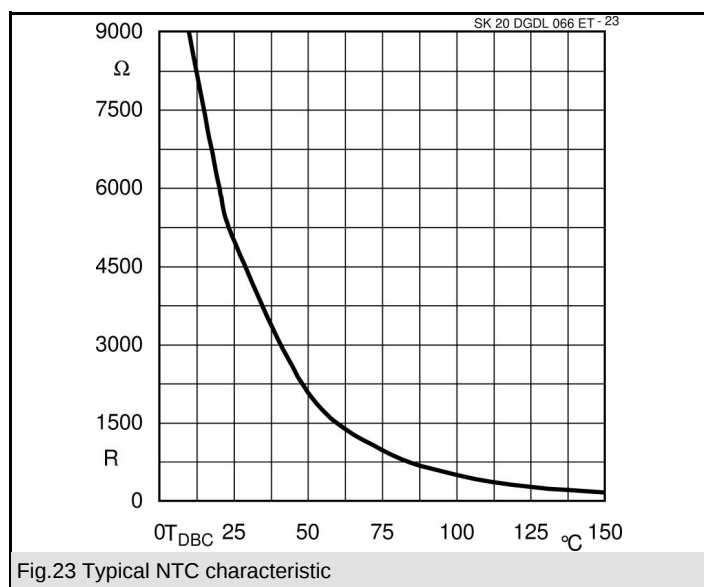
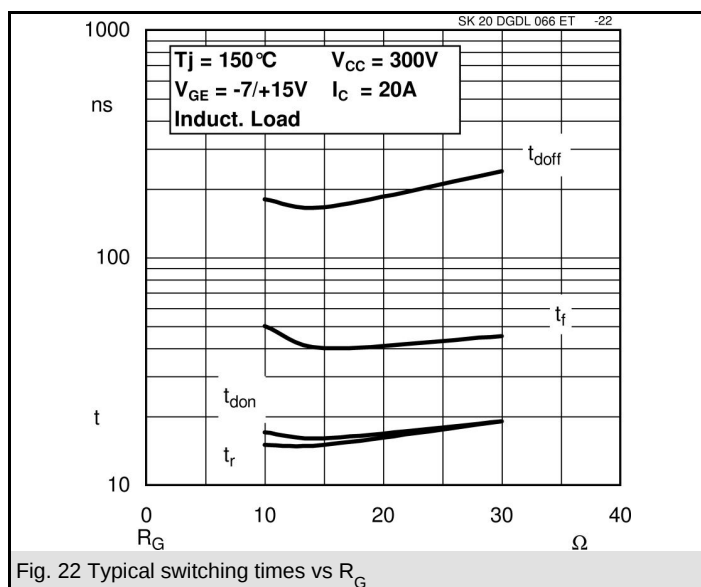
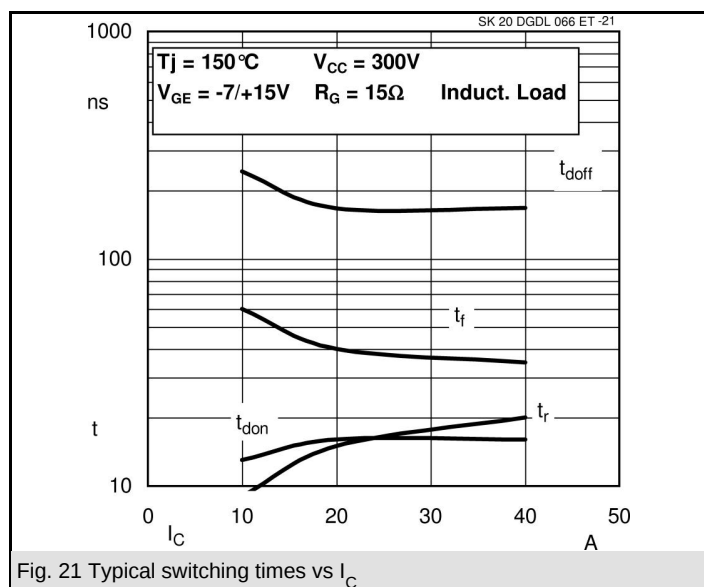
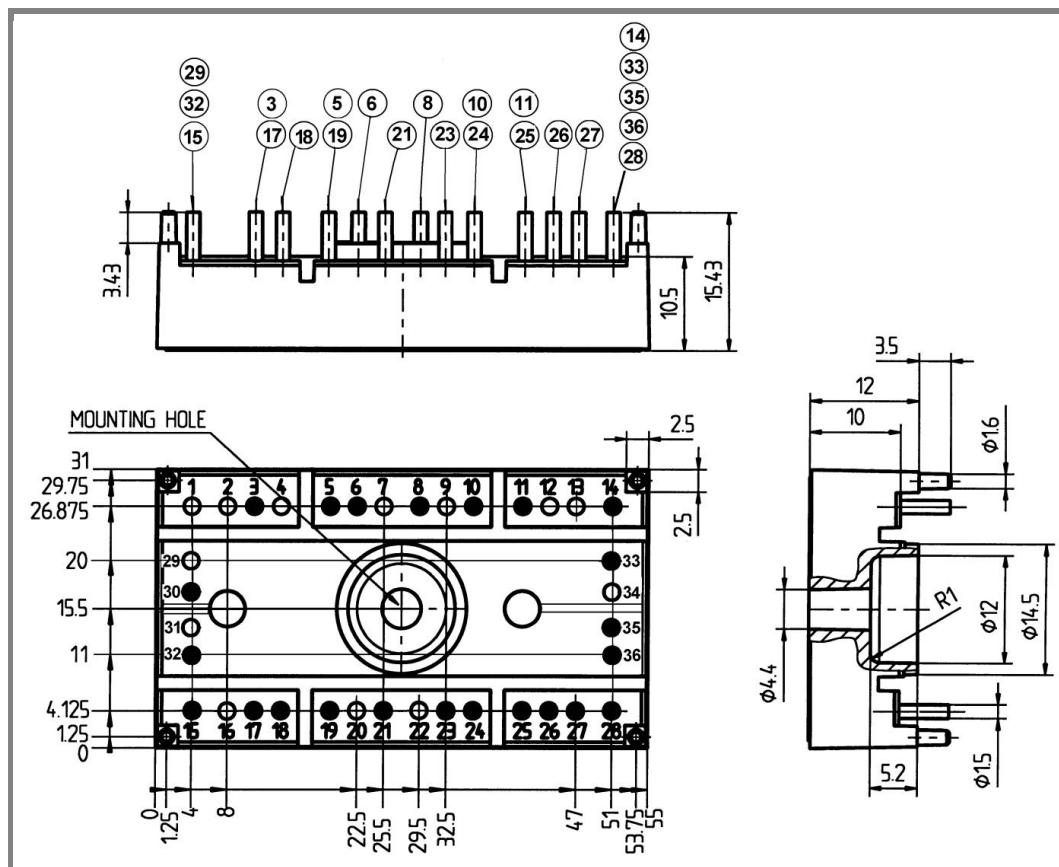
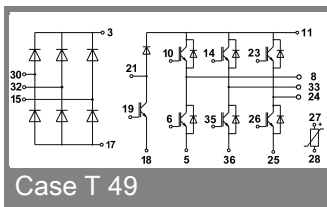


Fig. 19 Typical gate charge characteristic





Case T 49 (Suggested hole diameter, in the PCB, for solder pins and plastic mounting pins: 2mm)

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.